FLOOD RISK ASSESSMENT

Site Address

Waterside House & Riverview House
Oxford Road
Uxbridge
UB8 1WL

Client

Joel Wilder

Date

24/06/2025

1 Document Control

FLOOD RISK ASSESSMENT

Site Address:	Waterside House & Riverview House, Oxford Road Uxbridge UB8 1WL
National Grid Reference:	505013, 184402
STM Reference:	FRA - 2025 - 000040
Version No:	1.0
Prepared for:	Joel Wilder
Date:	24/06/2025
Report Author:	Yonas Makoni (BSc) **Junior Flood Risk and Drainage Consultant**
Reviewed By:	Georgia Travers (BSc) **Flood Risk and Drainage Consultant**
Authorised By:	Matthew Ashdown (BSc) **Senior Flood Risk and Drainage Consultant**

2 Contents

3 Abbreviations

Abbreviation	Description
STM	STM Environmental Consultants Limited
BGS	British Geological Survey
EA	Environment Agency
OS	Ordnance Survey of Great Britain
FRA	Flood Risk Assessment
NPPF	National Planning Policy Framework
FWD	Floodline Warning Direct
FRMS	Flood Risk Management Strategy
LBH	London Borough of Hillingdon
SWMP	Surface Water Management Plan
SFRA	Strategic Flood Risk Assessment
CDA	Critical Drainage Area
AEP	Annual Exceedance Probability
CC	Climate Change
SuDS	Sustainable Urban Drainage Systems
GWSPZ	Groundwater Source Protection Zone
LLFA	Lead Local Flood Authority
mbgl	metres below ground level
DCLG	Department for Communities and Local Government
PPGPS	Planning practice guidance and Planning system

4 Disclaimer

This report and any information or advice which it contains, is provided by STM Environmental Consultants Ltd (STM) and can only be used and relied upon by Joel Wilder (Client). Any party other than the Client using or placing reliance upon any information contained in this report, do so at their own risk.

STM has exercised such professional skill, care and diligence as may reasonably be expected of a properly qualified and competent consultant when undertaking works of this nature. However, STM gives no warranty, representation or assurance as to the accuracy or completeness of any information, assessments or evaluations presented within this report.

5 Executive Summary

SECTION	SUMMARY
Location	Waterside House & Riverview House, Uxbridge UB8 1WL Grid Reference: 505013, 184402
Area	17,240m^2 (1.72ha)
Proposed Development	2-storey upwards extension to existing building.
Flood Zone	The site is located in Flood Zone 1, 2 and 3. The majority of the site and proposed development are located in Flood Zone 1.
Topography	The ground level at the site ranges from 32.18mAOD (west) to 32.85mAOD (east). The proposed developments are indicated to lie at approximately 32.72mAOD (Waterside House) and 32.67mAOD (Riverview House) respectively.
Sequential and Exception Tests	The development is located in in Flood Zone 1 and, as such, the Sequential Test should not be required by the LLFA.
Main Sources of Flooding	River Colne, located adjacent to the western boundary of the site.
Flood Defences	Natural High Ground along the River Colne.
Records of Historic Flooding	The EA Historic Flood Map contains records of 2no. fluvial flood incidents within the vicinity of the site. The site was not impacted.
Fluvial (River) and Tidal (Sea) Flood Risk	Very Low – The site remains dry during all modelled fluvial events.
Pluvial (Surface Water) Flood Risk	Medium – The onsite roadway/access is indicated to be at 'High' risk of pluvial flooding during the climate change scenario, with potential flood depths of up to 0.2m. The rest of the site (including the proposed developments) remains dry.
Flood Risk from Artificial (Canals and Reservoirs) Sources	Low - No significant artificial sources identified.
Groundwater Flood Risk	Low – According to the BGS, the site is potentially susceptible to groundwater flooding at the surface. The groundwater table depth is indicated to be less than 3mbgl. No recorded incidents have been identified.
Development Impacts on Local Flood Risk	The` development will not increase the site impermeable and built-up area. As such, it will have no adverse impact on local flood risk.
Proposed Flood Risk Mitigation Measures	• As the development is an upward extension, the ground floor FFL will remain as existing; • Occupants will sign up for EA Emergency Flood Warning Direct Service; • Safe egress to Flood Zone 1 is available on site; • As the development is located in Flood Zone 1, it is considered to be in an area of safe refuge.

SECTION	SUMMARY
Surface Water Management (SuDS)	There is good potential for SuDS implementation. Consideration should be given to green roofs, infiltration techniques (permeable paving, soakaways, rain gardens) and rainwater harvesting.
Conclusions	Based on the information reviewed and taking into account the proposed mitigation measures, it is considered that overall flood risk to the proposed development is acceptable and that it will not increase local flood risk. As such, the development is considered to be in compliance with local planning policy and the NPPF.

6 Introduction

STM Environmental Consultants Limited (STM) were appointed by Joel Wilder (Client) to provide a Flood Risk Assessment (FRA) at a site located at Waterside House & Riverview House, Oxford Road, Uxbridge UB8 1WL.

7 Development Proposal

The FRA is required to support a planning application for a 2-storey upwards extension to the existing building.

8 Report Aims and Objectives

The purpose of this report is to establish the flood risk to the site from all potential sources and, where possible, to propose suitable mitigation methods to reduce any risks to an acceptable level. It aims to make an assessment of whether the development will be safe for its lifetime, taking into account climate change and the vulnerability of its users, without increasing flood risk elsewhere.

The FRA assesses flood risk to the site from tidal, fluvial, surface water, groundwater, sewers and artificial sources. The FRA has been produced in accordance with the National Planning Policy Framework (NPPF) and its supporting guidance.

9 Summary of Data Review Undertaken

The following research has been undertaken as part of the FRA:

- Desktop assessment of topographical, hydrological and hydrogeological settings through review of the information sourced from the British Geological Survey (BGS), the Environment Agency (EA) and the Ordnance Survey (OS);
- Review of publicly available flood risk mapping provided by the EA;
- Review of the Preliminary Flood Risk Assessment (PFRA) and Level 1 Strategic Flood Risk Assessment (SFRA) produced by the LLFA outlining flood risk from various sources within the borough.

10 Legislative and Policy Context

10.1 Legislative Context

The Flood and Water Management Act was introduced in 2010. The Act defines the role of lead local flood authority (LLFA) for an area. All LLFA are required to develop, maintain, apply and monitor a strategy for local flood risk management in its area, called “local flood risk management strategy”.

Alongside the Act, Flood Risk Regulations (2009) outline the roles and responsibilities of the various authorities, which include preparing Flood Risk Management Plans and identifying how significant flood risks are to be mitigated.

10.2 Policy Context

The National Planning Policy Framework (NPPF) sets out the Government's economic, environmental and social planning policies for England. The policies set out in this framework apply to the preparation of local and neighbourhood plans and to decisions on planning applications.

The latest version of the NPPF can be view online here. The below text it extracted from the online document from paragraphs 170 – 186.

Inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk (whether existing or future). Where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere.

Strategic policies should be informed by a strategic flood risk assessment, and should manage flood risk from all sources. They should consider cumulative impacts in, or affecting, local areas susceptible to flooding, and take account of advice from the Environment Agency and other relevant flood risk management authorities, such as lead local flood authorities and internal drainage boards.

All plans should apply a sequential, risk-based approach to the location of development – taking into account all sources of flood risk and the current and future impacts of climate change – so as to avoid, where possible, flood risk to people and property. They should do this, and manage any residual risk, by:

- Applying the sequential test and then, if necessary, the exception test as set out below;
- Safeguarding land from development that is required, or likely to be required, for current or future flood management;
- Using opportunities provided by new development and improvements in green and other infrastructure to reduce the causes and impacts of flooding, (making as much use as possible of natural flood management techniques as part of an integrated approach to flood risk management); and
- Where climate change is expected to increase flood risk so that some existing development may not be sustainable in the long-term, seeking opportunities to relocate development, including housing, to more sustainable locations.

A sequential risk-based approach should also be taken to individual applications in areas known to be at risk now or in future from any form of flooding, by following the steps set out below.

Within this context the aim of the sequential test is to steer new development to areas with the lowest risk of flooding from any source. Development should not be allocated or permitted if there are reasonably available sites appropriate for the proposed development in areas with a lower risk of flooding. The strategic flood risk assessment will provide the basis for applying this test.

The sequential test should be used in areas known to be at risk now or in the future from any form of flooding, except in situations where a site-specific flood risk assessment demonstrates that no built development within the site boundary, including access or escape routes, land raising or other potentially vulnerable elements, would be located on an area that would be at risk of flooding from any source, now and in the future (having regard to potential changes in flood risk).

Applications for some minor development and changes of use (62) should also not be subject to the sequential test, nor the exception test set out below, but should still meet the requirements for site-specific flood risk assessments set out in footnote (63).

Having applied the sequential test, if it is not possible for development to be located in areas with a lower risk of flooding (taking into account wider sustainable development objectives), the exception test may have to be applied. The need for the exception test will depend on the potential vulnerability of the site and of the development proposed, in line with the Flood Risk Vulnerability Classification set out in Annex 3.

The application of the exception test should be informed by a strategic or site-specific flood risk assessment, depending on whether it is being applied during plan production or at the application stage. To pass the exception test it should be demonstrated that:

- a) the development would provide wider sustainability benefits to the community that outweigh the flood risk; and
- b) the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

Both elements of the exception test should be satisfied for development to be allocated or permitted.

Where planning applications come forward on sites allocated in the development plan through the sequential test, applicants need not apply the sequential test again. However, the exception test may need to be reapplied if relevant aspects of the proposal had not been considered when the test was applied at the plan-making stage, or if more recent information about existing or potential flood risk should be taken into account.

Paragraph 181 of the National Planning Policy Framework (NPPF) states that:

> When determining any planning applications, local planning authorities should ensure that flood risk is not increased elsewhere. Where appropriate, applications should be supported by a site-specific flood-risk assessment (See Note 1)
> Development should only be allowed in areas at risk of flooding where, in the light of this assessment (and the sequential and exception tests, as applicable) it can be demonstrated that:
>
> - within the site, the most vulnerable development is located in areas of lowest flood risk unless there are overriding reasons to prefer a different location
> - the development is appropriately flood resistant and resilient such that, in the event of a flood, it could be quickly brought back into use without significant refurbishment;
> - it incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate;
> - any residual risk can be safely managed; and
> - safe access and escape routes are included where appropriate, as part of an agreed emergency plan.

Paragraph 182 states that:

Applications which could affect drainage on or around the site should incorporate sustainable drainage systems to control flow rates and reduce volumes of runoff, and which are proportionate to the nature and scale of the proposal. These should provide multifunctional benefits wherever possible, through facilitating improvements in water quality and biodiversity, as well as benefits for amenity. Sustainable drainage systems provided as part of proposals for major development should:

- a) take account of advice from the Lead Local Flood Authority;
- b) have appropriate proposed minimum operational standards; and
- c) have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development.

A major development is defined as:

- a residential development: 10 dwellings or more or residential development with a site area of 0.5 hectares or more where the number of dwellings is not yet known
- a non-residential development: provision of a building or buildings where the total floor space to be created is 1000 square metres or more or where the floor area is not yet known, a site area of 1 hectare or more.

Footnote 62 - This includes householder development, small non-residential extensions (with a footprint of less than 250m2) and changes of use; except for changes of use to a caravan, camping or chalet site, or to a mobile home or park home site, where the sequential and exception tests should be applied as appropriate.

Footnote 63 - A site-specific flood risk assessment should be provided for all development in Flood Zones 2 and 3. In Flood Zone 1, an assessment should accompany all proposals involving: sites of 1 hectare or more; land which has been identified by the Environment Agency as having critical drainage problems; land identified in a strategic flood risk assessment as being at increased flood risk in future; or land that may be subject to other sources of flooding, where its development would introduce a more vulnerable use.

(*Footnote 64 - As required by the Marine and Coastal Access Act 2009.*

10.2.1 Local Planning Policy – Hillingdon Council

POLICY DMEI 9: Management of Flood Risk

A) Development proposals in Flood Zones 2 and 3a will be required to demonstrate that there are no suitable sites available in areas of lower flood risk. Where no appropriate sites are available, development should be located on the areas of lowest flood risk within the site. Flood defences should provide protection for the lifetime of the development. Finished floor levels should reflect the Environment Agency's latest guidance on climate change.

B) Development proposals in these areas will be required to submit an appropriate level Flood Risk Assessment (FRA) to demonstrate that the development is resilient to all sources of flooding.

C) Development in Flood Zone 3b will be refused in principle unless identified as an appropriate development in Flood Risk Planning Policy Guidance. Development for appropriate uses in Flood Zone 3b will only be approved if accompanied by an appropriate FRA that demonstrates the development will be resistant and resilient to flooding and suitable warning and evacuation methods are in place.

D) Developments may be required to make contributions (through legal agreements) to previously identified flood improvement works that will benefit the development site.

E) Proposals that fail to make appropriate provision for flood risk mitigation, or which would increase the risk or consequences of flooding, will be refused.

Also relevant are the London Plan (2020) policies S1 12 ‘Flood Risk Management’; Policy SI 13 ‘Sustainable Drainage’ and the London Regional Flood Risk Appraisal (2018).

10.3 EA Standing Advice on Flood Risk

The Environment Agency’s standing advice lays out the process that must be followed when carrying out flood risk assessments for developments.

Flood Risk Assessments are required for developments within one of the Flood Zones. This includes developments:

- in Flood Zone 2 or 3 including minor development and change of use more than 1 hectare (ha) in Flood Zone 1;
- less than 1 ha in Flood Zone 1, including a change of use in development type to a more vulnerable class (for example from commercial to residential), where they could be affected by sources of flooding other than rivers and the sea (for example surface water drains, reservoirs);
- in an area within Flood Zone 1 which has critical drainage problems as notified by the Environment Agency.

11 Site Description and Environmental Characteristics

11.1 Site Location and Area

The site is located at Waterside House & Riverview House, Oxford Road, Uxbridge UB8 1WL and is centred at national grid reference 505013, 184402. The site has an area of 17,240m^2 (1.72ha).

A site location map and aerial photo are shown below. Photographs of the site are available in Appendix 1.

11.2 Site Access

The site is accessible via Oxford Road.

11.3 Local Planning Authority

The site falls within the jurisdiction of the London Borough of Hillingdon (LBH) in terms of the planning process.

11.4 Lead Local Flood Authority

LBH is also the Lead Local Flood Authority (LLFA).

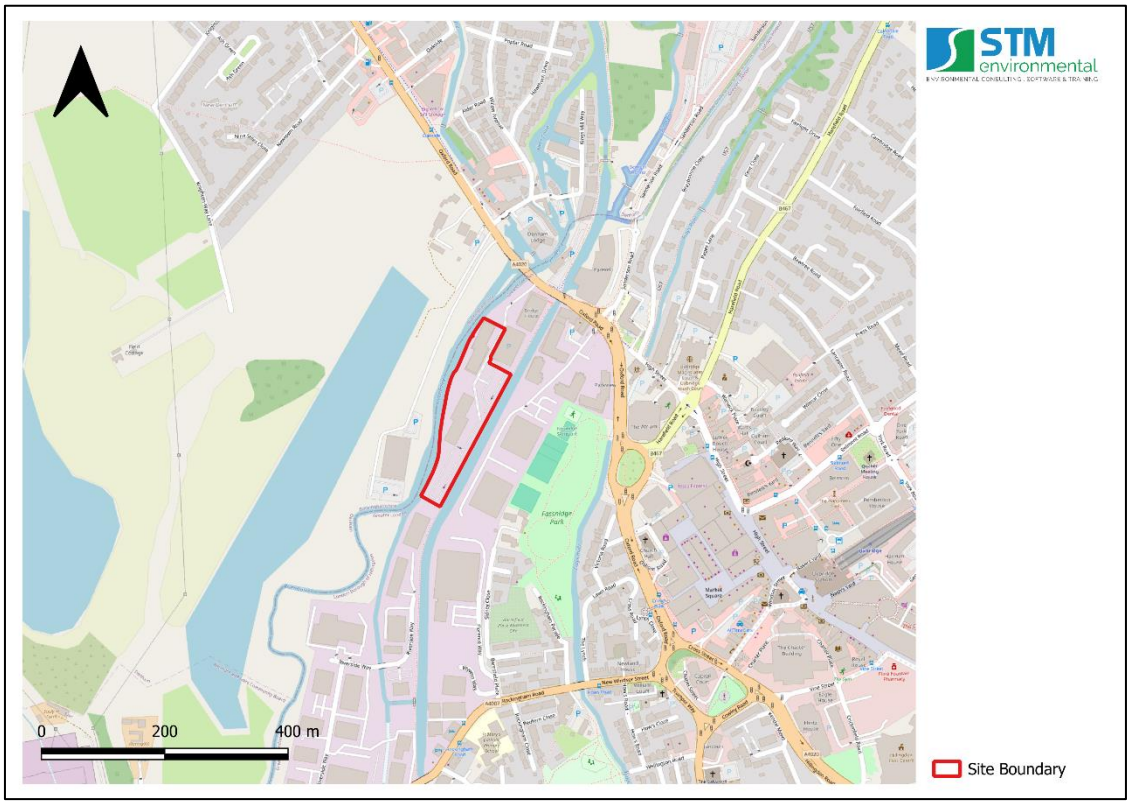


Figure 1: Site Location Map

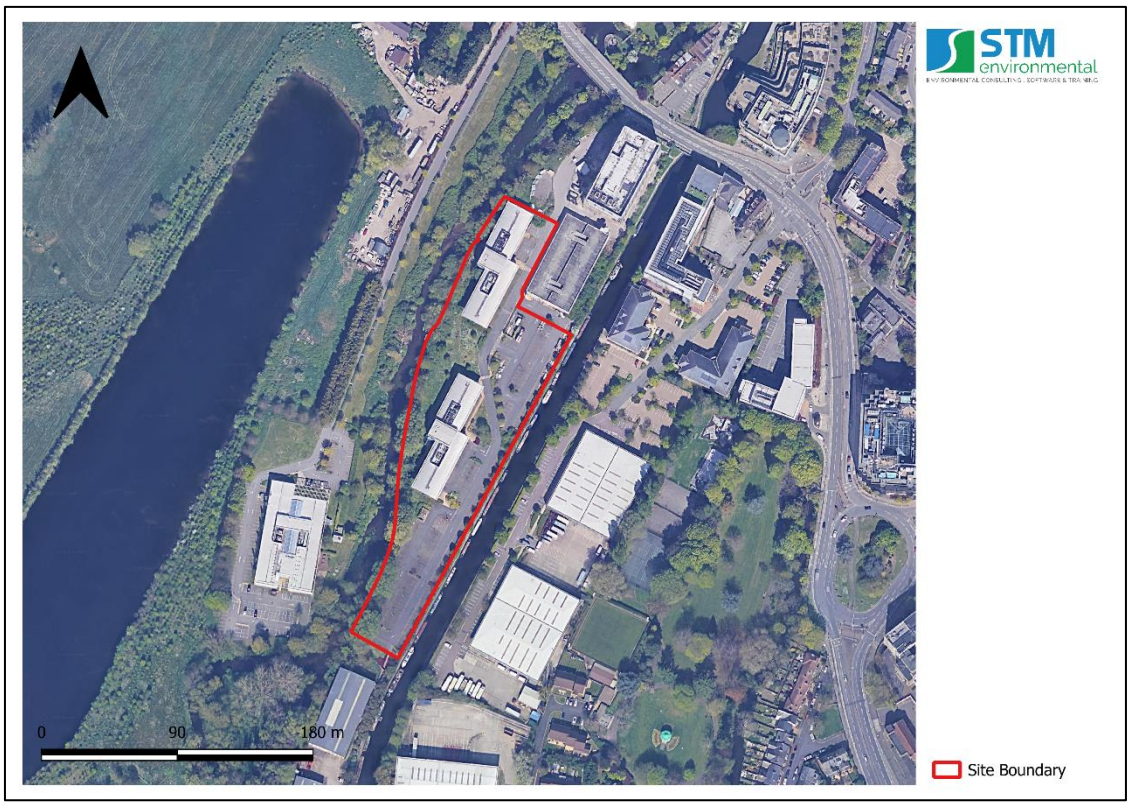


Figure 2: Site Aerial Map

11.5 Flood Zone

For planning purposes, the site is located in Flood Zones 1, 2 and 3b as defined by the EA and LLFA. The map of the Flood Zones is available in Appendix 5.

11.6 Site and Surrounding Land Uses

11.6.1 Site Current Land Use

The site currently comprises 2no. commercial office buildings and associated car parking.

11.6.2 Surrounding Land Uses

A description of the current and surrounding land uses of the site is given in Table 1.

Table 1: Summary of surrounding land uses

Boundary	Land Use Description	
	Immediately Adjacent (Within 0 – 25m)	**General Local Area (Within 25 – 250m)**
Northern	River Colne	Residential, Commercial
Eastern	Grand Union Canal	Commercial, Fossnidge Park
Southern	Grand Union Canal, River Colne	Commercial, Grand Union Canal
Western	River Colne	Lake, Undeveloped land

11.7 Hydrology

The nearest main watercourses are the River Colne and the Grand Union Canal which are located adjacent to the western and eastern boundaries of the site respectively and (7m and 10m from Waterside and Riverview House respectively). A map of the nearby hydrological features is present in Appendix 2.

11.8 Geology

Data from the British Geological Survey indicates that the underlying superficial geology is characterised as Alluvium. The underlying bedrock geology is characterized as the Lambeth Group.

11.9 Hydrogeology

The site lies upon Secondary A superficial and bedrock aquifers.

Appendix 3 provides BGS mapping showing the hydrogeology at the site location.

11.10 Topography

A topographic survey and LIDAR DTM map showing the topography of the site and surrounding area are available in Appendix 3.

The ground level at the site ranges from 32.18mAOD (west) to 32.85mAOD (east).

The majority of the site is flat at approximately 32.5 – 32.7mAOD.

Waterside House lies at 32.72mAOD and Riverview House at 32.67mAOD.

The west of the site, adjacent to the Grand Union Canal, and the main access roadway form the lowest points of elevation within the redline boundary. The low spots on the roadway aligns with the EA surface water flood maps.

11.10.1 Discrepancies

The LIDAR data indicates that there is a steep slope into the Grand Union Canal along the western boundary of the site, and that therefore the lowest elevation witnessed within the boundary is 30.59mAOD. The low values are likely due to the actual banks of the Canal rather than the ground elevation witnessed within the site. The ground elevations are likely why the site is indicated to be within Flood Zone 3a/b.

The topographic survey indicates that the lowest level within the boundary is 32.18mAOD (which is higher than the flood level during all modelled fluvial events. See Section 13.1.11).

12 The Sequential and Exception Tests

12.1 The Sequential Test

The Sequential Test aims to steer developments and redevelopments to areas of lower flood risk. The test compares the proposed development site with other available sites, in terms of flood risk, to aid the steering process.

The Sequential Test is not required if the proposed development is a minor development or if it involves a change of use unless the development is a caravan, camping chalet, mobile home or park home site.

Based on Government Guidance, Minor Development means:

- development of an existing dwellinghouse, or development within the curtilage of a dwellinghouse, for any purpose incidental to the enjoyment of the dwellinghouse
- an extension to an existing building used for non-domestic purposes where the floor space created by the development does not exceed 250 square metres
- alterations to an existing building which do not increase the size of the building

With regard to residential and commercial developments, major development, as defined by the Town and Country Planning (Development Management Procedure) means one or more of the following:

- Providing 10 or more dwellinghouses defined in article 2 of the DMPO or, where the number of dwellinghouses is not known, the site area is 0.5 hectares or more;
- Providing a building or buildings where the floor space to be created by the development will be 1,000 square metres or more;
- Development on a site of 1 hectare or more;
- The winning and working of minerals or the use of land for mineral - working deposits;
- Waste development

When development is exempt from the sequential test:

Development is exempt from the sequential test if it is a:

- householder development like residential extensions, conservatories or loft conversions
- small non-domestic extensions with a footprint of less than 250 square metres
- change of use (except changes of use to a caravan, camping or chalet site, or to a mobile home or park home site)

Development is also exempt from the sequential test if it is a development on a site allocated in the development plan through the sequential test and:

- the proposal is consistent with site's allocated use
- there have been no significant changes to the known level of flood risk to the site, now or in the future, which would have affected the outcome of the test

You may not need a sequential test if development can be laid out so that only elements such as public open space, biodiversity and amenity areas are located in areas at risk of any source of current or future flooding.

The development is non-minor and located in in Flood Zone 1 and, as such, the Sequential Test should not be required by the LLFA.

Although the Flood Zone 3 boundary impacts the site, the proposed development is located entirely in Flood Zone 1 and, as such, it is considered that the Sequential Test has been applied within the confines of the redline boundary. It should also be noted that the site remains dry during all modelled fluvial events.

12.2 The Exception Test

Where the Sequential Test is undertaken and alternative sites of lower flood risk are not available, then the proposed development may require an Exception Test in order to be granted planning permission.

Where the exception test is required, it should be applied as soon as possible to all local development document allocations for developments and all planning applications other than for minor developments. All three elements of the exception test have to be passed before development is allocated or permitted. For the exception test to be passed, it should be demonstrated that:

- development that has to be in a flood risk area will provide wider sustainability benefits to the community that outweigh flood risk; and
- the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

The requirements for an Exception Test are given in Table 2 and are defined in terms of Flood Zone and development vulnerability classification.

Table 2: NPPF Flood Zone vulnerability compatibility (source: NPPF).

Flood Zones	Flood Risk Vulnerability Classification				
	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.

The Exception Test should also not be required by the LLFA.

13 Site Specific Flood Risk Analysis

The PFRA and Level 1 SFRA produced by the LLFA and maps from the EA provide information regarding historic flooding events and incidents as well as predictions of flood extents and depths during extreme rainfall events.

13.1 Fluvial (River) and Tidal (Sea) Flood Risk

13.1.1 Mechanisms for Fluvial Flooding

Fluvial, or river flooding, occurs when excessive rainfall over an extended period of time or heavy snow melt causes a river to exceed its capacity. The damage from a fluvial flood can be widespread as the overflow may affect downstream tributaries, overtopping defences and flooding nearby inhabited areas. Fluvial flooding consists of two main types:

- Overbank flooding – this occurs when water rises steadily and overflows over the edges of a river or stream;
- Flash flooding – this is characterized by an intense, high velocity torrent of water that occurs in an existing river channel with little to no notice. Flash floods are very dangerous and destructive not only because of the force of the water, but also the hurtling debris that is often swept up in the flow.

13.1.2 Definition of EA Modelled Fluvial Flood Risk Zones

Fluvial flood risk is assessed using flooding maps produced by the Environment Agency. These maps use available historic data and hydraulic modelling to define zones of flood risk. The maps allow a site to be defined in terms of its flood zone (e.g. 1, 2, 3) and in terms of the overall flood risk (very low, low, medium or high). It is important to note that existing flood defences are not taken into account within the models or the maps. The EA fluvial flood zones are defined as follows:

- Flood zone 1: Less than 1 in 1000 (0.1%) annual probability of flooding;

- Flood zone 2: Between 1 in 100 (1%) and 1 in 1000 (0.1%) annual probability of flooding;
- Flood zone 3: Greater than 1 in 100 (1%) annual probability of fluvial flooding.

Flood zone 3 is split into two sub-categories (3a and 3b) by LLFAs depending on whether the land is considered to be a functional flood plain (i.e. an important storage area for flood waters in extreme events).

- Flood zone 3a: Greater than 1 in 100 (1%) annual probability of fluvial flooding and/or greater than 1 in 200 (0.5%) annual probability of tidal flooding;

Functional flood plain

- Flood zone 3b (definition specific to the LLFA). Less than a 1 in 20 (5%) annual probability of fluvial and/or tidal flooding.
- This zone comprises land where water from rivers or the sea has to flow or be stored in times of flood. The identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters.

Functional floodplain will normally comprise:

- land having a 3.3% or greater annual probability of flooding, with any existing flood risk management infrastructure operating effectively; orland that is designed to flood (such as a flood attenuation scheme), even if it would only flood in more extreme events (such as 0.1% annual probability of flooding).
- Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map)

13.1.3 Main Potential Sources of Local Fluvial Flooding

The nearest potential source of fluvial flooding to the site is considered to be the River Colne.

13.1.4 Records of Historic Fluvial Flooding Incidents

The EA's historic and recorded flood outline maps show the locations and extents of historic flooding. These maps indicate that there has been historic flooding in the vicinity of the site.

2no. records of historic fluvial flooding were identified, which took place in October 1987 (190m southwest of the site) and February 2014 (172m north). The site was not impacted.

Copies of these maps are available in Appendix 4.

13.1.5 Designated Fluvial Flood Risk Zone for the Site

The site is considered to be located within Flood Zones 1, 2, 3a and 3b as defined by the Environment Agency and the LLFA indicating that parts of the site have a greater than 3.33% annual probability of fluvial flooding.

However, the majority of the site (including the proposed development) is indicated to be in Flood Zone 1. Although the Flood Zone 3 extent impacts the western and eastern boundaries of the site and a small section of Waterside House, comparison of the EA Product 6 data and the topographic survey shows that the entire site remains dry during all modelled scenarios (see Section 13.1.13).

13.1.6 Mechanisms for Tidal Flooding

Tidal flooding may be described simply as the inundation of low-lying coastal areas by the sea, or the overtopping or breaching of sea defences. Tidal flooding may be caused by seasonal high tides, storm surges and where increase in water level above the astronomical tide level is created by strong on shore winds or by storm driven wave action.

13.1.7 Definition of EA Tidal Flood Risk Zones

As with fluvial flood risk, tidal flood risk is assessed using flooding maps produced by the Environment Agency. The difference is in the probability return periods used to define tidal flood zones. The EA tidal Flood Zones are defined as:

- Flood zone 1: Less than 1 in 1000 (0.1%) annual probability of flooding;
- Flood zone 2: Between 1 in 200 (0.5%) and 1 in 1000 (0.1%) annual probability of tidal flooding;
- Flood zone 3: Greater 1 in 200 (0.5%) annual probability of tidal flooding.

13.1.8 Potential Sources of Tidal Flooding

The area in which the site is located is considered unlikely to be affected by tidal flooding.

13.1.9 Flood Defences

The EA's flood defence map which is available in Appendix 7 that the site benefits from flood defences, including Natural High Ground along the River Colne.

13.1.10 Peak River Flow Climate Change Allowances

The EA's climate change allowances for peak river flow maps show that the site is considered to be in the Colne Management Catchment. The climate change allowances for this catchment are available in Appendix 11.

In flood zones 2 or 3a for:

- essential infrastructure – use the higher central allowance
- highly vulnerable – use central allowance (development should not be permitted in flood zone 3a)
- more vulnerable – use the central allowance

- less vulnerable – use the central allowance
- water compatible – use the central allowance

In flood zone 3b for:

- essential infrastructure – use the higher central allowance
- highly vulnerable – development should not be permitted
- more vulnerable – development should not be permitted
- less vulnerable – development should not be permitted
- water compatible – use the central allowance

The central allowance for more vulnerable developments indicates that a climate change allowance of 21% should be used.

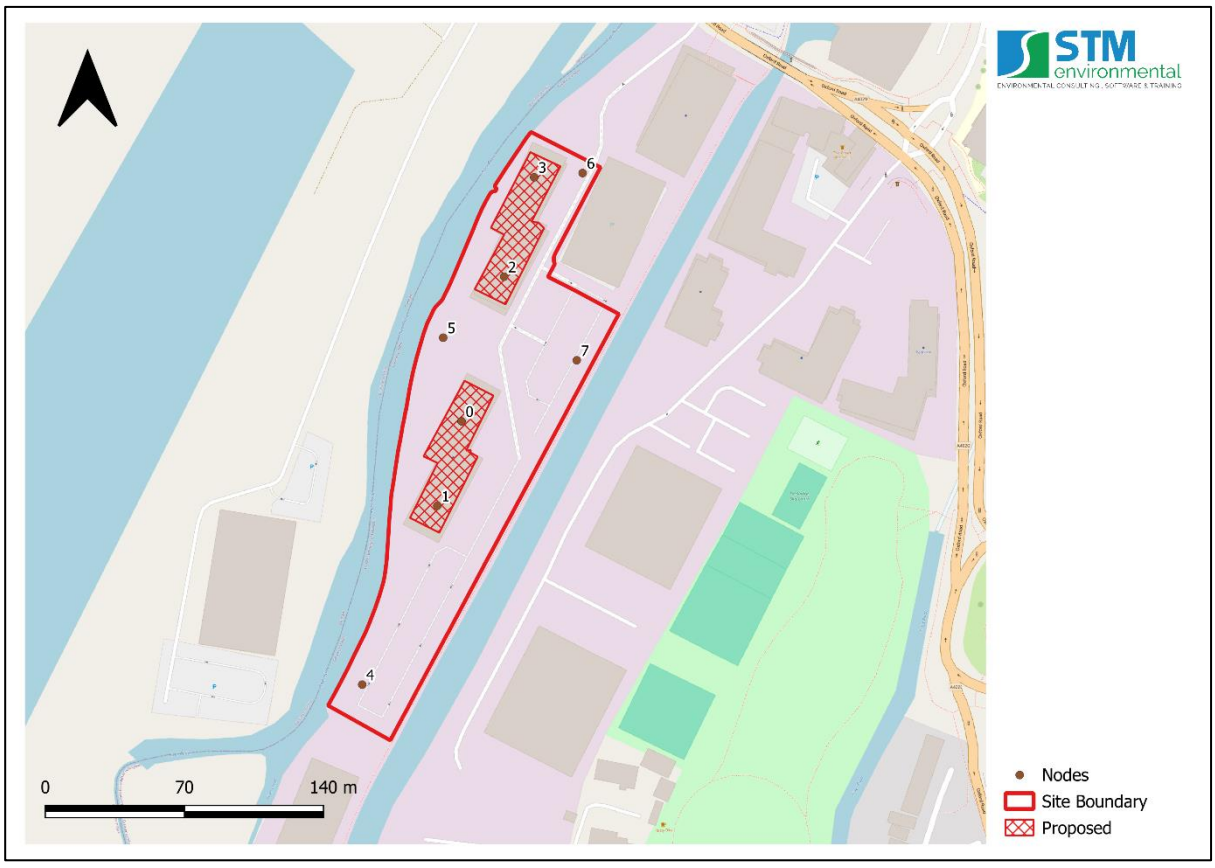
The modelled data provides the 1% AEP + 20% CC scenario, which is approximately equal (within 2dp) to the 1% AEP + 21% CC scenario. This has therefore been used in this assessment.

13.1.11 Climate Change - EA Modelled Predictions of Fluvial and Tidal Flood Levels and Extents

The EA Product 6 dataset which is presented in Appendix 11 provides modelled flood levels and flows for model node points close to the site. These are summarised in Table 3 below.

Table 3: EA modelled expected flood depths (m) and levels (mAOD) for different scenarios.

EA (Lower Colne Modelling and Mapping Study, 2012) - Defended											
Object ID	Easting	Northing	LIDAR DTM (mAOD)	5% AEP		1% AEP		1% AEP + 20% CC		0.1% AEP	
				Depth (m)	Level (mAOD)	Depth (m)	Level (mAOD)	Depth (m)	Level (mAOD)	Depth (m)	Level (mAOD)
0	505006	184403	32.70	0	30.78	0	30.96	0	31.13	0	31.21
1	504994	184361	32.66	0	30.78	0	30.96	0	31.06	0	31.21
2	505027	184476	32.69	0	30.92	0	31.1	0	31.24	0	31.36
3	505043	184526	32.47	0	30.92	0	31.1	0	31.31	0	31.36
4	504956	184271	32.61	0	30.65	0	30.83	0	30.95	0	31.09
5	504997	184445	32.51	0	30.92	0	31.1	0	31.2	0	31.36
6	505067	184528	32.41	0	30.92	0	31.1	0	31.31	0	31.36
7	505064	184434	32.60	0	31.72	0	31.78	0	31.83	0	31.93



The data shows that the site remains dry during all modelled events.

13.1.12 Long Term Fluvial/Tidal Flood Risk Considering Flood Defences

The EA's long term flood risk maps give an indication of the actual risk associated with flooding after taking into account the effect of any flood defences in the area. Copies

of maps for the site which are available in Appendix 9 indicate that the long-term risk from fluvial flooding to the site is very low during the period 2036-2069.

13.2 Pluvial (Surface Water) Flood Risk

A pluvial, or surface water flood, is caused when heavy rainfall creates a flood event independent of an overflowing water body. Surface water flooding occurs when high intensity rainfall leads to run-off which flows over the ground surface, causing ponding in low-lying areas when the precipitation rate or overland flow rate is greater than the rate of infiltration, or return into watercourses. Surface water flooding can be exacerbated when the underlying soil and geology is saturated (as a result of prolonged precipitation or a high-water table) or when the drainage network has insufficient capacity.

13.2.1 Mechanisms of Pluvial Flooding

The chief mechanisms for surface water flooding can be divided into the following categories:

- Runoff from higher topography;
- Localised surface water runoff – as a result of localised ponding of surface water;
- Sewer Flooding – areas where extensive and deep surface water flooding is likely to be influenced by sewer flooding. Where the sewer network has reached capacity, and surcharged, this will exacerbate the flood risk in these areas;
- Low Lying Areas – areas such as underpasses, subways and lowered roads beneath railway lines are more susceptible to surface water flooding;
- Railway Cuttings –railway infrastructure cut into the natural geological formations can cause extra surface run off and pooling disrupting service and potentially affecting adjacent structures;
- Railway Embankments – discrete surface water flooding locations along the up-stream side of the raised network rail embankments where water flows are interrupted and ponding can occur;

- Failure of artificial sources (i.e. man-made structures) such as such as canals and reservoirs.

13.2.2 Main Potential Sources of Local Pluvial Flooding

The main potential source of pluvial flooding to the site is considered to be surface water ponding and flooding associated with heavy rainfall.

13.2.3 Records of Historic Pluvial Flooding Incidents

Examination of the West London SFRA revealed no evidence of pluvial flooding on or in the vicinity of the site.

13.2.4 Surface Water Flood Risk from Artificial Sources (Reservoirs and Canals)

An examination of OS mapping and the EA's mapping revealed no indications of significant reservoirs or canals in the area of the site.

The EA's reservoir flood risk map indicates that the site does not lie within an area that is at risk of reservoir flooding.

13.2.5 Sewer Flooding

Examination of the West London 1 SFRA revealed no evidence of sewer flooding on or in the vicinity of the site.

A map showing recorded incidents of sewer flooding is available in Appendix 4.

13.2.6 Climate Change - Modelled Predictions of Surface Water Run-off Flooding

Mapping of the predicted extent and depth of surface water flooding for the 1 in 30-year, 1 in 100-year, and 1 in 1000-year rainfall return periods provided by the EA are available in Appendix 6.

- High - greater than or equal to 1 in 30 (3.3%) chance of flooding in any year
- Medium – Less than 1 in 30 (3.3%) but greater than or equal to 1 in 100 (1%) chance of flooding in any given year

- Low – Less than 1 in 100 (1%) but greater than or equal to 1 in 1000 (0.1%) chance of flooding in any given year

The roadway which runs from the entrance to the site to the western boundary of Riverview House is at 'High' risk of pluvial flooding during the 2040-2060 climate change scenario, indicating that it is impacted during all three precipitation events.

Flood depths may reach 0.2m along a minor section of the roadway; however, they are generally indicated to be less than 0.2m. The rest of the site (including the proposed development) remains dry.

13.2.7 Long Term Surface Water Flood Risk

The EA's long term flood risk maps which are available in Appendix 9 indicate that the long term risk of flooding from surface water is considered to be generally 'Very Low' during the period 2040-2060; however, the roadway within the site is indicated to be at 'High' risk.

13.3 Groundwater Flood Risk

Groundwater flooding occurs when water rises from an underlying aquifer (i.e. at the location of a spring) to such a level where it intersects the ground surface and inundates the surrounding land. Groundwater flooding tends to occur after long periods of intense precipitation, in often low-lying areas where the water table is likely to be at a shallow depth. Groundwater flooding is known to occur in areas underlain by principal aquifers, although increasingly it is also being associated with more localised floodplain sands and gravels. A high groundwater table also has the potential to exacerbate the risk of surface water and fluvial flooding by reducing rainfall infiltration capacity, and to increase the risk of sewer flooding through sewer/groundwater interactions.

13.3.1 Historic Records of Groundwater Flooding

Examination of the LLFA's Level 1 SFRA revealed no records of groundwater flooding at or within 500m of the site.

13.3.2 Susceptibility to Groundwater Flooding

The Groundwater Flood Susceptibility Map provided by BGS and presented in Appendix 10 indicates that the site has potential for groundwater flooding to occur at the surface. The Groundwater Depth map also provided by BGS indicates that the groundwater level may less than 3mbgl.

13.4 Critical Drainage Area

A Critical Drainage Area (CDA) may be defined as “a discrete geographic area (usually a hydrological catchment) where multiple and interlinked sources of flood risk (surface water, groundwater, sewer, main river and/or tidal) cause flooding in one or more Local Flood Risk Zones during severe weather thereby affecting people, property or local infrastructure”. A CDA is defined in the Town and Country Planning (General Development Procedure) (Amendment) (No. 2) (England) Order 2006 as “an area within Flood Zone 1 which has critical drainage problems and which has been notified to the local planning authority by the Environment Agency”.

The site is not located within a Critical Drainage Area. The LLFA’s CDA map is presented in Appendix 5.

14 Potential Impacts of the Development on Local Flood Risk

As the development is an upwards extension, it will not increase the impermeable or built-up areas of the site. It is therefore unlikely to impact upon local flood risk.

15 Flood Risk Mitigation Measures

15.1 SuDS

Planning practice guidance (PPG) which is prepared by the Ministry of Housing, Communities and Local Government (DCLG) states that developers and Local Authorities should seek opportunities to reduce the overall level of flood risk in the area through the layout and form of the development, and the appropriate application of sustainable drainage techniques.

As such, the developer has the option to implement a SuDS strategy in line with the drainage hierarchy as outlined in Table 4 below to reduce surface water discharges from the site.

Table 4: SuDS Options

▪ Store rainwater for later use; ▪ Use infiltration techniques, such as porous surfaces in non-clay areas; ▪ Attenuate rainwater in ponds or open water features for gradual release; ▪ Attenuate rainwater by storing in tanks or sealed water features for gradual release; ▪ Discharge directly to a water course; ▪ Discharge rainwater directly to a surface water sewer/drain; ▪ Discharge to a combined sewer.




Figure 3: Surface water storage facilities and potential SuDS features - rainwater harvesting, on-site tank storage, rain garden soak-away and green roofs. (Source: UK SuDS Manual)

Given the nature of the development and the size of the site, it is considered that there are good opportunities for implementing SuDS. Measures such as green roofs, rainwater harvesting or infiltration techniques (soakaways, permeable paving, rain gardens) should be considered.

A full SuDS strategy is outside the scope of works of this FRA.

15.2 Flood Resilience

Flood resilient construction uses methods and materials that reduce the impact from a flood, ensuring that structural integrity is maintained, and the drying out and cleaning required, following inundation and before reoccupation, is minimised.

15.2.1 Finished Floor Levels

As the development is an upwards extension, the lower-floor FFLs will remain as existing.

15.2.2 Compensatory Flood Storage (CFS)

CFS is not required as the proposed development will not increase the built-up area of the site.

16 Emergency Plan

16.1.1 Assessment of Danger to People

The dangers associated with flood water to people are possible injury and/or death. This can occur as a result of drowning or being carried along by the waters into hard objects or vice versa. The risk to life is largely a function of the depth and velocity of the floodwater as it crosses the floodplain. Fast flowing deep water that contains debris would represent the greatest hazard.

The assessment of danger to people from walking in floodwater is described in the Flood Risks to People guidance documents (FD2321_TR1 and FD2321_TR2) by DEFRA/EA.

Danger can be estimated by the simple formula:

$$HR = d \times (v + 0.5) + DF$$

where, HR = (flood) hazard rating; d = depth of flooding (m); v = velocity of floodwaters (m/sec); and DF = debris factor.

The scoring methodology and calculation matrix for this is summarised in Appendix 13.

As flood velocities were only provided for in-channel nodes, it was not possible to calculate the flood hazard rating at the site. However, the site remains dry during all modelled scenarios and is therefore considered to be in an area of 'Low' flood hazard.

The use of a flood emergency plan is therefore sufficient for the proposed development. The key elements of the emergency plan are described below.

16.1.2 EA Flood Warnings Direct Service Subscription

The occupants will subscribe to the EA Flood Warnings Direct Service which is a free service offered by the EA providing flood warnings direct to people by telephone,

mobile, email, SMS text message and fax. The EA aims to provide 2 hours' notice of flood, day or night, allowing timely evacuation of the site.

The agency operates a 24-hour telephone service on 0345 988 1188 that provides frequently updated flood warnings and associated floodplain information. In addition, this information can also be found at https://fwd.environment-agency.gov.uk/app/olr/home along with recommendations on what steps should be taken to prepare for floods, what to do when warnings are issued, and how best to cope with the aftermath of floods.

16.1.3 Access and Safe Egress

Flood Zone 1 is available on site.

The EA Flood Zone mapping indicates that the bridges on Oxford Road which provide access to the site are within Flood Zone 3. However, this is likely due to the bridges not being registered by the LIDAR data, as the roadways are indicated to be above the flood level during all modelled events.

16.1.4 Safe Refuge

The development is indicated to remain dry during all fluvial and pluvial events. As such, it is considered to be in an area of safe refuge.

17 Conclusions and Recommendations

This assessment has considered the potential risks to the application site associated with flooding from fluvial, tidal, surface water, artificial and groundwater sources and the potential impacts of climate change.

A review of LLFA's PFRA and SFRA as well as data provided by the EA was undertaken. The proposed development is considered to be in general compliance with local planning policy and the NPPF.

18 References

1. Communities and Local Government - National Planning Policy Framework NPPF, July, 2021.
2. Communities and Local Government - Planning Practice Guidance: Flood Risk and Coastal Change, Updated 06 March 2014.
3. Strategic Flood Risk Assessment, West London Councils, 2024.
4. Local Plan, LBH, 2020.
5. Surface Water Management Plan, LBH, 2011.
6. CIRIA, Defra, Environment Agency – UK SuDS Manual, 2015.
7. Greater London Authority – London Sustainable Drainage Action Plan, 2015.
8. London Plan (2021) - Mayor of London
9. London Regional Flood Risk Appraisal (2018) - Mayor of London

19 Appendices

19.1 Appendix 1 – Site Photographs

Not available.

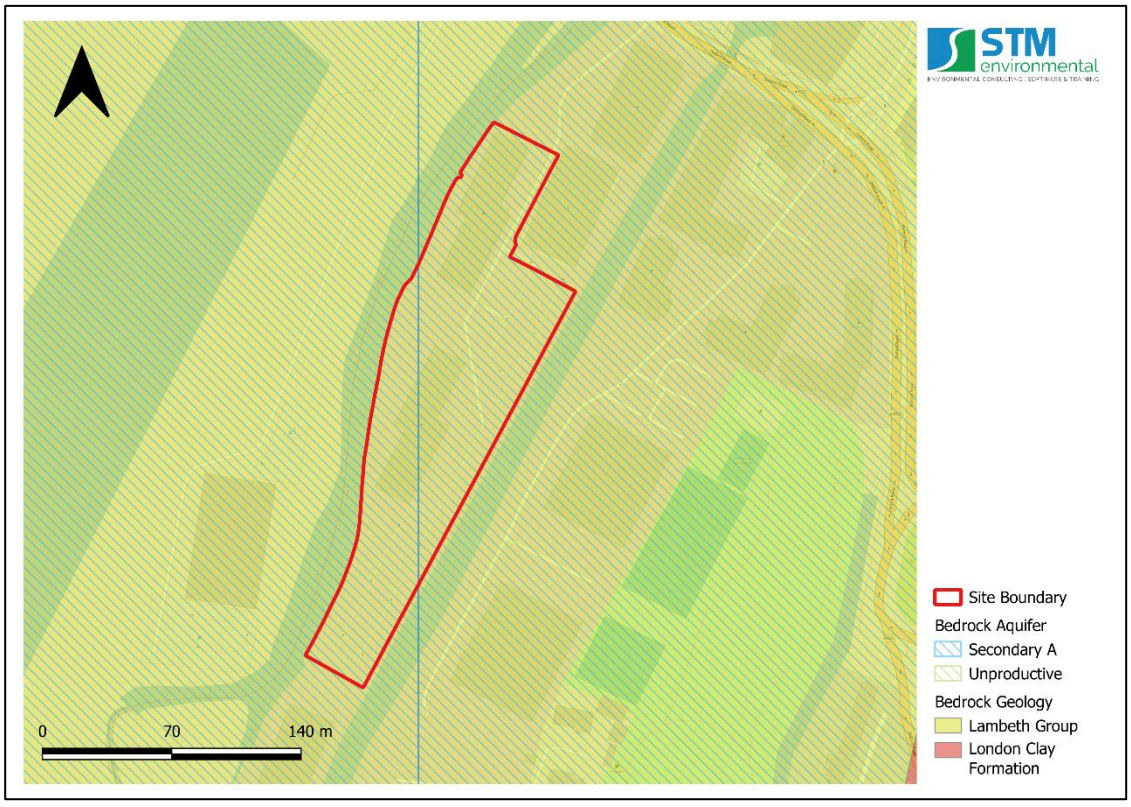
19.2 Appendix 2 – Development Plans

Not available.

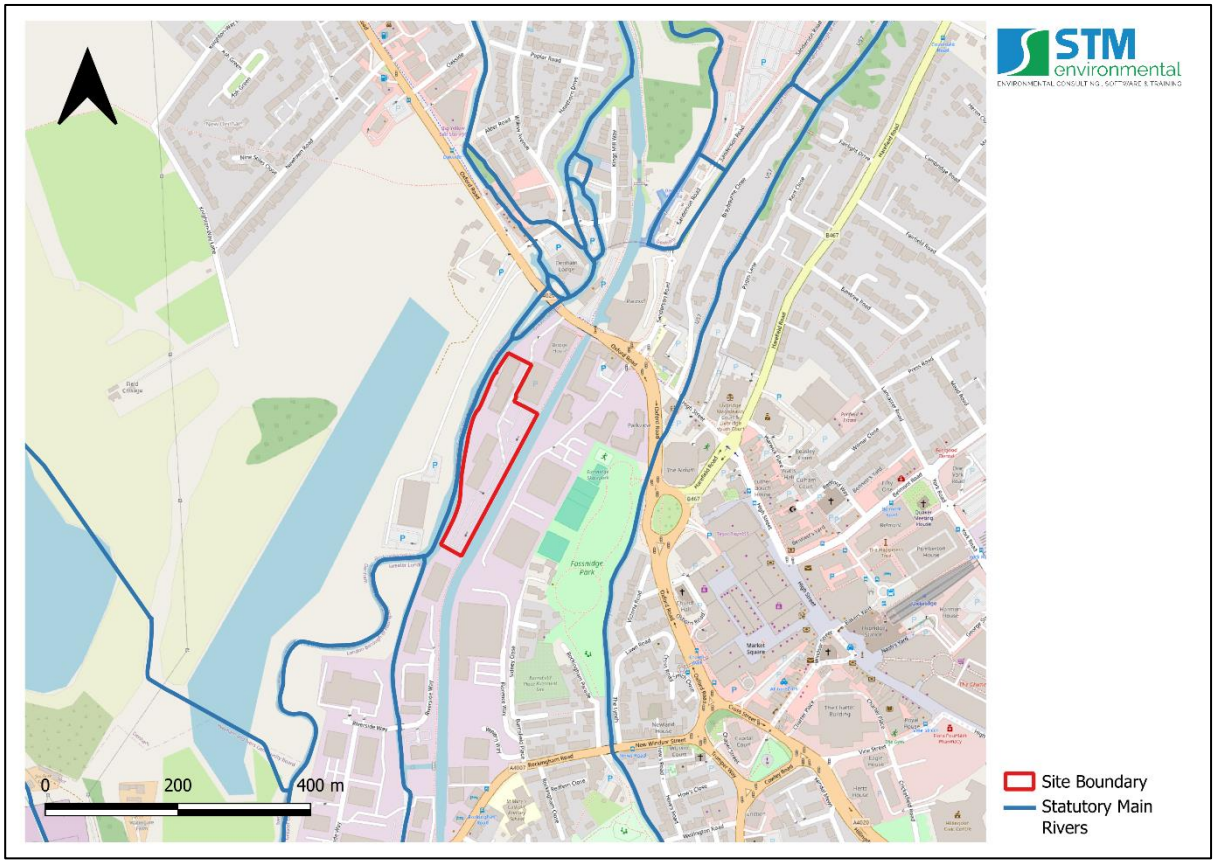
19.3 Appendix 3 – Environmental Characteristics

19.3.1 Superficial Hydrogeology Map

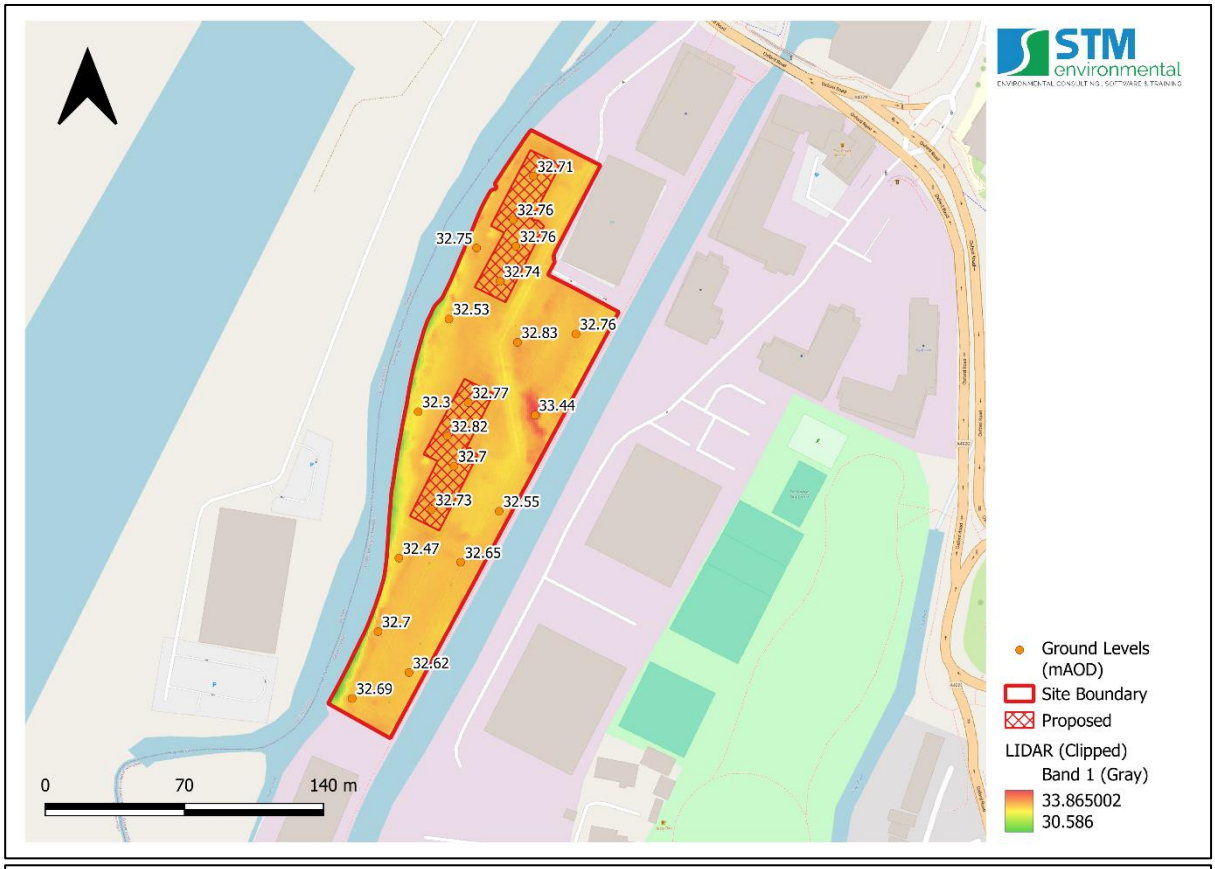
19.3.2 Bedrock Hydrogeology Map

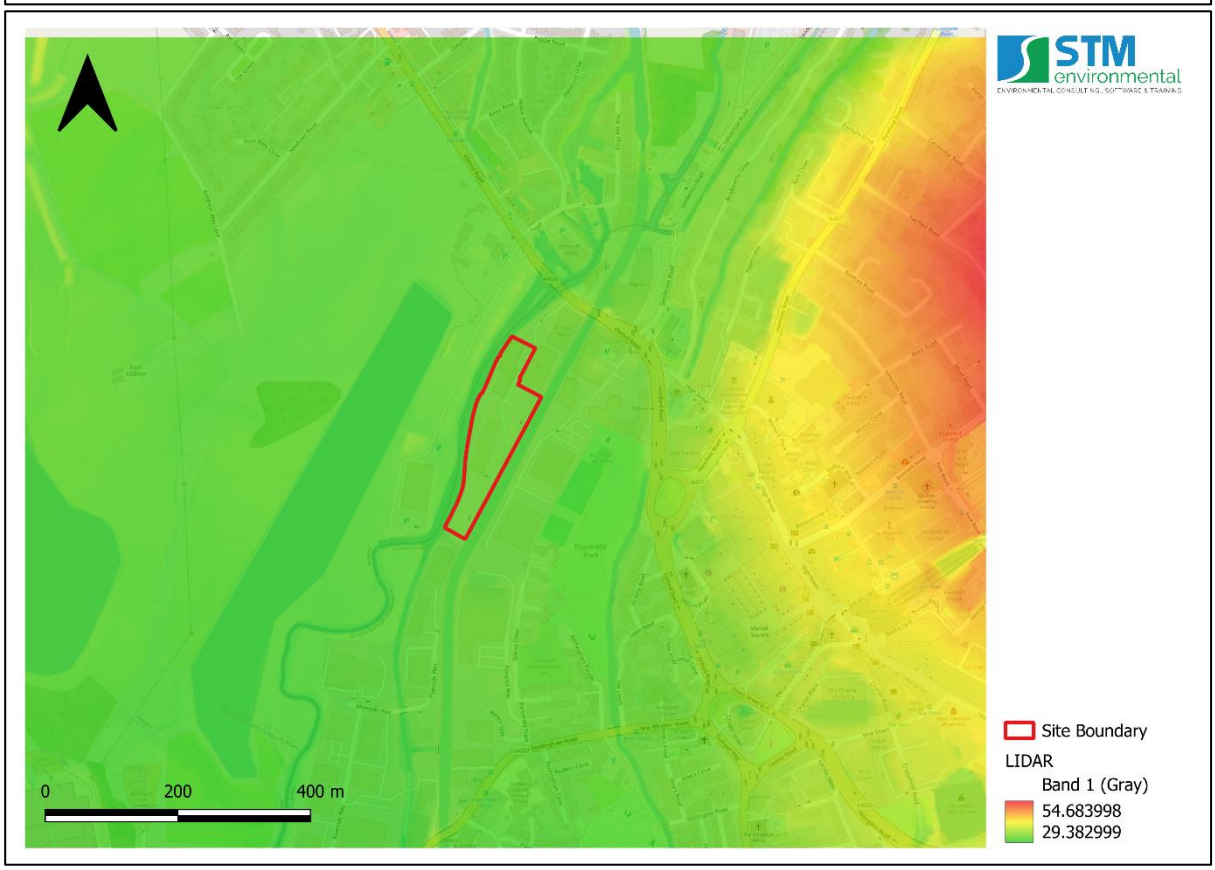


19.3.3 Hydrology Map



19.3.4 Topography Map

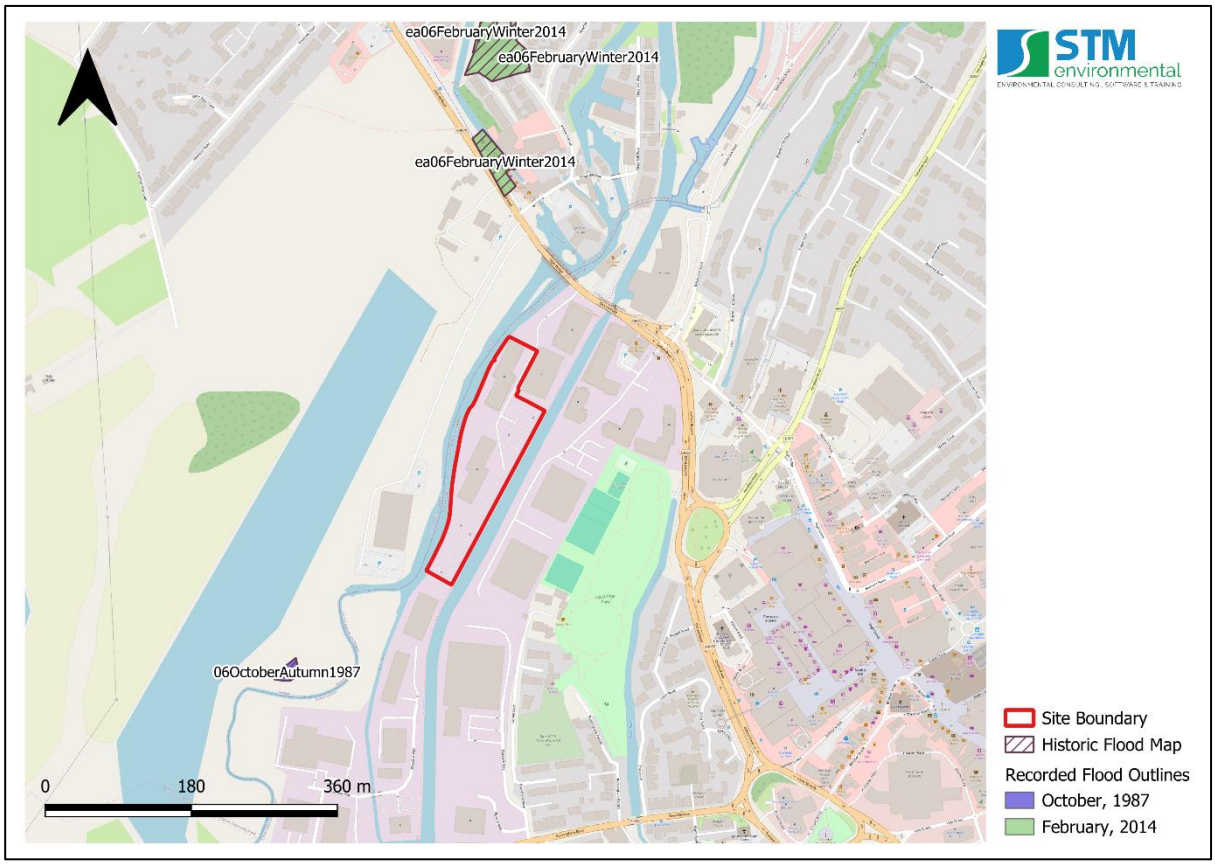




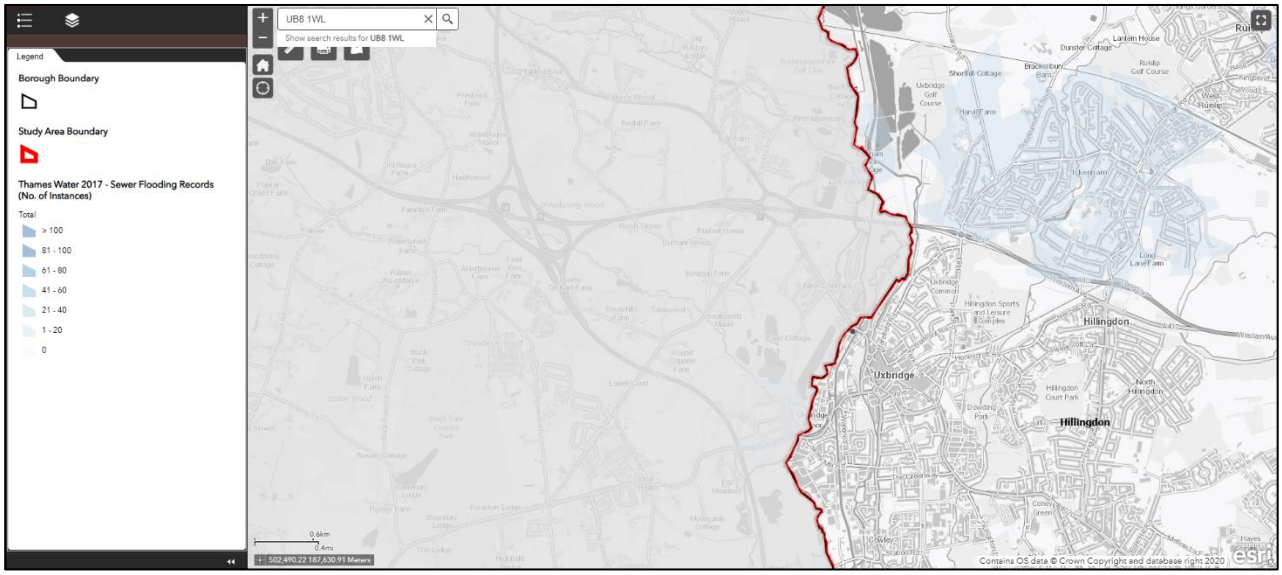

CANAL
CANAL
CANAL

19.4 Appendix 4 – Historical Flood Incident Maps

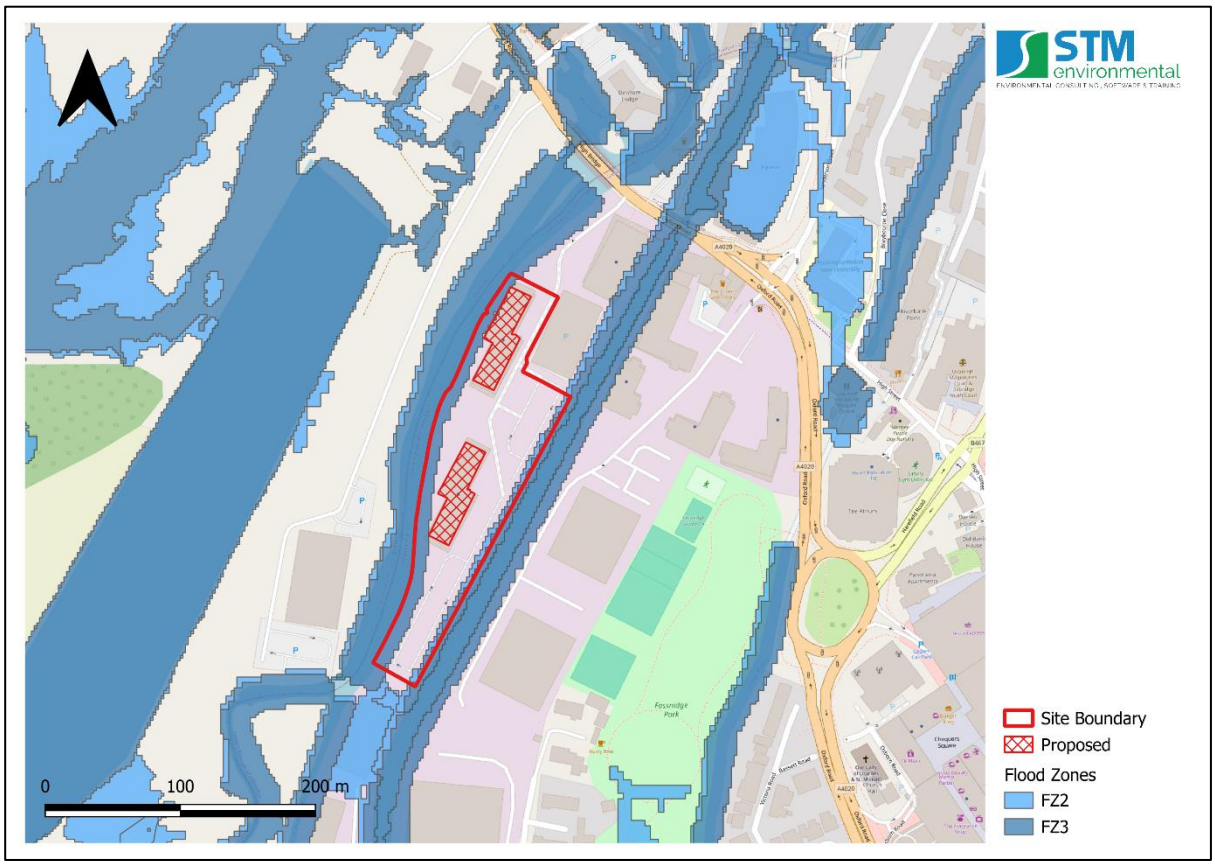
19.4.1 EA Historic and Recorded Flood Outlines



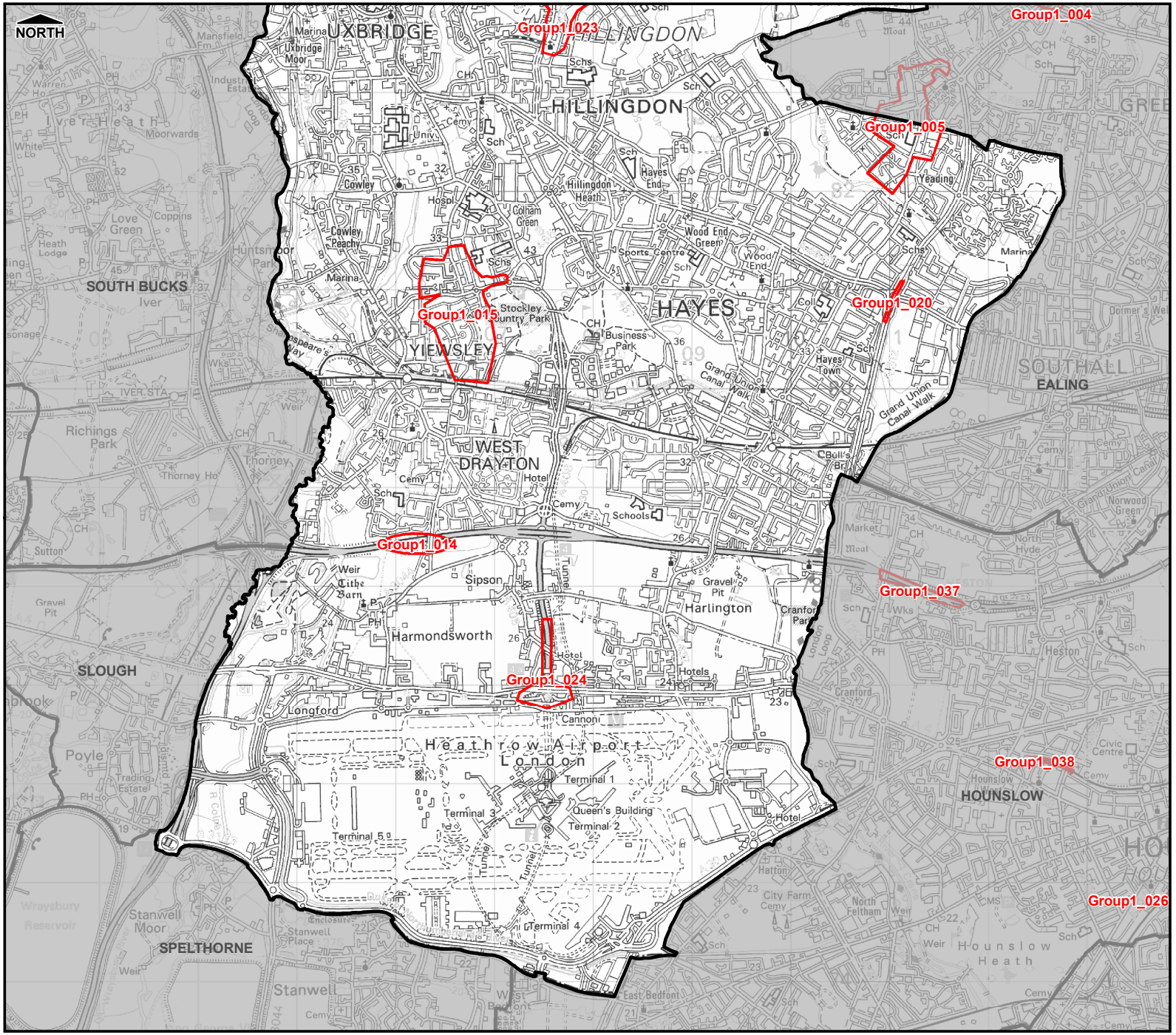
19.4.3 Map of Recorded Sewer Flooding



19.5 Appendix 5 - EA Flood Zone Map



19.5.1 Flood Zone 3b



THIS DRAWING MAY BE USED ONLY FOR THE PURPOSE INTENDED

Legend

- Borough Administrative Boundary
- Critical Drainage Area

Notes

London Borough of Hillingdon

Surface Water Management Plan

Scale at A3	Date	Drawn by	Approved by
1:40,000	15/04/2011	R.MOORE	P.HLINOVSKY

Critical Drainage Area Index Map

Consultants
CAPITA SYMONDS
Flood Risk Management
Scott Wilson
Capita Symonds
Level Seven,
52 Grosvenor Gardens,
Belgravia,
London
SW1W 0AU

Drain London Programme Board Members

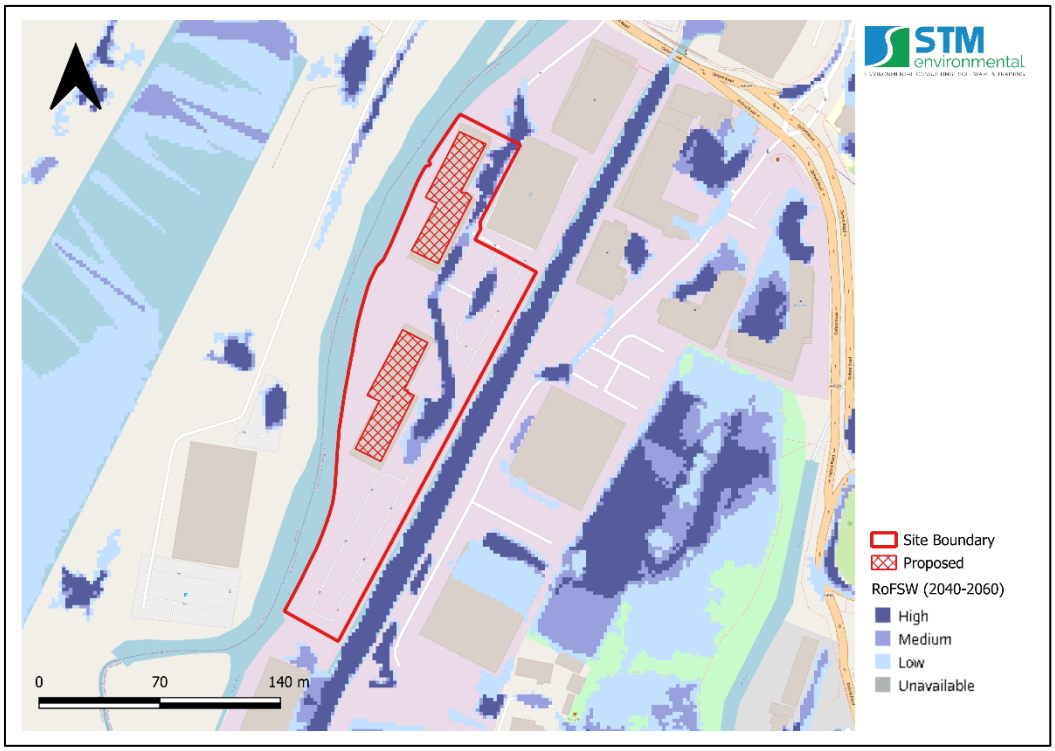
Environment Agency · Thames Water · LONDON COUNCILS · GREATER LONDON AUTHORITY

FIGURE 1.2

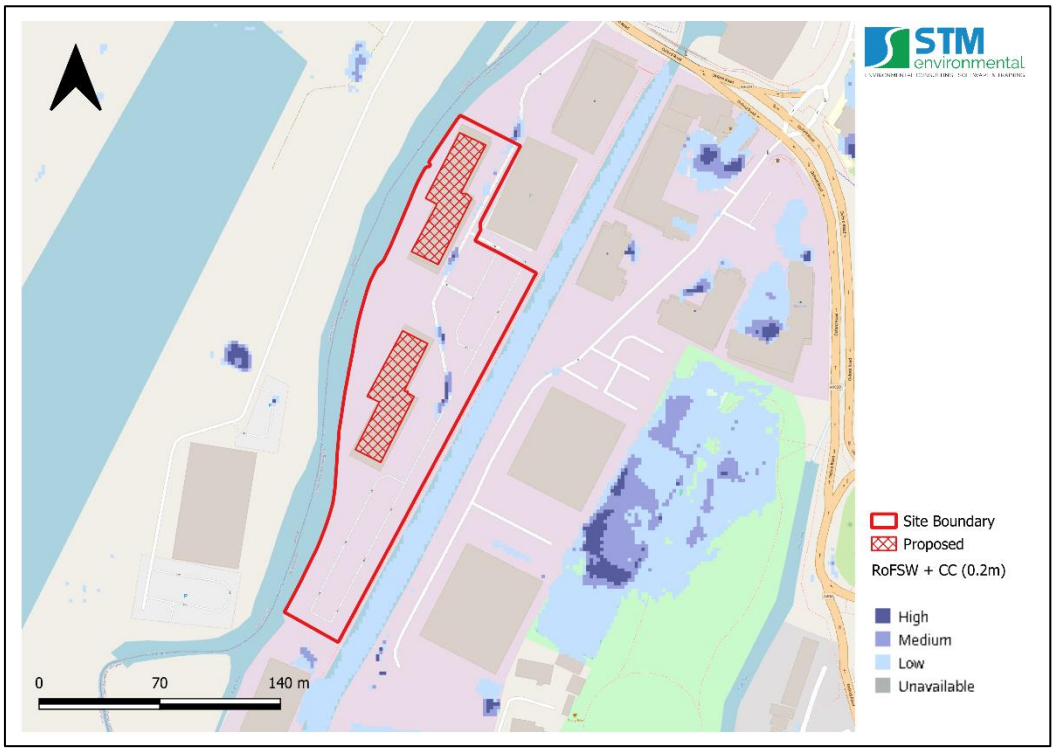
Filepath: L:\Environment\cwe\CS046913_DrainLondon_Tier2\Group1\ARC\mxds\GP1_Hillingdon_Fig1.2_CDA_Index.mxd

19.6 Appendix 6 – Surface Water Flood Extent and Depth Maps

19.6.1 Risk of Flooding from Surface Water, 2040-2060 (Source: EA, 2025).

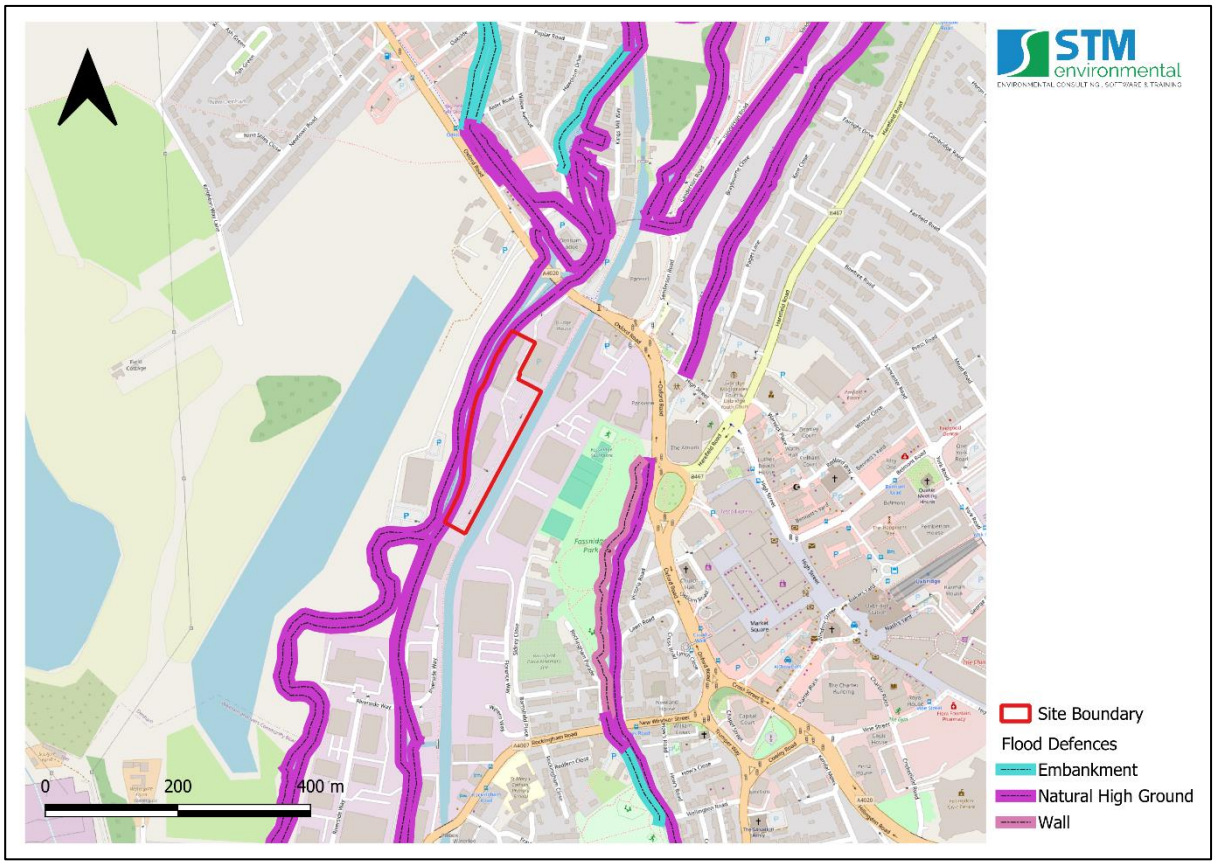


19.6.2 Risk of Flooding from Surface Water, 2040-2060 (0.2m Depth) (Source: EA, 2025).



19.7 Appendix 7 – Flood Defence Mapping

19.7.1 EA flood defence map



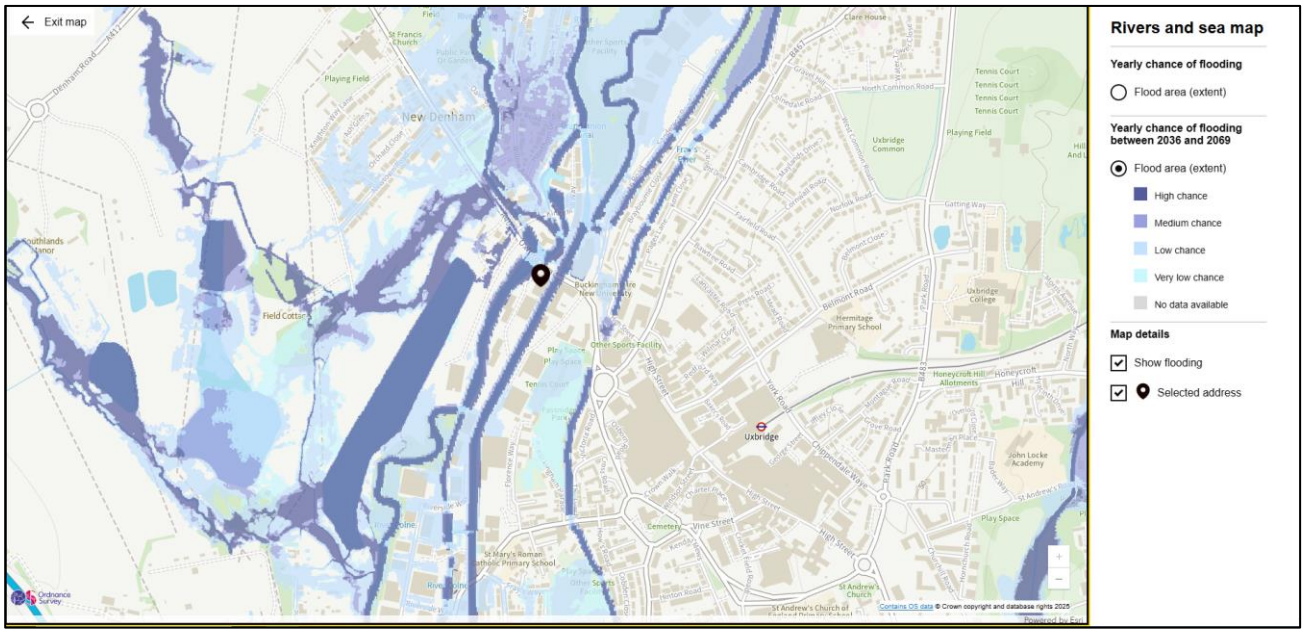
19.8 Appendix 8 – Risk of Flooding from Artificial Sources

19.8.1 Reservoir Flood Risk Map

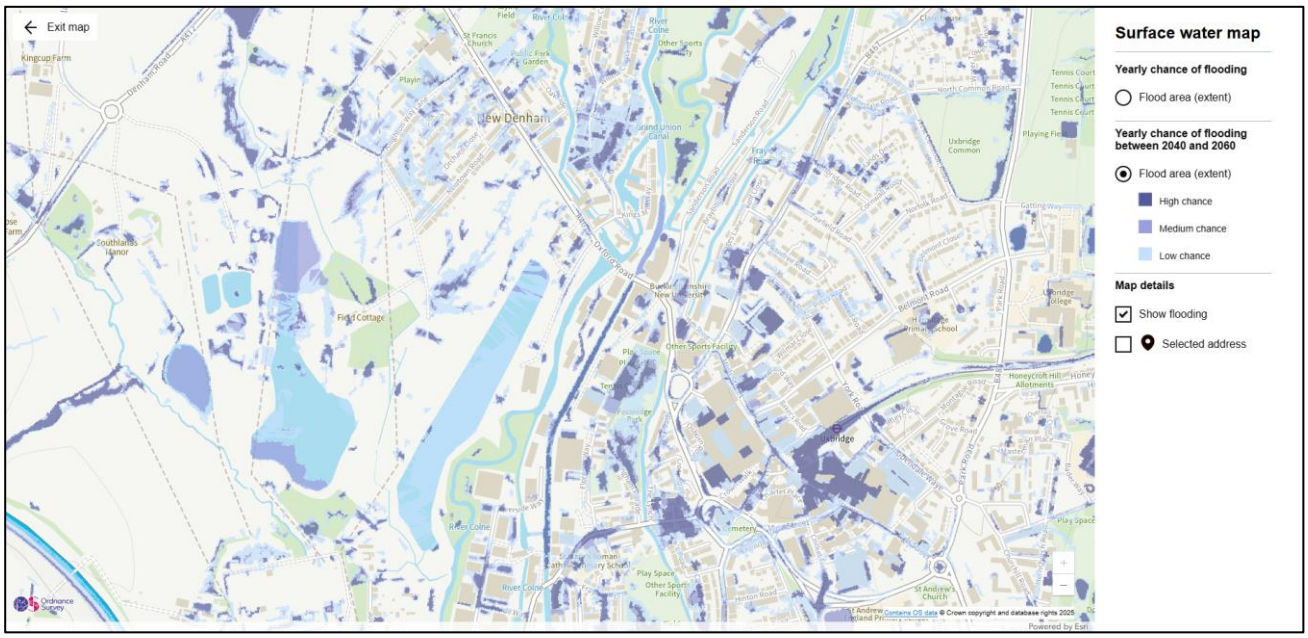
N/A.

19.9 Appendix 9 – EA's Long Term Flood Risk Maps

19.9.1 Long-Term Risk of Flooding from Rivers or the Sea, 2036-2069

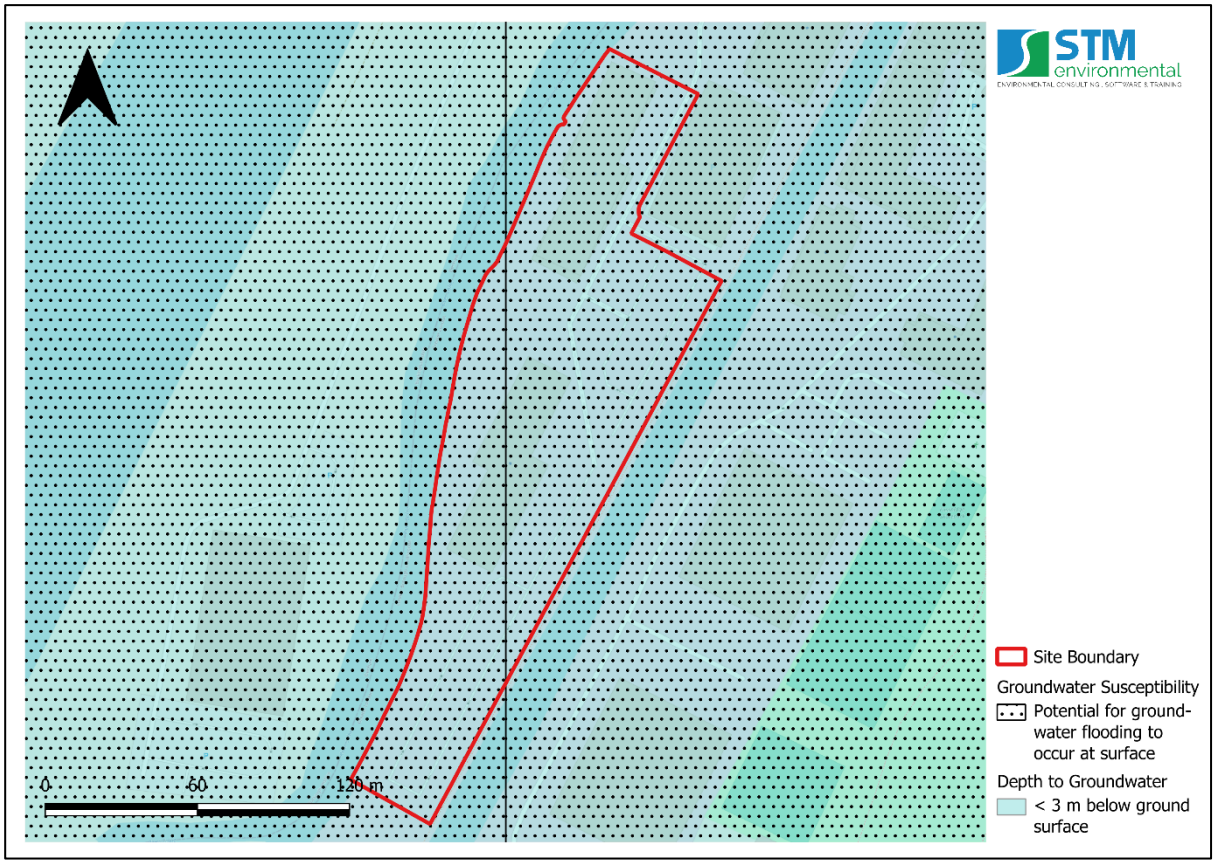


19.9.2 Long-Term Risk of Flooding from Surface Water, 2040-2060



19.10 Appendix 10 – Groundwater Flood Maps

19.10.1 Groundwater Flooding (Susceptibility) Map (BGS) and Potential Depth to the Groundwater Water Map (BGS)



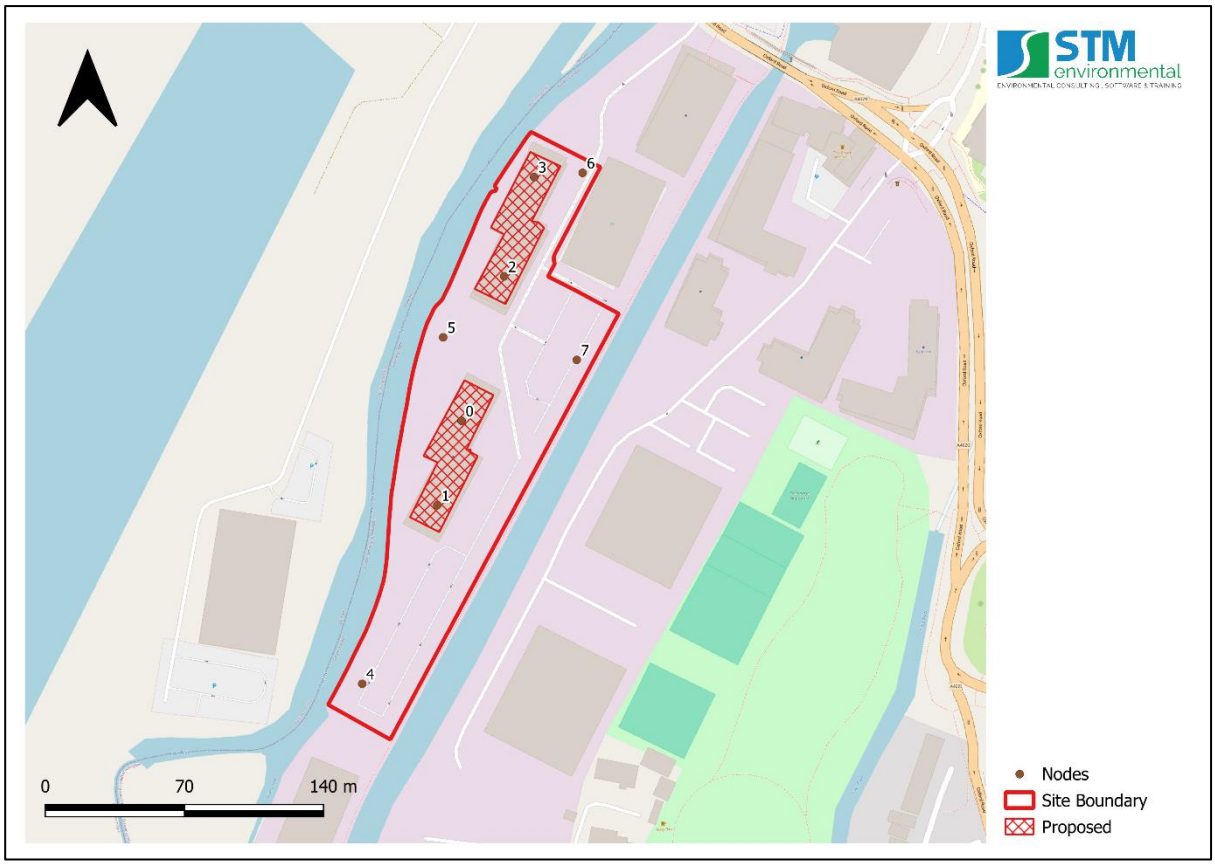
19.11 Appendix 11 - EA Product 6 (Detailed Flood Risk) Data

19.11.1 EA Climate Change Allowances for Peak River Flow

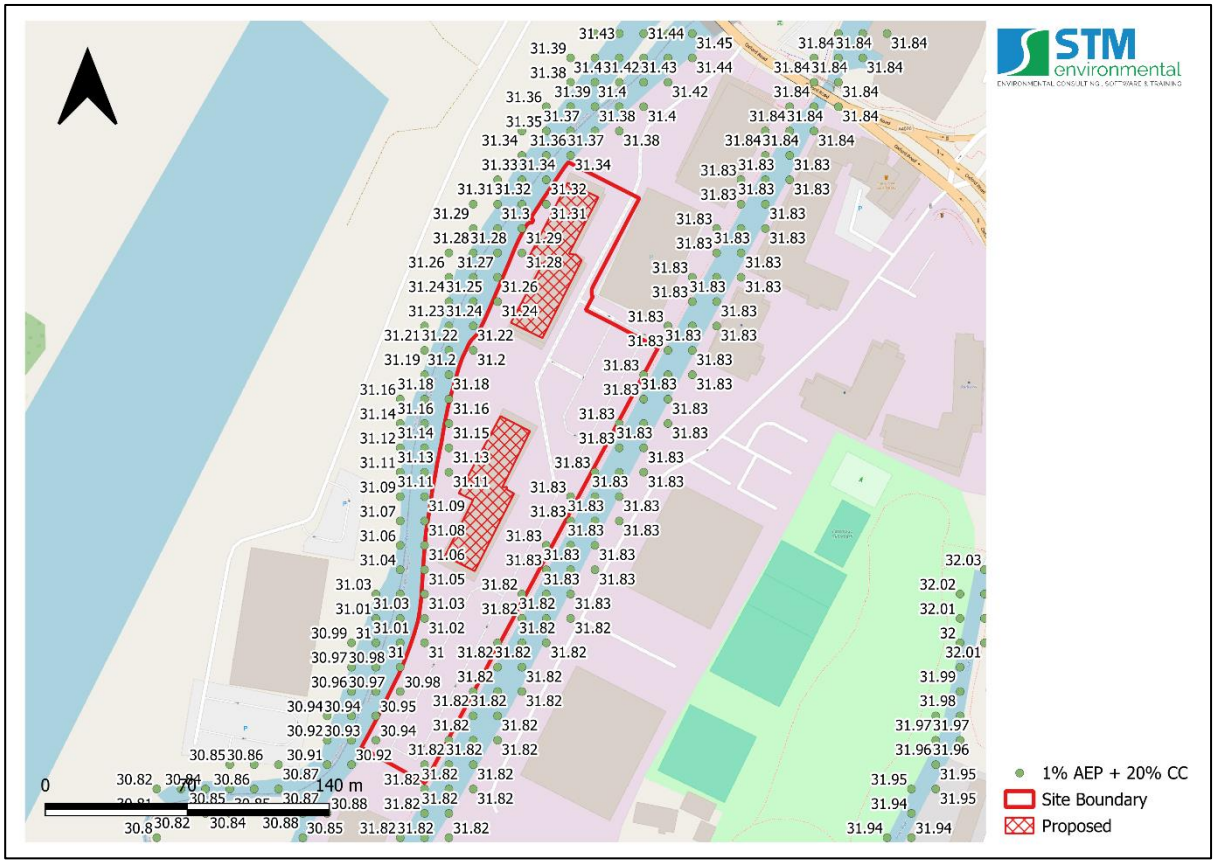
Colne Management Catchment peak river flow allowances

	Central	Higher	Upper
2020s	10%	16%	30%
2050s	8%	16%	38%
2080s	21%	35%	72%

19.11.2 Node Location Map



19.11.3 Fluvial Flood Depths during the 1% AEP + 20% CC Scenario Map



19.12 Appendix 12 – Calculation of Flood Hazard Rating

Flood Hazard Rating Scores – based on DF score of 0

Velocity	Depth									
	0.25	0.50	0.75	1.00	1.25	1.50	1.75	2.0	2.25	2.50
0.0	0.13	0.25	0.38	0.50	0.63	0.75	0.88	1.00	1.13	1.25
0.5	0.25	0.50	0.75	1.00	1.25	1.50	1.75	2.00	2.25	2.50
1.0	0.38	0.75	1.13	1.50	1.88	2.25	2.63	3.00	3.38	3.75
1.5	0.50	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00
2.0	0.63	1.25	1.88	2.50	3.13	3.75	4.38	5.00	5.63	6.25
2.5	0.75	1.50	2.25	3.00	3.75	4.50	5.25	6.00	6.75	7.50
3.0	0.88	1.75	2.63	3.50	4.38	5.25	6.13	7.00	7.88	8.75
3.5	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00
4.0	1.13	2.25	3.38	4.50	5.63	6.75	7.88	9.00	10.13	11.25
4.5	1.25	2.50	3.75	5.00	6.25	7.50	8.75	10.00	11.25	12.50
5.0	1.38	2.75	4.13	5.50	6.88	8.25	9.63	11.00	12.38	13.75

Summary of Scores

	Score From	Score To	Flood Hazard	Description
	<0.75	0.75	Low	Exercise Caution
Class 1	0.75	1.5	Moderate	Danger for some
Class 2	1.5	2.5	Significant	Danger for most
Class 3	2.5	20.0	Extreme	Danger for all

Values for Debris Factor for different flood depths

Depths	Pasture/Arable Land	Woodland	Urban
0 to 0.25	0	0	0
0.25 to 0.75	0.5	1	1
d>0.75 and/or v > 2	0.5	1	1

- The “danger to some” category includes vulnerable groups such as children, the elderly and infirm. “Danger: Flood zone with deep or fast
- flowing water”
- The “danger to most” category includes the general public.
- The danger to all category includes the emergency services.

A flood emergency plan is considered to be an acceptable way of managing flood risk where the flood hazard has been given a “very low hazard” rating. In some instances, flood emergency plans may also be acceptable where the rating is “danger for some”. However, it is unlikely to be an acceptable way of managing residual flood risk where the hazard to people classification is “danger for most” or “danger for all”.