

GA Site Investigation Limited

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GEOTECHNICAL REPORT

Report Reference:	GA079Q.11
Location:	Land to the rear of 14-16 Beever Lane Gawber Barnsley, S75 2RP
For:	Mr S Sanger
Prepared by:	Gordon M Anderson
Date of Investigation:	11 th April 2011
Report Date:	25 th April 2011

Company Registration Number: 06998509
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CONTENTS

	Page
1 INTRODUCTION	1
2 LIMITATIONS OF INVESTIGATION	1
3 SITE DESCRIPTION	1
4 SITE WORK	2
4.1 Boreholes	2
4.2 Standard Penetration Tests	2
5 EXPLORATORY HOLE FINDINGS	3
6 IN-SITU TEST DATA	5
6.1 Standard Penetration Test Data	5
7 CONCLUSIONS AND RECOMMENDATIONS	6

APPENDICIES

Appendix A	Site Location
Appendix B	Proposed Layout Plan and Exploratory Hole location Sketch
Appendix C	Exploratory Hole Records

1 INTRODUCTION:

GA Site Investigation Limited was commissioned by Mr Sanger, the proposed developer, take undertake a site investigation at land to the rear of 14-16 Beever Lane, Gawber, Barnsley, S75 2RP, where it is intended to construct a detached domestic dwelling and garage block.

2 LIMITATION OF INVESTIGATION:

This investigation is limited to a geotechnical intrusive investigation to determine potential foundation and shallow substrata details and does not include potential shallow mine or other mineral extraction work within the vicinity of or below the property nor is it a geo-environmental assessment of the site as these criteria are beyond the scope of our brief for this contract.

The comments and opinions are based on the ground conditions encountered during the site work and on the results of the tests carried out in the field and in the laboratory. There may, however, be other ground conditions prevailing on the site which have not been disclosed by this investigation and which have not been taken in to consideration by this report.

3 SITE DESCRIPTION:

The site is located to the west of Beever Lane, Gawber and comprises a grassed and lightly wooded sloping section of land, the land rising in an east to west direction, (see Appendix A).

A proposed site development plan is enclosed in Appendix B.

The approximate centre of the site can be located by National Grid Reference 432310 407300.

The proposed development has been located to the eastern portion of the site as the western area is classified as 'Greenbelt' and cannot be developed for this reason.

4 SITE WORK

The investigation took the form of four sampling borehole and in-situ soil strength tests to determine substrata details beneath the area of the proposed structures.

Pre-excavation Services Scanning:

Prior to the commencement of excavation operation the areas under investigation were first scanned for buried services utilising a Cable Avoidance Tool (CAT scanner).

Boreholes:

The boreholes were excavated using dynamic drilling equipment the sampling equipment comprising of a driven steel sampler containing a plastic liner tube into which the soil samples are driven.

Standard Penetration Tests:

The standard penetration test (SPT) comprises recording the number of blows required from a falling drive mass of 63.5 kilogram weight, falling through a constant drop of 0.75m, to drive an “open spoon sampler” 0.30m into the deposits under test, after an initial penetration of 0.15m has been achieved.

The recorded resistance to penetration, number of blows for 0.30m penetration, known as the N_{300} value, allows determination of the compactness of the deposits to be undertaken.

5 EXPLORATORY EXCAVATION FINDINGS:

Made Ground:

Discrete layers of Made Ground were encountered at each test location with these varying in thickness between 0.40m and 2.50m.

To the northern side of the development the Made Ground deposits are between 0.40m and 1.00m in thickness with the deepest made ground, which includes probable Made Ground in Borehole 2, being to the southern side of the site with these deposits with these being between 1.80m to 2.50m in thickness.

The made ground comprises an initial layer of topsoil and silt in Boreholes 1, 2, 3 with a 0.40m of gravel being placed over the topsoil/silt deposits in the area of Borehole 4. Borehole 4 was located on the recently disused construction traffic access road into a recently constructed housing development to the south of the site.

The 'Probable' Made Ground deposits beneath the topsoil/silt layer comprise weathered mudstone/siltstone in the area of Borehole 2 whilst the Made Ground deposits in Borehole 4 comprise further silt material to 1.00m below ground level (bgl) over weathered siltstone/mudstone and a 0.40m band of red shale and a further 0.10m band of shale and silt at 2.40m bgl.

Natural Strata:

Directly below the Made Ground deposits the boreholes encountered weathered mudstone/siltstone with inclusions/bands of coal over hard siltstone.

In the area of Borehole 1, taken to the northwest corner of the building, weak weathered mudstone is present between 1.00m and 4.10m depth with bands of coal being located in these deposits between 2.70m to 3.00m and 4.00m to 4.10m depth. Between 4.10m and 6.00m bgl the mudstone encountered is moderately strong and is underlain by a further 0.20m band of coal, which in turn overlays hard mudstone/siltstone.

In the area of Borehole 3, to the northeast corner of the building, lies weak siltstone to 2.50m depth with coal being present from 2.50m to 6.10m bgl. The coal contains 0.10m thick bands of weak mudstone at 3.30m and 3.70m depth, with the coal being underlain by hard siltstone at 6.00m bgl.

In Borehole 2, southwest corner, the deposits between 0.30m and 1.80m depth are described as 'Probable' Made Ground and are underlain by weak mudstone/siltstone to 4.40m bgl with coal being present from 4.40m to 4.55m bgl. Between 4.55m and 5.50m depth the borehole encountered moderately strong siltstone with the borehole terminating at 5.60m bgl in hard siltstone.

Borehole 4 was excavated in the area of the proposed detached garages, southeast corner, and encountered natural hard mudstone below the Made Ground from 2.50m bgl. The borehole was terminated at 2.90m depth due to the hardness of the mudstone preventing further sampling progress.

Groundwater:

No groundwater was encountered during or immediately after drilling operations.

Borehole Records:

Details of the strata encountered their thickness, depth and description, together with the level's at which testing and sampling were undertaken, are shown on the borehole record sheets contained in Appendix C of this report.

6 IN-SITU TEST DATA

Standard Penetration Tests:

The results of the Standard Penetration Tests recorded N_{300} values between 4 to in excess of 80 with tests in the 'hard siltstone' to the base of the boreholes recording the highest values.

The lower values were generally recorded in the coal and upper weathered siltstone and mudstone deposits.

8 CONCLUSIONS

From the evidence of this investigation the area of the proposed dwelling (BH's 1-3) is overlain by between 0.40m to potentially 1.80m of made ground, overlying weak to moderately strong mudstone/silt and bands of weak coal.

In the area of the proposed garages (BH4) Made Ground deposits are present to 2.50m depth.

Consultation with South Yorkshire Mining Advisory Services (SYMAS) indicates the general area around the site has been subjected to mining operations, which includes opencast and shallow post and stall working.

During post and stall mining pillars of coal are left in-situ to support the ground above the coal and worked seams. This type of mine extraction exists in areas to the east of the site and is a source of potential ground gas emissions.

During opencast working coal was extracted by mass excavation with local excavations to the site often being reinstated using red shale or granular excavated overburden materials, which includes weathered fractured rock deposits.

With the presence of the significant coal seams in Borehole 3, northeast corner of the development, and the presence of deep Made Ground and associated granular Made Ground, including red shale deposits in BH 4, it is considered possible that opencast coal extraction may have occurred in the area of southeast corner of the proposed development.

With the localised presence of the thick coal deposits to the northeast corner of the main dwelling there is a potential for differential settlement of the proposed building towards this area as the coal deposits have a much lower bearing capacity than adjacent deposits at similar depths.

The coal deposits are also loose in compaction and are considered at risk of potential long term consolidations under imposed load and are also subject to potential 'spontaneous combustion' when exposed to air during open excavation.

With the presence of the deep Made Ground, indicating potential shallow coal extraction to the southeast section of the site there is also a potential for differential foundation movement in or towards this area.

On the basis of this investigation the following recommendations are given;

Foundations:

Main Dwelling:

Foundations solutions are; Reinforced raft or piled reinforced raft.

The use of a rigid reinforced raft with thickened edge beams would be acceptable for this development providing ground bearing pressures can be kept below 40kN/m^2 to reduce potential ground consolidation, especially in the area of the deep coal deposits.

If bearing pressures cannot be kept below 40kN/m^2 the use of piles to support the rigid reinforced raft will be required with piles being taken into the underlying hard/competent rock deposits at depths indicated on the enclosed Borehole Record sheets, indicated as the depths the boreholes terminated in hard deposits.

Piles lengths of between 4.0m to in excess of 7.0m are anticipated for this development. Piles seated at depths in excess of those achieved in the sampling boreholes will have an N_{300} value of 50 for use in foundation design.

Detached Garages:

With the presence of the deep loose Made Ground deposits in the area of Borehole 4 it is recommended that the existing deposits are subject to remediation to improve their bearing capacities.

This should take the form of removal of at least the upper 1.5m of the Made Ground and the replacement of this material with inert imported graded crushed stone, placed and compacted in layers not exceeding 0.2m thickness so as to provide a compact base off which to construct a rigid reinforced raft.

General Requirements:

A suitable 'ground gas membrane' is required beneath the all buildings to prevent the ingress of potential mine gas/ground gases into the finished structure. A suitable membrane must have lapped and taped joints with all utility/service ducts/inlets into the building being adequately sealed to form a homogenous barrier against gas ingress.

Any coal deposits encountered during excavation for the raft foundation will require removing or encapsulating in concrete to reduce/prevent access for air which would increase the potential for spontaneous combustion of these deposits. Due to the presence of the coal deposits the installation of a basement is not recommended with such work requiring the mass excavation of the coal deposits to a depth of 6.0m in the area of Borehole 3 with the excavated material being replaced with inert crushed stone sub-base material with the added costs for excavation, reinstatement and spoil disposal

With the presence of the red shale deposits in the area of Borehole 4 it is recommended that sulphate protection is provided to all buried concrete or mortar to at least Design Sulphate Class DS-3 of BRE Special Digest 1: 2005 'Concrete in aggressive ground'.

G. M. Anderson

GA Site Investigation Limited

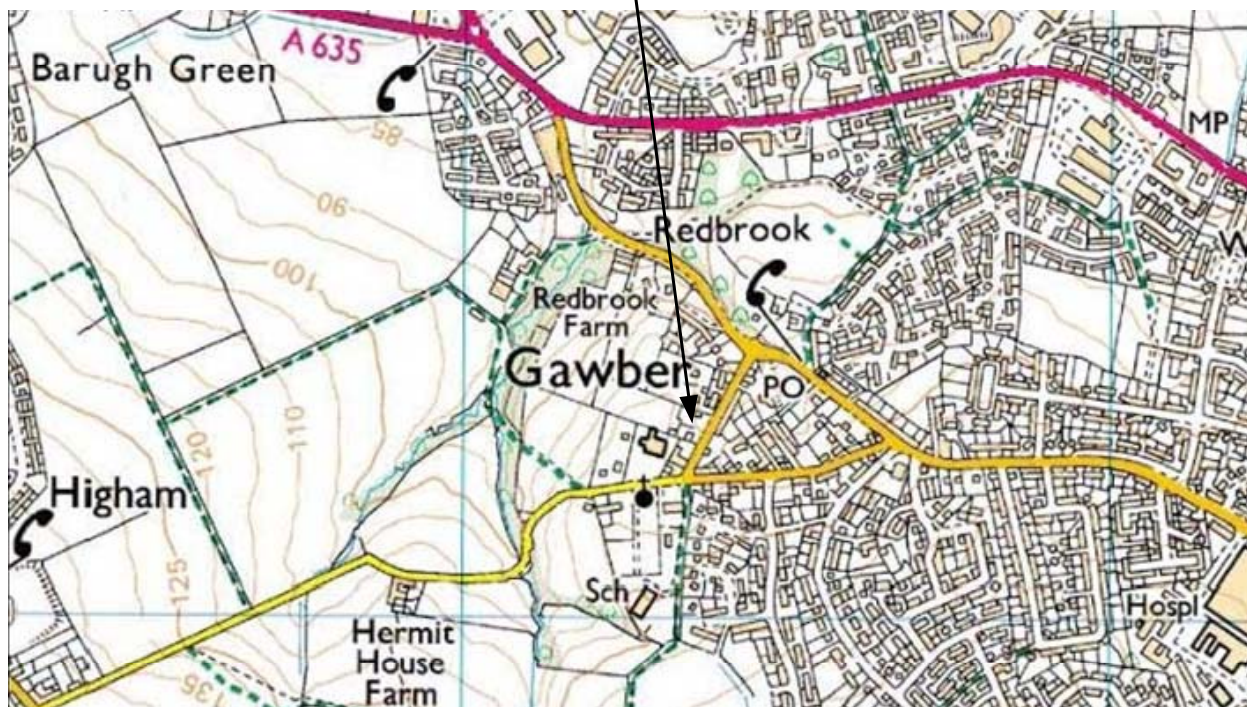
Appendix A

Site Location

SITE ADDRESS	Land at Beaver Lane, Gawber, Barnsley	CONTRACT No.	GA078Q.00
CLIENT	Mr Sanger	TITLE	Site Location



SITE

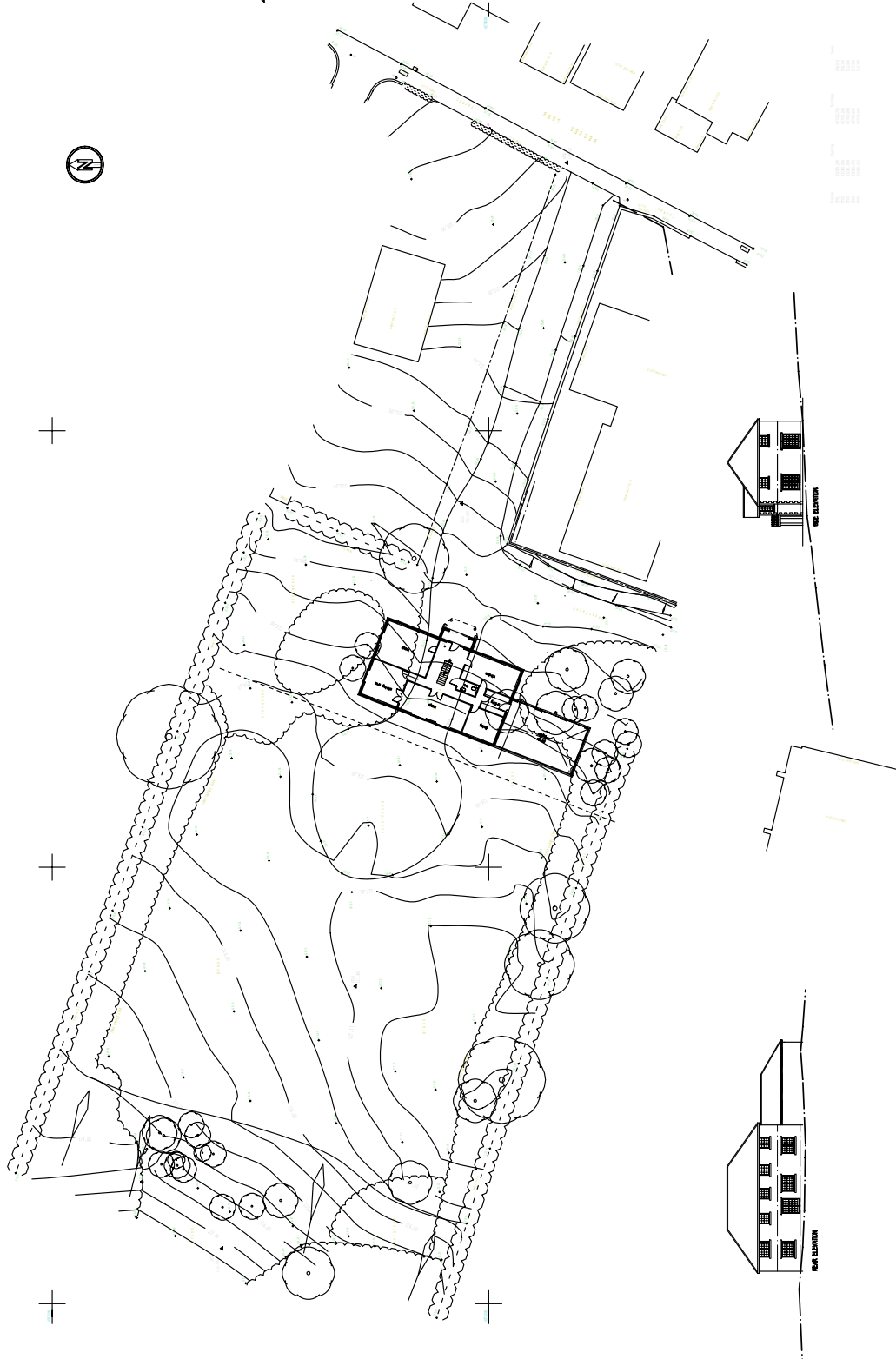


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GMA		11 th April 2011	
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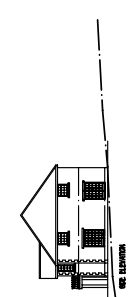
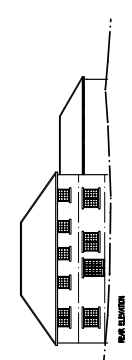
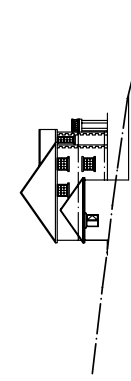
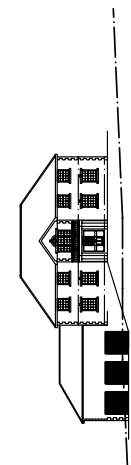
GA Site Investigation Limited

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North Yorkshire
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Tel: 07875 761 729

Appendix B
Proposed Layout Plan and Exploratory Hole location Sketch



Mr SANGER
PROPOSED DWELLING
LAND REAR OF
14-16 BEEVER LANE
GAWBER
SITE PLAN
1:500 NOV 10
Peter Thompson
Linwood
Barnsley Road
Dodworth
Barnsley S753JR
tel £ 01226
fax 201391
M.B.I.A.T.

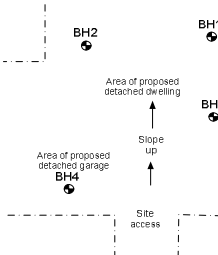
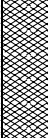


SITE ADDRESS		Land at Beaver Lane, Gawber, Barnsley		CONTRACT No.		GA078Q.00	
CLIENT		Mr Sanger		TITLE		Borehole Location	

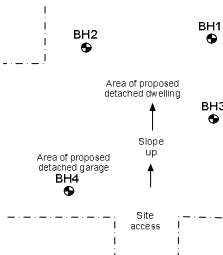
The diagram is a site plan for a property at Beaver Lane, Gawber, Barnsley. It shows the locations of four boreholes: BH1 (top right), BH2 (top left), BH3 (middle right), and BH4 (bottom left). Each borehole is marked with a circle divided into four quadrants. A dashed line indicates the boundary of the property. A solid line with an arrow pointing upwards is labeled 'Slope up'. A solid line with an arrow pointing downwards is labeled 'Beaver Lane'. A dashed line with an arrow pointing upwards is labeled 'Site access'. Two areas are labeled 'Area of proposed detached dwelling' and 'Area of proposed detached garage'. The plan is oriented with North at the top.

DRAWN BY		DATE		GA Site Investigation Limited 76 Thames Avenue Guisborough North Yorkshire TS14 8JR Tel: 07875 761 729
GMA		11 th April 2011		
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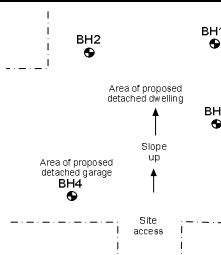
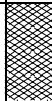
Appendix C
Exploratory Hole Records

SITE ADDRESS		Land at Beever Lane, Gawber, Barnsley		TP/BH REF		BH1		
CLIENT		Mr Sanger		DATE		11-Apr-11		
METHOD		Windowless Sampler		CONTRACT no.		GA079Q.11		
LOCATION PLAN:				BOREHOLE DIAMETER/SAMPLE SIZE & D				
				External BH Dia Sample Dia Depth to (m)				
				126mm 102mm 3.00				
				101mm 86mm 5.00				
				90mm 76mm 6.00				
				SPT 6.30				
DEPTH (m)		DESCRIPTION		LEGEND	SAMPLES & TESTS		FIELD OBSERVATIONS	
					DEPTH (m) TYPE RESULTS MOISTURE (%)		DETAILS	
		MADE GROUND: Loose SAND and TOPSOIL with fine to medium angular gravel			0.20 D			
0.40					0.40 D			
		MADE GROUND: Loose black SAND and GRAVEL including ash, glazed glazed tile, brick and pottery						
1.00					1.00 D			
		Weak light brown and grey fractured weathered MUDSTONE - recovered recovered as loose fine to medium angular gravel						
					1.50 D			
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SITE ADDRESS		Land at Beaver Lane, Gawber, Barnsley		TP/BH REF		BH2			
CLIENT		Mr Sanger		DATE		11-Apr-11			
METHOD		Windowless Sampler		CONTRACT no.		GA079Q.11			
LOCATION PLAN:				BOREHOLE DIAMETER/SAMPLE SIZE & D					
				External BH Dia		Sample Dia			
				126mm		102mm			
				101mm		86mm			
				90mm		76mm			
				Depth to (m)		3.00			
						5.00			
						5.60			
DEPTH (m)		DESCRIPTION		LEGEND		SAMPLES & TESTS		FIELD OBSERVATIONS	
						DEPTH (m)		TYPE	
						RESULTS		MOISTURE (%)	
								DETAILS	
		MADE GROUND: Loose TOPSOIL with ~medium angular gravel				0.10			
0.30						0.30			
		Weak red brown and light brown weathered MUDSTONE/SILTSTONE - recovered as fine to medium angular to tabular gravel				0.50			
		POSSIBLE MADE GROUND							
						1.00		D	
						1.50		D	
1.80						1.80		D	
		Weak weathered red brown MUDSTONE - recovered as fine angular to tabular gravel				2.00		P	
2.10						2.10		D	
		Weak light brown and occasionally red brown weathered SILTSTONE - recovered as fine to medium angular to tabular gravel							
						2.50		D	
3.00						3.00		D, P	
		Weak red brown weathered MUDSTONE - recovered as fine to medium angular gravel						N300=10	
3.40						3.40		D	
		Weak to moderately strong dark red MUDSTONE - recovered as fine to medium tabular gravel							
3.80						3.80		D	
		Weak grey and red brown rust stained weathered MUDSTONE - recovered as fine to medium angular gravel				4.00		D, P	
4.30						4.30		D	
4.40		Weak light grey weathered SILTSTONE - recovered as medium angular gravel				4.40		D	
4.55		Weak black COAL				4.55		D	
		Moderately strong red brown, purple and grey weathered SILTSTONE recovered as fine to medium angular to tabular gravel							
5.00						5.00		D, P	
		Borehole continued						N300=20	
KEY				GENERAL REMARKS					
D. Small disturbed.				P. Standard Penetration Tests (SPT)					
B. Bulk disturbed.				P.P. Pocket Penetrometer (Kg/cm2)					
R. Root.				S.V. Shear Vane (Kpa)					
W. Water				M.C. Moisture Content					
				1) Hole terminated at 5.60m					
				2) No water struck					
DRILLED BY		LOGGED BY							
GA SI Ltd		GMA							
ENGINEER		Sheet 1 of		2					
GMA									
GA Site Investigation Limited									

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SITE ADDRESS		Land at Beaver Lane, Gawber, Barnsley		TP/BH REF		BH3		
CLIENT		Mr Sanger		DATE		11-Apr-11		
METHOD		Windowless Sampler		CONTRACT no.		GA079Q.11		
LOCATION PLAN:				BOREHOLE DIAMETER/SAMPLE SIZE & D				
				External BH Dia Sample Dia Depth to (m)				
				126mm 102mm 3.00				
				101mm 86mm 5.00				
				90mm 76mm 6.00				
				SPT 6.20				
DEPTH (m)		DESCRIPTION		LEGEND	SAMPLES & TESTS		FIELD OBSERVATIONS	
					DEPTH (m) TYPE RESULTS MOISTURE (%)		DETAILS	
		MADE GROUND: Loose TOPSOIL			0.20 D			
0.40					0.40 D			
		Stiff orange brown and grey SILT/weak SILTSTONE						
0.90								
		Weak brown and grey weathered SILTSTONE recovered as firm silt and fine to medium angular gravel			1.00 D, P N300=17		Blows: 3, 3, 4, 4, 5, 4	
					1.50 D			
								
					2.00 D, P N300=9		Blows: 2, 2, 2, 2, 1, 2	
								
					2.50 D			
		Weak black COAL - recovered as fine to medium angular to tabular gravel						
					3.00 D, P N300=4		Blows:1, 1, 1, 1, 0, 1, 2	
								
					3.30 D			
3.40		Weak brown weathered MUDSTONE - recovered as fine to medium angular gravel			3.50 D			
		Weak black COAL - recovered as fine to medium angular to tabular gravel						
		gravel			3.70 D			
3.70		Weak brown and grey weathered MUDSTONE						
					4.00 D,P N300=4		Blows: 1, 1, 1, 1, 1, 1	
		Weak black COAL - recovered as fine to medium angular to tabular gravel						
								
								
								
								

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