Aval Consulting Group.

Level 2 Flood Risk Assessment

143 Hercies Road, Uxbridge UB10 9LY

Lotus Plan Design Build Ltd

July 2022

Aval Consulting Group.

Project Information

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Client	Lotus Plan Design Build Ltd
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Date of Issue	22 July 2022

Revision History

Revision	Date	Author	Reviewer	Approver	Status
A	21 July 2022	PR	WR	AC	Draft
B	21 July 2022	PR	WR	AC	Draft
B	22 July 2022	PR	WR	AC	Final

Disclaimer

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1. Executive Summary

Aval Consulting Group Limited has been commissioned by Lotus Plan Design Build Ltd ('the client') to provide a Flood Risk Assessment in relation to a planning application at 143 Hercies Road, Uxbridge UB10 9LY.

The proposed development is for the rear and side extension of the existing building and loft conversions with rear dormers front rooflights to create 3no. new dwellings.

A Level 2 Flood Risk Assessment has been carried out as per the requirements of the local authority. Both the Sequential and Exception Tests will be carried out as per the local authority's Strategic Flood Risk Assessment (SFRA) and the NPPF guidance. An evacuation plan has also been discussed.

The proposed development will also include information on surface water management and SuDS for the proposed development in order to reduce surface water discharge.

2. Introduction

2.1 Overview

AVAL Consulting Group Limited (ACL) has been commissioned by the client to produce a Flood Risk Assessment at 143 Hercies Road, Uxbridge UB10 9LY. This is to accompany the planning application to the Local Authority for consent to undertake the proposed work.

This report will state the Flood Zone the development is located in and demonstrate the proposed development would be suitable under both the Sequential and Exception Tests. An evacuation plan will also be discussed.

The site drawings are presented in Appendix A.

2.2 Site Location and Details

Figure 2.1 shows the proposed site location. The surroundings of the proposed development are largely residential in nature. The site is bounded by Hercies Road to the north, and residential developments in all other directions.

Figure 2.1: Proposed Site Location (Source: Lotus Plan Design Build Ltd)

2.3 Proposed Development and Vulnerability Classification

The proposed development is for the rear and side extension of the existing building and loft conversions with rear dormers front rooflights to create 3no. new dwellings.

The site is located at an approximate height of 34.70m AOD.

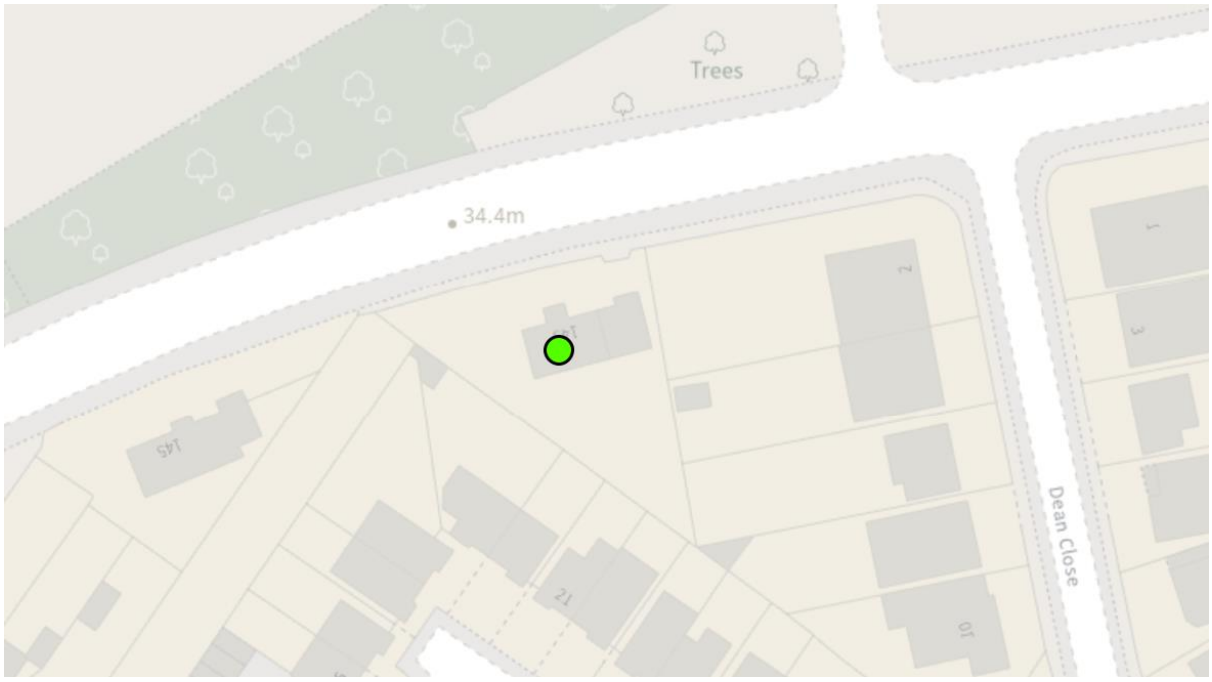

Figure 2.2: Height of Site (Source: Environment Agency Product 4 Data)

As per the National Planning Policy Framework, the proposed residential development will be under the **'More Vulnerable'** classification.

3. Relevant Standards and Policies

This section summarises all legislation, policy, statutory and non-statutory guidelines relevant to the proposed development. That also includes all the latest regional and local planning policy guidance specifically applicable to the proposed development.

3.1 The National Planning Policy Framework (NPPF)

The latest National Planning Policy Framework (NPPF) was published on 20th July 2021. The NPPF is supported by technical guidance set out within the Planning Practice Guidance for Flood Risk and Drainage, including the classification of the site vulnerability and the requirement do an Exception Test in relation to the Flood Zone and Vulnerability Classification.

One of the key aims of the NPPF is to ensure that flood risk is taken into account at all stages of the planning process to avoid inappropriate development in areas at risk of flooding and to direct development away from areas of highest risk.

It advises that where new development is necessary in areas of higher risk, flood mitigation resilience and resistance measures should be incorporated which can include but not limited to a higher finished floor level, installing flood boards and moving electrical points above. The developments upstream of the proposed development should also be taken into the consideration of flood risk.

The NPPF's flood risk advice is all set out in Chapter 14 of the Framework document, meeting the challenge of climate change, flooding and coastal change.

3.2 Flood and Water Management Act 2010

The Flood and Water Management Act 2010 received Royal Assent on 8th April 2010. This Act provides duties on the Environment Agency, Local Authorities, Developers and other bodies to manage flood risks. The Act has significant planning and design implications for Developers.

It should be noted that these standards and procedures are being reviewed by the respective regulatory bodies and third parties against the requirements imposed by the Flood and Water Management Act 2010. The advice and recommendations provided may change when associated regulations have been issued in order to implement the full scope of the Act.

3.3 London Borough of Hillingdon Local Plan

The London Borough of Hillingdon's Local Plan (adopted November 2012) highlights the main policy regarding Flood Risk.

Policy EM6: Flood Risk Management states the following:

"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."

3.4 West London Strategic Flood Risk Assessment

The West London Strategic Flood Risk Assessment, which includes London Borough of Hillingdon, provides maps of flood zones, highlights the requirement and procedure for the Sequential and Exception tests, as well as states any historic flooding which can help in the analysis of a proposed development. This will be used in order to progress through this report.

4. Assessment of Flood Risk and Product 4 Data

4.1 Flood Zone Areas

Part of the proposed development site boundary is located within a Flood Zone 2 area as per the Environment Agency's Flood Zone Map and the local authority's SFRA. Figure 4.1 shows the proposed development in terms of Flood Zone 2 and 3 using ArcGIS layers from the Environment Agency.

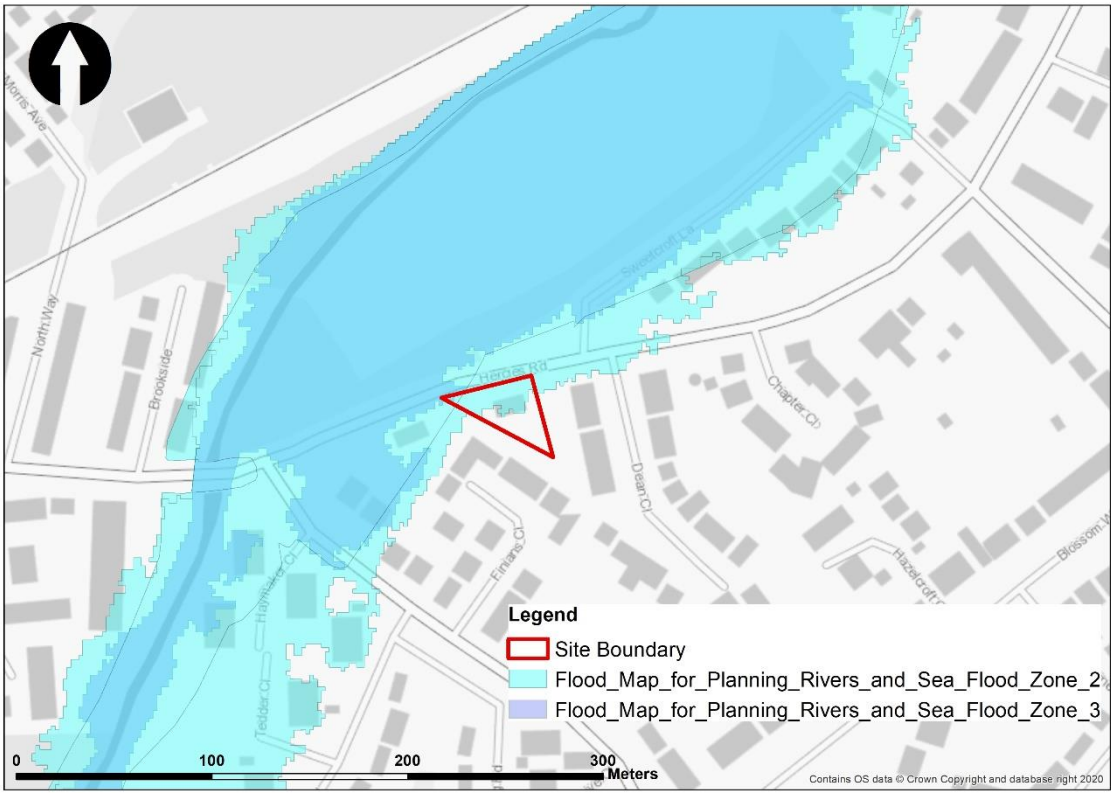

Figure 4.1: Flood Zone Area (Source: ArcGIS Layer from the EA)

4.2 River/Sea Flooding and Surface Water Flooding Risks

In terms of the risk of flooding from Surface Water and the River/Seas, part of the proposed development is at a medium risk of river/sea and at a low risk of surface water flooding as shown in Figures 4.2 and 4.3.

Appendix B includes the Product 4 data which shows the flood heights from river/sea flooding. As can be seen in Pages 25 and 26 of the Product 4 data, With the defences removed, the highest flood depth is 0.07m above ground. When considering defences and climate change as can be seen in Pages 28 and 29 of the Product 4 data, the site does not have any flooding.

It is to be noted that the Environment Agency's Product 4 data includes modelled data and hence the Product 4 data would need to be referred to.

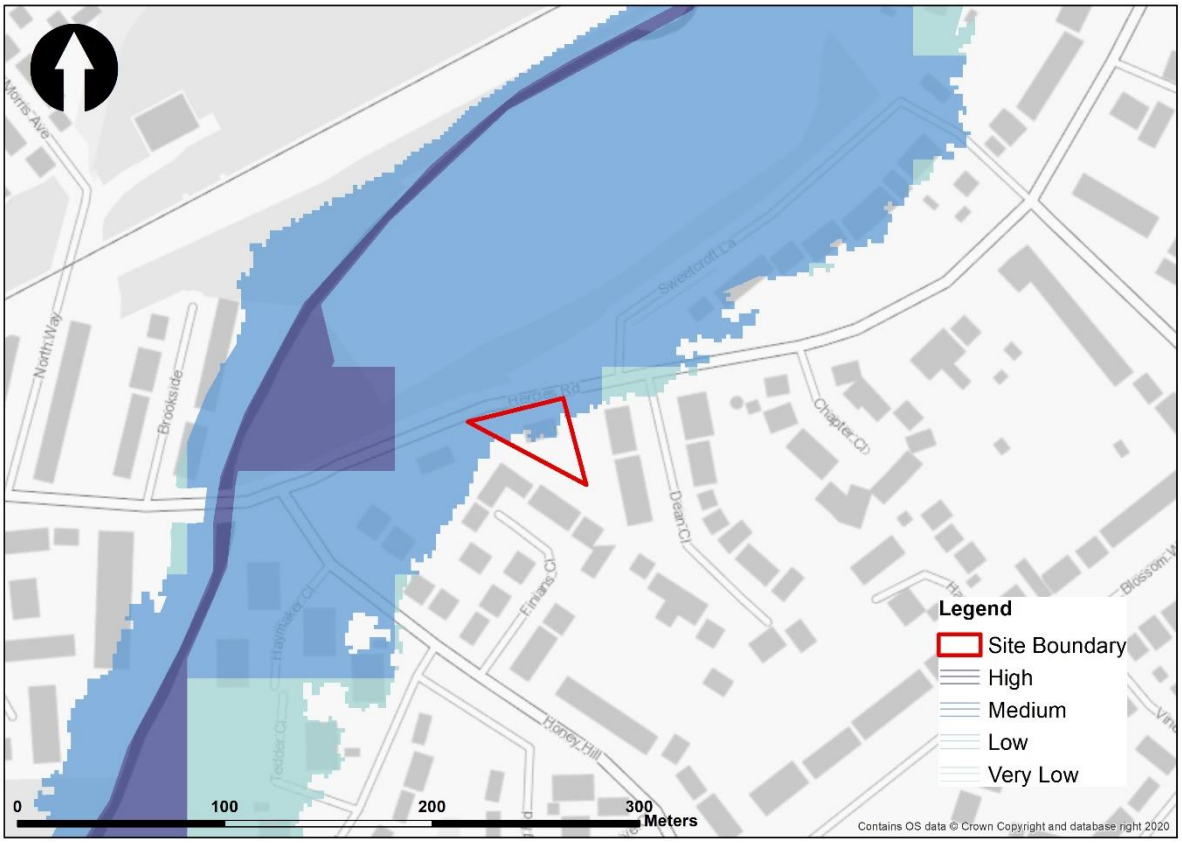

Figure 4.2: Extent of Flooding from River or the Seas (Source: ArcGIS Layer from the EA)

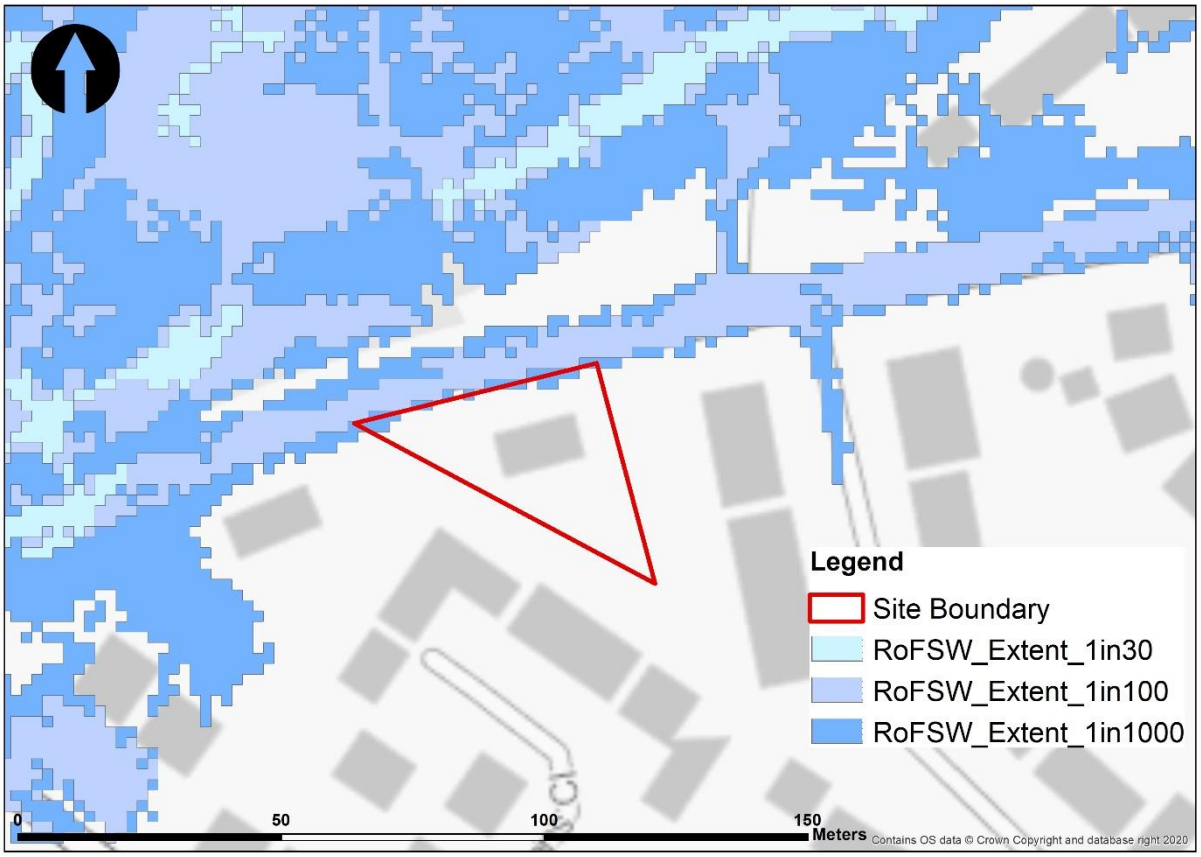

Figure 4.3: Extent of Flooding from Surface Water (Source: ArcGIS Layer from the EA)

4.3 Nearest Watercourse

The nearest watercourse is the River Pinn which is located approximately 70m west of the proposed development site.

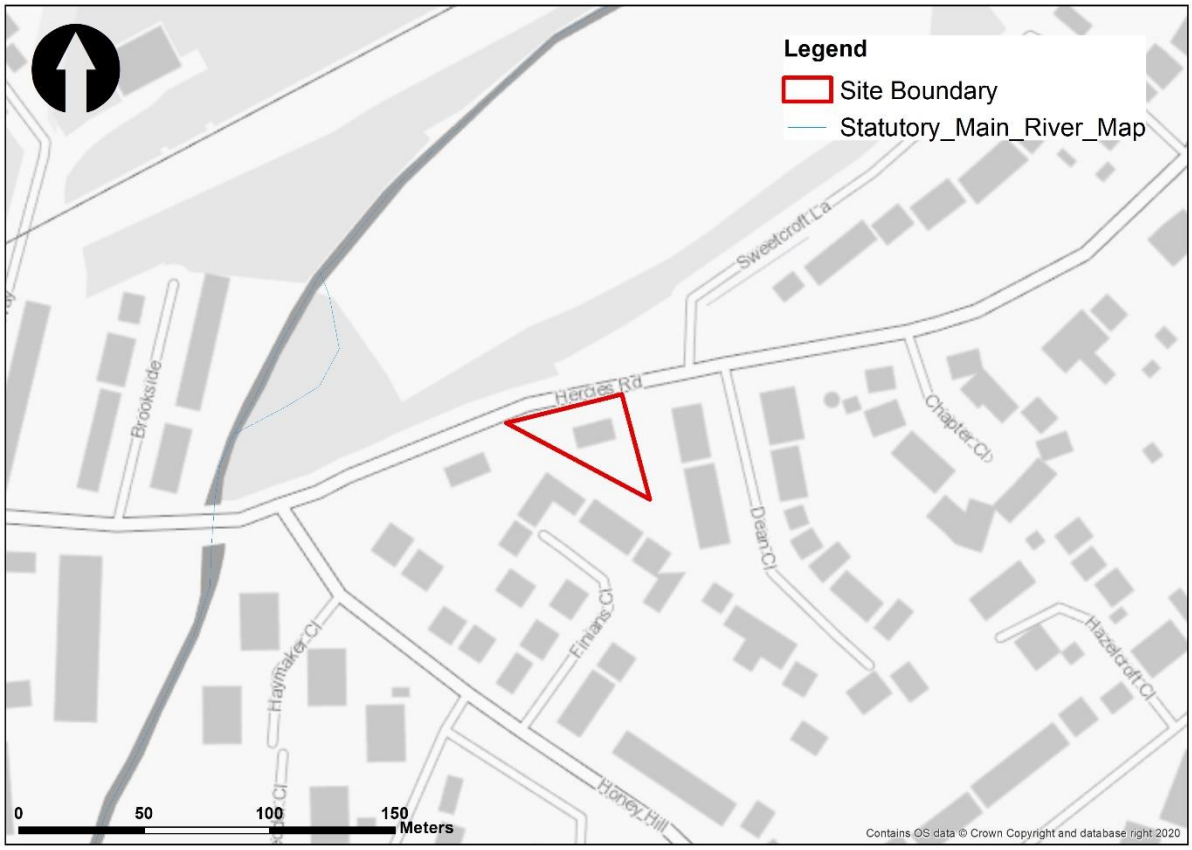

Figure 4.4: EA Watercourses (Source: ArcGIS Layer from the EA)

4.4 Other Sources of Flooding Risks and Historical Flooding

The proposed development is approximately 34.50m AOD, with the BGS geology maps indicating bedrock geology of London Clay Formation - Clay, Silt and Sand with no recorded superficial deposits.

There is a risk of reservoir flooding but only with flooding from rivers. There is currently no risk of groundwater flooding.

As per Environment Agency's Product 4 data and the West London SFRA, the site has recorded no previous flooding, although there have been previous floodings within nearby areas.

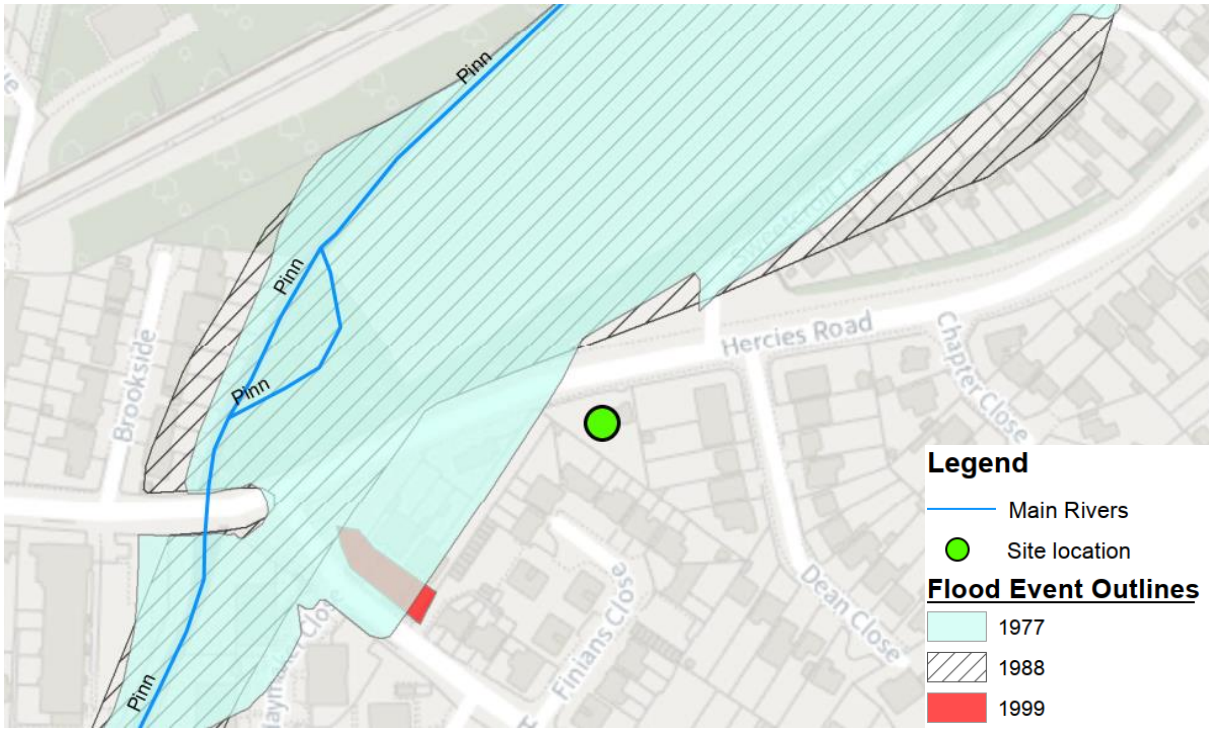

Figure 4.5: Recorded Flood Outline (Source: Environment Agency Product 4 Data)

4.5 Product 4 Data

As the site is within a Flood Zone 2 area due to the medium risk of river/sea floodings, Product 4 data was used to identify the potential flood heights under various flood events.

Appendix B includes the Product 4 Data from the Environment Agency.

The data includes flood heights from the 1 in 2 year flood event up to and including the 1 in 1000 year flood event. Data from the 1 in 1000 year flood event show a potential flood height of 35.38m AOD, which is approximately 0.68m in height.

The flood height will be used as a basis for the flood mitigation/management measures. Section 7 includes more details on flood mitigation/management measures.

5. Sequential Test

The Sequential Test allows for the analysis of the site location in respect to other similar available sites within Flood Zone 1. If no other sites are available in Flood Zone 1, sites are then seen within Flood Zone 2 with Flood Zone 3 seen if no sites in Flood Zone 2 are available.

Part of the site is located within a Flood Zone 2, with the rest of the area within a Flood Zone 1. The proposed development's extension pushes the rear of the development towards Flood Zone 1, with no bedrooms within the ground floor of the development.

Considering the above, the proposed development passes the Sequential Test on the basis the proposed development includes the mitigation/management measures stated within Section 7 as part of the design.

6. Residual Risk and Exception Test

This section will explain how the proposed development will reduce the flood risk within the site and within the surrounding areas of the site.

6.1 Residual Risk

The primary residual risk that would remain at the site would be the drainage of surface water. Flood Mitigation and Management details will be given in Section 6.3. However, other residual risks remain such as a breach of a raised flood defence, blockage of a surface water conveyance system, overtopping of an upstream storage area, or failure of a pumped drainage system; failure of a reservoir; or a severe flood event that exceeds a flood management design standard, such as a flood that overtops a raised flood defence, or an intense rainfall event which the drainage system cannot cope with.

In order to further reduce the risk of surface water flooding within the proposed development, Sustainable Urban Drainage Systems would need to be installed to either safely discharge the surface water or to temporarily store the surface water for future use or discharge. This can be in the form but are not limited to, permeable paving, green roofs, attenuation storage or rainwater harvesting.

6.2 Exception Test

The National Planning Policy Framework sets out the different conditions in terms of the vulnerability of the development and the flood zone and accordingly sets out the requirements to do an Exception Test. The table below describes the conditions required for an Exception Test.

Flood risk vulnerability classification (see table 2)		Essential infrastructure	Water compatible	Highly vulnerable	More vulnerable	Less vulnerable
Flood zone (see table 1)	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3a	Exception Test required	✓	×	Exception Test required	✓
	Zone 3b functional floodplain	Exception Test required	✓	×	×	×

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

As part of the proposed development area is located within a Flood Zone 2 and is classified as a ‘More Vulnerable’, an Exception Test is not required to be undertaken and the proposed development is appropriate.

7. Flood Mitigation/Management Measures and Evacuation Plan

As the proposed development is for the rear and side extension of the existing building and loft conversions with rear dormers front rooflights to create 3no. new dwellings, flood mitigation/management measures are required to be implemented as part of the design. This is to prevent any flooding within the development or elsewhere.

As per the Product 4 flood maps, the depth of flooding within the site is modelled to be 0.68m (680mm). As the proposed development is an extension to the existing building at the site, a Raised Finished Floor Level higher than the existing building would not be possible. Therefore, other alternatives would need to be explored.

Flood doors/boards are proposed to be installed within the entrance of the proposed development. This is aimed at preventing ay flooding to enter the proposed development and to keep flooding to a minimum. This also helps protect the users of the proposed development.

Electrical connection and socket points are also proposed to be placed at least 1000mm above the floor on the walls to prevent any damage to the development or to the residents.

As stated in Section 6.1, SuDS can help in reducing the effect of flooding within the site and also upstream of the development site. Storage of surface water for future use or a controlled discharge of surface water can help in the reduction of flooding upstream of the proposed development.

It is to be noted the proposed development site has not experienced any previous flooding and so, it is unlikely the site would be flooded.

The proposed development is within the Environment Agency's Flood Warning System. It is therefore recommended for the users of the proposed development to sign up to the warning/alert system. This will allow them to be alerted of any potential flooding ahead of the event. It is also recommended to get in touch with the local emergency services in regard to responses ahead of any potential flooding.

The evacuation plan would consist of the residents evacuating the proposed development site once the Environment Agency warning/alert has been received. All residents would need to be aware of the EA's Flood Warning/Alert System and sign up for the alerts upon initially using the proposed development. If the most severe warning appears, residents would have to call 999 if in immediate danger.

All Flood Doors need to be fully closed to prevent any water from entering the development.

Residents of the proposed development can then move to the highest point of the building until rescue services arrive. Alternatively, the residents can move towards the south where flooding is less likely to occur.

Appendix C includes the warning codes used by the Environment Agency with further information on required actions.

8. Climate Change and Surface Water Management

The National Planning Policy Framework 2021 (NPPF) and accompanying Planning Practice Guidance indicate surface water run-off should be controlled as near to its source as possible through a sustainable drainage approach to surface water management.

Consideration should therefore firstly be given to using sustainable urban drainage (SuDS) techniques including soakaways, infiltration trenches, permeable pavements, grassed swales, ponds and wetlands to reduce flood risk by attenuating the rate and quantity of surface water run-off from a site. This approach can also offer other benefits in terms of promoting groundwater recharge, water quality improvement and amenity enhancements. The NPPF sets out a hierarchy for the disposal of surface water which encourages a SuDS approach, which will be mentioned in Section 7.4.

8.1 Climate Change

There are indications that the climate in the UK is changing significantly and it is widely believed that the nature of climate change will vary greatly by region. Current expert opinion indicates the likelihood that future climate change would produce more frequent short duration and high-intensity rainfall events with the addition of more frequent periods of long duration rainfall.

The table below highlights the potential climate change expected in the future.

Applies across all of England	Total potential change anticipated for the '2020s' (2015 to 2039)	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2115)
Upper end	10%	20%	40%
Central	5%	10%	20%

As this development is for commercial use, **a climate change growth factor of 40% is recommended** to be used for the surface water runoff/storage calculations.

8.2 Methods of Surface Water Management

As set out within the NPPF 2021, there are four methods that have been reviewed for the management and discharge of surface water for the site which are detailed below; these may be applied individually or collectively to form a complete strategy. They should be applied in the order of priority as listed:

- Discharge via infiltration;
- Discharge via watercourse;
- Discharge via a dedicated public surface water system; and
- Discharged via a combined sewer.

Discharge via Infiltration

The first consideration for the disposal of surface water is via infiltration. The open space within the site boundary is not sufficient to hold an infiltration base whilst meeting the Building Regulations. The bedrock geology also indicates a possible impeded drainage, especially during winter rainfall.

Therefore, a discharge via infiltration is not possible.

Discharge to a Watercourse

Where infiltration techniques are not considered or not feasible, suitable a connection to a watercourse is the preferred option.

There are no watercourses in close vicinity to the proposed development and so, a discharge towards a river is not possible.

Discharge via a Dedicated Surface Water Sewer

The next method of discharge of surface water is via a dedicated public surface water system. There is a 225mm diameter Thames Water surface water sewer to the north of the site on Hercies Road. It is very likely the proposed development site is connected to the sewer.

Therefore, a discharge of surface water from the proposed development into the Thames Water sewer is possible. An underground utility survey or a CCTV survey is recommended to be carried out to confirm if the proposed development site is connected to the Thames Water surface water sewer.

The discharge rate should be no more than 5.0 l/s in order to meet greenfield run-off rates. This can be achieved through attenuation storage to temporarily store surface water and a flow control device to restrict the surface water discharge rate.

9. SuDS Appraisal and Proposed SuDS for Development

9.1 SuDS- General

Whilst the temporary storage volumes will be provided within an oversized pipework, the means by which the surface water is both stored and conveyed to the attenuation system should also incorporate various forms of Sustainable Drainage Systems (SuDS) where possible in accordance with the Environment Agency's general guidance and the National Planning Policy Framework.

Appropriately designed, constructed and maintained, SuDS are more sustainable than conventional drainage systems. Their benefits in general terms are summarised below.

SuDS can:

- Reduce run-off surface water flow-rates and/or volumes and hence reduce the risk of flooding;
- Encourage natural groundwater re-charge;
- Reduce pollutant concentrations in storm water;
- Provide habitats for wildlife.

9.2 SuDS Appraisal

There are many site-specific factors which will influence the choice of any single or combination of SuDS device used within a development. The primary factors are:

- Whether the development is domestic, commercial or industrial;
- Whether the underlying ground is contaminated. If so, infiltration systems (soakaways) will most probably not be permitted;
- Whether the underlying ground is permeable enough for infiltration systems (soakaways) to be considered;
- Whether the groundwater levels are deep enough for infiltration systems (soakaways) to be considered;
- Whether the site is steeply sloping and its general topography;
- The availability of space inside the development for each potential SuDS facility;

Health and Safety aspects should the development be likely to be inhabited or used by children.

9.3 Types of SuDS with Respect to Proposed Development

Based on local and regional policy, the primary SuDS elements proposed for this development are outlined below:

9.3.1 Oversized Pipes/Gutters

Slightly oversized pipes can also help in the temporary storage of surface water but can also help in the discharge of surface water from the roof without any major blockages. Gutters can also help take more surface water from the roof into the oversized pipes, thus reducing the pressure on the attenuation storage crates which can then be made smaller.

9.3.2 Water Butts

Water butts can be added to the proposed extension. This can temporarily store surface water and can be used at a later stage for reuse of surface water for gardening or cleaning purposes.

9.3.3 Flow Control Devices

Flow control devices such as an Orifice Plate or an Hydrobrake can be used to restrict the discharge rate of surface water. This is especially important to avoid any overcapacity of the public sewers and to prevent any flooding upstream of the development site.

9.3.4 Attenuation Storage

Attenuation Storage can help temporarily store surface water whilst also allowing for a reduction in discharge rate.

It is recommended to have a minimum of 33m^3 of storage in order to store surface water from the proposed development site.

10. Summary

Part of the proposed site area is located within a Flood Zone 2, with a medium risk of river/sea flooding and a low risk of surface water flooding.

Flood Mitigation measures such as Flood Boards/Doors within the development and a higher position of electrical sockets are recommended to be installed at the site. The proposed development will have the same Raised Finished Floor Level as the existing building.

An evacuation plan was explained, with residents encouraged to sign up to the Environment Agency's Flood Warning Services which can then help plan any evacuations with prior notice of any potential flooding.

The surface water from the site will be discharged into the existing drainage network, with an underground survey recommended to confirm if the water is being discharged into a public surface water system.

The proposed development would include SuDS such as water butts, flow control devices, attenuation storage and oversized pipes/gutters to limit the flooding both within and upstream of the development.

The development is accessible for emergency access and egress during times of extreme flooding as no potential flooding is evident on any of the access routes.

It can therefore be concluded that the proposed development meets the local and national policy.

Appendices

Appendix A: Existing and Proposed Site Plan

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REVISION NO.	DATE	COMMENTS

CLIENT
143 Hercies Road
Uxbridge
UB10 9LY

SCALE
1:1250 @ A4

DATE
April 2022

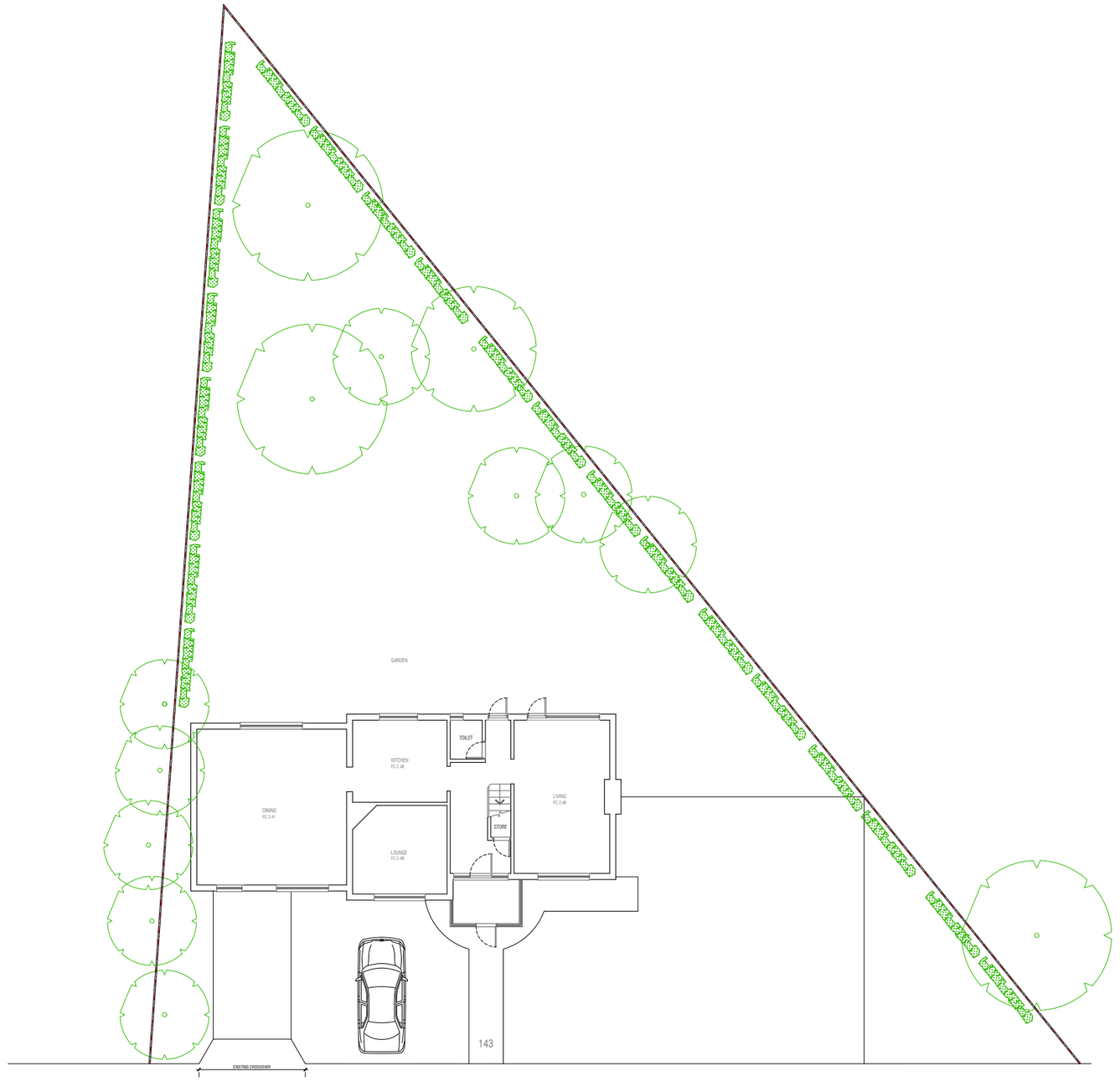
PROJECT
Proposed single storey rear extension, double storey side extension and loft conversion with rear dormers to provide 3no dwellings at 143 Hercies Road
Uxbridge, UB10 9LY

DRAWING TITLE
Location plan
TITLE PLAN- MX 277175

PROJECT NO.
LOTUS/683/22

DRAWING NO.
PL-000

DISCLAIMER



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DRAWING TITLE
Block plan

PROJECT NO.
LOTUS/683/22

DRAWING NO.
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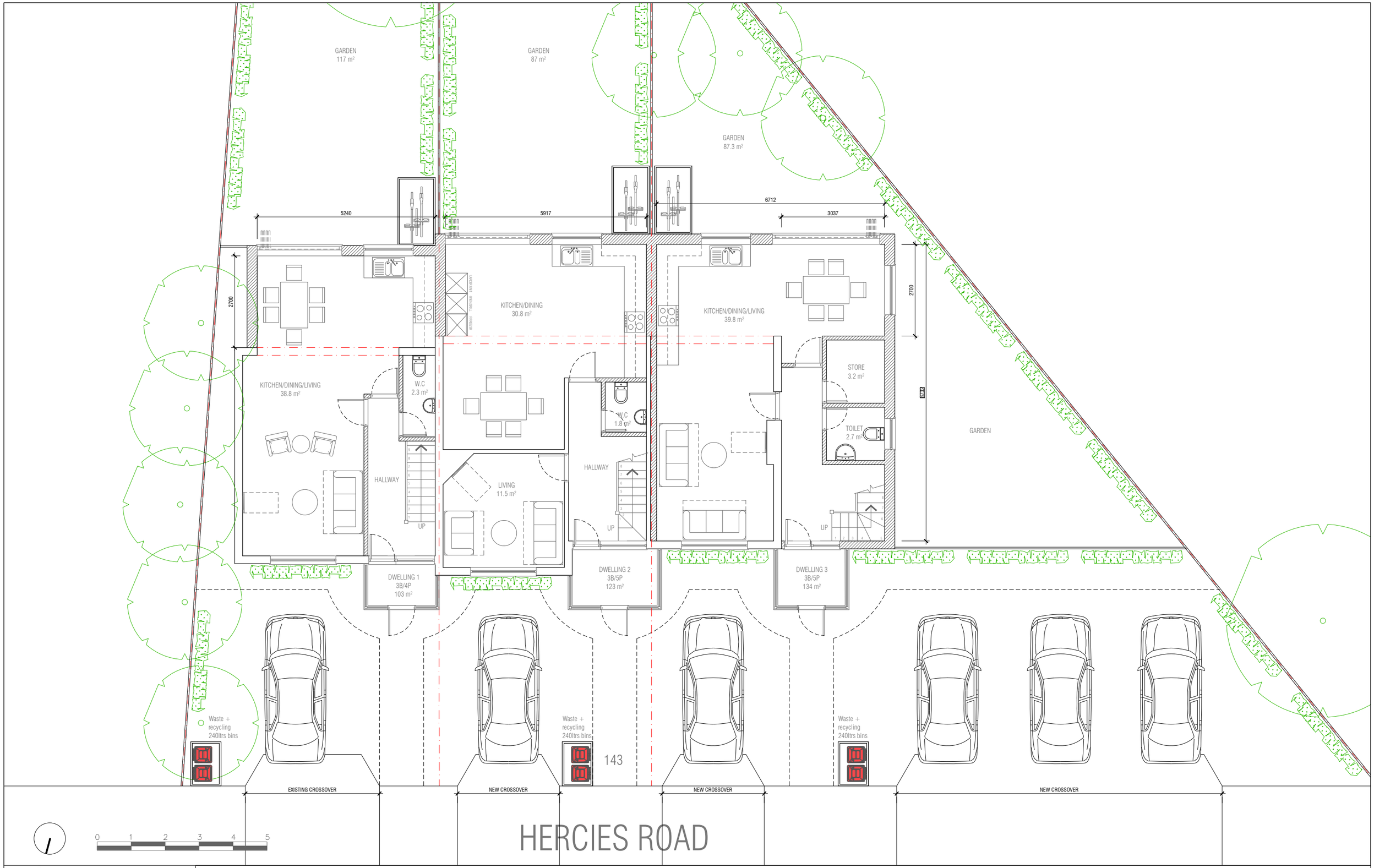

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DRAWING TITLE
Proposed Site plan

PROJECT NO.
LOTUS/683/22

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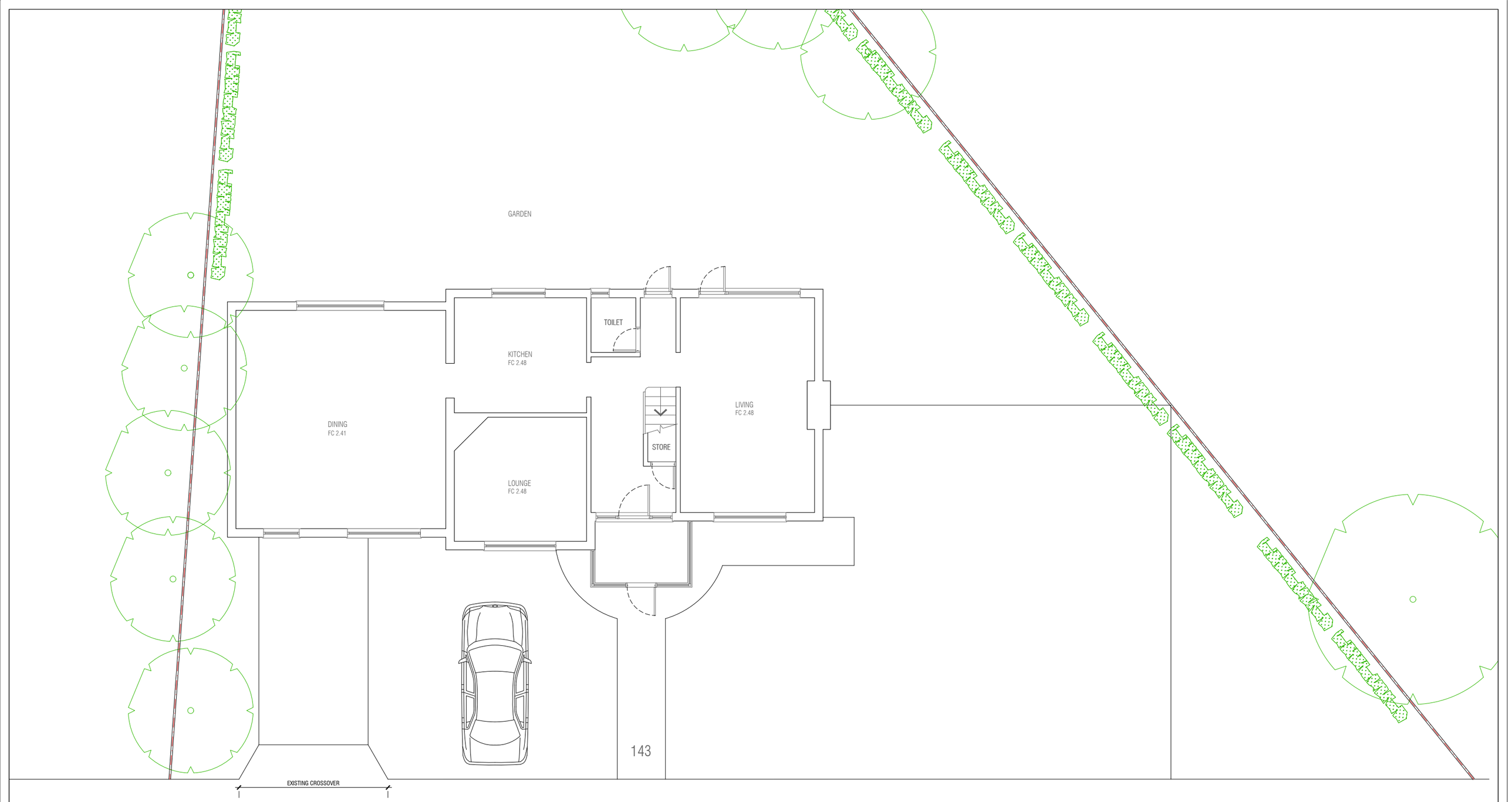

HERCIES ROAD

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DRAWING TITLE
Existing Ground floor plan

PROJECT NO.
LOTUS/683/22

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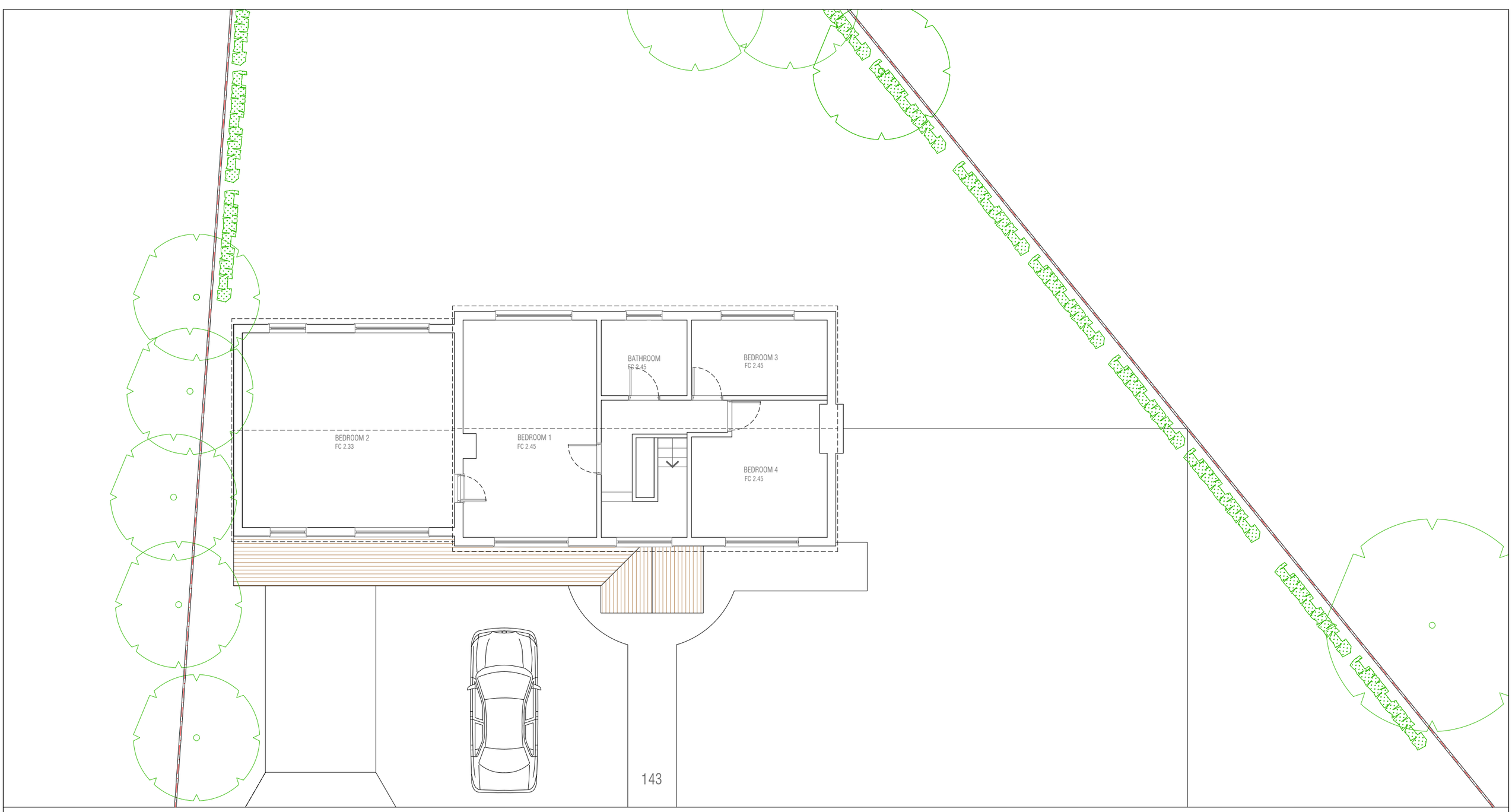

HERCIES ROAD

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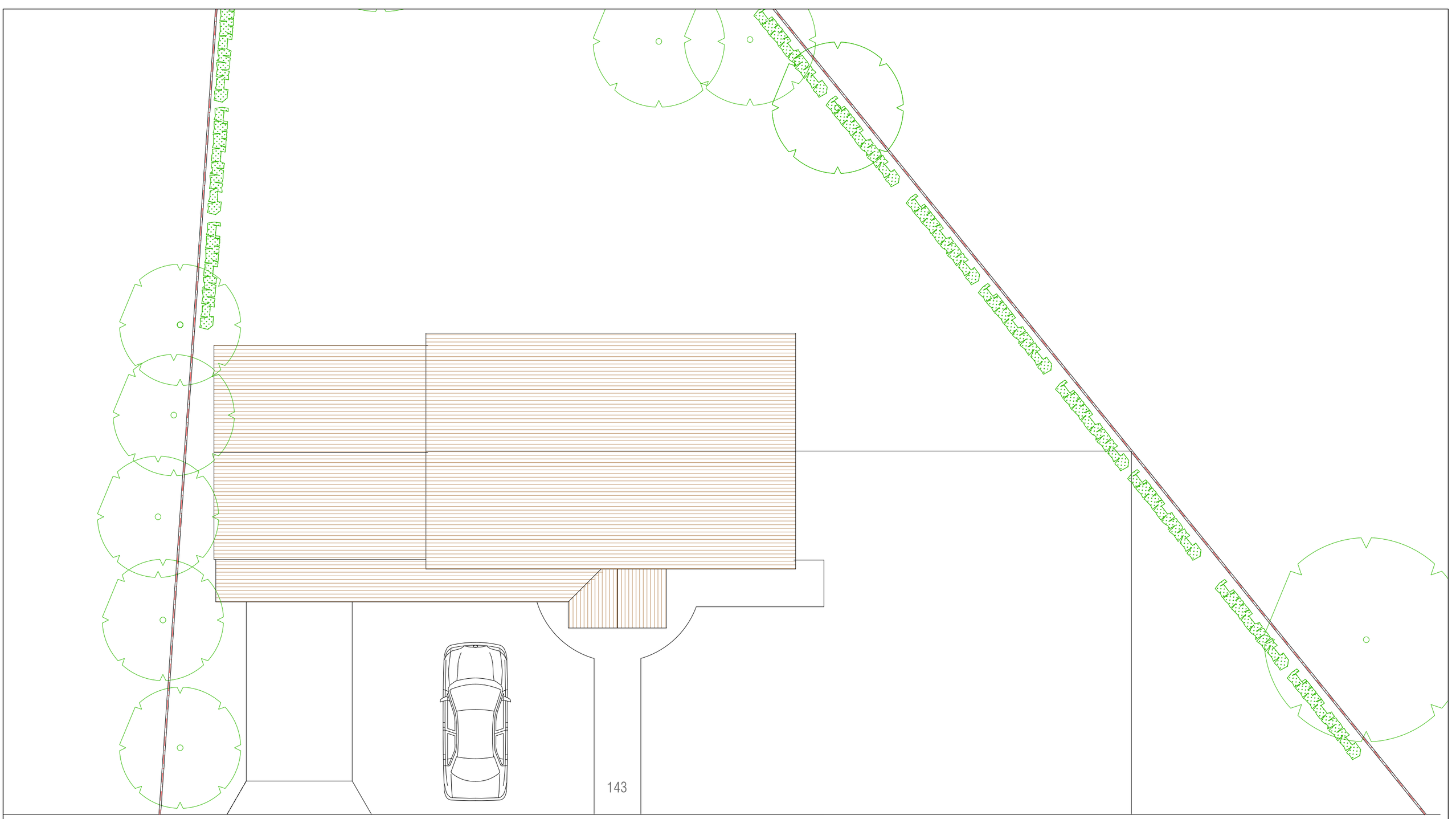
Uxbridge, UB10 9LY

DRAWING TITLE
Existing First floor plan

PROJECT NO.
LOTUS/683/22

DRAWING NO.
PL-004



HERCIES ROAD

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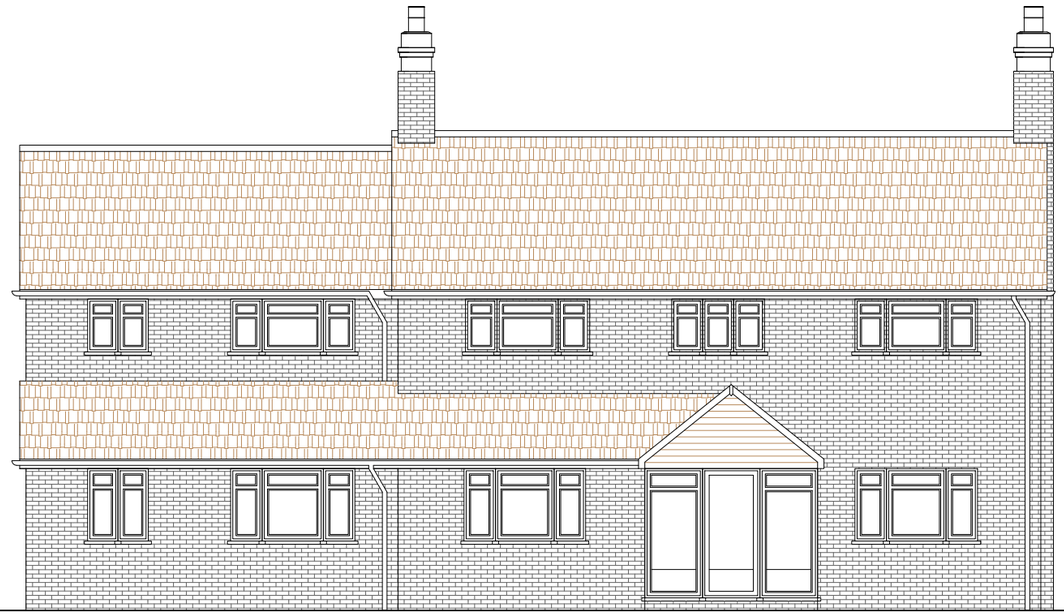
Uxbridge, UB10 9LY

DRAWING TITLE
Existing Roof plan

PROJECT NO.
LOTUS/683/22

DRAWING NO.
PL-005



EXISTING FRONT ELEVATION

143

EXISTING REAR ELEVATION

143

HERCIES ROAD

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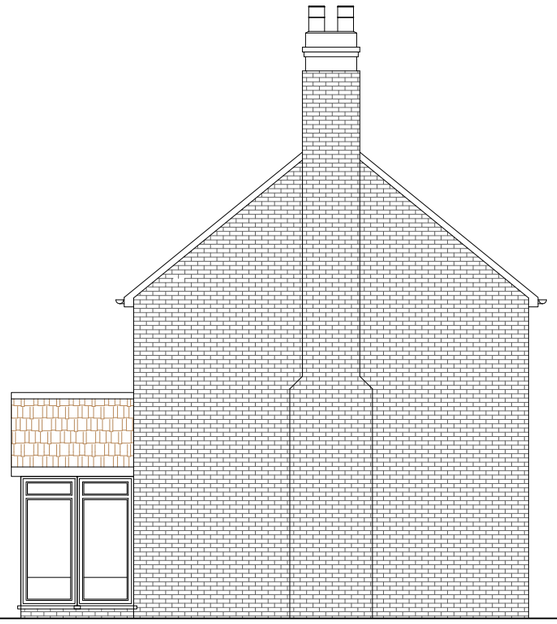
DRAWING TITLE
Existing Front & Rear elevations

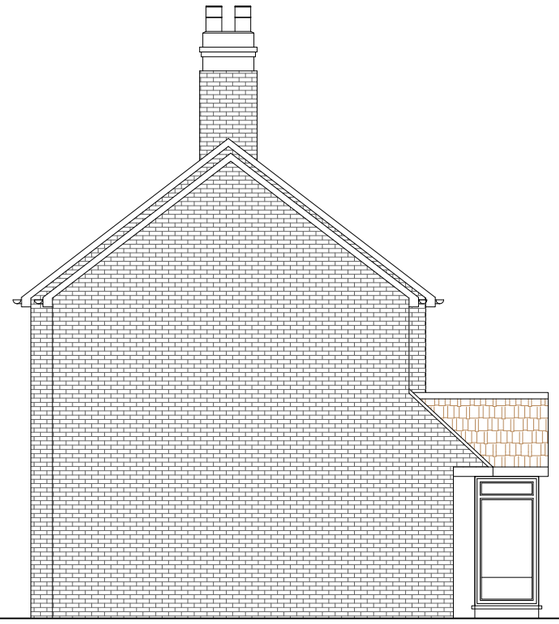
PROJECT NO.
LOTUS/683/22

DRAWING NO.
PL-006



EXISTING SIDE (1) ELEVATION

143



EXISTING SIDE (2) ELEVATION

143

0 1 2 3 4 5

LOTUS
plan design build ltd

86-90 Paul Street, London EC2A 4NE

telephone: +44 (0) 203 095 4799
mobile: +44 (0) 7414032573
e-mail: info@lotusplans.co.uk
www.lotusplans.co.uk

REVISION NO.	DATE	COMMENTS

CLIENT
143 Hercies Road
Uxbridge, UB10 9LY

SCALE
1:100 @ A3

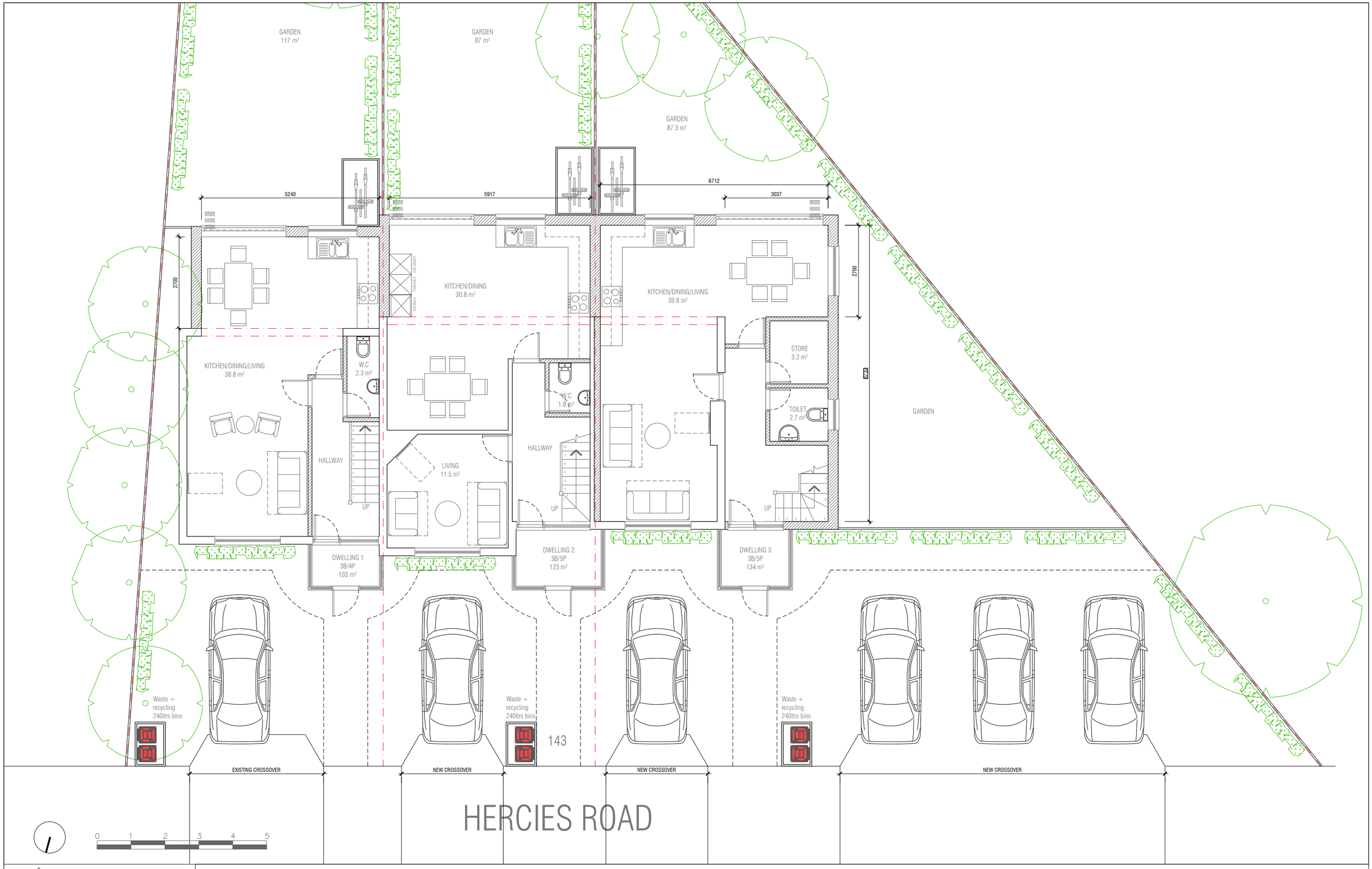
DATE
April 2022

PROJECT
Proposed single storey rear extension, double storey side extension and loft conversion with rear dormers to provide 3no dwellings at 143 Hercies Road
Uxbridge, UB10 9LY

DRAWING TITLE
Existing Side elevations

PROJECT NO.
LOTUS/683/22

DRAWING NO.
PL-007



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REVISION NO.	DATE	COMMENTS

CLIENT
143 Hercies Road
Uxbridge, UB10 9LY

SCALE
1:100 @ A3

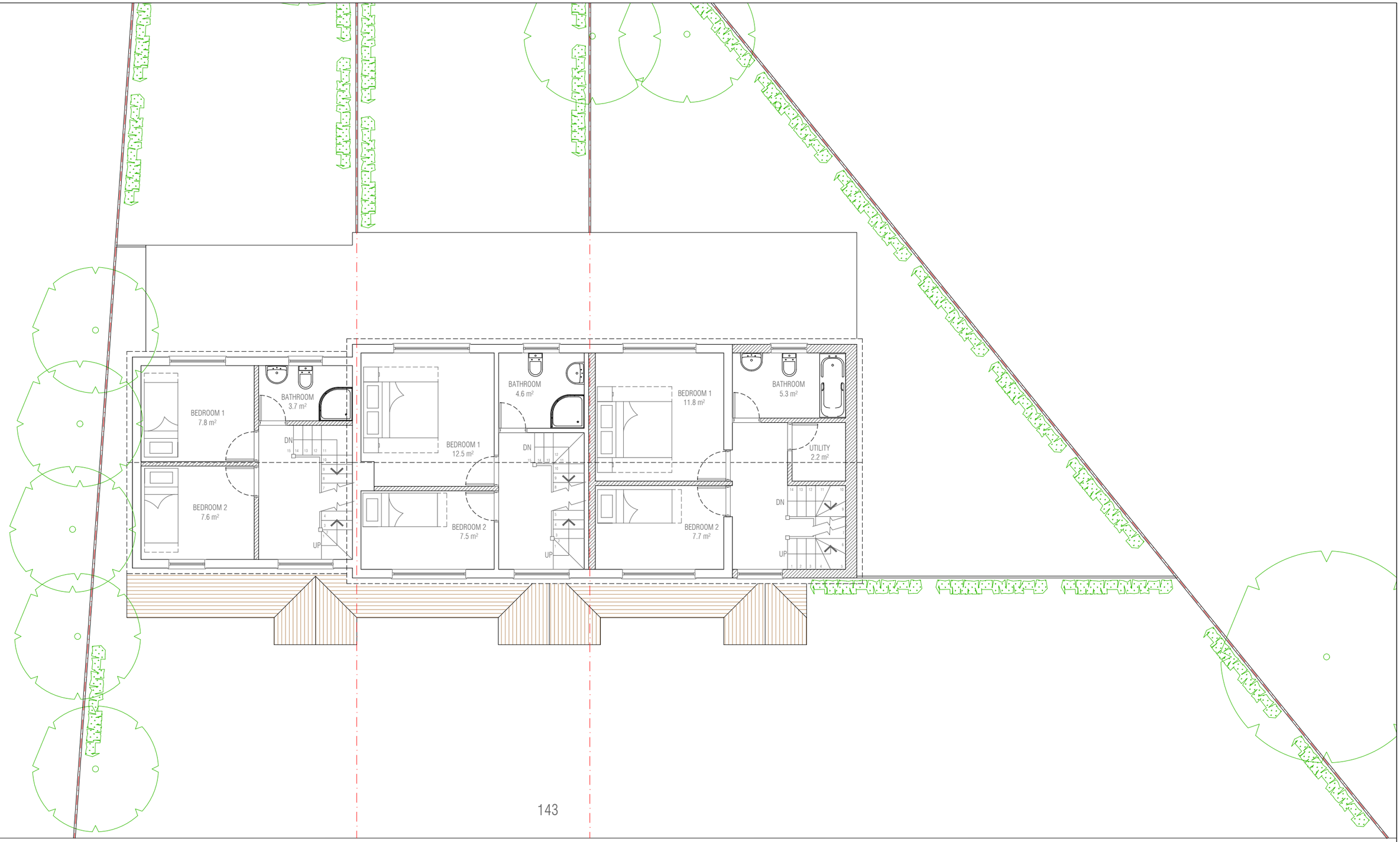
DATE
April 2022

PROJECT
Proposed single storey rear extension, double storey side extension and loft conversion with rear dormers to provide 3no dwellings at 143 Hercies Road
Uxbridge, UB10 9LY

DRAWING TITLE
Proposed Ground floor plan

PROJECT NO.
LOTUS/683/22

DRAWING NO.
PL-008



HERCIES ROAD

0 1 2 3 4 5

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REVISION NO.	DATE	COMMENTS

CLIENT
143 Hercies Road
Uxbridge, UB10 9LY

SCALE
1:100 @ A3

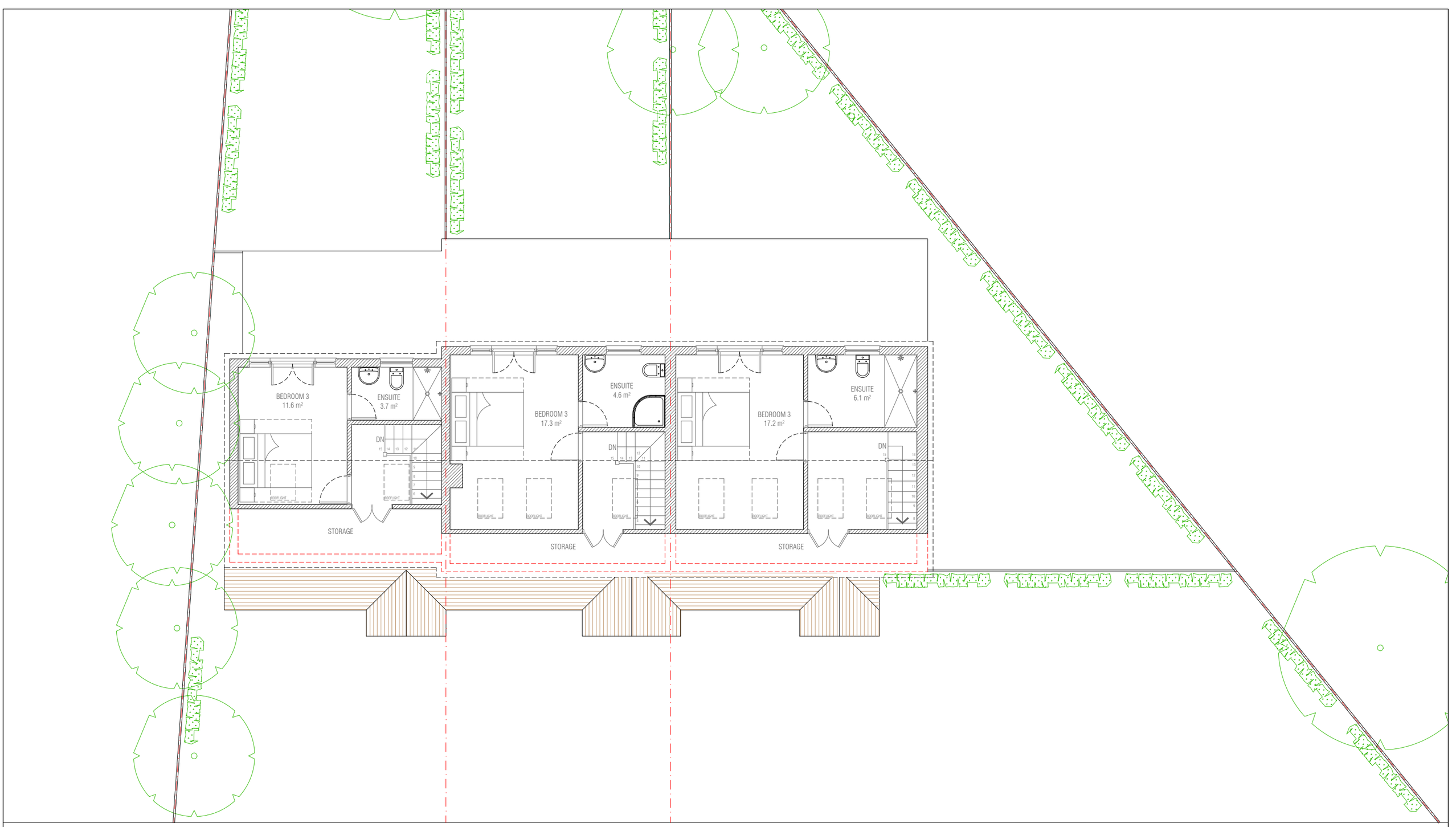
DATE
April 2022

PROJECT
Proposed single storey rear extension, double storey side extension and loft conversion with rear dormers to provide 3no dwellings at 143 Hercies Road
Uxbridge, UB10 9LY

DRAWING TITLE
Proposed First floor plan

PROJECT NO.
LOTUS/683/22

DRAWING NO.
PL-009



HERCIES ROAD

0 1 2 3 4 5

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REVISION NO.	DATE	COMMENTS

CLIENT
143 Hercies Road
Uxbridge, UB10 9LY

SCALE
1:100 @ A3

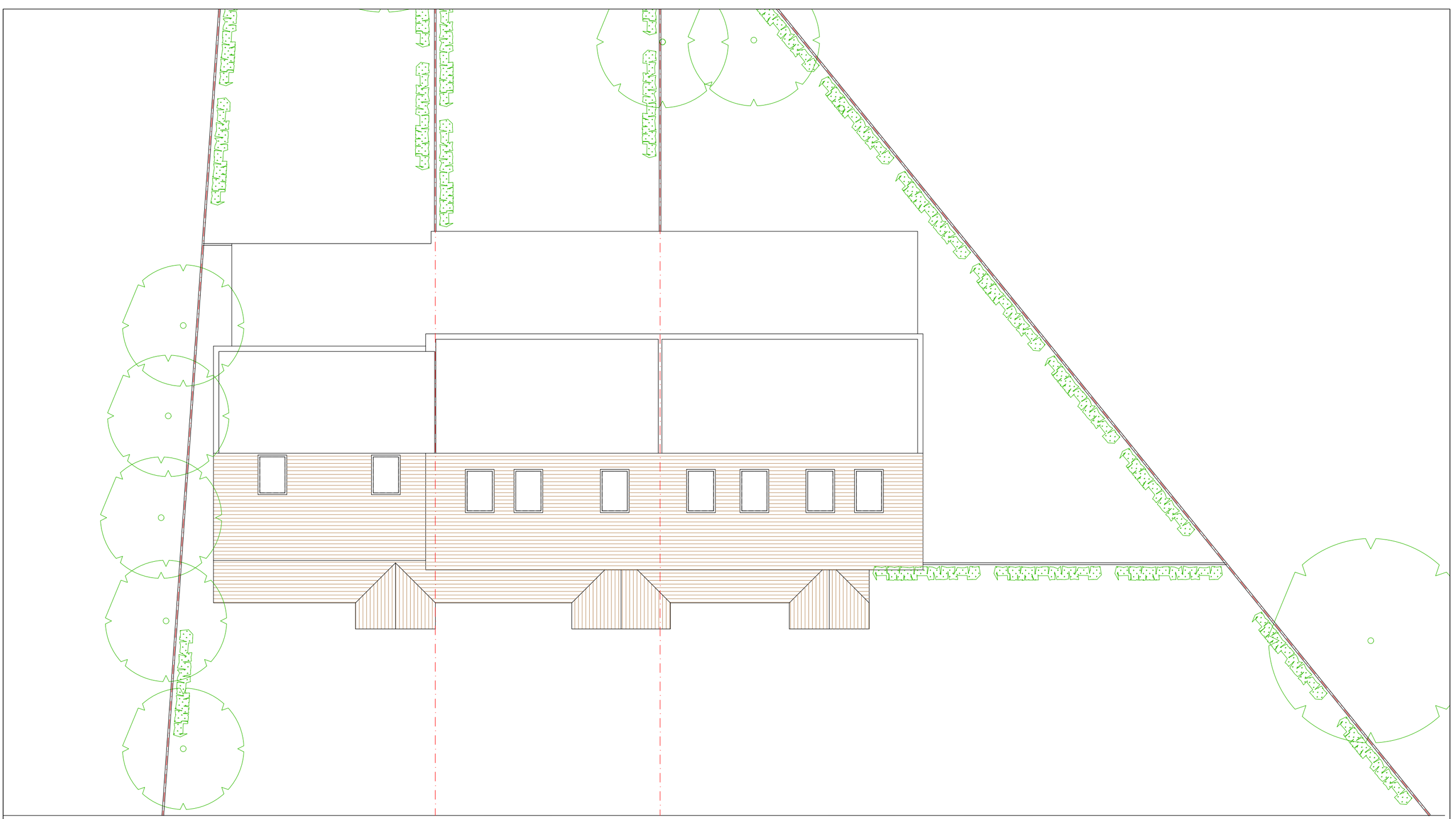
DATE
April 2022

PROJECT
Proposed single storey rear extension, double storey side extension and loft conversion with rear dormers to provide 3no dwellings at 143 Hercies Road
Uxbridge, UB10 9LY

DRAWING TITLE
Proposed Loft plan

PROJECT NO.
LOTUS/683/22

DRAWING NO.
PL-010



HERCIES ROAD

0 1 2 3 4 5

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REVISION NO.	DATE	COMMENTS

CLIENT
143 Hercies Road
Uxbridge, UB10 9LY

SCALE
1:100 @ A3

DATE
April 2022

PROJECT
Proposed single storey rear extension, double storey side extension and loft conversion with rear dormers to provide 3no dwellings at 143 Hercies Road
Uxbridge, UB10 9LY

DRAWING TITLE
Proposed Roof plan

PROJECT NO.
LOTUS/683/22

DRAWING NO.
PL-011

PROPOSED FRONT ELEVATION

1. Velux rooflights
2. Plain concrete tiles to match
3. Black rainwater goods to match
4. Facing brick to match
5. White UPVC glazing to match
6. New porch
7. GRP roof
8. Plain tiles hung on battens to match roof finish
9. Juliet Balcony

143

HERCIES ROAD

0 1 2 3 4 5

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REVISION NO.	DATE	COMMENTS

CLIENT
143 Hercies Road
Uxbridge, UB10 9LY

SCALE
1:100 @ A3

DATE
April 2022

PROJECT
Proposed single storey rear extension, double storey side extension and loft conversion with rear dormers to provide 3no dwellings at 143 Hercies Road
Uxbridge, UB10 9LY

DRAWING TITLE
Proposed Front elevation

PROJECT NO.
LOTUS/683/22

DRAWING NO.
PL-012

PROPOSED REAR ELEVATION

0 1 2 3 4 5

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REVISION NO.	DATE	COMMENTS

CLIENT
143 Hercies Road
Uxbridge, UB10 9LY

SCALE
1:100 @ A3

DATE
April 2022

PROJECT
Proposed single storey rear extension, double storey side extension and loft conversion with rear dormers to provide 3no dwellings at 143 Hercies Road
Uxbridge, UB10 9LY

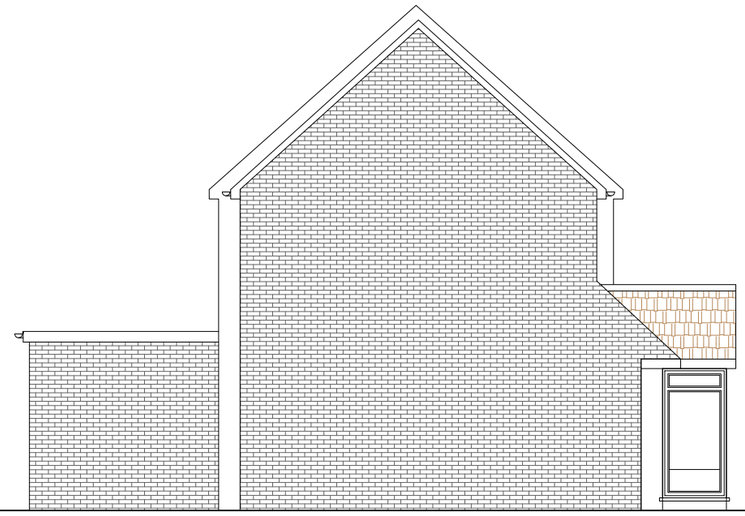
DRAWING TITLE
Proposed Rear elevation

PROJECT NO.
LOTUS/683/22

DRAWING NO.
PL-013

PROPOSED SIDE (1) ELEVATION

143



PROPOSED SIDE (2) ELEVATION

143

0 1 2 3 4 5

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REVISION NO.	DATE	COMMENTS

CLIENT
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Uxbridge, UB10 9LY

SCALE
1:100 @ A3

DATE
April 2022

PROJECT
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Uxbridge, UB10 9LY

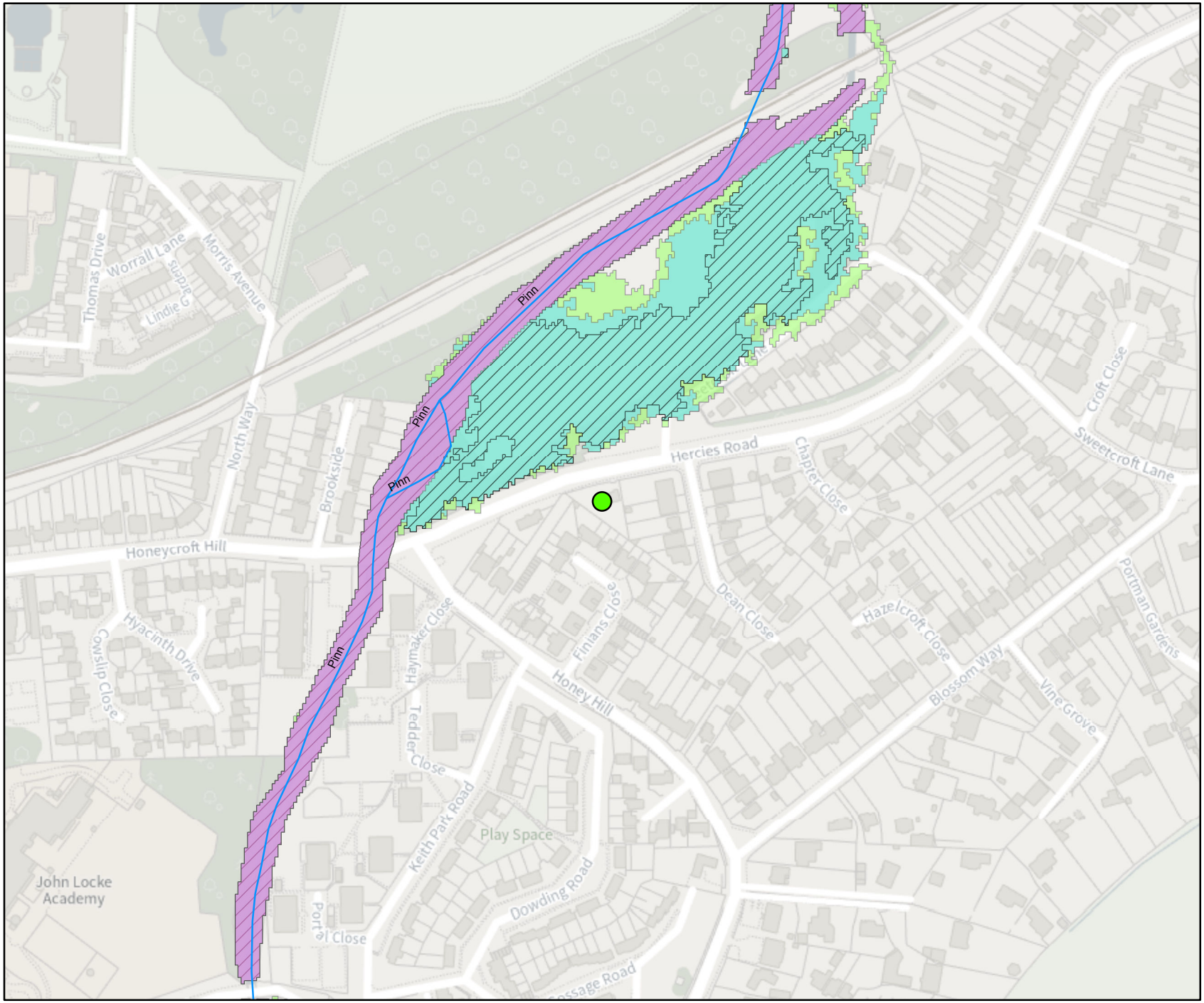
DRAWING TITLE
Proposed Side elevations

PROJECT NO.
LOTUS/683/22

DRAWING NO.
PL-014

Appendix B: Environment Agency Product 4 Data

Detailed FRA centred on: 143 Hercies Road, Uxbridge, UB10 9LY - 08/07/2022 - HNL 270563 NR



Environment Agency
Alchemy,
Bessemer Road,
Welwyn Garden City,
Hertfordshire,
AL7 1HE

N

0 50 100 200
Metres

Legend

- Main Rivers
- Site location

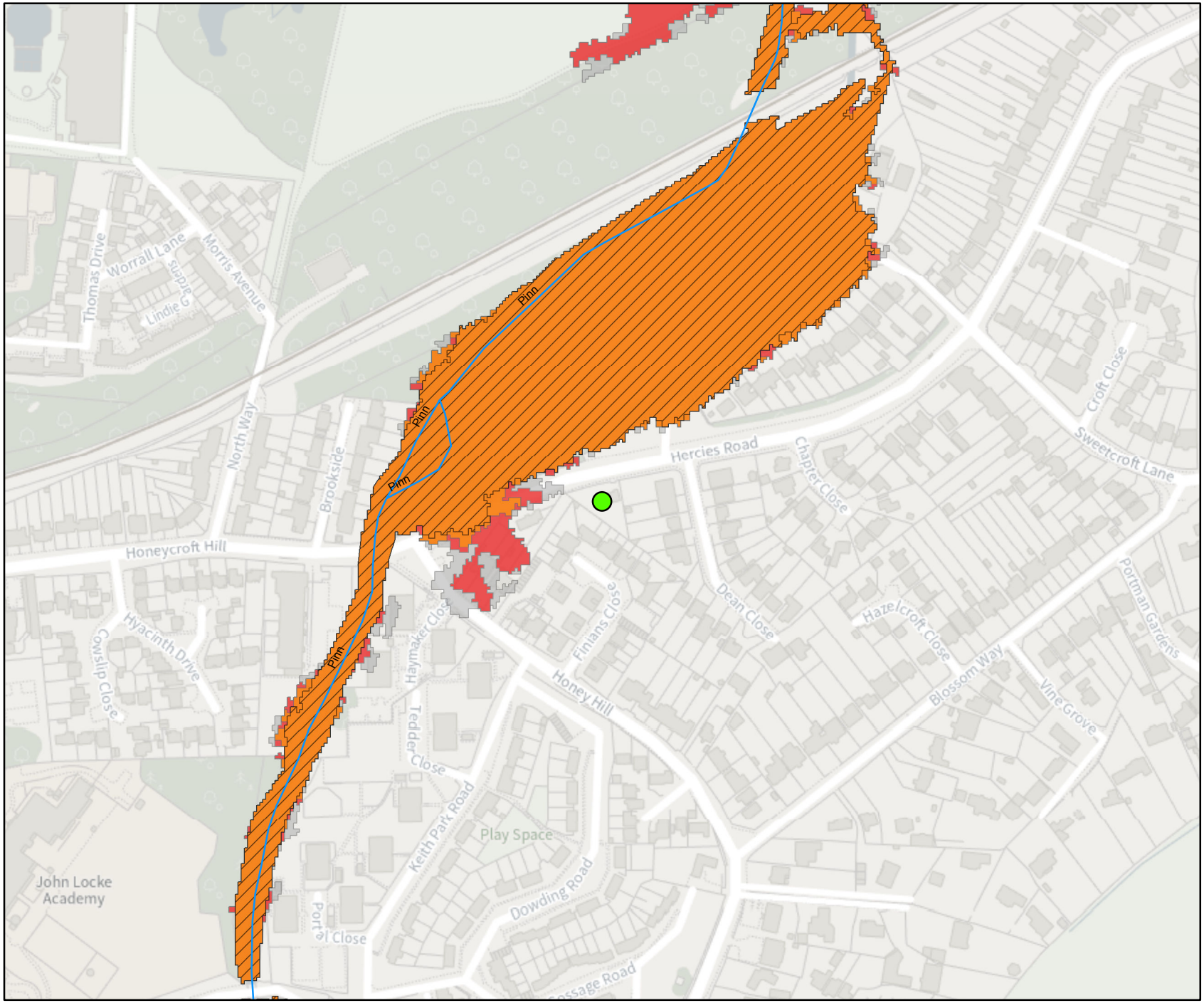
Defended Flood Outlines

- 1 in 2 year (50%) Defended
- 1 in 5 year (20%) Defended
- 1 in 10 year (10%) Defended
- 1 in 20 year (5%) Defended

The data in this map has been extracted from the River Pinn Mapping Study (JBA, 2015).
This model has been designed for catchment wide flood risk mapping. It should be noted that it was not created to produce flood levels for specific development sites within the catchment.
Modelled outlines take into account catchment wide defences.
Flood risk data requests including an allowance for climate change will be based on the 1 in 100 flood plus 20% allowance for climate change, unless otherwise stated. You should refer to 'Flood risk assessments: climate change allowances' to check if this allowance is still appropriate for the type of development you are proposing and its location. You may need to undertake further assessment of future flood risk using different allowances to ensure your assessment of future flood risk is based on best available evidence.
https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

Produced by:
Partnerships & Strategic Overview,
Hertfordshire & North London

Detailed FRA centred on: 143 Hercies Road, Uxbridge, UB10 9LY - 08/07/2022 - HNL 270563 NR



Environment Agency

Environment Agency
Alchemy,
Bessemer Road,
Welwyn Garden City,
Hertfordshire,
AL7 1HE

N

0 50 100 200
Metres

Legend

- Main Rivers
- Site location

Defended Flood Outlines

- 1 in 30 year (3.33%) Defended
- 1 in 50 year (2%) Defended
- 1 in 75 year (1.33%) Defended
- 1 in 100 year (1%) Defended

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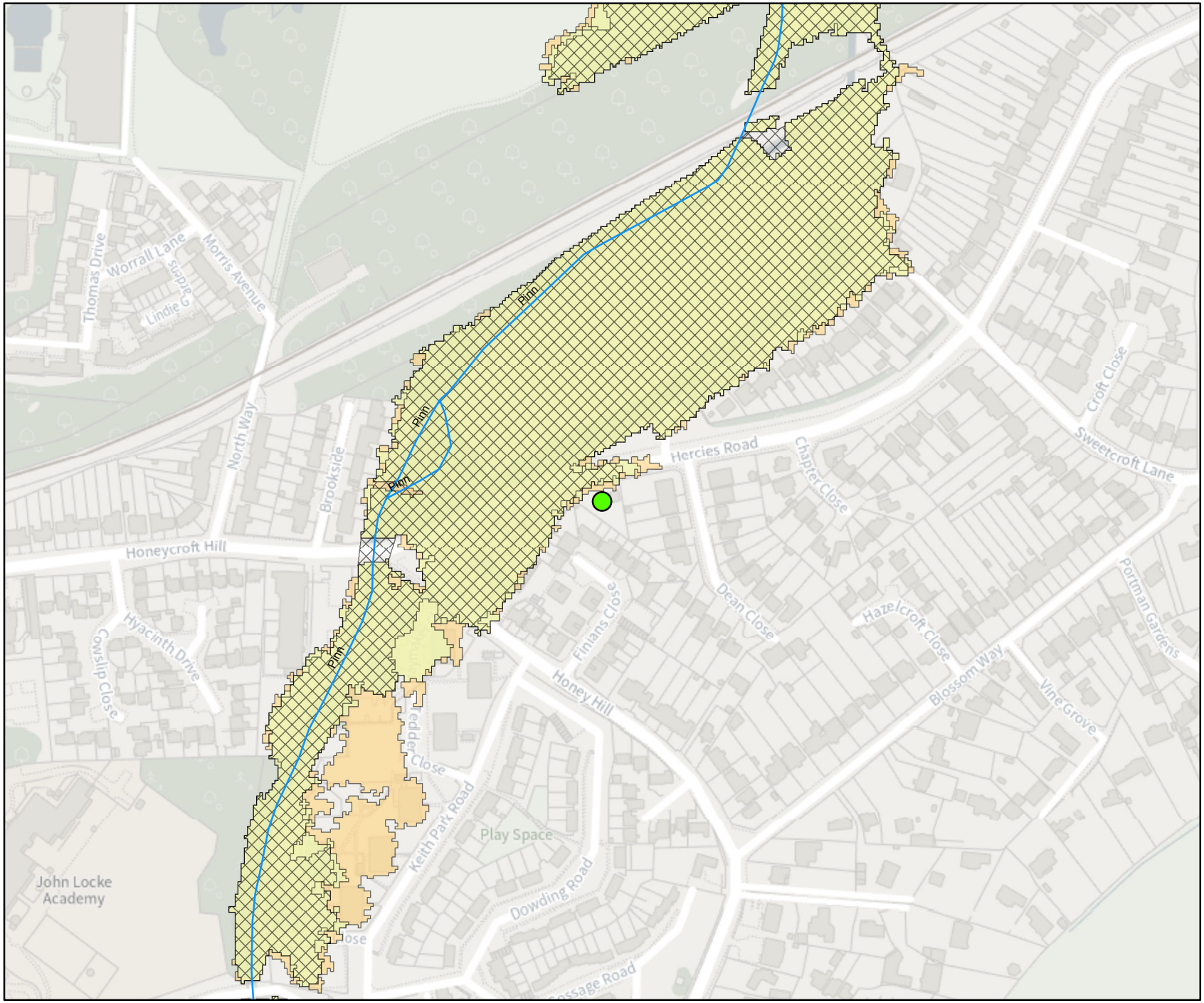
https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

Produced by:
Partnerships & Strategic Overview,
Hertfordshire & North London

Detailed FRA centred on: 143 Hercies Road, Uxbridge, UB10 9LY - 08/07/2022 - HNL 270563 NR



Environment Agency
Alchemy,
Bessemer Road,
Welwyn Garden City,
Hertfordshire,
AL7 1HE

N

0 50 100 200
Metres

Legend

- Main Rivers
- Site location

Defended Flood Outlines

- 1 in 100 year + 20% (*CC) Defended
- 1 in 100 year + 25% (*CC) Defended
- 1 in 100 year + 35% (*CC) Defended

The data in this map has been extracted from the River Pinn Mapping Study (JBA, 2015).
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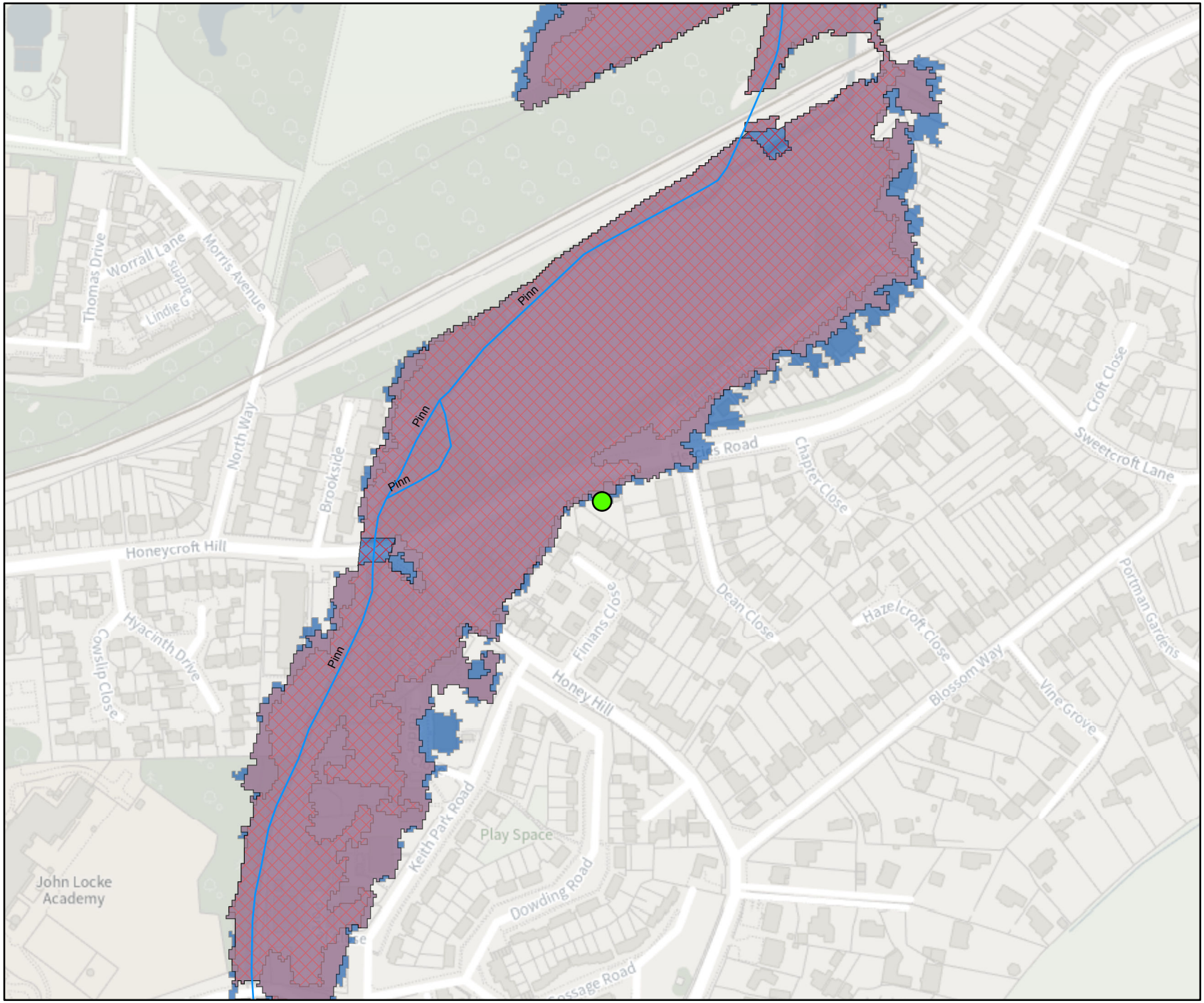
Detailed FRA centred on: 143 Hercies Road, Uxbridge, UB10 9LY - 08/07/2022 - HNL 270563 NR



Environment Agency
Alchemy,
Bessemer Road,
Welwyn Garden City,
Hertfordshire,
AL7 1HE

N

0 50 100 200
Metres

Legend

- Main Rivers
- Site location

Defended Flood Outlines

- 1 in 100 year + 70% (*CC) Defended
- 1 in 250 year (0.4%) Defended
- 1 in 1000 year (0.1%) Defended

The data in this map has been extracted from the River Pinn Mapping Study (JBA, 2015).
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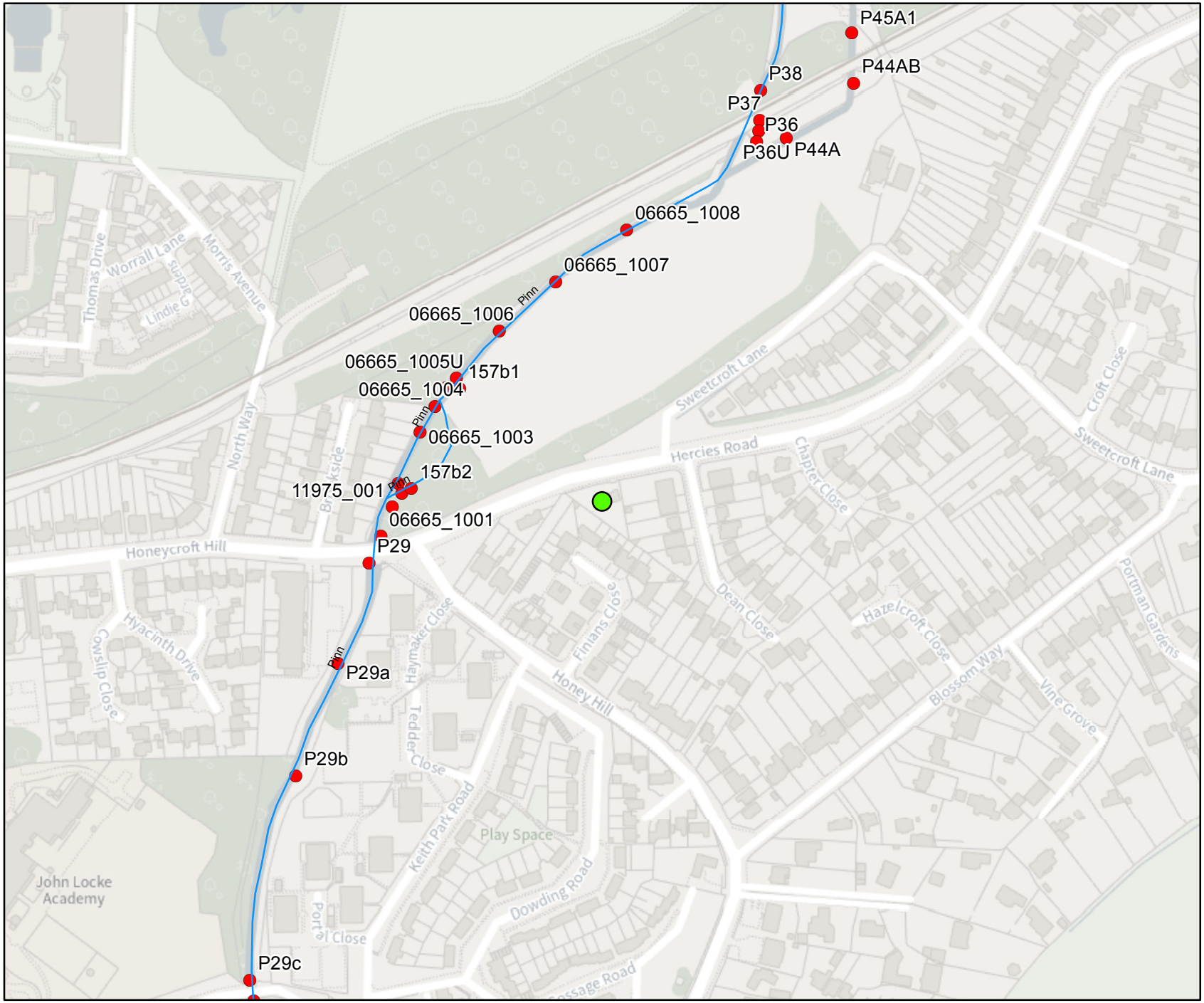
Modelled outlines take into account catchment wide defences.
Flood risk data requests including an allowance for climate change will be based on the 1 in 100 flood plus 20% allowance for climate change, unless otherwise stated. You should refer to 'Flood risk assessments: climate change allowances' to check if this allowance is still appropriate for the type of development you are proposing and its location. You may need to undertake further assessment of future flood risk using different allowances to ensure your assessment of future flood risk is based on best available evidence.
https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

Produced by:
Partnerships & Strategic Overview,
Hertfordshire & North London

Detailed FRA centred on: 143 Hercies Road, Uxbridge, UB10 9LY - 08/07/2022 - HNL 270563 NR



Environment Agency
Alchemy,
Bessemer Road,
Welwyn Garden City,
Hertfordshire,
AL7 1HE

N

0 50 100 200
Metres

Legend

- Main Rivers
- Site location

1D Node Results

- Nodes

The data in this map has been extracted from the River Pinn Mapping Study (JBA, 2015).
This model has been designed for catchment wide flood risk mapping. It should be noted that it was not created to produce flood levels for specific development sites within the catchment.
Modelled outlines take into account catchment wide defences.
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https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

Produced by:
Partnerships & Strategic Overview,
Hertfordshire & North London

Environment Agency ref: HNL 270563 NR

The following information has been extracted from the River Pinn Mapping Study (JBA, 2015)

Flood risk data requests including an allowance for climate change will be based on the 1 in 100 flood plus 20% allowance for climate change, unless otherwise stated. You should refer to 'Flood risk assessments: climate change allowances' to check if this allowance is still appropriate for the type of development you are proposing and its location. You may need to undertake further assessment of future flood risk using different allowances to ensure your assessment of future flood risk is based on best available evidence.
https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

Caution:
This model has been designed for catchment wide flood risk mapping. It should be noted that it was not created to produce flood levels for specific development sites across the entire catchment.

All flood levels are given in metres Above Ordnance Datum (mAOD)
All flows are given in cubic metres per second (cumecs)

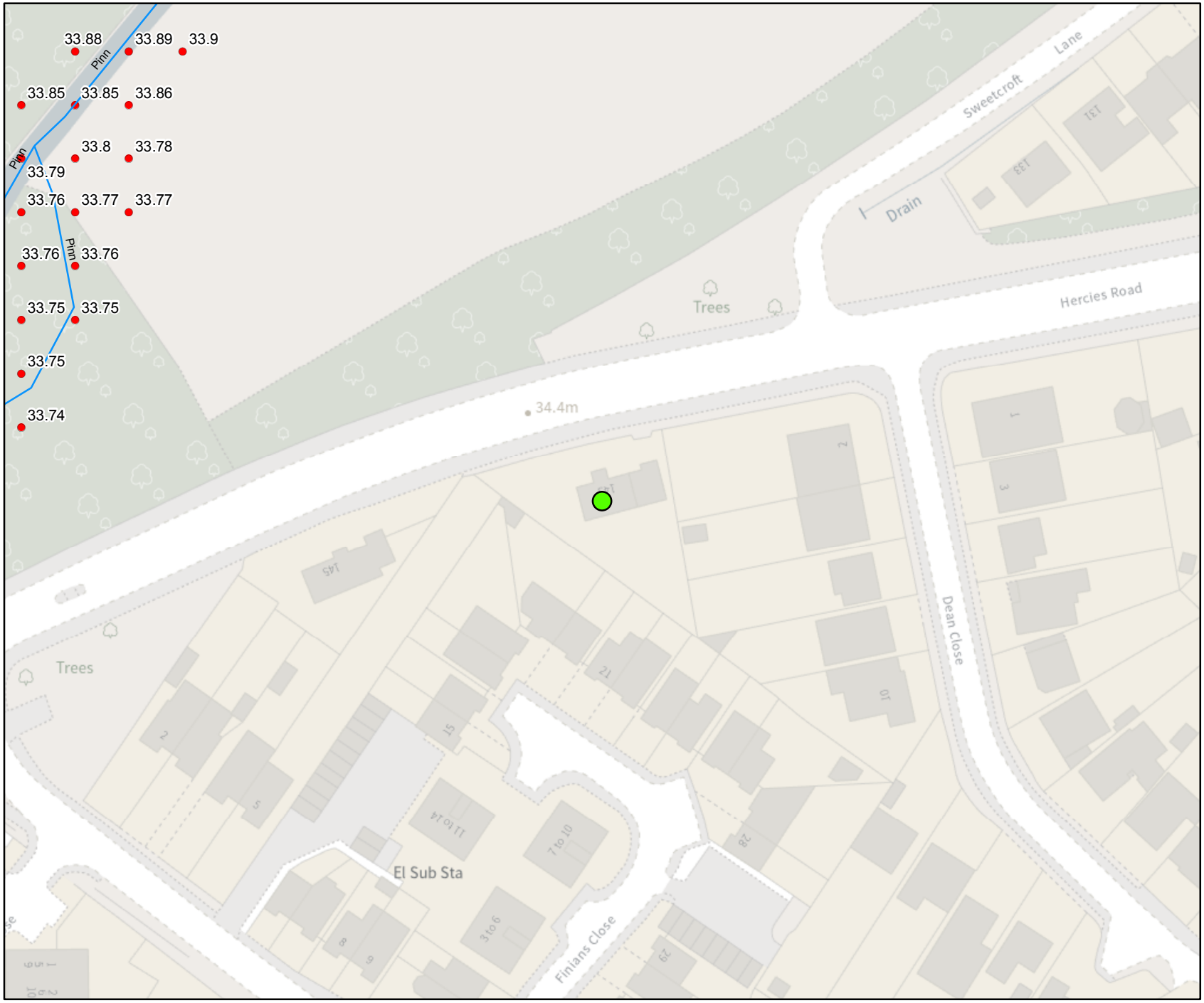
MODELLED FLOOD LEVEL

				Return Period												
Node Label	**Easting**	**Northing**	**2 yr**	**5 yr**	**10 yr**	**20 yr**	**30 yr**	**50 yr**	**75 yr**	**100 yr**	**100yr + 20%**	**100yr + 25%**	**100yr + 35%**	**100yr + 70%**	**250 yr**	**1000yr**
P38	506820	184634	34.39	34.52	34.58	34.64	34.67	34.72	34.77	34.81	35.00	35.05	35.15	35.40	35.11	35.58
P37	506820	184615	34.32	34.45	34.51	34.57	34.60	34.64	34.69	34.73	34.91	34.96	35.07	35.33	35.04	35.51
P36U	506819	184608	34.31	34.45	34.51	34.57	34.59	34.63	34.68	34.72	34.91	34.96	35.07	35.32	35.04	35.50
P36	506818	184601	34.31	34.45	34.51	34.57	34.59	34.63	34.68	34.72	34.91	34.96	35.07	35.32	35.04	35.50
06665_1008	506733	184544	34.17	34.31	34.39	34.46	34.49	34.56	34.63	34.68	34.89	34.95	35.05	35.29	35.02	35.47
06665_1007	506687	184510	34.08	34.23	34.31	34.39	34.43	34.51	34.59	34.66	34.88	34.94	35.05	35.30	35.03	35.49
06665_1006	506650	184478	33.99	34.14	34.24	34.35	34.41	34.50	34.59	34.65	34.88	34.94	35.10	35.44	35.04	35.66
06665_1005U	506622	184447	33.86	34.01	34.10	34.26	34.34	34.46	34.56	34.63	34.87	34.93	35.03	35.26	34.98	35.41
06665_1005D	506616	184442	33.86	34.01	34.10	34.26	34.34	34.46	34.56	34.63	34.87	34.93	35.03	35.26	34.98	35.41
06665_1004	506608	184429	33.73	33.90	34.01	34.19	34.28	34.42	34.52	34.59	34.84	34.91	35.01	35.25	34.96	35.39
06665_1003	506598	184412	33.72	33.90	34.01	34.19	34.29	34.42	34.52	34.60	34.85	34.91	35.01	35.25	34.96	35.39
06665_1002U	506584	184379	33.73	33.90	34.01	34.20	34.29	34.43	34.53	34.60	34.85	34.91	35.02	35.25	34.97	35.39
06665_1002D	506587	184373	33.73	33.90	34.01	34.20	34.29	34.43	34.53	34.60	34.85	34.91	35.02	35.25	34.97	35.39
11975_001	506580	184364	33.70	33.87	33.98	34.17	34.27	34.40	34.50	34.58	34.83	34.90	35.01	35.26	34.94	35.43
06665_1001	506573	184344	33.70	33.87	33.98	34.16	34.25	34.37	34.47	34.54	34.77	34.84	34.95	35.23	34.88	35.40
157b1	506624	184440	33.78	33.96	34.06	34.24	34.34	34.46	34.56	34.63	34.87	34.93	35.03	35.26	34.98	35.41
157b2	506593	184376	33.73	33.90	34.01	34.20	34.29	34.43	34.53	34.60	34.85	34.91	35.02	35.25	34.97	35.39
P45A1	506879	184672	34.32	34.48	34.54	34.62	34.64	34.68	34.73	34.77	34.95	35.03	35.12	35.39	35.10	35.57
P44AB	506881	184639	34.32	34.46	34.51	34.55	34.57	34.59	34.63	34.66	34.84	34.92	35.02	35.48	35.20	35.81
P44A	506837	184603	34.32	34.46	34.53	34.60	34.62	34.66	34.71	34.75	34.93	34.99	35.09	35.35	35.09	35.55
P29	506565	184327	33.68	33.85	33.95	34.08	34.15	34.25	34.33	34.39	34.57	34.62	34.73	35.07	34.66	35.27
P29a	506545	184262	33.56	33.74	33.84	33.98	34.05	34.16	34.25	34.30	34.50	34.55	34.65	35.00	34.60	35.20
P29b	506518	184189	33.55	33.72	33.82	33.97	34.04	34.16	34.25	34.31	34.51	34.56	34.67	35.00	34.60	35.19
P29c	506488	184056	33.46	33.63	33.73	33.87	33.94	34.06	34.15	34.21	34.42	34.48	34.58	34.95	34.53	35.17
P28a	506490	184042	33.42	33.57	33.67	33.78	33.84	33.91	33.98	34.02	34.16	34.20	34.28	34.63	34.24	34.97

MODELLED FLOWS

				Return Period												
Node Label	**Easting**	**Northing**	**2 yr**	**5 yr**	**10 yr**	**20 yr**	**30 yr**	**50 yr**	**75 yr**	**100 yr**	**100yr + 20%**	**100yr + 25%**	**100yr + 35%**	**100yr + 70%**	**250 yr**	**1000yr**
P38	506820	184634	6.46	7.04	7.34	7.82	8.18	8.73	9.15	9.51	10.67	11.10	12.02	16.11	12.53	20.30
P37	506820	184615	6.46	7.04	7.34	7.82	8.18	8.73	9.15	9.51	10.66	11.10	11.89	15.53	12.27	19.40
P36U	506819	184608	6.46	7.04	7.34	7.82	8.20	8.73	9.15	9.51	10.67	11.10	12.38	17.74	12.93	22.51
P36	506818	184601	7.20	8.86	9.64	10.86	11.37	12.12	12.68	13.17	14.85	16.23	18.03	23.08	16.43	27.51
06665_1008	506733	184544	7.29	8.65	8.93	9.51	9.75	9.89	9.95	9.99	10.09	10.28	11.59	15.66	10.55	18.92
06665_1007	506687	184510	7.29	8.65	8.93	9.44	9.61	9.73	9.77	9.79	9.80	9.97	9.97	13.28	9.79	16.38
06665_1006	506650	184478	7.29	8.65	8.92	8.98	9.00	9.11	9.18	9.23	9.33	9.41	9.46	11.28	9.39	13.90
06665_1005U	506622	184447	7.29	8.78	9.52	9.75	9.78	9.74	9.70	9.73	9.79	9.83	9.85	9.91	9.82	12.33
06665_1005D	506616	184442	4.82	5.76	6.40	6.96	7.00	7.13	7.19	7.22	7.25	7.25	7.25	7.78	7.24	9.98
06665_1004	506608	184429	4.82	5.76	6.40	6.96	7.02	7.22	7.33	7.37	7.45	7.48	7.52	7.56	7.50	8.71
06665_1003	506598	184412	4.82	5.76	6.40	6.95	7.01	7.21	7.32	7.37	7.45	7.47	7.53	7.91	7.51	9.43
06665_1002U	506584	184379	4.82	5.76	6.40	6.96	7.01	7.21	7.32	7.37	7.44	7.46	7.51	8.36	7.51	10.65
06665_1002D	506587	184373	7.29	9.03	10.12	11.21	11.34	11.62	11.76	11.82	11.98	12.03	12.10	12.94	12.14	16.33
11975_001	506580	184364	7.29	9.03	10.18	11.47	11.64	12.03	12.32	12.39	12.77	12.80	12.88	12.89	12.86	13.90
06665_1001	506573	184344	7.29	9.03	10.23	12.09	12.93	14.15	15.09	15.82	18.23	18.73	19.27	19.51	19.20	19.66
157b1	506624	184440	2.47	3.07	3.15	3.19	3.21	3.26	3.28	3.31	3.33	3.36	3.38	3.43	3.35	3.46
157b2	506593	184376	2.47	3.27	3.72	4.25	4.33	4.42	4.45	4.47	4.57	4.58	4.70	5.20	5.03	6.67
P45A1	506879	184672	0.74	1.95	2.81	4.20	4.63	5.20	5.65	5.98	6.89	6.93	7.31	11.42	10.06	14.71
P44AB	506881	184639	0.74	1.95	2.81	4.20	4.63	5.20	5.65	5.98	6.89	6.93	7.28	9.54	7.87	12.05
P44A	506837	184603	0.74	1.83	2.31	3.04	3.20	3.40	3.58	3.66	4.19	5.14	5.65	7.80	5.77	11.08
P29	506565	184327	7.29	9.03	10.23	12.09	12.93	14.15	15.09	15.82	18.23	18.73	19.27	19.51	19.20	19.66
P29a	506545	184262	7.29	9.03	10.23	12.09	12.93	14.15	15.09	15.81	18.14	18.70	19.79	21.05	19.31	21.57
P29b	506518	184189	7.29	9.03	10.23	12.09	12.93	14.15	15.09	15.81	18.27	18.92	20.04	22.21	19.41	25.58
P29c	506488	184056	7.28	9.03	10.23	12.08	12.93	14.14	15.08	15.81	18.27	18.92	20.08	22.54	19.42	23.11
P28a	506490	184042	7.28	9.03	10.23	12.08	12.93	14.14	15.08	15.81	18.27	18.92	20.08	22.54	19.42	23.11

Detailed FRA centred on: 143 Hercies Road, Uxbridge, UB10 9LY - 08/07/2022 - HNL 270563 NR



Environment Agency

Environment Agency
Alchemy,
Bessemer Road,
Welwyn Garden City,
Hertfordshire,
AL7 1HE

N

0 15 30 60
Metres

Legend

- Main Rivers
- Site location

2D Node Results: Heights

- 1 in 2 year (50%) Defended

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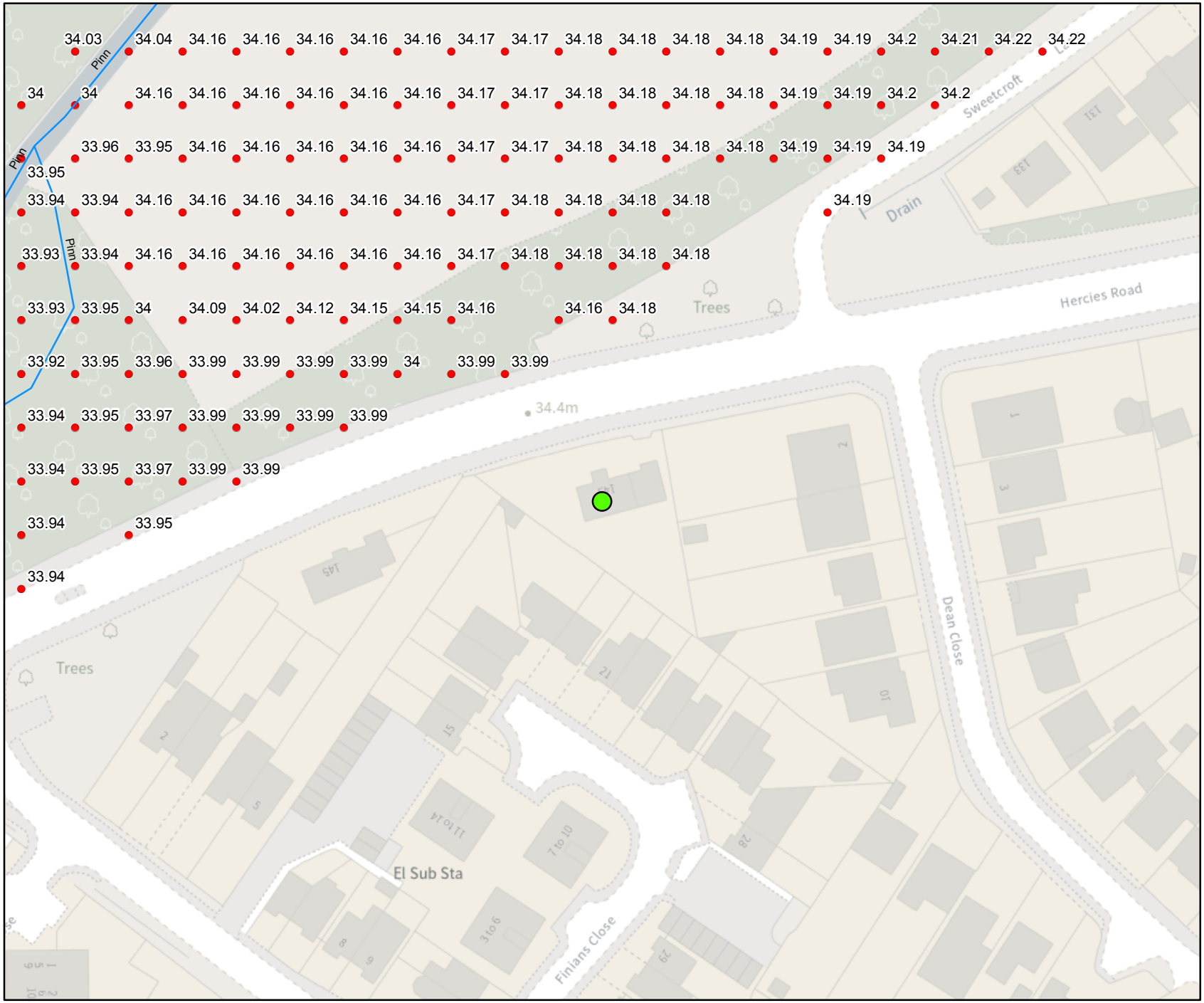

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0 15 30 60
Metres

Legend

- Main Rivers
- Site location

2D Node Results: Heights

- 1 in 5 year (20%) Defended

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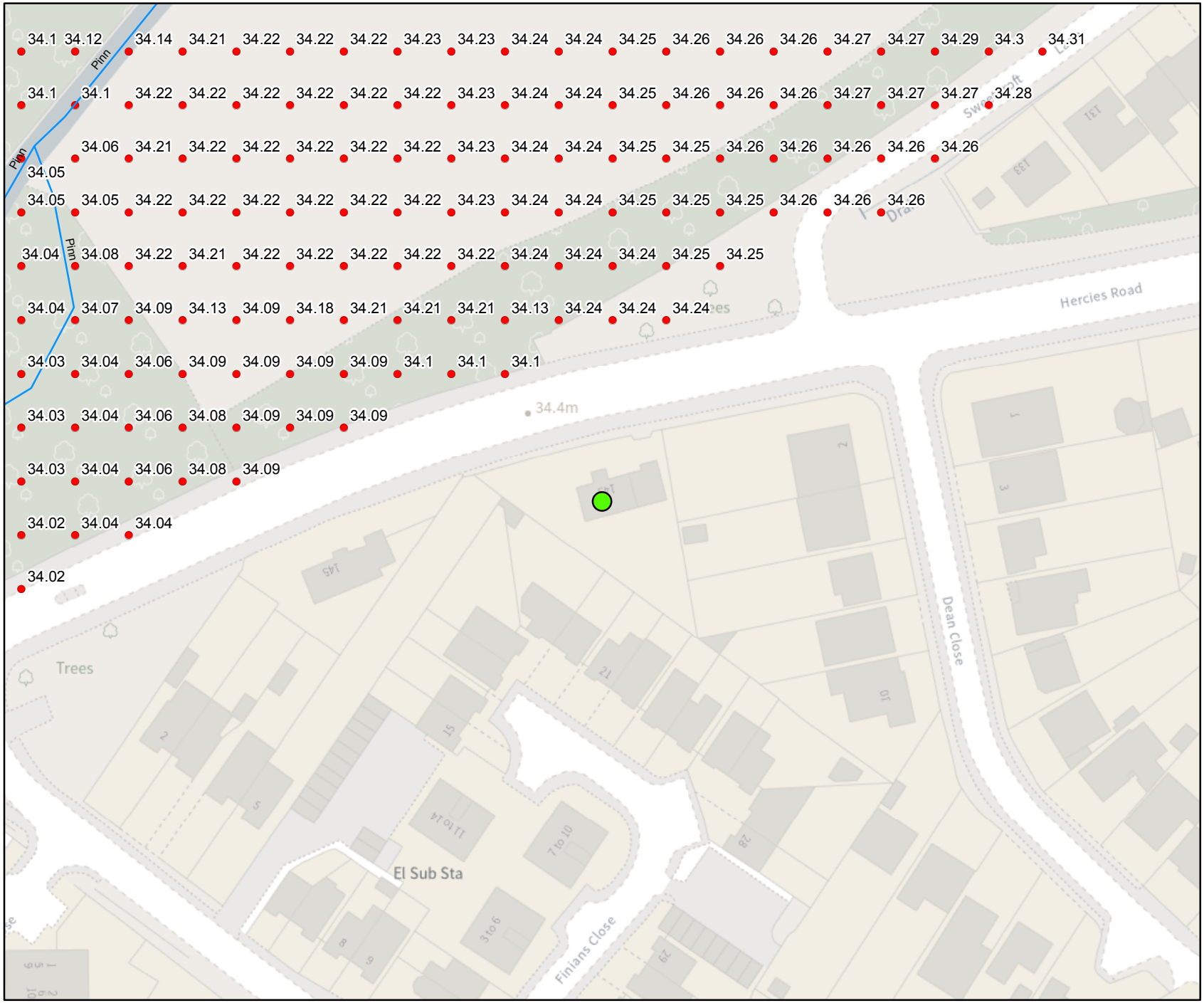

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Metres

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- Main Rivers
- Site location

2D Node Results: Heights

- 1 in 10 year (10%) Defended

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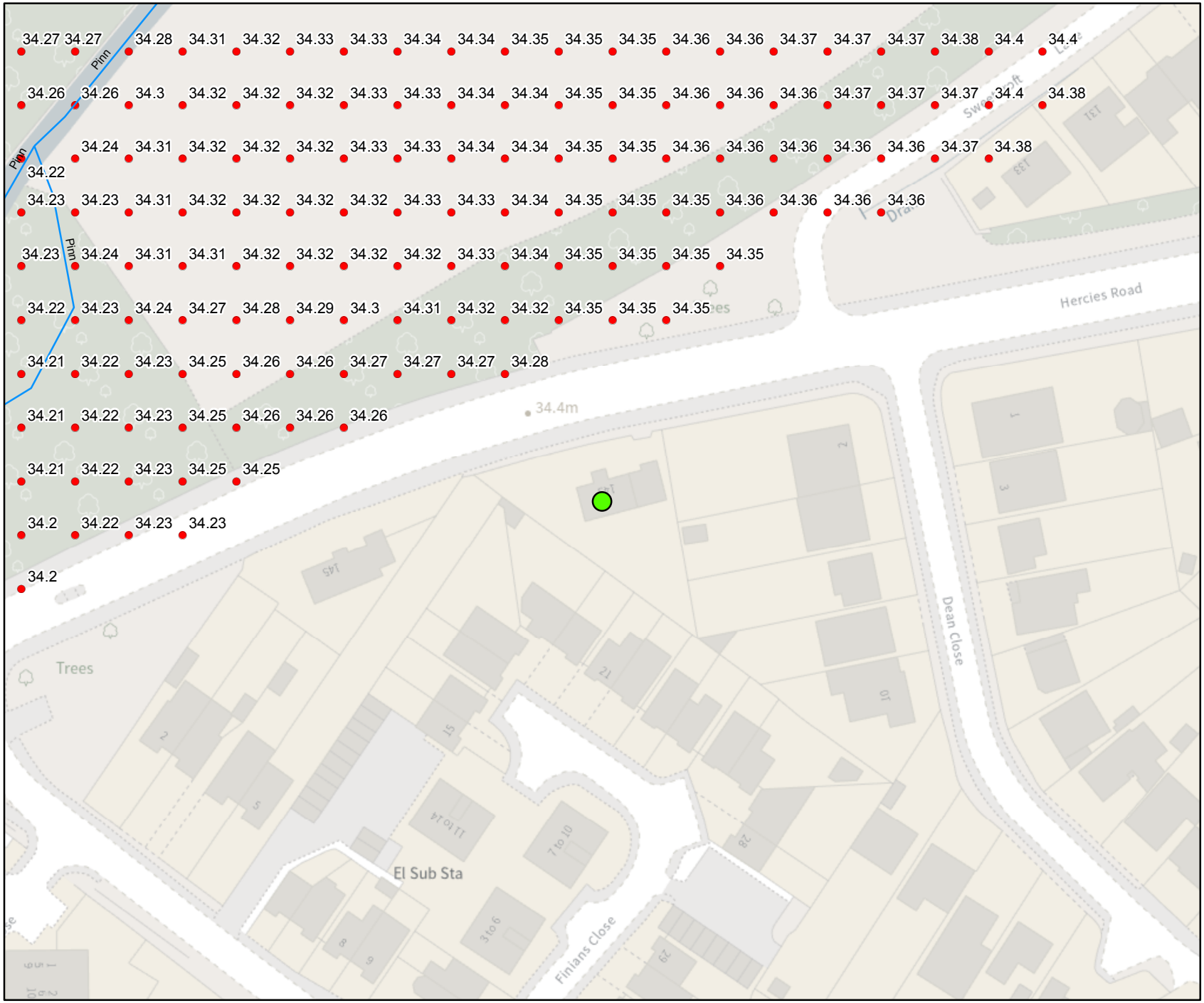

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0 15 30 60
Metres

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Main Rivers

Site location

2D Node Results: Heights

1 in 20 year (5%) Defended

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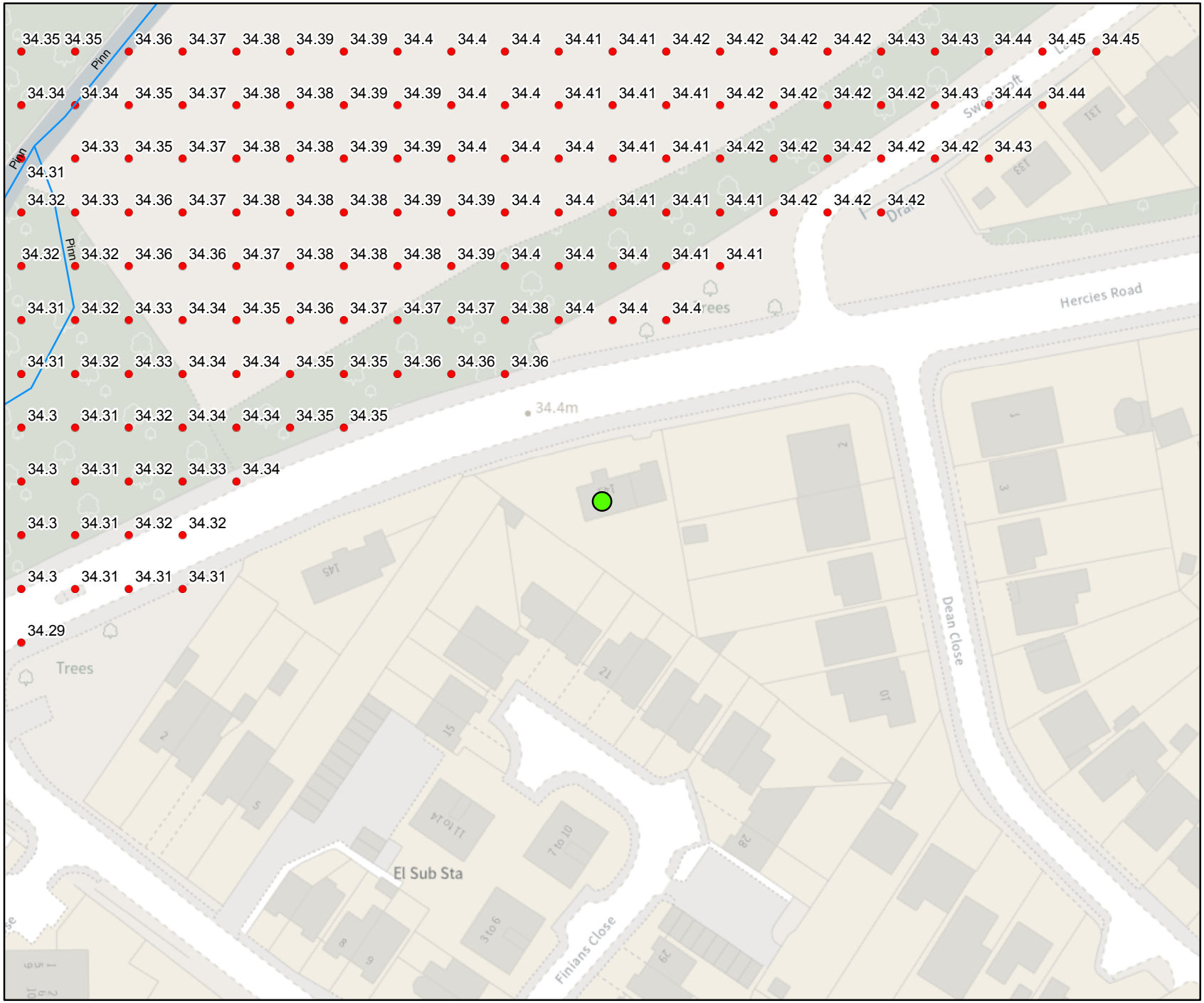

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0 15 30 60
Metres

Legend

- Main Rivers
- Site location

2D Node Results: Heights

- 1 in 30 year (3.33%) Defended

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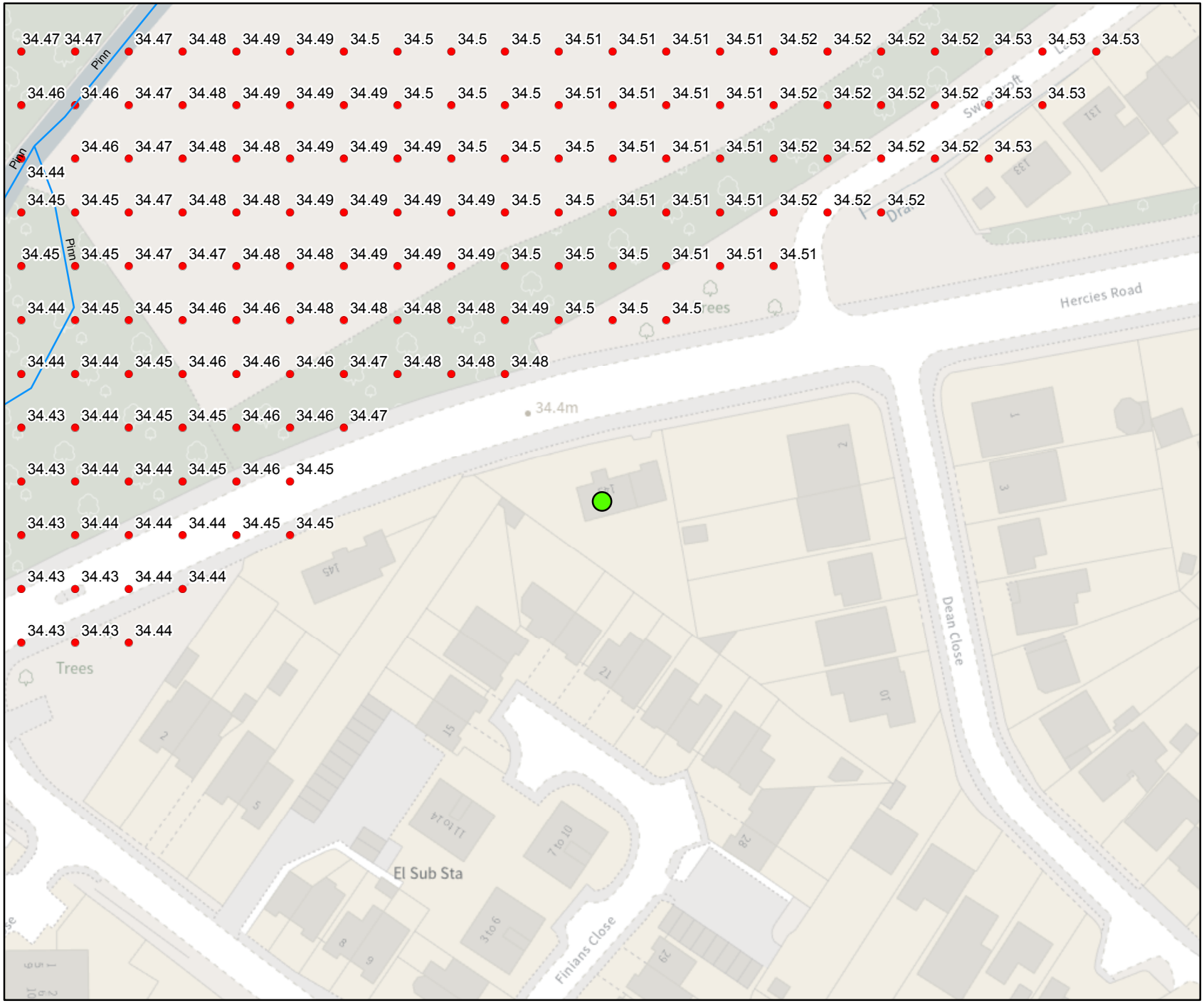

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0 15 30 60
Metres

Legend

- Main Rivers
- Site location

2D Node Results: Heights

- 1 in 50 year (2%) Defended

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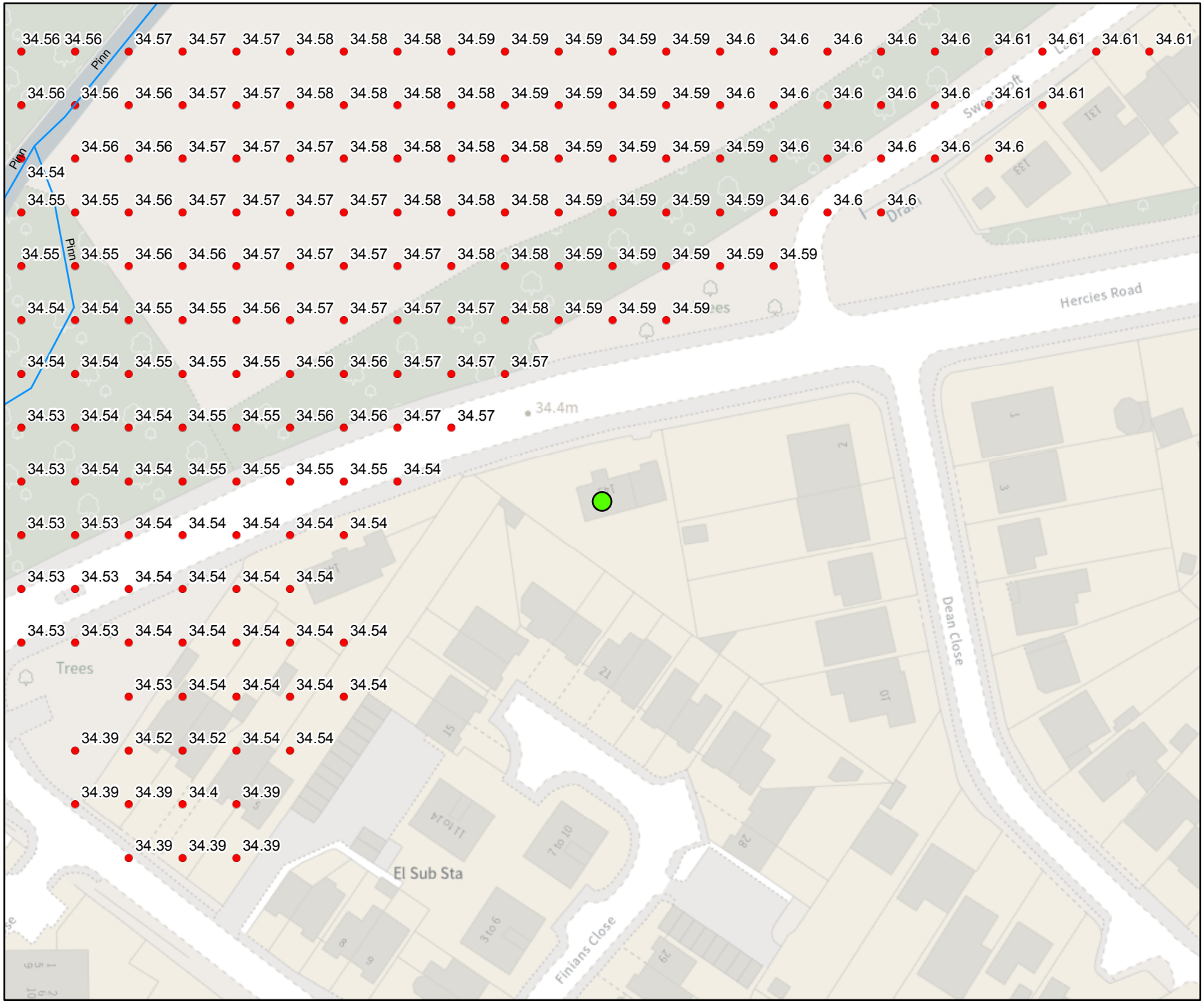

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Welwyn Garden City,
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N

0 15 30 60
Metres

Legend

- Main Rivers
- Site location

2D Node Results: Heights

- 1 in 75 year (1.33%) Defended

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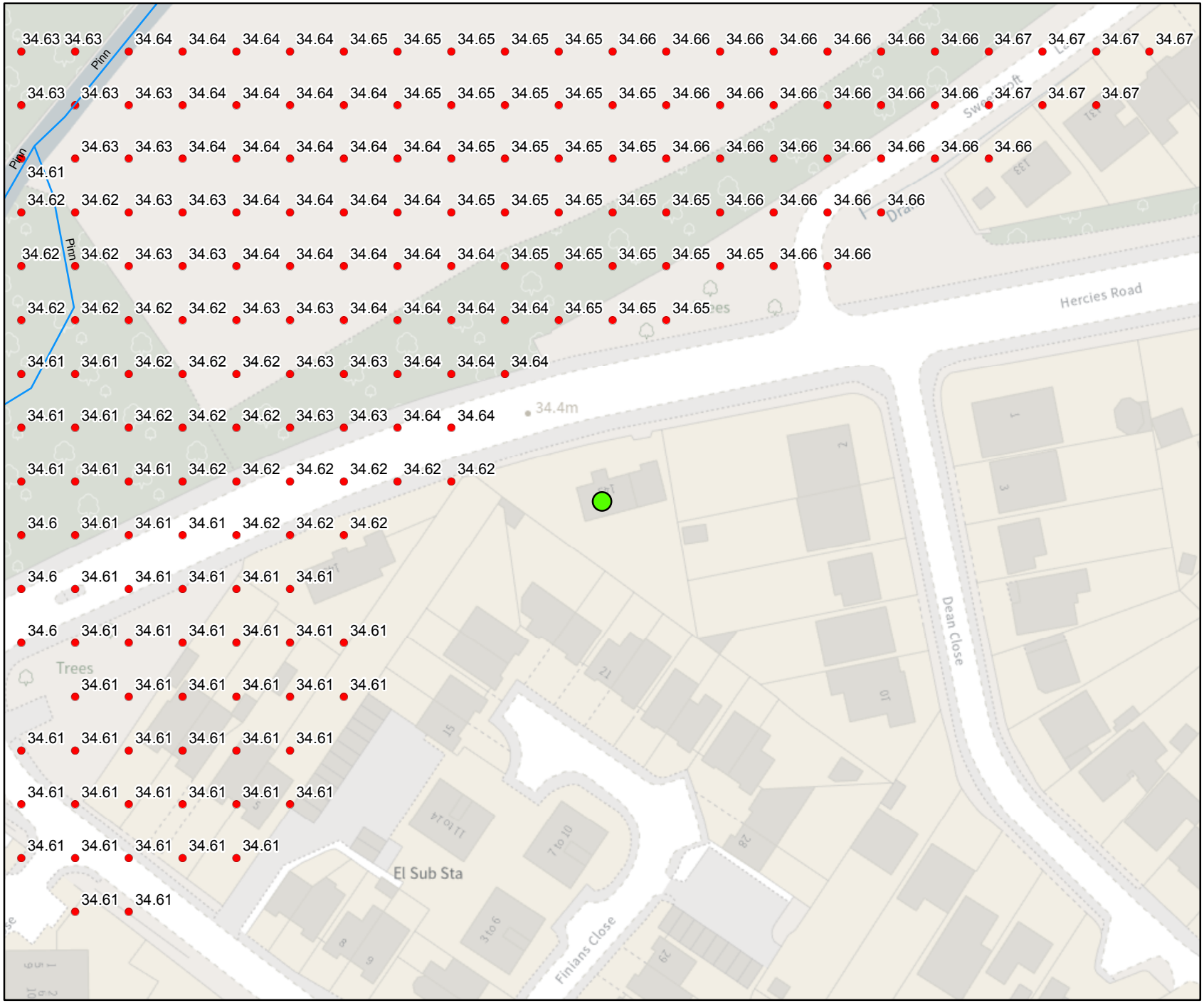

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N

0 15 30 60
Metres

Legend

- Main Rivers
- Site location

2D Node Results: Heights

- 1 in 100 year (1%) Defended

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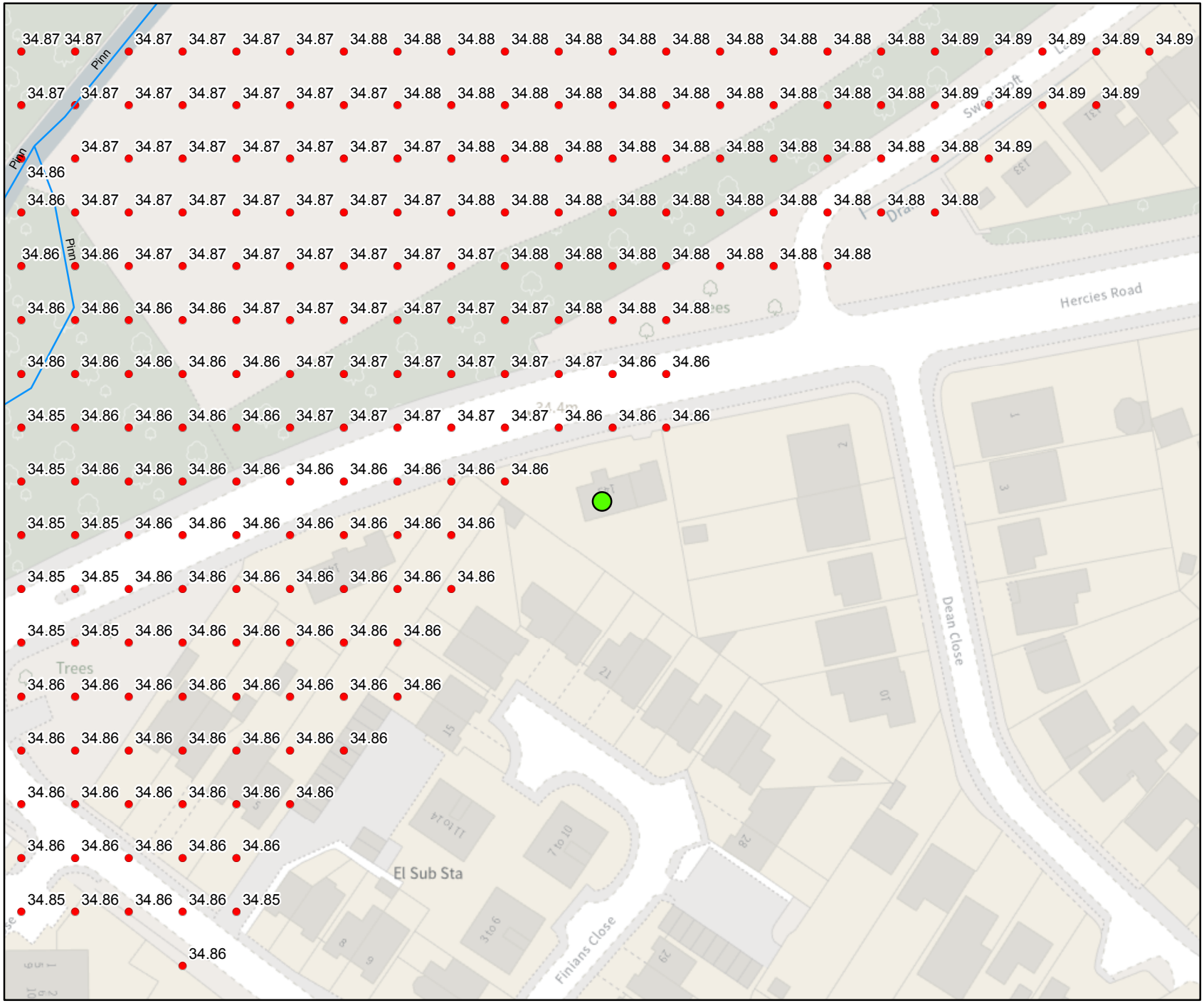

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N

0 15 30 60
Metres

Legend

Main Rivers

Site location

2D Node Results: Heights

1 in 100 year + 20% (*CC) Defended

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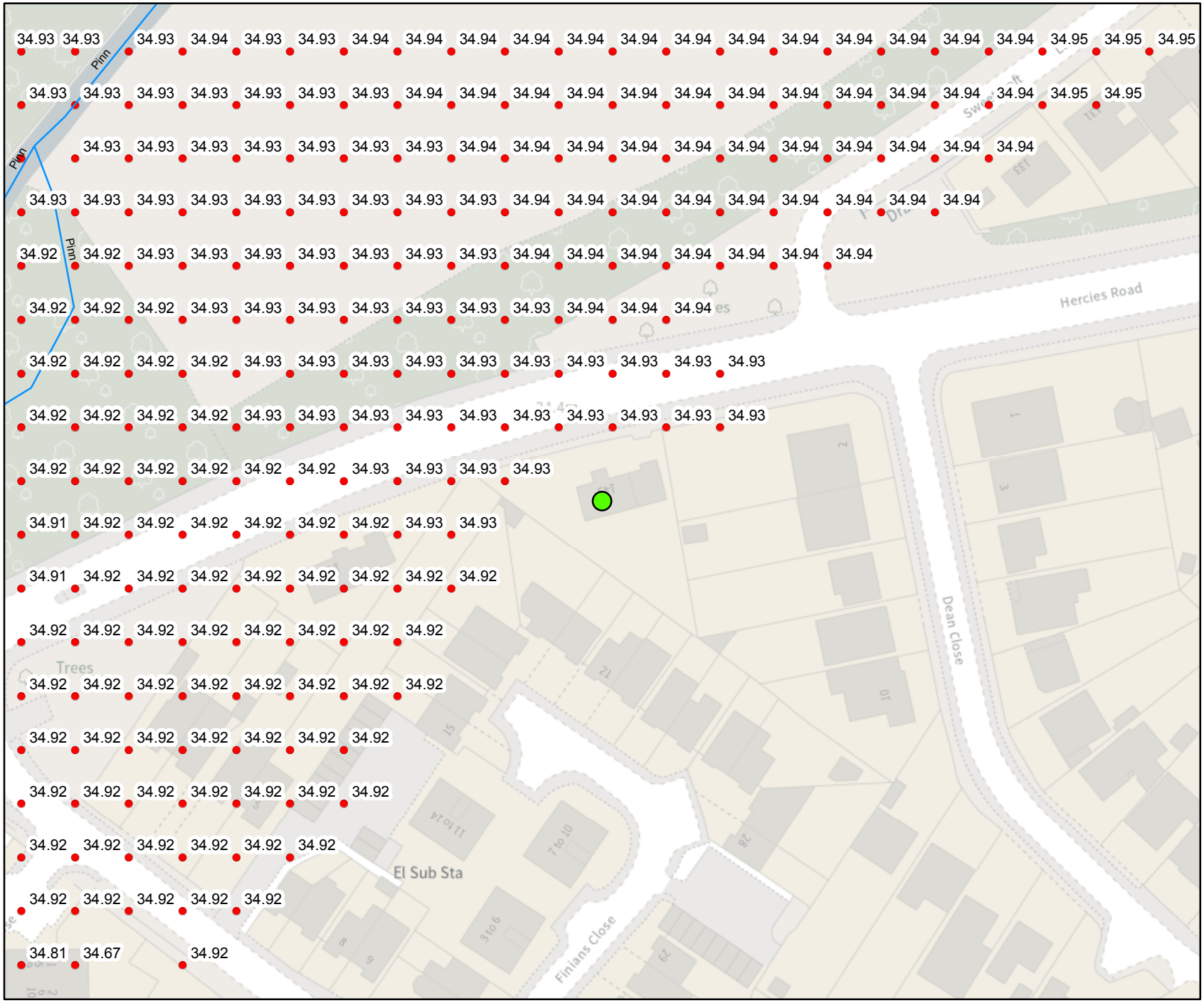

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Hertfordshire,
AL7 1HE

N

0 15 30 60
Metres

Legend

- Main Rivers
- Site location

2D Node Results: Heights

- 1 in 100 year + 25% (*CC) Defended

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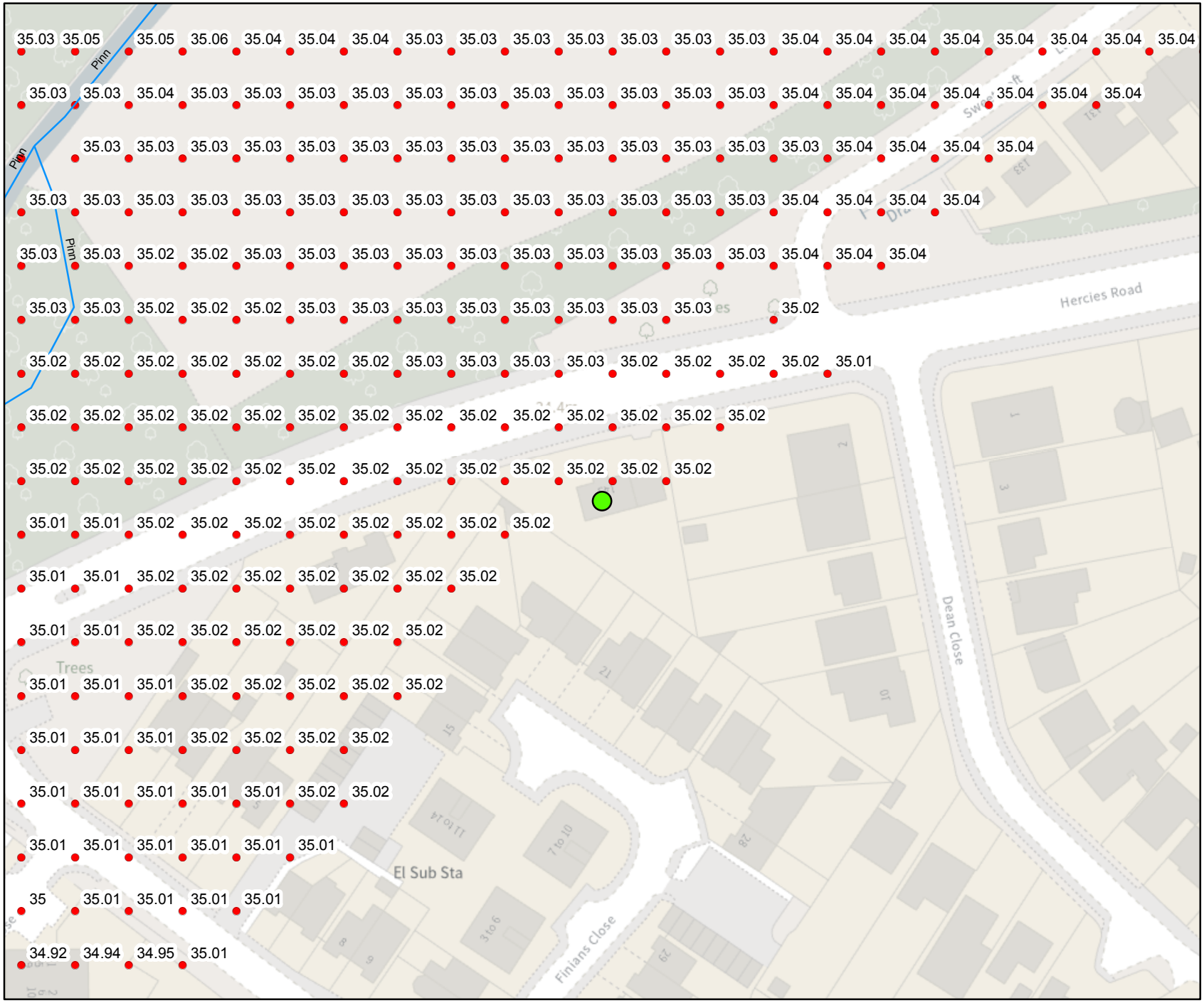

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Alchemy,
Bessemer Road,
Welwyn Garden City,
Hertfordshire,
AL7 1HE

N

0 15 30 60
Metres

Legend

Main Rivers

Site location

2D Node Results: Heights

1 in 100 year + 35% (*CC) Defended

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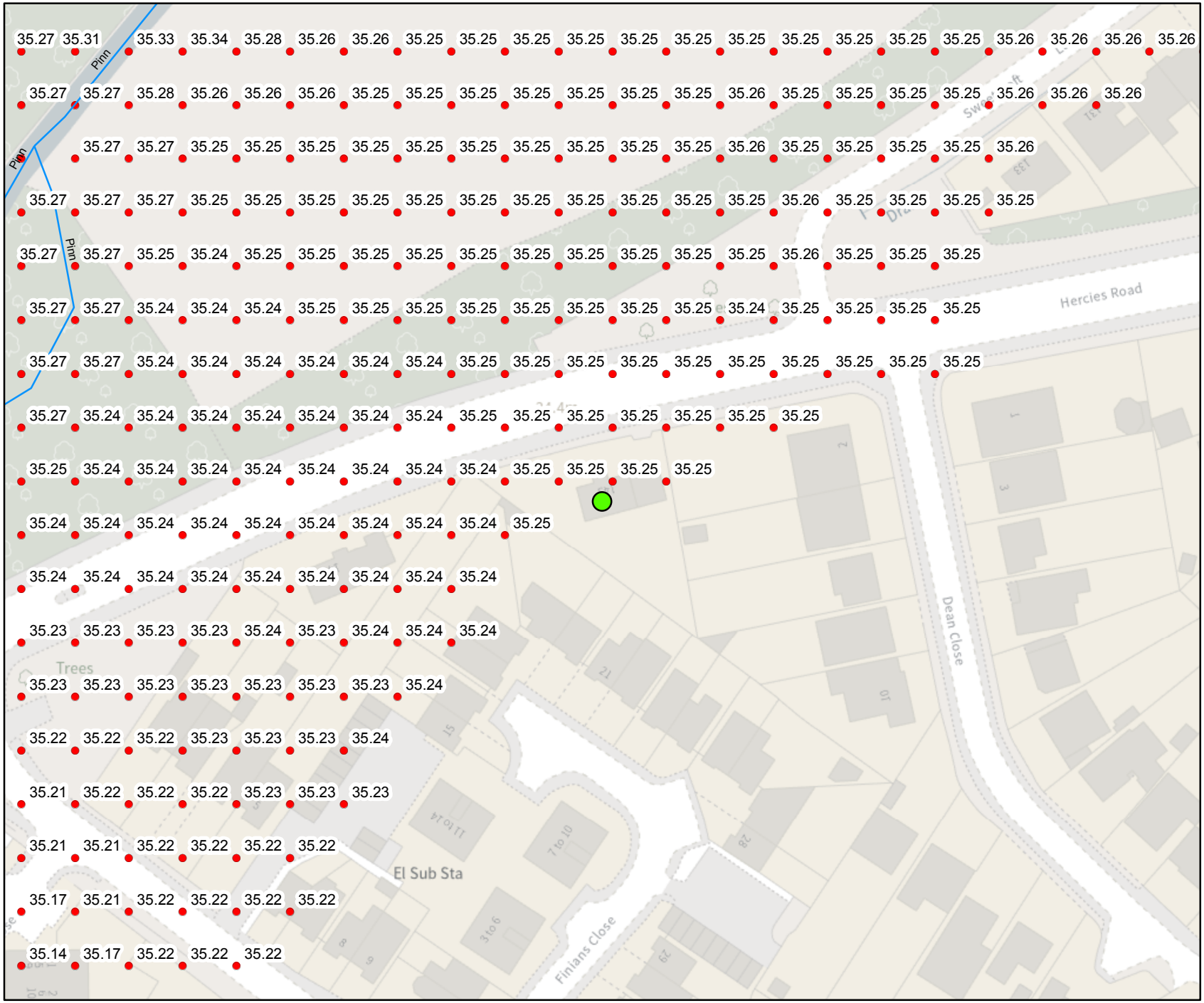

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Hertfordshire,
AL7 1HE

N

0 15 30 60
Metres

Legend

- Main Rivers
- Site location

2D Node Results: Heights

- 1 in 100 year + 70% (*CC) Defended

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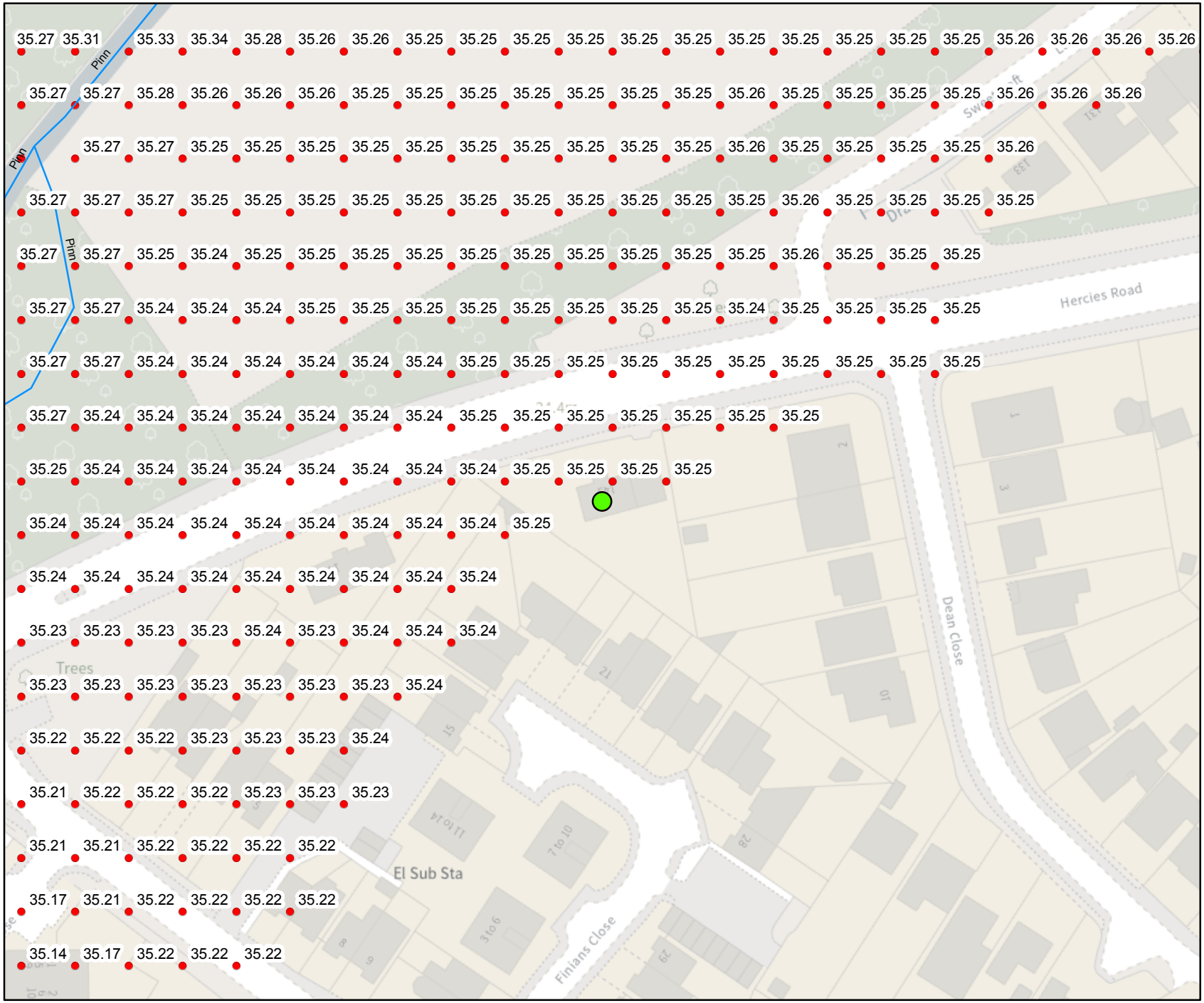

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0 15 30 60
Metres

Legend

- Main Rivers
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2D Node Results: Heights

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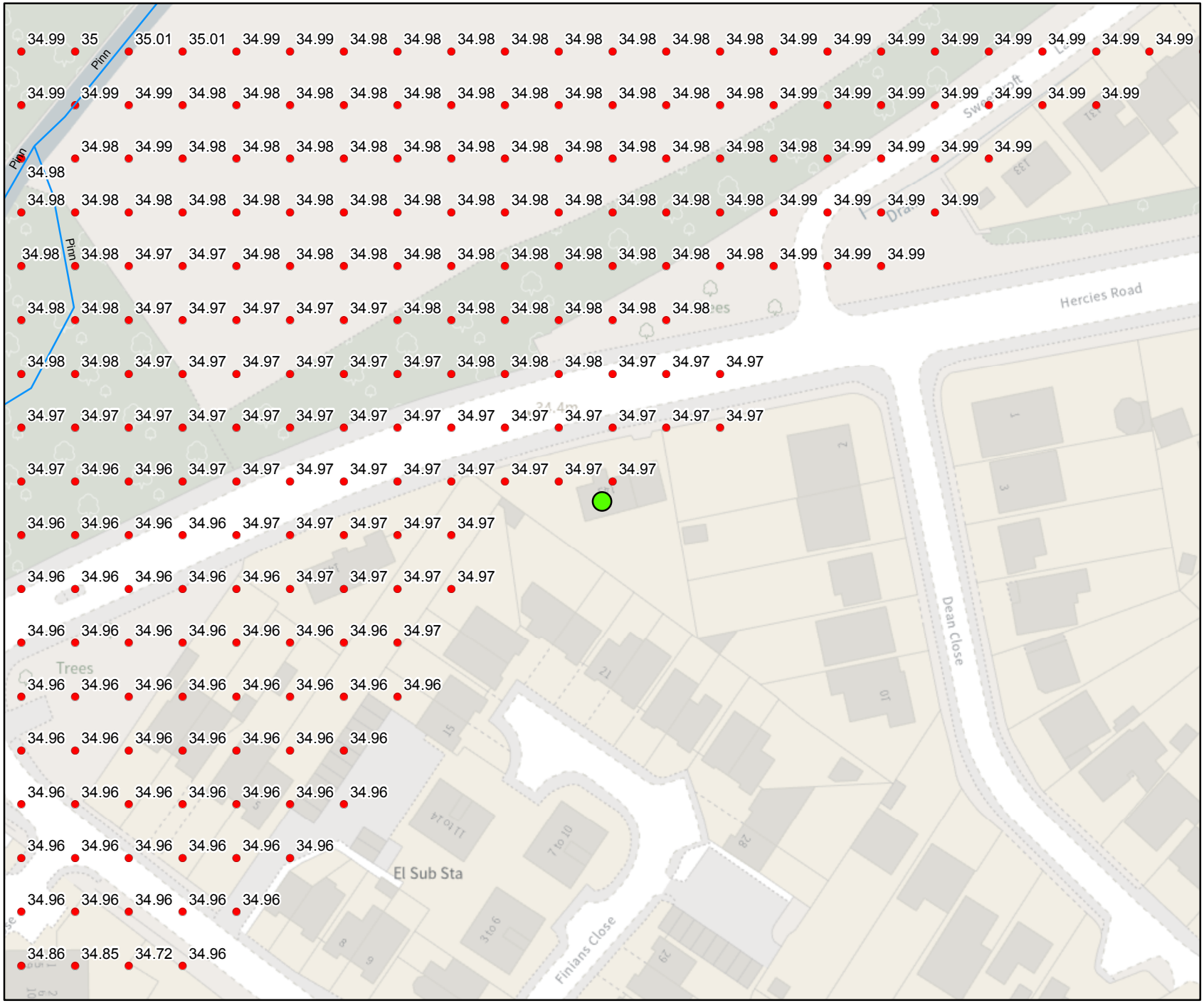

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Metres

Legend

Main Rivers

Site location

2D Node Results: Heights

1 in 250 year (0.4%) Defended

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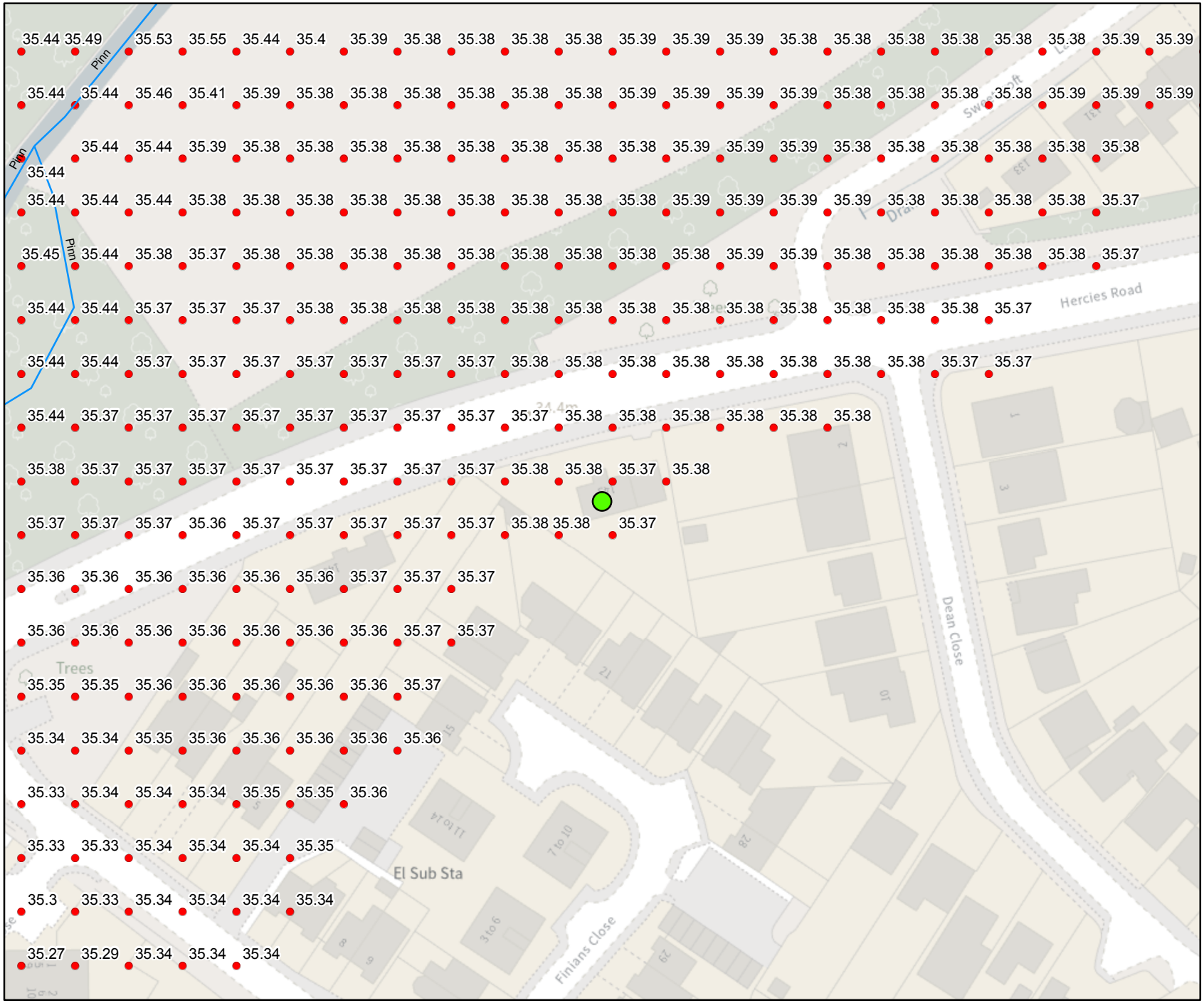
Hertfordshire & North London

Detailed FRA centred on: 143 Hercies Road, Uxbridge, UB10 9LY - 08/07/2022 - HNL 270563 NR



Environment Agency

Environment Agency
Alchemy,
Bessemer Road,
Welwyn Garden City,
Hertfordshire,
AL7 1HE

N

0 15 30 60
Metres

Legend

- Main Rivers
- Site location

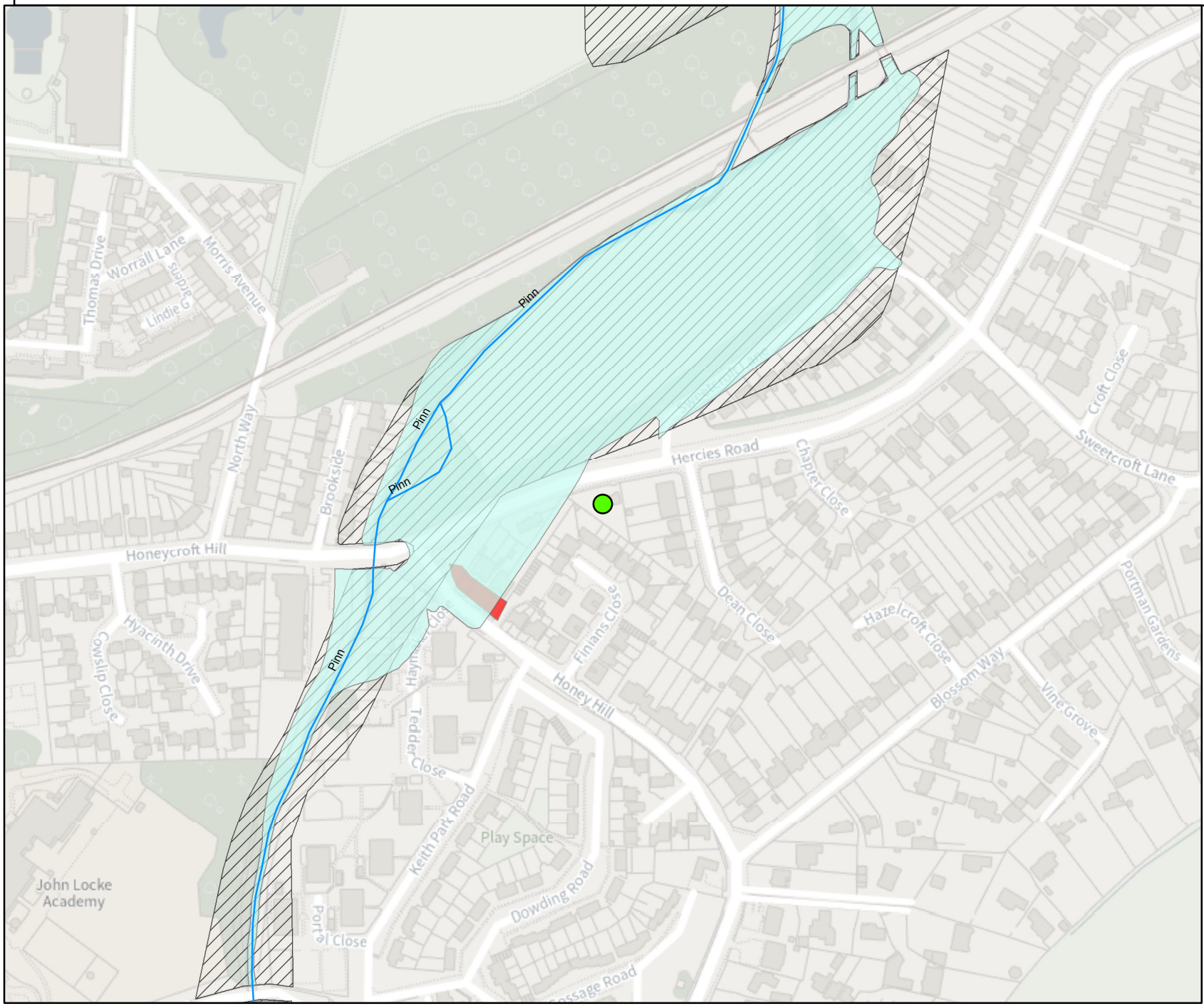
2D Node Results: Heights

- 1 in 1000 year (0.1%) Defended

The data in this map has been extracted from the River Pinn Mapping Study (JBA, 2015).
This model has been designed for catchment wide flood risk mapping. It should be noted that it was not created to produce flood levels for specific development sites within the catchment.
Modelled outlines take into account catchment wide defences.
Flood risk data requests including an allowance for climate change will be based on the 1 in 100 flood plus 20% allowance for climate change, unless otherwise stated. You should refer to 'Flood risk assessments: climate change allowances' to check if this allowance is still appropriate for the type of development you are proposing and its location. You may need to undertake further assessment of future flood risk using different allowances to ensure your assessment of future flood risk is based on best available evidence.
https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

Produced by:
Partnerships & Strategic Overview,
Hertfordshire & North London

Historic Flood Map centred on: 143 Hercies Road, Uxbridge, UB10 9LY - 08/07/2022 - HNL 270563 NR



Environment Agency

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Alchemy,
Bessemer Road,
Welwyn Garden City,
Hertfordshire,
AL7 1HE

N

0 50 100 200
Metres

Legend

- Main Rivers
- Site location

Flood Event Outlines

- 1977
- 1988
- 1999

The historic flood event outlines are based on a combination of anecdotal evidence, Environment Agency staff observations and survey.
Our historic flood event outlines do not provide a definitive record of flooding.
It is possible that there will be an absence of datain places where we have not been able to record the extent of flooding.
It is also possible for errors occur in the digitisation of historic records of flooding.

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Appendix C: Warning Codes and Personal Flood Plan

Flood Alert

Key Message: Flooding is possible. Be prepared

Timing: 2 hours to 2 days in advance of flooding

Actions: Be prepared for flooding
Prepare a flood kit of essential items
Monitor local water levels and flood forecasts

Flood Alerts are to warn people of the possibility of flooding and encourage them to be alert, stay vigilant and to make early preparations for flooding.

Flood Warning

Key Message: Flooding is expected. Immediate Action Required

Timing: Half an hour to 1 day in advance of flooding

Actions: Act now to protect your property
Block doors with flood boards or sandbags and cover airbricks and other ventilation holes
Move family, pets and valuables to a safe place
Turn off gas, electricity and water supplies if safe to do so
Keep a flood kit ready
Move cars, pets, food, valuables and important documents to safety

Flood Warnings are to warn people flooding is expected and encourage them to take immediate action to protect themselves and their property.

Severe Flood Warning

Key Message: Severe flooding. Danger to life

Timing: When flooding poses a significant threat to life and different actions are required

Actions: Stay in a safe place with a means of escape
Be ready should you need to evacuate from your home
Co-operate with the emergency services
Call 999 if you are in immediate danger

Severe Flood Warnings are to warn people of a significant risk to life or significant disruption to communities caused by widespread or prolonged flooding, and encourage them to take immediate action to protect themselves and follow the advice of the emergency services.

Warnings no longer in force

(no icon)

Key Message: No further flooding is currently expected for your area

Timing: When river or sea conditions begin to return to normal

Actions: Be Careful. Flood water may still be around for several days and could be contaminated
If you've been flooded, ring your insurance company as soon as possible

Warnings are removed to inform people that the threat has now passed.

Personal flood plan

Name

Environment Agency

Are you signed up to receive flood warnings? ☐
If not call Floodline on 0345 988 1188 to see if your area receives free flood warnings.

Let us know when you've completed your flood plan by calling Floodline on **0345 988 1188.** This will help us learn more about how people are preparing for flooding.

General contact list	Company name	Contact name	Telephone
Floodline	Environment Agency		0345 988 1188
Electricity provider			
Gas provider			
Water company			
Telephone provider			
Insurance company and policy number			
Local council			
Local radio station			
Travel/weather info			

Key locations

Service cut-off	Description of location
Electricity	
Gas	
Water	

Who can help/who can you help?

Relationship	Name	Contact details	How can they/you help?
Relative			
Friend or neighbour			

Be prepared for flooding. Act now

Personal flood plan

What can I do NOW?

Environment Agency

- Put important documents out of flood risk and protect in polythene ☐
- Check your insurance covers you for flooding ☐
- Look at the best way of stopping floodwater entering your property ☐
- Make a flood plan and prepare a flood kit ☐
- Find out where you can get sandbags ☐
- Identify who can help you/ who you can help ☐
- Identify what you would need to take with you if you had to leave your home ☐
- Understand the flood warning codes ☐

What can you do if a flood is expected in your area?

Actions	Location
Home	
• Move furniture and electrical items to safety	
• Put flood boards, polythene and sandbags in place	
• Make a list now of what you can move away from the risk	
• Turn off electricity, water and gas supplies	
• Roll up carpets and rugs	
• Unless you have time to remove them hang curtains over rods	
• Move sentimental items to safety	
• Put important documents in polythene bags and move to safety	
Garden and outside	
• Move your car out of the flood risk area	
• Move any large or loose items or weigh them down	
Business	
• Move important documents, computers and stock	
• Alert staff and request their help	
• Farmers move animals and livestock to safety	
Evacuation - Prepare a flood kit in advance	
• Inform your family or friends that you may need to leave your home	
• Get your flood kit together and include a torch, warm and waterproof clothing, water, food, medication, toys for children and pets, rubber gloves and wellingtons	

There are a range of flood protection products on the market to help you protect your property from flood damage. A directory of these is available from the **National Flood Forum** at **www.bluepages.org.uk**

Be prepared for flooding. Act now

GEHO0709BQPU-E-E

Appendix D: Surface Water Storage Estimation

Surface water storage requirements for sites

www.uksuds.com | Storage estimation tool

Calculated by:	Pratheek Ramesh
Site name:	92097
Site location:	143 Hercies Road, UB10 9LY

This is an estimation of the storage volume requirements that are needed to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). It is not to be used for detailed design of drainage systems. It is recommended that hydraulic modelling software is used to calculate volume requirements and design details before finalising the design of the drainage scheme.

Site Details

Latitude:	51.54816° N
Longitude:	0.46188° W
Reference:	2254940673
Date:	Jul 21 2022 09:51

Site characteristics

Total site area (ha):	0.07
Significant public open space (ha):	0
Area positively drained (ha):	0.07
Impermeable area (ha):	0.07
Percentage of drained area that is impermeable (%):	100
Impervious area drained via infiltration (ha):	0
Return period for infiltration system design (year):	100
Impervious area drained to rainwater harvesting (ha):	0
Return period for rainwater harvesting system (year):	100
Compliance factor for rainwater harvesting system (%):	66
Net site area for storage volume design (ha):	0.07
Net impermable area for storage volume design (ha):	0.07
Pervious area contribution to runoff (%):	30

* where rainwater harvesting or infiltration has been used for managing surface water runoff such that the effective impermeable area is less than 50% of the 'area positively drained', the 'net site area' and the estimates of Q_{BAR} and other flow rates will have been reduced accordingly.

Design criteria

Climate change allowance factor:	1.4
Urban creep allowance factor:	1.1
Volume control approach	Flow control to max of 2 l/s/ha or Qbar
Interception rainfall depth (mm):	5
Minimum flow rate (l/s):	2

Methodology

esti	IH124
Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	4	4
SPR:	0.47	0.47

Hydrological characteristics

	Default	Edited
Rainfall 100 yrs 6 hrs:	--	63
Rainfall 100 yrs 12 hrs:	--	91.63
FEH / FSR conversion factor:	1.19	1.19
SAAR (mm):	634	634
M5-60 Rainfall Depth (mm):	20	20
'r' Ratio M5-60/M5-2 day:	0.4	0.4
Hydological region:	6	6
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 10 year:	1.62	1.62
Growth curve factor 30 year:	2.3	2.3
Growth curve factor 100 years:	3.19	3.19
Q_{BAR} for total site area (l/s):	0.3	0.3
Q_{BAR} for net site area (l/s):	0.3	0.3

Site discharge rates	Default	Edited	Estimated storage volumes	Default	Edited
1 in 1 year (l/s):	2	2	Attenuation storage 1/100 years (m^3):	33	33
1 in 30 years (l/s):	2	2	Long term storage 1/100 years (m^3):	0	0
1 in 100 year (l/s):	2	2	Total storage 1/100 years (m^3):	33	33

This report was produced using the storage estimation tool developed by HRWallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at http://uksuds.com/terms-and-conditions.htm. The outputs from this tool have been used to estimate storage volume requirements. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of these data in the design or operational characteristics of any drainage scheme.