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Mr J Weld-Blundell

Proposed Conversion of Ancillary Agricultural Building at Windy Hill Farm, Chipping, Lancashire

Structural Appraisal Report

D1589 rev0

June 2012

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Document Control Sheet

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Structural Appraisal Report

Job	Date	Issue	Copy
D1589	*25 June 2012*	*D1589-R-01-o*	

Originator… *A Brigg – Associate Director*

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APPENDICES

1.0 Introduction

1.0.1 The scope of this Structural Appraisal is to offer opinion as to the structural integrity of an existing ancillary agricultural building, presently derelict, prior to consideration of conversion to two number individual residential dwellings. The reference structure to be surveyed is owned by Mr J Weld-Blundell.

1.0.2 This report is to be read in conjunction with PGB Architectural Services Limited drawings referenced 2606-01 to -05 inclusive, providing existing and proposed floor layouts and elevations.

1.0.3 The structure under consideration is situated at Ordnance Survey National Grid Reference 361992 444684, approximately 1.3km north-west of Chipping village centre, within the rural environs of the Borough of Ribble Valley. The area of proposed refurbishment comprises a traditional masonry constructed; dual pitch roofed ancillary agricultural building, adjacent to an existing farmyard area, presently derelict. A regional location plan referenced S1589-01 has been included within this report.

A copy of the existing site layout, D1589-02 has been included within the drawing sub-section of this report.

The structure is presently utilised as a storage facility for haylage. Based upon its existing layout, it is reasonable to postulate that the structure has historically been used for animal housing.

We would postulate, by nature of visual evidence that the ‘original’ building structure has been subject to more ‘formative’ alteration/extension by means of a ‘Shippon’ addition to the west facing elevation.

The surrounding landscape is of an agricultural nature, with fields bounding the north, east and west elevations. Directly adjacent to the south facing gable elevation, an area of farmyard and a residential dwelling are situated.

1.0.4 The structural inspection undertaken was limited to the area of proposed refurbishment. We would point out that during the course of our inspection, no intrusive/destructive investigation methods/procedures were utilised to ascertain the nature of construction of the property substructure and superstructure elements.

Whilst comment/opinion may be made regarding perceived wall elevation/stability, such opinion is based upon visible evidence of superstructure elements, not upon visual inspection of foundation/ substructure.

The structural inspection undertaken was limited to external and internal visual observations made during the course of our survey undertaken on 15 June 2012. All external observations were made from adjacent ground level. All internal observations were made from adjacent corresponding ground, and where accessible, first floor levels.

Whilst opinion may be made regarding perceived points of a structural nature, such opinion is based solely upon visible evidence observed, and experience/knowledge with respect to such issues. Such opinions where given, should, at the earliest opportunity be confirmed or otherwise by suitable and appropriate further investigation techniques.

This report addresses the adequacy of the existing structural integrity of the subject structure located within the confines of 'Windy Hill Farm', and its perceived adequacy to accommodate the Architectural proposals detailed upon drawings referenced 2606-03 & 04. Any deviation from these proposals should be further assessed prior to construction commencement to ascertain whether structural compromise is a resultant issue.

1.0.5 Included as Appendix A to this report, photographs taken during the course of our inspection. Where reference is made thereto, the proceeding commentary should be read in conjunction to their reference, and where appropriate, annotation of the photographs has been made to highlight pertinent points.

1.0.6 The area of refurbishment encompasses an unoccupied, partially dilapidated, ancillary agricultural structure. Of original load bearing masonry (sandstone) presumed rubble cavity filled construction generally 450mm thickness, it is postulated a formatively constructed 'Shippon' has been extended from the 'original' Barn to form the present west facing 'rear' elevation. The roof structure is of traditional timber construction, holding a roofing felt finish, supported by means of timber purlins spanning between wall elevations and timber truss profiles.

The ground floor construction is that of a presumed ground bearing nature, combining original stone setts and more formatively cast concrete slabs.

Where present, the first floor structure is of a suspended timber nature, comprising of joists spanning between wall elevations and intermediate floor beams.

2.0 Structural Inspection

2.0.1 External Observations

Gable Elevation (North facing); Plates 01-02 inclusive refers to the 450mm thick, coursed stone masonry, north facing gable elevation of the structure. The roofing felt finishes to the rear elevation roof pitch clearly exhibit evidence of previous historic deflection of underlying structural members.

The elevation holds four number infilled former window openings, now boarded, retaining adjacent agricultural land to a maximum approximate height of 1.0m adjacent to the west facing (rear) elevation.

The original elevation offers vertical misalignment of the order of 20mm from ground to 'hypothetical' first floor level adjacent to its junction with the east facing (front) elevation. The remaining elevation is vertically plumb. No lateral deviation of the elevation is noted.

Evidence of historic weathering of the facade is clearly visible, particularly at the apex resulting in spalled mortar beds and perpends (Plate 03), and adjacent to its junction with the rear elevation, obvious water ingress and 'staining' (Plate 04).

Front Elevation (East facing); Plate 05 provides record of the east facing front elevation general appearance. The elevation retains adjacent hardstanding to a maximum height of 300mm adjacent to its junction with the south facing gable elevation. A full height door forms the prominent feature to this elevation. The original masonry arch has been 'underdrawn' by the provision of a timber lintel (Plate 06), presumably remedially provided.

The elevation exhibits evidence of weathering, both in the appearance of mortar spalling and obvious remedial re-pointing works. Additionally, at its junction with the north gable elevation, the facade exhibits obvious water ingress staining, with vegetative growth (Plate 07).

Historic movement of the elevation is noted. The window opening situated adjacent to the south facing gable junction has 'dropped' at its north bearing (Plate 08). The elevation

does not exhibit any noticeable lateral mis-alignment, however, vertical deformation was noted at 25mm and 20mm from ground to 'first floor' levels to the right and left side of the Barn door opening respectively.

Gable Elevation(South facing); The south facing rear elevation of the structure is detailed within Plate 09. This depicts the postulated 'original' structure with a formatively constructed solid masonry 'Shippon' extended to the rear.

The facade would appear to have been the subject of recent remedial re-pointing.

Vegetative growth is noted emanating from apex and the front roof pitch eaves level.

Two parallel, vertical cracks have been the subject of extensive mortar filling, emanating from eaves level of the front roof pitch to mid and ground floor door opening head height (Plate 10). Further cracking has also been subjected to a similar remedial process at the junction of the postulated 'Shippon' extension and the 'original' structure (Plate 11).

The elevation exhibits no signs of lateral displacement, however, vertically displaced 20mm from ground to 'first floor' level.

Rear Elevation (West facing); Plate 12 provides record of the west facing rear elevation general appearance. The elevation combines the rebuilt brickwork facade adjacent to the junction of the north facing gable (Plate 13) together with that of the original 'Shippon' stone facade.

As expected of a west facing elevation, it exhibits considerable weathering, particularly within the more northerly areas (Plate 14). The elevation is laterally 'true', whilst vertical misalignment is noted within the central regions of the elevations, leaning 25mm from ground to eaves level.

As noted within comments attributable to the north facing gable, the roof finishes accentuate the movement of the underlying structural timber members within the rear pitch. Where felt finishes are removed adjacent to the north gable junction exposing rafter members; these have been subject to historic moisture exposure, resulting in rot infestation.

2.0.2 Internal Observations

'*Original' Barn Structure;* Visual evidence would suggest the more formative replacement of all rafter members together with selected purlin members to both front and rear pitches. Where original purlin sections remain, these have depleted section size (Plates 15 & 16).

There is no structural compromise visibly evident to the three number timber trusses insitu.

When viewed from ground level, there is evidence that all structural members have been subjected to wood boring insect infestation. Significant moisture and rot impregnation is visible within the central span of the uppermost front pitch purlin located within the central plan area of the structure (Plate 17).

All internal walls are of solid construction and of uniform thickness. At the junction of the front and south facing elevations, the exposed internal leaf has been rebuilt in concrete block (Plate 18), however not bonded/tied. The external vertical cracking noted within the south facing gable elevation is reciprocated on the inner leaf (Plate 19).Where external cracking was noted at the rear barn/Shippon junction, visual evidence would suggest remedial rebuilding works to have been undertaken in this are previously however, the junction of the elevations remains untied/unbounded (Plate 20).

Generally, all internal elevations are reasonably plumb, with the exception of the south gable. Vertical misalignment of this elevation varies from 20-40mm from ground to 'first floor' level.

A number of internal lintel members have been replaced by prestressed concrete members (Plate 21). Where original members remain (Plate 22), these offer visual evidence of section depletion and historic wood boring insect infestation.

Throughout the internal aspect, evidence suggests that historic and progressive damp penetration of all elevations, particularly at roof level where existing finishes have been compromised.

Plate's 23-25 inclusive detail the split-level ground floor construction of the main barn area. A more formatively replaced concrete ground bearing slab lies 850mm below entrance level, with adjacent ground retained by a masonry dwarf wall. The upper lying ground floor

comprises a combination of stone setts, flagging and hardstanding. Throughout the area, stockpiled haylage restricts inspection however, where visible there is no visual evidence of excessive ground movement. All areas of the ground floor plan slopes noticeably from north to south.

Shippon; With access gained to the first floor area/roof void via an opening formed within the rear elevation of the barn (Plate 26), visual inspection of structural timber purlin and truss roof members revealed historic wood boring insect infestation and section depletion (Plates 27-29 inclusive). Exposed roof members to the remaining northern area of the Shippon are consistent with the defects noted however, purlin end damp penetration is clearly visible at the bearing with the north facing gable (Plates 30 & 31).

Visual inspection of the first floor boarding did not offer any evidence of excessive damp penetration, or 'springing' when walked across. When viewed from corresponding ground level, the supporting timber joists, beams and stall partitions do not suggest historic structural overstress based upon previous loading scenarios (Plates 32 & 33).

Throughout the Shippon, visual evidence clearly reinforces the assumption that this area was a more formative extension, with vertical 'butt' joints visible at the junction with the main barn masonry elements. (Plates 34 & 35). Additionally, a vertical crack is noted at the rear elevation of the Shippon with that out the south gable, corresponding to the location noted within the main barn (Plate 36).

Throughout, evidence of damp ingress to all wall elevations is noted (Plate 36). At the junction of the rear external elevation and south facing Shippon gable, evidence would suggest that this area has been more formatively re-pointed/rebuilt . More obviously, directly adjacent to the north gable, the elevation has obviously been re-built utilising standard format brickwork (Plate 37).

The ground floor construction to the Shippon is one of a more formative ground bearing concrete slab. Reasonably level when walked across, the floor slopes prominently from north to south.

3.0 Conclusions and Recommendations

3.0.1 General

3.0.1.1 The buildings are generally of 'reasonable' structural condition considering their age and nature of construction. At present, the structures are stable; however, subject to historic movement and levels of deterioration, we are of the opinion that in their present condition, the medium to long term structural integrity of the buildings cannot be categorically guaranteed. We would therefore recommend a number of remedial measures to address deterioration of structural timber members and masonry stability/restraint, thus improving the long term structural integrity of the buildings, particularly based upon their proposed change of use to that of residential.

3.0.1.2 It is recommended that a "specialist" timber survey is undertaken upon the timber roof elements of the existing structures that are proposed to be retained in redevelopment, unless noted otherwise. Such a survey should identify the nature and extent of any wood boring insect infestation, dry/wet rot and fungal attack and recommend the extent of remedial works necessary to arrest such and maintain the structural member strength to continue to provide necessary support.

Should remedial treatment solutions be a viable option, we would recommend structural design assessment of the existing truss and purlin members be undertaken to verify, or otherwise, their suitability to provide adequate support to the roof structure if required.

It is our considered opinion that where insitu, the existing timber first floor elements **are not** adequate to sustain the proposed loading, and as a result, be replaced by structurally competent, designed supporting members.

Additionally, we would recommend the replacement of all existing timber lintel members with suitably designed prestressed concrete replacement lintel members.

3.0.1.3 Whilst not of structural concern, we would recommend a "damp" survey be undertaken to all masonry elevations within the proposed area of refurbishment. If as expected, the level of the moisture within the wall elevations is excessive, remedial treatment solutions should be considered if necessary, particularly as proposals necessitate the 'physical connection/tie' to a blockwork lining wall.

3.0.1.4 No vertical or lateral restraint is presently afforded to any wall elevations of the subject buildings. Whilst evidence of lateral displacement is noted throughout, where not subsequently noted as excessive, it is not of immediate detrimental effect. The provision of a proposed inner blockwork leaf tied to the existing masonry wall elevations will provide enhanced stability. However, notwithstanding this point, we would recommend as part of the refurbishment proposals, lateral and vertical restraint strapping at appropriate eaves, apex and first floor levels are undertaken throughout.

3.0.1.5 We are of the considered opinion that the building would benefit from 'tying' at their corresponding elevations. Remedial action may comprise of the staggered placement of helical wall ties applied externally at corner junctions. A more feasible alternative would be the introduction of internal mild steel restraint strapping at 450mm vertical centres for the full height of the corner junctions across adjacent internal leaves.

3.0.1.6 Again, not of structural significance, we would recommend that in the interests of durability, all elevations of the proposed refurbished structures are re-pointed with respect to mortar beds and perpends.

3.0.1.7 Based upon redevelopment proposals raising the existing ground floor slab level, the provision for a replacement ground floor slab should comprise of a 150mm thick, ground bearing concrete slab, laid upon suitably compacted hardcore and a single layer of 1200 gauge damp proof membrane ("Visqueen" or approved equal), formed upon approved competent sub-base strata, or alternatively if competent bearing strata is proven beneath the existing slab, directly off such. Nominal mesh type reinforcement (A193) to the top of the slab should be provided with 25mm cover. Adjacent to external wall elevations, and where requirement necessitates the provision of foundation for internal load bearing wall elevations, the requirement of a thickening/downstand should be accommodated upon which formation of the proposed blockwork internal leaf can be made.

3.0.1.8 Further investigations to ascertain existing foundation depth, width and nature of existing bearing strata should be undertaken in order that proposals do not compromise their integrity.

3.0.1.9 Based upon proposals, a blockwork lining skin is to be constructed internally throughout adjacent to the existing masonry inner leaf. This leaf should be fully tied into the existing masonry using appropriate proprietary wall ties at 900mm horizontal and 450mm vertical centres;150mm distance from and 300mm maximum vertical centres at all openings.

3.0.1.10 Where proposals necessitate the removal and/or demolition of existing structural elements of the property, careful consideration to the method and sequence of temporary support works should be given, not only to ensure the safety of site personnel, but so as not to compromise the structural integrity of the immediate property area.

3.0.2 Main Barn

3.0.2.1 Where vertical cracking is noted within the external and internal facade of the south facing gable elevation, remedial crack 'stitching' is required. The remedial works should take the form of helical reinforcement bars ('Twistfix' or approved equal) placed across the vertical crack location in accordance with the manufacturers guidance.

3.0.3 Shippon

3.0.3.1 Where vertical cracking is noted at the junction of the internal rear elevation and the south facing gable elevation, remedial crack 'stitching' is required. The remedial works should take the form of helical reinforcement bars ('Twistfix' or approved equal) placed across the vertical crack location in accordance with the manufacturers guidance.

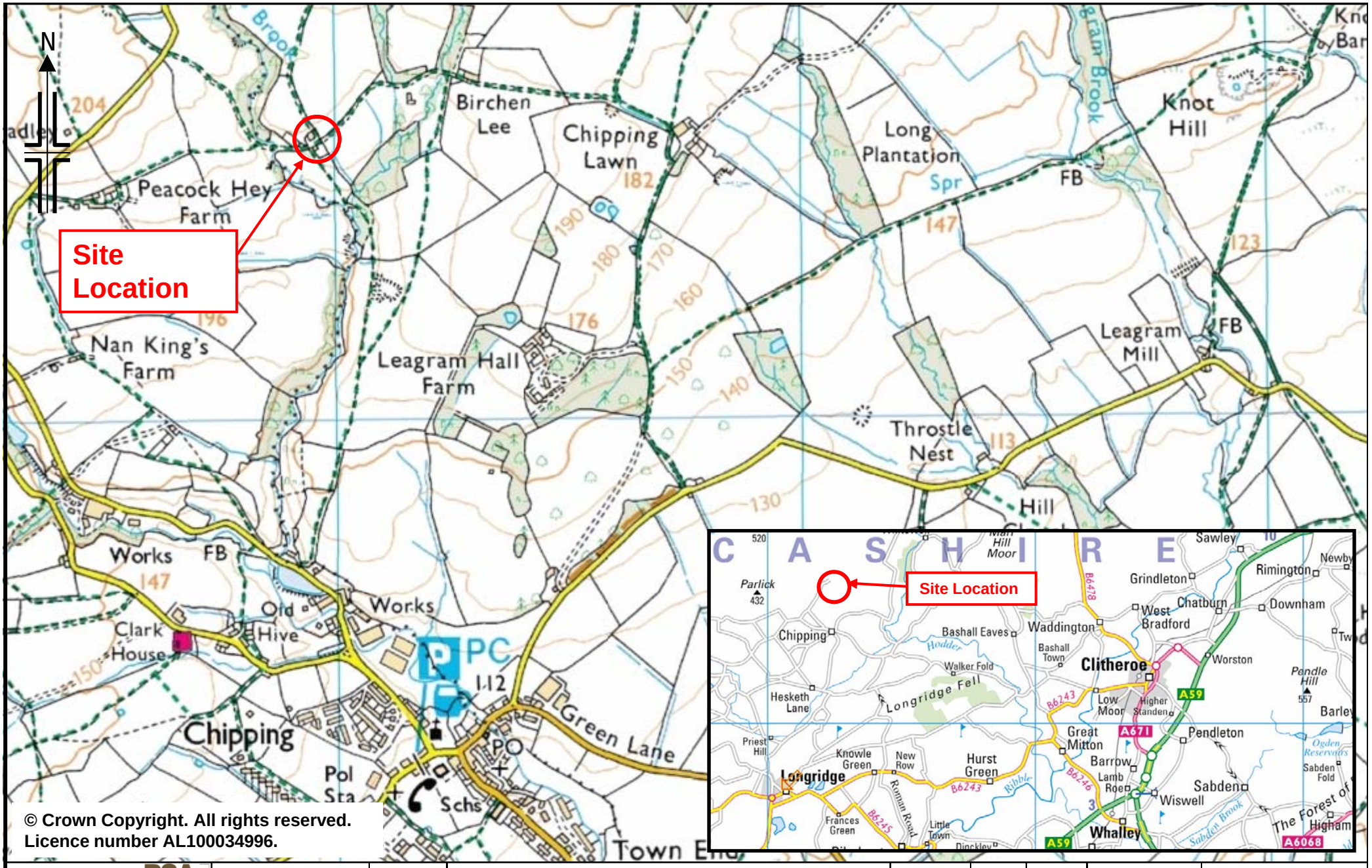
4.0 REPORT LIMITATIONS

4.1 PSA Design Limited believes that providing information with regard to limitations is essential to assist the client to identify and therefore manage its risks. Where investigations have been undertaken on a visual basis, our assumptions of construction materials and methodology are based upon experience and recorded empirical research of building construction. The risks associated with potential variation of the assumed construction may be mitigated by appropriate investigations, but cannot be eliminated.

4.2 An interpretation or recommendation based on this information provided within this report is based on our judgment and experience of this information and not on any greater knowledge that might be implied.

4.3 The interpretations and recommendations contained herein represent our opinions which are provided for the sole use of our client in accordance with a specific brief. As such these do not necessarily address all aspects of behaviour at the site. Should these interpretations be used by any third party, verification should be made by reference to the appropriate factual information.

DRAWINGS



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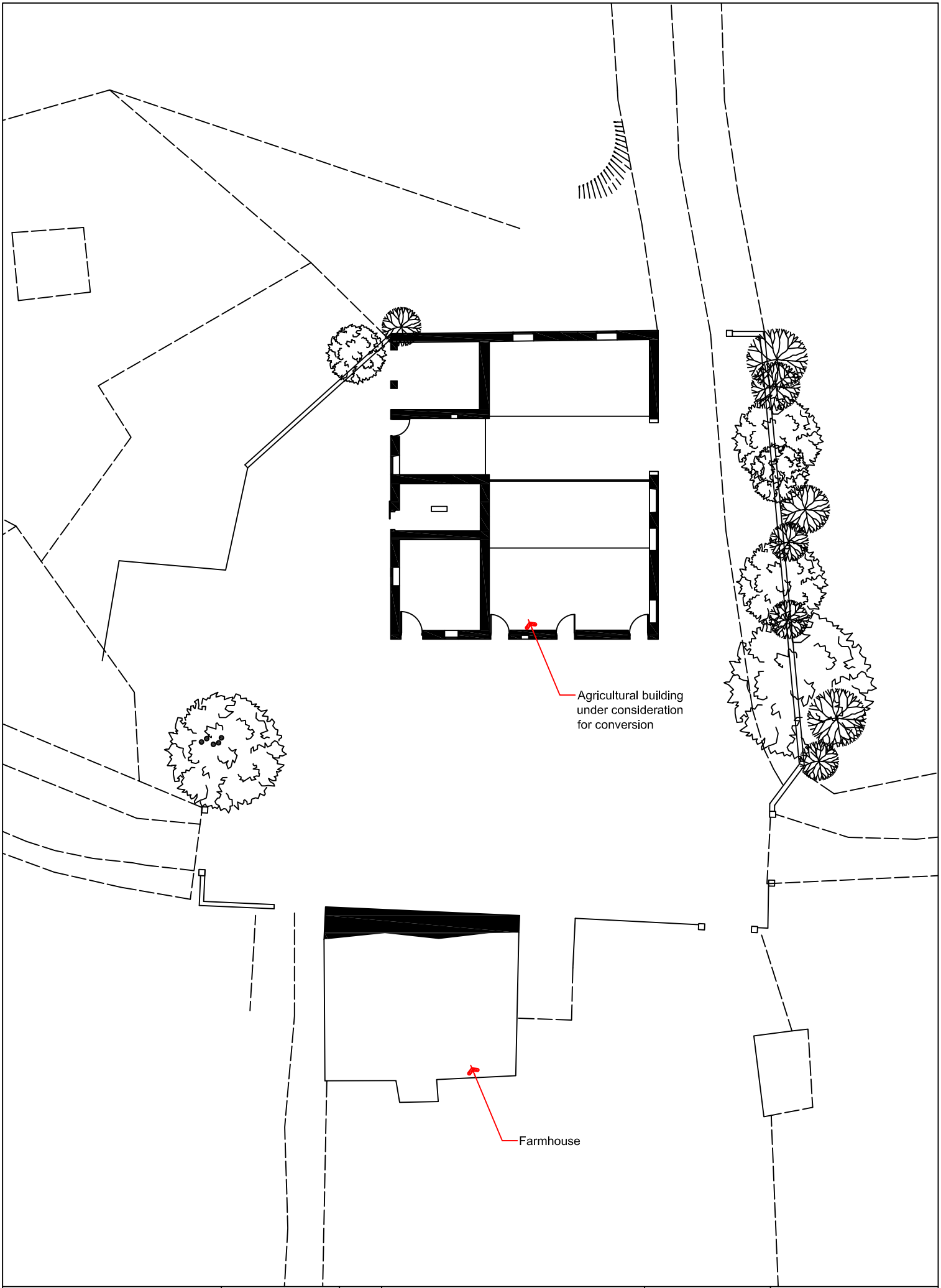
		Job	**Windy Hill Farm, Chipping**	Checked				
		Title	**Regional Location Plan**	Approved		Scale	**NTS**	Rev



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Client	Mr J Weld-Blundell
Job	Windy Hill Farm, Chipping
Title	Existing Site Layout

Scale	1:250		
Drawn	Check	Appr	
PJB	AGB	AGB	

Drg No.	S1589-02
Date	18.06.12
Rev.	

PHOTOGRAPHS

Plate 1 – North facing gable Elevation

Plate 2 – Undulating roof finishes to rear pitch

Plate 3 – Weathered mortar to North gable apex

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Plate 16 – Main Barn Roof

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Plate 31 – Damp penetration to purlin bearing at North gable (Shippon)

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