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# Conversion of Outbuilding, Cae Brynner Farm, Bowling Bank, Wrexham

## Structural Appraisal Report

September 2020

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## 1.0 Executive Summary

The outbuilding is arranged over two storeys and is located at the end of a range of outbuildings serving the working farm. The roof over the outbuilding comprises asbestos cement sheeting supported off steel angle purlins spanning between the gable elevation and party wall over an intermediate steel angle truss. First floor construction comprises boarded finishes over solid timber joists. The ground floor comprises a solid concrete slab with ledges within Barn 1 to form milking bays. External and internal walls comprise solid brickwork to full height. Foundation type and depth were not proven, however given the age of the building, it is assumed that concrete strip foundations are present.

The inspection was carried out during the morning of Monday 31<sup>st</sup> August 2020.

The overall condition of the building is considered to be fair.

The building shows evidence of deterioration that is consistent with its age, its previous use and a lack of routine maintenance over recent years. The building also shows evidence of settlement indicative of foundation movement along the front elevation, however this would appear to have abated.

The elevations show evidence of cracking and distortions consistent with a settlement along the front elevation of the building. The apparent settlement is at its greatest at the junction of the front and left hand side elevations. The cracking was noted as longstanding which would suggest that the movement is historical and has abated. Pointing to the elevations has eroded slightly over time. The remainder of the mortar was noted as generally hard. All of the elevations will require localised repair and repointing as part of the conversion scheme. Lintels to openings comprise precast concrete sections. Several of the lintels are cracked and spalled which is indicative of reinforcement corrosion. This type of defect is common in older buildings where poor quality concrete and inadequate cover is prevalent. Although only some of the lintels are affected, it would be prudent to replace all of the lintels as part of the conversion scheme to ensure long term durability.

No dpc is apparent. Although there is no significant evidence of rising damp in the external or internal walls, it would be prudent to install a new dpc as part of any conversion scheme. Any new dpc should carry an insurance backed guarantee.

The ground floor to the building comprises a concrete slab in reasonably good condition. It is unlikely that the floor will have a suitable damp proof membrane and will also need to be adjusted to suit the proposed levels. Therefore, a new floor incorporating a dpm and insulation to modern standards will be required as part of the conversion scheme.

First floor construction is considered to be in good/fair condition. Insect infestation is apparent throughout along with isolated areas of damp staining, though no significant section losses were apparent to joists. Section losses resulting from damp penetration and wear are apparent to boarded finishes and replacement would be prudent. The floors were reasonably solid and the joists would appear adequate for retention, though treatment will be required to ensure long term durability.

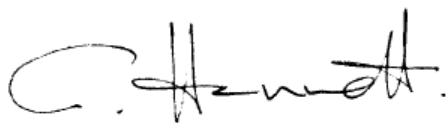
The condition of the roof over the building is generally fair, however the Client has expressed a preference for a slated roof over. The existing construction cannot be readily altered to suit the new finishes, therefore a new roof will be required over the whole building.

Gutters and downpipes were intact and discharge into working gulleys. The system should be inspected and repaired as necessary so that it can be retained.

Blueprint Architectural Services are seeking planning permission on behalf of Mr Stuart Edwards to convert the building into a self-contained dwelling. The proposed internal layout and alterations to the elevations are shown on the planning drawings (see Appendix B).

**The outbuilding is robustly constructed and is considered to be suitable for conversion into a self-contained dwelling.**

Report Compiled by:

A handwritten signature in black ink, appearing to read 'A. Hannett', with a stylized flourish at the end.

Andrew Hannett  
BEng(Hons), CEng, MICE

## 2.0 Client's Brief

This report was commissioned by Blueprint Architectural Services on behalf of Mr Stuart Edwards in support of the proposed planning application to convert the outbuilding into a self-contained dwelling. The purpose of the report is to identify whether the building is suitable for conversion and to confirm the extent of repairs required to ensure viability in the long term.

### 3.0 Inspection

#### 3.1 General

The inspection was carried out during the morning of Monday 31<sup>st</sup> August 2020. The weather during the inspection was warm and dry. The inspection comprised a visual inspection of those elements of the building readily visible from ground level and from within the building. No excavations were undertaken to uncover buried elements and any notes on the condition of these 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 outbuilding is arranged over two storeys and is located at the end of a range of outbuildings serving the working farm. The roof over the outbuilding comprises asbestos cement sheeting supported off steel angle purlins spanning between the gable elevation and party wall over an intermediate steel angle truss. First floor construction comprises boarded finishes over solid timber joists. The ground floor comprises a solid concrete slab with ledges within Barn 1 to form milking bays. External and internal walls comprise solid brickwork to full height. Foundation type and depth were not proven, however given the age of the building, it is assumed that concrete strip foundations are present.

Elevations and rooms are referenced on Architect's Drawings – refer to Appendix B.

## 3.2 External Inspection

### 3.2.1 Front Elevation

The elevation comprises brickwork to full height with several window and door openings apparent with concrete lintels over (see Photo 1).

The overall condition of the elevation is considered to be fair.

Cracking was apparent to the elevation in several locations. Diagonal bed joint cracking up to 5mm wide was noted extending from the ground floor door opening towards the right hand side elevation (see Photo 2). Cracking up to 2mm was noted extending down from both ends of the door lintel (see Photo 3). Hairline cracking was noted extending to roof level from the left hand side of the first floor door opening. A gap up to 5mm wide was noted to the left hand side of the ground floor window opening. The pattern of cracking is consistent with settlement at both ends of the elevation. The edges of the cracks were weathered which would indicate that the settlement is historic.

Deterioration is apparent to the concrete lintel over the ground floor door opening. A crack up to 5mm wide is apparent to the full length of the unit with a distinct sag along the soffit noted (see Photo 4). This type of defect is typically attributable to corrosion of embedded reinforcement which is common in buildings of this age.

The mortar to brickwork joints is cement based and was noted as slightly friable though generally hard and slightly eroded from the brickwork.

The verge to the roof was intact at the time of inspection.

The elevation shows a general slight outwards lean at up to 2.3% (23mm in 1.0m). The bed joints at the left hand end show a slight run towards the side elevation.

No dpc was apparent.

### 3.2.2 Left Hand Side Elevation

The elevation comprises brickwork to full height with several window and door openings apparent with concrete lintels over (see Photo 5). The roof over comprises asbestos cement sheeting.

The overall condition of the elevation is considered to be fair.

Cracking was apparent to the elevation in several locations. Vertical cracking was noted extending from the left hand end of the larger door lintel to eaves level (see Photo 6). The cracking was noted as up to 15mm wide at eaves level. The pattern of cracking is indicative of a significant settlement at the front elevation. Hairline cracking was noted extending up from the central window opening. The edges of the cracks were weathered which would indicate that the settlement is historic.

Deterioration is apparent to the concrete lintel over the large door opening. A large spall is apparent at the right hand bearing exposing severely corroded reinforcement within (see Photo 7). Minor spalling was also apparent along the soffit of this lintel and to the lintel over the smaller door opening.

The mortar to brickwork joints is cement based and was noted as slightly friable though generally hard and slightly eroded from the brickwork.

The roof over is in generally good condition with no significant holes visible. The guttering and downpipe were intact. The downpipe discharges into a gulley which appeared functional.

The elevation was noted as generally plumb. The bed joints at the right hand end show a run at 2.2% towards the front elevation.

No dpc was apparent.

### 3.2.3 Right Hand Side Elevation

The elevation comprises brickwork to full height with several window and door openings apparent with concrete lintels over (see Photo 8). The roof over comprises asbestos cement sheeting.

The overall condition of the elevation is considered to be fair.

Cracking was apparent to the elevation in several locations. Diagonal bed joint cracking was noted extending from the left hand side of the door opening (see Photo 9). The cracking extends through the small opening above to eaves level. The cracking was noted as up to 4mm wide. Hairline cracking was noted at eaves level adjacent to the front elevation and would appear to be a continuation of the cracking noted to the front elevation. Horizontal cracking 1mm wide was apparent above the lintel over the left hand window opening. Hairline bed joint cracking was apparent extending from the right hand window opening towards an infilled door opening. The pattern of cracking is indicative of a settlement at the front elevation. The edges of the cracks were weathered which would indicate that the settlement is historic. A small area of loose brickwork was noted at the junction with the front elevation.

The mortar to brickwork joints is cement based and was noted as slightly friable though generally hard and slightly eroded from the brickwork. A small area of significant pointing losses was noted at low level close to the front elevation possibly resulting from leaking guttering.

The roof over is in generally good condition with only one small hole visible. The guttering and downpipe were intact. The downpipe discharges into a gulley which appeared functional.

The elevation was noted as generally plumb.

No dpc was apparent.

### 3.3 Internal Inspection

#### 3.3.1 Barn First Floor

Barn First Floor occupies the entire first floor area. The room comprises bare brick external walls supporting a steel angle purlin and truss roof over. The floor comprises boarded finishes over timber joists (see Photo 10).

The overall condition of the room is considered to be fair.

Cracking was apparent to the external walls in several locations. Diagonal bed joint cracking was apparent extending from the central opening on the front elevation towards the purlin (see Photo 11). The cracking was noted as up to 0.5mm wide. Cracking up to 18mm wide was apparent in the left hand side elevation near to the front elevation and extending to wall plate level (see Photo 12). Further cracking up to 3mm wide was apparent in the left hand side elevation towards the rear of the room. Cracking up to 3mm wide was apparent in the right hand side elevation towards the centre of the room (see Photo 13). The pattern of cracking is consistent with an historic settlement along the front elevation.

The roof over the room appeared to be in generally fair condition. Several small holes were apparent in the sheet finishes. In one location the entire length of a sheet had split and opened up slightly. The steel purlins and truss supporting the roof show evidence of surface corrosion throughout, though no section losses were apparent.

The boarded finishes to the floor were noted as worn throughout with several small holes apparent in isolated locations. Staining was noted in several locations below holes in the roof, though no significant localised section losses were apparent. No significant spring was apparent in the floor.

The walls were noted as generally plumb except for the front elevation which shows a slight outwards lean. The floor was noted as generally level except close to the junction of the front and left hand side elevations where a run at 10mm in 1.0m (1%) was apparent.

#### 3.3.2 Barn 1

Barn One is located at the front of the building adjacent to the left hand side elevation. The room comprises rendered walls with a plasterboard ceiling to the floor over. The ground floor comprises a solid concrete slab with upstands forming milking bays.

The overall condition of the room is considered to be fair.

Minor cracking was apparent to rendered wall finishes throughout, probably resulting from long term shrinkage of finishes. The cracking is particularly prevalent around openings. Cracking 3-5mm wide was apparent to the concrete lintel over the door opening (see Photo 14). The cracking has resulted from corrosion of embedded reinforcement which is common in buildings of this age.

The floor over is hidden behind plasterboard finishes and not visible for inspection. Board pattern cracking was apparent throughout the ceiling. No significant areas of staining were apparent.

The floor incorporates various upstands but was noted to be in reasonably good condition. Several historical cracks were apparent which would appear to have resulted from shrinkage soon after casting and are not indicative of settlement.

The walls were noted as generally straight and plumb. The floor has been laid to falls to aid drainage.

### 3.3.3 Barn Two

Barn Two is located at the front of the building adjacent to the right hand side elevation. The room comprises rendered walls with a plasterboard ceiling to the floor over. The ground floor comprises a solid concrete slab.

The overall condition of the room is considered to be fair.

Minor cracking was apparent to rendered wall finishes throughout, probably resulting from long term shrinkage of finishes. Cracking 4-5mm wide was noted to the left of the door opening extending to first floor level (see Photo 15). The concrete lintel to the outer leaf over the door opening shows a significant sag at mid span resulting from corrosion of embedded reinforcement.

The floor over is hidden behind plasterboard finishes except for an area above the door opening on the front elevation which has collapsed. The collapse has resulted from weather penetration from above evidenced by staining to joists and boards locally (see Photo 16). Significant rot to boards was apparent locally. Minor worm infestation was noted though no section losses were apparent. Staining was also apparent to joist ends, though no significant rot was apparent.

The floor was noted to be in reasonably good condition. Several historical cracks were apparent which would appear to have resulted from shrinkage soon after casting and are not indicative of settlement.

The walls were noted as generally straight and plumb and the floor generally level.

### 3.3.4 Barn Three

Barn Three is located at the rear of the building adjacent to the right hand side elevation. The room comprises rendered walls with a floor over comprising boarded finishes over timber joists at regular centres. The ground floor comprises a solid concrete slab. A timber stair flight provides access to the upper floor.

The overall condition of the room is considered to be fair.

Cracking was apparent to the right hand side elevation. Bed joint cracking up to 6mm wide was noted extending to first floor level from the right hand side of the external door opening (see Photo 17). Cracking up to 1mm wide was noted extending to first floor level from the left of the window lintel. The pattern of cracking is consistent with a settlement at the gable elevation.

The floor over is constructed from 50mm x 200mm solid joists at 350mm centres with boarded finishes over (see Photo 18). Minor worm infestation was noted though no section losses were apparent. Staining was apparent to isolated areas of the boarded finishes with localised section losses noted. Staining was also noted to several joist ends, though no significant rot was apparent.

The floor was noted to be in reasonably good condition. Several historical cracks were apparent which would appear to have resulted from shrinkage soon after casting and are not indicative of settlement.

The walls were noted as generally straight and plumb and the floor generally level.

## 4.0 Conclusions and Discussion

The overall condition of the building is considered to be fair.

The building shows evidence of deterioration that is consistent with its age, its previous use and a lack of routine maintenance over recent years. The building also shows evidence of settlement indicative of foundation movement along the front elevation, however this would appear to have abated.

The elevations show evidence of cracking and distortions consistent with a settlement along the front elevation of the building. The apparent settlement is at its greatest at the junction of the front and left hand side elevations. The cracking was noted as longstanding which would suggest that the movement is historical and has abated. Pointing to the elevations has eroded slightly over time. The remainder of the mortar was noted as generally hard. All of the elevations will require localised repair and repointing as part of the conversion scheme. Lintels to openings comprise precast concrete sections. Several of the lintels are cracked and spalled which is indicative of reinforcement corrosion. This type of defect is common in older buildings where poor quality concrete and inadequate cover is prevalent. Although only some of the lintels are affected, it would be prudent to replace all of the lintels as part of the conversion scheme to ensure long term durability.

No dpc is apparent. Although there is no significant evidence of rising damp in the external or internal walls, it would be prudent to install a new dpc as part of any conversion scheme. Any new dpc should carry an insurance backed guarantee.

The ground floor to the building comprises a concrete slab in reasonably good condition. It is unlikely that the floor will have a suitable damp proof membrane and will also need to be adjusted to suit the proposed levels. Therefore, a new floor incorporating a dpm and insulation to modern standards will be required as part of the conversion scheme.

First floor construction is considered to be in good/fair condition. Insect infestation is apparent throughout along with isolated areas of damp staining, though no significant section losses were apparent to joists. Section losses resulting from damp penetration and wear are apparent to boarded finishes and replacement would be prudent. The floors were reasonably solid and the joists would appear adequate for retention, though treatment will be required to ensure long term durability.

The condition of the roof over the building is generally fair, however the Client has expressed a preference for a slated roof over. The existing construction cannot be readily altered to suit the new finishes, therefore a new roof will be required over the whole building.

Gutters and downpipes were intact and discharge into working gulleys. The system should be inspected and repaired as necessary so that it can be retained.

Blueprint Architectural Services are seeking planning permission on behalf of Mr Stuart Edwards to convert the building into a self-contained dwelling. The proposed internal layout and alterations to the elevations are shown on the planning drawings (see Appendix B).

**The outbuilding is robustly constructed and is considered to be suitable for conversion into a self-contained dwelling.**

## 5.0 Recommendations

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

- Remove existing roof construction and replace as necessary.
- Remove existing boarded finishes at first floor level. Obtain specialist inspection of timber joists and carry out treatments as required. Provide new floor decking glued and screwed to existing joists.
- Replace existing lintels with new precast concrete units as required.
- Repair cracking to external walls by providing bed joint reinforcement (e.g. Helifix system) at four-course vertical centres. All works shall be carried out in strict accordance with the manufacturer's recommendations.
- Carry out repairs to loose brickwork. Repoint elevations by raking out existing pointing to a minimum depth of 30mm. New pointing shall comprise a 1:1:6 lime:cement:sand mortar packed tight into joints and finished flush with the face of the wall.
- 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. As an alternative, provide vertical damp proofing to internal walls lapped and sealed with floor dpm.
- 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 or damp proofing.

## 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 – Front Elevation.



Photo 2 – Cracking to right of door opening.



Photo 3 – Cracking below lintel.



Photo 4 – Cracking to concrete lintel.



Photo 5 – Left Hand Side Elevation.



Photo 6 – Cracking extending from door opening.



Photo 7 – Spall to concrete lintel.



Photo 8 – Right Hand Side Elevation.



Photos 9 – Cracking above door opening.



Photo 10 – View of Barn First Floor.



Photo 11 – Cracking to front elevation.



Photo 12 – cracking to left hand side elevation.



Photo 13 – cracking to right hand side elevation.



Photo 14 – cracking to door lintel.



Photo 15 – Cracking to side of door opening.



Photo 16 – View of floor over.

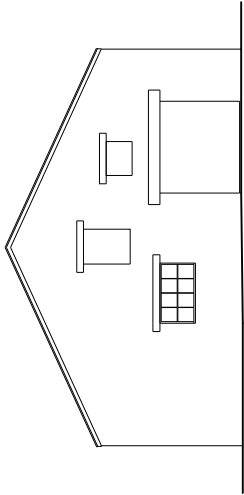


Photo 17 – Cracking to side of door opening.

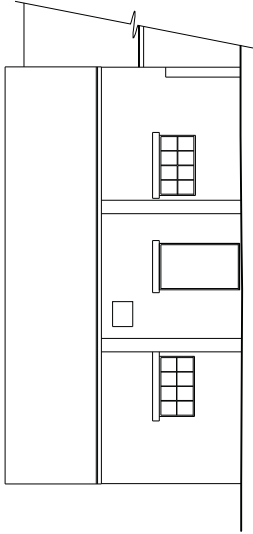


Photo 18 – General view of floor over.

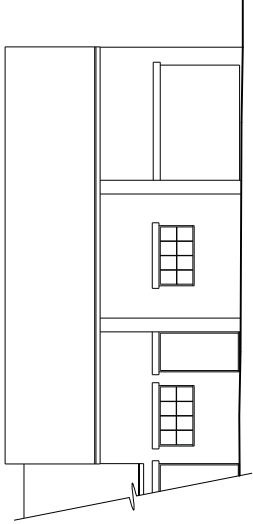
Appendix B – Architect's Drawings



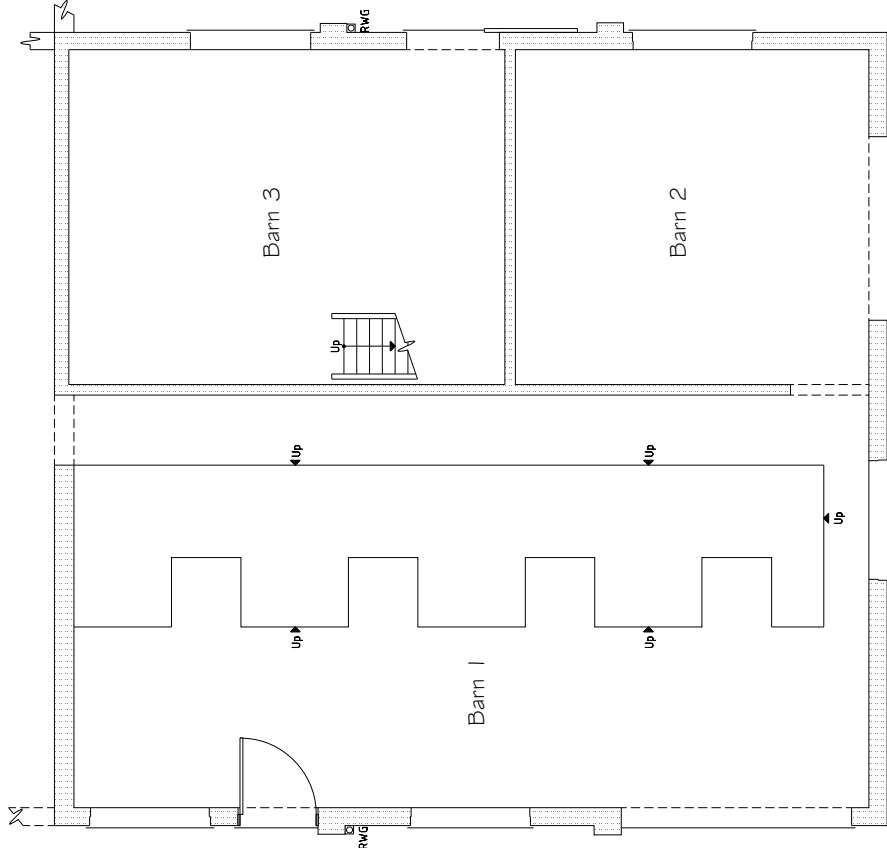
Front Elevation 1:100



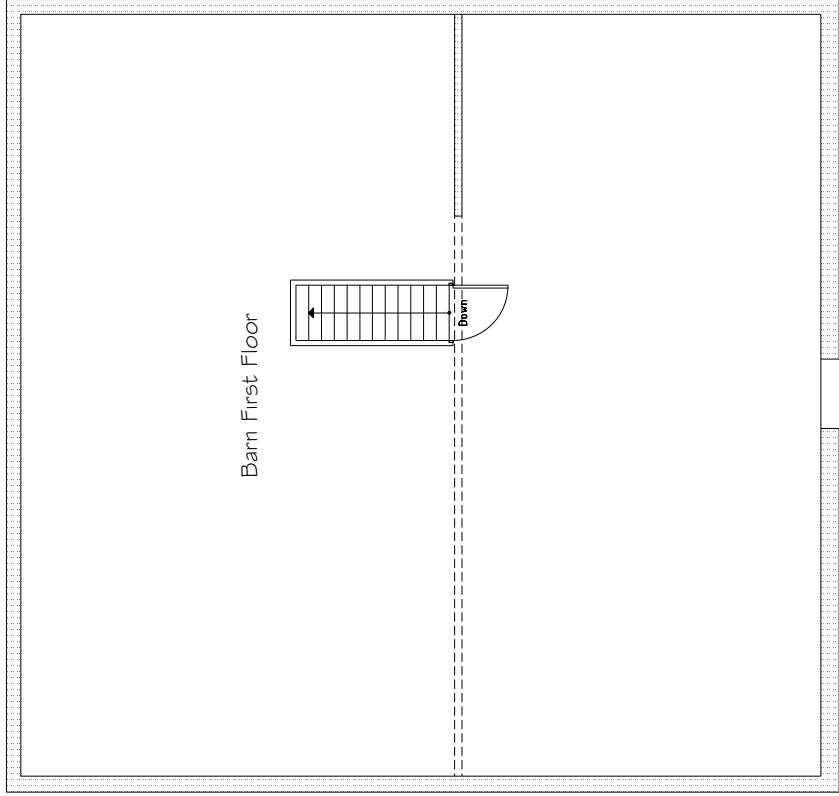
Side Elevation 1:100



Side Elevation 1:100



Ground Floor Plan 1:50



First Floor Plan 1:50

*Services Key*

☒ Existing Rain Water Gully (RWG) Position

| Rev | Date | Detail | Initial |
|-----|------|--------|---------|
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Project:

Proposed alterations at  
Cae Brymer Farm,  
Bowling Bank, Wrexham,  
LL13 9RL

Title:

Existing

Scale: (A2)

1:50 &  
1:100

Drawn By:

W Skillicorn

Date:

Feb 2020

Drawing No:

E072/001

Sheet:

1 of 1

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