

**FLOOD RISK ASSESSMENT
FOR RESIDENTIAL DEVELOPMENT AT
THE WILLOWS, PURLS BRIDGE, MANEA**

FINAL REPORT

ECL1147/MORTON & HALL CONSULTING

DATE NOVEMBER 2023

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1.0 INTRODUCTION

This Flood Risk Assessment has been prepared in accordance with National Planning Policy Framework (NPPF) and supporting planning practice guidance (PPG) on Flood Risk and Coastal Change.

In areas at risk of flooding or for sites of 1 hectare or more, developers are required to undertake a site-specific Flood Risk Assessment to accompany an application for planning permission. This Flood Risk Assessment has been produced on behalf of Mr & Mrs Barrett in respect of a development that consists of the demolition of a significant part of the existing dwelling and the construction of an extension to the remaining element. Based upon the scale of the change to the dwelling at The Willows, Purls Bridge, Manea the development has been considered to be a replacement dwelling.

A planning application for the proposed development is to be submitted by Morton & Hall Consulting Ltd.

2.0 SITE LOCATION AND DESCRIPTION

2.1 Site Location

The site is situated at The Willows, Purls Bridge, Manea, Cambridgeshire, PE15 0ND. The National Grid Reference of the site is 54758/28835.

The location of the site is shown on Figure 1.

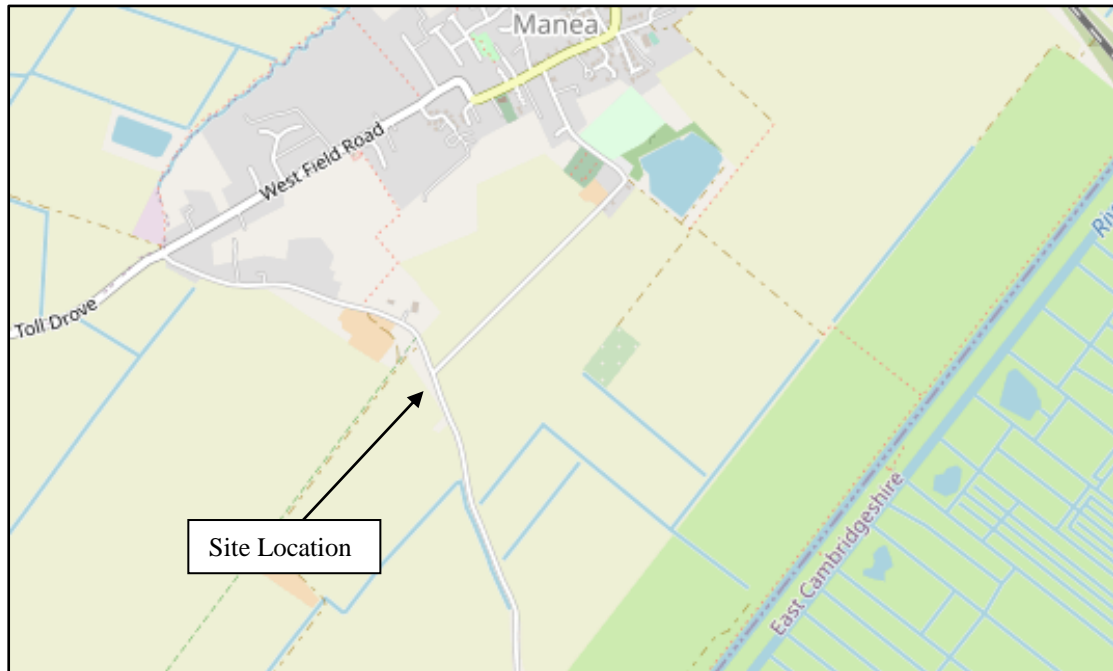


Figure 1 – Location Plan (© OpenStreetMap contributors)

2.2 Existing Site

The area for development is on the western side of Purls Bridge. The site consists of a two storey dwelling and the surrounding garden. The site is surrounded by agricultural land. The area of development is 0.32 hectares.

Environment Agency LIDAR information shows that the site is flat with a ground level of -0.8m in the around the existing dwelling. The agricultural land surrounding the dwelling is typically between -1.3m OD and -1.6m OD. The carriageway level of Purls Bridge alongside the site is -0.3m OD.

The site is in the Manea and Welney District Drainage Commissioners (DDC) area. Surface water at the site would naturally drain through soakaway and hence to the riparian drainage system and DDC network. There is a riparian drain on the field boundary to the west of the site and a Commissioner's main drain 200m south of the site.

The online British Geological Survey maps indicate that the site is likely to be underlain by the Amptill Clay Formation mudstone. The superficial deposits at the site are peat.

2.3 Proposed Development

The proposed development consists of the demolition of a significant part of the existing dwelling and the extension of the remaining element. A Site Plan is provided in Attachment 1.

2.4 Local Development Documents

The Fenland Local Development Plan is the adopted Local Plan for the district. Policy LP14 for Responding to Climate Change and Managing the Risk of Flooding in Fenland states the requirements for flood risk reduction.

The Fenland Level 1 Strategic Flood Risk Assessment (SFRA) was prepared in June 2022.

The Cambridgeshire Flood and Water Supplementary Planning Document has been prepared by Cambridgeshire County Council (as the Lead Local Flood Authority) in conjunction with the other Cambridgeshire local planning authorities and other relevant stakeholders to support the implementation of flood risk and water related policies.

2.5 Flood Zones

An extract from the Environment Agency Flood Map for Planning is shown in Figure 3. The site is located within Flood Zone 3, an area with a high probability of flooding.

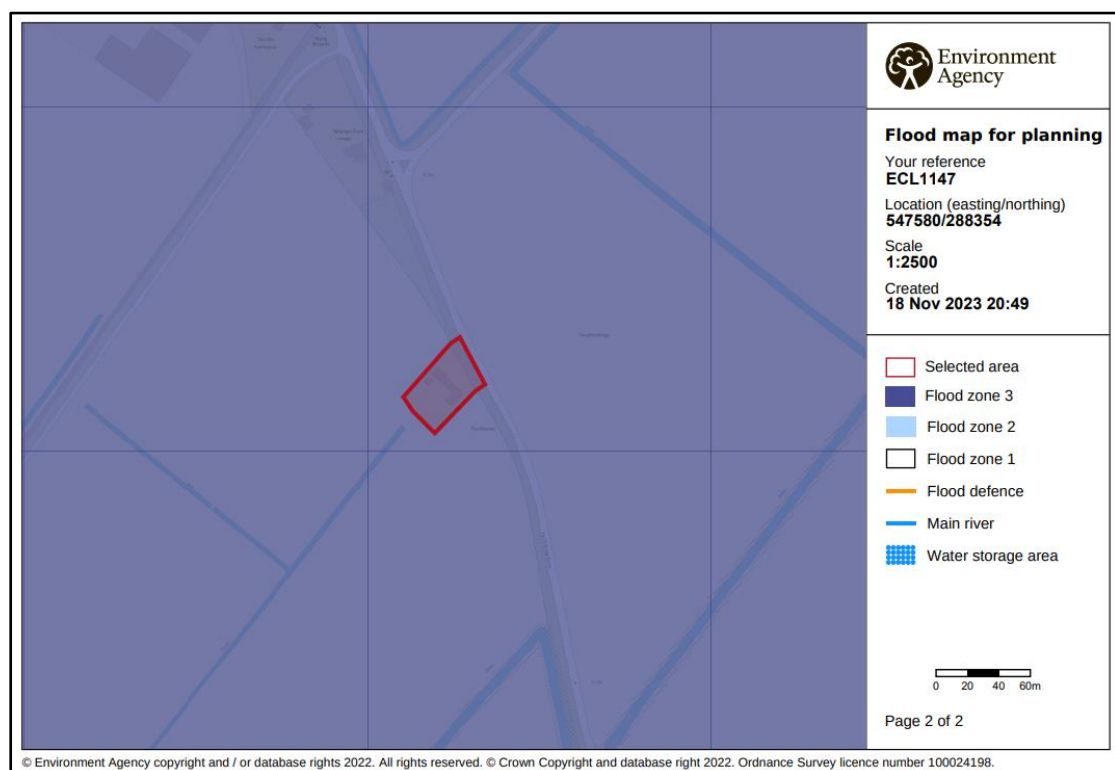


Figure 2 – Environment Agency Flood Map for Planning

The Environment Agency Long Term Flood Risk maps show that:

- the site is in an area with a medium risk of flooding from rivers or the sea (annual probability between 1% and 3.3%);
- the site has a very low risk of surface water flooding (annual probability less than 0.1%); and
- the site is within an area at risk of reservoir flooding when river levels are normal.

The Environment Agency's Hazard Mapping has been used to assess the risk during a breach scenario.

3.0 FLOOD RISK VULNERABILITY

3.1 The Sequential and Exception Test

The NPPF requires the application of a Sequential Test to ensure that new development is in areas with the lowest probability of flooding.

The Exception Test is a method to demonstrate and help ensure that flood risk to people and property will be managed, while allowing necessary development to go ahead in situations where suitable sites at lower risk of flooding are not available.

3.2 Vulnerability Classification

Table 2 of the PPG Flood Risk and Coastal Change categorises different types of uses and development according to their vulnerability to flood risk. The proposed development is covered by the description of buildings used for dwellings and is classified as 'More Vulnerable'.

Table 3 of the PPG Flood Risk and Coastal Change sets out Flood Risk Vulnerability and flood zone 'compatibility'. The site is in Flood Zone 3 and the development is 'More Vulnerable' therefore it is necessary to complete the Exception Test.

PPG Flood Risk and Coastal Change defines that the lifetime of the development in terms of flood risk and coastal change is 100 years.

3.3 Application of the Sequential Test and Exception Test

It is for the Local Planning Authority, using the evidence provided and taking advice from the Environment Agency as appropriate, to consider whether an application passes the Sequential Test.

The proposed development is considered to be same as a replacement dwelling and therefore it is not necessary to apply the Sequential Test to the development.

The Exception Test requires consideration of the wider sustainability benefits of a development and that the development would be safe and residual risks managed.

Section 5 of this Flood Risk Assessment describes the flood mitigation measures and the management of the residual risks, demonstrating that this development will be safe and not increase flood risk elsewhere. The development is considered to pass the Exception Test.

4.0 SITE SPECIFIC FLOOD RISK

4.1 Local Flood Assets

The site is 1.0km from the Ouse Washes. The Ouse Washes provides flood storage to manage flood risk from the River Great Ouse. The site, and the Middle Level drainage area, is protected by the Middle Level Barrier Bank. This defence is the responsibility of the Environment Agency. There is a long-term strategy for the maintenance of the Environment Agency defences which is reviewed and updated periodically.

Immediately west of the Middle Level Barrier Bank is the Counter Drain. There is a low bank between the Counter Drain and the land to the west. The Counter Drain normally discharges under gravity into the Great Ouse Tidal River. When this is not possible it is pumped into the Ouse Washes at Welches Dam Pumping Station.

The site is in the Manea and Welney District Drainage Commissioners area. The nearest DDC main drain is located 200m south of the site. The extensive local drainage network drains by gravity to Purls Bridge Pumping Station that discharges to the Counter Drain.

During the operation and maintenance of its pumping stations, associated structures, and channel systems, the DDC seeks to maintain a general standard capable of providing flood protection to its district. A routine maintenance programme is in place to ensure that the Board's assets are commensurate with the standard of protection that is sought.

Current maintenance standards of the Manea and Welney DDC, the Middle Level Commissioners and the Environment Agency's defences are generally good.

4.2 Sources of Flooding

A summary of the sources of flooding is provided in Table 1.

Source of Flooding	Level of Risk
Drainage Network Flooding	The risk is assessed in Section 4.3.
Surface Water Flooding	Based upon the EA maps the risk is very low.
Fluvial Flooding	The risk is assessed in Section 4.3 and Section 4.5.
Tidal Flooding	The site is not at risk of tidal flooding.
Reservoir Flooding	The residual risk associated of a breach of defences is considered in Section 4.6.
Groundwater Flooding	There is no evidence to suggest the site is at risk of groundwater flooding.

Table 1 – Sources of Flooding

4.3 Probability of Flooding

The probability of flooding associated with blockages in the Manea and Welney DDC drainage system is low due to the maintenance standards achieved and managed by the DDC. Failure of Purls Bridge Pumping Station could lead to an increased level of risk within the catchment.

Through the operation and maintenance of the pumping stations and the channel system the Board seek to maintain a general standard capable to providing flood protection to agricultural land and developed areas of 1 in 20 years and 1 in 100 years respectively. The risk associated with flood events that exceed the standard of protection provided is lowered due to the Manea and Welney DDC main drains incorporating freeboard. This freeboard provides storage during the exceedance events.

Welches Dam Pumping Station offers protection against the 1% annual probability (1 in 100 chance each year) fluvial event with an allowance for climate change.

The Middle Level Barrier Bank is located 1.5km from the development. The barrier bank is inspected and maintained in accordance with the standards of the Reservoirs Act. The defended model flood outline provided by the Environment Agency shows that the site is not at risk during the 0.1% annual probability (1 in 1000 chance each year) event.

4.4 Historic Flooding

During the preparation of this assessment, no evidence was discovered of the site being flooded. The major flood event of Easter 1998 gave rise to the highest ever recorded floodwater levels in the Middle Level System, but no property flooding occurred because of overtopping of embankments.

4.5 Climate Change

Climate change is likely to impact the site through increased rainfall intensity and duration affecting the local drainage network and flood levels in the Ouse Washes and Counter Drain.

The protection provided by the Middle Level Commissioners watercourses during a flood with a 1% annual probability (1 in 100 chance each year) includes an allowance for climate change. The Middle Level Barrier Bank has been designed to include an allowance for climate change.

The site is not at risk during the 1% annual probability (1 in 100 chance each year) including climate change. In summary the existing systems and defences are appropriate for the design life of the development (i.e., 100 years).

4.6 Residual Risks

The Environment Agency Hazard Mapping indicates the maximum flood depths in the event of overtopping or a combined breach. The maximum flood depth at the site during the 0.5% annual probability (1 in 200 chance each year) event with climate change and a combined breach is shown in Figure 3 below.

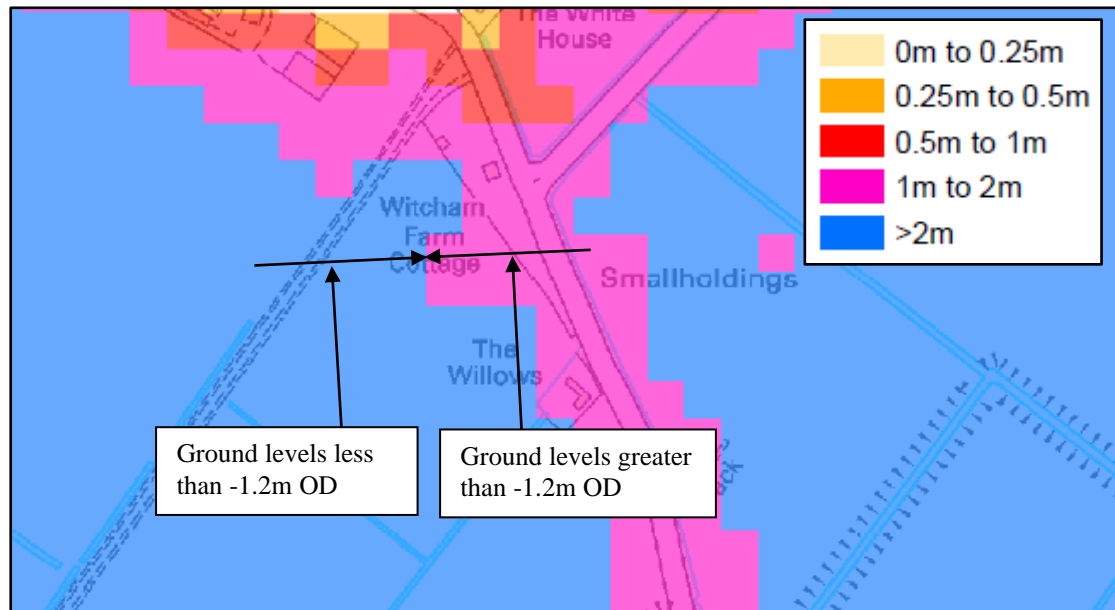


Figure 3 – Environment Agency Hazard Map

The flood level at the site has been estimated using Environment Agency LiDAR and the flood depths and extents shown on the breach hazard map. As shown in Figure 3, the agricultural land to the north west of the site transitions from being at risk with depths between 1m and 2m to being at risk with depths in excess of 2m. LiDAR shows that the ground level at the boundary between these two areas is -1.2m OD. Based upon a 2m depth of flooding the flood level can be estimated to be +0.8m OD.

The ground level around the dwelling is -0.8m OD therefore the flood depth is estimated to be 1.6m.

5.0 FLOOD RISK MITIGATION

5.1 Summary of Risks

The probability of this development flooding from localised drainage systems is low. Failure of Purls Bridge Pumping Station or Welches Dam Pumping Station could increase the level of risk at the site.

The probability of the site flooding from the Middle Level Commissioners river system is less than 1% because of the standards of the existing flood defence systems, storage within existing drainage channels and existing land levels of the site.

The probability of the site flooding from any Environment Agency system is less than 1% annual probability (1 in 100 chance each year) because of the standards of the existing flood defence systems. Over time there will be a gradual increase in risk to the site due to climate change. During the design life of the development the site is not at risk during the 1% annual probability (1 in 100 chance each year) event.

There is a residual risk to the site should there be a breach with a maximum flood depth of 1.6m.

The proposed arrangement increases the impermeable area. There will be an increased volume of surface water that has the potential to increase flood risk.

5.2 Mitigation Measures

Based upon the information available during the preparation of this flood risk assessment, it is recommended that:

- the floor level of the dwelling is 1.0m above ground level;
- there is 0.6m of flood resistant construction above floor level; and
- there is 0.9m of flood resilient construction above finished floor level.

The site has a low 'actual risk' of flooding. Considering the development is an agricultural building there are no specific mitigation measures proposed associated with the design.

The developer should ensure that the eventual occupier of the dwelling is sufficiently aware of the risk of flooding, and the standard of the existing defences. The Environment Agency operates a flood warning system for properties at risk of flooding to enable householders to protect life or take actions to manage the effect of flooding on property. Floodline Warnings Service is a national system run by the Environment Agency for broadcasting flooding warnings. The occupier of the dwelling should register to receive flood warnings.

Failure of Purls Bridge Pumping Station may occur due to long term mechanical breakdown or power supply being disrupted. However, in these circumstances, if

conditions were such to put properties and land at risk of flooding, the DDC and MLC would take emergency action to maintain the drainage level of service by using temporary pumping equipment.

It is recommended that surface water run-off is managed so that water from the site will not affect any adjoining properties or increase the flood risk elsewhere.

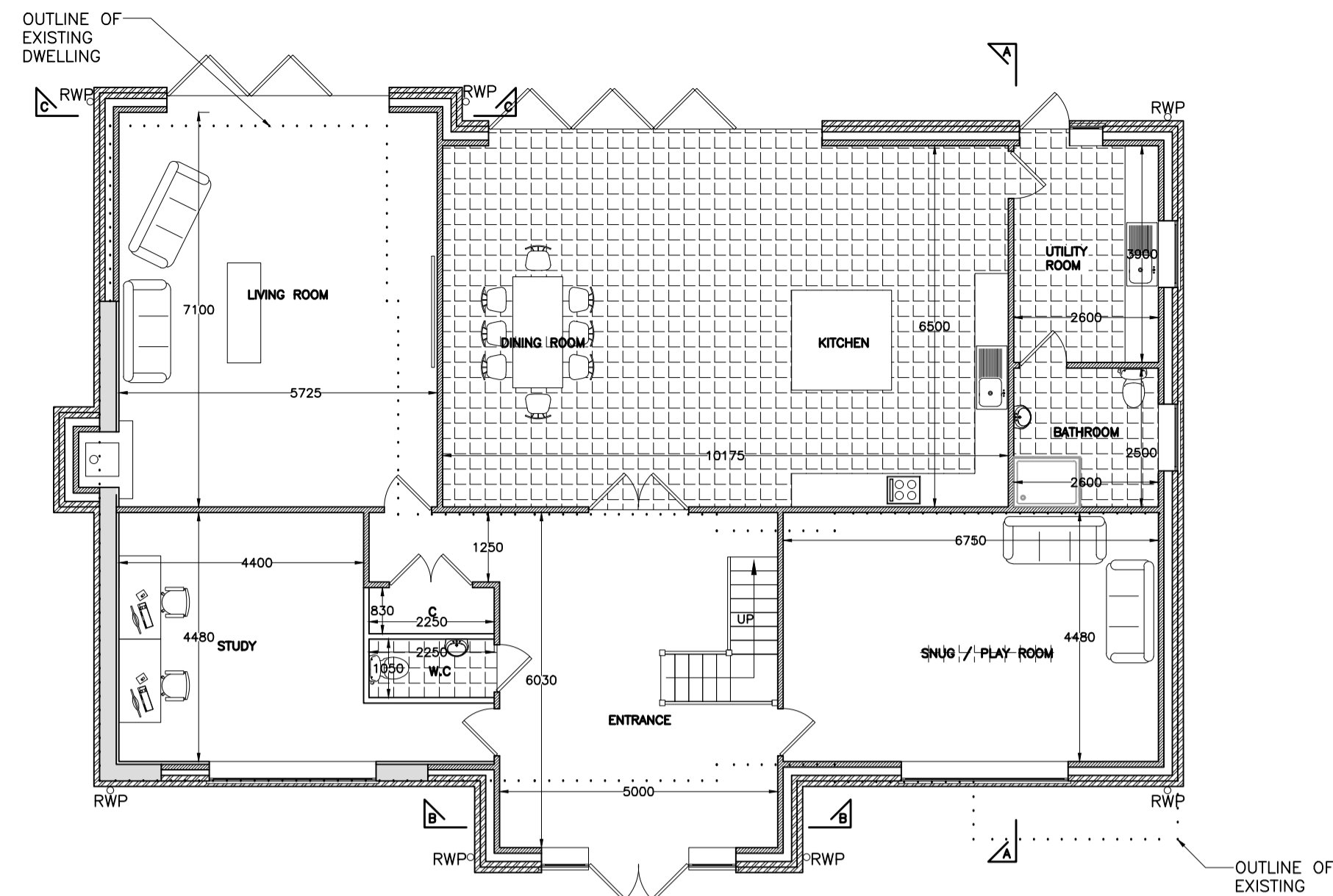
6.0 CONCLUSIONS

As a result of the assessment, the following conclusions have been reached.

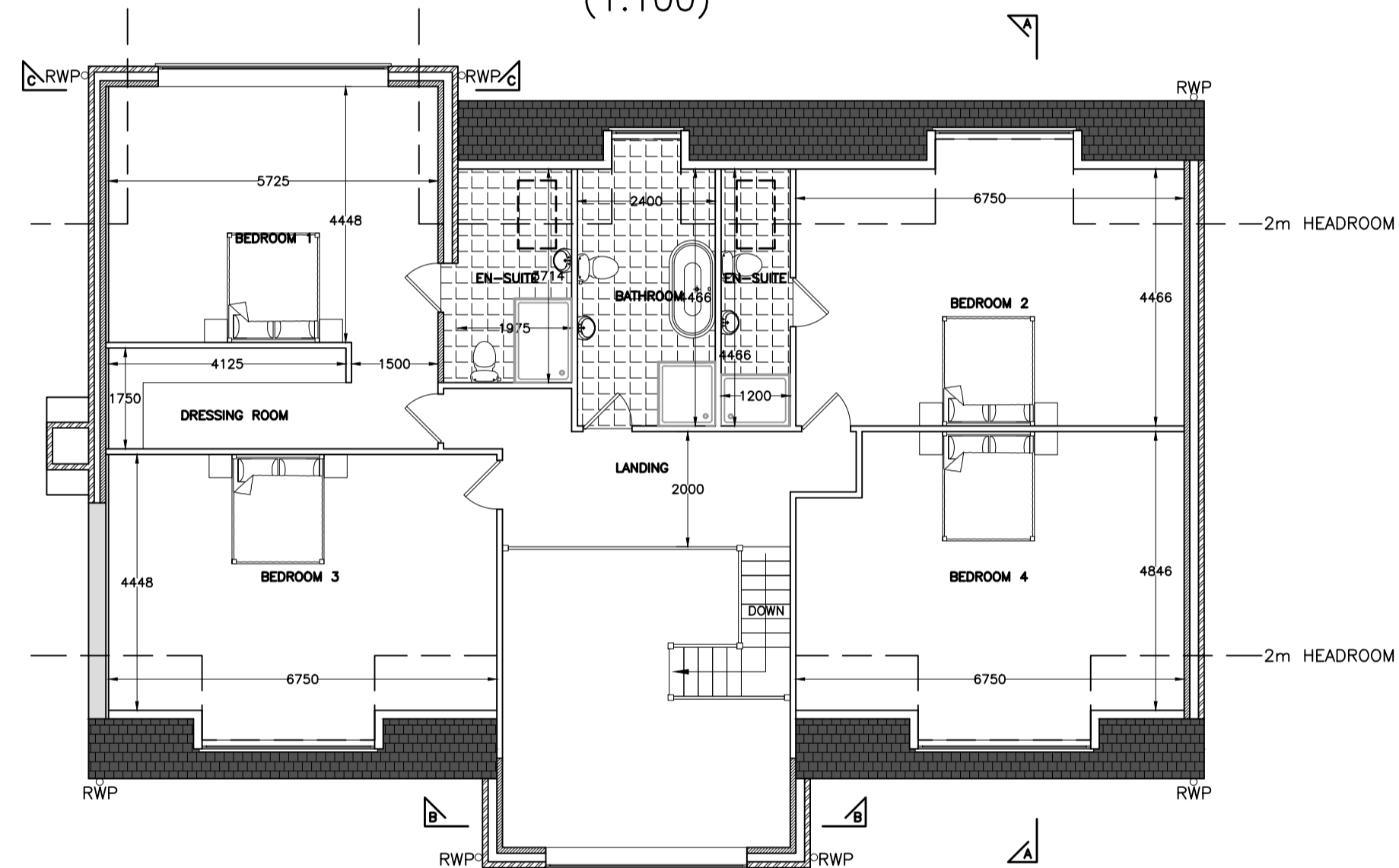
- The proposed development consists of the demolition of a significant part of the existing dwelling and the extension of the remaining element to form a 2 storey dwelling at The Willows, Purls Bridge, Manea.
- The site is located within an Internal Drainage Board catchment and through the operation and maintenance of the pumping stations and the channel system the Board seek to maintain a general standard capable to providing flood protection to agricultural land and developed areas of 1 in 20 and 1 in 100 years, respectively.
- The proposed development is in Flood Zone 3. The Ouse Washes have flood defences to protect against the 1% annual probability (1 in 100 chance each year) event including climate change. The site is at risk with depths up to 1.6m during a combined breach of the Middle Level Barrier Bank.
- It is recommended that the finished floor level of the dwelling is 1.0m above ground level with 0.6m of flood resistant and 0.9m of flood resilient construction above finished floor level.
- The development passes the Sequential Test and the Exception Test and is therefore suitable for the proposed location.

ATTACHMENT 1

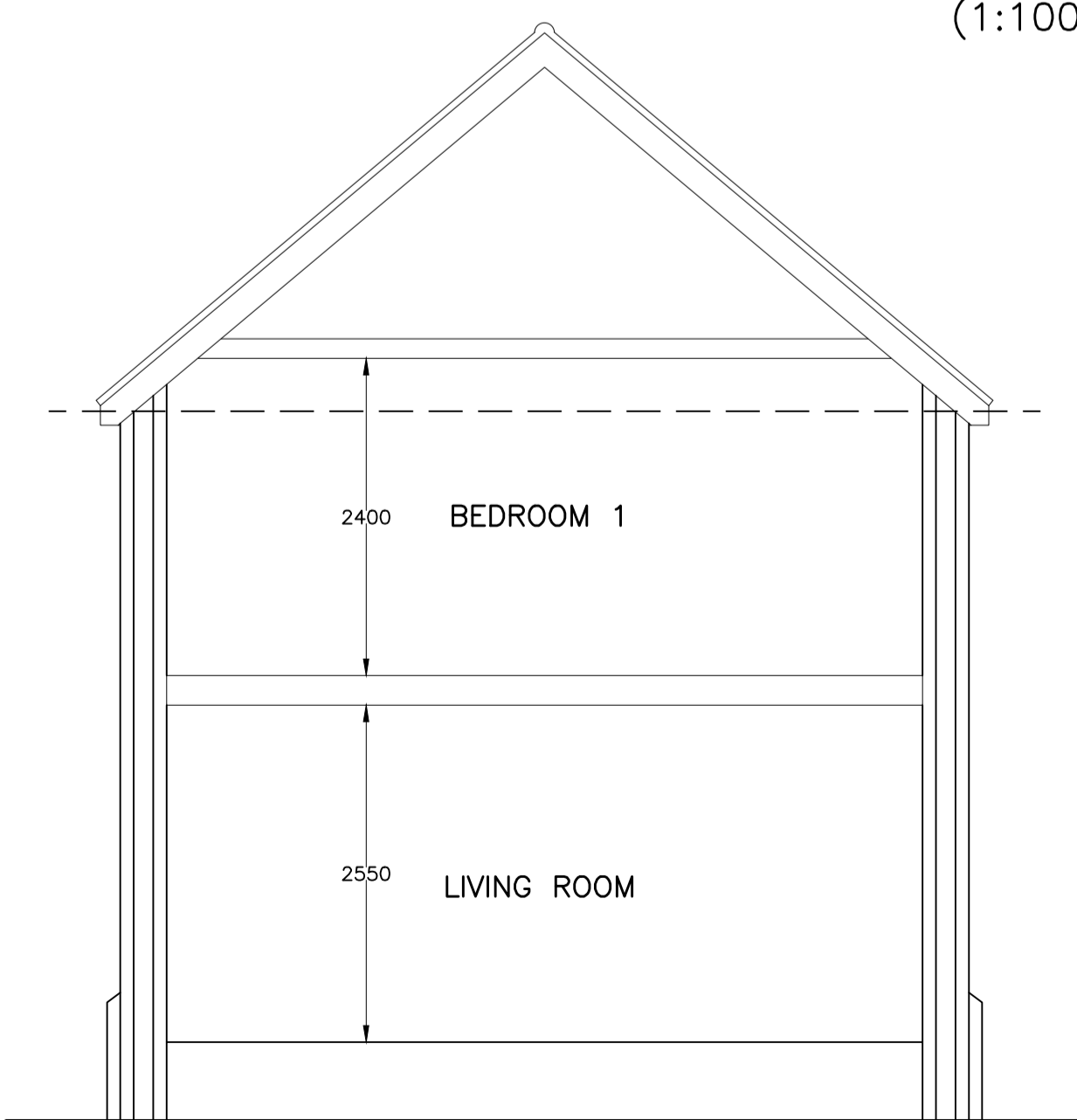
**PROPOSED PLANS & SECTIONS
(Dwg H9122/03B)**



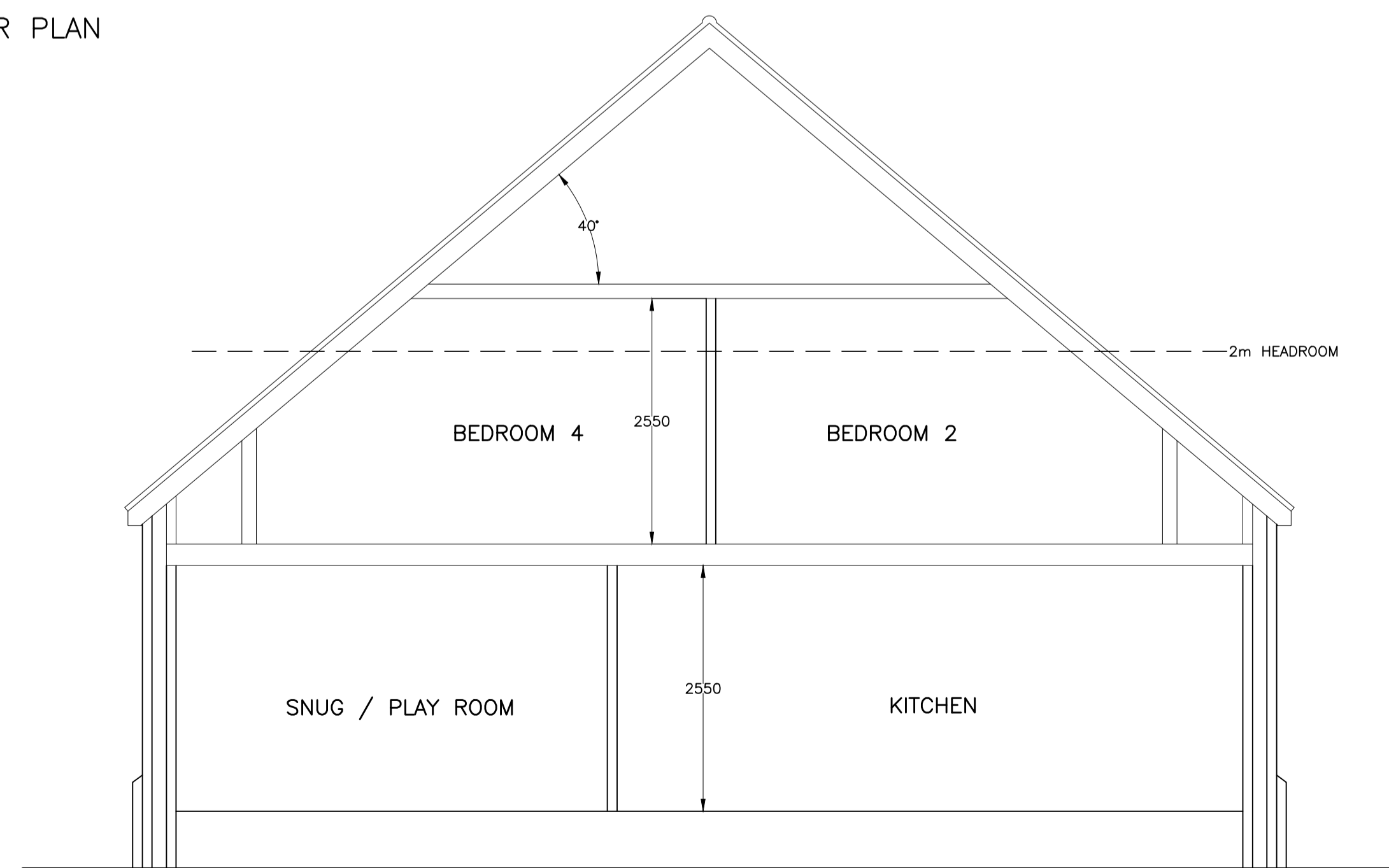
PROPOSED GROUND FLOOR PLAN (1:100)



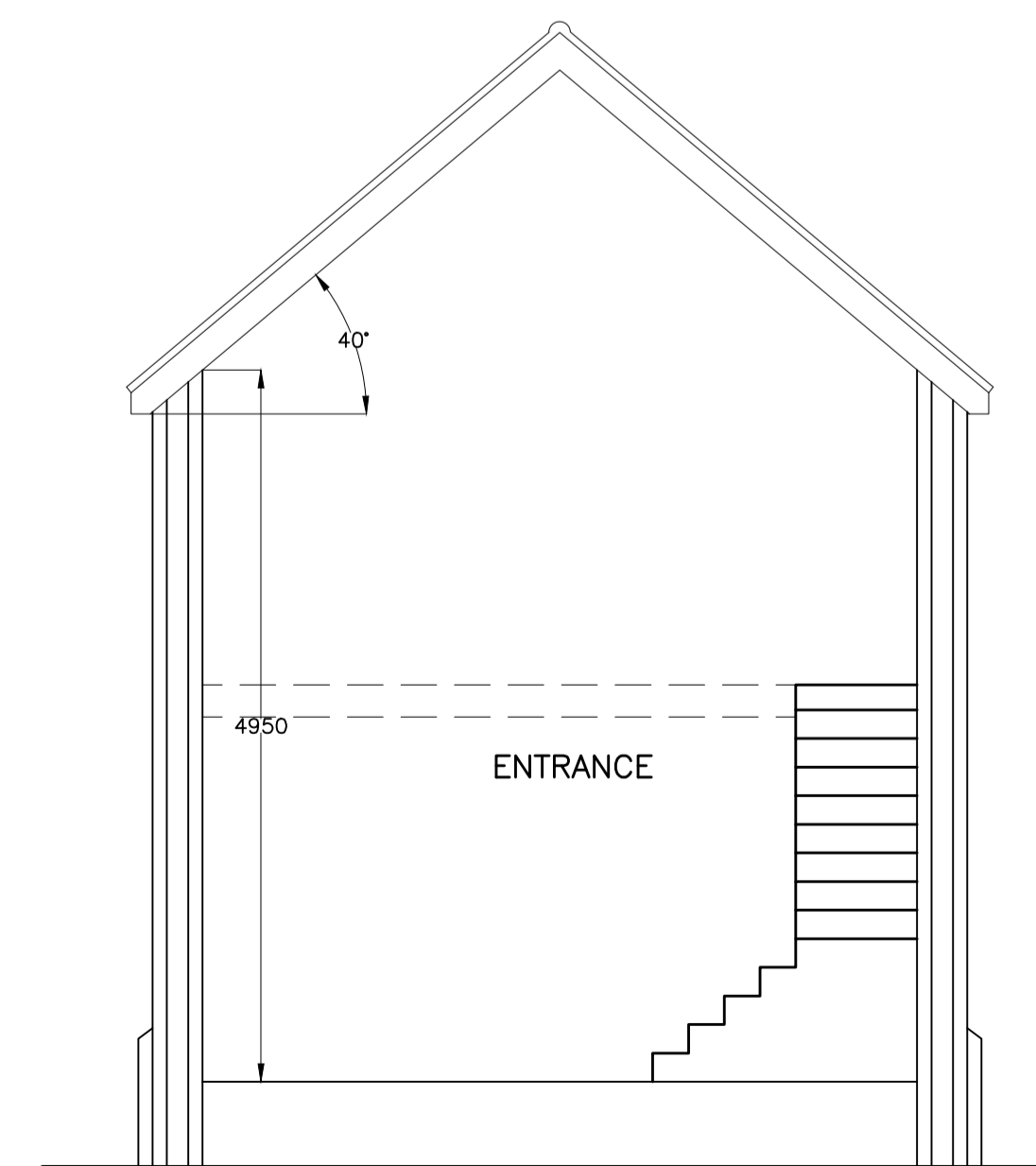
PROPOSED FIRST FLOOR PLAN (1:100)



PROPOSED SECTION C-C (1:50)



PROPOSED SECTION A-A (1:50)



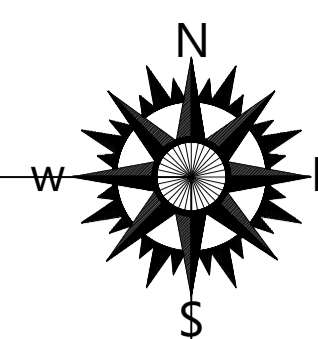
PROPOSED SECTION B-B (1:50)

LEGEND:

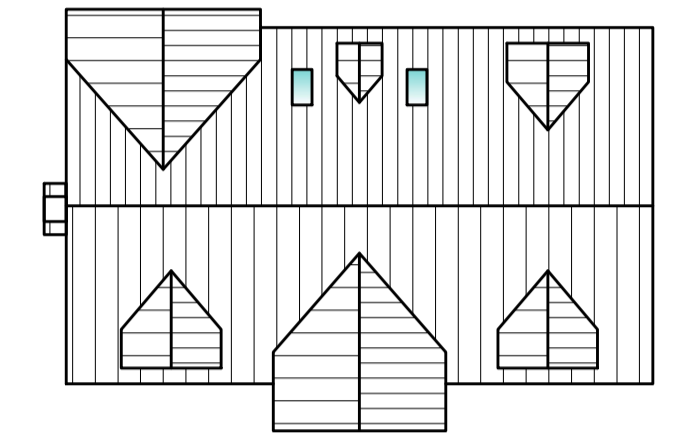
- EXISTING DWELLINGS
- PAVEMENT
- GRASS
- PERMEABLE BLOCK PAVING (NON SLIP)
- TARMAC
- GRAVEL
- SLAB PAVING
- WHEELIE BINS
- HEDGING
- VEGETATION



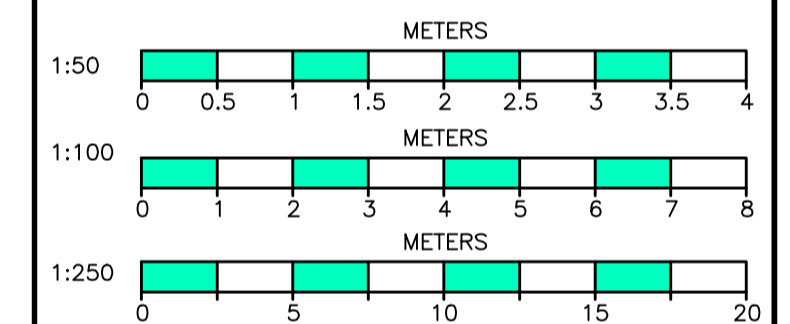
PROPOSED SITE PLAN (1:250)



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 Please read, if in doubt ask. Change nothing without consulting the Engineers.
 Contractor to check all dimensions on site before work starts or materials are ordered. If in doubt ask. All dimensions are in mm unless stated otherwise.
 Where materials, products and workmanship are not fully specified they are to be of the standard appropriate to the works and suitable for the purpose stated in or reasonably to be inferred from the drawings and specification. All work to be in accordance with good building practice and BS 8000 to the extent that the recommendations define the quality of the finished work. Materials products and workmanship to comply with all British Standards and EOTA standards with, where appropriate, BS or EC marks.
 All products and materials to be handled, stored, prepared and used or fixed in accordance with the manufacturers current recommendations.
 The contractor is to arrange inspections of the works by the BCO (or NHBC) as required by the Building Regulations and is to obtain completion certificate and forward to the Engineer
 All finishes, insulation and damp-proofing to architect's details



PROPOSED ROOF PLAN (1:250)



B	CLIENTS COMMENTS	OCT 2023
A	CLIENTS COMMENTS	OCT 2023
	REVISIONS	DATE

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LABC Fenland District Council Building Design Awards winner Building Excellence in Fenland

CLIENT: Mr & Mrs Barrett
 PROJECT: The Willows, Purls Bridge, Manea Cambridgeshire PE15 0ND
 TITLE: Proposed Plans & Sections

DRAWN: G.Bohram	DATE OF ISSUE:
CHECKED:	DRAWING NUMBER: H9122/03B
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