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GROUND INVESTIGATION REPORT
MAYFAIR AND CO DEVELOPMENTS LTD
PROPOSED RESIDENTIAL DEVELOPMENT
170 BURY OLD ROAD
SALFORD
MANCHESTER

Project No: 20-109

Prepared By:

A handwritten signature in dark ink, appearing to read 'J. Bradford'.

Matt Bradford

Date: 1st August 2022

Approved By:

A handwritten signature in dark ink, appearing to read 'J.P. Ditchburn'.

John Ditchburn

Date: 1st August 2022

The information and / or advice contained in this Ground Investigation Report is based solely on, and is limited to, the boundaries of the site, the immediate area around the site, and the historical use(s) unless otherwise stated. This 'Report' has been prepared in order to collate information relating to the physical, environmental and industrial setting of the site, and to highlight, where possible, the likely problems that might be encountered when considering the future development of this site for the proposed end use. All comments, opinions, diagrams, cross sections and / or sketches contained within the report, and / or any configuration of the findings is conjectural and given for guidance only and confirmation of the anticipated ground conditions should be considered before development proceeds. Agreement for the use or copying of this report by any Third Party must be obtained in writing from Arc Environmental Limited (ARC). If a change in the proposed land use is envisaged, then a reassessment of the site should be carried out.

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APPENDICES

Appendix I	Proposed Development Layout Plan
Appendix II	Borehole & Trial Pit Location Plan and Borehole & Trial Pit Record Sheets
Appendix III	Gas & Groundwater Monitoring Certificate
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1.0 Introduction:-

August 2022

As requested by Adept Consulting Engineers on behalf of Mayfair & Co Developments Ltd, Ground Investigation works have been carried out at 170 Bury Old Road in Manchester. Proposals have been made to develop 12 no. residential properties with associated parking areas and gardens.

The intrusive investigation works comprised 5 no. windowless sampling boreholes (BH01-BH05) incorporating 3 no. combined ground gas and groundwater monitoring installations (BH01, BH03 & BH05), and 7 no. mechanically excavated trial pits (TP01 - TP07). The positions of the exploratory hole locations can be seen on the Borehole & Trial Pit Location Plan, a copy of which can be seen in Appendix II. It should be noted that this plan is for orientating purposes only, as the positions shown are approximate and the plan is not to a standard scale.

2.0 Site Details:-

Table 2.1

N = north, S = south, etc.

Site Name & Address:	Proposed Residential Development, 170 Bury Old Road, Salford, Manchester.
Description of Location:	The site is rectangular in shape and has a mostly flat and even topography. The site is currently disused and derelict, occupied with semi matured/ matured trees and uncontrolled grass/ vegetation.
Site Boundaries:	N = Catherine Road with Playground beyond, E = Residential dwellings, S = Bury Old Road with residential dwellings beyond & W = Residential dwellings.

3.0 Scope of Works:-

Table 3.1

Client:	Mayfair & Co Developments Ltd.
Consulting Engineers:	Adept Consulting Engineers.
Project Type:	Proposed residential development.
Proposed Layout Plan:	See Appendix I.
Reporting:	Factual & Interpretative.
Laboratory Testing:	Geotechnical and Ground Contamination.

The information contained in this report is limited to the areas of the site, as indicated on the Proposed Site Layout Plan shown in Appendix I, and to those areas accessible during the ground investigation. The depths of strata on the record sheets are recorded from current ground levels. When considering the full scope of the development any features and / or issues not specifically mentioned in this report cannot be assumed to have been covered.

4.0 Investigation Rationale:-

This ground investigation has been designed to provide information on the general ground and groundwater conditions where access would allow, within the boundaries of the site. The rationale behind the location of each exploratory hole is summarised in Table 4.1 below.

Table 4.1

Potential issue	Exploratory hole
Determine the nature of the underlying ground conditions, including shallow groundwater.	BH01 to BH05 TP01 to TP07
Determine the levels of contamination present within the initial deposits with a view to determining the risks posed towards the future site end-users.	BH01 to BH05 TP01 to TP07
Determination of ground gas regime & shallow groundwater monitoring.	BH01, BH03 & BH05

4.0 Investigation Rationale (Cont'd):-

4.1 Contamination Related Sampling & Site Protocols:-

All works associated with this ground contamination assessment and investigations have generally been completed in accordance with BS10175:2011 + A2:2017: Investigation of potentially contaminated sites– Code of practice & Land Contamination Risk Management (LCRM: October 2020) which has replaced: Model Procedures for the Management of Land Contamination, with the precautions below specific to this project.

4.1.1 Ground Contamination Sampling:-

Samples were recovered by a representative of ARC Environmental Ltd. during the intrusive investigation works. All samples were stored at approximately c.2°C to c.8°C using cool boxes and ice packs prior to delivery to a UKAS / MCERTS accredited laboratory. Sampling was carried out in accordance with 'Technical Policy Statement 63: UKAS Policy on Deviating Samples'.

4.1.2 Avoiding Cross-Contamination between Sample Locations:-

To avoid possible cross-contamination of materials between soil horizons, drill casing was used to seal off the made ground. In addition, disposable plastic liners were used to collect samples from the windowless sampling boreholes carried out. With regards to the trial pits, the samples were recovered manually using dedicated disposable plastic gloves, replaced between each sample recovery. The trial pits were backfilled in reverse order.

5.0 Ground Conditions:-

For an accurate description of the ground conditions encountered at each investigation position, reference should be made to the Borehole and Trial Pit Record Sheets attached in Appendix II. It should be noted that there is always the possibility of variation in the ground conditions around and between the exploratory hole locations.

5.1 Soil Profile: -

A summary of the soil profile for this site can be seen in Table 5.1 below.

Table 5.1

BCGL = Below Current Ground Level.

<u>Type of Strata</u>	<u>Depths Recorded (BCGL)</u>	<u>Description & General Comments</u>
MADE GROUND	From 0.00m up to c.0.50m to c.>2.20m.	Generally slightly clayey gravelly sand with bricks, slate and some ash was recorded to a depth of between c.0.50m and c.0.90m. Deeper made ground was encountered within TP03 where a redundant drain was noted.
DRIFT GEOLOGY: (Glaciofluvial Deposits)	From c.0.50m and c.0.90m to c.>5.45m.	Predominantly medium dense light brown fine SAND with local pockets of clay.
SOLID GEOLOGY (Manchester Marls Formation)	~	Not Encountered.

There was no evidence of significant or gross contamination such as Asbestos Containing Materials (ACM's), fuels, oils, etc, noted within any of the investigation locations undertaken across the site.

5.0 Ground Conditions (Cont'd):-

5.2 Groundwater & Stability:-

During the investigation works, water ingresses were noted in all the boreholes at depths of between c.2.00m and c.3.60m.

It would therefore be prudent to allow for the introduction of adequate groundwater control techniques, to take care of any surface water, water ingresses and pockets of trapped surface drainage within the made ground and natural deposits during the construction period, especially during the wetter periods of the year.

Owing to the nature of the made ground and natural deposits present across the development area, adequate lateral trench support will be required for excavations, to prevent trench wall collapse or over excavations, as well as to create a safe working environment, and any excavations on this site should remain open for as short a period as possible, since some of these materials may be susceptible to deterioration, if left open to the natural elements for any significant period of time. Reference to CIRIA 97 'Trenching Practice' would be beneficial to establish a suitable means of support or battering of excavation sides during construction.

6.0 Insitu Testing & Sampling:-

6.1 Insitu Standard Penetration Tests:-

Standard penetration tests (SPT's) were carried out with the use of a normal split spoon sampler on the natural drift deposits encountered within the boreholes to determine the relative density / strength of the materials tested. The results are shown as 'N' values on the graphic borehole record sheets, adjacent to the appropriate sample level. A summary of the test results can be seen in Table 6.1 below.

Table 6.1 :-

* = Using N₆₀ values after Clayton 1995

Type of Strata	Range of SPT 'N' Values	Result details
DRIFT GEOLOGY: (Glaciofluvial Deposits)	13 – 36	Medium Dense deposits.

6.2 Insitu Gas & Water Monitoring:-

When considering the findings from the intrusive investigation works, combined ground gas & water monitoring standpipes were installed within the boreholes (BH01, BH03 and BH05) to assess the potential for hazardous ground gas generation.

A standard 50mm diameter HDPE standpipe, with gravel and geo-wrap surround, bentonite seal, gas valve cap and security cover, was installed within each borehole, and ground gas and water levels were allowed to reach equilibrium, prior to the first monitoring visit. The bentonite seal was taken to a depth of c.1.00m bgl, to prevent excessive surface water ingress or venting of soil gas, with the resulting response zone covering the remaining depths of the installations. Monitoring was undertaken using a Gas Data GFM series infra-red gas analyser, with integral flow meter, and an electronic dipmeter.

In accordance with CIRIA Report C665, November 2007, Report Edition No. 04, March 2007 and BS8485:2015+A1:2019 – Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings, it is felt that an adequate risk assessment can be undertaken based on the following limiting factors:-

6.0 Insitu Testing & Sampling (Cont'd):-

6.2 Insitu Gas & Water Monitoring (Cont'd):-

- The proposed development has been considered as high sensitivity i.e. residential type development (Tables 5.5a & 5.5b – Typical / Idealised frequency and period of monitoring, after Wilson et al, 2005).
- The risk associated with the generation potential of a source is considered as very low (assessment based on the findings of intrusive works).
- Monitoring over a minimum of three months with six recorded readings (Tables 5.5a & 5.5b – Typical / idealised frequency and period of monitoring after Wilson et al, 2005).
- Negligible flow rates are recorded during the monitoring period (Table 8.5 – Modified Wilson & Card classification).
- A targeted and phased programme of gas monitoring will be completed, which will obtain gas monitoring readings during varying atmospheric conditions, which covers the ‘worst case’ scenario for ground gas emissions to occur, particularly during rapid falls in atmospheric pressure and also during low atmospheric pressure events.

For this site, the monitoring visits undertaken to date were taken during falling and rising atmospheric pressure trends. Proposed monitoring visits will also be undertaken at steady atmospheric pressure trends in order to correlate with differing conditions.

Monitoring of the weather conditions and predicated atmospheric pressures (Met Office Surface Pressure Charts) will be carried out up to 72 hours in advance of proposed monitoring visits, in order that a reasonable period of data is obtained to determine atmospheric trends, and also to target the ‘worst case’ scenario.

A summary of the results for the visits undertaken to date, compared with the ‘inert’ background gas levels is presented in Table 6.2 below, whilst a copy of the monitoring certificate is attached in Appendix III.

Table 6.2

* Note – Atmospheric trend taken from www.weatheronline.co.uk for Manchester Airport.

Note: Atmospheric trend taken from www.weather.com/mexico for Monterrey Airport								
<u>Position</u>	<u>Date</u>	<u>Atmospheric Pressure (mbar)</u>	<u>Water (m bgl)</u>	<u>CH₄ (%v/v)</u>	<u>LEL (%v/v)</u>	<u>CO₂ (%v/v)</u>	<u>O₂ (%v/v)</u>	<u>Flow Rate (l/hr)</u>
Background		~	~	0	0	0	21.0	<0.1
BH01	23/06/22	1000 (*trend Falling)	4.02	0.0	0.0	3.9	16.5	<0.1
BH03			Dry	0.0	0.0	2.6	17.6	<0.1
BH05			Dry	0.0	0.0	3.8	18.1	<0.1
BH01	07/07/22	1022 (*trend – Rising)	4.09	0.0	0.0	0.0	20.0	<0.1
BH03			Dry	0.0	0.0	0.1	19.9	<0.1
BH05			Dry	0.0	0.0	0.3	19.8	<0.1
BH01	25/07/22	996 (*trend – Falling)	4.09	0.0	0.0	0.4	19.1	<0.1
BH03			Dry	0.0	0.0	0.7	19.2	<0.1
BH05			Dry	0.0	0.0	0.6	19.3	<0.1
3 no. outstanding visits to be completed – results to follow as Addendum Letter Report.								

From the results undertaken to date, no levels of Methane (CH₄) have been recorded during the monitoring period. However, detectable concentrations of Carbon Dioxide (CO₂) have been recorded, up to a maximum recorded level of 3.9% v/v, with associated depleted oxygen (O₂) concentrations (16.5% v/v). Negligible flow rates have been recorded during the monitoring period undertaken to date.

6.0 Insitu Testing & Sampling (Cont'd):-

6.2 Insitu Gas & Water Monitoring (Cont'd):-

Based on the results undertaken to date, in accordance with CIRIA Report C665, a risk assessment has been completed for this site, by converting the results in Table 6.2 above to a gas screening value (GSV), calculated by multiplying the typical maximum gas concentrations with the recorded maximum positive flow rates (after Wilson & Card). Using the maximum values recorded, as no levels of Methane have been recorded, the GSV for Carbon Dioxide only has been calculated, the results of which are shown below:

$$\text{Carbon Dioxide GSV} = 0.039 \text{ (3.9\%)} \times 0.1 = 0.0039 \text{ l/hr}$$

When considering these results, in accordance with CIRIA C665, and considering the, the GSV value for CO₂ is below the assessment GSV of 0.07 l/hr (Characteristic Situation 1 – CS1), resulting in no gas protection measures being required. Alternatively, if the proposed development were to comprise suspended floor slabs within the structures, in accordance with NHBC Traffic light system (low rise housing with ventilated underfloor void), the GSV for CO₂ would also fall below the lower target concentration of 0.78l/hr and would equate to a Green site classification, resulting in no gas protective measures being required for the proposed development.

A further three monitoring visits have been scheduled for this site and the results along with the final recommendations will be issued as an Addendum Letter Report.

From the water monitoring undertaken, shallow water ingress may occur within construction related excavations, and therefore, it would be prudent to allow for the introduction of groundwater control measures (i.e. sump pumping equipment), to take care of any localised ingresses of groundwater, especially during the wetter periods of the year.

6.3 Insitu Equivalent California Bearing Ratio (CBR) Tests:-

Insitu equivalent CBR tests were carried out using a MEXE Cone Penetrometer, in accordance with the manufacturer's instructions, in order to estimate the equivalent CBR values for the initial natural drift deposits noted within the trial pits. A series of tests were carried out and an average of the results can be seen on the graphic trial pit record sheets, adjacent to the appropriate sample level.

From the results of tests completed, CBR values of between 3.5% & 5.5% were recorded. Therefore, where the initial natural drift deposits are to be used as an undisturbed subgrade, a characteristic design CBR value of 3.0% should be adopted.

7.0 Laboratory Testing:-

All geotechnical testing was carried out in accordance with BS1377-1:2016 by Ian Farmers Associates (IFA), Washington, UK (UKAS accredited). Ground contamination was undertaken by Eurofins Chemtest Limited of Newmarket (UKAS & MCERTS accredited).

7.1 Determination of pH & SO₄:-

Representative samples (11 no.) of made ground materials and natural drift deposits recovered from across the site, were tested to determine their pH value and Soluble Sulphate (SO₄) levels. The results are shown in Table 7.1 on the following page and are also contained in the Eurofins Chemtest Limited Analytical Report (Ref. 22-22-23427), a copy of which is attached in Appendix IV.

7.0 Laboratory Testing (Cont'd):-

7.1 Determination of pH & SO₄ (Cont'd):-

Table 7.1

MG =Made Ground, NS = Natural Strata

Position	Strata	Depth (m)	pH value	SO ₄ (mg/l)	Design SO ₄ Class	ACEC Class
BH01	NS	1.40 - 1.60	7.9	120	DS-1	AC-1
BH02	NS	0.80 - 1.00	7.9	54	DS-1	AC-1
BH03	NS	1.20 - 1.40	6.8	190	DS-1	AC-1
BH04	NS	1.40 - 1.60	7.3	110	DS-1	AC-1
BH05	NS	0.70 - 0.90	8.5	83	DS-1	AC-1
TP01	MG	0.10 - 0.50	8.6	1100	DS-2	AC-2
TP02	MG	0.50 - 0.70	8.3	350	DS-1	AC-1
TP04	MG	0.60 - 0.70	7.7	65	DS-1	AC-1
TP05	MG	0.00 - 0.10	8.2	71	DS-1	AC-1
TP06	MG	0.10 - 0.60	7.8	140	DS-1	AC-1
TP07	MG	0.00 - 0.10	8.2	340	DS-1	AC-1

From these results the samples tested range in pH from 6.8 to 8.6 and the amount of Soluble Sulphate present ranges between 54mg/l and 1100mg/l. Therefore, in accordance with BRE Special Digest 1: 2005 the site can be given a classification of Class DS-1. When considering the pH values of the materials tested, and assuming potentially mobile groundwater, the assessment of the Aggressive Chemical Environment for Concrete (ACEC) classification for this site is AC-1.

7.2 Determination of Particle Size Distribution:-

Representative samples (3 no.) of the natural glaciofluvial drift deposits were tested to determine their particle size distribution, so these materials might be classified. The results of the tests are represented both graphically and numerically on the PSD results sheets contained in the IFA analytical report (Ref. 2281099/1), attached in Appendix IV and are summarised in Table 7.2 below.

Table 7.2:

Position	Depth (m)	Clay/Silt Fraction (%)	Sand Fraction (%)	Gravel Fraction (%)	Cobble Fraction (%)	Grading Characteristics	Brief Soil Description
BH01	0.70-0.90	33	43	24	0	Poorly graded	Silty gravelly clayey SAND
BH03	0.80-1.00	15	61	24	0	Poorly graded	Silty gravelly clayey SAND
BH05	1.40-1.60	27	63	10	0	Poorly graded	Silty gravelly clayey SAND

From the results of the grading analysis, the samples tested are generally poorly graded. The laboratory results / descriptions generally correspond with the field descriptions of the materials.

7.3 Contamination Screening / Screening Strategy:-

Representative samples of the made ground materials recovered from across the site were passed onto Eurofins Chemtest Limited of Newmarket, so that soil contamination screening could be carried out. In total 6 no. representative samples were screened using a standard generic contamination suite (based on the current CLEA SGV listed analytes with historical additions), which is used to assess typical made ground (disturbed natural strata mixed with anthropogenic debris) of an unknown source.

7.0 Laboratory Testing (Cont'd):-

7.3 Contamination Screening / Screening Strategy (Cont'd):-

Although no evidence of significant or gross contamination such as Asbestos Containing Materials (ACM's), fuels, oils, etc. was noted within the exploratory positions, for completeness and to aid in an assessment for off-site disposal classification, representative samples were tested for Speciated PAH (Polycyclic Aromatic Hydrocarbons), Speciated TPH (Total Petroleum Hydrocarbons) & Asbestos.

The catalogue of testing results can be found in the Eurofins Chemtest Limited Analytical Reports (Refs. 22-23427-1), attached in Appendix IV, and the total analysis carried out is summarised below:

- 6 no. soil samples screened for a generic (metals and non-organics) soil suite which includes the following determinants; Arsenic, Cadmium, Chromium (III & VI), Copper, Lead, Mercury, Nickel, Selenium, Zinc, Cyanide and Total Organic Carbon (TOC).
- 6 no. soil samples screened for Speciated Polycyclic Aromatic Hydrocarbons (PAH's)
- 6 no. soil samples screened for Speciated Total Petroleum Hydrocarbons (based on full Aliphatic / Aromatic Split & BTEX).
- 6 no. samples screened for the presence of asbestos.

These results have been used to carry out a Level 1: Quantitative Human Health & Controlled Waters Risk Assessment for the ground contamination present and are discussed in further detail in Section 8.0 below and on the following pages.

8.0 Ground Contamination Risk Assessment:-

8.1 Methodology:-

Following completion of the contamination screening undertaken on various samples from this site, a Level 1 quantitative ground contamination risk assessment has been undertaken, generally in accordance with BS10175:2011+A2:2017: Investigation of potentially contaminated sites—Code of practice & Land Contamination Risk Management (LCRM: October 2020). This quantitative ground contamination risk assessment uses the current UK practice for assessing the risks from land contamination, which is based on the established *source-pathway-receptor* pollutant linkage methodology and 'suitable for use' approach (Part IIA, EPA 1990 - inserted through Section 57 EA 1995).

Based on the Conceptual Site Model (CSM) for this site (described further in Section 8.4), a site-specific screening strategy for the site has been developed (see Section 7.3) and risks from potential contaminants have been assessed for both human health and controlled waters. The results of the risk assessments can be found in Sections 8.2 (Human Health) & 8.3 (Controlled Waters).

8.2 Level 1 Risk Assessment (Human Health):-

The soil screening results from the six soil samples retrieved from across the site have been assessed by comparing the Maximum Concentration values (C_M) recorded for each analyte to the Critical Concentration (C_C) values chosen for this site. The results of the testing are contained in Appendix IV, and the risk assessment has been summarised in Table 8.1 on the following page.

8.0 Ground Contamination Risk Assessment (Cont'd):-

8.2 Level 1 Risk Assessment (Human Health) (Cont'd): -

Table 8.1

Bold = result exceeds Target concentration

Analyte	Critical Conc. (Cc)	No. of Samples Screened	Max. Conc. (C _M) Recorded	No. of Samples > C _C
Arsenic	37 ⁽¹⁾	6	7.2	0
Cadmium	11 ⁽¹⁾	6	0.21	0
Chromium III	910 ⁽¹⁾	6	7	0
Chromium VI	6 ⁽¹⁾	6	<0.50	0
Copper	2400 ⁽¹⁾	6	13	0
Lead	200 ⁽²⁾	6	490	4 _(TP01, TP04, TP05, TP06)
Mercury	40 ⁽¹⁾	6	0.38	0
Nickel	130 ⁽¹⁾	6	11	0
Selenium	250 ⁽¹⁾	6	0.52	0
Zinc	3700 ⁽¹⁾	6	120	0
Cyanide	34 ⁽³⁾	6	<0.50	0
Acenaphthene	510 ⁽¹⁾	6	<0.1	0
Acenaphthylene	420 ⁽¹⁾	6	<0.1	0
Anthracene	5400 ⁽¹⁾	6	0.16	0
Benzo(a)anthracene	11 ⁽¹⁾	6	0.59	0
Benzo(a)pyrene	2.7 ⁽¹⁾	6	0.61	0
Benzo(b)fluoranthene	3.3 ⁽¹⁾	6	0.78	0
Benzo(ghi)perylene	340 ⁽¹⁾	6	<0.10	0
Benzo(k)fluoranthene	93 ⁽¹⁾	6	0.24	0
Chrysene	22 ⁽¹⁾	6	0.54	0
Dibenz(ah)anthracene	0.28 ⁽¹⁾	6	<0.10	0
Fluoranthene	560 ⁽¹⁾	6	1.1	0
Fluorene	400 ⁽¹⁾	6	<0.10	0
Indeno(123cd)pyrene	36 ⁽¹⁾	6	<0.10	0
Naphthalene	5.6 ⁽¹⁾	6	<0.10	0
Phenanthrene	220 ⁽¹⁾	6	0.55	0
Pyrene	1200 ⁽¹⁾	6	1.10	0
Benzene	0.17 ⁽¹⁾	6	<0.001	0
Toluene	290 ⁽¹⁾	6	<0.001	0
Ethylbenzene	110 ⁽¹⁾	6	<0.001	0
m & p-Xylene	140 ⁽¹⁾	6	<0.001	0
o-Xylene	140 ⁽¹⁾	6	<0.001	0
VPH Aliphatic (>C5-C6)	78 ⁽¹⁾	6	<1.0	0
VPH Aliphatic (>C6-C8)	230 ⁽¹⁾	6	<1.0	0
VPH Aliphatic (>C8-C10)	65 ⁽¹⁾	6	<1.0	0
EPH Aliphatic (>C10-C12)	330 ⁽¹⁾	6	<1.0	0
EPH Aliphatic (>C12-C16)	2400 ⁽¹⁾	6	<1.0	0
EPH Aliphatic (>C16-C35)	92000 ⁽¹⁾	6	<1.0	0
EPH Aliphatic (>C35-C44)	92000 ⁽¹⁾	6	<1.0	0
VPH Aromatic (>EC5-EC7)	140 ⁽¹⁾	6	<1.0	0
VPH Aromatic (>EC7-EC8)	290 ⁽¹⁾	6	<1.0	0
VPH Aromatic (>EC8-EC10)	83 ⁽¹⁾	6	<1.0	0
EPH Aromatic (>EC10-EC12)	180 ⁽¹⁾	6	<1.0	0
EPH Aromatic (>EC12-EC16)	330 ⁽¹⁾	6	<1.0	0
EPH Aromatic (>EC16-EC21)	540 ⁽¹⁾	6	<1.0	0
EPH Aromatic (>EC21-EC35)	1500 ⁽¹⁾	6	<1.0	0
EPH Aromatic (>EC35-EC44)	1500 ⁽¹⁾	6	<1.0	0
Asbestos	Presence	6	No Asbestos Detected	0

⁽¹⁾ = LQM CIEH Suitable 4 Use Levels (S4UL Nov 2014 (Revised August 2015)) – Residential with homegrown produce – 2.5% SOM), ⁽²⁾ = C4SL Values (Residential with homegrown produce), ⁽³⁾ = ATRISK^{SOIL} SSV. Note = All units are mg/kg.

Report Type: - Ground Investigation Report.

Project: 20-109 – Proposed Residential Development, 170 Bury Old Road, Salford, Manchester, M74QY.

Prepared For: Mayfair & Co Developments Ltd.

8.0 Ground Contamination Risk Assessment (Cont'd):-

8.2 Level 1 Risk Assessment (Human Health) (Cont'd): -

The results have identified the following:

- The results have identified that the Maximum Concentration (C_M) values for Lead exceeds the Critical Concentration (C_C) values for the site at the locations of TP01, TP04, TP05 and TP06.
- None of the remaining C_M values exceed the C_C values taken for the site.
- No asbestos fibres were detected and therefore the made ground is not felt to represent a risk with regards to asbestos.

The results of the contamination screening and analysis have confirmed that the made ground materials recovered from across the site are considered to pose a risk to Human Health where exposure pathways are available, and therefore there is requirement for removal, treatment, protection measures and / or further risk assessment to protect future end users (i.e. no risk to Human Health).

Where the future site has hard cover, most of these pathways will not be available. Similarly, where either hard cover and / or future surface water drainage systems are present, the potential effects of surface infiltration or contaminated surface water runoff will be greatly reduced.

With regard to the construction work force, exposure pathways through direct contact, ingestion and dust inhalation will be available during part of the construction process, and therefore adequate PPE should be provided to protect the work force during this period.

8.3 Risk Assessment (Controlled Waters):-

The following hydrogeological and hydrological issues have been taken into consideration when assessing the risks towards controlled waters across the site:

- No evidence of significant or gross contamination was noted within the made ground materials present on site, and the samples of made ground screened returned low contamination results.
- The solid geological deposits are classified as Secondary Aquifer A.
- There are no Source Protection Zones (SPZ) recorded within c.1km from the boundaries of the site.
- There are no Groundwater Abstractions recorded within c.1km from the boundaries of the site.
- There are no surface water features recorded within c.500m of the site.

When taking into account the above site setting, the risk of significant contamination being present below the site and impacting groundwater is felt to be negligible and therefore no leachate screening was deemed necessary.

8.4 Screening for Off-Site Disposal:-

Based on the results of the contamination screening, the low levels of heavy metals, PAH's, TPH and absence of asbestos do not indicate a hazardous waste source.

The results of the contamination screening should be forwarded on to the appropriate landfill operators for their comment.

8.0 Ground Contamination Risk Assessment (Cont'd):-

8.4 Screening for Off-Site Disposal (Cont'd):-

During future redevelopment works any excavated materials that are to be discarded and removed from this site as a waste to landfill will need to be classified in accordance with the 'Guidance on the Classification and Assessment of Waste (1st Edition V1.1, May 2018) – Technical Guidance WM3'.

Where possible, removal of materials from site as a 'waste' should be kept to a minimum and ideally excavated materials should all be reused on site. However, if excavated materials have to be discarded to accommodate finished ground levels etc., it should be noted that additional analysis and screening could be required once each specific waste stream has been identified and the volume of material to be disposed of has been calculated, since the amount of screening required, including any pre-disposal WAC screening, will be dependent upon the final volume of material to be disposed of.

When considering the risks to the construction workforce, adequate PPE will be required to provide protection against the levels of contaminants recorded during these investigation works.

Similarly, the results can also be used by the Main Contractor / Project Coordinator, when devising an adequate Site Health & Safety Plan, in accordance with current CDM Regulations.

8.5 Conceptual Site Model (CSM):-

From the results of the intrusive investigation works, a Conceptual Site Model (CSM) has been developed for this site and Table 8.2 below summarises the various contamination sources, plausible migration pathways and potentially sensitive receptors identified for this site.

Table 8.2

* = Not included as part of Level 1 Human Health or Controlled Waters risk assessment

	<i>Sources (S)</i>		<i>Pathways (P)</i>		<i>Receptors (R)</i>
S1	Potential contamination within the made ground – Elevated levels of Lead.	P1	Ingestion & Dermal Contact.	R1	Human health - (End users and construction workforce).
		P2	Air-inhalation of vapours and direct contact with dust.	R2	Controlled Waters - Groundwater within the underlying strata, designated as a Secondary A Bedrock Aquifer. Superficial strata is recorded as Secondary A Undifferentiated.
		P3	Plant uptake and attached soils.		
S2	Possible hazardous gas from on and off-site sources – no elevated readings have been recorded to date.	P4	Migration through existing services.	R3	Adjacent sites.
		P5	Direct contact with building materials.		
		P6	Surface run-off and infiltration.	R4*	Building materials.
				R5*	Flora and fauna.

8.5.1 Sources:-

The site is covered by a layer of made ground (generally up to c.0.90m in thickness) which represents a source of ground contamination for this. The majority of the made ground contains some anthropogenic debris mixed with disturbed natural strata, and these materials have been assessed using a standard generic soil suite, with the site considered as a single averaging area for these analytes.

There was no significant visual, olfactory or analytical evidence of significant heavy or gross contamination, such as waste oils, fuels, etc. However, when considering the sensitive end use of the site (residential dwellings) and to aid with off-site disposal, the potential for hydrocarbon based contamination (PAH's & TPH's) for this site have also been assessed. In addition, although no visual evidence of Asbestos (fibres or fragments) were noted, Asbestos has also been screened for.

8.0 Ground Contamination Risk Assessment (Cont'd):-

8.5 Conceptual Site Model (CSM) (Cont'd):-

8.5.2 Pathways:-

When considering the proposed end use, and without considering treatment, removal or protection measures, there are some potential plausible pathways available for direct contact, dermal contact, ingestion, inhalation, wind (dust / particulate), volatilization, and vertical and lateral transportation below the site.

Within the CLEA Risk Assessment Model for Human Health, there are 3 exposure mediums considered for on-site receptors, comprising ingestion of soil containing contaminants, inhalation of contaminated dust/vapours and dermal contact, with up to 10 no. exposure pathways considered, as shown below.

1. *Ingestion of soil and indoor dust* 2. *Consumption of homegrown produce and attached soil* 3. *Dermal contact (indoor)* 4. *Dermal contact (outdoor)* 5. *Inhalation of dust (indoor)* 6. *Inhalation of dust (outdoor)* 7. *Inhalation of vapour (indoor)* 8. *Inhalation of vapour (outdoor)* 9. *Oral background intake* 10. *Inhalation background intake.*

Where the future site has hard cover and below new structures, the majority of these pathways will not be available.

When considering the potential pathways for leachate migration, where either hard cover and / or future surface water drainage systems are present, the potential effects of surface infiltration or contaminated surface water runoff will be greatly reduced.

Similarly, when considering the construction work force, exposure pathways through direct contact, ingestion and dust inhalation will be available during part of the construction process, and therefore adequate PPE should be provided to protect the work force during this period.

8.5.3 Receptors:-

Within the CLEA Risk Assessment Model for Human Health, the potential receptors are assessed initially on site end use, followed by a delineation of age category (i.e. child or adult), with default settings for *Residential*, *Allotment* and *Public Open Space (Park)* end uses based on a child aged 0 to 6 years, *Public Open Space (Residential)* based on a child aged 3 to 9 and *Commercial* end uses based upon a working exposure period of up to 49 years (i.e. 16 to 65).

Key generic assumptions for *Residential* and *Public Open Space (Residential)* are based upon a typical residential property, consisting of a two-storey small, terraced house, with private garden, and a *Commercial* end use based upon a typical commercial or light industrial property, consisting of a three-storey office building (pre-1970). No buildings are anticipated for *Allotment* or *Public Open Space (Park)* end uses.

Within the CLEA Risk Assessment Model for Human Health there are 6 no. generic end use categories presently in use, as follows:-

- 1) *Residential - with home grown produce,* 2) *Residential - without home grown produce,* 3) *Allotments,* 4) *Commercial*
5) *Public Open Space – Residential,* 6) *Public Open Space - Park*

The proposed development comprises residential dwellings with private gardens and the Level 1 Risk Assessment has taken the end use category as:

- 1) *Residential - with home grown produce*

For Controlled Waters the primary receptor for this Level 1 Risk Assessment is groundwater at depth within the solid geology (Secondary A Aquifer).

9.0 Conclusions & Recommendations:-

9.1 Ground Conditions:-

Made ground comprising gravelly sand with bricks was recorded to depths of between c.0.50m and c.0.90m bgl across the site.

There was no visual and / or olfactory evidence of significant ground contamination (i.e. fuel-derived contaminants, asbestos, etc.) present at any of the exploratory positions undertaken across the site.

The natural drift deposits were recorded directly beneath the made ground materials and comprised medium dense light brown fine sand with coal and local pockets of clay to depths in excess of c.5.45m.

Solid deposits of the Manchester Marls Formation were not encountered during these investigation works.

9.2 Groundwater & Stability:-

Based on the ingresses of water noted within the boreholes and the subsequent water monitoring results, it would be prudent to allow for the introduction of groundwater control measures, to take care of localised ingress of water which may occur during the construction period, especially during the wetter periods of the year.

9.3 Gas Protection Measures:-

From the results undertaken to date, no levels of Methane (CH_4) have been recorded during the monitoring period. However, detectable concentrations of Carbon Dioxide (CO_2) have been recorded, up to a maximum recorded level of 3.9% v/v, with associated depleted oxygen (O_2) concentrations (16.5% v/v). Negligible flow rates have been recorded during the monitoring period undertaken to date.

When considering these results, in accordance with CIRIA C665, and considering the, the GSV value for CO_2 is below the assessment GSV of 0.07 l/hr (Characteristic Situation 1 – CS1), resulting in no gas protection measures being required.

Alternatively, if the proposed development were to comprise suspended floor slabs within the structures, in accordance with NHBC Traffic light system (low rise housing with ventilated underfloor void), the GSV for CO_2 would also fall below the lower target concentration of 0.78l/hr and would equate to a Green site classification, resulting in no gas protective measures being required for the proposed development.

A further three monitoring visits have been scheduled for this site and the final results along with the final recommendations will be issued as an Addendum Letter Report.

9.4 Foundation Options:-

Based on the findings of the site investigation works, it is considered that conventional strip and pad foundations could be considered, taken down through the full thickness of made ground materials and based within the natural medium dense sand deposits at a minimum depth of c.0.90m below finished ground levels where a maximum allowable bearing pressure of 150kN/m² will be available.

From the results of the pH and soluble sulphate testing carried out, future foundations and buried concrete across the site should be constructed using a concrete design class of DS-1 and ACEC class of AC-1.

9.0 Conclusions & Recommendations (Cont'd):-

9.4 Foundation Options (Cont'd):-

For the construction of ground bearing floor slabs, road pavement and car park areas, based on the insitu CBR testing undertaken within the trial pits where the initial natural deposits are to be used as an undisturbed subgrade, a design CBR value of 3% can be adopted.

Furthermore, it is recommended that the sub-grade materials are 'proof rolled' to identify any potential 'loose spots' below this development area, and these can be dealt with by excavation, processing and re-compaction or by introducing an increased thickness of compacted sub-base and/or a geogrid reinforcement. In addition, it may also be prudent to allow for an engineer to attend site during the development works, to confirm the design CBR value of the materials to be utilised prior to construction (e.g. plate bearing tests or similar).

9.5 Ground Contamination: -

From the results of the contamination screening, elevated levels of Lead have been recorded within the made ground soils on the site.

No loose asbestos fibres or ACM's were recorded within the samples of made ground tested.

Therefore, the made ground materials are considered to pose a risk to Human Health where exposure pathways are available. As a result, it is recommended that either treatment, removal, protection measures and / or further detailed quantitative risk assessment is required, potential remedial measures available are discussed further in Section 9.6.

When considering the environmental setting, the potential risks to Controlled Waters from any possible ground contamination on this site have been assessed as very low to negligible and therefore no further assessment with regards to the Controlled Waters is considered necessary.

When considering the risks to any future maintenance or construction workforce, appropriate PPE should provide adequate protection against the levels of potential contaminants recorded during these investigation works. Similarly, the results can also be used by the Main Contractor / Project Coordinator, when devising an adequate Site Health & Safety Plan, in accordance with current CDM Regulations. For further guidance reference should be made to the Health and Safety Executive (HSE) document EH40 / 2005 Workplace exposure limits.

9.6 Preliminary Remediation Statement: -

From the results of the contamination screening, elevated concentrations of Lead have been recorded with the made ground materials on the site. Therefore, these made ground materials represent a potential risk to future end users, where exposure pathways are available.

Taking into account the nature of the proposed development it is felt that the most suitable remedial option available is the installation of a robust clean cover system within any areas of soft landscaping / private gardens. At this stage a minimum 600mm thick cover, with a suitable basal geotextile marker / separator, is recommended.

When taking into account finished design levels, if no made ground is remains below proposed gardens / soft landscaping (i.e. has been completely removed), then no formal cover system will be required just an adequate depth of clean topsoil to act as a growing medium.

9.0 Conclusions & Recommendations (Cont'd):-

9.6 Preliminary Remediation Statement (Cont'd): -

Where buildings and areas of permanent hardstanding are proposed then the source-pathway-receptor pollutant linkage will not exist and the made ground can remain in-situ with no requirement to incorporate clean cover materials.

In addition, it is recommended that a 'watching brief' is put in place by the Main Contractor to ensure that any unknown or unforeseen ground contamination that might be present on this site is dealt with appropriately. Where future remediation works are undertaken, as well as completion of the 'watching brief', confirmatory validation works should be undertaken, i.e. sampling, screening and photographic evidence, etc., and submitted to the Local Authority on completion.

Similarly, if remediation works are carried out, it is recommended that a Remediation Statement / Strategy is prepared and agreed with the LA and validated by a suitably qualified Engineer to ensure that all works are completed in strict accordance with the agreed Remediation Statement / Strategy.

During future development works any excavated materials that are to be discarded and removed from this site as a waste to landfill will need to be classified in accordance with the 'Guidance on the Classification and Assessment of Waste (1st Edition V1.1, May 2018) – Technical Guidance WM3'.

Where possible, removal of materials from site as a 'waste' should be kept to a minimum and ideally excavated materials should all be reused on site. However, if excavated materials have to be discarded to accommodate finished ground levels etc., it should be noted that additional analysis and screening could be required once each specific waste stream has been identified and the volume of material to be disposed of has been calculated, since the amount of screening required, including any pre-disposal WAC screening, will be dependent upon the final volume of material to be disposed of.

9.7 General Comments: -

Where we have sampled and tested for asbestos this is discussed in the report. Whilst we would target any asbestos sampling and testing in accordance with a Conceptual Site Model and site findings, there is always the possibility, along with other contamination, that undiscovered asbestos exists between sample locations and the possibility of unknown asbestos exists on all sites, particularly brownfield sites where previous buildings have been demolished, where there were previous features that were infilled (old hollows, pits etc) or where significant quantities of materials such as demolition and brick rubble exist.

It is not uncommon for historical asbestos wastes to be deliberately buried on derelict sites or imported old demolition rubble which could contain asbestos to be imported for use as hardstanding / hardcore. Unless otherwise stated we have not assessed any below ground features such as service ducts, culverts, partly demolished or dilapidated structures, spoil heaps, fly tipped materials, etc.

For future site works, adequate lateral trench support will be required for excavations, in order to prevent trench wall collapse or over excavations, as well as to create a safe working environment, and any excavations on this site should remain open for as short a period as possible, since some of these materials may be susceptible to deterioration, if left open to the natural elements for any significant period.

It is also recommended for any new developments, adequate surface drainage should be designed and installed by a competent contractor, in order to prevent surface water 'ponding' or collection, during and post construction, particularly where the existing surface drainage system is disrupted or damaged.

9.0 Conclusions & Recommendations (Cont'd):-

9.6 General Comments (Cont'd):-

In addition, for deeper excavations, drainage, service runs or the like that may pass close to or beneath any proposed new foundations, these should be undertaken with care and completed prior to the preparation of any new foundations, so as not to allow any loose or granular material to move or 'flow', thus causing settlement to occur to any new foundations based at a higher level.

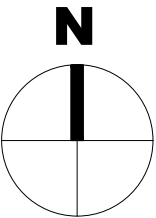
An "observational technique" can be applied to the design and construction of this site, and where ground conditions seem to vary from that indicated from the conceptual ground model derived from works to date, then advice from a suitably qualified Engineer should be sought.

END OF REPORT

APPENDIX I

Proposed Development Layout Plan

NOTES:



REV	DATE	NOTES	CHK
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PLANNING

Client

Mayfair & Co Development Ltd

Project

Bury Old Road

Drawing Title

Proposed Site Plan

Drawn	Checked	Paper Size	Scale	Date
FB	KE	A3	1:250	30.10.19
Project No.			Drawing No.	Revision
19567			0103	-

CORSTORPHINE
+WRIGHT
ARCHITECTS

London
Warwick
Birmingham
Manchester
Leeds
Newcastle
Glasgow
Canterbury
Dublin

APPENDIX II

Borehole & Trial Pit Location Plan and Borehole & Trial Pit Record Sheets



REV	DATE	NOTES	CHK
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PLANNING

Client

Mayfair & Co Development Ltd

Project

Bury Old Road

Drawing Title

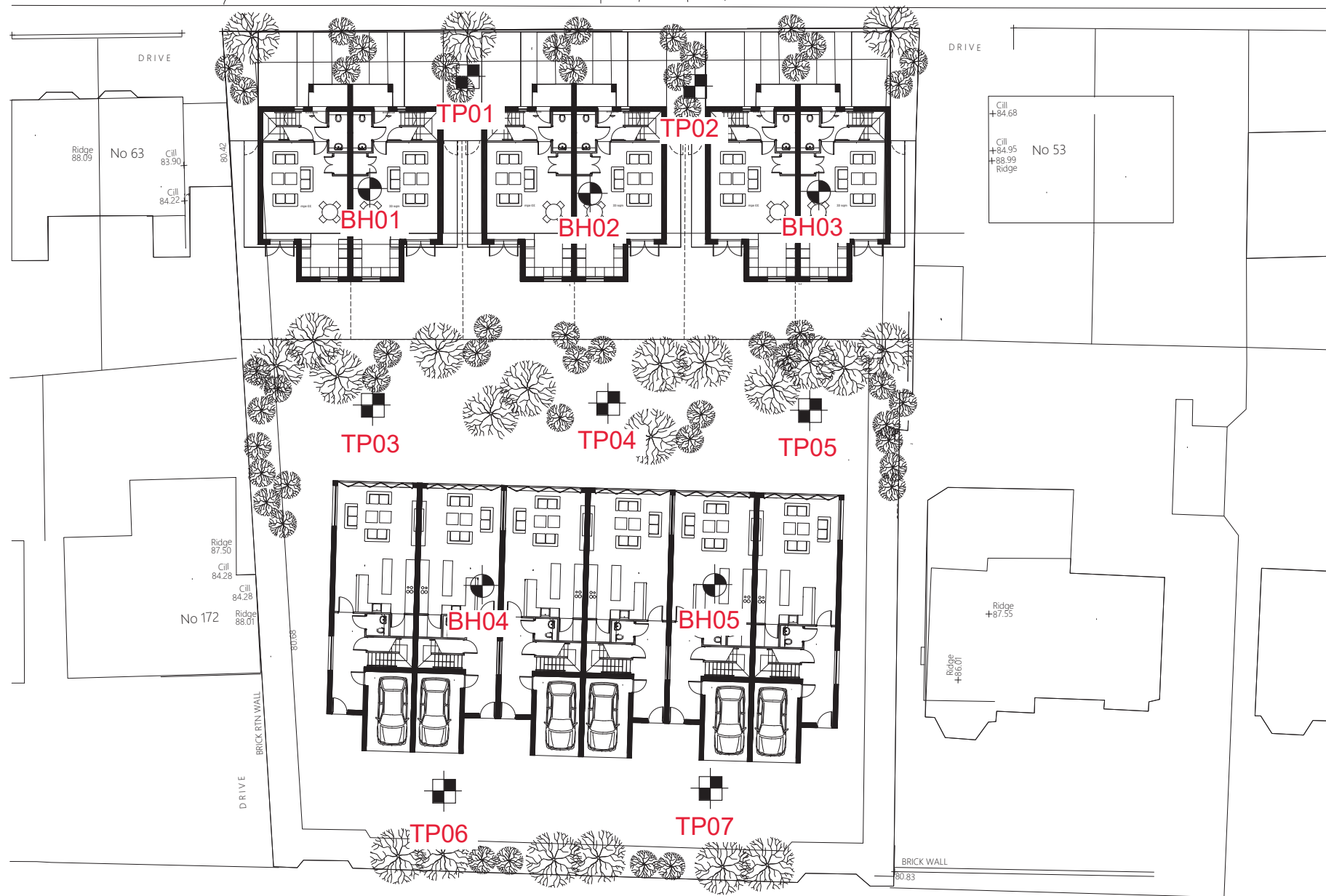
Proposed Site Plan

Drawn	Checked	Paper Size	Scale	Date
FB	KE	A3	1:250	30.10.19
Project No.		Drawing No.		Revision
19567		0103		-

CORSTORPHINE + WRIGHT
ARCHITECTS

London
Warwick
Birmingham
Manchester
Leeds
Newcastle
Glasgow
Canterbury
Dublin

vehicular access from Catherine Street



vehicular entrance for Bury Old Road



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BOREHOLE LOG

Project Proposed Residential Development, 170 Bury Old Road, Manchester				BOREHOLE No BH01	
Job No 20-109	Date 15-06-22 15-06-22	Ground Level (m)	Co-Ordinates ()		
Contractor Arc Environmental Ltd				Sheet 1 of 1	

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION		
0.20-0.40	J/D					0.10 (0.60) 0.70	Grey gravelly fill (MADE GROUND) Medium brown gravelly sand fill with bricks (MADE GROUND)		
0.70-0.90	B					(0.30) 1.00	Medium dense medium brown fine SAND with coal and sandstone.		
1.00-1.45	SPT	N=22				(1.20)	Medium dense light brown fine SAND.		
1.40-1.60	B								
2.00-2.45	SPT	N=24				2.20	Medium brown SAND with coal.		
2.40-2.60	B					(0.50) 2.70			
2.70-2.90	B					(0.60)	Medium dense medium to dark brown saturated silty SAND with coal, encountered water at 3.30m.		
3.00-3.45	SPT	N=13				3.30			
3.60-3.80	B					(0.70) 4.00	Medium dense medium brown fine gravelly SAND with coal and sandstone		
4.00-4.45	SPT	N=33				(1.45)	Medium dense dark brown saturated slightly silty SAND.		
4.40-4.60	B								
5.00-5.45	SPT	N=31				5.45			
							Borehole terminated at 5.45		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
											WATER: Encountered water at 3.30m
All dimensions in metres Scale 1:37.5			Client Adept Engineering Consultants			Method/ Plant Used Windowless Sampling			Logged By ST		

AGS3 UK BH TP AND BH LOGS.GPJ AGS3 ALL GDT 20/6/22



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BOREHOLE LOG

Project Proposed Residential Development, 170 Bury Old Road, Manchester				BOREHOLE No BH02	
Job No 20-109	Date 15-06-22 15-06-22	Ground Level (m)	Co-Ordinates ()		
Contractor Arc Environmental Ltd				Sheet 1 of 1	

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION		
0.10-0.30	J/D					0.10	Grey gravelly fill (MADE GROUND)		
						(0.70)	Medium brown gravelly sand fill with bricks (MADE GROUND)		
0.80-1.00	B					0.80	Medium dense medium brown fine SAND.		
1.00-1.45	SPT	N=20				(0.40)			
						1.20			
1.50-1.70	B					(0.80)	Soft to firm medium brown very sandy silty CLAY with coal, encountered water at 2.0m.		
1.50	V	52kN/m ²				2.00			
2.00-2.20	B					2.20	Medium brown fine-coarse slightly ironstained occasional gravel saturated SAND with coal.		
2.00	V	48kN/m ²				(0.40)	Medium dense Medium to dark brown/black heavily ironstained SAND with coal.		
2.40-2.60	B					2.60			
							Medium dense light brown fine SAND, encountered water at 3.30m.		
2.80-3.00	B					(0.70)			
3.00-3.45	SPT	N=32				3.30			
3.30-3.50	B						Medium dense dark brown saturated slightly silty SAND.		
4.00-4.45	SPT	N=20				(2.15)			
4.40-4.60	B								
5.00-5.45	SPT	N=26				5.45			
							Borehole terminated at 5.45		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
											WATER: Encountered water at 2.0m and 3.30m
All dimensions in metres Scale 1:37.5			Client Adept Engineering Consultants			Method/ Plant Used Windowless Sampling			Logged By ST		

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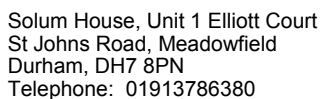
BOREHOLE LOG

Project Proposed Residential Development, 170 Bury Old Road, Manchester				BOREHOLE No BH03	
Job No 20-109	Date 15-06-22 15-06-22	Ground Level (m)	Co-Ordinates ()		
Contractor Arc Environmental Ltd				Sheet 1 of 1	

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION		
0.00-0.20	J/D					0.20	Grass overlying a dark brown topsoil fill.(MADE GROUND)		
0.40-0.60	J/D					(0.40) 0.60	Dark brown slightly clayey gravelly sand fill with bricks and ash. (MADE GROUND)		
0.80-1.00	B						Firm Medium brown sandy gravelly CLAY with excessive sand lenses.		
1.00-1.45	SPT	N=20				(1.40)			
1.20-1.40	B								
1.80-2.00	B					2.00			
2.00	V	60kN/m ²				(0.60) 2.60	Soft Medium brown very sandy silty CLAY with coal.		
2.40-2.60	B								
2.60-2.80	B						Medium brown fine to coarse slightly ironstained occasional gravel SAND with coal.		
3.00-3.45	SPT	N=21				(0.90) 3.50			
3.30-3.50	B								
3.80-4.00	B						Medium dense Medium to dark brown saturated fine SAND with coal, encountered water at 3.60m		
4.00-4.45	SPT	N=20				(1.95)			
4.40-4.60	B								
5.00-5.45	SPT	N=22				5.45			
							Borehole terminated at 5.45		

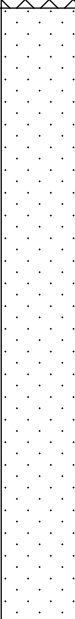
Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
											WATER: Encountered water at 3.60m
All dimensions in metres Scale 1:37.5			Client Adept Engineering Consultants			Method/ Plant Used Windowless Sampling			Logged By ST		

AGS3 UK BH TP AND BH LOGS.GPJ AGS3 ALL GDT 20/6/22



BOREHOLE LOG

Project Proposed Residential Development, 170 Bury Old Road, Manchester				BOREHOLE No BH04
Job No 20-109	Date 15-06-22 15-06-22	Ground Level (m)	Co-Ordinates ()	
Contractor Arc Environmental Ltd				Sheet 1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Back fill	
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick- ness)	DESCRIPTION			
0.12-0.30	J/D	N=26				0.10 (0.40) 0.50	Grey gravel fill. (MADE GROUND) Medium brown gravelly sand with bricks(.MADE GROUND)			
0.80-1.00	B			N=22			(3.10)			Medium dense medium brown fine occasionally ironstained SAND with coal and sandstone, encountered water at 3.60m.
1.00-1.45	SPT									
1.40-1.60	B									
2.00-2.45	SPT	N=28				3.60				
2.60-2.80	B									
3.00-3.45	SPT									
3.20-3.40	B	N=19				(1.85)	Medium dense medium to dark brown saturated silty SAND.			
3.80-4.00	B									
4.00-4.45	SPT									
4.60-4.80	B	N=20				5.45				
5.00-5.45	SPT									
							Borehole terminated at 5.45			

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Dia. mm	Water Dpt	From	To	Hours	From	To	
											WATER: Encountered water at 3.60m

All dimensions in metres
Scale 1:37.5

Client	Adept Engineering Consultants
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Method/ Plant Used	Windowless Sampling
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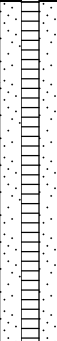
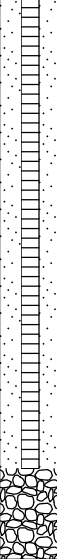
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BOREHOLE LOG

Project Proposed Residential Development, 170 Bury Old Road, Manchester				BOREHOLE No BH05	
Job No 20-109	Date 15-06-22 15-06-22	Ground Level (m)	Co-Ordinates ()		
Contractor Arc Environmental Ltd				Sheet 1 of 1	

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION		
0.10-0.30	J/D	N=22				0.10 (0.40) 0.50	Grey gravel fill. (MADE GROUND) Medium brown gravelly sand with bricks.(MADE GROUND)		
0.70-0.90	B					(0.50) 1.00	Medium dense medium brown fine to coarse gravelly SAND.		
1.00-1.45	SPT					(0.40) 1.40	Firm medium brown sandy gravelly CLAY.		
1.20-1.40	B					(0.40) 1.80	Medium dense medium brown fine ironstained SAND.		
1.40-1.60	B	N=29				(0.90) 2.70	Medium dense light brown fine SAND.		
1.80-2.00	B					(0.70) 3.40	Medium dense medium brown fine saturated SAND with coal, encountered water at 3.40m		
2.00-2.45	SPT					(2.05) 5.45	Medium dense Medium to dark brown saturated silty SAND with excessive coal.		
2.20-2.40	B						Borehole terminated at 5.45		
3.00-3.20	B	N=36							
3.00-3.45	SPT								
3.60-3.80	B								
4.00-4.45	SPT								
4.40-4.60	B	N=20							
5.00-5.45	SPT								
									
									

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
											WATER: Encountered water at 3.40m
All dimensions in metres Scale 1:37.5			Client Adept Engineering Consultants			Method/ Plant Used			Logged By ST		

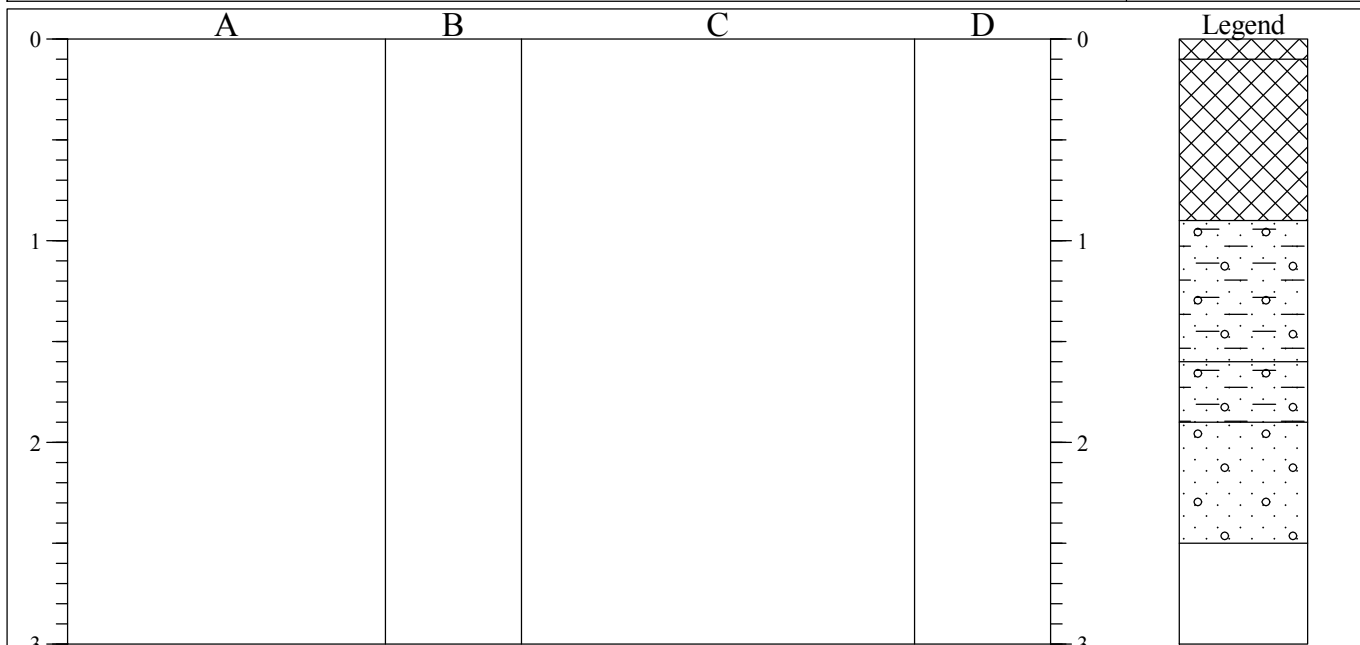
AGS3 UK BH TP AND BH LOGS.GPJ AGS3 ALL GDT 20/6/22



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Telephone: 01913786380

TRIAL PIT LOG

Project Proposed Residential Development, 170 Bury Old Road, Manchester				TRIAL PIT No TP01
Job No 20-109	Date 15-06-22 15-06-22	Ground Level (m)	Co-Ordinates ()	
Contractor Arc Environmental Ltd				Sheet 1 of 1



STRATA				SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests	
0.00-0.10		Soft dark brown sandy clay with rootlets (MADE GROUND)	0.00-0.10	J/D		
0.10-0.90		Drak brown Sand bricks gravel fragments of dark brown slate (MADE GROUND)	0.10-0.50	J/D		
0.90-1.60		Light brown to light yellow silty gravelly clayey SAND. Gravel is fine to medium.	1.00	CBR	5.5	
1.60-1.90		Light brown to light yellow gravelly clayey SAND with pockets of clay Gravel is fine to medium.	1.40-1.60	B	3.5	
1.90-2.50		Dark brown silty gravelly SAND with fragments of coal	1.60	CBR		
2.50		End of Trial pit at 2.50m	1.90-2.10	B		

Shoring/Support: Stability: 				GENERAL REMARKS	
				WATER: Trialpit dry and stable.	

All dimensions in metres Scale 1:37.5	Client Adept Engineering Consultants	Method/ Plant Used Excavator	Logged By ST
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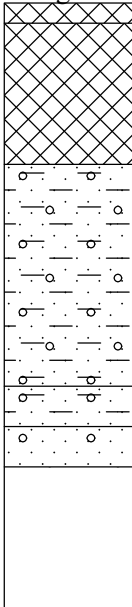
AGS3 UK TP TP AND BH LOGS GPJ AGS3 ALL GDT 28/6/22



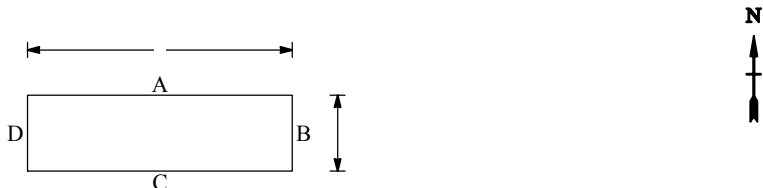
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Telephone: 01913786380

TRIAL PIT LOG

Project Proposed Residential Development, 170 Bury Old Road, Manchester				TRIAL PIT No TP02
Job No 20-109	Date 15-06-22 15-06-22	Ground Level (m)	Co-Ordinates ()	
Contractor Arc Environmental Ltd				Sheet 1 of 1

0	A	B	C	D	0	Legend 
1					1	
2					2	
3					3	

STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.10		Soft dark brown sandy clay with rootlets (MADE GROUND)	0.00-0.10	J/D	
0.10-0.80		Dark brown gravelly sand. Gravel is fine to medium with fragments of bricks. (MADE GROUND)	0.50-0.70	J/D	
0.80-1.90		Light brown to light yellow gravelly clayey SAND. Gravel is fine to medium.	1.00	CBR	4.5
			1.20-1.30	B	
			1.50-1.60	B	
1.90-2.10		Light brown to light yellow gravelly clayey SAND. Gravel is fine to medium with pockets of clay.	2.00-2.10	B	
2.10-2.30		Dark brown silty gravelly SAND. Gravel is fine to medium.			
2.30		End of Trial pit at 2.30m			

Shoring/Support: Stability:		GENERAL REMARKS
		WATER: Trialpit dry and stable.

All dimensions in metres Scale 1:37.5	Client Adept Engineering Consultants	Method/ Plant Used Excavator	Logged By ST
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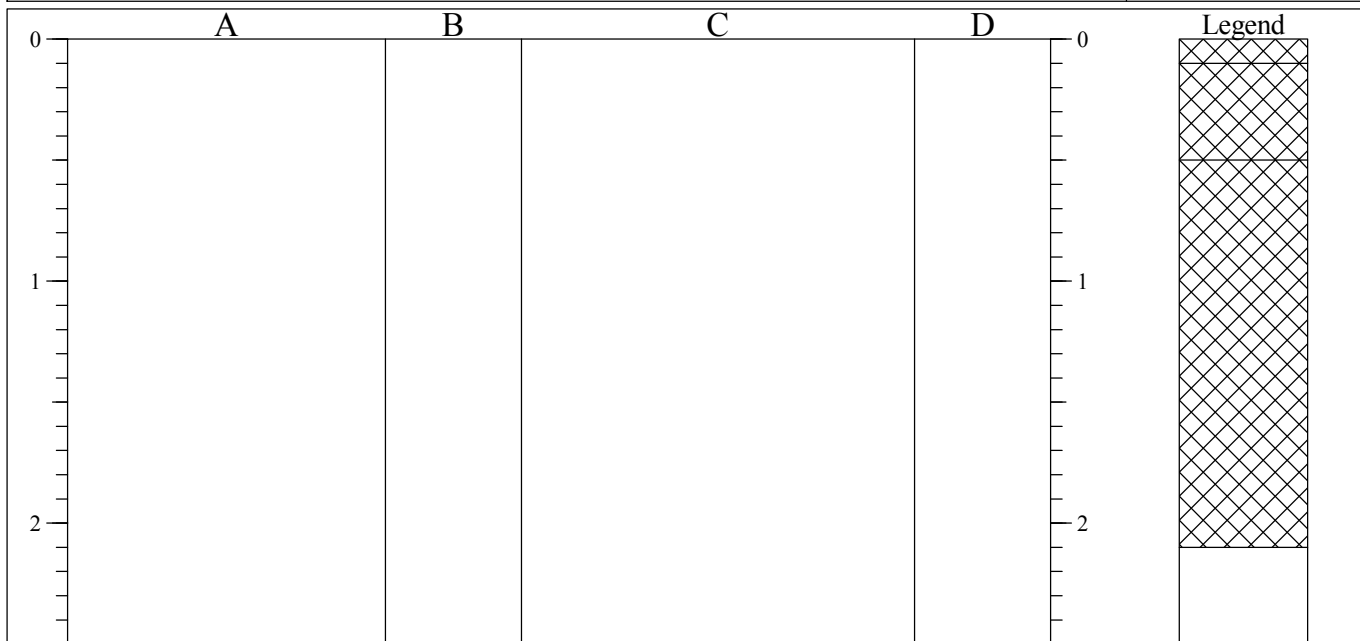
AGS3 UK TP TP AND BH LOGS.GPJ AGS3 ALL GDT 28/6/22



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TRIAL PIT LOG

Project Proposed Residential Development, 170 Bury Old Road, Manchester				TRIAL PIT No TP03
Job No 20-109	Date 15-06-22 15-06-22	Ground Level (m)	Co-Ordinates ()	
Contractor Arc Environmental Ltd				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.10		Soft dark brown sandy clay with rootlets (MADE GROUND)	0.00-0.10	J/D	
0.10-0.50		Dark brown gravelly Sand. Gravel is fine to medium with fragments of bricks.(MADE GROUND)			
0.50-2.10		Firm Light brown reworked clay with bricks a redundant drain pipe is observed at 2.10m and the trial pit is terminated. (MADE GROUND)			
			0.90-1.00	B	
			1.00	CBR	4.5
			1.50-1.70	B	
			1.50	CBR	5.5
2.10		End of Trial pit at 2.10m			

Shoring/Support: Stability:			GENERAL REMARKS	
			WATER: Trialpit dry and stable.	

All dimensions in metres Scale 1:31.25	Client Adept Engineering Consultants	Method/ Plant Used Excavator	Logged By ST
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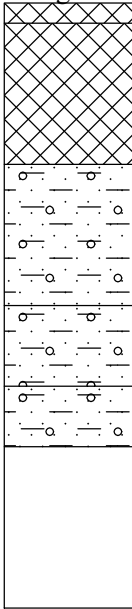
AGS3 UK TP TP AND BH LOGS.GPJ AGS3 ALL GDT 28/6/22



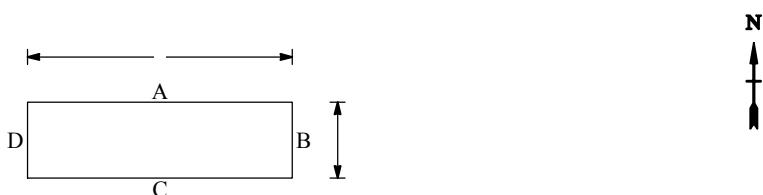
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Durham, DH7 8PN
Telephone: 01913786380

TRIAL PIT LOG

Project Proposed Residential Development, 170 Bury Old Road, Manchester				TRIAL PIT No TP04
Job No 20-109	Date 15-06-22 15-06-22	Ground Level (m)	Co-Ordinates ()	
Contractor Arc Environmental Ltd				Sheet 1 of 1

0	A	B	C	D	0	Legend 
1					1	
2					2	
3					3	

STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.10		Soft dark brown sandy clay with rootlets (MADE GROUND)	0.00-0.10	J/D	
0.10-0.80		Dark brown gravelly Sand. Gravel is fine to medium with fragments of bricks.(MADE GROUND)			
0.80-1.50		Light yellow to light brown slightly gravelly clayey SAND. Gravel is fine to medium.	0.60-0.70	J/D	
1.50-1.90		Light yellow to light brown slightly gravelly clayey SAND. Gravel is fine to medium with pockets of clay.	1.00	CBR	4.5
1.90-2.20		Dark brown silty gravelly clayey SAND. Gravel is fine to medium.	1.20-1.30	B	
2.20		End of Trial pit at 2.20m	2.00-2.10	B	

Shoring/Support: Stability:			GENERAL REMARKS
			WATER: Trialpit dry and stable.

All dimensions in metres Scale 1:37.5	Client Adept Engineering Consultants	Method/ Plant Used Excavator	Logged By ST
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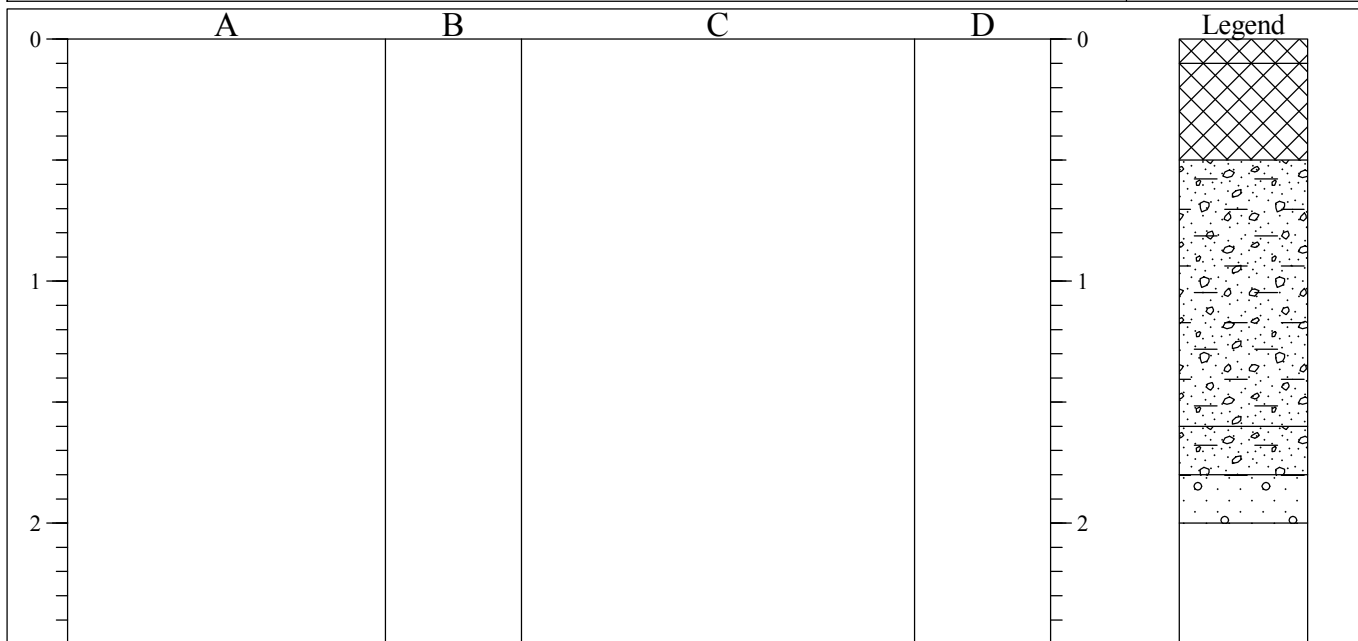
AGS3 UK TP TP AND BH LOGS.GPJ AGS3_ALL.GDT 28/6/22



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TRIAL PIT LOG

Project Proposed Residential Development, 170 Bury Old Road, Manchester				TRIAL PIT No TP05
Job No 20-109	Date 15-06-22 15-06-22	Ground Level (m)	Co-Ordinates ()	
Contractor Arc Environmental Ltd				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.10		Soft dark brown sandy clay with rootlets (MADE GROUND)	0.00-0.10	J/D	
0.10-0.50		Dark brown gravelly Sand. Gravel is fine to medium with fragments of bricks.(MADE GROUND)			
0.50-1.60		Light brown to light yellow clayey gravelly SAND. Gravel is fine to medium.			
			0.90-1.00	B	
			1.00	CBR	5
1.60-1.80		Light brown to light yellow clayey gravelly SAND. Gravel is fine to medium with pockets of clay.			
1.80-2.00		Dark brown silty gravelly SAND. Gravel is fine to medium.	1.90-2.00	B	
2.00		End of Trial pit at 2.0m			

Shoring/Support: Stability:		</
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All dimensions in metres Scale 1:31.25	Client Adept Engineering Consultants	Method/ Plant Used Excavator	Logged By ST
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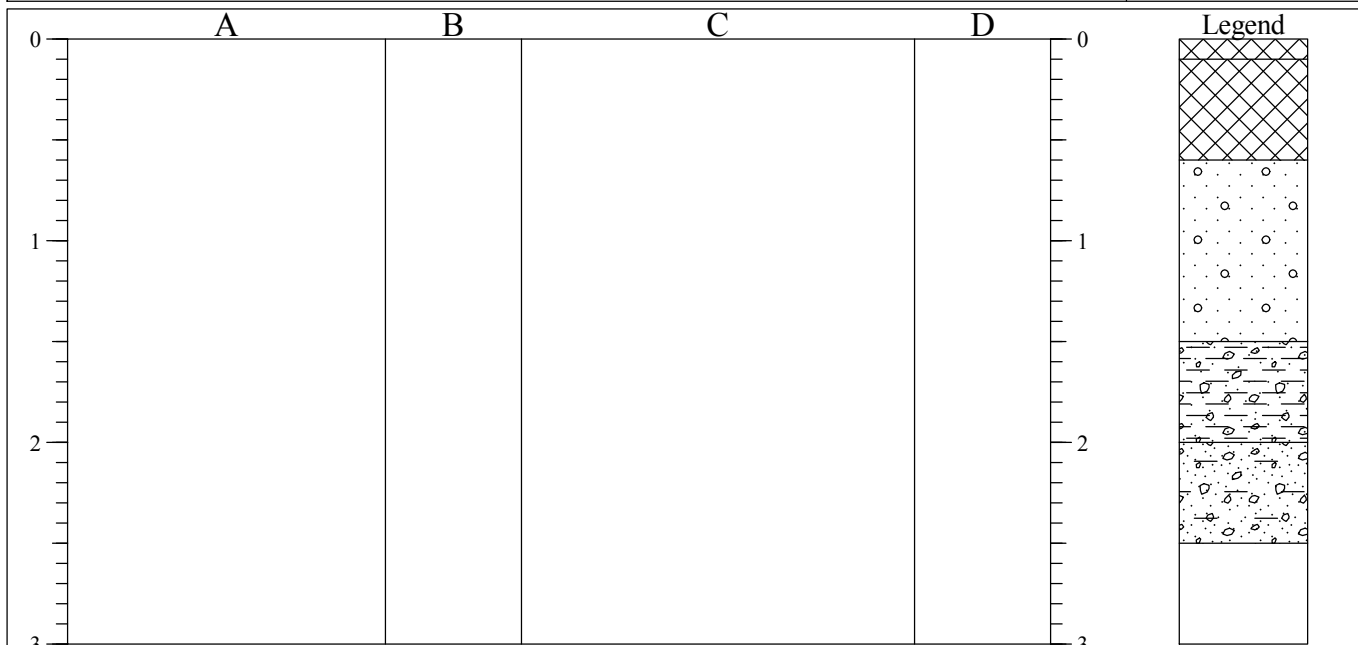
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TRIAL PIT LOG

Project Proposed Residential Development, 170 Bury Old Road, Manchester				TRIAL PIT No TP06
Job No 20-109	Date 15-06-22 15-06-22	Ground Level (m)	Co-Ordinates ()	
Contractor Arc Environmental Ltd				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.10		Soft dark brown sandy clay with rootlets (MADE GROUND)	0.00-0.10	J/D	4
0.10-0.60		Soft to firm light brown to dark brown sandy clay with bricks and tiles (MADE GROUND)	0.10-0.60	J/D	
0.60-1.50		Light brown to light yellow clayey gravelly SAND. Gravel is fine to medium.	1.00-1.10	B	
			1.00	CBR	
1.50-2.00		Stiff light brown to light yellow sandy gravelly CLAY. Gravel is fine to medium.	1.70-2.00	B	
2.00-2.50		Light brown to light yellow clayey gravelly SAND with fragments of coal. Gravel is fine to medium.			
			2.40-2.50	B	
2.50		End of Trial pit at 2.50m			

Shoring/Support: Stability:				GENERAL REMARKS	
				WATER: Trialpit dry and stable.	

All dimensions in metres Scale 1:37.5	Client Adept Engineering Consultants	Method/ Plant Used Excavator	Logged By ST
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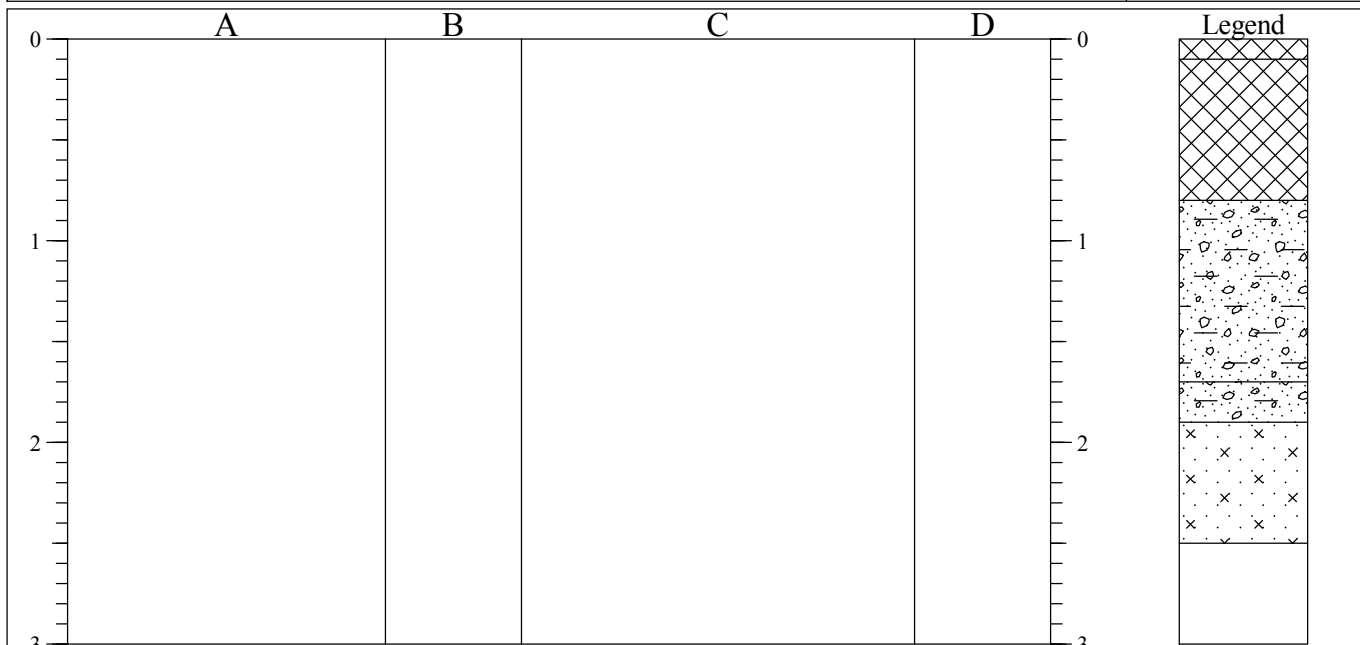
AGS3 UK TP TP AND BH LOGS GPJ AGS3 ALL GDT 28/6/22



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Telephone: 01913786380

TRIAL PIT LOG

Project Proposed Residential Development, 170 Bury Old Road, Manchester				TRIAL PIT No TP07
Job No 20-109	Date 15-06-22 15-06-22	Ground Level (m)	Co-Ordinates ()	
Contractor Arc Environmental Ltd				Sheet 1 of 1



STRATA				SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests	
0.00-0.10		Soft dark brown sandy clay with rootlets (MADE GROUND)	0.00-0.10	J/D		
0.10-0.80		Dark brown gravelly Sand. Gravel is fine to medium with fragments of bricks and wood. (MADE GROUND)	0.10-0.50	J/D		
0.80-1.70		Light brown to light yellow clayey gravelly SAND. Gravel is fine to medium grained.	1.00	CBR	4.5	
			1.10-1.20	B		
1.70-1.90		Light brown to light yellow clayey gravelly SAND. Gravel is fine to medium grained with pockets of clay.	1.80-1.90	B		
1.90-2.50		Light brown to light yellow silty SAND.				
2.50		End of Trial pit at 2.50m	2.40-2.50	B		

Shoring/Support: Stability: 				GENERAL REMARKS	
				WATER: Trialpit dry and stable.	

All dimensions in metres Scale 1:37.5	Client Adept Engineering Consultants	Method/ Plant Used Excavator	Logged By ST
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AGS3 UK TP TP AND BH LOGS.GPJ AGS3_ALL.GDT 28/6/22

APPENDIX III

Gas & Water Monitoring Certificate

Arc Environmental Ground Gas & Groundwater Monitoring Certificate



Site:	BURY OLD ROAD
Ref:	20-109

Visit	Date	Time	Equipment	Weather	Initials	Comments	Borehole	Gas Flow (l/hr)	Atmospheric Pressure (mb)	Trend	Methane (% v/v)		Methane (% LEL)		Carbon Dioxide (% v/v)		Oxygen (% v/v)		Hydrocarbons (GFM 435 only)		Other Gases (PPM)			Depth to Water (m bgl)
										R/F/S	Initial	Steady	Initial	Steady	Initial	Steady	Initial	Steady	Hex %	PID Cf	PID (Isobutylene)	H ₂ S	CO	
1	23/06/2022	12:44	GFM430	SUNNY	TMCL		1	<0.1	1000			0.0		0.0		3.9		16.5				0.0	0.0	4.02
							3	<0.1	1000			0.0		0.0		2.6		17.6				0.0	0.0	Dry
							5	<0.1	1000			0.0		0.0		3.8		18.1				0.0	0.0	Dry
2	07/07/2022	14:00	GFM430	SUNNY	TMCL		1	<0.1	1022			0.0		0.0		0.0		20.0				0.0	0.0	4.09
							3	<0.1	1022			0.0		0.0		0.1		19.9				0.0	0.0	Dry
							5	<0.1	1022			0.0		0.0		0.3		19.8				0.0	0.0	Dry
3	25/07/2022	12:44	GFM430	SUNNY	TMCL		1	<0.1	996			0.0		0.0		0.4		19.1				0.0	0.0	4.09
							3	<0.1	996			0.0		0.0		0.7		19.2				0.0	0.0	Dry
							5	<0.1	996			0.0		0.0		0.6		19.3				0.0	0.0	Dry
4																								
5																								
6																								

Notes:
Detection limits - Methane = 0.0%, Carbon Dioxide = 0.0%, LEL = 0.0%, Oxygen = 0.0%, Flow = 0.1l/hr
Monitoring order is from **Left to Right** across table
Monitoring should be for **Not Less** than 3 minutes. However, if high concentrations of gasses initially recorded, monitoring should be for up to 10 minutes
N/A = Not applicable = Off the scale

Cf = PID compensation Factor (1-10) - Must be used to multiply the PID reading to give an accurate measure of the total hydrocarbons in the borehole when methane is present
Hex = Hexane (Valid and in range up to 2.000%) - Recorded when abnormally high methane is present.
PID = Photo Ionisation Detector (Calibrated to Isobutylene)

APPENDIX IV

Laboratory Results (Geotechnical & Ground Contamination)

F.A.O.

Final Test Report - 2281099 / 1

Site: 170 Bury Old Road, Manchester

Job Number: 2281099

Originating Client: Arc-Environmental

Originating Reference: 20-109

Date Sampled: Not Given

Date Scheduled: 22/06/2022

Date Testing Started: 23/06/2022

Date Testing Finished: 28/06/2022

Previous Reports		Amendments	Date Issued

Amendments:

Authorised By:



Tim Robinson
Quality Supervisor

Report Issue Date: 29/06/2022



Site: 170 Bury Old Road, Manchester

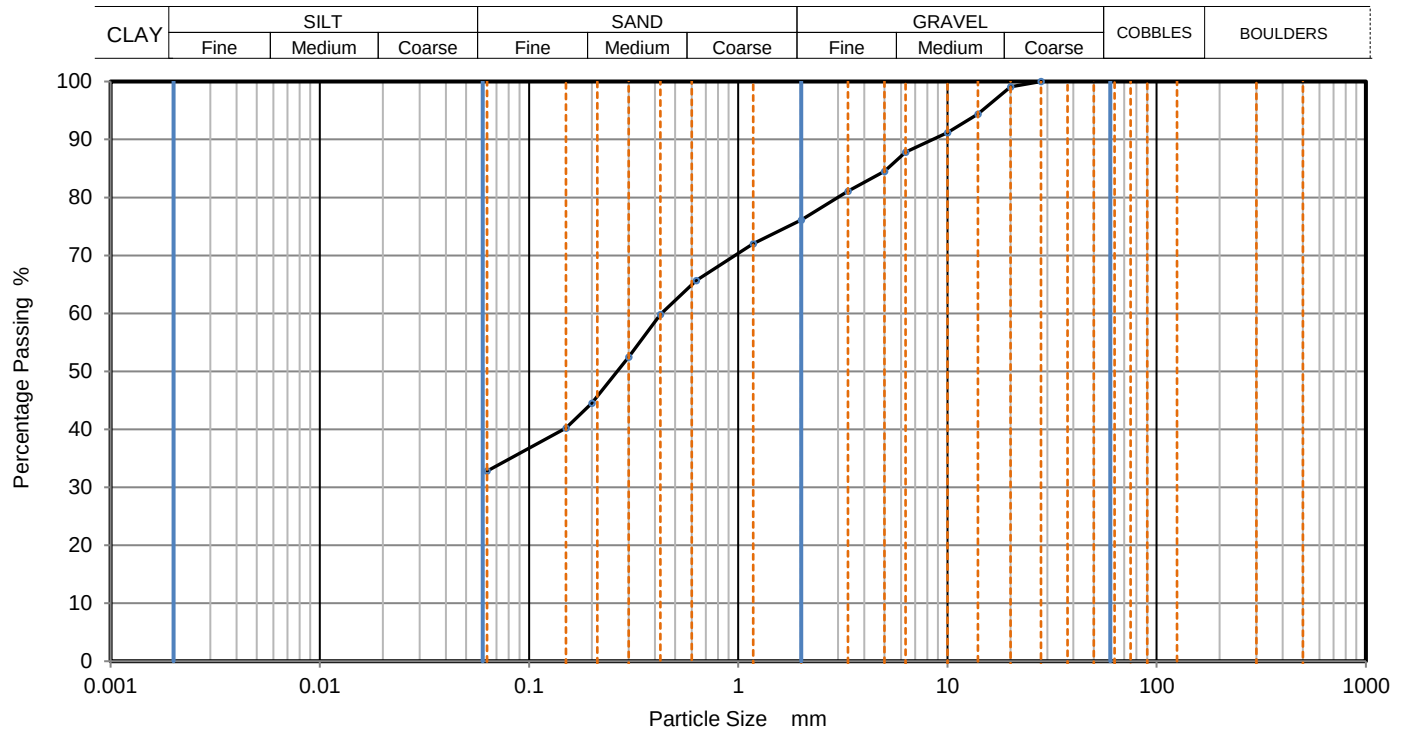
Job Number: 2281099

Client: Arc-Environmental

Page: 2

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Testing Type	Description
BH01	0.70	B	Wet Sieve	Brown slightly silty, gravelly SAND/CLAY



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
28	100		
20	99		
14	94		
10	91		
6.3	88		
5	85		
3.35	81		
2	76		
1.18	72		
0.63	66		
0.425	60		
0.3	53		
0.2	45		
0.15	40		
0.063	33		

Dry Mass of sample, g

1267

Sample Proportions	% dry mass
Very coarse	0
Gravel	24
Sand	43
Fines <0.063mm	33

Grading Analysis		
D100	mm	28
D60	mm	0.431
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS17892 unless noted below

Method of Preparation: BS EN 17892:Part4:2016, clause 5.2.2 Preparation of samples for wet sieving test

Method of Test: BS EN 17892:Part4:2016, clause 5.2.3 Determination of particle size distribution by wet sieving method

Result reported relates only to the sample tested.





Site: 170 Bury Old Road, Manchester

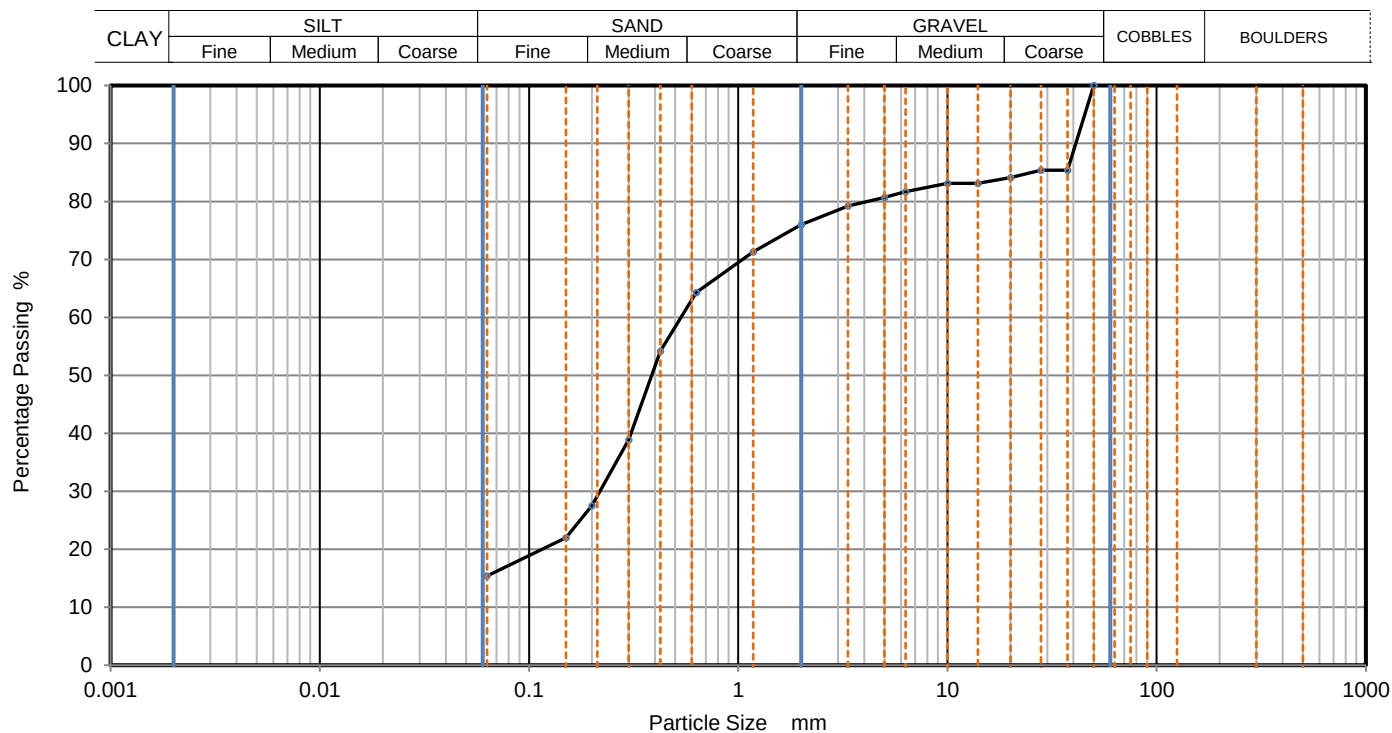
Job Number: 2281099

Client: Arc-Environmental

Page: 3

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Testing Type	Description
BH03	0.80	B	Wet Sieve	Brown slightly silty, slightly clayey, gravelly SAND



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
50	100		
37.5	85		
28	85		
20	84		
14	83		
10	83		
6.3	82		
5	81		
3.35	79		
2	76		
1.18	71		
0.63	64		
0.425	54		
0.3	39		
0.2	28		
0.15	22		
0.063	15		

Dry Mass of sample, g

1049

Sample Proportions	% dry mass
Very coarse	0
Gravel	24
Sand	61
Fines <0.063mm	15

Grading Analysis		
D100	mm	50
D60	mm	0.533
D30	mm	0.219
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS17892 unless noted below

Method of Preparation: BS EN 17892:Part4:2016, clause 5.2.2 Preparation of samples for wet sieving test

Method of Test: BS EN 17892:Part4:2016, clause 5.2.3 Determination of particle size distribution by wet sieving method

Result reported relates only to the sample tested.



Site: 170 Bury Old Road, Manchester

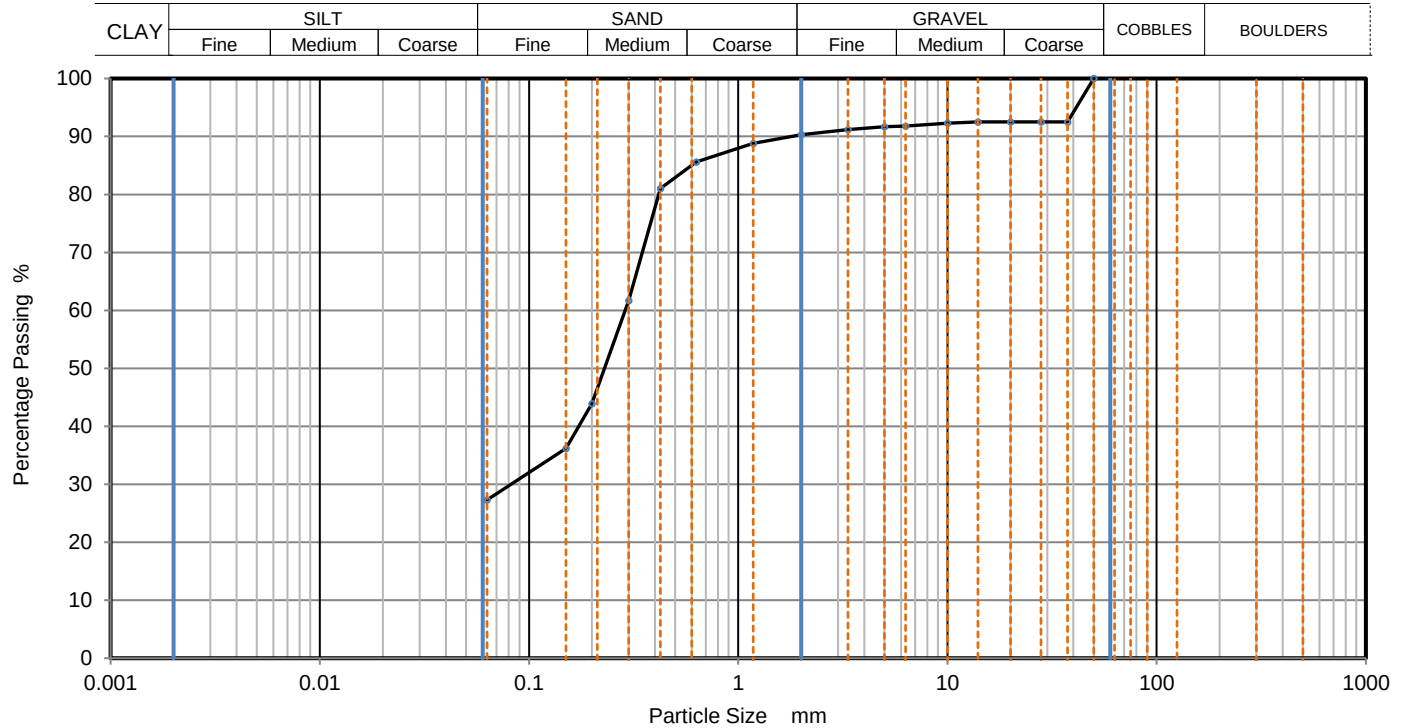
Job Number: 2281099

Client: Arc-Environmental

Page: 4

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Testing Type	Description
BH05	1.40	B	Wet Sieve	Brown slightly gravelly, slightly silty, clayey SAND



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
50	100		
37.5	93		
28	93		
20	93		
14	93		
10	92		
6.3	92		
5	92		
3.35	91		
2	90		
1.18	89		
0.63	86		
0.425	81		
0.3	62		
0.2	44		
0.15	36		
0.063	27		

Dry Mass of sample, g

1320

Sample Proportions	% dry mass
Very coarse	0
Gravel	10
Sand	63
Fines <0.063mm	27

Grading Analysis		
D100	mm	50
D60	mm	0.289
D30	mm	0.0822
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS17892 unless noted below

Method of Preparation: BS EN 17892:Part4:2016, clause 5.2.2 Preparation of samples for wet sieving test

Method of Test: BS EN 17892:Part4:2016, clause 5.2.3 Determination of particle size distribution by wet sieving method

Result reported relates only to the sample tested.



Final Test Report - 2281099 / 1

Site: 170 Bury Old Road, Manchester

Job Number: 2281099

Originating Client: Arc-Environmental

All opinions and interpretations contained within this report are outside of our Scope of Accreditation.

This test report shall not be reproduced, except in full and only with the written permission of Ian Farmer Associates Ltd.

Samples will be retained for 28 days from date of issue of the final test report before being disposed of, unless we receive written instruction to the contrary.

Report Issue Date: 29/06/2022



2183

Final Report

Report No.: 22-23427-1
Initial Date of Issue: 29-Jun-2022
Client Arc Environmental Ltd
Client Address: Solum House
Unit 1 Elliott Court
St Johns Road
Meadowfield
Durham
DH7 8PN
Contact(s): Matthew Bradford
Project 20-109 170 Bury Old Road, Manchester

Quotation No.:		Date Received:	23-Jun-2022
Order No.:		Date Instructed:	23-Jun-2022
No. of Samples:	11		
Turnaround (Wkdays):	5	Results Due:	29-Jun-2022
Date Approved:	29-Jun-2022		

Approved By:



Details: Stuart Henderson, Technical
Manager

Results - Soil

Project: 20-109 170 Bury Old Road, Manchester

Client: Arc Environmental Ltd	Chemtest Job No.:				22-23427	22-23427	22-23427	22-23427	22-23427	22-23427	22-23427	22-23427
Quotation No.:	Chemtest Sample ID.:				1453747	1453748	1453749	1453750	1453751	1453752	1453753	1453754
	Client Sample ID.:				TP01	TP02	TP04	TP05	TP06	TP07	BH01	BH02
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.10	0.50	0.60	0.00	0.10	0.00	1.40	0.80
	Bottom Depth (m):				0.50	0.70	0.70	0.10	0.60	0.10	1.60	1.00
	Date Sampled:				15-Jun-2022	15-Jun-2022	15-Jun-2022	15-Jun-2022	15-Jun-2022	15-Jun-2022	15-Jun-2022	15-Jun-2022
	Asbestos Lab:				DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM		
Determinand	Accred.	SOP	Units	LOD								
Moisture	N	2030	%	0.020	16	13	17	19	18	12	5.5	8.6
Arsenic	U	2455	mg/kg	0.5	4.8	2.7	7.2	6.0	3.6	1.4		
Cadmium	U	2455	mg/kg	0.10	0.21	< 0.10	0.10	0.20	0.13	0.17		
Chromium	U	2455	mg/kg	0.5	5.7	4.1	5.7	7.0	4.9	4.3		
Chromium (Trivalent)	N	2490	mg/kg	1.0	5.7	4.1	5.7	7.0	4.9	4.3		
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50		
Copper	U	2455	mg/kg	0.50	13	5.4	37	24	9.6	4.6		
Mercury	U	2455	mg/kg	0.05	0.38	0.05	0.12	0.28	0.24	< 0.05		
Nickel	U	2455	mg/kg	0.50	5.2	3.3	11	6.6	4.4	2.6		
Lead	U	2455	mg/kg	0.50	490	53	230	380	210	43		
Selenium	U	2455	mg/kg	0.25	0.29	0.29	0.52	0.37	< 0.25	< 0.25		
Zinc	U	2455	mg/kg	0.50	120	15	65	120	69	22		
pH	U	2010		4.0	8.6	8.3	7.7	8.2	7.8	8.2	7.9	7.9
Cyanide (Free)	U	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50		
Total Organic Carbon	U	2625	%	0.20	5.9	0.83	7.5	3.6	2.2	6.2		
Acenaphthene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10		
Acenaphthylene	N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10		
Anthracene	U	2800	mg/kg	0.10	0.16	< 0.10	< 0.10	0.13	< 0.10	< 0.10		
Benzo[a]anthracene	U	2800	mg/kg	0.10	0.59	< 0.10	< 0.10	0.48	< 0.10	< 0.10		
Benzo[g,h,i]perylene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10		
Benzo[a]pyrene	U	2800	mg/kg	0.10	0.61	< 0.10	< 0.10	0.61	< 0.10	< 0.10		
Benzo[b]fluoranthene	U	2800	mg/kg	0.10	0.78	< 0.10	< 0.10	0.62	< 0.10	< 0.10		
Benzo[k]fluoranthene	U	2800	mg/kg	0.10	0.24	< 0.10	< 0.10	0.24	< 0.10	< 0.10		
Chrysene	U	2800	mg/kg	0.10	0.54	< 0.10	< 0.10	0.46	< 0.10	< 0.10		
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10		
Fluoranthene	U	2800	mg/kg	0.10	1.1	< 0.10	0.41	1.0	0.42	0.79		
Fluorene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10		
Indeno(1,2,3-c,d)Pyrene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10		
Naphthalene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10		
Phenanthrene	U	2800	mg/kg	0.10	0.53	< 0.10	< 0.10	0.55	< 0.10	< 0.10		
Pyrene	U	2800	mg/kg	0.10	1.1	< 0.10	0.39	0.97	0.37	0.67		
Total Of 16 PAH's	N	2800	mg/kg	2.0	5.7	< 2.0	< 2.0	5.1	< 2.0	< 2.0		
Benzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		
Toluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		
Ethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		
m & p-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		
o-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		

Results - Soil

Project: 20-109 170 Bury Old Road, Manchester

Client: Arc Environmental Ltd	Chemtest Job No.:				22-23427	22-23427	22-23427	22-23427	22-23427	22-23427	22-23427	22-23427
Quotation No.:	Chemtest Sample ID.:				1453747	1453748	1453749	1453750	1453751	1453752	1453753	1453754
	Client Sample ID.:				TP01	TP02	TP04	TP05	TP06	TP07	BH01	BH02
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.10	0.50	0.60	0.00	0.10	0.00	1.40	0.80
	Bottom Depth (m):				0.50	0.70	0.70	0.10	0.60	0.10	1.60	1.00
	Date Sampled:				15-Jun-2022	15-Jun-2022	15-Jun-2022	15-Jun-2022	15-Jun-2022	15-Jun-2022	15-Jun-2022	15-Jun-2022
	Asbestos Lab:				DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM		
Determinand	Accred.	SOP	Units	LOD								
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0		
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0		
ACM Type	U	2192		N/A	-	-	-	-	-	-		
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	< 10	< 10	< 10	< 10	< 10	< 10		
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected		
Sulphate (2:1 Water Soluble) as SO4 mg/l	U	2120	mg/l	10.000	1100	350	65	71	140	340	120	54
Aliphatic TPH >C16-C35	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		

Results - Soil

Project: 20-109 170 Bury Old Road, Manchester

Client: Arc Environmental Ltd	Chemtest Job No.:				22-23427	22-23427	22-23427
Quotation No.:	Chemtest Sample ID.:				1453755	1453756	1453757
	Client Sample ID.:				BH03	BH04	BH05
	Sample Type:				SOIL	SOIL	SOIL
	Top Depth (m):				1.20	1.40	0.70
	Bottom Depth (m):				1.40	1.60	0.90
	Date Sampled:				15-Jun-2022	15-Jun-2022	15-Jun-2022
	Asbestos Lab:						
Determinand	Accred.	SOP	Units	LOD			
Moisture	N	2030	%	0.020	9.6	8.4	7.8
Arsenic	U	2455	mg/kg	0.5			
Cadmium	U	2455	mg/kg	0.10			
Chromium	U	2455	mg/kg	0.5			
Chromium (Trivalent)	N	2490	mg/kg	1.0			
Chromium (Hexavalent)	N	2490	mg/kg	0.50			
Copper	U	2455	mg/kg	0.50			
Mercury	U	2455	mg/kg	0.05			
Nickel	U	2455	mg/kg	0.50			
Lead	U	2455	mg/kg	0.50			
Selenium	U	2455	mg/kg	0.25			
Zinc	U	2455	mg/kg	0.50			
pH	U	2010		4.0	6.8	7.3	8.5
Cyanide (Free)	U	2300	mg/kg	0.50			
Total Organic Carbon	U	2625	%	0.20			
Acenaphthene	U	2800	mg/kg	0.10			
Acenaphthylene	N	2800	mg/kg	0.10			
Anthracene	U	2800	mg/kg	0.10			
Benzo[a]anthracene	U	2800	mg/kg	0.10			
Benzo[g,h,i]perylene	U	2800	mg/kg	0.10			
Benzo[a]pyrene	U	2800	mg/kg	0.10			
Benzo[b]fluoranthene	U	2800	mg/kg	0.10			
Benzo[k]fluoranthene	U	2800	mg/kg	0.10			
Chrysene	U	2800	mg/kg	0.10			
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10			
Fluoranthene	U	2800	mg/kg	0.10			
Fluorene	U	2800	mg/kg	0.10			
Indeno(1,2,3-c,d)Pyrene	U	2800	mg/kg	0.10			
Naphthalene	U	2800	mg/kg	0.10			
Phenanthrene	U	2800	mg/kg	0.10			
Pyrene	U	2800	mg/kg	0.10			
Total Of 16 PAH's	N	2800	mg/kg	2.0			
Benzene	U	2760	µg/kg	1.0			
Toluene	U	2760	µg/kg	1.0			
Ethylbenzene	U	2760	µg/kg	1.0			
m & p-Xylene	U	2760	µg/kg	1.0			
o-Xylene	U	2760	µg/kg	1.0			
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0			

Results - Soil

Project: 20-109 170 Bury Old Road, Manchester

Client: Arc Environmental Ltd	Chemtest Job No.:				22-23427	22-23427	22-23427
Quotation No.:	Chemtest Sample ID.:				1453755	1453756	1453757
	Client Sample ID.:				BH03	BH04	BH05
	Sample Type:				SOIL	SOIL	SOIL
	Top Depth (m):				1.20	1.40	0.70
	Bottom Depth (m):				1.40	1.60	0.90
	Date Sampled:				15-Jun-2022	15-Jun-2022	15-Jun-2022
	Asbestos Lab:						
Determinand	Accred.	SOP	Units	LOD			
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0			
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0			
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0			
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0			
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0			
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0			
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0			
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0			
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0			
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0			
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0			
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0			
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0			
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0			
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0			
ACM Type	U	2192		N/A			
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0			
Asbestos Identification	U	2192		N/A			
Sulphate (2:1 Water Soluble) as SO4 mg/l	U	2120	mg/l	10.000	190	110	83
Aliphatic TPH >C16-C35	U	2680	mg/kg	1.0			

Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Alkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazine.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenzo[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS

Report Information

Key

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

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

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

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

All Asbestos testing is performed at the indicated laboratory

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

Sample Deviation Codes

- A - Date of sampling not supplied
- B - Sample age exceeds stability time (sampling to extraction)
- C - Sample not received in appropriate containers
- D - Broken Container
- E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt

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

Charges may apply to extended sample storage

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

customerservices@chemtest.com