GROUND STABILITY REPORT

&

MINING RISK ASSESSMENT

PROPOSED EXTENSIONS & ALTERATIONS

KEN MALLINSON & SONS LTD TRANSPORT YARD

CLAYCLIFFE ROAD, BARUGH GREEN, BARNSLEY, S75 1LR

REPORT ref: TH/RA/MALL/001 – 16th March 2016

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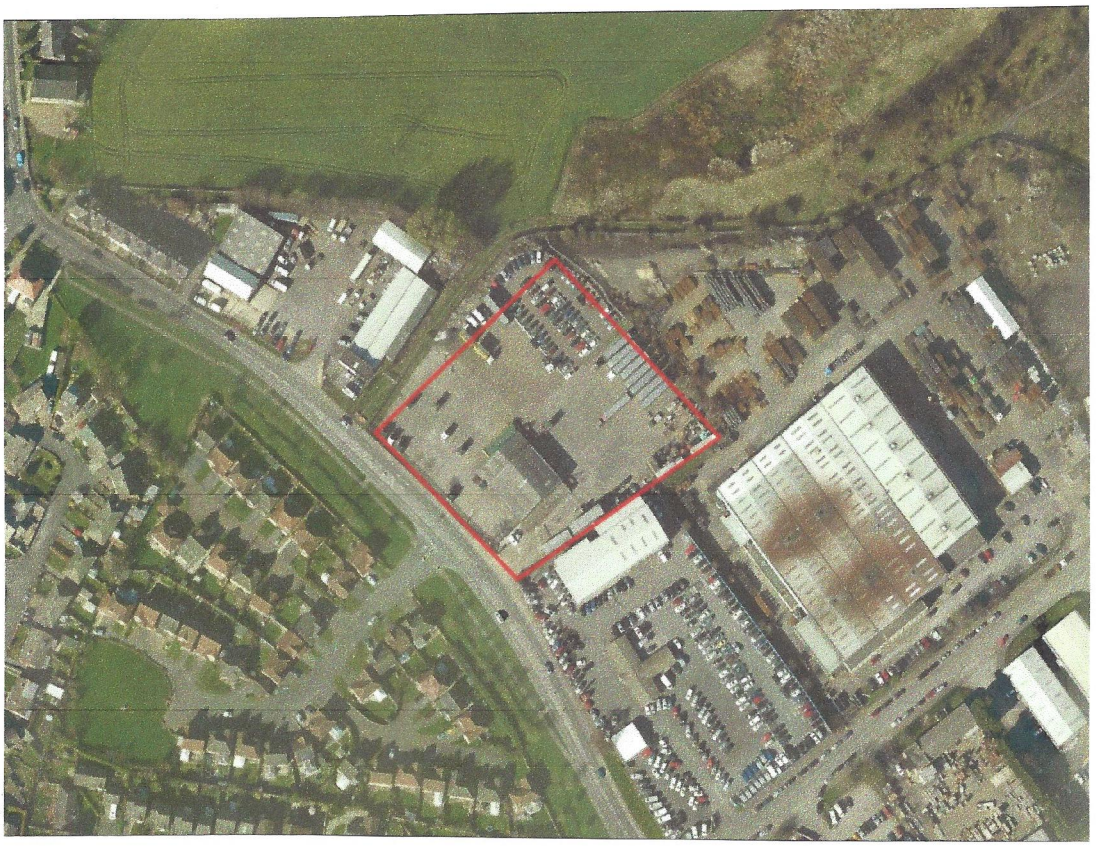
(i) TERMS OF REFERENCE

In March 2016, on the instructions of Mr Robert Agus (White Agus Partnership), acting on behalf of the client (Ken Mallinson Ltd), a pre-planning *Mining Risk Assessment* and *Ground Stability Appraisal* was requested for the purposes of a planning application to build extensions and make alterations to an existing commercial property at Claycliffe Road, Barugh Green, Barnsley, S75 1LR.



The Local Planning Authority required further information regarding the suitability of the site for the construction of the extension, and further details of the history of the site by way of a *Preliminary Mining Risk Assessment* regarding past coal mining use/influence, *Ground Stability* and *Radon* protective measures. There are three recognised key stages to making an assessment of this type;

- Obtain detailed ground stability and coal mining information for the proposed development site.
- Identify what risk, if any, is present from ground instability, coal mining and/or the presence of radon.
- Identify how ground instability, coal mining issues or radon might influence the development, its design layout, construction etc., and describe any mitigation required.

(ii) THE PARTIES

Property Address	Claycliffe Road, Barugh Green, Barnsley, S75 1LR
Client/Owner	Ken Mallinson Ltd Contact: (via architects only)
Architect/Designers	White Agus Partnership Contact: Mr Robert Agus E: info@whiteaguspartnership.co.uk T: 01226 208482
Geological Consultants	Earth-Tech Consulting Ltd Contact: Mr T. M. Hyett M.Sc FGS MIEI MCIOB Chartered Engineering Geologist E: timhyett@hotmail.co.uk T: 07790 581478

(iii) THE PROPOSED DEVELOPMENT

The proposals consist of an extension and minor alterations to workshops and offices to an existing, detached commercial premises.

The proposed new build development works are described in the Planning Application being prepared by architects *White Agus Partnership*, to be submitted in accordance with the Town and Country Planning Act, 1990 and generally are as detailed on drawing No. 14-104 (02). A copy of the drawing is attached at Appendix A.

(iv) THE SITE

The site is located on Claycliffe Road in the district of Barugh Green in Barnsley. It is an existing commercial site comprising an operational HGV transport distribution depot with an external surfaced parking capacity of 30 + trailers, HGV vehicles and other vehicles. The site is fully gated with security access and includes small office and welfare facilities integrated with an existing workshop constructed in steel frame with traditional brick cladding. There are 3No double height roller shutter doors to the front and to the rear of the existing structure. In addition, there are four overspill offices to the right of the entrance provided by way of double stacked, temporary porta-cabins.

The overall site is extensive and is generally a level site, sloping slightly to the North-east with defined boundaries. The surfacing is predominantly concrete paving with tarmacadam and other established hard-standings.

The development works consist of an extension to the existing workshops and minor alterations to the existing building to achieve a more substantial integrated workshop and offices.

(v) AVAILABLE INFORMATION

The following information was made available during the course of this appraisal;

a. Copies of the site plan & schematic showing the general site location and the proposed development and alterations (Dwng No. 13-104/07A).

b. An Ordinance Drawing depicting the site and its environs.

c. Access to the site to carry out a walk over survey.

(vi) MANDATORY GUIDANCE

- The Contaminated Land (England) Regulations 2000.
- Contaminated Land (England)(Amendment) Regulations 2012.
- The Environment Act 1995.
- The Environmental Protection Act 1990.
- Department for Communities and Local Government, 2012, National Planning Policy Framework.
- Department for Environment, Food and Rural Affairs, April 2012.Environmental Protection Act 1990, Contaminated Land Statutory Guidance. The Stationery Office Ltd.

(vii) TOPOGRAPHY & NEAR SURFACE GEOLOGY

The site was inspected and surveyed on 16th March 2016 by Mr T. M. Hyett M.Sc FGS MCIOB MIEI, a Chartered Building Engineer and Consultant Engineering Geologist from *Earth-Tech Consulting Ltd.*

Fig 1 – Ken Mallinson Ltd existing Worksops

The site is completely fenced and secure. There is evidence of very sparse vegetation around the perimeter, and the main site has a general covering of concrete paving, tarmacadam and sealed hardstanding. There are no established trees or vegetation that might affect the extension proposals or the alterations.

It is clear that the site has a current commercial use, primarily as a large storage and operational yard for HGV vehicles and trailers, and modest workshops for repairs and servicing etc.

The purpose of the walkover survey was to attempt to identify the undisturbed near surface geology, comment on the general bearing capacity of the soils to be expected at foundation depth, and provide general advice on the suitability of the ground generally for the construction of the proposed new development.

From the limited observations, and from consulting *Geological Map Extracts* from the *British Geological Survey* (BGS), the general underlying geology to be expected to be as follows :

"*MADE GROUND: grey clayey gravelly slightly organic fine to coarse SAND with some gravels. Gravel is angular to sub-rounded fine to coarse sandstone, occasional brick, ceramic, clinker.*" (ARTIFICIAL DEPOSIT) overlying "*Weathered, moderately strong Mudstone, Siltstone and Sandstone*" (PENNINE MIDDLE COAL MEASURES FORMATION).

Historical information indicates that the site is in location where there are records of **Potentially Infilled Land** (which includes former refuse heaps dating from 1929 to 1966).

Fig 2 – Ken Mallinson Ltd showing temporary two storey offices

Vegetation on the site is sparse, and what does exist is focussed around the perimeter. There is a small amount of shrubbery and four silver birch trees along the SW boundary, where the site abuts Claycliffe Road, all of which are unestablished and situated a more than adequate distance from the proposed works to be wholly unaffected, or to influence the structural integrity of the proposed building(s).

Fig 3 – Ken Mallinson Ltd showing SW boundary to Claycliffe Road

Evidence suggests a mixed soil type with the primary soil type in the overall matrix comprising mainly MADE GROUND and potential infill (unknown) overlying BEDROCK of the *Pennine Middle Coal Measures* formation. No problems are envisaged with swelling or shrinkage of soil due to the movement of groundwater and the propagation of trees, vegetation, flora and fauna.

Groundwater was not observable within the site or in any locations surrounding the site, but it can be assumed with some reliability that ground water level is below the zone of influence of the proposed foundations. There was no evidence of a perched water table and/or artesian pressure within the soil at shallow depth and groundwater, whilst not observed, if present at deeper elevations can reliably be estimated from empirical data to be in the region of between pH 5.5 – 7.0 representing a *low risk* in terms of acidic ground and potential sulphate attack on existing concrete and cement mortars (if any risk at all).

The topography of the site is generally flat and there is no evidence of unstable slopes or subsidence, however there is historical evidence of **infilled land**, which suggests the possibility of **compressible soils** or weak soils in the immediate proximity of the proposed development.

There is also a large, temporary diesel fuel tank on the site that will be moved to another location and may require a suitable catchment bund.

Fig 4 – Ken Mallinson Ltd fuel tank that requires moving to another suitable location

Historic records confirm that the site was used as a garage and motor vehicle repair site from 1998, and there is evidence that the site includes **Potentially Infilled Land** (including refuse heaps) from 1929 to 1966. This suggests the site had previous industrial use that might give rise to the presence of contaminants in various concentrations.

The existing site is fully sealed at the surface with extensive concrete paving and/or tarmacadam surfacing. As such it was not possible to inspect the underlying geology but the site itself was very tidy, generally clean and well maintained, and there were no visual indicators of the presence of, or high concentrations of *oils, lubricants, sulphates, asbestos (chrysotile, amosite, tremolite, actinolite or ferroactinolite), radon gas, methane, high concentrations of carbon monoxide, hydrogen sulphide* or *carbon dioxide*.

Given the proposals are to extend the existing workshops (only), and make minor alterations, in my opinion there is no requirement to further investigate the site for contamination or contaminated soils at the pre-planning stage, but this should be carried out post-planning for the purposes of providing information that may affect excavations for foundations etc.

PART 1 NATURAL GROUND STABILITY

1.1 BRITISH GEOLOGICAL SURVEY (BGS) - NATURAL GROUND STABILITY

A BGS Geo-Report was commissioned to consider if there are any natural geological hazards (other than coal mining) in the vicinity of the site that could be contributing to ground instability in the area. The BGS Geo-Report: *Natural Ground Stability* (Report No. GR-213345/1) is attached at Appendix B.

The BGS report confirms on page 5 that;

> **Significant natural ground instability is possible in the area. On a scale of A to E (low to high) the level of hazard on the project site is D. There are natural geological hazards in the vicinity of the project site that might contribute to ground instability, and very soft ground might compress and progressively sink under the weight of the building.**

What does this mean?

This means that the project site is situated in a location where there is potential ground instability (from potentially infilled land) that may cause some buildings to suffer subsidence damage due to compressible soils.

It does not necessarily mean that the proposed extension to the workshop on the site will be unduly affected by subsidence, or indeed that the site itself is in any way affected by unstable soils or compressible - it is just that such conditions are known to exist in the general area around the site on Claycliffe Road, and these should be considered at the design stage.

What it does mean for the proposals however, is that the site must be properly investigated post-planning, and suitable building foundations properly designed to take into account the critical geology prevalent across the site. A correctly designed foundation detail will mitigate and/or eliminate any potential risk of unstable soils, should they be found during the course of construction. Piled foundations (and/or a raft foundation) should be considered.

In particular, the site investigation should check for ***plasticity of soils*** (PI), and due consideration should be given to the ***stability of excavations***, ***surcharge loading*** and ***water content*** changes during and after construction. The site investigation should also consider the potential for ***dissolution problems***, and the potential for settlement during construction due to ***compressible soils***. In addition, there exists a potential hazard for geological deposits collapsing when loaded and saturated. If ***collapsible*** (loessic) deposits are encountered, it is important that the building foundation loads do not exceed the ***safe bearing capacity*** of the soils during or after construction.

1.2 BRITISH GEOLOGICAL SURVEY (BGS) – RADON (ENGLAND & WALES)

A BGS Geo-Report – *Radon Report: England and Wales* was also commissioned to consider the general ground conditions in the vicinity of the site and check whether the site is in a radon effected area and whether Radon protective measures are required for new buildings.

The Report confirms that;

> **No Radon Protective Measures are required for the Report Area**

And,

The site is located in a Radon affected area, but the estimated probability of the proposed property being above the Action Level for Radon is 1%-3% which represents an Intermediate Probability that requires no further action

What does this mean?

This means that the project site is situated in a location where there is an intermediate probability that Radon above actionable level will level be encountered, and no formal protective measures (such as Radon barriers etc.) will need to be incorporated into the design of the new buildings. The buildings are also commercial, and are excluded for the purposes of Public Health England, however some consideration should be given to carrying out a radon measurement within the excavations when the sub-surface geology is exposed.

The BGS Geo-Report: *Radon Report: England and Wales* (Report No. GR-213345/2) is attached at Appendix C.

PART 2 COAL MINING & OTHER RISKS

2.1 THE COAL AUTHORITY – COMMERCIAL ENVIRO ALL-IN-ONE REPORT

A *Commercial Coal Mining Enviro All-in-One Report* was commissioned from the Coal Authority Property Search Services to consider if the property is within an area that is in the likely zone of influence from past mine workings. The *Enviro All-in-One Report* was selected because this also includes extensive background data relating to the report area, including the potential for contamination and other relevant features that might affect the development proposals.

The Report confirms the site is within the likely zone of influence from workings in 4 seams of coal at shallow to 160m, last worked in 1970. Any ground movement from these coal seams should have stopped now.

The site is in an area where the Coal Authority believes there is coal close to the surface and this coal may have been worked at shallow depth at some time in the past.

The Report also confirms that;

There are no known mine entries within the site or within 20m of the boundary of the existing site.

In addition, The Coal Authority has not received a damage notice or claim for property within 50m of the site boundary since 31st October 1994.

There is no record of a mine gas emission requiring action by the Coal Authority within the boundary of the site, and the property has not been subject to remedial works, by or on behalf of the Authority, under its Emergency Surface Hazard Call Out procedures.

The Coal Authority Report – *Non-Residential Coal Authority Mining Report* (No. 51001110988001) is enclosed in Appendix D.

What does this mean?

For the purposes of the Local Authority Planning Application, this is not indicative of any potential problems associated with the feasibility of the proposed development. From the walk-over topographical survey of the site carried out on the 16th March 2016, in my opinion it is unlikely that there are any historic buried, shallow mine workings or adits present that could affect the proposed development, which to all intents and purpose, is an extension to an existing building (only).

2.2 CONTAMINATION

The *Commercial Coal Mining Enviro All-in-One Report* does confirm that areas of infilled land are present, or are in close proximity to the report area. There are a number of potentially contaminative issues, and historic records indicate fuel storage tanks present from 1991-1993 and historical landfill areas 16m to the north of the report area noted to accept inert waste in circa 1972. Past industrial uses and historic landfill are of some concern, and are identified close to the study site area.

What does this mean?

For the purposes of the Local Authority Planning Application, this is not necessarily indicative of any potential problems associated with the feasibility of the proposed development.

From the environmental report, and from the walk-over topographical survey of the site carried out on the 16th March 2016, in my opinion the extension to the workshops as proposed is unlikely to encounter landfill that could adversely affect the building. The existing building is relatively new, and is based on a steel frame structure. Given the extent of the site area, it is unlikely that this would have been situated directly above a known landfilled area, and given the proposals are for an extension (only), this risk can be mitigated by adequate foundation design and safety measures adopted during construction.

PART 3 RISK TO THE PROPOSED DEVELOPMENT & MITIGATION MEASURES RECOMMENDED

This assessment is a ***Preliminary Phase 1 Investigation*** intended to give an indication as to the need for further assessment of the site. This report may be submitted in support of either a planning application or for the purposes of due diligence on the part of the owner. It is recommended that further investigation and assessment be carried out (post planning) to fully characterise the site for the purposes of constructing the proposed extension in line with best industry practice.

The evidence collated in this report suggests that the site is suitable for the proposed development however, because the site is located in an area known for ***Coal Extraction*** close to the surface, and ***Ground Instability*** and ***Compressible Soils***, it is recommended that a site investigation is performed post-planning, and in order to perform a suitable foundation design.

There is also a possibility that the site consists of ***Potential Infilled Land*** and other unstable soils (including contaminated soils) at shallow depths. For the purposes of the Planning Application, these are engineering concerns that will affect foundation design (only).

A minor risk of vapour inhalation by site workers is possible (*low to very low*), as is the minor risk of possible contamination of groundwater by hydrocarbons (*very low to extremely low*) due the historic usage of the site. These risks would only be likely should evidence of hydrocarbon contamination in the soil be detected and confirmed in the laboratory by appropriate chemical testing of soil samples obtained from an intrusive site investigation.

During the course of the walkover survey, and from observations, there was no evidence that the near surface soils contained significant quantities of high risk contaminants. In my opinion there is NO REQUIREMENT at this stage to further investigate for contamination pre-planning, but this requirement should be included in the post-planning site investigation.

PART 4 CONCLUSIONS & RECOMMENDATIONS

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a. The site is assessed to present a ***low*** risk with respect to the presence of shallow mine workings beneath the proposed extension. Nonetheless, the scheme should include for a phase of "probe drilling" to shallow depth in order to prove that the extension area (only) is not influenced by shallow mine workings.

b. The probe drilling works should be properly supervised by a qualified geologist or engineering geologist, and the findings should be recorded in a short report format. The information will also serve to assist in the design of a suitable foundation for the extension. In the event that voids are encountered further measures will be required, and/or the site layout may need to be altered accordingly.

c. The site is assessed to present a ***medium*** risk of contamination from evidence of its historic use, in particular evidence that suggests potentially infilled land. The site is presently occupied (and has been for a number of years) but adequate management provisions exists that indicate there is no risk of contamination from any current use.

d. A possibility exists (*minor*) that hydrocarbon contamination could have an adverse impact on site workers during construction and this risk (*low to very low*) should nonetheless be mitigated by the adoption of safe working procedures and the use of appropriate PPE to be developed in construction method statements and risks assessments etc.

e. For the purposes of the development (generally), it is recommended that the site be characterised through a Phase 2 Site Investigation (SI) post planning approval. The SI should include a minimum of 1No. Borehole drilled to a depth not less than 8m (or to rock head, whichever is the shallower). Soil description and classification should be performed in accordance with the requirements of BS5930, and *moisture content, plastic limit, liquid limit* and *plasticity index* should be determined in accordance with the procedures described in BS1377 for the purposes of foundation design. In the unlikely event that contaminants are observed during borehole drilling, chemical analysis on soils should be carried out (as an additional precautionary measure). Should this be required, it is recommended that *TPH analysis, PAH analysis* and *Loss on Drying* be carried out in accordance with laboratory procedures A-T-007/019/020 respectively. [*Note- *this chemical analysis is generally inexpensive for limited soil samples, should it be required*].

Responsibility Statement

I can confirm to Barnsley District Council Planning Authority (and any other third party), that the geological conditions on the site are adequate for carrying out the development as proposed by architects *White Agus Partnership* subject to the provision of further detailed site investigation, mitigation measures to be adopted during construction, and additional foundation design as detailed above.

This report has been commissioned by, and written on behalf of the named client (only) in support of the application and submission to the Local Authority, and to other bodies at the client's discretion. It may not be used for any other purpose.

The report has been prepared under a brief issued by the scheme architects and represents the views of Mr T. M. Hyett M.Sc FGS MIEI MCIOB (Consultant Engineering Geologist for Earth-Tech Consulting Ltd).

Subject to, and in strict accordance with the brief, Mr Hyett accepts responsibility for the report to persons engaged by the architect as specified in the brief, but accepts no responsibility to any other person. Any reliance placed by any other person on the report will be entirely at that person's own risk, and no part of this document may be reproduced or passed to any other party.

Testimony of Independence

I am a professionally qualified Civil Engineer, Chartered Building Engineer and Consultant Engineering Geologist. I am a Fellow of The Geological Society (FGS), Member of the Institute of Engineers Ireland (MIEI); Member of the Chartered Institute of Building (MCIOB) and a Member the British Tunnelling a Society (BTS). I hold a post-graduate Master of Science degree in Engineering Geology (UOL1993), a Bachelor degree in Mathematics and Physics (MMU1989) and under-graduate qualifications in Civil Engineering (LU1986). I have more than 30 years of experience working in the sub-surface and mining industry and I specialise in the fields of underground space, tunnelling and foundation engineering. I also work as a court appointed Expert Witness in the (RCoJ). A detailed CV is available upon request.

I confirm that under para. 2.E.2 of Appendix 2E of *Planning Policy Guidance Note 14 (PPG14) – Development on Unstable Land, DoE, 1990* I am suitably qualified to make these statements, and I understand that my overriding duty is to present independent and impartial expert analysis, and I believe I have complied with that duty. The facts I have stated in this report are true and the opinions I have expressed are correct and they are entirely my own, based upon the evidence I have been shown and my own observations.

Signed

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Timothy M. Hyett M.Sc FGS MIEI MCIOB
Consultant Engineering Geologist
Earth-Tech Consulting Ltd
16th March 2016

Appendix A

Site Layout Drawing

Appendix B

Natural Ground Stability Report – BGS

Appendix C

Radon Gas Assessment - BGS

Appendix D

Coal Authority Report – Enviro All-in-One