GROUND INVESTIGATION
AT
SAVILLE ROAD, DODWORTH, BARNSLEY,
SOUTH YORKSHIRE.

FOR
BARNSLEY METROPOLITAN
BOROUGH COUNCIL

REPORT NO. NE3204
APRIL 2013

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GROUND INVESTIGATION AT SAVILLE ROAD, GILROYD, DODWORTH, BARNSLEY

CLIENT: BARNSLEY METROPOLITAN BOROUGH COUNCIL

ENGINEER: NPS BARNSLEY LIMITED

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1. INTRODUCTION

This report has been prepared in accordance with Order No. 4000195477 dated 18th March 2013, from the Engineer on behalf of the Client.

The brief was set out in the tender enquiry and our estimate, ref. e4634 and dated 19th February 2013, with amendments as the investigation proceeded and includes:

- 3 No. rotary boreholes
- 5 No. trial pits and a trial trench
- 3 No. soakaway 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 to the north side of Saville Road in the Gilroyd area of Dodworth, Barnsley, South Yorkshire as indicated on Figure 1. The approximate National Grid Reference of the centre of the site is 432301, 404624.

The irregular shaped area of land comprises an almost square area of land over the southeastern two thirds, then smaller irregular parts over the northern and western one third. The site is bounded by Saville Road in the south, a row of shops, their rear garden areas, a substation and open land in the east, housing and gardens and a footpath in the north and parking areas and a community building in the west.

The site is generally flat in its western extent. The larger square area of land that comprises the majority of the eastern and southeastern part of the site bound by Saville Road, the shops, a footpath and housing is initially level with Saville Road in the south, then slopes moderately down to the north before levelling out to a more gently slope down to the north. A slight noticeable depression is present in the central western area.

The site is largely grass covered with areas of planted bulbs and young tree saplings. Several semi mature and mature trees are noted in the western and northwestern parts of the site.

Within the western extent of the site is also a macadamed parking area.

1.2 Proposed Development and Purpose of the Ground Investigation

We understand that it is proposed to develop the site with social housing and associated parking areas, comprising eight semi-detached houses and one detached house.

The purpose of the investigation was to obtain an indication of the ground conditions, at the positions of the trial pits and rotary boreholes to assess the likelihood of a general pattern of strata being present below the site and to establish the load bearing characteristics of the strata deriving, if possible, an assessment of the suitability of appropriate founding techniques. Also to determine the presence of any shallow coal seams, or associated mine workings, in order to assess the risk to near surface ground stability and the constraints for the proposed development due to the possible fault crossing the site.

It was also to establish the capacity of the ground to stand open during trench excavation and the need for any special excavation techniques, together with a check if possible on any special design requirements resulting from exceptional ground conditions.

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

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

2. INVESTIGATION

2.1 Investigation Details

Three rotary boreholes were put down to depths of between 8.00 and 30.00 metres using a Beretta drilling rig, at the positions determined and set out by Sub Surface North East Limited, as shown on Figure 3.

The rotary boreholes were advanced by rotary open holing techniques, with a mist then water flushing medium, using 99mm diameter rock roller bits and 121mm diameter temporary casing. The foreman driller logged chippings flushed to the surface during drilling and the resulting Rotary Borehole Records are appended.

Five trial pits and a trial trench were taken out by a mechanical excavator at the positions determined and set out by Sub Surface North East Limited, as shown on Figure 3. The trial pits and trench were excavated to depths of between 1.8 metres and 3.2 metres, representative samples were taken and the materials were logged in accordance with BS. EN. 14688 and 14689: 2002-2004. The resulting Trial Pit Records are appended.

The trial pits were backfilled with arisings on completion with only nominal compaction being given by the excavator and it is therefore likely that loose or soft pockets will remain.

Three of the trial pits were utilised for soakaway testing prior to their backfilling.

2.2 Sub Surface Detail

Details of the strata encountered in the ground investigation are given on the appended Trial Pit and Rotary Borehole records. The exploratory holes found topsoil and occasional made ground overlying generally natural cohesive strata, which in turn overlay mudstone or sandstone bedrock. A general summary of the strata found is as follows:

2.2.1 Topsoil and Made Ground

Topsoil was encountered at all trial pit locations at depths of up to 0.3m below ground level with some brick fragments present in trial pit 4 to 0.3m. In trial trench 1 a topsoil with slight brick and brown clay (made ground) was present to 0.25m, overlying an old topsoil.

2.2.2 Drift Deposits/Cohesive Depsoits

Natural cohesive deposits were encountered beneath the topsoil and made ground to depths of 2.2m, 1.7m, 0.7m, 1.1m, 0.4m and 1.1m in trial pits 1 to 5 and trial trench 1 respectively. The strata were firm or stiff medium to high strength brown and grey silty clays and were largely completely weathered bedrock.

In trial pit 3 and trial pit 5 the weathered rock passed back into clays, i.e completely weathered bedrock between depths of 1.1m to 2.3 and 1.1 to 2.1m respectively.

In parts of the weathered strata, there were carbonaceous bands and slight coal traces.

2.2.3 Bedrock

Moderately to slightly weathered sandstones were encountered in trial pits 1 and 2 to their base and mudstones in the remaining pits to their full extent. The trial pits were extended to depths of 2.7m, 2.8m, 3.2m, 2.8m and 3.2m in pits 1 to 5 respectively.

In the rotary boreholes interbedded bands of grey and brown mudstone and siltstone were recorded to the termination of the boreholes at a depth of 30m with a thin band of coal between 4.40m and 4.80m in borehole R1. No voids, loose drilling or loss of flush was recorded in any of the boreholes.

2.2.4 Groundwater

A summary of groundwater entries and levels are tabulated below:

TABLE 1 GROUNDWATER

Expl. Hole No.	Water Entry Depth (m)	Rate of Inflow	Depth of Standing Water Level (m)
TP1	2.20	Seepage	1.80m
TP2	2.20	Seepage	2.60m
TP3	0.70	Seepage	
TP3	2.30	Seepage	2.54m
TP4	DRY		
TP5	0.80	Seepage	
R1	14.80	Slow	14.00*
R2	21.50	Medium	19.80*
R3A	22.00	Medium	19.00*

* after 20 minutes,

Monitoring of the standpipes installed in rotary boreholes R2 and R3B recorded standing water levels of 3.30m and 1.45m respectively, whilst R1 was dry.

3. SAMPLING, TESTING AND MONITORING

3.1 Sampling

Small disturbed and bulk disturbed samples were obtained from the strata encountered and were subjected to careful examination and hand penetrometer / 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

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

On completion of the trial pits, soakaway tests were undertaken in trial pits 1, 2 and 3. Water was added to the pits from a bowser and water levels were subsequently monitored over a period of 4 hours. Details of the pits and the results of the soakaway tests are appended.

3.3 Installations and Monitoring

On completion of the rotary boreholes hdpe standpipes were installed to a depths of 5.0 metres. The standpipes are slotted from 1.0 to 5.0 metres in 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 rotary Borehole Records.

Monitoring of the standpipes for ground gas and groundwater has been undertaken on one 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
- California bearing ratio tests on samples remoulded at natural moisture content
- Pyritic Ground testing (including soluble sulphate and pH value tests)
- Soluble sulphate content and pH value tests

Contamination analyses have been performed on 4 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. On one of the soil samples poly chlorinated bi-phenyls (PCBs) concentrations were also determined.

The results of the above analyses are appended.

4. APPRAISAL AND RECOMMENDATIONS

4.1 Comments on the Profile

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

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

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 Trial Pit and Rotary Borehole Records and a summary of the ground conditions is given in Section 2.2.

4.2 Geology and Mining

4.2.1 SYMAS Mineral Report

The Client has provided a Mineral Report produced by SYMAS, which is given in the appendix and assesses the likely geology and coal mining situation beneath the site.

The conclusions of the report are:

1. The site is stable from deep mining subsidence and should remain so.

2. Mine workings are recorded beneath the site in the Flockton seam, however the depth of workings are estimated to be in excess of 20m and therefore are sufficiently deep not to cause instability at the surface.

3. Due to the possible presence of a geological fault conjectured to run across the site and the presence of mine workings there is a risk of reoccuring fault movement and surface instability at the position of the fault.

4. There is a risk of the presence of fugitive mine gases.

4.2.2 Rotary Boreholes and Trial Trench

The rotary boreholes encountered interbedded bands of grey and brown mudstone and siltstone to their termination at a depth of 30m with a thin band of coal between 4.40m and 4.80m in borehole R1. No voids, loose drilling or loss of flush was recorded in any of the boreholes. Consequently, from the boreholes the Flockton seam would appear to be at a depth greater than 30m and would appear to confirm the SYMAS conclusion that the seam and any potential workings are sufficiently deep not to cause instability at the surface.

From the findings of the trial trench and the rotary boreholes it was not possible to determine the location or presence of the fault, conjectured to run across the site. However, this does not mean that there is no fault due to the possible similarity and nature of the strata on either side of the fault. As a result in our opinion, there is a marginal risk to ground stability and the integrity of the proposed development. Significant subsidence is not anticipated but minor residual settlement is a possibility in the fault shatter zone. We recommend that the proposed building be constructed on reinforced semi-raft, ring beam or raft foundations which are 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.

The risk from fugitive mine gasses is covered under Section 4.10.

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 with social housing and associated parking areas, comprising eight semi-detached houses and one detached house. However, at the time of writing this report no specific details regarding the building layout and design loadings were available and consequently the recommendations given are in general terms only.

The ground investigation found topsoil and occasional made ground to depths of up to 0.30m, overlying generally natural firm to stiff medium to high strength brown and grey silty clays, which in turn overlay mudstone or sandstone bedrock.

We would not recommend founding in the topsoil or made ground because of its inherent variability in consistency and compaction, and in parts the nature of its constituents. We would recommend that this is removed with a site strip.

Providing there is sufficient load bearing capability and in accordance with Section 4.2, we recommend that the proposed buildings are founded on a reinforced semi-raft, ring beam or raft foundations, which are able to span 3.0 metres and cantilever 1.5 metres due to a loss of support due to the possible presence of a fault. It should be noted that a semi raft foundation should have an integral suspended floor slab.

Atterberg limit tests on the upper natural cohesive strata indicate clays of intermediate to high plasticity which are considered to have a variable low to medium to high susceptibility to shrinkage and swelling with varying moisture content. Consequently we recommend that any foundations are placed at a minimum depth of 1.0 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 high shrinkage and swelling potential.

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

TABLE 2 SAFE BEARING CAPACITY

Expl Hole No.	Depth (m)	Shear Strength # (kN/m^2)	Safe Bearing Pressure (kN/m^2)		Minimum Foundation Depth (m)
			Strip Footing	Square Pad	
TP1	1.20	80	150*	180*	1.00
TP1	1.30	60	110	135	
TP1	1.70	80	150	180	
TP1	2.00	110	205	250	
TP2	0.90	50	95	110	1.00
TP2	1.30	80	150	180	
TP3	0.50	50	95	110	1.00
TP3	1.20	50	95	110	
TP3	2.00	70	130	155	

TP4	0.60	50	95	110	1.00
TP4	1.00	78	145	175	
TP5	1.20	52	95	115	1.00

* Consideration must be given to weaker underlying strata which might be overstressed if loading is not reduced.

\# Shear strength determined by hand shear vane test.

Appreciable variations in safe bearing capacity are indicated in Table 2 and as a consequence of this and the need to utilise a generally applicable safe bearing pressure to enable designs to be reasonably formulated we recommend use of a reinforced concrete semi-raft foundation to support all load bearing walls. The footings should take the form of perimeter and transverse downstand beams taking the whole load on the beam bases at a design bearing pressure not exceeding 95kN/m^2 and founding at a depth of the order of 1.0 metres..

All formation levels should be carefully inspected by an experienced and qualified Engineer to confirm the appropriateness of the design figures used with any softer/ looser 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.

4.4 Floor Slab Construction

With regard to the design and construction of floor slabs we would recommend the removal of any topsoil followed by the construction of a reinforced concrete suspended floor slab, integral with the reinforced semi-raft/ring beam.

4.5 Excavations and Groundwater

In our opinion, there should be no particular difficulties in excavating the strata down to the rockhead encountered at the base of the trial pits utilising an appropriate and suitably sized mechanical excavator.

Excavations during the relatively short time that they were left open and unsupported remained stable.

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

Groundwater seepages were recorded in the trial pits. Should groundwater seepages occur and water accumulate in the excavation it should be able to be removed by pumping from a filtered sump.

It should be noted that there is a soft waterlogged area in the centre of the site, there is a possibility that this could be related to the fault and a resulting “spring” type issue. Consequently, we would recommend that consideration is given to this area when designing the site drainage system.

It should be noted that groundwater inflows and levels are likely to be subject to seasonal and climatic variations.

Soakaway tests were carried out in trial pits TP1, TP2 and TP3, however, the due to the strata being predominantly clay or weathered mudstone of relative impermeability the test did not soak away. Consequently, in our opinion, the site site is not suitable for the use of soakaways.

4.6 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 3.7 to 7.5 (acidic).

Soluble sulphate concentrations were also determined for soil samples and the results ranged from 0.01 to 0.06 g/l.

Total sulphate and total sulphur have been determined for two soil samples and the results were 0.11% and 0.07% total sulphate and 0.69% and 4.3% total sulphur. Both samples were found to contain pyrite, which may oxidise to give sulphates, if the ground is disturbed.

Calculations have determined that there is a potential for pyrite/sulphides to weather and produce higher levels of sulphates and therefore the Design Sulphate Class for the site should be DS-4.

Our knowledge of the site and ground conditions indicates that the site is “brownfield” with “pyritic ground” and 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-5 should be used, as detailed on the appended extract.

4.7 Roads, Hardstandings and Car Parks

Laboratory California Bearing Ratio (CBR) tests have been undertaken on two soil samples of the upper natural clay recompacted at their natural moisture content from the positions of trial pits TP1 and TP2 shown on Figure 3 and the results of the tests are appended. A summary of the laboratory CBR test results is as follows:

TABLE 3 CBR RESULTS

Expl. Hole No.	Depth (m)	Dry Density (Mg/m^3)	Moisture Content (%)	CBR Value (%)	Sample
TP1	0.40	1.70	20	1.8	Dark brown gravelly silty CLAY
TP2	0.40	1.46	30	2.3	Yellowish brown and brown mottled silty CLAY

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

Given the above it would be advisable to design on a preliminary CBR value of 1.8% for the upper natural clays, where they are found at formation level. If there is to be a delay before construction, to prevent water softening, loosening and disturbance, the formation strata should not be exposed. We would recommend further in-situ CBR testing along any specific roads or hardstanding areas once the formation levels are determined to confirm or otherwise the preliminary design values given.

4.9 Contamination Considerations

At the outset it should be noted that this contamination investigation is an initial baseline survey only, in order to provide a preliminary risk assessment on the level of contamination present, and not a full contamination survey. Based upon the findings of this investigation additional sampling, analysis and assessment may be required.

It should be appreciated that the suite of determinants consist of a range of common contaminants and the analysis is restricted to these. However, the absence of other specific contaminants cannot be guaranteed.

4.9.1 Assessment (Soil)

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

The Department for Environment, Food and Rural Affairs (DEFRA) and the Environment Agency (EA) withdrew the soil guideline values (SGVs) and replaced the old CLR 10 document covering derivation of soil guideline values in 2008. This had the effect that any values derived using the old CLR 10 assumptions and parameters were no longer valid. In response Atkins updated their soil screening values (SSVs). DEFRA and EA published new soil guideline values (SGVs) for mercury, selenium, benzene, toluene, ethylbenzene and xylene on 31 March 2009, arsenic and nickel on 12 May 2009 and cadmium and phenols in June 2009. In July 2009 a substantial number of Generic Assessment Criteria (GACs) were published by Land Quality Management (LQM), in conjunction with the Chartered Institute of Environmental Health, which supplement the SGVs and effectively supersede many,

but not all, SSVs. Contaminated Land: Applications in Real Environments (CL:AIRE) guideline values were also published in December 2009 to supplement the above. The guideline values (SGVs, GACs, CL:AIRE and SSVs) vary dependant 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 housing, contamination analyses have been compared with the guideline values for a standard land use of residential with plant uptake.

The contamination analysis determined no elevated levels of the contaminants tested for when compared with the guideline values for a standard land use of residential with plant uptake. Guideline values for the assessment can be supplied directly to the Regulator, if requested.

No visible evidence of asbestos was found during the investigation and hence analysis was not undertaken.

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.

4.9.2 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;

(c) a relevant RECEPTOR (defined as living organisms, ecological systems, controlled waters or property); and

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

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

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

Site personnel involved in earthworks and excavations should wear gloves, overalls, and boots and smoking should be prohibited as a matter of standard safety procedure.

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.

Should it be necessary for groundwater to be pumped from on-site excavations the groundwater should be analysed and assessed for disposal. Disposal of groundwater is likely to be to a sewer, following receipt of a discharge consent from the appropriate authority, or to an off-site licensed discharge point

4.10 Ground Gas Considerations

Ground/mine gas monitoring visits have been undertaken on one of six scheduled occasions to date and the results of the monitoring visits are appended.

Ground/mine 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 4 GROUND GAS CONCENTRATIONS AND FLOW RATE

Methane (% vol. In air)	Carbon Dioxide (% vol. in air)	Oxygen (% vol. in air)	Gas Flow Rate (litres/ hour)
0.0	0.2 – 1.6	6.3 – 20.3	<0.1

It can be seen from the monitoring that in borehole R1 there was a slightly elevated level of carbon dioxide and a depleted level of oxygen, with no significant gas flow rate

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 characterisation and remediation from ground gas in affected developments”, published in October 2007 (BS.8485:2007).

The characteristic hazardous gas flow rate (Q_{hgs}) is calculated by dividing the maximum gas (methane or carbon dioxide) concentration by 100 and multiplying by the maximum flow rate in litres per hour (minimum 0.1 l/hr for Sub Surface monitoring equipment). For this site Q_{hgs} = [1.6/ 100] x 0.1 = 0.0016 l/hr

BS.8485:2007, Table 1, indicates that the site falls into Characteristic Situation 1 (CS1).

BS.8485:2007, Table 2, indicates that for a CS1 and the type of development proposed a score of zero gives no protection and remedial measures required.

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

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.

4.11 General

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 Simpsonat our Ossett office.

SUB SURFACE NORTH EAST LIMITED
REPORT No. NE3204
APRIL 2013

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For and on behalf of
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INFORMATION SUPPLIED BY THE CLIENT

MINERAL REPORT

Date: 21st August, 2012

My Ref: PJ/M380/3

CONFIDENTIAL

LAND AT SAVILLE ROAD AND LOCKE ROAD, GILROYD, DODWORTH

SITUATION

The land under consideration for housing development is shown edged orange on the attached drawing no M380/3A.

GEOLOGICAL INFORMATION

Geological records indicate that the sites are underlain by middle coal measures mudstones, siltstones and sandstones which dip at a rate of approximately 1 in 12 to the north east

A north east – south west trending geological fault is conjectured to outcrop through the sites as shown in blue on the attached plan.

MINING

Shallow Workings

Two mine entries are present in close proximity as shown on the attached drawing. These shafts were part of Rosehill colliery which mined the Flockton coal seam in the 1890's beneath the area. The colliery abandonment plan suggests the shafts are 21 yards deep (19m) the Flockton seam being 66cm thick. Mine workings are recorded beneath both pieces of land but are calculated to be at a depth of at least 20m and therefore sufficiently deep not to cause instability at the surface.

The Rosehill colliery abandonment plan also indicates the position of a 28ft deep "Well" in the south eastern corner of the Locke Road site as illustrated on the attached drawing. It is not clear whether the "well" is actually a shaft, a borehole (possible underground) or a water well at surface. The presence of a well or shaft at the surface can not be ruled out and therefore should be suitably investigated.

Deep Mine Workings

The land has been affected by mineworkings several coal seams in the past. Any normal movement at the surface should be complete and the site now lies remote from the active coalfield.

FORMER LAND USES

The relevant Ordnance Survey Sheets have been checked and there are no indications of any previous land use which may give rise to contamination issues.

LANDFILL

The site does not lie within 250 m of a known landfill site, as indicated on the current Borough Landfill Site Map.

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Website: www.barnsley.gov.uk/symas

BARNSLEY Metropolitan Borough Council
Doncaster Metropolitan Borough Council
Rotherham Metropolitan Borough Council

Continuation Sheet

CONCLUSIONS

1. The site is stable from the deep mining subsidence aspect and should remain so in future years.

2. Mine workings are recorded beneath land in the Flockton seam. The depth of the workings is estimated to be at least 20m and therefore sufficiently deep not to cause instability at the surface. However a prudent developer would undertake a limited number of boreholes to confirm ground conditions.
Due to the presence of mine workings adjacent to the geological faulting, reoccurring fault movement and surface instability at the position of the fault can not be ruled out. Ideally the fault position should be identified by trenching and development across the fault zone should be avoided and/or foundations should be suitably designed

3. The "Well" or shaft in the south eastern corner of the Locke Road site should be investigated by undertaking a site scrape down to bedrock. Any mine entries which are encountered during development works should be reported to the Coal Authority and will require appropriate treatment.

   Consultation with the Coal Authority is required prior to any investigation or operations that involves entry into any coal or mines of coal, including coal mine shafts, adits and workings. The Documentation which supports the Coal Authority's Permissions procedures can be viewed at: www.coal.gov.uk/services/permissions/index.cfm.

4. Given the presence of relatively shallow mine workings and geological faulting, the presence of fugitive mine gases can not be ruled out. Suitable gas monitoring investigations should be undertaken and it is recommended that monitoring in respect of fugitive gases should be undertaken during all site investigation and excavation works.
Precautions against fugitive gases may need to be incorporated into future development.

   THIS REPORT IS BASED ON AND LIMITED TO THE RECORDS IN THE POSSESSION OF SYMAS AT THE TIME THE ENQUIRY IS ANSWERED.

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Report prepared by P. James 21st August, 2012.

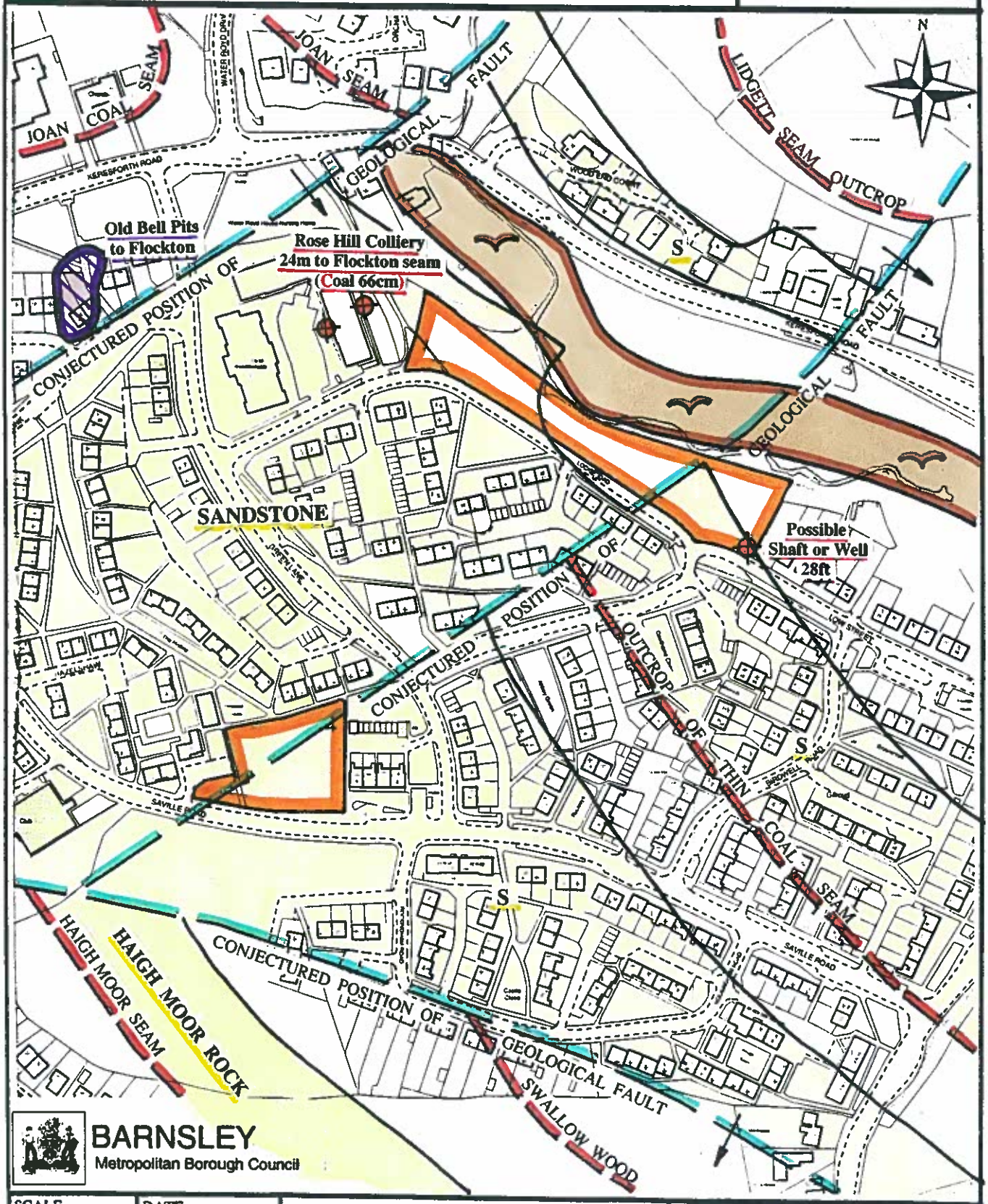
P. James,
Principal Mining Engineer.

DRAWING TITLE

LAND AT LOCKE ROAD AND SAVILLE ROAD GILROYD, DODWORTH

DRAWING NO.

M380/3A



SCALE	DATE		O.S REFERENCE
1:2500	21.8.12	SOUTH YORKSHIRE MINING ADVISORY SERVICE	SE 3204
DRAWN BY: AS	CHECKED BY: RT		P. JAMES BSc (Hons) PRINCIPAL MINING ENGINEER

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INSITU TEST RESULTS

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

In-Situ Test Results

Site: SAVILLE ROAD, GILROYD, DODWORTH, BARNSLEY

Client: BARNSLEY METROPOLITAN BOROUGH COUNCIL

Engineer: NPS (BARNSLEY) LTD

Job Number: NE3204

Sheet: 1 of 1

Ground Gas and Groundwater Monitoring Results Sheet

Date	Hole No.	Methane (% Volume)	Carbon Dioxide (% Volume)	Oxygen (% Volume)	Gas Flow Rate (l/hr)	Atmospheric Pressure (m bars)	Depth to Groundwater (m)
17/04/2013	R1	0.0	***1.6***	***6.3***	<0.1	997	DRY
	R2	0.0	1.0	18.5	<0.1	997	3.30
	R3B	0.0	0.2	20.3	<0.1	997	1.45

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

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Insitu Test Results

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Client: BARNSLEY METROPOLITAN BOROUGH COUNCIL

Engineer: NPS (BARNSLEY) LIMITED

Job Number: NE3204

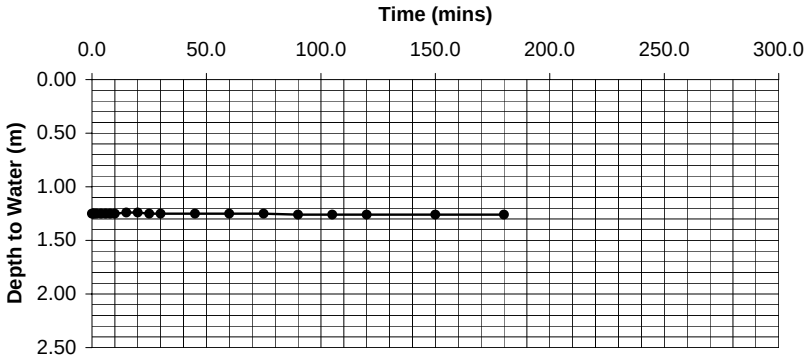
Sheet: 1 / 3

Soakaway Test

Trial Pit No: TP1

TEST NO: 1

DATE: 22/03/2013



Time (min)	Depth (m)
0.0	1.25
0.5	1.25
1.0	1.25
2.0	1.25
4.0	1.25
6.0	1.25
8.0	1.25
10.0	1.25
15.0	1.24
20.0	1.24
25.0	1.25
30.0	1.25
45.0	1.25
60.0	1.25
75.0	1.25
90.0	1.26
105.0	1.26
120.0	1.26
150.0	1.26
180.0	1.26

Length of pit:	L =	1.90	m
Width of pit:	W =	0.50	m
Depth of pit	D =	2.70	m
Base area of pit:	A =	0.95	m^2
100% effective depth	D100 =	1.25	m
75% effective depth	D75 =	1.61	m
50% effective depth	D50 =	1.98	m
25% effective depth	D25 =	2.34	m
time to D75	T75 =	-	sec
time to D25	T25 =	-	sec
time from D75 to D25 (T25 - T75)	t_{p75-25} =	-	sec
volume between D75 & D25 (A x (D25 - D75))	V_{p75-25} =	0.69	m^3
surface area to D50 inc. base ((2x(D-D50)x(W+L)) + A)	a_{p50} =	4.43	m^2

SOIL INFILTRATION RATE **f =** $\frac{V_{p75-25}}{a_{p50} \times t_{p75-25}}$

f = - m/sec

Test Strata: (see Trial Pit) Brown and grey mottled silty CLAY becoming weak brown slightly weathered very thinly bedded SANDSTONE

Remarks: Unable to calculate soil infiltration rate due to relative impermeability of strata

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Insitu Test Results

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Client: BARNSLEY METROPOLITAN BOROUGH COUNCIL

Engineer: NPS (BARNSLEY) LIMITED

Job Number: NE3204

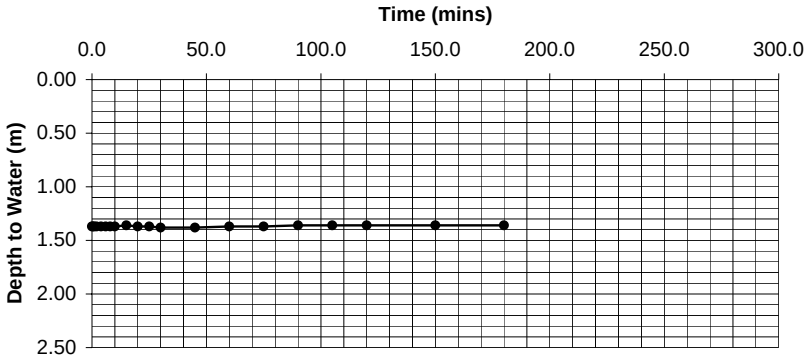
Sheet: 2 / 3

Soakaway Test

Trial Pit No: TP2

TEST NO: 1

DATE: 22/03/2013



Length of pit:	L =	2.00	m
Width of pit:	W =	0.50	m
Depth of pit	D =	2.80	m
Base area of pit:	A =	1.00	m^2
100% effective depth	D100 =	1.37	m
75% effective depth	D75 =	1.73	m
50% effective depth	D50 =	2.09	m
25% effective depth	D25 =	2.44	m
time to D75	T75 =	-	sec
time to D25	T25 =	-	sec
time from D75 to D25 (T25 - T75)	t_{p75-25} =	-	sec
volume between D75 & D25 (A x (D25 - D75))	V_{p75-25} =	0.72	m^3
surface area to D50 inc. base ((2x(D-D50)x(W+L)) + A)	a_{p50} =	4.58	m^2

SOIL INFILTRATION RATE **f =** $\frac{V_{p75-25}}{a_{p50} \times t_{p75-25}}$

f = - m/sec

Time (min)	Depth (m)
0.0	1.37
0.5	1.37
1.0	1.37
2.0	1.37
4.0	1.37
6.0	1.37
8.0	1.37
10.0	1.37
15.0	1.36
20.0	1.37
25.0	1.37
30.0	1.38
45.0	1.38
60.0	1.37
75.0	1.37
90.0	1.36
105.0	1.36
120.0	1.36
150.0	1.36
180.0	1.36

Test Strata: (see Trial Pit) Brown and grey silty CLAY becoming dark brown and grey silty CLAY completely weathered mudstone becoming weak brown thinly bedded SANDSTONE

Remarks: Unable to calculate soil infiltration rate due to relative impermeability of strata

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Insitu Test Results

Site: SAVILLE ROAD, GILDROYD, BARNSLEY, SOUTH YORKSHIRE

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Engineer: NPS (BARNSLEY) LIMITED

Job Number: NE3204

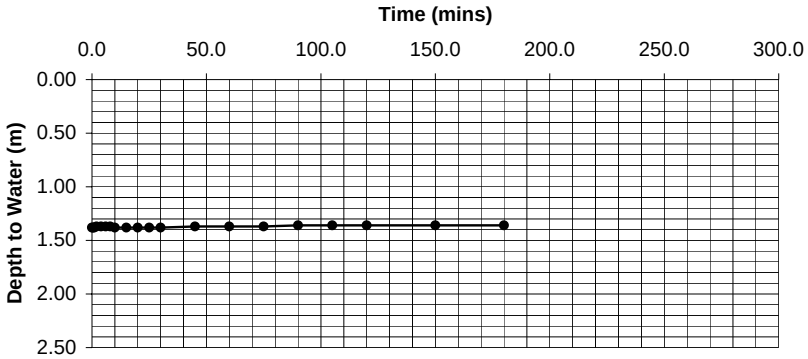
Sheet: 3 / 3

Soakaway Test

Trial Pit No: TP3

TEST NO: 1

DATE: 22/03/2013



Time (min)	Depth (m)
0.0	1.38
0.5	1.38
1.0	1.38
2.0	1.37
4.0	1.37
6.0	1.37
8.0	1.37
10.0	1.38
15.0	1.38
20.0	1.38
25.0	1.38
30.0	1.38
45.0	1.37
60.0	1.37
75.0	1.37
90.0	1.36
105.0	1.36
120.0	1.36
150.0	1.36
180.0	1.36

Length of pit:	L =	2.40	m
Width of pit:	W =	0.50	m
Depth of pit	D =	3.20	m
Base area of pit:	A =	1.20	m^2
100% effective depth	D100 =	1.38	m
75% effective depth	D75 =	1.84	m
50% effective depth	D50 =	2.29	m
25% effective depth	D25 =	2.75	m
time to D75	T75 =	-	sec
time to D25	T25 =	-	sec
time from D75 to D25 (T25 - T75)	t_{p75-25} =	-	sec
volume between D75 & D25 (A x (D25 - D75))	V_{p75-25} =	1.09	m^3
surface area to D50 inc. base ((2x(D-D50)x(W+L)) + A)	a_{p50} =	6.48	m^2

SOIL INFILTRATION RATE **f =** $\frac{V_{p75-25}}{a_{p50} \times t_{p75-25}}$

f = - m/sec

Test Strata (see Trial Pit): Brown silty CLAY becoming very weak dark brown highly to moderately weathered MUDSTONE

Remarks: Unable to calculate soil infiltration rate due to relative impermeability of strata

LABORATORY TEST RESULTS

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Laboratory Test Results

Site : SAVILLE ROAD, DODWORTH, BARNSLEY, SOUTH YORKSHIRE

Client : BARNSLEY METROPOLITAN BOROUGH COUNCIL

Engineer : NPS (BARNSLEY) LIMITED

Job Number NE3204

Sheet 1 / 1

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

Borehole/ Trial Pit	Depth (m)	Sample	Natural Moisture Content %	Sample Passing 425µm Sieve		Liquid Limit %	Plastic Limit %	Plasticity Index %	Liquidity Index	Group Symbol	Description
				Percentage %	Moisture Content %						
TP1	0.90	D	25	62	40	40	25	15	1.00	CI	Brown sandy CLAY with gravel to cobble sized fragments of sandstone. Some roots present.
TP1	1.70	D	20	97	21	47	22	25	-0.04	CI	Brown silty CLAY.
TP2	1.40	D	31	74	42	67	27	40	0.38	CH	Brown and grey silty CLAY.
TP3	1.00	D	40							NP	Dark grey completely to highly weathered silty MUDSTONE weathered to a clay in parts with slight coal traces.
TP3	2.10	D	34	68	50	69	30	39	0.51	CH	Brown silty CLAY.
TP3	3.00	D	18	60	30	44	24	20	0.30	CI	Dark brown highly to moderately weathered MUDSTONE.
TP4	1.20	D	14							NP	Dark grey moderately to slightly weathered thinly bedded silty MUDSTONE.

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

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

Remarks : NP = Non Plastic

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Engineer: NPS (BARNSLEY) LIMITED

Job Number: NE3204

Sheet: 1/2

CALIFORNIA BEARING RATIO

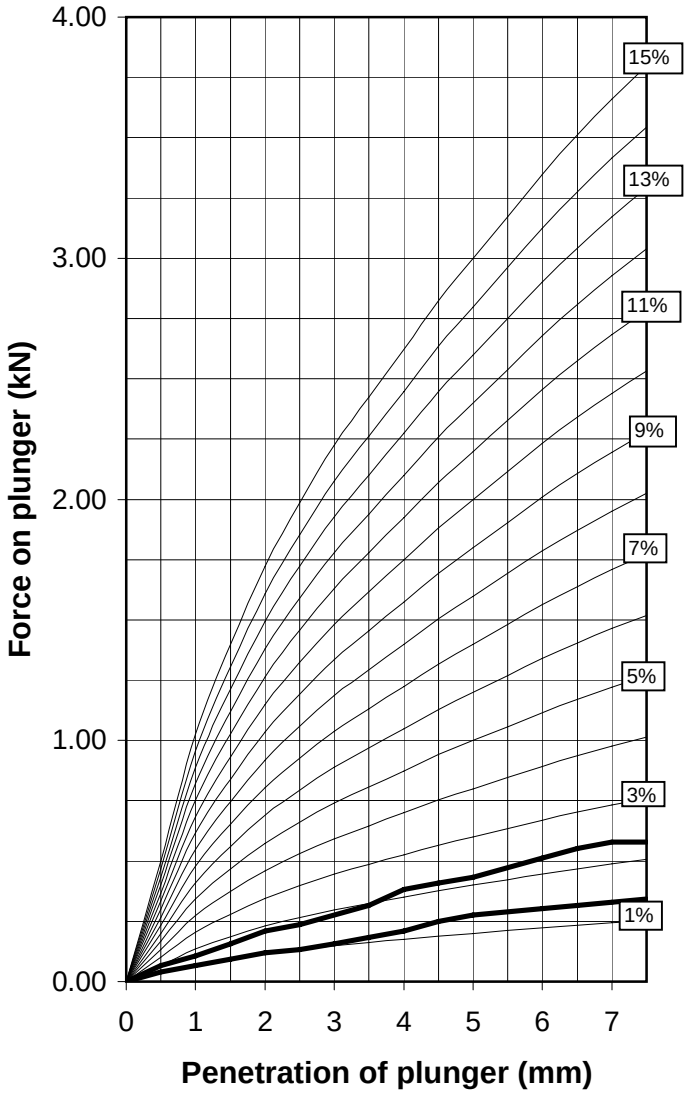
Position: TP1 Sample No: 058 Depth: 0.40 m

Description:

Dark brown gravelly silty CLAY with occasional root hairs/rootlets. Gravel is fine to coarse stone.

Preparation of sample: 4.5 Kg Rammer Method

Penetration of Plunger mm	Force on Plunger			
	Top	kN Top	Bottom	kN Bottom
0.0	0.0	0.00	0.0	0.00
0.5	2.5	0.07	1.5	0.04
1.0	4.0	0.11	2.5	0.07
1.5	6.0	0.16	3.5	0.09
2.0	8.0	0.21	4.5	0.12
2.5	9.0	0.24	5.0	0.13
3.0	10.5	0.28	6.0	0.16
3.5	12.0	0.32	7.0	0.18
4.0	14.5	0.38	8.0	0.21
4.5	15.5	0.41	9.5	0.25
5.0	16.5	0.43	10.5	0.28
5.5	18.0	0.47	11.0	0.29
6.0	19.5	0.51	11.5	0.30
6.5	21.0	0.55	12.0	0.32
7.0	22.0	0.58	12.5	0.33
7.5	22.0	0.58	13.0	0.34



	CBR % Value at:	
	2.5mm	5.0mm
Top	**1.8%**	**2.2%**
Bottom	**1.0%**	**1.4%**

Passing 20mm Sieve = **78 %**

Moisture Content = **20 %**

Bulk Density = **2.04 Mg/m^3**

Dry Density = **1.70 Mg/m^3**

Comments:	Operator	Checked	Approved
	SJG		

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Laboratory Test Results

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Client: BARNSLEY METROPOLITAN BOROUGH COUNCIL

Engineer: NPS (BARNSLEY) LIMITED

Job Number: NE3204

Sheet: 2/2

CALIFORNIA BEARING RATIO

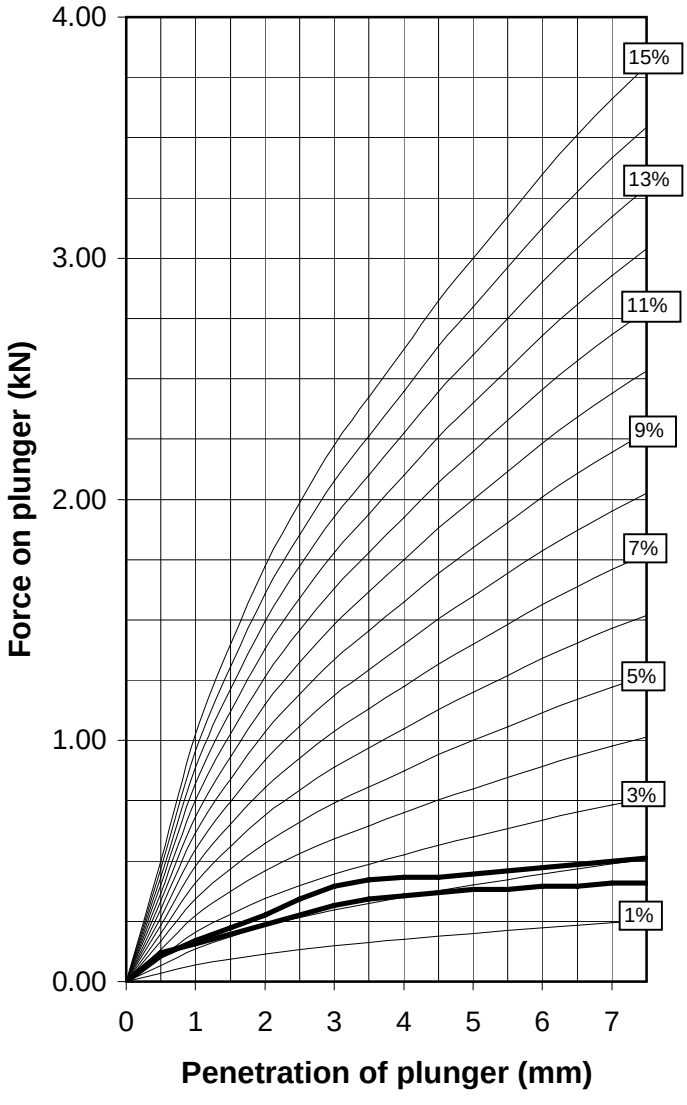
Position: TP2 Sample No: 065 Depth: 0.40 m

Description:

Yellowish brown and brown mottled silty CLAY.

Preparation of sample: 4.5 Kg Rammer Method

Penetration of Plunger mm	Force on Plunger			
	Top	kN Top	Bottom	kN Bottom
0.0	0.0	0.00	0.0	0.00
0.5	4.5	0.12	4.0	0.11
1.0	6.0	0.16	6.5	0.17
1.5	7.5	0.20	8.5	0.22
2.0	9.0	0.24	10.5	0.28
2.5	10.5	0.28	13.0	0.34
3.0	12.0	0.32	15.0	0.39
3.5	13.0	0.34	16.0	0.42
4.0	13.5	0.36	16.5	0.43
4.5	14.0	0.37	16.5	0.43
5.0	14.5	0.38	17.0	0.45
5.5	14.5	0.38	17.5	0.46
6.0	15.0	0.39	18.0	0.47
6.5	15.0	0.39	18.5	0.49
7.0	15.5	0.41	19.0	0.50
7.5	15.5	0.41	19.5	0.51



	CBR % Value at:	
	2.5mm	5.0mm
Top	**2.1%**	**1.9%**
Bottom	**2.6%**	**2.2%**

Passing 20mm Sieve = **100 %**

Moisture Content = **30 %**

Bulk Density = **1.89 Mg/m^3**

Dry Density = **1.46 Mg/m^3**

Comments:	Operator	Checked	Approved
	SJG		

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Laboratory Test Results

Site : SAVILLE ROAD, DODWORTH, BARNSLEY, SOUTH YORKSHIRE

Client : BARNSLEY METROPOLITAN BOROUGH COUNCIL

Engineer : NPS (BARNSLEY) LIMITED

Job Number NE3204

Sheet 1 / 1

DETERMINATION OF THE pH VALUE AND THE SULPHATE CONTENT OF SOIL AND GROUNDWATER

Borehole/ Trial Pit	Depth (m)	Sample	Concentration of Soluble Sulphate			Percentage of sample passing 2mm Sieve %	pH	Classification	Description
			Soil		Groundwater g /l				
			Total S04 %	S04 in 2:1 water:soil g /l					
TP1	0.90	D		0.06			7.5	DS-1	Brown sandy CLAY with gravel to cobble sized fragments of sandstone. Some roots present.
TP1	2.60	D		0.01			7.0	DS-1	Brown slightly weathered very thinly bedded SANDSTONE.
TP2	1.80	D		0.03			4.1	DS-1	Dark brown and grey completely to highly weathered silty MUDSTONE with coal traces weathered to a clay.
TP3	1.00	D		0.04			5.3	DS-1	Dark grey completely to highly weathered silty MUDSTONE weathered to a clay in parts with slight coal traces.
TP3	2.10	D		0.06			3.7	DS-1	Brown silty CLAY.
TP4	2.70	D		0.01			5.5	DS-1	Dark grey moderately to slightly weathered thinly bedded silty MUDSTONE.

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

Method of Test : BS 1377:PART 3:1990:5 Determination of the sulphate content of soil and ground water BS 1377:PART 3:1990:9 Determination of the pH value.

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

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AGGRESSIVE CHEMICAL ENVIRONMENT FOR CONCRETE (ACEC) SITE CLASSIFICATION

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

Sulfate				Groundwater		
Design Sulfate Class for Location	2:1 water/soil extract[b]	Groundwater	Total potential sulfate[c]	Static water	Mobile water	ACEC Class for location
1	2 (SO_4 mg/l)	3 (SO_4 mg/l)	4 (SO_4 %)	5 (pH)	6 (pH)	7
DS-1	<500	<400	<0.24	≥2.5		AC-1s
					>5.5d	AC-1d
					2.5 - 5.5	AC-2z
DS-2	500 - 1500	400 - 1400	0.24 - 0.6	>3.5		AC-1s
					>5.5	AC-2z
				2.5-3.5		AC-2s
					2.5 - 5.5	AC-3z
DS-3	1600-3000	1500-3000	0.7 - 1.2	>3.5		AC-2s
					>5.5	AC-3
				2.5 - 3.5		AC-3s
					2.5 - 5.5	AC-4
DS-4	3100 - 6000	3100 - 6000	1.3 - 2.4	>3.5		AC-3s
					>5.5	AC-4
				2.5 - 3.5		AC-4s
					2.5 - 5.5	AC-5
DS-5	>6000	>6000	>2.4	>3.5		AC-4s
				2.5 - 3.5	≥2.5	AC-5

Notes

a Applies to locations on sites that comprise either undisturbed ground that is in its natural state (ie not brownfield - Table C2) or clean fill derived from such ground

b The limits of Design Sulfate Classes based on 2:1 water/soil extracts have been lowered relative to previous Digests (Box C7).

c Applies only to locations where concrete will be exposed to sulfate ions (SO4) which may result from the oxidation of sulfides (eg pyrite) following ground disturbance (Appendix A1 and Box C8).

d For flowing water that is potentially aggressive to concrete owing to high purity or an aggressive carbon dioxide level greater than 15mg/l (Section C2.2.3), increase the ACEC Class to AC-2z.

Explanation of suffix symbols to ACEC Class

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

Table C1 Aggressive Chemical Environment for Concrrete (ACEC) classification for brownfield locations[a]

Sulfate						Groundwater		
Design Sulfate Class for Location	2:1 water/soil extract[b]		Groundwater		Total potential sulfate[c]	Static water	Mobile water	ACEC Class for location
1	2 (SO_4 mg/l)	3 (Mg mg/l)	4 (SO_4 mg/l)	5 (Mg mg/l)	6 (SO_4 %)	7 (pH)[d]	8 (pH)[d]	9
DS-1	<500		<400		<0.24	≥2.5		AC-1s
							>6.5[d]	AC-1
							5.5 - 6.5	AC-2z
							4.5 - 5.5	AC-3z
							2.5 - 4.5	AC-4z
DS-2	500 - 1500		400 - 1400		0.24 - 0.6	>5.5		AC-1s
							>6.5	AC-2
						2.5 - 5.5		AC-2s
							5.5 - 6.5	AC-3z
							4.5 - 5.5	AC-4z
							2.5 - 5.5	AC-5z
DS-3	1600 - 3000		1500 - 3000		0.7 - 1.2	>5.5		AC-2s
							>6.5	AC-3
						2.5 - 5.5		AC-3s
							5.5 - 6.5	AC-4
							2.5 - 5.5	AC-5
DS-4	3100 - 6000	≤1200	3100 - 6000	≤1000	1.3 - 2.4	>5.5		AC-3s
							>6.5	AC-4
						2.5 - 5.5		AC-4s
							2.5 - 6.5	AC-5
DS-4m	3100 - 6000	>1200[e]	3100 - 6000	>1000[e]	1.3 - 2.4	>5.5		AC-3s
							>6.5	AC-4m
						2.5 - 5.5		AC-4ms
							2.5 - 6.5	AC-5m
DS-5	>6000	≤1200	>6000	≤1000	>2.4	>5.5		AC-4s
						2.5 - 5.5	≤1000	AC-5
DS-5m	>6000	>1200[e]	>6000	>1000[e]	>2.4	>5.5		AC-4ms
						2.5 - 5.5	≥2.5	AC-5m

Notes

a Brownfield sites are those sites, or parts of sites, that might contain chemical residues produced by or associated with industrial production (Section C5.1.3).

b The limits of Design Sulfate Classes based on 2:1 water/soil extracts have been lowered relative to previous Digests (Box C7).

c Applies only to locations where concrete will be exposed to sulfate ions (SO4) which may result from the oxidation of sulfides (eg pyrite) following ground disturbance (Appendix A1 and Box C8).

d An additional account is taken of hydrochloric and nitric acids by adjustment to sulfate content (Section C5.1.3).

e The limit on water-soluble magnesium does not apply to brackish groundwater (chloride content between 12 000mg/l and 17000 mg/l). This allows 'm' to be omitted from the relevant ACEC Classification. Seawater (chloride content about 18 000 mg/l) and stronger brines are not covered by this table.

Explanation of suffix symbols to ACEC Class

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

CONTAMINATION ANALYSIS RESULTS

Chemtest
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Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070

Sub Surface Laboratories
3 Peel Street
Preston
Lancashire
PR2 2QS

FAO Simon Gabatt
15 April 2013

Dear Simon Gabatt

Test Report Number **227220**

Your Project Reference **NE3204 - Saville Road, Dodworth, Barnsley**

Please find enclosed the results of analysis for the samples received 5 April 2013.

All soil samples will be retained for a period of one month and all water samples will be retained for 7 days following the date of the test report. Should you require an extended retention period then please detail your requirements in an email to customerservices@chemtest.co.uk. Please be aware that charges may be applicable for extended sample storage.

If you require any further assistance, please do not hesitate to contact the Customer Services team.

Yours sincerely

Keith Jones, Technical Manager

UKAS TESTING
2183

ISO 14001 Registered Company
sira CERTIFICATION SERVICE
UKAS ENVIRONMENTAL MANAGEMENT
011

Notes to accompany report:

- *The sign < means 'less than'*
- *Tests marked 'U' hold UKAS accreditation*
- *Tests marked 'M' hold MCertS (and UKAS) accreditation*
- *Tests marked 'N' do not currently hold UKAS accreditation*
- *Tests marked 'S' were subcontracted to an approved laboratory*
- *n/e means 'not evaluated'*
- *i/s means 'insufficient sample'*
- *u/s means 'unsuitable sample'*
- *Comments or interpretations are beyond the scope of UKAS accreditation*
- *The results relate only to the items tested*
- *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*
- *Uncertainties of measurement for the determinands tested are available upon request*
- *None of the test results included in this report have been recovery corrected*

Newmarket • Coventry • Dublin
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Sub Surface Laboratories
3 Peel Street
Preston
Lancashire
PR2 2QS

FAO Simon Gabatt

LABORATORY TEST REPORT

Results of analysis of 4 samples
received 5 April 2013

NE3204 - Saville Road, Dodworth, Barnsley

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Report Date
15 April 2013

Login Batch No					**227220**			
Chemtest LIMS ID					AI51690	AI51691	AI51692	AI51693
Sample ID					TP1	TP2	TP4	TT1
Sample No					058	065	079	084
Sampling Date					22/3/2013	22/3/2013	22/3/2013	22/3/2013
Depth					0.40m	0.40m	0.50m	0.20m
Matrix					*SOIL*	*SOIL*	*SOIL*	*SOIL*
SOP↓	Determinand↓	CAS No↓	Units↓	*				
2010	pH			M	6.3	7.4	7.1	7.1
2300	Cyanide (total)	57125	mg kg-¹	M	<0.5	<0.5	<0.5	<0.5
2325	Sulfide (Easily Liberatable)	18496258	mg kg-¹	M	1.2	2.5	2.2	5.1
2120	Boron (hot water soluble)	7440428	mg kg-¹	M	0.5	<0.4	0.4	0.6
2490	Chromium (hexavalent)	18540299	mg kg-¹	N	<0.5	<0.5	<0.5	<0.5
2430	Sulfate (total) as SO4	14808798	%	M	0.03	0.02	0.02	0.06
2450	Arsenic	7440382	mg kg-¹	M	10	7.9	4.5	26
	Cadmium	7440439	mg kg-¹	M	0.12	<0.10	<0.10	0.18
	Chromium	7440473	mg kg-¹	M	<5.0	6.7	<5.0	<5.0
	Copper	7440508	mg kg-¹	M	18	29	31	41
	Mercury	7439976	mg kg-¹	M	<0.10	<0.10	<0.10	0.11
	Nickel	7440020	mg kg-¹	M	5.8	<5.0	11	12
	Lead	7439921	mg kg-¹	M	29	16	17	50
	Selenium	7782492	mg kg-¹	M	<0.20	<0.20	<0.20	<0.20
	Zinc	7440666	mg kg-¹	M	79	49	69	88
2670	TPH >C6-C10		mg kg-¹	N	< 1 [1]	< 1 [1]	< 1 [1]	< 1 [1]
	TPH >C10-C21		mg kg-¹	N	< 1 [1]	< 1 [1]	< 1 [1]	< 1 [1]
	TPH >C21-C40		mg kg-¹	N	< 1 [1]	< 1 [1]	< 1 [1]	< 1 [1]
	Total Petroleum Hydrocarbons		mg kg-¹	M	< 10 [1]	< 10 [1]	< 10 [1]	< 10 [1]
2700	Naphthalene	91203	mg kg-¹	M	< 0.1	< 0.1	< 0.1	< 0.1
	Acenaphthylene	208968	mg kg-¹	M	< 0.1	< 0.1	< 0.1	0.15
	Acenaphthene	83329	mg kg-¹	M	< 0.1	< 0.1	< 0.1	0.15
	Fluorene	86737	mg kg-¹	M	< 0.1	< 0.1	< 0.1	0.21
	Phenanthrene	85018	mg kg-¹	M	0.14	< 0.1	< 0.1	0.19

[1]The stability time for this analyte has been exceeded - these results may be compromised. The accreditation for these results remains unaffected.

All tests undertaken between 05/04/2013 and 15/04/2013

* Accreditation status

This report should be interpreted in conjuction with the notes on the accompanying cover page.

Sub Surface Laboratories
3 Peel Street
Preston
Lancashire
PR2 2QS

FAO Simon Gabatt

LABORATORY TEST REPORT

Results of analysis of 4 samples
received 5 April 2013

NE3204 - Saville Road, Dodworth, Barnsley

Chemtest
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Report Date
15 April 2013

					227220			
					AI51690	AI51691	AI51692	AI51693
					TP1	TP2	TP4	TT1
					058	065	079	084
					22/3/2013	22/3/2013	22/3/2013	22/3/2013
					0.40m	0.40m	0.50m	0.20m
					SOIL	*SOIL*	*SOIL*	*SOIL*
2700	Anthracene	120127	mg kg-¹	M	< 0.1	< 0.1	< 0.1	0.22
	Fluoranthene	206440	mg kg-¹	M	0.12	< 0.1	< 0.1	0.13
	Pyrene	129000	mg kg-¹	M	< 0.1	< 0.1	< 0.1	< 0.1
	Benzo[a]anthracene	56553	mg kg-¹	M	< 0.1	< 0.1	< 0.1	< 0.1
	Chrysene	218019	mg kg-¹	M	< 0.1	< 0.1	< 0.1	0.13
	Benzo[b]fluoranthene	205992	mg kg-¹	M	< 0.1	< 0.1	< 0.1	< 0.1
	Benzo[k]fluoranthene	207089	mg kg-¹	M	< 0.1	< 0.1	< 0.1	< 0.1
	Benzo[a]pyrene	50328	mg kg-¹	M	< 0.1	< 0.1	< 0.1	< 0.1
	Dibenzo[a,h]anthracene	53703	mg kg-¹	M	< 0.1	< 0.1	< 0.1	< 0.1
	Indeno[1,2,3-cd]pyrene	193395	mg kg-¹	M	0.1	< 0.1	< 0.1	< 0.1
	Benzo[g,h,i]perylene	191242	mg kg-¹	M	0.2	< 0.1	< 0.1	< 0.1
	Total (of 16) PAHs		mg kg-¹	M	< 2	< 2	< 2	< 2
2760	Methyl tert-butylether	1634044	µg kg-¹	N	< 1.0 [1]	< 1.0 [1]	< 1.0 [1]	< 1.0 [1]
	Benzene	71432	µg kg-¹	M	< 1.0 [1]	< 1.0 [1]	< 1.0 [1]	< 1.0 [1]
	Toluene	108883	µg kg-¹	M	< 1.0 [1]	< 1.0 [1]	< 1.0 [1]	< 1.0 [1]
	Ethylbenzene	100414	µg kg-¹	M	< 1.0 [1]	< 1.0 [1]	< 1.0 [1]	< 1.0 [1]
	m- & p-Xylene	1330207	µg kg-¹	U	< 1.0 [1]	< 1.0 [1]	< 1.0 [1]	< 1.0 [1]
	o-Xylene	95476	µg kg-¹	U	< 1.0 [1]	< 1.0 [1]	< 1.0 [1]	< 1.0 [1]
2815	PCB 101	37680732	mg kg-¹	M				< 0.01
	PCB 118	31508006	mg kg-¹	M				< 0.01
	PCB 138	35065282	mg kg-¹	M				< 0.01
	PCB 153	35065271	mg kg-¹	M				< 0.01
	PCB 180	35065293	mg kg-¹	N				< 0.01
	PCB 28	7012375	mg kg-¹	M				< 0.01
	PCB 52	35693993	mg kg-¹	M				< 0.01

[1]The stability time for this analyte has been exceeded - these results may be compromised. The accreditation for these results remains unaffected.

All tests undertaken between 05/04/2013 and 15/04/2013

* Accreditation status

This report should be interpreted in conjuction with the notes on the accompanying cover page.

Sub Surface Laboratories
3 Peel Street
Preston
Lancashire
PR2 2QS

FAO Simon Gabatt

LABORATORY TEST REPORT

Results of analysis of 4 samples received 5 April 2013

NE3204 - Saville Road, Dodworth, Barnsley

Report Date 15 April 2013

					227220			
					AI51690	AI51691	AI51692	AI51693
					TP1	TP2	TP4	TT1
					058	065	079	084
					22/3/2013	22/3/2013	22/3/2013	22/3/2013
					0.40m	0.40m	0.50m	0.20m
					SOIL	*SOIL*	*SOIL*	*SOIL*
2920	Phenols (total)		mg kg-[1]	N	<0.3	<0.3	<0.3	<0.3

[1]The stability time for this analyte has been exceeded - these results may be compromised. The accreditation for these results remains unaffected.

All tests undertaken between 05/04/2013 and 15/04/2013

* Accreditation status

This report should be interpreted in conjuction with the notes on the accompanying cover page.

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Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070

Sub Surface Laboratories
3 Peel Street
Preston
Lancashire
PR2 2QS

FAO Simon Gabbatt
19 April 2013

Dear Simon Gabbatt

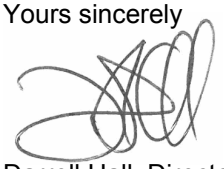
Test Report Number **227551**
Your Project Reference **NE3204 - Saville Road, Dodworth, Barnsley**

Please find enclosed the results of analysis for the samples received 11 April 2013.

All soil samples will be retained for a period of one month and all water samples will be retained for 7 days following the date of the test report. Should you require an extended retention period then please detail your requirements in an email to customerservices@chemtest.co.uk. Please be aware that charges may be applicable for extended sample storage.

If you require any further assistance, please do not hesitate to contact the Customer Services team.

Yours sincerely



Darrell Hall, Director

UKAS TESTING
2183

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011

Notes to accompany report:

- *The sign < means 'less than'*
- *Tests marked 'U' hold UKAS accreditation*
- *Tests marked 'M' hold MCertS (and UKAS) accreditation*
- *Tests marked 'N' do not currently hold UKAS accreditation*
- *Tests marked 'S' were subcontracted to an approved laboratory*
- *n/e means 'not evaluated'*
- *i/s means 'insufficient sample'*
- *u/s means 'unsuitable sample'*
- *Comments or interpretations are beyond the scope of UKAS accreditation*
- *The results relate only to the items tested*
- *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*
- *Uncertainties of measurement for the determinands tested are available upon request*
- *None of the test results included in this report have been recovery corrected*

Sub Surface Laboratories
3 Peel Street
Preston
Lancashire
PR2 2QS

FAO Simon Gabbatt

LABORATORY TEST REPORT

Results of analysis of 6 samples received 11 April 2013

NE3204 - Saville Road, Dodworth, Barnsley

Report Date 19 April 2013

Login Batch No					227551					
Chemtest LIMS ID					AI53520	AI53521	AI53522	AI53523	AI53524	AI53525
Sample ID					TP1	TP1	TP2	TP3	TP3	TP4
Sample No					059	063	067	073	075	083
Sampling Date					27/3/2013	27/3/2013	27/3/2013	27/3/2013	27/3/2013	27/3/2013
Depth					0.90m	2.60m	1.80m	1.00m	2.10m	2.70m
Matrix					*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*
SOP↓	Determinand↓	CAS No↓	Units↓	*						
2010	pH			M	7.5	7.0	4.1	5.3	3.7	5.5
2175	Sulfur (total TRL report 447)		%	M			0.69			4.3
2120	Sulfate (2:1 water soluble) as SO4	14808798	g l^{-1}	M	0.06	<0.01	0.03	0.04	0.06	<0.01
2430	Sulfate (total BS1377 HCl extract)	14808798	%	M			0.11			0.07

All tests undertaken between 11/04/2013 and 16/04/2013

* Accreditation status

This report should be interpreted in conjuction with the notes on the accompanying cover page.

TRIAL PIT RECORD SHEETS

SUB SURFACE

SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

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

Site SAVILLE ROAD, DODWORTH, BARNSLEY, SOUTH YORKSHIRE			**Trial Pit Number** TP1
Excavation Method MECHANICAL EXCAVATOR	**Dimensions** 0.50m x 1.90m	**Ground Level (mOD)**	**Client** BARNSLEY METROPOLITAN BOROUGH COUNCIL	**Job Number** NE3204
	Location AS PLAN	**Dates** 22/03/2013	**Engineer** NPS (BARNSLEY) LIMITED	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						TOPSOIL		
0.10	D				(0.20) 0.20			
0.40	B					Friable brown sandy CLAY with gravel to cobble sized fragments of sandstone. Some roots present.		
					(0.80)			
0.90	D							
					1.00	Stiff locally firm high locally medium strength brown silty CLAY.		
1.10	D		HV@1.20m, c=80kPa					
			HV@1.30m, c=60kPa		(0.60)			
					1.60	Stiff high strength brown and grey mottled silty CLAY.		
1.70	D		HV@1.70m, c=80kPa					
					(0.60)			
			HV@2.00m, c=110kPa					
			Seepage(1) at 2.20m.		2.20	Weak brown slightly weathered very thinly bedded SANDSTONE.		▽1
2.25	D				(0.50)			
2.60	D							
			22/03/2013:1.80m		2.70	Complete at 2.70m		

Plan

Remarks

Pit sides remained generally vertical.
Groundwater seepage at 2.20m
Pit orientated East to West
HV = Hand Shear Vane test
Standing water level at 1.80m after 2hours

Scale (approx)	Logged By	Figure No.
1:25	DS/SJ	NE3204.TP1

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SUB SURFACE

SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

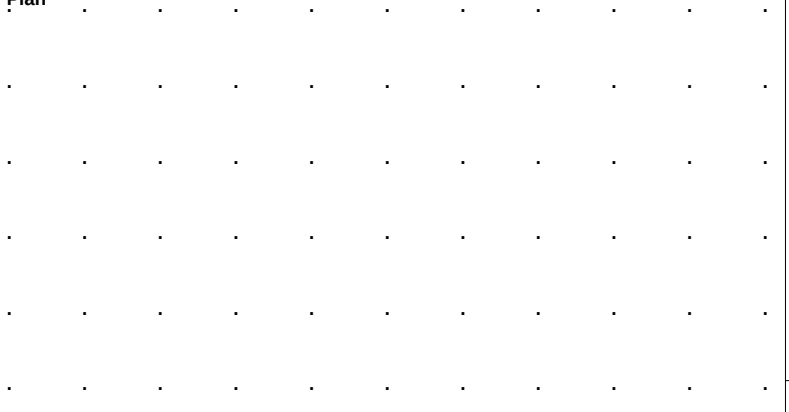
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Site	Trial Pit Number
SAVILLE ROAD, DODWORTH, BARNSLEY, SOUTH YORKSHIRE	TP2

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
MECHANICAL EXCAVATOR	0.50m x 2.00m		BARNSLEY METROPOLITAN BOROUGH COUNCIL	NE3204
	Location AS PLAN	**Dates** 22/03/2013	**Engineer** NPS (BARNSLEY) LIMITED	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	TOPSOIL		
0.20	D				0.30	Firm medium strength brown silty CLAY.		
0.50	B				(0.90)			
			HV@0.90m, c=50kPa					
					1.20	Stiff high strength brown and grey silty CLAY.		
			HV@1.30m, c=80kPa					
1.40	D				(0.50)			
					1.70	Friable dark brown and grey completely to highly weathered silty MUDSTONE with coal traces, weathered to a clay.		
1.80	D				(0.50)			
			Seepage(1) at 2.20m.		2.20	Initally friable brown silty CLAY grading quickly into weak brown thinly bedded SANDSTONE.		▽1
2.30	D				(0.60)			
2.70	D							
			22/03/2013:2.60m		2.80	Complete at 2.80m		

Plan



Remarks

Pit sides remained generally vertical.
Groundwater seepage at 2.20m
HV = Hand Shear Vane test
Pit orientated North to South
Standing water level at 2.60m after 2 hours

Scale (approx)	Logged By	Figure No.
1:25	DS/SJ	NE3204.TP2

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SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

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

Site	Trial Pit Number
SAVILLE ROAD, DODWORTH, BARNSLEY, SOUTH YORKSHIRE	TP3

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
MECHANICAL EXCAVATOR	0.50m x 2.40m		BARNSLEY METROPOLITAN BOROUGH COUNCIL	NE3204
	Location AS PLAN	**Dates** 22/03/2013	**Engineer** NPS (BARNSLEY) LIMITED	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					0.10 (0.10)	TOPSOIL		
0.05	D		Seepage(1) at 0.20m.			Firm medium strength brown silty CLAY.		▽1
0.50	B		HV:0.50m, c=50kPa		0.70 (0.60)			
0.70	D					Friable dark grey completely to highly weathered silty MUDSTONE weathered to a clay in parts with slight coal traces.		
1.00	D				1.10 (0.40)			
1.20	D		HV@1.20m, c=50kPa			Firm medium strength brown silty CLAY.		
			HV@2.00m, c=70kPa		(1.20)			
2.10	D							▽2
2.30	D		Seepage(2) at 2.30m.		2.30 (0.90)	Intially friable becoming very weak dark brown highly to moderately weathered MUDSTONE.		
3.00	D							
			22/03/2013:2.54m		3.20	Complete at 3.20m		

Plan

Remarks

Pit sides remained generally vertical.
Groundwater seepage at 0.20m and 2.30m
Pit orientated North to South
Standing water level at 2.54m after 2 hours
HV = Hand Shear Vane test

Scale (approx)	Logged By	Figure No.
1:25	DS/SJ	NE3204.TP3

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

Site	Trial Pit Number
SAVILLE ROAD, DODWORTH, BARNSLEY, SOUTH YORKSHIRE	TP4

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
MECHANICAL EXCAVATOR	0.50m x 2.20m		BARNSLEY METROPOLITAN BOROUGH COUNCIL	NE3204
	Location AS PLAN	**Dates** 22/03/2013	**Engineer** NPS (BARNSLEY) LIMITED	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10	D				(0.30)	MADE GROUND: topsoil with occasional brick fragments.		
					0.30	Firm locally stiff medium locally high strength brown silty CLAY.		
0.50	B		HV@0.60m, c=50kPa		(0.80)			
			HV@1.00m, c=78kPa		1.10			
1.20	D				(0.40)	Very weak dark grey moderately to slightly weathered thinly bedded MUDSTONE.		
					1.50	Weak dark grey moderately to slightly weathered thinly bedded silty MUDSTONE.		
1.60	D							
2.10	D				(1.30)			
2.70	D							
			22/03/2013:DRY		2.80	Complete at 2.80m		

Plan

Remarks

Pit sides remained generally vertical.
No groundwater entries encountered.
HV = Hand Shear Vane test
Pit orientated East to West

Scale (approx)	Logged By	Figure No.
1:25	DS/SJ	NE3204.TP4

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SUB SURFACE

SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

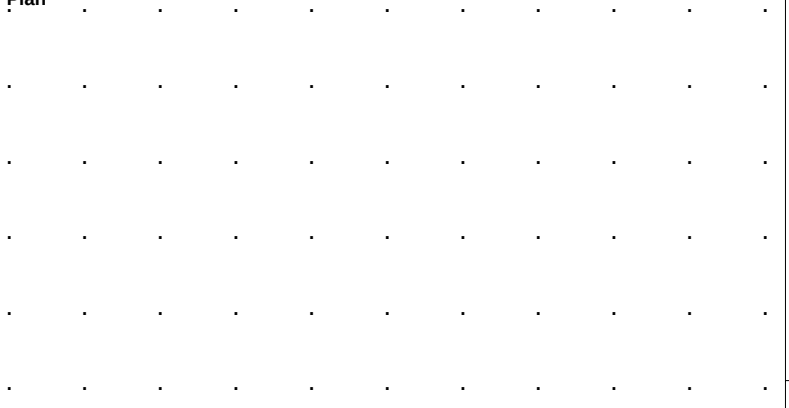
3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907

Site	Trial Pit Number
SAVILLE ROAD, DODWORTH, BARNSLEY, SOUTH YORKSHIRE	TP5

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
MECHANICAL EXCAVATOR	0.50m x 2.40m		BARNSLEY METROPOLITAN BOROUGH COUNCIL	NE3204
	Location AS PLAN	**Dates** 22/03/2013	**Engineer** NPS (BARNSLEY) LIMITED	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					0.10 (0.30)	TOPSOIL Friable brown silty CLAY.		
0.20	D				0.40 (0.40)	Friable dark grey completely weathered carboneaceous MUDSTONE.		
0.50	D				0.80 (0.30)	Very weak dark grey highly weathered carbonceous MUDSTONE with thin coal bands.		▽1
1.00	D		Seepage(1) at 0.80m.		1.10 (1.00)	Firm medium strength orange brown silty CLAY (completely weathered mudstone/seatearth).		
1.60	D		HV@1.20m, c=52kPa					
2.10	D				2.10 (1.10)	Very weak and weak brown and grey highly to moderately weathered silty MUDSTONE.		
2.60	D							
3.10	D		22/03/2013		3.20	Complete at 3.20m		

Plan

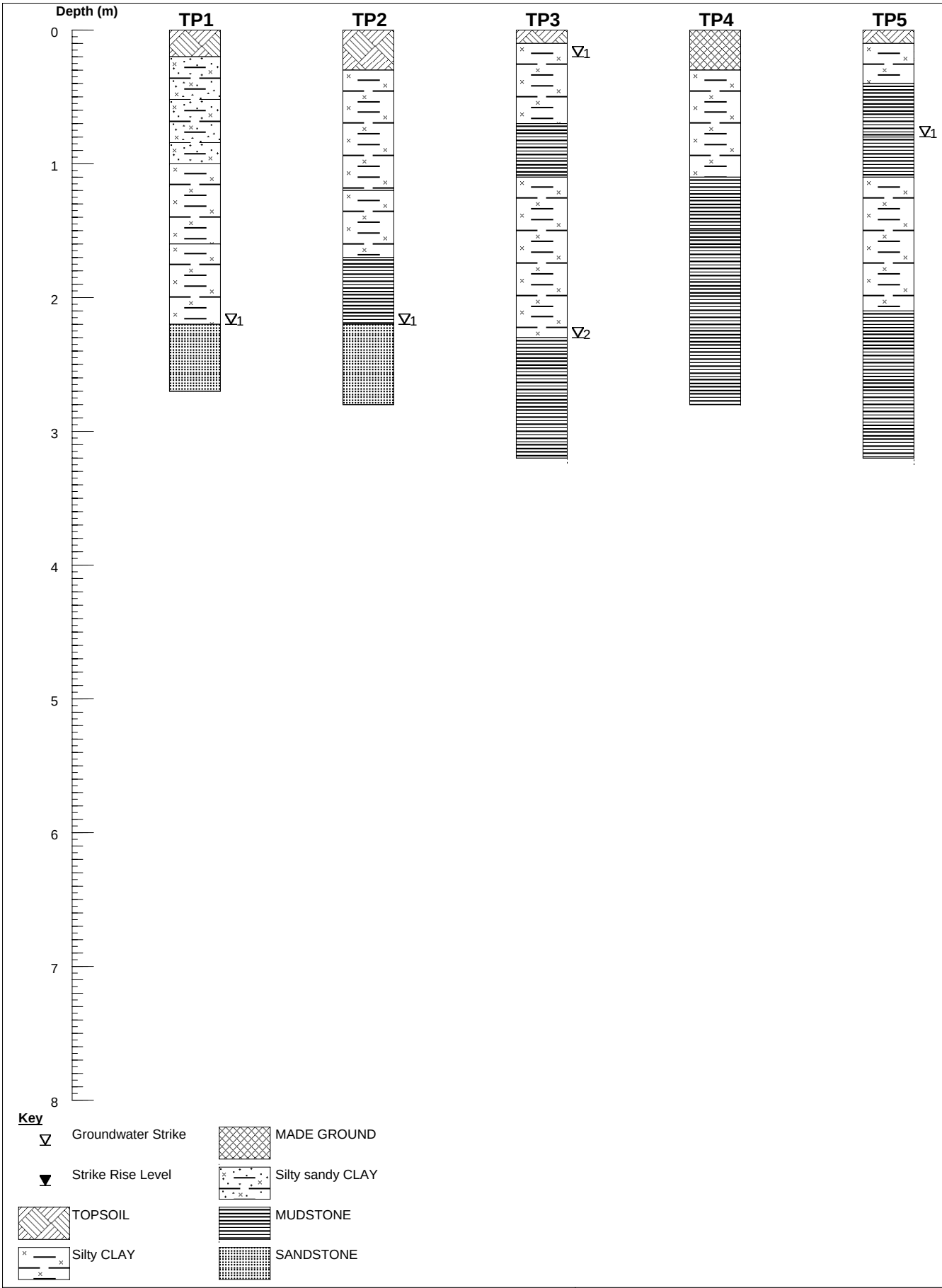


Remarks

Pit sides remained generally vertical.
Groundwater seepage at 0.80m
HV = Hand Shear Vane test
Pit orientated East to West

Scale (approx)	Logged By	Figure No.
1:25	DS/SJ	NE3204.TP5

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SUB SURFACE
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Nominal Section

Site	Date Drawn	Date Checked	Sheet	Job Number
SAVILLE ROAD, DODWORTH, BARNSLEY, SOUTH YORKSHIRE	07/05/2013		1/1	NE3204
Client	**Drawn By**	**Checked By**	**Scale**	**Figure No.**
BARNSLEY METROPOLITAN BOROUGH COUNCIL			1:40[V]	NE3204.1

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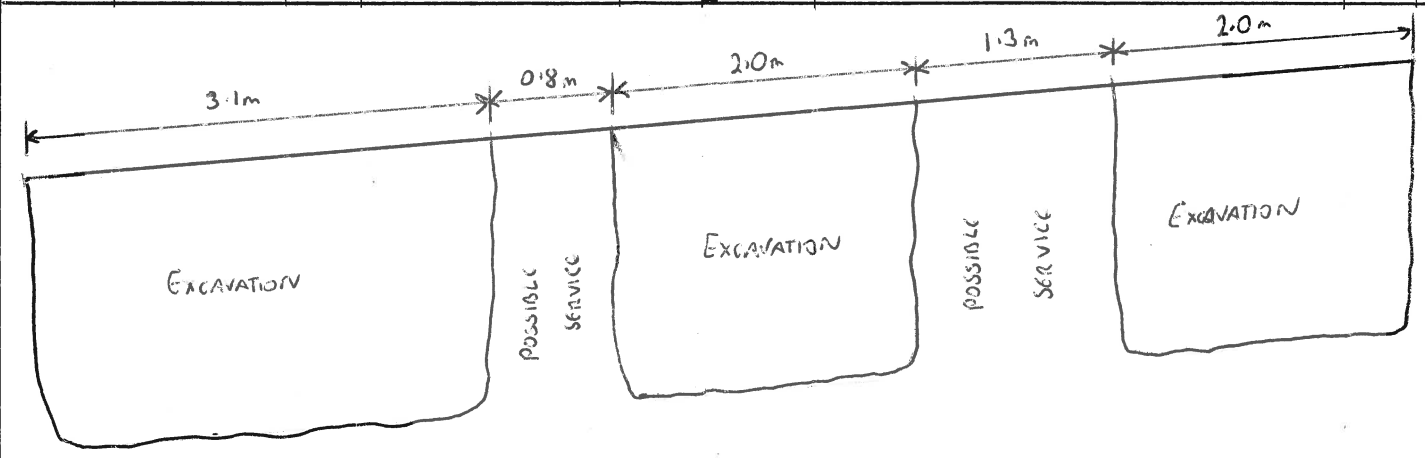
SUB SURFACE

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Site	Trial Pit Number
SAVILLE ROAD, DODWORTH, BARNSLEY, SOUTH YORKSHIRE	TT1

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
TRIAL TRENCH	3.10m x 0.80m		BARNSLEY METROPOLITAN BOROUGH COUNCIL	NE3204
	Location AS PLAN	**Dates** 16/04/2013	**Engineer** NPS (BARNSLEY) LIMITED	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.25)	MADE GROUND: topsoil with slight brick and brown clay.		
0.20-0.30	B				0.25 (0.15)	MADE GROUND: old topsoil.		
					0.40	Firm brown silty CLAY.		
0.80	D				(0.70)			
					1.10	Very weak grey thinly bedded MUDSTONE.		
1.50	D				(0.70)			
			16/04/2013		1.80	Complete at 1.80m		

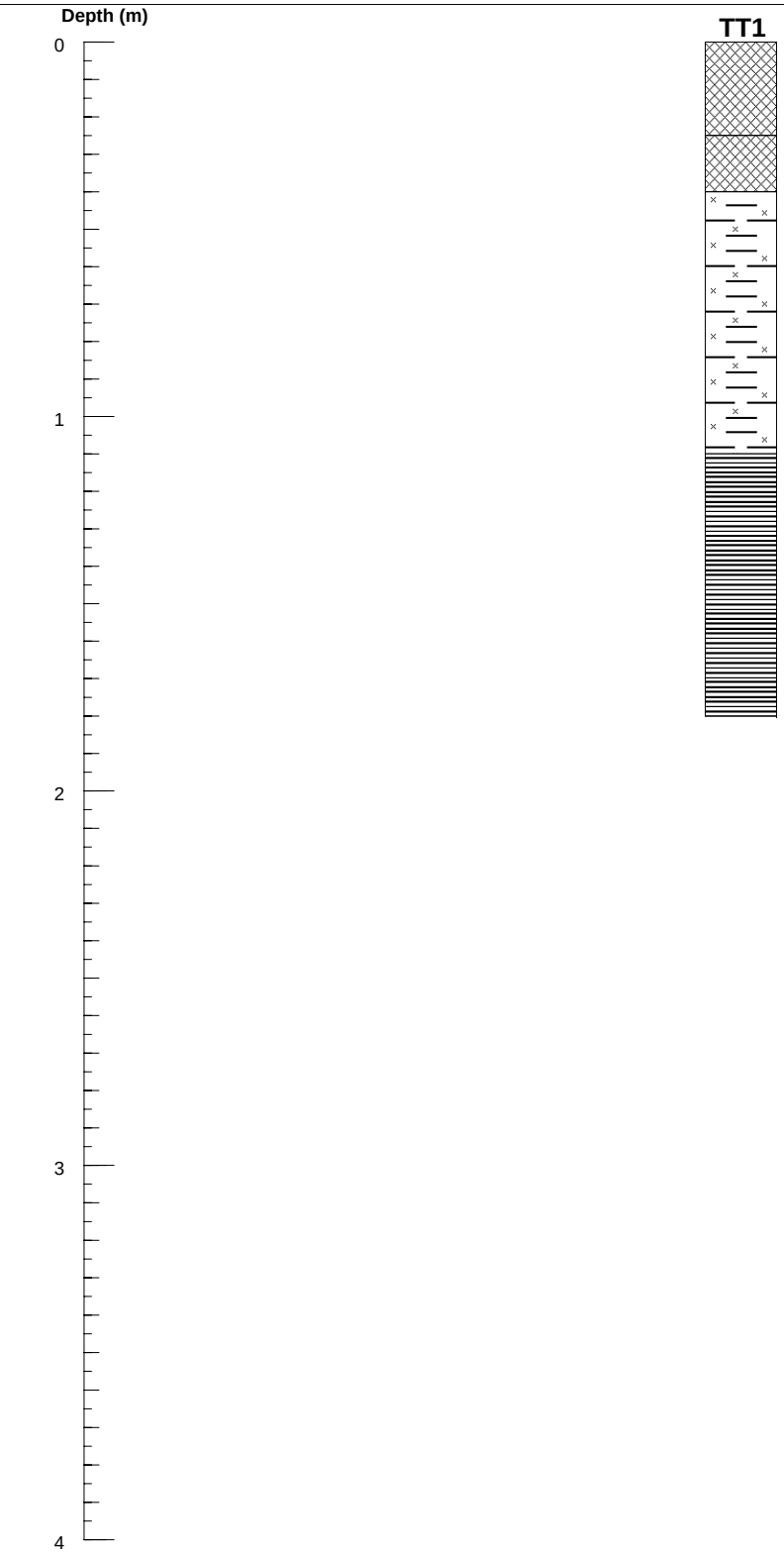


Plan

Remarks

Scale (approx)	Logged By	Figure No.
1:25	DS/SJ	NE3204.TT1

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Key

Groundwater Strike

Strike Rise Level

MADE GROUND

Silty CLAY

MUDSTONE

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Nominal Section

Site	Date Drawn	Date Checked	Sheet	Job Number
SAVILLE ROAD, DODWORTH, BARNSLEY, SOUTH YORKSHIRE	07/05/2013		1/1	NE3204
Client	**Drawn By**	**Checked By**	**Scale**	**Figure No.**
BARNSLEY METROPOLITAN BOROUGH COUNCIL			1:20[V]	NE3204.1

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ROTARY BOREHOLE RECORD SHEETS

SUB SURFACE

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Site
SAVILLE ROAD, DODWORTH, BARNSLEY, SOUTH YORKSHIRE

Borehole Number
R1

Machine : BERETTA
Flush : MIST/WATER
Core Dia :
Method : ROTARY OPEN HOLE

Casing Diameter
121mm to 2.50m

Ground Level (mOD)

Client
BARNSLEY METROPOLITAN BOROUGH COUNCIL

Job Number
NE3204

Location
AS PLAN

Dates
16/04/2013

Engineer
NPS (BARNSLEY) LIMITED

Sheet
1/2

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
							0.20	Brown sandy TOPSOIL.			
							(1.50)	Firm brown silty CLAY.			
							1.70	Weak grey MUDSTONE.			
							(2.10)				
							3.80	Dark grey MUDSTONE.			
							(0.60)				
							4.40	COAL.			
							(0.40)				
							4.80	Moderately strong grey MUDSTONE.			
							(0.80)				
							5.60	Moderately strong brown MUDSTONE.			
							(3.20)				
							8.80	Moderately strong grey MUDSTONE.			
							(0.50)				
							9.30	Strong brown SANDSTONE.			
							(0.40)				
							9.70	Moderately strong brown MUDSTONE.			
							(0.70)				
							10.40	Moderately strong grey MUDSTONE.			
							(2.10)				
							12.50	Strong grey SILTSTONE.			
							(2.20)			▼1	
					Slow Inflow(1) at 14.80m, rose to 14.00m in 20 mins.		14.70	Moderately strong grey MUDSTONE with siltstone bands.		▽1	

Remarks
Hand excavated inspection pit from GL to 1.20m to check for services - 0.75hr
Descriptions based upon foreman drillers records of flush returns.
No voids, no loose drilling, no loss of flush
On completion backfilled with grout and installed a 50mm dia hdpe slotted standpipe with a geosock and 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)
1:100

Logged By
DS/SJ

Figure No.
NE3204.R1

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Site
SAVILLE ROAD, DODWORTH, BARNSLEY, SOUTH YORKSHIRE

Borehole Number
R1

Machine : BERETTA
Flush : MIST/WATER
Core Dia :
Method : ROTARY OPEN HOLE

Casing Diameter
121mm to 2.50m

Ground Level (mOD)

Client
BARNSLEY METROPOLITAN BOROUGH COUNCIL

Job Number
NE3204

Location
AS PLAN

Dates
16/04/2013

Engineer
NPS (BARNSLEY) LIMITED

Sheet
2/2

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
							(15.30)	Moderately strong grey MUDSTONE with siltstone bands.			
					16/04/2013		30.00	Complete at 30.00m			

Remarks

Scale (approx)
1:100

Logged By
DS/SJ

Figure No.
NE3204.R1

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Site
SAVILLE ROAD, DODWORTH, BARNSLEY, SOUTH YORKSHIRE

Borehole Number
R2

Machine : BERETTA
Flush : MIST/WATER
Core Dia :
Method : ROTARY OPEN HOLE

Casing Diameter
121mm to 2.50m

Ground Level (mOD)

Client
BARNSLEY METROPOLITAN BOROUGH COUNCIL

Job Number
NE3204

Location
AS PLAN

Dates
15/04/2013

Engineer
NPS (BARNSLEY) LIMITED

Sheet
1/2

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
							0.20	Brown sandy TOPSOIL.			
							(1.60)	Firm brown silty CLAY.			
							1.80	Weak brown MUDSTONE.			
							(3.00)				
							4.80 (0.70)	Strong grey SILTSTONE.			
							5.50	Moderately strong grey MUDSTONE.			
							(1.50)				
							7.00	Strong grey SILTSTONE with mudstone bands.			
							(3.40)				
							10.40	Moderately strong grey MUDSTONE.			
							(1.80)				
							12.20	Strong grey MUDSTONE.			
							(3.50)				
							15.70	Strong grey SILTSTONE with mudstone bands.		▼1	

Remarks
Hand excavated inspection pit from GL to 1.20m to check for services - 0.5hr
Descriptions based upon foreman drillers records of flush returns.
No voids, no loose drilling, no loss of flush
On completion backfilled with grout and installed a 50mm dia hdpe slotted standpipe with a geosock and 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)
1:100

Logged By
DS/SJ

Figure No.
NE3204.R2

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Site SAVILLE ROAD, DODWORTH, BARNSLEY, SOUTH YORKSHIRE			**Borehole Number** R2
Machine : BERETTA **Flush :** MIST/WATER **Core Dia :** **Method :** ROTARY OPEN HOLE	**Casing Diameter** 121mm to 2.50m **Location** AS PLAN	**Ground Level (mOD)** **Dates** 15/04/2013	**Client** BARNSLEY METROPOLITAN BOROUGH COUNCIL **Engineer** NPS (BARNSLEY) LIMITED	**Job Number** NE3204 **Sheet** 2/2

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
								Strong grey SILTSTONE with mudstone bands.			
					Medium Inflow(1) at 21.50m, rose to 19.80m in 20 mins.		(14.30)			▽1	
					15/04/2013		30.00	Complete at 30.00m			

Remarks

Scale (approx)	Logged By
1:100	DS/SJ

Figure No. NE3204.R2

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Site SAVILLE ROAD, DODWORTH, BARNSLEY, SOUTH YORKSHIRE			**Borehole Number** R3
Machine : BERETTA **Flush :** MIST/WATER **Core Dia :** **Method :** ROTARY OPEN HOLE	**Casing Diameter**	**Ground Level (mOD)**	**Client** BARNSLEY METROPOLITAN BOROUGH COUNCIL **Job Number** NE3204
	Location AS PLAN	**Dates** 15/04/2013	**Engineer** NPS (BARNSLEY) LIMITED **Sheet** 1/1

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					15/04/2013		0.30 0.60 (0.50) 1.10	Brown sandy TOPSOIL. Firm brown silty CLAY. Loose brown SAND with clay bands. Complete at 1.10m		

Remarks
Hand excavated inspection pit from GL to 1.20m to check for services - 0.75hr
Descriptions based upon foreman drillers records of flush returns.
Drain encountered at 1.10m, borehole moved over.
On completion backfilled with arisings.

Scale (approx)	Logged By
1:100	DS/SJ

Figure No. NE3204.R3

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Site
SAVILLE ROAD, DODWORTH, BARNSLEY, SOUTH YORKSHIRE

Borehole Number
R3A

Machine : BERETTA
Flush : MIST/WATER
Core Dia :
Method : ROTARY OPEN HOLE

Casing Diameter
121mm to 3.00m

Ground Level (mOD)

Client
BARNSLEY METROPOLITAN BOROUGH COUNCIL

Job Number
NE3204

Location
AS PLAN

Dates
15/04/2013

Engineer
NPS (BARNSLEY) LIMITED

Sheet
1/2

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
							0.30	Brown sandy TOPSOIL.		
							(1.80)	Firm brown silty CLAY.		
							2.10			
							(1.30)	Weak brown MUDSTONE.		
							3.40			
							(0.70)	Strong grey SILTSTONE.		
							4.10			
							(0.80)	Strong brown SILTSTONE.		
							4.90			
							(1.80)	Moderately strong grey MUDSTONE.		
							6.70	Strong grey SILTSTONE.		
							7.10			
							(0.80)	Strong grey MUDSTONE.		
							7.90			
							(4.60)	Strong grey SILTSTONE with mudstone bands.		
							12.50			
							(3.70)	Strong grey MUDSTONE.		
							16.20			
								Strong grey SILTSTONE with mudstone bands.		▼1

Remarks
Hand excavated inspection pit from GL to 1.20m to check for services - 0.75hr
Descriptions based upon foreman drillers records of flush returns.
No voids, no loose drilling, no loss of flush.
On completion backfilled with grout.

Scale (approx)
1:100

Logged By
DS/SJ

Figure No.
NE3204.R3A

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SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

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Site SAVILLE ROAD, DODWORTH, BARNSLEY, SOUTH YORKSHIRE			**Borehole Number** R3A
Machine : BERETTA **Flush :** MIST/WATER **Core Dia :** **Method :** ROTARY OPEN HOLE	**Casing Diameter** 121mm to 3.00m **Location** AS PLAN	**Ground Level (mOD)** **Dates** 15/04/2013	**Client** BARNSLEY METROPOLITAN BOROUGH COUNCIL **Engineer** NPS (BARNSLEY) LIMITED	**Job Number** NE3204 **Sheet** 2/2

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
								Strong grey SILTSTONE with mudstone bands.		
					Medium Inflow(1) at 22.00m, rose to 19.00m in 20 mins.		(13.80)			▽1
					15/04/2013		30.00	Complete at 30.00m		

Remarks

Scale (approx)	Logged By
1:100	DS/SJ

Figure No. NE3204.R3A

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Site
SAVILLE ROAD, DODWORTH, BARNSLEY, SOUTH YORKSHIRE

Borehole Number
R3B

Machine : BERETTA
Flush : WATER
Core Dia :
Method : ROTARY OPEN HOLE

Casing Diameter
121mm to 2.00m

Ground Level (mOD)

Client
BARNSLEY METROPOLITAN BOROUGH COUNCIL

Job Number
NE3204

Location
AS PLAN

Dates
10/04/2013

Engineer
NPS (BARNSLEY) LIMITED

Sheet
1/1

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
							0.30	TOPSOIL			
							(1.70)	Brown silty CLAY.			
							2.00	Brown SANDSTONE and SILTSTONE.			
							(6.00)				
					10/04/2013		8.00	Complete at 8.00m			

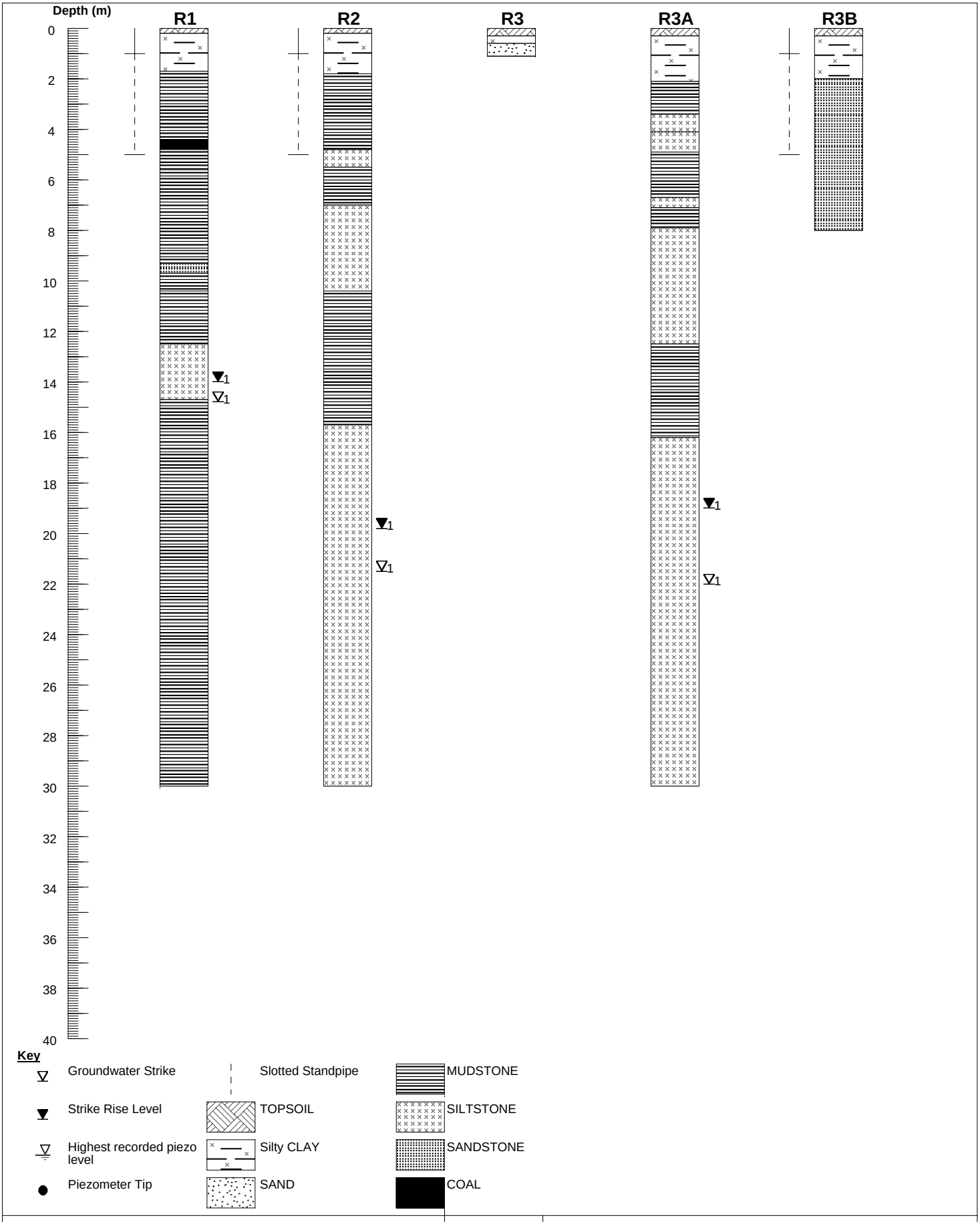
Remarks
Hand excavated inspection pit from GL to 1.20m to check for services.
Descriptions based upon foreman drillers records of flush returns.
On completion backfilled with arisings and installed a 50mm dia hdpe gas monitoring standpipe with a gas valve and gravel surround to 5.00m, a Bentonite seal from 1.00m to 0.20m and a concreted in lockable steel protective cover from 0.20m to GL.

Scale (approx)
1:100

Logged By
DS/SJ

Figure No.
NE3204.R3B

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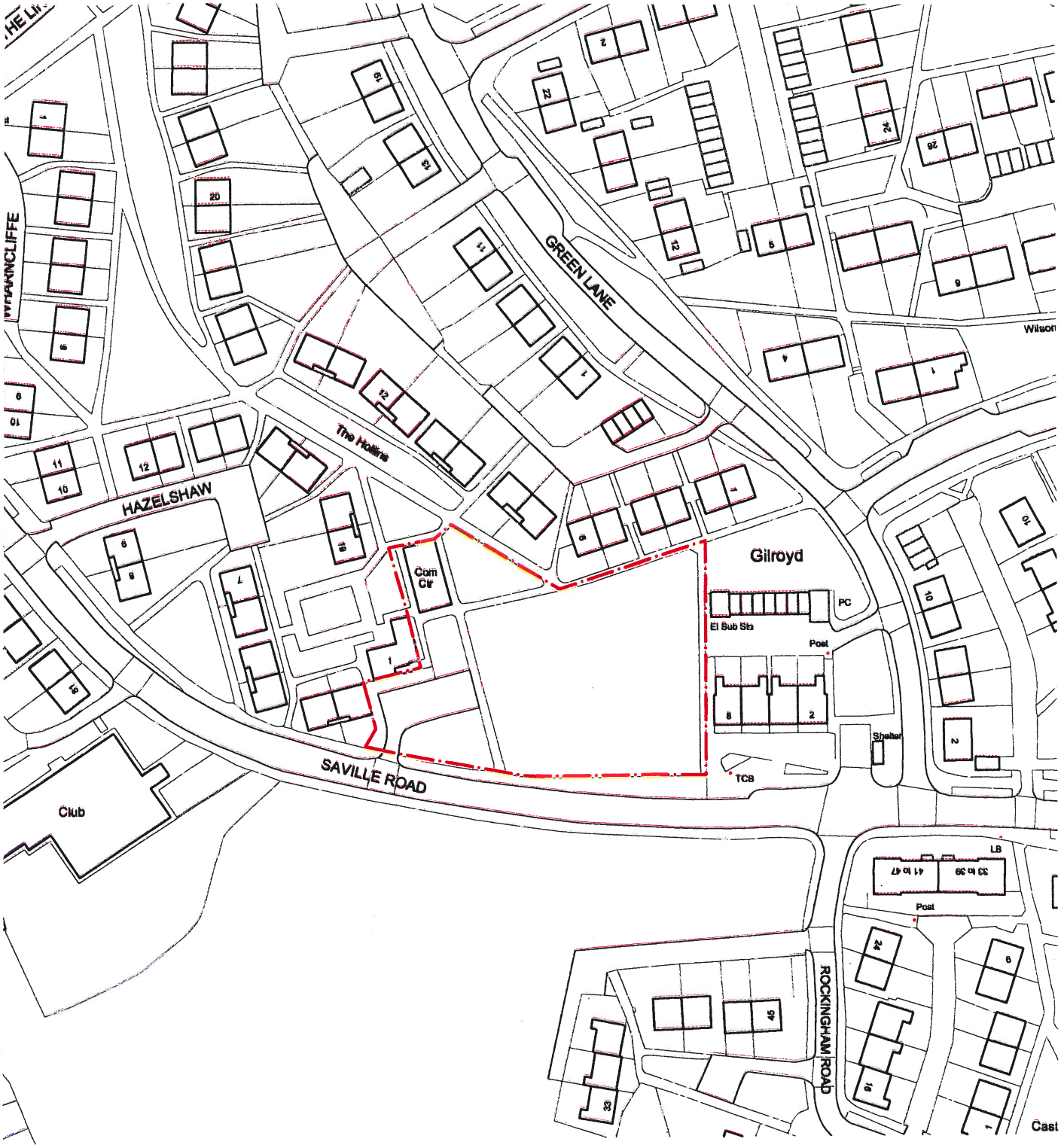
3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907

Nominal Section

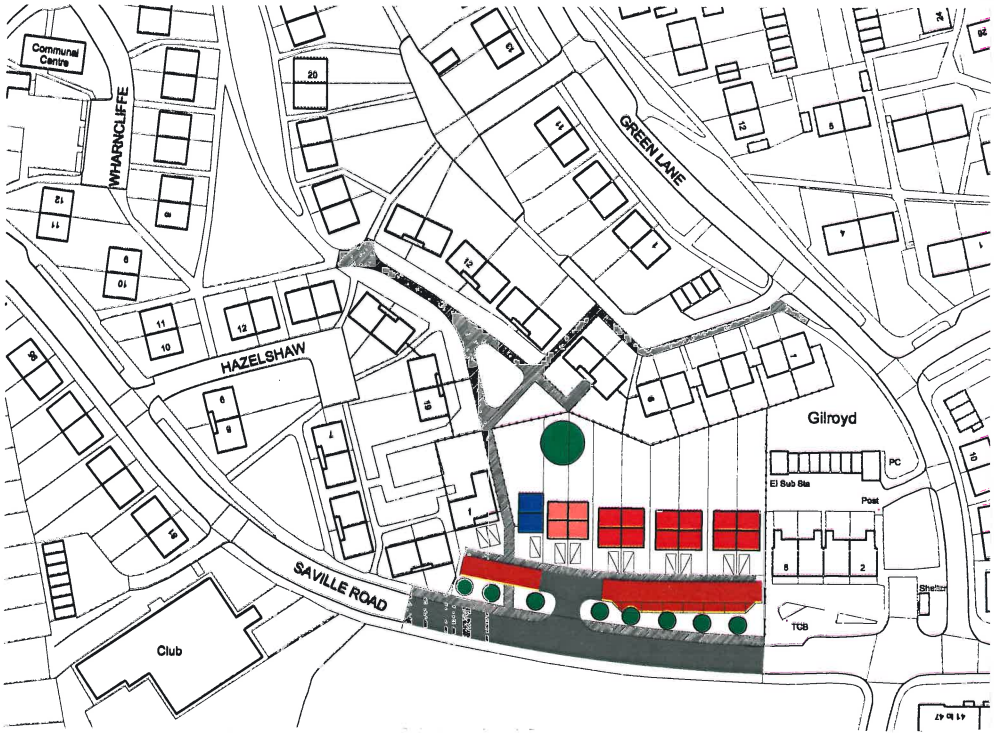
Site	Date Drawn	Date Checked	Sheet	Job Number
SAVILLE ROAD, DODWORTH, BARNSLEY, SOUTH YORKSHIRE	07/05/2013		1/1	NE3204
Client	**Drawn By**	**Checked By**	**Scale**	**Figure No.**
BARNSLEY METROPOLITAN BOROUGH COUNCIL			1:200[V]	NE3204.1

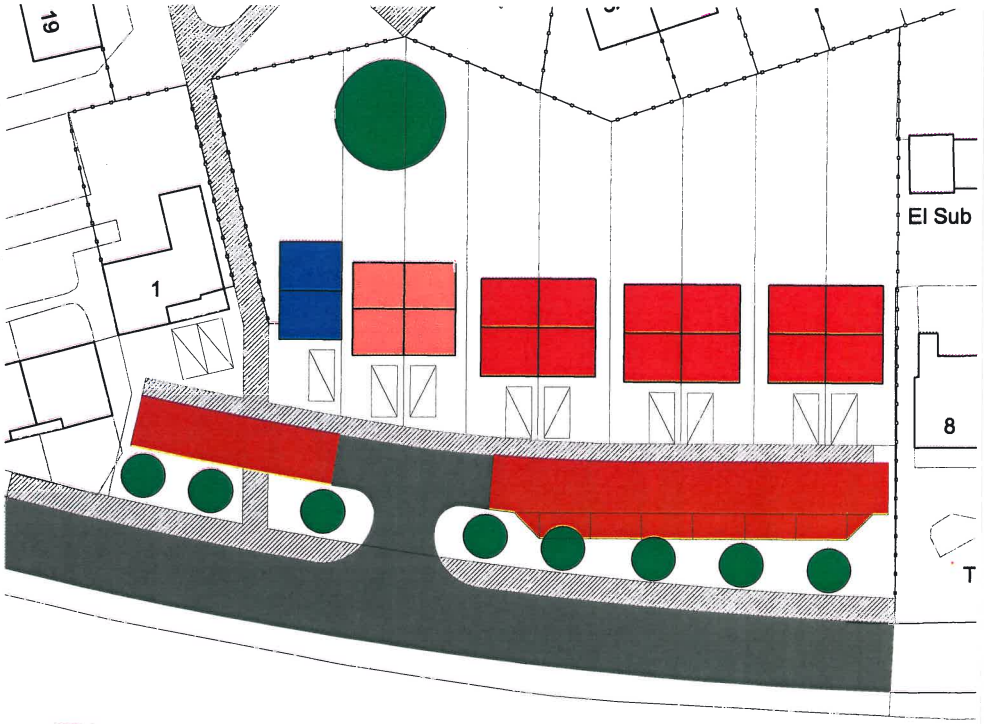
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FIGURES



SUB SURFACE SITE INVESTIGATION AND SPECIALIST GEOTECHNICAL CONSULTANTS 3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907	SITE LOCATION PLAN			
Site SAVILLE ROAD, DODWORTH, BARNSLEY, SOUTH YORKSHIRE.	Date Drawn 29-Apr-13	Date Checked 29-Apr-13	Orientation N	Job No. NE3204
Client BARNSLEY METROPOLITAN BOROUGH COUNCIL	Drawn By DS	Checked By CAM	Scale 1:1250	Figure No. 1





KEY:

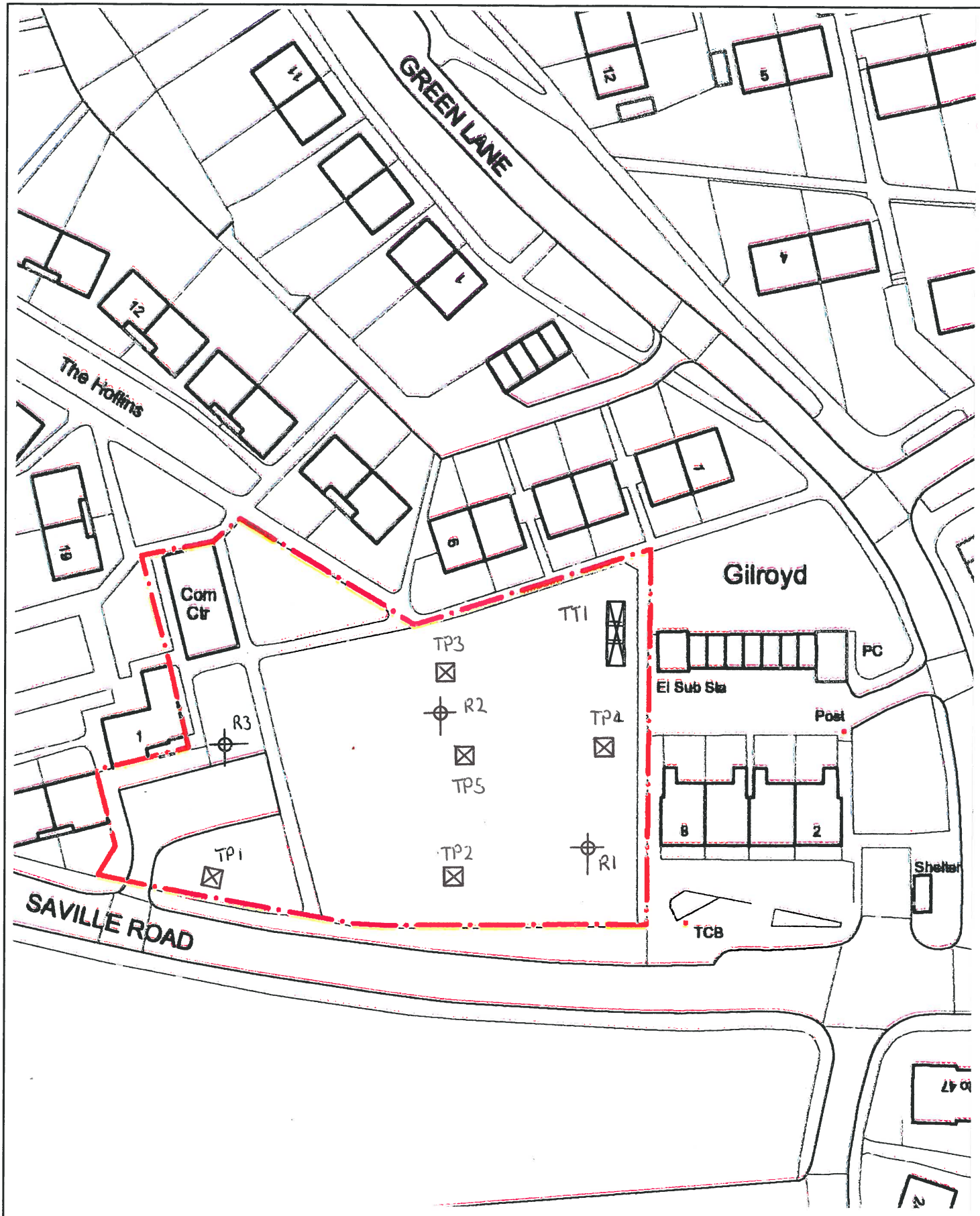
Proposed plan 1:500

3 Bed/ 4 Per Semi-detached dwelling
6 No units

4 Bed / 5Per Detached dwelling
1 No units

2 Bed/ 3 Per Semi-detached dwellings
2 No Units

SUB SURFACE SITE INVESTIGATION AND SPECIALIST GEOTECHNICAL CONSULTANTS 3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907	PROPOSED DEVELOPMENT LAYOUT PLAN			
Site SAVILLE ROAD, DODWORTH, BARNSLEY, SOUTH YORKSHIRE.	Date Drawn 29-Apr-13	Date Checked 29-Apr-13	Orientation N	Job No. NE3204
Client BARNSLEY METROPOLITAN BOROUGH COUNCIL	Drawn By DS	Checked By CAM	Scale NTS	Figure No. 2



SUB SURFACE SITE INVESTIGATION AND SPECIALIST GEOTECHNICAL CONSULTANTS 3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907	EXPLORATORY HOLE LOCATION PLAN			
Site SAVILLE ROAD, DODWORTH, BARNSLEY, SOUTH YORKSHIRE.	Date Drawn 29-Apr-13	Date Checked 29-Apr-13	Orientation N	Job No. NE3204
Client BARNSLEY METROPOLITAN BOROUGH COUNCIL	Drawn By DS	Checked By CAM	Scale NTS	Figure No. 3