

Woodland Consulting

Chartered Civil Engineers

Structural report:

H. Fisher

Suitability of barns for conversion to dwellings

Frog Hall Farm, Sheepy Magna

Job No. 21116-A

February 2022

1.0 Introduction

1.1 Woodland Consulting have been instructed by H. Fisher to provide a structural report on the suitability of three barns for conversion to dwellings at Frog Hall Farm, Sheepy Magna.



1.2 We visited the site on 4 October 2021. The weather was overcast and dry.

1.3 The visual inspection has been made within the limits of ready accessibility. Inaccessible, covered or unexposed areas have not been inspected and we are therefore unable to report that any such part of the property is free from defect.

1.4 External inspection has been carried out from ground level by visual sighting and without special access arrangements.

1.5 Unless specifically mentioned, the survey excludes an inspection of the electrical and mechanical installations, chimney flues, inspection for damp or woodworm, and all other non-structural matters. No manhole covers have been lifted or drainage runs inspected.

1.6 This report does not constitute a homebuyers report, valuation or schedule of refurbishment.

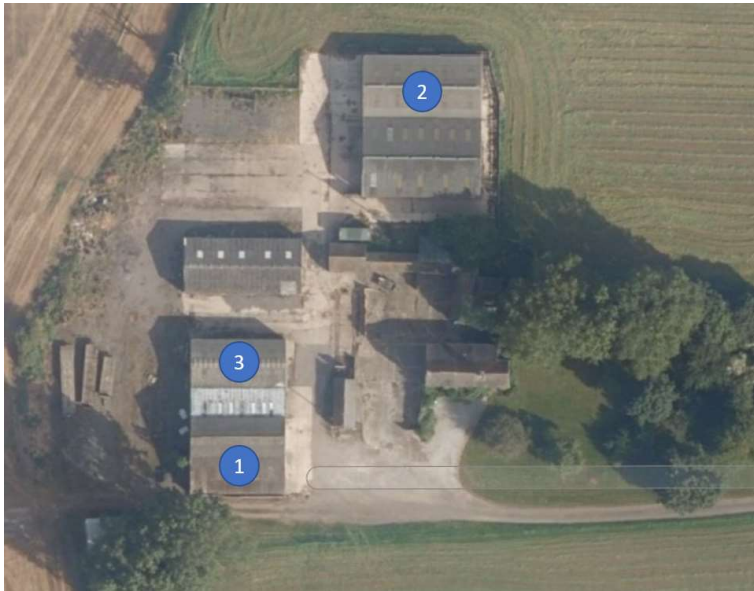
1.7 The site is not thought to be in an area of prior mining activity. We have not investigated the extraction of minerals and we recommend that the appropriate mining searches are made and considered alongside our report.

1.8 This report has been prepared solely for our client named above, and the benefit of the report may not be assigned to others without written permission from Woodland Consulting.

2.0 Inspection

2.1 The barns at Frog Hall Farm, Sheepy Magna are generally of steel portal frame construction, with corrugated fibre cement roofing. Our remit was to comment on their general suitability for conversion to habitable dwellings.

2.2 The site is generally flat and exposed, being surrounded by unbroken farmland. There are three steel barn structures being considered for habitable conversion.



Barn 01

2.3 The barn at the end of the driveway, is to the left hand side of two barns which have been joined. This barn is split into three bays, each of which is around 7m span between supporting columns. The ridge height is approximately 7m and the eaves around 3m.

2.4 The roof consists of corrugated cement sheeting and walls consist of a combination of steel corrugated sheeting and blockwork. The rear wall is partially of brickwork construction with timber cladding over.



2.5 The main structure consists of steel columns and steel trusses, with steel purlins. There is no vertical bracing or roof bracing.



2.6 The floor is covered with concrete slabs which has settled or been damaged in places, presumably due to heavy wheel loads.



Barn 01 infill section

2.7 There is an infill building between barns 01 and 02 which has been created by using timber poles to form rafters between the two other barns. The rafters have slender timber purlins, with galvanised steel sheeting over.



2.8 Some of the steel columns are damaged and will need remedial strengthening.



Barn 02

2.9 Barn 02 is a steel portal frame building consisting of two barns joined at the location of the middle columns. The left hand barn is approximately 12m span between columns, and the right hand barn is approximately 14.7m span between columns. The Ridge is around six metres, and the eaves are approximately 4.4 metres above ground level. There are steel purlins and corrugated fibre cement sheeting to the roof.



2.10 The left hand frame has some roof bracing and vertical bracing. There is no roof bracing or vertical bracing to the right hand frame. There are no rafter stays or torsional restraint to columns. There is an eaves haunch and apex haunch visible on the left hand frame, as is common to most portal frame buildings.



2.11 To the right hand frame, the eaves haunch is shorter than usual, and the apex haunch is missing and consists only of a web of thin steel (see next photo). This is likely to be inadequate and will need some additional plate welding in place.



2.12 Some columns are damaged by vehicle impact, and will need to be repaired.



2.13 The sides of the barn consist of blockwork and timber cladding.



2.14 To the left hand barn the flooring is partially concrete slab and partially of compacted stone. The right hand barn floor is entirely concrete slabbed, with an area of slab elevated above the main slab. The slab appears generally in good condition.

2.15 Windposts to the front and rear, supporting cladding, are generally inadequately supported.

Barn 03



2.20 Barn 3 is a steel portal frame structure of 9m span with 4.5m column spacing, 4m eaves height and 5.1m apex height. The roof consists of timber purlins and corrugated fibre cement sheeting. The sides consist of steel sheeting on timber sheeting rails.

2.21 There are no eaves haunches, no horizontal or vertical bracing, no rafter stays, no column stays. Whilst this is theoretically unstable the timber purlin at the eaves may be working nominally as an eaves tie, and sheeting may be giving the frame some “racking” resistance.



2.22 The floor slab appears to be in an adequate condition.

2.23 The timber rafters of barn 01 are seen to be supported on the left hand columns of this barn.



2.24 The rear elevation is a timber rail with timber wind-post, which appears inadequate.

2.25 Columns are extremely slender and appear potentially inadequate, especially when considering the additional load applied by the roof of barn 01.

3.0 Conclusion and recommendations

3.1 All barns will need to be assessed for strength due to the change of use and the addition of new roofing material, which will necessitate current structural codes of practice to be used. These codes will most likely show all structures to be insufficient in their current capacity, and a number of remedial details will then need to be designed. Once these are installed the steel frames should be adequate as a loadbearing structure for barn conversion.

3.2 There were a small number of steel columns which were showing signs of advanced corrosion at the base. These columns should be replaced or repaired.

3.3 Steel portal frame sheds are designed with an allowance for deflection which greatly exceeds the allowance recommended for domestic properties. In practice this means that the structure flexes and any brittle finishes connected to them will crack. This would need to be carefully taken into account in any architectural or interior design, either to allow in the detailing of the design for the deflection to happen (movement joints and so on), or to stiffen the steel frame so as to reduce this deflection.

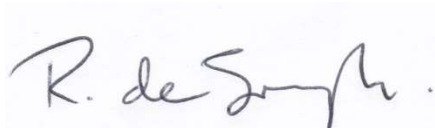
3.4 The column foundations were not inspected as part of the remit of this current inspection. It is likely that they will be adequate, but should be checked by digging a number of trial pits prior to detailed design taking place.

3.5 The concrete slabs in places showed signs of some settlement due to heavy traffic. These should be possible to be repaired to form the basis for ground floor slabs for the much smaller domestic loading requirements.

3.6 A geo-environmental survey and report is recommended for the site, covering contamination, geotechnical, and mining related issues.

3.7 The infill roof with the timber rafters is in our view inadequate and should be replaced with steel rafters and steel "Z" purlins. The columns and foundations for adjacent barns should be checked for this load.

Signed



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Structural Engineer