

Intended for  
**Andrew Edmunds**

Document type  
**Structural Engineering Report**

Date  
**February 2017**

Project Number  
**1620001247**

Document Number  
**1620001247-RP-001**

# GREENYARD FARM, ST ANDREWS MAJOR INITIAL STRUCTURAL INSPECTION REPORT



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Revision **P03**  
Date **18/02/2017**  
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## 1. EXECUTIVE SUMMARY

The proposed development at the site includes the change of use of the existing stone barn and the existing timber barn to residential. The development also includes the conversion of a former milking parlour to garage use and the construction of 12 holiday cabins and associated shower block.

Ramboll have been appointed by Andrew Edmunds to undertake an initial structural inspection of the existing timber and stone barn buildings at Greenyard Farm ahead of a new development at the site

From the inspection work undertaken to date it should be feasible to convert the existing barn structures for residential use. The next stage of the structural work would be to undertake a full structural and condition survey of both buildings.

On the timber barn the survey would determine the full extent of any deterioration to the timber members and the survey would highlight which timber members elements can be retained, which would require repair and which would need replacing. Structural design checks would be required to confirm the capacity of the structural elements for additional loads. On the stone barn the survey would determine the extent of any deterioration of any structural elements and any repairs that would be required.

Both buildings should be able to accommodate additional openings for doors and windows as required with suitable lintels and strengthening.

Overall the proposed development will provide a sustainable solution by retaining and extending the life of existing buildings on the site.

## 2. INTRODUCTION

### 2.1 Purpose of the Report

Ramboll have been appointed by Andrew Edmunds to undertake an initial structural inspection of the existing buildings at Greenyard Farm ahead of a new development at the site. The report is written with a view to it supporting a package information prepared for a planning application for the new development. The objective of the report is to describe the following with an aim to discuss the structural viability of maintaining and converting the use of the buildings.

- The general structural form of the buildings.
- The primary materials used in their construction.
- The general condition of the buildings.
- Outline advice on the repair of any significant defects observed.

### 2.2 Proposed Development

The proposed development at the site includes the change of use of the existing stone barn and the existing timber barn to residential. The development also includes the conversion of a former milking parlour to garage use and the construction of 12 holiday cabins and associated shower block.

### 2.3 The Site

The site is located approximated halfway between the towns of Barry and Dinas Powys and adjacent to Argae Lane at grid reference ST 13744 70550.

The site is presently occupied by 4 buildings including a timber barn, a stone barn, a masonry milking parlour and another stone dwelling.

Figure 1 – View of Existing Site



### 2.4 History of the Site

The Heritage Report written by EDP dated January 2017 can be referred to for further detail on the origin and function of Greenyard Farm.

The first records of Greenyard Farm are shown on maps dating back to 1840 and it is understood that the buildings have occupied the site for over 100 years. The working farm was converted to a golf course approximately 20 years ago and that the barns and milking parlour have been out of use or used for storage since that time.

### 3. TIMBER BARN INSPECTION

#### 3.1 Historical Use of the Building

The building was originally used as a stable and cart shed with a hayloft at first floor level.

#### 3.2 Structural Form and Material

The building is formed from a timber framed structure with a duo pitched roof. The roof slopes at approximately 32°, and is formed from profiled metal sheeting. The external walls are covered with timber cladding.

Figure 2 – External View of Barn



Figure 3 – External View of Gable End of Barn



The metal roof sheeting is supported on 6 timber purlins of varying size, 3 on each side, spaced equally along the roof and perpendicular to the direction of fall.

These timber purlins are supported at the gable ends of the building, on 3 tied rafters and one internal wall.

The tied rafters are then supported on the perimeter timber stud wall comprising a 3.5" x 4.5" top timber with 3"x4.5" verticals at approximately 1'10" c/c with additional framing around door and window apertures.

Figure 4 – Internal View of Roof



The first floor is formed from timber boards supported on 2.25" wide x 9" deep timber joists, at 2' centres, supported on the front and rear walls and a central timber beam.

The central beam is supported on the gable walls, 3 columns 6" square in the left hand side of the building, an internal wall and external wall at the right hand side of the building.

Figure 5 – Floor Joist Junction at External Wall



**Figure 6 – Floor Joist Beam Junction**

The ground floor contains a number of concrete walls, 5.5" thick approximately 5'6 high, creating 4 animal pens at the ground floor. It would appear that these pens were created separately from the primary building structure. However they may now be acting to support part of the structural frame in certain locations (refer to Section 2.2)

The present ground floor appears to be a concrete slab of unknown thickness and construction. The foundations of the barn are at present unknown, but it is likely given the nature of the building and period of construction that these would be a very shallow, and narrow spread type footing locally under the external walls and potentially at internal column locations.

Stability of the barn under horizontal loading is likely to provided by a combination of diaphragm action in the floors and roofs and racking of the external timber wall panels.

### **3.3 Condition**

The building is not at present weather or water tight; however the structural elements at present appear to show little sign of persistent water ingress or damage. There are unglazed window openings at first floor and some openings at both levels within the external cladding.

**Figure 7 – Openings in External Fabric**

The primary structural elements of the building appears to be in a reasonable condition overall with some localised areas of the structure affected by decay or infestation.

Areas of the first floor planks show damage consistent with an infestation of wood worm, it is not clear if this is an active problem at present. This should be investigated further and treated appropriately if required.

Areas of the first floor are presently covered with pigeon droppings. In addition to the health and safety risk these may if left for prolonged periods of time cause deterioration the structure. At present this does not appear to have caused significant damage to the floor.

**Figure 8 – Decay to base of existing posts**

The bases to all of the central timber columns showed significant amounts of decay, and it is likely that at present these columns are being supported by the concrete walls forming the animal enclosures. The base of these columns would need removing, to leave only competent material, and the base would then need replacing to maintain the integrity of the building, careful consideration would need to be taken in developing the sequence of propping, removal and

replacement to ensure the temporary stability of the overall structure. It is presently unclear as to the size or nature of the foundations supporting these columns and it would therefore be prudent to locate, verify and strengthen if required these foundations as part of these works.

### **3.4 Viability for Conversion**

From the inspection work undertaken to date it should be feasible to convert the existing structure for residential use. Additional openings or increased openings should be achievable with suitable lintels.

The next stage of the structural work would be to undertake a full structural and condition survey. The survey would determine the full extent of any deterioration to the timber members. The survey would highlight which timber members elements can be retained, which would require repair and which would need replacing.

The proposed conversion of the barn would introduce an increase in the loading applied to the roof structure from the new waterproofing, insulation, ceilings and services and also the additional finishes applied to the first floor structure. Design checks would be required to the existing and new members to confirm their structural capacity. The increase in loads would also require design checks being completed for the foundations.

Preliminary calculations based on the measured size and spacing of the existing joists at first floor suggests that there should be sufficient capacity within the joist to resist the proposed loading without additional strengthening.

## 4. STONE BARN INSPECTION

### 4.1 Structural Form and Materials

The building is comprised of three connected spaces, the main barn area, an adjacent room presently used for storage and a rear extension which will be demolished as part of the proposed works. The building is comprised of a sheet metal roof supported on stone walls.

Figure 9 – External View of Barn



The duo pitch metal sheeting roof of the main barn area is supported on 4 timber purlins spanning between the gable end walls, and two internal raised tied rafters on each pitch and a single ridge beam. These timber beams are also strapped down to the stone gable end walls to resist uplift on the roof. The roofs to the two smaller areas to be retained appear to be of similar construction.

Figure 10 – Roof of Stone Barn



Figure 11 – Stone Barn External Wall



The walls appear to be constructed from random rubble limestone with cut stone around openings and are approximately 20" thick. It is not clear from the visual inspection if these walls are constructed from solid stone or are comprised of external stone faces with a rubble core. The visible stone and mortar appear to be in good condition with no visible sign of significant deterioration.

The present ground floor appears to be paved stone of unknown thickness.

The foundations of the barn are at present unknown, but it is likely given the nature of the building and period of construction that these would be a very shallow and narrow, spread type footing, located locally under the external walls.

It is likely that the stability of the barn to resist horizontal loading is provided by racking action of the masonry walls.

#### 4.2 Condition

The building is not at present weather or water tight; however the structural elements appear to show little sign of persistent water ingress or damage. There are unglazed window openings within the barn area.

The primary structural elements of the building appears to be in good condition overall.

#### 4.3 Viability for Conversion

From the inspection work undertaken to date it should be feasible to convert the existing structure for residential use. Additional openings or increased openings should be achievable with suitable lintels.

As with the timber barn, the next stage of the structural work would be to undertake a full structural and condition survey. The survey would determine the full extent of any deterioration of any structural elements and any repairs that would be required.

The proposed conversion of the barn would introduce an increase in the loading applied to the roof structure from the waterproofing, insulation, ceilings and services that may be introduced. This would also increase the loading on the walls and foundations, however this increase is likely to be small in relation to the existing self-weight of the existing 20" thick stone walls and justifiable with less than a 10% increase in load.

It is understood that the proposed conversion would introduce a first floor into the building. Careful consideration will need to be given to the nature of this structure, to minimise the additional weight through the existing walls and foundations, and its connection to the existing external walls. Careful consideration will also need to be given when setting the level of the new floor to ensure sufficient head room beneath the tied rafters at first floor and also at ground floor.

Consideration will also need to be given to the ground floor, where it may be necessary to replace the existing paved floor with a new concrete ground floor slab.