

**REPORT on STRUCTURAL CONDITION**

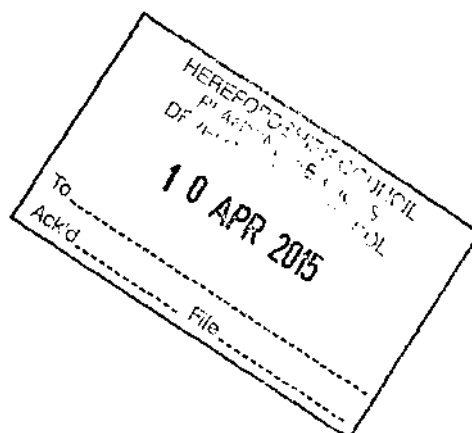
**of**

**BARNS 1, 2 and 3 for CONVERSION**

**at**

**DOVEHILLS  
BISHOPS FROME  
WORCESTERSHIRE**

**PROJECT NO. MS14101**



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**Report on Structural Condition of Barns 1, 2 and 3 for Conversion**  
**Client Ref: Mrs M Ong – MS14101**

**Dovehills, Bishops Frome, Worcestershire**

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**1.0 INTRODUCTION**

- 1.1 Our brief was to inspect the superstructure of Barns 1, 2 and 3 at Dovehills, Bishops Frome, Worcestershire following instructions by Josh Thomas, Architect on behalf of the owner, Mrs M Ong.
- 1.2 The report was required to support a planning application in connection with the proposed conversion of the buildings and was to confirm the present condition of the buildings and whether they could be converted without extensive alteration, demolition or rebuilding.
- 1.3 We were required to report on apparent defects, giving an opinion as to cause and structural significance, together with recommendations for further investigations if required, or where appropriate suggest in outline only the scope of any necessary remedial works, including general advice about the likely effects and need to treat any nearby trees and vegetation where it could affect the structure.
- 1.4 Unless specifically mentioned, our brief has not included an investigation into the presence of asbestos and all other non-structural elements or biohazards, nor have we inspected any electrical and mechanical installations.
- 1.5 External inspection of the buildings has been carried out from ground level by visual and optical sighting and, without special access arrangements, we cannot confirm that obscured parts are free from defect.
- 1.6 The internal inspection has been made within the limits of ready accessibility. Consequently, we have not been able to inspect woodwork or any other parts of the structures which are covered, unexposed or inaccessible and it is neither implied nor should it be construed that other parts are free from defect or that they have not suffered from insect or chemical attack.
- 1.7 The route and condition of any underground drainage associated with the buildings was not confirmed during this visit.
- 1.8 This report does not constitute a Valuation or Schedule of Refurbishment, and the lack of specific reference to any structural elements, materials or type of construction does not infer compliance with the current British Standards, Codes of Practice, or Building Regulations, and enquiries to the Local Authority have not been made.

- 1.9 The buildings and site have not been tested for any form of contamination, pollution, toxic mould or any other environmental impairment (methane, radon, etc.) and we are unable to make any comment in this regard.
- 1.10 Whilst we have used all reasonable skill and care in preparing this report, it should be appreciated that we cannot offer any guarantee that the buildings will be free from future defects or that existing ones will not suffer from further deterioration.

## 2.0 GENERAL

- 2.1 Barns 1, 2 and 3 are located at Dovehills, Bishops Frome, Worcestershire at Ordnance Survey grid reference SO 674 508.
- 2.2 The property as a whole includes various farm buildings including Barns 1, 2 and 3 adjacent to a Grade II Listed farmhouse.

Barns 1, 2 and 3 are one and two storey buildings, linked together and located to the north-west of the farmhouse.

The farm buildings and farmhouse surround a central concrete yard, and are themselves surrounded by a combination of fields and hardstanding areas which include other steel framed farm buildings/structures to be demolished.

An Architect's drawing showing the existing site plan and the general arrangement of the farm buildings is included in Appendix 1 of this report.

- 2.3 The ground adjacent to Barns 1, 2 and 3 was fairly level although the site as a whole sloped down gently from east to west.
- 2.4 With reference to British Geological survey sheet 199 and our general knowledge of the site, we would anticipate the upper ground material to be comprised of clay with a stone content (St Maughans Formation with sandstone).

Actual ground conditions had not been confirmed at the time of the inspection.

- 2.5 Barns 1, 2 and 3 are of traditional construction and include double pitched clay tiled roofs comprising timber rafters supported onto timber purlins spanning between timber frames/trusses.

Elevations are a combination of stonework and brickwork up to mid height level. The upper sections of the elevations to Barns 1 and 3 are timber framed and clad with timber boarding.

The southerly section of Barn 1 and all of Barn 3 included a first floor comprising timber floor joists spanning between timber beams and/or masonry walls.



- 2.6 Inspection of the west elevation and roof slopes of Barns 1 and 2 was restricted slightly due to the close proximity of other existing steel framed farm buildings.

Inspection above the first floor of Barn 3 was limited to that which could be seen from the east elevation first floor opening due to health and safety concerns regarding access onto the timber flooring.

- 2.7 The inspection was carried out on 14 November 2014. The weather at the time of the inspection was sunny and fairly mild following earlier heavy rain.
- 2.8 A marked up Architect's plan showing specific clause reference numbers relating to the report and also specific photograph locations is included in Appendix 2 of this report.
- 2.9 Photographs showing the general construction of the barns and specific defects are included in Appendix 3 of this report.
- 2.10 The general arrangement of the barns including plans and elevations are shown on drawings prepared by Josh Thomas Design House, Architects.

### **3.0 STRUCTURAL/GENERAL OBSERVATIONS**

#### **3.1 BARN 1** (see photographs 1, 3, 7, 8 and 9)

- 3.1.1 The roof slopes, ridge line and eaves lines were 'wavy'.

The roof slopes included some missing and displaced roof tiles, particularly over the south side of the east elevation close to eaves level.

- 3.1.2 The roof structure included timber rafters of varying sizes supported onto timber purlins spanning between 2 No. timber frames at each end, 2 No. inner timber frames at the sides of the main access doors and 2 No. intermediate timber 'cruck' frames.

- 3.1.3 There had been significant water ingress into the north-west corner of the barn causing severe rotting of the main north-west corner timber post, adjacent bracing members and roof members. The sole plate supporting the frame onto the low level brickwork was also partially rotten (see photograph 9).

Notwithstanding the above, the rafters, purlins and roof frames appeared to be generally in reasonable condition. The internal south end 'cruck' frame had twisted over to the south, particularly its upper section. The exposed purlin ends at each end of the barn had rotted by varying amounts.

- 3.1.4 The external and internal timber frames at the upper levels leaned by varying amounts.

The external cladding boards had 'warped' by varying amounts.

There were some holes and displaced boards on the west and north elevations.

The bottom of a vertical timber post on the west elevation had rotted.

- 3.1.5 The low level brickwork on the east elevation to the right-hand side of the main door bulged outwards significantly by up to 70 mm in one metre.

This section of brickwork included 2 No. diagonal cracks up to approximately 4 mm wide.

- 3.1.6 The top section of the masonry on the east and south elevations included missing and loose bricks.

The brickwork on all external elevations was built off a stone footing which included areas of missing stone units and mortar.

- 3.1.7 The south elevation low level brickwork bulged inwards by between 10 mm and 20 mm.

The west elevation low level brickwork leaned out by up to approximately 40 mm in one metre.

- 3.1.8 The main external door posts had rotted at the bottom by varying amounts.

- 3.1.9 The timber beams and joists forming the first floor over the south end of the barn appeared to be in reasonable condition.

### 3.2 BARN 2 (see photographs 1, 2, 4, 6, 10 and 11)

- 3.2.1 The roof slopes, ridge line and eaves lines were generally 'wavy'. The eaves line on the west elevation was very 'wavy'. The rain water gutter had partially collapsed.

The roof slopes had deflected/settled more significantly on the northern wing towards Barn 3.

The roof slopes included some missing and displaced tiles.

The tiles had been completely removed from the east roof slope of the wing adjacent to Barn 1, but had been replaced with roofing felt.

- 3.2.2 The roof structure included timber rafters supported onto timber purlins, spanning between internal king post roof trusses and end timber frames.

Several purlins, particularly over the northern wing, had deflected significantly.

The purlins over the north-west corner (hip end) sloped down towards the hip member.

Notwithstanding the above, the rafters, purlins and king post trusses appeared to be in reasonable condition.

- 3.2.3 The external stone elevations were generally in reasonable condition. These included some areas of missing units and mortar, particularly at ground level.

The north (rear) elevation leaned out by up to approximately 60 mm in one metre.

- 3.2.4 The steel lintel over the south elevation main opening had twisted.

The timber lintel over the west (rear) window was rotten.

The brickwork feature arches to the external elevations were in good condition.

- 3.2.5 The internal south facing wall included some diagonal cracking above the deflected timber lintel over the opening.

- 3.2.6 The internal wall between Barns 2 and 3 included 3 No. vertical fractures.

- 3.2.7 There was some separation and cracking at the junction of the rear north and west elevations.

- 3.2.8 The door posts at the side of the north (rear) elevation door were rotten at the bottom.

3.3 BARN 3 (see photographs 5, 6, 12, 13 and 14)

- 3.3.1 The roof slopes, ridge line and eaves lines were slightly 'wavy'.

The roof slopes included some missing and displaced tiles.

- 3.3.2 The roof structure included timber rafters supported onto 'rough' section timber purlins spanning between internal 'cruck' frames and end timber gable frames.

There was evidence of water staining on some of the roof members but they appeared to be generally in reasonable condition.

- 3.3.3 The internal 'cruck' roof frames were supported onto 2 No. timber beams and 1 No. steel beam at first floor level spanning between side walls.

The first floor joists and beams appeared to be in reasonable condition.

- 3.3.4 The upper timber boarding on the external elevations was slightly warped and weathered.

Some boards were missing, particularly on the north and east elevations.

The exposed ends of the timber purlins were rotten by varying amounts.

- 3.3.5 The low level stone elevations included some missing stones and mortar, particularly at the top and at ground level.

The walls, however, appeared to be practically vertical.

- 3.3.6 The timber sole plated at the bottom of the timber cladding on the south elevation was partially rotten.

The bottom of the timber door posts and the window cill member on the south elevation were rotten.

All other external timber framing appeared to be in reasonable condition.

- 3.4 On all of the three barns there was evidence of infestation by wood borers on the timber members.

#### **4.0 CONCLUSIONS AND RECOMMENDATIONS**

- 4.1 Barns 1, 2 and 3 were found to be in reasonable structural condition and are considered suitable for conversion without significant or extensive alteration, demolition or rebuilding.

##### **4.2 BARN 1**

- 4.2.1 The timber rafters and purlins were found to be in reasonable condition but may require some supplementing/strengthening subject to justification by calculation.

The timber framing supporting the roof and upper cladding on the north-west corner will require some replacement where affected by water ingress.

The other roof frames and 'cruck' frames would appear suitable for re-use. One frame will require some re-alignment.

- 4.2.2 The internal and external timber framing appeared generally in reasonable condition and is considered suitable for re-use. Some section of rotten timber such as door framing posts will need to be replaced.

External timber cladding will need to be replaced.

- 4.2.3 The first floor joists and beams are considered suitable for re-use subject to justification by calculation.

- 4.2.4 The low level brickwork on the east elevation to the right-hand side of the main door will need to be taken down and rebuilt.

All other sections of low level brickwork are considered to be in reasonable condition.

- 4.2.5 Refer to general comments 4.5 to 4.13.

#### 4.3 BARN 2

- 4.3.1 The timber rafters and purlins were found to be in reasonable condition but may require some supplementing/strengthening subject to justification by calculation. The settlement of the roof over the northern wing will need addressing and may require the replacement of several purlins and rafters to level out the roof as required.

The king post roof trusses were found to be in reasonable condition and suitable for reuse.

- 4.3.2 The cracking at the junction of the rear north and west elevations and internal south facing wall will need to be stitched.
- 4.3.3 All sections of rotten door posts and window framing will need to be replaced.
- 4.3.4 Additional restraint should be introduced to prevent further outward movement of the north rear elevation wall. This may be achieved by bonding the proposed new internal walls into the existing.
- 4.3.5 Refer to general comments 4.5 to 4.13.

#### 4.4 BARN 3

- 4.4.1 The timber rafters and purlins were found to be in reasonable condition but may require some supplementing/strengthening subject to justification by calculation.

The internal 'cruck' frames were found to be in reasonable condition and suitable for re-use.

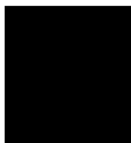
The end gable timber frames may need some localised replacement of rotten sections following close inspection.

- 4.4.2 External timber cladding will need to be replaced. The external timber framing appeared to be generally in reasonable condition and considered suitable for reuse. Some localised replacement of rotten sections may be required following close inspection.
- 4.4.3 The first floor joists and beams were found to be in reasonable condition and suitable for reuse subject to justification by calculation.
- 4.4.4 The low level stone elevations were found to be in reasonable condition.
- 4.4.5 Refer to general comments 4.5 to 4.13.
- 4.5 The outward and inward movement of the upper timber frames and low level masonry walls have most likely been caused by spreading and deflection of the roof structures and inadequate horizontal restraint.

We would recommend that additional structure including strapping and rafter bracing is added to the existing roof structures of the barns where appropriate to restrict further roof spreading and deflection in the future.

- 4.6 Any sections of timber structure, including lintels, found to be rotten/damaged upon close inspection should be replaced.
- 4.7 Any new and existing first floor structures should be tied/fixed to the external walls and timber frames (including 'cruck' frame external posts) to provide additional lateral support to the barns and to restrict future movement.
- 4.8 Any new internal walls should be tied/bonded to the existing external walls to provide additional restraint and restrict future movement.
- 4.9 All existing brickwork and stonework will require general repointing, stitching of cracks, making good and replacement of missing units.
- 4.10 All rainwater goods should be replaced and connected to suitable drainage to disperse rain water away from the barns.
- 4.11 A specialist should be engaged to report on the condition of all existing timber and any treatment that may be required.
- 4.12 The ground level around the barns should be reduced as necessary to a minimum of 150 mm below proposed ground floor level and should drain rain water away from the buildings.
- 4.13 The depth of the existing foundations should be confirmed relative to proposed formation levels of the new ground floor constructions, to ensure that the existing walls are not undermined.

Some underpinning or protection of existing shallow foundations may be required down to a level which would not be affected by seasonal thermal and moisture variations including frost action.



**Mike Speak**  
BSc, CEng, MIStructE

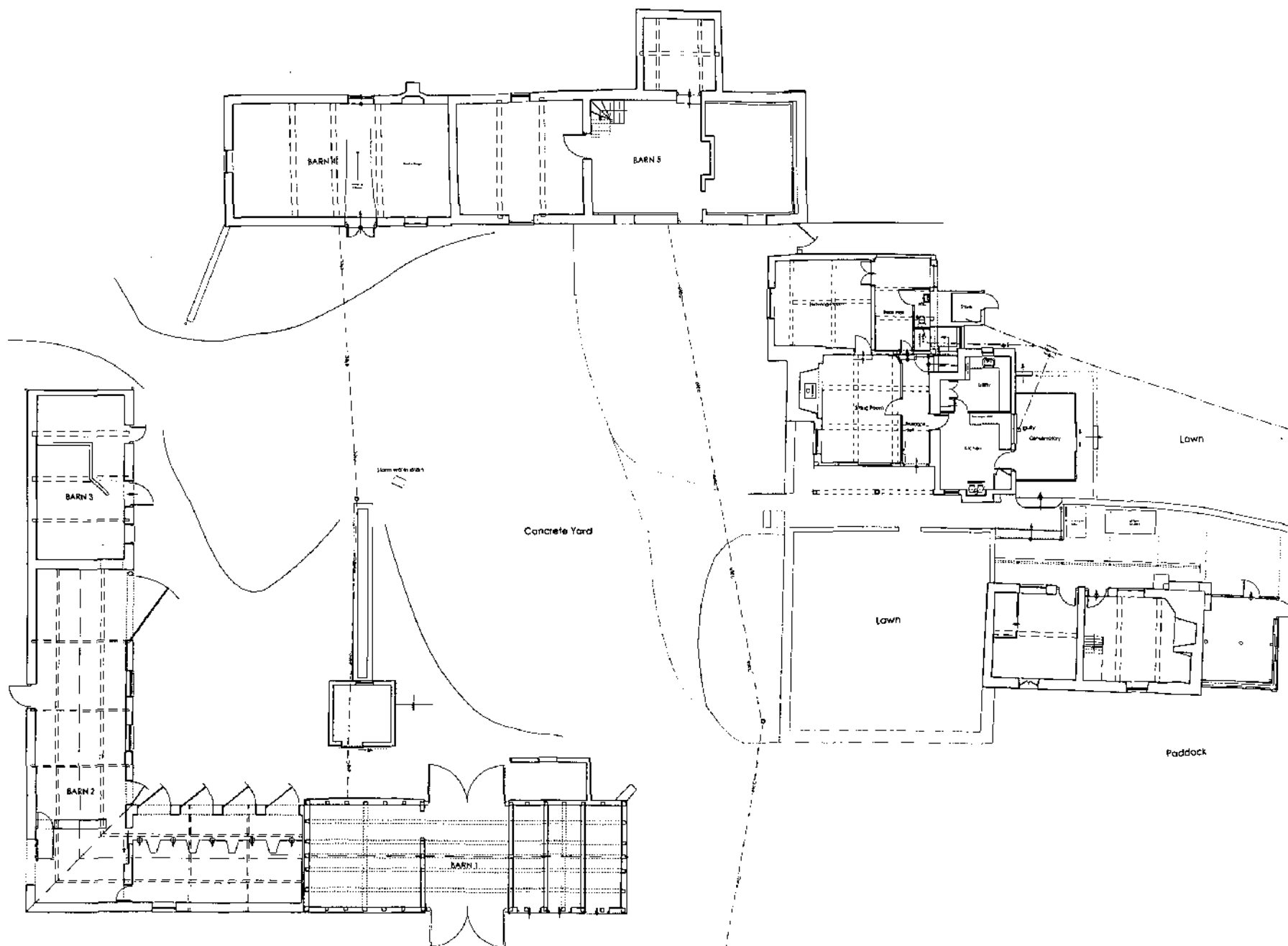
**November 2014**

**APPENDIX 1**

**EXISTING SITE PLAN**



RECEIVED 12 NOV 2014



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**Specific Notes**

1. Do not scale off this drawing.  
2. Any discrepancies to be reported immediately.  
3. This drawing is to be read in conjunction with all relevant specifications and other drawings issued by the Architect, Structural Engineer and other Specialists.  
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**General Notes**

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Revision	Date	Details Of Revision

Project: Proposed Alterations & Renovation  
Dovehills  
Bishops Frome  
Worce  
WR6 5BQ

Drawing Title: Existing Site Plan Plan

Draw No: 250/0011 Rev: A

Date: 20th November 2012 Status: CLNT

Scale: 1:200

Drawn by:



## **APPENDIX 2**

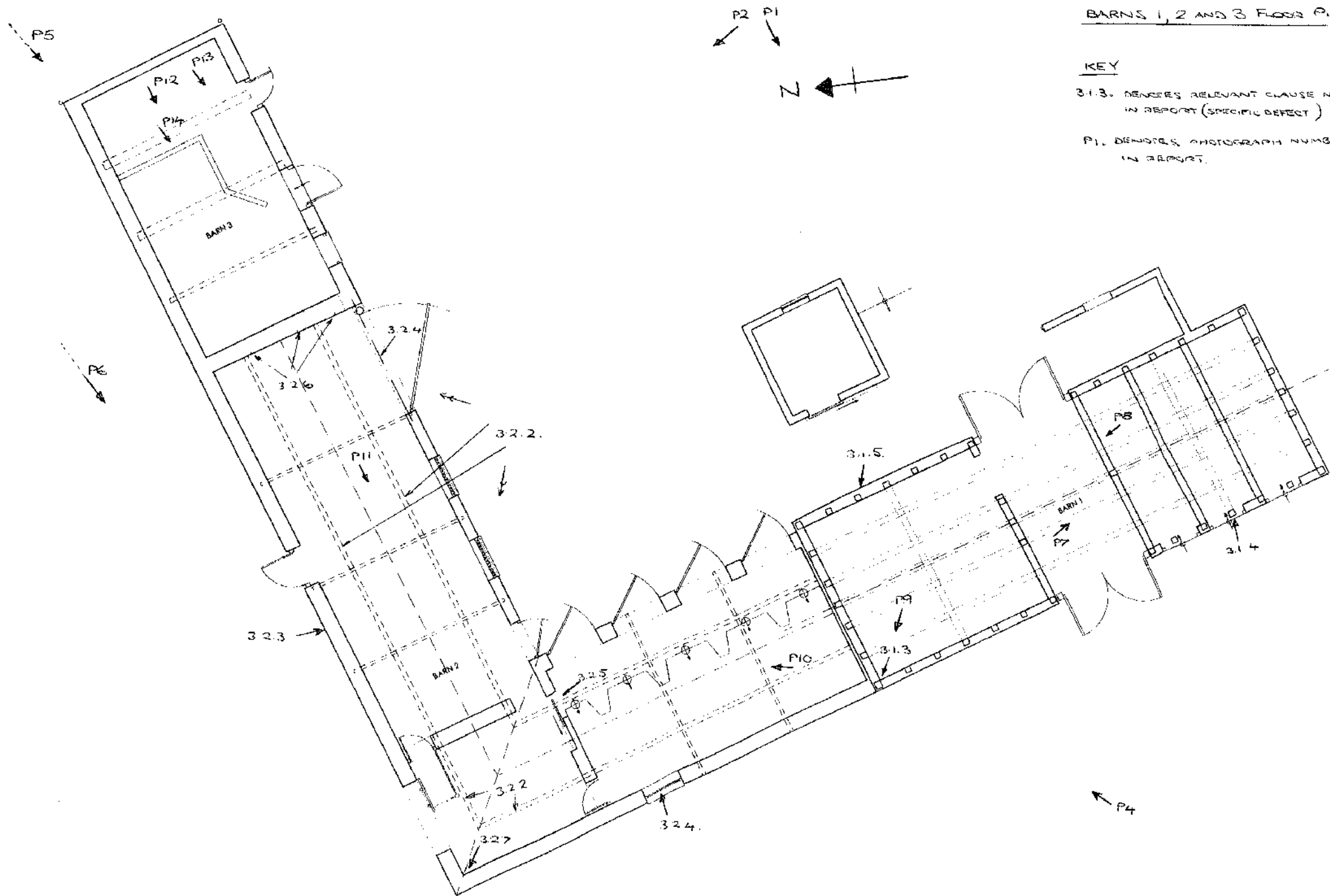
### **BARNS 1, 2 AND 3 FLOOR PLAN**

# BARNS 1, 2 AND 3 FLOOR PLAN

## KEY

3.1.3. DENOTES RELEVANT CLAUSE NUMBER  
IN REPORT (SPECIFIC DEFECT)

P1. DENOTES PHOTOGRAPH NUMBER  
IN REPORT.



**APPENDIX 3**

**PHOTOGRAPHS**



**Photograph 1. General view. Barn 1 and 2. East elevation.**



**Photograph 2. General view. Barns 2 and 3. South elevation.**





**Photograph 3. General view. Barn1. End, south elevation.**



**Photograph 4. General view. Barns 1 and 2. West elevation.**



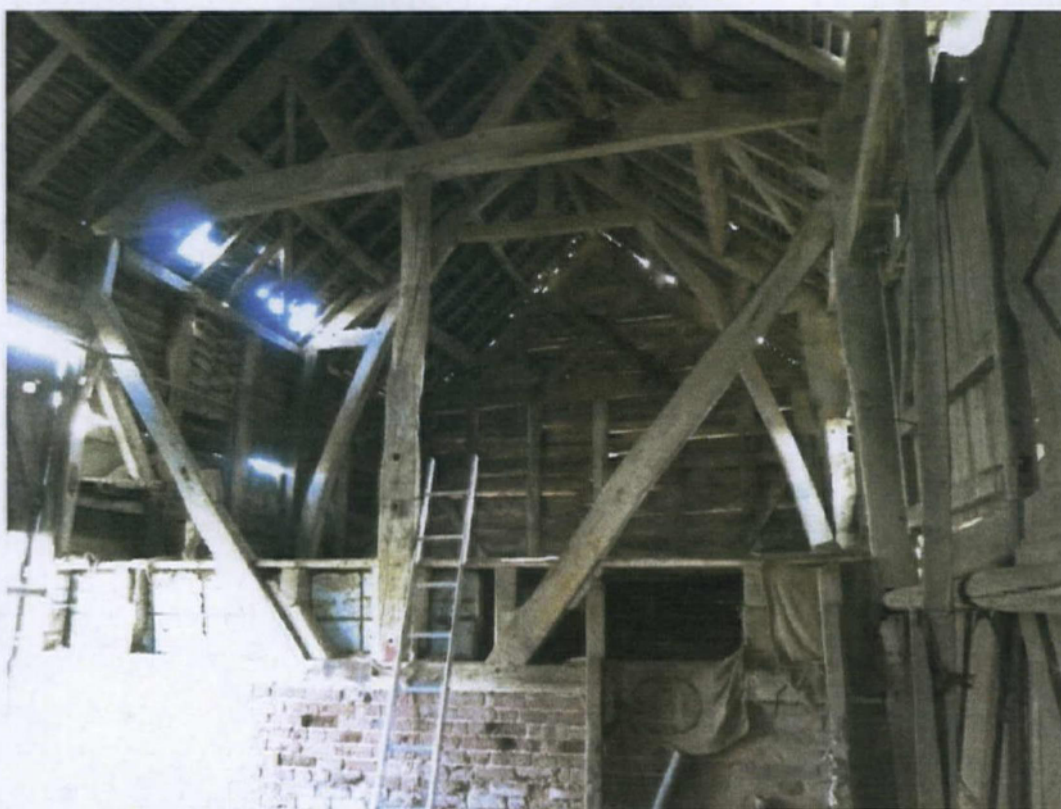


**Photograph 5. General view. Barn 3. End, east elevation.**



**Photograph 6. General view. Barns 2 and 3. Rear, north elevation.**



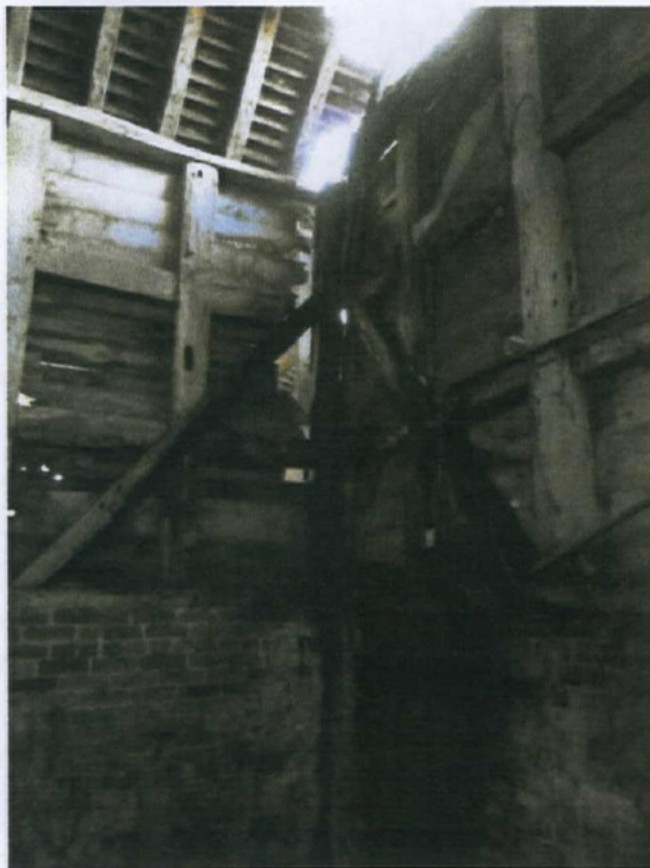


**Photograph 7. Barn 1. Internal view towards south gable wall.**



**Photograph 8. Barn 1. Internal view towards north/Barn 2 gable wall.**





**Photograph 9. Barn 1. North-west corner.  
Significant water penetration and rotten timber members.**

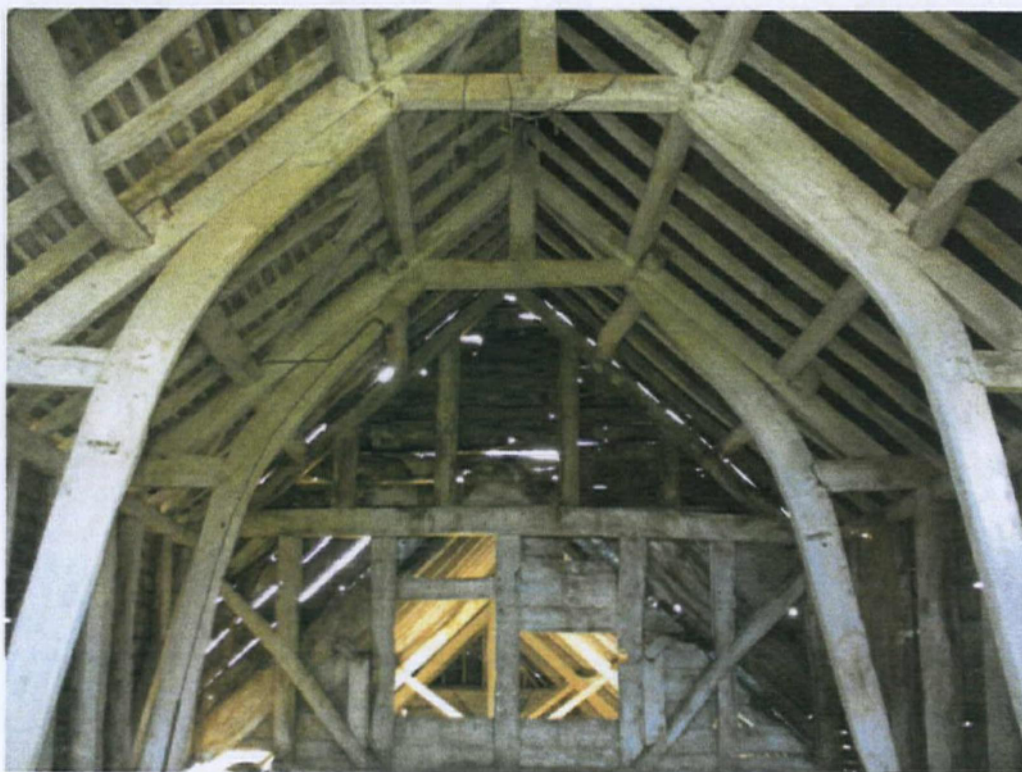


**Photograph 10. Barn 2. Internal view towards north east.**





**Photograph 11. Barn 2. Internal view towards west.**



**Photograph 12. Barn 3. Internal view above first floor level towards Barn 2.**





**Photograph 13. Barn 3. Internal view. South elevation above first floor level.**



**Photograph 14. Barn 3. Internal view below first floor towards Barn 2.**