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TECHNICAL REPORT

GROUND INVESTIGATION
AT
A61 BIRDWELL JUNCTION IMPROVEMENT,
TANKERSLEY,
SOUTH YORKSHIRE
FOR
BARNSLEY METROPOLITAN
BOROUGH COUNCIL
REPORT NO. NE3312A
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GROUND INVESTIGATION AT A61 BIRDWELL JUNCTION IMPROVEMENT, TANKERSLEY, SOUTH YORKSHIRE

CLIENT: BARNSLEY METROPOLITAN BOROUGH COUNCIL

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1. INTRODUCTION

This report has been prepared in accordance with an email dated 20 June 2014 and Order No. 3000243734 dated 23 June 2014 from the Client.

The brief was set out in our tender/ estimate, ref. E4933 dated 28 April 2014, with amendments as the investigation proceeded and includes:

- 12 No. mini boreholes
- 8 No. trial pits
- 9 No. dynamic probe holes
- 7 No. insitu dynamic cone penetration tests (for CBRs)
- Geotechnical laboratory testing
- Contamination analysis
- Installation of standpipes followed by groundwater and ground gas monitoring
- Provision of an interpretative report on the above.

1.1 Site Location and Description

The site is located to the north east of Junction 36 of the M1 Motorway and the A61 Birdwell Roundabout at Tankersley, South Yorkshire, as indicated on Figure 1. The approximate National Grid Reference of the centre of the site is SE. 3500 0035.

As shown on Figure 2, the undefined site comprises areas to the north and south of the A6135 Sheffield Road.

The northern area comprises an irregular shaped field which falls gently from the south east to the north west. The area is grassed and is bounded to the west north west by the A6195 Dearne Valley Parkway, to the south by the A6135 Sheffield Road, to the east by Cross Keys Lane with houses beyond and to the north by a continuation of the grassed field.

The southern area comprises the western and south western border of a grassed field which falls from the east to the west and is bounded to the south west by the Junction 36 roundabout over the M1 Motorway, to the west by the A61 trunk road, to the north west by the Birdwell Roundabout, to the north by the A6135 Sheffield Road and to the east by a continuation of the grassed field.

The field boundaries are marked by fences, mature bushes and young trees.

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1.2 Brief Site History, Geology and Mining

The following overview is based solely on a Desk Study Report by Abbeydale and the appended Mineral Report by the South Yorkshire Mining Advisory Service (SYMAS) provided by the Client.

The site was open fields known as Tankersley Common with the east to west Sheffield Road passing through it from before the 1850 Ordnance Survey. In the period between the 1942 and 1945 the Tankersley Common Opencast was taken out to the south of the A6135 Sheffield Road. The Birdwell Roundabout junction was constructed as part of the construction of the M1 Motorway in the early 1970's. Prior to 1995 the Rockingham Opencast was taken out to the north of the A6135 Sheffield Road. In the period up to 2002 the A6195 Dearne Valley Way was constructed and the Birdwell Roundabout junction was amended to its present configuration.

Underlying the site are Carboniferous Westphalian B Coal Measures strata with no natural drift cover. The 0.61 to 1.60 metre thick Swallow Wood (or Top Haigh Moor) Coal seam passes through the site in a north to south orientation, where it has not been taken by opencasting. The 1.04 to 2.15 metre thick Haigh Moor Coal seam and the possibly intermittent Low Haigh Moor Coal seam are at unknown depth below the Swallow Wood Coal seam with the 0.48 to 1.25 metre thick Lidget Coal seam further below. The Lidget Coal seam is about 40 to 50 metres below the Swallow Wood Coal seam and crops out about 500 metres to the west of the site. This indicates that the Haigh Moor Coal seam and Low Haigh Moor Coal seams should be present at less than 40 metres depth. The rock strata, including the Swallow Wood Coal seam, down dip at 4° to 7° to the north east. The rock strata are displaced by a geological fault which trends from the north west to the south east and downthrows strata to the south west.

The Tankersley Common Opencast extracted the 0.84 metre thick Swallow Wood Coal seam to an unknown depth and the Rockingham Opencast extracted the 0.93 metre thick Swallow Wood Coal seam to up to 20 metres depth. Compaction of the backfill to the Rockingham Opencast is understood to have been given. Two mine entries are possibly present in the south western part of the site adjoining the Birdwell Roundabout.

1.3 Proposed Development and Purpose of the Ground Investigation

We understand that it is proposed to reconfigure the Birdwell Roundabout road junction by changing the shape of the Birdwell Roundabout, by adding roundabouts about 190 metres to the north east and about 390 metres to the north north east and by constructing new and amended connecting roads at grade, in cuttings and on embankment, as shown on Figure 3. At the time of writing this report the levels of the new roads and junctions was not known.

The purpose of the investigation was to obtain an indication of the ground conditions, at the positions of the exploratory holes, to determine the soil and rock profile and to establish the characteristics of the strata for earthworks and road pavement design.

In addition a contamination 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. In view of infilled opencast pits, nearby landfills and colliery spoil mounds ground gas monitoring and assessment was also required to determine necessary precautions and/or remedial measures.

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2. INVESTIGATION

2.1 Investigation Details

Twelve mini boreholes were put down to depths of between 0.45 and 7.45 metres using a Dart Mini Sampling Rig fitted with windowless sample tubes of 83, 76, 72, 62 and 52mm diameter at the positions determined by the Client and set out by Sub Surface North East Limited, as shown on Figure 2. The samples were subsequently logged in accordance with BS. EN. 14688 and 14689: 2002-2004 and the resulting Mini Borehole Records are appended. M1, M3, M3A and M9 were backfilled with arisings soon after completion as no installations were required.

Eight trial pits were taken out by a mechanical excavator at the positions determined by the Client and set out by Sub Surface North East Limited, as shown on Figure 2. The trial pits were excavated to depths of between 2.35 and 3.85 metres, representative samples were taken and the materials were logged in accordance with BS. EN. 14688 and 14689: 2002-2004. The resulting Trial Pit Records are appended. The trial pits were backfilled with arisings on completion by the excavator and it is therefore likely that loose or soft pockets will still remain.

Nine dynamic probe holes were put down to depths of between 0.40 and 8.70 metres (refusal) at the positions determined by the Client and set out by Sub Surface North East Limited, as shown on Figure 2. The equipment conforms with BS.1377: 1990 and SRS15 Apparatus of the German Standard DIN4094 and comprises a 63.5kg rammer dropped through 750mm using 35mm diameter rods and a 20cm^2 area cone (50mm diameter and 90 degrees). The penetration rate, in blows/100mm, is given on the appended Dynamic Probe Hole Records.

The co-ordinates and ground levels for each of the exploratory holes has been determined by a survey undertaken by Central Alliance Survey on 30 July 2014. The co-ordinates and ground levels are related to the Ordnance Survey Grid and Ordnance Datum respectively.

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 bedrock, the upper part of which was completely weathered to a soil. The depth of the Made Ground/ Rockhead given for the Dynamic Probe Holes is based on the relative rates of penetration determined and is approximate only. The depths of strata were as follows:

TABLE 1 STRATA

Expl. Hole No.	Ground Level (mOD)	Depth of Made Ground (m)	Depth to Rockhead (m)	Depth (Thickness) of Swallow Wood Coal Seam Horizon (m)	Depth of Hole (m)
M1	136.74	> 0.45			0.45
M1A	136.74	> 6.45			6.45
M2	137.83	> 7.45			7.45
M3	139.85	> 0.45			0.45
M3A	139.85	> 0.45			0.45
M3B	139.85	> 5.45			5.45
M4	144.09	> 2.05			2.05
M5	143.85	> 2.95			2.95
M6	141.91	1.20	1.20	3.00 (1.10)	3.45
M7	141.53	0.60	2.00	-	2.95
M8	143.39	0.40	1.00	-	1.45
* M9	141.93	1.20	1.20	-	2.00
TP1	138.99	> 3.85			3.85
TP2	141.79	> 3.60			3.60
TP3	144.01	> 3.50			3.50
TP4	141.55	-	1.60	-	3.30
TP5	142.56	0.70	2.10	-	3.20
TP6	144.69	0.90	2.15	2.16 (0.01)	3.00
TP7	140.01	> 2.75			2.75
TP8	147.54	-	0.70	-	2.35
DP1	144.83	> 2.00			2.00
DP1A	144.81	> 1.90			1.90
DP2	145.13	> 0.40			0.40
DP2A	145.12	8.30	8.30		8.70
DP3	145.56	> 1.90			1.90
DP4	146.39	3.50	3.50		3.60
DP5	141.32	> 1.50			1.50
DP5A	141.28	> 2.00			2.00
DP6	141.58	2.80	2.80		3.00

M = Mini Borehole, TP = Trial Pit, DP = Dynamic Probe Hole.

* M9 replaced DP7 after rods broke when undertaking DP6.

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A general summary of the strata found is as follows:

2.2.1 Made Ground

The Made Ground (predominantly opencast backfill) was found to vary from cohesive to granular material both laterally and with depth. The variable depth of Made Ground is shown on the cross sections given as Figures 4 and 5.

Cohesive material was typically found to be gravelly to very gravelly silty clays with cobble and occasional boulder sized fragments of mudstone, siltstone and sandstone; the gravel sized fragments comprising mudstone, siltstone, sandstone and occasional coal. Shear strengths, determined by insitu Standard Penetration Tests and Dynamic Probe Hole blow counts, found variable low, medium and high shear strengths.

Granular material was typically found to be clayey silty sandy gravel and variable cobble sized fragments of mudstone and occasional siltstone and sandstone. Exceptions were, however, found in M1 and M6. Gravelly silty sands, where the gravel sized fragments comprised siltstone, were found in M1 whilst sandy gravel sized fragments of brick and burnt shale were found in M6. Relative densities, determined by Standard Penetration Tests and Dynamic Probe Hole blow counts, found relative densities to be in the medium dense and dense ranges.

2.2.2 Bedrock

Beneath an initial layer of topsoil completely weathered derivatives of the bedrock were found to comprise stiff clayey silts over stiff and then firm silty clays with gravel sized mudstone lithorelicts in TP4 and silty sandy gravel and cobble sized sandstone lithorelicts in TP8. Beneath cohesive Made Ground in M7, M8, TP5 and TP6, completely weathered derivatives of the bedrock were found to comprise firm, stiff and friable silty clays. Gravel and cobble sized mudstone and siltstone lithorelicts were recorded in M8 only whilst the cohesive derivatives were determined to be of medium strength in M7 only.

Underlying the above were typical Coal Measures strata comprising interbedded mudstones, siltstones and sandstones which were found to be generally very weak and highly becoming moderately or slightly weathered with depth.

Remnants of the Swallow Wood Coal seam were found in M6 and TP6 only. M6 found the coal seam horizon to comprise 0.10 metres of coal over 1.00 metres of stowed waste (silty clay with gravel sized fragments of coal and mudstone) in the mineworkings void over a seatearth or relic topsoil (very high strength silty clay with many gravel sized mudstone lithorelicts). TP6 found 0.01 metre of highly weathered coal, the mineworkings void having apparently completely closed.

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2.2.3 Groundwater

A summary of groundwater entries and levels are tabulated below:

TABLE 2 GROUNDWATER

Exploratory Hole No.	Water Entry Depth (m)	Rate of Inflow	Depth to Standing Water Level (m)
M1A	1.00	Seepage	Not Recorded
M2	1.00	Seepage	Not Recorded
M3B	0.45	Seepage	Not Recorded
M4	0.60	Seepage	Not Recorded
M5	0.70	Seepage	Not Recorded
TP7	2.60	Moderate	Not Recorded

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

Monitoring of standpipes installed in M1A, M2, M3B, M4, M5, M6, M7 and M8 between 18 June 2014 and 25 September 2014 found depths to groundwater to be highly variable at 0.80 to 1.20, 1.48 to 1.90, >5.00, 0.75 to >2.05, >2.70, 1.12 to 1.70, 0.30 to 0.75 and >1.00 metres depth respectively.

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

Thirty Standard Penetration Tests (SPTs) were performed in cohesive and granular Made Ground, cohesive derivatives of the bedrock and bedrock, the results of which are recorded on the appended Standard Penetration Test Results Sheet with 'N' values and indicative states of compaction and consistency, where appropriate, given on the Mini Borehole Records.

Seven insitu Dynamic Cone Penetration (DCP) tests were also carried from ground level to up to 0.90 metres depth and the results are appended. California Bearing Ratios (CBRs) were subsequently determined. The insitu DCP tests were undertaken adjacent to TP1 to TP7 inclusive, the locations of which are shown on Figure 2.

3.3 Installations and Monitoring

On completion of M1A, M2, M3B, M4, M5, M6, M7 and M8 hdpe standpipes were installed to depths of 5.00, 5.00, 5.00, 2.05, 2.70, 3.00, 2.50 and 1.00 metres respectively. The standpipes are slotted from 1.00 metres depth in all but M8, which was slotted from 0.80 metres depth. The standpipes 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 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.

- 34 No. Atterberg Limits (including moisture content)
- 1 No. particle size distributions by wet sieve analysis
- 8 No. particle densities
- 12 No. compaction tests using a 4.5kg rammer with CBRs determinations at each moisture content increment.
- 7 No pyritic ground test suites
- 9 No pH value and soluble sulphate 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, 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 three soils samples were analysed to determine speciated poly chlorinated bi-phenyls (PCBs) concentrations and Waste Acceptance Criteria (WAC).

Three leachate samples have 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.

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4. APPRAISAL AND RECOMMENDATIONS

4.1 Comments on the Profile

It should be appreciated that only a small proportion of the area has been sampled 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.

In our opinion 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, although clearly no guarantee can be given.

Whilst the exploratory holes indicate a general type of strata over the area they should not be interpolated or extrapolated to represent the ground conditions in adjacent areas as strata are displaced by a geological fault and mineworkings have been found in the Swallow Wood Coal seam where it has not been removed by opencasting.

Due to opencasting the depth of Made Ground varies considerably where buried highwalls are present (see cross section given as Figure 5). In addition the composition of the Made Ground (opencast backfill) has been found to vary laterally and with depth 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, Trial Pit and Dynamic Probe Hole Records.

4.2 Ground Conditions

The ground investigation found cohesive and granular Made Ground infilling a former opencast coal pit to the north of the A6135 Sheffield Road. The cohesive Made Ground typically comprised variable low, medium and high shear strength gravelly to very gravelly silty clays with cobble and occasional boulder sized fragments of mudstone, siltstone and sandstone; the gravel sized fragments comprising mudstone, siltstone, sandstone and occasional coal. The granular Made Ground typically comprised medium dense and dense clayey silty sandy gravel and variable cobble sized fragments of mudstone and occasional siltstone and sandstone.

Adjoining the road and at the western edge of the opencast coal pit Made Ground was found to 1.20 and about 2.80 metres depth in M6 and DP6 respectively and at the eastern edge of the opencast coal pit Made Ground was found to about 8.30 and about 3.50 metres depth in DP2A and DP4 respectively. Further to the north the depth of Made Ground was greater than 3.60, 5.45, 7.45 and 6.45 metres in TP2, M3B, M2 and M1A respectively. To the south of the A6135 Sheffield Road and east of the A61 exploratory holes skirted another opencast coal pit to the east and Made Ground was found to up to 0.90 metres depth.

Underlying the above, or a surface layer of topsoil, bedrock was generally completely weathered to medium strength (where determined) firm and stiff silty clays and clayey silts with mudstone and siltstone lithorelicts although silty sandy gravel and cobble sized sandstone lithorelicts were found in TP8. The above were underlain by generally very weak highly becoming moderately or slightly weathered interbedded mudstones, siltstones and sandstones. The Swallow Wood Coal seam, where it had not been removed by opencasting, was found to have been mined.

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4.3 Roads Pavement Considerations

We understand that it is proposed to reconfigure the Birdwell Roundabout road junction by changing the shape of the Birdwell Roundabout, by adding roundabouts about 190 metres to the north east and about 390 metres to the north north east and by constructing new and amended connecting roads at grade, in cuttings and on embankment, as shown on Figure 3. At the time of writing this report the levels of the new roads and junctions was not known.

Insitu Dynamic Cone Penetration tests, DCP1 to DCP7, were carried adjacent to the trial pits, TP1 to TP7, from ground level to up to 0.90 metres depth and the results are appended. California Bearing Ratios (CBRs) were subsequently determined and a summary of the findings is as follows:

TABLE 3 INSITU DCP/ CBR RESULTS

Exp. Hole No.	Approx. Depth (m)	CBR Value (%)	Strata (see Trial Pits for full description)
DCP1	0.50	20	MG: gravelly silty clay with cobble sf.
	0.90	16	MG: gravelly silty clay with cobble sf.
DCP2	0.50	51	MG: gravelly silty clay with cobble and boulder sf.
	0.90	55	MG: gravelly silty clay with cobble and boulder sf.
DCP3	0.50	37	MG: gravelly silty clay with cobble and boulder sf.
	0.90	52	MG: gravelly silty clay with cobble and boulder sf.
DCP4	0.50	5	Clayey SILT with gravel sized mudstone lithorelicts.
	0.90	9	Clayey SILT with gravel sized mudstone lithorelicts.
DCP5	0.50	-	-
	0.90	5	Silty CLAY.
DCP6	0.50	6	MG: gravelly silty clay.
	0.90	20	MG: silty clay.
DCP7	0.50	20	MG: gravelly silty clay with cobble and boulder sf.
	0.90	35	MG: gravelly silty clay with cobble and boulder sf.

It should be noted that where cobble and boulder sized fragments are present the determined CBR values might not be representative of the matrix material.

It should also be noted that a limitation of the above is that moisture contents are not available and the above CBR values are moisture dependent. Given that the testing was undertaken during a relatively dry summer period it is possible that the CBR values would reduce with increased moisture content; this being particularly so for cohesive strata.

The above tests indicate that a design CBR value of 6% for the cohesive Made Ground and 5% for the natural cohesive derivatives of the bedrock, where they are found at formation level, would be appropriate.

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We recommend that when formation levels are determined CBR values with moisture contents are determined by insitu CBR tests, or Modulus of Subgrade Reaction plate tests where coarse material predominates. These should be undertaken at regular intervals along the road in order that pavement design can reflect variations in ground conditions.

If there is to be a delay before construction, to prevent water softening, loosening and disturbance, the formation strata should not be exposed.

The location of the buried highwalls have been determined along the west to east section line shown on Figures 2 and 5. The dynamic probe holes were largely terminated on obstructions within the Made Ground. We recommend that additional mini boreholes or boreholes are taken out to confirm and delineate the buried highwalls.

Where proposed roads pass over the buried highwalls there is a potential for continuing differential settlement which could affect the road surface. To limit this we recommend that a proprietary geogrid is incorporated into the road pavement and advice from a specialist supplier should be sought.

4.4 Excavations, Groundwater and Earthworks

4.4.1 Excavations

Little difficulty in excavating near surface materials to depths of 3.00 to 3.85 metres was experienced during the trial pitting. However, TP7 was terminated on a large boulder sized obstruction at 2.75 metres depth and TP8 was terminated in mudstones at 2.35 metres depth.

The trial pits sides were found to be unstable in the deep Made Ground whilst they remained vertical and stable in the natural ground for the relatively short period that they were left open and unsupported.

It is therefore 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.

4.4.2 Groundwater

Groundwater seepages were recorded in M1A, M2, M3B, M4 and M5 at 1.00, 1.00, 0.45, 0.60 and 0.70 metres depth respectively whilst a moderate groundwater inflow was recorded in TP7 at 2.60 metres depth.

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

Monitoring of standpipes installed in M1A, M2, M3B, M4, M5, M6, M7 and M8 between 18 June 2014 and 25 September 2014 found depths to groundwater to be highly variable at 0.80 to 1.20, 1.48 to 1.90, >5.00, 0.75 to >2.05, >2.70, 1.12 to 1.70, 0.30 to 0.75 and >1.00 metres depth respectively.

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Where groundwater is encountered to about 3.00 metres depth and accumulates in open excavations it is considered that it should be able to be removed by pumping from a filtered sump.

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

4.4.3 Earthworks

Initially a topsoil strip should be undertaken for the area of the cut and fill earthworks and stored for re-use. Where possible the earthworks operations should be phased so that excavated materials, which are to be re-used, are transported and placed where they are required to limit multiple handling as this may cause deterioration in some of the earthworks material such that it cannot be re-used. All stockpiled material should be protected during inclement weather.

Given the variable nature of the soils underlying the site it would be advisable to selectively excavate soils with similar characteristics and place these in pre-determined storage areas. Mixing excavated materials should be avoided as this will almost certainly result in more material being disposed off-site and the possibility that more material will need to be imported.

Compaction tests have been undertaken on three samples of cohesive Made Ground from the northern area (TP1), five samples of cohesive Made Ground from the central area (TP2 and TP3), three samples of cohesive Made Ground from the southern area (TP6 and TP7) and one sample of natural silty clay from the southern area (TP6). A summary of the results is as follows:

TABLE 4 SUMMARY OF COMPACTION AND CBR TESTS

Expl. Hole No.	Sample Type/ Depth (m)	Moisture Content (%)	Optimum Moisture Content (OPMC) (%)	Moisture Content minus OPMC (%)	Maximum (Particle) Dry Density (Mg/m^3)	Test Moisture Content (%)	Mean CBR Value (%)	Soil #
TP1	B 0.50	15.5	10.1	+5.4	1.99 (2.65*)	4.0 7.2 10.1 13.1 15.5	45 40 37 24 14	Cohesive Made Ground
TP1	B 1.00	13.0	9.1	+3.9	2.07 (2.72)	4.3 7.0 9.1 10.9 13.0	43 38 33 24 16	Cohesive Made Ground
TP1	B 1.75	14.1	10.3	+3.8	1.81 (2.65*)	3.1 6.1 10.3 14.1 18.2	48 45 42 26 13	Cohesive Made Ground

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TABLE 4 (Cont'd) SUMMARY OF COMPACTION AND CBR TESTS

Expl. Hole No.	Sample Type/ Depth (m)	Moisture Content (%)	Optimum Moisture Content (OPMC) (%)	Moisture Content minus OPMC (%)	Maximum (Particle) Dry Density (Mg/m^3)	Test Moisture Content (%)	Mean CBR Value (%)	Soil #
TP2	B 0.50	10.8	9.1	+1.7	2.05 (2.70)	3.1 5.9 9.1 10.8 13.1	23 22 20 18 3.1	Cohesive Made Ground
TP2	B 1.20	11.4	9.9	+1.5	2.04 (2.65*)	3.9 6.0 9.9 11.4 13.1	69 23 21 19 14	Cohesive Made Ground
TP3	B 0.50	11.8	9.2	+2.6	2.07 (2.71)	3.1 6.2 9.2 11.8 14.1	31 21 18 14 2.6	Cohesive Made Ground
TP3	B 1.10	10.4	9.0	+1.4	2.06 (2.65*)	4.1 7.2 9.0 10.4 12.2	30 23 20 18 9.8	Cohesive Made Ground
TP3	B 1.80	16.1	13.6	+2.5	1.91 (2.73)	7.1 10.8 13.6 16.1 18.7	19 16 8.0 4.4 2.0	Cohesive Made Ground
TP6	B 0.50	18.5	16.6	+1.9	1.81 (2.65*)	8.1 14.0 16.6 18.5 20.3	16 12 8.4 7.1 5.3	Cohesive Made Ground
TP7	B 0.50	11.7	10.0	+1.7	2.05 (2.72)	3.0 6.1 10.0 11.7 14.2	28 27 16 12 2.6	Cohesive Made Ground
TP7	B 1.00	10.6	10.6	0.0	2.04 (2.68)	5.9 9.1 10.6 12.0 14.9	40 26 18 10 2.0	Cohesive Made Ground

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TABLE 4 (Cont'd) SUMMARY OF COMPACTION AND CBR TESTS

Expl. Hole No.	Sample Type/ Depth (m)	Moisture Content (%)	Optimum Moisture Content (OPMC) (%)	Moisture Content minus OPMC (%)	Maximum (Particle) Dry Density (Mg/m^3)	Test Moisture Content (%)	Mean CBR Value (%)	Soil #
TP6	B 1.00	33.0	17.8	+15.2	1.59 (2.65*)	5.1 10.2 17.8 24.0 33.0	26 25 15 2.4 1.0	Friable silty CLAY

* No particle density determination and so assumed value taken
# Test excludes material >20mm (> medium gravel) for 200mm diameter CBR mould.

Our analysis of the compaction tests indicates the following:

Northern Area (TP1):

Cohesive Made Ground is unacceptable earthworks materials for compaction given that the natural moisture content minus the optimum moisture content is greater than + 2.0%.

Central Area (TP2 and TP3):

Cohesive Made Ground is generally acceptable earthworks materials, although locally a little wet, for compaction given that the natural moisture content minus the optimum moisture content generally falls between + 2.0% and - 2.0%.

Southern Area (TP6 and TP7):

Cohesive Made Ground is generally acceptable earthworks materials, although locally a little wet, for compaction given that the natural moisture content minus the optimum moisture content generally falls between + 2.0% and - 2.0%.

The natural silty clays are unacceptable earthworks materials for compaction given that the natural moisture content minus the optimum moisture content is well in excess of + 2.0%.

It may, however, be possible to improve the unacceptable earthworks materials by the addition of quick lime or cement. If this option is taken further laboratory testing is recommended.

The degree of compaction achievable in the laboratory using the 4.5kg rammer method was found to be relatively good as indicated by the percentage air voids in relation to the moisture content against dry density curve shown on the appended compaction test results sheets. Air voids were less than 5% at the optimum moisture content for all but the sample of cohesive Made Ground from TP1 at 1.75 metres depth and the sample of silty clay from TP6 at 1.00 metres depth.

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It should be noted that coarse gravel, cobble and boulder sized fragments are removed prior to the compaction and CBR testing. Soils containing large quantities of coarse gravel, cobbles and boulders are unlikely to be suitable earthworks material. Consideration might be given on this site to crushing and grading the coarser material to enable it to be reused.

We recommend that following the topsoil strip, up to 0.60 metre benches are excavated into the hillside, to eliminate a plain of weakness being formed beneath proposed embankments.

Acceptable earthworks materials should be placed and compacted in accordance with the Department of Transport Specification for Highway Works, Series 600 Earthworks, or similar. We recommend that competitive tenders are sought from specialist earthworks contractors.

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.

Sixteen soil samples were subjected to pH and soluble sulphate testing with pH values found to range from 4.9 (acidic) to 8.6 (slightly alkaline) and soluble sulphate concentrations ranging from 0.03 to 0.60 g/l.

In addition seven of the soil samples were subjected to total sulphate, total sulphur and magnesium testing and the results ranged from 0.01 to 0.24%, <0.01 to 0.31% and <0.01 to 0.07 g/l respectively. The testing indicated that four of seven (57%) of the samples contained pyrite which could weather to sulphates.

The above results indicate that the Design Sulphate Class for the site ranges from DS-1 to DS-4. The area of TP1 was found to be DS-4, the area of M3B and TP2 was found to be DS-3, the area of TP3 and TP7 was found to be DS-2 and the remaining areas of M1A, TP8 and TP5/ TP6 were found to be DS-1.

Our knowledge of the site and ground conditions indicates that the site is "brownfield", "pyritic ground" and in parts acidic with generally static, but 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-3 should be used as detailed on the appended extract.

The exception to the above is in the area of TP1 where AC-4 should be used. It is recommended that further testing is undertaken in the area of TP1 to delineate the area.

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4.6 Contamination Considerations

At the outset it should be noted that this contamination investigation has been undertaken in order to provide an initial assessment on the level of contamination present. Based upon the findings of this investigation additional sampling, analysis and assessment may be required.

It should be appreciated that the suite of determinants analysed for consists of a range of common contaminants and the absence of any other specific contaminants cannot be guaranteed.

4.6.1 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.

The Department for Environment, Food and Rural Affairs (DEFRA) and the Environment Agency (EA) withdrew the soil guideline values (SGVs) and replaced the old CLR 10 document covering derivation of soil guideline values in 2008. This had the effect that any values derived using the old CLR 10 assumptions and parameters were no longer valid. DEFRA and EA published new 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 a substantial number of Generic Assessment Criteria (GACs) were published by Land Quality Management (LQM), in conjunction with the Chartered Institute of Environmental Health. Contaminated Land: Applications in Real Environments (CL:AIRE) guideline values were also published in December 2009 to supplement the above. The guideline values (SGVs, GACs and CL:AIRE) 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 it is proposed to reconfigure a road junction and construct roads, contamination analyses have been compared with the guideline values for a standard land use of commercial and industrial.

The contamination analysis determined no elevated levels of the determinants analysed for when compared with the guideline values for a standard land use of commercial and industrial. Guideline values for the assessment can be supplied directly to the Regulator, if requested.

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.

4.6.2 Assessment (Leachate)

To assess the leachability of contaminants and the consequent pollution potential of the on-site material to "controlled waters" three samples of near surface cohesive Made Ground have been processed in accordance with the Environment Agency's protocol, the leachate analysed for a suite of common contaminants and the results are appended.

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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 5 ASSESSMENT OF LEACHATE CONTAMINATION

Determinant	Exploratory Hole No	Depth (m)	Recorded Level (µg/l)	EA EQS (µg/l)	UK DWS (µg/l)
Benzo(b)fluoranthene	TP1	0.50	8.8	-	0.1
Benzo(a)pyrene	TP1	0.50	7.0	-	0.1
Indeno(123-cd)pyrene	TP1	0.50	8.6	-	0.1
Benzo(ghi)perylene	TP1	0.50	8.7	-	0.1
Total PAHs	TP1	0.50	67	-	0.1

The results of the leachate analysis indicate that "controlled waters" are potentially at risk from leachable benzo(b)fluoranthene, benzo(a)pyrene, indeno(123-cd)pyrene and benzo(ghi)perylene which are all poly-nuclear aromatic hydrocarbons (PAHs) for which there are guideline values.

It should be noted that, in our opinion, leachate analysis generally overestimates the level of leachable organic compounds in on-site soils. We therefore recommend that more reliance is placed on the analysis of water from the potentially affected "controlled waters" in this regard.

4.6.3 Conclusions and Recommendations

Our assessment, based on a limited number of soil samples only, indicates that there are no contaminants requiring remediation and/or precautions to be taken for the proposed development.

Should it be necessary to remove on-site materials from the site, classification of the waste should be undertaken before submitting the contamination analysis, including the Waste Acceptance Criteria (WAC) analysis, to appropriate waste carriers and/ or waste disposal site operators to determine the most appropriate tip to use and the associated costs.

SGVs, GACs 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.

Should it be necessary for groundwater to be pumped from on-site excavations the groundwater should be sampled and analysed and 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.

4.6.4 Combustibility

A coal seam crops out through the site and in addition there may be pockets of coaly material present in the Made Ground. Where the above are found during earthworks we recommend that calorific values are determined by testing.

The Building Regulations indicate that it is undesirable to build directly on 'combustible' materials, although the term 'combustible' is poorly defined in researched literature. We therefore propose the following categorisation based upon ICRCL 61/84: 1984, "Notes on the Fire Hazards of Contaminated Land":

Calorific Value (MJ/kg)	Combustible Category
less than 2	No risk
2 to 7	Marginal risk
7 to 10	Significant risk
greater than 10	High risk

Combustible materials are only likely to affect the foundations to buildings, roads and buried services if they are able to burn causing loss of volume and consequently causing a loss of support and ground settlement. We consider that provided combustible materials are covered and protected by well compacted non-combustible material, so avoiding contact with air or any device that could generate high temperatures, the combustible material could remain in-situ. Specifically, beneath buildings and roads combustible material should be removed and/ or separated by a 1.00 metre thickness of non-combustible material.

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4.7 Ground Gas Considerations

Ground gas monitoring has been undertaken on 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 6 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 to 1.1	0.0 to 28.3	20.5 to 0.5	< 0.1 to - 1.0

It can be seen from the monitoring that marginally elevated levels of methane, highly elevated levels of carbon dioxide and depleted levels of associated oxygen, have been detected together with negative gas flows.

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.

For any buildings that might be constructed on the site, levels of gas have been assessed in accordance with British Standard 8485, "Code of practice for the characterisation and remediation from ground gas in affected developments", published in October 2007 (BS.8485:2007).

The characteristic hazardous gas flow rate (Q_{hgs}) 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_{hgs} = [28.3/ 100] x 1.0 = 0.283 l/hr

BS.8485:2007, Table 1, indicates that the site falls into Characteristic Situation 3 (CS2).

BS.8485:2007, Table 2, indicates that for CS3 and a commercial building a score of 2 gives the level of protection and remedial measures required.

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For a commercial and/ or industrial building with a ground bearing floor slab BS.8485:2007 Table 3 indicates that the following protection and remedial measures should be considered:

Table 3(b) reinforced concrete ground bearing floor slab.
(Score 0.5)

and

Table 3(c) proprietary gas resistant membrane to reasonable levels of workmanship in line with current good practice under CQA with integrity testing and independent validation.
(Score 2.0)

OR .....

Table 3(b) reinforced concrete ground bearing foundation raft with limited service penetrations that are cast into the slab.
(Score 1.5)

and

Table 3(c) taped and sealed membrane to reasonable levels of workmanship in line with current good practice with validation.
(Score 0.5)

.....

For a commercial and/ or industrial building with a suspended floor slab BS.8485:2007 Table 3 indicates that the following protection and remedial measures should be considered:

Table 3(a) passive sub floor ventilation, which can be a clear void or formed using gravel, geocomposites, polystyrene void formers etc., of very good performance.
(Score 2.5)

and

Table 3(b) block and beam floor slab.
(Score 0.0)

OR .....

Table 3(a) passive sub floor ventilation, which can be a clear void or formed using gravel, geocomposites, polystyrene void formers etc., of good performance.
(Score 1.0)

and

Table 3(b) reinforced concrete cast in-situ suspended slab with minimal service penetrations and water bars around all slab penetrations and at joints.
(Score 1.5)

.....

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All excavations of greater than 1.20 metres depth should be routinely checked for air quality (including methane, carbon dioxide and oxygen) prior to man entry and appropriate precautions taken.

Any manholes, inspection chambers or other void spaces formed beneath the sites ground surface are potential ground gas traps. Precautions, as per the excavations above, should be taken.

4.8 General

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

It should be noted that we have made recommendations for further investigation in Sections 4.3, 4.4, 4.5 and 4.6.

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.

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 NORTH EAST LIMITED
REPORT No. NE3312A
OCTOBER 2014

A. J. Parker B.Sc.(Hons.), C.Geol., F.G.S.
Principal 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
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INFORMATION SUPPLIED BY THE CLIENT

MINERAL REPORT

Date: 16th August 2013

My Ref: PJ/M3687/5

CONFIDENTIAL

BIRDWELL ROUNDABOUT AND LINK ROAD TO ROCKINGHAM ROUNDABOUT.

SITUATION

A mining report has been requested for the proposed new Birdwell roundabout and link road. This report provides a review of the mining and geological history along the proposal and an assessment for the potential for mining legacy risks. The report makes recommendations for investigation and/or remediation requirements.

GEOLOGICAL INFORMATION

Geological records indicate that the land is underlain by Middle Coal Measures mudstones, siltstones and sandstones. A geological fault is conjectured to cross the proposal as shown coloured blue on drawing M3687/5a.
The proposal is also dominated by two areas of opencast backfill as shown on the attached drawing and detailed below.

MINING

Opencast

The Tankersley Common and Rockingham opencast sites were worked during the 1940's and 1990's respectively as marked red on drawing M3687/5a. The opencast voids were subsequently backfilled with overburden/spoil and the land returned to agricultural use/open space. The backfill varies in thickness from less than 2 metres in the west to in excess of 10m in the east. Consequently the proposed roads will cross backfill and opencast high walls.
The Rockingham opencast site was compacted back to provide a developable platform. Creep and/or differential settlement could still occur across high walls or above the Tankersley common site in particular.

Underground (Deep Mining)

This area has been affected by deep mine workings in the past.
However all affects from deep mine workings should have ceased decades ago and with the site now being remote from the active coalfield it should remain stable for the foreseeable future.

FORMER LAND USES

Historical ordnance survey plans show the route crossing open land with no significant development prior to the opencast working of coal.

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BARNSLEY Metropolitan Borough Council Doncaster Rotherham

LANDFILL

The current borough landfill register does not indicate the route to cross any landfill although one landfill sites is recorded within 250m of the proposal as detailed below.

Site No.	Landfill Material	Category
53	Demolition waste	4

Category 4 sites are described "as being licensed to accept material that would not be expected to give rise to landfill gas in substantial quantities"

CONCLUSIONS

1. The route is considered stable from the deep mining subsidence aspect and as it now lies remote from the active coalfield it is likely to remain in this state for the foreseeable future.

2. The Tankersley Common opencast backfill was not compacted to provide a developable platform. Although backfilled over 50 years ago the possibility for creep or differential settlement remains. It would therefore be prudent to undertake near surface soils investigations to adequately assess the ground conditions and compaction over the backfill. The road foundations should be suitably designed particularly across the high walls to prevent damage due to differential settlement.

3. Given the extent of opencast the chances of encountering unworked coal at surface is low. Any coal encountered in foundation excavations should be blinded off with a suitable inert material to reduce the risk of spontaneous combustion occurring. SYMAS can be called upon for on-site inspection if any unusual ground conditions are encountered.

4. Fugitive gases may be present within the opencast fill or landfill. Fugitive gas monitoring and safety procedures should therefore be undertaken where site personnel are required to work in deep or confined excavations.

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Report prepared by P. James 16th August, 2013.

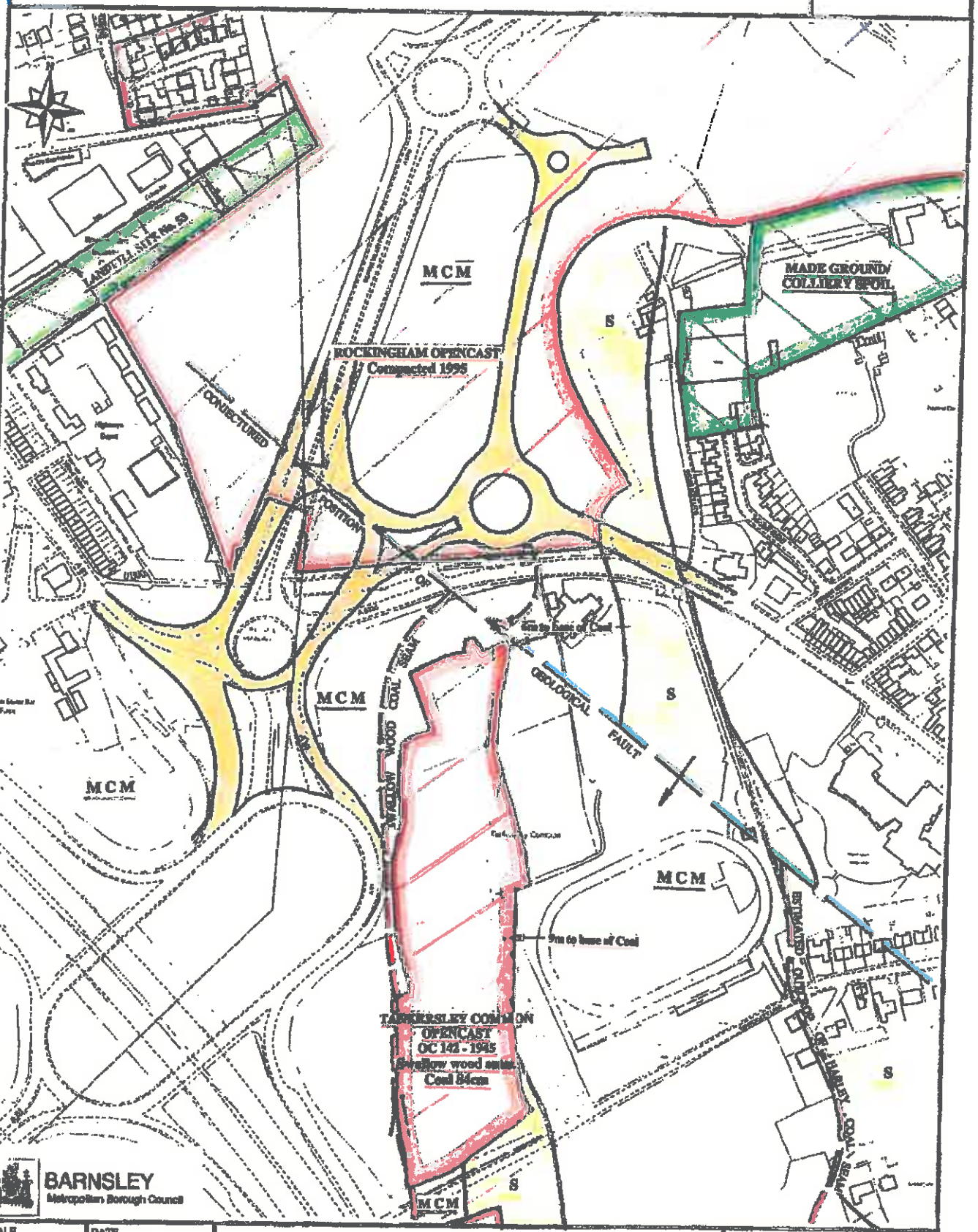
P. James,
Principal Mining Engineer.

DRAWING TITLE

BIRDWELL ROUNDABOUT & LINK ROAD TO ROCKINGHAM ROUNDABOUT

DRAWING NO.

M3687/5A



SCALE	DATE		O.S REFERENCE
1:2500 @ A3	12.8.13	SOUTH YORKSHIRE MINING	SE 3400/3500
DRAWN BY: AS	CHECKED BY:	ADVISORY SERVICE	P. JAMES BSc (Hons) PRINCIPAL MINING ENGINEER

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INSITU TEST RESULTS

SUB SURFACE
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Standard Penetration Test Results

Site : A61 BIRDWELL JUNCTION IMPROVEMENT, TANKERSLEY, SOUTH YORKSHIRE

Client : BARNSLEY METROPOLITAN BOROUGH COUNCIL

Engineer :

Job Number NE3312

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		
M1A	1.00	1.15	1.45	SPT	5	8	4	3	4	5	N=16	
M1A	2.00	2.15	2.45	SPT	3	5	6	7	5	5	N=23	
M1A	3.00	3.15	3.45	SPT	2	3	3	2	4	4	N=13	
M1A	4.00	4.15	4.45	SPT	3	4	6	6	6	4	N=22	
M1A	5.00	5.15	5.45	SPT	4	4	5	5	6	8	N=24	
M1A	6.00	6.15	6.45	SPT	2	3	3	4	5	6	N=18	
M2	1.00	1.15	1.45	SPT	4	4	4	4	3	3	N=14	
M2	2.00	2.15	2.45	SPT	3	3	4	4	4	3	N=15	
M2	3.00	3.15	3.45	SPT	5	5	5	5	5	3	N=18	
M2	4.00	4.15	4.45	SPT	3	4	4	3	6	5	N=18	
M2	5.00	5.15	5.45	SPT	2	2	2	4	2	2	N=10	
M2	6.00	6.15	6.45	SPT	3	4	1	4	5	5	N=15	
M2	7.00	7.15	7.45	SPT	2	2	4	6	5	5	N=20	
M3B	1.00	1.15	1.45	SPT	5	6	9	9	11	8	N=37	
M3B	2.00	2.15	2.45	SPT	5	3	5	5	7	9	N=26	
M3B	3.00	3.15	3.45	SPT	2	3	4	5	6	6	N=21	
M3B	4.00	4.15	4.45	SPT	8	8	3	4	8	9	N=24	
M3B	5.00	5.15	5.45	SPT	8	10	10	10	6	8	N=34	
M4	1.00	1.15	1.45	SPT	4	4	6	5	5	6	N=22	
M4	1.60	1.75	2.05	SPT	2	10	11	13	10	10	N=44	
M5	1.00	1.15	1.45	SPT	3	4	4	3	3	3	N=13	
M5	2.00	2.15	2.45	SPT	6	5	5	6	7	8	N=26	
M5	2.50	2.65	2.95	SPT	0	8	6	6	10	28	N=50	Sank under own weight to 2.575m
M6	1.00	1.15	1.45	SPT	8	5	4	3	6	12	N=25	
M6	2.00	2.15	2.45	SPT	1	2	3	5	3	6	N=17	
M6	3.00	3.15	3.45	SPT	2	7	7	5	12	21	N=45	
M7	1.00	1.15	1.45	SPT	2	2	2	3	3	3	N=11	
M7	2.00	2.15	2.45	SPT	3	3	5	7	8	8	N=28	
M7	2.50	2.65	2.95	SPT	5	9	12	12	13	19	N=56	
M8	1.00	1.15	1.45	SPT	2	5	5	10	18	28	N=61	

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Insitu Test Results

Site : A61 BIRDWELL JUNCTION IMPROVEMENTS, TANKERSLEY, SOUTH YORKSHIRE

Client : BARNSLEY METROPOLITAN BOROUGH COUNCIL

Engineer :

Job No. NE3312

Sheet 1 / 7

Date 10/06/14

INSITU DYNAMIC CONE PENENTRATION TEST

No: DCP1 (TP1)

Depth Range: 0.00m to 0.88m

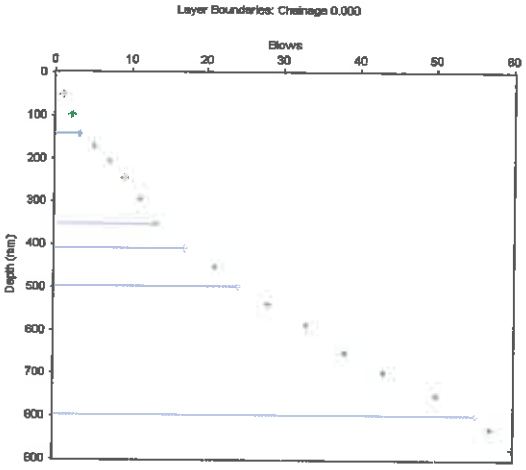
Description: MADE GROUND: grey gravelly silty clay with cobble sized fragments of mudstone and siltstone Gravel sized fragments are fine to coarse mudstone and siltstone

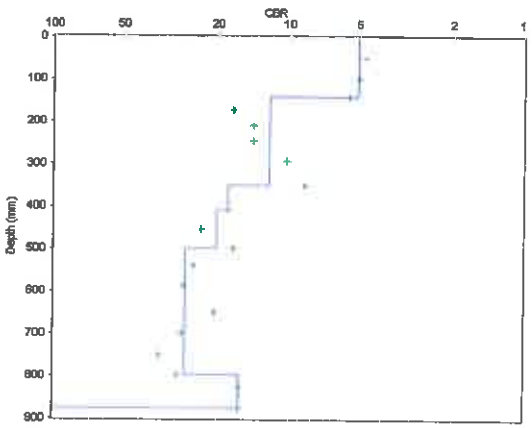
No.	Blows	Cumulative Blows	Penetration Depth (mm)
1	0	0	0
2	1	1	51
3	1	2	99
4	1	3	143
5	2	5	173
6	2	7	209
7	2	9	245
8	2	11	294
9	2	13	352
10	4	17	409
11	4	21	454
12	3	24	499
13	4	28	541
14	5	33	589
15	5	38	652
16	5	43	699
17	7	50	752
18	5	55	797
19	2	57	829
20	3	60	877

CBR Relationship:
TRL equation: $\log_{10}(CBR) = 2.48 - 1.057 \times \log_{10}(strength)$

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	47.67	5	143	143
2	20.90	12	209	352
3	14.35	18	57	409
4	12.26	20	90	499
5	9.61	28	298	797
6	15.00	16	80	877





SUB SURFACE
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Insitu Test Results

Site : A61 BIRDWELL JUNCTION IMPROVEMENTS, TANKERSLEY, SOUTH YORKSHIRE

Client : BARNSLEY METROPOLITAN BOROUGH COUNCIL

Engineer :

Job No. NE3312

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Date 10/06/14

INSITU DYNAMIC CONE PENENTRATION TEST

No: DCP2 (TP2)

Depth Range: 0.00m to 0.90m

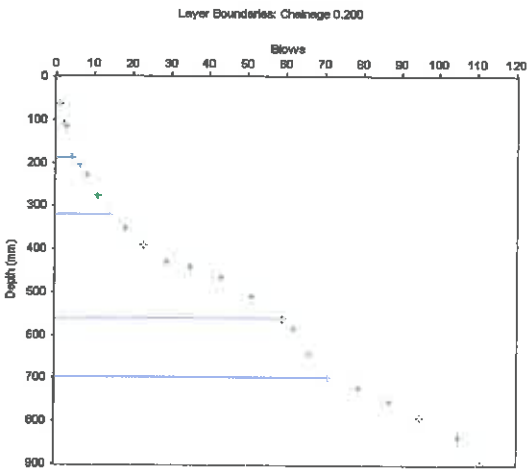
Description: MADE GROUND: grey gravelly silty clay with cobble and occasional boulder sized fragments of siltstone and sandstone. Gravel sized fragments are fine to coarse silstone and sandstone

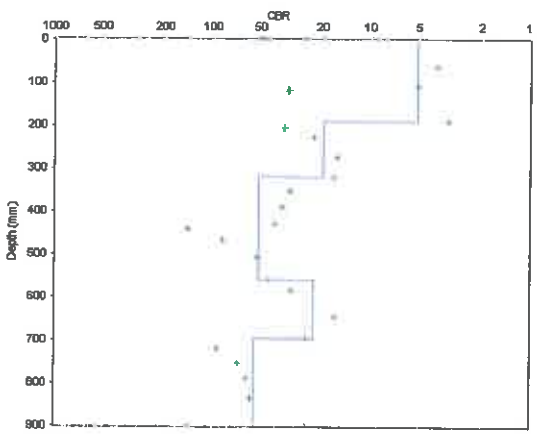
No.	Blows	Cumulative Blows	Penetration Depth (mm)
1	0	0	0
2	1	1	62
3	1	2	110
4	1	3	118
5	1	4	190
6	2	6	205
7	2	8	228
8	3	11	275
9	3	14	320
10	4	18	353
11	5	23	390
12	6	29	430
13	6	35	442
14	8	43	468
15	8	51	510
16	8	59	560
17	3	62	585
18	4	66	646
19	5	71	698
20	8	79	722
21	8	87	754
22	8	95	790
23	10	105	838
24	6	111	900

CBR Relationship:
TRL equation: $\log_{10}(CBR) = 2.48 - 1.057 \times \log_{10}(strength)$

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	47.50	5	190	190
2	13.00	20	130	320
3	5.33	51	240	560
4	11.50	23	138	698
5	5.05	55	202	900





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Insitu Test Results

Site : A61 BIRDWELL JUNCTION IMPROVEMENTS, TANKERSLEY, SOUTH YORKSHIRE

Client : BARNSLEY METROPOLITAN BOROUGH COUNCIL

Engineer :

Job No. NE3312

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Date 10/06/14

INSITU DYNAMIC CONE PENENTRATION TEST

No: DCP3 (TP3)

Depth Range: 0.00m to 0.88m

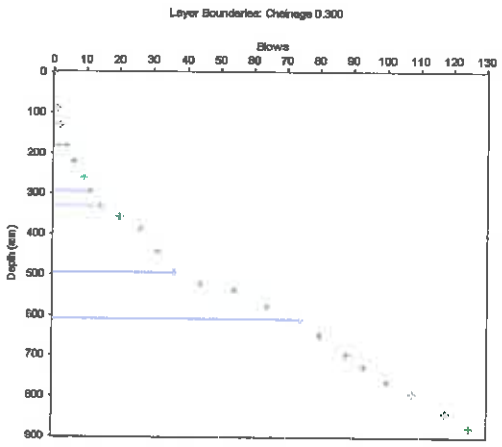
Description: MADE GROUND: light grey gravelly silty clay with cobble and occasional boulder sized fragments of silstone and sandstone. Gravel sized fragments are siltstone and sandstone

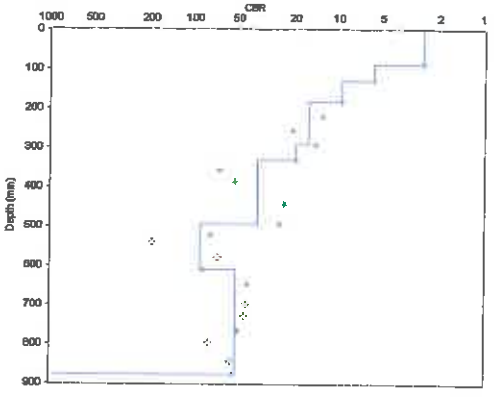
No.	Blows	Cumulative Blows	Penetration Depth (mm)
1	0	0	0
2	1	1	89
3	1	2	131
4	2	4	183
5	2	6	222
6	3	9	259
7	2	11	294
8	3	14	333
9	6	20	358
10	6	26	389
11	5	31	444
12	5	36	495
13	8	44	524
14	10	54	539
15	10	64	579
16	10	74	611
17	6	80	649
18	8	88	699
19	5	93	729
20	7	100	767
21	8	108	795
22	10	118	844
23	7	125	879

CBR Relationship:
TRL equation: $\log_{10}(CBR) = 2.48 - 1.057 \times \log_{10}(strength)$

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	89.00	3	89	89
2	42.00	6	42	131
3	26.00	10	52	183
4	13.86	16	111	294
5	13.00	20	39	333
6	7.36	37	162	495
7	3.05	93	116	611
8	5.25	52	268	879





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Client : BARNSLEY METROPOLITAN BOROUGH COUNCIL

Engineer :

Job No. NE3312

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Date 10/06/14

INSITU DYNAMIC CONE PENENTRATION TEST

No: DCP4 (TP4)

Depth Range: 0.00m to 0.86m

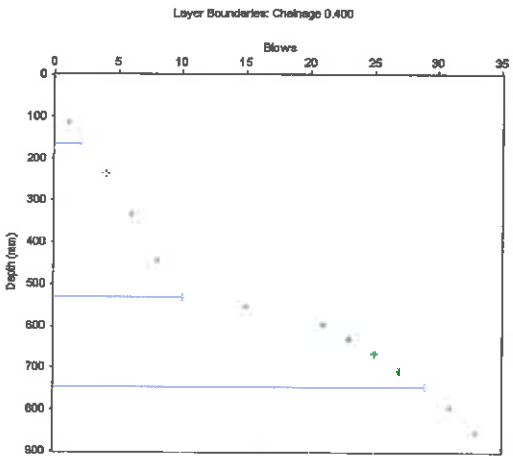
Description: Brown and yellow brown mottled clayey SILT with occasional gravel sized mudstone lithorelicts

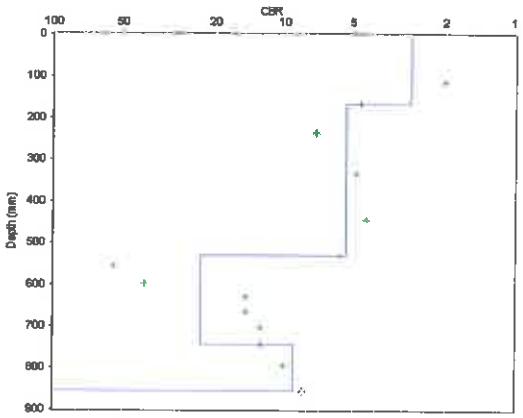
No.	Blows	Cumulative Blows	Penetration Depth (mm)
1	0	0	0
2	1	1	115
3	1	2	167
4	2	4	235
5	2	6	335
6	2	8	445
7	2	10	530
8	5	15	555
9	6	21	595
10	2	23	630
11	2	25	665
12	2	27	705
13	2	29	745
14	2	31	795
15	2	33	855

CBR Relationship:
TRL equation: $\log_{10}(CBR) = 2.48 - 1.057 \times \log_{10}(strength)$

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	83.50	3	167	167
2	45.38	5	363	530
3	11.32	23	215	745
4	27.50	9	110	855





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Site : A61 BIRDWELL JUNCTION IMPROVEMENTS, TANKERSLEY, SOUTH YORKSHIRE

Client : BARNSLEY METROPOLITAN BOROUGH COUNCIL

Engineer :

Job No. NE3312

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Date 10/06/14

INSITU DYNAMIC CONE PENENTRATION TEST

No: DCP5 (TP5)

Depth Range: 0.00m to 0.87m

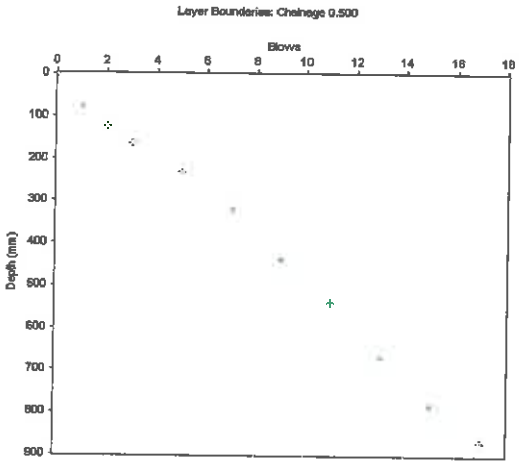
Description: Yellow brown silty CLAY (from 0.70m)

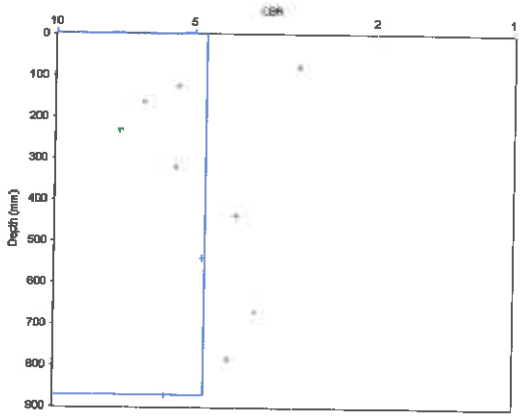
No.	Blows	Cumulative Blows	Penetration Depth (mm)
1	0	0	0
2	1	1	80
3	1	2	125
4	1	3	163
5	2	5	231
6	2	7	320
7	2	9	439
8	2	11	540
9	2	13	670
10	2	15	785
11	2	17	870

CBR Relationship:
TRL equation: $\log_{10}(CBR) = 2.48 - 1.057 \times \log_{10}(strength)$

Layer Properties

No.	Penetration Rate (mm/Blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	51.18	3	870	870





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Client : BARNSLEY METROPOLITAN BOROUGH COUNCIL

Engineer :

Job No. NE3312

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Date 10/06/14

INSITU DYNAMIC CONE PENENTRATION TEST

No: DCP6 (TP6)

Depth Range: 0.00m to 0.87m

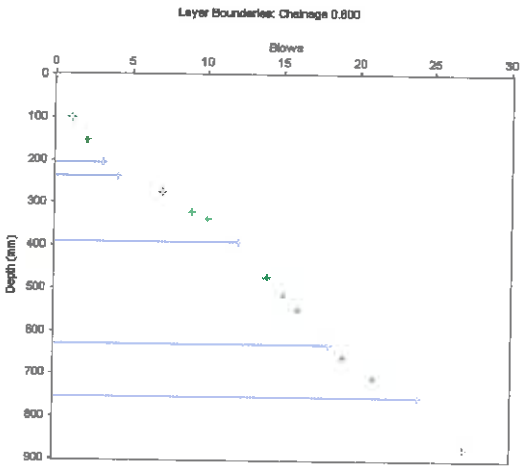
Description: MADE GROUND: brown and greymottled gravelly silty clay. Gravel sized fragments are fine to coarse mudstone and sandstone.
MADE GROUND: yellow brown silty clay (from 0.90m)

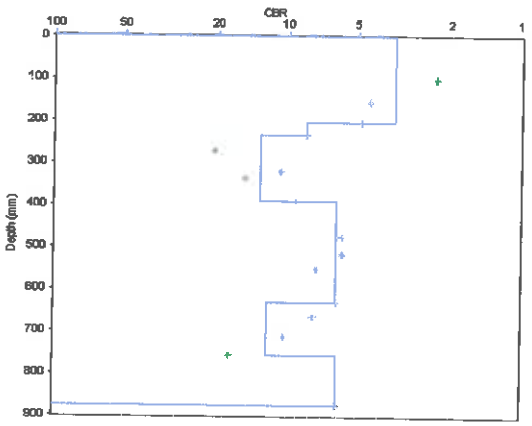
No.	Blows	Cumulative Blows	Penetration Depth (mm)
1	0	0	0
2	1	1	101
3	1	2	155
4	1	3	205
5	1	4	235
6	3	7	273
7	2	9	320
8	1	10	337
9	2	12	391
10	2	14	475
11	1	15	517
12	1	16	550
13	2	18	630
14	1	19	662
15	2	21	711
16	3	24	755
17	3	27	875

CBR Relationship:
TRL equation: $\log_{10}(CBR) = 2.48 - 1.057 \times \log_{10}(strength)$

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	58.39	3	206	206
2	30.00	3	30	236
3	19.30	13	153	391
4	39.83	6	239	630
5	20.83	12	125	755
6	40.00	6	120	875





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Insitu Test Results

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Client : BARNSLEY METROPOLITAN BOROUGH COUNCIL

Engineer :

Job No. NE3312

Sheet 7 / 7

Date 10/06/14

INSITU DYNAMIC CONE PENENTRATION TEST

No: DCP7 (TP7)

Depth Range: 0.00m to 0.87m

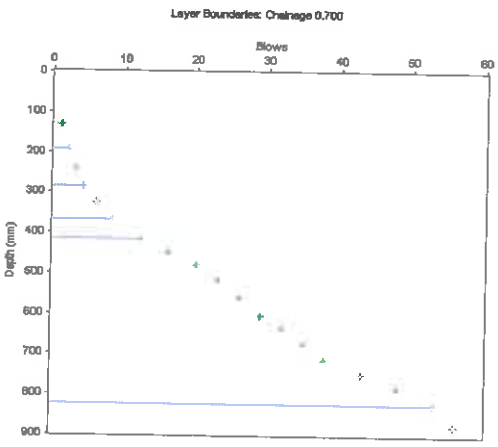
Description: MADE GROUND: light grey gravelly silty clay with cobble and occasional boulder sized fragments of siltstone and sandstone. Gravel sized fragments are siltstone and sandstone

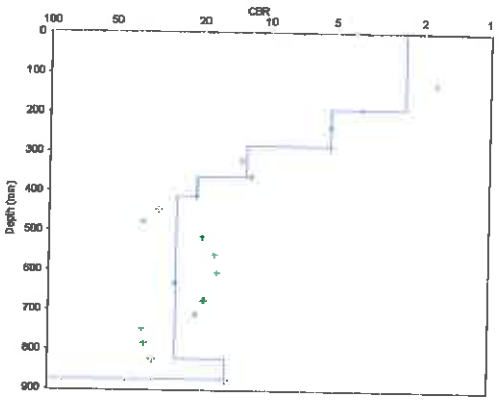
No.	Blows	Cumulative Blows	Penetration Depth (mm)
1	0	0	0
2	1	1	131
3	1	2	194
4	1	3	240
5	1	4	286
6	2	6	324
7	2	8	366
8	4	12	415
9	4	16	449
10	4	20	478
11	3	23	517
12	3	26	561
13	3	29	606
14	3	32	636
15	3	35	676
16	3	38	713
17	5	43	749
18	5	48	786
19	5	53	826
20	3	56	876

CBR Relationship:
TRL equation: $\log_{10}(CBR) = 2.48 - 1.057 \times \log_{10}(strength)$

Layer Properties

No.	Penetration Rate (mm/blow)	CBR (%)	Thickness (mm)	Depth to layer bottom (mm)
1	97.00	2	194	194
2	46.00	5	92	286
3	20.00	13	80	366
4	12.25	21	49	415
5	10.02	25	411	826
6	15.67	15	50	876





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Insitu Test Results

Site: A61 BIRDWELL JUNCTION IMPROVEMENT, TANKERSLEY, SOUTH YORKSHIRE

Client: BARNSLEY METROPOLITAN BOROUGH COUNCIL

Engineer:

Job Number: NE3312A

Sheet: 1 of 2

Ground Gas and Groundwater Monitoring Results Sheet

Date	Hole No.	Methane (% Volume)	Carbon Dioxide (% Volume)	Oxygen (% Volume)	Gas Flow Rate (l/hr)	Atmospheric Pressure (m bars)	Depth to Groundwater (m)
18/06/2014	M1A	0.0	***5.7***	***13.9***	< 0.1	1014	1.10
	M2	0.4	***11.3***	***7.5***	< 0.1		1.90
	M3B	***1.1***	***28.3***	***0.5***	< 0.1		Dry to 5.00
	M4	0.2	***7.6***	***12.8***	-0.3		0.75
	M5	0.0	***4.0***	***16.8***	-0.7		Dry to 2.70
	M6	0.0	***3.8***	***12.6***	< 0.1		1.20
	M7	0.0	***19.0***	***2.4***	< 0.1		0.30
	M8	0.0	***14.2***	***7.0***	< 0.1		Dry to 1.00
24/07/2014	M1A	0.2	***7.4***	***17.6***	-1.0	1007	1.20
	M2	0.2	***12.6***	***12.5***	-1.0		1.55
	M3B	0.2	***6.0***	***15.1***	-1.0		Dry to 5.00
	M4	0.1	***5.3***	***16.1***	-1.0		Dry to 2.05
	M5	0.0	0.8	20.4	< 0.1		Dry to 2.70
	M6	0.2	***5.5***	***14.6***	< 0.1		1.68
	M7	0.1	***3.9***	18.1	< 0.1		0.70
	M8	0.0	***9.8***	***13.7***	< 0.1		Dry to 1.00
30/07/2014	M1A	0.1	***7.4***	***17.9***	< 0.1	1000	1.20
	M2	0.4	***15.6***	***12.5***	< 0.1		1.80
	M3B	0.0	***2.1***	19.2	< 0.1		Dry to 5.00
	M4	0.1	***3.6***	***17.4***	< 0.1		0.80
	M5	0.0	0.6	20.4	< 0.1		Dry to 2.70
	M6	0.0	***2.1***	18.4	< 0.1		1.70
	M7	0.0	***2.7***	18.9	< 0.1		0.75
	M8	0.4	***9.9***	***14.2***	< 0.1		Dry to 1.00
14/08/2014	M1A	0.0	***1.5***	18.1	< 0.1	993	0.80
	M2	0.1	***1.6***	18.2	< 0.1		1.48
	M3B	0.0	0.7	19.8	< 0.1		Dry to 5.00
	M4	0.1	***3.1***	***17.7***	< 0.1		0.93
	M5	0.1	0.0	20.2	< 0.1		Dry to 2.70
	M6	0.1	1.2	***17.1***	< 0.1		1.12
	M7	0.0	***2.4***	***18.0***	< 0.1		0.40
	M8	0.4	***8.2***	***11.7***	< 0.1		Dry to 1.00

Remarks: Elevated levels of methane and carbon dioxide and depleted levels of oxygen are shown in ***bold/italics.***

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Insitu Test Results

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Client: BARNSLEY METROPOLITAN BOROUGH COUNCIL

Engineer:

Job Number: NE3312A

Sheet: 2 of 2

Ground Gas and Groundwater Monitoring Results Sheet

Date	Hole No.	Methane (% Volume)	Carbon Dioxide (% Volume)	Oxygen (% Volume)	Gas Flow Rate (l/hr)	Atmospheric Pressure (m bars)	Depth to Groundwater (m)
03/09/2014	M1A	0.1	***5.9***	***10.7***	< 0.1	1010	0.80
	M2	0.3	***11.8***	***11.6***	< 0.1		1.80
	M3B	0.1	0.9	20.2	< 0.1		Dry to 5.00
	M4	0.1	***8.5***	***14.3***	< 0.1		0.80
	M5	0.0	0.5	20.2	< 0.1		Dry to 2.70
	M6	0.1	***4.9***	***10.9***	< 0.1		1.70
	M7	0.0	***2.3***	20.0	< 0.1		0.75
	M8	0.5	***9.5***	***16.4***	< 0.1		Dry to 1.00
25/09/2014	M1A	0.3	***12.0***	***8.6***	< 0.1	1001	0.80
	M2	0.4	***12.5***	***12.9***	< 0.1		1.48
	M3B	0.1	0.6	20.2	< 0.1		Dry to 5.00
	M4	0.3	***6.5***	18.2	< 0.1		0.93
	M5	0.0	0.4	20.5	< 0.1		Dry to 2.70
	M6	***1.1***	***7.3***	***10.9***	< 0.1		1.13
	M7	0.0	***8.3***	***11.9***	< 0.1		0.45
	M8	0.4	***8.2***	***13.9***	< 0.1		Dry to 1.00

Remarks: Elevated levels of methane and carbon dioxide and depleted levels of oxygen are shown in ***bold/italics.***

LABORATORY TEST RESULTS

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Laboratory Test Results

Site : A61 BIRDWELL JUNCTION IMPROVEMENT, TANKERSLEY, SOUTH YORKSHIRE

Client : BARNSLEY METROPOLITAN BOROUGH COUNCIL

Engineer:

Job Number NE3312

Sheet 1 / 2

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 %						
M1A	1.00	D	8	60	14	33	17	16	-0.19	CL	MADE GROUND: light grey gravelly silty clay with cobble sized fragments of siltstone and mudstone. Gravel sized fragments are fine to coarse siltstone and mudstone.
M2	1.00	D	10	56	18	27	18	9	0.00	CL	MADE GROUND: light grey gravelly sandy silty clay. Gravel sized fragments are fine to coarse mudstone and siltstone.
M3B	1.00	D	6							NP	MADE GROUND: light grey very gravelly silty clay. Gravel sized fragments are fine to coarse siltstone, mudstone and shale.
M3B	2.00	D	9	71	13	35	16	19	-0.16	CL/CI	MADE GROUND: light grey gravelly silty clay. Gravel sized fragments are fine to coarse siltstone, mudstone and shale.
M4	1.00	D	8	66	13	31	16	15	-0.20	CL	MADE GROUND: light grey gravelly silty clay with cobble sized fragments of siltstone. Gravel sized fragments are fine to coarse siltstone.
M5	1.00	D	9	57	16	36	19	17	-0.18	CI	MADE GROUND: light grey gravelly silty clay with cobble sized fragments of siltstone. Gravel sized fragments are fine to coarse siltstone.
M6	1.00	D	15	69	22	29	20	9	0.22	CL	MADE GROUND: brown very gravelly silty clay. Gravel sized fragments are fine to coarse sandstone and brick.
M7	1.00	D	17	66	26	47	19	28	0.25	CI	Yellow brown and grey mottled silty CLAY with gravel sized mudstone lithorelicts.
M8	1.00	D	12	73	16	27				NP	Thinly bedded yellow brown highly weathered SANDSTONE.
TP1	0.50	B	12	53	23	39	19	20	0.20	CI	MADE GROUND: grey gravelly silty clay with cobble sized fragments mudstone and siltstone. Gravel sized fragments are fine to coarse mudstone and siltstone.
TP1	1.00	B	13	100	13	45	20	25	-0.28	CI	MADE GROUND: grey gravelly silty clay with cobble sized fragments mudstone and siltstone. Gravel sized fragments are fine to coarse mudstone and siltstone.
TP1	1.75	B	10	42	24	33	18	15	0.40	CL	MADE GROUND: dark grey gravelly silty clay with cobble sized fragments of siltstone and sandstone. Gravel sized fragments are fine to coarse siltstone and sandstone.
TP2	0.50	B	7	39	18	32	18	14	0.00	CL	MADE GROUND: light grey gravelly silty clay with cobble sized fragments of siltstone and sandstone. Gravel sized fragments are fine to coarse siltstone and sandstone.
TP2	1.20	B	15	62	24	41	19	22	0.23	CI	MADE GROUND: light grey gravelly silty clay with cobble sized fragments of siltstone and sandstone. Gravel sized fragments are fine to coarse siltstone and sandstone.
TP2	2.50	D	8	55	15	42	21	21	-0.29	CI	MADE GROUND: light grey gravelly silty clay with cobble sized fragments of siltstone and sandstone. Gravel sized fragments are fine to coarse siltstone and sandstone.
TP3	0.50	B	10	47	21	36	19	17	0.12	CI	MADE GROUND: light grey gravelly silty clay with cobble sized fragments of siltstone and sandstone. Gravel sized fragments are fine to coarse siltstone and sandstone.
TP3	1.10	B	7							NP	MADE GROUND: light grey gravelly silty clay with cobble sized fragments of siltstone and sandstone. Gravel sized fragments are fine to coarse siltstone and sandstone.

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 : NP = Non Plastic

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Laboratory Test Results

Site : A61 BIRDWELL JUNCTION IMPROVEMENT, TANKERSLEY, SOUTH YORKSHIRE

Client : BARNSLEY METROPOLITAN BOROUGH COUNCIL

Engineer :

Job Number NE3312

Sheet 2 / 2

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 %						
TP3	1.80	B	9	46	18	32	18	14	0.00	CL	MADE GROUND: light grey gravelly silty clay with cobble sized fragments of siltstone and sandstone. Gravel sized fragments are fine to coarse siltstone and sandstone.
TP4	0.50	B	46	94	49	53	36	17	0.76	MH	Brown and yellow brown mottled clayey SILT with occasional gravel sized mudstone lithorelicts.
TP4	1.00	B	18	74	24	46	19	27	0.19	CI	Brown and yellow brown mottled silty CLAY with occasional gravel sized mudstone lithorelicts.
TP4	2.00	D	11	57	19	39	19	20	0.00	CI	Brown highly weathered MUDSTONE.
TP5	0.50	B	30	89	34	40	22	18	0.67	CI	MADE GROUND: brown gravelly silty clay with cobble sized fragments of sandstone. Gravel sized fragments are fine to coarse sandstone.
TP5	1.00	B	26	77	34	39	22	17	0.71	CI	Yellow brown silty CLAY.
TP6	0.50	B	25	72	35	46	24	22	0.50	CI	MADE GROUND: yellow brown silty clay.
TP6	1.00	B	29	82	35	59	25	34	0.29	CH	Friable brown silty CLAY.
TP6	1.40	D	28	66	42	56	22	34	0.59	CH	Yellow brown silty CLAY.
TP6	2.00	D	21	81	26	39	17	22	0.41	CI	Yellow brown silty CLAY with gravel sized mudstone lithorelicts.
TP6	2.70	D	11	65	17	32	20	12	-0.25	CL	Brown slightly weathered silty SANDSTONE.
TP7	0.50	B	12	66	18	30	18	12	0.00	CL	MADE GROUND: light grey gravelly silty clay with cobble sized fragments of siltstone and sandstone. Gravel sized fragments are fine to coarse siltstone and sandstone.
TP7	1.00	B	8	37	21	32	18	14	0.21	CL	MADE GROUND: light grey gravelly silty clay with cobble sized fragments of siltstone and sandstone. Gravel sized fragments are fine to coarse siltstone and sandstone.
TP7	2.10	B	13	63	21	33	19	14	0.14	CL	MADE GROUND: light grey gravelly silty clay with cobble sized fragments of siltstone and sandstone. Gravel sized fragments are fine to coarse siltstone and sandstone.
TP8	0.80	B								NP	Brown moderately weathered fine grained SANDSTONE with partings of silty clay.
TP8	1.35	D	13	87	15	30	17	13	-0.15	CL	Orange brown and brown mottled highly weathered MUDSTONE, in parts completely weathered to silty clay.
TP8	1.70	B	6							NP	Brown moderately 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 : NP = Non Plastic

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Laboratory Test Results

Site : A61 BIRDWELL JUNCTION IMPROVEMENT, TANKERSLEY, SOUTH YORKSHIRE

Client : BARNSLEY METROPOLITAN BOROUGH COUNCIL

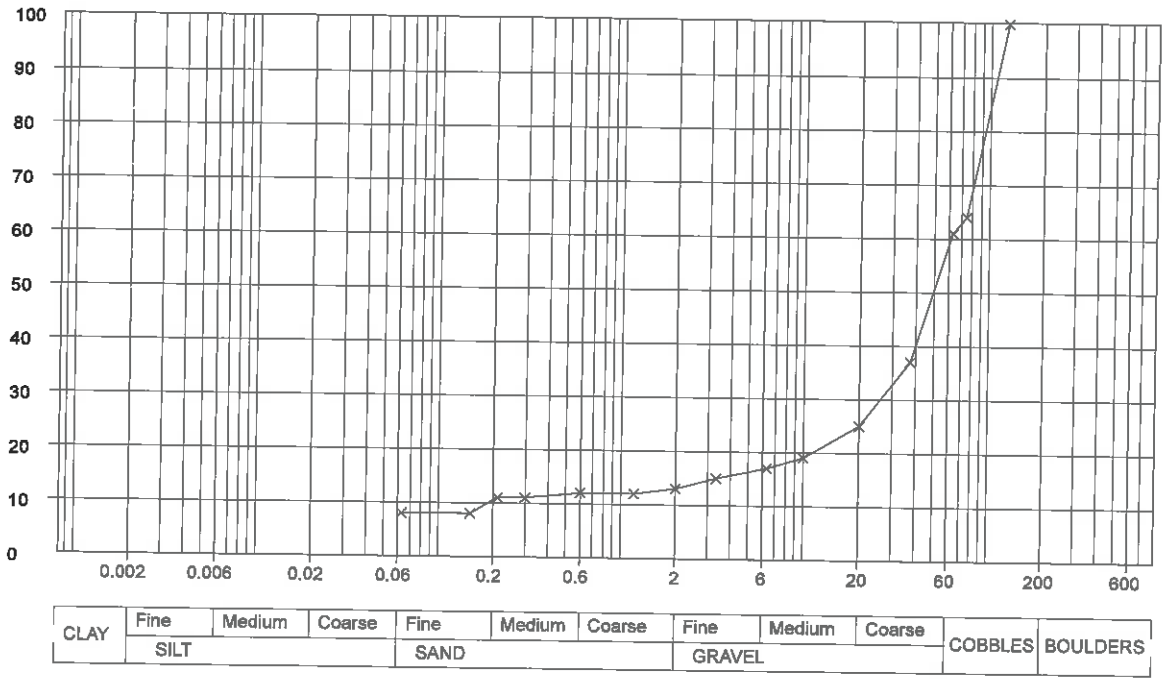
Engineer :

Job Number NE3312

Sheet 1/1

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
TP8	0.40	B	Brown silty sandy coarse GRAVEL and COBBLE sized sandstone lithorelicts.



Sieve / Particle Size	% Passing
125 mm	100.0
75 mm	64.0
63 mm	61.0
37.5 mm	37.0
20 mm	25.0
10 mm	19.0
6.3 mm	17.0
3.35 mm	15.0
2 mm	13.0
1.18 mm	12.0
600 µm	12.0
300 µm	11.0
212 µm	11.0
150 µm	8.0
63 µm	8.0

Grading Analysis	
D85	104.2 mm
D60	61.9 mm
D10	191.3 µm
Uniformity Coefficient	323.7

Particle Proportions	
Cobbles + Boulders	41.3%
Gravel	45.7%
Sand	5.0%
Silt	-
Clay	-

Method of Preparation : BS 1377:PART 1:1990:7.3 Initial preparation 1990:7.4.5 Particle size tests

Method of Test : BS 1377:PART 2:1990:9 Determination of particle size distribution

Remarks :

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SUMMARY OF SOIL DENSITY TESTS.

(B.S. 1377 : PART 2 : 7.2 & 8.2: 1990)

Client ref: NE3312
Location: A61 Birdwell Junction Improvement, Barnsley
Contract Number: 23755
Hole Number: As Stated
Sample Number: N/A
Depth (m) : As Stated
Sample Type: B

Location Number	Sample Number	Depth m	Moisture Content %	Bulk Density Mg/m3	Dry Density Mg/m3	Method of Laboratory compaction (kg Rammer)	Particle Density Mg/m3	Mg/m3	Remarks
TP1	248	1.00					2.72		
TP2	256	0.50					2.70		
TP3	271	0.50					2.71		
TP3	275	1.80					2.73		
TP6	237	0.50					2.65		
TP7	264	0.50					2.72		
TP7	266	1.00					2.68		
TP8	280	0.40					2.59		

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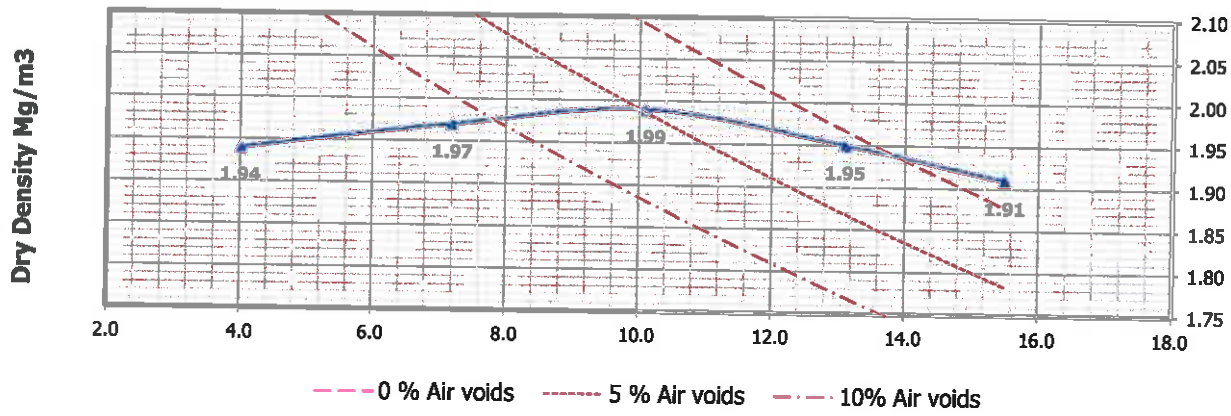
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Paul Evans
Quality Manager

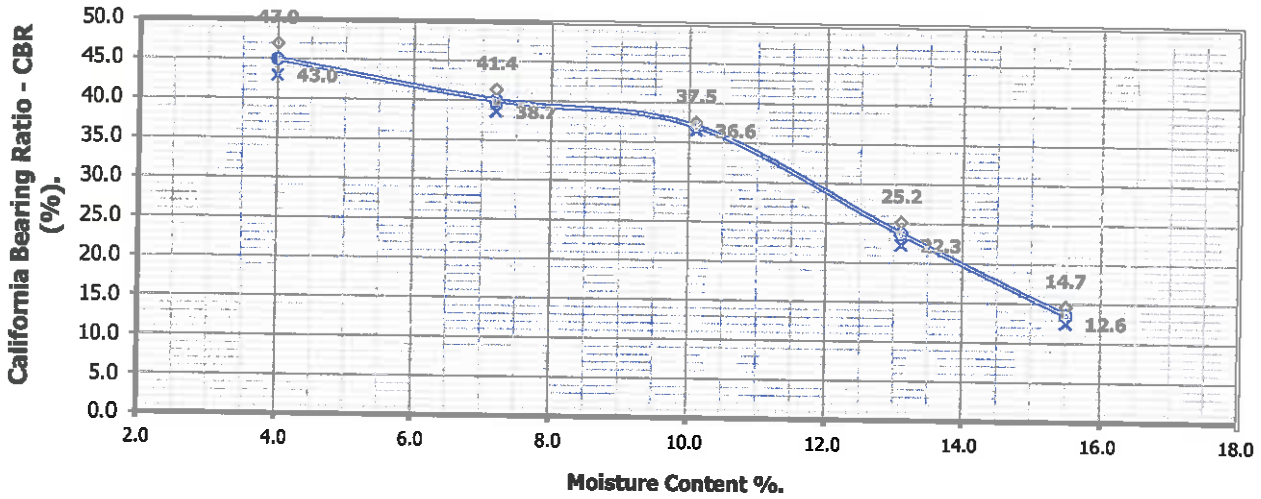
Approved by
Ben Sharp
Contracts Manager

Date of approval: 17/07/14

California Bearing Ratio/Dry Density Moisture Content Relationship
BS 1377:Part 4:1990

Client ref:	**NE3312**
Location:	**A61 Birdwell Junction Improvement, Barnsley**
Contract Number:	**23755**
Hole Number:	**TP1**
Sample Number:	**246**
Depth (m) :	**0.50**
Sample Type	**B**





Moisture Content	4.0	7.2	10.1	13.1	15.5
CBR Value Top	43.0	38.7	36.6	22.3	12.6
CBR Value Bot	47.0	41.4	37.5	25.2	14.7
Mean CBR Value	45.0	40.1	37.1	23.8	13.6
Dry Density	1.94	1.97	1.99	1.95	1.91

Initial Sample Conditions:			Method of Compaction 4.5kg Rammer
Initial Moisture Content (%):		15.5	Single sample Tested
Material Retained on the 37.5mm BS Sieve (%):		0	Maximum Dry Density (Mg/m^3) : 1.99
Material Retained on the 20.0mm BS Sieve (%):		2	Optimum Moisture Content(%): 10.1
Particle Density (Mg/m^3) :	Assumed	2.65	

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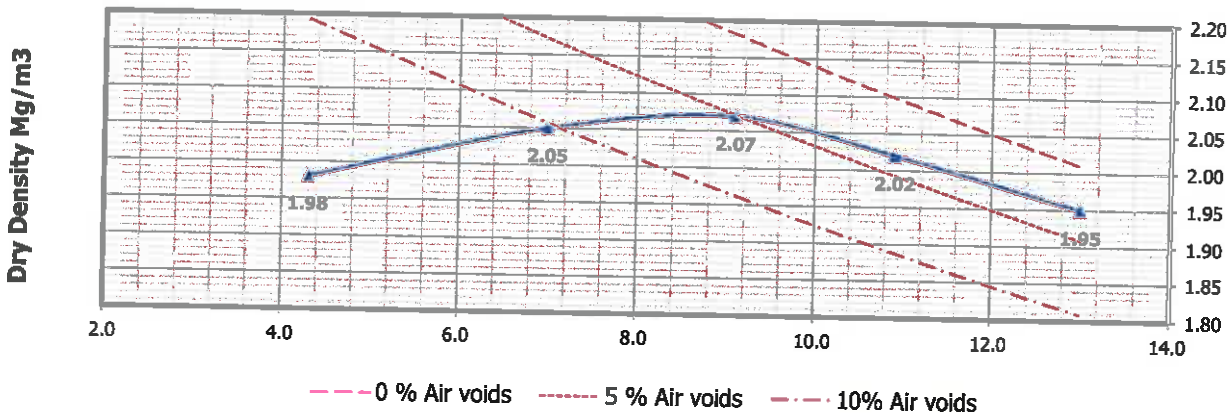
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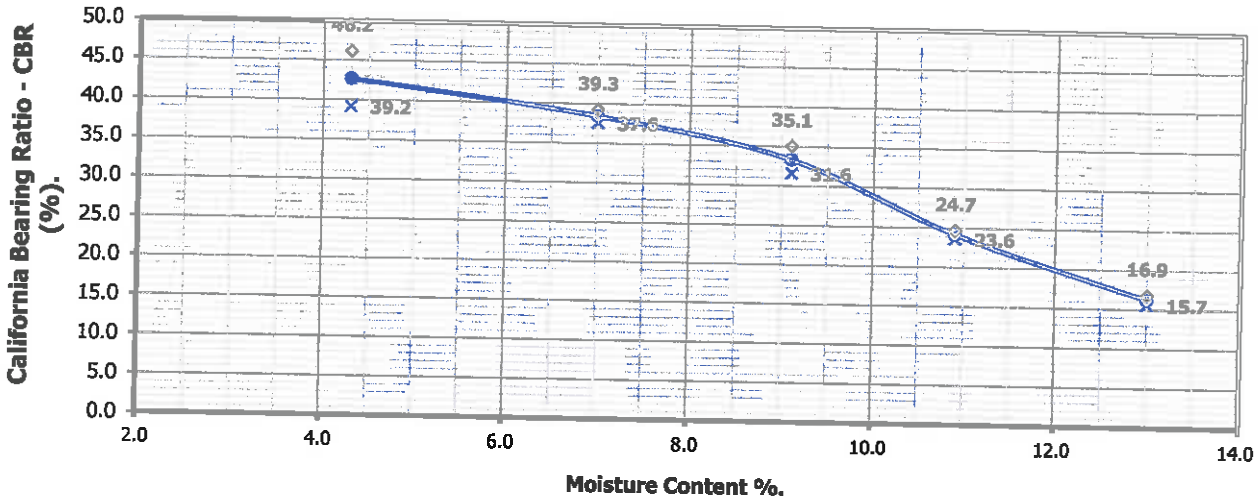
Contract No.: 23755
Client Ref No: NE3312

Unit 4 Dafen Llanelli, SA14 8QN

California Bearing Ratio/Dry Density Moisture Content Relationship
BS 1377:Part 4:1990

Client ref:	**NE3312**
Location:	**A61 Birdwell Junction Improvement, Barnsley**
Contract Number:	**23755**
Hole Number:	**TP1**
Sample Number:	**248**
Depth (m) :	**1.00**
Sample Type	**B**





Moisture Content	4.3	7.0	9.1	10.9	13.0	
CBR Value Top	39.2	37.6	31.6	23.6	15.7	
CBR Value Bot	46.2	39.3	35.1	24.7	16.9	
Mean CBR Value	42.7	38.4	33.3	24.2	16.3	
Dry Density	1.98	2.05	2.07	2.02	1.95	

Initial Sample Conditions:			Method of Compaction 4.5kg Rammer
Initial Moisture Content (%):		13.0	Single sample Tested
Material Retained on the 37.5mm BS Sieve (%):		1	Maximum Dry Density (Mg/m^3) : 2.07
Material Retained on the 20.0mm BS Sieve (%):		2	Optimum Moisture Content(%): 9.1
Particle Density (Mg/m^3) :	Actual	2.72	

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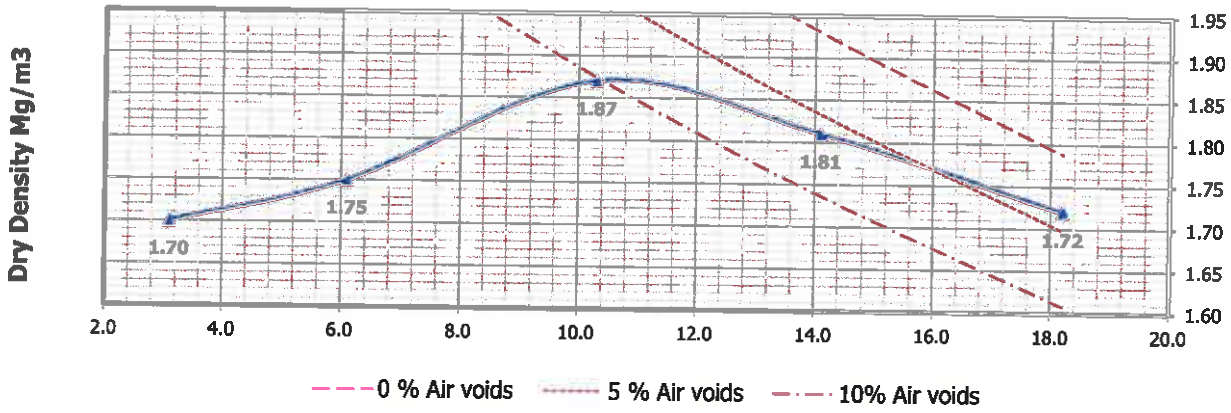
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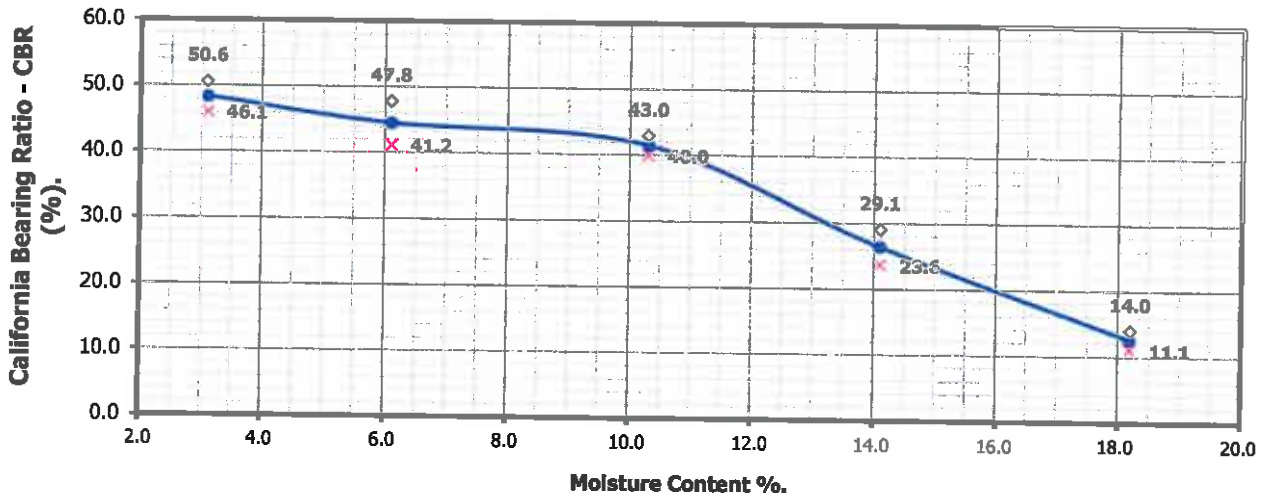
Contract No.: 23755
Client Ref No: NE3312

Unit 4 Dafen Llanelli, SA14 8QN

California Bearing Ratio/Dry Density Moisture Content Relationship
BS 1377:Part 4:1990

Client ref:	**NE3312**
Location:	**A61 Birdwell Junction Improvement, Barnsley**
Contract Number:	**23755**
Hole Number:	**TP1**
Sample Number:	**250**
Depth (m) :	**1.75**
Sample Type	**B**





Moisture Content	3.1	6.1	10.3	14.1	18.2	
CBR Value Top	46.1	41.2	40.0	23.6	11.1	
CBR Value Bot	50.6	47.8	43.0	29.1	14.0	
Mean CBR Value	48.3	44.5	41.5	26.4	12.6	
Dry Density	1.70	1.75	1.87	1.81	1.72	

Initial Sample Conditions:			Method of Compaction 4.5kg Rammer
Initial Moisture Content (%):		14.1	Single sample Tested
Material Retained on the 37.5mm BS Sieve (%):		1	Maximum Dry Density (Mg/m^3) : 1.81
Material Retained on the 20.0mm BS Sieve (%):		1	Optimum Moisture Content(%): 10.3
Particle Density (Mg/m^3) :	Assumed	2.65	

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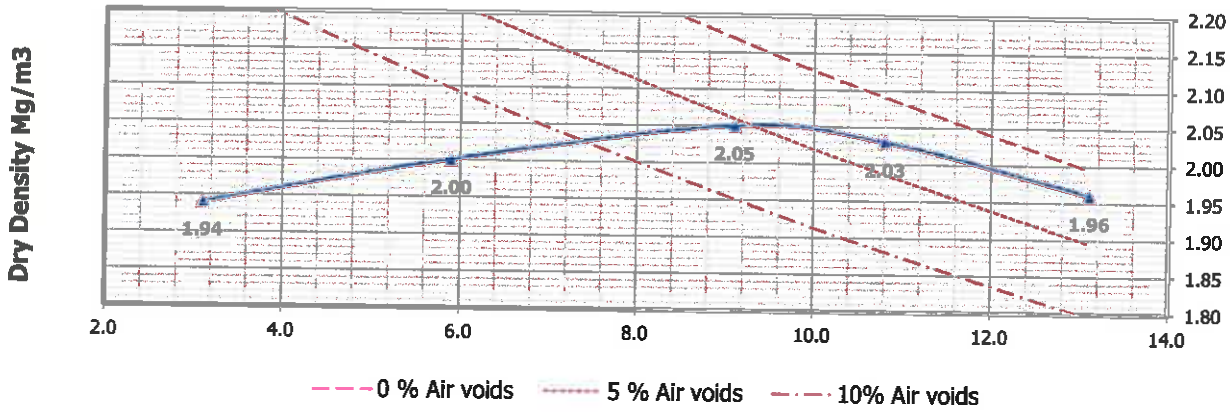
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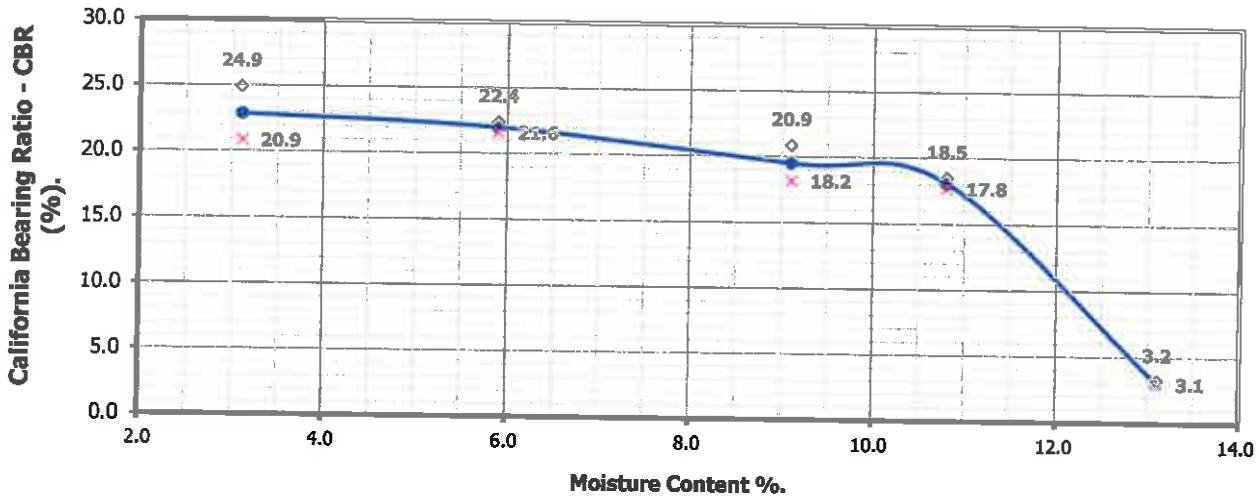
Contract No.: **23755**
Client Ref No: **NE3312**

Unit 4 Dafen Llanelli, SA14 8QN

California Bearing Ratio/Dry Density Moisture Content Relationship
BS 1377:Part 4:1990

Client ref:	**NE3312**
Location:	**A61 Birdwell Junction Improvement, Barnsley**
Contract Number:	**23755**
Hole Number:	**TP2**
Sample Number:	**256**
Depth (m) :	**0.50**
Sample Type	**B**





Moisture Content	3.1	5.9	9.1	10.8	13.1	
CBR Value Top	20.9	21.6	18.2	17.8	3.1	
CBR Value Bot	24.9	22.4	20.9	18.5	3.2	
Mean CBR Value	22.9	22.0	19.5	18.1	3.1	
Dry Density	1.94	2.00	2.05	2.03	1.96	

Initial Sample Conditions:			Method of Compaction 4.5kg Rammer
Initial Moisture Content (%):		10.8	Single sample Tested
Material Retained on the 37.5mm BS Sieve (%):		1	Maximum Dry Density (Mg/m^3) : 2.05
Material Retained on the 20.0mm BS Sieve (%):		1	Optimum Moisture Content(%): 9.1
Particle Density (Mg/m^3) :	Actual	2.70	

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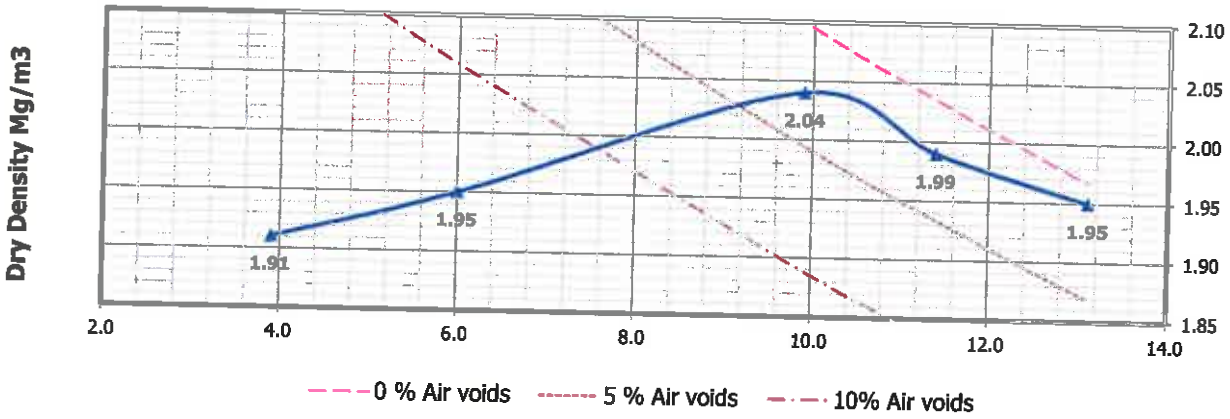
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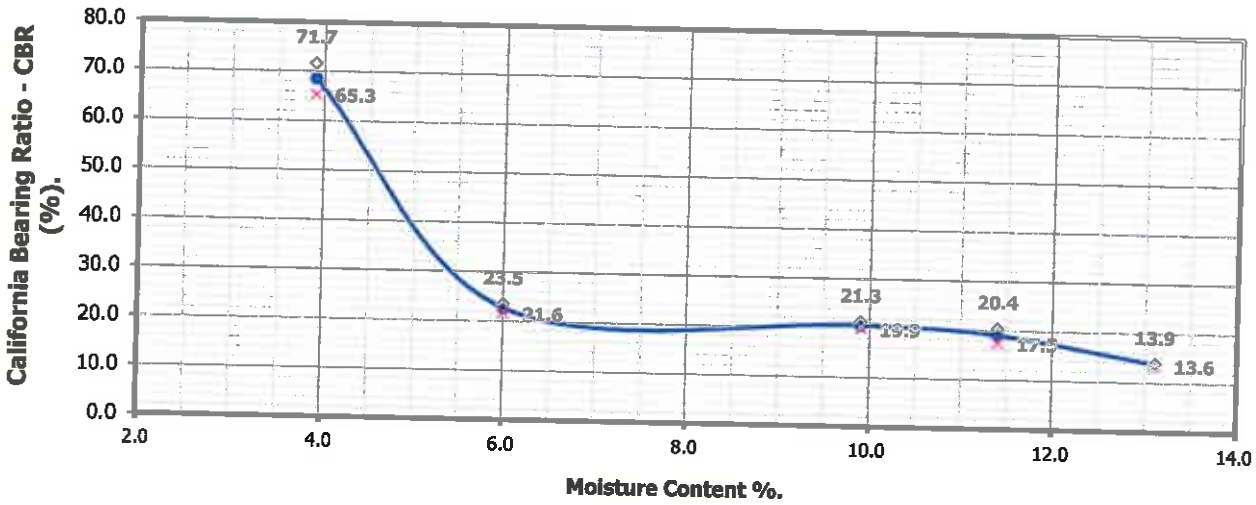
Contract No.: **23755**
Client Ref No: **NE3312**

Unit 4 Dafen Llanelli, SA14 8QN

California Bearing Ratio/Dry Density Moisture Content Relationship
BS 1377:Part 4:1990

Client ref:	**NE3312**
Location:	**A61 Birdwell Junction Improvement, Barnsley**
Contract Number:	**23755**
Hole Number:	**TP2**
Sample Number:	**258**
Depth (m) :	**1.20**
Sample Type	**B**





Moisture Content	3.9	6.0	9.9	11.4	13.1
CBR Value Top	65.3	21.6	19.9	17.5	13.6
CBR Value Bot	71.7	23.5	21.3	20.4	13.9
Mean CBR Value	68.5	22.6	20.6	19.0	13.7
Dry Density	1.91	1.95	2.04	1.99	1.95

Initial Sample Conditions:			Method of Compaction 4.5kg Rammer
Initial Moisture Content (%):		11.4	Single sample Tested
Material Retained on the 37.5mm BS Sieve (%):		2	Maximum Dry Density (Mg/m^3) : 2.04
Material Retained on the 20.0mm BS Sieve (%):		2	Optimum Moisture Content(%): 9.9
Particle Density (Mg/m^3) :	Assumed	2.65	

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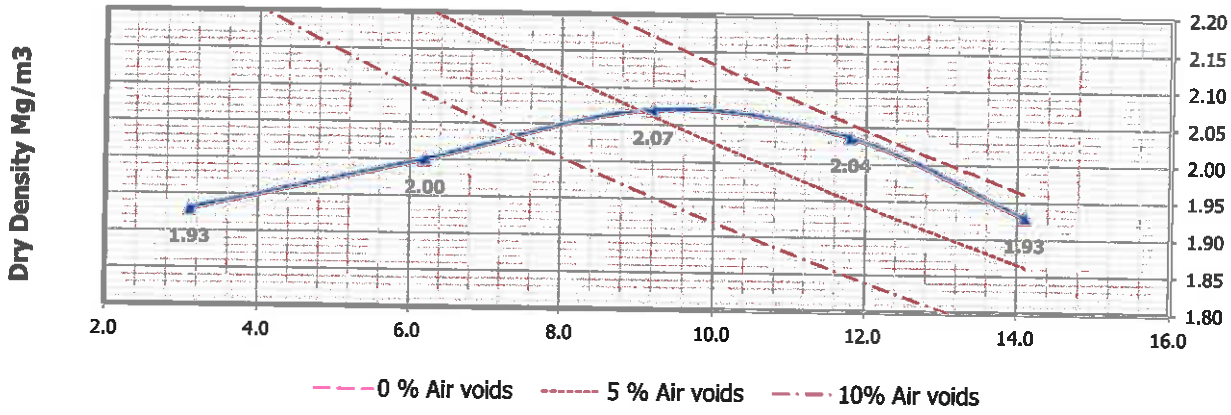
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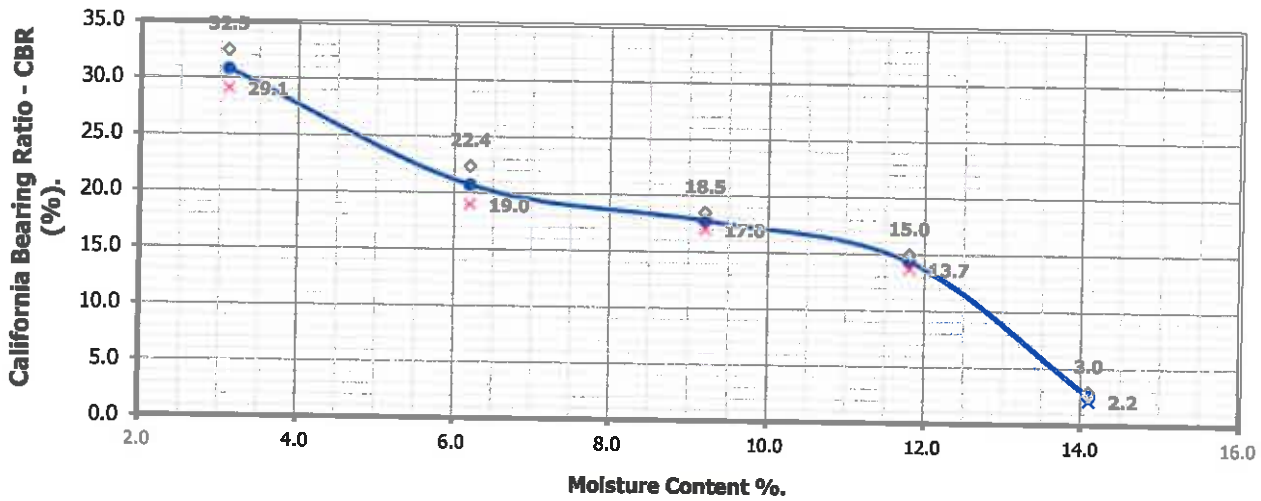
Contract No.: 23755
Client Ref No: NE3312

Unit 4 Dafen Llanelli, SA14 8QN

California Bearing Ratio/Dry Density Moisture Content Relationship
BS 1377:Part 4:1990

Client ref:	**NE3312**
Location:	**A61 Birdwell Junction Improvement, Barnsley**
Contract Number:	**23755**
Hole Number:	**TP3**
Sample Number:	**271**
Depth (m) :	**0.50**
Sample Type	**B**





Moisture Content	3.1	6.2	9.2	11.8	14.1	
CBR Value Top	29.1	19.0	17.0	13.7	2.2	
CBR Value Bot	32.5	22.4	18.5	15.0	3.0	
Mean CBR Value	30.8	20.7	17.8	14.3	2.6	
Dry Density	1.93	2.00	2.07	2.04	1.93	

Initial Sample Conditions:			Method of Compaction 4.5kg Rammer
Initial Moisture Content (%):		11.8	Single sample Tested
Material Retained on the 37.5mm BS Sieve (%):		1	Maximum Dry Density (Mg/m^3) : 2.07
Material Retained on the 20.0mm BS Sieve (%):		1	Optimum Moisture Content(%): 9.2
Particle Density (Mg/m^3) :	Actual	2.71	

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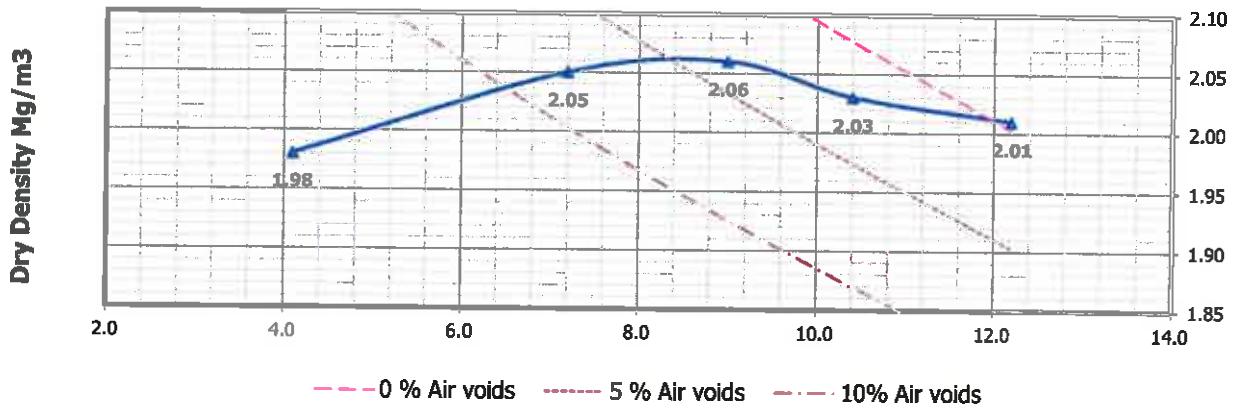
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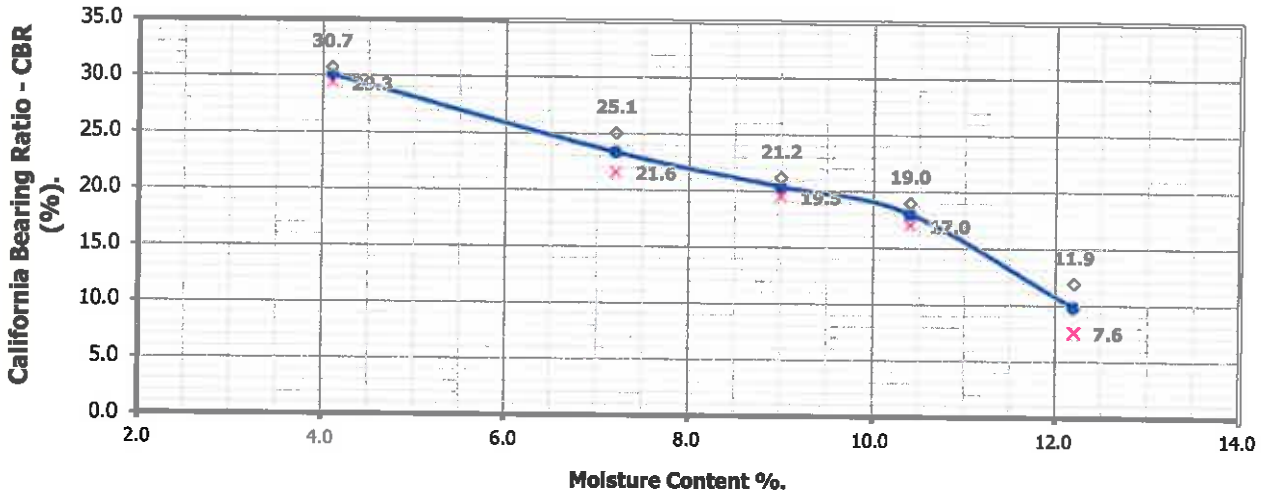
Contract No.: **23755**
Client Ref No: **NE3312**

Unit 4 Dafen Llanelli, SA14 8QN

California Bearing Ratio/Dry Density Moisture Content Relationship
BS 1377:Part 4:1990

Client ref:	**NE3312**
Location:	**A61 Birdwell Junction Improvement, Barnsley**
Contract Number:	**23755**
Hole Number:	**TP3**
Sample Number:	**273**
Depth (m) :	**1.10**
Sample Type	**B**





Moisture Content	4.1	7.2	9.0	10.4	12.2	
CBR Value Top	29.3	21.6	19.5	17.0	7.6	
CBR Value Bot	30.7	25.1	21.2	19.0	11.9	
Mean CBR Value	30.0	23.3	20.4	18.0	9.8	
Dry Density	1.98	2.05	2.06	2.03	2.01	

Initial Sample Conditions:			Method of Compaction 4.5kg Rammer
Initial Moisture Content (%):		10.4	Single sample Tested
Material Retained on the 37.5mm BS Sieve (%):		1	Maximum Dry Density (Mg/m^3) : 2.06
Material Retained on the 20.0mm BS Sieve (%):		2	Optimum Moisture Content(%): 9.0
Particle Density (Mg/m^3) :	Assumed	2.65	

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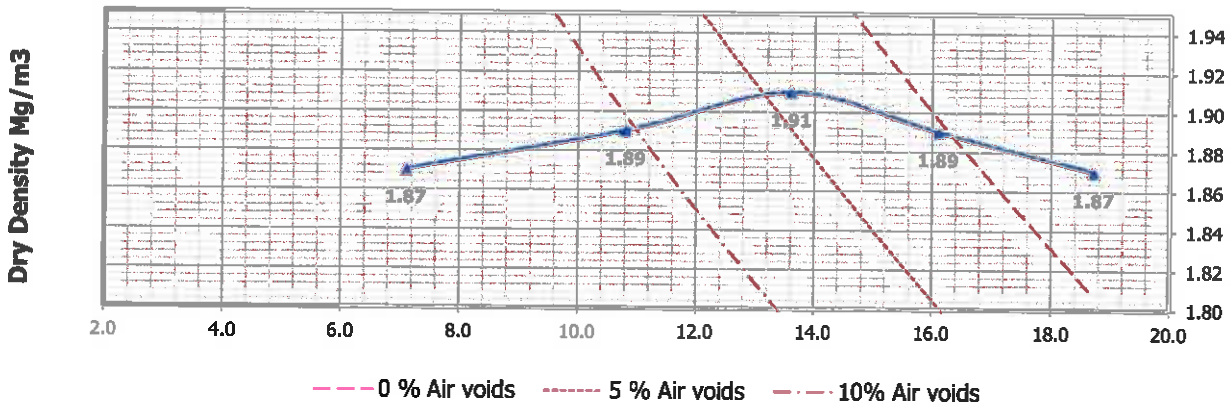
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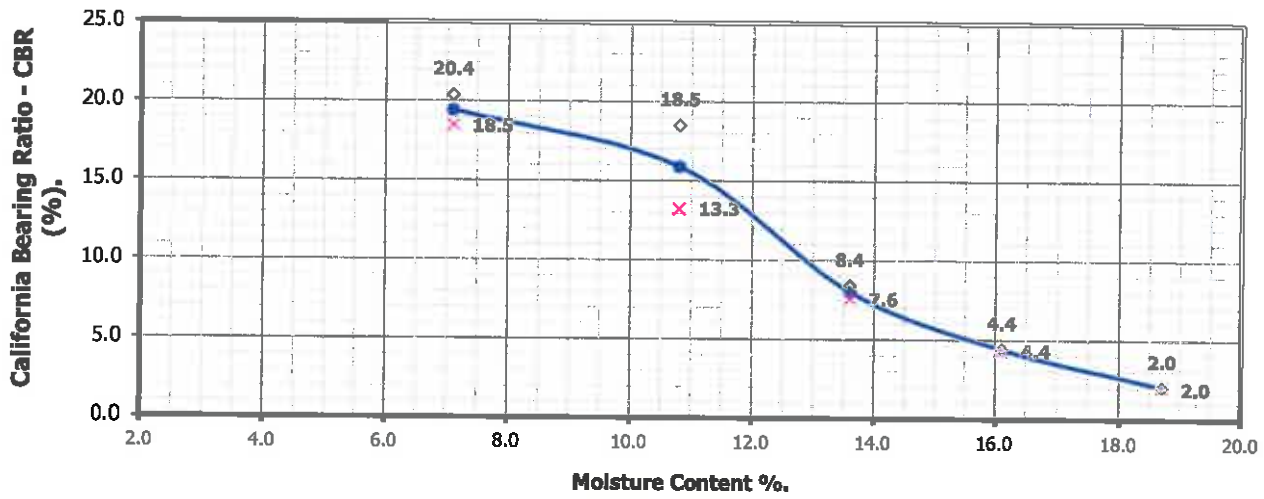
Contract No.: **23755**
Client Ref No: **NE3312**

Unit 4 Dafen Llanelli, SA14 8QN

California Bearing Ratio/Dry Density Moisture Content Relationship
BS 1377:Part 4:1990

Client ref:	**NE3312**
Location:	**A61 Birdwell Junction Improvement, Barnsley**
Contract Number:	**23755**
Hole Number:	**TP3**
Sample Number:	**275**
Depth (m) :	**1.80**
Sample Type	**B**





Moisture Content	7.1	10.8	13.6	16.1	18.7	
CBR Value Top	18.5	13.3	7.6	4.4	2.0	
CBR Value Bot	20.4	18.5	8.4	4.4	2.0	
Mean CBR Value	19.4	15.9	8.0	4.4	2.0	
Dry Density	1.87	1.89	1.91	1.89	1.87	

Initial Sample Conditions:		Method of Compaction	4.5kg Rammer
Initial Moisture Content (%):	16.1	Single sample Tested	
Material Retained on the 37.5mm BS Sieve (%):	1	Maximum Dry Density (Mg/m^3) :	1.91
Material Retained on the 20.0mm BS Sieve (%):	2	Optimum Moisture Content(%):	13.6
Particle Density (Mg/m^3) : Actual	2.73		

D P Evans — **Checked by** — **Date** 17/07/2014

Approved by — **Date** 17/07/2014

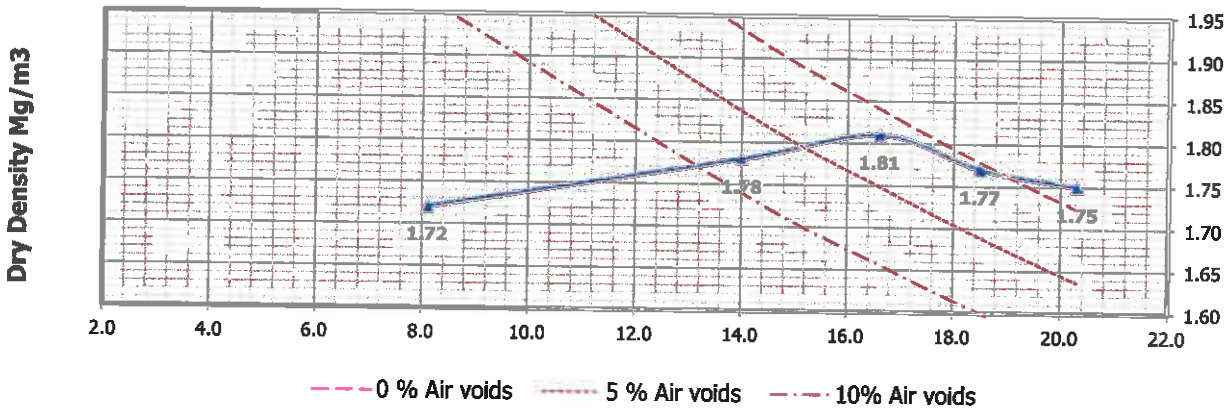
GSTL
GEO SITE & TESTING SERVICES LTD

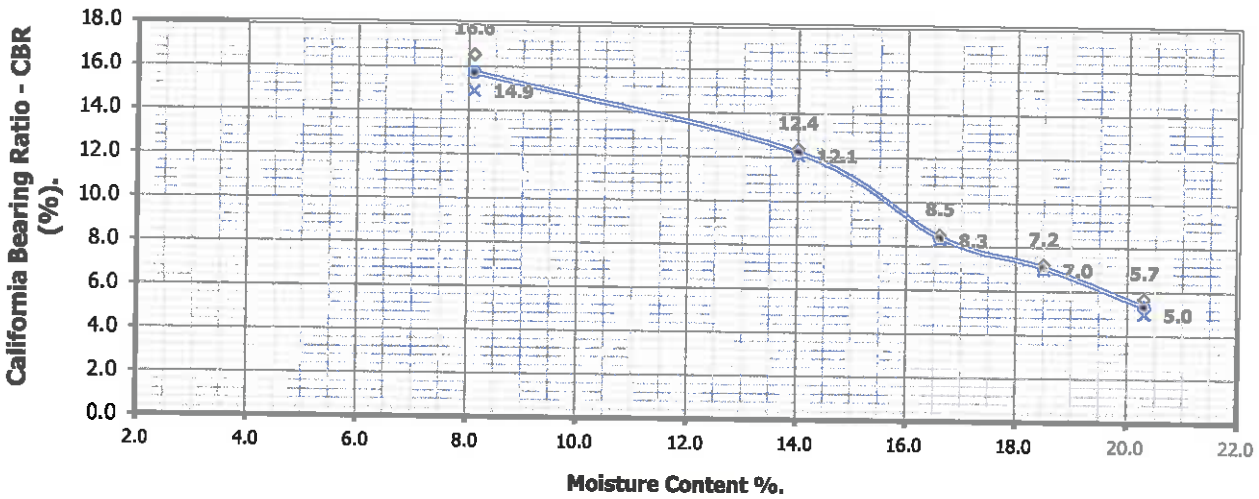
Contract No.: 23755
Client Ref No: NE3312

Unit 4 Dafen Llanelli, SA14 8QN

California Bearing Ratio/Dry Density Moisture Content Relationship
BS 1377:Part 4:1990

Client ref:	**NE3312**
Location:	**A61 Birdwell Junction Improvement, Barnsley**
Contract Number:	**23755**
Hole Number:	**TP6**
Sample Number:	**237**
Depth (m) :	**0.50**
Sample Type	**B**





Moisture Content	8.1	14.0	16.6	18.5	20.3	
CBR Value Top	14.9	12.1	8.3	7.0	5.0	
CBR Value Bot	16.6	12.4	8.5	7.2	5.7	
Mean CBR Value	15.7	12.2	8.4	7.1	5.3	
Dry Density	1.72	1.78	1.81	1.77	1.75	
Initial Sample Conditions:					Method of Compaction	4.5kg Rammer
Initial Moisture Content (%):				18.5	Single sample Tested	
Material Retained on the 37.5mm BS Sieve (%):				2	Maximum Dry Density (Mg/m^3) :	1.81
Material Retained on the 20.0mm BS Sieve (%):				3	Optimum Moisture Content(%):	16.6
Particle Density (Mg/m^3) :	Actual			2.65		

D P Evans — **Checked by** — **17/07/2014** **Date**

Approved by — **17/07/2014** **Date**

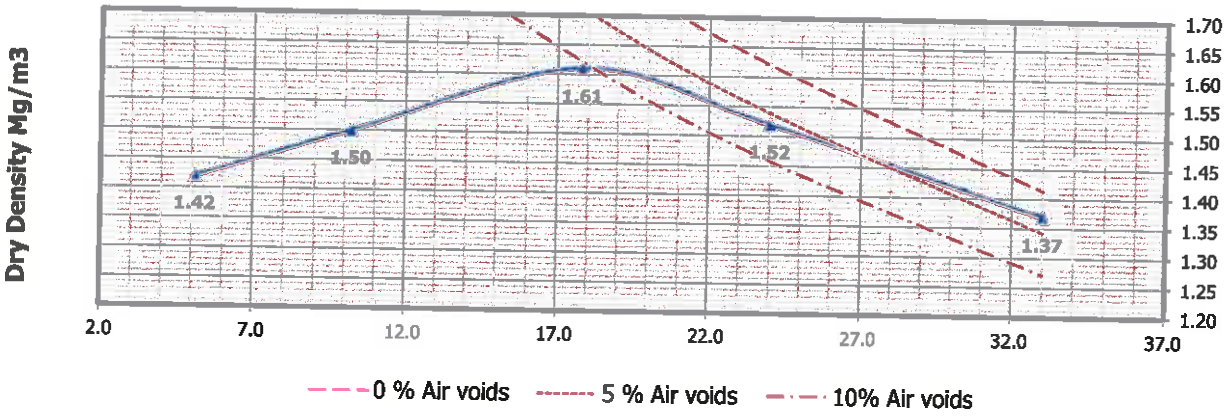
GSTL
GEO SITE & TESTING SERVICES LTD

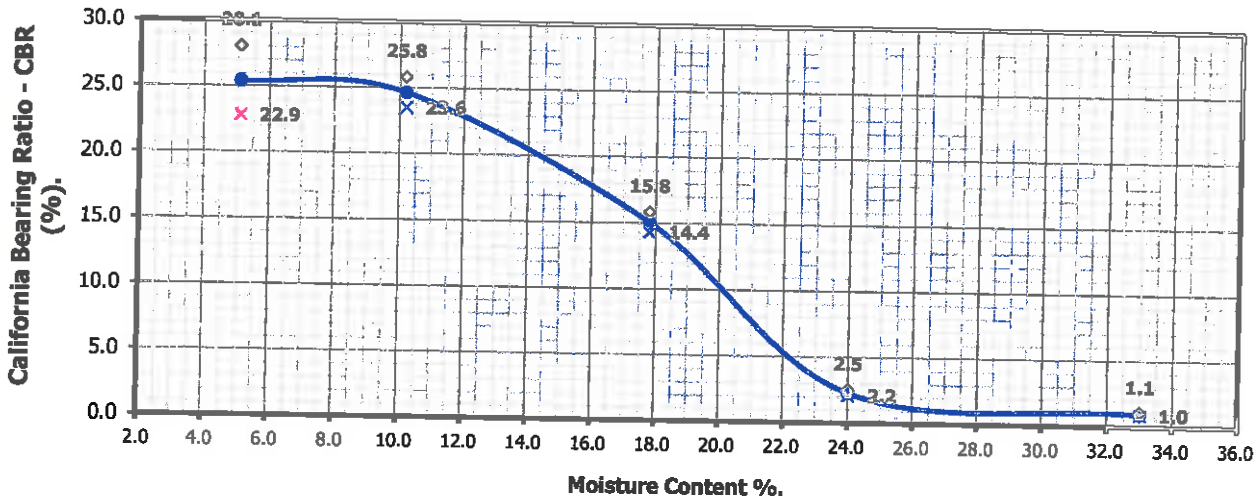
Contract No.: **23755**
Client Ref No: **NE3312**

Unit 4 Dafen Llanelli, SA14 8QN

California Bearing Ratio/Dry Density Moisture Content Relationship
BS 1377:Part 4:1990

Client ref:	**NE3312**
Location:	**A61 Birdwell Junction Improvement, Barnsley**
Contract Number:	**23755**
Hole Number:	**TP6**
Sample Number:	**239**
Depth (m) :	**1.00**
Sample Type	**B**





Moisture Content	5.1	10.2	17.8	24.0	33.0
CBR Value Top	22.9	23.6	14.4	2.2	1.0
CBR Value Bot	28.1	25.8	15.8	2.5	1.1
Mean CBR Value	25.5	24.7	15.1	2.4	1.0
Dry Density	1.42	1.50	1.61	1.52	1.37

Initial Sample Conditions:			Method of Compaction 4.5kg Rammer
Initial Moisture Content (%):		33.0	Single sample Tested
Material Retained on the 37.5mm BS Sieve (%):		0	Maximum Dry Density (Mg/m^3) : 1.59
Material Retained on the 20.0mm BS Sieve (%):		2	Optimum Moisture Content(%): 17.8
Particle Density (Mg/m^3) :	Assumed	2.65	

D P Ward — **Checked by** — **Date** 17/07/2014

Approved by — **Date** 17/07/2014

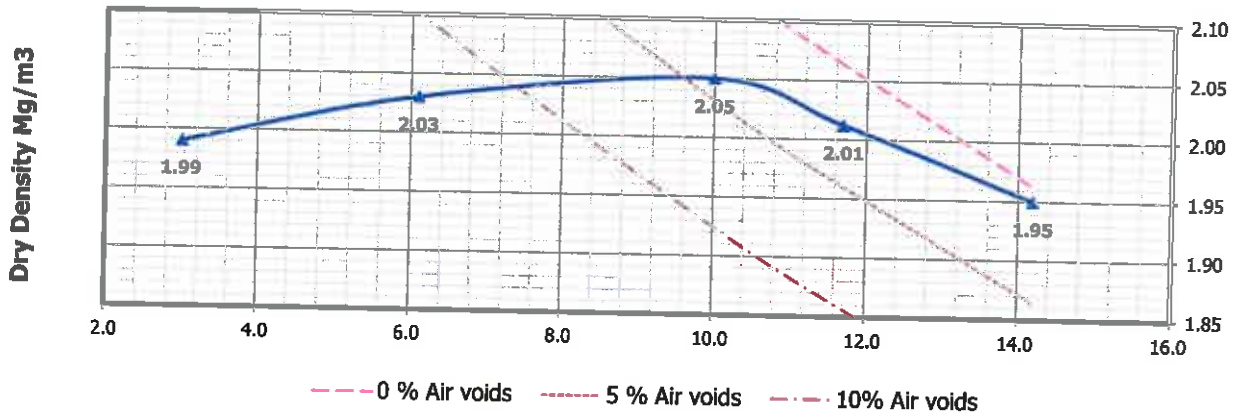
GSTL
GEO SITE & TESTING SERVICES LTD

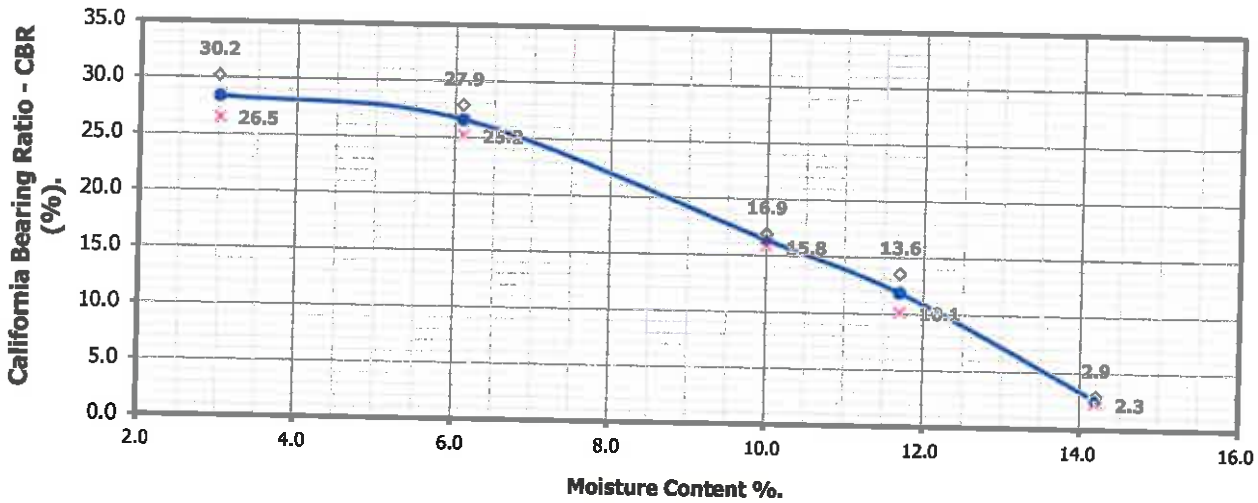
Contract No.: 23755
Client Ref No: NE3312

Unit 4 Dafen Llanelli, SA14 8QN

California Bearing Ratio/Dry Density Moisture Content Relationship
BS 1377:Part 4:1990

Client ref:	**NE3312**
Location:	**A61 Birdwell Junction Improvement, Barnsley**
Contract Number:	**23755**
Hole Number:	**TP7**
Sample Number:	**264**
Depth (m) :	**0.50**
Sample Type	**B**





Moisture Content	3.0	6.1	10.0	11.7	14.2	
CBR Value Top	26.5	25.2	15.8	10.1	2.3	
CBR Value Bot	30.2	27.9	16.9	13.6	2.9	
Mean CBR Value	28.4	26.5	16.4	11.9	2.6	
Dry Density	1.99	2.03	2.05	2.01	1.95	

Initial Sample Conditions:			Method of Compaction 4.5kg Rammer
Initial Moisture Content (%):		11.7	Single sample Tested
Material Retained on the 37.5mm BS Sieve (%):		1	Maximum Dry Density (Mg/m^3) : 2.05
Material Retained on the 20.0mm BS Sieve (%):		1	Optimum Moisture Content(%): 10.0
Particle Density (Mg/m^3) :	Actual	2.72	

D P Ross — **Checked by** — **17/07/2014 Date**

Approved by — **17/07/2014 Date**

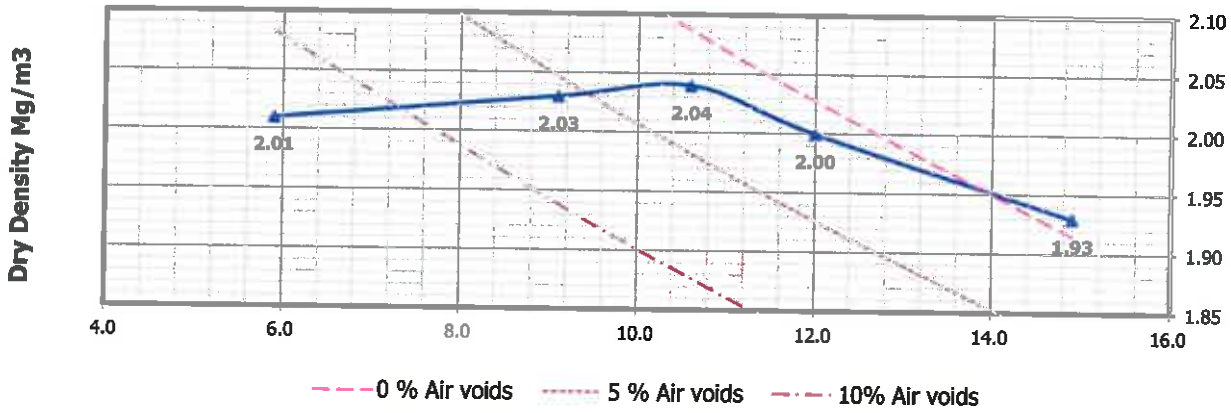
GSTL
GEO SITE & TESTING SERVICES LTD

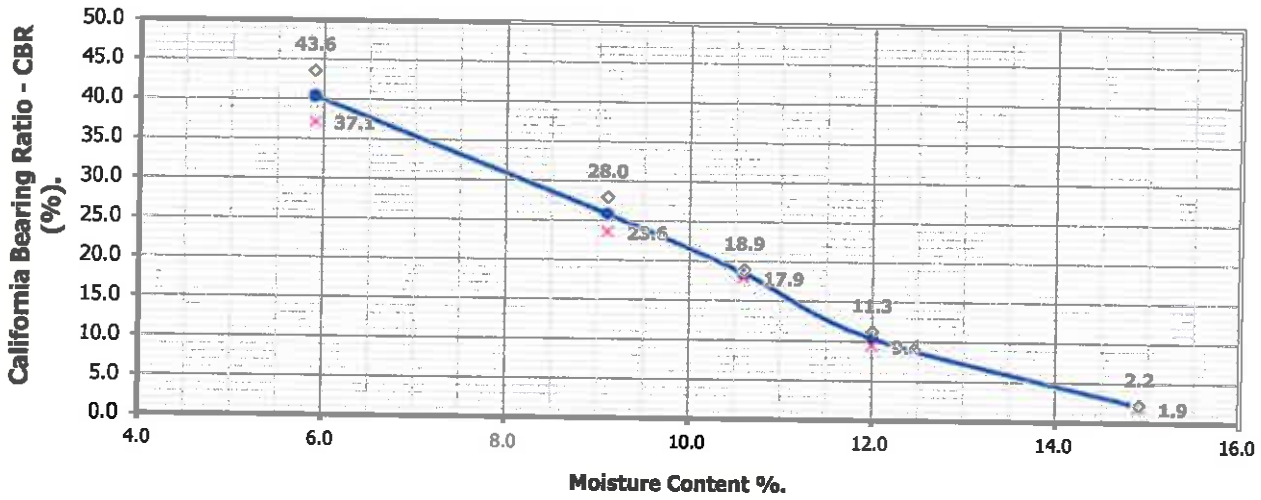
Contract No.: 23755
Client Ref No: NE3312

Unit 4 Dafen Llanelli, SA14 8QN

California Bearing Ratio/Dry Density Moisture Content Relationship
BS 1377:Part 4:1990

Client ref:	**NE3312**
Location:	**A61 Birdwell Junction Improvement, Barnsley**
Contract Number:	**23755**
Hole Number:	**TP7**
Sample Number:	**266**
Depth (m) :	**1.00**
Sample Type	**B**





Moisture Content	5.9	9.1	10.6	12.0	14.9
CBR Value Top	37.1	23.6	17.9	9.4	1.9
CBR Value Bot	43.6	28.0	18.9	11.3	2.2
Mean CBR Value	40.4	25.8	18.4	10.4	2.0
Dry Density	2.01	2.03	2.04	2.00	1.93

Initial Sample Conditions:			Method of Compaction 4.5kg Rammer
Initial Moisture Content (%):		10.6	Single sample Tested
Material Retained on the 37.5mm BS Sieve (%):		2	Maximum Dry Density (Mg/m^3) : 2.04
Material Retained on the 20.0mm BS Sieve (%):		2	Optimum Moisture Content(%): 10.6
Particle Density (Mg/m^3) :	Actual	2.68	

D P Rose
Checked by **17/07/2014** **Date**

Approved by **17/07/2014** **Date**

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GEO SITE & TESTING SERVICES LTD

Contract No.: **23755**
Client Ref No: **NE3312**

Unit 4 Dafen Llanelli, SA14 8QN

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

Laboratory Test Results

Site: A61 BIRDWELL JUNCTION IMPROVEMENT, TANKERSLEY, SOUTH YORKSHIRE

Job Number: NE3312

Client: BARNSLEY METROPOLITAN BOROUGH COUNCIL

Engineer:

Sheet: 1 / 2

DETERMINATION OF PARAMETERS FOR ASSESSMENT OF PYRITIC GROUND AND BURIED CONCRETE

Hole No	Depth (m)	Sample Type No.	pH (no units)	Soluble Sulphate 2:1 (g/l)	Total Sulphate (%)	Total Sulphur (%)	Magnesium 2:1 (g/l)				Descriptions
M1A	1.00	D 151	8.6	0.06	0.01	0.04	0.01				MADE GROUND: grey gravelly silty clay. Gravel sized fragments are fine to coarse mudstone and coal.
M3B	1.00	D 179	8.5	0.18							MADE GROUND: grey gravelly silty clay. Gravel sized fragments are fine to coarse mudstone.
M3B	2.00	D 181	8.2	0.10	0.02	0.24	0.02				MADE GROUND: grey gravelly silty clay. Gravel sized fragments are fine to coarse mudstone.
TP1	0.50	B 246	7.9	0.03	0.07						MADE GROUND: grey gravelly silty clay with cobble sized fragments of mudstone and siltstone. Gravel sized fragments are fine to coarse mudstone and siltstone.
TP1	1.75	B 250	7.7	0.60	0.24	1.10	0.07				MADE GROUND: dark grey gravelly silty clay with cobble sized fragments of siltstone and sandstone. Gravel sized fragments are fine to coarse siltstone and sandstone
TP2	1.20	B 258	8.0	0.22	0.07	0.31	0.03				MADE GROUND: light grey gravelly silty clay with cobble sized fragments of siltstone and sandstone. Gravel sized fragments are fine to coarse siltstone and sandstone
TP3	1.10	B 273	7.8	0.27	0.18						MADE GROUND: light grey gravelly silty clay with cobble sized fragments of siltstone and sandstone. Gravel sized fragments are fine to coarse siltstone and sandstone
TP3	1.80	B 275	8.0	0.10	0.02	0.11	0.02				MADE GROUND: light grey gravelly silty clay with cobble sized fragments of siltstone and sandstone. Gravel sized fragments are fine to coarse siltstone and sandstone
TP4	1.00	B 217	4.9	0.04							Brown and yellow brown mottled silty CLAY with occasional gravel sized mudstone lithorelicts

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

Laboratory Test Results

Site: A61 BIRDWELL JUNCTION IMPROVEMENT, TANKERSLEY, SOUTH YORKSHIRE

Client: BARNSLEY METROPOLITAN BOROUGH COUNCIL

Engineer:

Job Number NE3312

Sheet: 2 / 2

DETERMINATION OF PARAMETERS FOR ASSESSMENT OF PYRITIC GROUND AND BURIED CONCRETE

Hole No	Depth (m)	Sample Type No.	pH (no units)	Soluble Sulphate 2:1 (g/l)	Total Sulphate (%)	Total Sulphur (%)	Magnesium 2:1 (g/l)				Descriptions
TP5	0.50	B 227	7.7	0.04	0.06						MADE GROUND: friable brown gravelly silty clay with cobble sized fragments of sandstone. Gravel sized fragments are fine to coarse sandstone
TP6	1.00	B 239	5.9	0.04							Friable brown silty CLAY
TP6	2.00	D 241	**5.0**	0.04	0.02	< 0.01	< 0.01				Yellow brown silty CLAY with gravel sized mudstone lithorelicts
TP7	0.50	B 264	6.0	0.19	0.14						MADE GROUND: light grey gravelly silty clay with cobble sized fragments of siltstone and sandstone. Gravel sized fragments are fine to coarse siltstone and sandstone
TP7	1.00	B 266	7.1	0.30	0.07	0.12	0.04				MADE GROUND: light grey gravelly silty clay with cobble sized fragments of siltstone and sandstone. Gravel sized fragments are fine to coarse siltstone and sandstone
TP8	0.40	B 280	6.3	0.04	0.05						Brown silty sandy GRAVEL and COBBLE sized sandstone lithorelicts
TP8	1.70	B 283	6.2	0.04							Brown moderately weathered MUDSTONE

Remarks :

Bold pH values indicate acidic ground.

AGGRESSIVE CHEMICAL ENVIRONMENT FOR CONCRETE (ACEC) SITE CLASSIFICATION

Table C1 Aggressive Chemical Environment for Concrete (ACEC) classification for natural ground 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 (SO_4 mg/l)	4 (SO_4 %)	5 (pH)	6 (pH)	7
DS-1	<500	<400	<0.24	≥2.5		AC-1s
					>5.5d	AC-1d
					2.5 - 5.5	AC-2z
DS-2	500 - 1500	400 - 1400	0.24 - 0.6	>3.5		AC-1s
					>5.5	AC-2z
				2.5-3.5		AC-2s
					2.5 - 5.5	AC-3z
DS-3	1600-3000	1500-3000	0.7 - 1.2	>3.5		AC-2s
					>5.5	AC-3
				2.5 - 3.5		AC-3s
					2.5 - 5.5	AC-4
DS-4	3100 - 6000	3100 - 6000	1.3 - 2.4	>3.5		AC-3s
					>5.5	AC-4
				2.5 - 3.5		AC-4s
					2.5 - 5.5	AC-5
DS-5	>6000	>6000	>2.4	>3.5		AC-4s
				2.5 - 3.5	≥2.5	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 C1 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		AC-1s
							>6.5[d]	AC-1
							5.5 - 6.5	AC-2z
							4.5 - 5.5	AC-3z
							2.5 - 4.5	AC-4z
DS-2	500 - 1500		400 - 1400		0.24 - 0.6	>5.5		AC-1s
							>6.5	AC-2
						2.5 - 5.5		AC-2s
							5.5 - 6.5	AC-3z
							4.5 - 5.5	AC-4z
							2.5 - 5.5	AC-5z
DS-3	1600 - 3000		1500 - 3000		0.7 - 1.2	>5.5		AC-2s
							>6.5	AC-3
						2.5 - 5.5		AC-3s
							5.5 - 6.5	AC-4
							2.5 - 5.5	AC-5
DS-4	3100 - 6000	≤1200	3100 - 6000	≤1000	1.3 - 2.4	>5.5		AC-3s
							>6.5	AC-4
						2.5 - 5.5		AC-4s
							2.5 - 6.5	AC-5
DS-4m	3100 - 6000	>1200[e]	3100 - 6000	>1000[e]	1.3 - 2.4	>5.5		AC-3s
							>6.5	AC-4m
						2.5 - 5.5		AC-4ms
							2.5 - 6.5	AC-5m
DS-5	>6000	≤1200	>6000	≤1000	>2.4	>5.5		AC-4s
						2.5 - 5.5	≤1000	AC-5
DS-5m	>6000	>1200[e]	>6000	>1000[e]	>2.4	>5.5		AC-4ms
						2.5 - 5.5	≥2.5	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 000mg/l and 17000 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

Chemtest Ltd.
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.co.uk

Final Report

Report Number:	14-04895 Issue-1		
Initial Date of Issue:	10-Jul-14	**Date of Re-Issue:**	10-Jul-14
Client:	Sub Surface		
Client Address:	3 Peel Street Preston Lancashire PR2 2QS		
Contact(s):	Simon Gabbatt		
Client Reference:	(NE3312) A61 Birdwell Junction Improvement, Tankersley, South Yorkshire		
Quotation No.:		**Date Received:**	01-Jul-14
Order No.:	NE3312	**Date Instructed:**	30-Jun-14
No. of Samples:	16	**Results Due:**	08-Jul-14
Turnaround: (Weekdays)	7		
Date Approved:	08-Jul-14		
Approved By:			
Details:	Darrell Hall, Laboratory Director		

The results reported herein relate only to the material supplied to the laboratory.
This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Chemtest
The right chemistry to deliver results

Results Summary - Soil

Report No.: 14-04895 Issue-1 **Project: (NE3312) A61 Birdwell Junction Improvement, Tankersley, South Yorkshire**

Client: Sub Surface					Chemtest Sample ID.:	25277	25278	25279	25280	25281	25282	25283	25284	25285	25286	25287	25288	25289	25290	25291	25292
Quote:					Client Sample Ref.:	151	179	181	246	250	258	273	275	217	227	239	241	264	266	280	283
Order No.: NE3312					Client Sample ID.:	M1A	M3B	M3B	TP1	TP1	TP2	TP3	TP3	TP4	TP5	TP6	TP6	TP7	TP7	TP8	TP8
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Depth (m):	1.00	1.00	2.00	0.50	1.75	1.20	1.10	1.80	1.00	0.50	1.00	2.00	0.50	1.00	0.40	1.70
					Date Sampled:	10/06/14	10/06/14	10/06/14	10/06/14	10/06/14	10/06/14	10/06/14	10/06/14	10/06/14	10/06/14	10/06/14	10/06/14	10/06/14	10/06/14	10/06/14	10/06/14
Determinand	**Accre**	**SOP**	**Units**	**LOD**																	
Moisture	N	2030	%	0.02	6.1	5.1	8.0	7.3	8.6	6.3	6.7	12	14	6.1	17	16	6.4	5.5	14	6.3
Stones	N	2030	%	0.02	< 0.020		< 0.020		< 0.020	< 0.020		< 0.020				< 0.020		< 0.020		
pH	M	2010			8.6	8.5	8.2	7.9	7.7	8.0	7.8	8.0	4.9	7.7	5.9	5.0	6.0	7.1	6.3	6.2
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/L	0.01	0.060	0.18	0.10	0.028	0.60	0.22	0.27	0.097	0.037	0.040	0.043	0.042	0.19	0.30	0.039	0.035
Sulphate (Acid Soluble)	M	2430	%	0.01	0.011		0.019		0.24	0.065		0.024				0.016		0.066		
Total Sulphur	M	2175	%	0.01	0.040		0.24		1.1	0.31		0.11				< 0.010		0.12		
Magnesium (Water Soluble)	N	2120	g/L	0.01	0.011		0.017		0.071	0.033		0.017				< 0.010		0.040		
Boron (Hot Water Soluble)	M	2120	mg/kg	0.4				< 0.40			< 0.40			< 0.40			< 0.40		0.46	
Cyanide (Total)	M	2300	mg/kg	0.5				< 0.50			0.50			< 0.50			< 0.50		< 0.50	
Sulphide (Easily Liberatable)	M	2325	mg/kg	0.5				1.6			3.6			23			2.0		9.8	
Sulphate (Total)	M	2430	%	0.01				0.065			0.18			0.060			0.14		0.051	
Arsenic	M	2450	mg/kg	2				11			7.0			9.9			5.4		2.0	
Cadmium	M	2450	mg/kg	0.1				0.10			< 0.10			0.10			< 0.10		0.11	
Chromium	M	2450	mg/kg	5				25			22			11			18		12	
Copper	M	2450	mg/kg	5				37			32			12			32		11	
Mercury	M	2450	mg/kg	0.1				< 0.10			< 0.10			0.12			0.10		0.12	
Nickel	M	2450	mg/kg	5				48			94			13			37		16	
Lead	M	2450	mg/kg	5				22			15			20			15		13	
Selenium	M	2450	mg/kg	0.2				< 0.20			0.33			0.50			0.23		0.52	
Zinc	M	2450	mg/kg	5				110			110			48			88		73	
Chromium (Hexavalent)	N	2490	mg/kg	0.5				< 0.50			< 0.50			< 0.50			< 0.50		< 0.50	
TPH >C6-C10	N	2670	mg/kg	1				B < 1.0			B < 1.0			B < 1.0			B < 1.0		B < 1.0	
TPH >C10-C21	N	2670	mg/kg	1				B < 1.0			B < 1.0			B < 1.0			B < 1.0		B < 1.0	
TPH >C21-C40	N	2670	mg/kg	1				B 83			B < 1.0			B < 1.0			B < 1.0		B < 1.0	
Total TPH >C6-C40	N	2670	mg/kg	10				B 83			B < 10			B < 10			B < 10		B < 10	
Naphthalene	M	2700	mg/kg	0.1				< 0.10			0.39			< 0.10			0.26		< 0.10	
Acenaphthylene	M	2700	mg/kg	0.1				< 0.10			< 0.10			< 0.10			< 0.10		< 0.10	
Acenaphthene	M	2700	mg/kg	0.1				< 0.10			< 0.10			< 0.10			< 0.10		< 0.10	
Fluorene	M	2700	mg/kg	0.1				< 0.10			< 0.10			< 0.10			< 0.10		< 0.10	
Phenanthrene	M	2700	mg/kg	0.1				< 0.10			< 0.10			< 0.10			< 0.10		< 0.10	
Anthracene	M	2700	mg/kg	0.1				< 0.10			< 0.10			< 0.10			< 0.10		< 0.10	
Fluoranthene	M	2700	mg/kg	0.1				< 0.10			< 0.10			< 0.10			< 0.10		< 0.10	
Pyrene	M	2700	mg/kg	0.1				< 0.10			< 0.10			< 0.10			< 0.10		0.30	
Benzo(a)anthracene	M	2700	mg/kg	0.1				< 0.10			< 0.10			< 0.10			< 0.10		0.22	
Chrysene	M	2700	mg/kg	0.1				< 0.10			< 0.10			< 0.10			< 0.10		< 0.10	
Benzo[b]fluoranthene	M	2700	mg/kg	0.1				< 0.10			< 0.10			< 0.10			< 0.10		< 0.10	
Benzo[k]fluoranthene	M	2700	mg/kg	0.1				< 0.10			< 0.10			< 0.10			< 0.10		< 0.10	
Benzo[a]pyrene	M	2700	mg/kg	0.1				< 0.10			< 0.10			< 0.10			< 0.10		< 0.10	
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.1				< 0.10			< 0.10			< 0.10			< 0.10		< 0.10	
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.1				< 0.10			< 0.10			< 0.10			< 0.10		< 0.10	
Benzo[g,h,i]perylene	M	2700	mg/kg	0.1				< 0.10			< 0.10			< 0.10			< 0.10		< 0.10	
Total Of 16 PAH's	N	2700	mg/kg	2				< 2.0			< 2.0			< 2.0			< 2.0		< 2.0	
Benzene	M	2760	µg/kg	1				B < 1.0			B < 1.0			B < 1.0			B < 1.0		B < 1.0	
Toluene	M	2760	µg/kg	1				B < 1.0			B < 1.0			B < 1.0			B < 1.0		B < 1.0	
Ethylbenzene	M	2760	µg/kg	1				B < 1.0			B < 1.0			B < 1.0			B < 1.0		B < 1.0	
m & p-Xylene	M	2760	µg/kg	1				B < 1.0			B < 1.0			B < 1.0			B < 1.0		B < 1.0	
o-Xylene	M	2760	µg/kg	1				B < 1.0			B < 1.0			B < 1.0			B < 1.0		B < 1.0	
Methyl Tert-Butyl Ether	M	2760	µg/kg	1				B < 1.0			B < 1.0			B < 1.0			B < 1.0		B < 1.0	
Total Phenols	M	2920	mg/kg	0.3				< 0.30			< 0.30			< 0.30			< 0.30		< 0.30	

Results Summary - Leachate

Report No.: 14-04895 Issue-1 **Project: (NE3312) A61 Birdwell Junction Improvement, Tankersley, South Yorkshire**

Client: Sub Surface			Chemtest Sample ID.:		25280	25283	25286
Quote:			Client Sample Ref.:		246	273	227
Order No.: NE3312			Client Sample ID.:		TP1	TP3	TP5
			Sample Type:		SOIL	SOIL	SOIL
			Depth (m):		0.50	1.10	0.50
			Date Sampled:		10/06/14	10/06/14	10/06/14
Determinand	**Accred.**	**SOP**	**Units**	**LOD**			
pH	U	1010			7.6	7.3	7.2
Sulphate	U	1220	mg/l	1	1.8	30	< 1.0
Cyanide (Total)	U	1300	mg/l	0.05	< 0.050	< 0.050	< 0.050
Sulphide	U	1325	mg/l	0.05	< 0.050	< 0.050	< 0.050
Arsenic (Dissolved)	U	1450	µg/l	1	< 1.0	< 1.0	2.2
Boron (Dissolved)	U	1450	µg/l	20	< 20	< 20	22
Cadmium (Dissolved)	U	1450	µg/l	0.08	< 0.080	< 0.080	< 0.080
Chromium (Dissolved)	U	1450	µg/l	1	< 1.0	< 1.0	< 1.0
Copper (Dissolved)	U	1450	µg/l	1	< 1.0	< 1.0	3.2
Mercury (Dissolved)	U	1450	µg/l	0.5	< 0.50	< 0.50	< 0.50
Nickel (Dissolved)	U	1450	µg/l	1	< 1.0	< 1.0	< 1.0
Lead (Dissolved)	U	1450	µg/l	1	< 1.0	< 1.0	2.6
Selenium (Dissolved)	U	1450	µg/l	1	< 1.0	< 1.0	< 1.0
Zinc (Dissolved)	U	1450	µg/l	1	3.1	2.1	6.8
Chromium (Hexavalent)	U	1490	µg/l	20	< 20	< 20	< 20
TPH >C6-C10	N	1670	µg/l	0.1	B < 0.10	B < 0.10	B < 0.10
TPH >C10-C21	N	1670	µg/l	0.1	B < 0.10	B < 0.10	B < 0.10
TPH >C21-C40	N	1670	µg/l	0.1	B < 0.10	B < 0.10	B < 0.10
Total TPH >C6-C40	N	1670	µg/l	10	B < 10	B < 10	B < 10
Naphthalene	U	1700	µg/l	0.1	< 0.10	< 0.10	< 0.10
Acenaphthylene	U	1700	µg/l	0.1	< 0.10	< 0.10	< 0.10
Acenaphthene	U	1700	µg/l	0.1	< 0.10	< 0.10	< 0.10
Fluorene	U	1700	µg/l	0.1	< 0.10	< 0.10	< 0.10
Phenanthrene	U	1700	µg/l	0.1	< 0.10	< 0.10	< 0.10
Anthracene	U	1700	µg/l	0.1	< 0.10	< 0.10	< 0.10
Fluoranthene	U	1700	µg/l	0.1	0.34	< 0.10	< 0.10
Pyrene	U	1700	µg/l	0.1	0.44	< 0.10	< 0.10
Benzo[a]anthracene	U	1700	µg/l	0.1	6.7	< 0.10	< 0.10
Chrysene	U	1700	µg/l	0.1	8.6	< 0.10	< 0.10
Benzo[b]fluoranthene	U	1700	µg/l	0.1	8.8	< 0.10	< 0.10
Benzo[k]fluoranthene	U	1700	µg/l	0.1	8.7	< 0.10	< 0.10
Benzo[a]pyrene	U	1700	µg/l	0.1	7.0	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	1700	µg/l	0.1	8.6	< 0.10	< 0.10
Dibenz(a,h)Anthracene	U	1700	µg/l	0.1	9.0	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	1700	µg/l	0.1	8.7	< 0.10	< 0.10
Total Of 16 PAH's	U	1700	µg/l	2	67	< 2.0	< 2.0
Benzene	U	1760	µg/l	1	B < 1.0	B < 1.0	B < 1.0
Toluene	U	1760	µg/l	1	B < 1.0	B < 1.0	B < 1.0
Ethylbenzene	U	1760	µg/l	1	B < 1.0	B < 1.0	B < 1.0
m & p-Xylene	U	1760	µg/l	1	B < 1.0	B < 1.0	B < 1.0
o-Xylene	U	1760	µg/l	1	B < 1.0	B < 1.0	B < 1.0
Methyl Tert-Butyl Ether	N	1760	µg/l	1	B < 1.0	B < 1.0	B < 1.0
Total Phenols	U	1920	mg/l	0.03	< 0.030	< 0.030	< 0.030

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Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request.The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Chemtest Sample ID:	Sample Ref:	Sample ID:	Sampled Date:	Containers Received:	Deviation Code(s):
25280	246	TP1	10-Jun-2014	Amber Glass 250ml	B
25280	246	TP1	10-Jun-2014	Amber Glass 60ml	B
25280	246	TP1	10-Jun-2014	Plastic Tub 500g	B
25283	273	TP3	10-Jun-2014	Amber Glass 250ml	B
25283	273	TP3	10-Jun-2014	Amber Glass 60ml	B
25283	273	TP3	10-Jun-2014	Plastic Tub 500g	B
25286	227	TP5	10-Jun-2014	Amber Glass 250ml	B
25286	227	TP5	10-Jun-2014	Amber Glass 60ml	B
25286	227	TP5	10-Jun-2014	Plastic Tub 500g	B
25289	264	TP7	10-Jun-2014	Amber Glass 250ml	B
25289	264	TP7	10-Jun-2014	Amber Glass 60ml	B
25289	264	TP7	10-Jun-2014	Plastic Tub 500g	B
25291	280	TP8	10-Jun-2014	Amber Glass 250ml	B
25291	280	TP8	10-Jun-2014	Amber Glass 60ml	B
25291	280	TP8	10-Jun-2014	Plastic Tub 500g	B

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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, SVCOs, PCBs, Phenols
For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at our Coventry 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

Sample Retention and Disposal

All soil samples will be retained for a period of 1 month following the date of the test report
All water samples will be retained for 7 days following the date of the test report
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.co.uk

Chemtest Ltd.
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: Info@chemtest.co.uk

Final Report

Report Number:	14-04896 Issue-1
Initial Date of Issue:	10-Jul-14
Date of Re-Issue:	10-Jul-14
Client:	Sub Surface
Client Address:	3 Peel Street Preston Lancashire PR2 2QS
Contact(s):	Simon Gabbatt
Client Reference:	NE3312- A61 Birdwell Junction Improvement, Barnsley
Quotation No.:	
Date Received:	01-Jul-14
Order No.:	NE3312
Date Instructed:	30-Jun-14
No. of Samples:	3
Results Due:	09-Jul-14
Turnaround: (Weekdays)	8
Date Approved:	09-Jul-14
Approved By:	
Details:	Phil Hellier, Project Director

The results reported herein relate only to the material supplied to the laboratory.
This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

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Results Summary - Soil

Report No.: 14-04896 Issue-1
Project: NE3312- A61 Birdwell Junction Improvement, Barnsley

Client: Sub Surface					Chemtest Sample ID.:	25293	25294	25295
Quote:					Client Sample Ref.:	246	273	227
Order No.: NE3312					Client Sample ID.:	TP1	TP3	TP5
					Sample Type:	SOIL	SOIL	SOIL
					Top Depth (m):	0.50	1.10	0.50
					Bottom Depth(m):			
					Date Sampled:	10-Jun-14	10-Jun-14	10-Jun-14
Determinand	**Accred.**	**SOP**	**Units**	**LOD**				
Moisture	N	2030	%	0.02		8.0	5.9	14
PCB 28	M	2810	mg/kg	0.01		< 0.010	< 0.010	< 0.010
PCB 52	M	2810	mg/kg	0.01		< 0.010	< 0.010	< 0.010
PCB 101	M	2810	mg/kg	0.01		< 0.010	< 0.010	< 0.010
PCB 118	M	2810	mg/kg	0.01		< 0.010	< 0.010	< 0.010
PCB 153	M	2810	mg/kg	0.01		< 0.010	< 0.010	< 0.010
PCB 138	M	2810	mg/kg	0.01		< 0.010	< 0.010	< 0.010
PCB 180	M	2810	mg/kg	0.01		< 0.010	< 0.010	< 0.010

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Results Summary - 2 Stage WAC

Report No.: 14-04896 Issue-1

Project: NE3312- A61 Birdwell Junction Improvement, Barnsley

Chemtest Sample ID: 25293 Sample Ref: 246 Sample ID: TP1 Top Depth(m): 0.50 Bottom Depth(m): Sampling Date: 10/06/2014							Landfill Waste Acceptance Criteria Limits		
							Inert Waste Landfill	Stable Non-reactive Hazardous waste in non-hazardous	Hazardous Waste Landfill
Determinand	**SOP**	**Accred.**	**Units**						
Total Organic Carbon	2625	M	%			1.1	3	5	6
Loss on Ignition	2610	M	%			2.9	--	--	10
Total BTEX	2761	M	mg/kg			B < 0.001	6	--	--
Total PCBs (7 congeners)	2811	M	mg/kg			< 0.010	1	--	--
TPH Total WAC	2670	M	mg/kg			B < 10	500	--	--
Total (of 17) PAHs	2700	N	mg/kg			2.3	100	--	--
pH	2010	M				8.3	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.038	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative 10:1 mg/kg**	**Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg**		
Arsenic	1450	U	< 0.001	< 0.001	< 0.050	< 0.050	0.5	2	25
Barium	1450	U	0.011	0.007	< 0.50	< 0.50	20	100	300
Cadmium	1450	U	< 0.0001	< 0.0001	< 0.010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.001	< 0.001	< 0.050	< 0.050	0.5	10	70
Copper	1450	U	0.001	< 0.001	< 0.050	< 0.050	2	50	100
Mercury	1450	U	< 0.0005	< 0.0005	< 0.010	< 0.010	0.01	0.2	2
Molybdenum	1450	U	< 0.001	< 0.001	< 0.050	< 0.050	0.5	10	30
Nickel	1450	U	< 0.001	< 0.001	< 0.050	< 0.050	0.4	10	40
Lead	1450	U	< 0.001	< 0.001	< 0.010	< 0.010	0.5	10	50
Antimony	1450	U	< 0.001	< 0.001	< 0.010	< 0.010	0.06	0.7	5
Selenium	1450	U	< 0.001	< 0.001	< 0.010	< 0.010	0.1	0.5	7
Zinc	1450	U	0.003	< 0.001	< 0.50	< 0.50	4	50	200
Chloride	1220	U	3.9	< 1.0	< 10	< 10	800	15000	25000
Fluoride	1220	U	0.49	0.26	< 1.0	2.8	10	150	500
Sulphate	1220	U	20	3.0	40	46	1000	20000	50000
Total Dissolved Solids	1040	U	110	40	220	460	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	3.6	< 2.5	< 50	< 50	500	800	1000

Soild Information	
Dry mass of test portion/kg	0.175
Moisture (%)	8.0

Leachate Test Information	
Leachant volume 1st extract/l	0.335
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.161

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Results Summary - 2 Stage WAC

Report No.: 14-04896 Issue-1

Project: NE3312- A61 Birdwell Junction Improvement, Barnsley

Chemtest Sample ID: 25294 Sample Ref: 273 Sample ID: TP3 Top Depth(m): 1.10 Bottom Depth(m): Sampling Date: 10/06/2014							Landfill Waste Acceptance Criteria Limits		
							Inert Waste Landfill	Stable Non-reactive Hazardous waste in non-hazardous	Hazardous Waste Landfill
Determinand	**SOP**	**Accred.**	**Units**						
Total Organic Carbon	2625	M	%			1.0	3	5	6
Loss on Ignition	2610	M	%			5.1	--	--	10
Total BTEX	2761	M	mg/kg			B < 0.001	6	--	--
Total PCBs (7 congeners)	2811	M	mg/kg			< 0.010	1	--	--
TPH Total WAC	2670	M	mg/kg			B < 10	500	--	--
Total (of 17) PAHs	2700	N	mg/kg			< 2.0	100	--	--
pH	2010	M				8.2	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.018	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative 10:1 mg/kg**	**Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg**		
Arsenic	1450	U	< 0.001	< 0.001	< 0.050	< 0.050	0.5	2	25
Barium	1450	U	0.021	0.015	< 0.50	< 0.50	20	100	300
Cadmium	1450	U	< 0.0001	< 0.0001	< 0.010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.001	< 0.001	< 0.050	< 0.050	0.5	10	70
Copper	1450	U	0.003	< 0.001	< 0.050	< 0.050	2	50	100
Mercury	1450	U	< 0.0005	< 0.0005	< 0.010	< 0.010	0.01	0.2	2
Molybdenum	1450	U	0.002	< 0.001	< 0.050	< 0.050	0.5	10	30
Nickel	1450	U	< 0.001	< 0.001	< 0.050	< 0.050	0.4	10	40
Lead	1450	U	< 0.001	< 0.001	< 0.010	< 0.010	0.5	10	50
Antimony	1450	U	< 0.001	< 0.001	< 0.010	< 0.010	0.06	0.7	5
Selenium	1450	U	0.008	0.001	0.015	0.017	0.1	0.5	7
Zinc	1450	U	0.010	0.003	< 0.50	< 0.50	4	50	200
Chloride	1220	U	3.2	< 1.0	< 10	< 10	800	15000	25000
Fluoride	1220	U	0.33	0.15	< 1.0	1.7	10	150	500
Sulphate	1220	U	220	25	440	430	1000	20000	50000
Total Dissolved Solids	1040	U	380	99	760	1200	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	2.9	< 2.5	< 50	< 50	500	800	1000

Soild Information	
Dry mass of test portion/kg	0.175
Moisture (%)	5.9

Leachate Test Information	
Leachant volume 1st extract/l	0.339
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.160

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Results Summary - 2 Stage WAC

Report No.: 14-04896 Issue-1

Project: NE3312- A61 Birdwell Junction Improvement, Barnsley

Chemtest Sample ID: 25295 Sample Ref: 227 Sample ID: TP5 Top Depth(m): 0.50 Bottom Depth(m): Sampling Date: 10/06/2014							Landfill Waste Acceptance Criteria Limits		
Determinand	**SOP**	**Accred.**	**Units**				**Inert Waste Landfill**	**Stable Non-reactive Hazardous waste in non-hazardous**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	M	%			1.4	3	5	6
Loss on Ignition	2610	M	%			5.7	--	--	10
Total BTEX	2761	M	mg/kg			B < 0.001	6	--	--
Total PCBs (7 congeners)	2811	M	mg/kg			< 0.010	1	--	--
TPH Total WAC	2670	M	mg/kg			B < 10	500	--	--
Total (of 17) PAHs	2700	N	mg/kg			< 2.0	100	--	--
pH	2010	M				7.2	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.014	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative 10:1 mg/kg**	**Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg**		
Arsenic	1450	U	< 0.001	< 0.001	< 0.050	< 0.050	0.5	2	25
Barium	1450	U	0.004	0.004	< 0.50	3.9	20	100	300
Cadmium	1450	U	< 0.0001	< 0.0001	< 0.010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.001	< 0.001	< 0.050	< 0.050	0.5	10	70
Copper	1450	U	0.002	0.002	< 0.050	14	2	50	100
Mercury	1450	U	< 0.0005	< 0.0005	< 0.010	< 0.010	0.01	0.2	2
Molybdenum	1450	U	< 0.001	< 0.001	< 0.050	< 0.050	0.5	10	30
Nickel	1450	U	< 0.001	< 0.001	< 0.050	< 0.050	0.4	10	40
Lead	1450	U	< 0.001	0.002	< 0.010	< 0.010	0.5	10	50
Antimony	1450	U	< 0.001	< 0.001	< 0.010	< 0.010	0.06	0.7	5
Selenium	1450	U	< 0.001	< 0.001	< 0.010	< 0.010	0.1	0.5	7
Zinc	1450	U	0.002	0.003	< 0.50	< 0.50	4	50	200
Chloride	1220	U	2.9	< 1.0	< 10	23000	800	15000	25000
Fluoride	1220	U	0.40	0.37	< 1.0	240	10	150	500
Sulphate	1220	U	9.9	< 1.0	20	77000	1000	20000	50000
Total Dissolved Solids	1040	U	78	38	150	310000	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	5.1	2.9	< 50	17000	500	800	1000

Soild Information	
Dry mass of test portion/kg	0.175
Moisture (%)	14

Leachate Test Information	
Leachant volume 1st extract/l	0.321
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	1368.0

Chemtest
The right chemistry to deliver results

Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request.The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Chemtest Sample ID:	Sample Ref:	Sample ID:	Sampled Date:	Containers Received:	Deviation Code(s):
25293	246	TP1	10-Jun-2014	Amber Glass 250ml	B
25293	246	TP1	10-Jun-2014	Amber Glass 60ml	B
25293	246	TP1	10-Jun-2014	Miscellaneous	B
25293	246	TP1	10-Jun-2014	Plastic Tub 500g	B
25294	273	TP3	10-Jun-2014	Amber Glass 250ml	B
25294	273	TP3	10-Jun-2014	Amber Glass 60ml	B
25294	273	TP3	10-Jun-2014	Miscellaneous	B
25294	273	TP3	10-Jun-2014	Plastic Tub 500g	B
25295	227	TP5	10-Jun-2014	Amber Glass 250ml	B
25295	227	TP5	10-Jun-2014	Amber Glass 60ml	B
25295	227	TP5	10-Jun-2014	Miscellaneous	B
25295	227	TP5	10-Jun-2014	Plastic Tub 500g	B

Chemtest
The right chemistry to deliver results

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, SVCOs, PCBs, Phenols
For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at our Coventry 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

Sample Retention and Disposal

All soil samples will be retained for a period of 1 month following the date of the test report
All water samples will be retained for 7 days following the date of the test report
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

SUB SURFACE

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

Site A61 BIRDWELL JUNCTION IMPROVEMENT, TANKERSLEY, SOUTH YORKSHIRE			**Borehole Number** M1
Boring Method MINI PERCUSSIVE	**Casing Diameter**	**Ground Level (mOD)** 136.74	**Client** BARNSLEY METROPOLITAN BOROUGH COUNCIL	**Job Number** NE3312
	Location 435148.07 E 400685.61 N	**Dates** 09/06/2014	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.45	B					(0.18)	MADE GROUND: dark brown clayey topsoil.		
					136.56	0.18			
						(0.27)	MADE GROUND: grey gravelly silty sand. Gravel sized fragments are fine to coarse siltstone.		
				09/06/2014:DRY	136.29	0.45	.... at 0.45m : boulder sized obstruction		
							Complete at 0.45m		

Remarks
Hand dug inspection pit from GL to 0.45m to check for services.
Obstruction at 0.45m, unable to progress so backfilled with arisings and moved rig to M1A.

Scale (approx)	Logged By
1:25	DS/SJ

Figure No. NE3312.M1

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Site A61 BIRDWELL JUNCTION IMPROVEMENT, TANKERSLEY, SOUTH YORKSHIRE			**Borehole Number** M1A
Boring Method MINI PERCUSSIVE	**Casing Diameter**	**Ground Level (mOD)** 136.74	**Client** BARNSLEY METROPOLITAN BOROUGH COUNCIL	**Job Number** NE3312
	Location 435148.07 E 400685.61 N	**Dates** 09/06/2014	**Engineer**	**Sheet** 1/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.00-1.00	C			0.00m to 1.00m - 100% recovery	136.54	(0.20) 0.20	MADE GROUND: brown gravelly silty clay with occasional rootlets. Gravel sized fragments are fine to medium stone.			
						(0.80)	MADE GROUND: grey clayey silty sandy fine to coarse gravel and cobble sized fragments of mudstone.			
1.00-1.45 1.00-2.00 1.00-1.45	D C SPT N=16			Seepage(1) at 1.00m. 1.00m to 2.00m - 100% recovery 5,8/4,3,4,5	135.74	1.00	MADE GROUND: medium and high strength dark grey gravelly becoming very gravelly silty clay. Gravel sized fragments are fine to coarse mudstone and coal. .... from 1.40m : very gravelly		▽1	
2.00-2.45 2.00-3.00 2.20-2.45	SPT N=23 C D			3,5/6,7,5,5 2.00m to 3.00m - 80% recovery						
3.00-3.45 3.00-3.45 3.00-4.00	SPT N=13 D C			2,3/3,2,4,4 3.00m to 4.00m - 60% recovery		(5.45)				
4.00-4.45 4.00-4.45 4.00-5.00	SPT N=22 D C			3,4/6,6,6,4 4.00m to 5.00m - 40% recovery						
5.00-5.45	SPT N=24			4,4/5,5,6,8						

Remarks
C = Plastic lined core sample
Core diameter : 83mm to 2.00m, 72mm to 5.00m and 52mm to 6.00m
On completion backfilled with arisings to 5.00m and installed a 50mm dia hdpe gas monitoring standpipe with a gas valve and a gravel surround to 5.00m, 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	NM/SJ

Figure No. NE3312.M1A

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Site	Borehole Number
A61 BIRDWELL JUNCTION IMPROVEMENT, TANKERSLEY, SOUTH YORKSHIRE	M1A

Boring Method	Casing Diameter	Ground Level (mOD)	Client	Job Number
MINI PERCUSSIVE		136.74	BARNSLEY METROPOLITAN BOROUGH COUNCIL	NE3312
Location		**Dates**	**Engineer**	**Sheet**
435148.07 E 400685.61 N		09/06/2014		2/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
5.00-5.45 5.00-6.00	D C			5.00m to 6.00m - 50% recovery			MADE GROUND: medium and high strength dark gery very gravelly silty clay. Gravel sized fragments are fine to coarse mudstone and coal.			
6.00-6.45 6.00-6.45	SPT N=18 D			2,3/3,4,5,6			.... at 6.15m : medium strength and collapsing			
				10/06/2014:	130.29	6.45	Complete at 6.45m			

Remarks

Scale (approx)	Logged By
1:25	NM/SJ

Figure No. NE3312.M1A

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Site A61 BIRDWELL JUNCTION IMPROVEMENT, TANKERSLEY, SOUTH YORKSHIRE			**Borehole Number** M2
Boring Method MINI PERCUSSIVE	**Casing Diameter**	**Ground Level (mOD)** 137.83	**Client** BARNSLEY METROPOLITAN BOROUGH COUNCIL	**Job Number** NE3312
	Location 435182.79 E 400668.22 N	**Dates** 09/06/2014	**Engineer**	**Sheet** 1/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.00-1.00	C			0.00m to 1.00m - 90% recovery	137.63	(0.20) 0.20	MADE GROUND: brown gravelly silty clay with some rootlets. Gravel sized fragments are fine to medium stone.			
						(1.30)	MADE GROUND: grey clayey silty sandy fine to coarse gravel and cobble sized fragments of mudstone.			
1.00-1.45 1.00-2.00 1.00-1.45	D C SPT N=14			Seepage(1) at 1.00m. 1.00m to 2.00m - 100% recovery 4,4/4,4,3,3			.... from 1.15m : medium dense		▽1	
					136.33	1.50	MADE GROUND: medium, locally low and high, strength dark grey very gravelly silty clay. Gravel sized fragments are fine to coarse mudstone and coal.			
2.00-2.45 2.00-2.45 2.00-3.00	SPT N=15 D C			3,3/4,4,4,3 2.00m to 3.00m - 100% recovery						
3.00-3.45 3.00-3.45 3.00-4.00	SPT N=18 D C			5,5/5,5,5,3 3.00m to 4.00m - 100% recovery						
4.00-4.45 4.00-4.45 4.00-5.00	SPT N=18 D C			3,4/4,3,6,5 4.00m to 5.00m - 100% recovery		(5.95)				
5.00-5.45	SPT N=10			2,2/2,4,2,2			.... at 5.15m : low strength			

Remarks
C = Plastic lined core sample
Core diameter : 83mm to 2.00m, 72mm to 4.00m and 62mm to 6.00m and 52mm to 7.00m
On completion backfilled with arisings to 5.00m and installed a 50mm dia hdpe gas monitoring standpipe with a gas valve and a gravel surround to 5.00m, 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	NM/SJ

Figure No. NE3312.M2

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Site	Borehole Number
A61 BIRDWELL JUNCTION IMPROVEMENT, TANKERSLEY, SOUTH YORKSHIRE	M2

Boring Method	Casing Diameter	Ground Level (mOD)	Client	Job Number
MINI PERCUSSIVE		137.83	BARNSLEY METROPOLITAN BOROUGH COUNCIL	NE3312
	Location	**Dates**	**Engineer**	**Sheet**
	435182.79 E 400668.22 N	09/06/2014		2/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
5.00-5.45 5.00-6.00	D C			5.00m to 6.00m - 100% recovery			MADE GROUND: medium, locally low and high, strength dark grey very gravelly silty clay. Gravel sized fragments are fine to coarse mudstone and coal.			
6.00-6.45 6.00-6.45 6.00-7.00	SPT N=15 D C			3,4/1,4,5,5 6.00m to 7.00m - 100% recovery						
7.00-7.45 7.00-7.45	SPT N=20 D			2,2/4,6,5,5			.... at 7.15m : high strength and collapsing			
				09/06/2014:	130.38	7.45	Complete at 7.45m			

Remarks

Scale (approx)	Logged By
1:25	NM/SJ

Figure No. NE3312.M2

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Site	Borehole Number
A61 BIRDWELL JUNCTION IMPROVEMENT, TANKERSLEY, SOUTH YORKSHIRE	M3

Boring Method	Casing Diameter	Ground Level (mOD)	Client	Job Number
MINI PERCUSSIVE		139.85	BARNSLEY METROPOLITAN BOROUGH COUNCIL	NE3312
	Location	**Dates**	**Engineer**	**Sheet**
	435141.48 E 400588.85 N	09/06/2014		1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.45	B				139.79	0.06	MADE GROUND: clayey topsoil.		
						(0.39)	MADE GROUND: grey gravelly silty clay. Gravel sized fragments are fine to coarse siltstone.		
				09/06/2014:DRY	139.40	0.45	.... at 0.45m : obstruction		
							Complete at 0.45m		

Remarks
Hand dug inspection pit from GL to 0.45m to check for services.
Obstruction at 0.45m, unable to progress so backfilled with arisings and moved to M3A.

Scale (approx)	Logged By
1:25	DS/SJ

Figure No. NE3312.M3

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Site	Borehole Number
A61 BIRDWELL JUNCTION IMPROVEMENT, TANKERSLEY, SOUTH YORKSHIRE	M3A

Boring Method	Casing Diameter	Ground Level (mOD)	Client	Job Number
MINI PERCUSSIVE		139.85	BARNSLEY METROPOLITAN BOROUGH COUNCIL	NE3312
	Location	**Dates**	**Engineer**	**Sheet**
	435141.48 E 400588.85 N	09/06/2014		1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					139.79	0.06	MADE GROUND: clayey topsoil.		
						(0.39)	MADE GROUND: grey gravelly silty clay. Gravel sized fragments are fine to coarse siltstone.		
				09/06/2014:DRY	139.40	0.45	.... at 0.45m : obstruction		
							Complete at 0.45m		

Remarks
Hand dug inspection pit from GL to 0.45m to check for services.
Strata broadly similar to M3
Obstruction at 0.45m, unable to progress so backfilled with arisings and moved to M3B.

Scale (approx)	Logged By
1:25	DS/SJ

Figure No. NE3312.M3A

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Site	Borehole Number
A61 BIRDWELL JUNCTION IMPROVEMENT, TANKERSLEY, SOUTH YORKSHIRE	M3B

Boring Method	Casing Diameter	Ground Level (mOD)	Client	Job Number
MINI PERCUSSIVE		139.85	BARNSLEY METROPOLITAN BOROUGH COUNCIL	NE3312
	Location	**Dates**	**Engineer**	**Sheet**
	435141.48 E 400588.85 N	09/06/2014		1/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.00-1.00	C			0.00m to 1.00m - 100% recovery		(0.30)	MADE GROUND: brown gravelly slightly sandy silty clay with occasional rootlets. Gravel sized fragments are fine to coarse brick and stone.			
					139.55	0.30	MADE GROUND: grey clayey silty sandy fine to coarse gravel sized fragments of mudstone.			
				Seepage(1) at 0.45m.		(0.70)			▽1	
1.00-1.45 1.00-1.45 1.00-2.00	SPT N=37 C C			5,6/9,9,11,8 1.00m to 2.00m - 100% recovery	138.85	1.00	MADE GROUND: dense grey and occasional brown mottled clayey silty sandy fine to coarse gravel sized fragments of mudstone and occasional sandstone.			
						(1.00)				
2.00-2.45 2.00-2.45 2.00-3.00	SPT N=26 D C			5,3/5,5,7,9 2.00m to 3.00m - 100% recovery	137.85	2.00	MADE GROUND: medium dense grey clayey silty sandy fine to coarse gravel sized fragments of mudstone.			
3.00-3.45 3.00-3.45 3.00-4.00	SPT N=21 D C			2,3/4,5,6,6 3.00m to 4.00m - 90% recovery		(2.00)				
4.00-4.45 4.00-4.45 4.00-5.00	SPT N=24 D C			8,8/3,4,8,9 4.00m to 5.00m - 90% recovery	135.85	4.00	MADE GROUND: high strength grey very gravelly silty clay. Gravel sized fragments are fine to coarse mudstone.			
						(1.00)				
5.00-5.45	SPT N=34			8,10/10,10,6,8						

Remarks
C = Plastic lined core sample
Core diameter : 83mm to 2.00m, 72mm to 3.00m and 62mm to 5.00m
On completion backfilled with arisings to 5.00m and installed a 50mm dia hdpe gas monitoring standpipe with a gas valve and a gravel surround to 5.00m, 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	NM/SJ

Figure No. NE3312.M3B

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Site	Borehole Number
A61 BIRDWELL JUNCTION IMPROVEMENT, TANKERSLEY, SOUTH YORKSHIRE	M3B

Boring Method	Casing Diameter	Ground Level (mOD)	Client	Job Number
MINI PERCUSSIVE		139.85	BARNSLEY METROPOLITAN BOROUGH COUNCIL	NE3312
Location		**Dates**	**Engineer**	**Sheet**
435141.48 E 400588.85 N		09/06/2014		2/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
5.00-5.45	D				134.85	5.00	MADE GROUND: dense brown and grey mottled clayey silty sandy fine to coarse gravel sized fragments of sandstone, siltstone and mudstone.			
						(0.45)				
				09/06/2014:	134.40	5.45	Complete at 5.45m			

Remarks

Scale (approx)	Logged By
1:25	NM/SJ

Figure No. NE3312.M3B

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Site	Borehole Number
A61 BIRDWELL JUNCTION IMPROVEMENT, TANKERSLEY, SOUTH YORKSHIRE	M4

Boring Method	Casing Diameter	Ground Level (mOD)	Client	Job Number
MINI PERCUSSIVE		144.09	BARNSLEY METROPOLITAN BOROUGH COUNCIL	NE3312
	Location	**Dates**	**Engineer**	**Sheet**
	435171.01 E 400482.92 N	09/06/2014		1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.00-1.10	C			0.00m to 1.00m - 100% recovery		(0.20)	MADE GROUND: dark grey slightly gravelly silty clay with some roots and rootlets. Gravel sized fragments are fine brick and stone.			
					143.89	0.20	MADE GROUND: grey clayey silty sandy fine to coarse gravel and cobble sized fragments of mudstone.			
				Seepage(1) at 0.60m.					▽1	
1.00-1.45 1.00-1.45 1.00-1.60	SPT N=22 D C			4,4/8,5,5,6 1.00m to 1.60m - 100% recovery		(1.85)	.... from 1.15m : medium dense			
1.60-2.05 1.60-2.05	SPT N=44 D			2,10/11,13,10,10			.... from 1.75m : dense			
				09/06/2014:	142.04	2.05	.... at 2.05m : obstruction Complete at 2.05m			

Remarks
C = Plastic lined core sample
Core diameter : 83mm to 1.00m and 72mm to 1.60m
Terminated on obstruction at 2.05m and installed a 50mm dia hdpe gas monitoring standpipe with a gas valve and a gravel surround to 2.05m, 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	NM/SJ

Figure No.
NE3312.M4

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Site A61 BIRDWELL JUNCTION IMPROVEMENT, TANKERSLEY, SOUTH YORKSHIRE			**Borehole Number** M5
Boring Method MINI PERCUSSIVE	**Casing Diameter**	**Ground Level (mOD)** 143.85	**Client** BARNSLEY METROPOLITAN BOROUGH COUNCIL	**Job Number** NE3312
	Location 435112.82 E 400420.24 N	**Dates** 09/06/2014	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.00-1.00	C			0.00m to 1.00m - 90% recovery		(0.30)	MADE GROUND: dark brown gravelly silty clay with many rootlets. Gravel sized fragments are fine to medium brick and stone.			
					143.55	0.30	MADE GROUND: grey very gravelly silty clay with low cobble sized fragments of mudstone and siltstone. Gravel sized fragments are fine to coarse mudstone and siltstone.			
				Seepage(1) at 0.70m.					▽1	
1.00-1.45 1.00-1.45 1.00-2.00	SPT N=13 D C			3,4/4,3,3,3 1.00m to 2.00m - 80% recovery			.... from 1.15m : medium strength			
						(2.65)				
2.00-2.45 2.00-2.45 2.00-2.50	SPT N=26 D C			6,5/5,6,7,8 2.00m to 2.50m - 100% recovery			.... from 2.15m : high strength			
2.50-2.95 2.50-2.95	SPT N=50 D			0,8/6,6,10,28						
				09/06/2014:	140.90	2.95	Complete at 2.95m			

Remarks
C = Plastic lined core sample
Core diameter : 83mm to 2.00m, 76mm to 2.00m and 72mm to 2.50m
Terminated on obstruction at 2.95m, backfilled with arisings to 2.70m and installed a 50mm dia hdpe gas monitoring standpipe with a gas valve and a gravel surround to 2.70m, 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	NM/SJ

Figure No. NE3312.M5

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Site	Borehole Number
A61 BIRDWELL JUNCTION IMPROVEMENT, TANKERSLEY, SOUTH YORKSHIRE	M6

Boring Method	Casing Diameter	Ground Level (mOD)	Client	Job Number
MINI PERCUSSIVE		141.91	BARNSLEY METROPOLITAN BOROUGH COUNCIL	NE3312
	Location	**Dates**	**Engineer**	**Sheet**
	435036.26 E 400398.81 N	09/06/2014		1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.00-1.00	C			0.00m to 1.00m - 100% recovery	141.71	(0.20) 0.20	MADE GROUND: brown gravelly silty clay with occasional rootlets. Gravel sized fragments are fine to coarse mudstone.			
						(0.70)	MADE GROUND: grey very gravelly silty clay with low cobble sized fragments of mudstone. Gravel sized fragments are fine to coarse mudstone.			
1.00-1.45 1.00-1.45 1.00-2.00	SPT N=25 D C			8,5/4,3,6,12 1.00m to 2.00m - 100% recovery	141.01 140.91 140.71	0.90 (0.10) 1.00 (0.20) 1.20	MADE GROUND: brown very gravelly slightly sandy silty clay. Gravel sized fragments are fine to coarse lime. MADE GROUND: reddish brown sandy fine to coarse gravel sized fragments of brick and burnt shale.			
						(0.70)	Very weak thinly laminated brown, dark brown and occasional orangish brown and grey mottled highly weathered MUDSTONE, in parts completely weathered to silty clay.			
2.00-2.45 2.00-2.45 2.00-3.00	SPT N=17 D C			1,2/3,5,3,6 2.00m to 3.00m - 80% recovery	140.01 139.91	1.90 (0.10) 2.00	Very weak black highly weathered COAL. MINEWORKINGS: stowed waste comprising medium strength greyish brown and dark grey mottled gravelly silty clay. Gravel sized fragments are fine to medium coal and mudstone.			
						(1.00)				
3.00-3.45 3.00-3.45	SPT N=45 D			2,7/7,5,12,21	138.91	3.00	Very high strength yellowish brown and grey mottled silty CLAY with many fine to coarse gravel sized mudstone lithorelicts (SEATEARTH)			
						(0.45)				
				09/06/2014:DRY	138.46	3.45	Complete at 3.45m			

Remarks
C = Plastic lined core sample
Core diameter : 83mm to 2.00m and 72mm to 3.00m
On completion backfilled with arisings to 3.00m 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)	Logged By
1:25	NM/SJ

Figure No. NE3312.M6

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Site	Borehole Number
A61 BIRDWELL JUNCTION IMPROVEMENT, TANKERSLEY, SOUTH YORKSHIRE	M7

Boring Method	Casing Diameter	Ground Level (mOD)	Client	Job Number
MINI PERCUSSIVE		141.53	BARNSLEY METROPOLITAN BOROUGH COUNCIL	NE3312
	Location	**Dates**	**Engineer**	**Sheet**
	435013.49 E 400284.72 N	09/06/2014		1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.00-1.00	C			0.00m to 1.00m - 90% recovery		(0.60)	MADE GROUND: dark brown slightly gravelly silty clay with occasional rootlets. Gravel sized fragments are fine to coarse stone and brick.			
					140.93	0.60	Stiff orangish brown and grey mottled silty CLAY (completely weathered mudstone).			
						(0.40)				
1.00-1.45 1.00-1.45 1.00-2.00	SPT N=11 D C			2,2/2,3,3,3 1.00m to 2.00m - 100% recovery	140.53	1.00	Stiff medium strength brown and occasional grey and orangish brown mottled silty CLAY (completely weathered mudstone).			
						(1.00)				
2.00-2.45 2.00-2.45 2.00-2.50	SPT N=28 D C			3,3/5,7,8,8 2.00m to 2.50m - 100% recovery	139.53	2.00	Very weak brown highly weathered MUDSTONE.			
						(0.95)				
2.50-2.95 2.50-2.95	SPT N=56 D			5,9/12,12,13,19						
				09/06/2014:DRY	138.58	2.95	Complete at 2.95m			

Remarks
C = Plastic lined core sample
Core diameter : 83mm to 2.00m and 72mm to 2.50m
On completion backfilled with arisings to 2.50m and installed a 50mm dia hdpe gas monitoring standpipe with a gas valve and a gravel surround to 2.50m, 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	NM/SJ

Figure No. NE3312.M7

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Site	Borehole Number
A61 BIRDWELL JUNCTION IMPROVEMENT, TANKERSLEY, SOUTH YORKSHIRE	M8

Boring Method	Casing Diameter	Ground Level (mOD)	Client	Job Number
MINI PERCUSSIVE		143.89	BARNSLEY METROPOLITAN BOROUGH COUNCIL	NE3312
	Location	**Dates**	**Engineer**	**Sheet**
	435034.65 E 400238.99 N	09/06/2014		1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.00-1.00	C			0.00m to 1.00m - 90% recovery		(0.40)	MADE GROUND: dark brown slightly gravelly silty clay with occasional rootlets. Gravel sized fragments are fine to medium stone.			
					143.49	0.40				
						(0.60)	Stiff brown gravelly silty CLAY with low cobble sized siltstone and mudstone lithorelicts. Gravel is fine to coarse siltstone and sandstone lithorelicts (completely weathered mudstone, siltstone and sandstone).			
1.00-1.45 1.00-1.45	SPT N=61 D			2,5/5,10,18,28	142.89	1.00				
						(0.45)	Very weak grey, orangish brown and dark brown mottled highly weathered fine grained SANDSTONE.			
				09/06/2014:DRY	142.44	1.45				
							Complete at 1.45m			

Remarks

C = Plastic lined core sample
Core diameter : 83mm to 1.00m
On completion backfilled with arisings to 1.00m and installed a 50mm dia hdpe gas monitoring standpipe with a gas valve and a gravel surround to 1.00m, 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	NM/SJ

Figure No. NE3312.M8

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Site	Borehole Number
A61 BIRDWELL JUNCTION IMPROVEMENT, TANKERSLEY, SOUTH YORKSHIRE	M9

Boring Method	Casing Diameter	Ground Level (mOD)	Client	Job Number
MINI PERCUSSIVE		141.93	BARNSLEY METROPOLITAN BOROUGH COUNCIL	NE3312
	Location	**Dates**	**Engineer**	**Sheet**
	435038.56 E 400391.76 N	09/06/2014		1/1

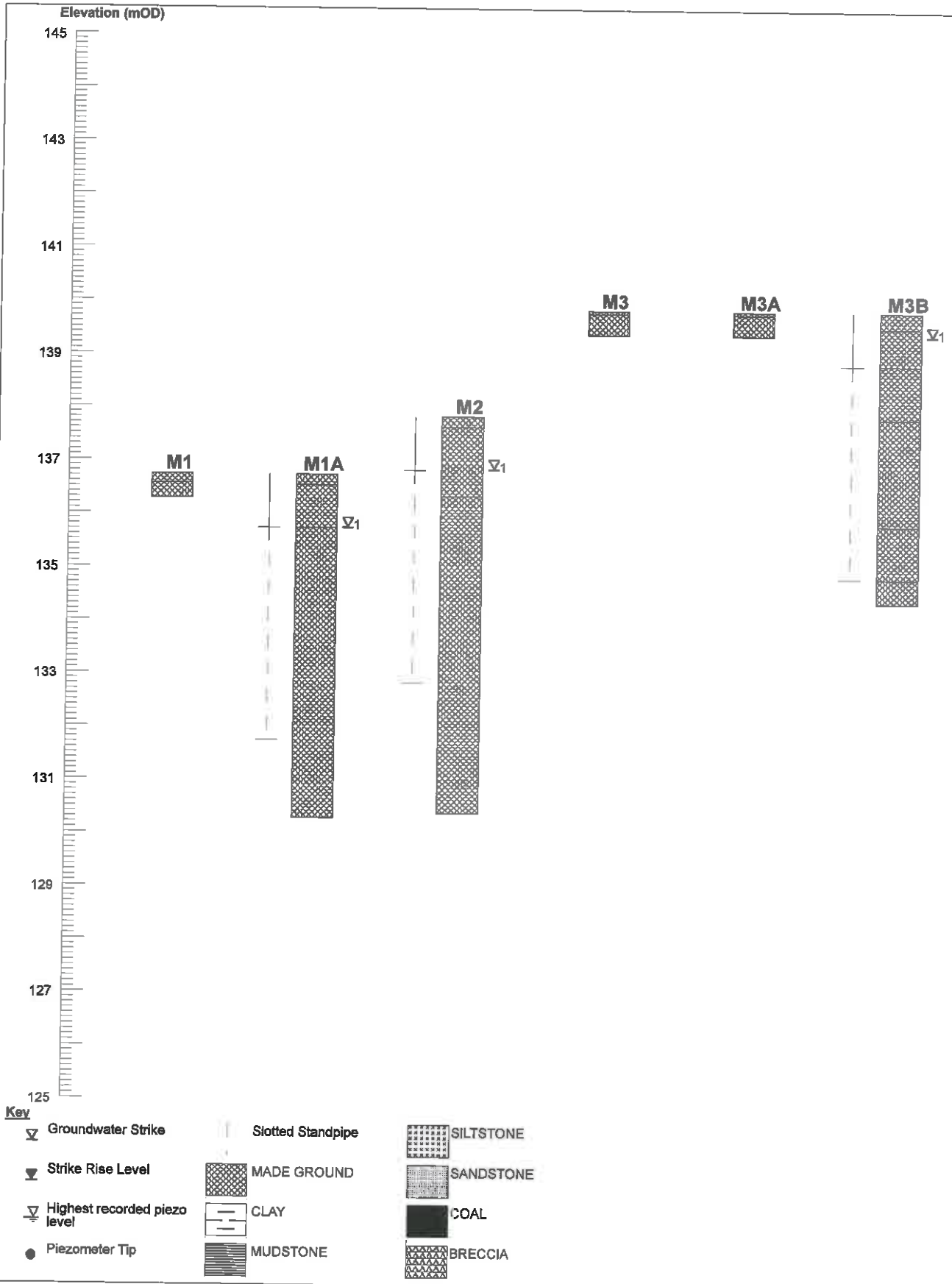
Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						(0.20)	MADE GROUND: brown gravelly silty clay with occasional rootlets. Gravel sized fragments are fine to coarse mudstone.		
					141.73	0.20			
							MADE GROUND: grey very gravelly silty clay with low cobble sized fragments of mudstone. Gravel sized fragments are fine to coarse mudstone.		
						(0.70)			
					141.03	0.90			
						(0.10)	MADE GROUND: brown very gravelly slightly sandy silty clay. Gravel sized fragments are fine to coarse lime.		
					140.93	1.00			
						(0.20)	MADE GROUND: reddish brown sandy fine to coarse gravel sized fragments of brick and burnt shale.		
1.20-2.00	C				140.73	1.20			
							Very weak dark brown, brown, orangish brown and grey mottled highly weathered SILTSTONE, in parts completely weathered to silty clay.		
						(0.80)			
				09/06/2014:DRY	139.93	2.00			
							Complete at 2.00m		

Remarks
C = Plastic lined core sample
Core diameter : 83mm to 2.00m
Descriptions from 0.00m to 1.20m as for M6
On completion backfilled with arisings.

Scale (approx)	Logged By
1:25	NM/SJ

Figure No. NE3312.M9

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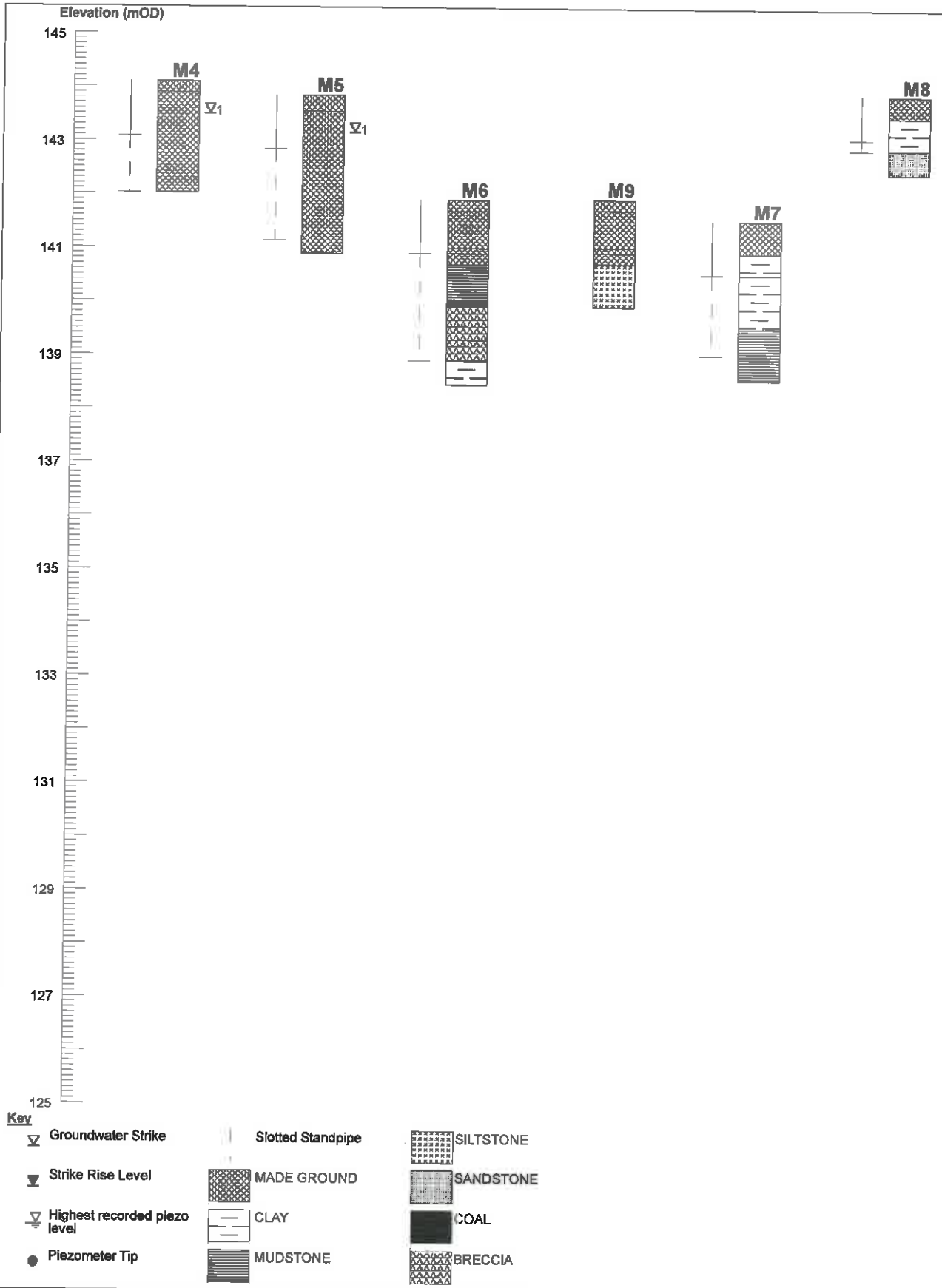


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Nominal Section

Site	Date Drawn	Date Checked	Sheet	Job Number
A61 BIRDWELL JUNCTION IMPROVEMENT, TANKERSLEY, SOUTH YORKSHIRE	07/08/2014		1/2	NE3312
Client	**Drawn By**	**Checked By**	**Scale**	**Figure No.**
BARNSLEY METROPOLITAN BOROUGH COUNCIL			1:100[V]	NE3312.1

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Nominal Section

Site	Date Drawn	Date Checked	Sheet	Job Number
A61 BIRDWELL JUNCTION IMPROVEMENT, TANKERSLEY, SOUTH YORKSHIRE	07/08/2014		2/2	NE3312
Client	**Drawn By**	**Checked By**	**Scale**	**Figure No.**
BARNSLEY METROPOLITAN BOROUGH COUNCIL			1:100[V]	NE3312.1

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TRIAL PIT RECORD SHEETS

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Site	Trial Pit Number
A61 BIRDWELL JUNCTION IMPROVEMENT, TANKERSLEY, SOUTH YORKSHIRE	TP1

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
MECHANICAL EXCAVATOR	0.60m x 3.20m	138.99	BARNSLEY METROPOLITAN BOROUGH COUNCIL	NE3312
	Location	**Dates**	**Engineer**	**Sheet**
	435171.68 E 400632.28 N	10/06/2014		1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.15)	MADE GROUND: dark brown clayey topsoil.		
0.10	D			138.84	0.15			
0.15	D					MADE GROUND: grey gravelly silty clay with cobble sized fragments of mudstone and siltstone. Gravel sized fragments are fine to coarse mudstone and siltstone		
0.50	B							
					(1.55)			
1.00	B							
1.25	D							
				137.29	1.70			
1.75	B					MADE GROUND: dark grey gravelly silty clay with cobble sized fragments of siltstone, sandstone and occasional mudstone and shale. Gravel sized fragments are fine to coarse siltstone, sandstone, mudstone and shale		
2.10	D							
2.70	D				(2.15)			
3.40	B							
3.80	D		10/06/2014:DRY	135.14	3.85	Complete at 3.85m		

Plan

Remarks

Partial collapse of pit sides.
No groundwater encountered, but wet from 1.70m.
Pit orientated East to West

Scale (approx)	Logged By	Figure No.
1:25	DS/SJ	NE3312.TP1

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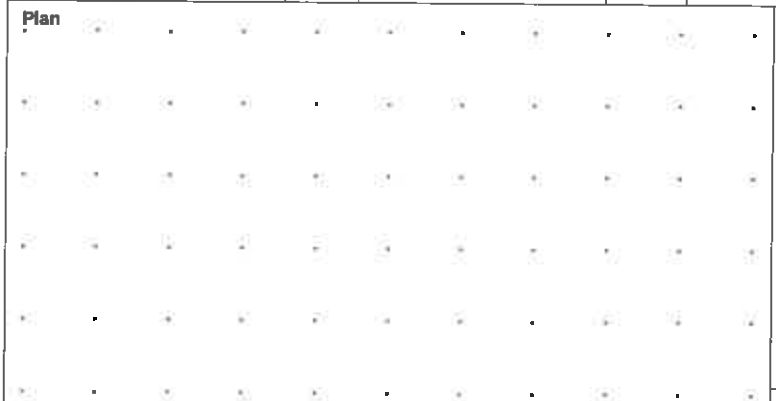
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			Site: A61 BIRDWELL JUNCTION IMPROVEMENT, TANKERSLEY, SOUTH YORKSHIRE	Trial Pit Number: TP2
Excavation Method: MECHANICAL EXCAVATOR	Dimensions: 0.60m x 2.90m	Ground Level (mOD): 141.79	Client: BARNSLEY METROPOLITAN BOROUGH COUNCIL	Job Number: NE3312
	Location: 435127.46 E 400523.33 N	Dates: 10/06/2014	Engineer	Sheet: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				141.71	(0.08) 0.08	MADE GROUND: dark brown clayey topsoil.		
0.10	D					MADE GROUND: light grey gravelly silty clay with cobble and occasional boulder sized fragments of siltstone, sandstone and occasional shale. Gravel sized fragments are fine to coarse siltstone, sandstone and shale		
0.50	B							
0.75	D							
						.... at 1.00m : boulder sized fragments (typically 0.80m x 0.40m x 0.30m)		
1.20	B							
1.70	D							
					(3.52)			
2.50	B							
3.00	D					.... at 3.00m : boulder sized fragments		
3.45	B							
			10/06/2014:DRY	138.19	3.60	Complete at 3.60m		

Plan



Remarks

Partial collapse of pit sides.
No groundwater encountered.
Pit orientated North to South

Scale (approx)	Logged By	Figure No.
1:25	DS/SJ	NE3312.TP2

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Excavation Method MECHANICAL EXCAVATOR	**Dimensions** 0.60m x 3.10m	**Ground Level (mOD)** 144.01	**Site** A61 BIRDWELL JUNCTION IMPROVEMENT, TANKERSLEY, SOUTH YORKSHIRE	**Trial Pit Number** TP3
	Location 435133.48 E 400444.17 N	**Dates** 10/06/2014	**Client** BARNSLEY METROPOLITAN BOROUGH COUNCIL	**Job Number** NE3312
			Engineer	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				143.91	(0.10) 0.10	MADE GROUND: dark brown clayey topsoil.		
0.20	D					MADE GROUND: light grey gravelly silty clay with cobble and occasional boulder sized fragments (typically 0.50m x 0.30m x 0.25m) of siltstone, sandstone and occasional mudstone and slate. Gravel sized fragments are fine to coarse siltstone, sandstone and mudstone		
0.50	B							
0.75	D							
1.10	B							
1.40	D							
1.80	B				(3.40)			
2.40 2.45	D D							
3.00	B							
			10/06/2014:DRY	140.51	3.50	Complete at 3.50m		

Plan

Remarks

Partial collapse of pit sides.
No groundwater encountered.
Pit orientated North West to South East

Scale (approx)	Logged By	Figure No.
1:25	DS/SJ	NE3312.TP3

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Site A61 BIRDWELL JUNCTION IMPROVEMENT, TANKERSLEY, SOUTH YORKSHIRE			**Trial Pit Number** TP4
Excavation Method MECHANICAL EXCAVATOR	**Dimensions** 0.60m x 2.80m	**Ground Level (mOD)** 141.55	**Client** BARNSLEY METROPOLITAN BOROUGH COUNCIL	**Job Number** NE3312
	Location 435010.67 E 400308.72 N	**Dates** 10/06/2014	**Engineer**	**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)	Dark brown clayey TOPSOIL.		
				141.35	0.20	Stiff brown and yellow brown mottled clayey SILT with occasional gravel sized mudstone lithorelicts (completely weathered mudstone and siltstone).		
0.50	B				(0.80)			
0.75	D							
1.00	B		HV@1.00m, c=80kPa	140.55	1.00	Stiff high strength brown and yellow brown mottled silty CLAY with occasional gravel sized mudstone lithorelicts (completely weathered mudstone).		
				140.25	(0.30) 1.30	Firm medium strength brown silty CLAY with occasional gravel sized mudstone lithorelicts (completely weathered mudstone)		
1.35	D		HV@1.40m, c=56kPa		(0.30)			
1.65	D			139.95	1.60	Very weak brown highly weathered MUDSTONE.		
					(0.30)			
2.00	D			139.65	1.90	Very weak brown highly becoming moderately weathered MUDSTONE.		
					(0.80)			
2.50	D							
2.70	D			138.85	2.70	Weak light grey and brown mottled moderately weathered MUDSTONE.		
3.00	B				(0.60)			
3.25	D		10/06/2014:DRY	138.25	3.30	Complete at 3.30m		

Plan

Remarks

Pit sides remained generally vertical and stable.
No groundwater encountered.
Pit orientated North East to South West
HV = Hand Shear Vane test

Scale (approx)	Logged By	Figure No.
1:25	DS/SJ	NE3312.TP4

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Site A61 BIRDWELL JUNCTION IMPROVEMENT, TANKERSLEY, SOUTH YORKSHIRE			**Trial Pit Number** TP5
Excavation Method MECHANICAL EXCAVATOR	**Dimensions** 0.60m x 2.80m	**Ground Level (mOD)** 142.56	**Client** BARNSLEY METROPOLITAN BOROUGH COUNCIL	**Job Number** NE3312
	Location 435022.67 E 400253.34 N	**Dates** 10/06/2014	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	MADE GROUND: dark brown sandy topsoil.		
0.10	D			142.36	0.20	MADE GROUND: friable brown gravelly silty clay with cobble sized fragments of sandstone. Gravel sized fragments are fine to coarse sandstone		
0.30	D				(0.50)			
0.50	B			141.86	0.70	Firm medium strength yellow brown silty CLAY (completely weathered mudstone)		
0.75	D		HV@0.90m, c=52kPa					
1.00	B				(0.70)			
1.40	D			141.16	1.40	Friable grey silty CLAY (completely weathered mudstone)		
					(0.70)			
2.15	D			140.46	2.10	Very weak grey and brown mottled highly weathered MUDSTONE		
					(0.40)			
2.50	D			140.06	2.50	Very weak grey and brown mottled moderately weathered MUDSTONE		
2.75	B				(0.45)			
3.00	D			139.61	2.95	Very weak brown moderately becoming slightly weathered MUDSTONE		
					(0.25)			
			10/06/2014:DRY	139.36	3.20	Complete at 3.20m		

Plan

Remarks

Pit sides remained generally vertical and stable.
No groundwater encountered.
Pit orientated North West to South East
HV = Hand Shear Vane test.

Scale (approx)	Logged By	Figure No.
1:25	DS/SJ	NE3312.TP5

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Site	Trial Pit Number
A61 BIRDWELL JUNCTION IMPROVEMENT, TANKERSLEY, SOUTH YORKSHIRE	TP6

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
MECHANICAL EXCAVATOR	0.60m x 2.70m	144.69	BARNSLEY METROPOLITAN BOROUGH COUNCIL	NE3312
	Location	**Dates**	**Engineer**	**Sheet**
	435054.11 E 400217.89 N	10/06/2014		1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.15)	MADE GROUND: dark brown clayey topsoil.		
0.10	D			144.54	0.15	MADE GROUND: brown and grey gravelly silty clay. Gravel sized fragments are fine to coarse mudstone and sandstone.		
0.25	D				(0.25)			
				144.29	0.40	MADE GROUND: yellow brown silty clay.		
0.50	B				(0.50)			
0.75	D							
				143.79	0.90	Friable brown silty CLAY (relic subsoil) (completely weathered mudstone)		
1.00	B				(0.40)			
				143.39	1.30	Firm yellow brown silty CLAY (completely weathered mudstone)		
1.40	D				(0.70)			
2.00	D			142.69	2.00			
					(0.15)	Firm yellow brown silty CLAY with gravel sized mudstone lithorelict (completely weathered mudstone).		
				142.54	2.15			
2.20	D			142.53	2.16	Dark grey highly weathered COAL.		
						Weak thinly bedded brown moderately becoming slightly weathered silty SANDSTONE.		
					(0.84)			
2.70	D							
2.95	D		10/06/2014:DRY	141.69	3.00	Complete at 3.00m		

Plan

Remarks

Pit sides remained generally vertical and stable.
No groundwater encountered.
Pit orientated North to South
Mineworkings void above or below remnant coal seam apparently completely closed.

Scale (approx)	Logged By	Figure No.
1:25	DS/SJ	NE3312.TP6

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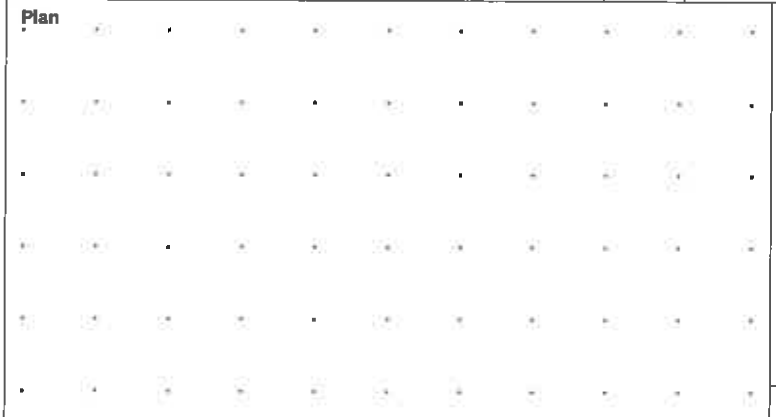
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Site	Trial Pit Number
A61 BIRDWELL JUNCTION IMPROVEMENT, TANKERSLEY, SOUTH YORKSHIRE	TP7

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
MECHANICAL EXCAVATOR	0.60m x 2.90m	140.01	BARNSLEY METROPOLITAN BOROUGH COUNCIL	NE3312
	Location	**Dates**	**Engineer**	**Sheet**
	435031.66 E 400459.85 N	10/06/2014		1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.15)	MADE GROUND: dark brown clayey topsoil.		
0.10	D			139.86	0.15	MADE GROUND: light grey gravelly silty clay with cobble and occasional boulder sized fragments of siltstone and sandstone. Gravel sized fragments are fine to coarse siltstone and sandstone		
0.50	B							
0.75	D							
1.00	B							
					(2.60)			
1.50	D							
2.10	B							
2.55	D		Inflow(1) at 2.60m. 10/06/2014:			.... at 2.75m : large sized boulder obstruction prevented further progress		▽1
				137.26	2.75	Complete at 2.75m		

Plan



Remarks

Partial collapse of pit sides.
Moderate groundwater inflow at 2.60m but no rise in water level recorded.
Pit orientated North East to South West

Scale (approx)	Logged By	Figure No.
1:25	DS/SJ	NE3312.TP7

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Site	Trial Pit Number
A61 BIRDWELL JUNCTION IMPROVEMENT, TANKERSLEY, SOUTH YORKSHIRE	TP8

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
MECHANICAL EXCAVATOR	0.60m x 2.20m	147.54	BARNSLEY METROPOLITAN BOROUGH COUNCIL	NE3312
	Location	**Dates**	**Engineer**	**Sheet**
	435220.21 E 400419.37 N	10/06/2014		1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.05	D			147.44	(0.10) 0.10	Dark brown clayey TOPSOIL		
0.40	B				(0.60)	Brown silty sandy fine to coarse GRAVEL and COBBLE sized sandstone lithorelicts.		
0.80	B			146.84	0.70	Weak thinly bedded brown moderately becoming slightly weathered fine grained SANDSTONE with partings of silty clay		
1.35	D			146.24	(0.60) 1.30			
1.70	B			145.94	(0.30) 1.60	Very weak orange brown and brown mottled highly weathered MUDSTONE, in parts completely weathered to silty clay		
2.10	D				(0.75)	Very weak brown moderately becoming slightly weathered MUDSTONE.		
			10/06/2014:DRY	145.19	2.35	Complete at 2.35m		

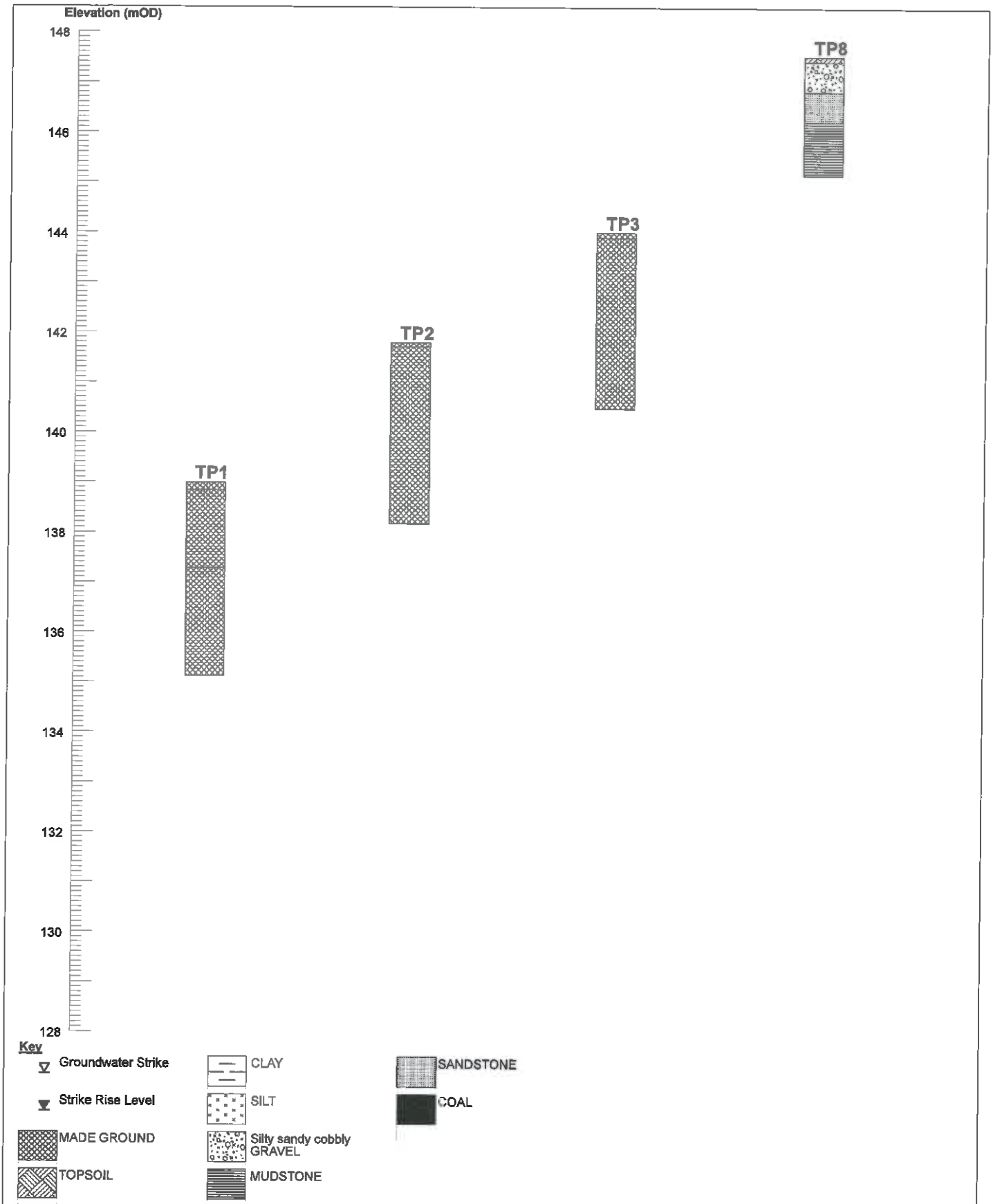
Plan

Remarks

Pit sides remained generally vertical and stable.
No groundwater encountered.
Pit orientated East to West

Scale (approx)	Logged By	Figure No.
1:25	DS/SJ	NE3312.TP8

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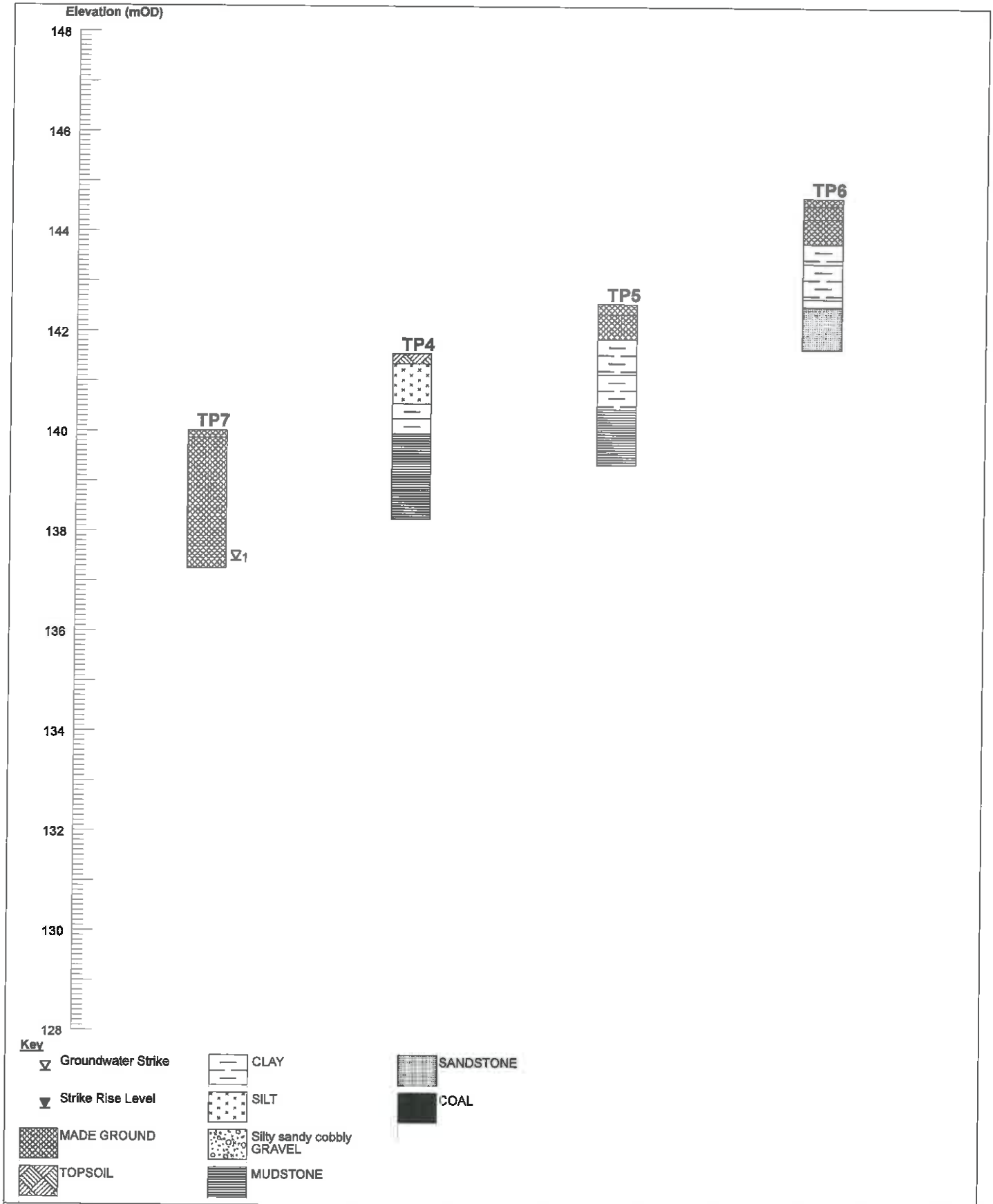


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Nominal Section

Site	Date Drawn	Date Checked	Sheet	Job Number
A61 BIRDWELL JUNCTION IMPROVEMENT, TANKERSLEY, SOUTH YORKSHIRE	07/08/2014		1/2	NE3312
Client	**Drawn By**	**Checked By**	**Scale**	**Figure No.**
BARNSLEY METROPOLITAN BOROUGH COUNCIL			1:100[V]	NE3312.1

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Nominal Section

Site	Date Drawn	Date Checked	Sheet	Job Number
A61 BIRDWELL JUNCTION IMPROVEMENT, TANKERSLEY, SOUTH YORKSHIRE	07/08/2014		2/2	NE3312
Client	**Drawn By**	**Checked By**	**Scale**	**Figure No.**
BARNSLEY METROPOLITAN BOROUGH COUNCIL			1:100[V]	NE3312.1

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DYNAMIC PROBE HOLE RECORD SHEETS

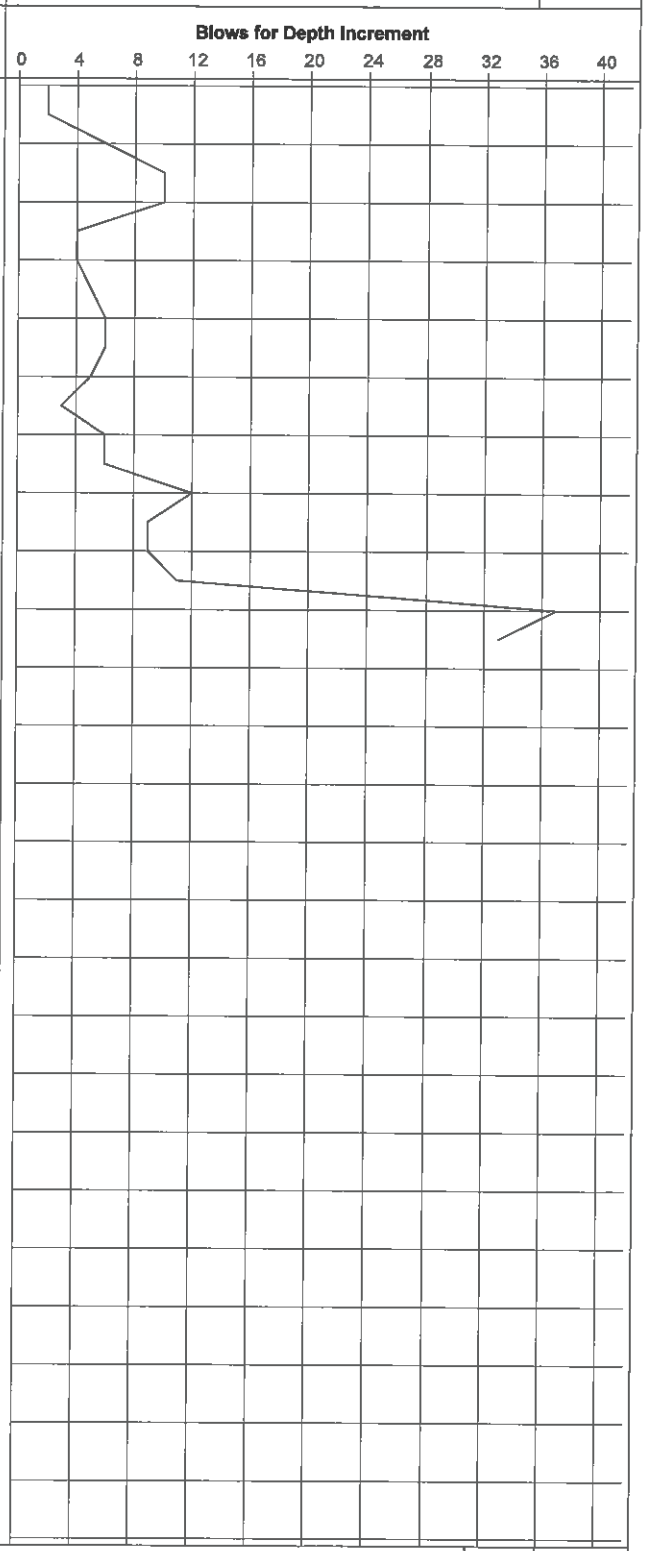
SUB SURFACE

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Site	Probe Number
A61 BIRDWELL JUNCTION IMPROVEMENT, TANKERSLEY, SOUTH YORKSHIRE	DP1

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
DYNAMIC PROBING	Diameter 50.5mm, Angle 90°	144.83	BARNSLEY METROPOLITAN BOROUGH COUNCIL	NE3312
	Location	**Dates**	**Engineer**	**Sheet**
	435164.79 E 400446.56 N	09/06/2014		1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	2		144.83	0.00
0.10-0.20	2			
0.20-0.30	6			
0.30-0.40	10			
0.40-0.50	10			
0.50-0.60	4		144.33	0.50
0.60-0.70	4			
0.70-0.80	5			
0.80-0.90	6			
0.90-1.00	6			
1.00-1.10	5		143.83	1.00
1.10-1.20	3			
1.20-1.30	6			
1.30-1.40	6			
1.40-1.50	12			
1.50-1.60	9		143.33	1.50
1.60-1.70	9			
1.70-1.80	11			
1.80-1.90	37			
1.90-2.00	33		142.83	2.00
			142.33	2.50
			141.83	3.00
			141.33	3.50
			140.83	4.00
			140.33	4.50
			139.83	5.00



Remarks
Weight 63.5kg
Fall 750mm
Completed at 2.00m

Scale (approx)	Logged By
1:25	AJP/DK

Figure No. NE3312.DP1

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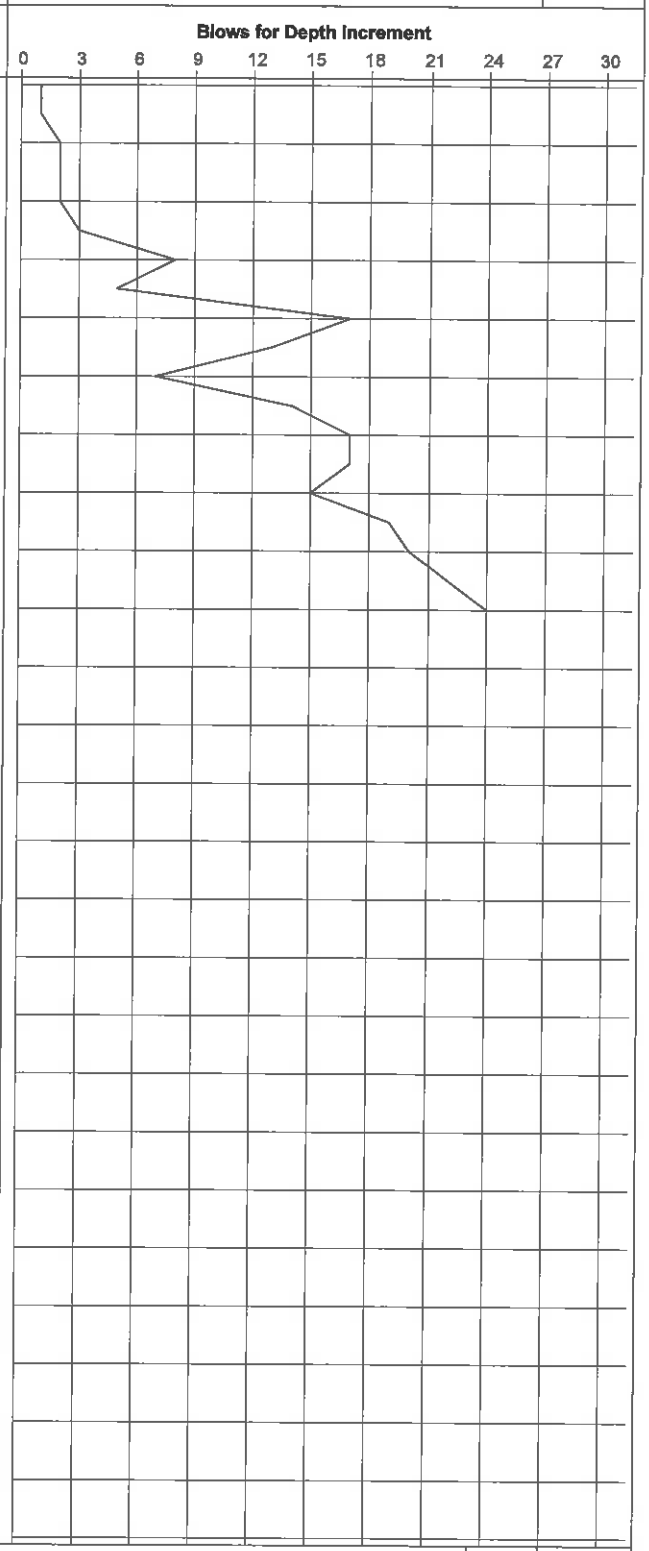
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Site	Probe Number
A61 BIRDWELL JUNCTION IMPROVEMENT, TANKERSLEY, SOUTH YORKSHIRE	DP1A

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
DYNAMIC PROBING	Diameter 50.5mm, Angle 90°	144.81	BARNSLEY METROPOLITAN BOROUGH COUNCIL	NE3312
	Location	**Dates**	**Engineer**	**Sheet**
	435163.94 E 400446.21 N	09/06/2014		1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	1		144.81	0.00
0.10-0.20	1			
0.20-0.30	2			
0.30-0.40	2			
0.40-0.50	2			
0.50-0.60	3		144.31	0.50
0.60-0.70	8			
0.70-0.80	5			
0.80-0.90	17			
0.90-1.00	13			
1.00-1.10	7		143.81	1.00
1.10-1.20	14			
1.20-1.30	17			
1.30-1.40	17			
1.40-1.50	15			
1.50-1.60	19		143.31	1.50
1.60-1.70	20			
1.70-1.80	22			
1.80-1.90	24			
			142.81	2.00
			142.31	2.50
			141.81	3.00
			141.31	3.50
			140.81	4.00
			140.31	4.50
			139.81	5.00



Remarks
Weight 63.5kg
Fall 750mm
Completed at 1.90m

Scale (approx)	Logged By
1:25	AJP/DK

Figure No.
NE3312.DP1A

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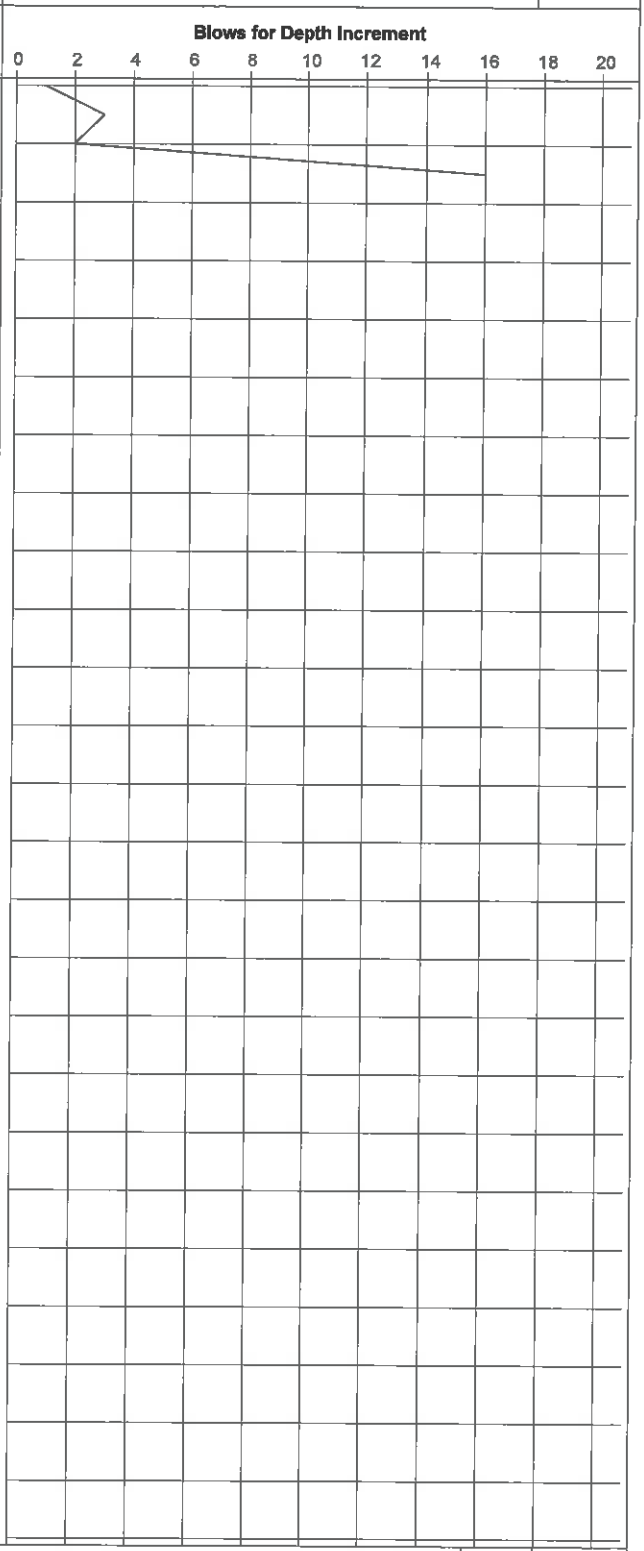
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Site	Probe Number
A61 BIRDWELL JUNCTION IMPROVEMENT, TANKERSLEY, SOUTH YORKSHIRE	DP2

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
DYNAMIC PROBING	Diameter 50.5mm, Angle 90°	145.13	BARNSLEY METROPOLITAN BOROUGH COUNCIL	NE3312
	Location	**Dates**	**Engineer**	**Sheet**
	435171.21 E 400436.93 N	09/06/2014		1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	1		145.13	0.00
0.10-0.20	3			
0.20-0.30	2			
0.30-0.40	16			
			144.63	0.50
			144.13	1.00
			143.63	1.50
			143.13	2.00
			142.63	2.50
			142.13	3.00
			141.63	3.50
			141.13	4.00
			140.63	4.50
			140.13	5.00



Remarks
Weight 63.5kg
Fall 750mm
Terminated on boulder at 0.40m

Scale (approx)	Logged By
1:25	AJP/DK

Figure No.
NE3312.DP2

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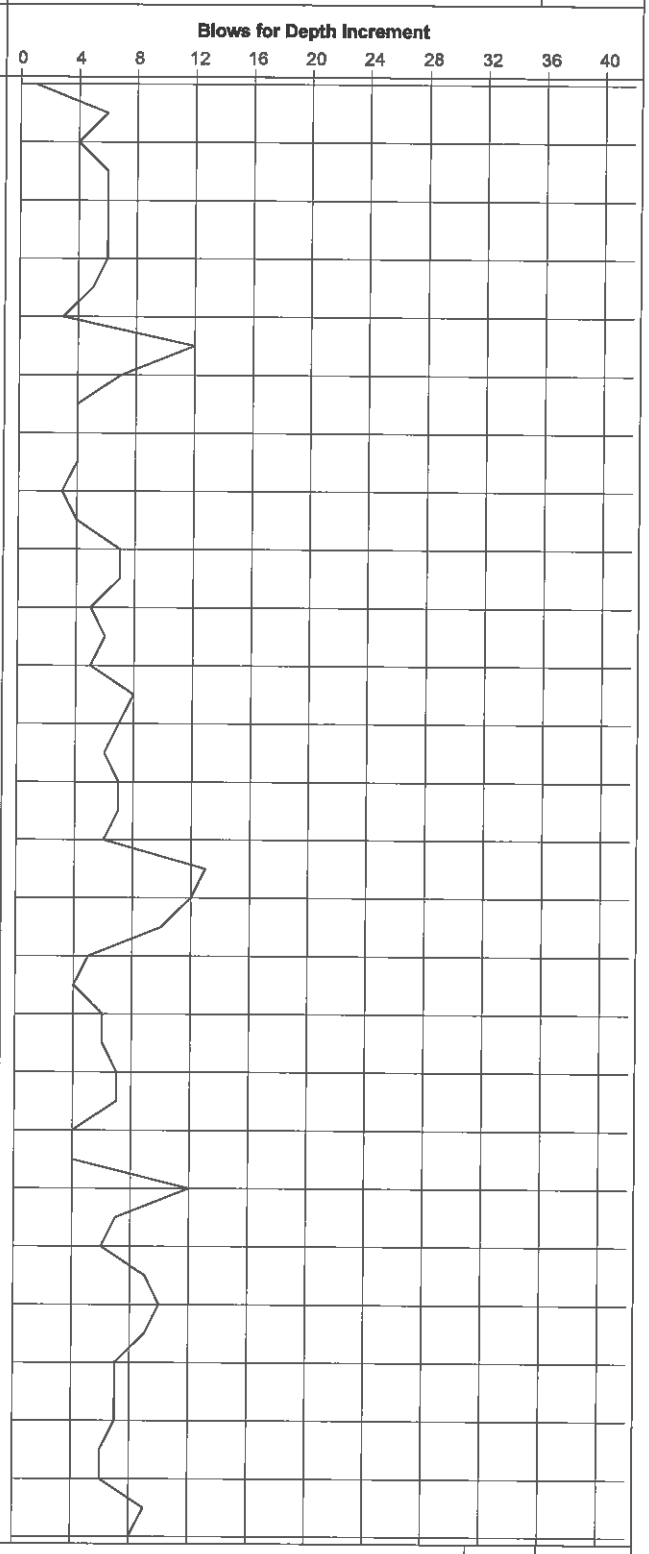
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Site	Probe Number
A61 BIRDWELL JUNCTION IMPROVEMENT, TANKERSLEY, SOUTH YORKSHIRE	DP2A

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
DYNAMIC PROBING	Diameter 50.5mm, Angle 90°	145.12	BARNSLEY METROPOLITAN BOROUGH COUNCIL	NE3312
	Location	**Dates**	**Engineer**	**Sheet**
	435170.71 E 400436.81 N	09/06/2014		1/2

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	1		145.12	0.00
0.10-0.20	6			
0.20-0.30	4			
0.30-0.40	6			
0.40-0.50	6			
0.50-0.60	6		144.62	0.50
0.60-0.70	6			
0.70-0.80	5			
0.80-0.90	3			
0.90-1.00	12			
1.00-1.10	7		144.12	1.00
1.10-1.20	4			
1.20-1.30	4			
1.30-1.40	4			
1.40-1.50	3			
1.50-1.60	4		143.62	1.50
1.60-1.70	7			
1.70-1.80	7			
1.80-1.90	5			
1.90-2.00	6			
2.00-2.10	5		143.12	2.00
2.10-2.20	8			
2.20-2.30	7			
2.30-2.40	6			
2.40-2.50	7			
2.50-2.60	7		142.62	2.50
2.60-2.70	6			
2.70-2.80	13			
2.80-2.90	12			
2.90-3.00	10			
3.00-3.10	5		142.12	3.00
3.10-3.20	4			
3.20-3.30	6			
3.30-3.40	6			
3.40-3.50	7			
3.50-3.60	7		141.62	3.50
3.60-3.70	4			
3.70-3.80	4			
3.80-3.90	12			
3.90-4.00	7			
4.00-4.10	6		141.12	4.00
4.10-4.20	9			
4.20-4.30	10			
4.30-4.40	9			
4.40-4.50	7			
4.50-4.60	7		140.62	4.50
4.60-4.70	7			
4.70-4.80	6			
4.80-4.90	6			
4.90-5.00	9		140.12	5.00



Remarks
Weight 63.5kg
Fall 750mm
Completed at 8.70m

Scale (approx)	Logged By
1:25	AJP/DK

Figure No.
NE3312.DP2A

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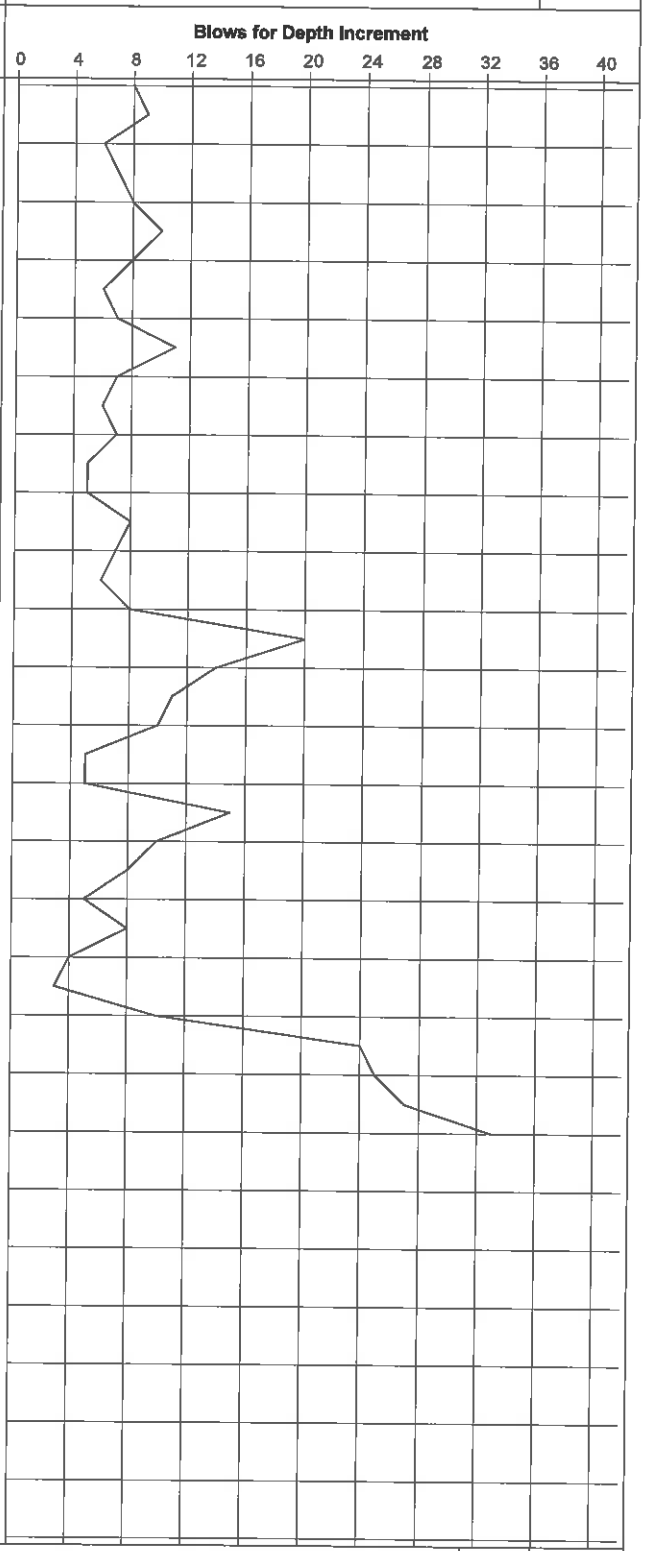
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Site	Probe Number
A61 BIRDWELL JUNCTION IMPROVEMENT, TANKERSLEY, SOUTH YORKSHIRE	DP2A

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
DYNAMIC PROBING	Diameter 50.5mm, Angle 90°	145.12	BARNSLEY METROPOLITAN BOROUGH COUNCIL	NE3312
	Location	**Dates**	**Engineer**	**Sheet**
	435170.71 E 400436.81 N	09/06/2014		2/2

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
5.00-5.10	8		140.12	5.00
5.10-5.20	9			
5.20-5.30	6			
5.30-5.40	7			
5.40-5.50	8			
5.50-5.60	10		139.62	5.50
5.60-5.70	8			
5.70-5.80	6			
5.80-5.90	7			
5.90-6.00	11			
6.00-6.10	7		139.12	6.00
6.10-6.20	6			
6.20-6.30	7			
6.30-6.40	5			
6.40-6.50	5			
6.50-6.60	8		138.62	6.50
6.60-6.70	7			
6.70-6.80	6			
6.80-6.90	8			
6.90-7.00	20			
7.00-7.10	14		138.12	7.00
7.10-7.20	11			
7.20-7.30	10			
7.30-7.40	5			
7.40-7.50	5			
7.50-7.60	15		137.62	7.50
7.60-7.70	10			
7.70-7.80	8			
7.80-7.90	5			
7.90-8.00	8			
8.00-8.10	4		137.12	8.00
8.10-8.20	3			
8.20-8.30	10			
8.30-8.40	24			
8.40-8.50	25			
8.50-8.60	27		136.62	8.50
8.60-8.70	33			
			136.12	9.00
			135.62	9.50
			135.12	10.00



Remarks

Scale (approx)	Logged By
1:25	AJP/DK

Figure No.
NE3312.DP2A

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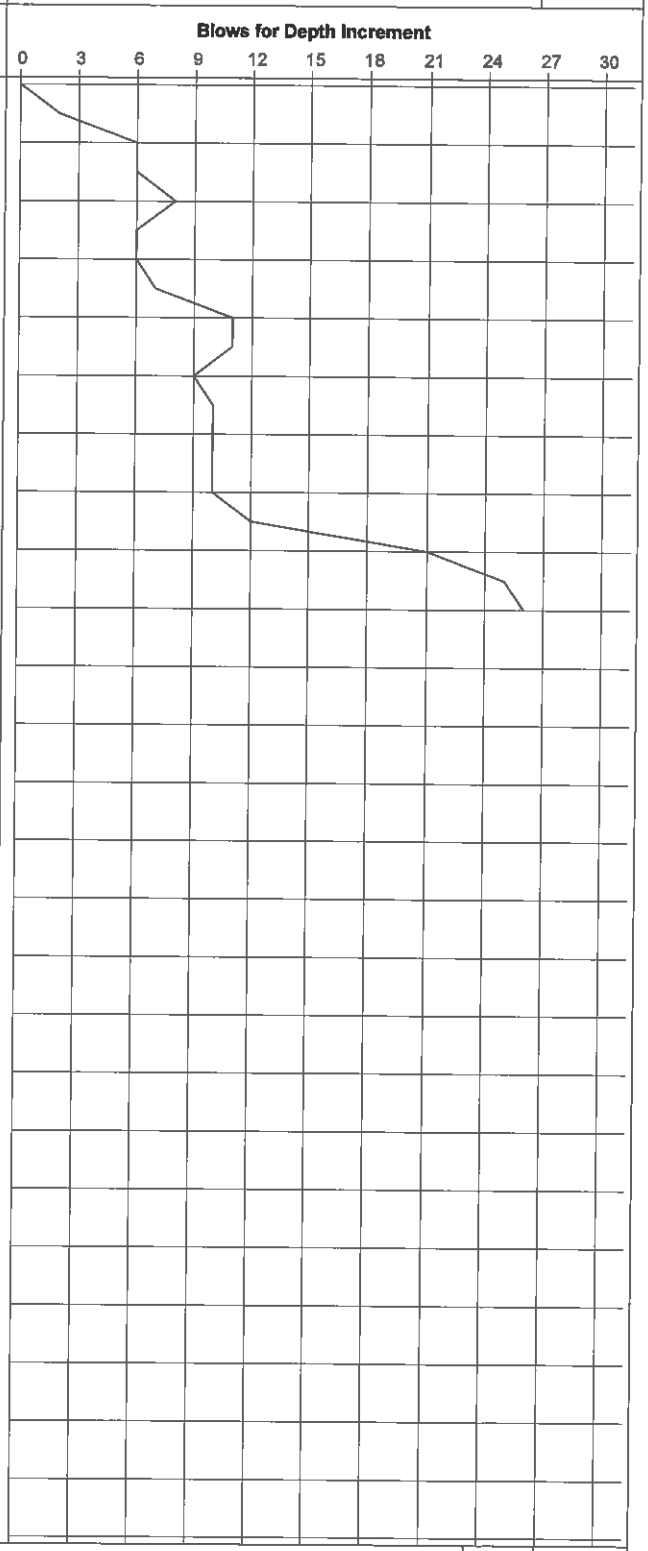
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Site	Probe Number
A61 BIRDWELL JUNCTION IMPROVEMENT, TANKERSLEY, SOUTH YORKSHIRE	DP3

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
DYNAMIC PROBING	Diameter 50.5mm, Angle 90°	145.56	BARNSLEY METROPOLITAN BOROUGH COUNCIL	NE3312
	Location	**Dates**	**Engineer**	**Sheet**
	435175.04 E 400420.36 N	09/06/2014		1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	0		145.56	0.00
0.10-0.20	2			
0.20-0.30	6			
0.30-0.40	6			
0.40-0.50	8			
0.50-0.60	6		145.06	0.50
0.60-0.70	6			
0.70-0.80	7			
0.80-0.90	11			
0.90-1.00	11			
1.00-1.10	9		144.56	1.00
1.10-1.20	10			
1.20-1.30	10			
1.30-1.40	10			
1.40-1.50	10			
1.50-1.60	12		144.06	1.50
1.60-1.70	21			
1.70-1.80	25			
1.80-1.90	26			
			143.56	2.00
			143.06	2.50
			142.56	3.00
			142.06	3.50
			141.56	4.00
			141.06	4.50
			140.56	5.00



Remarks
Weight 63.5kg
Fall 750mm
Completed at 1.90m

Scale (approx)	Logged By
1:25	AJP/DK

Figure No.
NE3312.DP3

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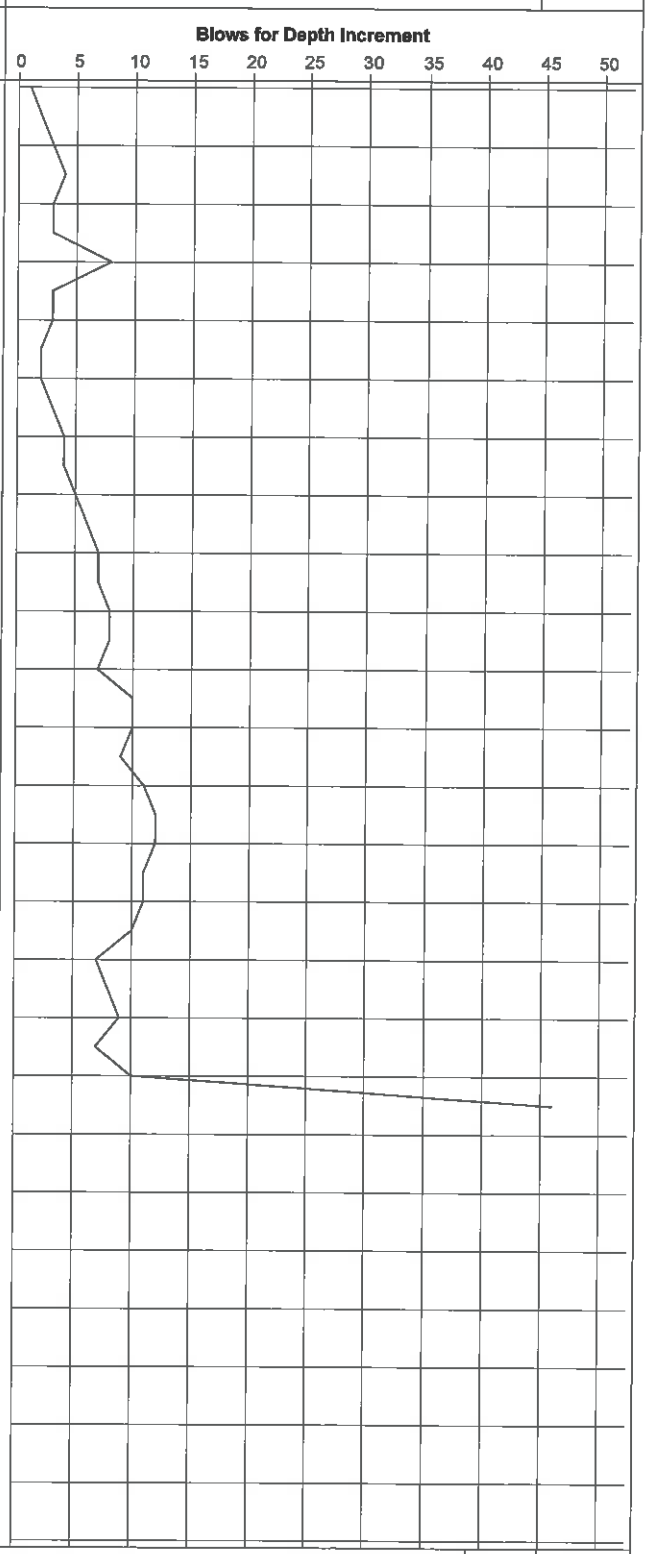
SUB SURFACE

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Site	Probe Number
A61 BIRDWELL JUNCTION IMPROVEMENT, TANKERSLEY, SOUTH YORKSHIRE	DP4

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
DYNAMIC PROBING	Diameter 50.5mm, Angle 90°	146.39	BARNSLEY METROPOLITAN BOROUGH COUNCIL	NE3312
	Location	**Dates**	**Engineer**	**Sheet**
	435186.55 E 400408.11 N	09/06/2014		1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	1		146.39	0.00
0.10-0.20	2			
0.20-0.30	3			
0.30-0.40	4			
0.40-0.50	3			
0.50-0.60	3		145.89	0.50
0.60-0.70	8			
0.70-0.80	3			
0.80-0.90	3			
0.90-1.00	2			
1.00-1.10	2		145.39	1.00
1.10-1.20	3			
1.20-1.30	4			
1.30-1.40	4			
1.40-1.50	5			
1.50-1.60	6		144.89	1.50
1.60-1.70	7			
1.70-1.80	7			
1.80-1.90	8			
1.90-2.00	8			
2.00-2.10	7		144.39	2.00
2.10-2.20	10			
2.20-2.30	10			
2.30-2.40	9			
2.40-2.50	11			
2.50-2.60	12		143.89	2.50
2.60-2.70	12			
2.70-2.80	11			
2.80-2.90	11			
2.90-3.00	10			
3.00-3.10	7		143.39	3.00
3.10-3.20	8			
3.20-3.30	9			
3.30-3.40	7			
3.40-3.50	10			
3.50-3.60	46		142.89	3.50
			142.39	4.00
			141.89	4.50
			141.39	5.00



Remarks
Weight 63.5kg
Fall 750mm
Completed at 3.60m

Scale (approx)	Logged By
1:25	AJP/DK

Figure No.
NE3312.DP4

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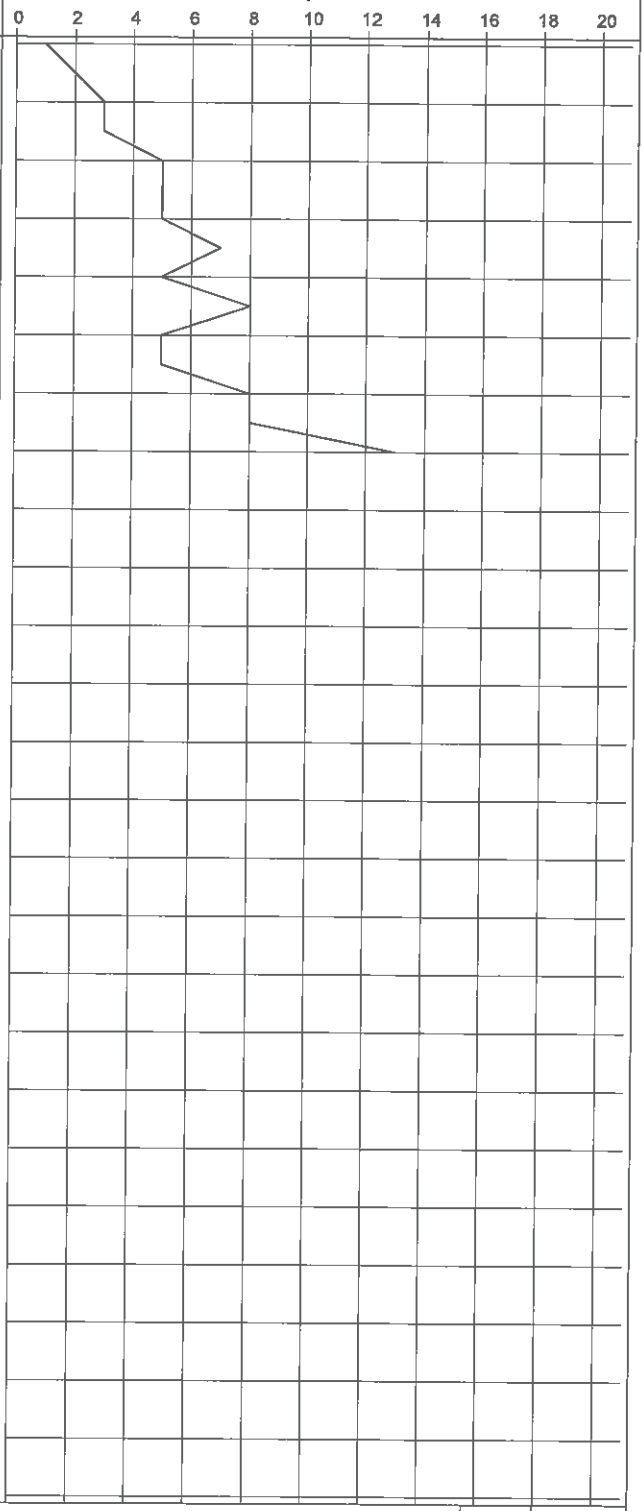
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Site	Probe Number
A61 BIRDWELL JUNCTION IMPROVEMENT, TANKERSLEY, SOUTH YORKSHIRE	DP5

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
DYNAMIC PROBING	Diameter 50.5mm, Angle 90°	141.32	BARNSLEY METROPOLITAN BOROUGH COUNCIL	NE3312
	Location	**Dates**	**Engineer**	**Sheet**
	435040.5 E 400419.64 N	09/06/2014		1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	1		141.32	0.00
0.10-0.20	2			
0.20-0.30	3			
0.30-0.40	3			
0.40-0.50	5			
0.50-0.60	5		140.82	0.50
0.60-0.70	5			
0.70-0.80	7			
0.80-0.90	5			
0.90-1.00	8			
1.00-1.10	5		140.32	1.00
1.10-1.20	5			
1.20-1.30	8			
1.30-1.40	8			
1.40-1.50	13		139.82	1.50
			139.32	2.00
			138.82	2.50
			138.32	3.00
			137.82	3.50
			137.32	4.00
			136.82	4.50
			136.32	5.00



Remarks
Weight 63.5kg
Fall 750mm
Rods broke and terminated at 1.50m.

Scale (approx)	Logged By
1:25	AJP/DK

Figure No.
NE3312.DP5

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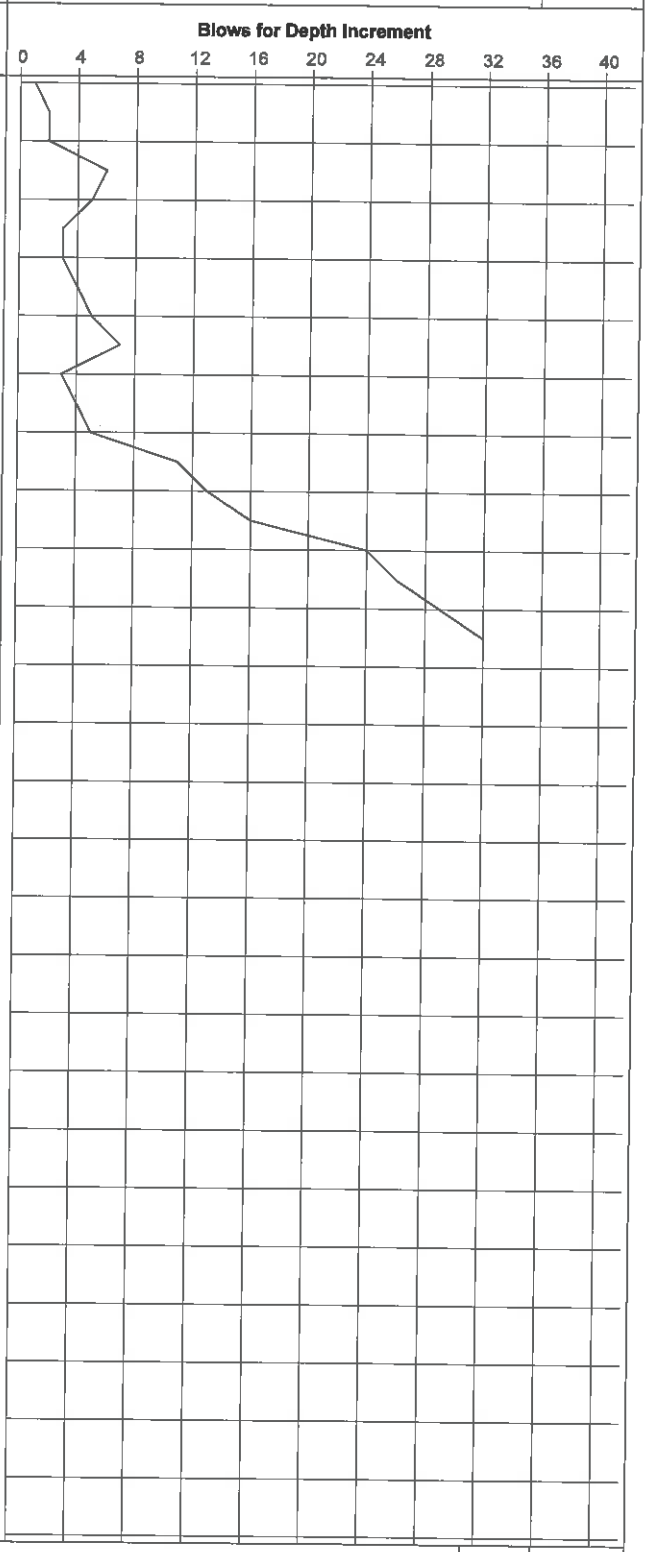
SUB SURFACE

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

Site	Probe Number
A61 BIRDWELL JUNCTION IMPROVEMENT, TANKERSLEY, SOUTH YORKSHIRE	DP5A

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
DYNAMIC PROBING	Diameter 50.5mm, Angle 90°	141.28	BARNSLEY METROPOLITAN BOROUGH COUNCIL	NE3312
	Location	**Dates**	**Engineer**	**Sheet**
	435041.64 E 400419.83 N	09/06/2014		1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	1		141.28	0.00
0.10-0.20	2			
0.20-0.30	2			
0.30-0.40	6			
0.40-0.50	5			
0.50-0.60	3		140.78	0.50
0.60-0.70	3			
0.70-0.80	4			
0.80-0.90	5			
0.90-1.00	7			
1.00-1.10	3		140.28	1.00
1.10-1.20	4			
1.20-1.30	5			
1.30-1.40	11			
1.40-1.50	13			
1.50-1.60	16		139.78	1.50
1.60-1.70	24			
1.70-1.80	26			
1.80-1.90	29			
1.90-2.00	32		139.28	2.00
			138.78	2.50
			138.28	3.00
			137.78	3.50
			137.28	4.00
			136.78	4.50
			136.28	5.00



Remarks
Weight 63.5kg
Fall 750mm
Completed at 2.00m

Scale (approx)	Logged By
1:25	AJP/DK

Figure No.
NE3312.DP5A

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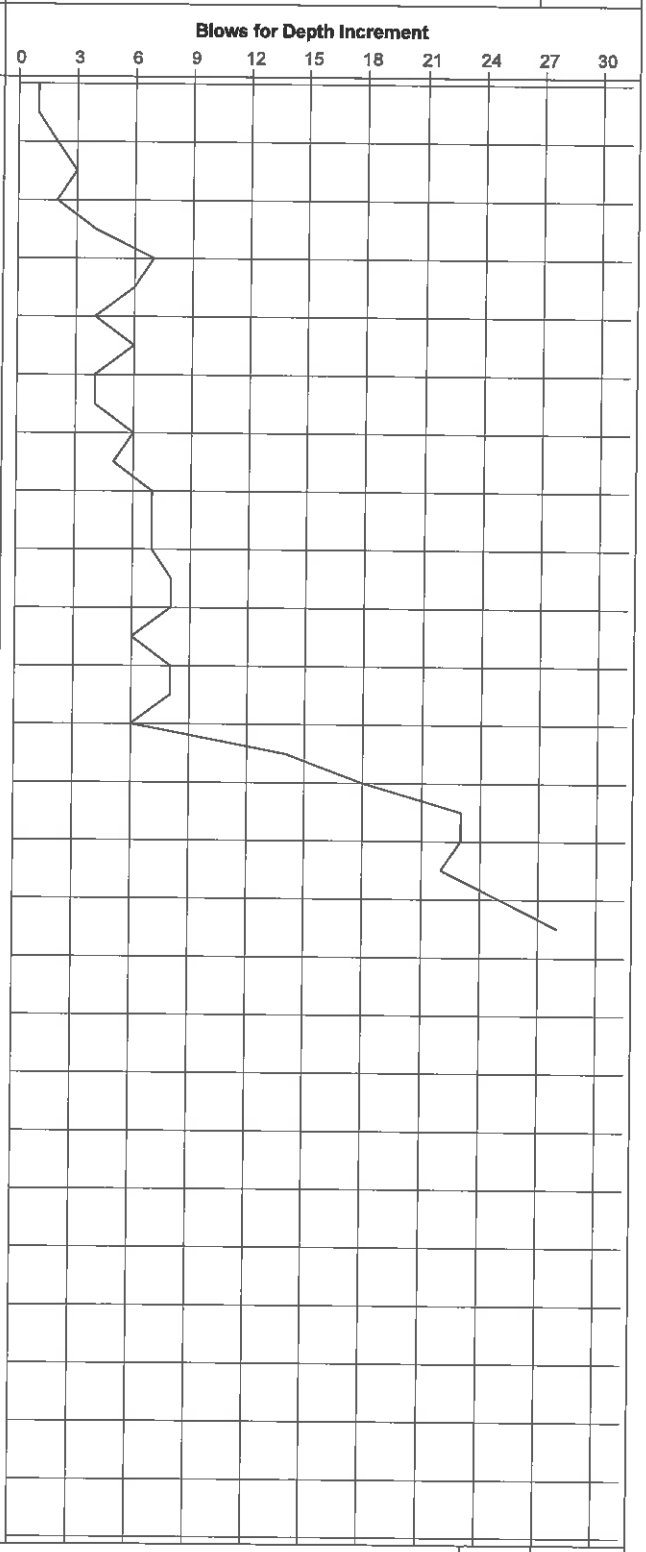
SUB SURFACE

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

Site	Probe Number
A61 BIRDWELL JUNCTION IMPROVEMENT, TANKERSLEY, SOUTH YORKSHIRE	DP6

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
DYNAMIC PROBING	Diameter 50.5mm, Angle 90°	141.58	BARNSLEY METROPOLITAN BOROUGH COUNCIL	NE3312
	Location	**Dates**	**Engineer**	**Sheet**
	435038.32 E 400412.21 N	09/06/2014		1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	1		141.58	0.00
0.10-0.20	1			
0.20-0.30	2			
0.30-0.40	3			
0.40-0.50	2			
0.50-0.60	4		141.08	0.50
0.60-0.70	7			
0.70-0.80	6			
0.80-0.90	4			
0.90-1.00	6			
1.00-1.10	4		140.58	1.00
1.10-1.20	4			
1.20-1.30	6			
1.30-1.40	5			
1.40-1.50	7			
1.50-1.60	7		140.08	1.50
1.60-1.70	7			
1.70-1.80	8			
1.80-1.90	8			
1.90-2.00	6			
2.00-2.10	8		139.58	2.00
2.10-2.20	8			
2.20-2.30	6			
2.30-2.40	14			
2.40-2.50	18			
2.50-2.60	23		139.08	2.50
2.60-2.70	23			
2.70-2.80	22			
2.80-2.90	25			
2.90-3.00	28			
			138.58	3.00
			138.08	3.50
			137.58	4.00
			137.08	4.50
			136.58	5.00



Remarks
Weight 63.5kg
Fall 750mm
Completed at 3.00m

Scale (approx)	Logged By
1:25	AJP/DK

Figure No.
NE3312.DP6

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PHOTOGRAPHS

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

Photographs

Site: A61 BIRDWELL JUNCTION IMPROVEMENT, TANKERSLEY, SOUTH YORKSHIRE

Client: BARNSLEY METROPOLITAN BOROUGH COUNCIL

Engineer:

Job No. NE3312

Sheet 1 / 2

Date 03/08/14

SITE PHOTOGRAPHS

1



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SUB SURFACE
SITE INVESTIGATION AND SPECIALIST GEOTECHNICAL CONSULTANTS
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Photographs

Site: A61 BIRDWELL JUNCTION IMPROVEMENT, TANKERSLEY, SOUTH YORKSHIRE

Client: BARNSLEY METROPOLITAN BOROUGH COUNCIL

Engineer:

Job No. NE3312

Sheet 2 / 2

Date 03/08/14

SITE PHOTOGRAPHS

4



3

2

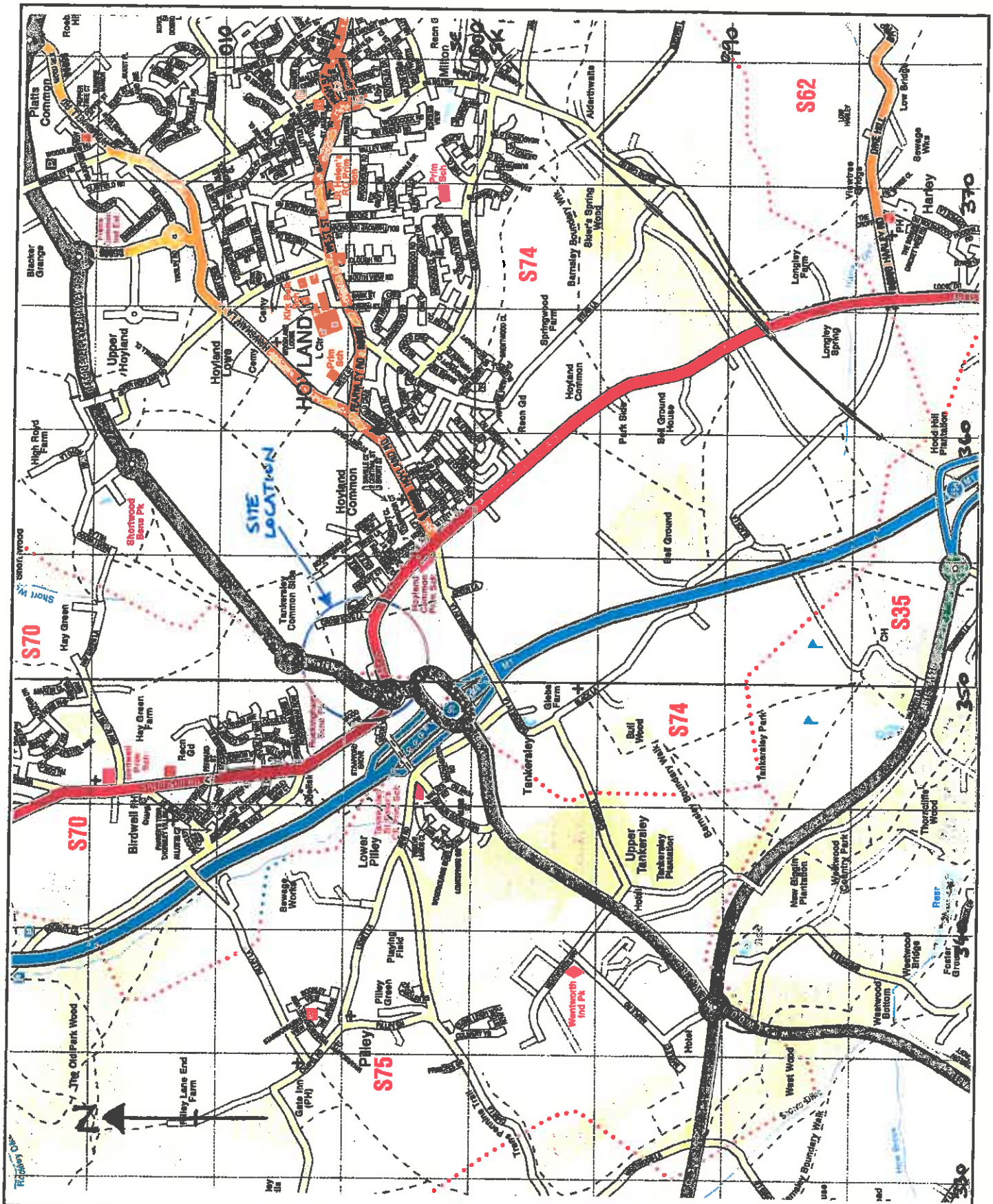
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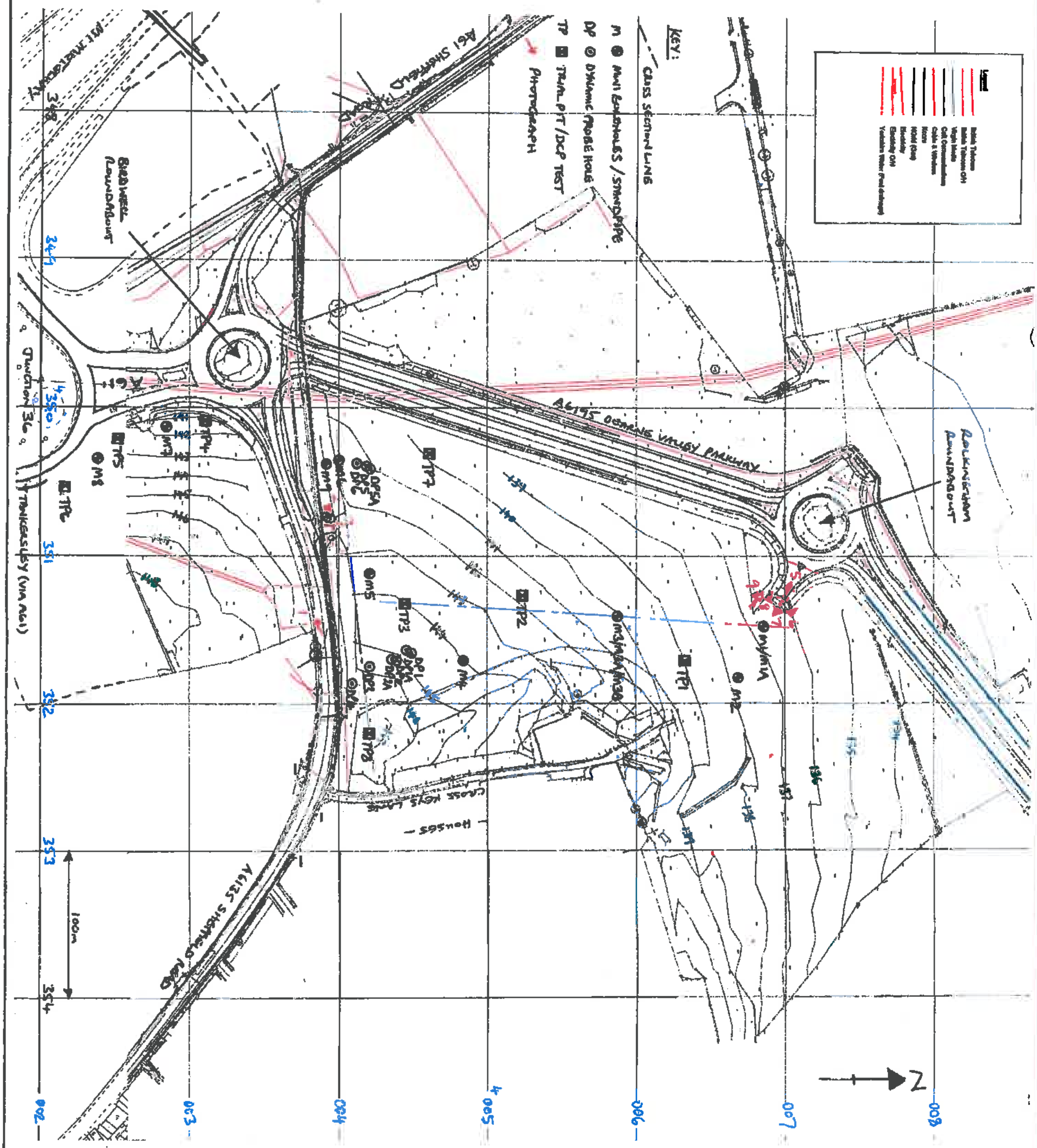
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FIGURES



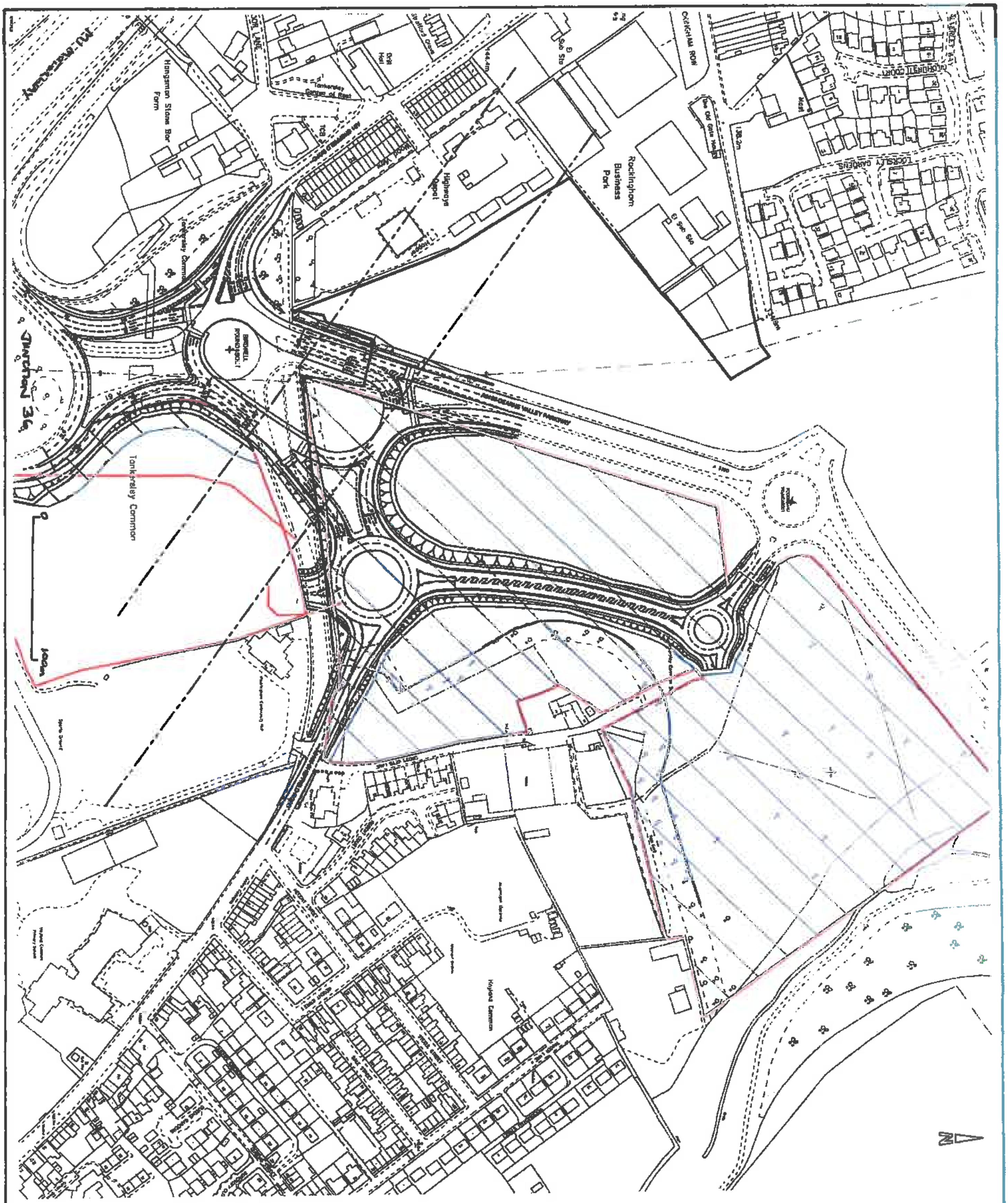
SUB SURFACE SITE INVESTIGATION AND SPECIALIST GEOTECHNICAL CONSULTANTS 3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907				
Site A61 BIRDWELL JUNCTION IMPROVEMENT, TANKERSLEY, SOUTH YORKSHIRE	Date Drawn 30-Jul-14	Date Checked	Sheet 1 / 1	Job No. NE3312
Client BARNSLEY METROPOLITAN BOROUGH COUNCIL	Drawn By AJP	Checked By	Scale 1:20,000	Figure No. 1

Site Location Plan



[Based on Barnsley MBC Drawing Nos. HD/A61.69.1/SU/1 dated April 2014 & HD/A61.69.1/GSI/2 Rev. A dated April 2014]

SUB SURFACE SITE INVESTIGATION AND SPECIALIST GEOTECHNICAL CONSULTANTS 3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907	Site & Exploratory Hole Location Plan			
Site: A61 BIRDWELL JUNCTION IMPROVEMENT, TANKERSLEY, SOUTH YORKSHIRE	Date Drawn: 05-Aug-14	Date Checked:	Sheet: 1 / 1	Job No.: NE3312
Client: BARNSLEY METROPOLITAN BOROUGH COUNCIL	Drawn By: AJP	Checked By:	Scale: 1:2,500 (at A3)	Figure No.: 2



[Based on Barnsley MBC Drawing No. HD/A61.68.1/GSI/2 Rev. A dated April 2014]

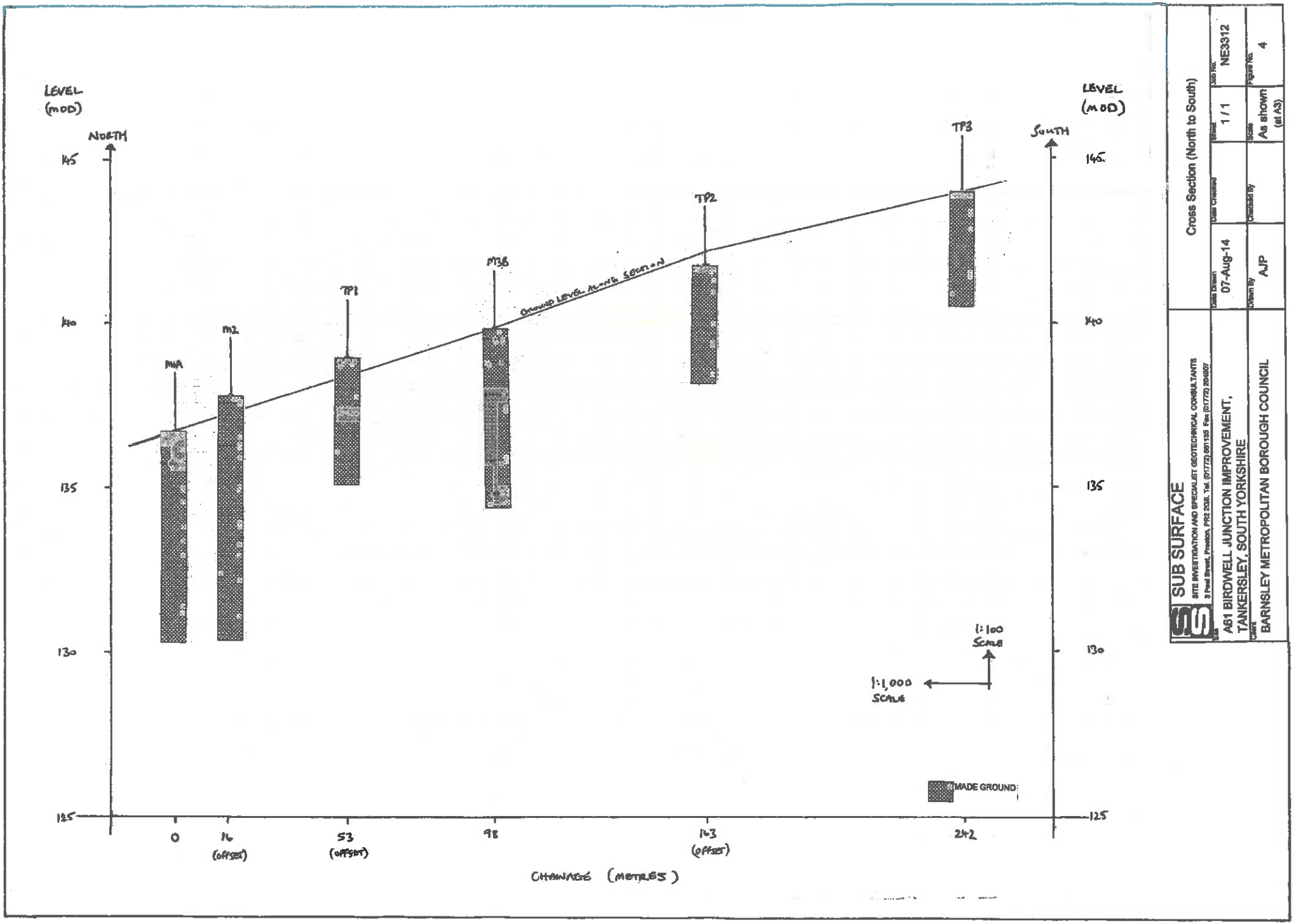
REPRODUCED FROM THE ORDNANCE SURVEY WITH THE PERMISSION OF THE CONTROLLER OF HER MAJESTY'S STATIONARY OFFICE

SUB SURFACE

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

Proposed A61 Birdwell Junction Improvement Plan

Site: A61 BIRDWELL JUNCTION IMPROVEMENT, TANKERSLEY, SOUTH YORKSHIRE	Date Drawn: 31-Jul-14	Date Checked:	Sheet: 1 / 1	Job No.: NE3312
Client: BARNSLEY METROPOLITAN BOROUGH COUNCIL	Drawn By: AJP	Checked By:	Scale: 1:2,500 (at A3)	Figure No.: 3



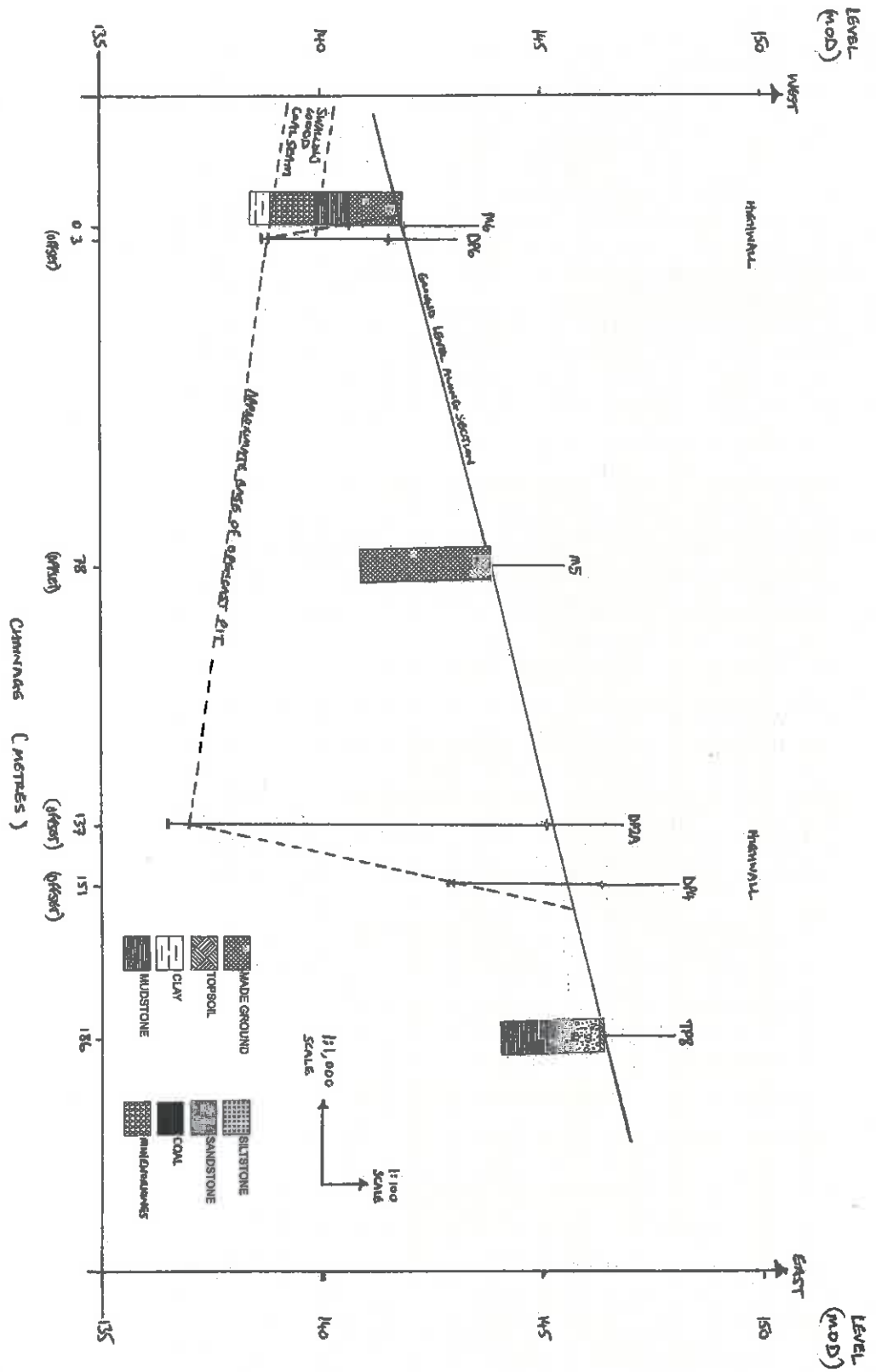
Cross Section (North to South)

SUB SURFACE
SITE INVESTIGATION AND SPECIALIST GEOTECHNICAL CONSULTANTS
3 Pond Street, Preston, PR2 2QS. Tel. (01772) 881135 Fax (01772) 204657

Date Drawn	07-Aug-14	Sheet	1 / 1
Date Checked		Job No.	NE3312
Drawn by	AJP	Scale	As shown (at A3)
Checked by		Figure No.	4

A61 BIRDWELL JUNCTION IMPROVEMENT, TANKERSLEY, SOUTH YORKSHIRE

Client: BARNSLEY METROPOLITAN BOROUGH COUNCIL



SUB SURFACE SITE INVESTIGATION AND SPECIALIST GEOTECHNICAL CONSULTANTS 3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561136 Fax (01772) 204907	Cross Section (West to East)			
Site A61 BIRDWELL JUNCTION IMPROVEMENT, TANKERSLEY, SOUTH YORKSHIRE	Date Drawn 07-Aug-14	Date Checked	Sheet 1 / 1	Job No. NE3312
Client BARNSLEY METROPOLITAN BOROUGH COUNCIL	Drawn By AJP	Checked By	Scale As shown (at A3)	Figure No. 5