

From: Stephen Penfold [mailto:stephen@spse.ltd]

Sent: 06 July 2021 10:24

To: Theo Hughes <theo.hughes@savills.com>

Cc: William Sleeman <WSleeman@savills.com>

Subject: Lepe Farmhouse - Redundant Barn, Lepe, Exbury Estate, New Forest.

Hi Theo,

Further to your e-mail of 18.06.21, I write to confirm I visited site on 02.07.21, to undertake an inspection of the front wall of the redundant farm building at the above, currently being re-roofed and where structural movement has been reported.

The site is located on the north-eastern side of Lepe Road, approximately 0.4m north of the shoreline of The Solent. The redundant farm building inspected is positioned on the south-western side of the site, with the south-western front wall facing onto Lepe Road.

It is a single storey building, approximately 20m long x 5m wide, with a duo-pitched roof, sloping front to back at an angle of approximately 45°. The northern end is hipped and southern end is dressed into an adjacent building.

At the time of the visit, no roof finishes were present, however it is believed to have been formerly covered in plain clay tiles, supported on a cut timber roof structure, which comprises 100x50 rafters at 400mm centres, a 100x75 purlin at midspan and 200x50 raised collars at purlin level positioned at approximately 2.0m centres along the length of the building.

Some recently installed 200x50 lateral ties have been installed at eaves level, at approximately 2.4m centres along the length of the building.

The cut timber roof structure is supported on solid masonry walls, the upper section of which is 215mm thick and the low level section 330mm thick, with a corbeled step internally.

In the north-west corner of the building, the south-western front and north-western flank walls are bonded together in differing coloured brickwork, forming decorative quoins up the height of the flank wall.

No guttering was recorded at eaves level.

The timber to the cut roof was found to generally weathered, with localised areas of wet rot and decay and varying degree's of insect infestation throughout. Some minor undulations were recorded along its length, although these did not appear excessive.

At the western end of the south-western front wall, there has been significant eaves spread, with the top of the wall pushed outwards by between 50-100mm.

The brickwork to the north-western flank wall was found to be well weathered, with the mortar joints recessed to varying degrees, particularly at ground level.

A tapering vertical crack following the edge of the quoins at the western end of the north-western flank wall was recorded. At the top of the wall, this crack was up to 25mm wide, reducing to 2mm wide at ground level.

At the western end of the south-western front wall, the brickwork was again weathered and a tapering vertical/diagonal crack, 25mm wide at eaves level reducing to 5mm wide at ground level, was recorded on the inside face. This crack was mirrored on the outside face.

Approximately 2m from the north-west corner, a further vertical crack between 2-5mm wide, was recorded on the inside face of south-western front wall and again this crack was mirrored on the outside face.

Typical photographs of the damage recorded is indicated in the attached photos and those in following e-mails.

From our inspection, there has clearly been notable structural movement at the western end of the south-western front wall of this redundant farm building, as demonstrated by the eaves spread and cracking recorded in the walls.

Much of the movement is historic and not the result of a recent event, however it is unclear whether it is active and ongoing, or whether it has ceased.

There are a couple of likely causes of the movement:-

1. A raised collar roof construction will always generate horizontal forces at eaves level on the supporting walls and such forces will be greater with heavier clay tiles. These horizontal forces will cause some lateral movement at the head walls, i.e. eaves spread, and this will be exacerbated when the members of the roof structure lose their stiffness through excessive decay and insect infestation, as is the case here.

Eaves spread will also cause cracking in the supporting walls, particularly at junctures when they are not adequately bonded together, again as is the case here with the decorative quoins in the north-west corner.

2. If well maintained gutters are not provided to a pitched roof, then rainwater discharging from the roof can, over a long period of time, cause washout of the ground supporting the foundation to the walls, which in turn will cause cracking in the walls.

In our opinion, the main cause of the movement in this building is excessive eaves spread through an inadequate roof design, exacerbated by a lack of maintenance to the building and inadequate bonding of the walls in the north-west corner.

Although the movement is historic, if remedial works are not undertaken, then this is likely to continue to the stage where the building possibly becomes structurally unstable.

In order to restore the buildings structural integrity, the following remedial works are recommended:-

1. Horizontal ties are introduced at eaves level along the full length of the building. These ties must span the full width of the building and comprise a minimum 200x50, C24, timbers, positioned at eaves level and bolted through the rafter feet and fixed with an M12 bolt. These must be installed every other rafter, i.e. 800mm centres.
2. The tapering crack down the side of the quoins in the north-western flank wall must be stitch repaired using stainless steel Helibars, as the attached and installed strictly in accordance with the manufacturers recommendations. These Helibars must be drilled through the centre of the wall at 300mm centres vertically and have a minimum 300mm anchorage in the main part of the north-western wall, as the attached sketch SK01.

3. The diagonal/vertical cracks must again be stitch repaired using Helibars, here 900mm long and again installed strictly in accordance with the manufacturers recommendations at 300mm centres vertically.
4. All cracking must be re-pointed with a hydraulic lime mortar, to match the properties of the existing lime putty mortar. In this regard, samples of the existing mortar should be taken to The Lime Centre at Twyford, Winchester, who will be able to design a suitable hydraulic lime mortar match. In no circumstances, must a cement based mortar be used.
5. The walls should be re-pointed throughout using the hydraulic lime mortar detailed in above.
6. All excessively damaged members making up the existing roof structure should be removed and replaced with new, of the same size and species as the existing timbers.
7. Gutters must be provided at eaves level, which discharge to a suitable sized soakaway, located a minimum of 5m away from any building, to meet the requirements of the Building Regulations.

As the proposed remedial works is to a building in the curtilage of Listed Building, we would recommend consultations with the Local Authority, Conservation Officer, are held, to ensure the proposed remedial works are acceptable and to see whether a formal Listed Building Application is required.

If you have any queries on any of the above, please let me know.

Regards

Steve Penfold

For and on behalf of STEPHEN PENFOLD STRUCTURAL ENGINEER LIMITED