

Whitehough Farm Barn– Structural Appraisal

Project No: 2628

Date: December 2023



**STRUCTURAL APPRAISAL REPORT
BARN CONVERSION**

**Whitehough Farm Barns,
Ipstones,
ST10 2LH**

for

Mr F Harris



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1.0 INTRODUCTION

REPlan and Design Ltd were asked to visit Whitehough Farm Barn, to assess the suitability of converting the barns into a habitable space.

This report is to assess the current structure of the barn.

Inspection carried out on the 19th October 2023.

Included in Appendix A of the report are, REPlan and Design's Standard Scope and Limitations of Survey.

Included in Appendix B of the report are, annotated relevant photographs taken at the time of the inspection.



Image 1&2 – Google Maps (Location)

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Image 3: Existing Elevations (RLM Associates)



Image 4: Proposed Plans (RLM Associates)

2.0 BRIEF DESCRIPTION OF THE PROPERTY

A stone constructed 2-part (north and south) barn believed to have been constructed in the 19th Century.

The north part of the barn has single storey side walls with gabled ends. A 1st floor is present to the central part of the northern section of the barn, within the roof space.

The roof is a duo pitched with a tiled finish.

The south part of the barn has 1½ - 2 storey side walls due to the ground level sloping down and a reduced width in the barn size. The roof is a duo pitched with a tiled finish in line with the north part.

The external walls to both parts of the barn are constructed with 500-650mm wide stonework.

The ground, on both of the long elevations of the bar, slopes from the north side towards the south with an approx. level difference of 1.0m

A small, covered link is currently present from the north end of the barn to a separate barn structure, this link will be taken down.

Foundations were not exposed; it is believed the stone walls are constructed off a larger key stone at the base at a shallow depth into the ground.

3.0 OBSERVATIONS

External

North section of barn: side elevation (west)

Single storey 500mm thick stone-built wall with a pitched tiled roof.

Larger key stone present at both corners.

Foundations are not exposed.

External hard paved courtyard with a small slope from north to south across the elevation.

1 window and 1 barn door present. A large stone lintel is present over the window and a pair of steel beams (152x89 UB's) are present over the barn door with timber facing.

The roof appears in a good condition with no noticeable defects.

The gutter at the eaves is broken / missing.

The wall is generally in a good condition, with some minor re-pointing required.

No issues are present to the stone lintel and the steel lintels appear structurally sound but do have surface rust present that will need to be shot blast cleaned and re-painted.

North section of barn: north elevation

Gable ended 500mm thick stone-built wall which has a covered link to the neighbouring barn. It is proposed to remove the link.

Foundations are not exposed.

1 door is present at ground level and a separate door has been blocked up with a timber lintel still present over. A higher-level window is present, central on the elevation, to the first floor which has been boarded up. It appears a large opening was once present centrally to the elevation, but this has been bricked up.

The wall is in a moderate condition with some minor re-pointing / infilling required.

The original timber purlins and some timber supports at floor level protrude from the wall.

Where they are from disused beams, they should be removed, and the gap infilled with masonry.

North section of barn: side elevation (east)

Single storey 500mm thick stone-built wall with a pitched tiled roof.

Larger key stone present at both corners.

North side wall linked to a stoned boundary wall.

Foundations are not exposed.

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Grassed external with a small slope from north to south across the elevation.

1 window and 1 barn door are present. A large stone lintel is present over the window and a 140mm deep concrete lintel present over the outer section of the wall for the door.

The roof appears in a good condition with no noticeable defects.

The gutter at the eaves is missing.

The wall is generally in a good condition, with some minor re-pointing required.

No issues are present to the stone or concrete lintels.

North section of barn: south elevation

Only a small section of wall is visible either side of the adjoining south part of the barn.

Gable ended 500mm thick stone-built walls with larger corner stones.

Foundations are not exposed.

A ground floor level window is present either side with a stone lintel over the outer section.

No structural issues noted.

South section of barn: side elevation (west)

1 ½ to 2 storey height of stonework wall which is 500mm thick for ¾ of the elevation but thickens out to 650mm for the bottom section of the wall to the last ¼ where the ground level is dropped.

A pitched tiled roof is present with continuation of the ridge line from the north section of the barn.

Larger key stone present at the corner.

Foundations are not exposed.

Grassed external with a steady to moderate slope at the end of the elevation.

2 doors are present with large stone lintels over.

The roof appears in a good condition with no noticeable defects.

The gutter at the eaves is missing.

The wall is general in a good condition with some minor re-pointing required.

No issues are present to the stone lintels.

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South section of barn: south elevation

2 Storey height gable ended 500mm thick stone-built wall.

Foundations are not exposed.

1 window is present at what would be 1st floor with a stone lintel over with limited bearing one side.

A vertical crack is present near the right-side corner running mainly in the joints of the key corner stonework, but a couple of the main stones are also cracked.

A small vertical crack is present over the lintel which is likely to be due to the limited bearing on the lintel.

A vertical crack is also present below the window for almost the full height which again is mainly in the joints of the stonework, but a couple of stones have also cracked.

These cracks are likely to have been caused by historic differential movement at foundation level and with minimal internal interface / ties between the roof and the walls and having no intermediate restraint to the double height wall, outward rotation has taken place causing a weakness in the wall and causing the vertical cracks to appear.

South section of barn: side elevation (east)

1 ½ to 2 storey height of stonework wall which is 500mm thick.

A pitched tiled roof is present with continuation of the ridge line from the north section of the barn.

Larger key stone present at the corner.

Foundations are not exposed.

Grassed external with a steady to moderate slope at the end of the elevation.

1 full height barn door is present with timber lintel over.

1 ground floor opening is present to the south side with a steel beam lintel over.

1 window is present at higher level, central to the elevation, with a stone lintel over.

The roof appears in a good condition with no noticeable defects.

The gutter at the eaves is missing.

The central section of the elevation is bowing outwards, and a vertical crack is present over the steel beam over the ground floor opening.

A vertical crack is present near the right-side corner running mainly in the joints of the key corner stonework but a couple of the main stones are also cracked.

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This crack and bow in the wall is likely to have been caused by historic differential movement at foundation level and with minimal internal interface / ties between the roof and the walls and having no intermediate restraint to the double height wall, outward rotation has taken place causing a weakness in wall and causing it to push out and the cracks to appear.

Internal

Ground Floor: north section of barn

A solid concrete floor slab is present, which has a step-in level along the width of the room. The walls are all stone built which are, in the main, plastered over. Some small cracks are present through the plaster between the stones, which is to be expected from this type of construction.

2 lines of internal masonry (assumed blockwork with render) which break the room into 3. These walls are built as 4 pillars which then have steel beams between them, and from the pillar to the gable wall breaking the span of the timber first floor beams / joists. These 6 steels are 203x102 UB. The steels all show signs of surface rust, but other than this, appear in good condition. Timber beams 170x170mm are present spanning between the side walls and steel beams / masonry pillars, which then have 90x50mm joist over spanning between the timber beams. Some of the beams / joists are rotten and or have signs of wood worm so will need to be replaced.

Timber lintels are present over the door and windows on the north elevation, which all appear in a reasonable condition. A timber lintel is present to the east elevation door, but no inner wall lintel is present over the window. A steel beam is present to the west elevation barn door which is covered in surface rust.

Ground floor: south section of barn

The south section of the barn is split into 3 areas with 2 brickwork walls constructed internally giving a 1st floor storage level over the southern section of the room.

A solid concrete floor slab is present, which steps between the areas to suit the external ground level. The higher slab level is still stepped down from the northern part of the barn. Other than the storage area, the south part of the barn is fully open with 3 lines of queen post trusses spanning between the side's walls. 2 lines of purlins are present either side of the roof spanning between the gable ends and the 3 trusses. Timber rafters are then present over the purlins and span to a ridge board at the apex and a timber wall plate on

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the outer section of the walls. The roof was only visible from ground level but appears in a reasonable condition with no noticeable structural repairs required.

Timber joists are present over the brickwork internal walls, providing an area for storage, this is not original to the barn and the walls haven't been tied into the external walls.

The external walls are all stonework which are, in the main, left uncovered.

The west flanking wall has 2 doors present, one into the main top section of the barn and one into the middle area both of which have timber lintels over the inner part of the wall.

This wall is in a good condition, but in the main is a tall wall that is unbuttressed and the roof is not strapped to the wall with the only restraint provided by the trusses.

The east flanking wall has one full height barn door present to the top section and a fully opened area to the bottom of the south room. The full height door has a timber lintel spanning over which supports the roof whilst the open area to the south has a 152x89UB steel beam over the inner section supporting the stonework over. The middle section of the wall can be seen to bow out in partially from mid-height upwards. This bow in the wall is likely to have been caused by historic differential movement at foundation level and with minimal internal interface / ties between the roof and the walls and having no intermediate floor / wall restraint to the double height wall, outward rotation has taken place causing a weakness in wall and causing it to push out and the cracks to appear.

First floor: north section of barn

The first floor was accessed by a ladder up from the south part of the barn, but due to missing boards / joists, the inspection was from one side only.

2No high collar king posts trusses are present breaking the span of 2no timber purlins either side of the pitched roof. Timber rafters are then present over the purlins and span to a ridge board at the apex and a timber wall plate on the outer section of the walls. The roof appears in a reasonable condition with no noticeable structural repairs required.

The area of 1st floor does not span to the eaves and timber stud walls run along the length giving an area approx. 2/3 the ground floor width.

The gable wall is stone work to both sides with the middle section built in brickwork. This wall was only visible from the opposite side of the room but appears in a reasonable condition.

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General comments

The building is in an average to good condition for its age but will require some structural work to bring it up to modern standards and for use as a habitable space.

The 1st floor joists and supporting steelwork of the north part of the barn will need to be replaced but this wouldn't be deemed an integral part of the main structure.

The roof is generally in a good condition and wouldn't be taking any greater load other than insulation if the barns were to be converted. Gutters and suitable drainage would need to be considered to ensure suitable rainfall runoff and prevent water ingress.

The south section of the barn will require some strengthening works to the east elevation to ensure no further torsion is applied resulting in more severe bowing and further masonry cracks. An internal framework (steel frame) could be constructed which will need to be tied to both flanking walls providing restraint to the building. Alongside this, straps should be introduced at wall plate level, tying the roof and walls.

The barn concrete slabs, which are not an integral part of the structure, would not meet modern standards, this would require insulation and a dpm. This individual element will need to be taken out or upgraded.

The foundations will need to be checked as these were not exposed, so could not be inspected. The cracks to the stonework on the east and south elevation where the ground slopes away could be a sign of historic ground movement. It doesn't appear any recent ground movement has taken place and the loads from a dwelling will not increase the current loads acting on the footings. However, a new ground floor slab will be required, the construction of this, including the insulation and stone depth could undermine the existing wall / foundation depth, therefore underpinning may be needed.

4.0 CONCLUSIONS

The existing barn which are proposed to be converted into a dwelling (habitable space) are in a reasonable condition for its age and could be converted without substantial rebuilding works, notwithstanding the elements / repairs mentioned below, which will ensure the building meets current standards.

Some items below would be recommended repairs, regardless of the buildings use, to prevent further structural issues over time.

As this is proposed to be a conversion project it would be recommended to carry out all the work during the construction process.

1st floor: Replace floor joists and supports to suit the proposed layout.

Introduction of steel framework to provide integrity to the south part of the barn structure.

Some masonry rebuilding / reinforcement stitching (Heli-bar or similar) where the vertical cracks are present.

Replacement of timber internal lintels.

Replace stone lintel of south elevation, where bearing is compromised.

Replacement of concrete ground floor slabs.

Foundations to be exposed: Underpinning will be required if the proposed ground floor slab construction means undermining the existing wall / foundation.

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APPENDIX A**REPlanAndDesign STANDARD SCOPE AND LIMITATIONS OF SURVEY****SCOPE AND LIMITATIONS OF SURVEY**

This report has been prepared to provide guidance on the structural elements to the property only.

The report is based on a visual inspection of those areas of the property that were readily accessible at the time of the inspection. As such, comments cannot be made on those parts of the building that were inaccessible or hidden from view.

The report does not provide a checklist of all repairs and improvements that might be desirable or necessary.

We have not inspected parts of the structure which were unexposed or inaccessible. We are therefore unable to report that such parts of the property are free from defects.

This report is for the private and confidential use of the client for whom it is prepared.

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