

1st Floor, Bevan House
9-11 Bancroft Court
Hitchin
Hertfordshire SG5 1LH

Telephone: 01462 632012
Email: office@mnp.co.uk
www.mnp.co.uk

VISUAL STRUCTURAL APPRAISAL
of
EAST BARN
FRIENDS GREEN FARM
WESTON
SG4 7BU

REF: 222453 - R01 (P01)

Dated: 03rd April 2023

CONTENTS

1. INTRODUCTION	2
2. REVIEW OF MAIN BARN (14 TH NOVEMBER 2022)	2
3. MAIN BARN - UPDATE FOLLOWING 16 TH JANUARY SITE MEETING	3
4. REVIEW OF WEST SIDE BARN (14 TH NOVEMBER 2022)	5
5. SIDE BARN - UPDATE FOLLOWING 16 TH JANUARY SITE MEETING	6

Report prepared by:

Stuart Ellis
Conservation Accredited Engineer
BSc(Hons) CEng MICE MIStructE GradDiplCons(AA)
Associate Director

1. INTRODUCTION

1.1 Appointment

- 1.1.1 Mason Navarro Pledge were engaged through Wastell and Porter Architects to undertake a visual inspection of the East Barn at Friend Green Farm with regard to the proposed conversion for residential use.

1.2 Site Visits

- 1.2.1 The visual inspection visit was undertaken on Monday 14th November 2022.
- 1.2.2 On 16th January 2023, a second visit was made with Mark Scott (Architect, Wastell Porter) and Mark Simmonds (Conservation Officer, North Herts District Council) to review options.

2. REVIEW OF MAIN BARN (14TH NOVEMBER 2022)

2.1 Overview

- 2.1.1 The initial impression of the main barn was one of a structure that had certainly seen better days, but also one that when originally constructed was structurally insubstantial in nature.

2.2 Observations

- 2.2.1 Aside from the decay of the sole plates and post feet, several of the diagonal braces (also acting as beams supporting wall studs) appeared deteriorated.
- 2.2.2 The poor performance of the roof purlins appears to have been addressed by addition of inserted props, tie beams and wall posts.
- 2.2.3 The roof has racked towards the south with the end gable wall also displaying a notable outward lean.
- 2.2.4 The south-east corner is restrained from outward movement with chains both along and across the building.
- 2.2.5 In the same area the eaves beam has fractured and the corner post is split at the top and decayed at the base.
- 2.2.6 Distortion has left the purlin with minimal bearing.
- 2.2.7 At the north east corner, the eaves beam has been pushed out and is also restrained by a chain.
- 2.2.8 The post to the threshing door has fractured where receiving the truss brace.
- 2.2.9 The corresponding tie beam may have failed as it has been splinted with side timbers.
- 2.2.10 It appears that the rafters have been exposed to water ingress (original coverings now removed) and so are likely to be decayed.

2.2.11 There are signs of fungal growth to the inner face of some wall weather boards, suggesting decay of studs.

2.2.12 Most of the brick plinths need to be reconstructed.

2.3 Discussion

2.3.1 Retention of the barn will be a challenge, but one worth pursuing while acknowledging the likely extensive nature of intervention required.

2.3.2 While an approach can be established in advance, the true extent of timber deterioration and therefore amount of intervention will only become apparent as works are undertaken.

2.4 Proposed Approach

2.4.1 The envisioned approach is to support the skeletal structure on a scaffold frame set to support eaves beams (and truss ties) to enable insitu repairs.

2.4.2 The walls and sole plates would be suspended, using straps, to allow construction of a full perimeter of new footings and plinth walls.

2.4.3 The existing sole plates and many of the stud bases are highly decayed and will need to be replaced above the new plinth walls, which would be raised to suit the level of decay to avoiding multiple end splices.

2.4.4 The decayed diagonal braces (important wind resisting beams as well as being struts) will probably need to be replaced. If sound, adjacent struts can be rotated away from the braces and be fixed back to new members.

2.4.5 The repaired walls will be stiffened by an external ply diaphragm.

2.4.6 The rafters will almost certainly have been affected by decay and the existing purlins are of insufficient size to span full bays.

2.4.7 The use of new rafters supported on eaves beams and a new flitch ridge beam is envisaged. The flitched ridge will take support from wall lines and an enhanced truss frames. Historic purlins can be reintroduced below the new rafters.

2.4.8 Decay and fracture is evident to a number of the eaves beams which will be repaired where feasible. Similarly, where feasible, fractured frame posts will be repaired by through-bolting.

3. MAIN BARN - UPDATE FOLLOWING 16TH JANUARY SITE MEETING

3.1 Observations

3.1.1 The timber structure appeared to have deteriorated further in the time since the initial visit.

- 3.1.2 A visual inspection was undertaken to confirm the extensive nature of previously reported decay, distortion and fracture and to confirm the relatively insubstantial nature of the original fabric.

3.2 Implication on structural performance.

- 3.2.1 While most original wall members were present, their condition was clearly poor. The timbers to walls abutting the adjacent structures (east and north-east) were clearly not original but were in better condition.
- 3.2.2 The frame members and wall timbers were clearly of minimal size to support loads from the original roof and to resist lateral wind loads.
- 3.2.3 The deterioration of the existing structure, while still in place and largely able to support self-weights, was such that it would clearly not support additional loads associated with the addition of insulation and finishes.
- 3.2.4 The original roof structure, of minimally sized rafters and slender purlins, was inadequate for its original purpose with additional lines of trusses having been added ad-hoc by the farmers to prop the deflecting purlins and racking rafters.
- 3.2.5 The roof, even with the previously added supports would not be able to support the additional weight of insulation and finishes.
- 3.2.6 The original brick plinths were generally in a very poor condition, requiring reconstruction rather than repair.

3.3 Potential to retain historic fabric.

- 3.3.1 Above plinth level, much of the timber was in good enough condition to retain, but would not have adequate capacity to perform a meaningful structural role.
- 3.3.2 With enhancement, more of the existing timbers could be retained. Enhancement might include local repair or splinting with an adjacent structural member.
- 3.3.3 It was felt that if additional structure, perhaps concealed within the envelope of externally applied insulation, could be accommodated, there could be a way to retain much of the historic fabric within a residential conversion.

3.4 Proposed Approach.

- 3.4.1 Enclose the barn in a protective scaffold.
- 3.4.2 Support the frame on scaffold props in a way that would allow removal of the brick plinth, of added roof props, taking the structure back to a skeletal frame.
- 3.4.3 In a surgical manner, undertake local repair of members or replacement of highly decayed timbers.
- 3.4.4 To construct a new 'over-sized' brick plinth, to align internal with existing sole plate (raised to allow trimming of decayed posts ends) and to align externally with the new outer surface (to accommodate external insulation).

- 3.4.5 The timber framed walls would then be sheathed in ply (providing lateral restraint and enhanced vertical load bearing capacity).
- 3.4.6 Outside the ply, new timber studs would be incorporated within the insulation zone and again be clad in ply, to ensure a structurally robust wall structure. The external weather-board finish would be secured to vertical battens.
- 3.4.7 The roof structure would be enhanced in a similar way, with new concealed rafters spanning outside existing retained purlins between a new concealed ridge beam and the new external wall frames. Many of the existing rafters could be retained. The ply diaphragm would brace the roof laterally (to prevent further racking).
- 3.4.8 The new ridge beams (of flitched timbers) would be supported on the enhanced existing and original truss frames. The additional intermediate frames (added by a farmer to support the failing roof) would be removed.
- 3.4.9 Internally, the majority of the existing timber structure would remain exposed to view.
- 3.4.10 Externally, the profile of added timbers could follow the line of adjacent frames to retain an element of the current distorted shape.
- 3.4.11 The existing floor would be removed and a new insulated reinforced concrete floor cast between the new plinth walls. With a damp course incorporated in the new inner plinth wall, there would be no need for the slab to breathe.

4. REVIEW OF WEST SIDE BARN (14TH NOVEMBER 2022)

4.1 Overview

- 4.1.1 The lower level structure extending to the west is of more modest construction than the main barn, but in worse condition.

4.2 Observations

- 4.2.1 The bases of all studs, posts and sole plates to the south wall were decayed.
- 4.2.2 To the north wall, most wall studs were decayed full height.
- 4.2.3 The roof coverings have allowed long term water ingress that has allowed decay of the eaves beams.
- 4.2.4 The tie beams (non-original and not corresponding to frame-posts) have not prevented spread of eaves beams, with several having fallen.
- 4.2.5 The once-supported purlins (don't appear to be original) are now hanging off the rafters (that they were supposed to be supporting).
- 4.2.6 The water ingress will also have affected the rafters.

4.3 Discussion

- 4.3.1 It seems likely that very little of the remaining structure will be capable of re-use as structural elements.

4.4 Proposal

- 4.4.1 We suggest that the structure is dismantled (retaining any sound timbers for re-use) and that a new timber framed structure erected (using traditional construction details and incorporating any sound timbers) on a new foundation and plinth wall.

5. SIDE BARN - UPDATE FOLLOWING 16TH JANUARY SITE MEETING

5.1 Condition Review

- 5.1.1 The extensive deterioration of the wall studs and rafters was noted.
- 5.1.2 An agreement was reached that reconstruction, in similar materials and overall cross-section (but not of structural arrangement) was appropriate.