Castledine Environmental

LAND CONTAMINATION SURVEYS

Phase 1 Land Contamination Risk Assessment

for

The Proposed Conversion of Barn to Form 2 No. Dwellings

on the site of

Mill Farm, The Green, Millon, Cumberland LA18 5HL

Date: May 2025

Status:	Final Report
Reference:	3965D P1 MVC Design – Millom
Date:	12/05/2025

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EXECUTIVE SUMMARY

The site is currently occupied by an old, vacant and disused former storage barn associated with an adjacent and offsite historical corn mill. The site has been developed with such features since at least circa.1860 and likely prior to this. The storage usage of the site (grain) is not considered a significant potential source of contamination, nor have any significant made ground deposits been identified nor are expected on site (ground conditions are hardstanding or natural, gravelly subbases) nor is the adjacent former mill usage considered a significant contaminant source. This is due to the age of the mill (prior to circa.1860) and the likely end-date of such usage (around circa.1923/26) – significant heavy machinery, electrical infrastructure or associated hydrocarbon usage or storage is not considered likely, as the adjacent mill was likely powered by the nearby, former 'Mill Race'. At present, the site ground conditions comprise building footprint (with natural gravel subbase noted within), hardstanding (with likely natural gravel subbase below) and limited soft-landscaping areas. The extent of soft-landscaping proposed in the final site design is limited in extent and existing site soils / gravels (i.e. for soft-landscaping and as a growing medium) are unlikely to be suitable for such a usage, as such, new soils are likely to be required to form the final site design.

Based on the information contained in this report, it is the opinion of Castledine Environmental that the site represents a **LOW** level of risk with respect to the proposed development.

It is not envisaged that any further works or investigation are required beyond the provision of a Remediation Method Statement, outlining the formation of exterior areas on site (i.e. soft-landscaping), in light of the lack of suitable soils extant on site.

This report should be submitted to your Local Planning Authority for agreement to allow the Phase 3 Remediation Strategy and Verification Plan to be produced.

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1.0 QUALITY ASSURANCE

Castledine Environmental confirm that all reasonable efforts have been made to ensure that the information outlined within this report is accurate.

Castledine Environmental would further confirm that due care, attention and technical skill were used in the creation of this report.

2.0 LIMITATIONS

The conclusions and recommendations made in this report are limited to those based on the findings of the investigation. Where comments are made based on information obtained from third parties, Castledine Environmental assumes that all third-party information is true and correct. No independent action has been undertaken to validate the findings of third parties. The assessments and interpretation have been made in line with legislation and guidelines in force at the time of writing, representing best practice at the time.

This survey has not included asbestos within existing structures, invasive plant species, geotechnical considerations or any elements unconnected with potential ground contamination at the site. If required, such surveys should be undertaken by suitably accredited organisations.

There may be other conditions prevailing at the site which have not been disclosed by this investigation and which have not been taken into account by this report. Responsibility cannot be accepted for conditions not revealed by the investigation.

3.0 INTRODUCTION AND SITE PROPOSALS

Castledine Environmental have been appointed by Mr. S. Rowles to undertake a Phase 1 Desk study on a site at Mill Farm, The Green, Millon, Cumberland LA18 5HL.

4.0 SCOPE

Castledine Environmental have prepared this report for the sole use and reliance of Mr. S. Rowles and associated appointees for the purpose of ensuring compliance with:

- National Planning Policy Framework (NPPF) December 2024;
- Part C1 of the building regulations;
- Support of a Planning Application.

This report may not be used or relied upon by any unauthorised third party, or for any other proposed use than that specified above, without the explicit written agreement of Castledine Environmental.

This report is to be regarded as a Preliminary Risk Assessment in accordance with the Environment Agency's Land Contamination Risk Management (LCRM – 2021), which replaces CLR11 *"Model Procedures for the Management of Land Contamination",* carried out in accordance with BS 10175:2011+A2:2017, *"Investigation of Potentially Contaminated Land - Code of Practice"* and relevant sections of BS5930:2015+A1:2020*, "Code of Practice for Ground Investigations".*

The objectives of the report are:-

- To assess historical activities at the site with respect to their potential impact on the site environment;
- To assess historical and current surrounding land use in relation to known or potential off-site contamination issues that may impact on the subject site;
- Review of geological, hydrogeological and hydrological conditions at the site, pertaining to land contamination issues;

- To characterise the environmental setting of the site, identify migration pathways and vulnerable receptors for contamination originating at the site, focusing on potential soil and groundwater liabilities; and
- To develop a preliminary conceptual site model (CSM).

This report has been produced in order to discharge any relevant planning conditions outlined by the Local Authority and Environment Agency; however, further requirements may be imposed after the findings of this report that may need to be addressed at a later date.

5.0 SITE DESCRIPTION

The site is located in Millom, Cumberland at National Grid Reference: 317855,484712 and is approximately 0.07ha in area.

The site is irregular in shape and is orientated north west to south east. The site is located in the small-scale, predominantly residential village of Millom, itself located within a wider, predominantly rural area comprising various field plots.

The site interior comprises a linear, stone-built barn and limited exterior areas. Access to site was provided via a gap in the concrete walling in the southern extent of the western boundary. This extent of site was then seen to comprise a small, enclosed yard area occupied by fractured concrete with low lying grasses and bushes noted in this area. The barn is then located in the north western extent of site, with a continuation of the exterior area forming the north eastern extent of site (with similar ground conditions as to that in the south). The barn was then seen to be two-storey, of an older, stone-built architectural style (i.e. stone walling, slate roofing, gravelled flooring and timber structuring). The barn itself was seen to be vacant and unoccupied on the day of the site walkover.

Nonsignificant potential sources of contamination were noted on site walkover. Topographically, the site slopes gently from the north west to the south east, as does the surrounding landform. Photos of the site are present in Appendix D.

6.0 REGULATORY AUTHORITY AND OTHER ENVIRONMENTAL DATA

An environmental search listing historical and environmental factors likely to affect the property has been reviewed.

The most pertinent information is summarised in the following sections.

A copy is presented in Appendix A.

Additional geological and hydrological data was obtained from the British Geological Survey.

6.1 HYDROLOGICAL

6.1.1 AQUIFER

6.1.1.1 SUPERFICIAL GEOLOGY

ID	Distance (m)	Direction	Designation	Description
1	0	On Site	Secondary (Undifferentiated)	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
2	187	N	Secondary A	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

6.1.1.2 BEDROCK GEOLOGY

ID	Distance (m)	Direction	Designation	Description
1	0	On Site	Secondary B	Predominantly lower permeability layers which may store/yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers

6.1.2 ABSTRACTIONS AND PRIVATE WATER SUPPLIES

None recorded within 1000m of site.

6.1.3 SOURCE PROTECTION ZONE

Site is not in a source protection zone (SPZ).

6.1.4 GROUNDWATER VULNERABILITY AND SOIL LEACHING POTENTIAL

An assessment of the vulnerability of groundwater to a pollutant discharged at ground level based on the hydrological, geological, hydrogeological and soil properties within a one-kilometre square grid. Groundwater vulnerability is described as High, Medium or Low as follows:

- High - Areas able to easily transmit pollution to groundwater. They are likely to be characterised by high leaching soils and the absence of low permeability superficial deposits.
- Medium - Intermediate between high and low vulnerability.
- 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.

ID	Location	Summary	Soil / Surface	Superficial Geology	Bedrock Geology
1	On site	Summary Classification: Secondary superficial aquifer - Medium Vulnerability Combined classification: Productive Bedrock Aquifer, Productive Superficial Aquifer	Leaching class: High Infiltration value: 40-70% Dilution value: >550mm/year	Vulnerability: Medium Aquifer type: Secondary Thickness: 3-10m Patchiness value: <90% Recharge potential: Low	Vulnerability: Medium Aquifer type: Secondary Flow mechanism: Well connected fractures

6.1.5 POTENTIAL SURFACE WATER

The Groundsure report records the Black Beck located 32m north east of site at its most proximate point to site.

6.1.6 DISCHARGE CONSENTS

The Groundsure report records active licenced discharge consents held:

- 29m east of site, relating to final / treated sewage effluent discharges (not on behalf of the local water company) into Black Beck (effective circa.1962 onwards);
- 35m south east, relating to final / treated sewage effluent discharges (not on behalf of the local water company) into Black Beck (effective circa.1970 onwards);
- 125m south east, relating to final / treated sewage effluent discharges (not on behalf of the local water company) into Black Beck (effective circa.1989 onwards).

6.2 PERMITTED PROCESSES

None recorded within 500m of site.

6.3 POLLUTION INCIDENTS

The Groundsure report records no pollution incidents located within 250m of site and no significant impact incidents located within 500m of site.

6.4 RADIOACTIVE SUBSTANCES REGISTRATIONS

None recorded within 500m of site.

6.5 WASTE

6.5.1 LICENSED WASTE MANAGEMENT FACILITIES (LOCATIONS)

None recorded within 500m of site.

6.5.2 LANDFILL SITES

None recorded within 500m of site.

6.6 HAZARDOUS SUBSTANCES

None recorded within 500m of site.

6.7 ECOLOGICAL RECEPTORS

The Groundsure report records areas of Designated Ancient Woodland located 505m north west, 508m west, 604m south west, 621m 644m and 676m north east and888m south of site; with an area of Special Scientific Interest (SSSI) and Special Area of Conservation (SAC) then located 740m east of site.

No further sensitive land usages are recorded within 1000m of site.

6.8 SOILS AND GEOLOGY

"Contains British Geological Survey materials © NERC 2025" obtained from http://www.bgs.ac.uk/data/mapViewers/home.html under the Open Government Licence

6.8.1 SUPERFICIAL DEPOSITS

Both BGS geological mapping and the Groundsure report record superficial geological deposits of Glacial Till on site, comprising sands, gravels, silts and clays with possible local lenses of silt, clay or peat.

6.8.2 SUPERFICIAL DEPOSITS PERMEABILTY

The Groundsure report records the site as being within an area where the maximum permeability of superficial deposits is recorded as ‘high’ and the minimum permeability as ‘low’ and facilitated by mixed flow mechanisms.

This is a qualitative classification of estimated rates of vertical movement of water from the ground surface through the unsaturated zone of any superficial deposits (the zone between the land surface and the water table).

6.8.3 BEDROCK DEPOSITS

Both BGS geological mapping and the Groundsure report records bedrock geology of the Waberthwaite Tuff Formation underlying the majority of site, comprising a lapilli-tuff and tuff (a type of igneous rock formed from volcanic ash or other pyroclastic materials that have been cemented, compacted or welded together during an explosive volcanic eruption); with a small extent of the far north of site underlain by the Borrowdale Sill Suite, comprising predominantly basaltic rocks.

6.8.4 BEDROCK PERMEABILITY

The Groundsure report records the site as being within an area where the maximum permeability of bedrock geology is recorded as ‘low’ and the minimum permeability as ‘low’ and facilitated by fracture flow mechanisms.

6.8.5 BEDROCK LINEAR FEATURES

The Groundsure report records the axial trace of a major syncline fold located 16m south east and orientated north east to south west.

6.8.6 ARTIFICIAL GROUND

BGS geological mapping records no artificial deposits located on or within 500m of site.

6.8.7 COAL MINING

The site is not located in a coal mining reporting area and the local geology is not considered appropriate for such extraction. As such the risk from coal mining activities is considered to be negligible.

6.8.8 NON-COAL MINING

The Groundsure report records the site as being located in an area where the limited extraction of vein minerals may have taken place. The report states:

"Underground mine workings may have occurred in the past or current mines may be working at significant depth to modern engineering standards. Potential for difficult ground conditions are unlikely and are at a level where they need not be considered."

The Groundsure report further records ceased operations igneous and metamorphic rock extraction formerly located 125m south west and ceased operations sand and gravel pits formerly located 412m and 438m south east of site.

6.8.9 SURFACE WORKINGS

ID	Distance (m)	Direction	Land Usage	Year of Mapping
2	39	E	Sewage works	1978
A	102	SW	Unspecified pit	1951
A	110	SW	Unspecified quarry	1927
A	111	SW	Unspecified pit	1923
A	115	SW	Unspecified old quarry	1898
A	115	SW	Unspecified quarry	1927
A	126	SW	Unspecified old quarry	1919
A	126	SW	Unspecified quarry	1919

6.8.10 RADON

The property is not in a Radon Affected Area, as less than 1% of properties are above the Action Level. No radon protective measures are necessary as described in publication BR211:2015 by the Building Research Establishment.

6.9 AERIAL PHOTOGRAPHY

Aerial photography shows the following:

6.9.1 GOOGLE EARTH

6 No. images are held in the historic imagery dataset, as follows:

Date	Description
December 2001	The site is shown as remaining occupied by the present-day barn and limited exterior areas, as seen on the site walkover. Surrounding areas remain consistent with the present-day (i.e. surrounding, predominantly residential village within a wider, predominantly rural area).
June 2018	No discernible change on site nor site relevant change to the surrounding areas.
August 2018	No discernible change on site nor site relevant change to the surrounding areas.
May 2020	No discernible change on site nor site relevant change to the surrounding areas.
March 2023	No discernible change on site nor site relevant change to the surrounding areas.
May 2023	No discernible change on site nor site relevant change to the surrounding areas.

6.9.2 GOOGLE STREET VIEW

Google Street View imagery is dated circa.2009 with the site viewed from the adjacent roadside and facing north, north east and east – the site is shown as remaining occupied by the barn and limited exterior areas seen in the present-day on the site walkover; however, the exterior areas are not overgrown / vegetated at this time and a small heap of rubbles is located in the southern extent of site, alongside a domestic vehicle.

6.10 HISTORIC MAPPING

The following historic maps have been reviewed as part of this assessment:

Map	Onsite	Offsite
OS County Series: 1860, 1:10,560	The site appears occupied by a structure matching that seen on site in the present-day in terms of layout and orientation.	The site remains located within the village of Millom, being directly bounded by and likely associated with a corn mill directly north and east of site. The riverside remains located approx.32m NE of site at its most proximate point to site. A further mill is then located 27m SE with a third located approx.81m SE of site. A 'Mill Race' is located approx.55m east of site.
OS County Series: 1863, 1:2,500	No discernible change on site.	Surrounding areas see little site relevant change.
OS County Series: 1898, 1:10,560 & 1:2,500	No discernible change on site.	An old quarry – small in scale – is now marked approx.115m SW of site.
OS County Series: 1914-1919, 1:10,560	No discernible change on site.	Surrounding areas see little site relevant change
OS County Series: 1919, 1:10,560	No discernible change on site.	Surrounding areas see little site relevant change.
OS County Series: 1924, 1:2,500	No discernible change on site.	The old quarry SW of site is no longer marked as such, however the excavation remains.
OS County Series: 1923-1926, 1:10,560	No discernible change on site.	Surrounding areas see little site relevant change.
OS County Series: 1927, 1:10,560	No discernible change on site.	The former corn mill east of site is no longer marked as such.
Provisional: 1951, 1:10,560	No discernible change on site.	Former mill SE of site now marked as an Inn with an adjacent mill remaining.

Map	Onsite	Offsite
National Grid: 1972-1977, 1:2,500	No discernible change on site.	No mills are marked in the local area. The structures directly east of site have seen some change in layout. The former mill races north NE of site has been redeveloped (likely infilled) into a roadway named the Green and housing has been erected in the area. Further housing has been erected approx.80m east of site. A sewage works and tank is now marked approx.39m east of site. The former quarry excavation to the SW of site is no longer marked on mapping.
National Grid: 1976-1978, 1:10,000	No discernible change on site.	Surrounding areas see little site relevant change.
National Grid: 1995, 1:2,500	No discernible change on site.	Surrounding areas see little site relevant change.
National Grid: 2001, 1:10,000	No discernible change on site.	Surrounding areas see little site relevant change.
Landline: 2003, 1:1,250	No discernible change on site.	Surrounding areas see little site relevant change.
National Grid: 2010, 1:10,000	No discernible change on site.	Surrounding areas see little site relevant change.
National Grid: 2025, 1:10,000	No discernible change on site.	Surrounding areas see little site relevant change.

6.11 CURRENT LAND USE DATA

The Groundsure report records a sewage works located 115m south east of site.

6.12 PETROL AND FUEL SITES

None recorded within 500m of site.

6.13 HISTORICAL PETROL AND FUEL SITE DATABASE

None recorded within 500m of site.

6.14 POTENTIAL CONTAMINATIVE USES IDENTIFIED ON MAPPING (<250M)

ID	Distance (m)	Direction	Use	Date
A	**0**	**On site**	**Mill**	**1923**
A	**0**	**On site**	**Corn mill**	**1914**
A	**0**	**On site**	**Unspecified mill**	**1927**
A	**0**	**On site**	**Corn mill**	**1919**
A	**0**	**On site**	**Corn mill**	**1919**
A	**0**	**On site**	**Unspecified mill**	**1951-1978**
A	**0**	**On site**	**Unspecified mill**	**1898**
A	**0**	**On site**	**Unspecified mill**	**1927**
A	**0**	**On site**	**Corn mill**	**1860**
B	27	SE	Unspecified mill	1927-1951
B	32	SE	Corn mill	1919
C	39	E	Sewage works	1978
B	57	SE	Unspecified mill	1898
B	57	SE	Unspecified mill	1927
B	72	SE	Corn mill	1860
B	81	SE	Mill	19233
B	81	SW	Corn mill	1914-1919
D	102	SW	Unspecified pit	1951
D	110	SW	Unspecified quarry	1927
D	111	SW	Unspecified pit	1923
D	115	SW	Unspecified old quarry	1898
D	115	SW	Unspecified quarry	1927
D	121	SW	Old quarry	1914
D	126	SW	Unspecified old quarry	1919
D	126	S	Unspecified quarry	1919
E	141	S	Smithy	194-1919
E	160	S	Smithy	1898
E	192	SE	Smithy	1919

6.15 HISTORICAL TANK DATABASE

The Groundsure report records an unspecified tank formerly located 119m south east of site and identified from historical mapping dated circa.1972.

6.16 HISTORICAL ENERGY FACILITIES

None recorded within 500m of site.

6.17 HISTORICAL GARAGE DATABASE

None recorded within 500m of site.

7.0 PRELIMINARY CONCEPTUAL SITE MODEL

The risk posed by any contaminants in soil or groundwater will depend on the nature of the hazard, the probability of exposure, the pathway by which exposure occurs, and the likely effects on the receptors. A contaminant is defined as a substance in, on or under land (or within groundwaters) that has the potential to cause harm, while a risk is considered to exist if such a substance is present in sufficient concentration to cause harm and a pathway exists for a receptor to be exposed to the substance. The following sections discuss all the identified potential on and off-site sources, pathways and receptors in the context of the proposed development and plausible pollutant linkages which may represent a risk to identified receptors from the data gained from the desk study. At this stage the assessment is qualitative and aimed to determine all pollutant linkages, irrespective of significance or allowing for uncertainty.

Source	A contaminant or pollutant that is in, on or under land that has the potential for cause harm or pollution to a receptor.
Pathway	The physical route by which a receptor is or could be affected by a contaminant or pollutant.
Receptor	Something or someone that could be adversely affected by a contaminant, i.e. people, controlled waters, ecological systems, buildings, crops, livestock.

By considering each of the three elements above, an assessment of actual and potential hazards to receptors can be carried out, taking into account the significance and degree of risk of each. The three elements above can exist separately; however, they only create a risk where they are linked together, thus creating a contaminant linkage. During the Preliminary Risk Assessment Stage, the linkages are referred to as ‘Potential Contaminant Linkages’, until they are confirmed via intrusive sampling, thus becoming ‘Relevant Contaminant Linkages’.

A tabled, diagrammatic or matrix of pollutant linkages is considered to be a Conceptual Site Model (CSM), the source-pathway-receptor linkages are reviewed and displayed, apportioning a risk-rating and mitigation suggestion after each summary.

Three impact potentials exist for any given site, these are:

- The site impacting upon itself;
- The site impacting on its surroundings; and
- The surroundings impacting on the site.

All three impacts need to be considered in a risk assessment.

7.1 SOURCES

The following potential sources of contamination have been identified:

7.1.1 ONSITE

- Corn mill usage of the site (at least circa.1860 to likely 1926/26)

Potential Sources and Associated Contaminants Identified	
Source	**Potential Contaminants of Concern**
Corn mill usage of the site (at least circa.1860 to likely 1926/26)	Significant contamination from such a usage is considered unlikely as no heavy machinery nor electrical generational equipment noted nor likely (mill race likely provided hydraulic power), mill just east and offsite, site likely used for storage

7.1.2 OFFSITE

- Adjacent corn mill usage (at least circa.1860 to likely 1926/26)
- Historical ‘old’ quarry (approx.115m SW of site, no longer marked on mapping by circa.1972/77)
- Infilled ‘Mill Race’ (approx.55m east, removed circa.1972/77)
- Sewage works (approx.39m east, circa.1972/77 until present-day)

Potential Sources and Associated Contaminants Identified	
Source	**Potential Contaminants of Concern**
Adjacent corn mill usage (at least circa.1860 to likely 1926/26)	Significant contamination from such a usage is considered unlikely as no heavy machinery nor electrical generational equipment noted nor likely (mill race likely provided hydraulic power), mill just east and offsite

Historical 'old' quarry (approx.115m SW of site, no longer marked on mapping by circa.1972/77)	Ground gases; however, discounted as feature is located topographically above site
Infilled 'Mill Race' (approx.55m east, removed circa.1972/77)	Ground gases; however, discounted as feature was redeveloped into a road (thus, geotechnically stable infill material) with adjacent housing directly east and west of the former run
Sewage works (approx.39m east, circa.1972/77 until present-day)	Ground gases and physical contaminants; however, ground gases discounted as feature remains in use and active with physical contamination discounted due to the downgradient location of the feature

7.2 PATHWAYS

A pathway is defined as a mechanism or route by which a contaminant comes into contact with, or otherwise affects a receptor. Pathways by which the identified receptors may be impacted upon in the context of the proposed development are identified as follows:

- Ingestion (direct and indirect via crop uptake);
- Dermal contact;
- Inhalation;
- Plant uptake;
- Direct contact by buried structures (i.e. pipe degradation and leaching, pH & Sulphate attack on concrete); and
- Leaching of soluble contamination into groundwater.

7.3 RECEPTORS

Receptors are defined as people, living organisms, ecological systems, controlled waters, atmosphere, structures and utilities that could be adversely affected by contaminant(s).

- Human Health;
    - Current users of the site;
    - Future users of the site;
    - Users of neighbouring sites;
    - Construction workers;
    - Services personnel working in trenches;

- Buried concrete, which may be affected by high concentrations of sulphate and/or low pH, in the soils and groundwater underlying the site;
- Construction Materials;
- Buried water pipes;
- Controlled Waters;
- Ecological Receptors; and
- Flora and fauna using the proposed development.

The site proposals are understood to be **residential**, as such the likely receptors are site workers during site development, end-users of the site following redevelopment (i.e. residents / tenants, children, visitors, service personnel), controlled waters (i.e. aquifers, watercourses), adjacent receptors (neighbours, flora and fauna, ecological receptors) and building fabric and buried utilities.

8.0 CONCEPTUAL SITE MODEL

The Conceptual Site Model (CSM) is a hypothesis of the nature and sources of contamination, potential receptors that may be the recipient of contamination arising from those sources and any pathways that may exist. It creates a plausible source-pathway-receptor pollutant linkage (hazard), set within the context of the ground and proposed end use of the site.

8.1 PRELIMINARY CONCEPTUAL SITE MODEL

8.1.1 SOIL CONTAMINATION

The site is currently occupied by an old, vacant and disused former storage barn associated with an adjacent and offsite historical corn mill. The site has been developed with such features since at least circa.1860 and likely prior to this. The storage usage of the site (grain) is not considered a significant potential source of contamination, nor have any significant made ground deposits been identified nor are expected on site (ground conditions are hardstanding or natural, gravelly subbases) nor is the adjacent former mill usage considered a significant contaminant

source. This is due to the age of the mill (prior to circa.1860) and the likely end-date of such usage (around circa.1923/26) – significant heavy machinery, electrical infrastructure or associated hydrocarbon usage or storage is not considered likely, as the adjacent mill was likely powered by the nearby, former 'Mill Race'. At present, the site ground conditions comprise building footprint (with natural gravel subbase noted within), hardstanding (with likely natural gravel subbase below) and limited soft-landscaping areas. The extent of soft-landscaping proposed in the final site design is limited in extent and existing site soils / gravels (i.e. for soft-landscaping and as a growing medium) are unlikely to be suitable for such a usage, as such, new soils are likely to be required to form the final site design.

8.1.2 GROUND GAS AND HAZARDOUS VAPOURS

No significant potential sources of hazardous vapour generation have been identified (as above, the historical adjacent mill usage was unlikely to have been electrically powered and thus significant machinery, electrical infrastructure or associated hydrocarbon usage or storage are not considered to have been located on or adjacent to site); and no significant potential sources of hazardous ground gas generation have been identified (former Mill Race likely infilled with geotechnically stable material – redeveloped into a road with adjacent dwellings; an infilled quarry located approximately 115m south west of site is located topographically above site, thus negating such a potential source; a sewage works east of site remains active and in use until the present-day). Furthermore, superficial deposits (Glacial Tills) are likely to be cohesive and thus of low permeability, and bedrock deposits (the Waberthwaite Tuff Formation) is recorded as predominantly low in permeability, thus further acting to reduce impact from offsite sources.

TABLE 1. SUMMARY OF SIGNIFICANT POLLUTION LINKAGES

Source	Pathway	Receptor	Probability of Pollutant Linkage	Conseq.	Risk	Possible Mitigation
Contaminated Soils *(no significant potential sources identified)*	Direct Ingestion & Direct Contact	Site Workers *(during site works, excavations, eating and drinking)*	Ul	Md	L	Site workers to wear appropriate PPE for health and safety reasons, suitable usage of PPE and adherence to relevant HSE guidance considered sufficient to mitigate inherent site worker hazards to low.
Contaminated Soils *(no significant potential sources identified)*	Inhalation of Dust, Dry Arisings	Site Workers *(during site works, excavations, eating and drinking)*	Ul	Md	L	
Contaminated Soils *(no significant potential sources identified)*	Crop Uptake & Direct Ingestion, Direct Contact	End Users *(residents / tenants, children, visitors, service personnel)*	Ul	Md	L	No significant potential sources of contamination considered capable of impacting the proposed site redevelopment have been identified, see Section 8.1.1. however, no existing soils are presently located on site considered suitable for the proposed end-usage and proposed soft-landscaping. As such, it is recommended that a Remediation Method Statement outlining the replacement of the exterior gravels with suitable soils (i.e. for soft-landscaping and as a growing medium) should be produced for the site, in light of the limited exterior works proposed. Beyond this, it is recommended that a Watching Brief (inline with Appendix F) be applied during all subsequent site works.
Contaminated Soils *(no significant potential sources identified)*	Inhalation of Dust, Dry Arisings	End Users *(residents / tenants, children, visitors, service personnel)*	Ul	Md	L	
Contaminated Soils *(no significant potential sources identified)*	Crop Uptake & Direct Ingestion, Direct Contact	Flora and Fauna *(on and offsite)*	Ul	Md	L	
Contaminated Soils *(no significant potential sources identified)*	Vertical and lateral migration *(superficial likely moderate to low in permeability, bedrock predominantly low)*	Controlled Waters *(Secondary Undifferentiated & B Aquifers)*	Ul	Md	L	
Contaminated Soils *(no significant potential sources identified)*	Direct contact *(pipe degradation and leaching)*	Services *(impacted new potable supply piping)*	Ul	Md	L	
Ground Gases (Methane and CO_2) *(no significant potential sources identified)*	Vertical and lateral migration *(superficial likely moderate to low in permeability, bedrock predominantly low)*	Site Workers & Excavations, End Users & Building Envelope *(ingress and build-up)*	Ul	Md	L	No significant potential sources of hazardous ground gas generation identified, see Section 8.1.2.
Volatile and Semi-volatile Organic Compounds *(no significant potential sources identified)*	Vertical and lateral migration *(superficial likely moderate to low in permeability, bedrock predominantly low)*	Site Workers & Excavations, End Users & Building Envelope *(ingress and build-up)*	Ul	Md	L	No significant potential sources of hazardous vapours identified, see Section(s) 8.1.1. & 8.1.2.
Radon	Vertical and lateral migration	End Users & Building Envelope	Ul	Md	L	Site is not located in a Radon Affected Area.

KEY: Probability of pollutant linkage Hi = Highly likely, Li = Likely, Lw = Low Likelihood, Ul = Unlikely
Consequence Sv = Severe, Md = Medium, Mi = Mild, Mr = Minor,
Overall Risk VH = Very High, H = High, M = Moderate, M/L = Moderate/Low, L = Low, VL = Very Low

Based on the preliminary CSM for the site, an environmental risk assessment has been undertaken. A simple matrix can provide a consistent basis for decision making. It should be used with caution, recognising the over-simplification that it will normally represent. The probability and consequences are defined according to parameters relevant to the situation; the boundaries of risk acceptability (and tolerability, where relevant) indicated on the matrix provided in Table 2, can be tailored to the factors influencing the significance of the risk. Individual situations are mapped onto the matrix to provide a ready and consistent indication of their acceptability or tolerability.

TABLE 2. RISK CLASSIFICATION MATRIX

		Consequence			
		Severe (Sv)	**Medium (Md)**	**Mild (Mi)**	**Minor (Mr)**
Probability	**High (Hi)**	Very high risk	High risk	Moderate Risk	Moderate/ Low Risk
	Likely (Li)	High risk	Moderate Risk	Moderate/Low Risk	Low Risk
	Low Likelihood (Lw)	Moderate Risk	Moderate/ Low Risk	Low Risk	Very Low Risk
	Unlikely (Ul)	Moderate/ Low Risk	Low Risk	Very Low Risk	Very Low Risk

Source: CIRIA Report C552, Contaminated Land Risk Assessment. A Guide to Good Practice, 2001

These attributes are evaluated qualitatively against individual hazard assessments to determine the likelihood of a given hazard occurring. The risk evaluations for each plausible pollutant linkage are given in the last three columns of Table 1.

TABLE 3. CLASSIFICATION OF RISK

Very high risk (Vh)	There is a high probability that severe harm could arise to a designated receptor from an identified hazard, OR, there is evidence that severe harm to a designated receptor is currently happening. This risk, if realised, is likely to result in a substantial liability. Urgent investigation (if not undertaken already) and remediation are likely to be required.
High risk (Hi)	Harm is likely to arise to a designated receptor from an identified hazard. Realisation of the risk is likely to present a substantial liability. Urgent investigation (if not undertaken already) is required and remedial works may be necessary in the short-term and are likely over the longer term.
Moderate risk (Md)	It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that any such harm would be severe, or if any harm were to occur it is more likely that the harm would be relatively mild. Investigation (if not already undertaken) is normally required to clarify the risk and to determine the potential liability. Some remedial works may be required in the longer-term.
Low risk (Lw)	It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild.
Very low risk (Vl)	There is a low possibility that harm could arise to a receptor. In the event of such harm being realised it is not likely to be severe.

Source: CIRIA Report C552, Contaminated Land Risk Assessment. A Guide to Good Practice, 2001

9.0 ENVIRONMENTAL RISK ASSESSMENT

Based on the information contained in this report, it is the opinion of Castledine Environmental that the site represents a **LOW** level of risk with respect to the proposed development.

It is not envisaged that any further works or investigation are required beyond the provision of a Remediation Method Statement, outlining the formation of exterior areas on site (i.e. soft-landscaping), in light of the lack of suitable soils extant on site.

This report should be submitted to your Local Planning Authority for agreement to allow the Phase 3 Remediation Strategy and Verification Plan to be produced.

10.0 SUMMARY OF RISKS

11.0 HUMAN HEALTH

11.1.1 RESIDENTS / END-USERS

The risks to end-users of the site following site redevelopment are considered to be low when assessed against the lack of development history on site, the lack of significant, gross or mobile contamination expected on site and the limited site development proposals (site designs largely comprise building footprint and hardstanding with a very limited area of soft-landscaping – no ground gas or vapour risks identified). As such, it is recommended that a Watching Brief is applied during all subsequent site redevelopment works and provision is made for a Remediation Method Statement to be produced for the site. The report should outline the formation of soft-landscaping areas on site, due to the lack of a suitable medium for proposed soft-landscaping (or as a growing medium) presently extant on site.

11.1.2 SITE WORKERS

The risks to site workers during site redevelopment are considered to be low due to the lack of significant, gross or mobile contamination expected on site, the unlikely presence of asbestos (structure erected before the prevalent usage of such a contaminant), the lack of ground gas or vapour hazards identified during the course of this report and the limited site redevelopment proposals (i.e. significant earthworks are unlikely). As such, with the provision of a Watching Brief, alongside the suitable usage of PPE and adherence to relevant HSE guidance during site redevelopment works, the risks to site workers are considered to be low.

12.0 CONTROLLED WATERS

The risks to controlled waters are considered to be low due to the lack of significant, gross or mobile contamination expected on site, the likely cohesiveness of superficial deposits on site (Glacial Tills – known to largely weather to clays) and predominantly low permeability of underlying bedrock deposits (the Waberthwaite Tuff Formation) and the lack of active abstraction sites within 1000m of site alongside the lack of an SPZ in the local area.

13.0 STRUCTURES

13.1.1 GROUND GASES

No significant potential sources of hazardous ground gas generation have been identified (former Mill Race likely infilled with geotechnically stable material – redeveloped into a road with adjacent dwellings; an infilled quarry located approximately 115m south west of site is located topographically above site, thus negating such a potential source; a sewage works east of site remains active and in use until the present-day). Additonally, superficial deposits (Glacial Tills) are likely to be cohesive and thus of low permeability, and bedrock deposits (the Waberthwaite Tuff Formation) is recorded as predominantly low in permeability, thus further acting to reduce impact from offsite sources.

13.1.2 HAZARDOUS VAPOURS

No significant potential sources of hazardous vapour generation have been identified (the historical adjacent mill usage was unlikely to have been electrically powered and thus significant machinery, electrical infrastructure or associated hydrocarbon usage or storage are not considered to have been located on or adjacent to site). Additionally, superficial deposits (Glacial Tills) are likely to be cohesive and thus of low permeability, and bedrock deposits (the Waberthwaite Tuff Formation) is recorded as predominantly low in permeability, thus further acting to reduce impact from offsite sources.

13.1.3 POTABLE WATER SUPPLY PIPING

Significant liquid hydrocarbon nor PAH contamination is not expected on site (for the reasons outlined in prior sections) and as such, hazards to new potable piping are considered to be low.

14.0 RECOMMENDATIONS

It is not envisaged that any further works or investigation are required beyond the provision of a Remediation Method Statement, outlining the formation of exterior areas on site (i.e. soft-landscaping), in light of the lack of suitable soils extant on site.

This report should be submitted to your Local Planning Authority for agreement to allow the Phase 3 Remediation Strategy and Verification Plan to be produced.

A watching brief (as outlined in Appendix E) should be carried out by the site supervisor during the course of demolition, site clearance and construction works for any obvious contamination (e.g. oil spillage in ground, buried waste, possible asbestos containing material). Should previously unreported or undiscovered contamination be identified, then development should stop and Castledine Environmental should be contacted to determine if further assessment or changes to the remediation scheme are required.

15.0 REFERENCES

15.1 LEGISLATION AND REGULATIONS

15.1.1 ACTS

[1] Environmental Protection Act 1990, Part IIA: inserted by Environment Act 1995, Section 57. See Environment Act 1995 for text of Part IIA.

15.1.2 PLANNING REGULATIONS

[2] The Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999 SI1999/No.293

[3] The Town and Country Planning (Environmental Impact Assessment) (England and Wales) (Amendment) Regulations 2000 SI2000/No.2867

[4] The Town and Country Planning (Environmental Impact Assessment) (England and Wales) (Amendment) Regulations 2017 SI2017/No.571

15.1.3 CONTAMINATED LAND REGULATIONS

[5] The Contaminated Land (England) Regulations 2000. SI2000/No.227

[6] The Contaminated Land (England) (Amendment) Regulations 2001 SI2001/No.663

[7] The Contaminated Land (England) Regulations 2006 SI2006/No.1380

15.2 STATUTORY GUIDANCE

[8] Department of Environment, Food and Rural Affairs. 2012. *Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance.* Department of Environment, Food and Rural Affairs

[9] Communities and local Government, 2024: National Planning Policy Framework.

15.3 BRITISH STANDARDS

[10] BS 5930:2015+A1:2020 Code of practice for site investigations

[11] BS 10175:2011+A2:2017 Investigation of potentially contaminated sites - Code of practice

[12] BS 8485:2015+A1:2019 Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings

[13] BS 8576:2013 Guidance on investigations for ground gas. Permanent gases and Volatile Organic Compounds (VOCs)

[14] Bs 10176:2020 Taking Soil Sample for Determination of Volatile Organic Compounds (VOCs)

15.4 NON-STATUTORY TECHNICAL GUIDANCE

15.4.1 ENVIRONMENT AGENCY

[15] Land Contamination Risk Management (LCRM) 2020, updated 2023

15.4.2 CIRIA PUBLICATIONS

[16] Wilson, S., Oliver, S., Mallett, H., Hutchings, H., and Card, G.. 2007, *C 665 Assessing risks posed by hazardous ground gases to buildings* London: Construction Industry Research and Information Association

[17] Mallett, H., Cox, L., Wilson, S. and Corban, M... 2014, *C 735 Good practice on the testing and verification of protection systems for buildings against hazardous ground gases* London: Construction Industry Research and Information Association

15.4.3 CL:AIRE

[18] Card G, Wilson S, Mortimer S. 2012. *A Pragmatic Approach to Ground Gas Risk Assessment. CL:AIRE Research Bulletin RB17*. CL:AIRE, London, UK. ISSN 2047- 6450 (Online)

16.0 APPENDICES

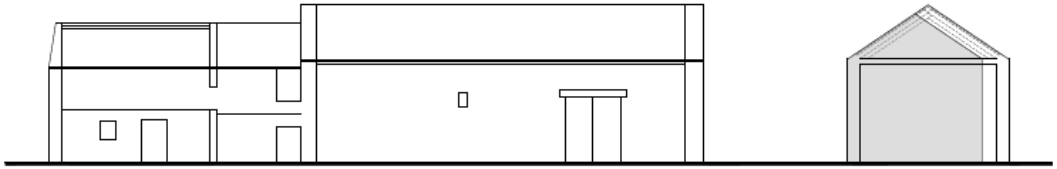
APPENDIX A **ENVIRONMENTAL SEARCH**

Separate Groundsure Report

APPENDIX B **HISTORICAL MAPPING**

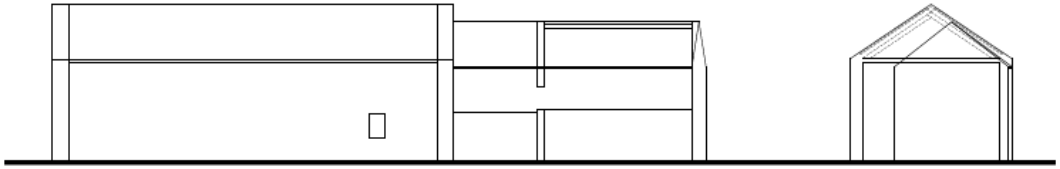
Separate Map Packs (2 No. files)

APPENDIX C PROPOSED AND CURRENT SITE PLANS



EXISTING FRONT ELEVATION

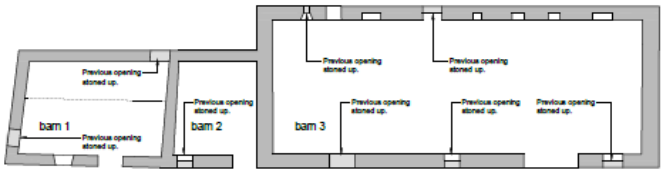
EXISTING SIDE ELEVATION



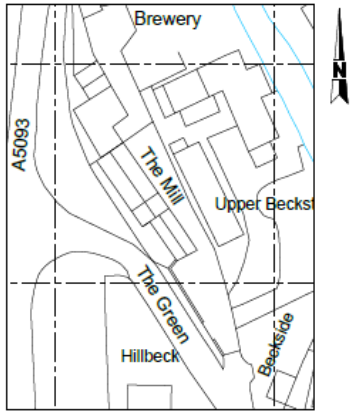
EXISTING REAR ELEVATION

EXISTING SIDE ELEVATION

EXISTING FIRST FLOOR PLAN



EXISTING GROUND FLOOR PLAN



EXISTING SITE PLAN

LOCATION PLAN

A	First issue	15/01/24
No.	Revision/Issue	Date

Site location

Mill Farm Barns
The Green
Millom
Cumbria
LA18 5HL

Project

Proposed barn conversion to form two dwellings.

Drawing title

Plans, elevations, site as existing and location plan.

MVC Design Ltd
ARCHITECTURAL DESIGN
11 Meadowside
Swarthmoor
Ulverston
Cumbria
LA12 0HD
Mob: 07730691656
Tel: 01229 582038
Email: mark@mvcdesign.co.uk

Dwg No.	MVC1065-01
Date	15/01/25
Scale	As shown at A1
Rev	A

APPENDIX D SITE PHOTOS AND LOCATIONS

Castledine Environmental
LAND CONTAMINATION SURVEYS

Site Walkover Photos

Address: Mill Farm Barn, Millon, Cumberland
Client: Mr. S. Rowles

Photo No.1: Facing north outside the western boundary of site

Photo No.2: Facing east outside the southern extent of the western boundary (site access to right of photograph)

Castledine Environmental
LAND CONTAMINATION SURVEYS

Site Walkover Photos

Address: Mill Farm Barn, Millon, Cumberland
Client: Mr. S. Rowles

Photo No.3: Facing north in the far south of site

Photo No.4: Facing west in the NE extent of site showing the eastern face of onsite barn and access (right of photograph)

Castledine Environmental
LAND CONTAMINATION SURVEYS

Site Walkover Photos

Address: Mill Farm Barn, Millon, Cumberland
Client: Mr. S. Rowles

Photo No.5: Facing south from the northern extent of site

Photo No.6: Facing east from within the barn showing the access to the barn (eastern face)

Castledine Environmental
LAND CONTAMINATION SURVEYS

Site Walkover Photos

Address: Mill Farm Barn, Millon, Cumberland
Client: Mr. S. Rowles

Photo No.7: Facing north within the barn showing the northern extent of the barn and unoccupied nature of barn

Photo No.8: Facing NW within the barn showing interior

APPENDIX E WATCHING BRIEF

It remains possible that previously unexpected soil conditions may be encountered during the construction process. Examples may include oily pockets within the soil, potential for asbestos containing materials, black ashy materials, soils exhibiting strong odours, brightly coloured materials, and former demolition materials.

Should previously undiscovered contamination be encountered during the demolition/construction of the new buildings the following course of action should be adhered to:

1. The ground workers should report any suspected contamination immediately to the Client's site supervisor. The supervisor should contact the Client or their appointed agent who will in turn contact Castledine Environmental to request an engineer to visit the site to assess the extent of the 'contamination'.
2. Castledine Environmental shall make records of their inspection, and pass details of these to the Local Authority.
3. Where the conditions revealed differ from those previously anticipated, the Castledine Environmental shall take samples as deemed appropriate to be dispatched for appropriate chemical testing.
4. Depending on the results of the testing either:
    a. no further work will be required;
    b. a further detailed risk assessment will be required; and/or
    c. Localised specific remedial measures will be necessary. Appraisal criteria will vary depending on the nature of the assessment.
5. The results of any such testing will be sent to the Local Authority Pollution Control Section, Local Authority development control section, and the appointed building inspector. If remediation is required, the LA/Building inspector will be informed of the date and time of the proposed works.

6. Remediation will be undertaken in accordance with a method statement submitted for approval. The works shall be supervised where necessary by Castledine Environmental who shall provide a Verification Report for the Local Authorities.
7. A copy of the discovery strategy should be lodged on site and provisions made to ensure that all workers are made aware of their responsibility to observe, report and act on any potentially suspicious or contaminated materials they may encounter.

APPENDIX F DISCOVERY STRATEGY