Reid Jones partnership

Consulting Civil & Structural Engineers

STRUCTURAL INSPECTION

OF

NEW HALL BARN, RIBCHESTER

ON BEHALF OF

STANTON ANDREWS ARCHITECTS

August 2015
Project No P2531

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1.0 INTRODUCTION

Reid Jones Partnership Ltd was instructed by Stanton Andrews Architects to carry out a structural inspection of New Hall Barn, Blackburn Road, Ribchester. The building has until recently been used for agricultural purposes.

It is proposed to convert the barn to residential accommodation. The purpose of the inspection was to assess its structural condition and to make recommendations on any essential structural repairs considered necessary as part of conversion and general refurbishment works.

Mr John Reid BSc CEng MICE MIStructE of Reid Jones Partnership Ltd carried out the structural inspection on Thursday 4th December 2014. Photographs are included within Appendix A, existing plans in Appendix B and architect's proposals in appendix C.

The inspection was of a visual nature, and no opening up of the fabric of the building was carried out.

This report shall be for the sole use of Stanton Andrews Architects and their professional advisors and shall not be relied upon by any other party without the full written consent of Reid Jones Partnership Ltd.

2.0 DESCRIPTION

For orientation purposes, the right- and left-hand sides of the barn and attached outbuildings are those viewed when standing at the front of the property and looking directly at the front wall, deemed to be the wall facing Blackburn Road.

The barn is a stone-built two-storey agricultural building, having a single-storey shippon to the rear and further single-storey additions to the rear and right-hand side. The barn appears to date from the late 1700s or early to mid 1800s, whereas the shippon and side extension are more modern additions **(photos 1&2)**. The barn and shippon have been used most recently for winter housing and milking of dairy cows, with the two upper loft areas used to store hay or feed. The building is at present unused.

The main barn is approximately 25m long and 5m increasing to 7m in width. There is one internal crosswall 5m from the left-hand gable, extending from foundation to roof level. The first floor does not extend over the full length of the barn, and the wider part is of double storey height. The shippon is approximately 4m in width, and together with a small rear attached outbuilding covers the full length of the barn.

The main walls of the barn are of traditional, solid, random stone masonry built in sand:lime mortar. Two doors on the front elevation have dressed stone surrounds. The outer face of the stone walls has been covered with a sand:cement render coating. The walls of the small extension at the rear right-hand corner are of similar construction, whereas those of the shippon are of solid clay brickwork. The walls of the outhouses at the right-hand gable are of concrete construction, cast in-situ. The roofs of the barn, shippon and attached outbuildings have a slate covering supported on timber rafters and timber purlins. In the barn, the purlins are supported on timber trusses, spanning between the front and rear walls **(photo 3)**. The shippon also has mono-pitch trusses spanning from the rear wall of the barn to the outside wall **(photo 28)**. The upper floor of the barn is of timber boards and joists supported on steel beams. The ground floor is of solid construction, of concrete or stone.

3.0 OBSERVATIONS

The following observations were made during the inspection of the property: -

Internal Inspection

Barn

- The roof structure of the main part of the barn was inspected from the hay loft, accessed via a ladder, and from ground floor level in the double-height space. The slate covering has been removed and replaced in the

relatively recent past, and new sawn timber rafters, purlins and slating battens provided **(photo 4)**. These items are all in reasonable structural condition.

- There are five timber trusses in the main part of the barn. All appear to be the original oak trusses, and all show signs of serious insect infestation and damage **(photos 3-10)**. The bottom tie beams are bowed, and one has a serious split **(photo 6)**. On one truss the high-level collar tie is loose and ineffective **(photo 8)**. On another, the principal rafter exhibits a serious bow **(photo 9)**. On a third, the internal bracing strut is missing **(photo 10)**.
- Vertical cracks were noted in the crosswall, on the side facing the larger loft **(photo 11)**, and at some truss bearing positions, where timber sections have been used as spreader beams **(photo 12)**.
- The small hayloft was accessed via a ladder through an opening in the floor. A number of vertical cracks on the inside face of the walls were noted **(photos 13&14)**. There is a vertical crack where the crosswall meets the front wall **(photo 14)**.
- In the small hay loft, a window opening in the left-hand gable wall has been in-filled with brickwork **(photo 15)**. A crack of some 30mm in width has formed at the top left-hand side of the opening **(photo 16)** and the wall is generally quite distorted in this area.
- The floor joists and steel beams forming both hay lofts were inspected. No significant defects were noted **(photo 17)**.
- In the byre below the smaller hay loft, the window has been reduced in height to include a ventilation opening. The original timber lintel remains in place **(photo18)**.
- Severe outward leaning of the front wall at the front left-hand corner was noted **(photo 19)**. The lean is approximately 100mm over the height of a 1200mm spirit level **(photo 20)**.
- Timber lintels have been provided over all window and door openings, including the former rear entrance door **(photos 21,22&23)**. The timber shows signs of decay due to insect infestation.
- There is a vertical crack of width up to 25mm over the full height of the rear wall near the door leading to the shippon **(photos 24&25)**.
- Three trial pits had been excavated, alongside the inside face of the external walls. Trial pit 1 was located at the left-hand gable **(photo 26)**, trial pit 2 at the right-hand gable **(photo 27)**, and trial pit 3 at the front wall in the double-height barn space. All three revealed that the walls are founded in stiff clay and extend no deeper than approximately150mm below the floor.

Shippon and Rear Outhouse

- The roof trusses appeared to be free of defect **(photo 28).**
- There are signs of serious water damage to the rafters and sarking boards near the door between the barn and shippon **(photo 29)**. Minor water damage to the boarding was noted at several other locations.
- Cracking in the stonework of the rear barn wall was noted at the left-hand gable end **(photo 30)** and right-hand gable end **(photo 31)**.

Gable Outhouses

- The roof structure is of timber boarding, rafters and purlins **(photo 32)**. It is in poor condition, and has collapsed above the rearmost outhouse **(photo 36)**.
- The walls have been constructed from concrete, cast in-situ, possibly using aggregate dredged from the adjoining river bed **(photo 33)**.

External Inspection

- The slating on the main barn and most of the shippon is good, reflecting the fact that they have recently been re-slated. The roof over the outhouses on the right-hand side is poor.
- The front wall of the barn shows the significant outward lean at the left-hand corner as noted internally **(photo 34)**. The wall leans inward at the main entrance door **(photo 35)**.
- The right-hand gable wall of the barn is reasonably straight and vertical. There is some cracking where the rear outbuilding joins the main barn **(photo 36)**.
- The rear wall of the shippon is reasonably straight and vertical **(photo 37)**. The timber lintels over the windows have decayed **(photo 38)**.
- The gable wall of the shippon has been partially demolished and the gap closed with plywood sheeting **(photo 37)**. A gap has opened where the brick gable wall of the shippon joins the main barn **(photo 39)**.

4.0 CONCLUSIONS AND RECOMMENDATIONS

Current architectural proposals involve converting the main part of the barn and the attached rear outbuilding to residential accommodation. The outbuildings attached to the right-hand gable wall will be demolished. The shippon will be demolished and re-built.

The roof covering of the barn is in reasonable condition, but the slates will need to be removed as part of any refurbishment and conversion to residential use.

The timber rafters and purlins are in reasonable condition. The rafters are however of limited depth, and may need to be replaced with deeper sections able to accommodate the required depth of new insulation. The conversion will require a new plasterboard ceiling fixed to the underside of the rafters. The purlins will most likely prove inadequate to take the increased weight.

The roof trusses in the main barn are in very poor condition. If they are to be retained as features in the new scheme, they will require lifting to ground level and sand-blasting to remove all decayed material. Members with insufficient residual cross section should be replaced or strengthened.

The roof trusses in the shippon appear to be reasonably sound but should be inspected by a timber preservation specialist if they are to be re-used. The trusses may need to be raised above their existing height to increase headroom below the bottom tie beams.

The first floor should be removed and replaced with a new floor. The overall robustness of the building will be improved by ensuring that the existing stone walls are fully tied to the new first floor for restraint.

The front wall of the barn leans out significantly at the left-hand corner. This area should be re-built (see marked-up plans in Appendix B), or otherwise stabilised with new steel posts or framing. The left-hand gable wall is distorted, cracked and bulging near the in-filled first floor window. This area should be re-built (see Appendix B). The right-hand gable wall is reasonably straight and vertical. The architectural proposals show that a large part of this wall will be removed over its full height. A rigid steel frame will be needed to support the roof and to give overall lateral stability to the barn. The rear wall of the barn is reasonably straight and vertical.

There are a number of vertical cracks on the inside face of the external walls, most likely the result of continual thermal and moisture movement. They should be repaired by stitching with steel bars or installing new bonding stones across the cracks. The significant crack near the door in the rear wall has been caused by water entry through the failed shippon roof and flashings. It should be stitched in a similar manner. A vertical gap has formed where the internal cross wall meets the front wall.

The internal crosswall provides essential buttressing to the front wall and rear walls of the barn. The architectural proposals call for this wall to be removed, and will require the introduction of a further rigid steel frame to maintain stability. The external walls and the first floor should be fully connected to the new frame.

Elsewhere, timber lintels should be removed and replaced with concrete or steel items.

The existing ground floor should be removed and replaced by a new concrete ground slab, insulated to current standards. No signs of significant foundation movement were noted. There may be a need to underpin the walls if the depth of the new slab, finishes and insulation extends to below the level of the existing foundation.

APPENDIX A

PHOTOGRAPHS

Photo 1 – Front Wall and Right-Hand Gable Wall of Barn

Photo 2 – Rear and Left-Hand Gable Wall of Barn and Shippon

Photo 3 – View of Barn Roof Trusses from First Floor

Photo 4 – Sawn Timber Rafters and Purlins

Photo 5 – Insect Decay at Truss Bearing

Photo 6 – Insect Damaged and Split Truss Bottom Tie

Photo 7 – Insect-Damaged Truss Principal Rafter

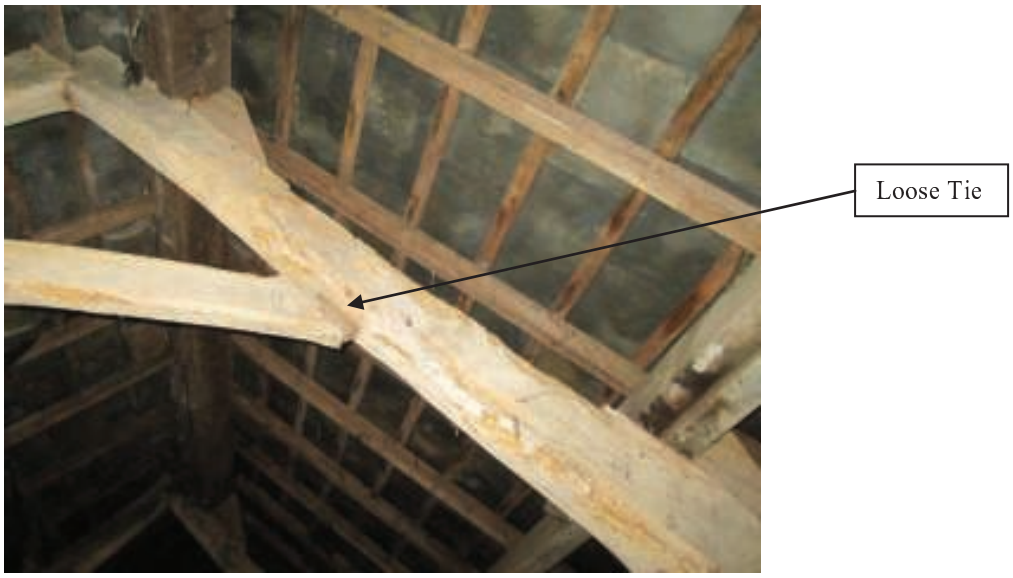


Photo 8 –Loose Truss Collar Tie

Photo 9 – Bowed Truss Principal Rafter.

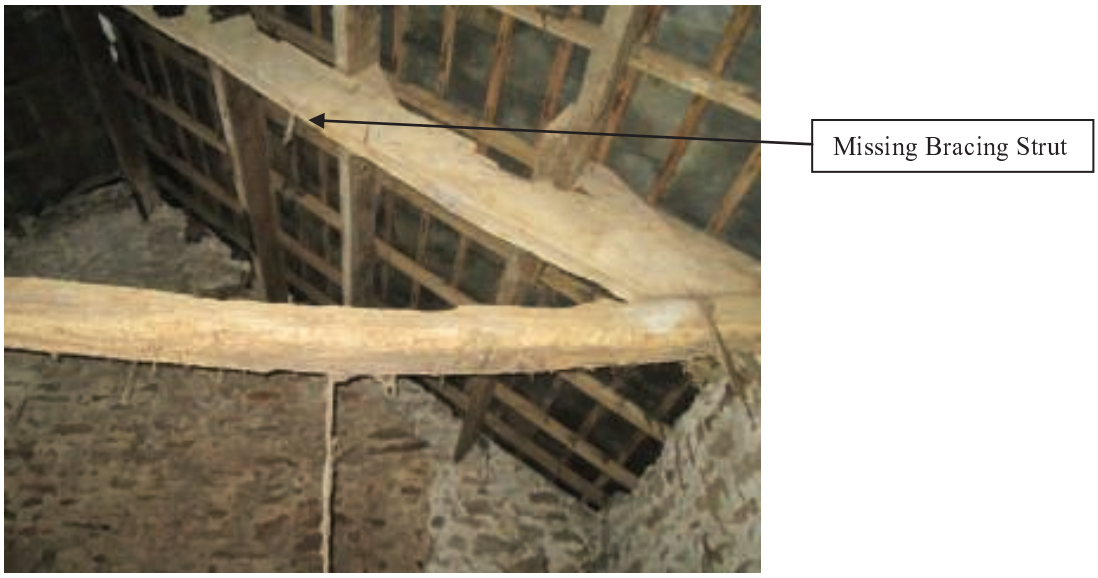


Photo 10 – Severe Bow and Insect Damage to Bottom Tie Beam. Missing Strut

Photo 11 – Vertical Crack in Central Wall

Photo 12 – Vertical Crack at Truss Bearing

Photo 13 – Small Loft - Vertical Cracks in Rear Wall

Photo 14 – Small Loft – Separation at Internal Wall / Front Wall Junction

Photo 15 – Small Loft - Left Gable Wall – In-filled Opening

Photo 16 – Small Loft - Left Gable Wall – Wide Crack

Photo 17 – Steel Beams Supporting Floor of Small Loft

Photo 18 – Timber Lintel – Left Hand Gable Wall, Ground Floor

Photo 19 –Leaning Front Wall

Photo 20 – Leaning Front Wall

Photo 21 – Timber Beams over Main Barn Doors

Photo 22 – Right-Hand Gable Wall – In-filled Door Opening

Photo 23 – Right-Hand gable Wall – Timber Lintels above Door / Window Opening

Photo 24 – Rear Wall of Barn – Vertical Crack (1)

Photo 25 – Rear Wall of Barn – Vertical Crack (2)

Photo 26 – Trial Pit 1 – Left Hand Gable Wall

Photo 27 – Trial Pit 2 – Right-Hand Gable Wall

Photo 28 – Internal View of Shippon

Photo 29 – Water Damage to Shippon Roof

Photo 30 – Junction of Shippon Wall and Barn Wall at Left-Hand Gable

Photo 31 –Cracking in Rear Wall of Barn at Right-Hand Gable

Photo 32 – Internal View of Outhouses at Right-Hand Gable

Photo 33 – Outhouse Wall Construction

Photo 34 – Leaning Front Wall near Left-Hand Gable

Photo 35 – Leaning Front Wall at Entrance Door

Photo 36 –Right-Hand Gable and Outhouses

Photo 37 – Rear Wall and Left-Hand Gable of Shippon

Photo 38 – Decayed Timber Lintels - Shippon

Photo 39 – Gap between Shippon and Barn - Left-Hand Gable Wall

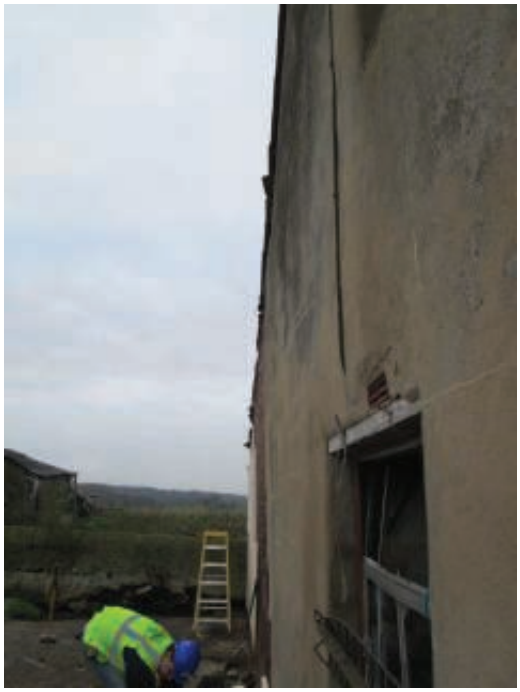
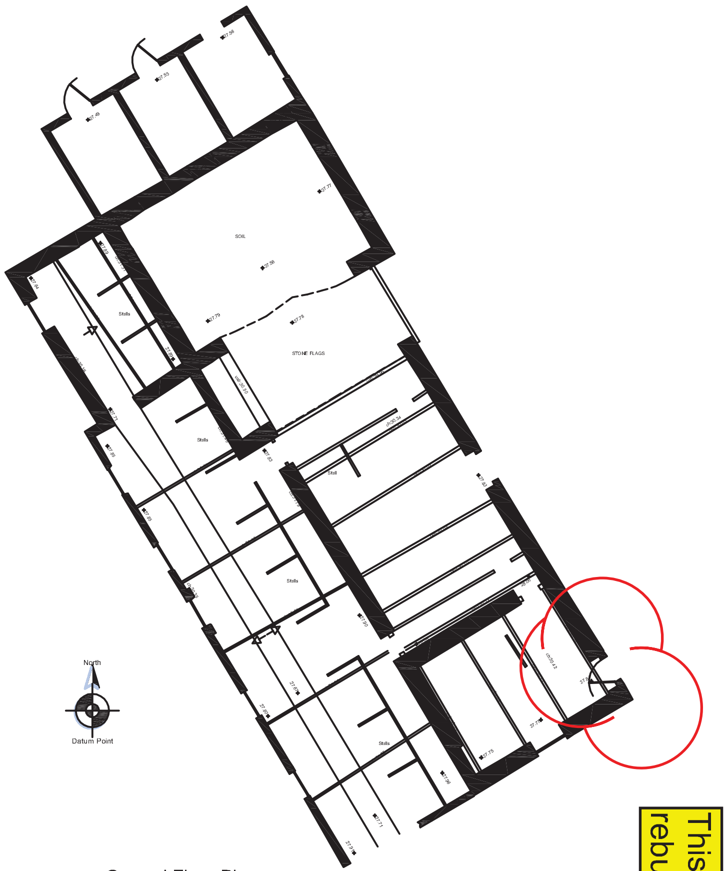


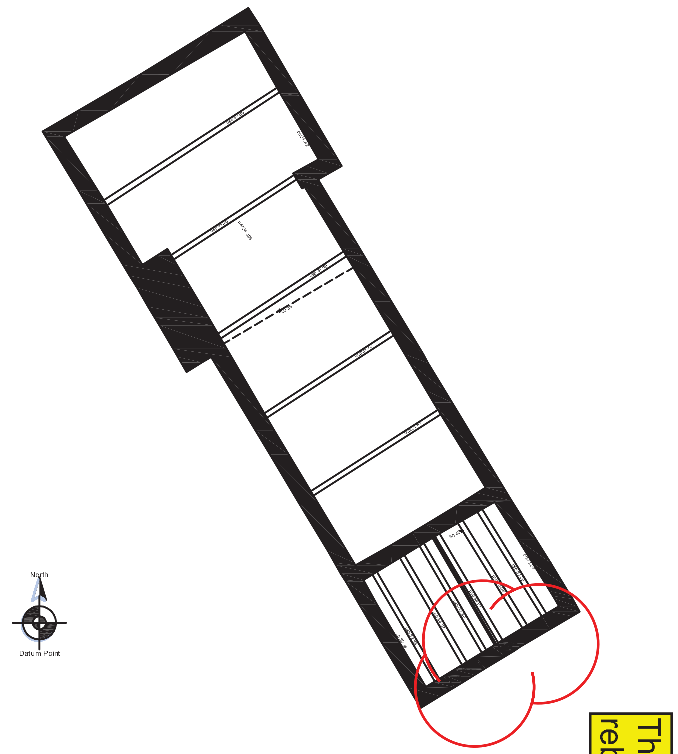
Photo 40 –Bulging Left-Hand Gable Wall

APPENDIX B

EXISTING PLANS



Ground Floor Plan



First Floor Plan

Notes

All Dimensions to be checked on site. Walls shown on plans are not to be assumed to be solid & should be checked for thickness, construction, load bearing capacity & stability.

North

0 1 2 3 4 5
Metres

ABBREVIATIONS

CH	Cable Height
CL	Cover Level
DK	Drop Kerb
EH	Eves Height
EP	Electric Pole
ffl:	Finished Floor Level
GU	Gully
MH	Man Hole
RH	Ridge/Roof Height
RWP	Rain Water Pipe
SP	Sign Post
TP	Telegraph Pole
TW	Top of Wall
usb:	Under Side of Beam
usj:	Under Side of Joist
usr:	Under Side of Ridge

NOTE

Rev.0 Description. Issued

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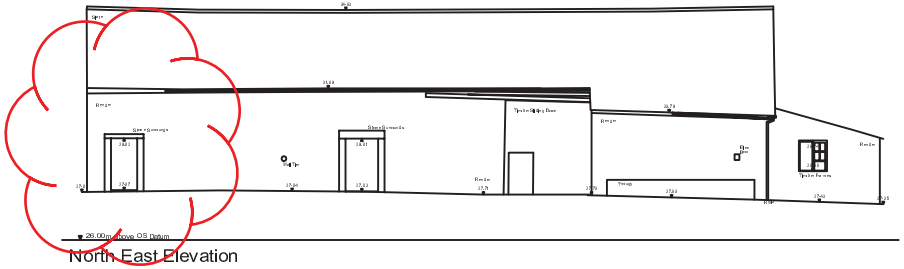
New Hall Farm Barn
Ribchester
PR3 3ZQ

Project Description
Site Survey

Drawing Title
Existing Floor Plans

Scale	Date	Drawn By
1:100@A1	04/12/2014	MW

Drawing Number
TRI-1337-03

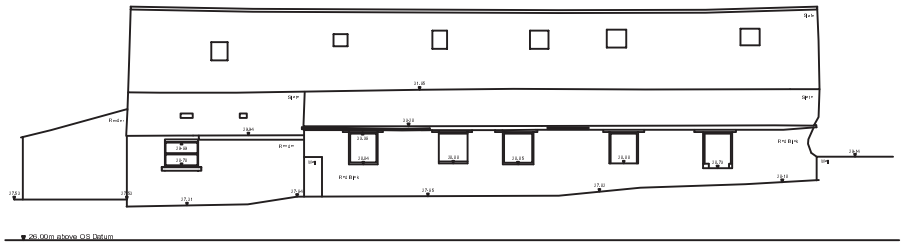


North East Elevation

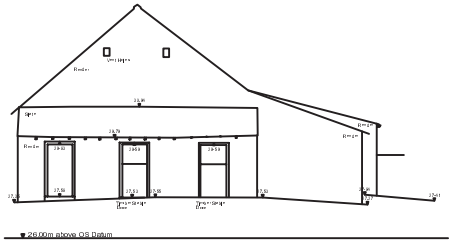
South East Elevation

This area to be rebuilt

This area to be rebuilt



South West Elevation



North West Elevation

Notes

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ABBREVIATIONS

CH	Cable Height
CL	Cover Level
DK	Drop Kerb
EH	Eves Height
EP	Electric Pole
fl:	Finished Floor Level
GU	Gully
MH	Man Hole
RH	Ridge/Roof Height
RWP	Rain Water Pipe
SP	Sign Post
TP	Telegraph Pole
TW	Top of Wall
usb:	Under Side of Beam
usj:	Under Side of Joist
usr:	Under Side of Ridge

NOTE

Rev.0 Description. Issued

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New Hall Farm Barn
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Project Description

Site Survey

Drawing Title

Existing Floor Plans

Scale	Date	Drawn By
1:100@A1	04/12/2014	MW

Drawing Number

TRI-1337-03

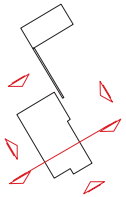
APPENDIX C

ARCHITECT'S PROPOSALS

'as existing' drawings based on information provided by others - no measured survey of the property has been undertaken by the architect.

this drawing is to be read in conjunction with all relevant consultants and specialists drawings. the architect is to be notified of any discrepancies before proceeding. do not scale from this drawing. all dimensions are to be checked on site. this drawing is subject to copyright.

key plan

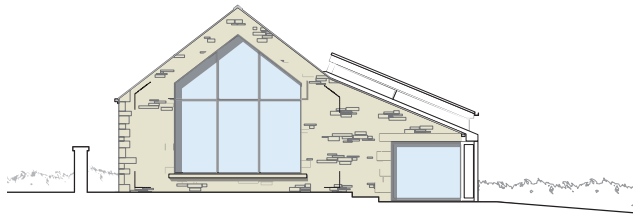


materials schedule

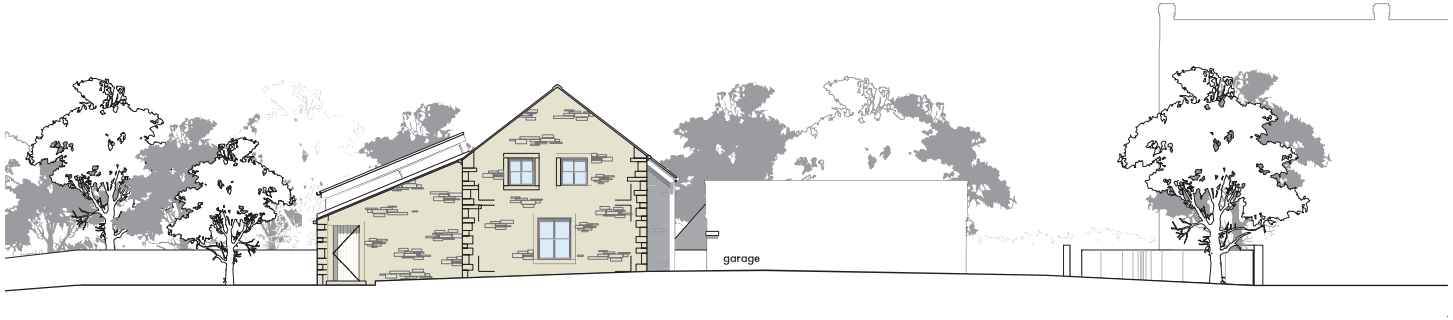
samples of materials to be made available for local authority on request.

roof	- natural slate
walls	- stonework
windows	- polyester coated aluminium

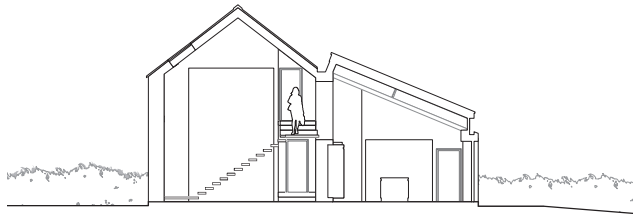
west elevation



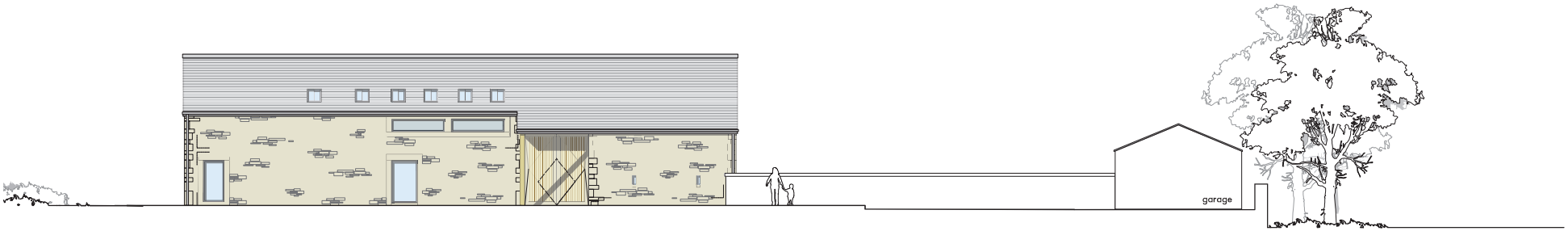
north elevation



south elevation



typical section



east elevation

0m 10m scale

B Issued for information August 2015
A Issued for information August 2015

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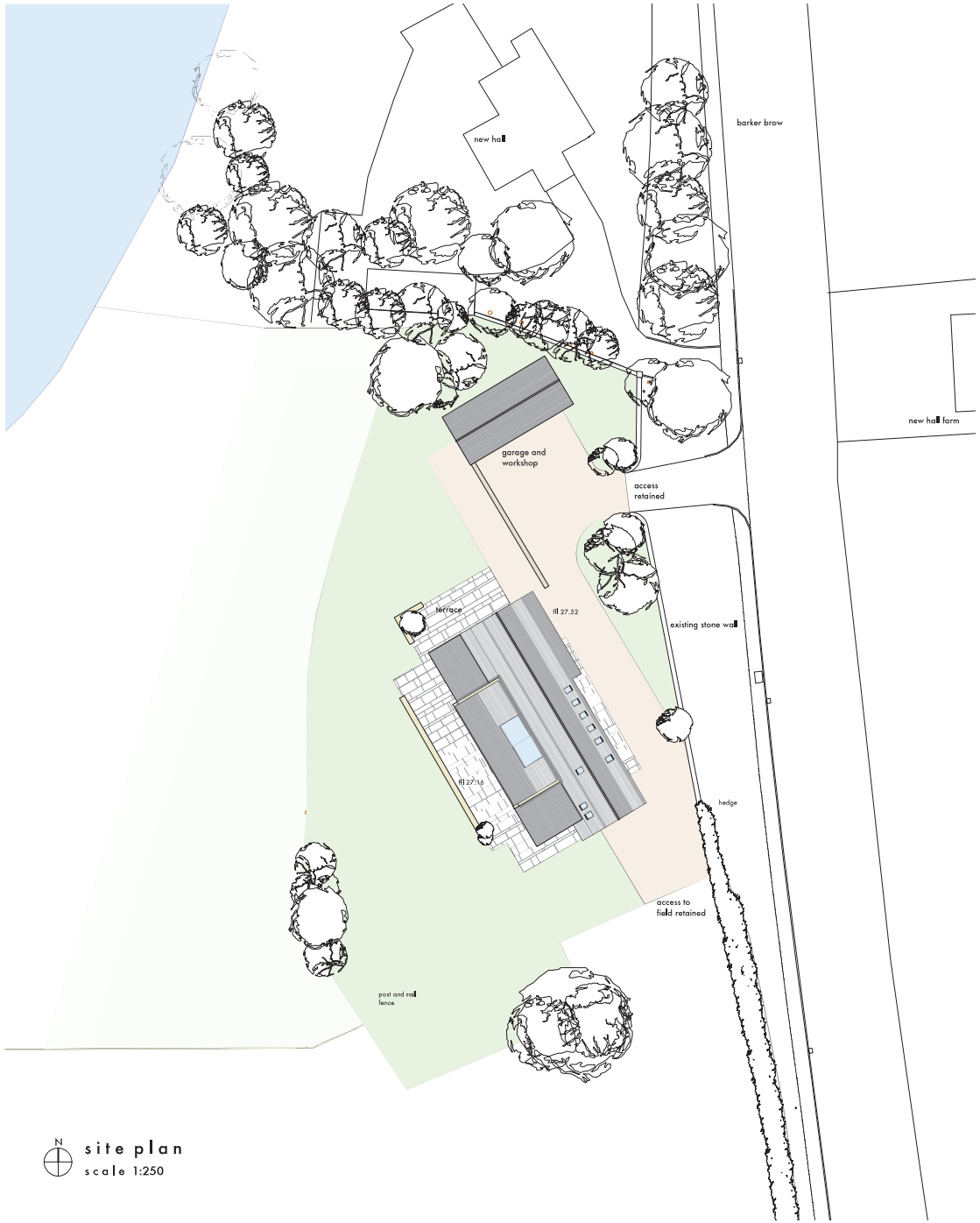
proposed elevations

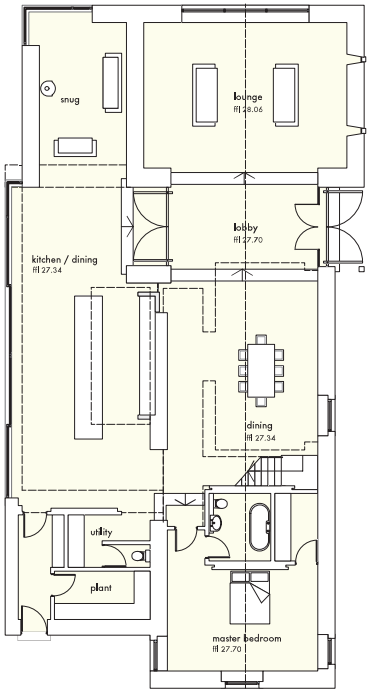
drg.no. 1471 / PL 01 rev. B

drawn. ae date. june 2015 scale. 1 to 100 @ A1



site plan
scale 1:250

0m 10m 20m scale



ground floor
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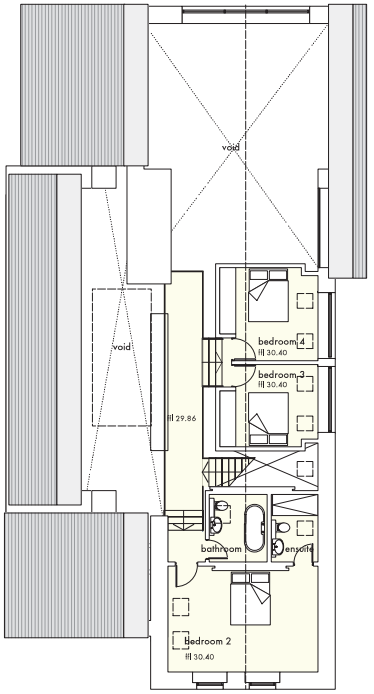

first floor
scale 1:100

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A	Issued for information	August 2015

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Proposed Plans

drg.no. 1471 / PL 00 rev. B

drawn. ae date. june 2015 scale. 1 to 100 @ A1