

Flood Risk Assessment

To accompany a planning application for an
extension to

88 Alexandra Road, Gravesend,
Kent, DA12 2QQ

Prepared by

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1 Executive Summary

- A The extension is to a dwelling house and this is minor development;
- B The site lies in robustly defended tidal Flood Zone 3 and the rear of the site is at a Low risk from surface water flooding;
- C The site is not shown to be at risk during a tidal breach;
- D Proportionate flood resilience and mitigation methods will be implemented on site;
- E Safe access/egress routes are not affected and the site will be signed up to flood warning schemes;
- F There is no documented evidence of flood risk from any other sources;
- G The development does not impact on flood risk elsewhere;
- H Assuming the mitigation, warning and evacuation procedures can be maintained over the lifetime of the development, the proposed minor development to an existing dwelling within a developed area is considered acceptable.

Client actions required

- I Sign up to flood warning schemes.
- II Complete an emergency flood plan.

Designer actions required

- 1 Ensure plans and specification are updated to incorporate flood resilience and resistance measures prior to submission.
- 2 Ensure plans clearly show FFL of the extension is no lower than the existing FFL.
- 3 Confirm the design intention to manage surface water at source.

2 Introduction

2.1 Site location

The project is at 88 Alexandra Road, Gravesend, Kent, DA12 2QQ (see Figure 1).

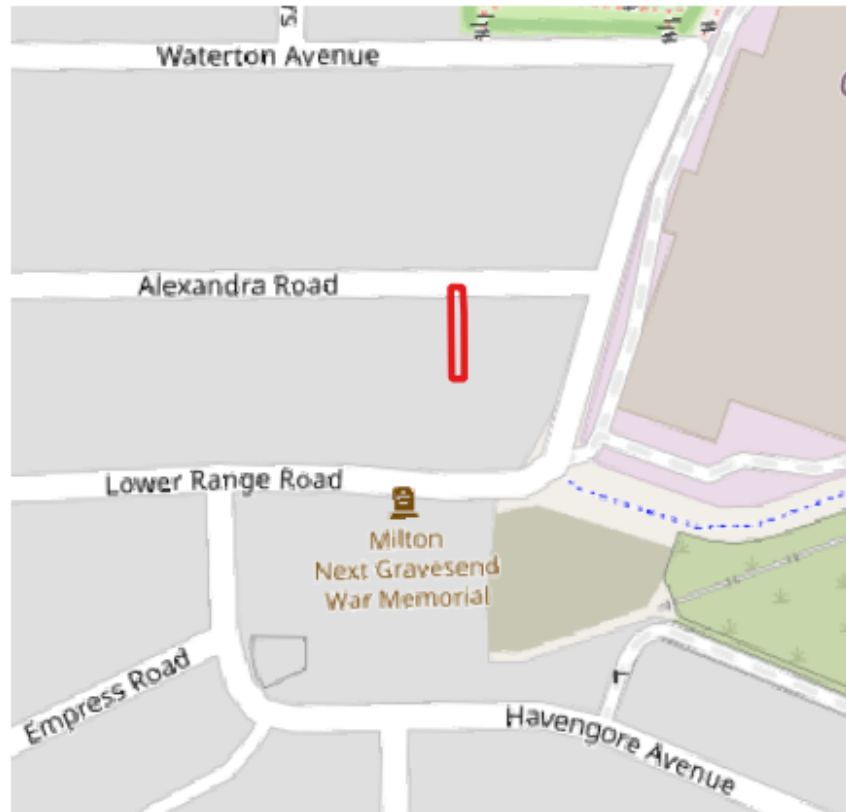


Figure 1: Site location plan, as indicated with North topmost. (source: EA flood mapping)

2.2 Development description

The proposal is for a domestic extension not exceeding 250m² in footprint. The site is an existing developed site and the proposed work is classed as minor development. The existing and proposed layouts and proposed sections are to be submitted under separate cover.

2.3 Site geology

Geological mapping data from within the vicinity indicate Taplow Gravel Member - Sand and gravel however this would require confirmation on site. If available on site, the superficial deposits may offer medium permeability.

Infiltration SuDS may therefore be viable.

3 Policies

In preparation for this Flood Risk Assessment (FRA), National Planning Policy Framework^[4] and British Standards on Assessing and Managing Flood Risk^[2] were reviewed, and their related policies are, where applicable, referred to in this report.

The Environment Agency has been consulted in order to establish the flood zone of the proposed site.

In addition, planning policies from the Local Authority were also reviewed including its Strategic Flood Risk Assessment.

Some of key policies are summarised as below.

3.1 Standing Advice

Generally the following applies: Apart from habitable basements, domestic extensions within the curtilage of the dwelling (see GDPO definition of, minor development) and non-domestic extensions with a footprint of less than 250 m² will not require a detailed FRA. These applications should demonstrate that the risk of flooding from all sources has been assessed. The main sources of flooding are likely to be tidal, surface water and sewer flooding.

3.2 Environment Agency Guidance on Standing Advice

- You need to provide a plan showing the finished floor levels and the estimated flood levels.
- Make sure that floor levels are either no lower than existing floor levels or 300 millimetres (mm) above the estimated flood level. If your floor levels aren't going to be 300mm above existing flood levels, you need to check with your local planning authority if you also need to take flood resistance and resilience measures.
- State in your assessment all levels in relation to Ordnance Datum (the height above average sea level). You may be able to get this information from the Ordnance Survey. If not, you'll need to get a land survey carried out by a qualified surveyor.
- Your plans need to show how you've made efforts to ensure the development won't be flooded by surface water runoff, eg. by diverting surface water away from the property or by using flood gates.

- If your minor extension is in an area with increased flood risk as a result of multiple minor extensions in the area, you need to include an assessment of the off-site flood risk. Check with your local planning authority if this applies to your development.
- Make sure your flood resistance and resilience plans are in line with the guidance on improving the flood performance of new buildings.

For all relevant vulnerable developments (ie more vulnerable, less vulnerable and water compatible), you must follow the advice for:

- surface water management
- access and evacuation
- floor levels
- extra flood resistance and resilience measures

4 Flood risk analysis

4.1 Sources of potential flooding

Flood risk from various sources at the site is analysed in this section.

4.1.1 Flood risk from sea and rivers

Flooding can also take place from flows that are not contained within the channel due to high levels of rainfall in the catchment.

The site is not at risk from fluvial flooding.

Flooding can occur from the sea due to a particularly high tide or surge, or combination of both.

With reference to the Environment Agency flood map, Figure 2, the site lies in Flood Zone 3. This means that the site, if undefended, would have a High probability of tidal flooding (greater than a 1 in 200yr annual probability of flooding).

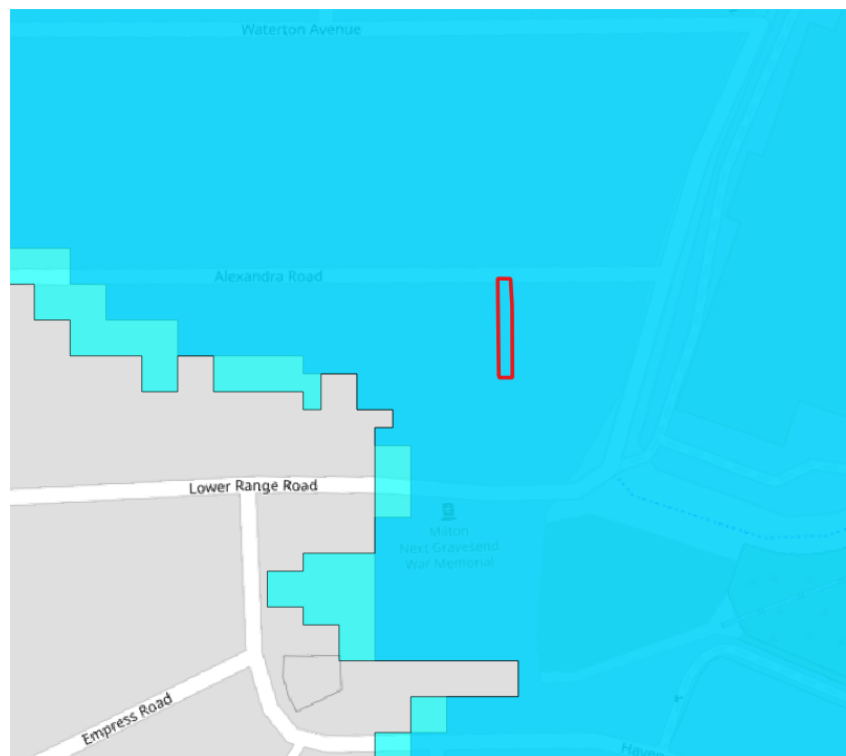


Figure 2: Flood mapping from the EA online data. The site falls within Flood Zone 3

4.1.2 Maximum Likely Water Level 2024

The MLWL for the Thames at the nearest EA model node (3.27) is 5.71m AOD

4.1.3 Maximum Likely Water Level 2100

The MLWL for the Thames at the nearest EA model node is 6.38m AOD

4.1.4 Defences

The site does however benefit from robust flood defences as indicated by the hatched area in Figure 3.

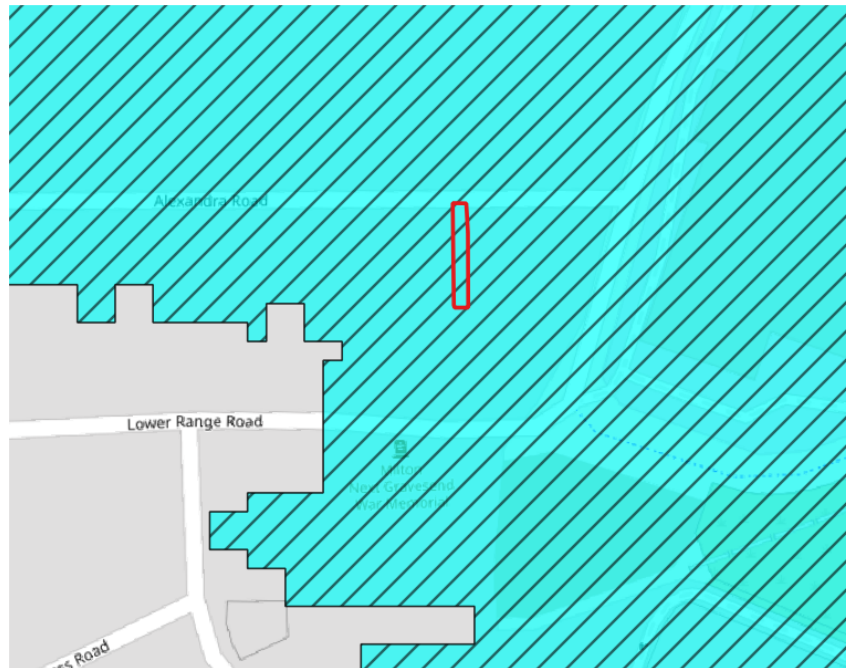


Figure 3: Defended area as indicted by hatching.

Given the robust nature of the Thames defences the relative risk of flooding to the site is given by the EA as Low.

4.1.5 Tidal Breach

The site falls inside an area at risk from a tidal breach (epoch 2100) as shown in Figure 4.



Figure 4: Site location relative to the extents of a tidal breach (SFRA)

4.1.6 Historic tidal flood events

The site falls outside an area of previous flooding as shown in Figure 5.

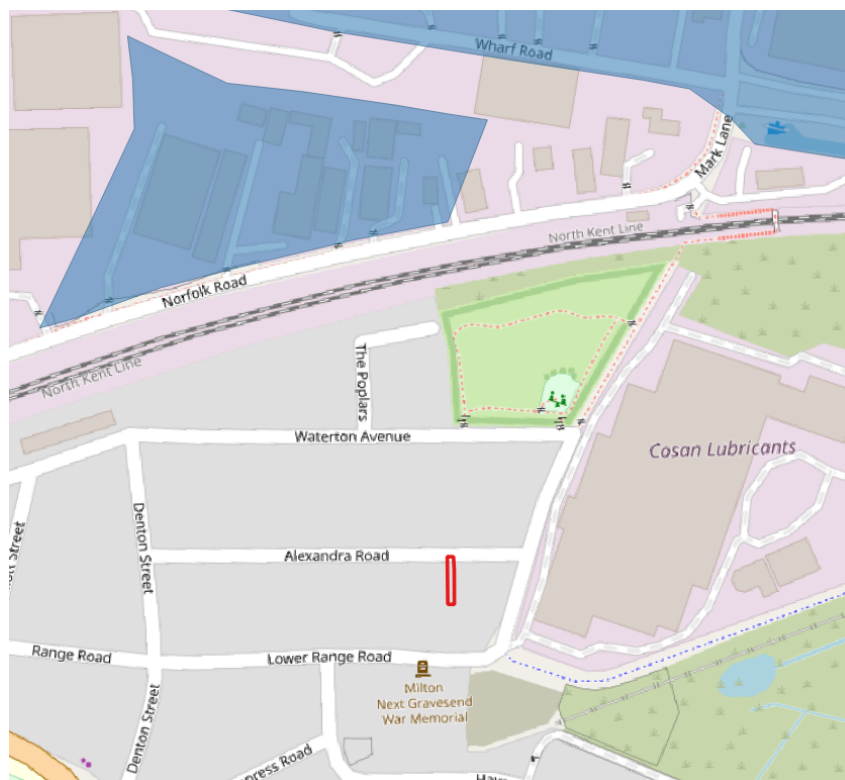


Figure 5: Site location relative to historic flood extents

4.1.7 Flood risk from groundwater

Groundwater flooding occurs when water levels in the ground rise above surface levels. It is most common in low-lying areas underlain by permeable rock (aquifers), usually due to extended periods of wet weather. This site is considered to be in an area at a Low risk.

Since the proposed development does not involve any basement elements, the impact of groundwater flooding on the proposed site will be minimal.

Hence, the relative risk of groundwater flooding on the proposed site can be considered to be negligible.

4.1.8 Flood risk from sewer and highway drains

Flooding occurs when combined, foul or surface water sewers and highway drains are temporarily over-loaded due to excessive rainfall or due to blockage.

There are no indicators to Sewer flooding at the site.

Hence, the risk of sewer and highway flooding to the proposed site can be considered to be Low.

4.1.9 Flooding risk from surface water

Flooding occurs when rainfall fall on a surface (on or off the site) which acts as run-off which has not infiltrated into the ground or entered into a drainage system.

With reference to the E.A online mapping, Figure 6, the site is not at risk from surface water flooding for the design period, 1 in 100yr event but part of the rear garden area is within an area at risk from the more extreme 1 in 100yr to 1 in 1000yr event.

The foot print of the extension is not at risk from surface water flooding.



Figure 6: SW flood extent mapping. The extension is not shown to be at risk from SW flooding.

4.1.10 Flood risk from infrastructure failure

Flooding occurs because of canals, reservoirs, industrial processes, burst water mains or failed pumping stations.

The site is not shown to be at flood risk due to reservoir failure.

Hence the flood risk to the site from reservoir failure is considered to be negligible.

4.1.11 Urban flash flooding

With reference to the UFF dataset there are no referenced flash flood incidents at this location.

4.2 On-site surface water analysis and management

4.2.1 Generation of Run-off

The post-development surface water run-off volume will increase when compared to the pre-development level because there is an overall reduction in permeable areas.

Hence any additional surface water arising from the extension will require management on site in line with the drainage hierarchy.

4.2.2 SuDS Statement:

Surface water will be managed in full alignment with the SuDS hierarchy as required under provisions made under the Town and Country Planning Act 1990.

While not required for Planning permission consent it can be confirmed that all SW on site will be also be designed, installed and tested in full accordance with Part H of the Building Regulations 2010 (as amended 2013), Requirement H3, as made under the Building Act 1984.

It is likely that shallow soakaways will be viable hence the recommendation of this report would be to adopt the use of shallow soakaways and a water butt as a viable and proportionate SuDS solution on site.

4.3 Impact on flood risk elsewhere

SW arising: Since the proposal is intending to manage any additional surface water at source the impact on flood risk elsewhere is Low.

5 Levels

5.1 Flood depth data

Predicted flood depth in the event of a tidal breach = 0.0m

5.2 Floor level data

The proposed floor level to be no lower than any existing ground floor levels.

6 Management of flood risk

6.1 Flood risk resilience measures

Because the site is located in Flood Zone 3 and hence at an albeit low risk from flooding, it is a recommendation¹ of this report that flood risk resilience measures should be incorporated into the development's construction, specifically at ground floor and all construction below such that "the development is appropriately flood resistant and resilient such that, in the event of a flood, it could be quickly brought back into use without significant refurbishment"^[4].

In accordance with the document "Improving the Flood Performance of New Buildings - Flood Resilient Construction"^[3] a series of design approaches should be planned to mitigate the flood risk based on the flow chart as at Figure 7.

¹While the actual choice of resilience measures is not a Statute requirement under the T&CP Act 1990, the designer should follow best practice guidance to meet NPPF:167(b). Hence the designer is advised to consider in full such recommendations so that NPPF:167(b) is met and compliance with Part C of the Building Regulations 2010 can later be demonstrated to the B.C.B.

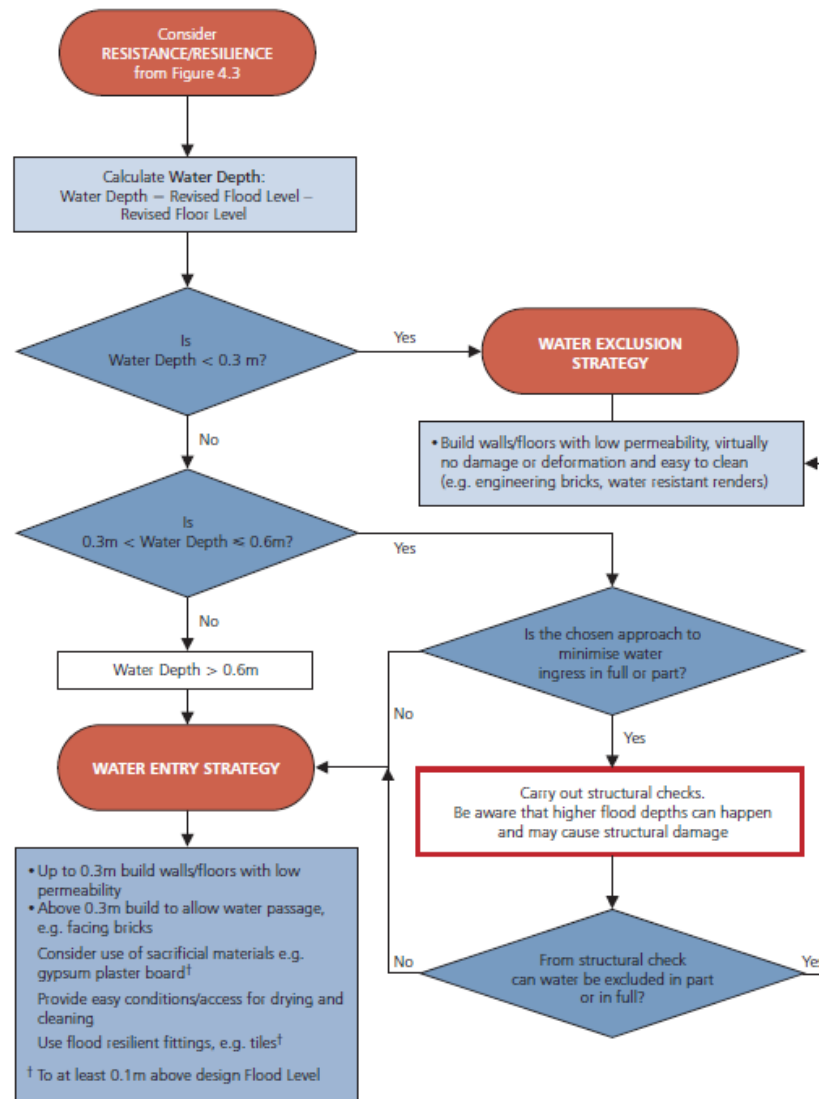


Figure 7: Design strategies for resistance and resilience^[3]

Table 1 provides guidance on which materials are most suitable, suitable and unsuitable, when considering construction work involved in this project. This report recommends the use of materials from the “most suitable” column were this is at all possible on site, however they are not mandatory requirements.

Component	Most suitable	Suitable	Unsuitable
Flooring	Concrete, pre-cast or in situ	Timber floor, fully sealed, use of marine plywood.	Untreated timber, Chipboard
Floor Covering	Clay tiles, Rubber sheet floors, Vinyl sheet floors	Vinyl tiles, Ceramic tiles	
External Walls - to max flood level	Engineering brick, Reinforced concrete	Low water absorption brick	Large window openings
Doors	Solid panels with waterproof adhesives, Aluminium, plastic or steel	Epoxy sealed doors	Hollow core plywood doors
Internal Partitions	Brick with waterproof mortar, Lime based plasters	Common bricks	Chipboard, Fibreboard panels, Plasterboard, Gypsum plaster
Insulation	Foam or closed cell types	Reflective insulation	Open cell fibres
Windows	Plastic, metal	Epoxy sealed timber with waterproof glues and steel or brass fittings.	Timber with PVA glues and mild steel fittings

Table 1: Summary of Material Suitability for Building Components^[1]

6.2 Flood mitigation measures

The designer is also recommended to consider the provision of a combination of the following flood mitigation measures, to be installed if at all practicable, for use within and around the extension for use in any flooding event:

- Flood resilient doors: Specifically designed to prevent ingress of flood water - passive system (see also Figure 8).
- Door defence: Bespoke barriers fitted externally across doors and low windows and/or the provision of filled sandbags (see also Figures 9 & 10).

- Anti flood air bricks: Where these are unavoidable, these offer replacements for standard air bricks these prevent water entering the sub floor void - passive system i.e. fully automatic (see also Figure 11).
- Air brick and flue covers (see also Figure 12).
- No service penetrations or other openings (cat flaps and letter boxes included) below 1m above FFL.



Figure 8: UPVC doors under flood conditions. These appear to offer reasonable flood resilience



Figure 9: Flood gate example.



Figure 10: Sand bag defence.



Figure 11: Anti flood air brick. Example from CSI products



Figure 12: Air brick covers. Example from Buffalo products

7 Management of residual risk

Any residual risk can be safely managed by not impairing access and evacuation routes, signing residents up to flood warning schemes and preparation of domestic flood plans.

7.1 Safe access and egress routes

The NPPF stipulates that, where required, safe access and escape routes should be available to/from new developments in flood risk areas. Access routes should be such that occupants can safely access and exit buildings in design flood conditions. The extension does not impact on existing access and egress routes. It is noted that the existing routes are within the flood risk zone (ref Figure 13).

It should be noted that tidal flood events are generally more predictable than fluvial events due to the cyclic nature of the tides and hence early warning is expected to be widely broadcast. It is therefore important that the occupiers gain early warning of any likely flood events.

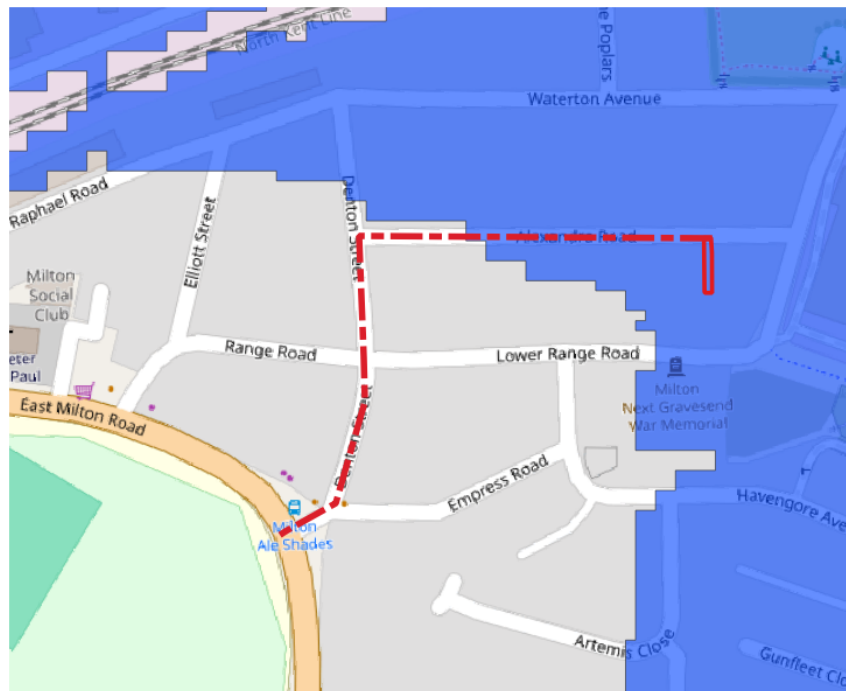


Figure 13: Access and Egress routes, although not ideal, are however existing and not impacted by the extension.

7.2 Flood warning schemes

Since it has been established that the site is sited in an area with a possibility of flooding the owners of the dwelling should (if they have not done so already) sign up to the E.A. “Flood Warnings Direct” which is a free service providing flood warnings by phone, text or email. See <https://www.fws.environment-agency.gov.uk/app/olr/register>, or call the E.A. on 0345 988 1188 for full information.

7.3 Flood Plan

This report also provides the owners of the dwelling with a proforma Flood Plan (See Appendix A for an example). The plan, when completed bespoke to the owners, will provide guidance on emergency response procedures in the event of flooding to the site. This will:

- Provide details of who to contact and how;
- Provide details of how to turn off gas, electricity and water mains supplies;
- Provide details of designated safe egress routes out of the building and out of the local area at risk;
- Provide details of E.A. Flood warning codes;
- Provide details of local radio stations
- Provide a check list of essential items.

8 Conclusions

Given that:

- The extension is to a dwelling house and this is minor development;
- The site lies in robustly defended tidal Flood Zone 3 and the rear of the site is at a Low risk from surface water flooding;
- The site is not shown to be at risk during a tidal breach;
- Proportionate flood resilience and mitigation methods will be implemented on site;
- Safe access/egress routes are not affected and the site will be signed up to flood warning schemes;
- There is no documented evidence of flood risk from any other sources;
- The development does not impact on flood risk elsewhere;

and assuming the mitigation, warning and evacuation procedures can be maintained over the lifetime of the development, the proposed minor development to an existing dwelling within a developed area is considered acceptable.

Signed:



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Date: 11th June, 2024

References

- [1] J Wingfield; M Bell; P Bowker. Improving the flood resilience of buildings through improved material, methods and details. Technical Report WP2c, CIRA, 2005.
- [2] BSI. BS 8533:2011. Technical report, 2011.
- [3] CIRIA, CLG, EA and DEFRA. Improving the flood performance of new buildings. Flood resilient construction, 2007.

- [4] Ministry of Housing, Communities and Local Government. National planning policy framework. 2021.

A Emergency flood plan (example)

Personal flood plan

Name

Environment Agency

Are you signed up to receive flood warnings?

If not call Floodline on 0345 988 1188 to see if your area receives free flood warnings.

Let us know when you've completed your flood plan by calling Floodline on 0345 988 1188. This will help us learn more about how people are preparing for flooding.

General contact list	Company name	Contact name	Telephone
Floodline	Environment Agency		0345 988 1188
Electricity provider			
Gas provider			
Water company			
Telephone provider			
Insurance company and policy number			
Local council			
Local radio station			
Travel/weather info			

Key locations

Service cut-off	Description of location
Electricity	
Gas	
Water	

Who can help/who can you help?

Relationship	Name	Contact details	How can they/you help?
Relative			
Friend or neighbour			

Be prepared for flooding. Act now

Personal flood plan

What can I do NOW?

☐ Put important documents out of flood risk and protect in polythene

☐ Look at the best way of stopping floodwater entering your property

☐ Find out where you can get sandbags

☐ Identify what you would need to take with you if you had to leave your home

☐ Check your insurance covers you for flooding

☐ Make a flood plan and prepare a flood kit

☐ Identify who can help you/ who you can help

☐ Understand the flood warning codes



What can you do if a flood is expected in your area?

Actions	Location
Home - Move furniture and electrical items to safety - Put flood boards, polythene and sandbags in place - Make a list now of what you can move away from the risk - Turn off electricity, water and gas supplies - Roll up carpets and rugs - Unless you have time to remove them hang curtains over rods - Move sentimental items to safety - Put important documents in polythene bags and move to safety	
Garden and outside - Move your car out of the flood risk area - Move any large or loose items or weigh them down	
Business - Move important documents, computers and stock - Alert staff and request their help - Farmers move animals and livestock to safety	
Evacuation - Prepare a flood kit in advance - Inform your family or friends that you may need to leave your home - Get your flood kit together and include a torch, warm and waterproof clothing, water, food, medication, toys for children and pets, rubber gloves and wellingtons	

There are a range of flood protection products on the market to help you protect your property from flood damage. A directory of these is available from the **National Flood Forum** at www.bluepages.org.uk

Be prepared for flooding. Act now

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