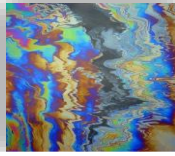




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TECHNICAL REPORT

**GROUND INVESTIGATION
AT
BOLTON HALL, CARR HEAD LANE,
BOLTON UPON DEARNE,
SOUTH YORKSHIRE
FOR
THE HOUSE CROWD**

**REPORT NO. NE3565
FEBRUARY 2017**



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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 AND TESTING	3.1 Sampling
	3.2 Field Testing
	3.3 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 Roads, Hardstandings and Car Parks
	4.7 Contamination Consideration
	4.8 General
APPENDICES	Insitu Test results
	Laboratory Test results
	Contamination Analysis results
	Mini Borehole Record sheets
	Trial Pit Record sheets
	Figures

**GROUND INVESTIGATION AT BOLTON HALL, CARR HEAD LANE, BOLTON
UPON DEARNE, SOUTH YORKSHIRE**

CLIENT: THE HOUSE CROWD LIMITED

ENGINEER: BELL MUNRO CONSULTING LIMITED

1. INTRODUCTION

This report has been prepared in accordance with an email, dated 3rd January 2017, from the Client.

The brief was set out in our estimate, ref. E5490 and dated 21st December 2016, with amendments as the investigation proceeded and includes:

- 6 No. mini boreholes
- 6 No. trial pits
- 3 No. soakaway tests
- 4 No. in-situ CBR tests
- Geotechnical laboratory testing
- Contamination analysis
- Provision of an interpretative report on the above.

It should be noted that a Phase I Preliminary Risk Assessment Report for this site, ref. LKC 16 1223 and dated June 2016 has been carried out by LK Consult Limited, which should be read in conjunction with this report.

1.1 Site Location and Description

The site is located at Bolton Hall, Carr Head Lane, Bolton upon Dearne, South Yorkshire, as indicated on Figure 1. The approximate National Grid Reference of the centre of the site is 445044 402700.

As shown on Figure 2, the irregular shaped site comprises of a bituminous macadam access driveway from Carr Head Lane to a two-storey brick nursing home awaiting demolition. The site access road and buildings are set within grassed areas, with the grassed areas slightly higher than the access driveway. The site is bound to the north by Carr Head Lane, to the east and west by residential houses and to the south by a recreational ground.

1.2 Proposed Development and Purpose of the Ground Investigation

We understand that it is proposed to build twenty-eight residential properties with associated gardens and an access road from Carr Head Lane, 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.

NE3565 – BOLTON HALL

In addition, 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.

2. INVESTIGATION

2.1 Investigation Details

Six mini boreholes were put down to depths of between 1.77 and 2.45 metres using an Archway Competitor 130 Mini Sampling Rig fitted with windowless sample tubes of 83mm diameter at the positions determined and set out by Sub Surface North East Limited, as shown on Figure 2. The samples were subsequently logged in accordance with BS EN ISO 14688-1: 2002 and BS EN ISO 14689-1: 2003 and the resulting Mini Borehole Records are appended. On completion, the mini boreholes were backfilled with arisings as no installations were required.

Six trial pits were taken out by a mechanical excavator at the positions determined and set out by Sub Surface North East Limited, as shown on Figure 2. The trial pits were excavated to depths of between 1.30m and 3.20 metres, representative samples were taken and the materials were logged in accordance with BS EN ISO 14688-1: 2002 and BS EN ISO 14689-1: 2003. The resulting Trial Pit Records are appended. On completion, soakaway tests were undertaken in TP1, TP2 and TP3. The trial pits were then backfilled with arisings by the excavator and it is therefore likely that loose or soft pockets will still remain.

2.2 Sub Surface Detail

Details of the strata encountered in the ground investigation are given on the appended Mini Borehole and Trial Pit Records. The exploratory holes found Made Ground overlying occasional bands of cohesive and granular strata, overlying sandstone with occasional bands of mudstone. The depths of strata found were as follows:

TABLE 1 STRATA

Expl. Hole No.	Depth of Made Ground (m)	Depth of Cohesive Strata (m)	Depth of Granular Strata (m)	Depth of Bedrock (m)	Depth of Hole (m)
M1	0.25	0.25 – 0.70, 1.00 – 1.70	0.70 – 1.00	- 1.70 - >1.87	1.87
M2	0.60	- 1.00 – 1.20	0.60 – 1.00, 1.20 – 1.40	- 1.40 - >1.93	1.93
M3	1.10	-	1.10 – 1.70	1.70 - >2.45	2.45
M4	0.30	-	-	0.30 - >1.83	1.83
M5	1.00	-	1.00 – 1.50	1.50 - >1.77	1.77
M6	1.30	-	-	1.30 - >2.30	2.30
TP1	1.10	1.10 – 1.40	-	1.40 - >2.70	2.70

NE3565 – BOLTON HALL

TP2	0.40	-	-	0.40 – >1.30	1.30
TP3	0.35	0.35 – 0.95	-	0.95 - >1.90	1.90
TP4	0.42/1.70	0.42 – 0.80	-	0.80/1.70 - >1.70	1.70
TP5	1.02	-	1.02 – 2.00	2.00 - >2.35	2.35
TP6	2.30	2.30 – 3.05	-	3.05 - >3.20	3.20

M = Mini Borehole, TP = Trial Pit

A general summary of the strata found is as follows:

2.2.1 Made Ground/Topsoil

The depths of Made Ground varied across the site to depths of between 0.25m and 2.30m. Made Ground topsoil was generally found initially comprising of dark brown slightly gravelly slightly sandy to sandy silty clay, a clayey sandy silt in some exploratory holes with occasional to many rootlets. Made Ground found in M1 was different, comprising of a bituminous macadam surfacing to 0.10m overlying grey sand fine to coarse gravel sized fragments of stone. Natural topsoil was found in TP2 from ground level to 0.40m.

Underlying the Made Ground topsoil in M2, M3, M6, TP1, TP3, TP4, TP5 and TP6 were brown to dark brown slightly gravelly occasionally slightly sandy to sandy silty clay, being very gravelly in M3 with low cobble sized fragments of brick and areas of sand sized ash in TP3. Underlying the topsoil in M5 were brown, dark brown and grey slightly clayey sandy fine to coarse gravel sized fragments of stone.

In M6, dark brown slightly gravelly silt, with occasional rootlets overlying a light brown and occasional dark brown and white gravelly fine sand was found beneath the clay. TP4 and TP6 found deep Made Ground to depths of 1.70m and 2.30m respectively with brick and sandstone rubble in the centre of TP4 and brown sand and gravel sized fragments of sandstone with some roots in TP6.

Gravel within the Made Ground comprised of fine to coarse stone, brick, concrete, coal and glass.

2.2.2 Cohesive Strata

Cohesive strata was found in a number of the exploratory holes, comprising of brown silty clay in M1, TP1, TP3, TP4 and TP5, slightly gravelly and sandy in places, becoming a clayey sand in places in TP3 and TP6. Worm burrows were noted in TP6 from 2.30m to 2.55m.

Stiff medium to high strength brown and occasional grey and dark grey silty clay (completely weathered mudstone) was found in M1, M2 and TP6.

It should be noted that the cohesive strata was desiccated in places and the foundations and floor slab should be designed with this in mind to eliminate the risk of heave.

NE3565 – BOLTON HALL

2.2.2 Granular Strata

Brown clayey sandy angular to subangular fine to coarse sandstone gravel was found in M1, with brown subangular fine to coarse sandstone gravel and cobbles in TP5. The remaining granular strata encountered in M2, M3, M5 and TP5 was completely weathered sandstone comprising of brown, occasionally light brown, grey and orangish brown slightly gravelly to gravelly silty fine to medium sand, becoming a sandy clay in places in TP5.

2.2.3 Bedrock

Bedrock was found in all the exploratory holes and generally comprised of very weak to weak, occasional extremely weak thinly bedded light brown highly weathered fine to medium grained sandstone, occasionally becoming strong and slightly weathered/fresh with depth in the trial pits.

A slightly finer grained bedrock was found in M4 comprising of extremely weak brown and grey highly weathered siltstone, becoming a very weak thinly laminated grey and occasional orangish brown highly weathered siltstone. Bands of mudstone were found in M1, M2 and M4 comprising of extremely weak to very weak brown and grey mottled highly weathered mudstone. The siltstone and mudstone bedrock was generally located in the south of the site where the bedrock is the Pennine Middle Coal Measures Formation.

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 and may be subject to seasonal and/ or climatic variations.

3. SAMPLING AND TESTING

3.1 Sampling

Core samples were taken in the mini boreholes, small disturbed samples were retained for the strata encountered and the samples 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

Three hand shear vane tests were undertaken in the trial pits and the results are given on the appended Trial Pit Records.

Eight Standard Penetration Tests (SPTs) and four 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.

Four insitu California Bearing Ratio (CBR) tests were carried out at the positions shown on Figure 2 and the results are appended.

On completion of TP1, TP2 and TP3 soakaway tests were undertaken in the sandstone. Water was added to the pits from a bowser and water levels were subsequently monitored over a period of up to four hours. Water levels were found to have fallen insufficiently to determine the Soil Infiltration Rates in TP1 and TP2. Whilst the Soil Infiltration Rates for TP3 have been determined and the details of the soakaway tests are appended.

3.3 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
- Pyritic Ground testing (including soluble sulphate and pH value tests)
- Soluble sulphate content and pH value tests

Contamination analyses have been performed on ten soil samples to determine: pH and concentrations of sulphate, sulphide, cyanide, arsenic, boron (soluble), cadmium, chromium, hexavalent chromium, copper, lead, mercury, 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, nine soil samples were subjected to an asbestos screen.

One leachate sample has been prepared in accordance with the Environment Agency protocol and contamination analyses have been performed to determine: pH and concentrations of sulphate, sulphide, cyanide, arsenic, boron (soluble), cadmium, chromium, hexavalent chromium, copper, lead, mercury, nickel, selenium, zinc, speciated TPHs, the speciated PAHs suite, the BTEX suite and phenols.

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 and whilst the exploratory holes indicate a degree of similarity they should not be interpolated or extrapolated to represent the ground conditions in adjacent areas.

Due to 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 not be undertaken.

Details of the findings of the investigation are given on the appended Mini Borehole and 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 build twenty-eight residential properties with associated gardens and an access road from Carr Head Lane, as shown on Figure 3. However, at the time of writing this report no specific details regarding the proposed foundations and design loadings were available and consequently the recommendations given are in general terms only.

The ground investigation found Made Ground overlying occasional bands of cohesive and granular strata, overlying sandstone with occasional bands of mudstone.

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 in the natural medium strength cohesive strata, the medium dense granular drift strata or rockhead.

Atterberg limit tests on the cohesive strata indicate clays of low 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.

Further precautions might need to be taken to protect walls and floor slabs from the effects of swelling following the removal of the trees or the cutting of the roots. Damage is likely to be caused when desiccated cohesive soils expand on taking up moisture previously taken by the roots; if for example, walls are constructed such as to constrain such soils to a limited volume.

It should be noted that in parts of the site the natural strata is at a depth of 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 in some areas 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 and laboratory 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	11	44	80	100	1.00
	1.80	50/70mm	-	600*	600*	
M2	1.15	30	-	355*	355*	1.00
	1.80	53/125mm	-	600*	600*	
M3	1.15	1	-	5*	5*	1.70
	2.15	61	-	600*	600*	
M4	1.15	15	60	110*	135*	0.75
	1.60	57/225mm	-	600*	600*	
M5	1.15	13	-	140*	140*	1.10
	1.70	50/70mm	-	600*	600*	
M6	1.15	20 ^{\$}	-	225*	225*	1.40
	2.00	56	-	600*	600*	
TP1	1.20	-	35 [#]	65	80	1.40
TP2	-	-	-	-	-	0.75
TP3	0.60	-	38 [#]	70	85	0.95
TP4	-	-	-	-	-	1.80
TP5	-	-	-	-	-	2.00
TP6	2.80	-	75 [#]	140	170	2.55

\$ Partial SPT 'N' Value used

* For footings on granular strata, the safe bearing capacity given is based upon a footing width of less than 1.50 metres. For wider footings a reduction would be necessary.

Shear strength determined by hand shear vane test.

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 80 kN/m² for strip footings and 100 kN/m² for square pads should not be exceeded for the recommended minimum foundation depth given.

It should be noted that the nursing home shows signs of a refurb and a new build extension in the recent past, and as we understand, the whole building is to be knocked down and all foundations are to be dug out.

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 (Mv) 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 granular, cohesive and/ or rock 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.

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 and possibility of heave of desiccated clays, 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, the bituminous macadam surfacing will need to be broken out prior to excavation.

The trial pit sides were found to have variable stability during the relatively short period that they were left open and unsupported with instability found in within the Made Ground.

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.

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 and may be subject to seasonal and/ or climatic variations.

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

Soakaway tests undertaken in TP1 and TP2 within the sandstone indicated that the strata was too impermeable to calculate the Soil Infiltration Rate and therefore will not be suitable for a sustainable urban drainage system. The soakaway tests undertaken in TP3 found Soil Infiltration rates of 4.62×10^{-5} and 7.63×10^{-6} m/second suggesting that a sustainable urban drainage system may be possible within this area. However, as all three soakaway tests were carried out within the same sandstone strata, in our opinion a sustainable urban drainage system would not be suitable.

4.5 Buried Concrete

For the design of buried concrete the recommendations given in Building Research Establishment (BRE) Special Digest 1 (September 2005 revision), "Concrete in Aggressive Ground", should be followed.

Determination of pH on the soil samples gave values in the range of 4.4 to 8.6 (acidic to alkaline).

Soluble sulphate concentrations were also determined for the soil samples and the results ranged from <0.01 to 0.14 g/l.

Total sulphate, total sulphur and magnesium have been determined for one soil sample and the results were <0.01%, 0.02% and <0.01 g/l respectively. Our calculations have determined that pyrite (sulphides) are not present and therefore will not weather and produce higher levels of sulphates.

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-4z should be used as detailed on the appended extract.

4.6 Roads, Hardstandings and Car Parks

Insitu California Bearing Ratio (CBR) tests have been undertaken along the line of the proposed road at the positions shown on Figure 2 and the results of the tests are appended. A summary of the insitu CBR test results is as follows:

TABLE 3 INSITU CBR RESULTS

Expl. Hole No.	Depth (m)	Moisture Content (%)	CBR Value (%)	Strata
CBR1	0.70	10	20	Brown SAND with sandstone lithorelicts
CBR2	0.50	18	1.0	Brown SAND with clayey bands
CBR3	0.30	16	6.8	Brown CLAY
CBR4	0.35	18	2.5	MG: Brown slightly gravelly CLAY

It should be noted that the above values are moisture dependent and it is possible that the CBR values would reduce with increased moisture content and increase with decreased moisture content; this being particularly so for cohesive strata.

Given the above it would be advisable to design on a CBR value of 1.0% for the road where they are found at formation level. If there is to be a delay before construction, to prevent water softening, loosening and disturbance, the formation strata should not be exposed.

We recommend that following earthworks to form the final formation levels for the proposed road, proof rolling and additional insitu CBRs should be undertaken. A review of the design CBR values should then be undertaken before finalising the pavement design.

4.7 Contamination Considerations

It should be noted that a Phase I Preliminary Risk Assessment Report, including a Conceptual Ground Model, ref. LKC 16 1223 and dated June 2016, has previously been undertaken by LK Consult Limited. This Phase II ground investigation has been undertaken to provide an initial contamination risk assessment in accordance with the 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.

4.8.1 Assessment (Soil)

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

Levels of the determinants has been compared against published guideline values. The Department for Environment, Food and Rural Affairs (DEFRA) and the Environment Agency published soil guideline values (SGVs) for mercury, selenium, benzene, toluene, ethylbenzene and xylene on 31 March 2009, arsenic and nickel on 12 May 2009 and cadmium and phenols in June 2009. In July 2009 Generic Assessment Criteria (GACs) were published by Land Quality Management Limited (LQM) in conjunction with the Chartered Institute of Environmental Health (CIEH). Contaminated Land: Applications in Real Environments (CL:AIRE) guideline values were also published in December 2009 to supplement the above. DEFRA published in March 2014 Category 4 Screening Levels (C4SLs) for arsenic, cadmium, lead, hexavalent chromium, benzo(a)pyrene and benzene. In November 2014 Suitable for Use Levels (S4ULs) were then published by LQM/ CIEH which superseded the GACs. Updated S4ULs values for cadmium and phenols were published in July 2015 and for nickel in August 2015. The guideline values (SGVs, S4ULs, CL:AIRE and C4SLs) 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 residential with associated gardens, 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 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	M5	0.60	43	37
lead	M5	0.60	1200	200
	M3	0.50	710	200
dibenzo(ah)anthracene	M2	0.00	0.34	0.30

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

The contamination analysis shows very marginal elevations of arsenic and dibenzo(ah)anthracene within only one soil sample and in our opinion they are at levels in which remedial measures or precautions are not required. However, there are elevated levels of lead on site, which will require remedial measures and/or precautions.

An asbestos screen was undertaken on nine soil samples and no asbestos was detected.

4.7.2 Assessment (Leachate)

To assess the leachability of contaminants, and the consequent pollution potential of the on-site material to “controlled waters”, one sample of near surface soil/ Made Ground have been processed in accordance with the Environment Agency’s protocol, the leachate analysed for a suite of determinants in accordance with the Conceptual Ground Model and the results are appended.

We have listed the samples where the levels of contamination have exceeded the Environment Agency’s Environmental Quality Standards (EA EQS) and/ or the United Kingdom Drinking Water Standards (UK DWS), as follows:

TABLE 4 ASSESSMENT OF LEACHATE CONTAMINATION

Determinant	Expl. Hole No	Depth (m)	Recorded Level (µg/l)	EA EQS (µg/l)	UK DWS (µg/l)
Total TPH	TP1	0.60	35	-	10
Total PAH	TP1	0.60	7.1	-	0.1

The levels of TPH and PAH are very low but are above the UK DWS, but the UK DWS is a post treatment standard and as such is very stringent. It should be noted that leachate analysis generally overestimates the levels of organic compounds and due to the nearest abstraction license being some 1157m to the north east and the nearest watercourse being the River Dearne some 480m to the south west of the site boundary, we believe the risk to controlled waters is very low.to negligible and no further action need be taken.

4.7.3 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 the soil samples, indicates that elevated levels of lead are present in the near surface Made Ground/ soils (source) in M3 and M5. 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.

The elevated contaminants found on site are particularly hazardous if they are in contact with the skin, ingested, usually by eating contaminated fruit and vegetables and/ or inhalation of dust, and in addition may hinder plant growth.

In gardens and areas of open space which are not covered by paving slabs, concrete and/or bituminous macadam surfaces, 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 600mm blanket of clean topsoil/ subsoil (equivalent to two spade depths) is provided in back gardens and a 450mm blanket of imported clean topsoil/ subsoil is provided in front gardens and other open spaces. 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.

Alternatively, further sampling and testing could be carried out to try to delineate the contaminated areas, as the more contaminated material appears to be in the locality of boreholes M3 and M5, in the south east corner and the north respectively. Consideration, may then be able to be given to excavating out any “hotspots” and removing them from site to an appropriately licenced tip.

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 wear gloves, overalls, and boots and smoking should be prohibited.

4.8 General

In the preparation of this report no consideration has been given to the possible presence of ground gas, as this was specified as not being necessary in the Desk Study carried out by LK Consult Limited.

It should be noted that we have made recommendations for further investigation in Section 4.7.2 to try to delineate the contaminated areas of lead found in boreholes M3 and M5.

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

We would be happy to undertake the above or alternatively the Client should undertake such consultations before proceeding.

We recommend that when developing a “brownfield site” a phased investigation is undertaken in order that each phase informs the next. A typical phased investigation comprises the following:

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

Following completion of the Phase II ground investigation and monitoring a Phase III remediation statement should be compiled and submitted to the Regulator for approval prior to 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. NE3565
FEBRUARY 2017

D. C. Marsden M.Eng.(Hons.).
Geotechnical Engineer
For and on behalf of
Sub Surface Consultants Limited

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

NE3565 – BOLTON HALL

INSITU TEST RESULTS



SUB SURFACE

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

Standard Penetration Test Results

Site : BOLTON HALL, BOLTON UPON DEARNE, SOUTH YORKSHIRE

Client : THE HOUSE CROWD LIMITED

Engineer: BELL MUNRO CONSULTING LIMITED

Job Number
NE3565

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	2	2	3	4	N=11	
M1	1.80	1.80	1.87	SPT			50				0*/0mm 50/70mm	
M2	1.00	1.15	1.45	SPT	4	5	5	9	9	7	N=30	
M2	1.80	1.80	1.93	CPT			12	41			0*/0mm 53/130mm	
M3	1.00	1.15	1.45	SPT	1	0	0	0	1	0	N=1	
M3	2.00	2.15	2.45	SPT	6	6	8	10	15	28	N=61	
M4	1.00	1.15	1.45	SPT	3	3	3	3	4	5	N=15	
M4	1.60	1.60	1.83	SPT			14	17	26		0*/0mm 57/225mm	
M5	1.00	1.15	1.45	CPT	4	4	4	3	3	3	N=13	
M5	1.70	1.70	1.77	CPT				50			0*/0mm 50/70mm	
M6	1.00	1.15	1.45	SPT	3	3	4	5	5	5	N=19	
M6	2.00	2.00	2.30	CPT			10	12	16	18	0*/0mm N=56	



SUB SURFACE

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

Insitu Test Results

Site: BOLTON HALL, BOLTON ON DEARNE, SOUTH YORKSHIRE
Client: THE HOUSE CROWD
Engineer: BELL MUNRO CONSULTING LTD

Job Number

NE3564

Sheet:

1 of 4

INSITU CALIFORNIA BEARING RATIO TEST

Date: 10.01.17

Position: CBR1

Sample Type/ No: 304, J

Depth (m): 0.70

Description:

GL - 0.65m MADE GROUND, brown silty sand and topsoil
0.65 - 0.75m Brown Sand with sandstone lithorelicts

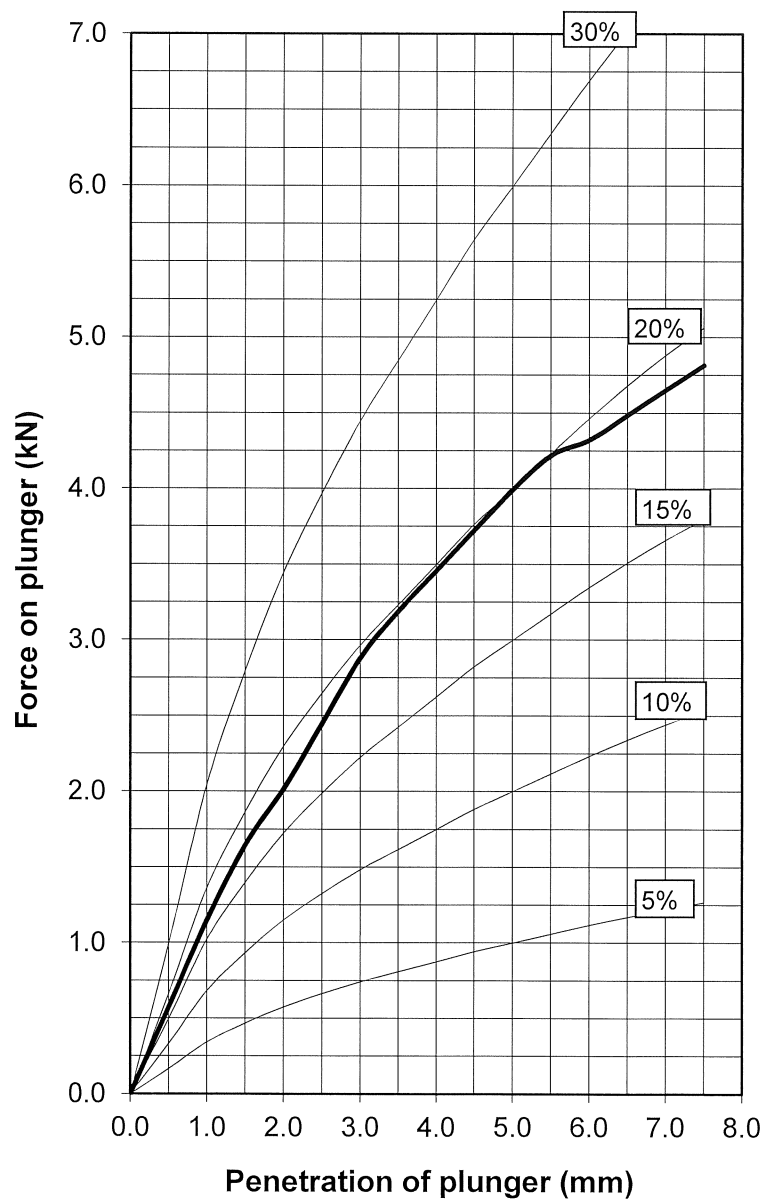
Penetration of Plunger (mm)	Force on Plunger	
	load gauge	kN
0.0	0.0	0.00
0.5	14.0	0.58
1.0	28.0	1.15
1.5	40.0	1.65
2.0	49.0	2.02
2.5	59.5	2.45
3.0	70.0	2.88
3.5	77.5	3.19
4.0	84.0	3.46
4.5	90.5	3.72
5.0	97.0	3.99
5.5	102.5	4.22
6.0	105.0	4.32
6.5	109.0	4.49
7.0	113.0	4.65
7.5	117.0	4.81

RESULTS Moisture Content = 10%

Pene-tration (mm)	Force (kN)	Standard Force (kN)	CBR (%)
2.5	2.45	13.2	18.5%
5.0	3.99	20.0	20.0%

Insitu CBR value

20.0%



Remarks:

Operator

DS

Checked

Ch

Approved

Ch



SUB SURFACE

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

Insitu Test Results

Site: BOLTON HALL, BOLTON ON DEARNE, SOUTH YORKSHIRE

Client: THE HOUSE CROWD

Engineer: BELL MUNRO CONSULTING LTD

Job Number

NE3564

Sheet:

2 of 4

INSITU CALIFORNIA BEARING RATIO TEST

Date: 10.01.17

Position: CBR 2

Sample Type/ No: 303, J

Depth (m): 0.50

Description:

GL - 0.4m MADE GROUND, brown silty sand and gravel sized stone
0.4m - 0.5m Brown SAND with clayey bands

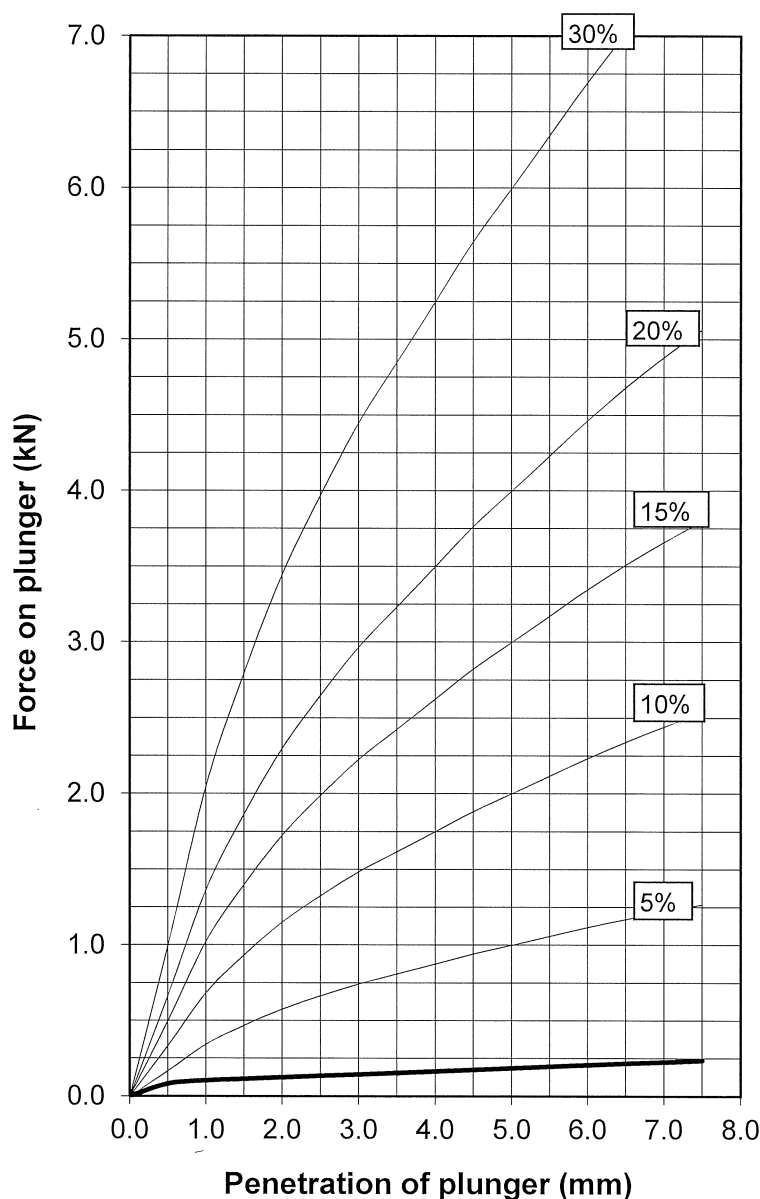
Penetration of Plunger (mm)	Force on Plunger	
	load gauge	kN
0.0	0.00	0.00
0.5	2.00	0.08
1.0	2.50	0.10
1.5	2.75	0.11
2.0	3.00	0.12
2.5	3.25	0.13
3.0	3.50	0.14
3.5	3.75	0.15
4.0	4.00	0.16
4.5	4.25	0.17
5.0	4.50	0.19
5.5	4.75	0.20
6.0	5.00	0.21
6.5	5.25	0.22
7.0	5.50	0.23
7.5	5.75	0.24

RESULTS Moisture Content = 18%

Pene- tration (mm)	Force (kN)	Standard Force (kN)	CBR (%)
2.5	0.13	13.2	1.0%
5.0	0.19	20.0	0.9%

Insitu CBR value

1.0%



Remarks:

Operator

DS

Checked

Dr

Approved

Dr



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3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907

Insitu Test Results

Site: BOLTON HALL, BOLTON ON DEARNE, SOUTH YORKSHIRE

Client: THE HOUSE CROWD

Engineer: BELL MUNRO CONSULTING LTD

Job Number

NE3564

Sheet:

3 of 4

INSITU CALIFORNIA BEARING RATIO TEST

Date: 10.01.17

Position: CBR 3

Sample Type/ No: 302, J

Depth (m): 0.30

Description:

GL - 0.3m TOPSOIL
0.3m - 0.35m Brown CLAY

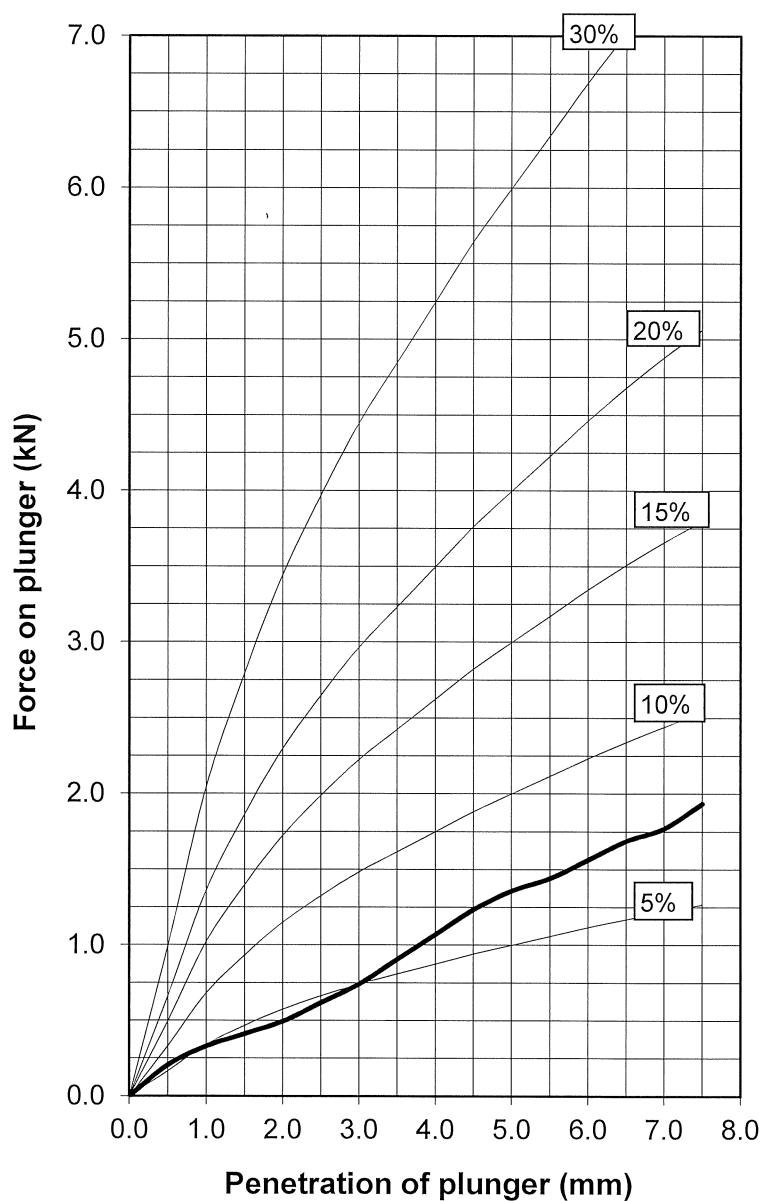
Penetration of Plunger (mm)	Force on Plunger	
	load gauge	kN
0.0	0.00	0.00
0.5	5.00	0.21
1.0	8.00	0.33
1.5	10.00	0.41
2.0	12.00	0.49
2.5	15.00	0.62
3.0	18.00	0.74
3.5	22.00	0.91
4.0	26.00	1.07
4.5	30.00	1.23
5.0	33.00	1.36
5.5	35.00	1.44
6.0	38.00	1.56
6.5	41.00	1.69
7.0	43.00	1.77
7.5	47.00	1.93

RESULTS Moisture Content = 16%

Pene- tration (mm)	Force (kN)	Standard Force (kN)	CBR (%)
2.5	0.62	13.2	4.7%
5.0	1.36	20.0	6.8%

Insitu CBR value

6.8%



Remarks:

Operator

DS

Checked

Ch

Approved

Ch



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Insitu Test Results

Site: BOLTON HALL, BOLTON ON DEARNE, SOUTH YORKSHIRE

Client: THE HOUSE CROWD

Engineer: BELL MUNRO CONSULTING LTD

Job Number

NE3564

Sheet:

4 of 4

INSITU CALIFORNIA BEARING RATIO TEST

Date: 10.01.17

Position: CBR 4

Sample Type/ No: 301, J

Depth (m): 0.35

Description:

GL - 0.35m MADE GROUND, Brown slightly gravelly clay

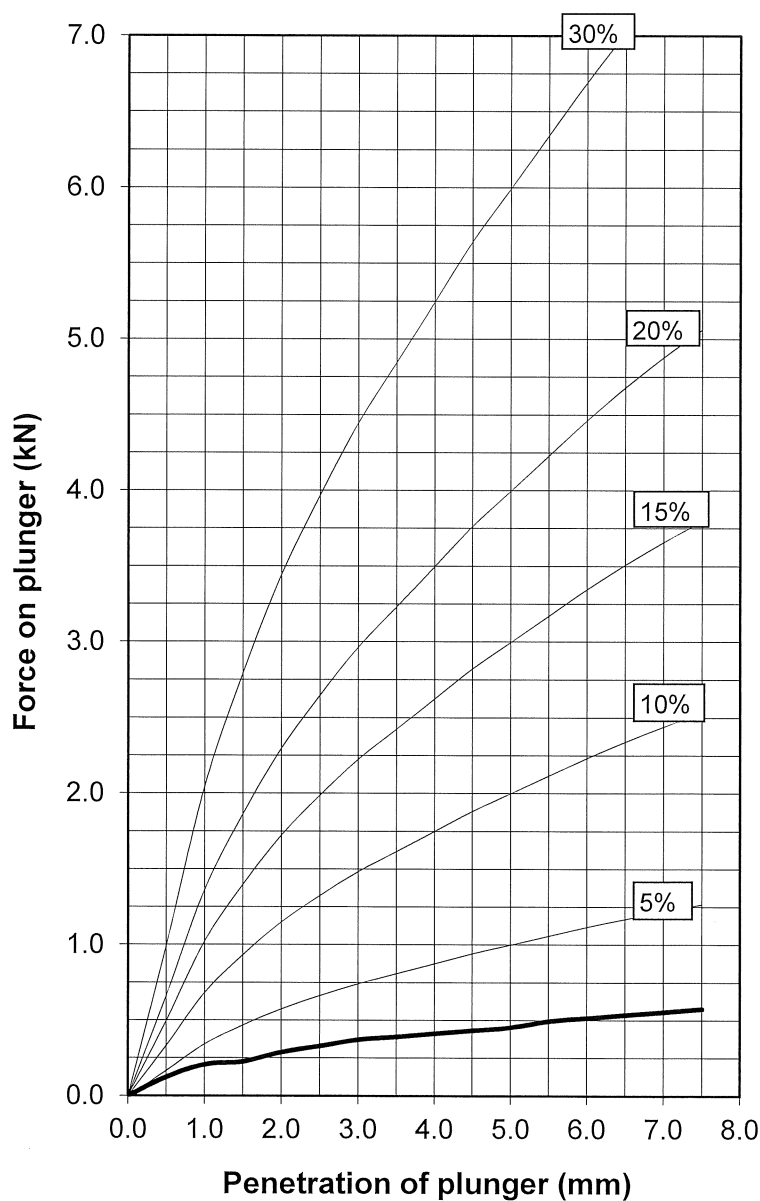
Penetration of Plunger (mm)	Force on Plunger	
	load gauge	kN
0.0	0.0	0.00
0.5	3.0	0.12
1.0	5.0	0.21
1.5	5.5	0.23
2.0	7.0	0.29
2.5	8.0	0.33
3.0	9.0	0.37
3.5	9.5	0.39
4.0	10.0	0.41
4.5	10.5	0.43
5.0	11.0	0.45
5.5	12.0	0.49
6.0	12.5	0.51
6.5	13.0	0.53
7.0	13.5	0.56
7.5	14.0	0.58

RESULTS Moisture Content = 18%

Pene-tration (mm)	Force (kN)	Standard Force (kN)	CBR (%)
2.5	0.33	13.2	2.5%
5.0	0.45	20.0	2.3%

Insitu CBR value

2.5%



Remarks:

Operator

DS

Checked

Dr

Approved

Dr



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3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907

Insitu Test Results

Site: BOLTON HALL, BOLTON ON DEARNE, SOUTH YORKSHIRE

Client: THE HOUSE CROWD

Engineer: BELL MUNRO CONSULTING LIMITED

Job Number

NE3565

Sheet:

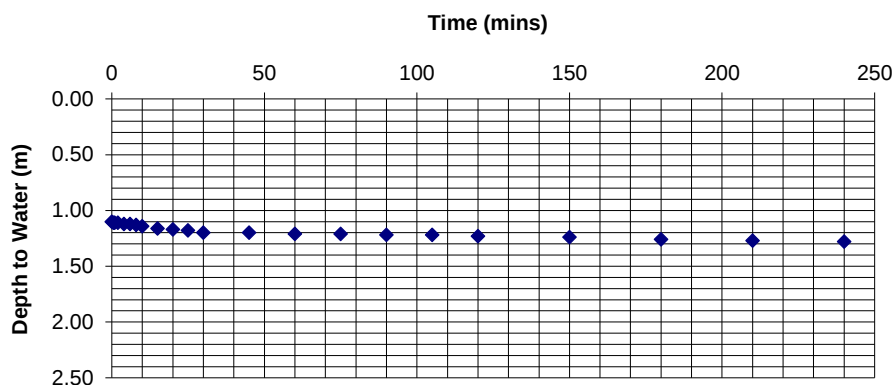
1 / 4

Soakaway Test

Trial Pit No: TP1

TEST NO: 1

DATE: 10/01/2017



Time (min)	Depth (m)
0	1.10
0.5	1.11
1	1.11
2	1.11
4	1.12
6	1.12
8	1.13
10	1.14
15	1.16
20	1.17
25	1.18
30	1.20
45	1.20
60	1.21
75	1.21
90	1.22
105	1.22
120	1.23
150	1.24
180	1.26
210	1.27
240	1.28

Length of pit: L = 2.10 m

Width of pit: W = 0.60 m

Depth of pit: D = 2.70 m

Base area of pit: A = 1.26 m²

100% effective depth D100 = 1.10 m

75% effective depth D75 = 1.50 m

50% effective depth D50 = 1.90 m

25% effective depth D25 = 2.30 m

time to D75 T75 = - sec

time to D25 T25 = - sec

time from D75 to D25 $t_{p75-25} = -$ sec
(T25 - T75)

volume between D75 & D25 $V_{p75-25} = 1.01$ m³
(A x (D25 - D75))

surface area to D50 inc. base $a_{p50} = 5.58$ m²
((2x(D-D50)x(W+L)) + A)

SOIL INFILTRATION RATE

$$f = \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}}$$

f = - m/sec

Test Strata:
(see Trial Pit)

See Trial Pit Logs

Remarks:

Strata too impermeable to calculate Soil Infiltration Rate



SUB SURFACE

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

Insitu Test Results

Site: BOLTON HALL, BOLTON ON DEARNE, SOUTH YORKSHIRE

Client: THE HOUSE CROWD

Engineer: BELL MUNRO CONSULTING LIMITED

Job Number

NE3565

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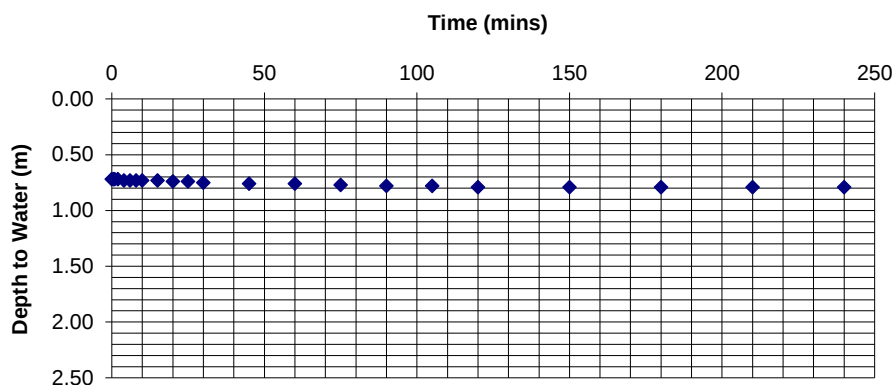
2 / 4

Soakaway Test

Trial Pit No: TP2

TEST NO: 1

DATE: 10/01/2017



Length of pit: L = 2.00 m

Width of pit: W = 0.60 m

Depth of pit: D = 1.30 m

Base area of pit: A = 1.20 m²

100% effective depth D100 = 0.72 m

75% effective depth D75 = 0.87 m

50% effective depth D50 = 1.01 m

25% effective depth D25 = 1.16 m

time to D75 T75 = - sec

time to D25 T25 = - sec

time from D75 to D25 $t_{p75-25} = -$ sec
(T25 - T75)

volume between D75 & D25 $V_{p75-25} = 0.35$ m³
(A x (D25 - D75))

surface area to D50 inc. base $a_{p50} = 2.71$ m²
((2x(D-D50)x(W+L)) + A)

SOIL INFILTRATION RATE

$$f = \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}}$$

f = - m/sec

Time (min)	Depth (m)
0	0.72
0.5	0.72
1	0.72
2	0.72
4	0.73
6	0.73
8	0.73
10	0.73
15	0.73
20	0.74
25	0.74
30	0.75
45	0.76
60	0.76
75	0.77
90	0.78
105	0.78
120	0.79
150	0.79
180	0.79
210	0.79
240	0.79

Test Strata:
(see Trial Pit)

See Trial Pit Logs

Remarks:

Strata too impermeable to calculate Soil Infiltration Rate



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Insitu Test Results

Site: BOLTON HALL, BOLTON UPON DEARNE, SOUTH YORKSHIRE

Client: THE HOUSE CROWD

Engineer: BELL MUNRO CONSULTING LIMITED

Job Number

NE3565

Sheet:

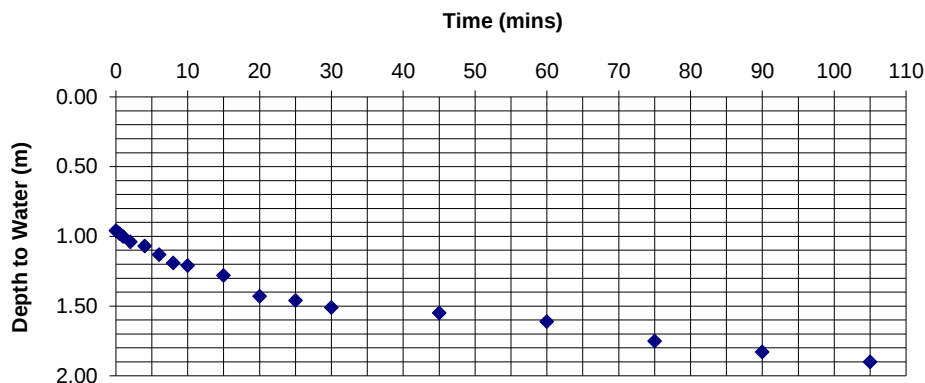
3 / 4

Soakaway Test

Trial Pit No: TP3

TEST NO: 1

DATE: 10/01/2017



Length of pit: L = 2.20 m
Width of pit: W = 0.60 m
Depth of pit: D = 1.90 m
Base area of pit: A = 1.32 m²

100% effective depth D100 = 0.96 m
75% effective depth D75 = 1.20 m
50% effective depth D50 = 1.43 m
25% effective depth D25 = 1.67 m

time to D75 T75 = 540 sec
time to D25 T25 = 3936 sec

time from D75 to D25 t_{p75-25} = 3396 sec
(T25 - T75)

volume between D75 & D25 V_{p75-25} = 0.62 m³
(A x (D25 - D75))

surface area to D50 inc. base a_{p50} = 3.95 m²
((2x(D-D50)x(W+L)) + A)

SOIL INFILTRATION RATE

$$f = \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}}$$

$$f = 4.62E-05 \text{ m/sec}$$

Time (min)	Depth (m)
0	0.96
0.5	0.98
1	1.00
2	1.04
4	1.07
6	1.13
8	1.19
10	1.21
15	1.28
20	1.43
25	1.46
30	1.51
45	1.55
60	1.61
75	1.75
90	1.83
105	1.90

Test Strata:
(see Trial Pit)

See Trial Pit Logs

Remarks:



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

Insitu Test Results

Site: BOLTON HALL, BOLTON UPON DEARNE, SOUTH YORKSHIRE

Client: THE HOUSE CROWD

Engineer: BELL MUNRO CONSULTING LIMITED

Job Number
NE3565

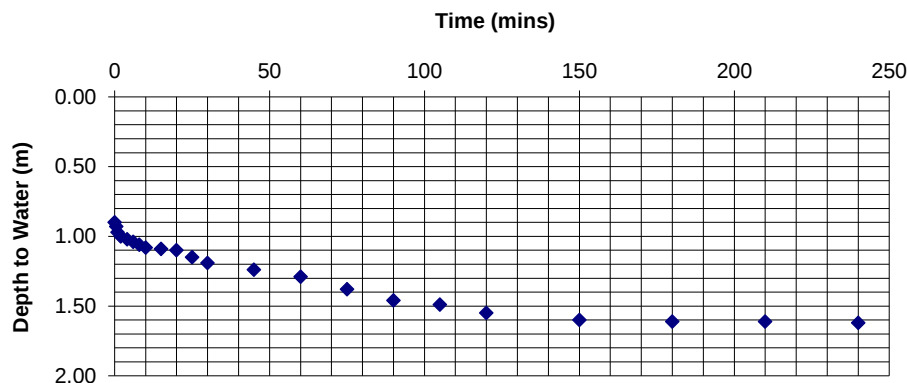
Sheet:
4 / 4

Soakaway Test

Trial Pit No: TP3

TEST NO: 1

DATE: 10/01/2017



Length of pit: L = 2.20 m
 Width of pit: W = 0.60 m
 Depth of pit: D = 1.90 m
 Base area of pit: A = 1.32 m²

100% effective depth D100 = 0.90 m
 75% effective depth D75 = 1.15 m
 50% effective depth D50 = 1.40 m
 25% effective depth D25 = 1.65 m

time to D75 T75 = 1500 sec
 time to D25 T25 = 22500 sec

time from D75 to D25 $t_{p75-25} = 21000$ sec
 (T25 - T75)

volume between D75 & D25 $V_{p75-25} = 0.66$ m³
 (A x (D25 - D75))

surface area to D50 inc. base $a_{p50} = 4.12$ m²
 ((2x(D-D50)x(W+L)) + A)

SOIL INFILTRATION RATE

$$f = \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}}$$

$$f = 7.63E-06 \text{ m/sec}$$

Time (min)	Depth (m)
0	0.90
0.5	0.93
1	0.97
2	1.00
4	1.02
6	1.04
8	1.06
10	1.08
15	1.09
20	1.10
25	1.15
30	1.19
45	1.24
60	1.29
75	1.38
90	1.46
105	1.49
120	1.55
150	1.60
180	1.61
210	1.61
240	1.62
375	1.65*

Test Strata:
(see Trial Pit)

See Trial Pit Logs

Remarks:

* - Extrapolated Value

LABORATORY TEST RESULTS



Site : BOLTON HALL, BOLTON UPON DEARNE, SOUTH YORKSHIRE Client : THE HOUSE CROWD LIMITED Engineer: BELL MUNRO CONSULTING LIMITED	Job Number NE3565
	Sheet 1 / 1

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 %						
TP1	1.20	D	21	78	27	29	18	11	0.82	CL	Brown sandy silty CLAY.
TP3	0.60	D								NP	Brown sandy silty friable CLAY, clayey very silty fine sand in places.
TP4	0.50	D	21	91	23	25	18	7	0.71	CL	Brown silty CLAY.
TP5	1.60	D	15	99	15	30	19	11	-0.36	CL	Brown silty SAND, sandy clayey, in places (completely weathered sandstone).
TP6	1.00	D	9							NP	MADE GROUND: brown sand and subangular gravel and cobble sized fragments of sandstone with some rootlets.
TP6	2.40	D	9	95	10	28	19	9	-1.00	CL	Brown sandy silty CLAY, clayey sand in places.

Remarks : NP = Non Plastic



SUB SURFACE

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

Laboratory Test Results

Site: BOLTON HALL, BOLTON UPON DEARNE, SOUTH YORKSHIRE

Client: THE HOUSE CROWD

Engineer: BELL MUNRO CONSULTING LIMITED

Job No.

NE3565

Sheet:

1/1

DETERMINATION OF PARAMETERS FOR ASSESSMENT OF PYRITIC GROUND AND BURIED CONCRETE

Hole No	Depth (m)	Sample	pH (no units)	Soluble Sulphate 2:1 (g/l)	Total Sulphate (%)	Total Sulphur (%)	Magnesium 2:1 (g/l)	Total Sulphate Potential Content (%)	Oxidised Sulphides (%)	Pyrite Present	Descriptions
M1	1.70	D	6.1	<0.01							Very weak brown and grey mottled highly weathered MUDSTONE, completely weathered to clay in places.
TP1	0.60	B	7.8	<0.01							MADE GROUND: brown silty clay.
TP1	1.90	B	6.1	<0.01	<0.01	0.02	<0.01	0.06	0.04	NO	Very weak and weak thinly bedded brown moderately to slightly weathered SANDSTONE with siltstone and mudstone beds.
TP3	1.10	B	5.5	<0.01							Weak thinly bedded brown moderately weathered medium to coarse grained SANDSTONE.
TP4	0.50	D	4.7	<0.01							Brown silty CLAY.
TP5	0.80	D	8.2	<0.01							MADE GROUND: dark brown slightly gravelly sandy silty clay. Gravel sized fragments are fine to coarse glass and plastic.
TP6	1.00	D	5.1	<0.02							MADE GROUND: brown sand and gravel sized and cobble sized fragments of sandstone with some roots.
TP6	2.40	D	4.4	0.14							Brown sandy silty CLAY, clayey sand in places.

Remarks :

Bold pH values indicate acidic ground.



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	Total potential sulfate ^c	Groundwater		ACEC Class for location
				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 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 15mg/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 included 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						Groundwater		
Design Sulfate Class for Location	2:1 water/soil extract ^b		Groundwater		Total potential sulfate ^c	Static water	Mobile water	ACEC Class for location
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 - 5.5	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 sites 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 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 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 included 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.
- Suffix 'm' relates to the higher levels of magnesium in Design Sulfate Classes 4 and 5.

CONTAMINATION ANALYSIS RESULTS



2183

Final Report

Report No.: 17-01520-1

Initial Date of Issue: 25-Jan-2017

Client Sub Surface

Client Address: 3 Peel Street
Preston
Lancashire
PR2 2QS

Contact(s): Simon Gabbatt

Project NE3565 Bolton Hall, Bolton on Dearne

Quotation No.: **Date Received:** 23-Jan-2017

Order No.: **Date Instructed:** 23-Jan-2017

No. of Samples: 17

Turnaround (Wkdays): 3 **Results Due:** 25-Jan-2017

Date Approved: 25-Jan-2017

Approved By:



Details: Robert Monk, Technical Development
Chemist

Client: Sub Surface	Chemtest Job No.:				17-01520
Quotation No.:	Chemtest Sample ID.:				402145
Order No.:	Client Sample Ref.:				TP1
	Client Sample ID.:				271
	Sample Type:				SOIL
	Top Depth (m):				0.60
	Date Sampled:				10-Jan-2017
Determinand	Accred.	SOP	Units	LOD	
pH	U	1010		N/A	8.0
Sulphate	U	1220	mg/l	1.0	6.1
Cyanide (Total)	U	1300	mg/l	0.050	< 0.050
Sulphide	U	1325	mg/l	0.050	0.057
Arsenic (Dissolved)	U	1450	µg/l	1.0	3.5
Boron (Dissolved)	U	1450	µg/l	20	33
Cadmium (Dissolved)	U	1450	µg/l	0.080	< 0.080
Chromium (Dissolved)	U	1450	µg/l	1.0	4.9
Copper (Dissolved)	U	1450	µg/l	1.0	9.6
Mercury (Dissolved)	U	1450	µg/l	0.50	< 0.50
Nickel (Dissolved)	U	1450	µg/l	1.0	13
Lead (Dissolved)	U	1450	µg/l	1.0	8.5
Selenium (Dissolved)	U	1450	µg/l	1.0	< 1.0
Zinc (Dissolved)	U	1450	µg/l	1.0	26
Chromium (Hexavalent)	U	1490	µg/l	20	[B] < 20
TPH >C6-C10	N	1670	µg/l	0.10	< 0.10
TPH >C10-C21	N	1670	µg/l	0.10	7.0
TPH >C21-C40	N	1670	µg/l	0.10	28
Total TPH >C6-C40	U	1670	µg/l	10	35
Naphthalene	U	1700	µg/l	0.10	< 0.10
Acenaphthylene	U	1700	µg/l	0.10	< 0.10
Acenaphthene	U	1700	µg/l	0.10	< 0.10
Fluorene	U	1700	µg/l	0.10	< 0.10
Phenanthrene	U	1700	µg/l	0.10	< 0.10
Anthracene	U	1700	µg/l	0.10	< 0.10
Fluoranthene	U	1700	µg/l	0.10	2.8
Pyrene	U	1700	µg/l	0.10	2.0
Benzo[a]anthracene	U	1700	µg/l	0.10	1.1
Chrysene	U	1700	µg/l	0.10	1.2
Benzo[b]fluoranthene	U	1700	µg/l	0.10	< 0.10
Benzo[k]fluoranthene	U	1700	µg/l	0.10	< 0.10
Benzo[a]pyrene	U	1700	µg/l	0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	1700	µg/l	0.10	< 0.10
Dibenz(a,h)Anthracene	U	1700	µg/l	0.10	< 0.10
Benzo[g,h,i]perylene	U	1700	µg/l	0.10	< 0.10
Total Of 16 PAH's	U	1700	µg/l	2.0	7.1
Benzene	U	1760	µg/l	1.0	< 1.0
Toluene	U	1760	µg/l	1.0	< 1.0
Ethylbenzene	U	1760	µg/l	1.0	< 1.0

Results - Leachate

Client: Sub Surface	Chemtest Job No.:		17-01520		
Quotation No.:	Chemtest Sample ID.:		402145		
Order No.:	Client Sample Ref.:		TP1		
	Client Sample ID.:		271		
	Sample Type:		SOIL		
	Top Depth (m):		0.60		
	Date Sampled:		10-Jan-2017		
Determinand	Accred.	SOP	Units	LOD	
m & p-Xylene	U	1760	µg/l	1.0	< 1.0
o-Xylene	U	1760	µg/l	1.0	< 1.0
Methyl Tert-Butyl Ether	N	1760	µg/l	1.0	< 1.0
Total Phenols	U	1920	mg/l	0.030	< 0.030

Results - Leachate

Results - Soil

Client: Sub Surface	Chemtest Job No.:				17-01520	17-01520	17-01520	17-01520	17-01520	17-01520	17-01520	17-01520	17-01520
Quotation No.:	Chemtest Sample ID.:				402139	402140	402141	402142	402143	402144	402145	402146	402147
Order No.:	Client Sample Ref.:				M1	M1	M2	M4	M5	M6	TP1	TP1	TP3
	Client Sample ID.:				67	65	63	56	52	50	271	274	281
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.50	1.70	0.0	0.15	0.60	0.0	0.60	1.90	0.30
	Bottom Depth (m):						0.15	0.40		0.30			
	Date Sampled:				10-Jan-2017	10-Jan-2017	10-Jan-2017	10-Jan-2017	10-Jan-2017	10-Jan-2017	10-Jan-2017	10-Jan-2017	10-Jan-2017
	Asbestos Lab:				COVENTRY		COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY		COVENTRY
Determinand	Accred.	SOP	Units	LOD									
ACM Type	U	2192		N/A	-		-	-	-	-	-		-
Asbestos Identification	U	2192	%	0.001	No Asbestos Detected		No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected		No Asbestos Detected
Moisture	N	2030	%	0.020	14	13	22	15	12	13	17	18	16
Stones	N	2030	%	0.020								< 0.020	
pH	U	2010		N/A	8.3	6.1	7.6	7.9	8.6	7.4	7.8	6.1	5.0
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	< 0.40		< 0.40	< 0.40	< 0.40	0.54	0.42		< 0.40
Magnesium (Water Soluble)	N	2120	g/l	0.010								< 0.010	
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010		< 0.010					< 0.010	< 0.010	
Total Sulphur	U	2175	%	0.010								0.017	
Cyanide (Total)	U	2300	mg/kg	0.50	< 0.50		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50		< 0.50
Sulphide (Easily Liberatable)	U	2325	mg/kg	0.50	2.4		3.8	1.5	35	1.7	7.8		1.4
Sulphate (Total)	U	2430	%	0.010	< 0.010		0.068	0.028	0.14	0.049	0.012		0.069
Sulphate (Acid Soluble)	U	2430	%	0.010								< 0.010	
Arsenic	U	2450	mg/kg	1.0	2.8		22	15	43	8.8	6.4		25
Cadmium	U	2450	mg/kg	0.10	0.19		0.41	0.28	0.28	0.21	0.26		0.29
Chromium	U	2450	mg/kg	1.0	11		22	24	18	12	24		17
Copper	U	2450	mg/kg	0.50	11		34	25	80	34	23		37
Mercury	U	2450	mg/kg	0.10	< 0.10		0.16	< 0.10	0.44	< 0.10	< 0.10		0.16
Nickel	U	2450	mg/kg	0.50	16		37	23	28	15	32		26
Lead	U	2450	mg/kg	0.50	24		100	67	1200	68	31		87
Selenium	U	2450	mg/kg	0.20	< 0.20		0.55	0.26	< 0.20	< 0.20	< 0.20		0.48
Zinc	U	2450	mg/kg	0.50	65		470	79	140	78	120		79
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50		< 0.50	< 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	< 1.0	< 1.0		< 1.0
TPH >C10-C21	N	2670	mg/kg	1.0	< 1.0		12	18	7.8	6.0	< 1.0		7.3
TPH >C21-C40	N	2670	mg/kg	1.0	< 1.0		29	37	14	26	< 1.0		22
Total TPH >C6-C40	U	2670	mg/kg	10	< 10		41	55	21	32	< 10		29
Naphthalene	U	2700	mg/kg	0.10	< 0.10		0.19	< 0.10	0.24	< 0.10	< 0.10		< 0.10
Acenaphthylene	U	2700	mg/kg	0.10	< 0.10		0.41	< 0.10	0.32	< 0.10	< 0.10		< 0.10
Acenaphthene	U	2700	mg/kg	0.10	< 0.10		2.2	< 0.10	0.13	< 0.10	< 0.10		< 0.10
Fluorene	U	2700	mg/kg	0.10	< 0.10		0.14	< 0.10	0.12	< 0.10	< 0.10		< 0.10
Phenanthrene	U	2700	mg/kg	0.10	< 0.10		3.8	< 0.10	1.7	0.38	< 0.10		< 0.10
Anthracene	U	2700	mg/kg	0.10	< 0.10		1.2	< 0.10	0.60	0.13	< 0.10		< 0.10
Fluoranthene	U	2700	mg/kg	0.10	< 0.10		5.5	0.50	2.3	1.3	< 0.10		0.51
Pyrene	U	2700	mg/kg	0.10	< 0.10		5.4	0.38	1.9	1.2	< 0.10		0.50
Benzo[a]anthracene	U	2700	mg/kg	0.10	< 0.10		2.7	< 0.10	1.3	< 0.10	< 0.10		< 0.10

Results - Soil

Client: Sub Surface	Chemtest Job No.:				17-01520	17-01520	17-01520	17-01520	17-01520	17-01520	17-01520	17-01520	17-01520
Quotation No.:	Chemtest Sample ID.:				402139	402140	402141	402142	402143	402144	402145	402146	402147
Order No.:	Client Sample Ref.:				M1	M1	M2	M4	M5	M6	TP1	TP1	TP3
	Client Sample ID.:				67	65	63	56	52	50	271	274	281
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.50	1.70	0.0	0.15	0.60	0.0	0.60	1.90	0.30
	Bottom Depth (m):						0.15	0.40		0.30			
	Date Sampled:				10-Jan-2017	10-Jan-2017	10-Jan-2017	10-Jan-2017	10-Jan-2017	10-Jan-2017	10-Jan-2017	10-Jan-2017	10-Jan-2017
	Asbestos Lab:				COVENTRY		COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY		COVENTRY
Determinand	Accred.	SOP	Units	LOD									
Chrysene	U	2700	mg/kg	0.10	< 0.10		0.73	< 0.10	1.1	< 0.10	< 0.10		< 0.10
Benzo[b]fluoranthene	U	2700	mg/kg	0.10	< 0.10		3.4	< 0.10	1.8	< 0.10	< 0.10		< 0.10
Benzo[k]fluoranthene	U	2700	mg/kg	0.10	< 0.10		0.93	< 0.10	0.70	< 0.10	< 0.10		< 0.10
Benzo[a]pyrene	U	2700	mg/kg	0.10	< 0.10		1.7	< 0.10	0.86	< 0.10	< 0.10		< 0.10
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10	< 0.10		1.8	< 0.10	0.86	< 0.10	< 0.10		< 0.10
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10	< 0.10		0.34	< 0.10	< 0.10	< 0.10	< 0.10		< 0.10
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10	< 0.10		0.87	< 0.10	0.23	< 0.10	< 0.10		< 0.10
Total Of 16 PAH's	U	2700	mg/kg	2.0	< 2.0		31	< 2.0	14	3.0	< 2.0		< 2.0
Benzene	U	2760	µg/kg	1.0	< 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		< 1.0
Ethylbenzene	U	2760	µg/kg	1.0	< 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		< 1.0
o-Xylene	U	2760	µg/kg	1.0	< 1.0		< 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	< 1.0		< 1.0
Total Phenols	U	2920	mg/kg	0.30	< 0.30		< 0.30	< 0.30	< 0.30	< 0.30	< 0.30		< 0.30

Results - Soil

Client: Sub Surface	Chemtest Job No.:				17-01520	17-01520	17-01520	17-01520	17-01520	17-01520	17-01520	17-01520
Quotation No.:	Chemtest Sample ID.:				402148	402149	402150	402151	402152	402153	402154	402155
Order No.:	Client Sample Ref.:				TP3	TP4	TP4	TP5	TP5	TP6	TP6	M3
	Client Sample ID.:				283	287	286	290	291	297	298	60
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				1.10	0.80	0.50	0.40	0.80	1.00	2.40	0.50
	Bottom Depth (m):											
	Date Sampled:				10-Jan-2017	10-Jan-2017	10-Jan-2017	10-Jan-2017	10-Jan-2017	10-Jan-2017	10-Jan-2017	10-Jan-2017
	Asbestos Lab:					COVENTRY		COVENTRY				
Determinand	Accred.	SOP	Units	LOD								
ACM Type	U	2192		N/A		-		-				
Asbestos Identification	U	2192	%	0.001		No Asbestos Detected		No Asbestos Detected				
Moisture	N	2030	%	0.020	7.7	16	15	13	12	7.5	8.5	15
Stones	N	2030	%	0.020								
pH	U	2010		N/A	5.5	7.7	4.7	8.2	8.2	5.1	4.4	8.4
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40		0.41		< 0.40				< 0.40
Magnesium (Water Soluble)	N	2120	g/l	0.010								
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	< 0.010		< 0.010		< 0.010	0.020	0.14	
Total Sulphur	U	2175	%	0.010								
Cyanide (Total)	U	2300	mg/kg	0.50		< 0.50		< 0.50				< 0.50
Sulphide (Easily Liberatable)	U	2325	mg/kg	0.50		2.2		9.4				4.0
Sulphate (Total)	U	2430	%	0.010		0.10		0.070				0.083
Sulphate (Acid Soluble)	U	2430	%	0.010								
Arsenic	U	2450	mg/kg	1.0		21		16				11
Cadmium	U	2450	mg/kg	0.10		0.46		0.31				0.20
Chromium	U	2450	mg/kg	1.0		21		44				12
Copper	U	2450	mg/kg	0.50		40		39				18
Mercury	U	2450	mg/kg	0.10		0.15		0.25				0.84
Nickel	U	2450	mg/kg	0.50		30		29				17
Lead	U	2450	mg/kg	0.50		130		200				710
Selenium	U	2450	mg/kg	0.20		0.36		0.20				< 0.20
Zinc	U	2450	mg/kg	0.50		130		140				150
Chromium (Hexavalent)	N	2490	mg/kg	0.50		< 0.50		< 0.50				< 0.50
TPH >C6-C10	N	2670	mg/kg	1.0		< 1.0		< 1.0				< 1.0
TPH >C10-C21	N	2670	mg/kg	1.0		< 1.0		11				17
TPH >C21-C40	N	2670	mg/kg	1.0		< 1.0		21				30
Total TPH >C6-C40	U	2670	mg/kg	10		< 10		33				47
Naphthalene	U	2700	mg/kg	0.10		< 0.10		< 0.10				< 0.10
Acenaphthylene	U	2700	mg/kg	0.10		< 0.10		< 0.10				< 0.10
Acenaphthene	U	2700	mg/kg	0.10		< 0.10		< 0.10				< 0.10
Fluorene	U	2700	mg/kg	0.10		< 0.10		< 0.10				< 0.10
Phenanthrene	U	2700	mg/kg	0.10		< 0.10		1.7				0.73
Anthracene	U	2700	mg/kg	0.10		< 0.10		0.65				0.34
Fluoranthene	U	2700	mg/kg	0.10		< 0.10		4.1				1.9
Pyrene	U	2700	mg/kg	0.10		< 0.10		4.2				2.1
Benzo[a]anthracene	U	2700	mg/kg	0.10		< 0.10		2.0				1.7

Results - Soil

Client: Sub Surface	Chemtest Job No.:				17-01520	17-01520	17-01520	17-01520	17-01520	17-01520	17-01520	17-01520
Quotation No.:	Chemtest Sample ID.:				402148	402149	402150	402151	402152	402153	402154	402155
Order No.:	Client Sample Ref.:				TP3	TP4	TP4	TP5	TP5	TP6	TP6	M3
	Client Sample ID.:				283	287	286	290	291	297	298	60
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				1.10	0.80	0.50	0.40	0.80	1.00	2.40	0.50
	Bottom Depth (m):											
	Date Sampled:				10-Jan-2017	10-Jan-2017	10-Jan-2017	10-Jan-2017	10-Jan-2017	10-Jan-2017	10-Jan-2017	10-Jan-2017
	Asbestos Lab:					COVENTRY		COVENTRY				
Determinand	Accred.	SOP	Units	LOD								
Chrysene	U	2700	mg/kg	0.10		< 0.10		0.79				0.88
Benzo[b]fluoranthene	U	2700	mg/kg	0.10		< 0.10		2.7				1.2
Benzo[k]fluoranthene	U	2700	mg/kg	0.10		< 0.10		0.83				0.36
Benzo[a]pyrene	U	2700	mg/kg	0.10		< 0.10		1.9				0.95
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10		< 0.10		1.4				< 0.10
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10		< 0.10		< 0.10				< 0.10
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10		< 0.10		1.1				< 0.10
Total Of 16 PAH's	U	2700	mg/kg	2.0		< 2.0		21				10
Benzene	U	2760	µg/kg	1.0		< 1.0		< 1.0				< 1.0
Toluene	U	2760	µg/kg	1.0		< 1.0		< 1.0				< 1.0
Ethylbenzene	U	2760	µg/kg	1.0		< 1.0		< 1.0				< 1.0
m & p-Xylene	U	2760	µg/kg	1.0		< 1.0		< 1.0				< 1.0
o-Xylene	U	2760	µg/kg	1.0		< 1.0		< 1.0				< 1.0
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0		< 1.0		< 1.0				< 1.0
Total Phenols	U	2920	mg/kg	0.30		< 0.30		< 0.30				< 0.30

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"

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

Sample Retention and Disposal

All soil samples will be retained for a period of 45 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.co.uk

MINI BOREHOLE RECORD SHEETS

S S SUB SURFACE SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS 3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907						Site BOLTON HALL, BOLTON UPON DEARNE, SOUTH YORKSHIRE		Borehole Number M1		
Boring Method MINI PERCUSSIVE		Casing Diameter			Ground Level (mOD)		Client THE HOUSE CROWD LIMITED		Job Number NE3565	
		Location AS PLAN			Dates 10/01/2017		Engineer BELL MUNRO CONSULTING LIMITED		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 - 85% recovery		(0.10)	MADE GROUND: bituminous macadam surfacing.			
						0.10	MADE GROUND: grey sandy fine to coarse gravel sized fragments of stone.			
						(0.15)				
						0.25	Firm brown slightly gravelly sandy silty CLAY. Gravel is subangular fine to coarse sandstone.			
						(0.45)				
						0.70	Brown clayey sandy angular to subangular fine to coarse sandstone GRAVEL.			
						(0.30)				
1.00-1.45	SPT N=11			2,2/2,2,3,4		1.00	Stiff medium strength brown and occasional grey and dark brown silty CLAY (completely weathered mudstone).			
1.00-1.45	D			1.00m to 1.80m - 100% recovery						
1.00-1.80	C					(0.70)				
										
						1.70	Very weak brown and grey mottled highly weathered MUDSTONE, completely weathered to clay in places.			
1.80-1.87	SPT 0*/0			/50		(0.10)				
50/70				10/01/2017:DRY		1.80	Very weak light brown highly weathered SANDSTONE.			
1.80-1.87	D					(0.07)				
						1.87	Complete at 1.87m			

 SUB SURFACE SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS 3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907							Site BOLTON HALL, BOLTON UPON DEARNE, SOUTH YORKSHIRE		Borehole Number M2
Boring Method MINI PERCUSSIVE		Casing Diameter		Ground Level (mOD)		Client THE HOUSE CROWD LIMITED		Job Number NE3565	
		Location AS PLAN		Dates 10/01/2017		Engineer BELL MUNRO CONSULTING LIMITED		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		(0.20)	MADE GROUND: dark brown slightly gravelly slightly sandy silty clay with occasional rootlets. Gravel sized fragments are fine to medium clinker and stone.		
						0.20	MADE GROUND: brown slightly gravelly slightly sandy silty clay. Gravel sized fragments are fine to medium brick and stone.		
						(0.40)			
						0.60	Brown clayey sandy angular to subangular fine to coarse sandstone GRAVEL.		
						(0.40)			
1.00-1.45	SPT N=30			4,5/5,9,9,7		1.00	Stiff medium strength brown and occasional grey and dark brown silty CLAY (completely weathered mudstone)		
1.00-1.45	D			1.00m to 1.80m - 88% recovery		(0.20)			
1.00-1.80	C					1.20	Dense light brown gravelly fine to medium SAND. Gravel sized fragments of subangular fine to medium sandstone lithorelicts (completely weathered sandstone)		
						(0.20)			
						1.40	Very weak brown and grey mottled highly weathered MUDSTONE, completely weathered to clay in places.		
						(0.35)			
1.80-1.93	SPT(C) 0*/0 53/130			/12,41		1.75	Light brown very weak highly weathered SANDSTONE.		
				10/01/2017:DRY		(0.18)			
						1.93	Complete at 1.93m		
Remarks C = Plastic lined core sample Core diameter : 62mm to 1.00m and 52mm to 1.80m On completion backfilled with arisings.								Scale (approx) 1:20	Logged By DM/SJ
								Figure No. NE3565.M2	



SUB SURFACE

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

Site

BOLTON HALL, BOLTON UPON DEARNE, SOUTH YORKSHIRE

Borehole Number

M3

Boring Method

MINI PERCUSSIVE

Casing Diameter

Ground Level (mOD)

Client

THE HOUSE CROWD LIMITED

Job Number

NE3565

Location

AS PLAN

Dates

10/01/2017

Engineer

BELL MUNRO CONSULTING LIMITED

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		(0.15) 0.15	MADE GROUND: dark brown slightly gravelly slightly clayey sandy silt with many rootlets. Gravel sized fragments are fine to medium stone.		
						(0.95)	MADE GROUND: dark greyish brown very gravelly slightly sandy silty CLAY with low cobble sized fragments of brick. Gravel sized fragments are fine to coarse brick, concrete, stone, coal and glass.		
1.00-1.45 1.00-1.45 1.00-2.00	SPT N=1 D C			1,0/0,0,1,0 1.00m to 2.00m - 90% recovery		1.10 (0.40)	Very loose greyish brown slightly gravelly very clayey silty fine to medium SAND. Gravel sized fragments of subangular fine to coarse sandstone lithorelicts (completely weathered sandstone).		
						1.50 (0.20)	Brown and orangish brown slightly gravelly silty fine SAND. Gravel sized fragments of subangular fine to medium sandstone lithorelicts (completely weathered sandstone).		
						1.70	Extremely weak brown and orangish brown highly weathered medium grained SANDSTONE, completely weathered to sand in places.		
2.00-2.45 2.00-2.45	SPT N=61 D			6,6/8,10,15,28		(0.75)	 from 2.00m : brown and occasional light brown		
				10/01/2017: DRY		2.45	Complete at 2.45m		

Remarks

C = Plastic lined core sample
Core diameter : 83mm to 1.00m and 72mm to 2.00m
On completion backfilled with arisings.

Scale (approx)

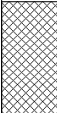
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DM/SJ

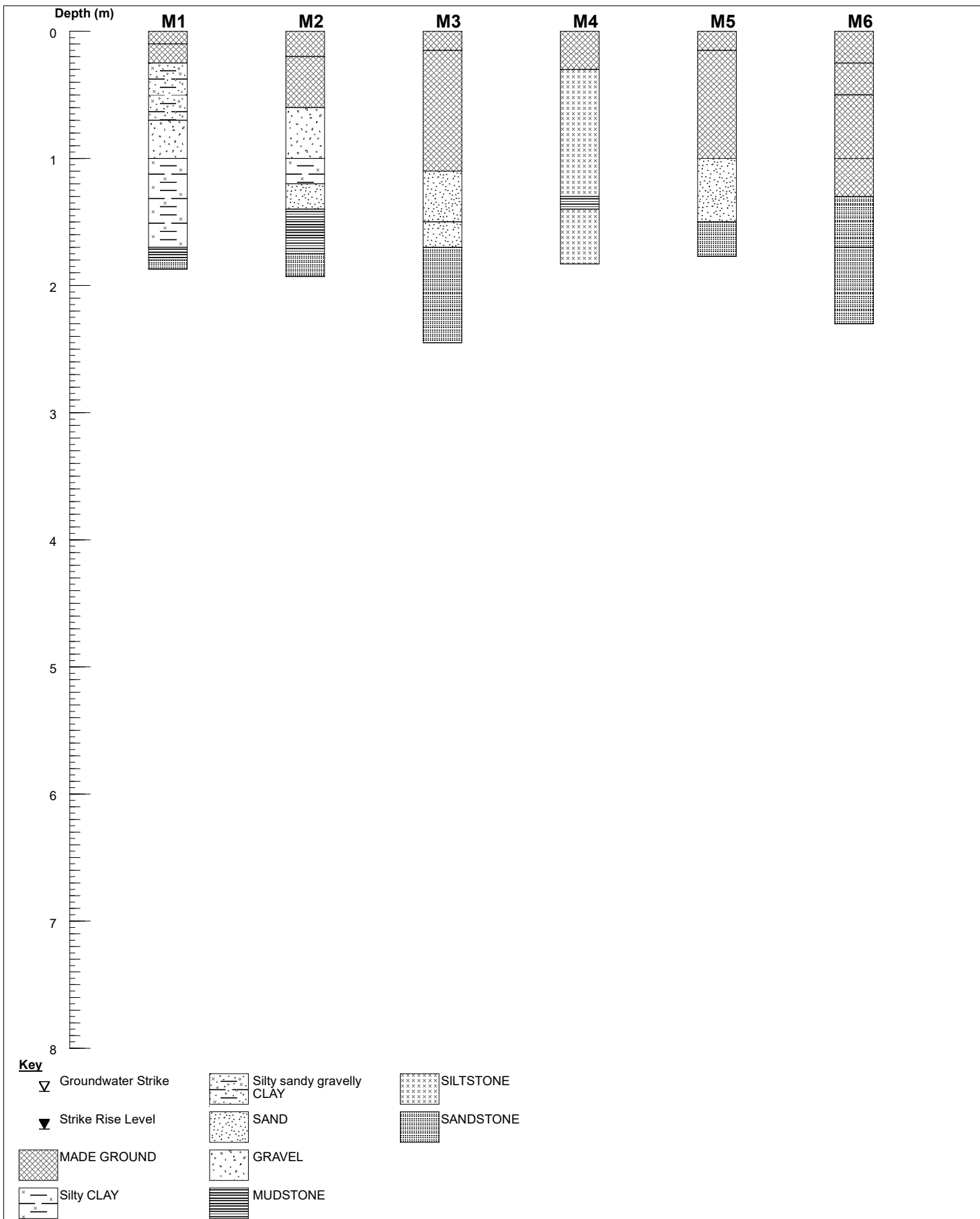
Figure No.

NE3565.M3

 SUB SURFACE SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS 3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907							Site BOLTON HALL, BOLTON UPON DEARNE, SOUTH YORKSHIRE		Borehole Number M4
Boring Method MINI PERCUSSIVE		Casing Diameter Location AS PLAN		Ground Level (mOD) Dates 10/01/2017		Client THE HOUSE CROWD LIMITED		Job Number NE3565	
						Engineer BELL MUNRO CONSULTING LIMITED		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		(0.30)	MADE GROUND: dark brown slightly gravelly slightly sandy silty clay with some roots. Gravel sized fragments are fine to medium stone.		
						0.30	Extremely weak brown and grey highly weathered SILTSTONE, completely weathered to clay in places.		
1.00-1.45	SPT N=15			3,3/3,3,4,5		(1.00)			
1.00-1.45	D			1.00m to 1.60m - 100% recovery					
1.00-1.60	C					1.30 (0.10)	Extremely weak brown and grey highly weathered MUDSTONE.		
						1.40	Very weak thinly laminated grey and occasional orangish brown highly weathered SILTSTONE.		
1.60-1.83	SPT 0*/0 57/225			/14,17,26		(0.43)			
				10/01/2017:DRY		1.83	Complete at 1.83m		
Remarks C = Plastic lined core sample Core diameter : 62mm to 1.00m and 52mm to 1.60m On completion backfilled with arisings.								Scale (approx) 1:20	Logged By DM/SJ
								Figure No. NE3565.M4	

S S SUB SURFACE SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS 3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907							Site BOLTON HALL, BOLTON UPON DEARNE, SOUTH YORKSHIRE		Borehole Number M5	
Boring Method MINI PERCUSSIVE		Casing Diameter			Ground Level (mOD)		Client THE HOUSE CROWD LIMITED		Job Number NE3565	
		Location AS PLAN			Dates 10/01/2017		Engineer BELL MUNRO CONSULTING LIMITED		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		(0.15) 0.15	MADE GROUND: dark brown slightly gravelly sandy clayey silt. Gravel sized fragments are fine to medium stone.			
						0.15	MADE GROUND: brown, dark brown and grey slightly clayey sandy fine to coarse gravel sized fragments of stone			
							 at 0.40m to 0.50m, limestone (possible cobble)			
							(0.85)			
										
										
										
1.00-1.45 1.00-1.70	SPT(C) N=13 C			4,4/4,3,3,3 1.00m to 1.70m - 100% recovery		1.00	Medium dense light brown gravelly fine SAND. Gravel sized fragments of fine to coarse sandstone lithorelicts (completely weathered sandstone)			
						(0.50)				
										
						1.50	Very weak light brown highly weathered medium grained SANDSTONE.			
						(0.27)				
1.70-1.77	SPT(C) 0*/0 50/70			/,50 10/01/2017:DRY		1.77	Complete at 1.77m			
										
										
										
										
										
										
										
										
										
										
										
										
										
										
										
Remarks C = Plastic lined core sample Core diameter : 83mm to 1.00m and 62mm to 1.60m On completion backfilled with arisings.								Scale (approx) 1:20	Logged By DM/SJ	
								Figure No. NE3565.M5		

S S SUB SURFACE SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS 3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907							Site BOLTON HALL, BOLTON UPON DEARNE, SOUTH YORKSHIRE		Borehole Number M6	
Boring Method MINI PERCUSSIVE		Casing Diameter			Ground Level (mOD)		Client THE HOUSE CROWD LIMITED		Job Number NE3565	
		Location AS PLAN			Dates 10/01/2017		Engineer BELL MUNRO CONSULTING LIMITED		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) 0.25 (0.25) 0.50 (0.50)	MADE GROUND: dark brown slightly gravelly sandy silt with occasional rootlets. Gravel sized fragments are fine to medium stone and brick. MADE GROUND: brown gravelly silty clay. Gravel sized fragments are fine to medium stone. MADE GROUND: dark brown slightly gravelly silt with occasional rootlets. Gravel sized fragments are fine to medium pottery and glass.			
1.00-1.45 1.00-1.45 1.00-2.00	SPT N=19 D C			3,3/4,5,5,5 1.00m to 2.00m - 90% recovery		1.00 (0.30) 1.30 (0.40) 1.70	MADE GROUND: light brown and occasional dark brown and white gravelly fine sand. Gravel sized fragments are fine to coarse stone and chalk. Extremely weak light brown highly weathered medium grained SANDSTONE, completely weathered to sand in places. Very weak light brownish grey highly weathered fine grained SANDSTONE.			
2.00-2.30	SPT(C) 0*/0 N=56			/10,12,16,18 10/01/2017:DRY		(0.60) 2.30	Complete at 2.30m			
Remarks C = Plastic lined core sample Core diameter : 62mm to 1.00m and 52mm to 2.00m On completion backfilled with arisings.								Scale (approx) 1:20	Logged By NM/SJ	
								Figure No. NE3565.M6		



 SUB SURFACE SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS 3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907	Nominal Section			
Site BOLTON HALL, BOLTON UPON DEARNE, SOUTH YORKSHIRE	Date Drawn 17/02/2017	Date Checked	Sheet 1/1	Job Number NE3565
Client THE HOUSE CROWD LIMITED	Drawn By	Checked By	Scale 1:40[V]	Figure No. NE3565.1

TRIAL PIT RECORD SHEETS



BOLTON HALL, BOLTON UPON DEARNE, SOUTH
YORKSHIRE

**Trial Pit
Number**
TP1

Dimensions
0.60m x 2.10m

Client	THE HOUSE CROWD LIMITED
---------------	-------------------------

**Job
Number**
NE3565

Dates	10/01/2017
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Engineer
BEI | MUNRO CONSULTING LIMITED

Sheet
1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.20	D				(0.40)	MADE GROUND: topsoil and some brown silty clay.		
0.60	B				0.40 (0.70)	MADE GROUND: brown silty clay.		
1.20	D		HV @ 1.20m, c=35kPa		1.10 (0.30)	Soft low strength brown sandy silty CLAY.		
1.50	D				1.40 (0.30)	Very weak thinly bedded brown moderately to slightly weathered medium grained SANDSTONE.		
1.90	B				1.70 (1.00)	Very weak and weak thinly bedded brown moderately to slightly weathered SANDSTONE.		
2.65	D		10/01/2012:DRY		2.70	Complete at 2.70m		

No groundwater entries recorded.
Partial collapse of pit sides in made ground.
Pit long axis orientated East to West.
On completion soakaway test carried out and then backfilled with arisings.
HV = Hand Shear Vane test

Scale (approx)

1.25

Logged By

DS/M.IF

Figure No.

NF3565 TP1



BOLTON HALL, BOLTON UPON DEARNE, SOUTH
YORKSHIRE

**Trial Pit
Number**
TP2

Dimensions
0.60m x 2.00m

Ground Level (mOD)

Client	THE HOUSE CROWD LIMITED
---------------	-------------------------

**Job
Number**
NE3565

Location

AS PL AN

Dates	10/01/2017
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Engineer
BEI | MUNRO CONSULTING LIMITED

Sheet
1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.20	D				(0.40)	TOPSOIL (possible made ground).		
0.50	D				0.40 (0.40)	Weak thinly bedded brown completely to highly weathered SANDSTONE.		
0.80	B				0.80 (0.50)	Strong thinly bedded brown slightly weathered SANDSTONE, with sub vertical open joints.		
1.20	D		10/01/2012: DRY		1.30	Complete at 1.30m		

Plan

Remarks

No groundwater entries recorded.
Pit sides remained vertical and stable.
Pit long axis orientated East to West.
On completion soakaway test carried out and then backfilled with arisings.

Scale (approx)

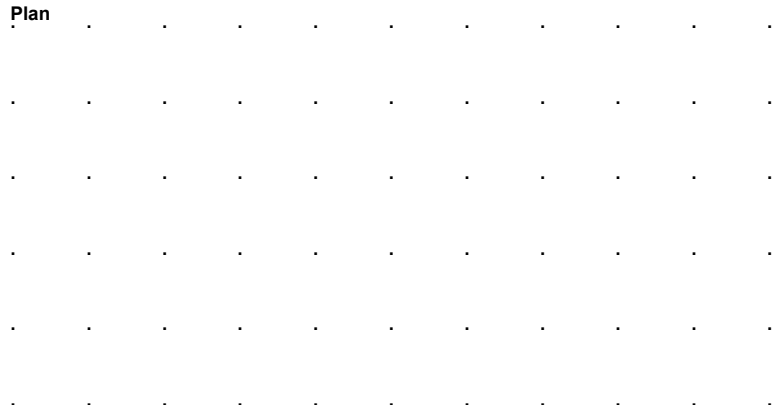
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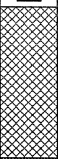
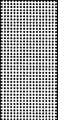
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DS/MJE

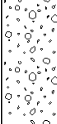
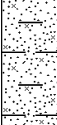
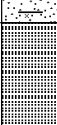
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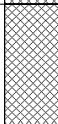
NE3565.TP2

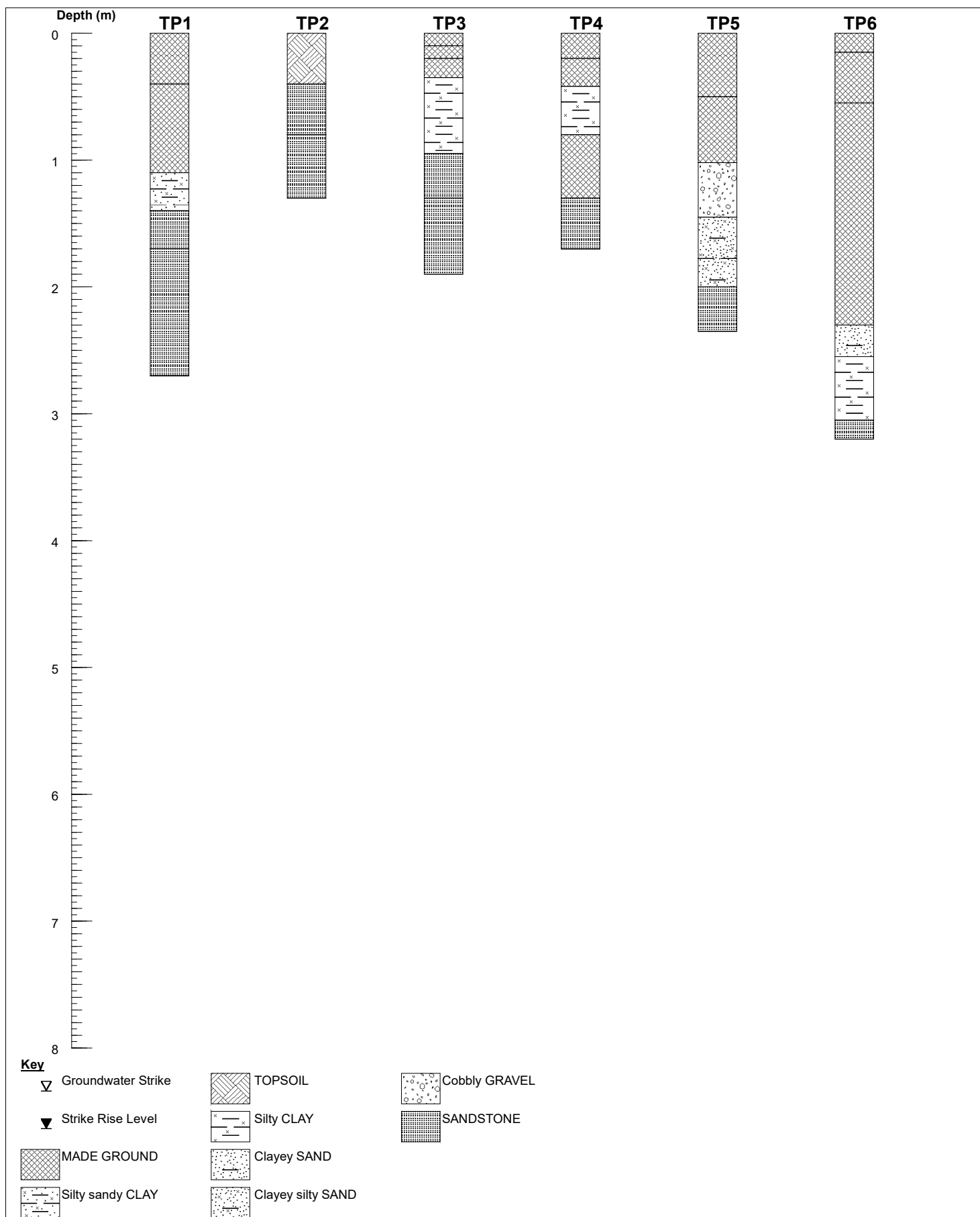
 SUB SURFACE SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS 3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907						Site BOLTON HALL, BOLTON UPON DEARNE, SOUTH YORKSHIRE		Trial Pit Number TP3
Excavation Method MECHANICAL EXCAVATION		Dimensions 0.60m x 2.20m		Ground Level (mOD)		Client THE HOUSE CROWD LIMITED		Job Number NE3565
		Location AS PLAN		Dates 10/01/2017		Engineer BELL MUNRO CONSULTING LIMITED		Sheet 1/1
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.15	D		HV @ 0.60m. c=38kPa		(0.10)	MADE GROUND: brown clayey topsoil.	      	
0.30	B				(0.10)	MADE GROUND: brown silty clay.		
					(0.15)	MADE GROUND: topsoil with occasional gravel sized fragments of stone and slight sand sized ash at one end of pit.		
0.60	D				0.35	Soft brown low strength friable silty CLAY, clay very silty fine sand in places.		
					(0.60)			
1.10	B				0.95	Weak thinly bedded brown moderately weathered medium to coarse grained SANDSTONE.	  	
					(0.35)			
					1.30	Weak to strong thinly bedded brown slightly weathered to fresh medium grained SANDSTONE.		
					(0.60)			
1.80	D		10/01/2012:DRY		1.90	Complete at 1.90m		
Plan 						Remarks No groundwater entries recorded. HV = Hand Shear Vane test. Pit sides remained vertical and stable. Pit long axis orientated North to South. On completion soakaway test carried out and then backfilled with arisings.		
						Scale (approx) 1:25	Logged By DS/MJE	Figure No. NE3565.TP3

S SUB SURFACE SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS 3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907					Site BOLTON HALL, BOLTON UPON DEARNE, SOUTH YORKSHIRE		Trial Pit Number TP4			
Excavation Method MECHANICAL EXCAVATION		Dimensions 0.60m x 2.40m		Ground Level (mOD)		Client THE HOUSE CROWD LIMITED		Job Number NE3565		
		Location AS PLAN				Dates 10/01/2017		Engineer BELL MUNRO CONSULTING LIMITED		Sheet 1/1
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description			Legend	Water
0.10	D				(0.20)	MADE GROUND: topsoil (A).				
					0.20	MADE GROUND: brown silty clay (B).				
					(0.22)					
0.50	D				0.42	Brown silty CLAY (C).				
0.80	B					MADE GROUND: brick and sandstone rubble and occasional topsoil (D).				
1.10	D				0.80/1.70	Strong thinly bedded brown slightly weathered SANDSTONE (E).				
1.60	D		10/01/2012: DRY		1.70	Complete at 1.70m				

Plan		Remarks	
PLAN VIEW		No groundwater entries recorded. Partial collapse of pit sides in made ground. Pit long axis orientated East to West. On completion backfilled with arisings.	
Scale (approx)		Logged By	Figure No.
1:25		DS/MJE	NE3565.TP4

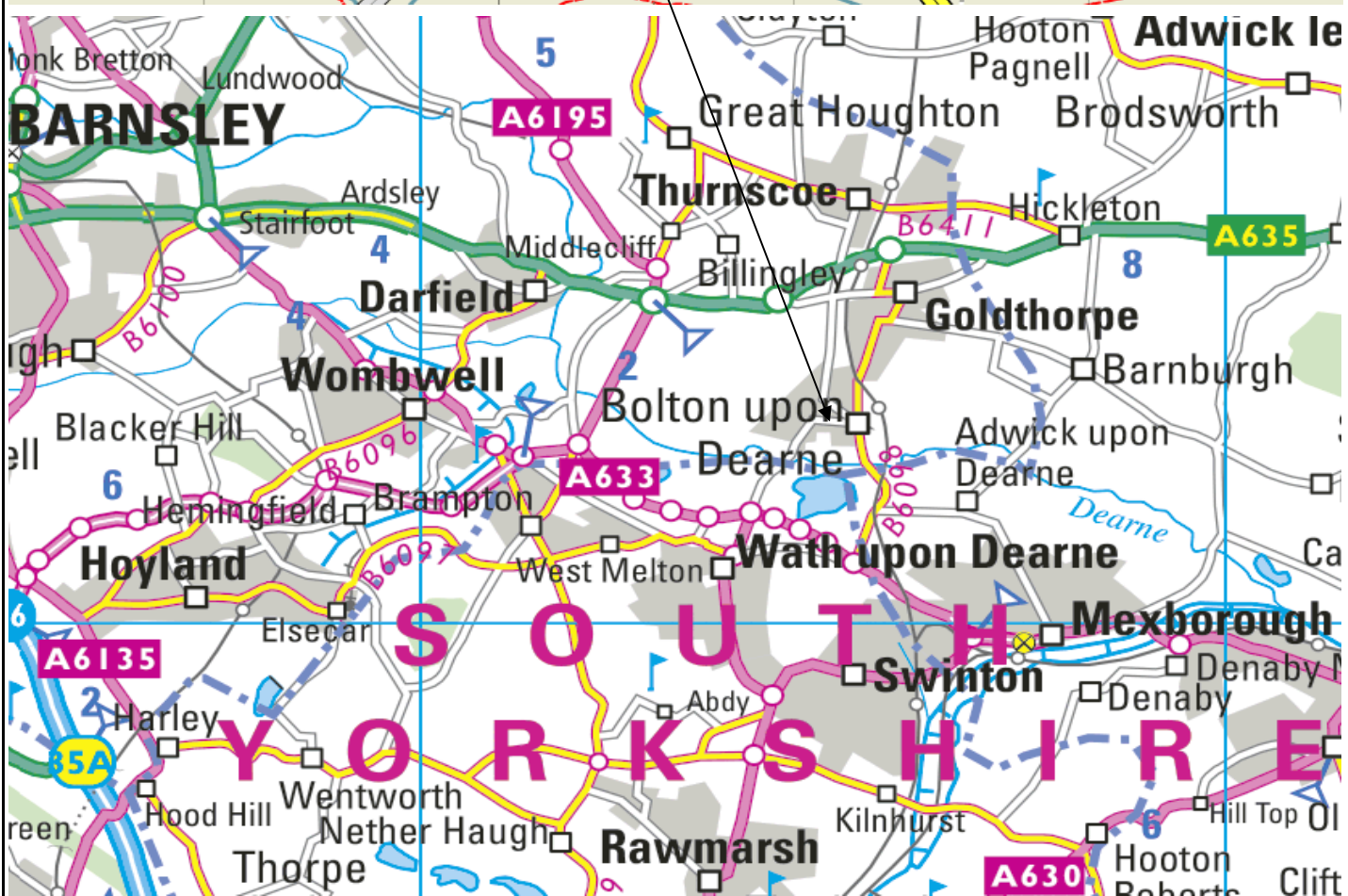
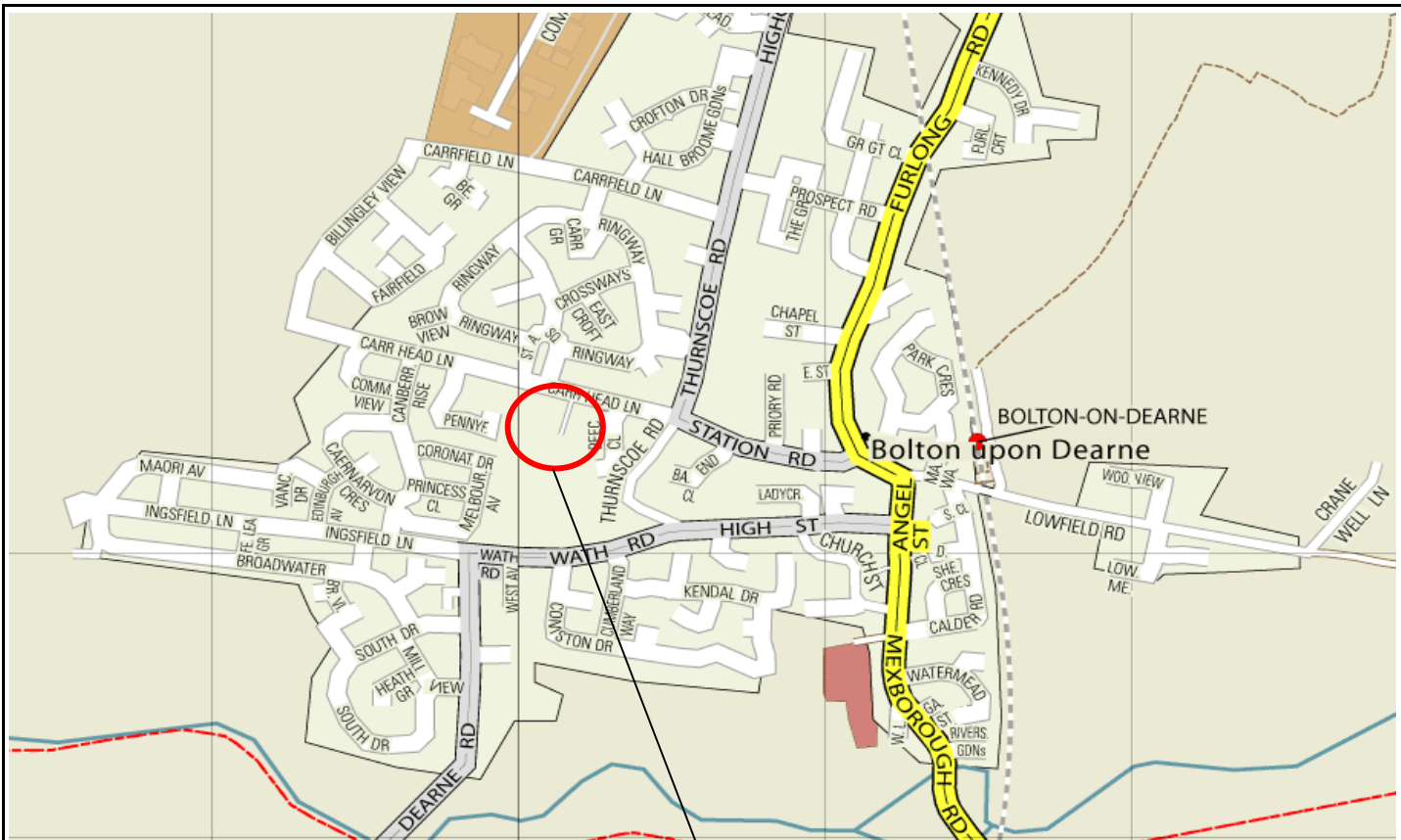
 SUB SURFACE SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS 3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907						Site BOLTON HALL, BOLTON UPON DEARNE, SOUTH YORKSHIRE		Trial Pit Number TP5	
Excavation Method MECHANICAL EXCAVATION		Dimensions 0.60m x 2.30m		Ground Level (mOD)		Client THE HOUSE CROWD LIMITED		Job Number NE3565	
		Location AS PLAN		Dates 10/01/2017		Engineer BELL MUNRO CONSULTING LIMITED		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	
0.40	B				(0.50)	MADE GROUND: topsoil and occasional brown clay.			
0.80	D				0.50 (0.52)	MADE GROUND: dark brown slightly gravelly sandy silty clay. Gravel sized fragments are fine to coarse glass and plastic.			
1.30	D				1.02 (0.43)	Brown subangular fine to coarse sandstone GRAVEL and COBBLES (possible made ground)			
1.60	D				1.45 (0.55)	Brown silty SAND, sandy clay in places (Completely weathered sandstone).			
2.10	D				2.00 (0.35)	Weak thinly bedded brown moderately weathered medium grained SANDSTONE.			
			10/01/2012: DRY		2.35	 at 2.35m : fresh brown SANDSTONE			
						Complete at 2.35m			
Plan .						Remarks No groundwater entries recorded. Pit sides remained vertical and stable. Pit long axis orientated North to South. On completion backfilled with arisings.			
						Scale (approx) 1:25	Logged By DS/MJE	Figure No. NE3565.TP5	

S S SUB SURFACE SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS 3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907						Site BOLTON HALL, BOLTON UPON DEARNE, SOUTH YORKSHIRE			Trial Pit Number TP6	
Excavation Method MECHANICAL EXCAVATION		Dimensions 0.60m x 2.40m		Ground Level (mOD)		Client THE HOUSE CROWD LIMITED			Job Number NE3565	
		Location AS PLAN								
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description			Legend	Water
0.10	D				(0.15)	MADE GROUND: brown sandy topsoil.				
					0.15	MADE GROUND: brown sandy silty clay with some roots.				
0.40	D				(0.40)					
					0.55					
1.00	D				(1.75)					
					2.30					
2.40	D				(0.25)					
2.60	D				2.55	Stiff medium to high strength brown silty CLAY with mudstone lithorelicts (completely weathered mudstone).				
					(0.50)					
3.10	D				3.05	Strong thinly bedded brown slightly weathered medium grained SANDSTONE.				
					(0.15)					
			10/01/2012: DRY		3.20	Complete at 3.20m				
Plan </										



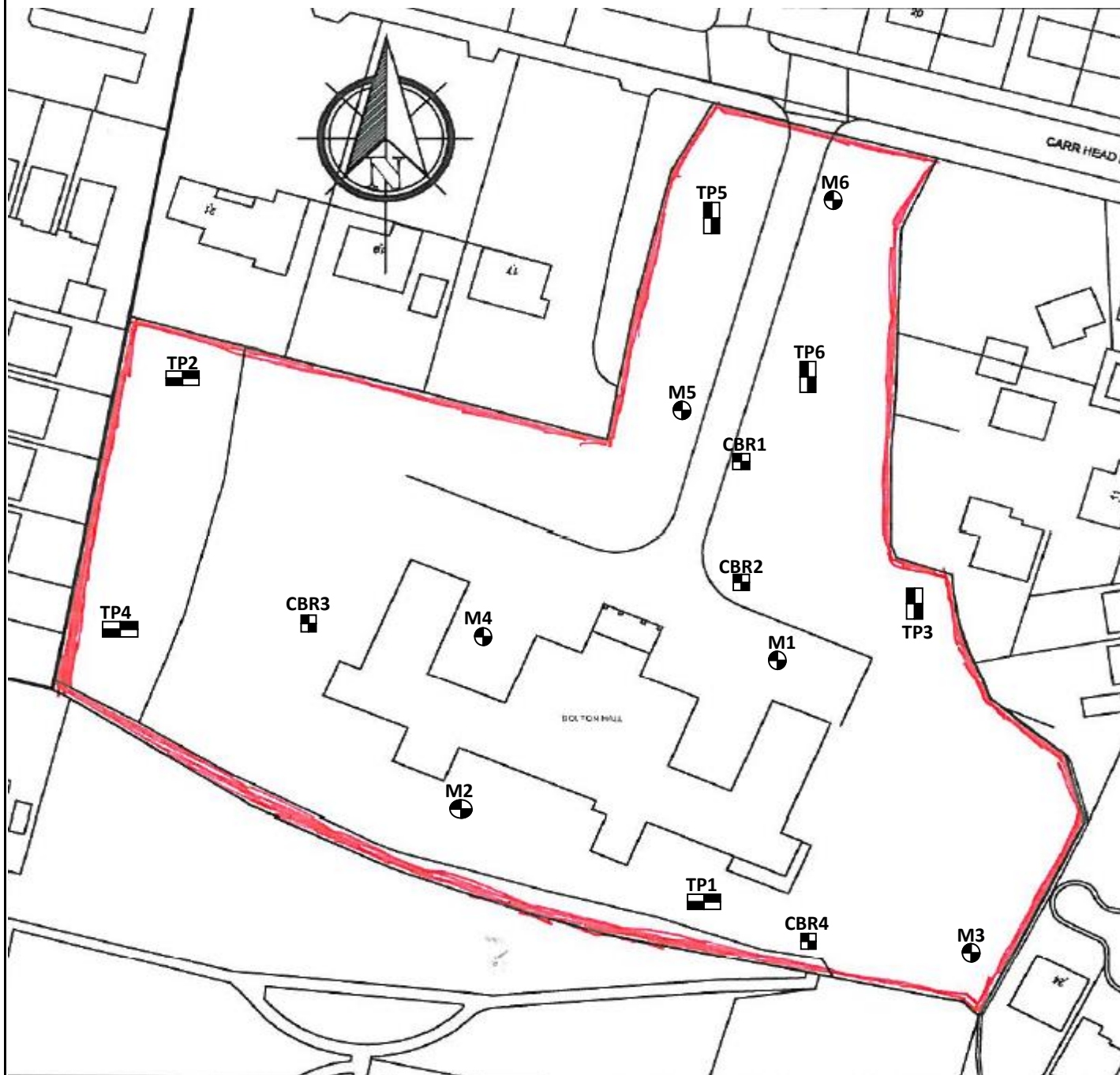
S SUB SURFACE SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS 3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907		Nominal Section		
Site BOLTON HALL, BOLTON UPON DEARNE, SOUTH YORKSHIRE	Date Drawn 17/02/2017	Date Checked	Sheet 1/1	Job Number NE3565
Client THE HOUSE CROWD LIMITED	Drawn By	Checked By	Scale 1:40[V]	Figure No. NE3565.1

FIGURES



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 SUB SURFACE SITE INVESTIGATION AND SPECIALIST GEOTECHNICAL CONSULTANTS 3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907	General Site Location 445044 402700			
Site BOLTON HALL, BOLTON UPON DEARNE, SOUTH YORKSHIRE	Date Drawn 15-Feb-17	Date Checked	Orientation 	Job No. NE3565
Client THE HOUSE CROWD	Drawn By DM	Checked By	Scale -	Figure No. 1



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SUB SURFACE

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3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907

Borehole Location Plan

Site	Date Drawn	Date Checked	Orientation	Job No.
BOLTON HALL, BOLTON UPON DEARNE, SOUTH YORKSHIRE	15-Feb-17			NE3565
Client	Drawn By	Checked By	Scale	Figure No.
THE HOUSE CROWD	DM		—	2



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SUB SURFACE

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

Proposed Development Plan

Site	BOLTON HALL, BOLTON UPON DEARNE, SOUTH YORKSHIRE	Date Drawn	15-Feb-17	Date Checked		Orientation		Job No.	NE3565
Client	THE HOUSE CROWD	Drawn By	DM	Checked By		Scale	—	Figure No.	3