

**General structural appraisal report on**

Redundant barns  
Treraven  
St Clether  
Launceston  
Cornwall  
PL15 8PX



**Ref: 11018\_TF\_20**

27.08.20

For:  
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## **Introduction**

**Property:** Redundant barns  
Treraven  
St Clether  
Launceston  
Cornwall  
PL15 8PX

**Listings:** None known.

**Brief:** To inspect and report on the structural aspects of the barns.

**Weather:** Wet and windy following a period of sustained rainfall.

**Inspection:** The building was inspected by T L Fewings MEng (Hons) OBO  
Foulkes Jackson Fewings Ltd on Thursday 27<sup>th</sup> August, 2020.

**Memberships:** Member of the Institution of Civil Engineers (ICE)  
(Membership No. 62913327)

Associate of the Royal Institution of Chartered Surveyors (RICS)  
(Membership No. 6622074)

Member of the Society for the Protection of Ancient Buildings (SPAB)

## Foreword

Treraven lies in a rural setting approximately one mile west of the village of St Clether. The site sits in a picturesque valley setting through which flows a small tributary of the river Inney. For the benefit of this report, the two barns subject to survey will herein be referred to as Barn I and Barn II. An annotated location plan is contained on the following page for reference.

The barns are likely to have once served the principle farmhouse, which lies in relatively close proximity to the south east of the setting. Barn I is considered to be a typical example of a traditional hay loft barn. Whilst the historical use of Barn II is less clear, it would have once supported the agricultural working of the farm and is clearly of similar era to Barn 1. It is suggested the setting as a whole is of historical interest and as such the barns should be carefully and sensitively preserved. Suggestions for structural repairs provided herein are given with due regard to the apparent heritage of the buildings. In doing so, reference where applicable has been made with this firm's general conservation philosophy; refer to Appendix A for further details.

It is understood a proposal exists to convert both barns for domestic use. Plans have not been provided that indicate how the building might be converted for this purpose. The intention of this report is to identify the current structural condition of the buildings in order to advise on their structural suitability for conversion as proposed.

This report concludes that both barns are good examples of typical agricultural outbuildings. It is apparent both have suffered from structural and weathering problems, to varying degrees, which has caused isolated deterioration in their fabric. Left unchecked there is a risk both will decay further and fall into greater disrepair. On the basis of our inspection we consider both barns are structurally capable of conversion such that they may be conserved and continue to be a valuable asset to the historic context in which they are set.

**Location**

For the benefit of this report, Barn I is considered to face east whilst Barn II is considered to face south. The two barns are identified individually below.



Figure 1.0 –Site location plan {note this plan does not define boundaries}

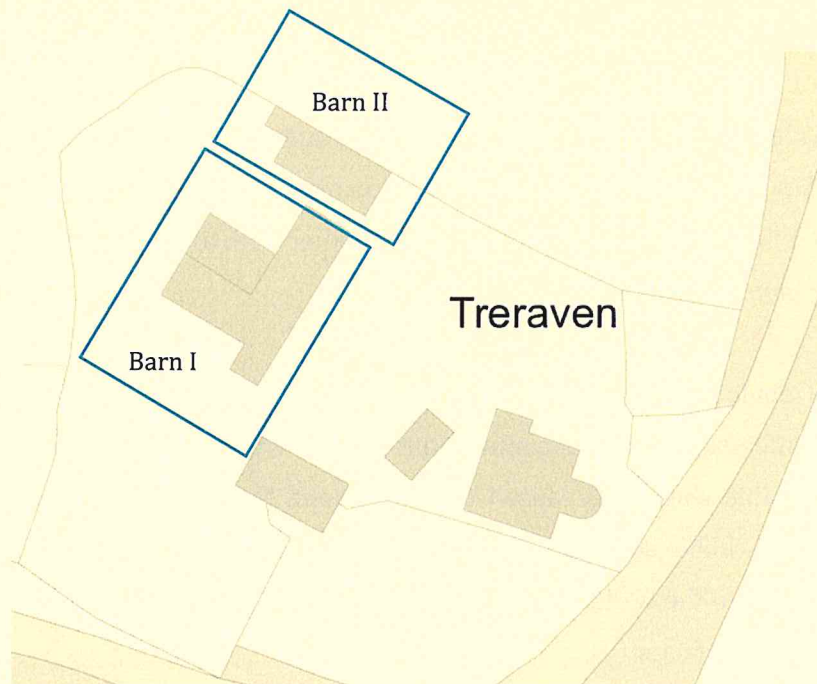


Figure 2.0 –Barns I & II highlighted individually.

## **Barn I**

### **1.0 Walls**

1.1 The original walls to Barn I consist approximately 450mm thick rubble stone. Such walls are typically constructed from two facing skins of stone with a rubble core. The quoins, door jambs and window reveals are generally formed with larger cut granite stones.



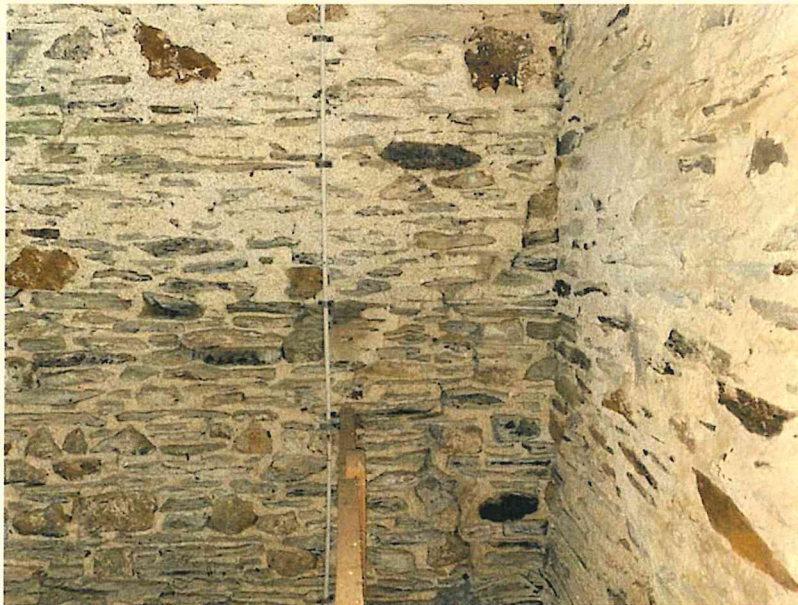
Photograph 1 – Front elevation of barn I

The stone walls throughout are generally straight and true with little sign of significant movement. Some outward bowing of the lower extents of the stone wall at the north end of the rear flank wall was recorded however together with a fine vertically propagating crack on the inner face of the stone.

There is no obvious causation to this movement. Noting the inner face of the wall appears less affected, and that the movement accords with position of a rainwater down pipe, it is possible water has caused the movement. Moisture ingress can result in a 'sumping' of the rubble core and associated lateral pressure on the outer facing stone. Minor settlement in the wall locally due to saturation of the ground below the wall may also be contributing factor.



Photograph 2 – Isolated lateral movement of stonework at rear corner.



Photograph 3 – Stepped vertical cracking on inside face of wall at rear corner.

The extent of the movement is not considered to be of significant structural concern at present although it should be monitored. Improvements should be made to the flashing where the rear roof abutment meets the stone here. The rainwater goods too should be checked and confirmed as functioning adequately.

1.2 The pointing to the external envelope consists a mix of original coarse slaked lime mortar and later cement. The cement pointing appears generally restricted to the northern end of the building. Whilst it is generally accepted that cement pointing is not suitable for application on mass stone walls, it would appear to be a relatively recent addition and its current condition appears good. Erosion of the original mortar by the climbing foliage growth on the gable wall may had led to this repointing work. The original lime mortar elsewhere appears to be in generally fair condition.



Photograph 4 – Later cement based pointing and foliage growth again gable.

The climbing foliage on the gable should be cut off at its base and allowed to die back before being removed completely. It is suggested the bedding joints of the stonework are ranged over and, where deemed to be required, racked out and repointed using a suitable natural hydraulic lime (NHL) mortar. Further advice in respect to any repointing work should be sought from a suitably experienced stone mason or lime mortar specialist such as the Cornish Lime Company (01208 79779).



1.3 To the south side of the original barn are evidently later single storey blockwork extensions that form a garage and small plant room. The garage is approximately 12m in length and 4m in width internally. The plant room is some 2.8m by 2.5m internally. The walls here are solid single skin concrete blockwork throughout.



Photograph 5 – Front garage door opening and single door opening into plant room



Photograph 6 – Side elevations of later concrete blockwork extensions.

The block walls were found to be in generally good order with no significant signs of structural movement.

## 2.0 Floors

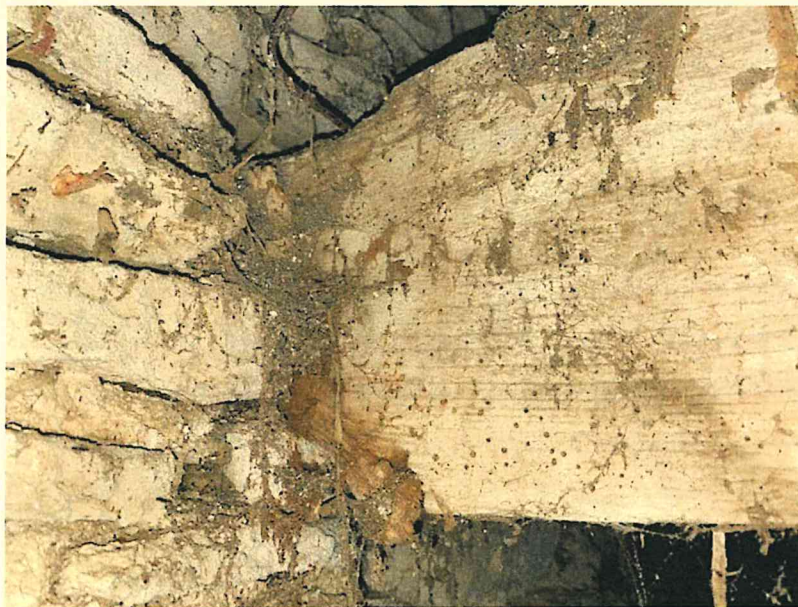
2.1 The floor within the original barn is formed from a series of roughhewn timber joists measuring in the order of 150-170mm by 100mm. The joists are typically spaced at between 450mm and 500mm centres down the length of the building. There is a single lateral beam running below the mid span of the joists. Whilst this timber tapers at its ends it broadly measures 140mm by 100mm in section. It is supported around its midspan on a circa 150mm square timber post. The timber joists are generally in fair condition for their age, however, some significant rot was recorded at their bearings where they extend into the thickness of the supporting walls. This rot is particularly pronounced at the rear western bearings; where some joists have compressed on their lower face and dropped considerably.



Photograph 7 – Timber floor joists to first floor of original barn.



Photograph 8 – Rotten joist end at bearing on rear wall.



Photograph 9 – Local displacement in joist end at rotten bearing.

Regardless of their condition it is suggested the existing joists would be undersized if subject to calculation in accordance with typical domestic floor loads. Upon conversion of the barn therefore strengthening will be required. The rotten joist ends will require repairing and an adequate form of intermediate support provided. This could either take the form of new internal load bearing walls, or, a new arrangement of supporting beams and posts. Alternatively consideration could be given to complete replacement of the floor joists. In this scenario it should be possible to design the new joists to span independently between the front and rear flank walls, if desired.

2.2 The ground floors within both the original stone barn and later block extensions are typically cast concrete slabs. The thickness of the slabs and their specification is unknown.



Photograph 10 – Example of ground floor construction..

The ground floor will evidently require relaying as a ground bearing concrete floor slab. Due to the surrounding ground levels, depending on the level of this slab thickenings may be required against the existing stone walls. It should be noted that the extent to which the existing stone walls extend below ground level is unknown. Although it is considered unlikely in this instance, if new floors are required below the level of the existing stonework then underpinning locally may be required.

### 3.0 Roof

3.1 The roof over the original barn consists of five raised tie 'A' frame trusses, purlins and common rafters. The trusses are formed from approximately 75 x 200mm roughhewn timbers with lateral ties set at circa 700mm above eaves level. It would appear that the ties have been cut and latterly raised from their original position at some point in the past, presumably to improve the clear headroom at this level. The purlins measure some 70 x 100mm and there are two to each pitch and a single ridge member. Rafters span between the purlins and measure in the order of 50/60 x 80mm lain flat and spaced at around 250mm centres throughout. The roof appears largely original. It is clad with slate externally. Whilst some slipped slates are apparent, a large number appear to have been retrospectively secured to the rafters and purlins via glued foam pads.



Photograph 11 – Raised A frame truss and purlin roof structure.



Photograph 12 – Original timber collar tie at eaves level cut off.



Photograph 13 – Common rafters glued to foam blocks and purlins.

The roof structure is in fair order for its age and is considered to be serviceable at present. Upon conversion it is likely the roof slates will need to be stripped and most, if not all, of the rafters replaced as a result. It should be possible to retain the purlins and principle trusses however; subject to further assessment by calculation in accordance with any new loads placed upon the fabric, such as plasterboard, insulation, services and alike.

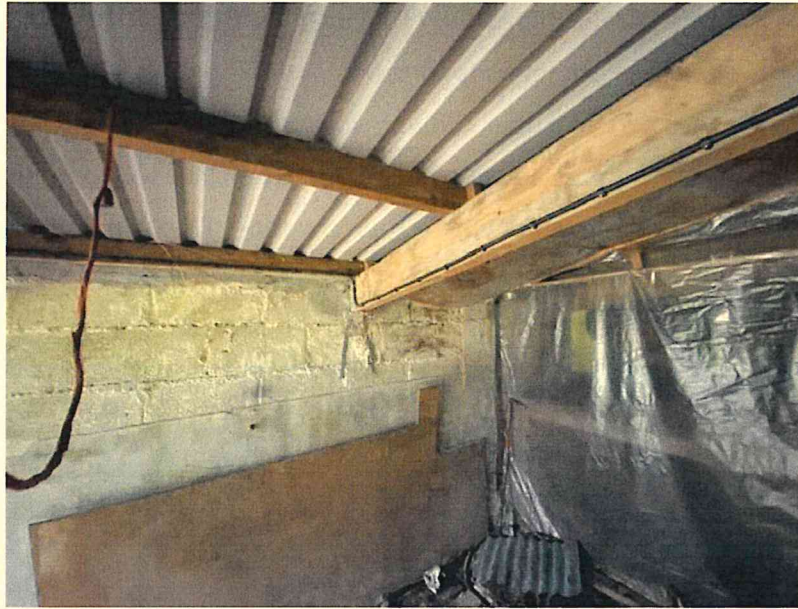
3.2 There is a small projecting canopy roof over the first floor hay loft door opening on the front elevation. The primary support to this roof is provided by two cantilevering beams. These beams extend some 600mm and are approximately 80 x 80mm in dimension. The beams support an eaves beam and wall plate which in turn supports a series of 50 x 60mm timber rafters with a slate covering. The rear canopy roof was not inspected.



Photograph 14 – Underside of hayloft canopy roof structure.

The front canopy is in fair condition and appears serviceable at present. Some repairs will be required to the timber members but largely it is considered the existing arrangement should be suitable for re slating and retention upon conversion of the building if required.

3.3 The roof to the garage area consists a series of approximately 75 x 170mm principle timber rafters set at around two meter centres. To the rear of the garage the roof over an open fronted storage area consists of two slightly larger rafters at 50 x 200mm supported on circa 60mm diameter iron poles. To the small plate room there is a single lateral purlin. All the roof structures in this area support a cladding of light weight corrugated steel sheeting.



Photograph 15 – Single principal timber rafter supporting corrugated sheet covering in garage.



Photograph 16 – Open fronted section of roof structure at rear.

The roof structures to the garage and plant room appear serviceable at present and free from and significant signs of structural movement. If they are to be subject to additional loads as part of any conversion then formal calculations should be undertaken to prove their capacity. The roof to the open fronted store area is in poor condition. It would be difficult to justify its retention and it is suggested it is replaced as required.



#### 4.0 Lintels

4.1 There are two approximately 1m wide and one 1.5m wide door opening set on the front elevation of the original barn at ground floor level. There are large granite lintels spanning over these openings on the outer face of the wall. These measure some 200 x 300mm in dimension. Behind these are a bank of timber lintels of varying size but in the order of 150 x 200mm. None of the lintels on the front elevation exhibit signs of significant movement and appear competent at present.

To the rear ground floor elevation there is a single 1.5m wide door opening which has been blocked up in the past with dense concrete blockwork. The inner timber lintel here is suffering from rot and have dropped and rotated at its bearing. This has caused reciprocal movement in the supported floor structure locally.



Photograph 17 – Displacement of lintel over rear ground floor door opening.

The lintels over this opening should be replaced or the opening should be re blocked up across the full width of the original stone wall using dense concrete block tied to the stonework up its height with stainless steel wall starters both sides.

4.2 On the first floor there are two central opposing hay loft door openings of some 1.5m width on the front and rear flank walls. Here again the openings are spanned by granite and timber lintels; each measuring in the order of 200 x 200mm.



Photograph 18 – View on front hay loft door opening at first floor level with timber lintel over.

These lintels appear to be functioning adequately over these openings at present.

4.3 To the side of the front hay loft door is a small candle recess (niche) measuring approximately 400 x 300mm. To the south gable there is a high level arrow slit window opening. Stones form the lintels over both of these openings.



Photograph 19 – Alcove to right side of door opening with stone lintel locally over.



Photograph 20 – Arrow slit window opening at high level on gable with stone lintel over.

Using stone over openings of such narrow aperture is a traditional detail and each appears to be functioning adequately at present.

4.4 On the northern gable there is a high level four pane timber casement window. This opening is some 600mm in width. There is a bank of timbers forming the lintels over this opening. The lintels appear to be performing adequately at present.

4.5 The majority of the lintels in the later concrete block garage and plant room appear to be precast concrete. Whilst their specification is unknown, no evidence was recorded to suggest they are suffering from structural movement and each appears to be performing adequately at present.

4.6 Whilst largely it appears all the lintels to the building are functioning adequately and would be suitable for retention, where lintels are to be subject to increases in loading they should be checked by calculation to be sufficient. It will also be important to further check the condition of all timber lintels for rot; particularly at their bearings where they extend into the original stone walls. If required, some repair or replacement of members may be needed.

## **5.0 Conclusion**

Barn I was found to be in a generally fair order given its age. The original hay loft barn presents as a classically well-proportioned and robustly built structure. The later adjoining concrete block additions are somewhat more basic in form but also generally structurally sound. It considered both as a whole would be suitable for conversion to provide domestic accommodation as is proposed.

## Barn II

### 6.0 Walls

6.1 The original walls to Barn I consist approximately 500mm thick rubble stone. The barn as a whole is split into two parts. The eastern part having a lower roof profile and adjoining the gable of what is likely to be the original extents of the building. The front and rear flank walls to both sections exhibit lateral movement.



Photograph 21 – Front flank wall of eastern section of barn II.



Photograph 22 – Rear flank wall elevations of barn II.



Photograph 23 – Extent of outward displacement on western end rear flank wall.



Photograph 24 – Rear elevation at western end of barn.

The primary causation behind the movement can almost certainly be associated with defects in the roof structures of the building. Some general patching up and local rebuilding of the stone has been undertaken, much of which using cement mortar. It is suggested further repairs are required to the walls. They should be ranged over and any loose stones replaced or unstable sections rebuilt. The bedding joints too should be raked out where eroded or defective and repointed with a suitable lime mortar.

6.2 The outward movement of the walls has caused cracking on the internal face of the stone work and typically at the junctions between the flank and gable wall panels. These cracks have been filled in the past with cement. Some re opening of the cracks has occurred in areas suggesting the movement may be progressive.



Photograph 25 – Internal cracking at flank to gable wall return, filled with cement, reopening.

It is suggested the cracks are stitched and the walls rebounded using a stainless steel helical tie bars or sock anchors. The exact specification of this work is beyond the scope of this report but reference may be made to typical repair details as published by 'Helifix', or similar.

6.3 There is some significant foliage growth to the external faces of the walls and this inhibited close inspection in areas. It is suggested all climbing foliage is cut off at its base and allowed to die back before being removed completely.

6.4 To the south side of the roof slope guttering and down pipes have been installed at eaves level. The guttering is defective and the down pipes appear to discharge straight into the ground at the base of the walls. There are no rainwater goods on the rear north side of the barn. Saturation of the ground at the base of the stone walls can lead to a significant weakening in the ground and it is suggested functional guttering is installed as soon as possible. Down pipes should be connected at their base and run to a suitable soak away.

## 7.0 Floors

7.1 Both sections of Barn II are single storey. The ground floor to each appears to be cast concrete of an unknown specification. It is likely that the existing floors will need to be broken out and replaced with a suitability insulated ground bearing concrete slab upon conversion. Whilst unlikely, local underpinning of the walls may be required if they are undermined by the level of any such new floor.

## 8.0 Roof

8.1 The roof over the eastern section of the barn is formed from three raised tie 'A' frame trusses, purlins and rafters. It is apparent ties of the trusses have been cut and raised at some point in the past. They are now at circa 300mm above eaves level. The trusses are formed from 75 x 180mm timbers. The purlins are approximately 50 x 100mm with 50mm square common rafters over at 250-400mm centres. The roof supports a cladding of slate externally. The trusses have raked over toward the east gable and there is significant undulation in the roof profile when viewed externally. One of the trusses appears to be a later addition and is set close to the side of the eastern most truss; presumably to provide additional support. These two trusses have had their bearings modified on the southern side with new spliced timbers and galvanized straps. Both are now supported here on light weight timber window framing set adjacent to the entrance door. There is significant water ingress locally.



Photograph 26 - Truss structure to eastern end of barn.





Photograph 27 – Purlins with common rafters and later foam pad fixings.



Photograph 28 – Ad hoc timber and bracket repairs to truss bearing on front elevation.

The modifications to the trusses is ad hoc and their bearing on the window framing structurally questionable. It is suggested additional props are provided below the truss bearings and the roof weathered in to prevent further movement, or local collapse. Generally the fabric of the roof here is in poor condition and it is suggested it will require complete replacement upon conversion of the building. Consideration could be given to the use of a ridge beam here to alleviate lateral pressure from the heads of the flanking wall panels.

8.2 The roof over the western section of the barn has been partially enclosed by boarding. What appears to be three original timber ties of the trusses are exposed below the boarding level. There are partially exposed planed soft wood timbers above the ties which appear, perhaps, to have been installed to repair the original roof; the extent of this work however could not be confirmed.

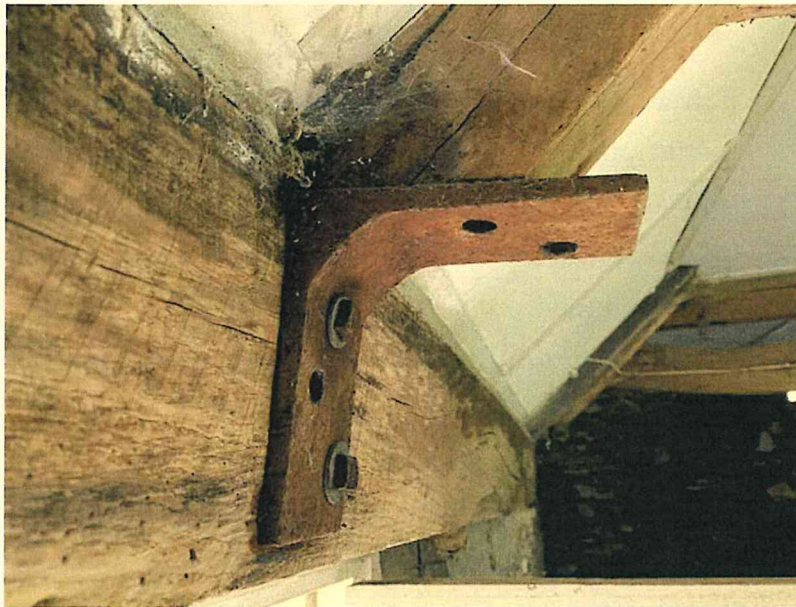


Photograph 29 – Internal view on ceiling boarded roof structure to west end of barn.

The boarding enclosing the roof needs to be removed in order to confirm if the existing roof structure is viable for retention. On the basis of the apparent condition of the original ties, and the apparent continuation of movement in the walls, it is suggested likely to the roof will also need complete replacement in this area. Here again consideration could be given to the use of a ridge beam in replacement of the existing to alleviate lateral pressure from the heads of the flanking wall panels.

## 9.0 Lintels

9.1 There is a door and a window opening on the front and rear flank walls of the western end of the barn over which a bank of approximately 100 x 200mm timber lintels support the roof and wall above. The inner lintel over the door has a 150 x 150mm equal angle steel bracket bolted to it to support the blade of the roof truss locally.



Photograph 30 – Equal angle steel supporting truss blade bearing on timber lintel over entrance door.

The lintels over these openings appear to be functioning adequately at present.

## 10.0 Conclusion

Whilst Barn II evidently requires some remedial stabilisation work to its fabric it is not considered to be beyond viable repair and as such it is suggested it is structurally viable for conversion to provide domestic accommodation as is proposed.

**Appendix A**

**Conservation Philosophy**

Before describing and repair work it is important to understand the approach taken to arrive at the works proposed. Our conservation philosophy is twofold and is used as a reference against which the building needs are measured. From most to least desirable;

**Fabric repairs**

- a. If structurally viable, conserve as found;
- b. If structurally viable, conserve and reinstate existing fabric where it survives but has been dislodged from its original location. Reinstatement can only take place where records can verify their original position.
- c. Minimise structural repairs without compromising the longevity of the fabric;
- d. Use like for like structural repairs, again using records where necessary;
- e. Finally use modern material as an honest structural repair or intervention, so long as this does not compromise the character of the listed building.

**The character of the listed building.**

- f. No change should take place to affect the character;
- g. Where an structural intervention takes place it is to maintain the character (reinstating lost features etc);
- h. If there is to be a structural intervention it is to be fully reversible;
- i. If the structural intervention is irreversible the design must be subservient to the character of the listed building. This could be using modern or traditional materials, depending on the circumstances.

No work should take place until permission has been sought and agreed by all statutory regulatory bodies.

## **Appendix B**

### **Limitations of investigation**

- This report is confidential to the client and without our express consent should not be used for any other purpose. Its contents should not, without our consent, be revealed to any third party other than the clients' professional advisers or published in a form without our express written consent. No responsibility is accepted by us toward unauthorised third parties acting upon information contained within this report.
- This report relates to the general structural condition of the two barns (I & II) as identified on the enclosed location plan only. The content of this report should be construed as a comment on the overall condition of the buildings and the quality of their construction and not as an inventory of every single defect. It restricts itself solely to the brief. We do not guarantee that all defects present, or that may occur in the future, will be discovered due to the limitations of this inspection.
- During our visit a condition survey was carried out and photographs taken. This report is based on notes taken from this visit without benefit of monitoring or previous knowledge of the buildings or site.
- All external observations were made from ground level unless noted otherwise. Parts of the structure, which were covered, unexposed or inaccessible, could not be visually inspected and therefore cannot be reported upon.
- This inspection relates to the main structural elements, i.e. roofs, walls and floors only.
- Dimensions, where given in the report, are estimated.
- Trial pit excavations were not carried out.

- Underground drains were not examined.
- Concrete blockwork construction was recorded during survey in a number of areas. Where such blockwork is to be retained, unless the age of its construction can be confirmed, it is suggested the concrete be formally tested for deleterious content ('mundic').
- There is evidence of damp in the building. Account of the full extent of this damp is beyond the scope of this report. It is recommended further investigation, including disruptive inspection behind wall linings, as required, is undertaken by a specialist contractor in order to establish the full scope of any remedial work needed in this respect.
- Evidence was found in a number of areas of timber rot and potential wood boring beetle infestation. Account of the full extent of this is beyond the scope of this report. It is recommended a specialist contractor, ideally Property Care Association registered, is engaged to carry out further investigations in this respect.
- Foliage was recorded as existing on, or in close proximity to, the walls of the building. Such growth can trap moisture against the wall fabric which can lead to degradation of the wall surface. Where it is recommended this foliage is removed, it should be cut off at its base and allowed to die back. Pulling such growth, particularly ivy, from the face of the walls can lead to surface damage.