

LCRM: Stage 1 Risk Assessment

**LAND TO REAR OF 32 QUEENS ROAD, BARNSELY**

Project Ref: GUK-0425-03

**For: Whitshaw Developments Ltd**

**SITE REFERENCE:**

**Land to rear of 32 Queens Road  
Barnsley**

**CLIENT:**

**Whitshaw Developments Ltd**

**PROJECT:**

**Residential Development**

**REPORT REFERENCE:**

**GUK-0425-03/Rp-001**



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## EXECUTIVE SUMMARY

This summary presents the salient points of the Report but should not be referred to in isolation of the body text. There will be other information contained within the Report which puts into context the findings of the Executive Summary. No reliance should therefore be placed on the Executive Summary until the Report has been read in full. The recommendations given are considered reasonable based on available information and the assessment of the Site as carried out by Groundsmiths (UK) Ltd at this time.

### 1 ENVIRONMENTAL CONSTRAINTS

Ground Investigation: A general environmental ground investigation is considered necessary given the current status and proposed end use of the development in relation to the identified levels of risk associated with the Site.

Biogenic Ground Gases: Risk from ground gas is currently anticipated based on the Site's environmental setting and historic monitoring data. A BS8485 Characteristic Situation 2 determination for the Site is therefore given at this time, but will need to be confirmed.

Radon: No radon precautions are indicated to be required in construction.

General Soil Contamination: A general Site-wide check on contaminant levels should be undertaken within the remit of an intrusive ground investigation.

Asbestos in Soil: A general Site-wide check on the presence of any asbestos containing materials should be undertaken within the remit of an intrusive ground investigation.

Remediation Requirements: If required, an LCRM Stage 3 Remedial Strategy incorporating current YALPAG guidelines would need to be issued to the LPA to address any soils and/or ground gas remediation requirements. Validation reporting would also be needed on a separate basis, once any remedial works had been completed.

Risk to Construction Workers: All works to be undertaken should be specifically assessed as part of a health and safety evaluation to mitigate the exposure of workers to any dusts and fibres as may be generated during development.

Controlled Waters Receptors: Risk from the off-site discharge of any leachable contaminants is considered to be very low. Further assessment is considered unlikely to be required.

Invasive Plants Species: Risk from invasive plant species has not been identified. Further specialist assessments are unlikely to be needed, but should be commissioned as required.

### 2 GEOTECHNICAL & GENERAL DEVELOPMENT CONSTRAINTS

Ground Investigation: A formal geotechnical assessment will need to be carried out to confirm the thickness of made ground materials, in addition to assessing the nature of the underlying natural strata to refusal given the potential for variation with spatial extent and depth.

Buried Concrete: Protection to buried concrete products will be required where they come into contact with soils that exhibit levels of sulphate above DS1, although final design parameters should be discussed with the Designing Engineer following completion of laboratory testing.

Anticipated Foundation Type & Ground Slab: To be confirmed following completion of ground investigation works and consultation with the Designing Engineer, although at this stage it is anticipated that traditional spread foundations and suspended floors should be suitable.

General Ground Stability: Global slope stability problems are not expected, although due consideration should always be given to how other off-site land could impact on the Site. The instability of loose and/or weathered strata should be anticipated, particularly during prolonged periods of wet weather, where any excavations are deep, or are left open for protracted periods of time. Where there is the possibility of weak/unstable ground being present or passing across any boundary, a geotechnical risk assessment of the integrity/stability should

be undertaken prior to excavation works being carried out. Designed and engineered temporary or permanent works should be deployed to ensure their continued stability, as necessary.

Heave Precautions: To mitigate against heave, foundations would need to be constructed in accordance with current guidelines where they are found to lie within influencing distance of removed, existing, or proposed planting when in cohesive soils. The testing of soils would be required to determine this.

Excavation Obstructions: Significant excavation obstructions are not anticipated on the basis of available information. Existing foundations and other substructure would need to be grubbed-out accordingly, where they impact upon new development.

Potable Water Supplies: Protection consistent with brownfield development (e.g. Protecta-Line) could potentially be required. This will need to be confirmed.

Surface Water Drainage: Should infiltration testing be required, this should be carried out in accordance with the method prescribed in BRE365. It should be noted, however, that the Site is underlain by soils that will have a very low infiltration potential. Furthermore, it would not be appropriate for unstable, potentially unstable, or any contaminated soils to receive point-source flows of water from dedicated soakaways. All soakaways in development would need to be 5m or more from foundations and pavement.

Pavement: It is expected that the excavation and replacement of unsuitable material with suitably compacted engineered fill would be needed in development prior to finished surfacing being laid. Since the minimum permitted design CBR is 2.5%, it is recommended at this stage that this conservative value for subgrade be used. Frost susceptibility should be assumed.

Archaeology: The need for archaeological monitoring has not been identified within the remit of this assessment.

### 3 MINING LEGACY CONSTRAINTS

The MRA indicates that the Site could potentially be at risk from shallow unrecorded coal mine workings at <30m depth. Intrusive works were historically completed to 15m bgl, having been commissioned by the previous land owner (although such works were inadequate with respect to the identified levels of risk). Supplementary drilling is therefore required. Once complete, the results of this phase of investigation will be provided in the accompanying LCRM: Intrusive Site Investigation report, Ref: GUK-0425-03/Rp-002.

The treatment of any shallow mine workings would be required if they are found to present an unacceptable level of risk (instability) to the proposed development. Specific proposals to consolidate any such workings would need to be completed in accordance with current UK guidance.

All mining-related investigation and any treatment works to be completed will need to be undertaken in accordance with the MRA's permitting requirements.

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## 1 INTRODUCTION

### 1.1 Appointment

Groundsmiths (UK) Ltd ('Groundsmiths') were appointed by Whitshaw Developments Ltd (the 'Client') to provide professional services in relation to the preliminary geotechnical and geo-environmental assessment of land located to the rear of 32 Queens Road, Barnsley, South Yorkshire (herein referred to as the 'Site').

Groundsmiths have prepared this report (the 'Report') for the sole use of the Client that commissioned it in accordance with the agreement under which our services are performed. No other warranty, expressed or implied, is made as to the professional advice included in this Report. Any unauthorised third parties using the information presented in this Report do so entirely at their own risk and are duly excluded from any warranty, duty of care, or skill.

No part of this Report shall be reproduced or redistributed without the prior written consent of Groundsmiths. However, the Report may be issued by the Client or their Agent to the Local Planning Authority (the 'LPA') to support the discharge of any pre-commencement or other such pre-occupancy planning condition as may be imposed in relation to the Site's redevelopment under the Town and Country Planning Act 1990.

### 1.2 Report Context and Status

It is understood that it is the Client's intention to redevelop the Site for residential end use, with this comprising four dwellings with associated soft landscaping and parking within its curtilage. The aim of this Report, therefore, is to present a preliminary assessment of the geotechnical, mining legacy, and land contamination status of the Site in relation to its proposed redevelopment<sup>1</sup>. It follows on from a series of third party reports dating back to 2008 which comprised coal mining risk assessments <sup>[1,2]</sup>, a preliminary environmental risk assessment <sup>[3]</sup>, and a limited phase of intrusive investigation and environmental risk assessment <sup>[4]</sup>.

The data presented in the pre-existing reports is either outdated or compiled with respect to other planning applications for different schemes; a précis of each report is given below in section 1.5, although this is for information purposes only<sup>2</sup>.

The purpose of this Report seeks to provide an up-to-date baseline assessment of the land contamination status of the Site thought likely to be encountered, having taken account of currently available geo-environmental records and data in relation to the residential development as proposed. The assessment given herein therefore follows a review of currently available published geological, hydrogeological, Mining Remediation Authority (the 'MRA'), and geo-environmental records, with works being completed in accordance with the general requirements of BS10175 <sup>[5]</sup>, BS5930 <sup>[6]</sup>, Land Contamination Risk Management ('LCRM') guidance <sup>[7]</sup> and MRA guidance <sup>[8]</sup>.

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<sup>1</sup> The Client-supplied layout of the proposed development is appended as drawing Ref: 24110D-11-P01.

<sup>2</sup> No reliance is placed upon third party data as it has not been reassigned. It is used solely for the purpose of informing the extent to which previous assessment was undertaken, and where there are any data gaps.

Notwithstanding the provision of discourse on any geotechnical, coal mining, or general construction matters that apply, the assessment also includes for potential sources of historic ground contamination, its anticipated impact on sensitive receptors, and identifies where any further risk assessment or intrusive works are required to facilitate development within the framework of a generic residential with home-grown produce exposure scenario as defined by the Environment Agency <sup>[9]</sup>.

Interpretation and recommendations given in this Report should not be assumed valid for adjacent areas of land, or for alternate land use. Should the proposed Site usage change, or significant other information come to light, the recommendations and conclusions presented in this Report will need to be re-assessed in accordance with current guidance.

### 1.3 Objectives

The primary objectives of this Report are to:

- Obtain current information from published sources with respect to any environmental designations, SSSI, visual and cultural designations, and agricultural and/or habitat designations as may exist on Site or within the immediate area of development;
- Obtain current information from published sources about the likely soil and groundwater conditions within the area of development;
- Identify and assess the potential for any ground related environmental hazards, including the potential for where any adverse ground gas regime may represent constraints to the proposed development;
- Identify and assess the potential for any ground related geotechnical hazards, including the potential for any ground instability arising from coal mining legacy;
- Define an up-to-date preliminary Conceptual Site Model ('CSM') of plausible source-pathway-receptor linkages and undertake a qualitative assessment to evaluate the level of risk associated with each linkage in accordance with the proposed development end use scenario;
- Outline preliminary development recommendations, and
- Provide advice on any additional stages of LCRM assessment that may need to be completed to satisfy the concerns of the regulatory authorities, this including Stage 1 generic or detailed quantitative risk assessment with ground investigation, Stage 2 options appraisal <sup>[10]</sup>, and/or Stage 3 remedial actions <sup>[11]</sup>.

### 1.4 Scope of Works

Assessment undertaken within the context of this Report comprised a review of the following sources of publicly available data:

- British Geological Survey ('BGS') 1:50,000 scale series geological mapsheets <sup>[12,13]</sup>
- British Geological Survey Onshore GeoIndex records database <sup>[14]</sup>
- Emapsite - Enviro+GeoInsight Data Report (Appendix A) <sup>[15]</sup>
- Emapsite - Historical Ordnance Survey ('OS') Plans (Appendix B) <sup>[16]</sup>
- Zetica UXO (Appendix C) <sup>[17]</sup>
- Third party reports (as cited below)

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## 1.5 Previous Reports

Groundsmiths were informed that various third party reports were in pre-existence, with these having been completed to facilitate previous development proposals for the Site. As indicated above, a review of each is given, although it should be noted that it is not the intention of this Report to reproduce the findings of each study in their entirety; the following salient information may be given as:

- i. Wardell Armstrong (2008). Phase II Environmental Assessment. 32 Queen's Road, Barnsley. Ref – SD08-0093, dated September

This document was prepared in relation to a commission on behalf of The Salvation Army with respect to the proposed redevelopment of the Site for use as a Salvation Army Hall.

Notwithstanding a general assessment of the likely geological, environmental, and mining legacy conditions thought likely to exist, the report also provided details with respect to a phase of intrusive investigation. This comprised the completion of two rotary open-hole boreholes (BH1 and BH2) to a depth of 15m bgl, eleven general percussive boreholes (WS101 to WS111) to a depth of 4.0m bgl, some environmental soils sampling and testing, and the installation of two ground gas piezometers (in positions WS104 and WS107).

Made ground of an unknown thickness and composition was initially anticipated, but confirmed to comprise a mixture of loose light brown/grey sandy gravel and loose black sandy gravel with soft black sandy gravelly clay to an overall thickness of about 0.6m. Within the gravel was recorded anthropogenic material (brick, concrete, cement, tarmac, clinker, some ash and traces of coal). The underlying natural strata were generally recorded as comprising an upper layer of soft to firm orange/grey slightly gravelly clay before transitioning to become a very firm to stiff thinly laminated brown/grey slightly gravelly clay. To the base of these was recorded a weak orange/brown/grey mudstone and/or very weak black coal.

The rotary drilling works reportedly encountered intact coal (interpreted as being the Two Foot seam) from between 3.4m bgl and 4.6m bgl, and for there to be no other coal(s) or evidence of working to 15.0m bgl. It should be noted, however, that the report refers to an Eastwood & Partners desk study from 2007 (NOTE: *this document has not been seen by Groundsmiths*) which postulated the presence of the Two Foot from a minimum depth of 8.0m bgl and for the underlying Abdy Coal to potentially lie at a depth of around 19.0m bgl (NOTE: *it is unknown why the rotary drilling investigation was terminated at 15.0m bgl*).

Risk assessment with respect to soil contamination is noted to have been carried out for both commercial and residential end use scenarios by Wardell Armstrong (NOTE: *no reliance is placed on the data given in their report as it is based on old screening criteria and not in accordance with current guidance, although it is noted that no asbestos fibres were recorded in the soil samples tested*).

For ground gas, it was reported that monitoring completed between 29<sup>th</sup> July and the 19<sup>th</sup> August 2008 recorded carbon dioxide concentrations in WS104 (to the north of the property at 32 Queens Road) between 12.1%v/v and 16.9%v/v and for flow to be between -0.1 l/hr and 3.4 l/hr. The measured concentrations were considered likely to be linked to the underlying coal and/or made ground. Wardell Armstrong indicated a worst-case Gas Screening Value of 0.6 l/hr for the Site, and for it to be determined as Characteristic Situation 2 (NOTE: *not all of*

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*the indicated data was present in the report, and it is unknown what guidance the data was assessed against<sup>3</sup>).*

No geotechnical data was provided in the report.

ii. William Saunders (2011). Coal Mining Risk Assessment. Proposed Church and Community Centre, Queen's Road, Barnsley. Ref – 10383/12, dated 8<sup>th</sup> November

This document was prepared in relation to a commission on behalf of The Salvation Army with respect to the proposed redevelopment of the Site for use as a church and community centre.

The report summarises the content of a Coal Authority mining report and indicated that the Site lies within the likely zone of influence from three seams of coal from 150m to 360m bgl, but that any movement from such working should have ceased by now; deep underground working was not therefore considered to present a hazard to the proposed development. It also indicated that the Coal Authority believed there to be coal at or close to the surface that may have been worked historically.

The report referenced the above cited Wardell Armstrong investigation data and the depths that they encountered coal at. It is noted, however, that the proposals for the Salvation Army development at the time required a level reduction of 1.75m below existing ground levels, so further ground investigation was required to assess any potential risk from the Abdy Coal given that Wardell Armstrong did not prove or discount its presence due to the rotary boreholes only being taken to 15.0m bgl.

Where coal was to be encountered in foundation excavations, it was indicated that it should either be removed or appropriately blinded to prevent spontaneous combustion.

iii. Geo<sup>2</sup> Remediation Ltd (2024). Phase 1 Preliminary Risk Assessment. Land to Rear of 32 Queens Road, Barnsley, S71 1AR. Ref – 24/1533.1, dated 1<sup>st</sup> May

This document is relatively recent, and was compiled with respect to the Site being redeveloped for residential end use. It was written without a walkover having been made.

Salient information indicates that the demolition of the former industrial units that were noted in the Wardell Armstrong report occurred in 2009, and that this risk assessment relates to the Site in its current vacant (post-demolition) condition. Potentially contaminative on-Site activities are noted to be associated with the former industrial buildings and their use, and/or made ground associated with their demolition (including any asbestos material as may be derived). Furthermore, risk associated with the presence of any underground shallow coal was also reported, but no off-Site sources of contamination were identified.

From a contaminative point of view, further investigation to assess risk to human health and other receptors from potential soil contaminants and ground gases, given the identified

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<sup>3</sup> Current guidance prescribed in BS8485 <sup>[19]</sup> indicates that a Characteristic Situation 2 determination by site characteristic Gas Screening Value relates to a flow rate of between 0.07 and <0.7 l/hr.

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source-pathway-receptor linkages and the defined C552 <sup>[18]</sup> risk determination, was recommended.

iv. Lyons CMC (2024). Coal Mining Risk Assessment. For proposed Residential Development at Land to the Rear of 32 Queens Road, Barnsley, S71 1AR. Ref – CMRA/00353, dated 24<sup>th</sup> April

As with the Geo<sup>2</sup> report, this study is relatively recent and appears to have been written without any oversight of the older documents. It was compiled to support a planning application for two residential blocks of three units at the Site.

The report suggests, based on coal seam crop position and dip rate, that the Two Foot coal could exist beneath the Site from around 5.0m bgl, with the Abdy Coal being present from around 20.0m bgl. A moderate to low risk from underground coal mining was postulated, whilst that associated with coal to be exposed or near foundation level was reported as being moderate to high.

It was reported that there was knowledge of working in the aforementioned coals within the wider area, and that intrusive investigation to confirm the mining legacy risk beneath the Site was needed; a target depth of 20.0m beneath rockhead was given. Recommendation for the completion of six boreholes was made, three per unit.

Where coal was to be exposed at the surface beneath any surficial material, it was indicated that appropriate considerations be made for removal and blinding to help prevent chemical attack on foundations and reduce the risk of spontaneous combustion.

A watching brief for any unrecorded mine entries, other such mining-related legacy, or bedrock weakness (i.e. fissures) was made, as was the requirement to confirm the gassing regime/install ground gas protection measures by default.

## **1.6 Limitations of Study**

This appraisal has been undertaken subject to the limitations detailed in Section 8 and any other limitations stated specifically in the Report. Where further works are identified, these shall be undertaken as required within the framework of LCRM, the MRA's permitting Terms and Conditions, and in accordance with any other current UK regulation.

No intrusive ground investigation works have been completed as part of this assessment.

## 2 SITE SETTING

### 2.1 Details & Description

A general summary of the Site’s setting is given in Table 2.1, below. This is based on current information and a walkover undertaken on the 9<sup>th</sup> May 2025.

**Table 2.1 - General Site Details**

National Grid Reference	The National Grid Reference (NGR) for the Site is indicated to be 434898mE 406474mN.
Area of Development	The area of development is indicated to be 0.12ha.
Ground Elevations	General topographic data indicates that the Site lies broadly at 99.3m AOD in the north, reducing to around 96.5m AOD in the south. Localised variation should be assumed.
General Site Layout and Boundary Development	<p>The Site comprises, in its current condition, an area of open and derelict land that has become vegetated with self-seeded weeds, bramble, and grasses. It is confined by metal security fencing along its southern and western boundaries, beyond which lie, respectively, the residential dwelling of 32 Queens Road and a short-unmarked road that provides access to a row of privately-owned garages; this road will also provide access to the new dwellings.</p> <p>The eastern and northern boundaries to the Site are marked by a semi-derelict brick wall (partly collapsed and leaning), against which some of the former buildings appear to have once been attached. Beyond the northern boundary are the houses that own the garages, whilst to the east (at a higher elevation) is Queens Road Academy.</p>
Ground covering	The Site is largely unsurfaced and comprises a mixture of exposed soil, granular made ground, and demolition material (bricks, concrete) with the exception of an area of remnant tarmac and concrete paving across its southern parts. Some localised fly-tipping is evident.
Invasive Species	No invasive plant species were observed during the Site visit. Further specialist assessments are unlikely to be required, but should be commissioned as deemed necessary.

### 2.2 Anticipated Geology & Hydrogeology

A summary of the salient geological data for the Site is given in Table 2.2, below and overleaf.

**Table 2.2 - Published Geological Conditions**

Radon	Third party data indicates that <1% of properties exceed the Radon Action Level in the area. No radon protective measures are indicated to be required in construction on this basis.
Bedrock Faults	There are no recorded geological faults within at least 500m.

Table Contd./

Infilled or Made  
 Ground Deposits

Records at the 1:10,000 and 1:50,000 scales indicate the nearest area of artificial deposit to be located from 143m to the south.

Superficial Geology

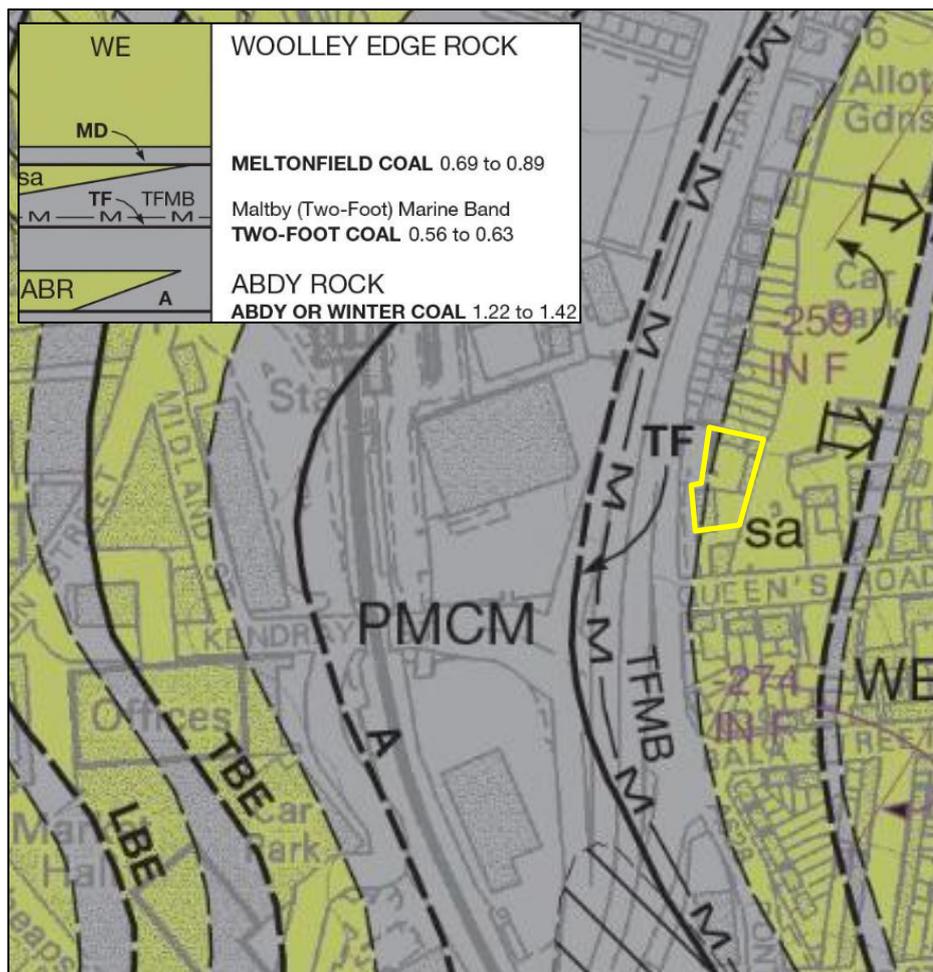
Data obtained from the BGS indicates that there are no superficial deposits present on Site or within approximately 500m.

Bedrock Geology

The solid geology underlying the Site is indicated to comprise deposits of the Pennine Middle Coal Measures ('PMCM'). These comprise a cyclic sequence of deposition consisting of interbedded horizons of mudstone, siltstone, and sandstone with numerous coal seams and their associated seatearths.

Specifically, the majority of the Site is shown to be underlain from surface by sandstone of the Woolley Edge Road, whilst this is in-turn underlain by undifferentiated mudstone, siltstone, and sandstone deposits; these are indicated to be present, from surface, along the western edge of the Site.

BGS data suggests that the dip of the bedrock across the local area is relatively shallow, with this being broadly between 5° and 8° towards the north-east. Some variation to this should be assumed.



Source: BGS Map Sheet SK30NW. Barnsley (1:10,000 scale) (2005)

Table Contd./

Coal	<p>It is understood that supplementary rotary open-hole drilling is to be completed under direct commission with the Client by Demolition &amp; Geotechnical Ltd ('D&amp;G') for the purpose of assessing potential mining legacy to a depth of 30.0m bgl beneath the Site. These works are to be carried out to assess whether the Abdy Coal is present beneath the Site at c.20m depth and whether there are any other mining-induced areas of instability at greater depth.</p> <p>All works will be undertaken in accordance with Mining Remediation Authority permit (Ref: 29242). The results of this phase of investigation will be provided in the accompanying LCRM: Intrusive Site Investigation report, Ref: GUK-0425-03/Rp-002.</p>
Hydrogeology	<p><u>Aquifer within Superficial Deposits on Site:</u> Not applicable.</p> <p><u>Aquifer within Bedrock on Site:</u> Secondary A (formerly minor aquifers given their potential to support water supplies at a generally local scale).</p> <p><u>Source Protection Zones:</u> There are no source protection zones within 500m.</p> <p><u>Source Protection Zones within Confined Aquifers:</u> There are no source protection zones within confined aquifers within 500m.</p> <p><u>Groundwater Vulnerability Zones:</u> The soil/surface leaching potential is classed as being low (&lt;40% infiltration with 300-550mm/year dilution), whilst the vulnerability of the bedrock geology is indicated to be medium. Groundwater flow through the bedrock would be via secondary porosity.</p> <p><u>Groundwater Vulnerability – Soluble Rock Risk:</u> No soluble rocks are identified as being present beneath the Site.</p>
Hydrology	<p>There are no recorded surface water features within at least 250m.</p> <p>The Site is indicated to lie within a Water Framework Directive Surface Water Body catchment, this being associated with:</p> <ul style="list-style-type: none"> <li>• Dearne from Cawthorne Dyke to Lundwood STW (Ref. GB104027063171).</li> </ul> <p>Furthermore, the Site is indicated to lie within a Water Framework Directive Groundwater Body Catchment. Data provided by the Environment Agency <sup>[20]</sup> indicates that the groundwater body associated with the 'Don &amp; Rother Millstone Grit &amp; Coal Measures' achieved an overall classification of 'Poor' in 2019.</p>

### 2.3 Designations

The Enviro+GeoInsight report provides details on property-specific environmental designations in addition to other potential actions associated with non-environmental search returns such as planning constraints. The following salient information is presented in Table 2.3, below and overleaf.

**Table 2.3 - Published Designations & Other Potential Actions**

SSSI	There are no statutory protection sites within at least 2km.
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Table Contd./

Ramsar	There are no records relating to conserved wetland areas under the Convention of Wetlands of International Importance within 2km.
SAC	There are no records of Special Areas of Conservation having been designated under the EC Habitats Directive within 2km.
SPA	There are no records of sites having been classified by the UK Government under the EC Birds Directive within 2km.
NNR	There are no records relating to important natural or semi-natural terrestrial ecosystems within 2km.
Nature Reserves	There is one record relating to a local nature reserve located 760m to the north-east at Dearne Valley Park.
Designated Woodland	There are no recorded areas of ancient woodland within 2km.
Green Belt	There are no recorded areas of greenbelt within at least 532m.
Nitrate Sensitivity	There are no records relating to nitrate sensitive areas within 2km.
Nitrate Vulnerability Zones	The Site is indicated to lie within a recorded nitrate vulnerable zone, with this being associated with the River Dearne NVZ (Ref. 278).
Visual & Cultural Designations	There are no world heritage sites, areas of outstanding natural beauty, national parks, listed buildings, conservation areas, or scheduled ancient monuments within at least 250m.
Habitat Networks	There are no indicated priority habitat inventory sites, habitat networks, or limestone pavement orders within at least 250m. An open mosaic habitat is recorded to the north-east (NLUD Ref: 440800323) from 224m.
Archaeology	The potential for below-ground archaeology has not been identified within the remit of this study.
UXO	Information obtained from Zetica ( <a href="https://zeticauxo.com">https://zeticauxo.com</a> ) suggests that the Site lies within a low risk zone from unexploded ordnance. Further detailed risk assessment is unlikely to be required.

## 2.4 Environmental Records

A summary of salient published environmental data is presented in Table 2.4, below and overleaf.

**Table 2.4 - Published Environmental Data**

Landfill	Available data indicates that there are no historical, recent, or active landfill sites within a radius of at least 429m.
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Table Contd./

Flooding	<p>Assessment of risk against flooding events is not within the remit of this study, so specialist advice should be sought as required, with all necessary studies and reports being completed to obtain regulatory sign-off.</p> <p><u>River &amp; Coastal Flooding:</u></p> <p>There are no recorded Flood Zone 2 or Flood Zone 3 areas within 50m.</p> <p><u>Surface Water &amp; Groundwater Flooding:</u></p> <p>The highest risk from on-Site surface water flooding and that within 50m of the Site is indicated to be negligible. For groundwater flooding, the same level of risk is indicated.</p>
Potable, Surface, and Groundwater Abstractions	<p>There are no recorded potable water, surface water, or groundwater abstractions within at least 423m of the Site.</p>
Public Register of Contaminated Land	<p>There are no sites determined as being Contaminated Land under Part 2A of the Environmental Protection Act (1990).</p>
Dangerous or Hazardous Sites	<p>There are no COMAH recorded sites within at least 500m.</p>
Radioactive Substances	<p>There are no live radioactive substance authorisations within 500m.</p>
Historical Fuel Sites	<p>There are no records of any historic petrol stations within 500m.</p>
Garages/Workshops	<p>The nearest recorded historic garage site is indicated from 317m to the south.</p>
National Grid	<p>There are no records relating to National Grid high pressure gas transmission pipelines or high voltage underground electricity transmission cables within 500m.</p>
Mine Gases	<p>Mine gas emission requiring action by the MRA is not anticipated. This does not preclude, however, the presence of any other biogenic gases (i.e. carbon dioxide and/or methane) that may be present. Taking into account the historic ground gas monitoring data from Wardell Armstrong, it is considered that supplementary monitoring and assessment will need to be completed before a final risk determination is given for the Site.</p>

## 2.5 Site History

It is not the intention of this Report to reproduce or describe in detail all of the changes that may have occurred on, or within a radius of 250m to the Site, although a general review of available historical OS maps has been undertaken to identify any potentially contaminative former land-uses that may significantly impact upon the proposed development. It should be noted that defined boundary on some of the maps may not fully align with the Site's position. Furthermore, some of the OS map editions may not be fully complete. It is possible, therefore, that additional land uses to those presented on the plans could have occurred in the past. A general summary of the historical land use at the Site and within its surrounding area is presented in Table 2.5, overleaf.

**Table 2.5 - Principal Historical Ordnance Survey Features**

Year	Principal On-Site Features	Principal Off-Site Features
1855-1889	The first edition OS plans dating back to 1855 indicate the Site to be open undeveloped farmland. It's located on the eastern side of the developed limits of Barnsley.	Land immediately surrounding the Site on the first edition OS plans, as well as that further to the north, south and east, is open undeveloped farmland with minimal development.  To the west, beyond Harborough Hill, is Harborough House and Harborough Hill House estate with its private grounds and manicured gardens. Further west still is Barnsley Railway Station and the wider town.
1890-1906	The 1890-1893 OS plans indicate the presence of some very localised development at the southern end of the Site, and for the remaining area to be undeveloped (the mapping does suggest however that the overall plot the Site lies within has been prepared for development).  The next available OS plans dated 1904-1906 indicate that some further development has occurred, and for this to comprise various small structures.	The 1890-1983 OS plans indicate the localised redevelopment of land is occurring. To the immediate west is a small collection of buildings (assumed terraced properties), whilst to the north, south, and east is a mixture of residential development (e.g. Holgate House, Swinhill House etc) and open space (e.g. Queens Ground). Some fields remain.  By 1904-1906 some additional construction had taken place to the west, and some small surface excavations (assumed for sandstone) had opened-up to the far south at around 250m.
1929-1948	The scale of the 1929 OS mapping and subsequent plans is too small to have any definition, but it appears that additional development is suggested within the Sites' boundaries and for this to be extending further northwards.	Development along the western side of the Site appeared to have extended up towards its northern limits by c.1929, whilst the Boro' Colliery (drift mine) is indicated to the north-east from c.120m. Other local development including allotment gardens to the north, a gas works to the far south, and much residential development to the south, is also mapped.  By c.1948, the housing to the north of the Site is mapped. No other significant changes are noted.
1956-1975	The next available OS plans dating back to c.1961 indicate the presence of various structures to be occupying the entire eastern and northern extents, and with separate detached development (albeit primarily in the southern half of the Site) against the western boundary.  The OS plans label the Site as 'Works' at this time, although their specific use is unknown.	The 1956 OS plan shows additional ground-working to have occurred at the Queens Ground (now Queens Recreational Ground) whilst by c.1961 the Harborough Hill House estate was no longer mapped (the 1962 OS plan shows it being developed as a bowling centre). The 1962 OS plan also indicates that the drift mine is now disused.  Ground to the east remains open and undeveloped on this series of plans, although from c.1974 it appears to be in use as car park with access from Queens Road.

Table Contd./

Year	Principal On-Site Features	Principal Off-Site Features
Contd./		The early 1970's OS plans show the A61 (Harborough Hill Road) to have been built to the west with this requiring the demolition and removal of the historic residential development that occurred to the west of the Site.
1977-1991	No significant changes are mapped on the c.1977 OS plan. Alteration is indicated from c.1991 with some buildings against the eastern boundary having been demolished, and for some others to have been extended.	<p>The road extends southwards towards Barnsley town centre and also removed along its length, amongst other development, the former gas works site.</p> <p>The existing garages that line the western side road to the Site are mapped from c.1983. These remain to date (information obtained from the local residents indicates that only a couple of these are used for the keeping of cars).</p>
1993-2003	No significant changes are mapped.	Other than for the construction of a sports centre on the recreational ground, no significant changes are noted at this time .
2009-2025	Planning information indicates that demolition was applied for in 2009; the 2010 OS plan suggests that buildings are still present.	The car park to the east of the Site is mapped as having been redeveloped for use as a school (Queens Road Academy) on the 2010 OS plan (the actual date of construction is unknown but could likely be prior to this mapping event). This remains to date.

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### **3 PRELIMINARY ENGINEERING APPRAISAL**

#### **3.1 Soils**

##### Made Ground

The Site is noted to have had a semi-industrialised past, with this comprising the presence of various small 'works' buildings (actual usage unknown). These buildings were positioned largely around the periphery to the Site, and for the internal yards to be hard paved with either tarmac, concrete, or a combination of both.

On the basis of the Site walkover, it is evident that there are made ground soils present and for these to comprise a mixture of demolition materials and reworked natural strata. Previous ground investigation works undertaken in 2008 by Wardell Armstrong confirmed the presence of loose light brown/grey sandy gravel and loose black sandy gravel with soft black sandy gravelly clay to an overall thickness of about 0.6m. Within the gravel was recorded anthropogenic material (brick, concrete, cement, tarmac, clinker, some ash, and traces of coal).

Although it would be anticipated for all made ground soils to be removed during an initial phase of enabling works, it is considered that the nature and composition of such soils should be explored and confirmed with spatial extent and depth across the Site.

##### Natural Strata

Based on the Site's geological setting, superficial deposits would not be expected to be present. As such, deposits of the PMCM will directly underlie the Site beneath the cover of made ground soils.

As indicated above, the solid bedrock geology to the majority of the Site is noted to be sandstone, with undifferentiated mudstone, siltstone and sandstone deposits beneath the western edge. These would be expected to be encountered at shallow depth if the cover of made ground soils is thin, or conversely at greater depth if artificial cover is thicker. The upper layers of the bedrock typically weather to form cohesive deposits of variable consistency, so subject to the material type and degree of weathering that has occurred it is likely that the underlying natural strata will comprise firm becoming stiff or very stiff gravelly clays with lithorelicts of the original bedrock, thinly laminated and highly weathered siltstone and mudstone, and/or slightly clayey sand/gravel with cobbles before more 'intact' material is encountered.

The nature and strength profile of the underlying Coal Measures soils should be confirmed as part of a ground investigation.

##### Groundwater

On the basis of available information, the Site's setting, and its indicated geology, significant shallow-depth groundwater would not be expected.

#### **3.2 Landslip (Mass Movement Deposits)**

In providing a preliminary assessment of risk associated with potential landslip, consultation was made with the data presented by GroundSure at the 1:10,000 and 1:50,000 scales.

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Information presented in the report indicates that there are no records of mass movement deposits within 500m, whilst the hazard rating for slope instability (landslide potential) on-Site and within 50m is very low. The GroundSure data also indicates that there are no records of landslip permeability (i.e. the estimated rate of vertical movement of water from the ground surface through the unsaturated zone of any landslip deposit) within 50m.

### **3.3 Foundations & Floor Slabs**

Although the specific foundation design for the proposed development lies outside the remit of this assessment, it is considered at this stage that various factors need to be taken into account and that ground investigation is required to provide the information from which informed decisions can be made.

#### *Made Ground*

The historical OS plans indicate previous development and historic ground investigation confirms the presence of a relatively thin covering of predominantly granular made ground. Such soils are poor in nature, their compaction will be non-engineered, and general geotechnical instability (including, potentially, any cross-boundary instability) will exist within them. As with all non-engineered soils therefore, made ground materials at this Site are not suitable founding stratum and a nil allowable bearing capacity value will need to be applied.

#### *Natural Strata*

Notwithstanding the presence of made ground, the Site is mapped as being underlain by Coal Measures deposits that could likely exhibit variation in terms of consistency (where cohesive), strength, and thickness.

With respect to foundations, it is anticipated at this stage that traditional spread footings (e.g. trench fill) could be suitable for lightly loaded dwellings of typical construction. In order to determine the most expedient foundation solution(s), the condition and bearing characteristics of the underlying natural soils will need to be confirmed through Site-wide ground investigation with in-situ testing and geotechnical laboratory analysis.

Once all ground investigation works have been completed, it would be advisable for a bearing capacity assessment to be completed by the Designing Engineer during the foundation design stage to ensure that the serviceability limit state of the proposed structures is not compromised in any way. This should also take account of the amount of total and/or differential settlement that could potentially occur. Furthermore, due consideration would need to be given to the chosen foundation solution(s) and how that interacts with any shallow underground mining legacy, should that be found to exist.

### **3.4 Floor Construction**

At this stage it is anticipated that the ground floor construction will be suspended, although the final decision will be dependent on the foundation solution(s) to be adopted and having due consideration to the ground conditions. The proposed floor construction and the loadings that will need to be carried is outside the remit of this study and will need to be established in consultation with the Designing Engineer.

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The allowance for the inclusion of ground gas precautions to Characteristic Situation 2 ('CS2') of BS8485 for carbon dioxide and/or methane should be made at this time, until confirmed otherwise through Site-specific monitoring.

### **3.5 Heave Precautions**

The combination of shrinkable soils and trees, hedgerows, and shrubs represent a potential hazard to foundations and supported structures due to the effects of volume change and ground movement.

All foundations would need to be provided in accordance with current heave precautionary guidelines <sup>[21]</sup> if they lie within the zone of influence of removed, existing, or proposed planting when in cohesive soils (which includes mudstone and siltstone). Information with respect to the plasticity indices and worst-case volume change potential of any proven or suspected cohesive soils will need to be obtained to assist with foundation design.

The need for any precautions in construction and how these interact with the foundation solution(s) should be discussed further with the Designing Engineer once ground investigation and all necessary testing and laboratory analytical works have been completed.

### **3.6 Slope Stability**

Global slope stability problems are not expected. However, due consideration to potential problems associated with adjacent land impacting on the Site should always be made.

### **3.7 Superstructure Precautions**

The need for superstructure precautions (e.g. masonry reinforcement) is considered unlikely at this time, although this should be discussed further with the Designing Engineer once all ground investigation works, including that associated with mining legacy, and testing have been completed.

### **3.8 Excavation Stability**

All excavation works should be carried out in accordance with current HSE guidance, 'Structural Stability During Excavation' <sup>[22]</sup>.

All made ground soils should be assumed to be unstable.

The instability of loose and/or weathered natural strata could be encountered in excavation, particularly during periods of wet weather, where excavations are deep, where they are left open for protracted periods of time, and/or where any shallow groundwater exists. Excavations may unduly widen if material collapse is encountered under these conditions.

Where there is the possibility of weak/unstable ground being present or passing across any boundary, a geotechnical risk assessment of the integrity/stability should be undertaken prior to excavation works being carried out. Designed and engineered temporary or permanent measures should be deployed to ensure their continued stability as necessary.

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### 3.9 Natural Ground Subsidence

With respect to natural ground subsidence, the Site may be classified as follows:

- 'Very Low' risk rating for landslides, shrink swell clay soils and collapsible deposits hazards, and a
- 'Negligible' risk rating for the ground dissolution of soluble rocks, running sands, and compressible deposits hazards.

### 3.10 Obstructions in Excavation

The existing buildings appear to have largely been removed as part of the demolition works, although there is evidence of some remnant construction (brick and concrete) along the northern and eastern boundaries and remnant surfacing to the south.

Where in-ground obstructions are encountered these will need to be grubbed out in their entirety, or at least where they interact with new construction, so as not to create 'hard spots'. Excavation/breaking machinery of sufficient size and strength, in addition to any excavation shoring, will need to be allowed for.

### 3.11 Basements

Whilst it is feasible for there to be basements associated with the former buildings, it is considered to be a low risk. If encountered during enabling works, they would need to be grubbed out and reinstated to level in an engineered manner and in accordance with current guidance. Consultation would need to be made with the Designing Engineer with respect to any implications this could have on the Site's layout.

### 3.12 Concrete

Protection would be required in accordance with current guidance <sup>[23]</sup> where buried concrete products are to be in contact with soils that exhibit elevated concentrations of sulphate. Specialist advice should be sought to confirm the ACEC and Design Chemical class of concrete to be adopted at the design stage to the build once representative samples of the underlying founding soils have been tested. The Designing Engineer should refer to BS8500-1 <sup>[24]</sup> as necessary.

### 3.13 Stress Relief

Risk associated with stress relief is considered to be low.

### 3.14 Pavement

The design of future trafficable areas would need to be such that it allows for the effects of any soft underlying or variable materials and for the potential reduction in the strength of any replacement material to its long-term CBR value.

It is expected that the excavation and replacement of unsuitable material with suitably compacted engineered fill would be needed in development prior to finished surfacing being

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laid. Since the minimum permitted design CBR is 2.5%, it is recommended at this stage that this conservative value for subgrade be used. In situ testing should be undertaken as required.

Frost susceptibility should also be assumed.

### **3.15 Site Drainage**

The drainage solution to be adopted is unknown at this time and should be explored with a competent drainage engineer. All drainage proposals will be subject to obtaining the necessary approvals.

Should infiltration testing be required, this should be carried out in accordance with the method prescribed in BRE365 <sup>[25]</sup>. It should be noted, however, that the Site is underlain by Coal Measures deposits that weather to firm becoming stiff clays within the near surface, and will therefore have a very low infiltration potential. Furthermore, it would not be appropriate for unstable, potentially unstable, or any contaminated soils to receive point-source flows of water from dedicated soakaways.

All soakaways in development would need to be 5m or more from foundations and pavement.

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## 4 PRELIMINARY ENVIRONMENTAL APPRAISAL

### 4.1 Introduction

Current UK legislation on contaminated land is set out in Part 2A of the Environmental Protection Act 1990 <sup>[26]</sup>, which was retrospectively inserted by Section 57 of the Environment Act 1995 <sup>[27]</sup>. The Contaminated Land Regulations 2000 <sup>[28]</sup> were amended in 2005. The Environmental Protection Act 1990: Part 2A Contaminated Land, Statutory Guidance, Edition 2 (2006) promulgates the revised statutory guidance with respect to the operation of the Contaminated Land Regime following the implementation of the Contaminated Land Regulations, 2005. The definition of contaminated land is central to the operation of Part 2A.

Legislation adopts the principle of a 'suitable for use' approach for the assessment of contaminated land, the rationale being reflected in the site-specific risk assessment and determination of remedial strategy; action is only required if unacceptable risks are posed to human health or to the environment, considering the site's land use and geo-environmental setting.

The legislation places a responsibility on the LPA to determine whether the land under its jurisdiction is contaminated by consideration of whether:

- The presence of substances (potential contaminants) are present at concentrations that are causing significant harm or have the significant possibility of causing significant harm;
- There are receptors which may be harmed (e.g. the water environment, human health, buildings, fauna and flora), and
- There is in existence a pathway between the identified sources and receptors.

To qualitatively assess the level of risk at the Site, the above rationale has been applied. This approach is consistent with the preliminary risk assessment procedure defined in LCRM. The following section summarises the preliminary CSM which has been produced following the review of available pertinent third party information. The CSM summarises Groundsmiths' current understanding of the surface and sub-surface features, potential sources of contamination, likely transport pathways, and the receptors, in order to support the identification and assessment of plausible potential contaminant linkages.

### 4.2 Potential Sources of Contamination

A potential source is defined as 'a contaminant which is in, or under the land and has the potential to cause harm to human health or to cause contamination of controlled waters receptors'.

In reviewing the Site's history, it is evident that it has had previous use for a long period of time. This, on the basis of available information, is assumed to have been light-industrial (although the exact use is unknown). Contamination associated with its former use could potentially have had an adverse effect on some of the soils to be encountered, with this being derived from any combustion residues (ash, clinker), or where any oils or fuels were potentially stored or used in the buildings or machinery. Furthermore, contamination could be associated with the [relatively recent] demolition of the former on-Site buildings and the soils that were derived from that activity, and any mining related sources.

Risk from off-Site sources having a direct impact on the Site through any contaminant mobility is considered to be very low to unlikely and may therefore be discounted, although it is possible that any materials used to raise Site levels, or perhaps if soils were used to level the ground prior to the existing hard paving being laid, could have been imported from nearby sites and could be contaminated?; such material would present the greatest risk to the proposed development.

Within the remit of this assessment, the following potential source-pathway-receptor linkages that may be associated with the Site have been considered. These are summarised in Table 4.1, below.

**Table 4.1 - Summary of Potential Sources and Contaminants**

Potential Sources	Potential Contaminants (not limited to)
Any potentially contaminated made ground associated with previous development, and/or if imported from other sites?	Metals, metalloids, inorganic contaminants, phytotoxic contaminants, sulphates, PAH, TPHCWG, VOC, SVOC, and asbestos
Any potentially contaminated made ground derived from recent demolition activities?	
Any potentially contaminated shallow-depth underlying natural strata?	
On-Site sources of ground gas from any underground coal mine workings, and/or should deep made ground be present?	CO <sub>2</sub> and CH <sub>4</sub>
Off-site sources of ground gas including any nearby underground coal mine workings, and/or should any areas of infilled localised ground working exist?	

### 4.3 Potential Migration Pathways

Migration pathways are routes by which contaminant sources may come into contact with receptors. Potential pathways for different types of contaminants vary depending on the properties of the contaminant, the mechanism of its release and the nature of the receptor. The principal potential contaminant pathways by which receptors might become exposed to potential contamination at the Site are summarised as follows in Table 4.2, overleaf.

**Table 4.2 - Summary of Plausible Pathways**

Potential Sources	Pathways
Any potentially contaminated made ground and/or shallow-depth underlying natural strata to the Site	Direct ingestion, dermal contact, and the inhalation of dust, vapour or fibres
	Direct ingestion and/or dermal contact with liquid contaminants
	Leaching and direct contact with potable water supply pipes
	Leachable contaminants via surface run-off, vertical and lateral migration via any permeable strata with the potential to impact controlled waters receptors
	Soft landscaping (to garden curtilage)
Sources of ground gas (e.g. underground coal mine workings, made ground)	Migration of gases and/or accumulation in void spaces via transport through service conduit, any permeable made ground and/or any permeable underlying natural strata

#### 4.4 Potential Receptors

A receptor is the potential target of the source contaminant, to which either significant harm or deterioration in quality may be caused. The potential sensitive receptors with respect to the potential contamination hazards identified above are considered in Table 4.3, below.

**Table 4.3 - Summary of Potential Receptors**

Potential Receptor	Comment
Human Health	Site end-users in the residential with home-grown produce end use scenario Site operatives (during construction phase only) Future workers involved with any in-ground maintenance works
Construction	Potable water supply pipes Foundations and service conduit
Controlled Waters	'Secondary A' aquifer soils

#### 4.5 Environmental Risk Assessment

Risk assessment and the procedure of identifying sources, pathways and receptors is recognised as an approach to determine the extent and significance of contamination either within the context of Part 2A (when assessing current site status or when considering the acquisition of an existing development) or the planning process (for the redevelopment of an existing site, or when considering the acquisition of a site for redevelopment purposes). Either way, the

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‘suitable for use’ approach is adopted when assessing risk and the source-pathway-receptor assessment defines the conceptual model for the site.

The statutory guidance describes a risk assessment methodology in terms of ‘significant contaminants’ and ‘contaminant linkages’, using the ‘source-pathway-receptor’ scenarios for the site. Contaminant linkages are formed when there is a linkage between a contaminant source and a receptor by means of a pathway. The existence of a contaminant linkage is dependent on site use, as well as environmental conditions. If no contaminant linkages can be proven, then the risks may be discounted. However, it is not to say that remediation is required if contamination is proven. The identified potential contaminants and receptors have been considered in relation to the pathways that may link them. The risk classification has been estimated in accordance with those methods prescribed in CIRIA C552. Risk is regarded as a combination of the likelihood of an ‘event’ occurring and its severity: both elements must be considered when assessing risk. The method for risk assessment, or evaluation, is purely qualitative. As defined in CIRIA C552, the magnitude of the potential ‘severity’ of risk occurring may be assessed against:

- **Severe (acute):** short term risk to human health likely to result in significant harm as defined under Environmental Protection Act 1990, Part 2A. Short term risk of pollution to sensitive water receptor (may result in death).
- **Medium (chronic):** long term risk and significant harm to human health, contamination of sensitive water resource or significant change to an ecosystem or specific organism (may result in death).
- **Mild (chronic, but applicable to less sensitive receptors):** contamination of non-sensitive water resource but significant damage to crops, buildings, structures and services or the environment.
- **Minor (not significant):** harm, which may result in financial loss, or expenditure to resolve. Non-permanent effects to human health. Easily repairable effects of damage to buildings, structures, and services.

Similarly, the classification of the magnitude of the ‘probability’ of the risk occurring may be assessed against:

- **High Likelihood:** a contaminant linkage exists and an event appears very likely in the short term, or almost inevitable in the long term, or contamination is causing harm at the receptor. Urgent action is required.
- **Likely:** a contaminant linkage exists and it is probable that an event will occur. An event may not occur, but it is possible in the short term and likely over the long term.
- **Low Likelihood:** a contaminant linkage exists and it is possible that an event will occur. It is not certain that an event will occur over time, but it is less likely in the short term.
- **Unlikely:** a contaminant linkage exists but it is not possible to say if an event will occur even over a very long time.

Following completion of the severity and probability assessment, classifications can be compared to indicate the actual risk each contaminant linkage presents: this can only be undertaken where there is a possibility of there being an active linkage. The risk categories which can be assigned are presented in Table 4.4, overleaf, and range between ‘very high’ to ‘very low’ (NB - it is not possible to classify an identified risk as ‘no-risk’).

**Table 4.4 - Risk Categorisation**

		Consequence			
		Severe	Medium	Mild	Minor
Probability	Highly Likely	Very High	High	Moderate	Moderate / Low
	Likely	High	Moderate	Moderate / Low	Low
	Low Likelihood	Moderate	Moderate / Low	Low	Very Low
	Unlikely	Moderate / Low	Low	Very Low	Very Low

Source: Table 6.5, C552 (2001).

- **Very High** – there is a high probability that severe harm could arise or that severe harm is occurring. Urgent investigation and remediation are likely to be required.
- **High** – harm is likely to occur, and that urgent investigation and remediation may be needed in the short term, but are likely over the longer term.
- **Moderate** – harm could occur. It is unlikely to be severe, most probably relatively mild. Investigation is normally required to clarify the risk with some remedial works being required in the longer term.
- **Low** – it is possible that harm could occur, but if it did, at worst it would be mild.
- **Very Low** – low possibility of harm arising, and that if it does it is not likely to be severe.

The identified potential contaminants and receptors have been considered in relation to the potential pathways that may link them. The resulting contaminant linkages are presented in Table 4.5, overleaf.

**Table 4.5 - Summary of Environmental Risk (Current Site Condition without Mitigation)**

Potential Sources	Potential Receptors	Plausible Pathways	Probability	Severity	Risk Rating	Comment
Any potentially contaminated made ground and/or shallow-underlying natural strata to the Site	<u>Human Health</u>  Site end-users, inc. maintenance and site workers (short term risk during redevelopment)	Direct ingestion, dermal contact with soil or inhalation of dust and/or vapour (Site end user)	Likely	Mild	Moderate/Low	An overall moderate to low risk is currently anticipated with respect to potential contamination within the underlying soils for Site end users and construction/other in-ground workers. A formal environmental investigation will therefore need to be undertaken to check on contaminant levels.  For asbestos, the level of risk is based to some extent on the severity rating of the contaminant and the risk profile that can be assigned within the assessment framework. Risk to Site end users and for those involved with in-ground works is considered to be moderate at this time, although likely to be much lower. Confirmation of presence would need to be established before a final risk determination can be given.
		Inhalation of asbestos fibres in made ground soils (Site end user)	Low Likelihood	Severe	Moderate	
		Direct ingestion, dermal contact with soil or inhalation of dust and/or vapour (In-ground worker)	Likely	Mild	Moderate/Low	
		Inhalation of asbestos fibres in made ground soils (In-ground worker)	Low Likelihood	Severe	Moderate	
		Direct ingestion and/or dermal contact with liquid contaminants (Site end user / In-ground worker)	Unlikely	Mild	Very Low	
	Potable Water Supply Pipes	Direct contact/leaching (tainting)	Low Likelihood	Mild	Low	The need for precautions in construction will need to be confirmed.
	Vegetation	Uptake via root system in soft landscaping	Low Likelihood	Mild	Low	Capping to 600mm could be needed in soft landscaped areas.
	Foundations	Direct contact/leaching	Low Likelihood	Mild	Low	The need for sulphate precautions for new buried concrete products will need to be confirmed.
	Controlled Waters	Vertical and/or lateral migration	Unlikely	Mild	Very Low	No particular risk anticipated.
Ground gas sources	Site End Users	Inhalation (via ingress and accumulation into buildings)	Low Likelihood	Medium	Moderate/Low	The need for precautions in construction will need to be confirmed. Allow for Characteristic Situation 2 at this stage.

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### General Soil Contaminants

It is anticipated at this stage, on the basis of available information and the preliminary risk assessment presented herein, that any on-Site made ground soil could present an unacceptable level of risk in relation to the potential for elevated concentrations of inorganic and organic contaminants of concern to be present at levels above residential with home-grown produce GAC threshold values, these being DEFRA's Category 4 Screening Levels <sup>[29]</sup>, the LQM/CIEH Human Health Values <sup>[30]</sup> and/or other in-house derived GAC's calculated by Groundsmiths for organic contaminants <sup>[31]</sup>.

The nature of the Site in its current condition suggests that the overall risk to Site end users without mitigation could be moderate to low, as there currently remains the possibility for elevated levels of contamination to be present within the soils to be encountered. At this stage, therefore, it is considered that a check on contaminant levels should be made within the remit of an intrusive ground investigation so that the levels to which any contamination may be present to in excess of relevant residential GAC values may be quantified.

### Asbestos Containing Materials (ACM)

A moderate risk is currently perceived in relation to the potential for asbestos containing materials, although the level of risk postulated is, however, elevated to some extent by the consequence (severity) of the contaminant and the risk assessment framework that may be adopted at this time. As with general soil contamination, it is considered that a check on the presence of any fibres (likely to be chrysotile) should be made within the remit of an intrusive ground investigation, although the actual level of risk could be much lower than stated at this time given that no asbestos was detected in the soil sample recovered as part of the 2008 investigation.

### Unforeseen Soil Contamination

As with any development site, there is the potential for contamination to be present that has not been identified at this stage. This is unavoidable so allowance for additional assessment should be made as required.

If any currently unforeseen contamination was identified during development, a representative level of supplementary sampling and testing with risk assessment would be required, with appropriate remediation being undertaken subject to the outcome of the works. Consultation with the LPA would be required.

### Ground Gases

Historic third party (Wardell Armstrong) data indicates that carbon dioxide concentrations in WS104 (positioned within the southern half of the Site) to between 12.1%v/v and 16.9%v/v were measured, and for flow to be between -0.1 l/hr and 3.4 l/hr. Measures consistent with Characteristic Situation 2 were identified and reported at the time.

It is considered, given the age of the historic data and that it has not been reassigned at this time, that supplementary monitoring should be completed so that a current and up to date assessment of the Site's gassing regime can be established. If it was found that a gas resistant

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membrane and other supporting components need to be provided in construction, further specific details in this regard would need to be submitted to the LPA in the form of a standalone LCRM: Stage 3 Remedial Strategy & Verification document.

#### Controlled Waters Receptors

A very low risk is anticipated in relation to the potential for any mobile contaminants of concern to enter into controlled waters receptors on the basis of the Site's underlying geology and lack of sensitive receptors. No further assessment is considered necessary, unless currently unforeseen gross contamination is encountered during development.

#### Potable Water

Water providers are required to maintain the safety of staff, contractors, and customers. On this basis, water providers work with a range of trigger values when laying mains pipes or services in contaminated or suspected contaminated ground, in the same way that assessment is made by contaminated land practitioners.

Testing in general accordance with UK Water Industry Research ('UKWIR')<sup>[32]</sup> published guidance should be completed so that informed decisions may be made. It is recommended that additional testing for corrosiveness (electrical conductivity and redox potential) is also completed.

#### Soils Disposal (Waste Acceptance Criteria)

Where any arisings are generated during redevelopment works, and they are intended for disposal to landfill, there is a requirement to determine if they would be classified as inert, non-hazardous or hazardous.

Technical Guidance WM3<sup>[33]</sup>, which was introduced on the 1<sup>st</sup> July 2015 and is adapted from the third edition of Technical Guidance WM2<sup>4</sup>, sets out the requirement for classification. The classification assesses the composition of the material and determines the concentrations of hazardous substances within it, in relation to particular thresholds.

Given that it is a statutory requirement to ensure that wastes are characterised to meet specific acceptance criteria if disposal to landfill is to be undertaken, Waste Acceptance Criteria (WAC) testing would need to be completed in parallel with standard soils analysis. This testing would need to be undertaken on representative samples of any soils that are to be disposed of (e.g. from foundation excavations), prior to being removed from Site.

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<sup>4</sup> Environment Agency (2011). Technical Guidance (WM2). Hazardous Waste: Interpretation of the Definition and Classification of Hazardous Waste (2<sup>nd</sup> Edition, Version 2.3).

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## 5 FURTHER WORKS

### 5.1 Introduction

The overall objective of this preliminary assessment was to contribute towards the understanding of the ground conditions underlying the proposed development site located to the rear of 32 Queens Road, Barnsley. Research into the history and evolution of the Site up to the present day has been undertaken, which allows a fair assessment of the risks posed to development to be made at this stage.

It is considered that the study has provided sufficient background data in terms of the historical land use to the Site and its surroundings, together with details of the general geology, hydrogeology, mining legacy, and anticipated sources of soil and ground gas contamination.

The preliminary environmental risk assessment, when considered within the context of proposed end-use, indicates that some potential contaminant linkages may present an unacceptable level of risk to human health in relation to the identified source-pathway-receptor linkages for the Site. On this basis, it is considered that further works are warranted prior to the Site's redevelopment so that Site-specific data can be obtained.

### 5.2 Objectives of Investigation

In relation to the proposed development, the objectives of an intrusive (geotechnical and environmental) ground investigation would be to:

- a. Investigate the general nature and thickness of the made ground and the depth to, condition, and nature of the underlying natural strata to facilitate foundation design;
- b. Determine the geotechnical parameters of the underlying natural strata via in situ testing (to refusal) and laboratory based analysis, as required;
- c. Report the presence of any in-ground obstructions and/or other such difficulties encountered during the works;
- d. Investigate the shallow-depth hydrogeological regime beneath the Site;
- e. Confirm the general presence of any underlying shallow coal to a depth of 30m bgl and any shallow workings that may exist within it (NOTE: *these works are to be completed by D&G under direct commission with the Client*);
- f. Identify the nature and concentration of any contamination within individual soil matrices, including sulphate analysis to assist with buried concrete design, and undertake Waste Acceptance Criteria testing for soils disposal purposes, and
- g. Provide general advice in relation to any environmental or geotechnical issues associated with the Site and/or any other recommendations needed to facilitate the proposed development, including, where necessary, identifying any additional phases of investigation, assessment, or remediation that may need to be carried out.

### 5.3 Proposed Methods of Investigation

Recommendation of the following works that could be completed is given in Table 5.1, below. The positioning of exploratory locations would be subject to any access constraints and the presence of any underground utilities which would need to be confirmed beforehand.

**Table 5.1 - Phase 2 Investigation Recommendations**

	<b>Anticipated Scope</b>	<b>Likely Investigation Method</b>	<b>Potential Contaminants of Concern</b>
<i>Environmental Investigation (not limited to)</i>			
1	Determine overall soil types and general contaminant levels across the Site (including sulphates for substructure concrete design)	Mechanical excavation and/or boring with sample recovery for environmental testing	A range of metals / metalloids, general inorganics, PAH, TPH, VOC, SVOC, and asbestos
2	WAC testing for any waste soils disposal that is to be undertaken		Full WAC Single Stage
3	Ground gas monitoring by 6 No. bi-weekly return visits	Mechanical boring with piezometer installation	CO <sub>2</sub> , CH <sub>4</sub>
<i>Geotechnical Investigation (not limited to)</i>			
4	Investigation into the thickness and strength profile of the underlying soils through in-situ testing	Mechanical excavation and/or boring (with sample recovery as required)	-
5	Determination of plasticity indices (i.e. Atterberg, Water Content etc) for any cohesive soils and any other associated works required to facilitate development	Geotechnical laboratory testing	-
6	Assess the potential for any shallow coal and any working that it contains	Rotary openhole boring	-

### 5.4 Testing

#### Geotechnical

With respect to geotechnical works, the nature, thickness, and integrity of any on-Site made ground soils to be encountered shall be investigated. Similarly, the nature of the underlying natural strata would need to be confirmed. Representative soil samples should be taken for a suite of geotechnical laboratory testing, with in situ strength testing also being undertaken throughout the vertical soils profile to refusal at selected positions across the Site so that

bearing capacities and the depth to competent strata for foundation design may be established.

All works will need to be undertaken in general accordance with the requirements of BS5930, BS10175, BS EN 1997-1 (2004+A1:2013) <sup>[34]</sup> and BS EN 1997-2 (2007) <sup>[35]</sup>. All works will need to be logged on-site by a competent engineer, with standard strata descriptions of the soils encountered being in general compliance with BS EN ISO 14688-1 (2002+A1:2013) <sup>[36]</sup>, BS EN ISO 14688-2 (2004+A1:2014) <sup>[37]</sup> and BS EN ISO 14689 (2003) <sup>[38]</sup>.

### Mining Legacy

Given the potential risk to development from ground instability associated with probable unrecorded shallow working, it is considered necessary to confirm the presence, or not, of the Two Foot Coal and the deeper Abdy Coal; this information would be supplementary to the need to assess general ground conditions. On this basis, it is proposed that the following mining legacy investigation should be completed:

- i. Undertake drilling to a terminal depth of 30.0m bgl by rotary openhole methods across the Site area at 6 No. positions. The MRA's standard permit application procedure would apply. Where borehole positions are proposed within 50m of occupied premises these will need to be advanced by water flush to be in line with Health & Safety Executive guidelines to mitigate the potential for carbon monoxide displacement. Water flush drilling will also mitigate risk associated with the potential for spontaneous combustion, although this is considered to be a low risk, and
- ii. Whilst the MRA data does not indicate the presence of any mine gas that has required remedial measures be introduced within a distance of 500m, they do not preclude the potential for other mitigation measures that may be required to protect future Site end users from the ingress and accumulation of general biogenic ground gas (e.g. carbon dioxide and/or methane). On this basis, a phase of monitoring in accordance with current guidance will need to be completed so that an up to date assessment of risk may be made.

### Environmental

All soils sampling undertaken as part of a ground investigation works will need to be in general accordance with those guidelines prescribed in BS10175 and any other specific requirements of the testing laboratory. All environmental soil samples would need to be collected in a combination of 500ml plastic tubs with sealable lids, 250ml glass amber jars and 60ml glass amber vials (this being subject to analytical requirements). This would also be the case for where WAC samples were taken for soils disposal purposes.

Care would need to be taken to minimise cross contamination between sampling. All of the environmental samples would need to be packed into cool boxes and transported to an MCERTS and UKAS <sup>[39]</sup> accredited laboratory of Groundsmiths' choosing for analysis and subsequent storage / disposal. Standard retention times would apply.

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## 5.5 Outline Remediation Requirements

### Soil

It is currently unknown if any soil remedial activities for contamination will be required within the context of the proposed development. Any remediation works to be completed would need to be undertaken in accordance with the requirements of guidance prescribed by the Yorkshire and Lincolnshire Pollution Advisory Group ('YALPAG')<sup>[40]</sup>.

Where soils remediation is to be completed, proposals and verification methodology would need to be submitted to the LPA in the form of a standalone LCRM: Stage 3 Remedial Strategy & Verification document.

### Ground Gas

For ground gas, Characteristic Situation 2 precautions in construction (as indicated in the third party reporting cited herein) may potentially be required.

For information at this time, and in accordance with BS8485, the structures as proposed would be determined as 'Type A (High Risk)' as they will have small volume internal spaces that will be generally poorly ventilated; the minimum gas protection score to be achieved, on the basis of Characteristic Situation and Building Type as detailed in BS8485, would be 3.5. As with any soil contamination requirements, specific remediation proposals and verification methodology for any protective measures to be provided would need to be submitted to the LPA in accordance with current guidelines.

The installation of any gas membranes and associated components to be used would need to be carried out in accordance with manufacturer requirements and / or any other guidance given<sup>[41,42]</sup>. Independent inspection of the membrane and componentry installation by competent persons would also be required, with relevant documentary and photographic evidence being provided to the LPA in a final post-installation Validation Report.

### Coal Mining

Should any risk from shallow coal mine workings be identified, details relating to the method of consolidation and validation to be followed will need to be submitted to the LPA (for consultation with the MRA) in the form of a standalone 'Treatment of Mine Workings Specification'. All works shall be in accordance with current UK guidelines<sup>[43]</sup>.

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## 6 REGULATORY APPROVAL

This preliminary risk assessment Report has been compiled in accordance with good practice guidance for the assessment and management of land that may be affected by land contamination and stability hazards.

The recommendations presented are considered reasonable on the basis of available information and the assessment of the Site as carried out by Groundsmiths. However, it remains the responsibility of the Client to ensure that the Site poses no significant risk to any sensitive receptor(s) and that it remains aligned with the proposed end-use and assessment framework adopted in this Report and any accompanying reports.

If at any time in the future, additional information comes to light that puts into doubt the accuracy of the professional opinion or third party information presented herein, be it in relation to contamination, geotechnical matters, or mining legacy, then it would be necessary to revisit this assessment.

Works undertaken cannot be guaranteed to gain approval by the regulatory authorities and / or your Warranty provider, so copies of this Report should be made available to the relevant organisations for comment and approval, prior to undertaking any irrecoverable works associated with the Site.

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## 7 INFORMATION SOURCES

The following references have been cited in the production of this report:

- 1 William Saunders (2011). Coal Mining Risk Assessment. Proposed Church and Community Centre, Queen's Road, Barnsley. Ref – 10383/12, dated 8<sup>th</sup> November.
- 2 Lyons CMC (2024). Coal Mining Risk Assessment. For proposed Residential Development at Land to the Rear of 32 Queens Road, Barnsley, S71 1AR. Ref – CMRA/00353, dated 24<sup>th</sup> April.
- 3 Geo<sup>2</sup> Remediation Limited (2024). Phase 1 Preliminary Risk Assessment. Land to Rear of 32 Queens Road, Barnsley, S71 1AR. Ref – 24/1533.1, dated 1<sup>st</sup> May.
- 4 Wardell Armstrong (2008). Phase II Environmental Assessment. 32 Queen's Road, Barnsley. Ref – SD08-0093, dated September.
- 5 BS10175 (2011+A2:2017). Investigation of Potentially Contaminated Sites. Code of practice.
- 6 BS5930 (2015+A1:2020). Code of Practice for Ground Investigations.
- 7 Environment Agency (2021). Land Contamination: Risk Management. LCRM: Stage 1 risk assessment - GOV.UK ([www.gov.uk](http://www.gov.uk)).
- 8 Mining Remediation Authority (2025). <https://www.gov.uk/guidance/planning-applications-coal-mining-risk-assessments>.
- 9 Environment Agency (2009). Updated Technical Background to the CLEA Model, Science Report SC050021/SR3.
- 10 Environment Agency (2021). Land Contamination: Risk Management. LCRM: Stage 2 options appraisal - GOV.UK ([www.gov.uk](http://www.gov.uk)).
- 11 Environment Agency (2021). Land Contamination: Risk Management. LCRM: Stage 3 remediation and verification - GOV.UK ([www.gov.uk](http://www.gov.uk)).
- 12 British Geological Survey (2008). Barnsley, England and Wales Sheet 87. Bedrock & Superficial. 1:50,000 (Keyworth, Nottingham: British Geological Survey).
- 13 British Geological Survey (2005). Barnsley, England and Wales Sheet SE30NW. Solid & Drift. 1:10,000 (Keyworth, Nottingham: British Geological Survey).
- 14 UKRI (2025). <http://www.bgs.ac.uk/map-viewers/geoindex-onshore>.
- 15 Groundsure (2025). Enviro+Geo Insight Report. 32 Queens Road, Barnsley. Ref No. EMS-1022943\_1292605, dated 14<sup>th</sup> May.
- 16 Groundsure (2024). Historical Ordnance Survey Plans. 32 Queens Road, Barnsley. Ref No. EMS-1022943\_1292604, dated 14<sup>th</sup> May.
- 17 Zetica (2024). <https://zeticauox.com>.
- 18 CIRIA C552 (2001). Contaminated Land Risk Assessment – A Guide to Good Practice. D. J. Rudland, R. M. Lancefield & P. N. Mayel.
- 19 BS8485 (2015+A1:2019) Code of Practice for the Design of Protective Measures for Methane and Carbon Dioxide Ground Gases for New Buildings.
- 20 Environment Agency (2023). <https://environment.data.gov.uk/catchment-planning/waterbody/GB40402G992300>.

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- 21 NHBC Standards (2019). Part 4: Foundations - Chapter 4.2 Building Near Trees.
  - 22 HSE (2024). <https://www.hse.gov.uk/construction/safetytopics/excavations.htm>.
  - 23 Building Research Establishment (2005). Special Digest SD1, Concrete in Aggressive Ground.
  - 24 BS 8500-1 (2015+A2:2019). Concrete – Complementary British Standard to BS EN 206. Part 1 – Method of Specifying and Guidance for the Specifier.
  - 25 Building Research Establishment (2003). Digest 365, Soakaway Design.
  - 26 Environmental Protection Act 1990: Part 2A Contaminated Land, Statutory Guidance, Edition 2, 2006.
  - 27 Environment Act (1995).
  - 28 The Contaminated Land Regulations (2000, amended 2005).
  - 29 Department for Environment, Food & Rural Affairs (2014). SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination – Policy Companion Document.
  - 30 LQM / CIEH: The LQM / CIEH S4UL's for Human Health Risk Assessment. Land Quality Press, Nottingham, 2015. Publication Number S4UL3339.
  - 31 Environment Agency. Contaminated Land Exposure Assessment (CLEA) software version 1.071. <https://www.gov.uk/government/publications/contaminated-land-exposure-assessment-clea-tool>.
  - 32 UKWIR (2011). Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites. Ref. 10/WM/03/21).
  - 33 Environment Agency (2018). Technical Guidance (WM3). Waste Classification, Guidance on the Classification and Assessment of Waste (1<sup>st</sup> Edition, Version 1.1).
  - 34 BS EN 1997-1 (2004+A1:2013). Eurocode 7. Geotechnical Design. General Rules.
  - 35 BS EN 1997-2 (2007). Eurocode 7. Geotechnical Design. Ground Investigation and Testing.
  - 36 BS EN ISO 14688-1 (2002+A1:2013). Geotechnical Investigation and Testing — Identification and Classification of Soil — Part 1: Identification and Description.
  - 37 BS EN ISO 14688-2 (2004+A1:2014). Geotechnical Investigation and Testing. Identification and Classification of Soil. Principles for a Classification.
  - 38 BS EN ISO 14689 (2003). Geotechnical Investigation and Testing. Identification, Description and Classification of Rock. Part 1: Identification and Description.
  - 39 United Kingdom Accreditation Service (2025). <https://www.ukas.com>.
  - 40 Yorkshire and Lincolnshire Pollution Advisory Group (2021). Verification Requirements for Cover Systems. Technical Guidance for Developers, Landowners and Consultants. Version 4.1.
  - 41 CIRIA C735 (2014). Good Practice on the Testing and Verification of Protection Systems for Buildings against Hazardous Ground Gases.
  - 42 Yorkshire and Lincolnshire Pollution Advisory Group (2016). Verification Requirements for Gas Protection Systems. Technical Guidance for Developers, Landowners and Consultants. Version 1.1.
  - 43 Parry, D. and Chiverrell, C. (eds) (2019). Abandoned Mine Workings Manual. C758D. CIRIA, London, UK (ISBN: 978-0-86017-765-4).

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## 8 REPORTING LIMITS

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The findings and opinions provided in this Report are given in good faith and are subject to the limitations and constraints imposed by the methods and information sources described. Factual information including, where stated, a visual inspection of the Site, has been obtained from a variety of sources. Groundsmiths assumes that third party data is reliable but cannot independently confirm this as the validity and accuracy of this information is outside our control. No guarantee can therefore be given as to the completeness of the information gathered during the study and no responsibility is accepted for errors or omissions in the third party information used. Groundsmiths' professional judgement and experience is however used to ensure that uncertainties are reduced to a level appropriate to the Site's conditions, the purpose of the investigation and the resources devoted to it by the Client.

Whilst every effort has been made to carry out a qualitative Stage 1 LCRM assessment that enables a realistic preliminary characterisation of the parameters to be identified, the possibility of variation in actual ground and groundwater conditions existing cannot be discounted. The findings and opinions presented in this Report are relevant to the time this assessment was undertaken but should not necessarily be relied upon to represent conditions at a substantially later date. Further information, ground investigation, construction activities, change of site use, or the passage of time may reveal conditions that were not indicated in the data presented and therefore could not have been considered in the preparation of this Report. Where such information might impact upon stated opinions, Groundsmiths reserve the right to modify the opinions expressed in this Report. Where opinions expressed in this Report are based on current available LCRM guidelines and/or other legislation, no liability can be accepted for the effects of any future changes to such guidelines and legislation. New information or improved practices and changes in legislation may require reinterpretation of the Report as a whole, or in part.

The conclusions and recommendations presented in this Report are based on the Site-specific assessment but utilising third party documentary information as appropriate. They are, however, limited to those that could be reasonably made at the time the assessment was undertaken. Where assessments of Site areas affected in particular ways are given, these are approximate.

This Report does not constitute an archaeological, ecological, arboriculturalist / invasive plant species, or detailed UXO survey. Any comment given in relation to these is for information only. Further assessments to assess these may be required as part of any planning condition and should therefore be undertaken by suitably qualified experts as required.

Groundsmiths reserve the right to edit and / or retract any conclusion or recommendation made in this Report should any further information, with respect to the Site, become available.

Groundsmiths disclaim any obligation to update the Report for events taking place after the time during which the assessment was carried out.

Groundsmiths do not provide or purport to provide legal advice. Should the Client require such advice then that of lawyers should be sought.

Groundsmiths accept no responsibility if any findings given in this Report are not implemented by the Client or their agents.

Groundsmiths accept no responsibility if any further works, as requested by the Local Planning Authority in the discharge of their duty of care, are not implemented by the Client or their agents.

This Report could be reassigned to a third party if they require reliance on it in the event that the Site is sold at any time in the future. An administrative fee would be applicable in such instances, payable prior to transfer.

