



Job No. SE18-451

Clive Olds
Bosanketh Farm
St Buryan
Penzance
TR19 6HF

Sumner
Goonbell
St Agnes
Cornwall
TR5 0PQ

www.entosconsulting.co.uk
01872 554031

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Dear Clive,

**STRUCTURAL FEASIBILITY STUDY FOR THE CONVERSION OF . . . EXISTING BARN AT
BOSANKETH FARM TO HABITABLE DWELLING**

Thank you for inviting Entos Consulting Ltd (Entos) to carry out a feasibility study on your barn. The purpose of this report is to outline the feasibility and structural alterations required to convert the existing barn into habitable dwelling. Several recommendations have been made in this report, to advise you of the structural works required to develop the existing barn.

Entos carried out a site inspection of the existing barn on the 4th December 2018. The inspection was a non-intrusive visual inspection only. The findings from our inspection are discussed below.



Barn

This barn consists of two adjoining structures, constructed in a 'T' configuration. For the purpose of this report, the structure will be divided into three discrete areas – The structure forming the leg of the 'T' shall be referred to as Area 1, the north half of the structure forming the cross of the 'T' shall be referred to as Area 2 and the remaining area referred to as Area 3.

Area 1

Description:

The side walls and the south-west gable wall are constructed from random stone, with the external elevation of this gable having been faced with concrete block masonry. The north west gable wall was originally formed by the side wall of Areas 2 & 3, this has been partially rebuilt in concrete block masonry. A concrete lintel has been installed over the opening on the south west elevation.

The roof construction appears to be relatively new, consisting of corrugated steel laid on purlins, which are built into pockets in the gable walls and supported off tied rafter trusses, positioned at approximately 600mm centres along the side walls. Straps have been installed on some, but not all, of the purlins.

A ground bearing concrete slab has been laid internally to form a solid floor.

Structural defects:

1. The stone walls are in good condition structurally, as are the concrete block walls. All walls appear to be well founded, and are plumb
2. To the rear of the area, a damp patch was noted in the centre of the wall (Photo 14). As access to the rear of this wall was not possible, the cause of the damp could not be determined. The damp may be caused either by vegetation growth, or rain water collecting between the new block wall and the existing stonework.
3. Vegetation growth (brambles, ivy) is present on the south west elevation (Photo 8).
4. The concrete lintel is in good condition, with no major cracks noted. No spalling is evident, which would indicate corrosion of the reinforcement strands.
5. No degradation of the roof timbers was noted.

Recommendations:

1. The stone walls should be repointed where mortar joints are missing, with a lime mortar which will allow the walls to breathe.
2. Concrete core testing of the slab should be undertaken, to determine the thickness and whether it is reinforced.
3. Although the roof timbers are in good condition, it is unlikely that they would be capable of supporting the more substantial roof covering required for a domestic property. An assessment may be carried out to determine their suitability, otherwise the roof structure should be replaced.
4. Head height is somewhat limited in this area, so it is recommended that a ridge beam is introduced to support the rafters if the roof structure is to be replaced. This will eliminate the need for ties, thereby increasing head height in the centre of the room.

Area 2

Description:

Internal access to this area was not possible due to extensive bramble growth around it, accordingly only an external survey was undertaken. This area occupies approximately a third of the structure forming Areas 2 & 3. The walls are constructed from large stones, with two low openings providing access. It is not known whether access may also be gained from Area 3, as access was not possible



due to vegetation growth. A lime rendered internal wall is present which divides the structure into Areas 2 & 3 and will also provide lateral support to the side walls. It is not known whether a concrete floor has been added, however it is unlikely. The form of the roof structure is unknown; however, the remains of the roof to Area 3 suggests rafters supported off purlins. The roof covering is slate.

Structural defects:

1. The stone walls appear to be in good condition, with no missing stones. All walls appear to be well founded, as there are no cracks indicating differential settlement. The walls are plumb.
2. Deflection of the roof was noted, indicating degradation of the roof timbers (Photo 11).

Recommendations:

1. All vegetation should be cleared from the walls, taking care not to dislodge the stones.
2. The stone walls should be repointed where mortar joints are missing, with a lime mortar which will allow the walls to breath.
3. It is likely that the roof timbers are degraded, the roof structure should therefore be replaced.
4. A concrete ring beam should be cast on the tops of the walls, which will tie the structure together, and increase the head height at the eaves. In addition, this will allow a ground bearing slab to be installed without excessive excavation and potential undermining of the walls.

Area 3

Description:

As with Area 2, the survey was limited to the external aspects of the structure, because access was not possible due to vegetation (Photo 17). As this is essentially the same structure as Area 2, the walls are of the same construction, i.e. large stones. It was not possible to determine whether a floor slab has been cast, but this is considered unlikely. No roof covering is present, what remains of the roof shows that the structure consisted of rafters supported off purlins, clad in slate.



Structural defects:



1. The stone walls appear to be in good condition, but the south west gable wall is covered in ivy (Photo 9), so the condition could not be verified. It remains standing, however, and appears to be plumb.
2. The remaining roof timbers are severely degraded.

Recommendations:

Refer to the recommendations for Area 2, as they also apply to Area 3 due to it being part of the same structure.





Reference	Photo
<p data-bbox="193 344 272 371">Photo</p> <p data-bbox="193 398 352 506">Barn , south east elevation (entrance to Area 1)</p>	 <p data-bbox="687 1039 1038 1066"><i>Photo 7 - Barn south east elevation</i></p>
<p data-bbox="193 1120 272 1146">Photo</p> <p data-bbox="193 1173 352 1258">Barn , south west elevation (Area 1)</p>	 <p data-bbox="647 1809 1086 1836"><i>Photo 8 - Barn south west elevation (Area 1)</i></p>

Reference	Photo
<p>Photo 9</p> <p>Barn south west elevation, showing Area 3 and vegetation growth on gable wall</p>	 <p style="text-align: center;"><i>Photo - South west elevation (Area 3)</i></p>
<p>Photo</p> <p>Barn north west elevation showing Areas 2 and 3 (access limited due to bramble growth)</p>	 <p style="text-align: center;"><i>Photo 10 - Barn north west elevation</i></p>

Reference	Photo
<p>Photo 11</p> <p>Barn , north east elevation, showing Area 2</p>	 <p><i>Photo 11 - Barn north east elevation (Area 2)</i></p>
<p>Photo 12</p> <p>Barn , north east elevation (Area 1 & 2)</p>	 <p><i>Photo 12 - Barn , north east elevation</i></p>

Reference	Photo
<p>Photo 13</p> <p>Barn north east elevation (Area 1)</p>	 <p><i>Photo 13 - Barn north east elevation (Area 1)</i></p>
<p>Photo 14</p> <p>Barn new block wall in Area 1 with damp patch in centre</p>	 <p><i>Photo 14 - Barn new block wall in Area 1 with damp patch</i></p>

Reference	Photo
<p>Photo 15</p> <p>Barn showing roof structure and straps</p>	 <p><i>Photo 15 - Barn Area 1 roof structure and straps</i></p>
<p>Photo 16</p> <p>Barn Area 1 showing stone side wall and front gable wall partially rebuilt in concrete block</p>	 <p><i>Photo 16 - Barn Area 1 stone side wall</i></p>

Reference	Photo
<p data-bbox="228 331 327 358">Photo 17</p> <p data-bbox="228 387 391 537">Barn entrance to Area 3 showing extensive vegetation growth</p>	 <p data-bbox="715 1025 1061 1052"><i>Photo 17 - Barn entrance to Area 3</i></p>