

LONDON BOROUGH OF HOUNSLOW SMALL SITES SMALL BUILDERS PROGRAMME GARAGE BLOCKS AT GUNNERSBURY CLOSE, CHISWICK, W4 4AH

Flood Risk Review

10030793-ARC-XX-XX-RP-CW-0110-01-Flood Risk Review

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Executive Summary

The site (garage blocks at Gunnersbury Close), which is currently predominantly occupied by garages and associated hardstanding areas, is part of London Borough of Hounslow's Small Sites Small Builders Programme, and hence may be considered for potential future redevelopment with residential uses.

Flood risk to the site from a range of potential sources has been considered in this Flood Risk Review. The site has a 'very low' risk of flooding from rivers and the sea, equivalent to an annual chance less than 1 in 1,000 (0.1%). No other local sources of flooding are considered to pose an onerous risk to the site in the context of its potential redevelopment.

According to the National Planning Policy Framework, a Flood Risk Assessment (FRA) is not necessary to support future redevelopment of the site as it is located in Flood Zone 1 on the Flood Map for Planning (Rivers and Sea), is less than 1 hectare (ha) in area and this Flood Risk Review demonstrates that the site is not at risk of flooding from other local sources.

A Drainage Strategy should nevertheless be prepared to support future redevelopment of the site to ensure that proposals meet national and local requirements and off-site flood risk is not increased as a result of redevelopment proposals.

1 Introduction

1.1 Background

Arcadis Consulting (UK) Limited ('Arcadis') has been commissioned by the London Borough of Hounslow (LBH) ('the Client') to undertake technical surveys for garage blocks at Gunnersbury Close, Chiswick, London, W4 4AH ('the site').

The site is being considered for divestment under the Client's Small Sites Small Builders Programme, which aims to enable positive regeneration. This Flood Risk Review is required to document the risk of flooding and consider potential constraints on future redevelopment, which may include residential uses.

1.2 Aim and Objectives

The aim of this Flood Risk Review is to assess and document the potential risk of flooding to the site from all sources (including rivers, the sea, surface water, groundwater and artificial sources) in the context of the site's future development.

Specific objectives of the Flood Risk Review are to:

- Review available sources of published flood risk data, supplemented by targeted data collection/consultation with the Environment Agency (EA) and the applicable Lead Local Flood Authority (LLFA).
- Consider all relevant forms of flood risk (e.g. rivers, the sea, surface water, groundwater and artificial sources), with a risk rating assigned (e.g. HIGH, MEDIUM, LOW) to each form of flooding.
- Confirm the site's Flood Zone designation and consider NPPF¹ acceptability in accommodating residential development, with reference to the Sequential and Exception Tests.

No site inspection, topographic survey or flood estimation/modelling has been undertaken by Arcadis to inform this desktop review.

1.3 Data Sources

The following data sources have informed the preparation of this Flood Risk Review:

- EA lidar topographic data (2m tiles TQ17NE and TQ27NW) (Ref. 1)
- EA Long Term Flood Risk Maps, including the 'Risk of Flooding from Rivers and Sea Map', 'Risk of Flooding from Surface Water Map' and 'Risk of Flooding from Reservoirs Map' (Ref. 2)
- EA 'Flood Map for Planning (Rivers and Sea)' (Ref. 3)
- EA 'Recorded Flood Outlines dataset (Ref. 4)
- LBH Strategic Flood Risk Assessment (SFRA) (Ref. 5)
- LBH Preliminary Flood Risk Assessment (PFRA) (Ref. 6) and Addendum (Ref. 7)
- LBH Local Flood Risk Management Strategy (LFRMS) (Ref. 8)
- LBH Surface Water Management Plan (SWMP) (Ref. 9)
- West London SFRA (Ref. 10)
- British Geological Survey (BGS) Geology of Britain Viewer (Ref. 11)
- Defra Magic Maps (for EA Aquifer Designations) (Ref. 12)

1.4 Terminology

Flood risk is a product of both the likelihood and consequence of flooding. Throughout this report, flood events are defined according to their likelihood of occurrence. Floods are described according to an 'annual chance', meaning the chance of a particular flood occurring in any one year. This is directly

¹ A summary of NPPF requirements with respect to flood risk is included in Appendix A.

linked to the probability of a flood. For example, a flood with an annual chance of 1 in 100 (a 1 in 100 chance of occurring in any one year on average), has an annual probability of 1%.

1.5 Limitations

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2 Site Overview

2.1 Site Description

The site is located at approximate National Grid Reference TQ199784 within the generally urban setting of Chiswick, Hounslow. It occupies an area of approximately 0.1 hectares (ha) and is roughly rectangular on plan, as illustrated in Figure 1.

The site is currently occupied by garages and associated hardstanding areas, with a small area of landscaped border in the south-western corner. It is surrounded by residential properties and gardens and there is a small strip of greenspace to the north of the site separating it from Chiswick High Road. The District Line and Overground (North London Line) passes close to the site approximately 20m to the north-west and Gunnersbury Underground Station is located within 100m of the site to the south-west. Chiswick Business Park is located on the opposite side of Chiswick High Road to the site and the Gunnersbury Triangle Local Nature Reserve is located 100m north-east of the site.

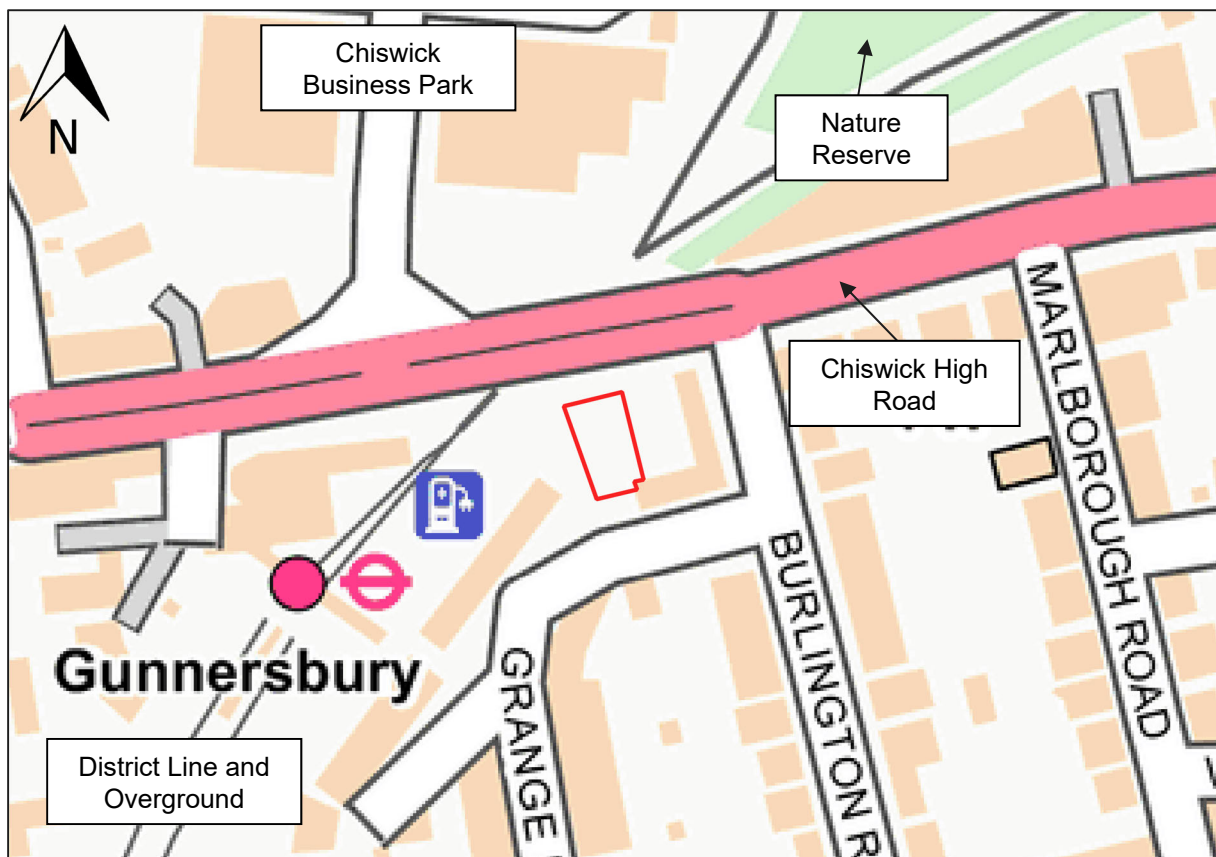


Figure 1 - Site Location (site boundary outlined in red)

Contains Ordnance Survey data © Crown copyright and database right 2019

2.2 Site Topography

Lidar data, shown in extract in Figure 2, indicates that the site is at levels of approximately 9.7-10.4m Above Ordnance Datum (AOD), with a slight slope downwards observable from west to east across the site.

Offsite, ground levels along the nearby underground line are notably lower than the site and surrounding area, as the underground line runs in a cutting with levels at approximately 4.8mAOD. Ground levels at the entrance to Chiswick Business Park (approximately 50m north-west of the site) are slightly raised above the surrounding area. The prevailing topography tends to slope downwards to the south towards the River Thames.

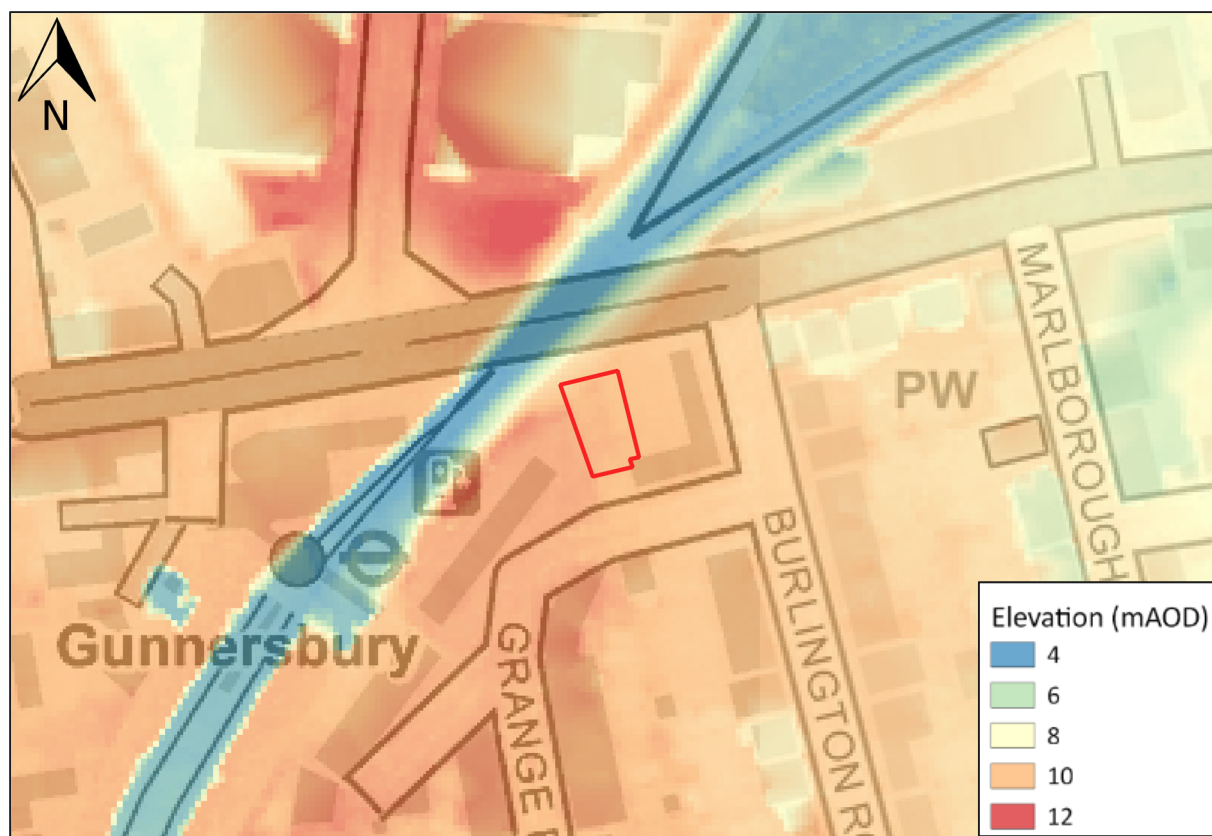


Figure 2 – Site Topography (filtered LiDAR data; site boundary outlined in red)

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3 Sources of Flood Risk

3.1 Flooding from Rivers and the Sea

Catchment Overview

The site is located in the catchment of the River Thames, which drains a total area of approximately 12,935km². The River Thames, which is tidal through this part of West London, flows in a south-easterly direction approximately 1km south-west of the site and the River Brent (and Grand Union Canal) discharges to the River Thames over 1.5 km upstream.

Historical Flooding

Historical fluvial flood events are listed in the PFRA and there are no recorded incidents of fluvial flooding at the site or surrounding area. This is corroborated by the EA 'Recorded Flood Outlines' dataset.

Flood Mapping

The Risk of Flooding from Rivers and Sea Map is informed by the EA National Flood Risk Assessment (NaFRA), which takes account of flood defence survey information and modelled river levels, factoring in a risk of overtopping of failure of raised defences where they exist, to provide a probabilistic assessment of flooding on a relatively coarse 50m grid. The Flood Map for Planning (Rivers and Sea), which is intended to inform the planning process, does not account for the impact of flood defences, but is created using detailed flood modelling (where available). The map also shows areas benefitting from defences. Extracts of these maps are shown in Figure 3 and Figure 4 respectively.

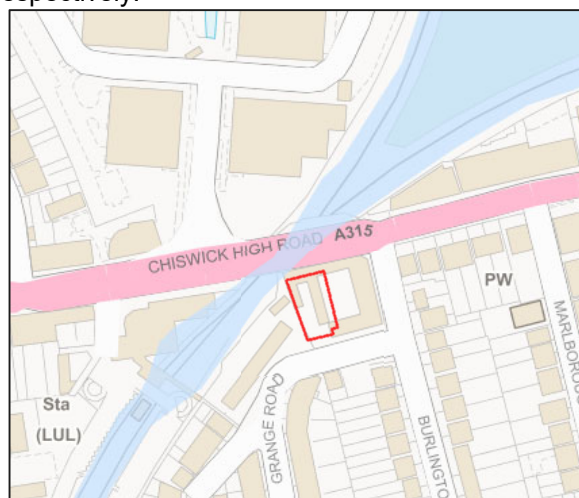


Figure 3 – Risk of Flooding from Rivers and Sea Map
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Figure 4 – Flood Map for Planning (Rivers and Sea)
Contains Environment Agency information © Environment Agency and/or database right

The Risk of Flooding from Rivers and Sea Map shows that the site is outside the extent of flooding associated with rivers and the sea and has a 'very low' risk of flooding, equivalent to an annual chance demonstrably less than 1 in 1,000 (0.1%). Accordingly, the Flood Map for Planning (Rivers and Sea) shows that the site is located in Flood Zone 1, equivalent to an annual chance of flooding less than 1 in 1,000 (0.1%).

The extent of an extreme flood is shown to be restricted to the low-lying underground line to the west, which provides a flow path for floodwater affecting lower-lying areas closer to the River Thames. These areas are similarly shown to have only a 'very low' risk of flooding, on account of the high standard of protection provided by the Thames Tidal Defences, which protect London from flooding and are reflected on the Flood Map for Planning (Rivers and Sea) north and west of the site.

Overall, the site is considered to be at ‘very low’ risk of flooding from rivers and the sea and this form of flooding is not considered to pose an onerous risk to the site in the context of its potential future redevelopment.

3.2 Flooding from Surface Water

The Risk of Flooding from Surface Water Map is informed by ‘direct rainfall’ modelling undertaken at a high (2m) resolution. It illustrates those areas at elevated risk of surface water flooding in low spots down-gradient of sloping ground or in the topographic valleys associated with current or former watercourses. An extract of the map is shown in Figure 5 below.

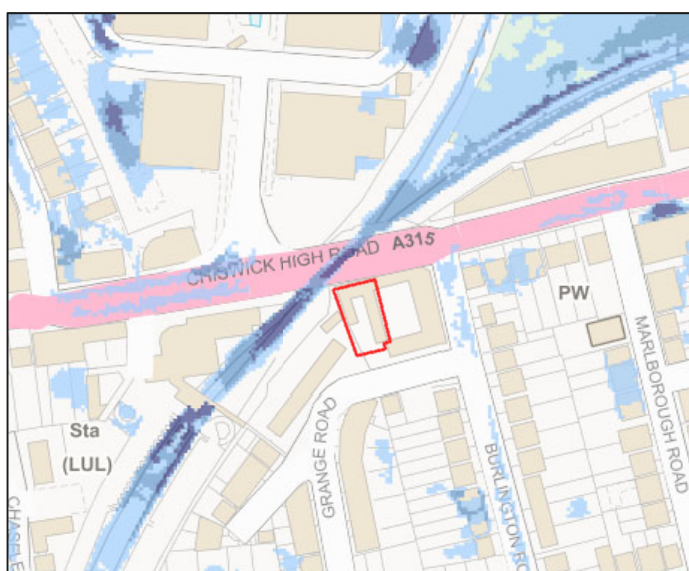


Figure 5 – Risk of Flooding from Surface Water Map
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The map indicates that the site has a ‘very low’ risk of surface water flooding, with an annual chance of less than 1 in 1,000 (0.1%).

Flooding in an extreme ‘low’ likelihood surface water flooding event, with an annual chance of 1 in 1,000 (0.1%) is restricted to isolated areas such as along the centre of Burlington Road to the west and Chiswick High Road to the north. Flooding in these areas in this extreme event is typically predicted to be shallow (i.e. less than 0.3m deep), is not unexpected in a largely urban area and is not indicative of a wider surface water flooding problem. Flooding is shown to affect the underground line extensively, on account of its low-lying level relative to the surrounding area, including in more frequent events. As the underground line is more than 5m lower than the site it is very unlikely that the floodwaters collecting along the line would reach the level of the site and surrounds, even in the more extreme events as indicated by the online mapping.

According to the records of historical flooding in the PFRA, there have been no recorded incidents of surface water flooding at the site. Mapping in the SWMP shows the Critical Drainage Areas (CDA) in Hounslow which are areas recognised as vulnerable to surface water flooding. The Group 1_031 CDA incorporates the section of railway tracks, and adjacent land, around Gunnersbury Station. From the mapping it is difficult to identify if the site lies within this CDA or adjacent to it. However as the railway line is substantially lower than the site and the site is shown to be at ‘very low’ risk of surface water flooding, it can be concluded that the site is not vulnerable to surface water flooding despite its proximity to the CDA.

Overall, the site is considered to have a ‘very low’ risk of surface water flooding, and this form of flooding is not considered to pose an onerous risk to the site in the context of its potential future redevelopment.

3.3 Flooding from Groundwater

Groundwater flood risk is not as well-defined as other sources of flooding and an assessment of risk often requires consideration of geological conditions. Groundwater flooding can occur from two general mechanisms (i) 'clearwater flooding', where the water table in unconfined aquifers rises above the ground surface, associated with permeable bedrock such as chalk and common in areas where 'winterbourne' streams are present, which may run dry for much of the year; and (ii) 'river-groundwater interaction', where river levels interact with permeable superficial deposits along river valleys, potentially flooding areas away from the river without necessarily overtopping the river banks.

According to BGS mapping, the site is underlain by superficial deposits of the Kempton Park Gravel Member above London Clay bedrock. The superficial deposits are classified as a 'Secondary A Aquifer' by the EA, while the London Clay bedrock is classified as 'Unproductive' on account of its low permeability.

According to the PFRA, the site and surrounds are located in a zone of Increased Potential for Elevated Groundwater (IPEG), but the SFRA states that Hounslow is at low risk of groundwater flooding and the mapping presented in the PFRA indicates that there have been no incidents of groundwater flooding at the site.

The unproductive nature of the London Clay bedrock suggests that the likelihood of clearwater flooding is remote. Groundwater is likely to be present at shallow depths within the permeable river terrace gravels overlying the London Clay bedrock at the site and this is likely to be responsible for the area's IPEG designation in the PFRA. However, water levels in these gravels are anticipated to be in continuity with water levels in the River Thames and since the River Thames is not predicted to flood areas near to the site, the likelihood of river-groundwater interaction causing groundwater to rise to the surface is considered similarly low.

The site is considered to be at 'low' risk of groundwater flooding and this form of flooding is not considered to pose an onerous risk to the site in the context of its potential future redevelopment.

3.4 Flooding from Artificial Sources

Sewers

Flooding from sewers can result from lack of sewer capacity, blockages within the sewer network or failure of infrastructure such as pumps. Any area that benefits from sewerage infrastructure has a potential risk of flooding, but the likelihood and consequences are most likely increased by topographic constraints such as low spots or flow paths that could influence the behaviour of floodwater originating from sewers.

Mapping in the PFRA shows incidents of flooding from sewers by postcode. Therefore, it is not possible to identify if any of the recorded incidents occurred at the site. The mapping shows that there have been a relatively small number of recorded incidents (between 1 to 5) of sewer flooding in the 'W4 4' postcode area.

In the absence of site-specific information on sewer flooding, the Risk of Flooding from Surface Water Map can aid understanding by indicating low spots that may be vulnerable were local sewers to cause flooding. As the site is not affected by any surface water flow paths or low spots, which would direct sewer flooding towards the site, it is concluded that sewer flooding in the vicinity does not pose an onerous risk to the site over and above that it poses to any similar developed area that benefits from sewerage infrastructure.

Reservoirs

The Risk of Flooding from Reservoirs Map illustrates the potential flood extent if large raised reservoirs were to fail and release the water that they hold. The map shows that the site is not within this flood extent, with potential flooding in the area generally restricted to the south of the M4/A4.

It is noted that there is a water feature in Chiswick Business Park which is shown by lidar data to be located at higher ground levels than the site. However, the water feature is set lower than local ground levels and is not embanked such that it is not considered to pose a risk to the site.

Canals

The Grand Union Canal is over 2km west of the site and joins the River Thames approximately 1km upstream of the site. As the canal is not embanked above surrounding ground levels, it is not considered to pose a flood risk to the site

Overall, the site is considered to be at 'very low' risk of flooding from artificial sources and this form of flooding is not considered to pose an onerous risk to the site in the context of its potential future redevelopment.

3.5 Future Redevelopment

A Flood Risk Assessment (FRA) is not necessary to support the development of the site as it is located in Flood Zone 1, less than 1ha in area and this Flood Risk Review has demonstrated that the site is not at risk of flooding from sources other than rivers and the sea. Specific planning application validation requirements should however be confirmed with LBH at the time a future planning application is prepared.

A Drainage Strategy would be required to consider available connections and the capacity of the local sewer network, informed by consultation with Thames Water where necessary. A Drainage Strategy should be designed to meet the London Plan (Ref. 13, Policy 5.15) requirement that developers should aim to achieve greenfield runoff rates and use Sustainable Drainage Systems (SuDS) unless there are practical reasons for not doing so. LBH provide guidance for the application of SuDS in their SFRA and the Drainage Strategy should be developed in consultation with LBH, detailing methods to manage site drainage post-development. Climate change allowances, detailed in the SFRA, also need to be incorporated into the Drainage Strategy. The suitability of these allowances should be confirmed with LBH during consultation.

Overall, flood risk is considered unlikely to substantively constrain redevelopment potential at the site.

4 Summary

This desktop Flood Risk Review has investigated the risk of flooding to the site based on a review of relevant data and information in the public domain. The following has been concluded:

- The site is located outside the floodplain of the River Thames and is at 'very low' risk of flooding from rivers and the sea, equivalent to an annual chance of less than 1 in 1,000 (0.1%).
- No other sources of flooding are considered to pose an onerous risk of flooding to the site in the context of its potential redevelopment and the site is considered to be acceptable in principle for all types of redevelopment with respect to flood risk.
- The findings of this Flood Risk Review suggest that an FRA is not necessary to support the development of the site.
- It is recommended that a Drainage Strategy is designed in consultation with LBH and Thames Water and that it includes appropriate allowance for climate change.

Table 1 presents a summary of the risk of flooding by source. It should be noted that differing levels of information have been available to assess the risk of flooding for each source, and the ratings for flooding from rivers, the sea and surface water, for example are necessarily more detailed where they are informed by published flood maps and models.

Table 1 – Summary of Flood Risk by Source

Source of Flooding	Qualitative Flood Risk Rating
Rivers	Very Low
The Sea	Very Low
Surface Water	Very Low
Groundwater	Low
Artificial Sources	Very Low

5 References

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APPENDIX A – Planning Policy and Flood Risk

The National Planning Policy Framework

With regard to flood risk and surface water drainage, the National Planning Policy Framework (NPPF) (Ref. 14) and its accompanying flood risk and coastal change Planning Practice Guidance (PPG) (Ref. 15) set out the Government's planning policy for England and advises on '*how to take account of and address the risks associated with flooding and coastal change in the planning process*'. The principal aim of the NPPF is to achieve sustainable development by accounting for flooding at all stages of the planning process, avoiding inappropriate development in areas at risk of flooding and directing development away from areas where risks are highest. Where development is necessary in areas at risk of flooding, the NPPF aims to ensure it is safe, without increasing flood risk to third parties. Early adoption of, and adherence to, the principles set out in the NPPF with respect to flood risk, can ensure that detailed designs and plans for development take due account of flood risk and the need for appropriate mitigation, if required.

The Sequential and Exception Tests

The PPG identifies four Flood Zone classifications, detailed in Table A1 below.

Table A1 – Flood Zones

Flood Zone	Annual Probability of Flooding
1 – Low Probability	Fluvial and Tidal <0.1% (AEP)
2 – Medium Probability	Fluvial 0.1-1.0% AEP Tidal 0.1-0.5% AEP
3a – High Probability	Fluvial > 1.0% AEP Tidal > 0.5% AEP
3b – The Functional Floodplain	Fluvial and Tidal >5.0% AEP *Starting point for consideration. Local planning authorities should identify Functional Floodplain, which should not be defined solely by rigid probability parameters.

Source: PPG, Flood Risk and Coastal Change

The NPPF specifies that the suitability of all new development in relation to flood risk should be assessed by applying the Sequential Test to demonstrate that there are no reasonably available sites in areas with a lower probability of flooding that would be appropriate to the type of development proposed. The PPG provides guidance on the compatibility of each land use classification in relation to each of the Flood Zones, as summarised in Table A2.

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Table A2 – Flood Risk Vulnerability Classification

Flood Zone	Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	✓	Exception Test required	✓	✓
Zone 3a	Exception Test required	✓	X	Exception Test required	✓
Zone 3b	Exception Test required	✓	X	X	X
Key: ✓ Development is appropriate X Development should not be permitted					

Source: PPG, Flood Risk and Coastal Change

When the Exception Test is triggered, this requires the development proposals to demonstrate wider sustainability benefits to the community that outweigh flood risk, and that the development will be safe for its lifetime, without increasing flood risk elsewhere and where possible reduce overall flood risk.

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