

Flood Risk Assessment

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Shop A, 80 White Hart Lane, Tottenham, London, N17 8HP

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1. Introduction

The following document is a Flood Risk Assessment carried out by Oakshire Environmental, and includes details of the site, vulnerability classification, flood linkages and an evaluation of risk.

1.1 Project Overview

The client's proposed project involves a change of use of the existing launderette to a one-bedroom flat at Shop A, 80 White Hart Lane, Tottenham, London, N17 8HP. Oakshire Environmental have carried out a Flood Risk Assessment as described below.

1.2 Purpose of Investigation

The objectives of the Flood Risk Assessment were to:

- Develop a detailed assessment of the site.
- Identify potential flood sources, receptors and pathways at the site.
- Assess the level of potential flood risk.
- Determine the requirement or scope of further investigations or mitigation measures.

1.3 Scope of Work

- Brief introductory information has been noted to provide context to the report and include an Introduction, Project Overview, Scope of Work and Limitations.
- To develop a detailed assessment of the site, desk studies have been carried out to collate information obtained from sources including the Environment Agency, Local & National Authorities, Strategic Flood Risk Assessments and Digital Terrain Model (DTM) LiDAR topographical surveys.
- This information has been used to identify potential flood sources, receptors and pathways at the site, as part of an initial Conceptual Site Model.
- To assess the level of potential flood risk, a Conceptual Site Model have been produced to categorise the potential severity of the impact of the flood linkage on the receptor and the probability of the flood linkage being present.
- Following the assessment of flood linkages, an evaluation of flood risk, mitigation measures, surface water management and safe access and egress has been conducted to determine the requirement or scope of further investigations.
- Supporting appendix include photographs, maps, and plans of the site.

1.4 Limitations

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This report excludes consideration of potential hazards arising from any activities at the site other than normal use and occupancy for the intended land uses. Hazards associated with any other activities have not been assessed and must be subject to a specific risk assessment by the parties responsible for those activities. Oakshire Environmental does not warrant or guarantee that the site is free of hazardous or potentially hazardous materials or conditions. It should be noted that this report has been produced for environmental purposes only.

2. Site

The following section provides a description of the site, location, proposed development and vulnerability classification, utilising information obtained from the client and publicly available sources.

2.1 Site Description and Location

The site is located on White Hart Lane in Tottenham and is approximately 0.02ha. The site is comprised of a three-storey end of terrace building at the south with a launderette and a flat on the ground floor and a further two flats on the floors above along with a small rear garden at the north. The site slopes from 13.63mAOD in the rear garden at the north to 12.22mAOD at the footpath adjacent to the building to the south.

The site is bordered by a vehicle storage yard to the north, terraced commercial premises and flats to the east, terraced dwellings to the west and White Hart Lane to the south with additional commercial premises beyond.

National Grid Reference: TQ 33595 91358

2.2 Proposed Development

The proposed development involves the change of use of the existing launderette to a one-bedroom flat. The existing finished floor level, exterior ground level and external hard surfaces will be unchanged.

2.3 Vulnerability Classification

The NPPF technical guidance determines the suitability of a proposed development in a particular location based on its flood risk vulnerability. Based on Annex 3 of the NPPF, the proposed residential development falls within the category of ‘more vulnerable’.

The Sequential Test is not required for change of use developments so the Sequential Test will not be carried out.

The flood map for planning indicates that the site falls within Flood Zone 2. More vulnerable developments are permitted in Flood Zone 2 without the requirement for the Exception Test so this will also not be carried out.

It should be noted that these Flood Zones do not take into account the impact of any flood defences or site specific mitigation measures.

Table 1: Flood Risk Vulnerability Classification table from National Planning Policy Framework Technical Guidance

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

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

3. Initial Conceptual Site Model

The following section outlines potential flood sources, pathways and receptors, utilising information gathered in the previous sections, to develop an initial conceptual site model.

3.1 Potential Flood Sources

Rivers & Seas

Moselle Brook (a tributary of the River Lee) is culverted beneath White Hart Lane to the south of the site and the Environment Agency's flood map for planning shows that the site is at risk of flooding in a 0.1% AEP event. The site is not protected by flood defences.

Modelling of the River Lee and its tributaries has been carried out by Halcrow and shows that the site is not at risk of flooding in a 1% AEP event and would flood to 12.70mAOD in a 0.1% AEP event. This would impact the south of the site with flood depths up to 0.48m anticipated at the footpath adjacent to the building to the south. Based on modelled flood velocities, this would present a significant hazard.

Environment Agency data shows that the site and the surrounding area has not previously flooded.

Surface Water

Surface water runoff is caused by heavy rainfall that can overwhelm the drainage network. The Environment Agency Risk of Flooding from Surface Water mapping can be used to identify areas at risk of surface water flooding. Map data shows that surface water predominantly follows topographical flow paths of existing watercourses or dry valleys and can pond in low-lying areas. The risk is most often confined to roads with some run-off flow routes around properties.

The site is situated within a Critical Drainage Area and Environment Agency maps show that the risk of surface water flooding at the site is very low, however, surface water flooding is anticipated along White Hart Lane to depths up to 0.6m in a 1% AEP event. No flooding is shown on the footpath adjacent to the site suggesting that the site would not be impacted by surface water flooding.

It is noted that Sustainable Drainage Systems (SuDS) have been implemented along White Hart Lane, including raingardens, tree pits and permeable paving, and no incidents of surface water flooding have been noted along the length of White Hart Lane since their construction.

Groundwater

Flooding from groundwater can occur when the water table rises and reaches ground level allowing water to seep through to the surface. This means that water may rise up through floors or underground rooms such as cellars or basements. Groundwater flooding is much slower to occur than river flooding and will usually happen days, weeks or even months after heavy or prolonged rainfall. And it may last weeks or even months.

The underlying London Clay bedrock is an unproductive aquifer and there are superficial deposits of sand and gravel resulting in a perched water table. This suggests a potential risk from groundwater flooding following extreme rainfall for short periods, coupled by high water levels in watercourses. The Environment Agency's Areas Susceptible to Groundwater Flooding map shows that the site lies within an area that is susceptible to groundwater flooding due to groundwater emergence from superficial deposits.

Given that the development will include no below ground infrastructure and there are no records of groundwater flooding in the vicinity of the site, the risk from groundwater flooding is considered to be low.

Sewers

Sewer flooding occurs when heavy rainfall and flooding overloads sewer capacity or when sewers cannot discharge to watercourses due to high water levels. Sewer flooding can also be caused by blockages, collapses, equipment failure or groundwater leaking into sewer pipes. Sewer flooding is often synonymous with other sources of flooding such as river, surface water and groundwater flooding.

Thames Water mapping shows that there are surface water sewers on White Lane that discharge into the culverted Moselle Brook, therefore, sewer flooding in this area is likely to be strongly linked to river flooding from Moselle Brook and/or surface water flooding on White Hart Lane. There are no records of sewer flooding in the vicinity of the site.

Reservoirs

The level and standard of inspection and maintenance required for reservoirs means that the risk of flooding from reservoirs is generally very low.

There are no reservoirs close to the site and Environment Agency mapping shows that the site is not at risk of flooding in the event of a reservoir failure or overtopping.

Climate Change

Climate change projections show an increased chance of warmer, wetter winters and hotter, drier summers with a higher likelihood of more frequent and intense rainfall. This is likely to make severe flooding happen more often. It is necessary to ensure that a development will be safe from flooding for its lifetime, which is generally considered to be 100 years for a residential development. Environment Agency guidance recommends that the impacts of climate change on river flooding are assessed based on management catchments and recommends the use of the 'central' peak river flow allowances for less vulnerable developments. To assess the impacts of climate change on surface water flooding in urbanised catchments, the peak rainfall intensity allowances should also be used and both the central and upper end allowances should be considered. The central peak river flow allowance for the 2080s in the London management catchment is 17% while the central and upper end peak rainfall intensity allowances for the 2070s in a 1% AEP are 25% and 40%, respectively.

Modelling of the 1% AEP flood event, including a 20% peak river flow allowance for climate change, shows that the site would not be impacted by river flooding.

Surface water modelling, taking into account climate change, has not been carried out for the site. In the absence of such modelling, the modelled 0.1% AEP flood event can be used as a proxy. Based on this, no flooding is anticipated on the site, however, flood depths of up to 0.9m are anticipated on White Hart Lane and the footpath adjacent to the site which is likely to impact the site.

3.2 Potential Flood Receptors

Given the proposed use of the site, the following receptors are considered:

- Residential end users

3.3 Potential Flood Pathways

Based on the expected on-site receptors, relevant pathways for the above receptors include:

- Moselle Brook
- Surface water along White Hart Lane
- Permeable superficial deposits
- Local sewers

Pathways between off-site sources and off-site receptors is beyond the scope of this assessment.

3.4 Risk Assessment Methodology

The potential level of risk posed by a particular source is determined by assessing the potential severity of the impact of the flood linkage on the receptor, if it is assumed to be present, and the probability of the flood linkage being present.

Severities are categorised from Minor to Severe and probabilities are categorised from Unlikely to High Likelihood to give a potential level of risk output.

Table 3: Risk Matrix

Probability	Severity of Consequence			
	Severe	Medium	Mild	Minor
High Likelihood	Very High Risk	High Risk	Moderate Risk	Low / Moderate Risk
Likely	High Risk	Moderate Risk	Low / Moderate Risk	Low Risk
Low Likelihood	Moderate Risk	Low / Moderate Risk	Low Risk	Very Low Risk
Unlikely	Low / Moderate Risk	Low Risk	Very Low Risk	Very Low Risk

Very High Risk

There is a high probability that severe harm could arise to a designated receptor from an identified source; or there is evidence that severe harm to a designated receptor is currently happening.

High Risk

Harm is likely to arise to a designated receptor from an identified source.

Moderate Risk

It is possible that harm could arise to a designated receptor from an identified source. It is relatively unlikely that any such harm would be severe or if any harm were to occur it is more likely that the harm would be relatively mild.

Low Risk

It is possible that harm could arise to a designated receptor from an identified source, however, it is likely that this harm, if realised, would normally be mild.

Very Low Risk

There is a low possibility that harm could arise to a receptor. In the event of such harm being realised it is not likely to be severe.

3.5 Conceptual Site Model

The information in this section has been compiled to produce an initial conceptual site model outlining the potential sources, pathways and receptors to consider at the site. The level of risk was categorised by considering the severity and probability, as outlined in the previous section.

Table 4: Conceptual site model

Sources	Pathways	Receptors	Severity	Probability	Potential Level of Risk	
Fluvial Flooding	Moselle Brook	Residential end users	Medium	Low Likelihood	Low to Moderate	Modelling of the River Lee and its tributaries shows that the site would flood to 12.70mAOD in a 0.1% AEP event. This would impact the south of the site with flood depths up to 0.48m anticipated at the footpath adjacent to the building to the south. Based on modelled flood velocities, this would present a significant hazard.
Surface Water Flooding	Surface water along White Hart Lane		Medium	Unlikely	Low	Environment Agency maps show that the risk of surface water flooding at the site is very low and no flooding is shown on the footpath adjacent to the site suggesting that the site would not be impacted by surface water flooding.
Groundwater Flooding	Permeable superficial deposits		Mild	Low Likelihood	Low	The underlying London Clay bedrock is an unproductive aquifer and there are superficial deposits of sand and gravel resulting in a perched water table. The Environment Agency's Areas Susceptible to Groundwater Flooding map shows that the site lies within an area that is susceptible to groundwater flooding due to groundwater emergence from superficial deposits. Given that the development will include no below ground infrastructure and there are no records of groundwater flooding in the vicinity of the site, the risk from groundwater flooding is considered to be low.
Sewer Flooding	Local sewers		Mild	Low Likelihood	Low	Thames Water mapping shows that there are surface water sewers on White Lane that discharge into the culverted Moselle Brook, therefore, sewer flooding in this area is likely to be strongly linked to river flooding from Moselle Brook and/or surface water flooding on White Hart Lane. There are no records of sewer flooding in the vicinity of the site.
Climate Change	Moselle Brook		Medium	Unlikely	Low	Modelling of the 1% AEP flood event, including a 20% peak river flow allowance for climate change, shows that the site would not be impacted by river flooding.
	Surface water along White Hart Lane		Medium	Low Likelihood	Low to Moderate	Using the modelled 0.1% AEP flood event as a proxy for climate change, no flooding is anticipated on the site, however, flood depths of up to 0.9m are anticipated on White Hart Lane and the footpath adjacent to the site which is likely to impact the site.

4. Conclusions

4.1 Risk Evaluation

The initial conceptual site model identified the following potential flood linkages present at the site and the following conclusions have been drawn:

- There is a **low to moderate risk** to residential end users and the proposed dwellings from river flooding from the culverted Moselle Brook to the south.
- There is a **low risk** to residential end users and the proposed dwellings from surface water flooding along White Hart Lane to the south of the site.
- There is a **low risk** to residential end users and the proposed dwellings from groundwater flooding through the permeable superficial deposits.
- There is a **low risk** to residential end users and the proposed dwellings from sewer flooding in local sewers.
- There is a **low risk** to residential end users and the proposed dwellings from river flooding, taking into account climate change.
- There is a **low to moderate risk** to residential end users and the proposed dwellings from surface water flooding, taking into account climate change.

4.2 Existing Flood Mitigation Measures

There are currently no flood mitigation measures at the site.

4.3 Proposed Flood Mitigation Measures

Based on the risk of surface water flooding at the site, taking into account climate change, flood mitigation measures are recommended. Given that the development will include a bedroom on the ground floor, it would not be acceptable to allow water to enter the building, therefore, flood mitigation measures should include permanent and/or temporary flood resistance measures that aim to keep water out of the building. Potential measures that could be implemented include:

- Applying low permeability external render to the external walls facing White Hart Lane
- Installing water-resistant external doors and windows at the south of the site
- Reconstructing the south facing wall with low permeability materials
- Installing temporary barriers at the south facing external doors and windows (e.g. 'Floodgate')

4.4 Surface Water Management

The proposed development will result in no change to the impermeable surface cover across the site, therefore, the rate and volume of runoff will be unchanged and the flood risk off-site will not be increased.

4.5 Safe Access and Egress

No river flooding is anticipated at the site or on White Hart Lane in a design flood event, therefore, safe access and egress will be possible to and from the proposed flats during design conditions, without the intervention of emergency services.

Surface water flooding is anticipated on White Hart Lane and the adjacent footpaths to depths of up to 0.9m which will present a significant hazard and will restrict safe access and egress.

The site is situated within the Environment Agency's 'Pymmes Brook at Upper Edmonton and Tottenham' Flood Warning Area, so it is advised that residents sign-up to receive these warnings in order to prepare to evacuate the site in advance of an extreme flood event.

The recommended evacuation route from the site is westward along White Hart Lane where large areas of land in Flood Zone 1 and with a low hazard from surface water flooding can be easily accessed within ~40m from the site.

4.6 Further Investigation

The site lies within Flood Zone 2, based on the Environment Agency's Flood Map for Planning. Assessment of the risk to the site from all sources of flooding, including consultation of the Haringey Council Strategic Flood Risk Assessment and Halcrow's River Lee modelling, shows that the site is considered to be at low to moderate risk from river flooding, low risk from surface water, groundwater and sewer flooding and a negligible risk from reservoir flooding.

There is also considered to be a low risk to the site from river flooding and a low to moderate risk from surface water flooding when taking into account climate change.

Based on the risk of surface water flooding at the site, taking into account climate change, flood mitigation measures are recommended and should include permanent and/or temporary flood resistance measures that aim to keep water out of the building.

The proposed development will result in no change to the impermeable surface cover across the site, therefore, the rate and volume of runoff will be unchanged and the flood risk off-site will not be increased.

The site is situated within the Environment Agency's 'Pymmes Brook at Upper Edmonton and Tottenham' Flood Warning Area, and it is advised that residents sign-up to receive these warnings in order to prepare to evacuate the site in advance of an extreme flood event.

It can be concluded that the proposed residential development will be safe from flooding for its lifetime, while not increasing flood risk elsewhere. It should be noted that this conclusion is based on the currently proposed development plan, therefore, flood risk at the site should be re-assessed if material changes are made to the proposed development.

5. References

British Geological Survey. *British Geological Survey (BGS)* [online] Available at: <bgs.ac.uk/>.

Department for Communities and Local Government, 2012. *Technical Guidance to the National Planning Policy Framework.*

Department for Environment Food & Rural Affairs, 2022. *Climate Change Allowances.* [online] Available at: <environment.data.gov.uk>.

Environment Agency, 2023. *Flood map for planning.* [online] Available at: <flood-map-for-planning.service.gov.uk>.

Environment Agency, 2022. *Flood risk and coastal change.* [online] Available at: <gov.uk/guidance/flood-risk-and-coastal-change>.

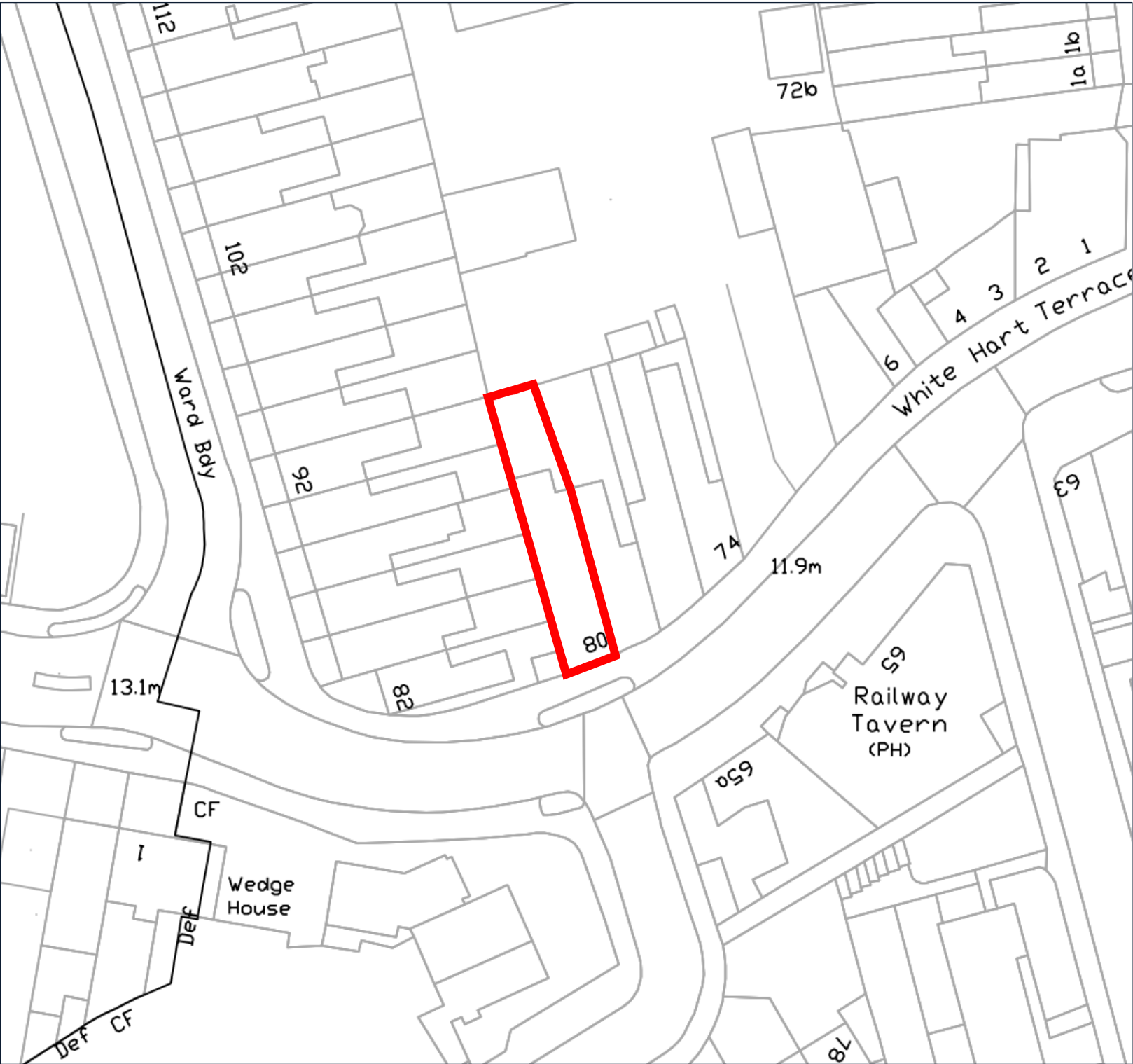
Environment Agency, 2022. *Flood risk assessments: climate change allowances.* [online] Available at: <gov.uk/guidance/flood-risk-assessments-climate-change-allowances>.

Halcrow Group Limited, 2010. *Environment Agency Thames Region TH006 Lee Model Maintenance Stage 2 - Final Report.*

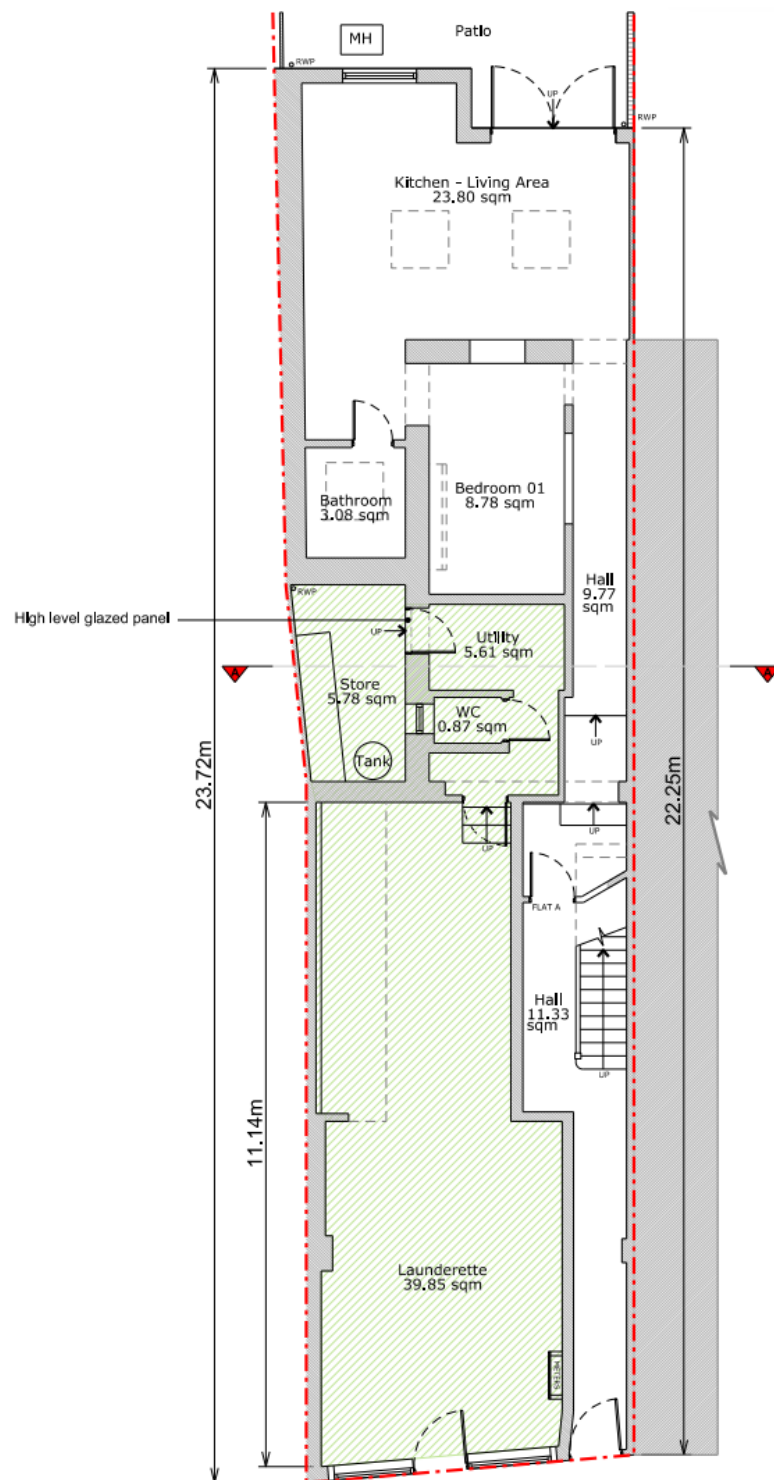
JBA Consulting, 2015. *Haringey Council Strategic Flood Risk Assessment.* [online] Available at: <Haringey.gov.uk>.

Ordnance Survey. [online] Available at: <ordnancesurvey.co.uk/>.

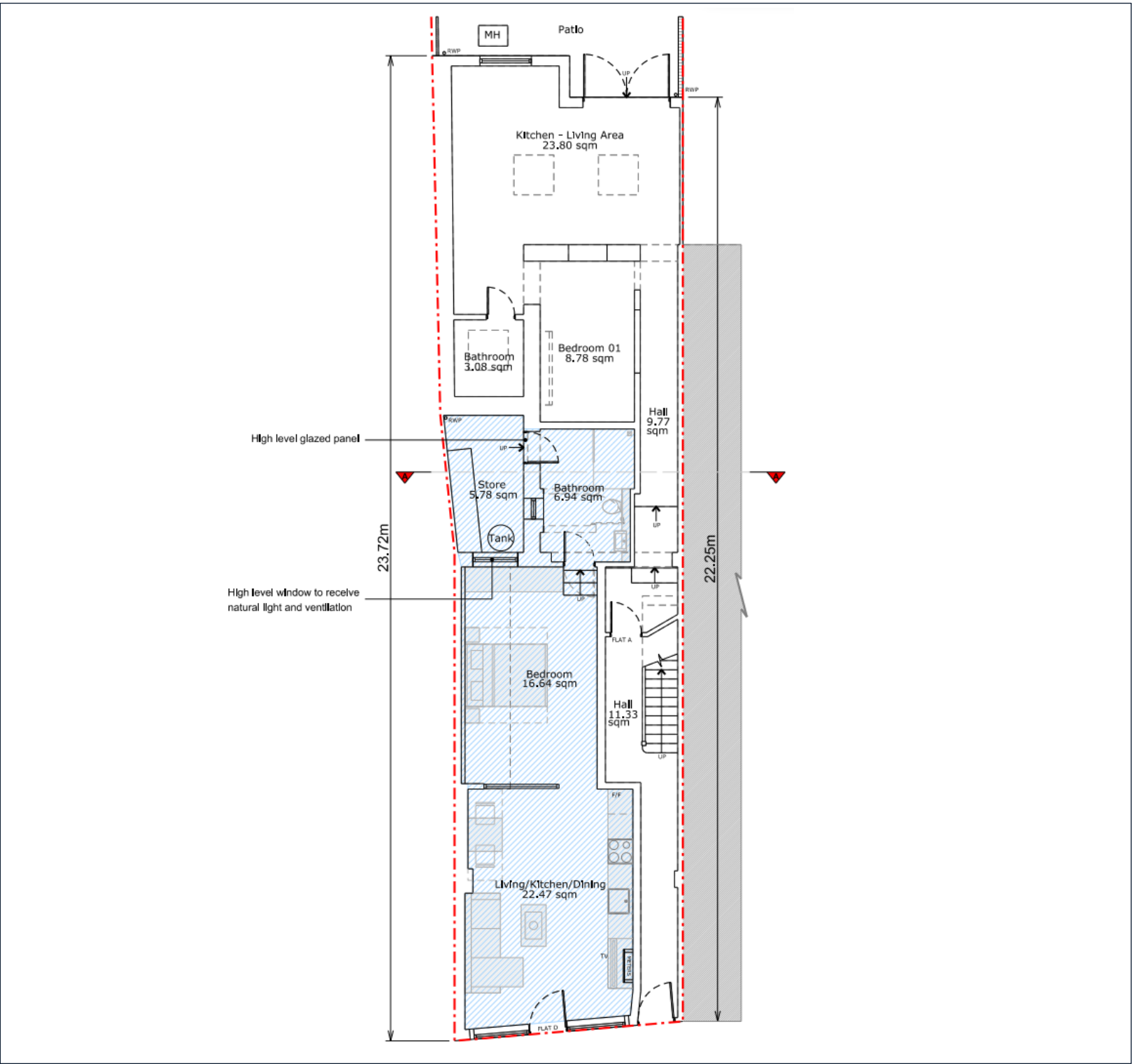
Oakshire Environmental. Available at: <oakshireenvironmental.co.uk>



Appendix - Site Maps & Plans	
Description	
Site location plan	
Sources	
Resi	
Key	
	Site boundary
	North



Appendix - Site Maps & Plans	
Description	
Existing floor plan	
Sources	
Resi	
Key	
	Site boundary
	North



Appendix - Site Maps & Plans

Description

Proposed floor plan

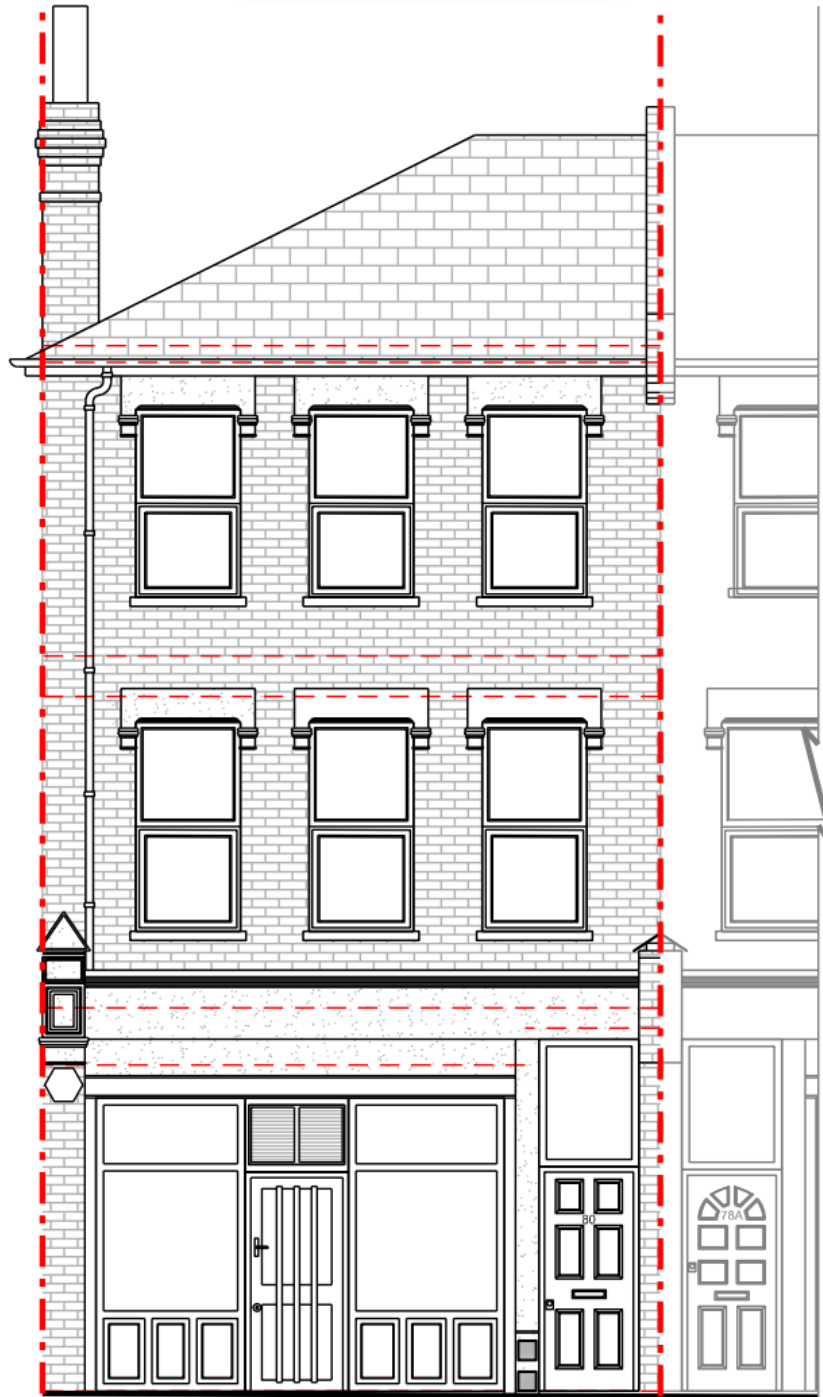
Sources

Resi

Key

Site boundary

North



Appendix - Site Maps & Plans

Description

Existing and proposed front elevation

Sources

Resi



Appendix - Site Photos

Description

Photo of the site from White Hart Lane, facing north

Sources

Resi



Appendix - Site Photos

Description

Photo of the rear garden at the north of the site, facing south

Sources

Resi



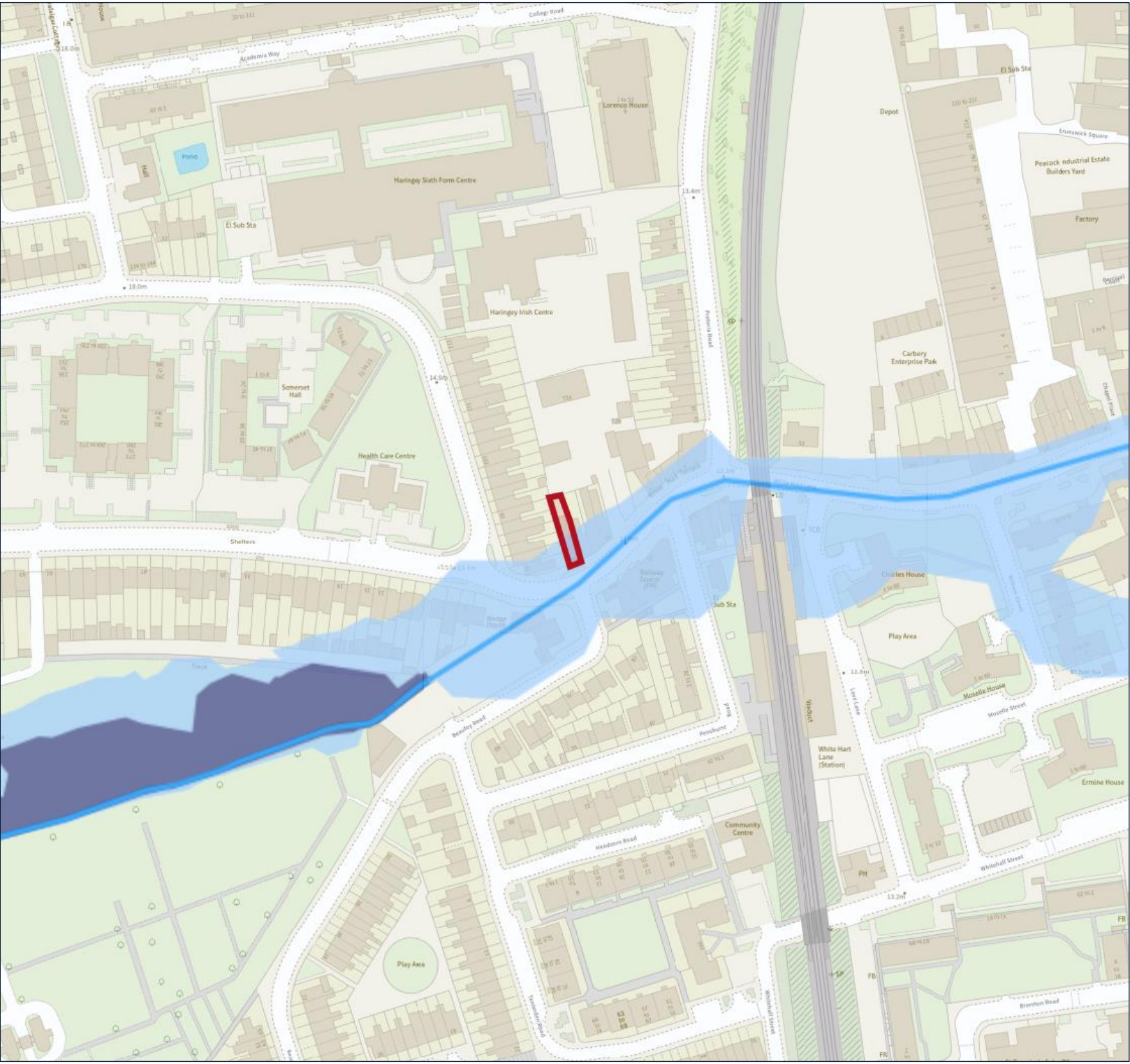
Appendix - Site Photos

Description

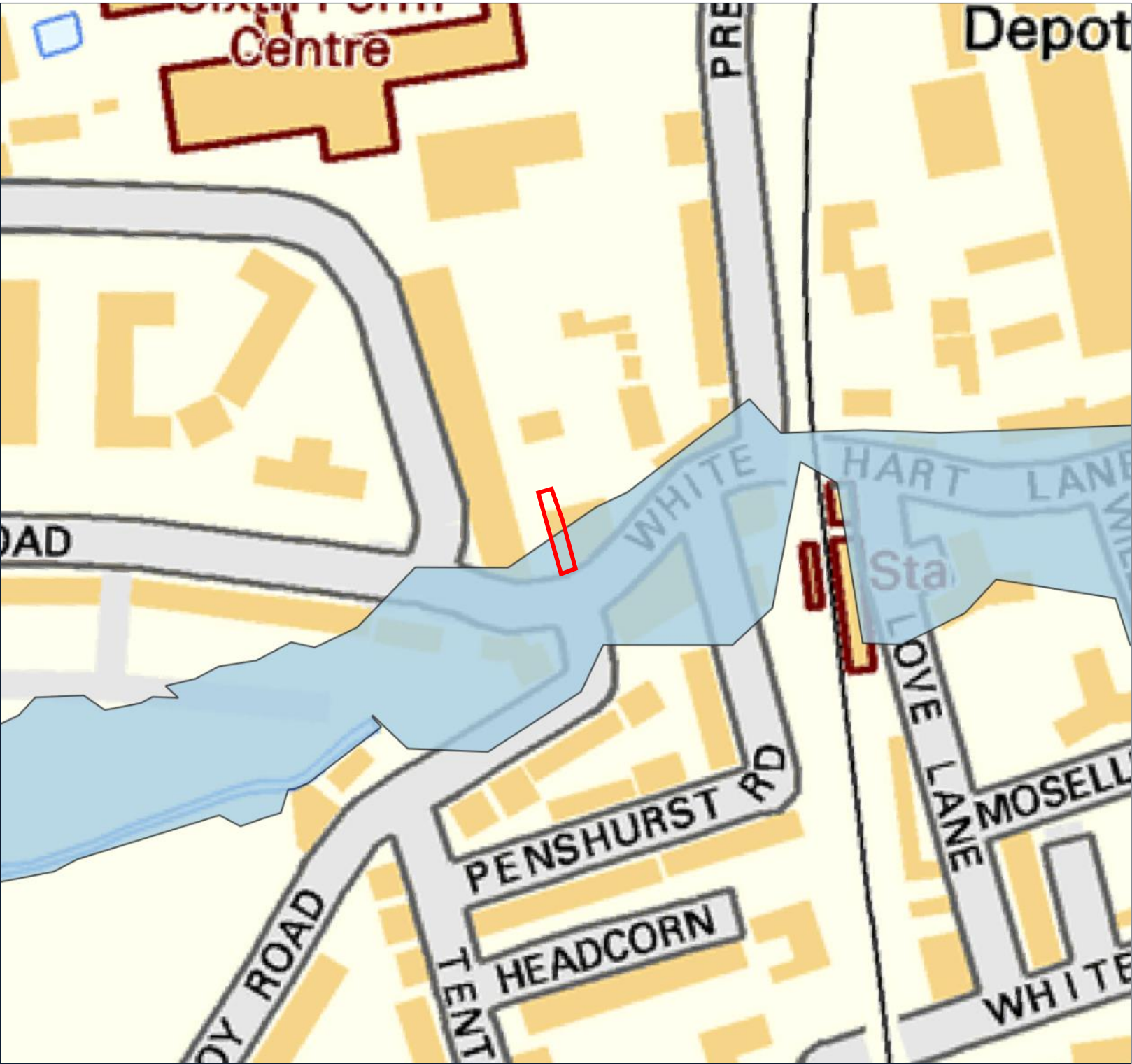
Photo of the interior of the existing laundrette, facing south

Sources

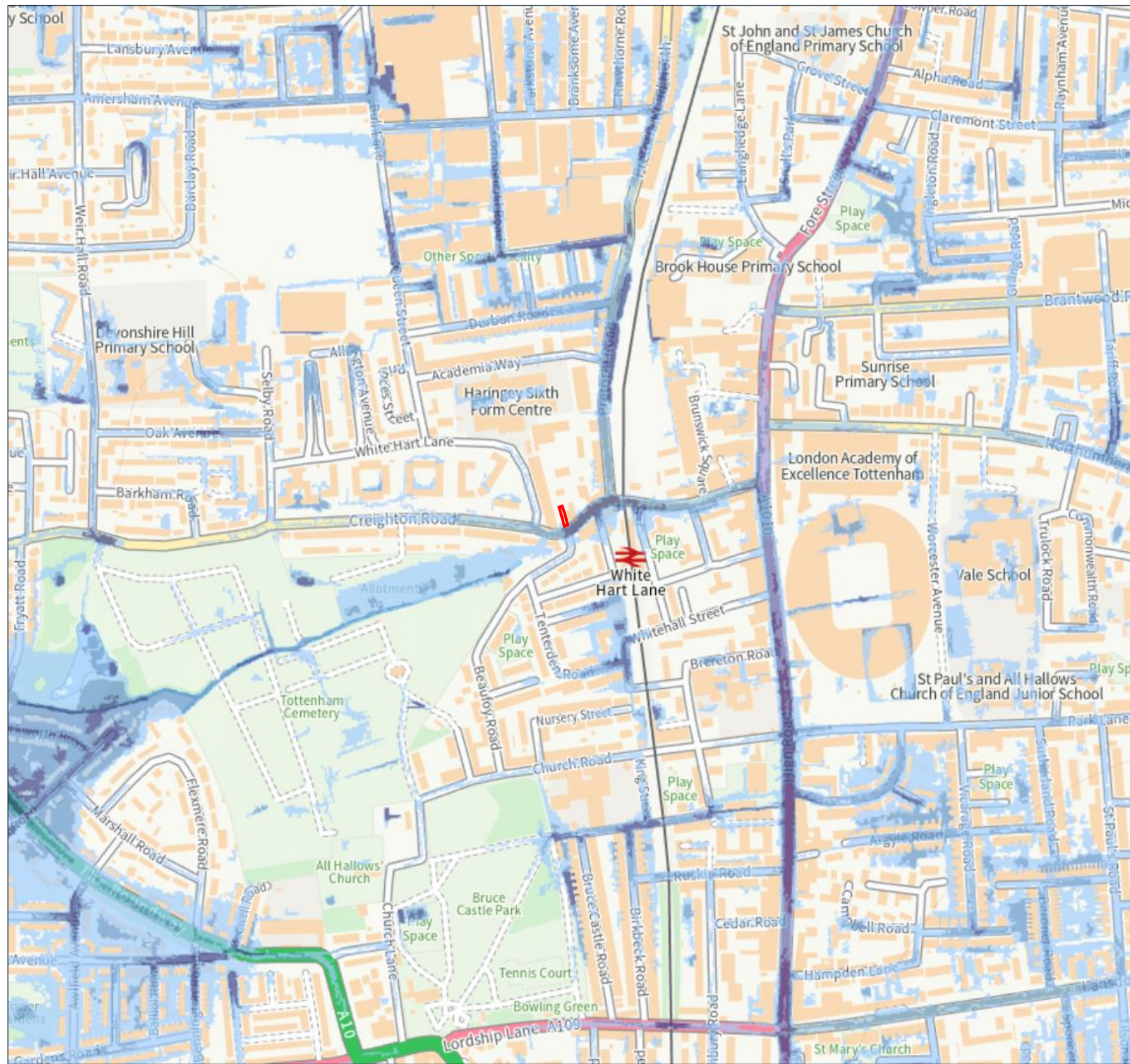
Resi



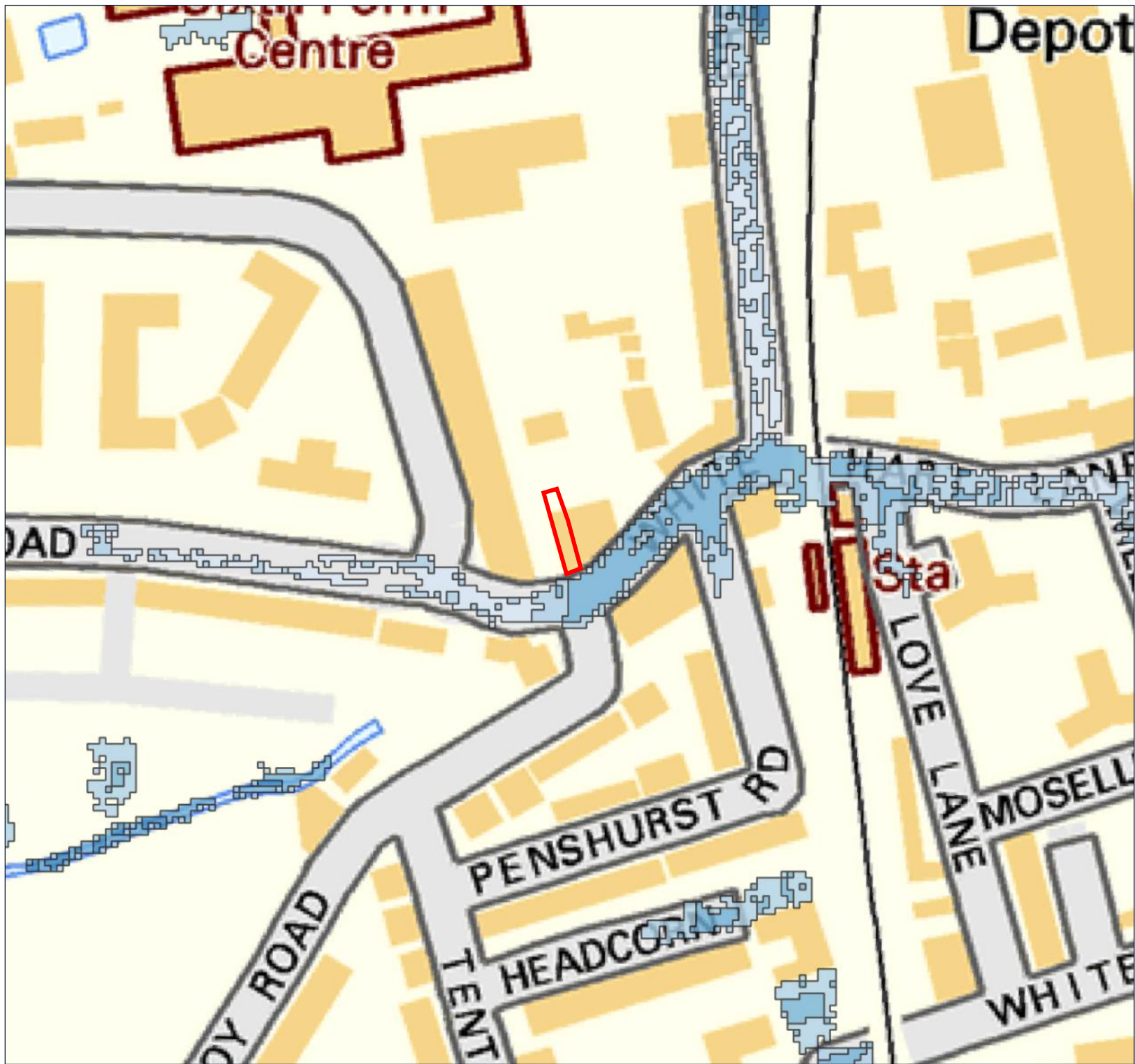
Appendix – Flood Risk Maps	
Description	
Flood zone map for planning	
Sources	
Environment Agency OS data © Crown copyright and database rights	
Key	
	Site boundary
	Flood Zone 1
	Flood Zone 2
	Flood Zone 3
	Main river
	Flood defence
	North



Appendix - Flood Risk Maps	
Description	
Modelled fluvial flood extent in a 0.1% AEP event	
Sources	
Halcrow OS data © Crown copyright and database rights	
Key	
	Site boundary
	0.1% AEP flood extent
	North



Appendix - Flood Risk Maps	
Description	
Environment Agency map showing the extent of flooding from surface water	
Sources	
Environment Agency OS data © Crown copyright and database rights	
Key	
	Site boundary
	Very Low
	Low
	Medium
	High
	North



Appendix - Flood Risk Maps

Description

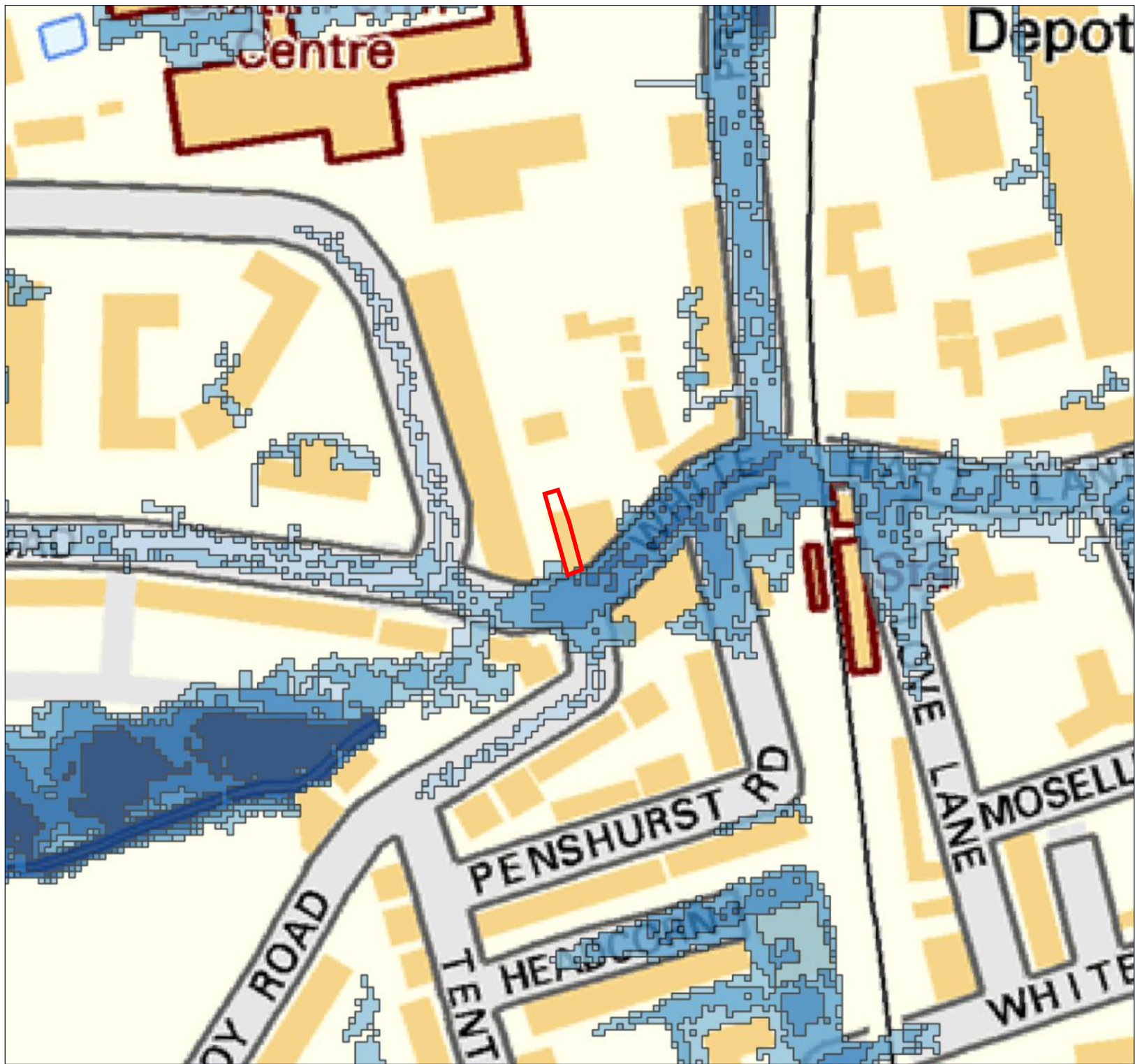
Environment Agency map showing the modelled depth of flooding from surface water in a 1% AEP event

Sources

Environment Agency
OS data © Crown copyright and database rights

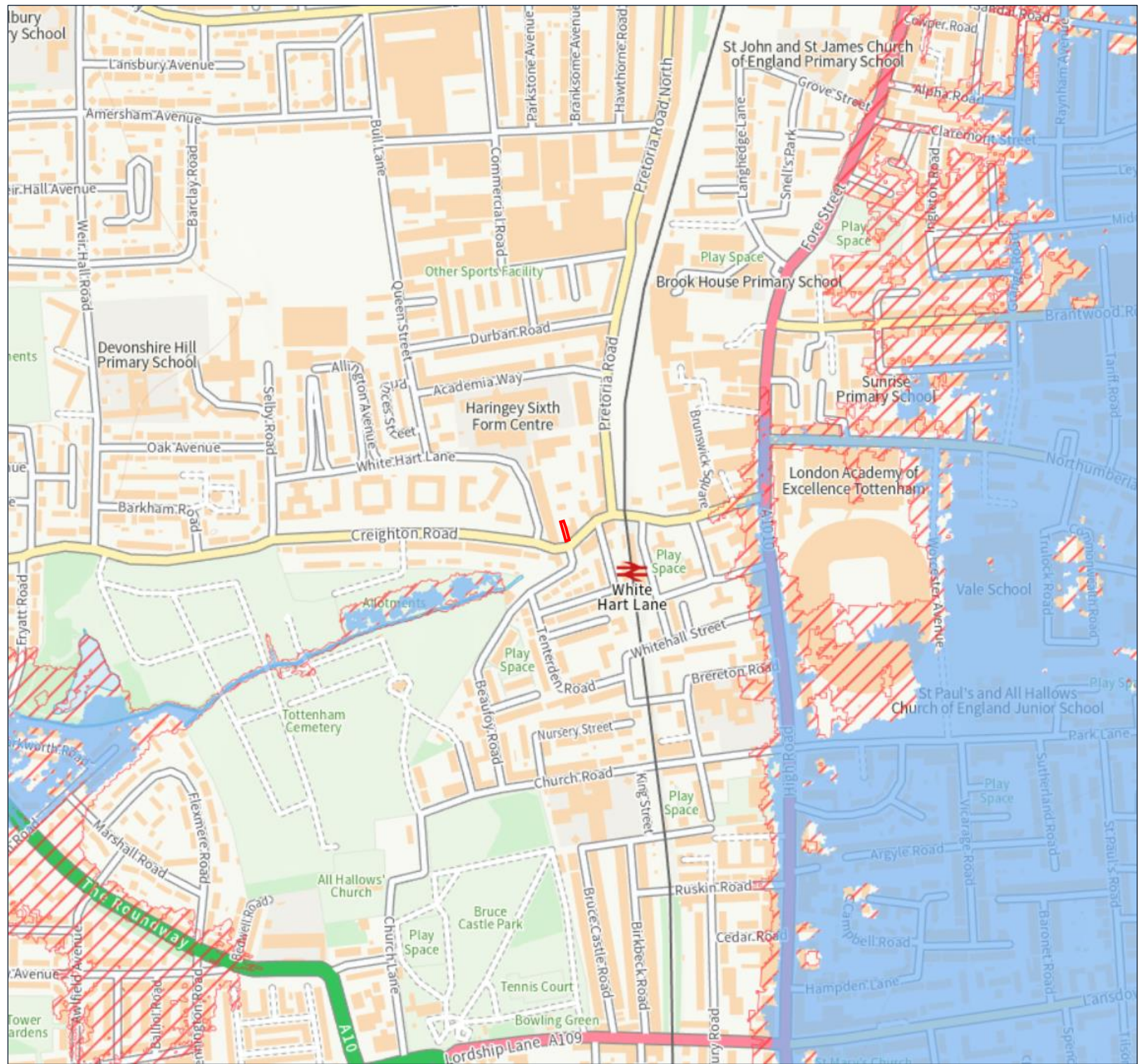
Key

	Site boundary
	< 0.15m
	0.15m - 0.30m
	0.30m - 0.60m
	0.60m - 0.90m
	0.90m - 1.20m
	> 1.20m
	North



Appendix - Flood Risk Maps

Description	
Environment Agency map showing the modelled depth of flooding from surface water in a 0.1% AEP event	
Sources	
Environment Agency OS data © Crown copyright and database rights	
Key	
	Site boundary
	< 0.15m
	0.15m - 0.30m
	0.30m - 0.60m
	0.60m - 0.90m
	0.90m - 1.20m
	> 1.20m
	North



Appendix - Flood Risk Maps

Description

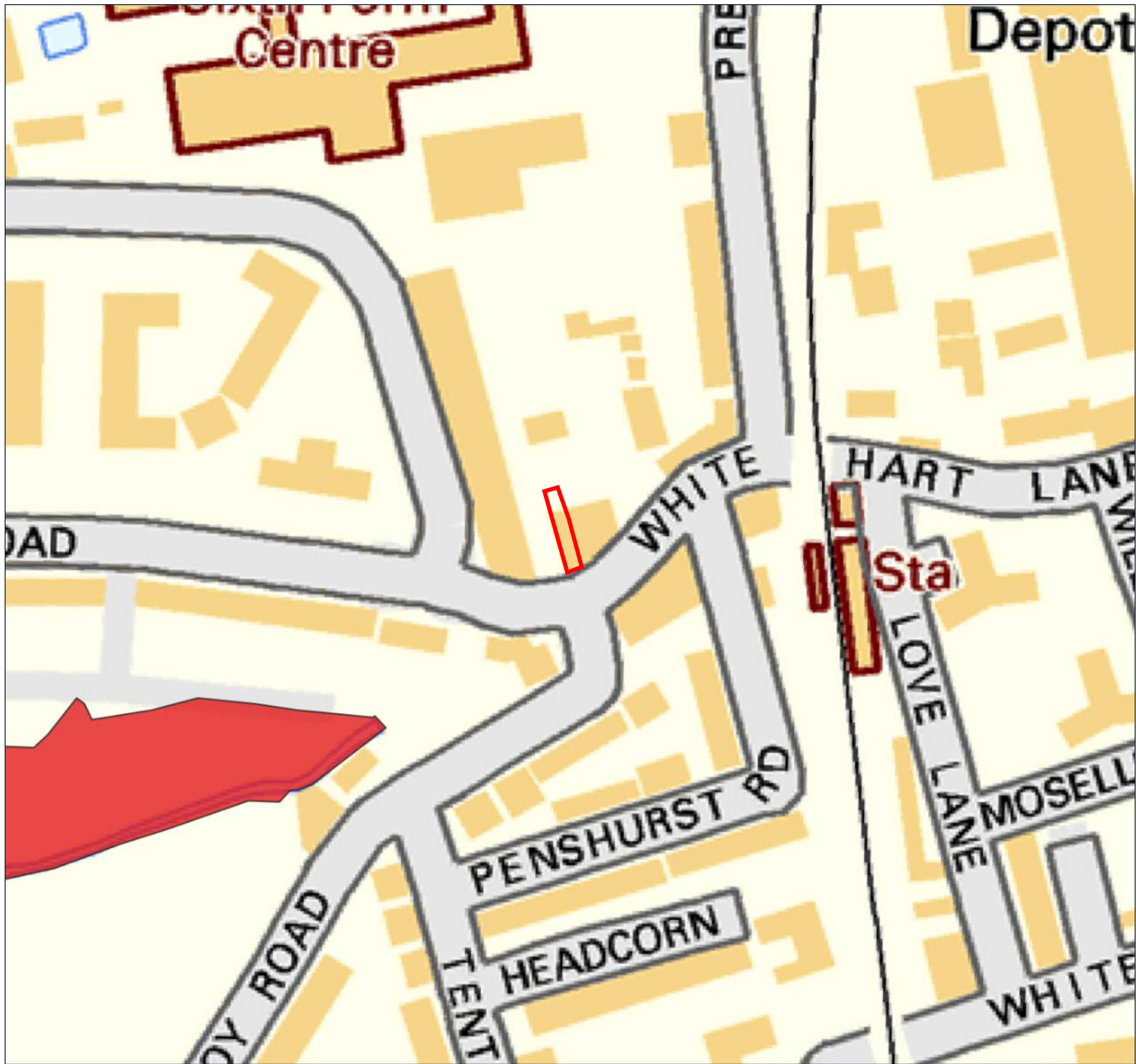
Environment Agency map showing the modelled extent of flooding from reservoirs

Sources

Environment Agency
OS data © Crown copyright and database rights

Key

	Site boundary
	When river levels normal
	When there is river flooding
	North



Appendix - Flood Risk Maps

Description

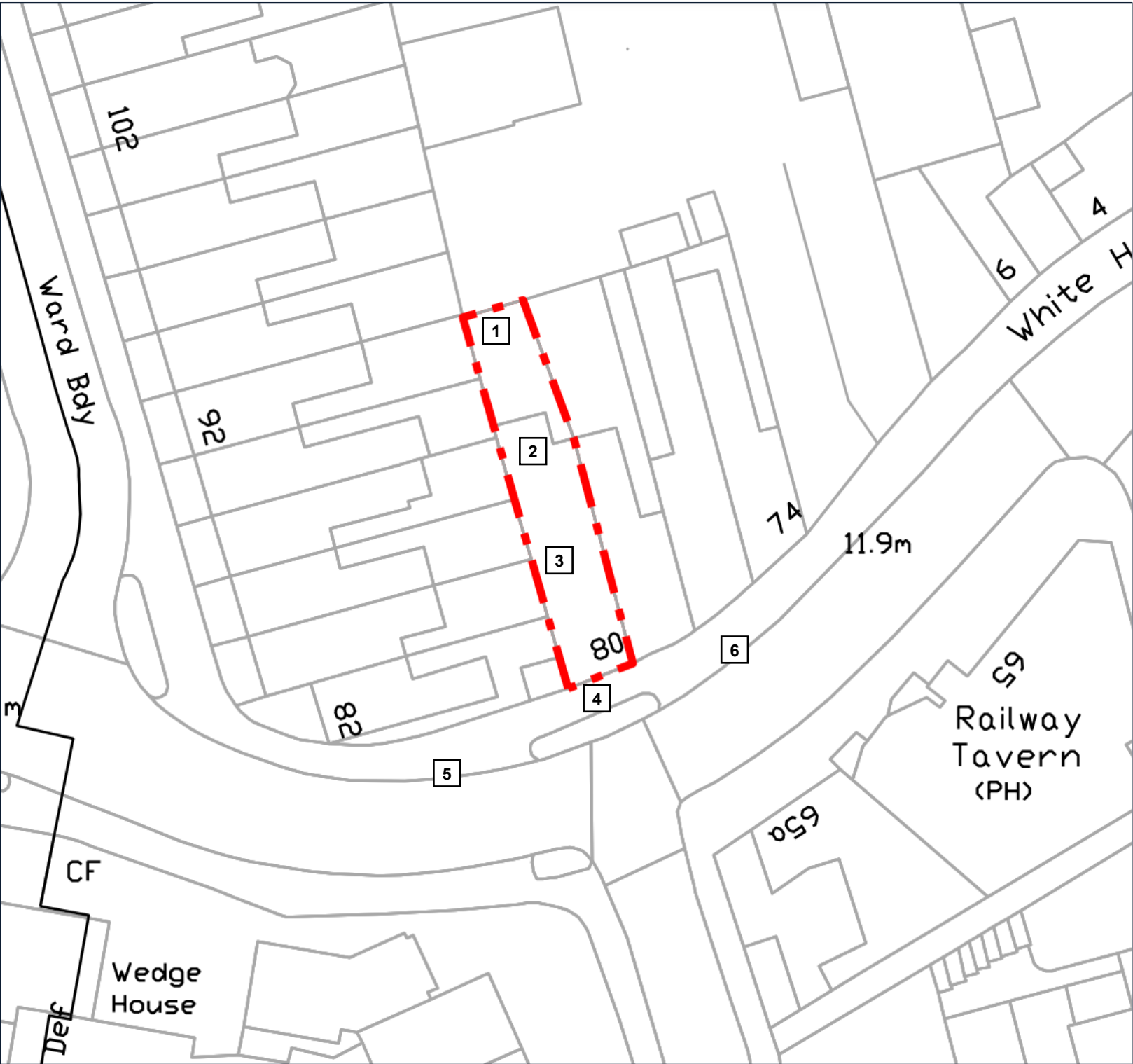
Modelled fluvial flood extent in a 1% AEP event, including a 20% peak river flow allowance for climate change

Sources

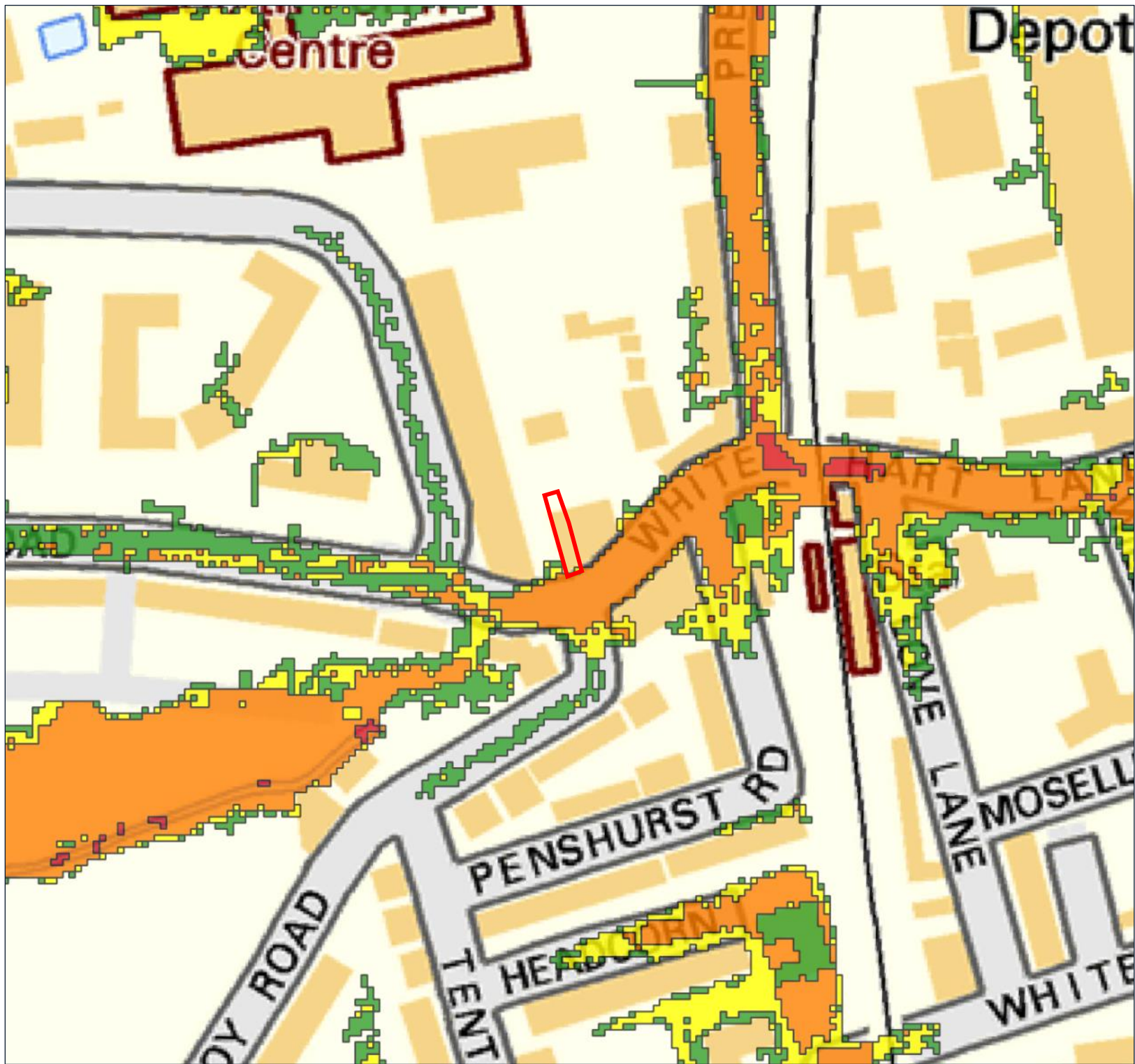
Halcrow
OS data © Crown copyright and database rights

Key

- Site boundary
- 1% AEP (+20%CC)
- North



Appendix - Flood Risk Maps	
Description	
Node map showing maximum modelled river flood levels in a 1% AEP event, including a 20% allowance for climate change	
Sources	
Halcrow Resi	
Key	
	Site boundary
1	Outside maximum flood extent
2	Outside maximum flood extent
3	Outside maximum flood extent
4	Outside maximum flood extent
5	Outside maximum flood extent
6	Outside maximum flood extent
▲	North



Appendix - Flood Risk Maps

Description

Environment Agency map showing the modelled flood hazard from surface water in a 0.1% AEP event

Sources

Environment Agency
OS data © Crown copyright and database rights

Key

- Site boundary
- Low
- Moderate
- Significant
- Extreme
- North