Hazel Dransfield & Jane Atkinson

Helm Farm

Structural Inspection Report

Rev01 | 12 April 2023

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Project number: 22-142

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1 Introduction & Scope

This report was commissioned by Hazel Dransfield and Jane Atkinson to support their proposals for converting the existing stone agricultural buildings at Helm Farm into residential use.

The site consists of a number of buildings of varying condition. The purpose of this report was to inspect and comment on the structural condition of the stone structures only and highlight recommendations for any remedial works to the structure deemed necessary to enable them to be refurbished and converted into habitable dwellings.

While there are other buildings on the site, this report relates to the unoccupied stone buildings only. For further details and a general description of the site refer to Section 2.

A site inspection was undertaken on 5th January 2023.

The report shall be read in conjunction with the architectural proposals and any other documentation produced as part of the application.

The report provides an overview of the site and buildings under considerations before discussing the structural condition and any recommendations as part of the conversion to residential dwellings. The report has been produced to provide information in relation to the planning application only and does not form a detailed design or schedule of works and should not be relied upon for any other purpose.

Figure 1 Overview of Helm Farm (Source: Google Maps).

2 General Site Description

This section provides an overview of the Helm Farm site, followed by more detailed descriptions of the stone buildings under consideration.

2.1 Overall site

Helm Farm is located off Helm Lane and Paul Lane in Huddersfield.

The site consists of a mix of existing residential dwellings and agricultural buildings. The agricultural buildings vary in age and condition. An overview of the site is provided on the next page and is summarised below.

Existing residential dwellings (green) are present to the north-west of the site and do not form part of this inspection.

A series of five stone agricultural buildings (blue) are present on the site: Stone Barn A; Stone Barn B; Stone Barn C; Garages; and Stables. It is proposed that these buildings will be converted to residential use and are the focus of this inspection and report. Based on information obtained from an archive map from the National Library of Scotland, it is believed that these buildings originally date from pre-1850 (see Figure 2). Anecdotally, it is suggested that some of these buildings may be over 300 years old.

A number of other agricultural buildings (red) of more modern and varying construction are proposed to be removed and therefore do not form part of this inspection.

Two agricultural barns of relatively modern construction (grey) are assumed to be retained and do not form part of this inspection or application.

Figure 2 Archive map from National Library of Scotland: Yorkshire Sheet 247 Surveyed: 1850 to 1851, Published: 1855.

Figure 3 Schematic overview of the Helm Farm site (background: Holden Surveys Ltd drawing PMA_032_Helm Farm).

2.2 Stone Barn A

The building is constructed from timber portal frames with coursed natural stonework and a pitched roof.

The barn is split into two distinct spaces: the main barn to east which is a double height space; and a single storey section to the west which continues the pitch of the main barn roof.

Figure 4 Stone Barn A viewed from north-west. Red: Main barn; Green: Single storey.

The roof is of traditional timber purlin and rafter construction covered with stone slates, with a mix of timber king post trusses and queen post trusses supporting the purlins. It appears queen post trusses have been installed some time after the original construction to replace the original king post trusses in some locations. The king post trusses align with timber posts embedded into the stone walls with bracing at the head to provide lateral stability. The reason for replacing the original king post trusses in not known.

The external walls are of stone construction (possibly rubble filled) in the order of 500-550mm thk.

Internally, the main barn is open throughout with a ceiling installed to the southern third of the barn, obscuring and limiting views of the roof in this location. The single storey section of the barn is split into five individual spaces, separated by coursed stonework walls.

As viewed from the east, there is a large arched opening that leads into the main barn.

The ground floor construction is a mixture of stone flags, cobbles and stone flags overlain with a concrete screed.

The Stables adjoin Stone Barn A to the north of the east elevation. Refer to Section 2.6 for further information on the Stables.

To the south is a set of internal steps leading up and into one of the agricultural buildings proposed to be demolished.

Figure 5 King post truss to foreground on timber posts with bracing and two queen post trusses to background having replaced a single original king post truss (note: timber columns to original king post truss are still present in wall).

2.3 Stone Barn B

The building is constructed in coursed natural stonework and a pitched roof. The building is two-storeys.

The roof is of traditional timber purlin and rafter construction covered with stone slates, with timber queen post trusses supporting the purlins.

The external walls are of are of stone construction (possibly rubble filled) in the order of 450-500mm thk.

Internally, both floors are large open spaces with no partitions. There is no internal staircase between the ground and first floors; access to the first floor is via an external stone staircase to the south-east corner adjacent to Stone Barn C.

Figure 6 First floor as viewed from doorway at top of steps in south-east corner, with views of queen post trusses.

The ground floor construction is concrete (note: this may be a concrete screed over stone flags however it wasn't possible to inspect further). The first floor is constructed from timber joists spanning between timber beams, supporting timber floor boarding.

Figure 7 View of ground floor from doorway to west elevation with view of underside of first floor construction.

To the north elevation, two coursed stonework buttresses have been installed. The buttresses measure approx. 1200mm wide at the base and 2800mm high.

Figure 8 North elevation with stonework buttresses

Stone Barn C adjoins the building on the east elevation. There is access between the ground floor of Stone Barn B and Stone Barn C which appears to have been retrospectively formed. Refer to Section 2.4 for further information on Stone Barn C.

2.4 Stone Barn C

The building is split into four distinct spaces: the main barn which is a double height space; a single storey section to the east which continues the pitch of the main barn roof; a single storey extension to the south; and a single storey brickwork and blockwork extension to the south-west. The brickwork and blockwork extension is proposed to be demolished and is therefore not considered as part of this inspection.

Figure 9 Stone Barn C viewed from east. Blue: Main barn; Red: Single storey to east; Green: Single storey extension to south. Note: brickwork and blockwork extension to west not visible.

The main barn is constructed from timber portal frames with coursed natural stonework and a pitched roof.

The roof is of traditional timber purlin and rafter construction covered with stone slates, with timber king post trusses with cambered bottom chords supporting the purlins. The king post trusses align with timber posts embedded into the stone walls with bracing at the head to provide lateral stability. In one location a queen post truss without the central post has been installed at some time after the original construction to replace the original king post truss in this location.

Stone Barn B adjoins the building to the north-west corner; refer to Section 2.3 for further information on Stone Barn C.

There is access between the ground floor of Stone Barn C and Stone Barn B which appears to have been retrospectively formed. The opening aligns with the location of the original portal frame where the king post truss has been replaced. The timber post of the portal frame on the west has been removed and a large corbel formed at high level to support the replacement truss discussed above. The timber post to the east elevation in this location remains in-situ. Although the timeline of the formation of the opening and replacement of the original king post truss is unknown, the provision of this opening between the two barns is a likely reason for the truss replacement.

Figure 10 Replacement truss to foreground with typical king post truss with cambered bottom chord to background in main barn.

Figure 11 Corbel supporting replacement truss.

The external walls are of stone construction (possibly rubble filled) in the order of 550mm thk.

Internally, the main barn is open throughout, however chicken wire and insulation has been installed beneath the trusses obscuring and limiting views of the roof structure. The single storey section to the east is open throughout and is separated from the main barn by a blockwork wall. The single storey extension to the south is open throughout.

As viewed from the east, there is a large opening to the main barn which has been infilled with brickwork to the bottom half and timber boarding to the top. To the west elevation is a smaller barn door opening.

The ground floor construction is concrete (note: this may be a concrete screed over stone flags however it wasn't possible to inspect further).

There is evidence that a previous single storey building to the north-east corner of the main barn and extending east has been removed. The concrete base for this building remains in-situ.

2.5 Garages

The building is a single storey building and is constructed in coursed natural stonework and a hipped roof. The west elevation has three stone arched openings providing access.

Figure 12 Garages viewed from the west.

The roof is of traditional timber purlin, hip rafter, and rafter construction covered with stone slates, with timber queen post trusses supporting the purlins and hip rafters.

The external walls are of stone construction (possibly rubble filled) in the order of 500mm thk.

Internally, the Garages are subdivided into three spaces with a mix of coursed stonework and brickwork walls.

The ground floor construction is unclear from inspection.

A brickwork and blockwork agricultural building adjoins the Garages to the north elevation and extends west. This building is proposed to be demolished and is therefore not considered as part of this inspection.

2.6 Stables

The building is a single storey building and is typically constructed in coursed natural stonework and a pitched roof.

The roof is of traditional timber purlin and rafter construction covered with stone slates, with timber queen post trusses supporting the purlins.

The external walls are typically of stone construction (possibly rubble filled) in the order of 450-500mm thk. To the south elevation, between the stone piers, the stable openings have been partially infilled with blockwork walls.

Figure 13 View of the south elevation of the Stables from Stone Barn A with the west gable of Stone Barn B in the background.

Internally, the Stables are subdivided into four spaces with blockwork walls between.

The ground floor construction is concrete (note: this may be a concrete screed over stone flags however it wasn't possible to inspect further).

Stone Barn A adjoins the Stables to the west elevation. There is no current access between the buildings, however there is evidence of an infilled opening. Refer to Section 2.2 for further information on Stone Barn A.

3 Structural Condition & Recommendations

This section provides an overview of the structural condition of the buildings observed during the structural inspection and highlights recommendations for remedial works to the structure deemed necessary to enable them to be refurbished and converted into habitable dwellings.

The inspection was undertaken from ground level or floor level where accessible; no access at height was provided. No inspection of the foundations has been carried out.

3.1 Stone Barn A

3.1.1 External walls

In general, the stonework appears to be in relatively good condition given the age of the building. However, it was observed that the mortar is weak, and the building as a whole requires repointing. There are some localised areas of making good required, such as where stonework is missing on the internal faces.

Given the removal of at least one of the original trusses forming one of the portal frames providing stability, it is recommended that any partition walls introduced as part of the conversion are designed as structural partitions to provide lateral support/buttressing of the external walls. This can be achieved using blockwork partitions or timber studwork sheathed with OSB/3 or plywood, nailed at close centres, with steel restraint straps at close vertical centres to tie the partition to the external stonework.

The east elevation wall to the south of the large opening appears distorted with some movement having occurred to the stonework. The risk of further movement/distortion can be reduced by introducing strapping and a buttressing partition as described previously.

Figure 14 Distortion of east elevation, south of large opening.

As part of good repair and maintenance, it is recommended that where there are existing timber lintels, these are replaced with stone lintels with steel ‘L-Strip’ lintels beneath to provide additional support. Where openings with timber lintels have been infilled, it is recommended that the timber lintel is removed and replaced with stonework coursed into the existing stonework.

Figure 15 Timber lintels to east elevation.

3.1.2 Roof structure

From ground level the existing roof structure appears to be in relatively good condition given the age of the building although it is noted that a close inspection has not been undertaken at this stage. At some stage the stone slates on the roof have been replaced or turned with a membrane installed between the slates and rafters.

We understand that as part of Building Regulations, it will be necessary to re-roof the structure to incorporate the appropriate membrane, ventilation, and thermal insulation. In terms of loading, the under drawing of the roof timbers with plasterboard and insulation will add some weight to the roof. Providing the load increase is less than around 10% the roof structure should be capable of adequately supporting this load increase.

The roof will require strapping to the walls in accordance with Building Regulations at eaves/wall plate level and along the verges.

3.1.3 Internal structure

As noted in Section 3.1.1, it is recommended that any partition walls introduced as part of the conversion are designed as structural partitions to provide lateral support/buttressing of the external walls.

Where new first floor structure is to be introduced, in accordance with the Building Regulations, strapping will need to be installed around the perimeter of the first floor to tie it to the external elevations.

3.2 Stone Barn B

3.2.1 External walls

In general, the stonework appears to be in relatively good condition given the age of the building. As a whole the building requires repointing; in a number of locations the mortar appears to have been lost to the full depth of the external leaf. For some of the more heavily weathered stone, it may be necessary to replace individual stone blocks. There are some localised areas of making good required, such as where stonework is missing on the external faces.

To the corners of the west gable there appears to be some movement and debonding of the stonework including loss of mortar from the joints. It is recommended that these corners are reinforced with helical steel bars to tie the masonry together and prevent further movement.

Figure 16 (a) South corner of west gable elevation; (b) North corner of west gable elevation.

The north elevation is distorted between ground level and a height of approx. 2800mm. This movement is likely to be long standing as two buttresses have been installed to this elevation to limit further movement (it is not known when the buttresses were installed). It is noted that the buttresses do not show any signs of distress suggesting limited local movement following the installation. As a minimum it would be prudent to allow for rebuilding of the section of wall between the two buttresses and ground and first floor levels which is most severely distorted.

To prevent further movement, it is recommended that any partition walls introduced as part of the conversion are designed as structural partitions to provide lateral support/buttressing of the external walls. This can be achieved using blockwork partitions or timber studwork sheathed with OSB/3 or plywood, nailed at close centres, with steel restraint straps at close vertical centres to tie the partition to the external stonework.

Figure 17 Distortion of north elevation viewed from east.

3.2.2 Roof structure

From ground level the existing roof structure appears to be in relatively good condition given the age of the building although it is noted that a close inspection has not been undertaken at this stage. At some stage the stone slates on the roof have been replaced or turned with a membrane installed between the slates and rafters.

We understand that as part of Building Regulations, it will be necessary to re-roof the structure to incorporate the appropriate membrane, ventilation, and thermal insulation. In terms of loading, the under drawing of the roof timbers with plasterboard and insulation will add some weight to the roof. Providing the load increase is less than around 10% the roof structure should be capable of adequately supporting this load increase.

The roof will require strapping to the walls in accordance with Building Regulations at eaves/wall plate level and along the verges.

3.2.3 Internal structure

As noted in Section 3.2.1, it is recommended that any partition walls introduced as part of the conversion are designed as structural partitions to provide lateral support/buttressing of the external walls.

The timber first floor appears to be in relatively good condition although it is noted that a close inspection has not been undertaken at this stage.

In accordance with the Building Regulations, strapping will need to be installed around the perimeter of the first floor to tie the first floor to the external elevations.

3.3 Stone Barn C

3.3.1 External walls

The majority of the stonework appears to be in relatively good condition given the age of the building. As a whole the building requires repointing and there are some localised areas of making good required, such as where stonework is missing on the external faces. There are some local areas of the stonework that appear to be in poor condition as described below.

The north gable elevation is distorted. There is limited tying between the north gable elevation and the east elevation (see Figure 18b). It appears that the movement is progressive as repointing local to the north-east corner has been undertaken in the past and further movement and cracking to the mortar joints has since occurred. Cracking was also observed in the north gable elevation (see Figure 19). It is recommended that part of the north gable elevation and the northern section of the east elevation is taken down and rebuilt, with the extent indicated in Figure 20. Temporary propping may be required until the permanent works for the conversion are complete.

Figure 18 (a) North end of east elevation; (b) Distortion of north gable elevation.

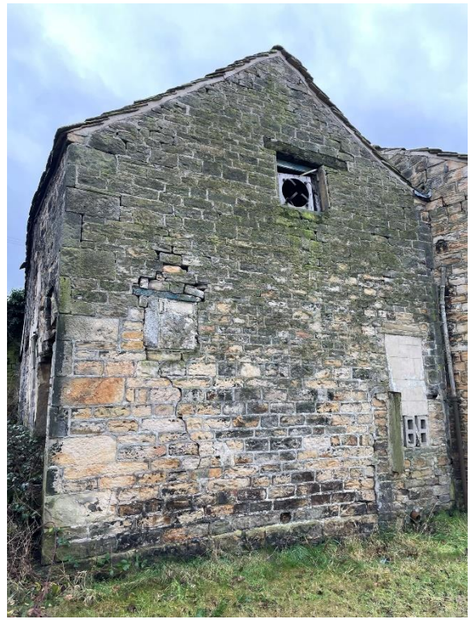

Figure 19 North gable elevation with cracking.

Figure 20 East (left) & north (right) elevations of Stone Barn C with areas of wall to be rebuilt indicated green.

The top of the south gable appears to be distorted (see Figure 21). It is likely that the movement is caused by listing of the roof structure (see Section 3.3.2). The top portion of the gable, above the adjoining single pitched roof, should be taken down and rebuilt.

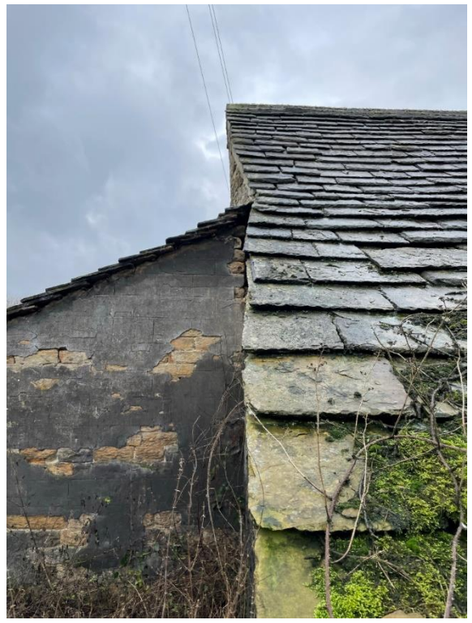

Figure 21 Distortion of south gable view from east.

As part of good repair and maintenance, it is recommended that where there are existing timber lintels, these are replaced with stone lintels with steel 'L-Strip' lintels beneath to provide additional support or steel beams with facing stonework. Stepped cracking was observed in the stonework above the timber lintel above the door opening to the east elevation. This will need reinforcing with helical steel bars and repointing following the replacement of the timber lintel.

The south-west corner of the southern extension is distorted. This appears to have been caused by a tree growing adjacent to the wall (now cut back). It is recommended that the wall local to the tree where distortion has occurred is taken down, the existing tree stub removed, and the wall rebuilt.

Figure 22 (a) Door opening to west elevation with timber lintel; (b) Large infilled opening to east elevation with timber lintel.

Figure 23 Distortion of south-west corner of southern extension, viewed from west with tree stub adjacent.

Where the south extension interfaces with the main barn, the stonework is not coursed or tied in to the main barn. The south extension should be tied to the main barn with helical steel bars.

Figure 24 Interface of south extension with main barn (a) West elevation; (b) East Elevation.

Given the removal of one of the original portal frames providing stability, it is recommended that any partition walls introduced as part of the conversion are designed as structural partitions to provide lateral support/buttressing of the external walls. This can be achieved using blockwork partitions or timber studwork sheathed with OSB/3 or plywood, nailed at close centres, with steel restraint straps at close vertical centres to tie the partition to the external stonework.

3.3.2 Roof structure

From ground level the existing roof structure appears to be listing to the south. It is noted that a close inspection has not been undertaken at this stage. It is assumed this movement has caused the distortion to the south gable elevation and impacted on the movement to the north gable elevation.

We understand that as part of Building Regulations, it will be necessary to re-roof the structure to incorporate the appropriate membrane, ventilation, and thermal insulation. During this works, the existing roof trusses will need to be returned to vertical prior to reroofing.

In terms of loading, the under drawing of the roof timbers with plasterboard and insulation will add some weight to the roof. Providing the load increase is less than around 10% the roof structure should be capable of adequately supporting this load increase.

The roof will require strapping to the walls in accordance with Building Regulations at eaves/wall plate level and along the verges.

Figure 25 View of Stone Barn C from east showing listing of roof to south.

3.3.3 Internal structure

As noted in Section 3.3.1, it is recommended that any partition walls introduced as part of the conversion are designed as structural partitions to provide lateral support/buttressing of the external walls.

Where new first floor structure is to be introduced, in accordance with the Building Regulations, strapping will need to be installed around the perimeter of the first floor to tie the first floor to the external elevations.

3.4 Garages

3.4.1 External walls

The majority of the stonework appears to be in relatively good condition given the age of the building. The building as a whole requires repointing. Some local defects were observed as described below.

To the corners of the south gable there appears to have been some movement and debonding of the stonework including loss of mortar from the joints. It is recommended that these corners are reinforced with helical steel bars to tie the masonry together and prevent further movement, however, the top few courses of the south-west corner may need to be rebuilt locally given the extent of the movement.

Figure 26 Movement to south elevation (a) West corner (b) East corner.

Movement and debonding of the stonework was observed to the north-east corner of the Garages including loss of mortar from the joints (see Figure 27). The cracks continued through the internal leaf of stonework. It is understood that this elevation is to be removed as part of the proposed conversion works and therefore local repairs are not required.

A crack in the mortar joints at the centre of the east elevation was observed. This has previously been repointed but further cracking has appeared suggesting the movement may be progressive. As a minimum the wall should be reinforced with helical steel bars to tie the masonry together across the existing crack.

Figure 27 (a) Movement to south-west corner of Garages; (b) Internal cracks matching external movement in south-west corner.

Figure 28 (a) Repointed crack to east elevation; (b) Cracking to repointed mortar joints.

There is slight movement of the stonework arches to the west elevation, with some of the bed joints having dipped over the arches, although the level of movement is not considered to be severe. As part of good repair and maintenance, it is recommended that steel arch lintels are introduced beneath the stone arches to provide additional support and steel helical bars installed to the mortar joints over the arches to limit further movement.

Figure 29 Stone arches to west elevation.

3.4.2 Roof structure

From ground level the existing roof structure appears to be in relatively good condition given the age of the building although it is noted that a close inspection has not been undertaken at this stage.

We understand that as part of Building Regulations, it will be necessary to re-roof the structure to incorporate the appropriate membrane, ventilation, and thermal insulation. In terms of loading, the under drawing of the roof timbers with plasterboard and insulation will add some weight to the roof. Providing the load increase is less than around 10% the roof structure should be capable of adequately supporting this load increase.

The roof will require strapping to the walls in accordance with Building Regulations at eaves/wall plate level.

3.4.3 Internal structure

It is assumed that as part of the conversion, the internal stonework and brickwork walls will be removed and replaced with new partitions walls. It is recommended that any partition walls introduced as part of the conversion are designed as structural partitions to provide lateral support/buttressing of the external walls.

3.5 Stables

3.5.1 External walls

In general, the stonework appears to be in relatively good condition given the age of the building. The building as a whole requires repointing.

3.5.2 Roof structure

From ground level the existing roof structure appears to be in relatively good condition given the age of the building although it is noted that a close inspection has not been undertaken at this stage. At some stage the stone slates on the roof have been replaced or turned, with a membrane installed between the slates and rafters.

We understand that as part of Building Regulations, it will be necessary to re-roof the structure to incorporate the appropriate membrane, ventilation, and thermal insulation. In terms of loading, if under drawing of the roof timbers with plasterboard and insulation is required this will add some weight to the roof. Providing the load increase is less than around 10% the roof structure should be capable of adequately supporting this load increase.

The roof will require strapping to the walls in accordance with Building Regulations at eaves/wall plate level and along the verges.

3.5.3 Internal structure

It is assumed that as part of the conversion, the internal blockwork walls will be removed and replaced as necessary.

4 Conclusion

This report finds that, in general, the buildings are in relatively good condition given their age, and with generally minor repairs (such as repointing, replacement lintels, masonry reinforcement with helical steel bars, and making good) accompanied with good design to provide additional structural support (such as internal structural partition walls and floor diaphragms), the buildings are capable of conversion and adaptation to become dwellings.

Some local elements of rebuilding external walls are recommended in Section 3, however it is noted that the overall percentage of rebuild equates to only approximately 6.5% of the existing external elevations (based on: total area of existing wall elevations of approx. 819m^2; total area of walls recommended to be rebuilt of approx. 53m^2). Considering the age of the buildings this is not considered a significant proportion of the buildings and, given the our responsibility to support a more sustainable construction sector, the reuse of a high proportion of the existing external fabric minimises the embodied carbon in the provision of dwellings on the site.