

# Laneside Barn, Grindleton – Addendum to the Structural Inspection for Planning

**Version:** 1.1

**Description:** For client and planning approval

## Summary

An inspection of the traditional masonry field barn located close to the intersection of the Grindleton Road and Green Lane, Grindleton was performed by Richard Lines C.Eng, MIStructE on the 23<sup>rd</sup> of August 2024.

The inspection found that the barn was suited to conversion subject to several recommendations, one of which was the demolition and rebuilding of the small lean-to extension to the east gable, and another was the demolition of the rear elevation of the rear cat-slide type extension to the southern elevation. This addendum makes reference to the naming system adopted for the individual wall panels, summarised below. Extension 1 and WP7 were recommended for demolition.

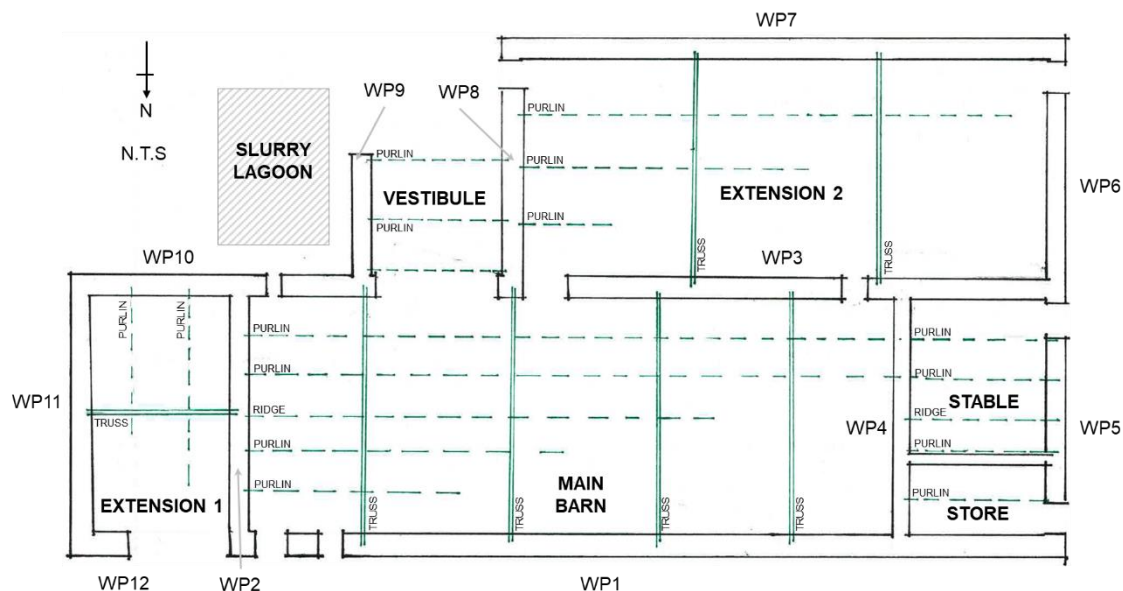


Figure 1: Site layout and nomenclature of the main barn and additional structures.

We have since been asked to comment on an updated scheme which has made some significant changes to the proposals, intended to address concerns highlighted by the planning authorities. With these updates in mind, we maintain our recommendation that the barn remains suited to conversion, subject to the following recommendations (*italicised font indicating the updated proposals*):

- Timely backfilling of the slurry lagoon with free draining granular material, well compacted in layers. Consideration should be given to whether to provide drainage to the lagoon to prevent a buildup of water here.
- Formal drainage should be provided around the shallow original barn foundations and guttering at roof level.
- Installation of a modern concrete ground floor structure.

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- Localised underpinning of WP7 at its eastern end, with investigation by excavation at the western end and underpinning if required here also.
- Any small areas of damaged or excessively deformed masonry should be rebuilt during works.
- Formal tying of any unsupported masonry panels at their abutment to adjacent masonry panels.
- Cosmetic 'repair' of cracks in masonry and a full repointing with a suitable lime mortar to maintain the weatherproof envelope.
- Replacement of the missing quoin stone at the northwestern corner.
- All timber lintels should be replaced with durable modern steel or concrete units. All stone heads to be retained should be inspected and replaced where necessary. Long span stone heads should be supported by other means.
- Installation of a suitably detailed first floor plate, capable of tying and restraining all connected masonry panels in both principal directions.
- Checks on all roof timbers which are to be re-used (if any) to include a thorough inspection for infestation and decay and verification by calculation for their capacity to bear the proposed new loads.
- The first-floor level doorway adjacent to the masonry arch in WP3 (southern elevation) should be blocked up with tooth bonded masonry, and the lintel below replaced. Temporary stability should be maintained with horizontal and vertical propping at the doorway during any masonry works locally to resist the horizontal arch thrust during works.

## Extension 1

We have received an updated set of planning drawings which indicate that Extension 1 is no longer under consideration for conversion and is to be demolished. The structural stability of Extension 1 is therefore not of concern.

## WP 7

WP 7 has suffered from a shallow foundation which has been wet for a long period of time due to the lack of guttering to the large roof area directly above. The water discharging onto the ground here will have softened the soils, allowing the wall to settle at its outer edge by a small amount. The settlement of the outer portion of the wall relative to the inner portion sets up a rotational type of movement which has manifest in an outward lean which was most pronounced at its eastern end.

The previous recommendation for demolition and rebuilding of WP7 was made on the basis of the balance which must be struck when considering the level of construction input and other obligations, such as planning restrictions. This need to propose the path of least resistance in construction to meet a necessary standard of structural performance is a central consideration in Structural Engineering practice and mandated by law in the CDM 2015 legislation.

The requirement to retain WP7 that has come to light through the planning process materially alters this balance and we have therefore altered our recommendations to support the proposed scheme and maintain our recommendation that the structure remains suited to conversion. The following paragraphs are provided to justify these recommendations.

A significant length of WP7 is to be an opening, which can therefore be neglected from the consideration of the generally poor condition of the masonry by default. Considering the remainder of

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the wall, the proposed opening has shifted slightly to the east, therefore removing slightly more of the masonry which was observed to be in the worst condition and preserving more of the masonry to the west which was in a better condition.

During the inspection, a maximal outward excursion of 75mm was estimated with a plumb bob and measuring tape. By conservative engineering theory for materials such as masonry, a freestanding (unrestrained) solid wall may deviate up to one sixth of its thickness before it is considered unstable – a manifestation of the ‘middle third rule’ for compressive structural elements. A cavity or other construction such as a rubble fill type wall (such as WP7) would reduce this limit slightly, and WP7 exceeds this limit.

If a wall is restrained against further movement (i.e. no longer considered to be freestanding), an often-quoted rule of thumb for structures of this nature is that 50 – 85% of the walls thickness is an acceptable and stable bulge, if the wall can be restrained<sup>1</sup>. Suitable restraint can be arranged by means of a firm connection to the roof structure and where necessary by some posts framing the proposed opening and concealed in the new construction to tie back to at the opening.

With the existing wall stabilised, the issue of the shallow foundation and the (likely) softened soils upon which they bear must be addressed. For this we recommend some localised underpinning at the eastern end of the wall, and some investigations into the ground conditions at the western end with a view to some additional underpinning locally if required.

Underpinning has successfully been undertaken to similar heavy masonry structures for decades. The underpinning would be carried out in the classical manner, excavating small bays by hand in a specified sequence, sized to suit the masonry characteristics and flooding with concrete to underpin. This underpinning would be undertaken prior to the formation of the proposed opening and would also require the careful propping / shoring of the eastern free end during excavations for the end bay.

In this manner, we believe the remainder of WP7 would be suited to the proposed conversion plans. A similar approach has been taken to for a significant number of Pennine field barns and as such can be considered a tried and tested technique for structures of this nature.

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<sup>1</sup> Robson, P. (1991). *Structural Appraisal of Traditional Buildings*. Gower Publishing Company, Limited.