



Barnsley Road, Goldthorpe, South Yorkshire
Phase I Geo-Environmental Assessment
For
Aldi Stores Ltd & Quora Ltd.

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EXECUTIVE SUMMARY

Land Use	The site is currently unoccupied grazing land, which is roughly triangular and generally level. The boundaries are marked by hedgerows and wooden fencing. The site lies at a lower level than the land to the north, east and south which rise towards the east. Residential properties lie to the east with agricultural land beyond highways on the other site boundaries During the walkover, no evidence of potential contamination sources was observed.
Site History	The site has no history of previous contaminative use and has remained undeveloped since 1854. No significant contaminative industry has historically operated adjacent to the site apart from a brick works some 250m to SW, which was present between 1905 and 1962.
Environmental Setting	• Geological information indicates the site to be underlain directly by Middle Coal Measures bedrock • No landfills recorded within 250m. • Thurnscoe dike lies 182m to the north. • The underlying strata are classed as a Minor Aquifer (Secondary A). • The site is not recorded to be at risk from flooding. • There are no licensed groundwater abstractions within 1km. • There are no discharge consents within 250m. • Radon protection measures are not required for future developments. • There are no Local Authority Pollution and Prevention Controls within
Contamination	Based on the site history and walkover survey, it is considered that the site itself presents a low environmental risk with respect to contamination.
Mining	The Coal Authority record workings beneath the site in 5 seams of coal between 280m and 810m depth. The Coal Authority also believes that the site is in an area where coal exists at or close to the surface which may have been worked at some time in the past. . In addition a shaft has been identified on the north site boundary, which is understood to have been 27m deep. Based on the available information it is possible that shallow coal workings are present beneath the site and it is recommended that a rotary drilling investigation is carried out to confirm the geology with respect to shallow workings.
Ground Gas	Ground gas risk is considered low to medium. Gas monitoring is required.
Foundations	It is likely that the site will be suitable for shallow strip or pad foundations terminating in the natural superficial deposits. Foundations should extend below made ground and any existing foundations and take account of the presence of mature trees on site boundaries. A ground may floor slab is likely to be suitable subject to re-engineering of any made ground.
Ground Investigation	A ground investigation is required to confirm the site conditions. This should include as a minimum: trial pits or mini-percussive holes, rotary drilling, gas monitoring installations, geotechnical and chemical laboratory analysis.



1 INTRODUCTION

1.1 3e Consulting Engineers Ltd (3e) were commissioned by Aldi Stores Ltd to carry out a Phase I Geo-Environmental assessment of land off Barnsley Road in Goldthorpe, South Yorkshire. This report highlights ground related environmental and geotechnical considerations in relation to the proposed development which includes the construction of an Aldi Store with associated car parking and soft landscaping, as indicated on the outline site plan included in **Appendix A**.

1.2 The objectives of this assessment were:

- To establish the historical development of the site and surrounding area.
- To establish the environmental setting of the site.
- To assess the potential impact of subsurface mining on the proposed development.
- To determine if historical or current activities could give rise to significant ground or groundwater contamination.
- To assess the potential for hazardous ground gas.
- To determine the potential risks posed by contamination arising from historical or current activities on or in the vicinity of the site.

1.3 To this end the study has included a site visit, an inspection of historical maps, a review of environmental data held on publicly available registers and other sources as indicated within the report.

1.4 This report presents the factual information available during this appraisal, interpretation of the data obtained and recommendations relevant to the scope of works outlined above. It has been assumed in the production of this report that the site is to be developed for a commercial end use.

1.5 The comments and opinions presented in this report are based on the findings of the available desk study investigation carried out by 3e. Responsibility cannot be accepted for any conditions not revealed by this desk study and which have not been taken into account by this report.



1.6 This report has been prepared for the sole use of Aldi Stores Ltd. No other third party may rely upon or reproduce the contents of this report without the written approval of 3e. If any unauthorised third party comes into possession of this report, they rely on it entirely at their own risk and 3E do not owe them any Duty of Care or Skill.

2 THE SITE

Location and Description

2.1 The site, centred on National Grid Reference 445010, 404280, is located on the west side of Goldthorpe, approximately 1km from the village centre.

2.2 The site is currently unoccupied grazing land, which is roughly triangular and generally level. During the walkover, evidence of potential contamination sources was not encountered.

2.3 The boundaries are marked by hedgerows and wooden fencing. The site lies at a lower level than the land to the north, east and south which rise towards the east.

2.4 The adjacent land use is as follows:

- North: Dearne Valley Parkway (A635), beyond which lies open farm land.
- South: Barnsley Road, beyond which lies open farm land.
- East: Residential development.
- West: Hollygrove Roundabout.

2.5 Photographs of the site are included as **Figure 2**.

3 SITE HISTORY

3.1 In order to establish the site's history an inspection of historical maps, dating between 1854 and 2013 and obtained as part of an Envirocheck report has been made (Ref. 54721541_1_1 dated 27 March 2014). A summary of the information is provided below and a copy of the maps is included as **Appendix B**.

Map Dates	On-Site Features	Relevant Off-Site Features
1854 -1905	Undeveloped agricultural land.	Barnsley Road, adjacent to south New Laithes Farm immediately to NW, later called Holly Grove.
1905-1962	No significant changes.	Goldthorpe Brickworks present 250m to SW.
1962 - 1995	No significant changes.	No significant changes.
1995 - 2006	No significant changes.	Dearne Valley Park (A635) constructed immediately to north.
2006 - present	No significant changes.	Residential development, adjacent to east.

3.2 In summary, the site has no history of previous contaminative use and has remained undeveloped. No significant contaminative industry has historically operated adjacent to the site apart from a brick works some 250m to SW, which was present between 1905 and 1962.

4 ENVIRONMENTAL SETTING

4.1 This section is based principally upon a search of information available on public registers through an Envirocheck search (Reference 54721541_1_1) included as **Appendix C**, together with other sources as indicated.

Geology and Mining

4.2 A summary of the site geology, based on available published information, is provided below.

Sources of Information	British Geological Survey (BGS) Sheet 87 Barnsley, 1:50 000 scale, Solid and Drift Edition. Coal Authority Mining Report. A Coal Authority mining report is included as Appendix D. BGS GeoIndex online database: 1 published borehole logs drilled near the site in the 1970's which is included in Appendix E.
Made Ground	None recorded on published maps. The previous boreholes recorded between 1.4m of topsoil, burnt shale and reworked soft to firm clay.
Superficial Deposits (drift)	The historical borehole records indicate firm yellow clay at approximately 1.4m to 1.9m depth.
Solid Geology	Carboniferous Middle Coal Measures, unnamed sandstone. The site lies in a faulted block, with the Shafton coal seam conjectured to crop some 500m to the south. According to a NERC publication of the Barnsley Coal Field the Shafton seam is between 1m and 2m thick. The historical borehole records indicate bedrock depth at approximately 1.9m and consists of bands of sandstone and mudstone to at least 4.4m depth.
Mining	The Coal Authority record workings beneath the site in 5 seams of coal between 280m and 810m depth. The Coal Authority also believes that the site is in an area where coal exists at or close to the surface which may have been worked at some time in the past. 1 mine entry is recorded on the northern site boundary which was filled by Barnsley MBC during the construction of the Dearne Valley Parkway. It should be noted that other unrecorded mine entries may be present. A supplementary interpretative report obtained from the Coal Authority for the recorded shaft is included as Appendix D. The report indicates the shaft to be immediately to the north of the site, is 2m wide and 27m deep. Based on this record it can be anticipated that this shaft would have been sunk to exploit the Shafton Coal seam.
Quarrying	None recorded on or immediately adjacent to the site.

Hydrology and Hydrogeology

4.3 A summary of available information pertaining to hydrology, hydrogeology, flood risk potential, water abstractions, discharge consents and pollution incidents to controlled waters is provided below.

Watercourses	Thurnscoe Dike 182m to north.
Flood Risk	The site does not lie within a fluvial flood plain considered to be at risk of flooding.
Groundwater Classification	Solid Geology: Minor Aquifer (Secondary A aquifer). Superficial Geology: NR.
Source Protection Zones	NR.
Springs	NR.
Wells	NR.
Licensed Surface Water Abstractions	NR within 1km.
Licensed Groundwater Abstractions	NR within 1km.
Discharge Consents	NR within 250m.
Pollution Incidents	NR within 250m.

NR – None Recorded

Landfill Sites and Waste Management

4.4 A summary of information regarding landfill sites (historical or current) and waste management facilities is provided below.

Local Authority Recorded Landfills	NR within 250m.
BGS / EA Recorded Landfills	NR within 250m.
Other Waste Management Facilities	1 registered waster transfer site 189m N; licence recorded as cancelled.

NR – None Recorded

Pollution Controls and Industrial Land Use

4.5 A summary of Pollution Control records and potentially polluting activities (fuel stations) is provided below.

Integrated Pollution Controls (IPC)	NR within 250m.
Integrated Pollution Prevention and Control (IPPC)	NR within 250m.
Pollution Prevention and Controls (PPC)	NR within 250m.
Petrol Filling Stations	NR within 250m.

NR – None Recorded

Radon

4.6 Radon protection measures are not required at this location.

Other

4.7 Other sensitive land uses or potentially contaminative activities are listed below. The entries relate to activities within approximately 250m of the site.

- 1 Contemporary Trade Directory Entry; inactive truck dealership 220m to north east.

5 CONCEPTUAL SITE MODEL

5.1 Based on the available desk study information, a conceptual site model (CSM) has been developed for the proposed future land use (commercial). This summarises the understanding of the existing site and its historical development, the site geology, the potential contaminant sources, transport pathways and receptors in order to assess potential pollutant linkages. In assessing the potential contaminants present at the site, reference has also been made to the relevant sections of CLR 8, the Department of the Environment Industry Profile reports and any other relevant supporting documentation.

5.2 The proposed development comprises an Aldi store with associated car parking and landscaping areas, as shown on the proposed site plan included in **Appendix A**. Based on the available information, a summary of the potential contamination sources, pathways and receptors is provided below.

Sources of Contamination

- Contamination associated with current and historic activities – made ground from construction of the adjacent highways.
- Ground gas from any made ground or coal workings.

Potential Pollution Pathways

- Humans – direct contact, soil ingestion and dust inhalation.
- Secondary A Aquifer – leaching and vertical migration of contamination.
- Vertical and lateral migration of ground gas into buildings and service entries (manholes).

Receptors

- Site end users.
- Construction workers.
- Underlying Aquifer (Secondary A).

Pollutant Linkage Assessment

5.3 A qualitative risk assessment has been made of the likelihood of any pollutant linkage operating and its potential significance, as summarised in the table below:

Contamination Source	Pathway	Hazard	Potential Receptors	Linkage Complete
Contaminants associated with made ground on site	Direct contact, ingestion, dust inhalation	Human health risk	Site construction workers	Yes, can be removed by the use of appropriate PPE and limited exposure
	Direct contact, ingestion, dust inhalation	Human health risk	Site end users	Yes, mitigated by use of hard cover in development
	Lateral and vertical migration	Pollution of controlled waters	Secondary A aquifer	Yes, although unlikely given the site history
Contaminants associated with off site sources	Lateral migration	Human health risk	Site end users	Yes, although unlikely given the site history
Ground Gas	Vertical migration into buildings or confined spaces	Human health risk. Fire risk	Human health and property	Yes. Possible gas from made ground and coal workings

5.4 At this stage, it is considered unlikely that the site will be significantly contaminated.

6 ENVIRONMENTAL RISK ASSESSMENT

6.1 The potential environmental risk has been assessed based on the 'source-pathway-target' pollutant linkages identified in the Conceptual Site Model, which requires that for a liability to arise each stage of the pollutant linkage must be present. References to risk classifications are made according to the following definitions:

- **Low risk** – it is unlikely that an issue will arise with respect to causing significant harm to human health or controlled waters.
- **Medium risk** – it is possible that an issue could arise with respect to causing significant harm to human health or controlled waters.
- **High risk** – it is likely that an issue will arise with respect to causing significant harm to human health or controlled waters.

6.2 Having evaluated the information gathered during this study and described in the previous sections the following risk assessment has been produced.

ENVIRONMENTAL RISK ASSESSMENT		
	Risk rating	Reason
Contamination potential for:		
On-site contamination	Low	No evidence of contaminative site usage.
Contaminants migrating off site	Low	No evidence of contaminative site usage.
Contaminants migrating onto site	Low	No evidence of contaminative site usage in immediate area part from made ground to raise road levels
Other environmental issues giving rise to concern	Low	None identified.
OVERALL RISK	Low	

Ground Gas Risk Assessment

6.3 Based on the above information gained through the Envirocheck report, the risk of ground gas emissions is considered to be low to moderate. The following summarises the gas risk for the site:

Potential Gas Source	Hazard	Risk Rating	Justification
Made ground (CH ₄ , CO ₂)	Humans: health risk Buildings: explosion	Low	Made ground not anticipated to be thick or putrescible.
Coal and historical mining	Humans: health risk Buildings: explosion	Low - Medium	Worked coal seams at 27m depth. Treated mine entry on northern site boundary.
Radon	Humans: health risk	N/A	No precautions required.
Overall Risk		Low - Medium	

7 GEOTECHNICAL CONSIDERATIONS

7.1 The following geotechnical considerations are given as preliminary guidelines only based on the available data on the ground conditions. Consequently, the following should not be taken as design criteria without further geotechnical data obtained from a suitably designed ground investigation.

Mining

7.2 The Shafton coal seam is known to have been used for industrial and brick making purposes and a brick works has been identified to the south west of the site. In addition a shaft has been identified on the north site boundary, which is understood to have been 27m deep.

7.3 Based on the above, it is possible that shallow coal workings are present beneath the site and it is recommended that a rotary drilling investigation is carried out to confirm the geology with respect to shallow workings.

Foundations

7.4 It is anticipated that the site is underlain by thin deposits of made ground or topsoil underlain by superficial clay and relatively shallow bedrock. Made ground is considered unsuitable as a bearing stratum using conventional shallow spread foundations due to the potential for excessive total and differential settlements. Foundations should therefore extend below any made ground to bear onto the natural superficial deposits. It is considered that conventional strip or trench fill foundations will be suitable.

Floor Slabs

7.5 It is considered that a ground bearing floor slab will be suitable subject to appropriate re-engineering of the made ground.



Pavements

7.6 It is anticipated, subject to a ground investigation, that standard construction techniques can be utilised.

Gas Protection Measures

7.7 The preliminary ground gas risk assessment identifies that there is a low to medium risk to the development from ground gas due to shallow coal seams and made ground.