



BARN CONVERSION
DOVECOTE RISE, SOUTH RAUCEBY
STRUCTURAL APPRAISAL REPORT

Commissioned by Mr A Hastings

Report 21743-Y-RP-001-R1

29 September 2023

BARN CONVERSION DOVECOTE RISE, SOUTH RAUCEBY STRUCTURAL APPRAISAL REPORT

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Issuing office Mason Clark Associates (York). Refer to final page for full office details.

1 INTRODUCTION

Mason Clark Associates (MCA) was commissioned by Mr A. Hastings to carry out a structural condition inspection of the Stone Barn, in Dovecote Rise, South Rauceby, Sleaford, Lincolnshire, NG34 8WZ. The client is preparing a planning application and listed building consent for the conversion of the barn to a dwelling.

The Stone Barn is located to the rear of Hill House, which is a designated heritage asset listed at grade II, hence is part of its curtilage. So, the relevant listed consents will be required.



Aerial view of the site with inspected part of the building outlined (© 2023 Google).

Ms Susana Moreira, Structural Engineer, carried out a non-intrusive visual inspection on 1 August 2023. The weather was sunny and dry.

The full external perimeter was inspected from ground level, together with the internal rooms.

Digital photographs were taken, a selection of which is attached to this report.

2 DESCRIPTION AND BACKGROUND

The Stone Barn is a single-storey building to the north side and a two-storey building towards the south side, with a quadrangular plan.

According to the Statement of Heritage Significance, the barn was built around 1840-50 and includes parts of an earlier structure (pre-1824). Minor changes were carried out during the latter half of the 20th century.

The UK Flood Map for Planning shows the site to be in Flood Zone 1. This is defined as an area at low risk, having a less than 1 in 1000 probability of river or sea flooding.

British Geological Survey mapping indicates that the local geology comprises the Blisworth Clay Formation (Mudstone) with no superficial deposits recorded.

The closest publicly available borehole scan is located at 200m from the barn and it recorded interspersed layers of rock and loamy clay over sandy rock with carbonaceous markings.

		Ft.	In.	
Upper Estuarine Clays.	Soil	2	00.61	Blisworth L. sh.
	Rock	0	60.15	
	Loamy clay	3	61.07	
	Rock	1	30.38	Rutland Fm
	Loamy clay	3	61.07	
	Blue rock	2	00.61	
	Loamy clay	2	00.61	
	Sandy rock with carbonaceous markings.	1	60.16	
			15	34.65

Borehole scans from British Geological Survey (BGS) website.

The following documents were provided prior to issuing this report:

Drawings of the existing and proposed (07.07.2023)

Groundsure Review with Full Planning (0 - 15 ha) - 0 - 15 ha (21.08.2023)

Groundsure Utility Premium (21.08.2023)

Preliminary Ecological Appraisal Stone Barn South Rauceby (21.08.2023)

Stone Barn, Dovecote Rise, South Rauceby - Statement of Heritage Significance March 2023 (21.08.2023)

Drawing of Stone-Barn-A1 (13.09.2023)

3 OBSERVATIONS

Key observations and defects are noted in the photographs below. Left/right and front/rear are used as relative to the specific image or concerning the main elevation (assumed WEST for the purposes of this report).

Where a reference to cracks is made, the following classification is used based on BRE Digest 251 "Assessment of damage in low-rise buildings":

Category 0 (hairline)	Hairline cracks less than 0.1mm.
Category 1 (fine)	Fine cracks of up to 1mm.
Category 2 (slight)	Cracks up to 5mm.
Category 3 (moderate)	Crack widths of 5 to 15mm (or several of eg 3mm).
Category 4 (severe)	Extensive damage, cracks 15 to 25mm.
Category 5 (very severe)	Structural damage, cracks greater than 25mm.

In general, categories 0, 1, and 2 with crack widths up to 5mm can be regarded as 'aesthetic' issues that require only redecoration. Categories 3 and 4 can generally be regarded as 'serviceability' issues, that is, they affect the weather-tightness of the building and the operation of doors and windows. Category 5 presents 'stability' issues and is likely to require structural intervention.

Where a reference to movement is made, the following classification is used:

Slight	up to 10 mm/metre
Moderate	10 mm to 25 mm/metre
Severe	over 25 mm/metre

Where tilt readings taken with a spirit level are indicated these are recorded for example as +25/900mm, i.e. leaning outwards (positive) by 25mm over a 900mm length of the level. The accuracy of these readings will be affected by rough surfaces, and they only provide an indication of verticality or level at a specific point.

Where the term "plumb" has been used, this is generally used in this report to mean close to vertical, as estimated by visual observation only.

Exterior



- 1 West elevation. Stone masonry in good condition. Roof cover of asbestos cement sheets. Minor deflection to the ridge in the centre of the building, with one of the ridge covers displaced. Five cross-shaped anchor plates for ties.



- 2 West elevation. Fine to slight diagonal stepped crack, under the ground-floor window of Barn 3.



3 West elevation. Fine diagonal crack from the first-floor window in Store 2 to the cross-shaped plate.



4 West elevation. Fine diagonal and bed joint crack from the corner of the window in Barn 1 to the base of the brick wall.



5 North elevation. Distinct stonework from possible different periods of construction. Vegetation growth to the top of the northeast corner.



6 North elevation. Fine cracking and open joints close to eaves and connection with east and west elevations.



- 7 East elevation. Distinct stonework from different periods of construction. Three brick buttresses with full height of wall and tie anchor plates. Minor outward lean to the top.



- 8 East elevation. Bed joint cracking at the top of the middle buttress.



9 East elevation. Fine cracks to the wall starting from the kneeler.



10 East elevation. Vegetation growth close to the wall. Interrupted drainage system.



11 South elevation. Fine cracks to top of gable along eaves and west kneeler. Previous repairs around the east kneeler.



12 South elevation. Separation between the brick wall of Store 1 and the stone wall of Barn 3. Vegetation growth close to the walls.

Ground
floor



- 13 Car port. Open joints to top half of wall and bearing of stained black timber beam. Open joints and cracking to connection between pre-1824 wall and 1824-1888 wall. Connection previously infilled.



- 14 Car port. Rotation of timber beam with fine bed joint cracking to top course. No visible cracking or deflection to beam.



15 Car port. Wall with stonework from different construction periods (bottom pre-1824) and top from 1824-1888. Severe outward lean to wall.



16 Garage. Efflorescence to the base of the wall.



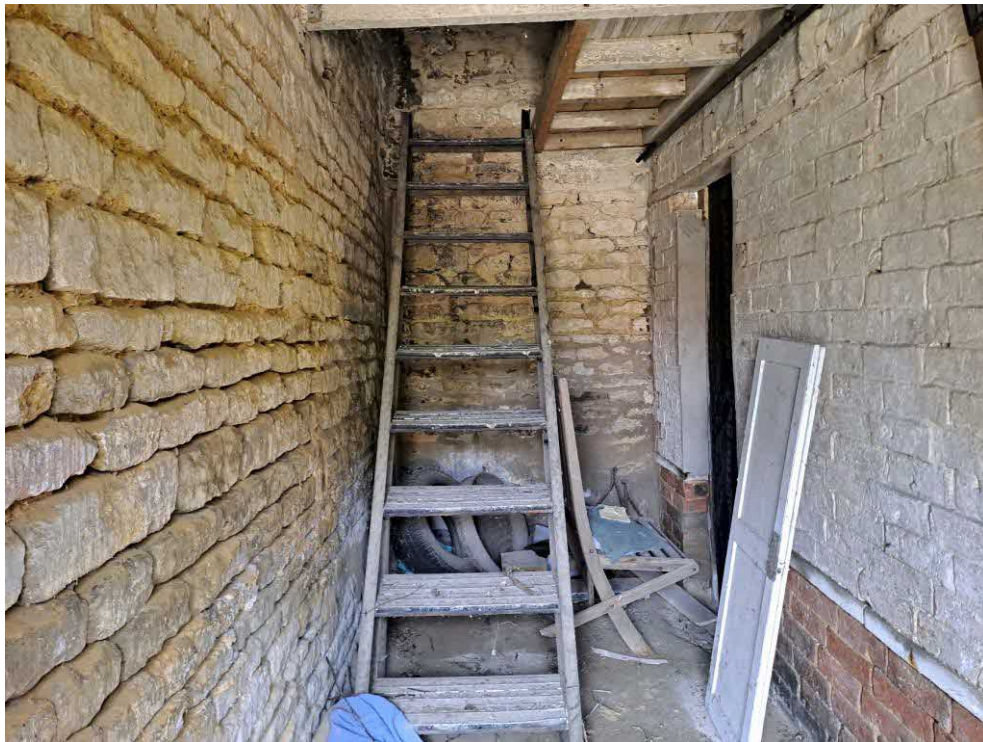
17 Garage. Open joints and cracking to connection between pre 1824 wall and 1824-1888 wall. Connection previously repaired.



18 Garage. Historic bent tie beam with iron ties embedded in the north wall. Fine vertical crack, full height, at the northeast corner.



19 Barn 1. Slight vertical cracks to the top half of the wall. Steel tie anchored to the west and east walls.



20 Stair. Deep recessed open joints to the wall at left. Steel tie anchored to the west and east walls.



21 Stair. Diagonal fine stepped cracks and moderate open joints (full height) to brick wall. Detail of the tie end: threaded bar bolted to flat plate.



22 Barn 2. Fine to slight diagonal cracks, full height. Joints previously infilled.



23 Barn 2. Fine to slight diagonal cracks, full height, to previously infilled joints.



24 Barn 2. Minor deflection to timber lintel.



25 Barn 3. Fine to slight diagonal stepped cracks to east wall. Severe open joints to south wall and connection to east wall. Deep recessed open joints to the base of the walls.



26 Barn 3. Vertical moderate open joints at the centre of the wall. New timbers added to existing joists. Infill at bearings and cracks with cement mortar. Twisting of joists.



27 Barn 3. Fine to slight diagonal cracks and open joints to wall on the north side. Deep recessed open joints to the base of the west wall.



28 Barn 3. Fine diagonal cracks below and above window. Slight diagonal crack above the lintel. Deep recessed open joints and efflorescences to base of the west wall.

First
floor



29 Stair 1st floor. Diagonal fine stepped cracks, very severe open joints, and fractured bricks to second-floor brick wall. Complete separation of east wall.



30 Stair 1st floor. Diagonal fine cracks to the inner face of the west wall.



31 Barn 2. Lime-ash floor on the first floor.



32 Store 2. Moderate to severe diagonal open joints to brick inner leaf of south gable. Fractured lime-ash floor with small hole near the door.



- 33 Store 2. Generalised cracking of lime-ash floor with moderate deflection from the centre to the east wall.



- 34 Store 2. Minor deflection of the floor. Vertical open joints to the west wall inner face, below the window (over the floor timber beam in Barn 3). Window frame skewed. Missing units to the top of wall. Wall-plate with water staining.



35 Store 2. Separation between the floor and west wall. Separation between window timber frame and brick inner leaf.



36 Store 2. Separation between the floor and east wall. Moderate deflection from the centre to the east wall. Inwards displacement of top three courses. Diagonal fine stepped cracks, very severe open joints, and fractured bricks to second-floor brick wall.



37 Store 2. Tie beam bearing on the east wall. Fractured iron tie. Reduced section to rafter foot.



38 Stair roof. Three top courses displaced inwards. Missing rafter end to wall.

4 DISCUSSION & CONCLUSIONS

The external and interior walls of the barn were built in rubble-coursed limestone, except for the following: the brick wall between the Car Port and Barn 1, the single brick wall between the Stair and Barn 2 and Store 2 (ground floor and first floor), the single brick gable wall between Barn 2 and the Stair; and the inner leaf of Store 2 (first floor). The roof cover is in corrugated asbestos cement sheets.

On the exterior, the building appears to be in good condition with few defects (Photos 1 to 11). The west elevation has fine diagonal cracking progressing from window corners, which is consistent with some of the cracking found on the inner face of the wall.

The east elevation shows parts of an earlier building (pre-1824 structure), with vertical and horizontal joints showing separate but conjoined structures. As already stated in the Statement of Heritage Significance, the earlier stonework is not laid level but runs at an angle following a rise in the land while the later coursing is levelled. From the exterior, there is a minor lean to the east elevation, which does not correspond to the severity of the tilt measured on the inner leaf. A part of the latter can result from the wall being constructed in different methods, with the interior not being as regular as the exterior.

On the north and south elevations, there is fine cracking around the kneeler stones. The north elevation has also fine cracking and open joints that seem to result from the connection with the perpendicular walls.

In the interior, there is diagonal cracking from fine to severe and open joints in the interior walls in the west-east direction, from Barn 1 to Barn 3, including Store 2 (first floor), and in the inner brick leaf of the south gable. Fine to slight diagonal cracking can be found on the inner leaf of the west and east walls in Barn 1, the Stair, and Barn 3 (Photos 13 to 38).

Additionally, there are cracking and open joints to the connection of all perpendicular walls to the east elevation. In the Car Port, the connection between the pre-1824 wall and the 1824-1888 wall, in the past was filled with mortar, broken bricks and smaller stones, which did not improve the bond between walls.

On the first floor, the inner leaf of the south gable has moderate to severe diagonal open joints, however, the outer leaf does not show the same level of cracking. This might suggest that the inner and outer leaves are not properly connected.

There is also generalised cracking of the lime-ash floor with a moderate deflection from the centre to the east wall. There is a gap between the floor and the west and east walls.

In addition to the cracking, there are efflorescences and deep recessed joints to the base of the walls which could result from rising damp.

The roof structure appears to be in good condition with defects probably being localised and specific to members (Photos 37 and 38). Rafters, purlins, and wall plates should be assessed on-site when the roof finishes are stripped.

The building appears to be in reasonable condition with fine to moderate cracking and severe open joints to the south wall and interior walls in the west-east direction, particularly in connection to the east wall, and moderate to severe leaning of the east wall, from the Garage to Barn 2. The observed damage is not recent but is unclear if it is progressing. The most probable causes can be related to excessive ground movement or roof spread, which would cause the walls to deform and crack in the observed patterns.

The presence of buttresses and steel ties confirms that the east wall, which has parts of an earlier building (pre-1824 structure) between the Garage and Barn 2, was moving in the past and these were probably used to mitigate the effects. The proposed site investigations and monitoring will help to clarify these questions and propose the appropriate remedial actions.

4.1 Proposed interventions

In addition to the proposed structural alterations, we recommend structural repairs to restore/improve the condition of the building.

All existing timber bent beams and ground-floor tie beams can be retained in their current position, as long as they don't interfere with the proposed openings and are in good condition.

The key interventions identified include:

- i. Replacement of Store 1 with an en-suite bathroom and store.
- ii. New ground-floor slabs for all rooms
- iii. Replacement/strengthening of existing timber lintel with timber beam in the existing Garage
- iv. New timber beam for the new opening between the existing Garage and Car Port areas
- v. Removal of ceiling boards and timber beam in existing Car Port
- vi. New timber beams on the east elevation, at the buttresses location, in the existing Car Port

- vii. Removal of ceiling joists in existing Barn 1
- viii. Raise the height of existing steel ties in existing Barn 1
- ix. Removal of tie beams in existing Store 2
- x. New openings for access and internal glazing
- xi. New partition walls
- xii. Removal of existing first-floor lime-ash floor and replacement with timber floor
- xiii. New timber beam and trimmer as part of the first-floor structure and staircase
- xiv. New timber staircase
- xv. New roof covering and insulation
- xvi. Structural repairs

We would comment against these proposals as follows.

4.1i Replacement of Store 1 with an en-suite bathroom and store.

At the current location of Store 1, it will be built an en-suite bathroom and store. The east wall will be retained and the new walls will be built using reclaimed brick. In this room, there is a timber tie beam which could be retained, assuming it will not interfere with the new doorway to be created.

During our visit, it was not possible to inspect the face of the wall facing east due to the vegetation growth. Hence, the wall will possibly require repointing with lime base mortar.

4.1ii New ground-floor slabs for all rooms

The installation of the new proposed limecrete breathable flooring system will require the removal of the existing concrete slabs and the ground to be excavated further, to maintain or increase the clear height of the rooms. The excavation should not disturb the existing footings of the walls and therefore, it is recommended that the profile and depth of the walls should be determined.

4.1iii Replacement/strengthening of existing timber lintel with timber beam in the existing Garage

The existing Garage door will be removed and replaced with timber folding external shutters, which will be aligned with the rest of the elevation. Currently, the garage door is projecting relatively to the rest of the west elevation, being supported by timber posts and beam. The roof was extended to cover the small extension and the gutter was installed along the door. Therefore, the timber posts and beam, roof cover and gutter will have to be removed. The timber beam could be possibly repurposed to strengthen the original lintel over the opening. The gutter will have to be reinstalled or replaced with a new one according to the new profile.

These works will require propping of the existing roof structure.

4.1iv New timber beam for the new opening between the existing Garage and Car Port areas

The creation of the new opening could be achieved through the installation of timber beams possibly in seasoned oak, to reduce shrinkage problems. The beams will have to support the roof loads and the masonry gable above them. At this location, adjacent to the wall, there is a historic timber tie which can be retained provided the clear height of the opening is smaller than the current height of the tie.

These works will require propping and needling to support the gable and roof loads.

4.1v Removal of ceiling boards and timber beam in existing Car Port

The existing ceiling boards and timber beam at the centre of the room appear to be later additions, which can be removed since no new ceiling will be installed.

4.1vi New timber beams on the east elevation, at the buttresses location, in the existing Car Port

At this location, the east wall will have three new openings. The lintels could be in timber possibly in seasoned oak and independent from each other. Allow for repointing with lime-based mortar the remaining wall. Further interventions will depend on monitoring results.

4.1vii Removal of ceiling joists in existing Barn 1

The existing ceiling joists can be removed since there will be no ceiling to support and possibly used to stiffen/strengthen the existing rafters or floor joists of the first floor.

4.1viii Raise the height of exiting steel ties in existing Barn 1

In the existing Barn 1, there are two ties anchored to the east and west walls that run along the walls. Both ties will probably have to be raised to accommodate the new wall openings, hence we recommend that they be raised just above the lintels.

4.1ix Removal of tie beams in existing Store 2

The tie beams in the existing Store 2 will have to be removed since their current height is incompatible with the proposed use of the first floor. One of the ties is embedded in the single brick wall that will be removed and the second one is approximately in the middle of the room. As we can see from Photo 37, the iron tie connecting the second tie beam to the wall-plate is fractured and therefore, is no longer fulfilling its function. On the other hand, the tie beam embedded in the wall is too slender and probably does not contribute substantially to tying the walls or absorbing the roof thrust.

At this point, we consider that it would be possible to remove the two tie beams without significantly affecting the structural response of the building. The additional loads will increase the thrust on the walls, hence further structural assessment of the roof should be carried out and possibly consider the installation of a ridge beam. Additionally, depending on the results of the monitoring additional measures could be considered to restrain the walls.

4.1x New openings for access and internal glazing

Lintels for the new openings (interior or exterior) could be in timber possibly in seasoned oak. Due to wall thickness, more than one lintel should be considered per wall except for the one to be placed in the single brick gable between Barn 1 and the Stair.

4.1xi New partition walls

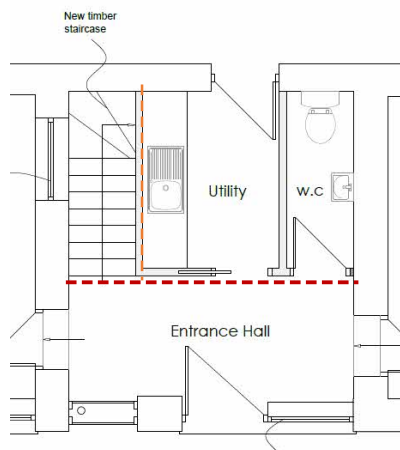
New partitions should be lightweight and can be built in studwork.

4.1xii Removal of existing first-floor lime-ash floor and replacement with timber floor

As previously discussed, the lime-ash floor is severely cracked and deflected and we recommend its removal and replacement with a timber floor. The timber joists can be retained pending a condition assessment after the removal of the lime-ash layer. The timber joists over the Stair room and Barn 2 will have to be carefully removed and can probably be reused in the new floor configuration for this section. A load assessment should be carried out to determine if the timber joists require stiffening/strengthening for domestic use.

4.1xiii New timber beam and trimmer as part of the first-floor structure and staircase

Currently, the single-brick wall between the Stair and Barn 2 is supporting the first-floor joists. Therefore a new support structure will have to be introduced to support the floor and stairs. At this moment, allow for a timber beam and trimmer joist as proposed in the sketch below. The first-floor brick wall will also be removed and therefore only the new partitions should be considered.



Proposed new timber beam and trimmer joist

4.1xiv New timber staircase

According to the architect's details.

4.1xv New roof covering and insulation

The existing corrugated asbestos cement sheets will be removed to install the proposed breathable roofing system. This will probably bring additional loads to the roof structure. The current timber roof structure seems to be composed of common rafter trusses with collar ties supporting the purlins and remaining rafters. From the information shared, the areas of the roof with 60w x 85d mm common rafters, at 400 mm centres, will probably have to be stiffened with side-by-side timbers. The areas with rafters 50w x 115d mm, at 370 mm centres, should comply with both stress and deflection limits. These should be properly assessed at the design stage.

4.1xvi Structural repairs

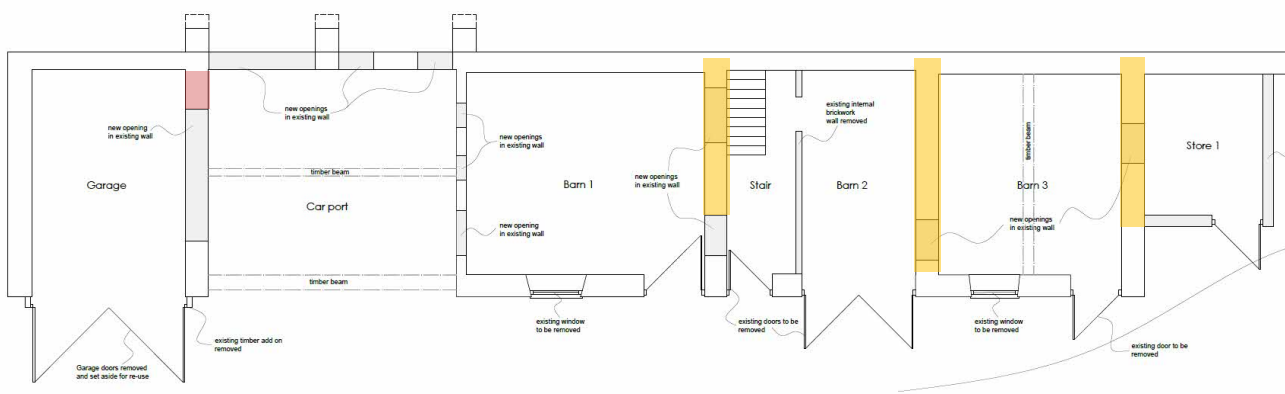
A series of structural defects were identified during the inspection and should be addressed to restore or improve the condition of the building. The cracking and open joints to the south wall and interior walls in the west-east direction, particularly in connection to the east wall should be addressed. The following interventions will have to be revised pending the monitoring results.

For the connection between the pre-1824 wall and the 1824-1888 wall, we recommend that this portion of the walls should be rebuilt since in the past it was filled with mortar, broken bricks and smaller stones. Carefully dismantle this portion of the wall and rebuild possibly using stone blocks from the newly created openings (the area in red on the ground floor plan).

The cracks to the south wall and interior stone walls in the west-east direction should be stitched using stainless steel helical bars to their full extent and on both sides of the wall. The helical bars could be used to also stitch these walls to the east wall (the areas in yellow on the ground floor plan).

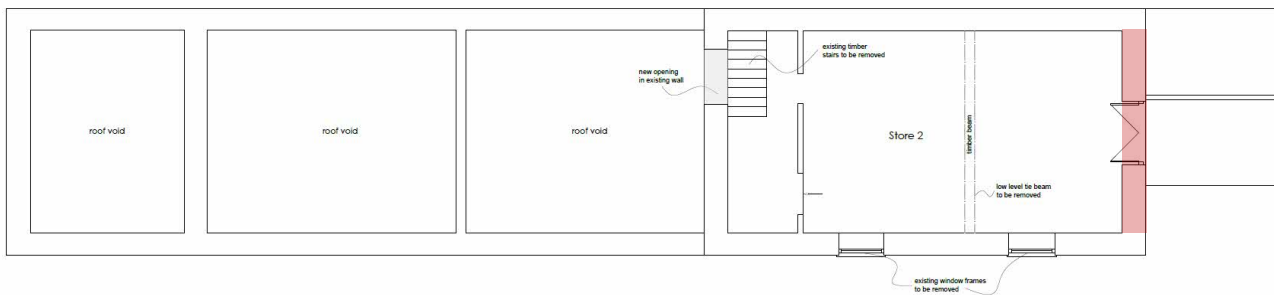
For the south wall on the first floor, we recommend rebuilding the inner face and installing wall ties to the outer leaf in stone (the area in red on the first-floor plan).

An allowance should be made for general repairs/replacements to timber lintels, rafters, purlins, and wall plates, to be assessed on-site when the roof finishes are stripped.



Existing ground floor plan with areas of intervention

- Masonry rebuild
- Corner and crack stitching

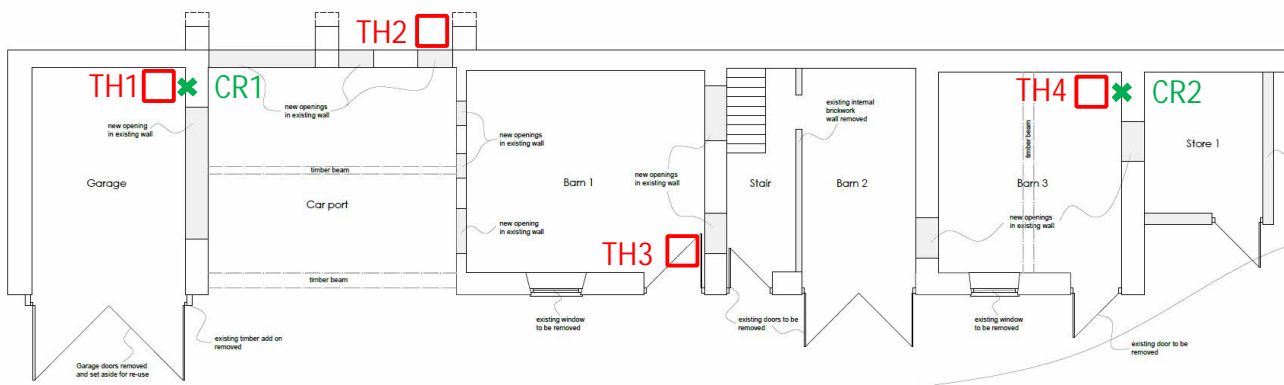


Existing first-floor plan with areas of intervention

- Rebuild the inner leaf with wall ties to the external leaf

5 RECOMMENDATIONS

- 5.1 Whilst this property is not listed, we recommend that any proposals to strengthen or repair the structure are carried out in consultation and agreement with the Local Authority Conservation Officer.
- 5.2 The development of the outline proposals will require additional technical information and potentially disruptive and extensive intrusive investigations. These may include:
- Inspect roof timbers in proximity to assess their condition before installation of new roof cover.
 - Remove one or two bricks of the inner leaf of the south wall to determine the level of connectivity between leaves.
 - Investigate existing rainwater drainage to understand if water might be affecting the foundations of the walls.
 - Carry out four trial holes (TH#) to determine the profile and depth of wall and buttress footings in the locations marked below.
 - Install crack monitoring in the following two locations. Carry out readings monthly up to the construction stage to determine if movement is still ongoing (in Figure below):
 - Wall between the Garage and Carport, on the Garage side.
 - Wall between Barn 3 and Store 1, on the Barn 3 side.



- 5.3 Replace and/or repair the existing rainwater drainage system to effectively discharge from roofs and redirect the water away from the building.
- 5.4 Careful removal of all cement pointing, and repointing in lime of all walls.

Signed on behalf of Mason Clark Associates Ltd:

Report authored by

Reviewed by



Susana Moreira *PhD*
Structural Engineer

Gez Pegram BSc (Hons) CEng FICE MIStructE
Director Engineer Accredited in Building
Conservation

6 LIMITATIONS

- 6.1 Our inspection and report are concerned with the structural aspects of the building such as foundations, walls, and floors. We have not concerned ourselves with the condition of items such as doors, windows, and other fittings; or items such as timber infestation / decay, dampness, and testing of services to the property, unless specified in the report.
- 6.2 Sampling and testing of materials is beyond the scope of this report.
- 6.3 We have not inspected woodwork or other parts of the structure which are covered, unexposed or inaccessible and we are therefore unable to report that any such part of the property is free from defect.
- 6.4 This report is applicable to the condition and state of the building at the time of inspection. The building may be subject to deterioration in the future and the opinions expressed in this report may need to be revised accordingly.
- 6.5 This report is limited to the property under consideration. It does not consider the effects that adjoining properties may have, unless with prior agreement, a detailed inspection of all adjoining properties can be made.
- 6.6 The above recommendations do not constitute a full list of works to be carried out and refer to the main areas of work associated with structural aspects of the building, based on a visual inspection only and under the limitations of our inspection.
- 6.7 All building and construction works are covered by the requirements of the CDM regulations. Owners/Clients have legal responsibilities to engage persons and companies with appropriate level of skills knowledge and experience to ensure that the requirements of the CDM regulations are met. The works required will be covered by the CDM regulations 2015 and you should understand your obligations and act accordingly.
- 6.8 Unless specifically mentioned no comment is made in the report as to the presence of new or old mine workings or tunnelling, heavy metals, chemical, biological, electromagnetic or radioactive contamination or pollution, or radon methane or other gases, underground services or structures, springs and water courses, sink holes or the like, noise or vibratory pollution, mould, asbestos and asbestos products.
- 6.9 The report has been prepared for the client alone and no third party should rely on it. For the avoidance of doubt, the Contracts (Rights of Third Parties) Act 1999 shall not apply to this contract.

- 6.10 The inspection and report will not include any liability in respect of Advice/Design in fire safety to the structure and/or any liability whatsoever in respect of any losses (whether direct or indirect) arising from combustibility of cladding in delivery of our Services. We shall not be liable for that part of any claim which relates to loss of profits, loss of use, loss of production, loss of contract, liquidated damages or for any cost of decamping or rehousing.
- 6.11 This report is limited to structural matters. The client should obtain their own advice on any specialist surveys that need to be undertaken.



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<p>CIVIL ENGINEERING Bridge design, maintenance and construction Wharfs, jetties and marine structures Highway design and maintenance Retaining wall and slope stability solutions Land remediation advice Road and sewer design to adoptable standards Section 38 and 104 Agreements Sewer requisitions and diversions Section 98 and 185 Agreements Flood Risk Assessments Coastal erosion flood breach analysis Flood risk management / prevention schemes Underground drainage design Stormwater attenuation SUDS Ponds, lakes and balancing ponds</p> <p>PROJECT MANAGEMENT QUANTITY SURVEYING & CONTRACT ADVICE CDM SERVICES</p> <p>BUILDING SURVEYING Design, Remedial Repair / Improvement Schemes Contract Administration Building Surveys Professional Opinion Reports Condition Surveys & Schedules of Condition Measured Surveys Dilapidation Claims Party Wall etc. Act Representation Disabled Adaptations</p> <p>EXPERT WITNESS SERVICES Civil & Structural engineering disputes Project Disputes Health and Safety Regulations</p>	<p>STRUCTURAL ENGINEERING Residential and commercial building structures Education and healthcare facilities Heavy industrial development Feasibility studies for development sites Building Regulations and Planning Applications Access and maintenance gantries Modular building design Blast design Subsidence management and resolution Temporary works design and specification Site and soils investigation Sulphate attack specialists Confined spaces assessments</p> <p>CONSERVATION ENGINEERING Engineer Accredited in Building Conservation CARE Registered Engineer Heritage and conservation engineering Listed Building refurbishment Historic Parks and Gardens Scheduled Ancient Monuments Monitoring and investigations Liaison with Local Conservation Officers Buildings at Risk and Managed Ruins</p> <p>3D LASER SCANNING AND DATA CAPTURE Latest Generation 3D Laser Scanning Measured Building Surveys Topographical Surveys Monitoring Surveys 3D modelling (Revit, CAD, Inventor, Solidworks) M & E Modelling Volumetric / Level analysis Scan to BIM Scan data cloud hosting Hi-Def HDR photographic surveys</p>	