



PHASE 1 PRELIMINARY GEO- ENVIRONMENTAL RISK ASSESSMENT

Land Adjacent to Smithfield Road
Egremont
Cumberland
CA22 2HB

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Rev B

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1.0 INTRODUCTION

1.1 PREAMBLE

Waterway Drainage Engineering Ltd (WDE) was commissioned by CDL Architecture Design to undertake a Phase 1 Preliminary Geo-Environmental Risk Assessment for a new dwelling on land adjacent to Smithfield Road, Egremont.

The report has been commissioned retrospectively in order to discharge conditions 8 and 9 of the planning approval 4/15/2441/0F1. The site covers an area of approximately 0.143 ha and currently comprises undeveloped lowland scrub.

A site location plan is presented within *Figure 1*.



Figure 1: Site Location Plan

1.2 OBJECTIVES

The principal objectives of the assessment are to determine the potential for soil and groundwater contamination to be present which could impact future site users/occupiers and the wider environment, significantly constrain the proposed use of the site or significantly affect the development process specifically for the proposed use of the site for a residential dwelling.

The key tasks of this assessment were as follows:

- To assess potential sources of contamination at the site, associated with historical and current land uses both on site and in the surrounding area;
- To review the environmental setting to assess the sensitivity of the surrounding area to ground contamination;
- To produce an outline Conceptual Site Model (CSM) identifying the pathways by which potential contamination may impact the identified receptors via pollutant linkages; and,
- To provide recommendations for further assessment/ investigation of potential pollutant linkages, where considered necessary.

1.3 LEGISLATION AND GUIDANCE

This report has been produced in general accordance with:

- Policy DS8: Soils, contamination and land stability of the Copeland Local Plan 2021 – 2039 (now Cumberland Council).
- Contaminated Land (England) Regulations 2006 (as amended);
- DEFRA Environmental Protection Act 1990: Part 2A - Contaminated Land Statutory Guidance (2012);
- DEFRA and Environment Agency (2004) Contaminated Land Report 11 (CLR 11): Model Procedures for the Management of Land Contamination;
- National Planning Policy Framework (2019);
- CIRIA Document C665: Assessing Risks Posed by Hazardous Ground Gases to Buildings;
- British Standard requirements for the 'Investigation of potentially contaminated sites - Code of practice' (ref. BS10175:2011+A1:2017);
- British Standard requirements for the 'Code of practice for ground investigations' (ref. BS5930:2015); and
- British Standard requirements for the 'Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings' (ref BS8485:2015+A1:2019).

2.0 SITE RECONNAISSANCE AND DESK STUDY

2.1 SITE RECONNAISSANCE

This section of the report is based upon observations made during a site visit carried out on 12 February 2026. A summary of the on-site activities is detailed below within *Table 1*.

Section:	Description:
Background	The site is located within the town of Egremont, Cumbria, 505m south west of the A595 northern Egremont roundabout at National Grid Reference 300440 , 511140. It is triangularly shaped and occupies an area of approximately 0.143 ha. The site is relatively flat and low lying with typical elevations of approximately 59m to 60mAOD.
Site Layout	The site, prior to development, largely comprised of open scrubland. Access is gained via Chaucer Avenue directly to the south of the development site. The area immediately adjacent to the north and western boundaries was covered in sparse vegetation along Skirting Beck. It is noted that to the south west of the site is located a raised earth bund, which appears to be a former railway embankment, populated by grass and shrub species.
Activity / Operations	The site is currently used as residential urban land. However, previously the land was scrubland with vehicle tracks noted towards Skirting Beck. No formal land use is noted of the site.
Building Structures	There were no buildings or structures present on site prior to the construction of the dwelling.
Surface Cover	The majority of the site had topsoil cover.
Drainage	Skirting Beck is present along the northern and western boundaries of the site although these were typically obscured by heavy vegetation. The base of Skirting Beck was observed with very low level of water present.
Bulk Storage / Tanks	There were no tanks observed to be present on the site.
Waste	There is no evidence of waste storage on site.
Air Emissions	The site does not operate any licensed air emissions.
Electricity Sub Stations / Transformers	No electricity substations or transformers were identified on site.
Visual Evidence of Contamination	Following a site visit and examining historic imagery of the development site, no visual evidence of contamination is present.
Statutory Nuisance	WDE is not aware of any statutory nuisance complaints associated with the site.
Other Issues	None identified

Table 1: Summary of on-site activities

A summary of the surrounding area is detailed below within *Table 2*.

The site is located within a residential area with James Park Homes – Smithfield Park located directly to the east of the development. At the time of the site inspection, neighbouring land consisted of the following:

Direction:	Description:
North	Skirting Beck directly to the north, with James Park Homes Caravan site – Smithfield Park beyond
East	James Park Homes Caravan site – Smithfield Park
South	Chaucer Avenue and the, now demolished, Orgill Infants School site. Currently this consists of hardstanding concrete areas and roughly mown grassland.
West	Skirting Beck with a former railway embankment prior to agricultural grazed fields

Table 2: Neighbouring Land Uses

2.2 SITE HISTORY

The following review is based on past editions of readily available Ordnance Survey (OS) maps. These include scales of 1:1,250, 1:2,500 and 1:10,000 dated 1882 to 2020.

The historic Ordnance Survey mapping available, and aerial photographs suggest that the site use remained unchanged prior to the construction of the dwelling in 2016.

Relevant planning records for the site, obtained from Copeland Borough Council (now Cumberland Council) planning websites are summarised as follows:

- 4/15/2441/0F1 – Full application for the erection of one 5 bedroom detached house
- 4/11/2516/0O1 – Outline application for a detached dwelling. Resubmission of 4/11/2026/0O1
- 4/14/2467/0O1 – Outline application for the renewal of approval for one detached dwelling, including minor amendments to the garden.

2.3 ENVIRONMENTAL SETTING

2.3.1 GEOLOGY

Based on British Geological Survey (BGS) mapping (1:50,000-scale) and the Environment Agency (EA) Groundwater Vulnerability mapping (1:100,000), the stratigraphic sequence and aquifer classifications beneath the site are indicated to be as follows:

- Bedrock Geology - Brockram-Breccia. These sedimentary rocks are fluvial in origin.
- Superficial Deposits - Alluvium-Clay, silt, sand and gravel. These sedimentary deposits are fluvial in origin.
- Aquifer Classification – Secondary A Aquifer and Secondary Undifferentiated Aquifer.

There are a number of BGS borehole records located approximately 150m to the north of the site. These are likely to be associated with the construction of the caravan site. BGS borehole reference NY01SW182, located approximately 150 m to the north of the site, was extended to a depth of 100 ft and the encountered stratigraphic sequence can be summarised as follows:

• Gravel and Pinnel	1 ft 6 Ins
• Conglomerate	5 ft 8 Ins
• Limestone (Mag)	2 ft 8 Ins
• Conglomerate	0 ft 11 Ins
• Red Sandstone	5 ft 3 Ins
• Grey Sandstone and Ore Joints	5 ft 11 ins
• Red Shale	2 ft 3 Ins
• Grey Sandstone and Ore Joints	5 ft 10 Ins
• Mottled Shale	2 ft 4 Ins
• Limestone Red	5 ft 1 Ins
• Red Shale	0 ft 11 Ins
• Grey Limestone	5 ft 4 Ins
• Mottled Shale	5 ft 7 Ins
• Grey Limestone	1 ft 8 Ins
• Grey Whilstone	4 ft 8 ins
• Limestone and Ore Joints	0 ft 6 Ins
• Red Whirlstone and Ore Joints	2 ft 2 Ins
• Iron Ore	5 ft 4 Ins
• Mottled Shale	5 ft
• Slate Shales	3 ft 5 Ins

There is the potential for Made Ground to be present on site, associated with its agricultural history and associated shallow soil workings. However, made ground of significant thickness is not anticipated to be widespread owing to the site's limited history of development. At present the nature and thickness of any made ground on site is unknown.

2.3.2 HYDROGEOLOGY

The majority of the site is located above a Secondary Undifferentiated Aquifer relating to the Brockram-Breccia Formation (undifferentiated). These formations have varying characteristics in different locations. According to Groundwater vulnerability mapping, the site is in a zone of medium vulnerability associated with groundwater flow through poorly connected rock fractures.

The Alluvium-Clay, silt, sand and gravel deposits which are indicated to be present within the site are classified as a Secondary A Aquifer. These formations contain permeable layers which are capable of supporting water supplies at a local rather strategic scale and in some cases form an important source of base flow to rivers.

According to EA data, the site is located in a groundwater Source Protection Zone (SPZ) area 3. A SPZ area 3 is detailed as an area around a supply source within which all the groundwater ends up at the abstraction point. This is the point from where the water is taken. This could extend some distance from the source point.

Under the Water Framework Directive, the Environment Agency's local River Basin Management Plan (North West River Basin Management Plan) classifies groundwater chemical quality beneath the site (Ehen Lower) as a fail (2015).

Environment Agency records indicate that there are no records of active licensed groundwater abstractions within 2km of the site.

2.3.3 SURFACE WATER

Skirting Beck is located on the western and northern boundary of the development site. The ecological classification of the wider catchment (Ehen Lower) is determined as good, but does fail in the chemical analysis due to Mercury and Its Compounds, Perfluorooctane sulphonate (PFOS) and Polybrominated diphenyl ethers (PBDE).

According to the Environment Agency (EA) flood risk mapping, the site is within a very low risk of surface water flooding.

2.3.4 FLUVIAL / TIDAL FLOOD RISK

According to the Environment Agency (EA) flood map, entirety of the site is located within Flood Zone 1, with the annual probability of flooding classified as less than 1 in 1000 (0.1%) annual probability of flooding. It is noted that to the west of the site along Skirting Beck there is an area of Flood Zone 3. However, this is not within the red line boundary of the site so is not considered as part of this study.

2.3.5 ECOLOGICALLY SENSITIVE SITES

Natural England data indicates that there are no ecologically sensitive sites, that constitute environmental receptors as defined within Table 1 of the DEFRA Environmental Protection Act 1990: Part 2A - Contaminated Land Statutory Guidance (2012), located within a 1km radius of the site.

2.3.6 OTHER SENSITIVE SITES

There are no records of World Heritage Sites, National Parks, Listed Buildings, Conservation Areas or Scheduled Ancient Monuments within 250m of the site.

2.3.7 RADON

According to the Indicative Atlas of Radon in England and Wales published by the Health Protection Agency (part of Public Health England) and the British Geological Survey, the site is located within an area where maximum radon potential is 10 – 30 %.

2.3.8 COAL AUTHORITY

The Interactive Map Viewer on the Coal Authority website indicates that the site is located within a coal mining reporting area.

2.3.9 NON COAL MINING

There are no records of natural cavities, surface or underground workings, non-coal mining or other mineral extraction operations within 1km of the site.

2.3.10 NATURAL LAND STABILITY

BGS data indicates that the site is located within an area at low risk from shrink swell clays and very low risk from collapsible deposits and landslides. The risk associated with compressible deposits and ground dissolution is indicated to be negligible. The risk associated with running sands from the bedrock is indicated to be negligible and from the superficial deposits is indicated to be very low.

2.4 AUTHORISED PROCESSES AND POLLUTION INCIDENTS

2.4.1 LANDFILLS AND WASTE SITES

Data provided by the EA, Local Authority and BGS indicates that there are no recorded licensed or known historical landfill sites located within 250m of the site.

2.4.2 ENVIRONMENTAL PERMITS

EA and Local Authority data indicates that there are processes regulated by an Environmental Permit (under the Environmental Permitting Regulations 2010) within 1 km of the subject site. This is described within the following table.

Licence Holder:	Address:	Permitted Activity:
United Utilities	ST BRIDGETS LANE CSO, ST BRIDGETS LANE (THORN HOW), EGREMONT, COPELAND, CUMBRIA, CA22 8BB	Storm Tank/CSO on Sewerage Network
United Utilities	OLD BRIDGE, OLD BRIDGE, EGREMONT, CUMBRIA	WwTW/Sewage Treatment Works
United Utilities	SYPHON, EGREMONT, COPELAND, CUMBRIA	Storm Tank/CSO on Sewerage Network
United Utilities	WYNDHAM TERRACE CSO, OPPOSITE 7 WYNDHAM TERRACE, EGREMONT, COPELAND, CUMBRIA, CA22 2EA	Storm Tank/CSO on Sewerage Network
United Utilities	BARNEY SCAR, BARNEY SCAR, EGREMONT, COPELAND, CUMBRIA	Storm Tank/CSO on Sewerage Network

Table 3: Environmental Permits within 1km of the Site

2.4.3 COMAH SITES

There are no operations under the Control of Major Accident Hazards (COMAH) Regulations 2015, located within 500m of the site.

2.4.4 POLLUTION INCIDENTS

Environment Agency data indicates that there are no records of ‘major’ or ‘significant’ pollution incidents within 500m of the site.

2.5 UNEXPLODED ORDNANCE

Reference to the online interactive Zetica Regional Unexploded Bomb Risk map for indicates that the site is in an area of low potential risk from Unexploded Bombs.

3.0 PRELIMINARY CONCEPTUAL SITE MODEL

3.1 BACKGROUND

An preliminary conceptual site model (CSM) consists of an appraisal of the source-pathway-receptor 'contaminant linkages' which is central to the approach used to determine the existence of 'contaminated land' according to the definition set out under Part 2A of the Environmental Protection Act 1990.

For a risk to exist (under Part 2A), all three of the following components must be present to facilitate a potential 'pollutant linkage'.

- Source referring to the source of contamination (Hazard).
- Pathway for the contaminant to move/migrate to receptor(s).
- Receptor (Target) that could be affected by the contaminant(s).

Receptors include human beings, controlled waters and buildings / structures. The National Planning Policy Framework, used to address contaminated land through the planning process, follows the same principles as those set out under Part 2A.

3.2 POTENTIAL POLLUTANT LINKAGES

Each stage of the potential pollutant linkages have been assessed individually on the basis of information obtained during the site reconnaissance, and desk study exercise and are discussed in the following section.

3.2.1 POTENTIAL CONTAMINANT SOURCES

The previous lowland agricultural use of the site is unlikely to result in significant contamination. There is the potential for diffuse pesticide/herbicide contamination to be present and a potential for localised hydrocarbon contamination associated with any fuel/oils spills associated with vehicles and agricultural machinery.

3.2.2 POTENTIAL PATHWAYS

In areas of the completed development covered by buildings or hardstanding, the risks to human health receptors associated with ground contamination (if present) via the pathways of dermal contact, ingestion and dust inhalation will be mitigated by the surface cover. However, in areas of soft landscaping, these pathways could be active. In addition, there would be potential for the airborne migration of soil/dust from these areas to the wider site and off site.

There is the potential for ground gas and volatile contaminants of concern in soil and/or groundwater (if present) beneath the site to impact future site users via the inhalation pathway in indoor areas of the completed development.

The site is indicated to be underlain by the low permeability Brockram-Breccia Formation (undifferentiated), which will likely limit the vertical migration of contaminants of concern to deeper groundwater and mitigate the lateral off-site and on-site migration of contaminants of concern via shallow groundwater (where present).

3.2.3 POTENTIAL RECEPTORS

Post development human health receptors include site users and neighbouring site users.

During the redevelopment process, construction personnel and neighbouring site users may be at increased risk from ground contamination, especially if soils are being disturbed. Providing construction workers adopt appropriate levels of hygiene and personal protective equipment based on appropriate risk assessment in accordance with the requirement of the CDM Regulations 2015, they are not considered to be at significant risk from potential contaminants of concern and have not been considered further as part of this assessment. Dust mitigation measures may be necessary to protect neighbouring sites users.

The nearest surface water features is Skirting Beck on the northern and western boundary of the Site. Measures may need to be implemented during the redevelopment process to protect surface water receptors.

3.3 PRELIMINARY CONCEPTUAL SITE MODEL

A preliminary CSM has been developed on the basis of the site reconnaissance and desk study. The CSM is used to identify potential sources, pathways and receptors (i.e. potential pollutant linkages) on site and is summarised in the table below:

Potential Source:	Contaminants of concern:	Via:	Potential Pathways:	Post Development Linkage Potentially Active:	Receptors:
Undeveloped agricultural land	Metals, asbestos, hydrocarbons, pesticides / herbicides, solvents.	Soil	Direct contact/ingestion	✓	Future site users
			Inhalation of volatiles	✓	Future site users
			Airborne migration of soil or dust	✓	Off-site users
			Leaching of mobile contaminants	X	Secondary Undifferentiated Aquifer Field drains and ditches
Radon within bedrock	Radon	Soil	Direct contact/ingestion	✓	Future site users
			Inhalation of volatiles	✓	Future site users

Table 4: Preliminary Conceptual Site Model

The risk assessment is based upon the available information relating to the site. Should ground conditions inconsistent with those outlined in this report be encountered WDE should be contacted to enable further assessment.

4.0 PRELIMINARY GEOTECHNICAL ASSESSMENT

4.1 PRELIMINARY GEOTECHNICAL RISK REGISTER

The following table provides a summary of key potential geotechnical hazards including preliminary indication of whether the site is likely to be affected by the hazard.

Hazard Description:	Potential for Hazard (Low / Moderate / High)	Comments:
Sudden lateral / vertical changes in ground conditions	Low to Moderate	Variation in the nature and distribution of soils may result in the potential for excessive differential and total settlement for proposed structures, dependent on the foundation solutions adopted.
Deeper pockets of Made Ground	Low	Made ground is not anticipated to be widespread owing to the site's limited history of development.
Highly compressible / low bearing capacity soils, (including peat and soft clay)	Low to Moderate	There is a potential for pockets of low strength clays to be present within the weathered portion of the Brockram-Breccia Formation (undifferentiated). Low strength weathered strata could result in excessive differential and total settlement of buildings and infrastructure.
Ground dissolution features / natural cavities	Low	Ground conditions beneath the site are not consistent with these hazards.
Shrinking and swelling clays	Moderate	The near surface soils may be of low to moderate volume change potential (this should be confirmed via geotechnical laboratory testing), which could result in settlement / heave of foundation and earthworks in particular when located within the influences of trees. Mature trees have been identified adjacent to the site. The potential effect of these on the depth required for the foundation should be assessed in accordance with the NHBC Manual guidelines.
Ground dissolution features / natural cavities	Low	Ground conditions beneath the site are not consistent with these conditions.
Underground mining	Low	Ground conditions beneath the site are not consistent with these risk factors.
Slope stability issues	Low	Any significant slopes present on site or any temporary slopes created as part of the development should be subject to appropriate geotechnical design based on site-specific site investigation information.

High groundwater table (including waterlogged ground)	Low to Moderate	There is the potential for shallow perched groundwater to be present beneath the site associated with Skirting Beck. Groundwater control/exclusion measures may be required to enable formation of any excavations required at the site depending on localised conditions. This may include pump and pumping, dewatering or sheet piled cofferdams in extreme circumstances. However, requirements for this should be confirmed via intrusive investigation and subsequent groundwater level monitoring.
Concrete classification	Low	Concrete is not anticipated to be widespread on site owing to the site's limited history of development
Seismic Activity	Low	The Eurocode 8 seismic hazard zoning maps for the UK (Musson and Sargeant, 2007) indicate that horizontal Peak Ground Acceleration (PGA) values with 10% probability of being exceeded in 50 years (475 year return period) are between 0.00 and 0.02g, which is considered very low.
Radon	High	BGS and Public Health England data indicates that the site is located within an area where maximum radon potential is 10 – 30 %. Radon protection measures are necessary.

Table 5: Preliminary Geotechnical Risk Register

4.2 PRELIMINARY GEOTECHNICAL RECOMMENDATIONS

4.2.1 GROUND CONDITIONS

The ground conditions at the site are anticipated to comprise superficial deposits of alluvium-clay, silt, sand and gravel, overlying the Brockram-Breccia Formation, either where, below the surface topsoil covering. A site-specific detailed ground investigation will be required to determine the geotechnical characteristics of the soils present on site to inform any subsequent design substructure design and to confirm groundwater levels.

The below advice is therefore, provided for preliminary purposes only and will need to be reappraised following completion of an appropriate ground investigation.

4.2.2 FOUNDATIONS

For lightly to moderately loaded structures, it is anticipated that shallow spread foundations in the alluvium-Clay, silt, sand and gravel will be suitable, subject to confirmation of the depth to the stratum, the volume change potential of the soils, the extent of any weathered or desiccated zone and presence of any relict failure planes known to be a feature of this stratum.

However, foundations spanning across granular and cohesive soils should be avoided where possible due to the potential for unacceptable amounts of differential settlement. The guidance set out in NHBC Chapter 4.2 Building Near Trees will need to be adhered to in relation to specifying minimum foundation depths and any heave precautions required. Should any areas of made ground be encountered on site, it should be removed and replaced with suitably engineered granular fill, or founded extended below this stratum to bear on the more competent natural soils below.

4.2.3 FLOOR SLAB

It is anticipated that natural soils will be encountered at proposed floor slab levels. Ground bearing floor slabs are therefore likely to be appropriate based on the anticipated ground conditions on site, notwithstanding the effects of any nearby trees, where appropriate guidance should be followed. As above, floor slabs spanning both granular and cohesive soils should be avoided where possible or designed to withstand the expected levels of differential settlement.

4.2.4 OTHER ISSUES

The maximum Radon potential of the site is between 10 and 30%. It is therefore recommended that Radon testing is undertaken on site post completion measuring actual levels. If the levels exceed 200 Bq/m³, remediation measures will be required for the proposed dwelling.

5.0 CONCLUSIONS AND RECOMMENDATIONS

The Phase 1 Preliminary Geo-Environmental Risk Assessment has identified a limited number of potential sources of contamination that could have resulted in minor localised soil or groundwater contamination.

There is the potential for several pollutant linkages to be active on completion of the development that could impact human health receptors but we anticipate that basic mitigation could be used to manage the risk. Given the environmental setting, controlled waters receptors are unlikely to be at significant risk.

It is likely that the pollutant linkages will be such that they could be mitigated by the use of typical measures such as a surface cover system, gas protection measures and 'barrier' water supply pipe. There may however be a requirement for a degree of remediation and increased soil/groundwater disposal cost may be realised.