

STRUCTURAL REPORT - EXISTING BARN (BUILDING 1)

RESIDENTIAL CONVERSION

Hill End Farm, Hill End Road, Mapplewell, Barnsley, S75 6DU

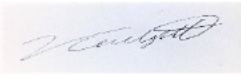
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17th June 2022



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(i) **Terms of Reference**

In June 2022, on the instructions of the Planning Consultant (Mr Tom Warren, Prism Agriculture Ltd) acting for the owner (Mr Needham) Earth-Tech Consulting Ltd were asked to prepare a **Structural Report** on an existing agricultural building (Building 1) that is the subject of a proposed residential conversion at Hill End Farm, Hill End Road, Mapplewell, Barnsley S75 6DU. The development proposal consists of the change of use of an existing building to create a dwelling in accordance with a proposed Class Q application to Barnsley Council (Ref: tbc).



Fig 1 - Aerial photographs: Hill End Farm, Mapplewell, S75 6DU

The client required a detailed assessment of the general suitability of the building for conversion - in particular, details of its general **STRUCTURAL CONDITION**, specifically relating to any evidence of *historic movement, subsidence, structural cracking and major defects* etc.

(ii) **Mandatory Guidance**

- *BS EN 1997-1: 2004 Eurocode 7 - Geotechnical Design - Part 1.*
- *BS EN 1997-2: 2007 Eurocode 7 - Geotechnical Design - Part 2.*
- *The Environmental Protection Act 1990.*
- *Department for Communities and Local Government, 2012, Nat Planning Policy Framework.*
- *Department for Environment, Food and Rural Affairs, April 2012. Environmental Protection Act 1990, Contaminated Land Statutory Guidance. The Stationery Office Ltd.*

(iii) The Parties

Property	Existing Barn (Building 1): Hill End Farm, Mapplewell, Barnsley, S75 6DU
Client/Owner	Mr Needham
Planning Consultant	Prism Agriculture Ltd Mr Tom Warren
Structural Consultants	Earth-Tech Consulting Ltd Mr T. M. Hyett MSc BSc CEng MIEI, MCIQB Chartered Engineer & Chartered Building Consultant

(iv) The Project Site

The site is situated in a semi-rural position off Wentworth Road / Hill End Road in Mapplewell, a former mining village in the metropolitan borough of Barnsley in South Yorkshire, England. Historically part of the West Riding of Yorkshire,

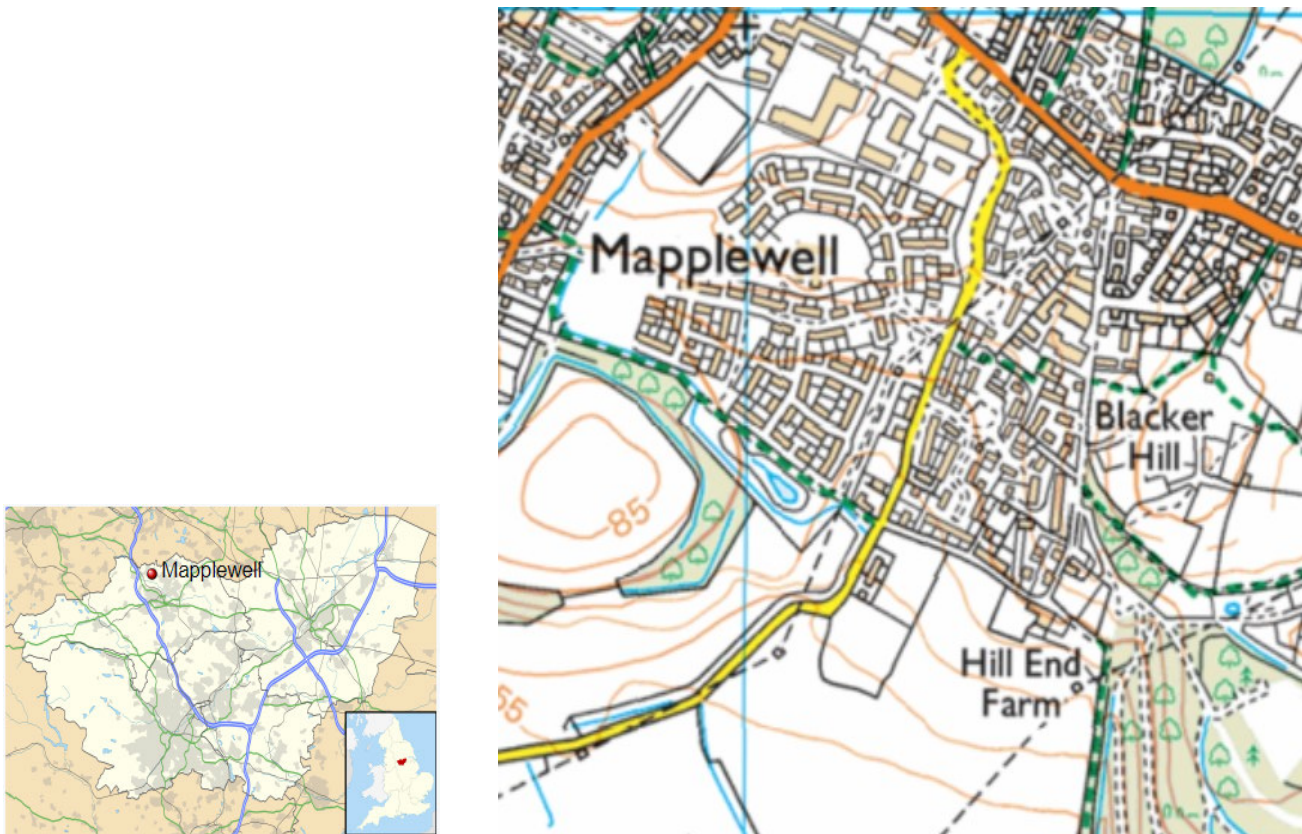


Fig 2 – General Location in South Yorkshire: Hill End Farm, Mapplewell, S75 6DU

Mapplewell is a medium sized village conurbation situated approximately 3 miles north of Barnsley, and 8 miles south of Wakefield at approximately 53°35'11"N - 1°30'9"W at an elevation of around 328 feet (100 m) above sea level.

Mapplewell was historically a hamlet in the ancient *Wapentake of Staincross*. As it grew in size it began to merge with neighbouring hamlet, Staincross and ever since the histories of the villages have been linked together. As in Staincross, nail making was an important industry in Mapplewell in the 17th century.

The village and its environs are traditionally associated with coal mining, and by the late 19th Century coal mining was the predominant source of employment, after the sinking of a deep mine in North Gawber.

The proposed development consists of the conversion of a single, existing old stone built detached former agricultural building that dates at least to the middle 19th Century (and probably considerably older) as shown below on the County Series historical maps from 1892 to 1893.

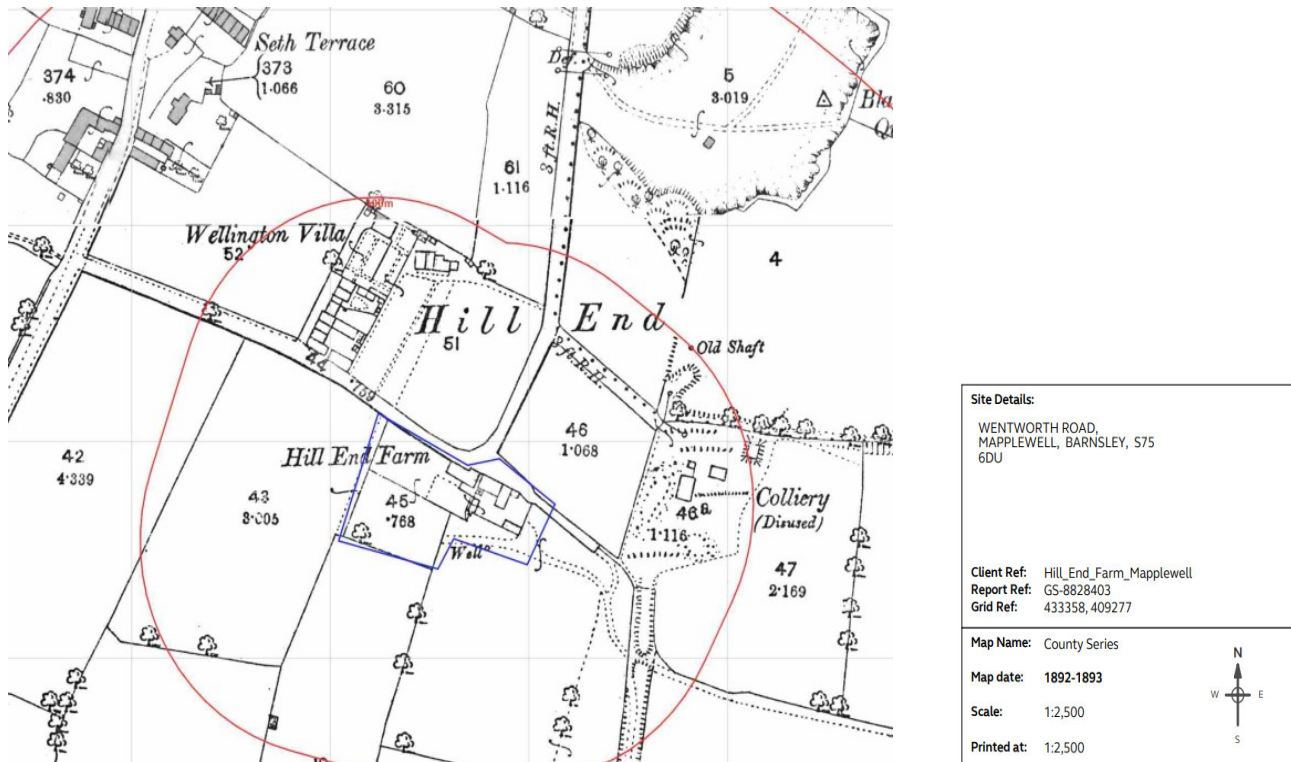


Fig 3 – County Series Historical Map 1892 to 1893

The building is in good general order situated within the courtyard of Hill End Farm, with front-facing off a side track at the bend of Wentworth Road / Hill End Road. The current land use is vacant land, and there is good access off Wentworth Road / Hill End Road and very good general curtilage to the Barn itself within at Hill End Farm.



Fig 4 – Existing Barn: Front – as viewed off Hill End Road looking south.



Fig 5 – Barn: Rear – as viewed from courtyard side looking north.

The present surfacing consists some concrete and compacted stone and general hardstanding at the entrance track. The site is generally level with well-defined boundaries, and there are established rural and semi-rural residential houses in proximity, off Hill End Road directly to the north-west, north and north-east.



Fig 6 – Block Plan and Photo of the existing former agricultural barn – Building 1 – at Hill End Farm, Mapplewell, S75 6DU.

The footprint of the existing building is rectangular, arranged as part natural stone (lower) and part steel-frame structure with traditional timber infill panels (upper) and slatted timber cladding (rear and sides), with a profile steel standing seam monopitch sloping roof. It is situated within a well-defined, well-established land parcel with good access and well-defined driveway with hardstanding for vehicles and parking etc.

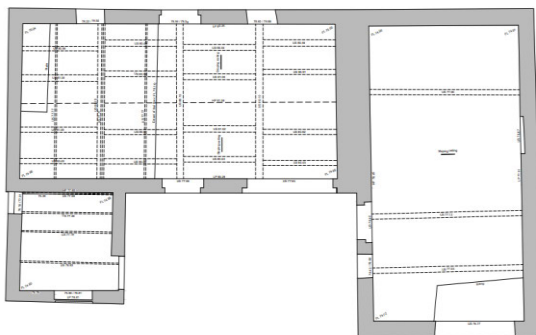


Fig 7 - Existing Floor Plan

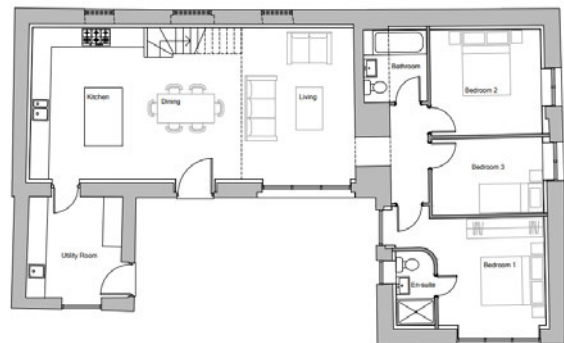


Fig 8 - Proposed Floor Plan

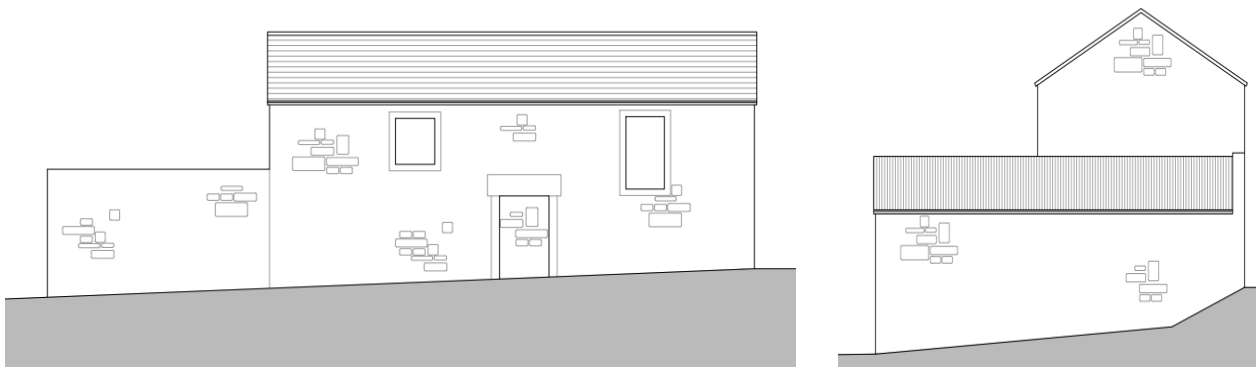


Fig 9 - EXISTING North & East Elevation



Fig 10 – **PROPOSED** North & East Elevation

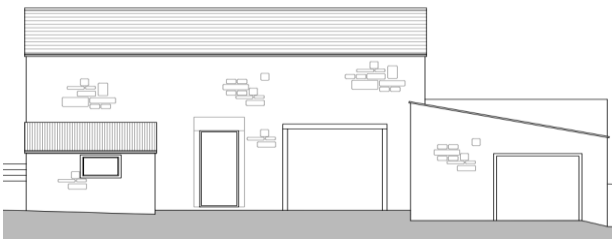
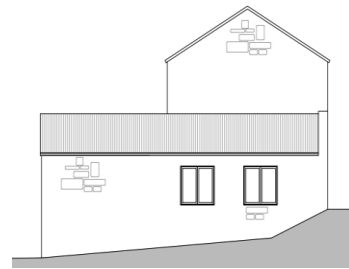


Fig 11 – **EXISTING** South & West Elevation

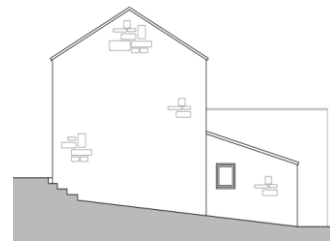
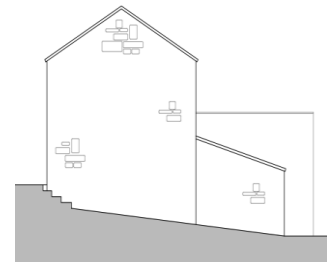


Fig 12 – **PROPOSED** South & West Elevation



There is clear evidence that the building has been agricultural in the past (as the name *Hill End Farm* suggests) and the existing barn (Building 1) subject to this application is a traditional stone built barn dating back at least two centuries.

From inquiries with the planning consultant the building has been used for agricultural storage, and various related purposes. As indicated from the historical mapping, the building dates back as agricultural to as far as the records exist (1892/93) when the surrounding area was open-fields, and there is no indication (from local knowledge, our research, our observations or otherwise) to suggest the site has had any other significant previous industrial or other usage.

(v) Available Information

The following information was made available prior to and during the course of this report:

1. Copies of Land Registry plans showing the property.
2. Historical photographs and miscellaneous information collected by the planning consultant regarding local coal mining activity thought to have been carried out in the wider area.
3. Access to the site to carry out a detailed walk-over survey and structural inspection.
4. Access to, and the use of a 3t mini-excavator with operator to conduct basic intrusive investigations into the underlying soils, if required.

PART 1 INSPECTION / SURVEY METHODOLOGY

1.0 INTRODUCTION

Structural Survey

In order to meet the client's objectives in a timely manner, the Planning Consultant instructed the property to be structurally surveyed and inspected internally and externally by a qualified Chartered Structural Engineer (CEng), and its environs inspected by a Chartered Geotechnical Engineer, so that any potential defects could be recorded and so that appropriate repairs could be properly planned, designed and carried out, subject to any LPA conditions attaching to the development scheme as approved.

Attention was drawn to the overall structural condition of the main elevations of the stone-built barn building; potential foundation movement, and tolerances/deviations from perpendicular etc., and the brief provided by the Planning Consultant was essentially whether the building was capable of full/partial retention in its current state.

The roof skeleton was also considered, and a basic crack assessment methodology was included, even though the elevations were/are constructed universally in coursed stonework around the perimeter, in accordance with the accepted industry convention and best practice (see below) for any substantial movement indicators.

Other Indicators

In addition, general information was also requested by the Planning Consultant, including information regarding the land parcel (as a whole) and comments were invited on the likelihood of instability of near surface soils due to natural geological features, land contamination and/or past coal mining activity, and if applicable, how this might 'structurally' affect the proposals for conversion to re-use an existing building in accordance with Barnsley Council's Policy GB3 for a Change of Use of existing building.

1.1 CRACK ASSESSMENT CONVENTION (if applicable)

Cracks are Indicators

Cracks occur in buildings for all sorts of reasons and the methodology adopted in this report is that cracks in buildings are the **visual symptom** of possible problems, not the problem itself.

Cracks are a mechanism for releasing stresses that have built up within a particular structure that will naturally exploit any inherent weaknesses in the building fabric.

Size convention of cracks

Negligible - hairline; with a dimension of less than 1 millimetre. Of little concern other than aesthetic and nuisance.

Slight - over a period of time, if structural movement has ceased and stabilised, cracks that are between 1mm and 5mm in width can normally be dealt with through filling the voids and re-decoration only.

Moderate - 5mm to 15mm; generally requiring building work to remedy; requiring the involvement of a professional to establish the real cause of the cracks; associated problems also likely, perhaps requiring the localised replacement of fractured elements such as cills and lintels. Work may also be required to remedy any associated concerns regarding the weather-tightness of the building that may have been compromised through disturbance of roof coverings and rainwater goods as a result of the movement.

Severe - 10mm to 25mm; usually indicates extensive structural repairs are required; involving possible replacement of affected sections of the building; cracks of this dimension are usually accompanied by a variety of lesser dimensioned cracks. Professional advice is required on the cause of the failure and the extent of remedial work. The installation of interim temporary support scaffolding or propping may also be necessary until the remedial works are carried out.

Very Severe - In excess of 25mm; usually indicates very severe structural damage requiring major repair works that could involve the partial or complete rebuilding of the affected area; structural underpinning may also be necessary due to the danger of associated collapse and instability. Professional advice is required immediately, and the building should not be occupied or inhabited. Temporary support is likely to be required immediately.

Shape convention of cracks

Fine - hairline cracks running across the face of a wall often indicates that a small degree of shrinkage has occurred in the fabric of the wall. Most buildings can accommodate such fine defects without undue concern. These cracks can also be seasonally driven, appearing and disappearing depending on climatic conditions.

Diagonal - stepped cracks often indicates that structural settlement is happening, possibly due to upheaval at foundation level or some other form of change in effective stress in the soil beneath the foundation. If foundation settlement is evident, this type of crack often grows in width with time. Professional advice is usually required at an early stage.

Vertical - often a sign of serious problems; if wide at the top and tight at the bottom this usually indicates that one or both ends of the buildings' foundation are dropping. Vertical cracks also usually indicate that the stresses have been sufficiently severe to crack individual elements (bricks) in the wall to such an extent that could make the broken elements unsafe. Professional advice is usually required at an early stage.

Horizontal - cracks following the masonry beds between brickwork should always be treated with concern and often indicate that walls are in an early stage of failure, particularly if they are retaining walls. Professional advice is usually required at an early stage.

1.2 DAMP, INSECT AND FUNGAL INFESTATION

Rising and Penetrating Damp

In agricultural barns (of any age) where there is no damp-proof course, it is common for buildings to suffer varying degrees of rising and penetrating damp caused by the absence of any form of DPC or DPM: the solid and/or open cavity wall construction and the deterioration of the roof coverings can give rise to water ingress into a building and any exposed wall core. These problems can be resolved by the introduction of solid concrete floors with a DPM (where practicable) on the ground floors and the injection or introduction during refurbishment of a suitable damp-proof course (where practicable) and re-pointing of the external brick/blockwork using a suitable cement mortar (or full/half rendering).

Insect and Fungal Infestation

Buildings of this type do occasionally exhibit varying degrees of *mould growth* (occasional white furry deposits and black spots on timbers) and occasional forms of wet rot in any exposed timbers that have been open to the elements over a period of time [i.e. usually in the form of *Coniophora Puteana* - a brown rot that favours wet conditions produced by persistent water leakage ; *Fibroporia Vaillantii* and other *Poria* species - brown rots that prefer higher temperatures causing cuboidal cracking of the wood where the mycelium appears as white or cream sheets, and strands (aggregations of *hyphae*) remain flexible when dry].

- *Wet rots can be grouped together collectively, and the above are typical building defects associated with old, redundant and dilapidated agricultural buildings that have been left exposed to weather, and in particular heavy precipitation, and have been poorly maintained for a considerable period of time. In all cases the presence of wet rot indicates that the MC (moisture content) of the timber on which they are growing has been well in excess of 20% for a considerable period.*

- *Wet rots are unable to colonise an area away from wet timber. If the source moisture can be eliminated, for example by roof repairs and/or re-roofing and the extensive refurbishment work as proposed, then as MC gradually drops below 20% any significant rot will become quiescent, and eventually die.*

Where observed, appropriate remedial action should be recommended, which usually includes provisions that all structural and non-structural timbers exhibiting signs of wet rot (if present within a building) are removed where practicable during the refurbishment phase, and all remaining and new structural timbers treated with a suitable course of preservative, as a matter of good building practice.

Any but the most serious infestation can be treated very easily during a comprehensive refurbishment program using a simple chemical insecticidal eradicant combined with the careful removal and replacement of defective timbers (or parts of timbers as identified during the construction phase of the works).

PART 2 STRUCTURAL SURVEY

2.0 OBSERVATIONS

The site was inspected on Friday 17th June 2022 by Mr T. M. Hyett MSc CEng MIEI CGeol FGS MCIOB, from Earth-Tech Consulting Ltd.

There is good general curtilage to the property and the present surfacing consists of concrete, compacted stone at the entrance off Wentworth Road / Hill End Road, and compacted gravel road to the front. The site is generally level with well-defined boundaries, and there are established residential settlements to the north and north-west.



Fig 13 – Rear hard-standing & concreted curtilage



Fig 14 – Front access track and hard-standing

The footprint of the existing building is rectangular, arranged over two storeys in height with two connected single / double lean-to structures at the rear creating a minor courtyard effect. It is situated within a well-defined, well-established almost rectangular parcel of land with good access, extensive passing and parking places and existing hardstanding areas for vehicles, bin store, EV points, bike store and parking etc.

The main building is enclosed on four sides with a single opening on the south elevation and internal openings connected to the lean-to structures which appear, on initial inspection to have been constructed at the same time as the main building.

The main structure is a two-storey height barn of solid wall construction comprising coursed squared Yorkshire stone outer leaf, rubble cavity fill, and rough stone inner leaf that has been repaired at various times in the past using stone and occasional conventional brick bond. Corners are constructed in Yorkshire stone coins.

The roof is traditional pitched with its original traditional Yorkshire stone slate covering. There are no gable copings and no evidence of stone square kneelers. The roof is a traditional timber skeleton in very good condition comprising oak or pithed pine rafters onto purlins onto tied primary rafters and king-post trusses. The roof skeleton is in very good condition but there are varying degrees of ridge deflection but no significant dishing.

The timber rafters generally require minor repairs and replacement throughout is not considered necessary and will be adequate to satisfy building regulations and should be capable of full retention. The rafters should be completely stripped to facilitate repairs and installation of a compliant, breathable membrane and thermal insulation.

The ground floor is part Yorkshire stone flags and part compacted concrete fill.

All the primary elevations are generally in very good order and are intact, and no sections have collapsed (or) exhibit excessive (or any) signs of foundation failure and/or deviation from plumb.

2.1 NORTH ELEVATION (FRONT)



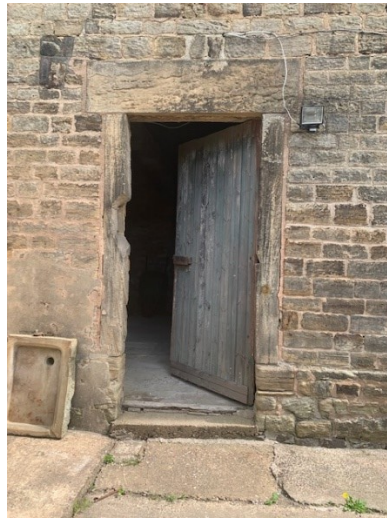
On the north elevation at the (main) front of the building facing the track onto Hill End Road the general structure of the building is plumb and exhibits no signs of substantial (or any) movement and/or significant damage.

The structural fabric requires some notional minor repairs and alterations but is capable of full retention with no major (or any) areas of deflection and no requirement to remove and/or replace large sections



The adjoining leant-to sides at the rear of the building is also in good general structural order, with the main elements all very plumb and exhibiting no serious signs of movement, deflection and/or significant damage.

2.2 SOUTH ELEVATION (REAR)



On the south elevation at the (main) rear of the building facing the courtyard area the general structure of the building is plumb and exhibits no signs of substantial (or any) movement and/or significant damage.

The structural fabric requires some notional minor repairs and alterations but is capable of full retention with no major (or any) areas of deflection and no requirement to remove and/or replace large sections



The adjoining leant-too side at the north-west elevation is also in good general structural order, with the main elements all very plumb and exhibiting no serious signs of movement, deflection and/or significant damage.

2.3 WEST ELEVATION



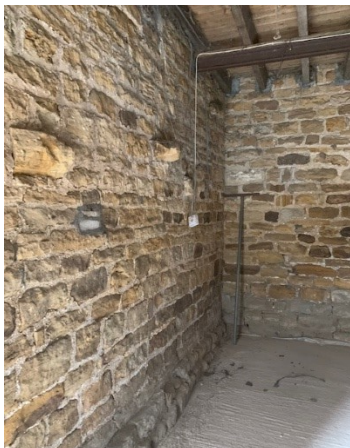
The main building west elevation + lean-too is also in good general structural order, with the main elements all very plumb and exhibiting no serious signs of movement, deflection and/or significant damage.

2.4 EAST ELEVATION

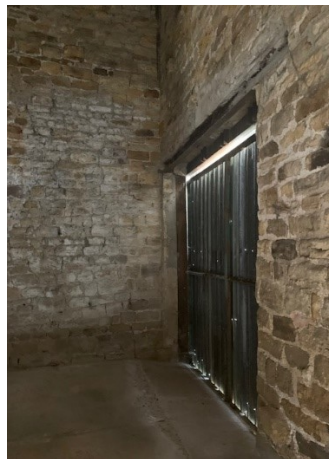


The main building east elevation is also in good general structural order, with the main elements all very plumb and exhibiting no serious signs of movement, deflection and/or significant damage.

2.5 INTERNAL



Internally, the main building (all elevations) are also in good general structural order, with the main elements all observed to be very plumb and exhibiting no serious signs of movement, deflection and/or significant damage.



2.6 ROOF



The roof structure is intact and stable, and whilst there may be some fabric repairs and infilling etc., it should be capable of retention with no requirement to remove and/or replace large structural sections

Some alterations will be required but in general the fabric is fully capable of retention with no areas of bulging/deflection and no requirement to repair by any means of disruptive dismantling or rebuilding.

2.7 RISING & PENETRATING DAMP

There is no evidence that the building is suffering from any form of rising and/or penetrating damp caused by the absence of any form of DPC or DPM: the solid and/or cavity wall construction consists of solid stone blocks, and the roof covering is in very good general order which has prevented any form of water ingress into the building or any part of the wall core. There may be areas that require some attention, but there is no evidence of water penetration on a major scale, and any future potential problems can be resolved by the injection or introduction during refurbishment of a suitable roof and damp-proof membrane (where practicable) and re-pointing of the external exposed blockwork using a suitable cement mortar.

2.8 INSECT & FUNGAL INFESTATION

The stone building and timber roof components do not exhibit any signs of *mould growth* of the type usually found on exposed timbers in agricultural buildings (which often manifests as white furry deposits and black spots). There are no structural timber elements within the structure, excepting the roof skeleton, and no sign of wet rot in exposed timbers that are often left open to the elements over a period of time (which can sometimes manifest in the form of *Coniophora Puteana* - a brown rot that favours wet conditions produced by persistent water leakage ; *Fibroporia Vaillantii* and other *Poria* species - brown rots that prefer higher temperatures causing cuboidal cracking of wood where the mycelium appears as white or cream sheets, and strands (aggregations of *hyphae*) remain flexible when dry).

2.9 SUMMARY

All the primary structural elements consist of original stone and original timber with the occasional rolled steel joists for the mezzanine deck on the upper level, and there is no evidence that these have suffered any significant corrosion, and all were observed to be true and plumb with no indication of excessive vertical, side or other loadings.

The building is in its original condition and of a permanent and substantial construction.

There is some (nominal) evidence that it has been repaired periodically in recent years using various corrugated and sheet materials to the two lean-to buildings extending from the two west and east elevations but there was no indication that corrugated asbestos sheet materials have been used. The owner is nonetheless reminded of his obligations under **The Control of Asbestos Regulations 2012** when facilitating future repairs / alterations / modifications etc.

- All the primary elevations are generally in very good order and are intact, and no sections have collapsed (or) sections that exhibit excessive (or any) signs of foundation failure and/or deviation from plumb.

The conversion works will, nonetheless, be extensive - but there is no practical reason why the structure cannot be retained in full and repaired / improved / modified using building best practices in order to meet current building regulations through the addition of internal elements and suitable building fabrics.

PART 3 BASIC GROUND STABILITY ASSESSMENT

3.0 BEARING CAPACITY

During the walkover and site inspection on Friday 17th June 2022 it was possible to observe exposed areas of previously disturbed ground and some shallow (nominal) excavations that had been carried out for trenching, gate posts etc. This enabled a basic inspection of the near surface geology, which, along with information collated from the *British Geological Society (BGS)* and from *Groundsure*, we are able to comment on the likely bearing capacity of the soils for the existing foundations and ascertain whether the ground has been adversely affected as a result of its former use. The Groundsure Report GS-6630201 is attached at Appendix A.

Typically, buildings of this type and age are built on stone pad foundations laid directly onto the subsoils. The walk-over survey and research are considered adequate to provide very basic geological information in order to comment on the general ground stability and the bearing capacity of the foundation soils beneath the structure, based on the observed geological sequence, as follows:

"TOPSOIL (and some Made Ground) around the existing buildings: brown compacted sandy gravels – gravels are likely to be angular coarse sandstone, occasional brick, ceramic, clinker." (ARTIFICIAL FILL DEPOSIT) is possible with a thin covering approximately 100mm to 150mm thick, overlying natural "yellowish brown, firm to stiff silty CLAY with sands and gravels – gravels are angular tabular fine to medium sandstone and mudstone litho-relics." (GLACIOFLUVIAL DEPOSITS - ALLUVIUM)."

There was no unusual colouration or odours to any of the soils encountered in 'open' and 'exposed' positions and/or nominal excavations during the walkover investigation and no evidence that the site had any previous heavy industrial/engineering use and no visual indicators to suggest the presence of hazardous contaminants in high (or any) concentrations, or any evidence of high (or any) concentration of *oils, lubricants, sulphates, asbestos (chrysotile, amosite, tremolite, actinolite or ferroactinolite), radon gas, methane, high concentrations of carbon monoxide, hydrogen sulphide or carbon dioxide*.

From consulting *Geological Map Extracts* from the BGS -*British Geological Survey* and from our own knowledge of the local geology the superficial deposits identified at near surface overly the natural bedrock consisting *"Weathered Sandstone"* (GRENOSIDE SANDSTONE and PENISTONE FLAGS SANDSTONE) and *"Weathered, moderately strong Mudstone, Siltstone and Sandstone"* (PENNINE LOWER COAL MEASURES FORMATION). The Penistone Flags is a prominent sandstone which can be expected to have weathered to a gravelly sand or sandy gravel in the near surface.

From consulting *Geological Map Extracts* from the BGS -*British Geological Survey* the superficial deposits that overly the natural bedrock consist loose, unconsolidated <https://en.wikipedia.org/wiki/Soil> glacial soils that have been eroded, reshaped by water in some form, and redeposited in a non-marine setting. Alluvium (also known as *Drift*) is typically made up of a broad variety of materials, including fine particles of silt and clay and larger particles of sand and gravel. When loose alluvial material is deposited or cemented into a lithological unit, or lithified, it is called an *alluvial deposit*.

Most alluvium is geologically *Quaternary* in age, and typically the cohesive soils present on the subject site originate in the early part of the *Quaternary* i.e. the *Pleistocene*, between 1m and 2.5 million years ago. The Quaternary Period is typically defined by the cyclic growth and decay of continental ice sheets associated with *Milankovitch* cycles and the associated climate and environmental changes that took place. [https://en.wikipedia.org/wiki/Quaternary - cite note-Denton2010-4](https://en.wikipedia.org/wiki/Quaternary_-_cite_note-Denton2010-4)

Typical Soil Parameters (from Index Testing)

Bulk Density	1900 Kg/cu.m
Unit Weight (γ)	18.6 Kn/cu.m
Angle of Internal friction	35 degrees
Cohesion	0 Kn/sq.m

Bearing Capacity Factors (Shallow Foundations) - (BS 8004: 1986)

N_c - 47

N_q - 35

N_γ - 40

Approximate Foundation width B – 0.6m

Approximate Foundation depth D – 0.5m

Approximation / Check on Bearing Capacity (after Terzaghi)

$$q_f = 0.5\gamma B N_\gamma + c N_c + \gamma D N_q$$

$$q_f = 0.5 \times 18.6 \times 0.6 \times 40 + 0 \times 47 + 18.6 \times 0.5 \times 35$$

$q_f = 548.7 \text{ kN/sq.m} \gg$ than the existing and/or proposed loading and acceptable for domestic usage – therefore O.K

Groundwater was not observed, and it can be reliably assumed that ground water level is significantly below the zone of influence of the existing and/or proposed foundations and there is no evidence of a perched water table or artesian pressure within the soil at shallow depth.

Vegetation on the site was found to be sparse suggesting a mixed soil type with the primary soil type in the overall matrix comprising a high volume of cohesive soil - but there are no major problems envisaged with swelling or shrinkage of soil due to the movement of groundwater and the removal or propagation of trees, vegetation, flora and fauna. Groundwater, whilst not encountered in the location of the foundations can be estimated from empirical data to be in the region of between pH 5.5 – 7.0 representing a *low risk* in terms of acidic ground and potential sulphate attack on concrete and cement mortars. This risk is reduced further by the general absence of groundwater and in particular the absence of movement of groundwater.

3.1 GROUND STABILITY - General

Regarding the **Geology** beneath the site, the Groundsure Geo-Insight Report (Ref: GS-8828402) states:

5.1 Superficial geology (625k)

Records within 500m			1
Generalised geology data based on BGS's published poster maps of the UK (North and South). Superficial related themes digitised from 1977 first edition Quaternary map (North and South).			
Location	Lex code	Description	Rock type
458m E	ALV-CLSS	ALLUVIUM	CLAY, SILT AND SAND

Regarding **Radon**, the Groundsure Geo-Insight Report (Ref: GS-8828401) states:

Location	Estimated properties affected	Radon Protection Measures required
On site	Between 1% and 3%	None

Regarding **Mining, Extraction & Natural Cavities**, the Groundsure Geo-Insight Report states:

ID	Location	Name	Commodity	Class	Likelihood
1	On site	Not available	Iron Ore (Bedded)	B	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered

Regarding **Natural Ground Subsidence**, the Groundsure Geo-Insight Report states:

Location	Hazard rating	Details
On site	Negligible	Ground conditions predominantly non-plastic.

PART 4 CONCLUSIONS & RECOMMENDATIONS

4.0 CONCLUSIONS

From my Structural Inspection of the existing barn (Building 1) AT Hill End Farm, Mapplewell, Barnsley S75 6DU, I can confirm to any third party that there are no observable significant *structural hazards* as at the date of inspection carried out on the 17th June 2022. The building is in very good order and the existing structural fabric is suitable for retention and/or conversion in accordance with current building best practice, subject to planning approval.

Externally, there are no observable *structural instability* problems on any of the primary elevations, although the proposal will require a comprehensive scheme of modification works to meet current Building Regulations, subject to planning approval by the Local Authority.

The proposals do not seek to alter the existing structural capacity of the building considerably, although the works will involve extensive modifications internally and to the facades. If planning approval is granted, the building should be re-inspected by a suitably qualified, competent Building Engineer following initial strip-out and during the conversion works.

In summary:

- The building is of a permanent and substantial construction, structurally capable of full retention, subject to a suitable engineered scheme of conversion and refurbishment. The existing building does not require any major building works or complete reconstruction.
- The building is not currently at risk from any extreme *damp, insect or fungal infestation*, and there is no potential for unexpected settlement during construction due to *compressible loessic soils* or any other external geological feature (from preliminary field observations & research).

4.1 RECOMMENDATIONS

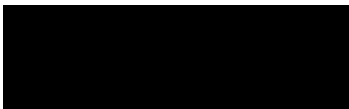
- a. The property is located in an area known for coal mining and the potential for shallow mine workings is reasonable. On this basis, and in context of structural integrity, we would recommend that a Coal Mining Risk Assessment CMRA be carried out.
- b. The property is in a radon affected area. This could mean that inhabitants are at risk from the harmful effects of radon and the percentage of homes estimated to be affected by radon in this locality is between 1% and 3%. This means the development will require some radon protection incorporating into the design, such as a liquid radon membrane if the existing ground floors are to be retained or a conventional CS2 membrane if the floors (stone flags) are to be removed and reinstalled.

- c. Although no asbestos was observed during this visit, it is well known that asbestos was used extensively as a building material in England and Wales from the 1950's through to the mid 1980's and old farm buildings were often temporarily repaired using ACMs. The owner/developer is therefore reminded of the requirements of *The Control of Asbestos Regulations 2012* which places an obligation on duty holders, if any material of this type is identified during future conversion works.
- d. Similarly, should the initial phase strip-out works expose any significant movement indicators, or should any structural concerns be identified as the initial work progresses, it is recommended that the building be re-assessed, and the findings evaluated to enable a suitable repair/refurbishment program to be designed to meet any unforeseen eventualities.

TESTIMONY OF INDEPENDENCE

I am a professionally qualified Chartered Engineer and Consultant Engineering Geologist. I am a Fellow of *The Geological Society* (FGS), Member of the *Institute of Engineers Ireland* (MIEI) and Member of the *Chartered Institute of Building* (MCIOB). I have more than 30 years of experience working in construction and specialise in the fields of underground space, structures and foundation engineering.

I confirm that under para. 2.E.2 of Appendix 2E of *Planning Policy Guidance Note 14 (PPG14) – Development on Unstable Land, DoE, 1990* I am suitably qualified to make these statements, and I understand that my overriding duty is to present independent and impartial expert analysis, and I believe I have complied with that duty. The facts I have stated in this report are true and the opinions I have expressed are correct and they are entirely my own, based upon the evidence I have been shown and my own observations.



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Building Consultant & Chartered Engineering Geologist
Earth-Tech Consulting Ltd
17th June 2022