REPORT

NPPF Flood Risk Assessment

34 Craneswater UB3 5HP

Client: Gagan Deep Mengi

Reference: 6836-AEA-ZZ-XX-RP-Z-2500
Status: S0/P01.01
Date: 22 September 2024

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a company of Royal HaskoningDHV

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Document title: NPPF Flood Risk Assessment

Subtitle: 34 Craneswater UB3 5HP
Reference: 6836-AEA-ZZ-XX-RP-Z-0001
Status: P01.01/S2
Date: 22 September 2022
Project name: Shrestha_Hillingdon
Project number: 6836

Classification
Project related

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Revision history

Revision	Date	Description	Prepared	Checked	Approved
S0	02/08/2022	Draft to Client for Approval	Oliver Harvey	Debra Griffin	Steven Brown

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Executive Summary

Royal HaskoningDHV has been appointed to undertake a National Planning Policy Framework (NPPF) [1] compliant Flood Risk Assessment (FRA) for the Development Proposals located at 34 Craneswater, Harlington, Hayes, Hillingdon UB3 5HP.

The existing site is currently consists of a single residential dwelling. It is understood that the development is for the construction of an extension to the rear of the existing dwelling to provide greater habitable space.

The proposed development is for an extension of the existing use and the increase in built footprint is under 250m^2. Therefore, the proposals would be classified as a 'Minor Development' ('householder development: For example, sheds, garages, games rooms etc within the curtilage of the existing dwelling, in addition to physical extensions to the existing dwelling itself') under Paragraph: 046 (Reference ID: 7-046-20140306) of the NPPF (2021).

The vulnerability classifications are summarised in Annexe 3 of the NPPF identifies that the Development Proposals are 'More vulnerable'**,** due to the residential use. The Development Proposals are for the construction of an extension to the existing site use (to provide additional habitable space). As such, there will be no change in flood risk vulnerability post-development.

The key findings of the Flood Risk Assessment are as follows:

- With reference to the Environment Agency (EA) Flood Map for Planning, the proposed development is located within Flood Zone 2.
- The site has been shown to remain unaffected by flooding during the present day 1:20 and 1:100 year scenarios.
- Analysis of the 1:100+25%CC flood extents show that the site would remain unaffected by flooding.
- The site has also been shown to be at relatively low risk from surface water, sewer, groundwater, reservoir sources.
- It is recommended that mitigation measures, in line with guidance set out in 'Improving the flood performance of new buildings, 2007' (standards for the installation and retrofit of resistance measures are available in British Standard 851188-1:2019+A1:2021) are incorporated into the proposed development, where possible.
- SuDS measures are to be incorporated into the proposed development. Two SuDSPlanter Roof Rainwater Management System 'Small' unit (dimensions: 1200mm(l)x600mm(w)x950mm(d)) on each downpipe which provides approximately 0.3m^3 of storage. Additionally, a large rainwater butt is to be utilised to provide water for non-potable uses around the site.

A summary of the flood risk for the Application Site for each source requiring consideration under the NPPF is presented as **Error! Reference source not found.**, overleaf.

The Surface Water Drainage Strategy outlined as part of this Flood Risk Assessment will reduce the peak rate of surface water discharge to a state that should not adversely impact third party properties.

The Flood Risk Assessment has been undertaken in accordance with the requirements of the NPPF and it can be demonstrated that the Development Proposals are compatible with the predicted flood risk profile, including climate change allowance over the development lifetime.

It should be noted that the Development Proposals are not predicted to increase the risk of flooding to others over the development lifetime. Consequently, it is concluded that, with regards to the Flood Risk requirements of the NPPF, the Development Proposals are acceptable.

1 Introduction

Royal HaskoningDHV has been appointed by to undertake a National Planning Policy Framework (NPPF) [1] compliant Flood Risk Assessment (FRA) for the Development Proposals located at 34 Craneswater, Harlington, Hayes, Hillingdon UB3 5HP. The site will hereafter be referred to as the Application Site.

The purpose of this assessment is to demonstrate that the Development Proposal can be satisfactorily accommodated without worsening flood risk for the area and without placing the development itself at risk of flooding. This assessment has been written in accordance with national guidance provided within the NPPF, the Planning Guidance, Flood risk and coastal change [2], DEFRA's National Standards for Sustainable Drainage [3], and Local Guidance and Policy Documents.

1.1 Site Overview

The Application Site is located at Ordnance Survey grid reference 509821mE, 177028mN, and the redline boundary includes an area of 400m^2 (0.04 Ha), as indicated on Figure 1.

Figure 1: Site Location Plan

1.2 Current Site Usage

The Application Site is currently a residential usage, formed of a residential dwelling, a driveway and soft landscaping, as shown in Figure 2.

Figure 2: Aerial Photograph

1.3 Development Proposals

It is understood that the development is for the construction of an extension to the rear of the existing dwelling to provide greater habitable space, hereafter referred to as the Development Proposals

The proposed development is for an extension of the existing use and the increase in built footprint is under 250m^2. Therefore, the proposals would be classified as a 'Minor Development' ('householder development: For example, sheds, garages, games rooms etc within the curtilage of the existing dwelling, in addition to physical extensions to the existing dwelling itself') under Paragraph: 046 (Reference ID: 7-046-20140306) of the NPPF (2021).

1.4 Development Vulnerability Classification

The vulnerability classifications are summarised in Annexe 3 of the NPPF identifies that the Development Proposals are **More vulnerable,** due to the residential use. The Development Proposals are for the construction of an extension to the existing site use (to provide additional habitable space). As such, there will be no change in flood risk vulnerability post-development.

1.5 NPPF Sequential Test

The proposed development is located within Flood Zone 1, as indicated by the EA Flood Map for Planning and is also located outside an area defined as being Flood Zone 3a/3b for surface water, as per the West London SFRA. According to Table 2 of the Flood Risk and Coastal Change PPG, the existing site is considered 'More Vulnerable', due to its usage for residential purposes. The proposed development is for an extension of existing use, to provide an additional habitable space. As the development is for an extension of existing use, it can also be considered as 'More Vulnerable'.

Given that the proposed development is associated with the existing use of the site, a pragmatic approach should be adopted regarding the Sequential Test, as the development cannot be located elsewhere. The NPPG states:

When applying the Sequential Test, a pragmatic approach on the availability of alternatives should be taken. For example, in considering planning applications for extensions to existing business premises it might be impractical to suggest that there are more suitable alternative locations for that development elsewhere.

Furthermore, Paragraph 168 of the NPPF states:

Applications for some minor development and changes of use (Footnote 56) should not be subject to the sequential or exception tests but should still meet the requirements for site-specific flood risk assessments set out in footnote 55.

Footnote 56:

This includes householder development, small non-residential extensions (with a footprint of less than 250m^2) and changes of use; except for changes of use to a caravan, camping or chalet site, or to a mobile home or park home site, where the sequential and exception tests should be applied as appropriate

Footnote 55:

A site-specific flood risk assessment should be provided for all development in Flood Zones 2 and 3. In Flood Zone 1, an assessment should accompany all proposals involving: sites of 1 hectare or more; land which has been identified by the Environment Agency as having critical drainage problems; land identified in a strategic flood risk assessment as being at increased flood risk in future; or land that may be subject to other sources of flooding, where its development would introduce a more vulnerable use

The development proposals are for a Minor Extension, and therefore under Footnote 56, the Sequential Test, and therefore the Exception Test do not need to be applied. However, the planning application submitted by the applicant is required to be accompanied by an FRA which shows that the development can be achieved in a sustainable manner, with an overall reduction of flood risk to the site and surrounding area

1.6 Site Topography

Ground levels within the Application Site have been determined by reviewing Environment Agency 2m LiDAR data. The ground levels are generally between 70.20mAOD and 71.15mAOD. The levels around the existing dwelling are higher with levels dropping down in the rear garden.

1.7 Nearby Watercourses

There are no ordinary watercourses or main river that intersect the site. The closest EA Main River to the site is the River Crane, located approximately 220m to the east of the site.

2 Scope of Assessment

Under Section 14 of the NPPF, a Flood Risk Assessment (FRA) is required for Development Proposals which meet any of the following conditions:

i. Development in Flood Zones 2 and 3.

ii. In Flood Zone 1, an assessment should accompany all proposals involving: sites of 1 hectare or more;

iii. Land which has been identified by the Environment Agency as having critical drainage problems;

iv. Land identified in a strategic flood risk assessment as being at increased flood risk in future; or,

v. Land that may be subject to other sources of flooding, where its development would introduce a more vulnerable use.

The NPPF states that a FRA needs to consider the risk of flooding to a property or site and demonstrate that the site will be safe over its lifetime (including identification of appropriate mitigation measures). The FRA also needs to demonstrate that the proposals will not increase flood risk to others. The sources of flooding that need to be assessed are from the following sources:

i. **Fluvial (River) flooding**. When flows within watercourses exceed the capacity of the watercourse, causing out of bank flows and resulting in flooding of adjacent areas.

ii. **Groundwater flooding.** Usually, the result of prolonged wet weather, causing groundwater levels to rise sufficiently to either emerge at surface or to cause flooding of below ground infrastructure, such as basements.

iii. **Pluvial (Surface Water) flooding**. When rainfall causes overland flow rates and volumes which exceed the capacity of the drainage network, causing flooding to land that is normally dry.

iv. **Tidal flooding.** When high tide events overtop the shoreline to cause flooding to land behind. This is usually the result of a combination of high tide events and storm surges.

As well as considering the risk of flooding from these primary sources, a FRA needs to consider the potential impact of a failure of flood defence or reservoir infrastructure; however, as the likelihood of these types of flooding are much lower, they are known as “residual risks”. The residual flood risks to be considered are:

i. **Reservoir failure**. Although the likelihood of reservoir failure resulting in widespread flooding is extremely low[1] [4], the consequences of such an event need to be considered to inform appropriate emergency planning.

ii. **Flood defence failure.** The consequence of a failure of part of a flood defence could result in the rapid release of water in an area that would otherwise not be at risk of flooding. If such an event were to occur, there could be very little warning time and therefore it is unlikely that prior evacuation from an area at risk could be achieved.

[1] Environment Minister Richard Benyon said: “While the risk of a reservoir failure is extremely low the safety of the public must remain our top priority and where there is even a small risk we need to make sure that we are prepared.”

3 Development Compatibility with Flood Zone

3.1 Development Vulnerability Classification

The vulnerability classifications are summarised in Table 1 (below) and identifies that the Development Proposals are **More vulnerable**, as highlighted below.

Table 1: Annex 3 of the NPPF, Flood risk vulnerability classification

Classification	Description
Essential infrastructure	Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk. Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including electricity generating power stations and grid and primary substations; and water treatment works that need to remain operational in times of flood. Wind turbines.
Highly vulnerable	Police and ambulance stations; fire stations and command centres; telecommunications installations required to be operational during flooding. Emergency dispersal points. Basement dwellings. Caravans, mobile homes and park homes intended for permanent residential use. Installations requiring hazardous substances consent. (Where there is a demonstrable need to locate such installations for bulk storage of materials with port or other similar facilities, or such installations with energy infrastructure or carbon capture and storage installations, that require coastal or water-side locations, or need to be located in other high flood risk areas, in these instances the facilities should be classified as 'Essential Infrastructure')
More vulnerable	Hospitals. Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels. **Buildings used for dwelling houses**, student halls of residence, drinking establishments, nightclubs and hotels. Non–residential uses for health services, nurseries and educational establishments. Landfill* and sites used for waste management facilities for hazardous waste. Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.
Less vulnerable	Police, ambulance and fire stations which are not required to be operational during flooding. Buildings used for shops; financial, professional and other services; restaurants, cafes and hot food takeaways; offices; general industry, storage and distribution; non-residential institutions not included in the 'more vulnerable' class; and assembly and leisure. Land and buildings used for agriculture and forestry. Waste treatment (except landfill* and hazardous waste facilities). Minerals working and processing (except for sand and gravel working). Water treatment works which do not need to remain operational during times of flood. Sewage treatment works, if adequate measures to control pollution and manage sewage during flooding events are in place.
Water-compatible development	Flood control infrastructure. Water transmission infrastructure and pumping stations. Sewage transmission infrastructure and pumping stations. Sand and gravel working. Docks, marinas and wharves. Navigation facilities. Ministry of Defence defence installations. Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location. Water-based recreation (excluding sleeping accommodation). Lifeguard and coastguard stations. Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms. Essential ancillary sleeping or residential accommodation for staff required by uses in this category, subject to a specific warning and evacuation plan.

3.2 Flood Zone Classification

The EA Flood Map for Planning (see Figure 3) demonstrates that the Development Proposals are located within an area defined as Flood Zone 2.

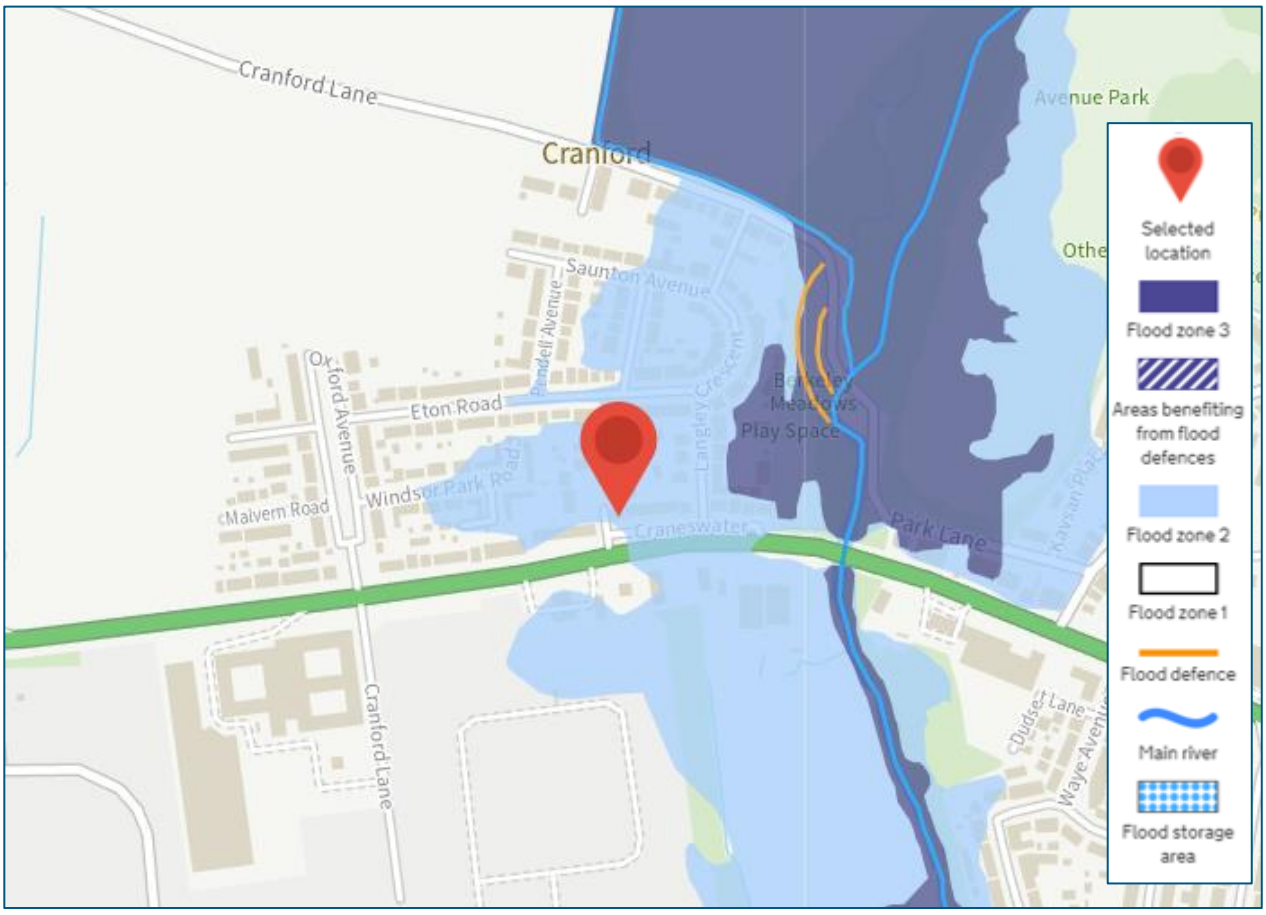

Figure 3: EA Flood Map for Planning (Source: EA).

Table 2 of the Flood Risk and Coastal Change Guidance [2], reproduced in Table 2 below, presents the flood zone definitions.

Table 2: Definitions of Flood Zones

Flood Zone	Description
1	Low Probability. This zone comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any year (<0.1%).
2	Medium Probability. This zone comprises land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% to 0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% to 0.1%) in any year.
3a	High Probability. This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.
3b	The Functional Floodplain. This zone comprises land where water has to flow or be stored in times of flood. SFRA's should identify this Flood Zone (land which would flood with an annual probability of 1 in 30 (3.3%) or greater in any year or is designed to flood in an extreme (0.1%) flood, or at another probability to be agreed between the LPA and the EA, including water conveyance routes).

4 Flood Risk: Historic Records

4.1 Assessment Methodology

In order to assess if the Application Site has previously been affected by flooding, the following data sources have been inspected:

- Environment Agency Historic Flood Maps
- Environment Agency Recorded Flood Outlines
- Strategic Flood Risk Assessment.

If these sources of data do not return any records of flooding, it is concluded that the Application Site has not been recorded as having flooded.

4.2 Recorded Flooding

The Environment Agency publishes records of historic flooding[2] and this data has been reviewed (see Figure 4). Furthermore, the West London SFRA showed that the site and surrounding area has not experienced any flooding historically.

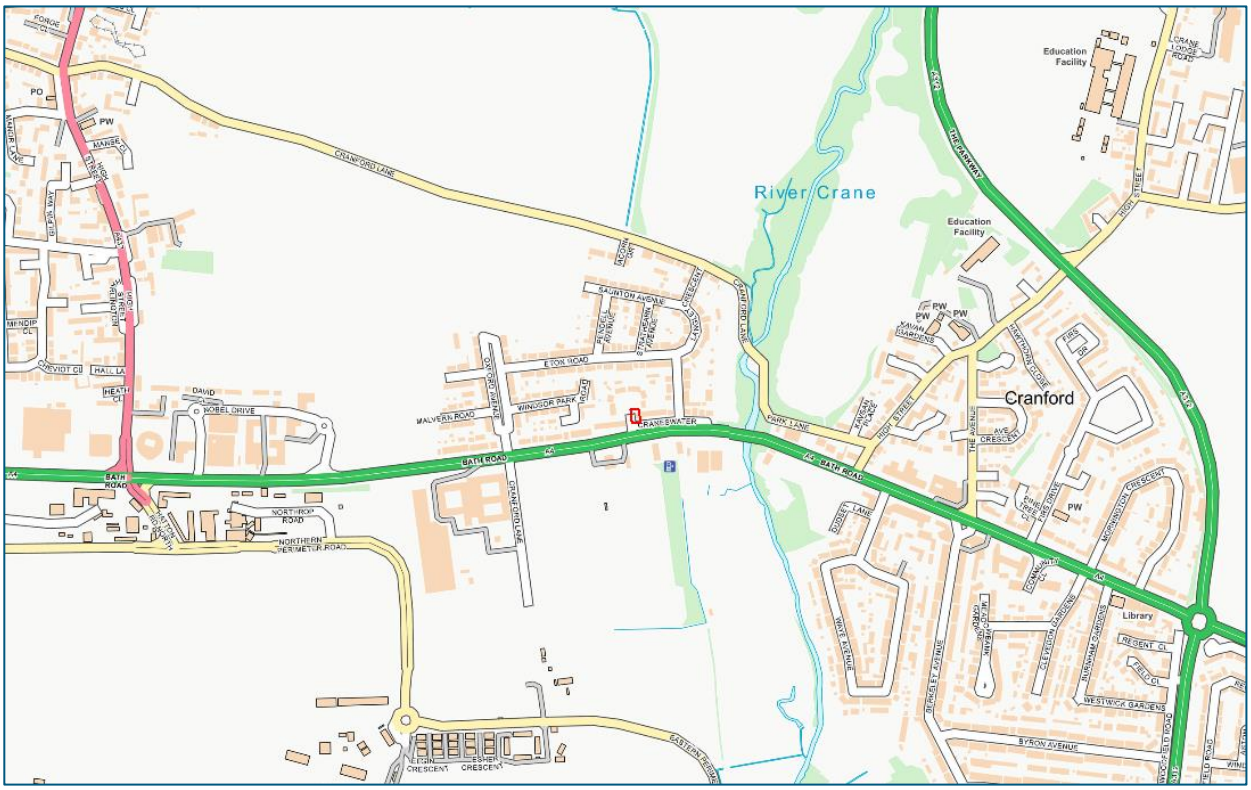

Figure 4: EA Historic and Recorded Flood Outlines (Source: EA).

4.3 Site Owner Recorded Flooding

The site owner has provided no details of flooding having affected the Application Site.

[2] Historic Flood Map - data.gov.uk

5 Flood Risk: Tidal/Fluvial Flooding

5.1 Assessment Methodology

At the time of writing no site specific modelled flood data (Product 4) has been provided by the EA. As such, the flood extents from the West London SFRA have been utilised to provide an understanding of the flood risk to the site.

5.2 Baseline Tidal/Fluvial Flood Risk

The EA Flood Map for Planning shows that the site is located within Flood Zone 2 (Figure 3). It should be noted that the main access point into the site, along Bath Road to the west, is located wholly within Flood Zone 1.

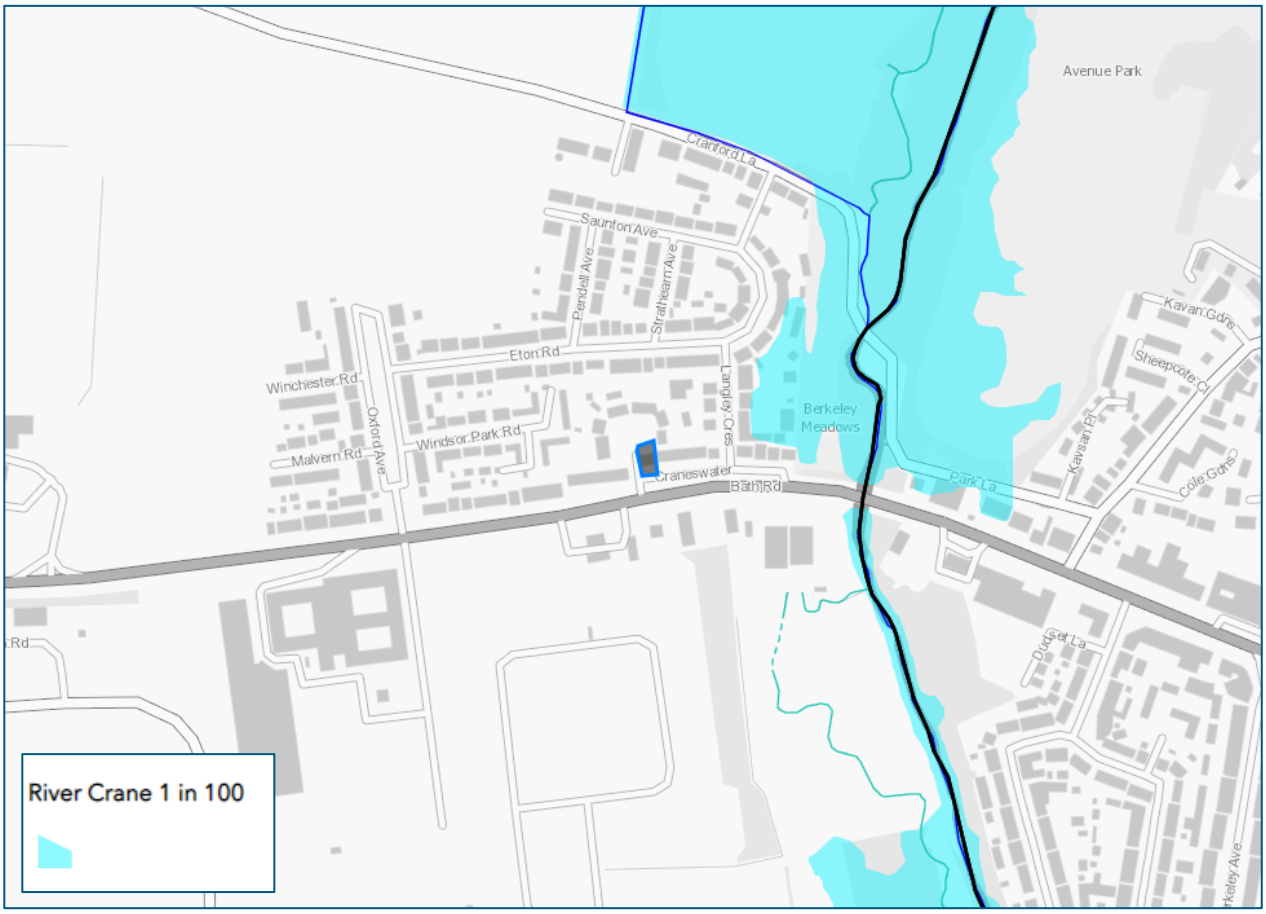

Figure 5: EA Flood Map for Planning

5.3 With Climate Change Pluvial Flood Risk

The risk of flooding is expected to increase as a result of climate change. The site is located within the Thames River Basin District and the London Management Catchment. The increase in peak river flow for the 2080's epoch for the 'central' allowance is +17%.

No data has been provided for the 1:100+17%CC flood event. However, data has been provided for the 1:100+25%CC scenario, this has been deemed to be a suitable proxy for the +17% scenario.

Analysis of the 1:100+25%CC event shows that the site would remain unaffected by flooding (Figure 6).

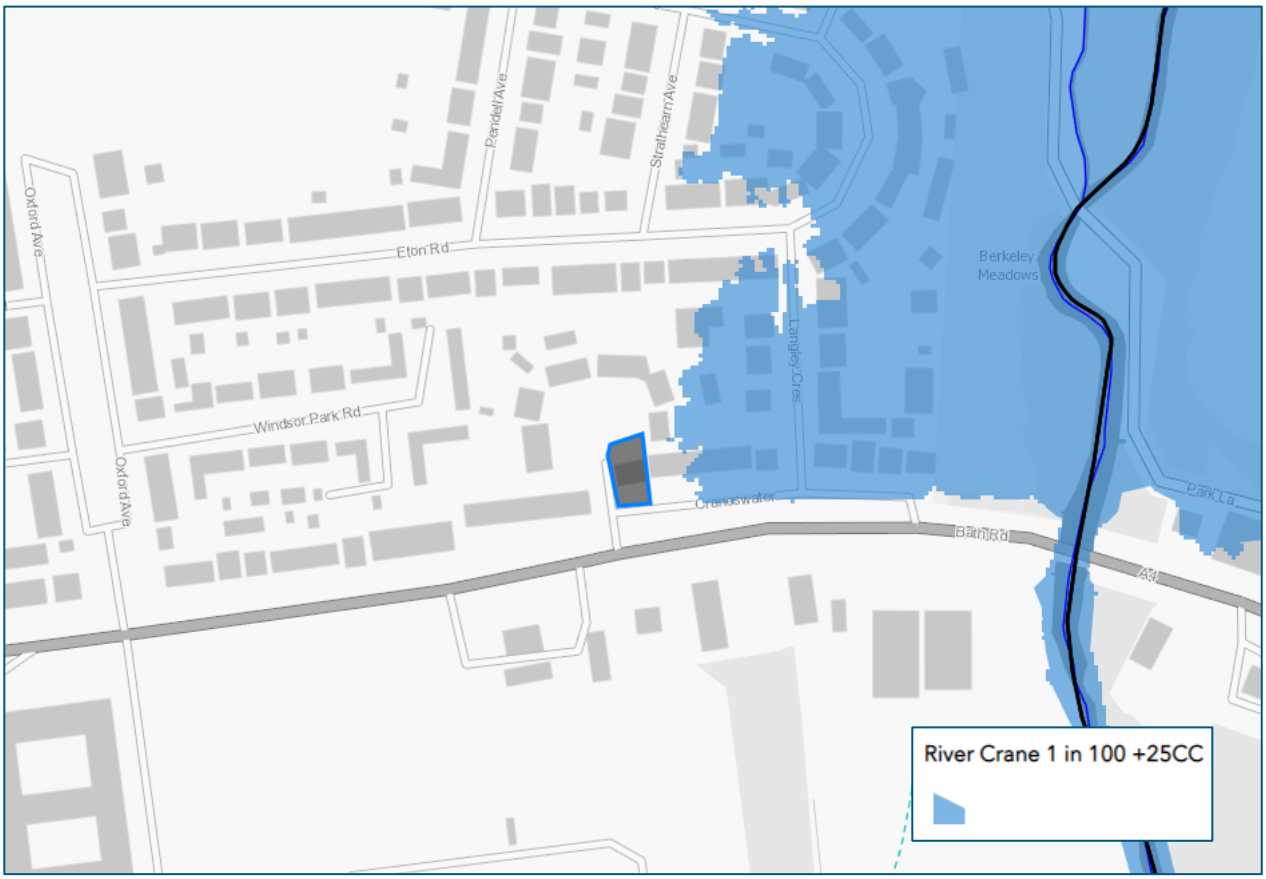

Figure 6: 1:100+25%CC Flood Extents

5.4 Assessed Tidal/Fluvial Flood Risk

Considering the impacts of climate change, the fact that the site is located within Flood Zone 2 and outside of the modelled 1:100+25%CC flood extents from the River Crane , the assessed tidal/fluvial flood risk over the development lifespan is considered to be relatively low.

6 Flood Risk: Pluvial Flooding

6.1 Baseline Pluvial Flood Risk

The EA's Risk of Flooding from Surface Water map shows the site to be located within an area of 'Very Low' risk of flooding (Figure 7). There are some areas around the site (to the east) that have a 'Medium' and 'High' surface water flood risk, but these do not directly affect the site.

The following definitions of the annual surface water flood risk labels are given by the EA:

- 'High Risk'; >3.3% AEP (more often than 1 in 30)
- 'Medium Risk'; 3.3% to 1.1% AEP (between 1 in 30 and 1 in 100)
- 'Low Risk'; 1% to 0.1% AEP (between 1 in 100 and 1 in 1000)
- 'Very Low Risk'; <0.1% AEP (less often than 1 in 1000)

Given that the site is shown to be located in an area at 'Very Low' risk of flooding, the EA Surface Water Depth map for the 'High' risk event (equivalent to the 1 in 30 year event) and for the 'Medium' risk event (equivalent to the 1 in 100 year event) shows that the site would remain unaffected by flooding. The 'Medium' risk depth map is shown in Figure 8.

Figure 7 EA Surface Water Flood Risk Map. (Source: EA)

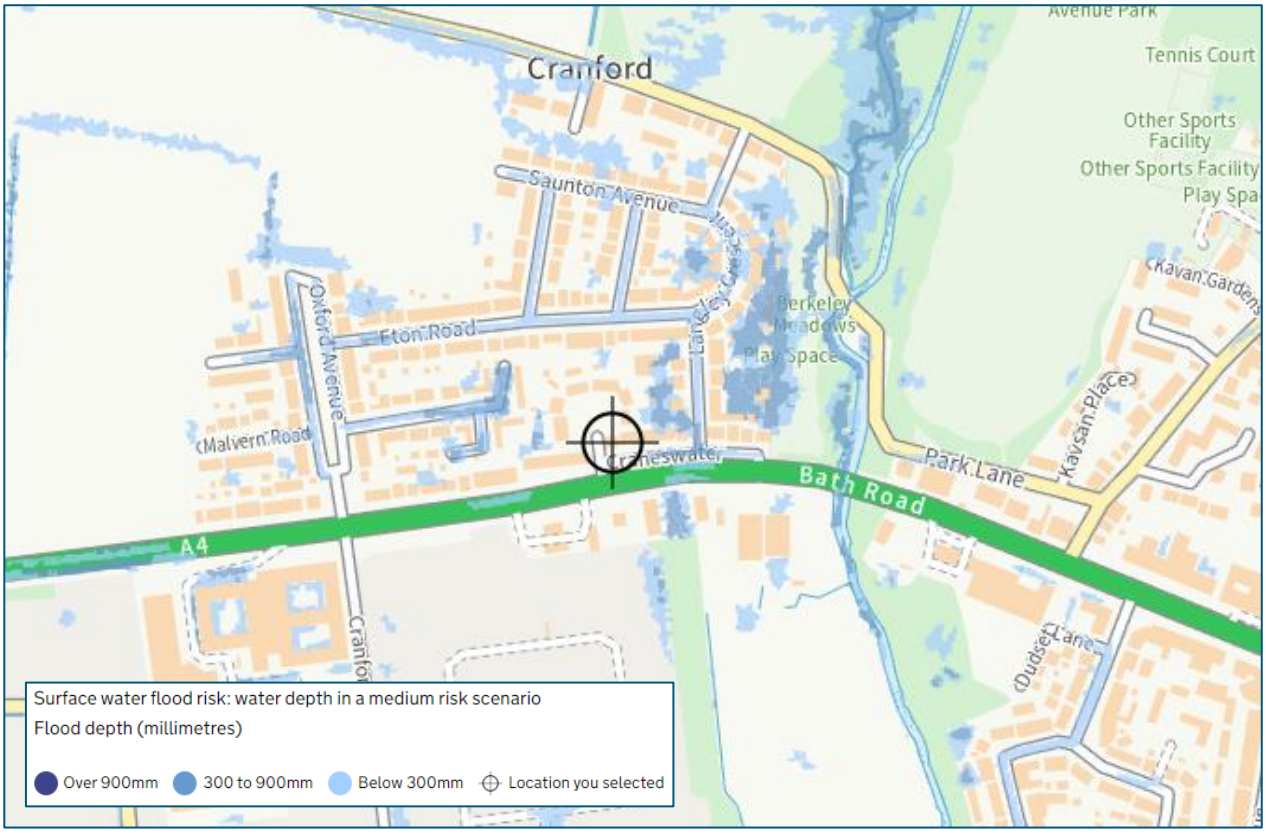

Figure 8: EA Surface Water Depth Map – High Risk Scenario (Source: EA)

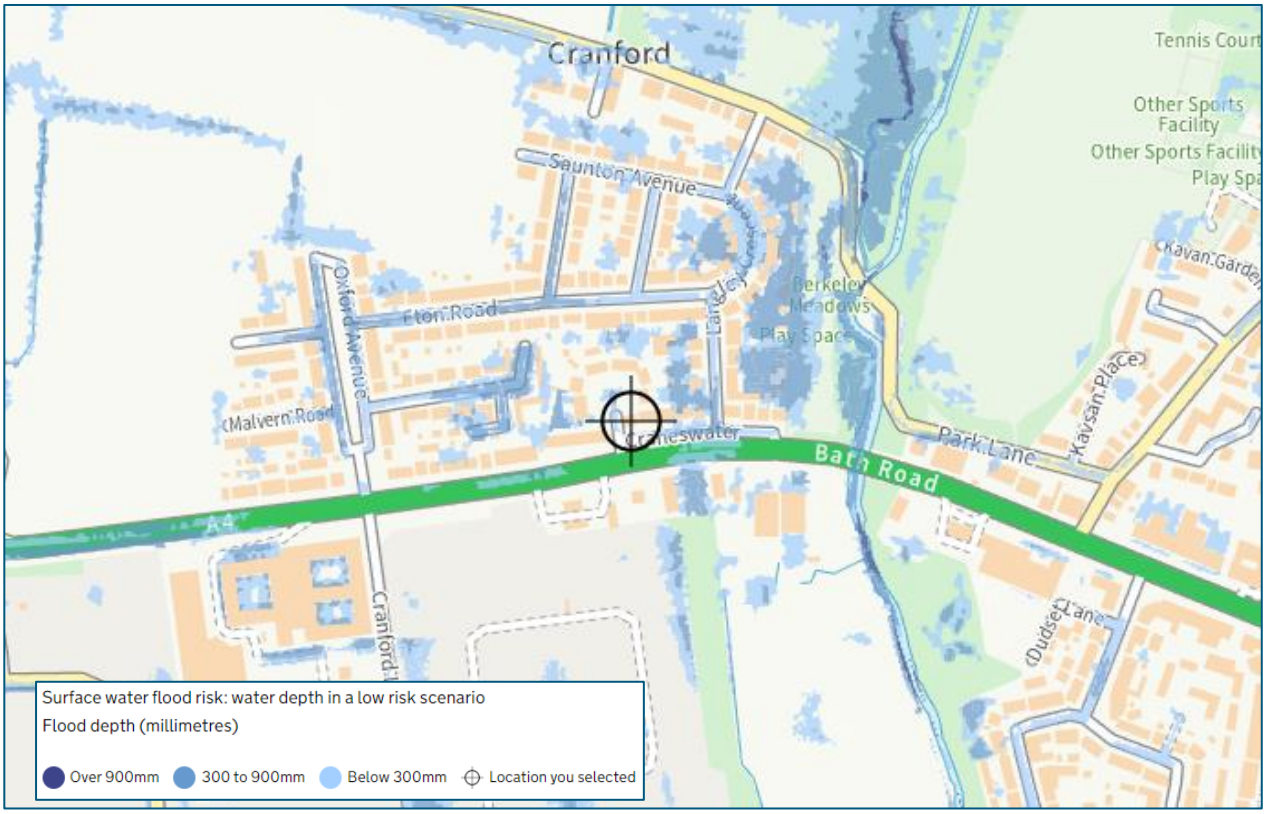

Figure 9 EA Surface Water Depth Map – Medium Risk Scenario (Source: EA)

The EA Surface Water Depth map (Figure 9) for the 'Low' risk event (equivalent to the 1 in 1000 year event) shows that the site would not be affected by flooding. The higher risk areas of flooding surrounding the site may experience flood depths between 300-600mm. It should also be noted that the main access route (along Craneswater and Bath Road) generally wouldn't experience flood depths greater than 300mm.

The West London SFRA (2018) states that land within EA modelled surface water flood risk extents predicted for up to and including 1 in 100 year return period events will be treated as being Flood Zone 3a (surface water). Furthermore, development within the 1 in 30 year RoFSW mapped extent will be treated as if it were Flood Zone 3b (Functional Floodplain). The definition of the Functional Floodplain is provided in Table 1 (Paragraph 065) of the PPG Flood risk and coastal change.

The West London SFR A requires the site to therefore be treated as if it were in Flood Zone 3, with regards to the needs of the NPPF, PPG and site specific FRA's:

Where Flood Zone 3a exceeds Flood Zone 3, Flood Zone 3a as defined by this document takes precedence and should be applied accordingly. It should also be noted that, Flood Zone 3a always includes land also defined as Flood Zone 3b. This is no different from how Flood Zone 2 incorporates land within Flood Zone 3. Sites within Flood Zone 3a and / or 3b as defined by this SFRA will be treated as if it were in Flood Zone 3 with regards to the needs of the NPPF, PPG and site-specific FRA submission requirements.

The site has been shown to be located outside of both the 1:30 year and 1:100 year RoFSW flood extents, therefore it should not be classified as Flood Zone 3a/3b.

6.2 With Climate Change Pluvial Flood Risk

The current Environment Agency pluvial flood risk maps currently do not incorporate predicted climate change allowances. However, due to the predicted increases in peak rainfall intensity, it is likely that surface water flood depths will increase over the lifetime of the development. Consequently, appropriate surface water mitigation measures are discussed in the appropriate section of this report.

6.3 Assessed Pluvial Flood Risk

The site has been shown to be unaffected by surface water flooding. However, additional mitigation measures are to be implemented in line with guidance set out in line with CLG 2007 'Improving the Flood Performance of New Buildings. As such, the risk of flooding can be considered to be low.

7 Flood Risk: Groundwater Flooding

7.1 Baseline Groundwater Flood Risk

As part of the West London SFRA, the EA have provided groundwater data, derived from the British Geological Survey (BGS) data, in the form of a groundwater vulnerability map, which provides key evidence for the EA's assessment of GW vulnerability. The data uses three categories to show this potential: high, medium and low vulnerability (Figure 10).

Analysis of the mapping shows that the site is located within a groundwater vulnerability area.

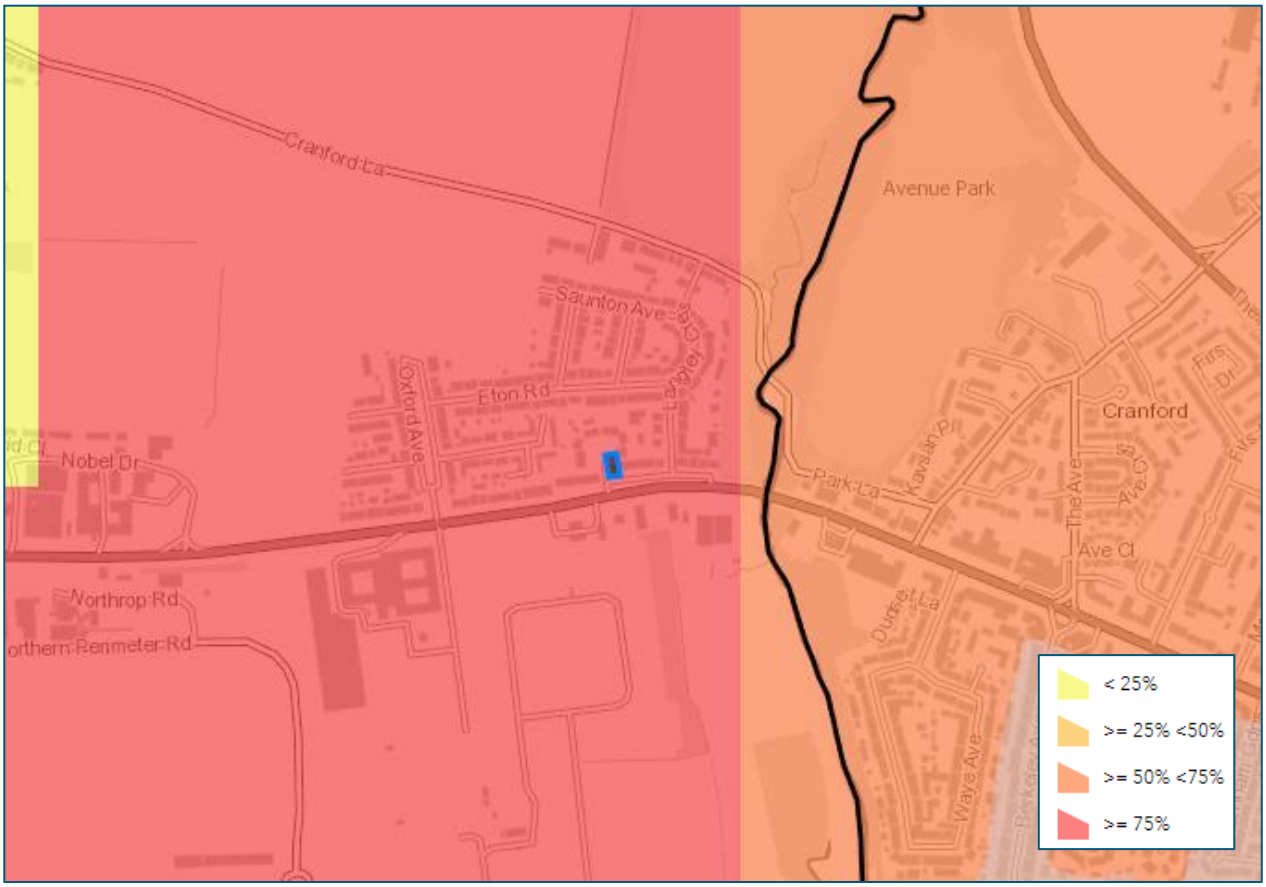

Figure 10 Groundwater Vulnerability Map (Source: West London SFRA)

7.2 Post Development Groundwater Flood Risk

As part of the proposals, the development will not incorporate any below ground (basement) habitable accommodation. There is no records to indicate that the existing residential dwelling has been previously affected by flooding from this source.

7.3 With Climate Change Groundwater Flood Risk

According to the UK Groundwater Forum[3], the effects of the predicted impacts of climate change may include:

[3] *Groundwater Resources and Climate Change, http://www.groundwateruk.org/Groundwater_resources_climate_change.aspx#:~:text=The%20effects%20of%20climate%20change,t*

- a long term decline in groundwater storage;
- increased frequency and severity of groundwater droughts;
- increased frequency and severity of groundwater-related floods;
- mobilisation of pollutants due to seasonally high water tables;
- saline intrusion in coastal aquifers, due to sea level rise and resource reduction.

These impacts cannot be locally managed and would need a catchment wide resource management plan to mitigate the risks.

7.4 Assessed Groundwater Flood Risk

Considering the impacts of climate change and the other factors discussed above, the assessed groundwater flood risk over the development lifespan can be considered to be moderate. Appropriate waterproofing should provide adequate mitigation.

he%20UK%20therefore%20may%20include%3A&text=increased%20frequency%20and%20severity%20of,to%20seasonally%20high%20water%20tables

8 Flood Risk: Sewer Flooding

8.1 Baseline Sewer Flood Risk

The West London SFRA has provided historic flood incidents from Thames Water as part of their DG5 register. Data is provided per postcode area. Analysis of the incidents map shows that the application site is located in an area that has not experienced any internal or external records of flooding. The exact locations of these incidents is not known and there is no evidence to suggest that the site has been previously affected by flooding from this source.

8.2 Post Development Sewer Flood Risk

Consent for any new sewer connections into the public sewer will be required. It is recommended that any new connections are fitted with non-return valves to minimise the risk of internal sewer flooding.

8.3 With Climate Change Sewer Flood Risk

Current climate change predictions are for changes in rainfall profile and water availablity, which are likely to alter the demands on the public sewer network. As far as practicable within the Development Proposals, opportunities for water reuse and to restrict surface water discharges have been considered.

8.4 Assessed Sewer Flood Risk

Considering the impacts of climate change and the other factors discussed above, the assessed sewer flood risk over the development lifespan can be considered to be relatively low.

9 Residual Flood Risk

Residual risks are those remaining after applying the sequential approach to the location of development and taking mitigating actions. Flood Defence Breach

9.1 Flood Defence Breach Analysis

The Application Site is not in an area that benefits from flood defences according to the EA Flood Map; therefore, the Application Site is not at residual risk of a flood defence breach and no specific mitigation measures are required.

9.2 Reservoir Failure

The Environment Agency risk of reservoir flooding indicates that the site is not at risk as a result of a modelled reservoir failure (Figure 11).

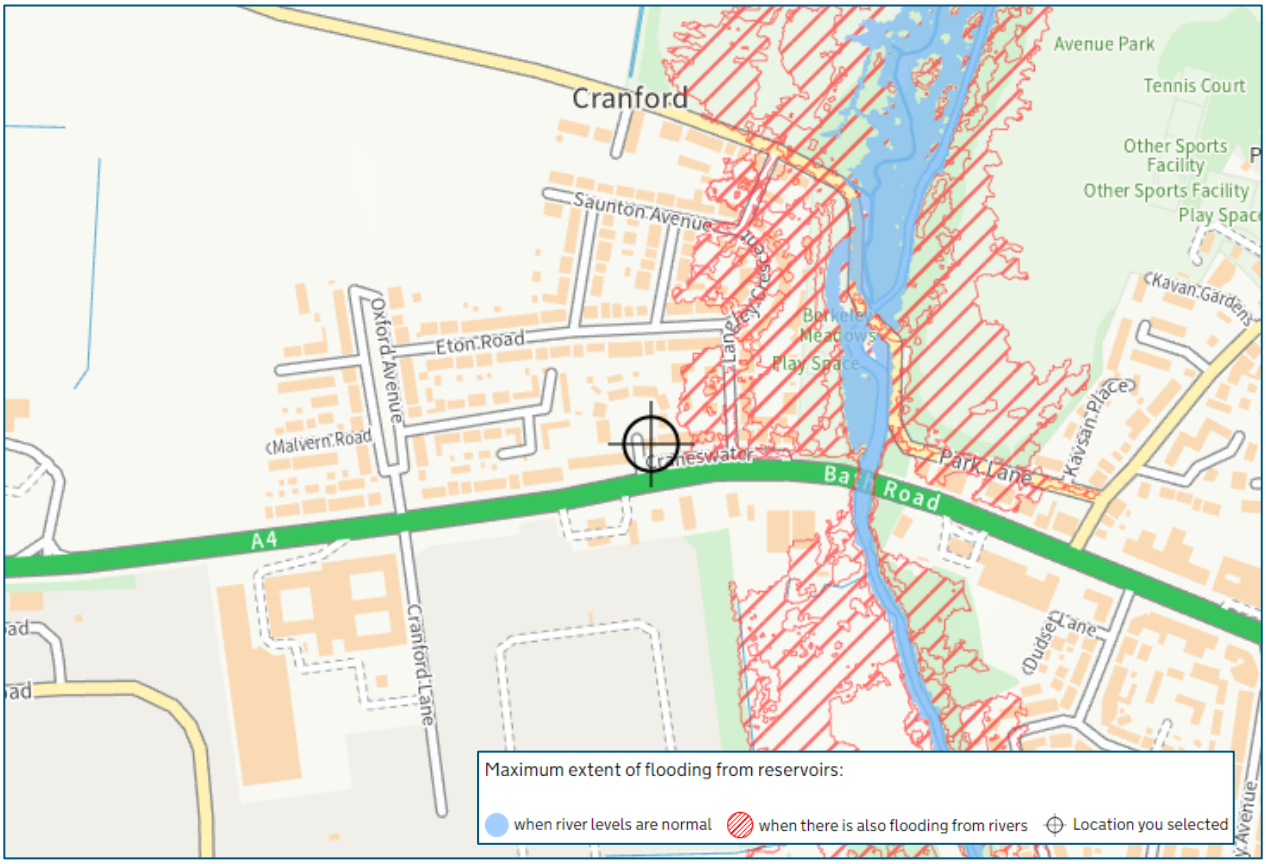

Figure 11: Environment Agency, Risk of Reservoir Flooding

9.3 Canal Failure

Canal Failure could result in flooding if a section of raised canal, either on an embankment or on a viaduct, was to fail.

As the Application Site is not within 1km of a raised canal, it is considered that the residual risk of canal flooding is low.

10 Flood Warning & Emergency Plan

Given the nature of the proposed development, and that it is classified as a Minor Extension under the NPPF, the access and egress to the existing dwelling is unlikely to be significantly changed as a result of the development.

10.1.1 Environment Agency Flood Warning Service

The below process outlines the key steps to take in response to the alert or warning level issued by the Environment Agency or Met Office Rain Warnings.

Preperation;

PRACTICE FWEP

Check the National Flood Forum or speak to a Floodline adviser to find out how to stay safe during a flood. Telephone: 0345 988 1188.

Prepare a personal flood plan, community or group flood plan, or business flood plan.

If you own property next to a watercourse, for example a river, culvert, brook or mill stream, you must:

- maintain river beds and banks (for advice speak to the Environment Agency or Lead Local Flood Authority for guidance) not obstruct the water flow

EA Flood Alert or Met Office Yellow Rain Warning

PREPARE FOR POSSIBLE FLOODING

check your flood risk - https://flood-warning-information.service.gov.uk/long-term-flood-risk

sign up for flood warnings - https://www.gov.uk/sign-up-for-flood-warnings

keep up to date with the latest situation - call Floodline on 0345 988 1188

or follow @EnvAgency and #floodaware on Twitter for the latest flood updates

have a bag ready with vital items like insurance documents and medications in case you need to leave your home

check you know how to turn off your gas, electricity and water mains supplies plan how you'll move family and pets to safety

empty water butts to provide surface water attenuation

EA Flood Warning or Met Office Amber Rain Warning

IMMEDIATE ACTION REQUIRED

move vehicles to higher ground

move family and pets to safety

move important items upstairs or to a safe place in your property, starting with cherished items and valuables, then furniture and furnishings

turn off gas, electricity and water supplies if it's safe to do so; never touch an electrical switch if you're standing in water

if you have property protection products such as flood barriers, or air brick covers, use them now

keep track of the latest situation - https://flood-warning-information.service.gov.uk/warnings

DANGER TO LIFE, ACT NOW.

call 999 if you're in immediate danger

follow advice from the emergency services and evacuate

make sure you have an emergency kit including a torch, spare batteries, mobile phone and charger, warm clothes, important numbers like your home insurance, water, food, first aid kit and any medicines and baby care items you may need

alert neighbours and offer help if it's safe to do so

avoid driving or walking through flood water: just 30cm (1 foot) of fast flowing water could move your car and even shallow moving water can knock you off your feet

keep your family and pets away from floodwater – it may contain heavy debris, sharp objects, open manhole covers, sewage and chemicals

It is important to leave the site/property upon receipt of a severe flood warning. This is to ensure that additional strain is not put on the emergency services.

10.2 Environment Agency Flood Warning Service

The Environment Agency provides a flood warning service and operates a flood forecasting and warning service for areas at risk of flooding from rivers or the sea. This is a free 24-hour service operating 365 days of the year and relies on direct or live observation of rainfall, river levels, tide lives, bespoke in-house predictive models, rainfall radar data and information from the UK Met Office. The Environment Agency operate a Flood Information service which identifies whether any flood warnings or alerts have been issued for a specific postcode or place in England or Wales: https://flood-warning-information.service.gov.uk/.

The Environment Agency also operate a 5 day county-wide forecast in relation to flood risk. It is recommended that this service is regularly checked to ensure occupants / residents are aware of any possible risks: https://flood-warning-information.service.gov.uk/5-day-flood-risk.

The site is located within a EA Flood Warning/Alert area, however the closest watercourse (200m to the west) is within a Flood Warning Area. Site users should monitor alerts at this location (The River Crane at Hillingdon, Southall, Cranford, Feltham and Twickenham, quick dial code: 172608).

The Site should be linked to the Environment Agency's flood warning service so that when the Environment Agency issues a flood alert or warning, the service would send an automated warning message to the appropriate contact (i.e., Resident). Flood warnings and alerts are provided by phone, email or text.

10.3 Met Office weather warnings

In addition to the Environment Agency flood warning service, it is recommended that the site occupants staff subscribe to weather warnings from the Met Office. These provide an indication of when weather warnings (e.g. extreme rainfall) are forecast and enable appropriate action to be taken.

The Met Office issues weather warnings up to 5 days in advance, through the National Severe Weather Warning Service, when severe weather has the potential to bring impacts to the UK. It is also possible to stay up to date with weather warnings through the Met Office app (available on both android and apple), social media (twitter, Facebook) or email alerts. More information can be found at https://www.metoffice.gov.uk/weather/guides/warnings.

During periods of bad weather, site users should monitor local weather reports and sign up for the Met Office UK weather warnings. Warnings can be monitored through an Apple/Android app, Twitter or directly via emails. Further information can be found at https://www.metoffice.gov.uk/.

10.3.1 Evacuation routes and designated evacuation points

The site resides within Flood Zone 2, however, has been shown to be located outside Flood Zone 3a/3b for surface water and outside the fluvial flood extents. Hillingdon require a safe access and egress route for the occupants and users of the property during flood events to be identified, marked up on a plan and submitted for approval.

The fluvial flood extent map (Figure 6) showed that Cranewater and Bath Road would remain unaffected by flooding during the 1:100+25%CC flood event. Therefore, dry access can be achieved.

Furthermore, the RoFSW surface water flood risk map has showed that both Craneswater and Bath Road are at relatively low risk of flooding. Therefore, dry access can also be achived.

Safe refuge from flooding can be achieved by remaining at the site and moving via internal stairwells to the upper floors, by moving to higher ground on site, or by leaving the site and heading away from the source of flooding.

As part of the preparation stage of a FEP, a flood bag should be made and stored in a safe but accessible place. The National Flood Forum provides guidance on what should be included in a flood bag, https://nationalfloodforum.org.uk/about-flooding/preparing/emergency-flood-kit/. The recommendations are summarised below:

- Essentials
  - Documents; Insurance documents and other important documents
  - Electricals; Mobile phones and charges (power banks can be useful)
  - Finance; Emergency cash and credit cards
  - Medication; Prescription medication / repeat prescription forms
- Children's Essentials
  - Milk and baby food
  - Sterilised bottles and spoons
  - Nappies
  - Wipes, nappy bags
  - Clothing
  - Comforter, favourite toy
- Considerations
  - Camera to record damage for insurance purposes (digital cameras are best)
  - Numbers for your emergency insurance, local council, emergency service, family and friends, plus local radio frequencies.
  - Torch with spare batteries is best; a wind-up torch is a good backup
  - Portable battery radio, a wind-up radio is a good backup
  - Non-perishable food items (including energy or cereal bars
  - Bottled water (check use-by date)
  - Wash kit and essential toiletries (including toilet and wet wipes)
  - Pack of playing cards or family games
  - Blankets, duvets, warm clothes
  - Wellington boots, waterproof clothing, rubber gloves
  - First aid kit

Note: a flood bag contains many items which would be useful in a variety of civil emergencies; therefore, it is beneficial to prepare an emergency bag, even if the risk of flooding is low.

DEFRA guidance 'Flood Risk to People' FD2321/TR1 states that there are, essentially, three reasons why vehicles cannot be used in floodwaters:

- The presence of water stops the engine functioning;
- The vehicle floats; and,
- The vehicle becomes difficult to control.

Cars will stop and/or float in relatively shallow water (as low as 0.5m in depth) while emergency vehicles may survive in slightly deeper waters (up to 1m in depth). However, with suitable modifications (high level air intakes/exhausts), a fire engine remains controllable in depths of 0.5m at up to 5 m/sec water flows.

As part of the Flood Risk Assessment process, the design of the Application Site has included measures to provide a safe emergency refuge within the buildings onsite in the event of a flood. Therefore, if prior evacuation is not possible, the safest course of action is to remain on site (on the upper floors) and await the co-ordinated blue light response. Unnecessary evacuations can place additional strain on Blue Light Responders, whose resources would be best developed servicing people and properties which pre-date modern flood risk management standards.

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11 Surface Water Management

The purpose of a surface water management plan is, wherever possible, to limit the peak rate of surface water run-off generated by impervious areas of the site, to a rate similar to that of a greenfield.

As the development proposals are for the extension of the existing use, it is proposed to re-use the existing surface water drainage discharge, and to retrofit in appropriate Sustainable Drainage Systems (SuDS). The proposed extension is to be constructed over the existing impermeable rear patio, so it is unlikely that runoff rates/regime will be significantly different post-development.

Any new hardstanding should be constructed using permeable paving (or similar) permeable surfacing. Small SuDS features could also be implemented such as installing a water butt, connected to an existing rainwater downpipe, or raised planter/bioretention area.

12 Mitigation Measures

12.1 Embedded Mitigation measures

The proposed development is for the construction of an extension to an existing building. As discussed above, the FRA will be required to comply with relevant EA Standing Advice (Minor Developments Standing Advice) which states that 'floor levels are either no lower than existing floor levels or 300mm above the estimated flood level. You will also need to use flood resistant materials up to at least 300mm above the estimated flood level.'

It is recommended that the following mitigation measures are incorporated into the proposed development, where possible. Standards for the installation and retrofit of resistance measures are available in British Standard 851188-1:2019+A1:2021:

- In accordance with the Environment Agency's Standing Advice for Minor Extensions, the finished floor levels will be no lower than the existing floor levels.
- Ground floor to be solid (i.e. concrete floors), where possible, with waterproof membrane.
- Damp proof membranes should be included within the design of the dwellings, to minimise the passage of water through ground floors. Impermeable polythene membranes should be at least 1200 gauge to minimise ripping. Effective methods of joining membrane sections are overlaps of 300mm, and also taping (mastic tape with an overlap of 50mm minimum). Care should be taken not to stretch the membrane in order to retain a waterproof layer.
- Utilise waterproof seals on the doors/windows of the new building, to minimise flood water ingress during a flood event.
- Internal cement renders (with good bond) are effective at reducing flood water leakage into a building and assist rapid drying of the internal surface of the wall. The extent to which render prevents drying of other parts of the wall is not currently clear. This may be important, particularly for solid wall construction
- External renders are effective barriers to water penetration and should be used with blocks (or bricks) to at least the predicted flood level (approx. 0.6m), ideally with an additional 0.3m freeboard. External cement renders with lime content (in addition to cement) can induce faster surface drying.
- Cavity insulation should preferably incorporate rigid closed cell materials as these retain integrity and have low moisture take-up. Other common types are not generally recommended as they can remain wet several months after exposure to flood water which slows down the wall drying process. Blown-in insulation can slump due to excessive moisture uptake, and some types can retain high levels of moisture for long periods of time (under natural drying conditions).
- The location of insulation materials, whether above or below the floor slab, is usually based on either achieving rapid heating of the building or aiming for more even temperature distribution with reduced risk of condensation. Insulation placed above the floor slab (and underneath the floor finish) rather than below would minimise the effect of flood water on the insulation properties and be more easily replaced, if needed
- Exterior ventilation outlets, utility points and air bricks to be fitted with removable waterproof covers.
- Any new hardstanding should be constructed using permeable paving (or similar) permeable surfacing. Small SuDS features could also be implemented such as installing a water butt, connected to an existing rainwater downpipe, or raised planter/bioretention area.
- Residents to sign up to EA Flood Warning/Alerts and formalise a Flood Evacuation Plan.

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13 Conclusions

Royal HaskoningDHV has been appointed to undertake a National Planning Policy Framework (NPPF) [1] compliant Flood Risk Assessment (FRA) for the Development Proposals located at 34 Craneswater, Harlington, Hayes, Hillingdon UB3 5HP.

The existing site is currently consists of a single residential dwelling. It is understood that the development is for the construction of an extension to the rear of the existing dwelling to provide greater habitable space.

The proposed development is for an extension of the existing use and the increase in built footprint is under 250m^2. Therefore, the proposals would be classified as a 'Minor Development' ('householder development: For example, sheds, garages, games rooms etc within the curtilage of the existing dwelling, in addition to physical extensions to the existing dwelling itself') under Paragraph: 046 (Reference ID: 7-046-20140306) of the NPPF (2021).

The vulnerability classifications are summarised in Annexe 3 of the NPPF identifies that the Development Proposals are 'More vulnerable', due to the residential use. The Development Proposals are for the construction of an extension to the existing site use (to provide additional habitable space). As such, there will be no change in flood risk vulnerability post-development.

The key findings of the Flood Risk Assessment are as follows:

- With reference to the Environment Agency (EA) Flood Map for Planning, the proposed development is located within Flood Zone 2.
- The site has been shown to remain unaffected by flooding during the present day 1:20 and 1:100 year scenarios.
- Analysis of the 1:100+25%CC flood extents show that the site would remain unaffected by flooding.
- The site has also been shown to be at relatively low risk from surface water, sewer, groundwater, reservoir sources.
- It is recommended that mitigation measures, in line with guidance set out in 'Improving the flood performance of new buildings, 2007' (standards for the installation and retrofit of resistance measures are available in British Standard 851188-1:2019+A1:2021) are incorporated into the proposed development, where possible.
- SuDS measures are to be incorporated into the proposed development. Two SuDSPlanter Roof Rainwater Management System 'Small' unit (dimensions: 1200mm(l)x600mm(w)x950mm(d)) on each downpipe which provides approximately 0.3m^3 of storage. Additionally, a large rainwater butt is to be utilised to provide water for non-potable uses around the site.

A summary of the flood risk for the Application Site for each source requiring consideration under the NPPF is presented as **Error! Reference source not found.**, overleaf.

The Surface Water Drainage Strategy outlined as part of this Flood Risk Assessment will reduce the peak rate of surface water discharge to a state that should not adversely impact third party properties.

The Flood Risk Assessment has been undertaken in accordance with the requirements of the NPPF and it can be demonstrated that the Development Proposals are compatible with the predicted flood risk profile, including climate change allowance over the development lifetime.

It should be noted that the Development Proposals are not predicted to increase the risk of flooding to others over the development lifetime. Consequently, it is concluded that, with regards to the Flood Risk requirements of the NPPF, the Development Proposals are acceptable.

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Glossary

Term	Definition
AEP	Annual Exceedance Probability is the probability of a rainfall or tidal event occurring within any one year. For example, an event of a 100 year return period has an AEP of 1:100 or 1%.
Flood Defences	Artificial structures maintained to a set operational level designed to protect land people and property from Tidal and Fluvial flood sources to an established chance of happening in any year threshold.
Flood Source: Fluvial (River)	When flows within watercourses exceed the capacity of the watercourse causing out of bank flows.
Flood Source: Groundwater	Groundwater flooding is usually the result of prolonged wet weather causing groundwater levels to rise sufficiently to either emerge at surface or to cause flooding of below ground infrastructure, such as basements.
Flood Source: Pluvial	When rainfall causes overland flows which exceed the capacity of the drainage network, causing flooding to land that is normally dry.
Flood Source: Tidal	When high tide events overtop the shoreline to cause flooding to land behind.
Flood Zone 1	Low Probability. Land defined as having a less than 1:1000 annual probability of flooding from tidal and fluvial sources.
Flood Zone 2	Medium Probability. Land defined as having a risk of fluvial flooding between 1:100 annual probability and 1:1000 annual probability. Or Land defined as having a risk of tidal flooding between 1:200 annual probability and 1:1000 annual probability.
Flood Zone 3 (A)	High Probability. Land defined as having a fluvial risk of 1:100 annual probability or greater. Or a tidal risk of 1:200 annual probability or greater.
Flood Zone 3 (B)	Functional Floodplain. Defined by SFRA's as areas where floodwater is stored during lower AEP events, typically the 1:20 annual probability.
Flood Zone Map	The Environment Agency has produced a mapping data set which covers England and provides the general extents of Flood Zones 1, 2, and 3. However the national data set available online does not differentiate between Flood Zone 3 (A) and 3 (B).
Freeboard	In flood risk management Freeboard is a term used to identify the vertical difference between the design flood level, and the design height of any flood mitigation measures. For instance if a pond had bank heights of 9.0m and the water level was at 8.6m the freeboard would be 0.4m (9.0-8.6)
LiDAR	"Light Detection and Ranging (LIDAR) is an airborne mapping technique, which uses a laser to measure the distance between the aircraft and the ground. Up to 500,000 measurements per second are made of the ground, allowing highly detailed terrain models to be generated at spatial resolutions of between 25cm and 2 metres." EA LiDAR
Major Development	Means development involving any one or more of the following: a. the winning and working of minerals or the use of land for mineral-working deposits b. waste development c. the provision of dwellinghouses where – i. the number of dwellinghouses to be provided is 10 or more; or ii. the development is to be carried out on a site having an area of 0.5 hectares or more and is not known whether the development falls within sub-paragraph I(i) d. the provision of a building or buildings where the floor space to be created by the development is 1,000 square metres or more; or e. development carried out on a site having an area of 1 hectare or more.
Main River	Defined on the Main River map and relate to rivers on which the Environment Agency have powers to carry out flood defence works.
Minor Development	Minor non-residential extensions: industrial/commercial/leisure etc extensions with a footprint less than 250 square metres.

Term	Definition
	Alterations: development that does not increase the size of buildings eg alterations to external appearance. Householder development: For example; sheds, garages, games rooms etc within the curtilage of the existing dwelling, in addition to physical extensions to the existing dwelling itself. This definition excludes any Development Proposals that would create a separate dwelling within the curtilage of the existing dwelling eg subdivision of houses into flats. Paragraph: 046 Reference ID: 7-046-20140306, Revision date: 06 03 2014 https://www.gov.uk/guidance/flood-risk-and-coastal-change#minor-development-to-flood-risk
m AOD	Metres Above Ordnance Datum.
OS	Ordnance Survey
Ordinary Watercourse	A watercourse which does not form part of a Main River, works on Ordinary Watercourses usually require consent from either the Lead Local Flood Authority, or the Internal Drainage Board (where one exists).
Qbar	Qbar is the mean annual maximum flow rate, for a catchment which has an equivalent return period of 1 in 2.3 years
Return Period	The return period of a flood might be 100 years; otherwise expressed as its probability of occurring being 1 in 100, or 1% in any one year. If a flood with such a return period occurs, then this does not mean the next will occur in about one hundred years' time - instead, it means that, in any given year, there is a 1% chance that it will happen, regardless of when the last similar event was. Or, put differently, it is 10 times less likely to occur than a flood with a return period of 10 years (or a probability of 10%).
SuDS	Sustainable Drainage Systems, which are designed to manage surface water flows in order to mimic the Greenfield run-off from an undeveloped site.
Urban Creep	Urban creep is the conversion of permeable surfaces to impermeable over time e.g. surfacing of front gardens to provide additional parking spaces, extensions to existing buildings, creation of large patio areas.

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Appendix

A. Development Proposals

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