



PROPOSED EXTENSION AT 4 HENDERSON CLOSE, BRAMFORD, SUFFOLK

FLOOD RISK ASSESSMENT

NOVEMBER 2023

REPORT REF: 3340/RE/11-23/01

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CONTRACT

Evans Rivers and Coastal Ltd has been commissioned by Mr Jack Walden to carry out a Flood Risk Assessment for a proposed extension at 4 Henderson Close, Bramford, 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:

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DISCLAIMER

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1. INTRODUCTION

1.1 Project Scope

1.1.1 Evans Rivers and Coastal Ltd has been commissioned by Mr Jack Walden to carry out a Flood Risk Assessment for a proposed extension at 4 Henderson Close, Bramford, 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 2023. 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.
- EA Standing Advice for Minor Extensions (<https://www.gov.uk/guidance/flood-risk-assessment-standing-advice#advice-for-minor-extensions>)

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 100049458).
- British Geological Survey, *Online Geology of Britain Viewer*.
- Filtered LIDAR data at 1m resolution covering the site and surrounding area.
- 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 4 Henderson Close, Bramford, Suffolk. The approximate Ordnance Survey (OS) grid reference for the site is 612505 246424 and the location of the site is shown on Figure 1.

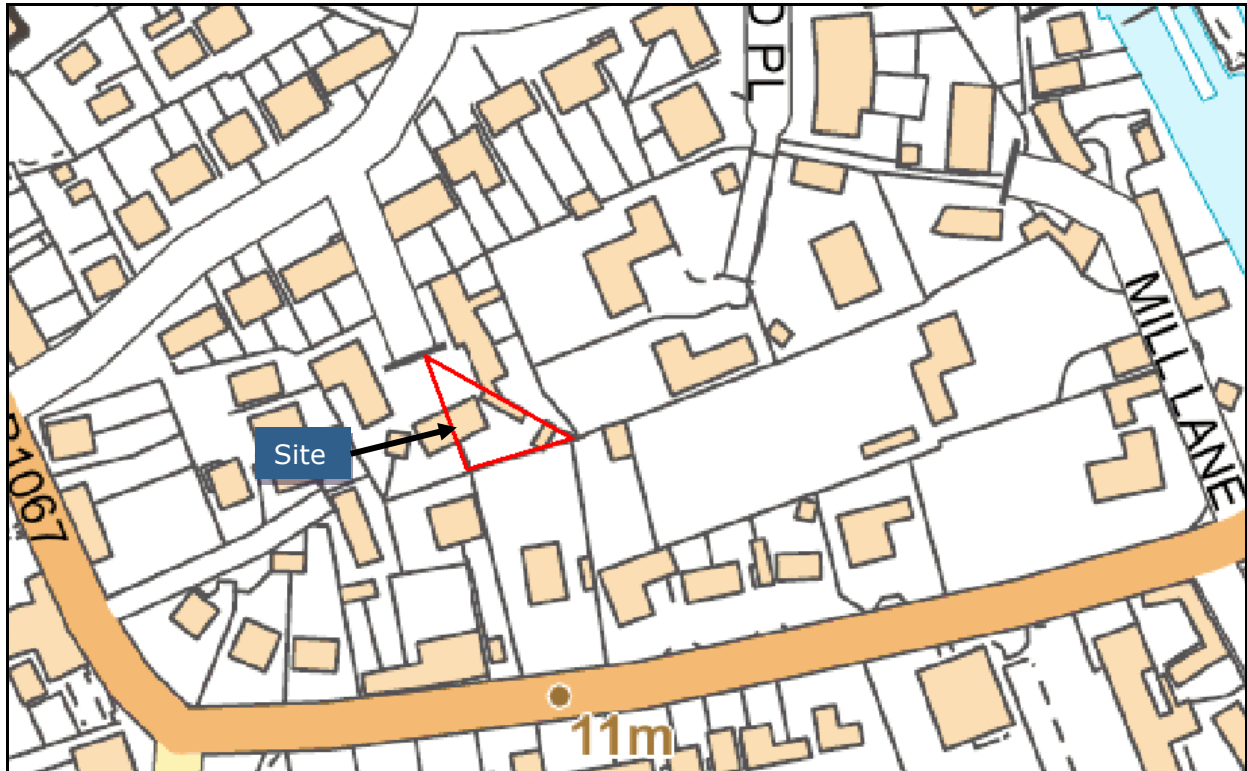


Figure 1: Site location plan (Source: Ordnance Survey)

3.1.2 The site comprises an existing two-storey semi-detached dwelling with single-storey rear and side extension together with front driveway and rear garden. The site is accessed from Henderson Close adjacent to the northern frontage of the site. The existing site layout can be seen on Drawing Number 23178/1.

3.1.3 Filtered LIDAR data at 1m resolution has 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 and on-site inspections that the ground floor is set 150mm higher than external ground level and at 10.50m 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 slightly extend the property along the side of the building and then to provide a first floor extension above this area as well as above the current rear extension.
- 3.2.2 The ground floor level of the extension will be the same as the dwelling and at 10.40m AOD.
- 3.2.3 The site proposals can be seen on Drawing Number 23178/2.
- 3.2.4 Annex 3 of the NPPF confirms that residential development is classified as a 'more-vulnerable' use.
- 3.2.5 Paragraph 27 of the NPPG and paragraph 168 of the NPPF states that the Sequential Test does not apply to minor householder development.

4. SOURCES OF FLOODING

4.1 Fluvial

4.1.1 The Environment Agency Flood Map (Figure 3) and Appendix B of the SFRA (Bramford and Blakenham Ward) shows that the site is located within the NPPF Flood Zone 1, 'Low Probability' which comprises land as having less than a 1 in 1000 year annual probability of fluvial or tidal flooding (i.e. an event more severe than the extreme 1 in 1000 year event). NPPF states that all uses of land are appropriate in this zone.

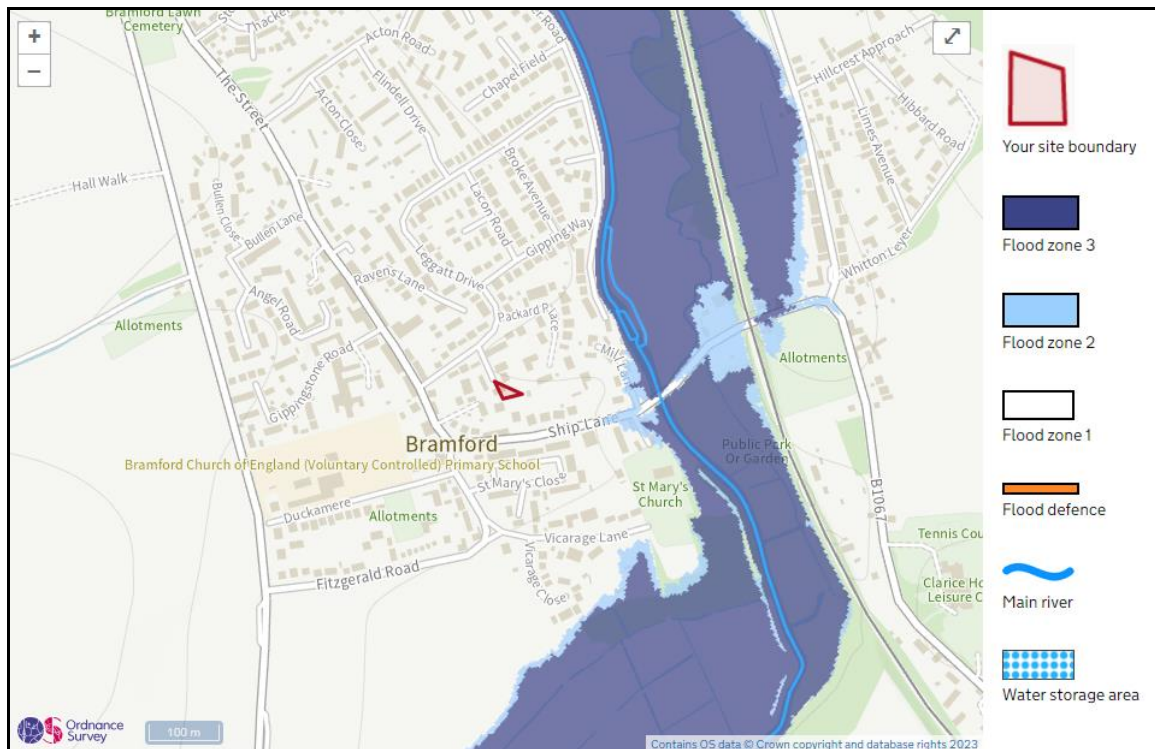


Figure 3: Environment Agency Flood Zone Map (Source: Environment Agency)

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.

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 is deemed as having a risk to subsurface assets but surface manifestation of groundwater is unlikely.

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. There are also no flood incidents that have been investigated at the site 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 surface water flood risk across the dwelling (i.e. less than 1 in 1000 year chance).
- 4.3.4 However, the mapping shows a very low to low risk adjacent to the dwelling (i.e. between a less than 1 in 1000 year chance and 1 in 100 years).
- 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>.

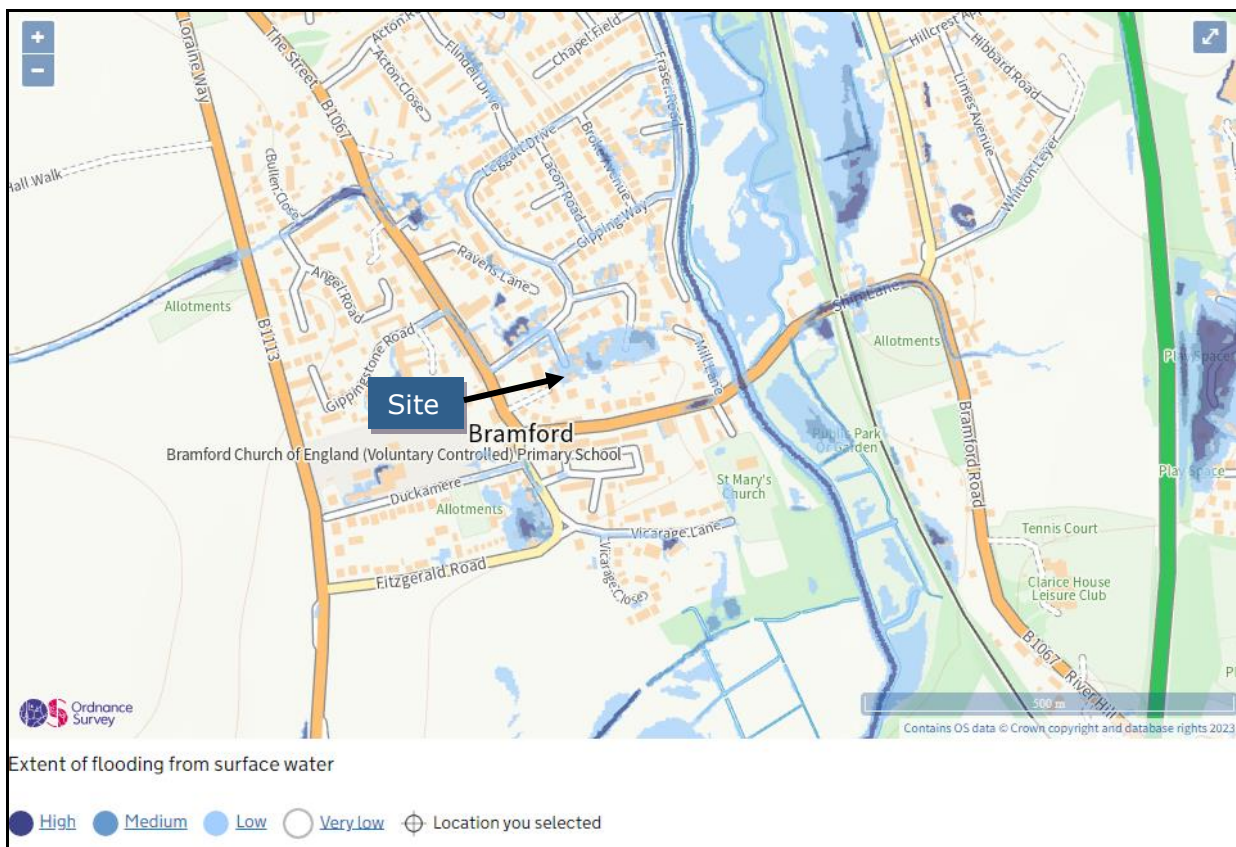


Figure 4: Environment Agency Surface Water Flooding Map (Source: Environment Agency, 2023)

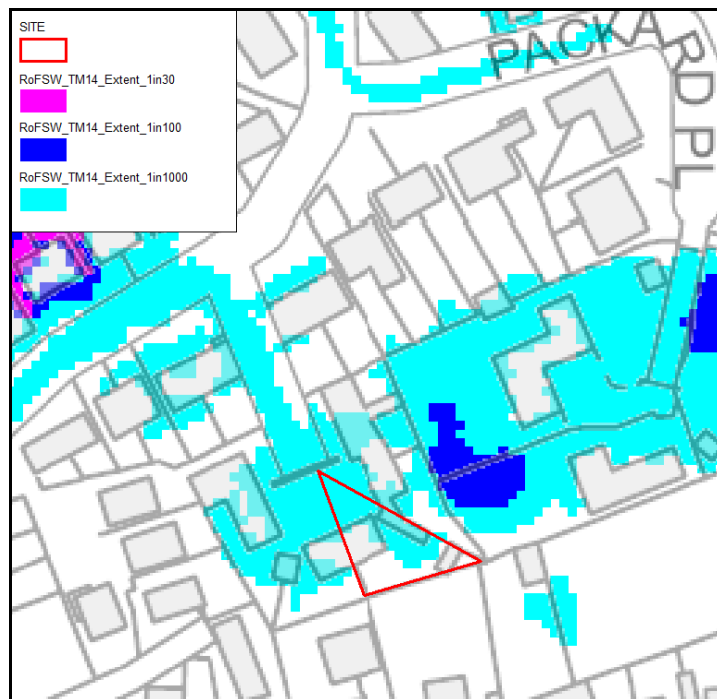


Figure 5: Environment Agency Surface Water Flooding Map (Source: Environment Agency, 2023)

- 4.3.6 Further detailed version of the 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_14).
- 4.3.7 Inspection of the data indicates that during low risk events the depth across the area intended for the small side extension is between 0.15m and 0.30m
- 4.3.8 By comparing the survey data to the low risk flood extent it is estimated that the low risk (1000yr/100yr plus climate change) flood level would be up to 10.50m AOD (i.e. 0.30m + 10.20m AOD).

Surface Water Flood Risk Mitigation

- 4.3.9 Paragraph 004 of the NPPF Planning Practice Guidance states that the first preference is to avoid flood risk by raising floor levels above the design flood level.
- 4.3.10 The ground floor level is set at 10.50m AOD and therefore above the flood level thus providing safe dry refuge and no internal flooding.
- 4.3.11 In order to comply with the EA Standing Advice for Minor Extensions (<https://www.gov.uk/guidance/flood-risk-assessment-standing-advice#advice-for-minor-extensions>), when considering flood resilience measures a freeboard allowance of 300mm above the estimated flood level should be included (i.e. to 10.80m AOD).

Water Entry Strategy

- 4.3.12 In accordance with the ODPM guidance document *Preparing for Floods* together with the aforementioned DCLG/DEFRA/EA document and CIRIA C790B – *Guidance on the code of practice for property flood resilience* dated 2020, a *Water Entry Strategy* should be incorporated to reduce the consequences of flooding up to the level of 10.80m AOD.

Floors

4.3.13 Suitable floor finishes such as ceramic or concrete based flooring are recommended.

Walls

4.3.14 Suitable flood proofing measures will need to be incorporated within the walls up to the flood level.

Fittings

4.3.15 Durable fittings which are not affected by floodwater could be used internally (e.g. plastic or stainless steel units). Wood fittings should be avoided; however sacrificial fittings can be installed which can then be replaced easily after the flood. There should be gaps behind the fittings to promote drainage and drying.

Services

4.3.16 It may be practical to set electrical sockets above the freeboard level, however, the mains supply of electric should be turned off in the event of a flood, and any boiler units should be placed as high as possible and above the flood level. Wiring for communications should also be insulated to prevent damage. Non-return valves are recommended to prevent back-flow of foul water.

Reducing Vulnerability to the Hazard

4.3.17 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
<p>Yellow: be aware</p>	<p>Yellow warnings can be issued for a range of weather situations.</p> <p>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.</p> <p>Other yellow warnings are issued when the weather could bring much more</p>	<p>Monitor flood risk through media.</p> <p>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).</p> <p>Check flood kit, check occupants, check pets – BE PREPARED in case the</p>	<p>Occupants</p>

	<p>severe impacts to many people but the certainty of those impacts occurring is much lower.</p> <p>It is important to read the content of yellow warnings to determine which weather situation is being covered by the yellow warning.</p>	<p>situation gets worse.</p>	
Amber: be prepared	<p>There is an increased likelihood of impacts from severe weather, which could potentially disrupt your works plans.</p>	<p>Monitor weather through media and local observations.</p> <p>Consider advice given from authorities including Council, Environment Agency and emergency services.</p> <p>Begin to implement Flood Plan.</p> <p>Check insurance, Check flood kit, Check Pets.</p>	Occupants
	<p>This means there is the possibility of travel delays, road and rail closures, power cuts and the potential risk to life and property.</p>		
Red: Take Action	<p>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.</p>	<p>Follow advice given by Emergency Services, Environment Agency and Council.</p> <p>Maintain communication through the media.</p>	Occupants

	<p>It is very likely that there will be a risk to life, with substantial disruption to travel, energy supplies and possibly widespread.</p> <p>You should avoid travelling, where possible, and follow the advice of the emergency services and local authorities.</p>	<p>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.</p> <p>People who do not evacuate should reside across building.</p>	
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Safe Access/Egress

4.3.18 The Agency’s map shows that there is a very low to low risk along Henderson Close adjacent to the site.

4.3.19 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 below) 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"

4.3.20 By reviewing the flood hazard GIS *shape file* downloaded from Data.gov.uk (<https://environment.data.gov.uk/DefraDataDownload/?Mode=rofs>) it can be seen that the hazard to people leaving the dwelling during low risk events would be a combination of *Very low*, *Dangerous for Some* and *Dangerous for Most* for 172m, then *Very low*.

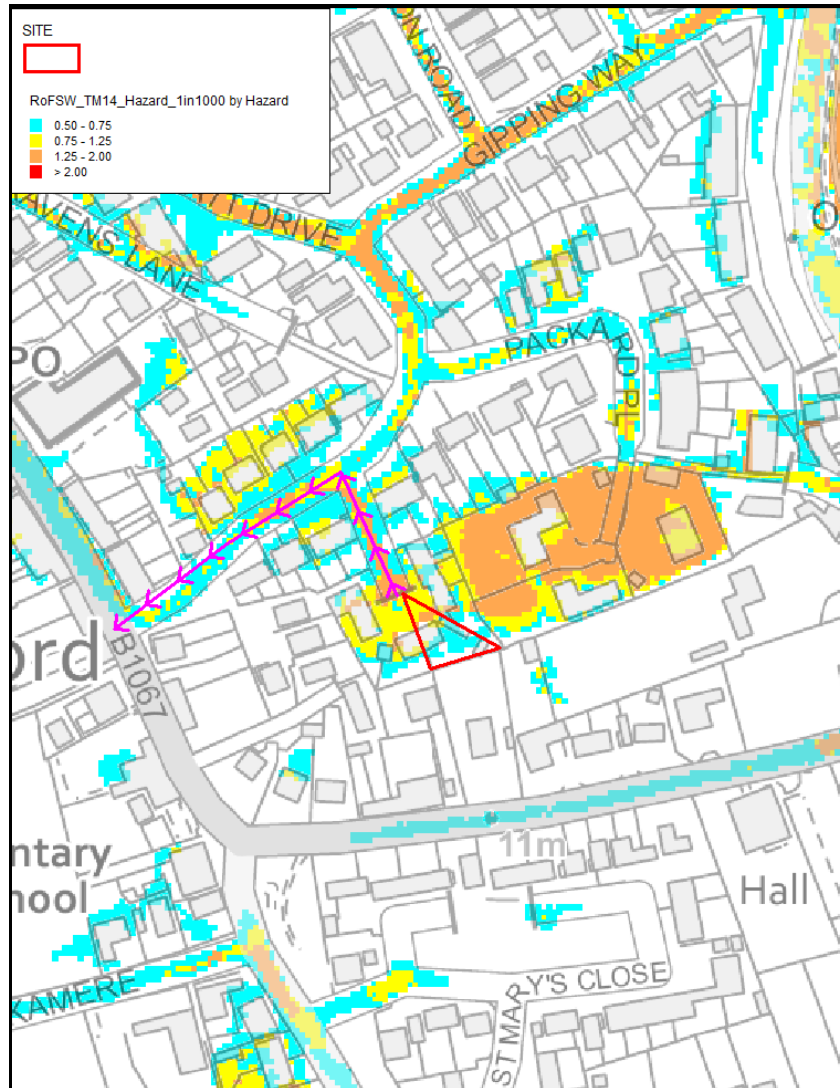


Figure 6: Hazard at the site and surrounding area (see Table 2 for hazard classification)

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

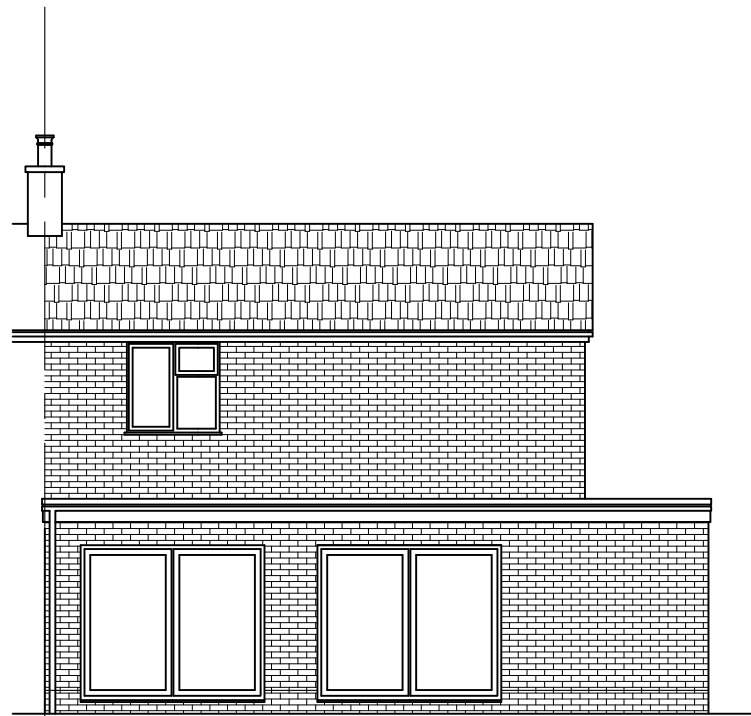
- The site is located within Flood Zone 1.
- There is a low groundwater flood risk and low risk from reservoirs.
- There is a very low surface water flooding risk (i.e. chance less than 1 in 1000 years) across the existing dwelling. However, the mapping shows a very low to low risk adjacent to the dwelling (i.e. between a less than 1 in 1000 year chance and 1 in 100 years).
- 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>.
- A more detailed analysis of the flood risk has been undertaken using the Data.gov.uk GIS data. It has been established that the low risk (1000yr/100yr plus climate change) surface water flood depth across the area intended for the small side extension is between 0.15m and 0.30m. The flood level has been estimated to be 10.50m AOD.
- The ground floor level is set at 10.50m AOD and therefore above the flood level thus providing safe dry refuge and no internal flooding.
- In order to comply with the EA Standing Advice for Minor Extensions (<https://www.gov.uk/guidance/flood-risk-assessment-standing-advice#advice-for-minor-extensions>), when considering flood resilience measures a freeboard allowance of 300mm above the estimated flood level should be included (i.e. to 10.80m AOD). A *Water Entry Strategy*, as discussed further in the aforementioned DEFRA/EA document, will be adopted.
- Safe refuge is available during the peak of the flood event across the ground floor.
- A flood response strategy is outlined in this report.

6. BIBLIOGRAPHY

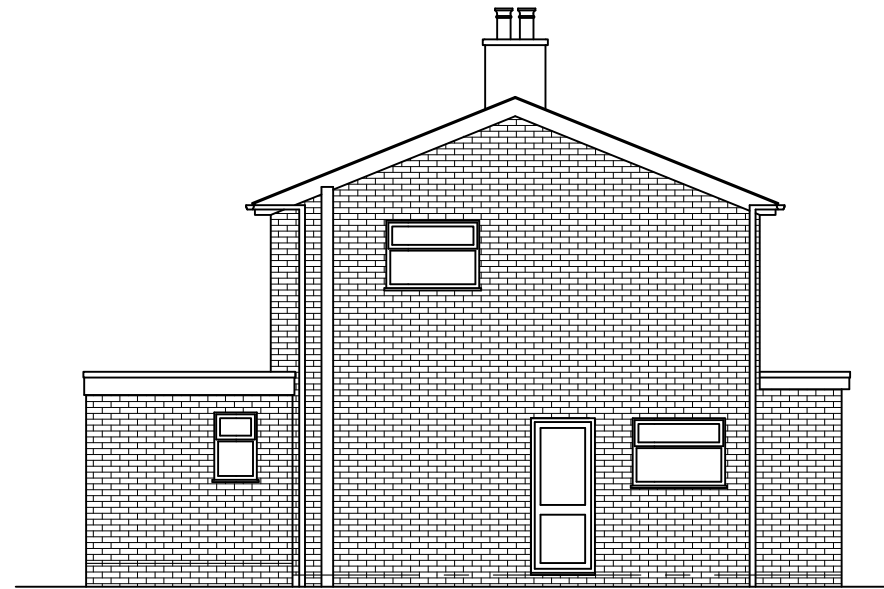
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DRAWINGS



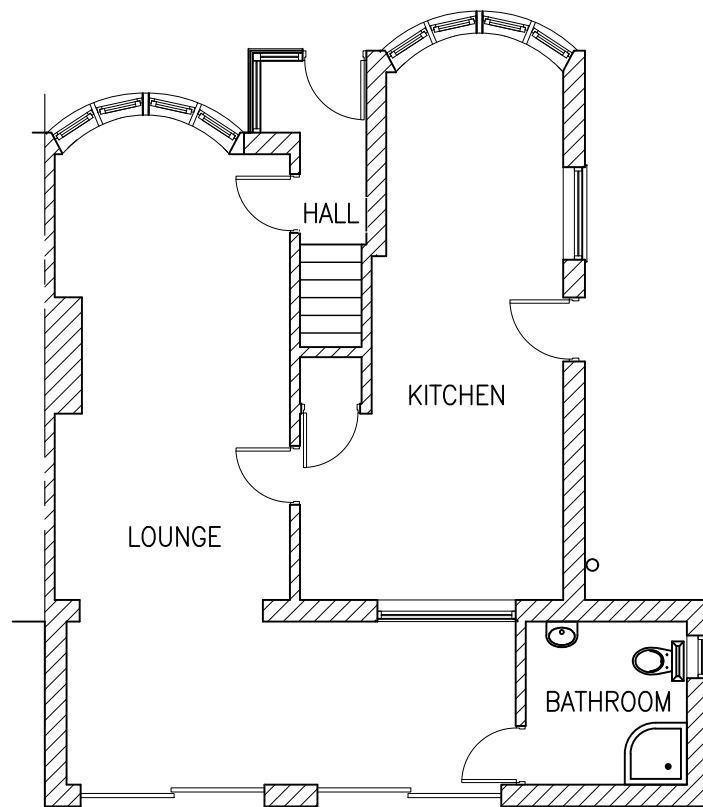
REAR (SOUTH) ELEVATION



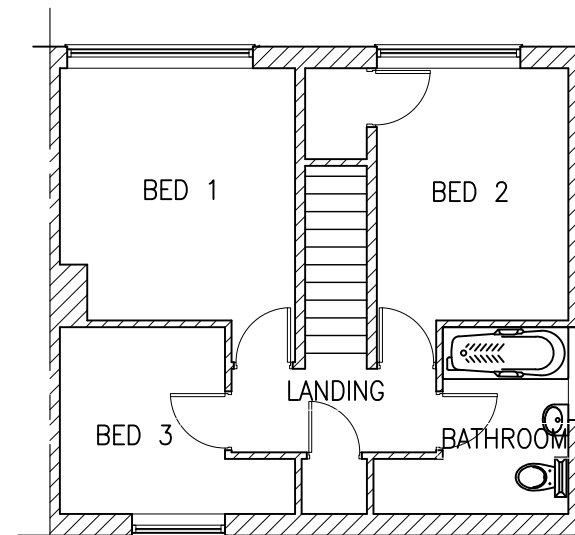
SIDE (EAST) ELEVATION



FRONT (NORTH) ELEVATION



GROUND FLOOR PLAN



FIRST FLOOR PLAN

DRAWING FOR PLANNING PURPOSE ONLY.



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71 Highfield Road,
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Structural Engineering &
Steelwork Fabrication

Drawing Title
4 HENDERSON CLOSE,
BRAMFORD.
IP8 4ET.
EXISTING DETAILS.

Scale 1:100(A3)	Drawn PRD	Date OCT 23	App
AutoCAD Drawing No. 23178 / 1			Rev.

Rev	Date	Drawn	Description



REAR (SOUTH) ELEVATION



SIDE (EAST) ELEVATION



FRONT (NORTH) ELEVATION

Materials.

Walls.

Red brickwork, to match existing.
Weather boarding, colour / type to be agreed.

Roof.

Flat roof construction.

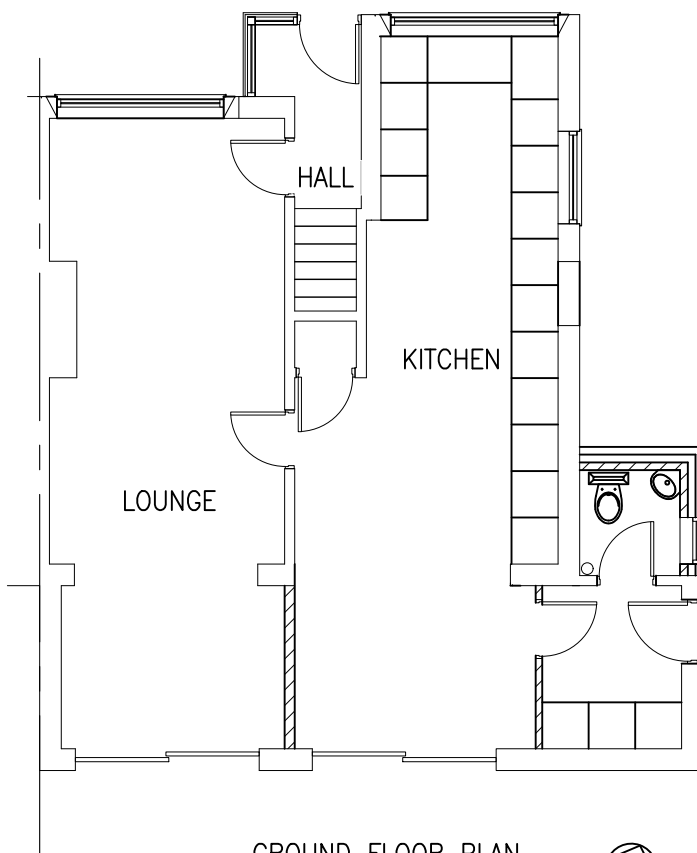
Windows and Doors.

White UPVC to match existing.

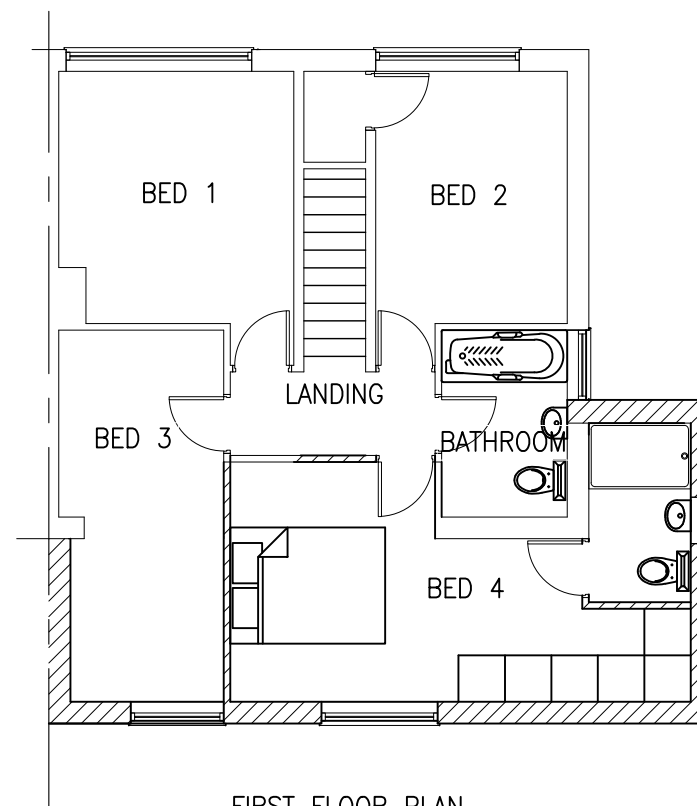
Fascia and Gutters.

White to match existing.

DRAWING FOR PLANNING
PURPOSE ONLY.



GROUND FLOOR PLAN



FIRST FLOOR PLAN

Paul Davis Structural Services,
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Structural Engineering &
Steelwork Fabrication

Drawing Title
4 HENDERSON CLOSE,
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PROPOSED DETAILS.

Scale 1:100(A3)	Drawn PRD	Date OCT 23	App
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AutoCAD Drawing No. 23178 / 2	Rev.
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Rev	Date	Drawn	Description

