



STRUCTURAL REPORT
FOR TATTON BARN, HAMSTREET ROAD,
HAMSTREET, KENT



June 2025
Project No 3674

By Joanne Whiley BEng CEng MStructE

1. Date of Inspections:

Inspection 19 March 2025 Trial pits inspected 30 May 2025.

2. Scope:

This report deals specifically with structural matters based solely on a visual inspection and the structural appraisal has been carried out in order to provide an assessment of the possible options for conversion to residential use. The observations and defects should be taken as an indication of the condition of the building rather than a comprehensive inventory.

3. The Property:

The property under consideration comprises a precast concrete portal framed agricultural building (Atcost type) and a lean-to section with timber roof structure supported on a combination of timber posts and blockwork walls.

4. Terms of Reference:

We visited the property by arrangement on 19 March and 30 May 2025 to carry out a visual inspection and report on the general structural condition of the building and its suitability for conversion to residential use.

This report has been produced in reference to current planning policy which requires that a building 'would be capable of conversion without extensive alteration or rebuilding without detrimental effect on the building's fabric.'

This report has been produced with reference to dha drawings numbered DHA/35942/03 and 05.

5. Geology:

The building is located in a rural location, near Ashford, Kent. The local geology map indicates the subsoil is Weald Clay Formation (sandstone).

6. Existing Structure:

The front section of the building is a double storey precast concrete portal frame spanning approximately 6m with two bays approximately 4.5m long. The roof covering is corrugated cement sheeting supported on concrete purlins, which span between the main concrete portal frames. The front elevation is mainly timber cladding with one section of brickwork. The left hand elevation is open and the right hand elevation is corrugated sheeting with brickwork at low level.

Looking from ground level the concrete purlins, main concrete rafters, and connections appear in reasonable condition. There are some areas where the concrete has spalled, exposing the reinforcement. This often happens on Atcost frames where the concrete cover is small allowing moisture to penetrate. From our inspection we are of the opinion that the exposed reinforcement has not corroded to the extent that the frame's strength

will be affected and these areas can be repaired by cleaning and treating the bars and applying a proprietary repair mortar. There are small sections on two of the columns which have been damaged and the reinforcement exposed. In these locations the concrete will need to be cut out locally to allow the repair.

A trial pit was dug adjacent to the front corner column and the foundation was found to be a concrete pad approximately 800mm square and 1 metre deep.

The rear section of the building is approximately 14.5 by 10m on plan and is single storey. The monopitch roof is constructed using corrugated cement sheeting supported on timber purlins and beams which are connected to the concrete frames at the front. Internally and on the perimeter, the roof structure is supported on substantial timber posts. The timber roof members are in reasonable condition although localised members have suffered from decay and some previous repairs are evident. The main posts are in good condition.

The internal posts bear onto the concrete slab although it looks like there are pad foundations based on the square shaped areas with different concrete. The slab varies in level and there is some cracking. A trial pit was dug to expose the foundation under one of the perimeter posts and the foundation projects from the wall 200mm, is approximately 450mm long and 680mm deep.

7. Structural Considerations for the Proposed Conversion:

The proposals are to convert the building into a detached dwelling with a first floor in the concrete framed section and the remainder being single storey. This will entail the upgrading of the external envelope to form a habitable environment, but maintaining and using the main structural members.

The main concrete frames are generally in reasonable condition and some local repairs can be carried out as part of the works. The loading capacity of the roof structure can be assessed and we would suggest that the new roof covering is selected to be as light as possible to be comparable to the existing. There is standard data available for Atcost frames which gives the allowable dead loading of 34 kg/m² from the roof sheeting.

The first floor could be designed to be independent from the main existing frame with the floor joists being supported by steel beams and posts or internal partition walls.

The foundations are concrete pad foundations. Based on a roof loading of 1.1 KN/m² the column load would be approximately 25KN including the frame which would result in a bearing pressure of 39KN/m² based on 800mm square. This pressure is low and, in our opinion, would be acceptable.

The timber framed section will require some repairs with some additional roof members inserted between the existing to assist in supporting the new roof covering. The existing timber posts are in good condition and a check calculation shows that they are adequate to support the roof loads.

8. Conclusion and Recommendations for Conversion:

The existing concrete frames will require design checks for the new roof construction. This is best carried out on a comparison of loading basis with the new roof covering selected to be as light as possible. There is some spalling of the concrete to the Atcost frame which can be repaired relatively easily as part of the works. The capacity of the timber members can be calculated and additional members inserted where necessary. The main vertical supporting posts are adequate.

We would recommend that any new internal walls are fixed to the external walls to provide additional lateral buttressing.

Based on our inspection and the structural form and condition of the building, we are of the opinion that the building is capable for the proposed conversion and the building's main structure can be retained and utilised.

The completion of the works should address any defects and necessary repairs and should enhance the structural stability of the building, ensuring its future use for the long term.

Report by:






Joanne Whiley




for R&J Structural Solutions Ltd



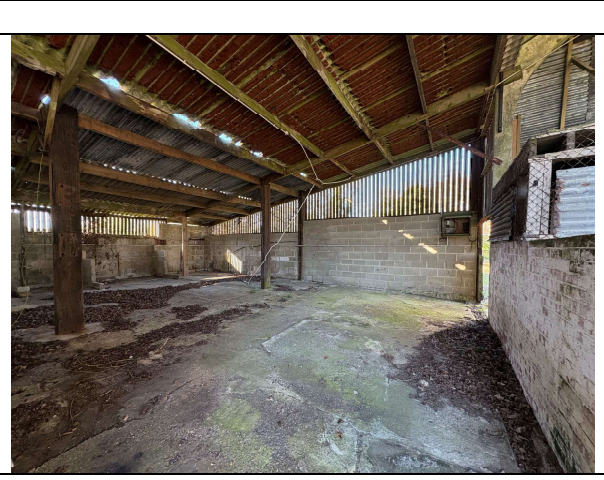
Qualifications: **BEng CEng MStructE**



Disclaimer: This report is not a full structural survey. The report is specifically restricted in accordance with conditions limitations and qualifications agreed.




PHOTOGRAPHS

<p>External Views</p> <p>Front Elevation</p>	 A photograph showing the front elevation of a two-story barn. The structure features vertical corrugated metal siding on the upper level and a lower section with a mix of brick and weathered metal. A large open bay door is visible on the left side. The barn is situated on a gravel or dirt area with trees in the background under a clear blue sky.
<p>Right hand elevation</p>	 A photograph showing the right-hand elevation of the barn. The structure is primarily composed of weathered, horizontal corrugated metal siding. A large open bay door is visible. The ground in front is a mix of gravel and grass. The sky is blue with some light clouds.
<p>Left hand elevation</p>	 A photograph showing the left-hand elevation of the barn. The structure features a large, arched opening supported by a brick pillar. The siding is a mix of corrugated metal and brick. The interior of the barn is visible through the opening. The ground is a mix of grass and gravel. The sky is blue.

<p>Internal view of concrete frame</p>	 A photograph showing the interior of a barn with a concrete frame. The roof is supported by wooden beams, and there is a brick wall in the background. The floor is concrete, and there is some grass and dirt in the foreground.
<p>Spalling of concrete to frame</p>	 A close-up photograph of the concrete frame showing significant spalling and damage. The concrete is crumbling, and the underlying structure is exposed. The roof is made of corrugated metal.
<p>Damage to front column requiring repair</p>	 A close-up photograph of a concrete column showing severe damage. The concrete is spalling, and the internal structure is exposed. The column is surrounded by wooden beams.

<p>Localised crack to brickwork</p>	
<p>Connection timber roof to concrete frame</p>	
<p>Internal view of rear timber section</p>	

<p>Internal view</p>	
<p>Decayed purlin</p>	
<p>Previous splice of rafters requires attention</p>	

<p>Local crack to block infill wall</p>	 A photograph showing a vertical crack in a grey concrete block wall. A black pipe runs horizontally across the wall above the crack. Sunlight filters through a window on the left, casting shadows on the wall.
<p>Trial pit 1 adjacent concrete column</p>	 A photograph of a trial pit dug in the ground. A concrete column is visible on the right side of the pit. The soil is dark and appears to be a mix of earth and gravel.
<p>Trial pit 2 adjacent timber post</p>	 A photograph of a trial pit dug in the ground. A timber post is visible on the left side of the pit. The soil is dark and appears to be a mix of earth and gravel.



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Project: TAYTON BARN.	By: JW	Chk:	Sheet No: 01	Rev.
	Date: 05/25		Project No: 3674	

Existing timber Column

Section is approximately 300x150mm, assume C16.

$$\frac{q = 5.85}{\phi = 7} \quad \square \quad \frac{q = 5.85}{\phi = 7}$$

Roof loading

$$\begin{aligned} \text{Dead } q &= \text{sheeting} = 0.2 \\ &\quad \text{purlins} = 0.1 \\ &\quad \text{ceiling} = 0.2 \\ &= 0.5 \text{ kN/m}^2 \end{aligned}$$

$$\text{Imposed } \phi = 0.6 \text{ kN/m}^2$$

$$\begin{aligned} \text{Rafter reaction} &= q = 0.6 \times 4.5 \times 2.6 = 5.85 \text{ kN} \\ \phi &= 0.6 \times 4.5 \times 2.6 = 7.0 \end{aligned}$$

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Site: Tatton Barn
 Job: Conversion
 Job number: 3674

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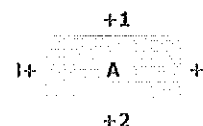
Calculations for timber post/stud to BS EN1995 using C16 timber

Location: Existing timber column

Pos	Dur	Load	kN	Factored	Offset	Moment y-y	Moment z-z
				6.10		6.10	6.10
1	G	roof	5.85	7.90	0	0.59	
1	QH	roof	7.00	10.50	0	0.79	
2	G	roof	5.85	7.90	0	-0.59	
2	QH	roof	7.00	10.50	0	-0.79	
Total load			25.70	36.79		0.00	0.00

Load offsets are measured in mm. from faces of member; moments in kNm

Load durations: G: Dead; Qx: Imposed; QH: Roof



Member length = 3.2 m

Use: 300 x 150 C16

Grade properties:

Loading duration factor, $k_{mod} = 0.6$ [EC5 Table 3.1] K_{sys} (load sharing factor) = 1.0

Material partial factor, $\gamma_m = 1.3$ [EC3 NA Table NA.3]

Grade compression stress, $f_{c,0,k} = 17.0$ N/mm²

Design compressive strength, $f_{c,0,d} = k_{mod} \cdot K_{sys} \cdot f_{c,0,k} / \gamma_m = 0.6 \times 1.0 \times 17.0 / 1.3 = 7.85$ N/mm²

Grade bending stress, $f_{m,k} = 16.0$ N/mm²

Design bending strength, $f_{m,d} = k_{mod} \cdot K_{sys} \cdot f_{m,k} / \gamma_m = 0.6 \times 1.0 \times 16.0 / 1.3 = 7.38$ N/mm²

Depth factors, $k_{h,v} = 1.00$; $k_{h,z} = 1.00$ [EC5 3.2]

Applying k_h depth factors $f_{m,y,d} = 1.00 \times 7.38 = 7.38$ N/mm² $f_{m,z,d} = 1.00 \times 7.38 = 7.38$ N/mm²

Compression y-y axis

Design compressive stress, $\sigma_{c,0,d} = 36.79 \times 1000 / (300 \times 150) = 0.818$ N/mm²

Effective length = $L_{FV} = 1.0L = 3.2$ m

Slenderness, $\lambda_v = 3.2 \times 1000 / (150 / \sqrt{12}) = 73.9$

$\lambda_{rel,v} = (\lambda_v / \pi) \sqrt{(f_{c,0,k} / E_{0,05})} = (73.9 / \pi) \sqrt{(17.0 / 5,400)} = 1.32$ [EC5 6.3.2 Eq.(6.21)]

$k_v = 0.5(1 + B_c(\lambda_{rel,v} - 0.3) + \lambda_{rel,v}^2) = 0.5 \times (1 + 0.2 \times (1.32 - 0.3) + 1.32^2) = 1.47$ [EC5 6.3.2 Eq.(6.27)]

B_c is 0.2 for solid timber, 0.1 for glulam and LVL [EC5 6.3.2 Eq.(6.29)]

$k_{c,v} = 1 / (k_v + \sqrt{(k_v^2 - \lambda_{rel,v}^2)}) = 1 / (1.47 + \sqrt{(1.47^2 - 1.32^2)}) = 0.470$ [EC5 6.3.2 Eq.(6.25)]

Design compressive strength = $k_{c,v} \cdot f_{c,0,d} = 0.470 \times 7.85 = 3.69$ N/mm²

Design axial load resistance = $3.69 \times 300 \times 150 / 1000 = 166$ kN <<< OK

Compression z-z axis

Design compressive stress, $\sigma_{c,0,d} = 36.79 \times 1000 / (300 \times 150) = 0.818$ N/mm²

Effective length = $L_{Fz} = 1.0L = 3.2$ m

Slenderness, $\lambda_z = 3.2 \times 1000 / (300 / \sqrt{12}) = 37.0$

$\lambda_{rel,z} = (\lambda_z / \pi) \sqrt{(f_{c,0,k} / E_{0,05})} = (37.0 / \pi) \sqrt{(17.0 / 5,400)} = 0.660$ [EC5 6.3.2 Eq.(6.22)]

$k_z = 0.5(1 + B_c(\lambda_{rel,z} - 0.3) + \lambda_{rel,z}^2) = 0.5 \times (1 + 0.2 \times (0.660 - 0.3) + 0.660^2) = 0.754$ [EC5 6.3.2 Eq.(6.28)]

B_c is 0.2 for solid timber, 0.1 for glulam and LVL [EC5 6.3.2 Eq.(6.29)]

$k_{c,z} = 1 / (k_z + \sqrt{(k_z^2 - \lambda_{rel,z}^2)}) = 1 / (0.754 + \sqrt{(0.754^2 - 0.660^2)}) = 0.895$ [EC5 6.3.2 Eq.(6.26)]

Design compressive strength = $k_{c,z} \cdot f_{c,0,d} = 0.895 \times 7.85 = 7.02$ N/mm²

Design axial load resistance = $7.02 \times 300 \times 150 / 1000 = 316$ kN

Bending about y-y axis:

Design bending strength, $f_{m,y,d} = 7.38$ N/mm²

Elastic section modulus, $W_{yy} = 300 \times 150^2 / (6 \times 1000) = 1,125$ cm⁴

Design bending moment = 0.000 kNm

Design bending stress, $\sigma_{m,v,d} = 0.00 \times 1000 / 1,125 = 0.00$ N/mm² OK

Moment resistance = $7.38 \times 1,125 / 1000 = 8.31$ kNm OK

Bending about z-z axis:

N/A

Combined compression and bending

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Ratios: Buckling y-axis : $0.82/3.69 = 0.222$

Buckling z-axis : $0.82/7.02 = 0.117$

Bending y-axis : $0.00/7.38 = 0.000$

Bending z-axis : $0.00/7.38 = 0.000$

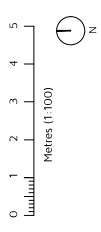
Check $(\sigma_{c,0,d}/f_{c,0,d})^2 + (\sigma_{m,y,d}/f_{m,y,d}) + k_m(\sigma_{m,z,d}/f_{m,z,d}) \leq 1$ [EC5 6.2.4 Eq.(6.19)]

and $(\sigma_{c,0,d}/f_{c,0,d})^2 + k_m(\sigma_{m,y,d}/f_{m,y,d}) + (\sigma_{m,z,d}/f_{m,z,d}) \leq 1$ [EC5 6.2.4 Eq.(6.20)]

For rectangular solid wood, glulam and LVL sections $k_m = 0.7$ [EC5 6.1.6]

Check 1: $0.222 + 0.000 + 0.7 \times 0.000 = 0.222 \leq 1.0$ OK

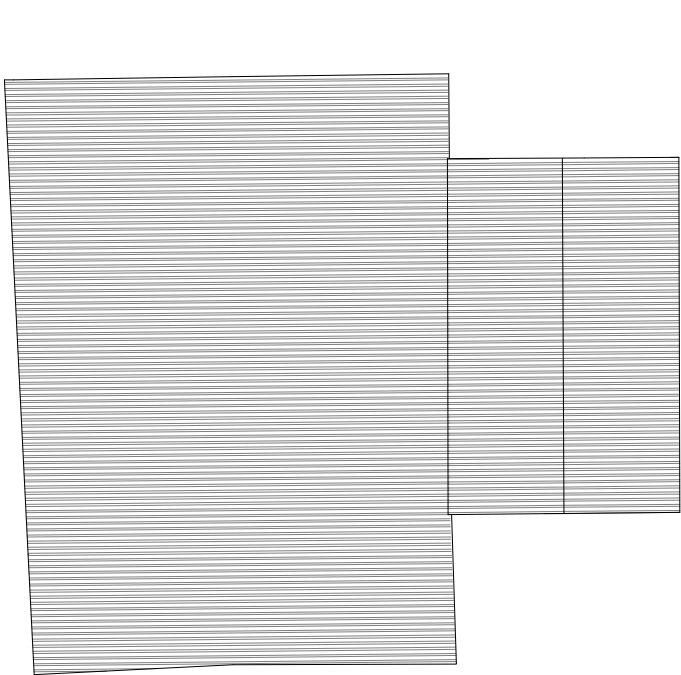
Check 2: $0.117 + 0.7 \times 0.000 + 0.000 = 0.117 \leq 1.0$ OK



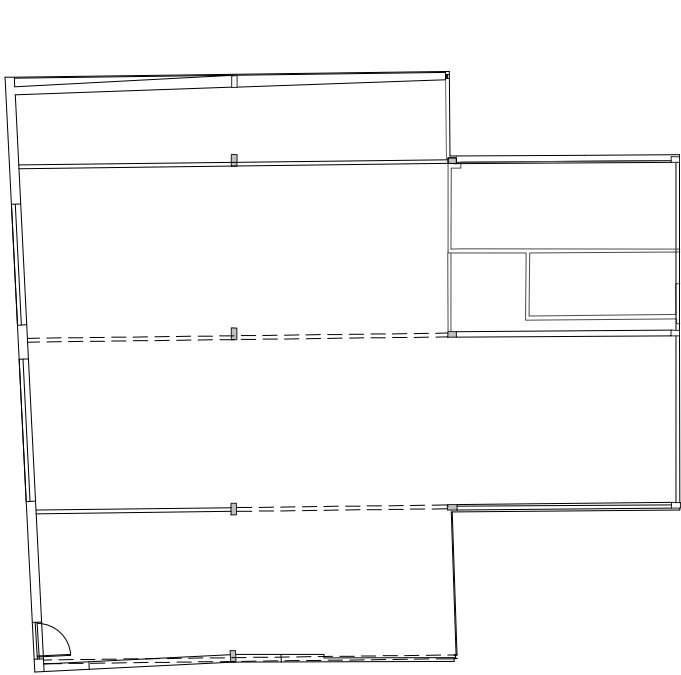
Existing GA : 222sqm

Material Specification

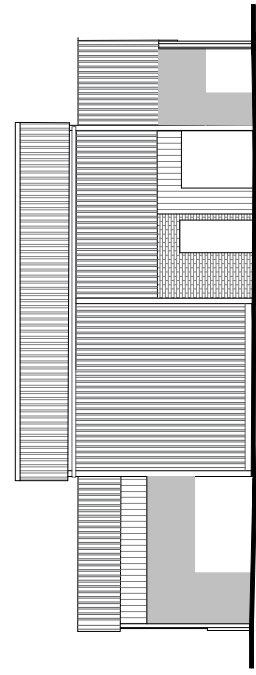
- Facade** Vertical grey weatherboarding, red brick, concrete breeze blocks
- Roof** Fibre cement roofing sheets
- Doors** Natural finish solid timber door
- Cladding/AVP** Grey UPVC



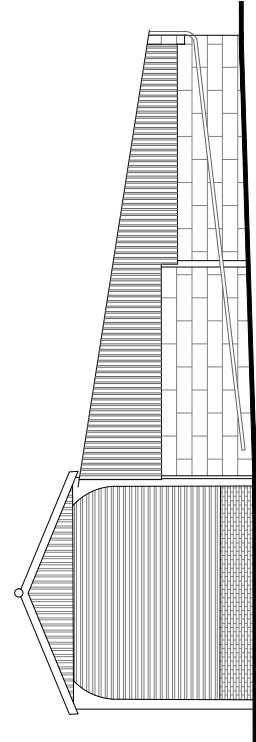
Existing Roof Plan
1:100 @ A2



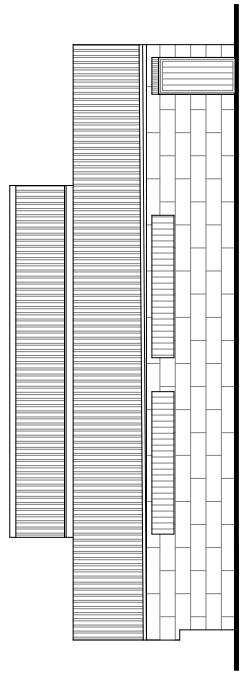
Existing Ground Floor Plan
1:100 @ A2



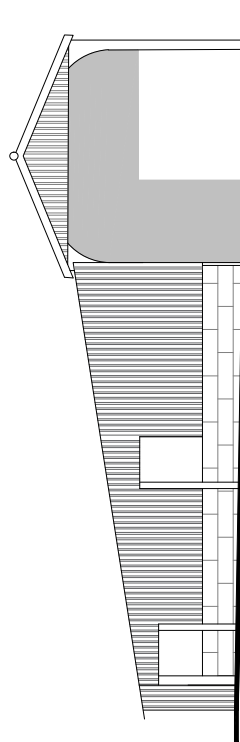
Existing Front (East) Elevation
1:100 @ A2



Existing Side (North) Elevation
1:100 @ A2



Existing Rear (West) Elevation
1:100 @ A2



Existing Side (South) Elevation
1:100 @ A2


Rev: Reason: Date:

Client: IEB ESTATES LTD

Project: TAYTON BARN, HAMSTREET ROAD, HAMSTREET, ASHFORD, TN26 1HY

Title: EXISTING PLANS AND ELEVATIONS

Drawing No: Rev: Scale: Date: DHA/35942/03 1:100 MAY 2025

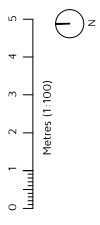


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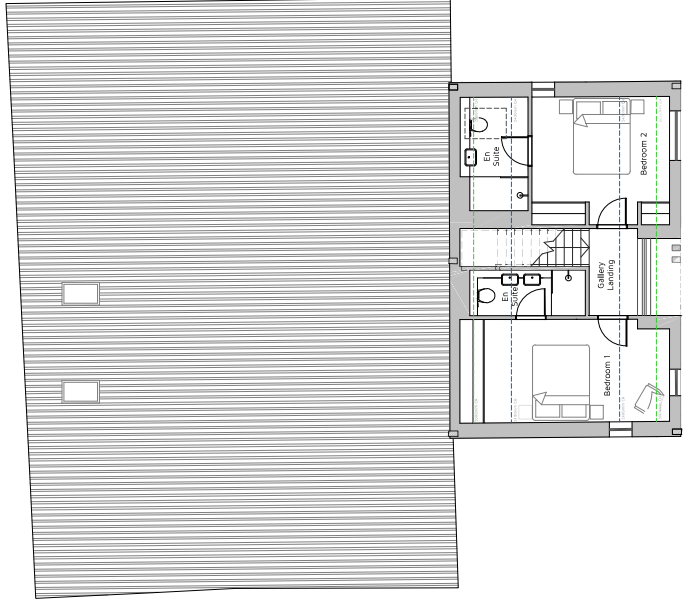
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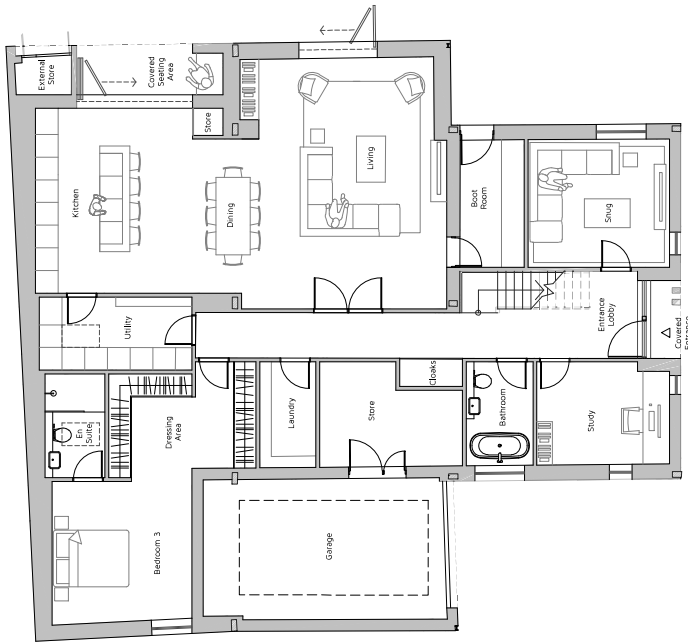
Proposed GIA : 245sqm

Material Specification

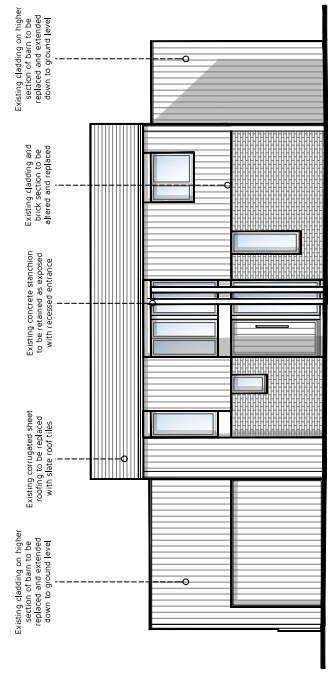
- Facade** Black vertical weatherboarding
red brick, concrete breeze blocks
- Roof** Slate roof tiles and black corrugated iron sheeting
- Windows** Black powder coated aluminium flush finish double glazing
- Doors** Black painted solid timber entrance and side doors. Black powder coated aluminium front and rear doors. Black bi-fold doors.
- Cladding/GWVP** Black uPVC



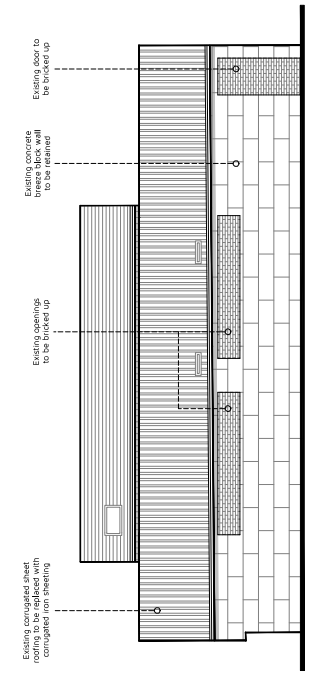
Proposed First Floor Plan
1:100 @ A2



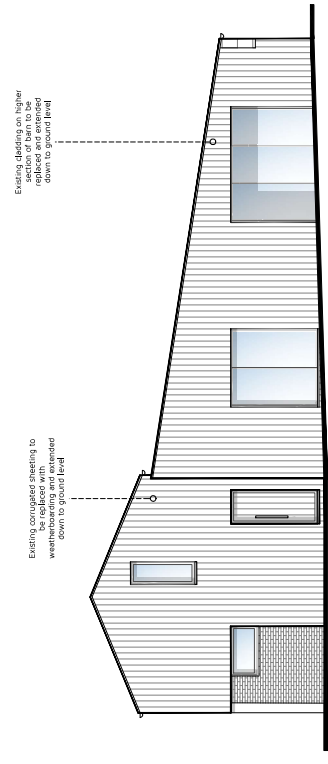
Proposed Ground Floor Plan
1:100 @ A2



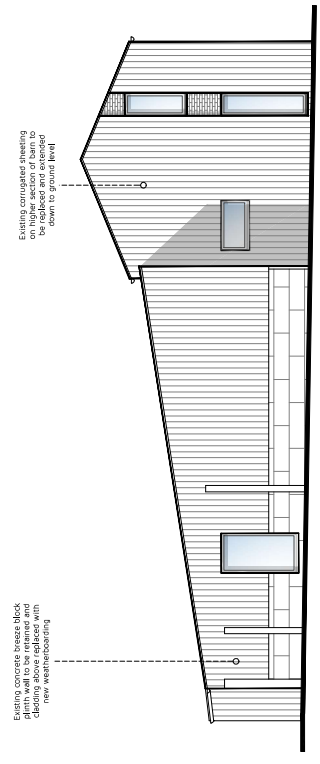
Proposed Front (East) Elevation
1:100 @ A2



Proposed Rear (West) Elevation
1:100 @ A2



Proposed Side (North) Elevation
1:100 @ A2



Proposed Side (South) Elevation
1:100 @ A2

Client: **IEB ESTATES LTD**

Project: **TATTON BARN, HAMSTREET ROAD, HAMSTREET, ASHFORD, TN26 1HY**

Title: **PROPOSED PLANS AND ELEVATIONS**

Drawing No: **DHA/35942/05** Rev: **1:100** Date: **MAY 2025**

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