

117 Pinner Road, Hillingdon, HA6 1DA  
Nimbus Engineering Consultants Ltd  
Flood Risk Assessment Report  
December 2022

**FLOOD RISK ASSESSMENT REPORT FOR  
117 PINNER ROAD, HILLINGDON, HA6 1DA**

**DOCUMENT NUMBER: C2853-REV-A-R1**

**PREPARED BY**



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## APPENDICES

### APPENDIX A – DRAWINGS

## 1. SITE DETAILS

### 1.1. Site Location

The location of the project site is shown in Figure 1 below.



Figure 1- Location of Project Site (Source: OS OpenData).

### 1.2. Existing Site Description

The existing site is brownfield, with levels falling from gradually from the front to the rear to of the site. The topographical survey drawing, and existing site plans can be found in Appendix A.

### 1.3. Geology of The Area

According to the British geological survey, there are no superficial deposits at the site, as shown in Figure 2 below. The bedrock at the area is of the London Clay Formation, consisting of clay, silt and sand, as shown in Figure 3, below.

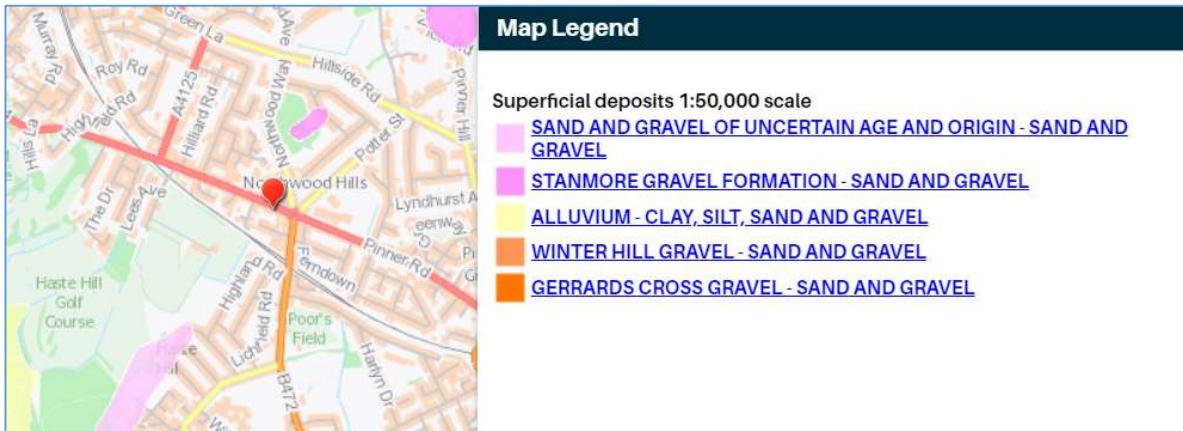


Figure 2- Superficial Deposit at the site. (Source: British Geological Society Website (contains British Geological Survey materials © NERC2022)).

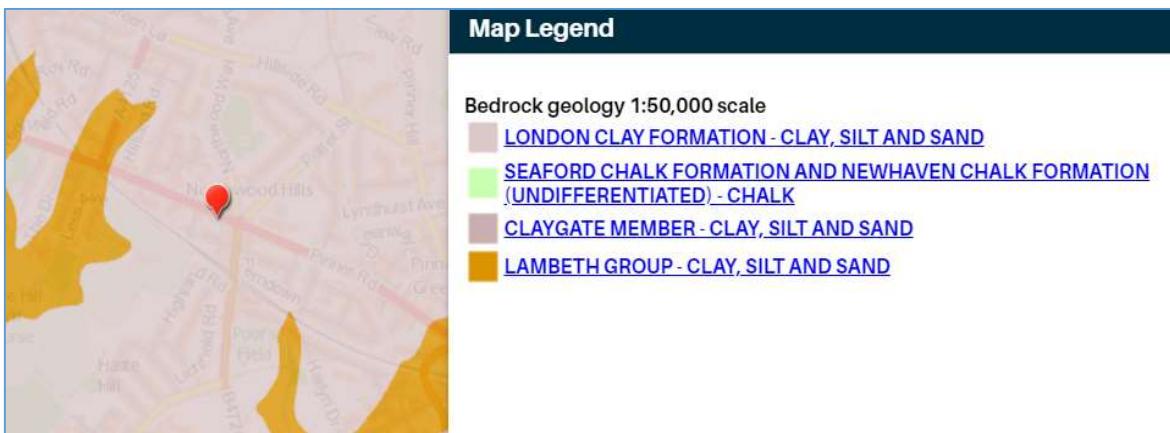


Figure 3- Bedrock at the site. (Source: British Geological Society Website (contains British Geological Survey materials © NERC2022)).

#### 1.4. Proposed Development

The proposals involve the construction of floors above the existing building.

The proposed site plans can be found in Appendix A.

## 2. PLANNING POLICIES

### 2.1. National Planning Policy

- NPPF's technical guidance states:

“The effect of development is generally to reduce the permeability of at least part of the site. This markedly changes the Site’s response to rainfall. Without specific measures, the volume of water that runs off the site and the peak run-off flow rate is likely to increase. Inadequate surface water drainage arrangements in new development can threaten the development itself and increase the risk of flooding others”.

- Non-statutory technical standards for sustainable drainage systems

### 2.2. Local Planning Policy

This report has been written in conjunction with the following local planning policies:

- London Borough of Hillingdon’s Strategic Flood Risk Assessment Report
- West London Strategic Flood Risk Assessment Report
- London Borough of Hillingdon’s Surface Water Management Plan
- London Borough of Hillingdon’s Preliminary Flood Risk Assessment report

- London Borough of Hillingdon's Policy EM6: Flood Risk Management.

The Council will require new development to be directed away from Flood Zones 2 and 3 in accordance with the principles of the National Planning Policy Framework (NPPF).

The subsequent Hillingdon Local Plan: Part 2 -Site Specific Allocations LDD will be subjected to the Sequential Test in accordance with the NPPF. Sites will only be allocated within Flood Zones 2 or 3 where there are overriding issues that outweigh flood risk. In these instances, policy criteria will be set requiring future applicants of these sites to demonstrate that flood risk can be suitably mitigated.

The Council will require all development across the borough to use sustainable urban drainage systems (SuDS) unless demonstrated that it is not viable. The Council will encourage SuDS to be linked to water efficiency methods. The Council may require developer contributions to guarantee the long term maintenance and performance of SuDS is to an appropriate standard.

- The London Plan, Policy SI.12 Flood Risk Management, which states:

A Current and expected flood risk from all sources (as defined in paragraph 9.2.12) across London should be managed in a sustainable and cost-effective way in collaboration with the Environment Agency, the Lead Local Flood Authorities, developers and infrastructure providers.

B Development Plans should use the Mayor's Regional Flood Risk Appraisal and their Strategic Flood Risk Assessment as well as Local Flood Risk Management Strategies, where necessary, to identify areas where particular and cumulative flood risk issues exist and develop actions and policy approaches aimed at reducing these risks. Boroughs should cooperate and jointly address cross-boundary flood risk issues including with authorities outside London.

C Development proposals should ensure that flood risk is minimised and mitigated, and that residual risk is addressed. This should include, where possible, making space for water and aiming for development to be set back from the banks of watercourses.

D Developments Plans and development proposals should contribute to the delivery of the measures set out in Thames Estuary 2100 Plan. The Mayor will work with the Environment Agency and relevant local planning authorities, including authorities outside London, to safeguard an appropriate location for a new Thames Barrier.

E Development proposals for utility services should be designed to remain operational under flood conditions and buildings should be designed for quick recovery following a flood.

F Development proposals adjacent to flood defences will be required to protect the integrity of flood defences and allow access for future maintenance and upgrading. Unless exceptional circumstances are demonstrated for not doing so, development proposals should be set back from flood defences to allow for any foreseeable future maintenance and upgrades in a sustainable and cost-effective way.

G Natural flood management methods should be employed in development proposals due to their multiple benefits including increasing flood storage and creating recreational areas and habitat.

- The London Plan, Policy SI 13 Sustainable drainage, which states:
  - A Lead Local Flood Authorities should identify – through their Local Flood Risk Management Strategies and Surface Water Management Plans – areas where there are particular surface water management issues and aim to reduce these risks. Increases in surface water run-off outside these areas also need to be identified and addressed.
  - B Development proposals should aim to achieve greenfield run-off rates and ensure that surface water run-off is managed as close to its source as possible. There should also be a preference for green over grey features, in line with the following drainage hierarchy:

- 1) Rainwater use as a resource (for example rainwater harvesting, blue roofs for irrigation)
- 2) Rainwater infiltration to ground at or close to source
- 3) Rainwater attenuation in green infrastructure features for gradual release (for example green roofs, rain gardens)
- 4) Rainwater discharge direct to a watercourse (unless not appropriate)
- 5) Controlled rainwater discharge to a surface water sewer or drain
- 6) Controlled rainwater discharge to a combined sewer.

C Development proposals for impermeable surfacing should normally be resisted unless they can be shown to be unavoidable, including on small surfaces such as front gardens and driveways.

D Drainage should be designed and implemented in ways that promote multiple benefits including increased water use efficiency, improved water quality, and enhanced biodiversity, urban greening, amenity and recreation.

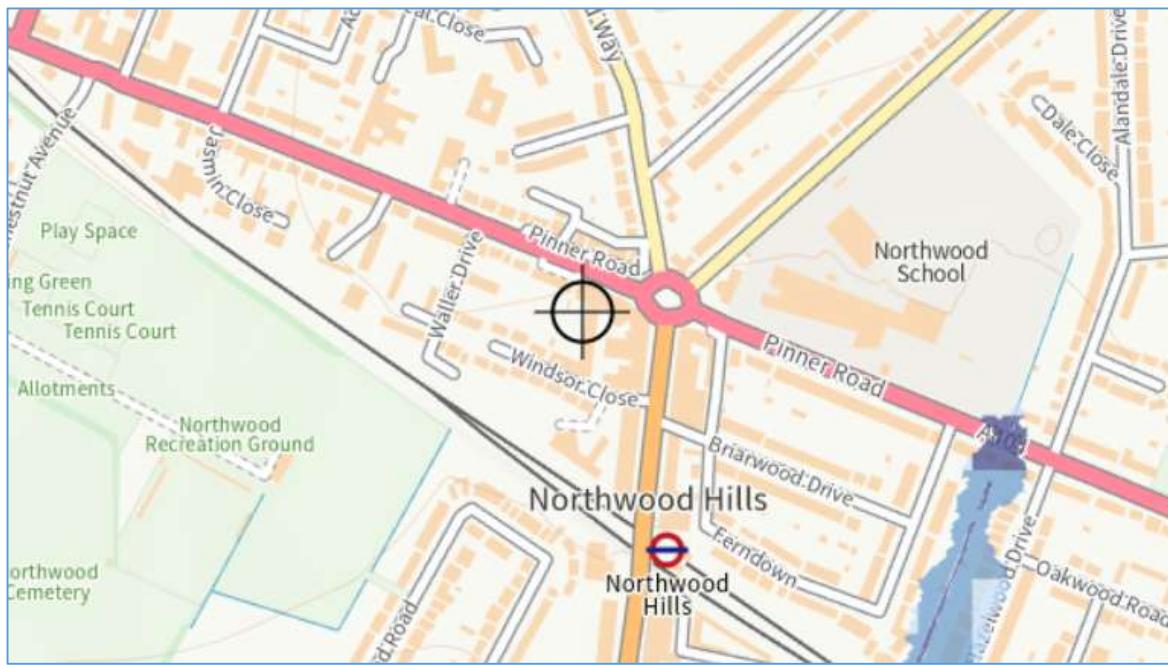
### 3. FLOOD RISK

The possible causes of flooding set out in NPPF are considered in this section in relation to flood risk to the site itself and the effects of the development of the site on the flood risk elsewhere.

#### 3.1. Flood Zones

The Environment Agency has developed a flood risk map, shown below which shows the relative risk of flooding for different return periods.

The development lies within flood zone 1 of the Environment Agency's Flood risk map, as shown below. Land located within flood zone 1 is at low risk of flooding, having an associated annual probability of less 1 in 1000.



Extent of flooding from rivers or the sea

High Medium Low Very Low Location you selected

Figure 4 – Environment Agency Flood Map for the proposed development.

As can be seen, the site is located within Flood zone 1, and in accordance with Table 1 from the NPPF's technical guidance, land within Flood zone 1 is suitable for any use.

Assessment of this site has been based upon the Environment Agency's flood map, the topographical site survey, and the architect's proposed development layout.

Table 1: NPPF Flood Zone Guidance

Flood Zone Classification	Definition of Zone	Appropriate uses	FRA Requirements	Policy Aims
<b>Zone 1 Low Probability</b>	This zone compromises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any year (0.1%<).	All uses of land are appropriate in this zone.	<p>For development proposals on sites compromising one hectare or above the vulnerability to flooding from other sources as well as from river and sea flooding, and the potential to increase flood risk elsewhere through addition of hard surfaces and the effect of new development on surface water run-off should be incorporated in a FRA.</p> <p>This need only be brief unless the factors above or other considerations require particular attention. See Annex E for minimum requirements.</p>	In this zone, developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area and beyond through the layout and form of development, and the appropriate application sustainable drainage techniques.
<b>Zone 2 Medium Probability</b>	This zone compromises land assessed as having between a 1 in 1000 annual probability of river flooding ( 1% -	The water-compatible less vulnerable and more vulnerable uses of land and essential infrastructure in	All development proposals should be accompanied by a FRA. See Annex E for minimum requirements.	In this zone developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area through the layout of form

Flood Zone Classification	Definition of Zone	Appropriate uses	FRA Requirements	Policy Aims
	0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5%-0.1%) in any year	<p>Table D 2 are appropriate in this zone.</p> <p>Infrastructure in Table D.2 are appropriate in this zone.</p> <p>Subject to the sequential Test being applied the highly vulnerable uses in Table D.2 are</p> <p>only appropriate in this zone if the exception Test (see para. D.9) is passed.</p>		and development, and the appropriate application of sustainable drainage techniques.
<b>Zone 3a High Probability</b>	This zone compromises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 greater annual probability of flooding from sea (>0.5%) in any year.	<p>The water compatible and less vulnerable uses of land in Table D.2 are appropriate in this Zone.</p> <p>The highly vulnerable uses in Table D.2 should not be permitted in this zone.</p> <p>The more vulnerable and essential infrastructure uses in D.2 should only be permitted in this zone if the Exception Test (see para.</p>	All development proposals in this zone should be accompanied by a FRA. See Annex E for minimum requirements.	<p>In this zone, developers and local authorities should seek opportunities to:</p> <ol style="list-style-type: none"> <li>reduce the overall level of flood risk in the area through the layout and form of the development and appropriate application of sustainable drainage techniques.</li> <li>relocate existing development to land in zones with a lower probability of flooding; and</li> <li>create space for flooding to occur by restoring functional</li> </ol>

Flood Zone Classification	Definition of Zone	Appropriate uses	FRA Requirements	Policy Aims
		D.9) is passed Essential Infrastructure permitted in this zone should be designed and constructed to remain operational and safe for users in times of flood.		floodplain and flood pathways and by identifying, allocating and safeguarding open space for flood storage.
<b>Zone 3b The Functional Floor Plan</b>	<p>This zone compromises land where water has to flow or be stored in times of flood.</p> <p>Local planning authorities should identify in their SFRAAs areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. The identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. But land which would flood with an annual</p>	<p>Only the water-compatible uses and the essential infrastructure listed in Table D.2 that has to be there should be permitted on this zone. It should be designed and constructed to:</p> <ul style="list-style-type: none"> <li>• remain operational and safe for users in times of flood;</li> <li>• result in no net loss of floodplain storage;</li> <li>• not impede water flows; and</li> <li>• not increase flood risk elsewhere</li> <li>• Essential infrastructure in this zone should pass the Exception Test.</li> </ul>	All development proposals in this zone should be accompanied by a FRA. See Annex E for minimum requirements.	<p>In this zone, developers and local authorities should seek opportunities to:</p> <ol style="list-style-type: none"> <li>i. reduce the overall level of flood risk area through the layout and form of the development and appropriate application of sustainable drainage techniques; and</li> <li>ii. relocate existing development to land with a lower probability of flooding.</li> </ol>

Flood Zone Classification	Definition of Zone	Appropriate uses	FRA Requirements	Policy Aims
	probability of 1 in 20 (5%) or greater in any year, or is designed to flood in an extreme (0.1%) flood should provide a starting point for consideration and discussions to identify the functional floodplain.			

### 3.2. Flood Vulnerability

Table 2 below, which has been extracted from NPPF's technical guidance, highlights the flood risk vulnerability of various developments. This information is based partly on DEFRA/Environment Agency research and 'Flood Risks to People' (FD2321/Tr2) and also on the need of some uses to keep functioning during flooding.

Buildings that combine a mixture of uses should be placed into the higher of the relevant classes of flood risk sensitivity. Developments that allow uses to be distributed over the site may fall within several classes of flood risk sensitivity.

The impact of a flood on a particular use identified within this flood risk vulnerability classification will vary within each vulnerability class. Therefore, the flood risk management infrastructure and risk mitigation measures needed to ensure the development is may differ between uses within a particular vulnerability classification.

**Table 2: NPPF's Flood Risk Vulnerability Classification**

Essential Infrastructure	<ul style="list-style-type: none"><li>Essential transport infrastructure and strategic utility infrastructure, including electricity generating stations and grinds and primary substations.</li></ul>
Highly Vulnerable	<ul style="list-style-type: none"><li>Police, Ambulance and Fire stations and command centres, and telecommunications installations and emergency disposal points.</li><li>Basement Dwellings, caravans, mobile homes and park homes intended for permanent residential use.</li><li>Installations requiring hazardous substance consent.</li></ul>
More Vulnerable	<ul style="list-style-type: none"><li>Hospitals, residential institutions such as care homes, children's homes, social services homes, prisons and hostels.</li><li>Buildings used for dwelling house, student halls of residence, drinking establishments, nightclubs, hotels and sites used for holiday or short-let caravans and camping.</li></ul>

	<ul style="list-style-type: none"> <li>• Non-residential uses for health service, nurseries and educations.</li> <li>• Landfill and waste management facilities for hazardous waste.</li> </ul>
Less Vulnerable	<ul style="list-style-type: none"> <li>• Buildings used for shops, financial, professional and other services, restaurants and cafes, offices, industry, storage and distribution and assembly and leisure.</li> <li>• Land and buildings used for agriculture and forestry.</li> <li>• Waste treatment (except landfill and hazardous waste facilities), mineral workings and processing (except for sand and gravel).</li> <li>• Water treatment plants and sewerage treatment plans (if adequate pollution control measures are in place.)</li> </ul>
Water-compatible Development	<ul style="list-style-type: none"> <li>• Flood control infrastructure, water transmission infrastructure and pumping stations.</li> <li>• Sewerage transmission infrastructure and pumping stations.</li> <li>• Sand and Gravel workings</li> <li>• Docks, marinas and wharves, navigational facilities.</li> <li>• MOD defence installations</li> <li>• Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterslide location.</li> <li>• Water-based recreation (excluding sleeping accommodation)</li> <li>• Lifeguard and coastguard stations</li> <li>• Amenity open space, nature conservation and sports recreation.</li> <li>• Essential sleeping or residential accommodation for staff required by users in this category, subject to a warning and evacuation plan.</li> </ul>

From the flood risk vulnerability classification table above, taken from the NPPF's technical Guidance, Buildings used for dwelling house come within the 'more vulnerable' classification, and commercial use is less vulnerable. However, based on the Environmental Agencies flood map, the development site is located within Flood Zone 1 and in accordance with table 3, overleaf is therefore suitable for any development. Furthermore, neither a sequential nor exception test is required as a part of this Flood Risk Assessment.

**Table 3: NPPF's Flood Risk Vulnerability and Flood Zone Compatibility**

Vulnerability Classification	Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone 1	✓	✓	✓	✓	✓
Flood Zone 2	✓	✓	Exception Test	✓	✓
Flood Zone 3a	Exception Test	✓	✗	Exception Test	✓
Flood Zone 3b	Exception Test	✓	✗	✗	✗

Key: ✓ Development is appropriate  
✗ Development should not be permitted

## 4. FLOOD RISK ASSESSMENT

The possible causes of flooding set out in NPPF's technical guidance are considered in this section in relation to the flood risk to the site itself and the effects of the development of the site on flood risk elsewhere.

### 4.1. Fluvial or Tidal Flooding

There are no main rivers close to the proposed development site, however there are several small watercourses within the vicinity of the site. However, any flooding from these does not affect the proposed development site.

The Environment Agency's Flood Map for Planning (Rivers and Sea), shown in section 2.1, indicates the site is in Flood Zone 1, and not at risk of flooding from rivers or the sea.

### 4.2. Flooding from Land (Overland Flow)

The Environment Agency's Flood maps shown overleaf, shows a part of the proposed development site to be at a low to high risk of surface water flooding, however this flood risk is at the north of the site, where there are no doors or access and egress from the site.

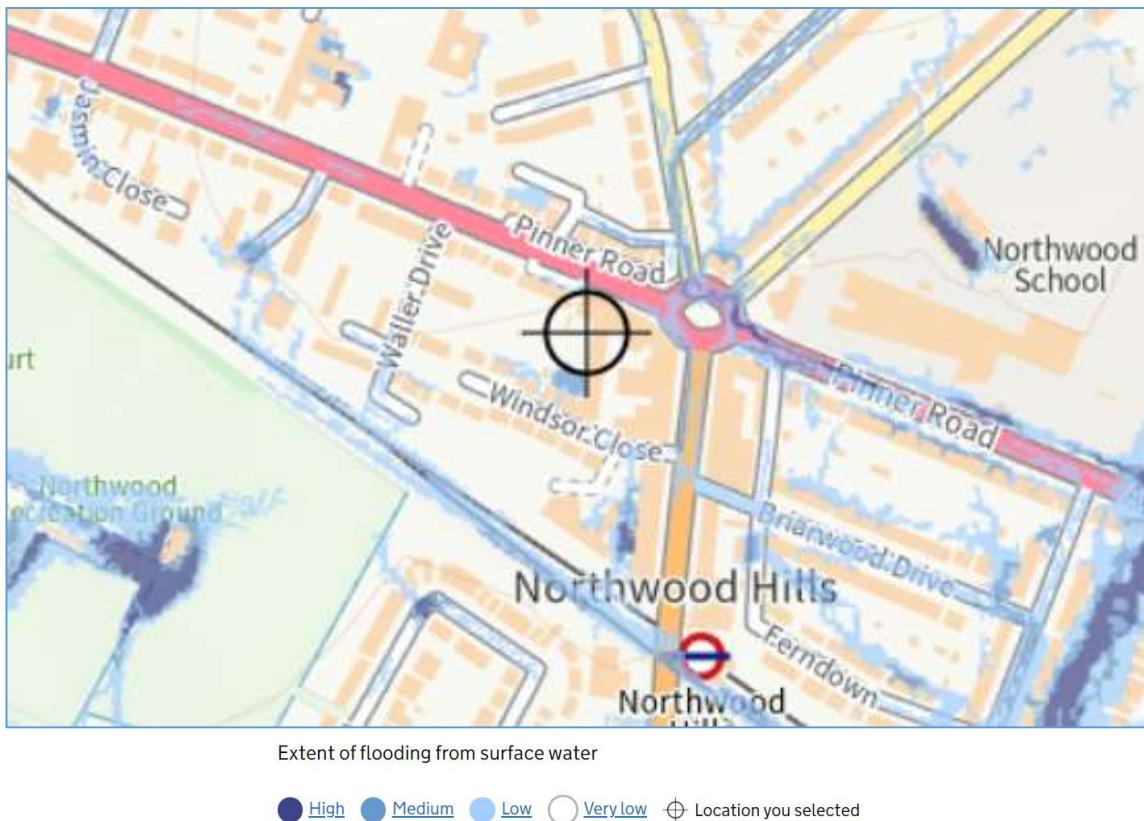


Figure 5 – Environment Agency Flood Map (from surface water) for the proposed development

The detailed flood maps from the Environment Agency as shown below show the depths of flooding to be between 300 and 900mm in depth, however this will not affect the upper floors that are proposed for this extension, however it will affect access and egress from this part of the site, therefore the residents from this entrance and exit area will need to be made aware of this surface water flood risk during extreme storm events.

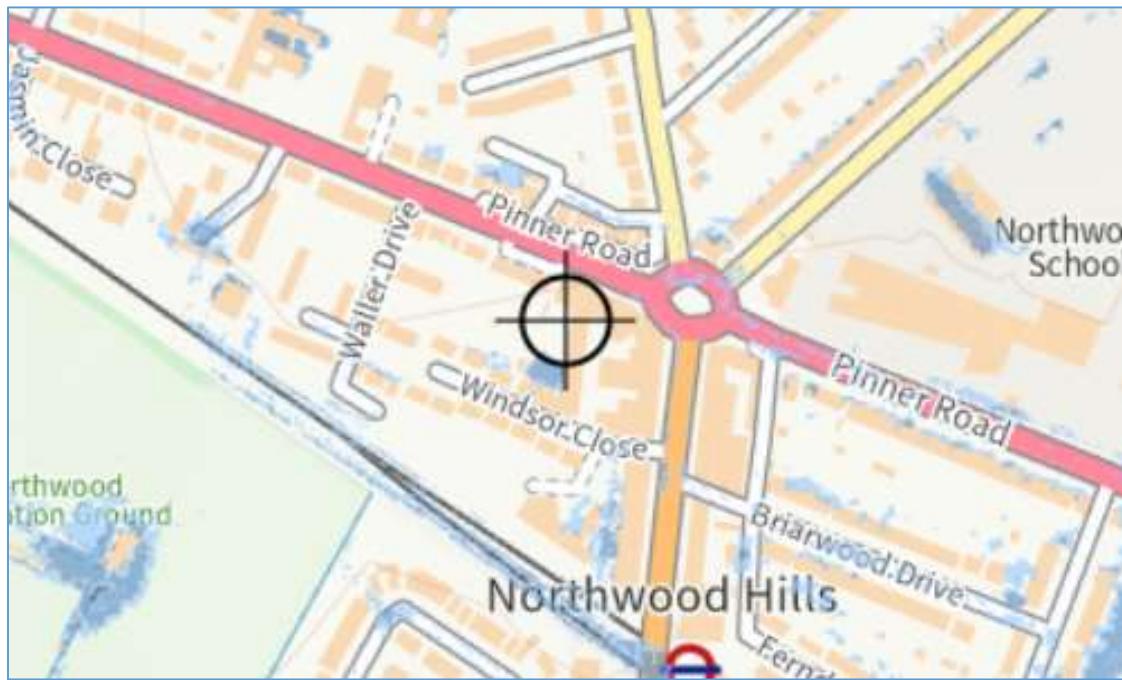


Figure 6 – Detailed Environment Agency Flood Map (from surface water) for the proposed development

We have also consulted the West London SFRA surface water flood map which gives the majority of flood depths of between 150mm and 300mm, and some very small areas showing a depth of flooding between 300mm and 600mm, however in reality this will be just over 300mm in depth. Therefore there will not be any major issues with access and egress from the site, but the residents need to be made aware of this when accessing and egressing the site during an extreme storm event. This flood map can be found overleaf.

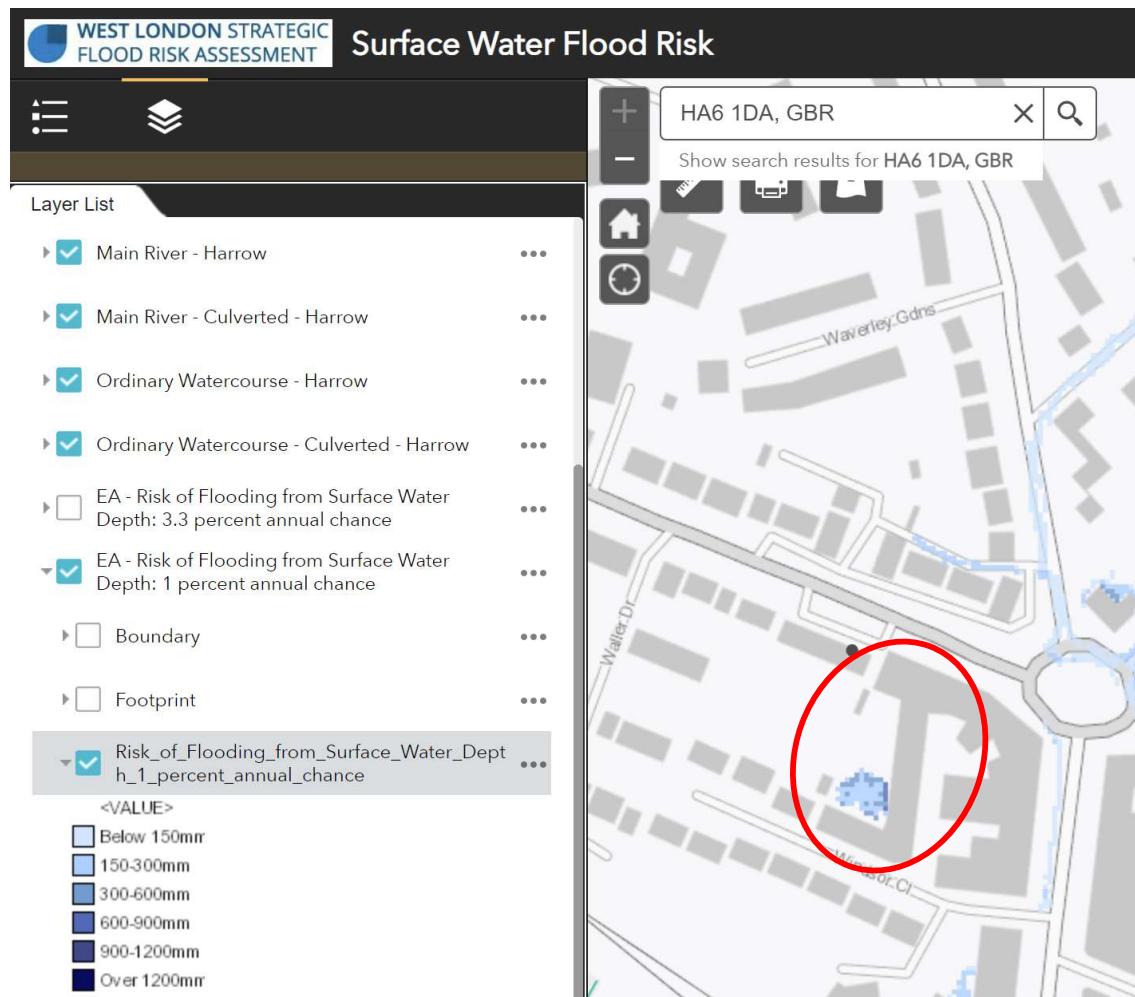


Figure 7 – Surface Water Flood Risk Map – Extracted from the West London SFRA

The proposed development will reduce the amount of surface water run off generated from the site, by proposing a suitable Sustainable Urban Drainage Systems solution. This will reduce the peak rate of run off leaving the site and entering the watercourses. Therefore, it is considered unlikely that there is any risk of flooding of the site due to surcharge of sewers, and in fact the proposed development will reduce the risk of flooding from sewers at the site and elsewhere.

#### 4.3. Flooding from Groundwater

The West London Strategic Flood Risk Assessment, susceptibility to groundwater flooding map shown below, shows the proposed development site to not be at risk of groundwater flooding, and as the proposals are for an upwards extension only, there will be no below ground excavations.

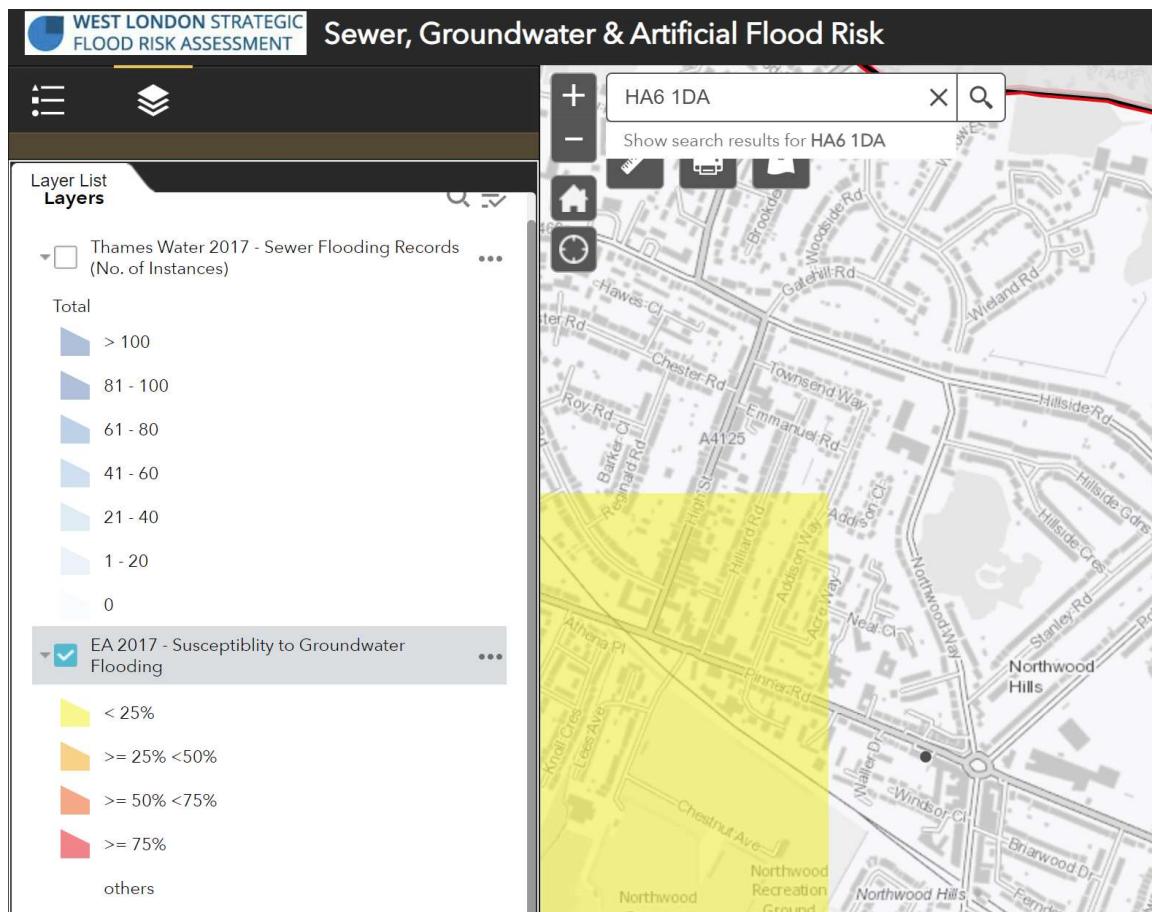


Figure 8 – Susceptibility to Groundwater Flooding Map for the proposed development, from the West London Strategic Flood Risk Assessment

#### 4.4. Flooding from Sewers

The West London Strategic Flood Risk Assessment, Sewer flooding records map shown below, shows there have been 41 to 60 instances of sewer flooding within the vicinity of the site.

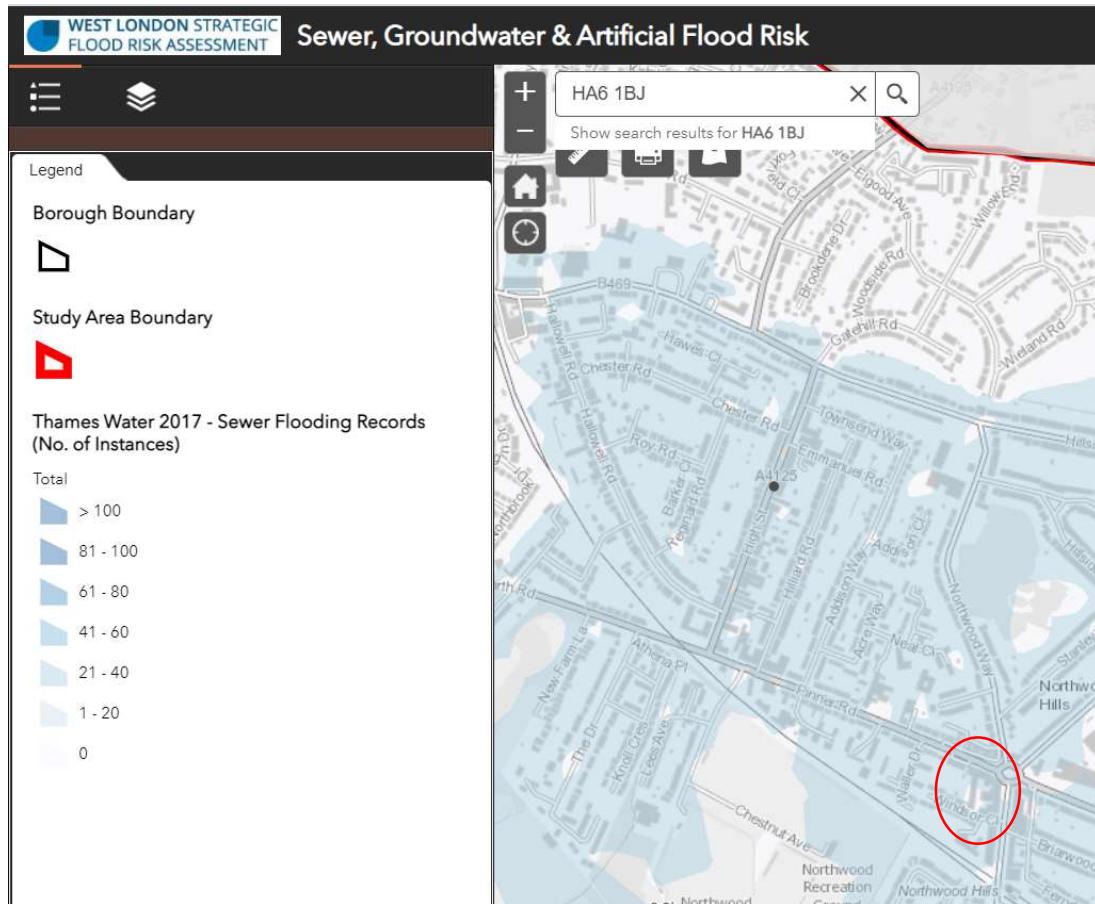


Figure 9 – Sewer flooding incidents Map for the proposed development, from the West London Strategic Flood Risk Assessment

#### 4.5. Flooding from Reservoirs, Canals or Other Artificial Sources

The proposed development site is not at risk of flooding from reservoirs. This can be confirmed by the Environment Agency's Flood map shown overleaf.



Figure 10 – Environment Agency Flood Map (from reservoirs) for the proposed development

## 5. CONCLUSIONS

The purpose of this report and associated calculations and drawing, is to assess the risk of flooding from all sources and to present a SuDS solution to satisfy Hillingdon Borough Council that the proposed development will not increase surface water flows, and hence increase flood risk at the site elsewhere.

This proposed development will greatly reduce the surface water run off leaving the site, and therefore reduce flood risk at the site and elsewhere, as well as providing biodiversity and amenity value.

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## APPENDIX A - DRAWINGS