Morton & Hall Consulting Limited
Consulting Structural Engineers & Building Design

Ref: H9844/MW/mh

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March
Cambridgeshire
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GROUND INVESTIGATION REPORT &

PRELIMINARY STRUCTURAL ASSESSMENT

FOR

PROPOSED EXTENSION AND ALTERATIONS AT

MANOR FARM

CHURCH ROAD

CATWORTH

CAMBS

PE28 0PA

V.A.T 876 0014 34
Reg: 5525923

1.0 INTRODUCTION

1.1 Client

The English Listed, 17 West Street, St Ives, Cambs, PE27 5PL

1.2 Date of Investigation

Thursday 1st August 2024

1.3 Brief

To visit site and excavate trialholes to expose the existing foundations and continue these with a hand augured boreholes to determine underlying soil strata.

An assessment of the existing building structural arrangement was undertaken and the report would include written details of any proposed structural strengthening, foundation recommendations and new structural requirements for the proposed extensions with respect to the existing structural arrangement.

We have not undertaken a measured survey of the plot nor desktop studies in order to establish any existing service locations and cannot comment further in this regard.

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1.4 Proposed Construction

It is proposed to construct an infill extension about the northern corner of the existing listed building. The proposals include new building elements incorporated into the existing property at ground and first floor level.

Alterations also include a reduction in floor level within the existing property and include a sunken terraced area to the adjoining garden adjacent the proposal.

Details are shown on drawings prepared by The English Listed.

1.5 **Appendices**

There are the following Appendices at the end of this report.

Appendix A	~	Drawing H9844/00	Site Layout
		Drawing H9844/01	Trialhole 1
		Drawing H9844/02	Trialhole 2
		Drawing H9844/03	Trialhole 3
Appendix B	~	Drawing H9844/P1	Preliminary Foundation Plan
		Drawing H9844/P2	Preliminary Ground Floor Plan Structure Over
		Drawing H9844/P3	Preliminary First Floor Plan Structure Over
Appendix C	~	Photographic Survey	

2.0 SITE INSPECTION AND INVESTIGATION

2.1 The Site

Location

The property was located on the outskirts of the Cambridgeshire village of Catworth, which is south of the A14 carriageway and approximately 12 miles west of the town of Huntingdon.

The property was located within a larger compound of agricultural buildings with surrounding agricultural farmland.

Survey Sheet

The British Geological Survey Sheet Wellingborough 186 indicated soils at the site to comprise Overby Till which is a stoney sandy silty clay with chalk lint, limestone, ironstone, sandstone and quartz clasts.

Topography

The site and surrounding areas increased in elevation from south to north with a slight slope.

Flood Map

On reviewing the Environment Agency Flood Risk Extract Map, this indicated the site to be in a Flood Zone 1 area which had a low probability of flooding from rivers and seas.

Drains/Rivers

There was a sizeable pond located immediately to the north east of the site beyond an established tree line set on the boundary.

The pond continued about the northern corner of the site, however the water levels were such that the pond bed was dry at the time of the inspection.

Vegetation

There was a row of established trees and hedges located along the north east boundary.

These comprised of Willow, Plum and various less established trees. These were generally in the order of 15m from the proposals and were up to 12m in height.

2.2 **Trialhole/Borehole Findings**

Trialhole/Borehole 1

Trialhole 1 was excavated adjacent to the rear wing of the main property. This revealed a brick corbelled foundation bearing onto medium grey clays at approximately 0.5m depth below ground level. Refer to drawing H9844/01. A borehole was then continued to approximately 1.0m depth and revealed the following laying of strata. Grey course topsoil and fill material continued from ground level to 0.4m, overlying medium grey clays to 0.9m, continuing beyond 3m were very stiff grey chalky clay.

Trialhole/Borehole 2

Trialhole 1 was excavated adjacent the existing brick built shed. This revealed a similar brick corbelled foundation bearing onto medium grey clays at approximately 0.5m depth below ground level. Refer to drawing H9844/02. The soils were consistent with those encountered within borehole 1.

Trialhole/Borehole 3

Trialhole 3 was excavated against the existing brick boundary wall, which was located on a slightly higher elevation. Refer to drawing H9844/03. The boundary wall foundation was at a similar depth of 0.5m depth below ground level however, it was bearing onto a looser brown silty topsoil and fill material.

2.3 **Existing Property**

An inspection was made about the existing property where the extension is to be located.

The main property was originally a timber framed cottage constructed in the 17th Century. Additional wings had been constructed onto the original property in a similar construction method, with timber frames with a rough cast render set about.

Typically through the property lower sections of timber frame had been reinforced with a brick infill construction from foundation level up to the first floor wall plate.

The property itself appeared to be moderately aligned considering its age. There was no evidence of severe structural distress. Generally structural timber elements such as the roof and floors had experienced historic deformation and floors were generally undulating throughout. There was not overall tilting in one direction.

A timber floor beam within the rear wing appeared to have lost bearing resulting in rotation of the first floor structure.

The front wing of the property had more recently been largely repaired and a smooth cast render had been set externally. Visual reports seen on site indicated that structural repairs had been undertaken to the timber frame. The remaining timbers to the rear wing where exposed where rendered finishes had eroded away. These timbers where exposed to the elements and were generally in a poor condition in need of repair.

The ground floor construction in the area of the proposals was stepped and uneven and appeared to be brick sets constructed directly off the sub soils. Some internal and external walls were acting as retaining structures in particular about the sunken internal cellar.

2.4 **Existing Brick Outbuilding**

There was an existing brick outbuilding located to the north west of the property. This was a single storey shed construction with a stretcher thickness external wall.

The shed was separated into two bays with a partly vaulted roof construction over. There was evidence of recent roof repairs with modern timber sawn cut graded timbers adjacent the end bay opening.

Externally the roof did not appear to be in a watertight condition, with slipped tiles in particular about the north west pitch.

External walls to the brick built shed were moderately aligned, however there were cracks up to 1.5mm thickness vertically through brickwork on the north east gable wall. Horizontal cracking was seen internally on the north east gable wall and the internal separating wall construction suggesting some degree of settlement.

Cracking within the shed walls appeared to be weathered and was not expected to be recent distress.

2.5 **External Boundary Wall**

There was an external brick boundary wall on the north west boundary adjacent the brick built shed. This was partially acting as a retaining wall where the garden ground level was approximately 0.3m higher than the adjacent field.

The ground level further reduced where a pond was located adjacent the northern corner. The wall had experienced severe rotation in particular to the northern corner. Some brickwork buttressing reinforcement had been constructed previously on the outside face of the boundary wall.

3.0 RECOMMENDATIONS

3.1 Foundations to the Proposed Extension

Due to the presence of the Willow tree adjacent the site, we recommend concrete trenchfill foundations are employed to extend foundations beyond depths where roots can be expected to disturb the equilibrium of the subsoil.

In accordance with the NHBC guidelines for building near trees on shrinkable clay soils, foundations should be extended to a depth of 1.5m at the side adjacent trees, stepping up to 1m elsewhere. A clay of low shrinkability is considered.

C25/30 concrete to BS:8500 should be adopted.

Foundations should be 600mm width, allowing for a safe bearing pressure of 100KN/m^2.

A foundation drawing should be produced by Morton & Hall Consulting Ltd indicating the required depths of the proposed foundations relative to the existing trees.

3.2 Ground Floor Construction for Proposed Extension

For new and replacement floors within the existing building, a ground bearing slab of 100mm thickness can be adopted bearing over a 1200 gauge polythene damproof membrane onto a rolled subbase of clean graded stone. This should continue to the tops of foundations, and excavations should be made through all surface topsoil down to underlying soil strata.

C28/30 concrete to BS:8500 should be employed and we recommend that this is reinforced with A142 mesh in the top, maintaining 40mm cover to reinforcement.

Partitions should preferably be extended to foundations rather than bear onto ground bearing slabs.

It is recommended that the lower cellar floor is replaced with a ground bearing slab incorporating a suitable damp proof membrane and further tanking where walls are acting as retaining structure. The existing brick flooring could be removed and relaid onto the new ground floor structure.

If the existing floor level was to be retained, it is likely that some additional underpinning would be required to the surrounding walls. Equally the floor level could be increased utilising the existing soil level as a base for the new construction.

3.3 **Underpinning and Mass Concrete Pad Foundations**

Where it is proposed to reduce internal ground floor levels and install new ground bearing slabs it is likely that existing brick corbelled foundations would be undermined by the excavations. It would therefore be necessary to locally underpin the existing brick footings with new mass concrete underpinning bases.

Underpinning bases should be installed in maximum 1m lengths ensuring existing brick footings are propped with sacrificial jacks. A minimum drying time of 72 hours should be left between pouring adjacent bases and it is essential that existing footings are thoroughly packed over new mass concrete bases.

Underpinning should be anticipated to the rear gable wall of the rear wing as well as large sections of the brick shed construction.

In addition to mass concrete underpinning bases, it would be expected that where concentrated loads are focused at foundation level via steel posts, or beams bearing on to existing brickwork, it would be necessary to install new mass concrete pad foundations at a depth of approximately 1m below ground level. These would be anticipated where lateral buttressing frames are installed and where any significant length of existing load bearing wall is removed.

3.4 **Removal of Load Bearing Wall Construction**

In particular about the existing pantry, there is a proposal to remove a length of the external brick infill wall as well as the more modern hallway and w.c. extension.

This wall is proposed to be removed at ground floor level only with upper timber framework, floors and roofs to be retained above. There would be a requirement to set a structural lintel below the existing first floor wall plate.

In order to avoid a severe downstand within the room it maybe possible to utilise the timber wall plate as the lintel with steel plate reinforcement bolted either side of the existing timber. Prior to considering this method, it would be necessary to fully expose the timber wall plate to ensure that this is a reasonable structurally sound condition and size requirement to enable the use of a strengthening method.

The existing wall was also acting as a buttressing wall to the main property and in removing this wall there would be a reduction in lateral support. We therefore recommend that the insulation of steel wind posts at the lintel supports constructed off new pad foundations.

3.5 **Construction of the First Floor Extension**

The new first floor extension accessed through the rear bedroom was expected to be of a timber frame construction in keeping with the original property.

The external walls and first floor construction would be supported by a number of timber flitch beams bolted to steel plates, gaining bearing onto the existing brickwork. There would be a requirement to strengthened new lintels where new timber beams are set to bear. This would be subject to a further inspection of the existing structural lintels and their supports.

3.6 **Refurbishment and Repairs to the Rear Wing**

The existing rear wing external walls had experienced severe blowing of rough render cast finishes and is expected that these would be fully removed prior to structural works commencing.

At this time, it would be a good opportunity to review the existing structural timber elements and determine if and where, any timbers required replacement or repair. Similarly the existing roof structure should be assessed and reviewed.

The sagging within the roof would indicate that rafters are over stressed and the installation of new timber purlins should be considered.

3.7 **New Superstructure Elements**

The new extension superstructure will require the design of steel beams and lintels to support structure over the openings and provide intermediate support to the new pitched roof.

It is expected that nominal steel posts would be installed between full height window openings with cladding set about.

3.8 **Sunken Garden Construction**

The sunken garden is proposed adjacent the new extension.

A reduction in ground level will be required and this would be in the proximity of the existing foul water drainage chamber. Depending on the proposed levels it may be necessary to replace the existing drains where the proposed finished levels fall below the existing invert level.

There maybe a requirement to divert or fully replace the full drainage run to the existing septic tank.

These would be subject to a drainage survey.

A suitable retaining structure should be designed to support the upper ground adjacent the sunken garden terrace. The retaining structure must be capable of supporting active earth pressures without overturning or sliding.

We recommended a Topographical Survey is undertaken to establish the maximum retaining height required and this would also incorporate a survey of the existing drainage run to determine whether these require a placing.

The sunken terrace is also located adjacent the existing boundary wall. Ground level will be reduced and could potentially undermine existing boundary wall foundations.

Some local underpinning may be required to the boundary wall and during the course of the works. It is also recommended that an additional buttressing pier is constructed internally off a new concrete pad foundation. This buttressing pier would be tied into the existing boundary wall with a steel tie rod providing additional stability against rotation where there are existing tilts in excess of 1:150.

3.9 **Vegetation Management**

As a general rule no trees or large shrubs should be planted within 5.0m of any building and elsewhere trees and shrubs should be kept pruned at heights no greater than their distance from any building.

3.10 **1996 Party Wall Act**

Under the terms of the 1996 Party Wall Act, 3m Notices should be served on adjacent owners if the new building is within 3m of an adjacent building or structure.

It is recommended that the ownership of the brick boundary wall is established prior to works commencing and if necessary, Party Wall Notices should be served on the owner.

3.11 **Site Inspections**

It is recommended that the Engineer is instructed to return to the site to inspect the foundations during their construction to ensure that these are in accordance with the recommendations given.

A detailed structural design for foundations and superstructure should be provided by Morton & Hall Consulting Ltd.

3.12 **Asbestos Materials Assessment Survey**

Prior to works commencing within the existing property, an Asbestos Materials Assessment Survey should be undertaken.

This will identify all asbestos containing material so that this can be safely treated and disposed of.

3.13 **Limitations**

These recommendations are based on the findings of our site investigation. We point out that other conditions may exist elsewhere on the site of which we have no knowledge and accept no responsibility. The site has not been tested for contamination. The final foundation design will be dictated by the proposed type of superstructure and performance specification of the building.

Signed ..

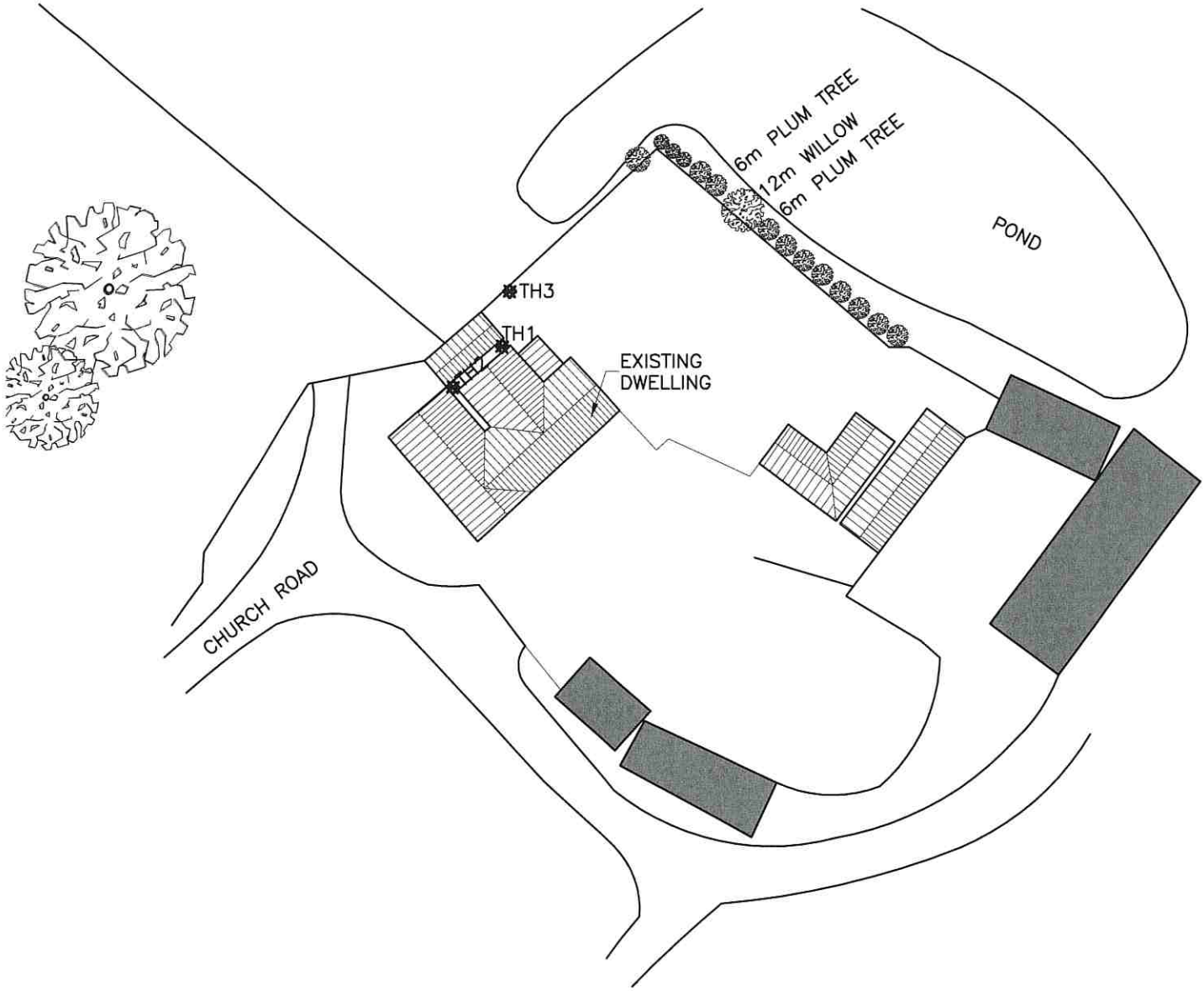
for and on behalf of

MORTON & HALL CONSULTING LIMITED

Richard A Morton, BSc, (Hons), C.Eng, MIStructE, MFPWS

Senior Director

APPENDIX A



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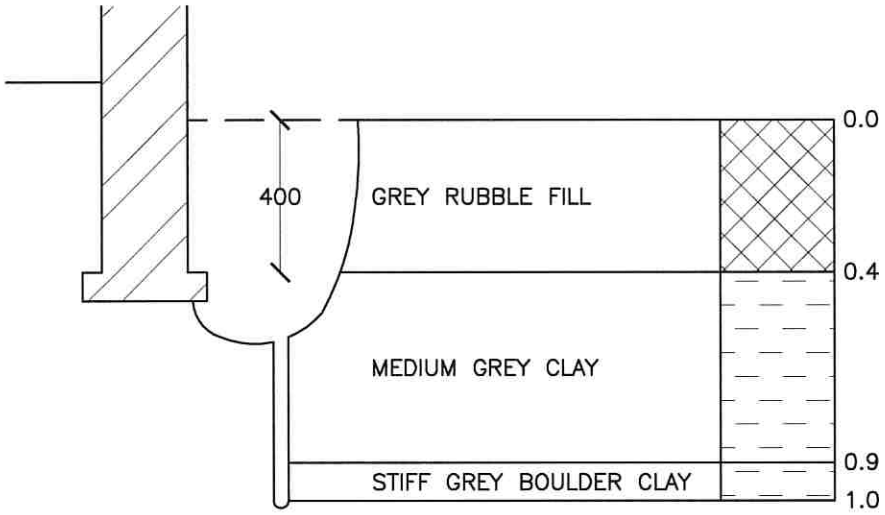
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project: Manor Farm
Church Road
Catworth

date: July.2024

title: Site Plan

drawing no: H9844/00



TRIALHOLE 01

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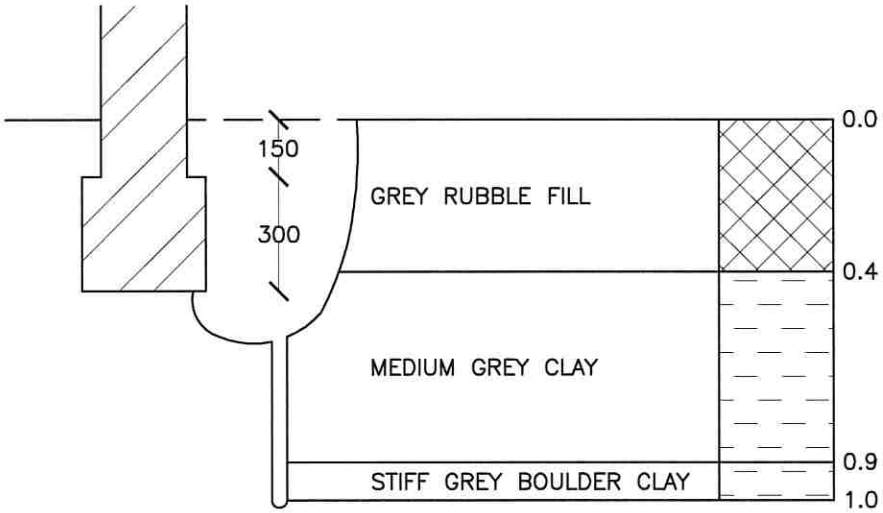
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project: Manor Farm, Church Road, Catworth

date: July.2024

title: Trialhole 1

drawing no: H9844/01



TRIALHOLE 02

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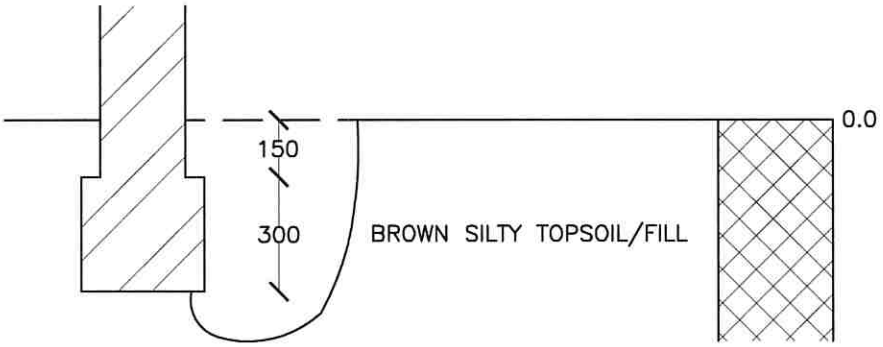
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project: Manor Farm, Church Road, Catworth

date: July.2024

title: Trialhole 2

drawing no: H9844/02



TRIALHOLE 03

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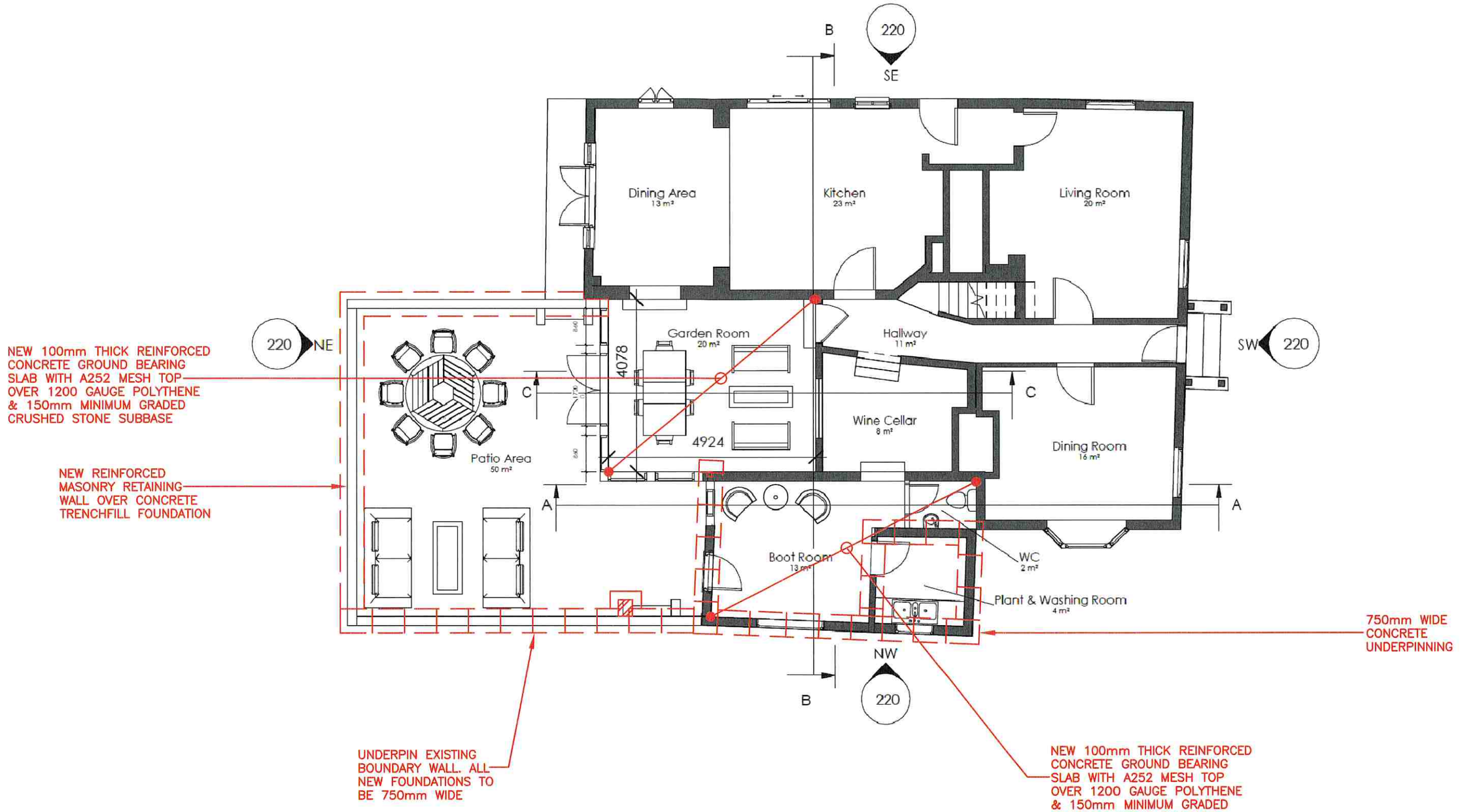
project: Manor Farm, Church Road, Catworth

date: July.2024

title: Trialhole 3

drawing no: H9844/03

APPENDIX B



PROPOSED FOUNDATION PLAN
(STRUCTURE OVER)

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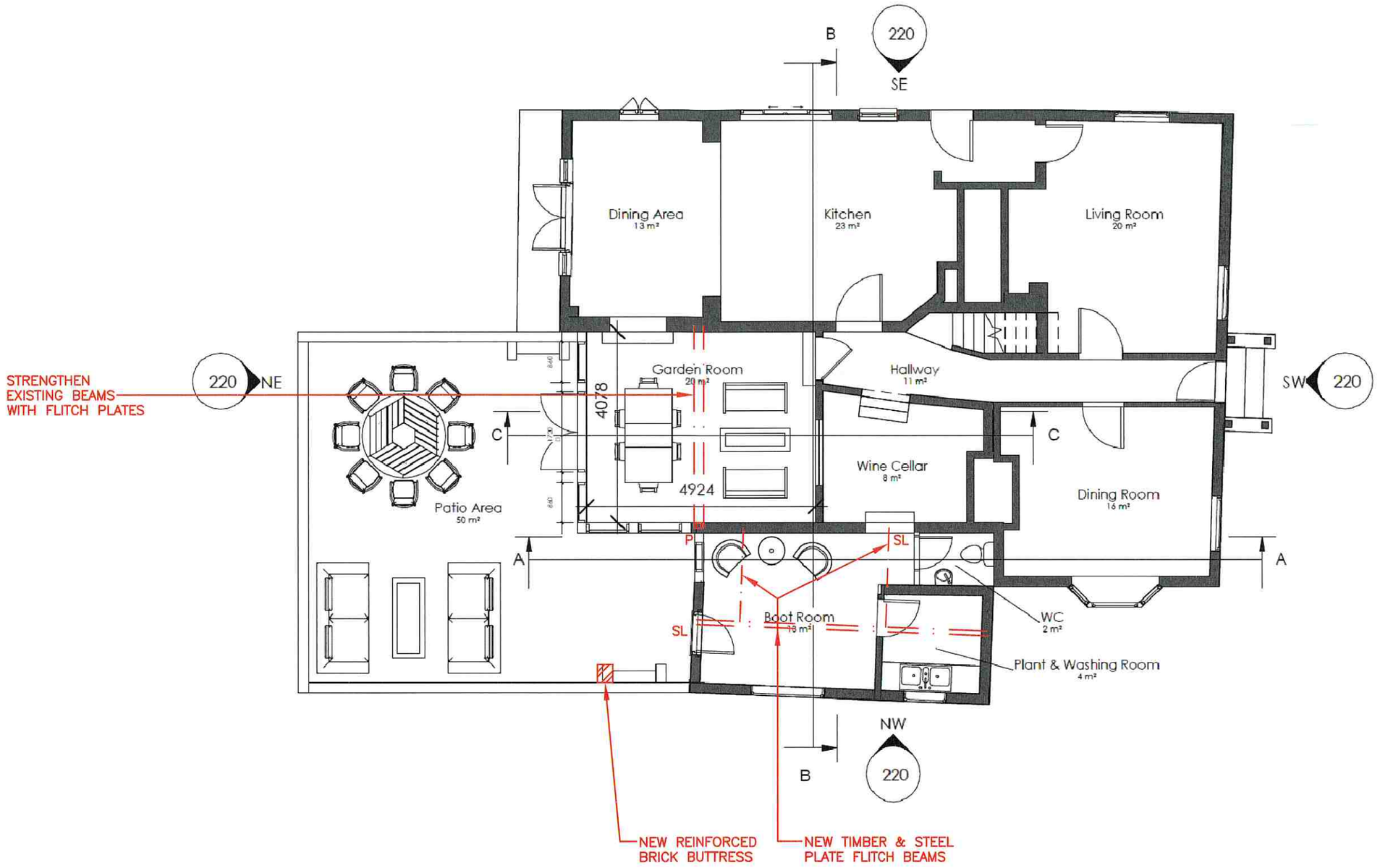
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client: Mr & Mrs Wilson

title: Foundation Strengthening

project: Manor Farm, Church Road, Catworth, Cambridgeshire

drawn	checked
H.Dean	
scale	date
NTS	August. 2024
drawing no	
H9844/01	



THIS DRAWING IS NOT TO SCALE

PROPOSED GROUND FLOOR PLAN (STRUCTURE OVER)

SL = EXAMINE & STRENGTHEN LINTELS
P = 100x100 STEEL SHS POST

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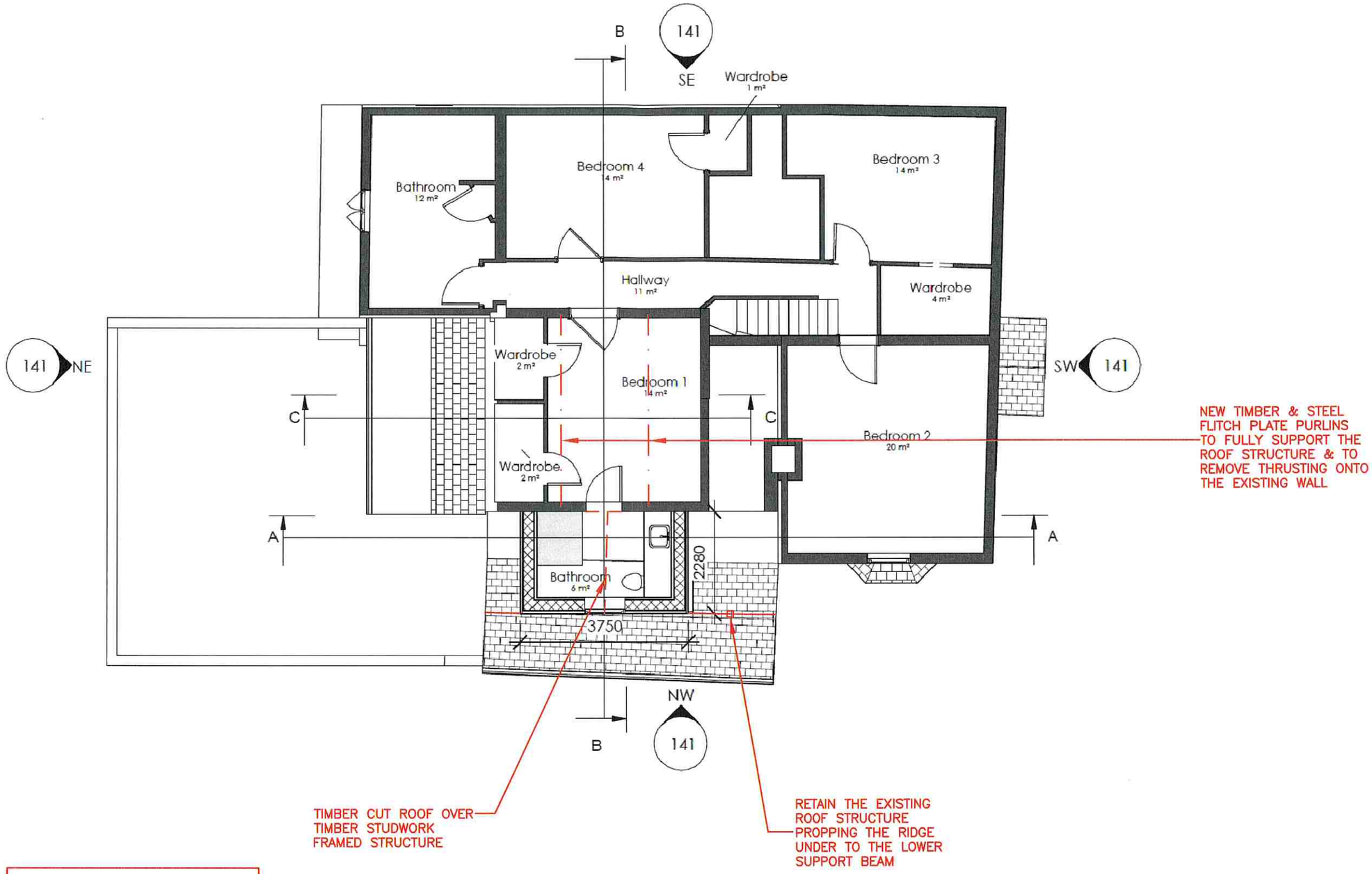
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client: Mr & Mrs Wilson

title: Proposed Ground Floor Plan (Structure Over)

project: Manor Farm
Church Road
Catworth
Cambridgeshire

drawn	checked
H.Dean	
scale: NTS	date: August. 2024
drawing no: H9844/02	



THIS DRAWING IS NOT TO SCALE

PROPOSED FIRST FLOOR PLAN (STRUCTURE OVER)

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client	Mr & Mrs Wilson
title	Proposed First Floor Plan (Structure Over)
project	Manor Farm, Church Road, Catworth, Cambridgeshire
drawn	H.Dean
checked	
scale	NTS
date	August. 2024
drawing no	H9844/03

APPENDIX C

H9844

PHOTOGRAPHIC SURVEY

1. View of the property from access driveway.
2. View of the property from the eastern gravelled parking area.
3. View of the property from the rear garden.
4. View of the property from the adjacent field.
5. View of the rear wing gable where the extension is to be located.
6. There were exposed structural timbers on the rear gable.
7. There were further exposed timbers on the south west two storey wing.
8. External wall coverings were blown and in poor repair.
9. Internal view of the existing pantry.
10. Internal view of the lower cellar floor construction.
11. There was an internal retaining wall and separating timber studwork wall above.
12. Internal view of the rear wing first floor bedroom.
13. There was some recent distress in the front wing bedroom.
14. External view of the rear wing roof.
15. There was vertical cracking in the existing brick built shed on the north east gable wall.
16. Cracking was seen internally within the brick built shed.
17. Replacement roof timbers had been installed in the shed.
18. View on trialhole/borehole 1.
19. Soils from trialhole/borehole 1.
20. View on trialhole/borehole 2.
21. Soils from trialhole/borehole 2.
22. View along brick boundary retaining wall.
23. View into existing foul water inspection chamber.
24. View on trialhole/borehole 3.
25. Soils from trialhole/borehole 3.



H9844-1



H9844-2



H9844-3



H9844-4



H9844-5



H9844-6



H9844-7



H9844-8



H9844-9



H9844-10



H9844-11



H9844-12



H9844-13



H9844-14



H9844-15



H9844-16



H9844-17



H9844-18



H9844-19



H9844-20



H9844-21



H9844-22



H9844-23



H9844-24



H9844-25