

**Proposed Re - Development at  
Startifant Farm, Longridge Rd,  
Chipping,  
Lancashire.**



**Structural Appraisal.  
of the Stone Barn**

*On Behalf Of*

**Mr & Mrs R. Robinson.**

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# **J HADFIELD ENGINEERING SURVEYING**

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## **1. Introduction**

1.1 On the instructions of Mr & Mrs Robinson, a structural appraisal was carried out at the above property on Friday 7<sup>th</sup> July 2017.

1.2 The purpose of the appraisal was to assess the structural condition of the building as part of a planning application to convert the barn into two dwellings.

1.3 This report is based on a visual inspection of relevant and readily accessible areas of the property only, carried out from ground & first floor level externally and internally.

1.4 This report is a structural survey only, and does not incorporate specialist timber, drainage or damp surveys.

## **2. Findings**

### **2.1 General**

2.1.1 The subject building is a detached building of stone construction, under a duo-pitched, slated roof. It occupies a generally level site in the middle of the farm curtilage, and the front elevation is considered to face south.

2.1.2 The barn is estimated to have been constructed in the early nineteenth century, and we are advised that the alterations which have been made to the barn were historically there being an "L" shaped mono pitched single storey lean to wrapping around the western gable and partially the front elevation and has since been removed with the only trace being the differences in texture on the walls left by the weather. Also the eastern end of the barn has been extended where the Ice-cream facility is situated, this was probably constructed in the nineteenth century as it is of a similar build style.

More recently there has been some internal alterations at the eastern end of the building to permit the installation of the ice cream manufacturing facility.

Aside from this area, the barn is now unused.

2.1.3 A selection of photographs and sketches are included as Appendix's to this report.

2.1.4 This report should be read alongside the proposed drawings for the project, as submitted.

## **2.2 External Observations**

2.2.1 The slated roof of the barn pitches from front to back, with the ridge and eaves lines being noted as level. There is a void in the roof covering high on the pitch to the south elevation, at the junction with the western gable, which has been sheeted over as a temporary repair, however it has not been particularly well secured.

There are a few other locally slipped slates across the pitch to both the front and rear aspects. Rainwater gutters are present for approximately three quarters of the elevation, but there is no downspout and the water is therefore permitted to run down the face of the masonry.

2.2.2 The barn is constructed of random rubble stonework, which although now weathered would originally have been flush pointed. The masonry to the west of the large barn door opening to the front elevation is very poor, having been badly weathered to the point of voids having developed across the stonework.

An outward lean of this section of masonry can also be detected, although being at its worst at high level, it is difficult to quantify accurately. It was estimated to be a maximum movement of 35mm in 1m, with the outward movement commencing at ground level.

The barn door opening has been formed by a very shallow arch of stone visors, which have a timber lintel below. The low level masonry to the eastern side of the barn door is in much better condition, although between the barn door and the pedestrian door at the eastern end of the elevation, evidence remains of what appears to be the lean to extension to the barn, with a visible step between the two sections of masonry of up to 50mm (see photograph 1).

The quoins to what would have been the earlier barn to the west remain in place to approximately 2.5m above ground level, but the stonework above this level is continuous, with no quoins between. The high level masonry is again weathered, and that at eaves level bulges outwards.

2.2.3 The eastern gable of the barn is generally in better condition than that to the front elevation, being plumb, and exhibiting some signs of weathering of the mortar joints at low level. We are advised that some alterations were made to the ground and first floor level window openings when the ice cream parlour was created.

The jambs and lintel to the first floor opening are concrete, with the remaining lintel, jambs and sills being stone. There is an infilled pedestrian door at the northern aspect of the gable, but with no bonding with the surrounding stonework, the opening may soon be reinstated.

There is evidence of some patch pointing and repairs to the elevation, again considered to have been done as part of the works to the ice cream facility. There is a small diagonal crack limited to the mortar joints which commences at the eaves level with the front elevation and extends toward the ground floor window opening. It is no more than 10mm in magnitude and is not of a nature which is of structural concern. With no fascia boards at the roof line, it is the probable result of a small amount of weather ingress which has been permitted into the joint.

2.2.4 The eastern aspect of the rear elevation is difficult to assess in close detail as there is a dilapidated lean to and numerous semi-mature trees in close proximity to the wall. The centre of the rear elevation has noticeably distorted, with the upper part particularly water ingress due to the erosion of the pointing.

This area coincides with that on the front elevation where the barn was probably extended. The alignment of the front and rear walls is not correct and gives an impression of movement on the rear elevation though there is no sign of movement internally on the walls or roof structure components or where they join.

2.2.5 The western gable has no openings across the elevation and despite it being one of the more exposed aspects, the flush pointed masonry remains in reasonable condition.

The gable is dominated by a crack where it should join to the front elevation which extends from approximately 1.5m above ground level up the eaves, and is estimated to be, at its most severe, 75mm in magnitude (see photograph 3). The movement has occurred between the quoins and the remaining gable stonework, and even extends over the uppermost quoin suggesting that the movement is entirely limited to the front elevation. Pockets were noted in the stonework at approximately 2m above ground level, where timbers were previously seated to form the lean-to adjacent to the barn. Again, no fascia boards are present along the roof line, and the stonework below the missing slates to the front elevation is particularly uneven.

There is no evidence to suggest that the footing stones have moved and are structurally sound.

## **2.3 Internal Observations**

2.3.1 The roof of the barn is of timber rafters bearing onto two lines of timber purlins per pitch and a ridge board. The purlins in turn are supported off the gable walls and three timber kingpost-type trusses. Whilst close inspection of the westerly timbers was not possible, they do not appear to be suffering from wet rot or any noticeable wood boring insect damage as neither is the truss that can be inspected from the first floor loft area.

The purlins are slender, and although they are not noticeably deflecting, despite those below the void in the roof being wet, they are unlikely to be suitable for retention. ( see appendix B, photo 5 a & b )

2.3.2 What was the gable wall of what is considered to be the original part of the barn has been removed at first floor level, to accommodate the eastern addition. The miss alignment of the rear elevation is also pronounced internally, however the step in the masonry noted to the front elevation is not replicated to the internal aspect.

2.3.3 There is poor bonding of the perpendicular walls internally, and much of the internal masonry is formed from rounded cobble-type stones. The movement noted to the western gable is also visible internally, albeit not to the same extent.

The installation of the timber lintel below the stone arch is an unusual arrangement, however given the shallow nature of the arch, it is unsurprising that an additional support to the opening was required. This lintel was noted to have wood boring insect damage, and diagonal cracking to the masonry above would suggest that some deflection of the lintel has occurred.

2.3.4 All of the timber lintels visible internally are suffering from wood boring insect damage, but are a good section size for the nominal spans (aside from that to the barn door already discussed), and none are displaying signs of being overstressed.

2.3.5 The internal walls within the ice cream facility are concrete blockwork, and are unlikely to have been bonded into the external stone walls.

### **3.0 Conclusions and Recommendations**

3.10 From the findings summarized previously it is apparent that there are some structural weaknesses within the building due to its neglected condition due to the type and standard of materials originally used in construction.

3.11 Despite this, it is considered that on the whole the integrity remains within the barn and that with some areas of rebuild, it can be satisfactorily converted.

3.12 It is misleading to see the misalignment in the front & rear elevations are a defect as the inward / outward bulges to the rear and front elevations respectively, are considered to be the result of the way in which the barn was extended eastwards. (see appendix B, Photo 2)

The removal of high level quoins, removal of at least part of the roof covering, and the removal of the first floor masonry would have left a very unstable structure, even in the short term. That said, the step in the stonework to the front elevation would suggest that that of the original barn may have moved forwards prior to it being extended.

Also, the masonry to the front elevation to the west of the barn door would ordinarily be considered to be far enough away from the works at the eastern end of the barn to be relatively unaffected by the extension.

The position of the crack to the eastern gable is further indication of poor tying between the perpendicular walls, common when this type of rounded rubble stone is used in construction, and the outward movement is clearly limited to just the front elevation. (see appendix B, Photo 3 a, b & c )

3.13 A new insulated, concrete ground bearing structural raft will need to be constructed into the barn floor, this should extend to the existing wall edge being thickened around the edge and where the internal party wall will be constructed for the load bearing block walls.

These new blockwork walls will form the load bearing element of the barn, and should be tied back into the stonework using proprietary remedial type ties at the standard 900/450mm centres.

The new roof structure and first floor will also need to be adequately fixed, where bearing on, and strapped where parallel, to the blockwork in accordance with current Building Regulations.

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The method of construction should be in the following order :-

- Excavate the internal floor area and construct a structurally re-enforced raft for the floor.
- Build internal blockwork skin and internal load bearing walls to eaves level.
- Demolish external wall (area's shown in appendix C)
- Rebuild external walls, tying in to new block inner skin.

This should retain the structural integrity of the building throughout the construction phase.

3.15 We would recommend that the nominal arch to the main barn door opening be rebuilt with a galvanised right angled lintel hidden behind to give additional support.

Although there is little evidence of the arch having dropped externally, the addition of the timber beam below is an unusual step, but probably a necessary one to support what is inherently a weak structure. The existing stone voussoir's could be reused if required. (see appendix B, Photo 4)

Appendix C, shows the area's needing to be re-built that equate 23 m<sup>2</sup> of random stone work to the two elevations, with an overall exterior area of 240.4 m<sup>2</sup>. This equates to 09.6% or the overall area that is well within the 30 – 40 % allowance.

3.16 Consideration should be given at Building Regulations stage to allow sufficient headroom to accommodate the retention of the existing trusses.

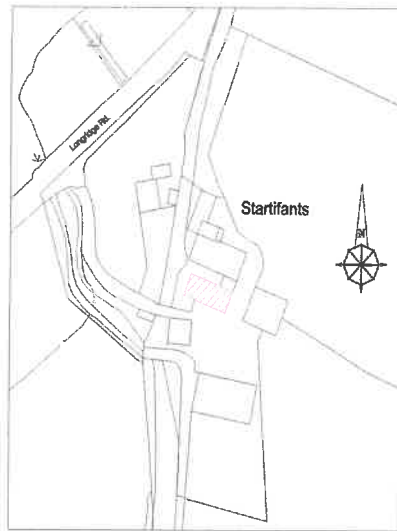
Aside from requiring treatment for wood boring insects, the timbers do appear to be in good condition, and as they are supporting a slated roof now, there will be little increase in load on the structure once it is converted. Given that the purlins are slender (and some affected with wet rot) it is unlikely that these could be retained, and the rafters will require replacement in order to accommodate the necessary insulation.

3.17 Considering the barn generally, once the rebuilding works have been undertaken, we would recommend that all elevations are repointed with a suitable mix of mortar.

The existing joints should be raked out to a minimum depth of 20mm prior to the application of the new mortar.



**Appendix A – Map showing location of the barn.**



**Appendix B – Photos of the exterior of the barn.**



**1 : Photo of the front elevation.**

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**2a : Photo of Step in front elevation masonry**



**2b : Photo of Step in rear elevation masonry**



**3a : Photo of West gable.**



**3b : Photo of West gable (Internally)**



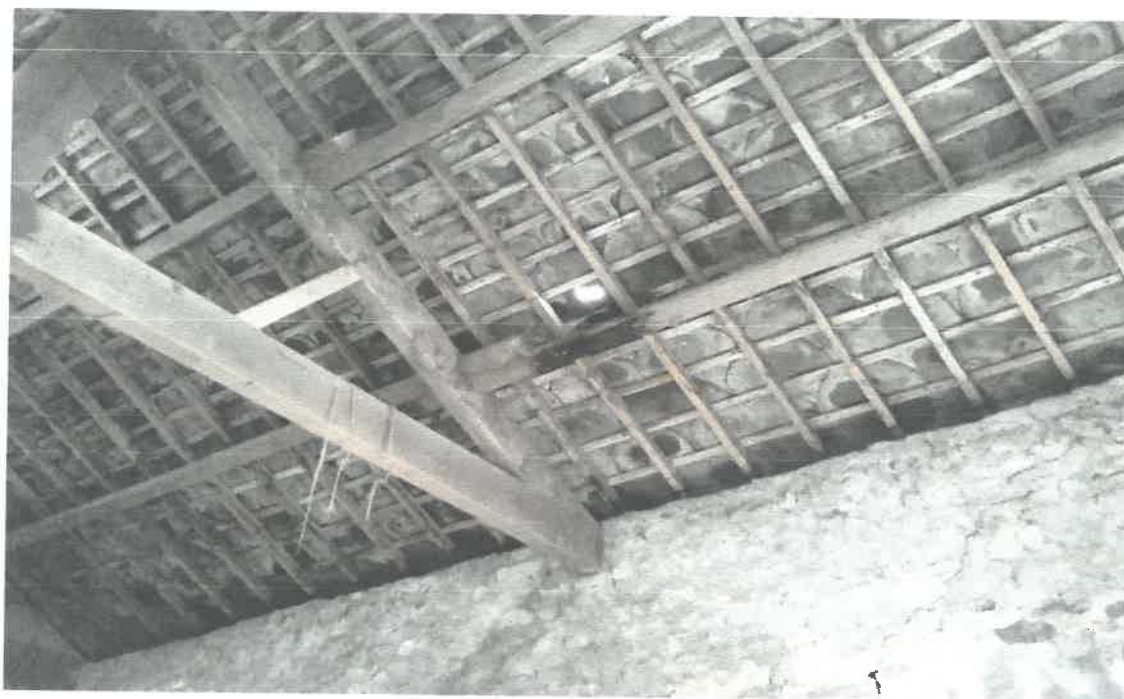
**3c : Photo of West gable.**



**4 : Photo of Front elevation arched door-way.**



**5a : Photo of internal roof structure – East gable end**



**5b : Photo of internal roof structure – West gable end**

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Appendix C – Drawing showing area's to be rebuilt.

