

TFL_PSF_9131 SITE INVESTIGATIONS: SMALL SITES INITIATIVE PORTOBELLO ROAD, W10 6HJ

Flood Risk Review

FEBRUARY 2020



Portobello Road, W10 6HJ

Flood Risk Review

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Executive Summary

The site off Portobello Road, which is currently a green space and embankment area south of the Circle and Hammersmith Railway Lines, is part of TfL Small Sites Initiative, and hence may be considered for potential future redevelopment.

Flood risk to the site from a range of potential sources has been considered in this Flood Risk Review. The site is located in Flood Zone 1 on the Flood Map for Planning (Rivers and the Sea) and 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.

However, the site sits within an area identified as a Critical Drainage Area (CDA) therefore, according to the National Planning Policy Framework, a Flood Risk Assessment (FRA) would be necessary to support future redevelopment of the site.

The Planning Practice Guidance indicates that the site would be suitable for most types of development subject to the development of an acceptable drainage strategy to support the FRA.

1 Introduction

1.1 Background

Arcadis Consulting (UK) Limited ('Arcadis') has been commissioned by Transport for London (TfL) ('the Client') to undertake technical surveys for a site on Portobello Road W10 6HJ ('the site') within the Royal Borough of Kensington and Chelsea (RBKC).

TfL is aiming to divest a number of small sites to enable regeneration. The aim of this flood risk review is to assess the flood risk status of the site and confirm the suitability for various forms of development on the site, including residential.

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)¹.
- 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 NPPF² 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 (1m tiles TQ28SW) (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)
- RBKC Strategic Flood Risk Assessment (SFRA) (Ref. 5)
- RBKC Preliminary Flood Risk Assessment (PFRA) (Ref. 6) and Addendum (Ref. 7)
- RBKC Local Flood Risk Management Strategy (LFRMS) (Ref. 8)
- RBKC Surface Water Management Plan (SWMP) (Ref. 9)
- RBKC Local Plan (Ref. 10)
- British Geological Survey (BGS) Geology of Britain Viewer (Ref. 11)
- Defra Magic Maps (for EA Aquifer Designations) (Ref. 12)

¹ A request has been sent to the LLFA for flood information that they may hold for the site and a response is currently pending. It is recommended that the findings of this review are revisited once a response has been received.

² A summary of NPPF requirements with respect to flood risk is included in Appendix A.

1.4 Terminology

Flood risk is a product of both the likelihood and consequences 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 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 National Grid Reference TQ 24420 81400 within the Royal Borough of Kensington and Chelsea. It occupies an area of approximately 0.4 hectares (ha) and is approximately 20m wide and 200m long, as illustrated in Figure 1.

The site is located in an area of land south of the A40 Westway Road and north of Chepstow House School. The northern boundary of the site is adjacent to the Circle and Hammersmith Railway Lines and the land is accessed from Portobello Road on the eastern side or the B450 on the western side.

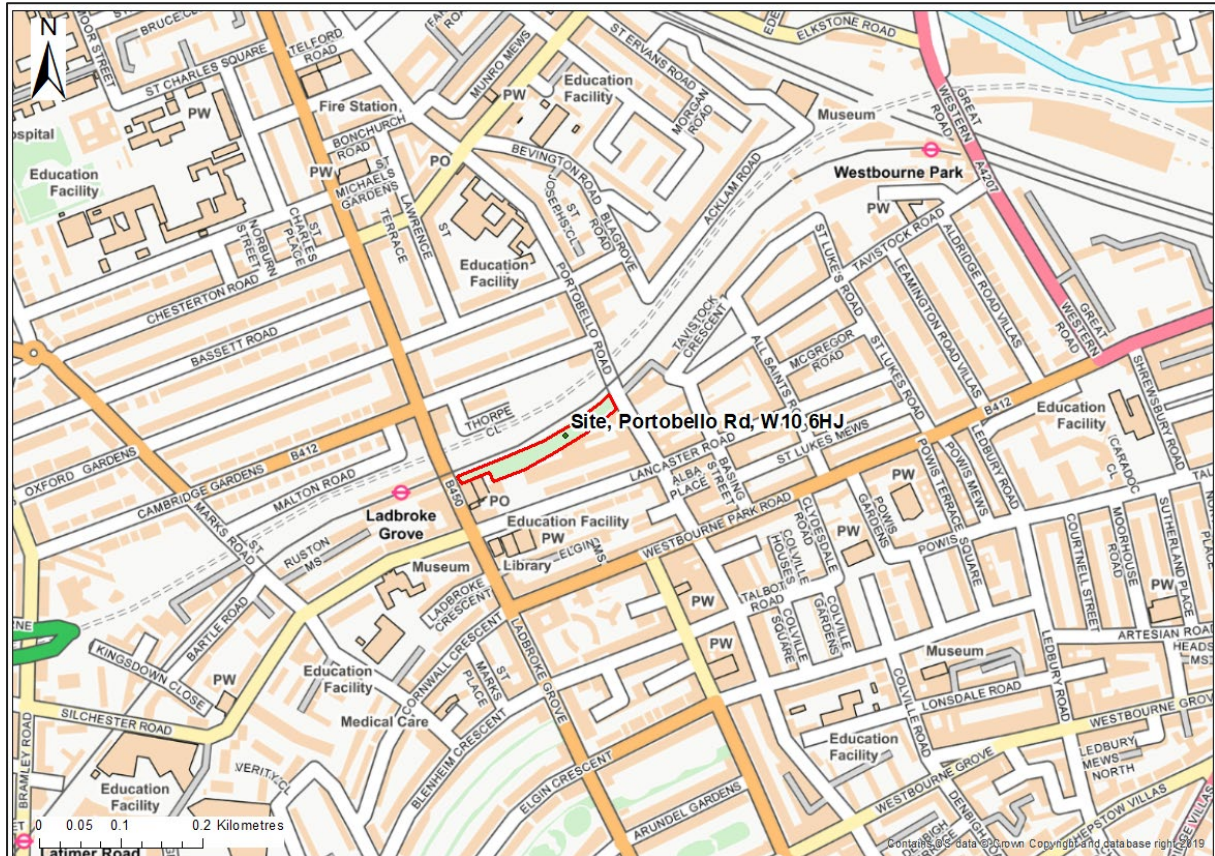


Figure 1 - Site Location (site outlined in red)

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2.2 Site Topography

Lidar data, shown in extract in Figure 2, indicates that the majority of the site sits on an embankment and slopes north to south from levels of approximately 20.9 – 15.0m Above Ordnance Datum (AOD). The ground levels in the north of the site are influenced by the embankment of the elevated railway line and then slope down to the south, merging with existing properties to the south at elevations between approximately 16.2 – 14.1m AOD.

In the wider area the topography slopes from north to south towards the River Thames.

It is worth noting that Google satellite imagery shows the site to be tree covered which may impact the elevation data reported above.

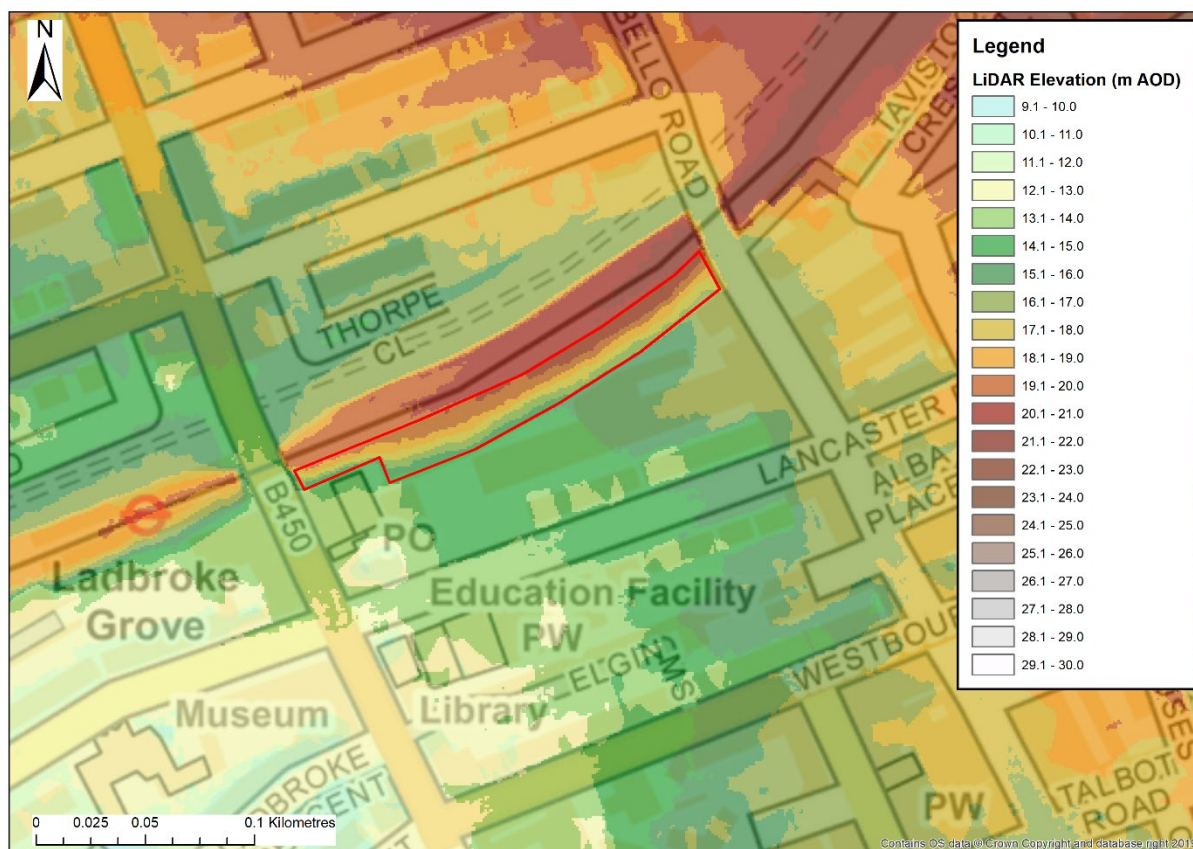


Figure 2 – Site Topography (filtered LiDAR data; site boundary outlined in red)

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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 and is located 3.5km north of the River.

The Borough includes two 'lost rivers', the Westbourne River and Counters Creek. These rivers have been culverted and incorporated into the sewer network, the closest of which is 700m to the west.

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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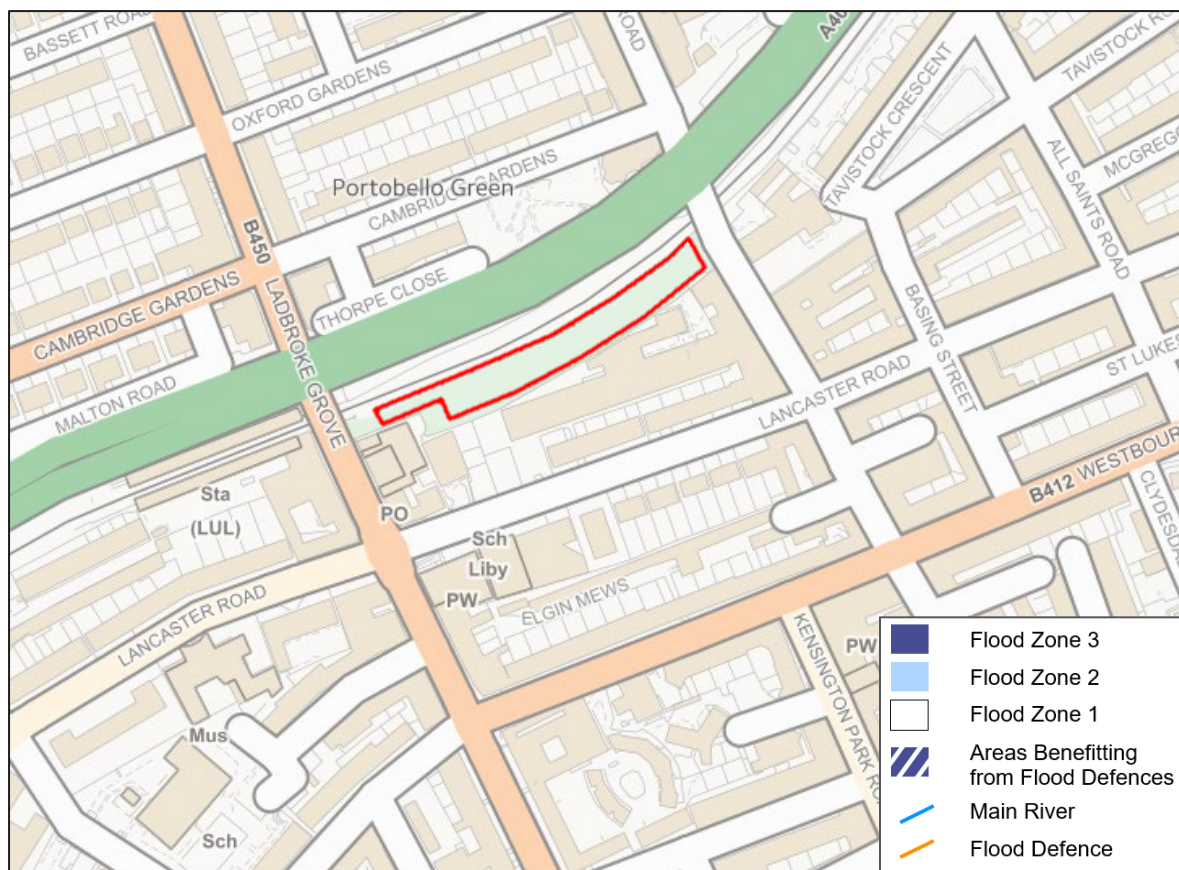


Figure 4 – Flood Map for Planning (Rivers and Sea)

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The Risk of Flooding from Rivers and Sea Map estimates the risk of flooding to the site to be 'very low', equivalent to an annual chance of flooding less than 1 in 1,000 (0.1%).

The Flood Map for Planning (Rivers and Sea) shows the site is located in Flood Zone 1, equivalent to less than 1 in 1,000 annual probability of river or sea flooding.

Historical Flooding

There are no records of fluvial flooding at the site in the PFRA or SFRA and this is corroborated by the EA's Recorded Flood Outline dataset.

Flood Defences

There are no formal flood defences in the vicinity of the site.

The site is considered to have a '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 is largely at 'very low' risk of surface water flooding, with an annual chance of less than 1 in 1,000 (0.1%). However, the map indicates the southern boundary of the site and access to and from the site via Portobello Road may be at high risk of surface water flooding, with a greater than 1 in 33 (3.3%) annual chance.

Mapping in the SFRA shows recorded incidents of surface water flooding across the borough the nearest of which occurred approximately 100m north west of the site, on Ladbroke Grove. Critical Drainage Areas (CDA) identify areas recognised as being vulnerable to surface water flooding. Mapping in the SWMP shows the CDAs in RBKC and identifies the site to be located in the North Kensington CDA. As the site is within a CDA, a Flood Risk Assessment (FRA) will be required to support any development on the site. The FRA will need to adequately demonstrate how the proposed development will mitigate any potential increase in flood risk in line with local and national planning policy.

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 and the Geological map presented in the SWMP, the site is underlain by London Clay bedrock with no superficial deposits. The London Clay bedrock is classified as 'Unproductive' on account of its low permeability.

According to the PFRA, the site and surrounds are not located in a zone of Increased Potential for Elevated Groundwater (IPEG). The SFRA and SWMP map show the site to be in an area considered to be at low risk of groundwater flooding and the nearest recorded incident of groundwater flooding reported is approximately 150m to the south of the site.

The above data suggests that the likelihood of significant clearwater flooding is low and the sites elevation and distance from any rivers make the likelihood of river-groundwater interaction type flooding very low.

The site is considered to be at 'very 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 a 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 approximately 50 recorded incidents of sewer flooding in the W10 postal district.

The SWMP provides the most detailed understanding of sewer capacity. The drainage in the RBKC catchment is noted as being predominantly a combined system. Modelling undertaken as part of the SWMP highlights capacity issues within much of the drainage network in the borough which is further evidenced by the recorded flood incidents many of which are attributed to surcharging of the drainage network.

The SWMP does not show any pipes on the site and any nearby surcharging drainage is likely to pond in a similar manner to the surface water flood map and, therefore, the site is considered to be 'very low' risk of sewer flooding.

Reservoirs

The Risk of Flooding from Reservoirs Map illustrates the potential flood extent were large raised reservoirs to fail and release the water that they hold. The map shows that the site is not within this flood extent.

Canals

The Grand Union Canal is 600m north of the site at its closets point. The canal travels across the north of the Borough and is embanked in a few areas which could potentially result in a flood if breached. The canal water levels are actively managed by the Canals and River Trust (CRT) and they have specific standards for the ongoing management of their assets which makes the occurrence of

overtopping or a breach unlikely, therefore, the risk of flooding from the canal is considered to be 'very low'.

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 would be required to support the development of the site due to its location within a Critical Drainage Area.

This FRA will need to focus on a suitable drainage strategy informed by consultation with Thames Water and the local planning department where necessary. A Drainage Strategy should be designed to meet the London Plan (Ref. 14, Policy 5.15) requirement to achieve greenfield runoff rates and use Sustainable Drainage Systems (SuDS) as well as RBKC Local Plan flood policy CE2 that provides guidance for managing surface water and the application of SuDS in within developments.

On the basis of this review, flood risk is considered unlikely to onerously constrain development on the site. However, an FRA will be required to accompany planning proposals as a result of the sites location within a CDA.

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 within Flood Zone 1 and therefore 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%). There are no recorded instances of fluvial/tidal flooding at the site.
- The site is located outside the area of residual flood risk associated with breaches in the Thames Tidal defences.
- 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.
- An FRA will be required to support redevelopment proposals on account of the site's location within a CDA.
- It is recommended that a Drainage Strategy is designed in consultation with RBKC 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	Very Low
Artificial Sources	Very Low

5 References

1. Defra, 2019. Defra Data Service Platform. Accessed April 2019 via: <https://environment.data.gov.uk/>
2. Environment Agency, 2019. Long term flood risk information. Accessed April 2019 via: <https://flood-warning-information.service.gov.uk/long-term-flood-risk/>
3. Environment Agency, 2019. Flood Map for Planning. Accessed April 2019 via: <https://flood-map-for-planning.service.gov.uk/>
4. Environment Agency, 2019. Recorded Flood Outlines dataset. Accessed April 2019 via: <https://data.gov.uk/dataset/16e32c53-35a6-4d54-a111-ca09031eaaaf/recorded-flood-outlines>
5. Capita URS, 2014. London Borough of Kensington and Chelsea Strategic Flood Risk Assessment.
6. Capita Symonds, 2011. London Borough of Kensington and Chelsea Preliminary Flood Risk Assessment.
7. London Borough of Kensington and Chelsea, 2017. Addendum to the Preliminary Flood Risk Assessment.
8. London Borough of Kensington and Chelsea, 2015. London Borough of Kensington and Chelsea Surface Local Flood Risk Management Strategy 2015-21.
9. Capita URS, 2014. London Borough of Kensington and Chelsea Surface Water Management Plan.
10. Borough of Kensington and Chelsea, 2019. Local Plan
11. British Geological Survey, 2019. Geology of Britain Viewer. Accessed Jan 2020 via: <http://mapapps.bgs.ac.uk/geologyofbritain/home.html>
12. Defra, 2013. Magic Map Interactive Map. Accessed April 2019 via: <https://magic.defra.gov.uk>
13. Environment Agency, 2017. Thames Estuary 2100 (TE2100) Plan. Accessed April 2019 via: <https://www.gov.uk/government/publications/thames-estuary-2100-te2100>
14. Greater London Authority, 2019. The Current London Plan. Accessed April 2019 via: <https://www.london.gov.uk/what-we-do/planning/london-plan/current-london-plan>
15. Department for Communities and Local Government, 2018. National Planning Policy Framework.
16. Department for Communities and Local Government, 2014. Planning Practice Guide: Flood Risk and Coastal Change.

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. 15) and its accompanying flood risk and coastal change Planning Practice Guidance (PPG) (Ref. 16) 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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