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MCDONALDS MD, HAVERHILL Phase 2 Geo-Environmental Assessment

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MCDONALDS MD, HAVERHILL

Phase 2 Geo-Environmental Assessment

Contents

- 1.0 Introduction
- 2.0 Site Location and Description
- 3.0 Environmental Setting
- 4.0 Review of Existing Information
- 5.0 Ground Investigation
- 6.0 Ground Conditions
- 7.0 Contamination Assessment
- 8.0 Geotechnical Appraisal
- 9.0 Infiltration Assessment
- 10.0 Conclusions & Recommendations
- 11.0 References

Figures

- 1.1 Proposed Development Plan View
- 2.1 Site Location Plan
- 2.2 Site Layout

Tables

- 6.1 Summary of Made Ground Geotechnical Test Results
- 6.2 Summary of Lowestoft Formation Geotechnical Test Results
- 7.1 Updated Conceptual Site Model
- 8.1 Geotechnical design parameters
- 8.2 Summary of shallow foundation design options
- 8.3 In situ and Laboratory DCP Results
- 9.1 Summary of infiltration test results

Appendices

- A Exploratory Hole Location Plan
- B Exploratory Hole Logs
- C Chemical Laboratory Test Certificates & Comparison Against SSAC
- D Geotechnical Laboratory Test Certificates
- E Geotechnical Plots
- F Ground Gas Monitoring
- G Dynamic Cone Penetration Results
- H Infiltration Test Data Sheets

Registration of Amendments

Revision and Date	Amendment Details	Revision Prepared By	Revision Approved By

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:

Geo-Environmental Site Investigation

- 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 enduse. 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 Nvalues 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-	1	102kp2
stage Triaxial	1 1	IUSKPa
рН	6	7.6 – 8.3
SO4	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 Table6.2, 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	$(N_1)_{60} = 46 \text{ to } (N_1)_{60} = r$	refusal)		
Corrected SPT N ₆₀ -Values	14	$N_{60} = 10$ to $N_{60} = 48$	Range	Cu	
	3	Cobbles (>60mm)	0%		
Particle Size Distribution (PSD)		Gravel (2mm-60mm)	0% – 5%	6*	
		Sand (0.06mm-2mm)	58% - 80%	0	
		Silt & Clay (<0.06mm)	19% – 42%		

 Table 6.2 Summary of Lowestoft Formation Geotechnical Test Results

 *All tests were unable to establish a Cu 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'.

<u>Groundwater</u>

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:</p>
 - Methane (CH₄) recorded at concentrations between 0.0% and 6.7% by volume;
 - Carbon dioxide (CO₂) recorded at concentrations between 0.5% and 9.7% by volume;
 - Oxygen (O₂) 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 (0.2I/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.</p>

- 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
		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
	Asbestos, Metals,	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.	-
Reworked	PAHs	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.	-
Made Ground Ground gas (methane and carbon dioxide)	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.	-	
	Possible lateral migration of ground gas contaminants onto Site and inhalation of harmful (asphyxiant) ground gases or	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	
	carbon dioxide) accumulation of explosive gases.	Construction, demolition and ground workers	Unlikely	Mild	Low	No action necessary.	-	
Off Cite	Metals, petroleum hydrocarbons and	Metals, petroleum hydrocarbons and	Future Site occupants	Low Likelihood	Mild	Low	No action necessary	-
Off-Site polyaromatic sources hydrocarbons (historical/	polyaromatic hydrocarbons	Permeation of organic compounds through water supply pipes	Construction/ground workers	Low Likelihood	Mild	Low		-
current industrial land uses) (carbon dioxide and methane)	Ground gas	Asphyxiation or explosion related to ground gas	Future Site occupants	Low Likelihood	Mild	Low	No off-site sources of ground gas identified	-
	(carbon dioxidepresent underground from made ground andand methane)natural sources (degradation of Chalk)Co		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:

Matarial	Depth to base	Thickness	Ŷ	lp	Design	Φ	c'
Iviaterial	(m bgl)	(m)	(kN/m³)	(%)	N-value	(°)	(kN/m²)
Made Ground / fill	3.50	3.5	20.4	8	N ₆₀ =11	8	60
Lowestoft		>2.0	20 E	17	N ₆₀ =17 to	o	110
Loweston	>0.50	>3.0	20.5	17	N ₆₀ =45	0	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:

$$q_a = c.N_c + \sigma_0.N_q + \frac{1}{2}.B.y.N_{\gamma}$$

where:

$$\begin{split} N_c, N_q & \text{and } N_Y \text{ are bearing capacity factors} \\ s_c, s_q & \text{and } s_Y \text{ are shape factors} \\ c' & \text{ is the cohesive strength of the soil } (kN/m^2) \\ B & \text{ is the width of the foundation } (m) \\ \Upsilon & \text{ is the unit weight of the soil } (kN/m^3) \\ \sigma_0 & \text{ is the overburden pressure} \end{split}$$

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	Foundation Width	Allowable Bearing Capacity
(m)	(m)	(kN/m²)
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:

	Laborator (0.50	Laboratory Test Result (0.50 – 1.00)		DCP Test Result (0.10-1.00m)	
DCP Location	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 SO₄ 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/m².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



ORIGINAL SHEET SIZE - A1 Portrait

DO NOT SCALE
APPENDIX B

EXPLORATORY HOLE LOGS

KEY SHEET

SAMPLING

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

TESTING

N= <i>x</i>	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



Borehole Log

BH01

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Well	Strike s	Depth (m)	Туре	Results	(m)	(m)	Legend		Stra	itum De	scription		
		1.00 2.00 3.00 4.00	SPT SPT SPT	N=14 (2,2/2,3,3,6) N=11 (5,3/2,2,3,4) N=18 (3,3/3,5,5,5) N=22 (2,3/4,6,6,6)	1.10 1.40 1.90 3.20 3.45 3.70 4.45	75.41 75.11 74.61 73.31 73.06 72.81 72.06		Firm brow clay. Grav. subround GROUNE Firm brow is fine to r and chalk Stiff grey medium s Firm brow clay. Grav subround 2.20m - Banc 2.88m - Banc Firm dark medium s Firm eartl sitt. Grave subround Firm buff- Gravel is chalk and	In grey blave ed flint an o n slightly medium si . MADE C white slig ubrounde of fine to n d of fine to n d of fine to n d of fine to n d of fine to n brown gra brown wh flint LOV End c	gravelly gravelly d chalk. gravelly ubanguid BROUNL ack sligh to mediu and flint. nedium cli ey slity of coarse slightly g coarse slightly g coarse slightly g coarse slightly g coarse slightly g coarse slightly g	tly gravelly silg m subangular Locally very so silghtly silty cl ar to subround b. elly silt. Gravel MADE GROU mker gravel. inker gravel.	htly sitty to oft. MADE ay. Gravel ed flint lis fine to ND. velly sitty to ND. clayey ND. clayey ND. shounded N.	1 - 2 - 3 - 4 - 5 -
	Depth Base	Borehole Diameter	Diameter	Denth	Casing Dia	ameter Diam	leter	Depth	Τορ	Ch	iselling	Duration	
	op in buse			- Depti		5.an		сери	- F			burullo	
Rem 1. WS 2. No 3. Exp	arks 5102 ha ground plorator	lted at 4.45m water encour y hole backfil	i, target ntered. led with	depth. arisings to su	rface.							AG	S

					E	Bor	eho	ole	Lo	3	WS1	03
									FF07 0		Sheet 1 Hole Ty	of 1 /pe
Projec	ct: Mo	Donalds MD		Pro	ject No:	P22-2590)	Co-ords:	E5676	34.87 N244280.80	WS	·
Locati	ion: Ha	verhill						Level:	76.52n	n aOD	Scale 1:40	Э 1
Client	:: Mo	Donald's Re	staurant	s Ltd				Date:	28/04/2	2022	Logge AW	d
Well	Water Strike	Sample a	Ind In S	itu Testing Results	Depth (m)	Level (m)	Legend		Stra	atum Description		
	5	2.00 3.00	SPT SPT SPT	N=12 (2,2/3,3,3,3) N=12 (2,2/2,3,3,4) N=19 (2,3/4,4,5,6)	2.10	74.42		Firm to subroun GROUN	wn grey bl ivel is fine ded chalk a D. tiff buff-brc avel is fine ded chalk a ded chalk a h-brown sl ded fiint <u>gr</u> End c	ack slightly slightly grav to medium subangular and flint. Locally soft. M its medium subangular to medium subangular and flint. MADE GROUI ightly clayey silt. Trace avel. MADE GROUND. if Borehole at 3.45m	relly silty to ADE	
	Depth Base	Borehole Diameter	Diameter	Depti	Casing Di Base	iameter Dian	neter	Dept	h Top	Chiselling Depth Base	Duration	
Rema 1. WS 2. No 3. Exp	arks 3103 ha ground blorator	Ited at 3.45m water encour y hole backfil	, target ntered. led with	depth. arisings to su	rface.						AG	S

											Borehole	e No.
			LTD		I	Bor	eho	ole	Log		WS1	04
Projec	:t: Mo	Donalds MD			Project No:	P22-2590)	Co-ords:	E567641.	17 N244283.36	Hole Ty	of 1 /pe
Locati	on: Ha	verhill						Level:	76.52m a	OD	Scale	e
Client	: Mo	Donald's Res	staurants	Ltd				Date:	28/04/202	22	Logge	ed
	Water	Sample a	nd In Sit	u Testino	Denth	Level					AW	
Well	Strike s	Depth (m)	Туре	Results	(m)	(m)	Legend		Stratu	n Description		
		1.00 2.00 3.00 4.00	SPT SPT SPT	N=10 (1,2/2,2,3,3 N=16 (3,2/3,4,4,5 N=15 (2,2/2,3,4,6 N=33 (3,4/7,8,9,5)))) 3.15 3.50)) 4.45	73.37 73.02 72.07		Soft brow Gravel Is fint. With clay. MAI	n grey slight fine to medic DE GROUND E GROUND Fine to medic chaik. MADE brown slight fine to medic chaik. MADE LOWESTOF	y gravelly slightly si m subangular to su ery soft black organ	Ity clay. brounded ic sility	
Rema	Depth Base	Sorehole Diameter	Nameter	onth	Casing I Casing I	Diameter Diam	heter	Depth	Тор	ChiseIling Depth Base	Duration	5
2. No 3. Exp	ground lorator	water encour y hole backfil	itered. led with a	arisings to	surface.						AG	S

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			e LTD		E	Bor	eho	ole	Log	9	WS1	05
Proje	ct: Mo	Donalds MD		Pro	oject No: I	P22-2590	0	Co-ords:	E5676	29.79 N244271.77	Sheet 1 Hole Ty	of 1 ype
Locat	ion: Ha	verhill						Level:	76.52n	n aOD	Scal	e
Client	: Mo	Donald's Re:	staurant	s Ltd				Date:	28/04/2	2022	Logge	ed
Well	Water	Sample a	and In Si	tu Testing	Depth	Level	Legend		Stra	tum Description	Avv	
	Strike S	Depth (m) 1.00 2.00 3.00	Type SPT SPT SPT	Results (2,2/2,3,3,3) (4,4/3,4,4,4) (5,3/5,5,6,6)	(m) 0.80 2.85 3.35 3.45	(m) 75.72 73.67 73.17 73.07	Legend	Firm bro clay. Gra subroun With poor MADE C Firm bro to mediu flint. MA	y slightly c th-brown s End c	tum Description hite slightly gravelly sla to medium subaugula to medium subaugula to medium subaugula inte gravelly clay. Grav lite gravelly clay. Gravelly clay. Gravelly lite gravelly clay. Gravelly clay. Gravelly lite gravelly clay. Gravelly clay. Gravelly lite gravelly clay. MADE GROU lite gravelly clay. Gravelly clay. Gravelly lite gravelly clay. MADE GROU lite gravelly clay. Gravelly clay. Gravelly lite gravelly clay. MADE GROU lite gravelly clay. Gravelly clay. Gravelly clay. Gravelly lite gravelly clay. MADE GROU lite gravelly clay. Gra	ightly silty to oble. y clay. el is fine alk and m angular ND.	
	Depth Base		Diameter	Dept	h Base	Dian	neter	Dept	h Top	Depth Base	Duration	1
Rema 1. WS 2. No 3. Exp	arks 5105 ha ground plorator	lted at 3.45m water encour y hole backfil	i, target ntered. Ied with	depth. arisings to su	Irface.						AG	S

					E	Bor	eho	ole	Lo)	WS1	06
											Sheet 1	of 1
Projec	st: Mo	Donalds MD		Pro	ject No: 1	P22-2590	C	Co-ords:	E5676	20.90 N244269.39	Hole Ty WS	ype
Locat	on: Ha	verhill						Level:	76.50n	n aOD	Scal	e
											1:40 Logge) ed
Client	: Mo	Donald's Re	staurant	s Ltd				Date:	28/04/2	2022	AW	
Well	Water Strike	Sample a	Ind In S	itu Testing	Depth (m)	Level	Legend		Stra	tum Description		
	S	Depth (m) 1.00 2.00 3.00	Type SPT SPT	N=12 (2,2/2,3,3,4) (3,3/3,3,3,4) N=23 (7,6/5,5,6,7)	 (m) 1.15 2.70 2.95 3.40 3.45 	(m) 75.35 73.80 73.55 73.10 73.05		Firm gre clay. Grs subroun MADE C Firm brc Gravel is flint and GROUN Firm buf GROUN Firm buf Gravel is chalk an 3.25m - 3.2 Stiff cree Gravel is chalk an	y-brown w avel is fine ded chalk t SROUND. wm white g s fine to me chalk. Trac D. k brown gr lar flint gra f-brown wf s fine to me chalk. Trac D. k brown gr lar flint gra f-brown wf s fine to me d flint. LOV 5m-3.30m € End c	ey sild trace medium ite slightly silty gravell int and brick. Locally s int and brick. Locally s int and brick. Locally s e black organic materi idium subangular to su e black organic materi ey silt. Trace medium vel. MADE GROUND. ite slightly silty gravelly S soft. white slightly gravelly S wtestoft FORMATIO soft.	ghtly silty to oft. y clay. brounded al. MADE //CLAY. brounded N.	
		Borehole Diameter			Casing Di	ameter	<u> </u>			Chiselling		
	Depth Base		Diameter	Dept	h Base	Dian	neter	Dept	h Top	Depth Base	Duration	
Rema 1. WS 2. No 3. Exp	arks 106 ha ground olorator	lted at 3.45m water encour y hole backfil	, target ntered. led with	depth. arisings to su	rface.			1			AG	S

					E	Bor	eho	ole	Lo	9	WS1	07
											Sheet 1	of 1
Projec	st: Mo	Donalds MD		Pro	ject No:	P22-2590	0	Co-ords:	E5676	16.36 N244256.90	WS	/pc
Locati	on: Ha	verhill						Level:	76.49n	n aOD	Scale 1.40	e
Client	Mc	Donald's Res	stauran	is Itd				Date:	28/04/	2022	Logge	ed
	Water	0						Dute.	20/04/		AW	
Well	Strike	Sample a	Ind In S	Results	Depth (m)	Level (m)	Legend		Stra	atum Description		
		1.00 2.00 3.00	SPT SPT	N=11 (2,2/2,3,3,3) N=24 (3,4/5,6,6,7) N=25 (4,4/5,6,7,7)	2.00 2.40 3.45	74.49 74.09 73.04		Firm dar MADE C	k brown si ROUND.	avelly clayey silt. Trace r to subrounded flint an of subrounded substance r to subrounded substance sk organic silty clay. MA earm and white gravelly o medium subangular to and flint. Trace sandsto WADE GROUND.	fine to d chalk.	
	Depth Base	Borehole Diameter	Diameter	Dept	Casing D n Base	iameter Diar	neter	Dept	h Top	Chiselling Depth Base	Duration	
Rema 1. WS 2. No 3. Exp	arks 107 ha ground lorator	lted at 3.45m water encour y hole backfil	, target ntered. led with	depth. arisings to su	rface.			<u> </u>			AG	S

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Borehole Log

												Sheet 1	of 1
Project	:: Mo	Donalds MD		Pi	oject No:	P22-2590	D	Co-ords:	E56762	25.19 N	244259.80	Hole T	уре :
Locatio	on: Ha	verhill						Level:	76.49m	aOD		Scal 1:40	e)
Client:	Mo	Donald's Re	staura	nts Ltd				Date:	28/04/2	022		Logge	ed '
Well S	Nater Strike	Sample a	and In	Situ Testing	Depth	Level	Legend		Stra	tum Des	cription	1	
	Strike	2.00	SPT SPT	N=6 (1,1/1,1,2, N=6 (1,1/1,1,2, (3,3/4,4,4,5) N=24 (4,4/5,6,6,7)	(m) 0.90 1.50 1.80 2.15 2.45 3.45	 Level (m) 75.59 74.99 74.69 74.34 74.04 73.04 	Legend	Firm brov subangui Orange s Soft brow to mediuu MADE G Very soft Gravel is GROUNI Stiff grey Gravel is Chalk and Stiff buff- Gravel is chalk and	Stra wn grey sill lar to subro stained in p wn slightly of m subroun ROUND. grey black fine to me ROUND. white slightly of the to me ROUND. brown clained the to me of the to me comparison of the to me the to me	tum Des ty clay, Tri- punded ch aart. MADI gravelly si ded to rou a slightly g dium sub- htty gravel. MJ te slightly dium sub- t/ESTOFT f Borehole	cription ace fine to m lalk and fint E GROUND. Ity clay, Grav unded chalk ravelly silty counded chalk ravelly silty counded fint race fine sut ADE GROUN gravelly clay angular to su FORMATIO at 3.45m	edium gravel. ravel. ilay. k. MADE y clay. and brick. y clay. and brick. oangular iD. ey SILT. brounded N.	
		Borehole Diameter		 	Casing	Diameter				Chie	elling		-
De	epth Base		Diameter	Dep	th Base	Diar	neter	Depth	т Тор	Dep	th Base	Duration	1
Remai 1. WS1 2. No g 3. Expl	rks I08 ha jround orator	lted at 3.45m water encour y hole backfil	i, targe ntered led wit	et depth. th arisings to s	urface.	<u> </u>		1				AG	S

	_									Borehol	e No.
Cor				E	Bor	eho	ole I	Log		WS1	09
							1			Sheet 1 Hole T	of 1
Project:	McDonalds MD		Proj	ect No: F	P22-2590)	Co-ords:	E567632.8	4 N244262.64	WS	5
Location:	Haverhill						Level:	76.50m aC	D	Scal 1:40	le D
Client:	McDonald's Re	stauran	ts Ltd				Date:	28/04/2022	!	Logg	ed /
Wat	er Sample a	nd In S	Situ Testing	Depth	Level	Logond		Stratum	Description		
s s	Depth (m)	Туре	Results	(m)	(m)	Legenu		Stratum	Description		
	1.00	SPT I	N=5 (1,1/1,1,1,2) N=13 (3,3/3,3,3,4) N=20 (3,3/4,5,5,6)	1.10 2.10 2.40 2.95 3.45	75.40 74.40 74.10 73.55 73.05		Firm grey fine to me chalk gra	to soft brown signi vel. MADE GR to soft brown side edium subangu MADE GROUI win grey black s vel is fine to m set is fine to m set fiint and ch hy brown silty win white grave subangular to s cally soft. LOW End of Bo	Illy drawelly sill illy clay. Gravell is fi ulty clay. Gravell is fi ulty clay. Gravel is fi ulty clay	Gravel is flint and Gravel is chalk ity ND. IND.	
	Borehole Diametor			Casing Di-	ameter		<u> </u>		Chiselling		
Depth I	Base I	Diameter	Depth	Base	Diam	leter	Depth	1 Тор	Depth Base	Duratio	n
Remarks 1. WS109 2. No grou 3. Explora	halted at 3.45m indwater encour tory hole backfil	, target ntered. led with	depth. arisings to sur	face.			I			AG	ı S

CONST				E	Bor	eho	ole	Lo	9	WS1	10
					200.050			F 6 7 0	40.40. NO.44005.00	Sheet 1 Hole T	of 1 ype
Project: M	CDonaids MD		Proj	ect No: H	-22-2590)	Co-oras:	E5676	40.10 N244265.22	ws	
Location: Ha	averhill						Level:	76.52n	n aOD	5cal 1:40	e)
Client: M	cDonald's Re	staurar	nts Ltd				Date:	28/04/2	2022	Logge AW	ed
Water Well Strike	Sample a	ind In S	Situ Testing	Depth (m)	Level (m)	Legend		Stra	atum Description		
Well Strike	Sample a Depth (m) 1.00 2.00 3.00	SPT SPT	N=8 (1,1/1,1,2,4) N=8 (1,1/1,1,2,4) N=14 (7,5/5,3,3,3) N=19 (2,3/4,5,5,5)	Depth (m) 0.45 2.20 2.70 3.20 3.45	Level (m) 76.07 74.32 73.82 73.82 73.07		Brown s subrour clay. Gr. subrour GROUN Brown s subrour Soft to f medium MADE (2.75m - 2.7 green on th Soft to f Gravel i LOWES	Stra iit. Trace fii ded flint gr 	Atum Description The to medium subangu avel. MADE GROUND Thile slightly gravelly slightly gravelly slightly gravelly slightly gravelly slightly soft. MADE The to medium subangular The to medium subangu avel. MADE GROUND The slightly clay. Trace fin the subrounded flint gr slightly clay. Trace flint gr slightly gravelly slit Slit Slightly gravelly slit Slit Slightly gravelly slit Slit Slit Slightly gravelly slit Slit Slit Slit Slit Slit Slit Slit S	lar to	
Depth Bass Remarks 1. WS110 hz 2. No ground	Borehole Diameter	Diameter , target	Depth.	Casing Dia Base	ameter Dian	neter	Dep	:h Top	Chiselling Depth Base	Duration	

					E	Bor	eho	ole	Log	I	WS1	11
											Sheet 1 Hole Ty	of 1 /pe
Proje	ct: Mo	Donalds MD		Proj	ect No: 1	22-2590)	Co-ords:	E56762	4.52 N244263.35	ws	
Locat	ion: Ha	verhill						Level:	76.24m	aOD	Scale 1:40	9 1
Client	:: Mo	Donald's Re	staurai	nts Ltd				Date:	28/04/20	022	Logge	ed
Well	Water Strike	Sample a	nd In	Situ Testing	Depth	Level	Legend		Strat	um Description		
	5	Depth (m)	SPT	Results N=5 (1,1/1,1,1,2) (3,4/4,5,5,6)	2.30 2.70 3.00	(m) 73.94 73.54 73.24		Firm bro clay. Grs subroun black org Firm dar subangu <u>GROUN</u> 250m -25 Firm ora Gravel is flint. MA	wn black wh ivel is fine to ded chalk ar janic silty cl k brown clat lar to subro D. m € Jayer of nge brown s fine to mec DE GROUN End of	yey silt. Trace fine to n unded flint. With pocets of ay. MADE GROUND.	antipation of the second secon	
	Depth Base	Borehole Diameter	Diameter	Depth	Casing Di Base	ameter Dian	neter	Dept	h Top	Chiselling Depth Base	Duration	
Rema 1. WS 2. No 3. Exp	arks 3111 ha ground blorator	Ited at 3.00m water encour y hole backfil	, targe ntered. led wit	depth.	face.						AG	S



Trial Pit I on

									Sheet 1 c
ojec	t: Mc	Donalds MD		F	Project No: F	P22-2590		Co-ords: E567615.87 N244292.90) Date
ooti		(orbill						Dimensions (m): 0.30	29/03/20 Scale
call		/emm						Depth: 8	1:10
ient:	Mc	Donald's Rest	aurants	Ltd				1.00	
/ell	Water	Sample a	ind In Si	itu Testing	Depth	Level	Legend	Stratum Description	
	Strikes	Depth (m)	Туре	Results	(m)	(m)		Soft becoming firm brown grev to grev sli	ohtly sandy
					0.15	76.53		Soft becoming firm brown grey to grey slig gravelly clay. Gravel is angular to subrour coarse flint and chalk. With rootlets. MAD Firm becoming firm to stiff grey brown slit clay. Gravel is subangular to subrounded chalk and subangular fine to coarse flint. occasional fragments of brick and organic MADE GROUND. End of Trial Pit at 1.00m	ghtly sandy need fine to E GROUND. y gravelly fine to coarse With c material.
ma	ırks							<u> </u>	

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Trial Pit Log

Trial Pit No.

TP02

	CONSU	ITTING ENGINEERS							Ŭ		01	-6.4
Proje	ct: Mc	Donalds MD			Project	No:	P22-2590		Co-ords: E56759 Level: 76.52m	2.92 N244302.07 AoD	Sheet 1 Date 29/03/20	of 1 e 022
Locat	ion [.] Ha	verhill							Dimensions (m):	0.30	Scale	е
Loout									Depth: සි		1:10)
Client	:: Mo	Donald's Res	staurants	s Ltd					1.00		TB	ea
Well	Water Strikes	Sample	and In S	Situ Testing	g C	Depth (m)	Level (m)	Legend	Stra	tum Description	1	
		Deptil (III)	Type	Result	5	. ,			Soft becoming firm b	rown grey to grey slightly	y sandy	
						0.10	76.52		gravelly clay. Gravel coarse flint and chalk	.s angular to subrounded With rootlets. MADE G	d fine to ROUND.	
									clay. Gravel is suban chalk and subangula	gular to subrounded fine r fine to coarse flint. MAI	to coarse DE	-
									GROUND.			-
		0.30	ES									
		0.30										
												-
												-
												-
												-
												-
												-
												-
						1.00	76.42			of Trial Dit at 1 00m		1 -
									End	of Thai Pit at 1.00m		-
												-
												-
												-
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												-
												2 -
Darr												
1. TP	arks 02 halteo	d at 1.00m. Ta	arget dei	oth								_
2. No 3. Tria	groundv al pit bac	vater encount kfilled with ar	ered isings to	surface								
											nuu	2

create
CONSULTING ENGINEERS LTD

Trial Pit Log

rejecti McDerecki MD		oloot No.	222.0500		Co-ords: E567616.12 N244308.46	Date
oject: McDonalds MD	Pr	oject No: F	-22-2590		Level: 76.51m AoD	29/03/20
cation: Haverhill					Dimensions (m): 0.30	Scale 1:10
ent: McDonald's Restaura	ants I td				Depth: $\overset{\odot}{_{1\ 00}}$	Logged
						TB
ell Water Sample and Strikes Depth (m) Type	n Situ Testing	Depth (m)	Level (m)	Legend	Stratum Description	
		0.10	76.51		Soft becoming firm brown grey to grey slig gravelly clay. Gravel is angular to subroun coarse flint and chalk. With rootlets. MADE Firm becoming firm to stiff grey brown silty	htly sandy ded fine to E GROUND. gravelly
0.20 Es	s				clay. Gravel is subangular to subrounded I chalk and subangular fine to coarse flint. V occasional fragments of brick. MADE GRC	îne to coarse Vith OUND.
		1.00	76.41		End of Trial Pit at 1.00m	

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Trial Dit Log

	CONSUL	LITING EINGINEERS							-		Sheet 1	<u>of 1</u>
Project	: Mc[Donalds MD		F	Project No: F	P22-2590		Co-ords: E Level: 7 Dimensions ()	567666.76 75.80m AoD	N244309.71	Date 29/03/2 Scale	e 022 e
ocatio	n: Hav	verhill						Depth:			1:10)
lient:	Mc	Donald's Res	taurants	Ltd				1.00	0		Logge TB	ed
Vell	Water	Sample	and In Si	tu Testing	Depth	Level	Legend		Stratum E	Description		
/Vell s	Water Strikes	Sample a Depth (m) 0.40	ES	tu Testing Results	Depth (m) 0.05	Level (m) 75.80	Legend	Soft becomin gravelly clay. coarse flint au Firm becomir clay. Gravel is chalk and sul fragments of	Stratum E g firm brown g Gravel is ang ind chalk. With s subangular to bangular fine to brick. MADE C	Description rey to grey slight ular to subrounder rootlets. MADE C grey brown silty gr o subrounded find o coarse flint. Wit SROUND. Pit at 1.00m	ly sandy d fine to <u>SROUND.</u> ravelly e to coarse h rare	
emar TP04	rks 4 halted hed gro	at 1.00m. Ta undwater at	rget dept 0.80m, ris	th sing to 0.10	m in 24 hours							2

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CONSU		NEERS LTD

Trial Dit Log

Level: 76.54m AoD 2003/000 cation: Haverhill Dimensions (m): 1.50 ent: McDonald's Restaurants Ltd Dimensions (m): 1.50 ent: McDonald's Restaurants Ltd Doph: 6 ent: McDonald's Restaurants Ltd Doph: 6 ent: McDonald's Restaurants Ltd Doph: 6 ent: McDonald's Restaurants Ltd 0.05 76.54 ent: 0.05 76.54 Soft brown grey slightly sandy gravely clay. Gravel is an anglate to subrounded fine to coarse that with occasional subrounded fine to coarse that subrounded fine to coarse that with occasional subround		Donalda MD			Nont No.			Co-ords: E567643.46 N244270.61	Date)
cation: Haveshill Dimensions (m): 1.50 Scale Depth: g g 1.10 Logent ell Water Sample and in Situ Testing Depth: g g ell Water Depth (m) Type Results Depth g off Depth (m) Type Results Depth Level (m) Legend Stratum Description	ioject: MC	Donalds MD		Pro	oject No: F	-22-2590		Level: 76.54m AoD	29/03/2	022
ent: McDonald's Restaurants Ltd ent McDonald's Restaurants ent McDonald'	ocation: Ha	verhill						Dimensions (m): 1.50	Scale 1:10	е)
Weiter Sample and In Situ Testing Depth (m) Level Legend Stratum Description Image: Strikes Depth (m) Type Results 0.05 76.54 Soft brown grey slightly sandy gravibly clay. Gravel is angular to suborunded fine to coarse fint. MADE GROUND. Image: Strikes Image: Strikes Soft brown grey slightly sandy gravibly clay. Gravel is angular to suborunded fine to coarse fint. MADE GROUND. Soft brown grey slightly sandy gravely clay. Gravel is angular to suborunded fine to coarse fint. MADE GROUND. Image: Strikes Image: Strikes Soft brown grey slightly sandy gravely clay. Gravel is angular to suborunded fine to coarse fint. MADE GROUND. Soft brown grey slightly sandy gravely clay. Gravel is angular to suborunded fine to coarse fint. MADE GROUND. Image: Strikes Image: Strikes Soft brown grey to dark grey Image: Strike grey Image: Strike grey Image: Strike grey Image: Strike grey Image: Strike grey Image: Strike grey	lient: Mo	Donald's Res	taurants	Ltd				Depth: 4 1.50	Logge	əd
ell Virtice Depth (m) Type Results 0.05 76.54 Soft brown grey slightly such oracle is angular to subrounded fine to coarse final with occasional subrounded fine to coarse final	10/-1	Sampla	and In Si		Dauth	1			ТВ	T
0.05 76.54 0.05 76.54 Soft brown grey elighty schward gravelly day. Gravel is angular to subrounded fine to coarse chalk with occasional subrounded fine to coarse chalk wi	Vell Strikes	Depth (m)		Results	(m)	(m)	Legend	Stratum Description		
	Vell Valer Strikes	Depth (m)	Type	Results		Level (m) 76.54 76.49	Legend	Soft brown grey slightly sandy gravelly clar angular to subrounded fine to coarse flint a With rootlets. MADE GROUND. Firm grey brown silty gravelly clay. Gravel subrounded fine to coarse chalk with occa subrounded fine to coarse flint. MADE GR 0.40mbecoming grey to dark grey End of Trial Pit at 1.50m	y. Gravel is and chalk. is angular to sional OUND.	

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Trial Pit Log

Project: McDonalds MD Project No: P22-2590 Co-ords: E567622.00 N244252.52 290 Location: Haverhill Iso 1.0 1.0 290 Clent: McDonald's Restaurants Ltd Image: Strikes		CONSU					Tri	al F	Pit Log	l	TPO)6
Location: Haverhill Level: 76.53m AoD 2800 Location: Haverhill Iso So Viell Sample and In Situ Testing Depth: 1 Viell Vieler Sample and In Situ Testing Depth: 1 Viell Vieler Sample and In Situ Testing Depth: 1 Viell Vieler Sample and In Situ Testing Depth: 1 Viell Vieler Sample and In Situ Testing Depth: Soft toron gree slightly samply aracle to account that and chaik. Viell Vieler Results 0.15 76.53	Proiect	t: Mc	Donalds MD			Proiect No:	P22-2590	1	Co-ords: E567	7622.00 N244252.52	Date	e
Location: Haverhill Dept: Dept:<									Level: 76.53 Dimensions (m):	29/03/2 Sca	2022 le	
Clerit: McDonald's Restaurants Lid 1.90 0 Log Water Strikes Sample and in Situ Testing Depth Level Level Legend Stratum Description Vell Valuer Depth (m) Type Results 0.015 76.53 Soft brown grey alightly sandy gravely clay. Gravel is angular to subrounded fine to coarse chait with occasional subrounded fine to coarse chait wi	Locatio	on: Ha	verhill						Depth: 4		1:10	C
Weiler Strikes Sample and in Situ Testing Depth (m) Depth (m) Type Results Level (m) Legend Stratum Description Image: Stratum Description (m) Type Results 0.15 76.53 Soft brown grey slightly sandy gravely clay. Gravel is angular to subrounded fine to coarse final and chaik. Image: Stratum Description 0.15 76.53 Firm grey brown elify gravely clay. Gravel is angular to subrounded fine to coarse final and chaik. 0.50-1.00 B 0.50-1.00 B 10.0 76.53 1.00 1.00 76.53 1.00 1.00 1.00	Client:	Мс	Donald's Res	taurants	Ltd				1.90	5	Logg TB	ed
Deput (in) 1/9 Nessures 1 1 0.15 76.53 Firm grey brown sity gravely clay. Gravel is angular to subrounded fine to coarse finit with occasional subrounded fine toccasional subrounded fine to coars	Well	Water Strikes	Sample :	and In S	itu Testing	Depth (m)	Level (m)	Legend	s	Stratum Description		
0.50 - 1.00 B					Tresuits	0.15	76.53		Soft brown grey s angular to subrou With rootlets. MAI	lightly sandy gravelly clay nded fine to coarse flint a DE GROUND. silty gravelly clay. Gravel i	: Gravel is nd chalk. s angular to	
1.30mwith organic fragments			0.50 - 1.00	В					subrounded fine to subrounded fine to	o coarse chalk with occas o coarse flint. MADE GRO	sional DUND.	
End of Trial Pit at 1.90m						1.90	76.38		1.30mwith organic	fragments	absent	

Remarks

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

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	CONSU		LTD				arr		og) (
								Co-ords:	E56764	1.77 N244	319.04	Sheet 1 Date	of 2 ə
Projec	ct: Mc	Donalds MD		P	roject No: F	P22-2590		Level:	76.30m	AoD		29/03/2	:022
Locati	ion: Ha	verhill						Dimension	is (m):	1.50		Scale 1:10	e)
Client	: Mc	Donald's Res	taurants	Ltd				2.40	0.4			Logge TB	əd
Well	Water Strikes	Sample a	and In S	itu Testing Results	Depth (m)	Level (m)	Legend		Stra	tum Descrip	otion		
			.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,					Soft brow angular to With trace	n grey sligh subrounde s of brick a	tly sandy gra d fine to coai nd rootlets. N	velly clay. C rse flint and /ADE GRO	Gravel is chalk. UND.	
					0.10	76.30		Firm dark is angular	grey to grey to subroun	y brown silty ded fine to co	gravelly cla parse chalk	y. Gravel and	-
								organic m	aterial. MAI	DE GROUNE).	DICK and	
		0.50 - 1.00	в										
													1 -
													-
								1					2 -
Rema 1. TP(2. Per 3. Tria	arks 07 halteo ched gro al pit bac	d at 2.40m, ta bundwater see kfilled with ari	rget dep epages a isings up	th at 1.50m and oon completio	1.70m n								

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Trial Pit Log

Trial Pit No.

Project: McDonalds MD Project No: P22-2590 C0-ords: ES67641.77 N2443194 Date 203320: cocstion: Haverhill Immediate Seaturants Ld Immediate Seaturants Ld Immediate Seaturants Ld Scale 2.40 Scale 2.40 Statum Description Scale 1 angular to autocunded fine to coarse chak and organic material. MOE GROUND. Scale 1 angular to autocunded fine to coarse chak and organic material. MOE GROUND.								0 1		Sheet 2	of 2
c.ccation: Haverhill Dimensions (m): 1.50 Scale Dimensions (m): 1.50 110 Logged Dimensions (m): 1.50 110 Logged Viel Well Water Sample and In Situ Testing Depth Level Legend Stratum Description Well Witker Sample and In Situ Testing Depth Level Legend Stratum Description Well Water Sample and In Situ Testing Depth Image: Stratum Description Image: Stratum Description Well Water Sample and In Situ Testing Depth Image: Stratum Description Image: Stratum Description Well Water Sample and In Situ Testing Depth Level Legend Stratum Description Sample and In Situ Testing Depth Image: Stratum Description Image: Stratum Description Image: Stratum Description Sample and In Situ Testing Depth Image: Stratum Description Image: Stratum Description Image: Stratum Description Sample and In Situ Testing Depth Image: Stratum Description Image: Stratum Description Image: Stratum Description Sample and In Situ Testing Z40 76.20 Image: Stratum Description Image: Stratum Descring Ima	Project: I	McDonalds MD		P	Project No:	P22-2590		Co-ords: E5676 Level: 76.30	641.77 N244319.04 m AoD	Date 29/03/20	e 022
Client: McDonald's Restaurants Lld Depth: 9/2.40 1:0 Logged TB Well Water Strikes Sample and in Situ Testing Depth (m) Dopth Level (m) Level (m) Level (m) Stratum Description Well Water Strikes Sample and in Situ Testing Depth (m) Dopth Course class and more set bind and organic material. Stratum Description Well Vater Sample and in Situ Testing Dopth Course class and more set bind and organic material. Stratum Description Well Vater Sample is subconstanted fine to course class and organic material. Stratum Description Pirm data grey to grey t	_ocation:	Haverhill		I				Dimensions (m):	1.50	Scale	e
Stant: McDonald's Restaurants Ltd 2.40 C Tite Weil Water Sample and In Situ Testing Depth Level Legend Stratum Description Weil Strikes Depth (m) Type Results (m) Level Legend Image: strikes Depth (m) Type Results (m) Level Legend Image: strikes Depth (m) Type Results (m) Level Legend Image: strikes Depth (m) Type Results (m) Image: strikes Image: strikes Image: strikes Depth (m) Type Results Image: strikes Image: strikes Image: strikes Image: strikes Depth (m) Type Results Image: strikes Image: strikes Image: strikes Image: strikes Depth (m) Type Results Image: strikes Image: strikes Image: strikes Image: strikes Depth (m) Type Results Image: strikes Image: strikes Image: strikes Image: strikes Depth (m) Transition Depth (m) Transition Image: strikes Image: strikes Depth (m) Transition Depth (m) Transition Image								Depth: ¹ 27		1:10 Logae) ed
Weil Water Sample and In Situ Testing Dep (m) Level (m) Stratum Description Vela Depth (m) Type Results (m) (m) [m]	Client: I	McDonald's Res	taurants L	td				2.40		TB	1
Depth (m) Lype Results Cov Firm dark gray to gray brown silk gravelly clay. Gravel is angular to subrounded fine to cuaran chalk and organic material. MADE GROUND. 2.40 76.20	Well Wate	er Sample :	and In Sit	u Testing	Depth (m)	Level (m)	Legend	St	ratum Description		
		Depth (m)		Kesults	2.40	76.20		Firm dark grey to g is angular to subroi subrounded fine to organic material. M	rey brown silty gravelly claunded fine to coarse chall coarse flint. With traces of ADE GROUND.	ay. Gravel (and f brick and	3

Stability : Stable

create	

Trial Pit I on

	t. Ma	Donalde MD		r	Project No:	DJJ JE00		Co-ords: E567613.70 N244280.90	Date
Jec		Donaids MD		r		PZZ-2590		Level: 76.53m AoD	29/03/20
ati	on: Hav	verhill						Dimensions (m): 1.50	Scale 1:10
ient: McDonald's Restaurants Ltd				l td				Depth: 7	Logged
									TB
ell	Water Strikes	Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description	
			Type		0.05	76.53		Soft brown grey slightly sandy gravelly clay. Gra angular to subrounded fine to coarse flint and ch With traces of brick and rootlets. MADE GROUN Firm dark grey to grey brown silty gravelly clay. is angular to subrounded fine to coarse chalk ar subrounded fine to coarse flint. With traces of br organic material. MADE GROUND. 0.40mwith occasional subrounded flint and chalk cobbined flint occasional subrounded flint and chalk cobbined flint and chalk cobb	vel is nalk. ND. Gravel nd rick and //es
					2 00	76 / 2			
					2.00	10.48		End of Trial Pit at 2.00m	

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oot: M-	Donalda MD				222 2500		Co-ords:	E56764	4.00 N	1244283.05	Dat	i ol
	Donaids MD		Pro		22-2590		Level:	76.52m	AoD	50	29/03/2	202
ation: Ha	verhill						Dimension	s (m):	1	.50	Sca 1:1	.le 0
nt: Mo	Donald's Rest	taurante	l td				Depth:	0.45			Logg	jed
	Bonala o reos	laurunto				1	2.00				TB	; ⊤
II Water Strikes	Sample a	and In Si	Results	Depth (m)	Level (m)	Legend		Stra	itum De	scription		
I Strikes	Depth (m)	В	Results	- (m) 0.05	(m) 76.52	Legend	Soft brown angular to With trace Firm brow subrounde to coarse material. f	oming light g	tum De tly sand d fine to nd rootla gravelly barse ch acces of DUND.	scription gravelly clay. coarse flint ar ets. MADE GR clay. Gravel is alk and subrou brick and organ wn mottling	Gravel is d chalk. OUND. angular to inded fine nic	
				2.00	76.47			End	of Trial P	it at 2.00m		

cro	ata

Trial Dit Lag

			LTD			Tri	al P	rit Log	TP10	
Projec Locati Client	on: Ha	Donalds MD verhill Donald's Res	taurants L	F td	Project No: F	22-2590		Co-ords: E567616.63 N244299.89 Level: 76.53m AoD Dimensions (m): 1.40 Depth: 47 0.80	Sheet 1 of 7 Date 29/03/2022 Scale 1:10 Logged	<u>1</u> 2
	Water	Sample	and In Sit	u Testina	Dopth	Lovol			ТВ	
Well	Strikes	Depth (m)	Туре	Results	(m)	(m)	Legend	Stratum Description		
		0.40 - 0.80	в		0.05	76.53		Soft brown grey slightly sandy gravelly clay. G angular to subrounded fine to coarse flint and With traces of brick and rootlets. MADE GRO Firm brown grey slity gravelly clay. Gravel is a subrounded fine to coarse chalk and subroun to coarse flint. With traces of brick and organi material. MADE GROUND.	Sravel is I chalk. UND. angular to ded fine c 1	
Rema 1. TP 2. Per 3. Tria 4. Infil	arks 10 halted ched gro I pit bac tration te	d at 0.80m. Ta bundwater at (kfilled with gra esting carried	rget depth D.80m avel to 0.4 out betwe	0 0m and ari en 0.40m a	sings to surfac	ce			AGS	

-	ro	to
L		

Trial Dit Log

			LTD			Tri	al P	Pit Log		TP1	1
Droit	ot: M	Donalda MD			oloot No.			Co-ords: E5676	49.24 N244305.43	Sheet 1 Date	of 1
Proje				PI		PZZ-2590		Level: 76.24r	n AoD	29/03/20 Scale	022
Locat	ion: Ha	verhill						Denth:	1.40	1:10	5
Clien	t: Mc	Donald's Res	taurants	Ltd				1.00		Logge TB)d
Well	Water Strikes	Sample a	and In Si	itu Testing	Depth (m)	Level (m)	Legend	St	ratum Description		
Well	Strikes	Depth (m)	Type	Results	Deptn (m) 0.05	Level (m) 76.24 76.19	Legend	St Soft brown grey slig angular to subroum With traces of brick Firm brown grey sil subrounded fine to to coarse flint. With organic material. M	ratum Description httly sandy gravelly clay. ded fine to coarse flint an and rootlets. MADE GRC ty gravelly clay. Gravel is coarse chalk and subrou occasional fragments of ADE GROUND. d of Trial Pit at 1.00m	Gravel is d chalk. <u>DUND</u> / angular to nded fine brick and	- 1-
Rem 1. TP 2. No 3. Tri	arks 11 halted groundw al pit bac	l at 1.00m. Ta vater encount kfilled with gr	rget dept ered avel to 0.	:h 50m and aris	ings to surfa	ce					2 -

APPENDIX C

CHEMICAL LABORATORY TEST CERTIFICATES & Comparison Against SSAC



Certificate Number 22-06153

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

hurod

Kirk Bridgewood General Manager



Derwentside Environmental Testing Services Limited Unit 2, Park Road Industrial Estate South, Consett, Co Durham, DH8 5PY Tel: 01207 582333 • email: info@dets.co.uk • www.dets.co.uk

Issued: 05-Apr-22



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
		.Sa	mple 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
		Sam	ole Type	ES						
		Sampli	ng Date	28/03/2022	28/03/2022	28/03/2022	28/03/2022	28/03/2022	28/03/2022	28/03/2022
		Sampli	ng Time	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										
рН	DETSC 2008#		рН	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



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
		.Sa	mple 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
		Samp	ole Type	ES						
		Sampli	ng Date	28/03/2022	28/03/2022	28/03/2022	28/03/2022	28/03/2022	28/03/2022	28/03/2022
		Sampli	ng Time	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

i DETS

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

				Holding time	Inappropriate
		Date		exceeded for	container for
Lab No	Sample ID	Sampled	Containers Received	tests	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



Issued: 09-May-22

Certificate Number 22-08244 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

emood

Kirk Bridgewood General Manager





Summary of Chemical Analysis Water Samples

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

Sample to Depth BH02 Other ID Sample Type Sampling Date 27/04/2022 Sampling Date 27/04/2022 Sampling Time 1100 Method LOD Units Metais 1100 Arsenic, Dissolved DETSC 2306 0.26 ug/l <0.1 Borium, Dissolved DETSC 2306 0.31 ug/l <0.1 Gadmium, Dissolved DETSC 2306 0.023 ug/l <0.25 Gadmium, Dissolved DETSC 2306 0.02 ug/l <0.25 Chromium, Hexavalent DETSC 2306 0.09 ug/l <0.07 Coppr, Dissolved DETSC 2306 0.99 ug/l <0.01 Metcury, Dissolved DETSC 2306 0.91 ug/l <0.01 Selenium, Dissolved DETSC 2306 0.91 ug/l <0.01 Selenium, Dissolved DETSC 2306 0.5 ug/l <0.02 Selenium, Dissolved DETSC 2306 0.1 ug/l <0.05 <th></th> <th></th> <th></th> <th>Lab No</th> <th>2003212</th>				Lab No	2003212
Depth Other ID Sample Type w Sample Type w Sampling Time 1100 Test Method DD Metais DETSC 2306 0.16 ug/l 1.2 Barium, Dissolved DETSC 2306 0.26 ug/l 64 Beryllium, Dissolved DETSC 2306 0.26 ug/l 64 Boron, Dissolved DETSC 2306 0.23 ug/l 6.07 Gadmium, Dissolved DETSC 2306 0.25 ug/l 6.025 Chromium, Heavalent DETSC 2306 0.02 ug/l <0.07			.Sa	ample ID	BH02
Other ID Sample Type w Sampling Date Sampling Time Test Method LOD Units Metals DETSC 2306 0.16 ug/l 1.20 Barium, Dissolved DETSC 2306 0.1 ug/l <0.1 Boron, Dissolved DETSC 2306 0.1 ug/l <0.1 Boron, Dissolved DETSC 2306 0.1 ug/l <0.07 Cadmium, Dissolved DETSC 2306 0.21 ug/l <0.07 Chromium, Dissolved DETSC 2306 0.29 ug/l <0.007 Copper, Dissolved DETSC 2306 0.01 ug/l <0.007 Mickel, Dissolved DETSC 2306 0.01 ug/l <0.007 Mickel, Dissolved DETSC 2306 0.1 ug/l <0.007 Mickel, Dissolved DETSC 2306 0.2 ug/l <0.007 Mickel, Dissolved DETSC 2306 0.2 ug/l <0.007 Vanadium, Dissolved DETSC 2306 0.2 <				Depth	
Sample Type Sampling Date Sample Type Sampling Time Time Wethod Wethod Wethod Test Method LOD Units Marcenic, Dissolved DETSC 2306 0.26 ug/l 64 Barium, Dissolved DETSC 2306* 0.1 ug/l <0.1 Boron, Dissolved DETSC 2306* 0.1 ug/l <0.1 Cadmium, Dissolved DETSC 2306 0.25 ug/l <0.25 Chromium, Dissolved DETSC 2306 0.02 ug/l <0.07 Chromium, Hexavalent DETSC 2306 0.4 ug/l 1.0 Mercury, Dissolved DETSC 2306 0.4 ug/l <0.07 Mercury, Dissolved DETSC 2306 0.01 ug/l <0.007 Nickel, Dissolved DETSC 2306 0.5 ug/l <0.01 Nadium, Dissolved DETSC 2306 0.6 ug/l <0.02 Vanadium, Dissolved DETSC 2306 0.1 ug/l <0.02 Vanadium, Dissolved DETSC 2306 0.1 ug/l </th <th></th> <th></th> <th></th> <th>Other ID</th> <th></th>				Other ID	
Sampling Date Sampling Time 27/04/2022 1100 Test Method LOD Units Metals			Sam	ple Type	W
Test Method LOD Units Metals Arsenic, Dissolved DETSC 2306 0.16 ug/l 64 Barium, Dissolved DETSC 2306* 0.1 ug/l 64 Beryllium, Dissolved DETSC 2306* 0.1 ug/l 64 Boron, Dissolved DETSC 2306* 0.1 ug/l 71 Cadmium, Dissolved DETSC 2306 0.03 ug/l 6.0.25 Chromium, Dissolved DETSC 2306 0.4 ug/l 7.1 Cadmium, Dissolved DETSC 2306 0.4 ug/l 7.1 Cadmium, Dissolved DETSC 2306 0.4 ug/l 1.2 Lead, Dissolved DETSC 2306 0.01 ug/l <0.01			Samp	ing Date	27/04/2022
Test Method LOD Units Marsenic, Dissolved DETSC 2306 0.16 ug/l 1.2 Barium, Dissolved DETSC 2306* 0.1 ug/l <0.1 Born, Dissolved DETSC 2306* 0.1 ug/l <0.1 Boron, Dissolved DETSC 2306* 0.2 ug/l <0.1 Cadmium, Dissolved DETSC 2306 0.25 ug/l <0.25 Chromium, Dissolved DETSC 2306 0.4 ug/l <0.25 Chromium, Hexavalent DETSC 2306 0.4 ug/l 1.2 Lead, Dissolved DETSC 2306 0.01 ug/l <0.007 Mercury, Dissolved DETSC 2306 0.5 ug/l <0.01 Nickel, Dissolved DETSC 2306 0.6 ug/l <0.6 Ginc, Dissolved DETSC 2306 0.6 ug/l <0.6 Ginc, Dissolved DETSC 2306 0.10 ug/l <0.02 Ginc, Dissolved DETSC 2306 1.3 ug/l <0.20			Sampl	ing Time	1100
Metals Def Statum Arsenic, Dissolved DETSC 2306 0.16 ug/l 1.2 Barium, Dissolved DETSC 2306 0.26 ug/l 64 Beryllium, Dissolved DETSC 2306* 1.1 ug/l <0.1 Boron, Dissolved DETSC 2306 0.03 ug/l <0.07 Chromium, Dissolved DETSC 2306 0.25 ug/l <0.25 Chromium, Hexavalent DETSC 2306 0.4 ug/l <0.007 Copper, Dissolved DETSC 2306 0.4 ug/l <0.007 Mercury, Dissolved DETSC 2306 0.4 ug/l <0.001 Mercury, Dissolved DETSC 2306 0.5 ug/l 1.5 Selenium, Dissolved DETSC 2306 0.5 ug/l 1.5 Selenium, Dissolved DETSC 2306 0.5 ug/l 1.6 Circ, Dissolved DETSC 2306 0.5 ug/l 1.7 Vanadium, Dissolved DETSC 2306 1.3 ug/l 3.2 Inorganics	Test	Method	LOD	Units	
Arsenic, Dissolved DETSC 2306 0.16 ug/ 1.2 Barium, Dissolved DETSC 2306 0.26 ug/ 64 Beryllium, Dissolved DETSC 2306* 0.1 ug/ <0.1	Metals		-		
Barium, Dissolved DETSC 2306 0.26 ug/l 64 Beryllium, Dissolved DETSC 2306* 0.1 ug/l <0.1	Arsenic. Dissolved	DETSC 2306	0.16	ug/l	1.2
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 0.03 ug/l < 0.25	Barium. Dissolved	DETSC 2306	0.26	ug/l	64
Boron, Dissolved DETSC 2306 12 ug/ T1 Cadmium, Dissolved DETSC 2306 0.03 ug/ 0.07 Chromium, Dissolved DETSC 2306 0.25 ug/ < 0.25	Bervllium, Dissolved	DETSC 2306*	0.1	ug/l	< 0.1
Cadmium, Dissolved DETSC 2306 0.03 ug/l 0.07 Chromium, Dissolved DETSC 2306 0.25 ug/l < 0.25	Boron, Dissolved	DETSC 2306*	12	ug/l	71
Chromium, Dissolved DETSC 2306 0.05 0.07 Chromium, Jessolved DETSC 2306 0.25 ug/l < 0.05	Cadmium Dissolved	DETSC 2306	0.03	ug/l	0.07
DETSC 2000 0.007 mg/l <0.007 Copper, Dissolved DETSC 2030 0.007 mg/l <0.007	Chromium Dissolved	DETSC 2306	0.00	ug/l	< 0.25
Det SC 2306 0.05 1163 Copper, Dissolved DETSC 2306 0.4 ug/l 1.2 Lead, Dissolved DETSC 2306 0.09 ug/l < 0.09	Chromium Hexavalent	DETSC 2300	0.007	mg/l	< 0.007
Copper, Disolved DETSC 2306 0.09 ug/l <0.09 Mercury, Dissolved DETSC 2306 0.09 ug/l <0.09	Copper Dissolved	DETSC 2205	0.007	ιισ/I	1 2
DETSC 2306 0.05 dg/ 0.05 Mercury, Dissolved DETSC 2306 0.01 ug/l < 0.01	Lead Dissolved	DETSC 2306	0.9	ισ/I	< 0.09
Intercently, Dissolved DETSC 2306 0.01 ug/l 15 Selenium, Dissolved DETSC 2306 0.25 ug/l 0.77 Vanadium, Dissolved DETSC 2306 0.6 ug/l <0.6	Mercury Dissolved	DETSC 2306	0.05	ug/1 μσ/Ι	< 0.05
DETSC 2306 0.0 ug/l 1.3 Selenium, Dissolved DETSC 2306 0.25 ug/l 0.77 Vanadium, Dissolved DETSC 2306 1.3 ug/l 3.2 Inorganics DETSC 2306 1.3 ug/l 3.2 pH DETSC 2306 1.3 ug/l <40	Nickel Dissolved	DETSC 2306	0.01	ug/1 μσ/Ι	15
DETSC 2306 0.2.5 0.2/1 0.7/1 Vanadium, Dissolved DETSC 2306 0.6 ug/l <0.7/2	Selenium Dissolved	DETSC 2306	0.5	ug/1 μσ/Ι	0.77
Variation, Dissolved DETSC 2306 0.0 ug/l < 0.0	Vanadium Dissolved		0.25	ug/i	0.77
Inite DETSC 2308 1.3 ug/l 3.2 Inorganics PH DETSC 2008 PH 7.3 Cyanide, Total DETSC 2130 40 ug/l <40	Zinc Dissolved	DETSC 2306	0.0	ug/i	> 0.0
pH DETSC 2008 pH 7.3 Cyanide, Total DETSC 2130 40 ug/l < 40		DE13C 2500	1.5	ug/1	5.2
prin DETSC 2008 prin 7.3 Cyanide, Total DETSC 2130 40 ug/l < 40				nЦ	7.2
Cyanide, Fotal DETSC 2130 40 ug/l < 40 Cyanide, Free DETSC 2130 20 ug/l < 20	pn Granida Tatal	DETSC 2008	40	p⊓ ua/l	/.3
Cyanide, Free DETSC 2130 20 ug/l < 20 Sulphate as SO4 DETSC 2055 0.1 mg/l 18 Sulphide DETSC 2028 10 ug/l 54 Total Organic Carbon DETSC 2085 1 mg/l 8.1 Petroleum Hydrocarbons EPH (C10-C35) DETSC 3311 10 ug/l 20.0 PAHs Naphthalene DETSC 3304 0.05 ug/l < 0.05		DETSC 2130	40	ug/i	< 40
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		DETSC 2130	20	ug/i	< 20
Submide 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 0.05 ug/l <0.05	Sulphate as 504	DETSC 2055	0.1	mg/I	18
Detroleum Hydrocarbons DETSC 3311 10 ug/l 120 PAHs DETSC 3304 0.05 ug/l <0.05	Supride	DETSC 2208	10	ug/i	54
Petroleum Hydrocarbons EPH (C10-C35) DETSC 3311 10 ug/l 120 PAHs Naphthalene DETSC 3304 0.05 ug/l < 0.05	Potro lovro Undro corbon	DETSC 2085	T	mg/I	8.1
EPH (CI0-C35) DETSC 3311 10 ug/l 120 PAHs Naphthalene DETSC 3304 0.05 ug/l < 0.05	For (C10, C25)	DETCC 2244	10		120
PARS Naphthalene DETSC 3304 0.05 ug/l < 0.05	EPH (CIU-C35)	DETSC 3311	10	ug/i	120
Naphthalene DETSC 3304 0.05 ug/l < 0.05	Neghthelene	DETCC 2204	0.05		40.05
Acenaphthylene DETSC 3304 0.01 ug/l < 0.01	Assesses	DETSC 3304	0.05	ug/i	< 0.05
Acenaphthene DETSC 3304 0.01 ug/i 0.01 Fluorene DETSC 3304 0.01 ug/i 0.01 Phenanthrene DETSC 3304 0.01 ug/i 0.03 Anthracene DETSC 3304 0.01 ug/i 0.03 Anthracene DETSC 3304 0.01 ug/i 0.01 Fluoranthene DETSC 3304 0.01 ug/i 0.01 Pyrene DETSC 3304 0.01 ug/i 0.02 Benzo(a)anthracene DETSC 3304 0.01 ug/i <0.01	Acenaphthylene	DETSC 3304	0.01	ug/I	< 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 0.03 Fluoranthene 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	Acenaphthene	DETSC 3304	0.01	ug/i	0.01
Phenanthrene DETSC 3304 0.01 ug/l 0.03 Anthracene DETSC 3304 0.01 ug/l < 0.01	Pluorene	DETSC 3304	0.01	ug/i	0.01
Anthracene DETSC 3304 0.01 ug/l < 0.01	Phenanthrene	DETSC 3304	0.01	ug/I	0.03
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	Anthracene	DETSC 3304	0.01	ug/I	< 0.01
Pyrene DETSC 3304 0.01 ug/l 0.02 Benzo(a)anthracene DETSC 3304* 0.01 ug/l < 0.01	Fluoranthene	DETSC 3304	0.01	ug/l	0.01
Benzo(a)anthracene DETSC 3304* 0.01 ug/l < 0.01	Pyrene	DETSC 3304	0.01	ug/l	0.02
Chrysene DETSC 3304 0.01 ug/l < 0.01 Benzo(b)fluoranthene DETSC 3304 0.01 ug/l < 0.01	Benzo(a)anthracene	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	Chrysene	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	Benzo(b)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	Benzo(k)fluoranthene	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(a)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	Indeno(1,2,3-c,d)pyrene	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	Dibenzo(a,h)anthracene	DETSC 3304	0.01	ug/l	< 0.01
PAH Total DETSC 3304 0.2 ug/l < 0.20 Phenols Phenols Phenols	Benzo(g,h,i)pervlene	DETSC 3304	0.01	ug/l	0.01
Phenols DETSC 2120 100 ug/l < 100	PAH Total	DFTSC 3304	0.2		< 0.20
Phenol - Monobydric DETSC 2120 100 ug/l < 100	Phenols	22130 3304	0.2	ug/1	\$ 0.20
	Phenol - Monobydric	DFTSC 2130	100	ιι σ /Ι	< 100



inannronriate

Information in Support of the Analytical Results

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

Containers Received & Deviating Samples

		Date			container for
Lab No	Sample ID	Sampled	Containers Received	Holding time exceeded for tests	tests
2003212	BH02 WATER	27/04/22	GB 1L, GV, PB 1L	pH/Cond/TDS (1 days)	
Kev: G-Glas	s 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)									
			Sample ID	BH01	BH01	BH02	BH02	TP02	TP03	TP04
LoD	Metals (Based on 6% SOM)	SSAC	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
0.2ma/ka	Boron, Water Soluble	240000		3.6	1.0	1.1	1.1	0.70	0.50	0.70
0.1ma/ka	Cadmium	190		13	0.40	0.60	0.30	0.20	0.20	0.70
0.15ma/ka	Chromium	8600		 CE	0.+0 20	14	17	12	15	14
1mg/kg	Chromium Heusyslant	2000		1.0	20	14	1/	15	15	14
ing/kg	Chromium, Hexavalent	33		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
U.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	Cvanide. Total	-		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
0.1ma/ka	Cvanide. 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	15	2.8	15	11	1.0
10ma/l	Sulphate Aqueous Extract as SOA	_		2600	70	1700	55	1500	400	1500
10mg/kg	Sulphate Aqueous Extract as 504	-		2000	< 10	1/00	24	1300	490	1300
10///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
0.01ma/ka	Aromatic C8-C10	3500		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
0.9ma/ka	Aromatic C10-C12	16000		< 0.9	< 0.9	< 0.9	2.1	17	< 0.9	< 0.9
0.5mg/kg	Aromatic C12-C16	36000		< 0.5	< 0.5	< 0.5	1.2	1.7	< 0.5	< 0.5
0.5mg/kg	Aromatic C12 C10	38000		< 0.5	< 0.5	< 0.5	0.70	2.4	< 0.5	< 0.5
1.4ma/kg	Aromatic C10-C21	28000		< 1.4	< 0.0	< 0.0	0.70	2.1	< 0.0	< 0.0
1.4mg/kg	Aromatic C21-C35	28000		< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4
10mg/kg	Aromatic CS-C35	-		< 10	< 10	< 10	< 10	< 10	< 10	< 10
10mg/kg	IPH 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
0.03ma/ka	Chrysene	350		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.03
0.03ma/ka	Benzo(b)fluoranthene	44		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
0.03ma/ka	Benzo(k)fluoranthene	1200		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
0.03ma/ka	Renzo(a)nyrene	25		< 0.03	0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
0.03mg/kg	Indono(1,2,2,c,d)=	33		< 0.03	0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
0.03mg/kg	Dibonzo(2 b)anthrasses	500		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
0.03mg/kg		3.5		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
0.03mg/kg	Benzo(g,h,i)perviene	3900		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
U.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

At or exceeding the SSAC (Site Specific Assessment Criteria) Within 90th percentile of SSAC contaminant value хх

хх

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)

			Sample ID
LoD	Metals (Based on 6% SOM)	SSAC	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	-	
0.01	Petroleum Hydrocarbons	2200	
0.01mg/kg	Aliphatic C5-C6	3200	
0.01mg/kg	Aliphatic C6-C8	7800	
0.01mg/кg 1.Бата (на	Aliphatic C8-C10	2000	
1.5mg/kg	Aliphatic C10-C12	9700	
1.2mg/kg	Aliphatic C12-C16	59000	
2.Jmg/kg	Aliphatic C10-C21	1600000	
5.4111у/ку 10ma/ka	Aliphatic C21-C35	1600000	
10iliy/ky 0.01ma/ka	Aromatic CE C7	-	
0.01mg/kg	Aromatic C7-C9	20000	
0.01mg/kg	Aromatic C8-C10	3500	
0.01mg/kg	Aromatic C10-C12	16000	
0.5mg/kg	Aromatic C12-C16	36000	
0.6ma/ka	Aromatic C16-C21	28000	
1.4ma/ka	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 хх

At or exceeding the SSAC (Site Specific Assessment Criteria) Within 90th percentile of SSAC contaminant value

хх

Laboratory 'Limit of Detection' LoD *

Based on ATKINS AtRisk Value, 2017



MD HAVERHILL

Comparison of Samples vs Site Specific Assessment Criteria

Ouality) P . .. ----

Criteria:	water Supply (water Qu	lality) 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
0.5ua/l	Nickel, Dissolved	20	15
0.25µa/l	Selenium Dissolved	10	0 77
0.6ua/l	Vanadium Dissolved	-	< 0.6
1 3ug/l	Zinc Dissolved	5000	2 2
1.509/1	Inc, Dissolved	3000	5.2
		10	7 2
40ua/I	Oranida Tatal	10	/.5
40ug/1	Cyanide, Total	50	< 40
20ug/1	Cyanide, Free	50	< 20
40ug/i	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	-	-
1uq/l	Aromatic C12-C16	-	
1ua/l	Aromatic C16-C21	-	
1ua/I	Aromatic C21-C35	-	
10ua/l	Aromatic C5-C35		-
10ug/l	TPH Ali/Aro Total	200	
10ug/l		300	120
1000/1	Renzene	-	120
1ug/l	Teluene	1	-
1ug/l	Toluene	-	-
1ug/1	Ethylbenzene	-	-
109/1	xyiene	-	-
0.05	PARS	-	. 0.05
0.05ug/i	Naphthalene	-	< 0.05
0.01ug/I	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
	,		



At or exceeding the SSAC (Site Specific Assessment Criteria) 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



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

Create Consulting Engineers Ltd

FAO Tom Bennett

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NR3 1AF

Page 1 of 1

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

Scheme	Haverhill Mat	terials Testing	April '2	2			
Report No.	Hole ID	Specimen Depth (m)	San Type	nple 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.

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

Jan Eller



FAO Tom Bennett

Create Consulting Engineers Ltd 15 Princes Street NORWICH NR3 1AF Email: civil.laboratory@norsegroup.co.uk Our reference No. NNPL202204012-Our Project No 103016 Your Sample Ref B1 Your Project or Order No. PO4543

Date Report Issued 27 Apr 2022

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Page 1 of 1

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

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		S	Source	Ex site		
	Test Specimen						
Location	Not applicable						
Orientation	Not applicable						
	Preparation De	tails					
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 calcula	tion is outside the	scope of UKAS accreditation.		
BS Soil Classification	n CL						

Remarks

NHBC Volume change potential classification is N/A

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Jou Eller



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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

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Page 1 of 1

Determination of Liquid Limit to BS1377-2:1990 CI 4.4 Cone Penetrometer (One Point Method) and Determination of Plasticity Index to BS1377-2:1990 CI 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	vas provided, it is available for inspection.	The accuracy of any in	formation provided by third parties cannot be

It 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, sligh	tly gravelly CL	AY. Gravel is r	ounded to sub-ang	gular, fine and medium flint.
Supplier	CREATE		S	ource	Ex site
	Test Specimen				
Location	Not applicable				
Orientation	Not applicable				
	Preparation Deta	ils			
Method of Division	Whole sample				
Preparation Method	Wet sieving		Air Drying		
Retained 425µm (%)	4	5.0			
Natural MC (%)	10				
Liquid Limit (%)	41				
Plastic Limit (%)	11				
Plasticity Index (%)	30				
Modified PI *(%)	29		*BRE Digest	240:1993.	
			This calculati	on is outside the s	cope of UKAS accreditation.
BS Soil Classification	n C I				

Remarks

NHBC Volume change potential classification is medium.

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Email: civil.laboratory@norsegroup.co.uk

Our reference No. NNPL2022040117-Our Project No103016Your Sample RefD4Your Project or Order No.PO4543Date Report Issued27 Apr 2022

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Page 1 of 1

Determination of Liquid Limit to BS1377-2:1990 CI 4.4 Cone Penetrometer (One Point Method) and Determination of Plasticity Index to BS1377-2:1990 CI 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 in	formation provided by third parties cannot be

It 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 bro	wn, gravelly CLAY. Grave	el is sub-angula	ar to rounded, fine and medium chalk.	
Supplier	CREATE		Source	Ex site	
	Test Specimen				
Location	Not applicable				
Orientation	Not applicable				
	Preparation Detai	S			
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 Diges	st 240:1993.		
		This calcula	ation is outside	the scope of UKAS accreditation.	
BS Soil Classification	n C I				

Remarks

NHBC Volume change potential classification is medium.

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FAO Tom Bennett

Create Consulting Engineers Ltd 15 Princes Street NORWICH NR3 1AF Email: civil.laboratory@norsegroup.co.uk Our reference No. NNPL202204019-

 Our Project No
 103016

 Your Sample Ref
 U2

 Your Project or Order No.
 PO4543

 Date Report Issued
 27 Apr 2022

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Page 1 of 1

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

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 De	tails				
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 240:199	93.		
			This calculation is ou	Itside the scop	e of UKAS accreditation.	
BS Soil Classification	n CL					

Remarks

NHBC Volume change potential classification is low.

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Jan Eller



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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

Page 1 of 1



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		Specification for Highway	Sample Proportions	
Particle Size	0	Works Classification	BOULDERS	0
mm	% Passing	Table 6/2	COBBLES	0
125	100	This material complies with the	Coarse GRAVEL	0
90	100	following material classes 2A/2B,	Medium GRAVEL	1
75	100	2A/2B.	Fine GRAVEL	1
63	100		Coarse SAND	2
37.5	100		Medium SAND	34
20	100		Fine SAND	44
14	100		Silt & Clay	19
10	100			
6.3	99		Grading Ana	lysis
5	99	Please be aware that we only report	D100	10
2	99	compliance with specifications using	D60	0.20
1.18	99	'simple acceptance' as a guide as	D10	0.03
0.600	97	the specifications for the material as	Uniformity Coefficient	6
0.425	93	well as the methodology for testing		
0.300	83	are well established and take into	Descripti	on
	63	account uncertainty in their	Brown slightly gravelly very s	andy CLAY.
0.212				-

7.9

Moisture content %

(BS1377-Part 2, 1990)

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* Uniformity coefficient extrapolated

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



Test Code = 612

Jan Eller



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

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Page 1 of 1



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		Specification for Highway	Sample Proportions		
Particle Size	0/ D	Works Classification	BOULDERS	0	
mm	% Passing	Table 6/2	COBBLES	0	
125	100	This material complies with the	Coarse GRAVEL	0	
90	100	following material classes 2A/2B.	Medium GRAVEL	0	
75	100	-	Fine GRAVEL	0	
63	100		Coarse SAND	2	
37.5	100		Medium SAND	29	
20	100		Fine SAND	27	
14	100		Silt & Clay	42	
10	100				
6.3	100		Grading A	Analysis	
5	100	Please be aware that we only report	D100	6	
2	99	compliance with specifications using	D60	0.16	
1.18	99	'simple acceptance' as a guide as the	D10	0.03	
0.600	98	specifications for the material as well	Uniformity Coefficient [!]	6	
0.425	95	as the methodology for testing are			
0.300	86	well established and take into	Description		
0.212	69	account uncertainty in their	Brown clayey very sandy S	ILT.	
0.000	42	formulation.			

Moisture content % 13

(BS1377-Part 2, 1990)

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* Uniformity coefficient extrapolated

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



Test Code = 612

Simon Holden (Operations Manager)



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Create Consulting Engineers Ltd FAO Tom Bennett 15 Princes Street NORWICH 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

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Page 1 of 1



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		Specification for Highway	Sample Pro	portions
Particle Size		Works Classification	BOULDERS	0
mm	% Passing	Table 6/2	COBBLES	0
125	100	This material complies with the	Coarse GRAVEL	2
90	100	following material classes 2A/2B,	Medium GRAVEL	2
75	100	2A/2B.	Fine GRAVEL	1
63	100		Coarse SAND	2
37.5	100		Medium SAND	43
20	98		Fine SAND	27
14	98		Silt & Clay	24
10	98			
6.3	97		Grading A	nalysis
5	97	Please be aware that we only report	D100	20
2	96	compliance with specifications using	D60	0.25
1.18	95	'simple acceptance' as a guide as	D10	0.04
0.600	94	the specifications for the material as	Uniformity Coefficient [!]	6
0.425	88	well as the methodology for testing		
0.300	71	are well established and take into	Descrip	otion
0.212	51	account uncertainty in their	Light orangish brown slight	ly gravelly very sandy
0.063	24	formulation.	CLAY.	

10

Moisture content % (BS1377-Part 2, 1990)

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* Uniformity coefficient extrapolated

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



Test Code = 612

Jan Eller



Email: civil.laboratory@norsegroup.co.uk

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

Our Project No103016Our Report and sample NoNNPL202204010-Your Sample RefB1Your Project or Order NoPO4543Date Report Issued27 April 2022Date Tested21 April 2022

Tom.Bennett@createconsultingengineers.co.uk

Page 1 of 1

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 t	o coarse flint and chalk.

Supplier	CREATE		Source	Ex site		
		Test Speci	men Preparation d	letails		
Location	Not applicat	ble	Method of I	Division	Quarte	ering
Orientation	Not applicat	ble	Preparation	n Method	Sievin	g, Natural Moisture Content
Retained 37.5mm	0.0	%	Retained 20)mm	2.7	%
BS Method	3.4, 2.5kg F	Rammer	Bulk Densi	ty	2.02	Mg/m ³
Number of layers	3		Dry Density	/	1.67	Mg/m ³
Blows per layer	62 Blows		Init. Moistu	re Content	19	%
Condition	Soaked					

Test Results					
		CBR Value Si	urface Modulus	s \$	
		%	Мра		
	Тор	3.6	40	\$ The calculation of Surface Modulus is not covered	
	Bottom	5.7	54	by UKAS accreditation	
Moisture Content Method		Oven dried @ 105-110°C	0		
Moisture Content Top	%	21	Moisture Cor	nt. Bottom % 11	

Remarks

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

Our Project No103016Our Report and sample NoNNPL202204011-Your Sample RefB1Your Project or Order NoPO4543Date Report Issued27 April 2022Date Tested05 April 2022

Tom.Bennett@createconsultingengineers.co.uk

Page 1 of 1

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-ang	ular, fine to coarse chalk.

Supplier	CREATE	Source Ex site			
	Test Specimen Pr	eparation 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/m ³		
Blows per layer	62 Blows	Init. Moisture Content	22 %		
Condition	Soaked				

		Test Re	esults	
		CBR Value S	urface Modulus	s \$
		%	Мра	
	Тор	1.9	27	\$ The calculation of Surface Modulus is not covered
	Bottom	3.9	42	by UKAS accreditation
Moisture Content Method		Oven dried @ 105-110°C	C	
Moisture Content Top	%	22	Moisture Cor	nt. Bottom % 22

Remarks

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

Our Project No103016Our Report and sample NoNNPL202204013-Your Sample RefB1Your Project or Order NoPO4543Date Report Issued27 April 2022Date Tested21 April 2022

Tom.Bennett@createconsultingengineers.co.uk

Page 1 of 1

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

Scheme	Haverhill Materials Testing April '22												
Location	TP10 @ 0.4m	P10 @ 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 typ	e	Bulk D	listurbed
Description	Soft to firm rounded, f	n, mottled dark browr fine to coarse chalk a	and grey, slightly silty nd flint.	, slightly sandy,	gravelly C	LAY. Gravel is sub-angular to
Supplier	CREATE		Source	Ex site		
		Test Spec	imen Preparation o	letails		
Location	Not applic	able	Method of	Division	Quarte	ering
Orientation	Not applic	able	Preparation	n Method	Sievin	g, Natural Moisture Content
Retained 37.5mm	0.0	%	Retained 2	0mm	2.2	%
BS Method	3.4, 2.5kg	Rammer	Bulk Densi	ty	2.02	Mg/m ³
Number of layers	3		Dry Densit	y	1.66	Mg/m ³
Blows per layer	62 Blows		Init. Moistu	re Content	23	%
Condition	Soaked					

		•	Test Results						
		CBR Value	Surface Modulus	\$					
		%	Мра						
	Тор	3.9	42	\$ The calculation of Surface Modulus is not covered					
	Bottom	4.3	45	by UKAS accreditation					
	Mean Value	4.1	43						
Moisture Content Method		Oven dried @ 10	05-110°C						
Moisture Content Top	%	22	Moisture Con	t. Bottom % 22					

Remarks

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Jan Eller



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 Na	me	HAVERHILL					
Project Nu	mber	C7630	Date samples received		06/04/2022		
Your Ref			Date written instructions received	ved	05/04/2022		
Purchase (Order	PN05037162	Date testing commenced		16/04/2022		
		Please find enclosed the re	esuits as summarised beig)W	1		
Item No	Test Quantity		Description		ISO 17025 Accredited		
8.12	2	Multistage consolidated undrained tri	axial		Yes		
Remarks :	1	1			1		
Issued by :	R Norris	Date of Issue :	20/04/2022	Key to symbols u	used in this report		
				S/C : Testing wa	as sub-contracted		
Approved Signa	itories :	R.J.Norrs					
		J.Hopkins (Laboratory Coordinator), M D Brow	m (Senior Quality Manager), R Norris (Su	ipervisor)			
Unde	Unless we All This r r multisite acc	are notified to the contrary, samples will I The results reported relate to sam results contained in this report are provis eport should not be reproduced except in reditation the testing contained in this rep	be disposed after a period of one r nples received in the laboratory on sional unless signed by an approv full without the written approval o port may have been performed at a	nonth from this dat ly. ed signatory f the laboratory. another Terra Tek l	e. aboratory.		
Only those r	esults indica	ted in this report are UKAS accredite	d and any opinions or interpre	tations expressed	a are outside the		
		Feedback on the this report may be left	ft via our website terratek.co.uk/fe	edback			
	do		College Road	d North, Aston Clinto	n, Bucks, HP22 5EZ		
					Tel: 01494 810136		
	(≯≮)			astonclinto	n@terrartek.co.uk		
mCERTS				ww	w.terratek.co.uk		
THE EXCLOSED FOR ALEXAND	0126		Office	Terra Tek Ltd is registered s in Airdrie, Birmingham, B	d in Scotland No. 121594 Belfast and Aston Clinton		

Page 1 of 1



Version 034 - 22/11/2012

Unit 2 Springfield Road, Chesham, Bucks, HP51PW

			Site		Contract No	C763
STEINESTRATIONAND LAGORATION STATUCE Client Norfolk Partnership Laboratory Engineer - - Engineer - - Image: Steine Statution (Status) Depth (m) 1.60-2.1 Sample Type U - Image: Steine Statution (Status) Depth (m) 1.60-2.1 Image: Steine Statution (Status) Image: Steine Statution (Status) Image: Steine Status) Image: Steine Statution (Status) Image: Steine Status) Image: Steine Status) Image: Steine Status) Image: Steine Status) Image: Steine Status) Image: Steine Status) Image: Steine Status) Image: Steine Status) Image: Steine Status) Image: Steine Status) Image: Steine Status) Image: Steine Status) Image: Steine Status) Image: Steine Status) Image: Steine Status) Image: Steine Status) Image: Steine Status) Image: Steine Status) Image: Steine Status) Image: Steine Status) Image: Steine Status) Image: Steine Status) Image: Steine Status) Image: Steine Status) Image: Steine Status) Image: Steine Status) Image: Steine Status) Image: Steine Status) Ima		TERRA TEK			Hole	BH01
		SITE INVESTIGATION AND LABORATORY SERVICES	Client	Norfolk Partnership Laboratory	Depth (m)	1.60-2.0
	<image/>		Engineer	-	Sample Type	U

Lab Project No C7630

Originator	Checked & Approved
АМ	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.





Version 034 - 22/11/2012

Unit 2 Springfield Road, Chesham, Bucks, HP51PW



#REF!

Unit 2 Springfield Road, Chesham, Bucks, HP51PW

APPENDIX E

GEOTECHNICAL PLOTS







APPENDIX F

GROUND GAS MONITORING

JOB DETAILS Site: Date:	P22-2590 30/03/202) McDona 22	alds Haver	rhill							Visit No: Operato	: r:	1 TB	of	6	CONSULTING ENGINEERS LTD
				GA	S CONCE	ENTRATI	ONS			FLOW	/ DATA	VOLA	TILES	WELL	AND	
Monitoring Point	Time	Methar	ne (%v/v)	Carbon	Dioxide	Oxvae	en (%v/v)	%	LEL	Flow ra	ate (l/hr)	BID Book	Product	WATE	R DATA	COMMENTS
j		Deek	Steedu	(%	v/v)	Min	Cteady.	Deek		Deek	Cteedu	(ppm)	thickness (mm)	Water level (mbgl)	Well Depth (m)	
BH01	10:15	4 9	4.8	Реак	9.7	win.	3.2	геак	Steady	Peak	0.1			DRY	6.00	
BH01	10:45	4.5	2.6		6.1		14.2				0.1			0.98	6.00	
5.102	10.10		2.0		0.1						0.1			0.00	0.00	
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	
METEOROLOGIC State of ground: Wind: Cloud cover:	CAL AND	SITE INF	ORMATIC	DN:	X	Dry Calm None		X	Moist Light Slight			Wet Moderate	•		Snow Strong Overcast	Frozen
Precipitation: Time monitoring Barometric press	performed: ure (mbar)	:			Х	None		10:00 999	Slight Start Start			Moderate	•	11:00 998	Heavy End End	
Pressure trend (E Source: Air Temperature	Daily): (Deg. C):				GA5000			X 10	Falling Before			Steady		11	Rising After	
INSTRUMENTAT Ground gas met Gas Range: Gas Flow range: Differential Press	FION TECH eer: sure:	INICAL S	GA5000 CH₄ +100/-50 (+/-) 1000	ATIONS: 0 - 100% 1/hour 0 Pa	5	CO2	0 - 100%		O ₂	0 - 25%		1				
Ambient air che	ck:		CH₄	C).0	CO2	0	.1	02	2	0.9	J				

JOB DETAILS																
Site:	P22-2590) McDon	alds Haver	rhill							Visit No:	:	2	of	6	Creale
Date:	12/04/202	22									Operato	r:	тв			CONSULTING ENGINEERS LTD
	_												-			
				GA	S CONCE	INTRATI	ONS			FLOW	/ DATA	VOLA	TILES	WELL	AND	
			(0) ()	Carbon	Dioxide		(0) ()						Product	WATE	R DATA	
Monitoring Point	Time	Metha	ne (%v/v)	(%	v/v)	Oxyge	en (%v/v)	%	LEL	Flow ra	ate (l/hr)	PID Peak	thickness	Water	Well Depth	COMMENTS
		Peak	Steady	Peak	Steady	Min.	Steady	Peak	Steady	Peak	Steady	(ppiii)	(mm)	level (mbgl)	(m)	
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	
Мах		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 detecte	d												
		NR -	Not recorde	-d												
		NA -	Non applica	able												
			i tori apprior	1010												
METEOROLOGI		SITE INF	ORMATIC	DN:												
State of around:			••••••		X	Drv			Moist			Wet			Snow	Frozen
Wind [.]					X	Calm		x	Light			Moderate	`		Strong	
Cloud cover:						None		X	Slight			Cloudy	,		Overcast	
Precipitation:					X	None		~	Slight			Moderate	`		Heavy	
Time monitoring r	orformed.				Λ	None		12.25	Start			moderate	,	14.10	End	
Parametria prose	uro (mbor)							007	Stort					007	End	
Broccure trend (D		•						- 337 - V	Folling			Stoody		331	Dicing	
	ally).				CA5000			^	Failing			Sleauy			Rising	
Air Tomporaturo (GA5000			20	Potoro					20	Attor	
All Temperature ((Deg. C).							20	Delote					20	Allel	
				TIONE												
				ATIONS:												
Ground gas met	er:		GA5000	0 100%		<u></u>	0 100%		0	0 25%						
				0 - 100%)	$\mathbf{U}\mathbf{U}_2$	0 - 100%)	\mathbf{U}_2	0-23%						
Gas Flow range:			+100/-50	i/nour												
Differential Press	ure:		(+/-) 1000	u Pa												
A	-1		C 11									7				
Ampient air cheo	CK:			L L	1.0		0). I	\mathbf{U}_2	2	0.9]				

JOB DETAILS																
Site:	P22-2590) McDon	alds Haver	rhill							Visit No:		3	of	6	Credie
Date:	27/04/20	22									Operato	r:	тв	•	•	CONSULTING ENGINEERS LTD
2000											operate		<u> </u>			
				GA	S CONCE	INTRATI	ONS			FLOW	/ DATA	VOLA	TILES	WELL	AND	
				Carbon	Dioxide	_							Broduct	WATE	R DATA	
Monitoring Point	Time	Metha	ne (%v/v)	(%	v/v)	Oxyge	n (%v/v)	%	LEL	Flow ra	ate (l/hr)	PID Peak	thickness	Water	Well Depth	COMMENTS
		Peak	Steady	Peak	Steady	Min.	Steady	Peak	Steady	Peak	Steady	(ppiii)	(mm)	level (mbgl)	(m)	
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 detecte	ed												
		NR -	Not recorde	ed												
		NA -	Non applica	able												
METEOROLOGI	CAL AND	SITE INF	ORMATIC	DN:												
State of ground:					Х	Dry			Moist			Wet			Snow	Frozen
Wind:						Calm		Х	Light			Moderate	9		Strong	
Cloud cover:						None			Slight			Cloudy		Х	Overcast	
Precipitation:					Х	None			Slight			Moderate	9		Heavv	
Time monitoring	performed:					1		08:45	Start			1		09:45	End	
Barometric press	ure (mbar)	:						1020	Start					1020	End	
Pressure trend (E) Dailv):							Х	Falling		Х	Steady			Risina	
Source:	,				GA5000						J	_ ,				
Air Temperature	(Deg. C):							10	Before					10	After	
	(-0 -/															
INSTRUMENTAT	ION TECH		SPECIFIC/	ATIONS:												
Ground gas met	er:	_	GA5000													
Gas Range:			CH₄	0 - 100%	D	CO ₂	0 - 100%	5	O ₂	0 - 25%						
Gas Flow range:			+100/-50	l/hour		-			-							
Differential Press	ure:		(+/-) 100	0 Pa												
			(,													
Ambient air che	ck:		CH₄	(0.0	CO ₂	0).1	O ₂	20	0.9]				

JOB DETAILS																are ate
Site:	P22-259	0 McDon	alds Have	rhill							Visit No		4	of	6	creale
Date:	13/05/20	22									Operato	r:	тв			CONSULTING ENGINEERS LTD
													_			
				GA	S CONCE	ENTRATI	ONS			FLOW	/ DATA	VOLA	ATILES	WEL		
	_			Carbon	Dioxide								Broduct	WATE	R DATA	
Monitoring Point	Time	Metha	ne (%v/v)	(%	v/v)	Oxyge	en (%v/v)	%	LEL	Flow ra	ate (l/hr)	PID Peak (ppm)	thickness	Water	Well Depth	COMMENTS
		Peak	Steady	Peak	Steady	Min.	Steady	Peak	Steady	Peak	Steady	(pp)	(mm)	level (mbgl	(m)	
BH01	14:30		0.1		1.6		19.6				0.1	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 detecto	nd							•••					
				tu ad												
			Non opplier	J u Abla												
		INA ·		able												
				NI-												
State of ground				JN.	V				Maint			W/ot			Snow	Frazan
					^	Diy		V	light			Madarati	_		Show	FIOZEI
wind:						Caim		X	Light				3		Strong	
Cloud cover:						None		X	Slight			Cloudy			Overcast	
Precipitation:					X	None			Slight			Moderate	9		Heavy	
Time monitoring	performed:							14:15	Start					15:00	End	
Barometric press	ure (mbar)	:						1010	Start			-		1010	End	
Pressure trend (Daily):								Falling		Х	Steady			Rising	
Source:					GA5000				-						-	
Air Temperature	(Deg. C):							12	Before					12	After	
INSTRUMENTAT	FION TECH	INICAL	SPECIFIC/	ATIONS:												
Ground gas met	ter:		GA5000													
Gas Range:			CH₄	0 - 100%	þ	CO2	0 - 100%	ò	O ₂	0 - 25%						
Gas Flow range:			+100/-50	l/hour												
Differential Press	sure:		(+/-) 100	0 Pa												
			. ,													
Ambient air che	ck:		CH₄	C).0	CO ₂	C).1	O ₂	2	0.9]				
				·								-				

JOB DETAILS Site:	P22-2590) McDona	alds Haver	hill							Visit No	:	5	of	6	create
Date:	20/05/202	22									Operato	r:	ТВ			CONSULTING ENGINEERS LTD
GAS CONCENTRATIONS									FLOW	DATA	VOLATILES		WELL AND			
Monitoring Point	Time	ne Methane (%v/v)		Carbon	Carbon Dioxide		Oxvgen (%v/v)		%LEL		Flow rate (I/hr)		Product thickness (mm)	WATER DATA		COMMENTS
				(%V/V) Reak Steady		Min Steady		Book Stoody		Peak Steady		(ppm)		Water level (mbgl)	Well Depth (m)	
BH01	10:35	Feak	0.1	Feak	1.1	IVIIII.	19.7	Feak	Steauy	Feak	0.2			DRY	6.00	
BH02	10:45		0.6		3.8		13.5			1	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	
METEOROLOGIC State of ground:	CAL AND	NA -	Non applica	able DN:		Dry			Moist		X	Wet			Snow	Frozen
Cloud cover:						None		~	Sliaht			Cloudy	,	Х	Overcast	
Precipitation:						None			Slight		Х	Moderate	9		Heavy	
Time monitoring p	erformed:							10:25	Start			-		11:00	End	
Barometric press	ure (mbar)	:						1010	Start			-		1010	End	
Pressure trend (D	aily):								Falling		Х	Steady			Rising	
Source:					GA5000										٦	
Air Temperature (Deg. C):							11	Before					11	After	
INSTRUMENTATION TECHNICAL SPECIE Ground gas meter: GA50 Gas Range: CH ₄ Cas Elow range: ±100				ATIONS: 0 - 100%	5	CO ₂	0 - 100%)	O ₂	0 - 25%						
Ambient air cheo	ure: : k:		(+/-) 1000 CH₄) Pa	0.0	CO₂	C).1] o ₂	20).9]				

JOB DETAILS Site:	P22-2590) McDona	alds Haver	rhill							Visit No:	:	6	of	6	create
Date:	23/05/20	22									Operato	r:	ТВ			CONSULTING ENGINEERS LTD
GAS CONCENTRATIONS									FLOW	DATA	VOLATILES		WELL AND			
Monitoring Point	Time	ime Methane (%v/v) C		Carbon	Carbon Dioxide		Oxygen (%v/v)		%LEL		Flow rate (I/hr)		Product	WATER DATA		COMMENTS
				Peak Stead		Min.	Steady	Peak	Steady	Peak	Steady	(ppm)	om) thickness (mm)	Water level (mbgl)	Well Depth (m)	
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	
METEOROLOGIC		NR - NA - SITE INF	Not recorde Non applica	ed able DN:		Dry			TMoist		X	Wet			Snow	Frozen
Wind.						Calm		x	Light			Moderate			Strong	FIOZEII
Cloud cover:						None			Slight			Cloudy		Х	Overcast	
Precipitation:						None		Х	Slight			Moderate	1		Heavy	
Time monitoring p	performed:							14:50	Start			-		15:35	End	
Barometric press	ure (mbar)	:						993	Start			_		993	End	
Pressure trend (D	Daily):							Х	Falling			Steady			Rising	
Source:					GA5000				-					h	•	
Air Temperature ((Deg. C):							16	Before					16	After	
INSTRUMENTAT	ION TECH		SPECIFIC/	ATIONS:												
Ground gas meter Gas Range:	er:		GA5000 CH ₄	0 - 100%	, 0	CO₂	0 - 100%		O ₂	0 - 25%						
Gas Flow range:			+100/-50	l/hour												
Differential Pressure:			(+/-) 100	0 Pa												
Ambient air cheo	ck:		CH₄	0).0	CO2	0).1	O ₂	20).9]				

APPENDIX G

DYNAMIC CONE PENETRATION RESULTS











100.0

Interpreted CBR Value 100mm Made Ground removed Start of Test **Initial Penetration**

TP02

DCP02



End of test

1000.0

1. 100mm Made Ground removed prior to starting test 2. Test carried out to a maximum depth of 1000mm

10.0

Cumulative Penetration (mm)

1000

1.0

3. Soils logged once instrument removed from ground









^{3.} Soils logged once instrument removed from ground










APPENDIX H

INFILTRATION TEST DATA SHEETS



1.50

0.45

2.00

Site:	Haverhill	MD		Co-ordinates	5676	513.7	Е	244280.9	Ν	Trial Pit
Client:	McDonal	d's Restaurants Ltd		Elevation	76.53	m				Dimensions (m)
Job No:	P22-2590			Date	29/03	/2022				Length
										Width
Soil type at	test level	MADE GROUND (Silty	grav	velly CLAY)						Depth
Ground	water	No				9	Ston	e Filled?	Yes	Test volume (m ³)
Sidewall	stability	Stable, vertical				V	oids	Ratio (%)	0.41	Effective Depth

V_{p7}	est 1	Te															0.5 0.6 0.7	
A _{S5}	000	000	000	000	000	000	000	00(000	000	00(00(000	000	000	•	0.8 0.9 1.0 (£ 1.1	
$t_{p7!}$) 1.2 1.3 1.4 1.5	
Soil																	1.7 1.7 1.8 1.9	
$f = \frac{1}{a}$	1380	1260	1170	1080	066	006	810	720	630	540	450	360	270	(1 80	06 ed (mii	O lapse	Time E	

V _{p75 -25} (m³)	0.14
<i>A_{S50}</i> (m²)	2.63
t _{p75 –25} (mins)	N/A
Soil infiltration	
rate	TEST
V_{p75-25}	FAIL
$J = \frac{1}{a_{S50} \times t_{p75-25}}$	

Effective Depth 1.00 Time (mins) Test 1 Test 2 Test 3 0 1.00 - - 45 0.99 - - 90 0.98 - - 135 0.96 - - 135 0.96 - - 225 0.93 - - 225 0.93 - - 225 0.93 - - 270 0.91 - - 315 0.89 - - 360 0.84 - - 405 0.84 - - 450 0.84 - - 540 0.84 - - 630 0.84 - - 720 0.84 - - 720 0.84 - - 900 0.84 - - 945 0.84	Test vo	0.68										
Time (mins) Test 1 Test 2 Test 3 0 1.00 - - 45 0.99 - - 90 0.98 - - 135 0.96 - - 135 0.96 - - 135 0.94 - - 225 0.93 - - 225 0.93 - - 315 0.89 - - 360 0.88 - - 360 0.84 - - 405 0.84 - - 450 0.84 - - 540 0.84 - - 630 0.84 - - 630 0.84 - - 675 0.84 - - 720 0.84 - - 990 0.84 - - 990 <td>Effect</td> <td colspan="11">Effective Depth</td>	Effect	Effective Depth										
Time (mins) Test 1 Test 2 Test 3 0 1.00 - - 45 0.99 - - 90 0.98 - - 135 0.96 - - 135 0.94 - - 225 0.93 - - 225 0.93 - - 225 0.93 - - 315 0.89 - - 360 0.88 - - 405 0.84 - - 405 0.84 - - 540 0.84 - - 540 0.84 - - 540 0.84 - - 630 0.84 - - 720 0.84 - - 765 0.84 - - 900 0.84 - - 990 <td></td> <td></td> <td></td> <td></td>												
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01.0045 0.99 90 0.98 135 0.96 180 0.94 225 0.93 270 0.91 315 0.89 360 0.88 405 0.84 405 0.84 540 0.84 585 0.84 630 0.84 720 0.84 755 0.84 900 0.84 900 0.84 91035 0.84 1035 0.84 1170 0.84 1125 0.84 11320 0.84 11380 0.84 11440 0.84	(mins)	1	2	3								
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$ 0.84 $ 495$ 0.84 $ 540$ 0.84 $ 585$ 0.84 $ 585$ 0.84 $ 720$ 0.84 $ 765$ 0.84 $ 900$ 0.84 $ 900$ 0.84 $ 990$ 0.84 $ 1035$ 0.84 $ 1125$ 0.84 $ 1125$ 0.84 $ 11320$ 0.84 $ 1380$ 0.84 $ 1440$ 0.84 $ -$	0	1.00	-	-								
90 0.98 135 0.96 180 0.94 225 0.93 270 0.91 315 0.89 360 0.88 405 0.86 495 0.84 540 0.84 585 0.84 630 0.84 720 0.84 755 0.84 810 0.84 900 0.84 990 0.84 1035 0.84 1125 0.84 1125 0.84 1120 0.84 11320 0.84 11440 0.84	45	0.99	-	-								
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 $ -$ 810 0.84 $ -$ 990 0.84 $ -$ 1035 0.84 $ -$ 1125 0.84 $ -$ 1120 0.84 $ -$ 1380 0.84 $ -$ 1440 0.84 $ -$	90	0.98	-	-								
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990 0.84 - - 1035 0.84 - - 1080 0.84 - - 1125 0.84 - - 1170 0.84 - - 1215 0.84 - - 1215 0.84 - - 1260 0.84 - - 1320 0.84 - - 1380 0.84 - - 1440 0.84 - -	945	0.84	-	-								
1035 0.84 - - 1080 0.84 - - 1125 0.84 - - 1170 0.84 - - 1215 0.84 - - 1215 0.84 - - 1260 0.84 - - 1320 0.84 - - 1380 0.84 - - 1440 0.84 - -	990	0.84	•	-								
1080 0.84 - - 1125 0.84 - - 1170 0.84 - - 1215 0.84 - - 1215 0.84 - - 1260 0.84 - - 1320 0.84 - - 1380 0.84 - - 1440 0.84 - -	1035	0.84	•	-								
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1170 0.84 - - 1215 0.84 - - 1260 0.84 - - 1320 0.84 - - 1380 0.84 - - 1440 0.84 - -	1125	0.84	-	-								
1215 0.84 - - 1260 0.84 - - 1320 0.84 - - 1380 0.84 - - 1440 0.84 - -	1170	0.84	-	-								
1260 0.84 - - 1320 0.84 - - 1380 0.84 - - 1440 0.84 - -	1215	0.84	-	-								
1320 0.84 - - 1380 0.84 - - 1440 0.84 - -	1260	0.84	-	-								
1380 0.84 - - 1440 0.84 - -	1320	0.84	-	-								
1440 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



1.50

0.45

2.00 0.68

Site:	Haverhill	MD		Co-ordinates	5676	544.0	Е	244283.0	Ν		Trial Pit
Client:	McDonal	d's Restaurants Ltd		Elevation	76.52	m					Dimensions (m)
Job No:	P22-2590			Date	29/03,	/2022					Length
										_	Width
Soil type at	test level	MADE GROUND (Silty	grav	velly CLAY)						1	Depth
Ground	water	No				S	Stone	e Filled?	Yes		Test volume (m ³)
Sidewall s	tability	Stable, vertical				Vo	oids	Ratio (%)	0.41		Effective Depth

V_{p75-2}	est 1	Te															0.5 0.6 0.7	
<i>A_{S50}</i> (m)00	000	000	000	000		000			000	000		000	000	000	•	0.8 0.9 1.0 (£ 1.1	
t_{p75-25}																	1.2 1.3 1.4 1.5 1.6	
$f = \frac{V_{p_7}}{a_{S50} \times c}$	1380	1260	1170	1080	066	006	810	720	630	540	450	360	270	180	06 ed (mir	O	™ 1.7 1.8 1.9 2.0	

V _{p75 -25} (m³)	0.14
<i>A_{S50}</i> (m²)	2.63
t _{p75 –25} (mins)	N/A
Soil infiltration	
rate	TEST
V_{p75-25}	FAIL
$J = \frac{1}{a_{S50} \times t_{p75-25}}$	

Ellect	ive De	JUN	1.00
Time	Test	Test	Tost
(mins)	1	2	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: AM	



1.40 0.45

0.80

0.25

Trial Pit

Site:	Haverhill	MD		Co-ordinates	5676	516.6	Е	244299.9	Ν		Trial Pit
Client:	McDonal	d's Restaurants Ltd		Elevation	76.53	m					Dimensions (m)
Job No:	P22-2590			Date	29/03	/2022					Length
											Width
Soil type at	test level	MADE GROUND (Silty g	gra	velly CLAY)							Depth
Ground	water	Perched groundwater a	at C).80m		S	tone	e Filled?	Ye	5	Test volume (m ³)
Sidewall	stability	Stable, vertical				Vo	oids	Ratio (%)	0.4	1	Effective Depth

0.0															Te	ost 1
0.1																
0.2																
€ 0.3																
는 도 0.4	00		00			000	000	000	000	000	00	000	000	000		000
de 0.5	-															
0.0 gt																
[≥] _{0.7}	-															_
0.8		-	0	0	0	0	0	0	0	0	0	0	0	0	0	-
		. 60	180	27C	360	450	540	630	720	810	900	990	080	170	260	380
Time E	lapse	d (mi	ns)	-	-			_		-			Ē.	1	Ĺ.	1

V _{p75 -25} (m³)	0.05
A _{S50} (m²)	1.37
t_{p75-25} (mins)	N/A
Soil infiltration	
rate	TEST
$f = \frac{V_{p75-25}}{V_{p75-25}}$	FAIL
$\int -a_{ax} \times t$	

Effect	0.40		
Time	Test	Test	
(mins)	1	2	3
0	0.40	-	-
45	0.39	-	-
90	0.39	1	-
135	0.39	1	-
180	0.39	-	-
225	0.39	1	-
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



1.40 0.45 1.00 0.32

Site:	Haverhill	MD		Co-ordinates	5676	649.2	Е	244305.4	1 N			Trial I	Pit
Client:	McDonal	d's Restaurants Ltd		Elevation	76.24	m					Dir	nensio	ns (m
Job No:	P22-2590)		Date	29/03	/2022					Le	ength	
											V	√idth	
Soil type at	test level	MADE GROUND (Silty §	grav	velly CLAY)							D	epth	
Groundwater No St						tone	Filled?	Yes	5 Test volume (m ³)				
Sidewall s	stability	Stable, vertical				Vo	oids I	Ratio (%)	0.41		Effect	ive Dep	oth
0.0				Το	c† 1	V -		- (m ³)	0.06		Time	Test	Test
0.1					31 1	₽ p7	/5 –2	5 (11)	0.00		(mins)	1	2
0.2											٥	0.50	_

0.2																
Water Depth (r 8.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	•	00	00	000	00	000	000	00	000	000	000	000	000	000	000	000
0.9 1.0	0	0	0	0	0	0	o.	0	0	0	0	0	0	0	0	0
Time E	lapse	റ d (mii	ns) ⁰⁰	27	36	45	54	63	72	81	06	66	108	117	126	138

<i>V</i> _{p75 –25} (m³)	0.06
<i>A_{\$50}</i> (m²)	1.56
t_{p75-25} (mins)	N/A
Soil infiltration	
rate	TEST
$f = V_{p75-25}$	FAIL
$f = \frac{1}{a_{s50} \times t_{p75-25}}$	

Effect	0.50		
Time	Test	Test	Test
(mins)	1	2	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	1	-
585	0.54	1	-
630	0.54	-	-
675	0.54	-	-
720	0.54	1	-
765	0.54	1	-
810	0.54	1	-
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