Eastwood & Partners
CONSULTING ENGINEERS

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PHASE 1 GEOTECHNICAL AND GEO-ENVIRONMENTAL SITE INVESTIGATION

SHAWFIELD ROAD, CARLTON INDUSTRIAL ESTATE, BARNSLEY

FOR

HAYWOOD & PADGETT LIMITED



39293-001

16 January 2016

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Haywood and Padgett Limited
Shawfield Road, Carlton Industrial Estate, Barnsley

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ISSUE 1

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1.0 EXECUTIVE SUMMARY

1. The site covers an area of approximately 0.82 hectares, located east of Shawfield Road, within the Carlton Industrial Estate. The site is centred on grid reference 436589 408802, it is rectangular in shape and it is relatively flat. It is proposed to contract an extension to the existing bakery premises, as well as two new warehouse buildings and associated hard landscaping.

2. Currently, the northern half of the site is used by a civil engineering company. Various vehicles and materials are stored and used on site, including excavators, cranes, trucks, skips, plastic pipes and tiles. There is a large pile of soil, a pile of rubble, and small piles of waste materials. The southern half of the site is currently vacant. Three small metal warehouses are present on site, and a small mobile café is present in the south western corner.

3. The site is indicated to have been undeveloped until between 2006 and 2015, when four buildings are shown on site. These show the same layout as the current buildings. The facilities are part of the Carlton Industrial Estate which covers the surrounding area.

4. The geological map shows the site to overlie Strata of the lower Coal Measures, most likely comprising mudstone. 'Made ground' is shown to overlie the western edge of the site. This is of unknown composition and depth.

5. The site is not expected to be affected by shallow mining

6. Simple pad foundations below columns should be suitable for the proposed development at a minimum depth of 900mm bgl, with strip or trench fill footings or reinforced ground beams between the pads to carry masonry walls, if proposed. Foundations will need to be constructed at a minimum depth of 900 mm and should be deepened near to trees.

7. A reinforced cast in-situ concrete ground floor is expected to be suitable for the proposed development.

8. Soakaways are not expected to be a suitable method of surface water drainage, due to the anticipated cohesive ground conditions. Surface water should be directed to a piped system.

9. No radon protective measures are necessary.

10. There are no recorded landfill sites within 250m of the site. Significant depths of made ground are not expected below the majority of the site, but may be encountered to the west of the site. At this stage, allowance for placing a gas resistant membrane below the floor should be made.

11. High levels of contamination are not expected on the site at this stage and the site will be hardcovered on completion. Significant remediation is not expected to be required and is expected to be limited to providing a minimum thickness of 450 mm of inert topsoil if any parts of the site are to be soft landscaped.

12. A minimum of Class 2 sulphate precautions should be allowed for in below ground concrete at this stage, and protective measures should be allowed for water supply pipes in areas of made ground. Chemical testing of soil samples may show this not to be required.

13. The conclusions made in this report in relation to contamination are subject to agreement by the approving bodies, such as the Local Authority and any warranty provider.

2.0 INTRODUCTION

2.1 Terms of Reference

This report presents the findings of a Phase 1 Geotechnical and Geo-environmental Site investigation carried out by Eastwood & Partners (Consulting Engineers) Limited for Haywood and Padgett Limited under the instruction of Building Design Services Limited. Any other parties using the information in this report do so at their own risk and any duty of care is excluded.

2.2 Context

Eastwood & Partners are not aware of any previous site investigations having been undertaken on this site.

2.3 Aims and Objectives

The aims and objectives of this investigation were as follows:

- To assimilate and review information extracted from published documentation as well as that obtained from a site reconnaissance to derive an outline conceptual model identifying potential contaminants, pathways and receptors, as well as possible linkages between these;
- To detail the expected ground conditions and their geotechnical properties enabling outline foundation proposals to be made for the proposed commercial development; and
- To outline proposals for further Phase 2 intrusive investigation, the purpose of which would be to obtain information to test the conceptual model and assess the risks to receptors as well as to confirm the foundation proposals.

2.4 Scope of Investigation

This document constitutes the findings of the Phase 1 investigation. This involved a review of information extracted from published documentation. Information regarding the current and former land uses both on and surrounding the site, as well as the environmental sensitivity of the location as determined by factors including geology, hydrogeology and hydrology, have been examined.

Information analysed has been obtained from a variety of sources and included the following:

- A Landmark Envirocheck report. This includes historical maps, as well as information regarding environmental issues such as abstraction licenses, pollution incidences and waste facilities

- A Coal Authority mining report
- Geological maps and associated geological memoirs
- Site walkover

2.5 Limitations of Investigation

This report is based on the assumption that the development will be for commercial use, comprising an extension to the current bakery building and the erection of two new warehouses, with associated service yards and car parking. It is assumed that ground levels will not alter significantly. If this is not the case, further advice may be needed.

Where assessments of site areas affected in particular ways are given, these are approximate. All information, comments and opinions given in this report are based on the documentary information examined. However, there may be conditions at the site that have not been taken into account, such as unpredictable soil strata and water conditions. This report considers the ground and groundwater and does not cover any buildings or their fabric. Risks to ecological receptors, such as bats, have not been considered.

3.0 THE SITE

3.1 Description

The site covers an area of about 0.82 hectares, located to the east of Shawfield Road, within the Carlton Industrial Estate in Barnsley. The site is centred around grid reference 436589 408802 and has a rectangular shape on plan and is relatively level.

The northern half of the site is currently used by a civil engineering and groundworks company. Various vehicles are stored and used on site, including excavators, cranes and trucks, along with tools and attachments/spares for the vehicles. There is a large pile of soil, which is currently being moved. There is also a pile of rubble, and several small piles of household waste. Various equipment and materials are being stored on site, including plastic piping, bricks and tiles etc. Two metal clad warehouse buildings are present in the northern half of the site.

The southern half of the site is currently vacant. Several low walls are present in the south eastern corner, along with rubbish and empty plastic IBCs. A metal warehouse is present, and a small mobile café is present in the south western corner.

The whole site is covered by areas of concrete, areas of compacted gravel, and an area of brick/stone made ground in the south east.

Photographs of the current site layout are included in Appendix 1.

3.2 History

Historical maps, obtained as part of the Envirocheck Report, have been reviewed to assess the previous use of the site and surrounding area. Copies of the maps are presented in Appendix 2.

3.2.1 The Site

The first map reviewed, dated 1854-1855, shows the site to be undeveloped and to comprise parts of three separate fields.

The site shows no significant change until 2006 where the western field boundary is no longer shown. By 2015 four small buildings are shown within the site, with the same layout as the current storage buildings.

No further significant changes have occurred to the present day.

3.2.2 The Surrounding Area

The earliest maps reviewed, dated 1854-1855, show the wider surrounding area to predominantly comprise agricultural land. By 1894 railway lines are present around 750 m east of the site, serving

collieries in the wider region. The closest one to the site is the Monk Bretton Colliery, located about 800 m south east of the site. The Wharncliffe Woodmoor Colliery and the Carlton Main Colliery are located approximated 1km to the north west and 1.2km to the north east respectively.

By the late 1930's, limited amounts of residential development have occurred in the wider surrounding area around 700m south east and north west of the site. Residential development continues and by 1974 a large portion of the areas to the west, south and east was covered by housing estates.

By 1981, the immediately surrounding area was developed with warehouses and depots of the Carlton Industrial Estate. This includes two tanks (most probably water/sprinkler tanks) approximately 50 m and 100m north west of the site. New residential properties are also added approximately 20 m to the east of the site. By 1991 the area directly to the north was developed with further industrial units, and another water tank is shown approximately 60 m to the north of the site.

The existing Haywood and Padgett Bakery is shown by 2006 immediately south of the site, and by 2015 a warehouse is shown to the rear of the bakery, in the present day configuration.

3.3 Geology

The geological map sheet SE 30 NE (1:10,560 scale) shows the site to overlie undifferentiated mudstone from the lower Coal Measures. Made ground is indicated to overlie the western edge of the site.

The general dip of the strata is expected to be 5-8° to the south east, although this value may be inaccurate, as dip measurements are scarce and not present within vicinity of the site by the maps.

No superficial deposits, other than the made ground, are shown to be present on site. No faults or other lines of weakness are shown to cross the site.

The British Geological Survey holds records of five boreholes located between 90 to 120 m south of the site, within the same geological strata. These reached a maximum depth of 5.6 m bgl. The natural ground comprised firm and/or stiff clay to depths of between 1.3 and 2.3 m bgl, overlying mudstone, siltstone and shale.

3.4 Hydrogeology

3.4.1 Groundwater Vulnerability

The Envirocheck Report records the site to overlie a Secondary A Aquifer. This aquifer classification comprises 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.

The site does not lie within a Groundwater Source Protection Zone.

3.4.2 Groundwater Abstractions

The Envirocheck Report does not list any groundwater abstractions within 500 m of the site.

3.5 Hydrology

The nearest surface water feature is indicated to be a drain about 170m north west of the site. This is not expected to be influenced by activities on the site.

3.6 Coal Mining

According to the geological map, the closest outcrop of coal is the Swinton Pottery Coal, which lies approximately 600m north of the site. This coal seam is expected to pinch out towards the site, and also lies stratigraphically above the site. It is therefore not considered to underlie the site.

The shallowest coal seam beneath the site is expected to be the Newhill Coal seam, which is estimated to be between 0.6 m and 1.35 m thick. Two boreholes to the north of the site, in a similar stratigraphic position, record this coal seam at 13 and 16 m bgl. When topography is taken into account the same coal seam can be estimated to lie under the site at approximately 25 m bgl. As there is estimated to be more than ten times the coal seam thickness of competent strata above the seam, any workings in the Newhill Coal seam should not affect ground stability at the surface for the proposed development.

The next shallowest coal seam is indicated to be the Meltonfield Coal, which is expected approximately 45 m below the Newhill Coal, and therefore approximately 70 m bgl. It is therefore not expected to pose a ground stability issue for the proposed developments.

A Coal Authority report has been obtained for the site. It states that the site is in the likely zone of influence from workings in 6 seams of coal at 80m to 320m depth, and last worked in 1958. Any ground movement from these coal workings should have stopped by now. The site is not in an area for which the Coal Authority is determining whether to grant a licence to remove coal using underground methods. The report does not state that the site lies in an area where coal is expected at shallow depth. This indicates that the Newhill Coal may be at a depth of at least 30 m bgl.

There are no known coal mine entries within, or within 20 metres of, the boundary of the property. However, records may be incomplete. The site is not within the boundary of an opencast site from which coal has been removed by opencast methods. The site is not within 200 metres of the boundary of an opencast site from which coal is being removed by opencast methods.

The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres, since 31st October 1994. There is no record of a mine gas emission requiring action by the Coal Authority within the boundary of the property.

Based on the above information, the Newhill Coal appears to be at a depth where any workings that have been undertaken will be at a depth where they are not expected to influence the development at the surface on the site. Therefore the site is not expected to be affected by shallow mining.

Sandstone quarrying has taken place in the nearby area. However, as mudstone is expected to underlie the site, sandstone quarrying is not considered to have taken place on site.

3.7 Ground Gas

Information contained within the Envirocheck Report states that no radon precautions will be required for properties constructed at the site.

According to the Envirocheck Report, there are no operational or historical landfill sites within 250 m of the site.

Made ground is expected to be present on site. The depth of the made ground shown on the geological map us unknown, although due to its localisation, it is not considered to be of significant thickness at this stage. As made ground is expected on site there is a slight risk of ground gas being produced and migrating towards the proposed development. At this stage, an allowance should be made for basic gas resisting measures. It is anticipated that a fully lapped and sealed gas resistant membrane, below the floor slab would be sufficient to mitigate any potential risk. Alternatively, intrusive investigation may prove there to be no significant thickness of made ground present and therefore, no risk would be presented.

3.8 Pollution Incidents to Controlled Waters

The Envirocheck Report records two pollution incidents to controlled waters within 250 m from the site. These are classified as minor incidents (Category 3), involving oils and unknown sewage. They occurred in 1992 and 1995. These incidents are not expected to have significantly affected the site.

3.9 Discharge Consents

The Envirocheck Report records no discharge consents within 250 m of the site.

3.10 Flooding

The Envirocheck Report indicates that the site does not lie within a floodplain.

4.0 EXPECTED GROUND CONDITIONS

4.1 Surface Covering

The site is currently surfaced by a combination of concrete slabs and compacted gravel.

The slabs are not expected to be significantly thick at this stage, but may contain reinforcement.

4.2 Made Ground

A superficial covering of made ground is generally expected across the site from surface. From a visual inspection, this appears to contain fragments of brick, stone, concrete and macadam within a sandy matrix. This surface covering is generally not expected to extend to significant depth.

The geological map indicates the western side of the site to be partially covered with an unknown depth of 'made ground', which is expected to extend beneath the western side of the bakery extension.

4.3 Natural Ground

The natural ground conditions are anticipated to predominantly comprise firm to stiff clay overlying mudstone at relatively shallow depth.

4.4 Groundwater

Groundwater is not expected to be encountered at shallow depth.

5.0 OUTLINE CONCEPTUAL MODEL

The current bakery to the south of the site is proposed to be extended, and two new warehouses are proposed to be erected for product storage.

5.1 Potential Sources of Contamination

Geological maps suggest that the western part of the site has been partially covered with made ground. The nature and thickness of which are not known. Historically, the site was predominantly agricultural land, and was only developed for commercial use in recent years.

Any made ground on site may contain elevated concentrations of heavy metals/metalloids, such as arsenic, and lead, as well as elevated levels of polycyclic aromatic hydrocarbons (PAHs), particularly if ashy materials are present. Elevated concentrations of petroleum hydrocarbons could also be present locally where vehicles and plant machinery has been stored on site. Elevated concentrations of sulphates may also be present within the made ground.

5.2 Ground Gas

No radon precautions will be required for properties constructed at the site.

There are no recorded landfill sites within 250 m of the site. Landfill gas from the surrounding area is therefore not expected to be a significant risk.

Made ground is expected on site. However, this is not anticipated to be of significant thickness at this stage. The geological map shows the western edge of the site to be potentially covered with made ground. We consider the risk of significant gas generation to be low at this stage. However allowance for the provision of a gas resistant membrane below the ground floor slab is recommended at this stage.

5.3 Potential Pollutant Linkages

Source	Pathway	Receptor
• Heavy metals/metalloids, asbestos fibres and PAHs in any made ground.	• Ingestion, inhalation, direct contact	• Future staff, visitors to site, construction workers
	• Migration through ground	• Secondary A Aquifer
• Heavy metals/metalloids and PAHs in natural ground.	• Direct contact	• Water supply pipes
• Sulphates in made ground	• Direct contact	• Below ground concrete
• Ground Gas	• Migration through ground	• Future staff and visitors

5.4 Remedial Measures

We understand that the proposed development will be for a commercial end use. High levels of contamination are not generally expected on the site. At this stage it is considered that the following allowances for remediation be made:

- A minimum thickness of 450 mm of inert topsoil if any parts of the site are to be soft landscaped.
- A minimum of Class 2 sulphate precautions in below ground concrete and protective water supply pipes in areas of made ground. Chemical testing of soil samples may show such measures to be unnecessary.
- The provision of a gas resistant membrane within the ground floor of the new bakery and warehouses. The membrane will need to be fully lapped and sealed. The need for this should be confirmed by intrusive investigation to determine whether any significant depth of made ground underlies the site.

6.0 GEOTECHNICAL APPRAISAL

6.1 General

The bakery workshop is proposed to be extended and two new warehouses are proposed to be erected.

Made ground is not anticipated to be present to significant depths across the majority of the site, but may be present, at an unknown depth underlying the western side of the bakery extension. The natural ground conditions are expected to comprise firm to stiff clay over mudstone.

The site is not considered to be at risk from shallow mining. However, made ground associated with colliery spoil could potentially be present beneath the proposed development.

6.2 Foundations

It is likely that the proposed bakery extension and warehouses will be constructed around a steel frame with masonry walls around and lightweight cladding. At this stage, it is expected that simple pad foundations below column positions will be suitable for the building frame, with strip or trench fill footings or reinforced ground beams between the pads to carry the masonry walls.

Foundations should be taken through any made and any soft layers and constructed in the competent natural ground below, at a minimum depth of 900 mm bgl, and deeper near trees.

If the intrusive investigation shows deep made ground to be present, alternative solutions may need to be considered, such as piled foundations.

6.3 Ground Slabs

A reinforced cast in-situ concrete floor should be suitable for the proposed development.

6.4 Superstructure Precautions

Superstructure precautions are not expected to be required due to the anticipated ground conditions.

6.5 Excavation Problems

Significant excavation problems are not anticipated.

The sides of trenches and excavations may be slightly unstable and temporary support may possibly be required in some areas. 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 sides of the excavation, the sides should be supported or battered back to make them safe.

6.6 Concrete

At this stage, sulphate precautions should be assumed to be required. We consider it prudent to assume class DS-2 AC-2 precautions as a minimum.

6.7 Surface Water Drainage

Soakaways do not seem to comprise a suitable method of surface water drainage, due to the anticipated cohesive ground conditions. It is likely that surface water will need to be taken into the piped drainage system. The site may already have a suitable system into which the new building can connect, subject to agreement by the regulators.

7.0 RECOMMENDATIONS FOR FURTHER WORK

Before more definite information regarding the properties of the ground and any contaminants present can be given, an intrusive ground investigation would be required. Investigation by mechanically dug trial pits would be the preferred method, as this allows a larger volume of soil to be viewed, although a window sample investigation could be used if disturbance to the existing surfacing is to be kept to a minimum.

If potentially permeable ground is encountered, infiltration testing is recommended to determine the suitability of the ground for soakaway drainage.

If deep made ground is found to be present, a borehole investigation may be necessary to establish the depth to competent strata.

The potential pollutant linkages presented in Section 5.3 would need to be investigated by means of soil analysis. The chemical testing suite should be chosen to cover the range of potential contaminants indicated. Geotechnical testing should be carried out if clayey soils are encountered to determine their volume change potential.

Appendix 1

Site Photographs



South east of site



Made Ground surfacing in south eastern area of site

Prepared	MDY	Checked	AJK	Date	16.01.2016	Photograph No	1 & 2

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SITE PHOTOGRAPHS



North east of site used for storage



Northern Area

Prepared	MDY	Checked	AJK	Date	16.01.2016	Photograph No	3 & 4

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SITE PHOTOGRAPHS



Central Area of SIte



Waste materials stored in northern area of site

Prepared	MDY	Checked	AJK	Date	16.01.2016	Photograph No	5 & 6

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SITE PHOTOGRAPHS



Scrap materials stored in North of site with soil mount adjacent



Buildings in north west

Prepared	MDY	Checked	AJK	Date	16.01.2016	Photograph No	7 & 8

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SHAWFIELD ROAD, CARLTON, BARNSLEY

SITE PHOTOGRAPHS

Appendix 2

Envirocheck Report

Coal Authority Mining Report