

Flood Risk Assessment

in connection with the proposed development at

46 Holmdale Road

London

NW6 1BL

for

Alex Wills & Artemis Doupa

LBH4507FRA Ver. 1.2

June 2018



LBH WEMBLEY

ENGINEERING

DOCUMENT CONTROL

Report Ref: LBH4507FRA

Version	Date	Comment	Authorised
			Seamus Lefroy-Brooks BSc(hons) MSc CEng MICE CGeol FGS CEnv MIEEnvSc FRGS SILC RoGEP UK Registered Ground Engineering Adviser NQMS SQP DoWCoP QP DEFRA National Expert Panel Member seamus@LBHGEO.co.uk
1.1	29 th January 2018	Issued for submission to CAMDEN	SRLB
1.2	27 th June 2018	Revised following CAMDEN comments	

LBH WEMBLEY ENGINEERING

Unit 12 Little Balmer
Buckingham Industrial Park
Buckingham
MK18 1TF

Tel: 01280 812310

email: enquiry@lbhgeo.co.uk

website: www.lbhgeo.co.uk

Contents

Contents	3
Foreword - Guidance Notes	5
1. Introduction	6
1.1 Camden Planning Policy	6
1.2 Documents Consulted	8
2. The Site	9
2.1 Site Location	9
2.2 Topographical Setting	9
2.3 Site Description	9
2.4 Proposed Development	11
3. Background	12
3.1 Existing Flood Alleviation Measures	12
3.2 Flood Risk Vulnerability Classification	12
3.3 The Sequential Test	12
3.4 The Exception Test	12
4. Hazard Identification	13
4.1 Flooding from Rivers and the Sea	13
4.2 Flooding from Land	13
4.3 Flooding from Groundwater	14
4.4 Flooding from Sewers	15
4.5 Flooding from Reservoirs, Canals and other Artificial Sources	15
5. Risk Estimation	17
5.1 Strategic Flood Risk Assessment	17
5.1.1 Probability of Site Flooding	17
5.1.2 Rate and Duration of Flooding	17
5.2 Climate Change	18
5.2.1 Adjustment for Potential Flooding from the Sea	18
5.2.2 Adjustment for Potential Flooding from the Land and Rivers	18
6. Risk Evaluation	19
6.1 Existing Situation	19
6.2 Potential Situation after Development	19
7. Flood Risk Mitigation	20
7.1 Off-site flooding	20
7.2 On-site flooding	20
7.3 Residual Flood Risk	20
8. Conclusion	21
APPENDIX	22
EXISTING AND PROPOSED DRAWINGS	22

SEWER FLOODING HISTORY ENQURY

Foreword - Guidance Notes

GENERAL

This report has been prepared for a specific client and to meet a specific brief. The preparation of this report may have been affected by limitations of scope, resources or time scale required by the client. Should any part of this report be relied on by a third party, that party does so wholly at its own risk and LBH WEMBLEY disclaims any liability to such parties.

The observations and conclusions described in this report are based solely upon the agreed scope of work. LBH WEMBLEY has not performed any observations, investigations, studies or testing not specifically set out in the agreed scope of work and cannot accept any liability for the existence of any condition, the discovery of which would require performance of services beyond the agreed scope of work.

VALIDITY

Should the purpose for which the report is used, or the proposed use of the site change, this report may no longer be valid and any further use of or reliance upon the report in those circumstances shall be at the client's sole and own risk. The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should therefore not be relied upon in the future and any such reliance on the report in the future shall again be at the client's own and sole risk..

THIRD PARTY INFORMATION

The report may present an opinion based upon information received from third parties. However, no liability can be accepted for any inaccuracies or omissions in that information.

1. Introduction

It is proposed to extend and deepen the existing partial basement present at this three storey terraced Victorian property to provide further habitable space. It is also proposed to construct a single storey infill extension to the rear of the building.

This Flood Risk Assessment (FRA) has been prepared, alongside a Basement Impact Assessment (LBH4507 Ver. 1.1), in support of a planning application to the London Borough of Camden.

An FRA is required in order to assess the potential for the development to increase flood risk elsewhere through the addition of hard surfaces and the potential effect of the new development on surface water run-off, in addition to assessing the site vulnerability to flooding from other sources including groundwater and overland runoff, rivers and the sea.

The purpose of this report is to assess the existing flood risk, including mitigation measures and whether the site is suitable for residential usage. The report identifies whether there are any flooding or surface water management issues, whether the site lies within an area that is at risk of flooding or whether the development may increase flood risk due to increased run-off. This is achieved through Identification of the sources of flooding which may affect the site, and includes the following:-

- An appraisal of the availability and adequacy of existing information
- A qualitative appraisal of the flood risk posed to the site, and potential impact of the development on flood risk elsewhere
- An appraisal of the scope of possible measures to reduce the flood risk to acceptable levels

The report will demonstrate to the Local Planning Authority (LPA) that the applicant is considering flood risk to the development from all sources and how this will be managed. The assessment also considers the disposal of drainage water, potential impacts on adjacent land and climate change effects.

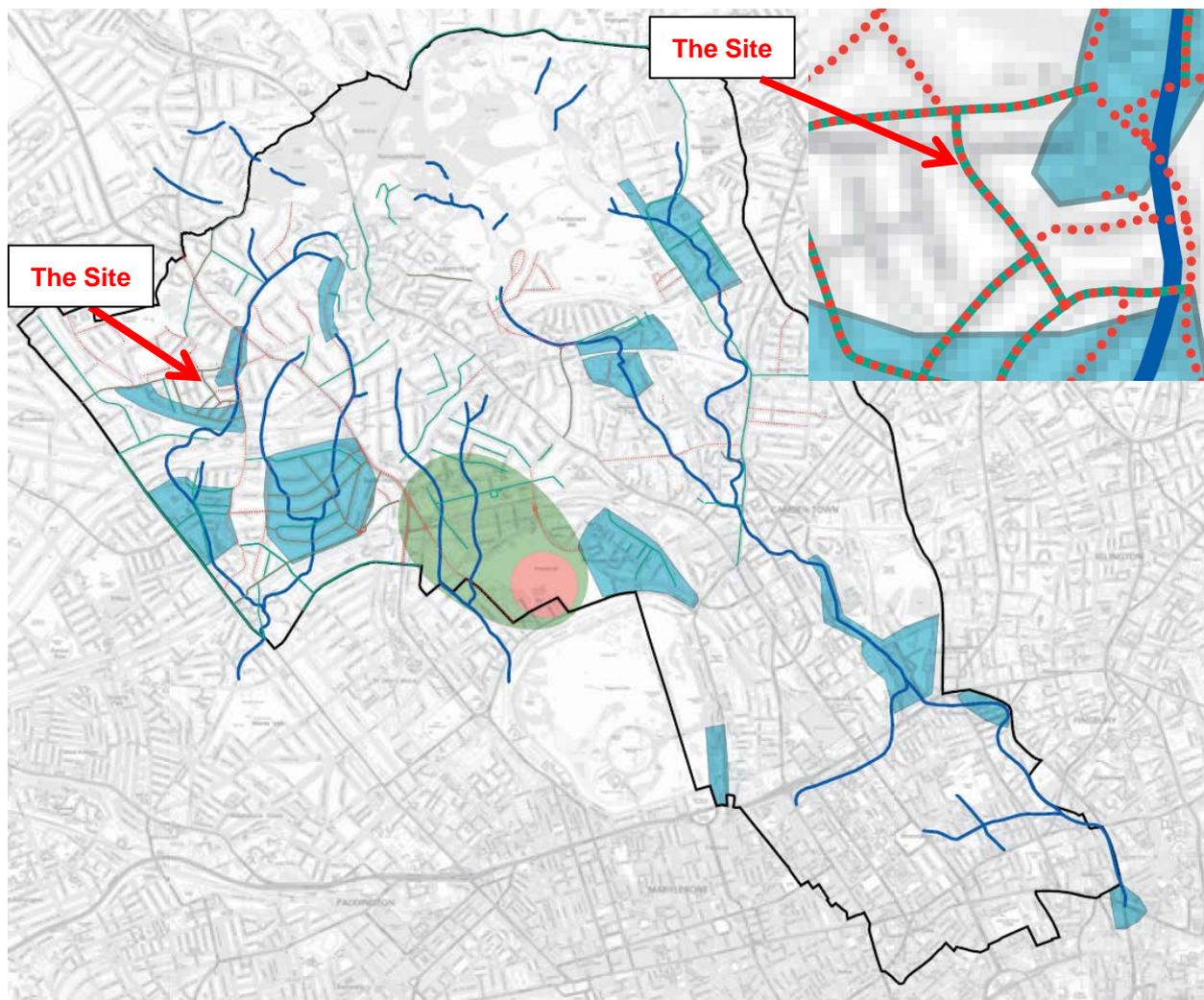
The assessment has been based on existing reports and archive information together with information from historical maps and photographs.

1.1 Camden Planning Policy

Policy CC3 “Water and Flooding” of the 2017 Camden Local Plan (superseding the 2010 policy DP23 “Water”) states that a site specific Flood Risk Assessment is necessary for:

- *All sites of 1 hectare or greater;*
- *All major planning applications in areas at high risk to flooding; and*
- ***All basement development on streets identified as being at flood risk or in an area where historic underground watercourses are known to have been present, or in areas where there is an elevated risk of groundwater flooding.***

The site is located within Local Flood Risk Zone (LFRZ) 3_010 as defined in Figure 3.1 of the Camden Surface Water Management Plan (SWMP) (2011) and has been identified as being situated in an area that has historically experienced localised surface water flooding, both in 1975 and 2002.



- | | | |
|---|---|--|
|  Local flood risk zone | Environment Agency groundwater source protection zone: |  Borough boundary |
|  Historic water course |  Inner zone (zone 1) | |
|  Flooded street 1975, 2002 |  Outer zone (zone 2) | |

Map extract of Camden Local Plan Map 6: Historic Flooding and Local Flood Risk Zones (Camden Local Plan, 2017)

In accordance with the Camden Local Plan, a FRA is therefore required in order to identify how the development will be designed to cope with flooding and how the risk will be mitigated without increasing the risk elsewhere. Recommendations in the FRA will then be secured by planning condition.

1.2 Documents Consulted

The following documents have been taken into consideration in the preparation of this report:

- Basement Impact Assessment of 46 Holmdale Road by LBH Wembley, Ref: LBH4507 Ver. 1.1), January 2018
- Camden Local Plan June 2017 (Policy CC3 “Water and Flooding”)
- Camden Planning Guidance - Basements March 2018
- London Borough of Camden SFRA, URS, July 2014
- Surface Water Management Plan for London Borough of Camden, July 2011
- Floods in Camden, Report of the Floods Scrutiny Panel, June 2003
- Camden Geological, Hydrogeological and Hydrological Study (CHGGS), November 2010, Ove Arup & Partners Limited

2. The Site



2017 Map

2.1 Site Location

The site is situated on the western side of Holmdale Road, approximately 60m south of the junction with Mill Lane.

The site may be located approximately by postcode NW6 1BL or by National Grid Reference 525210, 185180.

2.2 Topographical Setting

The site lies on the lower southwestern slopes of Hampstead Heath on land that falls gently to the south.

Street level at the front of the site appears to be situated at approximately +58m OD.

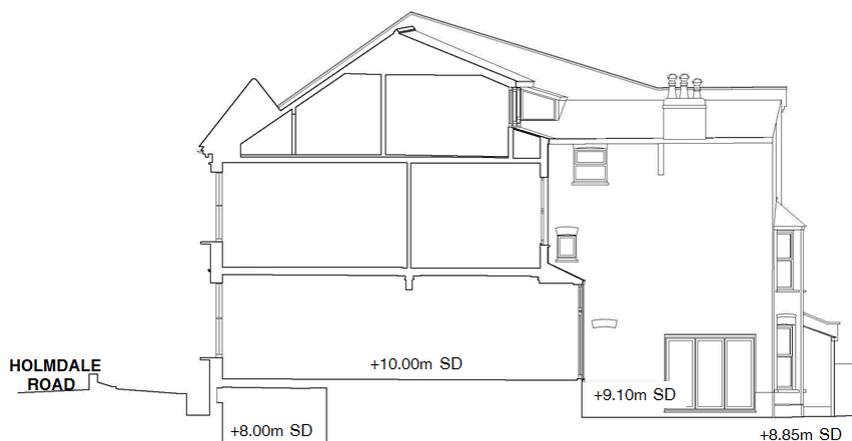
2.3 Site Description



Patio in the front garden area

The site is occupied by a Victorian, three storey terraced house with a partial basement beneath the front of the dwelling. A topographical survey undertaken by CSL Surveys (Ref: 22116RB F0, dated October 2016) indicates that the existing ground floor level is at approximately +58.5m OD and the existing basement floor level is approximately +56.5m OD.

E

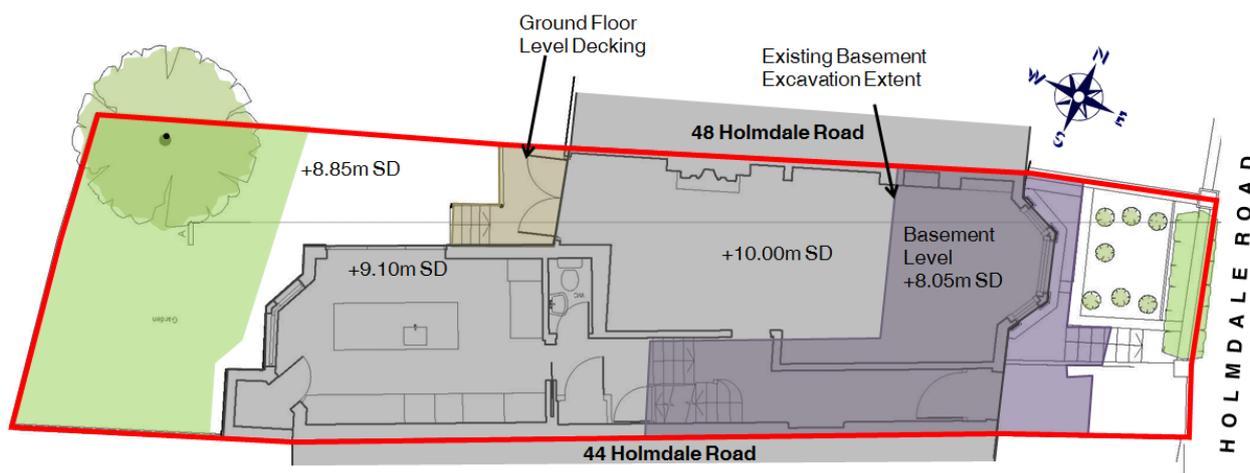


Cross section showing the existing levels

W



Mature plum tree in rear garden



Plan showing existing layout

At the front of the property there is a narrow lightwell beyond which a raised planted area reaches to the rear of the pavement. The ground beneath this area is indicated to include a coal storage bunker and may include further cellars. However, for the purposes of drainage assessment it is assumed that the slate chipped patio area is permeable.

The ground floor of the property is at a split level, such that the front of the house is set at approximately +10.0m SD, whilst the rear kitchen area is set at a lower level of approximately +9.1m SD. The rear garden steps down again to around +8.3m SD.

The rear garden comprises a paved area and a lawn; a mature plum tree is present in the northwest corner of the garden. A small decking is present at ground level (+10.0m OD) at the rear of the lounge with steps down to the rear garden patio.

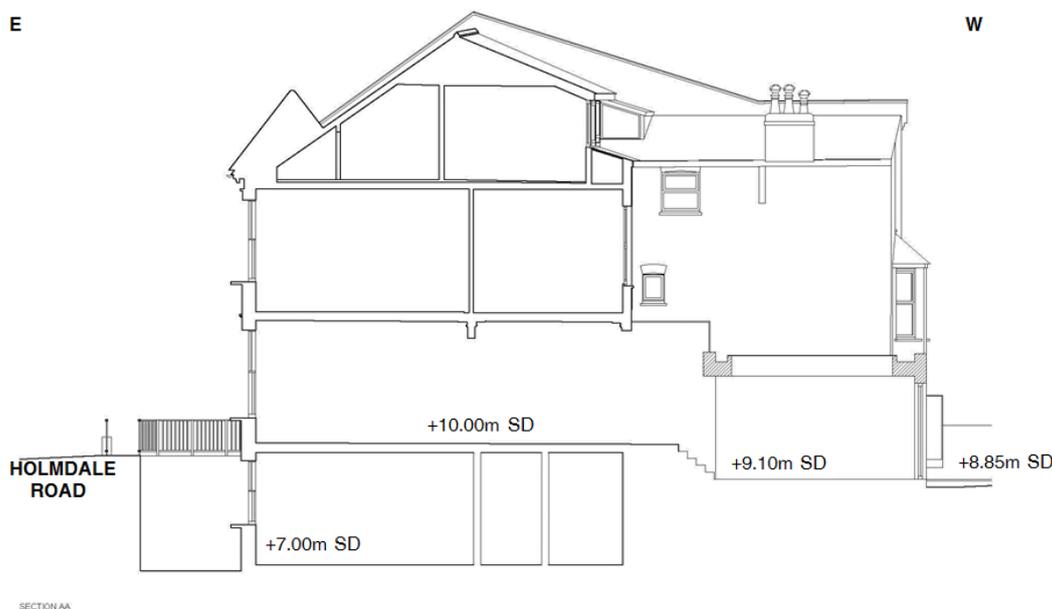
The site is adjoined to the north and south by terraced properties at No 48 and No 44 Holmdale Road.

2.4 Proposed Development

It is proposed to deepen the existing basement by approximately 1.1m and to extend this laterally beneath more of the existing house footprint, as well as extending and deepening the front lightwell.

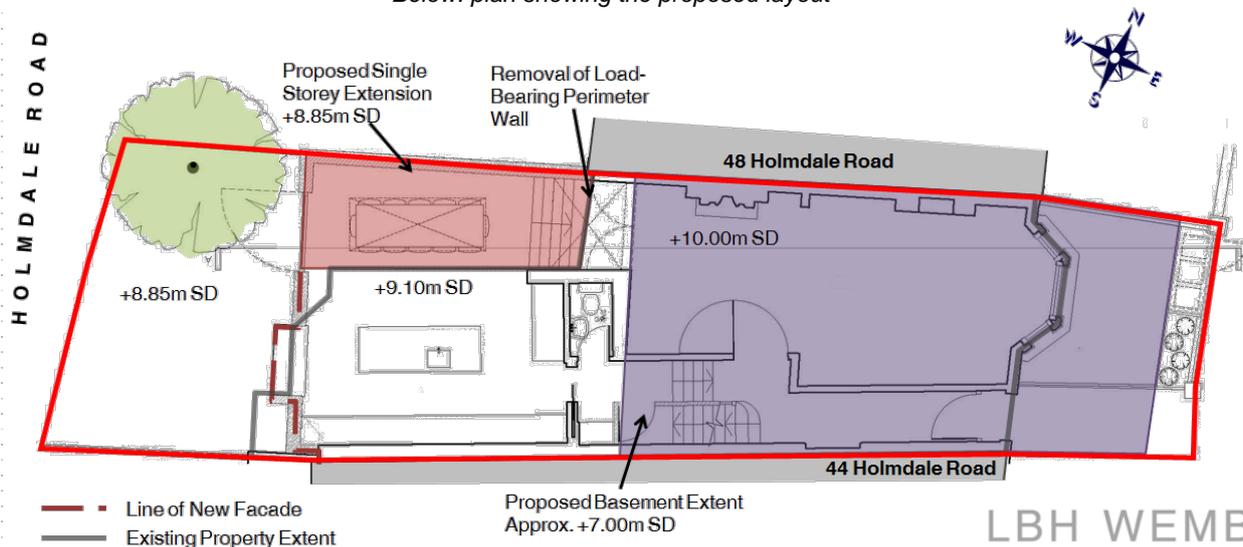
A single storey infill extension is also proposed to the rear of the property.

Alterations are proposed to the internal load bearing walls at the rear of the building, adjacent to the upper ground floor level patio and the ground floor façade at the rear of the kitchen.



Above: cross section showing the proposed levels

Below: plan showing the proposed layout



3. Background

The Department for Communities and Local Government have published their online Planning Practice Guidance (PPG) that supercedes the National Planning Policy Framework Technical Guidance of March 2012. The following section has been prepared in accordance with the PPG.

3.1 Existing Flood Alleviation Measures

A flood alleviation scheme on the nearby Sumatra Road, consisting of a sewer designed to intercept and divert flow to a storage tank, provides approximately 1700 m³ of storage during extreme rainfall events.

3.2 Flood Risk Vulnerability Classification

Table 2 of the Planning Practice Guidance (PPG) indicates that as the basement will be occupied by residential space, hence the site use falls into the “highly vulnerable” flood risk classification.

3.3 The Sequential Test

The PPG requires that the risk based sequential test should be applied at all stages of planning, which aims to steer new development to areas at the lowest probability of flooding (Flood Zone 1). It is also recognised that some areas will also be at risk of flooding from sources other than tidal and fluvial.

As shown on the Environment Agency (EA) flood map of flood risk from rivers and the sea, the site is locately entirely within Flood Zone 1. In addition, the EA flood map of surface water flood risk indicates the site to be at a very low risk to surface water flooding. As a result, it is considered that the Sequential Test is satisfied.

3.4 The Exception Test

Table 3 of the PPG does not require the Exception Test to be applied given that in Flood Zone 1 “*Development is appropriate*”.

4. Hazard Identification

4.1 Flooding from Rivers and the Sea

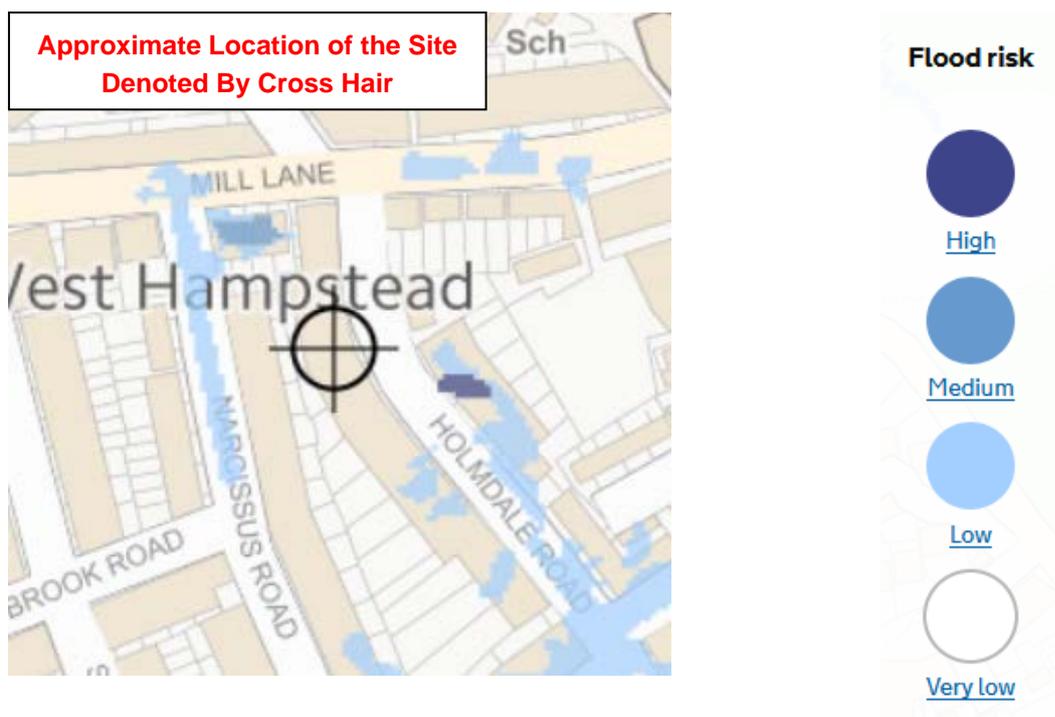
All main rivers located within the London Borough of Camden are culverted and are incorporated into the Thames Water sewer network.

As a result, the London Borough of Camden is located entirely within Flood Zone 1 and the site itself is located over 3km from the nearest higher Flood Zone, Flood Zones 2 and 3, associated with River Brent. This indicates that the assessed annual probability of flooding at the site is less than 1 in 1000 (<0.1%).

In addition, the Camden SFRA records that no flooding has occurred within the borough from fluvial or tidal sources.

4.2 Flooding from Land

The EA's Surface Water Flood Map indicates that the site is at a very low risk to flooding from surface water (equivalent to the 1 in 1000 event (0.1% AEP)).



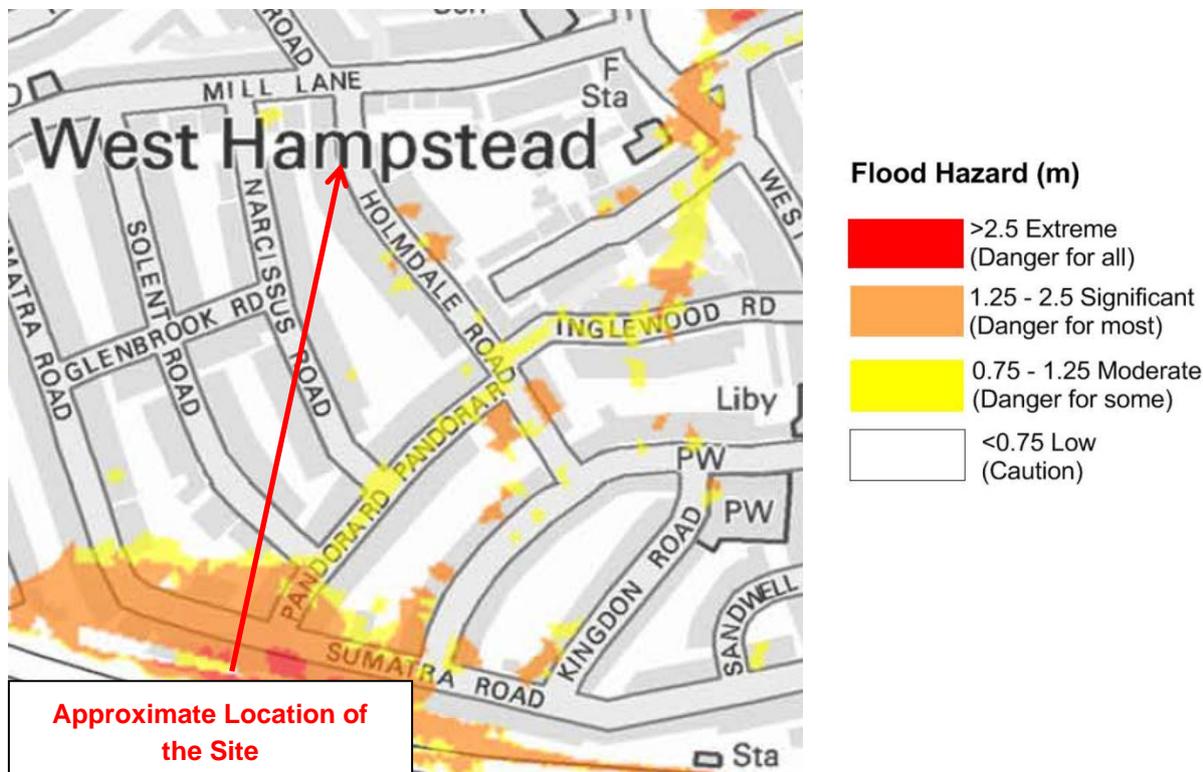
Extract of the EA's Surface Water Flooding map showing the flood risk from surface water

©Crown copyright and database rights 2018

Hazard mapping created by the EA indicates the hazard to people following a methodology presented by Defra in its R&D report on Flood Risks to People¹

¹ Defra (2006) Defra Guidance Document FD2321/TR2: Flood Risks to People

The following map indicates that even in the event of a 1 in 1000 rainfall event (<0.1%), the surface water flood hazard affecting the site is still classed as Low (Caution).



Extract of Figure 3 ix: Hazard 1 in 1000 year flood event (Camden SFRA, 2014)

Historic flood records indicate that the London Borough of Camden experienced significant flooding in 1975 and 2002. Holmdale Road was affected by surface water flooding during both events.

The report of the Floods Scrutiny Panel concluded that for both flood events, the sewer system capacity was exceeded, which resulted in surcharging of the sewer system at a number of locations.

Following the 2002 flood event, it is understood that a flood alleviation scheme was created at Sumatra Road, West Hampstead. This involved the construction of a sewer that was designed to intercept and divert flow towards a storage tank that provides around 1,700m³ of storage during extreme rainfall events.

4.3 Flooding from Groundwater

Groundwater flooding occurs when water levels within the ground rise above surface levels.

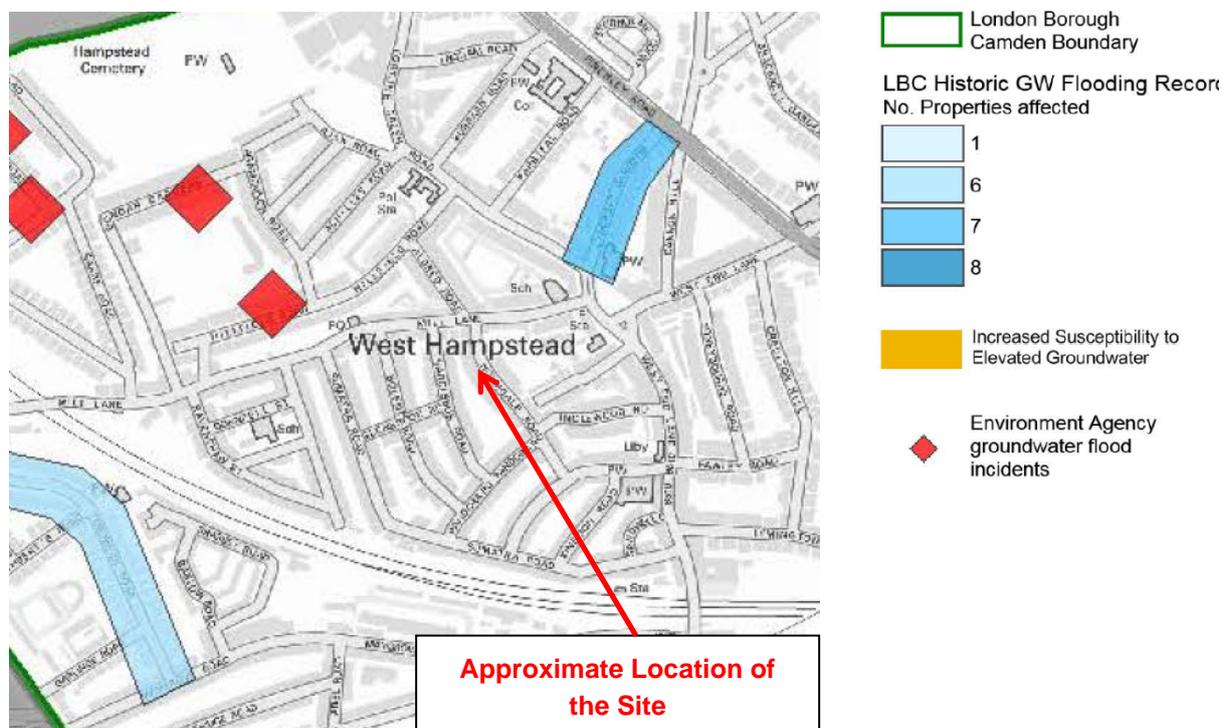
The British Geological Survey (BGS) records indicate that the site is underlain by the London Clay Formation, which the Environment Agency (EA) classifies 'Unproductive Strata'.

No groundwater was encountered during the investigation and no shallow groundwater table is considered to be present at this site.

The following figure identifies areas where there is increased potential for groundwater levels to rise within 2m of the ground surface following periods of higher than average groundwater recharge. In addition, the figure illustrates any recorded groundwater flood incidents.

The site does not lie within an area that is deemed to be at an increased susceptibility to elevated groundwater. It is however approximately 250m from an Environment Agency groundwater flood incident on Hillfield Road.

It is therefore concluded that the risk of groundwater flooding at the site is very low.



Extract of Figure 4e: Increased susceptibility to elevated groundwater (Camden SFRA, 2014)

4.4 Flooding from Sewers

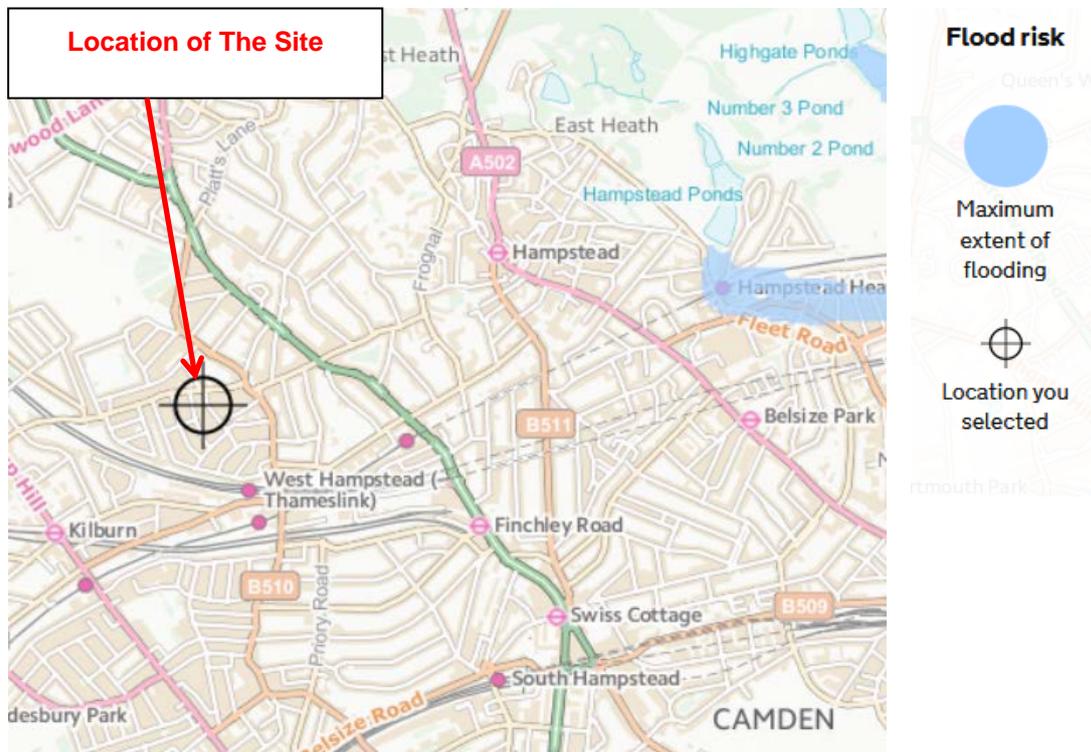
A sewer flooding history enquiry made to Thames Water² states “The flooding records held by Thames Water indicate that there have been no incidents of flooding in the requested area as a result of surcharging public sewers”. However, it is noted that the report of the Floods Scrutiny Panel concluded that the 1975 and 2002 flood events were both due to sewer flooding.

4.5 Flooding from Reservoirs, Canals and other Artificial Sources

The SFRA indicates that there are roughly 30 ponds located within Hampstead Heath, three of which are classified as large raised reservoirs under the Reservoirs Act 1975.

² Thames Water, January 2018, Sewer Flooding History Enquiry, Ref: SFH/SFH Standard/2018_3715911

The EA's Reservoir Flood Map identifies areas that could be flooded if a large reservoir were to fail or release the water it holds. The map shows that the site lies outside the area at risk of reservoir flooding, with the nearest area at risk of flooding located roughly 2km from the site, associated with the flooding of Highgate Ponds on Hampstead Heath.



Extract of the EA's Reservoir Flooding map showing the maximum extent of flooding

©Crown copyright and database rights 2018

The SFRA has not identified any other significant artificial sources of flood risk within the borough that may adversely affect the site.

5. Risk Estimation

5.1 Strategic Flood Risk Assessment

The SFRA provides local guidance in respect of flood risk.

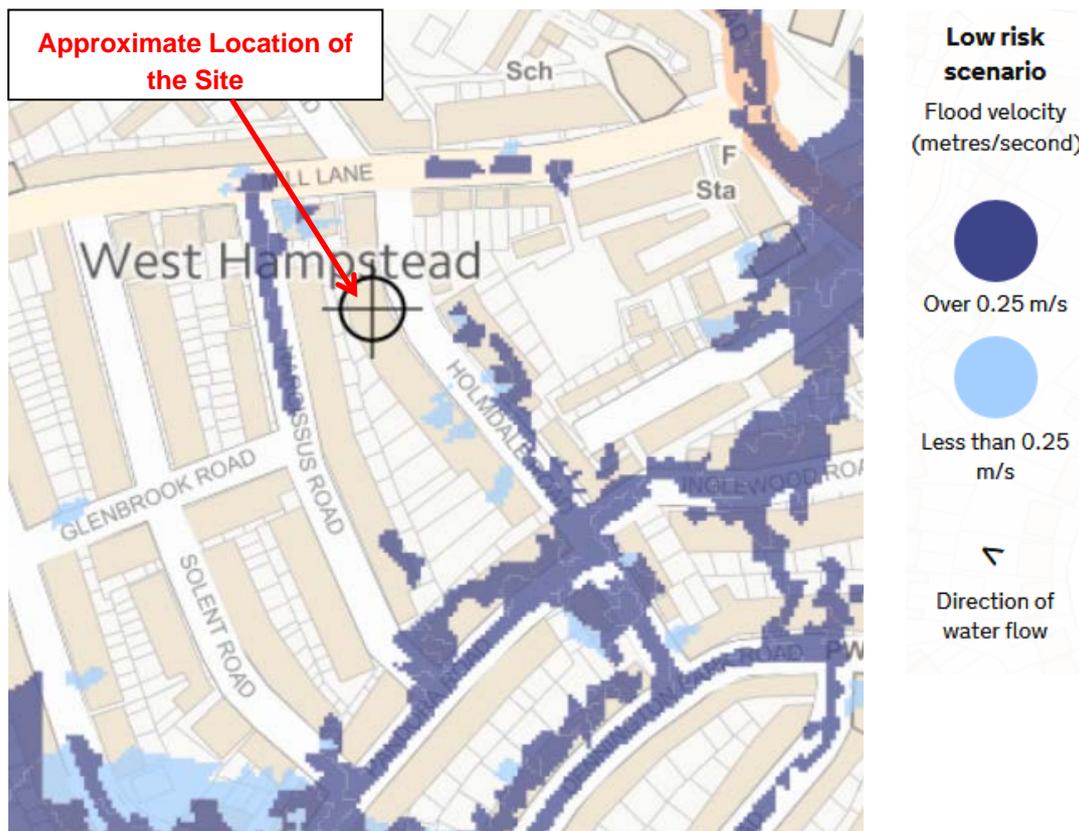
5.1.1 Probability of Site Flooding

Although the risk reduction effect of the Sumatra Road public storage tank scheme cannot be verified, it may reasonably be assumed that this was properly design and has given rise to the present indicated low risk of flooding at this site.

5.1.2 Rate and Duration of Flooding

No information is available on the predicted duration of any pluvial flooding.

The EA's surface water flooding map shows that, during a 0.1% AEP pluvial event, Holmdale Road would experience floods moving at a rate of over 0.25m/s, which appears to act as a conduit for flood waters. As part of this pluvial event, it would appear that the site would remain unaffected by the flooding.



Extract of the EA's surface water flooding map showing the flood velocities predicted in the vicinity of the site during a 0.1%AEP pluvial event.

©Crown copyright and database rights 2018

5.2 Climate Change

5.2.1 Adjustment for Potential Flooding from the Sea

The site is not considered to be at risk of flooding from tidal sources and no adjustment is required.

5.2.2 Adjustment for Potential Flooding from the Land and Rivers

The predicted effects of climate change - more intense summer rainfall events and higher winter rainfall - could increase the risk of surface water flooding.

The Environment Agency Flood Map and Flood Zones do not currently take account of possible future climate change impacts. The potential extent of an extreme flood shown on the Flood Map might in future become more 'normal' as a result of climate change.

The EA provides recommendations for precautionary sensitivity ranges for estimates of peak rainfall intensities and peak river flows in the next 100 years (Climate Change Allowances for Planners [September 2013]). These range from +5% up to +30% for rainfall intensity and from +10% up to +20% for river flow.

6. Risk Evaluation

6.1 Existing Situation

The risk of flooding from various sources has been evaluated and none of the sources give rise to anything above a low risk.

6.2 Potential Situation after Development

Aside from the obvious risk of the new basement itself flooding, the regional risk situation is not expected to significantly change. This is because the proposed basement is to be within the existing footprint of the building. The extended lightwell will replace a small slate-chipped patio and the small side extension will replace a small paved patio area.

In theory these small areas will be lost in terms of potential flood storage but the size of the areas concerned is minimal and because the site is not indicated to lie in an area when flood waters might collect there is considered to be negligible associated increased off-site flood risk.

As the proportion of hard standing / soft landscaping is not considered to change, the volume of surface water run-off that is likely to be generated from the development is not envisaged to significantly increase from the present amount. Therefore, the proposed scheme will not result in any actual additional adverse impact on sewer flooding.

The design capacity of the existing sewers will need to be assessed, including an account for the increased frequency and intensity of rainfall that is predicted as a result of climate change.

This assessment will form part of the detailed drainage design that is expected to be required by a pre-commencement planning condition

7. Flood Risk Mitigation

7.1 Off-site flooding

Because there is no identified increase in risk resulting from the proposed development there is not deemed to be a requirement to mitigate against flood risk outside the site.

7.2 On-site flooding

Certain measures will be required to protect the development itself from flooding.

The lightwells will be surrounded by a min 100mm high raised structural sill that will protect these against surface water flooding.

The basement drainage design will include a positive pumped chamber and a non return valve to direct any flood water away from the development and prevent the occurrence of flooding through the drainage system.

7.3 Residual Flood Risk

Flood risk to people and property associated with new developments can be managed but it can never be completely removed; a residual risk will always remain after flood management or mitigation measures have been put in place.

The residual risk will need to be identified following the detailed drainage design for the new development and an assessment should be made to detail any potential economic, social and environmental consequences of a flood event occurring at the site.

8. Conclusion

The development as described will not result in any significant increased flood risk elsewhere.

Whilst the proposed development does comprise a 'highly vulnerable' residential classification, based on the risks identified within this FRA, this is considered acceptable. Furthermore even when future climate change is taken into consideration, the site does not appear to experience a significantly greater risk.

Although the risk of flooding at this site is assessed as acceptably low, certain measures will be incorporated to protect the development itself against the possible effects of flooding.

APPENDIX

EXISTING AND PROPOSED DRAWINGS

SEWER FLOODING HISTORY ENQURY