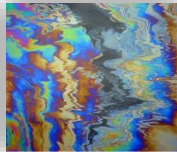




INVESTIGATE



REMEDiate



REGENERATE

# TECHNICAL REPORT

**GROUND INVESTIGATION  
AT  
CAPITOL PARK,  
DODWORTH, BARNSELY,  
SOUTH YORKSHIRE, S75 3TZ  
FOR  
CARNELL MANAGEMENT SERVICES LIMITED**

**REPORT NO. NE3608  
JULY 2017**



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**GROUND INVESTIGATION AT CAPITOL PARK, DODWORTH, BARNSELY,  
SOUTH YORKSHIRE, S75 3TZ.**

**CLIENT: CARNELL MANAGEMENT SERVICES LIMITED.**

**ENGINEER: WILLIAM SAUNDERS PARTNERSHIP.**

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## **1. INTRODUCTION**

This report has been prepared in accordance with an email dated 9<sup>th</sup> May 2017, from the Engineer on behalf of the Client.

The brief was set out in our estimate, ref. E5591 and dated 18<sup>th</sup> April 2017, with amendments as the investigation proceeded and includes:

- A geological and mining appraisal.
- 13 No. mini boreholes
- 5 No. rotary open hole boreholes
- 3 No. plate bearing tests
- 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 at Capitol Park, north west of Junction 37 of the M1 Motorway. The area of investigation comprises an irregular shaped area of land bound by the M1 motorway to the north east, Capitol Close, Capitol Court and main access road to the south west, existing commercial premises to the north west and south west, and a continuation of the development land to the south east, as shown on Figure 1.

The site is split into three different levels. In the north west at the highest level the flat site is bound by Capitol Close and existing commercial buildings to the west and southwest and abuts an embankment in the north east, separating the site from the motorway, which is at a lower level than the site. The embankment is grass and tree/shrub covered. Surrounding the remaining part of the site is a small barrier and bund, and along its south east edge this part of the site drops down to the next lower level. The slope is covered in small trees and shrubs. This higher level site also slopes gently down to the main Capitol Park access road in the south west, where there is a small planting scheme.

In the south east, in the central area, the site is level with the road but drops down a small slope from one part in the central section to a slightly lower level in the south east. Both areas are flat and bound by the tree and bush lined embankment along the north eastern edge with the motorway, Capitol Court road in the southwest and an extension of the site to the south east. To the south west of the site is the main road serving the area, with a part of the site here covered in stone and remnants of an old macadamed surface, and beyond the road to the south west is a lower level with additional construction underway.

The site areas are generally flat and covered in sparse vegetation, though some local areas contain bullrushes and small shrubs. At the time of the investigation the site was dry, though there is evidence of previous "boggy areas". The approximate National Grid Reference of the centre of the site is SE 31828, 06179.

## **1.2 Proposed Development and Purpose of the Ground Investigation**

We understand that it is proposed to develop the site by the construction of commercial units, as shown on Figure 3.

The purpose of the investigation was to determine the ground conditions at the positions of the exploratory holes, to assess the likelihood of a general pattern of strata being present below the site and to determine the presence of any shallow coal seams, and associated mineworkings, in order to assess the risk to near surface ground stability and to establish the load bearing characteristics of the strata deriving if possible an assessment of the suitability of appropriate founding techniques.

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

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

## **2. INVESTIGATION**

### **2.1 Investigation Details**

Thirteen mini boreholes were put down to depths of between 1.00 and 2.45 metres using a Dart mini sampling rig fitted with windowless sample tubes of 83 to 53mm diameter at the positions determined and set out by the Client's Engineer, as shown on Figure 2. The samples were subsequently logged in accordance with BS EN ISO 14688-1: 2002 and BS EN ISO 14689-1: 2003 and the resulting Mini Borehole Records are appended.

Five rotary boreholes were put down to depths of between 20.00 and 22.00 metres using a Beretta T44 drill rig at the positions determined and set out by the Client's Engineer, as shown on Figure 2. Boreholes were advanced by rotary open holing techniques, with water and mist flushing medium, using 100mm diameter rock roller bits and 120mm diameter temporary casing. The foreman driller logged chippings flushed to the surface during drilling and the resulting Rotary Borehole Records are appended.

### **2.2 Sub Surface Detail**

Details of the strata encountered in the ground investigation are given on the appended Borehole Records. The exploratory holes generally found Made Ground overlying a firm medium locally high strength grey and brown occasionally mottled orange slightly gravelly slightly sandy silty clay in the north west of the site in turn underlain by an extremely weak thinly laminated greyish brown highly weathered mudstone completely weathered to a clay in parts. The depths of strata found were as follows:

TABLE 1 STRATA

| Expl. Hole No. | Depth of Made Ground (m) | Depth of Clay (m) | Depth of Silt (m) | Depth of Rockhead (m) | Depth of Hole (m) |
|----------------|--------------------------|-------------------|-------------------|-----------------------|-------------------|
| M01            | 0.60                     | 1.40              | -                 | 1.40                  | 2.45              |
| M02            | 0.70                     | 1.35              | -                 | 1.35                  | 2.45              |
| M03            | 1.00                     | 2.00              | -                 | 2.00                  | 2.45              |
| M04            | 0.90                     | 2.00              | -                 | 2.00                  | 2.45              |
| M05            | 0.10                     | -                 | 1.00              | 1.00                  | 1.45              |
| M06            | 1.50                     | -                 | -                 | 1.50                  | 2.45              |
| M07            | 1.10                     | -                 | -                 | 1.10                  | 2.40              |
| M08            | 0.30                     | -                 | -                 | 0.30                  | 1.50              |
| M09            | 0.20                     | -                 | -                 | 0.20                  | 1.20              |
| M10            | 0.10                     | -                 | -                 | 0.10                  | 1.00              |
| M11            | 0.05                     | -                 | -                 | 0.05                  | 1.40              |
| M12            | -                        | 0.80              | -                 | 0.80                  | 2.45              |
| M13            | 1.00                     | -                 | -                 | 1.00                  | 1.30              |

M = Mini Borehole

A general summary of the strata found is as follows:

#### 2.2.1 Made Ground

The made ground was predominantly comprised of a greyish brown occasionally light brown gravelly sandy silty clay with the gravel sized fragments being fine to coarse stone, clinker, coal and brick with occasional low cobble content or fragments of extremely weak dark grey highly weathered mudstone completely weathered to clay in parts. It should be noted that due to the nature of the made ground in some areas appearing to reworked natural strata, it was difficult to determine the depth of the made ground/natural ground interface.

#### 2.2.2 Drift Deposits

Over the north western section of the site there appeared to be a layer of drift deposits generally comprising a mantle of completely weathered rockhead. A firm medium locally high strength grey and brown occasionally mottled orange slightly gravelly slightly sandy silty clay was encountered in boreholes M01 to M04 to depths of between 1.35m and 2.00m. A similar material was also encountered in borehole M12 in the south east corner of the site to a depth of 0.80m. In borehole M05 was a layer of dark brown then light greyish brown occasionally mottled orange friable clayey silt to 1.00m

#### 2.2.3 Bedrock

In all the boreholes beneath the made ground and any drift deposits was rockhead comprising an extremely weak thinly laminated greyish brown highly weathered mudstone completely weathered to a clay in places.

In the rotary open hole boreholes the rockhead was comprised of interbedded layers of brown siltstones and light grey, grey, brown and light brown mudstones with bands of black coal to the termination of the boreholes at depths of between 20.00m and 22.00m. The foreman driller recorded no obvious signs of voids, broken ground or loss of flush.

#### 2.2.4 Groundwater

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

Monitoring of standpipes installed in boreholes R1, R3 and R5 to a depth of 5.00m recorded no standing water levels.

### **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 and hand shear vane tests, where appropriate.

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**

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

Three in-situ plate bearing tests were carried out at the positions shown on Figure 2 using a 455mm diameter steel plate at 0.10 metres depth. The results of the plate bearing tests are appended.

#### **3.3 Installations and Monitoring**

On completion of rotary boreholes R1, R3 and R5 hdpe standpipes were installed to a depth of 5.00 metres. The standpipes are slotted from 1.00 metres depth, have an internal diameter of 50mm and have removable quick release gas valves to enable both ground gas and groundwater monitoring and sampling to be undertaken. Details of the installations are given on the Borehole Record sheets.

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

### 3.4 Laboratory Testing

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

- Moisture content, plastic limit and liquid limit tests
- Pyritic Ground testing (including soluble sulphate and pH value tests)
- Soluble sulphate content and pH value tests

Contamination analyses have been performed on five soil samples to determine: pH and concentrations of sulphate, sulphide, cyanide, arsenic, boron (soluble), cadmium, chromium, hexavalent chromium, copper, lead, mercury, 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 a soil sample from borehole M08 were subjected to an asbestos screen as a potentially asbestos containing material was encountered.

## 4. APPRAISAL AND RECOMMENDATIONS

### 4.1 Comments on the Profile

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

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

The exploratory holes generally found Made Ground overlying a firm medium locally high strength grey and brown occasionally mottled orange slightly gravelly slightly sandy silty clay in the north west of the site, in turn underlain by an extremely weak thinly laminated greyish brown highly weathered mudstone completely weathered to a clay in parts. It should be noted that due to the small volume of strata able to be inspected in mini boreholes and the nature of the strata encountered some difficulty was experienced in determining the exact depth of the made ground/natural ground/rockhead interface. Some cut and fill appears to have already taken place on site with some natural material reworked to produce the approximately level areas.

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

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

Details of the findings of the investigation are given on the appended Borehole Record sheets and a summary of the ground conditions is given in Section 2.2.

## 4.2 Geological and Mining Appraisal

### 4.2.1 Geological Appraisal

The British Geological Survey (BGS) have published sheet, ref. SE30NW, solid and drift edition at 1:10,560 scale dated 1980, an extract of which is given as Figure 3.

The geological survey indicates that the site is underlain by Westphalian B, Carboniferous Coal Measure rocks. There are no drift deposits recorded, however, a thin mantle of completely weathered rockhead might be expected.

Coal Measures strata in this area normally comprise interbedded mudstones, siltstones and subordinate sandstones with occasional economically important mineral seams of coal and ironstone.

The bedded strata are anticipated to be dipping at a shallow angle of 5 degrees to the north east or north north east, with no faults shown within the site boundaries.

The Haigh Moor Rock generally comprising a sandstone or a sandy mudstone is shown to be outcropping beneath the site, with the Top Haigh Moor Coal seam (0.69m to 1.19m thick, possibly in two leaves) shown to crop out close to the south west boundary of the site and the Low Haigh Moor Coal seam (0.43m to 1.02m thick, possibly in two leaves) shown to crop out further to the south west of the site boundaries. Due to the dip of strata the seams should be at an increasingly greater depth to the north east.

The generalized cross section shown on the geological survey sheet shows the Top Haigh Moor Coal seam and the Low Haigh Moor Coal seam to be separated by some 4 to 5 metres of coal measure strata. In addition, overlying the Top Haigh Moor Coal seam is the Swallow Wood Coal seam (0.30m to 1.15m thick, possibly in three leaves) with the distance between being uncertain due to the potential variable thickness of the Haigh Moor Rock. In our opinion, it is possible that the Swallow Wood Coal seam could be present beneath the site at very shallow depth.

Beneath the Low Haigh Moor Coal seam the generalised section gives a thin coal seam, possibly 18m below and the Lidget Coal seam (0.30m to 1.52m thick) some 30m below.

### 4.2.2 Mining Appraisal

The presence of mineral seams, including coal, which might have been mined beneath the site has been determined from the published geological sheet and the Coal Authority Mining Report, ref. 51001385604001 and dated 3<sup>rd</sup> March 2017, a copy of which is appended.

The Coal Authority indicates that according to their limited, and probably incomplete, records the site surface could be affected by underground mineworkings in 6 seams of coal at 100m to 310m depth the last mineworkings being in 1983. Any movement in the ground due to the coal mining activity should have stopped.

In addition, the Coal Authority indicates that they believe there is coal at or close to the surface, which may have been worked at some time in the past, for which they have no record.

In our opinion, it is possible that shallow coal seams beneath the site were worked prior to the Mines (Coal) Regulations Act of 1872, before which there was no statutory requirement to maintain and preserve plans of abandoned mines. Of those plans which were made it is likely that not all will have survived with time and hence shallow mineworkings may be present for which there is no record.

The Coal Authority also indicates that there is no current mining or proposals to mine coal beneath the site, although reserves of coal exist which could be mined in the future subject to feasibility, licences and planning consents. It should be noted that on 23<sup>rd</sup> December 2015 all underground coal mining ceased in the UK.

The Coal Authority are not aware of any recorded abandoned mine entries within the site or within 20 metres of the site boundary. However, the Coal Authority records may be incomplete and hence mine entries may be present for which the Coal Authority has no knowledge.

In any old mining area such as this, where records are generally incomplete, the existence of unrecorded mine entries should not be discounted and appropriate precautions should be taken during all earthworks. Should a mine entry be suspected appropriate action would need to be taken in the light of the established condition and location as determined by inspection and investigation.

The site is probably underlain by abandoned mineworkings at various depths and the risk of further residual settlement of these mineworkings occurring in such a way as to put at risk surface structures and services is dependent upon several factors. These include the thickness and type of superficial materials overlying the rockhead, the thickness and character of rock strata forming the roof to mineworkings, the depth of the seam, the original thickness of the seam, the extent and method of mining and the type of surface development proposed.

#### 4.2.3 Ground Investigation

The rotary borehole investigation carried out across the site revealed numerous coal seams of varying depth and thickness in all five boreholes. In our opinion, the coal seams encountered can be grouped as follows:

##### Top Haigh Moor Coal

|    |                                      |
|----|--------------------------------------|
| R1 | 8.50m to 10.00m and 10.50m to 10.80m |
| R2 | 7.60m to 9.00m and 9.60m to 10.40m   |
| R3 | 8.00m to 8.40m                       |
| R4 | 8.50m to 8.70m                       |
| R5 | 7.40m to 7.80m                       |

##### Low Haigh Moor Coal

|    |                  |
|----|------------------|
| R1 | 13.00m to 14.40m |
| R2 | 12.80m to 13.60m |
| R3 | 12.40m to 13.60m |
| R4 | Absent           |
| R5 | Absent           |

## Swallow Wood Coal

There are numerous seams of various thickness and depth between 1.60m and 5.70m which in our opinion, are likely to be related to the leaves of the Swallow Wood Coal seam.

The rotary boreholes found no obvious evidence of mineworkings for example loss of flush, large voids, broken ground etc. However, there is clear evidence that the Top Haigh Moor Coal is considerably thinner and with a missing leaf in boreholes R3, R4 and R5 when compared to boreholes R1 and R2. In addition the Low Haigh Moor Coal seam is absent in boreholes R4 and R5 and possibly thinner in borehole R2 when compared to boreholes R1 and R2. With regards to the leaves relating to the shallow Swallow Wood Coal it is difficult to determine whether any workings have taken place or not due to the number of leaves.

### 4.2.4 Conclusions and Recommendations

In our opinion, mineworkings have taken place beneath the site in the Top Haigh Moor Coal and the Low Haigh Moor Coal and possibly in the shallower Swallow Wood Coal to depths of up to 14.40m in borehole R1, becoming deeper towards the north eastern boundary of the site.

After due consideration, it is our opinion that the abandoned mineworkings are of such depth and character that they present a risk to ground stability and the integrity of the proposed development.

Problems of stability arise when the residual collapse of broken strata within or above the mined horizon migrates upwards through the roof strata and superficial materials to reach the near surface. The resulting settlement feature may be a distinct 'crownhole' or a less noticeable depression due to differential settlement. Residual settlement of abandoned mineworkings is not possible to predict, and although the risk may be increased by the stresses imposed by a surface load, settlement can and does occur irrespective of ground surface loads.

Consequently, we would recommend that the ground within and above the shallow mined horizons i.e. to the base of the Low Haigh Moor Coal seam be proven to be stable or rendered stable by drilling and grouting. Holes should be drilled into the mined horizons on a grid at spacings to be determined in relation to the plan area of proposed buildings and conditions encountered as the works proceed. Grout (liquid mixture of Pulverised Fuel Ash (PFA), cement, sand and water) should then be injected through each drill hole under an appropriate pressure to stabilise the voids and broken ground encountered.

In addition to the ground being stabilised by drilling and grouting, we would recommend that the proposed buildings or structures be constructed on a reinforced semi-raft foundation, which is able to span 3.0 metres and cantilever 1.5 metres due to a loss of support. It should be noted that a semi raft foundation should have an integral suspended floor slab.

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

### 4.3 Foundations

We understand that it is proposed to develop the site by the construction of commercial units, as shown on Figure 3. However, at the time of writing this report no specific details regarding the building layout, proposed foundations and design loadings were available and consequently the recommendations given are in general terms only.

The ground investigation found Made Ground overlying a firm medium locally high strength grey and brown occasionally mottled orange slightly gravelly slightly sandy silty clay in the north west of the site in turn underlain by an extremely weak thinly laminated greyish brown highly weathered mudstone completely weathered to a clay in parts

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

Providing there is sufficient load bearing capability we recommend that the proposed buildings are founded on the natural medium to high strength cohesive deposits or highly weathered rock strata on a reinforced semi-raft foundation, which is able to span 3.0 metres and cantilever 1.5 metres due to a loss of support.

Atterberg limit tests on the cohesive strata indicate clays of intermediate to high plasticity which are considered to have a medium susceptibility to shrinkage and swelling with varying moisture content. Given the above foundations should be taken down to a minimum 0.90 metres below finished ground level to avoid the zone which is subject to seasonal moisture content variation and frost action. If buildings are to be constructed adjacent to existing trees, trees are to be removed and/or trees are to be planted then the guidelines given in the National House Building Council (NHBC) Standards Chapter 4.2, 'Building Near Trees', should be followed for clays of medium shrinkage and swelling potential.

It should be noted that in parts of the site the natural strata is at a depth of in excess of 0.90 metres and in these areas foundations should be taken down to a minimum 0.10 metres below the base of the Made Ground unless the NHBC guidelines indicate a greater depth.

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

TABLE 2 SAFE BEARING CAPACITY

| Expl Hole No. | Depth<br>(m) | SPT 'N' Value | Shear Strength<br>(kN/m <sup>2</sup> ) | Safe Bearing Pressure<br>(kN/m <sup>2</sup> ) | Recommended Minimum Foundation<br>Depth<br>(m) |
|---------------|--------------|---------------|--|---|--|
|               |              |               |  | Semi Raft Foundation                          |  |
| M01           | 1.15         | 16            | 64                                     | 120   | 0.90   |
|               | 1.85         | 41            | -                                      | 300+  |  |
| M02           | 1.15         | 18            | 72                                     | 135   | 0.90   |
|               | 2.15         | 53            | -                                      | 300+  |  |
| M03           | 1.15         | 10            | 40                                     | 75  | 1.10   |
|               | 1.60         | -             | 70#                                    | 130   |  |
|               | 2.15         | 57            | -                                      | 300+  |  |
| M04           | 1.15         | 11            | 44                                     | 80  | 1.00   |
|               | 1.60         | -             | 96#                                    | 180   |  |
|               | 2.15         | 51            | -                                      | 300+  |  |
| M05           | 1.15         | 58            | -                                      | 300+  | 1.00   |
| M06           | 2.15         | 53            | -                                      | 300+  | 1.60   |
| M07           | 1.15         | 16            | 64                                     | 120   | 1.20   |
|               | 2.15         | 66            | -                                      | 300+  |  |
| M08           | 1.15         | 51            | -                                      | 300+  | 0.90   |
| M09           | 1.10         | 100           | -                                      | 300+  | 0.90   |
| M10           | 0.80         | 85            | -                                      | 300+  | 0.90   |
| M11           | 1.15         | 66            | -                                      | 300+  | 0.90   |
| M12           | 1.15         | 24            | 96                                     | 180   | 0.90   |
|               | 1.95         | 52            | -                                      | 300+  |  |
| M13           | 1.15         | 100           | -                                      | 300+  | 1.10   |

# Shear strength determined by hand shear vane test.

Appreciable variations in safe bearing capacity are indicated in Table 2 and as a consequence of this, and the need to utilise a generally applicable safe bearing pressure to enable designs to be reasonably formulated, for preliminary designs we would recommend that for foundations in the medium strength clays a safe bearing capacity value of 75kN/m<sup>2</sup> should not be exceeded, for the mudstones completely weathered to a clay in parts a safe bearing capacity value of 120kN/m<sup>2</sup> should not be exceeded and for the extremely weak mudstone rockhead a safe bearing capacity value of 300kN/m<sup>2</sup> should not be exceeded. However, once a final building and foundation layout is determined we would recommend that each unit is individually assessed to determine the most appropriate founding level and safe bearing capacity value.

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

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

#### **4.4 Excavations and Groundwater**

There should be no particular difficulties in excavating the strata indicated in the exploratory holes utilising an appropriate and suitably sized mechanical excavator. However, greater difficulty will be experienced when penetrating the rockhead especially beyond the initial weathered mantle.

It is recommended that all excavations to greater than 1.2 metres depth, or for shallower excavations where groundwater is encountered above this level, are closely supported, especially where man entry is required. Alternatively, where space permits, the excavations might be battered back to an appropriate angle.

The boreholes did not encounter any groundwater inflows, although it should be noted that they were only left open for a relatively short period of time and groundwater levels and rates of inflow may be subject to seasonal and/ or climatic variations. Should groundwater seepages occur and water accumulate in the excavation it should be able to be removed by pumping from a filtered sump.

#### **4.5 Buried Concrete**

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

Determination of pH on the soil samples gave values in the range of 4.7 to 7.9 (acidic to near neutral).

Soluble sulphate concentrations were also determined for the soil samples and the results ranged from <0.01 to 0.09 g/l.

Total sulphate, total sulphur and magnesium have been determined for two soil samples and the results were up to 0.05%, 0.03% and 0.01 g/l respectively. Our calculations have determined that pyrite (sulphides), which might weather and produce higher levels of sulphates, are not present.

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

Our knowledge of the site and ground conditions indicates that the site is "brownfield" with potentially mobile groundwater. Consequently, in accordance with the Design Sulphate Class for the site together with the site and groundwater conditions an Aggressive Chemical Environment for Concrete (ACEC) classification of AC-3z should be used as detailed on the appended extract.

#### **4.6 Contamination Considerations**

At the outset it should be noted that this contamination investigation is an initial survey in order to provide a contamination risk assessment. Based upon the findings additional sampling, analysis and assessment may be required.

Analysis of a suite of common determinants has been undertaken in the absence of historical evidence of the source of the Made Ground. However, the absence of other specific contaminants cannot be guaranteed.

It should be noted that a Phase I Walkover Survey and Desk Study Report, including a Conceptual Ground Model, ref. 11548/12 and dated April 2017, has previously been undertaken by William Saunders Partnership. This Phase II ground investigation has been undertaken to provide an initial contamination risk assessment in accordance with the Conceptual Ground Model. Based upon the findings of the above additional sampling, analysis and assessment may be required.

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

##### **4.6.1 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.

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

dependent upon the land use; allotment and residential use being the most sensitive and commercial/ industrial use being the least sensitive.

For the purposes of assessment, as the proposed development is for commercial units, the 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/industrial. Guideline values for the assessment can be supplied directly to the Regulator, if requested.

An asbestos screen was undertaken on a soil sample from borehole M8 at 0.30m, where a potential asbestos containing material was observed. The testing showed that no asbestos was present in the sample.

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 Conclusions and Recommendations

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

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

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

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

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

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

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

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

Our assessment, based on the results of the soil samples tested, indicates that there are no contaminants requiring remediation and/or precautions to be taken for the proposed development

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

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

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

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

#### **4.7 Ground Gas Considerations**

Ground gas monitoring has been undertaken on two of six scheduled occasions to date 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 3 GROUND GAS CONCENTRATIONS AND FLOW RATE**

| Methane<br>(% vol. In air) | Carbon Dioxide<br>(% vol. in air) | Oxygen<br>(% vol. in air) | Gas Flow Rate<br>(litres/ hour) |
|----------------------------|-----------------------------------|---------------------------|---------------------------------|
| 0.0                        | 1.4 to 6.4                        | 0.9 to 20.6               | <0.1                            |

To date, it can be seen from the monitoring that no elevated levels of methane or gas flows have been detected. However, elevated levels of carbon dioxide and depleted levels of associated oxygen have been detected in all three standpipes.

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

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

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  $Q_{hgs} = [6.4/ 100] \times 0.1 = 0.006$  l/hr

BS.8485: 2015, Table 2, indicates that the site falls into Characteristic Situation 1 (CS1). However, as on this site a significant number of carbon dioxide levels greater than 5% have been recorded the CS1 is increased by one to CS2.

BS.8485: 2015, Table 4, indicates that for a CS2 and the type of development proposed a score of 3.5 gives the level of protection and remedial measures required.

BS.8485: 2015 Tables 5, 6 and 7 indicate that a combination of the following protection and remedial measures should be considered to achieve the required score:

- |             |  |
|-------------|--|
| Table 5     | precast suspended segmental sub-floor slab (block and beam).<br>(Score 0.0)  |
| Table 5     | cast in-situ ground bearing floor slab (nominal mesh reinforcement).<br>(Score 0.5)  |
| Table 5     | reinforced cast in-situ monolithic ground bearing floor slab/ raft or reinforced cast in-situ suspended floor slab with minimal penetrations.<br>(Score 1.0)   |
| Table 5     | additionally reinforced cast in-situ monolithic ground bearing floor slab/ raft or additionally reinforced cast in-situ suspended floor slab with minimal penetrations – slab of minimum 150mm thickness with reinforcement at the bottom and the top<br>(Score 1.5) |
| .....       |  |
| Table 6 (a) | pressure relief pathway (low fines gravel blanket/ thin geocomposite blanket/ strips terminating in gravel trench external to the building)<br>(Score 0.5)   |

Table 6 (b) passive sub floor ventilation/ dispersal layer (clear void/ polystyrene void former/ geocomposite void former/ no fines gravel layer with gas drains/ no fines gravel layer) of very good performance.  
(Score 2.5)

Table 6 (b) passive sub floor ventilation/ dispersal layer (clear void/ polystyrene void former/ geocomposite void former/ no fines gravel layer with gas drains/ no fines gravel layer) of good performance.  
(Score 1.5)

Table 7 gas resistant membrane meeting the following criteria:

- sufficiently impervious to gases with a methane gas transmission rate of <math><40.0 \text{ ml/day/m}^2/\text{atm}</math> (average) for sheets and joints (tested in accordance with BS.ISO.15105-1 manometric method).
- sufficiently durable to remain serviceable for the anticipated life of the building and duration of gas emissions.
- sufficiently strong to withstand in-service stresses due to say settlement if placed below a floor slab.
- sufficiently strong to withstand the installation process and following trades (penetration from steel fibres in fibre reinforced concrete/ penetration from reinforcement ties/ tearing due to working above it or dropped tools) until covered.
- after installation being capable of providing a complete barrier to the entry of the relevant gas.
- verified in accordance with CIRIA C735 [N1].

(Score 2.0)

In road, hardstanding and car park areas over-site concrete and/or bituminous macadam surfaces will prevent ground gas escaping naturally to the atmosphere. It would be advisable to provide vent pipes through which ground gases are able to escape. These vent pipes might be placed in adjoining landscaped areas or incorporated in lamp posts or other similar furniture.

All excavations of greater than 1.20 metres depth should be routinely checked for air quality 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.

It should be noted that it is our intention to update this section of the report on completion of the ground gas monitoring.

#### **4.8 General**

In the preparation of this report no consideration has been given to

- the long term stability of the existing slopes and/or retaining structures and the short and long term stability of any proposed slopes and/or retaining structures required for the proposed development

as this was outside our brief.

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

SUB SURFACE CONSULTANTS LIMITED  
REPORT No. NE3608  
JULY 2017

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

## **COAL AUTHORITY MINING REPORT**

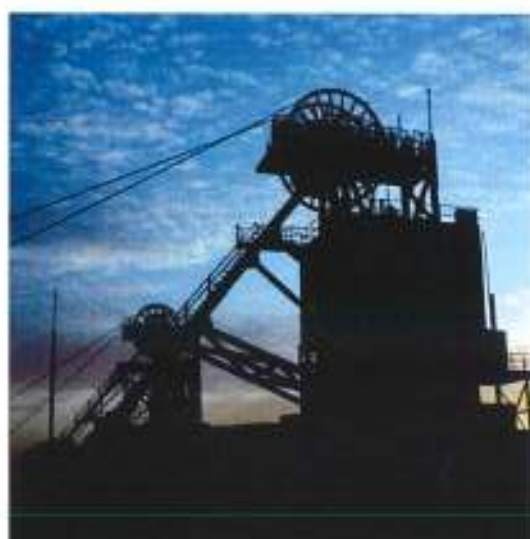


The Coal  
Authority

Resolving the **impacts** of mining

# CON29M Non-Residential Mining Report

SITE AT 431830, 406120  
SOUTH YORKSHIRE



|                        |                |
|------------------------|----------------|
| Date of enquiry:       | 03 March 2017  |
| Date enquiry received: | 03 March 2017  |
| Issue date:            | 03 March 2017  |
| Our reference:         | 51001385604001 |
| Your reference:        | 116447586_2    |

# CON29M Non-Residential Mining Report

This report is based on, and limited to, the records held by the Coal Authority and the Cheshire Brine Subsidence Compensation Board's records, at the time we answer the search.

## Client name

LANDMARK INFORMATION GROUP LIMITED

## Enquiry address

SITE AT 431830, 406120, SOUTH YORKSHIRE

## How to contact us

0345 762 6848 (UK)  
+44 (0)1623 637 000 (International)

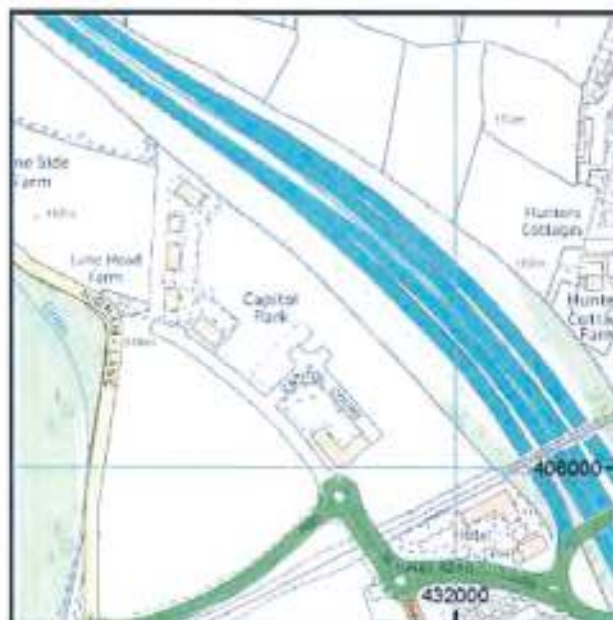
200 Lichfield Lane  
Mansfield  
Nottinghamshire  
NG18 4RG

[www.groundstability.com](http://www.groundstability.com)

 /company/the-coal-authority

 /thecoalauthority

 /coalauthority



Approximate position of property



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## Summary

| Has the search report highlighted evidence or potential of |   |     |
|--|---|-----|
| 1  | Past underground coal mining                                      | Yes |
| 2  | Present underground coal mining                                   | No  |
| 3  | Future underground coal mining                                    | Yes |
| 4  | Mine entries  | Yes |
| 5  | Coal mining geology   | No  |
| 6  | Past opencast coal mining   | No  |
| 7  | Present opencast coal mining                                      | No  |
| 8  | Future opencast coal mining                                       | No  |
| 9  | Coal mining subsidence  | No  |
| 10   | Mine gas  | No  |
| 11   | Hazards related to coal mining                                    | No  |
| 12   | Withdrawal of support   | No  |
| 13   | Working facilities order  | No  |
| 14   | Payments to owners of former copyhold land                        | No  |
| 15   | Information from the Cheshire Brine Subsidence Compensation Board | No  |

**For detailed findings, please go to page 4.**

# Detailed findings

## 1. Past underground coal mining

The property is in a surface area that could be affected by underground mining in 6 seams of coal at 100m to 310m depth, and last worked in 1983.

Any movement in the ground due to coal mining activity should have stopped.

In addition the property is in an area where the Coal Authority believe there is coal at or close to the surface. This coal may have been worked at some time in the past. The potential presence of coal workings at or close to the surface should be considered prior to any site works or future development activity. Your attention is drawn to the Comments on the Coal Authority information section of the report.

## 2. Present underground coal mining

The property is not within a surface area that could be affected by present underground mining.

## 3. Future underground coal mining

The property is not in an area where the Coal Authority has plans to grant a licence to remove coal using underground methods.

The property is not in an area where a licence has been granted to remove or otherwise work coal using underground methods.

The property is not in an area likely to be affected from any planned future underground coal mining.

However, reserves of coal exist in the local area which could be worked at some time in the future.

No notices have been given, under section 46 of the Coal Mining Subsidence Act 1991, stating that the land is at risk of subsidence.

## 4. Mine entries

There are no known coal mine entries within, or within 20 metres of, the boundary of the property.

There may however be mine entries/additional mine entries in the local area which the Coal Authority has no knowledge of.

## **5. Coal mining geology**

The Coal Authority is not aware of any damage due to geological faults or other lines of weakness that have been affected by coal mining.

## **6. Past opencast coal mining**

The property is not within the boundary of an opencast site from which coal has been removed by opencast methods.

## **7. Present opencast coal mining**

The property does not lie within 200 metres of the boundary of an opencast site from which coal is being removed by opencast methods.

## **8. Future opencast coal mining**

There are no licence requests outstanding to remove coal by opencast methods within 800 metres of the boundary.

The property is not within 800 metres of the boundary of an opencast site for which a licence to remove coal by opencast methods has been granted.

## **9. Coal mining subsidence**

The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres, since 31 October 1994.

There is no current Stop Notice delaying the start of remedial works or repairs to the property.

The Coal Authority is not aware of any request having been made to carry out preventive works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991.

## **10. Mine gas**

The Coal Authority has no record of a mine gas emission requiring action.

## **11. Hazards related to coal mining**

The property has not been subject to remedial works, by or on behalf of the Authority, under its Emergency Surface Hazard Call Out procedures.

## **12. Withdrawal of support**

The property is not in an area where a notice to withdraw support has been given.

The property is not in an area where a notice has been given under section 41 of the Coal Industry Act 1994, cancelling the entitlement to withdraw support.

### **13. Working facilities order**

The property is not in an area where an order has been made, under the provisions of the Mines (Working Facilities and Support) Acts 1923 and 1966 or any statutory modification or amendment thereof.

### **14. Payments to owners of former copyhold land**

The property is not in an area where a relevant notice has been published under the Coal Industry Act 1975/Coal Industry Act 1994.

### **15. Information from the Cheshire Brine Subsidence Compensation Board**

The property lies outside the Cheshire Brine Compensation District.

# Comments on the Coal Authority information

The Coal Authority own the copyright in this report and the information used is protected by our database right.

In view of the mining circumstances a prudent developer would seek appropriate technical advice before any works are undertaken.

Therefore if development proposals are being considered, technical advice relating to both the investigation of coal and former coal mines and their treatment should be obtained before beginning work on site. All proposals should apply good engineering practice developed for mining areas. No development should be undertaken that intersects, disturbs or interferes with any coal or mines of coal without the permission of the Coal Authority. Developers should be aware that the investigation of coal seams/former mines of coal may have the potential to generate and/or displace underground gases and these risks both under and adjacent to the development should be fully considered in developing any proposals. The need for effective measures to prevent gases entering into public properties either during investigation or after development also needs to be assessed and properly addressed. This is necessary due to the public safety implications of any development in these circumstances.

## Additional remarks

Information provided by the Coal Authority in this report is compiled in response to the Law Society's Con29M Coal Mining and Brine Subsidence Claim enquiries. The said enquiries are protected by copyright owned by the Law Society of 113 Chancery Lane, London WC2A 1PL. Please note that Brine Subsidence Claim enquiries are only relevant for England and Wales. This report is prepared in accordance with the Law Society's Guidance Notes 2006, the User Guide 2006 and the Coal Authority and Cheshire Brine Board's Terms and Conditions applicable at the time the report was produced.

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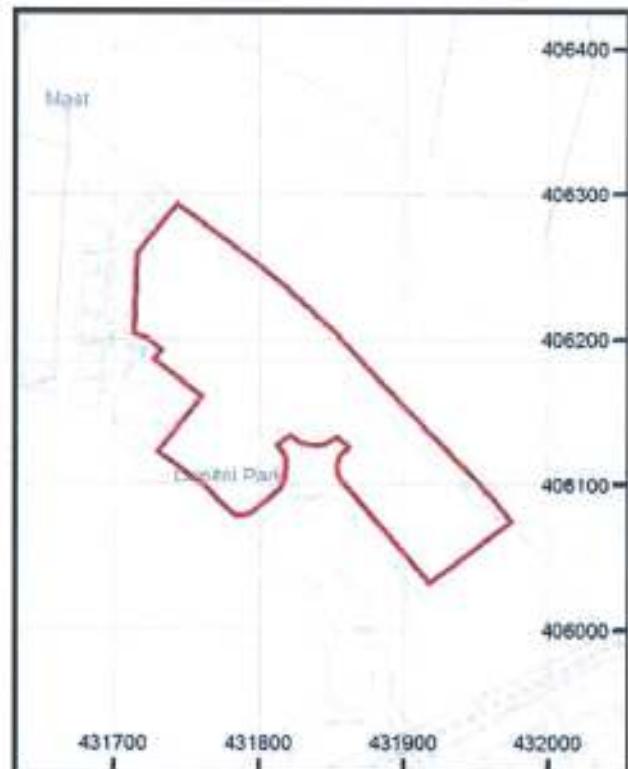
## Alternative formats

If you would like this report in an alternative format, please contact our communications team.

# Enquiry boundary

## Key

Approximate position of enquiry boundary shown




## How to contact us

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[www.groundstability.com](http://www.groundstability.com)

 /company/the-coal-authority

 /thecoalauthority

 /coalauthority



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## **INSITU TEST RESULTS**



# SUB SURFACE

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

## Standard Penetration Test Results

Site : CAPITOL PARK, DODWORTH, BARNSELY, SOUTH YORKSHIRE

Client : CARNELL MANAGEMENT SERVICES LIMITED

Engineer: WILLIAM SAUNDERS

Job Number  
NE3608

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  |                      |                                  |
| M01             | 1.00                 | 1.15                     | 1.45                  | CPT       | 1                      | 1  | 3                               | 3  | 4  | 6  | N=16                 | * Blows for seating penetration. |
| M01             | 1.70                 | 1.85                     | 2.15                  | CPT       | 3                      | 4  | 6                               | 8  | 10 | 17 | N=41                 |                                  |
| M02             | 1.00                 | 1.15                     | 1.45                  | SPT       | 1                      | 2  | 2                               | 3  | 5  | 8  | N=18                 |                                  |
| M02             | 2.00                 | 2.15                     | 2.45                  | SPT       | 8                      | 10 | 12                              | 12 | 13 | 16 | N=53                 |                                  |
| M03             | 1.00                 | 1.15                     | 1.45                  | CPT       | 2                      | 2  | 2                               | 3  | 2  | 3  | N=10                 |                                  |
| M03             | 2.00                 | 2.15                     | 2.45                  | CPT       | 3                      | 4  | 5                               | 16 | 17 | 19 | N=57                 |                                  |
| M04             | 1.00                 | 1.15                     | 1.45                  | CPT       | 1                      | 1  | 4                               | 2  | 2  | 3  | N=11                 |                                  |
| M04             | 2.00                 | 2.15                     | 2.45                  | CPT       | 3                      | 4  | 12                              | 12 | 12 | 15 | N=51                 |                                  |
| M05             | 1.00                 | 1.15                     | 1.45                  | CPT       | 7                      | 10 | 10                              | 12 | 14 | 22 | N=58                 |                                  |
| M06             | 1.00                 | 1.15                     | 1.45                  | SPT       | 1                      | 2  | 2                               | 3  | 3  | 5  | N=13                 |                                  |
| M06             | 2.00                 | 2.15                     | 2.45                  | SPT       | 7                      | 9  | 12                              | 12 | 14 | 15 | N=53                 |                                  |
| M07             | 1.00                 | 1.15                     | 1.45                  | CPT       | 1                      | 1  | 1                               | 3  | 5  | 7  | N=16                 |                                  |
| M07             | 2.00                 | 2.15                     | 2.38                  | CPT       | 8                      | 11 | 15                              | 15 | 20 |    | 50/225mm             |                                  |
| M08             | 1.00                 | 1.15                     | 1.45                  | CPT       | 1                      | 1  | 3                               | 10 | 17 | 21 | N=51                 |                                  |
| M09             | 1.00                 | 1.08                     | 1.23                  | SPT       | 30                     |    | 30                              | 20 |    |    | 30*/75mm<br>50/150mm |                                  |
| M10             | 0.70                 | 0.78                     | 0.95                  | SPT       | 25                     |    | 35                              | 15 |    |    | 25*/75mm<br>50/175mm |                                  |
| M11             | 1.00                 | 1.15                     | 1.38                  | SPT       | 13                     | 13 | 15                              | 15 | 20 |    | 50/225mm             |                                  |
| M12             | 1.00                 | 1.15                     | 1.45                  | SPT       | 3                      | 4  | 5                               | 5  | 6  | 8  | N=24                 |                                  |
| M12             | 1.80                 | 1.95                     | 2.25                  | SPT       | 9                      | 10 | 12                              | 12 | 14 | 14 | N=52                 |                                  |
| M13             | 1.00                 | 1.15                     | 1.30                  | SPT       | 14                     | 18 | 25                              | 25 |    |    | 50/150mm             |                                  |



### VERTICAL DEFORMATION TESTS.

BS 1377 : Part 9 : 1990.

Date of Test: 26-May-17

Test Position: 1

Depth (m): 0.10

Plate Area (m<sup>2</sup>): 0.1625971

Type of Kentledge: Wheeled

Maximum Applied Pressure (kPa):

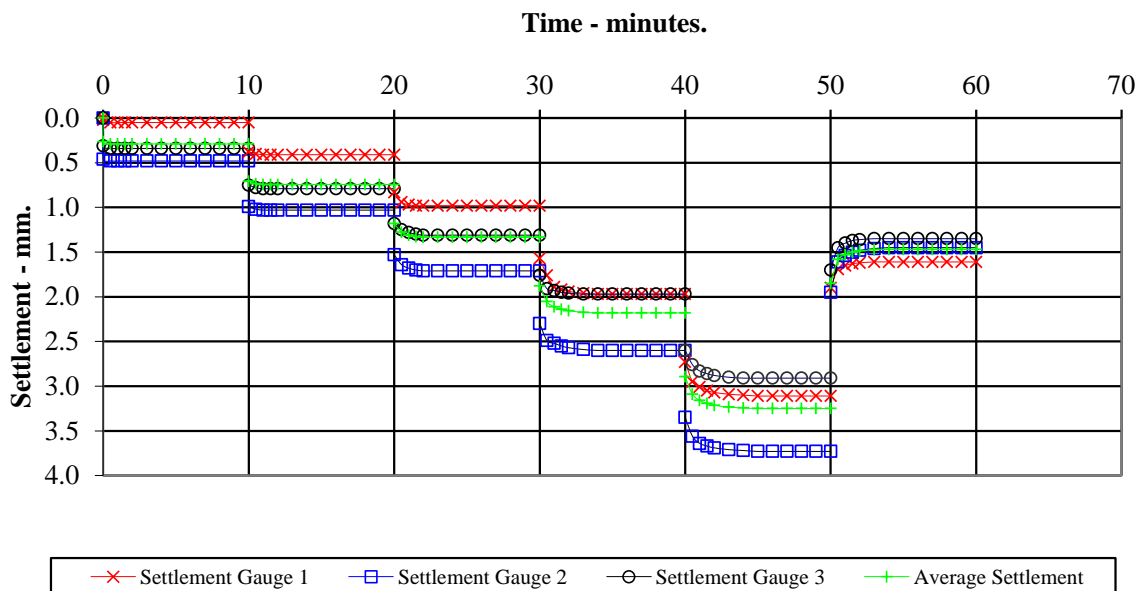
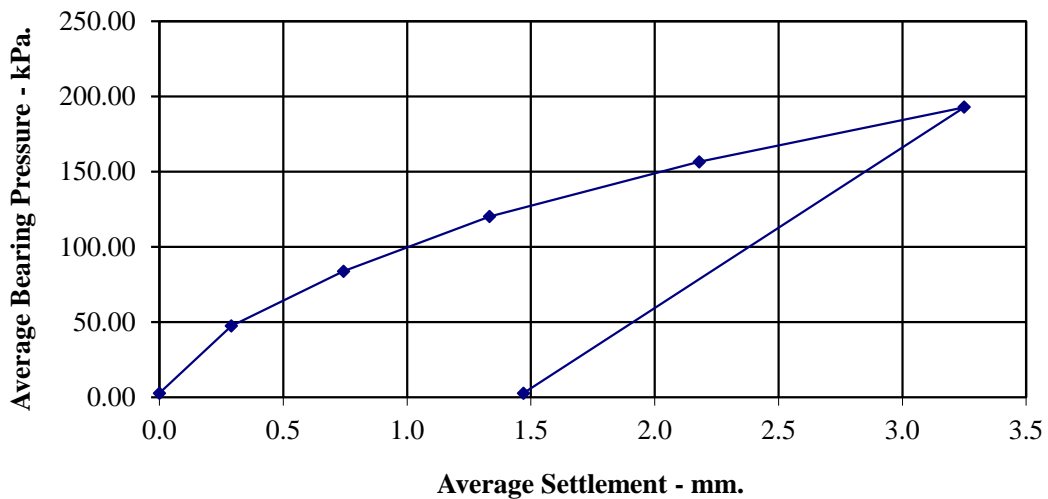
192.83

Maximum Deformation (mm):

3.25

Description:


Brown Mudstone



| Compiled By            | Date     | Checked By         | Date     | Approved By        | Date     | Contract No. |
|------------------------|----------|--------------------|----------|--------------------|----------|--------------|
| <i>[Signature]</i>     | 26/05/17 | <i>[Signature]</i> | 26/05/17 | <i>[Signature]</i> | 26/05/17 | PSL17/2499   |
| Captiol Park, Barnsley |          |                    |          |                    |          | Page of      |

**Calculation of Equivalent CBR Value from Plate Bearing Test**  
Design Manual for Roads and Bridges Volume 7 Section 2 Chapter 4  
Incorporating IAN 73/06

|   |                |                       |
|---|----------------|-----------------------|
| Date of Test                                    | 26-May-17      |                       |
| Test Position                                   | 1              |                       |
| Depth (m)                                       | 0.10           |                       |
| Description                                     | Brown Mudstone |                       |
| Maximum Deflection                              | 3.25           | mm                    |
| Deflection required for CBR value               | 1.25           | mm                    |
| Load(@1.25mm)                                   | 115.0          | kN/m <sup>2</sup>     |
| Plate diameter                                  | 455            | mm                    |
| Conversion factor for plate diameter            | 0.629          |                       |
| K <sub>762</sub> (modulus of subgrade reaction) | 57.9           | kN/m <sup>2</sup> /mm |
| CBR Value                                       | 10.9           | %                     |

| Checked/Approved  | Date     |
|---|----------|
|  | 26/05/17 |

Captiol Park, Barnsley

Contract No.  
PSL17/2499

### VERTICAL DEFORMATION TESTS.

BS 1377 : Part 9 : 1990.

Date of Test: 26-May-17

Test Position: 2

Depth (m): 0.10

Plate Area (m<sup>2</sup>): 0.1625971

Type of Kentledge: Wheeled

Maximum Applied Pressure (kPa):

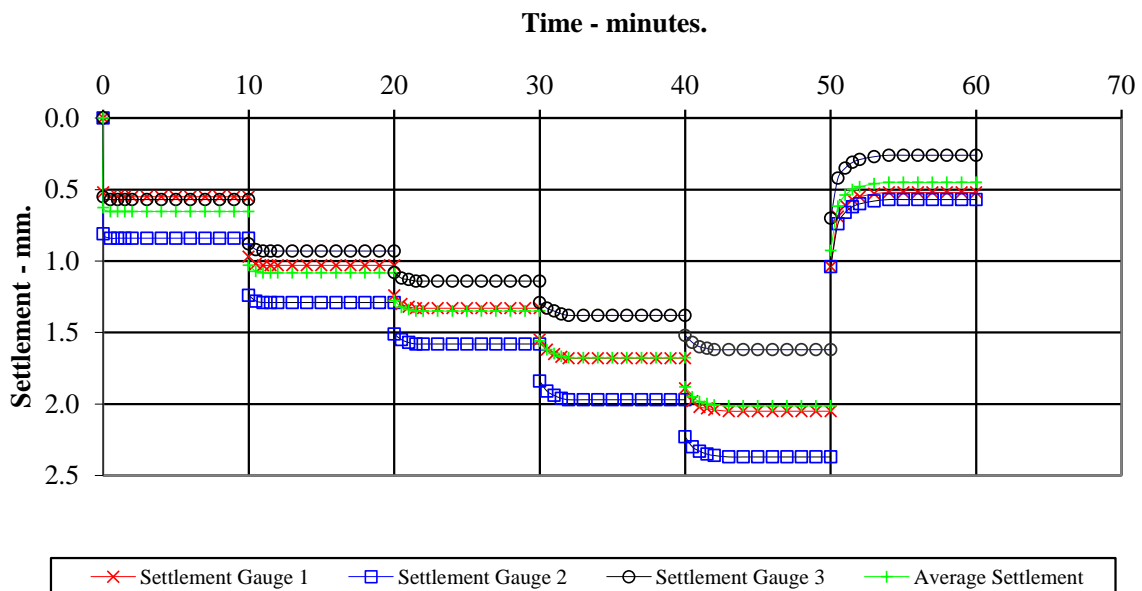
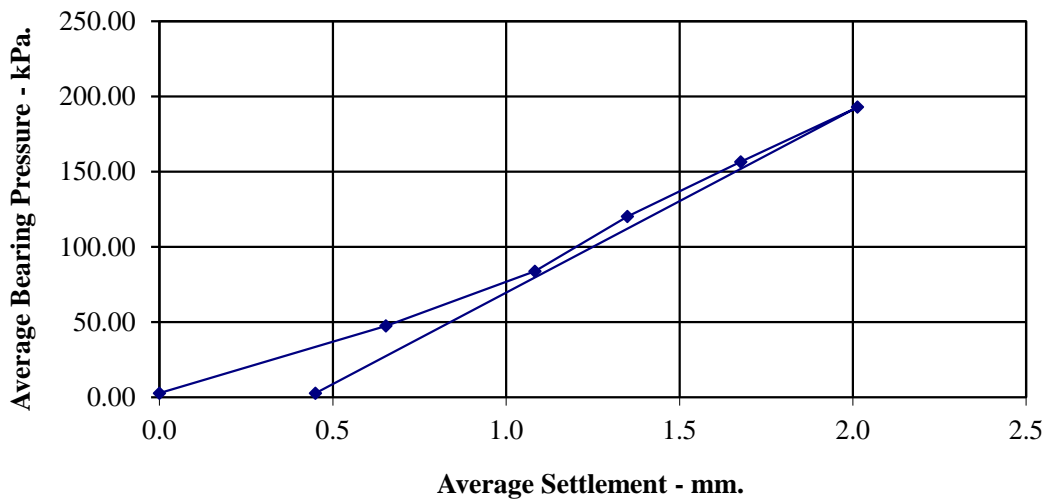
192.83

Maximum Deformation (mm):

2.01

Description:


Brown Mudstone



| Compiled By            | Date     | Checked By         | Date     | Approved By        | Date     | Contract No. |
|------------------------|----------|--------------------|----------|--------------------|----------|--------------|
| <i>[Signature]</i>     | 26/05/17 | <i>[Signature]</i> | 26/05/17 | <i>[Signature]</i> | 26/05/17 | PSL17/2499   |
| Captiol Park, Barnsley |          |                    |          |                    |          | Page of      |

**Calculation of Equivalent CBR Value from Plate Bearing Test**  
Design Manual for Roads and Bridges Volume 7 Section 2 Chapter 4  
Incorporating IAN 73/06

|  |                |                       |
|--|----------------|-----------------------|
| Date of Test                             | 26-May-17      |                       |
| Test Position                            | 2              |                       |
| Depth (m)                                | 0.10           |                       |
| Description                              | Brown Mudstone |                       |
| Maximum Deflection                       | 2.01           | mm                    |
| Deflection required for CBR value        | 1.25           | mm                    |
| Load(@1.25mm)                            | 108.0          | kN/m <sup>2</sup>     |
| Plate diameter                           | 455            | mm                    |
| Conversion factor for plate diameter     | 0.629          |                       |
| $K_{762}$ (modulus of subgrade reaction) | 54.4           | kN/m <sup>2</sup> /mm |
| CBR Value                                | 9.8            | %                     |

| Checked/Approved  | Date     |
|---|----------|
|  | 26/05/17 |

Captiol Park, Barnsley

Contract No.  
PSL17/2499

### VERTICAL DEFORMATION TESTS.

BS 1377 : Part 9 : 1990.

Date of Test: 26-May-17

Test Position: 3

Depth (m): 0.10

Plate Area (m<sup>2</sup>): 0.1625971

Type of Kentledge: Wheeled

Maximum Applied Pressure (kPa):

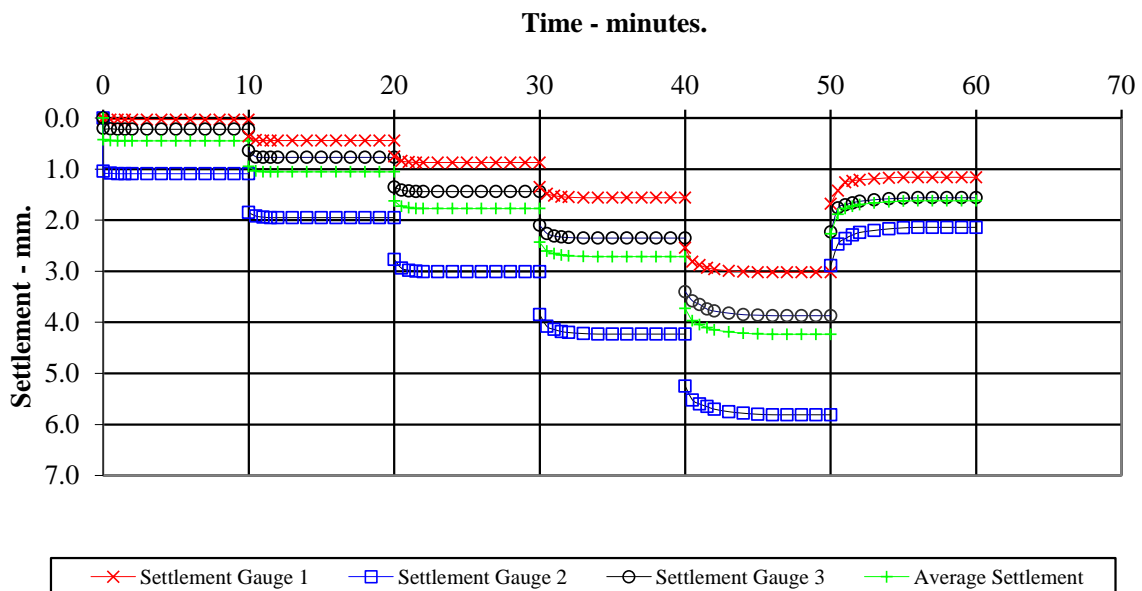
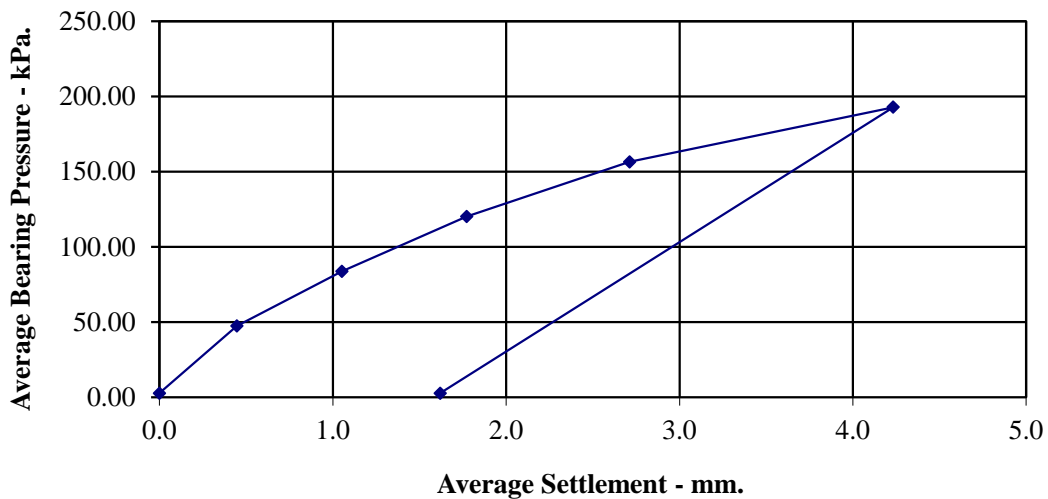
192.83

Maximum Deformation (mm):

4.23

Description:


Brown Mudstone



| Compiled By                   | Date     | Checked By         | Date     | Approved By        | Date     | Contract No. |
|-------------------------------|----------|--------------------|----------|--------------------|----------|--------------|
| <i>[Signature]</i>            | 26/05/17 | <i>[Signature]</i> | 26/05/17 | <i>[Signature]</i> | 26/05/17 | PSL17/2499   |
| <b>Captiol Park, Barnsley</b> |          |                    |          |                    |          | Page of      |

**Calculation of Equivalent CBR Value from Plate Bearing Test**  
Design Manual for Roads and Bridges Volume 7 Section 2 Chapter 4  
Incorporating IAN 73/06

|  |                |                       |
|--|----------------|-----------------------|
| Date of Test                             | 26-May-17      |                       |
| Test Position                            | 3              |                       |
| Depth (m)                                | 0.10           |                       |
| Description                              | Brown Mudstone |                       |
| Maximum Deflection                       | 4.23           | mm                    |
| Deflection required for CBR value        | 1.25           | mm                    |
| Load(@1.25mm)                            | 95.0           | kN/m <sup>2</sup>     |
| Plate diameter                           | 455            | mm                    |
| Conversion factor for plate diameter     | 0.629          |                       |
| $K_{762}$ (modulus of subgrade reaction) | 47.8           | kN/m <sup>2</sup> /mm |
| CBR Value                                | 7.9            | %                     |

| Checked/Approved  | Date     |
|---|----------|
|  | 26/05/17 |

Captiol Park, Barnsley

Contract No.  
PSL17/2499

## **LABORATORY TEST RESULTS**



# SUB SURFACE

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

## Laboratory Test Results

Site : CAPITOL PARK, DODWORTH, BARNSLEY, SOUTH YORKSHIRE

Client : CARNELL MANAGEMENT SERVICES LIMITED

Engineer : WILLIAM SAUNDERS

Job Number

NE3608

Sheet

1 / 1

### DETERMINATION OF MOISTURE CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY AND LIQUIDITY INDEX

| Borehole/<br>Trial Pit | Depth<br>(m) | Sample | Natural<br>Moisture<br>Content<br>% | Sample Passing<br>425µm Sieve |                          | Liquid<br>Limit<br>% | Plastic<br>Limit<br>% | Plasticity<br>Index<br>% | Liquidity<br>Index | Group<br>Symbol | Laboratory Description   |
|------------------------|--------------|--------|-------------------------------------|-------------------------------|--------------------------|----------------------|-----------------------|--------------------------|--------------------|-----------------|--|
|                        |              |        |                                     | Percentage<br>%               | Moisture<br>Content<br>% |                      |                       |                          |                    |                 |  |
| M01                    | 0.80         | C      | 28                                  | 93                            | 30                       | 55                   | 27                    | 28                       | 0.11               | CH              | MADE GROUND: extremely weak grey with orange and light brown mottled highly weathered mudstone fragments with occasional sandstone cobble. Completely weathered to clay in places. |
| M03                    | 0.80         | C      | 22                                  | 83                            | 27                       | 55                   | 26                    | 29                       | 0.03               | CH              | MADE GROUND: extremely weak grey with orange and light brown mottled highly weathered mudstone fragments with occasional cobble. Completely weathered to clay in places.           |
| M03                    | 1.70         | C      | 23                                  | 84                            | 27                       | 53                   | 23                    | 30                       | 0.13               | CH              | Light grey with light brown mottled slightly sandy silty CLAY. Possible made ground.   |
| M04                    | 1.10         | C      | 27                                  | 98                            | 28                       | 49                   | 25                    | 24                       | 0.13               | CI              | Brown and greyish brown with orange mottled slightly gravelly silty CLAY. Gravel is subangular fine to coarse coal and mudstone (possible made ground).                            |
| M09                    | 0.50         | C      | 21                                  | 85                            | 25                       | 46                   | 24                    | 22                       | 0.05               | CI              | Extremely weak light greyish brown with orange mottled highly weathered MUDSTONE. Completely weathered to clay in places (possibly made ground to 1.00m).                          |
| M11                    | 0.80         | C      | 9                                   |                               |                          |                      |                       |                          |                    |                 | Extremely weak light greyish brown with occasional light brown mottled highly weathered MUDSTONE completely weathered to clay in places (possibly made ground to 1.00m).           |
| M12                    | 0.80         | C      | 17                                  | 96                            | 18                       | 47                   | 24                    | 23                       | -0.26              | CI              | Extremely weak light brown and light grey highly weathered MUDSTONE completely weathered to clay in places.  |

Method of Preparation : BS 1377:PART 1:1990:7.4 Preparation of samples for classification tests BS 1377:PART 2:1990:4.2 & 5.2 Sample preparations

Method of Test : BS 1377:PART 2:1990:3 Determination of moisture content 1990:4 Determination of the liquid limit BS 1377:PART 2:1990:5 Determination of the plastic limit and plasticity index

Remarks :



# SUB SURFACE

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

## Laboratory Test Results

Site: CAPITOL PARK, DODWORTH, BARNSELY, SOUTH YORKSHIRE

Job No.

NE3608

Client: CARNELL MANAGEMENT SERVICES LIMITED

Sheet:

1 / 1

Engineer: WILLIAM SAUNDERS

### DETERMINATION OF PARAMETERS FOR ASSESSMENT OF PYRITIC GROUND AND BURIED CONCRETE

| Hole No | Depth (m) | Sample | pH (no units) | Soluble Sulphate 2:1 (g/l) | Total Sulphate (%) | Total Sulphur (%) | Magnesium 2:1 (g/l) | Chloride 2:1 (g/l) | Nitrate 2:1 (g/l) | Ammonia 2:1 (g/l) | Descriptions  |
|---------|-----------|--------|---------------|----------------------------|--------------------|-------------------|---------------------|--------------------|-------------------|-------------------|---|
| M02     | 0.60      | C      | 7.3           | 0.09                       |                    |                   |                     |                    |                   |                   | MADE GROUND: soft light brown with grey mottled slightly sandy silty clay.  |
| M03     | 1.80      | C      | <b>4.7</b>    | 0.04                       | 0.05               | 0.03              | <0.01               |                    |                   |                   | Firm medium strength light grey with light brown mottled slightly sandy silty CLAY. Possible made ground.   |
| M05     | 0.50      | C      | <b>5.2</b>    | <0.01                      |                    |                   |                     |                    |                   |                   | Firm to light greyish brown with occasional orange mottled friable clayey SILT.   |
| M08     | 0.70      | C      | <b>5.5</b>    | 0.05                       |                    |                   |                     |                    |                   |                   | Extremely weak light grey and light brown with orange mottled and dark grey in places highly weathered MUDSTONE. Completely weathered to clay in most places. |
| M10     | 0.50      | C      | 7.9           | <0.01                      |                    |                   |                     |                    |                   |                   | Extremely weak grey moderately weathered MUDSTONE partially weathered to clay in places (possibly made ground to 0.70m).                                      |
| M12     | 1.60      | C      | 7.3           | 0.01                       | <0.01              | <0.01             | 0.01                |                    |                   |                   | Extremely weak light brown and light grey highly weathered MUDSTONE completely weathered to clay in places.   |
|         |           |        |               |                            |                    |                   |                     |                    |                   |                   |   |
|         |           |        |               |                            |                    |                   |                     |                    |                   |                   |   |
|         |           |        |               |                            |                    |                   |                     |                    |                   |                   |   |

Remarks :

**Bold** pH values indicate acidic ground.



# SUB SURFACE

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

BRE Special Digest 1

## AGGRESSIVE CHEMICAL ENVIRONMENT FOR CONCRETE (ACEC) SITE CLASSIFICATION

**Table C1 Aggressive Chemical Environment for Concrete (ACEC) classification for natural ground locations<sup>a</sup>**

| Design Sulfate Class for Location | 2:1 water/soil extract <sup>b</sup> | Groundwater              | Total potential sulfate <sup>c</sup> | Groundwater       |                    | ACEC Class for location         |
|-----------------------------------|-------------------------------------|--------------------------|--------------------------------------|-------------------|--------------------|---------------------------------|
|                                   |                                     |                          |                                      | Static water      | Mobile water       |                                 |
| 1                                 | 2 (SO <sub>4</sub> mg/l)            | 3 (SO <sub>4</sub> mg/l) | 4 (SO <sub>4</sub> %)                | 5 (pH)            | 6 (pH)             | 7                               |
| DS-1                              | <500                                | <400                     | <0.24                                | ≥2.5              | >5.5d<br>2.5 - 5.5 | AC-1s<br>AC-1d<br>AC-2z         |
| DS-2                              | 500 - 1500                          | 400 - 1400               | 0.24 - 0.6                           | >3.5<br>2.5-3.5   | >5.5<br>2.5 - 5.5  | AC-1s<br>AC-2<br>AC-2s<br>AC-3z |
| DS-3                              | 1600-3000                           | 1500-3000                | 0.7 - 1.2                            | >3.5<br>2.5 - 3.5 | >5.5<br>2.5 - 5.5  | AC-2s<br>AC-3<br>AC-3s<br>AC-4  |
| DS-4                              | 3100 - 6000                         | 3100 - 6000              | 1.3 - 2.4                            | >3.5<br>2.5 - 3.5 | >5.5<br>2.5 - 5.5  | AC-3s<br>AC-4<br>AC-4s<br>AC-5  |
| DS-5                              | >6000                               | >6000                    | >2.4                                 | >3.5<br>2.5 - 3.5 | ≥2.5               | AC-4s<br>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 (SO<sub>4</sub>) which may result from the oxidation of sulfides (eg pyrite) following ground disturbance (Appendix A1 and Box C8).
- d For flowing water that is potentially aggressive to concrete owing to high purity or an aggressive carbon dioxide level greater than 15mg/l (Section C2.2.3), increase the ACEC Class to AC-2z.

### Explanation of suffix symbols to ACEC Class

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

**Table C2 Aggressive Chemical Environment for Concrete (ACEC) classification for brownfield locations<sup>a</sup>**

| Design Sulfate Class for Location | 2:1 water/soil extract <sup>b</sup> | Groundwater        | Total potential sulfate <sup>c</sup> | Groundwater        |  | ACEC Class for location                           |                     |                                   |
|-----------------------------------|-------------------------------------|--------------------|--------------------------------------|--------------------|--|---|---------------------|-----------------------------------|
|                                   |                                     |                    |                                      | Static water       | Mobile water   |   |                     |                                   |
| 1                                 | 2 (SO <sub>4</sub> mg/l)            | 3 (Mg mg/l)        | 4 (SO <sub>4</sub> mg/l)             | 5 (Mg mg/l)        | 6 (SO <sub>4</sub> %)                                    | 7 (pH) <sup>d</sup>                               | 8 (pH) <sup>d</sup> | 9                                 |
| DS-1                              | <500                                | <400               | <0.24                                | ≥2.5               | >6.5 <sup>d</sup><br>5.5 - 6.5<br>4.5 - 5.5<br>2.5 - 4.5 | AC-1s<br>AC-1<br>AC-2z<br>AC-3z<br>AC-4z          |                     |                                   |
| DS-2                              | 500 - 1500                          | 400 - 1400         | 0.24 - 0.6                           | >5.5<br>2.5 - 5.5  | >6.5<br>5.5 - 6.5<br>4.5 - 5.5<br>2.5 - 5.5              | AC-1s<br>AC-2<br>AC-2s<br>AC-3z<br>AC-4z<br>AC-5z |                     |                                   |
| DS-3                              | 1600 - 3000                         | 1500 - 3000        | 0.7 - 1.2                            | >5.5<br>2.5 - 5.5  | >6.5<br>5.5 - 6.5<br>2.5 - 5.5                           | AC-2s<br>AC-3<br>AC-3s<br>AC-4<br>AC-5            |                     |                                   |
| DS-4                              | 3100 - 6000                         | ≤1200              | 3100 - 6000                          | ≤1000              | 1.3 - 2.4  | >5.5<br>2.5 - 5.5                                 | >6.5                | AC-3s<br>AC-4<br>AC-4s<br>AC-5    |
| DS-4m                             | 3100 - 6000                         | >1200 <sup>e</sup> | 3100 - 6000                          | >1000 <sup>e</sup> | 1.3 - 2.4  | >5.5<br>2.5 - 5.5                                 | >6.5                | AC-3s<br>AC-4m<br>AC-4ms<br>AC-5m |
| DS-5                              | >6000                               | ≤1200              | >6000                                | ≤1000              | >2.4   | >5.5<br>2.5 - 5.5                                 | ≥2.5                | AC-4s<br>AC-5                     |
| DS-5m                             | >6000                               | >1200 <sup>e</sup> | >6000                                | >1000 <sup>e</sup> | >2.4   | >5.5<br>2.5 - 5.5                                 | ≥2.5                | AC-4ms<br>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 (SO<sub>4</sub>) which may result from the oxidation of sulfides (eg pyrite) following ground disturbance (Appendix A1 and Box C8).
- d An additional account is taken of hydrochloric and nitric acids by adjustment to sulfate content (Section C5.1.3).
- e The limit on water-soluble magnesium does not apply to brackish groundwater (chloride content between 12 000 mg/l and 17 000 mg/l). This allows 'm' to be omitted from the relevant ACEC Classification. Seawater (chloride content about 18 000 mg/l) and stronger brines are not covered by this table.

### Explanation of suffix symbols to ACEC Class

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

## **CONTAMINATION ANALYSIS RESULTS**



## Final Report

---

**Report No.:** 17-13677-1

**Initial Date of Issue:** 09-Jun-2017

**Client** Sub Surface

**Client Address:** 3 Peel Street  
Preston  
Lancashire  
PR2 2QS

**Contact(s):** Simon Gabbatt

**Project** (NE3608) Capitol Park, Dodworth, Barnsley, South Yorkshire

**Quotation No.:** **Date Received:** 02-Jun-2017

**Order No.:** **Date Instructed:** 02-Jun-2017

**No. of Samples:** 12

**Turnaround (Wkdays):** 5 **Results Due:** 08-Jun-2017

**Date Approved:** 09-Jun-2017

**Approved By:**

**Details:** Robert Monk, Technical Development  
Chemist

---

## Bulk Identification Certificate

**Client:** Sub Surface

**Your Ref.:**

**Site Address:**

**Project:** (NE3608) Capitol Park, Dodworth, Barnsley, South Yorkshire

**Date Sampled:** 16-May-2017

**Job Number:** 17-13677

**Date Received:** 02-Jun-2017

**No Samples:**

**Date Reported:** 09-Jun-2017

| Sample No. | Sample Ref. | Description | SOP  | Accred. | Laboratory | Material   | Result               |
|------------|-------------|-------------|------|---------|------------|------------|----------------------|
| 461091     | 171         | M8          | 2185 | U       | COVENTRY   | Cloth/Wrap | No Asbestos Detected |

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

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

Comments and interpretations are beyond the scope of UKAS accreditation.

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

Project: (NE3608) Capitol Park, Dodworth, South Yorkshire

| Client: Sub Surface                 | Chemtest Job No.:    |      |       |       |            | 17-13677   | 17-13677   | 17-13677   | 17-13677   | 17-13677 | 17-13677 |
|-------------------------------------|----------------------|------|-------|-------|------------|------------|------------|------------|------------|----------|----------|
| Quotation No.:                      | Chemtest Sample ID.: |      |       |       |            | 461080     | 461081     | 461082     | 461083     | 461084   | 461085   |
| Order No.:                          | Client Sample Ref.:  |      |       |       |            | M01        | M04        | M08        | M10        | M12      | M02      |
|                                     | Client Sample ID.:   |      |       |       |            | 163        | 155        | 172        | 174        | 176      | 161      |
|                                     | Sample Type:         |      |       |       |            | SOIL       | SOIL       | SOIL       | SOIL       | SOIL     | SOIL     |
|                                     | Top Depth (m):       |      |       |       |            | 0.20       | 0.70       | 1.00       | 0.40       | 0.20     | 0.60     |
|                                     | Bottom Depth (m):    |      |       |       |            |            |            | 1.50       |            |          |          |
|                                     | Date Sampled:        |      |       |       |            | 16/05/17   | 16/05/17   | 16/05/17   | 16/05/17   | 16/05/17 | 16/05/17 |
| Determinand                         | Accred.              | SOP  | Units | LOD   |            |            |            |            |            |          |          |
| Moisture                            | N                    | 2030 | %     | 0.020 | 14         | 11         | 13         | 6.0        | 17         | 57       |          |
| Stones                              | N                    | 2030 | %     | 0.020 |            |            |            |            |            |          |          |
| pH                                  | U                    | 2010 |       | N/A   | 7.7        | 8.2        | 8.1        | 8.1        | 5.2        | 7.3      |          |
| Sulphate (2:1 Water Soluble) as SO4 | U                    | 2120 | g/l   | 0.010 |            |            |            |            |            | 0.088    |          |
| Sulphate (Acid Soluble)             | U                    | 2430 | %     | 0.010 |            |            |            |            |            |          |          |
| Total Sulphur                       | U                    | 2175 | %     | 0.010 |            |            |            |            |            |          |          |
| Magnesium (Water Soluble)           | N                    | 2120 | g/l   | 0.010 |            |            |            |            |            |          |          |
| Boron (Hot Water Soluble)           | U                    | 2120 | mg/kg | 0.40  | < 0.40     | < 0.40     | 0.41       | < 0.40     | < 0.40     |          |          |
| Cyanide (Total)                     | U                    | 2300 | mg/kg | 0.50  | [B] < 0.50 | [B] < 0.50 | [B] < 0.50 | [B] < 0.50 | [B] < 0.50 |          |          |
| Sulphide (Easily Liberatable)       | U                    | 2325 | mg/kg | 0.50  | 6.3        | 4.4        | 9.2        | 4.5        | 8.1        |          |          |
| Sulphate (Total)                    | U                    | 2430 | %     | 0.010 | 0.18       | 0.038      | 0.094      | 0.045      | 0.041      |          |          |
| Arsenic                             | U                    | 2450 | mg/kg | 1.0   | 12         | 9.2        | 17         | 6.8        | 9.9        |          |          |
| Cadmium                             | U                    | 2450 | mg/kg | 0.10  | 0.13       | < 0.10     | 0.18       | < 0.10     | < 0.10     |          |          |
| Chromium                            | U                    | 2450 | mg/kg | 1.0   | 21         | 18         | 150        | 29         | 22         |          |          |
| Copper                              | U                    | 2450 | mg/kg | 0.50  | 32         | 31         | 42         | 35         | 26         |          |          |
| Mercury                             | U                    | 2450 | mg/kg | 0.10  | 0.11       | < 0.10     | 0.21       | < 0.10     | < 0.10     |          |          |
| Nickel                              | U                    | 2450 | mg/kg | 0.50  | 32         | 41         | 56         | 51         | 27         |          |          |
| Lead                                | U                    | 2450 | mg/kg | 0.50  | 47         | 21         | 33         | 24         | 18         |          |          |
| Selenium                            | U                    | 2450 | mg/kg | 0.20  | < 0.20     | < 0.20     | < 0.20     | < 0.20     | < 0.20     |          |          |
| Zinc                                | U                    | 2450 | mg/kg | 0.50  | 83         | 89         | 100        | 110        | 72         |          |          |
| Chromium (Hexavalent)               | N                    | 2490 | mg/kg | 0.50  | < 0.50     | < 0.50     | < 0.50     | < 0.50     | < 0.50     |          |          |
| TPH >C6-C10                         | N                    | 2670 | mg/kg | 1.0   | [B] 3.9    | [B] < 1.0  | [B] < 1.0  | [B] < 1.0  | [B] < 1.0  |          |          |
| TPH >C10-C21                        | N                    | 2670 | mg/kg | 1.0   | [B] 110    | [B] < 1.0  | [B] 17     | [B] < 1.0  | [B] < 1.0  |          |          |
| TPH >C21-C40                        | N                    | 2670 | mg/kg | 1.0   | [B] 530    | [B] < 1.0  | [B] 90     | [B] < 1.0  | [B] < 1.0  |          |          |
| Total TPH >C6-C40                   | U                    | 2670 | mg/kg | 10    | [B] 640    | [B] < 10   | [B] 110    | [B] < 10   | [B] < 10   |          |          |
| Naphthalene                         | U                    | 2700 | mg/kg | 0.10  | < 0.10     | < 0.10     | 1.0        | < 0.10     | < 0.10     |          |          |
| Acenaphthylene                      | U                    | 2700 | mg/kg | 0.10  | < 0.10     | < 0.10     | 0.19       | < 0.10     | < 0.10     |          |          |
| Acenaphthene                        | U                    | 2700 | mg/kg | 0.10  | < 0.10     | < 0.10     | 0.33       | < 0.10     | < 0.10     |          |          |
| Fluorene                            | U                    | 2700 | mg/kg | 0.10  | < 0.10     | < 0.10     | 0.32       | < 0.10     | < 0.10     |          |          |
| Phenanthrene                        | U                    | 2700 | mg/kg | 0.10  | < 0.10     | < 0.10     | 3.4        | 1.0        | < 0.10     |          |          |
| Anthracene                          | U                    | 2700 | mg/kg | 0.10  | < 0.10     | < 0.10     | 0.72       | 0.12       | < 0.10     |          |          |
| Fluoranthene                        | U                    | 2700 | mg/kg | 0.10  | < 0.10     | < 0.10     | 5.3        | 0.22       | < 0.10     |          |          |
| Pyrene                              | U                    | 2700 | mg/kg | 0.10  | < 0.10     | < 0.10     | 5.5        | 0.32       | < 0.10     |          |          |
| Benzo[a]anthracene                  | U                    | 2700 | mg/kg | 0.10  | < 0.10     | < 0.10     | 3.3        | < 0.10     | < 0.10     |          |          |
| Chrysene                            | U                    | 2700 | mg/kg | 0.10  | < 0.10     | < 0.10     | 3.1        | < 0.10     | < 0.10     |          |          |
| Benzo[b]fluoranthene                | U                    | 2700 | mg/kg | 0.10  | < 0.10     | < 0.10     | 4.1        | < 0.10     | < 0.10     |          |          |
| Benzo[k]fluoranthene                | U                    | 2700 | mg/kg | 0.10  | < 0.10     | < 0.10     | 1.5        | < 0.10     | < 0.10     |          |          |
| Benzo[a]pyrene                      | U                    | 2700 | mg/kg | 0.10  | < 0.10     | < 0.10     | 3.0        | < 0.10     | < 0.10     |          |          |
| Indeno(1,2,3-c,d)Pyrene             | U                    | 2700 | mg/kg | 0.10  | < 0.10     | < 0.10     | 2.6        | < 0.10     | < 0.10     |          |          |
| Dibenz(a,h)Anthracene               | U                    | 2700 | mg/kg | 0.10  | < 0.10     | < 0.10     | < 0.10     | 1.2        | < 0.10     |          |          |
| Benzo[g,h,i]perylene                | U                    | 2700 | mg/kg | 0.10  | < 0.10     | < 0.10     | < 0.10     | 1.9        | < 0.10     |          |          |
| Total Of 16 PAH's                   | U                    | 2700 | mg/kg | 2.0   | < 2.0      | < 2.0      | 34         | 4.7        | < 2.0      |          |          |
| Benzene                             | U                    | 2760 | µg/kg | 1.0   | [B] < 1.0  | [B] < 1.0  | [B] < 1.0  | [B] < 1.0  | [B] < 1.0  |          |          |
| Toluene                             | U                    | 2760 | µg/kg | 1.0   | [B] < 1.0  | [B] < 1.0  | [B] < 1.0  | [B] < 1.0  | [B] < 1.0  |          |          |
| Ethylbenzene                        | U                    | 2760 | µg/kg | 1.0   | [B] < 1.0  | [B] < 1.0  | [B] < 1.0  | [B] < 1.0  | [B] < 1.0  |          |          |
| m & p-Xylene                        | U                    | 2760 | µg/kg | 1.0   | [B] < 1.0  | [B] < 1.0  | [B] < 1.0  | [B] < 1.0  | [B] < 1.0  |          |          |
| o-Xylene                            | U                    | 2760 | µg/kg | 1.0   | [B] < 1.0  | [B] < 1.0  | [B] < 1.0  | [B] < 1.0  | [B] < 1.0  |          |          |
| Methyl Tert-Butyl Ether             | U                    | 2760 | µg/kg | 1.0   | [B] < 1.0  | [B] < 1.0  | [B] < 1.0  | [B] < 1.0  | [B] < 1.0  |          |          |
| Total Phenols                       | U                    | 2920 | mg/kg | 0.30  | < 0.30     | < 0.30     | < 0.30     | < 0.30     | < 0.30     |          |          |

Project: (NE3608) Capitol Park, Dodworth, South Yorkshire

| Client: Sub Surface                 | Chemtest Job No.:    |      |       |       |         | 17-13677 | 17-13677 | 17-13677 | 17-13677 | 17-13677 |
|-------------------------------------|----------------------|------|-------|-------|---------|----------|----------|----------|----------|----------|
| Quotation No.:                      | Chemtest Sample ID.: |      |       |       |         | 461086   | 461087   | 461088   | 461089   | 461090   |
| Order No.:                          | Client Sample Ref.:  |      |       |       |         | M03      | M05      | M08      | M10      | M12      |
|                                     | Client Sample ID.:   |      |       |       |         | 160      | 154      | 171      | 174      | 177      |
|                                     | Sample Type:         |      |       |       |         | SOIL     | SOIL     | SOIL     | SOIL     | SOIL     |
|                                     | Top Depth (m):       |      |       |       |         | 1.80     | 0.50     | 0.70     | 0.50     | 1.60     |
|                                     | Bottom Depth (m):    |      |       |       |         |          |          |          |          |          |
|                                     | Date Sampled:        |      |       |       |         | 16/05/17 | 16/05/17 | 16/05/17 | 16/05/17 | 16/05/17 |
| Determinand                         | Accred.              | SOP  | Units | LOD   |         |          |          |          |          |          |
| Moisture                            | N                    | 2030 | %     | 0.020 | 15      | 13       | 16       | 6.1      | 8.7      |          |
| Stones                              | N                    | 2030 | %     | 0.020 | < 0.020 |          |          |          |          | < 0.020  |
| pH                                  | U                    | 2010 |       | N/A   | 4.7     | 5.2      | 5.5      | 7.9      | 7.3      |          |
| Sulphate (2:1 Water Soluble) as SO4 | U                    | 2120 | g/l   | 0.010 | 0.043   | < 0.010  | 0.053    | < 0.010  | 0.011    |          |
| Sulphate (Acid Soluble)             | U                    | 2430 | %     | 0.010 | 0.052   |          |          |          |          | < 0.010  |
| Total Sulphur                       | U                    | 2175 | %     | 0.010 | 0.028   |          |          |          |          | < 0.010  |
| Magnesium (Water Soluble)           | N                    | 2120 | g/l   | 0.010 | < 0.010 |          |          |          |          | 0.011    |
| Boron (Hot Water Soluble)           | U                    | 2120 | mg/kg | 0.40  |         |          |          |          |          |          |
| Cyanide (Total)                     | U                    | 2300 | mg/kg | 0.50  |         |          |          |          |          |          |
| Sulphide (Easily Liberatable)       | U                    | 2325 | mg/kg | 0.50  |         |          |          |          |          |          |
| Sulphate (Total)                    | U                    | 2430 | %     | 0.010 |         |          |          |          |          |          |
| Arsenic                             | U                    | 2450 | mg/kg | 1.0   |         |          |          |          |          |          |
| Cadmium                             | U                    | 2450 | mg/kg | 0.10  |         |          |          |          |          |          |
| Chromium                            | U                    | 2450 | mg/kg | 1.0   |         |          |          |          |          |          |
| Copper                              | U                    | 2450 | mg/kg | 0.50  |         |          |          |          |          |          |
| Mercury                             | U                    | 2450 | mg/kg | 0.10  |         |          |          |          |          |          |
| Nickel                              | U                    | 2450 | mg/kg | 0.50  |         |          |          |          |          |          |
| Lead                                | U                    | 2450 | mg/kg | 0.50  |         |          |          |          |          |          |
| Selenium                            | U                    | 2450 | mg/kg | 0.20  |         |          |          |          |          |          |
| Zinc                                | U                    | 2450 | mg/kg | 0.50  |         |          |          |          |          |          |
| Chromium (Hexavalent)               | N                    | 2490 | mg/kg | 0.50  |         |          |          |          |          |          |
| TPH >C6-C10                         | N                    | 2670 | mg/kg | 1.0   |         |          |          |          |          |          |
| TPH >C10-C21                        | N                    | 2670 | mg/kg | 1.0   |         |          |          |          |          |          |
| TPH >C21-C40                        | N                    | 2670 | mg/kg | 1.0   |         |          |          |          |          |          |
| Total TPH >C6-C40                   | U                    | 2670 | mg/kg | 10    |         |          |          |          |          |          |
| Naphthalene                         | U                    | 2700 | mg/kg | 0.10  |         |          |          |          |          |          |
| Acenaphthylene                      | U                    | 2700 | mg/kg | 0.10  |         |          |          |          |          |          |
| Acenaphthene                        | U                    | 2700 | mg/kg | 0.10  |         |          |          |          |          |          |
| Fluorene                            | U                    | 2700 | mg/kg | 0.10  |         |          |          |          |          |          |
| Phenanthrene                        | U                    | 2700 | mg/kg | 0.10  |         |          |          |          |          |          |
| Anthracene                          | U                    | 2700 | mg/kg | 0.10  |         |          |          |          |          |          |
| Fluoranthene                        | U                    | 2700 | mg/kg | 0.10  |         |          |          |          |          |          |
| Pyrene                              | U                    | 2700 | mg/kg | 0.10  |         |          |          |          |          |          |
| Benzo[a]anthracene                  | U                    | 2700 | mg/kg | 0.10  |         |          |          |          |          |          |
| Chrysene                            | U                    | 2700 | mg/kg | 0.10  |         |          |          |          |          |          |
| Benzo[b]fluoranthene                | U                    | 2700 | mg/kg | 0.10  |         |          |          |          |          |          |
| Benzo[k]fluoranthene                | U                    | 2700 | mg/kg | 0.10  |         |          |          |          |          |          |
| Benzo[a]pyrene                      | U                    | 2700 | mg/kg | 0.10  |         |          |          |          |          |          |
| Indeno(1,2,3-c,d)Pyrene             | U                    | 2700 | mg/kg | 0.10  |         |          |          |          |          |          |
| Dibenz(a,h)Anthracene               | U                    | 2700 | mg/kg | 0.10  |         |          |          |          |          |          |
| Benzo[g,h,i]perylene                | U                    | 2700 | mg/kg | 0.10  |         |          |          |          |          |          |
| Total Of 16 PAH's                   | U                    | 2700 | mg/kg | 2.0   |         |          |          |          |          |          |
| Benzene                             | U                    | 2760 | µg/kg | 1.0   |         |          |          |          |          |          |
| Toluene                             | U                    | 2760 | µg/kg | 1.0   |         |          |          |          |          |          |
| Ethylbenzene                        | U                    | 2760 | µg/kg | 1.0   |         |          |          |          |          |          |
| m & p-Xylene                        | U                    | 2760 | µg/kg | 1.0   |         |          |          |          |          |          |
| o-Xylene                            | U                    | 2760 | µg/kg | 1.0   |         |          |          |          |          |          |
| Methyl Tert-Butyl Ether             | U                    | 2760 | µg/kg | 1.0   |         |          |          |          |          |          |
| Total Phenols                       | U                    | 2920 | mg/kg | 0.30  |         |          |          |          |          |          |

## Report Information

### Key

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

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

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

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

All Asbestos testing is performed at the indicated laboratory

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

### Sample Deviation Codes

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

### Sample Retention and Disposal

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All soil samples will be retained for a period of 45 days from the date of receipt

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

Charges may apply to extended sample storage

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

[customerservices@chemtest.co.uk](mailto: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  
CAPITOL PARK, DODWORTH, BARNSELY, SOUTH YORKSHIRE

Borehole Number  
**M01**

|                                  |                     |                     |   |                      |
|----------------------------------|---------------------|---------------------|---|----------------------|
| Boring Method<br>MINI PERCUSSIVE | Casing Diameter     | Ground Level (mOD)  | Client<br>CARNELL MANAGEMENT SERVICES LIMITED | Job Number<br>NE3608 |
|                                  | Location<br>AS PLAN | Dates<br>15/05/2017 | Engineer<br>WILLIAM SAUNDERS                  | Sheet<br>1/1         |

| Depth (m)              | Sample / Tests   | Casing Depth (m) | Water Depth (m) | Field Records  | Level (mOD) | Depth (m) (Thickness) | Description  | Legend | Water |
|------------------------|------------------|------------------|-----------------|--|-------------|-----------------------|--|--------|-------|
| 0.00-1.00              | C                |                  |                 | 0.00m to 1.00m - 100% recovery   |             | (0.60)                | MADE GROUND: firm greyish brown gravelly silty clay. Gravel sized fragments are fine to coarse stone, clinker and brick with low stone cobble content.   |        |       |
| 1.00-1.45<br>1.00-1.70 | SPT(C) N=16<br>C |                  |                 | 1,1/3,3,4,6<br><br>1.00m to 2.00m - 100% recovery<br>HV@1.13m, c=70kPa |             | (0.80)<br><br>1.40    | Firm medium strength light grey with light brown and orange mottled slightly gravelly slightly sandy silty CLAY. Gravel is angular to subangular fine to medium mudstone lithorelicts.<br><br>Extremely weak thinly laminated greyish brown highly weathered MUDSTONE. |        |       |
| 1.70-2.15              | SPT(C) N=41      |                  |                 | 3,4/6,8,10,17  |             | (1.05)                |  |        |       |
|                        |                  |                  |                 | 15/05/2017:  |             | 2.45                  | Complete at 2.45m  |        |       |

|   |                                 |           |
|---|---------------------------------|-----------|
| <b>Remarks</b><br>C = Plastic lined core sample<br>Core diameter : 83mm to 1.00m and 72mm to 2.00m<br>HV = Hand Shear Vane test | Scale (approx)                  | Logged By |
|   | 1:25                            | DF/DI/SJ  |
|   | <b>Figure No.</b><br>NE3608.M01 |           |



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Site  
CAPITOL PARK, DODWORTH, BARNSELY, SOUTH YORKSHIRE

Borehole Number  
**M02**

|                                  |                     |                     |   |                      |
|----------------------------------|---------------------|---------------------|---|----------------------|
| Boring Method<br>MINI PERCUSSIVE | Casing Diameter     | Ground Level (mOD)  | Client<br>CARNELL MANAGEMENT SERVICES LIMITED | Job Number<br>NE3608 |
|                                  | Location<br>AS PLAN | Dates<br>15/05/2017 | Engineer<br>WILLIAM SAUNDERS                  | Sheet<br>1/1         |

| Depth (m)              | Sample / Tests | Casing Depth (m) | Water Depth (m) | Field Records   | Level (mOD) | Depth (m) (Thickness) | Description  | Legend | Water |
|------------------------|----------------|------------------|-----------------|---|-------------|-----------------------|--|--------|-------|
| 0.00-1.00              | C              |                  |                 | 0.00m to 1.00m - 100% recovery                        |             | (0.30)                | MADE GROUND: firm to stiff greyish brown with occasional light brown slightly gravelly slightly sandy silty clay with occasional rootlets and low stone cobble content. Gravel sized fragments are fine to medium brick, coal and stone. |        |       |
|                        |                |                  |                 |   |             | 0.30                  |  |        |       |
|                        |                |                  |                 |   |             | (0.40)                | MADE GROUND: soft light brown with grey mottled slightly sandy silty clay.   |        |       |
|                        |                |                  |                 |   |             | 0.70                  |  |        |       |
| 1.00-1.45<br>1.00-2.00 | SPT N=18<br>C  |                  |                 | HV@0.80m,<br>c=70kPa<br>1,2/2,3,5,8                   |             | (0.65)                | Firm medium strength light grey with light brown and orange mottled slightly gravelly slightly sandy silty CLAY. Gravel is subangular fine coal and mudstone lithorelicts.   |        |       |
|                        |                |                  |                 | 1.00m to 2.00m - 85% recovery<br>HV@0.90m,<br>c=65kPa |             | 1.35                  |  |        |       |
|                        |                |                  |                 |   |             | (1.10)                | Extremely weak thinly laminated greyish brown highly weathered MUDSTONE.   |        |       |
| 2.00-2.45              | SPT N=53       |                  |                 | 8,10/12,12,13,16                                      |             | 2.45                  | Complete at 2.45m  |        |       |
|                        |                |                  |                 | 15/05/2017:   |             |                       |  |        |       |

|   |                          |           |
|---|--------------------------|-----------|
| <b>Remarks</b><br>C = Plastic lined core sample<br>Core diameter : 62mm to 1.00m and 53mm to 2.00m<br>HV = Hand Shear Vane test | Scale (approx)           | Logged By |
|   | 1:25                     | DF/DI/SJ  |
|   | Figure No.<br>NE3608.M02 |           |



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Site  
CAPITOL PARK, DODWORTH, BARNSELY, SOUTH YORKSHIRE

Borehole Number  
**M03**

|                                  |                     |                     |   |                      |
|----------------------------------|---------------------|---------------------|---|----------------------|
| Boring Method<br>MINI PERCUSSIVE | Casing Diameter     | Ground Level (mOD)  | Client<br>CARNELL MANAGEMENT SERVICES LIMITED | Job Number<br>NE3608 |
|                                  | Location<br>AS PLAN | Dates<br>15/05/2017 | Engineer<br>WILLIAM SAUNDERS                  | Sheet<br>1/1         |

| Depth (m)              | Sample / Tests   | Casing Depth (m) | Water Depth (m) | Field Records  | Level (mOD) | Depth (m) (Thickness) | Description  | Legend | Water |
|------------------------|------------------|------------------|-----------------|--|-------------|-----------------------|--|--------|-------|
| 0.00-1.00              | C                |                  |                 | 0.00m to 1.00m - 100% recovery                                     |             | (0.10)<br>0.10        | MADE GROUND: firm brown slightly sandy silt (topsoil).<br><br>MADE GROUND: extremely weak grey with orange and light brown mottled highly weathered mudstone fragments with occasional sandstone cobble. Completely weathered to clay in places. |        |       |
| 1.00-1.45<br>1.00-2.00 | SPT(C) N=10<br>C |                  |                 | 2,2/2,3,2,3<br>1.00m to 2.00m - 90% recovery                       |             | 1.00<br><br>(1.00)    | Firm medium strength light grey with light brown mottled slightly sandy silty CLAY. Possible made ground.  |        |       |
| 2.00-2.45              | SPT(C) N=57      |                  |                 | HV@1.60m,<br>c=70kPa<br><br>HV@1.80m,<br>c=75kPa<br>3,4/5,16,17,19 |             | 2.00<br><br>(0.45)    | Extremely weak thinly laminated greyish brown highly weathered MUDSTONE.   |        |       |
|                        |                  |                  |                 | 15/05/2017:  |             | 2.45                  | Complete at 2.45m  |        |       |

|   |                          |           |
|---|--------------------------|-----------|
| <b>Remarks</b><br>C = Plastic lined core sample<br>Core diameter : 83mm to 1.00m and 72mm to 2.00m<br>HV = Hand Shear Vane test | Scale (approx)           | Logged By |
|   | 1:25                     | DF/DI/SJ  |
|   | Figure No.<br>NE3608.M03 |           |



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Site  
CAPITOL PARK, DODWORTH, BARNSELY, SOUTH YORKSHIRE

Borehole Number  
**M04**

|                                  |                     |                     |   |                      |
|----------------------------------|---------------------|---------------------|---|----------------------|
| Boring Method<br>MINI PERCUSSIVE | Casing Diameter     | Ground Level (mOD)  | Client<br>CARNELL MANAGEMENT SERVICES LIMITED | Job Number<br>NE3608 |
|                                  | Location<br>AS PLAN | Dates<br>15/05/2017 | Engineer<br>WILLIAM SAUNDERS                  | Sheet<br>1/1         |

| Depth (m)              | Sample / Tests   | Casing Depth (m) | Water Depth (m) | Field Records  | Level (mOD) | Depth (m) (Thickness)                        | Description  | Legend | Water |
|------------------------|------------------|------------------|-----------------|--|-------------|--|--|--------|-------|
| 0.00-1.00              | C                |                  |                 | 0.00m to 1.00m - 100% recovery                                       |             | (0.10)<br>0.10                               | MADE GROUND: brown slightly sandy silt with many rootlets (topsoil).   |        |       |
| 1.00-1.45<br>1.00-2.00 | SPT(C) N=11<br>C |                  |                 | 1,1/4,2,2,3<br>1.00m to 2.00m - 100% recovery                        |             | (0.80)<br>0.90<br>(0.10)<br>1.00             | MADE GROUND: extremely weak dark grey highly weathered mudstone fragments (completely weathered to clay in places).<br><br>.... at 0.80m : low sandstone cobble content<br><br>Soft light grey with orange mottled slightly sandy silty CLAY (possible made ground).   |        |       |
| 2.00-2.45              | SPT(C) N=51      |                  |                 | HV@1.60m,<br>c=96kPa<br><br>HV@1.80m,<br>c=114kPa<br>3,4/12,12,12,15 |             | (1.00)<br><br>2.00<br><br>(0.45)<br><br>2.45 | Firm medium to high strength light brown and greyish brown with orange mottled slightly gravelly silty CLAY. Gravel is subangular fine to coarse coal and mudstone (possible made ground).<br><br>.... below 1.60m : high strength<br><br>Extremely weak thinly laminated greyish brown highly weathered MUDSTONE. |        |       |
|                        |                  |                  |                 | 15/05/2017:  |             |  | Complete at 2.45m  |        |       |

|   |                                 |           |
|---|---------------------------------|-----------|
| <b>Remarks</b><br>C = Plastic lined core sample<br>Core diameter : 83mm to 1.00m and 72mm to 2.00m<br>HV = Hand Shear Vane test | Scale (approx)                  | Logged By |
|   | 1:25                            | DF/DI/SJ  |
|   | <b>Figure No.</b><br>NE3608.M04 |           |



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Site  
CAPITOL PARK, DODWORTH, BARNSELY, SOUTH YORKSHIRE

Borehole Number  
**M05**

|                                  |                     |                     |   |                      |
|----------------------------------|---------------------|---------------------|---|----------------------|
| Boring Method<br>MINI PERCUSSIVE | Casing Diameter     | Ground Level (mOD)  | Client<br>CARNELL MANAGEMENT SERVICES LIMITED | Job Number<br>NE3608 |
|                                  | Location<br>AS PLAN | Dates<br>15/05/2017 | Engineer<br>WILLIAM SAUNDERS                  | Sheet<br>1/1         |

| Depth (m) | Sample / Tests | Casing Depth (m) | Water Depth (m) | Field Records                 | Level (mOD) | Depth (m) (Thickness) | Description   | Legend | Water |
|-----------|----------------|------------------|-----------------|-------------------------------|-------------|-----------------------|---|--------|-------|
| 0.00-1.00 | C              |                  |                 | 0.00m to 1.00m - 90% recovery |             | (0.10)<br>0.10        | MADE GROUND: dark brown slightly ashy slightly gravelly slightly sandy clayey silt with occasional rootlets. Gravel sized fragments are subangular fine to coarse coal. |        |       |
|           |                |                  |                 |                               |             | (0.40)                | Dark brown laminated friable slightly sandy SILT.   |        |       |
|           |                |                  |                 |                               |             | 0.50                  | Firm to stiff light greyish brown with occasional orange mottled friable clayey SILT.   |        |       |
|           |                |                  |                 |                               |             | (0.50)                |   |        |       |
| 1.00-1.45 | SPT(C) N=58    |                  |                 | 7,10/10,12,14,22              |             | 1.00                  | Extremely weak thinly laminated greyish brown highly weathered MUDSTONE.  |        |       |
|           |                |                  |                 |                               |             | (0.45)                |   |        |       |
|           |                |                  |                 | 15/05/2017:                   |             | 1.45                  | Complete at 1.45m   |        |       |

|   |                          |           |
|---|--------------------------|-----------|
| Remarks<br>C = Plastic lined core sample<br>Core diameter : 72mm to 1.00m | Scale (approx)           | Logged By |
|   | 1:25                     | DF/DI/SJ  |
|   | Figure No.<br>NE3608.M05 |           |



# SUB SURFACE

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Site  
CAPITOL PARK, DODWORTH, BARNSELY, SOUTH YORKSHIRE

Borehole Number  
**M06**

|   |                            |                            |  |                             |
|---|----------------------------|----------------------------|--|-----------------------------|
| <b>Boring Method</b><br>MINI PERCUSSIVE | <b>Casing Diameter</b>     | <b>Ground Level (mOD)</b>  | <b>Client</b><br>CARNELL MANAGEMENT SERVICES LIMITED | <b>Job Number</b><br>NE3608 |
|   | <b>Location</b><br>AS PLAN | <b>Dates</b><br>15/05/2017 | <b>Engineer</b><br>WILLIAM SAUNDERS                  | <b>Sheet</b><br>1/1         |

| Depth (m)              | Sample / Tests | Casing Depth (m) | Water Depth (m) | Field Records   | Level (mOD) | Depth (m) (Thickness)            | Description  | Legend | Water |
|------------------------|----------------|------------------|-----------------|---|-------------|----------------------------------|--|--------|-------|
| 0.00-1.00              | C              |                  |                 | 0.00m to 1.00m - 100% recovery  |             | (0.45)                           | MADE GROUND: grey slightly sandy fine to coarse gravel sized fragments of mudstone with many rootlets.   |        |       |
| 1.00-1.45<br>1.00-2.00 | SPT N=13<br>C  |                  |                 | 1,2/2,3,3,5<br>1.00m to 2.00m - 85% recovery<br><br>HV@0.70m ,<br>c=80kPa |             | 0.45<br>(0.55)<br>1.00           | MADE GROUND: firm grey and light brown mottled slightly gravelly slightly sandy silty CLAY with low brick cobble content. Gravel is fine to medium brick, quartz and mudstone.   |        |       |
| 2.00-2.45              | SPT N=53       |                  |                 | 7,9/12,12,14,15<br><br>15/06/2017:  |             | (0.50)<br>1.50<br>(0.95)<br>2.45 | MADE GROUND: firm light grey and light brown mottled slightly gravelly slightly sandy silty clay. Gravel is fine to medium brick and mudstone lithorelicts.<br><br>Extremely weak thinly laminated grey highly weathered MUDSTONE. |        |       |
|                        |                |                  |                 |   |             |                                  | Complete at 2.45m  |        |       |

|   |                                 |                  |
|---|---------------------------------|------------------|
| <b>Remarks</b><br>C = Plastic lined core sample<br>Core diameter : 83mm to 1.00m and 72mm to 2.00m<br>HV = Hand Shear Vane test | <b>Scale (approx)</b>           | <b>Logged By</b> |
|   | 1:25                            | DF/DI/SJ         |
|   | <b>Figure No.</b><br>NE3608.M06 |                  |



# SUB SURFACE

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

Site  
CAPITOL PARK, DODWORTH, BARNSELY, SOUTH YORKSHIRE

Borehole Number  
**M07**

|                                  |                     |                     |   |                      |
|----------------------------------|---------------------|---------------------|---|----------------------|
| Boring Method<br>MINI PERCUSSIVE | Casing Diameter     | Ground Level (mOD)  | Client<br>CARNELL MANAGEMENT SERVICES LIMITED | Job Number<br>NE3608 |
|                                  | Location<br>AS PLAN | Dates<br>15/05/2017 | Engineer<br>WILLIAM SAUNDERS                  | Sheet<br>1/1         |

| Depth (m)              | Sample / Tests   | Casing Depth (m) | Water Depth (m) | Field Records  | Level (mOD) | Depth (m) (Thickness)  | Description   | Legend | Water |
|------------------------|------------------|------------------|-----------------|--|-------------|------------------------|---|--------|-------|
| 0.00-1.00              | C                |                  |                 | 0.00m to 1.00m - 85% recovery                                      |             | (1.00)                 | MADE GROUND: soft dark brown slightly gravelly slightly sandy silty clay with some rootlets. Gravel sized fragments are fine to medium quartz, clinker and brick.   |        |       |
| 1.00-1.45<br>1.00-2.00 | SPT(C) N=16<br>C |                  |                 | HV@0.75m, c=72kPa<br>1,1/1,3,5,7<br>1.00m to 2.00m - 100% recovery |             | 1.00<br>(0.10)<br>1.10 | MADE GROUND: firm grey slightly gravelly slightly sandy silty clay. Gravel sized fragments are fine to medium clinker, brick and mudstone.<br><br>Extremely weak thinly laminated grey highly weathered MUDSTONE. |        |       |
| 2.00-2.38              | SPT(C) 50/225    |                  |                 | 8,11/15,15,20<br><br>15/05/2017:                                   |             | 2.40                   | Complete at 2.40m   |        |       |

|   |                                 |           |
|---|---------------------------------|-----------|
| <b>Remarks</b><br>C = Plastic lined core sample<br>Core diameter : 72mm to 1.00m and 63mm to 2.00m<br>HV = Hand Shear Vane test | Scale (approx)                  | Logged By |
|   | 1:25                            | DF/DI/SJ  |
|   | <b>Figure No.</b><br>NE3608.M07 |           |



# SUB SURFACE

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Site  
CAPITOL PARK, DODWORTH, BARNSELY, SOUTH YORKSHIRE

Borehole Number  
**M08**

|                                  |                     |                     |   |                      |
|----------------------------------|---------------------|---------------------|---|----------------------|
| Boring Method<br>MINI PERCUSSIVE | Casing Diameter     | Ground Level (mOD)  | Client<br>CARNELL MANAGEMENT SERVICES LIMITED | Job Number<br>NE3608 |
|                                  | Location<br>AS PLAN | Dates<br>16/05/2017 | Engineer<br>WILLIAM SAUNDERS                  | Sheet<br>1/1         |

| Depth (m)              | Sample / Tests   | Casing Depth (m) | Water Depth (m) | Field Records                     | Level (mOD) | Depth (m) (Thickness) | Description   | Legend | Water |
|------------------------|------------------|------------------|-----------------|-----------------------------------|-------------|-----------------------|---|--------|-------|
| 0.00-1.00              | C                |                  |                 | 0.00m to 1.00m - 100% recovery    |             | (0.30)                | MADE GROUND: light brown sandy fine to coarse gravel sized fragments and cobble sized fragments of sandstone.<br>..... at 0.30m : possible asbestos           |        |       |
| 1.00-1.45<br>1.00-1.45 | SPT(C) N=51<br>B |                  |                 | 1,1/3,10,17,21<br><br>16/05/2017: |             | (1.20)                | Extremely weak light grey and light brown with orange mottled and dark grey in places highly weathered MUDSTONE. Completely weathered to clay in most places. |        |       |
|                        |                  |                  |                 |                                   |             | 1.50                  | Complete at 1.50m   |        |       |

|  |                |           |
|--|----------------|-----------|
| <b>Remarks</b><br>C = Plastic lined core sample<br>Core diameter : 76mm to 1.00m | Scale (approx) | Logged By |
|  | 1:25           | DF/DI/SJ  |
| <b>Figure No.</b><br>NE3608.M08  |                |           |



# SUB SURFACE

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Site  
CAPITOL PARK, DODWORTH, BARNSELY, SOUTH  
YORKSHIRE

Borehole  
Number  
**M09**

|                                  |                     |                     |   |                      |
|----------------------------------|---------------------|---------------------|---|----------------------|
| Boring Method<br>MINI PERCUSSIVE | Casing Diameter     | Ground Level (mOD)  | Client<br>CARNELL MANAGEMENT SERVICES LIMITED | Job Number<br>NE3608 |
|                                  | Location<br>AS PLAN | Dates<br>16/05/2017 | Engineer<br>WILLIAM SAUNDERS                  | Sheet<br>1/1         |

| Depth (m) | Sample / Tests      | Casing Depth (m) | Water Depth (m) | Field Records                  | Level (mOD) | Depth (m) (Thickness) | Description   | Legend | Water |
|-----------|---------------------|------------------|-----------------|--------------------------------|-------------|-----------------------|---|--------|-------|
| 0.00-1.00 | C                   |                  |                 | 0.00m to 1.00m - 100% recovery |             | (0.20)<br>0.20        | MADE GROUND: light brown slightly clayey silty slightly sandy fine to coarse gravel sized fragments of stone and brick with low concrete cobble content with roots near top.<br><br>Extremely weak light greyish brown with orange mottled highly weathered MUDSTONE. Completely weathered to clay in places (possibly made ground to 1.00m). |        |       |
| 1.00-1.23 | SPT 30*75<br>50/150 |                  |                 | 30/30,20<br><br>16/05/2017:    |             | (1.00)<br><br>1.20    | Complete at 1.20m   |        |       |

|  |                                 |           |
|--|---------------------------------|-----------|
| <b>Remarks</b><br>C = Plastic lined core sample<br>Core diameter : 72mm to 1.00m | Scale (approx)                  | Logged By |
|  | 1:25                            | DF/DI/SJ  |
|  | <b>Figure No.</b><br>NE3608.M09 |           |



# SUB SURFACE

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Site  
CAPITOL PARK, DODWORTH, BARNSELY, SOUTH YORKSHIRE

Borehole Number  
**M10**

|                                  |                     |                     |   |                      |
|----------------------------------|---------------------|---------------------|---|----------------------|
| Boring Method<br>MINI PERCUSSIVE | Casing Diameter     | Ground Level (mOD)  | Client<br>CARNELL MANAGEMENT SERVICES LIMITED | Job Number<br>NE3608 |
|                                  | Location<br>AS PLAN | Dates<br>16/05/2017 | Engineer<br>WILLIAM SAUNDERS                  | Sheet<br>1/1         |

| Depth (m) | Sample / Tests       | Casing Depth (m) | Water Depth (m) | Field Records                  | Level (mOD) | Depth (m) (Thickness) | Description  | Legend | Water |
|-----------|----------------------|------------------|-----------------|--------------------------------|-------------|-----------------------|--|--------|-------|
| 0.00-1.00 | C                    |                  |                 | 0.00m to 1.00m - 100% recovery |             | (0.10)<br>0.10        | TOPSOIL: Brown slightly sandy silt with roots.<br>Extremely weak grey moderately weathered MUDSTONE partially weathered to clay in places (possibly made ground to 0.70m). |        |       |
| 0.70-0.95 | SPT 25*/75<br>50/175 |                  |                 | 25/35,15<br><br>16/05/2017:    |             | (0.90)<br><br>1.00    | Complete at 1.00m  |        |       |

|  |                |           |
|--|----------------|-----------|
| <b>Remarks</b><br>C = Plastic lined core sample<br>Core diameter : 62mm to 1.00m | Scale (approx) | Logged By |
|  | 1:25           | DF/DI/SJ  |
| <b>Figure No.</b><br>NE3608.M10  |                |           |



# SUB SURFACE

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Site  
CAPITOL PARK, DODWORTH, BARNSELY, SOUTH  
YORKSHIRE

Borehole  
Number  
**M11**

|                                  |                     |                     |   |                      |
|----------------------------------|---------------------|---------------------|---|----------------------|
| Boring Method<br>MINI PERCUSSIVE | Casing Diameter     | Ground Level (mOD)  | Client<br>CARNELL MANAGEMENT SERVICES LIMITED | Job Number<br>NE3608 |
|                                  | Location<br>AS PLAN | Dates<br>16/05/2017 | Engineer<br>WILLIAM SAUNDERS                  | Sheet<br>1/1         |

| Depth (m) | Sample / Tests | Casing Depth (m) | Water Depth (m) | Field Records                     | Level (mOD) | Depth (m) (Thickness) | Description  | Legend | Water |
|-----------|----------------|------------------|-----------------|-----------------------------------|-------------|-----------------------|--|--------|-------|
| 0.00-1.00 | C              |                  |                 | 0.00m to 1.00m - 100% recovery    |             | 0.05                  | TOPSOIL: light brown slightly sandy silt with many rootlets.<br>Extremely weak light greyish brown with occasional light brown mottled highly weathered MUDSTONE completely weathered to clay in places (possibly made ground to 1.00m). |        |       |
| 1.00-1.38 | SPT 50/225     |                  |                 | 13,13/15,15,20<br><br>16/05/2017: |             | (1.35)<br><br>1.40    | Complete at 1.40m  |        |       |

|  |                |           |
|--|----------------|-----------|
| <b>Remarks</b><br>C = Plastic lined core sample<br>Core diameter : 72mm to 1.00m | Scale (approx) | Logged By |
|  | 1:25           | DF/DI/SJ  |
| <b>Figure No.</b><br>NE3608.M11  |                |           |



# SUB SURFACE

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

Site  
CAPITOL PARK, DODWORTH, BARNSELY, SOUTH YORKSHIRE

Borehole Number  
**M12**

|                                  |                     |                     |   |                      |
|----------------------------------|---------------------|---------------------|---|----------------------|
| Boring Method<br>MINI PERCUSSIVE | Casing Diameter     | Ground Level (mOD)  | Client<br>CARNELL MANAGEMENT SERVICES LIMITED | Job Number<br>NE3608 |
|                                  | Location<br>AS PLAN | Dates<br>16/05/2017 | Engineer<br>WILLIAM SAUNDERS                  | Sheet<br>1/1         |

| Depth (m)              | Sample / Tests | Casing Depth (m) | Water Depth (m) | Field Records                                 | Level (mOD) | Depth (m) (Thickness) | Description   | Legend | Water |
|------------------------|----------------|------------------|-----------------|---|-------------|-----------------------|---|--------|-------|
| 0.00-1.00              | C              |                  |                 | 0.00m to 1.00m - 100% recovery                |             | (0.80)                | Firm slightly friable light grey with orangish brown mottled silty CLAY.                                    |        |       |
| 1.00-1.45<br>1.00-1.80 | SPT N=24<br>C  |                  |                 | 3,4/5,5,6,8<br>1.00m to 1.80m : 100% recovery |             | 0.80                  | Extremely weak light brown and light grey highly weathered MUDSTONE completely weathered to clay in places. |        |       |
| 1.80-2.25              | SPT N=52       |                  |                 | HV@1.70m,<br>c=73kPa<br>9,10/12,12,14,14      |             | (1.65)                |   |        |       |
|                        |                |                  |                 | 16/05/2017:                                   |             | 2.45                  | Complete at 2.45m   |        |       |

|   |                                 |           |
|---|---------------------------------|-----------|
| <b>Remarks</b><br>C = Plastic lined core sample<br>Core diameter : 72mm to 1.00m and 63mm to 1.80m<br>HV = Hand Shear Vane test | Scale (approx)                  | Logged By |
|   | 1:25                            | DF/DI/SJ  |
|   | <b>Figure No.</b><br>NE3608.M12 |           |



# SUB SURFACE

SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS  
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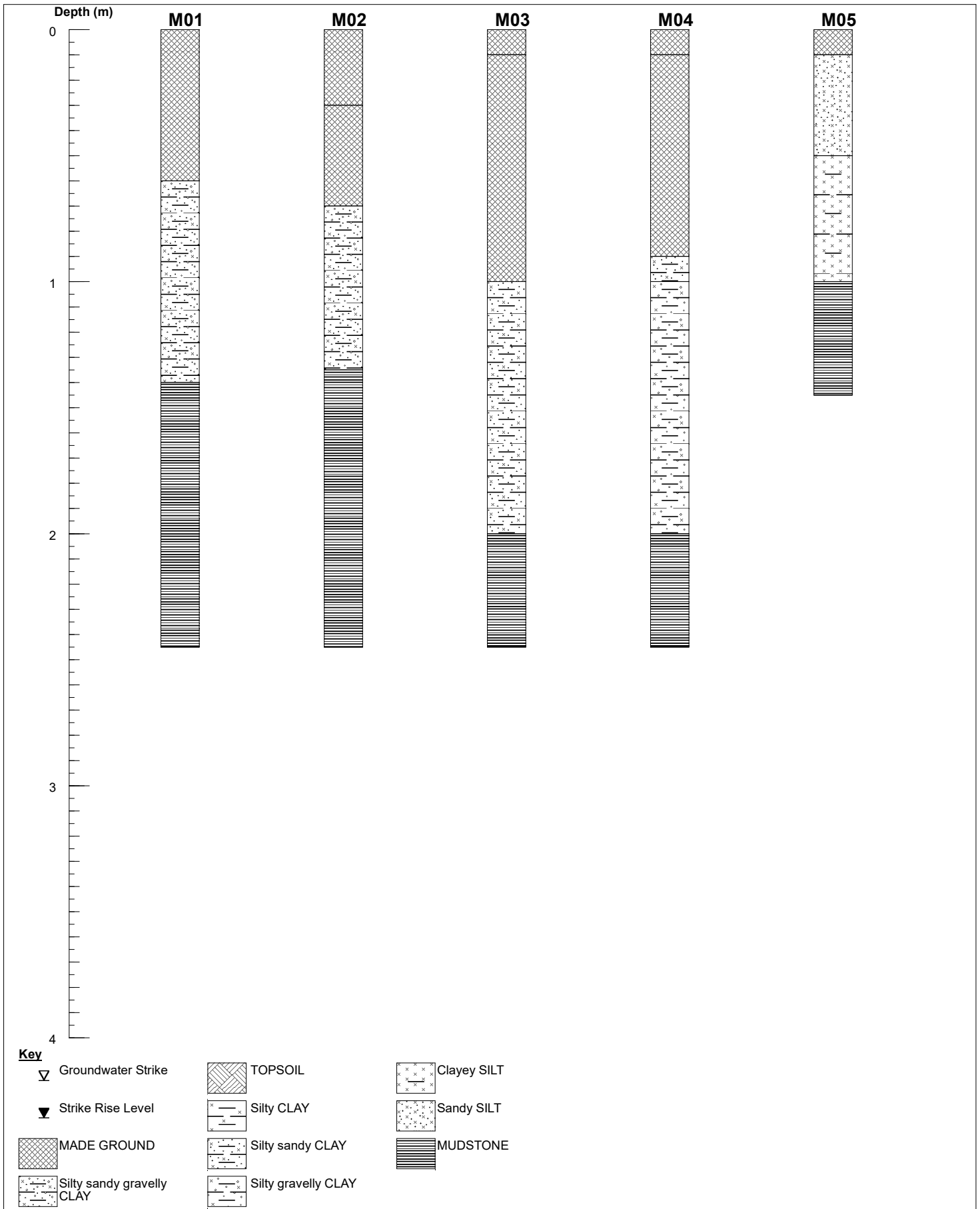
Site  
CAPITOL PARK, DODWORTH, BARNSELY, SOUTH YORKSHIRE


Borehole Number  
**M13**

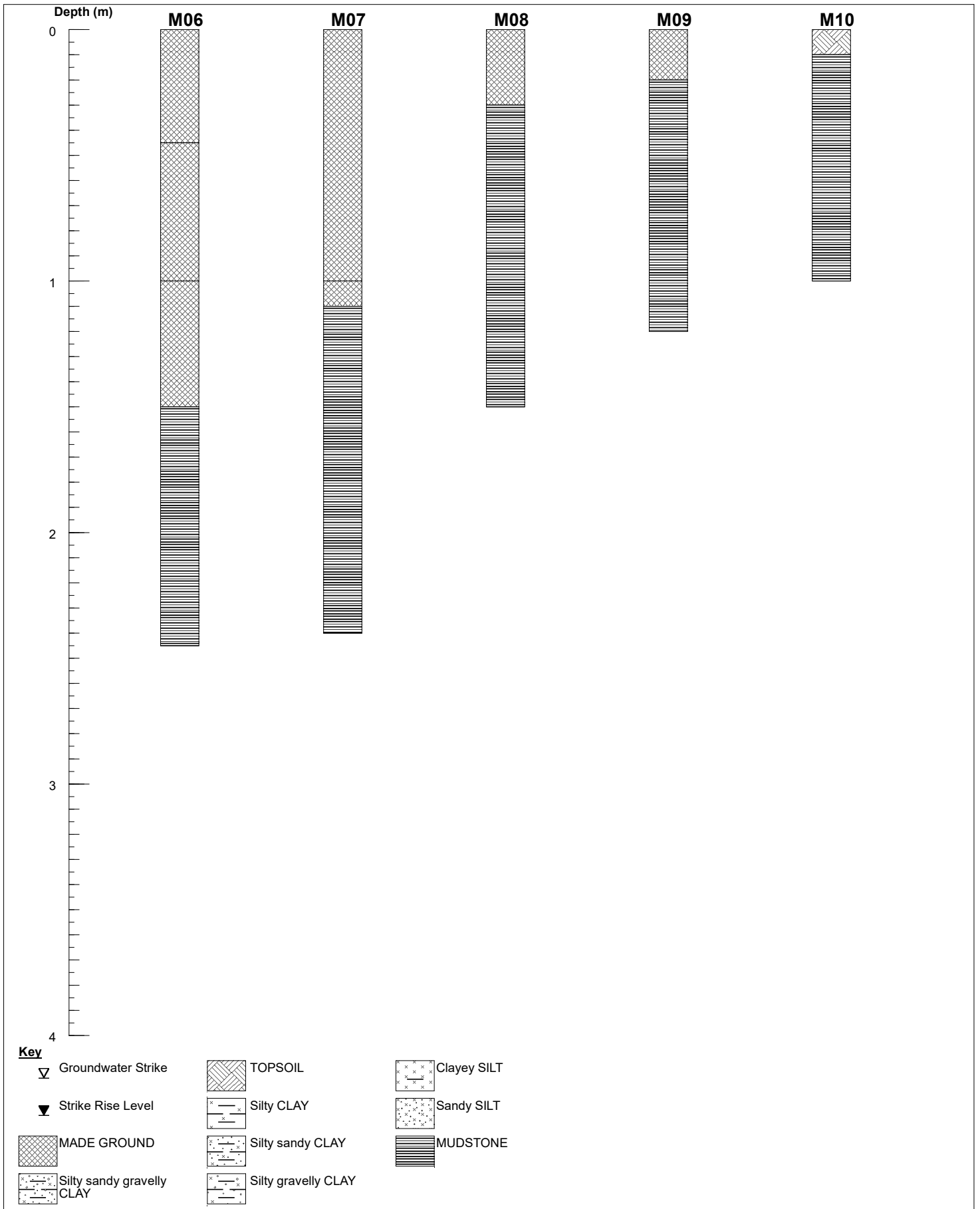
|                                  |                     |                     |   |                      |
|----------------------------------|---------------------|---------------------|---|----------------------|
| Boring Method<br>MINI PERCUSSIVE | Casing Diameter     | Ground Level (mOD)  | Client<br>CARNELL MANAGEMENT SERVICES LIMITED | Job Number<br>NE3608 |
|                                  | Location<br>AS PLAN | Dates<br>16/05/2017 | Engineer<br>WILLIAM SAUNDERS                  | Sheet<br>1/1         |


| Depth (m) | Sample / Tests | Casing Depth (m) | Water Depth (m) | Field Records                                       | Level (mOD) | Depth (m) (Thickness)  | Description   | Legend | Water |
|-----------|----------------|------------------|-----------------|---|-------------|------------------------|---|--------|-------|
| 0.00-1.00 | C              |                  |                 | 0.00m to 1.00m - 100% recovery                      |             | (1.00)                 | MADE GROUND: stiff brown slightly gravelly slightly sandy silty clay, with some rootlets and medium concrete cobble content. Gravel sized fragments are fine to coarse mudstone lithorelicts, siltstone and concrete. |        |       |
| 1.00-1.30 | SPT 50/150     |                  |                 | HV@0.84m, c=83kPa<br>14,18/25,25<br><br>16/05/2017: |             | 1.00<br>(0.30)<br>1.30 | Extremely weak thinly laminated greyish brown highly weathered MUDSTONE.<br><br>Complete at 1.30m   |        |       |

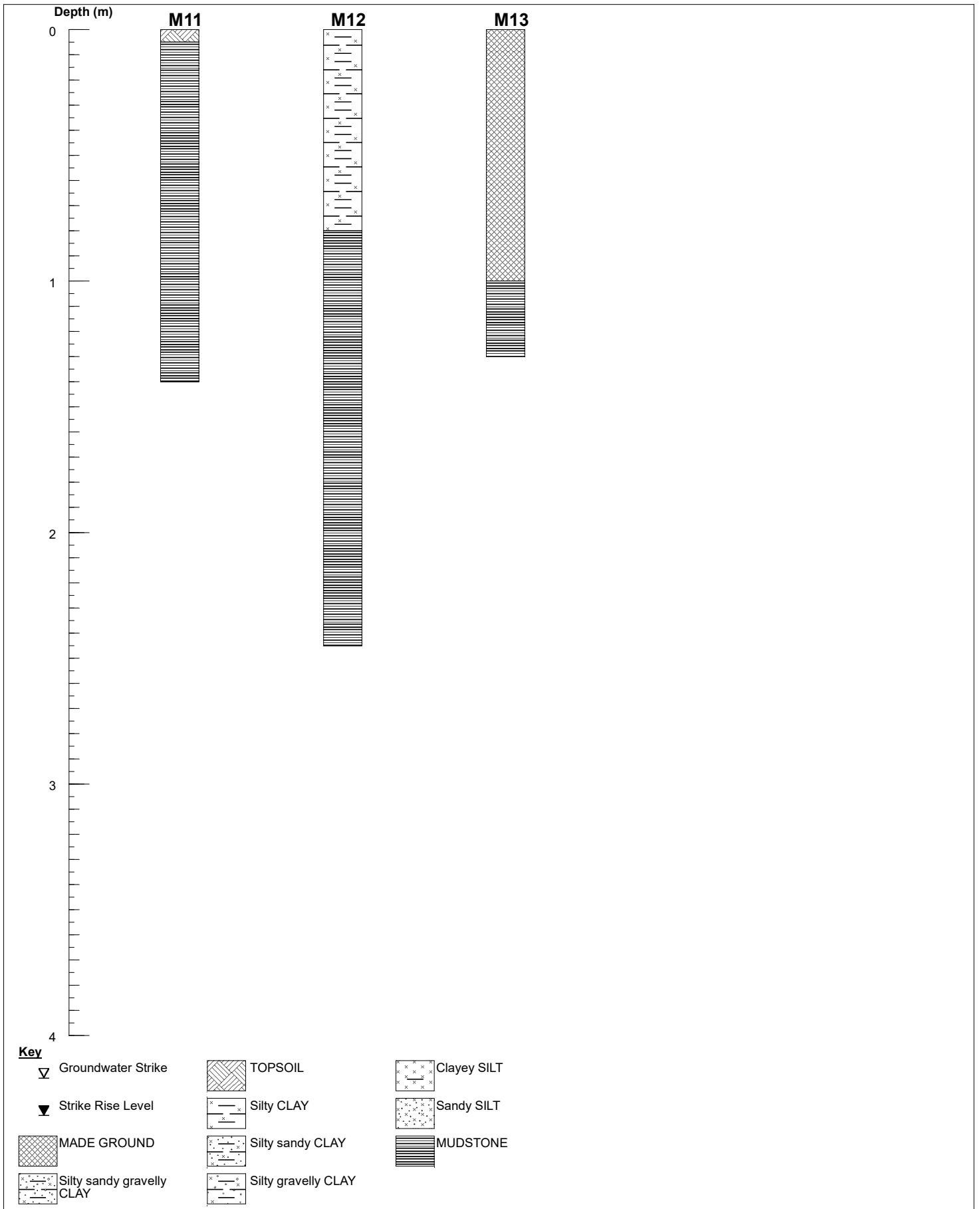
|   |                                 |           |
|---|---------------------------------|-----------|
| <b>Remarks</b><br>C = Plastic lined core sample<br>Core diameter : 72mm to 1.00m<br>HV = Hand Shear Vane test | Scale (approx)                  | Logged By |
|   | 1:25                            | DF/DI/SJ  |
|   | <b>Figure No.</b><br>NE3608.M13 |           |




|  |                                 |                     |                         |                               |
|--|---------------------------------|---------------------|-------------------------|-------------------------------|
|  <b>SUB SURFACE</b><br>SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS<br>3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907 | <b>Nominal Section</b>          |                     |                         |                               |
|  | <b>Date Drawn</b><br>14/07/2017 | <b>Date Checked</b> | <b>Sheet</b><br>1/3     | <b>Job Number</b><br>NE3608   |
| <b>Site</b><br>CAPITOL PARK, DODWORTH, BARNSELY, SOUTH YORKSHIRE   | <b>Drawn By</b>                 | <b>Checked By</b>   | <b>Scale</b><br>1:20[V] | <b>Figure No.</b><br>NE3608.1 |
| <b>Client</b><br>CARNELL MANAGEMENT SERVICES LIMITED   |                                 |                     |                         |                               |



|  |                                 |                     |                         |                               |
|--|---------------------------------|---------------------|-------------------------|-------------------------------|
|  <b>SUB SURFACE</b><br>SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS<br>3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907 | <b>Nominal Section</b>          |                     |                         |                               |
|  | <b>Date Drawn</b><br>14/07/2017 | <b>Date Checked</b> | <b>Sheet</b><br>2/3     | <b>Job Number</b><br>NE3608   |
| <b>Site</b><br>CAPITOL PARK, DODWORTH, BARNSELY, SOUTH YORKSHIRE   | <b>Drawn By</b>                 | <b>Checked By</b>   | <b>Scale</b><br>1:20[V] | <b>Figure No.</b><br>NE3608.1 |
| <b>Client</b><br>CARNELL MANAGEMENT SERVICES LIMITED   |                                 |                     |                         |                               |



|  |                                 |                     |                         |                               |
|--|---------------------------------|---------------------|-------------------------|-------------------------------|
|  <b>SUB SURFACE</b><br>SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS<br>3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907 | <b>Nominal Section</b>          |                     |                         |                               |
|  | <b>Date Drawn</b><br>14/07/2017 | <b>Date Checked</b> | <b>Sheet</b><br>3/3     | <b>Job Number</b><br>NE3608   |
| <b>Site</b><br>CAPITOL PARK, DODWORTH, BARNSELY, SOUTH YORKSHIRE   | <b>Drawn By</b>                 | <b>Checked By</b>   | <b>Scale</b><br>1:20[V] | <b>Figure No.</b><br>NE3608.1 |
| <b>Client</b><br>CARNELL MANAGEMENT SERVICES LIMITED   |                                 |                     |                         |                               |

**ROTARY BOREHOLE RECORD SHEETS**



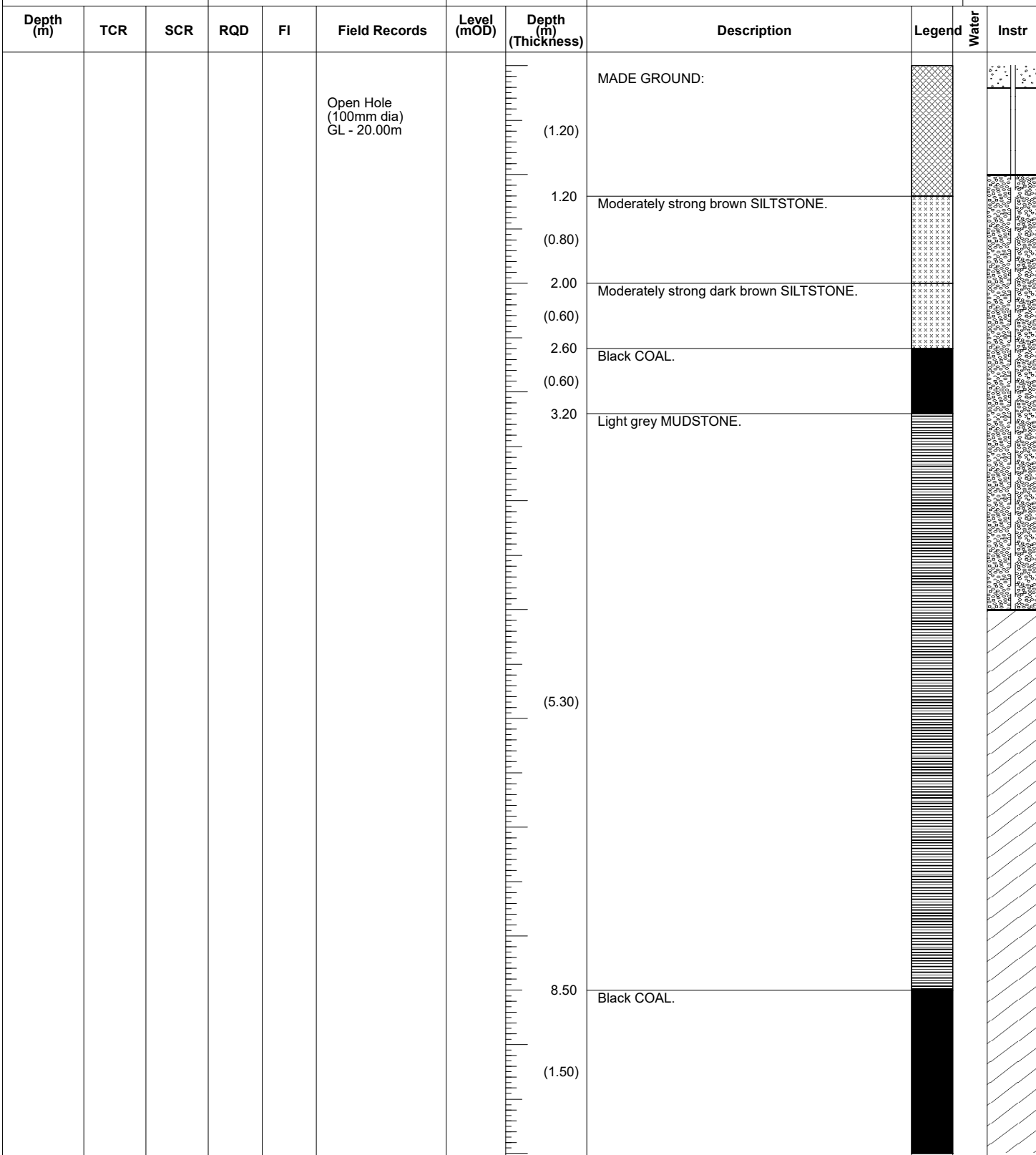
# SUB SURFACE

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

Site  
CAPITOL PARK, DODWORTH, BARNSELY, SOUTH YORKSHIRE

Borehole Number  
**R1**

|                           |                                   |                     |   |                      |
|---------------------------|-----------------------------------|---------------------|---|----------------------|
| Machine : BERETTA T44     | Casing Diameter<br>120mm to 1.50m | Ground Level (mOD)  | Client<br>CARNELL MANAGEMENT SERVICES LIMITED | Job Number<br>NE3608 |
| Flush : WATER             | Location<br>AS PLAN               | Dates<br>12/06/2017 | Engineer<br>WILLIAM SAUNDERS                  | Sheet<br>1/2         |
| Core Dia: NONE mm         |                                   |                     |   |                      |
| Method : ROTARY OPEN HOLE |                                   |                     |   |                      |



|  |                         |           |
|--|-------------------------|-----------|
| <b>Remarks</b><br>Descriptions based upon foreman drillers records of flush returns.<br>Foreman driller recorded no voids, broken ground or loss of flush returns.<br>On completion backfilled with grout and arisings to 5.00m and installed a 50mm slotted standpipe with a gas valve and a gravel surround to 5.00m,<br>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 |
|  | 1:50                    | AJP/SJ    |
|  | Figure No.<br>NE3608.R1 |           |



# SUB SURFACE

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Site  
CAPITOL PARK, DODWORTH, BARNSELY, SOUTH YORKSHIRE

Borehole Number  
**R1**

|                           |                                   |                     |   |                      |
|---------------------------|-----------------------------------|---------------------|---|----------------------|
| Machine : BERETTA T44     | Casing Diameter<br>120mm to 1.50m | Ground Level (mOD)  | Client<br>CARNELL MANAGEMENT SERVICES LIMITED | Job Number<br>NE3608 |
| Flush : WATER             | Location<br>AS PLAN               | Dates<br>12/06/2017 | Engineer<br>WILLIAM SAUNDERS                  | Sheet<br>2/2         |
| Core Dia: NONE mm         |                                   |                     |   |                      |
| Method : ROTARY OPEN HOLE |                                   |                     |   |                      |

| Depth (m) | TCR | SCR | RQD | FI | Field Records | Level (mOD) | Depth (m) (Thickness) | Description                      | Legend | Water | Instr |
|-----------|-----|-----|-----|----|---------------|-------------|-----------------------|----------------------------------|--------|-------|-------|
|           |     |     |     |    |               |             | 10.00                 | Moderately strong grey MUDSTONE. |        |       |       |
|           |     |     |     |    |               |             | (0.50)                |                                  |        |       |       |
|           |     |     |     |    |               |             | 10.50                 | Black COAL.                      |        |       |       |
|           |     |     |     |    |               |             | (0.30)                |                                  |        |       |       |
|           |     |     |     |    |               |             | 10.80                 | Light grey MUDSTONE.             |        |       |       |
|           |     |     |     |    |               |             | (2.20)                |                                  |        |       |       |
|           |     |     |     |    |               |             | 13.00                 | Black COAL.                      |        |       |       |
|           |     |     |     |    |               |             | (1.40)                |                                  |        |       |       |
|           |     |     |     |    |               |             | 14.40                 | Light grey MUDSTONE.             |        |       |       |
|           |     |     |     |    |               |             | (5.60)                |                                  |        |       |       |
|           |     |     |     |    |               |             | 20.00                 |                                  |        |       |       |

12/06/2017:

|         |                         |           |
|---------|-------------------------|-----------|
| Remarks | Scale (approx)          | Logged By |
|         | 1:50                    | AJP/SJ    |
|         | Figure No.<br>NE3608.R1 |           |



# SUB SURFACE

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Site  
CAPITOL PARK, DODWORTH, BARNSELY, SOUTH YORKSHIRE

Borehole Number  
**R2**

|                           |                                   |                     |   |                      |
|---------------------------|-----------------------------------|---------------------|---|----------------------|
| Machine : BERETTA T44     | Casing Diameter<br>120mm to 2.00m | Ground Level (mOD)  | Client<br>CARNELL MANAGEMENT SERVICES LIMITED | Job Number<br>NE3608 |
| Flush : MIST              | Location<br>AS PLAN               | Dates<br>12/06/2017 | Engineer<br>WILLIAM SAUNDERS                  | Sheet<br>1/2         |
| Core Dia: NONE mm         |                                   |                     |   |                      |
| Method : ROTARY OPEN HOLE |                                   |                     |   |                      |

| Depth (m) | TCR | SCR | RQD | FI | Field Records                        | Level (mOD) | Depth (m) (Thickness) | Description                               | Legend | Water |
|-----------|-----|-----|-----|----|--------------------------------------|-------------|-----------------------|---|--------|-------|
|           |     |     |     |    | Open Hole (100mm dia)<br>GL - 20.00m |             | (1.80)                | MADE GROUND:                              |        |       |
|           |     |     |     |    |                                      |             | 1.80 (0.20)           | Moderately strong orange brown SILTSTONE. |        |       |
|           |     |     |     |    |                                      |             | 2.00 (0.40)           | Black COAL.                               |        |       |
|           |     |     |     |    |                                      |             | 2.40                  | Light brown MUDSTONE.                     |        |       |
|           |     |     |     |    |                                      |             | (5.20)                |   |        |       |
|           |     |     |     |    |                                      |             | 7.60                  | Black COAL.                               |        |       |
|           |     |     |     |    |                                      |             | (1.40)                |   |        |       |
|           |     |     |     |    |                                      |             | 9.00 (0.60)           | Dark grey MUDSTONE.                       |        |       |
|           |     |     |     |    |                                      |             | 9.60                  | Black COAL.                               |        |       |

|   |                         |           |
|---|-------------------------|-----------|
| <b>Remarks</b><br>Descriptions based upon foreman drillers records of flush returns.<br>Foreman driller recorded no voids, broken ground or loss of flush returns.<br>On completion backfilled with grout and arisings. | Scale (approx)          | Logged By |
|   | 1:50                    | AJP/SJ    |
|   | Figure No.<br>NE3608.R2 |           |



# SUB SURFACE

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

Site  
CAPITOL PARK, DODWORTH, BARNSELY, SOUTH YORKSHIRE

Borehole Number  
**R2**

|                           |                                   |                     |   |                      |
|---------------------------|-----------------------------------|---------------------|---|----------------------|
| Machine : BERETTA T44     | Casing Diameter<br>120mm to 2.00m | Ground Level (mOD)  | Client<br>CARNELL MANAGEMENT SERVICES LIMITED | Job Number<br>NE3608 |
| Flush : MIST              | Location<br>AS PLAN               | Dates<br>12/06/2017 | Engineer<br>WILLIAM SAUNDERS                  | Sheet<br>2/2         |
| Core Dia: NONE mm         |                                   |                     |   |                      |
| Method : ROTARY OPEN HOLE |                                   |                     |   |                      |

| Depth (m) | TCR | SCR | RQD | FI | Field Records | Level (mOD) | Depth (m) (Thickness) | Description          | Legend | Water |
|-----------|-----|-----|-----|----|---------------|-------------|-----------------------|----------------------|--------|-------|
|           |     |     |     |    |               |             | (0.80)                | Black COAL.          |        |       |
|           |     |     |     |    |               |             | 10.40<br>(0.60)       | Light grey MUDSTONE. |        |       |
|           |     |     |     |    |               |             | 11.00<br>(1.80)       | Grey MUDSTONE.       |        |       |
|           |     |     |     |    |               |             | 12.80<br>(0.80)       | Black COAL.          |        |       |
|           |     |     |     |    |               |             | 13.60<br>(6.40)       | Light grey MUDSTONE. |        |       |
|           |     |     |     |    |               |             | 20.00                 |                      |        |       |

12/06/2017:

|         |                         |           |
|---------|-------------------------|-----------|
| Remarks | Scale (approx)          | Logged By |
|         | 1:50                    | AJP/SJ    |
|         | Figure No.<br>NE3608.R2 |           |



# SUB SURFACE

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

Site  
CAPITOL PARK, DODWORTH, BARNSELY, SOUTH YORKSHIRE

Borehole Number  
**R3**

|                           |  |                                   |                     |   |                      |
|---------------------------|--|-----------------------------------|---------------------|---|----------------------|
| Machine : BERETTA T44     |  | Casing Diameter<br>120mm to 1.50m | Ground Level (mOD)  | Client<br>CARNELL MANAGEMENT SERVICES LIMITED | Job Number<br>NE3608 |
| Flush : MIST              |  | Location<br>AS PLAN               | Dates<br>12/06/2017 | Engineer<br>WILLIAM SAUNDERS                  | Sheet<br>1/3         |
| Core Dia: NONE mm         |  |                                   |                     |   |                      |
| Method : ROTARY OPEN HOLE |  |                                   |                     |   |                      |

| Depth (m) | TCR | SCR | RQD | FI | Field Records                     | Level (mOD) | Depth (m) (Thickness)  | Description  | Legend | Water | Instr |
|-----------|-----|-----|-----|----|-----------------------------------|-------------|------------------------|--|--------|-------|-------|
|           |     |     |     |    | Open Hole (100mm dia) GL - 22.00m |             | (0.20)<br>0.20         | MADE GROUND: grey slag.<br>Moderately strong light brown MUDSTONE. |        |       |       |
|           |     |     |     |    |                                   |             | (1.80)                 |  |        |       |       |
|           |     |     |     |    |                                   |             | 2.00<br>(0.20)<br>2.20 | Black COAL<br>Moderately strong light grey MUDSTONE.               |        |       |       |
|           |     |     |     |    |                                   |             | (0.50)                 |  |        |       |       |
|           |     |     |     |    |                                   |             | 2.70<br>(0.20)<br>2.90 | Black COAL.<br>Moderately strong light grey MUDSTONE.              |        |       |       |
|           |     |     |     |    |                                   |             | (0.80)                 |  |        |       |       |
|           |     |     |     |    |                                   |             | 3.70<br>(0.20)<br>3.90 | Black COAL.<br>Strong light grey MUDSTONE.                         |        |       |       |
|           |     |     |     |    |                                   |             | (0.20)<br>4.10         | Black COAL.  |        |       |       |
|           |     |     |     |    |                                   |             | (0.30)<br>4.40         | Light grey MUDSTONE.   |        |       |       |
|           |     |     |     |    |                                   |             | (3.60)                 |  |        |       |       |
|           |     |     |     |    |                                   |             | 8.00<br>(0.40)<br>8.40 | Black COAL.<br>Light grey MUDSTONE.                                |        |       |       |
|           |     |     |     |    |                                   |             |                        |  |        |       |       |

|   |                         |           |
|---|-------------------------|-----------|
| <b>Remarks</b><br>Descriptions based upon foreman drillers records of flush returns.<br>Foreman driller recorded no voids, broken ground or loss of flush returns.<br>On completion backfilled with grout and arisings to 5.00m and installed a 50mm slotted 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 |
|   | 1:50                    | AJP/SJ    |
|   | Figure No.<br>NE3608.R3 |           |



# SUB SURFACE

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

Site  
CAPITOL PARK, DODWORTH, BARNSELY, SOUTH YORKSHIRE

Borehole Number  
**R3**

|                           |                                   |                     |   |                      |
|---------------------------|-----------------------------------|---------------------|---|----------------------|
| Machine : BERETTA T44     | Casing Diameter<br>120mm to 1.50m | Ground Level (mOD)  | Client<br>CARNELL MANAGEMENT SERVICES LIMITED | Job Number<br>NE3608 |
| Flush : MIST              | Location<br>AS PLAN               | Dates<br>12/06/2017 | Engineer<br>WILLIAM SAUNDERS                  | Sheet<br>2/3         |
| Core Dia: NONE mm         |                                   |                     |   |                      |
| Method : ROTARY OPEN HOLE |                                   |                     |   |                      |

| Depth (m) | TCR | SCR | RQD | FI | Field Records | Level (mOD) | Depth (m) (Thickness) | Description          | Legend | Water | Instr |
|-----------|-----|-----|-----|----|---------------|-------------|-----------------------|----------------------|--------|-------|-------|
|           |     |     |     |    |               |             | (4.00)                | Light grey MUDSTONE. |        |       |       |
|           |     |     |     |    |               |             | 12.40                 | Black COAL           |        |       |       |
|           |     |     |     |    |               |             | (1.20)                |                      |        |       |       |
|           |     |     |     |    |               |             | 13.60                 | Light grey MUDSTONE. |        |       |       |
|           |     |     |     |    |               |             | (8.40)                |                      |        |       |       |

|         |                         |           |
|---------|-------------------------|-----------|
| Remarks | Scale (approx)          | Logged By |
|         | 1:50                    | AJP/SJ    |
|         | Figure No.<br>NE3608.R3 |           |



# SUB SURFACE

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

Site  
CAPITOL PARK, DODWORTH, BARNSELY, SOUTH YORKSHIRE

Borehole Number  
**R3**

|                           |                                   |                     |   |                      |
|---------------------------|-----------------------------------|---------------------|---|----------------------|
| Machine : BERETTA T44     | Casing Diameter<br>120mm to 1.50m | Ground Level (mOD)  | Client<br>CARNELL MANAGEMENT SERVICES LIMITED | Job Number<br>NE3608 |
| Flush : MIST              | Location<br>AS PLAN               | Dates<br>12/06/2017 | Engineer<br>WILLIAM SAUNDERS                  | Sheet<br>3/3         |
| Core Dia: NONE mm         |                                   |                     |   |                      |
| Method : ROTARY OPEN HOLE |                                   |                     |   |                      |

| Depth (m) | TCR | SCR | RQD | FI | Field Records | Level (mOD) | Depth (m) (Thickness) | Description          | Legend | Water | Instr |
|-----------|-----|-----|-----|----|---------------|-------------|-----------------------|----------------------|--------|-------|-------|
|           |     |     |     |    |               |             |                       | Light grey MUDSTONE. |        |       |       |
|           |     |     |     |    | 12/06/2017:   |             | 22.00                 | Complete at 22.00m   |        |       |       |

|                         |                |           |
|-------------------------|----------------|-----------|
| Remarks                 | Scale (approx) | Logged By |
|                         | 1:50           | AJP/SJ    |
| Figure No.<br>NE3608.R3 |                |           |



# SUB SURFACE

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

**Site**  
 CAPITOL PARK, DODWORTH, BARNSELY, SOUTH YORKSHIRE

**Borehole Number**  
**R4**

|   |  |                            |                            |  |                             |
|---|--|----------------------------|----------------------------|--|-----------------------------|
| <b>Machine :</b> BERETTA T44<br><b>Flush :</b> MIST<br><b>Core Dia:</b> NONE mm<br><b>Method :</b> ROTARY OPEN HOLE |  | <b>Casing Diameter</b>     | <b>Ground Level (mOD)</b>  | <b>Client</b><br>CARNELL MANAGEMENT SERVICES LIMITED | <b>Job Number</b><br>NE3608 |
|   |  | <b>Location</b><br>AS PLAN | <b>Dates</b><br>12/06/2017 | <b>Engineer</b><br>WILLIAM SAUNDERS                  | <b>Sheet</b><br>1/2         |

| Depth (m) | TCR | SCR | RQD | FI | Field Records                     | Level (mOD) | Depth (m) (Thickness)       | Description                                  | Legend | Water |
|-----------|-----|-----|-----|----|-----------------------------------|-------------|-----------------------------|--|--------|-------|
|           |     |     |     |    | Open Hole (100mm dia) GL - 20.00m |             | (0.30)                      | Weak brown SHALE                             |        |       |
|           |     |     |     |    |                                   |             | 0.30                        | Moderately strong light grey brown MUDSTONE. |        |       |
|           |     |     |     |    |                                   |             | (1.70)                      |  |        |       |
|           |     |     |     |    |                                   |             | 2.00                        | Moderately strong grey MUDSTONE.             |        |       |
|           |     |     |     |    |                                   |             | (2.20)                      |  |        |       |
|           |     |     |     |    |                                   |             | 4.20                        | Black COAL.                                  |        |       |
|           |     |     |     |    |                                   |             | (0.40)                      |  |        |       |
|           |     |     |     |    |                                   |             | 4.60                        | Light grey MUDSTONE.                         |        |       |
|           |     |     |     |    |                                   |             | (0.40)                      |  |        |       |
|           |     |     |     |    |                                   |             | 5.00                        | Black COAL                                   |        |       |
|           |     |     |     |    |                                   | (0.20)      |                             |  |        |       |
|           |     |     |     |    |                                   | 5.20        | Light grey MUDSTONE.        |  |        |       |
|           |     |     |     |    |                                   | (0.30)      |                             |  |        |       |
|           |     |     |     |    |                                   | 5.50        | Black COAL.                 |  |        |       |
|           |     |     |     |    |                                   | (0.20)      |                             |  |        |       |
|           |     |     |     |    |                                   | 5.70        | Light grey MUDSTONE.        |  |        |       |
|           |     |     |     |    |                                   | (2.80)      |                             |  |        |       |
|           |     |     |     |    |                                   | 8.50        | Black COAL.                 |  |        |       |
|           |     |     |     |    |                                   | (0.20)      |                             |  |        |       |
|           |     |     |     |    |                                   | 8.70        | Strong light grey MUDSTONE. |  |        |       |

|   |                                |                            |
|---|--------------------------------|----------------------------|
| <b>Remarks</b><br>Descriptions based upon foreman drillers records of flush returns.<br>Foreman driller recorded no voids, broken ground or loss of flush returns.<br>On completion backfilled with grout and arisings. | <b>Scale (approx)</b><br>1:50  | <b>Logged By</b><br>AJP/SJ |
|   | <b>Figure No.</b><br>NE3608.R4 |                            |



# SUB SURFACE

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

Site  
CAPITOL PARK, DODWORTH, BARNSELY, SOUTH  
YORKSHIRE

Borehole  
Number  
**R4**

|   |                            |                            |  |                             |
|---|----------------------------|----------------------------|--|-----------------------------|
| <b>Machine :</b> BERETTA T44<br><b>Flush :</b> MIST<br><b>Core Dia:</b> NONE mm<br><b>Method :</b> ROTARY OPEN HOLE | <b>Casing Diameter</b>     | <b>Ground Level (mOD)</b>  | <b>Client</b><br>CARNELL MANAGEMENT SERVICES LIMITED | <b>Job Number</b><br>NE3608 |
|   | <b>Location</b><br>AS PLAN | <b>Dates</b><br>12/06/2017 | <b>Engineer</b><br>WILLIAM SAUNDERS                  | <b>Sheet</b><br>2/2         |

| Depth (m) | TCR | SCR | RQD | FI | Field Records | Level (mOD) | Depth (m) (Thickness) | Description                 | Legend | Water |
|-----------|-----|-----|-----|----|---------------|-------------|-----------------------|-----------------------------|--------|-------|
|           |     |     |     |    |               |             | (11.30)               | Strong light grey MUDSTONE. |        |       |
|           |     |     |     |    |               |             | 20.00                 |                             |        |       |

|                |                                |                            |
|----------------|--------------------------------|----------------------------|
| <b>Remarks</b> | <b>Scale (approx)</b><br>1:50  | <b>Logged By</b><br>AJP/SJ |
|                | <b>Figure No.</b><br>NE3608.R4 |                            |



# SUB SURFACE

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

Site  
CAPITOL PARK, DODWORTH, BARNSELY, SOUTH YORKSHIRE

Borehole Number  
**R5**

Machine : BERETTA T44

Flush : MIST

Core Dia: NONE mm

Method : ROTARY OPEN HOLE

Casing Diameter

Ground Level (mOD)

Client  
CARNELL MANAGEMENT SERVICES LIMITED

Job Number  
NE3608

Location  
AS PLAN

Dates  
12/06/2017

Engineer  
WILLIAM SAUNDERS

Sheet  
1/2

| Depth (m) | TCR | SCR | RQD | FI | Field Records                     | Level (mOD) | Depth (m) (Thickness)                          | Description                             | Legend | Water | Instr |
|-----------|-----|-----|-----|----|-----------------------------------|-------------|--|---|--------|-------|-------|
|           |     |     |     |    | Open Hole (100mm dia) GL - 20.00m |             | (0.40)   | Weak brown SHALE.                       |        |       |       |
|           |     |     |     |    |                                   |             | 0.40   | Moderately strong light brown MUDSTONE. |        |       |       |
|           |     |     |     |    |                                   |             | (1.20)   |   |        |       |       |
|           |     |     |     |    |                                   |             | 1.60   | Black COAL.                             |        |       |       |
|           |     |     |     |    |                                   |             | (0.50)   |   |        |       |       |
|           |     |     |     |    |                                   |             | 2.10   | Moderately strong brown MUDSTONE.       |        |       |       |
|           |     |     |     |    |                                   |             | (1.10)   |   |        |       |       |
|           |     |     |     |    |                                   |             | 3.20   | Black COAL.                             |        |       |       |
|           |     |     |     |    |                                   |             | (0.80)   |   |        |       |       |
|           |     |     |     |    |                                   |             | 4.00   | Moderately strong light grey MUDSTONE.  |        |       |       |
|           |     |     |     |    |                                   | (0.30)      |  |   |        |       |       |
|           |     |     |     |    |                                   | 4.30        | Black COAL.                                    |   |        |       |       |
|           |     |     |     |    |                                   | (0.20)      |  |   |        |       |       |
|           |     |     |     |    |                                   | 4.50        | Light grey brown MUDSTONE.                     |   |        |       |       |
|           |     |     |     |    |                                   | (2.90)      |  |   |        |       |       |
|           |     |     |     |    |                                   | 7.40        | Black COAL.                                    |   |        |       |       |
|           |     |     |     |    |                                   | (0.40)      |  |   |        |       |       |
|           |     |     |     |    |                                   | 7.80        | Moderately strong light grey to grey MUDSTONE. |   |        |       |       |

### Remarks

Descriptions based upon foreman drillers records of flush returns.  
Foreman driller recorded no voids, broken ground or loss of flush returns.  
On completion backfilled with grout and arisings to 5.00m and installed a 50mm slotted 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)

1:50

Logged By

AJP/SJ

Figure No.

NE3608.R5



# SUB SURFACE

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

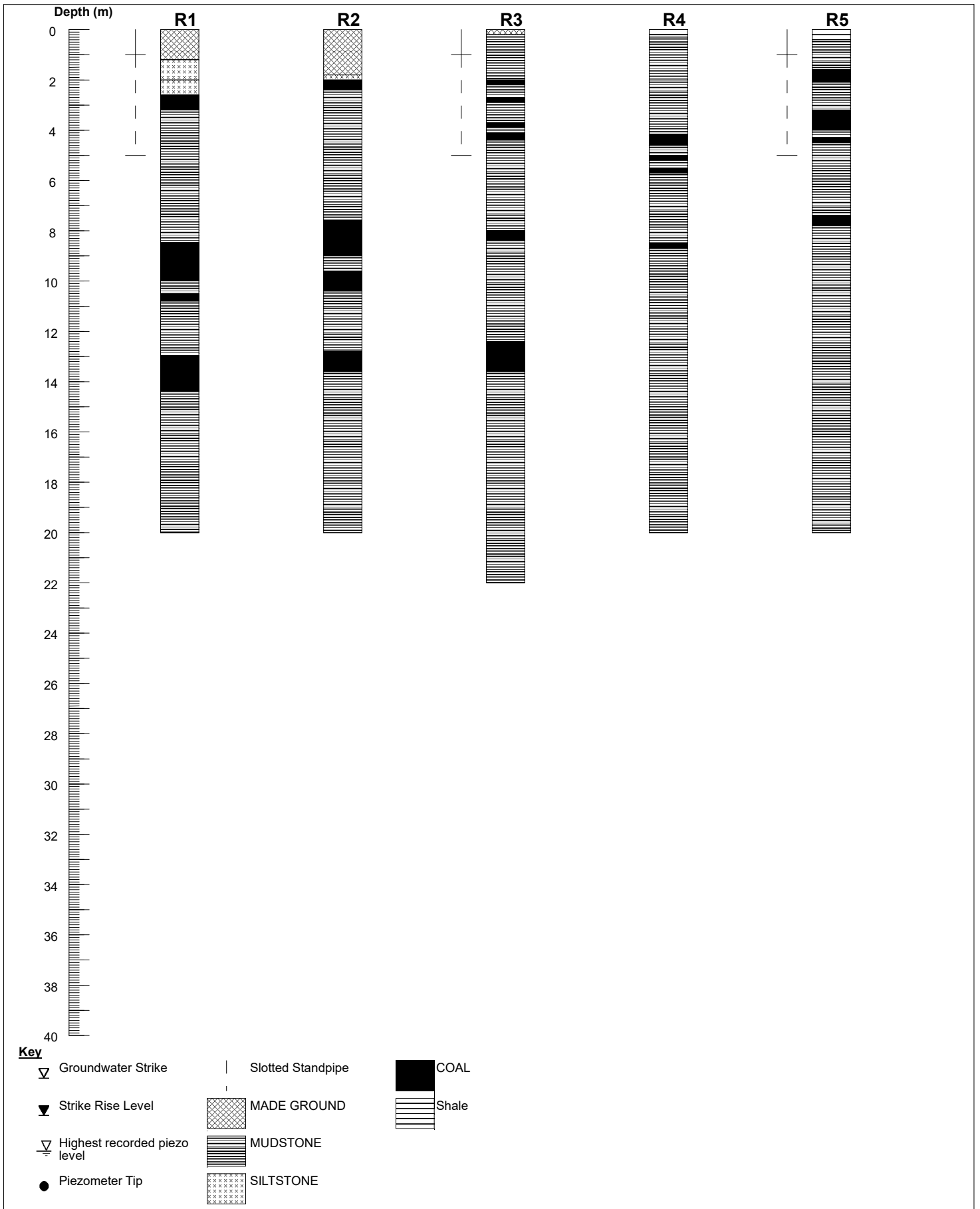
Site  
CAPITOL PARK, DODWORTH, BARNSELY, SOUTH YORKSHIRE


Borehole Number  
**R5**

|                           |                 |                    |                                     |            |
|---------------------------|-----------------|--------------------|-------------------------------------|------------|
| Machine : BERETTA T44     | Casing Diameter | Ground Level (mOD) | Client                              | Job Number |
| Flush : MIST              |                 |                    | CARNELL MANAGEMENT SERVICES LIMITED | NE3608     |
| Core Dia: NONE mm         | Location        | Dates              | Engineer                            | Sheet      |
| Method : ROTARY OPEN HOLE | AS PLAN         | 12/06/2017         | WILLIAM SAUNDERS                    | 2/2        |

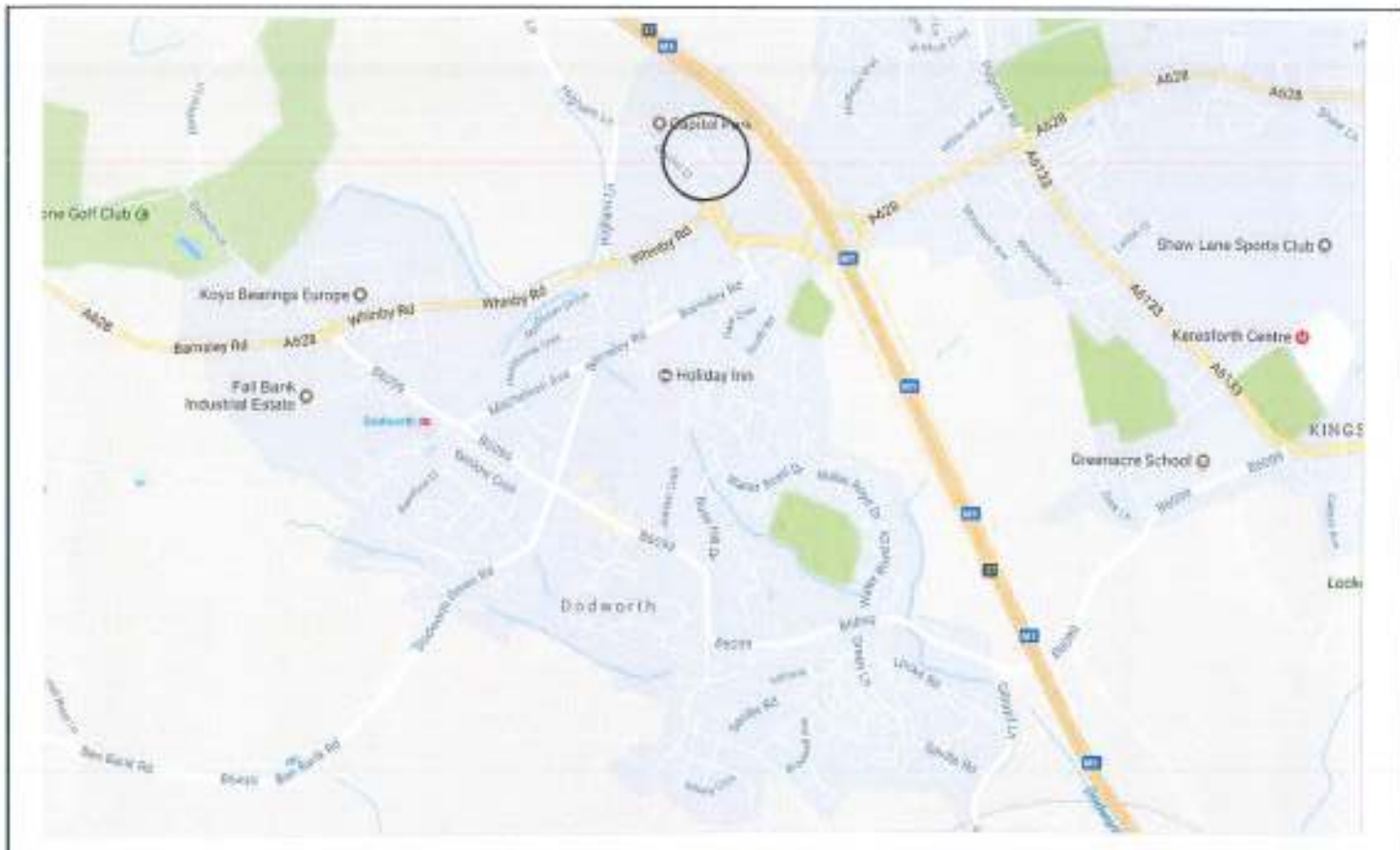
| Depth (m) | TCR | SCR | RQD | FI | Field Records | Level (mOD) | Depth (m) (Thickness) | Description                                    | Legend | Water | Instr |
|-----------|-----|-----|-----|----|---------------|-------------|-----------------------|--|--------|-------|-------|
|           |     |     |     |    |               |             |                       | Moderately strong light grey to grey MUDSTONE. |        |       |       |
|           |     |     |     |    |               |             | (12.20)               |  |        |       |       |
|           |     |     |     |    |               |             | 20.00                 |  |        |       |       |

|         |                         |           |
|---------|-------------------------|-----------|
| Remarks | Scale (approx)          | Logged By |
|         | 1:50                    | AJP/SJ    |
|         | Figure No.<br>NE3608.R5 |           |



|  |  |                                 |                          |                               |
|--|--|---------------------------------|--------------------------|-------------------------------|
|  <b>SUB SURFACE</b><br>SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS<br>3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907 | <b>Nominal Section</b>   |                                 |                          |                               |
|  | <b>Site</b><br>CAPITOL PARK, DODWORTH, BARNSELY, SOUTH YORKSHIRE | <b>Date Drawn</b><br>14/07/2017 | <b>Date Checked</b>      | <b>Sheet</b><br>1/1           |
| <b>Client</b><br>CARNELL MANAGEMENT SERVICES LIMITED   | <b>Drawn By</b>  | <b>Checked By</b>               | <b>Scale</b><br>1:200[V] | <b>Figure No.</b><br>NE3608.1 |

## FIGURES



**SUB SURFACE**

SITE INVESTIGATION AND SPECIALIST GEOTECHNICAL CONSULTANTS  
 3 Paul Street, Preston, PR2 2QS. Tel. (01772) 961135 Fax (01772) 204907

**SITE LOCATION PLAN**

|  |                        |                          |  |                   |
|--|------------------------|--------------------------|--|-------------------|
| Site<br>CAPITOL PARK, DODWORTH, BARNSELY, SOUTH YORKSHIRE. | Date Drawn<br>07-07-17 | Date Checked<br>07-07-17 | Orientation<br> | Job No.<br>NE3608 |
| Client<br>CARNELL MANAGEMENT SERVICES LIMITED.             | Drawn By<br>DS         | Checked By<br>CAM        | Scale<br>NTS   | Figure No.<br>1   |

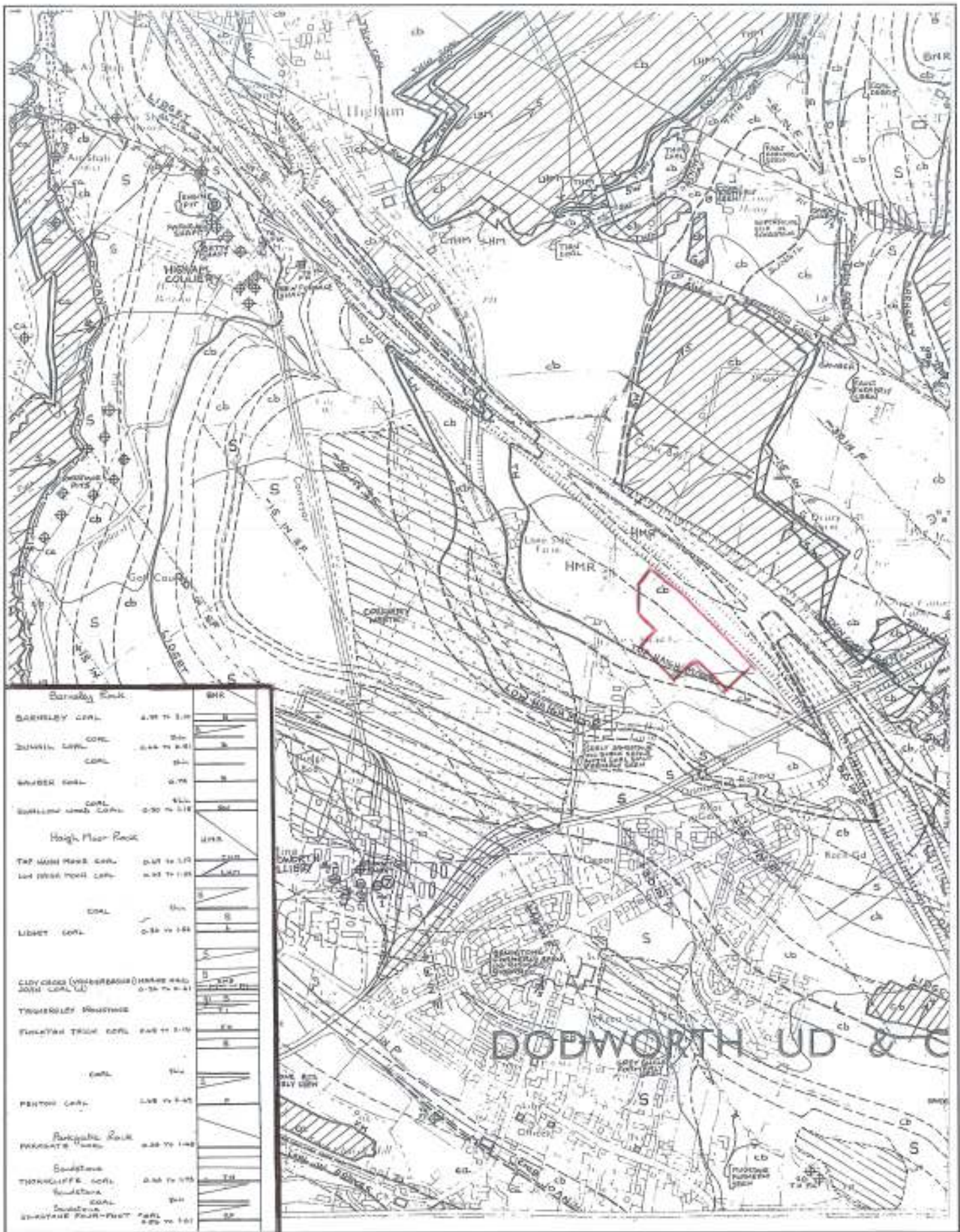


## SUB SURFACE

SITE INVESTIGATION AND SPECIALIST GEOTECHNICAL CONSULTANTS  
 3 Paul Street, Pwllheli, P92 2DS. Tel: (01772) 981136 Fax: (01772) 204801

## EXPLORATORY HOLE LOCATION PLAN

|              |   |            |     |            |
|--------------|---|------------|-----|------------|
| Site         | CAPITOL PARK, DODWORTH, BARNESLEY, SOUTH YORKSHIRE. |            |     |            |
| Client       | CARNELL MANAGEMENT SERVICES LIMITED.                |            |     |            |
| Date Drawn   | 07-07-17  | Drawn By   | DS  | Drawn By   |
| Date Checked | 07-07-17  | Checked By | CAM | Checked By |
| Orientation  |   | Scale      | NTS | Scale      |
| Job No.      | NE3608  | Figure No. | 2   | Figure No. |



|  |  |                                 |  |                          |
|--|--|---------------------------------|--|--------------------------|
|  <b>SUB SURFACE</b><br>SITE INVESTIGATION AND SPECIALIST GEOTECHNICAL CONSULTANTS<br>3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204807 | <b>EXTRACT OF GEOLOGICAL SURVEY SHEET SE30NW</b> |                                 |  |                          |
|  | Date Drawn<br><b>07-07-17</b>                    | Date Checked<br><b>07-07-17</b> | Orientation<br> | Job No.<br><b>NE3608</b> |
| Client<br><b>CARNELL MANAGEMENT SERVICES LIMITED.</b>  | Drawn By<br><b>DS</b>                            | Checked By<br><b>CAM</b>        | Scale<br><b>NTS</b>  | Figure No.<br><b>3</b>   |