

Cae Madog Farm, Church Road, Gwynfryn

Structural Assessment of Suitability of Outbuildings for Conversion to Dwellings

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Introduction

This report is prepared on the instruction of Mr. and Mrs. P. Tomlinson, owners of the property. The report is intended to assess the suitability of the structural elements of the buildings for conversion to dwellings.

There are two buildings included in the application. These are referred as the 'Traditional Barn' and 'Modern Building'. Each are assessed separately.

The buildings are currently disused barns that were originally part of the working farm but are now used for storage or similar purposes.

Traditional Barn

An L shaped two storey building in stonework with a corrugated sheeted roof and a footprint of approximately 130 sq. metres.

Walls

The walls are constructed in stonework approximately 450 mm thick. The height varies averaging 3.8 metres from ground level to wall plate. The stonework to the South and East elevation is in good order with no indications of cracking or vertical misalignment. There are several openings on this elevation but the stone lintels are true to level and no sign of distress to the adjacent stonework.

The North Elevation (rear) stonework acts as a retaining wall to a maximum height of 2.3 metres to the field. An assessment of the structural stability is not possible as the width of the wall at the base cannot be determined without excavation and it is not intended to remove any material for the conversion.

However the wall is intact both materially and in both the vertical and horizontal alignment. In view of the length of time that this wall has been adequately functioning in its retaining capacity it can be confidently taken that it will continue to do so for the foreseeable future life of the building.

All the gable walls are of similar condition with no major defects therefore it would be advisable to retain the walls in their present condition to keep the building in character with the surroundings.

Foundations

The absence of any indication of subsidence or stone course misalignment leads to the conclusion that the existing structure is founded on the traditional footing appertaining to the period. As any conversion for domestic use would not increase the foundation load above that currently applied, the foundations are not likely to require any additional support e.g. underpinning.

However it would be prudent to investigate the nature of the sub-soil and the extent of the stonework below ground level and provide a calculation to satisfy the building regulations.

Floors

The existing ground floor concrete has been removed as a precaution due to the uneven and rough finish together with non-specific steps in level. This operation would have been necessary independent of any future use. The subsoil is dry and either bedrock or very stiff clay suitable for a new domestic ground floor construction incorporating insulation, dpm and concrete. The floor may act independently as the walls require no support.

The first floor will require to be renewed using timber joists as the existing floor is uneven and not structurally sufficient for domestic loading. A minimum of 200x50 mm C24 joists at 400 mm. ccs or the equivalent would be adequate.

Roof

The roof is constructed of cement /fibre and metal sheeting on rafters supported by purlins which are, in turn, supported by traditional timber trusses. The proposed conversion includes replacing the roof covering with slates and rafters sized to suit current building control requirements for insulation and stability.

The wall plate condition was poor and that replacement will be required shortly although this is not a major structural element.

An initial analysis of the purlins indicates that some strengthening or replacement would be required and the existing roof trusses to be modified to provide adequate headroom. Depending on the allowable height of the wall plate it would be possible to retain the basic frame of the trusses but lift the bottom boom section in either a Raised Chord truss or Compound Swiss truss format.

Recommendations

Prior to Conversion:

Expose the foundations and assess the bearing capacity of the sub-soil.

Check the capacity of the existing purlins and roof trusses for the increased roof loading.

Required maintenance:

Pointing to external stonework as necessary.

Replace affected lengths of wall plate.

Conclusions

The building is substantially constructed and does not suffer from any major defects. The structural elements are sound and can be utilised in a proposed conversion to the extent permitted by current building regulations.

However if the proposed conversion is not carried out the building will require attention in areas outlined in this report or deterioration will very quickly accelerate.

Modern Building

A rectangular single storey structure in 225 mm brickwork with a steel sheeted profiled roof with a footprint of approximately 60 sq. m. Floor to eaves is 2.5 metres and the roof pitch is 20 deg.

Walls

The building is constructed with 225 mm. brickwork walls with the predominant openings to the East elevation. The exterior condition is fair with no indication of vertical or horizontal displacement.

Similarly there is no roof spread at eaves level and the gables are not displaced at the apex.

Internally the brickwork shows signs of water ingress with old plaster adhesion lost. Some internal cracks are visible to the internal faces but these are not critical and can be repaired during any conversion works.

The openings on the East elevation are sited as such that current building regulations would require additional stability in the form of wind posts or piers. The lack of piers on a 225mm. wall of this length is not currently acceptable from a stability standpoint . These deficiencies should be considered when planning future layouts, particularly in respect of internal walls

Foundations

Reportedly these are in concrete 450 mm wide to an undetermined depth but the nature of the local subsoil is such that the actual depth, provided an inspection is confirmatory, is not necessarily critical. This conversion would remain single storey and therefore the increased loading would be minimal and well within capacity.

Ground Floor

Constructed in concrete of unknown depth but likely to be in the order of 150mm. The floor is not part of the structural integrity of the building but should be examined to determine if the expansion / construction joint which would be required in a concrete floor of this area is sufficient prior to other work being carried out.

Roof

Roof construction is metal sheeting on purlins supported on steel angle trusses. This type of roof is typical of agricultural buildings and is designed to carry the standard live loading and minimal dead load. The roof has a slight undulation and superficial damage and will require replacement in any proposed conversion.

Neither the purlins or the angle trusses are sufficient to carry a slate roof to a dwelling. However if the proposal is to construct a vaulted roof using ridge beams and / or new purlins the existing angle trusses could be retained as a feature to keep the character of the building.

Recommendations

Determine the depth of foundations and the nature of the subsoil to assess bearing capacity.
Effect temporary repairs to the roof to prevent further water ingress.

Conclusions

This building is substantial and suitable for conversion to a single storey dwelling but the design of a conversion should pay attention to increasing the stability of the brickwork. Similarly a new roof construction can incorporate the existing trusses as a feature if required but shall be a self-supporting unit with minimal lateral loading to the brickwork.



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