PROPOSED CONVERSION OF EXISTING STORAGE BUILDING AT THE STABLES, LOW STREET, HOXNE, SUFFOLK

FLOOD RISK ASSESSMENT

NOVEMBER 2023

REPORT REF: 3324/RE/11-23/01

Evans Rivers and Coastal Ltd
T: 07896 328220
E: Enquiries@evansriversandcoastal.co.uk
W: www.evansriversandcoastal.co.uk

CONTRACT

Evans Rivers and Coastal Ltd has been commissioned by Mr Flatman to carry out a Flood Risk Assessment for a proposed conversion of existing storage building at The Stables, Low Street, Hoxne, Suffolk.

QUALITY ASSURANCE, ENVIRONMENT AND HEALTH AND SAFETY

Evans Rivers and Coastal Ltd operates a Quality Assurance, Environmental, and Health and Safety Policy.

This project comprises various stages including data collection; hydrological and hydrogeological assessments; surface water drainage designs; and reporting. Quality will be maintained throughout the project by producing specific methodologies for each work stage. Quality will also be maintained by initiating internal quality procedures including the validation of third party deliverables; creation of an audit trail to record any changes made; and document control using a database and correspondence log file system.

To adhere to the Environmental Policy, data will be obtained and issued in electronic format and alternatively by post. Paper use will also be minimised by communicating via email or telephone where possible. Documents and drawings will be transferred in electronic format where possible and all waste paper will be recycled. Meetings away from the office of Evans Rivers and Coastal Ltd will be minimised to prevent unnecessary travel, however for those meetings deemed essential, public transport will be used in preference to car journeys.

The project will follow the commitment and objectives outlined in the Health and Safety Policy operated by Evans Rivers and Coastal Ltd. All employees will be equipped with suitable personal protective equipment prior to any site visits and a risk assessment will be completed and checked before any site visit. Other factors which have been taken into consideration are the wider safety of the public whilst operating on site, and the importance of safety when working close to a water source and highway. Any designs resulting from this project and directly created by Evans Rivers and Coastal Ltd will also take into account safety measures within a "designers risk assessment".

Report carried out by:

Rupert Evans, BSc (Hons), MSc, CEnv, C.WEM, MCIWEM, PIEMA

DISCLAIMER

This report has been written and produced for Mr Flatman. No responsibility is accepted to other parties for all or any part of this report. Any other parties relying upon this report without the written authorisation of Evans Rivers and Coastal Ltd do so at their own risk.

COPYRIGHT

CONTENTS

1. INTRODUCTION

1.1 Project Scope

1.1.1 Evans Rivers and Coastal Ltd has been commissioned by Mr Flatman to carry out a Flood Risk Assessment for a proposed conversion of existing storage building at The Stables, Low Street, Hoxne, Suffolk.

1.1.2 It is understood that this assessment will be submitted to the Local Planning Authority as part of a planning application. Specifically, this assessment intends to:

1) Review any literature and guidance specific to this area such as the SFRA;

2) Assess the flood risk from all sources to people and property and propose mitigation measures accordingly;

3) Review existing evacuation and warning procedures for the area;

4) Report findings and recommendations.

1.1.3 This assessment is carried out in accordance with the requirements of the National Planning Policy Framework (NPPF) dated 2021. Other documents which have been consulted include:

- DEFRA/EA document entitled *Framework and guidance for assessing and managing flood risk for new development Phase 2 (FD2320/TR2)*, 2005;
- Communities and Local Government 2007. *Improving the Flood Performance of New Buildings*. HMSO.
- DEFRA/EA document entitled *The flood risks to people methodology (FD2321/TR1),* 2006;
- EA *Supplementary Note on Flood Hazard Ratings and Thresholds for Development Planning and Control Purpose*, 2008;
- National Planning Practice Guidance – Flood Risk and Coastal Change.
- UK Government's climate change allowances guidance.
- Suffolk Local Flood Risk Management Plan dated 2012.
- Suffolk County Council Preliminary Flood Risk Assessment dated 2011.
- Babergh and Mid Suffolk Level 1 Strategic Flood Risk Assessment (SFRA) dated 2020.

2. DATA COLLECTION

2.1 To assist with this report, the data collected included:

- Ordnance Survey 1:10,000 street view map obtained via Promap (Evans Rivers and Coastal Ltd OS licence number AC0000814628).
- British Geological Survey, *Online Geology of Britain Viewer*.
- Filtered LIDAR data at 1m resolution covering the site and surrounding area.
- Topographical survey data shown on Drawing Number 2312/L0(-)01.
- 1:625,000 *Hydrogeological Map of England and Wales*, published in 1977 by the Institute of Geological Sciences (now the British Geological Survey).

3. SITE CHARACTERISTICS

3.1 Existing Site Characteristics and Location

3.1.1 The site is located at The Stables, Low Street, Hoxne, Suffolk. The approximate Ordnance Survey (OS) grid reference for the site is 618035 277148 and the location of the site is shown on Figure 1.

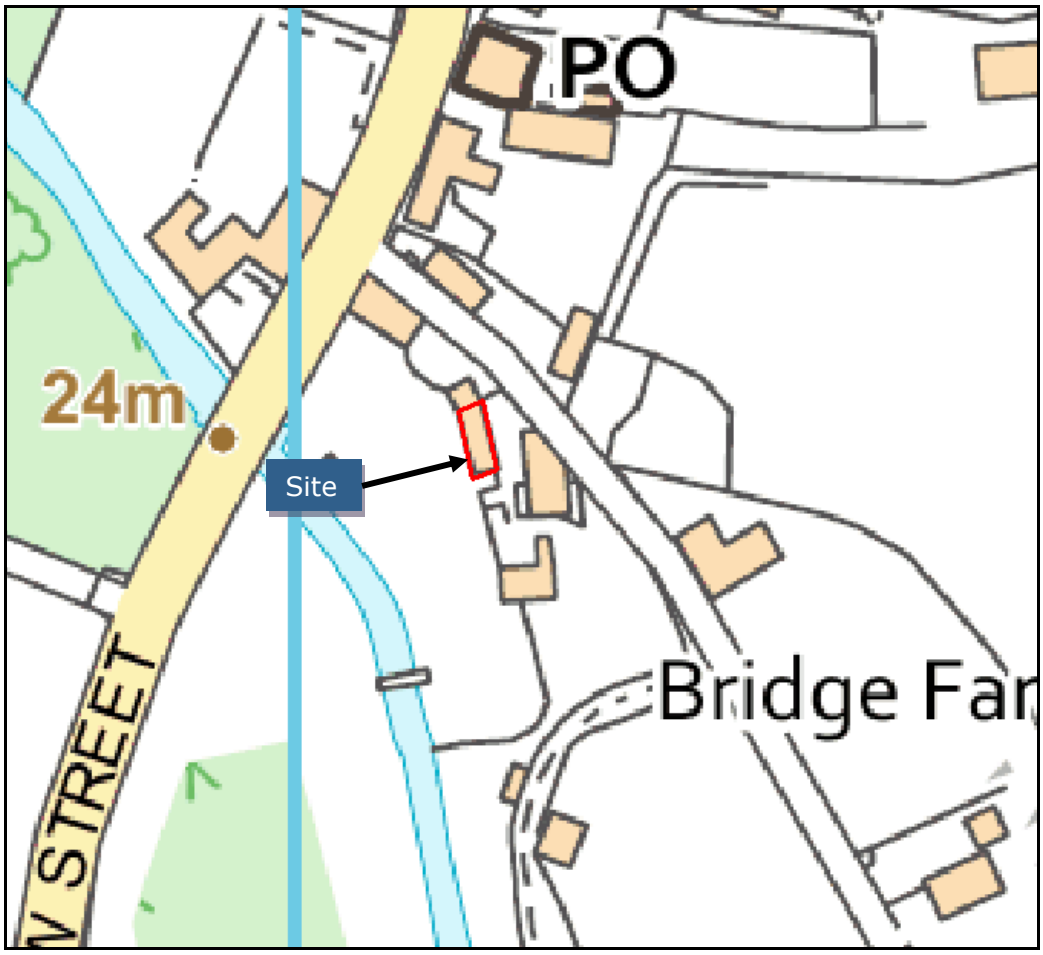


Figure 1: Site location plan (Source: Ordnance Survey)

3.1.2 The site comprises an existing storage building which is accessed through the adjacent courtyard and onto a track which leads to Low Street to the north.

3.1.3 A topographical survey can be seen on Drawing Number 2312/L0(-)01. Filtered LIDAR data at 1m resolution has also been obtained to determine and illustrate the topography of the site and surrounding area (Figure 2).

3.1.4 It can be seen from the survey data that ground levels fall in a westerly direction and that the existing building is set similar to existing ground levels and at 23.75m AOD.

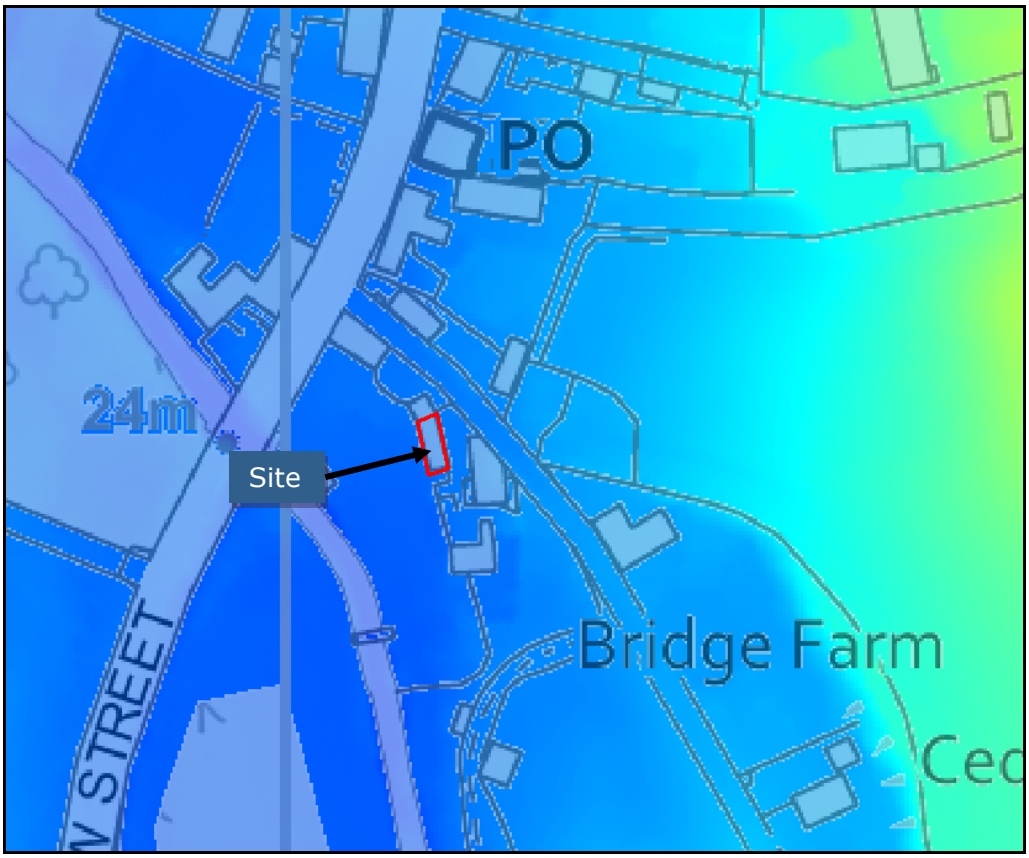


Figure 2: Filtered LIDAR survey data at 1m resolution where higher ground is denoted by red and orange colours and lower ground is denoted by blue colours

3.2 Site Proposals

3.2.1 It is the Client's intention to change the use of the building to a residential dwelling. The ground floor level will be set at 24.45m AOD.

3.2.2 The proposed site layout can be seen on Drawing Number 2312/L0(-)01 and 2312/SK1A. (It should be noted that the information on the drawings suggest a replacement building which is not now the case.)

3.2.3 Annex 3 of the NPPF confirms that residential development is classified as a 'more-vulnerable' use.

3.2.4 Paragraph 14 and 27 of the NPPG and paragraph 168 of the NPPF states that the Sequential Test does not usually apply to change of use applications.

4. SOURCES OF FLOODING

4.1 Fluvial

4.1.1 The Environment Agency Flood Map (Figure 3) and Appendix B of the SFRA (Hoxne Ward) shows that the site is located within the NPPF defined Flood Zone 3, 2 and 1.

4.1.2 To the west of the site an Ordinary Watercourse exists (known locally as Goldbrook) and is a tributary of the River Dove. The route of the watercourse is also shown on Appendix F of the Council's Strategic Flood Risk Assessment (SFRA).

4.1.3 The site is located within the Waveney Lower Yare & Lothingland Internal Drainage Board (IDB) area (Denham). The Goldbrook is designated an IDB maintained drain, however, the Client has noted that maintenance of the brook has not been undertaken for some time.

4.1.4 The information from the IDB's *Policy Statement on Flood Protection and Water Level Management* indicates that the IDB maintains the drainage network and more specifically water levels through the operation and maintenance of its pumping stations. The IDB's infrastructure, including its watercourses and pumping stations, is monitored by the IDB to ensure that their condition meet the standards of protection sought and improvement works are carried out where appropriate and necessary.

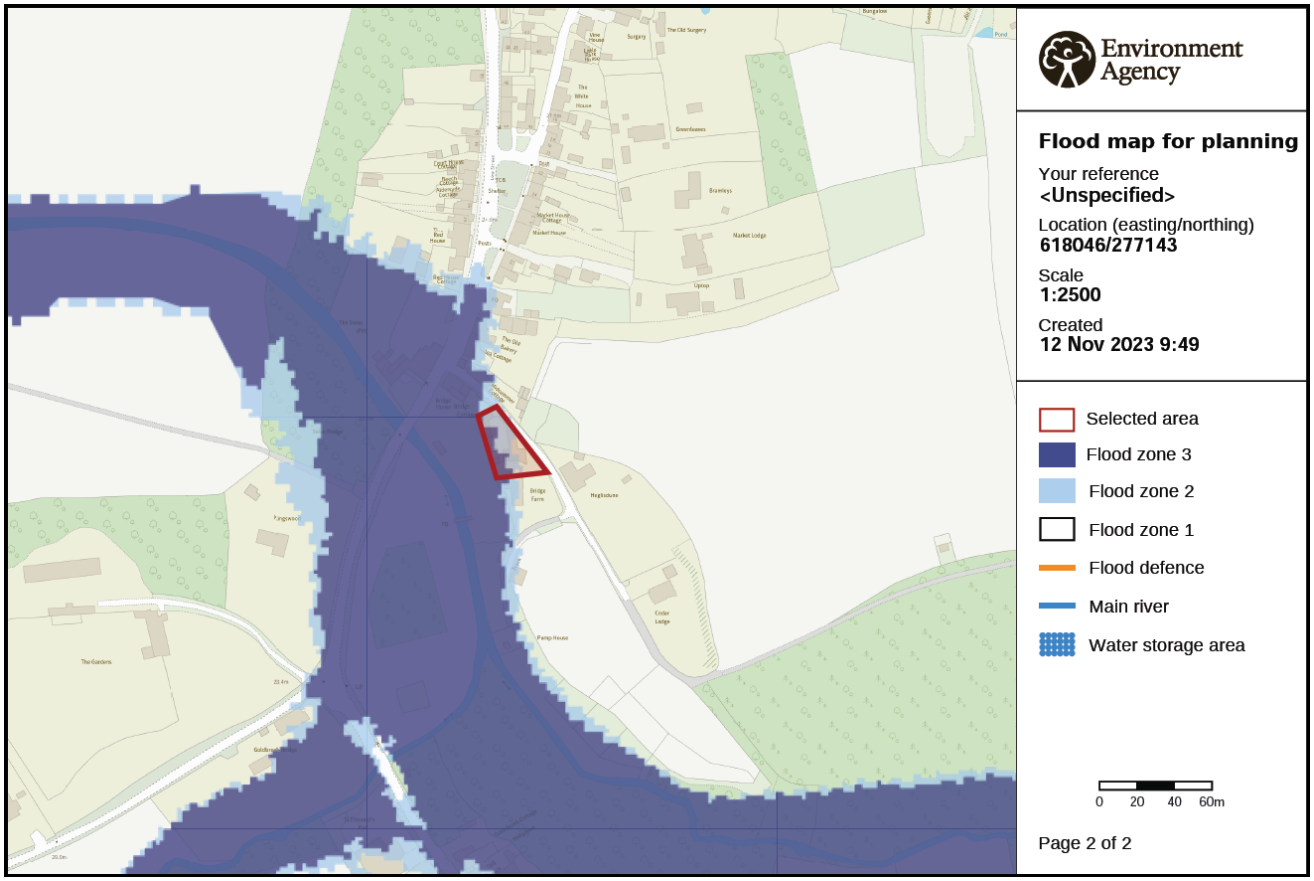


Figure 3: Environment Agency Floodplain Map (Source: Environment Agency)

4.1.5 The SFRA suggests that where no detailed hydraulic models are present, Flood Zone 2 (as shown on Figure 3) can be used as a proxy when considering climate change impacts.

4.1.6 The flood zone extents have been imported onto the survey data and the flood contour for the (Zone 2) 1 in 1000 year event is approximately 24.25m AOD.

4.1.7 Therefore, the flood depth above the existing ground floor is 0.50m, however, the proposed ground floor level of 24.45m AOD will be set above the flood level thus providing safe (dry) refuge.

4.1.8 Safe access/egress is available once occupants reach the adjacent track.

Flood Warning and Emergency Planning

4.1.9 The site is not located within Environment Agency Flood Warning Area.

4.1.10 It is understood that in the event of flooding, evacuation is managed by a multi-agency team in conjunction with the Police. The multi-agency team provides suitable premises for shelter, first aid, refreshments and possible transportation with consideration given to the elderly and vulnerable groups. It is essential that occupants produce robust Emergency Flood Plans to avoid putting themselves or emergency services at risk and that they do not rely solely on emergency services during the event.

4.2 Groundwater Flooding

4.2.1 In order to assess the potential for groundwater flooding during higher return period rainfall events, the Jacobs/DEFRA report entitled *Strategy for Flood and Coastal Erosion Risk Management: Groundwater Flooding Scoping Study*, published in May 2004, was consulted, together with the guidance offered within the document entitled *Groundwater flooding records collation, monitoring and risk assessment (ref HA5)*, commissioned by DEFRA and carried out by Jacobs in 2006.

Soil and Geology at the Site

4.2.2 The British Geological Survey's *Online Geology of Britain Viewer*, indicates that the soils beneath the site comprise sand and gravel deposits.

Groundwater Flooding Potential at the Site

4.2.3 There have been no recorded groundwater flood events across the area between 2000 and 2003, as indicated by the Jacobs study. Appendix G of the SFRA indicates that this area has a risk of groundwater flooding to both surface and subsurface assets.

4.2.4 However, it is considered that the building footprint and raised floor level will reduce the risk to acceptable levels.

4.3 Surface Water Flooding and Sewer Flooding

4.3.1 Surface water and sewer flooding across urban areas is often a result of high intensity storm events which exceed the capacity of the sewers thus causing them to surcharge and flood. Poorly maintained sewer networks and blockages can also exacerbate the potential for sewer flooding. Surface water flooding can also occur as a result of overland flow across poorly drained rural areas.

4.3.2 Appendix E of the SFRA shows that there have been no recorded sewer flood incidents in this postcode area. Appendix D of the SFRA indicates that there have been no recorded flood incidents at the site and no flood incidents have been investigated at this location by Suffolk County Council.

4.3.3 The Environment Agency's Surface Water Flooding Map (Figure 4 and 5) together with Appendix A of the SFRA indicates that there is a very low to low surface water flood risk across the site (i.e. between a less than a 1 in 1000 year chance and 1 in 100 year chance).

4.3.4 Further more detailed data has been obtained via the Data.gov.uk site (https://environment.data.gov.uk/DefraDataDownload/?Mode=rofsw). The flood extent, depth and hazard GIS *shape file* was downloaded from Data.gov.uk (for tile TM_17).

4.3.5 It is generally accepted that the low risk flood event (i.e. between 1 in 1000 years and 1 in 100 years) on the Agency's map is used as a substitute for the climate change 1 in 100 year event to provide a worst-case scenario. There is no policy requirement to apply climate change onto the 1 in 1000 year event, as climate change is applied up to the 1 in 100 year event as confirmed at https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#when-to-use-climate-change-allowance.

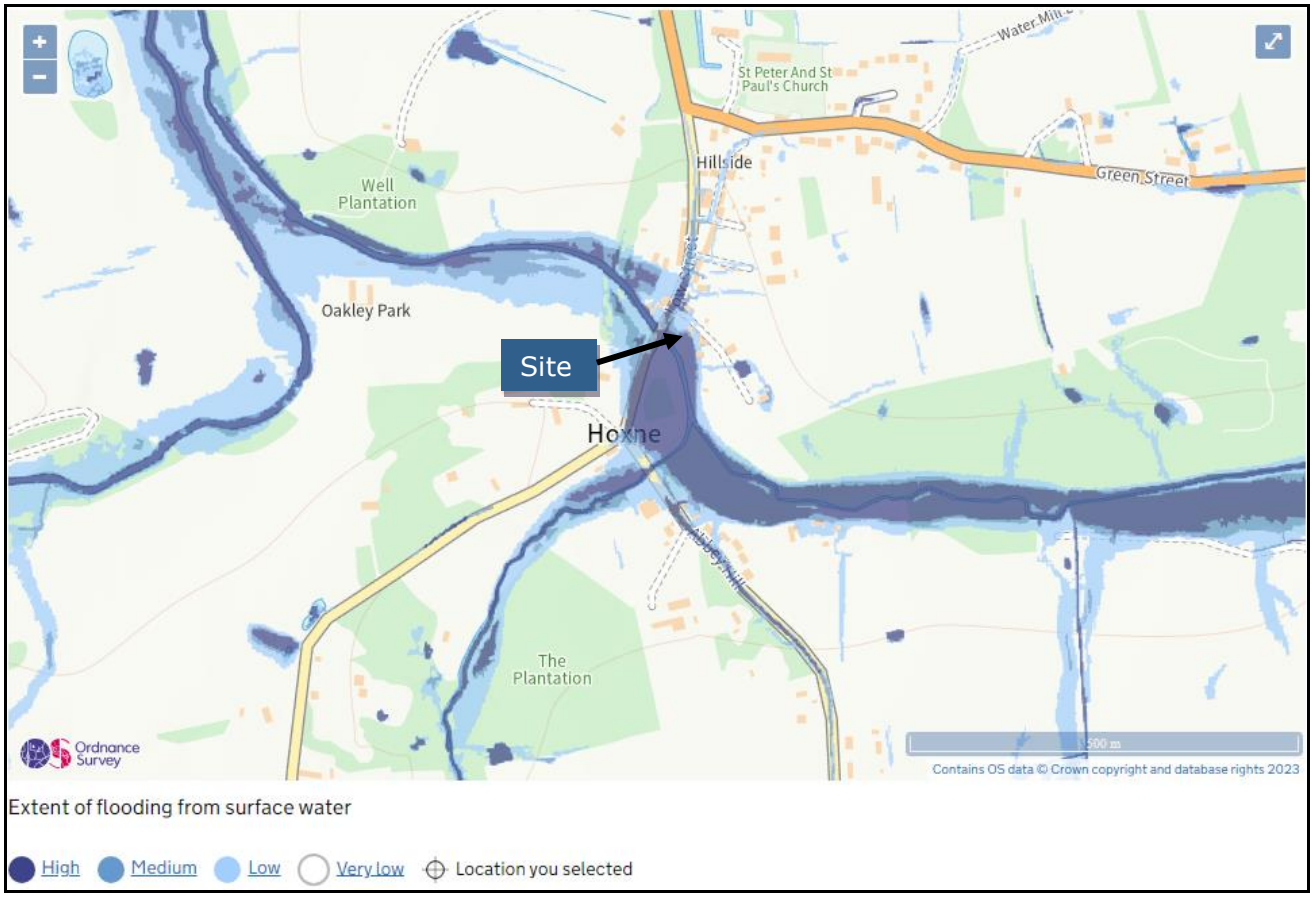


Figure 4: Environment Agency Surface Water Flooding Map (Source: Environment Agency, 2023)

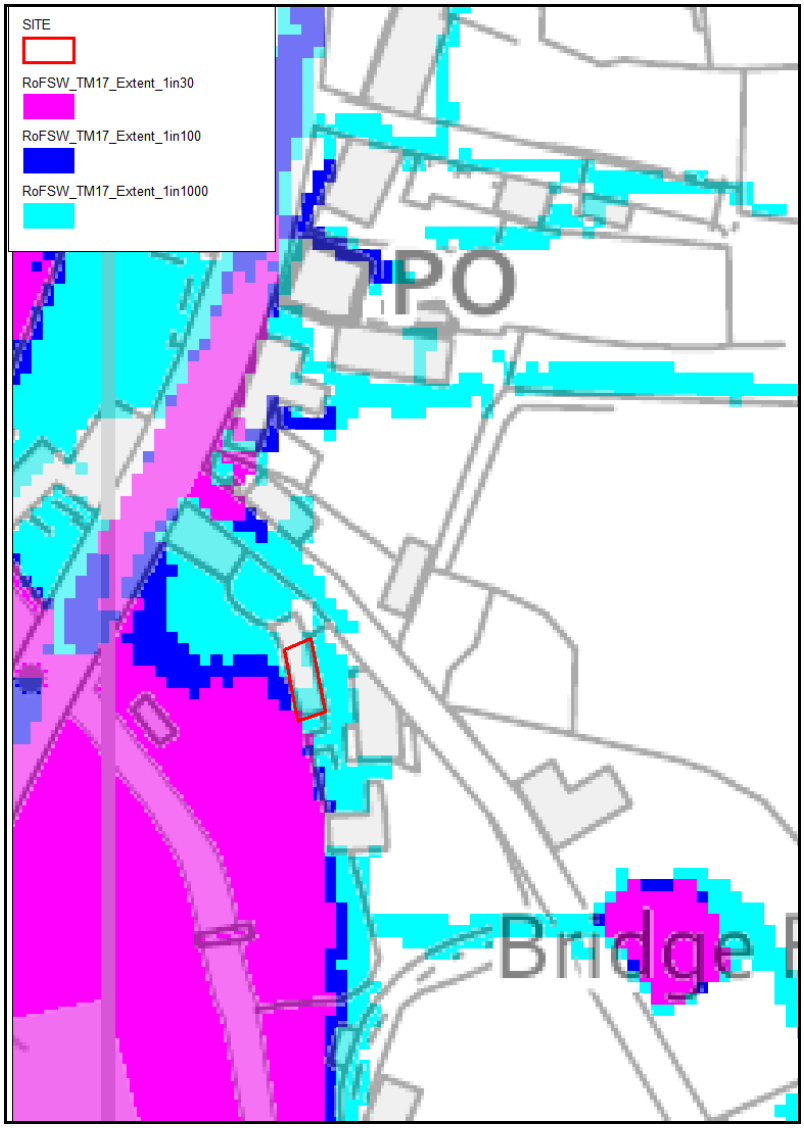


Figure 5: Environment Agency Surface Water Flooding Map (Source: Environment Agency, 2023)

4.3.6 Inspection of the data indicates that during low risk events the depth across the existing building is between 0m and 0.30m. Therefore, by comparing the LIDAR data to the flood depth it is estimated that the flood level would be up to 24.05m AOD.

4.3.7 The proposed ground floor level will be 24.45m AOD and therefore above the flood level thus providing safe dry refuge and no internal flooding.

Reducing Vulnerability to the Hazard

4.3.8 Flood Warnings for surface water flooding do not currently exist, however, the occupants should sign up to the Met Office weather warning system https://www.metoffice.gov.uk/public/weather/warnings and safe refuge is available at all times.

Table 1: Flood Event Action Plan

Alert	Level Definition	Action	Responsibility
Yellow: be aware	Yellow warnings can be issued for a range of weather situations. Many are issued when it is likely that the weather will cause some low level impacts, including some disruption to travel in a few places. Other yellow warnings are issued when the weather could bring much more severe impacts to many people but the certainty of those impacts occurring is much lower. It is important to read the content of yellow warnings to determine which weather situation is being covered by the yellow warning.	Monitor flood risk through media. Locate family members and inform them of risk. If away from the site make assessment on risk if considering returning to site (i.e. how long it will take to return etc). Check flood kit, check occupants, check pets – BE PREPARED in case the situation gets worse.	Occupants
Amber: be prepared	There is an increased likelihood of impacts from severe weather, which could potentially disrupt your works plans. This means there is the possibility of travel delays, road and rail closures, power cuts and the potential risk to life and property.	Monitor weather through media and local observations. Consider advice given from authorities including Council, Environment Agency and emergency services. Begin to implement Flood Plan. Check insurance, Check flood kit, Check Pets.	Occupants

Red: Take Action	Dangerous weather is expected and, if you haven't already done so, you should take action now to keep yourself and your works force safe from the impact of the severe weather. It is very likely that there will be a risk to life, with substantial disruption to travel, energy supplies and possibly widespread. You should avoid travelling, where possible, and follow the advice of the emergency services and local authorities.	Follow advice given by Emergency Services, Environment Agency and Council. Maintain communication through the media. Occupants can evacuate themselves if they feel unsafe providing that they make a judgement in relation to any external flood hazard. Take flood kit, occupants and pets with you. People who do not evacuate should reside across building.	Occupants

Safe Access/Egress

4.3.9 The Agency's map shows that there is a low risk adjacent to the site entrance, and a low to high risk along Low Street further north.

4.3.10 The flood hazard is calculated based on different combinations of floodwater depth and velocity, and subsequently by using the hazard equation as cited in the DEFRA/EA R&D Document *Framework and guidance for assessing and managing flood risk for new development Phase 2 (FD2320/TR2).* The numerical hazard rating extracted from the model is then categorised into four degrees of flood hazard (Table 2) in accordance with Table 3.2 of *FD2321/TR1* and Table 4.2 of *FD2321/TR2.*

Table 2: Hazard to people categories (taken from Table 3.2 of *FD2321/TR1* and Table 4.2 of *FD2321/TR2)*

Hazard Rating	Degree of Flood Hazard	Description
< 0.75	Very low hazard	Caution "Flood zone with shallow flowing water or deep standing water"
0.75 – 1.25	Danger for Some	Dangerous for some (i.e. children) "Danger: Flood zone with deep or fast flowing water"
1.25 – 2.0	Danger for Most	Dangerous for most people (i.e. general public) "Danger: Flood zone with deep fast flowing water"
> 2.0	Danger for All	Dangerous for all "Extreme danger: flood zone with deep fast flowing water"

4.3.11 By reviewing the flood hazard GIS *shape file* downloaded from Data.gov.uk (https://environment.data.gov.uk/DefraDataDownload/?Mode=rofsw) it can be seen that the hazard to people leaving the site during low risk events would be *Very low* for 11m, *Dangerous for Some* for 6m, *Dangerous for Most* for 65m, *Dangerous for Some* for 128m then *Very low* (Figure 6).

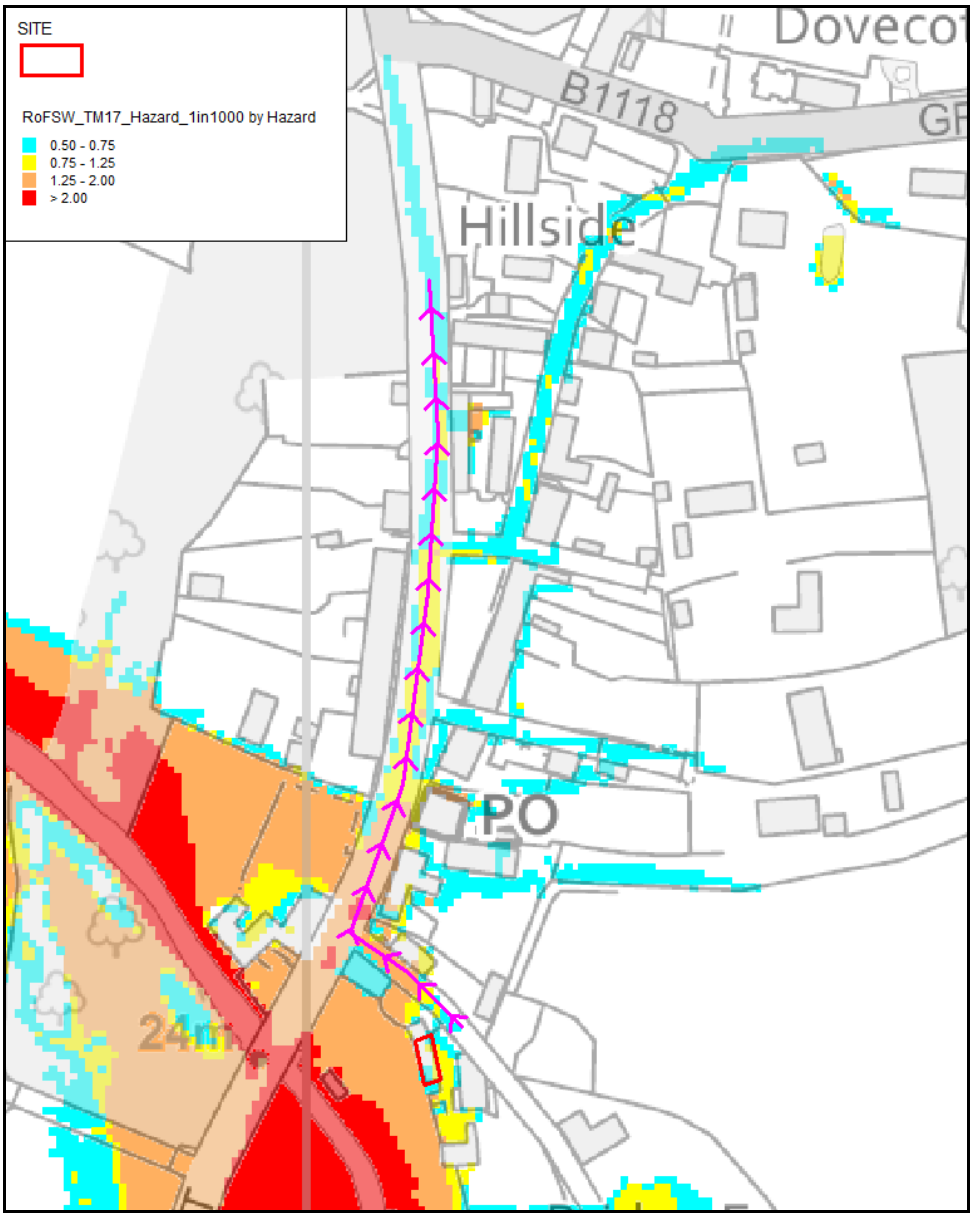


Figure 6: Evacuation route and hazard during low risk events (see Table 2 for hazard classification)

4.4 Reservoirs, Canals And Other Artificial Sources

4.4.1 The failure of man-made infrastructure such as flood defences and other structures can result in unexpected flooding. Flooding from artificial sources such as reservoirs, canals and lakes can occur suddenly and without warning, leading to high depths and velocities of flood water which pose a safety risk to people and property.

4.4.2 The Environment Agency's "Risk of flooding from reservoirs" map suggests that the site is not at risk from reservoirs.

5. CONCLUSIONS

- It is the Client's intention to change the use of the building to a residential dwelling. The ground floor level will be set at 24.45m AOD.
- The site is located within Flood Zone 3, 2 and 1 from the Ordinary Watercourse located to the west of the site. The SFRA suggests that where no detailed hydraulic models are present, Flood Zone 2 can be used as a proxy when considering climate change impacts.
- The flood zone extents have been imported onto the survey data and the flood contour for the (Zone 2) 1 in 1000 year event is approximately 24.25m AOD.
- Therefore, the proposed ground floor level of 24.45m AOD will be set above the flood level thus providing safe (dry) refuge.
- There is a low groundwater flood risk and low risk from reservoirs.
- There is a very low to low surface water flood risk across the site, although there is a very low risk across the dwelling. A more detailed analysis of the flood risk has been undertaken using the Data.gov.uk GIS data. The low risk (1000yr/100yr plus climate change) flood level is 24.05m AOD and therefore the proposed floor level will be set above the flood level.
- It is generally accepted that the low risk flood event (i.e. between 1 in 1000 years and 1 in 100 years) on the Agency's map is used as a substitute for the climate change 1 in 100 year event to provide a worst-case scenario. There is no policy requirement to apply climate change onto the 1 in 1000 year event, as climate change is applied up to the 1 in 100 year event as confirmed at https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#when-to-use-climate-change-allowance.
- Safe (dry) refuge will be available at all times.

6. BIBLIOGRAPHY

i. ADAS 1980. MAFF Report 5, *Pipe size design for field drainage*.

ii. Balmforth, D., et al. 2006. *Designing for exceedance in urban drainage – good practice, Report C635.* London: CIRIA.

iii. Bettess, R. 1996. *Infiltration drainage – Manual of good practice, Report C156*. London: CIRIA.

iv. BRE 1991. Digest 365. *Soakaway Design*.

v. British Standards Institute 2013. BS8582:2013 *Code of practice for surface water management for development sites*.

vi. Communities and Local Government 2012. *National Planning Policy Framework.*

vii. DEFRA 2015. *Sustainable Drainage Systems – Non statutory technical standards for sustainable drainage systems*.

viii. DEFRA/EA 2013. *Rainfall runoff management for developments*.

ix. DEFRA/EA 2005. *Framework and guidance for assessing and managing flood risk for new development, Phase 2, Flood and Coastal Defence R&D Programme, R&D Technical Report FD2320/TR2*. Water Research Council.

x. DEFRA/Jacobs 2004. *Strategy for Flood and Coastal Erosion Risk Management: Groundwater Flooding Scoping Study (LDS), Final Report, Volumes 1 and 2*.

xi. Dickie et al. 2010. *Planning for SUDS – Making it happen*. *Report C687*. London: CIRIA

xii. DOE 1981. *The Wallingford Procedure: Design and Analysis of Urban Storm Drainage*. HR Wallingford.

xiii. DOE 1981a. *Modified Rational Method: The Wallingford Procedure*. HR Wallingford.

xiv. Geological Society of London 2006. *Groundwater and Climate Change.* Geoscientist magazine, Volume 16, No 3.

xv. HR Wallingford 2005. *Use of SUDS in high density developments,* Report SR 666.

xvi. HR Wallingford 2002. *Guide for the Drainage of Development Sites,* Report SR 574.

xvii. Interpave 2010. *Understanding permeable paving: Guidance for designers, planners and local authorities*

xviii. Interpave 2010a. *Permeable pavements – guide to the design construction and maintenance of concrete block permeable pavements*

xix. Institute of Geological Sciences 1977. *Hydrogeological Map of England and Wales,* 1:625,000. NERC.

xx. Martin, P. *et al*. 2001. *Sustainable urban drainage systems – best practice guide, Report C523*. London: CIRIA.

xxi. Martin, P. *et al*. 2000. *Sustainable urban drainage systems - Design manual for England and Wales, Report C522*. London: CIRIA.

xxii. National SUDS Working Group. 2004. *Interim Code of Practice for Sustainable Drainage Systems*.

xxiii. NERC 2009. *Flood Estimation Handbook* [CD-ROM], Version 3. Institute of Hydrology.

xxiv. NERC 1975. *Flood Studies Report (FSR)*. Institute of Hydrology.

xxv. Newman, A.P. 2004. *Protecting groundwater with oil-retaining pervious pavements: historical perspectives, limitations and recent developments*. Quarterly Journal of Engineering Geology and Hydrogeology.

xxvi. Pratt, C., Wilson, S., and Cooper, P. 2002. *Source control using constructed pervious surfaces; hydraulic, structural and water quality performance issues, Report C582*. London: CIRIA.

xxvii. Reed, R., Faulkner, D. and Bayliss, A. 1999. *Flood Estimation Handbook (FEH)*, 5 Volumes. Institute of Hydrology.

xxviii. Soil Survey of England and Wales 1983. *Soil Map of East England (Sheet 4)*, 1:250,000. Cranfield University.

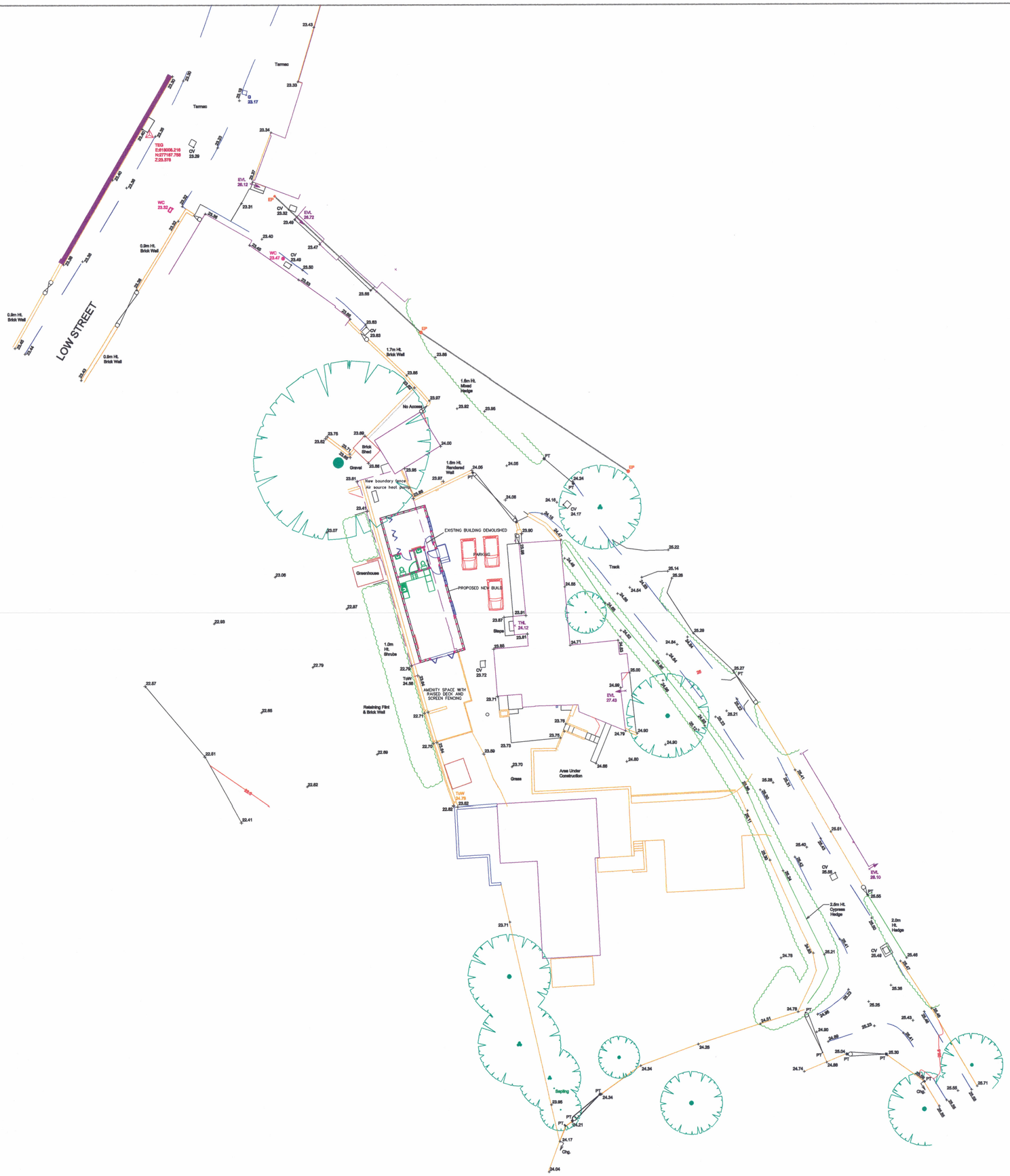
xxix. Water UK 2012. *Sewers for Adoption 7th Edition, A design and construction guide for developers*. Water Research Council.

xxx. Wilson, S., Bray, R. and Cooper, P. 2004. *Sustainable Drainage Systems; hydraulic, structural and water quality advice*, *Report C609.* London: CIRIA.

xxxi. Woods-Ballard., et al. 2015. *The SUDS Manual, Report C753*. London: CIRIA.

xxxii. Woods-Ballard., et al. 2007. *The SUDS Manual, Report C697*. London: CIRIA.

DRAWINGS



CLIENT

JAMES FLATMAN

PROJECT THE STABLES
LOW STRET HOXNE
EYE SUFFOLK IP21 5AR

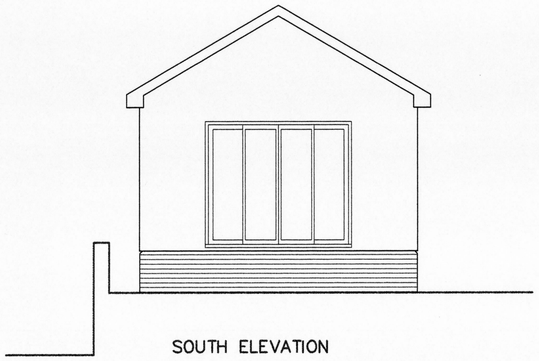
ARCHITECTURAL SOLUTIONS

THE STUDIO PAKENHAM
BURY ST EDMUNDS
SUFFOLK IP31 2LP
Telephone 01359 231932

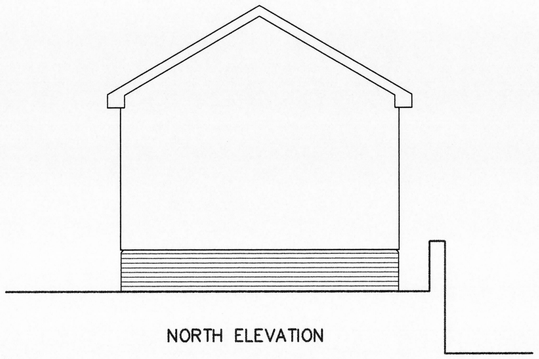
DRAWING

BLOCK PLAN

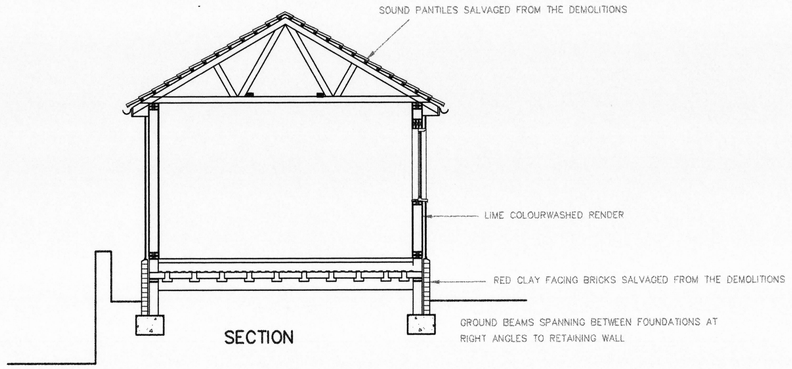
DRAWN ASL	DATE 09/23
SCALE 1:200	REV
JOB NO 2312/LO(-)01	



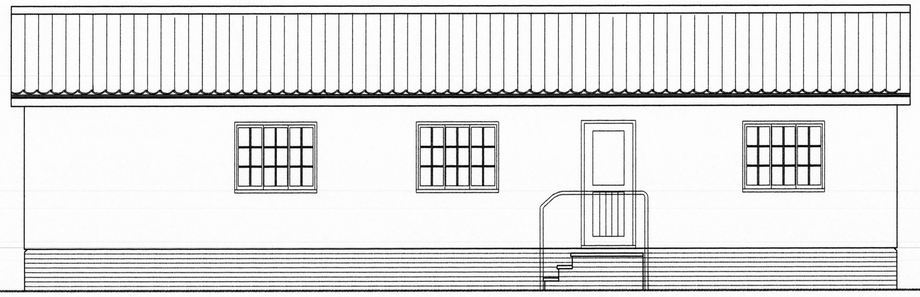
SOUTH ELEVATION



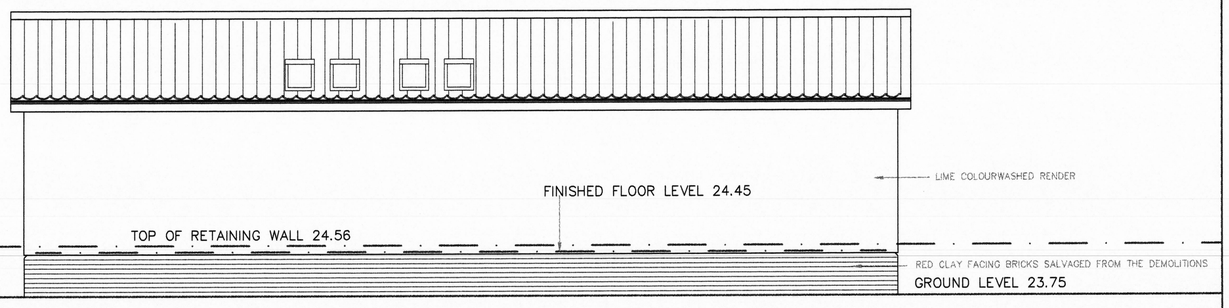
NORTH ELEVATION



SECTION

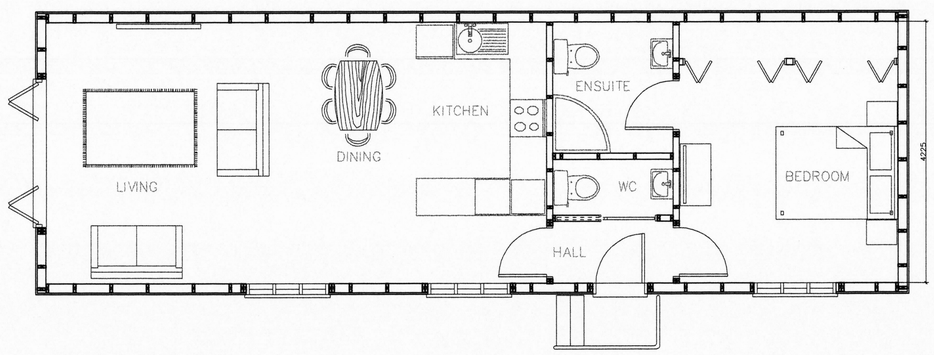


EAST ELEVATION

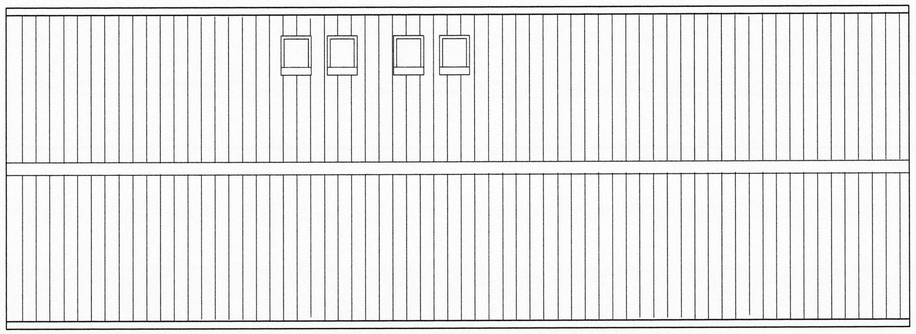


WEST ELEVATION

GROUND LEVEL AT BOTTOM OF RETAINING WALL 22.73



GROUND FLOOR PLAN



ROOF PLAN

CLIENT
JAMES FLATMAN

PROJECT
THE STABLES
LOW STREET HOXNE
EYE SUFFOLK IP21 5AR

ARCHITECTURAL SOLUTIONS
THE STUDIO PAKENHAM
BURY ST EDMUNDS
SUFFOLK IP31 2LP
Telephone 01359 231932

DRAWING
PROPOSED
RESIDENTIAL ACCOMMODATION

DRAWN ASL	DATE 09/23
SCALE 1:50	REV
JOB NO 2312/SK1A	


EVANS
Rivers and Coastal