



WE. Consulting Engineers
Black Barn
Fen Rd
Guyhirn
Wisbech
Cambs
PE13 4AA

Structural Survey Report

on
Agricultural Barn for Domestic Conversion

at
Holly Cottage
Old Fen Dyke
Sutton St. James
Lincs

for
Mrs. H. Thompson

Job reference: WECE/23/325

Issue date(s): First Issue Jan 2024

1. Client

Ms. H. Thompson
Holly Cottage
Old Fen Dyke
Sutton St. James
Lincs

2. Brief and Introduction

- 2.1. Instructions were received from Ms. Thompson to undertake a structural survey of the 'The Barn' at Holly Cottage, Old Fen Dyke, Sutton St. James.
- 2.2. The purpose of the survey was to assess the structural condition of the existing barn, thought to of been originally constructed around 1998-2003, with the intention of conversion to a single storey residential dwelling. The barn was advised as being previously used for straw bale storage.
- 2.3. The survey was undertaken on 13th October 2023 with Bradley Whyatt from WE. Consulting Engineers in attendance.
- 2.4. The survey was a visual inspection from the ground only. The building's interior and external envelope was reasonably accessible with exception to the southeast and southwest elevations due to overgrown vegetation close to the building.
- 2.5. No monitoring or testing of materials was conducted.
- 2.6. The barn considered in this report is situated in an adjacent agricultural field to the northeast of Holly Cottage and other outbuildings at the property.
- 2.7. Externally the building is surrounded by fields off the northeast, northwest, and southwest elevations. Trees and then a through track, which provides access to the barn, are adjacent the southeast elevation.
- 2.8. In accordance with our standard practice, this report is for the sole use of the parties to whom it is addressed, and no responsibility is accepted to any third party for the whole or any parts of its contents.
- 2.9. The recommendations in this report are based solely on the findings of the site visit. We highlight that, other conditions may occur elsewhere on the site of which we have no knowledge and therefore cannot accept any responsibility.

3. Observations

- 3.1. The barn is rectangular on plan, approximately 15.0m long x 7.6m wide, and around 4.8m to eaves.
- 3.2. The barns envelope comprises a single skin trapezoidal profile metal cladding supported on timber purlins and side rails over 5No. timber post frames with a typical bay spacing of between 3.1m to 3.9m centres. The roof was considered to be nominally flat.
- 3.3. An opening on the northeast facing elevation provides the only access into the barn.
- 3.4. The timber members were typically measured to be:
 - Side rails: 120x38, 150x47, or 95x47. All at around 1.750m centres.
 - Purlins: from the ground these appeared to be similar sections and spacing to the side rails. Posts: 170-200mm diameter treated timber round posts.
 - Beams: from the ground these appeared to be similar sections to the posts.
- 3.5. Roof beams are sited at the head and to the side of the timber posts. There are 13No. posts in total and it appeared gravity loads are supported by the 10No. side wall posts and additionally by the 2No. central end elevation posts where beams are supported on a metal bracket, and through bolted to the supporting posts. The centre post was not thought to be providing vertical support to the adjacent roof beam as these members were only through bolted together which is likely to only provide lateral restraint at the head of the post. The client confirmed that this post was installed to provide support to the barns partition gates.
- 3.6. With no specific bracing members, stability of the barn appeared to be provided by the post members cantilevering from the ground. There may be some diaphragm action afforded by the provision of the cladding on the roof and three sides, which would assist in distributing lateral loads.
- 3.7. There was no visible excessive deflection or distortion in the roof beam members, and posts were plumb and aligned within normal construction tolerances. There were no signs of structural distress in the primary timber frame members and no visible indication of settlement at any post. However, we did observe that some secondary structural members - roof purlins, show signs of vertical deflection and nominal distortion.
- 3.8. Viewing from the ground there was no evidence of timber fungi such as dry or wet rot, or insect attack.
- 3.9. The roof and wall cladding were confirmed to be a 35mm deep trapezoidal profile sheet, with approximate weight around 0.065kN/m², supported on timber sections at approximately 1.750m centres.
- 3.10. Small areas of localised corrosion were observed to the underside of the roof cladding at a couple of locations. Whilst there did not appear to be any evidence of corrosion on the wall cladding, we did notice a few sporadic dents located around the building.
- 3.11. There was no evidence that there has ever been a concrete floor slab within the barn or any drainage goods.

4. Conclusions and Recommendations

- 4.1. The structural condition of the existing building is generally good considering its agricultural purpose and age with little or no visible defects in the primary timber frame members. We confirm that these members have been treated with what appeared to be Creosote which has provided necessary protection against fungal attack over the lifespan of the barn. Normally, Creosote will afford timber post embedded in the ground a minimum service life of 30 years, but it is not unusual for the treated timbers to be serviceable for many more years.
- 4.2. With allusion to the Architectural drawing ref: SE-1987-PP1000 by Swann Edwards, we comment that the proposed single storey layouts could be constructed without subjecting the existing structures envelope to additional loadings.
- 4.3. For this project, as there is no existing floor slab, we advise that the new single storey construction will require a slab to support the ground floor structure. We suggest this should be independent of the existing timber frame envelope structure. The timber posts embedded in the ground will need to be inspected regularly in the future to confirm their structural integrity as part of general maintenance of the proposed dwelling. Keeping these parts of the proposed building separate would allow for easier inspection and maintenance/repair or replacement of existing members as required over the lifespan of the new dwelling.
- 4.4. We suggest the roof and walls should be constructed adopting a cold deck with ventilation, which has helped preserve the timber to date, throughout the existing envelope timber frame structure. The provision of a clear gap between the new construction and the existing envelope would also allow for potential differential movement that may occur between the existing frame post members and the proposed internal construction.
- 4.5. We comment that the minor distortion of the existing roof purlins may be due to missing noggins which does not represent a major structural concern. We would expect noggins to be provided at least at mid-span of the purlins and these noggin members should be installed as part of the domestic conversion. With respect to the observed vertical deflection, the purlin members section size and/or spacing should be reviewed as part of the conversion works. If the existing section or spacing is determined to be inadequate or excessive respectively, we suggest that additional purlin members are provided between the existing to prevent potential issues such as water ponding on the roof. Small areas of roof and wall cladding will need to be repaired or replaced where they are either corroded or damaged/dented as part of the conversion works.
- 4.6. A new stormwater drainage system including guttering, downpipes underground pipework and soakaways as necessary to Building Regulations should be installed as part of the proposed conversion. We expect that any new drainage system will be designed and installed to current Build Regulations.
- 4.7. Overall, subject to suitable architectural and structural design (to include load assessment), we would currently consider that most of the existing building structure can be utilised sustainably and would facilitate the conversion of the barn to domestic use without the requirement for significant structural works to the existing structure.

Report prepared by

WE. B. Whyatt



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for and on behalf of WE Consulting Engineers



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Appendix A: Google Maps Building Location Plan



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Image 1. Building location plan

Appendix B: Site Photos



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Photo 1. Northeast Elevation



Photo 2. Northwest Elevation



Photo 3. Southwest Elevation



Photo 4. Southeast Elevation



Photo 5. Internal



Photo 6. Roof cladding and supporting structural members



Photo 7. Side cladding and supporting structural members



Photo 8. Timber post base