

EARTH ENVIRONMENTAL  
& GEOTECHNICAL

## Phase 1 GeoEnvironmental Desk Study

Higher Gibfield Barn

Burnley

March 2024

On behalf of

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**PHASE I GEOENVIRONMENTAL DESK STUDY**

**HIGHER GIBFIELD BARN**

**MANCHESTER ROAD BARN**

**BURNLEY**

**BB11 5NS**

**FOR**

**MR. CHRIS KAROO**

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**Report No. A5910/24/FDS**

**MARCH 2024**

<b>Report Title:</b>	<b>Higher Gibfield Barn, Burnley Phase I GeoEnvironmental Desk Study</b>
<b>Report Reference:</b>	<b>A5910/24/FDS</b>
<b>Client:</b>	<b>Mr. Chris Karoo</b>
<b>Issue Date:</b>	<b>6<sup>th</sup> March 2024</b>
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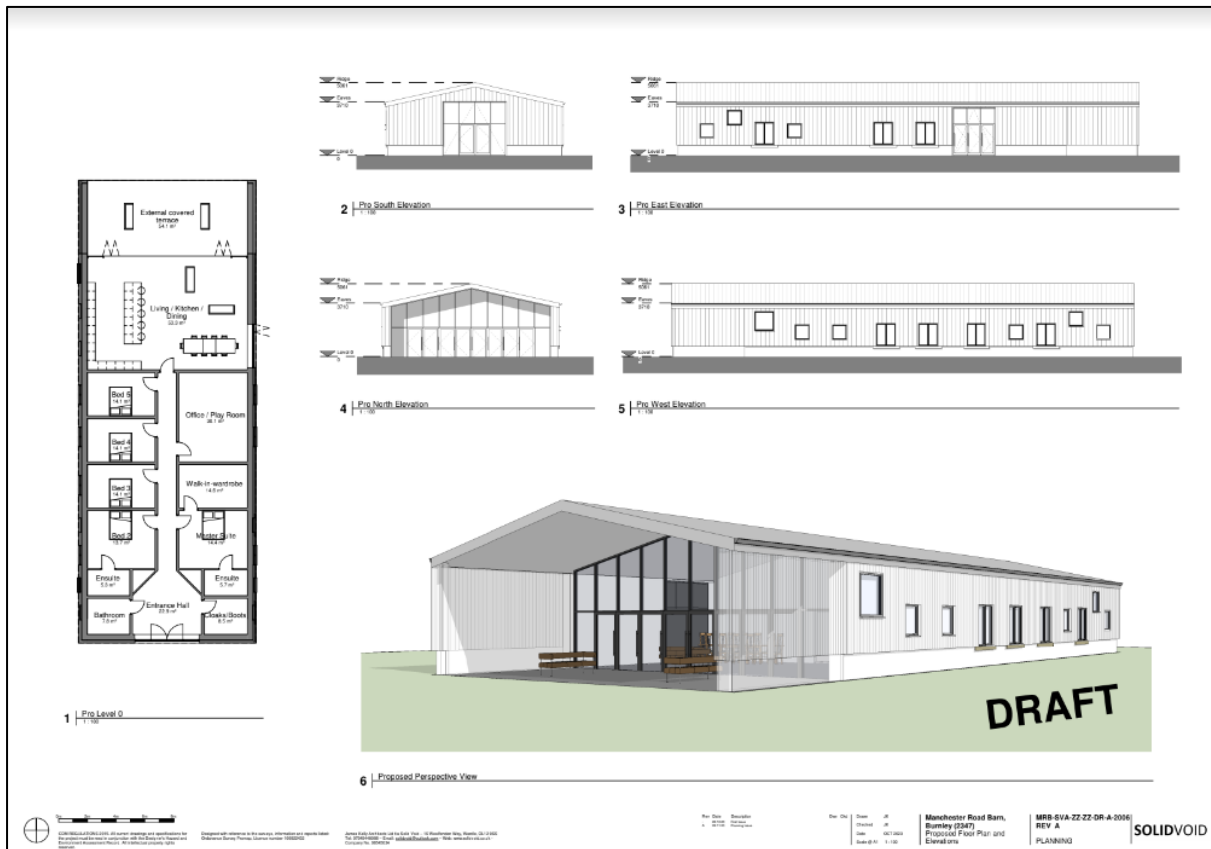
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## 1.0 INTRODUCTION

### Appointment

- 1.1 Earth Environmental & Geotechnical Ltd has been commissioned by Mr. Chris Karoo (the Client) to undertake a Phase I GeoEnvironmental Desk Study for Higher Gibfield Barn, Burnley.
- 1.2 It is understood that the Client intends to demolish the derelict existing agricultural barn and construct a new residential dwelling in its footprint. Access will be retained to the site via Manchester Road.
- 1.3 The new dwelling will largely replicate the form of the existing barn in its height, scale, and massing.
- 1.4 A proposed development plan is presented in Figure 1, below.

**Figure 1 Proposed Development Plan**



## **Objective**

- 1.5 The purpose of the Desk Study is to collate available geological and environmental data for the site (and its environment) and provide a preliminary geotechnical and geo-environmental appraisal, with a site-specific conceptual model. This enables a preliminary assessment of geo-environmental risks to be undertaken and, if necessary, provides information for the design of a Phase 2 Ground Investigation.

## **Scope**

- 1.6 The Phase I Environmental Desk Study comprises of a site reconnaissance visit and a review of the following information sources, some of which was provided by the client.
- British Geological Survey online maps.
  - Google Earth imagery.
  - Environment Agency online mapping data.
  - Historical Ordnance Survey maps.
  - The site and surrounding areas environmental, geological, and mining data presented in the site specific GroundSure Reports (Appendix 1).
  - Coal Authority Interactive Viewer.
  - Burnley Borough Council Planning Portal.

## 2.0 SITE LOCATION AND DESCRIPTION

- 2.1 The site (0.65hectares) is located off Manchester Road. The site is situated approximately 3km southwest of Burnley town centre.
- 2.2 The site is agricultural land with access off Manchester Road via a single track lane to a cattle gate and is abounded by a wire mesh fence boundary. The existing barn is in an extremely dilapidated state of repair, with broken sheet cladding to the walls and roof.
- 2.3 A Public Right of Way crosses the site to the west of the existing barn but remains unaffected by the proposals and does not result a requirement to divert or extinguish a PROW.
- 2.4 The site sits within green belt and the predominant focus of this designation is to prevent over development, urban sprawl and maintain the openness of the green belt. Therefore, these proposals seek to re-build a new structure on the same footprint, to the same height and massing as the existing, and to the identical volume.
- 2.5 The approximate National Grid Reference for the centre of the site is SD 83019 29696 (X: 383019, Y: 429696), with the closest postcode being BB11 5NS.
- 2.5.1 The site is an irregular shaped parcel of land, which is comprised of an agricultural barn. The area surrounding the barn is comprised of fields. There is access to the site by a small road off of Manchester Road.
- 2.5.2 The barn is currently derelict with an entrance to the south and east.
- 2.5.3 The only hardstanding on site at the time of the walkover was the road leading to the barn.
- 2.6 The general surrounding area comprises of agricultural land and farmhouses. Manchester Road is adjacent to the western boundary of the site.
- 2.7 A location plan is shown below as Figure 2, together with a recent site photograph as Figure 3 (overleaf).



**Figure 2 Site Location Plan**



**Figure 3 Site Photograph**



### **Site Utility Services**

- 2.8 Site service plans have been obtained for the site by the Client. The status of all services should be checked prior to any development (including site investigation) commencing.

### 3.0 ENVIRONMENTAL SETTING

- 3.1 The geology of the site is covered by British Geological Survey (BGS) online data and the site specific GroundSure Enviro+Geo Insight report (Appendix 1).
- 3.2 Environmental conditions are covered by Environment Agency (EA) and British Geological Survey (BGS) online data, and the site specific GroundSure Enviro+Geo Insight report (Appendix 1).

#### Geology

- 3.3 The BGS states that the site is underlain by undivided made ground.
- 3.4 The site is recorded to be underlain by superficial deposits of Devensian Till, commonly known as Boulder Clay.
- 3.5 The solid geology beneath the site is shown to be the Westphalian Old Lawrence Rock, comprising of sandstone.
- 3.6 There are 9 records of linear features within 500m of the site boundary. The closest record refers to a fault 171m southwest of the site.
- 3.7 There are no records of landslips within 500m of the site.
- 3.8 There are no borehole records identified within 250m of the site.
- 3.9 The site is in an area where the hazard rating is negligible with regards to compressible deposits and soluble rocks. The hazard rating is very low with regards to swelling clay, running sands, and collapsible deposits. The hazard rating is low with regards to landslides.

#### Ground Workings

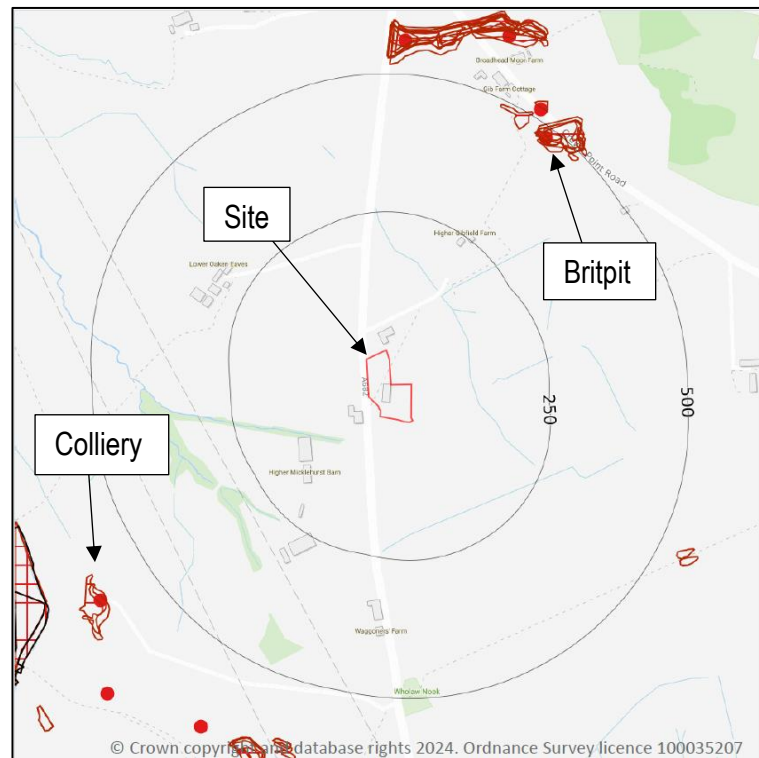
- 3.10 There are no records of historical surface ground working features identified within 250m of the site boundary.
- 3.11 According to the BGS, there is 1no. record of a British Pit within 500m of the site. The closest record refers to a surface mineral working for sandstone referenced 'Brown Head Moor', located 481m to the northeast of the site.

#### Mining and Other Underground Workings

- 3.12 The site is located within an identified coal mining area; however, it is not located within a Coal Authority Development High Risk Area.
- 3.13 There are no records of non-coal mining areas located within 1km of the site.
- 3.14 There are no records of brine areas, gypsum extraction, tin mining, or clay mining on the site.
- 3.15 There are no records of natural cavities within 500m of the site.

- 3.16 There are no records for mining cavities identified within 1km of the site.
- 3.17 There are 14no. records for historical underground working features identified within 1km of the site. The closest record refers to a colliery 675m west of the site.
- 3.18 There are no records of historical mineral planning areas within 500m of the site.

**Figure 4 Mining and Ground Workings**



### Radon Potential

- 3.19 The site is not located in a Radon Affected Area, less than 1% of the properties are above the Action Level. Therefore, radon protection measures will not be required.

### Hydrogeology and Hydrology

- 3.20 The Devensian Till Deposits are classified by the Environment Agency (EA) as a Secondary Undifferentiated Aquifer, with a mixed flow type and a high to low permeability. The BGS states the following:

**Secondary Undifferentiated Aquifer** 'Assigned where it is not possible to attribute either category A or B to a rock type. In general, these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type.'

- 3.21 The Westphalian Old Lawrence rock is classified by the Environment Agency (EA) as a Secondary A Aquifer, with a fracture flow type and a high to moderate permeability. The BGS states the following:

**Secondary A Aquifer** *'Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.'*

- 3.22 The groundwater vulnerability of the site has been classified as low for the superficial aquifer and bedrock aquifer. The soil leaching potential of the site classified as low. The BGS states:

*'Low – 'Areas that provide the greatest protection from pollution. They are likely to be characterised by low leaching soils and/or the presence of superficial deposits characterised by a low permeability.'*

- 3.23 There are no groundwater abstraction license records within 2km of the site.
- 3.24 There are 10no. surface water abstraction license records within 2km of the site. The nearest historical licence refers to a general farming and domestic water supply 386m to the west of the site.
- 3.25 There are 6no. potable water abstraction license records within 2km of the site. The nearest active licence refers to a potable water supply 1.6km to the south of the site.
- 3.26 The site is not located within 500m of a Source Protection Zone or a Source Protection Zone within a confined aquifer.
- 3.27 There are 13no. water network entries within 250m of the site. The nearest refers to a water network 80m southwest of the site.
- 3.28 There are 10no. surface water features identified within 250m of the site.
- 3.29 There are no records of Water Framework Directive (WFD) surface water bodies located within 2km of the site.
- 3.30 There is 1no. record of a Water Framework Directive (WDF) groundwater body located on-site. The record refers to the Douglas, Darwen and Calder Carboniferous Aquifers which had a poor chemical rating in 2019.

#### **Landfill & Waste Management Activity**

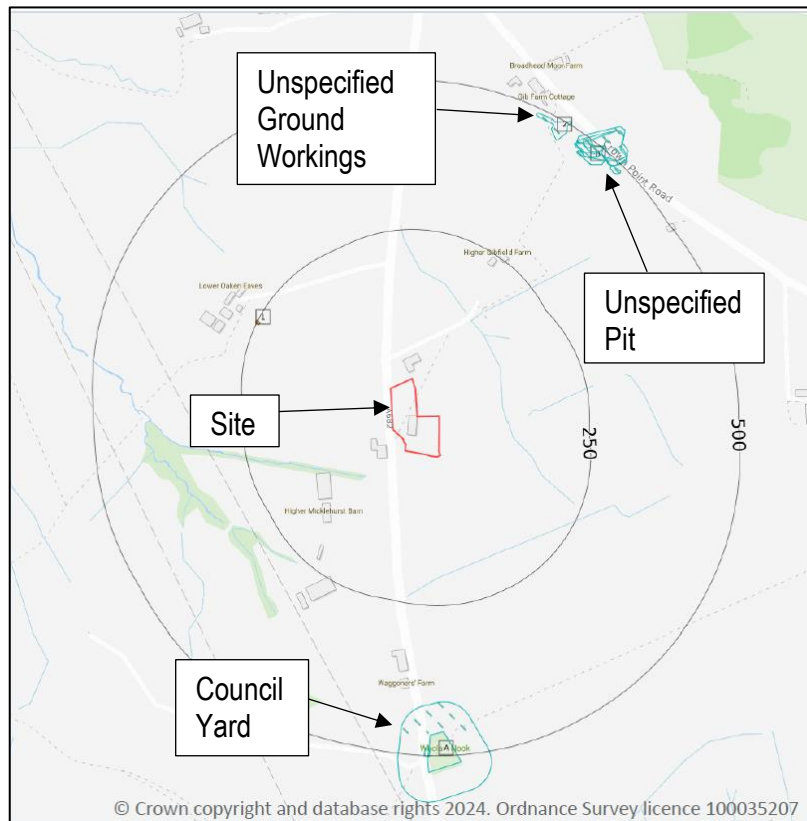
- 3.31 There are no records for current Environment Agency landfill records within 500m of the site.
- 3.32 There are no records of historic Environment Agency landfill sites within 500m of the site.
- 3.33 There are no records of BGS/DoE non-operational landfill sites within 500m of the site.
- 3.34 There are no records of a historical landfill from the Local Authority and Historical Mapping records within 500m of the site.

- 3.35 There are 36no. records of a waste treatment, transfer, or disposal site within 500m of the site. The closest record refers to a storage waste exemption for the storage of sludge located 114m to the north of the site.
- 3.36 There are no records of historical waste sites within 500m of the site.
- 3.37 There are no records of current Environment Agency licensed waste sites within 500m of the site.

### **Industrial Land Use Information**

- 3.38 There are 15no. records of potentially contaminative historical land uses identified within 500m of the site. The nearest record refers to a council yard located 410m south of the site, dated to 1965. Other records within the vicinity refer to unspecified pits, unspecified ground workings, unspecified old quarries, an unspecified tank, and a rubble sandstone quarry, dated between 1846 and 1989.
- 3.39 There is 1no. record of current potentially contaminative land uses identified within 250m of the site. The closest records refer to a tank located 237m northwest of the site.
- 3.40 There are 2no. records of historical tanks identified within 500m of the site. The closest record refers to an unspecified tank located 244m northwest of the site, and dated between 1960 and 1993.
- 3.41 There are no records of historical energy features identified within 500m of the site.
- 3.42 There are no records for current petrol or fuel sites within 500m of the site.
- 3.43 There are no records of historical petrol or fuel sites within 500m of the site.
- 3.44 There are no records of historical garage and motor vehicle repair sites identified within 500m of the site.

**Figure 5 Historical Industrial Land Uses**



- 3.45 There are no records of historical military land use record within 500m of the site.
- 3.46 There are no National Grid high voltage underground electricity transmission cables within 500m of the site.
- 3.47 There are no National Grid high-pressure gas transmission pipelines within 500m of the site.
- 3.48 There are no historical railway and tunnel features identified within 250m of the site.
- 3.49 There are no historical railway lines identified within 250m of the site.
- 3.50 There are no current active railway line records identified within 250m of the site.
- 3.51 There are no underground railway lines or tunnels identified within 250m of the site.
- 3.52 The site is not within 500m of the route of the High Speed 2 rail project.
- 3.53 The site is not within 500m of the route of the Crossrail 1 rail project.

## Environmental Permits, Incidents and Registers

- 3.54 The Groundsure Report includes records of environmental permits, incidents, and registers within 500m of the site, which are summarised in Table 1 below.

**Table 1: Environmental Permits, Incidents and Registers within 500m of the Site**

Permit/Incident/Register	Number
Historical Licensed Industrial Activities (IPC)	0
Part A (1) and IPPC Authorised Activities	0
Pollutant Release to Surface Waters (Red List)	0
List 1 Dangerous Substances Inventory Sites	0
List 2 Dangerous Substances Inventory Sites	0
Part A (2) and Part B Activities and Enforcements	0
Category 3 or 4 Radioactive Substance Authorisations	0
Licensed Discharge Consents	0
Planning Hazardous Substance Consents and Enforcements	0
Dangerous or Hazardous (COMAH and NIHHS) Sites	0
Sites Determined as Contaminated Land under Part 2a EPA 1990	0
Regulated Explosive Sites	0
Pollutant Release to Public Sewer	0
Substantiated Pollution Incidents (Category 1 and 2)	0
Pollution Inventory Substances, Wastes and Radioactive Wastes	0

- 3.55 There are no records of environmental permits, incidents, and registers within 500m of the site.

## Environmentally Sensitive Sites

- 3.56 There are no records of a Site of Specific Scientific Interest (SSSI) located within 2km.
- 3.57 There are no records of Special Areas of Conservation (SAC) within 2km of the site.
- 3.58 There are no records of green belt land within 2km of the site.
- 3.59 There are no records of a nitrate vulnerable zone within 2km of the site.
- 3.60 There are no further records of environmentally sensitive sites within 2km of the site.

## Ecology

- 3.61 An ecological assessment of the site falls outside the brief of this report. Where considered necessary, advice should be sought from an ecological specialist in this respect.
- 3.62 However, the site is classified as Grade 4 agricultural land.



### **Archaeology**

- 3.63 An archaeological assessment falls outside the brief of this report. Where considered necessary, advice should be sought from an archaeological specialist in this respect.
- 3.64 There are no records of Listed Buildings within 250m of the site.
- 3.65 There are no records of Schedule Ancient Monuments within 250m of the site.

### **Potential Flood Risks**

- 3.66 Detailed assessment of flood risks is outside the scope of this report. However, the site does not lie within 50m of an Environment Agency Zone 2 or Zone 3 floodplain.
- 3.67 There are no records of risk of flooding from rivers and sea (RoFRaS) within 50m of the site.
- 3.68 There are no records of a historical flood event within 250m of the site.
- 3.69 There are no records of flood defences, no areas benefitting from flood defences, or no areas used for flood storage within 250m of the site.
- 3.70 The highest risk of surface water flooding occurring on-site is negligible.
- 3.71 The highest risk of groundwater flooding occurring on-site is low.

### **Previous Site Investigations**

- 3.72 Earth Environmental & Geotechnical Ltd are not aware of any previous site investigations carried out at the site.

## 4.0 SITE HISTORY

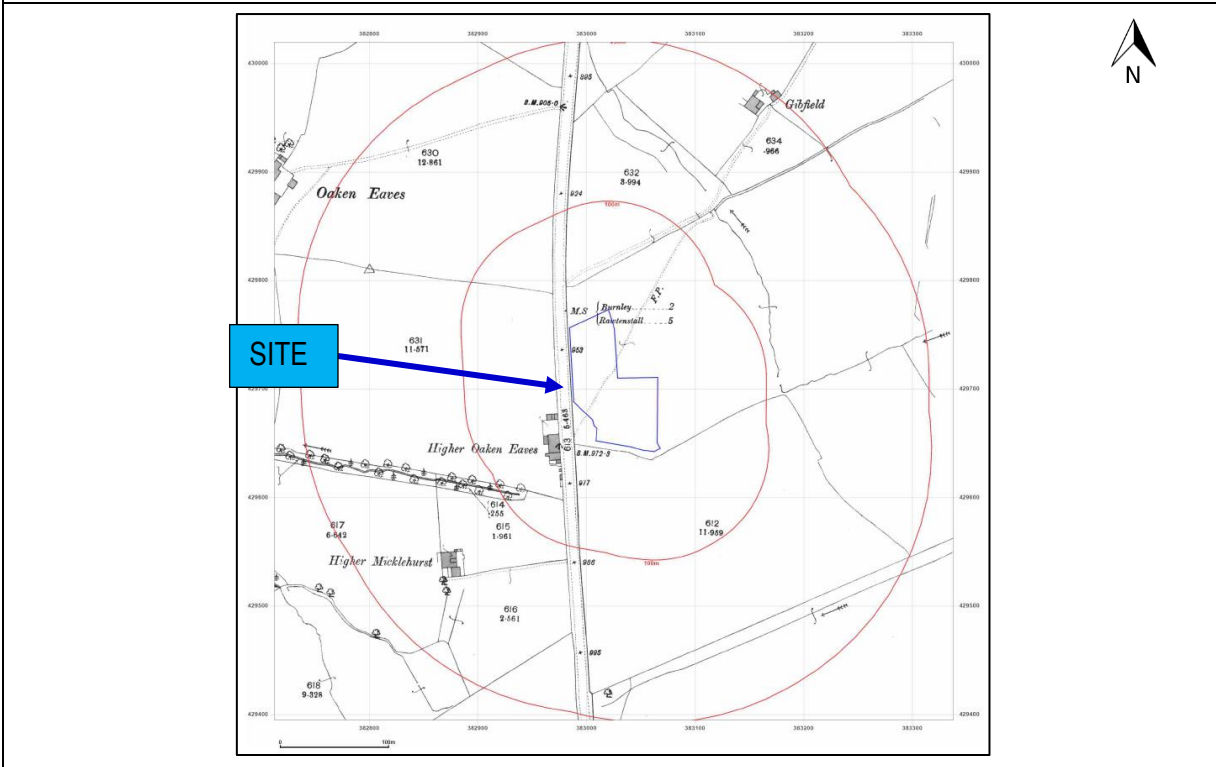
- 4.1 The historical development of the site has been determined by reference historical plans and Google Earth imagery. The reviewed historical plans comprise only readily available records and may be limited; however, the information available to date indicates that additional searches are unlikely to add to our understanding of the site. The earliest available historical mapping covering the site dates back to 1846.
- 4.2 The site history is summarised in Table 2, below, followed by selected extracts from maps and aerial photographs.

**Table 2: Summary of Site History**

Date	On-Site History	Surrounding Land Use History
1846 1891-1892 1:10,560  1892 1:2,500	Site is part of a vacant field. There is a footpath from the main road to Gibfield farm through the site.	There is a main road adjacent to the western border of the site.  Gibfield farm is located 245m northeast of the site.  Oaken Heaves is located 250m northwest of the site.  Higher Oaken Heaves is located 15m west of the site.  Higher Micklehurst is located 175m southwest of the site.  The general surrounding area is comprised of agricultural fields on rolling hills.  Waggoners Inn located 400m south of the site.  There are multiple sandstone quarries (rubble) located approx. 600m northeast of the site.
1909-1910 1928-1929 1931 1:10,560  1912 1930 1:2,500	No significant changes.	Some smaller structures constructed as part of Higher Oaken Eaves.  Small structure constructed as part of Higher Micklehurst.  There are 2 springs located between 220m and 360m southwest of the site.  Oaken Eaves is now recorded as Lower Oaken Eaves and there are some new smaller structures constructed.  Hydraulic ram and stepping stones located 420m west of the site.  Sandstone quarries northeast of the site all recorded as old quarries.  There is a trough located 400m south of the site.  Smallpox Hospital located 600m east of the site.
1950 1965 1:10,560	There is a new property boundary running through the site.	There is a tank located 495m south of the site.  Spring and wind pump located 380m northwest of the site.  Issues located 255m southwest of the site.

Date	On-Site History	Surrounding Land Use History
1960 1:2,500		
1993 1:2,500 1986-1989 1:10,000	No significant changes.	There is a pump located 245m northeast of the site. There are sinks located 250m south of the site. Waggoners Farm located 415m south of the site.
2003 1:1,250  2001 2010 2024 1:10,000  2000-2023 Google Earth Imagery	Barn constructed on the site with an access road off of Manchester Road.	No significant changes.

**Figure 6 OS Map Extract 1892**



**Figure 7 OS Map Extract 1960**

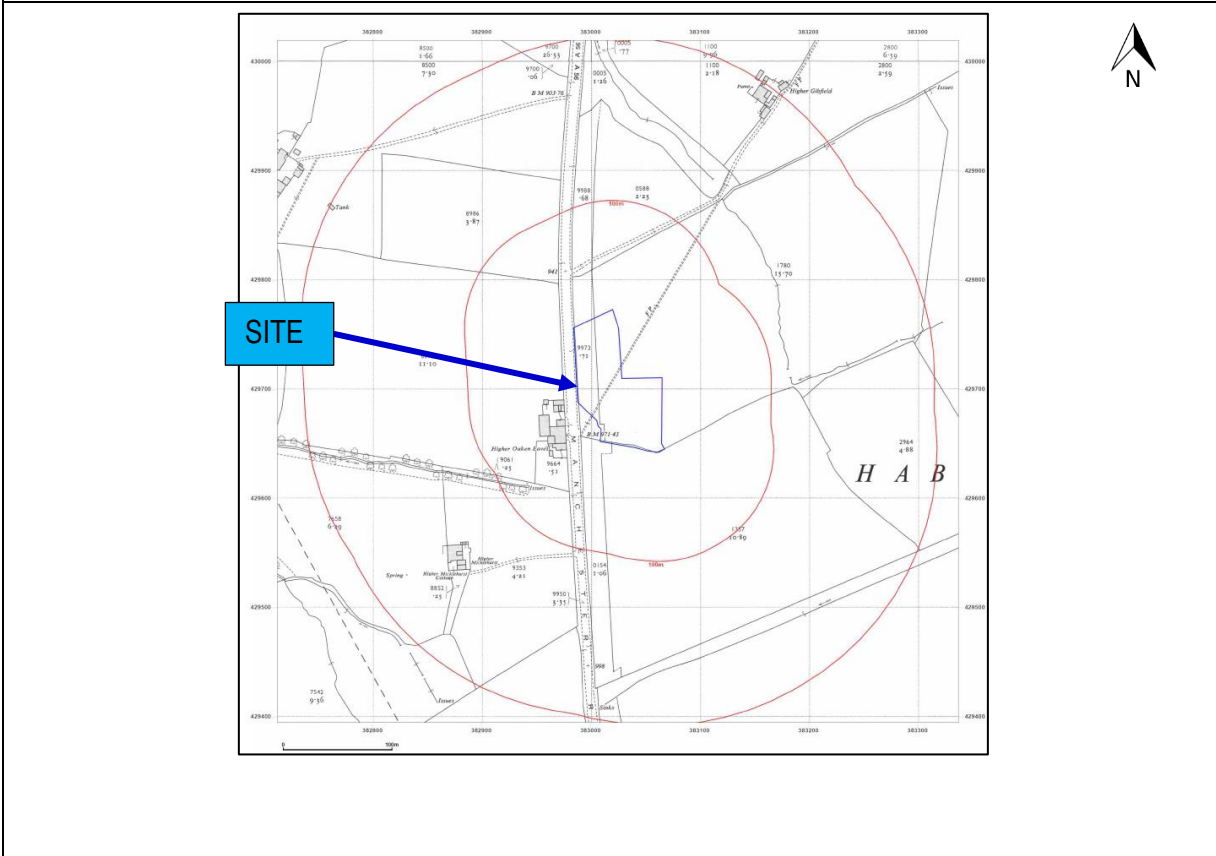


Figure 8 OS Map Extract 1993

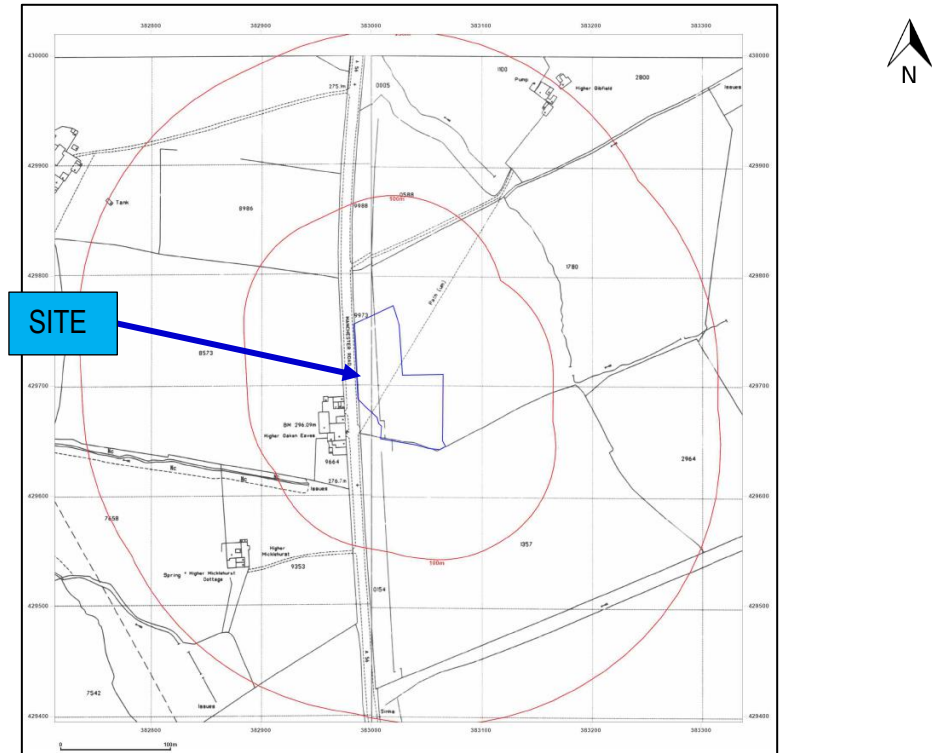
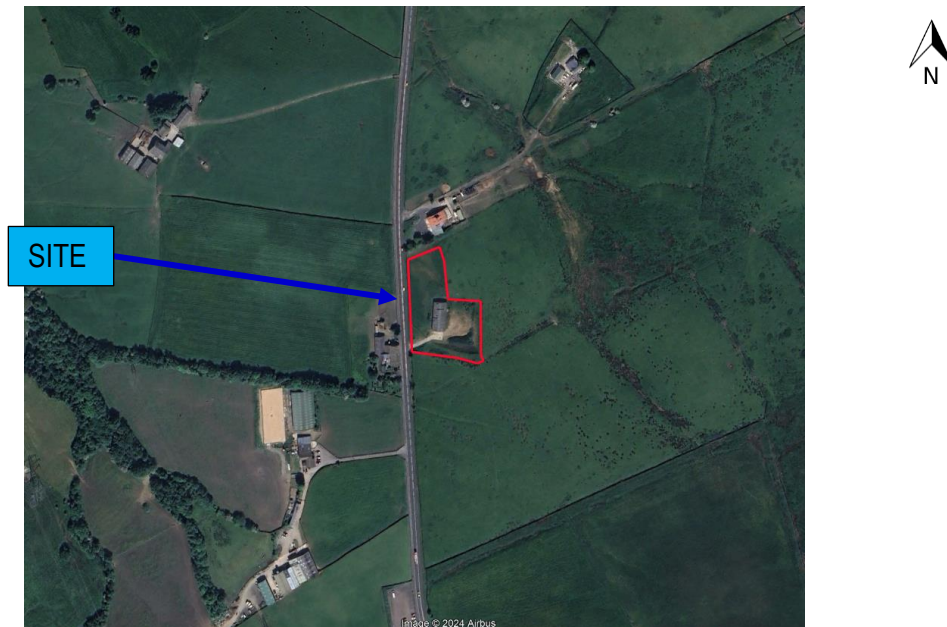


Figure 9 OS Map Extract 2023



## 5.0 WALKOVER SURVEY

- 5.1 A walkover survey was completed on Monday 4<sup>th</sup> March 2024. The photographs and notes from this survey are appended to this report as Appendix 2 and Appendix 3 respectively.
- 5.2 The site is accessed by vehicle via a small access road off of Manchester Road, located adjacent to the western border of the site. There is an entrance to the barn to the south and east of the building.
- 5.3 The site is currently occupied by a barn, which had been used for agriculture storage. The barn is not currently in use and there is a small amount of litter inside; old barbed wire fencing, wooden posts, bricks, plastic tubs and a single plastic chair.
- 5.4 The barn is derelict with broken and missing metal sheet padding to the walls and roof.
- 5.5 The site is demarcated by a residential property to the north of the site, which is under construction. Rolling hills to the east and south. Manchester Road and another residential property to the west.
- 5.6 There are no manhole covers or overhead telephone cables present on site.
- 5.7 Generally, the immediate surrounding area is comprised of rolling hills and farmhouses.
- 5.8 A site features plan is presented as Figure 10 overleaf.

Figure 10 Site Features Plan



## 6.0 PRELIMINARY CONTAMINATION RISK ASSESSMENT

### Introduction

- 6.1 The following paragraphs outline a Preliminary Risk Assessment (PRA) for the site based on the above desk study information as defined by Land Contamination Risk Management Environment Agency, July 2023.
- 6.2 Table 5 provides a Preliminary Conceptual Model (PCM) which considers the source-pathway-receptor linkages present alongside the likelihood, severity and risk level as defined within Table 3 and Table 4 below. The assessment of probability, a modified risk table, and certain consequence definitions are based on CIRIA C552 and Land Contamination Risk Management Environment Agency, July 2023.
- 6.3 Table 5 considers whether a pollution linkage is potentially present and provides a preliminary qualitative assessment of risk based on the information currently available. Where a possible linkage is identified, it does not necessarily mean that a significant risk exists but indicates that further information is required through appropriate site investigation to substantiate the conceptual model.
- 6.4 The PCM/PRA is based on a residential end use.

**Table 3: Consequence, Probability and Risk**

Probability	Consequence,	Risk
High Likelihood- There is a pollution linkage and an event either appears very likely in the short term and almost inevitable over the long term, or there is evidence at the receptor of harm or pollution	Very High – acute risk to the human health likely to result in significant harm. Risk of severe or irreversible effect on ground/surface water quality. Catastrophic damage to buildings / property.	Very High – there is a high potential that the source-pathway-receptor scenarios may give rise to harm to human health, or the environment and remedial action is likely to be required.
Likely – there is a pollution linkage, and all the elements are present, which means that it is probable an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term.	High – Severe or irreversible effect on human health. Temporary severe or irreversible effect on ground/surface water quality. Reduction of water quality rendering groundwater or surface water unfit to drink and/or substantial adverse impact on groundwater dependant environmental receptors.	High – it is likely that the source-pathway-receptor scenarios may give rise to an impact on human health or the environment, which may require remediation and/or control measures to mitigate risks
Low likelihood– there is a pollutant linkage and circumstances are possible for an event could occur. However, it is by no means certain that even over a longer period such event would take place, and is less likely in the shorter term	Moderate – Long term or short-term moderate effect on human health. Moderate effect on ground/surface water quality, reversible with time. Reduced reliability of a supply at a groundwater or surface water abstraction source	Moderate – it is possible that the source-pathway-receptor scenarios may give rise to an impact on human health or the environment, however it is either relatively unlikely that such would be severe, or if any harm were to occur it is more likely that harm would be mild.
Unlikely – there is a pollution linkage, but circumstances are such that it is doubtful that an event would occur even in the very long term.	Low – Non-permanent health effects to human health (easily prevented by means such as personal protective clothing etc.) Slight effect on ground/surface water quality, reversible with time. Marginal reduced reliability of a supply at a groundwater or surface water abstraction source.	Low – it is possible that harm could arise at the source, however it is likely that this would at worst be mild.



Very Low – it is unlikely that the source-pathway-receptor scenarios will give rise to an impact on human health or the environment.

**Table 4: Estimation of Level of Risk by Comparison of Consequence and Probability**

		Consequence			
		High	Moderate	Low	Very low
Probability	High Likelihood	Very High	High risk	Moderate risk	Moderate to low risk
	Likely	High risk	Moderate risk	Moderate to low risk	Low risk
	Low Likelihood	Moderate risk	Moderate to low risk	Low risk	Very low risk
	Unlikely	Moderate to low risk	Low risk	Very low risk	Very low risk

### Potential Sources

- 6.5 Historically, the site was occupied by vacant fields until 2003 when there was a barn recorded on site, with a small access road off of Manchester Road.
- 6.6 Geological mapping shows made ground on the site although this is not evident on Ordnance Survey maps.
- 6.7 To summarise, there is potential for the presence of contamination associated with the following:
- Made ground from various phases of on-site development and demolished buildings.

### Potential Receptors

- 6.8 The following receptors have been considered for the construction and operational stages of the proposed redevelopment.
- Current site users;
  - Adjacent land users;
  - Future land users;
  - Construction workers during site development works;
  - Surface water and Groundwater within the underlying aquifer

### Potential Pathways

- 6.9 The following pathways have been considered for the construction and operational stages of the proposed redevelopment.
- Dermal contact, ingestion, inhalation pathways of potentially contaminated soils;
  - Downward vertical migration of leachate to surface waters and shallow groundwater;
  - Vertical or lateral migration of ground gas.

**Table 5: Preliminary Conceptual Model**

Source	Pathway	Receptor	Probability	Consequence	Risk	Comment
<p>Contamination associated with the made ground.</p> <p>E.g., Heavy Metals, PAH, TPH, BTEX, ground gases.</p>	Dermal contact, ingestion, and inhalation of soils dust	Current Site Users	Unlikely	Moderate	Low	The site is currently occupied by a derelict agricultural barn. There is a hardstanding path off of Manchester Road to the barn. The rest of the outdoor space is soft landscaping, which increases potential for direct contact between contaminated soils and receptors. However, there are limited potential sources. The risk is therefore considered to be <b>LOW</b> .
		Adjacent land users	Unlikely	Moderate	Low	There is a residential property to the north of the site under construction and another to the west of the site. The risk is considered <b>LOW</b> and usual dust control measures should be implemented as part of good site working practices during construction to reduce dust generation.
		Future land users	Unlikely	Moderate	Low to Moderate	The existing building will be demolished, and a new residential property will be erected within the same footprint. Areas of soft landscaping have been proposed, which increases exposure to contaminated soils. However, the risk to future site users via direct exposure is considered to be <b>LOW to MODERATE</b> . This assessment is based on the sensitivity of the receptor.
		Construction Workers	Unlikely	Moderate	Low	Construction workers may be exposed to potentially contaminated made ground materials during construction works, however exposure duration will be short-term only. Assuming appropriate health and safety measures are adopted (in line with CDM and other relevant health and safety guidance) a <b>LOW</b> risk to construction workers is anticipated.
	Downward vertical migration of leachate to shallow groundwater	Groundwater within the Underlying Aquifer	Unlikely	Moderate	Low	Leachable contaminants are not expected to be present on site but may be present associated with vehicles that have been on site. There are no groundwater abstraction licenses within 500m of the site. The underlying superficial soils are anticipated to be cohesive, which will inhibit migration. The groundwater vulnerability is low. The risk to groundwater is therefore considered <b>LOW</b> .
	Lateral migration in surface waters	Surface water	Unlikely	Moderate	Low	Leachable contaminants are not expected to be present on site but may be present associated with vehicles that have been on site. There are 10 surface water features and 13 water network entries within 250m of the site. Therefore, the perceived risk to surface waters is <b>LOW</b> .

Source	Pathway	Receptor	Probability	Consequence	Risk	Comment
	Vertical or lateral migration of ground gas	Current Site Users	Unlikely	Moderate	Low	There may be made ground soils present on site associated with the construction of the barn. The risk to current site users from ground gas is therefore considered <b>LOW</b> .
		Adjacent land users	Unlikely	Moderate	Low	There is a residential property to the north of the site under construction and another to the west of the site. There may be made ground soils present on site associated with the construction of the barn. However, there are limited potential sources of ground gas on site, therefore, the risk to adjacent site users from ground gas is considered <b>LOW</b> .
		Future land users	Unlikely	Moderate	Low	The existing building will be demolished, and a new residential property will be erected within the same footprint. There may be made ground soils present on site associated with the construction of the barn. Modern construction practices will provide a barrier and ventilation to any encountered. The risk to future site users from ground gas is therefore considered <b>LOW</b> .
		Construction Workers	Unlikely	Moderate	Low	Construction workers may be exposed to ground gas/depleted oxygen conditions in confined spaces and excavations; however, the duration will be short term. The risk to construction workers from ground gas is considered <b>LOW</b> .
Asbestos Containing Material (ACM)		Current Site Users	Unlikely	Moderate	Low	Asbestos is not expected to be present in the barn or in any made ground soils. Asbestos is only harmful when disturbed. The risk to current site users is considered to be <b>LOW</b> .
		Adjacent land users	Unlikely	Moderate	Low	There is a residential property to the north of the site under construction and another to the west of the site. Asbestos is not expected to be present in the barn or in any made ground soils. There was no asbestos observed on the site walkover. Demolition and disturbance of soil during the construction phase may allow fibres to become airborne. The risk is considered <b>LOW</b> . Dust control measures (dampening down) should be implemented as part of good site working practices in order to reduce the risk.
		Future land users	Unlikely	Moderate	Low	The existing building will be demolished, and a new residential property will be erected within the same footprint. Areas of soft landscaping increase the exposure to ACM in soils; however, asbestos is not expected to be encountered on site. The risk is therefore considered <b>LOW</b> .

Source	Pathway	Receptor	Probability	Consequence	Risk	Comment
		Construction Workers	Unlikely	Moderate	Low	Construction workers may be exposed to potential asbestos on site. However, it is not expected that any asbestos will be found in made ground soils or in the barn. The risk is considered <b>LOW</b> .

## 7.0 GEOTECHNICAL HAZARDS ASSOCIATED WITH THE DEVELOPMENT

7.1 In addition to the environmental hazards there are also geotechnical hazards associated with the stability of the ground including load bearing capacity, slope stability and effects of ground mining activities. Local Authorities follow NPPF (2012) which requires that a site be suitable for its new use taking into account of ground conditions and land instability, including from natural hazards to former activities such as mining. A summary of the geotechnical considerations is provided below in Table 6.

**Table 6: Summary of Geotechnical Hazards**

<b>Geohazards:</b>	
Highly Compressible Ground	Negligible risk.
Collapsible Soils	Very low risk.
Swelling Clay	Very low risk.
Running Sand	Very low risk.
Ground Dissolution	Negligible risk.
Landslip	Low risk.
Mining & Quarrying	The site is located within an identified coal mining area but is not located within a Coal Authority Development High Risk area. The risk from mining and quarrying is considered low.
<b>Geotechnical Design Considerations</b>	
Site Clearance	The site is currently occupied by a derelict barn, previously used for agriculture and storage. There is a small off road off of Manchester Road leading to the barn. The existing building will need to be demolished.
Trees	There are no trees directly located on site.
Existing Buildings/Obstructions	The site is currently occupied by a derelict barn, previously used for agriculture and storage. There are no manhole covers or overhead telephone cables. Historical maps show that there were no former structures located on site. Groundsure reports show that there are no historical potentially contaminative land uses located on site.

Geotechnical Design Considerations	
Foundations	The suitability of the proposed foundations would depend on the ground conditions present on site. The site is recorded to be underlain by made ground and superficial deposits of Devensian Till (commonly known as Boulder Clay). The solid geology is the Westphalian Old Lawrence Rock, comprising of sandstone. The proposed development involves demolishing the existing derelict barn and constructing a new residential property within the same footprint. Therefore, deeper foundations are unlikely to be required. However, an intrusive ground investigation will be carried out prior to any construction works taking place to discover the most suitable foundation options for the site and to make sure the ground conditions are the same across the entire site.
Floor Slabs	An intrusive geotechnical investigation is recommended prior to any construction works to identify the most suitable slab design for the on-site ground conditions.
Groundwater	Exact groundwater conditions are not known at this stage. For more detailed knowledge of the groundwater regime, an intrusive geotechnical investigation would be needed. However, it is recorded that the site is underlain by a Secondary Undifferentiated superficial aquifer and a Secondary A bedrock aquifer. The highest risk of groundwater flooding on site is considered low.
Earthworks	Extensive earthworks are unlikely to be required for the site as the proposed development is located within the footprint of the existing building. However, it is likely the existing foundations and hardstanding will need to be removed.
Slopes	The site is located on rolling hills and slopes down towards the north and Manchester Road to the west.
Retaining Walls	There are currently no retaining walls present on site.
Chemically aggressive soils	There is a low potential for chemically aggressive ground conditions on site.

## 8.0 CONCLUSIONS & RECOMMENDATIONS

### Conclusions

- 8.1 Historically, the site was occupied by vacant fields until 2003 when there was a barn recorded on site, with a small access road off of Manchester Road.
- 8.2 The site is currently occupied by a derelict barn with an access road off of Manchester Road. The barn is currently not in use but was previously used for agriculture and storage.
- 8.3 It is understood that the Client intends to demolish the derelict existing agricultural barn and construct a new residential dwelling in its footprint.
- 8.4 There is limited potential for the presence of contamination on the site. There is however a record of made ground on the site.
- 8.5 The site is recorded to be underlain by made ground and superficial deposits of Devensian Till Deposits, commonly known as Boulder Clay (Secondary Undifferentiated Aquifer). The solid geology beneath the site is shown to be the Westphalian Old Lawrence Rock, comprising of sandstone (Secondary A Aquifer).
- 8.6 The site is located within the specified search distance of an identified coal mining area but it is not located within a Development High Risk Area.
- 8.7 The property is not located in a Radon Affected Area, as less than 1% of the properties are above the Action Level.
- 8.8 The overall risk from soil contamination to residential end users and construction workers is **LOW to MODERATE**
- 8.9 The overall risk to controlled waters is concluded to be **LOW** based on the anticipated cohesive soils and absence of leachate contaminants.
- 8.10 The risk from ground gas to end users and construction workers is **LOW** based on the absence of significant sources.
- 8.11 An Environment Agency Flood Zone 2 and 3 are not located on site. However, the highest risk of groundwater flooding is **LOW**.

### Recommendations

- 8.12 An intrusive investigation should be undertaken to establish geotechnical parameters for the design of foundations, floor slabs and pavement construction for the proposed new structures and surrounding area.
- 8.13 As part of this site investigation shallow soils samples should be recovered for contamination testing.

## APPENDIX 1

# GROUNDSURE REPORTS



## **APPENDIX 2**

### **SITE PHOTOGRAPHS**

<p><b>Earth Environmental &amp; Geotechnical Ltd</b></p> <p><b>Tel:</b> 0161 975 6088  <b>Email:</b> info@earthenvironmental.co.uk  <b>Web:</b> www.earthenvironmental.co.uk</p>	<p><b>SITE PHOTOGRAPHS</b></p> 
<p><b>Job No.:</b> A5910/24/FDS</p>	<p><b>Site:</b> Higher Gibfield Barn, Burnley</p>
<p><b>Plate 1 Viewing west showing the access road and gate to the barn</b></p>	<p><b>Plate 2 Viewing northeast showing the east of the site</b></p>
	
<p><b>Date:</b> 4<sup>th</sup> March 2024</p>	<p><b>Date:</b> 4<sup>th</sup> March 2024</p>
<p><b>Plate 3 Viewing north showing the inside of the barn and small amount of litter</b></p>	<p><b>Plate 4 Viewing north showing the residential property under construction to the north of the site</b></p>
	
<p><b>Date:</b> 4<sup>th</sup> March 2024</p>	<p><b>Date:</b> 4<sup>th</sup> March 2024</p>





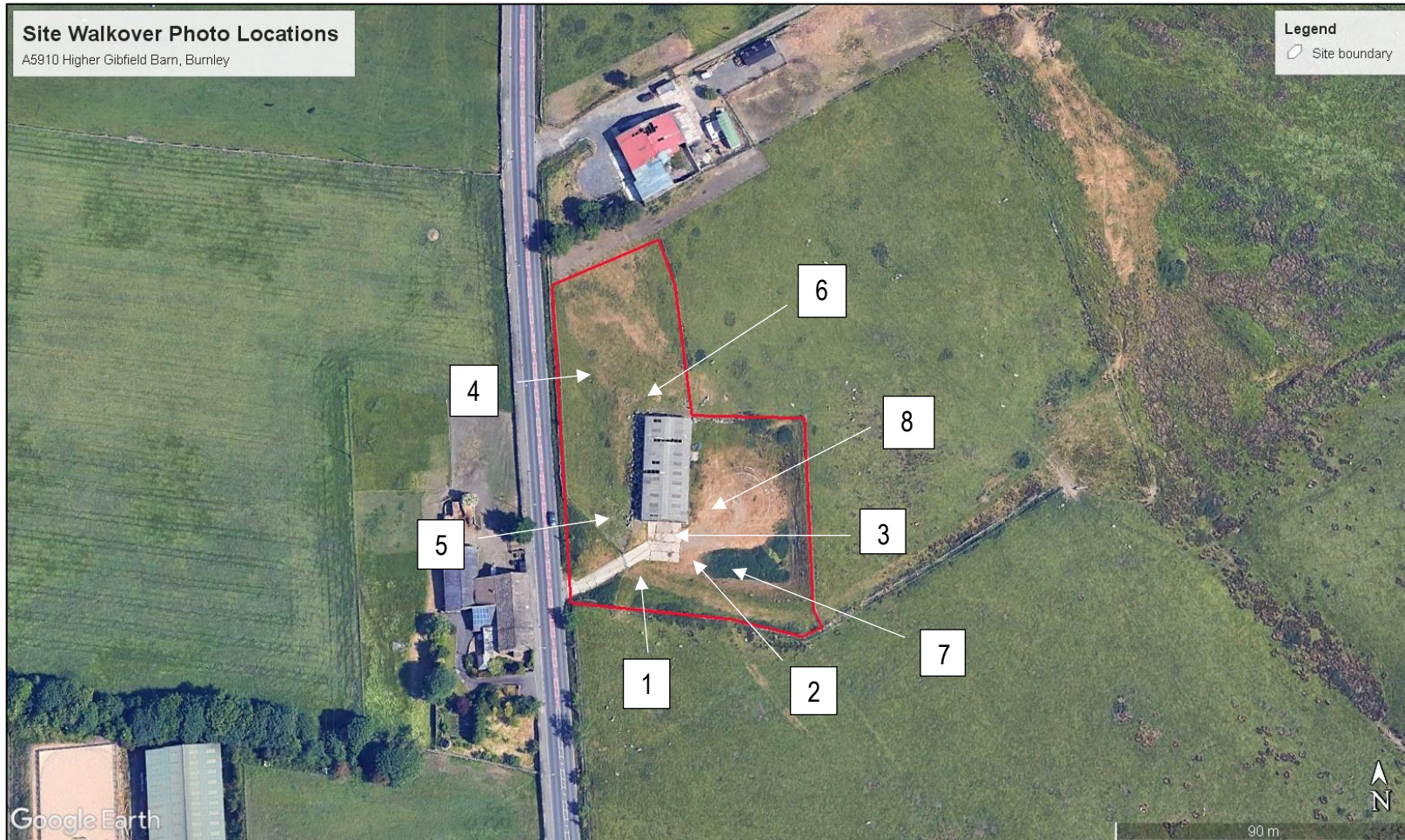
<p><b>Earth Environmental &amp; Geotechnical Ltd</b></p> <p><b>Tel:</b> 0161 975 6088  <b>Email:</b> info@earthenvironmental.co.uk  <b>Web:</b> www.earthenvironmental.co.uk</p>	<p><b>SITE PHOTOGRAPHS</b></p> 
<p><b>Job No.:</b> A5910/24/FDS</p>	<p><b>Site:</b> Higher Gibfield Farm, Burnley</p>
<p><b>Plate 5 Viewing northwest showing Manchester Road and the west of the site</b></p>	<p><b>Plate 6 Viewing southeast showing the back of the barn</b></p>
	
<p><b>Date:</b> 4<sup>th</sup> March 2024</p>	<p><b>Date:</b> 4<sup>th</sup> March 2024</p>
<p><b>Plate 7 Viewing east showing the rolling hills adjacent to the site</b></p>	<p><b>Plate 8 Viewing northwest showing the side of the barn and missing metal cladding</b></p>
	
<p><b>Date:</b> 4<sup>th</sup> March 2024</p>	<p><b>Date:</b> 4<sup>th</sup> March 2024</p>

Figure 11 Site Walkover Photo Locations



## **APPENDIX 3**

### **SITE WALKOVER NOTES**

## WALK OVER SURVEY REPORT

**Site:** Higher Gibfield Barn, Burnley

**Date:** 4<sup>th</sup> March 2024

**Job No:** A5910//24/FDS

**Undertaken By:** M. McMonagle

**Purpose of Site Walkover:**

- 1) Provide further information for the Desk Study Report;
- 2) Identify potential contamination sources, pathways, and receptors;
- 3) Identify geotechnical features and potential geohazards;
- 4) Determine locations for exploratory boreholes.

Desk Study features checked during site visit	Feature and Information required	Present	Description / Comments
Site Setting	Description required for:  Town/Country/Suburb Setting  Industrial/Residential/Retail Usage  Current Site use (if undertaking security and access to the site)		Agricultural land.  Agricultural use.  Barn is derelict and there are no current site users.
Evidence of Past Activities	Are there:  Any relevant street names in area?  Features or relics which indicate past history?	Yes/No  Yes/No	Manchester Road  Barn, indicates agricultural use
Geographic Setting	Description required for: Low lying flood plain/dry valley/rolling hills etc.		Rolling hills
Ground Conditions	Is there any evidence of:  Mining, Mine entries  Subsidence  Landslip/slope erosion  Former investigation works	Yes/No  Yes/No  Yes/No  Yes/No	N/A  N/A  N/A  N/A

Desk Study features checked during site visit	Feature and Information required	Present	Description / Comments
Topography	Description required for:  Are there apparent differences between site and surrounding area? (If yes describe the presence of retaining walls, and slopes).	Yes/No	The site slopes towards the north and is elevated above Manchester Road.
	Is there evidence of Made Ground / Fill on site?	Yes/No	Small road to the barn.
Site Boundaries and Neighbours	Description required for:  Type of boundary demarcation (if any) on each side of site, usage of adjacent land and name of industrial/commercial occupiers.  Note any adjacent features such as water course and other potentially environmentally sensitive uses (residential, school, infirmary, SSSI etc)		The site is bounded by barbed wire fencing all around. There is a residential property under construction to the north. There is another residential property to the west. The western boundary is demarcated by Manchester Road. The rest of the site is surrounded by rolling hills and agricultural land.
Vegetation	Are there any vegetation/trees on or close to site (if yes describe locations, type, maturity, etc)	Yes/No	N/A
	Is there any evidence of poor health / distress?	Yes/No	N/A
Ground Surface	Are there areas of hardstanding and estimate the split between hard and soft cover? (If yes describe locations, types, and conditions).	Yes/No	The only area of hardstanding is the small road to the barn.
	Is there any evidence of any spillages or staining?	Yes/No	

Desk Study features checked during site visit	Feature and Information required	Present	Description / Comments
Site Drainage	<p>Are there any drain covers / soakaways (if yes describe locations)</p> <p>Are there any outfalls/water courses on site (note the condition of water courses in open water courses. discolouration, odour, eutrophication, oily sheen, gas bubbling water, clear or cloudy)</p> <p>Where a watercourse runs alongside or crosses a site are there any differences in visible water quality upstream and downstream of the site?</p>	<p>Yes/No</p> <p>Yes/No</p> <p>Yes/No</p>	N/A
Electrical Equipment	<p>Are there any electricity sub stations on or adjacent to the site? Are there any electrical transformers, capacitors, pylons etc on site?</p>	<p>Yes/No</p>	
Buildings	<p>Is there any evidence of asbestos construction materials e.g., roofing, insulation materials.</p> <p>Do any buildings have basements?</p> <p>Do any buildings have a boiler room (if yes, describe fuel type and storage arrangements)?</p>	<p>Yes/No</p> <p>Yes/No</p> <p>Yes/No</p>	<p>No evidence of asbestos was observed on the site walkover.</p>



Desk Study features checked during site visit	Feature and Information required	Present	Description / Comments
Landfilling	Is there any evidence of gas protection measures (gas membrane, gravel-filled trenches, venting pipes, etc)?	Yes/No	N/A.
Process Air Emissions	Point Source: Are there any stacks / vents / cooling towers / abatement equipment?	Yes/No	N/A.
	Fugitive Source: is there any stockpiled material / windblown dust / vapour process?	Yes/No	N/A.
Storage of fuels & Chemicals	Are there any drums / containers (if yes, describe quantity, full /empty, stored on hard standing / soft landscaping, bunding)?	Yes/No	N/A.
	Are there any above ground fuel tanks (if yes, describe locations, volumes, how many, bunding, used / disused, condition?)	Yes/No	N/A.
	Is there any evidence of underground fuel tanks (fuel pumps, covers, vent pipes, how many and how large, fill point, used / disused, and condition)?	Yes/No	N/A.
Accidents	In the event of a large spillage would runoff affect any vulnerable watercourse/culverts?	Yes/No	N/A.
	Are emergency procedures / equipment in place?	Yes/No	N/A.

Desk Study features checked during site visit	Feature and Information required	Present	Description / Comments
Waste	Are there any waste skips present on site?	Yes/No	N/A.
	Are waste storage facilities adequate?	Yes/No	
	Is there any litter/fly tipped material?	Yes/No	
Atmospheric	Are there any fumes, odours originating from site or affecting site from neighbouring sites?	Yes/No	N/A.
Access / Further Investigations	<p>If a Phase 2 Investigation is likely to be required, describe any access problems including headroom where relevant, services, overhead cables, restricted access areas, confined spaces, trafficked areas, etc that are likely to affect investigation scope/techniques.</p> <p>Identify possible site office and storage locations.</p> <p>Identify possible water supply.</p>		<p>Access road to site is steep and of poor quality.</p> <p>East of site.</p> <p>Barn.</p>
Site Environs	Are there any local features that could have a harmful influence e.g., landfill, industrial processes, railway land?	Yes/No	N/A.
	Are there any sensitive water features/courses near to the site?	Yes/No	N/A.
Local Knowledge / Anecdotal Evidence			
Site Dimensions	Describe shape of Site in plan and measure dimensions.		The site is an irregular shaped parcel of land. Site dimensions in section 2.3.

## **APPENDIX 4**

### **REPORT LIMITATIONS**

## **LIMITATIONS**

This contract was completed by Earth Environmental & Geotechnical Ltd on the basis of a defined programme and scope of works and terms and conditions agreed with the client. This report was compiled with all reasonable skill, and care, bearing in mind the project objectives, the agreed scope of works, the prevailing site conditions, the budget, and staff resources allocated to the project.

Other than that, expressly contained in the above paragraph, Earth Environmental & Geotechnical Ltd provides no other representation or warranty whether express or implied, is made in relation to the services. Unless otherwise agreed this report has been prepared exclusively for the use and reliance of the client in accordance with generally accepted consulting practices and for the intended purposes as stated in the agreement under which this work was completed. This report may not be relied upon, or transferred to, by any other party without the written agreement of a Director of Earth Environmental & Geotechnical Ltd.

If a third party relies on this report, it does so wholly at its own and sole risk and Earth Environmental & Geotechnical Ltd disclaims any liability to such parties.

It is Earth Environmental & Geotechnical Ltd understanding that this report is to be used for the purpose described in the introduction to the report. That purpose was an important factor in determining the scope and level of the services. Should the purpose for which the report is used, or the proposed use of the site change, this report will no longer be valid and any further use of, or reliance upon the report in those circumstances by the client without Earth Environmental & Geotechnical Ltd review and advice shall be at the client's sole and own risk.

The report was written in 2024 and should be read considering any subsequent changes in legislation, statutory requirements, and industry best practices. Ground conditions can also change over time and further investigations, or assessment should be made if there is any significant delay in acting on the findings of this report. The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should not be relied upon in the future without the written advice of Earth Environmental & Geotechnical Ltd. In the absence of such written advice of Earth Environmental & Geotechnical Ltd, reliance on the report in the future shall be at the client's own and sole risk. Should Earth Environmental & Geotechnical Ltd be requested to review the report in the future, Earth Environmental & Geotechnical Ltd shall be entitled to additional payment at the then existing rate or such other terms as may be agreed between Earth Environmental & Geotechnical Ltd and the client.

The observations and conclusions described in this report are based solely upon the services that were provided pursuant to the agreement between the client and Earth Environmental & Geotechnical Ltd. Earth Environmental & Geotechnical Ltd has not performed any observations, investigations, studies or testing not specifically set out or mentioned within this report.

Earth Environmental & Geotechnical Ltd is not liable for the existence of any condition, the discovery of which would require performance of services not otherwise contained in the services. For the avoidance of doubt, unless otherwise expressly referred to in the introduction to this report, Earth Environmental & Geotechnical Ltd did not seek to evaluate the presence on or off the site of electromagnetic fields, lead paint, radon gas or other radioactive materials.

The services are based upon Earth Environmental & Geotechnical Ltd observations of existing physical conditions at the site gained from a walkover survey of the site together with Earth Environmental & Geotechnical Ltd interpretation of information including documentation, obtained from third parties and from the client on the history and usage of the site. The findings and recommendations contained in this report are based in part upon information provided by third parties, and whilst Earth Environmental & Geotechnical Ltd have no reason to doubt the accuracy and that it has been provided in full from those it was requested from, the items relied on have not been verified.

No responsibility can be accepted for errors within third party items presented in this report. Further Earth Environmental & Geotechnical Ltd was not authorised and did not attempt to independently verify the accuracy or completeness of information, documentation or materials received from the client or third parties, including laboratories and information services, during the performance of the services. Earth Environmental & Geotechnical Ltd is not liable for any inaccurate information, misrepresentation of data or conclusions, the discovery of which inaccuracies required the doing of any act including the gathering of any information which was not reasonably available to Earth Environmental & Geotechnical Ltd and including the doing of any independent investigation of the information provided to Earth Environmental & Geotechnical Ltd save as otherwise provided in the terms of the contract between the client and Earth Environmental & Geotechnical Ltd.

Where field investigations have been carried out these have been restricted to a level of detail required to achieve the stated objectives of the work. Ground conditions can also be variable and as investigation excavations only allow examination of the ground at discrete locations. The potential exists for ground conditions to be encountered which are different to those considered in this report. The extent of the limited area depends on the soil and groundwater conditions, together with the position of any current structures and underground facilities and natural and other activities on site. In addition, chemical analysis was carried out for a limited number of parameters [as stipulated in the contract between the client and Earth Environmental & Geotechnical Ltd] based on an understanding of the available operational and historical information, and it should not be inferred that other chemical species are not present.

The groundwater conditions entered on the exploratory hole records are those observed at the time of investigation. The normal speed of investigation usually does not permit the recording of an equilibrium water level for any one water strike. Moreover, groundwater levels are subject to seasonal variation or changes in local drainage conditions and higher groundwater levels may occur at other times of the year than were recorded during this investigation.

Any site drawing(s) provided in this report is (are) not meant to be an accurate base plan but is (are) used to present the general relative locations of features on, and surrounding, the site.