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civil | structural | architectural



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Conversion of Outbuildings, Charity Farm, Haighton La, Bangor-on-Dee, Wrexham

Structural Appraisal Report

June 2017

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1.0 Executive Summary

The outbuildings to be converted comprises a general agricultural barn and a shippon. Both buildings are located near to the farm house and would appear to be in continued general agricultural use.

The barn is Z shaped in plan with outriggers extending from the side elevations. The outrigger extending towards the highway has been converted in the past and is outside the scope of this report. The building is of two storeys with the right hand outrigger (converted) being single storey. The building comprises a slated pitched roof supported off a traditional purlin and rafter roof spanning between solid brickwork elevations, internal walls and intermediate timber trusses. First floor construction comprises timber boards and joists whilst ground floors are of concrete slab construction or earth. Foundation type and depth were not proven. However given the age of the building, it is assumed that shallow brick spreaders are present.

The shippon is a detached single storey building located to the left of the outbuilding (when viewed from the farmhouse). The building comprises a pitched roof finished in asbestos cement sheeting supported off steel purlins and fabricated trusses and solid brickwork external walls. Shutter doors are provided to the front, rear and right hand side elevations under short overhangs above formed from the concrete lintels over. Ground floor construction comprises a stepped concrete slab laid to falls. Foundation type and depth were not proven. However given the age and style of the building, it is assumed that mass concrete strip foundations will be present.

The date of construction of either building is not known.

The inspection was carried out during the afternoon of Monday 05th June 2017.

The overall condition of the outbuilding and shippon are considered to be goof/fair.

The barn shows evidence of deterioration that is consistent with the age of the building and its continued agricultural use. Minor historical settlement is apparent to the external elevations. The proximity of downpipes and a lack of positive drainage would suggest water penetration and a slight softening of the formation has occurred in the past. There is no evidence of progressive movement and strengthening of foundations is not considered necessary. Timber lintels show evidence of minor deterioration throughout and consideration should be given to their replacement as part of the proposed conversion. The lintel over the door opening to the left hand side elevation is inadequate and will require replacement. Isolated spalling to brick units and erosion of mortar to bed joints was prevalent. This is not untypical in agricultural buildings and can be readily repaired. No dpc is apparent. Although only slight evidence of rising damp was apparent, consideration should be given to the installation of an injected or mechanically installed system carrying an insurance backed guarantee.

The ground floors to the barn are of variable construction though no evidence of significant settlement was apparent. It is unlikely that the floors will have a suitable damp proof membrane and will also need to be adjusted to the proposed levels. Therefore, new floors incorporating a dpm and insulation to modern standards will be required as part of the conversion scheme.

The first floor construction to the barn is in reasonably good condition. However, all of the floors are springy especially to Room 11. This is due to inadequate joist and support beam sections and consideration should be given to replacement or strengthening depending upon floor heights and internal layouts.

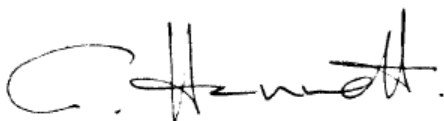
The condition of the roof over the barn is generally fair. The roof shows evidence of minor sag to the ridge line between load bearing walls and the intermediate supports. This is indicative of long term creep in timbers and is not considered to be significant. Slipped, cracked and missing slates were apparent to isolated areas. Part of the roof has a felt membrane, however this will not be suitable for rafter level insulation. Therefore all slate finishes will need to be stripped off to allow for a breathable membrane to be installed. Minor repairs are required to timbers resulting from long term weather penetration particularly around roof lights. Headroom at first floor level is limited by intermediate trusses and modifications to supports will need to be implemented. Gutters and downpipes are intact throughout. No gulleys were apparent and downpipes currently discharge to hardstanding areas close to the elevations. New gulleys will need to be provided as part of any conversion scheme to ensure that discharges are directed away from foundations to a soakaway or to the drainage system.

The shippon shows evidence of minor deterioration consistent with the age of the building. No evidence of settlement was apparent to external walls. Isolated spalling to brick units and erosion of mortar to bed joints was prevalent. This is not untypical in agricultural buildings and can be readily repaired. No dpc is apparent. Although only slight evidence of rising damp was apparent, consideration should be given to the installation of an injected or mechanically installed system carrying an insurance backed guarantee. The floor slab was in good condition with no significant defects apparent at the time of inspection. The roof is considered to be in reasonably good condition, though leaking through joints and fixings was apparent. Supporting purlins and trusses show evidence of minor surface corrosion and will require protection if retained.

The Owners are seeking planning permission to convert the outbuildings into self-contained dwellings. The proposed internal layout has not been finalised, however it is unlikely that significant structural alterations will be required. The proposed alterations and change of use will therefore not significantly increase loadings onto supports and foundations.

The outbuildings are robustly constructed and are considered to be suitable for conversion into self-contained dwellings.

Report Compiled by:



Andrew Hannett
BEng(Hons), CEng, MICE

2.0 Client's Brief

This report was commissioned by Blueprint Architectural Services in support of the proposed planning application to convert the outbuilding and shippon into self-contained dwellings. The purpose of the report is to identify whether the outbuilding and shippon are suitable for conversion and to confirm the extent of repairs required to ensure the buildings are viable in the long term.

3.0 Inspection

3.1 General

The inspection was carried out during the afternoon of Monday 05th June 2017. The weather during the inspection was cool with persistent rainfall. The inspection comprised a visual inspection of those elements of the building readily visible from ground level, from within the building and from a ladder. No excavations were undertaken to uncover buried elements and any notes on the condition of buried elements are made based on the visible condition of the property. Testing requiring the use of specialist equipment or training, e.g. electrical systems, gas appliances, water systems, etc., has not been undertaken. Manhole covers were not lifted and drains were not tested.

The outbuildings to be converted comprises a general agricultural barn and a shippon. Both buildings are located near to the farm house and would appear to be in continued general agricultural use.

The barn is Z shaped in plan with outriggers extending from the side elevations. The outrigger extending towards the highway has been converted in the past and is outside the scope of this report. The building is of two storeys with the right hand outrigger (converted) being single storey. The building comprises a slated pitched roof supported off a traditional purlin and rafter roof spanning between solid brickwork elevations, internal walls and intermediate timber trusses. First floor construction comprises timber boards and joists whilst ground floors are of concrete slab construction or earth. Foundation type and depth were not proven. However given the age of the building, it is assumed that shallow brick spreaders are present.

The shippon is a detached single storey building located to the left of the outbuilding (when viewed from the farmhouse). The building comprises a pitched roof finished in asbestos cement sheeting supported off steel purlins and fabricated trusses and solid brickwork external walls. Shutter doors are provided to the front, rear and right hand side elevations under short overhangs above formed from the concrete lintels over. Ground floor construction comprises a stepped concrete slab laid to falls. Foundation type and depth were not proven. However given the age and style of the building, it is assumed that mass concrete strip foundations will be present.

The date of construction of either building is not known.

Elevations and rooms are referenced in accordance with Architect's Drawings – refer to Appendix B.

3.2 Barn

3.2.1 Elevations

The elevations comprise brickwork to full height. The lintels to window and door openings are a mixture of brick arches, timber sections and concrete units. Roof finishes comprise slate throughout with clay ridge tiles and pointed verges. Windows comprise single glazing in steel frames with a timber leaves and frames provided to the door openings (see Photos 1 – 5). A large opening on the front elevation has been infilled in the past to form two smaller door openings.

The overall condition of the elevations are considered to be fair. Loose brickwork was apparent to the bullseye opening on the front elevation (see Photo 6). Several of the bricks have been dislodged in the arch ring also. Vertical bed joint cracking was noted extending below the opening to approximately 1.2m above ground level (see Photo 7). The cracking was noted as up to 2mm wide at opening level. Diagonal bed joint cracking was noted extending to eaves level above the opening into Room 4. The cracking was noted as up to 2mm wide at lintel level. The edges of the all of the cracking was noted as weathered. The pattern of cracking is indicative of a slight historic settlement of the front corner. Loose brickwork was apparent above the door opening to the left hand side elevation. No lintel is provided externally and the presence of a severely rotted lifting beam would appear to be contributory. The area should be rebuilt as part of the conversion. Mortar to bed joints is lime based generally and was noted as reasonably firm when probed. Spalling and erosion to isolated brick units was apparent throughout the elevations. This is not uncommon in buildings of this age where brick units are porous and soft and susceptible to frost action.

Green staining is apparent to the corner of the elevation under the covered area at the rear. The staining is located below the valley in the roof and would suggest that flashings have failed locally.

The overall condition of the roof where visible is considered to be fair. Isolated missing, broken and slipped slates were noted to all of the roof elevations. Pointing at verges is cracked throughout with some significant missing areas also apparent. Evidence of minor sag is apparent to the ridge line between intermediate supports. All of the guttering and downpipes were intact at the time of inspection. Downpipes discharge directly onto hardstanding areas.

The elevations were noted as generally straight and plumb at ground floor level. However the front elevation shows a slight outwards lean at first floor level. The bed joints were noted as generally straight and level.

No dpc is apparent.

3.2.2 Ground Floor Rooms

The ground floor is separated into six distinct rooms – refer to Appendix B for room references. The rooms are generally finished with bare brick walls except in Room 1 where the walls are finished with painted render and in Room 6 where half height render finishes are provided. Ground floors comprise a mixture of earth, tiles and concrete slabs depending on their use. First floor construction comprises timber joists with boarded finishes supported off intermediate beams and load bearing walls. Boarded finishes are provided to the ceiling within Room 1. No access was available to Room 3 at the time of inspection.

The overall condition of the ground floor rooms is considered to be fair with the first floor construction over considered to be fair also.

Cracking was apparent to external and internal walls at ground floor level. Vertical cracking was apparent through render finishes extending to ceiling level from the window to Room 1. The cracking was noted as up to 3mm wide at ceiling level. The cracking does not extend below window level and would appear indicative of a slight settlement on the elevation. Minor cracking up to 2mm wide was apparent above the door opening between Rooms 4 and 3 (Photo 8). Cracking up to 3mm wide was apparent above the door opening between Rooms 4 and 5 (see Photo 9). A single missing brick was noted to the arched lintel over the opening locally. The pattern of cracking at each location is indicative of a minor settlement of the external elevation. All of the cracking appeared fairly longstanding and does not appear to be indicative of an ongoing movement.

Rising damp was apparent at low level within Rooms 2, 4 and 5. This is typically indicative of a missing or failed dpc. Spalling to brickwork at low level is indicative of frost damage to generally porous brickwork and is typical in buildings of this age.

The lintel to the external door opening in Room 6 shows evidence of rot at one end. This would appear to be due to water penetration through the low level roof externally. No distortion was apparent, however it would be prudent to replace the unit as part of the conversion. The remainder of the timber lintels show evidence of slight section losses due to infestation and rot. All timber lintels should be replaced as part of the proposed conversion.

The boarded finishes, joists and intermediate beams to the first floors over show evidence of minor deterioration due to insect infestation (see Photo 10). No section losses were apparent, however several of the joists and beams appear undersized for the span and imposed loadings.

The ground floor showed no evidence of significant defects.

The walls were noted as generally straight and plumb. The floors were noted as uneven and have been laid with steps and falls to several areas, all of which appeared as built.

3.2.3 First Floor Rooms

Access to the first floor rooms is via a timber stair located between Rooms 2 and 3 and via a hatch in Room 6. Due to stored materials it was not possible to fully access the first floor. Therefore observations are based on the limited views afforded.

The timber access stair is in a fairly poor condition due to wear and weather penetration through roof finishes above. The proposed conversion will need to make provision for alternative means of access to the first floor.

The rooms are generally finished with bare brickwork to external and internal walls under a traditional purlin and rafter roof supported off load bearing walls and intermediate timber trusses. First floor finishes comprise timber boards with some areas over-boarded with ply.

The overall condition of the first floor rooms is considered to be fair.

Vertical cracking and loose brickwork was apparent in the gable elevation of Room 9 above the bullseye window. The top five bricks to the arch ring have dropped along with the brickwork above. The cracking was noted as up to 5mm wide above the opening and 2mm below. The pattern of movement is consistent with a slight settlement at the front corner of the building. Staining was apparent to brickwork on both sides of the internal wall at the base of valley over Room 9. The defect appears longstanding and is indicative of failed flashings in the valley.

Severe distortion was apparent to the lintel over the external door opening to Room 7 (see Photo 11). This is due to the lintel being inadequate to support the reaction from a timber lifting beam installed over the opening. The brickwork is loose and replacement lintels will

be required. The arched brick lintel to one side of the door between Rooms 7 and 8 has partially collapsed with several bricks being missing (see Photo 12). This has resulted in significant cracking in the brickwork above.

The slated finishes are generally laid directly over the rafters with torching internally. However over Rooms 9, 10 and 11, a felt membrane has been installed over part of the roof which would suggest that the roof has been re-laid in the past. Several small holes were noted to the slated finishes within Rooms 7, 8 and 11. Severe water penetration was apparent below the valley over Room 9 which has resulted in severe degradation to the timber below. The remainder of the roof timbers show evidence of minor deterioration as a result of insect infestation and minor weather penetration over an extended period (see Photo 13). The defects are particularly prevalent below roof lights which appear to be leaking. The intermediate trusses show evidence of slight deterioration. The roof construction requires extensive minor repair with some isolated timber renewal.

The boarded finishes to the floor show evidence of slight wear where visible. The floors were noted as slightly springy throughout which is indicative of undersized floor joists and supporting beams. However the floor to Room 11 was noted as particularly springy and will need to be replaced during the conversion.

The walls were noted generally straight and plumb except for the front elevation which shows a slight outwards lean. The floors were noted as generally level, where visible. Stored materials prevented a full assessment.

3.3 Shippon

3.3.1 Elevations

The elevations comprise brickwork to full height. The lintels and cills to high level window openings comprise precast concrete units. Lintels to low level openings comprise insitu concrete beams with short external overhangs. Roof finishes comprise asbestos cement sheeting. Windows comprise single glazing in steel frames, doors comprise timber leaves supported by top runners (see Photos 14 – 17).

The overall condition of the exterior is considered to be good/fair.

No evidence of cracking was apparent to the elevations. Isolated spalled brick units were prevalent to the gable peak of the front elevation. General degradation to mortar was apparent throughout up to a depth of 20mm. The defect is particularly prevalent to the front elevation and at low level to the right hand side elevation. Green staining was also apparent at low level along both side elevations adjacent to in areas of ponding. Very minor spalling was apparent to the window cill units and along the top edge of the overhang above door openings.

Minor moss growth was apparent to the roof sheeting though this does not appear to be affecting the performance of the sheeting itself. Discolouration was apparent to roof lights resulting from UV exposure. All guttering was present, however several sections of downpipe were missing allowing water to discharge onto the elevations directly. No positive drainage is provided with discharges onto the hardstanding areas around the building. Ponding is prevalent alongside the side elevations suggesting that the hardstanding has inadequate falls.

3.3.2 Interior

The interior of the shippon comprises a single open room. The floor comprises a stepped concrete ground bearing slab. Walls generally comprise bare brickwork with areas of cement render at low level. An insitu concrete ring beam is provided above the door openings on the front and rear elevations. The roof over comprises asbestos cement sheeting supported off tubular purlins spanning between fabricated steel truss frames (see Photo 18).

The overall condition of the interior is considered to be good/fair.

Staining was apparent to roof sheeting adjacent to roof lights, joints and adjacent to the purlins (see Photo 19). The staining is generally minor except under the roof lights where green staining would suggest that the defect is longstanding. Several small holes were apparent to the sheeting which are allowing water to penetrate the sheeting. Minor surface corrosion was noted to the steel purlins and roof trusses, though no significant section losses were apparent.

No evidence of cracking was apparent to the external walls. Staining was evident to several areas of the walls below purlin bearings and under roof lights. No degradation to the mortar beds was apparent locally. No cracking or spalling was apparent to the concrete ring beams.

The ground floor showed no evidence of significant defects.

The walls were noted as generally straight and plumb. The floor has been laid with steps and falls to several areas, all of which appeared as built.

4.0 Conclusions and Discussion

The overall condition of the barn and shippon are considered to be good/fair.

The barn shows evidence of deterioration that is consistent with the age of the building and its continued agricultural use. Minor historical settlement is apparent to the external elevations. The proximity of downpipes and a lack of positive drainage would suggest water penetration and a slight softening of the formation has occurred in the past. There is no evidence of progressive movement and strengthening of foundations is not considered necessary. Timber lintels show evidence of minor deterioration throughout and consideration should be given to their replacement as part of the proposed conversion. The lintel over the door opening to the left hand side elevation is inadequate and will require replacement. Isolated spalling to brick units and erosion of mortar to bed joints was prevalent. This is not untypical in agricultural buildings and can be readily repaired. No dpc is apparent. Although only slight evidence of rising damp was apparent, consideration should be given to the installation of an injected or mechanically installed system carrying an insurance backed guarantee.

The ground floors to the barn are of variable construction though no evidence of significant settlement was apparent. It is unlikely that the floors will have a suitable damp proof membrane and will also need to be adjusted to the proposed levels. Therefore, new floors incorporating a dpm and insulation to modern standards will be required as part of the conversion scheme.

The first floor construction to the barn is in reasonably good condition. However, all of the floors are springy especially to Room 11. This is due to inadequate joist and support beam sections and consideration should be given to replacement or strengthening depending upon floor heights and internal layouts.

The condition of the roof over the barn is generally fair. The roof shows evidence of minor sag to the ridge line between load bearing walls and the intermediate supports. This is indicative of long term creep in timbers and is not considered to be significant. Slipped, cracked and missing slates were apparent to isolated areas. Part of the roof has a felt membrane, however this will not be suitable for rafter level insulation. Therefore all slate finishes will need to be stripped off to allow for a breathable membrane to be installed. Minor repairs are required to timbers resulting from long term weather penetration particularly around roof lights. Headroom at first floor level is limited by intermediate trusses and modifications to supports will need to be implemented. Gutters and downpipes are intact throughout. No gulley was apparent and downpipes currently discharge to hardstanding areas close to the elevations. New gulleys will need to be provided as part of any conversion scheme to ensure that discharges are directed away from foundations to a soakaway or to the drainage system.

The shippon shows evidence of minor deterioration consistent with the age of the building. No evidence of settlement was apparent to external walls. Isolated spalling to brick units and erosion of mortar to bed joints was prevalent. This is not untypical in agricultural buildings and can be readily repaired. No dpc is apparent. Although only slight evidence of rising damp was apparent, consideration should be given to the installation of an injected or mechanically installed system carrying an insurance backed guarantee. The floor slab was in good condition with no significant defects apparent at the time of inspection. The roof is considered to be in reasonably good condition, though leaking through joints and fixings was apparent. Supporting purlins and trusses show evidence of minor surface corrosion and will require protection if retained.

The Owners are seeking planning permission to convert the outbuildings into self-contained dwellings. The proposed internal layout has not been finalised, however it is unlikely that significant structural alterations will be required. The proposed alterations and change of use will therefore not significantly increase loadings onto supports and foundations.

The outbuildings are robustly constructed and are considered to be suitable for conversion into self-contained dwellings.

5.0 Recommendations

The following items should be addressed as part of any works to the outbuildings to ensure structural viability in the long term:

- Replace isolated spalled brick units with similar. Locally rebuild areas of loose brickwork. Repoint elevations by raking out existing pointing to a minimum depth of 40mm. New pointing shall comprise a traditional lime mortar finished flush with the face of the masonry.
- Remove existing slated finishes to barn and set aside for re-use. Inspect existing timbers and replace as necessary. Relay slated finishes on treated battens over breathable membrane. Modifications to roof construction will be required to increase headroom at first floor level.
- Remove sheeting to shippon roof. Prepare and repaint retained steel sections as necessary. Install new insulated roof over.
- Strengthen or replace first floor construction. Provide lateral restraint strapping as necessary secured to external and internal walls and extending across three floor joists.
- Replace timber lintels to external and internal openings with proprietary precast concrete or steel units.
- Install injected chemical or sheet dpc at least 150mm above ground level to external and internal walls of the original part of the building. A ten year insurance backed guarantee should be provided for all materials and installation.
- Provide new concrete ground floors throughout incorporating insulation to modern standards. A dpm should also be provided which shall be lapped or tucked into any existing or new dpc.

6.0 Limitations and Liability

This report has been prepared for the exclusive use of the commissioning party and unless otherwise agreed in writing by Andrew Hannett Limited, no other party may use, make use of or rely on the contents of the report. No liability is accepted by Andrew Hannett Limited for any use of this report, other than for the purposes for which it was originally prepared and provided.

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The timber or other parts of the building which are covered, unexposed or inaccessible to the Structural Engineer without the assistance of a ladder in excess of 3m have not been inspected. The report does not cover the condition of the dpc, possible damp penetration or condensation unless specifically highlighted as part of the inspection. Where the property was furnished at the time of inspection those elements of the structure covered over have not been fully inspected. Therefore it is not possible to confirm that those elements are free from defect.

No excavations were undertaken to uncover buried elements or foundations and any notes on the condition of such elements are made based on the visible condition of the property. No intrusive testing was carried out. Manhole covers were not lifted and drains were not tested. Testing requiring the use of specialist equipment or training, e.g. electrical systems, gas appliances, water systems, etc., has not been undertaken.

This report is not intended to be an exhaustive list of all defects and only significant structural faults which could lead to instability of the structure in the present or future have been reported. Further defects may become apparent during more extensive investigation or during future refurbishment works.

Detailed calculations to determine the adequacy of structural members are outside the scope of this report and have not been undertaken. However evidence of distress as a result of overloading or deterioration will be identified so that provision for additional works can be made during any future refurbishment scheme.

The report shall be solely used by the Client to determine the extent of works to the property and liability in this respect will be limited to the instructing Client.

Nothing in the Contract confers nor purports to confer on any third party any benefit nor any right to enforce any terms of this Contract pursuant to the Contracts (Rights of Third Parties) Act 1999.

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Appendix A – Photographs



Photo 1 – Outbuilding Front Elevation.



Photo 2 – Outbuilding Left Hand Side Elevation.



Photo 3 – Outbuilding Rear Elevation.



Photo 4 – Outbuilding Rear Elevation within covered area.



Photo 5 – Outbuilding Right Hand Side Elevation.



Photo 6 – Loose brickwork above opening and to arch ring.



Photos 9 – Cracking above internal opening.
Note missing brick.

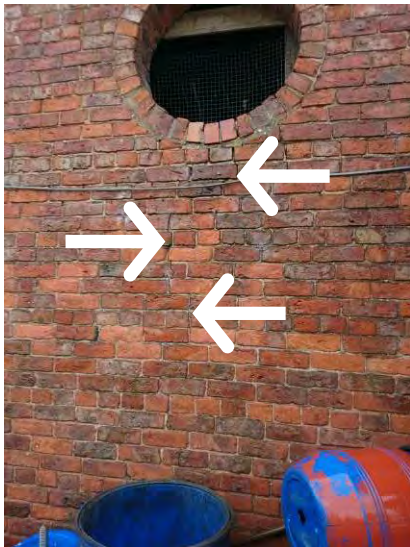


Photo 7 – Cracking below bullseye opening.



Photo 10 – Typical condition
of first floor construction.



Photo 8 – Cracking above internal opening.



Photo 11 – Inadequate lintel and loose
brickwork above opening.



Photo 12 – Missing brickwork above opening.
Note cracking above.



Photo 15 – Shippon Right Hand Side Elevation.



Photo 13 – Typical condition of
roof construction



Photo 16 – Shippon Rear Elevation.



Photo 14 – Shippon Front Elevation.



Photo 17 – Shippon Left Hand Side Elevation..

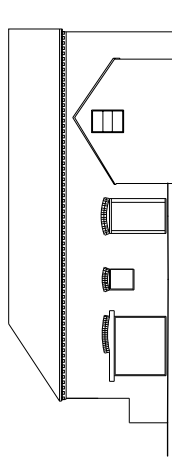


Photo 18 – Typical view of roof construction.

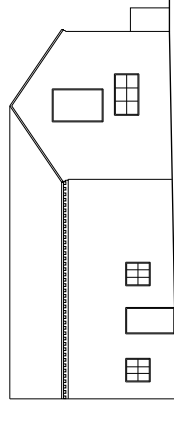


Photo 19 – Staining to sheeting.

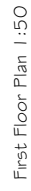
Appendix B – Architect's Drawings

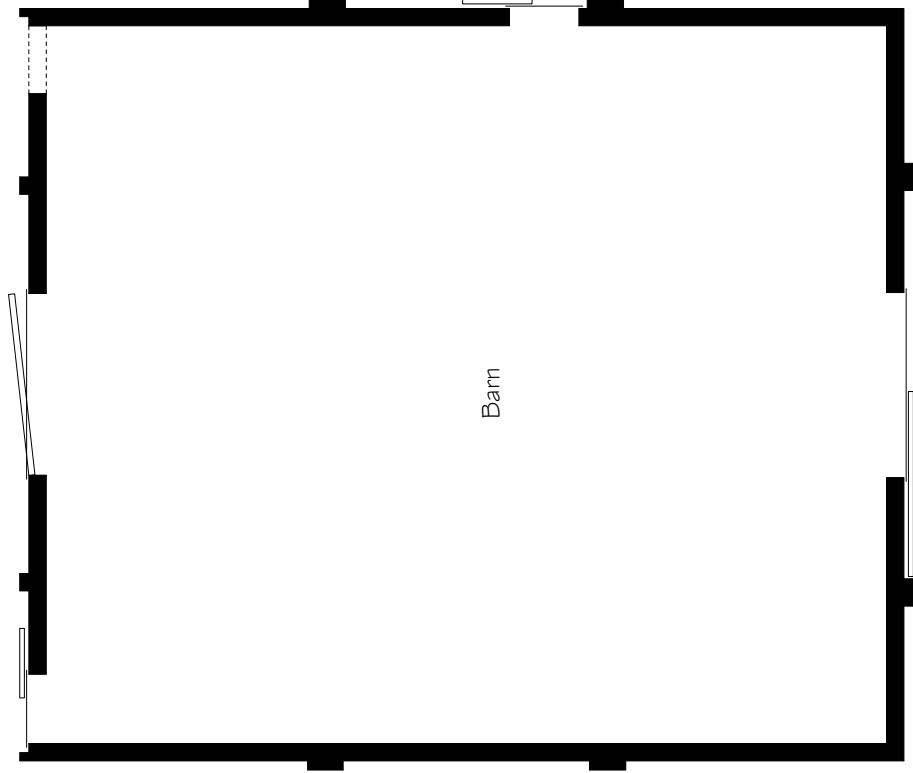
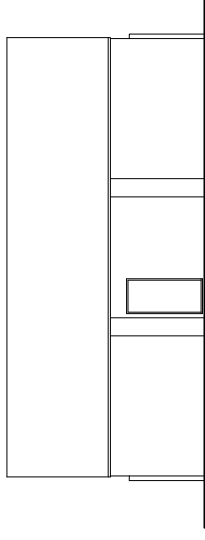
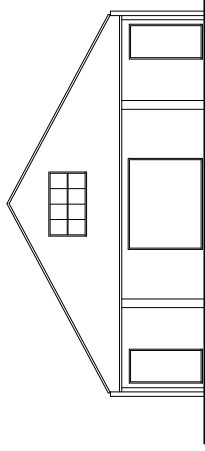
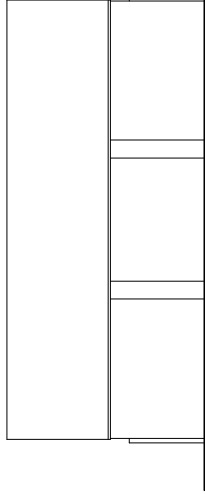
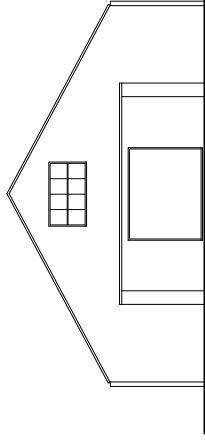


Side Elevation 1:100



Side Elevation 1 : 100



[illegible]

Project: Proposed alterations at
Charity Farm,
Houghton Lane,
Bangor on Dee,
Wrexham, LL13 0BW.

Title:	Existing	Scale: (A2) 1:50 \$ 1:100
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Drawn By: J Felgate	Date: April 2017
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Drawing No: A045/001	Sheet: 1 of 1
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