



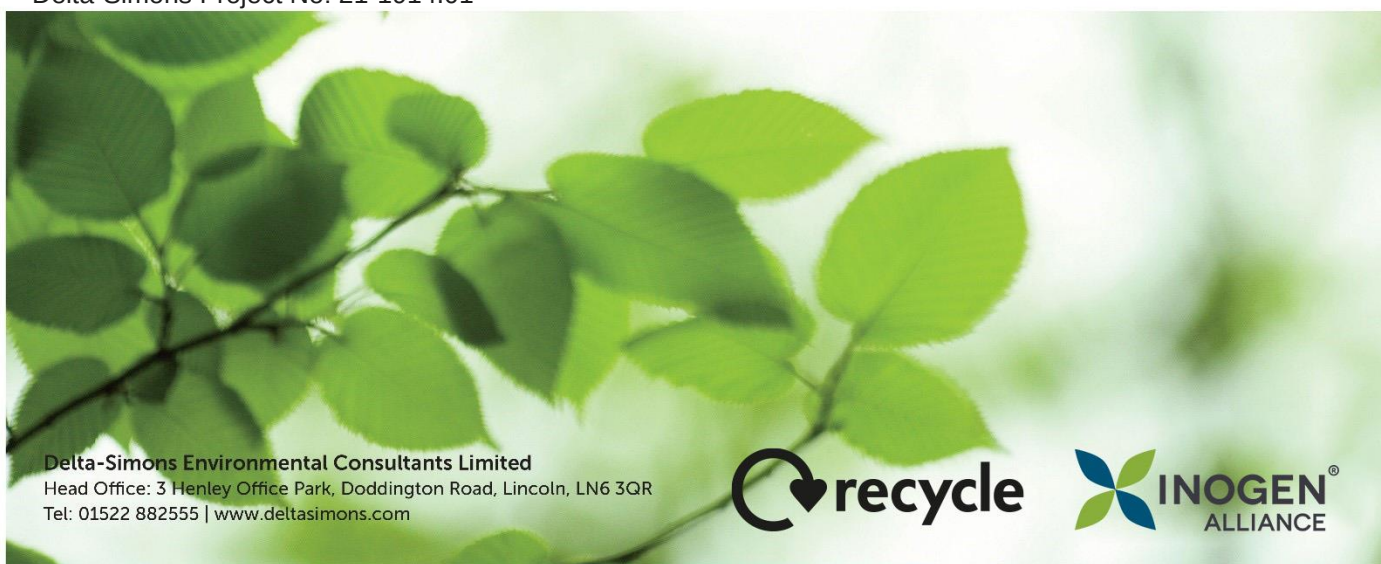
Geo-Environmental Assessment

Media Studio Project

Presented to: **Manchester City Football Club**

Issued: October 2021

Delta-Simons Project No: 21-1914.01



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Report Details

Client	Manchester City Football Club
Report Title	Geo-Environmental Assessment
Site Address	Manchester City Football Club Training Ground, Manchester, M11 2AP
Report No.	21-1914.01
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Quality Assurance

Issue No.	Status	Issue Date	Comments	Author	Technical Review	Authorised
01	Final	20/10/2021		<i>Giuseppe Melosu</i>	<i>Mel Booth</i>	<i>Richard Lawless</i>
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Executive Summary

Brief	Delta-Simons Environmental Consultants Limited (“Delta-Simons”) was instructed by Manchester City Football Club (the “Client”) to prepare a Geo-Environmental Assessment for the proposed Media Studio project development (the “Site”). The report aims to provide geotechnical and geo-environmental information to support the planning application for the proposed media studio development.
Site Setting	The Site comprises an area of soft landscaping within the Manchester City Football Club training ground. The proposed development comprises a new single-storey media studio. Historically, the Site and surrounding area has been occupied by a number of industrial uses and underwent an extensive remediation and enabling works programme prior to the construction of the Manchester City Football Club complex. The Site is underlain by engineered Made Ground, overlying Devensian Till (Secondary Undifferentiated Aquifer) and the Pennine Upper Coal Measures Formation (Secondary A Aquifer).
Ground Conditions	The current ground investigation recorded deep Made Ground, overlying Devensian Till and bedrock of the Pennine Upper Coal Measures Formation with a weathered horizon. Groundwater was encountered within the Made Ground during drilling.
Land Contamination Assessment	Asbestos has been identified within Made Ground on Site, and therefore suitable remedial measures will need to be implemented as part of the development works, to mitigate the risk to end users. Ground gas monitoring was not included within the scope of this Report, however, historical third-party reports include recommendations the installation of gas protection measures in line with a Characteristic Situation 2 classification, which Delta-Simons considers appropriate in the absence of additional data.
Geotechnical Assessment	Deep Made Ground has been encountered on Site, in accordance with the anticipated ground conditions following the wider site enabling works. Although the Site has been subject to intensive historical earthworks, the competency and strength properties of the Made Ground cannot be guaranteed in its current form. Aggressive ground conditions have been encountered within the Made Ground, and the underlying natural soils are potentially pyritic. Concrete used as part of the redevelopment should be suitable for a DS-4 AC-4 classification. Cohesive Made Ground is considered to be desiccated, has a medium to high plasticity and medium volume change potential, while the underlying Devensian Till has a low to medium plasticity and medium volume change potential. Shallow spread foundations are considered unsuitable unless Made Ground soils are improved and stabilised. Alternatively a piled solution (traditional bored or continuous flight auger) may be feasible.
Data Gaps and Uncertainty	The following data gaps or uncertainties have been identified: ▲ This report assumes that risks associated with legacy coal workings have been addressed as part of historical earthworks; ▲ No proposed loadings were provided by the Client; ▲ Site specific gas monitoring has not been undertaken.

Recommendations	Based on the findings of this report, the following recommendations are made; ▲ A remediation strategy, and verification report; ▲ Waste classification assessment should material removal from Site be required.
This is intended as a summary only. Further detail and the limitations of the assessment are provided within the main body of the Report.	

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DRAWINGS

Drawing 1 – SITE LOCATION PLAN (Reference 2024.33.201)

Drawing 2 - PROPOSED SITE PLAN (Reference 2024.33.203)

FIGURES

Figure 1 – Site Location Map

Figure 2 – Exploratory Hole Location Plan

Figure 3 - Corrected SPT (N60) vs Depth Plots

Figure 4 – Inferred Undrained Shear Strength vs Depth Plots

APPENDICES

Appendix A – Limitations

Appendix B – Borehole Logs, SPT Calibrations Certificates

Appendix C – Geotechnical Analysis Results

Appendix D – Soil Chemical Analysis Results

Appendix E – Risk Definitions

1.0 Introduction

1.1 Appointment

Delta-Simons Environmental Consultants Limited (“Delta-Simons”) was instructed by Manchester City Football Club (the “Client”) to prepare a Geo-Environmental Assessment for the proposed Media Studio project development (the “Site”).

1.2 Context & Purpose

The aim of the study was to complete a geo-environmental assessment of the proposed development area. The investigation has obtained information regarding ground conditions, from which risks to end-users, the environment and structures have been assessed, with mitigation measures suggested where necessary. The investigation has also gathered geotechnical information to inform comment on the preliminary design of foundations and infrastructure. The report provides recommendations for further work (where appropriate) based on the findings of the investigation.

1.3 Scope of Works

The scope of the investigation and layout of this report has been designed with consideration of guidance on Land Contamination: Risk Management pages of the [GOV.UK](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/1004408/NPPF_JULY_2021.pdf) web pages, the relevant requirements of the National Planning Policy Framework (NPPF) (as revised 2021) (paragraphs 174 & 183-184)¹ and the Planning Practice Guidance (Land Affected by Contamination)²

The project was undertaken to an agreed brief as set out in Delta-Simons’ proposal (reference 21-1914.01, dated 3 September 2021).

The detailed scope of works is outlined in Section 3.

Specific sections of this report may generally follow guidance set out in Eurocode 7 for a Ground Investigation Report (GIR), as defined in BS EN 1997-1:2004 and BS EN 1997-2:2007. Eurocode 7 includes specific guidance on the number and spacing of investigation positions, methods of investigation and sample quality to be achieved which may not have been met by this investigation. The report also includes information which may support a Geotechnical Design Report (GDR) as defined in BS EN 1997-1:2004; however, unless otherwise explicitly stated, the investigation has not been undertaken in accordance with Eurocode 7 and the preliminary geotechnical interpretation, assessments, risk register (if included) and recommendations presented within this report may not meet the full requirements of a GDR.

1.4 Proposed Development

The Site comprises an area of soft landscaping within the Manchester City Football Club training ground. The proposed development comprises a new single-storey media studio.

The proposed redevelopment is subject to a planning application reference 131109/FO/2021 from Manchester City Council. The proposed development plans associated with the application, including a Site location plan and the proposed development plan for the subject Site, are included as Drawings 1 and 2 respectively. For full details of the proposed development and plans, reference should be made to the planning application. The following conditions related to land contamination have been presented:

3) a) *Before the development hereby approved commences, a report (the Preliminary Risk Assessment) to identify and evaluate all potential sources and impacts of any ground contamination, groundwater contamination and/or ground gas relevant to the site shall be submitted to and approved in writing by the City Council as local planning authority. The Preliminary Risk Assessment shall conform to City Council's current guidance document (Planning Guidance in Relation to Ground Contamination).*

In the event of the Preliminary Risk Assessment identifying risks which in the written opinion of the Local Planning Authority require further investigation, the development shall not commence until a scheme for the investigation of the site and the identification of remediation measures (the Site Investigation Proposal) has been submitted to and approved in writing by the City Council as local planning authority.

¹ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1004408/NPPF_JULY_2021.pdf

² <https://www.gov.uk/guidance/land-affected-by-contamination>

The measures for investigating the site identified in the Site Investigation Proposal shall be carried out, before the development commences and a report prepared outlining what measures, if any, are required to remediate the land (the Site Investigation Report and/or Remediation Strategy) which shall be submitted to and approved in writing by the City Council as local planning authority.

b) When the development commences, the development shall be carried out in accordance with the previously agreed Remediation Strategy and a Completion/Verification Report shall be submitted to and approved in writing by the City Council as local planning authority prior to the first use of the development.

In the event that ground contamination, groundwater contamination and/or ground gas, not previously identified, are found to be present on the site at any time before the development is occupied, then development shall cease and/or the development shall not be occupied until, a report outlining what measures, if any, are required to remediate the land (the Revised Remediation Strategy) is submitted to and approved in writing by the City Council as local planning authority and the development shall be carried out in accordance with the Revised Remediation Strategy, which shall take precedence over any Remediation Strategy or earlier Revised Remediation Strategy.

This report may be used in support of the discharge of these planning conditions.

1.5 Existing Information

The following information was made available/obtained by Delta-Simons for review:

- ▲ Arup MCFA Remediation Strategy: Central Training Facility (reference MCFA_ARP-REP_504) dated January 2013;
- ▲ BAM Construction Geotechnical Design Report (reference REP/226518/G001) dated May 2013;
- ▲ Arup MCFA Remediation Strategy: Site Wide (reference MCFA_ARP-REP_508) dated June 2013; and,
- ▲ Worms Eye Preliminary Risk Assessment (Desk Study) (reference M11 4TQ/2021) dated August 2021.

A review of these third party reports is provided for information purposes only. No reliance on these reports is assumed or inferred.

1.6 Limitations

The assessment is limited to the issues agreed within the proposal for the works. General notes on limitations associated with this assessment are provided in Appendix A.

1.7 Data Gaps and Uncertainty

In addition, the following specific data gaps and uncertainty apply to this assessment:

- ▲ The presence of underground services on-Site dictated the location of the borehole locations.
- ▲ The report assumes that risks associated with legacy coal workings have been addressed as part of historical earthworks and remedial activity and as such consideration of associated geotechnical risks is outside the scope of this investigation.
- ▲ No proposed loadings were provided by the Client.
- ▲ Site specific gas monitoring was not included within this scope of works. Ground gas recommendations are based on historical information available within third-party reports.

2.0 Site Details

2.1 Site Setting

A summary of the current Site status, environmental setting and key historical features is presented below. This has been summarised from available online information and from the existing report(s) listed in Section 1.5, which should be consulted for further detail regarding the wider Site setting.

Co-ordinates	Centred approximately at National Grid Reference 387537, 398049	Elevation	62 m AOD
		Area	0.02 Ha
Site Address and Location	The Site is located off Ashton New Road at the Manchester City Football Club training ground, approximately 3.5 km east of Manchester city centre. A Site location map is provided as Figure 1. Google Maps		
Current Site Description	The Site comprises an area of soft landscaping within the Manchester City Football Club training ground.		
Physical Setting	From published British Geological Survey mapping (1:50,000 Sheet Number 85, Manchester), the Site is indicated as being directly underlain by superficial deposits of Devensian Till comprising Diamicton. The Site is underlain by bedrock of the Pennine Upper Coal Measures Formation (PUCMF) comprising mudstone, siltstone and sandstone. Given the current development and historical uses of the Site, a variable thickness of compacted, engineered fill (between 2m and 6m) is anticipated to be present at the surface overlying the Devensian Till. The Environment Agency (EA) classifies the superficial deposits of Devensian Till as a Secondary (Undifferentiated) Aquifer. The bedrock (PUCMF) is classified as a Secondary A Aquifer. There are a number of BGS borehole records within 150m of the Site, however, given the distance and date of drilling (1955), the ground conditions encountered within these is not considered to be representative of the current ground conditions on Site, following the enabling works undertaken across the wider site area. The Geotechnical Design Report issued by BAM Construction in 2013 reported that 'no original Made Ground was left in place' within Phase 1 (which includes the area of the subject Site). The Made Ground was excavated and replaced with engineered fill, to between 2m and 6m bgl. The nearest surface water feature is the Ashton Canal located approximately 400 m to the north of the Site. The Site topography is relatively flat. The regional topography slopes gently towards the south-west.		
Key Historical Features	The earliest reviewed mapping (1848) shows the Site comprised undeveloped land. By 1933, a building was present on Site associated with Clayton Aniline Works, present until 1981. Subsequently, the industrial works complex was subject to a major remediation and enabling works programme to facilitate the current sports complex, including the subject Site, between circa 2011 and 2013. The surrounding area has been occupied by various industrial uses, including the wider Clayton Aniline Works, which included railway sidings, numerous tanks and chimneys. A colliery, numerous mine shafts, a coal pit, unspecified works, engineering works and reservoirs were located within the vicinity of the Site.		

Summary of Previous /Third Party Reports	Delta-Simons has obtained the reports detailed in Section 1.5, for review below. BAM Construction Geotechnical Design Report (reference REP/226518/G001) dated May 2013 Pertinent information from the Geotechnical Design Report, in particular in relation to the Phase 1 within which the subject Site is located, is summarised as follows: ▲ The enabling works generally included removal and processing of Made Ground to the underlying Devensian Till, and no original Made Ground was left in place within Phase 1; ▲ Devensian Till is anticipated at thicknesses between 15m and 20m beneath the placed Made Ground fill; ▲ The Bradford Fault bisects the wider site, with Coal Measures sub-cropping to the west and Sherwood Sandstone to the east; ▲ Properties of engineered fill have been established based on bench trial data and in-situ CBR, Mexe probe and plate bearing test data; ▲ Results for E' (drained stiffness modulus) were typically within the range of 40-120 MPa for areas of 'enhanced' engineered fill and 25 MPa for areas of general engineered fill; ▲ The report recommended AC-4, DC-4 classifications with respect to concrete design requirements; ▲ Grouting of worked coal seams within the wider site area is reported to have been undertaken with grout to ten times the seam thickness. It was recommended that piling is terminated at least three times the pile diameter above rockhead. It was also reported that treatment of mine shafts identified during enabling works was undertaken; and ▲ It is understood that cement stabilised Galligu (a by-product of the Leblanc process) was encountered in the wider site and has been placed beneath the Phase 1 area. Arup MCFA Remediation Strategy: Site Wide dated June 2013 Pertinent information from the Arup MCFA <i>Remediation Strategy: Site Wide</i> is summarised as follows: The remediation strategy report was produced to address pre-commencement conditions related to contamination management (namely Condition 6 of Planning Application 097342/OO/2011/N2). The preliminary conceptual model identified three potential sources of contamination (remediated Made Ground beneath hardstanding, soils placed above the remediated soils in pitches and soft landscaping and ground gases). A quantitative risk assessment subsequently discounted the risks from Made Ground and soils placed at surface, and identified the following plausible pollutant linkages in the wider site (excluding the NWDC, FM Building and CTF areas) in relation to ground gases: ▲ Inhalation of ground gases including carbon dioxide, methane, carbon monoxide and VOC (from Made Ground and Coal Measures strata) by security guards, grounds people; ▲ Accumulation of gases to explosive concentrations and causing damage to security huts/ maintenance sheds;
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	▲ Uptake of phytotoxic contaminants by vegetation planted in areas of soft landscaping; ▲ Dermal contact with soil/ soil dust, ingestion/ inhalation of soil dust, inhalation of soil vapours by grounds men digging in areas of soft landscaping. It is considered that the ground gases including, may accumulate and reach potentially toxic or explosive concentrations in the building. Six programmes of gas monitoring were undertaken (between 2006 and 2012) in response to the identified risk. The report details the particulars of each monitoring programme (four undertaken for pre-constraints removal works and two undertaken for post-constraints removal works). It summarises that low levels of carbon dioxide and methane suggest the site falls under Characteristic Situation 1 for a commercial development however the levels of carbon monoxide and VOC recorded during the recent gas monitoring were elevated. The conceptual site model suggest vapours from the Made Ground may enter the site buildings and it is considered that protective measures in line with those recommended for a Characteristic Situation 2 site are required to mitigate the risk from these gases. The following gas protection measures are recommended, in line with the overall recommendation to install gas protection measures in line with a Characteristic Situation 2 classification: ▲ A synthetic low permeability gas/ vapour membrane, which is designed to prevent migration of VOC and carbon monoxide; ▲ Cast in-situ concrete floor slab above the gas membrane. Arup MCFA Remediation Strategy: Central Training Facility (reference MCFA_ARP-REP_504) dated January 2013 Pertinent information from the Arup Remediation Strategy: Central Training Facility is summarised as follows: This remediation strategy report was produced to address pre-commencement conditions related to contamination management (namely Condition 6 of Planning Application 097341/00/2011N2L). The conceptual model identified a plausible pollutant link between users of the site and accumulation of ground gases originating from Made Ground and the Coal Measures at depth beneath the site. Five separate programmes of ground gas monitoring were undertaken (between 2006 and 2012) in response to the identified risk. The report details the particulars of each monitoring programme (four undertaken for pre-constraints removal works and one undertaken by GGS for post-constraints removal works). It summarises that all five programmes determined a worst-case Characteristic Situation value of 2 (CS2) for the Site. The post-constraints removal works monitoring indicated that concentrations of carbon dioxide and methane had reduced as a result of the Constraints Removal Works; however residual volatile organic vapours and Carbon monoxide (in the shallow soils and elevated above occupational exposure levels within GM4) were detected. It was therefore concluded that gas protection measures should be considered for the future buildings and structures within Central Training Facility (which the subject Site sits within). Specifically, the following measures were recommended: ▲ Ground gas protection measures for all structures (including the covered pitch) are required in line with Characteristic Situation 2 as defined by CIRIA
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	C665, which are also capable of excluding Volatile Organic Compounds (VOC). ▲ The design of these protection measures must also be coordinated with requirements for the structural waterproofing elements. ▲ Additional gas protection measures are required beneath the covered pitch including a more resistant gas membrane capable of excluding VOC. ▲ The performance specification and level of gas protection required are outlined in the Arup Performance Specification for Ground Gas Protection CTF and FM Building Rev A. ▲ Should a piling solution be used, careful consideration of the methods employed should be given to not create a preferential pathway for ground-gases to migrate to the buildings. Preference should be given to Continuous Flight Auger (CFA) or bored and filled in-situ, concrete piles. The concrete type should be suitably resistant to ground conditions. Worms Eye Preliminary Risk Assessment (Desk Study) (reference M11 4TQ/2021) dated August 2021 Pertinent information from the Worms Eye Preliminary Risk Assessment (Desk Study) is summarised as follows: The Preliminary Risk Assessment was produced to support the Media Centre application and considers contamination, landfill gas and geotechnical issues. A desk-based conceptual model concluded that aggressive ground conditions (sulphate), hydrocarbons and landfill/ground gas are potential sources of contamination. The following gas protection measures are recommended: ▲ Ventilation of confined spaces within buildings. ▲ A well-constructed ground slab/suspended floor with sub-floor venting. ▲ Visqueen Gas Barrier (blue with foil layer – resists methane, carbon dioxide and radon). ▲ Minimum penetration of ground slab by services. The following additional investigations are recommended: ▲ A series of water soluble sulphate tests are suggested to confirm the requirement for sulphate resistant concrete. ▲ Tests for a general suite of contaminants to classify soils for disposal off-site. ▲ A series of boreholes are suggested to inform the foundation design.
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2.2 Preliminary Conceptual Site Model

A summary of the preliminary Conceptual Site Model is presented below. The following key pathways and receptors have been identified at the Site:

Pathways

- ▲ P1 - Direct contact, ingestion or inhalation of soil bound contaminants/dust during or following redevelopment.
- ▲ P2 - Inhalation of organic vapours associated with contamination.

- ▲ P3 - Migration of ground gas/vapours into on-Site buildings causing asphyxiation or risk of explosion.
- ▲ P4 - Leaching of contamination into groundwater followed by migration of groundwater to the wider groundwater environment or discharge to surface waters.
- ▲ P5 - Direct contact between aggressive ground conditions and new infrastructure.

Receptors

- ▲ R1 - Construction workers.
- ▲ R2 - Third parties during construction (adjacent Site users and adjacent residents).
- ▲ R3 - Future Site users and maintenance workers.
- ▲ R4 - The Built Environment (new buildings and infrastructure / utilities).

Source	Potential Contaminants of Concern (CoC)	Pathway(s)	Receptor(s)	Preliminary Risk Rating
On-Site Made Ground deposits	Asbestos, heavy metals, PAHs, TPH and VOCs	P1, P2, P3, P4, P5	R1, R2, R3, R4	Low to Moderate

3.0 Ground Investigation

3.1 Intrusive Investigation

Delta-Simons carried out intrusive investigation work from 14th to 15th September 2021 to assess the potential linkages identified in the outline conceptual model (see Section 2.2 above) and to provide geotechnical information.

3.2 Ground Investigation and Rationale

3.2.1 Intrusive Works

The ground investigation comprised the following items:

- ▲ Service avoidance exercise and topographic survey of exploratory holes to x,y,z coordinates;
- ▲ Supervision of all works by a Delta-Simons Geo-Environmental engineer. All intrusive locations were logged to BS 5930:2015+A1:2020 Code of Practice for Ground Investigation.
- ▲ Drilling of four dynamic sampler boreholes (DS401 to DS403 and DS404A) to a maximum depth of 5.45 m bgl; and
- ▲ Drilling of one rotary borehole utilising dynamic sampling and open-hole methodologies (RO101) to a maximum depth of 15.00 m bgl.

An intrusive exploratory hole location plan is presented as Figure 3.

Specific limitations affecting the proposed scope of works are summarised in Section 1.7.

Delta-Simons exploratory borehole logs are presented as Appendix B together with the SPT Calibration Certificates, in accordance with BS EN ISO 22476-3:2005+A1:2011 (incorporating corrigendum No. 1 2007), Geotechnical investigation and testing - Field testing - Part 3: Standard penetration test for SPT trip hammers are provided in Appendix B.

3.2.2 Rationale

Location	Rationale	Key Contaminants of Concern
DS401-DS403 and DS404A	Boreholes drilled to provide general coverage and geotechnical data.	Asbestos, heavy metals, TPH and PAHs
RO101	Rotary borehole utilising dynamic sampling and open-hole techniques to provide deeper geotechnical data to potentially inform preliminary pile design.	pH, Sulphur (Chemical attack from aggressive, sulphurous ground conditions).

3.3 Geotechnical Sampling and In-Situ Testing

3.3.1 Sampling

Sampling comprised disturbed tub (D), bulk samples (B) and environmental samples (ES) as detailed on the borehole logs.

3.3.2 In-Situ Tests

SPT tests were undertaken in all boreholes at 1.00 m intervals until 10.00 m bgl, then every 1.5 m bgl thereafter. The results of these tests are presented on the borehole logs included as Appendix B. Plots of corrected SPT N values versus depth are included as Figures 4a and 4b.

3.4 Geotechnical Laboratory Testing

A selection of soil samples were submitted to the UKAS accredited laboratory for a range of geotechnical testing, the results of which are included in Appendix C. The rationale for the laboratory tests undertaken is provided in the table below.

Laboratory Test	Test Standard	Number of Samples Tested	Rationale
Classification			
Moisture Content	BS1377-2:3 or BS EN ISO 17892-1	11	To assess the potential for cohesive soils to shrink and swell due to changes in the water content of a soil. Often associated with the presence, removal or addition of trees and shrubs, as well as seasonal changes.
Liquid and Plastic Limits	BS1377-2:4 – 5 or BS EN ISO 17892-12	11	
Particle Size Analysis (sedimentation)	BS1377-2:9.2 & 9.3	2	To assess the suitability of the natural soils for re-use as an acceptable earthworks material in accordance with the Specification for Highways Works (SHW) (Series 600).
Geo-Chemical – Soil Samples			
pH	BRE Special Digest 1	5	To assess the soil conditions of the Site in accordance with BRE Special Digest 1 Concrete in aggressive ground and specify an appropriate concrete class to resist chemical attack.
Water-Soluble Sulphate (2:1 water/soil extract)		5	
Acid Soluble Sulphate		5	
Total Sulphur		5	

3.5 Environmental Sampling and Laboratory Analysis

Soils collected for laboratory analysis were placed in a variety of containers appropriate to the anticipated testing suite. Records of the samples taken as part of the Site investigation works, including their depths and location, are included within the exploratory hole records in Appendix B.

Samples were stored in accordance with Delta-Simons' quality procedures to maintain sample integrity and preservation and to minimise the chance of cross contamination. Samples analysed for environmental purposes were placed in chilled cool boxes on site and transported to the laboratory for analysis on completion of the Site investigation works.

The rationale for chemical analysis is presented in the table below and the results of the chemical laboratory testing are included in Appendix D.

Analytes	No. of Samples Tested		Rationale
	Soil	Ground-water	
Asbestos	5	-	Common potential contaminant - Analysed in all samples of Made Ground.
pH, As, Cd, Cu, Cr, Hg, Pb, Ni, Zn	5	-	Potential contaminants of concern, common to many sites.
speciated Polycyclic Aromatic Hydrocarbons (PAH)	9	-	
Total Petroleum Hydrocarbons, Criteria Working Group Method (TPHCWG), Benzene, Toluene, Ethylbenzene and Xylene (BTEX)	9	-	
pH, sulphate	5	-	To assess potential for chemical attack on buried concrete.

Analytes	No. of Samples Tested		Rationale
	Soil	Ground-water	
Total Organic Carbon (TOC)	3	-	To allow comparison of potentially elevated contaminants against their relevant assessment criteria.

4.0 Ground Summary

4.1 Introduction

The sections below summarise the ground and groundwater conditions encountered during the Site investigation.

4.2 Ground Summary

A summary of the observed ground conditions at the Site is provided.

Strata	Typical Strata Description	Depth Range of Strata Top (m)	Depth Range of Strata Base (m)	Maximum Proven Thickness (m)	Comments
Made Ground	Dark brown slightly gravelly clayey fine to coarse SAND with occasional rootlets. Gravel is subangular to subrounded fine to medium of concrete, sandstone and brick. Firm dark grey slightly sandy slightly gravelly locally gravelly CLAY with low cobble content and occasional pockets of ash. Sand is fine to coarse. Gravel is angular fine to coarse of brick, concrete, sandstone, coal and clinker. Cobbles are angular of brick.	0.00	5.45-5.70	5.70	<i>Encountered in all exploratory holes overlying the Devensian Till. The base of Made Ground was not proven in DS101 to DS103 and DS104A.</i>
Devensian Till	Firm to stiff greyish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subrounded fine to medium of mudstone and siltstone.	5.70	9.40	3.70	<i>Encountered in RO101</i>
Weathered Pennine Upper Coal Measures Formation	Very stiff greyish brown sandy CLAY. Sand is fine to coarse.	9.40	13.90	4.50	<i>Encountered in RO101</i>
Pennine Upper Coal Measures Formation	Yellowish brown fine to medium grained SANDSTONE	13.90	15.00 (Not Proven)	Not Proven	<i>Encountered in RO101</i>

The thickness of the Made Ground was proven in RO101 only, where it was encountered to 5.70 m bgl. The Made Ground was recorded to comprise both cohesive and granular deposits with anthropogenic material such as brick, ash, concrete, sandstone, coal, clinker, plastic and wood. Observations of Made Ground soils during the ground investigation did not generally suggest a putrescible composition, however occasional fragments of wood were recorded as well as rootlets in shallow Made Ground soils.

4.3 Groundwater

4.3.1 Strikes During Investigations

The groundwater strikes during the ground investigation are summarised below.

Exploratory Hole	Water strike during drilling (m bgl)	Water strike during drilling (m AOD)	Stratum	Comment
RO101	1.80	61.99	Made Ground	Slow seepage

4.4 Visual and Olfactory Evidence of Contamination

The following visual and olfactory evidence of contamination was identified within Made Ground during this investigation:

Location	Depth (m bgl)	Observation
DS101	3.2 – 5.0	Pockets of ash and slight hydrocarbon odour
DS102	2.9 – 5.45	Slight hydrocarbon odour
DS103	0.8 – 5.45	Pockets of ash
	3.1 – 3.6	Black with slight hydrocarbon odour
DS104A	2.0 – 5.45	Pockets of ash and slight hydrocarbon odour
	4.0 – 4.7	Dark grey and black with coal and ash
RO101	2.8 – 5.7	Slight hydrocarbon odour

4.5 Material Properties

The table below summarises the factual material properties based upon the results of in-situ and laboratory test data and where appropriate provides derived geotechnical parameters.

Parameter	Unit	Value or Range	Justification
Made Ground			
Uncorrected SPT 'N'	Blows	10 – 50	In Situ Testing
Corrected SPT 'N ₆₀ '	-	9 – 46	SPT N values corrected for energy ratio (Er) after BS EN ISO 22476-3:2005. Er stated on borehole logs.
W (Moisture Content)	%	17 – 25	Laboratory Testing
IP (Plasticity Index)	%	24 – 34	
IP' (Modified Plasticity Index)	%	20 – 26	IP' value calibrated as 'IP' = ((IP x % Passing 425 _{um})/100)'
PL (Plastic Limit)	%	22 – 32	Laboratory Testing
LL (Liquid Limit)	%	46 – 66	

Parameter	Unit	Value or Range	Justification
Devensian Till			
Uncorrected SPT 'N'	Blows	16 – 42	In Situ Testing
Corrected SPT 'N60'	-	15 – 38	SPT N values corrected for energy ratio (Er) after BS EN ISO 22476-3:2005. Er stated on borehole logs.
W (Moisture Content)	%	13 – 23	Laboratory Testing
IP (Plasticity Index)	%	19 – 21	
IP' (Modified Plasticity Index)	%	18 – 20	IP' value calibrated as ' $IP' = ((IP \times \% \text{ Passing } 425_{um})/100)'$
PL (Plastic Limit)	%	14 – 21	Laboratory Testing
LL (Liquid Limit)	%	33 – 42	
Cu (Inferred Undrained Shear Strength)	kPa	75 – 190	Derived using Stroud (1975) relationship and is defined as $Cu = f_1 \times N$, where f_1 is inferred from plasticity index testing. An f1 value of 5.1 has been adopted, based on the average plasticity index obtained from laboratory analysis within Devensian Till.
Weathered Pennine Upper Coal Measures Formation			
Uncorrected SPT 'N'	Blows	50	In Situ Testing
Corrected SPT 'N60'	-	46	SPT N values corrected for energy ratio (Er) after BS EN ISO 22476-3:2005. Er stated on borehole logs.
W (Moisture Content)	%	7.3 – 18	Laboratory Testing
IP (Plasticity Index)	%	11 – 18	
IP' (Modified Plasticity Index)	%	10 – 18	IP' value calibrated as ' $IP' = ((IP \times \% \text{ Passing } 425_{um})/100)'$
PL (Plastic Limit)	%	12 – 18	Laboratory Testing
LL (Liquid Limit)	%	23 – 36	
Pennine Upper Coal Measures Formation			
Uncorrected SPT 'N'	Blows	50	In Situ Testing
Corrected SPT 'N60'	-	46	SPT N values corrected for energy ratio (Er) after BS EN ISO 22476-3:2005. Er stated on borehole logs.

Plots of corrected SPT N value versus depth per strata are presented as Figures 4a and 4b. Plots of undrained shear strength versus depth per strata are presented as Figures 5a and 5b.

4.5.1 Earthworks Classification Testing

The table below summarises material grading results undertaken within shallow Made Ground soils and the corresponding earthworks class, in accordance with the Specification for Highways Works, Series 600, Table 6/2:

Exploratory Location	Depth (m bgl)	Strata	Cobble Content (%)	Gravel Content (%)	Sand Content (%)	Fines Content (%)		Series 600 Earthworks Class (Table 6/2)
						Silt	Clay	
DS103	3.50 – 4.00		0.0	27.0	28.0	31	14	Class 2C

DS104A	2.50 – 3.00	Made Ground	0.0	5.0	36.0	43	16	Class 2A/2B
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4.6 Geochemical Testing

Geochemical analysis was undertaken on ten soil samples of Made Ground, tested for selective contaminants (BRE Special Digest 1:2005 (3rd Edition), Concrete in Aggressive Ground, the results of which are summarised in the table below.

Tests	No. of Tests	Minimum	Maximum
Made Ground			
Soil - pH	10	8.4	9.9
Soil - Total Sulphur	5	0.207%	0.859%
Soil – Total Sulphate	5	0.249%	1.23%
Soil - Water Soluble Sulphate	10	193 mg/L	2340 mg/L

5.0 Geotechnical Assessment

5.1 Introduction

5.1.1 Summary of Development Proposals

The Site has outline planning permission for a proposed new single-storey media studio. A proposed development plan is provided as Drawing 2.

At the time of writing, structural and floor loadings and final levels were unknown. Consequently, the information provided below should be treated as preliminary and will be subject to review once a scheme and levels have been finalised. As a result, further detailed assessment may be required.

5.1.2 Preliminary Geotechnical Hazards

The geohazards listed below have been identified to follow guidance presented in the HE document CD622 'Managing Geotechnical Risk' (2019) which aims to identify and manage the geotechnical risks associated with a scheme throughout its lifespan, from planning to construction to maintenance.

The following geohazards are considered to be substantial ground related risks associated with the proposed development. A substantial risk is defined by Delta-Simons in Appendix E.

Deep Made Ground: Made Ground is typically variable in nature and strength with a potentially low bearing capacity. Made Ground is often also associated with unacceptable levels of total/differential settlement. Although the Site has been subject to intensive historical earthworks, the competency and strength properties of the Made Ground cannot be guaranteed in its current form.

Aggressive Ground Conditions: The ground model comprises deep Made Ground, Devensian Till and underlying Pennine Upper Coal Measures bedrock. There is therefore the potential for the ground model to sustain aggressive, sulphurous ground conditions in the Made Ground, and also a potentially pyritic environment in the underlying natural soils.

5.2 Earthworks

The Site has been subjected to an intensive historical earthworks programme as part of the wider remediation and development of the existing Manchester City Football Club campus and associated facilities. A Geotechnical Design Report (as reviewed above) suggests that "enhanced" fill was placed in the vicinity of the Elite Training and Academy buildings within Phase 1 (adjacent to the current Site area). The fill placed within this area is recorded to have utilised both Class 6N and 6F2 granular fill.

At the time of writing, finished levels were unclear although, it is understood that to some degree earthworks will be required as part of the proposed development. A significant cut and fill operation is not anticipated.

Shallow earthworks and excavations will predominantly encounter Made Ground. Due to the depth of natural Devensian Till, such strata is not likely to be encountered during earthworks operations.

The results of the material classification in section 4.5.1 suggests that the Made Ground on-Site will likely fall into Class 2A/2B and Class 2C (General Cohesive Fill). Given the variable nature of Made Ground soils, this classification may however differ locally.

Although significant earthworks fill operations and raising of levels is not anticipated to be required as part of Site enabling works, any materials used as fill will need to be placed to a suitable engineering specification with the degree of compaction required dependent on end usage and serviceability criteria. For example, a lesser degree of compaction may be suitable for paved areas, however foundations and ground bearing slabs will likely require a higher degree of compaction.

5.3 Foundations

5.3.1 Volume Change Potential

The liquid limits recorded in the cohesive Made Ground suggest a medium to high plasticity, whilst the underlying Devensian Till is of low to medium plasticity.

As a result, the modified plasticity index results suggests that Made Ground soils are of medium volume change potential. The underlying Devensian Till in contrast are of low to medium volume change potential. In the majority of samples the cohesive Made Ground was also indicated to be significantly desiccated.

The volume change potential of soils should be considered in any foundation or engineering solution, including piling.

5.3.2 Shallow Spread Foundations

The Made Ground in its current form is considered to be unsuitable as a viable founding stratum due the thickness of the strata and potential for an inconsistent and highly variable composition. In addition, it is understood that, contrary to the remediation work previously undertaken which was indicated to have comprised the placement of 'enhanced' selected granular fill, the majority of the Made Ground appears to comprise general cohesive fill, with only a thin covering of granular material (typically < 1m). Moreover, this cohesive fill is of medium volume change potential and is also indicated to be predominately significantly desiccated.

As a result, shallow spread foundations are considered unsuitable for the proposed single-storey media centre unless bearing pressures are reduced to a very low level or Made Ground soils are improved and stabilised.

Dependent on proposed loadings, a ground improvement solution maybe a more cost-effective alternative to piling. Such improvement methodologies may include, but are not limited to, reinforcement techniques such as Vibro Stone Columns (VSC) or Controlled Modulus Columns (CMC), or stabilisation by soil mixing.

VSC and CMC techniques involve the installation of stone/concrete columns. Typically, VSC's may achieve bearing capacities of up to 120 kPa. CMC's may allow higher loadings depending on end-use and serviceability criteria and can be used in soils that are deemed unsuitable for vibro techniques. In any event, ground improvement will likely improve achievable bearing capacities and reduce total and differential settlements to within acceptable values.

Such techniques may therefore enable the utilisation of shallow mass concrete pad, strip or raft foundations depending on required design loadings. A specialist ground improvement contractor should be consulted to understand feasibility and suitability of techniques, whose design should be warranted if this is to be considered further.

5.3.3 Piling

A piled foundation solution using traditional bored or Continuous Flight Auger (CFA) piles transferring loads to competent geology may be suitable in the event proposed design loads exceed that achievable using other methodologies, utilising both skin friction and end bearing capacity. Piling may also be a requirement in the event settlement tolerances are minimal, thus removing ground improvement as a solution. Driven piling is unlikely to be considered feasible at the Site due to the proximity of adjacent structures and the potential for onerous levels of noise and vibration.

The precise method of pile installation and applicability of proprietary systems, diameters and depths required would need to be informed based on the results of this investigation, by discussions with a piling contractor with suitable experience, whose design should be warranted.

It is recommended that any relict basements, foundations, piles caps and other obstructions are removed, and the locations of existing piles (if present) recorded to avoid in-ground obstructions during piling. However, given the history of the Site and associated earthworks, the risk of encountering any obstructions is considered to be low.

Normal static dynamic load, and integrity testing (including uplift tests) should be considered to achieve satisfactory quality control/assurance in accordance with good practice.

There will be a requirement for the placement of a suitably engineered piling mat, which should be designed in accordance with BRE 470, "Working Platforms for Tracked Plant" and validated by a suitably qualified and experienced engineer.

5.3.4 Floor Slabs

In the event a ground improvement solution is utilised to stabilise and prepare Made Ground soils, a ground bearing slab formation may be feasible should the floor slab be cast on the near surface granular Made Ground and subject to any limitations from the ground gas regime at the Site. A ground bearing floor slab would not be considered appropriate if cast close to the underlying cohesive Made Ground which is indicated to be desiccated and could potentially exert heave pressures on the floor slab. Alternatively, heave protection measures could be incorporated below the design of any ground bearing slab.

Should a piled foundation solution be implemented, either a ground bearing or suspended floor slab will be suitable, partly subject to the ground gas regime at the Site and comments relating to potential heave pressures from the desiccated cohesive Made Ground discussed above. Where piles are utilised, it is recommended that unsuitable Made Ground soils are excavated, screened as necessary, placed to a suitable specification and proof-rolled prior to casting the floor slab.

The extent of formation preparation is dependent upon floor slab level (proximity to the underlying cohesive Made Ground) and the transfer of loadings, i.e. floor slab end-bearing directly upon piles, or the floor slab transferring the majority of the loading to prepared ground with wider structural loadings supported on piles.

Formation preparation may also consider the incorporation of a piling mat into the design.

5.4 Excavations & Obstructions

It is expected that conventional mechanical excavators will readily remove the Made Ground likely to be encountered in shallow excavations although a breaker may be required to remove any existing concrete hardstanding. Chrysotile asbestos has been identified in one location within Made Ground soils. As such, control measures may be required during shallow excavations and considered as part of any risk assessment.

All shallow foundation or services excavations at the Site should be considered unstable, therefore, temporary support of all excavations should be considered when excavating on-Site. All excavation should be undertaken in accordance with CIRIA Report 97 "Trenching Practice".

5.5 Groundwater

Significant groundwater would not be anticipated during the excavations required as part of the proposed development, however localised perched groundwater within Made Ground soils cannot be discounted, following a slow seepage identified in RO101 at 1.80 m bgl (61.99 m AOD). Any such seepages should be readily dealt with but traditional sump and pump techniques. Any water ingress into shallow foundations may cause softening of the formation layer. Therefore excavations should be protected from adverse weather conditions and groundwater ingress prior to casting any concrete.

5.6 Chemical Attack on Buried Concrete

In accordance with the recommendations of BRE Special Digest 1, 'Concrete in Aggressive Ground' 2005, the conditions of the shallow Made Ground soils at the Site classify as Design Sulphate Class DS-4 and ACEC Class AC-4 for soils and groundwater, when considering the most appropriate type of concrete to be used at the Site in order to resist chemical attack from elevated sulphate present in the soils (assuming mobile groundwater in potentially pyritic soils).

6.0 Generic Quantitative Risk Assessment

6.1 Introduction

The presence of hazardous substances in or on a Site is generally only of concern if an actual or potential unacceptable risk exists. Legislation and guidance on the assessment of contaminated sites, consistent with UK best practice, acknowledges the need for a tiered risk-based approach. This section represents a Generic Quantitative Risk Assessment (GQRA) being a comparison of Site contaminant levels against Generic Assessment Criteria.

6.2 Human Health GQRA

The assessment of risks in relation to human health has been undertaken using Generic Assessment Criteria (GAC) as detailed within the appropriate tables. Risk from soil has been considered. The GAC are predominantly based on long term (chronic) risk to health. However, in the limited circumstances where short-term (acute) risks are more pronounced, these GAC have been utilised to ensure a thorough and conservative initial assessment is undertaken.

Based on the proposed commercial use, the soil chemical data has been compared against a commercial end use GAC for 1% soil organic matter (SOM) content.

6.2.1 Risks from Soil Sources

Asbestos has been recorded in one sample of Made Ground soil, at 0.9 m bgl in DS103. Laboratory analysis of four shallower soil samples taken from RO101 (0.70 m), DS101 (0.50 m), DS102 (0.40 m) and DS104A (0.80 m) did not detect any asbestos; therefore, evidence of widespread contamination does not appear to be present at the Site. The main exposure pathway for asbestos fibres is inhalation of soil/dust and so the contaminant linkage to future Site users can be broken by the retention of topsoil above the Made Ground (or an alternative clean cover system) in proposed soft landscaped areas.

None of the other contaminants of concern analysed for in the soil samples exceeded the commercial GACs.

6.3 Built Environment

6.3.1 Potable Water Supply Pipes

The investigation requirements for the selection of potable water pipe material are set out in UKWIR Report 10/WM/03/21 Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites (UKWIR, 2010). This report has very specific and onerous investigation requirements and as such the detailed investigation of each utility route was not within the scope of this investigation. It is understood that no water supply pipes will be installed within the proposed building as shown in the Proposed Plan 2024.33.301 dated 9 July 2021, included as Drawing 2. However, the relevant water supply company should be contacted at an early stage to confirm its requirements for assessment, should water pipes be required within the proposed development, and it should be noted that the water supply company requirements may not necessarily be the same as those recommended by UKWIR.

6.3.2 Building Materials

Risks to building materials associated with aggressive ground conditions are addressed in Section 5.9.

6.4 Waste Management

In recent years a number of mechanisms have aimed to change the way in which waste materials have traditionally been managed (*i.e.* a move away from less sustainable options such as landfill disposal). These include:

- ▲ Legislation and guidance (e.g. the Waste Framework Directive [2008, as amended]; the Waste [England and Wales] Regulations, 2011; the Definition of Waste: Development Industry Code of Practice, Version 2 [DoWCoP; CL:AIRE, 2011]).
- ▲ Fiscal drivers (e.g. the landfill tax escalator).
- ▲ Corporate responsibility campaigns (e.g. WRAP: Halving waste to landfill & Quality Protocol projects; Ellen Macarthur Foundation).

There is now a greater focus on waste re-use, treatment and recovery as organisations try and move their waste materials up the Waste Hierarchy and move to more circular models of material supply and re-use.

In accordance with current industry best practice, guidance and legislation Delta-Simons would always recommend options including managing materials on Site through the DoWCoP, waste treatment and waste recovery be considered ahead of landfill disposal. Landfill disposal should be seen as an option of last resort given that in terms of cost, environment and social outcomes it is less sustainable. However, the availability of alternatives to landfill disposal depends on the timescales of the project, proactive involvement of qualified advisors and the nature and status of the materials being considered.

6.5 Waste Classification

In general, the predominant waste material encountered during the construction phase of development schemes will likely be construction and demolition waste, predominantly waste soils and crushed demolition arisings. These may be found *in situ* in the ground or stockpiled on sites and they may be contaminated which may have implications for their classification and subsequent management.

This investigation was not undertaken to advise on the classification or potential management routes for such waste materials. Classification and management of these types of wastes either on to Site, off Site or within the development are likely to require further investigation and assessment. The extent of such work will depend on the particular management option that is being considered and could, for example, involve the use of waste acceptance criteria analyses.

7.0 Revised Conceptual Site Model

A revised CSM is presented in the table below, and has been formulated taking into account all of the available data from the Delta-Simons intrusive investigation, suitable for the proposed commercial end-use of the Site.

Revised Conceptual Site Model				
Source	Pathways	Receptors	Pollutant Linkage?	Discussion and Mitigation
Asbestos in shallow Made Ground	Inhalation of soil/dust	Human health – future site users	Yes	It is anticipated that Made Ground will remain on-Site. Where Made Ground is present, the risk from identified asbestos can be mitigated by the provision of hardstanding or a suitable thickness of clean cover in soft landscaped areas, to break contaminant linkage.
		Human health – construction workers	Yes	Short term risk would be mitigated by use of PPE and provision of suitable welfare facilities.
Ground gases	Indoor exposure/explosive hazard via enclosed space accumulation of ground gas	Human health – future site users	Yes	Additional ground gas monitoring was not included within the scope of this assessment. Therefore, this assessment is based on historical information available to Delta-Simons. During continuous gas monitoring carried out by GGS in 2021, residual volatile organic vapours and elevated carbon monoxide concentrations were identified in the Central Training Facility (CTF) area, within which the subject Site is located. Subsequently, ground gas protection measures for all structures within the CTF area were recommended in line with Characteristic Situation 2.

8.0 Conclusions & Recommendations

8.1 Ground Model Summary

Ground conditions underlying the Site were found to comprise deep Made Ground overlying Devensian Till and completely weathered and competent Pennine Upper Coal Measures Formation.

Although groundwater was encountered during drilling within the Made Ground, this was considered to represent limited, discontinuous, perched groundwater bodies.

8.2 Geotechnical Summary

Deep Made Ground has been encountered on Site, in accordance with the anticipated ground conditions following the wider site enabling works. Although the Site has been subject to intensive historical earthworks, the competency and strength properties of the Made Ground cannot be guaranteed in its current form.

Aggressive ground conditions have been encountered within the Made Ground, and the underlying natural soils are potentially pyritic. Concrete used as part of the redevelopment should be suitable for a DS-4 AC-4 classification.

Cohesive Made Ground is considered to have a medium to high plasticity and medium volume change potential, while the underlying Devensian Till has a low to medium plasticity and medium volume change potential. It is also considered to be desiccated. Therefore shallow spread foundations are considered unsuitable unless Made Ground soils are improved and stabilised. Alternatively a piled foundation solution (traditional bored or continuous flight auger) would be feasible to support the proposed development.

8.3 Contamination Summary

The investigation has been carried out in order to provide information on the quality of the soil beneath the Site in the context of land contamination for a commercial end use. The assessment is being completed prior to the proposed redevelopment of the Site.

Data gaps and uncertainties remain as outlined within Section 1.7.

8.3.1 Human Health

Asbestos has been recorded in only one sample of Made Ground, at 0.9 m bgl. Laboratory analysis of four shallower soil samples taken from across Site did not detect any asbestos, and therefore, evidence of widespread contamination does not appear to be present at the Site. Retention of topsoil material (or an alternative clean cover system) in any proposed soft landscaping areas would mitigate the risk to future Site users.

Groundworkers and sub-surface maintenance workers should be made aware of the possibility of encountering contaminated soils through toolbox talks and in particular the potential presence of asbestos and an appropriate protocol to mitigate exposure of the workforce and general public should be in place. The Contractor will need to prepare a risk assessment which identifies a safe system of work to handle the asbestos containing soils which is likely to include asbestos awareness training, a protocol for unexpected finds (should gross asbestos material be identified) as well as safe working procedures such as damping down of excavations and stockpiles in line with general dust generation mitigation. The risk assessment will need to identify the appropriate levels of PPE and/or respiratory protective equipment (RPE) required. This recommendation should be captured in Site health and safety documentation and in maintenance plans.

8.3.2 Ground Gas

During continuous gas monitoring carried out by GGS in 2012, residual volatile organic vapours and elevated carbon monoxide concentrations were identified within the Central Training Facility area, which includes the subject Site.

Subsequently, ground gas protection measures for all structures within the CTF area were recommended in line with a Characteristic Situation 2 classification.

8.3.3 Built Environment

The ground investigation was not designed to assess ground conditions in full accordance with the UKWIR guidance for water supply pipes. However, based on the general absence of petroleum hydrocarbons including hydrocarbons in the ground, the use of standard plastic infrastructure is likely to be suitable in the event that new water supply pipes are required. If water supply pipes are required within the new development, the local water authority should be contacted to confirm their pipeline requirements.

Aggressive ground conditions associated with elevated sulphates recorded in the soils have the potential to attack buried concrete, particularly where the ground has the potential to be oxidised (e.g. through ground disturbance or addition of water). Buried concrete is recommended to be designed to concrete design class DS-4 and ACEC-4 within the Made Ground.

8.4 Recommendations

Based on the findings of this Report, the following recommendations for supplementary works are made:

- ▲ A remediation strategy, and subsequent verification reports, should be produced to confirm appropriate mitigation for identified contaminants;
- ▲ Waste classification has not been undertaken as part of the scope of works, should it be proposed to dispose of materials from the Site then specific additional investigations may be needed to classify the materials in accordance with current regulatory requirements.

Drawings

Drawing 1 – SITE LOCATION PLAN (Reference 2024.33.201)

Drawing 2 - PROPOSED SITE PLAN (Reference 2024.33.203)

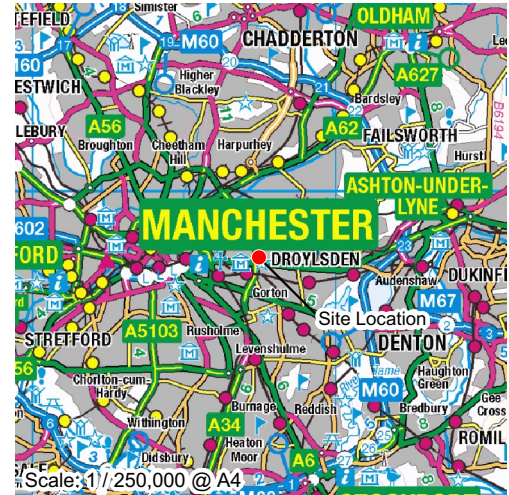


ref	revision	by	date

	Architects Quantity Surveyors		21 Silverwell Street Bolton BL1 1PR t: 01204 525321 email: info@bghbolton.co.uk www.bghbolton.co.uk	
	Bradshaw Gass & Hope LLP			
client CITY BUILD LTD				
project MEDIA STUDIO PROJECT - CFA				
drawing PROPOSED SITE PLAN				
drawn by DJH		date 09.07.2021		
checked by		date		
scale 1:100		A1		
dwg no 2024.33.203		rev		

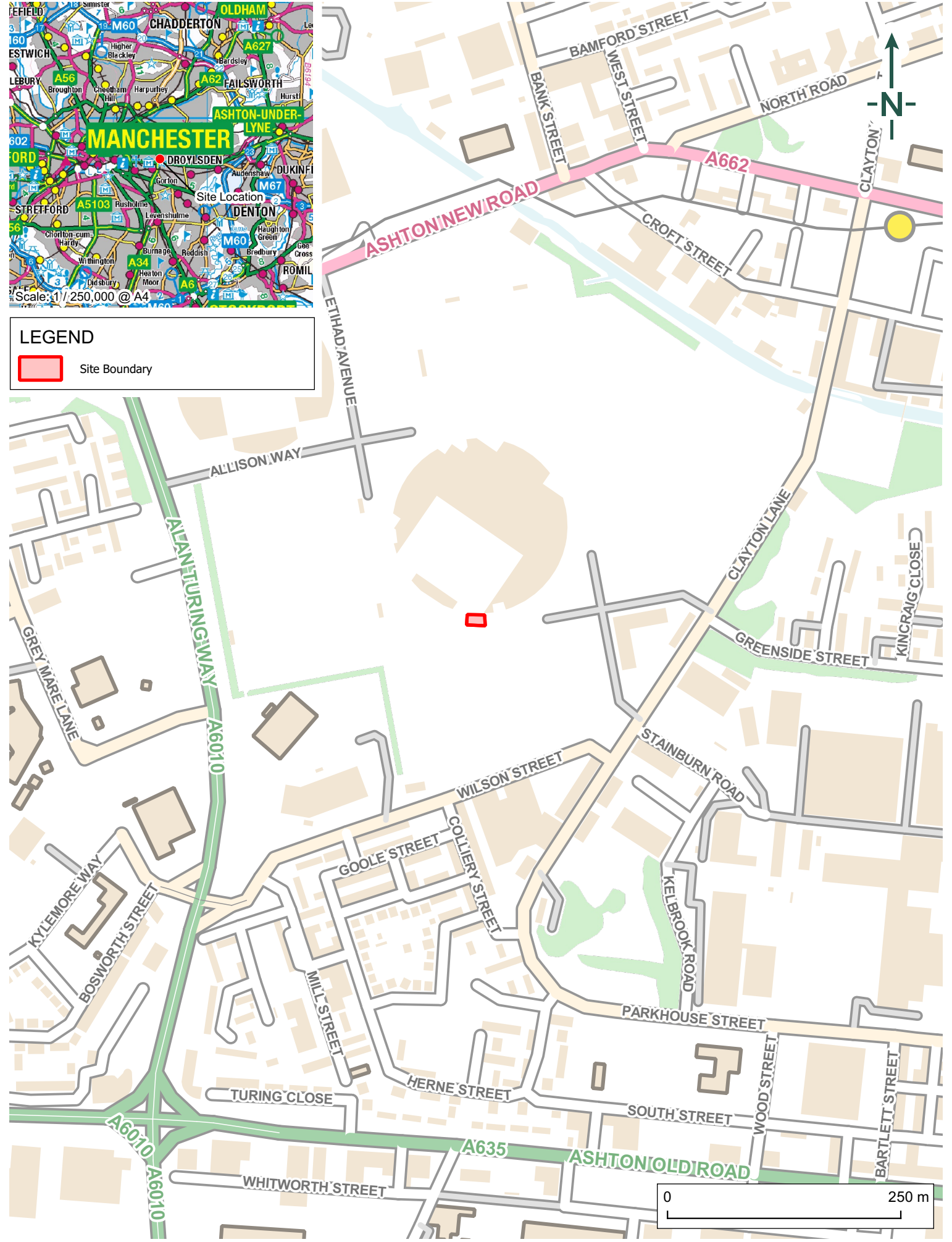
Figures

Figure 1 – Site Location Map



LEGEND

-  Site Boundary



Scale: 1:5,000 @ A4

Service Layer Credits: Contains OS data @ Crown Copyright and Database Right 2019

Figure 2 – Exploratory Hole Location Plan



Bing Maps

LEGEND

Site Boundary

 Site Boundary

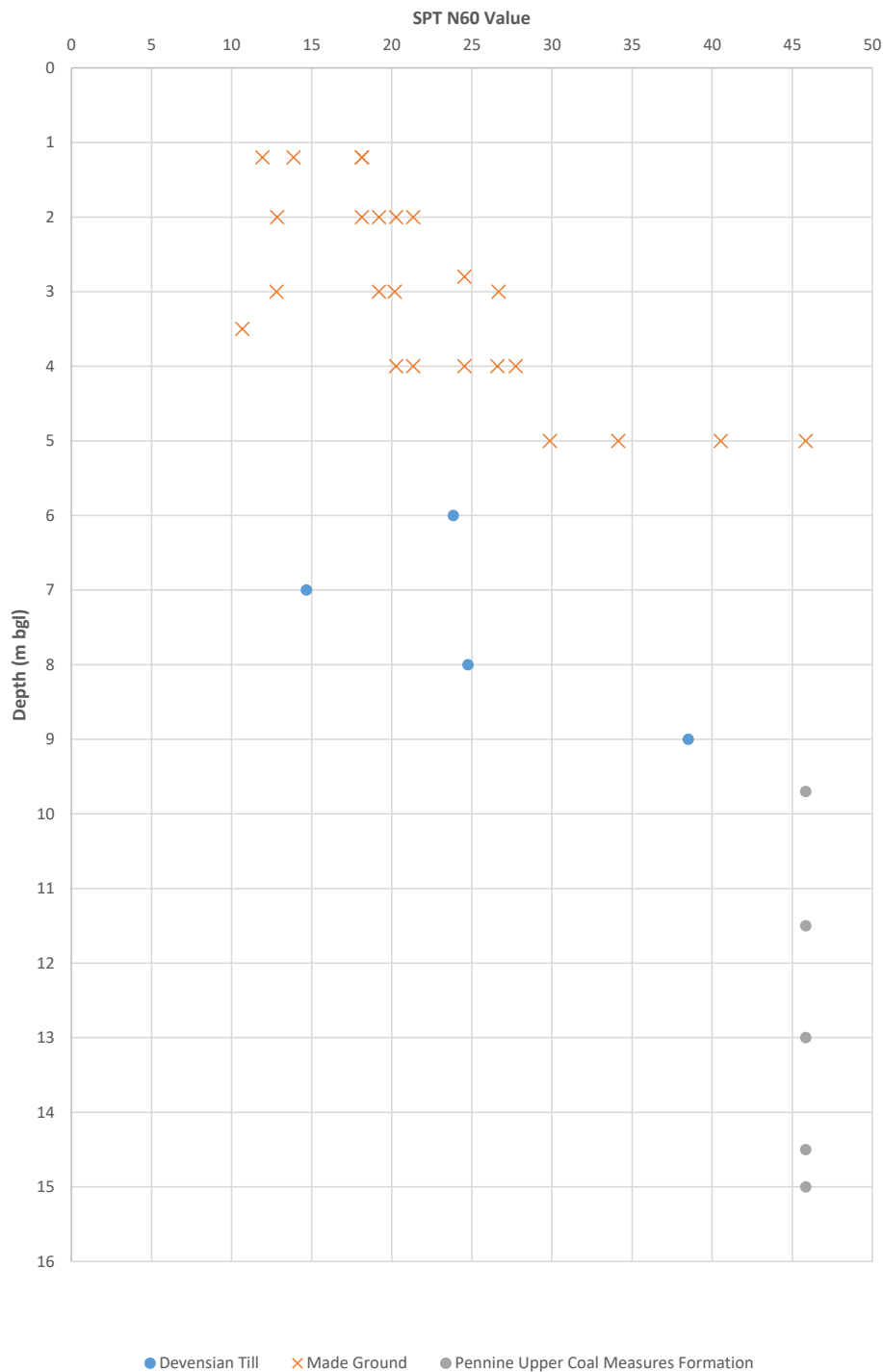
Exploratory Hole Locations

 Dynamic Sampler Borehole

 Rotary Borehole

DRAWN BY: RD	SCALE (@A4): 1:150	PROJECT NO: 21-1914.01
CHECKED BY: MB	REVISION: -	FIGURE NO: 2
DATE: 13 October 2021		

Figure 3 - Corrected SPT (N60) vs Depth Plots



TITLE:

Corrected SPT N₆₀ Values vs Depth Plot (m bgl)
Manchester City Football Club

DWN:

MB

PROJECT NO.:

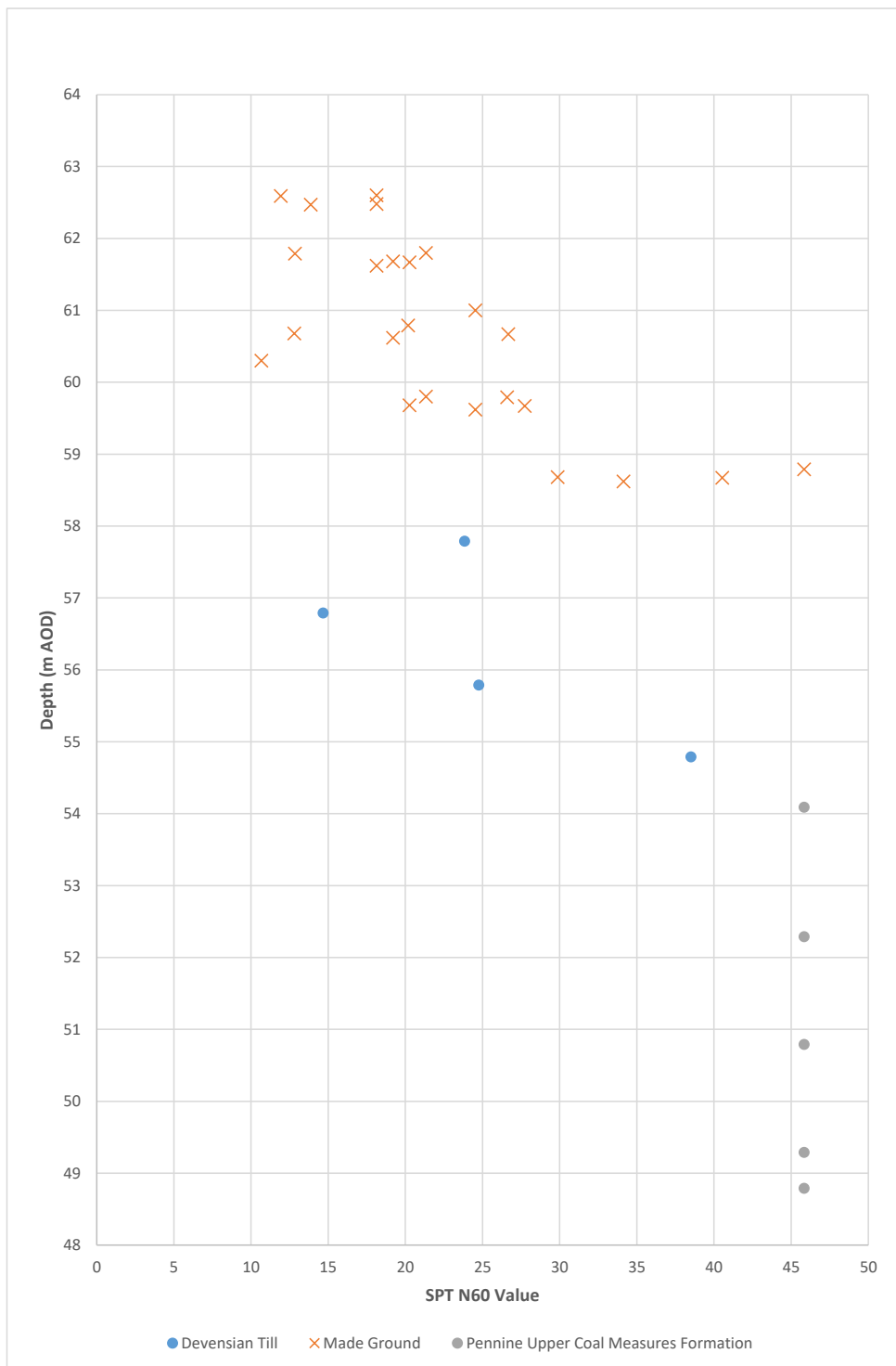
21-1914.01

DATE:

13/10/2021

Figure:

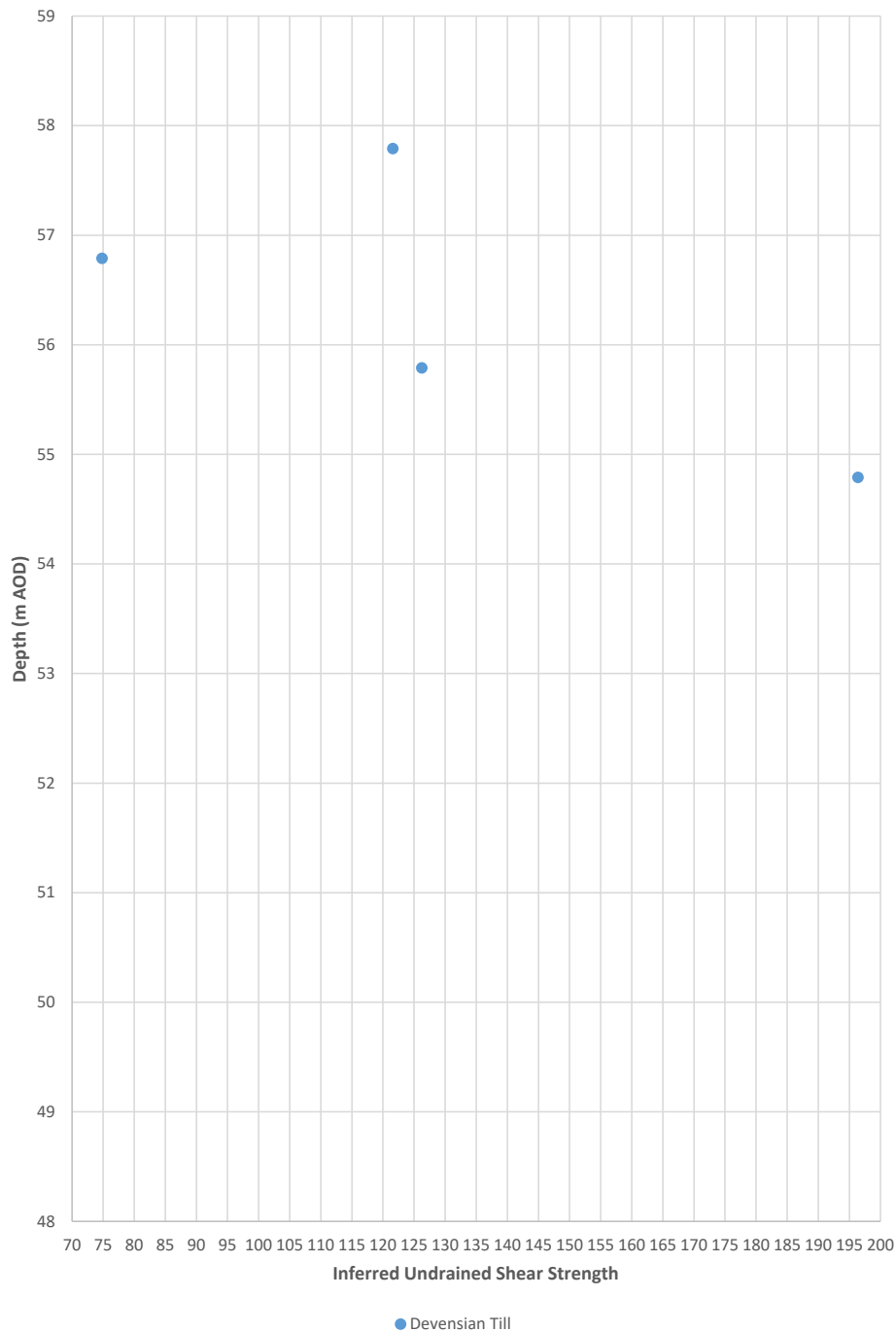
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TITLE:
Corrected SPT N₆₀ Values vs Depth Plot (m AOD)
Manchester City Football Club

DWN:	PROJECT NO.:
MB	21-1914.01
DATE:	Figure:
13/10/2021	3b

Figure 4 – Inferred Undrained Shear Strength vs Depth Plots



TITLE:
Inferred Undrained Shear Strength vs Depth Plot
(m AOD)
Manchester City Football Club

DWN:	PROJECT NO.:
MB	21-1914.01
DATE:	Figure:
13/10/2021	4b

Appendices

Appendix A – Limitations

Limitations

This Report was prepared by Delta-Simons Environmental Consultants Ltd (Delta-Simons) for the sole and exclusive use of the Client and for the specific purpose for which Delta-Simons was instructed. Nothing contained in this Report shall be construed to give any rights or benefits to anyone other than the Client and Delta-Simons, and all duties and responsibilities undertaken are for the sole and exclusive benefit of the Client and not for the benefit of any other party. Delta-Simons does not intend, without its written consent through a formal letter of reliance or warranty, for this Report to be disseminated to any party other than the named Client or to be used or relied upon by any party other than the named Client. Use of the Report by any other party is unauthorised and such use is at the sole risk of the user. Any party using or relying upon this Report, other than the Client, agrees by virtue of its use to indemnify and hold harmless Delta-Simons from and against all claims, losses and damages (of whatsoever nature and howsoever or whensoever arising), arising out of or resulting from the performance of the work by Delta-Simons. Unless explicitly agreed otherwise, in writing, this Report has been prepared under Delta-Simons' Standard Terms and Conditions as included within our proposal to the Client.

The recommendations contained within this Report represent Delta-Simons professional opinions, based upon the information detailed within the Report, exercising the reasonable skill and care to be expected of a professional consultant holding itself out as having the competence, experience and resources necessary for the purpose of carrying out similar work in scope and character to the services performed. The Report needs to be considered in the light of the proposal and associated limitations of scope. The Report needs to be read and considered in full and isolated sections cannot be used without full reference to other elements of the report and any previous works referenced within the Report.

Where Delta-Simons has obtained, reviewed and evaluated information in preparing this Report from the Client and others and Delta-Simons conclusions, opinions and recommendations has been reasonably determined using this information, Delta-Simons does not warrant the accuracy of the third-party information provided to it and cannot be responsible for any opinions which Delta-Simons has expressed, or conclusions which it has reached in reliance upon information which is subsequently proven to be inaccurate.

Site surveys document the conditions encountered at the time of survey only and conditions may change due to natural processes or human intervention. As such, surveys represent an assessment at a specific point in time and Delta-Simons cannot be responsible for adverse conditions which arise or become apparent after the time of the survey or for conditions which sit outside the scope for which the survey or Report was commissioned.

Where intrusive investigations have been completed, information, comments and opinions given in this report are based on the ground conditions encountered during the site work period and on the results of laboratory and field tests performed during the investigation. Ground conditions are inherently variable such that no investigation can be exhaustive to the extent that all adverse conditions are revealed. Conditions may therefore be present beneath the site that were not apparent in the data reviewed or obtained as part of this assessment. It should be noted that groundwater levels vary due to seasonal and other effects and may at times differ to those measured during the investigation. Delta-Simons does not warrant or guarantee that the Site is free of hazardous or potentially hazardous materials or conditions. Where risk assessment is undertaken, this is based upon the standards, guidance and common practice at the time of the assessment and Delta-Simons cannot be responsible for conditions which become apparent following changes in guidance or practice or advancements in scientific knowledge which change the position in relation to assessment of risk.

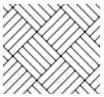
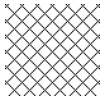
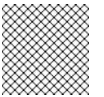
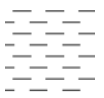
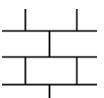
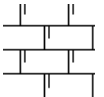
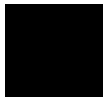
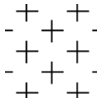
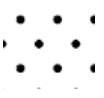
No aspect of this Report constitutes a design. Where this information is used in design, the designer should verify the information has been used appropriately.

Where budgets are prepared and presented within the Report, these are for information only to indicate the likely magnitude of a cost and do not represent an invitation to treat for the works. All budgets and programmes presented should be reviewed and verified by appropriately qualified and experienced independent Project Managers and Cost Consultants.

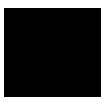
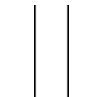
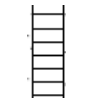
Appendix B – Borehole Logs, SPT Calibrations Certificates

KEY TO BOREHOLE AND TRIAL PIT LOGS

MATERIAL LEGENDS

	Topsoil		Made Ground		Bituminous Material
	Concrete		Clay		Silt
	Sand		Gravel		Peat
	Cobbles		Boulders		Mudstone
	Siltstone		Sandstone		Limestone
	Chalk		Coal		Breccia
	Conglomerate		Igneous		Metamorphic
	Pyroclastic (volcanic ash)		Gypsum		Shale
	Ironstone		Bedrock (Unidentified)		Void

INSTALLATION/BACKFILL LEGENDS

	Sand		Gravel		Bentonite/Grout
	Arisings		Concrete		Plain Pipe
	Slotted Pipe				

Legend symbols in general accordance with BS 5930:2015+A1:2020 and standard industry practice.

SAMPLE TYPES

ACM	Asbestos Containing Material Sample
B	Bulk Disturbed Sample
BLK	Block Sample
C	Core Sample
CBR	Undisturbed Sample for California Bearing Ratio Test – 154mm diameter
D	Disturbed Sample - Tub
ES	Soil Sample for Environmental Testing
EW	Water Sample for Environmental Testing
G	Gas Sample
U	Undisturbed Driven Tube Sample – 70/102mm diameter, 450mm long
W	Water Sample

TEST TYPES

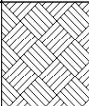
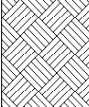
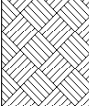
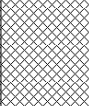
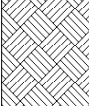
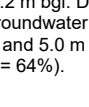
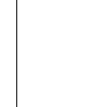
CPT	Cone Penetrometer Test (kN/m ²)
FID	Flame Ionisation Detector Test (ppm)
HV	In-Situ Hand Shear Vane Test (kN/m ²)
PID	Photoionisation Detector Test (ppm)
SPT (S)	Standard Penetration Test – Split Spoon Sampler
SPT (C)	Standard Penetration Test – Solid 60 Degree Cone

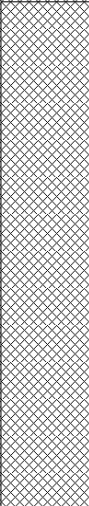
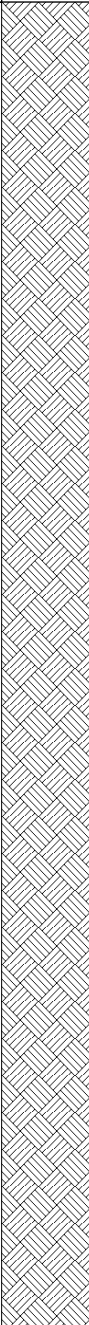
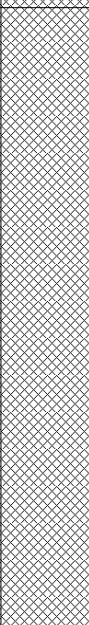
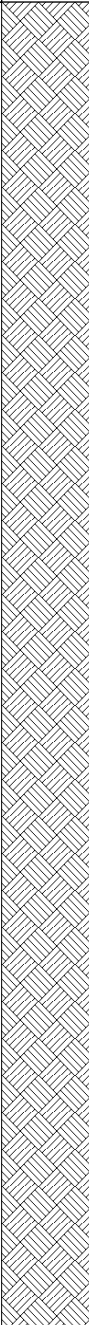
CORE DETAILS

If	Fracture Spacing (mm) – Minimum, Average, Maximum
NI	Non-Intact where >25 fracture spacings per metre
TCR	Total Core Recovery (%)
SCR	Solid Core Recovery (%)
RQD	Rock Quality Designation (%)
AF	Air Flush Return (%)
WF	Water Flush Return (%)
NIDD	Non-Intact - Drilling Disturbed
AZCL	Assessed Zone of Core Loss

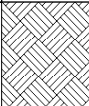
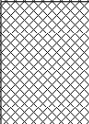
WATER COLUMN DETAILS

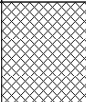
	Water Strike
	Water Level

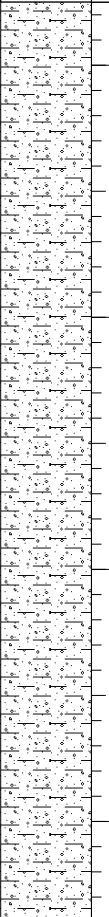
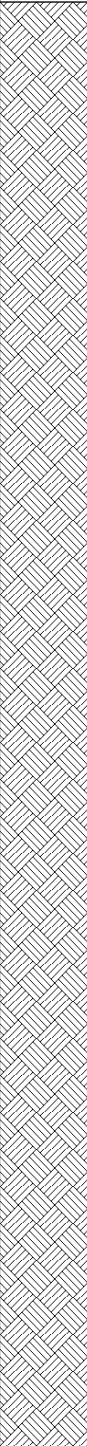
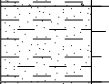
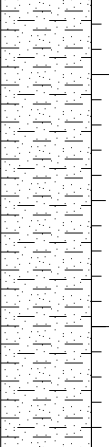
 Head Office 3 Henley Way, Doddington Road Lincoln, LN6 3QR Tel: +44 (0) 1522 882555 Email: info@deltasimons.com					Project No: 21-1914.01		Hole ID: DS101		Page: 1 of 1		
					Project: Proposed Media Studio						
Dynamic Sampler Log					Date: 14/09/2021		Client: Manchester City Football Club				
Description of Strata	Legend	Strata Depth (m bgl)	Strata Thickness (m)	Reduced Level (mAOD)	Casing Diameter (mm)	Water	Sample Details		Test Details		Backfill
							Depth (m)	Type & Ref	Depth (m)	Results	
MADE GROUND: Grass over dark brown slightly gravelly slightly clayey fine to coarse SAND with occasional rootlets. Gravel is subangular to subrounded fine to medium of concrete, sandstone and brick. MADE GROUND: Greyish brown slightly sandy clayey subangular to subrounded fine to coarse GRAVEL of concrete, sandstone and brick with low cobble content. Sand is fine to coarse. Cobbles are angular of concrete and sandstone.		0.35	(0.35)	63.45			0.50	ES1	1.20	SPT(S) N=17 (1,3/3,3,5,6)	
		1.30	(0.95)	62.50							
MADE GROUND: Stiff dark brown slightly sandy gravelly CLAY. Sand is fine to medium. Gravel is angular to subrounded fine to coarse of concrete, brick and sandstone. Occasional fragments of wood throughout.		3.20	(1.90)	60.60			2.00 - 2.45	D2	2.00	SPT(S) N=20 (1,3/3,4,5,8)	
MADE GROUND: Stiff dark brown mottled black slightly sandy gravelly CLAY. Sand is fine to medium. Gravel is angular to subrounded fine to medium of concrete, brick and sandstone. Slight hydrocarbon odour. Occasional pockets of ash (up to 20 mm).		3.20	(1.80)	60.60			3.00 - 3.45	D3	2.80	SPT(S) N=23 (4,5/4,6,6,7)	
MADE GROUND: Stiff dark brown mottled black slightly sandy gravelly CLAY. Sand is fine to medium. Gravel is angular to subrounded fine to medium of concrete, brick and sandstone. Slight hydrocarbon odour. Occasional pockets of ash (up to 20 mm).		3.20	(1.80)	60.60			3.30 - 3.40	ES2	3.50	SPT(S) N=10 (2,3/2,2,2,4)	
MADE GROUND: Stiff dark brown mottled black slightly sandy gravelly CLAY. Sand is fine to medium. Gravel is angular to subrounded fine to medium of concrete, brick and sandstone. Slight hydrocarbon odour. Occasional pockets of ash (up to 20 mm).		3.20	(1.80)	60.60			3.50 - 3.95	D4	3.50	SPT(S) N=10 (2,3/2,2,2,4)	
MADE GROUND: Stiff dark brown mottled black slightly sandy gravelly CLAY. Sand is fine to medium. Gravel is angular to subrounded fine to medium of concrete, brick and sandstone. Slight hydrocarbon odour. Occasional pockets of ash (up to 20 mm).		3.20	(1.80)	60.60			4.00 - 4.45	D5	4.00	SPT(S) N=20 (4,4/4,3,5,8)	
Borehole complete at 5.00 m bgl.											
Remarks: 1. Logged in general accordance with BS 5930:2015+A1:2020. 2. Area spot cleared for services by a specialist contractor prior to excavation/drilling. 3. Hand excavated between ground level and 1.2 m bgl. Dynamic sampled between 1.2 and 5.0 m bgl. SPT taken from 1.2 to 4.45 m bgl. Groundwater was not encountered during drilling. 4. Slight hydrocarbon odour noted between 3.2 and 5.0 m bgl. 5. SPT Hammer ID DART511 (Energy Ratio Er = 64%).					Water Strike			Water Level		Borehole Diameter	
					Date	Depth (m)	Remarks	Duration (min)	Depth	Depth Base	Diameter
Coordinates: E387529.78 N398046.39		Elevation (mAOD): 63.80		Drilled By: Geotron UK		Plant Used: Archway		Logged: RD	Checked: MB	Approved:	Scale: 1:32

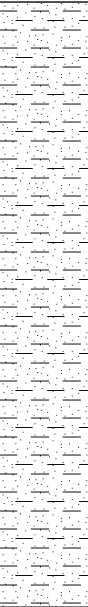
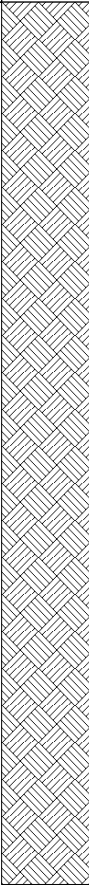
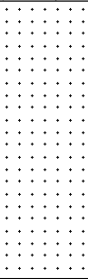
 Head Office 3 Henley Way, Doddington Road Lincoln, LN6 3QR Tel: +44 (0) 1522 882555 Email: info@deltasimons.com					Project No: 21-1914.01		Hole ID: DS102		Page: 1 of 1		
					Project: Proposed Media Studio						
Dynamic Sampler Log					Date: 14/09/2021		Client: Manchester City Football Club				
Description of Strata	Legend	Strata Depth (m bgl)	Strata Thickness (m)	Reduced Level (mAOD)	Casing Diameter (mm)	Water	Sample Details		Test Details		Backfill
							Depth (m)	Type & Ref	Depth (m)	Results	
MADE GROUND: Grass over dark brown slightly gravelly clayey fine to coarse SAND with occasional rootlets. Gravel is subangular to subrounded fine to medium of concrete, sandstone and brick. MADE GROUND: Dark brown gravelly fine to coarse SAND with low cobble content. Gravel is subangular to subrounded fine to coarse of concrete, sandstone and brick. Cobbles are angular of concrete and sandstone. MADE GROUND: Stiff greyish brown slightly sandy gravelly CLAY. Sand is fine to medium. Gravel is subangular to subrounded fine to medium of brick, concrete and sandstone.	  	0.30	(0.30)	63.36			0.40	ES1	1.20	SPT(S) N=13 (2,2/3,3,3,4)	
		0.80	(0.50)	62.86							
		2.90	(2.10)	60.76							
MADE GROUND: Stiff dark brown mottled black slightly sandy gravelly CLAY. Sand is fine to medium. Gravel is angular to subrounded fine to medium of concrete, brick, clinker and sandstone. Slight hydrocarbon odour.							3.00 - 3.45 3.00 - 4.00	D4 B1	3.00	SPT(S) N=25 (13,4/4,5,7,9)	
							4.00 - 4.20 4.00 - 4.45	ES3 D5	4.00	SPT(S) N=26 (6,5/5,6,6,9)	
							5.00 - 5.45	D6	5.00	SPT(S) N=38 (13,12/10,15,9,4)	
Borehole complete at 5.45 m bgl.		5.45		58.22							
Remarks: 1. Logged in general accordance with BS 5930:2015+A1:2020. 2. Area spot cleared for services by a specialist contractor prior to excavation/drilling. 3. Hand excavated between ground level and 1.2 m bgl. Dynamic sampled between 1.2 and 5.0 m bgl. SPT taken from 1.2 to 5.45 m bgl. Groundwater was not encountered during drilling. 4. Slight hydrocarbon odour noted between 2.9 and 5.0 m bgl. 5. SPT Hammer ID DART511 (Energy Ratio Er = 64%).					Water Strike			Water Level		Borehole Diameter	
					Date	Depth (m)	Remarks	Duration (min)	Depth	Depth Base	Diameter
Coordinates: E387530.86 N398040.36		Elevation (mAOD): 63.66		Drilled By: Geotron UK		Plant Used: Archway		Logged: RD	Checked: MB	Approved:	Scale: 1:32



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					Project: Proposed Media Studio									
Dynamic Sampler Log					Date: 14/09/2021 - 15/09/2021		Client: Manchester City Football Club							
Description of Strata	Legend	Strata Depth (m bgl)	Strata Thickness (m)	Reduced Level (mAOD)	Casing Diameter (mm)	Water	Sample Details		Test Details		Backfill			
							Depth (m)	Type & Ref	Depth (m)	Results				
MADE GROUND: Grass over dark brown slightly gravelly slightly clayey fine to coarse SAND with occasional rootlets. Gravel is subangular to subrounded fine to medium of concrete, sandstone and brick.		0.35	(0.35)	63.33			0.80 - 0.90	ES1	1.20	SPT(S) N=17 (2,3/4,4,4,5)				
MADE GROUND: Dark brown gravelly fine to coarse SAND. Gravel is angular to subrounded fine to medium of concrete, brick and sandstone.		0.70	(0.35)	62.98										
MADE GROUND: Dark grey gravelly clayey fine to coarse SAND. Gravel is angular to subrounded fine to medium of concrete, sandstone and brick.		0.80	(0.10)	62.88										
MADE GROUND: Friable dark grey slightly gravelly sandy SILT. Sand is fine to coarse. Gravel is angular fine to coarse of concrete, brick and sandstone.		1.00	(0.20)	62.68										
MADE GROUND: Firm brownish grey slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular fine to coarse of brick, concrete, quartzite and occasional coal.		2.00	(1.00)	61.68										
MADE GROUND: Firm to stiff dark grey slightly sandy gravelly CLAY with occasional pockets of ash. Sand is fine to coarse. Gravel is angular fine to coarse of brick, concrete, coal, clinker, sandstone and quartzite. Slight hydrocarbon odour.			(3.45)				2.00 - 2.45	D3	2.00	SPT(S) N=18 (3,4/4,4,5,5)				
												2.30 - 2.40	ES3	
												2.50 - 3.00	B1	
Between 4.0 m and 4.7 m bgl: dark grey and black with frequent ash and coal.							4.00 - 4.45	D5	4.00	SPT(S) N=19 (3,4/5,6,8,0)				
							5.00 - 5.45	D6	5.00	SPT(S) N=28 (3,4/6,7,7,8)				
Borehole complete at 5.45 m bgl.		5.45		58.23										
Remarks: 1. Logged in general accordance with BS 5930:2015+A1:2020. 2. Area spot cleared for services by a specialist contractor prior to excavation/drilling. 3. Hand excavated between ground level and 1.2 m bgl. Dynamic sampled between 1.2 and 5.0 m bgl. SPT taken from 1.2 to 5.45 m bgl. Groundwater was not encountered during drilling. 4. Black staining noted between 4.0 m and 4.7 m bgl. Slight hydrocarbon odour noted between 2.0 m and 5.0 m bgl. 5. SPT Hammer ID DART511 (Energy Ratio Er = 64%).					Water Strike			Water Level		Borehole Diameter				
					Date	Depth (m)	Remarks	Duration (min)	Depth	Depth Base	Diameter			
Coordinates: E387538.55 N398039.71		Elevation (mAOD): 63.68		Drilled By: Geotron UK		Plant Used: Archway		Logged: RD/GM	Checked: MB	Approved:	Scale: 1:32			

 Environment - Health & Safety - Sustainability Head Office 3 Henley Way, Doddington Road Lincoln, LN6 3QR Tel: +44 (0) 1522 882555 Email: info@deltasimons.com				Project No: 21-1914.01		Hole ID: RO101		Page: 1 of 3			
				Project: Proposed Media Studio							
Rotary Auger Borehole Log				Date: 14/09/2021 - 15/09/2021		Client: Manchester City Football Club					
Description of Strata	Legend	Strata Depth (m)	Reduced Level (mAOD)	Casing Diameter (mm)	Water Strike	Sample Details			Test Details		Backfill
						Depth (m)	Type	Ref	Depth (m)	Results	
MADE GROUND: Dark brown slightly gravelly slightly clayey fine to coarse SAND with frequent rootlets. Gravel is subangular to subrounded fine to medium of concrete, sandstone and brick.		0.40	63.38			0.70	ES	1	1.20	SPT(S) N=13 (3,6/4,3,4,2)	
MADE GROUND: Brown gravelly fine to coarse SAND with low cobble content. Gravel is subangular to subrounded fine to medium of sandstone, concrete and brick. Cobbles are subangular of concrete and sandstone.		1.40	62.38								
MADE GROUND: Stiff dark brown slightly sandy gravelly CLAY. Sand is fine to medium. Gravel is angular to subrounded fine to coarse of concrete, brick and sandstone. Occasional fragments of wood throughout.		2.80	60.98								
MADE GROUND: Stiff dark brown mottled black slightly sandy gravelly CLAY. Sand is fine to medium. Gravel is angular to subrounded fine to medium of concrete, brick and sandstone. Occasional fragments of glass and plastic sheeting. Slight hydrocarbon odour throughout.		5.70	58.08								

 Environment - Health & Safety - Sustainability Head Office 3 Henley Way, Doddington Road Lincoln, LN6 3QR Tel: +44 (0) 1522 882555 Email: info@deltasimons.com				Project No: 21-1914.01			Hole ID: RO101		Page: 2 of 3		
				Project: Proposed Media Studio							
Rotary Auger Borehole Log				Date: 14/09/2021 - 15/09/2021			Client: Manchester City Football Club				
Description of Strata	Legend	Strata Depth (m)	Reduced Level (mAOD)	Casing Diameter (mm)	Water Strike	Sample Details			Test Details		Backfill
						Depth (m)	Type	Ref	Depth (m)	Results	
Firm to stiff greyish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subrounded fine to medium of mudstone and siltstone. (DEVENSIAN TILL)						6.00 - 6.45	D	7	6.00	SPT(S) N=26 (2,4/5,6,7,8)	
						7.00 - 7.45	D	8	7.00	SPT(S) N=16 (1,2/3,3,5,5)	
						8.00 - 8.45	D	9	8.00	SPT(S) N=27 (3,5/4,7,7,9)	
						9.00 - 9.45	D	10	9.00	SPT(S) N=42 (2,3/5,10,12,15)	
Very stiff greyish brown sandy CLAY. Sand is fine to coarse. (Possible weathered PENNINE UPPER COAL MEASURES FORMATION)		9.40	54.38								
Open hole drilled. Driller reports: very stiff greyish brown sandy CLAY. Sand is fine to coarse. (Possible weathered PENNINE UPPER COAL MEASURES FORMATION)		9.70	54.08			9.70 - 10.15	D	11	9.70	SPT(S) 50 (6,13/50 for 215mm)	
						11.50 - 11.95	D	12	11.50	SPT(S) N=50 (3,7/50 for 270mm)	
Remarks: 1. Logged in general accordance with BS 5930:2015+A1:2020. 2. Area spot cleared for services by a specialist contractor prior to excavation/drilling. 3. Hand excavated between ground level and 1.2 m bgl. Dynamic sampled between 1.2 and 9.7 m bgl. Rotary open hole drilled between 9.7 and 15 m bgl. SPT taken from 1.2 to 15.18 m bgl. Hole terminated in natural strata. 4. Slight hydrocarbon odour noted between 2.8 m and 5.7 m bgl. 5. SPT Hammer ID AR1893 (Energy Ratio Er = 55%).				Water Level Observations					Chiselling		
				Date	Time	Strike	Duration	Standing	Depth (m)	Time (h:m)	
				14/09/2021		1.80 m	20	1.80 m			
Coordinates: E387534.55 N398043.34		Elevation (mAOD): 63.78		Drilled By: Geotron UK		Plant Used: Comacchio GEO305		Logged: RD/GM	Checked: MB	Approved:	Scale (m): 1:30

 Head Office 3 Henley Way, Doddington Road Lincoln, LN6 3QR Tel: +44 (0) 1522 882555 Email: info@deltasimons.com				Project No: 21-1914.01		Hole ID: RO101		Page: 3 of 3					
Rotary Auger Borehole Log				Date: 14/09/2021 - 15/09/2021		Client: Manchester City Football Club							
				Project: Proposed Media Studio									
Description of Strata	Legend	Strata Depth (m)	Reduced Level (mAOD)	Casing Diameter (mm)	Water Strike	Sample Details			Test Details		Backfill		
						Depth (m)	Type	Ref	Depth (m)	Results			
Open hole drilled. Driller reports: very stiff greyish brown sandy CLAY. Sand is fine to coarse. (Possible weathered PENNINE UPPER COAL MEASURES FORMATION)		13.90	49.88			13.00 - 13.45	D	13	13.00	SPT(S) 50 (25 for 85mm/50 for 85mm)			
Open hole drilled. Driller reports: yellowish brown fine to medium grained SANDSTONE. (Probable PENNINE UPPER COAL MEASURES FORMATION)		15.00	48.78						14.50	SPT(C) 50 (25 for 85mm/50 for 85mm)			
Borehole complete at 15.00m bgl.									15.00	SPT(C) 50 (25 for 95mm/50 for 90mm)			
Remarks: 1. Logged in general accordance with BS 5930:2015+A1:2020. 2. Area spot cleared for services by a specialist contractor prior to excavation/drilling. 3. Hand excavated between ground level and 1.2 m bgl. Dynamic sampled between 1.2 and 9.7 m bgl. Rotary open hole drilled between 9.7 and 15 m bgl. SPT taken from 1.2 to 15.18 m bgl. Hole terminated in natural strata. 4. Slight hydrocarbon odour noted between 2.8 m and 5.7 m bgl. 5. SPT Hammer ID AR1893 (Energy Ratio Er = 55%).				Water Level Observations					Chiselling				
				Date	Time	Strike	Duration	Standing	Depth (m)	Time (h:m)			
				14/09/2021		1.80 m	20	1.80 m					
Coordinates: E387534.55 N398043.34				Elevation (mAOD): 63.78		Drilled By: Geotron UK		Plant Used: Comacchio GEO305		Logged: RD/GM	Checked: MB	Approved:	Scale (m): 1:30

SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

ARCHWAY ENGINEERING (UK) LTD
AINLEYS INDUSTRIAL ESTATE
ELLAND
WEST YORKSHIRE
HX5 9JP

SPT Hammer Ref: AR1893
Test Date: 12/08/2020
Report Date: 12/08/2020
File Name: AR1893.spt
Test Operator: CM

Instrumented Rod Data

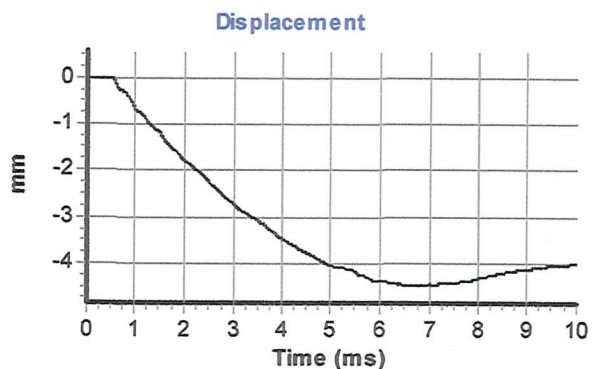
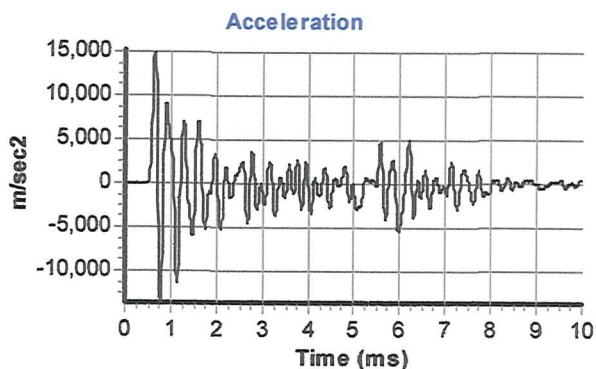
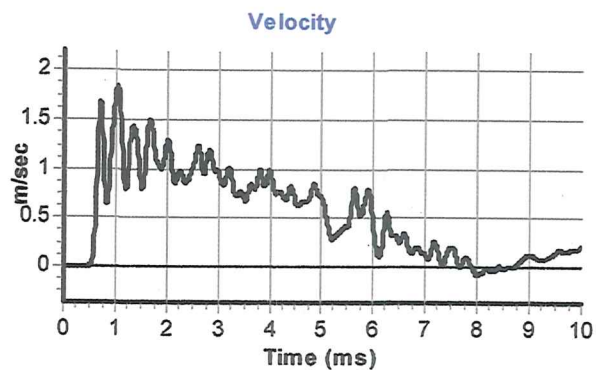
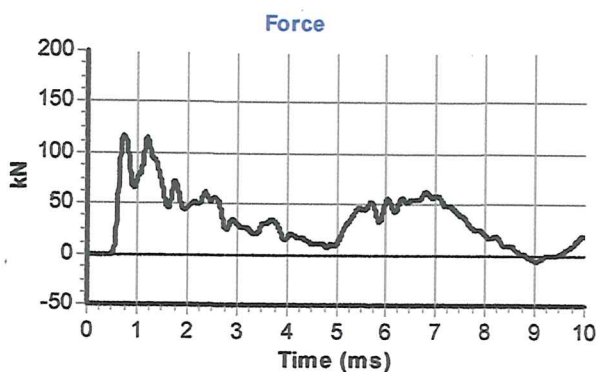
Diameter d_r (mm): 54
Wall Thickness t_r (mm): 6.0
Assumed Modulus E_a (GPa): 200
Accelerometer No.1:
Accelerometer No.2:

SPT Hammer Information

Hammer Mass m (kg): 63.5
Falling Height h (mm): 760
SPT String Length L (m): 10.0

Comments / Location

GEOTRON UK LTD/71750



Calculations

Area of Rod A (mm²): 905
Theoretical Energy E_{theor} (J): 473
Measured Energy E_{meas} (J): 258

Energy Ratio E_r (%): **55**

Signed: C.McCLUSKEY
Title: FITTER

The recommended calibration interval is 12 months

SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

ARCHWAY ENGINEERING (UK) LTD
AINLEYS INDUSTRIAL ESTATE
ELLAND
WEST YORKSHIRE
HX5 9JP

SPT Hammer Ref: DART511
Test Date: 19/02/2021
Report Date: 19/02/2021
File Name: DART511.spt
Test Operator: JL

Instrumented Rod Data

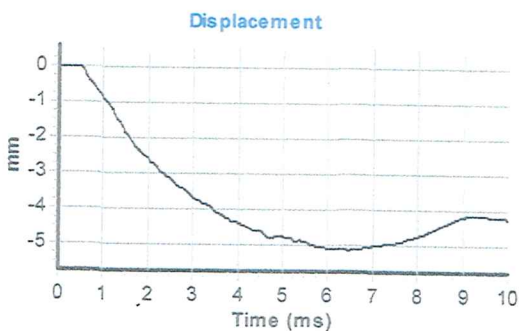
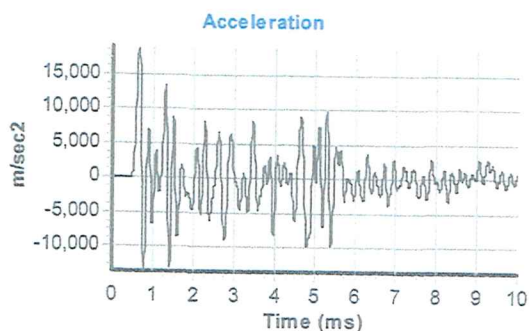
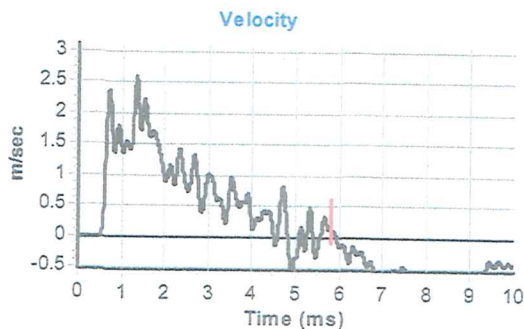
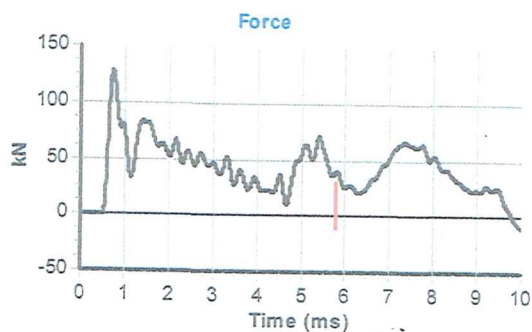
Diameter d_r (mm): 54
Wall Thickness t_r (mm): 6.3
Assumed Modulus E_a (GPa): 208
Accelerometer No.1: 7080
Accelerometer No.2: 11609

SPT Hammer Information

Hammer Mass m (kg): 63.5
Falling Height h (mm): 760
SPT String Length L (m): 10.0

Comments / Location

GEOTRON - 74210



Calculations

Area of Rod A (mm²): 944
Theoretical Energy E_{theor} (J): 473
Measured Energy E_{meas} (J): 303

Energy Ratio E_r (%): 64

Signed: J. LOCK
Title: FITTER

The recommended calibration interval is 12 months

Appendix C – Geotechnical Analysis Results

4041

Client: Delta-Simons
Client Address: Suite 4a, One Portland Street,
Manchester, M1 3BE

Contact: Melanie Booth
Site Address: Proposed Media Studio

Client Reference: 21-1914.01
Job Number: 21-10876
Date Sampled: 15/09/2021
Date Received: 16/09/2021
Date Tested: 28/09/2021
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

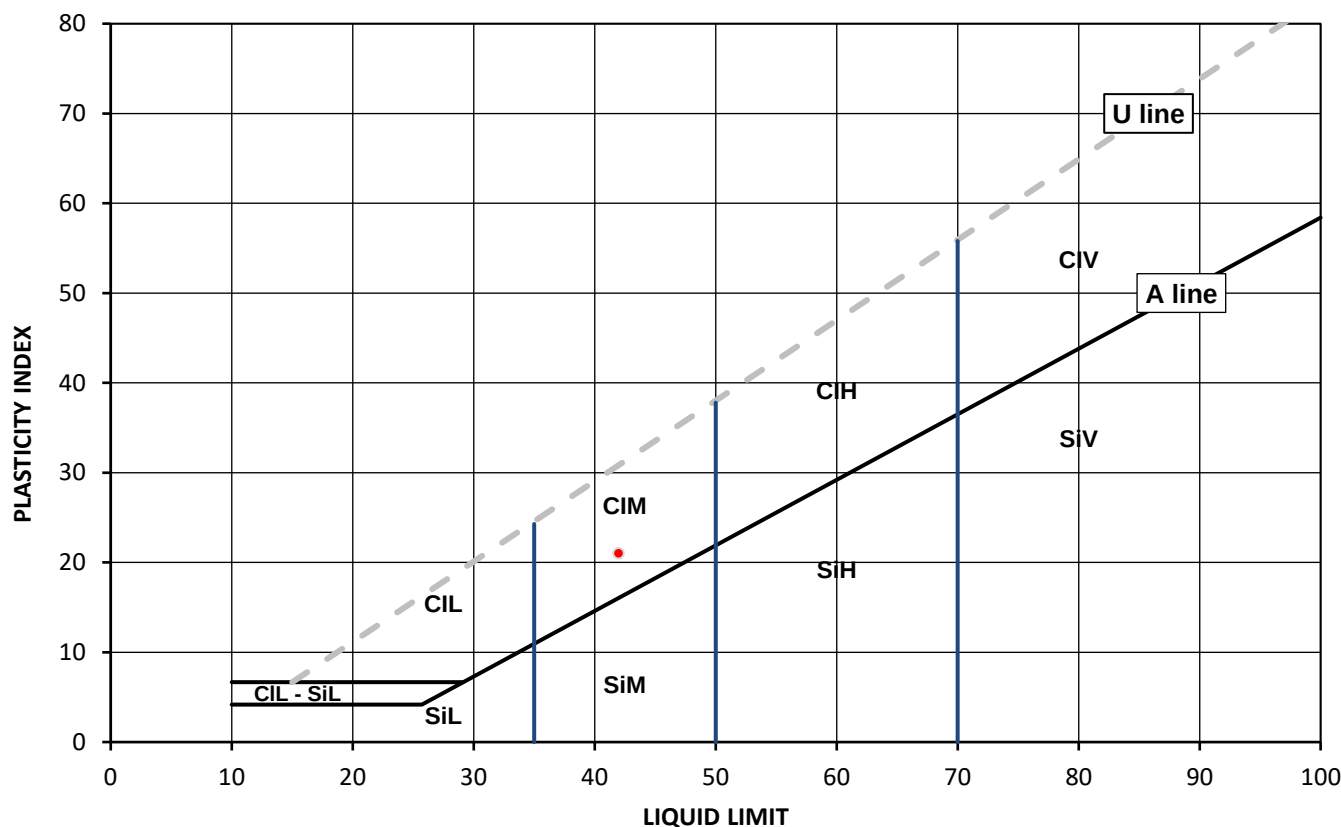
Test Results:

Laboratory Reference: 2016227
Hole No.: RO101
Sample Reference: Not Given
Sample Description: Dark brown slightly gravelly sandy CLAY

Depth Top [m]: 6.00
Depth Base [m]: 6.45
Sample Type: D

Sample Preparation: Tested after >425um removed by hand

As Received Moisture Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
19	42	21	21	98



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl Clay	L Low	below 35
Si Silt	M Medium	35 to 50
	H High	50 to 70
	V Very high	exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:

Szczepan Bielatowicz
PL Deputy Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

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Date Reported: 30/09/2021

GF 236.11

4041

Client: Delta-Simons
Client Address: Suite 4a, One Portland Street,
Manchester, M1 3BE

Contact: Melanie Booth
Site Address: Proposed Media Studio

Client Reference: 21-1914.01
Job Number: 21-10876
Date Sampled: 15/09/2021
Date Received: 16/09/2021
Date Tested: 28/09/2021
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

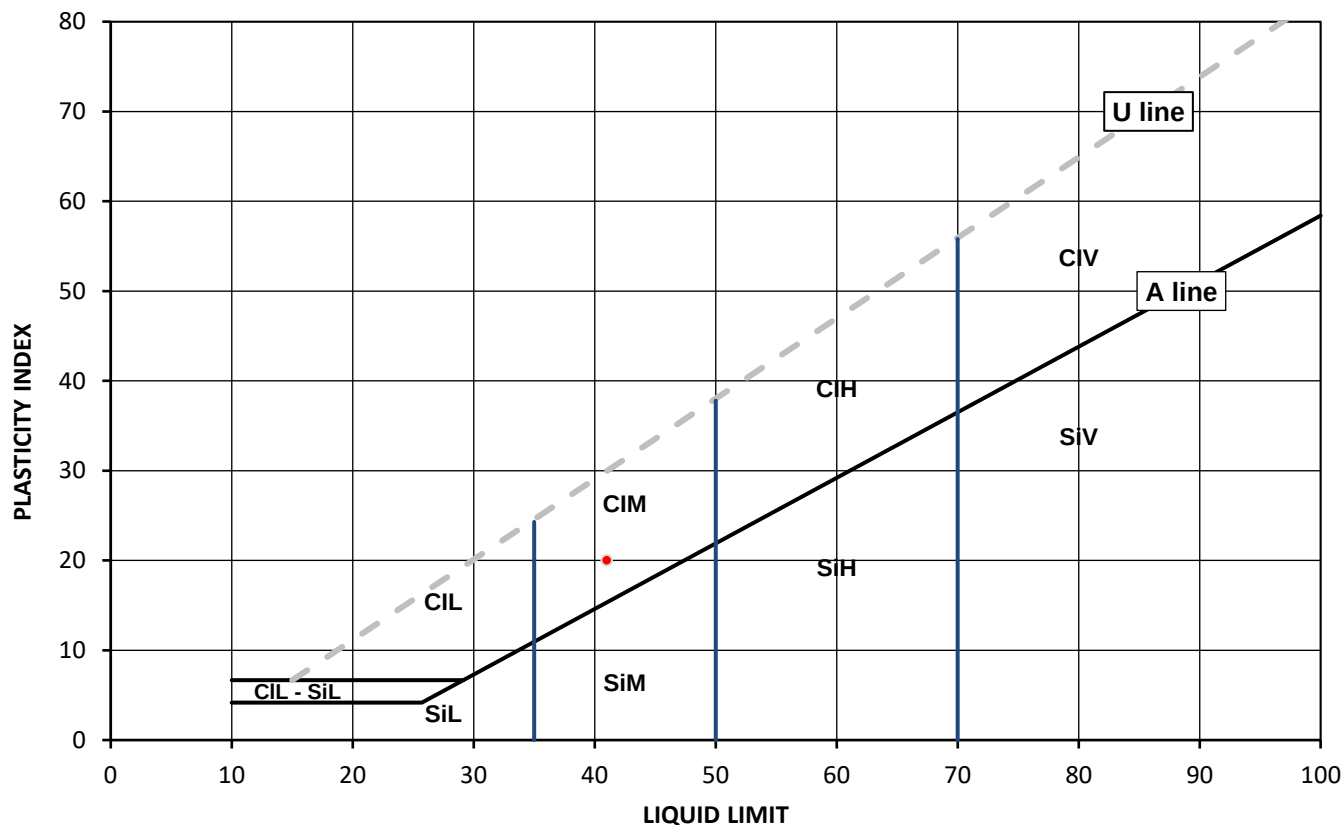
Test Results:

Laboratory Reference: 2016228
Hole No.: RO101
Sample Reference: Not Given
Sample Description: Greyish brown slightly gravelly sandy CLAY

Depth Top [m]: 7.00
Depth Base [m]: 7.45
Sample Type: D

Sample Preparation: Tested after >425um removed by hand

As Received Moisture Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
23	41	21	20	98



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl	Clay	below 35
Si	Silt	35 to 50
	L	Low
	M	Medium
	H	High
	V	Very high
	O	Organic
		append to classification for organic material (eg CIHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

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Site Address: Proposed Media Studio

Client Reference: 21-1914.01
Job Number: 21-10876
Date Sampled: 15/09/2021
Date Received: 16/09/2021
Date Tested: 28/09/2021
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

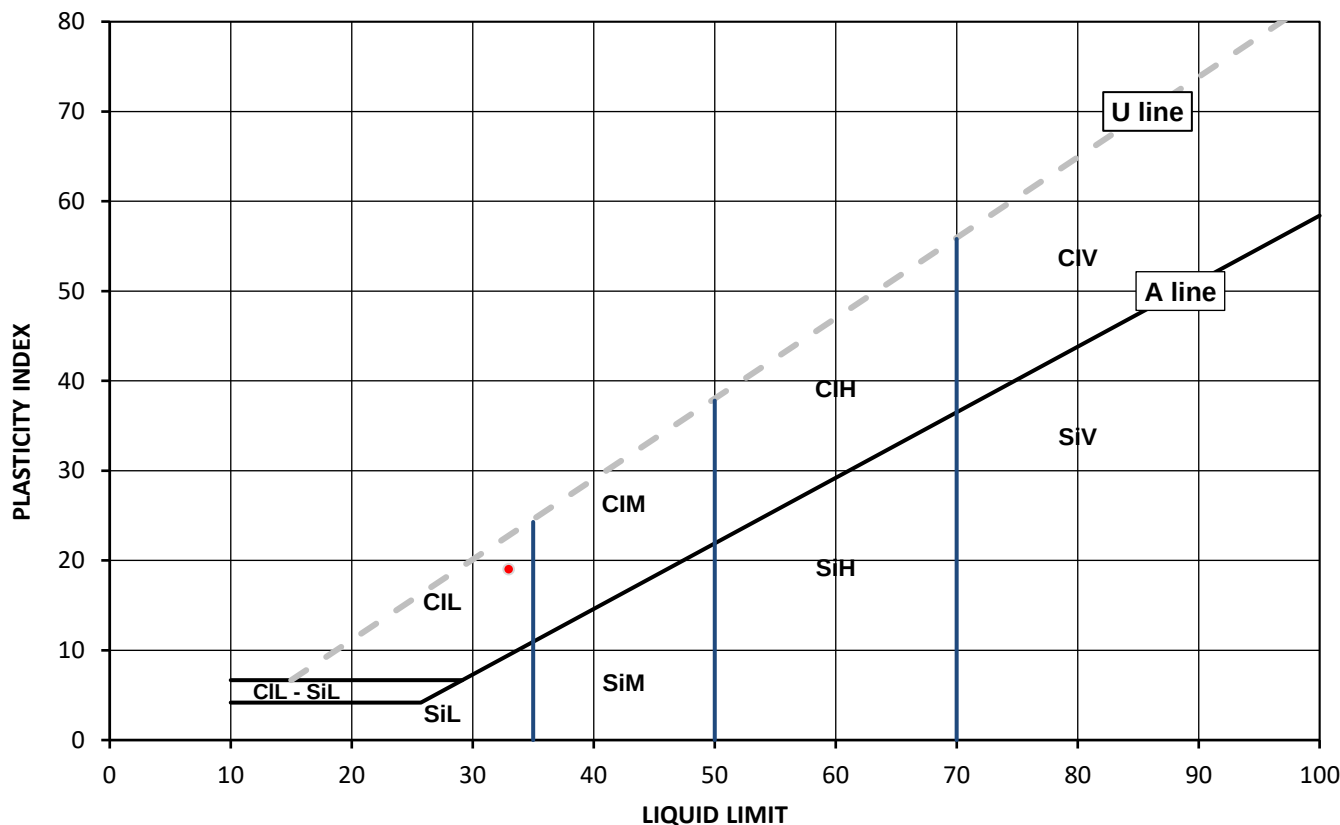
Test Results:

Laboratory Reference: 2016229
Hole No.: RO101
Sample Reference: Not Given
Sample Description: Greyish brown slightly gravelly very sandy CLAY

Depth Top [m]: 8.00
Depth Base [m]: 8.45
Sample Type: D

Sample Preparation: Tested after >425um removed by hand

As Received Moisture Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
13	33	14	19	96



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl	Clay	below 35
Si	Silt	35 to 50
	L	Low
	M	Medium
	H	High
	V	Very high
	O	Organic
		append to classification for organic material (eg CIHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

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Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

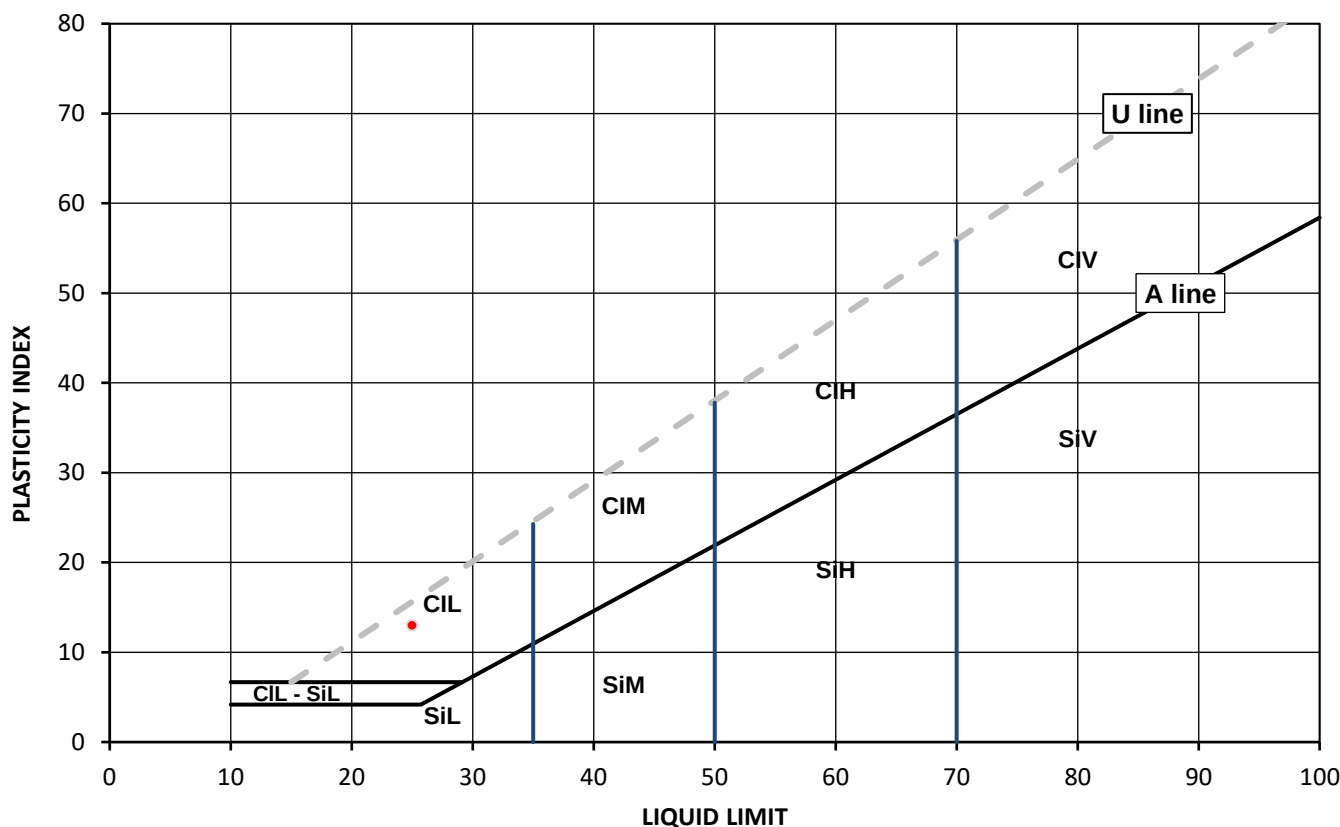
Test Results:

Laboratory Reference: 2016230
Hole No.: RO101
Sample Reference: Not Given
Sample Description: Greyish brown slightly gravelly clayey SAND

Depth Top [m]: 9.70
Depth Base [m]: 10.15
Sample Type: D

Sample Preparation: Tested after washing to remove >425um

As Received Moisture Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
7.3	25	12	13	87



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl	Clay	below 35
Si	Silt	35 to 50
	L Low	50 to 70
	M Medium	exceeding 70
	H High	
	V Very high	
	O Organic	append to classification for organic material (eg CIHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

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Contact: Melanie Booth
Site Address: Proposed Media Studio

Client Reference: 21-1914.01
Job Number: 21-10876
Date Sampled: 15/09/2021
Date Received: 16/09/2021
Date Tested: 28/09/2021
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

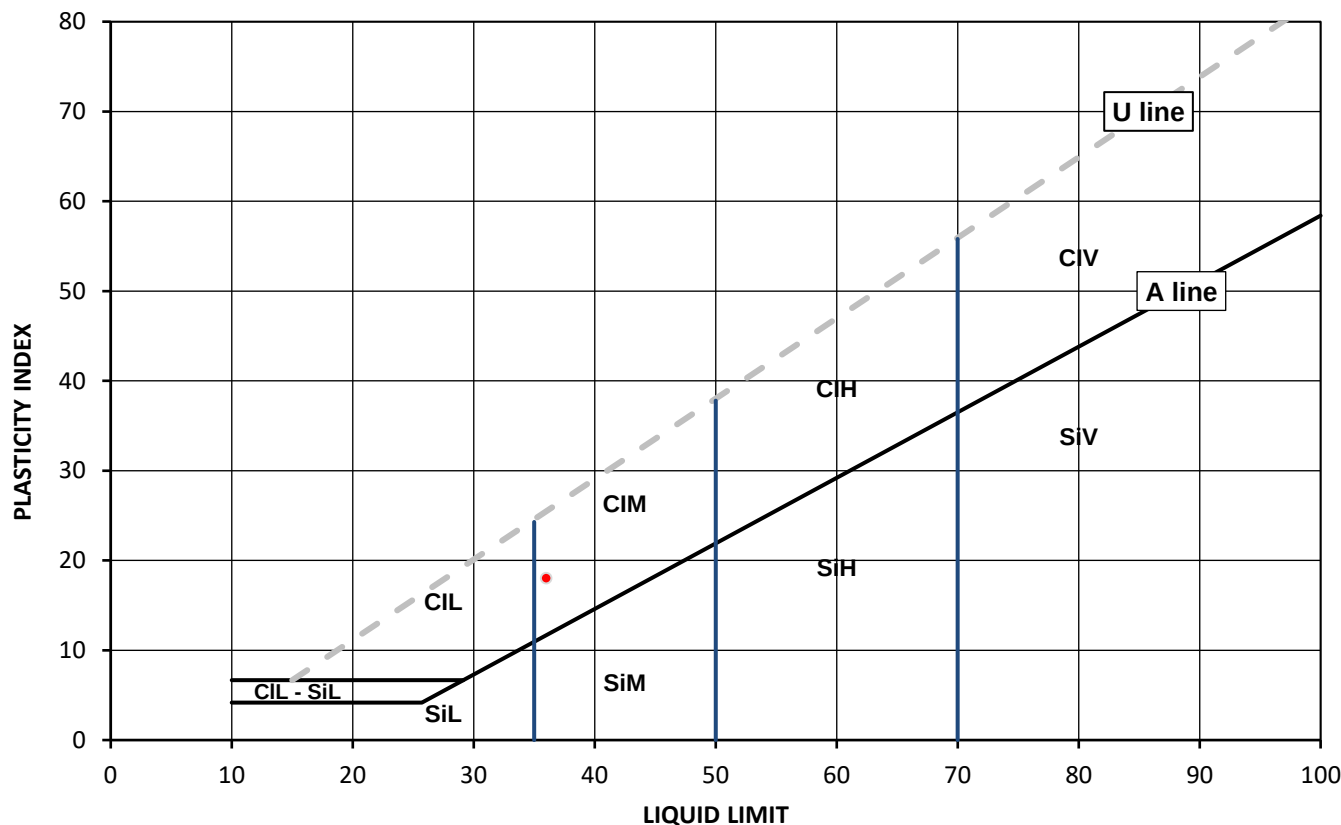
Test Results:

Laboratory Reference: 2016231
Hole No.: RO101
Sample Reference: Not Given
Sample Description: Greyish brown slightly gravelly sandy CLAY

Depth Top [m]: 11.50
Depth Base [m]: 11.95
Sample Type: D

Sample Preparation: Tested after >425um removed by hand

As Received Moisture Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
14	36	18	18	99



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl	Clay	below 35
Si	Silt	35 to 50
	L Low	50 to 70
	M Medium	exceeding 70
	H High	
	V Very high	
	O Organic	append to classification for organic material (eg CIHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

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Contact: Melanie Booth
Site Address: Proposed Media Studio

Client Reference: 21-1914.01
Job Number: 21-10876
Date Sampled: 15/09/2021
Date Received: 16/09/2021
Date Tested: 28/09/2021
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

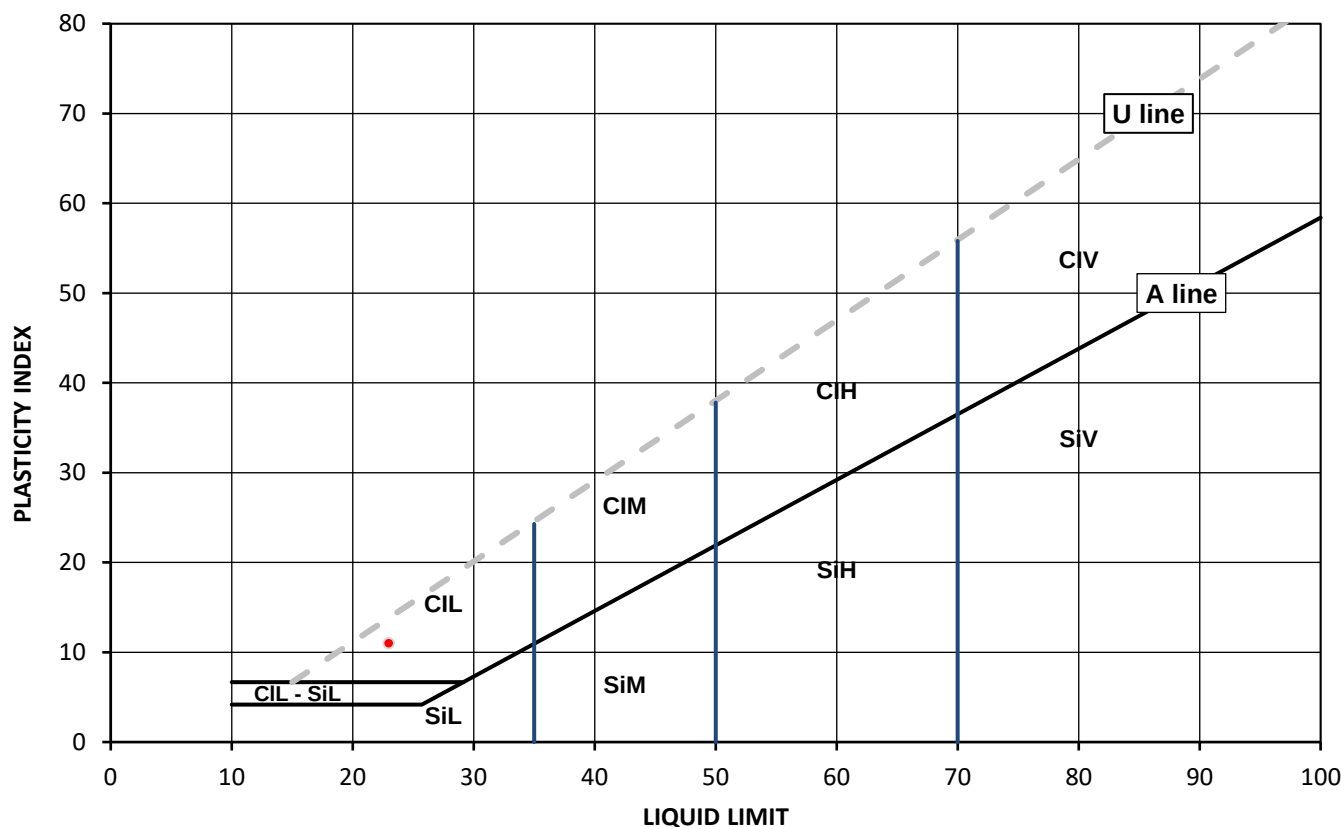
Test Results:

Laboratory Reference: 2016232
Hole No.: RO101
Sample Reference: Not Given
Sample Description: Greyish brown slightly gravelly clayey SAND

Depth Top [m]: 13.00
Depth Base [m]: 13.45
Sample Type: D

Sample Preparation: Tested after >425um removed by hand

As Received Moisture Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
18	23	12	11	94



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl	Clay	below 35
Si	Silt	35 to 50
	L	Low
	M	Medium
	H	High
	V	Very high
	O	Organic
		append to classification for organic material (eg CIHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

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Client Reference: 21-1914.01
Job Number: 21-10876
Date Sampled: 14/09/2021
Date Received: 16/09/2021
Date Tested: 28/09/2021
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

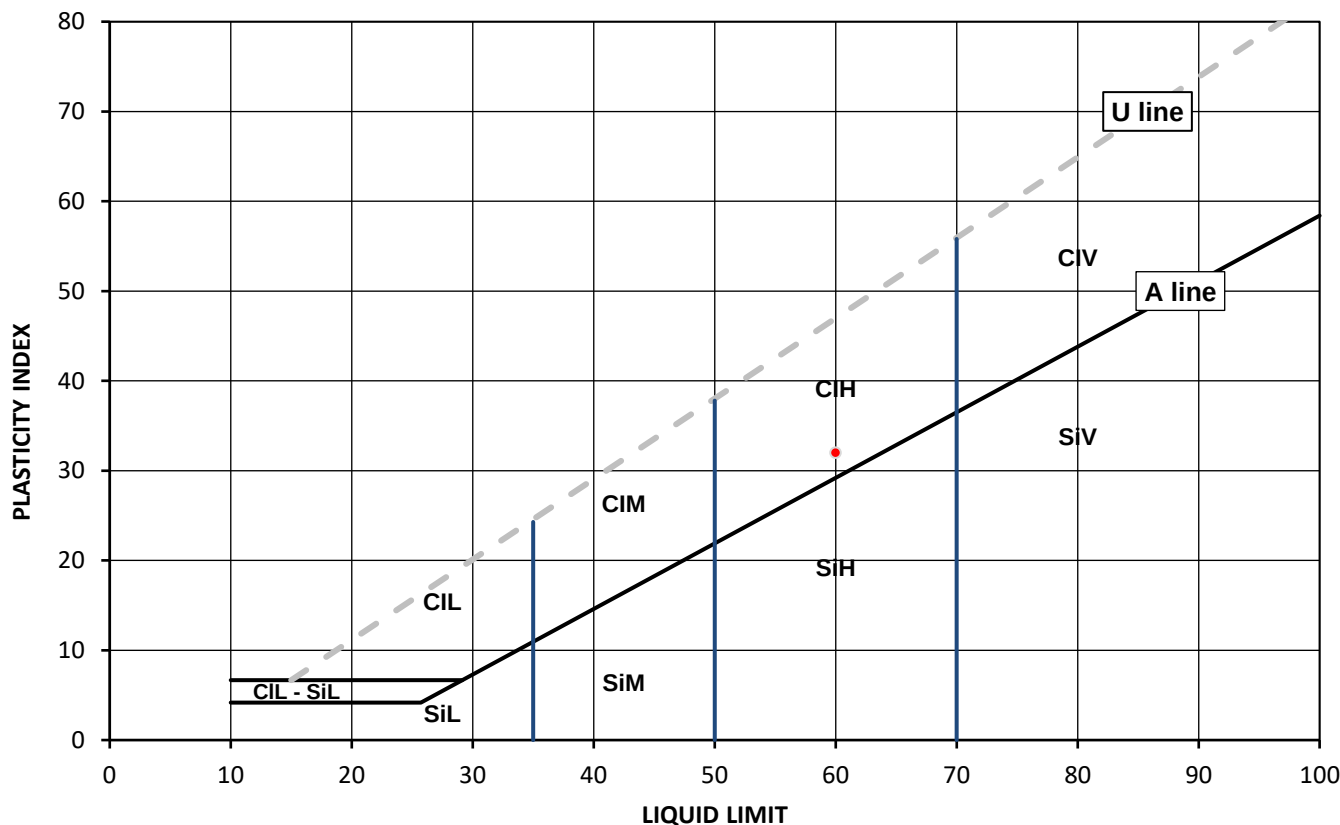
Test Results:

Laboratory Reference: 2016233
Hole No.: DS101
Sample Reference: Not Given
Sample Description: Dark grey gravelly CLAY

Depth Top [m]: 4.00
Depth Base [m]: 4.45
Sample Type: D

Sample Preparation: Tested after washing to remove >425um

As Received Moisture Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
22	60	28	32	65



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl	Clay	below 35
Si	Silt	35 to 50
	L	Low
	M	Medium
	H	High
	V	Very high
	O	Organic
		append to classification for organic material (eg CIHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

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Contact: Melanie Booth
Site Address: Proposed Media Studio

Client Reference: 21-1914.01
Job Number: 21-10876
Date Sampled: 14/09/2021
Date Received: 16/09/2021
Date Tested: 28/09/2021
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

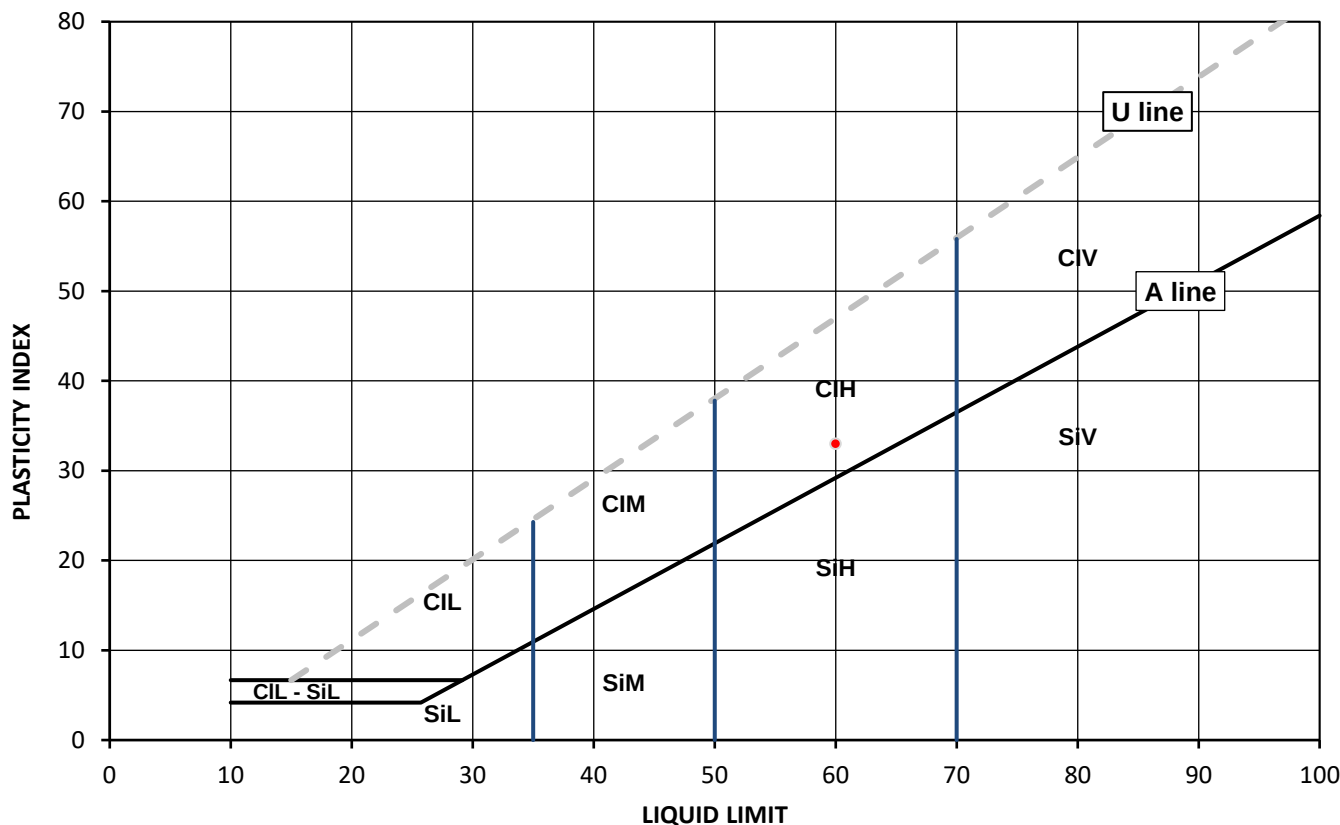
Test Results:

Laboratory Reference: 2016234
Hole No.: DS102
Sample Reference: Not Given
Sample Description: Greyish brown slightly gravelly CLAY

Depth Top [m]: 1.20
Depth Base [m]: 1.65
Sample Type: D

Sample Preparation: Tested after washing to remove >425um

As Received Moisture Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
18	60	27	33	79



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl	Clay	below 35
Si	Silt	35 to 50
	L Low	50 to 70
	M Medium	exceeding 70
	H High	
	V Very high	
	O Organic	append to classification for organic material (eg CIHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

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Contact: Melanie Booth
Site Address: Proposed Media Studio

Client Reference: 21-1914.01
Job Number: 21-10876
Date Sampled: 15/09/2021
Date Received: 16/09/2021
Date Tested: 28/09/2021
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

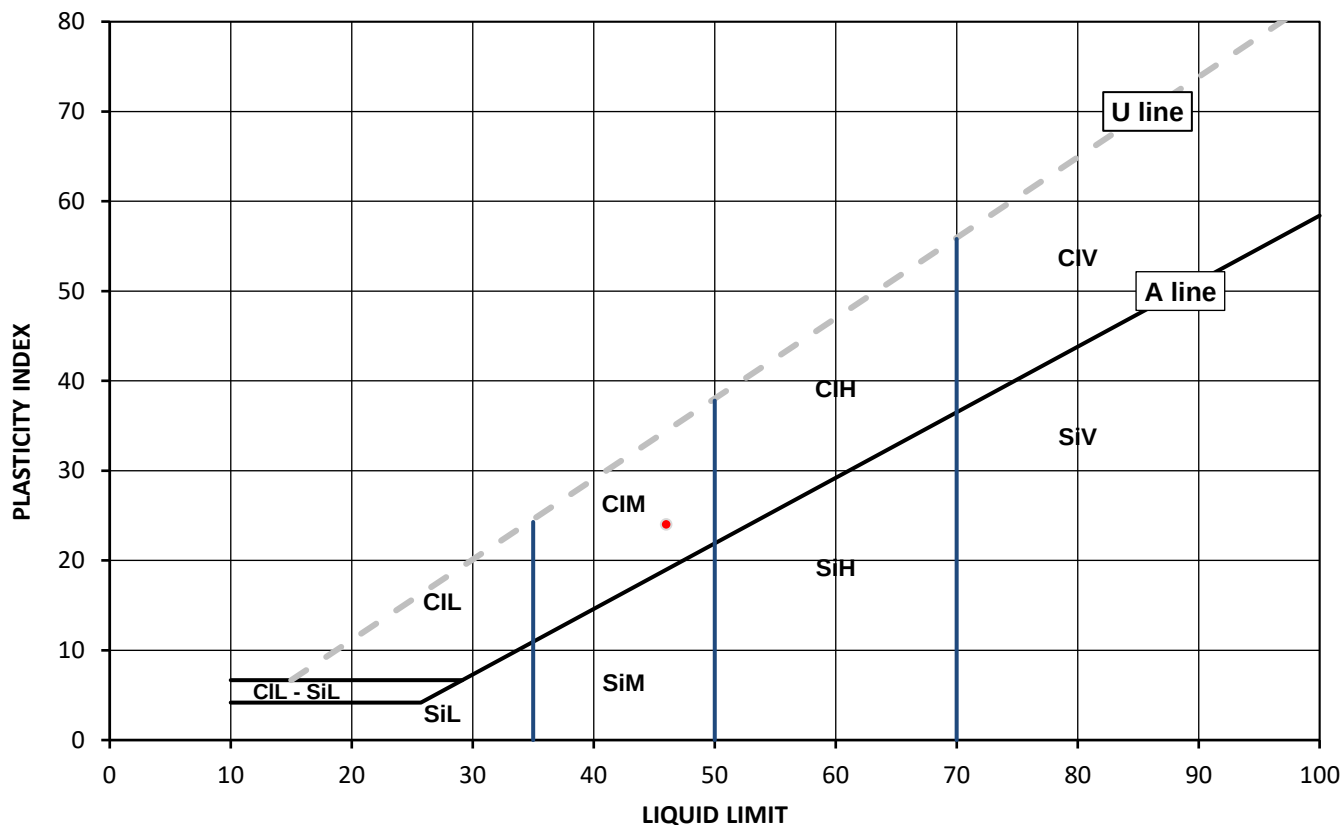
Test Results:

Laboratory Reference: 2016235
Hole No.: DS103
Sample Reference: Not Given
Sample Description: Greyish brown slightly gravelly slightly sandy CLAY

Depth Top [m]: 5.00
Depth Base [m]: 5.45
Sample Type: D

Sample Preparation: Tested after washing to remove >425um

As Received Moisture Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
17	46	22	24	95



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl	Clay	below 35
Si	Silt	35 to 50
	L	Low
	M	Medium
	H	High
	V	Very high
	O	Organic
		append to classification for organic material (eg CIHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

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Contact: Melanie Booth
Site Address: Proposed Media Studio

Client Reference: 21-1914.01
Job Number: 21-10876
Date Sampled: 15/09/2021
Date Received: 16/09/2021
Date Tested: 27/09/2021
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

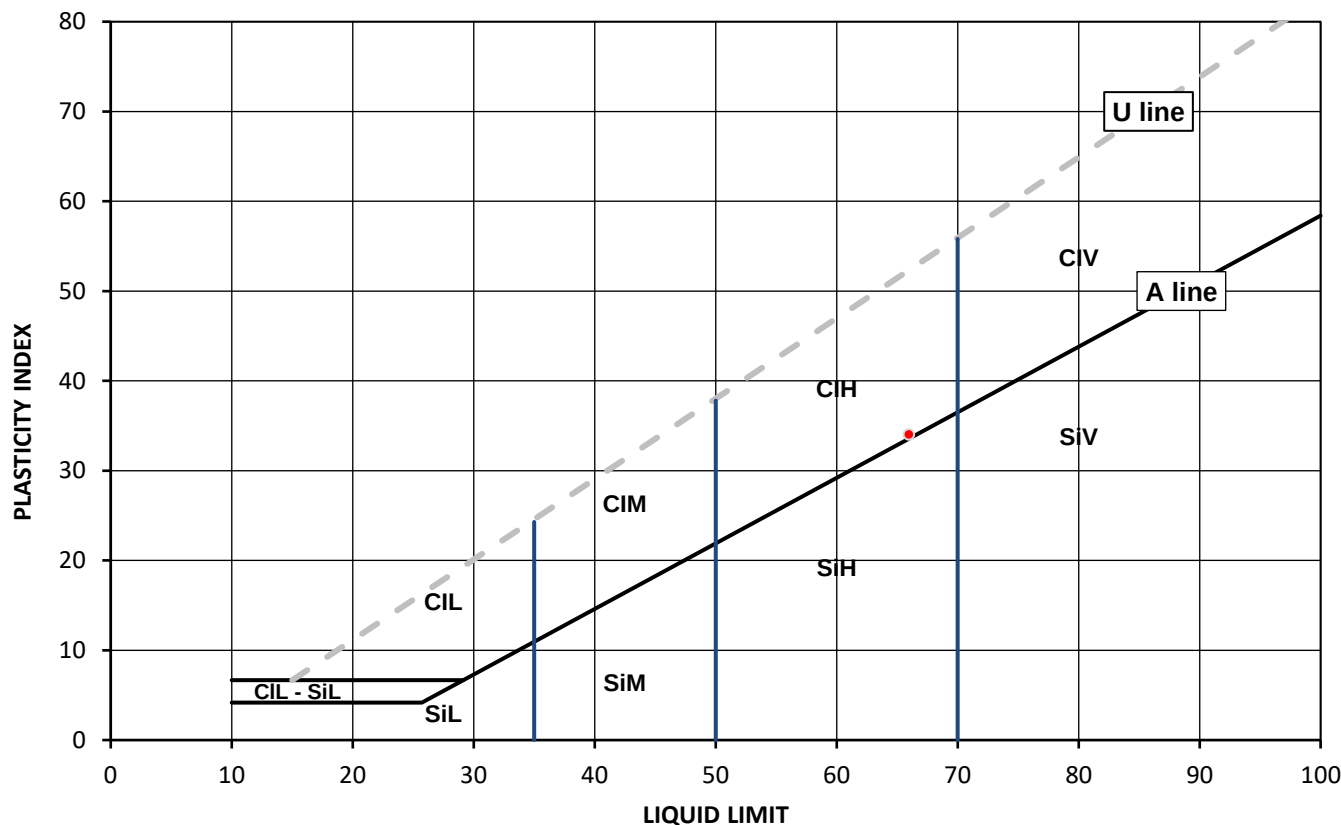
Test Results:

Laboratory Reference: 2016236
Hole No.: DS103
Sample Reference: Not Given
Sample Description: Dark grey very gravelly very sandy clayey SILT with fragments of brick

Depth Top [m]: 3.50
Depth Base [m]: 4.00
Sample Type: B

Sample Preparation: Tested after washing to remove >425um

As Received Moisture Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
25	66	32	34	58



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl	Clay	below 35
Si	Silt	35 to 50
	L Low	50 to 70
	M Medium	exceeding 70
	H High	
	V Very high	
	O Organic	append to classification for organic material (eg CIHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

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PL Deputy Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

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Page 1 of 1

Date Reported: 30/09/2021

GF 236.11

4041

Client: Delta-Simons
Client Address: Suite 4a, One Portland Street,
Manchester, M1 3BE

Contact: Melanie Booth
Site Address: Proposed Media Studio

Client Reference: 21-1914.01
Job Number: 21-10876
Date Sampled: 15/09/2021
Date Received: 16/09/2021
Date Tested: 27/09/2021
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

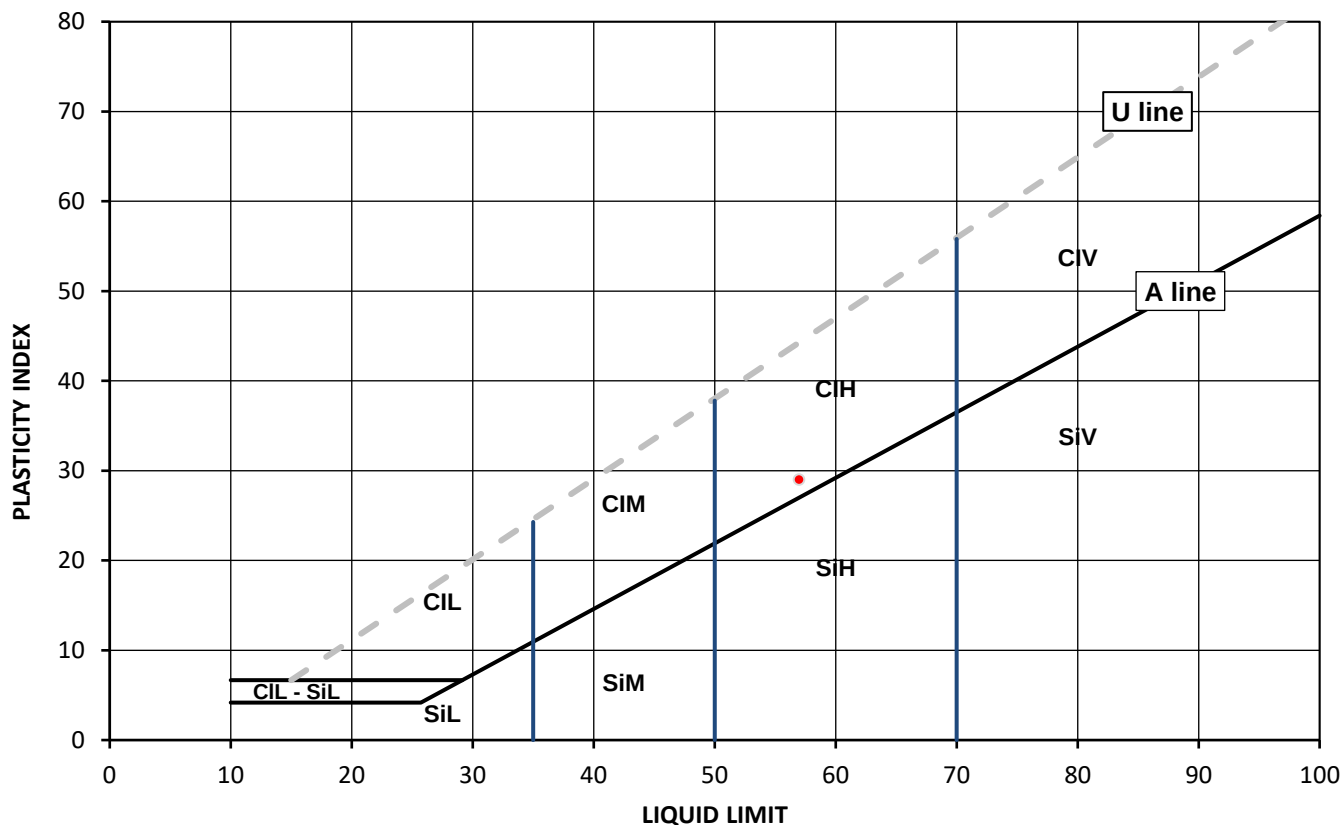
Test Results:

Laboratory Reference: 2016237
Hole No.: DS104A
Sample Reference: Not Given
Sample Description: Brownish grey very sandy clayey slightly gravelly SILT

Depth Top [m]: 2.50
Depth Base [m]: 3.00
Sample Type: B

Sample Preparation: Tested after washing to remove >425um

As Received Moisture Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
24	57	28	29	86



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl	Clay	below 35
Si	Silt	35 to 50
	L Low	50 to 70
	M Medium	exceeding 70
	H High	
	V Very high	
	O Organic	append to classification for organic material (eg CIHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:

Szczepan Bielatowicz
PL Deputy Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

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4041

Client: Delta-Simons

Client Address: Suite 4a, One Portland Street,
Manchester, M1 3BE

Contact: Melanie Booth

Site Address: Proposed Media Studio

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

SUMMARY REPORT**SUMMARY OF CLASSIFICATION TEST RESULTS**

Tested in Accordance with:

Moisture Content by BS 1377-2: 1990: Clause 3.2; Water Content by BS EN
17892-1: 2014; Atterberg by BS 1377-2: 1990: Clause 4.3 (4 Point Test),
Clause 4.4 (1 Point Test) and 5; PD by BS 1377-2: 1990: Clause 8.2i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Environmental Science

Client Reference: 21-1914.01

Job Number: 21-10876

Date Sampled: 14/09 - 15/09/2021

Date Received: 16/09/2021

Date Tested: 27/09 - 28/09/2021

Sampled By: Not Given

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	Moisture Content [W]	Water Content [W]	Atterberg				Density			Total Porosity#		
		Reference	Depth Top	Depth Base	Type					% Passing 425um	WL	Wp	Ip	bulk	dry	PD			
			m	m															
2016233	DS101	Not Given	4.00	4.45	D	Dark grey gravelly CLAY	Atterberg 4 Point	22		65	60	28	32						
2016234	DS102	Not Given	1.20	1.65	D	Greyish brown slightly gravelly CLAY	Atterberg 4 Point	18		79	60	27	33						
2016236	DS103	Not Given	3.50	4.00	B	Dark grey very gravelly very sandy clayey SILT with fragments of brick	Atterberg 4 Point	25		58	66	32	34						
2016235	DS103	Not Given	5.00	5.45	D	Greyish brown slightly gravelly slightly sandy CLAY	Atterberg 4 Point	17		95	46	22	24						
2016237	DS104A	Not Given	2.50	3.00	B	Brownish grey very sandy clayey slightly gravelly SILT	Atterberg 4 Point	24		86	57	28	29						
2016227	RO101	Not Given	6.00	6.45	D	Dark brown slightly gravelly sandy CLAY	Atterberg 4 Point	19		98	42	21	21						
2016228	RO101	Not Given	7.00	7.45	D	Greyish brown slightly gravelly sandy CLAY	Atterberg 4 Point	23		98	41	21	20						
2016229	RO101	Not Given	8.00	8.45	D	Greyish brown slightly gravelly very sandy CLAY	Atterberg 4 Point	13		96	33	14	19						
2016230	RO101	Not Given	9.70	10.15	D	Greyish brown slightly gravelly clayey SAND	Atterberg 4 Point	7.3		87	25	12	13						
2016231	RO101	Not Given	11.50	11.95	D	Greyish brown slightly gravelly sandy CLAY	Atterberg 4 Point	14		99	36	18	18						

Note: # Non accredited; NP - Non plastic

Comments:

Signed:

Szczepan Bielatowicz
PL Deputy Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

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Client:

Client: Delta-Simons

Client Address:

Suite 4a, One Portland Street,
Manchester, M1 3BE

Contact: Melanie Booth

Site Address: Proposed Media Studio

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

SUMMARY REPORT

SUMMARY OF CLASSIFICATION TEST RESULTS

Tested in Accordance with:

Moisture Content by BS 1377-2: 1990: Clause 3.2; Water Content by BS EN 17892-1: 2014; Atterberg by BS 1377-2: 1990: Clause 4.3 (4 Point Test), Clause 4.4 (1 Point Test) and 5; PD by BS 1377-2: 1990: Clause 8.2

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Client Reference: 21-1914.01

Job Number: 21-10876

Date Sampled: 15/09/2021

Date Received: 16/09/2021

Date Tested: 28/09/2021

Sampled By: Not Given

Test results

[illegible]

Note: # Non accredited; NP - Non plastic

Comments:

Signed:

Sergius
Gildas

Szczepan Bielatowicz
PL Deputy Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Particle Size Distribution

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Tested in Accordance with: BS 1377-2: 1990

Client: Delta-Simons
Client Address: Suite 4a, One Portland Street,
Manchester, M1 3BE

Contact: Melanie Booth
Site Address: Proposed Media Studio

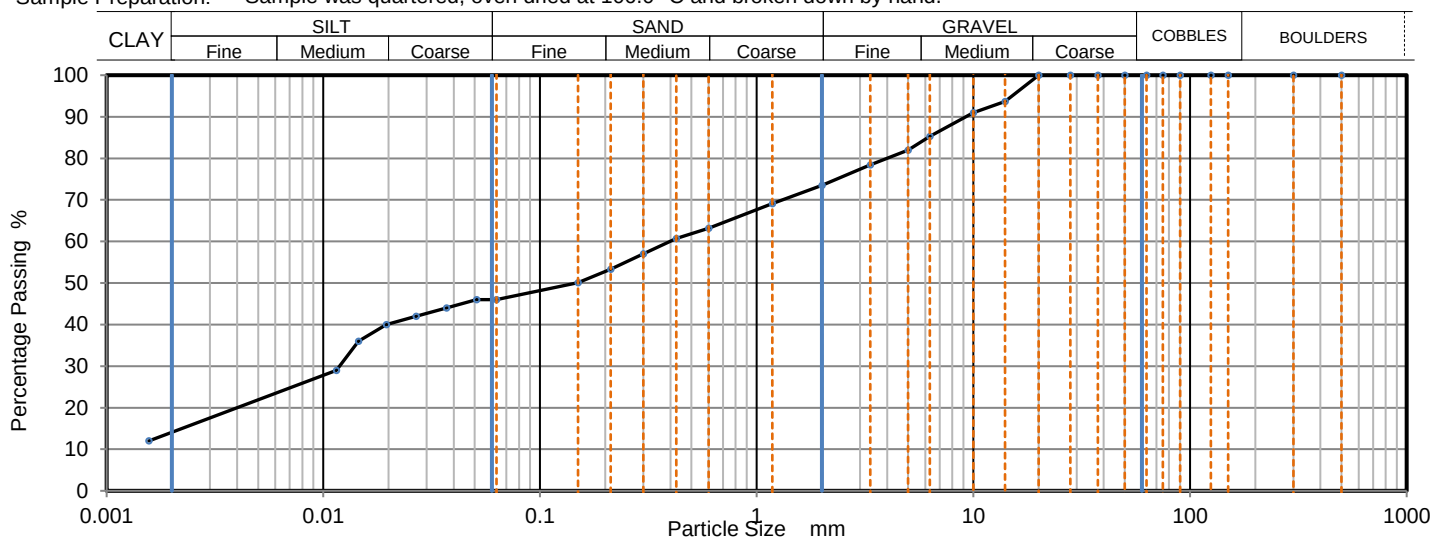
Client Reference: 21-1914.01
Job Number: 21-10876
Date Sampled: 15/09/2021
Date Received: 16/09/2021
Date Tested: 27/09/2021
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference: 2016236
Hole No.: DS103
Sample Reference: Not Given
Sample Description: Dark grey very gravelly very sandy clayey SILT with fragments of brick
Sample Preparation: Sample was quartered, oven dried at 106.0 °C and broken down by hand.

Depth Top [m]: 3.50
Depth Base [m]: 4.00
Sample Type: B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100	0.0510	46
300	100	0.0370	44
150	100	0.0268	42
125	100	0.0195	40
90	100	0.0145	36
75	100	0.0115	29
63	100	0.0016	12
50	100		
37.5	100		
28	100		
20	100		
14	94		
10	91		
6.3	85		
5	82		
3.35	78	Particle density (assumed) 2.65 Mg/m ³	
2	74		
1.18	69		
0.6	63		
0.425	61		
0.3	57		
0.212	53		
0.15	50		
0.063	46		

Sample Proportions	% dry mass
Very coarse	0
Gravel	27
Sand	28
Silt	31
Clay	14

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	> 250
Curvature Coefficient	

Uniformity Coefficient and Coefficient of Curvature calculated in accordance with BS EN ISO 14688-2: 2004 + A1: 2013

Note: Tested in Accordance with BS1377:Part 2:1990, clauses 9.2 and 9.5

Remarks:

Signed:

Szczepan Bielatowicz

Szczepan Bielatowicz
PL Deputy Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Particle Size Distribution

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Tested in Accordance with: BS 1377-2: 1990

Client: Delta-Simons
Client Address: Suite 4a, One Portland Street,
Manchester, M1 3BE

Contact: Melanie Booth
Site Address: Proposed Media Studio

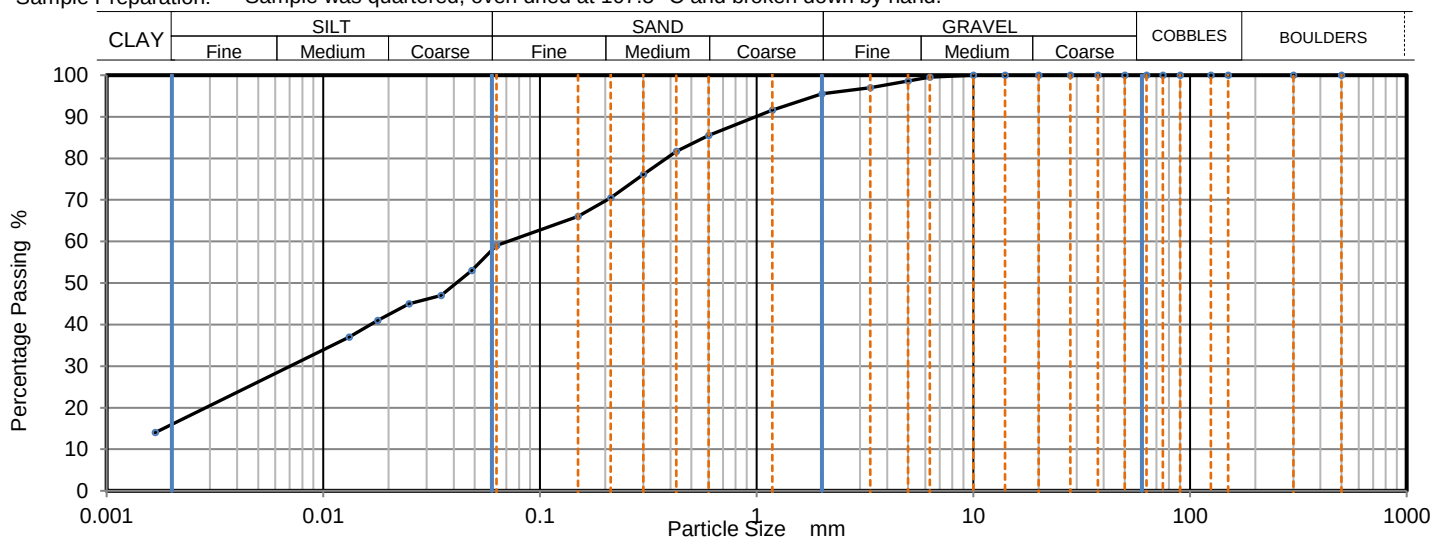
Client Reference: 21-1914.01
Job Number: 21-10876
Date Sampled: 15/09/2021
Date Received: 16/09/2021
Date Tested: 27/09/2021
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference: 2016237
Hole No.: DS104A
Sample Reference: Not Given
Sample Description: Brownish grey very sandy clayey slightly gravelly SILT
Sample Preparation: Sample was quartered, oven dried at 107.5 °C and broken down by hand.

Depth Top [m]: 2.50
Depth Base [m]: 3.00
Sample Type: B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100	0.0630	59
300	100	0.0484	53
150	100	0.0349	47
125	100	0.0248	45
90	100	0.0178	41
75	100	0.0132	37
63	100	0.0017	14
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	99		
3.35	97	Particle density (assumed) 2.65 Mg/m ³	
2	96		
1.18	92		
0.6	86		
0.425	82		
0.3	76		
0.212	71		
0.15	66		
0.063	59		

Sample Proportions	% dry mass
Very coarse	0
Gravel	5
Sand	36
Silt	43
Clay	16

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	> 42
Curvature Coefficient	

Uniformity Coefficient and Coefficient of Curvature calculated in accordance with BS EN ISO 14688-2: 2004 + A1: 2013

Note: Tested in Accordance with BS1377:Part 2:1990, clauses 9.2 and 9.5

Remarks:

Signed:

Szczepan Bielatowicz
PL Deputy Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

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Melanie Booth
Delta-Simons
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M1 3BE

i2 Analytical Ltd.
7 Woodshots Meadow,
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Watford,
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f: 01923 237404
e: reception@i2analytical.com

e: Melanie.Booth@deltasimons.com

Analytical Report Number : 21-10879

Project / Site name:	Proposed Media Studio	Samples received on:	16/09/2021
Your job number:	21-1914.01	Samples instructed on/ Analysis started on:	16/09/2021
Your order number:	DS63538	Analysis completed by:	29/09/2021
Report Issue Number:	1	Report issued on:	29/09/2021
Samples Analysed:	5 soil samples		

Signed: *A. Czerwińska*

Agnieszka Czerwińska
Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 21-10879
Project / Site name: Proposed Media Studio
Your Order No: DS63538

Lab Sample Number				2016246	2016247	2016248	2016249	2016250
Sample Reference				DS101	DS101	DS102	DS103	DS104A
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				2.00-2.45	4.00-4.45	1.20-1.65	3.50-4.00	5.00-5.45
Date Sampled				14/09/2021	14/09/2021	14/09/2021	15/09/2021	15/09/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	14	16	15	16	15
Total mass of sample received	kg	0.001	NONE	0.70	0.40	0.30	0.70	0.50

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	9.9	8.8	9.5	9.8	8.4
Total Sulphate as SO ₄	%	0.005	MCERTS	1.11	0.959	0.544	1.23	0.249
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	4300	3800	4700	4200	1600
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	2.2	1.9	2.3	2.1	0.81
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	2160	1900	2340	2100	811
Total Sulphur	%	0.005	MCERTS	0.475	0.859	0.326	0.646	0.207

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number : 21-10879

Project / Site name: Proposed Media Studio

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
2016246	DS101	None Supplied	2.00-2.45	Brown clay and loam with gravel and vegetation.
2016247	DS101	None Supplied	4.00-4.45	Brown clay and loam with gravel and vegetation.
2016248	DS102	None Supplied	1.20-1.65	Brown clay and loam with gravel and brick.
2016249	DS103	None Supplied	3.50-4.00	Brown clay and sand with gravel and brick.
2016250	DS104A	None Supplied	5.00-5.45	Brown clay and loam with gravel and vegetation.

Analytical Report Number : 21-10879

Project / Site name: Proposed Media Studio

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total Sulphate in soil as %	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Total Sulphur in soil as %	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Sulphate, water soluble, in soil	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Appendix D – Soil Chemical Analysis Results



Melanie Booth
Delta-Simons
Suite 4a
One Portland Street
Manchester
M1 3BE

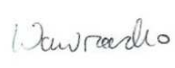
i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

e: Melanie.Booth@deltasimons.com

Analytical Report Number : 21-10834

Project / Site name:	Proposed Media Studio	Samples received on:	16/09/2021
Your job number:	21-1914.01	Samples instructed on/ Analysis started on:	20/09/2021
Your order number:	DS63538	Analysis completed by:	27/09/2021
Report Issue Number:	1	Report issued on:	27/09/2021
Samples Analysed:	9 soil samples		


Signed:

Joanna Wawrzeczko
Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 21-10834
Project / Site name: Proposed Media Studio
Your Order No: DS63538

Lab Sample Number				2016019	2016020	2016021	2016022	2016023
Sample Reference				RO101	RO101	DS101	DS101	DS102
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.70	2.80-2.90	0.50	3.30-3.40	0.40
Date Sampled				14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	12	19	8.8	19	11
Total mass of sample received	kg	0.001	NONE	1.4	1.5	1.5	1.4	1.4

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	-	Not-detected	-	Not-detected

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.7	-	8.6	-	9.2
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	830	-	390	-	530
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.41	-	0.19	-	0.26
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	415	-	193	-	264
Organic Matter (automated)	%	0.1	MCERTS	-	-	-	4.5	-

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	2.1	48	0.94	20	2.1
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	3.6	< 0.05	1.9	0.28
Acenaphthene	mg/kg	0.05	MCERTS	1.0	14	0.31	6.9	1.2
Fluorene	mg/kg	0.05	MCERTS	1.0	28	0.27	10	2.5
Phenanthrene	mg/kg	0.05	MCERTS	8.6	75	2.4	44	11
Anthracene	mg/kg	0.05	MCERTS	2.0	40	0.50	16	20
Fluoranthene	mg/kg	0.05	MCERTS	9.3	55	3.1	38	11
Pyrene	mg/kg	0.05	MCERTS	9.2	55	3.0	35	10
Benzo(a)anthracene	mg/kg	0.05	MCERTS	4.7	31	1.5	17	5.6
Chrysene	mg/kg	0.05	MCERTS	4.7	22	1.4	16	4.8
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	5.8	26	1.6	19	6.1
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	1.4	7.9	0.73	4.3	1.7
Benzo(a)pyrene	mg/kg	0.05	MCERTS	4.7	20	1.5	15	5.2
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	2.3	9.6	0.78	6.5	2.4
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.70	3.2	0.22	2.2	0.83
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	2.8	11	0.92	7.8	3.0

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	60.3	450	19.0	258	88.4
-----------------------------	-------	-----	--------	------	-----	------	-----	------

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	45	-	18	-	42
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	-	< 0.2	-	< 0.2
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2	-	< 1.2	-	< 1.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	30	-	14	-	28
Copper (aqua regia extractable)	mg/kg	1	MCERTS	91	-	36	-	72
Lead (aqua regia extractable)	mg/kg	1	MCERTS	190	-	68	-	150
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.7	-	0.6	-	0.6
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	23	-	13	-	19
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	170	-	77	-	170

Analytical Report Number: 21-10834
Project / Site name: Proposed Media Studio
Your Order No: DS63538

Lab Sample Number				2016019	2016020	2016021	2016022	2016023
Sample Reference				RO101	RO101	DS101	DS101	DS102
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.70	2.80-2.90	0.50	3.30-3.40	0.40
Date Sampled				14/09/2021	14/09/2021	14/09/2021	14/09/2021	14/09/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					

Monoaromatics & Oxygenates

Benzene	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Toluene	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Ethylbenzene	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
p & m-xylene	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
o-xylene	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	6.7	< 2.0	6.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	17	< 8.0	24	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	57	< 8.0	80	< 8.0
TPH-CWG - Aliphatic >EC35 - EC40	mg/kg	10	NONE	< 10	< 10	< 10	10	< 10
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	81	< 10	110	< 10

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	3.6	26	< 1.0	6.4	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	9.2	68	< 2.0	27	16
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	28	180	< 10	100	33
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	48	190	30	140	68
TPH-CWG - Aromatic >EC35 - EC40	mg/kg	10	NONE	< 10	27	10	17	15
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	89	470	38	270	120

TPH (C35 - C40)	mg/kg	10	MCERTS	< 10	27	10	28	15
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U/S = Unsuitable Sample I/S = Insufficient Sample

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Your Order No: DS63538

Lab Sample Number				2016024	2016025	2016026	2016027
Sample Reference				DS102	DS103	DS103	DS104A
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				4.00-4.20	0.90	3.20-3.30	0.80-0.90
Date Sampled				14/09/2021	14/09/2021	15/09/2021	14/09/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status				
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	17	12	16	13
Total mass of sample received	kg	0.001	NONE	1.4	1.4	1.4	1.4

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	Chrysotile- Loose Fibres	-	-
Asbestos in Soil	Type	N/A	ISO 17025	-	Detected	-	Not-detected

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	-	9.9	-	9.6
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	-	3200	-	3800
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	-	1.6	-	1.9
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	-	1580	-	1920
Organic Matter (automated)	%	0.1	MCERTS	3.5	-	-	4.7

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	18	2.9	8.1	1.6
Acenaphthylene	mg/kg	0.05	MCERTS	0.60	0.24	0.58	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	6.1	1.2	3.8	1.5
Fluorene	mg/kg	0.05	MCERTS	6.3	1.4	3.5	1.5
Phenanthrene	mg/kg	0.05	MCERTS	24	6.5	32	7.4
Anthracene	mg/kg	0.05	MCERTS	6.4	2.2	6.5	2.0
Fluoranthene	mg/kg	0.05	MCERTS	20	7.9	56	7.3
Pyrene	mg/kg	0.05	MCERTS	19	7.3	61	6.6
Benzo(a)anthracene	mg/kg	0.05	MCERTS	8.9	3.8	37	3.4
Chrysene	mg/kg	0.05	MCERTS	7.4	3.2	32	3.0
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	7.2	3.9	23	3.4
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	3.1	1.2	5.6	1.1
Benzo(a)pyrene	mg/kg	0.05	MCERTS	6.9	3.2	16	3.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	2.9	1.5	5.0	1.4
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.99	0.52	2.0	0.47
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	3.5	1.8	6.2	1.6

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	142	48.9	297	45.1
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	-	100	-	76
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	-	< 0.2	-	< 0.2
Chromium (hexavalent)	mg/kg	1.2	MCERTS	-	< 1.2	-	< 1.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	-	29	-	30
Copper (aqua regia extractable)	mg/kg	1	MCERTS	-	190	-	110
Lead (aqua regia extractable)	mg/kg	1	MCERTS	-	330	-	190
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	-	1.5	-	1.1
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	-	28	-	30
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	-	320	-	170

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Lab Sample Number				2016024	2016025	2016026	2016027
Sample Reference				DS102	DS103	DS103	DS104A
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				4.00-4.20	0.90	3.20-3.30	0.80-0.90
Date Sampled				14/09/2021	14/09/2021	15/09/2021	14/09/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status				
Monoaromatics & Oxygenates							
Benzene	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
Toluene	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
Ethylbenzene	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
p & m-xylene	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
o-xylene	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	1.6	< 1.0	< 1.0	1.3
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	16	3.6	3.6	9.8
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	36	16	14	15
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	100	63	72	55
TPH-CWG - Aliphatic >EC35 - EC40	mg/kg	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	150	82	90	81

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	9.5	3.5	6.1	3.9
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	32	8.8	28	15
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	83	31	170	26
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	130	59	130	58
TPH-CWG - Aromatic >EC35 - EC40	mg/kg	10	NONE	20	< 10	13	< 10
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	260	100	330	100

TPH (C35 - C40)	mg/kg	10	MCERTS	20	14	23	< 10
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U/S = Unsuitable Sample I/S = Insufficient Sample

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* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
2016019	RO101	None Supplied	0.7	Brown loam with gravel and vegetation.
2016020	RO101	None Supplied	2.80-2.90	Brown clay and loam with gravel.
2016021	DS101	None Supplied	0.5	Brown loam with gravel and vegetation.
2016022	DS101	None Supplied	3.30-3.40	Brown clay and loam with gravel.
2016023	DS102	None Supplied	0.4	Brown loam with gravel and vegetation.
2016024	DS102	None Supplied	4.00-4.20	Brown clay and loam with gravel and vegetation.
2016025	DS103	None Supplied	0.9	Brown loam with gravel and vegetation.
2016026	DS103	None Supplied	3.20-3.30	Brown clay and loam with gravel and vegetation.
2016027	DS104A	None Supplied	0.80-0.90	Brown loam with gravel and vegetation.

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Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

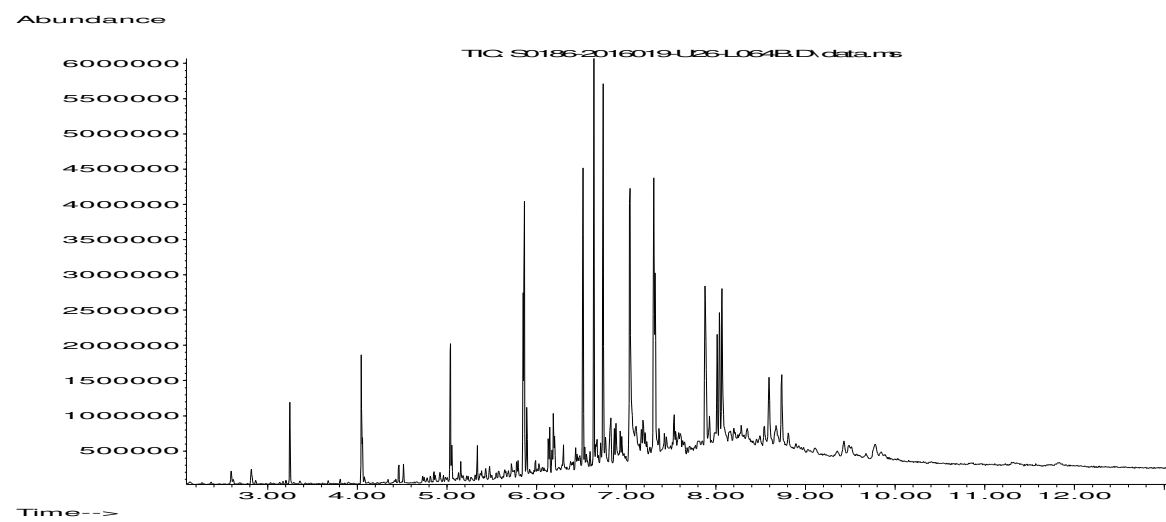
Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Hexavalent chromium in soil (Lower Level)	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
TPH Chromatogram in Soil	TPH Chromatogram in Soil.	In-house method	L064-PL	D	NONE
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Sulphate, water soluble, in soil	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS

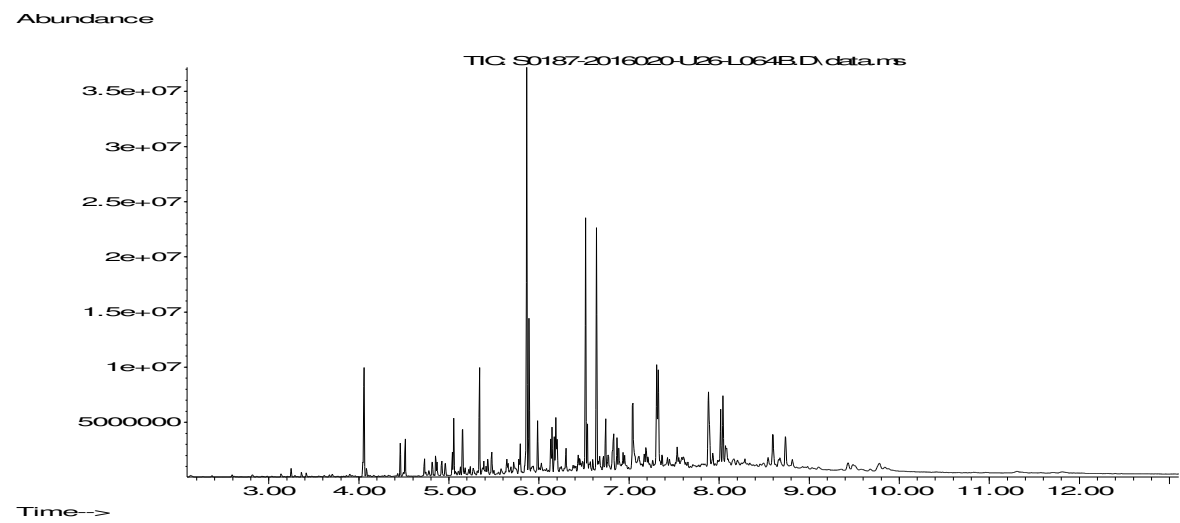
For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

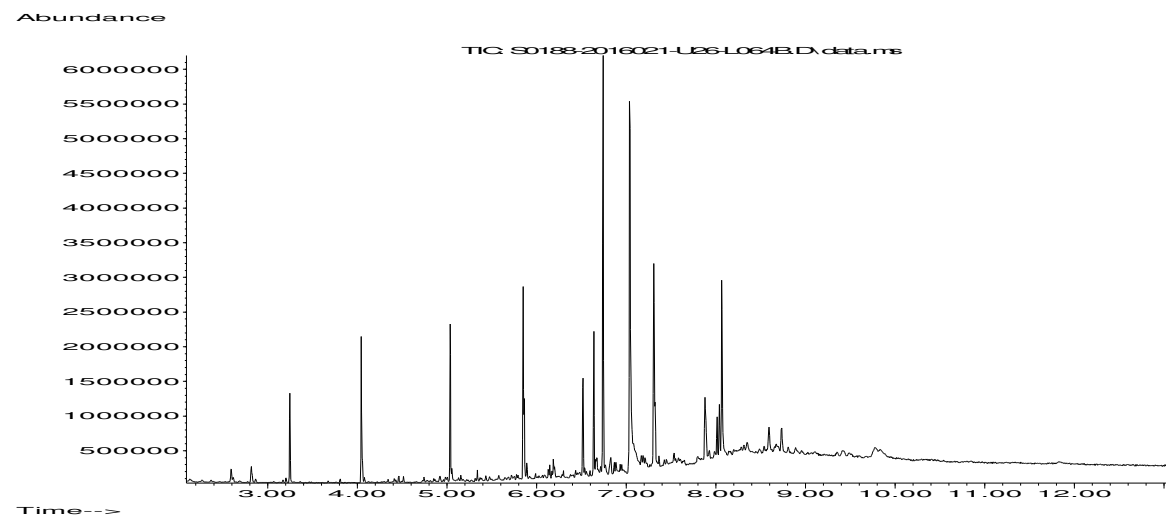
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

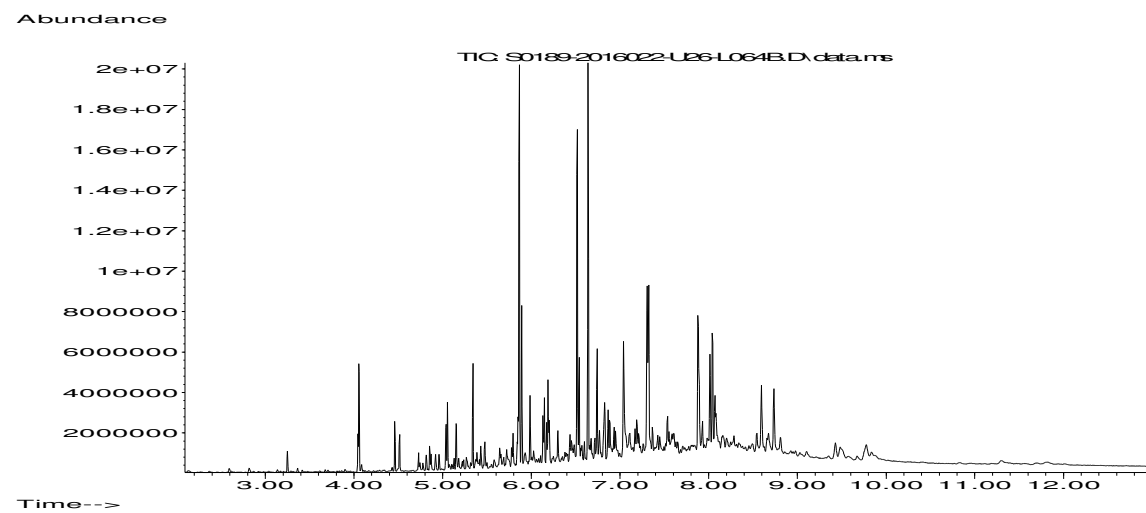
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

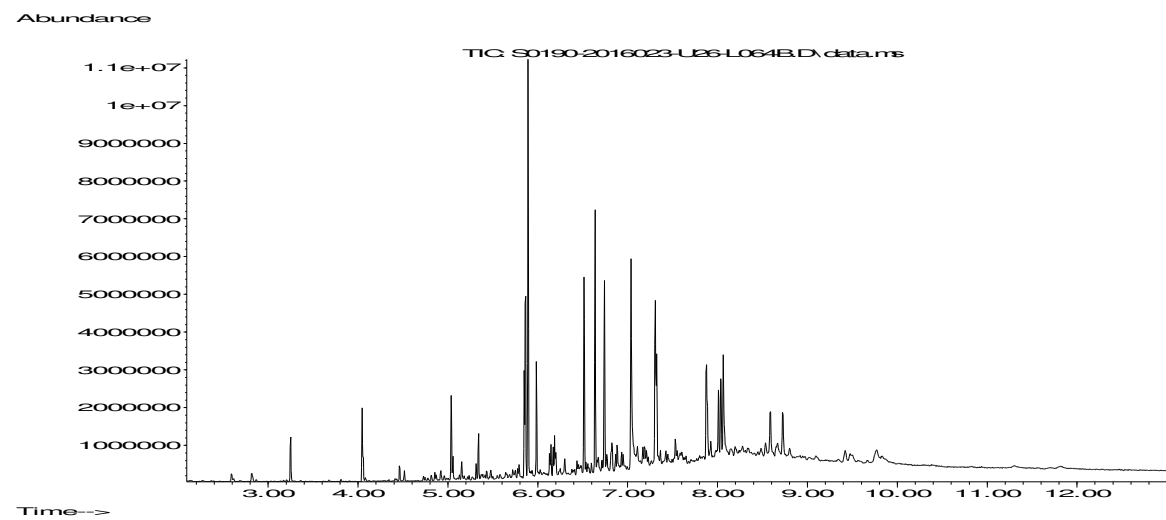
Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

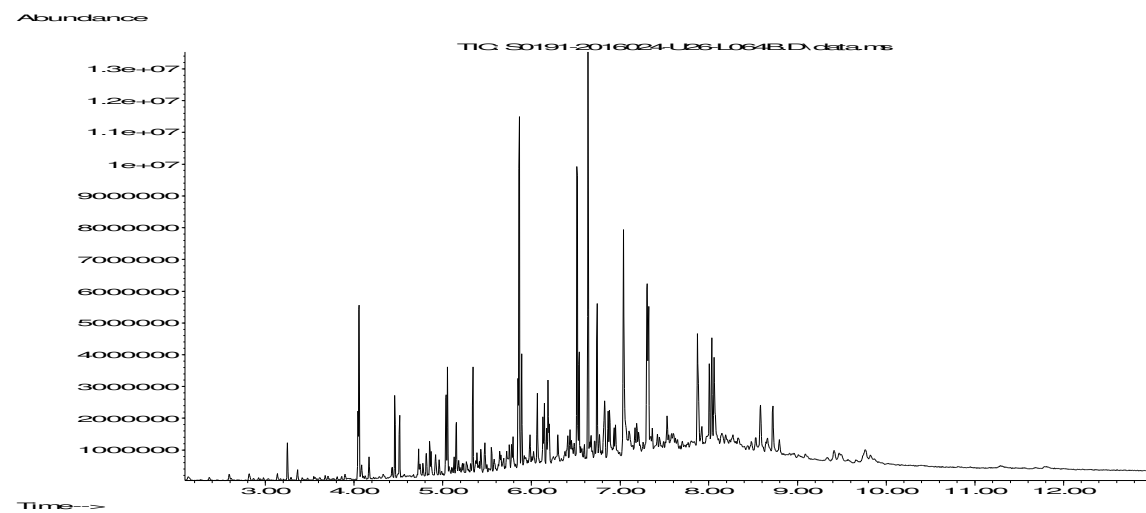


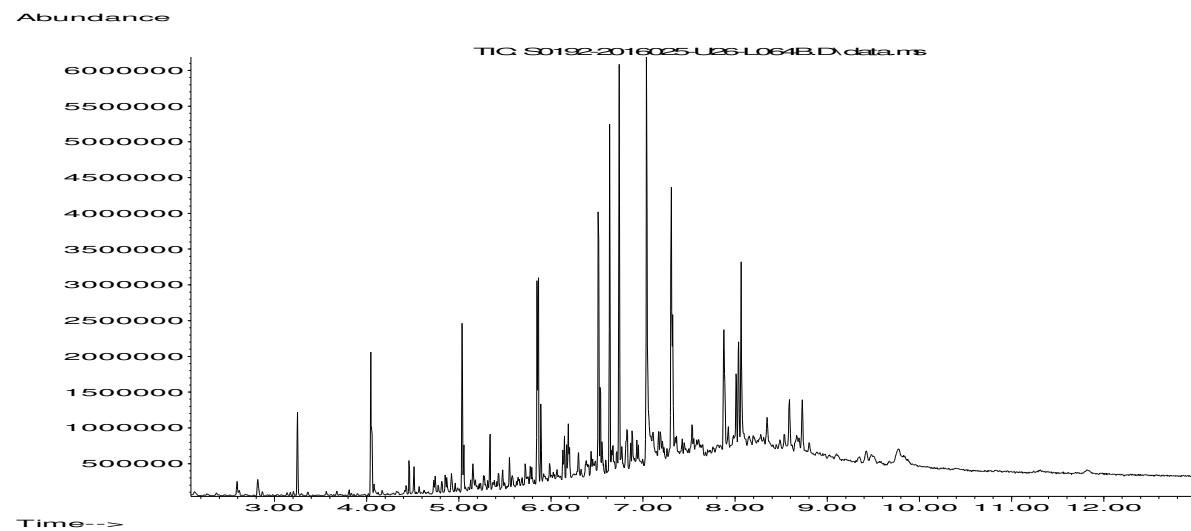


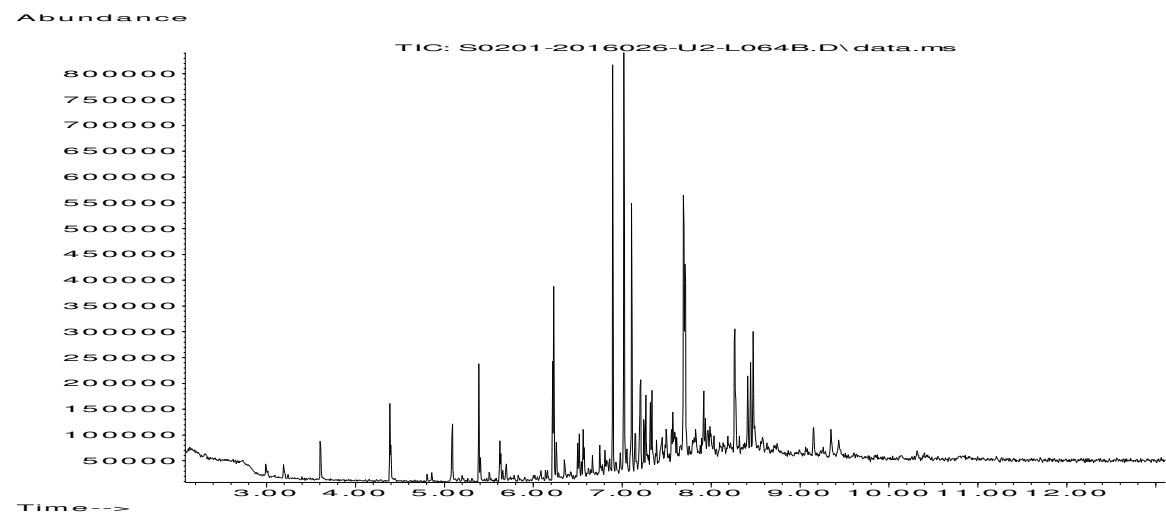


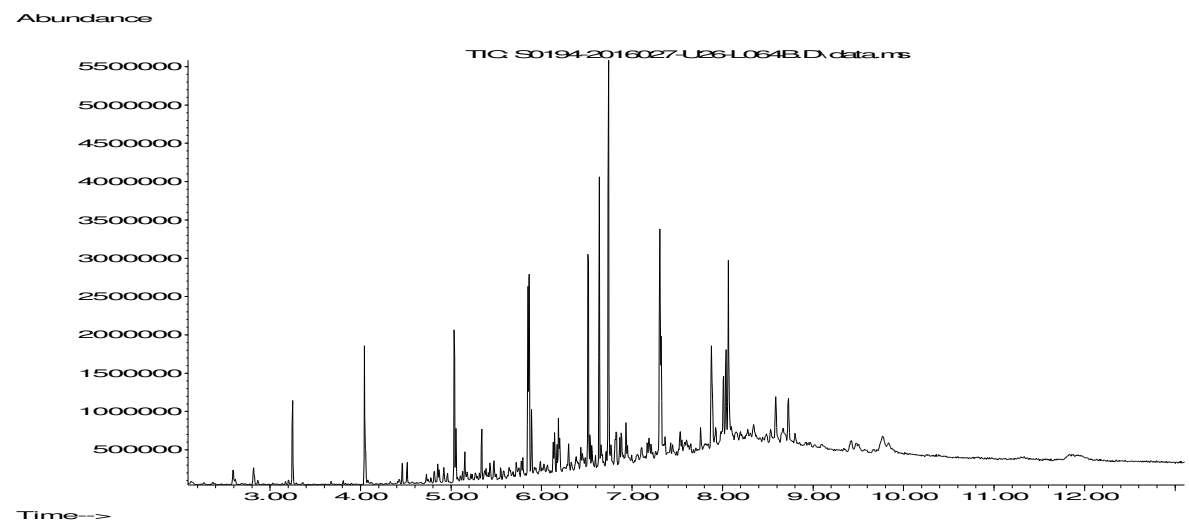












Appendix E – Risk Definitions

Contaminated Land Risk Definitions

The following methodology is based on the methodology presented in CIRIA C552 Contaminated Land Risk Assessment: A Guide to Good Practice 2001. It requires the classification of the:

- ▲ Magnitude of the potential consequence (severity) of the Risk occurring: and
- ▲ Magnitude of the Probability (likelihood) of the Risk occurring.

The classifications are then compared to indicate the risk presented by each pollutant linkage.

Consequence to Receptor Definition Matrix

	Human Health	Controlled Waters	Buildings/Services
Severe Consequence	Acute or chronic permanent impact on human health.	Sensitive controlled water pollution ongoing, or just about to occur.	Catastrophic collapse
Medium Consequence	Chronic permanent impact on human health	Gradual pollution of sensitive controlled water	Degradation of materials
Mild Consequence	Chronic temporary impact on human health	Gradual pollution of non-sensitive controlled water	Damage to building rendering it unsafe to occupy (eg foundation damage resulting in instability).
Minor Consequence	Non-permanent health effects to human health (easily prevented by means such as personal protective clothing etc).	Slight discoloration of water	Easily repairable effects of damage to buildings, structures and services, i.e discoloration of concrete

Probability Definitions

Probability	Definition in Context
Higher	There is a pollution linkage and an event that either appears very likely in the short term and almost inevitable over the long term, or there is evidence at the receptor of harm or pollution. Positive evidence of source, pathway and receptor.
Likely	There is a pollution linkage and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term. Suspect source, pathway, and receptor
Low Likelihood	There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such event would take place, and is less likely in the shorter term.
Unlikely	There is a pollution linkage but circumstances are such that it is improbable that an event would occur even in the very long term No evidence of hazard, pathway, and receptor

Standard Risk Matrix

		Consequence/Magnitude of impact			
		Severe	Medium	Mild	Minor
Probability	High	Very High	High	Moderate	Moderate/Low
	Likely	High	Moderate	Moderate/low	Low
	Low Likelihood	Moderate	Moderate/low	Low	Very Low
	Unlikely	Moderate/low	Low	Very Low	Very Low

Classified risks and likely action

Significance Level	Definition/Comments
Very High Risk	There is a high probability that severe harm could arise to a designated receptor from an identified hazard, OR, there is evidence that severe harm to a designated receptor is currently happening. This risk, if realised, is likely to result in a substantial liability. Urgent investigation (if not undertaken already) and remediation are likely to be required. Demonstrable contaminated land situation, highest threat & liability level, urgent action recommended.
High Risk	Harm is likely to arise to a designated receptor from an identified hazard. Realisation of the risk is likely to present a substantial liability. Urgent investigation (if not undertaken already) is required and remedial works may be necessary in the short term and are likely over the longer term. Likely contaminated land situation, risk assessment and action recommended.
Moderate	It is possible that harm could arise to a designated receptor from an identified hazard. However, if it is either relatively unlikely that any such harm would be severe, or if any harm were to occur it is more likely that the harm would be relatively mild Investigation (if not already undertaken) is normally required to clarify the risk and to determine the potential liability. Some remedial works may be required in the longer term. Plausible contaminated land situation, risk assessment and possible action recommended.
Low Risk	It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild. Unlikely contaminated land situation, possible risk assessment and possible action.
Very Low Risk	There is a low possibility that harm could arise to a receptor. In the event of such harm being realised it is not likely to be severe. Negligible risk, no action recommended except vigilance for changes in conditions.

Geotechnical Risk Classification

The geohazards listed in the report within Section 4 follow guidance presented in Clayton, C.R.I. (2001) *Managing Geotechnical Risk*, Thomas Telford and the Highways Agency document CD622 '*Managing Geotechnical Risk*' (2008) which aims to identify and manage the geotechnical risks associated with a scheme throughout its lifespan, from planning to construction to maintenance.

For each geohazard the probability of the hazard occurring (P) has been considered together with the impact it would have (I) if it were to happen to calculate the risk rating between 1 and 25.

Risks that fall within Moderate, Significant and Severe categories below are considered to be **substantial** and are therefore listed within the report.

Probability	(P)		Impact	(I)		(R)	Risk
Very Likely (VLk)	5	X	Very High (VH)	5	=	20 – 25	Severe
Likely (Lk)	4		High (H)	4		15 – 19	Substantial
Plausible (P)	3		Medium (M)	3		10 – 14	Moderate
Unlikely (U)	2		Low (L)	2		5 – 9	Minor
Very Unlikely (VU)	1		Very Low (VL)	1		1 – 4	Negligible