

# CONSULTING ENGINEERS

Industrial Commercial Residential Educational Public



Our Ref: 9175/DSM/NE/2

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21<sup>st</sup> December 2023

Dear Edward

## RE: MOORBRIDGE FARM

### 1.0 Introduction

GDC Partnership was instructed by Edward Heldreich to carry out a visual inspection of two barns at Moorbridge Farm, Moorbridge Lane, Harleston, Stowmarket IP14 3JH and to assess their suitability for conversion to domestic use. The inspection was carried out on the morning of 22<sup>nd</sup> November 2023 and the weather was fine. The inspection was limited to a visual inspection and no testing or opening up works were carried out and areas which were covered, unexposed or inaccessible were not inspected. We have not carried out any structural analysis of the buildings and any comments on the stability are based on experience of similar structures. All measurements are approximate. Left and right should be read when looking towards the element referenced and photographs referred to are included at the end of the report.

### 2.0 Results of the Inspection

#### Barn 1

Barn 1 is a precast concrete portal frame construction, rectangular in plan with a span of approximately 15.85m and length of 26.55m formed by 6 bays of 4.425m length. Photo 1 shows the front elevation, Photos 2 and 3 the sides and Photos 4 and 5 general views of the inside of the barn. The portal rafters sit on a concrete corbel at the top of the column and are connected by a steel bolt, refer to Photo 6, there is a simple plate connection at the eaves, refer to Photo 7. The tops of the portal frame columns are tied by an eaves beam which may also serve as a precast concrete gutter, refer to Photo 8.

The building has a low level blockwork wall to the long elevations with corrugated metal sheeting above, the sheeting is supported on a mix of precast concrete and cold rolled metal purlins. The purlins are connected to the columns by angle brackets, refer to Photo 9.

The roof is a corrugated cement board supported on concrete purlins. The rear bay of the building is open to the left and rear with the blockwork wall and cladding returning on the line of the last but one portal frame with the cladding supported on cold rolled steel purlins spanning between the concrete portal frame and intermediate steel gable posts, refer to Photo 10.

The front elevation is clad in corrugated metal sheeting to ground level and has a large roller shutter door opening in the middle framed with steel posts and a small personnel access door to the left side, purlins are cold rolled steel spanning between the door posts and concrete portal frame columns, refer to Photos 11 and 12. The ground floor of the barn is a concrete slab. There is a precast concrete retaining wall around the inside of the building which does not form part of the structure of the building.

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The building appeared to be in good condition with no major structural defects apparent. There was a vertical crack visible to the external blockwork wall at 450mm from the end portal frame, refer to Photo 13, and further vertical cracks in the middle of the third bay from the front, refer to Photo 14.

## Barn 2

This barn is a steel framed structure with corrugated metal cladding to the sides and corrugated cement sheeting with plastic roof lights to the roof. The structure of the building is formed by a central series of steel portal frames at 4.57m centres with a span of around 10.35m and appears to have been extended to either side by around 6.5m with a steel mono pitch lean to formed of rectangular posts and beams to give an overall size of approximately 54.8m x 23.35m, Photos 15 – 17 show the external elevations and 18 – 19 the internal view.

The steel portal frame is formed of columns which are 152x152 UC sections and rafters which are 152 x 89 UB sections, there are haunches at the bolted eaves and ridge connections, refer to Photos 20 and 21. The lean to elements are formed of 75x75 steel box section rafters supported on an edge, two internal 75 x 75 steel columns and the portal frame column, refer to Photo 22, except for the first bay which is a continuation of the steel portal frame construction, refer to photo 23. Roof purlins are generally steel except for that between the tops of the portal frame columns which is timber as can be seen in Photo 23, there are diagonal stays between the columns and this eaves purlin and diagonal bracing in the plane of the roof in the third bay from the front and rear. The side sheeting is supported by timber purlins which are connected to the steel columns by steel brackets, refer to photo 24.

To the front right hand side the building abuts another blockwork structure, refer to Photo 25. The gables are formed of steel posts around the door openings with timber purlins supporting the cladding. There is some mechanical damage to the posts either side of the door, refer to photo 26.

There is damage to the cladding to the rear and right hand side of the building which can be seen in Photo 17

The steelwork has lost most of its paint protection system and there is light surface rusting visible to all steelwork but no evidence of greater corrosion or delamination.

The floor slab is concrete, divided into bays, and there is some evidence of wear of the surface of the slab in two lines, most likely due to vehicles, refer to Photo 27 and some localised cracking around a joint in the 5<sup>th</sup> bay from the front, refer to photo 28.

## **3.0 Conclusions**

Barn 1 is a concrete framed structure with no obvious structural defects. The building has had some of the side cladding replaced with some changes to the sheeting rails visible. Being a precast concrete portal frame suggests that the frame has been engineered though it was noted that there is no evidence of any longitudinal bracing between the frames to provide racking resistance, it is presumed that the roof sheeting is acting as a diaphragm to transfer lateral loads from the gables to the frames and it may be

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that the side sheeting performs a similar function, this would need to be assessed during the detailed design phase or additional longitudinal bracing added. The building is likely to have been designed to the class 2 agricultural building standard which is less onerous in terms of loading than a residential building, it is likely that the conversion would consider replacing the existing roof cladding with an insulated composite panel and the weight of this would need to be assessed against the weight of the current roofing to avoid undue increase in loading, alternatively the insulated panel could be installed beneath the existing roof on its own structural framing which is eminently feasible given the height of the building.

Barn 2 shows no obvious evidence of structural distress and appears to be performing satisfactorily. The central steel portal frame has eaves and ridge haunches which suggests some engineering input though it was likely that the design was to a Class 2 agricultural building which has less onerous loading requirements than a residential building and the capacity of the steelwork would need to be assessed in detail during the detailed design of the conversion however it is highly likely that this can be easily addressed as part of the design process should any deficiencies be found. There is some light bracing in the roof but not vertical bracing along the longitudinal sides of the building to provide racking resistance, it may be that this was removed when the building was extended, this deficiency can be easily addressed during the design of the conversion either by adding in steel cross bracing or building in buttressing walls depending on the final layout. The steel frame is formed of light steel sections and support a very lightweight roof sheeting, it is likely that any conversion would look to use a more robust sheeting which could be insulated and therefore heavier, in this case it is possible that the steel frame may require some strengthening, alternatively a lightweight replacement cladding could be used, and the insulation provided in a separate sub frame. The steelwork has lost any corrosion protection and the reinstatement of this would need to be addressed in the design of the conversion.

In conclusion we believe that both barns are suitable for conversion to residential use.

We trust that the above is acceptable, however, should you require any further information please do not hesitate to contact us.

Yours sincerely

A handwritten signature in blue ink that reads 'David S. Mole'.

David Mole



Photo 1



Photo 2





Photo 3



Photo 4



Photo 5



Photo 6





Photo 7



Photo 8



Photo 9

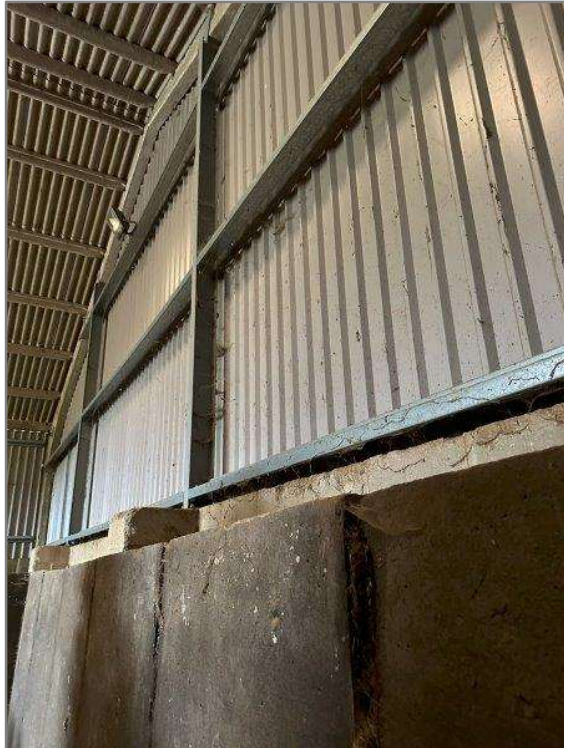


Photo 10





Photo 11



Photo 12



Photo 13



Photo 14



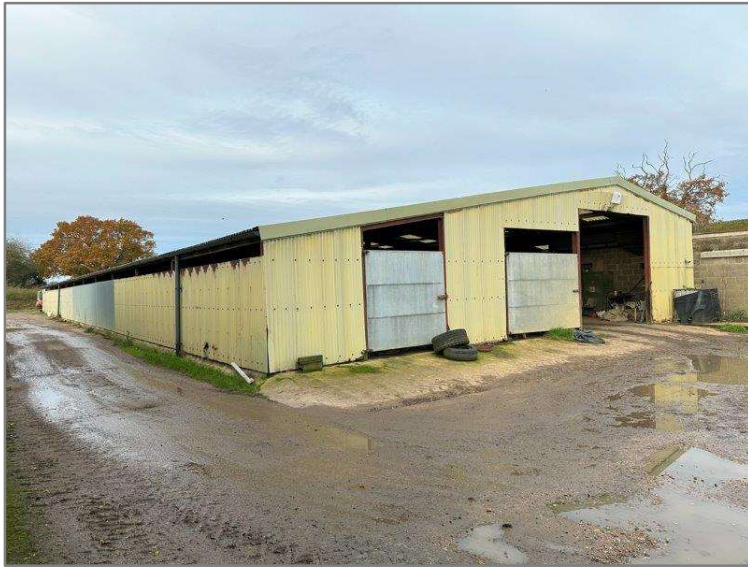


Photo 15



Photo 16





Photo 17



Photo 18



Photo 19



Photo 20





Photo 21



Photo 22





Photo 23



Photo 24



Photo 25



Photo 26





Photo 27



Photo 28