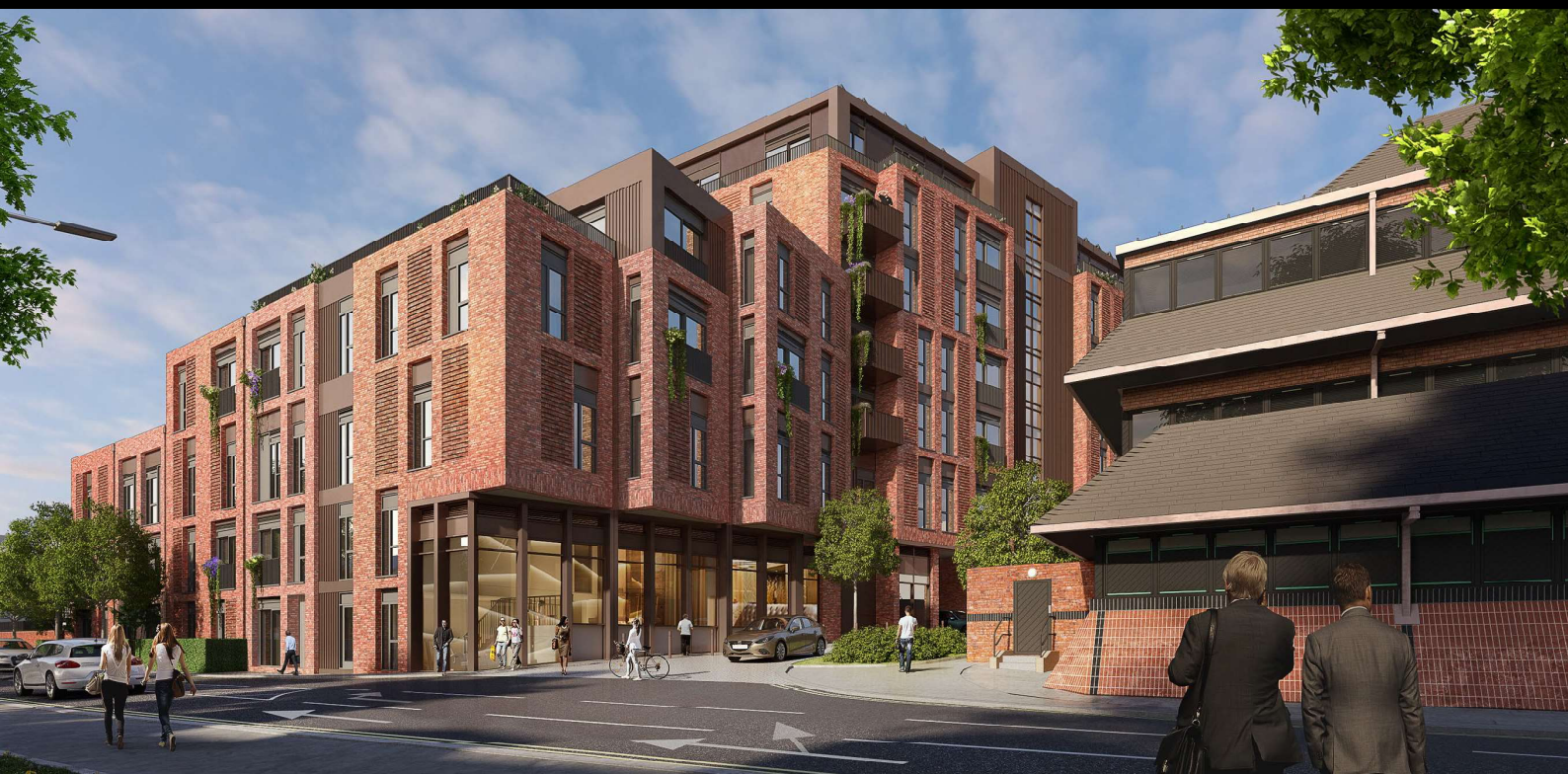
GUILD LIVING @ UXBRIDGE.

Flood Risk Assessment

SEPTEMBER 2020

GUILD LIVING | Legal & General



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Flood Risk Assessment

Land off Harefield Road (Units 1 and 2), Uxbridge, UB8 1JS

Client:	Senior Living Urban (Uxbridge) Limited (Guild Living)
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Executive Summary

A residential apartments will be expected to remain dry in all but the most extreme conditions. The proposed development will provide betterment compared to the existing situation. Providing the recommendations made in this FRA are instigated, flood risk from all sources will be minimised, the consequences of flooding are acceptable and the development will be in accordance with the requirements of the NPPF.

This FRA demonstrates that the proposed development will be operated with minimal risk from flooding, will not increase flood risk elsewhere and is compliant with the requirements of the NPPF. The development should not therefore be precluded on the grounds of flood risk.

1. Introduction

1.1 Background

This Flood Risk Assessment (FRA) has been prepared by Tier Environmental at the request of Senior Living Urban (Uxbridge) Limited (Guild Living) for the proposed development at Land off Harefield Road (Units 1 and 2), Uxbridge, UB8 1JS. This FRA has been carried out in accordance with guidance contained in the National Planning Policy Framework (NPPF)[1], associated National Planning Practice Guidance (NPPG)[2] and the NPPG 'Site-specific flood risk assessment checklist (para 068 Reference ID: 7-068-20140306. This FRA identifies and assesses the risks of all forms of flooding to and from the development and demonstrates how these flood risks will be managed so that the development remains safe throughout the lifetime, taking climate change into account.

It is recognised that developments which are designed without regard to flood risk may endanger lives, damage property, cause disruption to the wider community, damage the environment, be difficult to insure and require additional expense on remedial works. The development design should be such that future users will not have difficulty obtaining insurance or mortgage finance, or in selling all or part of the development, as a result of flood risk issues.

A separate Surface Water Drainage Strategy for the proposed development which proposes to reduce the surface water runoff rates has been developed.

1.2 Report Structure

This FRA has the following report structure:

- Section 2 details the flood risk policy and sources of information that have been consulted;
- Section 3 describes the location area and the existing and proposed development;
- Section 4 outlines the flood risk to the existing and proposed development;
- Section 5 details the proposed surface water drainage for the site;
- Section 6 describes the risk management methods used to mitigate all sources of flood risk; and
- Section 7 presents a summary and conclusions.

[1] Ministry of Housing, Communities and Local Government (2019) National Planning Policy Framework.
[2] Department for Communities and Local Government (2014) Planning Practice Guidance - Flood Risk and Coastal Change.

2. Flood Risk Policy

2.1 National Planning Policy Framework (NPPF)

One of the key aims of the NPPF is to ensure that flood risk is taken into account at all stages of the planning process; to avoid inappropriate development in areas at risk of flooding and to direct development away from areas of highest risk. It advises that where new development is exceptionally necessary in areas of higher risk, this should be safe, without increasing flood risk elsewhere, and where possible, reduce flood risk overall.

A risk based approach is adopted at stages of the planning process, applying a source pathway receptor model to planning and flood risk. To demonstrate this, an FRA is required and should include:

- whether a proposed development is likely to be affected by current or future flooding from all sources;
- whether it will increase flood risk elsewhere;
- whether the measures proposed to deal with these effects and risks are appropriate;
- if necessary, provide the evidence to the Local Planning Authority (LPA) that the Sequential Test can be applied; and
- whether the development will be safe and pass part c) of the Exception Test if this is appropriate.

2.2 London Plan

The Mayor of London published a revised London Plan in March 2016. The London Plan sets out policies pertaining to flood risk that should be considered as part of the development process:

POLICY 5.12 FLOOD RISK MANAGEMENT

Strategic

A. The Mayor will work with all relevant agencies including the Environment Agency to address current and future flood issues and minimise risks in a sustainable and cost effective way.

Planning decisions

B. Development proposals must comply with the flood risk assessment and management requirements set out in the NPPF and the associated technical Guidance on flood risk over the lifetime of the development and have regard to measures proposed in Thames Estuary 2100 (TE2100 – see paragraph 5.55) and Catchment Flood Management Plans.

C. Developments which are required to pass the Exceptions Test set out in the NPPF and the Technical Guidance will need to address flood resilient design and emergency planning by demonstrating that:

a. the development will remain safe and operational under flood conditions

b. a strategy of either safe evacuation and/or safely remaining in the building is followed under flood conditions

c. key services including electricity, water etc will continue to be provided under flood conditions

d. buildings are designed for quick recovery following a flood.

D. Development adjacent to flood defences will be required to protect the integrity of existing flood defences and wherever possible should aim to be set back from the banks of watercourses and those defences to allow their management, maintenance and upgrading to be undertaken in a sustainable and cost effective way.

POLICY 5.13 SUSTAINABLE DRAINAGE

Planning decisions

A. Development should utilise sustainable urban drainage systems (SUDS) unless there are practical reasons for not doing so, and should aim to achieve greenfield run-off rates and ensure that surface water run-off is managed as close to its source as possible in line with the following drainage hierarchy:

1. store rainwater for later use
2. use infiltration techniques, such as porous surfaces in non-clay areas
3. attenuate rainwater in ponds or open water features for gradual release
4. attenuate rainwater by storing in tanks or sealed water features for gradual release
5. discharge rainwater direct to a watercourse
6. discharge rainwater to a surface water sewer/drain
7. discharge rainwater to the combined sewer.

Drainage should be designed and implemented in ways that deliver other policy objectives of this Plan, including water use efficiency and quality, biodiversity, amenity and recreation.

2.3 London Borough of Hillingdon

The London Borough of Hillingdon (LBH) is the LPA, and the LLFA and has responsibilities for 'local flood risk', which includes surface runoff, groundwater and ordinary watercourses. Planning guidance written by LBH regarding flood risk was consulted to assess the policies in place. The LBH Strategic Flood Risk Assessment (SFRA) and the LBH Preliminary Flood Risk Assessment (PFRA) which cover the site have been reviewed.

The Hillingdon Local Plan: Part 1- Strategic Policies is the key strategic planning document for Hillingdon and will support the delivery of the spatial elements of the Sustainable Community Strategy and was adopted in November 2012. The Local Plan sets out policies pertaining to flood risk that should be considered as part of the development process:

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 LBH Unitary Development Plan (adopted 1998) Saved Policies 27th September 2007. The following policies, OE7-OE10, are taken from the above document.

OE7

IN THE AREAS LIABLE TO FLOODING PERMISSION WILL NOT BE GRANTED FOR NEW DEVELOPMENT OR THE INTENSIFICATION OF EXISTING DEVELOPMENT UNLESS A DEVELOPER IS PREPARED TO IMPLEMENT FLOOD PROTECTION MEASURES AS PART OF THE PROPOSED DEVELOPMENT TO A STANDARD SATISFACTORY TO THE COUNCIL, IN CONSULTATION WITH THE ENVIRONMENT AGENCY AND WHERE APPROPRIATE, OTHER DRAINAGE BODIES.

OE8

PLANNING PERMISSION WILL NOT BE GRANTED FOR NEW DEVELOPMENT OR REDEVELOPMENT OF EXISTING URBAN AREAS WHICH WOULD RESULT IN AN INCREASED FLOOD RISK DUE TO ADDITIONAL SURFACE WATER RUNOFF, UNLESS THE PROPOSED DEVELOPMENT INCLUDES APPROPRIATE ATTENUATION MEASURES TO A STANDARD SATISFACTORY TO THE COUNCIL, IN CONSULTATION WITH THE ENVIRONMENT AGENCY AND, WHERE APPROPRIATE, OTHER DRAINAGE BODIES.

OE9

IN CATCHMENTS WHICH HAVE A POTENTIAL FOR SEWERAGE FLOODING PERMISSION WILL NOT NORMALLY BE GRANTED FOR DEVELOPMENT WHICH MAY PRECIPITATE SUCH FLOODING OR FURTHER FLOODING, UNTIL SUFFICIENT IMPROVEMENT HAS BEEN IMPLEMENTED TO ALLEVIATE THE PROBLEM.

OE10

IN AREAS OF POTENTIAL FLOODING OR INADEQUATE CAPACITY OF THE FOUL AND SURFACE WATER SEWERAGE SYSTEM TO RECEIVE THE ADDITIONAL DISCHARGE FROM THE DEVELOPMENT, A PHASED DEVELOPMENT MAY BE REQUIRED TO MATCH THE PROVISION OF INFRASTRUCTURE SO THAT THE EXITING SYSTEM IS NOT OVERLOADED TO THE DETRIMENT OF THE COMMUNITY AS A WHOLE.

2.4 Environment Agency

The Flood and Water Management Act 2010 gives the Environment Agency a strategic overview role for all forms of flooding and coastal erosion. They also have direct responsibility for the prevention, mitigation and remediation of flood damage for main rivers and coastal areas. The Environment Agency is the statutory consultee with regards to flood risk and planning. Information regarding the current flood risk at the application site, local flood defences and flood risk has been obtained from the Environment Agency.

2.5 Thames Water

Thames Water is responsible for the disposal of waste water and supply of clean water for this area. Information with regards to sewer and water main flooding contained within the LBH SFRA and the LBH PFRA have been consulted. All Water Companies have a statutory obligation to maintain a register of properties/areas which are at risk of flooding from the public sewerage system, and this is shown on the DG5 Flood Register.

3. Location & Description

3.1 Site Location

The application site ('the site') is located at Land off Harefield Road (Units 1 and 2), Uxbridge, UB8 1JS (see Drawing TL/1306/FRA/1). The site is located to the east of Harefield Road and north of Warwick Place within Uxbridge Town Centre. It is bound by the rear gardens of the residential properties of Harefield Road and Lancaster Road to the north; Warwick Place and Beasley Court to the south; Penfield Estate to the east; and Harefield Road to the west.

3.2 Existing Development

The existing site comprises two low density attached retail warehouse buildings (Use Class A1), currently occupied by Wickes (Unit 1) and Halfords (Unit 2). The buildings are set back within the site which includes a large car park situated in front of the buildings. The site benefits from existing landscaping which is generally limited to eastern and northern boundaries. The site is currently raised above Harefield Road which is fronted by a retaining wall to the car park. The site benefits from existing vehicular and pedestrian access from Harefield Road, with a separate access to a loading bay off Warwick Place.

3.3 Proposed Development

The proposed development is for a full planning permission for comprehensive redevelopment of the site comprising demolition of existing buildings to provide residential care accommodation (C2), café and nursery (E) in buildings up to 8 storeys, car parking, landscaping and associated works (see Appendix B). Further details with regard to the proposed development can be found in the accompanying information submitted with the planning application.

3.4 Ground Levels

The site is relatively flat with a with a ground levels above 40.00 metres Above Ordnance Datum (mAOD)

3.5 Catchment Hydrology

There are no watercourses evident on, or within the vicinity of the site. The nearest watercourse is approximately 120 m to the west of the site.

3.6 Geology

The British Geological Survey (BGS) Map indicates that the superficial deposits underlying the site consists of the Lynch Hill Gravel Member - sand and gravel. Superficial deposits formed up to 2 million years ago in the Quaternary Period in a local environment previously dominated by rivers (U). The bedrock deposits consist of the London Clay Formation - clay, silt and sand. Sedimentary bedrock formed approximately 48 to 56 million years ago in the Palaeogene Period in local environment previously dominated by deep seas.

3.7 Groundwater

The Environment Agency has designated the superficial and bedrock deposits as Secondary A Aquifers. These are permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.

3.8 Groundwater Source Protection Zones

The site is not located within an Environment Agency Groundwater Source Protection Zone.

3.9 Soil

Information from the National Soil Resource Institute3 details the site area as being situated on loamy soils with naturally high groundwater.

3.10 Permeability/Infiltration Rate

In determining the future surface runoff from the site, the potential of using infiltration devices has been considered. It has been concluded that the site will not be suitable for infiltration drainage due to the site ground conditions and limited space. Soakaway testing has been undertaken on the site and the test results are in Table 3.1.

Table 3.1 - Soakaway Test Results

Location	Test	29th July	30th July
		Test K (m/s)	
TWS01	1	4.54E-05	2.10E-05
	2	2.53E-05	1.68E-05
	3	5.01E-05	
TWS05	1	1.75E-05	1.01E-05
	2	1.15E-05	1.27E-05
TWS09	1	1.26E-05	
	2	1.07E-05	
TWS11	1		1.47E-05
	2		1.18E-05
	3		1.70E-05
WS201	1		4.11E-05

[3] National Soil Resources Institute (NSRI) 2013. The Soils Guide. Available: www.landis.org.uk. Cranfield University, UK. Last accessed 01/06/2020.

	2		3.78E-06
WS203	1		3.10E-05
	2		2.39E-05
	3		1.46E-05
WS204	1		1.03E-05
	2		9.96E-05

Upon review of the results, soakaways do not appear to be a feasible option to remove the need to discharge surface water to the sewer. Based on an available courtyard space of 325 m^2 (assuming 5 m offset from building) , the required soakaway size will be 25 m x 13 m x 4 m deep. This level of excavation will not be feasible on site without extensive temporary works. However, options to include areas within the landscaping features that allow for discharge direct to ground will be considered as part of the holistic strategy.

4. Flood Risk

4.1 Sources of Flooding

All sources of flooding have been considered, these are; fluvial (river) flooding, tidal (coastal) flooding, groundwater flooding, surface water (pluvial) flooding, sewer flooding and flooding from artificial drainage systems/infrastructure failure.

4.2 Historic Flooding

There are no records of anecdotal information of flooding at the site including within the British Hydrological Society "Chronology of British Hydrological Events[4]". No other historical records of flooding for the site have been recorded. Therefore, it has been assumed that the site has not flooded within the recent past.

4.3 Existing and Planned Flood Defence Measures

It is understood that there are no Environment Agency maintained defences in this area. Further risk management measures will be used to protect the site from flooding these are discussed in Section 7.0.

4.4 Environment Agency Flood Zones

A review of the Environment Agency's flood map indicates that the site is located within Flood Zone 1 and therefore has a 'low probability' of fluvial flooding as shown in see Drawing TL/1306/FRA/2. Flood Zone 1 has less than 1 in 1000 annual probability of river/tidal in any year (<0.1%).

The Flood Zones are the current best information on the extent of the extremes of flooding from rivers or the sea that will occur without the presence of flood defences, because these can be breached, overtopped and may not be in existence for the lifetime of the development. The Environment Agency Flood Zones and acceptable development types are explained in Table 4.1. Table 4.1 shows that all development types are generally acceptable in Flood Zone 1.

In the Planning Practice Guidance to the NPPF (Table 1) appropriate uses have been identified for the Flood Zones. Applying the Flood Risk Vulnerability Classification in Table 2 and 3 of the Planning Practice Guidance to the NPPF, the development is classified as 'more vulnerable'. Table 4.2 of this report and Table 3 of the Planning Practice Guidance to the NPPF states that 'more vulnerable' uses are appropriate within Flood Zone 1.

Table 4.1 - Environment Agency Flood Zones and Appropriate Land Use

Flood Zone	Probability	Explanation	Appropriate Land Use
Zone 1	Low	Less than 1 in 1000 annual probability of river or sea flooding in any year (<0.1%)	All development types generally acceptable
Zone 2	Medium	Between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% - 0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% 0.1%) in any year	Most development type are generally acceptable
Zone 3a	High	A 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year	Some development types not acceptable
Zone 3b	'Functional Floodplain'	Land where water has to be flow or be stored in times of flood. SFRAs should identify this zone (land which would flood with an annual probability of 1 in 20 (5%) or greater in any year or is designed to flood in an extreme (0.1% flood, or at another probability to be agreed between the LPA and the Environment Agency, including water conveyance routes)	Some development types not acceptable

Table 4.2 - Flood Risk Vulnerability and Flood Zone 'Compatibility' as identified in Table 3 of the Planning Practice Guidance to the NPPF

Flood Risk Vulnerability Classification	Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	✓	Exception test required	✓	✓
Zone 3a	Exception test required	✓	×	Exception test required	✓
Zone 3b 'Functional Floodplain'	Exception test required	✓	×	×	×

Key: ✓: Development is appropriate, ×: Development should not be permitted.

4.5 Climate Change

Projections of future climate change, in the UK, indicate more frequent, short-duration, high intensity rainfall and more frequent periods of long duration rainfall. Guidance included within the NPPF

recommends that the effects of climate change are incorporated into FRA. Recommended precautionary sensitivity ranges for peak rainfall intensities and peak river flows are outlined in the associated Planning Practice Guidance to the NPPF[4].

Table 4.3 shows peak river flow climate change allowances by river basin district. The flood risk assessments: climate change allowances guidance recommends that for 'more vulnerable' uses in Flood Zone 1 that the central allowances are used. Therefore, the design flood level for the site is the 1 in 100 year (+25%) event.

Table 4.3 - Peak River Flow Allowances by River Basin District (use 1961 to 1990 baseline)

River Basin District	Allowance Category	2015 to 2039	2040 to 2059	2060 to 2115
Thames	Upper end	+25%	+35%	+70%
	High central	+15%	+25%	+35%
	Central	+10%	+15%	+25%

4.6 Fluvial (river) Flooding

There are no watercourses evident on, or within the vicinity of the site (see Drawing TL/1306/FRA/2). Even with the impacts of climate change taken into account the site will not be inundated with floodwater for all events up to and including the 1 in 100 year (+25%) and 1 in 1000 year event. The site is not located within the vicinity of fluvial flooding sources and the risk of fluvial flooding is considered to be not significant.

4.7 Tidal (coastal) Flooding

The site is not located within the vicinity of tidal flooding sources and the risk of tidal flooding is considered to be not significant.

4.8 Groundwater Flooding

Groundwater flooding is defined as the emergence of groundwater at the ground surface or the rising of groundwater into man-made ground under conditions where the normal range of groundwater levels is exceeded. Groundwater flooding tends to occur sporadically in both location and time. When groundwater flooding does occur, it tends to mostly affect low-lying areas, below surface infrastructure and buildings (for example, tunnels, basements and car parks) underlain by permeable rocks (aquifers).

The susceptibility of the site to groundwater flooding, based on the underlying geological conditions, is moderate. There are no records of groundwater flooding at or near to the site. It can therefore be concluded that the risk of groundwater flooding is not significant.

[4] https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#high-allowances.

4.9 Surface Water (pluvial) Flooding

The soil condition at the site and within the vicinity of the site and the topography of the site suggest that the site is relatively well drained and surface water flooding will not be expected to accumulate to any significant depths. Surface water flooding tends to occur sporadically in both location and time such surface water will tend to be confined to the streets around the development.

Drawing TL/1306/FRA/2/3 confirms that the majority of the site has a very low risk of surface water flooding with a chance of flooding of less than 1 in 1000 years (0.1%). %). However, a small proportion of the site has a low risk of surface water flooding with a chance of flooding of between 1 in 1000 (0.1%) and 1 in 100 (1%) years.

It can therefore be concluded that the risk of surface water flooding is of low significance. The risk from the surface water sources will be managed and mitigated by using a number flood mitigation measures to manage and reduce the overall flood risk at the site (see Section 7.0).

4.10 Sewer Flooding

Sewer flooding occurs when urban drainage networks become overwhelmed and maximum capacity is reached. This can occur if there is a blockage in the network causing water to back up behind it or if the sheer volume of water draining into the system is too great to be handled. Sewer flooding tends to occur sporadically in both location and time such flood flows will tend to be confined to the streets around the development.

There are existing public sewers within roads adjacent to the site these will inevitably have a limited capacity so in extreme conditions there will be surcharges, which may in turn cause flooding. Flood flows could also be generated by burst water mains, but these will tend to be of a restricted and much lower volume than weather generated events and so can be discounted for the purposes of this assessment. Given the design parameters normally used for drainage design in recent times and allowing for some deterioration in the performance of the installed systems, which are likely to have been in place for many years, an appropriate flood risk probability from this source could be assumed to have a return period in the order of 1 in 10 to 1 in 30 years.

The provision of adequate level difference between the ground floors and adjacent ground level will reduce the annual probability of damage to property from this source to 1 in 100 years or less. Therefore, sewer flooding poses a low flood risk to the site. It can therefore be concluded that the risk of sewer flooding is of low significance. The risk from the sewer sources will be managed and mitigated by using a number of flood mitigation measures to manage and reduce the overall flood risk at the site (see Section 7.0).

4.11 Flooding from Artificial Drainage Systems/Infrastructure Failure

There are no other nearby artificial water bodies, water channels and artificial drainage systems that could be considered a flood risk to the site. The Environment Agency Reservoir flood map shows that the site is not at risk of reservoir flooding (see Drawing TL/1306/FRA/4). The risk of flooding from reservoir failure is considered to be not significant.

4.12 Effects of the Development on Flood Risk

The site is located within Flood Zone 1, there will be no loss of floodplain storage capacity and the proposed development will have no impact on the movement of water.

4.13 Summary of Site Specific Flood Risk Assessment

A summary of the sources of flooding and a review of the risk posed by each source at the site is shown in Table 4.3.

Table 4.3 - Risk Posed by Flooding Sources

Sources of Flooding	Potential Flood Risk	Potential Source	Probability/Significance
Fluvial (river) Flooding	No	None Reported	Not significant
Tidal (coastal) Flooding	No	None Reported	Not significant
Groundwater Flooding	No	None Reported	Not significant
Surface Water (pluvial) Flooding	Yes	Low Spots	Low
Sewer Flooding	Yes	Local Sewers	Low
Flooding from Artificial Drainage Systems/Infrastructure Failure	No	None Reported	Not significant

The site is not at risk of flooding from a major source (e.g. fluvial and/or tidal). The site has a 'low probability' of fluvial flooding as the site is located within Flood Zone 1 with less than a 1 in 1000 annual probability of river/tidal flooding in any year (<0.1%). A number of secondary flooding sources have been identified which may pose a low risk to the site. These are:

- Surface Water (pluvial) Flooding
- Sewer Flooding

The risk of flooding from all sources is considered to be low or not significant. The flooding sources will only inundate the site to a relatively low water depth and water velocity, will only last a short period of time, in very extreme cases and will not have an impact on the whole of the proposed development site.

The proposed development is classified as 'more vulnerable', 'more vulnerable' uses are appropriate within Flood Zone 1 after the completion of a satisfactory FRA. The flood risk at the site, will be further managed and mitigated by using a number of risk management techniques, and mitigation strategies to manage and reduce the overall flood risk at the site.

In conclusion, the flood risk to the site can be considered to be limited; the site is situated in Flood Zone 1, with a low annual probability of flooding and from all sources. The site is unlikely to flood except in very extreme conditions.

5. Sequential Approach

5.1 Sequential Test

The risk-based Sequential Test in accordance with the NPPF aims to steer new development to areas at the lowest probability of flooding (i.e. Flood Zone 1). The proposed development site complies with the sequential approach which should be applied at all stages of planning. Therefore, the Sequential Test will not need to be undertaken as part of this planning application.

5.2 Exception Test

Applications located within Flood Zone 1 are not subject to the Exception Test as confirmed within Table 4.2 of this report and Table 3 of the Planning Practice Guidance to the NPPF.

6. Surface Water Management

6.1 Surface Water Drainage Overview

A SuDS Strategy for the site proposals should be developed to manage and reduce the flood risk posed by the surface water runoff from the site. An assessment of the surface water runoff rates should be undertaken, in order to determine the surface water options and attenuation requirements for the site. The assessment considers the impact of the development compared to current conditions. Therefore, the surface water attenuation requirement for the developed site can be determined and reviewed against existing arrangements.

The surface water drainage arrangements for any development site should be such that the volumes and peak flow rates of surface water leaving a developed site are no greater than the rates prior to the proposed development unless specific off-site arrangements are made and result in the same net effect.

It should be acknowledged that the satisfactory collection, control and discharge of surface water runoff are now a principle planning and design consideration. This is reflected in recently implemented guidance and released National Sustainable Drainage Systems (SuDS) Standards.

6.2 Discharge of Surface Water

There are three possible options to discharge the surface water runoff in accordance with requirement H3 of the Building Regulations, this hierarchy is also promoted within the NPPF. Rainwater shall discharge to one of the following, listed in order of priority:

- an adequate soakaway or some other adequate infiltration system; or, where that is not reasonably practicable,
- a watercourse; or where that is not reasonably practicable,
- a sewer.

It is necessary to identify the most appropriate method of controlling and discharging surface water. The design should seek to improve the local runoff profile by using systems that can either attenuate runoff and reduce peak flow rates or positively impact on the existing surface water runoff.

6.3 Soakaway/Infiltration System

In determining the future surface runoff from the site, the potential of using infiltration devices has been considered. It has been concluded that the site will not be suitable for infiltration drainage due to the site ground conditions and limited space. Therefore, it will not be possible to discharge surface water runoff from the site via infiltration methods. However, options to include areas within the landscaping features that allow for discharge direct to ground will be considered as part of the holistic strategy.

6.4 Watercourse

Should infiltration be found to be unsuitable, the next option is discharge to a watercourse. There are no watercourses evident either on, or within the vicinity of the site. The nearest watercourse is approximately 120 m to the west of the site. Due to the extent of development in the area including key infrastructure (Court, Police station) and no practical route to access the river directly a connection to the watercourse is not a viable option.

6.5 Sewer

In the event that discharge of surface water via infiltration or discharge to a watercourse is deemed unsuitable, then discharge to the public sewer will be possible and should be investigated further. The site has an existing connection to the public sewer and it is considered sustainable to retain and reuse this connection. Where the developer proposes to discharge to a public sewer, prior approval from Thames Water Developer Services will be required, to ensure that the surface water discharge from the site shall not be detrimental to the existing sewerage system.

6.6 Surface Water Drainage Strategy

A separate Surface Water Drainage Strategy for the proposed development which proposes to reduce the surface water runoff rates has been developed. There is limited space within the proposed site layout for the attenuation storage, the limited space has been maximised as much as possible. It is proposed the surface water for the development will discharge into the public sewers at a restricted runoff rate of 1.50 l/s for all events up to and including the 1 in 100 year (+40%) event by a flow control device before discharging off the site. This will provide betterment compared to the existing situation.

An assessment of the surface water runoff rates has been undertaken, in order to determine the surface water options and attenuation requirements for the site. The assessment considers the impact of the development compared to current conditions. Therefore, the surface water attenuation requirement for the developed site can be determined and reviewed against existing arrangements.

6.7 Designing for Local Drainage System Failure/Design Exceedance

When considering residual risk, it is necessary to make predictions as to the impacts of a storm event that exceeds the design event, or the impact of a failure of the local drainage system. The Surface Water Drainage Strategy applies a safe and sustainable approach to discharging rainfall runoff from the site and this reduces the risk of flooding however, it is not possible to completely remove the risk. This section of the FRA is therefore associated with the way the residual risk is managed.

As part of the FRA it must be demonstrated that the flooding of property will not occur in the event of local drainage system failure and/or design exceedance. It is not economically viable or sustainable to build a drainage system that can accommodate the most extreme events. Consequently, the capacity of the drainage system may be exceeded on rare occasions, with excess water flowing above ground[5].

[5] CIRIA (2006) Designing for exceedance in urban drainage – good practice.

The attenuation requirements have been designed to accommodate the 1 in 100 year storm event plus climate change (+40%). The design of the site layout provides an opportunity to manage this local drainage system failure/exceedance flow and ensure that indiscriminate flooding of property does not occur.

There will not be an extensive sewerage network on the proposed development site and therefore any potential exceedance flooding will be from the sewers, lateral drains connecting the properties to the underground storage areas. It is very unlikely that a catastrophic failure will occur. An exceedance or blockage event of the sewers will not affect the proposed buildings because the finished floor level will be raised above surrounding ground levels, ensuring any exceedance flooding will not affect the buildings. The gardens and driveways of the properties will be rise away from the highways so that any flows will not enter the property boundaries.

Exceedance flows will be contained within the highways within the site and adjacent to the site and will flow to the lower ground levels where the landscaped areas are located. In particular, the landscaped areas will include preferential flow paths that convey water away from buildings. Surface water runoff will be directed to the drainage system through drainage gullies located around the perimeter of the buildings and through contouring of the hardstanding areas. It is not considered that there is an increased risk to the properties on the site or located adjacent to the site.

7. Risk Management

7.1 Introduction

In this flood zone, developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area through the layout, form of the development and the use of flood mitigation measures including SuDS techniques. The flooding sources will have to mitigated on the site by using a number of techniques, and mitigation strategies to manage and reduce the overall flood risk at the site. These will be used to ensure the development will be safe and there is:

- Minimal risk to life;
- Minimal disruption to people living and working in the area;
- Minimal potential damage to property;
- Minimal impact of the proposed development on flood risk generally; and;
- Minimal disruption to natural heritage.

7.2 Minimum Floor Level

There is no minimum finished floor level proposed as a result of flooding.

7.3 Flood Resilience and Resistance

The development of the layout should always consider that the site is potentially at risk from an extreme event and as such the implementation of flood resilience and resistance methods should be assessed. Relatively simple measures such as raising utility entry points, using first floor or ceiling down electrical circuits and sloping landscaping away from properties can be easily and economically incorporated into the development of the site.

7.4 Access and Egress

The site and surrounding area is located within Flood Zone 1 therefore a permanently safe and dry access can be maintained.

7.5 Flooding Consequences

The mitigation measures detailed above show that the flood risk can be effectively managed and therefore the consequences of flooding are acceptable. In conclusion, the flood risk to the site can be considered to be limited; the site is situated in Flood Zone 1, with a low annual probability of flooding and from all sources.

8. Summary and Conclusion

8.1 Introduction

This report presents an FRA in accordance with the NPPF for the proposed development at Land off Harefield Road (Units 1 and 2), Uxbridge, UB8 1JS. This FRA identifies and assesses the risks of all forms of flooding to and from the development and demonstrates how these flood risks will need to be managed so that the development remains safe throughout the lifetime, taking climate change into account.

8.2 Flood Risk

The site is not at risk of flooding from a major source (e.g. fluvial and/or tidal). The site has a 'low probability' of fluvial flooding as the site is located within Flood Zone 1 with less than a 1 in 1000 annual probability of river/tidal flooding in any year (<0.1%). A number of secondary flooding sources have been identified which may pose a low risk to the site. These are:

- Surface Water (pluvial) Flooding
- Sewer Flooding

The risk of flooding from all sources is considered to be low or not significant. The flooding sources will only inundate the site to a relatively low water depth and water velocity, will only last a short period of time, in very extreme cases and will not have an impact on the whole of the proposed development site.

The proposed development is classified as 'more vulnerable', 'more vulnerable' uses are appropriate within Flood Zone 1 after the completion of a satisfactory FRA. The flood risk at the site, will be further managed and mitigated by using a number of risk management techniques, and mitigation strategies to manage and reduce the overall flood risk at the site.

In conclusion, the flood risk to the site can be considered to be limited; the site is situated in Flood Zone 1, with a low annual probability of flooding and from all sources. The site is unlikely to flood except in very extreme conditions.

8.3 Sequential and Exception Tests

The development proposals should be considered by the LPA to satisfy the Sequential and Exception Tests as set out in the NPPF.

8.4 Surface Water Drainage Strategy

A separate Surface Water Drainage Strategy for the proposed development which proposes to reduce the surface water runoff rates has been developed. There is limited space within the proposed site layout for the attenuation storage, the limited space has been maximised as much as possible. It is

proposed the surface water for the development will discharge into the public sewers at a restricted runoff rate of 1.50 l/s for all event up to and including the 1 in 100 year (+40%) event.

by a flow control device before discharging off the site. This will provide betterment compared to the existing situation.

8.5 Risk Management

The flooding sources will be managed on the site by using a number of mitigation strategies to manage and reduce the overall flood risk at the site and will ensure the development will be safe. Measures used:

Minimum Floor Level - There is no minimum finished floor level proposed as a result of flooding.

Flood Resilience and Resistance - The development of the layout should always consider that the site is potentially at risk from an extreme event and as such the implementation of flood resilience and resistance methods should be assessed.

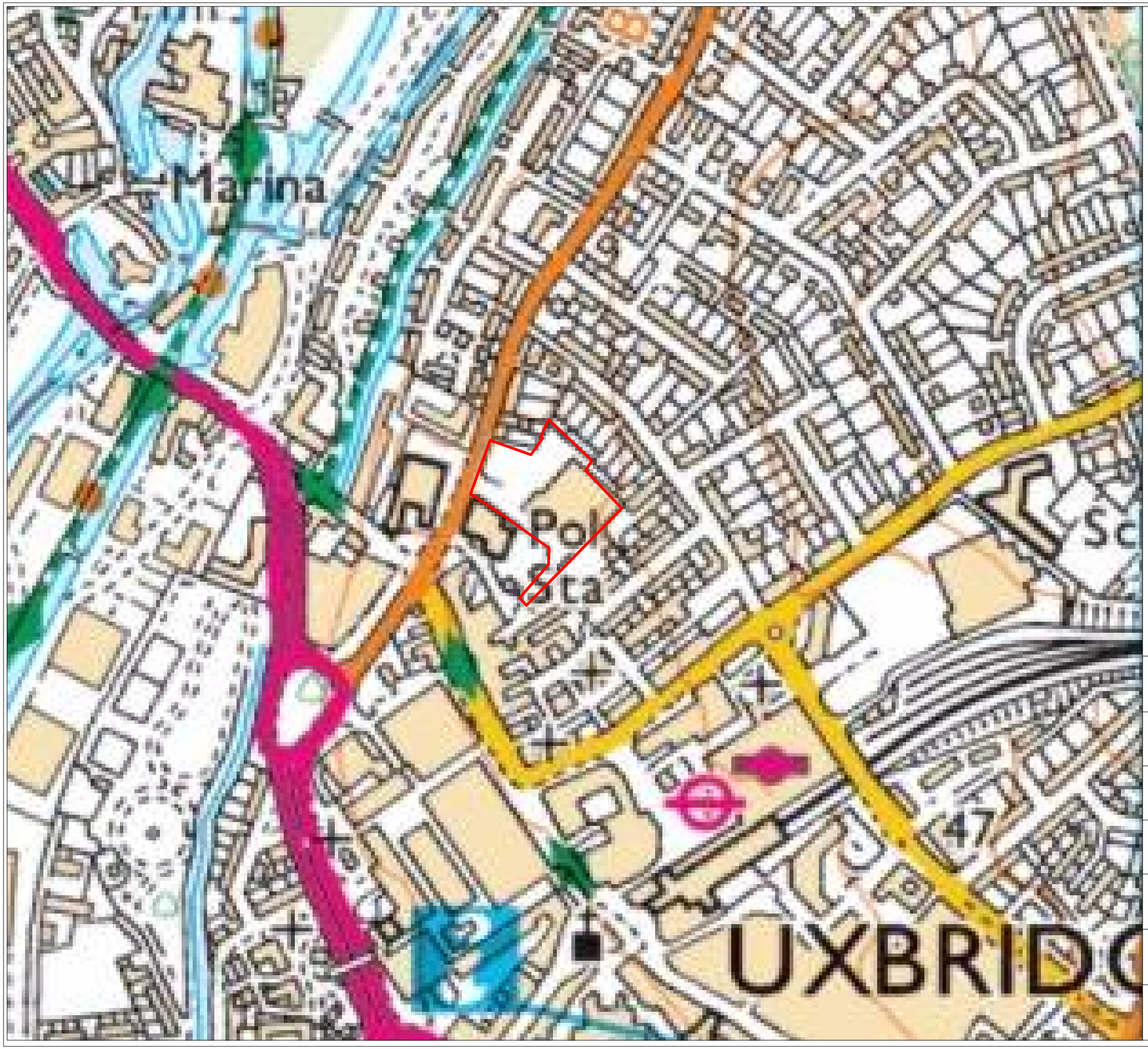
Access and Egress - The site and surrounding area is located within Flood Zone 1 therefore a permanently safe and dry access can be maintained.

8.6 Conclusion

In conclusion, residential apartments, will be expected to remain dry in all but the most extreme conditions. The proposed development will provide betterment compared to the existing situation. Providing the recommendations made in this FRA are instigated, flood risk from all sources will be minimised, the consequences of flooding are acceptable and the development will be in accordance with the requirements of the NPPF.

This FRA demonstrates that the proposed development will be operated with minimal risk from flooding, will not increase flood risk elsewhere and is compliant with the requirements of the NPPF. The development should not therefore be precluded on the grounds of flood risk.

Appendix A – Drawings



KEY

Site Boundary

TIER CONSULT

PROJECT
TL/1306/FRA
Harefield Road, Uxbridge

CLIENT
Guild Living

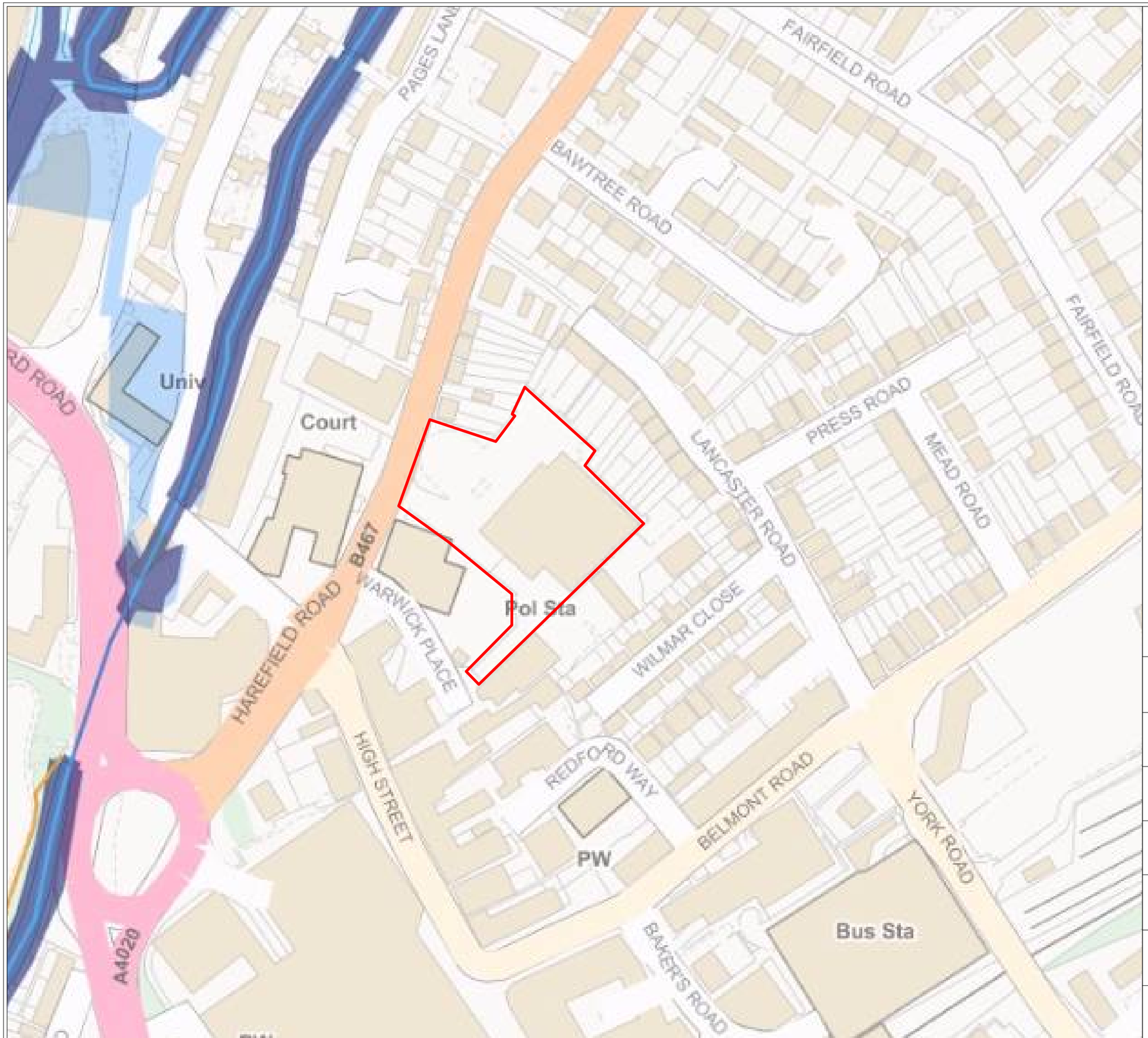
TITLE
Site Location

PROJECT REF
TL/1306/FRA

DRAWING NO
TL/1306/FRA/1

SCALE
NTS@A3

DATE
May 2020

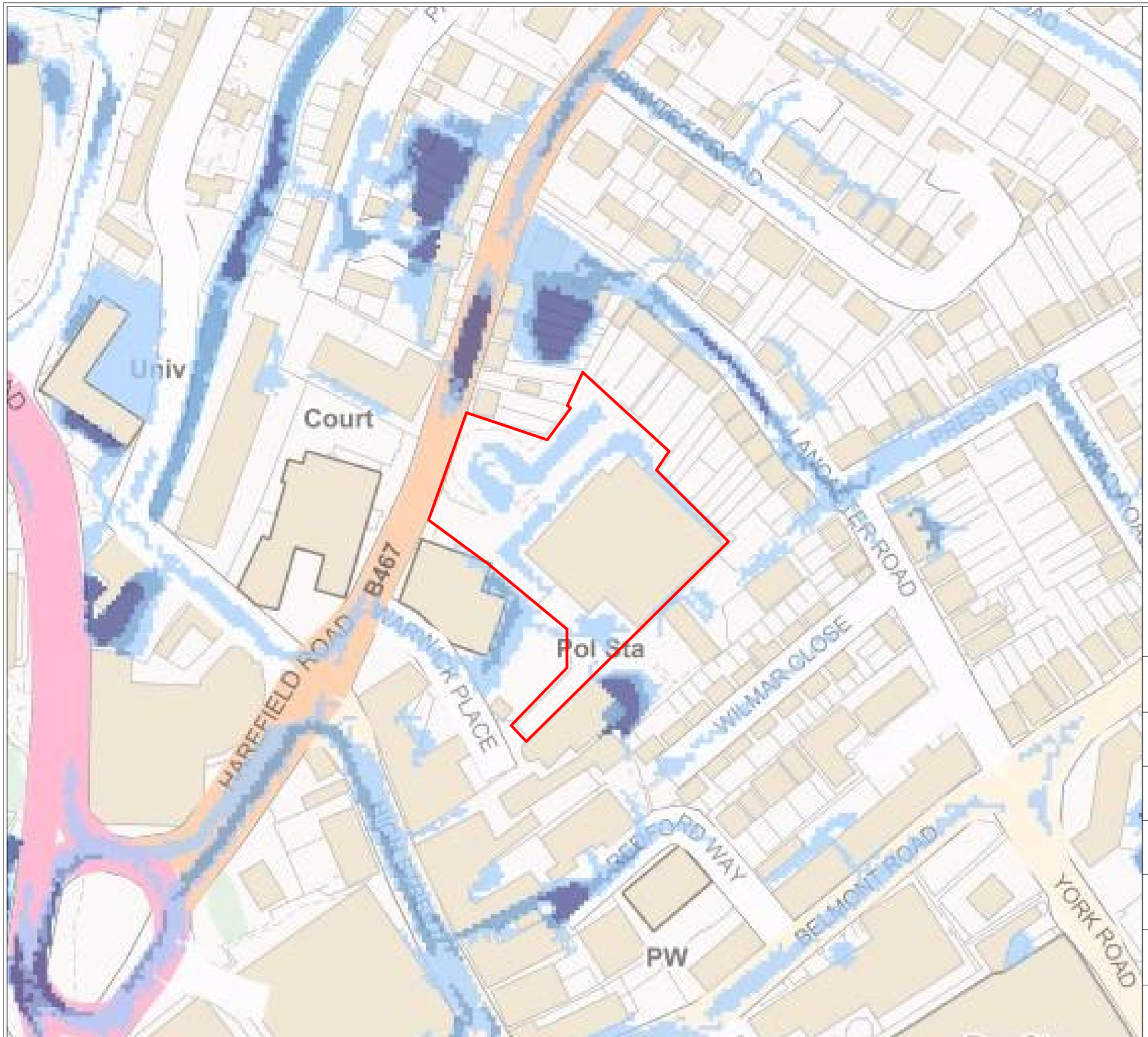


KEY

- Flood Zone 3
- Flood Zone 2
- Flood Zone 1

TIER CONSULT

PROJECT	Harefield Road, Uxbridge
CLIENT	Guild Living
TITLE	Environment Agency Flood Zones
PROJECT REF	TL/1306/FRA
DRAWING NO	TL/1306/FRA/2
SCALE	NTS@A3
DATE	May 2020

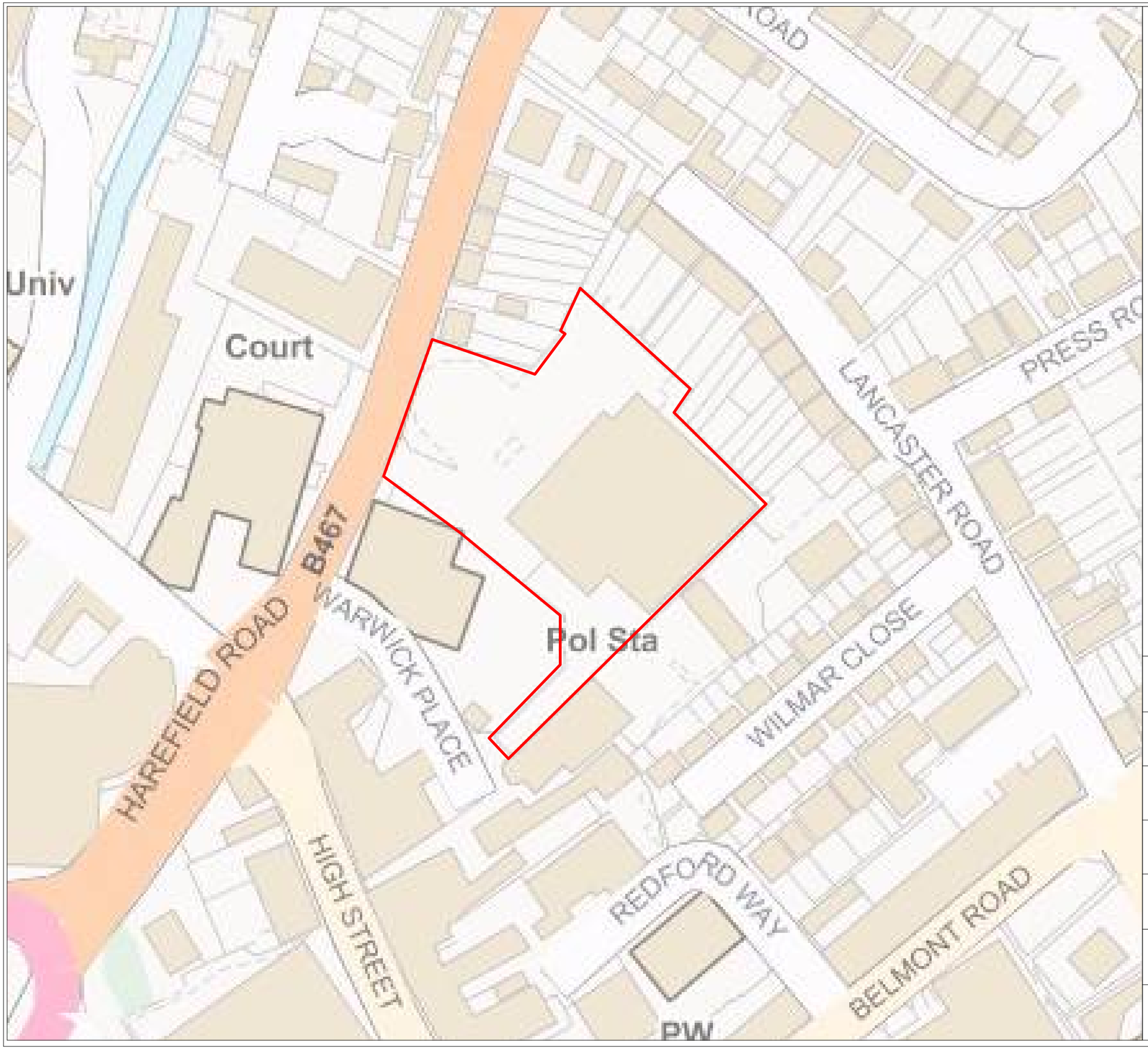


KEY

- Very Low
- Low
- Medium
- High

TIER CONSULT

PROJECT	Harefield Road, Uxbridge
CLIENT	Guild Living
TITLE	Environment Agency Surface Water Flood Map
PROJECT REF	TL/1306/FRA
DRAWING NO	TL/1306/FRA/3
SCALE	NTS@A3
DATE	May 2020



KEY

Reservoir Flood Outline

TIER CONSULT

PROJECT
Harefield Road, Uxbridge

CLIENT
Guild Living

TITLE
Environment Agency Reservoir Flood Map

PROJECT REF
TL/1306/FRA

DRAWING NO
TL/1306/FRA/4

SCALE
NTS@A3

DATE
May 2020

Appendix B – Proposed Site Layout

GENERAL NOTES

This drawing remains the copyright of Andy Sturgeon Garden Design Limited.
All dimensions to be checked prior to commencement of any works, and/or preparation of any shop drawings on site.
Any dimensional discrepancies and alterations to be referred to the designer.

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Iss	Date	Issue notes	Drawn by	Checked by	Approved by
P03	13.08.20	Updated inline with architecture proposals	JW	EE	AS
P02	04.08.20	First Issue	EE	EE	AS
P01	30.06.20	First Issue	JW	EE	AS

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project no.	drawing no.	issue
596	_P_00_100	P03

client: Guild Living

project: Uxbridge

drawing: Ground Floor Masterplan

scale: 1:300@A1
1:600@A3

ISO A1 841mm x 594mm



WORK IN PROGRESS

REV	DATE	DESCRIPTION	BY
1	[illegible]	FOR INFORMATION ONLY	[illegible]

PURPOSE OF ISSUE | STATUS

KEY PLAN

NOTES
1. ALL DIMENSIONS IN MILLIMETERS (mm) AND LEVELS IN METERS (m) ABOVE NATIONAL DATUM
2. DO NOT SCALE FROM THIS DRAWING. ONLY WRITTEN DIMENSIONS SHALL BE USED.
3. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTURAL DRAWINGS AND SPECIFICATIONS AS WELL AS ALL RELEVANT INFORMATION FROM THE STRUCTURAL, MEP AND CIVIL ENGINEERS.
4. THIS DRAWING HAS BEEN PREPARED IN ACCORDANCE WITH THE SCOPE OF APPOINTMENT WITH THE CLIENT AND IS SUBJECT TO THE TERMS OF THAT APPOINTMENT AND SHOULD ONLY BE USED FOR THE PURPOSE FOR WHICH IT IS INTENDED.

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Kuala Lumpur - Auckland - Christchurch - London
Madrid

CLIENT
GUILD LIVING

PROJECT
GUILD LIVING @ UXBRIDGE
2 HAREFIELD ROAD | UXBRIDGE | UB8 1JS

DRAWING TITLE
Ground Floor - Proposed

DISCIPLINE: ARCHITECTURE | SCALE @ A1: 1 : 500

DRAWN	DESIGNED	CHECKED	APPROVED
Author	Designer	Checker	Approver

DRAWING No.: UXB001-MPI-A-20_000 | REV: 1

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