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INDUSTRIAL DEVELOPMENT LAND, MAPPLEWELL

**PHASE 2 – SITE INVESTIGATION REPORT
W84039/02**

JULY 2005



MAPPLEWELL, BARNLEY
CONTAMINATED LAND, PHASE 2: SITE INVESTIGATION
W84039/VCP

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CONTENTS

1.	INTRODUCTION	1
2.	OBJECTIVES	1
3.	DATA SOURCES	1
4.	DESKTOP INFORMATION	2
4.1	SITE LOCATION	2
4.2	SITE DESCRIPTION	2
4.3	SURROUNDING LAND USE	3
4.4	GEOLOGICAL SETTING	3
4.5	HYDROGEOLOGY	4
5.	STATUTORY REGISTERS AND DATABASE SEARCHES	5
5.1	INTRODUCTION	5
5.2	LAND USE HISTORY	5
5.3	STATUTORY AUTHORITY RECORDS	6
6.	PHASE II INVESTIGATION	7
6.1	INTRODUCTION	7
6.2	FIELDWORK	7
6.3	TESTING	7
6.4	GROUND CONDITIONS	8
7.	ENGINEERING ASSESSMENT	11
7.1	FOUNDATIONS	11
7.2	MINE WORKINGS	11
7.3	GROUNDWATER	12
7.4	EARTHWORKS	12
7.5	BURIED CONCRETE	12
7.6	GAS	12
8.	CONCEPTUAL SITE MODEL AND PRELIMINARY RISK ASSESSMENT	14
8.1	LEGISLATIVE BACKGROUND	14
8.2	POTENTIAL SOURCES OF CONTAMINATION	15
8.3	SOILS ANALYSIS	15
8.4	POTENTIAL PATHWAYS	17
8.5	POTENTIAL RECEPTORS AT OR IN THE VICINITY OF THE SITE	19
8.6	POLLUTANT LINKAGES	19
8.7	CONCLUSION AND RECOMMENDATIONS	21
9.	LIMITATIONS AND UNCERTAINTIES	22

APPENDICES

APPENDIX A

FIGURES

- Figure 1 Site Location Plan
Figure 2 Geological Plan
Figure 3 Exploratory Hole Location Plan

APPENDIX B

EXPLORATORY HOLE LOGS

APPENDIX C

GEOTECHNICAL TEST RESULTS

APPENDIX D

CHEMICAL TEST RESULTS



EXECUTIVE SUMMARY

In May 2005, Pell Frischmann was appointed by Chris Carr Associates on behalf of CPS Leisure to provide a Phase II Intrusive Site Investigation Report to identify any potential contamination sources and determine geotechnical ground conditions at an existing industrial site off Mapplewell Drive in Barnsley.

The objective of the investigation was to assess the suitability of the site for the construction of a series of commercial/industrial units and the refurbishment of an existing factory building. The intrusive investigation works were undertaken to determine geotechnical parameters of the near surface materials for foundation design purposes and to identify any potential sources of contamination from previous and present site activities so that any necessary remediation measures could be determined.

The published geology indicates the site to be underlain by the Carboniferous Coal Measures. No superficial deposits are expected beneath the site; however localised deposits of Alluvium are noted in the vicinity of the site. A shallow coal seam (inferred to be the Kent Thin Seam) was encountered in all but one of the rotary holes.

The historical Ordnance Survey mapping indicates that the site was initially partially developed with residential housing in the late 1800's. This housing and adjacent farmland remained until the 1950's when the residential housing was demolished. To the south and east the land was developed in the late 1800's as a colliery with associated rail infrastructure. The colliery was developed throughout the 1900's. By the 1930's a spoil heap from the colliery is present to the south of the site and may indeed extend onto the southern edge of the site itself. Buildings likely to be associated with the colliery first appear on the site in 1962. The southern section was then developed as a car park in the 1970's and an electricity substation was built.

The made ground is not considered a suitable founding stratum as it was probably end tipped and will have had no form of controlled compaction. It is likely to be loose with many voids.

For the mid and northern parts of the site, shallow foundations placed onto the rock at will be suitable for the proposed structures. The sandstone will accommodate bearing pressures well in excess of that likely to be exerted from the foundation loads.

To the south of TP4 the rockhead becomes deeper – maximum depth of 4.4m. Piling in this area is a possible alternative; however boulders were encountered within the trial pit in the south western corner of the site. This may make it difficult to achieve penetration and obtaining an end bearing into the rock. As an alternative, consideration could be given to excavating down to rockhead and replacement with mass concrete. If this is adopted, it is anticipated that the foundations will be stepped as the rockhead falls to the south. For this proposal, it is recommended that the excavations are inspected by an engineering geologist/geotechnical engineer to confirm that rockhead has been encountered.

The results of laboratory contamination testing undertaken on six soil samples indicates the site is generally uncontaminated with respect to heavy metals. However elevated levels of sulphate, TPH and PAH were encountered throughout the site which could potentially pose an unacceptable risk to future users of the site.



Given the limited nature of contamination testing undertaken to date, with only six samples analysed for a general suite of contaminants, the information only provides a very outline preliminary guide to the contaminative setting of the site. Prior to redevelopment further intrusive site investigation including contamination testing will need to be undertaken to determine whether the risk to site can be removed through site capping (potentially hardstanding) or whether remediation will be required.

To date only one gas monitoring visit has been undertaken. The preliminary results classify the gas regime for the site as a CIRIA 'Characteristic Situation 2'. However Further gas monitoring is required in order to determine the actual gas regime beneath the site.

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1. INTRODUCTION

In May 2005, Pell Frischmann was appointed by CPS Leisure Ltd to undertake a Phase II Ground Investigation of a derelict industrial site off Mapplewell Drive, Barnsley. The site is located to the west of Mapplewell Drive, to the north east of Barnsley town centre, as shown in Figure 1 in Appendix A.

2. OBJECTIVES

Pell Frischmann understands that CPS Leisure propose to redevelop the site with a series of small industrial units and to undertake the refurbishment of an existing industrial site. The site comprises an existing factory building, with tarmac hardstanding covering around 60% of the site the remainder comprising derelict land. The purpose of the site assessment was to investigate the ground conditions at the site in order to identify any potential sources of contamination from previous site activities and to determine geotechnical parameters of the materials for foundation design purposes.

3. DATA SOURCES

In the production of this report the following researches have been undertaken:

- (i) Phase I (Desk Study) report for Mapplewell, prepared by Pell Frischmann in July 2005. Report Ref W840039/01.
- (ii) A review of Historic Ordnance Survey maps;
- (iii) A review of British Geological Survey maps;
- (iv) A Review of information included within an Envirocheck Report prepared by Landmark Information Group;
- (v) Information included on the Environment Agency website;

In the production of this report the following data sources have been reviewed:

- Environmental Data Search Results
- Environment Agency Data
- British Geological Survey Maps

A walkover survey was carried out as part of the Phase I report.

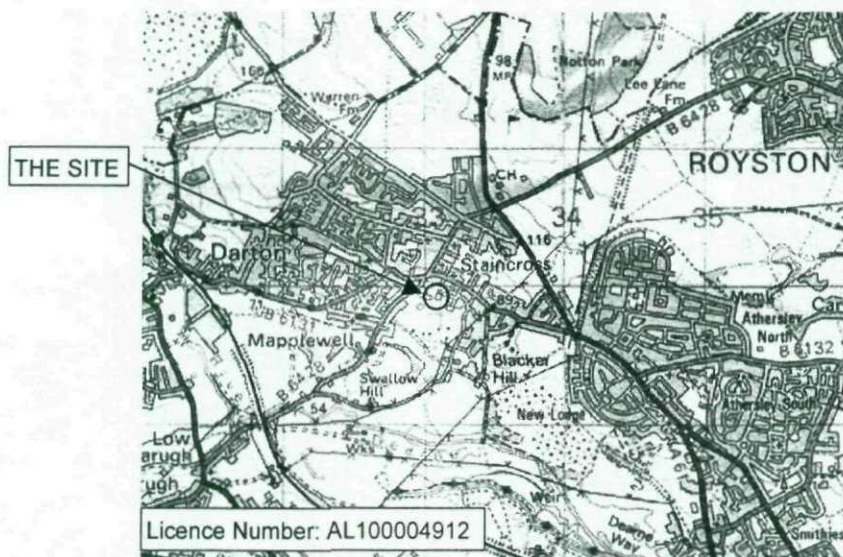


4. DESKTOP INFORMATION

4.1 SITE LOCATION

The site is located at National Grid Reference SE 331 099, off the south west of Mapplewell Drive in north Barnsley. The site occupies an area of approximately 0.8 hectares and lies at an elevation of approximately 97m aOD. The site is generally flat. The site location is shown in extract below and as Figure 1 in Appendix A.

Figure 1 - Site Location (Extract)



4.2 SITE DESCRIPTION

A full assessment of the site was undertaken as part of Pell Frischmann's Phase I Report of July 2005. A summary of the information is given below

At the time of the site walkover the site was derelict. The site comprises three distinct areas:

- An area of concrete and tarmac hardstanding;
- A factory building running from north to south along the site's eastern boundary;
- An area of derelict land covered with plastic spoil.

The factory building is currently disused and comprises a steel framed portal with brick and cladding walls. Immediately to the south of the factory building is an electricity substation comprising a brick building and generator compound

surrounded by palisade fencing. No obvious signs of contamination were noted within the compound or in its immediate vicinity.

The southern half of the site is derelict and comprises soft landscaping (soil) with much spoil strewn across the area. The spoil typically comprises pieces of formed plastic, plastic chippings, stone and timber.

The eastern and southern boundaries of the site are marked by a six foot palisade fences. The northern boundary is marked by the rear of a series of small industrial units, a storage container and a six foot palisade fence. The western boundary has a brick retaining wall along the northern length, wooden fencing along the central section and further palisade fencing to the south. During the site walkover the retaining wall was noted to be in poor condition with cracking present.

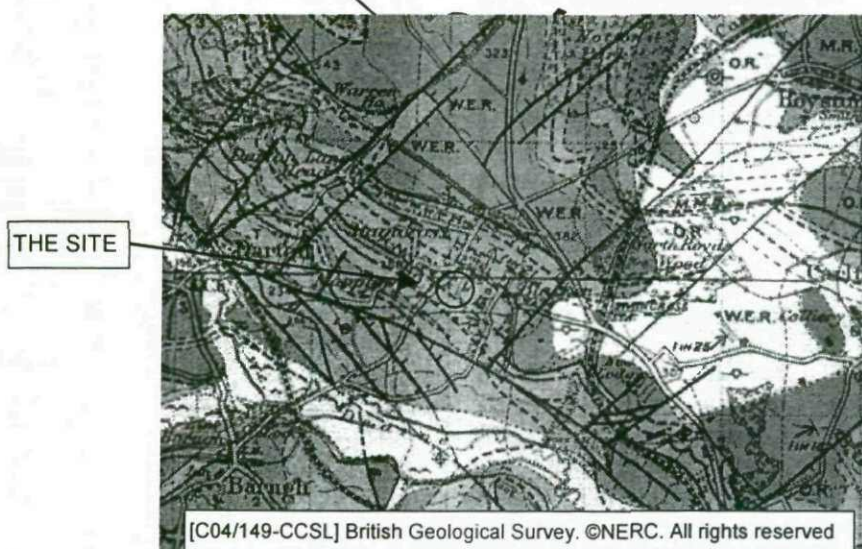
4.3 SURROUNDING LAND USE

The site is bounded to the north and east by industrial premises, to the south by open ground comprising the former colliery spoil tip beyond which is an unnamed drain a tributary of the River Dearne and to the west by a mixture of residential and commercial properties

4.4 GEOLOGICAL SETTING

The published geological map for the area is shown on British Geological Society Sheet 87 Barnsley, 1:50,000 scale, Solid with Drift. An extract of the geology plan is presented in extract below and as Figure 2 in Appendix A.

Figure 2 – Geological Map (Extract)





The published geological map indicates that the site is underlain by Carboniferous Middle Coal Measures strata. Only localised superficial deposits are present in the area and typically comprise Alluvium which is found in the River Valleys. The strata would appear to dip towards the north east.

4.5 HYDROGEOLOGY

4.5.1 Hydrogeology

The Environment Agency 1:100,000 groundwater vulnerability map Sheet 11 South Pennines classifies the site to be underlain by a minor aquifer (variable permeability). Minor aquifers can be fractured or potentially fractured rocks, which do not have a high primary permeability, or other formations of variable permeability including unconsolidated deposits. Although not producing large quantities of water for abstraction, they are important for local supplies and in supplying base flow to rivers.

The site is not within a groundwater source protection zone. The nearest licensed groundwater abstraction lies approximately 1.6km west of the site.

The site is considered to be of low sensitivity with respect to groundwater.

4.5.2 Hydrology

The closest surface water feature to the site is an unnamed drain which lies 300m south and south east of the site. This drain is a tributary of the River Dearne which it joins approximately 1km south of the site. There are no licensed surface water abstractions within 1km of the site.

The site is not classified by the Environment Agency on their website as being in a Fluvial Indicative Flood Plain.

The site is considered to be of low sensitivity with respect to surface water.

4.5.3 Designated Areas

There is one adopted green belt within 1km of the site. The green belt lies approximately 335m south west of the site.

The site and surrounding area are designated as a Nitrate Vulnerable Zone.

The site does not directly impact upon scheduled or designated areas including NNRs, Ramsar sites, SINC, AONB, ESAs, National Parks, SPA, etc. The site is not considered to represent a risk to areas designated for environmental protection.



5. STATUTORY REGISTERS AND DATABASE SEARCHES

5.1 INTRODUCTION

A Phase I desk study on the site was undertaken by Pell Frischmann prior to commencement of the Phase II intrusive site investigation. The desk study involved the study of archives and public records encompassing relevant information with regard to the history and current status of the site and its surrounding area.. The following sources of information were consulted as part of this process.

- Superseded (historical) editions of Ordnance Survey maps;
- Local Authority records;
- Environment Agency records, including National Rivers Authority;
- Coal Mining Report;
- Other Statutory Authority Records.

Full details of the information obtained in these searches can be found in Pell Frischmann's Phase I (Desk Study) Report for Mapplewell, Report Reference W840039/001, July 2005. A summary of the information is given below.

5.2 LAND USE HISTORY

The historical Ordnance Survey mapping indicates that the site was initially partially developed with residential housing in the late 1800's. This housing and adjacent farmland remained until the around the 1950's when the residential housing was demolished. The surrounding land use to the north and west was a mixture of residential housing and farmland. To the south and east of the site the land was developed in the late 1800's as a colliery with associated rail infrastructure. The colliery continued to be developed throughout the 1900's. By the 1930's a spoil heap from the colliery was present to the south of the site and may have extend onto the southern edge of the site itself. Buildings likely to be associated with the colliery first appear on the site in 1962. The southern section of the site was then developed as a car park in the 1970's and an electricity substation was built.

The main contaminated land uses identified within the site itself are the presence of an electricity substation and the plastic spoil identified within the southern half of the site. The principle contaminative land use to exist or to have historically existed within the sites immediate surrounding area is the colliery, associated mine shafts and rail infrastructure located to the south of the site.



5.3 STATUTORY AUTHORITY RECORDS

A summary of the findings of the statutory registers search are given below.

The statutory registers and database searches record that there are three active air pollution consents within 1km of the site, all relating to Petrol Filling Stations located more than 700m from the site. Given the distances involved it is unlikely that these will have had an adverse impact on the site.

There are three active discharge consents within 1km of the site located 550m to 565m south of the site. Given that the surface water flow within the local area is likely to be towards the south and the River Dearne, it is unlikely that these will have affected the site.

There are five pollution incidents recorded within 1km of the site. The closest incident is classified as a Category 3 – Minor Incident, located 117m west of the site, involving the release of sewage effluent, however no other details are supplied. Given that the incident was only recorded as a minor incident, that the likely hydraulic gradient within the surrounding area is towards the south and that the surrounding area is predominantly flat lying it is unlikely that this incident will have impacted the site.

The statutory registers indicate there are forty nine contemporary trade entries within 1km of the site. The three closest entries are all garage services within 70m of the site.

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6. PHASE II INVESTIGATION

6.1 INTRODUCTION

The information obtained during the compilation of Pell Frischmann's Phase I (Desk Study) Report dated July 05 was used to design the Phase II site investigation works.

6.2 FIELDWORK

A total of five rotary boreholes and four trial pits were undertaken during the phase II intrusive site works in May 2005.

The rotary boreholes were drilled to 20m below ground level (bgl), using open hole rotary techniques, with the exception of holes R1 and R2, which are located along the southern edge of the site. Rotary boreholes R1 and R2 were open hole drilled through the made ground until rock head was encountered was encountered at 4.5m bgl and 6.0m bgl respectively in holes R1 and R2. On encountering rock head the upper 5m was cored before the holes were completed using open hole rotary techniques.

The four trial pits (TP1 to TP4) were excavated to a maximum depth of 4.0m bgl or rock head using a JCB with 2 foot bucket.

The exploratory hole logs are included in Appendix B and an Exploratory Hole Location Plan is included as Figure 3 in Appendix A.

6.3 TESTING

During the site works samples of soils were taken and scheduled for chemical and geotechnical laboratory testing. A programme of laboratory testing was prepared by Pell Frischmann, with the geotechnical testing being carried out by C.C. Geotechnical and the chemical testing being undertaken by Chemtech Environmental Ltd.

6.3.1 Geotechnical Testing

Only limited geotechnical testing comprising point load tests on the rock core were undertaken.

No test results have been received to date. The analysis of the results will therefore be included in the final report and the test certificates will be included in Appendix C.

6.3.2 Contamination Testing

Five samples of soils were retained from the trial pits and were scheduled for geochemical laboratory testing. The soil samples were analysed for the following:



Arsenic	Copper	Sulphate (2:1 extract)
Cadmium	Nickel	Sulphate (total)
Chromium (total)	Zinc	Sulphide
Chromium (hexavalent)	Phenols	Sulphur (free)
Lead	PAH (screen)	Cyanide (free)
Mercury	TPH (screen)	Cyanide (complex)
Selenium	Nitrate (2:1 extract)	Thiocyanate
Boron (water soluble)	Chloride (2:1 extract)	pH

The contamination test results are included in Appendix D.

6.4 GROUND CONDITIONS

The ground conditions encountered during the investigation generally confirmed the published geology. The sequence of strata was generally as follows:

6.4.1 Topsoil

Topsoil was encountered in two of the trial pits (TP3 and TP4) located in the northern end of the site. The topsoil was encountered beneath a 0.15m (TP3) to 0.4m (TP5) thick layer of tarmac hardstanding and gravel sub-base and was found to be between 0.2m (TP5) and 0.25m (TP3) thick.

6.4.2 Made Ground

Made Ground was encountered in all of the exploratory holes. The depth of the made ground varied across the site and was generally found to deepen towards the southern end of the site.

At the northern end of the site the made ground comprised a thin layer of gravel sub-base and tarmac hardstanding that was encountered to a maximum depth of 0.4m below ground level (bgl).

Rotary hole R3 drilled near the centre of the site encountered 3.0m of made ground comprising brick and sandstone gravel in a sand matrix with occasional cobbles.

Towards and in the south of the site, the made ground was found to deepen to a maximum depth of 4.4m bgl in R2. The made ground in rotary hole R1 comprised a combination of brick, coal, ash and mudstone cobbles and boulders in a sand matrix.



In TP1, located in the south east of the site a layer of reinforced concrete was encountered between 0.1m and 0.4m bgl within the made ground.

6.4.3 Superficial Deposits

No superficial deposits were encountered in any of the exploratory holes.

6.4.4 Rockhead

Rockhead comprising Carboniferous Coal Measures was encountered in the majority of the exploratory holes.

The Carboniferous Coal Measures were found to comprise layers of varying thickness of moderately strong to strong yellow brown fine grained thinly laminated sandstone interbedded with siltstone and weak to moderately strong thinly laminated grey/olive/blue mudstone.

The depth of rockhead increased to the south of the site, with rockhead being encountered within the rotary boreholes at 0.4m below ground level (bgl) in R3 and R4, at 3.0m bgl in R5, at 3.9m bgl in R1 and at 4.4m bgl in R2.

Coal was encountered in four of the five rotary holes drilled, the exception being R1. In R2 coal was encountered immediately underlying the made ground at 3.9m bgl and was found to be 0.4m thick. A 0.5m thick seam of coal was encountered at 3.5m bgl in R3. In R4 a 0.5m thick coal seam and was encountered at 8.0m below ground level. In R5 a 0.4m thick seam was encountered at 7.4m. The coal seams were unworked, dipping in a north easterly direction and are inferred to be the Kent Thin Seam.

6.4.5 Groundwater

Groundwater was not encountered within any of the exploratory holes during the site investigation works. A further round of groundwater monitoring was undertaken in three of the five rotary holes on the 30th June 2005. The results of the monitoring are given in Table 1 below.

TABLE 1: GROUNDWATER MONITORING: SUMMARY OF RESULTS				
Exp. Hole. Ref:	Date	Strata	Depth of Piezo m bgl	Water Dep m bgl
R1	30.06.05	Made ground to 4.6m underlain by sandstone	5.0	4.0
R2	30.06.05	Made ground to 4.4m underlain by mudstone	5.0	4.9
R5	30.06.05	Made ground to 0.4m, sandstone to 4.3m underlain by mudstone	5.0	4.1



6.4.6 Gas Monitoring

The three boreholes were gas monitored following the investigation. The monitoring results indicate elevated levels of carbon dioxide at both locations as shown in Table 2 below.

TABLE 2: GAS MONITORING: SUMMARY OF RESULTS							
Exp. Hole. Ref:	Time / Atmospheric Pressure (mB)	Date	Methane (%)	Carbon Dioxide (%)	Oxygen (%)	Hydrogen sulphide (ppm)	Gas flow (l/hr)
R01	994 (F)	30.06.05	0.0	3.3	17.5	0.0	0.02
R02	994 (F)	30.06.05	0.0	0.5	18.7	0.0	0.00
R05	994 (F)	30.06.05	0.0	0.9	18.9	0.0	0.00

It should be noted that gas monitoring is ongoing and further results will be included in the final report.



7. ENGINEERING ASSESSMENT

7.1 FOUNDATIONS

The rotary holes and trial pits encountered made ground throughout the site. The made ground was found as a thin veneer beneath the central and northern parts of the site (north of TP4), but deepened towards the south. Beneath the southern part of the site a thickness of up to 4.4m of made ground was encountered in rotary hole R2 and a thickness of 3.8m was encountered in R1 in the south east corner of the site.

The made ground is not considered a suitable founding stratum as it was probably end tipped and will have had no form of controlled compaction. It is likely to be loose with many voids.

The exploratory holes from TP4 northwards encountered sandstone rockhead between 0.4m and 0.7m below ground level. Therefore, for the mid and northern parts of the site, shallow foundations placed onto the rock will be suitable for the proposed structures. The sandstone will accommodate bearing pressures well in excess of that likely to be exerted from the foundation loads.

To the south of TP4 the rockhead becomes deeper – maximum depth of 4.4m recorded in exploratory hole R2. Piling in this area is a possible alternative; however boulders were encountered within the trial pit in the south western corner of the site. This may make it difficult to achieve penetration and obtaining an end bearing into the rock. As an alternative, consideration could be given to excavating down to rockhead and replacement with mass concrete. If this is adopted, it is anticipated that the foundations will be stepped as the rockhead falls to the south. For this proposal, it is recommended that the excavations are inspected by an engineering geologist/geotechnical engineer to confirm that rockhead has been encountered.

7.2 MINE WORKINGS

A shallow coal seam (inferred to be the Kent Thin Seam) was encountered in all but one (R2) of the rotary holes.

This seam was found to vary between 0.4 -0.5m in thickness and was found to be dipping in a north easterly direction. No workings were encountered within this seam. Rotary Hole R2 did not encounter this seam and this appears to be due to the fact that the existing rock head level encountered in this hole is lower than the projected base level of the coal seam.

The mining information obtained as part of the Phase 1 Desk Study indicates that the Kent Thin Coal Seam was worked by opencast methods within the vicinity of the site. From the information obtained during this investigation it is possible that open cast workings may have been carried out within the southern edge of the site and that the existing made ground could be part of opencast backfill deposits.



Rotary Hole R3 did encounter a deeper seam of 200mm in thickness at 16.3m depth. This could possibly be the Kent Thick. No workings were encountered. The thickness and depth of the seam are not considered a problem to the proposed development even if workings had taken place within this seam.

7.3 GROUNDWATER

No groundwater was encountered during the investigation works. However, during a subsequent round of groundwater monitoring on the 30th June 2004 groundwater was encountered between 4.0m bgl in rotary hole R1 and at 4.9m bgl in hole R5.

7.4 EARTHWORKS

The site is generally flat lying and as such only minor earthworks would be anticipated for the majority of the development. Confined excavations will be required for construction of foundations and services.

Conventional mechanical plant is considered suitable for excavation of the anticipated materials.

7.5 BURIED CONCRETE

The results of the laboratory test results on soil samples retained during the ground investigation recorded soluble sulphate concentrations of between 0.026 and 1.24g/l, chloride concentrations of between 0.011 – 0.059 g/l, nitrate concentrations of between 0.001 and 0.01g/l and pH values of between 5.4 to 11.9.

One sample was found to be above the threshold, set at 1.2g/l, for a design sulphate class of DS-1, the remainder all fell below this threshold. Using the procedure set out in BRE Special Digest 1, Section 6 "Classification of Sites for Chemicals Aggressive to Concrete" a 'characteristic' value for sulphate concentration was calculated. As a total of six samples were tested the characteristic value is calculated using the mean of the highest two values. This gave a characteristic value for the site of 0.82g/l. Therefore in accordance with BRE Special Digest 1 a design class of DS-1 should be applied to the site.

The ACEC classification for the site would be AC-3z based on a worse case scenario from the results of available data.

7.6 SOIL GAS

One round of gas monitoring has been undertaken following completion of the investigation works.. The results of the monitoring recorded methane at below detection limits with carbon dioxide levels recorded to a maximum of 3.3%. The results of the monitoring are given in Section 6.4.6.

The principal aim of the monitoring is to ascertain the gas regime during worse case conditions. For any development overlying a gassing source, any natural



dilution or dispersion of the gas may be inadequate thus allowing the collection of gas beneath and within the development. In addition, a pressure may be created between the development and the underlying gassing source, thus encouraging the migration of gas towards the development. Gas may enter the development by several entry routes (cracks and openings, construction joints, gaps in service pipes / ducts and cavity walls), all of which need to be addressed in the foundation design.

The first round of gas monitoring classifies the site as a 'Characteristic Situation 2' in accordance with the CIRIA Report 149. However further gas readings will need to be undertaken to determine whether this is a true representation of the gassing situation beneath the site. Only then can the necessary gas protection measures for the site be determined.

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8. CONCEPTUAL SITE MODEL AND PRELIMINARY RISK ASSESSMENT

8.1 LEGISLATIVE BACKGROUND

The primary legislative mechanism for contaminated land management in the UK is Part IIA of the Environmental Protection Act 1990. The following section provides a brief introduction to this legislation and introduces the terminology used within the subsequent sections of this report.

Part IIA was inserted under Section 57 of the Environment Act 1995. It provided a new regulatory regime for the identification and remediation of contaminated land and is the primary mechanism in the contaminated land regime. Local authorities are the principal regulator for inspection of land under Part IIA.

As regards England, Part IIA is described fully in DETR Circular 02/2000, which also contains the statutory guidance (Department of the Environment, Transport and the Regions, 2000a).

Part IIA defines contaminated land 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. Pollution of controlled waters is being, or is likely to be, caused'

Part IIA is designed to 'enable the identification and remediation of land on which contamination is causing unacceptable risks to human health or the wider environment. It does not necessarily include all land where contamination is present, even though such contamination may be relevant in the context of other regimes'.

In applying the definition of contaminated land, Part IIA states that 'the Local Authority must:

1. Identify a 'Pollution Linkage'. That is, a linkage between a contaminant and a receptor, by means of a pathway(s).
2. Determine if the contaminant is causing significant harm to that receptor, or there is a significant possibility of such harm being caused by that contaminant to that receptor.

If any one element of the pollutant linkage is not present then the land should not be identified as contaminated land'.

As the first step in the process of identifying potential Pollution Linkages, this report schedules and prioritises the potential contamination sources on the Site and assesses the laboratory results obtained.



Following a review of the background environmental information on the site, a conceptual model has been formulated to identify sources of contamination, potential pathways and potential receptors on and in the immediate vicinity of the site.

8.2 POTENTIAL SOURCES OF CONTAMINATION

The Pell Frischmann's Phase I Report of July 2005 including a desktop study identified several potentially contaminative land uses both within the site itself and within the immediate surrounding area. The main potentially contaminative land uses identified within the site itself is the presence of an electricity substation within the southern end of the site and the area of plastic spoil also within the southern half of the site. The principle contaminative land use to exist or to have historically existed within the sites immediate surrounding area are the colliery and associated rail infrastructure to the south of the site and the garage servicing operations to the west of the site.

8.3 SOILS ANALYSIS

To ascertain a preliminary assessment of the contaminative nature of the near surface materials across the site, six samples of soils were retained during the site investigation works and submitted to Chemtech Environmental Ltd for laboratory analysis. A preliminary assessment of the laboratory results have been assessed relative to the recently published CLR values where available for a commercial/industrial end use. Should the proposed end use of the site be altered then the results of this preliminary assessment will need to be revisited.

8.3.1 Heavy Metals

The results of the chemical analysis for heavy metal concentrations within the near surface soil samples are summarised in Table 3 below.

TABLE 3: HEAVY METALS				
Determinant	Concentration Range (mg/kg)	US95	CLR [▽] Soil Guidance Value (mg/kg)	No of Samples Tested
Arsenic	11 – 59	53.18	500	6
Cadmium	<0.1	0.100	1400	6
Chromium (total)	11 – 53	36.04	5000	6
Chromium (hex)	<1	1.000	NV	6
Lead	22 – 118	84.62	750	6
Mercury	<0.1 – 0.9	0.713	480	6
Selenium	<0.1 – 0.4	0.318	8000	6
Boron	< 0.5 – 2.4	1.969	NV	5
Copper	10 – 43	33.76	NV	6
Nickel	6 – 27	21.93	5000	6
Zinc	31 – 89	80.88	NV	6

▽ CLR SGV commercial.



From the results it can be seen that the made ground and underlying natural ground is generally uncontaminated with respect to the soil guideline values for heavy metals for the proposed commercial end use.

In accordance with CLR a statistical analysis (the mean value test) of the results has been undertaken to determine the US95 percentile value for each of the determinants analysed. The statistical analysis indicates that the US95 values for the determinands pass the mean value test. On this basis for the determinants with published CLEA values the site does not pose a significant risk to human health or the surrounding environment in the context of Part IIA.

No CLEA SGV values are currently available for boron, copper and zinc, therefore to allow an initial assessment of the site to be made reference has been made the Dutch standards. The Copper and Zinc results are both below the Dutch Intervention Levels.

Given the proposed site usage for industrial/commercial with predominantly hardstanding and associated landscaping it is considered from this assessment that heavy metal contamination is unlikely to pose a significant risk to the human health of future users of the site.

8.3.2 Inorganic Substances

The results of the chemical analysis of the soil sample for organic compounds are summarised in Table 4.

TABLE 4: INORGANIC COMPOUNDS			
Determinant	Concentration Range (mg/kg)	US95	No of Samples Tested
Sulphate	880 – 6900	4955.5	6
Sulphide	22 – 50	41.45	5
Sulphur	<50	50.00	6
Cyanide (free)	<2	2.000	6
Cyanide (complex)	<2	2.000	6
Thiocyanate	<0.5	0.500	6
pH	5.4 – 11.9	9.962	6

No CLEA SGV values are currently available for any of these determinands.

The pH values varied from slightly acidic to alkaline with results from 5.4 to 11.9, suggesting a slightly acid to alkali soil. The generally neutral nature of the soils will generally limit any availability of the metals, which generally tend to be more mobile at low pHs.



Sulphur, Cyanide and Thiocyanate were all encountered at levels below the detection limits and therefore they are not considered to pose a risk to future users of the site.

Elevated levels of total sulphate were encountered throughout the site. However, sulphate is only considered a risk in relation to concrete attack on building foundations rather than as a risk to human health. The potential risks posed to concrete can be designed out by properly classifying the concrete mix for the site and therefore sulphate is not considered to pose a risk to future users of the site.

8.3.3 Organic Substances

The results of the chemical analysis of the soil samples for organic compounds are summarised in Table 5.

TABLE 5: ORGANIC COMPOUNDS			
Determinant	Concentration Range (mg/kg)	US95	No of Samples Tested
PAH	<5 – 70	62.10	6
Phenols	<0.5 – 1.2	1.405	3
TPH	257 – 1559	1110.4	6

No guidance values are available yet for these determinands. The results of the analysis recorded low to non detectable concentrations of phenols across the site with low to non detectable concentrations of Polyaromatic hydrocarbons (PAH) and moderate concentrations of Total Petroleum hydrocarbons (TPH).

8.4 POTENTIAL PATHWAYS

Pathway components describe the likelihood of contact with, or transport of a contaminant to a receptor. Different receptors have different pathway parameters, and these are considered in Table 6.

TABLE 6: PATHWAY ASSESSMENT				
Pathway	Receptor	Pathway component	Comments	Current Significance
Surface run-off to surface waters	Surface water (Unnamed drain and river Dearne)	Topography	The site is generally flat lying.	Low
		Distance to surface water	Both watercourses lie over 300m from the site. The proposed development will principally comprise buildings and hardstanding and is to be drained to the local sewer with appropriately designed surface water interceptors.	



MAPPLEWELL, BARNLEY
CONTAMINATED LAND, PHASE 2: SITE INVESTIGATION
W84039/VCP

TABLE 6: PATHWAY ASSESSMENT

Pathway	Receptor	Pathway component	Comments	Current Significance
Leaching to groundwater	Groundwater	Thickness & permeability of soils	Surface soils are of low to high permeability (mudstone and sandstone). However the proposed development will result in nearly 100% of the site being covered by buildings or car park hardstanding. There are no groundwater abstractions within 1km of the site.	Low
		Rainfall (leachate)	The area under consideration is currently 60% soft standing but the majority of the area is to be covered by new buildings and hardstanding.	Medium
Impacted groundwater to groundwater abstraction	Groundwater user	Distance to groundwater user	There are no abstractions within 1km of the site.	Low
Soil to direct dermal contact or accidental ingestion (humans)	Dermal contact or accidental ingestion (humans)	Depth of contaminant	The site is predominantly soft standing, thus direct contact risks for current site use is moderate but during construction is likely to be high.	Medium/High
		Built environment / surface cover	New buildings likely to be constructed with concrete slab floors, however direct contact is possible within landscaped areas but will be limited.	Low/Medium
Volatilisation to indoor or outdoor air	Inhalation of air or dust	Porosity of soil	Soil anticipated to be of low to high porosity (mudstone and sandstone) thus migration of vapour is possible. Hydrocarbon contamination has been encountered; however gas readings to date only indicate the presence of low levels of CO ₂ . New buildings likely to be constructed with concrete slab floors and gas precautions reducing volatilisation potential.	Medium
		Perched groundwater	No perched groundwater was encountered in near surface deposits.	Low

From the "significance" column of Table 5, the pathways of note are dermal contact or accidental ingestion (humans) and volatilisation to indoor or outdoor air.



8.5 POTENTIAL RECEPTORS AT OR IN THE VICINITY OF THE SITE

The presence of potential receptors has been evaluated from our understanding of the current or potentially future land use of the site, together with an assessment of surrounding land uses. The assessment for potential receptors at the site is shown in Table 7 below.

TABLE 7: POTENTIAL RECEPTORS		
Possible Receptor	Present?	Reason
Current users of site and visitors	No	Site currently disused. Site is fenced and locked.
Excavation workers	Yes	New building is to be constructed on site.
Future users of the site	Yes	Site is to be developed as a series of small commercial/industrial units with associated hardstanding for car parking.
Groundwater / Groundwater Users	No	No abstraction within 1km of the site.
Surface water use	No	Nearest surface watercourses, River Dearne and an unnamed drain, both greater than 300m from the site.
Ecosystems	No	There are no designated sites within 500m of the site.

8.6 POLLUTANT LINKAGES

A preliminary risk assessment was undertaken based on a qualitative assessment of the likely presence of a pollutant linkage. A pollutant linkage is the relationship between a source (or contaminant), a pathway and a target (or receptor). Unless all three elements of a pollutant linkage are present a significant risk is not considered to exist. The approach adopted is to screen the site based on assigning a simple low, medium or high category. If a high category is assigned, further evaluation is undertaken if this could be urgent (high-urgent) or non-urgent (high). The preliminary risk assessment is shown in Table 8 below:

TABLE 8: POLLUTANT LINKAGES				
Scenario	Source	Pathway	Target	Complete?
Users of property located on site	Elevated concentrations of TPH and PAH within the Made ground.	Contact and accidental ingestion of surface soils	Construction workers, occupiers, users.	Yes but exposure can be limited by wearing of appropriate PPE
Risk Rating	Medium	High	High	Low/Medium



TABLE 8: POLLUTANT LINKAGES

Scenario	Source	Pathway	Target	Complete?
Future Users of proposed units	Elevated concentrations of TPH and PAH within the Made ground.	Contact and accidental ingestion of surface soils.	Workers, occupiers, visitors	Possible, however exposure limited by site being predominantly hardstanding covered and appropriate management of any landscaped areas.
Risk Rating	Low/Medium	Low	Low	Low
Scenario	Source	Pathway	Target	Complete?
Future Users of buildings	Elevated near surface concentrations of TPH and PAH	Soil vapour intrusion to buildings	Workers, occupiers, visitors	Likely although limited by assumed presence of concrete slab floors and gas precautions
Risk Rating	Medium	Medium	Medium	Medium/Low
Scenario	Source	Pathway	Target	Complete?
Migration of contamination onto the site	Spoil and contamination on former colliery. Mine gases	Migration of mine gases and soil vapour intrusion to buildings.	Occupiers of properties on the site	Gas monitoring to date indicates low risk from gases further monitoring required.
Risk Rating	High	Low	Low	Low/medium
Scenario	Source	Pathway	Target	Complete?
Groundwater beneath site	Leaching of contamination from the made ground	Percolation through sub-surface soils	Groundwater beneath site is classified as minor aquifer by the Environment Agency	Yes although likely to be limited by hardstanding site
Risk Rating	Medium	Medium	Medium	Low/Medium

Complete potential pollutant linkages have been identified on the site; an overall non-urgent medium risk rating has been assigned as the proposed end use will limit contact with the underlying materials by the future site users and reduce infiltration and thus potential mobilisation of contaminants. The potential risks are summarised as follows:

1. Presence of localised area of hydrocarbon contamination (TPH and PAH) may have the potential to have an unacceptable impact on construction workers and future residents/users of the site through dermal contact and volatilisation to indoor air.
2. The potential for mine gases to have an unacceptable impact on future users of buildings on the site unless appropriate gas precaution measures are installed.



8.7 CONCLUSION AND RECOMMENDATIONS

The contamination laboratory testing undertaken as part of the investigation indicates that generally the near surface materials beneath the site are uncontaminated with respect to heavy metals.

Elevated levels of total sulphate were encountered throughout the site. This is likely due to the presence of colliery spoil used as an infill material beneath the site. The majority of the samples also recorded elevated concentrations of TPH and PAH which potentially pose a risk to construction workers during the redevelopment of the site and occupiers and users of the site.

Given the limited nature of contamination testing undertaken to date, with only six samples analysed for a general suite of contaminants, the information only provides a very outline preliminary guide to the contaminative setting of the site.

Prior to redevelopment of the site further intrusive site investigation including contamination testing will need to be undertaken to determine whether the risk to site can be removed through site capping (potentially hardstanding) or whether some remediation work will be required to make the site suitable for the proposed end usage.

Further gas monitoring is required in order to determine the actual gas regime beneath the site.

DRAFT



9. LIMITATIONS AND UNCERTAINTIES

Pell Frischmann has obtained, reviewed and evaluated information from previous reports and the ground investigation study.

Pell Frischmann has prepared this report solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from Pell Frischmann; a charge may be levied against such approval.

The investigation of the site has been carried out to provide sufficient information concerning the type and degree of contamination, geotechnical characteristics and ground and groundwater conditions to provide a reasonable assessment of the environmental risks together with engineering and development implications. The objectives of the investigation have been limited to establishing the risks associated with potential human targets, building materials, the environment (including adjacent land), and to surface and ground water.

The exploratory holes undertaken, which investigate only a small volume of the ground in relation to the size of the site, can only provide a general indication of site conditions. The opinions provided and recommendations given in this report are based on the ground conditions apparent at the site of each of the exploratory holes. There may be exceptional ground conditions elsewhere on the site which have not been disclosed by this investigation and which therefore have not been taken into account in this report.

The comments made on groundwater conditions are based on observations made at the time that site work was carried out. It should be noted that groundwater levels will vary owing to seasonal, tidal and weather related effects. Levels can also be affected by anthropogenic impacts such as water abstraction from nearby wells.

The recommendations contained in this report represent our professional opinions. These opinions were arrived at in accordance with currently accepted industry practices and hydrological and engineering practices at this time and location and as such are not a guarantee that the site is free of hazardous, or potentially hazardous materials, or conditions.



APPENDIX A
FIGURES



Pell Frischmann

George House, George Street, Wakefield, West Yorkshire, WF1 1LY
Tel: 01924 368145 Fax: 01924 376643 www.pellfrischmann.com

TITLE

SITE LOCATION PLAN

PROJECT:

MAPPLEWELL, BARNSELEY

CLIENT

CPS LEISURE LTD

AMD REF:

BY: AD

CHKD: CM

DATE:

MAY 05

JOB No:

W84039

SCALE:

NOT TO SCALE

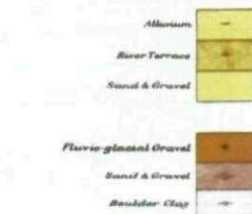
DRG No.

FIGURE 1

RECENT

GLACIAL

Middle Coal Measures



- 2° Dip of strata, the angle in degrees.
- + Dip proved underground.
- Horizontal strata.
- 2° Gently inclined strata.
- 0° Mine Shaft abandoned.
- 0° Barshole.
- 0° Water Bore.
- 0° Mine Mouth.
- 0° Mine Mouth abandoned.
- 0° Landslips.
- 0° Faults, crossmark on downthrow side.
- 0° Coal-crops.
- 0° Gold lines are Mineral Vene.
- 0° Geological boundaries (Solid).
- 0° Boundaries, coal crops and faults, where uncertain, are shown broken.
- 0° Geological boundaries (Dashed).
- 0° Fossil localities.
- 0° Mansfield Marine Band.
- 0° Marine Bands.
- 0° Carbonaceous Bands.

Coal Seams and Ironstone Bands

- 0° Brimley.
- 0° Shadwell.
- 0° Swinton Pottery.
- 0° Newhill.
- 0° Woodmoor, Washwood, or Melton Field.
- 0° Two Foot.
- 0° Abdy or Winter.
- 0° Kent's Thin.
- 0° Kent's Thick or Mapplewell.
- 0° Barnley.
- 0° Swallow Wood or Haigh Moor.
- 0° Lidgate.
- 0° Swan.
- 0° Tankersley Ironstone.
- 0° Flockton Thick.
- 0° Flockton Thin.
- 0° Ponton.
- 0° Partridge.
- 0° Thornecliffe Thin.
- 0° Silketone.



UPPER CARBONIFEROUS

LOWER COAL



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Pell Frischmann

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CLIENT

CPS LEISURE LTD

TITLE

GEOLOGICAL PLAN

PROJECT

MAPPLEWELL, BARNSELY

AND REF

BY

AD

CHKD

CM

DATE

MAY 05

JOB NO

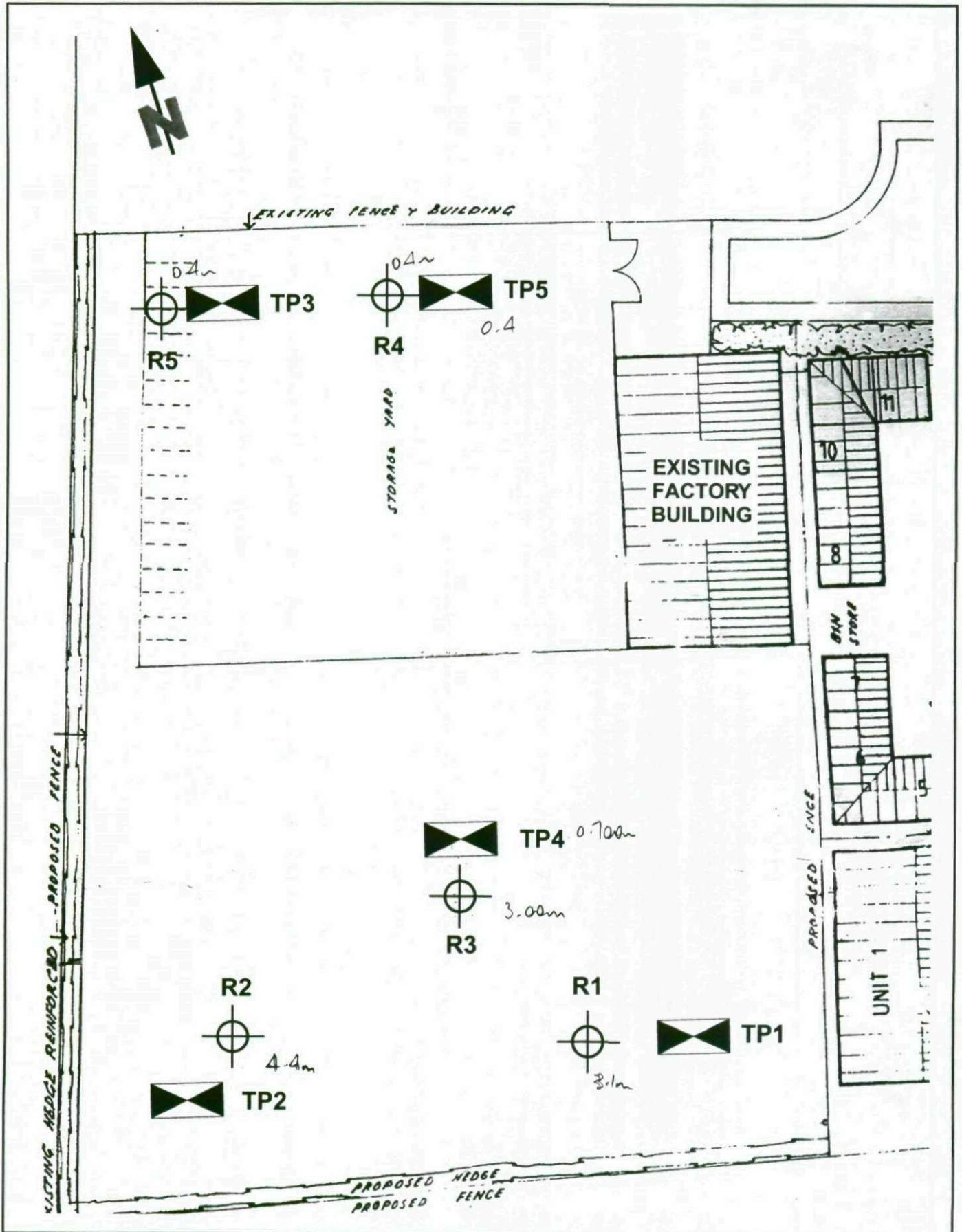
W84039

SCALE

NOT TO SCALE

DRG NO

FIGURE 2



Pell Frischmann

George House, George Street, Wakefield, West Yorkshire, WF1 1LY
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CLIENT

CPS LEISURE LTD

TITLE

EXPLORATORY HOLE LOCATION PLAN

PROJECT:

MAPPLEWELL, BARNSELY

AMD REF:

BY: AD

CHKD:

CM

DATE:

JUNE 05

JOB No:

W84039

SCALE:

NOT TO SCALE

DRG No.

FIGURE 3



APPENDIX B
EXPLORATORY HOLE LOGS



PELL FRISCHMANN CONSULTANTS LTD
CONSULTING ENGINEERS

George House, George Street, Wakefield, West Yorkshire, England WF1 1LY
Tel: Wakefield (01924) 369145 Fax: Wakefield (01924) 376649
Outside UK (+44 1924) Email: PFWAKEFIELD@pellfrischmann.com

Trial Pit Record: 1

Site: Mapplewell	Start Date: 11/05/2005	Ground Level: -
Client: CPS Leisure	End Date: 11/05/2005	Easting: -
Project No: W84039/VCP	Logged By: OTW	Northing: -
Site National Grid Reference: 0E 0N	Excavation Method:	
	Plant: JCB	
	Shoring/Support: N/A	

Trial Pit Length: 2.50 Trial Pit Width: 0.50

Strata Details

Samples & Tests

Description	Legend	Depth	Thk	Type	Depth	Result
MADE GROUND, plastic chippings		0.10	0.10	A	0.20	
MADE GROUND, yellowy grey sandy gravel with occasional brick cobbles, construction waste.		0.40	0.30			
		0.50	0.10			
		0.70	0.20			
MADE GROUND, reinforced concrete.						
MADE GROUND, unburnt brick red colliery spoil.			1.80			
MADE GROUND, dark grey/black slightly clayey colliery spoil.						
MADE GROUND, black colliery spoil, tarry smell noted.		2.50				
			1.30			
Weathered thinly horizontally bedded SANDSTONE		3.80	0.20	C	3.90	
		4.00				
End of Trialpit at 4.00 m						

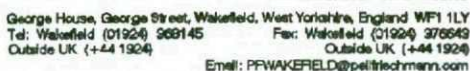
General Notes:

1. All linear dimensions are in metres unless otherwise stated
2. All relative density/shear strength descriptions are based only on field observations and available in-situ test data.
3. Trial pit logged from the ground surface below 1.2 m depth.

Groundwater Observations:
Dry

Stability:
Stable at 4m

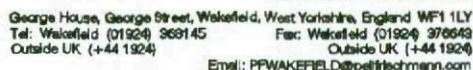
General Remarks:



Site: Mapplewell	Start Date: 11/05/2005	Ground Level: -
Client: CPS Leisure	End Date: 11/05/2005	Easting: -
Project No: W84039/VCP	Logged By: OTW	Northing: -
Site National Grid Reference: 0E 0N	Excavation Method:	
	Plant: JCB	
	Shoring/Support: N/A	
	Trial Pit Length: 2.50	Trial Pit Width: 0.50

1. All linear dimensions are in metres unless otherwise stated
2. All relative density/shear strength descriptions are based only on field observations and available in-situ test data.
3. Trial pit logged from the ground surface below 1.2 m depth.

Sheet 1 of 1



Site: Mapplewell	Start Date: 11/05/2005	Ground Level: -
Client: CPS Leisure	End Date: 11/05/2005	Easting: -
Project No: W84039/VCP	Logged By: OTW	Northing: -
Site National Grid Reference: 0E 0N	Excavation Method:	
	Plant: JCB	
	Shoring/Support: N/A	
	Trial Pit Length: 2.50	Trial Pit Width: 0.50

General Notes:

1. All linear dimensions are in metres unless otherwise stated
2. All relative density/shear strength descriptions are based only on field observations and available in-situ test data.
3. Trial pit logged from the ground surface below 1.2 m depth.

Sheet 1 of 1



PELL FRISCHMANN CONSULTANTS LTD
CONSULTING ENGINEERS

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Trial Pit Record: 4

Site: Mapplewell	Start Date: 11/05/2005	Ground Level: -
Client: CPS Leisure	End Date: 11/05/2005	Easting: -
Project No: W84039/VCP	Logged By: OTW	Northing: -
Site National Grid Reference: 0E 0N	Excavation Method:	
	Plant: JCB	
	Shoring/Support: N/A	

Trial Pit Length: 2.50 Trial Pit Width: 0.50

Strata Details

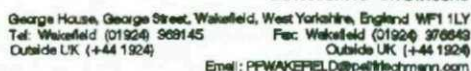
Samples & Tests

Description	Legend	Depth	Thk	Type	Depth	Result
MADE GROUND, sandy fine to coarse angular gravel with brick cobbles.		0.70	0.70	G	0.30	
Yellowy brown slightly clayey weathered horizontally bedded SANDSTONE.		2.00	2.00	H	0.80	
End of Trialpit at 2.70 m		2.70				

General Notes:

1. All linear dimensions are in metres unless otherwise stated
2. All relative density/shear strength descriptions are based only on field observations and available in-situ test data.
3. Trial pit logged from the ground surface below 1.2 m depth.

Groundwater Observations: Dry	Stability: Stable at 2.7m	General Remarks:
----------------------------------	------------------------------	------------------



Site: Mapplewell	Start Date: 11/05/2005	Ground Level: -
Client: CPS Leisure	End Date: 11/05/2005	Easting: -
Project No: W84039/VCP	Logged By: OTW	Northing: -
Site National Grid Reference: 0E 0N	Excavation Method:	
	Plant: JCB	
	Shoring/Support: N/A	
	Trial Pit Length: 2.50	Trial Pit Width: 0.50

1. All linear dimensions are in metres unless otherwise stated
2. All relative density/shear strength descriptions are based only on field observations and available in-situ test data.
3. Trial pit logged from the ground surface below 1.2 m depth.

Sheet 1 of 1

CLIENT

PELL FRISCHMANN

SITE

MAPPLEWELL, NR BARNSELY

DATE OF FIELDWORK

19/05/05-19/05/05

SCALE

1:50

LEVEL/POSITION

SEE LOCATION PLAN

OPERATOR

CJB

LOGGED BY

RR

JOB NO.

05/3379

SAMPLE RECORD	Depth (Run)	TCR %	SCR %	RQD %	l _f	Standp/ Piezo	DESCRIPTION OF STRATUM (thickness)	DEPTH	REDUCED LEVEL	LEGEND
SPT 50/225MM 1.00 - 1.45 SPT 5 2.00 - 2.45 SPT 50/75MM 3.00 - 3.45							MADE GROUND comprising plastic fragments in brown sand (0.10) CONCRETE (0.60)	0.10		
							MADE GROUND comprising brick and sandstone gravel and cobbles in brown sand (1.70)	0.70		
							MADE GROUND comprising sandstone gravel and cobbles in brown sand (0.70)	2.40		
							Strong moderately fractured brown SANDSTONE (0.50)	3.10		
							Weak grey MUDSTONE (0.30)	3.60		
							COAL (0.40)	3.90		
							Strong yellow/light brown fine grained thinly laminated generally fresh SANDSTONE/SILTSTONE with closely spaced occasionally medium spaced approximately horizontal discontinuities weathered to stiff clay at 4.6-5.0mbgl (3.80)	4.30		
	1	10	5	0	9					
	4.60									
	2	90	85	31	14					
	6.10									
	3	90	15	7	14					
	7.60									
	4	80	75	43	12		Weak grey/olive thinly laminated generally fresh MUDSTONE with closely spaced occasionally medium spaced approximately horizontal discontinuities	8.10		
	9.10									

GROUNDWATER AND CASING INFORMATION

DEPTH STRUCK	DEPTH CASED	ELAPSED TIME	WATER LEVEL	DEPTH SEALED
NS				

REMARKS ON GROUNDWATER AND CASING
BOREHOLE DRY

DRILLING METHOD AND REMARKS

DANDO TOPDRIVE
1HR DIGGING 1.2M SERVICE PIT

CLIENT

PELL FRISCHMANN

SITE

MAPPLEWELL, NR BARNSELY

DATE OF FIELDWORK

19/05/05-19/05/05

SCALE

1:50

LEVEL/POSITION

SEE LOCATION PLAN

OPERATOR

CJB

LOGGED BY

RR

JOB NO.

05/3379

SAMPLE RECORD

 Depth
(Run)

 TCR
%

 SCR
%

 RQD
%

 I_f

 Standp/
Piezo

DESCRIPTION OF STRATUM (thickness)

DEPTH

 REDUCED
LEVEL

LEGEND

(Continued boring in same stratum)

BOREHOLE TERMINATED

20.00

GROUNDWATER AND CASING INFORMATION

DEPTH STRUCK	DEPTH CASED	ELAPSED TIME	WATER LEVEL	DEPTH SEALED	REMARKS ON GROUNDWATER AND CASING
NS					BOREHOLE DRY

DRILLING METHOD AND REMARKS

 DANDO TOPDRIVE
 1HR DIGGING 1.2M SERVICE PIT

CLIENT

PELL FRISCHMANN

SITE

MAPPLEWELL, NR BARNLEY

DATE OF FIELDWORK

23/05/05-23/05/05

SCALE

1:50

LEVEL/POSITION

SEE LOCATION PLAN

OPERATOR

CJB

LOGGED BY

RR

JOB NO.

05/3379

SAMPLE RECORD	Depth (Run)	TCR %	SCR %	RQD %	l _f	Standp/ Piezo	DESCRIPTION OF STRATUM (thickness)	DEPTH	REDUCED LEVEL	LEGEND
SPT 50/25MM 1.00 - 1.45							Medium dense MADE GROUND comprising brick, coal, ash and mudstone cobbles and boulders in brown sand (4.40)			
SPT 2.00 - 2.45	23									
SPT 50/75MM 3.00 - 3.45										
SPT 4.00 - 4.45	69									
	4.50							4.40		
	1	0	0	0	-		Weak yellow/olive/light brown thinly laminated partially disintegrated MUDSTONE (occasionally fine grained SILTSTONE) interbedded with fresh intact sections with closely spaced approximately horizontal discontinuities (9.30)			
SPT 75/50MM 6.00 - 6.45	6.00									
	2	55	50	7	11					
	7.50									
	3	45	40	0	10					
	9.00									
	4	85	10	0	50+					

GROUNDWATER AND CASING INFORMATION

DEPTH STRUCK	DEPTH CASED	ELAPSED TIME	WATER LEVEL	DEPTH SEALED
NS				

REMARKS ON GROUNDWATER AND CASING

BOREHOLE DRY

DRILLING METHOD AND REMARKS

 DANDO TOPDRIVE
 1HR DIGGING 1.2M SERVICE PIT

ROTARY LOGHOLE NO. R2
Sheet 2 of 2

CLIENT

PELL FRISCHMANN

SITE

MAPPLEWELL, NR BARNLEY

DATE OF FIELDWORK

23/05/05-23/05/05

SCALE

1:50

LEVEL/POSITION

SEE LOCATION PLAN

OPERATOR

CJB

LOGGED BY

RR

JOB NO.

05/3379

SAMPLE RECORD	Depth (Run)	TCR %	SCR %	RQD %	l _f	Standp/ Piezo	DESCRIPTION OF STRATUM (thickness)	DEPTH	REDUCED LEVEL	LEGEND
	10.50						(Continued boring in same stratum)			
							Strong brown SANDSTONE (1.40)	13.70		
							Weak grey MUDSTONE	15.10		
							BOREHOLE TERMINATED	20.00		

GROUNDWATER AND CASING INFORMATION

DEPTH STRUCK	DEPTH CASED	ELAPSED TIME	WATER LEVEL	DEPTH SEALED	REMARKS ON GROUNDWATER AND CASING
NS					BOREHOLE DRY

DRILLING METHOD AND REMARKS

DANDO TOPDRIVE
1HR DIGGING 1.2M SERVICE PIT

BOREHOLE LOGHOLE NO. R3
Sheet 1 of 2

CLIENT

PELL FRISCHMANN

SITE

MAPPLEWELL, NR BARNSELY

DATE OF FIELDWORK

18/05/05-18/05/05

SCALE

1:50

LEVEL/POSITION

SEE LOCATION PLAN

OPERATOR

CJB

LOGGED BY

RR

JOB NO.

05/3379

SAMPLE RECORD DEPTH	TYPE	SPT N (Cu-kN/m ²)	Standp/ Piezo	DESCRIPTION OF STRATUM (thickness)	DEPTH	REDUCED LEVEL	LEGEND
				MADE GROUND comprising brick and sandstone gravel and cobbles in brown sand (1.30)			
				MADE GROUND comprising sandstone gravel and cobbles in brown sand (1.70)	1.30		
				Moderately strong brown SANDSTONE (0.50)	3.00		
				COAL (0.50)	3.50		
				Weak grey MUDSTONE (0.30)	4.00		
				Strong brown SANDSTONE (8.70)	4.30		

GROUNDWATER AND CASING INFORMATION

DEPTH
STRUCKDEPTH
CASEDELAPSED
TIMEWATER
LEVELDEPTH
SEALED

REMARKS ON GROUNDWATER AND CASING

NS

BOREHOLE DRY

BORING METHOD AND REMARKS

DANDO TOPDRIVE

1HR DIGGING 1.2M SERVICE PIT

		Tel: 0151-523-0202		BOREHOLE LOG		HOLE NO. R3	
		Fax: 0151-523-0252				Sheet 2 of 2	
CLIENT				SITE			
PELL FRISCHMANN				MAPPLEWELL, NR BARNSELEY			
DATE OF FIELDWORK		SCALE	LEVEL/POSITION		OPERATOR	LOGGED BY	JOB NO.
18/05/05-18/05/05		1:50	SEE LOCATION PLAN		CJB	RR	05/3379
SAMPLE RECORD DEPTH	RECORD TYPE	SPT N (Cu-kN/m ²)	Standp/ Piezo	DESCRIPTION OF STRATUM (thickness)		DEPTH	REDUCED LEVEL
				(Continued boring in same stratum)			
				Moderately strong grey/blue MUDSTONE		13.00	
				BOREHOLE TERMINATED		20.00	
GROUNDWATER AND CASING INFORMATION						BORING METHOD AND REMARKS	
DEPTH STRUCK	DEPTH CASED	ELAPSED TIME	WATER LEVEL	DEPTH SEALED	REMARKS ON GROUNDWATER AND CASING	DANDO TOPDRIVE 1HR DIGGING 1.2M SERVICE PIT	
NS					BOREHOLE DRY		

CC Geotechnical		Tel: 0151-523-0202 Fax: 0151-523-0252		BOREHOLE LOG		HOLE NO. Sheet 1 of 2	R4
CLIENT PELL FRISCHMANN				SITE MAPPLEWELL, NR BARNLEY			
DATE OF FIELDWORK 18/05/05-18/05/05		SCALE 1:50	LEVEL/POSITION SEE LOCATION PLAN		OPERATOR CJB	LOGGED BY RR	JOB NO. 05/3379
SAMPLE RECORD DEPTH	TYPE	SPT N (Cu-kN/m ²)	Standp/ Piezo	DESCRIPTION OF STRATUM (thickness)		DEPTH	REDUCED LEVEL
				TARMAC (0.10) STONE SUBBASE (0.30)		0.10	
				Moderately strong brown SANDSTONE (7.20)		0.40	
				Weak grey MUDSTONE (0.40)		7.60	
				COAL (0.50)		8.00	
				Moderately strong light brown MUDSTONE (4.50)		8.50	
GROUNDWATER AND CASING INFORMATION				BORING METHOD AND REMARKS			
DEPTH STRUCK	DEPTH CASED	ELAPSED TIME	WATER LEVEL	DEPTH SEALED	REMARKS ON GROUNDWATER AND CASING		
NS					BOREHOLE DRY		
					DANDO TOPDRIVE 1HR DIGGING 1.2M SERVICE PIT		

		Tel: 0151-523-0202 Fax: 0151-523-0252		BOREHOLE LOG		HOLE NO. R4 Sheet 2 of 2							
		CLIENT PELL FRISCHMANN				SITE MAPPLEWELL, NR BARNLEY							
DATE OF FIELDWORK 18/05/05-18/05/05		SCALE 1:50		LEVEL/POSITION SEE LOCATION PLAN		OPERATOR CJB		LOGGED BY RR		JOB NO. 05/3379			
SAMPLE RECORD DEPTH TYPE		SPT N (Cu-kN/m ²)		Standp/ Piezo		DESCRIPTION OF STRATUM (thickness)				DEPTH REDUCED LEVEL		LEGEND	
						(Continued boring in same stratum)				13.00			
						Strong brown SANDSTONE (4.10)							
						Weak grey MUDSTONE (1.40)							
						Strong brown SANDSTONE							
						BOREHOLE TERMINATED				20.00			
GROUNDWATER AND CASING INFORMATION						BORING METHOD AND REMARKS							
DEPTH STRUCK		DEPTH CASED		ELAPSED TIME		WATER LEVEL		DEPTH SEALED		REMARKS ON GROUNDWATER AND CASING		DANDO TOPDRIVE 1HR DIGGING 1.2M SERVICE PIT	
NS										BOREHOLE DRY			
All dimensions are in metres unless otherwise stated													

[illegible]