FLOOD RISK ASSESSMENTS & DRAINAGE STRATEGIES

61 St Lawrence Drive, Pinner, HA5 2RW

Reference: R0862 FRA-v1

Jun-25

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The study provides no guarantee against flooding of the study site or elsewhere, nor of the absolute accuracy of water levels, flow rates and associated probabilities.

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Introduction 1

Purpose of this report

1.1 RIDA Reports Ltd has been appointed to undertake a Level 2 – Scoping Study Flood Risk Assessment for a development located at HA5 2RW.

Objectives

1.2 The objectives of this FRA are to demonstrate the following:

- Whether the proposed development will likely be affected by current or future flooding.
- Whether the proposed development will increase flood risk elsewhere.
- Whether the flood risks associated with the proposed development can be satisfactorily managed.
- Whether the measures proposed to deal with the flood risk are sustainable.

Documents Consulted

1.3 To achieve these objectives, the following documents have been consulted and referenced:

The National Planning Policy Framework (NPPF)
CIRIA C753 document The SuDS Manual, 2015
Local Flood Risk Management Strategy (LFRMS)
Level 1 Strategic Flood Risk Assessment (SFRA)
Aerial photographs and topographical survey of the site
British Geological Society Records
Local Council flood Maps
Environment Agency flood maps
The CIRIA publication 'C635 Designing for exceedance in urban drainage Good practice'

Development Site and Location

2.1 The site is located at St Lawrence Drive, London. The nearest postcode is HA5 2RW. Refer to appendix A for site location plan.

2.2 The current use of the site is the garden of the property. The current user vulnerability classification of the site is More vulnerable . The site is located in the River Flood Zone 3. Refer to Appendix B for more details.

Development Proposals

2.3 The proposed development includes the extension, loft conversion & reconfiguration. Refer to Appendix B for the layout of the proposed development.

2.4 The vulnerability classification of the proposed development is More vulnerable with an estimated lifetime between 50 and 100 years.

Site Hydrology and Hydrogeology

Hydrology

2.5 The River Pinn is located approximately 30 m away from the development.

Aquifer

2.6 The development is located within a secondary aquifer type A. Aquifers type A consist of permeable layers capable of supporting water supplies at a local rather than strategic scale. They are generally aquifers formerly classified as minor aquifers.

Source Protection Zone

2.7 The site is located within a source protection zone 3. This zone is defined as the area around a source within which all groundwater recharge is presumed to be discharged at the source.

Groundwater Levels

2.8 The ground water levels for this site are unknown.

Site Geology

Bedrock

2.9 The British Geological Survey records of the site show that it is located within the Lambeth Group - Clay, Silt and Sand.

Superficial Deposits

2.10 The British Geological Survey records show that the superficial deposits are Alluvium - Clay, Silt, Sand and Gravel.

National Planning Policy Framework (NPPF)

3.1 The NPPF and its technical guidance is a set of planning policies with the key objective of contributing to sustainable development. As part of it, they ensure that flood risk and sustainability are considered during the planning process. This ensures that developments are not located in flood risk areas and directs developments to lower risk areas. The NPPF applies a sequential risk-based approach to determining land suitability for development in flood risk areas. The NPPF also encourages developers to seek opportunities to reduce the overall level of flood risk through the development layout and the application of Sustainable Drainage Systems (SuDS).

The Flood and Water Management Act (2010)

3.2 The Flood and Water Management Act aims to reduce the flood risk associated with extreme weather events. It provides robust flood risk management for people, homes and businesses and encourages using SuDS for developments. A robust SuDS strategy should consider the recommendations in this Flood Risk Assessment.

Strategic Flood Risk Assessment (SFRA)

3.3 Planning policy with regard to development and flood risk in the area is detailed in the Surface Water Management plan (SWMP) which was published in 2010. The proposed development site is located within the administrative boundary of the London Borough of Hillingdon.

3.4 The SFRA commits to direct new development to locations at the lowest flood risk. The SFRA provides information on the levels and flood hazards that could result from flooding. The Environment Agency flood zone maps and the SFRA ignore the presence of existing flood defences when defining the potential extent of flooding.

3.5 This report follows the guidance given in the Surface Water Management plan by evaluating the flood risk and providing relevant flood mitigation.

The Sequential and Exception Test 4

4.1 The NPPF guidance states that the sequential test "is designed to ensure that areas at little or no risk of flooding from any source are developed in preference to areas at higher risk. This means avoiding, so far as possible, development in current and future medium and high flood risk areas considering all sources of flooding including areas at risk of surface water flooding."

Applicability of the Sequential Test

4.2 The flood risks were determined by identifying all the sources of flooding and assessing their possible impact and likelihood to development. It is confirmed that the development is:

- In Flood Zone 3, based on the Planning Flood Risk Map
- In Flood Zone 1, based on the Flood Level information Provided by the Environment Agency and the location of the extension
- At High risk of surface flooding
- At very low risk of groundwater flooding
- Within a critical drainage area
- Potentially within an area of sewer flooding

4.3 This type of development is exempt from applying the sequential test as per the National Planning Policy Framework paragraph 174, footnote 60. The development has been made safe and has not increased the risk to other properties. See copy of note below "(60) This includes householder development, small non-residential extensions (with a footprint of less than 250m2) and changes of use; except for changes of use to a caravan, camping or chalet site, or to a mobile home or park home site, where the sequential and exception tests should be applied as appropriate."

Exception Test

4.4 Fluvial flood risk for this minor development was assessed using the Environment Agency Flood Zone Maps and the standing advice approach recommended in the NPPF guidelines. The standing advice considers the development's size and the flood risk vulnerability of land use.

Step 1 4.5

Flood Zone categorisation

The proposed development falls within The Environment Agency (EA) Flood Zone 3. The Flood Zone 3 is considered to have a high probability of flooding with a 100 years or greater annual probability or >1%AEP.

Step 2 4.6

The Exception Test

The Exception Test is not required for this development.

5.1 The development has been assessed for the following potential flood risks, river and tidal flood risk, surface water flooding, flooding from groundwater, reservoir flood risk and drainage systems.

Flood Defence and Historic Flooding

5.2 The Environment Agency records show that the site does not benefit from flood defences. They also show that the area around the site has potentially been flooded in the past. This data does not indicate if a property has been flooded internally. See Appendix C for details.

Flooding from river and sea

5.3 The site is affected by River Flooding. The proposed development falls within The Environment Agency (EA) Flood Zone 3. The Flood Zone 3 is considered to have a high probability of flooding with a 100 years or greater annual probability or >1%AEP.

5.4 The climate change allowance has been taken from the EA peak river flow map. The vulnerability of the development, the design life of the building, and the flood zone classification were used to determine it. The climate change allowance for this site is 21%. The nearest climate change allowance of 25% provided by the EA was used as the most representative to complete this assessment.

5.5 The levels provided by the Environment Agency are shown in table 1 below. Further details are provided in Appendix D.

Flood levels in channel

Return Period	Flood Level (m AOD)
1 in 20 (5%)	43.734
1 in 30 (3.3%	43.811
1 in 100 (1%)	44.139
1 in 100 + 25%(CC)	44.146
1 in 1000 (0.1%)	44.511

Flood levels at Site

Return Period	Flood Level (m AOD)
1 in 20 (5%)	43.735
1 in 30 (3.3%	43.811
1 in 100 (1%)	44.138
1 in 100 + 25%(CC)	44.278
1 in 1000 (0.1%)	44.495

5.6 The river flood risk level is 44.278m AOD. This level is 1.32 m lower than the site level. This flood level does not have an impact on the finished floor levels of development.

Surface water (overland flows) flood risk

5.7 The Environment Agency maps show that the flood risk from surface water is high. The residual risk of localised deep ponding remains highly likely. The Environment Agency surface water flood risk maps are defined through a specific procedure based on digital terrain models and assumptions regarding infiltration and urban drainage losses. The surface water flood maps are determined by the Environment Agency as follows:

5.8 *"The nationally produced surface water flood mapping only indicates where surface water flooding could occur due to local rainfall. It does not fully represent flooding that occurs from:*

- Ordinary watercourses
- Drainage systems or public sewers caused by catchment-wide rainfall events
- Rivers
- Groundwater

Due to the modelling techniques, the mapping picks out depressions in the ground surface. It simulates some flow along natural drainage channels, rivers, low areas in floodplains, and flow paths between buildings. Although the maps appear to show flooding from ordinary watercourses, they should not be taken as definitive mapping of flood risk from these as the conveyance effect of ordinary watercourses or drainage channels is not explicitly modelled. Also, structures (such as bridges, culverts and weirs) and flood risk management infrastructure (such as defences) are not represented.

The nationally produced surface water flood mapping does not consider the effect of pumping stations in catchments with pumped drainage. No allowance is made for tide locking, high tidal or fluvial levels where sewers cannot discharge into rivers or the sea."

5.9 The strategic flood risk for the London Borough of Hillingdon confirms that the flood risk for the site is High. The surface water flood data has not been produced to determine the flood levels at individual properties. This data does not contain the climate change allowances for depth levels. Therefore, the Design flood level given below is an assumption. The new development may have greater or lower surface water flood depths.

5.10 Based on the Environment Agency and the Strategic flood risk assessment's surface water mapping, together with the presence of surface water drainage systems at the site and surrounding area, it is concluded that the site is at High risk of flooding from surface water sources. The depth of water is potentially below 300mm. For this assessment, a depth of water of 0.2m has been taken as the most appropriate depth to the site. The average ground level at the site is 44.2m AOD. The surface water flood level on this site could be in the region of 44.4m AOD.

Flooding from drainage systems in adjacent areas

5.11 The area around the development is shown as having a high level of sewer incident within the flood maps of the Strategic Flood Risk Assessment. See appendix C for details.

Reservoirs Risks

5.12 The Reservoir Flood Map (RFM) produced by the Environment Agency do not show the risk to individual properties of dam breach flooding. The maps do not indicate or relate to any particular probability of dam breach flooding. The maps were prepared for emergency planning purposes. They can be used to help reservoir owners produce on-site plans, and the Local Resilience Forum produce off-site plans and to prioritise areas for evacuation/early warning in the event of a potential dam failure. The RFM shows that the development could be within the possible dam breach flooding path. See Appendix C.

Groundwater flood risk

5.13 The British Geological Survey's flood risk susceptibility maps show that the development has limited susceptibility to groundwater flooding. The risk of groundwater flood to the site is considered very low. Refer to appendix C for record drawings.

Critical Drainage Areas

5.14 The development falls within a Critical Drainage Area. The risks of critical

problems and the increase of downstream flooding are high. Critical Drainage Area (CDA) is an area that has critical drainage problems and which has been notified to the local planning authority by the Environment Agency.

6.1 The Flood hazard assessment has demonstrated that the site is:

- In Flood Zone 3, based on the Planning Flood Risk Map
- In Flood Zone 1, based on the Flood Level information Provided by the Environment Agency and the location of the extension
- At High risk of surface flooding
- At very low risk of groundwater flooding
- Within a critical drainage area
- Potentially within an area of sewer flooding

6.2 Under the NPPF it is necessary to demonstrate that, for any new development on the site, it is possible to provide an adequate level of flood protection for personnel working or living at the development.

Design Flood Level

6.3 The design flood level is the maximum estimated water level during the design storm event including an allowance for climate change in line with current best practice and the national planning policy guidance.

6.4 The Design Flood Level for this development has been determined by evaluating the levels from the Fluvial/Sea, Surface Water and Groundwater flood levels.

6.5 For this site, the Design Flood Level is 44.4m AOD. This is the highest level and corresponds to the Surface Water Flood Level.

Flood Protection

6.6 The National Planning Guidance standing advice and Environment Agency recommends that where possible, flood avoidance is provided by establishing the development's finished floor level 600mm above (freeboard) the design flood level. However, this level can be reduced if there is a high level of certainty about the estimated flood level. For this site the estimated free board has been determined to be 0.3m above the Design Flood Level due to the quality of the flood risk information available and the type of risk. The finished floor should be 44.7m AOD. The site already complies with this level

as the average external level is 45.6 m AOD and the current FFL is 45.9m AOD.

It is noted that although the red line boundary of the development falls within the flood zone, the actual area of proposed extension is located outside of it.

6.7 The site is within an area of sewer flooding. The following recommendation should be followed:

- All new connections to the sewer network should have non-return valves.

6.8 The Development Management Procedure Order (2015) requires that the Environment Agency and Council is consulted on developments within Areas with Critical Drainage Problems (ACDPs). The development is within a Critical Drainage Area, the local authority expects that the new development to reduce flood risks downstream, rather than having just neutral impact. It also expects that Sustainable Drainage Systems (SuDS) are used for managing surface water. Refer to section 7 of this report.

7.1 The NPPF specifically stipulates that consideration should be given to potential off-site flood impacts of any proposed development. These off-site impacts are in relation to the following:

- Surface water management
- Flood flow conveyance, storage and climate change

Surface Water Management

7.2 The surface water run-off will be disposed of using SuDS techniques. The aim is to provide a sustainable design that accommodates the proposed attenuation volume and replicates the existing drainage regime using the SuDS hierarchy, is shown in the figure below.

7.3 The Landis Top Soil classification is impeded drainage. The SuDS techniques highlighted in red below could be used on-site. This assessment is based on the LANDIS Top Soil infiltration, ground conditions and available potential discharge points.

The SuDS Hierarchy (Source:EA Thames region, SuDS a practical guide)

	SUDS technique	*Flood Reduction*	*Pollution Reduction*	*Landscape & Wildlife Benefit*
Most Sustainable	**Living roofs**	✔	✔	✔
	Basins and ponds - Constructed wetlands - Balancing ponds - Detention basins - Retention ponds	✔	✔	✔
	Filter strips and swales	✔	✔	✔
	Infiltration devices - soakaways - infiltration trenches and basins	✔	✔	✔
	Permeable surfaces and filter drains - gravelled areas - solid paving blocks - porous paviors	✔	✔	
Least Sustainable	**Tanked systems** - over-sized pipes/tanks - storms cells	✔		

7.4 With no increase in the rate of surface water discharge from the site, compared to the site in its current configuration, the proposed development would have no adverse impact on surface water flood risk at the site or surrounding area. The SuDS should be designed at the detailed project stage.

Flood Flow conveyance and storage

7.5 Due to the size of the development and its location in the flood risk zone, flood compensation for this development is not required. It is important to note that while the red line boundary intersects the flood zone, the proposed extension itself is situated outside of the flood extent.

8.1 This flood risk assessment has identified the potential flooding mechanisms that could affect the site. As part of this, the following residual risks have been evaluated.

Public safety and Site Access

8.2 This assessment has demonstrated that the proposed development will have no adverse impact on flood risk in the area surrounding the site. Available evidence indicates that the development would not change surface water generation. Therefore, there is no basis to indicate that, with respect to flood risk, the proposed development would adversely impact public safety.

8.3 It will be necessary to ensure that all building users are fully informed of procedures to be implemented during the threat of imminent flooding.

Flood Warning and evacuation

8.4 The site is located within an area covered by the Environment Agency Flood Alert service. It is recommended that the users of the proposed development are registered with this service to receive early warning of imminent flooding.

8.5 The occupants of the site are encouraged to sign up for the alerts. The Table 4 below shows the actions that must be taken for each flood warning.

8.6 Action to be taken in the event of an Alarm being Raised or a Flood Warning Received:

a. Raise the alarm and evacuate the site following the established Fire Drill procedures. The main assembly is as per the main house fire drill assembly point.

b. Contact Emergency Fire Services (999) if necessary and Environment Agency Floodline: (0845 988 1188) if the event is unexpected.

c. If safe to do so, locate and turn off critical services, e.g. water, gas & electricity.

d. Follow the routes below to evacuate the site altogether.

Actions that will be taken for each flood warning

Warning	Message	Timing	Action
 FLOOD ALERT	Flooding is possible. Be prepared.	2 hours to 2 days in advance of flooding.	- Be prepared for flooding. - Prepare a flood kit.
 FLOOD WARNING	Flooding is expected. Immediate action required.	Half an hour to 1 day in advance of flooding.	- Act now to protect your property. - Block doors with flood boards or sandbags and cover airbricks and other ventilation holes. - Move pets and valuables to a safe place. - Keep a flood kit ready. - Move any critical equipment and information to a safe location
 SEVERE FLOOD WARNING	Severe flooding. Danger to life.	When flooding poses a significant threat to life and different actions are required.	- Be ready should you need to evacuate from the property. - Co-operate with the emergency services and call 999 if you are in immediate danger.
Warning Removed	No further flooding is currently expected for your area.	Issued when a flood warning is no longer in force.	- Flood water may still be around and could be contaminated. - If you've been flooded, ring your buildings and contents insurance company as soon as possible.

Useful local phone numbers

Please write your local phone numbers in the space provided below.
Make sure they are easy to find in the event of a flood.


Local authority:

Local police:


Gas and electricity company:

Insurance company and policy details:


Doctor:


Pharmacy:


Electrician:

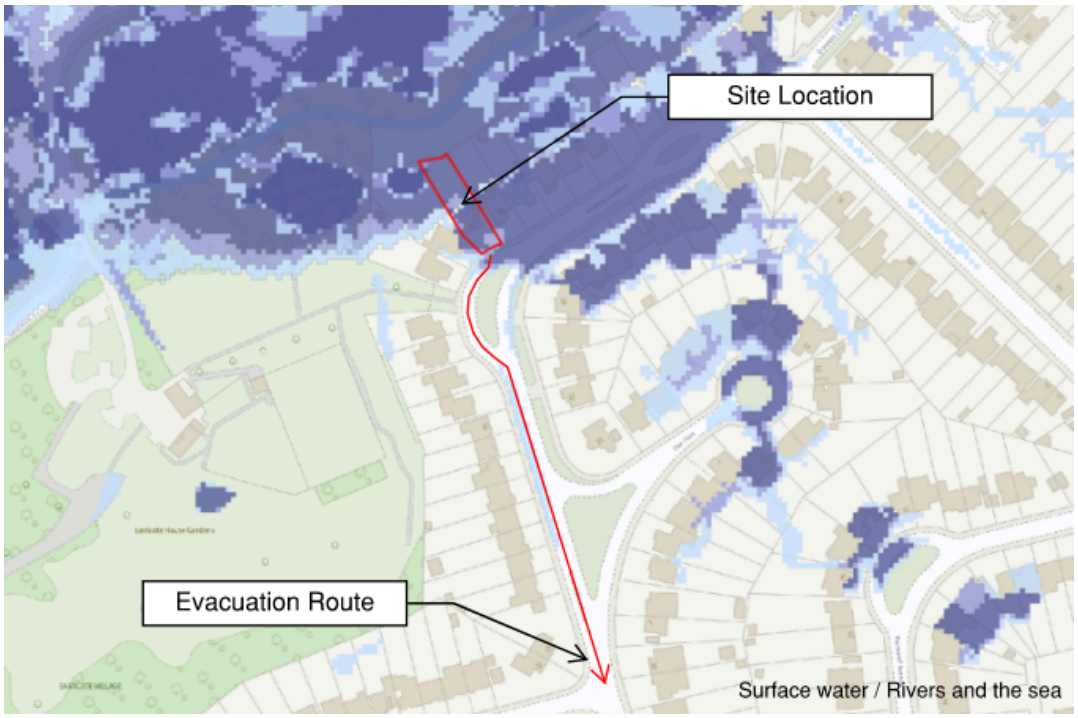

Gas safe engineer:


Plumber:


Builder:

8.7 The proposed evacuation route below shows how the development could be evacuated before the 1 in 1000 or 0.1% annual probability of flooding extreme flood occurs. Safe egress is achievable by following St Lawrence Drive which is shown to be beyond the extent of flooding. See figure below for details.

Evacuation Route



Conclusions 9

9.1 It is concluded that the proposed development can be delivered in accordance with the provisions of the National Planning Policy Framework (NPPF), as well as the requirements of the Environment Agency and the local planning authority.

9.2 This report demonstrates that the proposal will be safe, in terms of flood risk, for its design life and will not increase the flood risk elsewhere. Although the red line boundary lies within the flood zone, the proposed extension is entirely located outside of the flood-affected area, further supporting the low-risk nature of the development.

9.3 It is proposed that a formal Flood Warning and Emergency Response Plan is developed for the proposed development to communicate flood emergency response procedures to all the occupants of the site.

Appendix A

N

1 Block Plan location plan
1 : 1250

10m 50 m 100 m

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Drawing Status:

PLANNING

Rev.	Description	by	Date
P1	Planning issue	BC	03/04/2025

Project Name
61 St Lawrence Drive, Pinner, HA5 2RW

Clients Name
Reza Naji

Drawing Title
Location Plan

Description
Extension, loft conversion & reconfiguration

Scale	Date	Drawn By
1:1250@A3	April 2025	BC

Drawing Number
240068-PL-D 0012

Issue Date	Checked	Revision
03/04/2025	PN	P1

Appendix B

N

1 Block Plan Existing_
1 : 500

2 Block Plan Proposed
1 : 500

0 50m
5m 10m 20m 30m

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PLANNING

Rev.	Description	by	Date
P1	Planning issue	BC	03/04/2025

Project Name
61 St Lawrence Drive, Pinner, HA5 2RW

Clients Name
Reza Naji

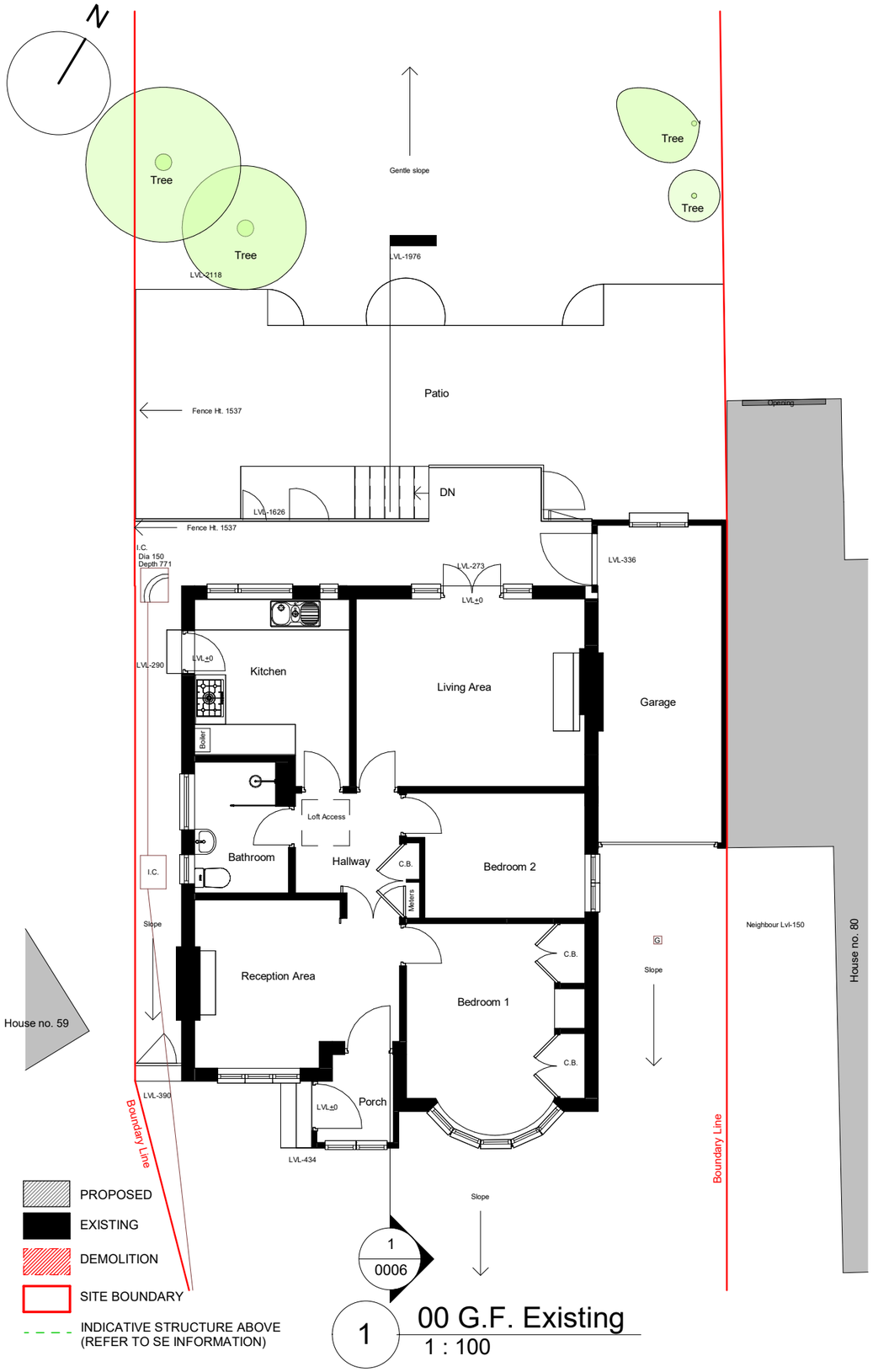
Drawing Title
Block Plan

Description
Extension, loft conversion & reconfiguration

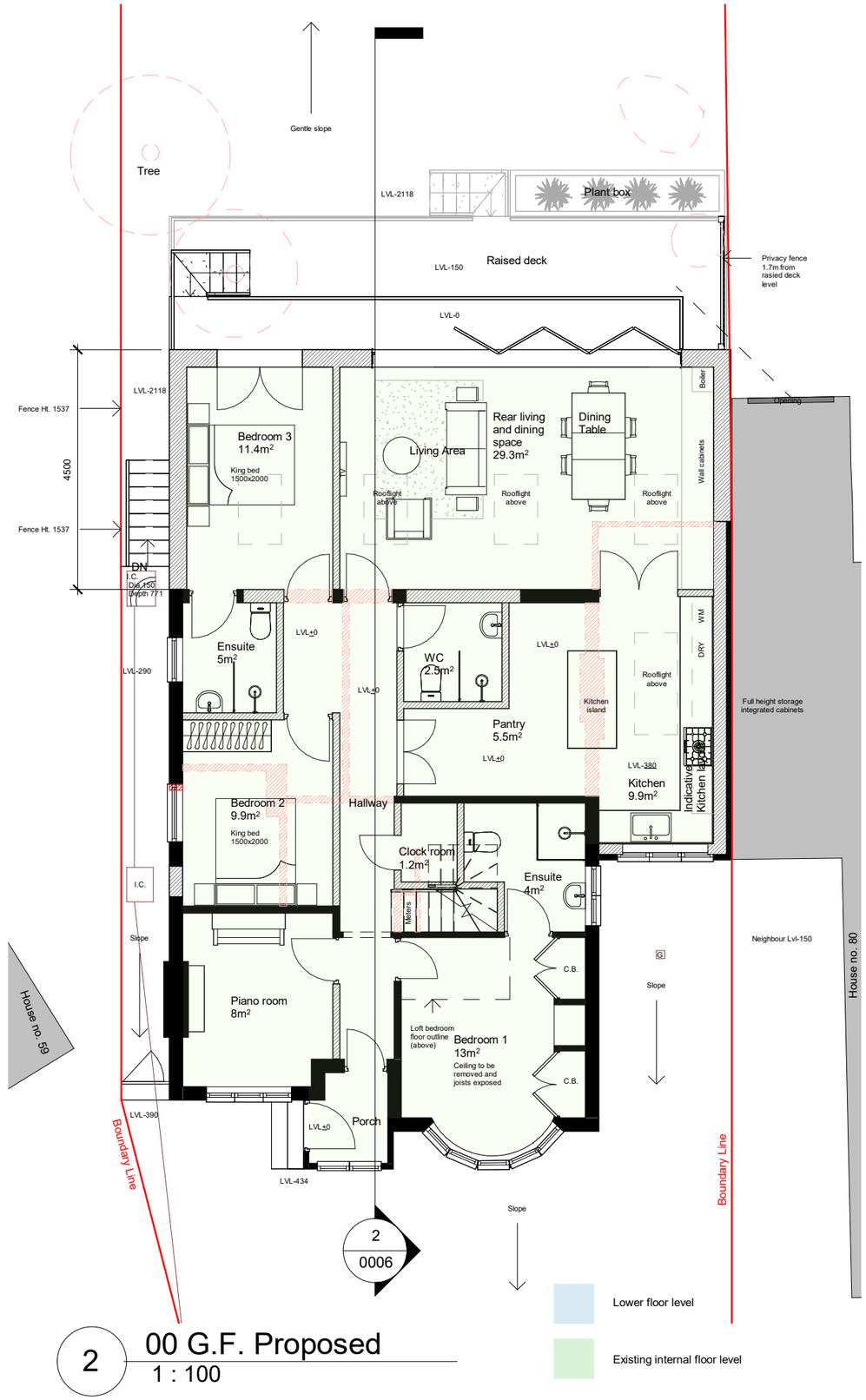
Scale	Date	Drawn By
1:500@A3	April 2025	BC

Drawing Number
240068-PL-D 0001

Issue Date	Checked	Revision
03/04/2025	PN	P1



1 00 G.F. Existing
1 : 100



2 00 G.F. Proposed
1 : 100

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Rev.	Description	by	Date
P1	Planning issue	BC	03/04/2025

Project Name
61 St Lawrence Drive, Pinner, HA5 2RW

Clients Name
Reza Naji

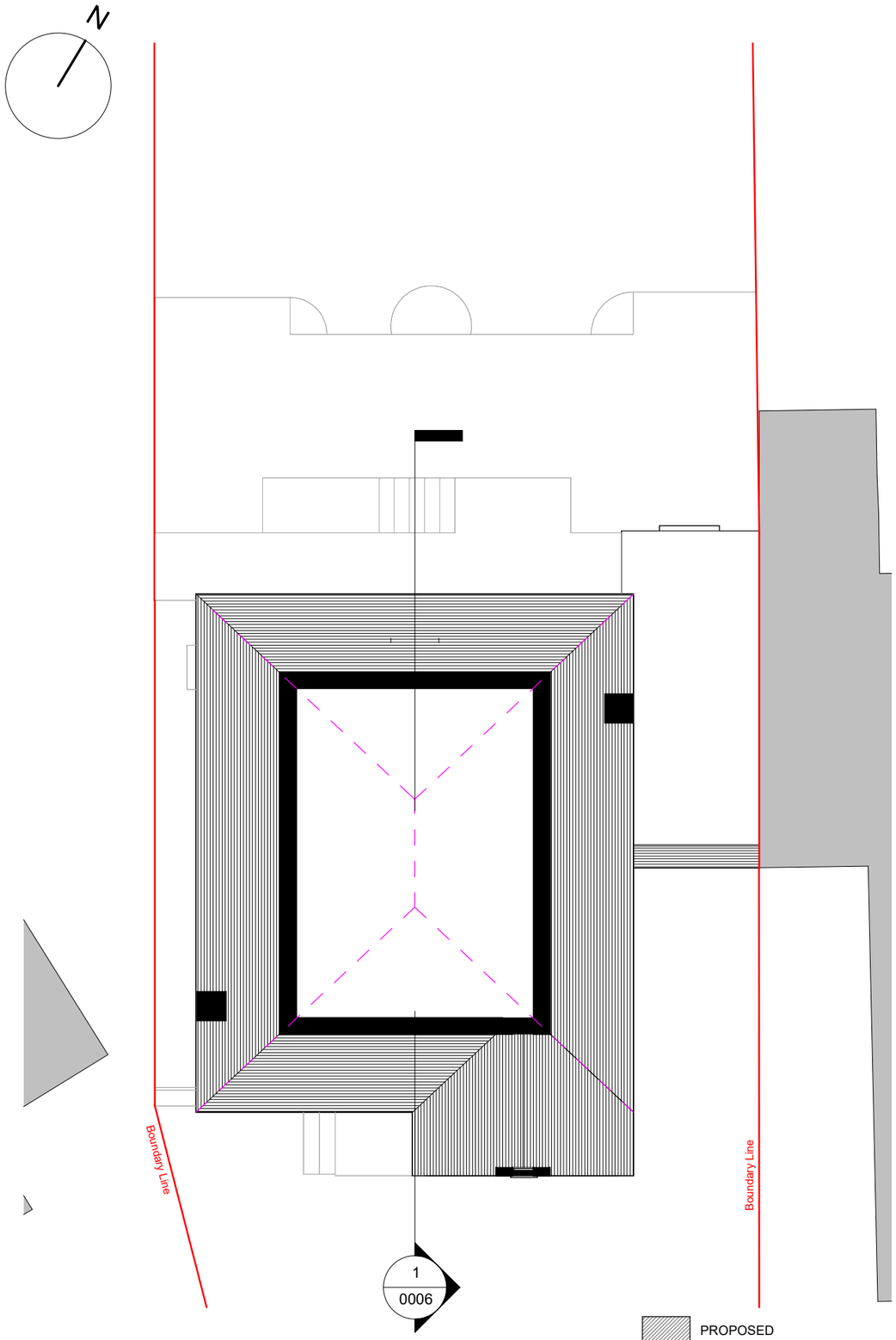
Drawing Title
Ground Floor

Description
Extension, loft conversion & reconfiguration

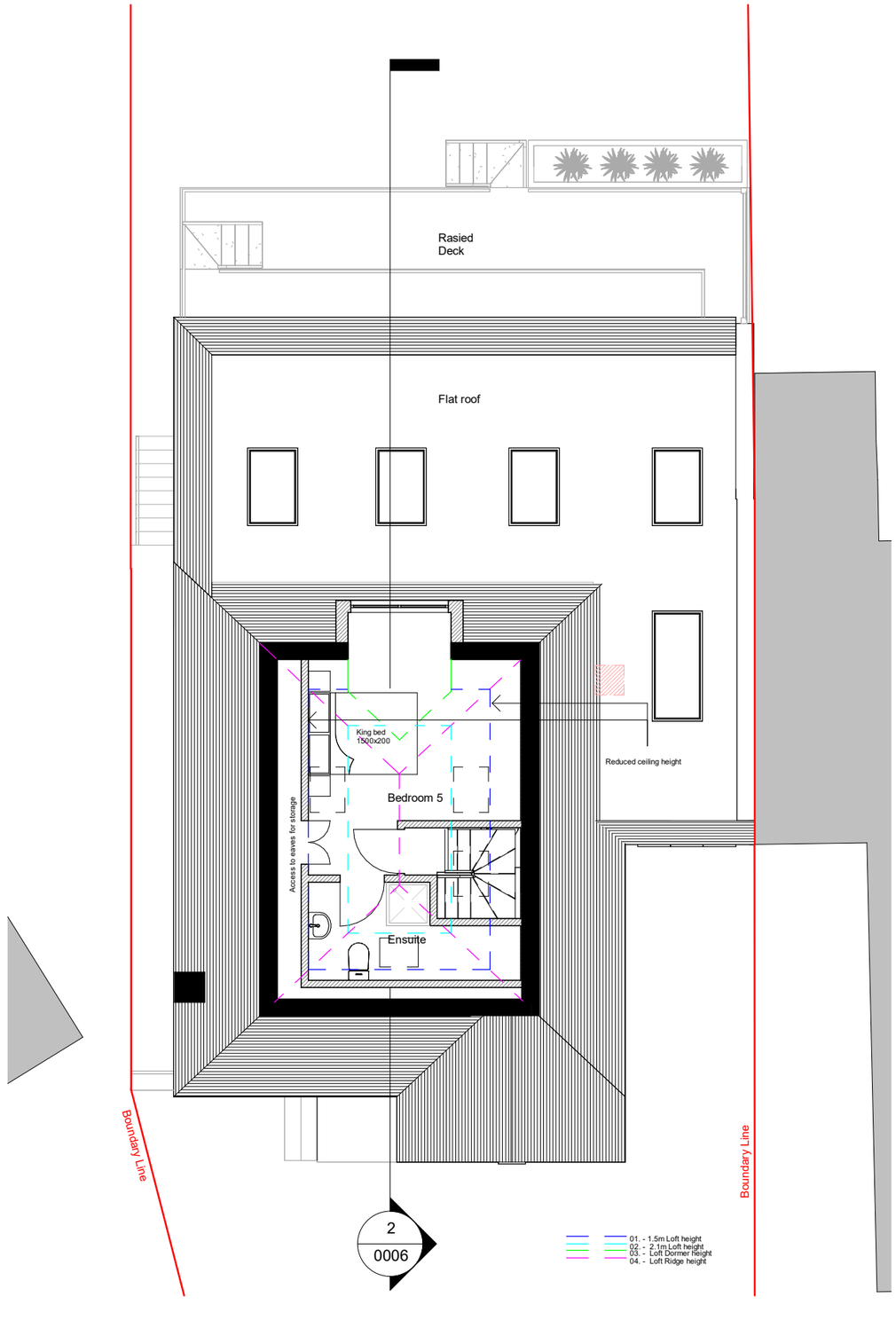
Scale	Date	Drawn By
1:100@A3	April 2025	BC

Drawing Number
240068-PL-D 0002

Issue Date	Checked	Revision
03/04/2025	PN	P1



1 01Loft Existing
1 : 100



2 01Loft Proposed
1 : 100

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Clients Name
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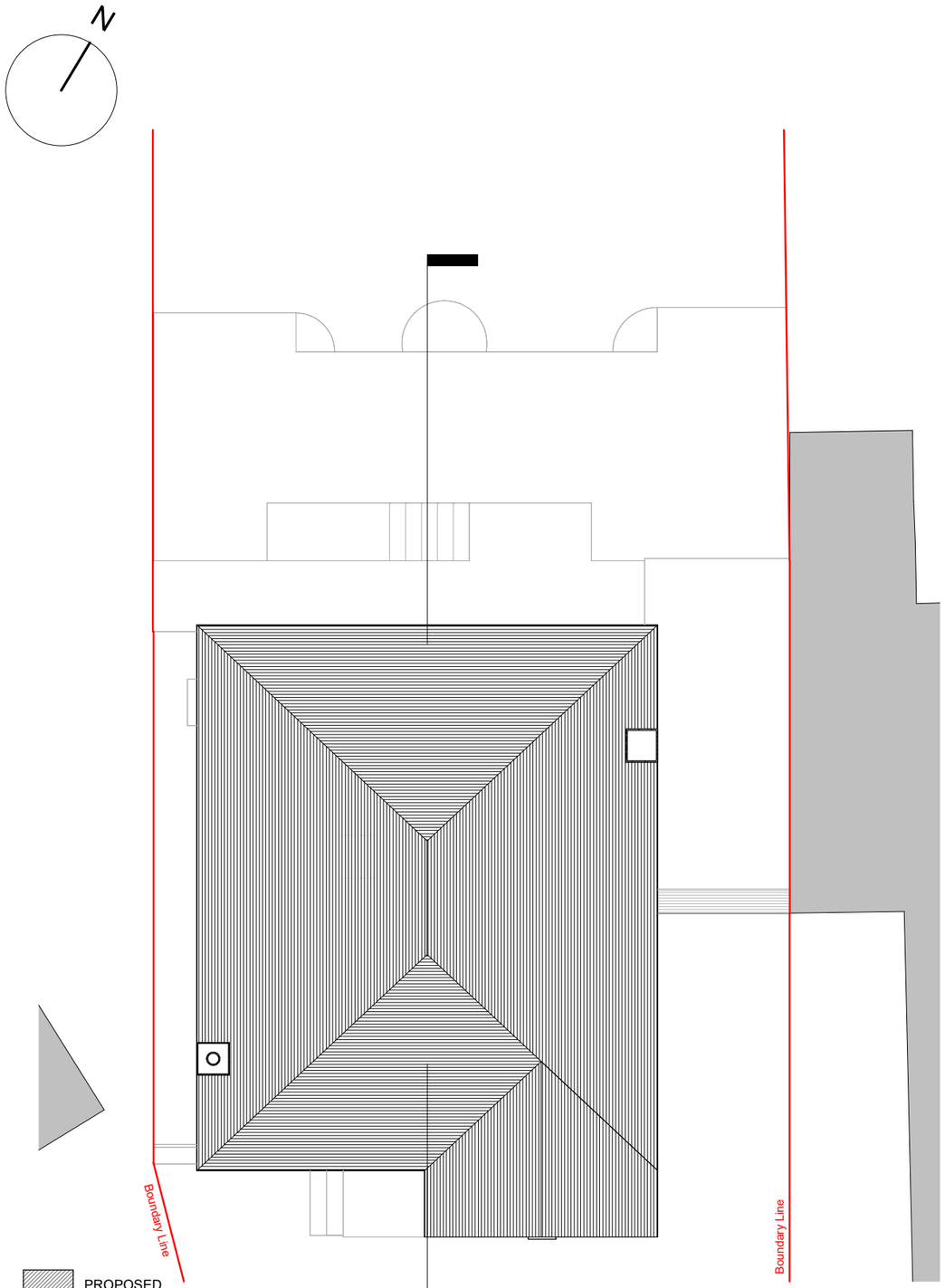
Drawing Title
Loft Plans

Description
Extension, loft conversion & reconfiguration

Scale	Date	Drawn By
1:100@A3	April 2025	BC

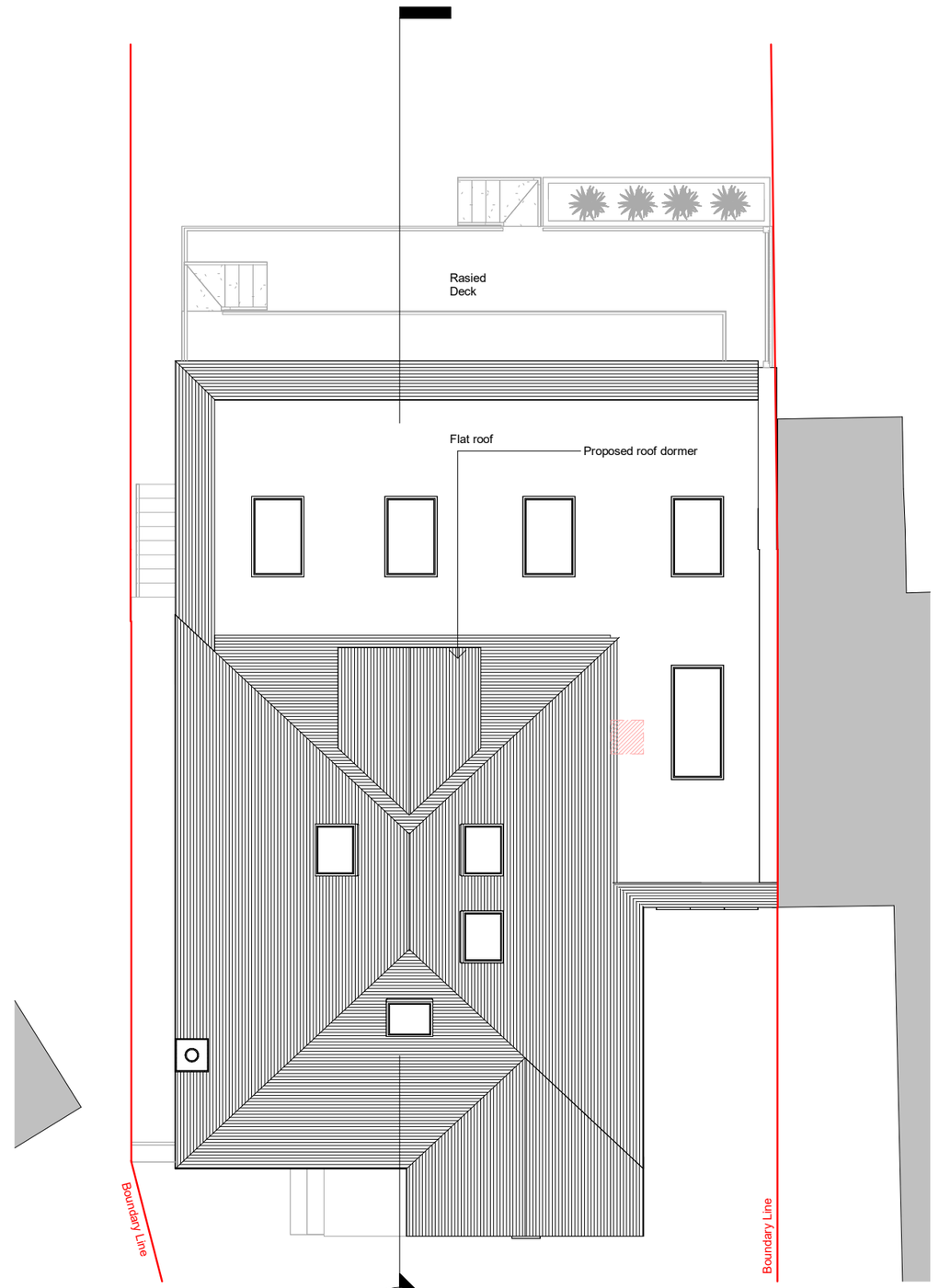
Drawing Number
240068-PL-D 0004

Issue Date	Checked	Revision
03/04/2025	PN	P1



1 0006

1 02 Roof Existing
1 : 100



2 0006

2 02 Roof Proposed
1 : 100

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Clients Name
Reza Naji

Drawing Title
Roof Plans

Description
Extension, loft conversion & reconfiguration

Scale	Date	Drawn By
1:100@A3	April 2025	BC

Drawing Number
240068-PL-D 0005

Issue Date	Checked	Revision
03/04/2025	PN	P1

1 Section 1 - Existing
1 : 100

2 Section 1 - Proposed
1 : 100

PROPOSED
EXISTING
DEMOLITION
SITE BOUNDARY
INDICATIVE STRUCTURE ABOVE (REFER TO SE INFORMATION)

0 5m 10m
1m 2m 3m 4m 6m 7m 8m 9m

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RIBA Chartered Practice

General Notes:

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Drawing Status:

FOR COMMENT

Rev.	Description	by	Date
P1	Planning issue	BC	03/04/2025

Project Name
61 St Lawrence Drive, Pinner, HA5 2RW

Clients Name
Reza Naji

Drawing Title
Section 1

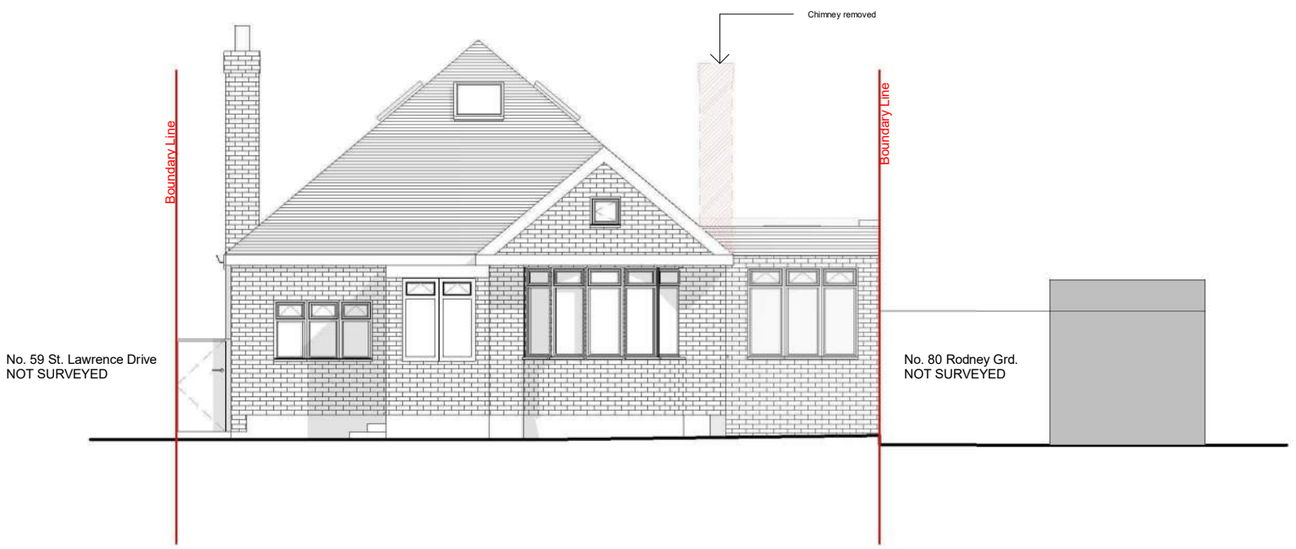
Description
Extension, loft conversion & reconfiguration

Scale	Date	Drawn By
1:100@A3	April 2025	BC

Drawing Number
240068-PL-D 0006

Issue Date	Checked	Revision
03/04/2025	PN	P1

1 Front elevation- Existing
1 : 100



2 Front elevation- Proposed
1 : 100

PROPOSED
EXISTING
DEMOLITION
SITE BOUNDARY
INDICATIVE STRUCTURE ABOVE
(REFER TO SE INFORMATION)

0 5m 10m
1m 2m 3m 4m 6m 7m 8m 9m

All dimensions are approximate only have been added for information purposes only.
Dimensions should be checked prior to construction or manufacture

THE MARKET DESIGN & BUILD
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RIBA Chartered Practice

General Notes:

Drawing Status:

FOR COMMENT

Rev.	Description	by	Date
P1	Planning issue	BC	03/04/2025

Project Name
61 St Lawrence Drive, Pinner, HA5 2RW

Clients Name
Reza Naji

Drawing Title
Front Elevation

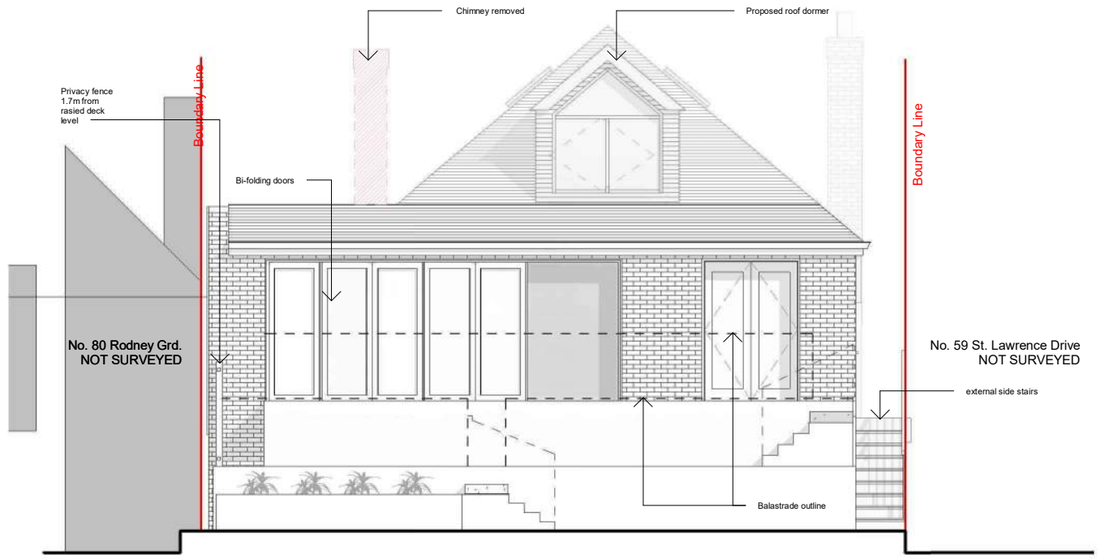
Description
Extension, loft conversion & reconfiguration

Scale	Date	Drawn By
1:100@A3	April 2025	BC

Drawing Number
240068-PL-D 0008

Issue Date	Checked	Revision
03/04/2025	PN	P1

1 Rear elevation - Existing
1 : 100



2 Rear elevation - Proposed
1 : 100

PROPOSED
EXISTING
DEMOLITION
SITE BOUNDARY
INDICATIVE STRUCTURE ABOVE
(REFER TO SE INFORMATION)

0 5m 10m
1m 2m 3m 4m 6m 7m 8m 9m

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Drawing Status:

FOR COMMENT

Rev.	Description	by	Date
P1	Planning issue	BC	03/04/2025

Project Name
61 St Lawrence Drive, Pinner, HA5 2RW

Clients Name
Reza Naji

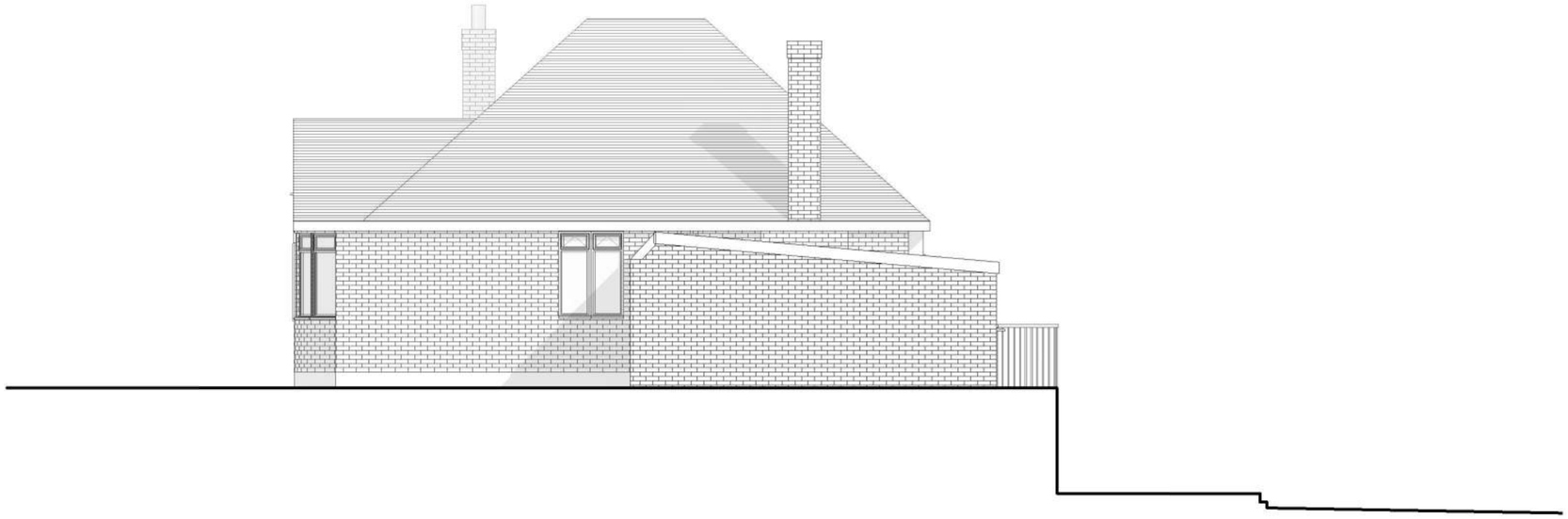
Drawing Title
Rear Elevation

Description
Extension, loft conversion & reconfiguration

Scale	Date	Drawn By
1:100@A3	April 2025	BC

Drawing Number
240068-PL-D 0009

Issue Date	Checked	Revision
03/04/2025	PN	P1



1 Side elevation 1 - Existing
1 : 100

2 Side elevation 1 - Proposed
1 : 100

PROPOSED
EXISTING
DEMOLITION
SITE BOUNDARY
INDICATIVE STRUCTURE ABOVE (REFER TO SE INFORMATION)

0 5m 10m
1m 2m 3m 4m 6m 7m 8m 9m

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Drawing Status:

FOR COMMENT

Rev.	Description	by	Date
P1	Planning issue	BC	03/04/2025

Project Name
61 St Lawrence Drive, Pinner, HA5 2RW

Clients Name
Reza Naji

Drawing Title
Side Elevation 1

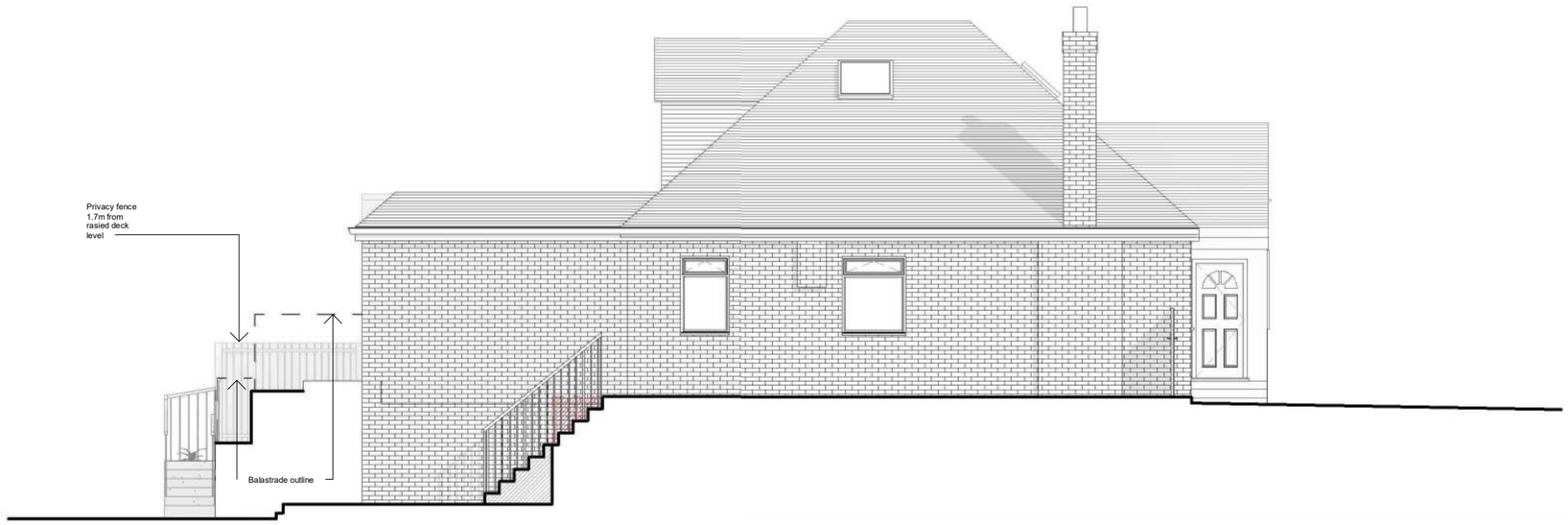
Description
Extension, loft conversion & reconfiguration

Scale	Date	Drawn By
1:100@A3	April 2025	BC

Drawing Number
240068-PL-D 0010

Issue Date	Checked	Revision
03/04/2025	PN	P1

1 Side elevation 2 - Existing
1 : 100



2 Side elevation 2 - Proposed
1 : 100

PROPOSED
EXISTING
DEMOLITION
SITE BOUNDARY
INDICATIVE STRUCTURE ABOVE
(REFER TO SE INFORMATION)

0 5m 10m
1m 2m 3m 4m 6m 7m 8m 9m

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FOR COMMENT

Rev.	Description	by	Date
P1	Planning issue	BC	03/04/2025

Project Name
61 St Lawrence Drive, Pinner, HA5 2RW

Clients Name
Reza Naji

Drawing Title
Side Elevation 2

Description
Extension, loft conversion & reconfiguration

Scale	Date	Drawn By
1:100@A3	April 2025	BC

Drawing Number
240068-PL-D 0011

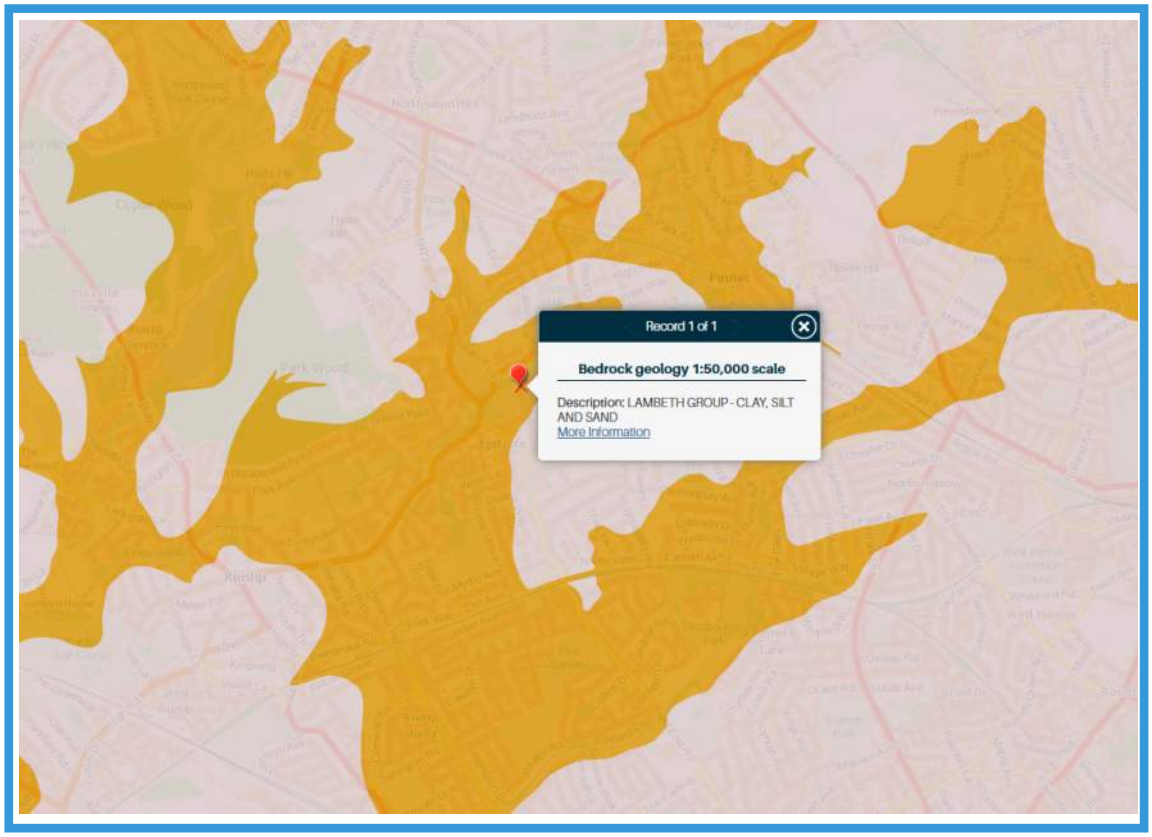
Issue Date	Checked	Revision
03/04/2025	PN	P1

Appendix C

SITE GEOLOGY

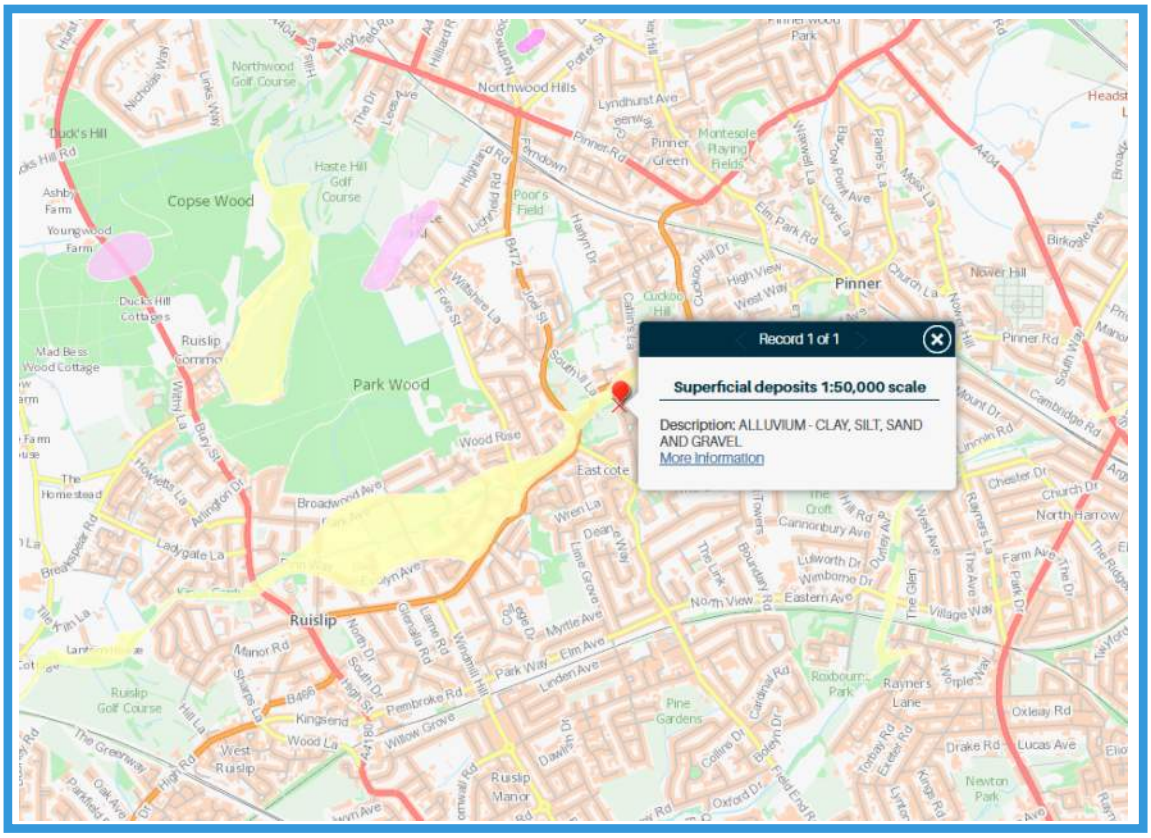
GEOINDEX ONSHORE

GEOLOGY - BEDROCK - LAMBETH GROUP - CLAY, SILT AND SAND



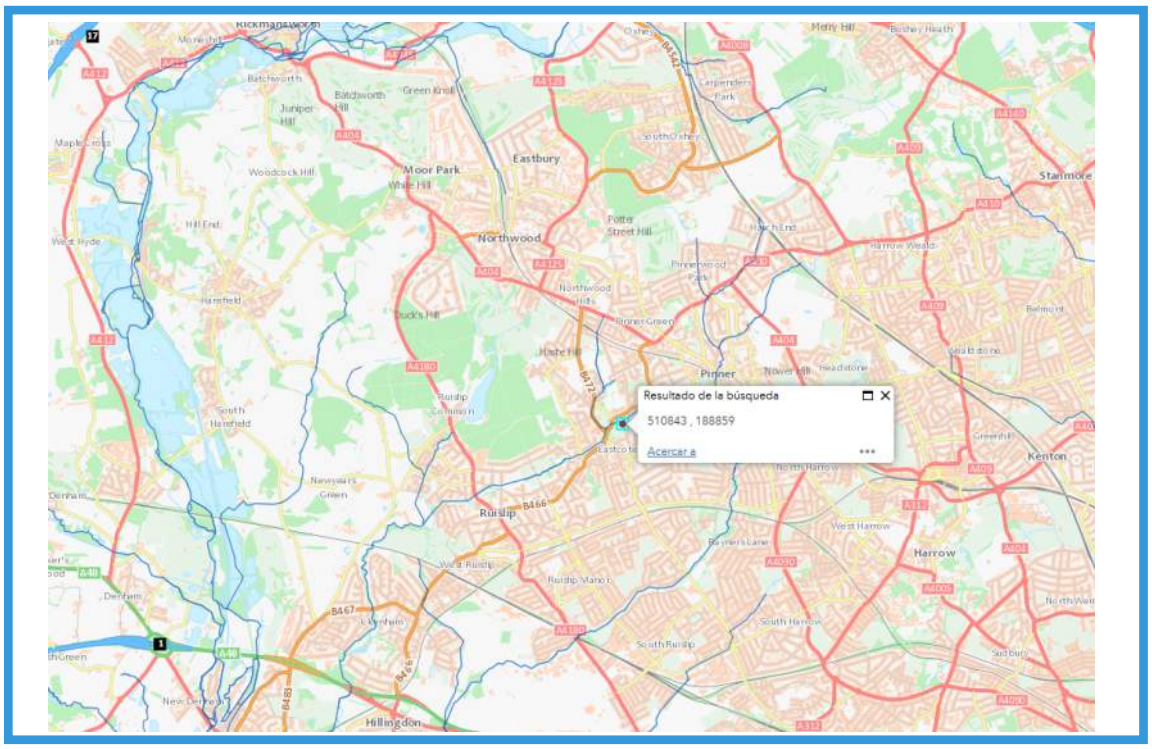
GEOINDEX ONSHORE

GEOLOGY - SUPERFICIAL DEPOSITS - ALLUVIUM - CLAY, SILT, SAND AND GRAVEL



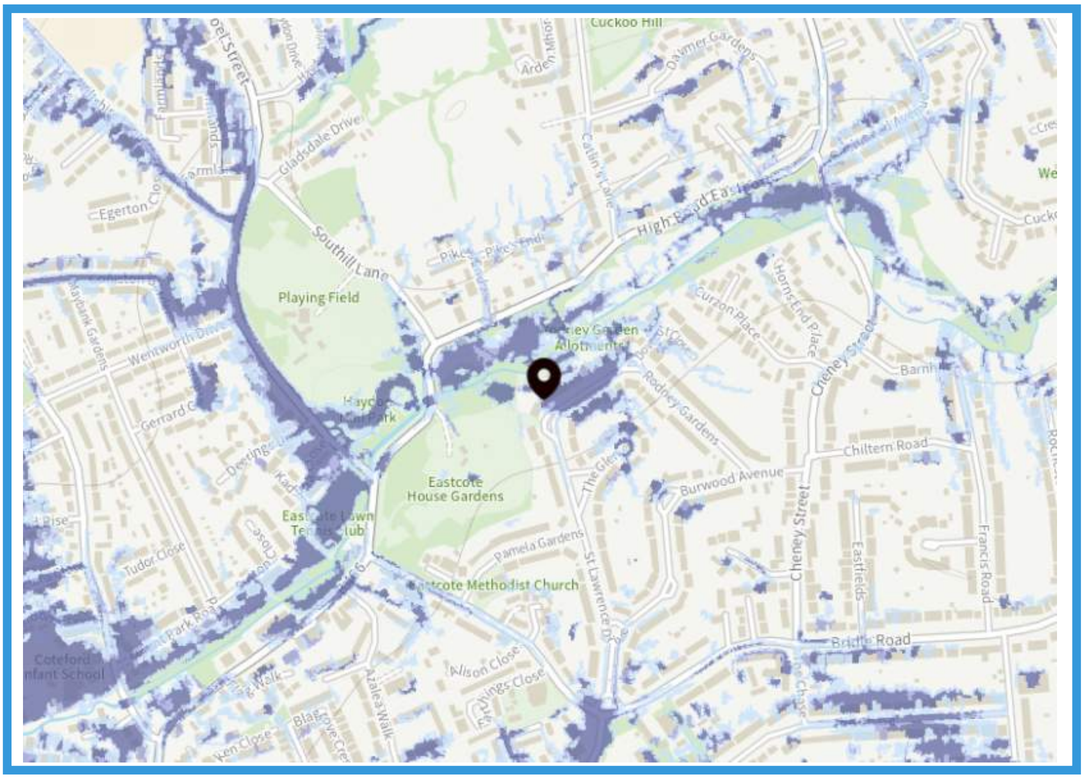
SITE HYDROGEOLOGY

Environment Agency Main River Map



SITE SURFACE WATER FLOOD RISK

High risk means a chance of flooding greater than 3.3% (1:30)
Medium risk means a chance of flooding of btw 1% (1:100) and 3.3%
Low risk means a chance of flooding of btw 0.1% (1:1000) and 1%
Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding



Yearly chance of flooding between 2040 and 2060

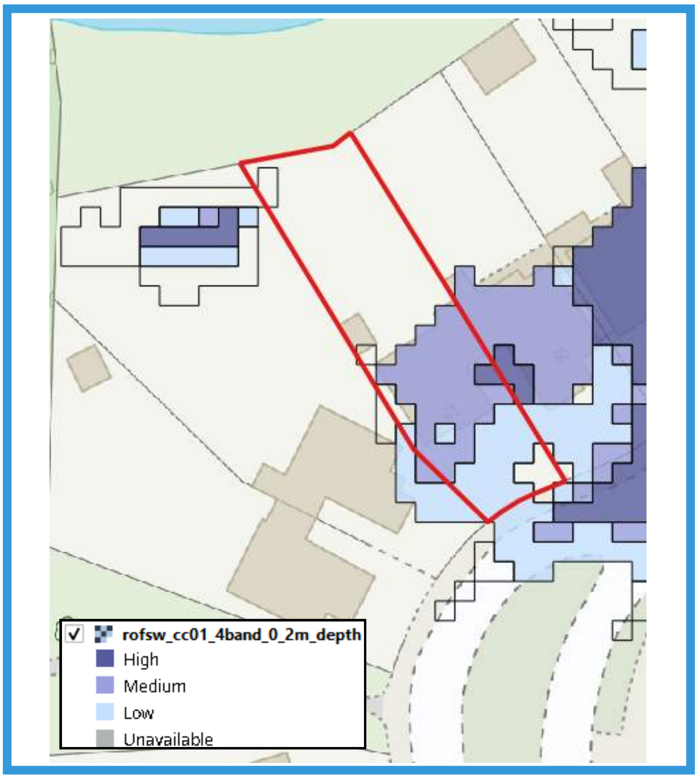
Flood area (extent)

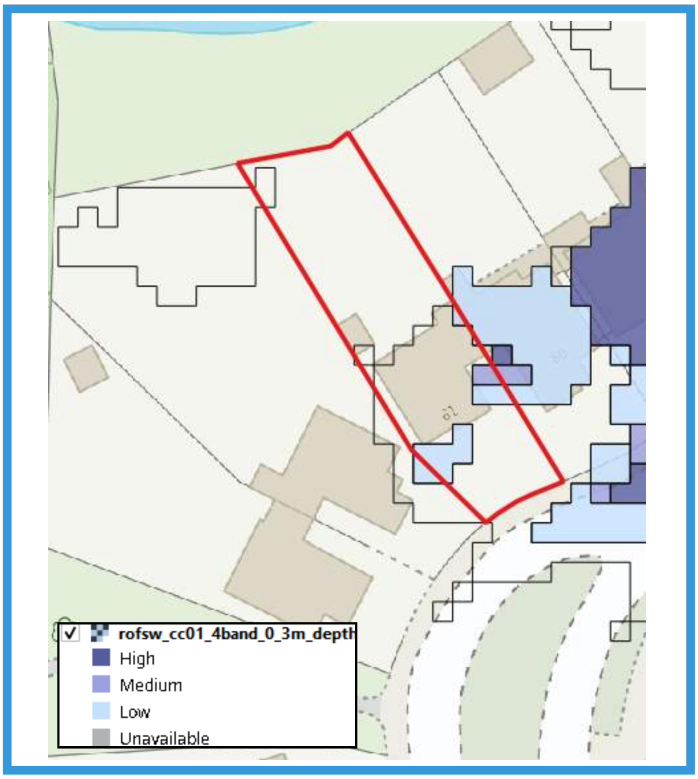
High chance

Medium chance

Low chance

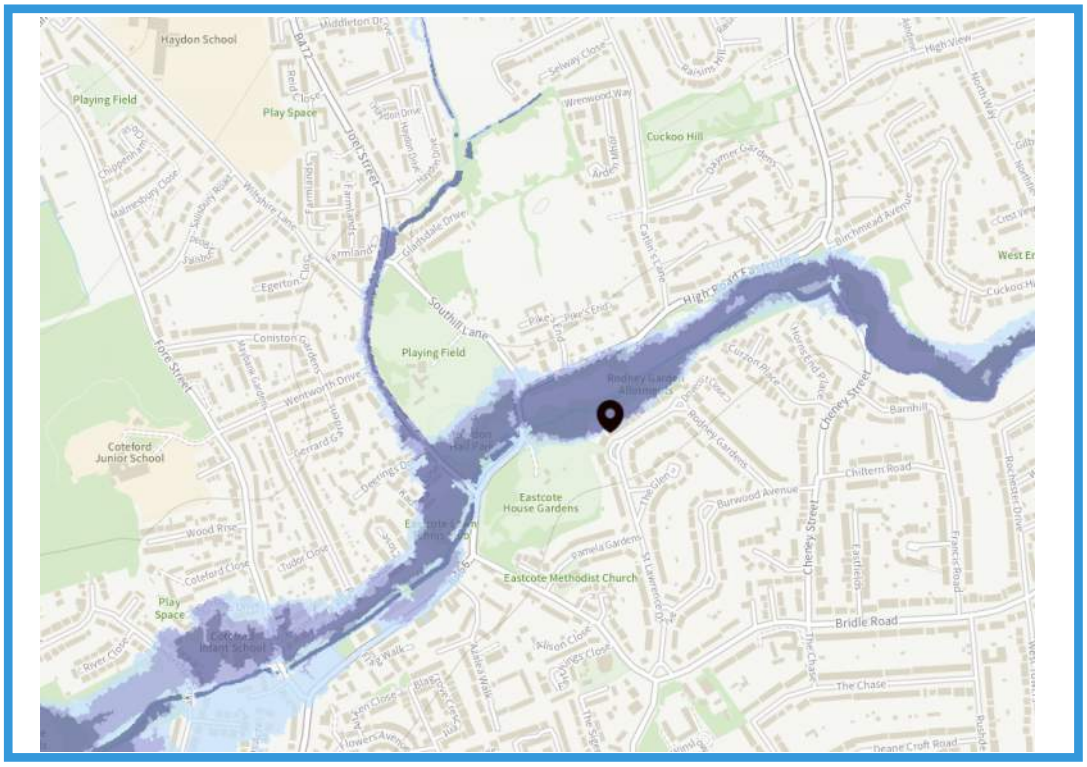
DEPTH



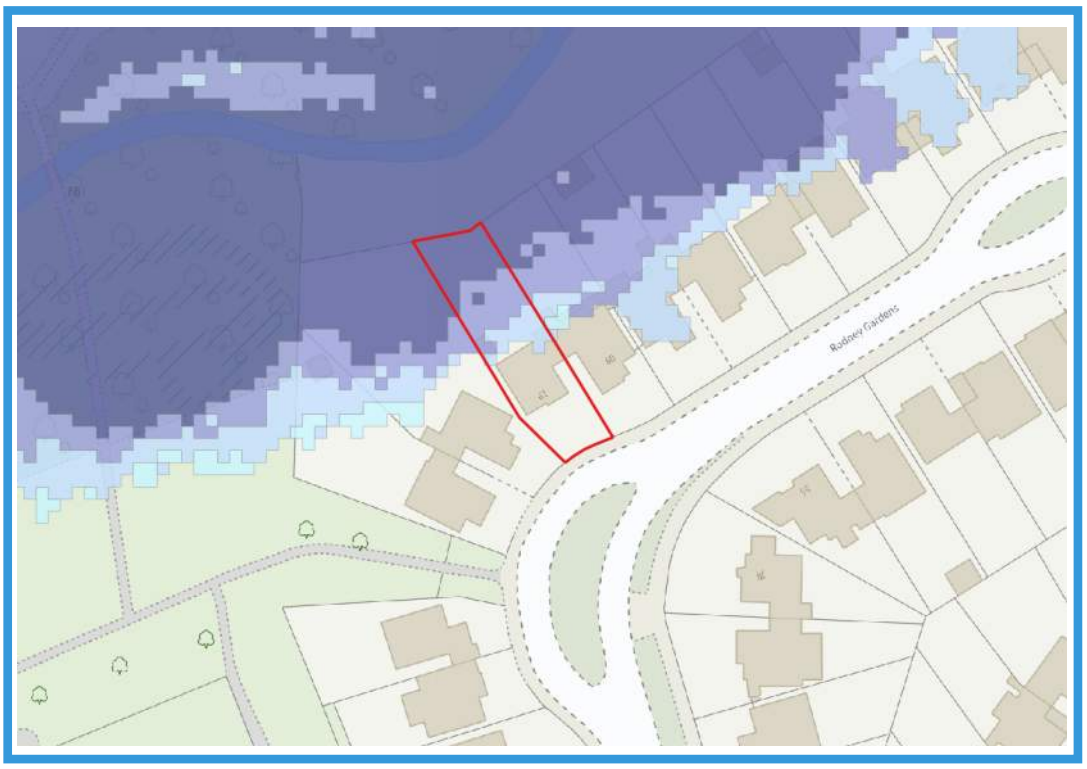


RIVER AND SEA FLOOD RISK MAP

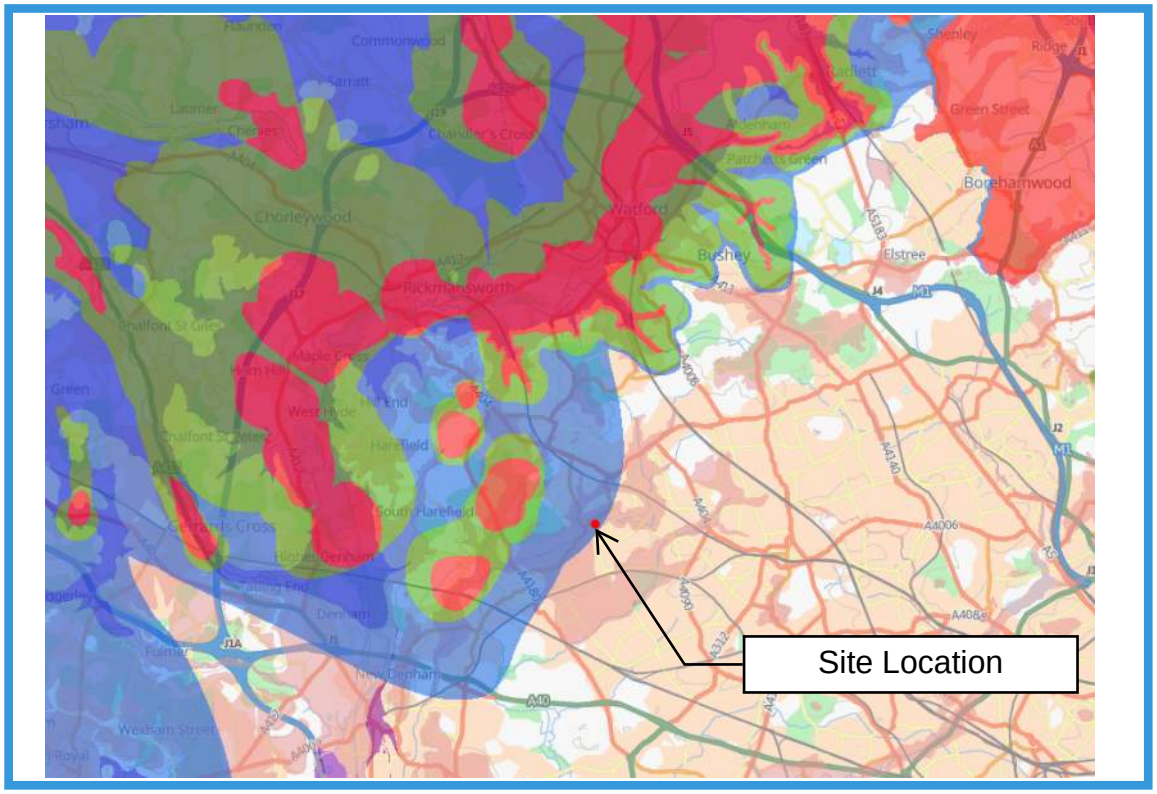
- High - greater than or equal to 1 in 30 (3.3%) chance of flooding in any year
- Medium –Less than 1 in 30 (3.3%) but greater than or equal to 1 in 100 (1%) chance of flooding in any given year
- Low –Less than 1 in 100 (1%) but greater than or equal to 1 in 1000 (0.1%) chance of flooding in any given year
- Very low –less than 1 in 1000 (0.1%) chance of flooding in any given year



DEPTH



MAGIC RESULTS



Site Check Results

Site Check Report generated on Tue Jun 10 2025

The following features have been found in your search area:

You selected the location: Centroid Grid Ref: TQ10848885

Source Protection Zones merged (England)

NUMBER	3

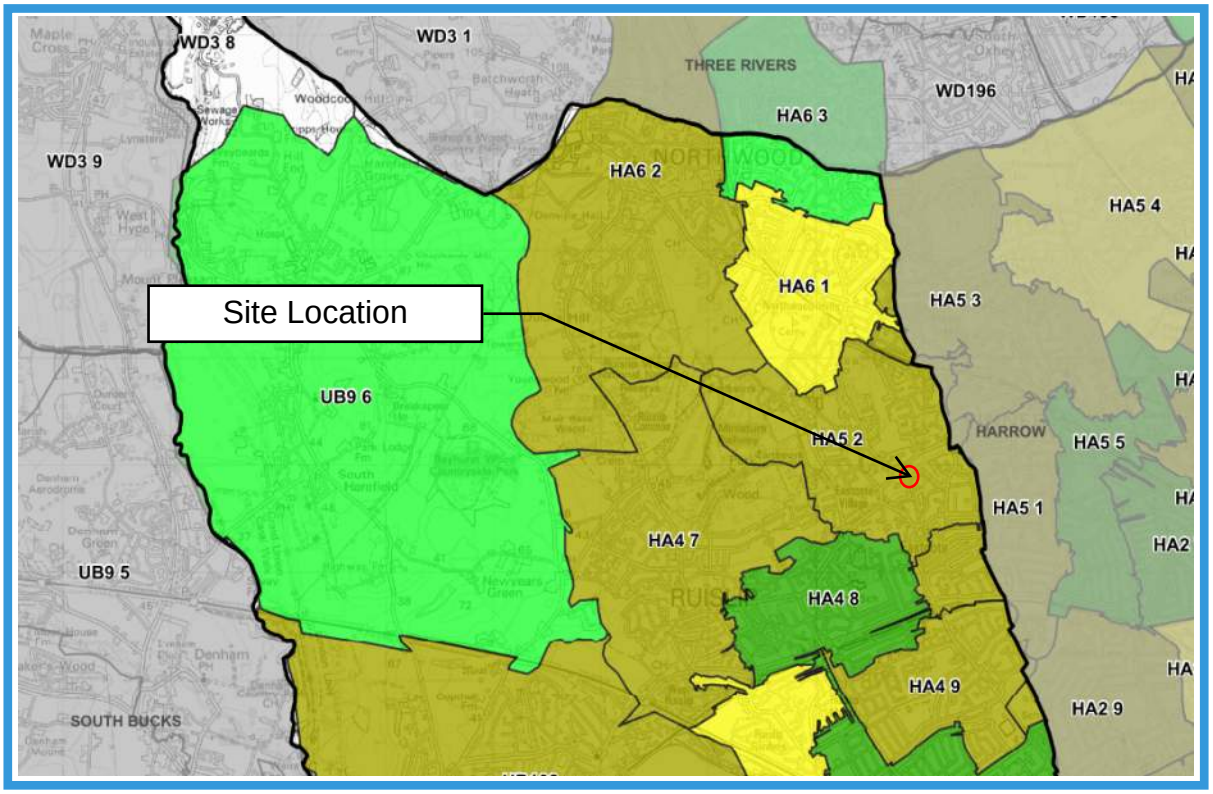
Aquifer Designation Map (Superficial Drift) (England)

TYPOLOGY	Secondary A

Aquifer Designation Map (Bedrock) (England)

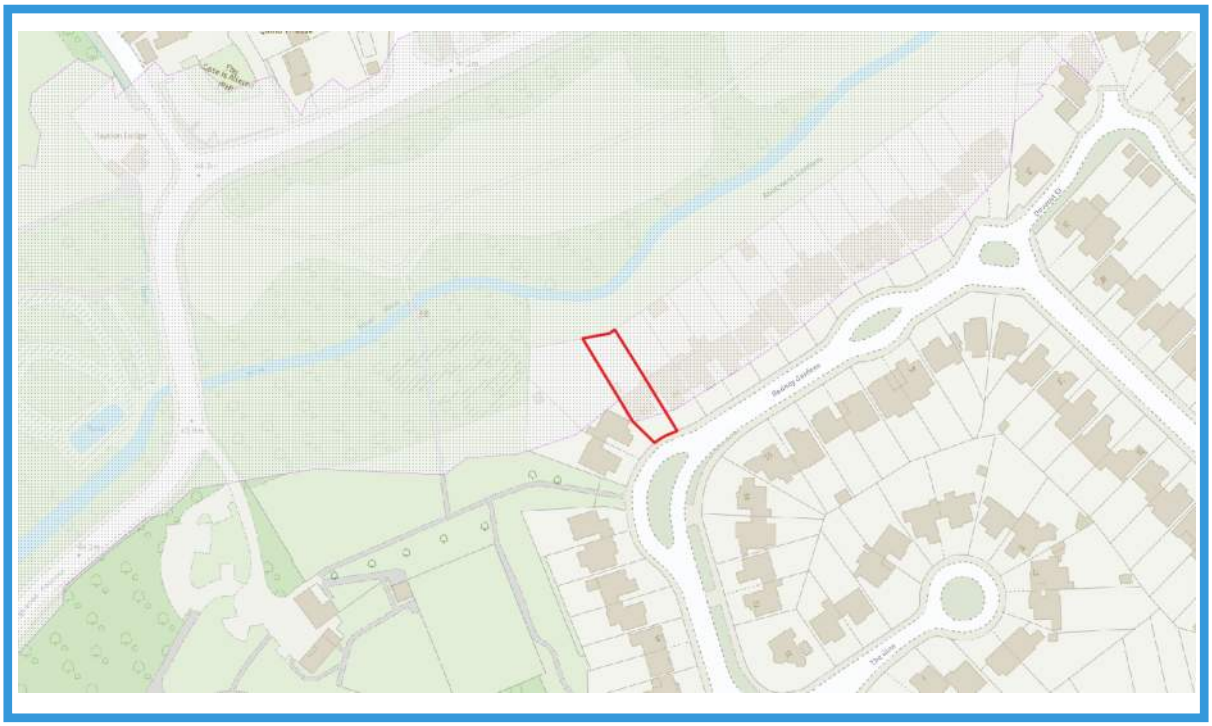
TYPOLOGY	Secondary A

SITE SEWER FLOODING



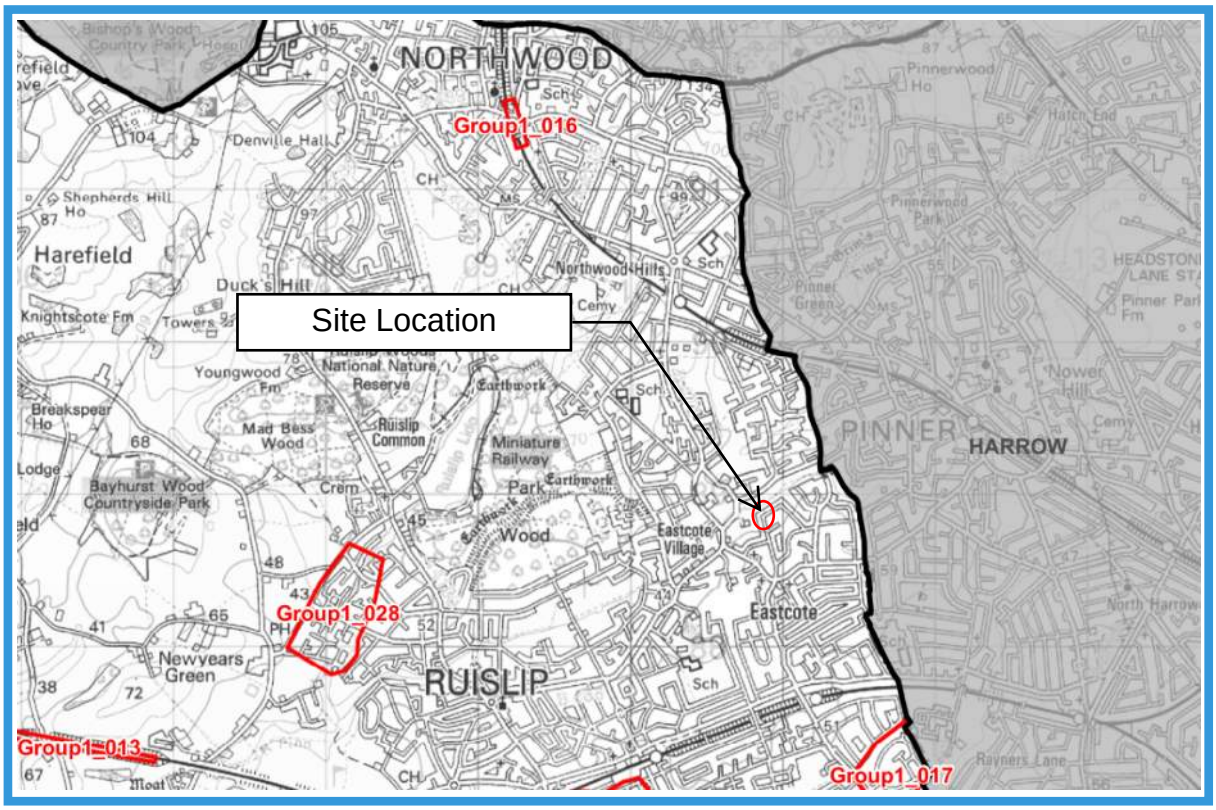
GROUND WATER FLOOD RISK

FLOOD WARNING AREA

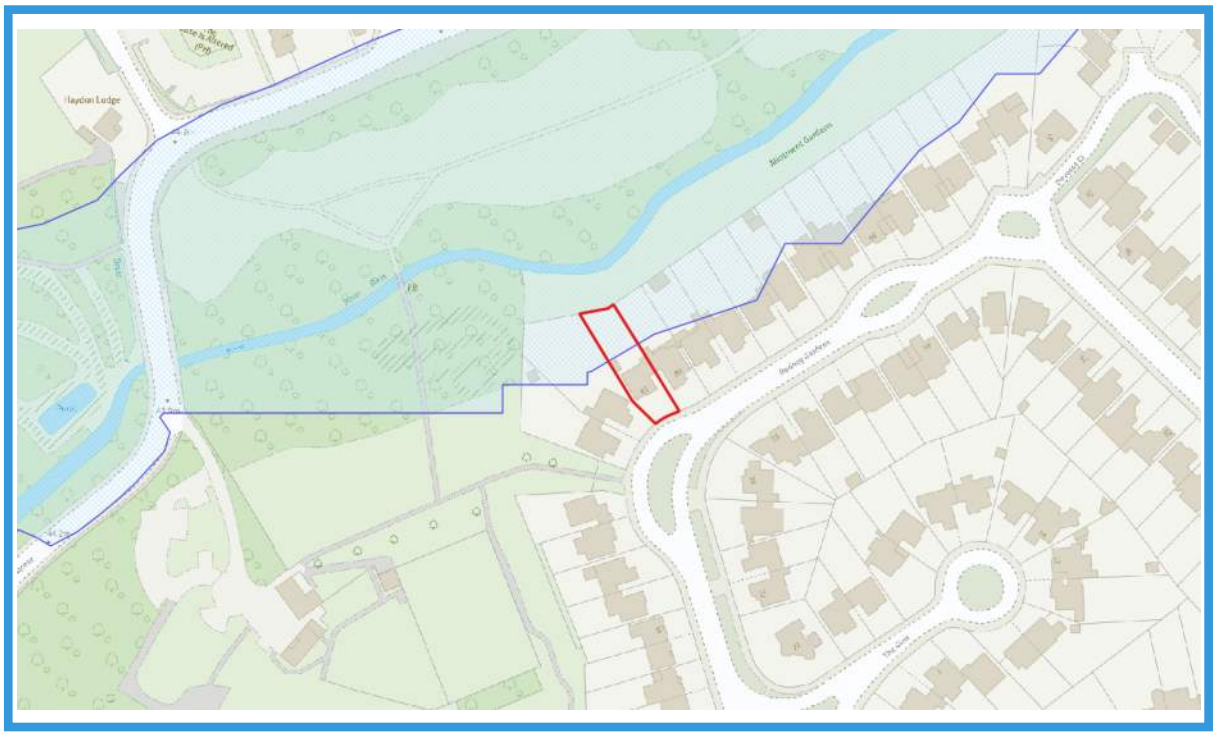


Flood Warning areas

CRITICAL DRAINAGE AREA



HISTORIC FLOOD MAP



Historic Flood Outline

Flood map for planning

Your reference	Location (easting/northing)	Created
Unspecified	**510842/188860**	**10 June 2025 07:53**

Your selected location is in flood zone 3, an area with a high probability of flooding.

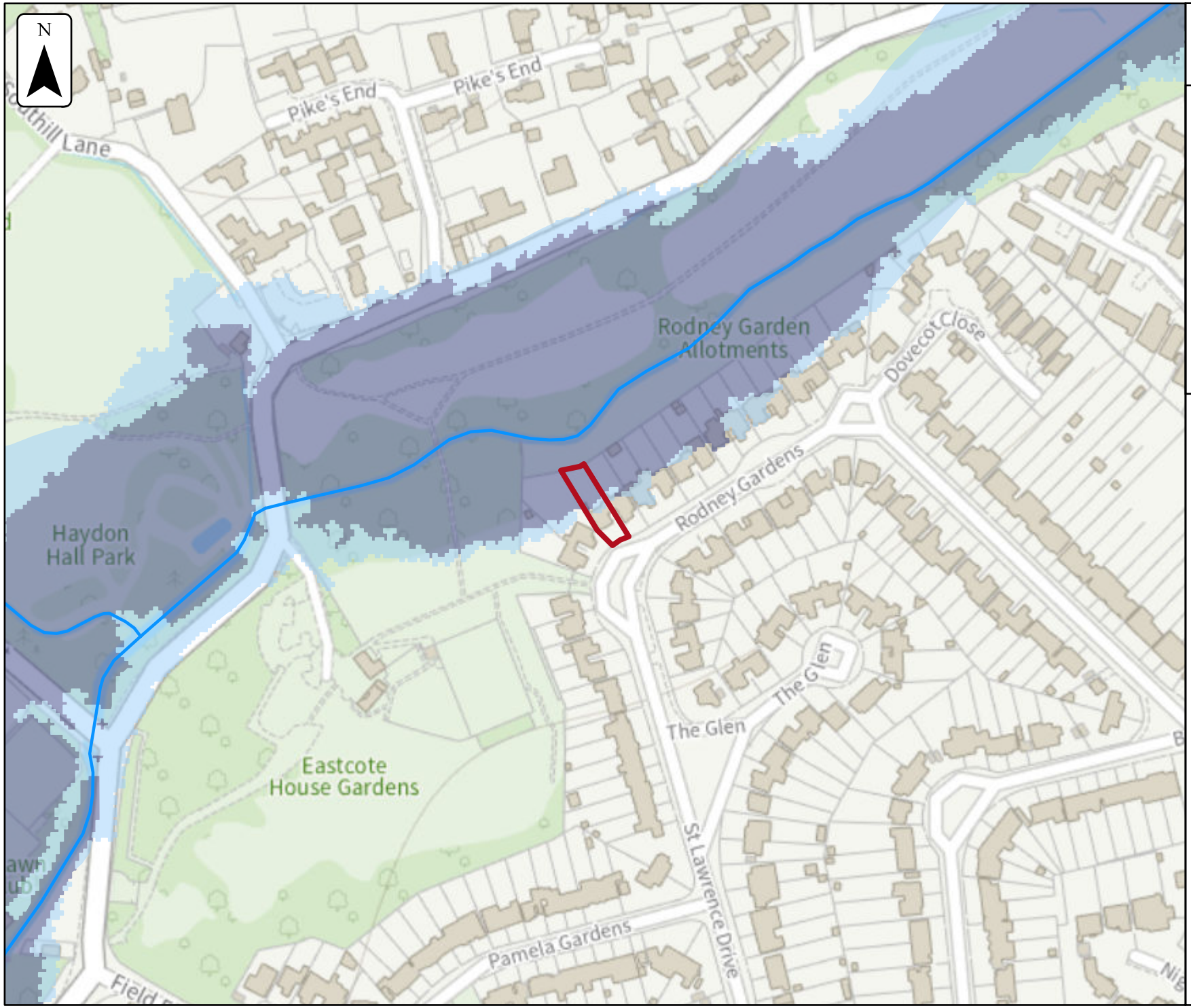
This means:

- you must complete a flood risk assessment for development in this area
- you should follow the Environment Agency's standing advice for carrying out a flood risk assessment (see https://www.gov.uk/guidance/flood-risk-assessment-standing-advice)

Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.



Environment Agency

Flood map for planning

Your reference
Unspecified

Location (easting/northing)
510842/188860

Scale
1:2,500

Created
10 Jun 2025 07:53

- Selected area
- Flood zone 3
- Flood zone 2
- Flood zone 1
- Flood defence
- Main river
- Water storage area

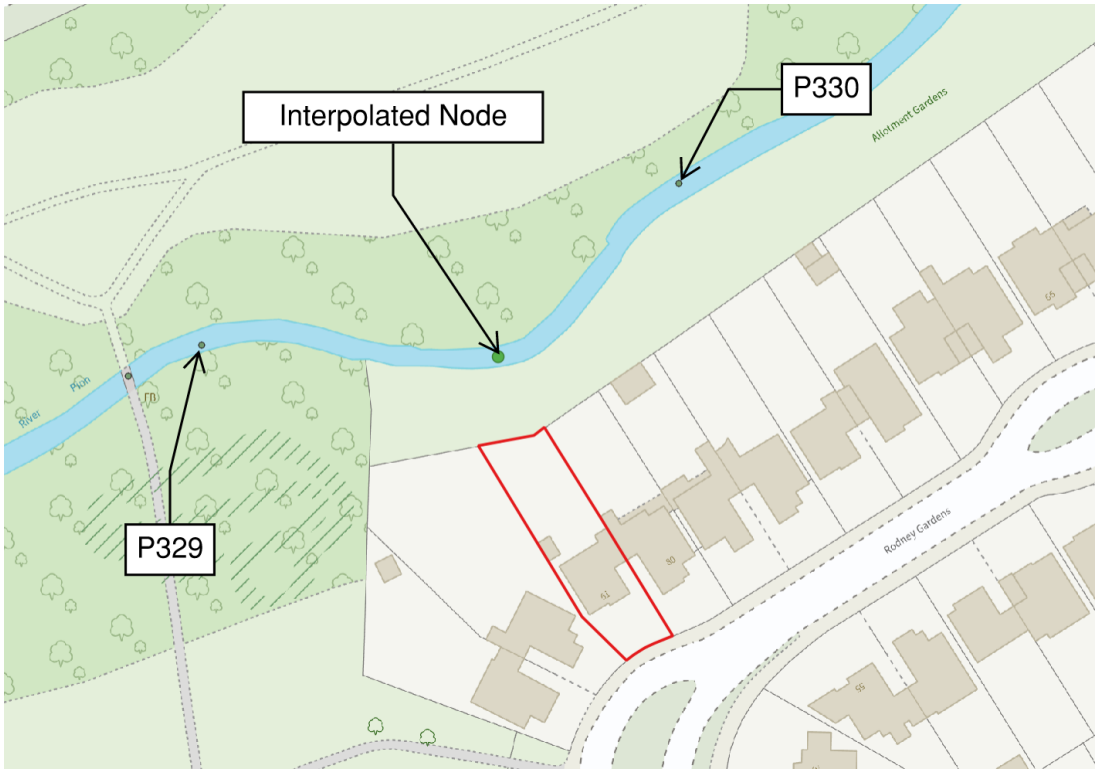
0 20 40 60 m

Appendix D

FLOOD LEVELS

River Pinn Modelling Study 2015

Level in Channel



Defended

Node	Easting	Northing	Water Level (m AOD) 1 in 2	Water Level (m AOD) 1 in 5	Water Level (m AOD) 1 in 10	Water Level (m AOD) 1 in 20	Water Level (m AOD) 1 in 30	Water Level (m AOD) 1 in 50
P329	510779.20	188893.50	43.205	43.474	43.582	43.688	43.784	43.885
Interpolated Node	510829.50	188891.60	43.285	43.553	43.648	43.734	43.811	43.899
P330	510860.30	188921.00	43.365	43.632	43.714	43.779	43.837	43.913

Node	Easting	Northing	Water Level (m AOD) 1 in 75	Water Level (m AOD) 1 in 100	Water Level (m AOD) 1 in 100 +CC	Water Level (m AOD) 1 in 250	Water Level (m AOD) 1 in 1000
P329	510779.20	188893.50	43.970	44.023	44.118	44.176	44.429
Interpolated Node	510829.50	188891.60	43.979	44.030	44.122	44.180	44.432
P330	510860.30	188921.00	43.988	44.037	44.126	44.183	44.435

Undefended

Node	Easting	Northing	Water Level (m AOD) 1 in 100	Water Level (m AOD) 1 in 100 +25%CC	Water Level (m AOD) 1 in 100 +35%CC	Water Level (m AOD) 1 in 100 +70%CC	Water Level (m AOD) 1 in 1000
P329	510779.20	188893.50	44.134	44.142	44.183	44.314	44.509
Interpolated Node	510829.50	188891.60	44.139	44.146	44.186	44.317	44.511
P330	510860.30	188921.00	44.143	44.150	44.189	44.319	44.513

Flood Level at the property

Defended

Node	Easting	Northing	Water Level (m AOD) 1 in 2	Water Level (m AOD) 1 in 5	Water Level (m AOD) 1 in 10	Water Level (m AOD) 1 in 20	Water Level (m AOD) 1 in 30	Water Level (m AOD) 1 in 50
1	510834.14	188873.90	Nil	Nil	43.656	43.735	43.811	43.899
2	510843.99	188859.85	Nil	Nil	Nil	Nil	Nil	Nil
3	510853.57	188845.14	Nil	Nil	Nil	Nil	Nil	Nil

Node	Easting	Northing	Water Level (m AOD) 1 in 75	Water Level (m AOD) 1 in 100	Water Level (m AOD) 1 in 100 +CC	Water Level (m AOD) 1 in 250	Water Level (m AOD) 1 in 1000
1	510834.14	188873.90	43.979	44.030	44.122	44.179	44.421
2	510843.99	188859.85	Nil	Nil	Nil	Nil	Nil
3	510853.57	188845.14	Nil	Nil	Nil	Nil	Nil

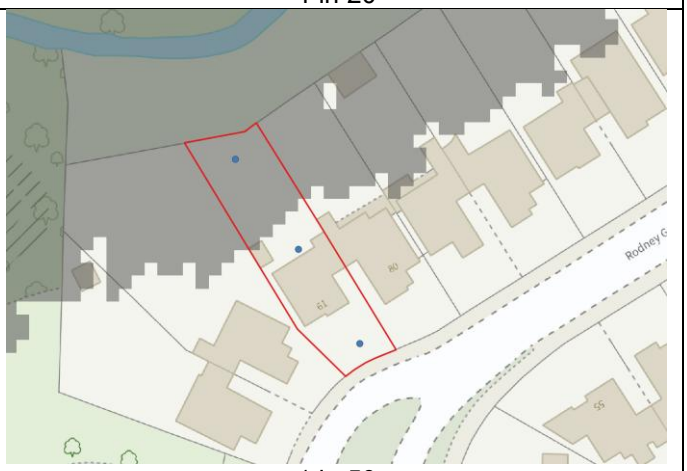
1 in 2

1 in 5

1 in 10

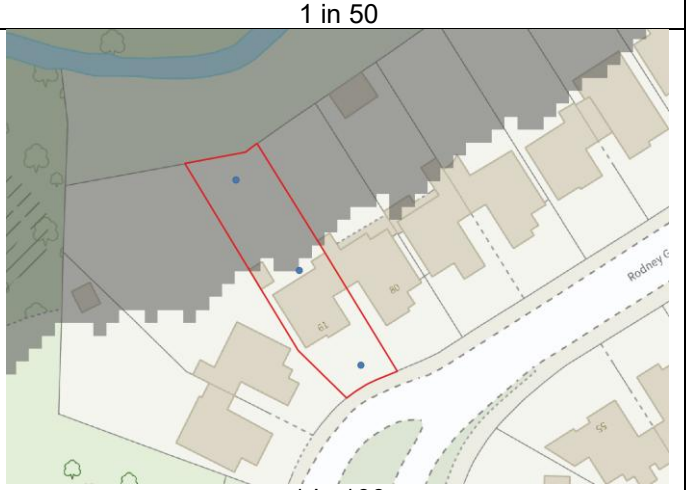
1 in 20

1 in 30

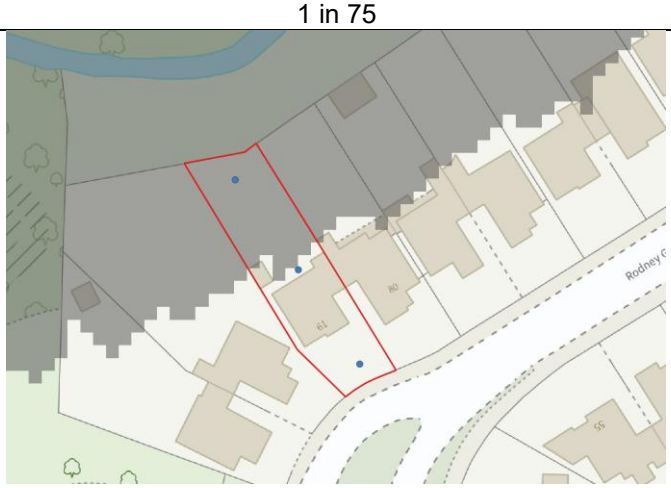


1 in 50

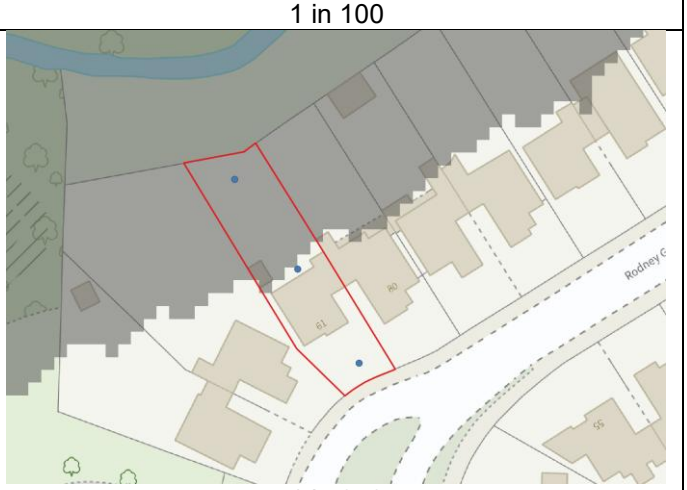
1 in 75



1 in 100



1 in 100 + 20%CC



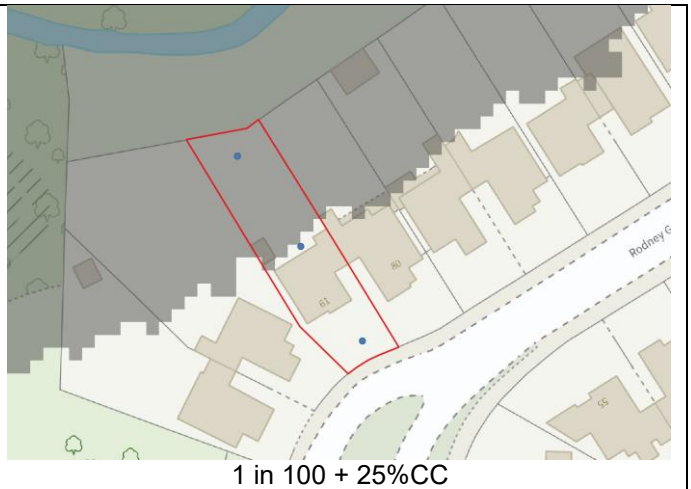
1 in 250

1 in 1000

Undefended

Node	Easting	Northing	Water Level (m AOD) 1 in 100	Water Level (m AOD) 1 in 100 +25%CC	Water Level (m AOD) 1 in 100 +35%CC	Water Level (m AOD) 1 in 100 +70%CC	Water Level (m AOD) 1 in 1000
1	510834.14	188873.90	44.138	44.278	44.319	44.411	44.495
2	510843.99	188859.85	Nil	Nil	Nil	Nil	44.495
3	510853.57	188845.14	Nil	Nil	Nil	Nil	Nil

1 in 100



1 in 100 + 25%CC

1 in 100 + 35%CC

1 in 100 + 70%CC

 1 in 1000	