

Flood Response Plan for Former Henry Isaac Foundry, St. Ippolyts

Supporting Document

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Prepared for: Jarvis Homes Ltd

Jarvis
HOMES OF DISTINCTION

www.jbaconsulting.com

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Purpose

This Flood Response Plan has been commissioned by Jarvis Homes in order to look to address Planning Condition 16 and 20.

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Abbreviations

ADEPT	Association of Directors of Environment, Economy, Planning and Transport
AEP	Annual Exceedance Probability
AOD	Above Ordnance Datum
BBC.....	British Broadcasting Corporation
BDMA.....	British Damage Management Association
CC	Climate Change
EA	Environment Agency
FFL.....	Finished Floor Levels
FRA.....	Flood Risk Assessment
FRP.....	Flood Response Plan
ISO	International Organisation for Standardisation
JBA.....	Jeremy Benn Associates

Definitions

Flood Risk Assessment: A site-specific assessment of all forms of flood risk to the site and the impact of development of the site to flood risk in the area.

Fluvial flooding: Overland flooding occurring from a river, lake or stream overflowing.

Surface water flooding: Overland flooding occurring from rainwater being unable to drain away through existing drainage systems.

Reservoir flooding: Water escaping from a reservoir, for example as a result of dam failure.

Risk: In flood risk management, risk is defined as a product of the probability or likelihood of a flood occurring, and the consequence of the flood.

Section One, the Flood Response Plan is provided within a separate document. Sections Two and Three are provided within this supporting document and provide the data and evidence that has been used to derive the Flood Response Plan.

Section Two: Site Information and Flood Risk

1 Site Information

1.1 Site Location

A location plan is shown in Figure 1-1. The site is located in close proximity of St Ippolyts Brook.

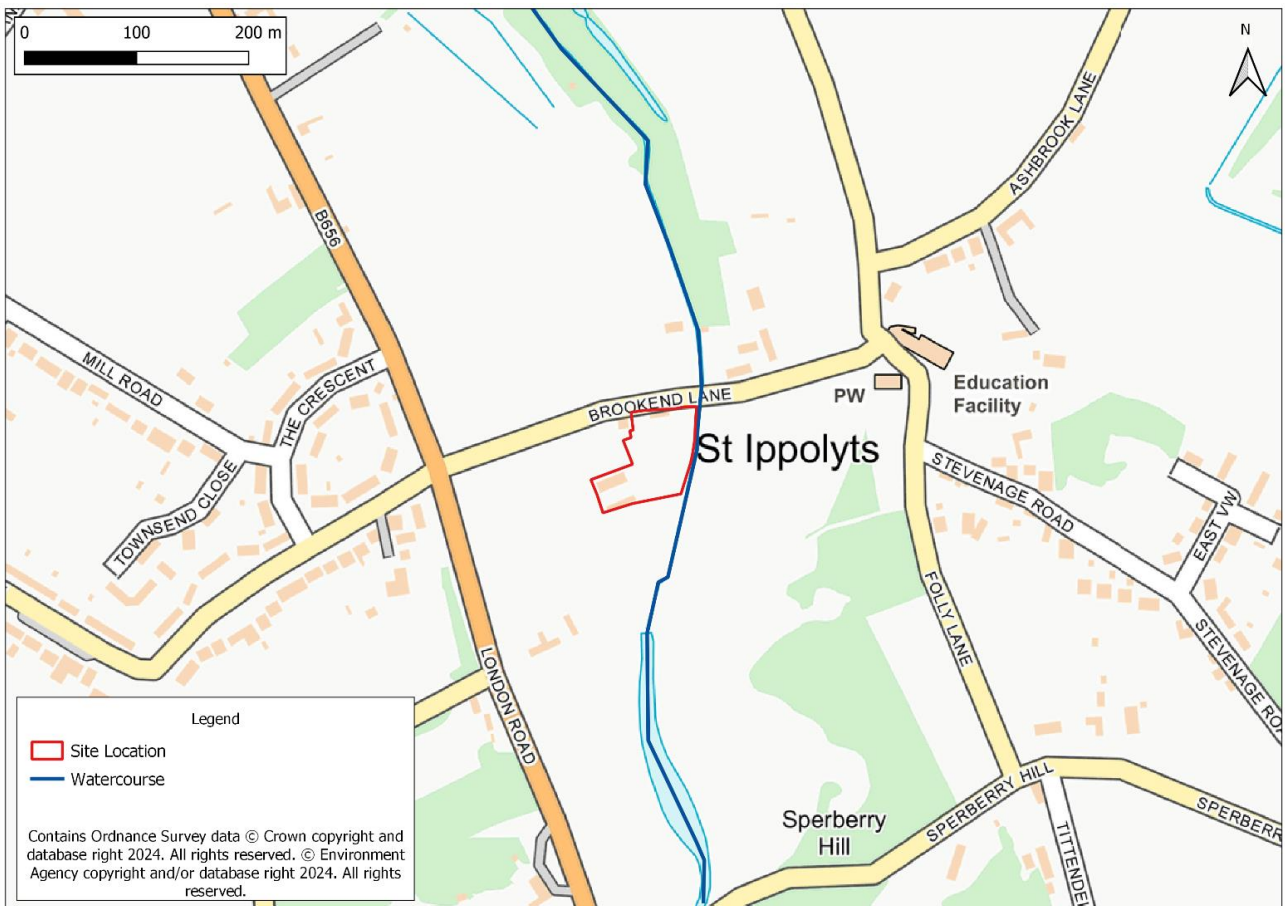


Figure 1-1 - Site Boundary and Nearby Watercourse

1.2 Proposed Development

1.2.1 Buildings

The proposal details the site's redevelopment at the former Henry Isaacs Foundry, Stevenage Road, SG4 7NU, consisting of removing all remaining existing buildings and the erection of 7 dwellings with associated amenity space, parking, and landscaping, and excavation work to provide extra floodplain storage (Figure 1-2). The proposal will have a total footprint of 1116m² and an overall floorspace of approximately 1532m².

The proposal comprises two semi-detached 3 bedroom chalet bungalows and five detached 4 bedroom chalet bungalows. These properties will all have two storeys. The development will be accessed from a new access road (Henry Isaac Mews) from Brookend Lane, with

three dwellings along the site frontage onto Brookend Lane - the pair of chalets (Units 2 & 3) to the east of the proposed access and one detached chalet dwelling to the west. The internal access road (Henry Isaac Mews) follows a south westerly alignment through the site with the remaining four detached chalets (Units 4, 5, 6 & 7) facing onto the carriageway on the western side. Units 3, 4 and 5 are closest to St. Ippolyts Brook.

The walls of the buildings are to be constructed of brick, the floor is to be constructed of solid / hardstanding foundation. Properties 2 and 3 will be constructed on voided foundations. The remaining properties will be constructed on solid foundations. Garages are provided for all of the dwellings with at least two car parking spaces each plus two visitor parking spaces provided off the access road.

The development shall be carried out in accordance with the mitigation measures detailed in the JBA Flood Risk Assessment dated February 2023 (ref: A1-C09):

- Finished floor levels of dwellings on solid foundations will be set at a minimum level of 71.25mAOD.
- Finished floor levels of dwellings on voided foundations will be set at a minimum level of 71.55mAOD.
- Raised boardwalks will be provided for units 2 and 3. The soffit level of the boardwalks will be set at a minimum of 71.25mAOD.

1.2.2 Local Geography

The St Ippolyts Brook flows in a northerly direction immediately adjacent to the eastern edge of the site. To the east of the brook is agricultural grazing land. The land to the south and west of the application site is agricultural grazing land. The majority of the site (with the exception of the western edge) falls within the functional floodplain and Flood Zones 2 and 3 as identified on the Environment Agency's flood map.

The site will have a minimum Finished Floor Level ranging from 71.25m to 71.55m AOD, which ranges from approximately 9mm to 82mm above the surrounding ground levels across the site, with the higher disparity at the north end (Figure 1-3).



Figure 1-2 -: Detailed Site Plan

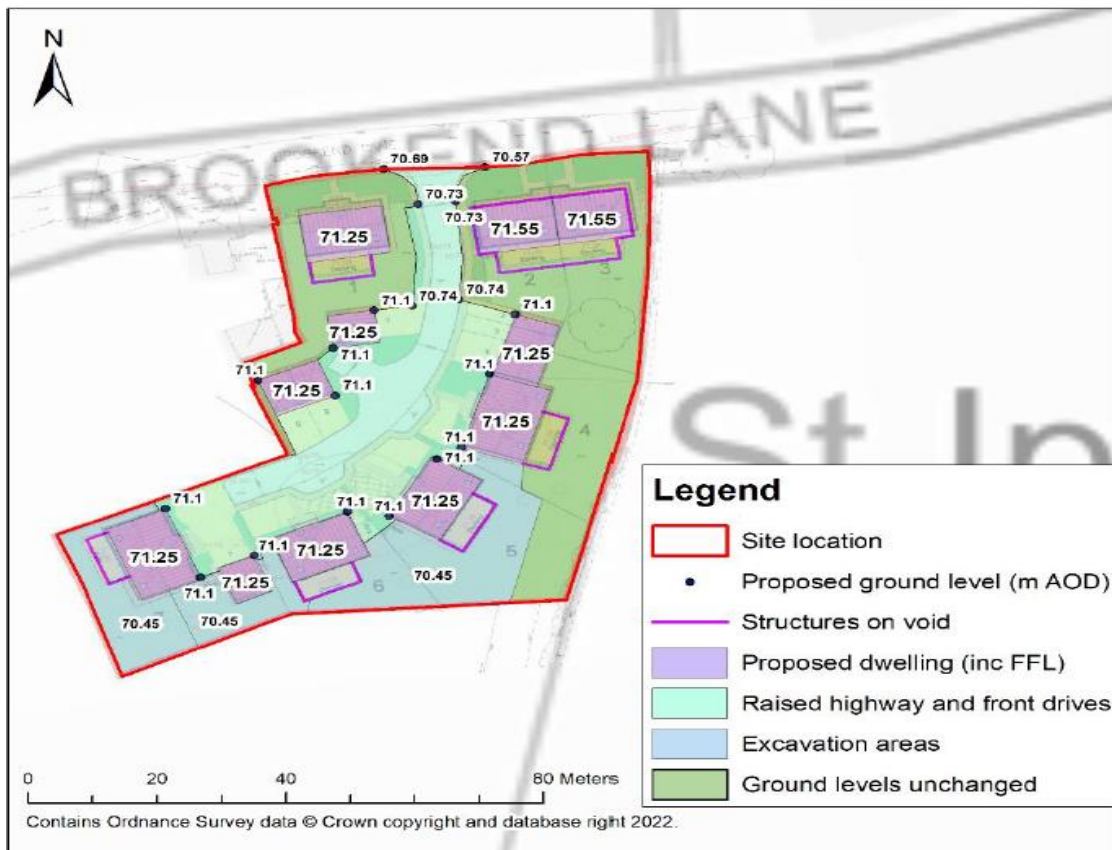


Figure 1-3 - Site Levels Plan with Finished Floor Levels

2 Flood Risk

2.1 Overview

The 2023 JBA Consulting Flood Risk Assessment for the site identified that the site is at medium to high risk from fluvial flooding and low risk from sewer flooding, groundwater flooding and flooding as a result of a reservoir or canal embankment failure.

The principal watercourse in the vicinity of the site is the St Ippolyts Brook, located along the eastern boundary.

2.2 Fluvial Flood Risk

2.2.1 Fluvial Baseline

The Environment Agency (EA) Flood Map for Planning (Figure 2-1) indicates that the proposed development site partially falls within Flood Zones 1, 2 and 3. This was confirmed as part of the detailed modelling work carried out by JBA in 2021 which considered baseline and post development scenarios for a range of flood events.

2.2.2 Fluvial Flood Modelling

Hydraulic modelling studies within chalk catchments notoriously lead to overly conservative estimations of flood levels. Notwithstanding this, site-specific hydraulic modelling was undertaken to support the proposed development (see JBA FRA Feb 2023). The hydraulic modelling indicates that parts of the site are inundated during the 1 in 20-year flood event; however the flooding characteristics in the inundated area indicate that the affected area should not be considered as 'functional floodplain'. During the assessment for the previous successful planning application on the site, the EA stated that as the land had been developed then it should be classified as Flood Zone 3a. On the site visit, after 3 days of rain, no water in the channel was observed. This is backed up in the lack of historical flood records for the site.

The purpose of developing a hydraulic model was to:

- To gain a better understanding of the flood characteristics at the site to inform a detailed Flood Risk Assessment to support the planning approval for the proposed development.
- Identify ground levels required on site to maintain flood levels off-site to their pre-development values, provide acceptable access and egress during flood events and maintain the total floodplain capacity of the site (following recommendations made by the Environment Agency in July 2022).

The model was run for a range of flood events including the 1 in 100-year and the 1 in 1000-year flood events. This is shown in Figure 2-2 and Figure 2-3.

Climate change (Fluvial)

The fluvial climate change allowances provided by the EA were updated on 20 July 2021 and are included in this assessment. The site is located within the Anglian River Basin District – Upper and Bedford Ouse management catchment.

The model was run for the 1 in 100 year + 19% CC event. This is in line with the climate change uplifts for this management catchment. This is shown in Figure 2-4.

Mitigation

As part of the FRA, the following it was recommended that: Following a review of all sources of flood risk on site, it is recommended that the following mitigation measures are implemented as part of the proposal:

- The recommended minimum floor level of properties on solid / hardstanding foundation should be set 300mm above the 1 in 100-year with (+19%) climate change fluvial flood level (i.e. 70.95m AOD + 0.3 = 71.25m AOD).
- The recommended minimum floor level of properties on a void / on stilts and any other infrastructures on stilts (e.g. back garden decking areas) should be set 600mm above the 1 in 100-year with (+19%) climate change fluvial flood level (i.e. 70.95m AOD + 0.6 = 71.55m AOD) in order to minimise the risk of a blockage from floating debris.
- A floodplain compensation scheme including excavation work to the back of Units 7, 6 and 5 will be provided as part of the proposal. Notwithstanding the degree of conservatism included in the modelled 'design' flood level (i.e. 70.95m AOD), the floodplain compensation scheme will be able to:
- Provide level-for-level floodplain compensation up to 70.75m AOD (and even provide an additional 86.1m³ of extra storage capacity), and;
- Increase the total 100-year with (+19%) climate change floodplain storage capacity of the site by 0.9m³.

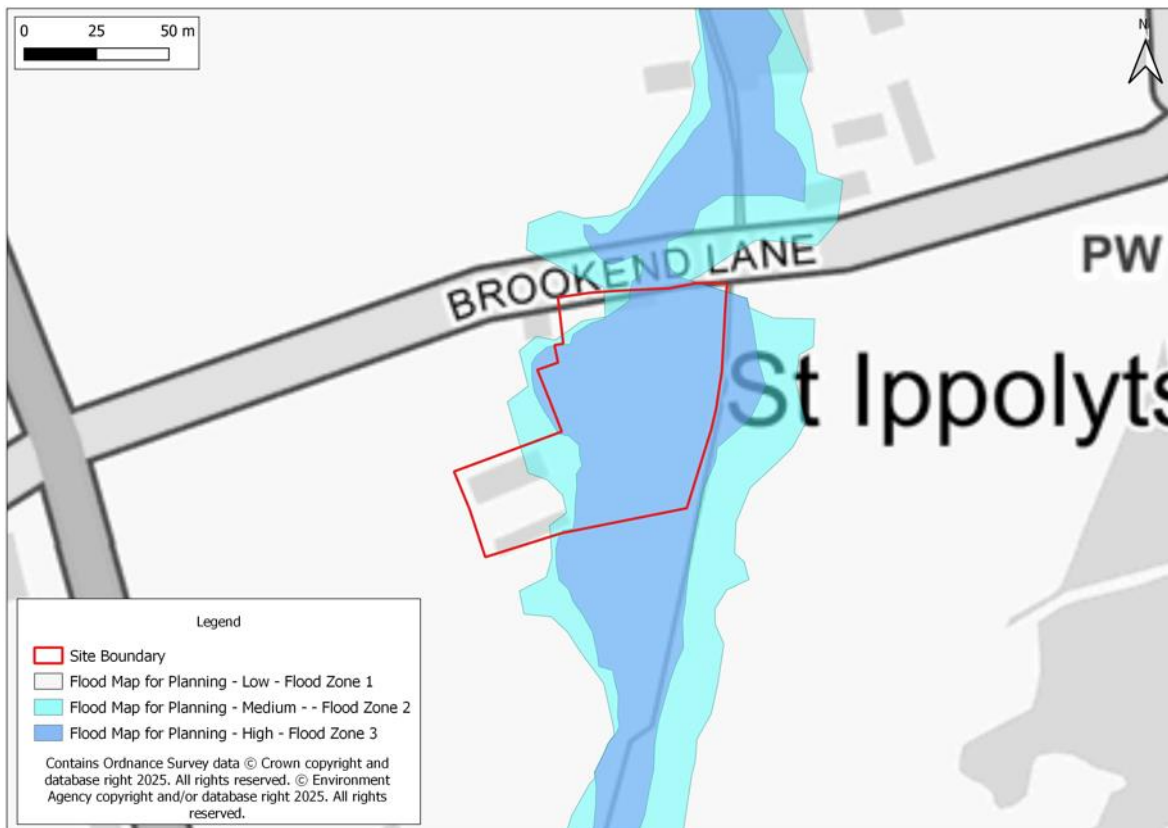


Figure 2-1 - Environment Agency's Fluvial Flood Map for Planning

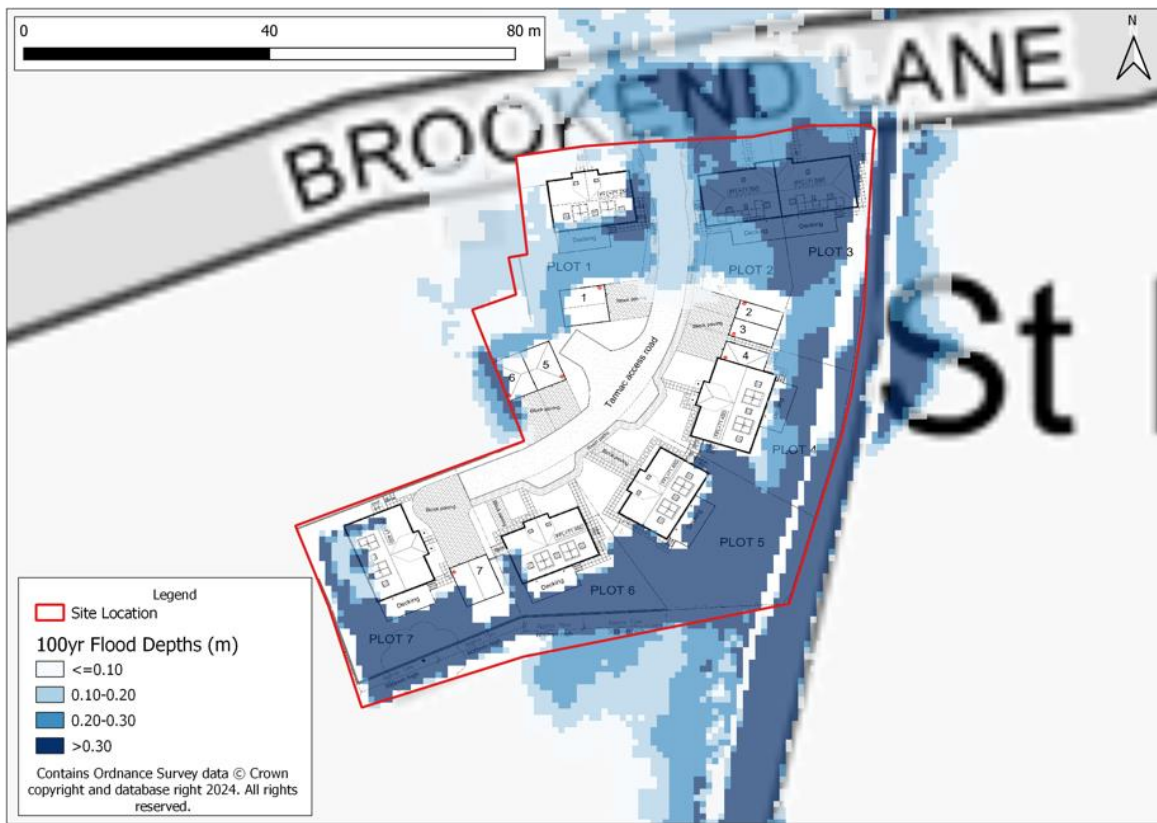


Figure 2-2 – Fluvial 1 in 100 year flood depths.

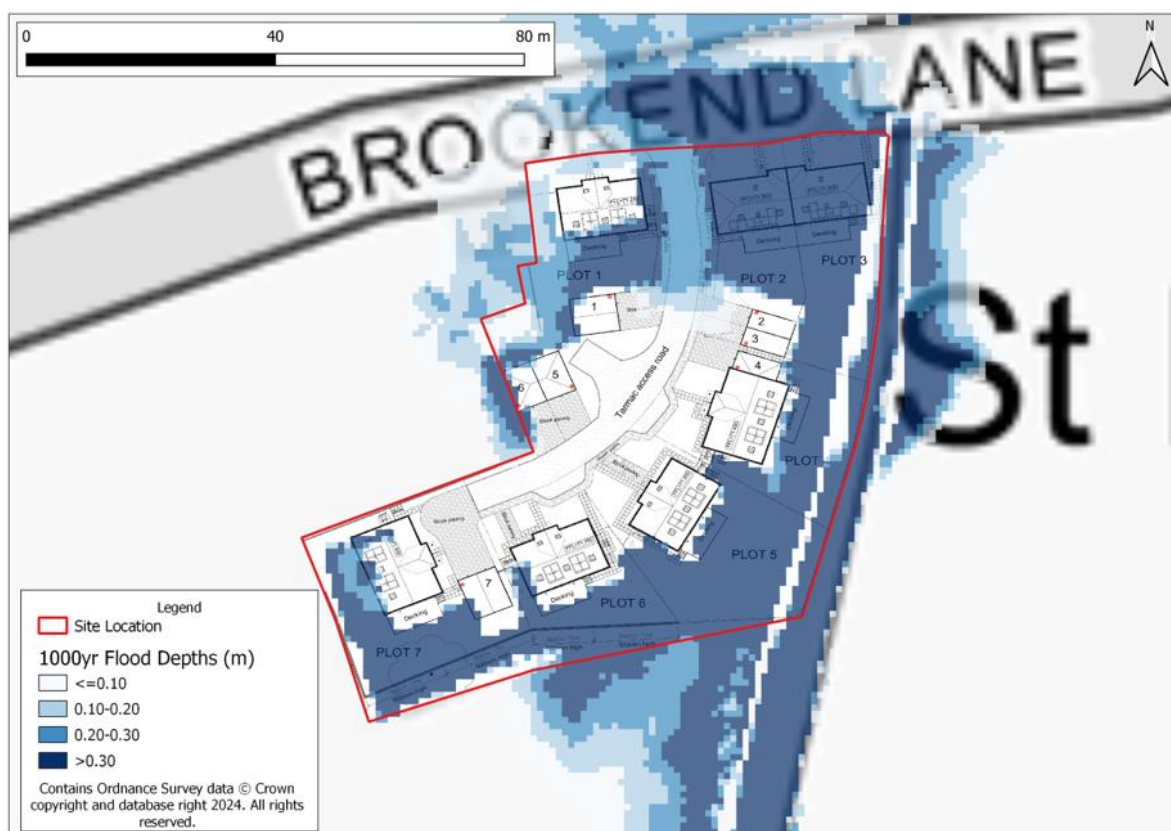


Figure 2-3 – Fluvial 1 in 1000 year Flood Depths

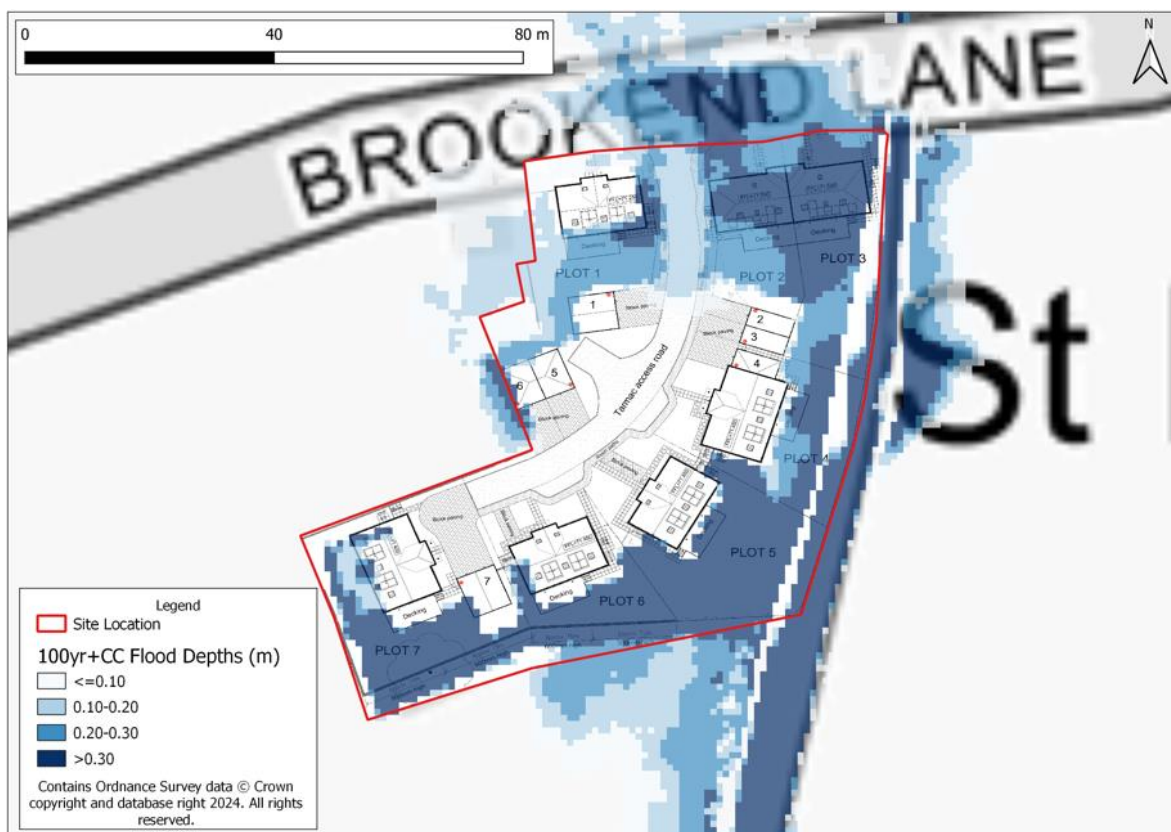


Figure 2-4 – Fluvial 1 in 100 year + CC flood depths

2.2.3 Fluvial Hazard to People

During the 100-year-plus climate change (19%) event, dry access and egress would not be maintained along the eastern end of Brookend Lane. The Hazard to People classification shows that Henry Isaac Mews has a low hazard to people during the flood event (Figure 2-5).

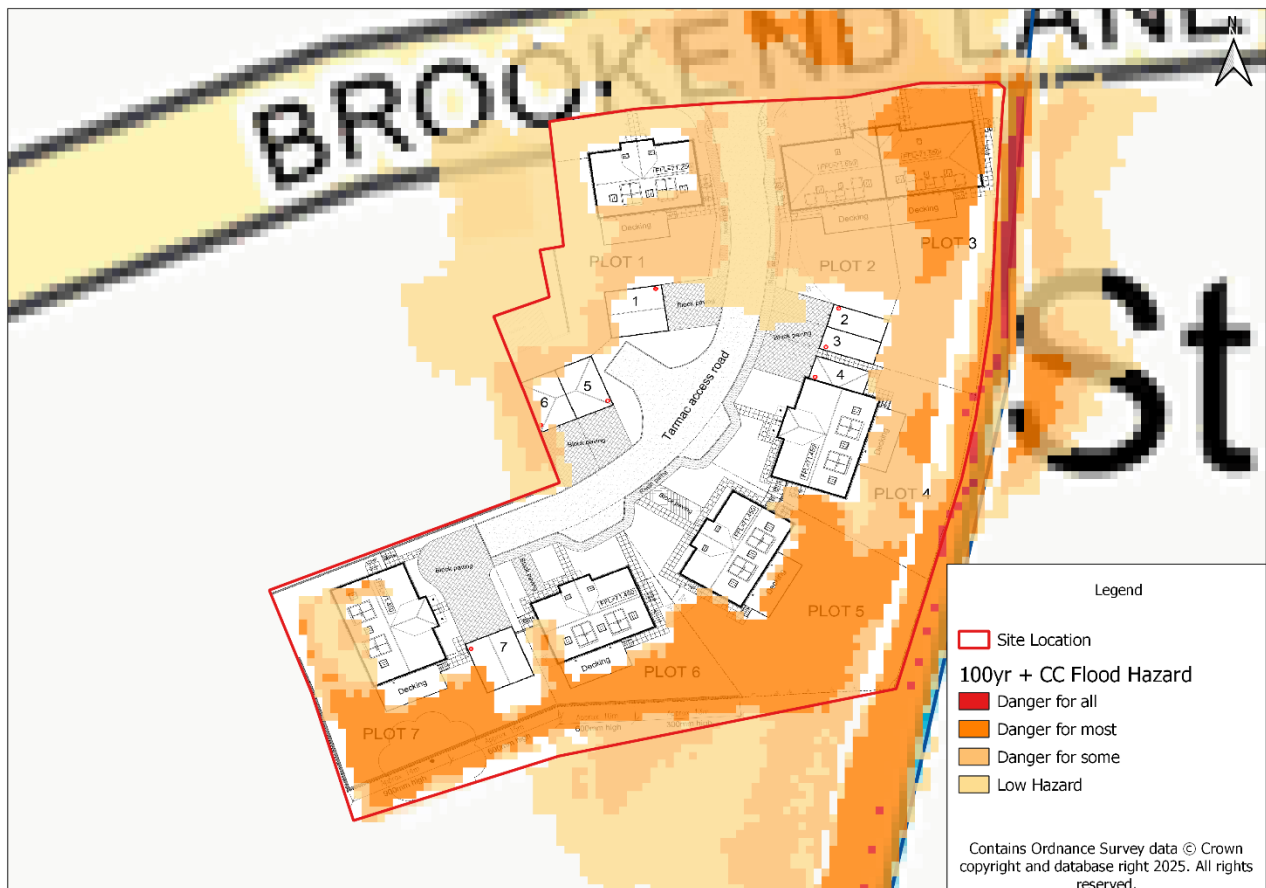


Figure 2-5 – 1 in 100-year + 19% Climate Change Hazard Map

2.2.4 Fluvial Flood Duration

The fluvial flood duration modelling for the 1 in 100 year + 19% CC indicates out of bank flows 4 hours 30 minutes into the scenario (Figure 2-6). At 7 hours 15 minutes, the results show garden flooding, access and egress routes are modelled to remain unaffected by flood water at this point. At 7 hours 45 minutes, Brookend Lane, east of the Henry Isaac Mews entrance is impacted by flooding. The peak in flood extents and depth is at 11hrs 45 mins. Water then recedes slowly. With flooding still affecting the site at the 20 hour duration.

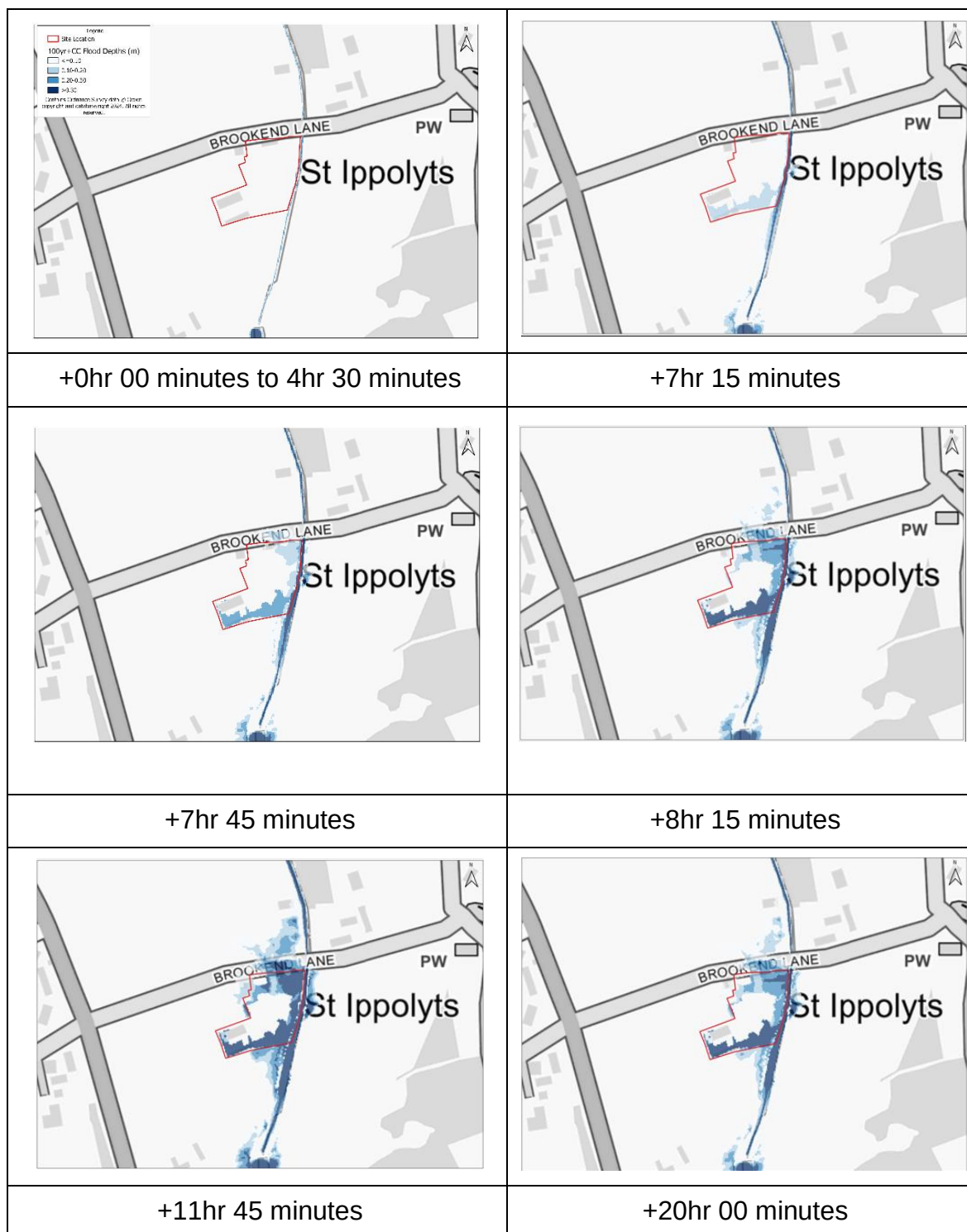


Figure 2-6 – Modelled Flood Depth Durations

2.3 Surface Water Flood Risk

Surface water flooding arises when rain falling on saturated ground flows overland, following the local topography. Surface water flooding and subsequent overland flow can originate from several sources, for example, surcharging sewers and blocked drains. Overland flow can therefore pose a risk to both the development site and land surrounding the development site. In the former case, overland flow may originate from the site itself or from adjoining land at a higher elevation from which flow migrates onto the development area. In the latter case, existing developments at a lower elevation may be subject to flooding due to overland flow originating from the site and migrating towards lower areas. The layout of the proposed development needs to reflect and, where necessary, mitigate against the aforementioned risks.

Surface water flood risk to the site has been assessed using the national scale Government's Surface Water Flood Map which identifies areas where surface water flooding poses a risk, classified as follows:

- High – an area has a chance of flooding of greater than 1 in 30 each year.
- Medium – an area has a chance of flooding of between 1 in 30 and 1 in 100 each year.
- Low – an area has a chance of flooding of between 1 in 100 and 1 in 1,000 each year.
- Very Low – an area has a chance of flooding of less than 1 in 1,000 each year.

Figure 2-7 below shows the Surface Water Flood Risk Map at the proposed development site and the surrounding area. The map indicates that the surface water risk varies from low to high, with the areas of highest risk on the eastern and southern boundaries. Central parts of the site are considered medium risk. The roads surrounding the site also show variance from low to high risk of flooding from surface water.

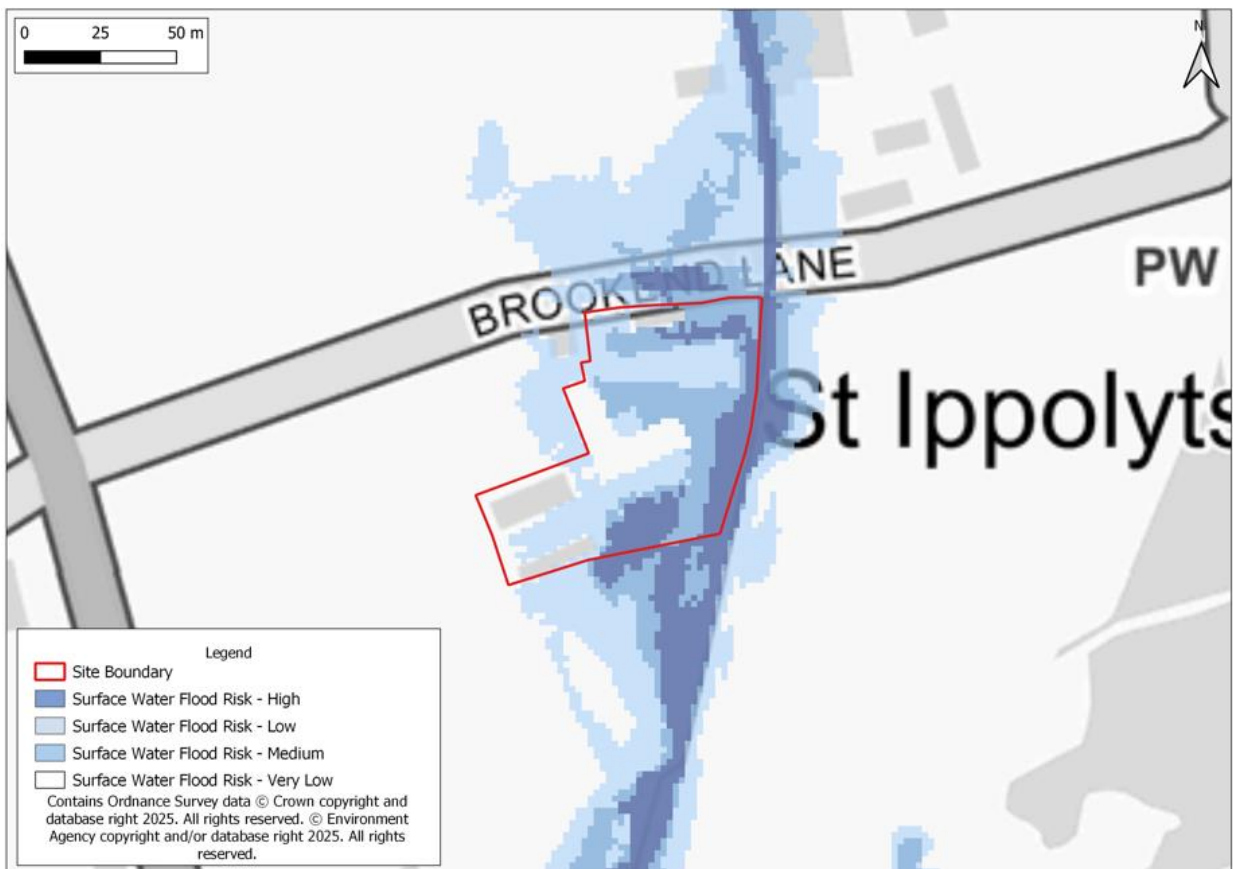


Figure 2-7 – Surface Water Flood Risk Map (site and surrounding area)

2.4 Sewer Flood Risk

Sewer flooding generally results in localised, short-term flooding and occurs when intense rainfall overloads the sewer system capacity (surface water, foul or combined) and/or when sewers cannot discharge to watercourses due to high water levels. Sewer flooding can also be caused by blockage or structural failure within the sewage system.

No records of sewer flooding at the proposed development location were found. The risk from flooding of sewers is therefore considered to be low.

2.5 Groundwater Flood Risk

Groundwater flooding occurs when the water table rises above ground level, especially after prolonged rainfall periods. This is most likely to occur in low-lying areas that are underlain by permeable bedrock and superficial geologies. Unlike other forms of flooding, groundwater flood does not pose a significant risk to life but can cause serious damage to property.

No specific records of groundwater flooding at the development site and the immediate surrounding area have been found in the documents reviewed. The risk of flooding from groundwater is considered to be low.

2.6 Risk of Flooding from Reservoirs

In 2009, the Environment Agency produced a series of reservoir inundation flood maps to show the extent of flooding should a reservoir fail or breach (i.e. the worst-case scenario). If a location is shown to be at risk, the regulated nature of reservoir management meant a failure is still extremely unlikely. There has been no loss of life in the UK from reservoir flooding since 1925.

The Environment Agency's Flood Risk from Reservoirs Map shows the potential extent of flooding that could occur as a result of the failure of a large reservoir. The mapping does not show the development site as being at risk of reservoir flooding. Therefore, the risk of reservoir flooding is considered to be very low.

Section Three: Information Sources

3 Information Sources

3.1 Directory of Information Sources

The following services provide a wide range of useful information for monitoring a flood event. The list is not exhaustive.

It may be useful to follow these sources on social media platforms.

Table 3-1: Met Office Flood Information Sources

Met Office Services	What to look out for
National Severe Weather Warnings	A severe weather warning for rainfall - this may indicate potential stormy conditions.
Weather forecast	Met Office area - Hitchin
Met Office Guide to email alert service	Register for warnings

Table 3-2: Environment Agency Flood Information Sources

Environment Agency Services	What to look out for
5-day weather forecast	Notification of severe weather and flood risk
Flood Alerts and Flood Warnings	Notifications of flood alerts and warnings
Sign up for Flood Warnings	Register for warnings

Table 3-3: Other weather and flood-related services for monitoring activities

Services	What to look out for
Hertfordshire Constabulary	Potential notification of flooding.
BBC St Ippolyts BBC National Hertfordshire Mix 92.6 Radio	Notifications of flooding can be disseminated via local TV and/or radio stations.
Highways England	Notifications of road closed due to flooding.
North Hertfordshire District Council	Potential notification of flooding.

It is important to note that for river flooding, the Environment Agency typically issues a flood alert 2-12 hours ahead of possible flooding and aims to issue Flood Warnings 1-2 hours before the predicted event.

3.2 Met Office Weather Warnings

The Met Office warn the public of severe hazardous rainfall that can potentially cause damage, widespread disruption and/or danger to life via their national severe weather warning system. The warning levels are determined based on the likelihood of the rainfall event occurring and the impact the conditions may have.

This is colour-coded as:

No Severe Weather	Be Aware	Be Prepared	Take Action

To view the Met Office National Severe Weather Warnings, visit: [UK weather warnings - Met Office](#)

On the site, several tabs are at the top of the page. The tabs allow you to navigate through the next seven days, with warning triangles highlighting any weather warnings affecting the UK each day. To see the full details for each warning, click on the chosen warning label on the map.

For example, if S Ippolyts is shown to be affected by a Yellow, Amber or Red Warning for Rainfall, ensure you click on the warning and read the further detailed information. This is explained on the [Met Office's Weather warnings guide](#).

3.3 Environment Agency Flood Alerts and Warnings

Three-day flood risk forecast	 FLOOD ALERT	 FLOOD WARNING	 SEVERE FLOOD WARNING	Warning no longer in force
What it means Be aware. Think ahead. Keep an eye on the weather situation.	What it means Flooding is possible. Be prepared.	What it means Flooding is expected. Immediate action required.	What it means Severe flooding. Danger to life.	What it means No further flooding is currently expected for your area.
When it's used Daily forecasts of flood risk on our website www.environment-agency.gov.uk . These are updated more frequently for higher flood risk situations.	When it's used Two hours to two days in advance of flooding.	When it's used Half an hour to one day in advance of flooding.	When it's used When flooding poses a significant risk to life or significant disruption to communities.	When it's used When a flood warning or severe flood warning is no longer in force.
Triggers - Information updated daily on the Environment Agency website. - The information includes the current and forecast situation and how this is likely to affect each county in England and Wales over the next three days.	Triggers - Forecasts that indicate that flooding from rivers may be possible. - Forecast intense rainfall for rivers that respond very rapidly. - Forecasts of high tides, surges or strong winds.	Triggers - High tides, surges coupled with strong winds. - Heavy rainfall forecast to cause flash flooding of rivers. - Forecast flooding from rivers.	Triggers - Actual flooding where the conditions pose a significant risk to life and/or widespread disruption to communities. - On-site observations from flooded locations. - A breach in defences or failure of a barrier that is likely to cause significant risk to life. - Discussions with partners.	Triggers - Risk of flooding has passed. - River or sea levels have dropped back below severe flood warning or flood warning levels. - No further flooding is expected. - Professional judgment and discussions with partners agree that a severe flood warning status is no longer needed.
Impact on the ground Maps will show one of four levels of risk for each county: - Green = no risk of flooding - Yellow = low risk of flooding - Amber = medium risk of flooding - Red = high risk of flooding	Impact on the ground - Flooding of fields, recreation land and car parks. - Flooding of minor roads. - Flooding of farmland. - Spray or wave overtopping on the coast.	Impact on the ground - Flooding of homes and businesses. - Flooding of rail infrastructure. - Flooding of roads with major impacts. - Significant waves and spray on the coast. - Extensive flood plain inundation (including caravan parks or campsites). - Flooding of major tourist/recreational attractions.	Impact on the ground - Deep and fast flowing water. - Debris in the water causing danger. - Potential or observed collapse of buildings and structures. - Communities isolated by flood waters. - Critical infrastructure for communities disabled. - Large number of evacuees. - Military support.	Impact on the ground - No new impacts expected from flooding, however there still may be: - standing water following flooding; - flooded properties; - flooding or damaged infrastructure.
Advice to the public/media - Check the forecast on our website. - Remain aware of the impending weather conditions for your area.	Advice to the public/media - Be prepared to act on your flood plan. - Prepare a flood kit of essential items. - Avoid walking, cycling or driving through flood water. - Farmers should consider moving livestock and equipment away from areas likely to flood. - Call Floodline on 0845 988 1188 for up-to-date flooding information. - Monitor local water levels on the Environment Agency website www.environment-agency.gov.uk.	Advice to the public/media - Protect yourself, your family and help others. - Move family, pets and valuables to a safe place. - Turn off gas, electricity and water supplies if safe to do so. - Put flood protection equipment in place. - If you are caught in a flash flood, get to higher ground. - Call Floodline on 0845 988 1188 for up-to-date information.	Advice to the public/media - Stay in a safe place with a means of escape. - Be ready should you need to evacuate from your home. - Co-operate with the emergency services. - Call 999 if you are in immediate danger. - Call Floodline on 0845 988 1188 for up-to-date flooding information.	Advice to the public/media - Be careful. Flood water may still be around for several days and could be contaminated. - If you've been flooded, ring your insurance company as soon as possible.
Advice to operational organisations - The three-day forecast is the public facing version of the Flood Guidance Statement that category 1 and 2 responders receive. - Advice for organisations varies depending on the level of flood risk and is provided on the Flood Guidance Statement issued by the Flood Forecasting Centre.	Advice to operational organisations - Check your flood response plans to see how your organisation needs to respond. - Speak to your local Environment Agency Flood Warning Duty Officer for the latest forecast information. - Dial into Flood Advisory Service teleconferences. - Advise the public to call Floodline on 0845 988 1188 for up-to-date flooding information. - Please report any flooding in your area to your local Environment Agency office.	Advice to operational organisations - Check flood response plans for actions required at this stage. - Speak to your local Environment Agency Flood Warning Duty Officer for the latest forecast information. - Advise the public to call Floodline on 0845 988 1188 for up-to-date flooding information. - Please report any flooding in your area to your local Environment Agency office.	Advice to operational organisations - Check flood response plans for actions required at this stage. - Advise the public to put their safety first and to be ready to evacuate should the authorities decide it's needed. - Develop clear messages for local communities and the public.	Advice to operational organisations - Recovery phase will have started. - Advise the public to call Floodline on 0845 988 1188 for advice on what to do if they have been affected by flooding.

Offices at

Bristol
Coleshill
Doncaster
Dublin
Edinburgh
Exeter
Glasgow
Haywards Heath
Leeds
Limerick
Newcastle upon Tyne
Newport
Peterborough
Portsmouth
Saltaire
Skipton
Tadcaster
Thirsk
Wallingford
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