

**FLOOD RISK ASSESSMENT
FOR RESIDENTIAL DEVELOPMENT AT
SCHOOL ROAD, TERRINGTON ST JOHN**

FINAL REPORT

ECL0519/PETER HUMPHREY ASSOCIATES

DATE JUNE 2021

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(Dwg 6318/PL01A)

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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 C Holden in respect of a development that consists of the conversion of an agricultural building to form one residential dwelling at School Road, Terrington St John.

A planning application for the development is to be submitted by Peter Humphrey Associates.

2.0 SITE LOCATION AND DESCRIPTION

2.1 Site Location

The site is situated on land north of Czar Trees, School Road, Terrington St John, King's Lynn, PE14 7SG. The National Grid Reference of the site is 55389/31284.

The location of the site is shown in Figure 1.



Figure 1 – Location Plan (© OpenStreetMap contributors)

2.2 Existing Site

The site is on the eastern side of School Road. The site consists of several paddocks and an agricultural building. There is a dwelling to the north and agricultural land to the south and east. The site has an existing access to School Road. The area of the proposed development is approximately 0.19 hectares.

Environment Agency LiDAR data shows that ground levels within the site are typically between +1.5m OD and +1.8m OD. In general, the lowest ground levels are closest to the eastern boundary of the site. Ground levels on School Road at the entrance to the site are +2.7m OD.

The site is in the King's Lynn Internal Drainage Board's (IDB) area. Surface water at the site would naturally drain through soakaway and hence to the IDB drain system. There is a riparian drain on the western boundary of the site and the eastern boundary of the site is formed by an IDB Board Drain.

The online British Geological Survey maps indicate that the site is likely to be underlain by the Amphill Clay Formation mudstone. The bedrock is shown to be overlain with superficial deposits of clay and silt.

2.3 Development

The development consists of the conversion of an agricultural building to form one residential dwelling. The dwelling will be single storey. A Site Plan is provided in Attachment 1.

2.4 Local Development Documents

The King's Lynn and West Norfolk Borough Council Local Development Framework - Core Strategy is the adopted Local Plan for the district. Policy CS08 for Sustainable Development states the requirements for flood risk reduction.

The King's Lynn and West Norfolk Borough Council Level 1 Strategic Flood Risk Assessment (SFRA) was prepared in November 2018. The Level 2 SFRA was prepared in March 2019.

The Norfolk Lead Local Flood Authority (LLFA) Statutory Consultee Guidance Document has been drafted to support the development of Norfolk County Council's LLFA role as a statutory consultee to planning and to inform stakeholders in this process such as Local Planning Authorities (LPA's) and developers.

2.5 Flood Zones

As shown in Figure 2, the site is located within Flood Zone 3, an area with a high probability of flooding that benefits from flood defences, of the Environment Agency Flood Maps for Planning.

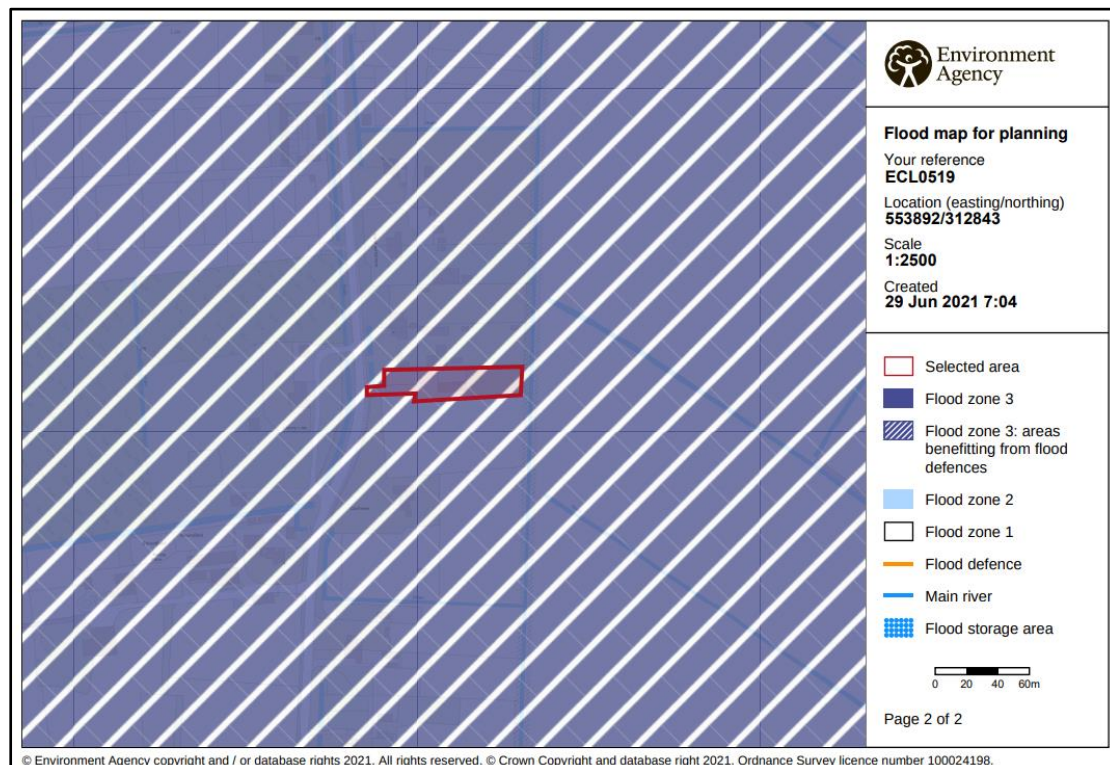


Figure 2 – Environment Agency Flood Map for Planning

The Environment Agency Long Term Flood Risk maps show that:

- the site has 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 not within an area at risk of reservoir flooding.

The site is not within one of the settlements considered within the King's Lynn and West Norfolk Borough Council Level 2 SFRA. As such the Level 1 SFRA maps have been reviewed and they show that:

- the site is in Flood Zone 3;
- the site is not at risk during a 1% annual probability (1 in 100 chance each year) fluvial event including allowance for climate change;
- the site is not at risk during a 0.5% annual probability (1 in 200 chance each year) tidal event including allowance for climate change;
- the site is not at risk of surface water flooding during the 1% annual probability (1 in 100 chance each year) event including 40% allowance for climate change;
- the site is not in an area with susceptibility to groundwater flooding;
- an area close to the eastern boundary of the site is within an area at risk from a tidal breach; and
- the site is not within an area at risk from reservoir flooding.

Flood risk information specific to a nearby site that was provided by the Environment Agency has been used to assess the residual risk.

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'. For a site in Flood Zone 3 and a development that is 'More Vulnerable' 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, taking advice from the Environment Agency as appropriate, to consider the Sequential Test.

Paragraph 033 of planning practice guidance (PPG) on Flood Risk and Coastal Change states that 'The Sequential Test does not need to be applied for applications for Change of Use (except for a change of use to a caravan, camping or chalet site, or to a mobile home or park home site)'.

Paragraph 048 of the PPG states that 'A Change of Use may involve an increase in flood risk if the vulnerability classification of the development is changed. In such cases, the applicant will need to show in their flood risk assessment that future users of the development will not be placed in danger from flood hazards throughout its lifetime.' The mitigation measures proposed in Section 5.2 of this flood risk assessment are such that risks to future users are mitigated.

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

The Borough Council's Site Allocations and Development Management Policies Plan has designated Terrington St John as a Key Rural Service Centre. It is designated a Key

Rural Service Centre because its potential to accommodate growth to sustain the wider rural community.

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 5.5km from the River Great Ouse. The site is protected by tidal defences on the River Great Ouse. These defences are 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.

There is an extensive local drainage network managed by the King's Lynn IDB. The nearest Board drain is located on the eastern boundary of the site. The site, and surrounding land, drains by gravity to Smeeths Lode which outfalls to the River Great Ouse via the Islington Pumping Station. The Islington Pumping Station is maintained and operated by King's Lynn IDB.

During the operation and maintenance of its pumping stations, associated structures, and channel systems, the IDB 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.

The site is 3.7km from the Middle Level Main Drain, an embanked channel which flows to St German Pumping Station to discharge to the tidal River Great Ouse. The Middle Level Main Drain and St Germans Pumping Station are the responsibility of the Middle Level Commissioners.

Current maintenance standards of the King's Lynn IDB's, the Middle Level Commissioners and the Environment Agency's defences are generally good.

4.2 Sources of Flooding

The following potential sources of flooding have been identified during this assessment:

- local blockages to the IDB main drain system;
- an event in the local drainage network that exceeds the standard of protection;
- failure of the Islington Pumping Station;
- failure of St Germans Pumping Station;
- overtopping and/or breaching of the Middle Level Main Drain; and
- overtopping and/or breaching of the River Great Ouse tidal.

Overtopping and/or breach of the Middle Level Main Drain is considered to be a lesser risk than a tidal breach. As such it has not been considered further in this assessment.

4.3 Probability of Flooding

The probability of flooding associated with blockages in the IDB's drainage system is low due to the maintenance standards already achieved and managed by the IDB.

The standard of drainage provided by King's Lynn IDB is assessed at 1% annual probability (1 in 100 chance each year) in line with their target standard of protection to residential properties. This exceeds the Department of the Environment, Food and Rural Affairs (DEFRA) target level of service for rural drainage and flood defence works. The risk associated with flooding due to events greater than 1% annual probability (1 in 100 chance each year) is lowered due to the King's Lynn IDB main drains incorporating freeboard. This provides storage during events greater than 1% annual probability (1 in 100 chance each year).

St Germans Pumping Station offers protection against the 1% annual probability (1 in 100 chance each year) fluvial event with an allowance for climate change. St Germans Pumping Station was replaced in 2011 so that a standard of protection against the 1% annual probability (1 in 100 chance each year) event could be maintained.

The site benefits from defences on the River Great Ouse that provide protection during an event with a 0.5% annual probability (1 in 200 chance each year). The River Great Ouse tidal defences were improved after the 1978 tidal surge event to a level of 6.30m AOD for hard defences and 7.00m AOD for soft defences. The highest recorded tide level in the River Great Ouse is 6.17m AOD and was recorded during the surge event of 5 December 2013.

4.4 Historic Flooding

During the preparation of this assessment, no evidence was discovered of the site being flooded.

4.5 Climate Change

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

The SFRA maps show that the site is not at risk during the 0.5% annual probability (1 in 200 chance each year) tidal event with climate change. When this event is considered in the River Great Ouse it is likely to lead to some overtopping of the defences. However, the level of overtopping is such that it would not affect the site.

4.6 Residual Risk

The SFRA indicates that there is a residual risk of flooding at the site during a breach. The Environment Agency Hazard Mapping indicates the maximum flood depth at the site during the 0.5% annual probability (1 in 200 chance each year) event with climate change with combined breaches on the River Great Ouse. An extract from the Environment Agency's Maximum Flood Depth Map within Attachment 2 is shown in Figure 3.

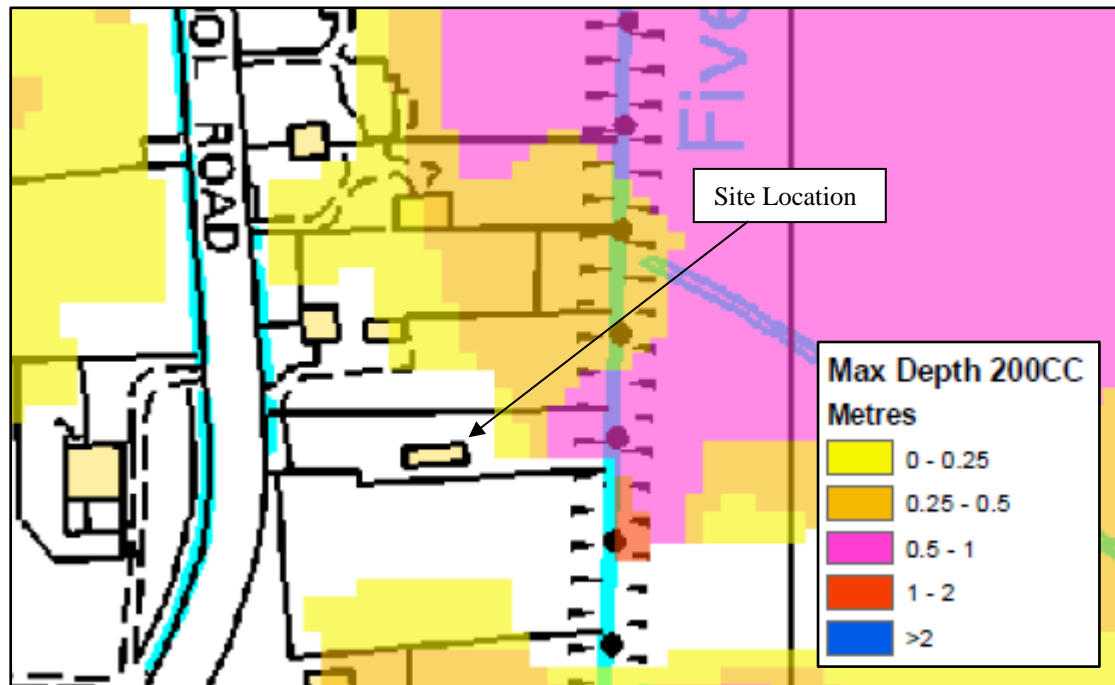


Figure 3 – Environment Agency Maximum Flood Depth Map (combined breach)

Figure 3 shows that the eastern part of the site is at risk during a breach. The agricultural building to be converted to a dwelling is not at risk during a breach.

The proposed development is single storey and therefore any mitigation measures will need to consider the 0.1% annual probability (1 in 1000 chance each year) event in 2115. Based upon the areas at risk during the 0.5% annual probability (1 in 200 chance each year) event and a review of the LiDAR data it is possible that the area around the proposed dwelling would be at risk during a breach during the more extreme event. It is anticipated that if the area around the building is at risk during the 0.1% annual probability (1 in 1000 chance each year) event in 2115 the depths would be less than 0.25m.

5.0 FLOOD RISK MITIGATION

5.1 Summary of Risks

The probability of this development flooding from localised drainage systems is low. Failure of Islington Pumping Station or St Germans Pumping Station would increase the level of risk at the site.

The probability of the site flooding from the River Great Ouse is less than 0.5% annual probability (1 in 200 chance each year) because of the standards of the existing flood defences. Over time there will be a gradual increase in risk to the site due to climate change. During the design life of the development, it is not anticipated that the site would flood from these watercourses.

The site is at risk during a breach of the tidal defences. The Environment Agency Breach Hazard Maps show that in the event of multiple breaches during the 0.5% annual probability (1 in 200 chance each year) tidal event in 2116 the proposed dwelling would not be at risk. In the event of multiple breaches during the 0.1% annual probability (1 in 1000 chance each year) tidal event in 2116 it is anticipated that if the area around the dwelling were at risk, then the depth would be up to 0.25m.

Any increase in impermeable area associated with the development will be minimal so there is no potential that flood risk will be increased elsewhere due to surface water.

5.2 Mitigation Measures

The site has a low 'actual risk' of flooding. Based upon the information available during the preparation of this flood risk assessment, it is recommended that the floor level of the dwelling is 0.5m above surrounding ground levels. It is recommended that there is 0.3m of flood resilient construction above finished floor level.

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 provides a Flood Warning Service which includes Flood Warning Codes and uses direct warning methods where the risks and impacts of flooding are high.

In addition to direct and indirect flood warnings, the Environment Agency operates a 24 hour a day Floodline Service providing advice and information on flooding. The occupier of the dwelling should register with the Floodline Direct Warnings Service to receive any future flood warnings.

During an extreme event it is anticipated that sufficient time would be available to take precautionary actions to limit the potential impact of flooding.

Failure of Islington Pumping Station or St Germans 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 IDB would take emergency action to maintain the drainage level of service by utilising temporary pumping equipment. The Board of King's Lynn IDB has resolved to carry out replacement of the Islington Pumping Station to provide protection during the 1% annual probability (1 in 100 chance each year) with climate change event.

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

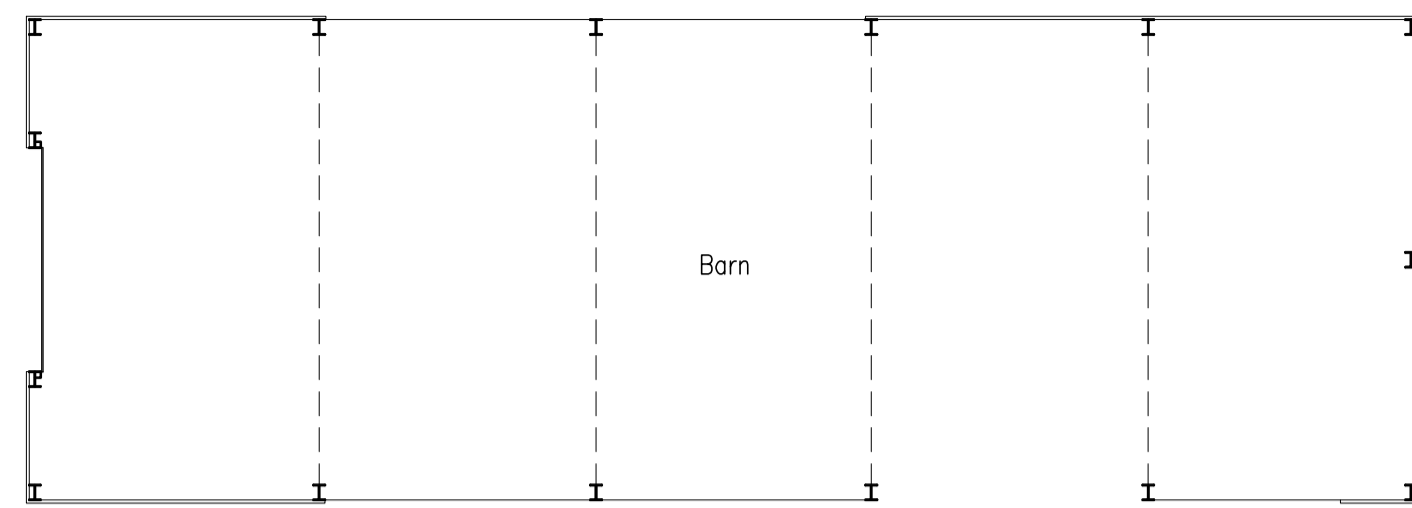
6.0 CONCLUSIONS

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

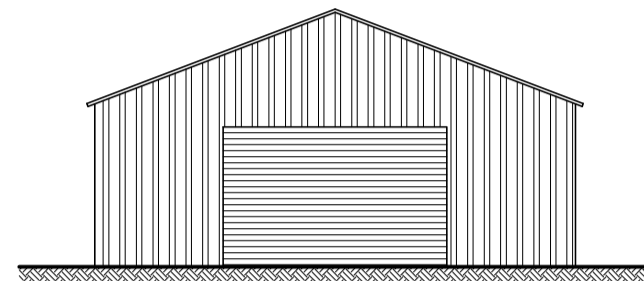
- The proposed developments consist of the conversion of an agricultural building to form one dwelling at School Road, Terrington St John
- The site is located within an IDB catchment with a minimum standard of drainage of 1% annual probability (1 in 100 chance each year) which accords with DEFRA guidelines for rural development. The risk of flooding is lowered further due to the Board drains incorporating a significant freeboard. This provides storage during events greater than 1% annual probability (1 in 100 chance each year).
- The proposed development is in Flood Zone 3. The site benefits from defences on the tidal River Great Ouse that provide protection during the 0.5% annual probability (1 in 200 chance each year) event including climate change. It is anticipated that the area around the dwelling is at risk during a breach of the tidal defences with depths up to 0.25m.
- It is recommended that the finished floor level of dwelling is a minimum of 0.5m above surrounding ground levels and there is 0.3m of flood resilient construction above finished floor level.
- The development passes the Sequential Test and Exception Test and is therefore suitable for the proposed location.

ATTACHMENT 1

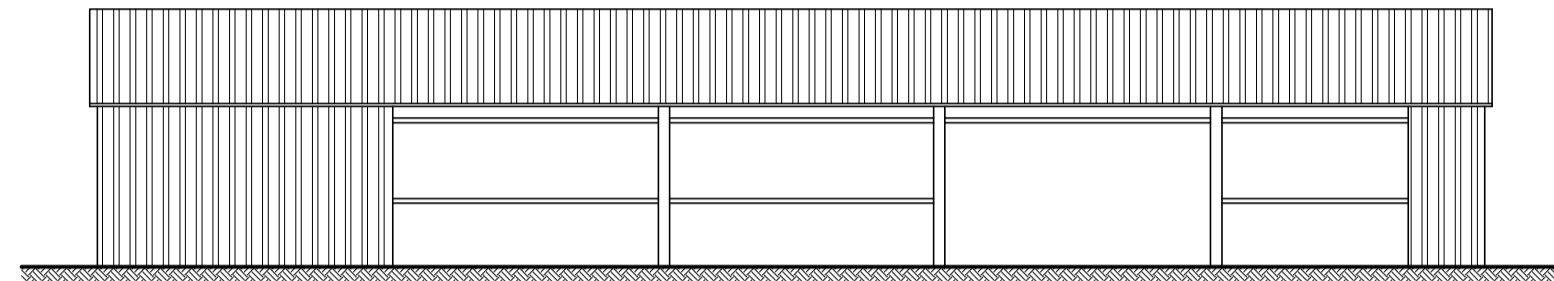
**EXISTING AND PROPOSED COMBINATION DRAWING
(Dwg 6318/PL01A)**



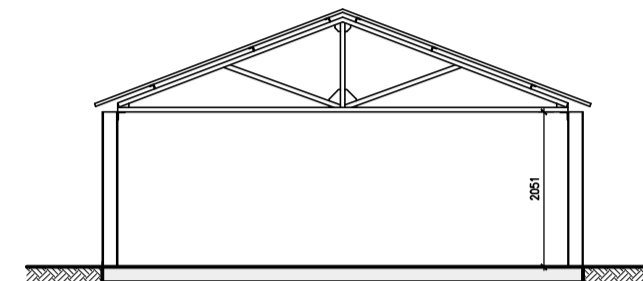
Existing plan 1:100



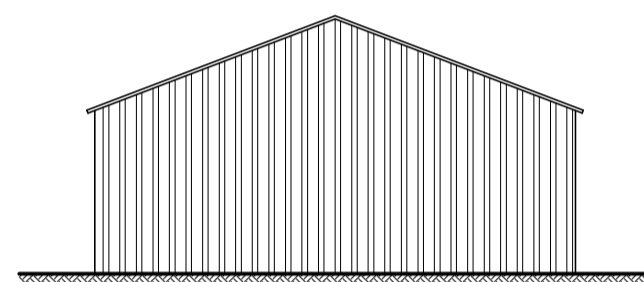
Existing Front elevation 1:100



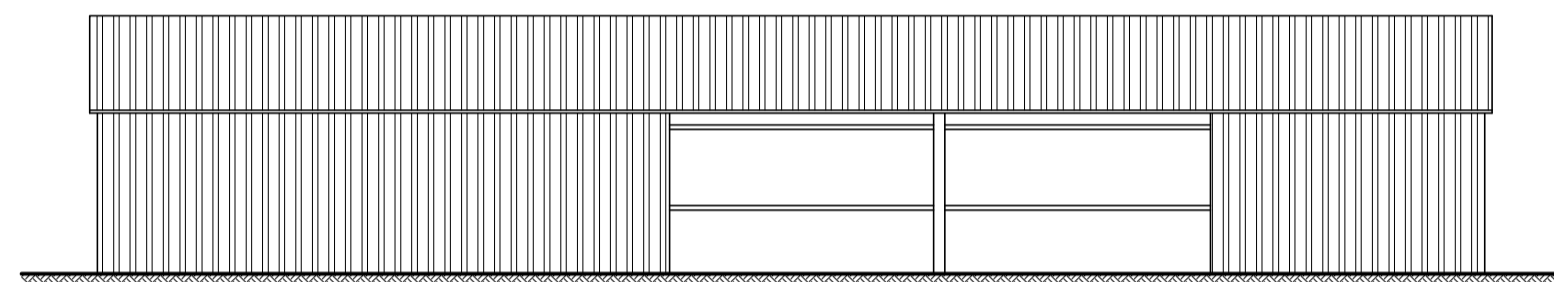
Existing Side elevation 1:100



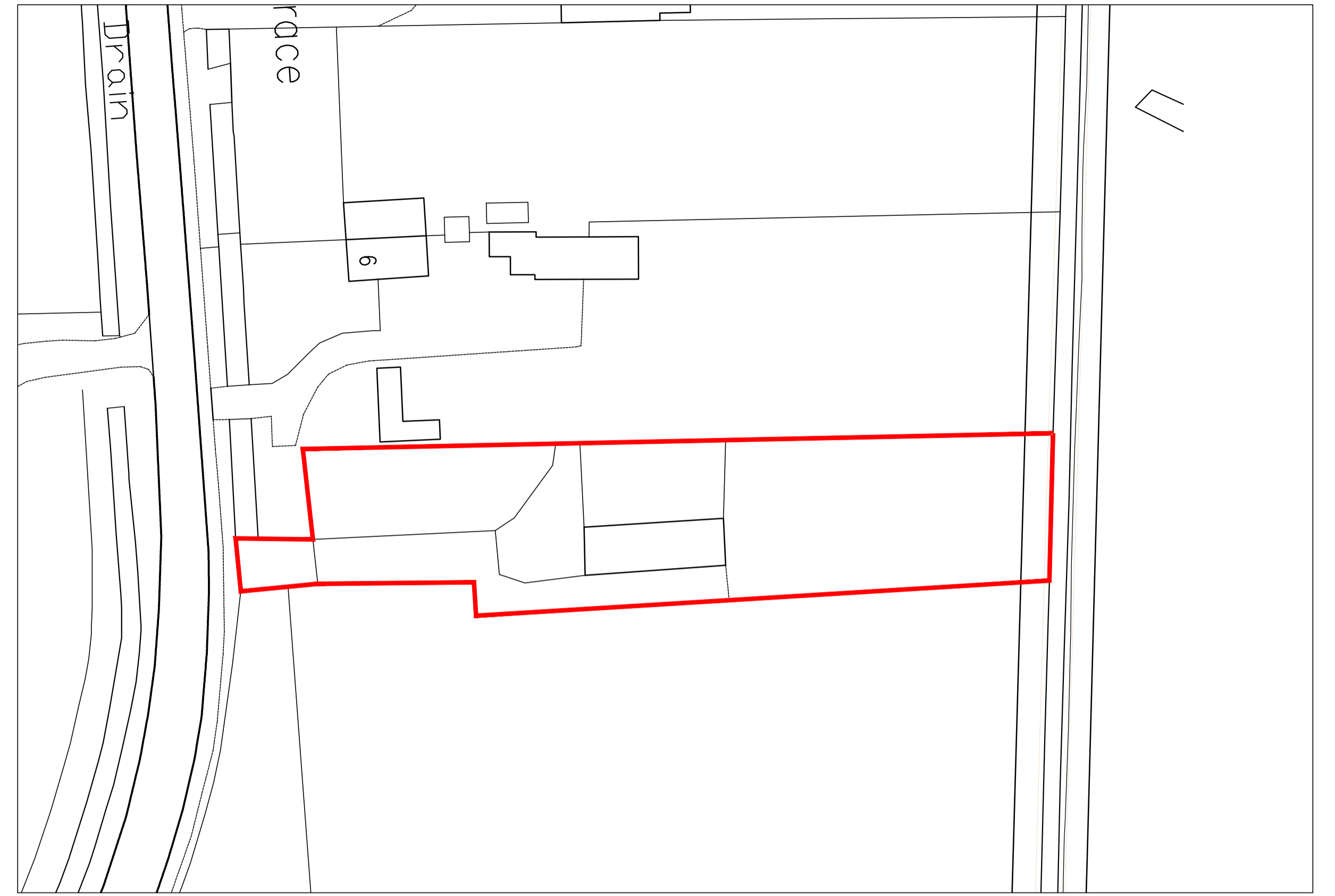
Existing Section 1:100



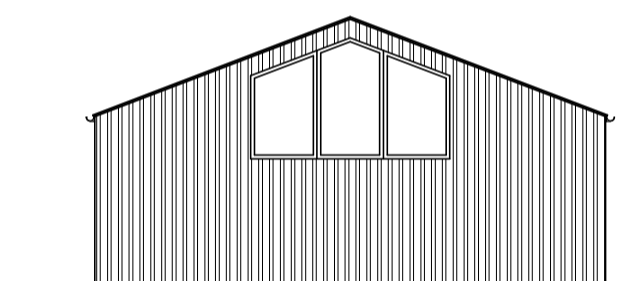
Existing Rear elevation 1:100



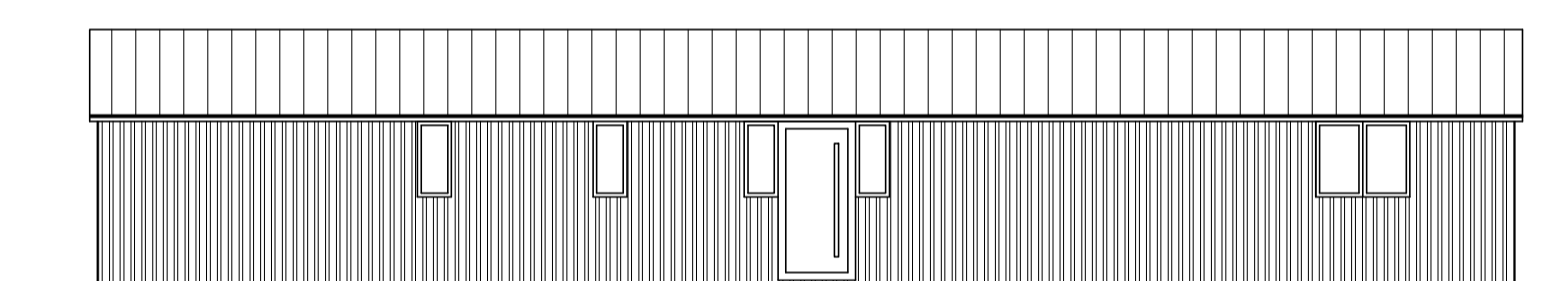
Existing Side elevation 1:100



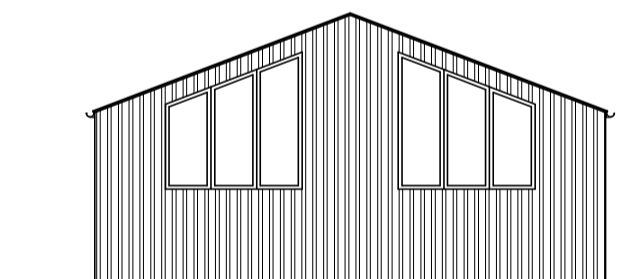
Existing Site Plan 1:500



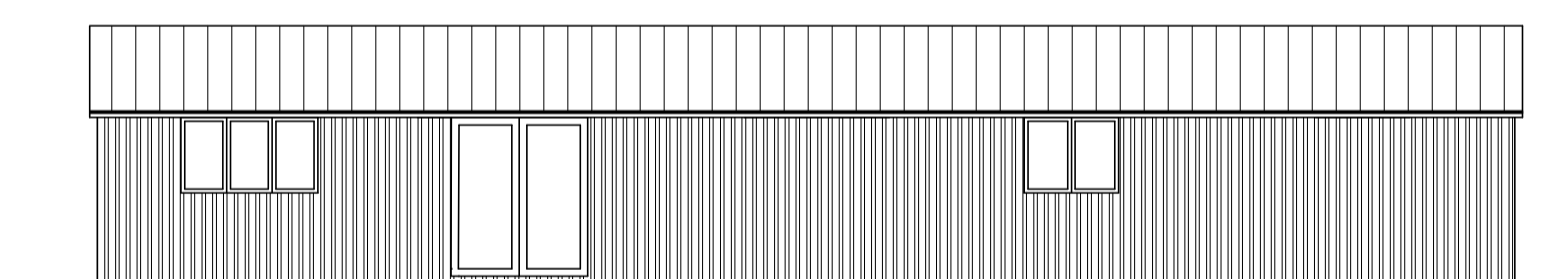
Proposed Front elevation 1:100



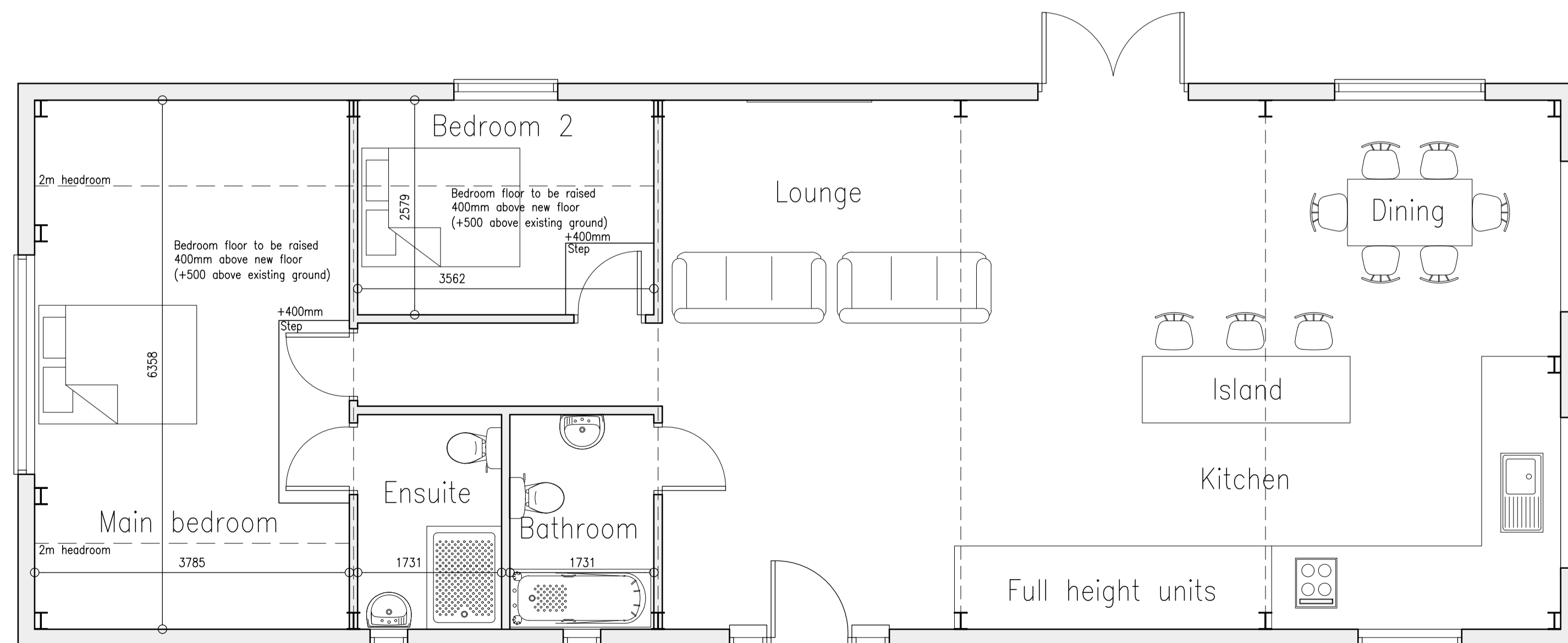
Proposed Side elevation 1:100



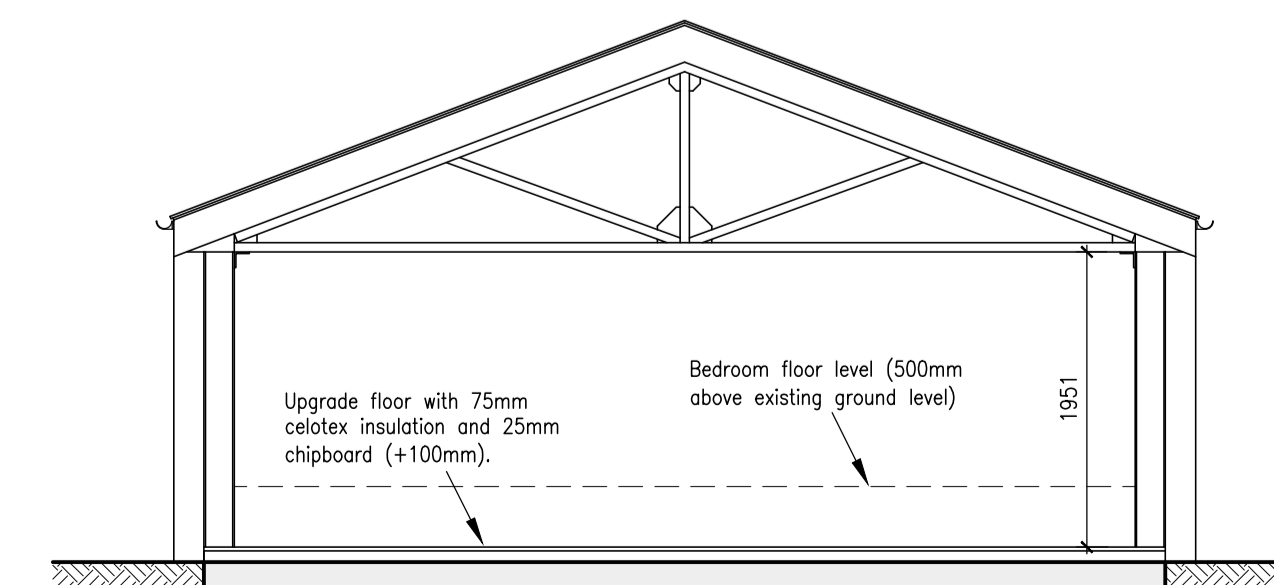
Proposed Rear elevation 1:100



Proposed Side elevation 1:100



Proposed Plan 1:50



Proposed Section 1:50

Peter Humphrey Associates Ltd.
ARCHITECTURAL DESIGN AND BUILDING

PROJECT
PROPOSED BARN CONVERSION

SITE
BARN NORTH OF CZAR TREES
SCHOOL ROAD
TERRINGTON ST JOHN
NORFOLK
PE14 7SG

Drawing 1 of 1

DRAWING
Existing and Proposed combination drawing

CLIENT
Mr P Nichols

DATE May 2021 SCALE As Shown at A1 JOB No. 6318/PL01A

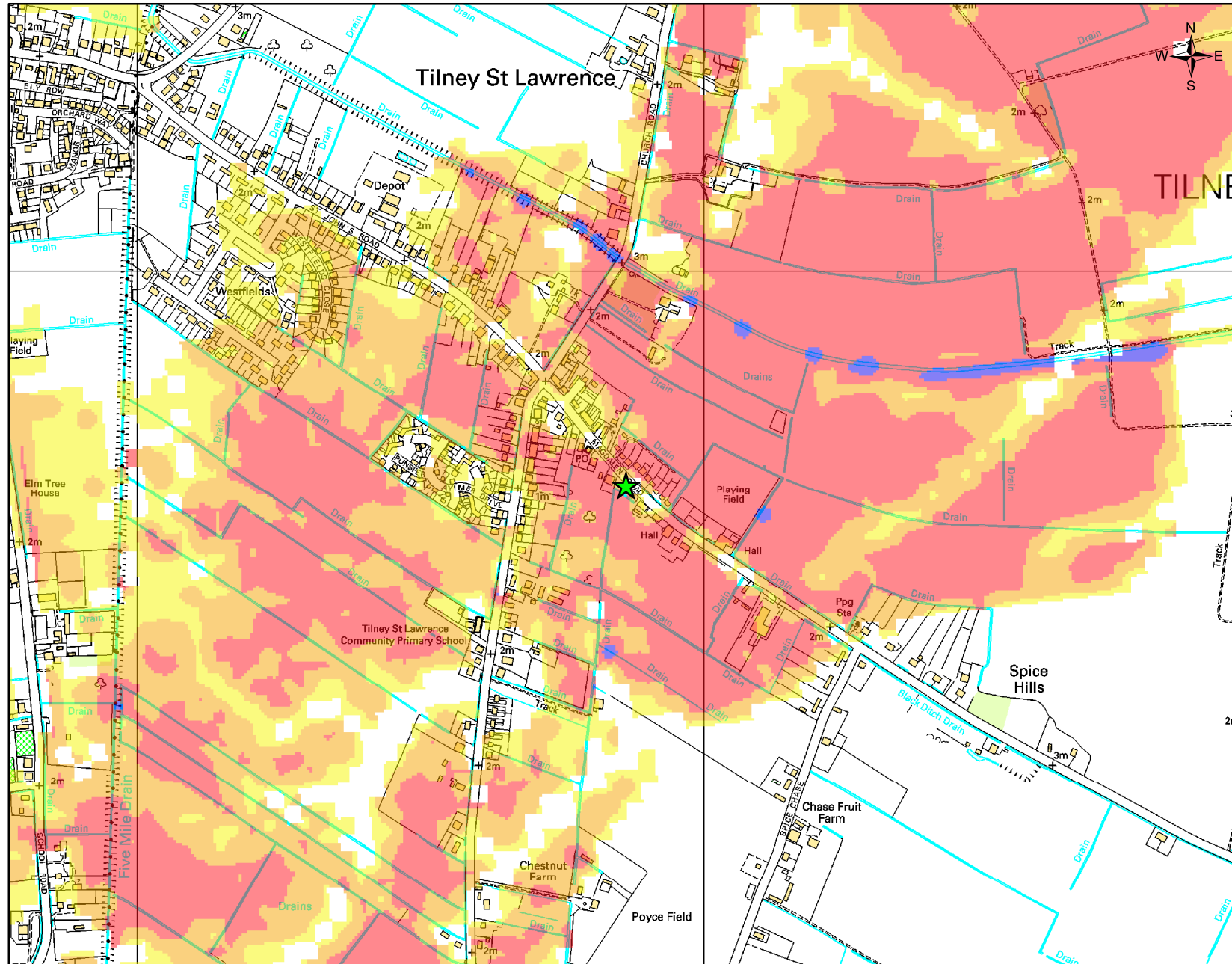
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31 OLD MARKET WISBECH CAMBS PE13 1NB
Fenland District Council
Building Design Awards
Building Excellence in Fenland
Category Winner 08/09/10
Overall Winner 2010

ATTACHMENT 2

ENVIRONMENT AGENCY FLOOD RISK INFORMATION

Map Showing the Maximum Hazard Rating (combined breach) centred on Tilney St Lawrence. NGR TF5486213620. Ref CCC/2015/23116. Created on 14 December 2015.



Scale 1:10,000

Legend

Max Hazard Rating 200cc

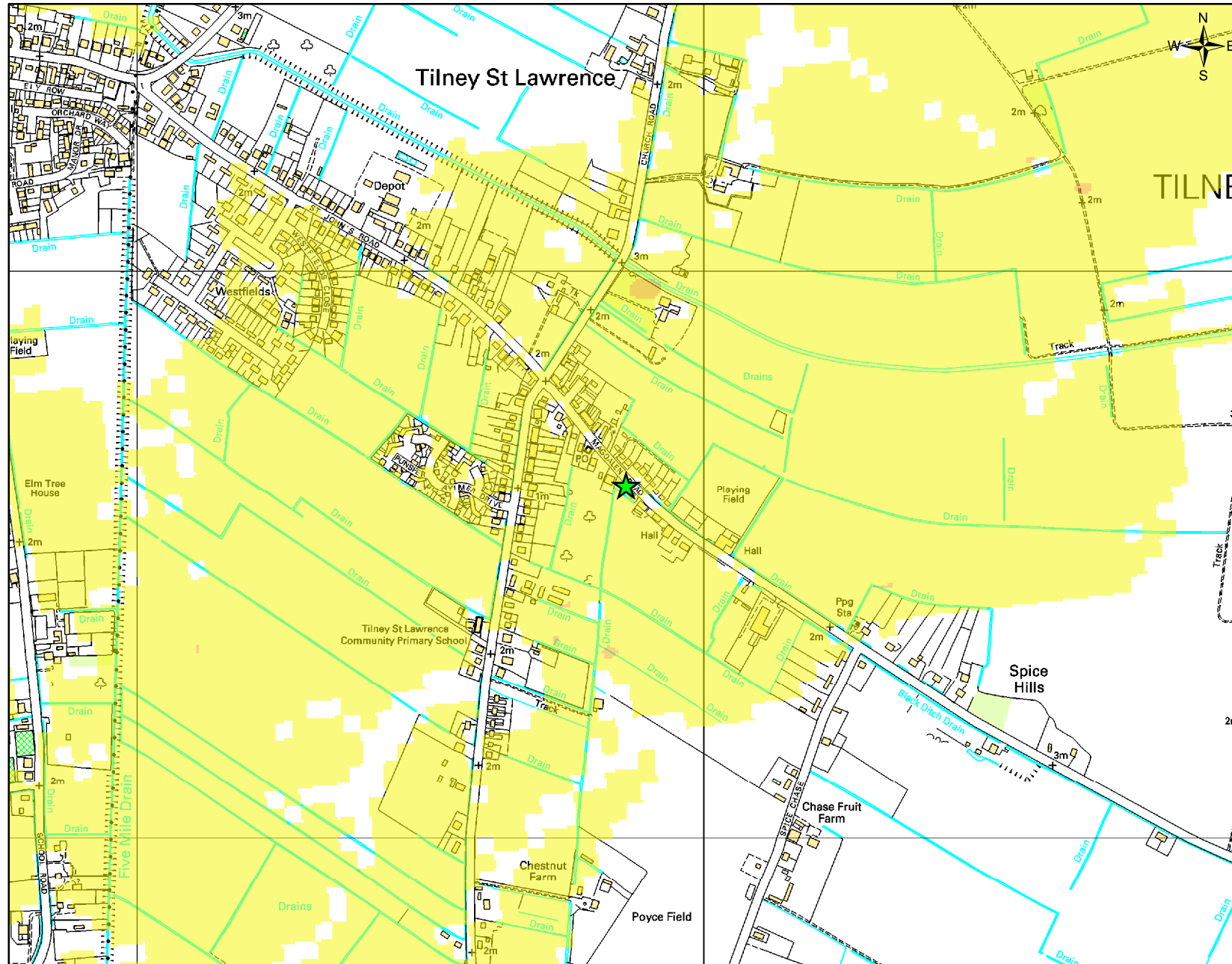
Haz Rating

- 0 - 0.75 - Very Low Hazard
- 0.75 - 1.25 - Danger to Some
- 1.25 - 2 - Danger to Most
- > 2 - Danger to All

★ Site location

1. This map shows the level of flood hazard to people (called a hazard rating) if our flood defences are breached at certain locations, for a range of scenarios. The hazard rating depends on the depth and velocity of floodwater and maximum values of these are also mapped.
2. The map is based on computer modelling of simulated breaches at specific locations. Each breach has been modelled individually and the results combined to create this map. Multiple breaches, other combinations of breaches, different sized tidal surges or flood flows may all give different results.
3. The map only considers the consequences of a breach, it does not make any assumption about the likelihood of a breach occurring.

**Map Showing the Maximum Water Velocity (combined breach) centred on Tilney St Lawrence.
NGR TF5486213620. Ref CCC/2015/23116. Created on 14 December 2015.**



Scale 1:10,000

Legend

Max Velocity 200cc

m/s

- 0 - 0.3
- 0.3 - 1
- 1 - 1.5
- 1.5 - 2.5

★ Site Location

1. The map is based on computer modelling of simulated breaches at specific locations. Each breach has been modelled individually and the results combined to create this map. Multiple breaches, other combinations of breaches, different sized tidal surges or flood flows may all give different results.
2. The map only considers the consequences of a breach, it does not make any assumption about the likelihood of a breach occurring.