

GEO-ENVIRONMENTAL ASSESSMENT
29-39 STIRLING ROAD AND 2 - 10 ROSLIN ROAD
ACTON, LONDON, W3
VISION CONSTRUCT
GEA-22310-21-264
JULY 2021

IDOM



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EXECUTIVE SUMMARY

A Geo-Environmental Assessment was requested by Vision Construct. The purpose of the assessment was to identify any contaminative or geotechnical issues associated with former land use at *29-39 Stirling Road and 2 - 10 Roslin Road, Acton, London, W3* which might impact on the redevelopment of the site.

SITE DETAILS: 29-39 STIRLING ROAD	
Approximate site area	0.14 ha
Current/previous use	Currently commercial building (since 1970s). Previously terraced housing.
Proposed use	Residential apartments over commercial space at ground and first floor levels.
SITE DETAILS: UNIT ON ROSLIN ROAD	
Approximate site area	0.09 ha
Current/previous use	Currently a bookbinding works (since the 1970s). Previously terraced housing. Orchard on pre 1868 – 1896 mapping.
Proposed use	Residential apartments over commercial space at ground floor level.
PHASE 1 NON-INTRUSIVE INVESTIGATION: BOTH SITES	
Expected geology	Made ground over River Terrace Gravels over London Clay.
Groundwater	Secondary A aquifer associated with the superficial gravel geology. The bedrock London Clay is indicated to be an unproductive stratum. Not in a groundwater source protection zone.
Surface water	No surface waters in the vicinity. Site is at very low risk of flooding.
Other	Not in a radon affected area. Numerous current and historic industries in the vicinity.
PHASE 2 EXPLORATORY INVESTIGATION: BOTH SITES	
Ground Conditions	Limited thicknesses of made ground overlying superficial deposits of Kempton Park Gravel above the London Clay Formation. Groundwater strikes recorded in the superficial gravel and London Clay.
Contamination	Generally low levels of contaminants have been identified but in the context of the proposed development no consequent remedial action has been identified.
Geotechnical issues	No special geotechnical constraints identified.
RECOMMENDATIONS	
Geotechnical	Due to the high-rise nature of the proposed structures, piled foundations will be required.

Remediation	Suspended floor slabs should be adopted at the site, whilst for preliminary design purposes, a CBR value of 3 % should be adopted for the made ground.
Waste classification	Buried concrete classes DS-2 and AC-2 will apply to new foundation concrete. No specific remediation actions are identified. Made ground arisings are assumed non-hazardous at this stage.

SECTION 1 INTRODUCTION

- 1.1 Vision Construct proposes to obtain planning for development of two parcels of land in Acton, London W3. The development site is located at 29 – 39 Stirling Road and on 2 – 10 Roslin Road at the northern end of Stirling Road. The building proposed at Stirling Road will comprise two blocks of 8 and 11 storeys set over a two-storey podium. Flexible commercial space will be provided at ground and first floor levels with residential at second floor and above. The building at Roslin Road will extend up to 15 storeys with commercial at ground floor and residential above.



Figure 1: Site Location Plan

- 1.2 The objectives of the investigation are to:
- i.* Assess surface and sub-surface ground conditions present at the site;
 - ii.* Identify hazards associated with ground contamination which may place constraints on the site and the proposed development;
 - iii.* Evaluate the risks associated with any identified hazards;
 - iv.* Provide preliminary recommendations for the mitigation of any significant risks identified; and
 - v.* Provide preliminary geotechnical recommendations.

- 1.3 A Phase 1 (Non-intrusive Investigation), a Phase 2a (Preliminary Exploratory Investigation) and a Phase 2b (Supplementary Investigation) have been undertaken for the subject site.
- 1.3.1 Summary of the Phase 1 (Non-intrusive Investigation):
- i.* Historic plans show that the sites were originally woodland (possibly orchard) which were developed into terraced housing by 1915. The residential housing was then demolished and replaced with an Engineering Works on the Stirling Road site and a Bookbinding Works on the Roslin Road site by the 1970s with no significant redevelopment since.
 - ii.* The surrounding area has numerous industrial land uses. Relevant potentially contaminative land uses within 250 m of the sites include chemical works, a compound factory, several engineering works, two laundries, plastic moulding works, a plastic and ceramics factory, a stationary factory, a button factory, motor repair works, a plating works, a milk depot. The nearby railways and works associated with them are also potential contaminative sources.
- 1.4 This report presents the findings of the geo-environmental investigation and provides an interpretation of the geo-environmental conditions that exist at the site. The contaminative status of the site and the implications with respect to development have been interpreted in accordance with the current government guidance on source-pathway-receptor risk assessment. This report uses a Tier 1 risk assessment to ascribe a conservative qualitative appraisal of the hazards associated with the site.
- 1.5 This report has been prepared for Vision Construct for the sole purpose described above and no extended duty of care to any third party is implied or offered. Third parties making reference to the report should consult Vision Construct and IDOM as to the extent to which the findings may be appropriate for their use.

SECTION 2 SITE INVESTIGATION RATIONALE**2.1 INTRODUCTION**

2.1.1 A site investigation rationale has been devised in accordance with the findings of the Phase 1 investigation and the resultant preliminary conceptual site model and risk assessment. Made ground and associated anthropogenic contamination likely. Potential for spillage of hydrocarbons on the Stirling Road site. Local groundwater could be affected by diffuse contamination from industry in the vicinity.

2.1.2 Intrusive sampling locations were chosen on the basis of providing broad spatial coverage of the site as no obvious features suggesting contaminative use were identified which required targeted investigation. Both sites were occupied by tenant businesses and therefore exploratory holes were not possible inside buildings for Roslin Road and only one hole was inside a building at the Stirling Road site.

2.2 SITE INVESTIGATION METHODS

2.2.1 An intrusive investigation was carried out by IDOM between 7 and 12 November 2019 and comprised the following scope of work:

- i.* Two cable percussion boreholes (MBH1 and MBH2) to 20 metres below ground level (m bgl); and
- ii.* Four shallow windowless sample holes (MWS1 to MWS4) advanced to a maximum depth of 3.6 m bgl;

2.2.2 A supplementary investigation was carried out by IDOM between 27 May and 2 June 2021, consisting of the following scope of work:

- i.* Two cable percussion boreholes (MBH101 and MBH102) advanced to a maximum depth of 30.45 m bgl;
- ii.* Five machine-dug trial pits (MTP01 to MTP05) excavated to a maximum depth of 3.4 m bgl; and
- iii.* Five plate load tests (CBR01 to CBR05) to determine California Bearing Ratio (CBR) values.

2.2.3 Exploratory hole locations are indicated on Drawing Nos. 22310-304-001 and 22310-304-002 which are presented in Appendix 1. Logging of exploratory holes was undertaken by an IDOM Officer. Exploratory hole logs are contained in Appendix 2.

2.2.4 Light cable percussion equipment was used to advance boreholes MBH1 and MBH102 (2-10 Roslin Road) and boreholes MBH2 and MBH101 (29-39 Stirling Road). Standard Penetration Tests (SPTs) were performed at regular intervals throughout the boreholes. The tests involved driving a steel cone tipped series of rods into the ground over a distance of 450 mm using the repeated blows of a 63.5 kg weight allowed to free fall over a distance of 760 mm. The total number of blows

required for the final 300 mm penetration (the 'N' value) is recorded on the borehole logs.

- 2.2.5 A tracked windowless sampling rig was used to advance MWS1-4. This comprised a rig-mounted drop hammer to drive a hollow steel barrel into the ground. The barrel is recovered along with a removable plastic sleeve, which lines the barrel and holds a core of soil which is retracted for logging and sampling. SPTs were performed at approximate 1 m intervals in all windowless sample holes.
- 2.2.6 Boreholes and windowless sample holes were installed for environmental monitoring. A 50 mm diameter groundwater monitoring standpipe with filter sock was placed in the hole to form a response zone. The standpipe was provided with a gravel pack around the slotted section within the response zone and a bentonite seal elsewhere around the plain sections as required. A removable gas tap, ¼" tail and trafficable flush cover were installed. Both original boreholes were installed for groundwater monitoring purposes: MBH1 (to 3.5 m bgl) and MBH2 (to 5.0 m bgl), whilst standpipes were also installed in MBH101 and MBH102 to depths of 6.0 m bgl. Each windowless sample hole was installed for monitoring purposes with response zones below 0.5 m bgl.
- 2.2.7 Representative soil samples were taken from various depths and strata to assess the contaminative status of the site. Soil samples were submitted to an MCERTS/UKAS accredited laboratory for chemical analysis of a broad suite of potential contaminants. The results are provided in Appendix 3.
- 2.2.8 A programme of geotechnical laboratory testing was performed on selected soil samples obtained from the boreholes, comprising classification and strength tests. Chemical testing was also undertaken to assess the aggressiveness of the ground with respect to buried concrete. The results are provided in Appendix 4.

SECTION 3 GROUND CONDITIONS

3.1 SURFACE GROUND CONDITIONS

- 3.1.1 For each exploratory hole, the surface ground conditions were on hardstanding ground. For all locations at the Roslin Road site this consisted of asphalt tarmac. At Stirling Road, this consisted of asphalt tarmac over reinforced concrete (outdoor) and reinforced concrete floor (inside warehouse).

3.2 SUB-SURFACE GROUND CONDITIONS

- 3.2.1 The ground conditions identified by the investigations are consistent with the published geology, with the exception of variable thicknesses of made ground revealed at shallow depth.
- 3.2.2 A summary of the ground conditions encountered is presented in Table 1, whilst a more detailed assessment of the strata is contained in the following sections of the report.

Table 1: Summary of Sub-surface Ground Conditions

STRATA	DEPTH TO TOP RANGE (m bgl)	THICKNESS RANGE (m)
Made Ground	0.0	0.70 – 2.40
Kempton Park Gravel Member (sand and gravel).	0.70 – 2.40	6.00 - 7.40
London Clay Formation	6.90 - 8.10	>23.10

3.2.3 Made Ground

3.2.3.1 Made ground was revealed from ground level across the Stirling Road site to depths of up to 2.4 m bgl, whilst on Roslin Road a maximum thickness of 1.2 m was recorded. The base of the made ground was not confirmed in MWS1, MWS2 or MWS3.

3.2.3.2 Beneath a surface layer of asphalt or reinforced concrete, the made ground was generally described as dark brown, greenish brown or light brown mottled light grey sandy clay with variable amounts of flint, brick, concrete and asphalt gravel. Occasional fragments of coal were noted in MBH1, whilst occasional dark organic particles were present in MWS3 between 0.7 and 1.0 m bgl. Locally, fragments of slate and metal were observed.

3.2.3.3 No significant visual or olfactory evidence of contamination was encountered within the made ground.

3.2.3.4 No perched groundwater was observed within the made ground.

3.2.4 Natural Ground

3.2.4.1 Natural superficial soils of the Kempton Park Gravel Member were present below made ground and ranged in thickness from 6.0 to 7.4 m. The soils generally consisted of light brown and brown, locally mottled orange clayey sandy flint gravel or clayey very gravelly sand with occasional subordinate layers of sandy clay. Borehole MBH102 encountered sandy clay between 2.3 and 5.0 m bgl, with deposits of sandy gravel above and below.

3.2.4.2 No significant visual or olfactory evidence of contamination was encountered within the natural superficial soils.

3.2.4.3 A groundwater strike was recorded within the Kempton Park Gravel encountered in MBH1 at a depth of 6.0 m bgl.

3.2.4.4 Sieve analyses were carried out on two samples of granular soil recovered from borehole MBH1. A sample obtained from a depth of 1.2 m bgl was described as orangish brown sandy clayey gravel, whilst a sample from 5.0 m bgl comprised

yellowish brown clayey sand. A further three samples recovered from MBH101 and MBH102 described the soils as either brown clayey silty very sandy gravel or yellowish brown sandy / very sandy gravel.

- 3.2.4.5 Atterberg limit tests carried out on four samples of superficial clay indicate that the soil can be classified as clay of intermediate and high plasticity. The plasticity index of the soil was found to range between 22 and 35 %, and in accordance with NHBC guidelines, this soil is of medium volume change potential. Two additional samples were found to be non-plastic. Moisture contents were also determined and ranged from 10 to 35 %.
- 3.2.4.6 A triaxial test was performed on a single undisturbed sample of superficial clay obtained from a depth of 3.5 m bgl in MBH102. The test revealed an average undrained shear strength of 39 kN/m², indicative of soft low strength ground conditions.
- 3.2.4.7 SPTs carried out within the superficial granular soils recorded 'N' values typically ranging from 31 to 50, indicating the presence of dense ground conditions. Locally, SPT 'N' values of 14 and 22 were revealed, suggesting medium dense conditions. In MBH1 an SPT 'N' value of 7 was recorded in a layer of superficial clay, indicating this layer as soft low strength in nature. SPTs performed within the superficial clay revealed in MBH102 recorded 'N' values of 15 and 16, indicative of firm medium strength conditions.
- 3.2.4.8 The London Clay Formation was revealed beneath the superficial deposits at depths of between 6.9 and 8.1 m bgl. This typically comprised grey fissured clay with occasional shell fragments.
- 3.2.4.9 A groundwater strike was recorded within the London Clay encountered in MBH1 at a depth of 17.3 m bgl, whilst a standing water level of 9.5 m bgl was recorded in MBH101.
- 3.2.4.10 An Atterberg limit test carried out on a single sample of London Clay indicates that the soil can be classified as clay of very high plasticity. A plasticity index value of 40 % was determined for the soil. A moisture content of 32 % was also determined for this sample.
- 3.2.4.11 Triaxial tests were performed on fourteen undisturbed samples of clay obtained from depths of between 8.0 and 25.5 m bgl in the boreholes. The tests revealed average undrained shear strengths ranging from 103 to 264 kN/m². These results are indicative of stiff and very stiff (high and very high strength) ground conditions. A sample recovered from MBH101 at 10.5 m bgl recorded an average undrained shear strength of 29 kN/m², suggesting soft low strength conditions. This result is likely to be due to sample disturbance.
- 3.2.4.12 SPTs undertaken within the London Clay revealed 'N' values in the range 19 to >50, indicative of stiff high strength and very stiff very high strength ground conditions.

SECTION 4 PRELIMINARY GEOTECHNICAL RECOMMENDATIONS**4.1 FOUNDATIONS**

- 4.1.1 The proposed development consists of two separate plots of land which front onto Bollo Lane. The land adjacent to Roslin Road will make way for a new fifteen storey structure with commercial units at ground level and residential apartments above. The second plot of land situated between Bollo Lane and Stirling Road will comprise two blocks (9 and 12 storeys high) with a two-storey podium. Flexible commercial space will be provided at ground and first floor levels with residential apartments above.
- 4.1.2 The recent ground investigation has encountered ground conditions comprising variable thicknesses of made ground (0.7 – 2.4 m thick) underlain by superficial deposits of the Kempton Park Gravel (6.0 – 7.4 m thick), whilst superficial clay has been revealed locally. These soils were underlain by the London Clay which was revealed at depths of between 6.9 and 8.1 m bgl.
- 4.1.3 SPTs performed in the granular superficial deposits recorded typically dense ground conditions, whilst locally medium dense conditions were present. Superficial clay was found to be firm medium strength in nature. SPTs undertaken within the underlying London Clay recorded typically stiff high strength and very stiff very high strength ground conditions.
- 4.1.4 In view of the high-rise nature of the new structures, traditional shallow foundations will not be feasible. Similarly, ground improvement is unlikely to be suitable. Therefore, it is recommended that a piled foundation solution is adopted.
- 4.1.5 It is envisaged that either driven or bored / Continuous Flight Auger (CFA) piles could be adopted at the site. Driven piles could possibly be utilised as they have the advantage that no arisings are generated, however, the effects of noise / vibrations are likely to be an issue given the proximity of the existing industrial development and railway.
- 4.1.6 The advantage of using bored / CFA piles is the low noise / vibration of the system, however, arisings are generated by bored / CFA piles. Piles would need to be taken through the made ground and superficial deposits to found within the underlying competent London Clay. Pile lengths will vary depending on the depth of the London Clay beneath each building, however, it is likely that minimum lengths of around 12 m will be required.
- 4.1.7 It is recommended that the advice of a specialist contractor be sought in order to determine the most appropriate / cost effective system and to advise on pile diameters, depths and safe working capacity. A guide to safe working loads for individual bored / CFA piles of varying length and diameter is presented in the table below. Pile calculations have been based on assessing skin friction and end bearing resistance in the undisturbed natural strata. No allowance has been made at this

stage for any potential drag down (negative skin friction). This should be assessed and allowed for by the designer.

- 4.1.8 The calculations assume a pile penetrating into the stiff / very stiff natural clay, whilst no contribution from existing fill materials has been allowed for. A factor of safety of 2.6 has been applied to the calculated ultimate capacities. Greater safe working capacities would be achievable if piles were taken to greater depth thereby benefiting from increased skin friction contribution and possible greater end bearing resistance. As discussed, these values are for guidance purposes only and should be verified by a specialist contractor. In addition, the safe working loads given are for individual isolated piles. The group effect should be assessed during the design stage.

Table 2: Safe Working Capacities for bored / CFA Piles

Pile Diameter (mm)	Length (m)	Safe Working Capacity (kN)
300	12	170
	15	235
	20	390
450	12	275
	15	380
	20	620
	25	830
600	12	395
	15	535
	20	870
	25	1155
750	12	535
	15	710
	20	1145
	25	1505

4.2 EXCAVATIONS AND GROUNDWATER

- 4.2.1 Based on the ground conditions observed at the site, any shallow excavations have the potential to become unstable in the short term, therefore, if man-entry is required, excavations should be supported by shoring or otherwise battered back to a safe angle in order to protect the workforce from possible collapse.

4.2.2 Groundwater was encountered during the intrusive investigation in MBH1 at a depth of 6.0 m bgl within superficial gravel, whilst a water strike was also recorded at 17.3 m bgl within the London Clay. Borehole MBH101 recorded a standing water level of 9.5 m bgl within the London Clay. In view of this, it is considered unlikely that groundwater ingress will occur in shallow excavations, however, provision for dewatering during the construction period should still be considered.

4.3 **FLOOR SLABS**

4.3.1 In view of the presence of made ground and cohesive soils at shallow depth across the site, and the need for the new structures to be piled, suspended floor slabs will be required for the proposed development.

4.4 **BURIED CONCRETE**

4.4.1 Recommendations given in BRE Special Digest 1:2005 "*Concrete in aggressive ground*" have been followed in order to give recommendations with respect to buried concrete.

4.4.2 Water soluble sulphate analysis was carried out on nineteen soil samples obtained from depths of between 0.2 and 19.0 m bgl with soil pH determination also carried out on these samples. Water soluble sulphate contents ranged between 0.017 and 2.0 g/l. In accordance with BRE guidelines the characteristic value is calculated by determining the mean of the highest 20 % of results. In this case the characteristic value is 0.74 g/l. On this basis the Design Sulphate Class is DS-2.

4.4.3 The pH values in the soil samples varied between 7.5 and 11.2. The mean of the lowest 20 % of values is 7.9 which represents the characteristic value. Mobile groundwater conditions have been assumed and on this basis the Aggressive Chemical Environment for Concrete (ACEC) class for the site is AC-2.

4.5 **ROADS AND PAVED AREAS**

4.5.1 *In situ* plate load tests were performed in five locations (CBR01 to CBR05) in order to determine CBR values at current ground levels. The tests were conducted on predominantly granular made ground and revealed CBR values ranging from 1.3 to 17 %.

4.5.2 Based on the test results obtained to date, it is recommended that a California Bearing Ratio (CBR) value of 3 % is adopted for the shallow made ground. Any soft or loose spots would need to be proof rolled and re-tested or possibly excavated and replaced with suitable granular fill.

4.6 **SOAKAWAYS**

4.6.1 The recent ground investigation has revealed the presence of natural granular soils at relatively shallow depth across the site. The granular nature of these soils suggests that these will be suitable for use as a soakage medium, however, the feasibility of drainage via infiltration methods at this site will depend on the design

criteria and regulatory requirements, which will include consideration of the thickness of the unsaturated zone, i.e. the depth to groundwater.

SECTION 5 ENVIRONMENTAL ASSESSMENT

5.1 SOIL QUALITY

- 5.1.1 A total of thirteen soil samples were submitted to the laboratory for chemical analysis, samples were from made ground and one from natural ground (MWS4 at 1.1 m). The laboratory chemical analysis certificates are contained in Appendix 3. The results of the analysis are summarised in Table 3.
- 5.1.2 An initial screening exercise has been undertaken whereby contaminant concentrations recorded in soils have been assessed against *Suitable for Use Levels* (S4ULs) published in 2015 by LQM/CIEH¹. These precautionary screening levels are designed to be representative of minimal risk to human health in a number of land use scenarios. In this report S4ULs have been selected for residential public open space (POS1) and assuming a soil organic matter of 1 %. For lead the DEFRA Category 4 Screening Level² has been used as this is based on updated toxicological data and a low risk to human health. Given the actual land use proposed the screening levels are considered highly conservative.
- 5.1.3 An additional set of phytotoxin screening levels have been adopted from 'The Code of Agricultural Practice for the Protection of Soil' Ministry of Agriculture, Fisheries and Food (MAFF), 1993, which are protective of healthy plant growth. This is also highly conservative given the proposed use of the site.

Table 3: Summary of Soils Chemical Analysis Results

CONTAMINANT	UNITS	MAX	MEAN	No of Tests	SCREENING LEVEL (SL)	No > SL*
HUMAN HEALTH RISK ASSESSMENT						
Asbestos in soil	-	nd	nd	16	Detected	0
pH	-	11.2	8.4	13	5 – 10	¹ (MWS4@0.2)
Arsenic	mg.kg ₁ ⁻¹	28	15.8	13	79	0
Cadmium	mg.kg ₁ ⁻¹	0.7	0.3	13	120	0
Chromium (total)	mg.kg ₁ ⁻¹	42	31.7	13	1500	0
Hexavalent Chromium	mg.kg ₁ ⁻¹	4	4	13	7.7	0
Lead	mg.kg ₁ ⁻¹	710	249.2	13	630	² (MWS3@0.3 & MTP01@0.5)

¹ Nathanail, C. P., McCaffrey, C., Gillett, A. G., Ogden, R. C. and Nathanail, J. F. 2015. *The LQM/CIEH S4ULs for Human Health Risk Assessment*. Land Quality Press, Nottingham. Copyright Land Quality Management Limited reproduced with permission; Publication Number S4UL3100. All rights reserved. Including August 2015 nickel update.

² SP1010 *Development of Category 4 Screening Levels Main Report* (Dec 2013) and *SP1010 Policy Companion Document* (Mar 2014).

CONTAMINANT	UNITS	MAX	MEAN	No of Tests	SCREENING LEVEL (SL)	No > SL*
HUMAN HEALTH RISK ASSESSMENT						
Mercury	mg.kg ₁ ⁻¹	1.5	0.6	13	120	0
Nickel	mg.kg ₁ ⁻¹	38	22.5	13	230	0
Selenium	mg.kg ₁ ⁻¹	1	1	13	1100	0
TPH Aliphatic >EC ₅ - EC ₆	mg.kg ₁ ⁻¹	0.001	0.001	13	570000	0
TPH Aliphatic >EC ₆ - EC ₈	mg.kg ₁ ⁻¹	0.001	0.001	13	600000	0
TPH Aliphatic >EC ₈ - EC ₁₀	mg.kg ₁ ⁻¹	0.001	0.001	13	13000	0
TPH Aliphatic >EC ₁₀ - EC ₁₂	mg.kg ₁ ⁻¹	6.3	1.9	13	13000	0
TPH Aliphatic >EC ₁₂ - EC ₁₆	mg.kg ₁ ⁻¹	8.8	4.0	13	13000	0
TPH Aliphatic >EC ₁₆ - EC ₂₁	mg.kg ₁ ⁻¹	16	9.0	13	250000	0
TPH Aliphatic >EC ₂₁ - EC ₃₅	mg.kg ₁ ⁻¹	49	17	13	250000	0
TPH Aromatic >EC ₅ - EC ₇	mg.kg ₁ ⁻¹	0.001	0.001	13	56000	0
TPH Aromatic >EC ₇ - EC ₈	mg.kg ₁ ⁻¹	0.001	0.001	13	56000	0
TPH Aromatic >EC ₈ - EC ₁₀	mg.kg ₁ ⁻¹	0.001	0.001	13	5000	0
TPH Aromatic >EC ₁₀ - EC ₁₂	mg.kg ₁ ⁻¹	3.2	1.2	13	5000	0
TPH Aromatic >EC ₁₂ - EC ₁₆	mg.kg ₁ ⁻¹	21	5.4	13	5100	0
TPH Aromatic >EC ₁₆ - EC ₂₁	mg.kg ₁ ⁻¹	180	37.9	13	3800	0
TPH Aromatic >EC ₂₁ - EC ₃₅	mg.kg ₁ ⁻¹	200	49.3	13	3800	0
Benzene	mg.kg ₁ ⁻¹	0.001	0.001	13	72	0
Toluene	mg.kg ₁ ⁻¹	0.001	0.001	13	56000	0
Ethylbenzene	mg.kg ₁ ⁻¹	0.001	0.001	13	24000	0
Xylene	mg.kg ₁ ⁻¹	0.001	0.001	13	41000	0
Acenaphthene	mg.kg ₁ ⁻¹	1.1	0.2	13	15000	0
Acenaphthylene	mg.kg ₁ ⁻¹	0.5	0.1	13	15000	0
Anthracene	mg.kg ₁ ⁻¹	3.4	0.8	13	74000	0
Benzo(a)anthracene	mg.kg ₁ ⁻¹	11	2.8	13	29	0
Benzo(a)pyrene	mg.kg ₁ ⁻¹	13	3.0	13	5.7	2 (MWS1 and MWS2@0.3)
Benzo(b)fluoranthene	mg.kg ₁ ⁻¹	15	3.6	13	7.1	2 (MWS1 and MWS2@0.3)
Benzo(ghi)perylene	mg.kg ₁ ⁻¹	4.7	1.4	13	640	0
Benzo(k)fluoranthene	mg.kg ₁ ⁻¹	3.7	1.1	13	190	0
Chrysene	mg.kg ₁ ⁻¹	7.3	2	13	57	0

CONTAMINANT	UNITS	MAX	MEAN	No of Tests	SCREENING LEVEL (SL)	No > SL*
HUMAN HEALTH RISK ASSESSMENT						
Dibenz(a,h)anthracene	mg.kg ₁ ⁻¹	1.2	0.4	13	0.57	3 (MWS1 and MWS2@0.3 & MTP02@0.3)
Fluoranthene	mg.kg ₁ ⁻¹	23	5.6	13	3100	0
Fluorene	mg.kg ₁ ⁻¹	1.3	0.3	13	9900	0
Indeno(123-cd)pyrene	mg.kg ₁ ⁻¹	5.2	1.4	13	82	0
Naphthalene	mg.kg ₁ ⁻¹	0.05	0.05	13	4900	0
Phenanthrene	mg.kg ₁ ⁻¹	17	3.6	13	3100	0
Pyrene	mg.kg ₁ ⁻¹	22	5.2	13	7400	0
Phenol	mg.kg ₁ ⁻¹	1	1	13	440	0
PHYTOTOXICITY RISK ASSESSMENT						
	Units	Max	Mean	No of Test	Screening Level (SL)	No > SL
Copper	mg.kg ₁ ⁻¹	130	42.7	13	200	0
Nickel	mg.kg ₁ ⁻¹	38	22.5	13	110	0
Zinc	mg.kg ₁ ⁻¹	410	176.3	13	300	3 (MWS3@0.3, MTP01@0.5 & MTP02@0.3)

Notes: * Number of samples exceeding screening level

nd = not detected

5.1.4 Zootoxic Metals (harmful to human health)

5.1.4.1 British Geological Survey 'normal' background concentrations for lead within the urban domain lie at 800 mg.kg⁻¹ and so the elevated levels found at locations MWS3 (0.3 m bgl) and MTP01 (0.5 m bgl) are within the expected range of the urban background concentrations.

5.1.5 Phytotoxic Metals (harmful to plant health)

5.1.5.1 An exceedance in zinc was found at three locations: MWS3 (0.3 m bgl), MTP01 (0.5 m bgl) and MTP02 (0.3 m bgl). Due to the proposed development having no landscaped areas at ground level this exceedance can be discounted as a risk to future plant health.

5.1.6 Organic Contaminants

5.1.6.1 Exceedances of benzo(a)pyrene, benzo(b)fluoranthene and dibenzo (a,h)anthracene found at MWS1 (0.4 m bgl) and MWS2 (0.3 m bgl) may be associated with asphalt fragments encountered within the made ground sampled at these locations. Dibenzo (a,h)anthracene was also detected above the screening level in MTP02 (0.3 m bgl).

5.1.7 Inorganic Contaminants

5.1.7.1 Elevated levels of pH have found in location MWS4 (0.2 m bgl) can be explained by the sample underlying a concrete layer. It is likely fragments and dust from the breaking of the concrete were incorporated within the sample and therefore increasing the pH of the sample taken.

5.1.8 Summary

5.1.8.1 Contaminants exceeding highly conservative screening levels were found within the made ground in the upper 0.4 m at three locations across site. Elevated pH levels at MWS4 (0.2 m bgl) are associated with concrete fragments. Exceedances of PAHs at MWS1 (0.4 m bgl) and MWS2 (0.3 m bgl) can be explained by the content of asphalt pieces at these locations, whilst asphalt was not observed in MTP02 which also had a PAH exceedance.

5.1.8.2 No visible asbestos or asbestos fibres were detected at any of the sample locations, however the presence of asbestos in made ground across both subject sites cannot be discounted at this stage.

5.1.8.3 No visual or chemical contamination was encountered within the natural ground.

5.2 **GROUNDWATER**

5.2.1 Groundwater was not encountered in the installed borehole standpipes for both MBH1 and MBH2. All installed window sample standpipes were also dry during monitoring visits.

5.3 **HAZARDOUS GAS**

5.3.1 Gas monitoring has been undertaken on three occasions – 27/11/19, 05/12/19, and 11/12/19. Levels of methane, carbon dioxide and oxygen were recorded in each standpipe, together with associated parameters including borehole flow and ambient air pressure. The results of these gas monitoring rounds are contained in Appendix 5.

5.3.2 The monitoring rounds were undertaken at barometric pressures ranging from 981 to 1019 mb. Positive flow was recorded at 0.1l/hr at two locations during one monitoring round. Over the three monitoring rounds no methane (CH₄) was detected, carbon dioxide (CO₂) was detected to a maximum of 11 % v/v with a corresponding depleted oxygen concentration of 12.5 % v/v.

5.4 **WASTE CLASSIFICATION, OFF-SITE DISPOSAL OR RE-USE**

5.4.1 Waste Considerations

5.4.1.1 WM3 assessment of the chemical results determines that the made ground tested is categorised as non-hazardous. This is due to low levels of contamination in the tested material.

- 5.4.1.2 No visible asbestos was detected throughout the investigation, and no asbestos fibres were detected in tested soil samples.
- 5.4.1.3 Natural as-dug arisings (excluding topsoil) could be classed as inert waste without the requirement for Waste Acceptance Criteria (WAC) testing.
- 5.4.1.4 WAC testing will be required for made ground soils destined for landfill. Initial results of WAC testing from materials destined for disposal has been provided by Vision construct and is attached in Appendix
- 5.4.1.5 Materials, including waste soils which are not to be retained on site, should be removed and disposed of in accordance with all relevant statues including the *Environmental Protection Act 1990* as amended, *The Controlled Waste Regulations 2012* as amended, *The Waste Regulations 2011* as amended, *The Hazardous Waste Regulations 2005* as amended, *The Waste Management Regulations 2006*, *The Environmental Permitting Regulations 2010* as amended and *The Hazardous Waste (Miscellaneous Amendments) Regulations 2015*.
- 5.4.1.6 It is a requirement of these regulations that waste sent to landfill should have been subject to measures to reduce the amount of waste, reduce harmful or hazardous properties and facilitate recycling. These requirements may be satisfied by measures such as segregation and screening of wastes to recover suitable fill and material for crushing, segregation of inert materials and putrescible wastes.
- 5.4.2 Re-use Considerations
- 5.4.2.1 As a sustainable alternative to off-site disposal, it may be possible to re-use site-won soils provided the following criteria are met:
- i.* Use of the material will not create an unacceptable risk of pollution to the environment or harm to human health;
 - ii.* The material must be chemically and geotechnically suitable without further treatment;
 - iii.* There must be certainty of use within the scheme;
 - iv.* Material should only be used in the quantity necessary for that use.
- 5.4.2.2 Provided these criteria are met, the re-use of site-won materials is unlikely to be deemed a waste activity. Production of a *Materials Management Plan* under the industry *CL:AIRE Code of Practice on the Definition of Waste* represents a robust method of demonstrating that the proposed re-use of material meets the criteria and is not liable for landfill tax.

SECTION 6 RISK ASSESSMENT

- 6.1 The potential sources of contamination at the site and the implications with respect to development have been interpreted in accordance with the current government guidance on source-pathway-receptor risk assessment.
- 6.2 The investigations demonstrate that the former uses of the site have resulted in substantial layer of made ground overlying natural sand and gravels. Contamination within the made ground is associated with concrete and asphalt within reworked clay or a sandy gravelly matrix of brick and concrete. These materials are considered for their potential to act as sources for a number of pollutant linkages.
- 6.3 The potential impacts of contamination sources have been considered with respect to the following receptors:
- i.* The general public and present site users,
 - ii.* Residents of future development,
 - iii.* Construction workers,
 - iv.* Adjacent land, and
 - v.* Infrastructure.
- 6.4 In each case the existence of a pollutant linkage requires a pathway by which the receptor could be exposed to the source. A qualitative assessment of risk is thus considered in the first instance with respect to the site in its current condition and is summarised in the sections below.
- 6.5 The general public and present site users
- 6.5.1 Current site users have no exposure to ground contamination due to hardstanding surface throughout both subject sites. Unless hardstanding ground is broken there will be no exposure.
- 6.6 Residents of future development
- 6.6.1 Soil contamination (chemical)
- 6.6.1.1 Due to the low levels of ground contamination and the proposed developments on the sites, there is a very low risk to residents and users of the future development. This is due to the entirety of both sites being capped with hardstanding leaving no exposure to soil contamination. Very low risk level.
- 6.6.2 Asbestos
- 6.6.2.1 No asbestos was identified during the investigation on either of the subject sites. As both sites are to be capped entirely with hardstanding, there will be no exposure to asbestos from the ground for future users. Very low risk level.

- 6.6.3 Hazardous Soil Gas/Vapours
 - 6.6.3.1 CIRIA 665 / BS8485(2015+A1:2019) has been followed to assess the recorded soil gas and flow conditions. Calculations are presented in Appendix 6 which suggest that the site has the Wilson and Card Risk Characteristic Situation 1 (Very low risk), however due to levels of carbon dioxide recorded above 5% at one occasion, Characteristic Situation 2 (low risk) should be considered. The elevated levels of carbon dioxide were found at one location on the Stirling Road site.
 - 6.6.3.2 Review of historic plans does not suggest the presence of any significant sources of ground gas in the area and the investigation does not show evidence of deep made ground or putrescible material in the site.
 - 6.6.3.3 The investigations have not identified any area in which hydrocarbons/ volatile species are present in significant amounts.
 - 6.6.3.4 It is concluded that no significant risk is presented by ground gases to the structure.
 - 6.6.3.5 Construction workers
- 6.6.4 Potentially, construction workers are at the greatest risk from exposure to hazardous contamination due to excavation works and during the handling of materials including imported soils. Providing that dust levels are kept within statutory limits and appropriate health and safety procedures are adhered to during the construction phase, the levels of chemical contamination recorded to date are not considered to present an acute risk to human health.
- 6.7 Adjacent land
 - 6.7.1 Site derived contamination levels are low and therefore it is considered unlikely to impact adjacent land. Comment on risks to adjacent land from site-derived contamination. No nearby land uses identified are likely to have significant impact the subject sites.
 - 6.7.2 Low risk level to adjacent land.
- 6.8 Infrastructure
 - 6.8.1 Limited contamination with the potential to permeate polymeric services has been identified by this investigation, however it is recommended that the utility provider is consulted with respect to their requirements for water supply pipes.
 - 6.8.2 Utility companies apply strict guideline levels on use of polymeric pipes and may consider all made ground unsuitable for typical plastic pipe materials to be used.

SECTION 7 UPDATED CONCEPTUAL MODEL

- 7.1 Following completion of phases 1 and 2 of the investigation and a qualitative risk assessment, the conceptual model for the site, with relation to pollutant linkages, has been updated. The revised model is presented in Table 4 below.

Table 4: Revised Conceptual Model

POSSIBLE POLLUTANT LINKAGE			RISK CHARACTERISATION
POTENTIAL SOURCES	PATHWAYS	RECEPTORS	
Heavy metals and hydrocarbons (made ground)	Contact with contaminated soil	Human health (current users)	Very low risk identified Potential for made ground which can contain elevated metals and hydrocarbons. However, the sites are currently hardstanding.
	Ingestion and inhalation of contaminated soil and dust	Human health (current users)	
Asbestos heavy metals and hydrocarbons (made ground)	Contact with contaminated soil	Human health (future residents)	Very low risk identified Development proposals indicate the sites will be covered with hardstanding. No exposure to ground contamination for future site users.
	Ingestion and inhalation of contaminated soil and dust	Human health (future residents)	
Asbestos, heavy metals and hydrocarbons (made ground)	Contact with contaminated soil	Human health (construction workers)	Low risk identified Potential for made ground which can contain elevated metals and hydrocarbons. Cannot rule out the presence of asbestos in the soil.
	Ingestion and inhalation of contaminated soil and dust	Human health (construction workers)	
Contamination (all forms)	Vertical migration to aquifer	Controlled waters	Low risk identified Limited potential for mobile contamination with the potential to affect shallow gravel aquifer.
Contamination (all forms)	Horizontal migration to surface water	Controlled waters	Low risk identified No surface waters in the vicinity
Hydrocarbons	Direct contact	Plastic water pipes	Low risk identified Investigations have not identified hydrocarbons in significant quantities
Hazardous Gas/Vapours In soil	Ingress into buildings and voids	Human health (future residents and construction workers) Roslin Road	Low risk identified Made ground which could act as source of hazardous gas but no significant gas detected
Hazardous Gas/Vapours In soil	Ingress into buildings and voids	Human health (future residents and construction workers) Stirling Road	Low risk identified No significant sources of gas/vapours identified
Adjacent Land	Migration of contaminated groundwater	Subject Site	Low risk identified Potential for local groundwater quality to be impacted by industrial use

SECTION 8 PRELIMINARY REMEDIATION STRATEGY

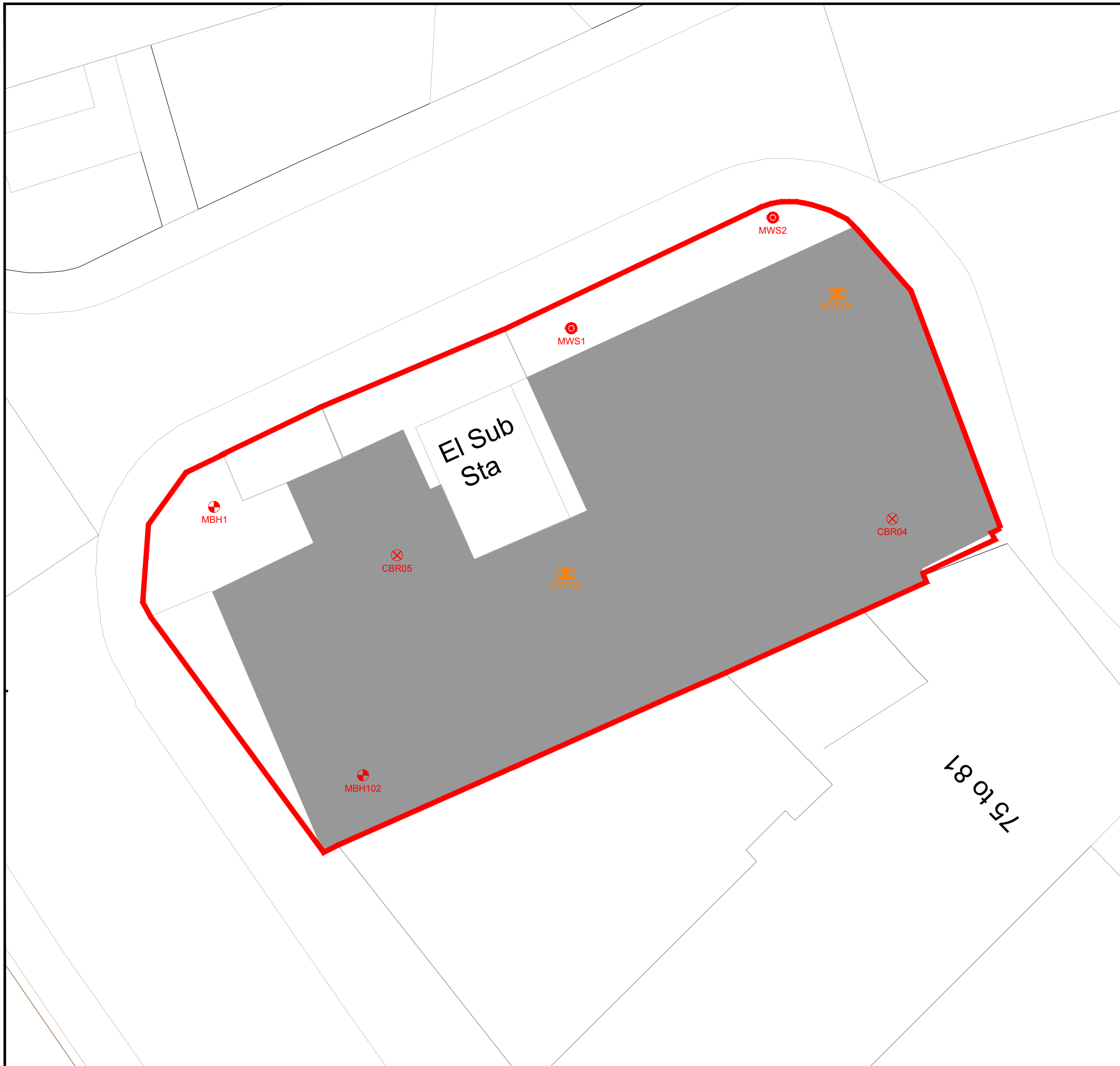
- 8.1 The identified risks at the site can be mitigated by removal of either the source, pathway or receptor. With reference to the conceptual model for the site a remediation strategy, based on source or pathway removal, has been designed.
- 8.2 The proposed developments of residential buildings with commercial space provide no pollution pathway for ground contamination as there are no proposed soft landscaped areas. No evidence has been found of volatile or mobile contaminants. When the site is capped with hardstanding, it is concluded that there will be no risk to future site users from ground contamination.
- 8.3 No requirement for protection of structures against the ingress of ground gases are proposed. It is recommended that this report is provided to regulators/ building control as required.
- 8.4 Potential risks to construction workers have been identified and the adoption of appropriate Health and Safety procedures will ensure that risks to operatives from hazardous materials at the site are minimised. Operatives should not be allowed to eat, drink or smoke on site except in designated areas and should be required to wash all exposed skin at the end of each shift. Operatives should be informed of the potential hazards at the site and should be required to report any observations of suspect material.
- 8.5 Materials, including waste soils which are not to be retained on site, should be removed and disposed of in accordance with all relevant statutes including the *Environmental Protection Act 1990* as amended, *The Controlled Waste Regulations 2012* as amended, *The Waste Regulations 2011* as amended, *The Hazardous Waste Regulations 2005* as amended, *The Waste Management Regulations 2006*, *The Environmental Permitting Regulations 2010* as amended and *The Hazardous Waste (Miscellaneous Amendments) Regulations 2015*.
- 8.6 It is recommended that this report is submitted to the regulators (Local Authority EHO and Planners, Environment Agency Planning Liaison and NHBC) for approval prior to commencement of the works.
- 8.7 Any observations of ground conditions atypical of those already described should be reported to IDOM immediately so that an assessment of appropriate action can be made which could entail remedial works.

SECTION 9 CONCLUSIONS

- 9.1 The site investigations undertaken to date encountered ground conditions comprising hardstanding underlain by made ground (0.7 m to 2.4 m in thickness). Beneath the made ground, natural ground consisted of superficial deposits of sand and gravel (locally some clay), with thicknesses of between 6.0 and 7.4 m, whilst these were underlain by the London Clay Formation.

- 9.2 The geotechnical conditions and proposed structures indicate a need to use piled foundations for the new development. Pile depths will depend on the structural loads and pile diameters proposed, but it is not envisaged that piles will penetrate below the base of the London Clay and there is not considered to be a risk of vertical migration of contaminants to any sensitive aquifers.
- 9.3 No significant soil contamination has been identified by the recent investigation however it is acknowledged that site investigation coverage was limited around existing buildings. Risks to all receptors from soil contamination are considered to be very low due to the proposed development removing any exposure to future site users.
- 9.4 Absence of contamination must not be assumed from this investigation and it is recommended that further observation/investigation following demolition in order to confirm site conditions and to limit and potential contaminant exposure during the construction phase.
- 9.5 At this stage it is considered likely that made ground arisings from the site will be categorised as non-hazardous. Some materials may be capable of meeting inert disposal criteria if demonstrated to meet Inert WAC test criteria.

APPENDIX 1 ▪ Drawings



Legend

- Site boundary
- ⊕ MBHref Merebrook borehole with location reference
- ⏏ MTPref Merebrook trial pit with location reference
- ⊙ MWSref Merebrook window sample with location reference
- ⊗ CBRref Californian bearing ratio test with location reference

First Issue	30-06-2021		-
	JB	SE	SE
Issue Details	Dwn	Chd	App'd

Client/Project

Vision Construct LTD
Roslin Road

Dwg Title

Undertaken Site Investigation Locations

Job No. 22310	Dwg No. 304-001	Revision -
Scale N.T.S	Date June 2021	Frame Dimensions mm (A3) 400 x 280
Drawn JB	Checked SE	Approved SE

London

Kent

Derbyshire

Cardiff

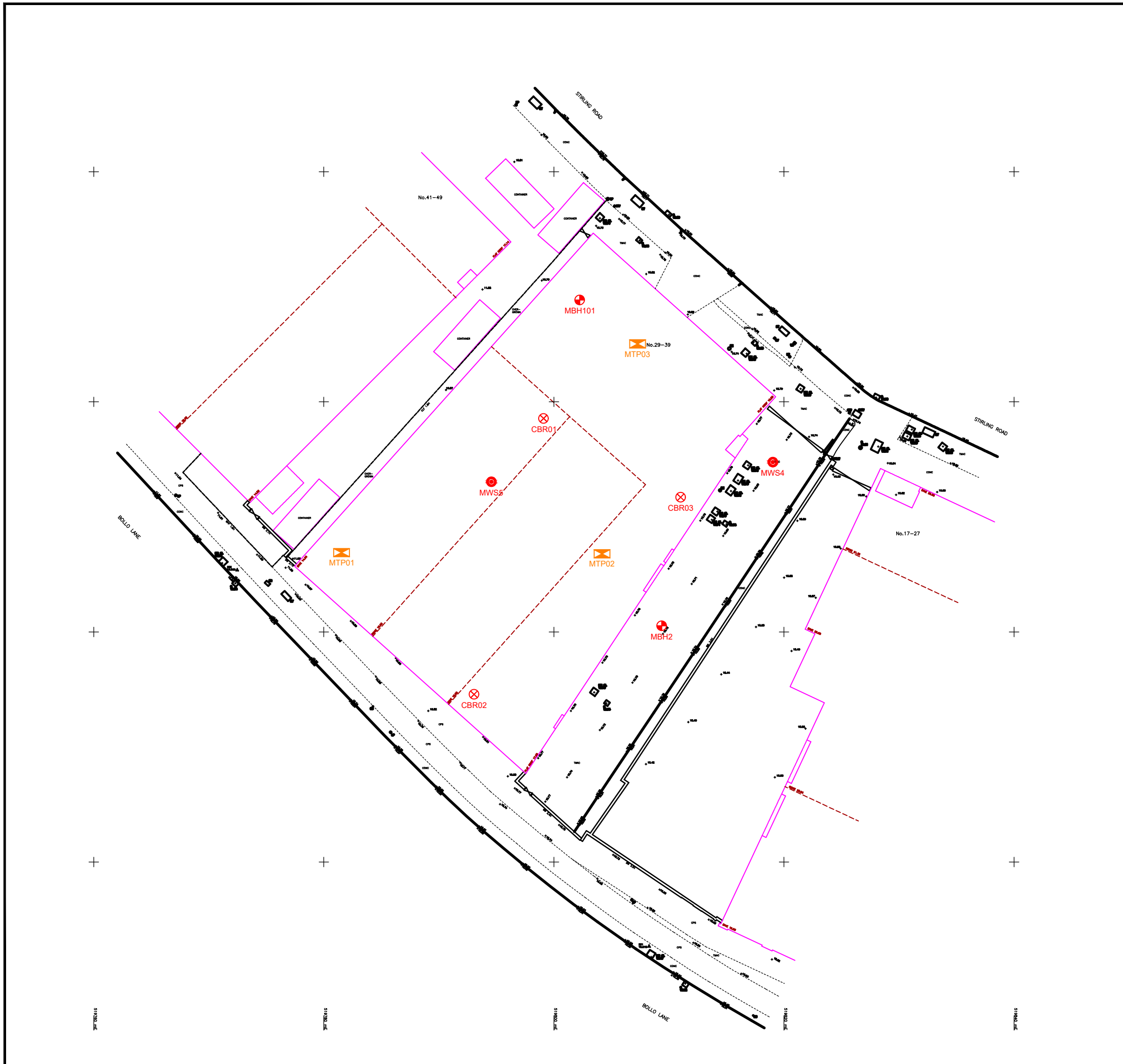
Manchester

Stirling

Birmingham

IDOM

Cromford Mills, Mill Lane, Matlock, Derbyshire DE4 3RQ
t: +44(0)1773 829 988 f: +44(0)1773 829 393 e: info.derbyshire@idom.com



Legend

- Site boundary
- MBHref Merebrook borehole with location reference
- ⊠ MTPref Merebrook trial pit with location reference
- MWSref Merebrook window sample with location reference
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First Issue	30-06-2021		-
	JB	SE	SE
Issue Details	Dwn	Chd	App'd

Client/Project

**Vision Construct LTD
Stirling Road**

Dwg Title

Undertaken Site Investigation Locations

Job No. 22310	Dwg No. 304-002	Revision -
Scale N.T.S	Date June 2021	Frame Dimensions mm (A3) 400 x 280
Drawn JB	Checked SE	Approved SE

- London
- Kent
- Derbyshire**
- Cardiff
- Manchester
- Stirling
- Birmingham



Cromford Mills, Mill Lane, Matlock, Derbyshire DE4 3RQ
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APPENDIX 2 ▪ Exploratory Hole Logs

Project Name: Stirling Road and Roslin Road

 Project No.
22310

Co-ords:

 Scale
1:50

Location: Acton, London W3

Level (m):

 Logged By
RL

Equipment: CP Rig - Dando

Dates: 27/05/2021

 Checked By
DCE

Well	Wtr Strk	Sample and In Situ Testing			Coring				Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results	FI	TCR	SCR	RQD					
		0.20 - 0.30	D,J,V								MADE GROUND: Brown slightly gravelly slightly sandy medium locally soft CLAY. Gravel is fine to medium sub-angular to angular of chalk, slate, brick and flint.		
		1.50 - 2.00 1.50	B SPT(C)	32 (5,20/32 for 155mm)					0.90 1.20		Orangish brown slightly gravelly very sandy CLAY. Sand is fin to coarse, Gravel is fine to medium sub-angular to rounded of flint. Dense orangish brown slightly clayey gravelly medium to coarse SAND. Gravel is fine to medium sub-rounded to angular of flint and quartz.	1	
		2.50 - 3.00 2.50	B SPT(C)	N=19 (2,4/4,4,5,6)					1.90		Medium dense orangish brown slightly clayey very sandy fine to coarse sub-rounded to angular GRAVEL of flint.	2	
		3.50 - 4.00 3.50	B SPT(C)	N=14 (3,4/3,3,4,4)					4.00		Medium dense, becoming dense orangish brown slightly clayey gravelly medium to coarse SAND. Gravel is fine to medium sub-rounded to angular of flint and quartz.	3	
		4.50 - 5.00 4.50	B SPT(C)	N=33 (4,6/7,8,9,9)								4	
		6.00 - 6.50 6.00	B SPT(C)	N=48 (4,7/10,12,12,14)					6.90		Stiff high strength grey slightly silty CLAY with occasional shell fragments. Locally very stiff.	5	
		7.50 - 7.95	U	Ublow=50								6	
		7.95 - 8.00	D									7	
		9.00 9.00	D SPT(S)	N=28 (3,4/6,7,7,8)								8	
												9	
												10	

Continued on Next Sheet

D = small disturbed sample (tub)
 J = organic sample (amber glass jar)
 V = volatile sample (amber glass vial)
 B = bulk bag sample
 SPT(C) = Standard Penetration Test (Cone)
 SPT(S) = Standard Penetration Test (Split Spoon)

HSV = hand shear vane (kPa)
 PP = pocket penetrometer (kg.cm2)
 PID = photoionisation detector (ppm)
 FI = fracture index
 TCR = total core recovery
 SCR = solid core recovery
 RQD = rock quality designation

Remarks

Coordinates and levels, where indicated, must not be used for design purposes.
 The user is responsible for verifying all site and setting out dimensions.
 Standing water level at 9.5 m at start of drilling on second day.

Project Name: Stirling Road and Roslin Road

 Project No.
22310

Co-ords:

 Scale
1:50

Location: Acton, London W3

Level (m):

 Logged By
RL

Equipment: CP Rig - Dando

Dates: 27/05/2021

 Checked By
DCE

Well	Wtr Strk	Sample and In Situ Testing			Coring				Depth (m)	Level (m)	Legend	Stratum Description		
		Depth (m)	Type	Results	FI	TCR	SCR	RQD						
		10.50 - 10.95	U	Ublow=70								Stiff high strength grey slightly silty CLAY with occasional shell fragments. Locally very stiff.		
		10.95 - 11.00	D										11	
		12.00 12.00	D SPT(S)	N=21 (2,4/4,5,5,7)									12	
		13.50 - 13.95	U	Ublow=85									13	
		14.00	D										14	
		15.00 15.00	D SPT(S)	N=27 (5,6/6,7,7,7)									15	
		16.50 - 16.85	U	Ublow=85									16	
		16.90	D										17	
		18.00 18.00	D SPT(S)	N=36 (5,5/8,9,9,10)									18	
		19.50 - 19.95	U	Ublow=100									19	
		20.00	D										20	
	Continued on Next Sheet													

D = small disturbed sample (tub)
 J = organic sample (amber glass jar)
 V = volatile sample (amber glass vial)
 B = bulk bag sample
 SPT(C) = Standard Penetration Test (Cone)
 SPT(S) = Standard Penetration Test (Split Spoon)

HSV = hand shear vane (kPa)
 PP = pocket penetrometer (kg.cm2)
 PID = photoionisation detector (ppm)
 FI = fracture index
 TCR = total core recovery
 SCR = solid core recovery
 RQD = rock quality designation

Remarks

Coordinates and levels, where indicated, must not be used for design purposes.
 The user is responsible for verifying all site and setting out dimensions.
 Standing water level at 9.5 m at start of drilling on second day.

Project Name: Stirling Road and Roslin Road	Project No. 22310	Co-ords:	Scale 1:50
Location: Acton, London W3		Level (m):	Logged By RL
Equipment: CP Rig - Dando		Dates: 27/05/2021	Checked By DCE

Well	Wtr Strk	Sample and In Situ Testing			Coring				Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results	FI	TCR	SCR	RQD					
		21.00 21.00	D SPT(S)	N=33 (4,6/7,8,8,10)								Stiff high strength grey slightly silty CLAY with occasional shell fragments. Locally very stiff.	21
	22.50 - 22.95	U	Ublow=100							22			
	23.00	D								23			
	24.00 24.00	D SPT(S)	N=39 (6,6/9,9,10,11)										24
	25.50 - 25.95	U	Ublow=100							25			
	25.95	D								26			
	27.00 27.00	D SPT(S)	N=50 (7,10/50 for 290mm)										27
	28.50 - 28.75	U	Ublow=100							28			
	28.80	D								29			
	30.00	D							30.00				30

From 24.0 m: very stiff very high strength.

Continued on Next Sheet

D = small disturbed sample (tub)
 J = organic sample (amber glass jar)
 V = volatile sample (amber glass vial)
 B = bulk bag sample
 SPT(C) = Standard Penetration Test (Cone)
 SPT(S) = Standard Penetration Test (Split Spoon)

HSV = hand shear vane (kPa)
 PP = pocket penetrometer (kg.cm2)
 PID = photoionisation detector (ppm)
 FI = fracture index
 TCR = total core recovery
 SCR = solid core recovery
 RQD = rock quality designation

Remarks

Coordinates and levels, where indicated, must not be used for design purposes. The user is responsible for verifying all site and setting out dimensions.
 Standing water level at 9.5 m at start of drilling on second day.

Project Name: Stirling Road and Roslin Road

 Project No.
22310

Co-ords:

 Scale
1:50

Location: Acton, London W3

Level (m):

 Logged By
NJA

Equipment: CP Rig - Dando

Dates: 01/06/2021

 Checked By
DCE

Well	Wtr Strk	Sample and In Situ Testing			Coring				Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results	FI	TCR	SCR	RQD				
		1.50 - 2.00	B	N=41 (7,9/10,10,9,12)					0.80			MADE GROUND comprising soft dark brown to brown slightly sandy gravelly Clay. Gravels are fine to coarse angular brick, concrete, flint and slate. Sand is fine to coarse.
		1.50	SPT(C)						1.30			Soft brown sandy CLAY. Sand is fine to coarse.
		2.50	SPT(S)	N=15 (4,4/3,4,4,4)					2.30			Dense brown slightly clayey sandy fine to coarse sub-rounded to rounded GRAVEL of flint.
		3.00 - 3.50	B									Firm medium strength brown and grey mottled sandy CLAY.
		3.50 - 3.95	U	Ublow=30								
		4.00	D									
		4.50	SPT(S)	N=16 (2,3/3,4,3,6)					5.00			
		6.00 - 6.50	B	N=41 (7,8/9,9,11,12)					5.20			Medium dense yellowish brown slightly gravelly fine to coarse SAND. Gravels are fine to medium sub-rounded to rounded flint. Dense yellowish brown sandy GRAVEL of fine to coarse sub-rounded to rounded flint. Sand is fine to coarse.
		6.00	SPT(C)									
		7.50 - 8.00	B	N=49 (6,8/10,12,12,15)					7.90			Stiff light grey slightly silty CLAY.
		7.50	SPT(C)						8.30			Stiff high strength becoming very stiff grey slightly silty CLAY.
		8.50 - 9.00	B									
		9.00	SPT(S)	N=19 (2,3/4,4,5,6)								
												Continued on Next Sheet

D = small disturbed sample (tub)
 J = organic sample (amber glass jar)
 V = volatile sample (amber glass vial)
 B = bulk bag sample
 SPT(C) = Standard Penetration Test (Cone)
 SPT(S) = Standard Penetration Test (Split Spoon)

HSV = hand shear vane (kPa)
 PP = pocket penetrometer (kg.cm2)
 PID = photoionisation detector (ppm)
 FI = fracture index
 TCR = total core recovery
 SCR = solid core recovery
 RQD = rock quality designation

Remarks

Coordinates and levels, where indicated, must not be used for design purposes. The user is responsible for verifying all site and setting out dimensions. Service Plans checked and location C.A.T prior to drilling. Groundwater was not encountered.

Project Name: Stirling Road and Roslin Road

 Project No.
22310

Co-ords:

 Scale
1:50

Location: Acton, London W3

Level (m):

 Logged By
NJA

Equipment: CP Rig - Dando

Dates: 01/06/2021

 Checked By
DCE

Well	Wtr Strk	Sample and In Situ Testing			Coring				Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results	FI	TCR	SCR	RQD					
		10.50 - 10.95	U	Ublow=40								Stiff high strength becoming very stiff grey slightly silty CLAY.	
		11.00	D									11	
		12.00	SPT(S)	N=20 (3,4/4,5,5,6)								12	
		13.50 - 13.95	U	Ublow=55								13	
		14.00	D									14	
		15.00	SPT(S)	N=32 (6,7/7,8,8,9)								15	
		16.50 - 16.60 16.65	U D	Ublow=100									16
		18.00	SPT(S)	N=40 (6,7/8,10,12,10)									17
		19.50 - 19.80 19.55	U D	Ublow=100									18
													19
											20		

From 16.6 to 16.75 m. Claystone.

From 18.0 m: very stiff very high strength.

Continued on Next Sheet

D = small disturbed sample (tub)
 J = organic sample (amber glass jar)
 V = volatile sample (amber glass vial)
 B = bulk bag sample
 SPT(C) = Standard Penetration Test (Cone)
 SPT(S) = Standard Penetration Test (Split Spoon)

HSV = hand shear vane (kPa)
 PP = pocket penetrometer (kg.cm2)
 PID = photoionisation detector (ppm)
 FI = fracture index
 TCR = total core recovery
 SCR = solid core recovery
 RQD = rock quality designation

Remarks

Coordinates and levels, where indicated, must not be used for design purposes.
 The user is responsible for verifying all site and setting out dimensions.

Service Plans checked and location C.A.T prior to drilling. Groundwater was not encountered.



Borehole Log

Borehole No.

MBH102

Sheet 3 of 4

Project Name: Stirling Road and Roslin Road Project No. 22310 Co-ords: Scale 1:50

Location: Acton, London W3 Level (m): Logged By NJA

Equipment: CP Rig - Dando Dates: 01/06/2021 Checked By DCE

Well	Wtr Strk	Sample and In Situ Testing			Coring				Depth (m)	Level (m)	Legend	Stratum Description		
		Depth (m)	Type	Results	FI	TCR	SCR	RQD						
		21.00	SPT(S)	N=33 (4,5/7,9,8,9)								Stiff high strength becoming very stiff grey slightly silty CLAY.	21	
		22.50 - 22.80	U	Ublow=100									22	
		22.85	D										23	
		24.00	SPT(S)	N=37 (7,8/9,8,9,11)									24	
		25.50	U	Ublow=100									25	
		26.00	D										26	
		27.00	SPT(S)	N=48 (7,9/11,11,13,13)									27	
		28.50 - 28.95	U	Ublow=100									28	
		29.00	D										29	
		30.00	SPT(S)	N=49 (9,11/13,14,14,8)									30	
	Continued on Next Sheet													

D = small disturbed sample (tub)
 J = organic sample (amber glass jar)
 V = volatile sample (amber glass vial)
 B = bulk bag sample
 SPT(C) = Standard Penetration Test (Cone)
 SPT(S) = Standard Penetration Test (Split Spoon)

HSV = hand shear vane (kPa)
 PP = pocket penetrometer (kg.cm2)
 PID = photoionisation detector (ppm)
 FI = fracture index
 TCR = total core recovery
 SCR = solid core recovery
 RQD = rock quality designation

Remarks
 Coordinates and levels, where indicated, must not be used for design purposes. The user is responsible for verifying all site and setting out dimensions.
 Service Plans checked and location C.A.T prior to drilling. Groundwater was not encountered.



Borehole Log

Borehole No.

MBH102

Sheet 4 of 4

Project Name: Stirling Road and Roslin Road

Project No.
22310

Co-ords:

Scale
1:50

Location: Acton, London W3

Level (m):

Logged By
NJA

Equipment: CP Rig - Dando

Dates: 01/06/2021

Checked By
DCE

Well	Wtr Strk	Sample and In Situ Testing			Coring				Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results	FI	TCR	SCR	RQD					
									30.45			Stiff high strength becoming very stiff grey slightly silty CLAY.	
												End of Borehole at 30.45m	31
													32
													33
													34
													35
													36
													37
													38
													39
													40

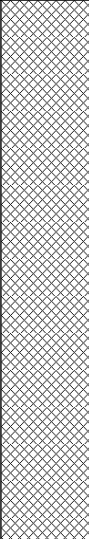
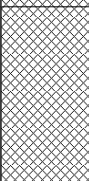
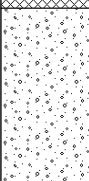
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 J = organic sample (amber glass jar)
 V = volatile sample (amber glass vial)
 B = bulk bag sample
 SPT(C) = Standard Penetration Test (Cone)
 SPT(S) = Standard Penetration Test (Split Spoon)

HSV = hand shear vane (kPa)
 PP = pocket penetrometer (kg.cm2)
 PID = photoionisation detector (ppm)
 FI = fracture index
 TCR = total core recovery
 SCR = solid core recovery
 RQD = rock quality designation

Remarks

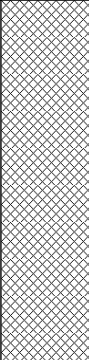
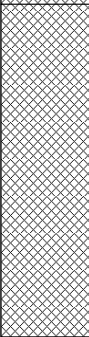
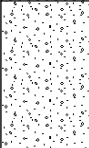

Coordinates and levels, where indicated, must not be used for design purposes. The user is responsible for verifying all site and setting out dimensions.
 Service Plans checked and location C.A.T prior to drilling. Groundwater was not encountered.

Project Name:	Stirling Road and Roslin Road	Project No.	22310	Co-ords:	519787.00 - 179202.00	Date	01/06/2021
Location:	Acton, London W3			Dimensions (m):	2.50	Scale	1:25
Equipment:	13 ton excavator			Depth	3.00	Logged	Checked

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.50	D,J					MADE GROUND comprising soft dark brown slightly sandy gravelly clay. Gravels are fine to cobble angular brick, concrete and metal. Sand is fine to coarse.
	2.00	D,J		1.80			MADE GROUND comprising soft brown sandy gravelly clay. Gravels are fine to coarse angular to rounded brick, concrete and flint. Sand is fine to coarse.
	2.75	D,J		2.40			Brownish orange sandy GRAVEL of fine to coarse sub rounded to rounded flint. Sand is fine to coarse.
				3.00			End of Pit at 3.000m

D = small disturbed sample (tub) J = organic sample (amber glass jar) V = volatile sample (amber glass vial) B = bulk bag sample HSV = hand shear vane (kPa) PP = pocket penetrometer (kg.cm2) PID = photoionisation detector (ppm)	Stability Pit walls remained stable.	Remarks Coordinates and levels, where indicated, must not be used for design purposes. The user is responsible for verifying all site and setting out dimensions. Services plans checked and locations C.A.T prior to excavation.
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Project Name:	Stirling Road and Roslin Road	Project No.	22310	Co-ords:	519806.00 - 179204.00	Date	01/06/2021
Location:	Acton, London W3			Dimensions (m):	2.30	Scale	1:25
Equipment:	13 ton excavator			Depth	3.00	Logged	Checked

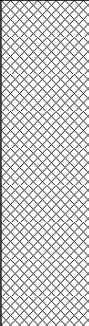
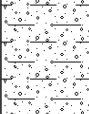
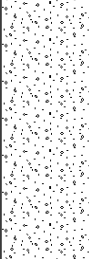
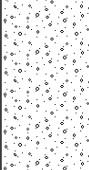
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.30	D,J					MADE GROUND comprising soft dark brown slightly sandy gravelly clay. Gravels are fine to cobble angular brick, concrete and metal. Sand is fine to coarse.
	1.50	D,J		1.20			Soft orangish brown slightly sandy gravelly CLAY. Gravels are fine to coarse sub rounded to rounded flint.
	2.50	D,J		2.30			Brownish orange slightly gravelly fine to coarse SAND. Gravels are fine to medium rounded flint.
				2.80			Brownish orange sandy GRAVEL of fine to coarse sub rounded to rounded flint. Sand is fine to coarse.
				3.00			End of Pit at 3.000m

D = small disturbed sample (tub)
 J = organic sample (amber glass jar)
 V = volatile sample (amber glass vial)
 B = bulk bag sample
 HSV = hand shear vane (kPa)
 PP = pocket penetrometer (kg.cm2)
 PID = photoionisation detector (ppm)

Stability
 Pit walls remained stable.

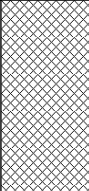
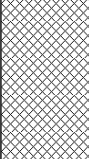
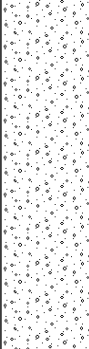
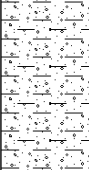
Remarks
 Coordinates and levels, where indicated, must not be used for design purposes. The user is responsible for verifying all site and setting out dimensions.
 Services plans checked and locations C.A.T prior to excavation.

Project Name:	Stirling Road and Roslin Road	Project No.	22310	Co-ords:	519807.00 - 179217.00	Date	01/06/2021
Location:	Acton, London W3			Dimensions (m):	2.80	Scale	1:25
Equipment:	13 ton excavator			Depth	3.00	Logged	Checked

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.40	D,J					MADE GROUND comprising soft brown slightly sandy gravelly clay. Gravels are fine to cobble angular brick, concrete and metal. Sand is fine to coarse.
	1.30	D,J		1.10			Brownish orange slightly clayey sandy GRAVEL of fine to coarse sub rounded to rounded flint. Sand is fine to coarse.
				1.50			Brownish orange slightly gravelly fine to coarse SAND. Gravels are fine to medium rounded flint.
				2.40			Brownish orange sandy GRAVEL of fine to coarse sub rounded to rounded flint. Sand is fine to coarse.
				3.00			End of Pit at 3.000m

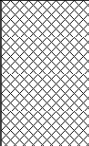
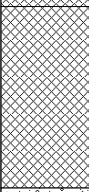
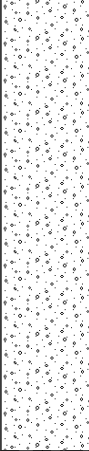
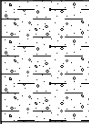
D = small disturbed sample (tub) J = organic sample (amber glass jar) V = volatile sample (amber glass vial) B = bulk bag sample HSV = hand shear vane (kPa) PP = pocket penetrometer (kg.cm2) PID = photoionisation detector (ppm)	Stability Pit walls remained stable.	Remarks Coordinates and levels, where indicated, must not be used for design purposes. The user is responsible for verifying all site and setting out dimensions. Services plans checked and locations C.A.T prior to excavation.
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Project Name:	Stirling Road and Roslin Road	Project No.	22310	Co-ords:	519730.00 - 179321.00	Date	02/06/2021
Location:	Acton, London W3			Level:		Scale	1:25
Equipment:	13 ton excavator			Dimensions (m):	3.40	Logged	Checked
				Depth	3.00	NJA	

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.20	D,J					MADE GROUND comprising soft brown and grey slightly sandy gravelly clay. Gravels are fine to cobble angular brick, concrete and slate.
	0.90	D,J		0.65			MADE GROUND comprising soft brown slightly sandy slightly gravelly clay. Gravels are fine to coarse angular brick and flint. Sand is fine to coarse.
	1.50	D,J		1.20			Orangish brown clayey sandy GRAVEL of fine to coarse sub rounded to rounded flint. Sand is fine to coarse.
				2.40			Soft to firm brown slightly sandy gravelly CLAY. Gravels are fine to coarse rounded flint. Sand is fine to coarse.
				3.00			End of Pit at 3.000m

D = small disturbed sample (tub) J = organic sample (amber glass jar) V = volatile sample (amber glass vial) B = bulk bag sample HSV = hand shear vane (kPa) PP = pocket penetrometer (kg.cm2) PID = photoionisation detector (ppm)	Stability Pit walls remained stable.	Remarks Coordinates and levels, where indicated, must not be used for design purposes. The user is responsible for verifying all site and setting out dimensions. Services plans checked and locations C.A.T prior to excavation.
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Project Name:	Stirling Road and Roslin Road	Project No.	22310	Co-ords:	519709.00 - 179307.00	Date	02/06/2021
Location:	Acton, London W3			Level:		Scale	1:25
Equipment:	13 ton excavator			Dimensions (m):	3.10	Logged	Checked
				Depth	3.00	NJA	

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.30	D,J		0.50			MADE GROUND comprising soft brown and grey slightly sandy gravelly clay. Gravels are fine to cobble angular brick, concrete and slate.
	0.80	D,J		1.10			MADE GROUND comprising soft brown slightly sandy slightly gravelly clay. Gravels are fine to coarse angular brick and flint. Sand is fine to coarse.
	2.00	D,J		2.60			Orangish brown clayey sandy GRAVEL of fine to coarse sub rounded to rounded flint. Sand is fine to coarse.
				3.00			Soft to firm brown slightly sandy gravelly CLAY. Gravels are fine to coarse rounded flint. Sand is fine to coarse.
							End of Pit at 3.000m

D = small disturbed sample (tub) J = organic sample (amber glass jar) V = volatile sample (amber glass vial) B = bulk bag sample HSV = hand shear vane (kPa) PP = pocket penetrometer (kg.cm2) PID = photoionisation detector (ppm)	Stability Pit walls remained stable.	Remarks Coordinates and levels, where indicated, must not be used for design purposes. The user is responsible for verifying all site and setting out dimensions. Services plans checked and locations C.A.T prior to excavation.
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Project Name: Stirling Road, Acton

 Project No.
21849

Co-ords:

 Hole Type
CP

Location: Acton, London

Level (m):

 Scale
1:50

Equipment: Cable Percussion Drilling Rig

Dates: 08/11/2019

 Logged By
RMH

Well	Wtr Strk	Sample and In Situ Testing			Coring				Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results	FI	TCR	SCR	RQD				
									0.10		MADE GROUND. Overlying hardstanding layer of tarmac/asphalt. MADE GROUND. Orangey brown reworked sandy clay with occasional brick fragments and coal gravel.	
		0.50 - 0.70	D,J,V,B						0.70		Light brown mottled orange sandy CLAY with occasional dark organic particles.	1
		1.20 - 1.50	B						1.20		Brown clayey very sandy sub-angular flint GRAVEL.	2
		1.50	SPT(C)	N=34 (19,6/16,10,4,4)								
		1.80 - 2.00	B									
		2.50	D									
		2.50	SPT(C)	N=32 (7,9/11,9,8,4)								
		3.00	B						3.20		Reddish brown mottled grey sandy CLAY.	3
		3.40	D									
		3.50	SPTLS									
		3.50	SPT(S)	N=7 (1,0/1,1,2,3)								
		4.20 - 4.50	B						4.00		Brown mottled orange clayey fine SAND with occasional sub-angular flint gravel.	4
		4.50	SPTLS									
		4.50	SPT(S)	N=31 (2,3/4,9,8,10)					4.60		Medium dense to very dense brown sand SAND with abundant sub-angular flint gravel.	5
		5.00	B						5.20		Dense brown sandy sub-angular flint GRAVEL.	5
		6.00	B									
		6.00	SPT(C)	N=43 (5,7/8,9,11,15)								
		7.50	B									
		7.50	SPT(C)	N=50 (2,6/8,12,15,15)								
		8.20	B						8.10		Grey firm to stiff fissured CLAY with occasional shell traces.	8
		8.50	D									
		9.00	SPTLS									
		9.00	SPT(S)	N=20 (1,2/3,5,5,7)								
		10.00	D									
Continued on Next Sheet												

D = small disturbed sample (tub)
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 V = volatile sample (amber glass vial)
 B = bulk bag sample
 SPT(C) = Standard Penetration Test (Cone)
 SPT(S) = Standard Penetration Test (Split Spoon)

HSV = hand shear vane (kPa)
 PP = pocket penetrometer (kg.cm2)
 PID = photoionisation detector (ppm)
 FI = fracture index
 TCR = total core recovery
 SCR = solid core recovery
 RQD = rock quality designation

Remarks

R M Foster

Project Name: Stirling Road, Acton

 Project No.
21849

Co-ords:

 Hole Type
CP

Location: Acton, London

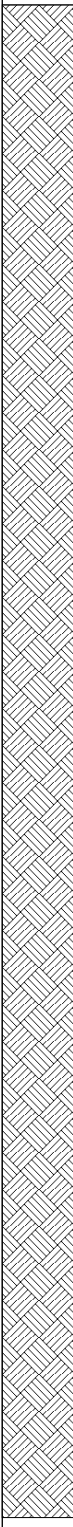
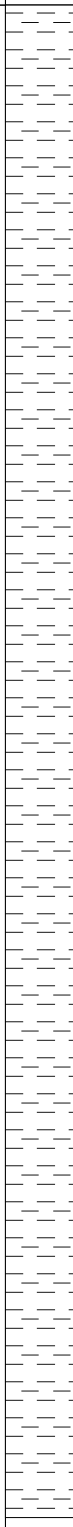
Level (m):

 Scale
1:50

Equipment: Cable Percussion Drilling Rig

Dates: 08/11/2019

 Logged By
RMH

Well	Wtr Strk	Sample and In Situ Testing			Coring				Depth (m)	Level (m)	Legend	Stratum Description			
		Depth (m)	Type	Results	FI	TCR	SCR	RQD							
		10.50 - 10.90	U	Ublow=50								Grey firm to stiff fissured CLAY with occasional shell traces.			
		10.90	D										11		
		11.50	D												
		12.00	SPTLS												
		12.00	SPT(S)	N=30 (4,5/6,7,8,9)										12	
		13.00	D												
		13.50 - 13.90	U	Ublow=80											
		13.90	D												
		14.50	D												
		15.00	SPTLS												
		15.00	SPT(S)	N=29 (2,4/6,7,7,9)											15
		16.00	D												
		16.50 - 16.90	U	Ublow=90											
		16.90	D												
		17.50	D												
		18.00	SPTLS												
	18.00	SPT(S)	N=36 (4,6/9,9,9,9)										18		
	19.00	D													
	19.50 - 19.90	U	Ublow=100												
	19.90	D													
	20.00	SPTLS													
								20.00					20		

Continued on Next Sheet

D = small disturbed sample (tub)
 J = organic sample (amber glass jar)
 V = volatile sample (amber glass vial)
 B = bulk bag sample
 SPT(C) = Standard Penetration Test (Cone)
 SPT(S) = Standard Penetration Test (Split Spoon)

HSV = hand shear vane (kPa)
 PP = pocket penetrometer (kg.cm2)
 PID = photoionisation detector (ppm)
 FI = fracture index
 TCR = total core recovery
 SCR = solid core recovery
 RQD = rock quality designation

Remarks
 R M Foster

Project Name: Stirling Road, Acton

 Project No.
21849

Co-ords:

 Hole Type
CP

Location: Acton, London

Level (m):

 Scale
1:50

Equipment: Cable Percussion Drilling Rig

Dates: 07/11/2019

 Logged By
RMH

Well	Wtr Strk	Sample and In Situ Testing			Coring				Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results	FI	TCR	SCR	RQD					
									0.10			MADE GROUND. Overlying hardstanding layer of tarmac/asphalt.	
									0.20			CONCRETE with metal rebar.	
												MADE GROUND. Greenish pale brown clayey gravelly sand with brick, concrete and occasional asphalt fragments.	1
									1.20			Light brownish pale yellow clayey sandy GRAVEL. Gravel is sub-angular and sub-rounded flint.	
		2.00	SPT(S)	N=22 (7,7/3,3,4,12)									2
		3.00	SPT(S)	N=33 (2,3/7,7,7,12)					3.00				3
		4.00	SPT(C)	N=50 (6,8/12,12,14,12)									4
		5.00	SPT(C)	N=50 (6,7/12,13,13,12)									5
		6.50	SPT(C)	N=16 (4,7/5,4,3,4)									6
		8.00 - 8.45	U	Ublow=38					7.50			Grey firm to stiff fissured CLAY with occasional shell traces.	7
		9.50	SPT(S)	N=20 (4,4/4,5,5,6)									8
													9
													10

Continued on Next Sheet

D = small disturbed sample (tub)
 J = organic sample (amber glass jar)
 V = volatile sample (amber glass vial)
 B = bulk bag sample
 SPT(C) = Standard Penetration Test (Cone)
 SPT(S) = Standard Penetration Test (Split Spoon)

HSV = hand shear vane (kPa)
 PP = pocket penetrometer (kg.cm2)
 PID = photoionisation detector (ppm)
 FI = fracture index
 TCR = total core recovery
 SCR = solid core recovery
 RQD = rock quality designation

Remarks

South Eastern Drilling

Project Name: Stirling Road, Acton

 Project No.
21849

Co-ords:

 Hole Type
CP

Location: Acton, London

Level (m):

 Scale
1:50

Equipment: Cable Percussion Drilling Rig

Dates: 07/11/2019

 Logged By
RMH

Well	Wtr Strk	Sample and In Situ Testing			Coring				Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results	FI	TCR	SCR	RQD				
		11.00 - 11.45	U	Ublow=56								Grey firm to stiff fissured CLAY with occasional shell traces.
		12.50	SPT(S)	N=22 (4,5/5,6,5,6)								
		14.00 - 14.45	U	Ublow=63								
		15.50	SPT(S)	N=28 (4,5/6,7,7,8)								
		17.00 - 17.45	U	Ublow=100								
		18.50	SPT(S)	N=29 (4,5/6,7,8,8)								
		20.00 - 20.45	U	Ublow=72					20.00			End of Borehole at 20.00m

D = small disturbed sample (tub)
 J = organic sample (amber glass jar)
 V = volatile sample (amber glass vial)
 B = bulk bag sample
 SPT(C) = Standard Penetration Test (Cone)
 SPT(S) = Standard Penetration Test (Split Spoon)

HSV = hand shear vane (kPa)
 PP = pocket penetrometer (kg.cm2)
 PID = photoionisation detector (ppm)
 FI = fracture index
 TCR = total core recovery
 SCR = solid core recovery
 RQD = rock quality designation

Remarks

South Eastern Drilling

Project Name: Stirling Road, Acton

 Project No.
21849

Co-ords:

 Hole Type
WLS

Location: Acton, London

Level (m):

 Scale
1:25

Equipment: Tracked Windowless Sample Rig

Dates: 08/11/2019

 Logged By
RMH

Well	Wtr Strk	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.40	D,J		0.10		MADE GROUND. Overlying hardstanding layer of tarmac/asphalt.	
		1.00	SPT(C)	N=50 (1,2/6,11,16,17)	1.20		MADE GROUND. Light brown mottled light grey reworked sandy gravelly clay with occasional brick, concrete and asphalt fragments. Gravel is sub-angular flint.	
								End of Borehole at 1.20m

D = small disturbed sample (tub)
 J = organic sample (amber glass jar)
 V = volatile sample (amber glass vial)
 B = bulk bag sample

SPT(C) = Standard Penetration Test (Cone)
 SPT(S) = Standard Penetration Test (Split Spoon)
 HSV = hand shear vane (kPa)
 PP = pocket penetrometer (kg.cm2)
 PID = photoionisation detector (ppm)

Remarks

5

Project Name: Stirling Road, Acton

 Project No.
21849

Co-ords:

 Hole Type
WLS

Location: Acton, London

Level (m):

 Scale
1:25

Equipment: Tracked Windowless Sample Rig

Dates: 08/11/2019

 Logged By
RMH

Well	Wtr Strk	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.10		MADE GROUND. Overlying hardstanding layer of tarmac/asphalt.		
		0.30	D,J		0.40		MADE GROUND. Dark brown sandy clay with brick, concrete and asphalt fragments.		
		0.70	D,J		1.20		MADE GROUND. Light brown mottled light grey reworked sandy gravelly clay with occasional brick, concrete and asphalt fragments. Gravel is sub-angular flint.		
							End of Borehole at 1.20m		

D = small disturbed sample (tub)
 J = organic sample (amber glass jar)
 V = volatile sample (amber glass vial)
 B = bulk bag sample

SPT(C) = Standard Penetration Test (Cone)
 SPT(S) = Standard Penetration Test (Split Spoon)
 HSV = hand shear vane (kPa)
 PP = pocket penetrometer (kg.cm2)
 PID = photoionisation detector (ppm)

Remarks

Initial hand dug pit obstruction hit at 1.2m - CAT scanner giving off electrical current. Standpipe installed. No SPT value taken.

Project Name: Stirling Road, Acton

 Project No.
21849

Co-ords:

 Hole Type
WLS

Location: Acton, London

Level (m):

 Scale
1:25

Equipment: Tracked Windowless Sample Rig

Dates: 08/11/2019

 Logged By
RMH

Well	Wtr Strk	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.15		Rebarred CONCRETE flooring with overlying plastic flooring tiles		
		0.30	D,J		0.25		MADE GROUND. Sandy matrix of fragmented bricks, concrete and pale yellowish/orange stone blocks.		
							MADE GROUND. Friable dark brown mottled orange reworked sandy clay with frequent brick and concrete.		
		0.70	D,J		0.70				
		1.00	SPT(C)	50 (7,17/50 for 225mm)	1.00		MADE GROUND. Light brown mottled light grey reworked sandy gravelly clay with occasional brick and concrete. Gravel is sub-angular flint. Occasional dark organic particles present.		
End of Borehole at 1.00m								1	
								2	
								3	
								4	
								5	

D = small disturbed sample (tub)
 J = organic sample (amber glass jar)
 V = volatile sample (amber glass vial)
 B = bulk bag sample

SPT(C) = Standard Penetration Test (Cone)
 SPT(S) = Standard Penetration Test (Split Spoon)
 HSV = hand shear vane (kPa)
 PP = pocket penetrometer (kg.cm2)
 PID = photoionisation detector (ppm)

Remarks

Project Name: Stirling Road, Acton

 Project No.
21849

Co-ords:

 Hole Type
WLS

Location: Acton, London

Level (m):

 Scale
1:25

Equipment: Tracked Windowless Sample Rig

Dates: 08/11/2019

 Logged By
RMH

Well	Wtr Strk	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10			0.10		MADE GROUND. Overlying hardstanding layer of tarmac/asphalt.		
		0.20	D,J		0.20		CONCRETE with metal rebar.		
		0.30			0.30		MADE GROUND. Greenish brown friable dry sand with fragments of brick and concrete.		
		0.50	D,J				MADE GROUND. Dark stained reworked clay with brick fragments.		
		0.70	D,J		0.60		MADE GROUND. Brown mottled dark brown reworked sandy clay. Occasional brick fragments.		
		1.00	SPT(C)	N=32 (1,4/10,10,8,4)	1.00		Greyish brown sandy gravelly CLAY.	1	
		1.10	D,J		1.20		Light brownish orange clayey SAND with occasional sub rounded flint gravel.		
		1.60	D,J						
		2.00	SPT(C)	N=39 (2,5/11,10,8,10)				2	
		2.70	D,J						
		3.00	SPT(C)	N=26 (5,7/8,4,6,8)				3	
		3.10	D,J						
		3.60	SPT(C)	50 (10,10/50 for 150mm)	3.60		End of Borehole at 3.60m	4	
								5	

D = small disturbed sample (tub)
 J = organic sample (amber glass jar)
 V = volatile sample (amber glass vial)
 B = bulk bag sample

SPT(C) = Standard Penetration Test (Cone)
 SPT(S) = Standard Penetration Test (Split Spoon)
 HSV = hand shear vane (kPa)
 PP = pocket penetrometer (kg.cm2)
 PID = photoionisation detector (ppm)

Remarks

- APPENDIX 3**
- Soil Chemistry
 - Summary Spreadsheet
 - Laboratory Analysis Certificates



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Analytical Report Number : 21-79517

Project / Site name:	Bollo, Acton	Samples received on:	03/06/2021
Your job number:	22310	Samples instructed on/ Analysis started on:	07/06/2021
Your order number:	21-2-FDO-LABS	Analysis completed by:	14/06/2021
Report Issue Number:	1	Report issued on:	14/06/2021
Samples Analysed:	7 soil samples		

Signed: *Karolina Marek*

Karolina Marek
PL Head of 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

Excel copies of reports are only valid when accompanied by this PDF certificate.

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: 21-79517
 Project / Site name: Bollo, Acton
 Your Order No: 21-2-FDO-LABS

Lab Sample Number	1894468	1894469	1894470	1894471	1894472			
Sample Reference	MTP01	MTP01	MTP02	MTP03	MTP04			
Sample Number	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied			
Depth (m)	0.50	2.00	0.30	0.40	0.20			
Date Sampled	01/06/2021	01/06/2021	01/06/2021	01/06/2021	02/06/2021			
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
Moisture Content	%	0.01	NONE	12	-	9.4	-	12
Total mass of sample received	kg	0.001	NONE	0.80	-	0.70	-	0.70

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.3	-	7.6	-	8.2
Total Cyanide	mg/kg	1	MCERTS	< 1.0	-	< 1.0	-	< 1.0
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	1.8	-	0.59	-	0.18
Sulphide	mg/kg	1	MCERTS	23	-	< 1.0	-	19
Organic Matter	%	0.1	MCERTS	1.6	-	3.5	-	2.2

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	-	< 1.0	-	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	-	0.50	-	0.22
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	-	0.22	-	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	1.4	-	4.5	-	1.3
Anthracene	mg/kg	0.05	MCERTS	0.44	-	0.74	-	0.37
Fluoranthene	mg/kg	0.05	MCERTS	3.8	-	10	-	3.6
Pyrene	mg/kg	0.05	MCERTS	3.2	-	8.5	-	3.6
Benzo(a)anthracene	mg/kg	0.05	MCERTS	2.3	-	5.9	-	2.7
Chrysene	mg/kg	0.05	MCERTS	1.5	-	4.1	-	1.8
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	2.2	-	6.6	-	2.9
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.86	-	2.2	-	1.2
Benzo(a)pyrene	mg/kg	0.05	MCERTS	1.6	-	4.7	-	2.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.91	-	2.7	-	1.2
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.29	-	0.83	-	0.43
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	1.1	-	3.3	-	1.6

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	19.4	-	55.0	-	23.0
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Analytical Report Number: 21-79517
 Project / Site name: Bollo, Acton
 Your Order No: 21-2-FDO-LABS

Lab Sample Number	1894468	1894469	1894470	1894471	1894472			
Sample Reference	MTP01	MTP01	MTP02	MTP03	MTP04			
Sample Number	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied			
Depth (m)	0.50	2.00	0.30	0.40	0.20			
Date Sampled	01/06/2021	01/06/2021	01/06/2021	01/06/2021	02/06/2021			
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					

Heavy Metals / Metalloids

Parameter	Units	Limit of detection	Accreditation Status	1894468	1894469	1894470	1894471	1894472
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	18	-	28	-	19
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	-	< 0.2	-	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	-	< 4.0	-	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	29	-	34	-	25
Copper (aqua regia extractable)	mg/kg	1	MCERTS	45	-	130	-	60
Lead (aqua regia extractable)	mg/kg	1	MCERTS	710	-	520	-	280
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	1.0	-	1.5	-	1.1
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	23	-	38	-	26
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	-	< 1.0	-	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	410	-	410	-	210

Monoaromatics & Oxygenates

Parameter	Units	Limit of detection	Accreditation Status	1894468	1894469	1894470	1894471	1894472
Benzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	< 1.0
p & m-xylene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	< 1.0
o-xylene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	< 1.0

Petroleum Hydrocarbons

Parameter	Units	Limit of detection	Accreditation Status	1894468	1894469	1894470	1894471	1894472
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	-	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	-	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	-	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	-	< 1.0	-	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	-	< 2.0	-	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	-	< 8.0	-	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	-	< 8.0	-	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	-	< 10	-	< 10

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	-	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	-	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	-	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	3.2	-	< 1.0	-	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	12	-	< 2.0	-	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	30	-	29	-	23
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	54	-	50	-	46
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	98	-	80	-	68

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

Analytical Report Number: 21-79517
 Project / Site name: Bollo, Acton
 Your Order No: 21-2-FDO-LABS

Lab Sample Number				1894473	1894474
Sample Reference				MTP04	MTP05
Sample Number				None Supplied	None Supplied
Depth (m)				0.90	0.30
Date Sampled				02/06/2021	02/06/2021
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		
Stone Content	%	0.1	NONE	-	< 0.1
Moisture Content	%	0.01	NONE	-	12
Total mass of sample received	kg	0.001	NONE	-	0.70

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

General Inorganics

Parameter	Units	N/A	MCERTS		
pH - Automated	pH Units	N/A	MCERTS	-	7.5
Total Cyanide	mg/kg	1	MCERTS	-	< 1.0
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	-	0.12
Sulphide	mg/kg	1	MCERTS	-	< 1.0
Organic Matter	%	0.1	MCERTS	-	1.0

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS		
				-	< 1.0

Speciated PAHs

Parameter	mg/kg	0.05	MCERTS		
Naphthalene	mg/kg	0.05	MCERTS	-	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	-	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	-	< 0.05
Fluorene	mg/kg	0.05	MCERTS	-	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	-	< 0.05
Anthracene	mg/kg	0.05	MCERTS	-	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	-	< 0.05
Pyrene	mg/kg	0.05	MCERTS	-	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	< 0.05
Chrysene	mg/kg	0.05	MCERTS	-	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS		
				-	< 0.80

Analytical Report Number: 21-79517
 Project / Site name: Bollo, Acton
 Your Order No: 21-2-FDO-LABS

Lab Sample Number				1894473	1894474
Sample Reference				MTP04	MTP05
Sample Number				None Supplied	None Supplied
Depth (m)				0.90	0.30
Date Sampled				02/06/2021	02/06/2021
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		
Heavy Metals / Metalloids					
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	-	13
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	-	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	-	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	-	38
Copper (aqua regia extractable)	mg/kg	1	MCERTS	-	19
Lead (aqua regia extractable)	mg/kg	1	MCERTS	-	41
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	-	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	-	22
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	-	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	-	78

Monoaromatics & Oxygenates

Benzene	µg/kg	1	MCERTS	-	< 1.0
Toluene	µg/kg	1	MCERTS	-	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	-	< 1.0
p & m-xylene	µg/kg	1	MCERTS	-	< 1.0
o-xylene	µg/kg	1	MCERTS	-	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	< 1.0

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	< 10

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	< 10
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	< 10

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



Analytical Report Number : 21-79517

Project / Site name: Bollo, Acton

* 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 *
1894468	MTP01	None Supplied	0.5	Brown clay and loam with gravel and vegetation.
1894470	MTP02	None Supplied	0.3	Brown clay and loam with gravel and vegetation.
1894472	MTP04	None Supplied	0.2	Brown loam and clay with gravel and brick.
1894474	MTP05	None Supplied	0.3	Brown clay and sand with gravel.

Analytical Report Number : 21-79517
Project / Site name: Bollo, Acton

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
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
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	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
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-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
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
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode.	In-house method	L010-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 cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	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
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
D.O. for Gravimetric Quant if Screen/ID positive	Dependent option for Gravimetric Quant if Screen/ID positive scheduled.	In house asbestos methods A001 & A006.	A006-PL	D	NONE

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.



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Analytical Report Number : 19-71937

Project / Site name:	Stirling Road, Acton	Samples received on:	11/11/2019
Your job number:	21849	Samples instructed on:	14/11/2019
Your order number:	19-S2-FDO-LABS	Analysis completed by:	21/11/2019
Report Issue Number:	1	Report issued on:	21/11/2019
Samples Analysed:	8 soil samples		

Signed: 

Zina Abdul Razzak
Senior Quality Specialist

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

Excel copies of reports are only valid when accompanied by this PDF certificate.

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.

Iss No 19-71937-1 Stirling Road, Acton 21849

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The results included within the report are representative of the samples submitted for analysis.

Page 1 of 8

Analytical Report Number: 19-71937

Project / Site name: Stirling Road, Acton

Your Order No: 19-S2-FDO-LABS

Lab Sample Number	1362521	1362522	1362523	1362524	1362525			
Sample Reference	MWS1	MWS2	MWS2	MWS3	MWS3			
Sample Number	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied			
Depth (m)	0.40	0.30	0.70	0.30	0.60			
Date Sampled	08/11/2019	08/11/2019	08/11/2019	08/11/2019	08/11/2019			
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	%	N/A	NONE	16	14	17	14	16
Total mass of sample received	kg	0.001	NONE	2.0	2.0	2.0	2.0	2.0

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.1	9.4	7.5	9.6	7.9
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.044	0.11	0.047	2.0	0.26
Sulphide	mg/kg	1	MCERTS	1.1	1.2	< 1.0	4.7	< 1.0
Organic Matter	%	0.1	MCERTS	1.9	2.1	0.8	1.7	0.9

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	0.36	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	0.88	1.1	0.42	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	0.90	1.3	0.37	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	16	17	5.5	0.95	< 0.05
Anthracene	mg/kg	0.05	MCERTS	3.3	3.4	0.99	0.16	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	23	22	6.6	2.3	< 0.05
Pyrene	mg/kg	0.05	MCERTS	22	20	6.3	2.3	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	11	9.7	2.6	1.5	< 0.05
Chrysene	mg/kg	0.05	MCERTS	7.3	6.5	2.1	1.3	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	15	13	2.9	2.4	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	3.7	3.4	1.0	0.85	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	13	12	2.6	2.1	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	5.2	5.1	1.2	0.95	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	1.2	1.1	0.24	0.25	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	4.7	4.6	1.2	1.1	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	127	120	34.0	16.0	< 0.80
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Analytical Report Number: 19-71937

Project / Site name: Stirling Road, Acton

Your Order No: 19-S2-FDO-LABS

Lab Sample Number	1362521	1362522	1362523	1362524	1362525			
Sample Reference	MWS1	MWS2	MWS2	MWS3	MWS3			
Sample Number	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied			
Depth (m)	0.40	0.30	0.70	0.30	0.60			
Date Sampled	08/11/2019	08/11/2019	08/11/2019	08/11/2019	08/11/2019			
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					

Heavy Metals / Metalloids

Element	Unit	Limit of detection	Accreditation Status	1362521	1362522	1362523	1362524	1362525
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	16	15	11	21	8.6
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.3	0.4	< 0.2	0.7	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	29	30	39	26	29
Copper (aqua regia extractable)	mg/kg	1	MCERTS	37	67	8.7	76	11
Lead (aqua regia extractable)	mg/kg	1	MCERTS	190	320	20	690	35
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.5	0.6	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	20	21	22	21	13
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	150	250	68	400	52

Monoaromatics & Oxygenates

Compound	Unit	Limit of detection	Accreditation Status	1362521	1362522	1362523	1362524	1362525
Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Petroleum Hydrocarbons

Compound	Unit	Limit of detection	Accreditation Status	1362521	1362522	1362523	1362524	1362525
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	2.0	3.0	6.3	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	8.8	7.0	5.2	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	16	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	49	23	< 8.0	19	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	76	41	12	22	< 10

Compound	Unit	Limit of detection	Accreditation Status	1362521	1362522	1362523	1362524	1362525
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	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	12	21	7.3	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	110	180	43	17	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	130	200	35	55	< 10
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	260	400	85	72	< 10

Analytical Report Number: 19-71937

Project / Site name: Stirling Road, Acton

Your Order No: 19-S2-FDO-LABS

Lab Sample Number	1362526	1362527	1362528		
Sample Reference	MWS4	MWS4	MBH1		
Sample Number	None Supplied	None Supplied	None Supplied		
Depth (m)	0.20	0.50	0.50		
Date Sampled	08/11/2019	08/11/2019	08/11/2019		
Time Taken	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
Moisture Content	%	N/A	NONE	11	18
Total mass of sample received	kg	0.001	NONE	2.0	2.0

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

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	11.2	8.0	8.1
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.12	0.26	0.042
Sulphide	mg/kg	1	MCERTS	< 1.0	5.3	< 1.0
Organic Matter	%	0.1	MCERTS	0.4	2.3	1.2

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.30
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	1.0
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	1.1
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.81
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.65
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.95
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.29
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.94
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.53
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.58

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80	7.16

Analytical Report Number: 19-71937

Project / Site name: Stirling Road, Acton

Your Order No: 19-S2-FDO-LABS

Lab Sample Number				1362526	1362527	1362528		
Sample Reference				MWS4	MWS4	MBH1		
Sample Number				None Supplied	None Supplied	None Supplied		
Depth (m)				0.20	0.50	0.50		
Date Sampled				08/11/2019	08/11/2019	08/11/2019		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	16	14	11		
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2		
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0		
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	27	30	34		
Copper (aqua regia extractable)	mg/kg	1	MCERTS	31	42	24		
Lead (aqua regia extractable)	mg/kg	1	MCERTS	98	260	61		
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	1.0	< 0.3		
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	18	20	19		
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	68	79	62		

Monoaromatics & Oxygenates

Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	1.6	2.0	2.8		
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	6.0	4.2	6.3		
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	13	< 8.0	8.3		
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	40	15	19		
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	61	28	36		

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0		
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	< 10	< 10		
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10	< 10	21		
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10	32		



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Environmental Science

Analytical Report Number : 19-71937**Project / Site name: Stirling Road, Acton**

* 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 *
1362521	MWS1	None Supplied	0.40	Brown clay and sand.
1362522	MWS2	None Supplied	0.30	Brown clay and sand.
1362523	MWS2	None Supplied	0.70	Brown clay.
1362524	MWS3	None Supplied	0.30	Brown clay and sand with gravel.
1362525	MWS3	None Supplied	0.60	Brown clay and sand.
1362526	MWS4	None Supplied	0.20	Brown sand with rubble and gravel
1362527	MWS4	None Supplied	0.50	Brown clay.
1362528	MBH1	None Supplied	0.50	Brown clay and sand.



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Environmental Science

Analytical Report Number : 19-71937**Project / Site name: Stirling Road, Acton****Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)**

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
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
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
D.O. for Gravimetric Quant if Screen/ID positive	Dependent option for Gravimetric Quant if Screen/ID positive scheduled.	In house asbestos methods A001 & A006.	A006-PL	D	NONE
Hexavalent chromium in soil	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
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
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In-house method based on BS1377 Part 2, 1990, Classification tests	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-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.	BS1377 Part 3, 1990, Chemical and Electrochemical Tests"	L009-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
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
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
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 based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode.	In-house method	L010-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
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

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.

Sample Deviation Report



Sample ID	Other_ID	Sample Type	Job	Sample Number	Sample Deviation Code	test_name	test_ref	Test Deviation code
MBH1		S	19-71937	1362528	b	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	b
MBH1		S	19-71937	1362528	b	TPHCWG (Soil)	L088/76-PL	b
MWS1		S	19-71937	1362521	b	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	b
MWS1		S	19-71937	1362521	b	TPHCWG (Soil)	L088/76-PL	b
MWS2		S	19-71937	1362522	b	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	b
MWS2		S	19-71937	1362522	b	TPHCWG (Soil)	L088/76-PL	b
MWS2		S	19-71937	1362523	b	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	b
MWS2		S	19-71937	1362523	b	TPHCWG (Soil)	L088/76-PL	b
MWS3		S	19-71937	1362524	b	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	b
MWS3		S	19-71937	1362524	b	TPHCWG (Soil)	L088/76-PL	b
MWS3		S	19-71937	1362525	b	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	b
MWS3		S	19-71937	1362525	b	TPHCWG (Soil)	L088/76-PL	b
MWS4		S	19-71937	1362526	b	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	b
MWS4		S	19-71937	1362526	b	TPHCWG (Soil)	L088/76-PL	b
MWS4		S	19-71937	1362527	b	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	b
MWS4		S	19-71937	1362527	b	TPHCWG (Soil)	L088/76-PL	b



Analytical Report Number: 19-72241

Project / Site name: Stirling Road, Acton

Your Order No: 19-S2-FDO-LABS

Lab Sample Number				1364177				
Sample Reference				MWS4				
Sample Number				None Supplied				
Depth (m)				1.10				
Date Sampled				08/11/2019				
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1				
Moisture Content	%	N/A	NONE	6.8				
Total mass of sample received	kg	0.001	NONE	1.0				

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected				
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.0				
Total Cyanide	mg/kg	1	MCERTS	< 1				
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.094				
Sulphide	mg/kg	1	MCERTS	< 1.0				
Organic Matter	%	0.1	MCERTS	0.6				

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0				
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05				
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05				
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05				
Fluorene	mg/kg	0.05	MCERTS	< 0.05				
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05				
Anthracene	mg/kg	0.05	MCERTS	< 0.05				
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05				
Pyrene	mg/kg	0.05	MCERTS	< 0.05				
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05				
Chrysene	mg/kg	0.05	MCERTS	< 0.05				
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05				
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05				
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05				
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05				
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05				
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05				

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80				
-----------------------------	-------	-----	--------	--------	--	--	--	--

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	15				
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2				
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0				
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	42				
Copper (aqua regia extractable)	mg/kg	1	MCERTS	3.9				
Lead (aqua regia extractable)	mg/kg	1	MCERTS	14				
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3				
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	30				
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0				
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	55				



Analytical Report Number: 19-72241

Project / Site name: Stirling Road, Acton

Your Order No: 19-S2-FDO-LABS

Lab Sample Number				1364177				
Sample Reference				MWS4				
Sample Number				None Supplied				
Depth (m)				1.10				
Date Sampled				08/11/2019				
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					

Monoaromatics & Oxygenates

Benzene	µg/kg	1	MCERTS	< 1.0				
Toluene	µg/kg	1	MCERTS	< 1.0				
Ethylbenzene	µg/kg	1	MCERTS	< 1.0				
p & m-xylene	µg/kg	1	MCERTS	< 1.0				
o-xylene	µg/kg	1	MCERTS	< 1.0				
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0				

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0				
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0				
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0				
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0				
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10				

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0				
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0				
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10				
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10				
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10				



Analytical Report Number : 19-72241

Project / Site name: Stirling Road, Acton

* 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 *
1364177	MWS4	None Supplied	1.10	Brown loam and clay with gravel.

Analytical Report Number : 19-72241

Project / Site name: Stirling Road, Acton

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
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
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
D.O. for Gravimetric Quant if Screen/ID positive	Dependent option for Gravimetric Quant if Screen/ID positive scheduled.	In house asbestos methods A001 & A006.	A006-PL	D	NONE
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method	L080-PL	W	MCERTS
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
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In-house method based on BS1377 Part 2, 1990, Classification tests	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-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.	BS1377 Part 3, 1990, Chemical and Electrochemical Tests""	L009-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
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
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
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 based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode.	In-house method	L010-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
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

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.

Sample Deviation Report



Sample ID	Other ID	Sample Type	Job	Sample Number	Sample Deviation Code	test_name	test_ref	Test Deviation code
MWS4		S	19-72241	1364177	bc	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	b
MWS4		S	19-72241	1364177	bc	Sulphide in soil	L010-PL	c
MWS4		S	19-72241	1364177	bc	TPHCWG (Soil)	L088/76-PL	b
MWS4		S	19-72241	1364177	bc	Total cyanide in soil	L080-PL	c

BASIC STATISTICAL RESULTS SUMMARY



choose screening level from dropdown -> POSresi

0
 Site Name Stirling Rd/Roslin Rd, Acton
 Project Number 22310
 Sample Location
 Depth

MWS1 MWS2 MWS2 MWS3 MWS3 MWS4 MWS4 MWS4 MBH1 MTP01 MTP02 MTP04 MTP05
 0.40 0.30 0.70 0.30 0.60 0.20 0.50 1.10 0.50 0.5 0.3 0.2 0.3

Determinand	Number of Tests	Maximum (mg.kg ⁻¹)	Mean (mg.kg ⁻¹)	Screening Level (mg.kg ⁻¹)	No. > SL
Arsenic	13	28	15.82	79	0
Cadmium	13	0.7	0.26	120	0
Hexavalent Chromium	13	4	4.00	7.7	0
Chromium	13	42	31.69	1500	0
Copper	13	130	42.66	12000	0
Lead	13	710	249.15	630	2
Mercury	13	1.5	0.60	120	0
Nickel	13	38	22.54	230	0
Selenium	13	1	1.00	1100	0
Zinc	13	410	176.31	81000	0
pH	13	11.2	8.42	10	1
Cyanide total	13	1	1.00	-	-
Water Soluble Sulphate (Soil Equivalent)	0	0	0.00	-	-
Water Soluble Sulphate as SO4 (2:1)	0	0	0.00	-	-
Water Soluble SO4 (BRE SD 2:1 Leach Equivalent)	13	<2	0.44	-	-
Sulphide	13	<23	4.72	-	-
Organic matter	13	<3.5	1.55	-	-
Aliphatic C5-C6	13	<.001	0.00	570000	0
Aliphatic C6-C8	13	<.001	0.00	600000	0
Aliphatic C8-C10	13	<.001	0.00	13000	0
Aliphatic C10-C12	13	<6.3	1.90	13000	0
Aliphatic C12-C16	13	<8.8	3.96	13000	0
Aliphatic C16-C21	13	<16	9.02	250000	0
Aliphatic C21-C35	13	<49	17.00	250000	0
Aliphatic C5-C35	13	<76	25.85	-	-
Aromatic C5-C7	13	<.001	0.00	56000	0
Aromatic C7-C8	13	<.001	0.00	56000	0
Aromatic C8-C10	13	<.001	0.00	5000	0
Aromatic C10-C12	13	<3.2	1.17	5000	0
Aromatic C12-C16	13	<21	5.41	5100	0
Aromatic C16-C21	13	<180	37.85	3800	0
Aromatic C21-C35	13	<200	49.31	3800	0
Aromatic C5-C35	13	<400	88.08	-	-
Benzene	13	<1	1.00	-	-
Ethylbenzene	13	<1	1.00	-	-
Toluene	13	<1	1.00	-	-
p & m-xylene	13	<1	1.00	-	-
o-xylene	13	<1	1.00	-	-
MTBE	13	<1	1.00	-	-
Benzene	13	0.001	0.00	72	0
Ethylbenzene	13	0.001	0.00	24000	0
Toluene	13	0.001	0.00	56000	0
total xylene	13	0.002	0.00	41000	0
MTBE	13	<.001	0.00	-	-
Naphthalene	13	0.05	0.05	4900	0
Acenaphthylene	13	0.05	0.12	15000	0
Acenaphthene	13	0.88	0.22	15000	0
Fluorene	13	0.9	0.25	9900	0
Phenanthrene	13	16	3.63	3100	0
Anthracene	13	3.3	0.75	74000	0
Fluoranthene	13	23	5.58	3100	0
Pyrene	13	22	5.17	7400	0
Benzo(a)anthracene	13	11	2.83	29	0
Chrysene	13	7.3	1.96	57	0
Benzo(b)fluoranthene	13	15	3.55	7.1	2
Benzo(k)fluoranthene	13	3.7	1.06	190	0
Benzo(a)pyrene	13	13	3.02	5.7	2
Indeno(1,2,3-c,d)pyrene	13	5.2	1.39	82	0
Dibenzo(a,h)anthracene	13	1.2	0.36	0.57	3
Benzo(g,h,i)perylene	13	4.7	1.42	640	0
Total PAH - USEPA 16	13	127	31.20	-	-
Phenol - Monohydric	13	1	1.00	440	0

- APPENDIX 4**
- Geotechnical Laboratory Certificates
 - *In Situ* Test Certificates

IDOM Merebrook Limited

Page 1 of 1


Cromford Mills
Mill Lane
Cromford
Derbyshire
DE4 3RQ

For the attention of Simon Edwards

Report No: C7416

Issue No 01

LABORATORY TEST REPORT

Project Name	BOLLO, ACTON		
Project Number	C7416	Date samples received	Various
Your Ref		Date written instructions received	08/06/2021
Purchase Order		Date testing commenced	14/06/2021
Please find enclosed the results as summarised below			
Item No	Test Quantity	Description	ISO 17025 Accredited
2.11	2	Moisture Content	Yes
2.21	1	Four point liquid and plastic limits	Yes
2.23	1	Non-plastic Atterberg limit	Yes
2.60	3	Particle Size Distribution	Yes
7.34	6	Multistage quick undrained triaxial	Yes
Remarks :			
Issued by : J Hopkins		Date of Issue : 30/06/2021	Key to symbols used in this report S/C : Testing was sub-contracted
Approved Signatories :  30/06/2021		J.Hopkins (Laboratory Coordinator), M D Brown (Senior Quality Manager), R Norris (Supervisor)	
<p>Unless we are notified to the contrary, samples will be disposed after a period of one month from this date. The results reported relate to samples received in the laboratory only. All results contained in this report are provisional unless signed by an approved signatory This report should not be reproduced except in full without the written approval of the laboratory. Under multisite accreditation the testing contained in this report may have been performed at another Terra Tek laboratory.</p> <p>Only those results indicated in this report are UKAS accredited and any opinions or interpretations expressed are outside the scope of UKAS accreditation.</p> <p>Feedback on the this report may be left via our website terratek.co.uk/feedback</p>			



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Offices in Airdrie, Birmingham, Belfast and Aston Clinton

 SITE INVESTIGATION AND LABORATORY SERVICES	Site	BOLLO, ACTON	Contract No. C7416 Hole ID MBH102 Date Sampled 06/01/2021 Depth (m) 1.50-2.00 Sample Type B
	Client	IDOM Merebrook Limited	
	Engineer	-	

Non Engineering Description : Brown slightly clayey sandy fine to coarse GRAVEL.


Preparation : Sample washed and air dried


Sample was determined to be Non-Plastic after preparation

Results :

As Received Moisture Content : (BS1377:Part 2:Clause 3:1990)	2.5 %
Percentage retained on 425µm sieve :	94 %

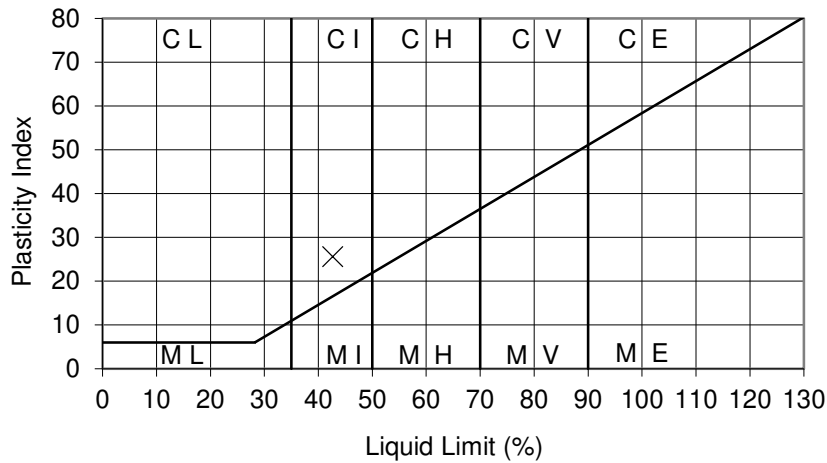
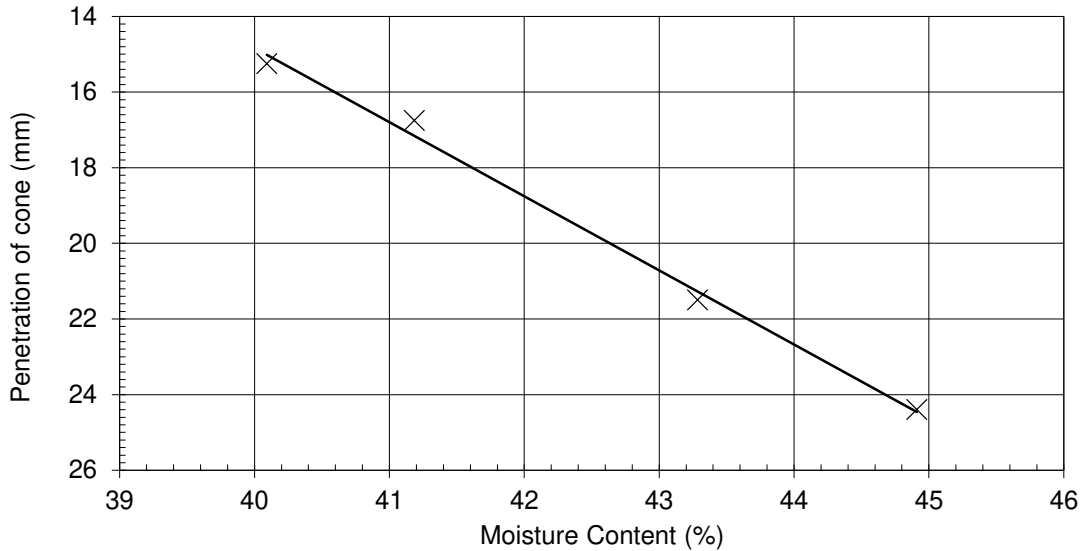
Equivalent moisture content of material passing 425µm sieve : 39 %

Originator	Checked & Approved	Plastic Limit BS 1377:Part 2:Clause 5:1990	
JAH	30/06/2021 <i>JAH</i>		

 SITE INVESTIGATION AND LABORATORY SERVICES	Site	BOLLO, ACTON	Contract No.	C7416
	Client	IDOM Merebrook Limited	Hole ID	MBH102
	Engineer	-	Date Sampled	01/06/2021
			Depth (m)	3.00-3.50
			Sample Type	B


Non Engineering Description : Brown slightly gravelly slightly sandy CLAY. Gravel is fine to coarse.

Preparation : Sample washed and air dried



Results :

As Received Moisture Content : (BS1377:Part 2:Clause 3:1990)	21 %
Percentage retained on 425µm sieve :	12 %
Liquid Limit :	43 %
Plastic Limit :	17 %
Plasticity Index :	26
Equivalent moisture content of material passing 425µm sieve :	24 %
Liquidity Index :	0.27

Originator	Checked & Approved	Liquid Limit (Four Point Cone Penetrometer Method) Plastic Limit, Plasticity Index & Liquidity Index BS 1377:Part 2:Clause 4.3:1990 BS 1377:Part 2:Clause 5:1990	
SP	Jan. 30/06/2021		



SITE INVESTIGATION AND LABORATORY SERVICES

Site BOLLO, ACTON

Client IDOM Merebrook Limited

Engineer -

Contract No **C7416**

Hole MBH101
 Date Sampled 27/05/2021
 Depth (m) 2.50-3.00
 Sample Type B

Particle Size	% Passing
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	100
50.0 mm	100
37.5 mm	94
28.0 mm	89
20.0 mm	85
14.0 mm	79
10.0 mm	72
6.30 mm	64
5.00 mm	62
3.35 mm	57
2.00 mm	54
1.18 mm	52
630 µm	49
425 µm	42
300 µm	32
200 µm	24
150 µm	21
63 µm	19
20 µm	14
6 µm	11
2 µm	9

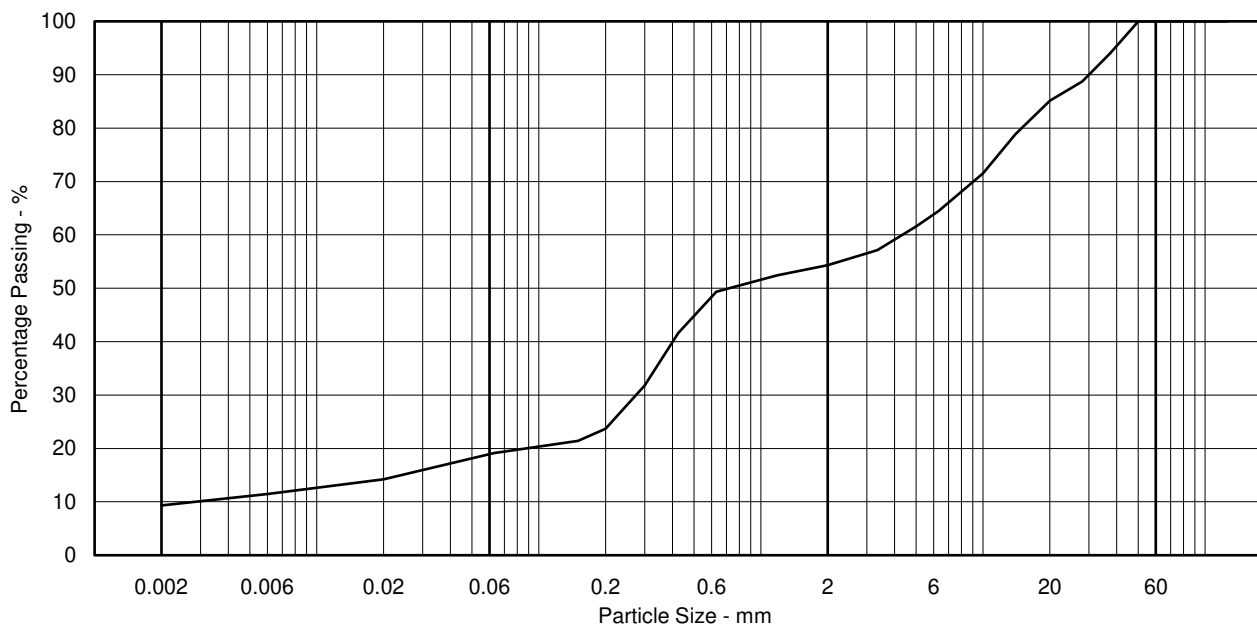
Non Engineering Description
Brown clayey silty very sandy fine to coarse GRAVEL.

Sample Proportions - %	
Cobbles	0.0
Gravel	45.6
Sand	35.5
Silt	9.5
Clay	9.3

Particle Diameter - mm	
D100	50
D60	4.3
D10	0.0028
Uniformity Coefficient <small>(SHW series 600, Table 6/1, footnote 5)</small>	1535.7

Notes
Sedimentation sample not pre-treated

Clay	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles
	Silt			Sand			Gravel			



Originator	Checked & Approved
JAH	<i>JAH</i> 30/06/2021

PARTICLE SIZE DISTRIBUTION
 BS EN ISO 17892-4 2016 Clause 5.2 - Sieving Method
 BS EN ISO 17892-4 2016 Clause 5.4 - Pipette Method





SITE INVESTIGATION AND LABORATORY SERVICES

Site BOLLO, ACTON

Client IDOM Merebrook Limited

Engineer -

Contract No **C7416**

Hole MBH101
 Date Sampled 27/05/2021
 Depth (m) 4.50-5.00
 Sample Type B

Particle Size	% Passing
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	100
50.0 mm	100
37.5 mm	96
28.0 mm	85
20.0 mm	70
14.0 mm	55
10.0 mm	44
6.30 mm	32
5.00 mm	29
3.35 mm	23
2.00 mm	19
1.18 mm	17
630 µm	15
425 µm	9
300 µm	3
200 µm	1
150 µm	1
63 µm	0

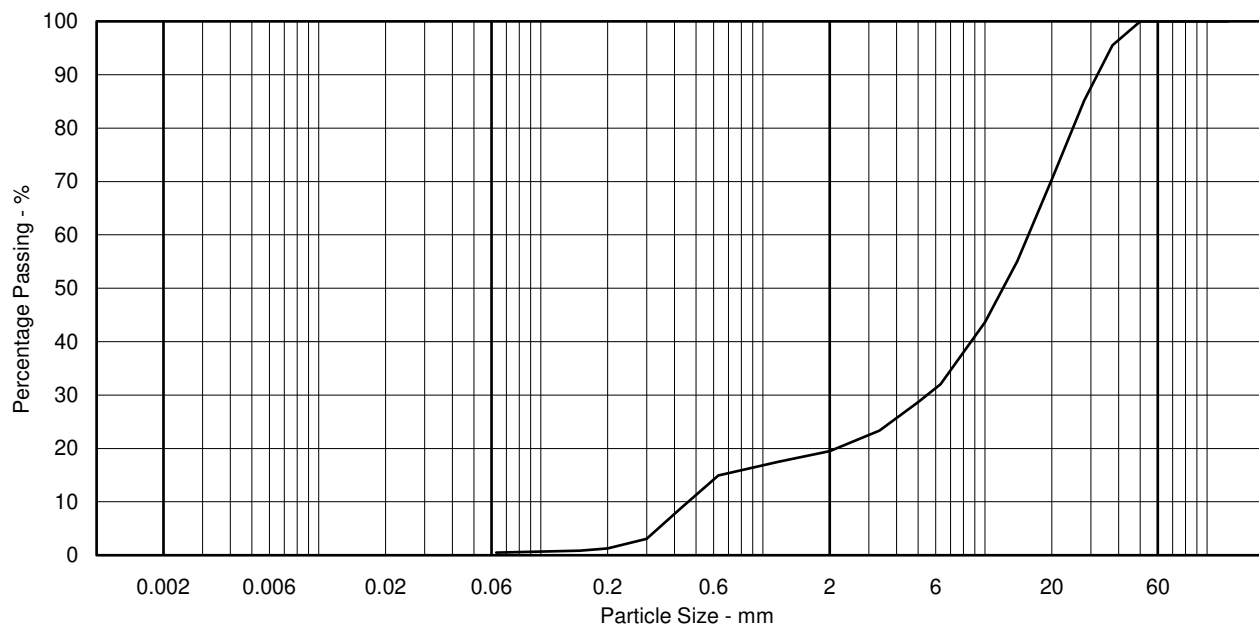
Non Engineering Description
Yellowish brown sandy fine to coarse GRAVEL.

Sample Proportions - %	
Cobbles	0.0
Gravel	80.5
Sand	19.0
Silt & Clay	0.5

Particle Diameter - mm	
D100	50
D60	16
D10	0.46
Uniformity Coefficient <small>(SHW series 600, Table 6/1, footnote 5)</small>	34.8

Notes

Clay	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles
	Silt			Sand			Gravel			



Originator	Checked & Approved
JAH	<i>JAH</i> 30/06/2021

PARTICLE SIZE DISTRIBUTION
 BS EN ISO 17892-4 2016 Clause 5.2 - Sieving Method





SITE INVESTIGATION AND LABORATORY SERVICES

Site	BOLLO, ACTON
Client	IDOM Merebrook Limited
Engineer	-

Contract No	C7416
Hole	MBH102
Date Sampled	01/06/2021
Depth (m)	6.00-6.50
Sample Type	B

Particle Size	% Passing
125.0 mm	100
90.0 mm	100
75.0 mm	100
63.0 mm	100
50.0 mm	100
37.5 mm	96
28.0 mm	89
20.0 mm	73
14.0 mm	60
10.0 mm	48
6.30 mm	38
5.00 mm	35
3.35 mm	32
2.00 mm	29
1.18 mm	25
630 µm	19
425 µm	13
300 µm	8
200 µm	4
150 µm	3
63 µm	2

Non Engineering Description

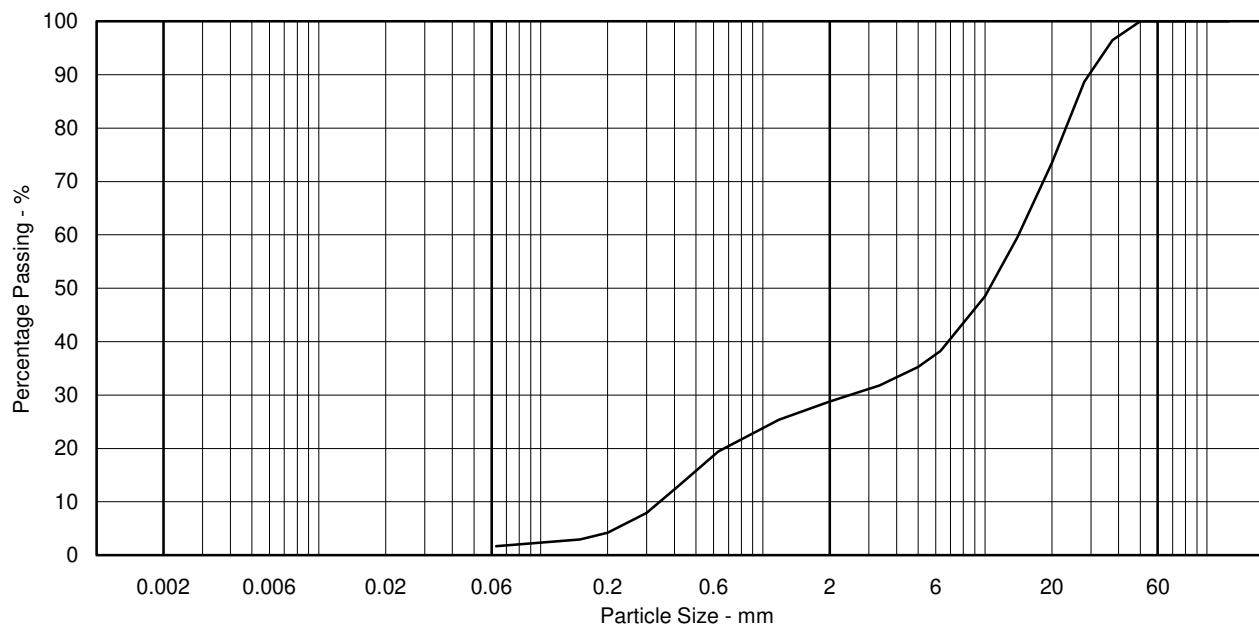
Yellowish brown very sandy fin to coarse GRAVEL with rare small pockets of clay.

Sample Proportions - %	
Cobbles	0.0
Gravel	71.2
Sand	27.1
Silt & Clay	1.7

Particle Diameter - mm	
D100	50
D60	14
D10	0.34
Uniformity Coefficient <small>(SHW series 600, Table 6/1, footnote 5)</small>	41.2

Notes

Clay	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles
	Silt			Sand			Gravel			



Originator	Checked & Approved
JAH	<i>JAH</i> 30/06/2021

PARTICLE SIZE DISTRIBUTION
BS EN ISO 17892-4 2016 Clause 5.2 - Sieving Method





SITE INVESTIGATION AND LABORATORY SERVICES

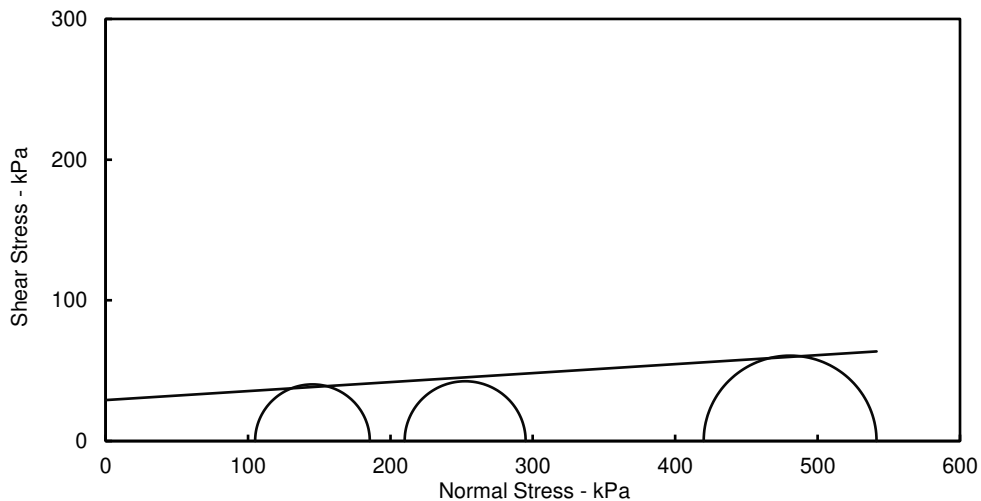
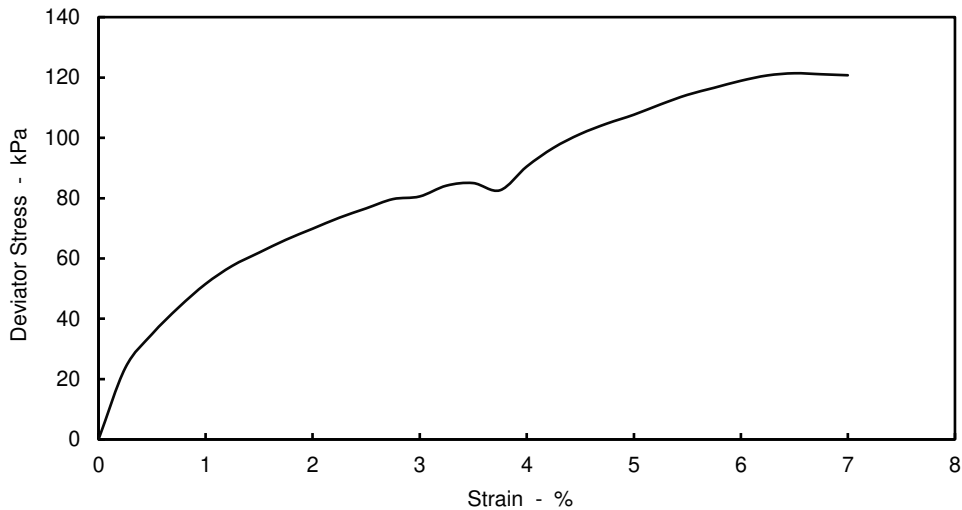
Site	BOLLO, ACTON
Client	IDOM Merebrook Limited
Engineer	-

Contract No.	C7416
Hole	MBH101
Date Sampled	27/05/2021
Depth (m)	10.50-10.95
Sample Type	U

Sample Details		Undisturbed			
Sample Condition		Undisturbed			
Height	mm	200.0			
Diameter	mm	103.0			
Moisture Content	%	25			
Bulk Density	Mg/m ³	1.99			
Dry Density	Mg/m ³	1.59			
Test Details		Stage	1	2	3
Membrane Thickness	mm		0.20	0.20	0.20
Membrane Correction	kPa		0.16	0.18	0.31
Rate of Axial Displacement	%/min		0.76	0.76	0.76
Cell Pressure	kPa		105	210	420
Strain at Failure	%		3.0	3.5	6.5
Maximum Deviator Stress	kPa		81	85	121
Shear Strength	kPa		40	42	61
Mode of Failure			Compound		
Non Engineering Description		Soft intact dark grey slightly sandy CLAY.			

Comments
 Undisturbed specimen taken 100mm below top of tube

Shear Strength Parameters		
C	29	kPa
Phi	3.7	°



Originator	Checked & Approved
JAH	<i>JAH</i> 30/06/2021

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



TERRA TEK

SITE INVESTIGATION AND LABORATORY SERVICES

Site BOLLO, ACTON

Client IDOM Merebrook Limited

Engineer -

Contract No **C7416**

Hole MBH101

Date Sampled 27/05/2021

Depth (m) 10.50-10.95

Sample Type U



Originator	Checked & Approved
JAH	<i>JAH</i> 30/06/2021

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





SITE INVESTIGATION AND LABORATORY SERVICES

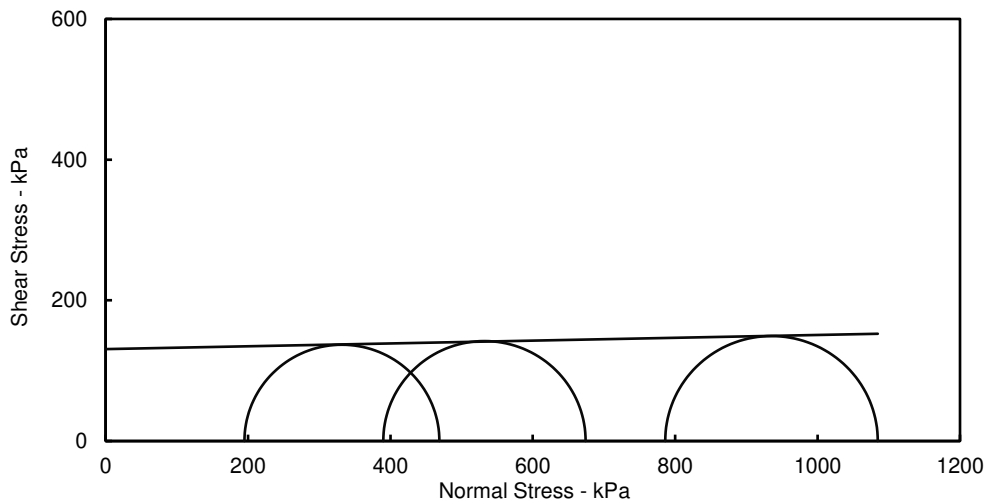
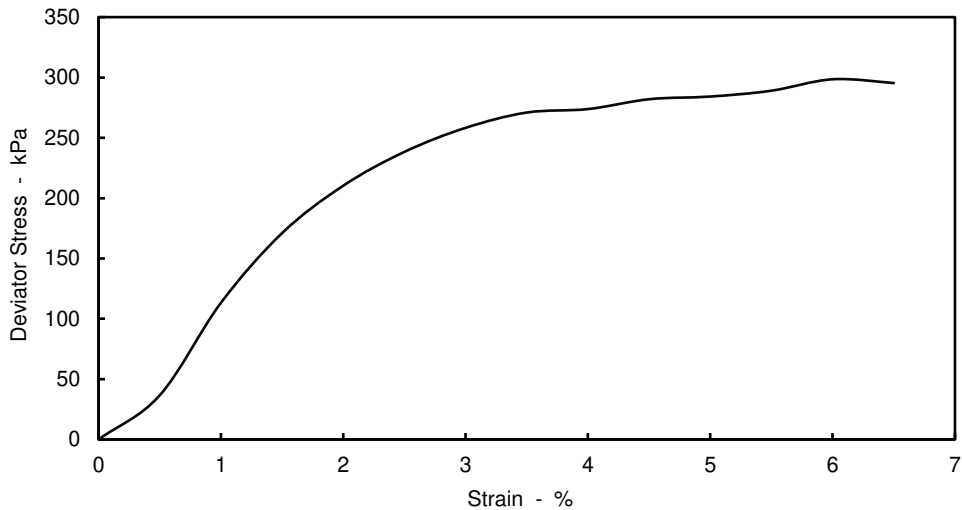
Site	BOLLO, ACTON
Client	IDOM Merebrook Limited
Engineer	-

Contract No.	C7416
Hole	MBH101
Date Sampled	28/05/2021
Depth (m)	19.50-19.95
Sample Type	U

Sample Details		Undisturbed			
Sample Condition		Undisturbed			
Height	mm	200.0			
Diameter	mm	103.1			
Moisture Content	%	26			
Bulk Density	Mg/m ³	2.00			
Dry Density	Mg/m ³	1.59			
Test Details		Stage	1	2	3
Membrane Thickness	mm		0.20	0.20	0.20
Membrane Correction	kPa		0.21	0.25	0.29
Rate of Axial Displacement	%/min		0.76	0.76	0.76
Cell Pressure	kPa		195	390	786
Strain at Failure	%		4.0	5.0	6.0
Maximum Deviator Stress	kPa		274	284	299
Shear Strength	kPa		137	142	149
Mode of Failure			Brittle		
Non Engineering Description		Stiff fissured dark grey slightly gravelly slightly sandy CLAY. Gravel is fine to medium.			

Comments
 Undisturbed specimen taken 100mm below top of tube

Shear Strength Parameters		
C	131	kPa
Phi	1.2	°



Originator	Checked & Approved	UNCONSOLIDATED UNDRAINED MULTISTAGE TRIAXIAL COMPRESSION BS 1377 : Part 7 : 1990 Clause 9
JAH	<i>JAH</i> 30/06/2021	



TERRA TEK

SITE INVESTIGATION AND LABORATORY SERVICES

Site BOLLO, ACTON

Client IDOM Merebrook Limited

Engineer -

Contract No **C7416**

Hole MBH101

Date Sampled 28/05/2021

Depth (m) 19.50-19.95

Sample Type U



Originator	Checked & Approved
JAH	<i>JAH</i> 30/06/2021

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





SITE INVESTIGATION AND LABORATORY SERVICES

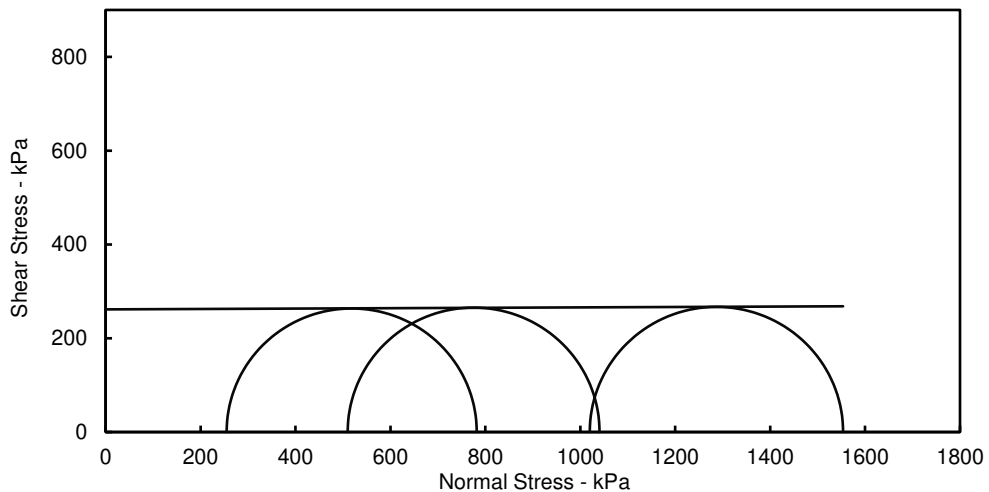
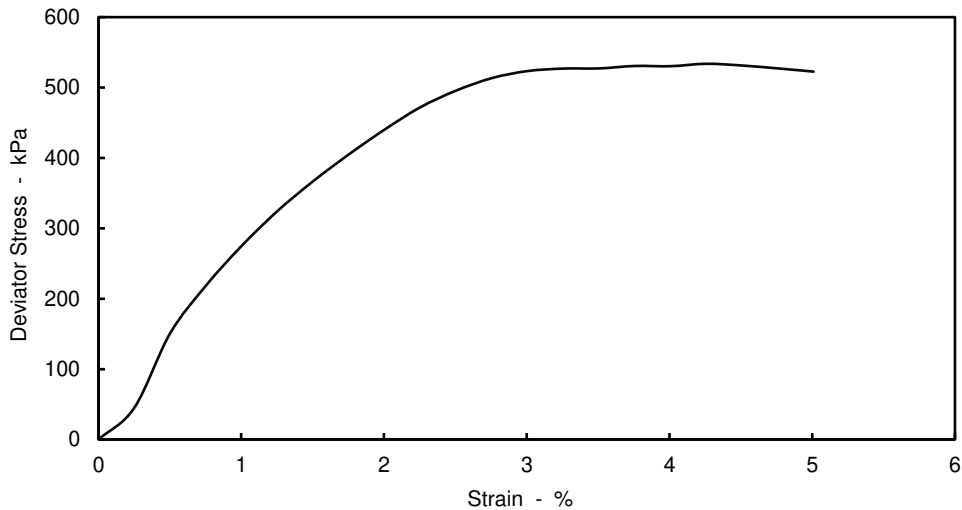
Site	BOLLO, ACTON
Client	IDOM Merebrook Limited
Engineer	-

Contract No.	C7416
Hole	MBH101
Date Sampled	28/05/2021
Depth (m)	25.50-25.95
Sample Type	U

Sample Details		Undisturbed			
Sample Condition		Undisturbed			
Height	mm	199.6			
Diameter	mm	102.7			
Moisture Content	%	24			
Bulk Density	Mg/m ³	2.03			
Dry Density	Mg/m ³	1.64			
Test Details		Stage	1	2	3
Membrane Thickness	mm		0.20	0.20	0.20
Membrane Correction	kPa		0.17	0.20	0.22
Rate of Axial Displacement	%/min		0.76	0.76	0.76
Cell Pressure	kPa		255	510	1020
Strain at Failure	%		3.3	3.8	4.3
Maximum Deviator Stress	kPa		527	531	534
Shear Strength	kPa		263	265	267
Mode of Failure				Brittle	
Non Engineering Description		Very stiff fissured dark grey CLAY.			

Comments
 Undisturbed specimen taken 100mm below top of tube

Shear Strength Parameters	
C	262 kPa
Phi	0.2 °



Originator	Checked & Approved
JAH	<i>JAH</i> 30/06/2021

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 BS 1377 : Part 7 : 1990 Clause 9



TERRA TEK

SITE INVESTIGATION AND LABORATORY SERVICES

Site BOLLO, ACTON

Client IDOM Merebrook Limited

Engineer -

Contract No **C7416**

Hole MBH101

Date Sampled 28/05/2021

Depth (m) 25.50-25.95

Sample Type U



Originator	Checked & Approved
JAH	<i>JAH</i> 30/06/2021

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





SITE INVESTIGATION AND LABORATORY SERVICES

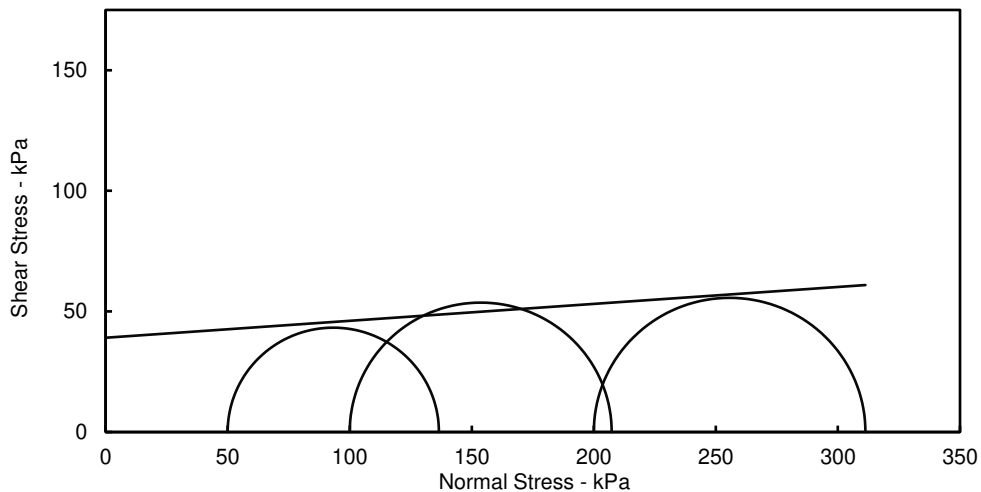
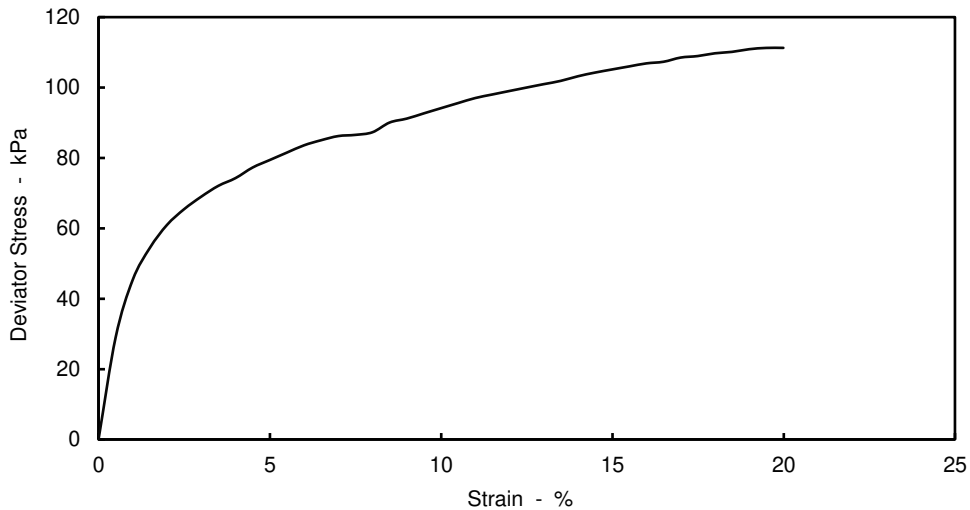
Site	BOLLO, ACTON
Client	IDOM Merebrook Limited
Engineer	-

Contract No.	C7416
Hole	MBH102
Date Sampled	01/06/2021
Depth (m)	3.50-3.95
Sample Type	U

Sample Details		Undisturbed			
Sample Condition		Undisturbed			
Height	mm	200.1			
Diameter	mm	102.6			
Moisture Content	%	28			
Bulk Density	Mg/m ³	1.96			
Dry Density	Mg/m ³	1.53			
Test Details		Stage	1	2	3
Membrane Thickness	mm		0.20	0.20	0.20
Membrane Correction	kPa		0.35	0.64	0.74
Rate of Axial Displacement	%/min		0.76	0.76	0.76
Cell Pressure	kPa		50	100	200
Strain at Failure	%		7.5	16.5	20.0
Maximum Deviator Stress	kPa		87	107	111
Shear Strength	kPa		43	54	56
Mode of Failure			Compound		
Non Engineering Description		Soft intact brown slightly sandy CLAY.			

Comments
 Undisturbed specimen taken 100mm below top of tube

Shear Strength Parameters		
C	39	kPa
Phi	4.0	°



Originator	Checked & Approved
JAH	<i>JAH</i> 30/06/2021

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



TERRA TEK

SITE INVESTIGATION AND LABORATORY SERVICES

Site BOLLO, ACTON

Client IDOM Merebrook Limited

Engineer -

Contract No **C7416**

Hole MBH102

Date Sampled 01/06/2021

Depth (m) 3.50-3.95

Sample Type U



Originator	Checked & Approved
JAH	<i>JAH</i> 30/06/2021

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





SITE INVESTIGATION AND LABORATORY SERVICES

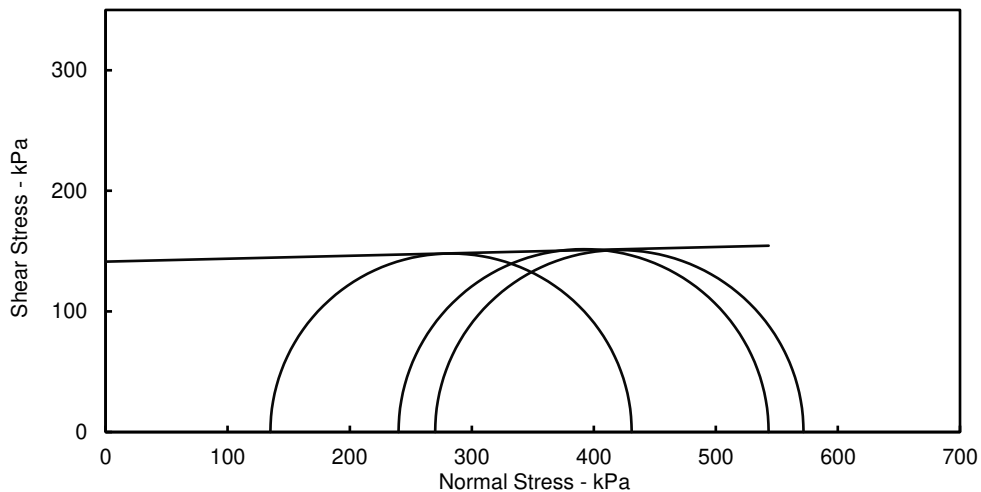
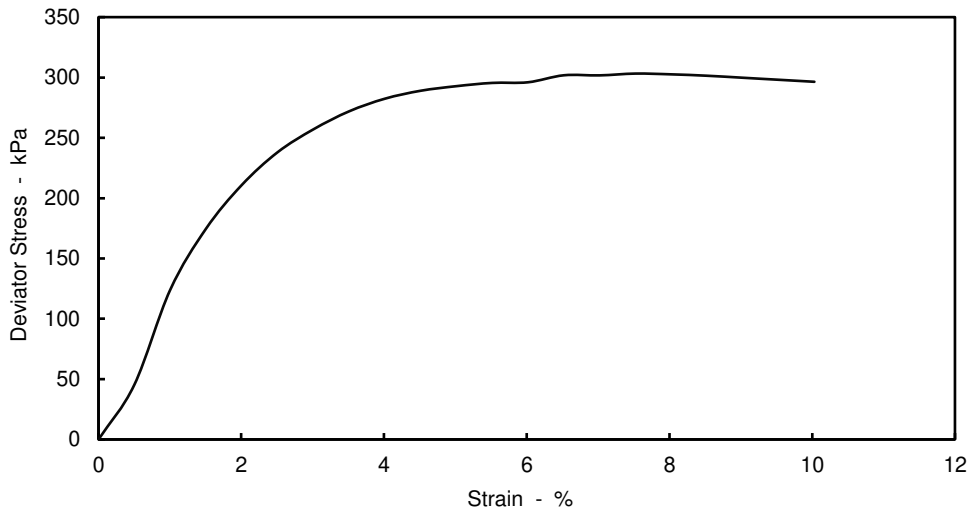
Site	BOLLO, ACTON
Client	IDOM Merebrook Limited
Engineer	-

Contract No.	C7416
Hole	MBH102
Date Sampled	01/06/2021
Depth (m)	13.50-13.95
Sample Type	U

Sample Details		Undisturbed			
Sample Condition		Undisturbed			
Height	mm	199.4			
Diameter	mm	102.7			
Moisture Content	%	26			
Bulk Density	Mg/m ³	2.02			
Dry Density	Mg/m ³	1.60			
Test Details		Stage	1	2	3
Membrane Thickness	mm		0.20	0.20	0.20
Membrane Correction	kPa		0.29	0.31	0.35
Rate of Axial Displacement	%/min		0.76	0.76	0.76
Cell Pressure	kPa		135	270	240
Strain at Failure	%		6.0	6.5	7.5
Maximum Deviator Stress	kPa		296	302	303
Shear Strength	kPa		148	151	152
Mode of Failure			Brittle		
Non Engineering Description		Very stiff fissured dark grey CLAY.			

Comments
 Undisturbed specimen taken 100mm below top of tube

Shear Strength Parameters		
C	141	kPa
Phi	1.4	°



Originator	Checked & Approved
JAH	<i>JAH</i> 30/06/2021

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



TERRA TEK

SITE INVESTIGATION AND LABORATORY SERVICES

Site BOLLO, ACTON

Client IDOM Merebrook Limited

Engineer -

Contract No **C7416**

Hole MBH102

Date Sampled 01/06/2021

Depth (m) 13.50-13.95

Sample Type U



Originator	Checked & Approved
JAH	<i>JAH</i> 30/06/2021

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





SITE INVESTIGATION AND LABORATORY SERVICES

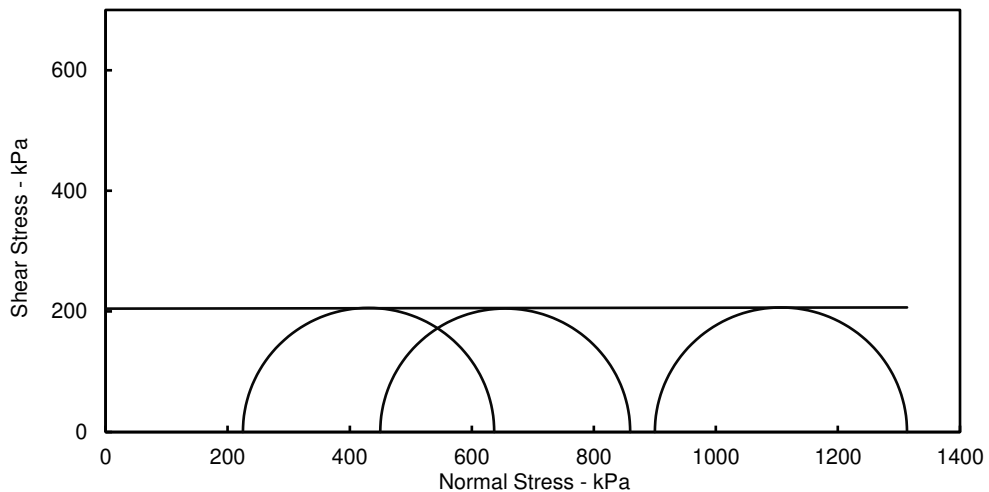
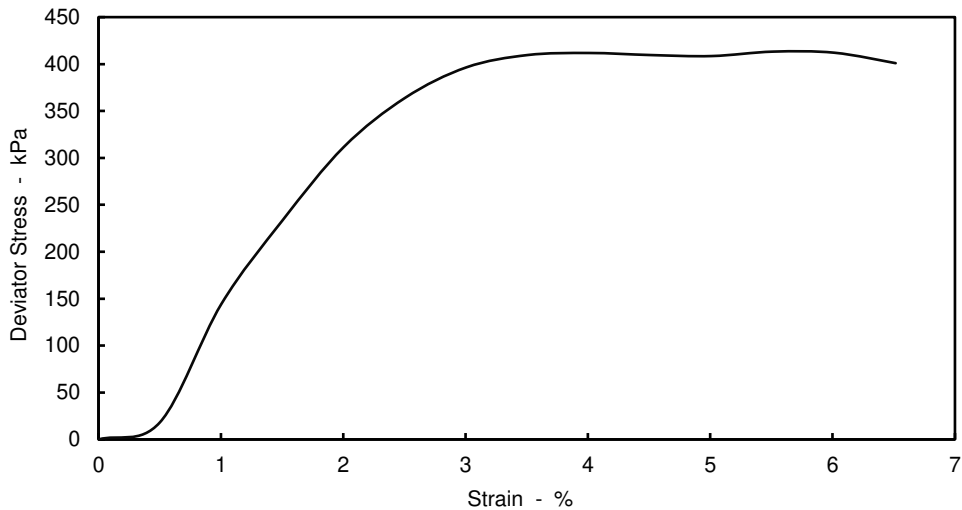
Site	BOLLO, ACTON
Client	IDOM Merebrook Limited
Engineer	-

Contract No.	C7416
Hole	MBH102
Date Sampled	02/06/2021
Depth (m)	22.50-22.80
Sample Type	U

Sample Details		Undisturbed			
Sample Condition		Undisturbed			
Height	mm	199.5			
Diameter	mm	102.5			
Moisture Content	%	24			
Bulk Density	Mg/m ³	2.06			
Dry Density	Mg/m ³	1.67			
Test Details		Stage	1	2	3
Membrane Thickness	mm		0.20	0.20	0.20
Membrane Correction	kPa		0.21	0.23	0.27
Rate of Axial Displacement	%/min		0.76	0.76	0.76
Cell Pressure	kPa		225	450	900
Strain at Failure	%		4.0	4.5	5.5
Maximum Deviator Stress	kPa		412	410	413
Shear Strength	kPa		206	205	207
Mode of Failure				Brittle	
Non Engineering Description		Very stiff fissured dark grey slightly sandy CLAY.			

Comments
 Undisturbed specimen taken 100mm below top of tube

Shear Strength Parameters	
C	205 kPa
Phi	0.1 °



Originator	Checked & Approved	UNCONSOLIDATED UNDRAINED MULTISTAGE TRIAXIAL COMPRESSION BS 1377 : Part 7 : 1990 Clause 9
JAH	<i>JAH</i> 30/06/2021	



TERRA TEK

SITE INVESTIGATION AND LABORATORY SERVICES

Site BOLLO, ACTON

Client IDOM Merebrook Limited

Engineer -

Contract No **C7416**

Hole MBH102

Date Sampled 02/06/2021

Depth (m) 22.50-22.80




Sample Type U



Originator	Checked & Approved
JAH	<i>JAH</i> 30/06/2021

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



 TERRA TEK <small>SITE INVESTIGATION AND LABORATORY SERVICES</small>				Site BOLLO, ACTON Client IDOM Merebrook Limited Engineer										Contract No C7416						
Sample Identification				Lab Sample ID	pH	Sulphate (soluble in 2:1 water extract) as SO4 g/l	Sulphate (acid soluble as SO4) %	Total Sulphur %												
Hole	Depth m	Sample Ref	Sample Type																	
MBH102	11.00		D	357620	8.0	0.41	0.10	0.47												
MBH102	16.65		D	357622	8.1	0.29	0.09	0.17												
MBH101	7.95		D	357641	8.3	0.32	0.07	0.43												
MBH101	16.90		D	357650	8.7	0.31	0.10	0.40												
MBH101	23.00		D	357656	8.6	0.35	0.10	0.31												
Limits of Detection Terra Tek Analysis Method Accreditation M=Mcerts U=UKAS N=No accreditation					~ M	0.01 TP169 M	0.01 TP171 M	0.01 TP129 M												
Originator	Checked & Approved		BRE SUITE																	
DAB	 22/06/2021																			

 <small>SITE INVESTIGATION AND LABORATORY SERVICES</small>	Site	BOLLO, ACTON	Contract No	C7416
	Client	IDOM Merebrook Limited		
	Engineer			

Sample Identification				Lab Sample ID	Date Sampled	Temperature on receipt °C	PRIMARY MATRIX	Secondary Matrix	Additional matrix	% Loss at 30C	% Retained 2mm
Exploratory Hole	Depth m	Sample Ref	Sample Type								
MBH102	11.00		D	357620	Deviating	15.6	CLAY			16.9	39.1
MBH102	16.65		D	357622	Deviating	15.6	SANDSTONE			6.5	51.0
MBH101	7.95		D	357641	Deviating	15.6	CLAY			22.9	27.2
MBH101	16.90		D	357650	Deviating	15.6	CLAY			18.6	36.0
MBH101	23.00		D	357656	Deviating	15.6	CLAY			18.1	34.9

Notes


Terra Tek are accredited for clay, sand and loam matrix types only, where they constitute the major component of the sample. Other coarse granular materials such as gravel, are not accredited where they comprise the major component of the sample.

Results are expressed on a dry-weight basis (samples dried at <30°C) except where stated. Samples for asbestos testing are dried at 85°C.

With the exception of samples analysed for asbestos, the laboratory removes any material > 2mm prior to analysis. The quantity and nature of the material is shown as the secondary and additional matrix types in the above table.



Where a parameter cannot be determined in house it is our policy to use a UKAS/MCERTS accredited laboratory wherever possible. Terra Tek will assume responsibility for the quality of subcontracted tests and the performance of the subcontractor chosen. Where there is no known UKAS/MCERTS laboratory for a particular parameter, a laboratory listed within the Terra Tek Approved Subcontractors List, which is subject to performance assessment, will be selected.

Originator	Checked & Approved	SAMPLE DESCRIPTIONS	Appendix S1
DAB	<i>S. Langren</i> 22/06/2021		

 TERRA TEK <small>SITE INVESTIGATION AND LABORATORY SERVICES</small>				Site BOLLO, ACTON		Contract No C7416					
				Client IDOM Merebrook Limited							
				Engineer							
Sample Identification				Lab Sample ID	Date Sampled	Deviating conditions					Preservatives used
Exploratory Hole	Depth m	Sample Ref	Sample Type			Sampling date has not been provided	Exceeded maximum holding time for selected test(s)	Presence of headspace in sample vial	Poorly fitting cap or lid	Damaged container	
MBH102	11.00		D	357620	Deviating						
MBH102	16.65		D	357622	Deviating						
MBH101	7.95		D	357641	Deviating						
MBH101	16.90		D	357650	Deviating						
MBH101	23.00		D	357656	Deviating						

NOTES

- 1 Results reported for samples classified as deviating may be compromised. Deviation types are shown as "X" or "Yes" in the table above.
- 2 The absence of "X" or "Yes" in the table above indicates no reported deviations.
- 3 Deviations due to use of incorrect sample container are shown on result tables.
- 4 Deviating results are indicated within result tables.

 TERRA TEK <small>SITE INVESTIGATION AND LABORATORY SERVICES</small>		Site BOLLO, ACTON	Contract No C7416		
		Client IDOM Merebrook Limited			
		Engineer			
Method Code	Reference	Description of Method	ISO17025 Accredited	MCERTS Accredited	Wet/Dry Sample Tested
GP001	BS1377, Part 3, 1990: Soils for Civil Engineering Purposes.	Preparation of soil samples for chemical analysis	Yes	Yes	N/A
GP012	BS EN 12457-3: Characterisation of Waste - Compliance test for leaching of granular waste materials and sludges (two-stage batch test)	Preparation of soil samples for two-stage leachate test			Dry
TP019	BS1377, Part 3, 1990: Soils for Civil Engineering Purposes.	Determination of pH in 2.5:1 water/soil extract using pH meter.	Yes	Yes	Dry
TP032	MAFF Book 427: The Analysis of Agricultural Materials: Method 8	Determination of water soluble boron by ICP-OES	Yes		Dry
TP040	APHA/AWWA, 19th edition: Method 3500Cr-D	Determination of hexavalent chromium by colorimetry.	Yes		Dry
TP041	BS1377, Part 3, 1990: Soils for Civil Engineering Purposes.	Determination of organic matter by titrimetry.	Yes		Dry
TP042	BS1377, Part 3, 1990: Soils for Civil Engineering Purposes.	Determination of loss on ignition at 50-440°C by gravimetry	Yes	Yes	Dry
TP045	GACHAMJA A.M. Chromatography and Analysis: 1992 9-11 (modified)	Determination of polyaromatic hydrocarbons extractable in dichloromethane, by GC/MS	Yes	Yes	Dry
TP046	MEWAM method: Phenols in water and Effluents: 4-aminoantipyrine method	Determination of monohydric phenols by steam distillation/colorimetry	Yes	Yes	Dry
TP047	MEWAM method: Cyanide in Waters etc	Determination of free cyanide by steam distillation/colorimetry	Yes		Dry
TP048	MEWAM method: Cyanide in Waters etc	Determination of total cyanide by steam distillation/colorimetry.	Yes	Yes	Dry
TP049	MEWAM method: Cyanide in Waters etc	Determination of complex cyanide by calculation	Yes		Dry
TP050	MEWAM method: Determination of Thiocyanate ,1985	Determination of thiocyanate by colorimetry	Yes	Yes	Dry
TP051	USEPA Method 9030B	Determination of acid soluble sulphides by steam distillation/colorimetry.	Yes	Yes	Wet
TP067	TNRCC Method 1005: 2001 (modified)	Determination of pentane/acetone extractable petroleum hydrocarbons (C8 - C40) by GC/FID	Yes	Yes	Wet
TP072	In-house documented method	Determination of ammoniacal nitrogen by colorimetry			Dry
TP074	In-house documented method	Determination of water soluble fluoride by ion selective electrode			Dry
TP098	BS1377, Part 3, 1990: Soils for Civil Engineering Purposes.	Determination of acid soluble chloride by titrimetry			Dry
TP099	BS1377, Part 3, 1990: Soils for Civil Engineering Purposes.	Determination of water soluble chloride by titrimetry	Yes	Yes	Dry
TP100	Wisconsin DNR Modified GRO method, Method for Determining Gasoline Range Organics	Determination of Volatile Petroleum Hydrocarbons/GRO.	Yes	Yes	Wet
Notes 1. Terra Tek (Birmingham) are MCERTS accredited for clay, sand & loam matrix types only, where they constitute the major component of the sample. Other coarse granular materials, ie gravel, are not accredited where they comprise the major component of the sample. 2. Results are expressed on a dry-weight basis (samples dried at <30°C) except where stated. 3. With the exception of samples analysed for asbestos, the laboratory removes any material >2mm prior to analysis. The quantity and nature of any material removed from samples is recorded and the information is available on request. 4. The laboratory records the date of analysis of each parameter. This information is available on request. 5. The test results pertain only to the samples provided and is not guaranteed to be representative of the parent material in whole or part from which the sample was taken. Sample location, site address, taken by and client reference are included where provided by the client, Terra Tek accepts no responsibility for the validity or accuracy of this information.					
Originator	Checked & Approved	SUMMARY OF IN-HOUSE ANALYTICAL TEST METHODS (SOIL)			 Appendix S3 Sheet 1 of 2
N/A	N/A				

 TERRA TEK <small>SITE INVESTIGATION AND LABORATORY SERVICES</small>		Site BOLLO, ACTON	Contract No C7416		
		Client IDOM Merebrook Limited			
		Engineer			
Method Code	Reference	Description of Method	ISO17025 Accredited	MCERTS Accredited	Wet/Dry Sample Tested
TP110	USEPA Methods 8082A & 3665A	Determination of Total & Speciated 7 PCB Congeners by GC/MS SIM	Yes	Yes	Wet
TP114	BS1377, Part 3, 1990: Soils for Civil Engineering Purposes.	Determination of carbonate in soil (rapid titration method)			Dry
TP126	TNRCC Method 1006 (modified)	Extracted petroleum hydrocarbons from TP067 split into aromatic and aliphatic fractions. Analysed by GC/FID.	Yes		Wet
TP129	In-house documented method	Determination of total sulphur by ICP-OES spectroscopy	Yes	Yes	Dry
TP134	In-house documented method	Determination of water soluble chloride by titrimetry	Yes	Yes	Dry
TP135	USEPA Methods 8100 & 8270D. In-house method TP045	Determination of polyaromatic hydrocarbons extractable in dichloromethane, by GC/MS (with concentration stage)			Dry
TP137	BS7755: Section 3.9: 1995/ISO 11466:1995	Determination of acid extractable metals in soil by ICP-OES	Selected	Selected	Dry
TP145	USEPA Methods 3550C & 8270D	Determination of Semi-Volatile Organic Compounds by GC/MS	Yes	Yes	Wet
TP147	USEPA Methods 8082A & 3665A	Determination of total & speciated WHO 12 PCB Congeners by GC/MS SIM.			Wet
TP150	USEPA Methods 8081B & 8141B	Determination of pesticides and herbicides in soil by GC/MS SIM			Dry
TP152	USEPA Method 556	Determination of carbonyls by GC/MS.			Wet
TP154	USEPA Method 5021. Wisconsin DNR modified GRO method	Determination of volatiles in by GC/MS headspace	Yes	Selected	Wet
TP158	USEPA Method 1671	Determination of glycols by GC/FID DI			Wet
TP169	In-house documented method	Determination of water soluble sulphate in 2:1 water/soil extract by ICP-OES spectroscopy	Yes	Yes	Wet
TP171	In-house documented method	Determination of acid soluble sulphate by ICP-OES spectroscopy	Yes	Yes	Dry
TP174	In-house documented method	Determination of Total Organic Carbon in soils by high temperature combustion & NDIR detection	Yes		Dry
TP178	In-house documented method	Determination of water soluble nitrate by ion selective electrode			Dry
TP181	HSG 248 Asbestos: The Analysts Guide (Appendix 2)	Asbestos Identification in bulk materials	Yes	No	Dry
TP183	HSG 248 Asbestos: The Analysts Guide (Appendix 2) & Standing Committee of Analysts: The Quantification of Asbestos in Soil (2017)	Asbestos Identification & Quantification in soils	Yes	No	Dry
TP185	In-house documented method	Determination of loss on ignition at 150-440°C by gravimetry	No	No	Dry
Notes 1. Terra Tek (Birmingham) are MCERTS accredited for clay, sand & loam matrix types only, where they constitute the major component of the sample. Other coarse granular materials, ie gravel, are not accredited where they comprise the major component of the sample. 2. Results are expressed on a dry-weight basis (samples dried at <30°C) except where stated. 3. With the exception of samples analysed for asbestos, the laboratory removes any material >2mm prior to analysis. The quantity and nature of any material removed from samples is recorded and the information is available on request. 4. The laboratory records the date of analysis of each parameter. This information is available on request. 5. The test results pertain only to the samples provided and is not guaranteed to be representative of the parent material in whole or part from which the sample was taken. Sample location, site address, taken by and client reference are included where provided by the client, Terra Tek accepts no responsibility for the validity or accuracy of this information.					
Originator	Checked & Approved	SUMMARY OF IN-HOUSE ANALYTICAL TEST METHODS (SOIL)		 Appendix S3	Sheet 2 of 2
N/A	N/A				

IDOM Merebrook Limited

Page 1 of 1


Cromford Mills
Mill Lane
Cromford
Derbyshire
DE4 3RQ

For the attention of Simon Edwards

Report No: C7409

Issue No 01

LABORATORY TEST REPORT

Project Name	ACTON		
Project Number	C7409	Date samples received	
Your Ref		Date written instructions received	01/06/2021
Purchase Order		Date testing commenced	01/06/2021
Please find enclosed the results as summarised below			
Item No	Test Quantity	Description	ISO 17025 Accredited
10.06	5	Plate bearing test	Yes
Remarks :			
Issued by : J Hopkins		Date of Issue : 03/06/2021	Key to symbols used in this report S/C : Testing was sub-contracted
Approved Signatories :  03/06/2021		J.Hopkins (Laboratory Coordinator), M D Brown (Senior Quality Manager), R Norris (Supervisor)	
<p>Unless we are notified to the contrary, samples will be disposed after a period of one month from this date. The results reported relate to samples received in the laboratory only. All results contained in this report are provisional unless signed by an approved signatory This report should not be reproduced except in full without the written approval of the laboratory. Under multisite accreditation the testing contained in this report may have been performed at another Terra Tek laboratory.</p> <p>Only those results indicated in this report are UKAS accredited and any opinions or interpretations expressed are outside the scope of UKAS accreditation.</p> <p>Feedback on the this report may be left via our website terratek.co.uk/feedback</p>			



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www.terratek.co.uk

Terra Tek Ltd is registered in Scotland No. 121594
Offices in Airdrie, Birmingham, Belfast and Aston Clinton



Site Investigation & Laboratory Services

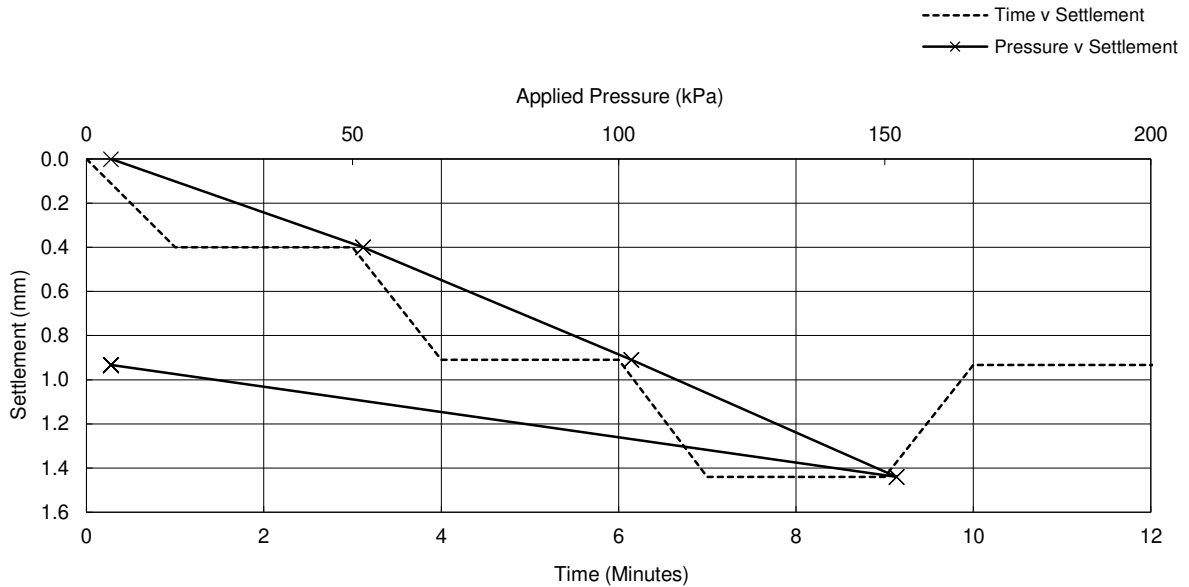
Site ACTON	Contract No C7409
Client IDOM Merebrook Limited	
Engineer	

Description : MADE GROUND (Brown silty very sandy fine to coarse crushed concrete).

Test Area Test 1.
 Date of Test 01/06/2021
 Weather Conditions Clear
 Temperature (°C) Maximum 19.2°C Minimum 18.4°C
 Reaction load Excavator
 Plate Diameter 455mm
 Requested Increment 50 100 150 0 kPa
 Load Offset 5kPa
 Thickness of layer N/A mm

Selected Pressure Increment (kPa)	Applied Pressure Increment (kPa)	Cumulative Ground Settlement (mm)	Ground Settlement per Load Increment (mm)	Total Time Taken (mins)
0	5	0.00	0	0
50	50	0.40	0.40	3
100	100	0.91	0.51	6
150	150	1.44	0.53	9
0	5	0.93	-0.51	12

Settlement versus Time and Applied Pressure



Equivalent CBR Value 15%

Originator	Checked & Approved	IN-SITU PLATE LOADING TEST California Bearing Ratio In-House Procedure TP175	
HL	<i>Jaw</i> 03/06/2021		



Site Investigation & Laboratory Services

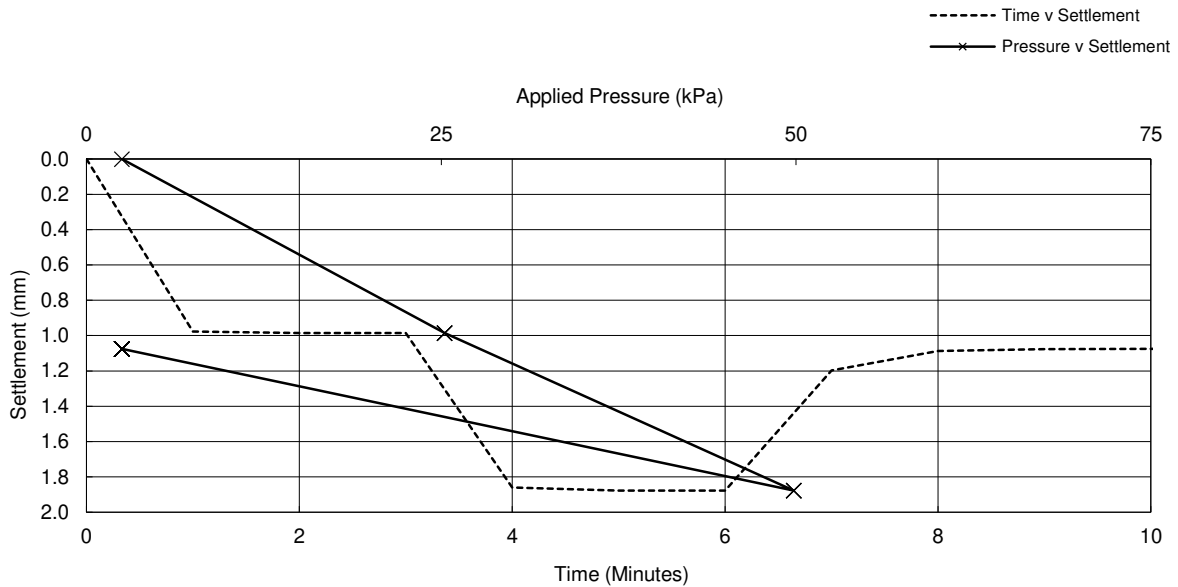
Site ACTON	Contract No C7409
Client IDOM Merebrook Limited	
Engineer	

Description : MADE GROUND (Very dark grey slightly sity very gravelly sand. Gravel is fine to coarse).

Test Area Test 2.
 Date of Test 01/06/2021
 Weather Conditions Clear
 Temperature (°C) Maximum 21.7°C Minimum 20.7°C
 Reaction load Excavator
 Plate Diameter 455mm
 Requested Increment 25 50 0 kPa
 Load Offset 2kPa
 Thickness of layer N/A mm

Selected Pressure Increment (kPa)	Applied Pressure Increment (kPa)	Cumulative Ground Settlement (mm)	Ground Settlement per Load Increment (mm)	Total Time Taken (mins)
0	2	0.00	0	0
25	25	0.98	0.98	3
50	50	1.88	0.89	6
0	2	1.08	-0.80	10

Settlement versus Time and Applied Pressure



Equivalent CBR Value 1.3%

Originator	Checked & Approved	IN-SITU PLATE LOADING TEST California Bearing Ratio In-House Procedure TP175	
HL	<i>Jan.</i> 03/06/2021		



Site Investigation & Laboratory Services

Site	ACTON
Client	IDOM Merebrook Limited
Engineer	

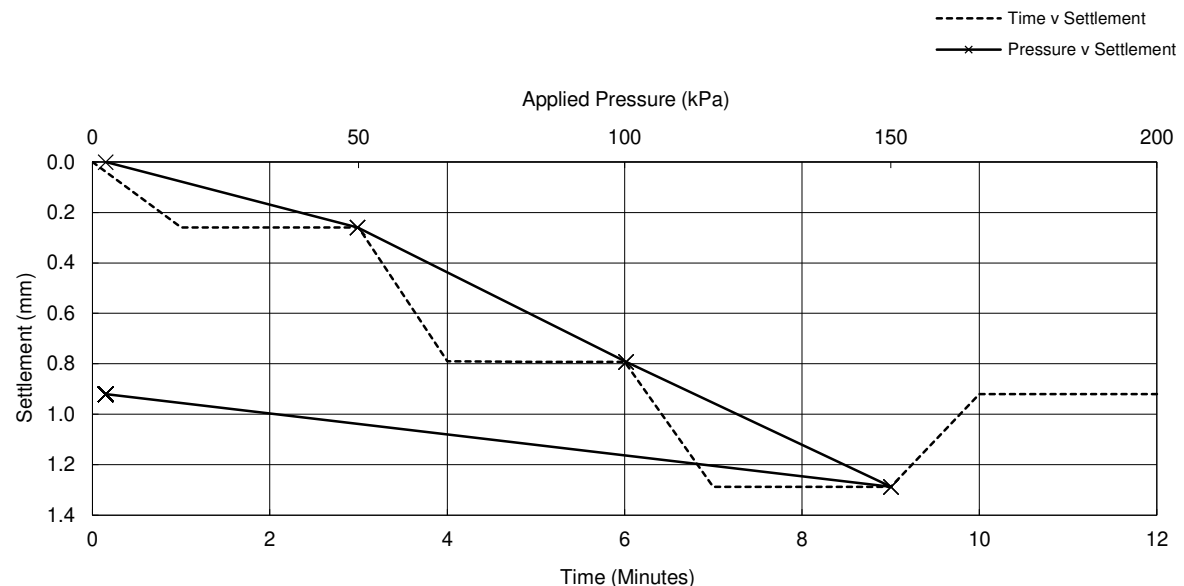
Contract No	C7409
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Description : MADE GROUND (Brown slightly silty very sandy fine to coarse crushed concrete).

Test Area Test 3.
 Date of Test 01/06/2021
 Weather Conditions Clear
 Temperature (°C) Maximum 27.2°C Minimum 26°C
 Reaction load Excavator
 Plate Diameter 455mm
 Requested Increment 50 100 150 0 kPa
 Load Offset 2kPa
 Thickness of layer N/A mm

Selected Pressure Increment (kPa)	Applied Pressure Increment (kPa)	Cumulative Ground Settlement (mm)	Ground Settlement per Load Increment (mm)	Total Time Taken (mins)
0	2	0.00	0	0
50	50	0.26	0.26	3
100	100	0.79	0.53	6
150	150	1.29	0.49	9
0	2	0.92	-0.37	12

Settlement versus Time and Applied Pressure



Equivalent CBR Value 17%

Originator	Checked & Approved
HL	<i>Jaw.</i> 03/06/2021

IN-SITU PLATE LOADING TEST
 California Bearing Ratio
 In-House Procedure TP175





Site Investigation & Laboratory Services

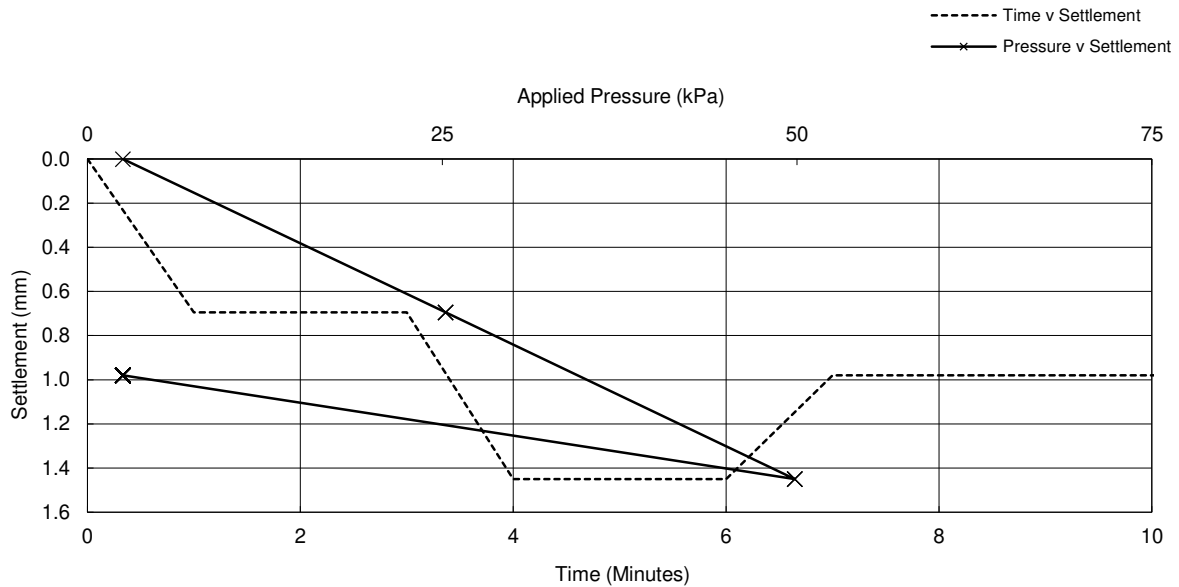
Site	ACTON	Contract No C7409
Client	IDOM Merebrook Limited	
Engineer		

Description : **MADE GROUND (Brown slightly silty very sandy fine to coarse crushed concrete).**

Test Area Test 4.
 Date of Test 01/06/2021
 Weather Conditions Clear
 Temperature (°C) Maximum 27.2°C Minimum 26°C
 Reaction load Excavator
 Plate Diameter 455mm
 Requested Increment 25 50 0 kPa
 Load Offset 2kPa
 Thickness of layer N/A mm

Selected Pressure Increment (kPa)	Applied Pressure Increment (kPa)	Cumulative Ground Settlement (mm)	Ground Settlement per Load Increment (mm)	Total Time Taken (mins)
0	2	0.00	0	0
25	25	0.69	0.69	3
50	50	1.45	0.76	6
0	2	0.98	-0.47	9

Settlement versus Time and Applied Pressure



Equivalent CBR Value 2.1%

Originator	Checked & Approved	IN-SITU PLATE LOADING TEST California Bearing Ratio In-House Procedure TP175	
HL	<i>Jan.</i> 03/06/2021		



Site Investigation & Laboratory Services

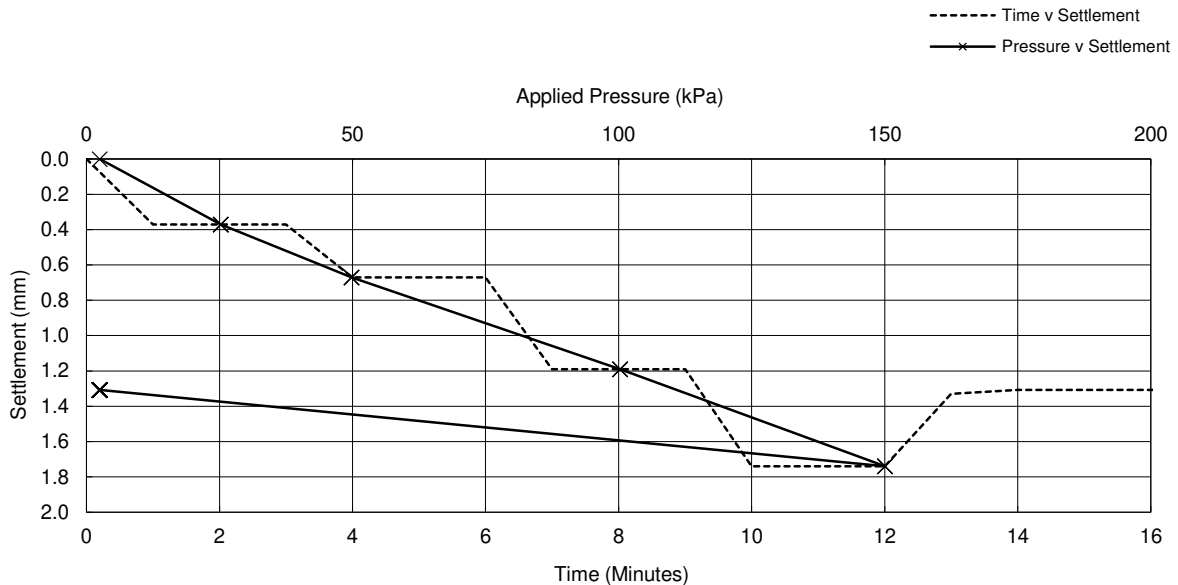
Site ACTON	Contract No C7409
Client IDOM Merebrook Limited	
Engineer	

Description : MADE GROUND (Brown slightly silty very sandy fine to coarse crushed concrete).

Test Area Test 5.
 Date of Test 01/06/2021
 Weather Conditions Clear
 Temperature (°C) Maximum 26°C Minimum 25.4°C
 Reaction load Excavator
 Plate Diameter 455mm
 Requested Increment 25 50 100 150 0 kPa
 Load Offset 2kPa
 Thickness of layer N/A mm

Selected Pressure Increment (kPa)	Applied Pressure Increment (kPa)	Cumulative Ground Settlement (mm)	Ground Settlement per Load Increment (mm)	Total Time Taken (mins)
0	2	0.00	0	0
25	25	0.37	0.37	3
50	50	0.67	0.30	6
100	100	1.19	0.52	9
150	150	1.74	0.55	12
0	2	1.31	-0.43	15

Settlement versus Time and Applied Pressure



Equivalent CBR Value 9.9%

Originator	Checked & Approved	IN-SITU PLATE LOADING TEST California Bearing Ratio In-House Procedure TP175	
HL	<i>Jan.</i> 03/06/2021		

APPENDIX 5

- Field Monitoring Records
- Groundwater Level Data
- Hazardous Soil Gas Data

GAS MONITORING RECORD ROUND 1

Location Reference	Time	Flow and Pressure Measurements				Gas Measurements						VOC Measurements		Dip Measurements		Comments
		Flow		Atmospheric Pressure	Differential Pressure	Methane	Methane LEL	Carbon Dioxide	Oxygen	Carbon Monoxide	Hydrogen Sulphide	Hexane	PID	Depth to Water	Depth to Base	
		max	steady													
l hr ⁻¹		mb	Pa	%	%	%	%	ppm	ppm	%	ppm	m	m			
MBH1	07:30	0.1	0.1	981	0	0	0	0.1	18.4	0	0	0.009	nr	3.19	3.21	flush
MBH2	09:00	-0.1	-0.1	981	0	0	0	3.6	12.5	0	0	0.007	nr	4.92	4.94	flush
MWS1	07:10	-0.2	0	981	0	0	0	0.1	19.4	0	0	0.010	nr	dry	1.03	flush. 0.02 m of silty sediment at base, otherwise dry
MWS2	07:00	0	0	982	0	0	0	0.4	19.6	0	0	0.012	nr	dry	1.19	flush
MWS3	08:30	0.1	0.1	981	0	0	0	2.4	14.4	0	0	0.008	nr	dry	1.37	flush
MWS4	08:15	-0.3	-0.3	981	-1	0	0	2	13.8	0	0	0.008	nr	dry	3.87	flush. 0.02 m of silty sediment at base, otherwise dry
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
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-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Weather:	Overcast, mild, occasional showers				nr = not recorded				Gas Analyser	PID		Site:		Stirling Road, Acton		
								Model:	GFM435	-		Project Number:		21849		
								Serial Number:	11839	-		Monitored By:		Andrew Harris		
								Date of Last Calibration:	21/06/2019	-		Date:		27/11/2019		

GAS MONITORING RECORD ROUND 2

Location Reference	Time	Flow and Pressure Measurements				Gas Measurements						VOC Measurements		Dip Measurements		Comments
		Flow		Atmospheric Pressure	Differential Pressure	Methane	Methane LEL	Carbon Dioxide	Oxygen	Carbon Monoxide	Hydrogen Sulphide	Hexane	PID	Depth to Water	Depth to Base	
		max	steady													
l hr ⁻¹		mb	Pa	%	%	%	%	ppm	ppm	%	ppm	m	m			
MBH1	07:30	0	0	1018	0	0	0	0.2	19.9	0	0	0.013	nr	dry	3.12	Flush, silty
MBH2	08:15	0	0	1019	0	0	0	0.7	18.2	0	0	0.011	nr	dry	4.90	Flush, silty
MWS1	07:00	0	0	1019	0	0	0	0.1	20	0	0	0.015	nr	dry	1.03	Flush
MWS2	07:15	0	0	1019	0	0	0	0.3	19.9	0	0	0.012	nr	dry	1.18	Flush
MWS3	08:30	0	0	1019	0	0	0	2.3	15.5	0	0	0.011	nr	dry	1.36	Flush
MWS4	08:00	0	0	1019	0	0	0	0.6	17.8	0	0	0.011	nr	dry	3.87	Flush
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
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-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Weather:	Dry, overcast, cold				nr = not recorded				Gas Analyser	PID		Site:		Stirling Road, Acton		
								Model:	GFM435		-		Project Number:		21849	
								Serial Number:	11839		-		Monitored By:		Andrew harris	
								Date of Last Calibration:	21/06/2019		-		Date:		05/12/2019	

GAS MONITORING RECORD ROUND 3

Location Reference	Time	Flow and Pressure Measurements				Gas Measurements						VOC Measurements		Dip Measurements		Comments	
		Flow		Atmospheric Pressure	Differential Pressure	Methane	Methane LEL	Carbon Dioxide	Oxygen	Carbon Monoxide	Hydrogen Sulphide	Hexane	PID	Depth to Water	Depth to Base		
		max	steady														
l hr ⁻¹		mb	Pa	%	%	%	%	ppm	ppm	%	ppm	m	m				
MBH1	07:30	0	0	1004	0	0	0	0.6	18	0	0	0.014	nr	3.08	3.12	Flush	
MBH2	08:15	-0.1	0	1005	0	0	0	11	17.8	0	0	0.014	nr	dry	4.93	Flush	
MWS1	07:00	-0.1	0	1006	0	0	0	0.3	18.3	0	0	0.018	nr	dry	1.05	Flush	
MWS2	07:15	0	0	1005	0	0	0	0.3	19.5	0	0	0.015	nr	dry	1.19	Flush. Headworks flooded	
MWS3	08:30	0	0	1004	0	0	0	1.7	17	0	0	0.014	nr	dry	1.38	Flush	
MWS4	08:00	0	0	1005	0	0	0	1.8	15	0	0	0.014	nr	dry	3.88	Flush	
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
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-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Weather:	Dry, cold, clear			nr = not recorded				Gas Analyser	PID		Site:		Stirling Road, Acton				
							Model:	GFM435		-		Project Number:		21849			
							Serial Number:	11839		-		Monitored By:		Andrew Harris			
							Date of Last Calibration:	21/06/2019		-		Date:		11/12/2019			

APPENDIX 6 ▪ Gas Risk Assessment

MODIFIED WILSON AND CARD GAS CHARACTERISTIC SITUATION

SITE: Stirling Road, Acton

JOB NUMBER: 21849

20/12/2019

Carbon Dioxide				Methane			
Maximum Gas Concentration	11.00 %	carbon dioxide concentration greater than 5% consider Characteristic Situation 2		Maximum Gas Concentration	0.10 %		
Maximum Measured Steady Flow	0.10 L hr ⁻¹			Maximum Measured Peak Flow	0.10 L hr ⁻¹		
Gas Screening Value	0.01 L hr ⁻¹			Gas Screening Value	0.00 L hr ⁻¹		
Characteristic Situation	1			Characteristic Situation	1		

if measured values are zero then resolution limit of instrument is used for calculation of GSV
 worst case carbon dioxide or methane characteristic situation value defines overall characteristic situation for the site

Modified Wilson and Card Classification

					BS 8485:2015+A1:2019 Gas Protection Scores - refer to standard for full guidance			
					Minimum Gas Protection Score Required			
Characteristic Situation	Risk Classification	Gas Screening Value Threshold (L hr ⁻¹)	Additional Factors	Typical Source of Generation	Type A Building	Type B Building	Type C Building	Type D Building
1	very low risk	<0.07	typically methane not to exceed 1% and/or carbon dioxide 5% otherwise consider increase to situation 2	natural soils with low organic content; 'typical' made ground	0	0	0	0
2	low risk	0.07 to <0.7	borehole air flow rate not to exceed 70 L hr ⁻¹ otherwise consider increase to situation 3	natural soils with high peat/organic content; 'typical' made ground	3.5	3.5	2.5	1.5
3	moderate risk	0.7 to <3.5		old landfill, inert waste, mineworking flooded	4.5	4	3	2.5
4	moderate to high risk	3.5 to <15	quantitative risk assessment required to evaluate scope of protective measures	mineworking susceptible to flooding, completed landfill	6.5 ^{A)}	5.5 ^{A)}	4.5	3.5
5	high risk	15 to <70		mineworking unflooded inactive with shallow workings near surface	hazard too high for this method to define protection measures	6 ^{A)}	5.5	4.5
6	very high risk	>70		recent landfill site	hazard too high for this method to define protection measures	hazard too high for this method to define protection measures	hazard too high for this method to define protection measures	6

BS 8485:2015+A1:2019 Gas Protection Measures - refer to standard for full guidance							
Select two or more elements from the following three types of protection to achieve score (only one element per type permitted)							
Structural Barrier	Score ^{A)}	Ventilation Measures	Score	Gas Resistant Membrane	Score		
Precast suspended segmental subfloor (i.e. beam and block)	0	Pressure relief pathway (usually formed of low fines gravel or with a thin geocomposite blanket or strips terminating in a gravel trench external to the building)	0.5	Gas resistant membrane meeting all of the following criteria: 1. sufficiently impervious, both in the sheet material and in the sealing of sheets and sealing around sheet penetrations, to prevent any significant passage of methane and/or carbon dioxide through the membrane. A membrane with a methane gas transmission rate <40.0 ml/day/m ² /atm (average) for sheets and joints (tested in accordance with BS ISO 15105-1:2007 manometric method) is regarded as sufficiently impervious. 2. sufficiently durable to remain serviceable for the anticipated life of the building and duration of gas emissions 3. sufficiently strong* to withstand the installation process and following trades until covered (e.g. penetration from steel fibres in fibre reinforced concrete, penetration of reinforcement ties, tearing due to working above it, dropping tools, etc) and to withstand in-service stresses (e.g. settlement if placed below a floor slab) 5. capable, after installation, of providing a complete barrier to the entry of the relevant gas 6. verified in accordance with CIRIA C735 * For example, reinforced LDPE (virgin polymer) membranes having a minimum mass per unit area of 370 g/m ² and not significantly less than 0.4 mm thickness between the reinforcement scrim (tested in accordance with Procedure D (2 mm diameter tip) of BS EN ISO 9863-1:2016) installed above floor slabs are considered sufficiently strong to meet the performance criteria (see also C.3). Thicker and more robust membranes or an additional membrane protection layer should be installed directly beneath cast-in-situ floor slabs	2		
Cast in situ ground-bearing floor slab (with only nominal mesh reinforcement)	0.5	Passive sub floor dispersal layer	Very good performance ^{E)}			2.5	
			Good performance ^{E)}			1.5	
Cast in situ monolithic reinforced ground bearing raft or reinforced cast in situ suspended floor slab with minimal penetrations	1 or 1.5 ^{B)}	Active dispersal layer, usually comprising fans with active abstraction (suction) from a subfloor dilution layer, with roof level vents. The dilution layer may comprise a clear void or be formed of geocomposite or polystyrene void formers ^{E)}	1.5 to 2.5				
Basement floor and walls conforming to BS 8102:2009, Grade 2 waterproofing ^{C) D)}	2	Active positive pressurization by the creation of a blanket of external fresh air beneath the building floor slab by pumps supplying air to points across the central footprint of the building into a permeable layer, usually formed of a thin geocomposite blanket ^{E)}	1.5 to 2.5				
Basement floor and walls conforming to BS 8102:2009, Grade 3 waterproofing ^{C) D)}	2.5	Ventilated car park (floor slab of occupied part of the building under consideration is underlain by a basement or undercroft car park) ^{F)}	4				

Notes

A) The scores are conditional on breaches of floor slabs, etc., being effectively sealed

B) To achieve a score of 1.5 the raft or suspended slab should be well reinforced to control cracking and have minimal penetrations cast in

C) The score is conditional on the waterproofing being provided by a suitable structural barrier with the design and detailing of the walls and floor meeting the requirements for Type B protection. The score cannot be assigned for Type A (waterproof membrane) or Type C (drained cavity wall).

D) If a membrane is installed beneath and around the basement to provide Type A waterproofing (BS 8102:2009), it can be assigned a gas protection score in accordance with Table 7, if it meets all the criteria for a gas resistant membrane in that table

E) Refer to BS 8485:2015 Annex B to determine performance and assign score

F) Assumes that the car park is vented to deal with car exhaust fumes, designed to Buildings Regulations 2000, Approved Document F

Building Types

Type A

Private ownership with no building management controls on alterations to the internal structure, the use of rooms, the ventilation of rooms or the structural fabric of the building. Some small rooms present. Probably conventional building construction (rather than civil engineering). Examples include private housing and some retail premises.

Type C

Commercial building with central building management control of any alterations to the building or its uses and central building management control of the maintenance of the building, including the gas protection measures. Single occupancy of ground floor and basement areas. Small to large size rooms with active ventilation or good passive ventilation of all rooms and other internal spaces throughout ground floor and basement areas. Probably civil engineering construction. Examples include offices, some retail premises, and parts of some public buildings (such as schools, hospitals, leisure centres and parts of hotels).

FOR TYPE A BUILDINGS ACTIVE VENTILATION MEASURES ARE INAPPROPRIATE

Type B

Private or commercial property with central building management control of any alterations to the building or its uses but limited or no central building management control of the maintenance of the building, including the gas protection measures. Multiple occupancy. Small to medium size rooms with passive ventilation of rooms and other internal spaces throughout ground floor and basement areas. May be conventional building or civil engineering construction. Examples include managed apartments, multiple occupancy offices, some retail premises and parts of some public buildings (such as schools, hospitals, leisure centres) and parts of hotels.

Type D

Industrial style building having large volume internal space(s) that are well ventilated. Corporate ownership with building management controls on alterations to the ground floor and basement areas of the building and on maintenance of ground gas protective measures. Probably civil engineering construction. Examples are retail park sales buildings, factory shop floor areas, warehouses. (Small rooms within these style buildings should be separately categorized as Type B or Type C).

APPENDIX 7 ▪ WAC Testing Certificates



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Analytical Report Number : 21-74606

Project / Site name:	Bollo Road	Samples received on:	13/05/2021
Your job number:		Samples instructed on/ Analysis started on:	13/05/2021
Your order number:		Analysis completed by:	20/05/2021
Report Issue Number:	1	Report issued on:	20/05/2021
Samples Analysed:	2 10:1 WAC Samples		

Signed: *Karolina Marek*

Karolina Marek
PL Head of 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

Excel copies of reports are only valid when accompanied by this PDF certificate.

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.

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Waste Acceptance Criteria Analytical Results							
Report No:	21-74606						
				Client: HESUS			
Location		Bollo Road					
Lab Reference (Sample Number)		1869279 / 1869280		Landfill Waste Acceptance Criteria			
Sampling Date		13/05/2021		Limits			
Sample ID		TH1		Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill	
Depth (m)		1.00					
Solid Waste Analysis							
TOC (%)**	0.5			3%	5%	6%	
Loss on Ignition (%) **	3.1			--	--	10%	
BTEX (µg/kg) **	< 10			6000	--	--	
Sum of PCBs (mg/kg) **	< 0.007			1	--	--	
Mineral Oil (mg/kg)	< 10			500	--	--	
Total PAH (WAC-17) (mg/kg)	< 0.85			100	--	--	
pH (units)**	7.8			--	>6	--	
Acid Neutralisation Capacity (mol / kg)	0.56			--	To be evaluated	To be evaluated	
Eluate Analysis							
	10:1		10:1	Limit values for compliance leaching test			
(BS EN 12457 - 2 preparation utilising end over end leaching procedure)	mg/l		mg/kg	using BS EN 12457-2 at L/S 10 l/kg (mg/kg)			
Arsenic *	0.0037		0.0330	0.5	2	25	
Barium *	0.0201		0.179	20	100	300	
Cadmium *	< 0.0001		< 0.0008	0.04	1	5	
Chromium *	0.0015		0.014	0.5	10	70	
Copper *	0.0081		0.072	2	50	100	
Mercury *	< 0.0005		< 0.0050	0.01	0.2	2	
Molybdenum *	0.0023		0.0206	0.5	10	30	
Nickel *	0.0032		0.028	0.4	10	40	
Lead *	< 0.0010		< 0.010	0.5	10	50	
Antimony *	< 0.0017		< 0.017	0.06	0.7	5	
Selenium *	< 0.0040		< 0.040	0.1	0.5	7	
Zinc *	0.0086		0.077	4	50	200	
Chloride *	1.8		16	800	15000	25000	
Fluoride	0.50		4.4	10	150	500	
Sulphate *	47		410	1000	20000	50000	
TDS*	110		980	4000	60000	100000	
Phenol Index (Monohydric Phenols) *	< 0.010		< 0.10	1	-	-	
DOC	6.46		57.3	500	800	1000	
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	1.2						
Dry Matter (%)	88						
Moisture (%)	12						
Results are expressed on a dry weight basis, after correction for moisture content where applicable. * = UKAS accredited (liquid eluate analysis only)							
Stated limits are for guidance only and i2 cannot be held responsible for any discrepancies with current legislation ** = MCERTS accredited							
Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes as defined by the Waste (England and Wales) Regulations 2011 (as amended) and EA Guidance WM3.							
This analysis is only applicable for landfill acceptance criteria (The Environmental Permitting (England and Wales) Regulations) and does not give any indication as to whether a waste may be hazardous or non-hazardous.							

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Waste Acceptance Criteria Analytical Results							
Report No:	21-74606						
				Client: HESUS			
Location		Bollo Road					
Lab Reference (Sample Number)		1869281 / 1869282		Landfill Waste Acceptance Criteria			
Sampling Date		13/05/2021		Limits			
Sample ID		TH2		Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill	
Depth (m)		1.00					
Solid Waste Analysis							
TOC (%)**	1.0			3%	5%	6%	
Loss on Ignition (%) **	3.7			--	--	10%	
BTEX (µg/kg) **	< 10			6000	--	--	
Sum of PCBs (mg/kg) **	< 0.007			1	--	--	
Mineral Oil (mg/kg)	< 10			500	--	--	
Total PAH (WAC-17) (mg/kg)	13.5			100	--	--	
pH (units)**	7.9			--	>6	--	
Acid Neutralisation Capacity (mol / kg)	4.1			--	To be evaluated	To be evaluated	
Eluate Analysis							
	10:1		10:1	Limit values for compliance leaching test			
(BS EN 12457 - 2 preparation utilising end over end leaching procedure)	mg/l		mg/kg	using BS EN 12457-2 at L/S 10 l/kg (mg/kg)			
Arsenic *	0.0076		0.0637	0.5	2	25	
Barium *	0.0148		0.125	20	100	300	
Cadmium *	< 0.0001		< 0.0008	0.04	1	5	
Chromium *	0.0041		0.035	0.5	10	70	
Copper *	0.011		0.088	2	50	100	
Mercury *	< 0.0005		< 0.0050	0.01	0.2	2	
Molybdenum *	0.0110		0.0926	0.5	10	30	
Nickel *	0.0019		0.016	0.4	10	40	
Lead *	0.0045		0.038	0.5	10	50	
Antimony *	< 0.0017		< 0.017	0.06	0.7	5	
Selenium *	< 0.0040		< 0.040	0.1	0.5	7	
Zinc *	0.013		0.11	4	50	200	
Chloride *	3.3		28	800	15000	25000	
Fluoride	0.24		2.0	10	150	500	
Sulphate *	100		870	1000	20000	50000	
TDS*	160		1400	4000	60000	100000	
Phenol Index (Monohydric Phenols) *	< 0.010		< 0.10	1	-	-	
DOC	6.38		53.8	500	800	1000	
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	1.2						
Dry Matter (%)	85						
Moisture (%)	15						
Results are expressed on a dry weight basis, after correction for moisture content where applicable. * = UKAS accredited (liquid eluate analysis only)							
Stated limits are for guidance only and i2 cannot be held responsible for any discrepancies with current legislation. ** = MCERTS accredited							
Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes as defined by the Waste (England and Wales) Regulations 2011 (as amended) and EA Guidance WM3. This analysis is only applicable for landfill acceptance criteria (The Environmental Permitting (England and Wales) Regulations) and does not give any indication as to whether a waste may be hazardous or non-hazardous.							



Analytical Report Number : 21-74606
Project / Site name: Bollo Road

* 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 *
1869279	TH1	None Supplied	1	Brown clay and loam with gravel.
1869281	TH2	None Supplied	1	Brown clay and loam with gravel.

Analytical Report Number : 21-74606
Project / Site name: Bollo Road

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
BS EN 12457-2 (10:1) Leachate Prep	10:1 (as recieved, moisture adjusted) end over end extraction with water for 24 hours. Eluate filtered prior to analysis.	In-house method based on BSEN12457-2.	L043-PL	W	NONE
Acid neutralisation capacity of soil	Determination of acid neutralisation capacity by addition of acid or alkali followed by electronic probe.	In-house method based on Guidance an Sampling and Testing of Wastes to Meet Landfill Waste Acceptance"	L046-PL	W	NONE
Loss on ignition of soil @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace.	In house method.	L047-PL	D	MCERTS
Mineral Oil (Soil) C10 - C40	Determination of mineral oil fraction extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L076-PL	D	NONE
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Speciated WAC-17 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. MCERTS accredited except Coronene.	L064-PL	D	NONE
PCB's By GC-MS in soil	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L027-PL	D	MCERTS
pH at 20oC in soil	Determination of pH in soil by addition of water followed by electrometric measurement.	In house method.	L005-PL	W	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 organic carbon (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 in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Total BTEX in soil (Poland)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073-PL	W	MCERTS
Metals in leachate by ICP-OES	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil"	L039-PL	W	ISO 17025
Chloride 10:1 WAC	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260.	L082-PL	W	ISO 17025
Fluoride 10:1 WAC	Determination of fluoride in leachate by 1:1ratio with a buffer solution followed by Ion Selective Electrode.	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination"	L033B-PL	W	ISO 17025
Sulphate 10:1 WAC	Determination of sulphate in leachate by ICP-OES	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil"	L039-PL	W	ISO 17025
Total dissolved solids 10:1 WAC	Determination of total dissolved solids in water by EC probe using a factor of 0.6.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L004-PL	W	ISO 17025

Analytical Report Number : 21-74606
Project / Site name: Bollo Road

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
Monohydric phenols 10:1 WAC	Determination of phenols in leachate by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080-PL	W	ISO 17025
Dissolved organic carbon 10:1 WAC	Determination of dissolved inorganic carbon in leachate by TOC/DOC NDIR Analyser.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	NONE

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.



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Analytical Report Number : 21-74596

Project / Site name:	Bollo Road	Samples received on:	13/05/2021
Your job number:		Samples instructed on/ Analysis started on:	13/05/2021
Your order number:		Analysis completed by:	19/05/2021
Report Issue Number:	1	Report issued on:	19/05/2021
Samples Analysed:	2 soil samples		

Signed: *Karolina Marek*

Karolina Marek
PL Head of 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

Excel copies of reports are only valid when accompanied by this PDF certificate.

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: 21-74596
Project / Site name: Bollo Road

Lab Sample Number				1869214	1869215
Sample Reference				TH1	TH2
Sample Number				None Supplied	None Supplied
Depth (m)				1.00	1.00
Date Sampled				13/05/2021	13/05/2021
Time Taken				1130	1130
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		
Stone Content	%	0.1	NONE	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	12	15
Total mass of sample received	kg	0.001	NONE	1.2	1.2

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

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.1	8.7
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0
Total Sulphate as SO ₄	mg/kg	50	MCERTS	1400	2500
Total Sulphate as SO ₄	%	0.005	MCERTS	0.145	0.249
Organic Matter	%	0.1	MCERTS	0.8	1.7
Total Organic Carbon (TOC)	%	0.1	MCERTS	0.5	1.0

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	0.24	0.70
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	0.34	2.0
Pyrene	mg/kg	0.05	MCERTS	0.29	1.8
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	1.2
Chrysene	mg/kg	0.05	MCERTS	< 0.05	1.0
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	1.3
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.78
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	1.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	0.61
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	0.71

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	0.87	11.2

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	16	15
Boron (water soluble)	mg/kg	0.2	MCERTS	1.7	3.5
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	0.6
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2	< 1.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	37	25
Copper (aqua regia extractable)	mg/kg	1	MCERTS	21	52
Lead (aqua regia extractable)	mg/kg	1	MCERTS	93	310
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	0.9
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	24	19
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	61	45
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	90	200



Analytical Report Number: 21-74596
 Project / Site name: Bollo Road

Lab Sample Number				1869214	1869215
Sample Reference				TH1	TH2
Sample Number				None Supplied	None Supplied
Depth (m)				1.00	1.00
Date Sampled				13/05/2021	13/05/2021
Time Taken				1130	1130
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		
Petroleum Hydrocarbons					
TPH C10 - C40	mg/kg	10	MCERTS	< 10	35

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



Analytical Report Number : 21-74596
Project / Site name: Bollo Road

* 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 *
1869214	TH1	None Supplied	1	Brown clay and loam with gravel.
1869215	TH2	None Supplied	1	Brown clay and loam with gravel.

Analytical Report Number : 21-74596
Project / Site name: Bollo Road

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
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
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
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
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-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
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
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-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 cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total organic carbon (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
TPH Banding in Soil by FID	Determination of hexane extractable hydrocarbons in soil by GC-FID.	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	W	MCERTS
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
D.O. for Gravimetric Quant if Screen/ID positive	Dependent option for Gravimetric Quant if Screen/ID positive scheduled.	In house asbestos methods A001 & A006.	A006-PL	D	NONE



Analytical Report Number : 21-74596
 Project / Site name: Bollo Road

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
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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.

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