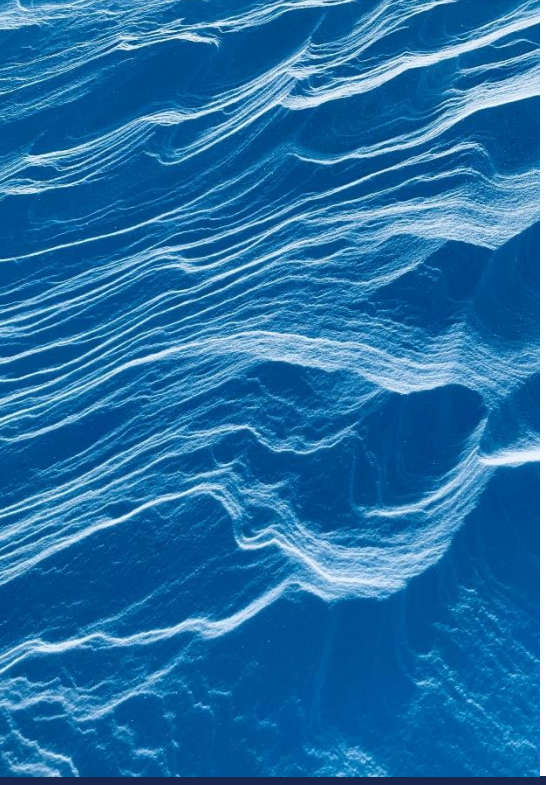

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Flood risk, water and environment

Flood Risk Assessment
AEG02241_UB10_Hillingdon_01

Site Address: 21 The Avenue
Ickenham
Hillingdon
London
UB10 8NR

UK Experts in Flood Modelling, Flood Risk Assessments, and Surface Water Drainage Strategies

aegaea

Flood risk, water and environment

Document Issue Record

Project: Flood Risk Assessment

Prepared for: Hardeep Jhutty

Reference: AEG02241_UB10_Hillingdon_01

Site Location: 21 The Avenue, Ickenham, Hillingdon, London, UB10 8NR

Consultant		Date	Signature
Author	Richard Gazzard	24/03/2023	
Document Check	Daniel Cook	28/03/2023	
Authorisation	Nick Darling-Drewett	31/03/2023	

Rev A - Alterations to the Proposed Plan

Consultant		Date	Signature
Author	Ahmed Alwaal	28/06/2023	
Authorisation	Nick Darling-Drewett	28/06/2023	

Rev B - Alterations to the Proposed Plan

Planning permission was granted for Rev A. The client is now submitting a revised application for a loft conversion and an increase in roof ridge height. The impact of these changes on flood risk is considered negligible given they will be at the roof level.

Consultant		Date	Signature
Author	Ahmed Alwaal	11/07/2023	
Authorisation	Nick Darling-Drewett	11/07/2023	

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Please Note:

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Summary

Development Description	Existing	Proposed
Development Type	A detached residential dwelling.	Loft conversion and an increase in roof ridge height
EA Vulnerability Classification	More Vulnerable	More Vulnerable
Ground Floor Level	Approximately 37.15mAOD to 37.59mAOD based on LiDAR.	No change. FFLs of proposed extension should be set no lower than existing FFLs in line with EA Standing Advice for Minor Developments.
Level of Sleeping Accommodation	First Floor	First and second floors.
Surface Water Drainage	N/A[1]	Runoff from the extension could be discharged via the existing system, given that proposal is a Minor Development. Betterment could be provided through small-scale SuDS such as rainwater planters and water butts.
Site Size	Approximately 1327m^2	No change
Development Size	107m^2	<250m^2
Risk to Development	**Summary**	**Comment**
EA Flood Zone	Flood Zone 1 and 2	Review of the EA Flood Map For Planning shows that the majority of the footprint of the proposed extension lies in Flood Zone 2, however inspection of the West London SFRA Fluvial and Tidal Flood Risk mapping shows that neither the footprint of the proposed extension nor the site are affected by the modelled 1% or 1%+cc events.
Flood Source	N/A	The River Pinn approximately 180m west of the site.
SFRA Available	West London Online SFRA (2018)	
Management Measures	**Summary**	**Comment**

Ground floor level above extreme flood levels	Yes	Inspection of the West London SFRA Fluvial and Tidal Flood Risk mapping shows that neither the footprint of the proposed extension nor the site are affected by the modelled 1% or 1%+cc events. Finished Floor Levels (FFLs) of extension should be set no lower than the existing FFLs in line with EA Standing Advice for Minor Developments
Safe Access/Egress Route	Access/egress potentially affected during the modelled low risk pluvial event	Sign up to the EA Flood Warning and Alert Service - River Pinn at Ickenham Area. Access/ egress arrangements would not differ from existing as proposal is Minor Development.
Flood Resilient Design	Yes	Extension should be constructed in flood resilient manner in accordance with CLG *Report Improving the Flood Performance of New Buildings - Flood Resilient Construction*[1] *(2007).*
Site Drainage Plan	N/A[1]	Runoff from extension could be discharged via existing system given that proposal is Minor Development. Betterment could be provided through small-scale SuDS such as rainwater planters and water butts.
Flood Warning & Evacuation Plan	Yes	Sign up to the EA Flood Warning Service - River Pinn at Ickenham Area.
Offsite Impacts	**Summary**	**Comment**
Displacement of floodwater	Negligible	Proposal is Minor Development which may not result in significant impact of floodplain storage in isolation in

1 https://assets.publishing.service.gov.uk/media/602d673ee90e0709e8d085d8/Improving_the_Flood_Resilience_of_Buildings_Through_Improved_Materials__Methods_and_Details_Technical_Report.pdf

		accordance with paragraph 051 of the Flood Risk and Coastal Change PPG.
Increase in surface run-off generation	N/A	Runoff from extension could be discharged via existing system given that proposal is Minor Development. Betterment could be provided through small-scale SuDS such as rainwater planters and water butts.
Impact on hydraulic performance of channels	Negligible	The development should not affect watercourse.

[1] not required for this assessment [2] data not available.

1. Introduction

1.1. Aegaea were commissioned by Hardeep Jhutty to undertake a Flood Risk Assessment (FRA) to facilitate a planning application for the proposed development. This FRA has been prepared in accordance with the requirements set out in the National Planning Policy Framework (NPPF) and the associated Planning Practice Guidance.

1.2. This FRA is intended to support a full planning application and as such the level of detail included is commensurate and subject to the nature of the proposals.

Site Overview

1.3. The site of the proposed development is 21 The Avenue, Ickenham, Hillingdon, London, UB10 8NR (Figure 1).

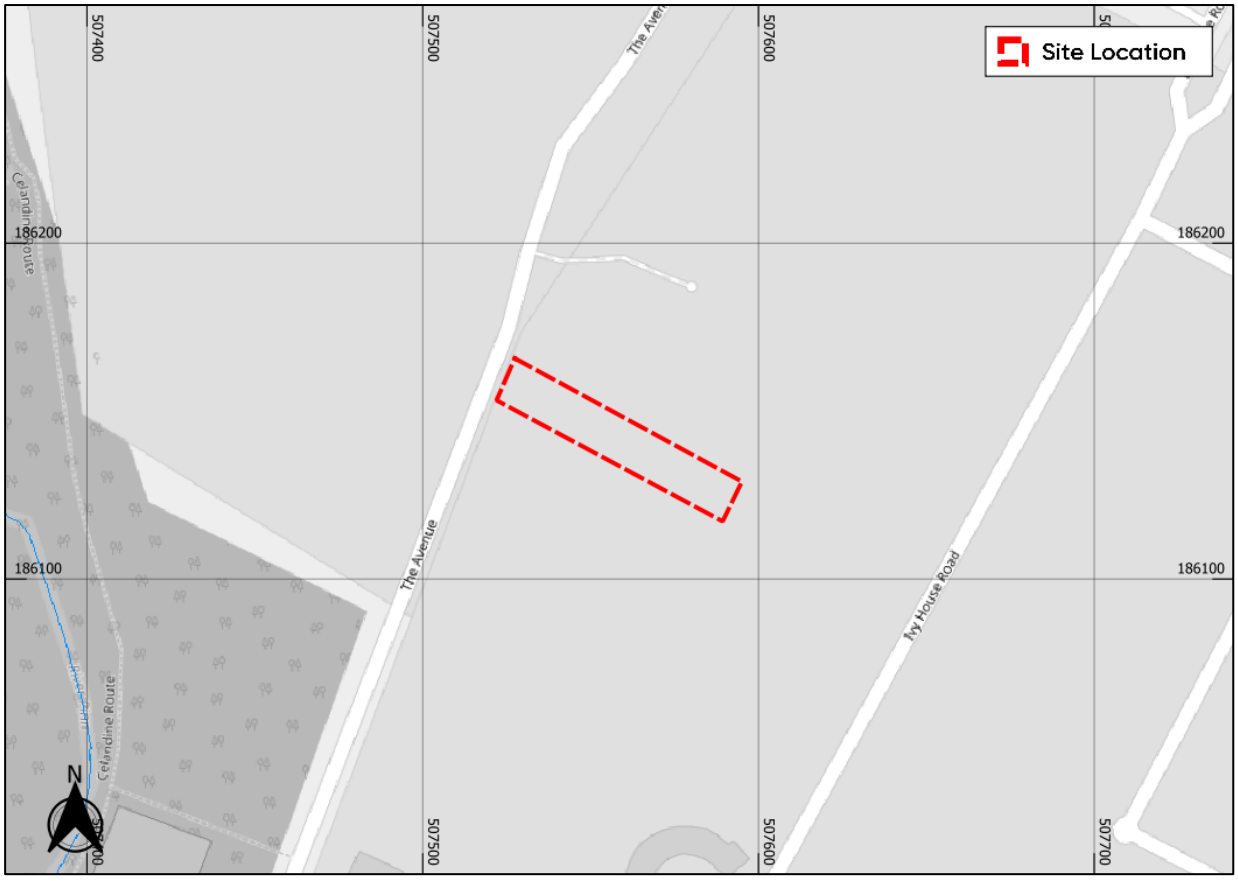

Figure 1: Site Location Mapping (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © https://www.openstreetmap.org and contributors).

1.4. The proposed development is for the construction of an extension and alterations to the existing dwelling on site to provide greater habitable space and as such, is classed as a minor development.

1.5. Note that a previous planning application has been approved. However, the client is submitting a new full planning application for a loft conversion and increase of the ridge height. **The impact of these changes on flood risk is considered negligible given they will be at the roof level.** The extension and alterations are illustrated in Figure 2. A full set of development proposals can be found in Appendix A of this report.

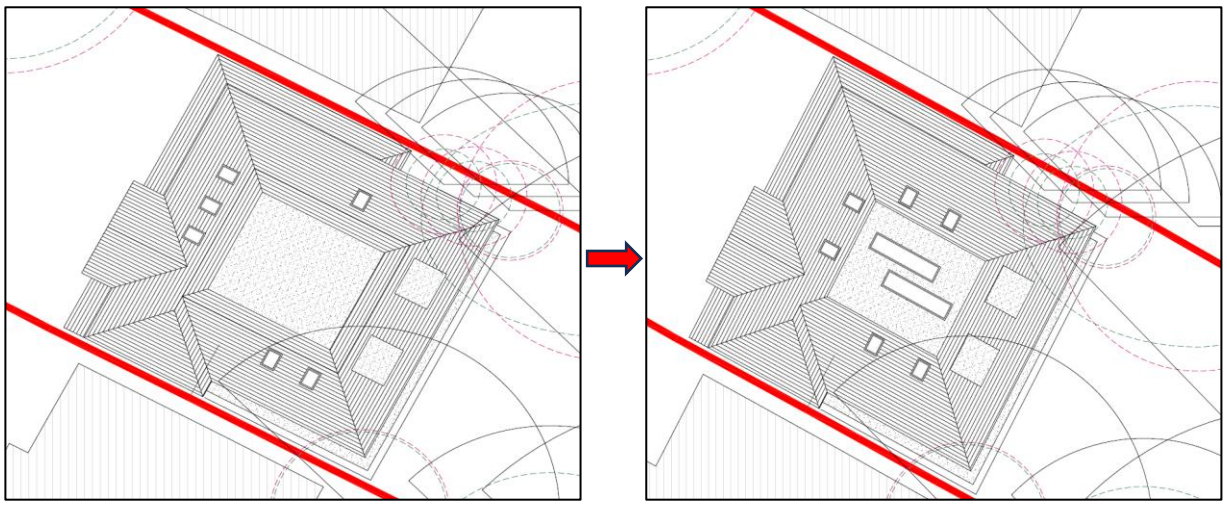

Figure 2: Previous Design vs New Proposed Design

1.6. In the absence of a topographical survey, Environment Agency Light Detection and Ranging (LiDAR) data Digital Terrain Model (1m resolution) has been used to review the topography of the site. The LiDAR data shows the ground elevation of the site varies between approximately 37.15mAOD (metres Above Ordnance Datum) and 37.59mAOD. Analysis of topographic levels indicates that the site generally slopes with a fall to the south-east (Figure 3).

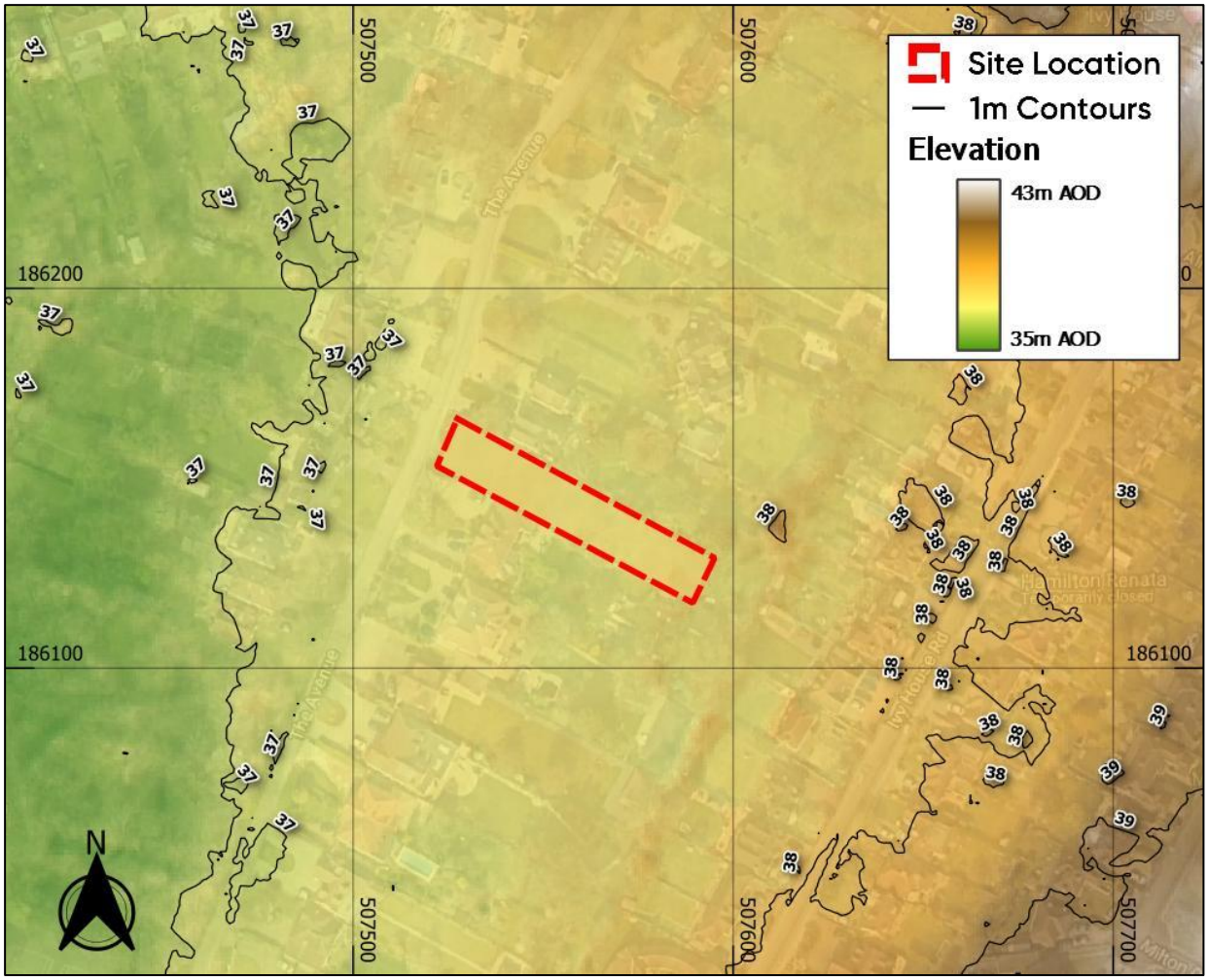

Figure 3: Site Topography Mapping (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © https://www.openstreetmap.org and contributors. Contains public sector information licensed under the Open Government Licence v3.0.

1.7. Hillingdon Council is the Local Planning Authority (LPA) for the site, and also the designated Lead Local Flood Authority (LLFA). The site sits within the Environment Agency's Hertfordshire and North London region.

Planning Policy and Guidance

1.8. UK government planning guidance states[2] that an FRA is required for developments which are:

- *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*

1.9. The site is partially in Flood Zone 2 therefore the NPPF states that an FRA is required.

1.10. The objective of this FRA is to demonstrate that the proposals are acceptable in terms of flood risk. This report summarises the findings of the study and specifically addresses the following issues in the context of the current legislative regime:

- Fluvial flood risk
- Surface water flood risk
- Risk of flooding from other sources

[2] https://www.gov.uk/guidance/flood-risk-assessment-for-planning-applications#when-you-need-an-assessment

2. Planning Policy

2.1. Inappropriate development in a flood risk area could pose significant risk in terms of personal safety and damage to property for the occupiers of the development or for people elsewhere. The approach taken in the assessment of flood risk at the planning stage is set out in national, regional, and local planning policy and associated guidance. This section summarises the key policies and guidance relevant to the proposed development.

National Planning Policy Framework (NPPF)

2.2. The National Planning Policy Framework[3] (NPPF) (DLUHC, 2021) which includes UK Government policy on development and flood risk states:

> *"159. 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.*
>
> *167. 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. 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:*
>
> *a) 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;*
>
> *b) 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;*
>
> *c) it incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate;*

[3] https://www.gov.uk/guidance/national-planning-policy-framework, **last updated July 2021**

d) any residual risk can be safely managed; and

e) safe access and escape routes are included where appropriate, as part of an agreed emergency plan.

168. Applications for some minor development and changes of use should not be subject to the sequential or exception tests but should still meet the requirements for site-specific flood risk assessments set out in footnote 55. "

2.3. Paragraph 051 of the Flood Risk and Coastal Change Planning Practice Guidance (PPG) states:

Minor development means:

- *minor non-residential extensions (industrial/commercial/leisure etc): extensions with a floorspace not in excess of 250 square metres.*
- *alterations: development that does not increase the size of buildings, e.g. alterations to external appearance.*
- *householder development: for example, sheds, garages, games rooms etc within the curtilage of the existing dwelling,* ***in addition to physical extensions to the existing dwelling itself.*** *This definition excludes any proposed development that would create a separate dwelling within the curtilage of the existing dwelling (eg subdivision of houses into flats) or any other development with a purpose not incidental to the enjoyment of the dwelling.*

2.4. As such, the proposal would be considered a Minor Development under the PPG.

2.5. Footnote 55 of the NPPF states:

"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."

2.6. Flood Zones in England are defined as follows:

Table 1: Flood Zone Definitions

Flood Zone	Definition
Zone 1 Low Probability	Land having less than 1 in 1,000 annual probability of river or sea flooding (all land outside Zones 2 and 3).
Zone 2 Medium Probability	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding.
Zone 3a High Probability	Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding.
Zone 3b The Functional Floodplain	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; or land 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)

2.7. An FRA should be appropriate to the scale, nature, and location of the development. It should identify and assess the risk from all sources of flooding to and from the development and demonstrate how any flood risks will be managed over the lifetime of the development.

The London Plan

2.8. The London Plan prepared by the Greater London Authority in 2021 sets out the policies for development in the region.

2.9. Policy SI 12 Flood risk management outlines the requirements for new development within the region. It states:

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

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

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

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

- E. Development proposals for utility services should be designed to remain operational under flood conditions and buildings should be designed for quick recovery following a flood. - F. Development proposals adjacent to flood defences will be required to protect the integrity of flood defences and allow access for future maintenance and upgrading. Unless exceptional circumstances are demonstrated for not doing so, development proposals should be set back from flood defences to

allow for any foreseeable future maintenance and upgrades in a sustainable and cost-effective way.

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

Hillingdon Local Plan: Part 1 Strategic Policies

2.10. The Local Plan prepared by the Local Planning Authority, Hillingdon Council, sets out the policies for development in the local area.

2.11. Policy EM6 Flood Risk Management outlines the requirements for new development within the area. It states:

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.

Sequential and Exception Tests

2.12. The Sequential and Exception Tests are applied in specific cases defined by UK Government policy. Their purpose is to drive development to areas of low flood risk and to support developments which improve flood risk for developments in areas at risk of flooding.

2.13. Under the NPPF all new planning applications should undergo a Sequential Test accordance with paragraph 168 and footnotes 55 and 56. This test should be implemented by local planning

authorities with a view to location particularly vulnerable new developments outside of the floodplain.

2.14. Paragraph 168 of the NPPF states:

> *168. Applications for some minor development and changes of use should not be subject to the sequential or exception tests but should still meet the requirements for site-specific flood risk assessments set out in footnote 55.*

2.15. As such, a site-specific Sequential Test and Exception Test for the proposed developments is not considered necessary in line with the NPPF given that the proposal is for a Minor Development (in terms of flood risk).

Summary

2.16. This flood risk assessment has been prepared with due consideration to the above local and national policy.

3. Document Review

Documents and Online Mapping

3.1. The site is within the remit of Hillingdon Council as Lead Local Flood Authority (LLFA).

3.2. Local Governments and Lead Local Flood Authorities provide documents which contain data and policies on flood risk and new development in their areas. These documents are introduced and briefly summarised below. For the purposes of this FRA, these documents have been reviewed for relevant information and any relevant data is discussed within the appropriate sub heading of this report.

3.3. The following sources of information have been reviewed for this assessment:

- Flood Map for Planning on the Environment Agency website *https://flood-map-for-planning.service.gov.uk/*
- Long Term Flood Risk Information on the Environment Agency website *https://www.gov.uk/check-long-term-flood-risk*
- National Planning Policy Framework (NPPF) (Department for Levelling Up, Housing and Communities, 2021)
- Planning Practice Guidance - Flood Risk and Coastal Change (Department for Levelling Up, Housing and Communities, 2022)
- The London Plan (Greater London Authority, 2021)
- Geoindex Onshore (British Geological Survey, 2022)
- Local Plan: Part 1 - Strategic Policies (Hillingdon Council, 2012)[4]
- Preliminary Flood Risk Assessment (Hillingdon Council, 2011)[5]
- West London Strategic Flood Risk Assessment (Hillingdon Council, 2018)[6]

[4]https://www.hillingdon.gov.uk/media/3080/Local-Plan-Part-1---Strategic-Policies/pdf/Local_Plan_Part_1_Strategic_Policies_15_feb_2013_a_1_1.pdf?m=1598370401647

[5] https://modgov.hillingdon.gov.uk/documents/s8734/Appendix%20-%20Flood%20Appraisal.pdf

[6] https://westlondonsfra.london/

- Local Flood Risk Management Strategy 2015 (Hillingdon Council, 2016)[7]

Preliminary Flood Risk Assessment (PFRA)

3.4. The PFRA, published in 2011, is a high-level appraisal of flood risk across Lead Local Flood Authority Hillingdon Council. The flood risk from all sources, including fluvial, surface water, groundwater and surcharged sewers is evaluated. It is the basis upon which the Local Flood Risk Management Strategy is produced.

3.5. The PFRA summarises historical flood incidents in Hillingdon Council. The site is not recorded as having been affected by any flood event.

Strategic Flood Risk Assessment (SFRA)

3.6. The SFRA, published in 2018, provides the evidence base for the Local Planning Authority Hillingdon Council Local Plan and guidance for consideration when determining planning applications. The SFRA seeks to place new development into areas of lower flood risk taking into account current flood risk, future flood risk, and the effect a proposed development would have on the risk of flooding.

3.7. The SFRA mapping provided by Hillingdon Council has been used throughout production of this report as a source of information, particularly pertaining to historical flood incidents.

Local Flood Risk Management Strategy (LFRMS)

3.8. The Local Flood Risk Management Strategy sets out roles and responsibilities for flood risk management, assesses the risk of flooding in the area, where funding can be found to manage flood risk, and the policies, objectives and actions of the Lead Local Flood Authority. The Hillingdon Council LFRMS is used within this report to identify any flood management infrastructure and historical incidences of flooding.

[7]https://www.hillingdon.gov.uk/media/4499/Local-Flooding-Risk-Management-Strategy/pdf/Appendix_A_-_Local_Flood_Risk_Management_Strategy_2016_1.pdf?m=1610451478887

4. Sources of Flood Risk

Fluvial

4.1. Flooding from watercourses arises when flows exceed the capacity of the channel, or where a restrictive structure is encountered, resulting in water overtopping the banks into the floodplain.

Main Rivers and Ordinary Watercourses

4.2. The River Pinn flows north to south approximately 180m to the west of the site and the Ickenham Stream flows north to south approximately 650m to the east of the site.

4.3. There are no other watercourses in the vicinity of the site.

Historical Fluvial Flooding

4.4. The site is almost entirely outside the extent of EA historical flood mapping (Figure 4). Additionally, mapping within the Hillingdon Council PFRA (2011) shows no record of historical fluvial flood incidents within the vicinity of the site.

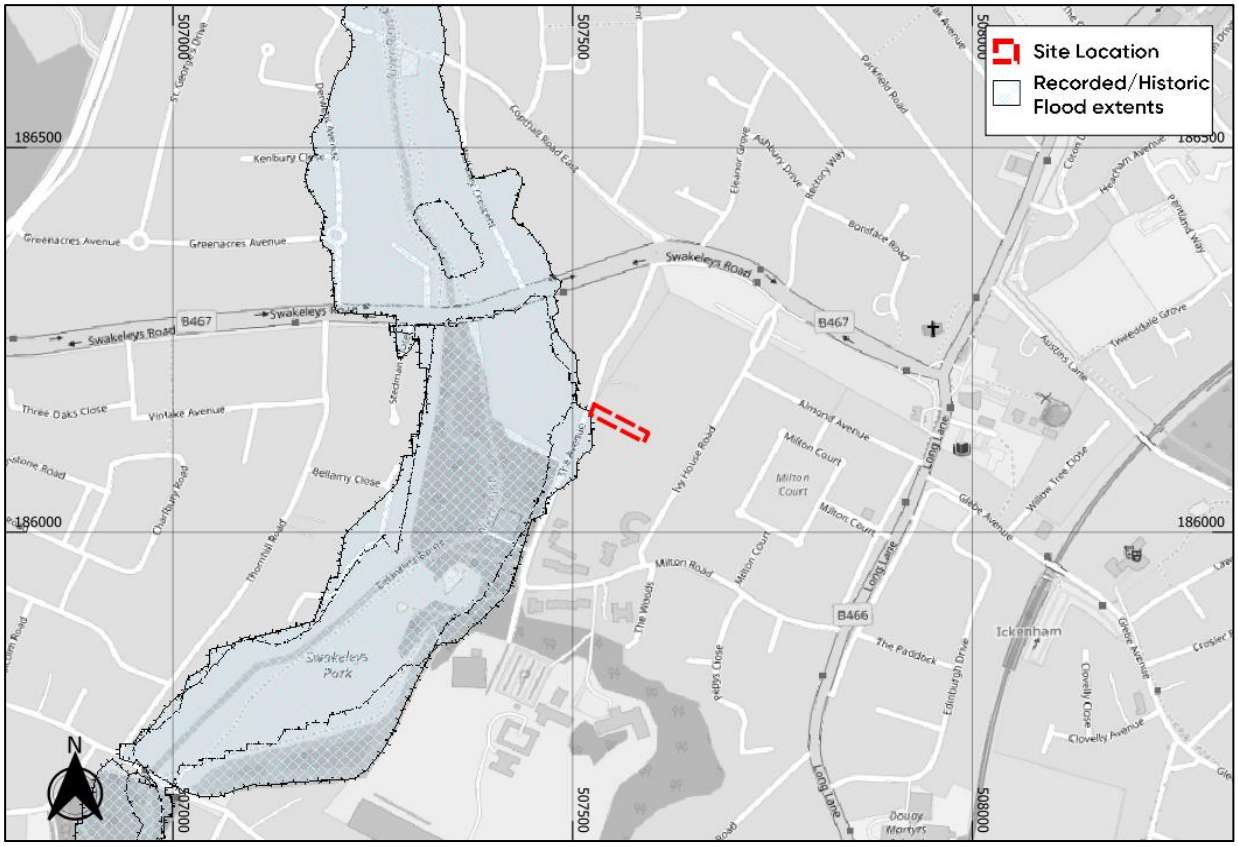

Figure 4: EA Historic Flood Mapping (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © https://www.openstreetmap.org and contributors. Contains public sector information licensed under the Open Government Licence v3.0).

EA Flood Map for Planning

4.5. The site is located within Flood Zone 1 and 2 according to the EA Flood Map for Planning (Figure 5). Flood Zone 2 denotes a risk of flooding from fluvial sources between a 1 in 100 (1%) and 1 in 1,000 (0.1%). Flood Zone 1 is denoted as land having less than 1 in 1,000 (0.1%) annual probability of river or sea flooding.

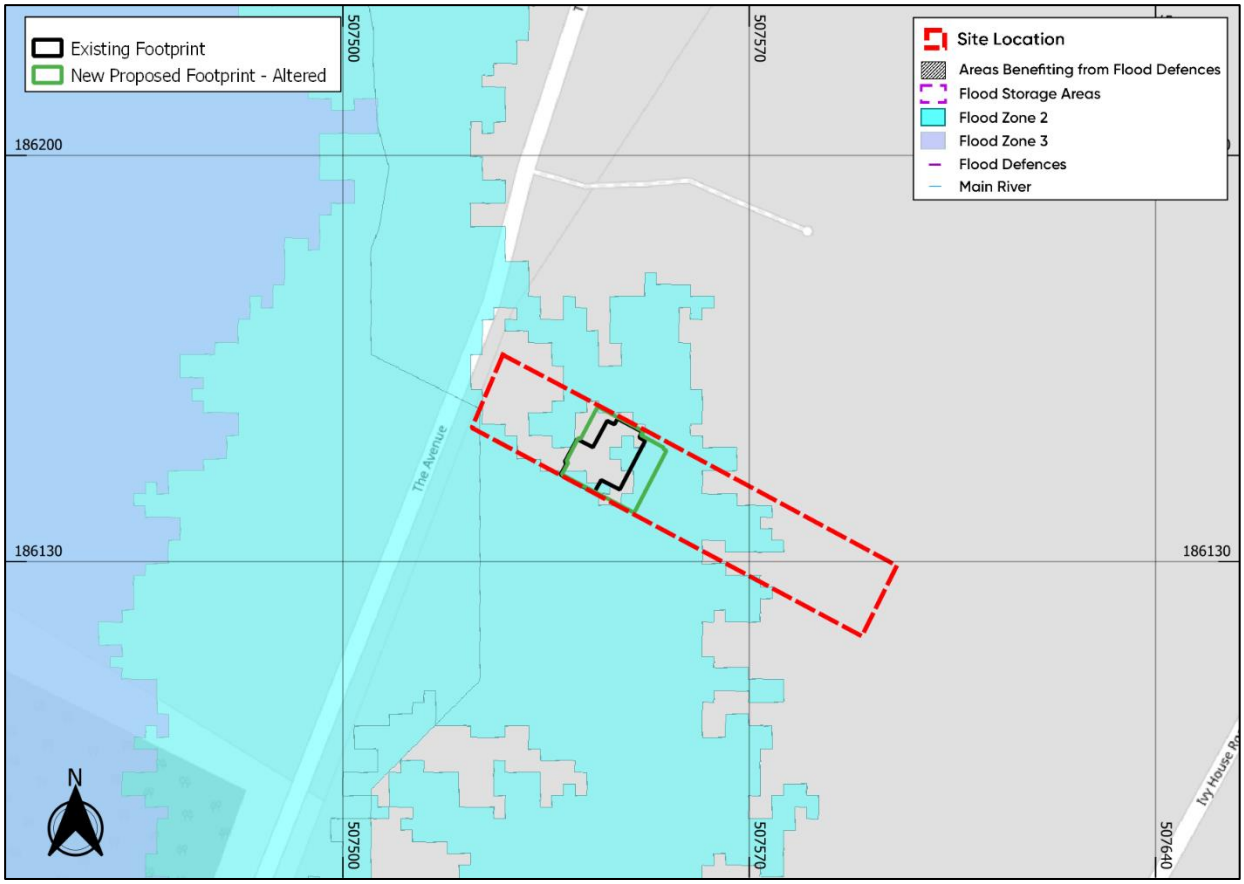

Figure 5: EA Flood Zone (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © https://www.openstreetmap.org and contributors. Contains public sector information licensed under the Open Government Licence v3.0).

Climate Change

4.6. The site lies in the EA Colne Management Catchment for which the climate change central allowance for peak river flow, applicable for 'more vulnerable' developments, is stated as 21%.

4.7. The West London SFRA Fluvial and Tidal Flood Risk Map (online) shows the site to be entirely outside the flood extent of the River Pinn 1:100 year flood extent (Figure 6). It also shows the site to be outside the flood extent of the River Pin 1:100+25%cc climate change allowance which has been used as a conservative estimate for the 1:100+21%cc (Figure 7).

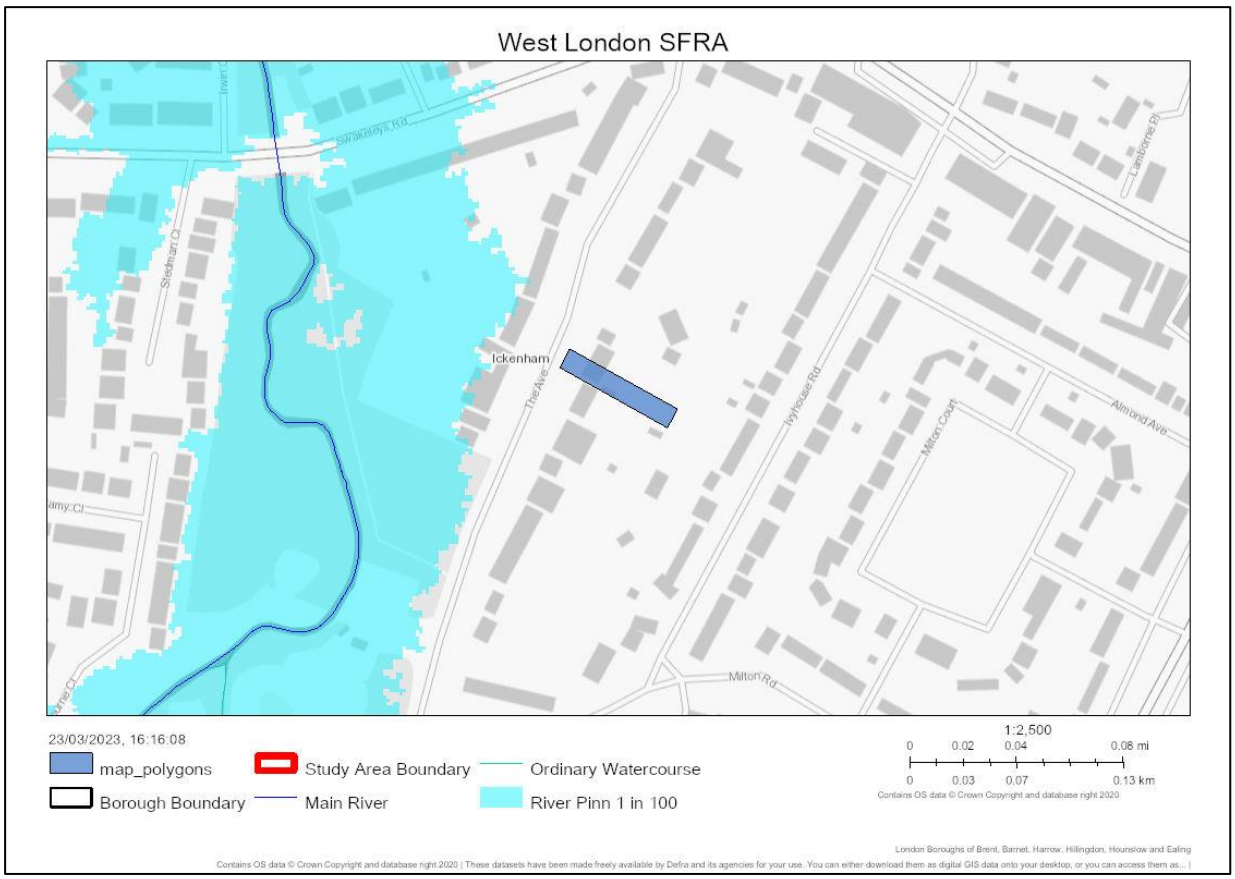

Figure 6: 1:100 year Fluvial flood extent (source: West London SFRA; available from: https://westlondonsfra.london/).

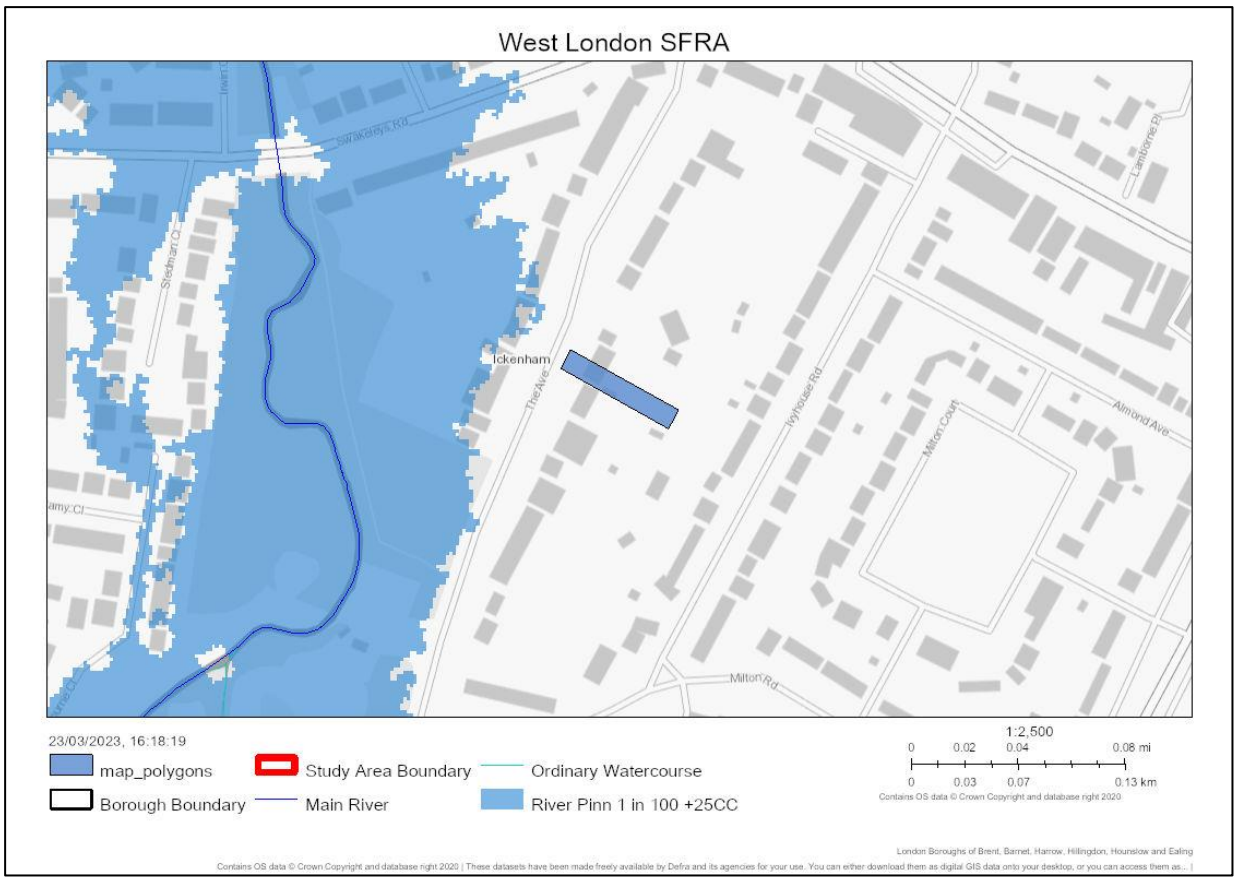

Figure 7: 1:100+25%cc year Fluvial flood extent (source: West London SFRA; available from: https://westlondonsfra.london/).

4.8. The West London SFRA does not include a 1:1000 year extent on the River Pinn. However, as the site is in Flood Zone 2, which is derived in part using the recorded flood outlines and part using detailed modelling, the site is partially affected in the modelled 1:1000 year event although depths cannot be quantified at the time of writing.

4.9. As such, based on the EA Flood Map for Planning and data reviewed as part of the West London SFRA, the risk of flooding from fluvial sources is considered moderate.

4.10. The development proposals constitute a 'Minor Development' and so, in line with the EA Standing Advice for Minor Developments, the Finished Floor Levels (FFLs) of the proposed extensions should be set no lower than the existing dwelling FFLs. This is discussed further along with other mitigation strategies in section 5 of this SFRA.

Tidal

4.11. Tidal flooding occurs when a high tide and high winds combine to elevate sea levels. An area behind coastal flood defences can still flood if waves overtop the defences or break through them. Tidal flooding can also occur a long way from the coast by raising river levels. Water may overtop the riverbank or river defences when tide levels are high.

4.12. The site is a significant distance from any tidal source and above the anticipated extreme tidal levels, even when considering the impacts of climate change. Therefore, the risk of flooding from tidal sources is considered low.

4.13. There is no record of historical tidal or sea flooding.

Canals

4.14. The Canal and River Trust (CRT) generally maintains canal levels using reservoirs, feeders, and boreholes and manages water levels by transferring it within the canal system.

4.15. Water in a canal is typically maintained at predetermined levels by control weirs. When rainfall or other water enters the canal, the water level rises and flows out over the weir. If the level continues rising it will reach the level of the storm weirs. The control weirs and storm weirs are normally designed to take the water that legally enters the canal under normal conditions. However, it is possible for unexpected water to enter the canal or for the weirs to become obstructed. In such instances the increased water levels could result in water overtopping the towpath and flowing onto the surrounding land.

4.16. Flooding can also occur where a canal is impounded above surrounding ground levels and the retaining structure fails.

4.17. There are no canals identified within 1000m of the site. The risk of flooding to this site from canals is considered to be low.

Pluvial

4.18. Pluvial flooding can occur during prolonged or intense storm events when the infiltration potential of soils, or the capacity of drainage infrastructure is overwhelmed leading to the accumulation of surface water and the generation of overland flow routes.

4.19. Annual surface water flood risk is labelled by the EA as:

- 'High Risk'; >3.3% AEP (annual probability greater than 1 in 30).
- 'Medium Risk'; 1.1% to 3.3% AEP (annual probability between 1 in 100 and 1 in 30).
- 'Low Risk'; 0.1% to 1% AEP (annual probability between 1 in 1000 and 1 in 100).
- 'Very Low Risk'; <0.1% AEP (annual probability less than 1 in 1000).

4.20. Review of the EA's Flood Risk from Surface Water mapping for High Risk, Medium Risk and Low Risk AEP flood events indicates that the site would remain unaffected in the modelled 1:30 year (high risk) and 1:100 year (medium risk) events (Figure 8).

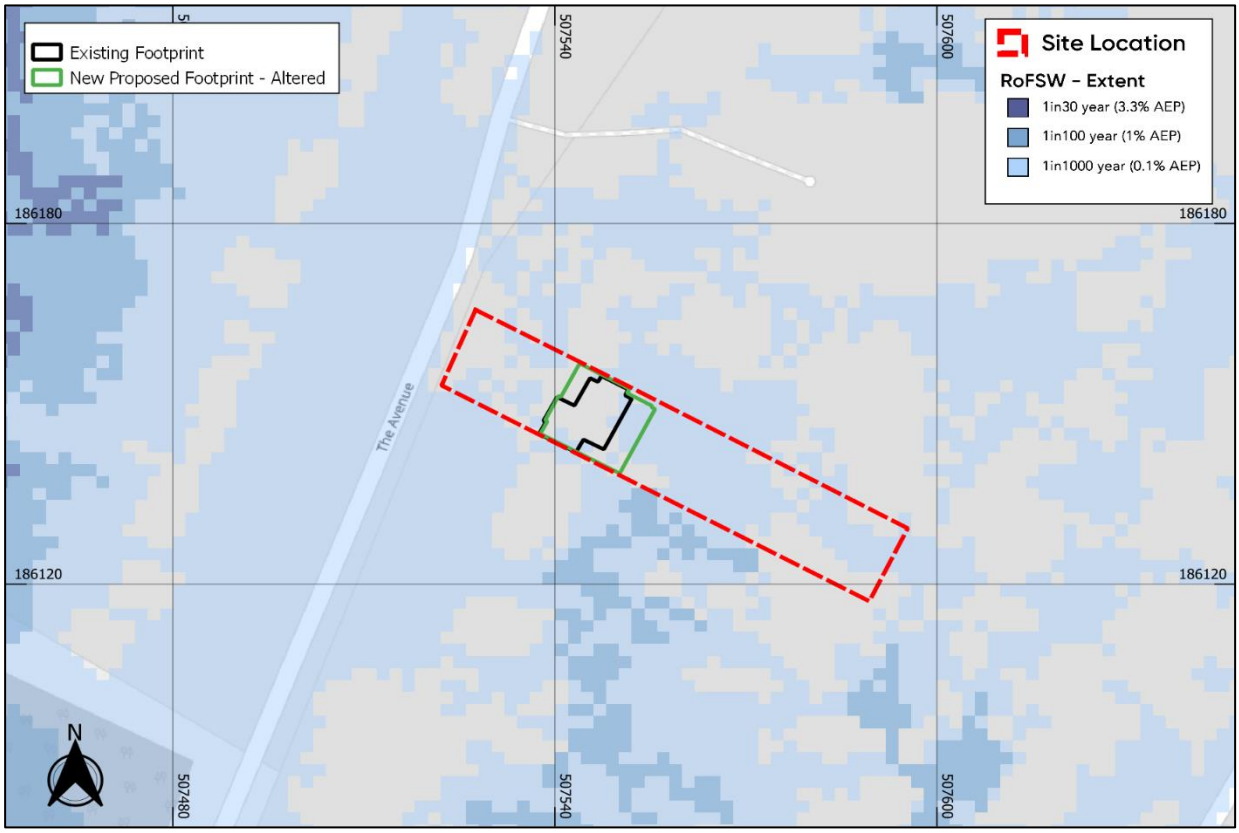

Figure 8: EA Surface Water Flood Risk Mapping Scenario (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © https://www.openstreetmap.org and contributors. Contains public sector information licensed under the Open Government Licence v3.0).

4.21. However, model results show that the site would experience flood depths of up to 600mm during the modelled 1:1000 year (low risk) event (Figure 9) with depths of up 300mm affecting the footprint of the proposed development.

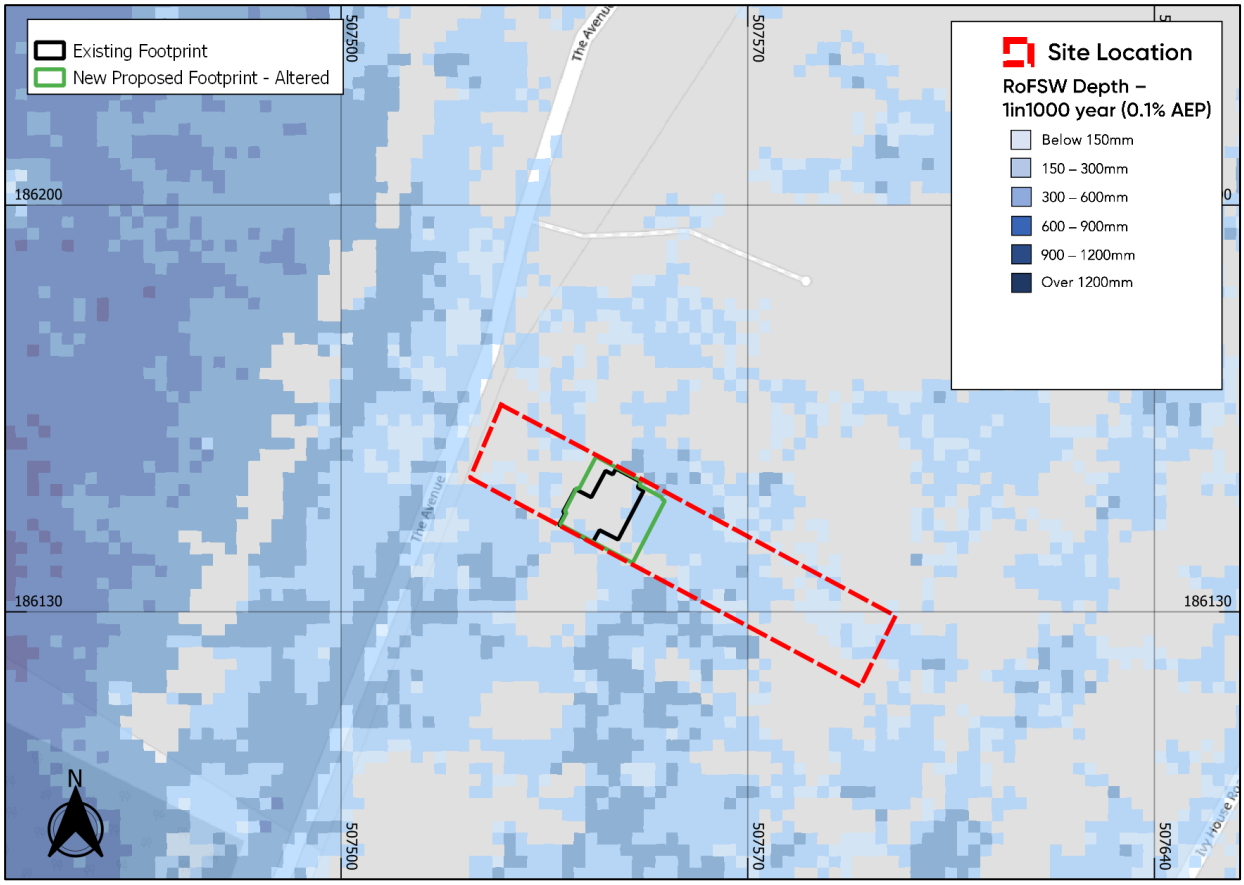

Figure 9: EA Surface Water Flood Risk Mapping-Flood Depths for 0.1% AEP event Scenario (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © https://www.openstreetmap.org and contributors. Contains public sector information licensed under the Open Government Licence v3.0).

4.22. The Avenue, which serves as the only access road to the site, is shown to be affected during the modelled low risk pluvial event with depths up to 300mm and EA Hazard rating indicating conditions of 'Danger to Some' immediately in front of the site (Figure 10). Therefore, in such conditions, access and egress are affected. If it evacuation is prior to the onset of flooding when conditions are safe, it is recommended that residents head north along The Avenue where model results indicate depths are lower; otherwise residents should seek safe refuge within the property until flooding recedes and conditions return to a safe level.

4.23. It is also important to note that access/ egress arrangements would not differ from the existing as the proposal is a Minor Development.

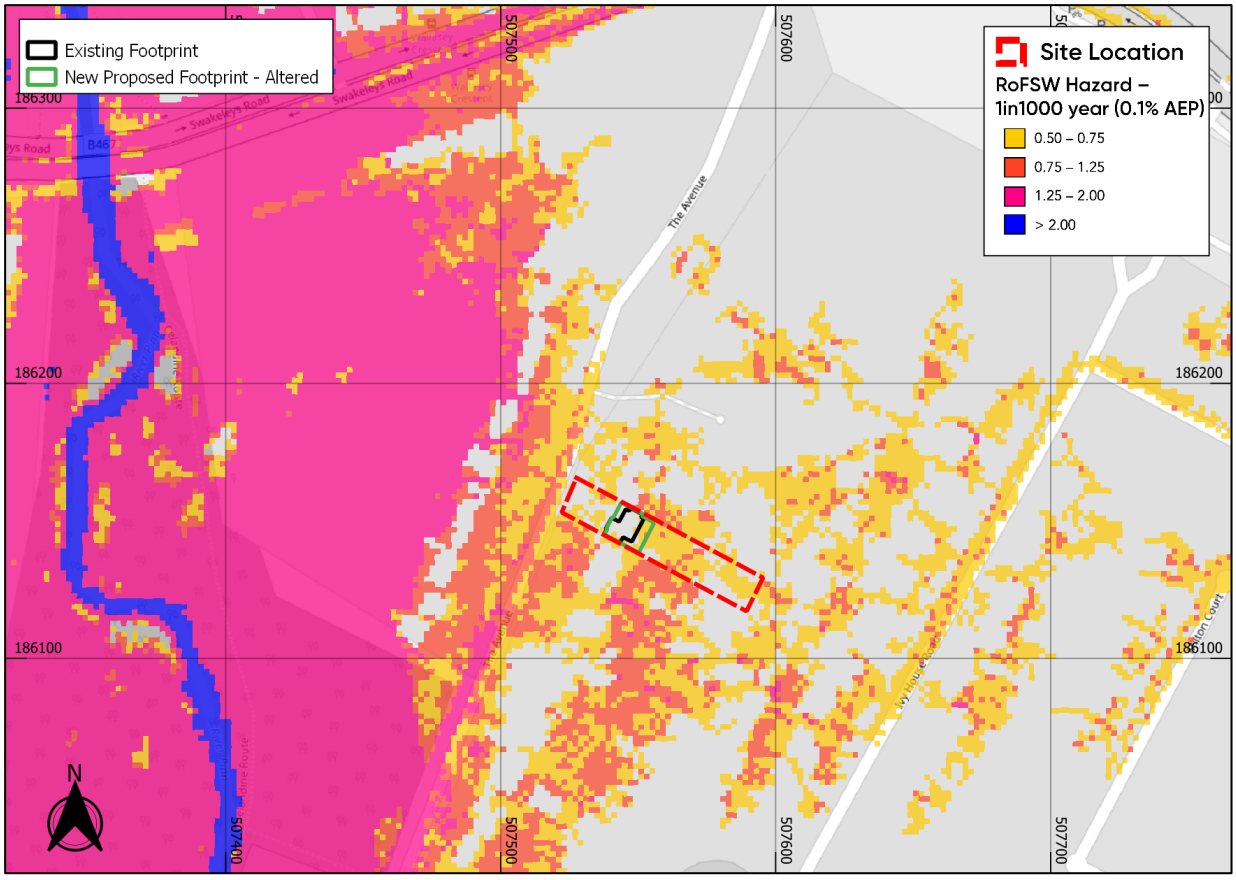

Figure 10: EA Surface Water Flood Risk Mapping – Hazard map for the 0.1% AEP event Scenario (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © https://www.openstreetmap.org and contributors. Contains public sector information licensed under the Open Government Licence v3.0).

4.24. The site is only affected during the modelled low risk pluvial event and therefore, the risk of flooding from pluvial sources is considered low.

Reservoirs

4.25. Flooding can occur from large waterbodies or reservoirs if they are impounded above the surrounding ground levels or are used to retain floodwater. Although unlikely, reservoirs and large waterbodies could overtop or breach leading to rapid inundation of the downstream floodplain.

4.26. According to the EA's Flood Risk from Reservoirs mapping the site is at risk of flooding in the event of a breach at the George V FSA and Ruislip Lido reservoirs (Figure 11). The worst reservoir failure model is a 'wet day' scenario meaning that it would have to happen at the same time as other flooding for there to be enough water to reach the site.

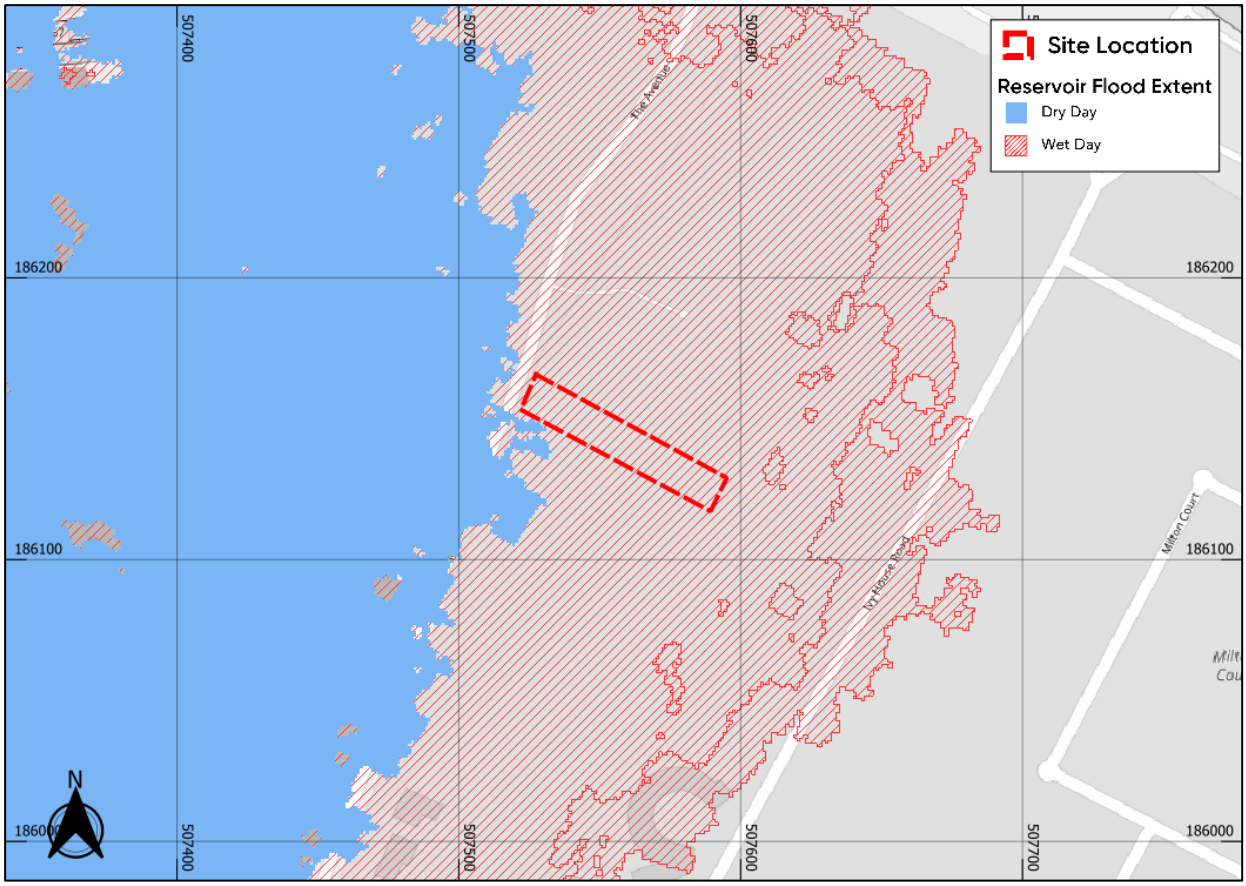

Figure 11: EA Reservoir Flood Risk Mapping (Source: Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA) © https://www.openstreetmap.org and contributors. Contains public sector information licensed under the Open Government License v3.0).

4.27. All large reservoirs must be inspected and supervised by reservoir panel engineers as detailed by the Reservoirs Act 1975 in England and Wales. The EA are responsible to ensure that reservoirs are inspected regularly, and essential safety work carried out. As reservoirs are highly managed the maximum flood extent provided in the EA Risk of Flooding from Reservoirs mapping is considered a worst-case scenario. As reservoir flooding is unlikely and the modelled flood depths are based on the worst-case scenario, flooding from this source may be considered as a relatively low risk. Although to be precautionary flood resilient design and building practices could be implemented to further reduce risk.

Groundwater

4.28. Groundwater flooding occurs in areas where underlying geology is permeable, and water can rise within the strata sufficiently to breach the surface.

4.29. British Geological Survey's (BGS) mapping cannot identify the superficial deposits underlying the site but records the bedrock composition has been found to be Lambeth Group Clay comprised of clay silt and sand. This formation is designated a 'Secondary A Aquifer' which comprise 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. This suggests water would not be able to reach the surface, but the gravel/sand strata may possess perched water.

4.30. The closest historical BGS boreholes to the site (ref: TQ08NE164 - approximately 320 southwest of the site) recorded boring through chalk but did not record the groundwater level.

4.31. The PFRA contains mapping of areas with potential for elevated groundwater levels (Figure 12). The site is shown to be neither on permeable superficial deposits nor on a consolidated aquifer. Additionally, the map shows that there are no recorded groundwater flooding incidents in the vicinity of the site in any records.

4.32. Furthermore, the West London SFRA (2018) indicates that the site is within a 1km grid square of which <25% is considered to be susceptible to groundwater flooding.

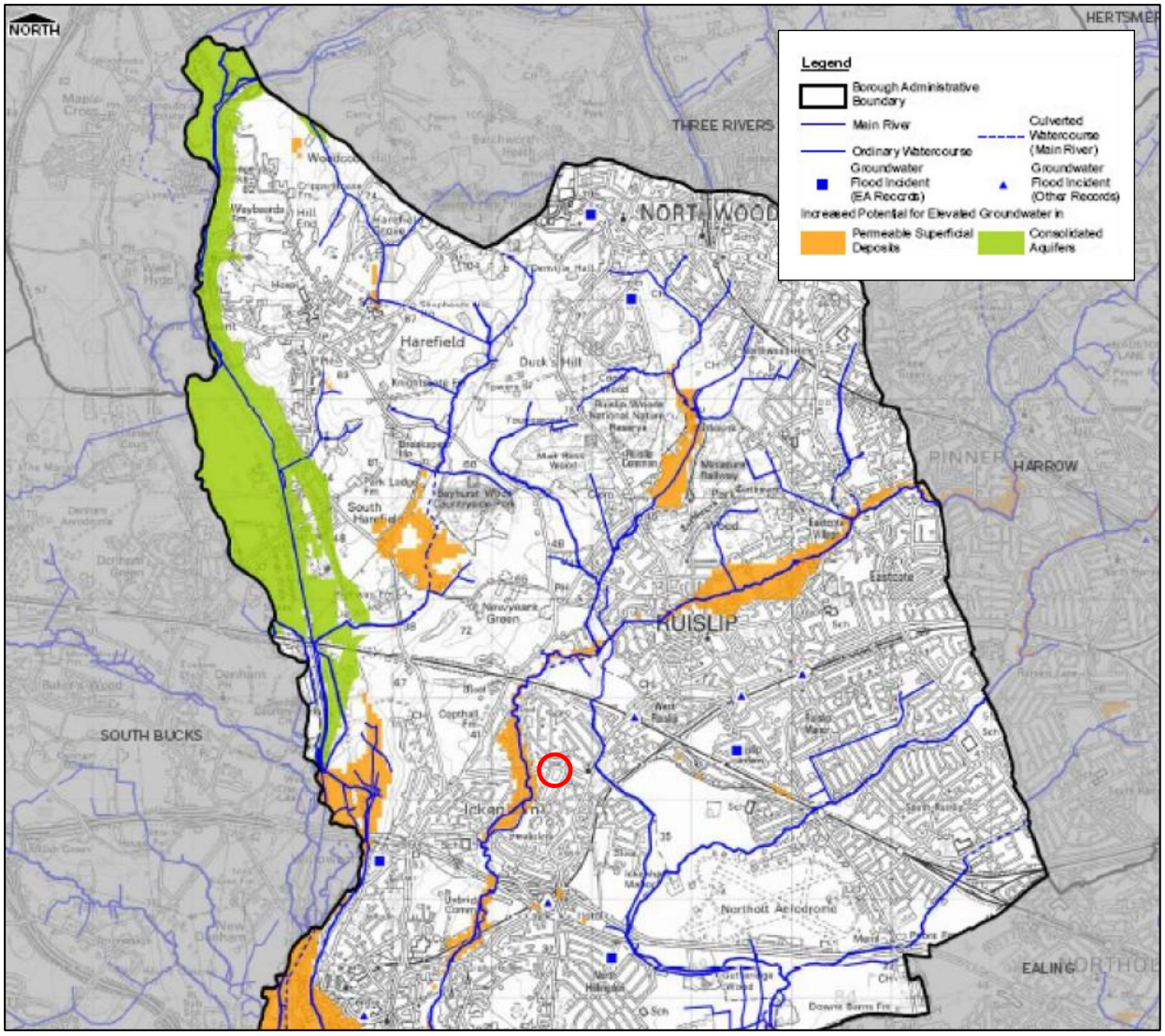

Figure 12: Potential for Elevated Groundwater (source: London Borough of Hillingdon PFRA 2011); the approximate location of the site is marked by the red circle.

4.33. The risk from groundwater to the development is therefore considered to be low.

Sewers

4.34. Foul or surface water sewers can be a cause of flooding if the drainage network becomes overwhelmed, either by blockage or due to local development beyond the designed capabilities of the drainage system.

4.35. The SFRA provides mapping of historical sewer flood incident records kept by the local authority (Thames Water) and is shown in Figure 13. The site is shown to be in the area 'UB10 8' where 11-15 sewer incidents (internal and external) were recorded between December 2011 and June

2017 (addendum by London Borough of Hillingdon 2017) OR 11-20 as of 2010 (Hillingdon PFRA 2011).

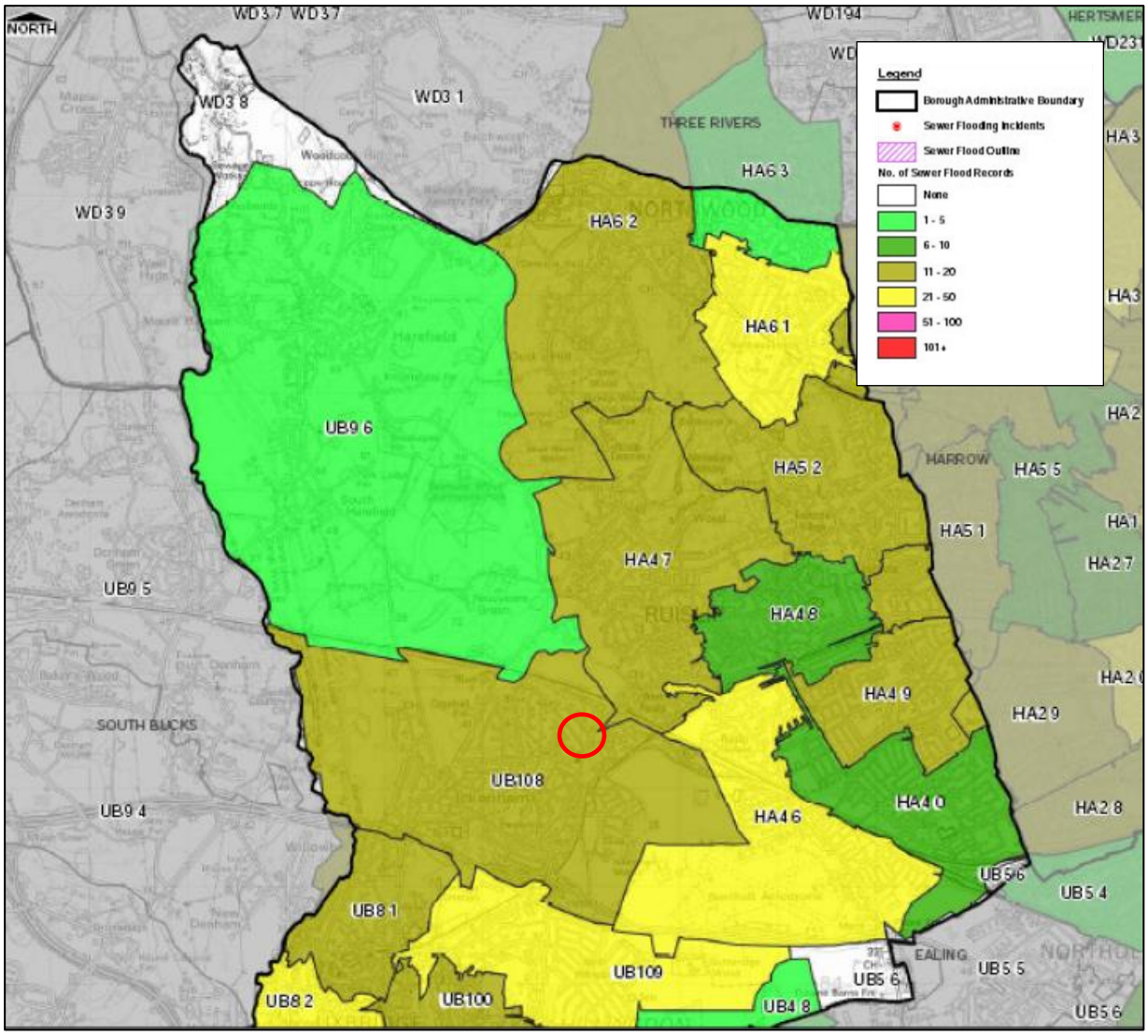

Figure 13: Historic Sewer Flooding Incidents (source: London Borough of Hillingdon PFRA 2011); the approximate location of the site is marked by the red circle.

4.36. The West London SFRA does not identify the site as being in a Critical Drainage Area.

4.37. The development is therefore considered to be at low risk of flooding from sewers.

5. Flood Risk Mitigation

Fluvial

5.1. Based on the EA Flood Map for Planning, the risk of flooding from fluvial sources is considered moderate.

5.2. This FRA has shown that the proposed development is not affected during the modelled 1:100 year and 1:100 year +cc events.

5.3. In line with best practice outlined in the EA Standing Advice for Minor Developments, Finished Floor Levels (FFLs) of the proposed extension will be set no lower than those of the existing dwelling. Furthermore, the extension should be constructed in a flood resilient manner in accordance with the CLG Report, *Improving the Flood Performance of New Buildings - Flood Resilient Construction (2007)* including, where feasible, the measures listed below:

- Solid (i.e. concrete floors) with waterproof screed.
- Raised wiring and power outlets at ground level.
- Units to be raised on legs above plinth.
- Waterproof plasterboard used at ground floor.
- Air brick covers to be installed.
- Damp Proof Membranes (d.p.m.) should be included in any design to minimise the passage of water through ground floors.
- Patio doors may be susceptible to ingress of flood water. Any PVC window/door sills should be adequately sealed. Double glazing should be used to provide resistance against external flood water pressure. Of concern would be excessive water pressure on the glazing of patio doors.
- Residents to sign up to the EA Flood Warning Service (River Loddon at Winnersh and Woodley) if not done so already.

Pluvial

5.4. It has been shown that the site could be affected by flooding during the low risk (0.1% AEP) pluvial event and therefore the risk from pluvial flooding to the proposed development is considered low. Access/egress are unaffected during the high (3.3% AEP) and medium (1% AEP) pluvial events but may be affected during the low risk (0.1%) event. In such a scenario, residents

are advised to stay indoors (and outside the extent of the flood) until conditions become safe to leave the site. If it evacuation is sought at the early onset of flooding and when conditions are safe, it is recommended that residents head north along The Avenue where model results indicate depths are lower.

5.5. It is also important to note that access/ egress arrangements would not differ from the existing as the proposal is a Minor Development.

5.6. During periods of bad weather, site users should monitor local weather reports and sign up for the Met Office UK weather warnings. The Met Office issues weather warnings up to 5 days in advance, through the National Severe Weather Warning Service, when severe weather has the potential to bring impacts to the UK. It is also possible to stay up to date with weather warnings through the Met Office app (available on both android and apple), social media (twitter, Facebook) or email alerts. Warnings can be monitored through an Apple/Android app, Twitter or directly via emails.

5.7. The flood resilience measures recommended to mitigate the risk of fluvial flooding should provide sufficient mitigation against pluvial flooding.

Other Sources

5.8. Flood risk from all other reviewed sources is considered to be low, therefore no mitigation other than that recommended above is required.

EA Flood Warning Service

5.9. As a further precaution and risk reduction, the owner of the site should sign up the River Pinn at Ickenham EA flood warning service and/or the River Pinn and Woodridings Stream Flood Alert. This service allows site owners to register an address, which is at risk of flooding, along with contact details so that in the event of a flood being forecast, the site owner will be sent an alert directly to their chosen method of contact.

5.10. Flood warnings/alerts can be enforced at any time of the day or night. Signing up for this service provides site owners some notice before a flood event. The amount of time afforded before a flood occurs depends on the site-specific location (e.g. proximity to the source of flooding, topography of the surrounding area) and the flood mechanism (e.g. bank over topping versus a breach event). Flood alerts and warnings provide site managers with time to take necessary action, e.g. communication of the risk of flooding to occupants/employees etc, evacuation of

occupants offsite or to a safe level, removal of valuable items out of reach of flooding and the mounting of site specific flood defences.

Increase to Flood Risk Elsewhere

5.11. Review of the West London Fluvial and Tidal Flood Risk Mapping indicates that the site is unaffected by both the 1:100 year and 1:100 year +cc modelled events.

5.12. The proposed development is for the construction of an extension and alteration to the existing dwelling on site to provide greater habitable space. As such, the proposal constitutes a Minor Development under the NPPF.

5.13. Paragraph 051 of the Flood Risk and Coastal Change Planning Practice Guidance (PPG) states:

> *Minor developments are unlikely to raise significant flood issues unless:*
>
> - *they would have an adverse effect on a watercourse, floodplain or its flood defences;*
> - *they would impede access to flood defence and management facilities, or;*
> - *where the cumulative impact of such developments would have a significant effect on local flood storage capacity or flood flows.*

5.14. As such, the proposed development in isolation should have a negligible impact on flood risk elsewhere.

6. Conclusions

6.1. This FRA has been undertaken with reference to the requirements of NPPF and Planning Practice Guidance with respect to the development at 21 The Avenue, Ickenham, Hillingdon, London, UB10 8NR. It has been written to support a planning application and has been prepared with due consideration to the nature of the proposed development to provide the appropriate level of detail.

6.2. An assessment of the risk of flooding from all sources has been undertaken and is summarised in the table below:

Source of Flooding	Flood Risk Summary
Fluvial	Based on the EA Flood Map for Planning, the risk of flooding from fluvial sources is considered moderate. However, the proposal is a Minor Development, and can adhere to the EA Standing Advice for Minor Developments. The site is located within Flood Zone 1 and 2, with the majority of the proposed extension in Flood Zone 2, according to the EA Flood Map For Planning. However, the West London SFRA Fluvial and Tidal Flood Risk Map (online) shows the site to be entirely outside the flood extent of the River Pinn 1:100 and 1:100+25% cc allowance which has been used as a conservative estimate for the 1:100+21%cc.
Pluvial	Low risk - the site is only affected during the low risk pluvial event. However, safe access and egress via The Avenue may be affected during the low risk (0.1% AEP) surface water scenario. It is also important to note that access/ egress arrangements would not differ from the existing as the proposal is a Minor Development.
All other reviewed sources	The site is considered to be at low risk from other sources.

6.3. The FRA supports the planning application and demonstrates that there is an acceptable level of flood risk to the site if the mitigation strategies recommended are implemented in the scheme. The development does not increase flood risk off site or to the wider area.

6.4. The following conclusions can be drawn from this FRA:

- This FRA has identified no prohibitive constraints in developing the proposed site for the proposed usage.
- The site and location of the proposed extension is in Flood Zone 1 and 2 and therefore deemed to be at medium risk of flooding from fluvial sources, however both have been shown to be entirely outside the flood extent of the River Pinn 1:100 and 1:100+25%cc allowance which has been used as a conservative estimate for the 1:100+21%cc.
- The site is affected during the modelled low risk pluvial event and therefore at low risk of pluvial flooding
- The site is considered to be at low risk from all other sources.
- The proposed development is not expected to cause any increase in flood risk either onsite or elsewhere over the lifetime of the development.

6.5. This Flood Risk Assessment should be submitted as part of the planning application to satisfy the requirements under NPPF.

Appendix A - Development Proposals

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Rev	Date	Description	Init.
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Client

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Project Title

PROPOSED EXTENSIONS AND ALTERATIONS

21 THE AVENUE, ICKENHAM, UB10 8NR

Drawing Title

LOCATION PLAN

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BR	SEP 2022	NJ
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Middlesex HA4 7AR

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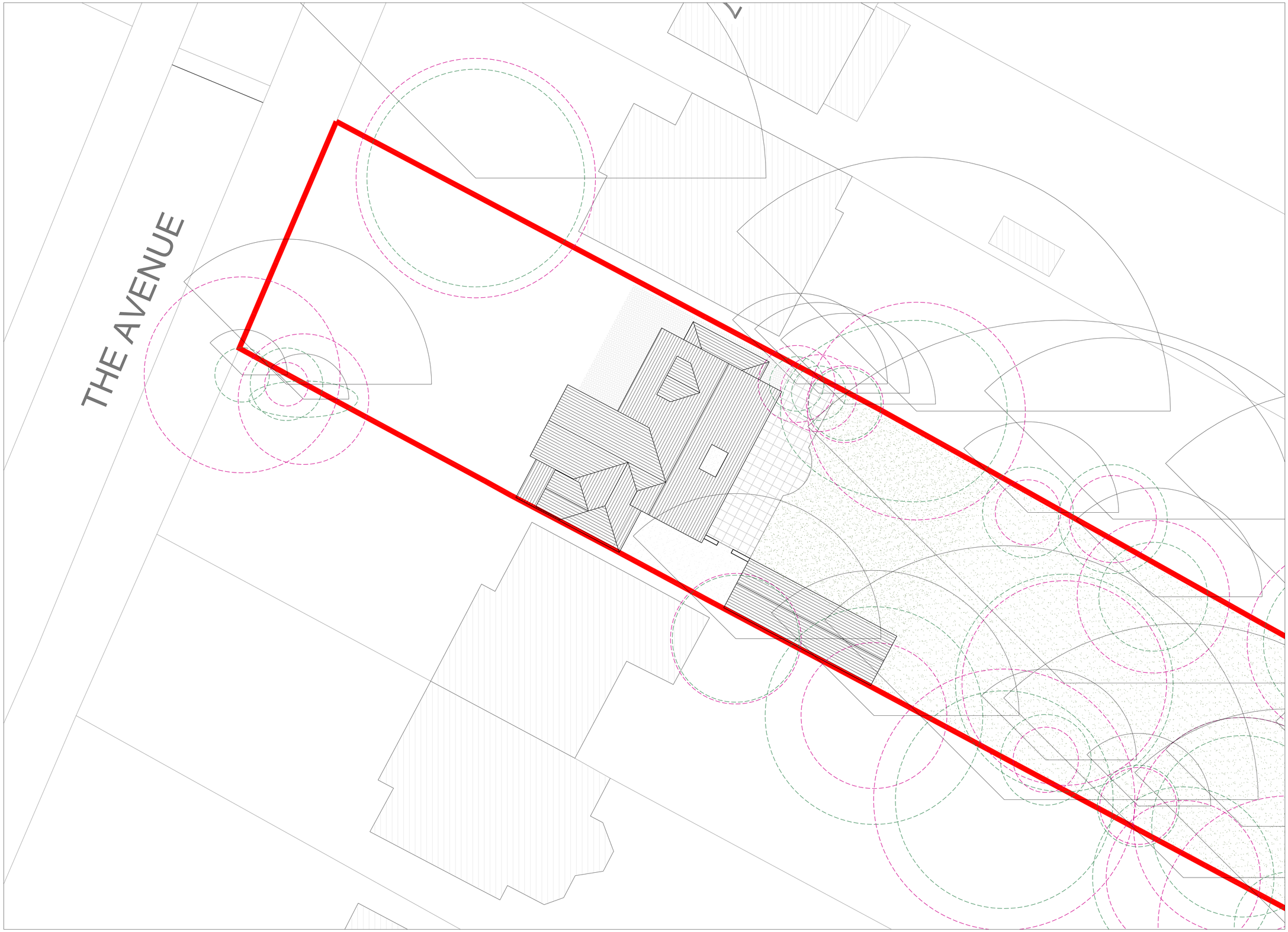

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Project Title
PROPOSED EXTENSIONS AND ALTERATIONS

21 THE AVENUE, ICKENHAM, UB10 8NR

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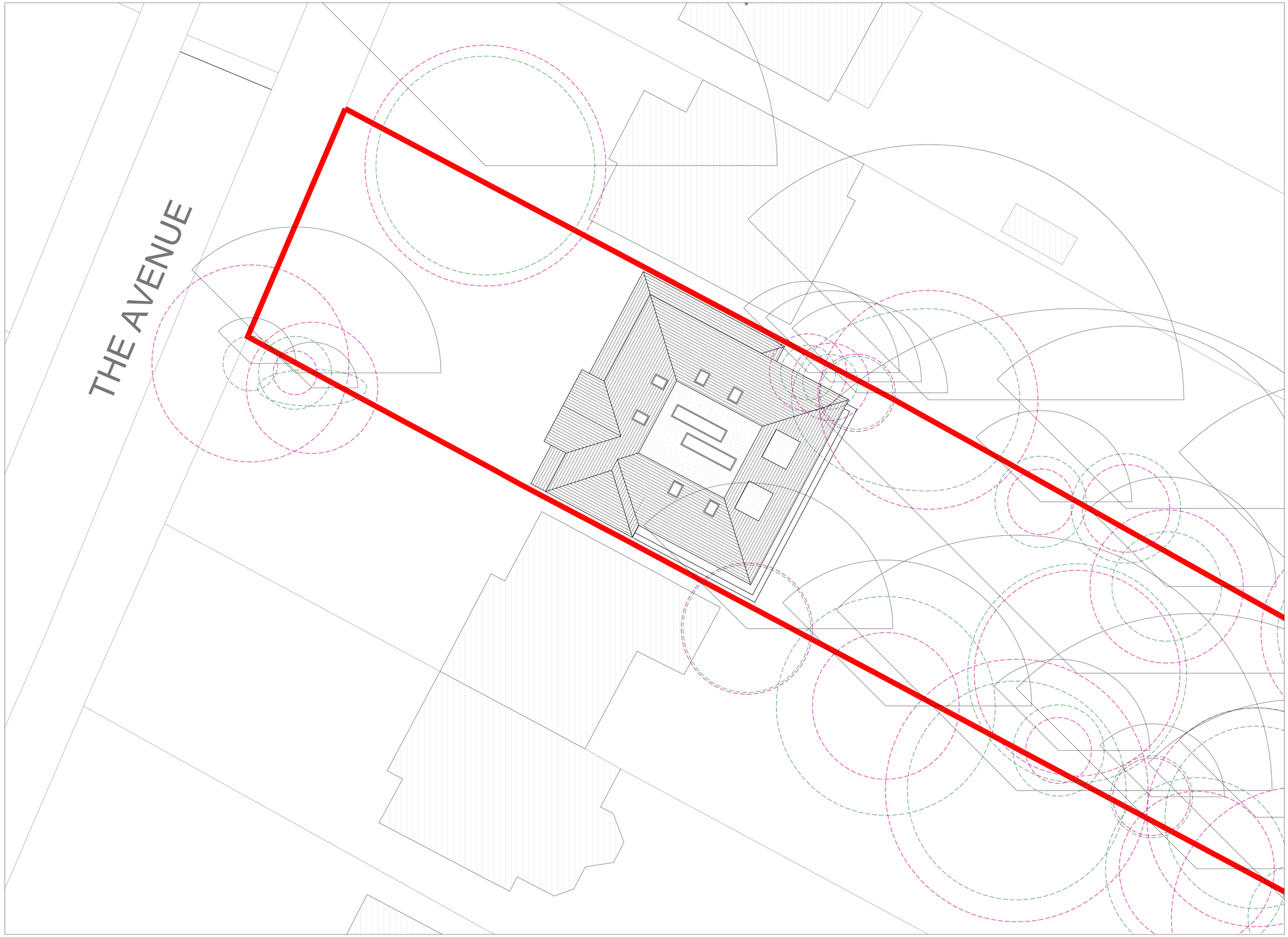

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D	19.04.23	AMENDED TO SUIT PLANNING COMMENTS	KP
C	17.02.23	AMENDED TO SUIT PLANNING COMMENTS	KP
B	01.02.23	AMENDED TO SUIT PLANNING COMMENTS	KP
A	21.10.22	AMENDED TO SUIT CLIENTS COMMENTS	KP

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PROPOSED EXTENSIONS AND ALTERATIONS

21 THE AVENUE, ICKENHAM, UB10 8NR

Drawing Title

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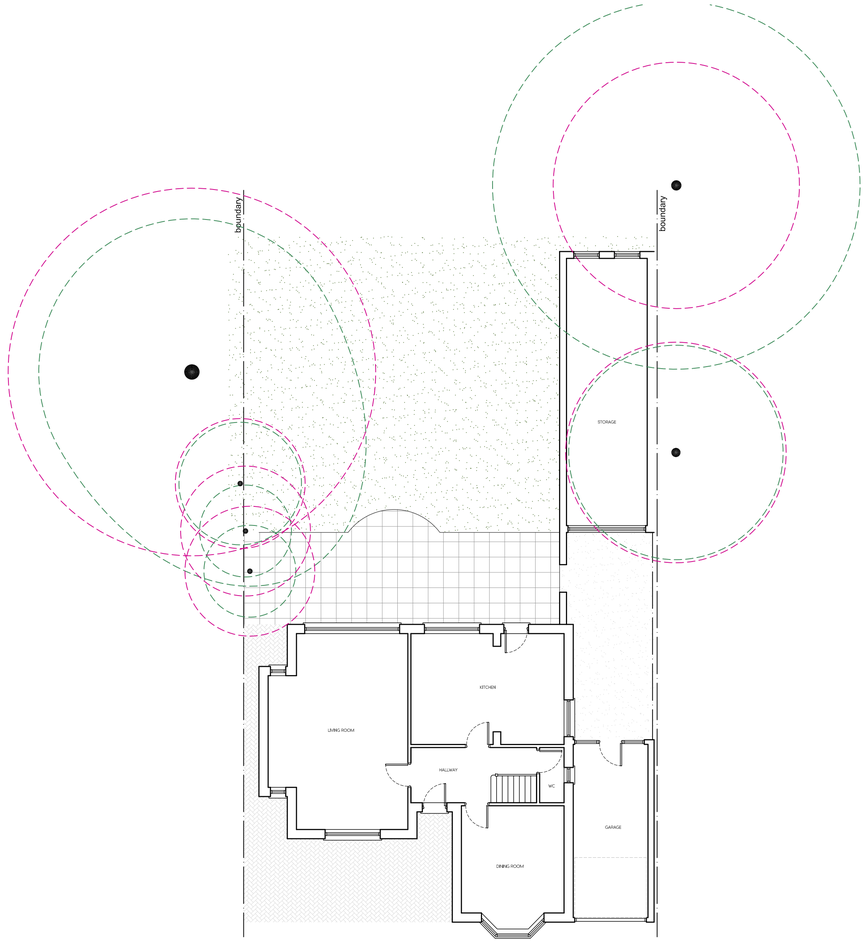

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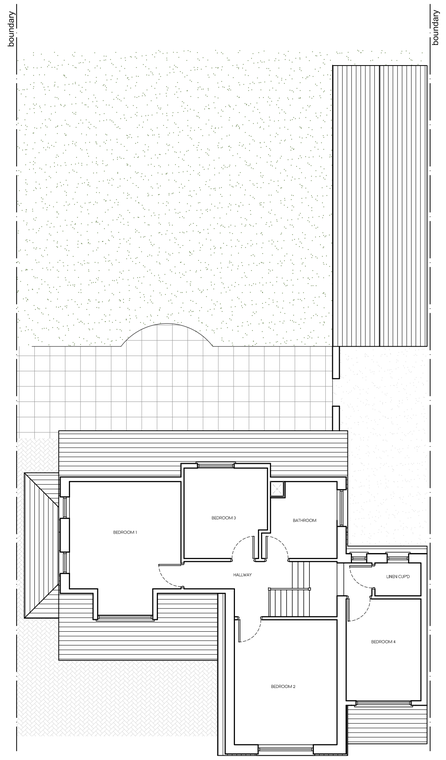

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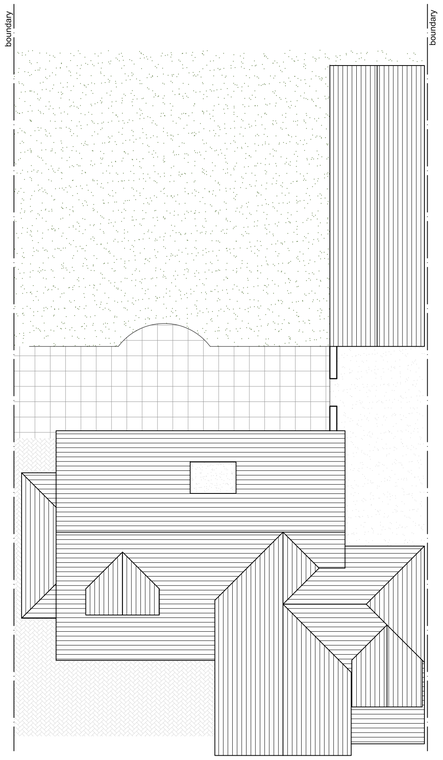

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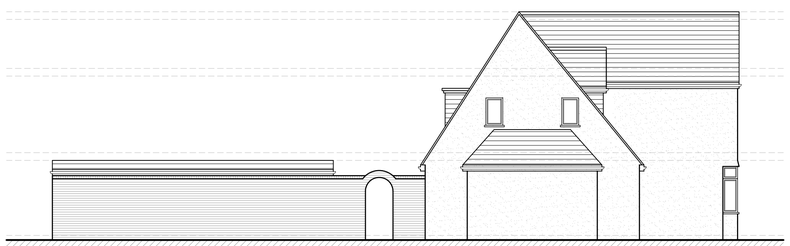

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EXISTING SIDE ELEVATION

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PROPOSED EXTENSIONS AND ALTERATIONS

21 THE AVENUE, ICKENHAM, UB10 8NR

Drawing Title

EXISTING PLANS AND ELEVATIONS

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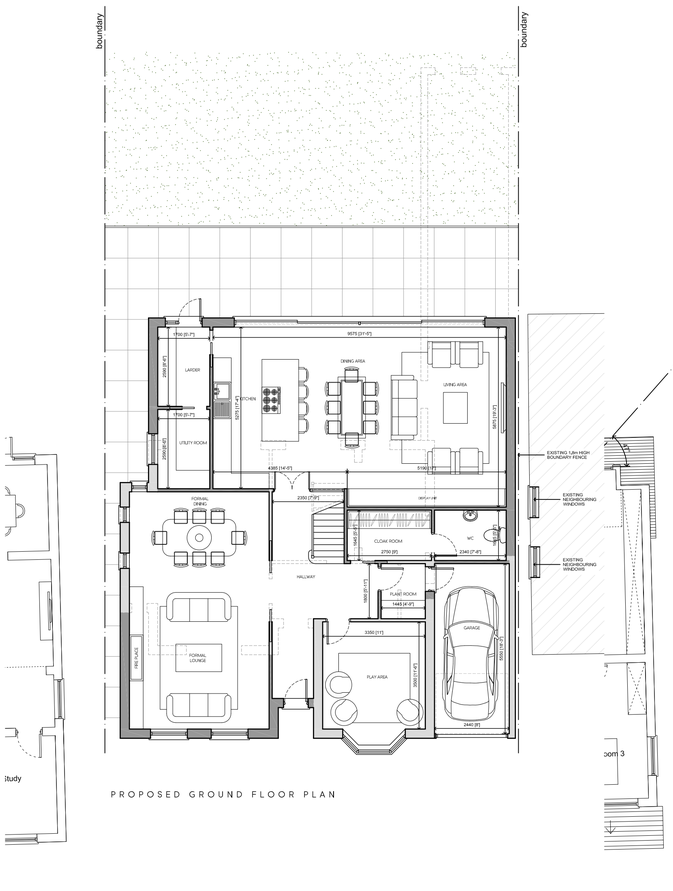

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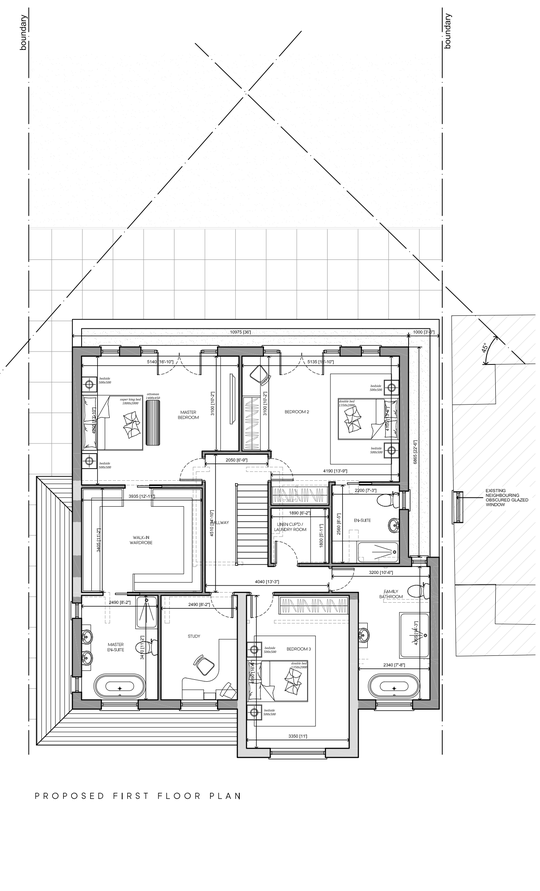

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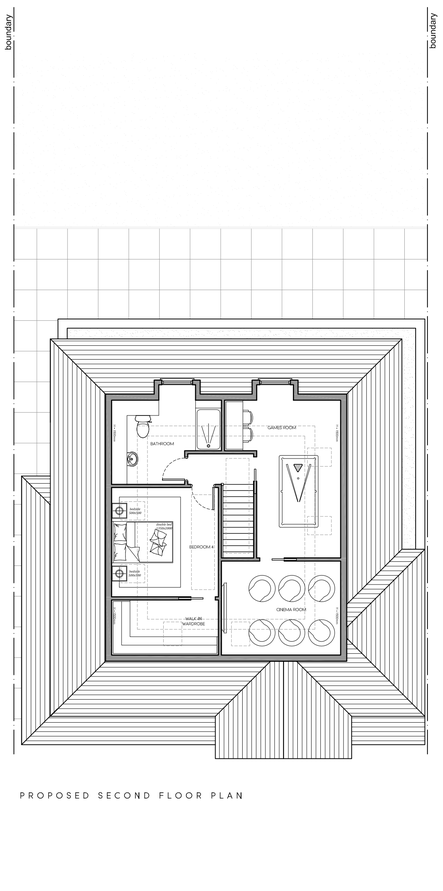

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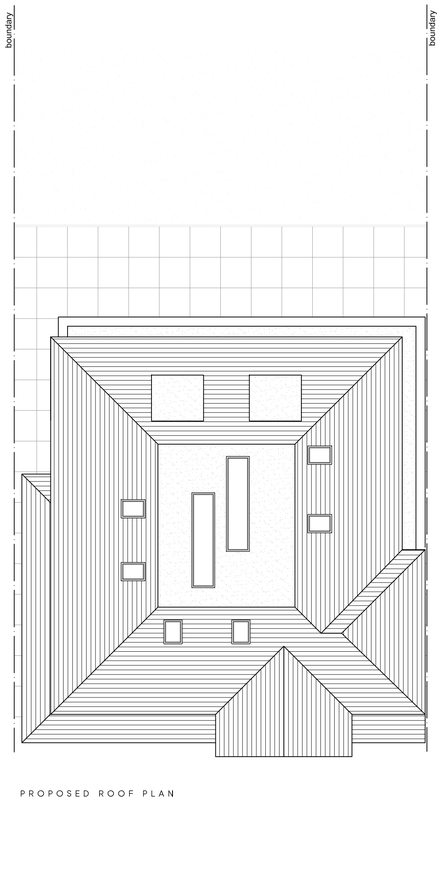

PROPOSED ROOF PLAN

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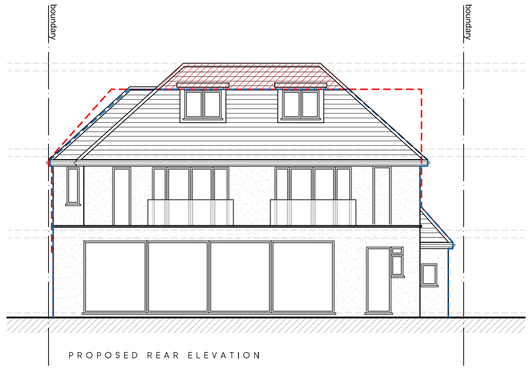
PROPOSED FRONT ELEVATION



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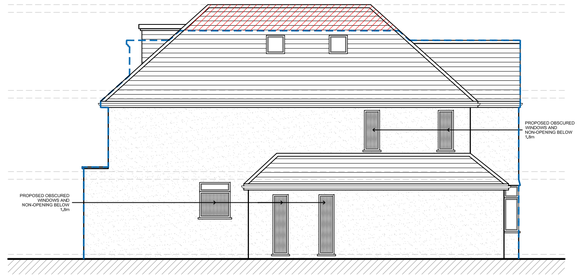

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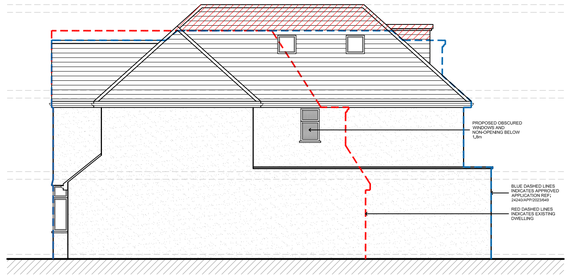

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B	01.02.23	AMENDED TO SUIT PLANNING COMMENTS	KP
A	21.10.22	AMENDED TO SUIT CLIENTS COMMENTS	KP

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PROPOSED EXTENSIONS AND ALTERATIONS

21 THE AVENUE, ICKENHAM, UB10 8NR

Drawing Title

PROPOSED PLANS AND ELEVATIONS

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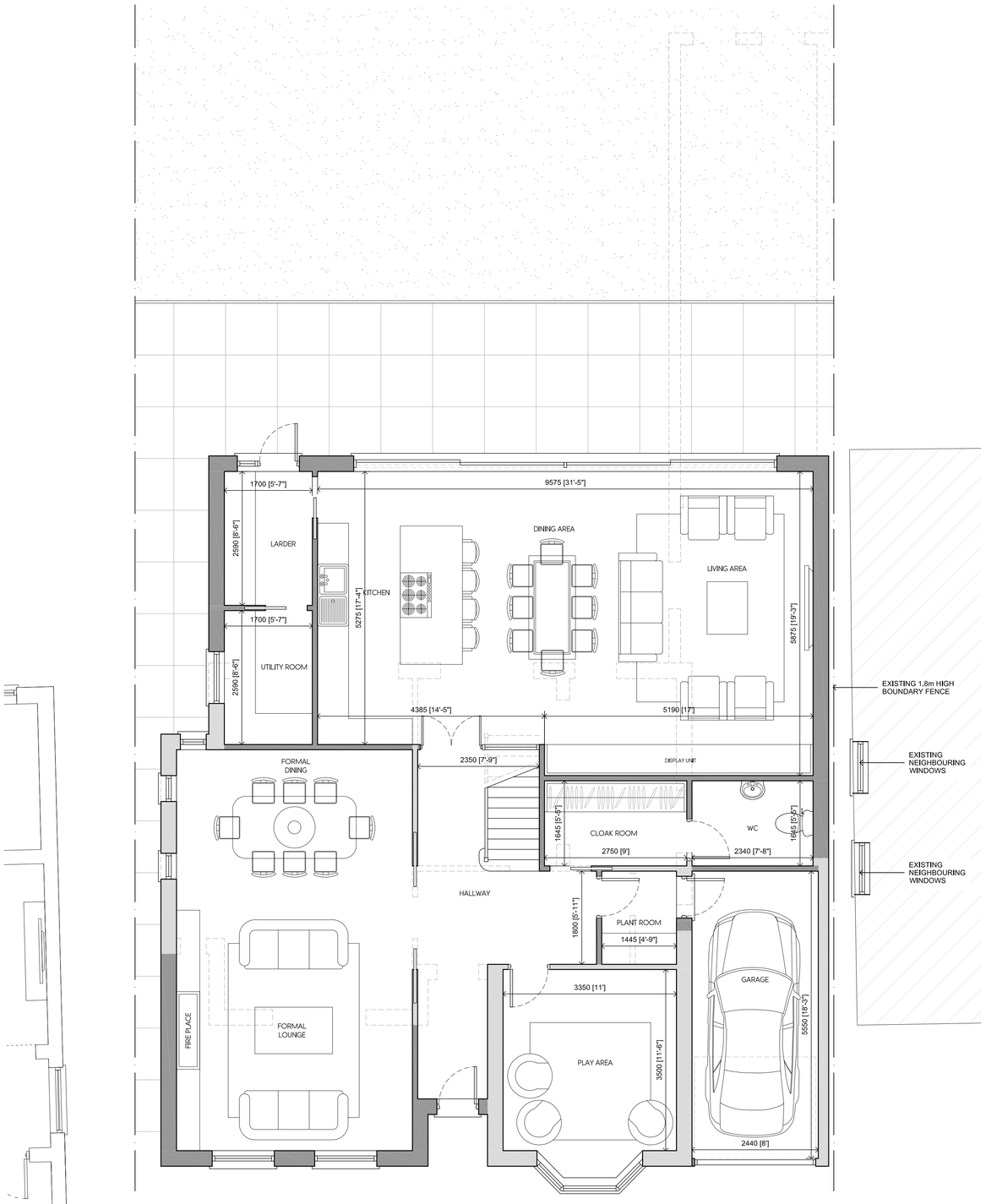

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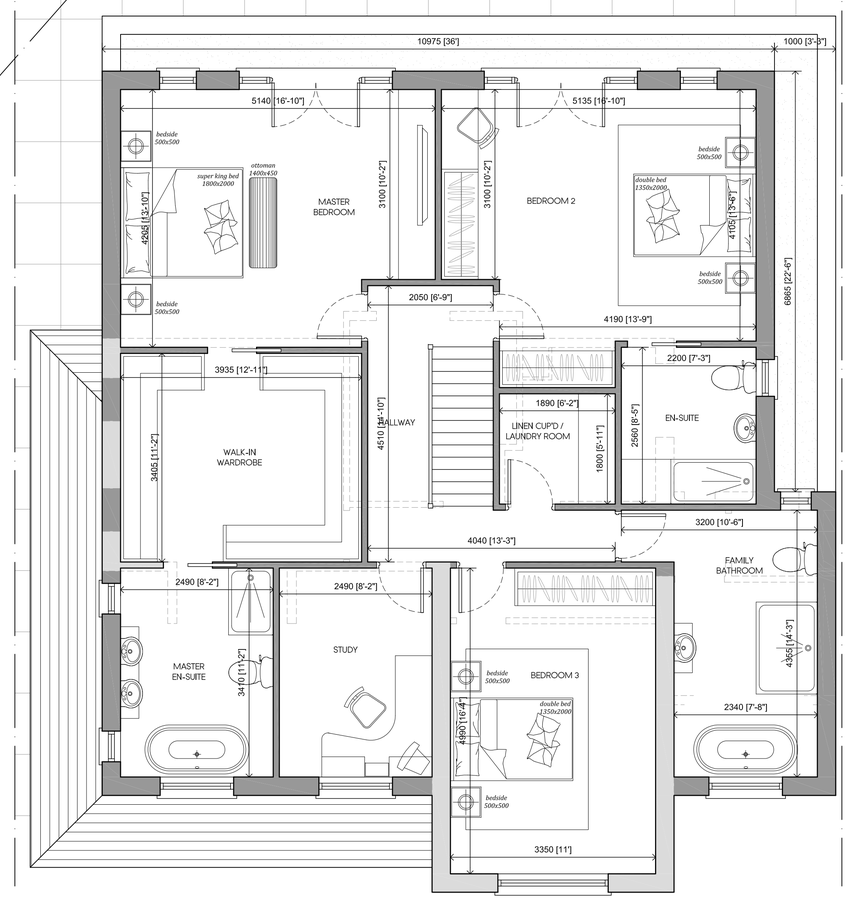

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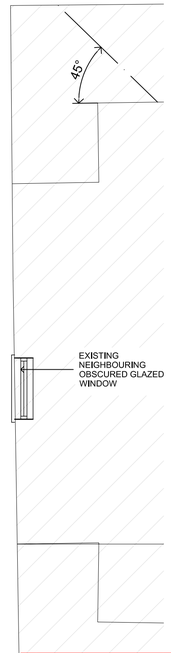

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PROPOSED EXTENSIONS AND ALTERATIONS

21 THE AVENUE, ICKENHAM, UB10 8NR

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PROPOSED GROUND AND FIRST FLOOR PLANS

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info@juttla-architects.com
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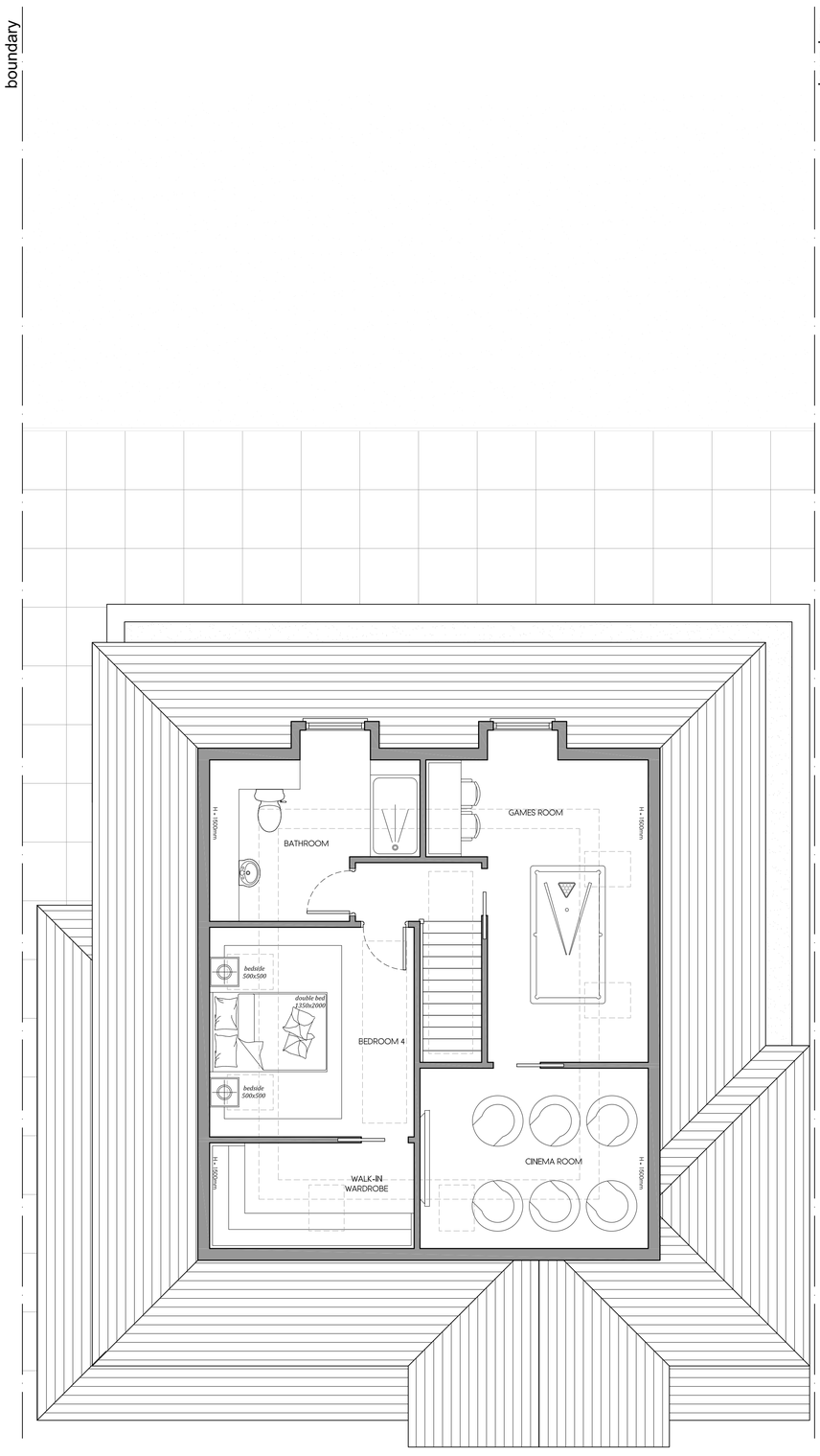
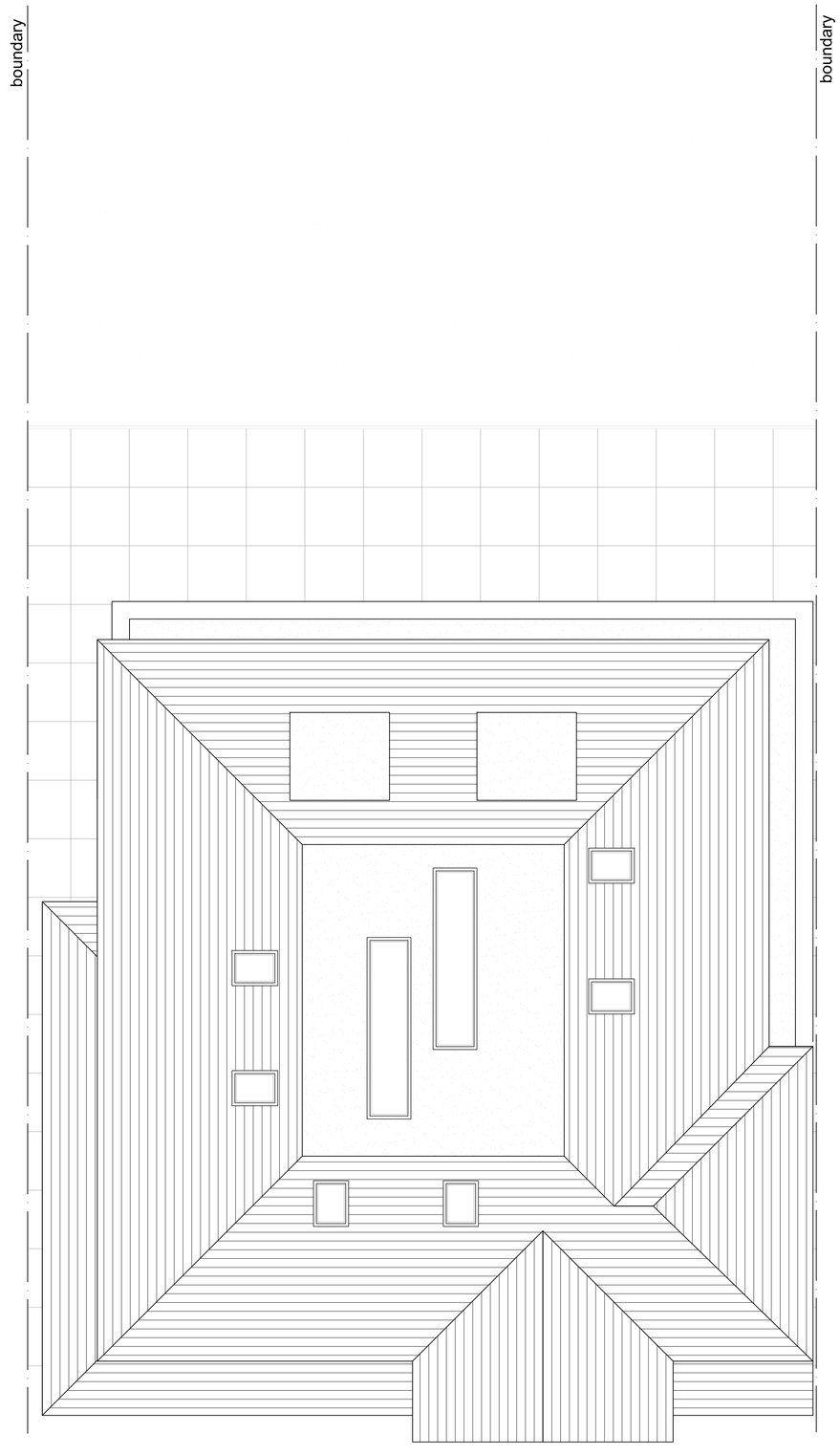


PROPOSED SECOND FLOOR PLAN



PROPOSED ROOF PLAN

LOCATION PLAN
SCALE 1:1250

Rev	Date	Description	Init.
F	06.07.23	RESUBMISSION TO FULL PLANNING	KP
E	17.05.23	AMENDED TO SUIT PLANNING COMMENTS	KP
D	27.04.23	AMENDED TO SUIT CLIENT COMMENTS	KP
C	19.04.23	AMENDED TO SUIT PLANNING COMMENTS	KP
B	01.02.23	AMENDED TO SUIT PLANNING COMMENTS	KP
A	21.10.22	AMENDED TO SUIT CLIENTS COMMENTS	KP

Client

MR & MRS JHUTTY

Project Title

PROPOSED EXTENSIONS AND ALTERATIONS

21 THE AVENUE, ICKENHAM, UB10 8NR

Drawing Title

PROPOSED SECOND FLOOR AND ROOF PLANS

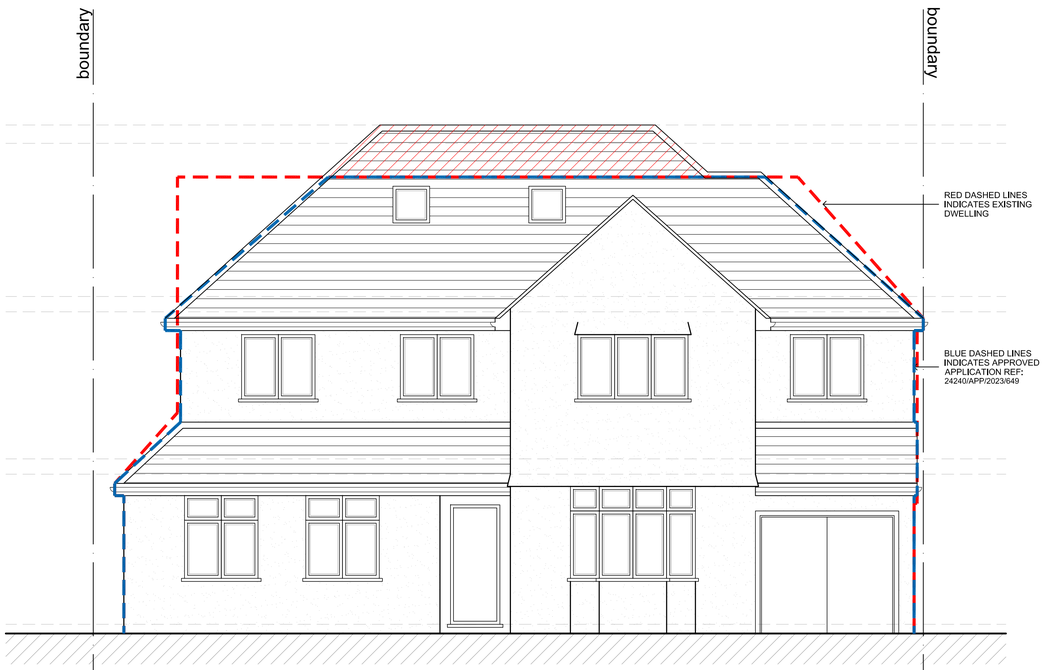
Cad File	Sheet Size	Scale
P001	A1	1:50
Drawn by	Drawing Date	Approved by
KP	OCT 2022	NJ
Project No.	Drawing No.	Revision
1942	P302	F

Juttla Architects

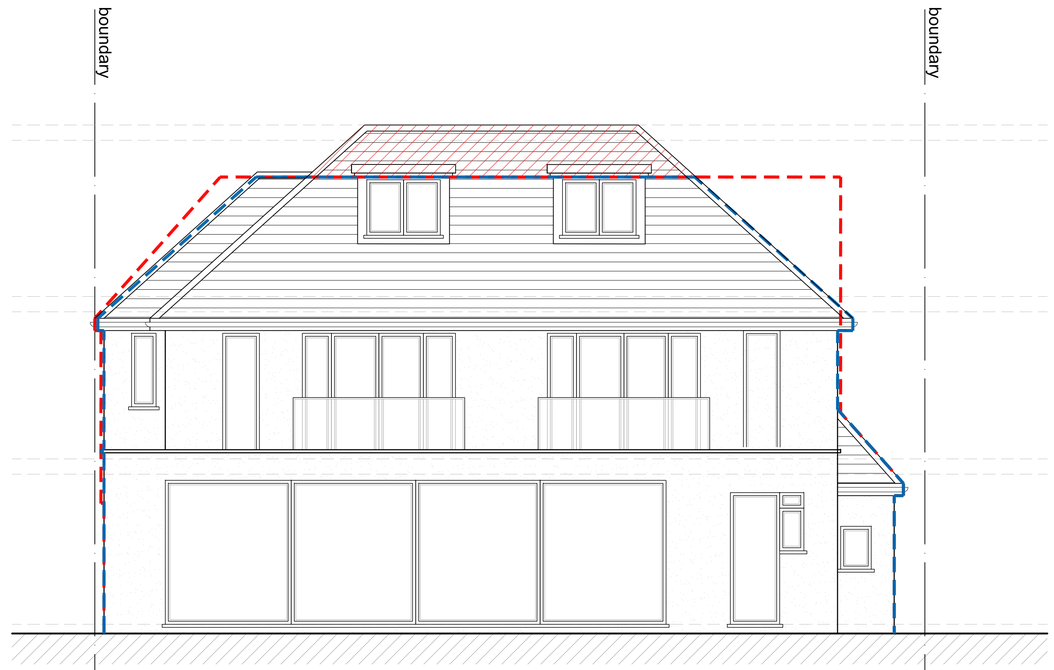
2-4 High Street Ruislip
Middlesex HA4 7AR

t 01923 840077 f 01923 840078
info@juttla-architects.com
juttla-architects.com

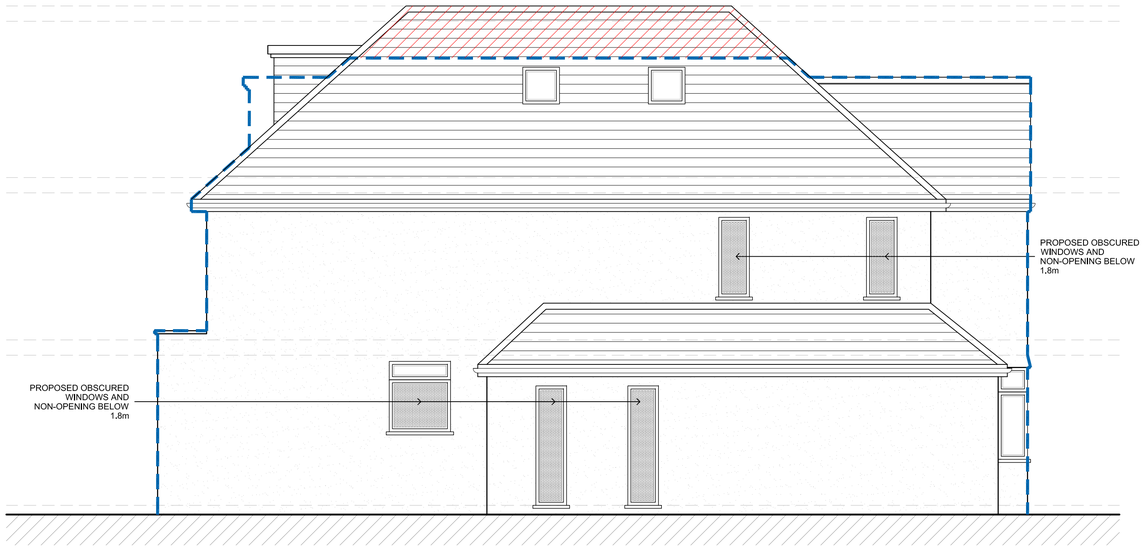
PLANNING ISSUE



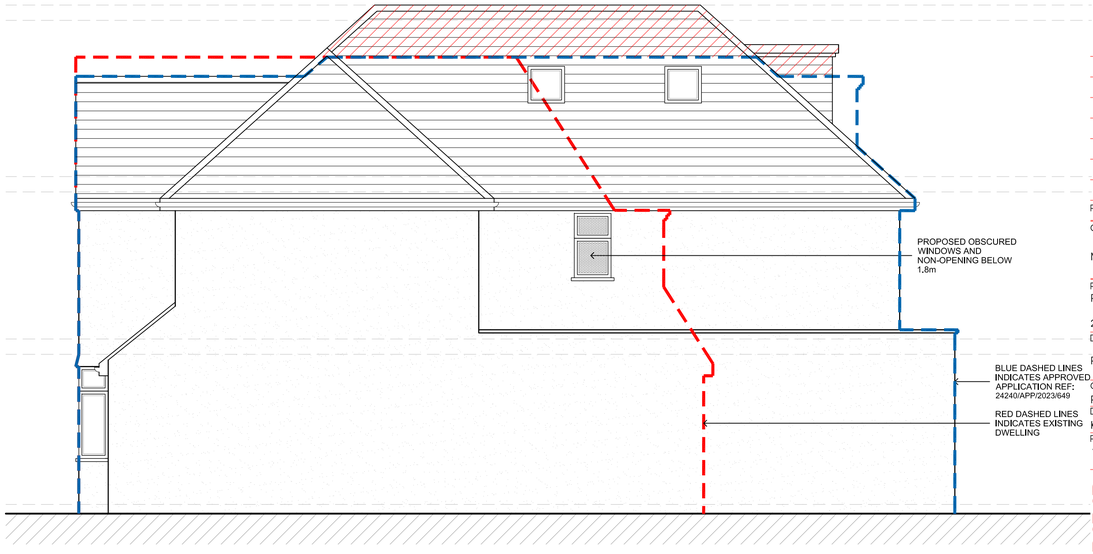
PROPOSED FRONT ELEVATION



PROPOSED REAR ELEVATION



PROPOSED SIDE ELEVATION



PROPOSED SIDE ELEVATION

SCALE BAR 1:50

LOCATION PLAN
SCALE 1:1250

Rev	Date	Description	Init.
G	06.07.23	RESUBMISSION TO FULL PLANNING	KP
F	29.06.23	AMENDED TO SUIT PLANNING COMMENTS	KP
E	17.05.23	AMENDED TO SUIT PLANNING COMMENTS	KP
D	27.04.23	AMENDED TO SUIT CLIENT COMMENTS	KP
C	19.04.23	AMENDED TO SUIT PLANNING COMMENTS	KP
B	01.02.23	AMENDED TO SUIT PLANNING COMMENTS	KP
A	21.10.22	AMENDED TO SUIT CLIENTS COMMENTS	KP

Client

MR & MRS JHUTTY

Project Title

PROPOSED EXTENSIONS AND ALTERATIONS

21 THE AVENUE, ICKENHAM, UB10 8NR

Drawing Title

PROPOSED ELEVATIONS

Cad File	Sheet Size	Scale
P001	A1	1:100
Drawn by	Drawing Date	Approved by
KP	OCT 2022	NJ
Project No.	Drawing No.	Revision
1942	P401	G

Juttla Architects

2-4 High Street Ruislip
Middlesex HA4 7AR

t 01923 840077 f 01923 840078
info@juttla-architects.com
juttla-architects.com

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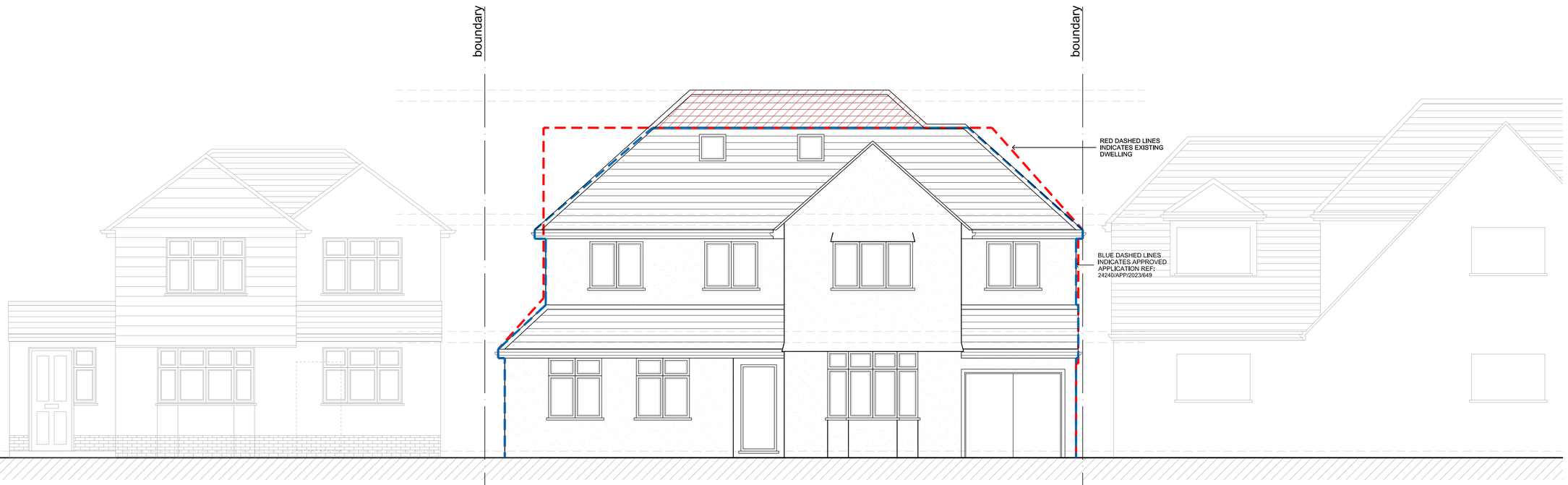
EXISTING FRONT ELEVATION



PROPOSED FRONT ELEVATION

0 1m 2m 3m 4m 5m

SCALE BAR 1:50

LOCATION PLAN
SCALE 1:1250

Rev	Date	Description	Init.
D	06.07.23	RESUBMISSION TO FULL PLANNING	KP
C	17.05.23	AMENDED TO SUIT PLANNING COMMENTS	KP
B	27.04.23	AMENDED TO SUIT CLIENT COMMENTS	KP
A	19.04.23	AMENDED TO SUIT PLANNING COMMENTS	KP

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PROPOSED EXTENSIONS AND ALTERATIONS

21 THE AVENUE, ICKENHAM, UB10 8NR

Drawing Title

EXISTING AND PROPOSED STREET SCENE

Cad File	Sheet Size	Scale
P001	A1	1:100
Drawn by	Drawing Date	Approved by
KP	OCT 2022	NJ
Project No.	Drawing No.	Revision
1942	P402	D

Juttla Architects

2-4 High Street Ruislip
Middlesex HA4 7AR

t 01923 840077 f 01923 840078
info@juttla-architects.com
juttla-architects.com

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