PHASE I ENVIRONMENTAL ASSESSMENT

Land at Barnsley Road
Darton
Barnsley
S75 5NT

For

Alistair Flatman Planning

September 2021

21/1207.1.1

Geo² Remediation Limited

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Alistair Flatman Planning

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Issue No.	Date	Description
1	30/09/2021	1st issue

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1.0 Introduction

Geo^2 Remediation Limited were commissioned by Alistair Flatman Planning, on behalf of Mr Jonathan Scott, to conduct a Phase I Environmental Assessment of a parcel of land located at Barnsley Road, Darton, Barnsley, S75 5NT. The site is approximately 5.44 hectares in area and located at grid reference 431370, 409380. The study was undertaken prior to proposed redevelopment of the site for residential use.

The Phase I Environmental Assessment, consisting of a walkover and desk study, was conducted in order to establish evidence of potential contamination, if any, resulting from the past use of the site and current land use. The desk study was also undertaken to identify possible sensitive receptors that may be at risk within the locality of the site.

2.0 Description of the Site and Surroundings

2.1 Site Description

The area shown within the bold site boundary on Figure 1 and Figure 2, in Appendix A, will be referred to throughout this document as 'the site'. Figure 1 below shows the site local boundary and Figure 2 is at a larger scale, showing the site location in a regional context.

The site is comprised of agricultural land and an equestrian farm, boundaries of which are shown in yellow and red, respectively, in Figure A below. These two segments of land a separated by a surface water drainage ditch that runs north-west to south-east.



Figure A: Site Boundaries (Image Taken from www.google.com/maps).

2.1.1 Pasture Area

The agricultural area is divided into three segments comprising large fields to the north and south, with a smaller field in the centre. All of these are used as horse pastures.

The southern pasture is bordered with wooden fencing and metal gates. The northern pasture is bordered with wooden posts and a mixture of rope and barbed wire fencing. The smaller central section shares fencing with the northern segment along its northern boundary and wooden fencing along the southern boundary.

Grassland bounds the site to the north, with a surface water drain, a pond, residential dwellings with associated farm buildings and agricultural land bounding the site to the west. The southern boundary is bordered by agricultural land, and the River Dearne bounds the eastern limit of the site.

Two metal boxes are present in the northern and central fields, which contain batteries used to power the electric fence.

2.1.2 Equestrian Centre

An equestrian centre is located in a rectangular parcel of land in the west of the site. This is currently operational and contains two rectangular buildings used as horse stables in the north-west, a hay barn with two additional horse stables in the north-east, and a manège in the south-east. There is a welfare cabin to the south of the horse stables used as a canteen. Plastic drums containing unknown liquids are stored outside the welfare cabin. A shipping container is located to the north-east of the horse stables, which is used for general storage. Stables waste (manure and hay) is piled to the north of the stables and hay barn. A chicken coop is located along the eastern wall of the horse stables. Wood panels, logs, a tractor (used for hay transportation), empty IBCs and other miscellaneous items are stored to the east of the hay barn.

Figure B, below, shows the view of the equestrian centre and the main features in this area.



Figure B: Aerial view of the equestrian and its key objects (image taken from: www.google.com/maps).

The area in between the wooden horse stable blocks is covered with concrete hard standing observed to be in good condition. These structures are single storey wooden horse stables with concrete flooring and roofed with metal sheets topped with solar panels. The hay barn is constructed from metal corrugated sheeting and timber boarding. The barn is accessed via the open southern wall. The roof is constructed from corrugated metal and plastic panels.

The manège is covered with sand and shredded rubber and bounded with a wooden fence.

There is a surface water drain running along the eastern boundary of the equestrian centre separating it from the pastureland previously discussed.

The equestrian centre is bounded by agricultural land to the north and horse grazing pastures to the east. To the south the site is bounded by a driveway with residential properties and farm buildings beyond. The site is bounded to the west by Barnsley Road with residential properties beyond.

The equestrian centre is bounded by wooden posts and barb wire fencing along the western boundary and by a wooden fence along the eastern boundary.

There are two access points to the site, both located along the western site boundary leading from Barnsley Road (A637).

2.2 Site Walkover

A walkover inspection was carried out by Geo^2 on the 21st of September 2021 by a competent and qualified geo-environmental engineer. During the site walkover the current use of the site, along with any areas of potential contamination were identified, these are outlined below:

- No visual or olfactory evidence of contamination relating to current or historical activities was identified during the site walkover in pasture area or the equestrian.

- No evidence of any other historical structures than described in section 2.1 been indicated during the site walkover.

- Although, no potentially Asbestos Containing Materials (ACMs) were identified during the walkover, an asbestos survey of the structures on site and shallow soils should be considered.

- Anecdotal evidence suggests that the drain running along the western boundary of the agricultural fields and along the eastern boundary of the equestrian centre overflows during the winter months. This causes flooding of the agricultural fields and eastern portion of the equestrian centre. During the inspection of the site, the drain was observed to be situated within a trench and heavily overgrown.

- A non-native invasive weed, Himalayan Balsam, was observed to be present around the area of the neighbouring pond and along the River Dearne. Himalayan Balsam is listed under Schedule 9 to the Wildlife and Countryside Act 1981 with respect to England and Wales. As such, it is an offence to plant or otherwise allow this species to grow in the wild. A consultants specialist survey should be considered.

- Large quantities of horse manure have been observed to be tipped off the eastern site boundary onto the bank of the River Dearne.

2.3 Site Surroundings

The site is located in the village of Darton in the Metropolitan Borough of Barnsley in West Yorkshire. The nearest residential properties are situated directly along the mid-western site boundary and beyond Barnsley Road to the west of the site. The surrounding land uses of the site are summarised in Table 1 below.

Direction	Land use
North	River Dearne, with grassland, an unnamed access road and Darton park beyond.
East	River Dearne with an agricultural field and commercial estate beyond.
West	Barnsley Road (A637) with residential properties beyond.
South	A pond, residential dwellings with associated farm buildings and agricultural land.

Table 1. Land uses in the Surrounding Area.

2.4 Site Topography

The eastern agricultural land segment slopes westward towards the drain. The equestrian centre segment slopes eastward towards the drain.

2.5 Proposed Development

No proposed development plans have been provided to Geo^2 and no detailed design is available at the time of writing. However, it is understood that three existing structures in the equestrian centre will be redeveloped into residential properties.

3.0 Desk Study

Information regarding the environmental setting of the site was obtained from the Envirocheck report, which collated information from a variety of sources. A copy of the Envirocheck report is presented in Appendix C.

Where indicated in the following sections, the data from the Envirocheck report has been supplemented with additional information obtained from freely available online data.

3.1 Site Geology

The BGS online mapping indicates that the superficial deposits underlying the northern corner and most of the southern portion of the site consists of Alluvium – clay, silt, sand and gravel superficial deposits formed approximately 2 million years ago in the Quaternary Period.

There are no records of superficial deposits underlying the site along the north-western boundary and the north-eastern segment.

The BGS online mapping indicates that the north-western and eastern area of the site is underlain by Pennine Middle Coal Measures Formation and the High Moor Rock bedrock underlies the northern segment of the site.

The Envirocheck report indicates that the site has a moderate potential for compressible ground stability hazards in the east of the site. All other ground stability hazards have a low, very low or no hazard potential.

There are six BGS Recorded Mineral Sites within 500m of the site. The nearest of these is located 303m to the north-east and relates to the opencast mining of the Darton Coal Crop Workings. The mining operation has now ceased.

The site is described as an area which might be affected by coal mining. Therefore, as recommended by Envirocheck, a coal report was obtained and is reviewed in Section 3.7. The full report is presented in Appendix C.

The site is in a low and intermediate probability radon area, whereby 1% to 3% of properties are above the Action Level. Therefore, no protection measures are necessary for in the construction of new dwellings or extensions.

3.2 Site Hydrogeology

The bedrock and superficial deposits underlying the site are classified as a Secondary A Aquifers.

There is one recorded groundwater abstraction within 1,000m of the site. This is located 158m to the north of the site and is used for ‘Commercial Use (pubs etc)’.

The site is not situated within a Source Protection Zone. However, the site is classified within a high groundwater vulnerability zone of Productive Bedrock and Superficial Aquifers.

There is a potential for groundwater flooding to occur of property situated below ground level.

3.3 Site Hydrology

The nearest surface water feature is a drain which runs through the site, separating the two segments of land. This discharges into the River Dearne which runs along the north-eastern,

eastern and south-eastern site boundaries. A pond is located adjacent to the south-western site boundary.

There are no listed surface water abstractions within 1,000m of the site.

There are ten discharge consents within 1,000m of site. The nearest is located 417m east of the site and relates to 'surface water effluent'.

There are twenty-five recorded pollution incidents to controlled waters within 1,000m of the site. The closest is 35m north of the site when an unknown pollutant leaked into a freshwater stream/river. This occurred 1990 and is listed as Category 2 – Significant Incident.

3.4 Waste

There are six historical landfill sites within 1,000m of the site. The closest is located 192m to the east and consisted of deposited waste of inert, industrial and commercial waste.

The site is listed within Local Authority Landfill Coverage; however, no landfill data is supplied.

There are six Local Authority Recorded Landfill Sites within 1,000m of the site. The closest is located 175m east of the site.

There are seventeen areas of potentially infilled land (non-water) within 1,000m of the site. The nearest of which is an unknown filled ground (pit, quarry etc.) located 116m to the north. From a review of historical mapping, it appears to be an old coal pit.

There are sixteen areas of potentially infilled land (water) within 1,000m of the site. The nearest is located 165m to the south-east.

3.5 Other Receptors

The site is located within Nitrate Vulnerable Zone (NVZ).

The site is located within an area of adopted green belt.

3.6 Other Potential Sources

There are twelve 'contemporary trade directory entries' within 500m of the site. The closest relates to a scaffolding & work platforms business located 127m to the south-west of the site which is listed as active.

There are ten 'manufacturing and production' sites within 500m of the site. The closest is located 140m to the north of the site and relates to 'business parks and industrial estates.'.

There are five 'commercial services' sites within 500m of the site. The nearest of these is located 230m to the south of the site and relates to 'transport, storage and delivery'.

3.7 Coal Report

The Consultants Coal Mining Report was obtained and reviewed; the findings are summarised below:

- 143m below the site runs the Fenton coal seam associated with Woolley Colliery. This is approximately 193cm in thickness, it was last mined in 1977.
- There are no recorded faults, fissures or break lines within the vicinity of the site.
- There are two workable coal outcrops running within the site and one outcrop running close to the north-western site boundary.
- Records suggest presence of probable unrecorded shallow workings underlying the site.
- There is a large area of historical open cast mining which is located approximately 280m south-west of the western site boundary and extends 900m west along Bence Lane.
- There are two opencast mine areas within 500m of the site. Both are located 480m to the south-east and are associated with the site at Barugh Bridge (Gawber) and license reference 95/0085/S.
- The Coal Authority has received 2 coal mining subsidence claims within 50 metres of the property boundary.
- There is no current Stop Notice delaying the start of remedial works or repairs to the property.
- The property is in an area where notices to withdraw support were given in 1956, 1982 and 1989.
- The property is not in an area where a notice has been given under section 41 of the Coal Industry Act 1994, cancelling the entitlement to withdraw support.
- In the event of a redevelopment, advice should be sought to characterise the structural risk from coal subsidence. It is understood that the site is located in an area of previous interest and local investigations have been undertaken, for which the coal authority holds records.

4.0 Site History

Details regarding the development of the site, its immediate surroundings and potentially contaminative land uses were obtained from a review of historical maps. Copies of the maps are provided in Appendix C and a summary is provided in Table 2. All distances are approximate and are relative to the site, unless otherwise stated.

Date	Onsite	Offsite
1854-1855	The site is undeveloped/agricultural land.	The site is predominantly surrounded by undeveloped/agricultural land. There are residential dwellings present along the mid-western site boundary. An old coal pit is labelled 116m to the north. There is a railway 250m east of the site.
1891-1893	There is a drain running along the western site boundary which also passes through the site.	The old coal pit is no longer marked on the mapping.
1932-1938, 1948	No change.	The village of Darton starts to develop and expands north of the site. Darton Main Colliery is now present 750m north-west of the site. Darton Colliery is present 750m east of the site.
1956, 1962-1966	No change.	Residential properties have been constructed beyond the Barnsley Road west of the site. Darton Main Colliery and Darton Colliery are now disused.
1973	No change.	A factory has been constructed beyond the River Dearne 100m north-east of the site. The M1 Motorway has been constructed 500m to the west of the site.
1991	No change.	A pond now exists directly west of the mid-western site boundary.
1999-2006	Three rectangular buildings have been constructed in the western segment of the site.	No significant change.
2021	A manège has been constructed in the south-eastern area of the western segment.	The formerly noted factory has been redeveloped and now is labelled as a Darton Business Park.

Table 2. Summary of historical map review.

5.0 Hazard Identification

In the context of land contamination, there are three essential elements to any risk:

- A **contaminant** (or contaminant source)– a substance that is in, on or under the land and has the potential to cause harm or to cause pollution of controlled waters;
- A **receptor** – in general terms, something that could be adversely affected by a contaminant, such as people, an ecological system, property, or a water body; and
- A **pathway** – a route or means by which a receptor can be exposed to, or affected by, a contaminant.

Each of these elements can exist independently, but they create a risk only where they are linked together, so that a particular contaminant affects a particular receptor through a particular pathway. This kind of linked combination of contaminant–pathway–receptor is described as a contaminant linkage. All potential sources, pathways and receptors present at this site have been detailed in this section.

5.1 Source Characterisation

- **On-site sources**

  No asbestos register has been obtained; pre-2000 development of the site makes asbestos presence in building fabrics and shallow soils possible.

  The site walkover did not identify evidence of potentially contaminative activities or visible/olfactory evidence of contamination on the site.

- **Off-site sources**

  There is a potential of ground gas generation associated with the historical mining activities and workable coal seams within the site. Mine gas (e.g. methane and carbon dioxide) can migrate to the surface and induce significant risks to human health.

  Two historical collieries were located 750m north-west and east of the site. Due to the distance from site, these are not considered to be a potentially contaminative source that could impact the site.

  A landfill is present approximately 175m north-east of the site. This was reported to deposit inert and construction waste. Due to the distance from site and the type of waste deposited, this is not considered to be a potential source of hazardous ground gasses that could impact the site.

5.2 Potential Receptors and Points of Exposure

Potential receptors both on and offsite that could be affected by contamination hazards at the site are listed below:

- **Surface water**

  The nearest surface water feature is a drain running within the western site boundary, a pond located directly west of the mid-western site boundary and the River Dearne which flows along the eastern extents of the site.

- **Groundwater as a resource**

  The site is situated on bedrock and superficial deposits which are classified as Secondary A Aquifers. This resource is considered to be a feasible receptor for any identified potentially significant source of contamination on the site.

- **Future residential site users**

  This will include exposure to users on the site, including within buildings.

- **Neighbouring residential and public properties**

  The nearest neighbouring residential properties are located directly south of the equestrian segment of the site.

- **Site workers during any redevelopment**

  Any construction workers involved in works in impacted areas may become directly exposed to contaminants. Potential hazards should be considered as part of a health and safety risk assessment prior to any works. Therefore, this will not be considered further in this report.

5.3 Contaminant Pathways

Potential pathways by which any identified contamination may manifest itself in the environment are as follows:

- **Direct contact or ingestion.**

  Shallow fugitive dusts and soils may pose a threat through direct contact, inhalation and ingestion. This could affect future residential users in the areas of the site which remain landscaped or could affect site workers during the redevelopment of the site.

- **Accumulation of volatile vapours and tainting of potable water.**

  Volatile compounds may generate potentially harmful vapours which may accumulate within future buildings onsite. Shallow contamination or ground gases may migrate along, or within, water pipes. Exposure to contaminated material may lead to tainting of buried water pipes. Exposure to contaminated material may lead to tainting of water supplies.

5.4 Initial Contaminant linkages

All contamination linkages arising as a result of the interconnection of the contaminant source, contamination pathways and potential receptors detailed above are summarised in Table 3, below.

Linkage No.	Source	Pathway	Receptor
1	Potential ground gas generation associated with the historical mining activities and workable coal seams at the site.	Exposure to harmful vapours, hazardous ground gas and tainting of water supply.	Future site users, principally within future buildings onsite.

Table 3. Identified Site Specific Contamination Linkages.

6.0 Risk Estimation

The objective of the qualitative risk assessment is to determine the significance of the risk, if any, which may occur as a result of the creation of pollutant linkages, which connect a potential receptor to an identified potential contaminant source at the site.

The perceived risk is based on a consideration of both the likelihood of an event (probability) occurring, and the severity of the potential consequence. Classification of these two factors is detailed in Appendix D.

6.1 Qualitative Risk Assessment

The pollutant linkage identified in the conceptual site model is detailed below in order to enable an assessment of the probability of the identified chain of events occurring and the likely severity of the resultant impact. These classifications will be used to allow an estimation of the perceived risk to be made.

Additionally, where data is limited around some potential sources or features this has been reflected in the risk designation, which has been increased by one level in order to be protective of the identified receptors.

<table>
<tr><th colspan="5">Linkage 1</th></tr>
<tr><td>Source-</td><td colspan="3">Potential ground gas generation associated with the historical mining activities and workable coal seams at the site.</td><td rowspan="2">Probability</td><td rowspan="2">Severity</td></tr>
<tr><td>Pathway-</td><td>Exposure to harmful vapours, hazardous ground gas and tainting of water supply.</td><td>Receptor-</td><td>Future site users, principally within future buildings onsite.</td></tr>
<tr><td colspan="4" rowspan="3">Any volatile contamination present in the subsurface could result in a source for vapours or gases. Any such impact may be capable of causing harm to human health.

The site is located within an area of historical coal mining and has two workable outcrops running across the site. This could potentially result in emissions of gas from the ground originating from sub-cropping coal, old pits, shafts and etc, and cause harm to human health.

As such, the risk to human health is classified as moderate/low.</td><td>Low Likelihood</td><td>Medium</td></tr>
<tr><td colspan="2">Classification</td></tr>
<tr><td colspan="2">Moderate/Low Risk</td></tr>
</table>

Table 4. Qualitative Risk Assessment

6.2 Potentially Significant Contaminant Linkages

Table 5, below, summarises the relative significance of each contamination linkage and which are deemed to present the possibility of unacceptable risk. At a site where linkages are identified, these should be considered for further assessment or, even remedial works, in order to mitigate these identified risks.

Linkage No.	Source	Pathway	Receptor	Potentially Unacceptable Risk
1	Potential ground gas generation associated with the historical mining activities and workable coal seams within the site.	Exposure to harmful vapours, hazardous ground gas and tainting of water supply.	Future site users, principally within future buildings onsite.	✓/×

Table 5. Summary of Qualitative Risk Assessment

7.0 Conclusions and Recommendations

7.1 Conclusions

A Phase 1 Desk Study of the site, located on Barnsley Road, Darton, Barnsley, S75 5NT was undertaken, prior to planned residential redevelopment in the western segment of the site. The purpose of the assessment was to evaluate the potential for risk to be posed to human health and sensitive environmental receptors from historical and current use of the site.

During the walkover no visual or olfactory evidence of contamination or contaminative activities has been identified at the site. However, the review of the coal report suggests a risk of ground gas generation associated with historical mining activities at the site and in close proximity.

As such, Geo^2 considers there is a moderate/low risk to human health receptors.

7.2 Recommendations

The following measures are recommended to address the identified risks:

On the basis of the Phase I Environmental Assessment Geo^2 recommend the following:

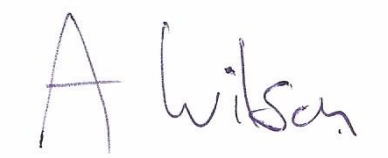
- No assessment has been undertaken with respect to potential asbestos within the shallow soils. An appropriate survey should be undertaken prior to refurbishment.
- Prior to development, appropriate specialist advice should be sought with regards to Coal Mining legacy in the area and geotechnical vulnerability of the site.
- As an invasive weed, Himalayan Balsam, was identified during the site walkover, a specialist consultants survey should be undertaken.

This report was prepared by:



30/09/2021
Ugne Ankenaite — Date

This report was reviewed by



30/09/2021
Adam Wilson — Date

8.0 Limitations

Geo^{2}s' conclusions, recommendations and opinions are based on information gathered at the time of the investigation from a variety of third party sources and from observations made during site reconnaissance. Therefore, there may be conditions at the site that have not been taken into account which were not apparent at the time of investigation.

A portion of this report is based solely upon information provided by third parties. The information has not been independently verified by Geo^2. Whilst this report and the opinions given in it are accurate to the best knowledge of Geo^2, Geo^2 cannot guarantee the completeness or accuracy of any descriptions, opinions or conclusions based solely upon information that has not been independently verified.

The recommendations contained within this report represent our professional opinions. These opinions were arrived at in accordance with currently accepted industry practices and hydrological and engineering practices at this time. As such they are not a guarantee that the site is free of hazardous materials or conditions.

9.0 References

British Standards Institute

BS10175:2011 “Investigation of potentially contaminated land sites – code of practice”

British Geological Society

Geology of Britain Viewer

Desk Study Data

Envirocheck Report - for Environmental Data

Envirocheck Historical Maps

Environmental Agency

Land Contamination Risk Management (Lcrm) Guidance, 2020