

TFL_PSF_9131 SITE INVESTIGATIONS: SMALL SITES INITIATIVE WADHAM ROAD, WANDSWORTH SW15 2LR

Flood Risk Review

JANUARY 2020



Wadham Road, Wandsworth SW15 2LR
Flood Risk Review

Author	Nick Cramp
Checker	Hywel Roberts
Approver	Alison Pugh
Report No	10038043-ARC-02-XX-RP-YY-0006-01-Flood Risk Review_Wadham Road
Date	JANUARY 2020

VERSION CONTROL

Issue	Revision No.	Date Issued	Description of Revision: Page No.	Description of Revision: Comment	Reviewed by:
1	0	28/01/2020	-	First Issue	HR

This report dated 28 January 2020 has been prepared for Transport for London (the “Client”) in accordance with the terms and conditions of appointment (the “Appointment”) between the Client and **Arcadis Consulting (UK) Limited** (“Arcadis”) for the purposes specified in the Appointment. For avoidance of doubt, no other person(s) may use or rely upon this report or its contents, and Arcadis accepts no responsibility for any such use or reliance thereon by any other third party.

CONTENTS

EXECUTIVE SUMMARY	1
1 INTRODUCTION	2
1.1 Background	2
1.2 Aim and Objectives	2
1.3 Data Sources	2
1.4 Terminology	2
1.5 Limitations	3
2 SITE OVERVIEW	4
2.1 Site Description	4
2.2 Site Topography	5
3 SOURCES OF FLOOD RISK.....	6
3.1 Flooding from Rivers and the Sea.....	6
3.2 Flooding from Surface Water.....	8
3.3 Flooding from Groundwater.....	9
3.4 Flooding from Artificial Sources	9
3.5 Future Redevelopment	10
4 SUMMARY	11
5 REFERENCES	12
APPENDIX A – PLANNING POLICY AND FLOOD RISK.....	13
The National Planning Policy Framework	13
The Sequential and Exception Tests	13

Executive Summary

The site (land at the southern end of Wadham Road) is part of the Transport for London (TfL) Small Sites Initiative, 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 is located in Flood Zone 1 on the Environment Agency (EA) Flood Map for Planning (Rivers and the Sea) 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%). 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 (NPPF), there is no requirement to produce a Flood Risk Assessment (FRA) to support future redevelopment of the site given the size (<1 hectare) and location of the site within Flood Zone 1. The Planning Practice Guidance (PPG) indicates that the site would be suitable for all types of development, including residential uses.

A Drainage Strategy should also 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 Transport for London (TfL) ('the Client') to undertake technical surveys for a site on Wadham Road SW15 2LR ('the site') within the London Borough of Wandsworth.

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 TQ27NW and TQ27SW) (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)
- London Borough of Wandsworth (LBW) Strategic Flood Risk Assessment (SFRA) (Ref. 5)
- LBW Preliminary Flood Risk Assessment (PFRA) (Ref. 6)
- LBW Local Flood Risk Management Strategy (LFRMS) (Ref. 7)
- LBW Surface Water Management Plan (SWMP) (Ref. 8)
- British Geological Survey (BGS) Geology of Britain Viewer (Ref. 9)
- Defra Magic Maps (for EA Aquifer Designations) (Ref. 10)

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

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.

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

This report has been prepared for the Client in accordance with the terms and conditions of appointment. Arcadis cannot accept any responsibility for any use of or reliance on the contents of this report by any third party. The copyright of this document, including the electronic format shall remain the property of Arcadis.

This report has been compiled from several sources, which Arcadis believes to be trustworthy. However, Arcadis is unable to guarantee the accuracy of information provided by others. The report is based on information available at the time. Consequently, there is a potential for further information to become available, which may change this report's conclusion and for which Arcadis cannot be responsible.

2 Site Overview

2.1 Site Description

The site is located at approximate National Grid Reference TQ 24415 75075 within the London Borough of Wandsworth. It occupies an area of approximately 0.2 hectares (ha) and is currently a paved open space between residential properties 64 and 66 Wadham Road and backs onto the elevated District Railway Line, as illustrated in Figure 1.

The site is located approximately 400m east of Putney Station and 400m south of the River Thames at the southern end of Wadham Road near the junction with Disraeli Road. The site is accessed from Wadham Road.

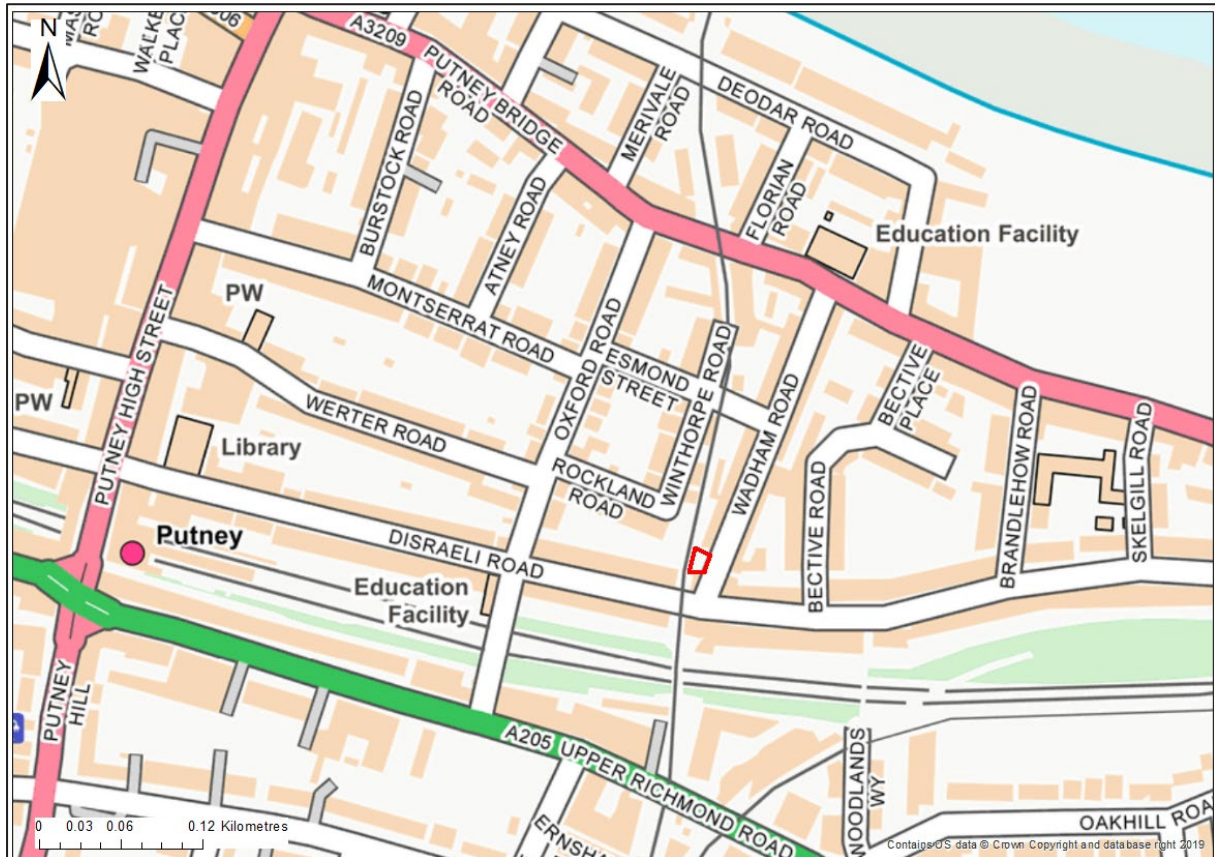


Figure 1 - Site Location (site outlined in red)

Contains Environment Agency information © Environment Agency and/or database right.

2.2 Site Topography

Lidar data, shown in extract in Figure 2, indicates that the site is relatively flat at elevation between 12.4 - 12.6m Above Ordnance Datum (AOD). To the west of the site sits the elevated railway line at approximately 19.5m AOD and the Waterloo Reading Line, which is in cutting, to the south at 9.5m AOD. In the wider surrounding area, the topography slopes south to north, towards the River Thames. Along Wadham Road the elevations drop from of 13.1m AOD at the southern end to 8.8m AOD at the northern end.

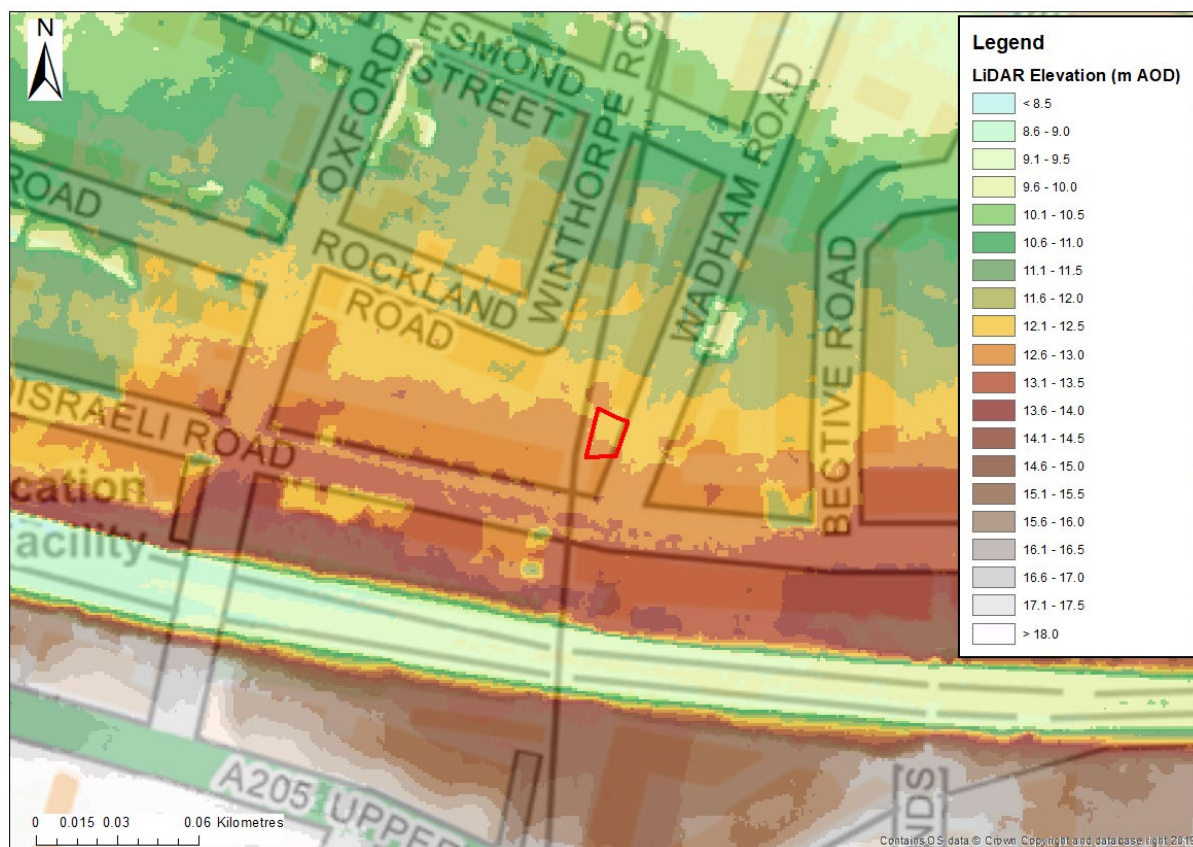


Figure 2 – Site Topography (filtered LiDAR data; site boundary outlined in red)

Contains Ordnance Survey data © Crown copyright and database right 2020. Contains Environment Agency information © Environment Agency and/or database right

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. The River Thames, which is tidal through this part of West London, flows in south-easterly direction approximately 400m north of the site. The River Wandle runs south to north through Wandsworth 1.5km to the east of the site.

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

Contains Environment Agency information © Environment Agency and/or database right

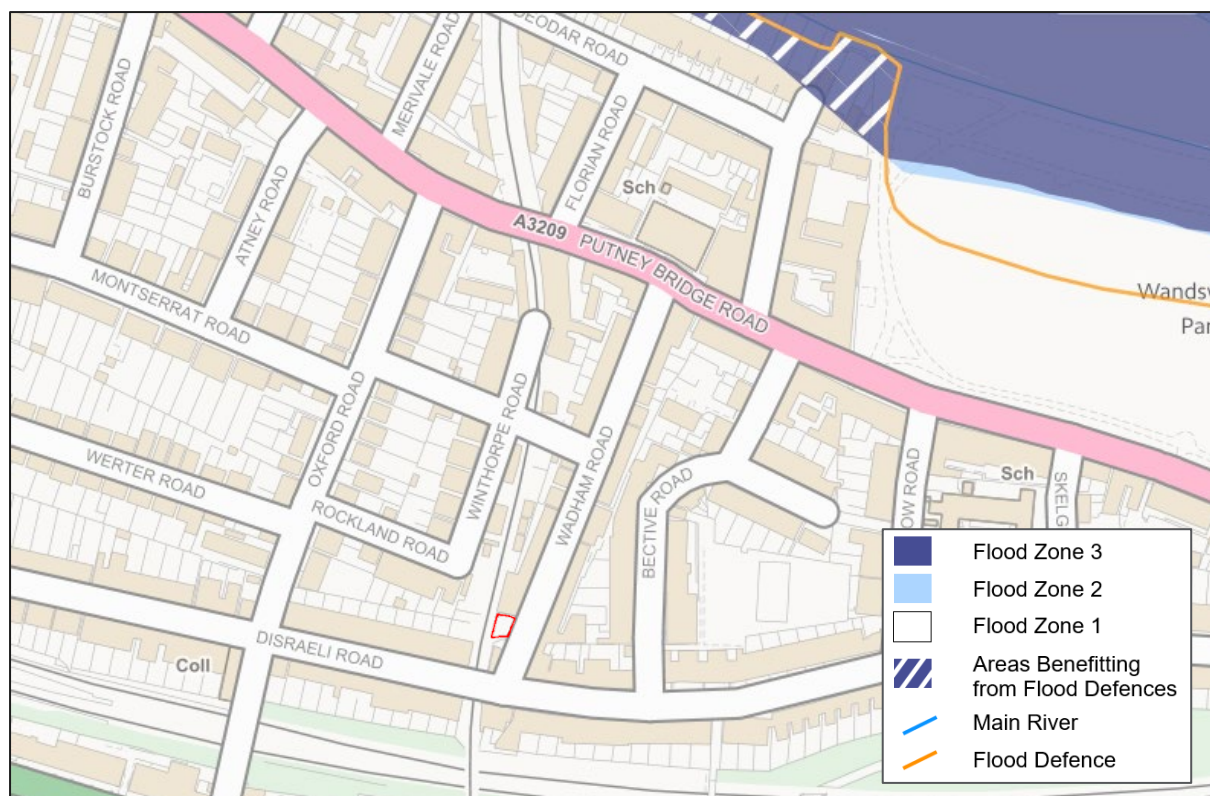


Figure 4 – Flood Map for Planning (Rivers and Sea)

Contains Environment Agency information © Environment Agency and/or database right

The Risk of Flooding from Rivers and Sea Map 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

The site is protected from flooding by the Thames Tidal Defences, including the Thames Barrier. The Thames Tidal Defences were designed to provide a high standard of protection for London and will protect against a 1 in 1,000 (0.1%) flood event until the year 2030, after which time climate change is expected to result in sea level rise that will slowly reduce the standard of protection provided unless further action is taken.

The Thames Estuary 2100 Plan ("TE2100")³ details the flood risk management measures that will be undertaken to maintain the current high standard of protection to 2100 and beyond. As a result of sea level rise, even with the TE2100 plan in place, an increasing frequency of higher tides will be permitted to enter London past the Thames Barrier. As a result of the need to protect against increasingly higher tidal levels in the River Thames, the TE2100 plan sets out future levels to which flood defences, including the river walls along the River Thames, will need to be raised to achieve the proposed standard of protection. It is a reasonable assumption, given the amount of property and infrastructure at risk that the recommended works will be undertaken to preserve the high level of protection afforded to the site and surrounds from flooding from the River Thames.

³ <https://www.gov.uk/government/publications/thames-estuary-2100-te2100>

Residual Risk of Flooding

Regardless of precise flood levels, the protection provided by the Thames Tidal Defences means that actual flood risk to the site and surrounds is very low and it is a reasonable assumption that it will remain so over the next century.

There exists, however, a residual risk of flooding should a breach occur in the raised tidal defences during an extreme flood event. To allow for a precautionary consideration of this residual risk in the planning process, the EA has undertaken an assessment of the consequences of breaching along the River Thames. Results of the EA Breach Modelling assessment are presented in the SFRA and show the site not to be at risk of flooding for the scenarios modelled up to and including the 2100 epoch climate change scenario. Therefore, the residual risk of tidal at the site is considered 'Low'.

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

Contains Environment Agency information © Environment Agency and/or database right

The map indicates that the site is at 'very low' risk of surface water flooding, with an annual chance of less than 1 in 1,000 (0.1%). The map indicates some small areas of surface water flooding on Wadham Road and along Putney Bridge Road to the north, however, these areas are generally 'Low' risk (between 1 in 1000 (0.1%) and 1 in 100 (1%)).

Mapping in the SFRA shows recorded incidents of surface water flooding across the Borough, the nearest of which occurred approximately 300m east of the site between Brandehow Road and Skelgill Road. Two further incidents, 500m to the west, are recorded near to Putney High Street.

Critical Drainage Areas (CDA) identify areas recognised as being vulnerable to surface water flooding. Mapping in the SWMP shows the site to be located outside of any CDA.

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 superficial deposits of Kempton Park Gravel Member - Sand and Gravel. 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 LFRMS and SWMP, the site and surrounds are not located in a zone of Increased Potential for Elevated Groundwater (IPEG). The SFRA map shows the site to be in an area with '*Potential for groundwater flooding of property situated below ground level*'. The nearest recorded incident of groundwater flooding reported is approximately 500m to the east of 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 gravels overlying the London Clay bedrock at the site. However, the likelihood of flooding as a result of river-groundwater interactions is considered to be remote given the sites elevation at approximately 4m above the River Thames in this location.

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 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 SWMP 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 6-10 recorded incidents of sewer flooding in the SW15 2 postal area.

In the absence of site-specific information on sewer flooding, the Risk of Flooding from Surface Water Map can aid understanding. As the site is not in flow paths which would direct sewer water towards the site or in a low spot where water could collect, it can be concluded that sewer flooding in the vicinity does not pose a notably onerous risk over and above any similar site benefiting from sewers.

Reservoirs

The EA 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.

The review has not identified any other sources of artificial flooding, such as canals, in the vicinity of the site.

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) would not ordinarily be required to support the development of the site as it is located in Flood Zone 1, less than 1ha in area, is not located in a CDA and this Flood Risk Review has demonstrated that the site is at low risk from all sources. Specific planning application validation requirements should, however, be confirmed with Wandsworth Local Planning Policy at the time a future planning application is prepared.

Consideration will need to be made with regard to the surface water drainage and runoff from the site, including available connections with and capacity of the local sewer network which should be investigated with Thames Water. The development Drainage Strategy should be designed to meet the London Plan (Ref. 12, Policy 5.15) requirement to achieve greenfield runoff rates and use Sustainable Drainage Systems (SuDS) as well as Wandsworth Planning Policy DMS6 that provides guidance for managing surface water and the application of SuDS within new developments.

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 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 most types of redevelopment with respect to flood risk.
- An FRA is unlikely to be required to support redevelopment proposals on account of its location in Flood Zone 1 and as it is less than 1 hectare in size, however, it is recommended that a Drainage Strategy is developed in consultation with LBW 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

1. Defra, 2020. Defra Data Service Platform. Accessed January 2020 via: <https://environment.data.gov.uk/>
2. Environment Agency, 2020. Long term flood risk information. Accessed January 2020 via: <https://flood-warning-information.service.gov.uk/long-term-flood-risk/>
3. Environment Agency, 2020. Flood Map for Planning. Accessed January 2020 via: <https://flood-map-for-planning.service.gov.uk/>
4. Environment Agency, 2020, Recorded Flood Outlines dataset. Accessed January 2020 via: <https://data.gov.uk/dataset/16e32c53-35a6-4d54-a111-ca09031eaaaf/recorded-flood-outlines>
5. AECOM, 2015. London Boroughs of Croydon, Merton, Sutton and Wandsworth Strategic Flood Risk Assessment.
6. URS / Scott Wilson, 2011. London Borough of Wandsworth Preliminary Flood Risk Assessment.
7. London Borough of Wandsworth, 2015. Local Flood Risk Management Strategy 2016-22.
8. URS / Scott Wilson, 2011. London Borough of Wandsworth Surface Water Management Plan.
9. British Geological Survey, 2019. Geology of Britain Viewer. Accessed Jan 2020 via: <http://mapapps.bgs.ac.uk/geologyofbritain/home.html>
10. Defra, 2013. Magic Map Interactive Map. Accessed January 2020 via: <https://magic.defra.gov.uk>
11. Environment Agency, 2017. Thames Estuary 2100 (TE2100) Plan. Accessed January 2020 via: <https://www.gov.uk/government/publications/thames-estuary-2100-te2100>
12. Greater London Authority, 2019. The Current London Plan. Accessed January 2020 via: <https://www.london.gov.uk/what-we-do/planning/london-plan/current-london-plan>
13. Department for Communities and Local Government, 2018. National Planning Policy Framework.
14. 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.

Flood Risk Review

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.

Arcadis UK

Arcadis Cymru House,
St Mellons Business Park,
Fortran Rd,
Cardiff
CF3 0EY

United Kingdom
T: +44 (0)2920 729 800

[arcadis.com](https://www.arcadis.com)