

MILL BARNS, CHARLTON , HITCHIN

PRELIMINARY STRUCTURAL REPORT

MILL-BUR-ZZ-ZZ-RP-S-0001 – S2 – P01

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Burdon

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CONTENTS

1.0	Brief	
2.0	Introduction	
3.0	Mill Barns	
3.1	Barn A	
3.2	Barn B	
3.3	Barn C	
4.0	Further Investigations	
5.0	Conclusion	
	Appendix I	- Photographs

1.0 BRIEF

This report has been prepared on the instruction of Howkins and Harrison on behalf of Mr. Will Taylor. The brief is to provide a report with recommendations and comments regarding the development potential of the existing farm buildings on the site known as Mill Farm with respect to residential conversion, see site location plan below. The proposed development consists of the refurbishment of single storey agricultural buildings.



Figure 1 - Site Location Plan

This report is restricted to comments regarding the conversion works with recommendations for works required in order to strengthen and ensure the long-term use of these structures together with recommendations for additional surveys as necessary.

2.0 INTRODUCTION

The site forms part of the original Mill Farm and sits within the village of Charlton, Hitchin. The Mill Barns are located adjacent the River Hiz and comprise a number of sheds/extensions of various construction materials.

Desktop geological records suggest that the site is underlain with sands and gravels over chalk. Therefore, the effects of heave and shrinkage associated with clay soils are unlikely to be an issue on this site.

For the purposes of this report, we have surveyed the buildings outlined in red in Figure 2 below and denoted the barns A, B & C, respectively.

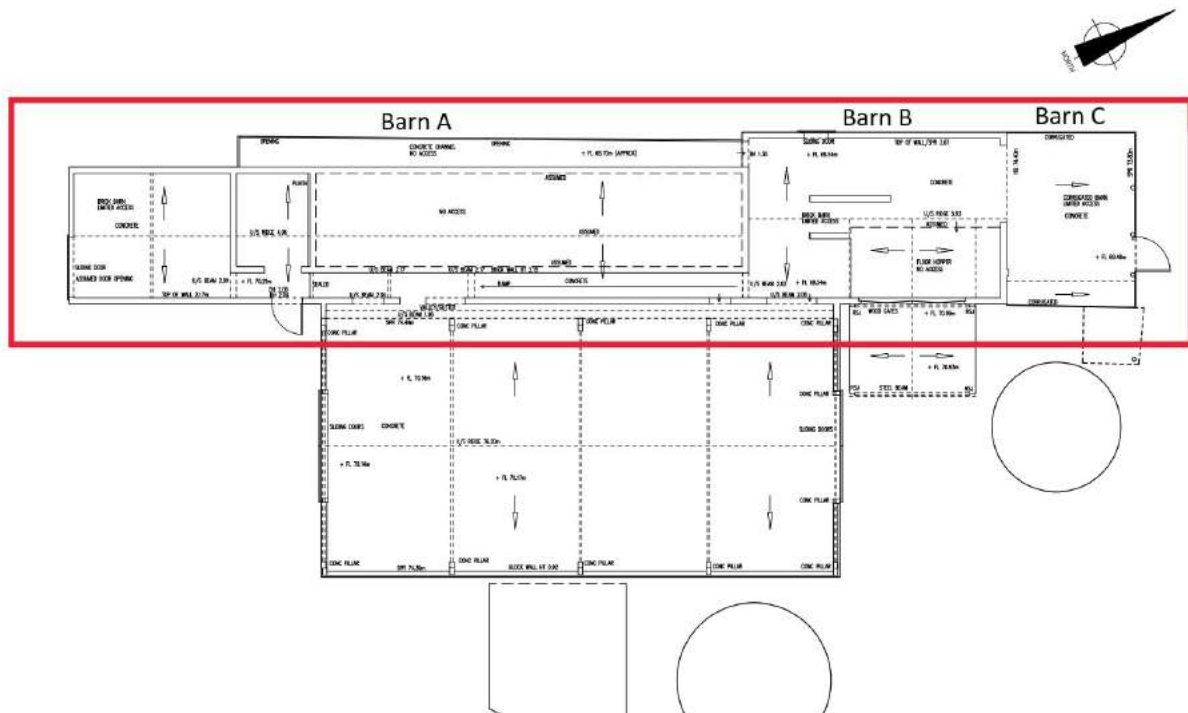


Figure 2 – Mill Barns Floor Plan



Image 1 – Barns A, B & C

The site levels vary with a cross fall of approximately 600mm from Northern to Southern ends of the barns. The site inspection was visual only and no opening up works or testing were carried out.

Comments are restricted to structural matters only and further investigations may be necessary to determine the feasibility of access, drainage, etc.

3.0 MILL BARNS

3.1 BARN A

Barn A is a single storey long barn with a corrugated cement-based sheeting roof. The walls are of masonry construction and the roof is formed from timber trusses with timber purlins spanning between them. The roof trusses are in good condition but may need to be strengthened to accommodate the additional roof loads due to insulation/ ceiling installation.

There is a small lean-to structure housing a service trench to the Western side of the barn with a more recently constructed concrete portal frame shed to the East of the barn. The small lean-to roof has failed and needs replacing while the guttering detail between the portal frame shed and Barn A has led to water ingress and weathering of an area of masonry.

There is a concrete ground slab throughout, although levels vary along the length of the barn. The underside of ridge height is approximately 4.0m from slab level. The internal layout is split into 5No. bays/stores. 3 of the stores are enclosed with masonry walls with no access. Each of the enclosed stores were empty. On the Southern section of Barn A there are two accessible stores which are currently used for miscellaneous storage.

It is expected that the new development will include the addition of insulation to the roof and walls and that the roof sheeting will be removed. It is therefore recommended that the roof covering be replaced in lightweight artificial slate.

The masonry is in good condition with only a number of areas requiring repairs where water ingress has weathered the brickwork and repointing of the mortar is required. A slate DPC is visible and is in good condition.

Two instances of historical cracking were observed within the same bay and have been remediated with steel ties and wall anchors. There were no visible signs of lateral bowing of the walls. The cracks were at high level only and assumed to be associated with historical storage of the the bay. As part of any new development the cracks would be stitched and cross walls tied into the external frame to ensure stability. The current layout offers significant lateral stability to the barn through the 5No. cross walls.

There were no signs of any subsidence. However, it was noted that the floor to ceiling height to the truss bottom chords is approximately 2170mm. Allowing for a new ground floor slab build up including a 125mm reinforced slab, 50mm sand blinding, 100mm compacted hardcore, DPM, 100mm insulation and 75mm screed (= 450mm total) then the foundations would have to be at least 700mm deep to allow excavation for the new slab and to achieve a ceiling height of 2400mm minimum.

Excavations should be carried out to determine the depth of the foundations. However the footings are assumed to be deep considering the varying level of the ground floor and presence of the 1.0m deep service trench to the Western side of the barn.

3.2 BARN B

Barn B is of masonry construction and is rectangular in plan with an open front lean to structure to the Eastern side of the barn. Both Barn A & B would have been constructed at the same time. The roof is supported on timber trusses and intermediate purlins with the area over a floor hopper supported by a central post.

The floor hopper occupies approximately one third of the floor space of Barn B and it is assumed that the hopper will be infilled to provide a level floor across the entire barn.

Similar to Barn A, the roof comprises cement-based roof sheeting which are likely to be replaced as part of a new development.

The masonry is in good condition and only a couple of areas require minor repairs where makeshift lintels have been installed to form openings.

The underside of ridge height is approximately 2.0m higher than Barn A at 5.95m from slab level. The internal layout is occupied with disused agricultural plant but the area has the potential to be open plan.

There may also be an option of converted Barn B to a duplex dwelling considering the additional height of the structure.

Comments regarding the construction of the ground floor slab as above (Barn A) apply. However the presence of the floor hopper suggests deep footings and there should be no issue installing a new insulated ground floor slab.

The lean to area comprises a steel frame with corrugated tin sheeting to the walls and roof. The steelwork frame and sheeting are in fair condition with visible rusting and will need replacing as part of any new development.

3.3 BARN C

Barn C is of single storey construction formed from lightweight steel framing and corrugated tin sheeting to the external walls and roof, typical of agricultural storage sheds.

The layout is roughly square in plan. Barn C forms a relatively small extension of the original barns and assumed to have been constructed at a later date.

The structure is in fair condition and it is anticipated that this barn will be insulated and reclad in timber cladding with a new roof covering. We therefore recommend that the wall construction consist of 12mm plywood fixed to the existing frame (to provide stability) with insulation and cladding over. The roof should be replaced with lightweight artificial slates over plywood cladding and insulation.

4.0 FURTHER INVESTIGATIONS

The following investigations and studies should be carried out to confirm the cost risks associated with the project:

- Ground investigation and contamination
- Asbestos survey (roof sheeting identified as high risk)
- Bat/wildlife
- Drainage (surface and foul)
- Utilities (Water/ gas/ electric)

5.0 CONCLUSION

Barns A & B are in good condition and can be converted with minor repairs to the masonry and lean-to structures.

Barn C is considered to be in fair condition and the architectural layout and finishes will need to be designed carefully to allow full refurbishment.

A trial pit investigation should be carried out to all foundations to establish the make-up of the ground floor slabs and whether there will be a need for underpinning to accommodate the slab build-up.

A handwritten signature in blue ink, appearing to read 'David Donnellan', is positioned above the printed name.

David Donnellan
BEng (Hons) CEng EUR ING MIEI
20th December 2023

APPENDIX I

PHOTOGRAPHS



Photograph 1 – Western Elevation of Barns A, B & C



Photograph 2 – Southern Elevation of Barn A



Photograph 3 – Barn A and adjacent portal frame shed on Eastern Elevation



Photograph 4 – Barn A Service Trench lean to on Western Elevation



Photograph 5 – Failed lean to roof



Photograph 6 – Wall Plate Anchor



Photograph 7 – Masonry cracking adjacent Wall Plate Anchor in Barn A



Photograph 8 – Cement Based Roof Sheeting to Barn A



Photograph 9 – Junction between Barn A and concrete portal frame shed



Photograph 10 – Gutter detail between Barn A and concrete portal frame shed



Photograph 11 – Area of water ingress under gutter between Barn A and portal frame shed



Photograph 12 – Cracking above wall anchor plate in Barn A



Photograph 13 – Installed Steel Tie in Barn A



Photograph 14 – Timber Truss, Purlins and Roof Sheeting in Barn A



Photograph 15 – Internal cross wall in Barn A



Photograph 16 – Masonry infill junction to be repaired



Photograph 17 – Timber lintel in Barn A



Photograph 18 – Gutter junction with water ingress



Photograph 19 – Internal corridor within Barn A



Photograph 20 – Timber Truss support in Barn A



Photograph 21 – Cross Wall Opening between Barns A & B



Photograph 22 – Masonry Walls 220mm wide



Photograph 23 – Western Elevation of Barn B



Photograph 24 – Removed brickwork at entrance door to Barn B



Photograph 25 – Infilled opening between Barns A & B



Photograph 26 – Barn Roof Structure with central post



Photograph 27 – Opening Through Cross Wall between Barns B & C



Photograph 28 – Disused Agri-plant and roof support in Barn B



Photograph 29 – Disused Agri-plant and roof structure to Barn B



Photograph 30 – Floor Hopper Barn B



Photograph 31 – Open front lean-to Barn B Eastern elevation



Photograph 32 – Open front lean-to steel frame structure with corrugated tin walls and roof



Photograph 33 – Barn C North elevation



Photograph 34 – Barn C



Photograph 35 – Barn C roof structure



Photograph 36 – Barn C roof and wall structure



Photograph 37 – Barn C interior roof and wall structure



Photograph 38 – Barn C interior roof and wall structure



Photograph 39 – Barn B/C junction



Photograph 40 – Slate DPC