



# West Bradley House

## Existing Building Survey

*For Mr. and Mrs. T Steyn*

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## 1. Introduction

Hydrock have been employed by Mr. and Mrs. T. Steyn for Structural Design for RIBA Stage 2 to RIBA Stage 6 for West Bradley House located at Glastonbury, BA6 8LT.

This Report constitutes a summary of the initial Site Visit and Condition of the existing buildings on site. This Report is updated following a second Site Visit with exposed structure.

The Main House is a Grade II listed building and has gone through different refurbishment and additions during the years. Any structural alterations proposed to the main building will need to be coordinated with a heritage consultant.

On the 6th of June 2023, Hydrock met with Alex Kirkwood from Richard Parr Associates to have an initial walk around the site and inspect the buildings that will be refurbished. The buildings inspected were: the Main House, Apple Barn, Cart Shed, Red brick Barn and the Tractor Sheds.

On the 5th of October 2023, Hydrock met with Jemma Williams and Joshua Sturgess from Richard Parr Associates to have a walk around site and inspect opening up works. The team was also met by Justin Ayton the heritage consultant to discuss how structural repairs and alterations could be incorporated with minimal impact on the heritage asset.

On the 16th of November 2023, Hydrock visited site to follow up additional opening up works requested by the team to further determine the extent and depth of existing foundations.

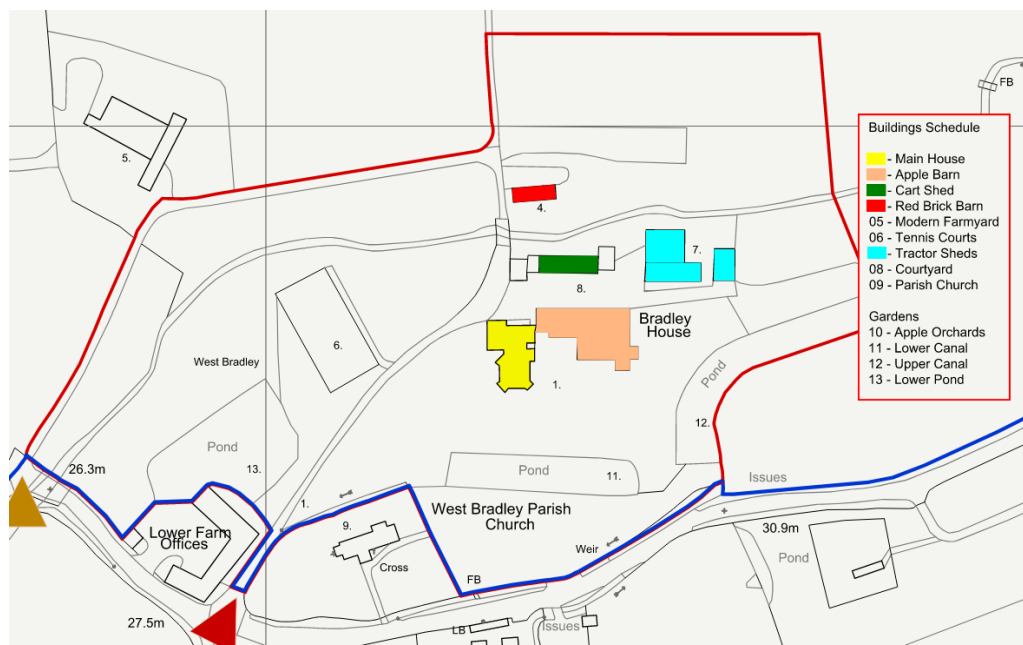


Figure 1: Existing Sitewide plan with the existing buildings inspected highlighted

Only Visual inspections were carried out to opening up works. Special surveying techniques were not employed.

This document reports on the findings of the structural inspection and advises on further work required. Works will protect and improve the long-term integrity of the asset.

## 2. Executive Summary

### 2.1 Main House

#### *Summary of Existing Structure*

The main house consists of a basement + 3Storeys and a later roof addition load bearing masonry/stone building with timber floors and timber trussed roof introduced at a later stage.

The masonry load bearing walls are generally in good condition with some repointing likely being required generally to the external facade.

There are signs that the main staircase has been moved from its original position to one of the corners of the house. The proposals are to reinstate the staircase in the originally constructed location.

The ground floor joists have been temporarily propped within the basement to restrict the existing floor joists from sagging further. There is evidence of rot, woodworm, failed bearings and excessive sagging in some of the ground floor joists, additional joists will be required to be spliced between the existing to reinstate bearings and to relevel existing floors.

The existing internal oak lintels in the basement demonstrate signs of damp and rot which will need to be replaced to avoid failure.

A steel goal postframe has been installed to open up the ground floor lounge room and support the load bearing wall above.

The joists and beams exposed were found to be in good condition at first and second floor and can be retained with typically no remedial works required. There is some deflection in the timber joists across the span of the floor.

The roof to the main house has been added at a later stage, it is designed such that thrust is placed laterally into the walls, an undesirable long-term condition. The ridge beam is missing from sections of the roof and there are signs of damp to the timber rafters. This has resulted in an externally visible deflection in the new roof. Hairline cracks in the gable end wall suggest the new masonry gable ends are not properly restrained. The roof should be replaced to avoid long term damage to the stonework that remains.

With the exception of the roof the general structural condition of the Main House is good with small localised repairs being required to ensure the longevity of the building.

The roof to the kitchen extension shows signs of deflection externally. Internally the visible timber structure appears to be in good condition and with minor repairs the roof will be able to be retained.

#### *Proposed remediation to structure for heritage consultant*

Within the basement internal oak lintels demonstrating rot will be replaced with like-for-like oak lintels in keeping with the existing building.

Locally some joists and beams at ground floor found to be in poor condition will require a hierarchy of remedial repairs: firstly, doubling up of joists to strengthen existing, secondly, strengthening in the form of spliced connections; thirdly full replacement of timber. This will allow the removal of the rotting temporary propping in the basement.

The first and second floor timber joists are to be retained in entirety. To level the floor for domestic use joists will be doubled up where required. Inspection of the floor shows that the existing structure is capable of this conversion.

The new roof to the main house has been designed such that thrust is placed laterally into the walls, an undesirable condition long term and not acceptable by today's design standards. This thrust will force out the existing stonework walls over time. The masonry gable ends have been built up from the original walls and externally rendered grey. These show hairline cracks suggesting that the masonry walls are not properly retained. The new roof is to be replaced to avoid long term damage to the original stonework. This will improve the long-term integrity of the asset.

In replacing the new roof, a new terrace floor is to be installed at the current ceiling level. This is to support a belvedere structure. The new floor structure will be contained on the existing walls and have no impact on the heritage asset.

The roof to the kitchen extension is to be retained. Visual inspection from below did not reveal any significant structural damage.

The floor to the kitchen has been raised with a concrete slab and linoleum flooring. This is to be stripped back to its original floor level.

The walls to the kitchen area are to be generally retained and reworked locally to provide new sliding doors and close up some existing openings. Where existing openings will be closed, infill to the existing walls is to be stone in-keeping with the original structure. Internally new openings will be formed with oak lintels to match existing, externally new openings will be made using stone lintels also to match existing. Where a new external opening is required to support an existing structural element a thin profile metal lintel with stone facing will be used to minimise visual impact. Inspection on site reveals the walls are capable of the new openings with lintels.

Trial pits suggest deep foundations across the whole structure. Inspection shows no evidence of failure in the existing foundations and so no remediation is proposed.

## 2.2 Apple Barn

### *Summary of existing structure*

The Apple Barn has a main volume with ground + mezzanine and a later modern blockwork barn extension.

The main volume is a masonry/stone load bearing building with a timber first floor on cast iron beams and columns and a timber trussed roof that has been supported with unfixed temporary timber posts to the first-floor. First floor build-up consists of 35mm chip board on 35mm timber boards onto the existing timber joists holding ground floor ceiling panels.

The modern barn extension is a blockwork loadbearing construction with a timber trussed roof and corrugated sheets for finishes.

From an external visual inspection, the ridge of the barn appears to undulate. There is no ridge beam and the roof trusses have been partially supported with propping on the 1st floor, these do not align with the first-floor beams and ground floor structure.

The ground floor slab is a ground bearing slab.

The general structural condition of the walls are good. Stone arch lintels appear to be in good condition with some existing timber lintels appearing degraded.

### *Proposed remediation to structure*

The existing ground floor is to be lowered to create a habitable space. As the new ground floor slab and insulation formation level will undermine the existing foundations, underpinning will be required to the existing foundations.

The current roof is supported with temporary propping and is failing structurally. It is recommended that the roof structure is replaced in entirety with new oak trusses in existing positions and to match the current details. Where possible existing timber will be reused in the new structure. The new structure will be constructed to be aesthetically similar to the existing structure. This will increase the long-term integrity of the asset.

The cast-iron columns and beams and first floor timber joists are to be retained with no remedial actions anticipated. Non-structural finishes to the first floor are to be replaced. This will not impact the existing structure.

Some openings in the existing stone wall are to be reworked with new windows. In-fill is to be in keeping with original stonework and lintels are to be stone arches to match existing. Where this is not possible lintels will be formed of slimline steel to mitigate visual impact. The existing structure is capable of supporting these lintels.

Where the oak trusses bear onto existing timber lintels, these lintels are to be replaced to ensure sufficient bearing capacity to the new roof.

The blockwork barn is to be demolished as an ancillary agricultural structure.

Externally ground level against the elevation is to be excavated, likely some remediation, cleaning and repointing, will be required to the stonework that has previously been buried.



## 2.3 Cart Shed

The Cart Shed is a single storey shed with load bearing masonry walls, timber trusses and corrugated roof sheathing.

Some of the trusses have been propped with new timber sections.

This shed is proposed to be demolished so no detailed inspection has been performed.

The existing foundations are not visible new foundations will be required for the new structure.

## 2.4 Little Stone Barn

### *Summary of existing structure*

The little stone barn is a load bearing masonry external walls with a timber trussed roof.

The masonry walls are bulging and leaning significantly, likely induced by the horizontal splaying forces from the roof. Temporary propping is required before any works can be undertaken to the little stone barn.

There is no ridge beam and the two timber trusses are tying the walls together just enough to keep the walls in place. But this has caused vertical shear failures in the existing walls. Both trusses are in poor condition and cannot be structurally retained.

The general condition of this barn is not structurally stable as it currently exists and the walls should be propped as soon as possible to stabilise them.

Continued observation of the little stone barn has identified continual movement. Due to the danger posed by the unstable structure careful consideration of the temporary works and construction sequence is required to protect site operatives in the vicinity of the structure.

### *Proposed remediation to structure for heritage consultant*

The construction sequence and temporary works will be required to be appropriate, accounting for the inherent instability in the existing structure, and allowing the maintenance of the building.

It is recommended that the roof structure is replaced with new pitched rafters and a ridge beam to avoid transferring horizontal forces to the existing stone walls. This will increase the life of the structure and ensure its long-term integrity.

The masonry walls are in poor condition and strengthening will be required to make them stable. There will be local patches of repointing to the stonework. The walls require tying at mid-height and at the top of the walls. The installation of a mezzanine floor at mid-height will be used to fix a steel frame to the stone walls providing mid-height restraint. This steel frame will continue to the top of the walls and a ring beam hidden at the eave's height will provide the top restraint and support the new roof.

## 2.5 Tractor Sheds

The Tractor Sheds are all single storey building. The structural form is portal frames with corrugated sheets for the façade and for the roofs.

The tractor sheds will be demolished to accommodate the new Leisure Barn in a similar footprint so no further investigation has been performed.

### 2.5.1 *Precast concrete portal frame shed.*

There is loss of structural section in the columns leaving the rebar exposed.

Some columns have been repaired with steel sections that have suffered from corrosion.

The general structural condition is poor but remains structurally stable.

### 2.5.2 *Steel portal frame shed.*

The general condition of the steel frame is good from a visual inspection.

This shed is proposed to be demolished in full and a new building is proposed in the approximate same footprint.

### 3. Main House



Figure 2: Main House External View

#### 3.1 Structural Observations

##### 3.1.1 Externally

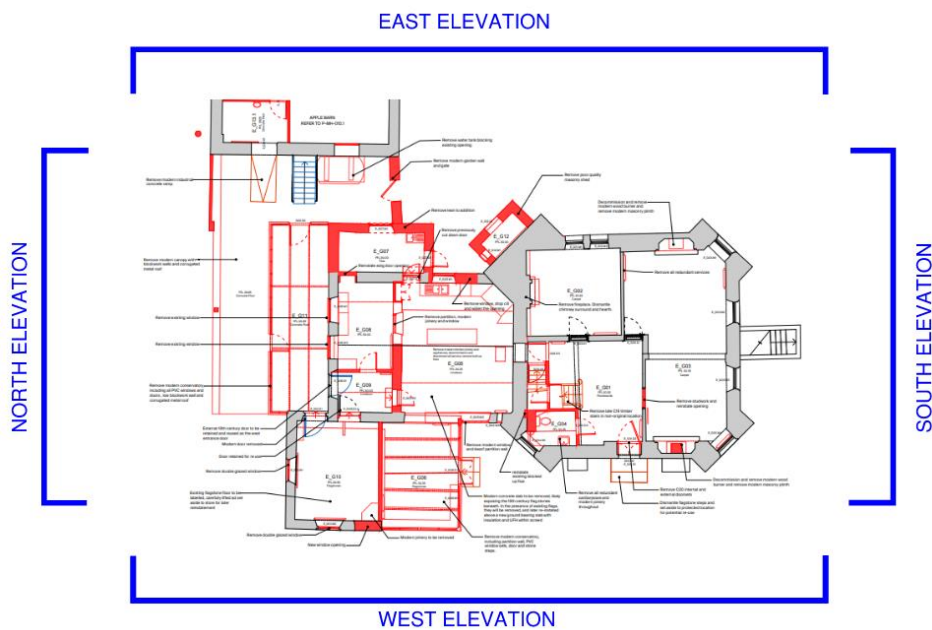


Figure 3: Main House. Plan indicating elevations

The pitched roof appears as a later ancillary addition to the original house. It is in keeping with the design of the Apple Barn and likely mimics this design, replacing a previous roof. Gable ends constructed of redbrick masonry have also been introduced.

There was likely a stone parapet higher than the original flat roof level. This parapet was then removed to build the current pitched roof.

On the East elevation the original lintels to the top floor windows were replaced by timber lintels to the underside of the pitched roof.

The top floor windows at the corners of the house are blind windows as there are fire places behind.

Throughout the whole building, it can be noted that repointing has been carried out several times.

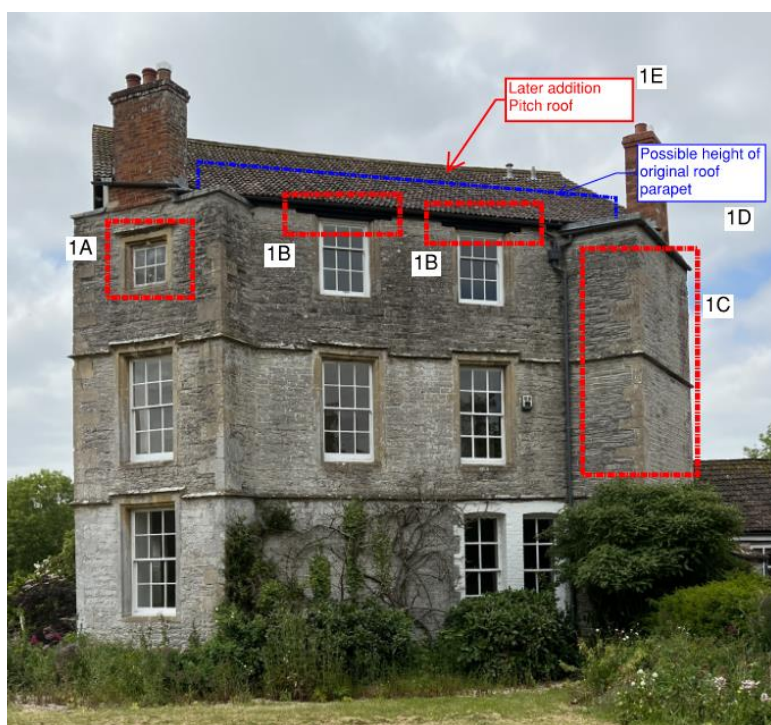


Figure 4: East Elevation

On the East Elevation, the following observations were made:

- » Blind/fake windows at the top floor outside the fire place (1A)
- » Original lintels have been replaced with a more modern and shallower lintel (1B)
- » The original stone is repointed in places (1C)
- » There was likely an original roof parapet that was demolished and the overall height of the external wall was reduced (1D)
- » Later added pitched roof (1E)

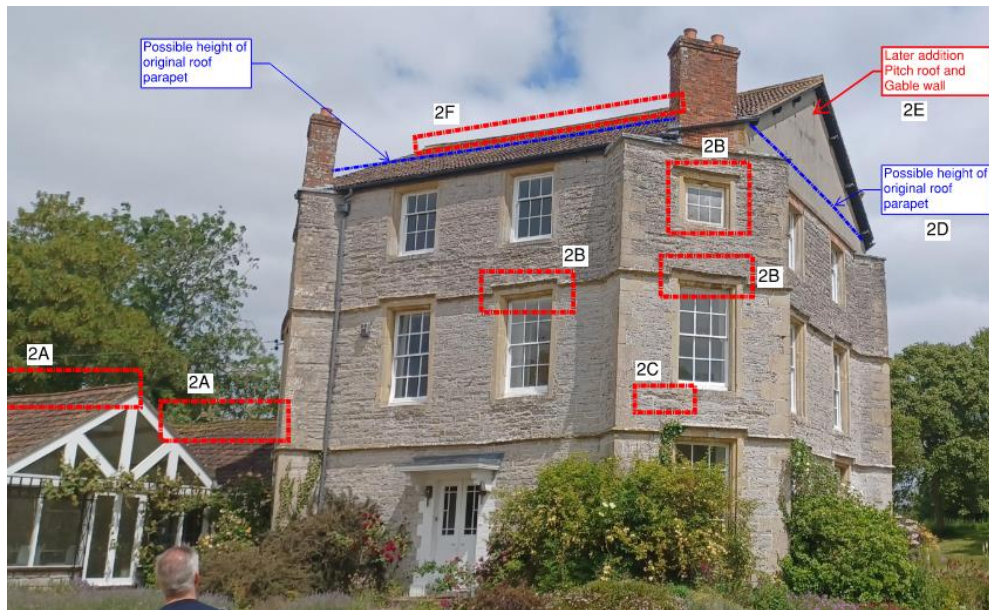


Figure 5: West-South elevation

On the West-South elevation, the following observations were made:

- » The ridges of the kitchen and access are not straight (2A)
- » The stone lintels have sagged at mid span and some of them are cracked (2B)
- » The façade stone has lost section in places (2C)
- » There was likely an original roof parapet that was demolished in the East and West elevations and built up to form the gable end walls in the South and North elevations (2D), (2E)
- » The ridge of the later added pitched roof is not straight and has deflected over the recommended deflection values for a roof (2F)

### 3.1.2 Internally

For floor plans and pictures of the internal condition refer to Appendix A.

#### 3.1.2.1 Basement

On the basement, the following observations were made:

- » No ground bearing slab only stone paving present
- » Most walls are damp
- » Timber props present propping the ground floor in places but not fixed to each other, or walls or floor
- » Section loss in some walls
- » Existing ground floor joists show signs of rot
- » Drainage pipe fixed to the basement wall and exits the basement through one of the basement walls

- » The basement wall construction has different build-ups in places, indicates that it has been repaired more than once
- » Ground floor joists are rotten in places were visible
- » The lintel over the window is bent and cracks are present in the masonry above
- » No major cracks in the basement walls

#### 3.1.2.2 *Ground Floor*

On the ground floor, the following observations were made:

- » There are signs that the current staircase is not the original staircase of the house
- » Some of the mortar has disintegrated observed in the trial opening
- » No signs of cracks visible through the plaster
- » Modern Timber staircase
- » Different age floor boards at the distribution space
- » 45-degree crack and horizontal crack in one of the corners of the house mid height of the wall
- » Damp patch at the ceiling and 45-degree crack in the finishes
- » The walls look in good conditions generally
- » Steel frame added in to remove historically load bearing stone wall
- » Timber joists require strengthening works, to be doubled up with similar. Joists found to be 200mm deep by 65mm wide @ 450mm spacing.

#### 3.1.2.3 *Ground Floor of Modern Conservatory*

- » Stone flagstones in good condition where still exposed
- » No ridge beam
- » Roof shows significant deflection but does not demonstrate evidence of failure

#### 3.1.2.4 *First Floor*

On the first floor, the following observations were made:

- » A trial hole in the external wall shows brick of different ages and condition.
- » New breaking out suggests original staircase adjacent to existing one.
- » Floor boards from a different location have been reused next to the staircase
- » Existing joists are demonstrated to be in good condition. Joists found 200mm deep 65mm wide at 450mm centres.
- » Timber trimming beams around existing and original staircase location, suggests easy method to return staircase to original location.
- » Generally timber joists spanning on to masonry walls.
- » Doubling up of joists required to level floor

#### 3.1.2.5 *Second Floor*

On the Second Floor, the following observations were made:

- » 45-degree crack in the finishes at the staircase mid-way landing
- » Crack between the stone and the plaster at the fire place
- » Damp patch on the carpet at the staircase landing

- » 45-degree 5mm crack under lintel and vertical crack separating the window and the wall.
- » 45-degree hair thin crack next to the fire place to the underside of the roof.
- » The presence of several 45-degree cracks to the underside of the roof could indicate a lateral push from the new pitched roof. These cracks are in the plaster and further investigations are required to determine the condition of the masonry behind.
- » Vertical to 45-degree 5mm thick crack under recent timber post.
- » The mid floor height window indicates that the initial staircase would have been in this location.
- » Several parallel hair thin 45-degree cracks in the recent gable end wall.
- » Timber joists 200mm deep 65mm wide span in a different direction to first floor. Timber joists span onto large downstanding timber beams.

### 3.1.2.6 Loft

On the loft, the following observations were made:

- » Roof timber rafters have early signs of damp
- » No continuous ridge beam through the roof
- » Rafters spanning from stone wall to a ridge plate in absence of beam. Resulting in thrust in to stone walls. Rafters supported at midspan by purlins on trusses.
- » There is loft insulation in places

## 3.2 Structural Integrity

Load bearing walls are generally in good condition with some maintenance required along the external façade and at basement level.





A few floor joists at ground floor were observed to have cracks and the ground floor is currently propped to the basement floor in some locations. These floor joists will be doubled up with new timber joists to strengthen the ground floor and existing propping to be removed.

The pitched roof structure is a timber roof with no support to the apex and no continuous ridge beam. The timber rafters have signs of damp. Hairline cracks in the gable end wall suggest that the new masonry gable ends are not properly restrained. Due to the current status of the timber rafters and design of the roof, it is recommended that a new roof is installed for the preservation of the heritage asset.




The roofs to the northern extension rooms show evidence the apex of the roof has dropped. Internally it is clear that the trusses have deflected further than the initial design criteria over time and are bowing. These roofs should be replaced to ensure longevity of the building.





### 3.3 Remedial Works




Table 1: Main House remedial proposals


	Structural Defect	Proposed Solution
1	<p>Local patches of poor mortar and stone condition</p> 	<p>Repointing required</p>
2	<p>Lintel crack</p> 	<p>Some external masonry lintels have cracked.</p> <p>As there are no alterations to external openings lintels can remain as they are.</p>
3	<p>Masonry walls in poor condition around historic fire place</p> 	<p>Allow for replacement of deteriorated masonry, particularly where it has become soft and crumbly to touch,</p>
4	<p>Unfixed timber props to Ground Floor</p> 	<p>Timber propping to be removed. Once ground floor joists have been strengthened.</p>



	Structural Defect	Proposed Solution
5	<p>Insect infestation/rotten timber</p> 	<p>Strengthen existing timber joists at ground floor to make ground floor structurally safe</p>
6	<p>Sagged Timber lintel</p> 	<p>All timber lintels in basement to be replaced.</p>
7	<p>Local loss of mortar and masonry section</p> 	<p>Damaged masonry/stone to be replaced and mortar repointed</p>

	Structural Defect	Proposed Solution
8	Damp patch, horizontal and 45-degree crack 	Wall finishes to be removed to expose masonry and beam support. Allow for Helifix stitching of masonry
9	Horizontal crack under lintel 	Remove existing finishes to inspect lintel bearing
10	45-degree crack in external wall caused by roof 	Remove existing finishes and allow for Helifix masonry stitching
11	Vertical / 45-degree crack from roof 	Re-design of roof Remove wall finishes and expose masonry. Allow for Helifix stitching.

	Structural Defect	Proposed Solution
<p><b>12</b></p>	<p>Pitched roof structure</p> 	<p>There is no recommendation for repairing the existing pitched roof.</p> <p>The existing roof should be demolished and a new flat roof should be constructed that is more in keeping with the original building design intent.</p>
<p><b>13</b></p>	<p>Loose Cornice (General maintenance)</p> 	<p>Replace or fix accordingly</p>
<p><b>14</b></p>	<p>45-degree parallel cracks</p> 	<p>Provide Gable end lateral restraint ties to roof structure.</p> <p>Remove wall finishes to determine the extent of the cracks and repair masonry wall accordingly.</p> <p>Allow for rebuild of masonry gable end walls.</p>

	Structural Defect	Proposed Solution
15	<p>Pitched roof above kitchen extension sagging.</p> 	<p>No observable structural failures of elements and therefore the roof is able to be retained.</p>

## 4. Apple Barn



Figure 7: Apple Barn. View from the connecting link to the main house



Figure 6: External view of the Apple Barn

### 4.1 Structural Observations

For floor plans pictures of the external and internal condition, refer to Appendix A.

#### 4.1.1 Externally

Throughout the whole building it can be noted that the general condition of the load bearing stone is good with some localised patch repairs needed and repointing.

- » Repointing was done in places at some point in the past.
- » The timber joists supported the entrance roof to the West appear in poor condition.
- » The ridge of the main space has deflected.
- » There are several cracks around the main opening in the North Façade.
- » There is overgrown vegetation fixed to the North façade that is getting in between the stones.
- » The openings in the West façade are blocked with a later blockwork construction.
- » The North-East elevations shows signs of movement with a crack in both sides of the corner.

#### 4.1.2 Internally

##### 4.1.2.1 Ground Floor

On the Ground Floor, the following observations were made:

- » The masonry load bearing walls look in good condition overall
- » The existing ground floor slab has lost the cover in places exposing the aggregate
- » The finish floor surface is uneven and it's cracked at the column locations
- » There are internal manhole covers
- » The steel columns show superficial corrosion at the bottom section which will need to be cleaned
- » The door frames are corroded at the bottom section

#### 4.1.2.2 First Floor

On the First Floor, the following observations were made:

- » The timber trusses are propped to the first-floor slab without fixings. The line of the trusses and props are not on the line of columns as shown in Figure 8 below,
- » One of the trusses is cracked, likely a shear failure at the prop location.
- » There are signs of damp on the external wall next to the Velux window
- » The first floor build-up is 200mm deep timber joists with chipboard.

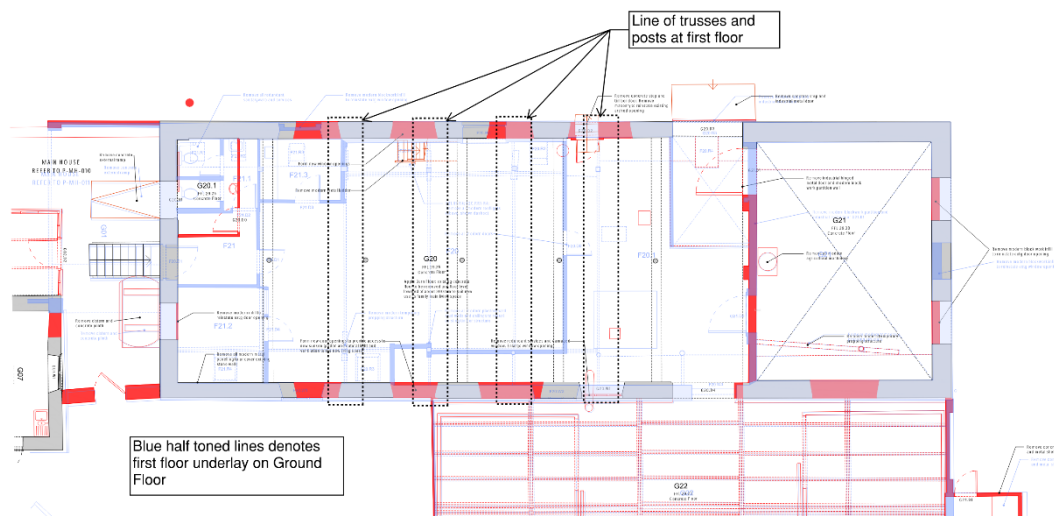


Figure 8: Overlaid first floor and ground floor. Apple Barn

#### 4.1.2.3 Loft

On the Loft space, the following observations were made:

- » There is no ridge beam as part of the roof construction
- » The general condition of the rafters is poor with splices and signs of damp
- » The roof covering is damaged in places
- » The roof is noticeably deflecting

#### 4.1.2.4 Annex Barn extension

On the Annex Barn, the following observations were made:

- » The timber trusses are in poor condition
- » The roof covering is in poor condition with a line of separation at the ridge
- » The external blockwork construction is poor with gaps in the mortar
- » The trusses are embedded in the blockwork walls

## 4.2 Structural Integrity

The load bearing stone/masonry walls are generally in good condition requiring some maintenance along the external façade and internally.

The steel columns at the ground floor levels present some small signs of corrosion and will need to be repaired to avoid further loss of section.

The roof structure of the main barn is an A-framed truss with timber rafters running parallel to the trusses and no ridge beam. The A-framed trusses have been propped onto the first-floor.

The ridge of the main barn is deflected to a visual inspection showing signs that the roof configuration no longer has structural capacity.


The first floor is not safe in areas due to exposed heights and we recommend to restrict the access to the first floor until propped or repaired.




The roof structure of the annex barn is timber trusses with purlins spanning onto the trusses, the trusses look in good condition overall.

As part of the refurbishment works, the first-floor structure should be exposed and checked thoroughly for any defects and measured to aid structural checks. This information should be returned to the project's structural engineer for review.




## 4.3 Remedial Works




Table 2: Apple Barn remedial proposals




	Structural Defect	Proposed Solution
1	<p>Timber props for roof truss unfixed</p> 	<p>Roof structure to be removed along with propping. New roof to be installed.</p>



	Structural Defect	Proposed Solution
<p>2</p>	<p>Shear failure in one of the main rafters at the prop location</p> 	<p>These rafters are proposed to be removed and new roof to be installed.</p>
<p>3</p>	<p>Damp patch under roof window</p> 	<p>Expose damp to find source and repair accordingly. Allow for timber rafters replacement.</p>
<p>4</p>	<p>No roof ridge beam to main barn roof</p> 	<p>Replace roof structure – some of the newer timbers may be able to be reused</p>



	Structural Defect	Proposed Solution
<p>5</p>	<p>Degradation of timber roof structure adjacent to Annex Barn extension</p> 	<p>Apple barn roof structure requires replacing in entirety – some of the newer timbers may be able to be reused</p>
<p>6</p>	<p>Partially supported roof</p> 	<p>Roof to be replaced in Apple Barn</p>
<p>7</p>	<p>Existing roofing structure and timber sections</p> 	<p>The blockwork barn is to be removed.</p>

	Structural Defect	Proposed Solution
<p>8</p>	<p>Existing first floor beams</p> 	<p>Existing beams to be exposed and structurally checked for compliance.</p>
<p>9</p>	<p>Corroded base of steel column</p> 	<p>Allow for additional plates at the base of the columns for strengthening.</p>
<p>10</p>	<p>Deflected ridge</p> 	<p>Allow for replacement of the roof structure. Some of the newest sections could be reused,</p>

	Structural Defect	Proposed Solution
<p><b>11</b></p>	<p>Rotten timber rafters</p> 	<p>New roof structure to be proposed as part of the new scheme,</p>
<p><b>12</b></p>	<p>Mortar in poor condition</p> 	<p>Blockwork barn is not being retained.</p>
<p><b>13</b></p>	<p>Several cracks in the door frame</p> 	<p>Allow for structural door framing to be replaced with new timber structure.</p>

	Structural Defect	Proposed Solution
<p><b>14</b></p>	<p>External bed mortar in poor condition</p> 	<p>Allow for mortar repointing generally to external structure</p>
<p><b>15</b></p>	<p>5-10 crack in the North-East elevation</p> 	<p>Allow for helifix stich repair</p>

## 5. Cart Shed



Table 3: External View of the Cart Shed

### 5.1 Structural Observations

For floor plans and pictures of the Structural condition, refer to Appendix A

This barn is proposed to be demolished and rebuild with a new structure, load bearing walls and roof.

#### 5.1.1 Externally

This building hasn't been used in quite a while and hasn't been maintained regularly.

- » There are cracks in the masonry walls
- » The render of the walls is not in good conditions and would need repointing
- » The rails supporting the main gate are corroded and in poor condition
- » The external paving slabs are cracked and have lost section in places
- » The gutter has deflected as the result of the movement of one of the columns
- » Some of the rafters of the roof have failed leaving one side unsupported
- » Different roof finishes are present as a result of different repairs during the life of the building

#### 5.1.2 Internally

This building wasn't inspected internally as the result of the poor structural condition.

### 5.2 Structural Integrity




Load bearing walls could be reused if the cracks are repaired.

The roof rafters are in poor condition, some of the rafters are unsupported as a result of the roofing panel failure and major water ingress.

The whole roof finishes and structure needs redesign and replacing.

### 5.3 Remedial Works

Table 4: Cart Shed remedial condition

	Structural Defect	Proposed Solution
<p>1</p>	<p>Existing external door beams corroded</p> 	<p>Existing doors and posts are to be demolished</p> <p>No further solution proposed</p>
<p>2</p>	<p>Existing timber post cracked</p> 	<p>Timber posts to be demolished and new foundations required.</p> <p>New roof structure required existing roof to be demolished</p> <p>No further solution proposed</p>
<p>3</p>	<p>Crack in external masonry</p> 	<p>New load bearing masonry walls required as part of the new Architectural proposals.</p> <p>No further solution proposed</p>

## 6. Red Brick Barn and Annex



### 6.1 Structural Observations

For Building plans and pictures refer to survey pictures in Appendix A

#### 6.1.1 Externally

Throughout the whole building can be noted that the masonry walls are generally in poor condition.

- » The masonry/stone walls are leaning outwards as a result of a poor roof design and lateral push.
- » There is a mixture of different types of masonry and stone used in the wall build-up.
- » Some of the stone crumbles to the touch.
- » Some of the roof tiles are missing.

#### 6.1.2 Internally

- » The walls are not restrained at the head.
- » There is a major vertical crack separating the wall panel and the pier where the timber truss is supported.
- » The timber truss is currently stopping the walls from fully leaning outwards and collapse.
- » There is not a ridge beam.
- » The roof of the Annex has collapsed.
- » There is a timber frame supporting the roof of the Annex unfixed.

### 6.2 Structural Integrity

This building is not structurally safe for access.

The loadbearing stone/masonry walls are in poor condition and will need stabilisation so stop them fully leaning outwards.

Once the walls are stabilised or rebuilt, patch repair and repointing will be required generally.

There are two A-framed timber trusses and timber rafters forming the roof structure. The absence of ridge beam and the poor roof design is pushing the masonry walls to lean outwards. The roof structure will need to be redesigned and replaced.



The load bearing walls of the Annex are in poor condition and crumble to the touch.

A new roof structure for the Annex is required as there is not roof structure at the moment.




The timber frame partially supporting the roof of the Annex is not fixed to the wall or posts and it will need to be replaced with a permanent roof structure.




### 6.3 Remedial Works


Table 5: Red Brick Barn and Annex remedial proposals

	Structural Defect	Proposed Solution
<p>1</p>	<p>General poor mortar condition and poor masonry condition</p> 	<p>Repointing required generally and brick/stone replacement locally</p>
<p>2</p>	<p>Significant leaning and bulging of masonry walls. Masonry walls unrestrained at the head.</p> 	<p>Strengthening and tying walls together using new mezzanine structure, masonry anchors and a ring beam at the top of the wall.</p>



	Structural Defect	Proposed Solution
<p>3</p>	<p>Crumbing stone</p> 	<p>Damaged bricks and stone needs rebuilding and repointing</p>
<p>4</p>	<p>Poor condition of masonry</p> 	<p>Damaged bricks and stone needs rebuilding and repointing</p>
<p>5</p>	<p>Roof structure in poor condition and not providing restrain to the masonry walls</p> 	<p>Replace roof structure.</p>

	Structural Defect	Proposed Solution
6	<p>Vertical &gt;5mm crack separating wall panel from pier</p> 	<p>Allow Helifix crack stitching</p>
7	<p>No ground floor slab visible</p> 	<p>Allow for Ground Bearing slab</p>
8	<p>Unsafe support to Timber truss</p> 	<p>New roof structure to sit on steel frame tied into masonry walls</p>

	Structural Defect	Proposed Solution
9	<p data-bbox="400 331 858 365">Collapsed roof, unfixed timber props</p> 	<p data-bbox="1093 331 1428 398">Blockwork extension to be rebuilt.</p>

## 7. Tractor Sheds

### 7.1 Structural Observations

For floor plans and pictures of the internal and external condition refer to Appendix A.

#### 7.1.1 Precast Concrete Shed



Figure 9: Precast Concrete Shed

Throughout the precast concrete shed, it can be noted that different structural repairs have happened to strengthen the columns where the concrete cover was lost.

- » The structural repairs used steel angles that have corroded during the time.
- » The structural repairs are very localised and not everywhere that is required.
- » The concrete columns have continued to degrade during the time.
- » The roofing sheet looks in reasonably good condition.
- » This shed is proposed to be demolished in the New Architectural Proposal.
- » Some of the external wall panels have fallen.
- » The concrete ground floor slab is in very poor condition with loss of cover.
- » The timber rails supporting the cladding panels show signs of degradation.
- » The precast concrete beams supporting the roof are in reasonably good condition.

### 7.1.2 Steel Portal frame shed



Figure 10: Steel portal frame shed

Throughout the steel frame shed, there are signs of corrosion.

- » The main structure is hot rolled steel portal frames with galvanised steel purlins
- » The roof steel bracings show signs of corrosion
- » The main portal frame columns show signs of corrosion up to the mid height of the column
- » The cladding purlins also show signs of corrosion
- » This shed is proposed to be demolished in the Architectural proposal.

## 7.2 Structural Integrity



The steel frame shed is in generally good condition and some of the steel sections could be reused in other places of the project.


The precast concrete shed is in poor condition as for the vertical structure. Structural repairs would be required to retain the columns if desired.

The roof structure of the precast concrete shed is in good condition and the precast concrete beams/joists could be reused.

## 7.3 Remedial Works

Table 6: Tractor Sheds Remedial proposals

	Structural Defect	Proposed Solution
<p>1</p>	<p>Loss of section in existing precast concrete columns</p> 	<p>Columns are proposed to be demolished.</p> <p>No further solution proposed.</p>
<p>2</p>	<p>Loss of section in most of precast concrete columns</p> 	<p>Whole precast concrete shed is proposed to be demolished,</p> <p>No further solution proposed.</p>
<p>3</p>	<p>Corroded structural steel repair</p>	<p>Whole precast concrete shed is proposed to be demolished,</p> <p>No further solution proposed.</p>

	Structural Defect	Proposed Solution
		
<p>4</p>	<p>Existing tank next to shed</p> 	<p>Allow for tank to be removed and any contamination to be contained.</p>
<p>5</p>	<p>Roof bracing corrosion</p> 	<p>The steel sections that are corroded could be sand blasted, painted to the required corrosion protection levels and reused.</p>