



INVESTIGATE



REMEDIATE



REGENERATE



GROUND INVESTIGATION REPORT

**FOR
188 DEIGHTON ROAD,
HUDDERSFIELD,
WEST YORKSHIRE,
HD2 1JJ**

**PREPARED FOR
JAMIE TULLY**

**REPORT NO. NE4118A
OCTOBER 2022**

SUB SURFACE NORTH EAST LIMITED

**RCM Business Centre
Dewsbury Road
Ossett
West Yorkshire
WF5 9ND**

Tel: (01924) 278181 Fax: (01924) 283455

Email: info@subsurface.co.uk

Website: www.subsurface.co.uk



CONTENTS

1. INTRODUCTION	1.1 Site Location and Description
	1.2 Proposed Development and Purpose of the Ground Investigation
2. INVESTIGATION	2.1 Investigation Details
	2.2 Sub Surface Detail
3. SAMPLING, TESTING AND MONITORING	3.1 Sampling
	3.2 Field Testing
	3.3 Installations and Monitoring
	3.4 Laboratory Testing
4. APPRAISAL AND RECOMMENDATIONS	4.1 Comments on the Profile
	4.2 Foundations
	4.3 Floor Slab Construction
	4.4 Excavations and Groundwater
	4.5 Buried Concrete
	4.6 Geology and Mining
	4.7 Contamination Considerations
	4.8 Ground Gas Considerations
	4.9 General
APPENDICES	Insitu Test results
	Laboratory Test results
	Contamination Analysis results
	Mini Borehole Record sheets
	Rotary Borehole Record sheets
	Hand Dug Trial Pit Record sheets
	Figures

GROUND INVESTIGATION FOR 188 DEIGHTON ROAD, HUDDERSFIELD, WEST YORKSHIRE, HD2 1JJ

CLIENT: JAMIE TULLY

ENGINEER: STUDIO KMA

1. INTRODUCTION

This report has been prepared in accordance with an email, dated 7th March 2022, from the Engineer on behalf of the Client.

The brief was set out in our estimate, ref. E7476A and dated 4th March 2022, with amendments as the investigation proceeded and includes:

- 6 No. mini boreholes
- 3 No. rotary boreholes
- 4 No. hand excavated trial pits
- Insitu testing
- Geotechnical laboratory testing
- Contamination analysis
- Installation of standpipes followed by groundwater and ground gas monitoring
- Provision of an interpretative report on the above.

It should be noted that Build Vision Ltd. has previously issued a Phase I Desk Study Report for this site, ref. 1299 and dated August 2021. In addition we have previously issued a Phase I Geological and Mining Appraisal Report for this site, ref. NE4118 and dated November 2021. These reports should be read in conjunction with this Phase II Ground Investigation Report.

1.1 Site Location and Description

The site is located at 188 Deighton Road, Huddersfield, West Yorkshire, HD2 1JJ, as indicated on Figure 1. The approximate National Grid Reference of the centre of the site is E415887m, N419405m.

As shown on Figure 2, the about 0.04 hectare roughly rectangular shaped site is bounded to the east by No. 178 Deighton Road, to the north by the grounds of No. 1 Oddfellows Buildings, to the west by No. 190 Deighton Road, and to the south by Deighton Road. The site is currently partially concrete, partially hardcore surfaced, with areas which are overgrown, generally used for storage of building material waste, and slopes gently down to the south.

1.2 Proposed Development and Purpose of the Ground Investigation

We understand that it is proposed to construct a residential property and a detached workshop, as shown on Figure 3.

The purpose of the investigation was to determine the ground conditions at the positions of the exploratory holes, to assess the likelihood of a general pattern of strata being present below the site and to establish the load bearing characteristics of the strata deriving, if possible, an assessment of the suitability of appropriate founding techniques.

In addition rotary borehole investigation was required to determine the presence of any shallow coal seams, and associated mineworkings, in order to assess the risk to near surface ground stability.

Contamination analysis and assessment was required in order to determine necessary precautions and/or remedial measures required for the proposed development and to ascertain the need for any further sampling and analysis.

Ground gas monitoring and assessment was also required to determine necessary precautions and/or remedial measures.

2. INVESTIGATION

2.1 Investigation Details

Six mini boreholes were put down to depths of between 1.45 and 4.45 metres using a Dart Mini Sampling Rig fitted with windowless sample tubes of 86mm to 64mm diameter at the positions determined and set out by Sub Surface North East Ltd., as shown on Figure 4. The samples were subsequently logged in accordance with BS.5930:2015+A1:2020 and the resulting Mini Borehole Records are appended. On completion M2, M2A and M3 were backfilled with spoil due to the holes collapsing in, whilst pipes were installed in the remaining mini boreholes to allow for ground gas and groundwater monitoring to take place.

Three rotary boreholes were put down to depths of between 12.00 and 30.00 metres using a Fraste SL drill rig at the positions determined and set out by Sub Surface North East Ltd., as shown on Figure 4. Boreholes were advanced by rotary open holing techniques, with water flushing medium, using 140mm diameter temporary casing. The foreman driller logged chippings flushed to the surface during drilling and the resulting Rotary Borehole Records are appended. On completion the rotary boreholes were backfilled with Bentonite grout.

Four hand dug trial pits were taken out at the positions determined and set out by Sub Surface North East Ltd., as shown on Figure 4. The hand dug trial pits were excavated to depths of between 0.10 and 0.30 metres. Samples were taken for logging, in accordance with BS.5930:2015+A1:2020, and testing. The resulting Hand Dug Trial Pit Records are appended. On completion the hand dug trial pits were backfilled with arisings.

2.2 Sub Surface Detail

Details of the strata encountered in the ground investigation are given on the appended Mini Borehole Records, Rotary Borehole Records, and Hand Dug Trial Pit Records. The exploratory holes found Made Ground to depths of between >0.10 and 3.50 metres, overlying cohesive deposits in M1, M2 and M2A to depths of between 1.40 and 1.70 metres which is likely completely weathered bedrock. Mudstone bedrock was encountered at depths of between 1.40 and 3.50 metres in M1, M2A, M3A, M4, R1, R2, and R3.

The depths of strata found were as follows:

TABLE 1 STRATA

Expl. Hole No.	Depth of Made Ground (m)	Depth of Cohesive Deposits (m)	Depth to bedrock (m)	Depth of Hole (m)
M1	1.00	1.70	1.70	4.08
M2	1.00	>1.45	-	1.45
M2A	0.80	1.40	1.40	2.00
M3	>1.45	-	-	1.45
M3A	2.35	-	2.35	3.00
M4	3.50	-	3.50	4.45
R1	2.80	-	2.80	30.00
R2	2.40	-	2.40	30.00
R3	2.10	2.10	2.10	12.00
HD1	>0.30	-	-	0.30
HD2	>0.20	-	-	0.20
HD3	>0.30	-	-	0.30
HD4	>0.10	-	-	0.10

M = Mini Borehole, R = Rotary Borehole, HD = Hand Dug Trial Pit.

A general summary of the strata found is as follows:

2.2.1 Made Ground

Made Ground was encountered at the surface of the mini boreholes M1, M2, M2A, M3, M3A, and M4 to depths of 1.00, 1.00, 0.80, >1.45, 2.35, and 3.50 metres respectively. Made Ground in M1 and M2A comprised dark grey and dark brown slightly clayey to clayey silty fine to coarse sand and fine to coarse gravel sized fragments of stone brick, concrete and wood with occasional roots and some cobble sized fragments of stone and brick to depths of 0.90 and 0.80 metres respectively. Made Ground in M2, M3, M3A, and M4 comprised dark brown and dark greyish brown sandy to very sandy slightly clayey to clayey silty fine to coarse gravel sized fragments of sandstone, concrete, brick, wood and coal with occasional rootlets and some cobble sized fragments of sandstone to depths of 0.25, 1.00, 2.35, and 3.50 metres respectively.

Underlying the initial layer of Made Ground in M1 and M2, Made Ground comprised very soft dark greyish brown and orangish brown slightly gravelly to gravelly slightly sandy to sandy silty clay with occasional rootlets. Gravel sized fragments in this layer of Made Ground were fine to coarse stone and concrete with occasional cobble sized fragments of stone. Underlying the initial layer of Made Ground in M3, Made Ground comprised light brown silty fine to coarse sand and fine to coarse gravel sized fragments of sandstone.

Made Ground was encountered at the surface of the rotary boreholes R1, R2, and R3 to depths of 2.80, 2.40, and 2.10 metres respectively. Made Ground in the rotary boreholes comprised compact dark brown soil with orange sandstone rubble and brick earth and occasional cobble sized fragments of sandstone blocks to a depth of 0.80 metres, overlying dense orange brown sandstone gravel and cobbles to depths of between 1.10 and 1.90 metres, overlying very dense orange brown sandstone and siltstone gravel and cobbles to depths of between 2.10 and 2.80 metres.

Made Ground was encountered at the surface of the hand dug trial pits HD1, HD2, HD3, and HD4 to depths of >0.30, >0.20, >0.30, and >0.10 metres respectively. Made Ground in the trial pits comprised dark brown clayey silty fine to coarse sand and fine to coarse gravel sized fragments and cobble sized fragments of stone, brick, concrete and suspected cement bound asbestos.

2.2.2 Drift Deposits

Cohesive deposits were observed underlying the Made Ground in M1, M2, and M2A at depths of 1.00, 1.00, and 0.80 metres respectively to depths of 1.70, >1.45, and 1.40 metres respectively. These comprised in M1 soft low strength becoming firm orangish brown and brownish grey mottled silty clay, in M2 stiff high strength yellowish brown and occasional brownish grey mottled slightly gravelly silty clay with occasional thin bands of mudstone, and in M2A soft orangish brown and brownish grey mottled silty clay to a depth of 1.00 metres overlying, firm to stiff high strength orangish brown and brownish grey mottled slightly gravelly slightly sandy silty clay. The clay is likely to be completely weathered bedrock. Gravel within the cohesive deposits was subangular to subrounded fine to coarse sandstone, ironstone and mudstone.

In addition in R3 at 2.10 metres depth soft greyish brown clay was found overlying strong mudstone.

2.2.3 Bedrock

Bedrock was encountered underlying the cohesive deposits in M1, M2A, and R3 at depths of between 1.40 and 2.10 metres, and the Made Ground in M3A, M4, R1, and R2 at depths of between 2.35 and 3.50 metres.

Bedrock in the mini boreholes comprised extremely weak thinly bedded greyish brown and brownish grey highly to completely weathered mudstone.

Bedrock in the rotary boreholes comprised strong greyish brown mudstone to depths of between 8.10 and 8.70 metres, overlying a 0.40 to 0.50 metre thick band of strong black brown coal to depths of between 8.60 and 9.10 metres, overlying strong dark grey mudstone to depths of between 10.90 and 11.00 metres, overlying strong grey to light grey mudstone to a depths of 16.50 metres in R1 and R2 becoming very strong in R2 below 15.00 metres whilst R3 is completed in this strata at 12.00 metres. At 16.50 metres depth in R1 bedrock comprised very strong light grey mudstone to a depth of 17.10 metres. At 17.10 metres in R1 and 16.50 metres in R2 bedrock comprised strong grey and light grey mudstone with occasional very thin lenses of coal to the end of the rotary boreholes at 30.00 metres. No voids, broken ground or loss of flush was recorded in the rotary boreholes.

2.2.4 Groundwater

No groundwater was encountered in the exploratory holes although it should be noted that they were only left open for a short period of time and groundwater levels and rates of inflow may be subject to seasonal and/ or climatic variations.

Monitoring of standpipes installed in M1 and M4 between 1.00 and 4.00 metres, and in M3A between 1.00 and 3.00 metres found the mini boreholes to remain dry.

3. SAMPLING, TESTING AND MONITORING

3.1 Sampling

Continuous core, small disturbed and bulk disturbed samples were obtained for the strata encountered and were subjected to careful examination.

The samples will be retained for a period of one month after the issue of this report, for reference purposes, and then disposed of unless otherwise instructed.

3.2 Field Testing

Nine Standard Penetration Tests (SPTs) and four Standard Cone Penetration Tests (CPTs) were performed in the mini boreholes, the results of which are recorded on the appended Standard Penetration Test Results Sheet with 'N' values and indicative relative density and shear strength, where appropriate, given on the Mini Borehole Records.

3.3 Installations and Monitoring

On completion of the mini boreholes M1, M3A and M4 hdpe standpipes were installed to depths of 4.00, 3.00, and 4.00 metres respectively. The standpipes are slotted from 1.00 metres depth, have an internal diameter of 50mm and have removable quick release gas valves to enable both ground gas and groundwater monitoring and sampling to be undertaken. Details of the installations are given on the Mini Borehole Records.

Monitoring of the standpipes for ground gas and groundwater has been undertaken on six of six scheduled occasions using portable equipment. A Gas Data GFM 435 was used for monitoring methane, carbon dioxide, oxygen, gas flows and atmospheric pressure. The results of the monitoring is given on the appended Ground Gas and Groundwater Monitoring Results sheet.

3.4 Laboratory Testing

The following laboratory tests were carried out in accordance with BS.1377: 1990, where applicable, and the results are appended.

- Moisture content, plastic limit and liquid limit tests
- Soluble sulphate content and pH value tests.

Contamination analyses have been performed on five soil samples to determine: pH and concentrations of sulphate, sulphide, cyanide, arsenic, boron (soluble), cadmium, chromium, hexavalent chromium, copper, lead, mercury, molybdenum, nickel, selenium, zinc, speciated total petroleum hydrocarbons (TPHs), the speciated polynuclear aromatic hydrocarbons (PAHs) suite, the benzene/ ethylbenzene/ toluene/ xylene (BTEX) suite and phenols.

In addition one soil sample and three samples of possible asbestos cement were subjected to an asbestos screen. Where asbestos was detected by the screen, asbestos type and detection was undertaken.

The results of the above analyses are appended.

4. APPRAISAL AND RECOMMENDATIONS

4.1 Comments on the Profile

At the outset it should be appreciated that only a small proportion of the area to be developed has been investigated and consequently the recommendations made and opinions expressed in this report can only be applied to such conditions as were encountered in the exploratory holes.

The exploratory holes indicate a nature and degree of similarity to the extent that we consider them likely to be representative of the natural ground conditions. However, no guarantee can be given.

The internet based British Geological Survey (BGS) Onshore GeoIndex indicates that the site is underlain by the Pennine Lower Coal Measures strata. Given the above there is an indication that the geological formation will be similar beneath the site and the immediate surrounding area and hence some continuity might be assumed, but not guaranteed.

Due to the site having been previously developed, and the nature of Made Ground, localised variations in thickness and composition should be anticipated and hence interpolation or extrapolation from the exploratory holes to adjoining areas should only be undertaken with caution.

Details of the findings of the investigation are given on the appended Mini Borehole Records, Rotary Borehole Records and Hand Dug Trial Pit Records and a summary of the ground conditions is given in Section 2.2.

4.2 Foundations

We understand that it is proposed to construct a residential property and a detached workshop. However, at the time of writing this report no specific details regarding the building layout, proposed foundations and design loadings were available and consequently the recommendations given are in general terms only.

The ground investigation found Made Ground to depths of between >0.10 and 3.50 metres, overlying in M1 soft to firm low strength clay to a depth of 1.70 metres, in M2 stiff high strength clay to a depth of 1.45 metres, and in M2A soft becoming firm to stiff high strength at 1.00 metres to a depth of 1.40 metres. Mudstone bedrock was encountered at depths of between 1.10 and 3.50 metres in M1, M2A, M3A, M4, R1, R2, and R3.

We would not recommend founding in the Made Ground in its present condition because of its inherent variability in consistency and compaction, and in parts the nature of its constituents.

Providing there is sufficient load bearing capability we recommend that the proposed buildings are founded on strip footings for wall loads and pad foundations for column loads and socketed in the natural rock strata or natural high strength clays (completely weathered bedrock).

Atterberg limit tests on the cohesive strata indicate clays of low to intermediate plasticity which are considered to have a low susceptibility to shrinkage and swelling with varying moisture content. Given the above foundations should be taken down to a minimum 0.75 metres below finished ground level to avoid the zone which is subject to seasonal moisture content variation and frost action. If buildings are to be constructed adjacent to existing trees, trees are to be removed and/or trees are to be planted then the guidelines given in the National House Building Council (NHBC) Standards Chapter 4.2, 'Building Near Trees', should be followed for clays of low shrinkage and swelling potential.

It should be noted that in some parts of the site the natural strata is at a depth in excess of 0.75 metres and in these areas foundations should be taken down to a minimum 0.10 metres below the base of the Made Ground unless the NHBC guidelines indicate a greater depth.

In view of the depth of foundations required it is anticipated that trench fill will be used to bring levels back up to the surface. Largely dependent upon the cost of disposal of arisings, we anticipate that trench fill would normally be economically viable providing foundation depths do not exceed about 2.50 to 3.00 metres.

Taking the results of the field tests we have determined the safe bearing capacity of the natural strata, as follows:

TABLE 2 SAFE BEARING CAPACITY

Expl Hole No.	Depth (m)	SPT 'N' Value	Shear Strength (kN/m ²)	Safe Bearing Pressure (kN/m ²)		Recommended Minimum Foundation Depth (m)
				Strip Footing	Square Pad	
M1	1.15	7	28	50	60	1.70
	2.15	28	112	210	255	
	3.15	36	144	270	325	
	3.95	50/130mm	200+	>380	>455	
M2	1.15	22	88	165	200	1.10
M2A	1.15	53	212	400	480	1.00
M3A	2.35	36\$	144	270	325	2.45
M4	4.15	42	168	315	380	3.60
R1						2.90
R2						2.50
R3						2.20

\$ Partial SPT 'N' Value used

Appreciable variations in safe bearing capacity are indicated in Table 2 and as a consequence of this, and the need to utilise a generally applicable safe bearing pressure to enable designs to be reasonably formulated, we recommend that values of 165 kN/m² for strip footings and 200 kN/m² for square pads should not be exceeded for the recommended minimum foundation depth given.

All formation levels should be carefully inspected by an experienced and qualified engineer to confirm the appropriateness of the design figures used with any soft, loose, or rubbly zones removed and replaced with lean mix concrete. The formation should then be blinded with lean mix concrete as soon as possible after exposure, if there is to be a delay before construction, to prevent water softening or disturbance.

It should be noted that the safe bearing pressures given for the cohesive strata do not take into consideration settlement. Settlement is dependent upon loading intensity, the width of the foundation and the coefficient of volume compressibility (M_v) of the compressible strata. When details of the foundations are formulated we recommend that total and differential settlements are assessed to ensure that they are within acceptable limits.

Should cohesive strata be present at the proposed formation level we recommend that foundation excavations should be locally deepened in order that the formation is entirely within similar strata. If this is not possible we recommend that reinforcement in foundations is provided to give adequate strength to bridge or cantilever over areas of significantly differing rates of settlement and to induce an increase in the settlement where relatively low settlements are expected.

It should be noted that the depth of Made Ground encountered in borehole M4 would generally be considered too deep for the satisfactory construction of trenchfill and/ or pad foundations. Consequently, consideration may need to be given to a piled foundation transferring the structural loads down to the mudstone bedrock.

With regard to the choice of pile type, consideration could be given to driven piles, continuous flight auger (CFA) piles or cast in-situ bored piles with the driven pile option probably being the most economical. However, in considering piles driven to a pre-determined set in the more competent strata at depth, it is essential to ensure that any vibrations set up during the driving process are not transmitted to adjacent/ nearby buildings, structures, services and/or slopes/ retaining walls as they may be detrimentally affected. Consequently, in respect of driven piles, we recommend that any tendering Specialist Piling Contractor confirm that vibrations will not detrimentally affect adjacent/ nearby buildings, structures, services and/or slopes/ retaining walls. If such confirmation cannot be given then we would recommend using either CFA or cast in-situ bored piles.

To formulate the most satisfactory and economic scheme we recommend that competitive tenders and designs from Specialist Piling Contractors should be sought using the exploratory hole information obtained.

4.3 Floor Slab Construction

With regard to the design and construction of normal ground bearing floor slabs, it should be noted that due to the thickness of Made Ground there will be a risk of significant total and differential settlements, the extent of which will be a matter of chance rather than being assessable by calculation.

To obviate any significant damaging settlements we would recommend using a suspended floor slab with intermediate support designed on the same basis as the main foundations where the spans are too large for economical single suspended slab design.

4.4 Excavations and Groundwater

There should be no particular difficulties in excavating the strata indicated in the exploratory holes utilising an appropriate and suitably sized mechanical excavator. However, where obstructions were found in M2A and M3A they will need to be broken out prior to excavation.

It is recommended that all excavations to greater than 1.20 metres depth, or for shallower excavations where groundwater is encountered above this level, are closely supported, especially where man entry is required. Alternatively, where space permits, the excavations might be battered back to an appropriate angle.

The exploratory holes did not encounter groundwater inflow, although it should be noted that they were only left open for a relatively short period of time and groundwater levels and rates of inflow may be subject to seasonal and/ or climatic variations.

Monitoring of standpipes installed in M1 and M4 between 1.00 and 4.00 metres, and in M3A between 1.00 and 3.00 metres found the mini boreholes to remain dry.

Should groundwater seepages occur and water accumulate in the excavation it should be able to be removed by pumping from a filtered sump. However, given the limited information, groundwater seepages or inflows are not anticipated in shallow excavations.

Care will need to be taken when reducing groundwater levels to ensure that adjoining/ nearby buildings, structures and services are not affected.

4.5 Buried Concrete

For the design of buried concrete the recommendations given in Building Research Establishment (BRE) Special Digest 1 (February 2017 revision), "Concrete in Aggressive Ground", should be followed.

Determination of pH on the soil samples gave values in the range of 8.6 to 8.7 (alkaline).

Soluble sulphate concentrations were also determined for the soil samples and the results ranged from <0.01 to 0.03 g/l.

The results indicate that the Design Sulphate Class for the site should be DS-1.

Our knowledge of the site and ground conditions indicates that the site is "brownfield" with potentially mobile groundwater. Consequently, in accordance with the Design Sulphate Class for the site together with the site and groundwater conditions an Aggressive Chemical Environment for Concrete (ACEC) classification of AC-1 should be used as detailed on the appended extract.

4.6 Geology and Mining

4.6.1 Geological Appraisal

The geological appraisal indicated that the site would be underlain by the Pennine Lower Coal Measures and an unnamed sandstone strata in the north west corner of the site. No Made Ground was indicated to be present in the area of the site however the site has previously been developed and therefore some may be present. In addition, no superficial deposits were indicated to be present in the area of the site however a thin layer of weathered rockhead is likely to be present.

4.6.2 Mining Appraisal

The mining appraisal indicated that the site may be underlain by shallow coal seams which may have been worked at some time in the past, but for which they have no record.

There are no abandoned mine entries within the site or within 20 metres of the site boundary according to the Coal Authority records.

4.6.3 Findings of the Ground Investigation

The rotary borehole investigation found a 0.40 to 0.50 metre thick band of strong black brown coal at depths of 8.10, 8.50, and 8.70 metres in R1, R2, and R3 respectively. Above the coal seam between 5.30 and 6.60 metres of intact rock strata composed of strong greyish brown mudstone was present.

No voids, broken ground, or loss of flush were recorded by the foreman driller indicating it is unlikely that the coal band has been previously mined.

4.6.4 Conclusions and Recommendations

Surface instability arises when the collapse of mineworkings migrates upwards through the roof strata and back to the surface or near surface level. There is considered to be a potential for this if there is less than ten times the unworked thickness of the coal seam in intact rock strata above the mined coal seam.

In addition residual settlement of incompletely collapsed and consolidated mineworkings can take place over a long period after mining has taken place. It should be noted that although the risk of residual settlement may be increased by the stresses imposed by a surface load, settlement can and does occur irrespective of ground surface loads.

Given the above we recommend that no ground stabilisation measures or precautions need be considered in relation to mineworkings.

Although we have traced no record of mine entries, observations should be kept throughout all site operations for signs attributable to an unrecorded mineshaft or adit. If a mineshaft or adit is suspected, appropriate action would need to be taken in the light of the established condition and location as determined by inspection and investigation.

4.7 Contamination Considerations

Build Vision Ltd have previously undertaken a Phase I Report, ref. 1299 and dated August 2021 and this Phase II ground investigation has been undertaken to provide an initial contamination risk assessment in accordance with the Phase I Conceptual Ground Model. Based upon the findings of the above additional sampling, analysis and assessment may be required.

It should be appreciated that the suite of determinants analysed for consists of a range of contaminants identified in the Conceptual Ground Model. However, the absence of any other specific contaminants cannot be guaranteed.

4.7.1 Assessment (Soil)

In order to provide an assessment of the presence of contamination five soil samples have been analysed for a suite of determinants and the results are appended.

Levels of the determinants have been compared against the most recently published guideline values. Contaminated Land: Applications in Real Environments (CL:AIRE) published guideline values in December 2009 to supplement previous guideline values. The Department for Environment, Food and Rural Affairs (DEFRA) published in March 2014 Category 4 Screening Levels (C4SLs) for arsenic, cadmium, lead, hexavalent chromium, benzo(a)pyrene and benzene. Land Quality Management Limited (LQM)/ Chartered Institute of Environmental Health (CIEH) then published Suitable for Use Levels (S4ULs) in November 2014, which largely superseded the previous guideline values. Updated S4ULs values for cadmium and phenols were published in July 2015 and for nickel in August 2015. The guideline values (S4ULs and occasionally C4SLs and CL:AIRE) are derived using the Environment Agency's CLEA Model and vary dependent upon the land use; allotment and residential use being the most sensitive and commercial/ industrial use being the least sensitive.

For the purposes of assessment, as the proposed development is a residential property with a lawn and potential garden areas, contamination analyses have been compared with the guideline values for a standard land use of residential with plant uptake (with homegrown produce).

When compared with published guideline values for a standard land use of residential with plant uptake (with homegrown produce) the contamination analysis determined elevated levels of a number of contaminants with varying distribution, as tabulated below:

TABLE 3 ASSESSMENT OF SOIL CONTAMINATION

Determinant	Expl. Hole No.	Depth (m)	Recorded Level (mg/kg)	Published Guideline Value (mg/kg)
arsenic	M1	0.05 to 0.30	45	37
	HD1	0.00 to 0.30	54	37
	HD4	0.00 to 0.40	40	37
lead	M1	0.05 to 0.30	400	200
	M4	1.00 to 2.00	300	200
	HD1	0.00 to 0.30	440	200
	HD4	0.00 to 0.40	310	200

Copyright: Land Quality Management Limited data reproduced with permission; Publication Number S4UL3114. All Rights Reserved.

Guideline values for the assessment can be supplied directly to the Regulator, if requested.

When compared with published guideline values for a standard land use of residential with plant uptake (with homegrown produce) the contamination analysis determined elevated levels of a number of Polynuclear Aromatic Hydrocarbons (PAHs), as tabulated below:

TABLE 4 ASSESSMENT OF SOIL CONTAMINATION

Determinant	Exp. Hole No.	Depth (m)	Determined Level (mg/kg)	S4UL (mg/kg)
benzo(b)fluoranthene	HD4	0.00 to 0.40	4.2	3.7
benzo(a)pyrene	HD4	0.00 to 0.40	3.3	3.0
dibenzo(ah)anthracene	M1	0.05 to 0.30	0.39	0.30
	HD1	0.00 to 0.30	0.75	0.30
	HD4	0.00 to 0.40	0.87	0.30

Copyright: Land Quality Management Limited data reproduced with permission; Publication Number S4UL3114. All Rights Reserved.

The ratios of the Polynuclear Aromatic Hydrocarbons (PAHs): benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(123-cd)pyrene, dibenzo(ah)anthracene and benzo(ghi)perylene have been assessed in the tables appended to the contamination analysis results. The profile of the PAHs was found to match the ratio profile of the coal tar test material studied by Culp et al in 1998 allowing PAHs to be assessed against the C4SL for benzo(a)pyrene as a surrogate marker. The maximum determined benzo(a)pyrene level of 3.3 mg/kg is lower than the published C4SL for residential with plant uptake of 5.0 mg/kg and consequently, in our opinion, the level of PAHs, including benzo(b)fluoranthene and dibenzo(ah)anthracene, are within acceptable limits.

An asbestos screen was undertaken on one soil sample and three cement samples and asbestos was detected within the three cement samples. Analysis determined that white (chrysotile) asbestos was present.

In addition to the above, an assessment of risk to personnel who will come into contact with on-site materials throughout the site has been undertaken.

4.7.2 Conclusions and Recommendations

Section 78a(2) of the Environmental Protection Act: 1990 as amended by the Contaminated Land (England) (Amendment) regulations 2012, and Section 86 of the Water Act 2003, defines CONTAMINATED LAND for the purposes of Part IIA as:

“any land which appears to the LOCAL AUTHORITY in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that:

- (a) SIGNIFICANT HARM is being caused or there is a SIGNIFICANT POSSIBILITY of such harm being caused; or
- (b) SIGNIFICANT POLLUTION OF CONTROLLED WATERS is being, or is likely to be, caused”

Before a LOCAL AUTHORITY can make the judgement that land appears to be CONTAMINATED LAND on the basis that SIGNIFICANT HARM is being caused, or that there is a SIGNIFICANT POSSIBILITY of such harm being caused, the LOCAL AUTHORITY must identify a SIGNIFICANT POLLUTANT LINKAGE. This means that each of the following has to be identified:

- (a) a CONTAMINANT;
- (b) a relevant RECEPTOR (defined as living organisms, ecological systems, controlled waters or property); and
- (c) a PATHWAY by means of which either:
 - (i) the CONTAMINANT is causing SIGNIFICANT HARM to that RECEPTOR, or
 - (ii) there is a SIGNIFICANT POSSIBILITY of such harm being caused by that CONTAMINANT to that RECEPTOR

It should be noted that the words in capitals have a legal definition within the legislation.

Without a clear identification of all three elements of the pollutant linkage, land cannot be identified as contaminated under the regime.

The National Planning Policy Framework states that, “after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990”. Therefore, the general principles detailed above apply to this assessment.

Our assessment, based on five soil samples, indicates elevated levels of arsenic and lead are present in the near surface Made Ground/ soils (source). In addition asbestos bound cement is present in rubble on the surface of the site. The pathway from the source to site operatives during earthworks, the end users of the development and any proposed planting (receptors) will need to be removed by precautions and/ or remedial measures.

Where the contaminated materials are covered by buildings or a hard surface cover of concrete or bituminous macadam no clean cover will be required. However, in gardens and other open space areas the end users should be protected from the contaminated materials and plants should be provided with a medium in which they can safely grow.

We recommend a 450mm blanket of imported clean topsoil/ subsoil is provided in gardens and other open spaces. If there is a potential for fruit and/or vegetables to be grown in the gardens the thickness of topsoil/ subsoil should be increased to 600mm. In addition deeper rooted bushes and trees should be pit planted on and in clean topsoil.

Contaminated materials should, where possible, be retained on site. However, it should be appreciated that contaminated material left on site is the legal responsibility of the landowner, unless the person who created the contamination can be identified.

If waste materials are to be removed from the site, classification of the waste should be undertaken to determine the most appropriate tip to use and the associated costs. It should be noted that significant cost savings can sometimes be made on waste disposal by correct classification of the waste, a service that we can provide.

It should be noted that all vehicles carrying contaminated material should be securely sheeted and the wheels and undercarriages cleaned before leaving site to ensure that hazardous materials are not dropped onto public roads.

S4ULs, C4SLs and CL:AIRE assume long term contact with contamination and assess chronic health risk. The risk of short term acute exposure to site personnel is dealt with in the remit of the Health and Safety Executive under the Health and Safety at Work Act: 1974 and Regulations made under the Act, including the Control of Substances Hazardous to Health (COSHH) Regulations. The levels of contamination and risk to site personnel should be considered under the Construction Design and Management (CDM) Regulations at the planning stage and in the development of the designers and contractors Health and Safety Plans and Method Statements. The risk of contact with on-site soils should be minimised and the following precautions should be taken as a minimum requirement.

Site personnel involved in earthworks and excavations should be made aware of the hazards of working with contaminated materials found on the site. Strict personal hygiene should be observed and gloves, overalls, asbestos grade dust masks and boots should be worn. In addition smoking should be prohibited to minimise the potential for transfer of contaminants from hand to mouth.

Earthworks undertaken during dry weather might generate dust and in this instance dust should be damped down and asbestos grade dust masks made available to site operatives. In addition stockpiled materials should be sheeted over to prevent excessive airborne dust being formed.

Should it be necessary for groundwater to be pumped from on-site excavations the groundwater should be sampled and analysed and the groundwater analysis should be submitted to the appropriate waste water authority with a request for a discharge consent. Following receipt of a discharge consent groundwater is likely to be discharged to a sewer or to an off-site licensed discharge point.

4.8 Ground Gas Considerations

Ground gas monitoring has been undertaken on six of six scheduled occasions and the results of the monitoring visits are appended.

Ground gases: methane, carbon dioxide and oxygen and flow rate have been monitored and the ranges of ground gases and flow rate during the monitoring period are as follows:

TABLE 5 GROUND GAS CONCENTRATIONS AND FLOW RATE

Methane (% vol. In air)	Carbon Dioxide (% vol. in air)	Oxygen (% vol. in air)	Gas Flow Rate (litres/ hour)
0.0	0.1 to 5.5	15.8 to 20.7	<0.1

It can be seen from the monitoring that no elevated levels of methane or gas flows have been detected. However, elevated levels of carbon dioxide and depleted levels of associated oxygen have been detected.

Methane gas when present between 5% volume in air (Lower Explosive Limit - L.E.L.) and 15% volume in air (Upper Explosive Limit - U.E.L.) is potentially explosive and inflammable whilst carbon dioxide in conjunction with depleted oxygen is an asphyxiant. Both methane and carbon dioxide are a by-product of the anaerobic and aerobic decomposition of biodegradable materials.

The levels of gas have been assessed in accordance with British Standard 8485, “Code of practice for the design of protective measures for methane and carbon dioxide gasses for new buildings”, published in June 2015 and updated in January 2019 (BS.8485:2015+A1:2019).

The characteristic hazardous gas flow rate (Q_{hg}) is calculated by dividing the maximum gas (methane or carbon dioxide) concentration by 100 and multiplying by the maximum flow rate in litres per hour (minimum 0.1 l/hr for Sub Surface monitoring equipment). For this site $Q_{hg} = [5.5 / 100] \times 0.1 = 0.006$ l/hr

Based on the monitoring to date, BS.8485:2015+A1:2019, Table 2, indicates that the site falls into Characteristic Situation 1 (CS1).

BS.8485:2015+A1:2019, Table 4, indicates that for a CS1 and the type of development proposed a score of zero gives no protection and remedial measures required.

All excavations of greater than 1.20 metres depth should be routinely checked for air quality prior to man entry and appropriate precautions taken.

4.9 General

It should be noted that when developing a “brownfield site” a phased investigation should be undertaken in order that each phase informs the next. A typical phased investigation comprises the following:

- Phase I: desk study report
- Phase II: ground investigation with report
- Phase III: remediation statement report
- Phase IV: validation with report.

In the preparation of this report no consideration has been given to the long term stability of the existing slopes and/or retaining structures and the short and long term stability of any proposed slopes and/or retaining structures required for the proposed development as this was outside our brief.

We recommend that consultation should be undertaken with, and the written approval obtained from, the Local Authority Environmental Health Officer, the Local Authority Building Control Officer and the Coal Authority prior to commencing development.

Following completion of the Phase II ground investigation and monitoring a Phase III remediation statement should be compiled and submitted to the Regulator for written approval prior to commencing development.

We trust that this report fulfils your present requirements but if you have any queries or we can be of further assistance please contact the undersigned or Mr David Simpson at our Ossett office.

SUB SURFACE CONSULTANTS LIMITED
REPORT No. NE4118A
OCTOBER 2022

Redacted

L. A. W. McCall - Bhakta B.Sc.(Hons.).
Geotechnical Engineer
For and on behalf of
Sub Surface Consultants Limited

Redacted

C. A. Marsden B.Sc.(Hons.), C.Eng., M.I.C.E.
Director
For and on behalf of
Sub Surface Consultants Limited.

INSITU TEST RESULTS



SUB SURFACE

SITE INVESTIGATION SPECIALISTS, GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS
3 Peel Street, Preston, Lancashire, PR2 2QS. Tel: (01772) 561135 Fax: (01772) 204907

Standard Penetration Test Results

Site : 188 DEIGHTON ROAD, HUDDERSFIELD, WEST YORKSHIRE

Client : JAMIE TULLY

Engineer : STUDIO KMA

Job Number
NE4118A

Sheet
1 / 1

Borehole Number	Base of Borehole (m)	End of Seating Drive (m)	End of Test Drive (m)	Test Type	Seating Blows per 75mm		Blows for each 75mm penetration				Result	Comments
					1	2	1	2	3	4		
M1	1.00	1.15	1.45	SPT	2	2	1	2	2	2	N=7	
M1	2.00	2.15	2.45	SPT	5	5	8	6	7	7	N=28	
M1	3.00	3.15	3.45	SPT	6	8	7	9	9	11	N=36	
M1	3.80	3.95	4.08	SPT	6	10	26	24			50/130mm	
M2	1.00	1.15	1.45	SPT	4	3	4	5	5	8	N=22	
M2A	1.00	1.15	1.45	CPT	17	5	14	14	12	13	N=53	
M3	1.00	1.15	1.45	SPT	3	2	2	2	2	2	N=8	
M3A	1.00	1.15	1.45	CPT	2	4	5	4	5	5	N=19	
M3A	2.00	2.15	2.45	SPT	4	5	5	7	8	9	N=29	
M4	1.00	1.15	1.45	CPT	3	3	2	4	3	1	N=10	
M4	2.00	2.15	2.45	SPT	2	3	8	8	3	5	N=24	
M4	3.00	3.15	3.45	SPT	5	21	17	5	5	5	N=32	
M4	4.00	4.15	4.45	CPT	7	7	8	11	11	12	N=42	

LABORATORY TEST RESULTS

**SUB SURFACE**SITE INVESTIGATION SPECIALISTS, GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS
3 Peel Street, Preston, Lancashire, PR2 2QS. Tel: (01772) 561135 Fax: (01772) 204907**Laboratory Test Results**

Site : 188 DEIGHTON ROAD, HUDDERSFIELD, WEST YORKSHIRE

Client : JAMIE TULLY

Engineer : STUDIO KMA

Job Number
NE4118ASheet
1 / 1**DETERMINATION OF MOISTURE CONTENT, LIQUID LIMIT AND PLASTIC LIMIT
AND DERIVATION OF PLASTICITY AND LIQUIDITY INDEX**

Borehole/ Trial Pit	Depth (m)	Sample	Natural Moisture Content %	Sample Passing 425µm Sieve		Liquid Limit %	Plastic Limit %	Plasticity Index %	Liquidity Index	Group Symbol	Laboratory Description
				Percentage %	Moisture Content %						
M2A	1.00	C	21	98	21	41	22	19	-0.05	CI	Firm to stiff orangish brown and brownish grey mottled slightly gravelly slightly sandy silty CLAY. Gravel is subangular to subrounded fine to coarse sandstone.
M3A	2.50	C	15	99	15	33	23	10	-0.80	CL	Extremely weak thinly bedded light brown and occasional grey and yellowish brown mottled highly weathered MUDSTONE.

Method of Preparation : BS 1377:PART 1:1990:7.4 Preparation of samples for classification tests BS 1377:PART 2:1990:4.2 & 5.2 Sample preparations**Method of Test** : BS 1377:PART 2:1990:3 Determination of moisture content 1990:4 Determination of the liquid limit BS 1377:PART 2:1990:5 Determination of the plastic limit and plasticity index**Remarks** :



SUB SURFACE

SITE INVESTIGATION SPECIALISTS, GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS
3 Peel Street, Preston, Lancashire, PR2 2QS. Tel: (01772) 561135 Fax: (01772) 204907

Laboratory Test Results

Site : 188 DEIGHTON ROAD, HUDDERSFIELD, WEST YORKSHIRE

Client : JAMIE TULLY

Engineer : STUDIO KMA

Job Number
NE4118A

Sheet
1 / 1

DETERMINATION OF pH, SULPHATE CONTENT AND TOTAL SULPHUR OF SOIL AND GROUNDWATER AND MAGNESIUM, CHLORIDE, AMMONIA AND NITRATE CONTENT

Borehole/ Trial Pit	Depth (m)	Sample	Concentration of Sulphate			Total Sulphur %	Magnesium mg/l	Ammonium NH4 mg/l	Water Soluble Chloride mg/l	Water Soluble Nitrate mg/l	pH	Design Class	Laboratory Description
			Soil		Ground Water g /l								
			Total S03 %	S04 in 2:1 water:soil g /l									
M2A	1.00	C		<0.01						8.6	DS-1	Firm to stiff orangish brown and brownish grey mottled slightly gravelly slightly sandy silty CLAY. Gravel is subangular to subrounded fine to coarse sandstone.	
M3A	1.00	B		0.03						8.7	DS-1	MADE GROUND: dark brown very sandy clayey silty fine to coarse gravel sized fragments of sandstone and concrete with occasional cobble sized fragments of sandstone.	

Method of Preparation : BS 1377:PART 1:1990:7.5 Preparation of soil for chemical tests BS 1377:PART 3:1990:5.2, 5.3, 5.4 & 9.4

Method of Test : Lab in-house methods based on BS1377: Part 3 for contents of water sol sulphate, pH, chloride and magnesium. Lab in-house method based on MEWAM (EA, 2006) for total sulphur

Remarks : Classification relates to Design Sulphate Class of BRE Special Digest 1 (2005)



SUB SURFACE

SITE INVESTIGATION AND SPECIALIST GEOTECHNICAL CONSULTANTS
 3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907

BRE Special Digest 1

AGGRESSIVE CHEMICAL ENVIRONMENT FOR CONCRETE (ACEC) SITE CLASSIFICATION.

Table C1 Aggressive Chemical Environment for Concrete (ACEC) classification for natural ground locations^a

Sulfate Design Sulfate Class for location	2:1 water/soil extract ^b		Groundwater		Groundwater		ACEC Class for location
	2	3	Total potential sulfate ^c	Static water	Mobile water		
1	2 (SO ₄ mg/l)	3 (SO ₄ mg/l)	4 (SO ₄ %)	5 (pH)	6 (pH)	7	
DS-1	< 500	< 400	< 0.24	≥ 2.5	> 5.5 ^d 2.5–5.5	AC-1s AC-1 ^d AC-2z	
DS-2	500–1500	400–1400	0.24–0.6	> 3.5 2.5–3.5	> 5.5 2.5–5.5	AC-1s AC-2 AC-2s AC-3z	
DS-3	1600–3000	1500–3000	0.7–1.2	> 3.5 2.5–3.5	> 5.5 2.5–5.5	AC-2s AC-3 AC-3s AC-4	
DS-4	3100–6000	3100–6000	1.3–2.4	> 3.5 2.5–3.5	> 5.5 2.5–5.5	AC-3s AC-4 AC-4s AC-5	
DS-5	> 6000	> 6000	> 2.4	> 3.5 2.5–3.5	≥ 2.5	AC-4s AC-5	

Notes
 a Applies to locations on sites that comprise either undisturbed ground that is in its natural state (ie is not brownfield – Table C2) or clean fill derived from such ground.
 b The limits of Design Sulfate Classes based on 2:1 water/soil extracts have been lowered relative to previous Digests (Box C7).
 c Applies only to locations where concrete will be exposed to sulfate ions (SO₄) which may result from the oxidation of sulfides (eg pyrite) following ground disturbance (Appendix A1 and Box C8).
 d For flowing water that is potentially aggressive to concrete owing to high purity or an aggressive carbon dioxide level greater than 15 mg/l (Section C2.2.3), increase the ACEC Class to AC-2z.

Explanation of suffix symbols to ACEC Class
 ● Suffix 's' indicates that the water has been classified as static.
 ● Concrete placed in ACEC Classes that include the suffix 'z' primarily have to resist acid conditions and may be made with any of the cements or combinations listed in Table D2 on page 42.

Table C2 Aggressive Chemical Environment for Concrete (ACEC) classification for brownfield locations^a

Sulfate and magnesium Design Sulfate Class for location	2:1 water/soil extract ^b		Groundwater		Total potential sulfate ^c	Groundwater		ACEC Class for location
	2	3	4	5		Static water	Mobile water	
1	2 (SO ₄ mg/l)	3 (Mg mg/l)	4 (SO ₄ mg/l)	5 (Mg mg/l)	6 (SO ₄ %)	7 (pH) ^d	8 (pH) ^d	9
DS-1	< 500		< 400		< 0.24	≥ 2.5	> 6.5 ^d 5.5–6.5 4.5–5.5 2.5–4.5	AC-1s AC-1 AC-2z AC-3z AC-4z
DS-2	500–1500		400–1400		0.24–0.6	> 5.5 2.5–5.5	> 6.5 5.5–6.5 4.5–5.5 2.5–4.5	AC-1s AC-2 AC-2s AC-3z AC-4z AC-5z
DS-3	1600–3000		1500–3000		0.7–1.2	> 5.5 2.5–5.5	> 6.5 5.5–6.5 2.5–5.5	AC-2s AC-3 AC-3s AC-4 AC-5
DS-4	3100–6000	≤ 1200	3100–6000	≤ 1000	1.3–2.4	> 5.5 2.5–5.5	> 6.5 2.5–6.5	AC-3s AC-4 AC-4s AC-5
DS-4m	3100–6000	> 1200 ^e	3100–6000	> 1000 ^e	1.3–2.4	> 5.5 2.5–5.5	> 6.5 2.5–6.5	AC-3s AC-4m AC-4ms AC-5m
DS-5	> 6000	≤ 1200	> 6000	≤ 1000	> 2.4	> 5.5 2.5–5.5	≥ 2.5	AC-4s AC-5
DS-5m	> 6000	> 1200 ^e	> 6000	> 1000 ^e	> 2.4	> 5.5 2.5–5.5	≥ 2.5	AC-4ms AC-5m

Notes
 a Brownfield locations are those sites, or parts of sites, that might contain chemical residues produced by or associated with industrial production (Section C5.1.3).
 b The limits of Design Sulfate Classes based on 2:1 water/soil extracts have been lowered from previous Digests (Box C7).
 c Applies only to locations where concrete will be exposed to sulfate ions (SO₄), which may result from the oxidation of sulfides such as pyrite, following ground disturbance (Appendix A1 and Box C8).
 d An additional account is taken of hydrochloric and nitric acids by adjustment to sulfate content (Section C5.1.3).
 e The limit on water-soluble magnesium does not apply to brackish groundwater (chloride content between 12 000 mg/l and 17 000 mg/l). This allows 'm' to be omitted from the relevant ACEC classification. Seawater (chloride content about 18 000 mg/l) and stronger brines are not covered by this table.

Explanation of suffix symbols to ACEC Class
 ● Suffix 's' indicates that the water has been classified as static.
 ● Concrete placed in ACEC Classes that include the suffix 'z' have primarily to resist acid conditions and may be made with any of the cements in Table D2 on page 42.
 ● Suffix 'm' relates to the higher levels of magnesium in Design Sulfate Classes 4 and 5.

CONTAMINATION ANALYSIS RESULTS



Final Report

Report No.: 22-15196-1
Initial Date of Issue: 03-May-2022
Client Sub Surface
Client Address: 3 Peel Street
Preston
Lancashire
PR2 2QS
Contact(s): Simon Gabbatt
Project NE4118A DEIGHTON ROAD,
HUDDERSFIELD
Quotation No.:
Order No.:
No. of Samples: 10
Turnaround (Wkdays): 7
Date Approved: 03-May-2022
Approved By:

Date Received: 25-Apr-2022
Date Instructed: 25-Apr-2022
Results Due: 04-May-2022

Details: Stuart Henderson, Technical
Manager

Bulk Identification Certificate

Client: Sub Surface

Site Address:

Date Sampled: 19-Apr-2022

Date Received: 25-Apr-2022

Your Ref.:

Project: NE4118A DEIGHTON ROAD,
HUDDERSFIELD

Job Number: 22-15196

No Samples:

Date Reported: 03-May-2022

Sample No.	Sample ID	Sample Ref.	Description	Top (m)	Bottom (m)	SOP	Accred.	Laboratory	Material	Result
1416596	355		M4	0	0.4	2185	U	COVENTRY	Cement	Chrysotile
1416600	336		HD2	0	0.2	2185	U	COVENTRY	Cement	Chrysotile
1416601	343		HD3	0	0.3	2185	U	COVENTRY	Cement	Chrysotile

The in-house procedure SOP2185 is in accordance with the requirements of Appendix 2 of the Analyst Guide (HSG 248).

The results relate only to items tested as supplied by the client.

Comments and interpretations are beyond the scope of UKAS accreditation.

Samples associated with asbestos in building surveys are retained for six months (HSG 264 refers)

Results - Soil

Project: NE4118A DEIGHTON ROAD, HUDDERSFIELD

Client: Sub Surface		Chemtest Job No.:		22-15196	22-15196	22-15196	22-15196	22-15196	22-15196	22-15196
Quotation No.:		Chemtest Sample ID.:		1416592	1416593	1416594	1416595	1416597	1416598	1416599
		Client Sample ID.:		331	344	347	352	357	348	335
		Sample Location:		M1	M2	M2A	M3A	M4	HD4	HD1
		Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):		0.05	0.5	1.0	1.0	1.0	0	0
		Bottom Depth (m):		0.3	0.6	2.0	2.0	2.0	0.4	0.3
		Date Sampled:		19-Apr-2022	19-Apr-2022	19-Apr-2022	19-Apr-2022	19-Apr-2022	19-Apr-2022	19-Apr-2022
		Asbestos Lab:		COVENTRY						
Determinand	Accred.	SOP	Units	LOD						
ACM Type	U	2192		N/A	-					
Asbestos Identification	U	2192		N/A	No Asbestos Detected					
Moisture	N	2030	%	0.020	13	18	16	17	12	12
pH	U	2010		4.0	8.9	8.6	8.6	8.7	9.2	8.6
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	0.43	< 0.40			0.43	0.46
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010			< 0.010	0.030		
Cyanide (Total)	U	2300	mg/kg	0.50	< 0.50	< 0.50			0.90	0.60
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50	2.7	12			23	38
Sulphate (Total)	U	2430	%	0.010	0.17	0.022			0.11	0.15
Arsenic	U	2455	mg/kg	1.0	45	9.2			22	40
Cadmium	U	2455	mg/kg	0.10	1.5	0.36			0.56	1.0
Chromium	U	2455	mg/kg	1.0	36	31			22	73
Molybdenum	U	2455	mg/kg	2.0	5.7	2.5			1.6	6.7
Copper	U	2455	mg/kg	0.50	100	24			32	94
Mercury	U	2455	mg/kg	0.10	0.93	0.10			0.21	0.88
Nickel	U	2455	mg/kg	0.50	38	24			19	49
Lead	U	2455	mg/kg	0.50	400	46			300	310
Selenium	U	2455	mg/kg	0.20	2.3	0.94			0.88	1.9
Zinc	U	2455	mg/kg	0.50	350	100			500	310
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50			< 0.50	< 0.50
TPH >C6-C10	N	2670	mg/kg	1.0	< 1.0	< 1.0			< 1.0	< 1.0
TPH >C10-C21	N	2670	mg/kg	1.0	21	< 1.0			< 1.0	11
TPH >C21-C40	N	2670	mg/kg	1.0	220	< 1.0			< 1.0	17
Total TPH >C6-C40	U	2670	mg/kg	10	240	< 10			< 10	28
Naphthalene	U	2700	mg/kg	0.10	< 0.10	< 0.10			< 0.10	1.5
Acenaphthylene	U	2700	mg/kg	0.10	< 0.10	< 0.10			< 0.10	0.19
Acenaphthene	U	2700	mg/kg	0.10	< 0.10	< 0.10			< 0.10	0.49
Fluorene	U	2700	mg/kg	0.10	< 0.10	< 0.10			< 0.10	0.45
Phenanthrene	U	2700	mg/kg	0.10	1.8	< 0.10			< 0.10	3.6
Anthracene	U	2700	mg/kg	0.10	0.54	< 0.10			< 0.10	0.92
Fluoranthene	U	2700	mg/kg	0.10	3.1	< 0.10			0.67	5.9
Pyrene	U	2700	mg/kg	0.10	3.3	< 0.10			0.74	6.3
Benzo[a]anthracene	U	2700	mg/kg	0.10	1.6	< 0.10			0.76	3.0
Chrysene	U	2700	mg/kg	0.10	2.4	< 0.10			0.95	4.2
Benzo[b]fluoranthene	U	2700	mg/kg	0.10	2.3	< 0.10			< 0.10	4.2
Benzo[k]fluoranthene	U	2700	mg/kg	0.10	1.4	< 0.10			< 0.10	1.9

Results - Soil

Project: NE4118A DEIGHTON ROAD, HUDDERSFIELD

Client: Sub Surface		Chemtest Job No.:		22-15196	22-15196	22-15196	22-15196	22-15196	22-15196	22-15196
Quotation No.:		Chemtest Sample ID.:		1416592	1416593	1416594	1416595	1416597	1416598	1416599
		Client Sample ID.:		331	344	347	352	357	348	335
		Sample Location:		M1	M2	M2A	M3A	M4	HD4	HD1
		Sample Type:		SOIL						
		Top Depth (m):		0.05	0.5	1.0	1.0	1.0	0	0
		Bottom Depth (m):		0.3	0.6	2.0	2.0	2.0	0.4	0.3
		Date Sampled:		19-Apr-2022						
		Asbestos Lab:		COVENTRY						
Determinand	Accred.	SOP	Units	LOD						
Benzo[a]pyrene	U	2700	mg/kg	0.10	2.6	< 0.10		< 0.10	3.3	2.8
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10	1.2	< 0.10		< 0.10	2.0	1.6
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10	0.39	< 0.10		< 0.10	0.87	0.75
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10	1.3	< 0.10		< 0.10	2.3	2.0
Total Of 16 PAH's	U	2700	mg/kg	2.0	22	< 2.0		3.1	41	32
Benzene	U	2760	µg/kg	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
Ethylbenzene	U	2760	µg/kg	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
o-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0	< 1.0	< 1.0
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0	< 1.0	< 1.0
Total Phenols	U	2920	mg/kg	0.10	< 0.10	< 0.10		< 0.10	< 0.10	< 0.10

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



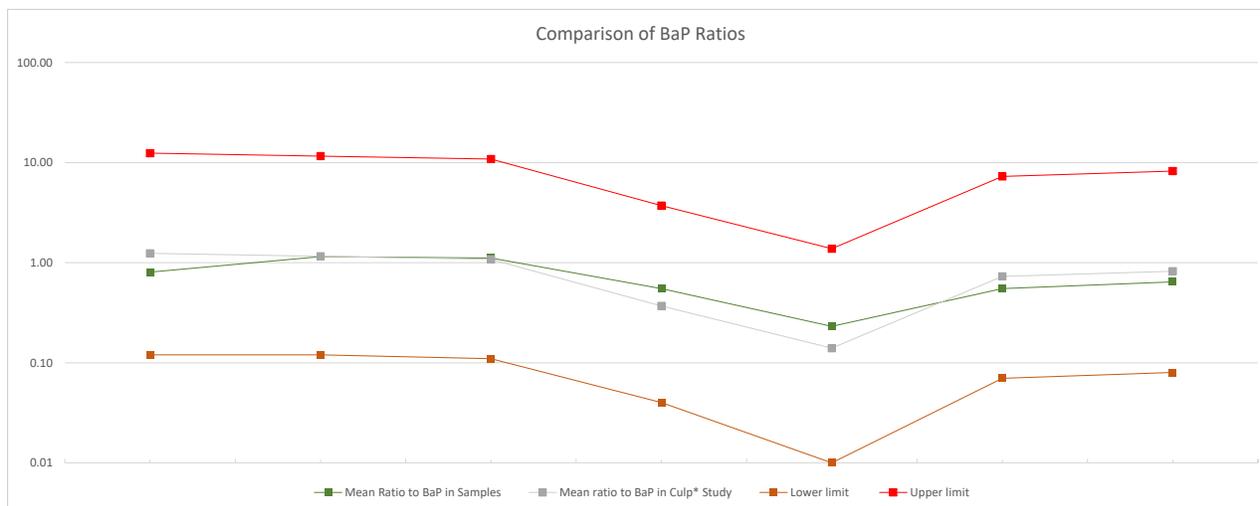
Site: 188 DEIGHTON ROAD, HUDDERSFIELD, WEST YORKSHIRE, HD2 1JJ
 Client: JAMIE TULLY
 Engineer: STUDIO KMA

Job Number:
NE4118A
 Sheet:
1 / 1

Benzo(a)pyrene Surrogate Marker Test

Exp. Hole No./ Depth (m)	Units	Ratio to BaP							
		Benzo[a]pyrene	Benzo[a]anthracene	Chrysene	Benzo[b]fluoranthene	Benzo[k]fluoranthene	Dibenz[ah]anthracene	Indeno[123-cd]pyrene	Benzo[ghi]perylene
M1 0.05m to 3.00m	mg/kg	2.60	1.60	2.40	2.30	1.40	0.39	1.20	1.30
HD1 0.00m to 0.30m	mg/kg	2.80	2.40	3.40	3.20	1.50	0.75	1.60	2.00
HD4 0.00m to 0.40m	mg/kg	3.30	3.00	4.20	4.20	1.90	0.87	2.00	2.30
	mg/kg								
	mg/kg								
	mg/kg								
	mg/kg								
	mg/kg								
	mg/kg								
	mg/kg								
	mg/kg								
	mg/kg								
	mg/kg								
	mg/kg								
	mg/kg								
Mean Concentrations	mg/kg	2.90	2.33	3.33	3.23	1.60	0.67	1.60	1.87

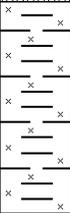
PAH	Units	Mean Concentrations in samples	Mean Ratio to BaP in Samples	Mean ratio to BaP in Culp* Study	Lower limit	Upper limit
Benzo(a)pyrene	mg/kg	2.9	1.00	-	-	-
Benzo[a]anthracene	mg/kg	2.333333333	0.80	1.24	0.12	12.43
Chrysene	mg/kg	3.333333333	1.15	1.16	0.12	11.61
Benzo[b]fluoranthene	mg/kg	3.233333333	1.11	1.08	0.11	10.85
Benzo[k]fluoranthene	mg/kg	1.6	0.55	0.37	0.04	3.72
Dibenz[ah]anthracene	mg/kg	0.67	0.23	0.14	0.01	1.38
Indeno[123-cd]pyrene	mg/kg	1.6	0.55	0.73	0.07	7.27
Benzo[ghi]perylene	mg/kg	1.866666667	0.64	0.82	0.08	8.22



Comments:

*CULP, S.J., GAYLOR, D.W., SHELDON, W.G. GOLDSTEIN, L.W., BELAND, F.A., 1998. A comparison of the tumors induced by coal tar and benzo(a)pyrene in a 2-year bioassay. Assessed in accordance with Development of Category 4 Screening Levels for assessment of land affected by contamination - SP1010 Appendix E

MINI BOREHOLE RECORD SHEETS

 SUB SURFACE SITE INVESTIGATION SPECIALISTS, GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS 3 Peel Street, Preston, Lancashire, PR2 2QS. Tel: (01772) 561135 Fax: (01772) 204907						Site 188 DEIGHTON ROAD, HUDDERSFIELD, WEST YORKSHIRE			Borehole Number M1		
Boring Method MINI PERCUSSIVE		Casing Diameter		Ground Level (mOD)		Client JAMIE TULLY		Job Number NE4118A			
		Location AS PLAN		Dates 19/04/2022		Engineer STUDIO KMA		Sheet 1/1			
Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr	
0.05-0.30	B						MADE GROUND: dark grey clayey silty fine to coarse sand and fine to coarse gravel sized fragments of stone and concrete with occasional roots.				
0.40-0.80	B					(0.90)					
0.90-1.00	B					0.90 (0.10)	MADE GROUND: very soft dark greyish brown slightly gravelly sandy silty clay. Gravel sized fragments are fine to coarse stone and concrete.				
1.00-1.45	D			1.00m to 2.00m - 100% Recovery		1.00					
1.00-2.00	C			2,2,1,2,2,2			Soft low strength becoming firm orangish brown and brownish grey mottled silty CLAY with occasional roots and rootlets.				
1.00-1.45	SPT N=7					(0.70)					
2.00-2.45	D			2.00m to 3.00m - 90% Recovery		1.70 (0.15)	Extremely weak thinly bedded yellowish brown, brownish grey and dark brown highly weaehered MUDSTONE with occasional bands of moderately weak to strong IRONSTONE.				
2.00-3.00	C			5,5/8,6,7,7		1.85					
2.00-2.45	SPT N=28						Extremely weak thinly bedded yellowish brown and brownish grey highly weathered MUDSTONE.				
3.00-3.45	D			3.00m to 4.00m - 100% Recovery		(2.23)					
3.00-3.80	C			6,8/7,9,9,11							
3.00-3.45	SPT N=36										
3.80-4.08	SPT 50/130			6,10/26,24							
3.80-4.08	D					4.08	Complete at 4.08m				
Remarks Hand dug inspection pit from GL to 1.00m to check for services. Core diameter: 86mm to 2.00m, 76mm to 3.00m and 64mm to 3.80m. No groundwater encountered. Borehold cased to 2.00m. On completion backfilled with gravel and installed a 50mm dia hdpe gas monitoring standpipe with a gas valve and a gravel surround to 4.00m, a Bentonite seal from 1.00m to 0.20m and a concreted in lockable steel protective cover from 0.20m to GL.								Scale (approx) 1:25		Logged By LMB/VW	
								Figure No. NE4118A.M1			

Boring Method MINI PERCUSSIVE	Casing Diameter	Ground Level (mOD)	Client JAMIE TULLY	Job Number NE4118A
	Location AS PLAN	Dates 19/04/2022	Engineer STUDIO KMA	Sheet 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-1.00	C			0.00m to 1.00m - 90% Recovery		(0.25)	MADE GROUND: dark brown sandy slightly clayey silty fine to coarse gravel sized fragments of stone, brick and coal with occasional rootlets.		
						0.25	MADE GROUND: very soft orangish brown and occasional brown mottled gravelly slightly sandy silty clay. Gravel sized fragments are fine to coarse stone, brick and coal with occasional cobble sized fragments of stone with occasional rootlets.		
1.00-1.45 1.00-1.45	SPT N=22 D			4,3/4,5,5,8		1.00	Stiff high strength yellowish brown and occasional brownish grey mottled slightly gravelly silty CLAY with occasional thin bands of mudstone. Gravel is subangular fine to coarse sandstone, mudstone and ironstone (completely weathered bedrock).		
						(0.45)	Complete at 1.45m		
				19/04/2022:DRY		1.45			

Remarks Core diameter: 86mm to 1.00m. No groundwater encountered. Hope collapsed to 0.40m. On completion backfilled with spoil.	Scale (approx) 1:25	Logged By LMB/VW
Figure No. NE4118A.M2		

Boring Method MINI PERCUSSIVE	Casing Diameter		Ground Level (mOD)	Client JAMIE TULLY	Job Number NE4118A
	Location AS PLAN		Dates 19/04/2022	Engineer STUDIO KMA	Sheet 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-1.00	C			0.00m to 1.00m - 100% Recovery		(0.80)	MADE GROUND: dark brown slightly clayey silty fine to coarse sand and fine to coarse gravel sized fragments of stone, brick and wood with some cobble sized fragments of stone and brick.		
1.00-2.00	C			1.00m to 2.00m - 95% Recovery		0.80 (0.20)	Soft orangish brown and brownish grey mottled silty CLAY.		
1.00-1.45	SPT(C) N=53			17,5/14,14,12,13		1.00 (0.40)	Firm to stiff high strength orangish brown and brownish grey mottled slightly gravelly slightly sandy silty CLAY. Gravel is subangular to subrounded fine to coarse sandstone.		
						1.40	...below 1.30m: brown and occasional grey and yellowish brown mottled.		
						(0.60)	Extremely weak thinly bedded light brown highly to completely weathered MUDSTONE.		
				19/04/2022: DRY		2.00	Complete at 2.00m		

Remarks Core diameter: 86mm to 1.00m and 76mm to 2.00m. No groundwater encountered. Hole collapsed. On completion backfilled with spoil.	Scale (approx)	Logged By
	1:25	LMB/VW
	Figure No. NE4118A.M2A	

Boring Method MINI PERCUSSIVE	Casing Diameter	Ground Level (mOD)	Client JAMIE TULLY	Job Number NE4118A
	Location AS PLAN	Dates 19/04/2022	Engineer STUDIO KMA	Sheet 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-1.00	C			0.00m to 1.00m - 80% Recovery		(1.00)	MADE GROUND: dark brown very sandy slightly clayey silty fine to coarse gravel sized fragments of sandstone with some cobble sized fragments of sandstone.		
1.00-1.45 1.00-1.45	SPT N=8 D			3,2/2,2,2,2 19/04/2022:DRY		1.00 (0.45) 1.45	MADE GROUND: light brown silty fine to coarse sand and fine to coarse gravel sized fragments of sandstone.		
							Complete at 1.45m		

Remarks Core diameter: 86mm to 1.00m. No groundwater encountered. Hole collapsed. On completion backfilled with spoil.	Scale (approx) 1:25	Logged By LMB/VW
Figure No. NE4118A.M3		

Boring Method MINI PERCUSSIVE	Casing Diameter 100mm cased to 2.00m	Ground Level (mOD)	Client JAMIE TULLY	Job Number NE4118A
	Location AS PLAN	Dates 19/04/2022	Engineer STUDIO KMA	Sheet 1/1

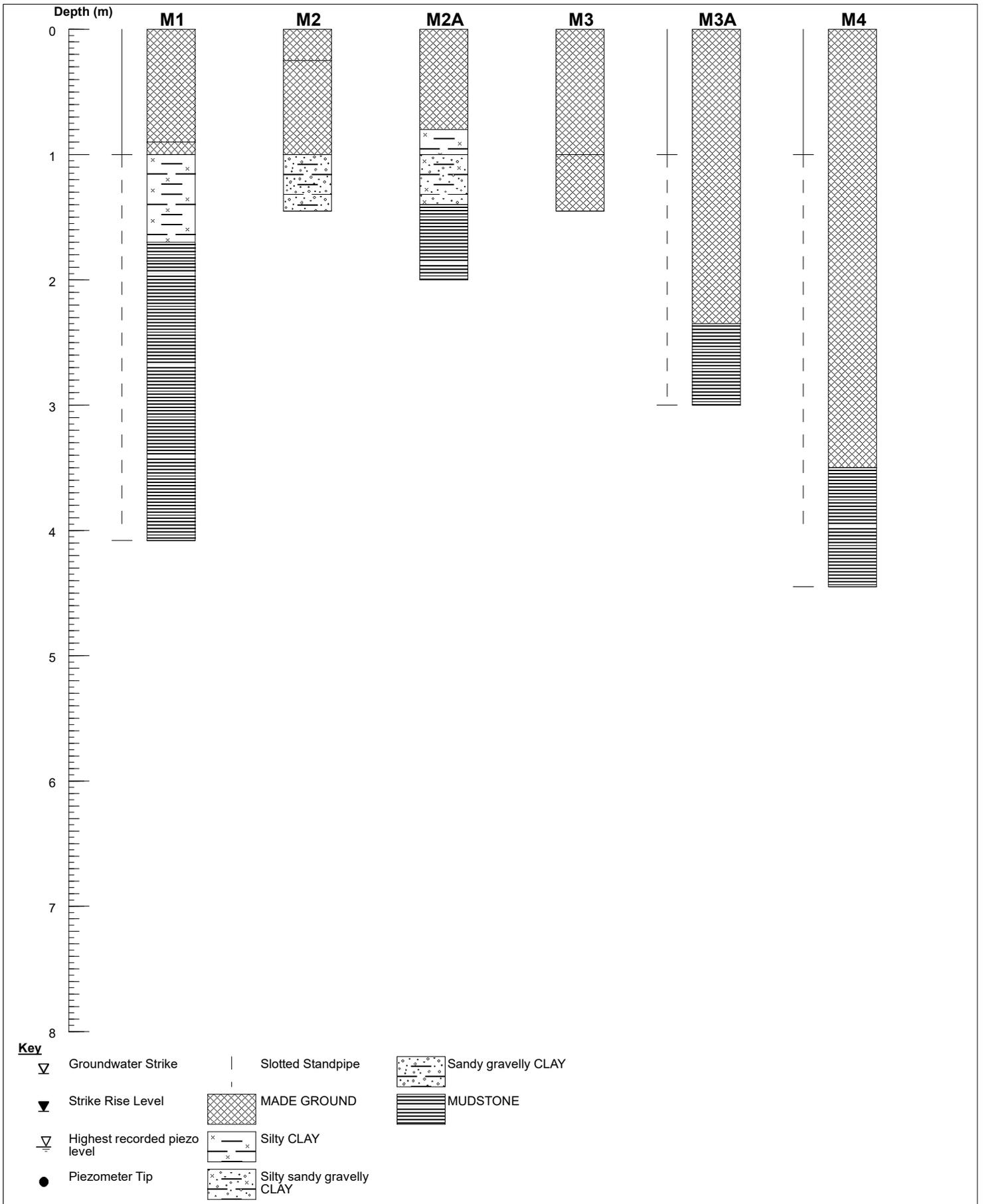
Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.20-0.70	B						MADE GROUND: dark brown very sandy clayey silty fine to coarse gravel sized fragments of sandstone and concrete with occasional cobble sized fragments of sandstone. Extremely weak thinly bedded light brown and occasional grey and yellowish brown mottled highly weathered MUDSTONE.			
1.00-1.45 1.00-2.00	SPT(C) N=19 B			2,4/5,4,5,5	(2.35)					
2.00-2.45 2.00-3.00 2.00-2.45	D C SPT N=29			2.00m to 3.00m - 100% Recovery 4,5/5,7,8,9	2.35 (0.65)					
				19/04/2022: DRY		3.00	Complete at 3.00m			

Remarks Hand dug inspection pit from GL to 1.00m to check for services. Core diameter: 76mm to 3.00m. No groundwater encountered. Pushing cobble from 1.00m to 2.00m. Hole collapsed at 3.00m. On completion backfilled with Gravel and installed a 50mm dia hdpe gas monitoring standpipe with a gas valve and a gravel surround to 3.00m, a Bentonite seal from 1.00m to 0.20m and a concreted in lockable steel protective cover from 0.20m to GL.	Scale (approx) 1:25	Logged By LMB/VW
Figure No. NE4118A.M3A		

Boring Method MINI PERCUSSIVE	Casing Diameter		Ground Level (mOD)	Client JAMIE TULLY	Job Number NE4118A
	Location AS PLAN		Dates 19/04/2022	Engineer STUDIO KMA	Sheet 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.00-0.40	B						MADE GROUND: dark greyish brown very sandy clayey silty fine to coarse gravel sized fragments of sandstone, concrete, wood and brick with occasional cobble sized fragments of sandstone.			
0.50-0.90	B									
1.00-1.45 1.00-2.00	SPT(C) N=10 B			3,3/2,4,3,1						
2.00-2.45 2.00-2.45 2.00-3.00	SPT N=24 D B			2,3/8,8,3,5		(3.50)				
3.00-3.45 3.00-4.00 3.00-3.45	D C SPT N=32			3.00m to 4.00m - 90% Recovery 5,21/17,5,5,5		3.50	Extremely weak thinly bedded greyish brown and brownish grey highly to completely weathered MUDSTONE.			
4.00-4.45	SPT(C) N=42			7,7/8,11,11,12		(0.95)				
				19/04/2022:DRY		4.45	Complete at 4.45m			

Remarks Hand dug inspection from GL to 1.00m to check for services. Core diameter: 64mm to 4.00m. No groundwater encountered. On completion backfilled with gravel and installed a 50mm dia hdpe gas monitoring standpipe with a gas valve and a gravel surround to 4.00m, a Bentonite seal from 1.00m to 0.20m and a concreted in lockable steel protective cover from 0.20m to GL.	Scale (approx)	Logged By
	1:25	LMB/VW
Figure No. NE4118A.M4		



SS SUB SURFACE SITE INVESTIGATION SPECIALISTS, GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS 3 Peel Street, Preston, Lancashire, PR2 2QS. Tel: (01772) 561135 Fax: (01772) 204907	Nominal Section			
	Site 188 DEIGHTON ROAD, HUDDERSFIELD, WEST YORKSHIRE	Date Drawn 01/11/2022	Date Checked	Sheet 1/1
Client JAMIE TULLY	Drawn By	Checked By	Scale 1:40[V]	Figure No. M3648.1

ROTARY BOREHOLE RECORD SHEETS

Machine : FRASTE SL Flush : WATER Core Dia: NONE mm Method : ROTARY OPEN HOLE	Casing Diameter 140mm cased to 3.00m	Ground Level (mOD)	Client JAMIE TULLY	Job Number NE4118A
	Location AS PLAN	Dates 30/09/2022	Engineer STUDIO KMA	Sheet 1/2

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
							(0.80)	MADE GROUND: compact dark brown soil with orange sandstone rubble and brick earth.		
							0.80 (0.50) 1.30	MADE GROUND: dense orange brown sandstone lumps (possibly natural) ground.		
							(1.50)	MADE GROUND: very dense orange brown sandstone/siltstone.		
							2.80	Strong greyish brown mudstone.		
							(5.30)			
							8.10 (0.50) 8.60	Strong black brown (dirty) coal.		
							8.60	Strong dark grey mudstone.		
							(2.40)			
							11.00	Strong grey to light grey mudstone.		
							(5.50)			
							16.50 (0.60) 17.10	Very strong light grey mudstone.		
							17.10	Strong light to mid grey mudstone with very thin lenses of fine coal.		

Remarks Description based upon foreman drillers records of water flush returns. Foreman driller recorded no voids, broken ground or loss of flush returns. On completion backfilled with arisings and grout.	Scale (approx) 1:100	Logged By LMB/VW
Figure No. NE4118A.R1		



SUB SURFACE

SITE INVESTIGATION SPECIALISTS, GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS
3 Peel Street, Preston, Lancashire, PR2 2QS. Tel: (01772) 561135 Fax: (01772) 204907

Site
188 DEIGHTON ROAD, HUDDERSFIELD, WEST YORKSHIRE

Borehole Number
R1

Machine : FRASTE SL Flush : WATER Core Dia: NONE mm Method : ROTARY OPEN HOLE	Casing Diameter 140mm cased to 3.00m	Ground Level (mOD)	Client JAMIE TULLY	Job Number NE4118A
	Location AS PLAN	Dates 30/09/2022	Engineer STUDIO KMA	Sheet 2/2

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
							(12.90)			
					30/09/2022: DRY		30.00	Complete at 30.00m		

Remarks	Scale (approx) 1:100	Logged By LMB/VW
	Figure No. NE4118A.R1	



SUB SURFACE

SITE INVESTIGATION SPECIALISTS, GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS
3 Peel Street, Preston, Lancashire, PR2 2QS. Tel: (01772) 561135 Fax: (01772) 204907

Site
188 DEIGHTON ROAD, HUDDERSFIELD, WEST YORKSHIRE

Borehole Number
R2

Machine : FRASTE SL	Casing Diameter 140mm cased to 3.00m	Ground Level (mOD)	Client JAMIE TULLY	Job Number NE4118A
Flush : WATER			Engineer STUDIO KMA	Sheet 1/2
Core Dia : NONE mm	Location AS PLAN	Dates 30/09/2022-01/10/2022		
Method : ROTARY OPEN HOLE				

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
							(0.80)	MADE GROUND: compact dark brown soil with orange sandstone rubble and brick earth.		
							(0.30) (0.80) (1.10)	MADE GROUND: dense orange brown sandstone lumps (possible natural ground).		
							(1.30)	MADE GROUND: very dense orange brown sandstone/siltstone.		
							2.40	Strong greyish brown mudstone.		
							(6.10)			
							8.50 (0.40) (8.90)	Strong black brown (dirty) coal.		
							(2.10)	Strong dark grey mudstone.		
							11.00	Strong grey to light grey mudstone.		
							(3.00)			
							14.00	Strong grey to light grey mudstone.		
							(1.00)			
							15.00	Very strong grey to light grey mudstone.		
							(1.50)			
							16.50	Strong grey to light grey mudstone with very thin occasional coal lenses.		

Remarks Description based upon foreman drillers records of water flush returns. Foreman driller recorded no voids, broken ground or loss of flush returns. On completion backfilled with arisings and grout.	Scale (approx)	Logged By
	1:100	LMB/VW
	Figure No. NE4118A.R2	

Machine : FRASTE SL Flush : WATER Core Dia: NONE mm Method : ROTARY OPEN HOLE	Casing Diameter 140mm cased to 3.00m	Ground Level (mOD)	Client JAMIE TULLY	Job Number NE4118A
	Location AS PLAN	Dates 30/09/2022-01/10/2022	Engineer STUDIO KMA	Sheet 2/2

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
							(13.50)			
					30/09/2022:DRY		30.00	Complete at 30.00m		

Remarks	Scale (approx) 1:100	Logged By LMB/VW
Figure No. NE4118A.R2		



SUB SURFACE

SITE INVESTIGATION SPECIALISTS, GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS
3 Peel Street, Preston, Lancashire, PR2 2QS. Tel: (01772) 561135 Fax: (01772) 204907

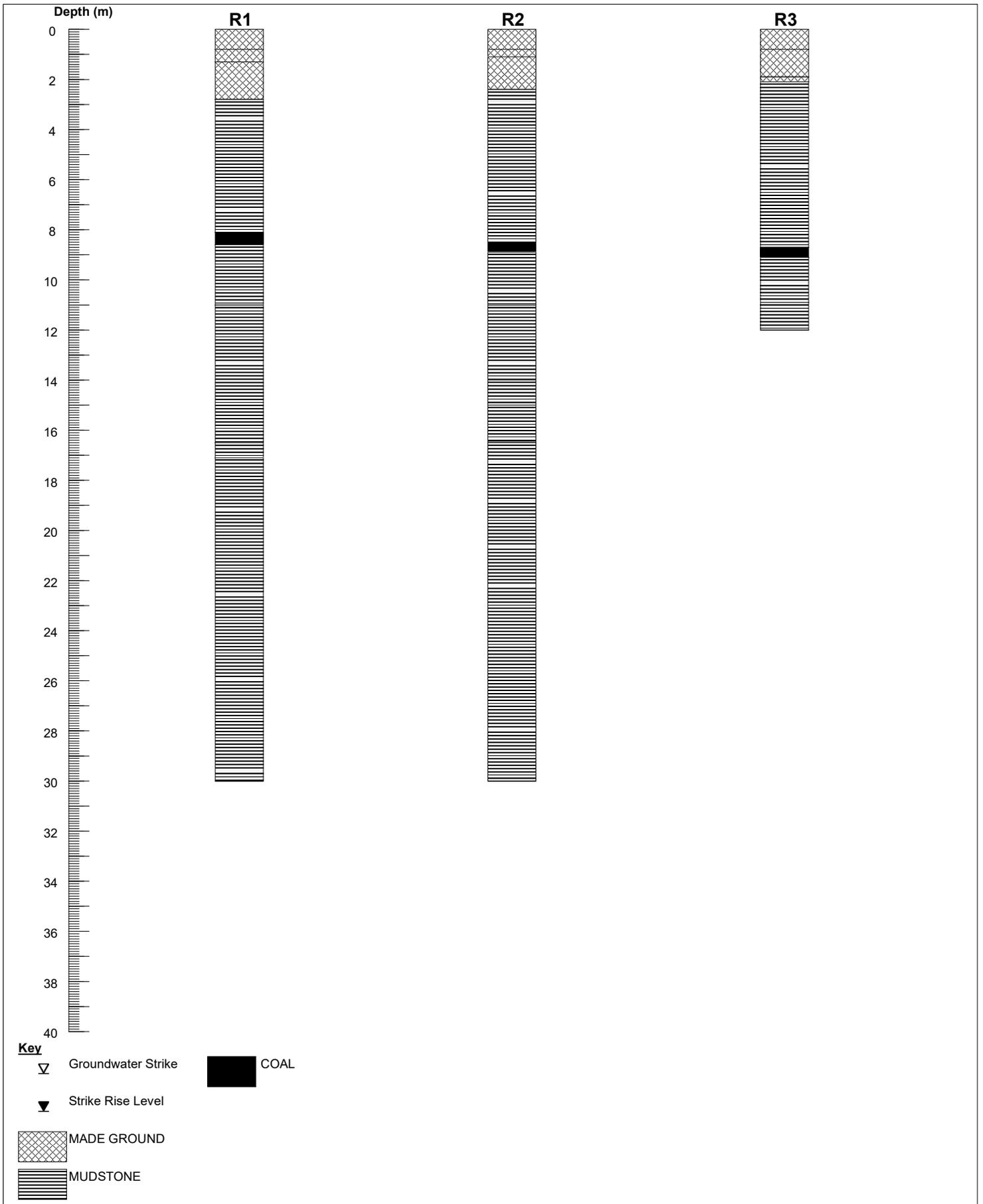
Site
188 DEIGHTON ROAD, HUDDERSFIELD, WEST YORKSHIRE

Borehole Number
R3

Machine : FRASTE SL	Casing Diameter 140mm cased to 2.00m	Ground Level (mOD)	Client JAMIE TULLY	Job Number NE4118A
Flush : WATER			Engineer STUDIO KMA	Sheet 1/1
Core Dia : NONE mm	Location AS PLAN	Dates 30/09/2022-01/10/2022		
Method : ROTARY OPEN HOLE				

Depth (m)	TCR (%)	SCR (%)	RQD (%)	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
							(0.80)	MADE GROUND: compact dark brown soil with orange sandstone rubble and brick earth, some large sandstone blocks.		
							0.80			
							(1.10)	MADE GROUND: dense orange brown sandstone lumps (possible cellar).		
							1.90			
							2.10	MADE GROUND: very dense orange brown sandstone/siltstone.		
								Soft greyish brown mudstone/clay over strong mudstone.		
							(6.60)			
							8.70			
							(0.40)	Strong black brown (dirty) coal.		
							9.10	Strong dark grey mudstone.		
							(1.80)			
							10.90	Strong grey to light grey mudstone.		
							(1.10)			
							12.00	Complete at 12.00m		
					30/09/2022: DRY					

Remarks Description based upon foreman drillers records of water flush returns. Foreman driller recorded no voids, broken ground or loss of flush returns. On completion backfilled with arisings and grout.	Scale (approx)	Logged By
	1:100	LMB/VW
	Figure No. NE4118A.R3	



 SUB SURFACE SITE INVESTIGATION SPECIALISTS, GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS 3 Peel Street, Preston, Lancashire, PR2 2QS. Tel: (01772) 561135 Fax: (01772) 204907	Nominal Section			
	Date Drawn 01/11/2022	Date Checked	Sheet 1/1	Job Number NE4118A
Site 188 DEIGHTON ROAD, HUDDERSFIELD, WEST YORKSHIRE	Drawn By	Checked By	Scale 1:200[V]	Figure No. M3648.1
Client JAMIE TULLY				

HAND DUG TRIAL PIT RECORD SHEETS

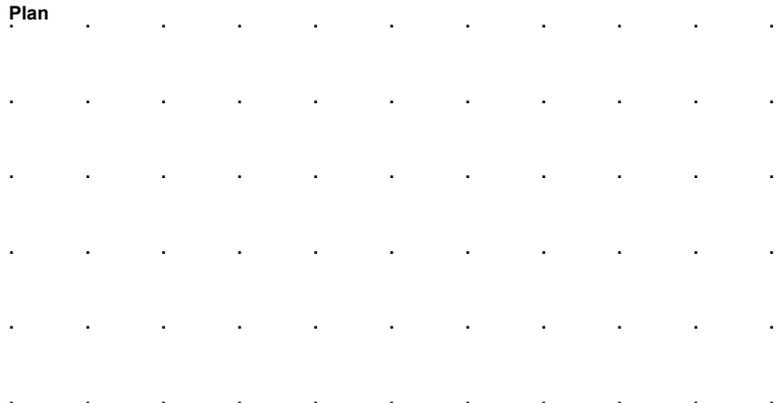
Excavation Method HAND DUG	Dimensions	Ground Level (mOD)	Client JAMIE TULLY	Job Number NE4118A
	Location AS PLAN	Dates 19/04/2022	Engineer STUDIO KMA	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.30	B		19/04/2022:DRY		(0.30) 0.30	MADE GROUND: dark brown clayey silty fine to coarse sand and fine to coarse gravel sized fragments and cobble sized fragments of stone, brick, concrete and suspected cement bound asbestos. Complete at 0.30m		

Plan 	Remarks Pit sides remained vertical and stable. No groundwater encountered. On completion backfilled with arisings.			
	<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:30%;">Scale (approx) 1:25</td> <td style="width:30%;">Logged By LMB/VW</td> <td style="width:40%;">Figure No. NE4118A.HD1</td> </tr> </table>	Scale (approx) 1:25	Logged By LMB/VW	Figure No. NE4118A.HD1
Scale (approx) 1:25	Logged By LMB/VW	Figure No. NE4118A.HD1		

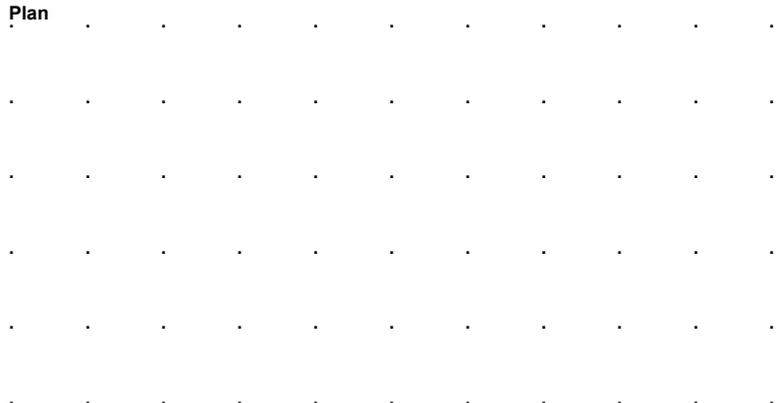
Excavation Method HAND DUG	Dimensions	Ground Level (mOD)	Client JAMIE TULLY	Job Number NE4118A
	Location AS PLAN	Dates 19/04/2022	Engineer STUDIO KMA	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.20	D		19/04/2022:DRY		(0.20) 0.20	MADE GROUND: dark brown clayey silty fine to coarse sand and fine to coarse gravel sized fragments and cobble sized fragments of stone, brick, concrete and suspected cement bound asbestos. Complete at 0.20m		

Plan 	Remarks Pit sides remained vertical and stable. No groundwater encountered. On completion backfilled with arisings.			
	<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:30%;">Scale (approx) 1:25</td> <td style="width:30%;">Logged By LMB/VW</td> <td style="width:40%;">Figure No. NE4118A.HD2</td> </tr> </table>	Scale (approx) 1:25	Logged By LMB/VW	Figure No. NE4118A.HD2
Scale (approx) 1:25	Logged By LMB/VW	Figure No. NE4118A.HD2		

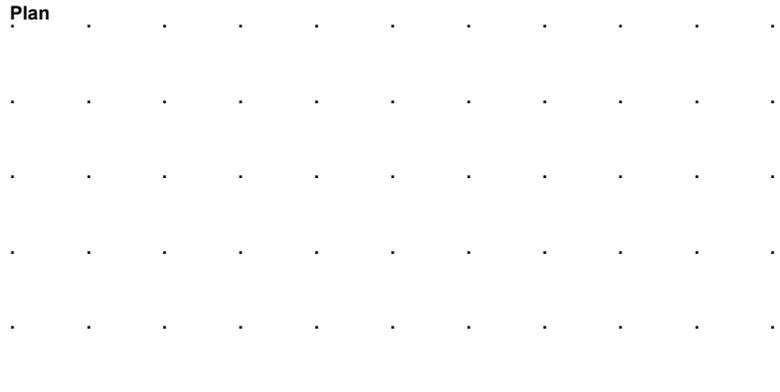
Excavation Method HAND DUG	Dimensions	Ground Level (mOD)	Client JAMIE TULLY	Job Number NE4118A
	Location AS PLAN	Dates 19/04/2022	Engineer STUDIO KMA	Sheet 1/1

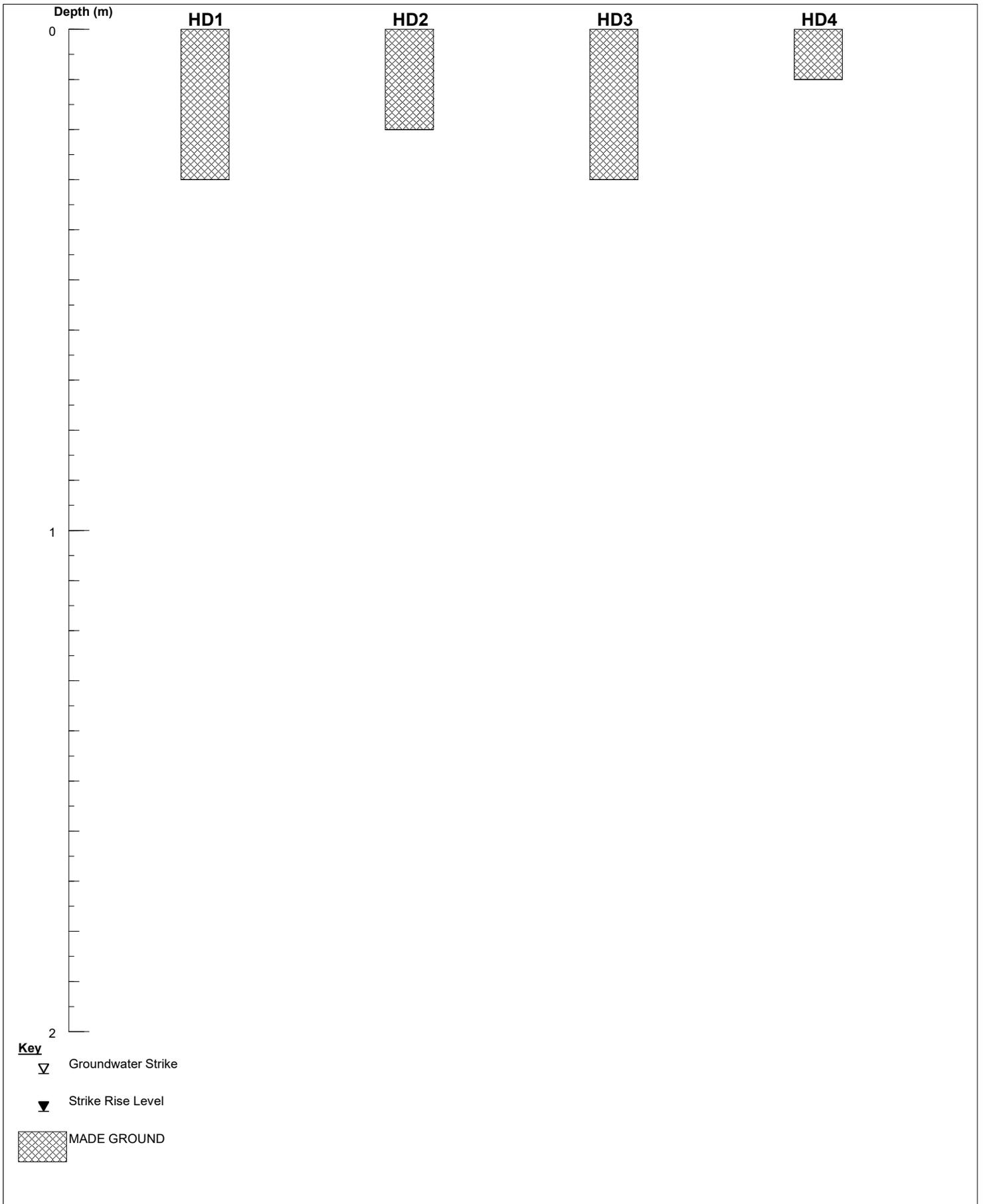
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.30	B		19/04/2022:DRY		(0.30) 0.30	MADE GROUND: dark brown clayey silty fine to coarse sand and fine to coarse gravel sized fragments and cobble sized fragments of stone, brick, concrete and suspected cement bound asbestos. Complete at 0.30m		

Plan 	Remarks Pit sides remained vertical and stable. No groundwater encountered. On completion backfilled with arisings.			
	<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:30%;">Scale (approx) 1:25</td> <td style="width:30%;">Logged By LMB/VW</td> <td style="width:40%;">Figure No. NE4118A.HD3</td> </tr> </table>	Scale (approx) 1:25	Logged By LMB/VW	Figure No. NE4118A.HD3
Scale (approx) 1:25	Logged By LMB/VW	Figure No. NE4118A.HD3		

Excavation Method HAND DUG	Dimensions	Ground Level (mOD)	Client JAMIE TULLY	Job Number NE4118A
	Location AS PLAN	Dates 19/04/2022	Engineer STUDIO KMA	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.10	B		19/04/2022:DRY		(0.10) 0.10	MADE GROUND: dark brown clayey silty fine to coarse sand and fine to coarse gravel sized fragments and cobble sized fragments of stone, brick, concrete and suspected cement bound asbestos. Complete at 0.10m		

Plan 	Remarks Pit sides remained vertical and stable. No groundwater encountered. On completion backfilled with arisings.	
Scale (approx) 1:25	Logged By LMB/VW	Figure No. NE4118A.HD4

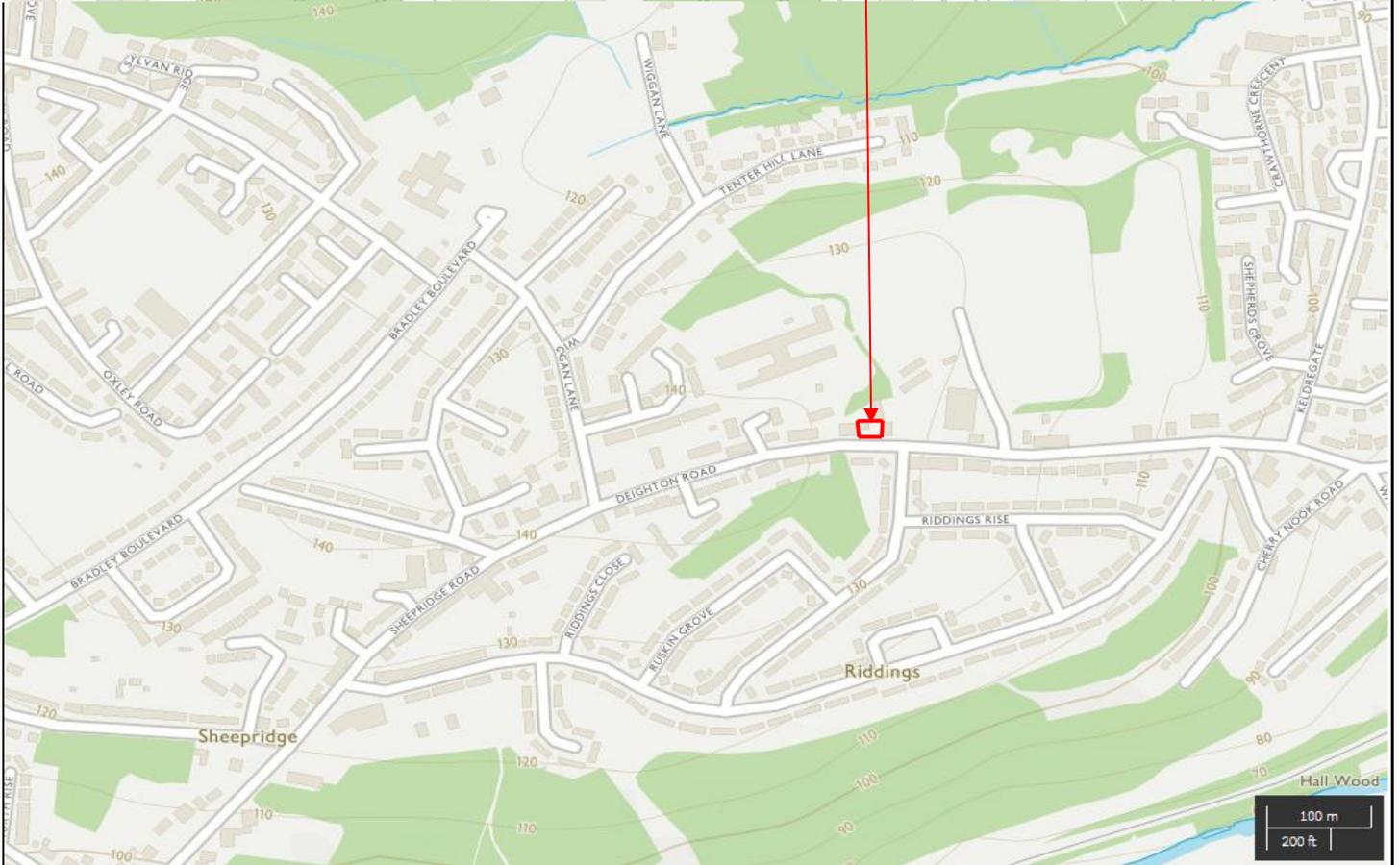
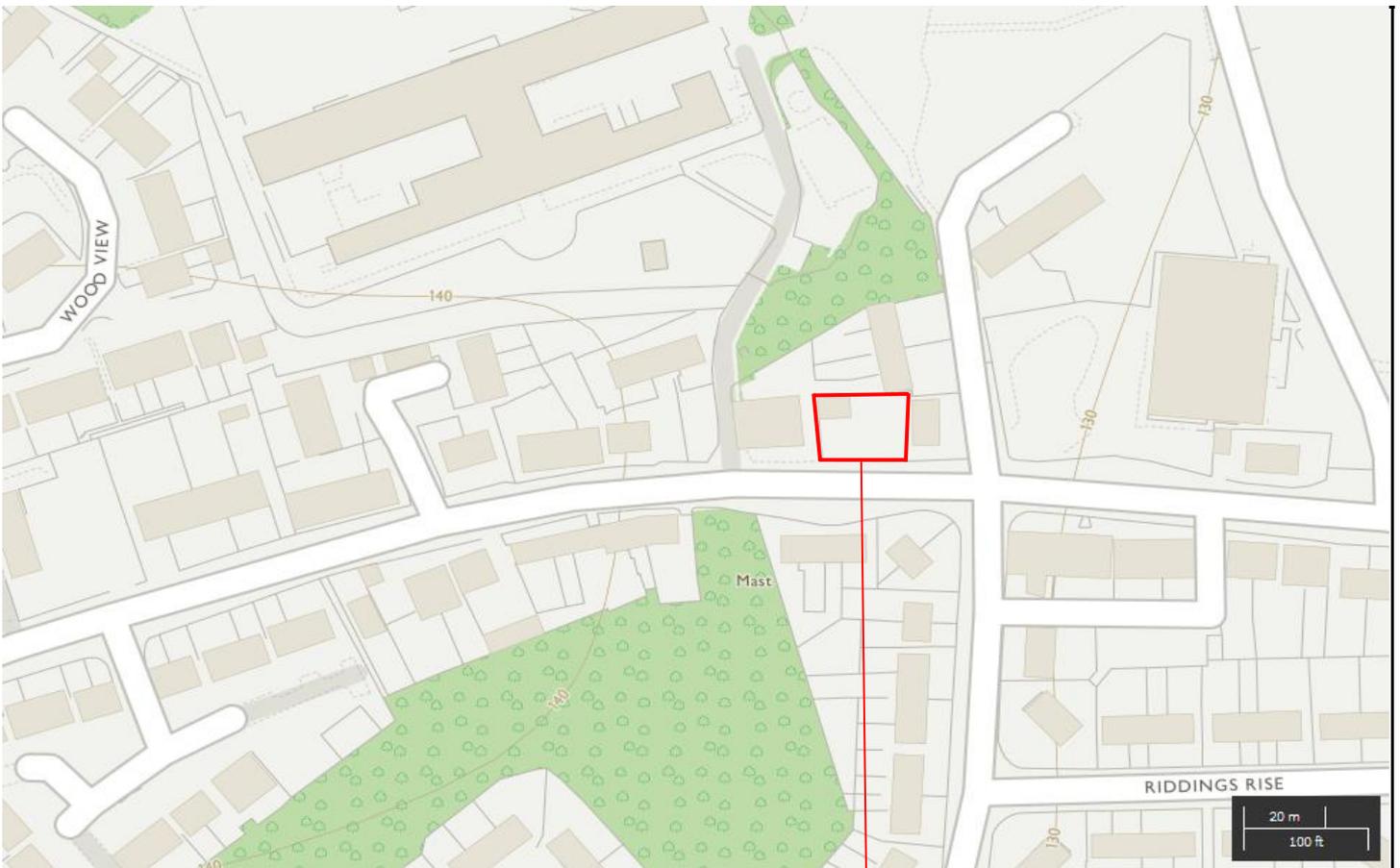


SS SUB SURFACE
 SITE INVESTIGATION SPECIALISTS, GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS
 3 Peel Street, Preston, Lancashire, PR2 2QS. Tel: (01772) 561135 Fax: (01772) 204907

Nominal Section

Site 188 DEIGHTON ROAD, HUDDERSFIELD, WEST YORKSHIRE	Date Drawn 01/11/2022	Date Checked	Sheet 1/1	Job Number NE4118A
Client JAMIE TULLY	Drawn By	Checked By	Scale 1:10[V]	Figure No. M3648.1

FIGURES



SUB SURFACE

SITE INVESTIGATION AND SPECIALIST GEOTECHNICAL CONSULTANTS
3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907

General Site Location

Site 188 DEIGHTON ROAD, HUDDERSFIELD, WEST YORKSHIRE, HD2 1JJ	Date Drawn 19-Oct-22	Date Checked	Orientation 	Job No. NE4118A
Client JAMIE TULLY	Drawn By LMB	Checked By	Scale -	Figure No. 1



Location Plan (1:500 @ A3)

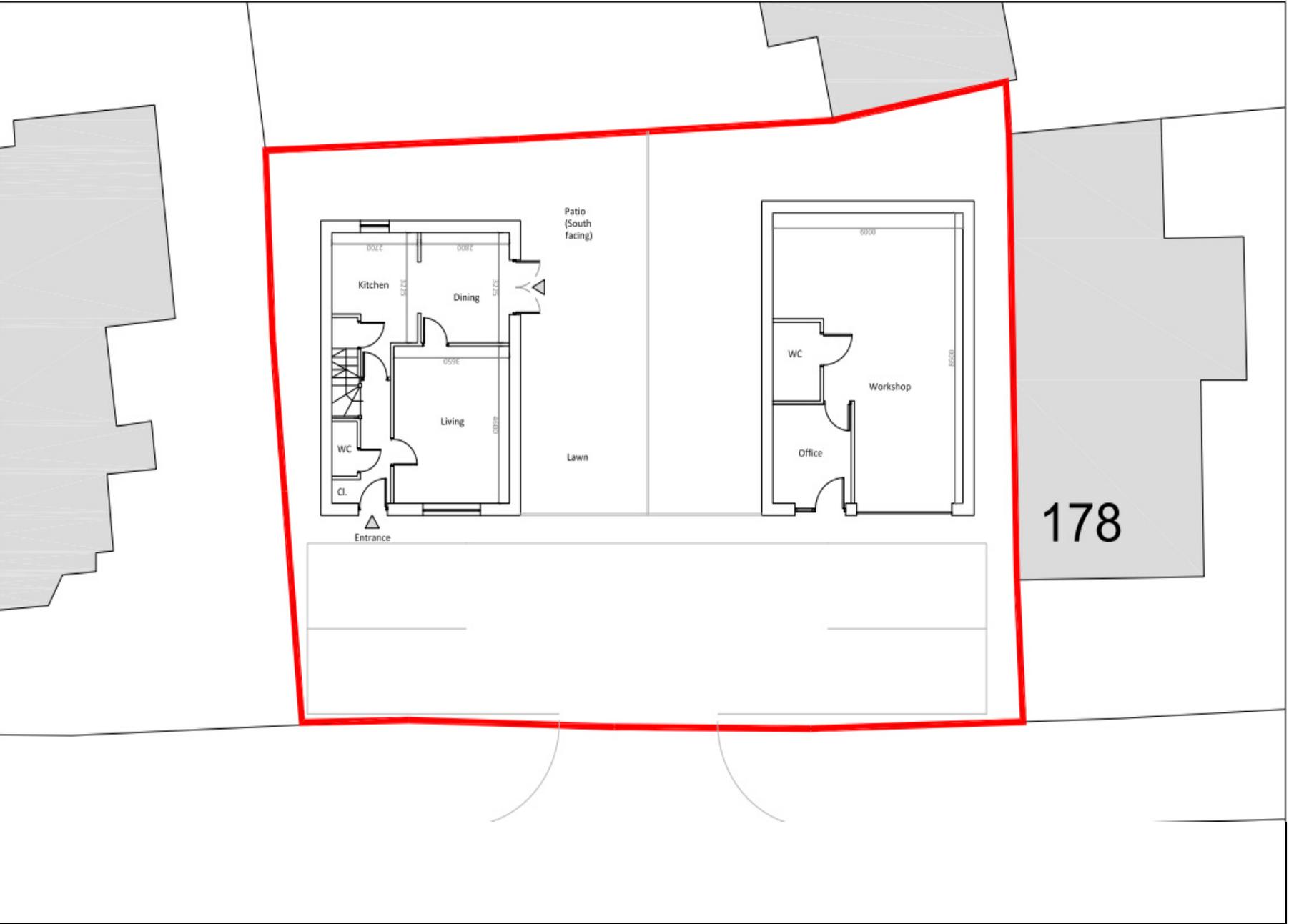


SUB SURFACE

SITE INVESTIGATION AND SPECIALIST GEOTECHNICAL CONSULTANTS
 3 Peel Street, Preston, PR2 2QS. Tel. (01772) 56135 Fax (01772) 204907

Site Location

Site 188 DEIGHTON ROAD, HUDDERSFIELD, WEST YORKSHIRE, HD2 1JJ	Date Drawn 19-Oct-22	Date Checked	Orientation 	Job No. NE4118A
Client JAMIE TULLY	Drawn By LMB	Checked By	Scale -	Figure No. 2



SUB SURFACE

SITE INVESTIGATION AND SPECIALIST GEOTECHNICAL CONSULTANTS
 3 Peel Street, Preston, PR2 2QS. Tel: (01772) 56185 Fax (01772) 204907

Proposed Development Plan

Site	188 DEIGHTON ROAD, HUDDERSFIELD, WEST YORKSHIRE, HD2 1JJ			
Client	JAMIE TULLY			
Date Drawn	19-Oct-22	Date Checked		Job No.
Drawn By	LMB	Checked By		NE4118A
Scale	—	Orientation		Figure No.
				3



SUB SURFACE

SITE INVESTIGATION AND SPECIALIST GEOTECHNICAL CONSULTANTS
 3 Peel Street, Preston, PR2 2QS, Tel. (01772) 56185 Fax (01772) 204907

Exploratory Hole Location Plan

Site	188 DEIGHTON ROAD, HUDDERSFIELD, WEST YORKSHIRE, HD2 1JJ			Date Drawn	19-Oct-22	Date Checked		Orientation		Job No.	NE4118A
Client	JAMIE TULLY			Drawn By	LMB	Checked By		Scale	—	Figure No.	4