

21st December 2023

Mr John Scaife
Box Valley Architectural Design
13 Gallows Hill
Hadleigh
Suffolk
IP76DD

Our Ref: DWS/11479
Your Ref: N/A

Dear Mr Scaife,

Re: Visual Structural Inspection in Relation to Proposed Conversion of Existing Barn for Residential Use Adjacent to Cobbold, West Street, Walsham-le-Willows.

We refer to your instructions in relation to the above and having visited the barn on Thursday 23rd November 2023, we submit the following report:

1.0) Introduction.

Brett Design Partnership were appointed by Mr and Mrs Long to visit the above property and undertake a visual structural inspection of the existing barn in relation to its proposed conversion for habitable use. The contents of this report are thus so confined.

2.0) Limitations of the Survey/Report.

Our report is prepared with respect to the structural elements of the buildings and does not include comment on the fixtures and fittings unless it is considered that they will have an influence on the structural elements.

We have not inspected parts of the structure which are covered, unexposed or inaccessible and are therefore unable to report that any such parts are free from defect.

Any photographs included as part of this report are intended to portray the nature of any defects, they are not to be taken as a comprehensive record or schedule of defects.

3.0) General Description.

The building under consideration is outlined in red (refer Figure 1). The barn has a rectangular footprint measuring approximately 18.5m long x 12.5m wide with the main axis (ridge line) running East to West. The Barn sits just off Ixworth Road. The Barn occupies a relatively flat and level parcel of land.

To the North and East of the barn is an area of unoccupied land currently laid to lawn and presumably used for access to the barn and to the fields lying to the East of the farm. To the North of this lies the parent farmhouse and associated rear garden. To the South is the boundary with Home Farm formed with traditional hedgerow. To the West there are a group of mature fir trees at a distance of approximately 6m from the West gable end. To the West of these trees lies a pond.

Construction comprises four steel portal frames spaced at approximately 6.1m centres which support pressed steel z-purlins and cladding rails. Centres of the roof purlins are generally at 1.05m, however, an additional row of purlins appears to have been added adjacent to the eaves.

The purlins support profiled steel roof and side cladding. The side cladding runs all the way down to slab level, there is no masonry plinth wall.

The steel portal frames are slightly unusual in that both columns and rafters are tapered. The columns are approximately 125mm deep at floor level tapering out to approximately 400mm deep at eaves level. The rafters also taper by what appears to be a similar amount.

The eaves connection appears to be a fully welded mitred joint between the rafter and column. There is therefore a bolted cover plate moment splice connection around the mid-span of the rafter (slightly closer to the eaves) to allow the frame to be transported and erected in manageable sections.

Both gable frames appear to be as per the two internal frames but with the addition of gable posts at approximately 1/3 span points to support the cladding rails and frame the large double doors which are present in both gable ends.

The barn has a concrete floor slab with brushed finish.

A trial hole was undertaken on the foundations to one of the steel columns. The trial hole indicates the columns to have mass concrete pad foundations approximately 900mm square x 300mm thick (approximately 450mm below ground level).

With reference to the British Geological Survey GeoIndex, the suggestion is that the site is underlain by superficial deposits of Lowestoft formation in this case chalky, flinty Boulder Clay. This was largely confirmed by the trial hole inspection.

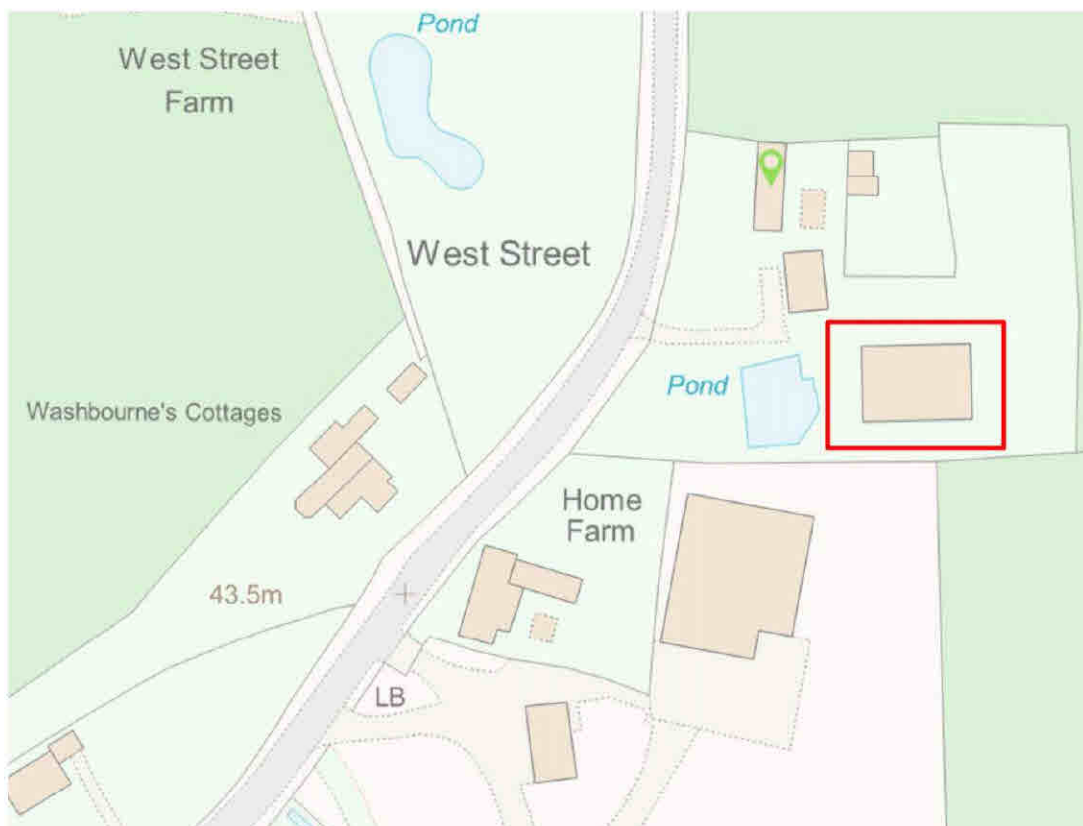


Figure 1: Site Plan with Barn Outlined in Red.

4.0) Inspection.

We inspected the barn externally and internally from ground level. Overall the barn appears to be in a reasonable condition when considering form of construction, likely age and previous usage.

The galvanised Z-purlins are approximately 150mm deep at maximum 1050mm centres and appear to be appropriately sized for the span and in generally reasonable condition but with extensive surface corrosion which, whilst we would not consider to be at a stage which would affect structural performance, will require some future attention.

The steel portal frames appear to be reasonably well considered in their design with the tapered columns and rafters at their maximum depth where the maximum bending moment will occur at the eaves connection. It is difficult to provide a preliminary assessment of the frame due to the slightly unusual tapered members, however, with reference to BCSA Publication No. M1: 1963: Details of Single Bay, Single Storey Portal Frame Sheds, we would anticipate a frame section size of the order 305 x 165 x 40 UB and at it's deepest the tapered columns and rafters are slightly larger than this.

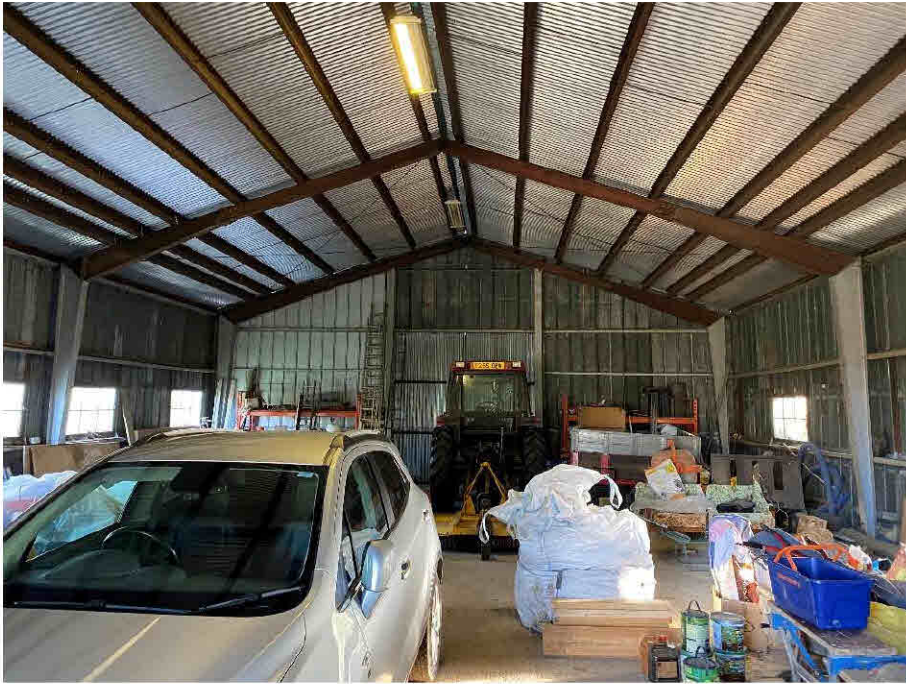
The portal frames appear to have suffered from surface corrosion which will require some attention however, other than this the frames appear to be well aligned and upright with no indication of bowing or sagging.

Some nominal bracing has been provided to the end bay between the rafters. This takes the form of crossed steel tie rods. These perhaps help to transfer wind loading on the gable end to the flank walls, however, there is no apparent bracing to the flank walls other than the diaphragm action of the profiles steel cladding. Despite this, there is no indication that the building has listed over.

Photographs 1 to 19 below indicate the general condition of the barn as well as some of the defects noted during our inspection:



Photograph 1: West Gable Elevation and North Flanking Wall, Note Proximity of Mature Fir Trees.



Photograph 2: Internal View Looking East Showing Steel Portal Frames and Purlins etc. Note Threaded Rod Cross Bracing to End Bay.



Photograph 3: Typical Portal Frame, Note Welded Mitre Joint at Eaves and Cover Plate Splice Connection Further up Rafter.



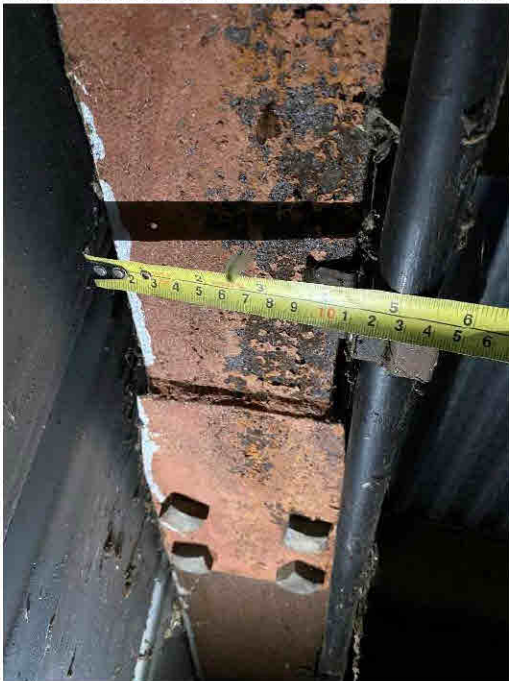
Photograph 4: Typical Portal Frame Column, Note Tapering Profile.



Photograph 5: Typical Portal Frame Rafter. Note Apex Section of Rafter is Not Tapered.



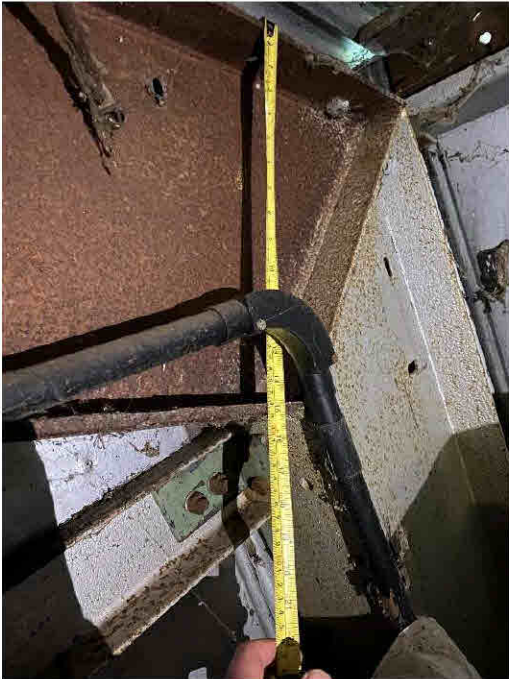
Photograph 6: Close Up of Cover Plate Splice Connection to Rafter. Note Surface Corrosion to Steelwork. Rafter Depth Approx. 200mm.



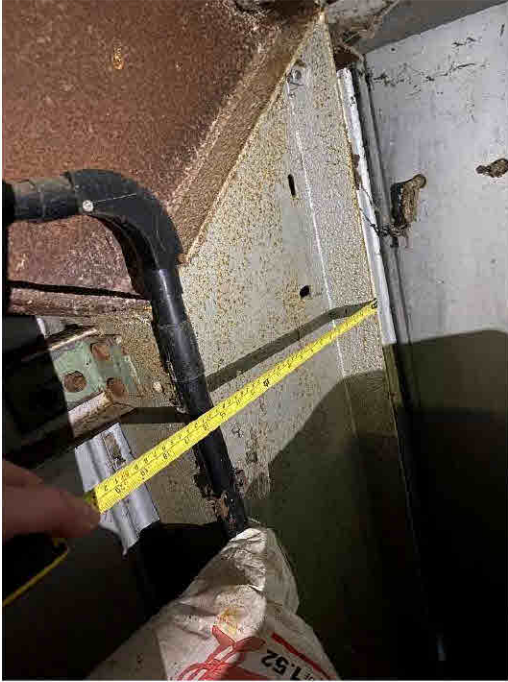
Photograph 7: Close Up of Underside of Cover Plate Splice Connection. Rafter Width Approximately 100mm.



Photograph 8: Purlin Depth Recorded as Approximately 150mm. Note Surface Corrosion to Purlin.



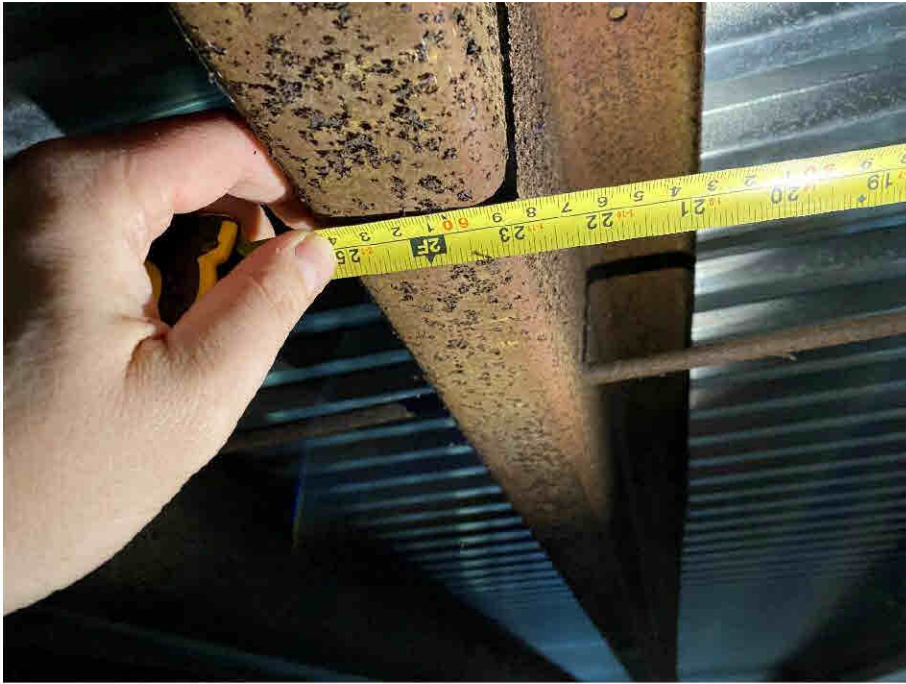
Photograph 9: Depth of Tapered Rafter at Eaves Approximately 380mm.



Photograph 10: Depth of Tapered Column at Eaves Approximately 380mm.



Photograph 11: Crossed Steel Rod Bracing Approximately 10mm Diameter.



Photograph 12: Purlin Centres Closed up to 600mm. Note Surface Corrosion.



Photograph 13: Purlins Generally at 1050mm Centres.



Photograph 14: Cladding Rail Depth Measured as Approximately 150mm.



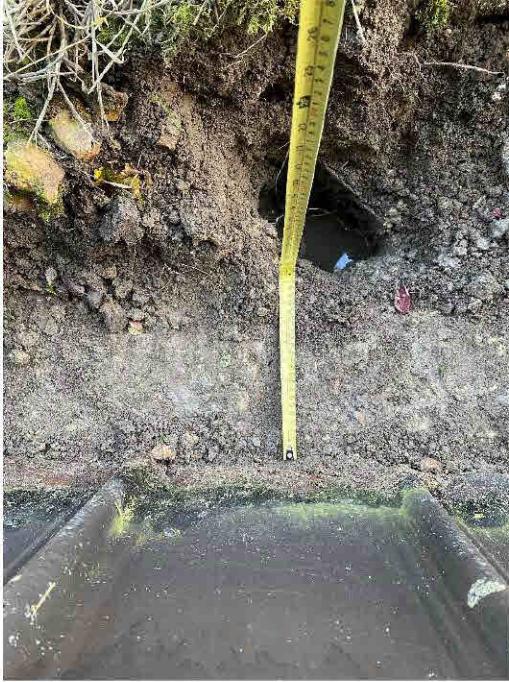
Photograph 15: Cladding Rail Flange Width Measured at Approximately 65mm.



Photograph 16: Trial Hole on Column Foundation, North Elevation.



Photograph 17: Trial Hole Exposing Edge of Concrete Pad Foundation. Pad Width Measured at Approximately 900mm.



Photograph 18: Pad Foundation Projects Approximately 250mm From Face of Cladding Indicating 900mm Square Pad.



Photograph 19: Concrete Thickness to Pad Foundation Approximately 300mm.

5.0) Conclusions and Recommendations.

As noted above, we would consider the existing barn to be in a good condition with steel section sizes appropriate for their span and loading, it should therefore be relatively straightforward to convert the existing barn for habitable use without significant structural modification and therefore in compliance with Class Q guidance.

It is unlikely that the existing structure would permit the replacement of the existing profiled steel roof cladding with a traditional tiled or slate roof finish as this is likely to introduce significant additional loading, however, a detailed assessment by a chartered Structural Engineer may justify otherwise.

It should be possible to remove the mild surface corrosion by wire brushing. We would also recommend that any corroded bolts/fixings also be replaced as a matter of maintenance rather than as part of any proposed conversion works.

Should it be proposed to introduce a mezzanine floor as part of the conversion, it is our understanding that independent support for a mezzanine floor is not prohibited by Class Q.

We note that the existing mass concrete pad foundations may perhaps be shallow by modern Standards, however, the plan area is appropriate for the anticipated loading and the allowable bearing pressure of the ground and there is no evidence of significant foundation movement.

On the basis of the above conclusions and recommendations, we can confirm that the barn would be suitable for conversion for residential use.

We trust that the above report meets with your current requirements, however, should you have any queries, or require any further assistance at this stage, please do not hesitate to contact us.

Yours Sincerely,

A handwritten signature in black ink, appearing to read 'David Stark', with a long, sweeping underline that extends to the left.

David Stark BEng (Hons) CEng MIStructE
Chartered Structural Engineer
On behalf of Brett Design Partnership Ltd.