

**PHASE 1
GEOTECHNICAL AND GEO-ENVIRONMENTAL REPORT**

OAKS FARM, DARTON

FOR

**EXECUTORS OF K BIRKINSHAW DEC'D
C/O CHRIS CARR ASSOCIATES**

ISSUE 1

33349-001

November 2010



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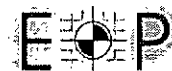
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CONTENTS

1.0	EXECUTIVE SUMMARY	4
2.0	INTRODUCTION	6
3.0	THE SITE	7
3.1	Description	7
3.2	History	7
3.3	Geology.....	8
3.4	Hydrogeology	9
3.5	Hydrology	9
3.6	Mining.....	9
3.7	Ground Gas.....	10
3.8	Pollution Incidents to Controlled Waters	11
3.9	Discharge Consents.....	11
3.10	Flooding	11
4.0	EXPECTED GROUND CONDITIONS	12
5.0	GEOTECHNICAL APPRAISAL	13
5.1	General	13
5.2	Foundations and Floor Slabs	13
5.3	Problems Due To Past Development.....	13
5.4	Excavation Problems	13
5.5	Surface Water Drainage.....	14
5.6	Sulphate Attack of Buried Concrete	14
6.0	CONTAMINATION APPRAISAL	15
6.1	Outline Conceptual Model.....	15
6.2	Possible Significant Pollutant Linkages.....	16
7.0	RATIONALE FOR FURTHER INVESTIGATION	17

APPENDICES

Appendix 1 'Site Location Plan', Drawing 33349/001 Revision A

Appendix 2 Envirocheck Report
Coal Authority Mining Report



1.0 EXECUTIVE SUMMARY

1. The site is located to the north west of Oak Wood Drive in Darton, Barnsley. The site has an area of approximately 0.5 hectares and is centred on grid reference 432010, 410060 (SE320100).
2. The site comprises a disused farm. A stone-built bungalow lies to the south west of the centre of the site, surrounded by soft landscaping and paved areas. Two adjoining derelict barns lie to the east and north east of the centre of the site and are thought to date back to the seventeenth century. Part of one of the barns is Grade II listed. The site generally falls gently to the south. The north eastern section of the site has been cut into to build the barns over a relatively level area, and flat areas of hardstanding can be seen surrounding the buildings.
3. A limited amount of made ground is expected at surface level, likely to comprise granular material beneath areas of hardstanding. The made ground may include red shale, ash and coal. Made ground is also expected beneath former buildings, although the thickness of made ground is unlikely to be significant. Beneath the made ground, firm to stiff clay is expected, becoming weak mudstone and/or shale with depth. Groundwater is not expected at shallow depth.
4. The Barnsley coal seam underlies the site at shallow depth which may have been worked in the past. A drilling programme will be required to determine the depth to the Barnsley coal seam and if it has been worked.
5. Basic radon precautions will be required. Shallow coal workings potentially underlie the site, and may be a source of ground gas. A suitably resistant gas membrane and ventilated void beneath the floor slab will be the minimum level of protection required by the regulators in new dwellings if workings are encountered. These measures may be reduced if a gas monitoring programme is carried out.
6. It is likely that suitable founding material will be encountered at shallow depth within the area for redevelopment, and therefore the most suitable foundation type for a low rise residential development will be traditional strip or trench fill footing, taken through any made ground and constructed within the natural clay or mudstone/shale bedrock at a minimum depth of 900 mm.
7. If shallow coal workings are encountered and are in need of drilling and grouting, the footings will need to be thickened and reinforced. Masonry reinforcement in the

superstructure may also be needed if the workings are found to be of a significant thickness at relatively shallow depth.

8. As the soils are expected to be clayey in nature, footings should be deepened and heave precautions taken where trees will potentially influence the foundation, in accordance with guidance given in NHBC Chapter 4.2.
9. Less than 600 mm of made ground is expected. Ground bearing floor slabs should be appropriate. If gas precautions are required, or footings are deepened over 1500 mm due to trees, a precast concrete floor with a void below will be required.
10. At this stage, class DS-2, AC-2 sulphate precautions should be adopted for all subsurface concrete.
11. Generally, no significant contamination is expected to be encountered. Chemical testing of the soils will be required to determine the level of risk presented and hence the level of remediation required.
12. The conclusions made in this report are subject to agreement by the approving bodies such as the Local Authority.



2.0 INTRODUCTION

This report presents the findings of a Phase 1 desktop investigation undertaken by Eastwood & Partners for the Executors of K Birkinshaw Dec'd, c/o Chris Carr Associates. It incorporates information from an Envirocheck report, a Coal Authority Mining report and a site walkover survey.

The recommendations made within this report are based on the assumption that the site will be developed for a residential end use. The two existing barns are to be converted into three new dwellings. The existing bungalow is to be retained and one new dwelling is to be built. It has been assumed that new houses will be of traditional construction and will be a maximum of three storeys in height. It has also been assumed that all plots will have private gardens and associated areas of hardstanding.

All information, comments and opinions given in this report are based on the information gained from the review of published information, as outlined above, and from observations made during the site walkover. However, there may be conditions at the site, which have not been taken into account such as unpredictable soil strata and water conditions. It should be noted that groundwater levels vary due to seasonal or other affects and may at times differ to those measured during the investigation.

This report was prepared for the sole and exclusive use of the Executors of K Birkinshaw Dec'd, c/o Chris Carr Associates. Any other parties using the information contained in this report, unless given prior written approval, do so at their own risk, and any duty of care to those parties is excluded.

3.0 THE SITE

3.1 Description

The site is located to the north west of Oak Wood Drive in Darton, Barnsley. The site has an area of approximately 0.5 hectares and is centred on grid reference 432010, 410060 (SE320100).

The site comprises a disused farm. A stone-built bungalow lies to the south west of the centre of the site, surrounded by soft landscaping and paved areas. Two adjoining barns lie to the east and north east of the centre of the site and are thought to date back to the seventeenth century. They are predominantly stone built with a slate roof and occasional brick extension, and are in a derelict condition. Part of one of the barns is Grade II listed.

The site generally falls gently to the south. A drop of around 1 m occurs along the southern boundary, with the land beyond dropping more sharply towards the south. The north eastern section of the site has been cut into to build the barns over a relatively level area, and flat areas of hardstanding can be seen surrounding the buildings.

The site is surrounded with a stone wall, with woodland to the west, housing to the north and south and Oak Wood Drive to the east.

The 'Site Location Plan', drawing 33349/001 revision A, in Appendix 1 shows the general layout of the site.

3.2 History

Historical Ordnance Survey maps have been studied to assess the previous use of the site. Copies of the maps are presented in Appendix 2.

3.2.1 The Site

The earliest map reviewed, dated 1854-1855, indicates the site to house 'The Oaks' farm. The buildings can be seen more clearly on the 1893 map. Three farm buildings are present within the centre of the site comprising two rectangular shaped buildings and a square building to the west of these, with the south western section of the site part of Oaks Plantation.

Between 1956 and 1961, the square building had been demolished and a new rectangular building (the existing bungalow) had been constructed in the south of the site. The plantation to the west no longer overlaps onto the site. A number of small buildings or extensions to the existing rectangular buildings appear on the 1961 map. By 1978, two silos have been built in



the north western site corner, with a possible third in the centre of the site. By the 1990s, the two silos in the site corner have been removed. The layout of the site remains in a similar condition today.

3.2.2 The Surrounding Area

Historical maps from the 1850s show plantations to be present to the east and west of the site, with open land to the north and south. An old coal pit is present around 80 m to the north east of the site and also 200 m to the east. Speedwell Colliery lies around 280 m to the east of the site. Two small collieries are also present over 500 m to the east of the site.

By the 1890s, the coal pits and Speedwell Colliery are no longer shown to be present. A railway line has been built around 200 m to the south of the site, connecting collieries and brick works in the east to the main railway line in the west.

By 1906 a cistern is shown to be present adjacent to the site northern boundary. A pump lies around 50 m to the south. A shaft and dayhole (adit) are noted around 170 m to the north west of the site. Excelsior Works (gas and water) is present around 175 m to the west of the site, with terraced housing to the west and south of the works buildings. A small quarry can also be seen around 100 m north of the site.

By 1918, the shaft and dayhole to the north west are no longer present. Housing and garages now lie within the vicinity of the former mine entries. Excelsior Works become disused by 1930. The historical map identifies a cistern to the north of the site, and also a second tank to the east of the eastern site boundary.

During the 1950s and 1960s, housing had begun to be constructed along Darton Lane to the south. By the 1970s, a large square building, later labelled as 'depot' had been built to the south east of the site. The Oaks Plantation had also decreased in size. Housing had been built to the west of the site, and to the south of the site by the 1990s. By 1991 the depot had been replaced by a small housing estate. By 1993, housing covers land to the east and north east of the site.

Today, housing lies to the north, east and south of the site, with woodland to the west.

3.3 Geology

The Geological Map Sheet 262 SW (1:10,560 scale) shows the solid geology beneath the site to comprise undifferentiated shales and mudstones of the Middle Coal Measures. No alluvial or superficial deposits are indicated to cover the site, and no faults or other lines of weakness are indicated to cross the site.

The Barnsley Rider coal seam is conjectured to outcrop through the north eastern section of the site, whilst the Barnsley coal seam is inferred to outcrop beneath the south western site corner. The strata are indicated to dip towards the north east at an angle of around 4°.

3.4 Hydrogeology

3.4.1 Groundwater Vulnerability

The Environment Agency identify the site to overlie a Secondary A aquifer (formerly minor aquifer) comprising permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.

3.4.2 Groundwater Abstractions

There are no groundwater abstractions within 500 m of the site boundary.

3.5 Hydrology

The nearest surface water feature to the site is a stream, located 50 m north west of the site. The site does not lie within a Groundwater Source Protection Zone. The Envirocheck Report does not identify any surface water abstractions within 500 m of the site boundary, although the historical maps show a well around 50 m to the south of the site.

3.6 Mining

3.6.1 Coal Mining

The historical maps show a number of old mine entries present to the north and east of the site. There is therefore the potential for shallow coal workings to be present beneath the site.

The Barnsley coal seam is expected to outcrop beneath the site's south western corner and is thought to be around 3 m thick in the area. The strata in the area are expected to dip at around 4° towards the north east, therefore the seam is expected to be present at shallow depth beneath the site.

The area surrounding the site is heavily faulted therefore it is difficult to estimate the depth at which the Barnsley seam is expected to be found. However, if the seam does dip at around 4° from its assumed outcrop position, the seam is expected at up to 10 m depth across the site. This seam is expected to have been worked in the area, and due to the extractable thickness, precautions may be required against the effects of shallow mining.

A drilling programme will be required to determine the depth to the Barnsley coal seam and if it has been worked.

The Barnsley Rider coal seam is expected to outcrop beneath the north eastern section of the site, dipping towards the north east. The seam, between 0.5 and 0.8 m thick, is expected at shallow depth and dips away from the site towards the north east at around 4°. Beneath the north eastern site corner the Barnsley Rider seam is expected at a depth of around 3 m. The seam is unlikely to have been taken via underground methods at this shallow depth, but there is the potential for the seam to have been extracted via bell pits. However, if the Barnsley Rider seam outcrops at its expected position, it should not affect the proposed new building at the site.

A Coal Authority mining report has been obtained, and this confirms that the site is within the zone of likely physical influence from workings in 8 seams from shallow to 310 m depth, last worked in 1985. There are no recorded mine shafts or entries on the site or within 20 m of the boundary, although Coal Authority records may be incomplete.

The site is within an area for which notices for entitlement to withdraw support have been published, and these have not yet been revoked. This could mean underlying coal seams could be mined in the future. The report also states that there are reserves of coal which remain in the area, which could potentially be worked in the future, subject to planning consent and licenses. However, this is unlikely to be within any shallow seams of coal, and therefore workings are unlikely to affect surface developments. Future working of the remaining coal reserves below the site is considered unlikely in any case, due to the demise of the UK coal industry and due to the site's location within an urbanised area.

There have been no claims for subsidence due to mining activity made to the Coal Authority.

3.6.2 Quarrying

A number of small sandstone quarries are noted around the area by the historical maps and by information provided within the Envirocheck Report. The closest of these was located around 110 m north of the site, where sandstone was extracted. Evidence of quarrying activity was not noted to be present during the site walkover.

3.7 Ground Gas

3.7.1 Landfill Gas

The Envirocheck Report does not include any records of any former landfill sites within 250 m of the site. During the historical review, no areas of potentially infilled land have been identified in the area immediately surrounding the site. However, a sandstone quarry is

shown on historical maps around 100 m to the north of the site between around 1906 and the 1970s. The quarry is then developed over with housing by 1998.

The quarry appears to be small in size and has been disused and potentially infilled for at least 30 years. The Envirocheck Report does not record this site as being a landfill site. It can therefore be considered not to pose a significant risk to the site. Landfill gas precautions will therefore not be required.

3.7.2 Radon Gas

Information provided within the Envirocheck Report states that the site is within an area for which basic radon precautions will be required.

3.7.3 Mine Gas

Shallow coal workings potentially underlie the site, and may be a source of ground gas. A suitably resistant gas membrane and ventilated void beneath the floor slab will be the minimum level of protection required by the regulators in new dwellings if workings are encountered. These measures may be reduced if a gas monitoring programme is carried out.

3.8 Pollution Incidents to Controlled Waters

The Envirocheck Report does not record any pollution incidents to controlled waters within 250 m of the site.

3.9 Discharge Consents

The Envirocheck Report does not record any discharge consents within 250 m of the site.

3.10 Flooding

Information provided in the Envirocheck Report shows that the site does not lie within a flood plain. The risk of flooding due to river waters is therefore considered to be low.



4.0 EXPECTED GROUND CONDITIONS

On the basis of information on the historical Ordnance Survey Maps, geological information and the walkover survey, it is expected that natural ground will be encountered at shallow depth across the site.

A limited amount of made ground is expected at surface level, likely to comprise granular material beneath areas of hardstanding. The made ground may include red shale, ash and coal. Made ground is also expected beneath former buildings, although the thickness of made ground is unlikely to be significant.

Beneath the made ground, firm to stiff clay is expected, becoming weak mudstone and/or shale with depth.

Groundwater is not expected at shallow depth.

5.0 GEOTECHNICAL APPRAISAL

5.1 General

A thin covering of made ground is expected over most of the site, comprising mainly granular materials. Some areas of the site have a covering of topsoil. The natural ground beneath the site is indicated to be mudstone and/or shale of the Middle Coal Measures. This is likely to have weathered to firm to stiff clay in the upper layers.

Shallow coal workings are thought to be present on site. A drilling programme will be required to determine the depth to the Barnsley coal seam and if it has been worked.

5.2 Foundations and Floor Slabs

It is likely that suitable founding material will be encountered at shallow depth within the area for redevelopment, and therefore the most suitable foundation type for a low rise residential development will be traditional strip or trench fill footing, taken through any made ground and constructed within the natural clay or mudstone/shale bedrock at a minimum depth of 900 mm.

If shallow coal workings are encountered and are in need of drilling and grouting, the footings will need to be thickened and reinforced. Masonry reinforcement may also be needed if the workings are found to be of a significant thickness at relatively shallow depth.

As the soils are expected to be clayey in nature, footings should be deepened and heave precautions taken where trees will potentially influence the foundation, in accordance with guidance given in NHBC Chapter 4.2.

Less than 600 mm of made ground is expected. Ground bearing floor slabs should be appropriate. If gas precautions are required, or footings are deepened over 1500 mm due to trees, a precast concrete floor with a ventilated void below will be required.

5.3 Problems Due To Past Development

It is unlikely that significant issues will be encountered due to the lack of previous development.

5.4 Excavation Problems

Excavations are likely to be fairly stable in the natural ground, but are expected to be slightly unstable in any made ground which is present. Groundwater is not expected at shallow depth.

Where excavations which workers are required to enter are over 1.2 m 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.

5.5 Surface Water Drainage

It is expected that clay soils will be encountered below the site, and therefore soakaway drainage is unlikely to be suitable for use within the development.

Surface water from the development should therefore be directed into the local sewer network, subject to agreement from the Local Authority and the water company if applicable.

5.6 Sulphate Attack of Buried Concrete

At this stage, it should be assumed that a minimum Design Sulphate Class of DS-2 will be necessary due to the likely presence of made ground on the site. This would require the use of FND-2 concrete for below ground structures at the site.

It is recommended that chemical testing is carried out during an intrusive investigation, and pending the results of the testing, it may be possible to downgrade this classification.

6.0 CONTAMINATION APPRAISAL

6.1 Outline Conceptual Model

The site is approximately 0.5 hectares in area. The historical maps indicate the site to have been used as a farm since at least the 1850s, with two barns and a bungalow currently present on site.

Due to the age of the buildings, it is possible that asbestos may be present in the soils surrounding the structures. Made ground is expected beneath the areas of hardstanding, which may contain ash and red shale.

No tanks are currently present on site, although it is possible that a tank was present previously when the site was a working farm.

The surrounding area is predominantly residential, before which it was mainly agricultural in nature. A former depot was once present to the south east of the site between the 1970s and the early 1990s. This has now been developed with housing. The site lies downstream of the farm, and should not pose a significant risk to the proposed development.

Coal mining and sandstone quarrying have been carried out in the surrounding area over the last 150 years or so but should not pose a contamination risk to the site.

From the past and present uses of the site, it can be considered that the potential for significant contamination to be present is generally low. Some elevated concentrations of heavy metals and PAHs may be encountered within any made ground that is present, particularly if ashy materials have been deposited across the site in the past. Elevated concentrations of sulphates may be encountered if red shale or similar materials have been included within the made ground. Sulphates can be aggressive towards buried concrete structures, meaning that more resistant concrete mixtures are required.

Some naturally elevated concentrations of heavy metals such as arsenic, copper or nickel may also be recorded in the natural strata.

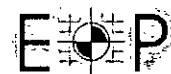
There is a small potential for hydrocarbon contamination to be present, if vehicles using the site have suffered from leakages of fuel, or if fuel was stored in any of the barns on the site. Such contamination is likely to be confined to localised areas of the site, however.

Basic radon precautions are required in new dwellings built on the site. Precautions against the effects of mine gas will also be required if shallow coal workings are encountered.



6.2 Possible Significant Pollutant Linkages

Contaminant	Pathways	Receptor
<ul style="list-style-type: none"> • Heavy metals and PAH's within any made ground present. 	<ul style="list-style-type: none"> • Ingestion or inhalation, • Dermal contact. 	<ul style="list-style-type: none"> • Future residents, construction workers, visitors.
<ul style="list-style-type: none"> • Hydrocarbons from fuel spillages. • Elevated heavy metals within natural strata. 	<ul style="list-style-type: none"> • Migration through ground 	<ul style="list-style-type: none"> • Groundwater aquifer.
<ul style="list-style-type: none"> • Elevated arsenic, zinc, copper and nickel within made and natural ground. 	<ul style="list-style-type: none"> • Direct contact and root uptake 	<ul style="list-style-type: none"> • Plants
<ul style="list-style-type: none"> • Asbestos 	<ul style="list-style-type: none"> • Ingestion or inhalation, • Dermal contact. 	<ul style="list-style-type: none"> • Future residents, construction workers, visitors.
<ul style="list-style-type: none"> • Sulphate. 	<ul style="list-style-type: none"> • Direct contact. 	<ul style="list-style-type: none"> • Below ground concrete.
<ul style="list-style-type: none"> • Radon, Mine Gas 	<ul style="list-style-type: none"> • Inhalation 	<ul style="list-style-type: none"> • Future residents, construction workers, visitors.



7.0 RATIONALE FOR FURTHER INVESTIGATION

Before more definite foundation information or a contamination appraisal can be given, an intrusive investigation will be required. This will be best done by way of a trial pit investigation, using a mechanical excavator. Investigation positions should be selected to give good coverage across the area of the site to be redeveloped.

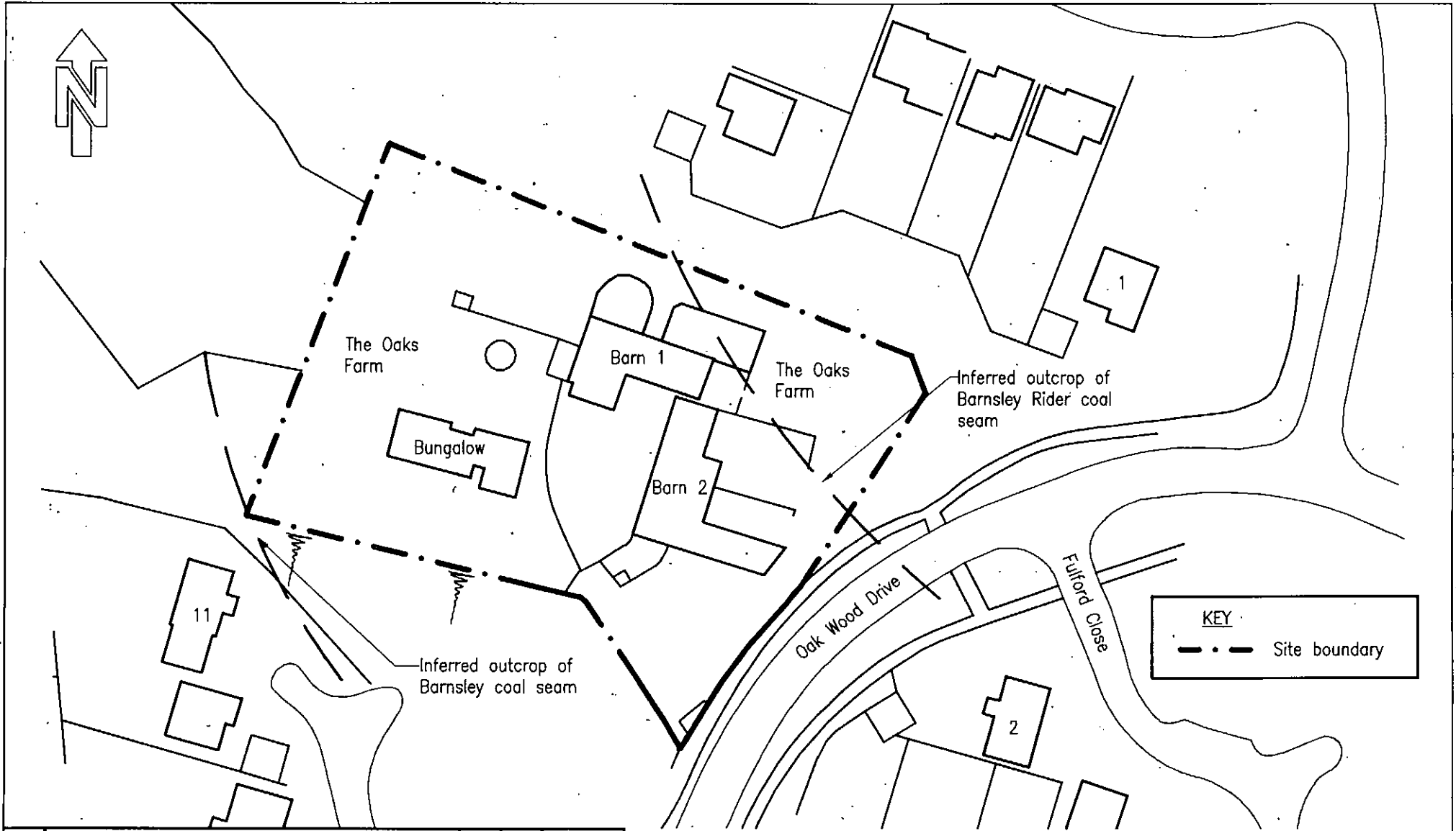
A rotary drilling programme will also be required to determine the depth of the Barnsley coal seam and if it has been worked.

The potential pollutant linkages presented in the Outline Conceptual Model will also need to be investigated by means of soil analysis. The chemical testing suite should be chosen to cover the range of potential contaminants indicated above. Hydrocarbon testing should be carried out where fuel contamination is suspected.



APPENDIX 1

'Site Location Plan', Drawing 33349/001 revision A



A First Issue.

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EXECUTORS OF K.BIRKINSHAW DEC'D C/O CHRIS CARR ASSOCIATES
OAKS FARM, OAK WOOD DRIVE, DARTON
SITE LOCATION PLAN

CHECKED
KE

SCALE AT A4
1:1000

DRAWING STATUS

INFORMATION

DRAWN
JB

DATE
11.11.10

DRAWING NUMBER
33349/001

REV
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APPENDIX 2

Envirocheck Report
Coal Authority Mining Report

Envirocheck[®] Report:

Datasheet

Order Details:

Order Number:

32967610_1_1

Customer Reference:

33349/MJY/AS/KE

National Grid Reference:

432010, 410060

Slice:

A

Site Area (Ha):

0.47

Search Buffer (m):

1000

Site Details:

Oaks Farm, Oaks Wood Drive

Darton

BARNSELY

South Yorkshire

S75 5PT

Client Details:

Miss A Seymour

Eastwood & Partners Ltd

St Andrews House

23 Kingfield Road

Sheffield

S11 9AS

Report Section	Page Number
Summary	-
Agency & Hydrological	1
Waste	13
Hazardous Substances	16
Geological	17
Industrial Land Use	22
Sensitive Land Use	25
Data Currency	26
Data Suppliers	30
Useful Contacts	31

Introduction

The Environment Act 1995 has made site sensitivity a key issue, as the legislation pays as much attention to the pathways by which contamination could spread, and to the vulnerable targets of contamination, as it does the potential sources of contamination. For this reason, Landmark's Site Sensitivity maps and Datasheet(s) place great emphasis on statutory data provided by the Environment Agency and the Scottish Environment Protection Agency; it also incorporates data from Natural England (and the Scottish and Welsh equivalents) and Local Authorities; and highlights hydrogeological features required by environmental and geotechnical consultants. It does not include any information concerning past uses of land. The datasheet is produced by querying the Landmark database to a distance defined by the client from a site boundary provided by the client.

In the attached datasheet the National Grid References (NGRs) are rounded to the nearest 10m in accordance with Landmark's agreements with a number of Data Suppliers.

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Report Version v47.0

Data Type	Page Number	On-Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Agency & Hydrological					
Contaminated Land Register Entries and Notices					
Discharge Consents	pg 1				11
Enforcement and Prohibition Notices					
Integrated Pollution Controls	pg 3				1
Integrated Pollution Prevention And Control					
Local Authority Integrated Pollution Prevention And Control					
Local Authority Pollution Prevention and Controls	pg 3				1
Local Authority Pollution Prevention and Control Enforcements					
Nearest Surface Water Feature	pg 4		Yes		
Pollution Incidents to Controlled Waters	pg 4				33
Prosecutions Relating to Authorised Processes					
Prosecutions Relating to Controlled Waters					
Registered Radioactive Substances					
River Quality	pg 9				1
River Quality Biology Sampling Points					
River Quality Chemistry Sampling Points	pg 10				2
Substantiated Pollution Incident Register					
Water Abstractions	pg 11				1 (*2)
Water Industry Act Referrals					
Groundwater Vulnerability	pg 12	Yes	n/a	n/a	n/a
Source Protection Zones					
Extreme Flooding from Rivers or Sea without Defences				n/a	n/a
Flooding from Rivers or Sea without Defences				n/a	n/a
Areas Benefiting from Flood Defences				n/a	n/a
Flood Water Storage Areas				n/a	n/a
Flood Defences				n/a	n/a
Waste					
BGS Recorded Landfill Sites					
Historical Landfill Sites	pg 13				3
Integrated Pollution Control Registered Waste Sites					
Licensed Waste Management Facilities (Landfill Boundaries)					
Licensed Waste Management Facilities (Locations)					
Local Authority Recorded Landfill Sites	pg 13				3
Registered Landfill Sites	pg 14				3
Registered Waste Transfer Sites					
Registered Waste Treatment or Disposal Sites					