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STRUCTURAL APPRAISAL REPORT

Existing Barn at;-
Crowtree Farm,
Whitecross Lane,
Surfleet,
Lincolnshire



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Property;-	**Existing Barn at;-** Crowtree Farm, Whitecross Lane, Surfleet, Lincolnshire	**Instructed**;- Dec 2018 **Surveyed**;- Jan 2019
Client:-	**Dr and Mrs Scarisbrick** c/o G R Merchant Ltd 4 Wrights Mews, 12A Park Road, Holbeach, Lincolnshire PE12 7EE	**Survey & Report by**;- J. Ellington BSc. CEng MIStructE MIoD J. Hicks BEng(Hons) MSc, PgDip.CHE, MIoD
Reference:-	JC/18/03/4337	**Issued**:- Feb 2019

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The Institution of Structural Engineers

STRUCTURAL APPRAISAL REPORT,

Existing Barn at;-
Crowtree Farm,
Whitecross Lane,
Surfleet,
Lincolnshire

Our Ref;- JC/18/03/4337

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1.0 BRIEF

1.1 JC Consultancy Limited was requested by Dr and Mrs Scarisbrick, to assess and comment on the structural condition of an existing barn located at Crowtree Farm, Whitecross Lane, Surfleet, Lincolnshire.

2.0 INTRODUCTION & SCOPE

2.1 The barn is located off the highway known as Whitecross Lane in a rural location near the village of Surfleet, in Lincolnshire.

2.2 The client owns the property and has instructed a structural appraisal report to be carried out in order to assess possible options for future development. This instruction was provided by the clients agent, G.R.Merchant Ltd on 12th December 2018.

2.3 This report should be read in-conjunction with documentation prepared and issued by the client's architect, G.R. Merchant Ltd.

2.4 This report is solely for the purposes of the client, clients agent and no other third parties. Transfer of this report to a third party is not permitted.

2.5 JC Consultancy Limited visited the property on 29th January 2019, in order to carry out a structural appraisal survey.

2.6 Weather conditions at the time of the survey were cold and dry.

2.7 This report is limited to elements of the structural fabric of the property, i.e roof, walls and floors, and comments only upon their structural condition and performance.

2.8 The report does not contain observations, comments or recommendations to any non structural items including, but not limited to drainage, electrical, heating and plumbing services, timber work and decorative plasters.

2.9 Decay associated to damp, fungal attack, insect infestation or contamination is outside the scope of our appointment or report. Any reference to decay associated to damp, fungal attack, insect infestation or contamination to either structural or non-structural items are observations only. As such we recommend that further advice is sought from specialists in the fields of damp, fungal attack, insect infestation or contamination in order to guarantee peace of mind from these potential defects.

2.10 The inspection was of a visual nature only. There has been no opening up works involved in this investigation. Wall finishes or floor finishes, including carpets where applicable have not been removed or lifted during the inspection.

2.11 Any part of the structure that was hidden, covered or otherwise inaccessible have not been inspected or commented upon. We therefore cannot guarantee that any such parts are free from defect. It should be noted that inspection of the fabric of the barn was limited due to the presence of various goods internally, together with climbing plants / overgrowth that is prevalent externally.

2.12 The performance of foundations may be referred to within this report; however the existing foundation system has not been exposed as part of this report and as such we cannot guarantee that the foundation system is free from defect throughout.

2.13 The performance of the existing ground strata and general ground conditions may be referred to within this report; however the existing ground conditions have not been inspected therefore comments made will be based on analysis sought from indicative desktop sources including but not limited to the 'British Geological Society'. These sources generally provide sound interpretation, however local anomalies can occur, and as such we cannot guarantee their accuracy.

2.14 The observations and defects noted in order to prepare this report should not be considered as a comprehensive inventory of each and every single item witnessed during our survey. Instead the observations have been taken as an indication of the condition of the structure in general, and should demonstrate the likely defects that may be present elsewhere in areas of the fabric that have not been surveyed or recorded. In order to demonstrate the condition of the original fabric, potential loss percentages have been provided in Section 4.0 of this report.

3.0 GENERAL DESCRIPTION

3.1 The barn is part 1.5 storey and part single storey, of L shape arrangement, and in the style of a former Hay Store / General Store. The barn is predominantly traditionally constructed.

3.2 The construction date of the barn is unknown, but it is likely to have been originally constructed during the early 1900's, with single storey additions being added to at later dates.

3.3 The general construction of the barn consists of; -

Duo-pitched Roof

A clay pantile roof covering over a timber hand cut roof consisting of timber rafters, ties and purlins.

Walls

A combination of 330mm / 215mm wide, traditional solid wall construction consisting of clay masonry units laid in various mortars.

Ground Floor

The ground floor consisted of part earth, part concrete presumably laid directly on the ground. The concrete floors have been added at a later date but their specification is unknown.

Foundations

Foundations were not inspected as part of this preliminary report; however, they are likely to consist of shallow corbelled masonry foundations bearing onto the ground strata below.

3.4 Published Geological records show the building to be within an area where the soil sequence consists of a solid formation of Oxford Clay formation (Mudstone) overlain by Tidal Flat Deposits of Clays and Silts.

3.5 There are no mature trees in close proximity to the barn. Overgrowth and climbing plants are prevalent to a number of the elevations and a number of small trees are present in overgrown areas around the perimeter of the barn.

4.0 SUMMARY OF OBSERVATIONS

(Read in conjunction with Section 2.14 and **APPENDIX A** of this report)

Based on initial visual observations conducted during our survey, we estimate that the likely loss of **original** fabric during a typical conversion will be as follows; -

Roof Structure – 100% (Original roof structure showing signs of distortion and 'spread'. The distortion and spread accommodated by the roof have consequently contributed to defects on the supporting masonry walls – A full replacement roof structure is deemed necessary as part of any conversion).

Masonry Walls – 75%+ (The walls can be described as delicate and can be seen to be accommodating significant vertical, lateral and differential movement throughout. As such we estimate a large percentage of existing wall panels are considered beyond sensible repair and would need to be reinstated as part of any schedule of works – A mark up of G.R Merchant Ltd Existing Drawing has been provided in order to assist in appreciating the extent of reinstatement that may be required. – See **Appendix A**).

Ground Floor – 100% (Existing ground floor construction is unsuitable for retainment in conversion. A replacement Reinforced Concrete ground bearing slab is envisaged that will also be constructed in order to assist the performance of the foundation system).

Foundations – 75%+ Existing foundations to those walls that are deemed robust enough to remain as part of a conversion will have suffered vertical, differential style movement and will need improving using a Reinforced Concrete internal raft slab system.
The remaining foundations are likely to be extremely shallow, and should replacement elements / extensions be added to the footprint of the remaining barn, they will require Reinforced Concrete 'Raft' style foundations in order to limit the potential of future differential movement.)

5.0 DISCUSSIONS & RECOMMENDATIONS

5.0.1 The prevailing condition of the remaining barn elements is considered poor. Some areas of existing masonry walls are in a reasonable condition, whilst significant areas can be described as being in a 'delicate' and potentially unrepairable structural state.

5.0.2 Generally, the barn will require a high degree of intervention in order for it to accommodate a sensitive conversion into a habitable dwelling. We do have reservations over the extent of original fabric that will be retained as part of any conversion, and discuss this further in Section 6.0 of this report, however should a conversion take place we recommend the following statements are considered as part of the design and planning stages;-

5.1 Roof Structure

5.1.1 The current roof covering is clay pantile. Many areas of displaced tiles were noted and ivy growth prevents full inspection, however it is envisaged that some of the original roof covering could be set-aside and reinstated as part of any proposed conversion scheme.

5.1.2 The roof structure construction varies, but is principally of a raised-tie system. Whilst the roof elements are present and albeit appear secure, the roof structure as a whole can be seen to be accommodating stress and will have deflected and distorted in parts. It is common for this type of roof arrangement to exert horizontal thrust on the top of the supporting walls, which in this case can be seen in the form of rotation to the upper levels of the supporting walls. As such the roof can be considered to have 'spread' in parts.

Elsewhere, partial wetting and water penetration is likely to have encouraged decay and the part failure of timber ends.

It is unlikely that the roof structure will accommodate additional loadings from modern day insulations, and ceiling finishes without significant strengthening, and introduction of further horizontal ties would be required in order to prevent progressive roof spread. At this stage we strongly recommend that a full replacement roof structure is deemed necessary as part of any conversion.

5.1.3 Any new roof structures should be engineer designed in order that they do not exert excessive lateral forces upon the supporting walls. Finishes, battens and felt membranes will need to be installed in accordance with the architect's requirements and roof specifications.

5.1.4 There is a lack of suitable rainwater discharge downpipes throughout the barn which has resulted in the localised wetting of masonry. Rainwater goods should be installed to any conversion to allow reliable discharge of rain water.

5.2 External Walls

5.2.1 The condition of the walls vary throughout. A mark up of G R Merchant Ltd Drawings have been provided – See **Appendix A**, in order to demonstrate the area of existing masonry that we feel could be retained and repaired as part of any conversion.

5.2.2 The upper walls of the main 1.5 storey barn appear to have been added in the past, presumably to increase the eaves height of the barn. This additional brickwork appears to have been affected by the aforementioned roof spread resulting in rotation of the masonry panels. Lower (original) sections of the wall panels are displaying signs that they are accommodating considerable vertical stress, again in the form of outward rotation and general distortion, together with a number of fractures and cracks.

Elsewhere areas of rebuilt brickwork is apparent around openings, and former openings have been adjusted in parts.

The walls forming the single storey projection to the North-West of the 1.5 storey barn can be described as delicate. The South-West facing wall of this projection is accommodating significant vertical movement, with tapered horizontal cracking identified just above ground level, suggesting the foundation system has failed in this location.

The walls forming the single storey projections to the South-East of the 1.5 storey barn can be described as delicate and have partially collapsed. These areas are considered un-repairable, and full demolition will be required.

5.2.3 The constant saturation of the lower areas of the masonry walls from defective rainwater discharge, together with agitation associated to the growth of vegetation and Ivy is likely to be an additional cause of any movement witnessed upon the masonry panels.

5.2.4 It is envisaged that a high percentage of the walls would need to be rebuilt as part of any conversion scheme, however, for any masonry walls that are retained, open fractures will require repair and many areas of defaced brick units will need further localised replacement.

5.2.5 The performance of any walls that are to remain can be improved by low key stitching using the 'Helifix' masonry repair system, which involves installing remedial 'Heli-bar' rods into the bed joint of the masonry at regular vertical centres over any open cracks. We recommend that allowance is made for the application of this system to localised areas of all retained masonry panels.
More information can be seen at www.helifix.co.uk.

5.2.6 Any areas of hard cement re-pointing previously carried out on brickwork that is to be retained should be carefully removed and replaced with a sympathetic soft lime based mortar. Other areas of weathered masonry joints were prevalent amongst the elevations and should be repointed in a similar fashion.

5.2.7 All timber lintels / backing timbers that are present over any openings that are to be retained should be replaced throughout. Any timber wall plates that are present within the walls should be removed and replaced with remedial brickwork infill.

5.2.8 Ideally, any proposed layout by the architect should introduce cross walls / partitions. This would significantly increase the stability of the barn, and partition walls can be utilised to support proposed roof structures.

5.3 Ground Floors

5.3.1 The existing ground floor system needs to be removed and replaced with a ground bearing, concrete ground floor slab as part of any conversion. The slab should be engineered to ensure that it is suitable to accommodate loadings from the proposed use, including any inner leaf blockwork and any loadbearing partitions. Once installed, the slab will act as an internal raft type slab system, which will minimise any additional loadings placed upon the existing foundations.

5.3.2 In addition the internal raft slab can be adapted to assist in the performance of the walls and foundations in the form of a partial underpinning system. This can be achieved by casting in Reinforced Concrete 'fingers' cut into the walls as part of the slab construction. This should assist in improving the overall structural performance of the building.

5.3.3 The floor should also incorporate insulation and damp proof systems as specified by the architect to meet current regulations. Damp proof membranes should be applied underneath the floor slab which should be continuous with any damp proof systems that are applied to the walls.

5.3.4 We do not recommend that the floor slab levels are raised substantially to that which are currently present, as the process of raising the floor levels will undoubtably place an increase in stress and outward force upon the lower levels of the wall panels, which in their current form are already considered to be delicate. In addition, for the floor slab to perform as in internal 'raft foundation' as described in section 5.3.2, the slab needs to be ground bearing at levels equivalent to the current floor level.

5.4 Foundations

5.4.1 Existing foundations to those walls that are deemed robust enough to remain as part of a conversion will have suffered vertical, differential style movement in the past. With this in mind, we would recommend that the performance of any remaining foundations are improved using the Reinforced Concrete internal raft slab as previously described in section 5.3.1 and 5.3.2

5.4.2 The remaining foundations are likely to be extremely shallow, and should replacement elements / extensions be added to the footprint of the remaining barn, we would recommend that Reinforced Concrete 'Raft' style foundations should be utilised for these areas of re-build / extensions.

The introduction of 'Raft' style foundations will assist in keeping any proposed foundations to a similar depth as the existing, reducing the risk of future differential movement between existing and reinstated masonry walls.

5.4.3 The external ground levels should be landscaped and prepared to ensure that they do not exert pressures on the base of the walls. Controlling surface rainwater and introducing a gravelled apron / French drain around the external perimeter of the walls will assist in reducing softening of the ground and subsequent foundation movement in the future.

5.5 General

5.5.1 Finally, whilst reference to damp is outside the scope of this report (see 2.9), it can be seen that the structure, has suffered from a degree of water penetration over the years.

As such it is essential that advice and any required treatment from specialists in the field of damp and decay should be carried out in conjunction with the conversion, in order to ensure that damp and timber decay are not trapped within the fabric post completion.

6.0 CONCLUSIONS

6.1 The condition of the barn elements varies throughout, with some areas of existing masonry walls being considered in a reasonable condition, whilst other areas can be described as being in a 'delicate' structural state. Generally, the barn will require a high degree of intervention in order for it to accommodate a sensitive conversion into a habitable dwelling.

6.2 Loss of original fabric occurs in almost all conversions of this type, and generally cannot be avoided. The majority of loss is usually due to the structure being exposed to the elements during its period of non-use, or masonry walls accommodating significant levels of structural movement from defective roof structures together with the general activity of material fatigue. In order to demonstrate the condition of the original fabric, potential loss percentages have been provided in Section 4.0 of this report and a mark up showing areas of walls that are likely to be retained / lost is enclosed with Appendix A of this report.

In this instance, we feel that losses will be high, and we do recommend that you seek guidance from your Architect and the Local Authority Planning Departments as they may feel that there is in-sufficient existing fabric to be retained in order to provide a serviceable building for conversion.

6.3 The potential losses perceived in this report are for guidance only. It is not uncommon for additional losses to occur once works commence as material fatigue and other catalysts of material failure may only present themselves following intrusive opening up works. All parties should be aware that in this instance, losses approaching 100% of all original fabric may occur following the commencement of works, due to the delicate nature of the structure in its present form.

6.4 Section 5.0 of this report highlights a series of recommendations that should be considered at Planning and Tender Stages should a conversion be deemed possible. Further inspections and considerations will need to be conducted as works progress to ensure that the remaining and any proposed additions comply with Part A (Structure) of the Building Regulations.

6.5 Consideration of any proposals should be done only following liaison with your Architect, and guidance from, the Local Authority Planning and Building Control Departments.

JC Consultancy Limited
Consulting Structural Engineers

February 2019

7.0 PHOTOGRAPHS.



Photograph # 1



Photograph # 2



Photograph # 3



Photograph # 4



Photograph # 5



Photograph # 6



Photograph # 7



Photograph # 8



Photograph # 9



Photograph # 10



Photograph # 11



Photograph # 12



Photograph # 13

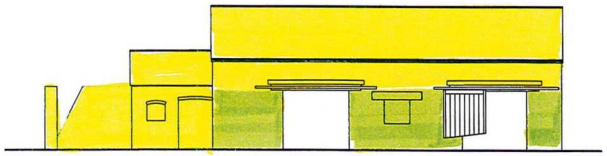


Photograph # 14

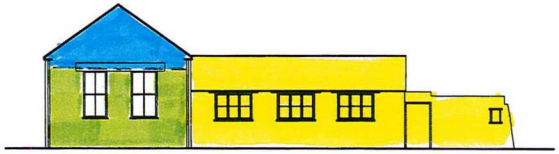


Photograph # 15

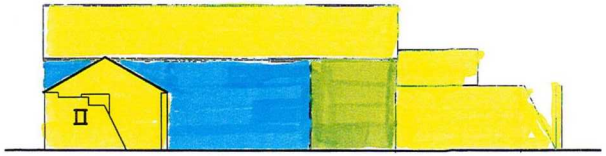
APPENDIX A



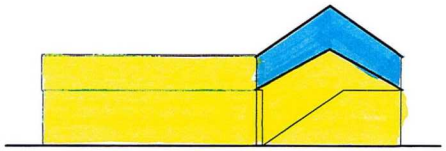
YARD ELEVATION



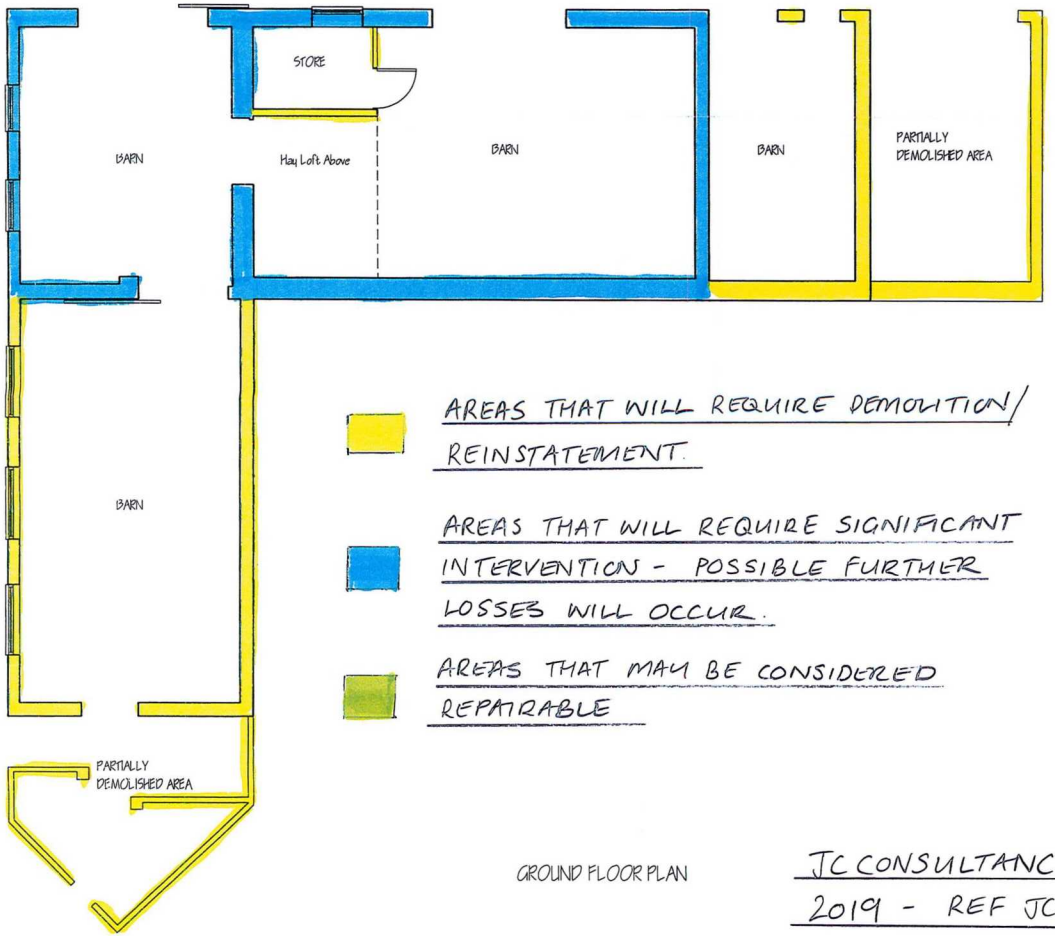
ROAD ELEVATION



REAR ELEVATION



END ELEVATION

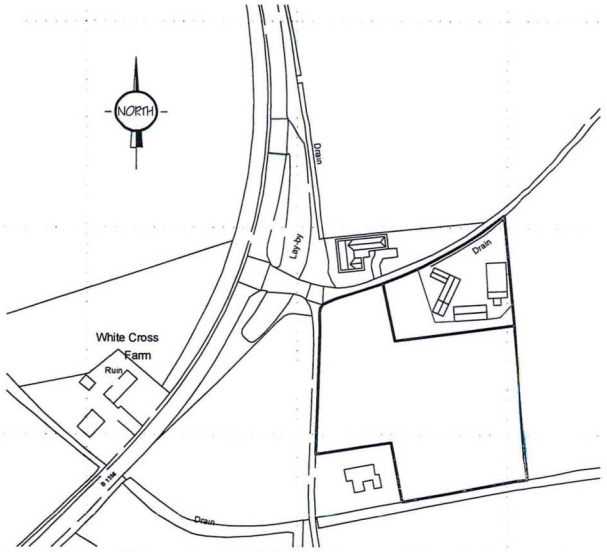


AREAS THAT WILL REQUIRE DEMOLITION/ REINSTATEMENT.

AREAS THAT WILL REQUIRE SIGNIFICANT INTERVENTION - POSSIBLE FURTHER LOSSES WILL OCCUR.

AREAS THAT MAY BE CONSIDERED REPAIRABLE

GROUND FLOOR PLAN



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LOCATION PLAN 1:1250

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2019 - REF JC/18/03/4337

A	LOCATION PLAN ADDED	JAN 2019
ref	revision	date

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Project	BARN CONVERSION SIBOM TREE FARM BARNS WHITE CROSS LANE SURFLEET, SPALDING, LINCS PE11 4AJ
Client	DR & MRS SCHRIBER.
Drawing	FLOOR PLAN - EXISTING ELEVATIONS - EXISTING LOCATION PLAN
Job Ref	3288-18
Drawing No	01A
Date	MAR 2018
Drawn	SLB
Scales	1:50 & 1:100 (Unless Otherwise Stated)

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END OF REPORT