

DAVID PARTRIDGE LTD

CHARTERED ENGINEER

B.Eng., C.Eng., M.I.C.E.

REPORT ON : **REDUNDANT BARN,
100 ACRES FARM,
SOPWORTH,
WILTSHIRE
OX15 6HW**

JOB NUMBER **25 / 73**
CLIENT **Mr Andrew Sells**
DATE **22nd April, 2025**

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1.0 PREAMBLE

It is proposed to seek Consent under the Planning Act for the conversion of the redundant agricultural building on this site into residential use. It stands just north of the former farm dwelling on generally flat land in open countryside to the south east of the village of Sopworth in the county of Wiltshire. [Plate 01].

The building has clearly been built at different times with the taller original part [reference 'X'] orientated east to west, a slightly later addition to its south [reference 'Y'] and a much later addition to the west [reference 'Z'].

Parts X and Y have stone walls whereas those of Z are concrete blockwork.

The subsequent Sections of this Appraisal are sub-divided to allow a separate assessment of each of the three parts.

The purpose of this document is to appraise the stability and condition of the primary loadbearing structural elements which form the three parts and to advise if they are 'suitable' for residential conversion with the consideration that they should require no more than 'normal' levels of maintenance and remain serviceable over the minimum anticipated design life of sixty years once converted; it is a high level assessment to establish the principle, not a detailed analysis of each element.

The inspection of the building was made on 2nd April, 2025 by the Principal of this Practice, David Partridge B.Eng.[Hons], C.Eng., M.I.C.E. who is also the author of this Report. My experience of this type of residential scheme extends over 45 years in Private Practice covering all types of redundant agricultural buildings.

2.00 STRUCTURAL FORM and CONDITION

The structural form of each part is very typical of agricultural buildings which have been erected over the lifetime of a farm establishment with parts X and Y being older with stone walls and Z much younger with concrete block walls.

PART 'X' [Plate 02]

ROOF.....

The structural form comprises a cut timber duo-pitched natural stone tile clad roof of rafters, on two purlins below each slope, on trusses approximately equally spaced along the building and supported on the side walls. [Plate 03].

The rafters are 'spike nail' fixed to the purlins which are very securely attached with 'half' joints over the trusses. [Plate 04].

The trusses are well 'designed' and constructed with a principal rafter under each slope and a horizontal tie at eaves level. [Plate 05].

Condition :

- All timbers of the rafters, purlins and trusses are generally free from damage caused by damp ingress, rot and splitting. Very minor water ingress has stained some timber surfaces, particularly at eaves level [Plate 06] but no apparent loss of structural cross sectional area can be seen in any timber.
- Notably, all timber joints of the trusses remain tight with no distortion or splitting. [Plates 07 and 08]. The trusses remain vertical with no sway towards either gable end which can be a common defect in this type of building.

EXTERNAL WALLS.....

The walls comprise solid natural stonework with varying quantities of lime mortar.

The roof rafter ends and masonry in the gable ends are supported over the wall openings with timber lintels which have sufficient end bearings and are well set on the masonry. [Plates 09].

Condition :

- The two gable end and southern walls are generally vertical over their entire elevations with no relevant or significant distortion. Except that the top of the eastern gable leans out slightly [Plate 10].
- The northern wall leans out along the majority of its length [Plate 11] and vertical cracks have opened internally at the wall's abutment with the gable ends. [Plates 12 and 13].
- The masonry under each truss bearing is in excellent condition and not distorted.
- The timber beam carrying the wall over the large opening in the northern wall is quite badly deflected. [Plate 14].

PART 'Y' [Plate 15]**ROOF.....**

The structural form of the corrugated sheet clad mono-pitched roof is series of timber purlins spanning on to the two side walls. [Plate 16].

Condition :

- The purlins are straight with no vertical deflection.
- Minor damp penetration exists but there is no loss of timber cross sectional area.

EXTERNAL WALLS.....

The walls are essentially 'wing' walls to form an extension against the south wall of the original building. They are not bonded to the south wall. [Plate 17].

Condition :

- The top of all walls lean outwards. [Plates 17 and 18].
- The top of the main eastern wall is collapsed between eaves level and the roof of the associated lower part. [Plate 19].

PART 'Z' [Plate 01]

ROOF.....

The structural form is very simple, comprising a duo-pitched corrugated sheet covering supported on timber purlins spanning the full length of the building. [Plate 20].

Condition :

- The purlins show no obvious, serious deflection or distortion.

WALLS.....

The walls comprise 215mm thick dense concrete blockwork supported on a concrete raft foundation taken into the natural brash subsoil. [Plate 21].

Condition :

- No distortion or cracking exists in the walls.

3.00 DISCUSSIONS

Part 'X'

The roof structure shows no relevant defect. The timbers are free from rot which would be caused by water penetration and all timber joints are well made and show no evidence of opening up which, in itself, is a good sign that the overall building has suffered no unusual structural movement.

Preliminary structural calculations show that the timbers will satisfactorily sustain all existing self-weight and imposed snow loads and can be retained.

The height to thickness ratio of the external walls is well within the maximum ratio allowed by the British Standard Code of Practice for Loadbearing Masonry [BS5628]. The outwards lean in the northern wall has been caused by nominal slippage of the timber rafters down the slope because the rafters are not robustly fixed to the purlins. In addition, the walls of Part 'Y' are offering significant lateral support to the southern wall of 'X' meaning that any tendency for lateral sway will be wholly manifest in its northern wall.

The introduction of a new first floor will allow the discreet installation of metal tie across the narrow width of the building to arrest any chance of future lateral movement quite apart from the stiffening effect an intermediate floor will provide by itself.

The timber lintels over the opening in the northern wall are too badly deflected to be retained and should be replaced 'like for like'.

Part 'Y'

The roof purlins display no significant distortion and can be retained.

Whilst the relative thickness of the walls to their height is well within the Code of Practice limit, the fact that they are not bonded into and are therefore not restrained by Part 'X' has caused them to deflect laterally, almost to the point where ideally they should be re-build. The absence of bonding is probably exasperated by the walls having no foundations.

Part 'Z'

The roof purlins display no significant distortion and can be retained.

The relative thickness of the walls to their height complies with the Code limits which together with the existence of a robust concrete foundation explains the absence of superstructure movement.

4.00 CONCLUSIONS

The primary structural elements of Parts X and Z are in good condition and display very limited evidence of distress caused by an inability of the elements to satisfactorily sustain externally applied loads --- snow load applied vertically on the roof and wind applied horizontally.

This leads to the **conclusion** that :

Parts X and Z of the existing building are suitable for conversion to residential use.

Whilst the roof of Part Y might be capable of retention, the three 'wing' walls display sufficient lateral deflection and stone collapse to warrant their re-construction.

Part Y should not be retained.

Signed *David Partridge* Dated *22nd April, 2025*

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APPENDIX A

**REDUNDANT BARN, 100 ACRES FARM,
SOPWORTH.**

PHOTOGRAPHS TO ACCOMPANY REPORT.



PLATE 01 -- GENERAL VIEW OF ALL PARTS

PART 'X'



PLATE 02 -- OVERALL VIEW OF PART X



PLATE 03 -- ROOF STRUCTURE



PLATE 04 -- RAFTER, PURLIN AND TRUSS CONNECTIONS



PLATE 05 -- TRUSS STRUCTURE AND BEARING TO WALL



PLATE 06 -- NOMINAL DAMP PENETRATION



PLATE 07 -- TIGHT TRUSS JOINT AND RIDGE



PLATE 08 -- TIGHT TRUSS JOINT AND BOTTOM TIE



PLATE 09 -- TIMBER LINTELS OVER OPENINGS



PLATE 10 -- OUTWARDS LEAN IN TOP OF EASTERN WALL



PLATE 11 -- OUTWARDS LEAN OF NORTHERN WALL



PLATE 12 -- CRACK IN CORNER



PLATE 13 -- CRACK IN CORNER



PLATE 14 -- BADLEY DEFLECTED TIMBER LINTEL

PART 'Y'



PLATE 15 -- GENERAL VIEW



PLATE 16 -- ROOF PURLINS



PLATE 17 -- UNBONDED WING WALL



PLATE 18 -- BADLY LEANING WING WALL



PLATE 19 -- PARTLY COLLAPSED WING WALL

PART 'Z'



PLATE 20 -- ROOF PURLINS



PLATE 21 -- WALL AND FOUNDATION