

Project P0969: 1 Manor Farm House
63 High Street
Worton
SN10 5RU

Report: STRUCTURAL REPORT
Purpose: Structural Report and drawings as supplementary information for planning submission to repair and Outbuilding and Garage in curtilage of a Grade 2 listed house.
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1. Introduction

This report and drawings have been prepared to support an application for listed building consent and planning permission for the residential refurbishment and part conversion of an outhouse originally used for livestock and horses. The buildings are Listed as part of the curtilage of the main Grade 2 listed house.

The report enables a structural scope of works for the conversion, structural repair and strengthening to be set out such that the Conservation Officer can be confident in the proposals.

Our work has included an initial condition survey and full visual inspection both internally and externally of the walls and roof and make an assessment of movement, stability and strength considerations amongst others.

The buildings are currently used for general storage and garage and the upper floor as storage as it has only limited access having been used only as a hay loft.

The building has suffered from significant roof movement in its life which has caused large outward movement of the brick walls which in turn has pushed the garage over. Attempts have been made to prevent the roof movement with ties and straps.

It is proposed to reroof the main barn however the high ridge deflection and added weights needs to be resolved to achieve this.

This report is to be read in conjunction with the architects proposed drawings and the set of existing annotated structural A3 drawings.

- 7no. A3 Existing drawings 001 to 007 incl. dated 03.07.26
- 4no. A3 Proposed drawings 052, 053, 055 & 057 dated 03.07.26

The report focuses on the most significant structural aspects and alterations but also discusses other issues.

2. Existing Building context

Based on the survey dated 13th May 2026.

The outbuildings are part of a group within the curtilage of a Gade 2 listed house and built onto a gradual slope.

External walls are in brickwork.

The first floor is timber and is supported on the outer masonry walls but also on timber posts that were installed at a latter date due to movement and loss of bearings related to the roof splay.

The roof is primarily all timber but has many non-original components in steel and timber and a variety of alterations. There is considerable damage to some original elements such as the eaves posts where excessive strain has caused full cracks.

In summary as marked and referenced on the A3 drawings:

Ground floor

Area GA - Current use for general garden storage

- Typically bare earth floors but with some paving/ concrete in parts. Details unknown.
- Subdivided down the middle with a timber wall which also provides important support to the floor and roof.
- Timber posts have been inserted at many first floor beam bearings due to decay but primarily due to loss of bearings due in turn to high lateral wall movement.

First Floor (Hay Loft)

Area FA - Current not in use due to poor access, water ingress and rotted floorboards in places.

- Access via a small hatch in the floor.
- Subdivided by 4 bays that correspond to the 3 roof trusses.
- At the eaves there are originally vertical timber posts with horizontal ties that provide vertical support to the roof trusses. The large deflection of the ridge due to lack of vertical support with corresponding lateral splay of the eaves has caused a failure in the pegged mortice and tenon joints. Similarly, the continued movement since the steel u shape brackets have been added has caused excessive bending in the posts and full cracks in places.
- This movement would have been gradual since the original construction but would have accelerated when the pegged eaves support joints failed.
- Small Steel angle brackets have been added which tie the eaves timber post assembly to the first floor beams. These are very important to the structural stability and fixings should be improved.
- The high lateral wall movement when combined with the timber bearers has resulted in failure in the brick bearings.
- Corner steel braces and embedded timber binders appear to be functioning to tie the corners.

- There are 2 doors and one window on the south elevation and each with a brick arch above. The outward movement of the wall has resulted in damage to the arches which have bowed out. There are signs of multiple repairs and pointing repairs in non matching lime material.

Roof

Barn Roof A – Long rectangular tiled pitched roof with hipped ends

- Consists of 3 no timber trusses with a high raised collar. This is a very flexible structure due to the inefficient height of the collar.
- The eaves structures were important in the resisting of the roof forces however they were not strong enough and have progressively failed.
- Steel cramps, brackets and ties have been added and appear to be partially successful however there is still some lateral movement.
- The hips dont have any special support and rely on 3D tying/ prop action. Indeed 2 small posts have been placed at one end to prevent movement.

Garage Roof B – fully open (3 car bays) rectangular tiled pitched roof with brick gable end

- 2no trussed rafters set on lateral timber eaves beams and 2 sets of 2no. hollow steel posts.
- The large lateral eaves movement of the main barn roof on north elevation has pushed one of the garage eaves out by a similar extent (8 to 10 cm) with corresponding warping damage to the end brick gable wall.
- The trussed rafters arrangement is poor resulting in a higher proportion of the roof load being supported in beam action on the tie beam. Resulting in significant sag.
- The overall movement has also resulted in the trussed rafters slewing over sideways which increases the general movement.

3. The Structural Repairs:

The recommended repairs to the main existing structural elements are outlined on the A3 drawings 052, 053, 055 & 057

The main proposal is to retain historic elements where not decayed and install new structure that is clearly defined from the older but that strengthens the roof and prevents further future damage to the barn and connected garage.

Main Barn

- BA- Remove the lower sets of screw fixings of the steel angle and replace with long bolts fully through the supporting timber beams
- BB- Remove the plywood and inserted softwood block diaphragms to eaves bays and replace with small steel angle strut screwed to the timbers at each end.
- BC- Remove small diameter tie and end bracket assembly and replace with new tie assembly suitable for the actual roof load and added rafter loads
- BD- Install a paired timber ridge beam above the existing ridge plate that takes new rafters loads directly into the trusses apex. The ridge will cantilever past the end trusses such that the two hip ends have enhanced support.
- BE- Sets of new rafters spanning from the new ridge beam the existing eaves wall plate. This has further benefits of relieving loads off the existing round pole purlins and extending their life.
- BF- Helifix bed joint reinforcement and repointing to brick above arches

Garage

- GA- Add additional rafters (4x1no.) to make a pair with the single truss rafters such that a stiffer triangle is formed. The rafter to tie beam with will be bolted to strengthen this connection.
- GB-Place timber fillet blocks behind the bottom of the purlin at the diagonal prop position to enhance the robustness in a traditional way.
- GC- Pack and bolt the last timber rafter to the main barn to give added lateral stability to the garage roof structure and end brick gable which relies on this effect.
- GD- Mechanically tie the purlins to the end brick gable to enhance the lateral stability.

Also refer to architects proposed plans.

4. Investigations:

The majority of the structure is visible so no opening up was needed.

5. Summary

The existing building is comprised of 3 joined brick and timber buildings or structures all built at different times.

The original central barn structure and roof had inherent weaknesses which led to significant outward push of the eaves and drop of the ridge.

The addition of the small utility building effectively “buttressed” one side of the barn but both exaggerating the wall movement above the first floor on that side but also increasing the effective lateral movement on the garage side.

The garage structure lacking in lateral stiffness and relying on the main barn for lateral stability has followed the outward movement leading to significant warping of the garage end gable.

The pegged tenon and mortice connections between the purlin and the trusses are intact and has been the main contributory factor behind the roof longevity.

Steel ties, straps and holding down angles were then added at a later stage to prevent further structural movement which would have otherwise led to collapse.

The building is now to be refurbished and which includes re-roofing. The high vertical ridge settlement and poor existing strengthening requires a sympathetic approach which also benefits the garage:

1. Retain the existing rafters, ridge and other timber members.
2. Insert a new ridge above which allows new rafters to pick up the roof tiles whilst relieving the purlins and its joints and retaining the rafters below.
3. Removing the barns poor repairs such as the plywood diaphragms and tie and replacing with stiffer more sympathetic alternatives.
4. Retaining all garage timber roof members and adding in additional minimal elements to strengthen and tie to the main barn.
5. Use bed joint reinforcement to the worst bowed brickwork and repoint to match.
6. Repair the few damaged brick and timber bearings to the first floor main timber beams.

6. Appendix

- Selection of Photographs



South Elevation Barn- note 3 brick arches and movement/ repairs



Junction of the utility wall and roof providing “buttressing” to the barn



East elevation



Oblique elevation east and north elevations



Garage East elevation



North elevation with high ridge deflection- note garage relies on main barn for stability



Garage end gable- high left hand side deflection and damage due to main barn movement



Internal garage roof tied rafters- note sag in tie beam due to inefficient connections



Internal view main barn first floor looking towards the east- note two hip end props and metal ties



Internal view main barn first floor looking towards the west- note steel elements and ply wood diaphragms



Eaves detail with original post and ledger and added ply wood and soft wood diaphragm and brackets



Close up eaves detail with original post and ledger and added ply wood and soft wood diaphragm and brackets



Opposite eaves detail similar



Close up opposite eaves detail



Tie down steel angle to main beams



Detail showing 6cm tenon failure



Typical truss, collar tie and lower steel tie rod



Tie rod end detail and bolted "pegged" purlin tenon



Eaves detail showing high lateral deflection and bent post (some are cracked)



Underside detail of central truss eaves detail



Internal ground floor view



Outer side wall and beam bearing with binder



Corner steel braces



Failed beam bearing having pulled over the binder and 3 courses of bricks



Outer tie boss



Inner tie boss connection to main floor beam to tie across the building