

R A Engineering Solutions

Structural Engineers



BENLIN FARM.

Suitability of Conversion of a Barn to a Habitable Building.

Structural Statement.

May 2022

Introduction.

R. A Engineering Solutions Ltd was commissioned to prepare this Structural Statement by the Client. The report outlines the initial structural appraisal of the design of a single storey house at the site of an existing barn. The report demonstrates the various stages of how to upgrade the existing building structure in compliance with the current Building Regulations.

The report highlights the contamination on the site and ways of mitigating the effect of toxic gases on the proposed foundation and new fabric of the building.

The report includes lateral stability and robustness of the building, which is also critical given the exposure of the existing and proposed building.

Existing Building.

The existing single storey building is currently used as farm/agricultural storage. The existing building has a pitch roof section and a monopitch roof section. Other than demarcating the area into three sections, there are no internal walls as such.

The pitched roof has a corrugated sheet covering supported by timber rafters, purling, struts and a ridge member as shown on the enclosed existing floor plan. The external walls have horizontal timber side rails supported by timber studs at 400mm centres. The external timber walls are built off shallow brick plinths.

The floor in this section of the building is timber joists with floorboards spanning the joists.

The mono pitch roof area is in two sections, one has 100x50 primary roof beams and the other section has 75x225 and 63x175 primary

members. Timber telegraph pole columns support the roof structure in both areas.

The floor is crushed hardcore with no binder at all.

The building as a whole is framed in timber and is in a satisfactory state with no excessive deflections, signs of distresses and timber decays or deformation. Other than the low-level timber wallboards enclosing the pitched roof section, which has shown some degradation due to contact with vegetation, the entire wall covering is watertight.

Given the location of the building and wind exposure, the building has managed to resist all lateral forces thrown at it over the years.

Preliminary geotechnical assessment of the site is made with initial desk study information based on the investigation for other developed buildings in the vicinity of the proposed building.

Some existing ground contamination is present at the site, for this reason, soil tests will be carried out at a later stage prior to the full design stage. The Geotechnical Report will define the extent of the contamination and the profile and properties of the underlying soil. It will also make recommendations for the proposed floor construction.

Proposed Building.

The proposal includes:

1. Careful removal of the existing building coverings.
2. Construction of foundation pads for the existing telegraph poles. As the existing foundation under the brick plinth is unknown, it may be necessary to add more timber columns to the existing pitched roof area to help redistribute the loads.

3. Construction of a structural and thermal efficient ground floor structure with respect to the present contamination gases.
4. Construction of fire, sound and thermal compliant internal and external walls. The walls will be designed to offer lateral stability to the proposed building.
5. Construction of a new pitched and flat roof to provide adequate thermal, fire and structural protection and to comply with Building Regulations.

There will be a fair amount of propping of the existing structure in order to safely and successfully carry out the proposed works.

The structural viability of the proposed building with regards the existing structure is positive. Once the existing roof and wall coverings are removed, the timber frames will be further assessed for verticality and load carrying capacity.

New pad foundations will be installed to support the existing Telegraph Pole Columns in accordance with current Codes of Practice. The pitched roof area with a somewhat degraded brick plinth currently supporting the stud walls could be made redundant by building strip foundations in its place. A strip foundation is more suitable to support a suspended, vented floor. The new suspended floor will be fully specified in the Geotechnical Report. Most likely there will be new internal strip footings to support the new suspended floor.

The existing timber columns will be clad with insulated and vented studwall panels. The panels will be braced and plied for lateral stability and robustness. As the building stands now, there are no internal shear walls. The new layout offers internal walls that improve the ability of the proposed building to resist wind forces and other nominal lateral forces.

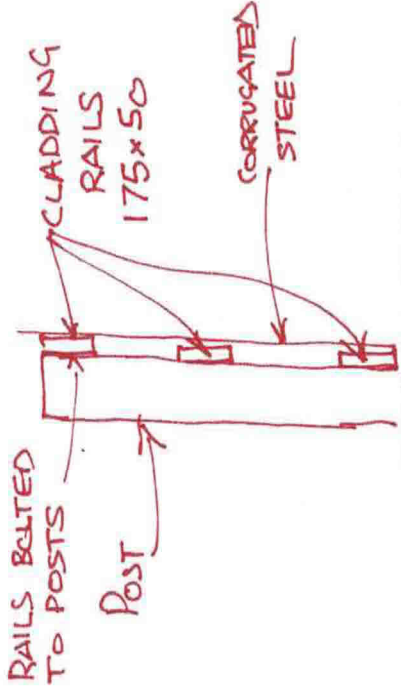
The existing roof members are as good as they can be structurally. The existing spans are not excessive. Some members will be doubled

up for serviceability and capacity reasons. Diagonal and cross bracings which are currently missing will be added to the roof in order to meet current Regulations.

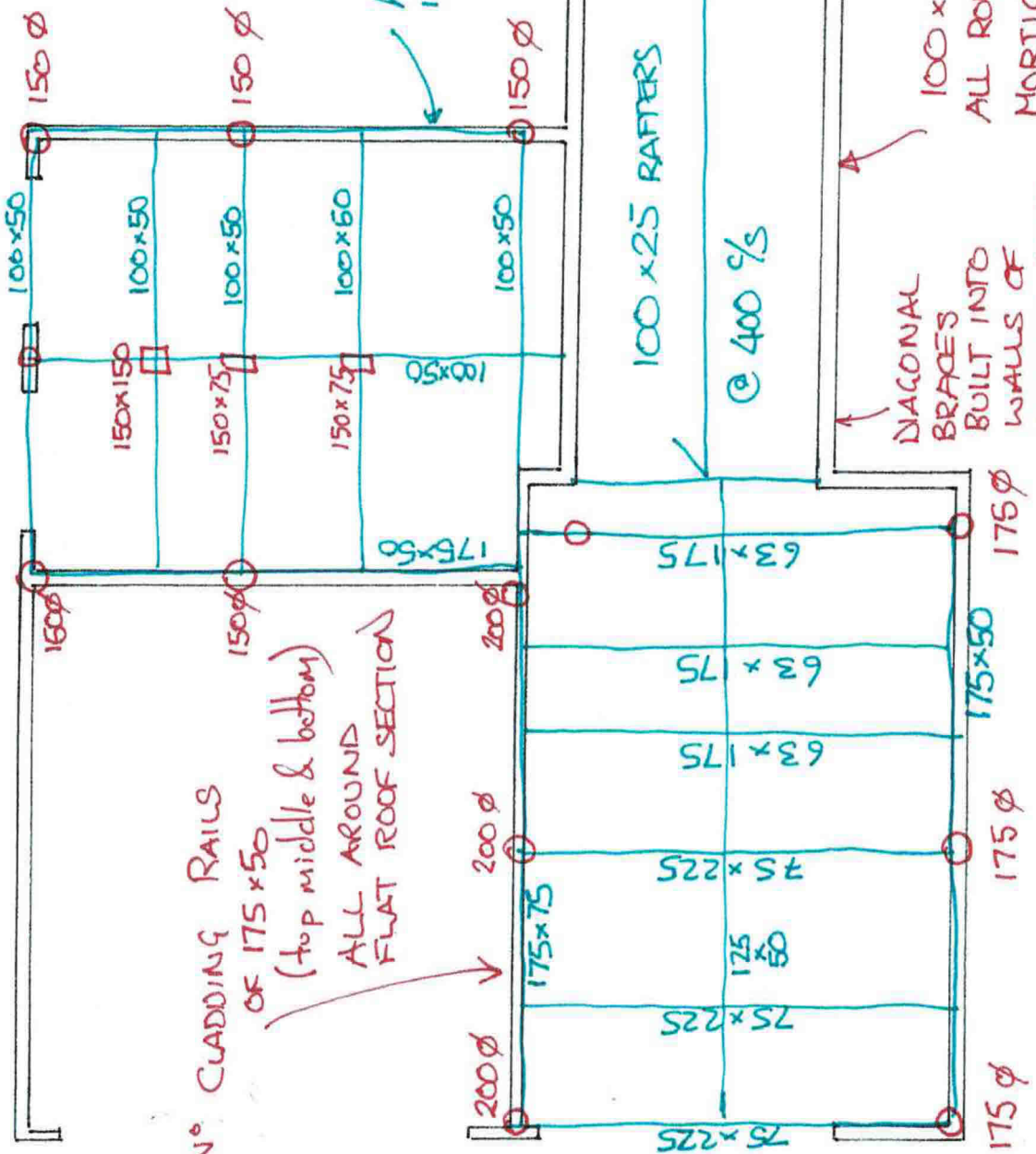
Conclusion.

All in all, due to the ground contamination, the most structural upgrading to the building will be to the foundations and new ground floor. The walls and roof will be replaced and upgraded for aesthetics, thermal, water tightness, sound and fire reasons.

In conclusion, the existing timber structure possesses enough integrity to be retained in order to convert the building to a habitable space.



BENJIN FARM BARN
EXISTING FLOOR PLAN
1:100 REV -
27 MARCH 2022



3 NO CLADDING RAILS
OF 175x50
(top middle & bottom)
ALL AROUND
FLAT ROOF SECTION

ASSUMED
175x50

100x25 RAFTERS
@ 400%

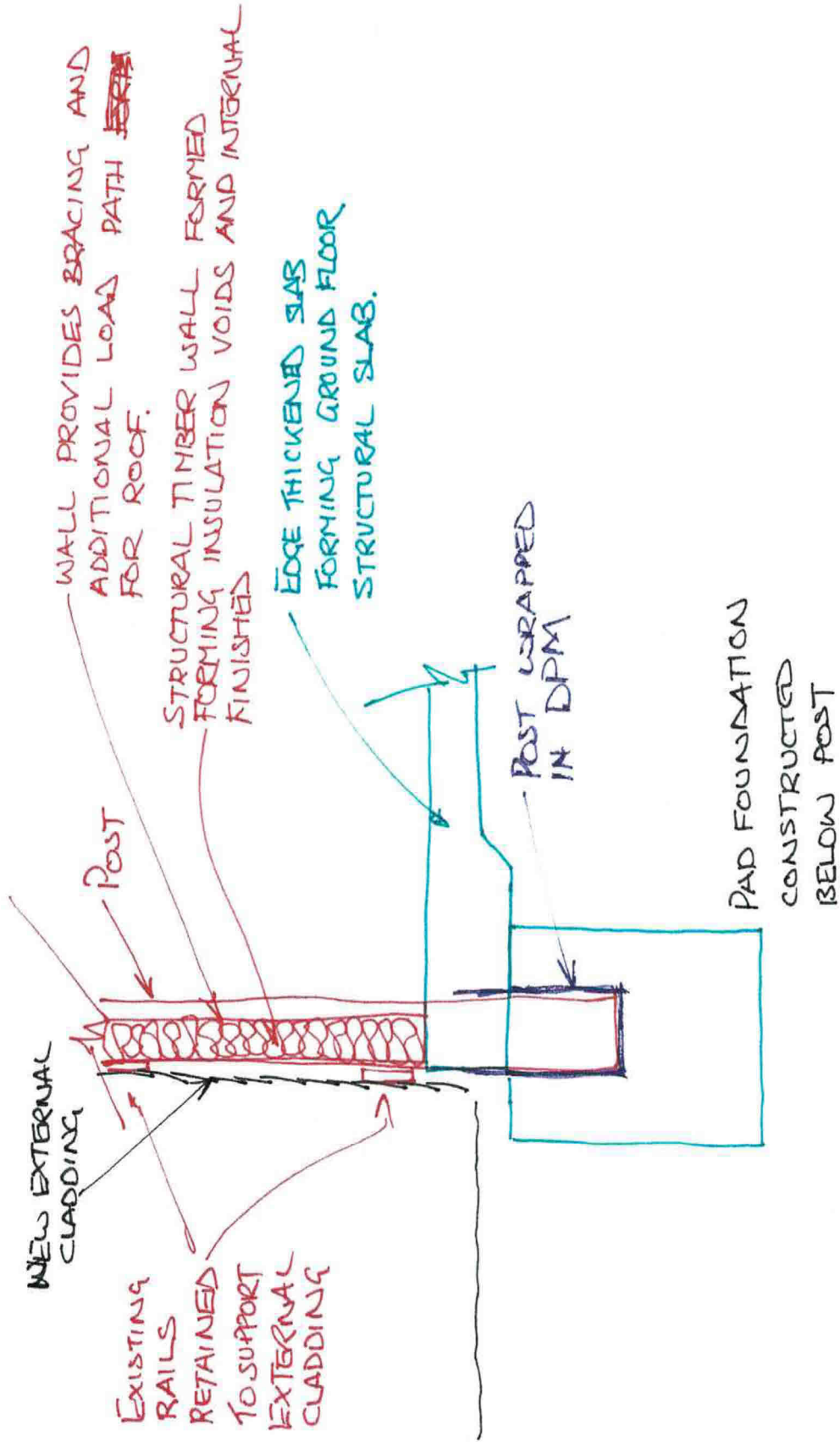
100x50 STUDS
ALL ROUND @ 400%
MORTICES + TENONED
TO SOLE AND HEAD
PLATE 100x75 MM.

DIAGONAL
BRACES
BUILT INTO
WALLS OF
PITCHED ROOF
SECTION OF
BARN.

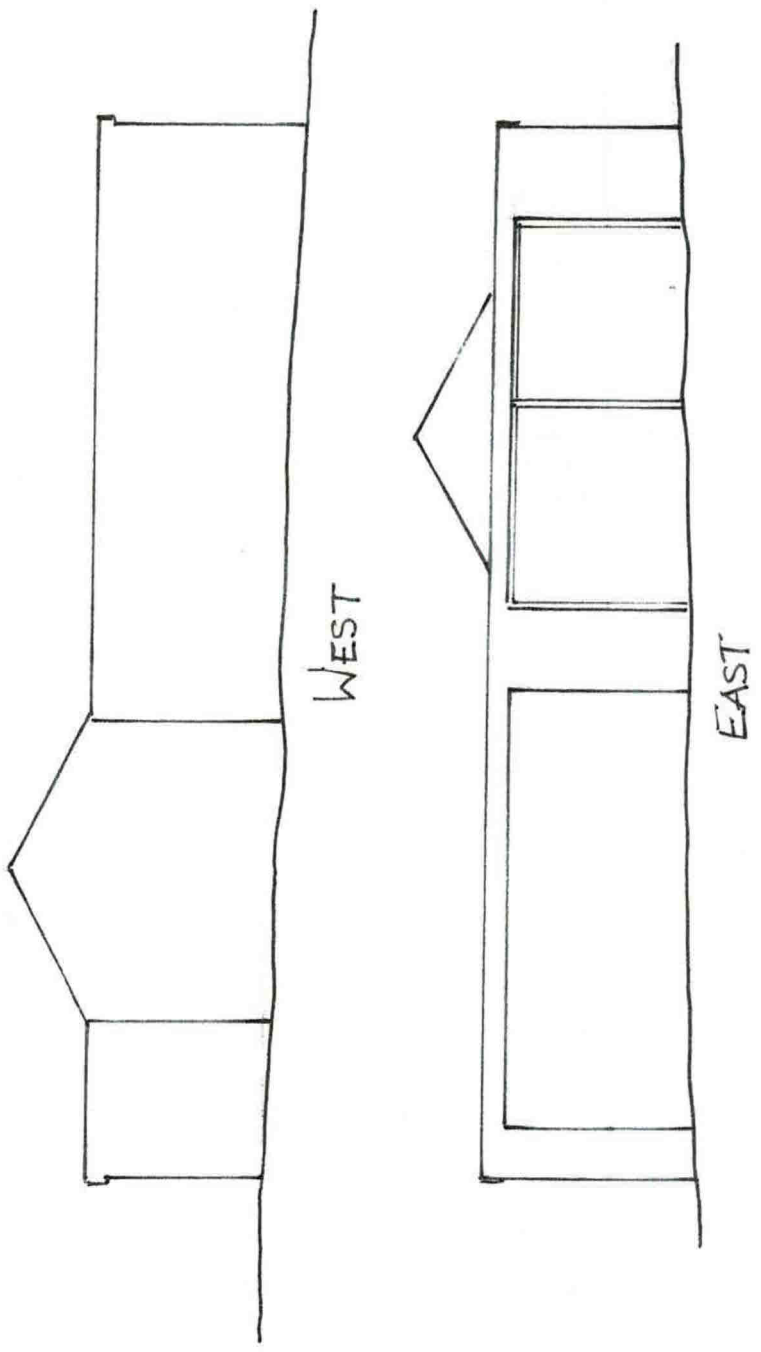
BRICK
PLINTH
BELOW SOLE
PLATE TWO
COURSES ONE
BRICK THICK.

CORNER
POST
2x100x50
AT 4 CORNERS
OF PITCHED
ROOF
SECTION.

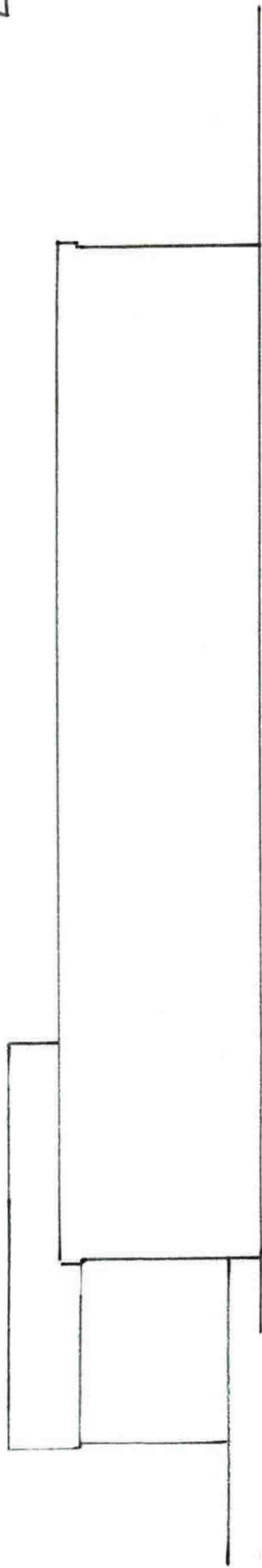
5m



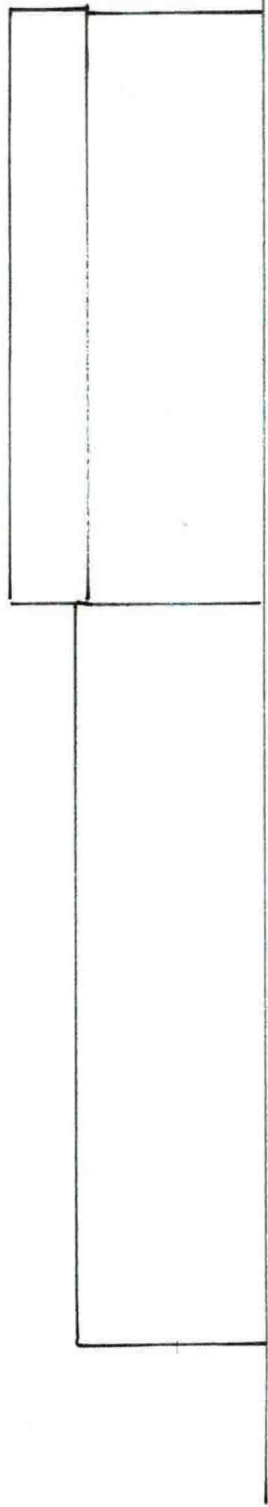
BENJIN FARM BARN
EXISTING ELEVATIONS:
1:100 Rev —
27 MARCH 2022



BENLIN FARM BARN
EXISTING ELEVATIONS
1:100 REV —
27 MARCH 2022

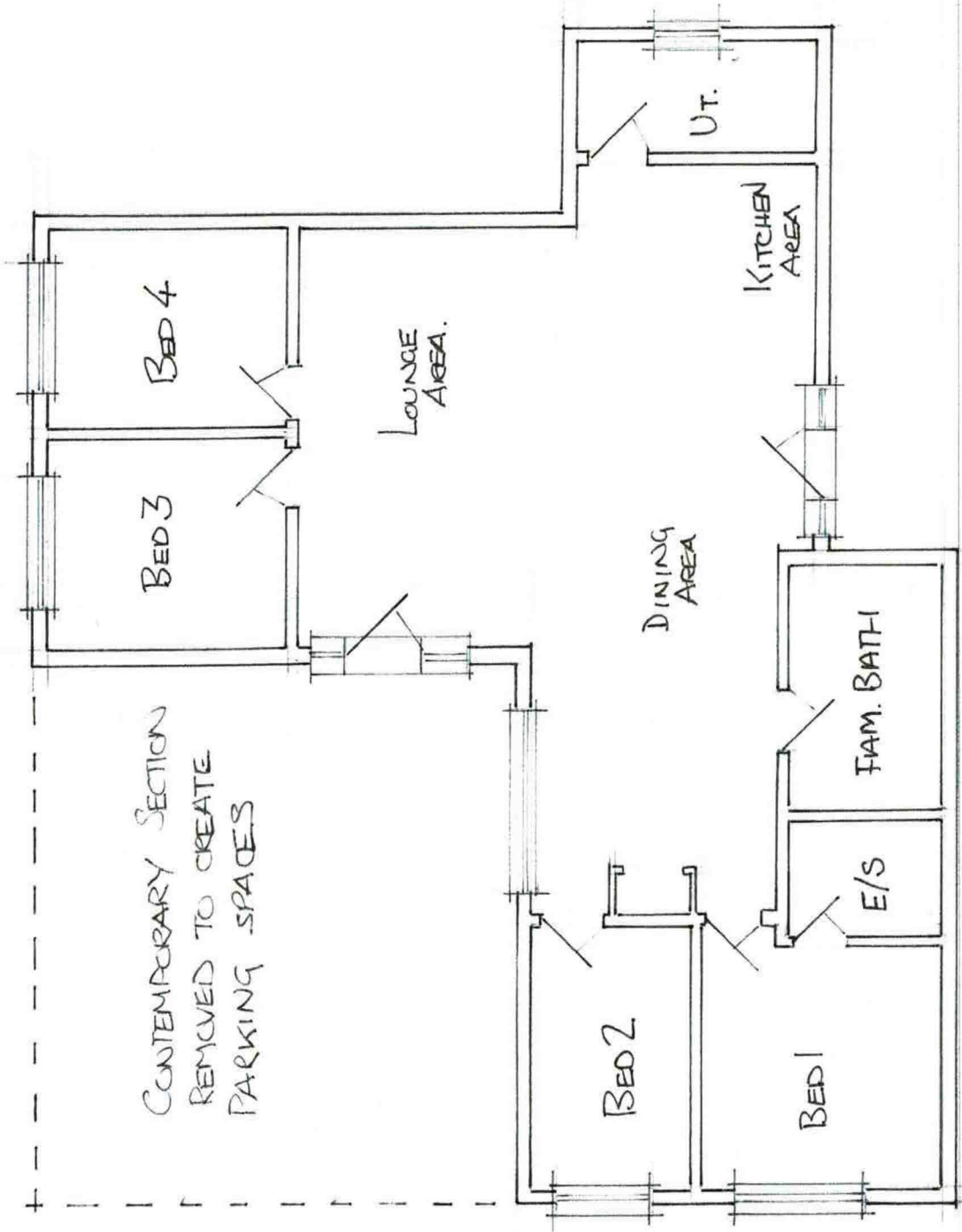


SOUTH



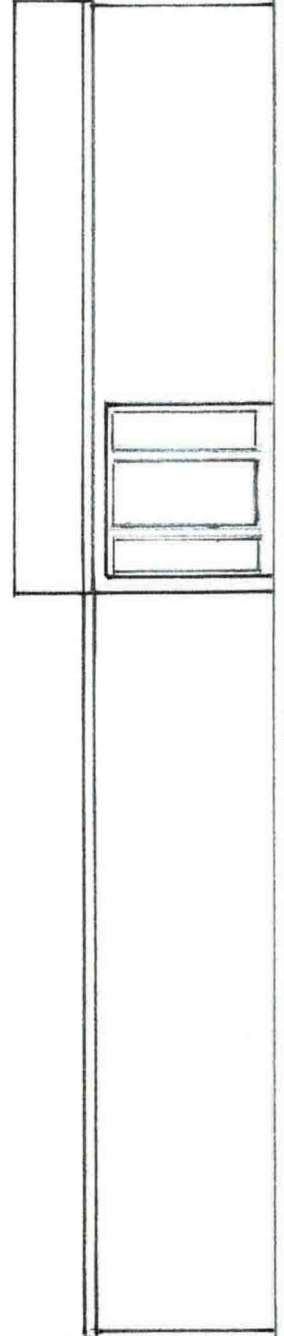
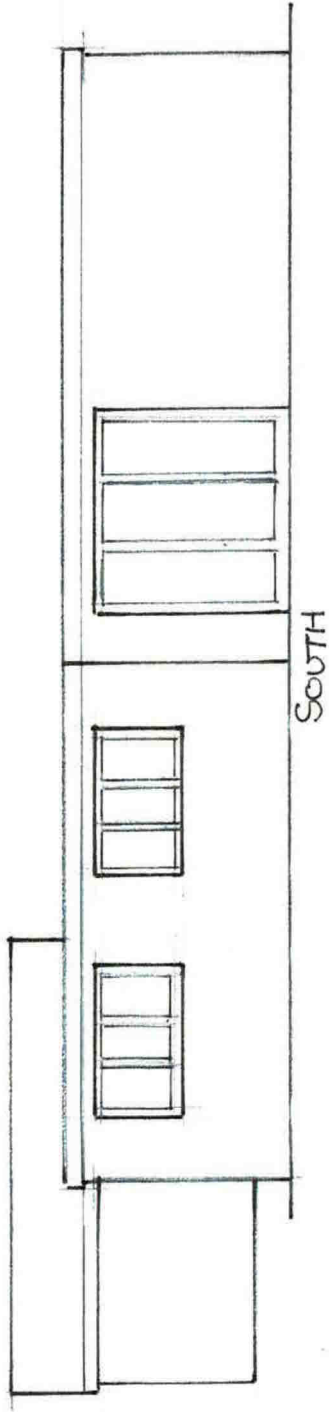
NORTH

BENLIN FARM BARN
PROPOSED FLOOR PLAN
1:100 REV --
27 MARCH 2022



5M

BENLIN FARM BARN
PROPOSED ELEVATIONS 1
1:100 REV —
27 MARCH 2022



BENLIN FARM BARN
PROPOSED ELEVATIONS
1:100 Rev —
27 MARCH 2022

