

s h e d visual structural survey
Flemings Hall barns
Beddingfield, Suffolk

As part of the proposed conversion works to the existing barns and outbuildings at Flemings Hall, Bedingfield, **s h e d** undertook a visual structural survey on the property to inform the planning submission and overall development proposals.

s h e d undertook the visual survey in July 2023. Weather conditions were fine and dry.

This report has been compiled solely from visual investigations on site. A full site measure was not undertaken.

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Contents

Executive Summary

Report:

1.0 Introduction

2.0 Survey Findings and Recommendations

3.0 Summary

Appendix - reference sketch layout

Executive Summary:

The existing outbuildings and barn at Flemings Hall have been subject to a visual structural survey to review their current structural condition and comment on them in relation to proposals to convert the buildings to habitable accommodation.

Each structure has been reviewed with comments relating to the redevelopment proposals provided along with a comment regarding their current suitability for conversion. In this respect it is the structures ability to withstand alteration or addition (i.e. loads in the form of insulation, finishes) etc. to make the buildings habitable and to modern performance standards.

The existing more modern outbuildings comprise single storey primarily oak frame structures, some of which have been previously converted to habitable accommodation. These have been previously sensitively repaired with members replaced throughout. These are in good structural order and overall there are no concerns with their ability to withstand further alteration or addition to suit the proposals.

The existing 18th century barn is a standalone structure consistent with other structures in the area. The primary frame comprises an oak structure. The barn is an historic structure with timber condition consistent in parts with its age, although substantial repairs have already been undertaken sensitively to the roof. This can be feasibly continued with the principal frame and wall members repaired and replaced as required. This, along with stabilisation of the base via local underpinning will ensure long term integrity of the structure and so it can be considered suitable for conversion with the necessary repairs carried out, and any localised strengthening works undertaken.

1.0 Introduction

Flemings Hall comprises an historic dwelling surrounded by its own moat within the heart of the Suffolk countryside. Located to the south-east of the main house lies a number of existing outbuildings including a separate 18th century thatched barn. It is proposed that the existing outbuildings and barn are converted providing holiday rental accommodation for the hall. This includes a proposal for a further new dwelling which is outside the remit of this report. A structural appraisal is required for this type of planning application to establish whether the existing structures are capable of conversion and/or to establish what remedial works may be required to maintain integrity of the structure whilst allowing alterations which may be required to accommodate modern performance and living standards. s h e d have undertaken a visual structural survey of the existing outbuildings and barn to inform the development proposals.

The following summarises our findings providing a commentary to be read in conjunction with other relevant planning statements and highlights any key issues and risks to be reviewed as part of the developing proposals.



Fig.1 aerial view - site location

2.0 Survey findings and recommendations

Existing structural arrangement - Overview:

The existing structures comprise a number of outbuildings including an 18th century barn. Each structure is described with reference to fig.2 as follows:

Structure 1 comprises a previously converted single storey barn with visible oak structure, tiled roof, rendered façade to the south-east (courtyard) elevation and large format boarded timber horizontal timber to the north-west elevation with a visible brick structure behind.

The structure continues providing a covered external link with entrance to structure 1 and 2, noted as 'link'

Structure 2 is of similar construction to structure 1 with black timber cladding to the courtyard elevation and exposed brick structure facing the moat with visible brick piers. The barn has also been previously converted into living accommodation with visible oak structure internally.

Between structures 2 and 3 there is an external area that would have originally formed part of the barns with the original timber framing visible to the courtyard elevation and brick wall facing the moat.

Structure 3 is of similar oak framed construction currently utilised as a workshop with exposed concrete floor slab and visible oak roof structure and exposed brickwork throughout.

Structure 4 is a thatched oak framed barn thought to have been constructed in the 18th century. The barn is single storey but of significant height circa 8m to ridge with the walls set onto a plinth structure that has at some point been replaced with a concrete upstand wall with concrete floor slab. The original open gable ends have been infilled with further timber framing, with black timber cladding externally.

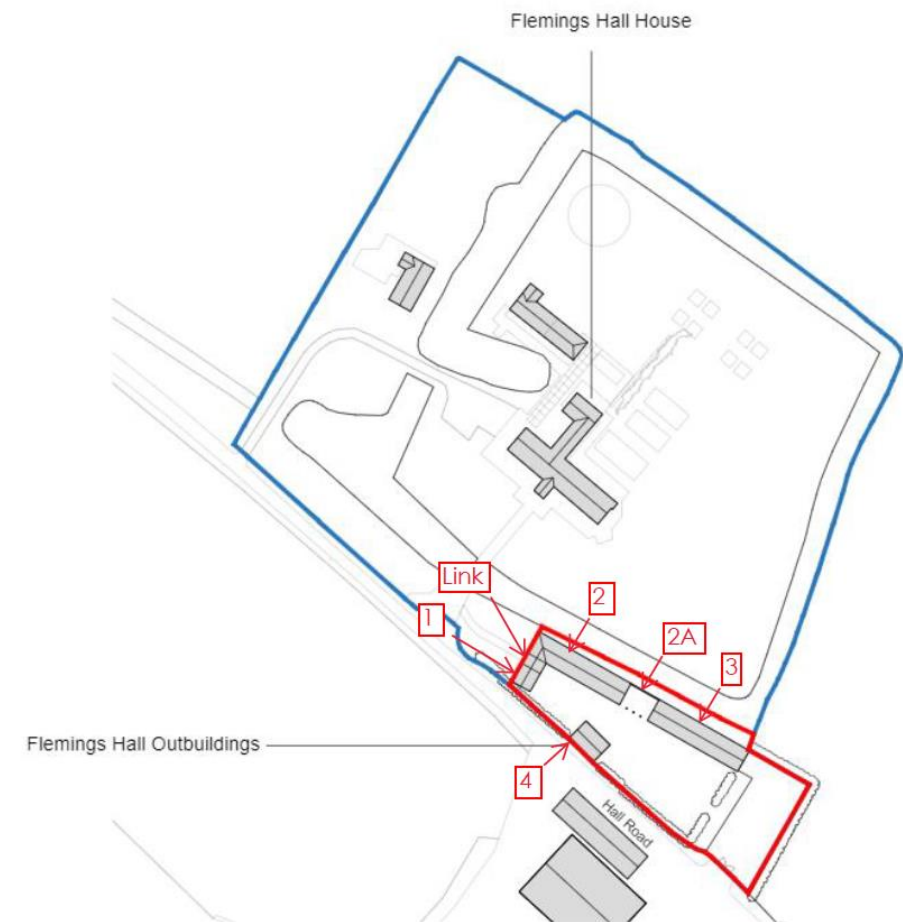


Fig.2 outbuilding/barn refs.

Structure 1 and link:

The barn is a single storey structure with visible oak structure internally forming a traditional pitched roof, likely supported off a concealed timber frame structure with low level brick walls, which are clad externally with both rough sawn timber boards and rendered panels. The structure appears to have been constructed later than the 18th century thatched barn and substantial repair and re-building works are likely to have been undertaken from the visible condition noted. The visible timbers appear to be in good condition and appear to have been sensitively replaced, likely during the previous conversion works. There are some exposed timbers to the covered external link sat on low level brick piers which appear to be in good condition.

The barn has been previously converted to provide living accommodation, currently utilised as storage. There are no visible signs of movement or structural distress to the structure, and walls appear stable. Given its current state, there are no concerns with the ability of the structure to be upgraded as required to suit current building performance requirements.

If the proposals include any amendments to existing cladding/render, appropriate care should be taken to consider future damp penetration to any exposed timber members.

Development considerations:

- Amendments to cladding (if required) to be considered in relation to avoiding any future damp penetration to exposed timbers.

Suitability for conversion:

- The structure is stable and considered adequate for any further improvement works as required to suit the proposals.



Fig.3 rendered elevation to courtyard



Fig.4 timber clad elevation to north-west

Structure 2:

The structure forms a continuation of structure 1 and link and is a previously converted single storey barn. Similarly, to structure 1, there is visible oak structure internally forming a traditional pitched roof, likely supported directly off a concealed timber frame to one side, clad externally to the courtyard facing elevation with black stained timber cladding and exposed facing brick on the north elevation facing the moat. Here this appears to have comprised an original brick garden wall although this appears to have been repaired, likely when the barn was converted into habitable accommodation. No issues were noted to this section of the wall. Substantial repair and re-building works are likely to have been undertaken from the visible condition noted generally of the timber roof structure with visible timbers in good condition. These appear to have been sensitively replaced, likely during the previous conversion works.

The barn has been previously converted to provide living accommodation. There are no visible signs of movement or structural distress to the structure, and walls appear stable. Given its current state, there are no concerns with the ability of the structure to be upgraded as required to suit current building performance requirements.

If the proposals include any amendments to existing cladding/render, appropriate care should be taken to consider future damp penetration to any exposed timber members.

Development considerations:

- Amendments to cladding (if required) to be considered in relation to avoiding any future damp penetration to exposed timbers.

Suitability for conversion:

- The structure is stable and considered adequate for any further improvement works as required to suit the proposals.



Fig.5 timber clad elevation to courtyard

Structure 2A:

The structure comprises a standalone timber frame likely original to this section of the barn given there is a similar entrance arrangement to structure 3. There is no roof structure although it is likely this would have been present as a continuation of structure 2 with the roof supported from the brick garden wall. Given they are fully exposed with no protection from wetting, the timbers are in reasonable condition. There is some splitting noted and UV damage, but this would be expected for externally exposed timber and is not considered to be causing any loss of structural integrity. The timbers are supported above ground level from plinths and there does not appear to be any localised issues as a result of damp.

It would be advisable as part of any redevelopment works to provide a UV protective coating but overall, the timbers appear adequate and would likely be sufficient to support a reinstated roof structure if of similar construction to the existing, without any further strengthening.

The exposed brick garden wall appears to be in its original state and there are localised issues which should be addressed. The wall has been rendered on one side but is past its lifespan and has spalled off in places. This has likely caused the brickwork itself to spall, exacerbated at original rafter/truss and wallplate locations visible, and there are a number of brick courses with missing bricks and mortar loss as a result. It is advised that this is removed, and the brickwork infilled and re-pointed to reinstate structural integrity of the wall. If rendered, then a breathable render should be provided. The exposed brickwork face towards the moat is of similar condition, albeit with substantial lime bloom noted. There has been some historic movement of the wall and patching undertaken but substantial piers are in place on the moat side at each end of the wall panel which appear adequate and in good condition. It is advised that vegetation growing adjacent to the wall on the courtyard side are removed to mitigate against future damage and movement to the wall.



Fig.6 exposed timber frame



Fig.7 garden wall condition

Render facing courtyard, bricks missing, vegetation

Structure 2A - continued:

There is 1 no. small area noted with mortar loss and missing bricks which will require repair (shown on fig.8). Overall, the wall appears structurally substantial for its purpose but should be repaired as noted with brickwork reinstated and repointing throughout. A flexible mortar is recommended and damp protection to internal areas as part of any redevelopment would need to be considered. If the original roof structure was to be reinstated, then this would be of benefit providing further restraint to the top of wall as ties could be incorporated.

Development considerations:

- The exposed timbers should be treated as part of any redevelopment works to mitigate against ongoing exposure to the elements.
- The existing brick garden wall has localised issues which should be addressed including removal of the existing render, infilling of brickwork and re-pointing.
- Should this area become an internal space then damp penetration would need to be considered as part of the proposals.

Suitability for conversion:

- The exposed timber structure appears stable and adequate to support the load should the original form be reinstated.
- The exposed brick garden wall once repaired would be adequate to support the load should the original roof be reinstated.



Fig.8 brickwork condition to elevation facing moat

Structure 3:

The structure is a continuation of the same style of barn structure as structure 2 and is currently utilised as both storage and a workshop accessed from a central covered area - see fig. 10. The timber frame is visible throughout with the roof structure supported along a timber clad elevation facing the courtyard and a brick wall to the rear wall likely as the original garden wall as structure 2.

The visible timber appears forming the traditional cut roof and the framing elements to the courtyard facing elevation appear to be in good condition and it is thought the members have been substantially and sensitively replaced likely during the conversion works of the adjacent structures. standalone forms a continuation of. There was some localised splitting of the timbers noted (fig. 13) but this is not unusual in timber structures, and the frame is uninsulated and so not thermally protected. There are no concerns over this structurally.

The exposed timbers at the covered entrance area are protected from direct wetting from above and do not appear to be showing any issues as a result of water damage either at the head or at the base where they are supported on raised plinths.

The brick wall along the moat facing elevation appears to be in good condition and was likely locally repaired when the roof structure was repaired/replaced. There are no concerns structurally with the wall. Local damp penetration and protection issues should be considered as part of any conversion works.

The current floor comprises a cast in-situ concrete slab. This is not original. Its condition appears reasonable consistent with its usage and trafficking. It appears to have been cast in sections with joints visible however some localised surface cracking was noted. This is most likely apparent as a result of shrinkage cracking and is not of structural concern. The build-up and levels of a proposed ground floor if converted would need to be considered in relation to the existing slab levels and adjacent ground levels.



Fig.9 general view



Fig.10 covered entrance area

Structure 3 - continued:

Given its current state, there are no concerns with the ability of the structure to be upgraded as required to suit current building performance requirements.

Development considerations:

- Amendments to cladding and proposed wall build-ups to be considered in relation to avoiding any future damp penetration to the timber framing and exposed timbers.
- Ground floor build-ups would need to consider the existing concrete slab levels and adjacent ground levels, also to ensure there is no potential for damp penetration to the base of the timber framing.

Suitability for conversion:

- The structure is stable and considered adequate for further improvement works as required to suit the proposals for conversion.



Fig.11 general view - roof condition over covered external area



Fig.12 general view - internal roof condition



Fig.13 general view - visible timber frame



Fig.14 general view - concrete floor slab

Structure 4:

General:

The structure is a standalone barn thought to have been constructed in the 18th century and is consistent with the form of similar structures in the surrounding area.

The barn frame comprises 4 no. primary frames, noted as F1-F4 on the structural sketch arrangement included in the appendix. The frames comprise a pitched braced portal arrangement with a horizontal eaves tie with sloping principal rafter members above in lieu of a separate truss, which in turn support cut timber rafters on purlins. The long elevations include diagonal braces between adjacent frames forming stability in this direction. Between the frames loose verticals are present spanning from the top of a raised perimeter concrete plinth to eaves level supporting the horizontal black stained cladding.

The end gables have been more recently infilled, discussed in more detail below.



Fig.15 general external view



Fig.16 general internal frame view

Structure 4:

Internal condition:

Roof:

Overall, the roof structure appears to be in the most reasonable condition of the whole structure. Previous works have been undertaken to re-thatch the roof, and it appears that the majority of the original sloping structure has been replaced above eaves level. The timbers appear to be in good condition of high-quality timber, likely undertaken on a like for like basis with oak used throughout. The battens have also been replaced and appear sound. Both the cut rafters and principal rafters have been replaced and therefore currently the roof structure is performing adequately and stable. Timbers to the gables do not appear to have been replaced, refer to discussion on gable walls for comments.

For conversion works, upgrades to the roof build-up internally i.e insulation and finishes should be considered in relation to the capacity of the existing roof structure however this is not thought to be of concern as the members throughout appear substantial and the roof structure is adequately tied. If found to be required, localised strengthening could be incorporated with additional timbers of similar grade and quality to reinforce the frame locally as required. This would not be detrimental to the structure.

Walls:



Fig.17 general roof structure

Structure 4:

Internal condition:

Walls - long elevations:

The walls comprise original vertical timbers spanning from a low level concrete plinth to eaves level. There are typically 4-5 between each primary frame with some knee braces incorporated at eaves level and some surface fixed diagonals - as general image shown.

These timbers are original and are in poor condition. These have been subject to extensive insect damage and long term deformation, with loss of section in numerous locations. In some locations there is little contact between base of member and the existing soleplate (fig. 20-21). The external cladding has been more recently replaced however it does not appear any of the existing frame or wall verticals were repaired or replaced. To provide support to the cladding the verticals have been supplemented by additional vertical timbers of varying depth to accommodate the alignment vertically of the original frame, which appear to be treated softwood, and are in reasonable condition. These are in places fixed to the existing verticals and currently provide the majority of support and integrity to the cladding.

The original verticals and diagonals form part of the overall stability of the frame and by virtue of the supplementary timbers are currently stable, however, to reinstate structural integrity to the frame these should be replaced where insufficient. Each member will need to be reviewed on a case by case basis. The majority will require attention with either complete replacement or significant sections cutting out and replaced with timber on a like for like basis. If this is adopted then suitable joints should be utilised. Some members will require complete replacement. A suitable method statement should be provided by the contractor to advise on replacement to coordinate with any upgrades to the building fabric as required to facilitate conversion. Replacement on a one-by-one basis is advised to maintain stability of the frame. This also applies to the principle verticals of frame F1-F4. For these, temporary bracing may be required to prop the eaves members whilst replacement is undertaken.



Fig.18 general wall elevation



Fig.19 supplementary cladding supports



Fig.20 insect damage

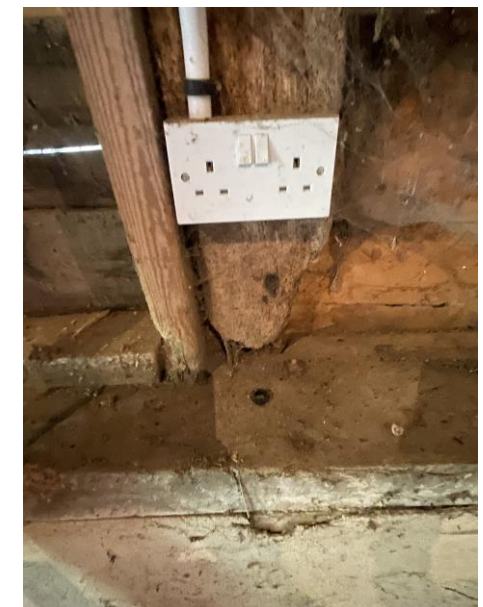


Fig.21 loss of base section

Structure 4:

Internal condition:

Walls - gable ends:

The gable walls comprise infill timbers, original above eaves tie level which do not appear to have been replaced or repaired as part of previous cladding works. The timbers visually appear in reasonable condition although loss of section and insect damage was noted to various members particularly along the sloping rafter lines. A similar strategy to the walls should be used to maintain long term integrity of the structure, with either complete replacement or localised sections cut out and replaced on a like for like basis.

Below eaves tie level, each gable end has been infilled. It is likely the structure may have originally been open or substantial doors present. Currently, softwood infills have been provided comprising verticals to provide cladding support, trimmed around a doorway at each end. One infill appears to have been provided at the same time as the cladding repairs as the timbers are similar, and is of reasonable quality and performing adequately. The southern gable has a more recent infill comprising smaller sections of treated softwood. The sections do not appear adequate and despite some diagonal bracing are not sufficient. The trimming arrangement around the opening is not adequate resulting in the lintel member sagging and doors unable to open easily. These are not structural integral to the frame and could be omitted to facilitate conversion. Doing so would allow opportunity for additional strengthening in the plane of the gable to provide additional long term support to the frame.



Fig.22 northern gable



Fig.23 southern gable

Structure 4:

Internal condition:

Frame notes:

Condition of the vertical members was mentioned above, however the horizontals and diagonal braces are of similar condition, notably F2-F4 where considerable section has been lost to the horizontals with cracking and insect damage visible. F2 and F3 have had at some point additional braces provided to supplement original members, these appear to be performing adequately. Those members to F3 are raw timber and so their structural grade will be variable. It is recommended that where this occurs these are replaced with timber of known grade.

Soleplate and perimeter plinth:

The base of the timber frame is supported from an original timber soleplate off a concrete plinth that has at some point been inserted to lift the timber off the ground. The soleplate is variable in condition with sections subject to insect attack. To maintain long term integrity sections should be cut out and replaced.

The concrete plinth itself is in reasonable condition with only some localised cracking noted near openings which would be anticipated (fig. 26).

Base slab:

The ground floor comprises a concrete slab which is variable in level. It is thought this was likely cast over the original surface which may have been just a compacted earth floor, likely at the same time as the perimeter plinth was provided to form support to the frame. It is anticipated the perimeter extends below ground forming a perimeter foundation but likely only of shallow depth.



Fig.24 left - F4 insect damage, right - cracking and loss of section to F3



Fig.25 soleplate section with significant insect damage



Fig.26 plinth and floor slab cracking

Structure 4:

Internal condition:

Base slab:

There is considerable cracking across the floor which in itself may not be an issue as the surface was adequate for its intended agricultural use however may only comprise unreinforced concrete without joints and therefore has been subject to shrinkage over time. The level is variable however and the north-west corner slopes down which indicates likely settlement of the ground beneath. Externally, the condition of the perimeter plinth visible appears good, with cracking noted to the western elevation particularly at the north-west corner (fig.28). This appears to be localised only and given the relatively light loading from the timber frame not likely to be progressive. It would be advised however that any redevelopment works incorporated stabilisation in the form of local underpinning to this corner. It is likely any conversion would require insulation to the ground floor. The existing surface could be utilised with insulation and a flexible finish provided, although a better long term solution may be to remove the cracked slab, compact any soft spots below and provide a new levelled concrete slab. This would need to be considered in sequence to avoid compromising the perimeter plinth structure.

External comments:

Generally, the verticality of the walls appeared good, although this is noted as a result of variable depth supplementary cladding support being utilised to realign the elevations. This in itself is not considered to be an issue and is an approach used in historic structures which have suffered deformation. If the frame and wall members are repaired or replaced as noted above then progressive movement of the walls would not be considered to be of long term concern.



Fig.27 slab cracking



Fig.28 external plinth cracking

Structure 4:

Development considerations:

- Timbers to principal frames and walls require attention with either complete replacement or sectional replacement. This should be done in a suitable sequence with method statement provided by the contractor including the provision of any temporary supports required.
- The gable frame infills could be omitted notably the southern elevation which is not adequate.
- Local underpinning/strengthening should be carried out notably to the north-west corner of the structure where settlement has occurred.
- The concrete slab is considerably cracked and consideration should be given to either providing a flexible surface above or removing this to provide a new levelled floor slab.

Suitability for conversion:

- The structure has a number of areas which require attention to provide long term integrity, however current deformations are typical of this type and age of structure and can be adequately addressed if the building was converted to another use.

3.0 Summary

The existing outbuildings and barn at Flemings Hall have been subject to a visual structural survey to review their current structural condition and comment on them in relation to proposals to convert the buildings to habitable accommodation.

Each structure has been reviewed with comments relating to the redevelopment proposals provided along with a comment regarding their current suitability for conversion. In this respect it is the structures ability to withstand alteration or addition (i.e. loads in the form of insulation, finishes) etc. to make the buildings habitable and to modern performance standards.

The structures can be summarised as follows:

Structures 1, link, & 2

These structures have previously been subject to conversion and appear to be in good structural order. These structures are considered stable and sufficient for any further works to facilitate the proposals.

Structure 2A

The existing exposed timbers are in reasonable condition and considered sufficient should the original roof be reinstated. Localised protection of the timbers and repairs to the existing garden brick wall would be required but are feasible to facilitate this, including conversion of this area into internal accommodation.

Structure 3

The structure is visible and in good condition consistent with the other outbuildings. There are no concerns with regards to the structure to withstand alterations to facilitate conversion of the building into habitable accommodation.

Structure 4

The barn is an historic structure with timber condition consistent in parts with its age, although substantial repairs have already been undertaken sensitively to the roof. This can be feasibly continued with the principal frame and wall members repaired and replaced as required. This, along with stabilisation of the base via local underpinning will ensure long term integrity of the structure and so it can be considered suitable for conversion with the necessary repairs carried out, and any localised strengthening works undertaken.

BARN STRUCTURAL FRAME (NTS)

