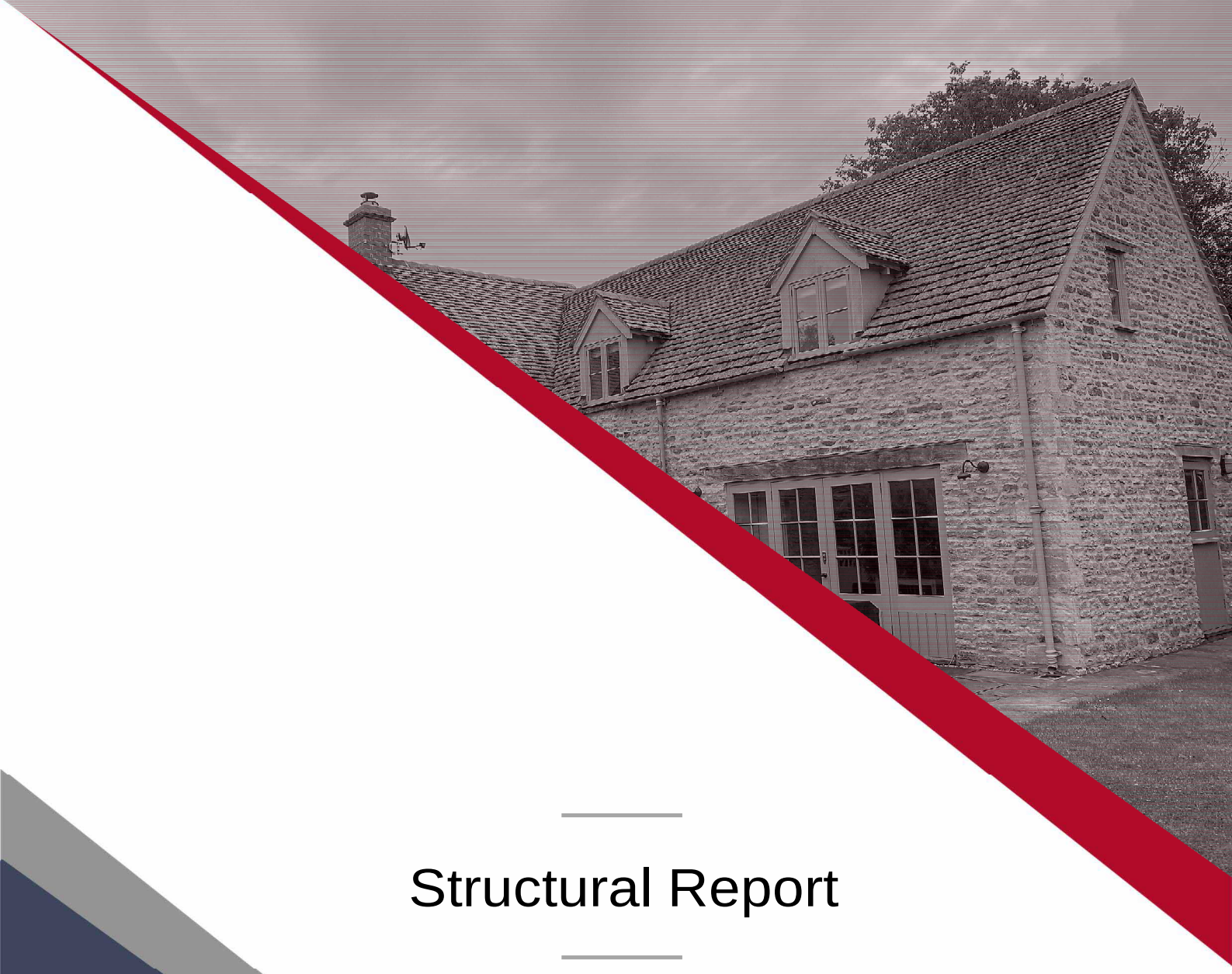

Structural Report

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Client: Demian Brasil

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1 Introduction

This report has been prepared following a request from Tyack Architects to undertake inspections of the barn at Barn Cottage, Bledington which is being considered for conversion into residential accommodation as an extension to the existing cottage.

This report provides an assessment of the suitability for conversion as well as the likely impact of the proposed scheme. This report will also consider the feasibility of retaining the existing structural fabric of the buildings with particular considerations as to whether the elements are deemed perishable or non-perishable. The elements under consideration will include the existing roof structure, walls, floors and foundations.

The report has been compiled without the benefit of a detailed ground investigation or desktop study of the geology of the area and our instructions do not extend to undertaking any prior research of the property or review of historical records or geological maps. Therefore, the assessment will be based on likely foundation depths for buildings of this nature.

We have not had the opportunity to undertake any intrusive investigative work and the assessment is based on a simple visual inspection without having had the opportunity to study the structure over a prolonged period of time.

The report does not consider the market value of the property, rights of access, tenure or the condition of adjoining outbuildings where these do not form part of the proposed development.

2 The Site

Barn Cottage is domestic dwelling situated in the centre of Bledington and has a traditional Cotswold Stone barn located within its curtilage. The site is surronded by the Bledington village to the South and West with the B4450 to the East and North with the remaining village beyond. Arable farmland surrounds the village.

3 Proposed Development

The proposed development is to convert the existing barn into habitable accommodation incorporating the construction of two new mezzanine floors. The barn is to be linked to the existing cottage through the construction of a single storey link structure.

4 The Barn

4.1 Structural Form

The existing barn structure consists of timber rafters supported on a series of timber purlins, supported on timber trusses, which span the full width of the barn and gain support from the load-bearing Cotswold Stone walls, which transfers all load into the supporting ground. The existing floor slab is of concrete construction with varying levels throughout.

4.2 Site Observations

- Existing trusses have failed significantly with lateral displacements resulting in failure of the trusses in several locations
- Evidence of roof spread expressed in the front and rear walls
- Rafters are only supported by purlins
- Beams over barn door openings appear to comprise a steel beam to the inside face and oak beam to the external face
- Evidence of movement between the gable wall and the front/rear walls
- Concrete floor slab is a irregular with varying levels throughout
- Left-hand Gable wall has been subject to some form of buttressing/underpinning at its base
- Lack of buttressing walls

5 Discussion

The proposal is for the existing barn to be converted into habitable accommodation with a mezzanine floor installed at either end of the barn. The existing house will be connected to the barn at the North East gable, with steps as required to provide the necessary access. Given that this gable wall has been subject to some form of previous repair/stabilisation, expressed as an outstand of concrete at its base, investigations will need to be completed to establish the nature of the stiffening work including the size and form of any underpinning/bracing, to allow its purpose to be understood and to enable it to be modified where access steps are required.

When considering the existing slab, to satisfy current building regulations, finishes will need to be applied and to this end it would first need to be levelled before applying any form of insulation and screed. However, when considering the level of the slab in relation to head heights and thresholds, it is preferred that a level threshold is achieved at the main barn door which will result in the slab needing to be removed and lowered. This will need careful consideration in relation to carbon impact as leaving the slab in place and reusing it with a levelling screed presents the most carbon efficient solution. However, if levels and head heights demand that the slab needs to be removed then it would be sensible to consider

crushing the excavated concrete to allow it to remain on site and be reused as a base for the new slab. To lower the slab, the depth of the existing wall foundations will need to be established to allow the depth to which the slab can be lowered to be realised, the nature of the founding strata, which is believed to be sands and gravels over the charmouth mudstone formation. If the underside of slab needs to extend beyond the base of the walls then a scheme of underpinning may be required.

When considering the walls, they are generally in good condition, although some remedial measures are required in the four corners of the barn to ensure that the gables are sufficiently tied to the front and rear elevations. Given that the structure is not listed, this can be achieved with a scheme of stitching through the installation of precast concrete lintels at regular vertical centres. The upper part of the wall, which gives support to the wallplate, will need to be assessed as part of the upgrading of the roof structure, as some of the stone may have become loose as a result of the roof spread that has been expressed in the structure.

It's my understanding that the roof structure is to be replaced in full with three new trusses introduced splitting the roof space evenly. Given the current drive for Net Zero and the need for a reduction in carbon footprint of construction sites, the reuse of as much of the existing salvaged timber as possible, would be preferable. The reuse of the rafters and purlins coupled with the construction of the new trusses, with timber that has been sustainably sourced and sized to reduce the requirement for steel plating, allows the roof to be rectified and returned to good working order with minimal impact on the environment.

When considering the existing roof structure, the existing trusses have suffered significant deformation and deflection as a result of the load applied by the existing roof. Attempts to stiffen the trusses are evident thoughout the roof, to prevent failure. Given that the roof covering will need to be upgraded to align with current building control requirements, the trusses will need to be replaced as they do not have sufficient capacity to support the increased loads.

When considering the new positions of the three new trusses in place of the existing, this will result in the existing purlins losing their support in the their current location. On this basis it would be advisable to install the trusses in the original locations to prevent the need to replace the purlins. However, if this proposal significantly compromises the architectural scheme then a method of extending/stiffening the purlins could be considered prior to wholesale replacement. Alternatively, they can be removed and reused elsewhere on the property, for instance as part of the proposed link structure.

For the construction of the new mezzanine floors, these will need to be supported by a load transfer system spanning between the front and rear walls of the barn. To reduce the span and improve efficiency it may be possible for the platform to gain support from the trusses. The floor plates will act as a means of providing stability and restraint to the external walls.

6 Conclusion

The barn structure, other than the roof trusses, is generally in reasonable condition and has sufficient capacity within its walls to a accommodate the conversion into habitable accommodation.

Some of the recommendations in this report have been provided based on the current design rationale following the COP26 Summit and the resulting design guidance for achieving Net Zero. How these recommendations are incorporated into the final design will be dealt with at the detailed design stage, but the earlier that they are considered as part of the project the less impact the structure will have on the environment.

It is clear that the existing structures are sufficiently robust, proportioned, substantial and largely free from significant movement or deterioration which cannot be rectified. This concludes that they are suitable for conversion to habitable accomodation without compromising their integrity. The buildings lend themselves readily to the proposed conversion, which will not require a significant element of structural alteration or reconstruction.