

Appendix 6: Ground Investigation

Provided by *Eastwood + Partners*
Consulting Engineers

41 pages inserted

**GROUND INVESTIGATION
REPORT
OF LAND AT HAVELOCK STREET
DARFIELD
FOR
CODA STUDIOS LTD**

28489

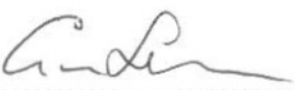
February 2006

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DARFIELD
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EXECUTIVE SUMMARY

- 1 This ground investigation has been undertaken on behalf of Coda Studios Limited of approximately 0.6 hectares of land alongside Havelock Street, in Darfield, Barnsley, South Yorkshire. It supplements a desk study report dated 26 September 2005 by Eastwood & Partners.
- 2 Presently the site is used as grazing land for animals.
- 3 Ground conditions comprise topsoil overlying a thin layer of made ground of approximate thickness 0.5m, but can be over 1.2m thick. The underlying natural ground comprises stiff sandy clays and a bedrock of weathered mudstone, generally encountered at a depth of 3.0 to 3.5m below ground level.
- 4 No precautions against mining will be required.
- 5 The most suitable foundations for houses are likely to be unreinforced strip footings founded on undisturbed natural ground at a probable minimum depth of 900mm and deeper near trees and hedges, in accordance with NHBC Standards Chapter 4.2.
- 6 The natural ground on the site will probably be suitable for the use of insitu reinforced ground slabs. These may be used when there is less than 600mm of made ground below the slab and this is well-compacted granular material. Any desiccated and partially desiccated material must also be removed below slabs cast on the ground.
- 7 Old foundation structures and basements may be present on site. In TP2 sandstone masonry was found at the edge of the trial pit to a depth of 2.0m. This structure is probably associated with the demolished housing and could be part of a basement structure.
- 8 Design Sulphate Class of DS-1 with concrete classification of AC-1 should be used for foundations.
- 9 Slightly elevated benzo (a) pyrene concentrations were found in one sample of topsoil and one sample of natural ground. It is probable that this natural ground result is a rogue result. If the topsoil is to be used in gardens and landscaped areas, further testing will be required.
- 10 Basic radon protection is required for new dwellings on the site.

- 11 The conclusions made in this summary are subject to agreement by the approving bodies, the NHBC, Local Authority and Environment Agency.

1.0 INTRODUCTION

This report presents the findings of a ground investigation. All works have been carried out on behalf of Coda Studios Limited.

The report is based on the trial pits and boreholes, as well as chemical testing of soil samples and a detailed risk assessment. Eastwood & Partners' desk top report dated September 2005 has been referred to also.

This report presents information on the current condition of the site, based on the above sources of information. The objectives of the investigation were thus:

- To outline the general site conditions and the likely subsurface features of the area surrounding the site.
- Determine the extent of any contamination on site

The recommendations provided in this report are based on the assumption that the site will be redeveloped with a residential end use.

All information, comments and opinions given in this report are based on the information gained from the ground investigation. However, there may be conditions at the site which have not been taken into account, such as unpredictable soil strata and water conditions.

This report has been prepared for the sole and exclusive use of Coda Studios Limited in response to particular instructions. Any other parties using the information contained in this report do so at their own risk and any duty of care to those parties is excluded.

2.0 THE SITE

2.1 Description

The site comprises approximately 0.6 hectares of land alongside Havelock Street in the Darfield area of Barnsley, South Yorkshire, approximately 3.5 miles south east of Barnsley town centre. The site is centred on National Grid reference SK 411 042.

The main features of the site are shown on the appended site plan, Drawing Number 28489/002.

The site is roughly triangular in shape. It is surrounded mainly by residential properties. There are some commercial buildings bordering Snape Hill Road which back onto the site.

The site is currently used as grazing land for donkeys, and is covered with topsoil and grass. Most of the site slopes towards the south at an angle of approximately 1 in In the northern part of the site, the slope increases to form an embankment. This has an angle of approximately 30° which increases to around 40° at the eastern side of the site. Access is provided by a gateway in the east and a stile in the southwest.

Two alders are present in the south west of the site. The larger of the trees is approximately 8m in height.

2.2 Geology and Groundwater Vulnerability

The geological maps, Sheet 87 (1:50,000 scale) and 275 SW (1:10,560 scale) show the solid geology underlying the site to be undifferentiated mudstones of the Middle Coal Measures series of the Carboniferous period. No glacial or recent deposits are shown to overlay the site. No faults are shown to run across the site.

The groundwater vulnerability map for the area, Sheet 12, shows the site to lie on a minor aquifer with overlying soils assumed to be of high leaching potential. This is due to their location within an urban area, and fewer observations are available.

2.3 Mining

Reference to the geological maps and memoirs indicates that many seams of coal are expected to lie below the site. None of these, however are shown to, or conjectured to, outcrop in close proximity to the site. Darfield Main Colliery encountered at least eleven seams of coal, namely the Newhill, Wathwood, Two Foot, Abdy, Kent's Thin, Kent's Thick, Barnsley, Dunsil, Swallow Wood, Fenton and the Parkgate seams in descending order. The Swinton Pottery Coal is not recorded as being encountered in the colliery shafts, but is shown to outcrop to the south of the site, above the Newhill seam. There is therefore a chance that this seam may be present at shallow depth beneath the site.

The seams expected below the site are summarised in the below:

Seam Name	Approximate Depth Below Ground Level (BGL)	Approximate Seam Thickness
Swinton Pottery Coal	30m	0.5m
Newhill Coal	65m	1.1m
Wathwood Coal	130m	1.35m
Two Foot Coal	135m	0.6m
Abdy Coal	150m	0.9m
Kent's Thin Coal	190m	0.8m
Kent's Thick Coal	220m	1.5m
Barnsley Coal	280m	2.4m
Dunsil Coal	300m	1.1m
Swallow Wood Coal	330m	1.6m
Fenton Coal	505m	-
Parkgate Coal	525m	-

Thicknesses relevant to this site could not be found for the Fenton and Parkgate seams. The depths to each coal seam was taken from the shaft records of the Darfield Main Colliery with the exception of the Swinton Pottery Coal, which was interpolated from records of the average separation of this seam and the Newhill Coal below it. Information provided by the geological memoir suggests that the Two Foot and the Abdy Coal seams were rarely worked

in this area of Barnsley.

The information provided by the geological maps and the highly faulted nature of the Coal Measures strata in the area surrounding the site means that it is difficult to say for sure which coal seams will be present beneath the site and at what depth, and therefore the information provided by the above table should not be relied upon as being definitive. Further investigation will be required before development of the site takes place.

The Coal Authority Mining Report confirms that the site is within the zone of likely influence at surface from workings in nine seams of coal at depths of between 180m and 680m, with the last date of working given as 1988. The report states that all ground movement associated with these workings should by now have ceased. Additionally, the report states that the site is in an area where coal is believed to exist at or close to surface which may have been worked at some time in the past. This may relate to the Swinton Pottery Coal which may be located beneath the site at shallow depth. The Coal Authority states that there is one known mine entry within 20m of the site boundary. This is a shaft believed to be located to the north west of the site, beneath a parking bay adjacent to Verona Road.

The site does not lie within the zone of likely influence on the surface of any present underground workings, and there are currently no licenses to extract coal by either underground or opencast methods in place or awaiting determination by the Coal Authority. There are presently no plans to begin extraction in the area. Reserves of coal exist in the locality, however, with the demise of the UK coal industry, and the fact that the site is in a highly developed area, future working is unlikely.

3.0 GROUND INVESTIGATION

3.1 Site Works

Six trial pits were excavated to a maximum of 4.3m below ground level on 1 February 2006 to identify the shallow ground conditions and the depth of any made ground. These trial pits were drilled

Four rotary-drilled boreholes (BH A-D) were drilled on 01 February 2006 to identify any coal seams or workings below the site. These boreholes were drilled to a maximum of 21m below ground level.

Locations of the trial pits and boreholes are shown on the site plan on 28489/002. The trial pit and borehole logs are presented in Appendix 1.

3.2 Laboratory Testing

During the field work, samples of soil were obtained for subsequent laboratory testing.

Three samples of topsoil, one of made ground and three samples of natural ground were tested for chemical contaminants, as discussed in 6.0, by Severn Trent Laboratories which is a UKAS accredited laboratory. The results are enclosed in Appendix 2.

A description of all the samples tested is enclosed in Appendix 2. All the samples tested were also checked for unusual smells, which would be an indication of organic compounds. No smells were detected.

4.0 GROUND CONDITIONS

Made Ground

Topsoil overlies a thin layer of made ground that is generally less than 0.5m thick but was found to be up to 1.2m thick in the centre of the site. This material comprises sandy clays with rare brick fragments.

Natural Ground

Underlying the made ground are stiff clays from 1.5 to more than 4.0m thick. This clay is generally sandy with the occasional gravel of sandstone.

In TP4, pockets of coal were found from a depth of 2.2m but the adjacent borehole BH D did not find a coal seam.

The underlying bedrock of the site is weathered mudstone, encountered at approximately 3.0 – 3.5m below ground level.

Groundwater

Groundwater was not encountered in any of the trial pits excavated.

5.0 GEOTECHNICAL APPRAISAL

5.1 General

The ground conditions comprise topsoil over made ground, up to 1.2m thick, over stiff clay, then mudstone.

Boreholes were drilled to 21 m and no evidence of coal, workings or disturbed ground was encountered. Therefore, no precautions against mining will be required in the new dwellings.

5.2 Foundations

The most suitable foundations for houses are likely to be unreinforced strip footings, if the made ground is less than 2.0m deep, founded on undisturbed natural ground at a probable minimum depth of 900mm and deeper near trees and hedges, in accordance with NHBC Standards Chapter 4.2.

Where the footing depth to allow for the effect of trees is over 1.5m from past or present tree growth, additional precautions are required in the footings to reduce the effect of trees. This includes the use of expanded polystyrene on the inside of the footings to external walls. It is also prudent to incorporate reinforcement in the top of the footing.

5.3 Superstructure Precautions

No specific precautions will be required in the superstructure.

5.4 Ground Slabs

The natural ground on the site will probably be suitable for the use of insitu reinforced ground slabs. These may be used when there is less than 600mm of made ground below the slab and this is well-compacted granular material. Any desiccated and partially desiccated material must also be removed below slabs cast on the ground.

Where made ground is in excess of 600mm thick, which is likely to occur on most of the sites, a suspended reinforced ground slab or precast concrete floor should be used or ground improvement undertaken. Where footings are in excess of 1500mm deep due to past or

present tree growth, a precast concrete floor should be used with a void below it. The height of the void is dependent on the shrinkability of the soil as prescribed by NHBC Standards.

5.5 Road Works

On the basis of a visual inspection of the ground we suggest that you assume a CBR value of 2 % and that the ground is frost susceptible. The CBR value to be used for adoptable highway design should be agreed with the Highway Authorities at an early stage.

5.6 Problems due to Past Development

Old foundation structures and basements may be present on site. In TP2 sandstone masonry of an old structure was found in the edge of the pit to a depth of 2.0m. This structure is probably associated with the demolished housing and could be part of a basement.

5.7 Excavation Problems

On the basis of the borehole information, it is likely that hard rock will be encountered at a depth of about 4.0 m bgl.

Where excavations which men will enter are over 1.2m deep, or less where there is a risk of harm from collapse of the side of the excavation, the sides should be supported or battered back to make them safe.

5.8 Surface Water Drainage

As clay soils predominate across the site soakaways will not be suitable. Surface water will therefore need to be taken into an appropriate drainage system.

5.9 Sulphate Attack of Buried Concrete

Tests for water-soluble sulphate and pH were carried out on all of the samples and these results were compared with BRE Special Digest 1 "Concrete in Aggressive Ground".

Water-soluble sulphate levels ranged up to 0.08 g/l and the pH indicated relatively neutral conditions, whilst total sulphate results also ranged up to 0.08 %. On the basis of these results, Design Sulphate Class of DS-1 with concrete classification of AC-1 should be used for foundations.

5.10 Radon

In accordance with BRE 211 “Radon: Guidance on Protective Measures for new Dwellings”, basic radon precautions are required in all new dwellings of this development.

6.0 CONTAMINATION APPRAISAL

6.1 Objectives of the Investigation

The object of the investigation is to identify likely contamination sources and with limited testing to indicate the probable level of contamination within the site. The testing regime is not aimed at finding hot spots of contamination. This would involve substantially more monitoring points and chemical testing. Any remediation suggested will have to be approved by the regulatory bodies listed later.

6.2 Site Categorisation

The made ground on site appears to be reworked natural clay with rare brick fragments. We do not have any reason to believe that it will be significantly chemically contaminated.

6.3 Sampling and Testing

To determine whether there is any contamination of the site and if so to what extent, three samples of topsoil, three samples of natural and one sample of made ground were tested for the following chemical contaminants.

Arsenic	Copper	Lead
Cadmium	Nickel	Mercury
Chromium	Zinc	Water Soluble Sulphate in 2:1 extract g/l
Selenium	pH	Speciated PAH
Total Sulphate		

The samples were tested by Severn Trent Laboratories. A list of the actual techniques used is detailed as part of the Certificate of Analysis. The soils were collected in 500ml plastic tubs and amber glass jars. Each was labelled with the sample position and depth and checked for any visible or olfactory evidence of significant contamination. None was recorded.

The results have been received and a copy of the Certificate of Analysis is also enclosed in Appendix 2.

6.4 Assessment of Chemical Test Results

When assessing the chemical test results, the values are initially compared with an assessment value. Concentrations of particular contaminants below this value are considered to be too low to be of cause for concern. Only contaminants with concentrations higher than the threshold value are then considered in the risk assessment section that follows as Section 7.0.

Soil Guideline Values (SGVs) designed for the end use residential with gardens, have been used to assess the levels of contamination, where available. These are described in the Contaminated Land Report Series (CLR), more specifically CLR7 “Assessment of Risks to Human Health from Land contamination. An overview of the Development of Soil Guideline Values and Related Research”. At the time of writing, of the determinands tested, SGVs were only available for arsenic, cadmium, chromium, inorganic mercury, nickel, selenium and lead.

For those determinands for which SGVs have yet to be published, assessment values have been derived from other available information:

- The assessment values for the phytotoxic metals copper and zinc, are levels at which plant growth is affected (maximum permissible and advisable concentrations in soil after application of sewage sludge given in the ‘Code of Good Agricultural Practice for the Protection of Soil’, MAFF 1998). These values are pH dependent.
- The assessment value for potentially the most harmful species of PAH, benzo(a)pyrene, was derived from a quantitative risk assessment using the SNIFFER model. This indicates an assessment value for benzo(a)pyrene of 1.6 mg/kg.

A summary of all assessment values used is presented in Appendix 2.

Copper and zinc are included in the testing suite primarily because of the effects they have on vegetation and are independent of human health.

6.5 Summary of Results

Elevated benzo (a) pyrene concentrations were encountered in one of the topsoil samples and one of the natural ground samples.

6.6 Conceptual Model

6.6.1 Site Description

The site comprises approximately 0.6 hectares of land. It is intended that the site be developed with residential properties with gardens and landscaped areas and consequently plant uptake.

Topsoil covers the site. Made ground comprises clay with rare brick fragments.

6.6.2 Contamination Identified

Benzo (a) pyrene

Benzo (a) pyrene was elevated in samples TP2 (0.6 m) and TP6 (0.15 m) with concentrations of 2.1 and 2.4 mg/kg respectively, both exceeding the assessment value of 1.6 mg/kg.

6.6.3 Significant Pollutant Linkages

Contaminant	Pathway	Receptor
BaP	Direct contact	Construction workers, end users of the site
	Direct uptake	Plants in landscaped areas
	Migration through ground	Controlled waters
Sulphate	Direct contact	Cementitious products
Radon	Vertical migration through underlying rocks	Future residents and visitors to the site as well as construction workers

7.0 RISK ASSESSMENT

7.1 Human Health After Development

Benzo (a) pyrene contamination was recorded in samples of the topsoil. Since the results do not significantly exceed the assessment value, the topsoil could still be suitable for use in gardens and landscaped areas. Further testing of these samples will be needed to confirm this.

The sample of natural ground that contains benzo (a) pyrene contamination is most likely a rogue result, due to the fact that the other samples of natural ground do not show excessive benzo (a) pyrene concentrations. This material is not considered likely to pose a significant risk to human health.

7.2 Human Health During Construction

Normal precautions such as washing hands before eating should be adopted. Any unusual, brightly coloured or odorous material encountered during construction should be brought to the attention of the site staff and investigated.

7.3 Plants

The material on site does not pose a risk to plants.

7.4 Landfill Gases and other Vapours

There are no recorded landfill sites within 250m of the site, therefore precautions against landfill gas will not be required.

7.5 Radon

With reference to current Building Regulations outlined in BRE document BR211, 1999, the site lies within an area where basic radon protective measures are required for new residential buildings. These include providing a ventilated void below suspended floors, or a polythene membrane below ground bearing slabs.

7.6 Attack on Construction Materials

Tests for water-soluble sulphate and pH were carried out on all of the samples and these results were compared with BRE Special Digest 1 “Concrete in Aggressive Ground”. Water-soluble sulphate levels ranged up to 0.08 g/l and the pH indicated relatively neutral conditions, whilst total sulphate results also ranged up to 0.08 %. On the basis of these results, Design Sulphate Class of DS-1 with concrete classification of AC-1 should be used for foundations.

7.7 Groundwater

Groundwater was not encountered during the ground investigation. The contamination on site should not pose a risk to groundwater or nearby watercourses.

7.8 Recommendations and Approvals

1. Design Sulphate Class of DS-1 with concrete classification of AC-1 should be used for foundations.
2. Basic radon precautions are required in all new dwellings.
3. The proposals above must be agreed with the Local Authority, Environment Agency and NHBC.
4. It is possible that localised zones of contaminated material may be found on the site. If ashy, odorous, brightly coloured or apparently contaminated material is found on site, this should be tested to check if it is contaminated. If it is found to be contaminated, after consultation with the regulatory authorities, it should be removed or capped.

APPENDIX 1

Trial Pit Logs

Borehole Logs

TRIAL PIT No								1	
Depth		Strata description							
From	To								
0.0	0.2	TOPSOIL: Soft brown slightly sandy clay with occasional rootlets.							
0.2	0.45	MADE GROUND: Firm brown lightly sandy clay with occasional brick cobbles. P = 250 @ 0.3 m							
0.45	2.3	Firm becoming stiff pale brown orange slightly sandy CLAY. P = 250 @ 1.8 m							
2.3	3.7	Stiff pale grey mottled orange slightly gravelly sandy CLAY. Gravel is fine to medium subangular of sandstone. P = 300 @ 2.5 m							
3.7	4.2	Moderately weak dark blue grey finely laminated clayey WEATHERED MUDSTONE.							
4.2		Base of trial pit.							
P and V values where given refer to the unconfined compressive strength in kN/m ² measured with a hand penetrometer (P) or hand vane (V)									
Groundwater:		Dry							
Side stability:		Stable							
Sampling:		0.15 m, 0.3 m, 0.7 m							
Pit dimensions:		0.6 x 1.6 x 4.2 m							
Machine:		JCB 3CX							
Weather:		Cold							
Other:									
Typist	KE	Checked	KE	Logged	KE	Date Exc.	01-02-06	Job No	28489

 <p>Eastwood & Partners CONSULTING ENGINEERS</p> <p>St Andrews House 23 Kingfield Road Sheffield S11 9AS</p> <p>Tel: (0114) 2554554 Fax: (0114) 2554330</p>	<p>CODA STUDIOS</p> <p>HAVELOCK STREET, DARFIELD</p> <p>TRIAL PIT LOG</p>
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TRIAL PIT No									2
Depth		Strata description							
From	To								
0.0	0.15	TOPSOIL: Soft brown slightly sandy clay with occasional rootlets.							
0.15	0.4	MADE GROUND: Firm brown lightly sandy clay with occasional brick cobbles and occasional rootlets. P = 250 @ 0.3 m							
0.4	0.8	Firm becoming stiff brown orange slightly gravelly CLAY. Gravel is fine to medium subangular sandstone. P = 275 @ 0.6 m							
0.8	2.4	Stiff brown orange gravelly CLAY. Gravel is fine to medium subangular sandstone. P = 350 @ 1.75 m							
2.4	3.4	Stiff pale grey mottled orange CLAY. P = 350 @ 2.8 m							
3.4	4.3	Moderately weak dark blue grey finely laminated clayey WEATHERED MUDSTONE.							
4.3		Base of trial pit.							
P and V values where given refer to the unconfined compressive strength in kN/m ² measured with a hand penetrometer (P) or hand vane (V)									
Groundwater:		Dry							
Side stability:		Stable							
Sampling:		0.1 m, 0.3 m, 0.6 m, 1.1 m							
Pit dimensions:		0.6 x 1.6 x 4.3 m							
Machine:		JCB 3CX							
Weather:		Cold							
Other:		“Placed” sandstone was encountered to 2.0 m at the edge of the trial pit. Possibel cellar structure							
Typist	KE	Checked	KE	Logged	KE	Date Exc.	01-02-06	Job No	28489

 <p>Eastwood & Partners CONSULTING ENGINEERS</p> <p>St Andrews House 23 Kingfield Road Sheffield S11 9AS</p> <p>Tel: (0114) 2554554 Fax: (0114) 2554330</p>	<p>CODA STUDIOS</p> <p>HAVELOCK STREET, DARFIELD</p> <p>TRIAL PIT LOG</p>
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TRIAL PIT No								3	
Depth		Strata description							
From	To								
0.0	0.15	TOPSOIL: Soft brown slightly sandy clay with occasional rootlets.							
0.15	0.35	MADE GROUND: Firm brown lightly sandy clay with occasional brick cobbles.							
0.35	1.0	MADE GROUND: Rubble of brick, clinker and tarmac fragments.							
1.0	2.5	Stiff pale brown mottled grey slightly gravelly CLAY. Gravel is fine to medium subangular of mudstone. Occasional black organic traces. P = 300 @ 1.3 m							
2.5	3.3	Stiff orange sandy CLAY. P = 300 @ 2.6 m and 3.1 m							
3.3	4.1	Moderately weak dark blue grey finely laminated clayey WEATHERED MUDSTONE.							
4.1		Base of trial pit.							
P and V values where given refer to the unconfined compressive strength in kN/m ² measured with a hand penetrometer (P) or hand vane (V)									
Groundwater:		Dry							
Side stability:		Stable							
Sampling:		0.1 m, 0.3 m, 1.2 m							
Pit dimensions:		0.6 x 1.6 x 4.1 m							
Machine:		JCB 3CX							
Weather:		Cold							
Other:									
Typist	KE	Checked	KE	Logged	KE	Date Exc.	01-02-06	Job No	28489
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TRIAL PIT No										4
Depth			Strata description							
From	To									
0.0	0.3		Thin topsoil overlying MADE GROUND: Firm brown lightly sandy clay with occasional brick cobbles.							
0.3	1.6		Stiff pale orange grey slightly gravelly CLAY. Gravel is medium subangular of sandstone. P =350 @ 1.3 m							
1.6	3.0		Stiff orange slightly gravelly sandy CLAY. Gravel is medium subangular of sandstone. Pockets of coal, 0.1 x 0.4 m, from depth of 2.2 m. P =350 @ 2.0 m							
3.0	4.3		Stiff orange brown CLAY. P = 350 @ 3.2 m							
4.3			Base of trial pit.							
P and V values where given refer to the unconfined compressive strength in kN/m ² measured with a hand penetrometer (P) or hand vane (V)										
Groundwater:			Dry							
Side stability:			Stable							
Sampling:			0.15 m, 0.5 m, 1.7 m, 2.8 m							
Pit dimensions:			0.6 x 1.6 x 4.3 m							
Machine:			JCB 3CX							
Weather:			Cold							
Other:										
Typist	KE	Checked	KE	Logged	KE	Date Exc.	01-02-06	Job No	28489	

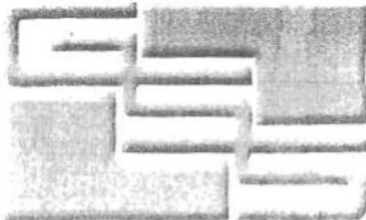
 <p>Eastwood & Partners CONSULTING ENGINEERS</p> <p>St Andrews House 23 Kingfield Road Sheffield S11 9AS</p> <p>Tel: (0114) 2554554 Fax: (0114) 2554330</p>	<p>CODA STUDIOS</p> <p>HAVELOCK STREET, DARFIELD</p> <p>TRIAL PIT LOG</p>
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TRIAL PIT No								5	
Depth		Strata description							
From	To								
0.0	0.3	Thin topsoil overlying MADE GROUND: Firm brown lightly sandy clay with occasional brick cobbles.							
0.3	1.7	Stiff orange mottled grey slightly sandy gravelly CLAY. Gravel is fine to medium subangular of sandstone. P = 350 @ 0.8 m							
1.7	3.9	Moderately weak dark blue grey finely laminated clayey WEATHERED MUDSTONE.							
3.9		Base of trial pit.							
P and V values where given refer to the unconfined compressive strength in kN/m ² measured with a hand penetrometer (P) or hand vane (V)									
Groundwater:		Dry							
Side stability:		Stable							
Sampling:		0.15 m, 0.5 m, 1.2 m							
Pit dimensions:		0.6 x 1.6 x 3.9 m							
Machine:		JCB 3CX							
Weather:		Cold							
Other:									
Typist	KE	Checked	KE	Logged	KE	Date Exc.	01-02-06	Job No	28489

 <p>Eastwood & Partners CONSULTING ENGINEERS</p> <p>St Andrews House 23 Kingfield Road Sheffield S11 9AS</p> <p>Tel: (0114) 2554554 Fax: (0114) 2554330</p>	<p>CODA STUDIOS</p> <p>HAVELOCK STREET, DARFIELD</p> <p>TRIAL PIT LOG</p>
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TRIAL PIT No								6	
Depth		Strata description							
From	To								
0.0	0.2	TOPSOIL: Soft brown slightly sandy clay with occasional rootlets.							
0.2	0.9	MADE GROUND: Stiff orange gravelly clay. Gravel is medium subangular of mudstone. P = 300 @ 0.6 m							
0.9	1.4	MADE GROUND: Rubble of brick and clinker.							
1.4	2.3	Stiff dark brown slightly sandy CLAY. P = 350 @ 1.8 m							
2.3	3.9	Moderately weak dark blue grey finely laminated clayey WEATHERED MUDSTONE.							
3.9		Base of trial pit.							
P and V values where given refer to the unconfined compressive strength in kN/m ² measured with a hand penetrometer (P) or hand vane (V)									
Groundwater:		Dry							
Side stability:		Stable							
Sampling:		0.15 m, 0.3 m, 1.6 m							
Pit dimensions:		0.6 x 1.6 x 3.9 m							
Machine:		JCB 3CX							
Weather:		Cold							
Other:									
Typist	KE	Checked	KE	Logged	KE	Date Exc.	01-02-06	Job No	28489

 <p>St Andrews House 23 Kingfield Road Sheffield S11 9AS</p> <p>Tel: (0114) 2554554 Fax: (0114) 2554330</p>	<p>CODA STUDIOS</p> <p>HAVELOCK STREET, DARFIELD</p> <p>TRIAL PIT LOG</p>
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Ivy mount, High Road, Carlton in lindrick, Worksop, Notts, England, S819EB
Phone: 01909 733150 Email: drillrig@hotmail.com Fax: 01909 540756

Site: HAVELOCK STREET
DARFIELD.

Sheet: 1 OF 2.

Rig: 400

Crew: A. PAYNE & W SMITH

Date: 1-02-06

Hours on site

Travelling Time:

BH	Depth	Strata Description	BH	Depth	Strata Description
A	Gh To 1.00	SOIL	B	Gh To 1.00	SOIL
	1.00 To 1.50	CLAY		1.00 To 1.90	CLAY
	1.50 To 4.00	SAND AND CLAY		1.90 To 3.00	CLAYEY MUDSTONE
	4.00 To 7.80	BROWN AND GREY MUDSTONE.		3.00 To 4.00	SANDSTONE
	7.80 To 8.00	BLACK MUDSTONE		4.00 To 7.30	BROWN AND GREY MUDSTONE
	8.00 To 13.20	GREY MUDSTONE		7.30 To 7.60	BLACK MUDSTONE
	13.20 To 13.30	BLACK MUDSTONE		7.60 To 10.00	GREY MUDSTONE
	13.30 To 15.00	GREY MUDSTONE		10.00 To 10.30	BLACK SHALEY MUDSTONE
	15.00 To 21.00	INTER BEDDED SILTY MUDSTONE AND MUDSTONE.		10.30 To 14.50	GREY MUDSTONE
BACK FILL HOLE WITH ARISINGS AND BENTONITE.				14.50 To 14.60	BLACK MUDSTONE
				14.60 To 21.00	INTER BEDDED GREY MUDSTONE AND SILTY MUDSTONE.

BACK FILL HOLE
WITH ARISINGS.

BH	Casing Die	Depth	Strike	Water Rise	Sealed	Totals	BH's	Drill	Case	Core
						Today				
						Previous				
						To date				

M.A. Payne

Dollar



Ivy mount, High Road, Carlton in lindrick, Worksop, Notts, England, S819EB
Phone: 01909 733150 Email: drillrig@hotmail.com Fax: 01909 540756

Site: HAVELOCK STREET
DARFIELD

Sheet: 2 of 2

Rig: 400

Crew: A. PAYNE & W. SMITH

Date: 01-02-06

Hours on site

Travelling Time:

BH	Depth	Strata Description	BH	Depth	Strata Description
C	GL TO 0.50	SOIL	D	GL TO 0.30	SOIL
	0.50 TO 3.00	CLAYEY SANDSTONE		0.30 TO 2.70	CLAY
	3.00 TO 10.20	BROWN AND GREY MUDSTONE		2.70 TO 4.00	CLAYEY MUDSTONE
	10.20 TO 10.50	BLACK MUDSTONE		4.00 TO 6.00	GREY MUDSTONE
	10.50 TO 13.70	GREY MUDSTONE		6.00 TO 7.70	SANDSTONE
	13.70 TO 14.00	BLACK CARBONACEOUS MUDSTONE		7.70 TO 10.00	BROWN AND GREY MUDSTONE
	14.00 TO 21.00	INTER BEDDED MUDSTONE AND SILTY MUDSTONE		10.00 TO 10.40	BLACK MUDSTONE
				10.40 TO 12.00	GREY MUDSTONE
				12.00 TO 12.10	BLACK MUDSTONE
				12.10 TO 15.00	GREY MUDSTONE
				15.00 TO 15.40	BLACK SHALEY CARBONACEOUS MUDSTONE
				15.40 TO 18.90	GREY MUDSTONE AND SILTY MUDSTONE
				18.90 TO 19.10	BLACK MUDSTONE
				19.10 TO 21.00	GREY MUDSTONE AND SILTY MUDSTONE

BACK FILL HOLE
WITH ARISINGS.

BACK FILL HOLE
WITH ARISINGS.

BH	Casing Die	Depth	Strike	Water Rise	Sealed	Totals	BH's	Drill	Case	Core
						Today	4	84.00		
						Previous	—	—		
						To date	4	84.00		

M.A.

APPENDIX 2

Description of Samples Sent for Chemical Testing

Chemical Test Results

Table of Assessment Values

Description of Samples Sent for Chemical Testing:

STL

Sample	Depth	Description
TP1	0.15 m	TOPSOIL: Soft brown slightly sandy clay with occasional rootlets. No odour or obvious signs of contamination.
TP2	0.3 m	MADE GROUND: Firm brown lightly sandy clay with occasional rootlets. No odour or obvious signs of contamination.
TP2	0.6 m	Firm becoming stiff brown orange slightly gravelly CLAY. Gravel is fine to medium subangular sandstone. No odour or obvious signs of contamination.
TP3	0.1 m	TOPSOIL: Soft brown slightly sandy clay with occasional rootlets. No odour or obvious signs of contamination.
TP4	0.5 m	Stiff pale orange grey slightly gravelly CLAY. Gravel is medium subangular of sandstone. No odour or obvious signs of contamination.
TP5	0.5 m	Stiff orange mottled grey slightly sandy gravelly CLAY. Gravel is fine to medium subangular of sandstone. No odour or obvious signs of contamination.
TP6	0.15 m	TOPSOIL: Soft brown slightly sandy clay with occasional rootlets. No odour or obvious signs of contamination.