



9 Leaholme Waye

Flood Risk Assessment

Job Number: 1202

Date	Version	Notes/Amendments
May 2022	1	Issued for Information

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Acronyms	
AOD	Above Ordnance Datum
CIRIA	Construction Industry Research and Information Association
EA	Environment Agency
FRA	Flood Risk Assessment
NPPF	National Planning Policy Framework
PPG	Planning Practice Guidance
SFRA	Strategic Flood Risk Assessment

Introduction

Flume Consulting Engineers have been appointed to undertake a Flood Risk Assessment for the proposed development at 9 Leaholme Waye, Ruislip, HA4 7RA.

This FRA has been carried out in accordance with the National Planning Policy Framework (NPPF) and the Planning Practice Guidance 'Flood Risk and Coastal Change'. This FRA also incorporates advice and guidance from the Environment Agency (EA), the Strategic Flood Risk Assessment (SFRA) produced by the West London Boroughs (London Borough of Hillingdon) and CIRIA documents.

The Environment Agency's (EA) indicative floodplain map shows that the site is located in Flood Zone 3. This assessment will therefore focus on the flood risk to the site from watercourses, as well as from other sources.

Site Description and Location

The existing property is a two-storey house. To the rear is an existing soft and hard landscaped area, and to the left side (facing north) lays an entrance corridor to the rear along the edge of the site boundary between next door.

The dwelling fronts onto Leaholme Waye, occupied entirely by similar dwelling types. A number of properties abut the site to the north, with two vehicular car parking spaces to the front of the property. The Mad Bess Brook flows to the south of the development, which is the source of the fluvial flood risk.

The site postcode is HA4 7RA and the OS grid reference is TQ 07990 88250.



FIGURE 1. SITE LOCATION

Development Proposal

The development proposals involve a single storey rear extension. The extension will add approximately 15m² of new internal ground floor space to the rear of the property, which generally replaces a positively drained area hard.

The proposed extension will be finished throughout to the same floor level as the existing ground floor, and will be accessed via main entrance. Vehicular access will be maintained and remain unchanged from the existing case (via Leaholme Waye). Pedestrian street access is also unaffected.



FIGURE 2. EXISTING AND PROPOSED GROUND FLOOR

Flood Risk Assessment

The National Planning Policy Framework states that minor developments such as residential extensions and conversions, are unlikely to raise significant flood risk issues. The NPPF refers applications to the Environment Agency's (EA) 'Standing Advice' for further guidance.

Flood Risk from Watercourses

The EA's indicative floodplain map shows that the site is located in Flood Zone 3 (High flood risk) and is at risk of flooding from a tributary of the River Pinn, Mad Bess Brook at its confluence with the Cannon Brook. Land in this flood zone is assessed as having annual probability of river flooding greater than 1%. The EA's indicative fluvial/tidal flood risk maps, Figure 4, suggest that the site is in an area which is does not have flood defences, however the EA's website also states that not all defences are shown on the map.

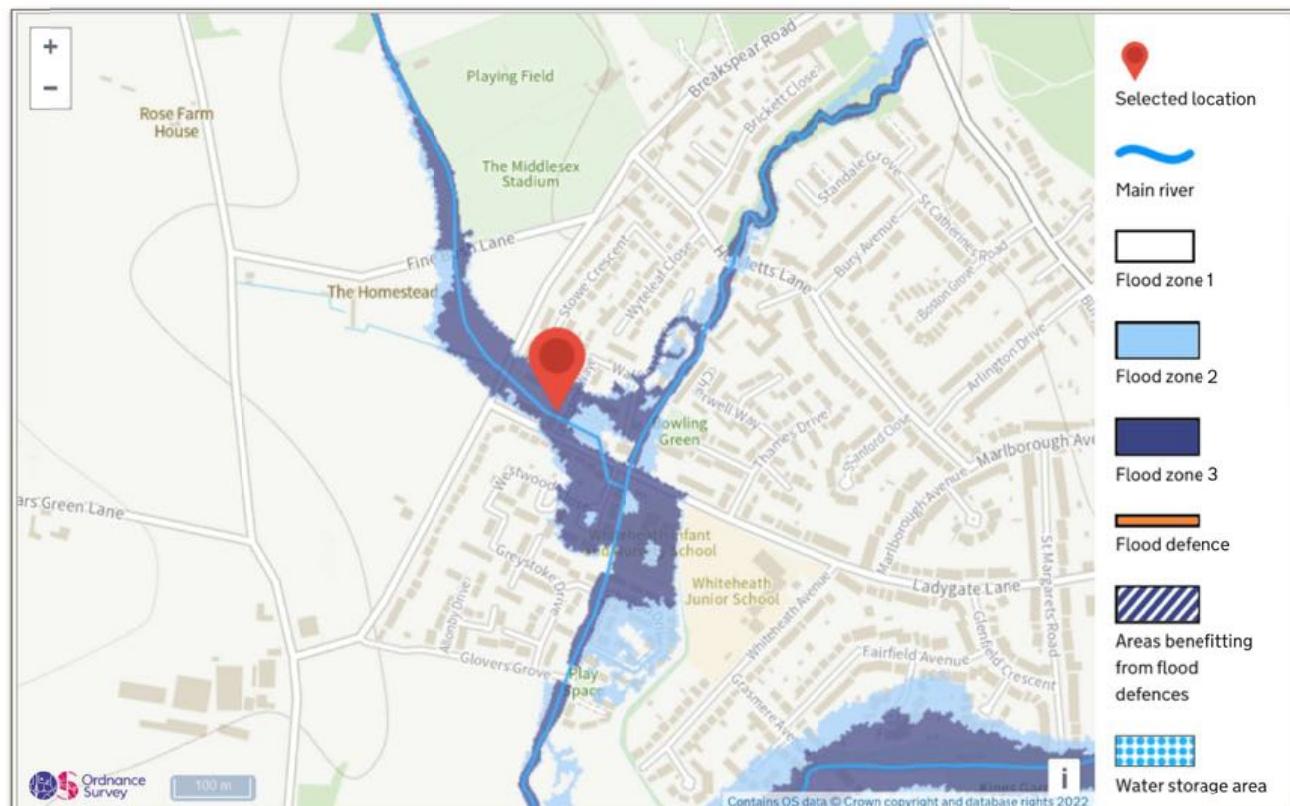


FIGURE 3. ENVIRONMENT AGENCY FLOOD RISK FROM RIVERS OR SEA MAP (GOV.UK, 2022)

It can be seen however, that the Gov.uk/EA's long-term flood risk maps¹ indicated in Figure 5, shows the site is at *Medium* risk of flooding from rivers or the sea. Medium risk means that each year this area has a chance of flooding of between 1% and 3.3%.

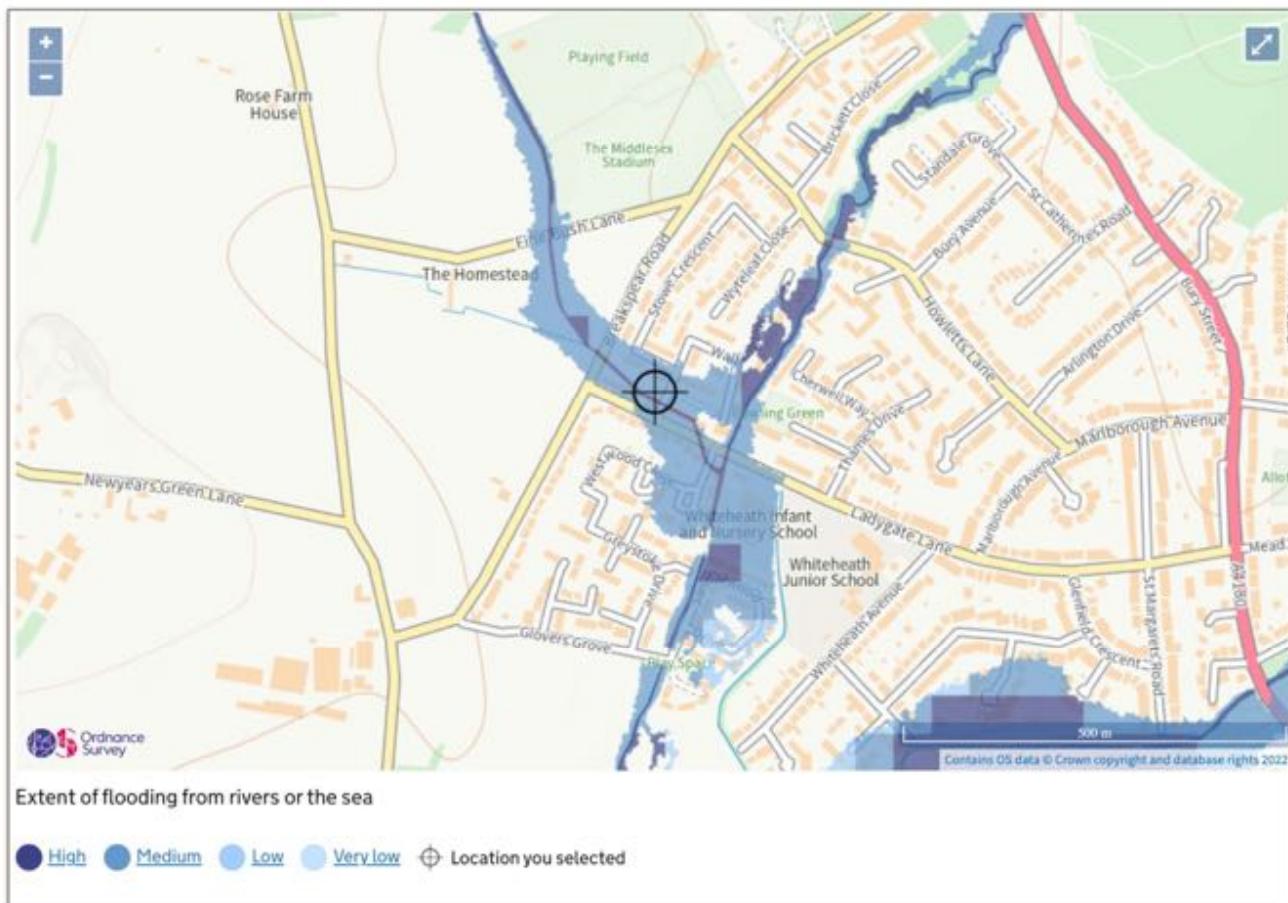


FIGURE 4. ENVIRONMENT AGENCY LONG-TERM FLOOD RISK FROM RIVERS OR SEA MAP (GOV.UK, 2022)

Flume requested the latest 'Product 4' Flood Information from the EA, to assess more accurately the flood risk in relation to the development (Appendix A). These are also presented and discussed in the relevant Flood Mitigation Measures chapter below.

¹ <https://flood-warning-information.service.gov.uk/long-term-flood-risk>

Flood Risk from Groundwater

Flooding from groundwater typically occurs following prolonged periods of wet weather within low laying areas underlain by permeable aquifers. When aquifers are fully saturated, flooding at surface level can occur from the sub-surface strata.

The susceptibility or vulnerability of the particular area, is highlighted on the *susceptibility to groundwater map* (Figure 6), which indicates the development resides outside of a region susceptible to groundwater flooding in the area.



FIGURE 5. EA/SFRA'S SUSCEPTIBILITY TO GROUNDWATER FLOODING MAP (WEST LONDON SFRA, 2020)

Finally, groundwater flooding is an important consideration for subterranean basements. However, this is a small extension and no basements are proposed in this instance. Therefore, the likelihood of groundwater flooding at ground level is considered to be low risk.

Flood Risk from Surface Water and Overland Flows

Surface water flooding occurs when intense rainfall is unable to infiltrate into the ground or overwhelms the drainage system. This surface water runs across the surface of the ground causing flooding. The Environment Agency's Surface Water Flood Risk Map can also reflect surface water flooding along the line of small ordinary watercourses. Overland flows can also be generated by burst water mains, failed dams and any failure in a system storing or transferring water.

The EA's indicative Surface Water Flooding Map, Figure 6, shows that the site is at *high risk* of surface water flooding.

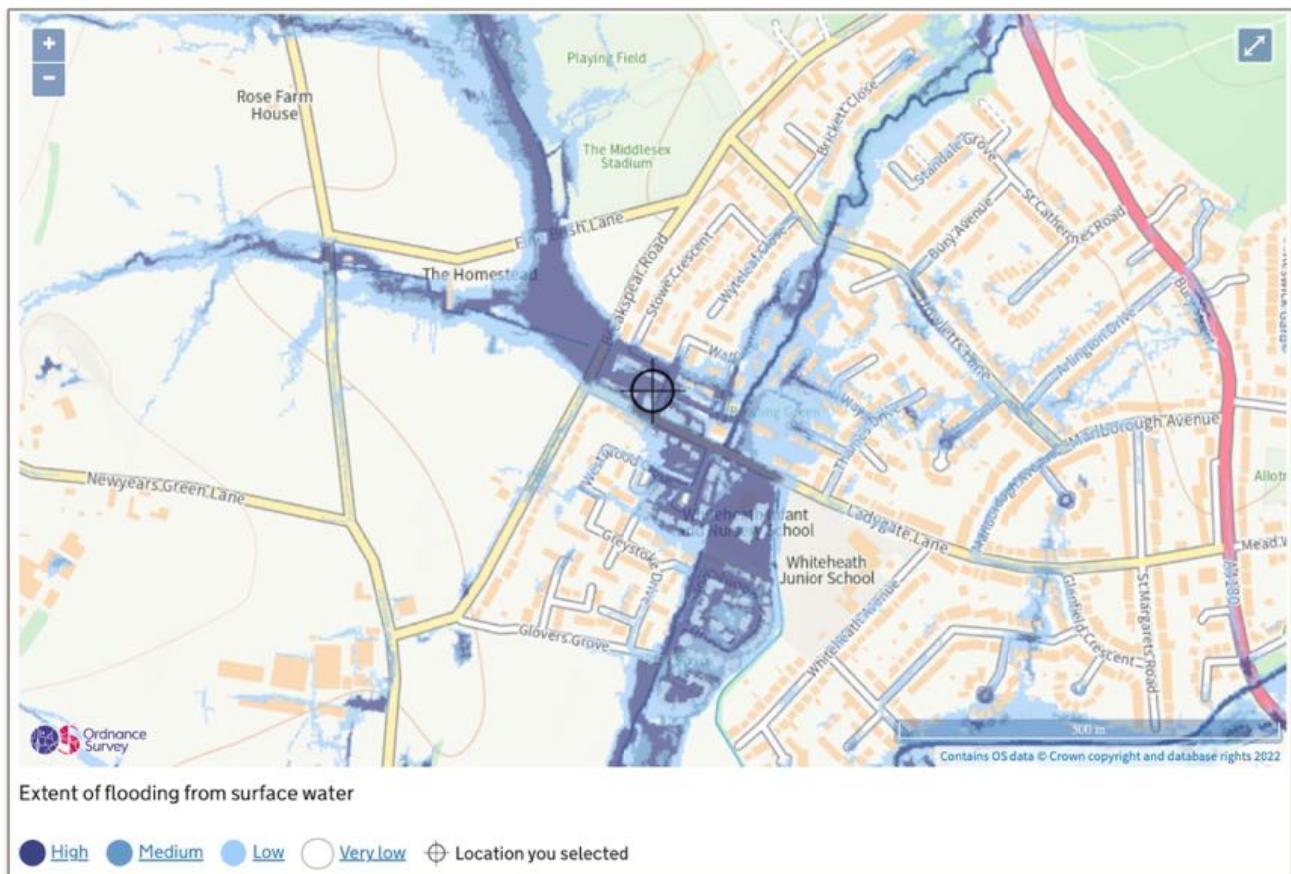


FIGURE 6. ENVIRONMENT AGENCY FLOOD RISK FROM SURFACE WATER MAP (GOV.UK, 2022)

The EA's indicative map shows that the surface water extents mirror the fluvial flood risk from watercourses. This is also reflected on the local authority's surface water flood risk map (Figure 7). The map also shows that a large part of the flooding in the 1 in 100-year (1%) storm event, occurs within the main channel of the watercourse. Any flood mitigation measures incorporated into the design to mitigate the fluvial flood risk, will also serve to mitigate the surface water flood risk for the proposed development.



FIGURE 7. NORTH LONDON SFRA - FLOOD RISK FROM SURFACE WATER MAP (SFRA, 2022)

The proposed FFLs will be constructed above the surrounding ground levels, reducing opportunities for surface water to inundate through building thresholds. Furthermore, as part of the extension, permeable paving and other SuDS features should be promoted within the design. External ground levels immediately outside of the building will fall away from the building thresholds, ensuring the minimisation of storm water ingress. This can be achieved by either reducing the external ground levels below internal floor levels, and/or incorporating channel drainage system along the entrance into the building to positively drain overland flows.

Therefore, the likelihood of surface water flooding in the proposed scenario is considered low risk.

Flood Risk from Reservoir and Infrastructure Failure

The EA's information states that reservoir flooding is extremely unlikely to happen and there has been no loss of life in the UK from reservoir flooding since 1925. The Reservoir Act of 1975 ensures that reservoirs are inspected regularly and essential safety work is carried out.



FIGURE 8. ENVIRONMENT AGENCY FLOOD RISK FROM RESERVOIRS MAP (GOV.UK, 2022)

Figure 8 shows that Reservoir flooding could impact the site in the event of catastrophic failure. Flooding from reservoirs is extremely unlikely. An area is considered at risk if peoples' lives could be threatened by an uncontrolled release of water from a reservoir. The reservoir which could impact the site is the Ruislip Lido (grid reference TQ0880089000) and owned by the London Borough of Hillingdon.



FIGURE 9. SFRA'S HISTORIC SEWER FLOODING (THAMES WATER, 2017)

The Thames Water historical sewer flooding dataset provides details on the number of reported sewer flood incidents within a four-digit postcode area. The site is located in postcode HA4. Figure 9 shows the site lays within an administrative boundary with between no reported sewer flooding events. As such, the risk of flooding from sewer sources could be considered low.

Flood Mitigation Measures

The extension is approximately 15m² in size. It is proposed that the Finished Floor Level (FFL) of the ground floor extension remains the same as the existing ground floor FFLs, while also ensuring that FFLs are set at a minimum 43.48m AOD (300mm higher than the 1 in 100 year plus 35%cc flood level - Figure 10). These proposals are in accordance with the EA's Standing Advice², which states that floor levels within the proposed development should be set no lower than existing levels, and flood proofing should be incorporated in order to protect the extension from flooding.

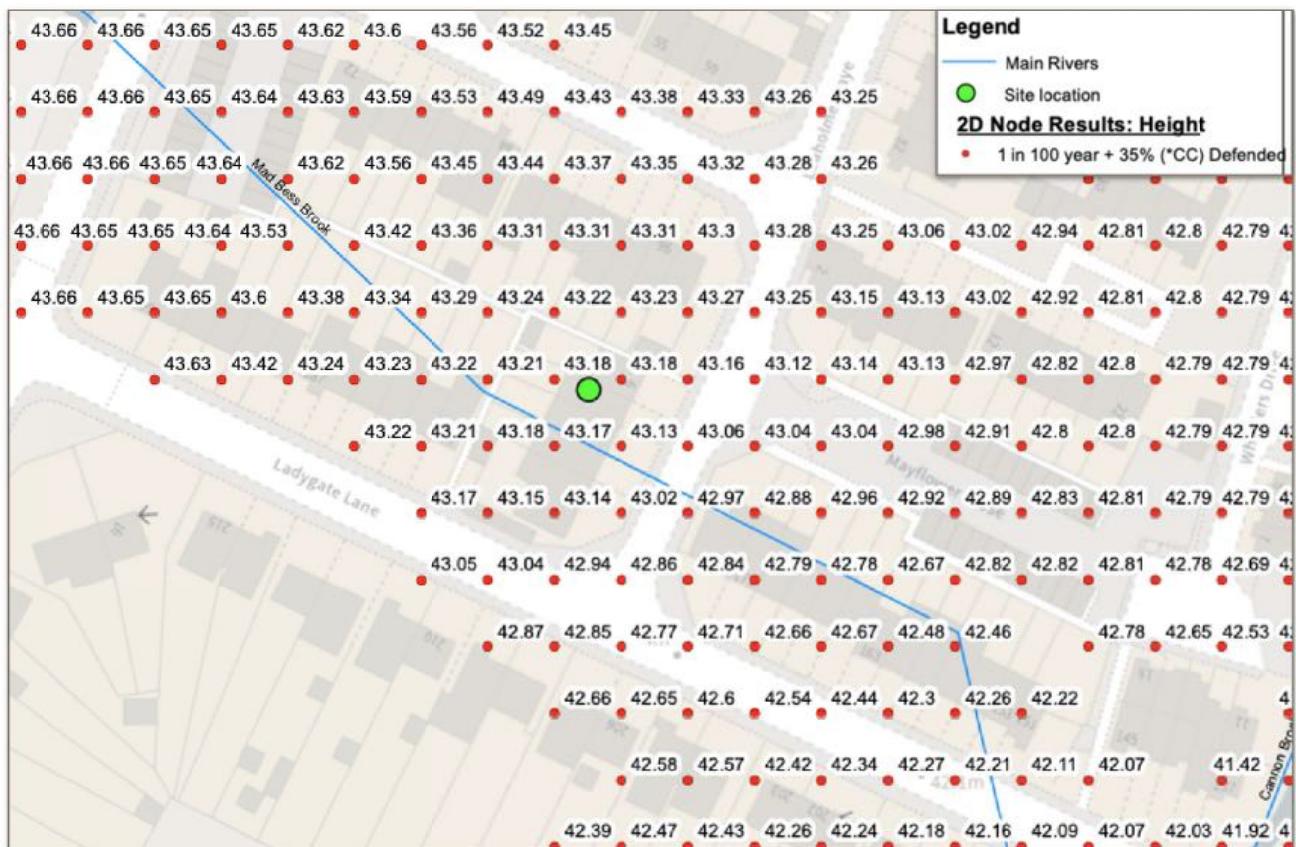


FIGURE 10. LATEST MODELLED FLOOD LEVELS - 1% AEP + 35% CC (EA, 2022)

It is proposed flood resilient³ materials will be used for flooring and on the walls up to minimise the potential for damage, in the event flood water impacts the proposed ground floor. Furthermore, the EA notes that a replacement floor constructed to a high standard with reinforced concrete and with a continuous damp proof membrane can be an effective solution where groundwater pressures are low.⁴

All drainage systems should be routinely maintained to reduce the risk of blockage and surface water flood risk. It is also recommended that channel drainage is introduced immediately outside of the proposed building threshold as this would assist in alleviating ponding issues.

² <https://www.gov.uk/guidance/flood-risk-assessment-standing-advice>

³ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/7730/flood_performance.pdf

⁴ 'Flooding from groundwater: Practical advice to help you reduce the impact of flooding from groundwater' - Environment Agency

If not already listed, it is recommended that the property is registered with the EA's Flood Warning Service. If you are unsure and/or you wish to register for this free service please contact Floodline Warning Service⁵. Floodline is a free service operated by the EA that provides flood warnings direct to occupants by telephone, mobile phone etc.

As the development resides entirely in the floodplain, flood compensation on a level for level basis is not possible. Therefore, underfloor voids will be incorporated into the design beneath the raised finished floor levels, providing indirect compensation for any loss of floodplain storage. Void openings will be a minimum of 1m long and open from existing ground levels to at least the 1% annual probability plus climate change flood level (43.18m AOD).

⁵ www.environmentagency.gov.uk/floodline

Conclusions

The National Planning Policy Framework (NPPF) states that minor developments such as residential extensions and conversions, are unlikely to raise significant flood risk issues. The FRA has further demonstrated that the proposed extension has an acceptable flood risk within the terms and requirements of NPPF and accompanying technical guidance.

The proposed extension will raise the building to the same FFL as the existing building. This is in accordance with the EA's Standing Advice, and also raises the ground floor above all modelled flood events including the 1 in 1000 year return period. Furthermore, underfloor voids have been incorporated into the design beneath the raised finished floor levels, providing indirect compensation for any loss of floodplain storage up to the 1 in 100 year return period plus climate change allowance.

The proposed extension will not increase the impermeable areas on the site, as the external area is currently positively drained hardstanding/roof areas. It will therefore not increase the flood risk from surface water, as there will be no increase in the surface water run-off rate or volumes.

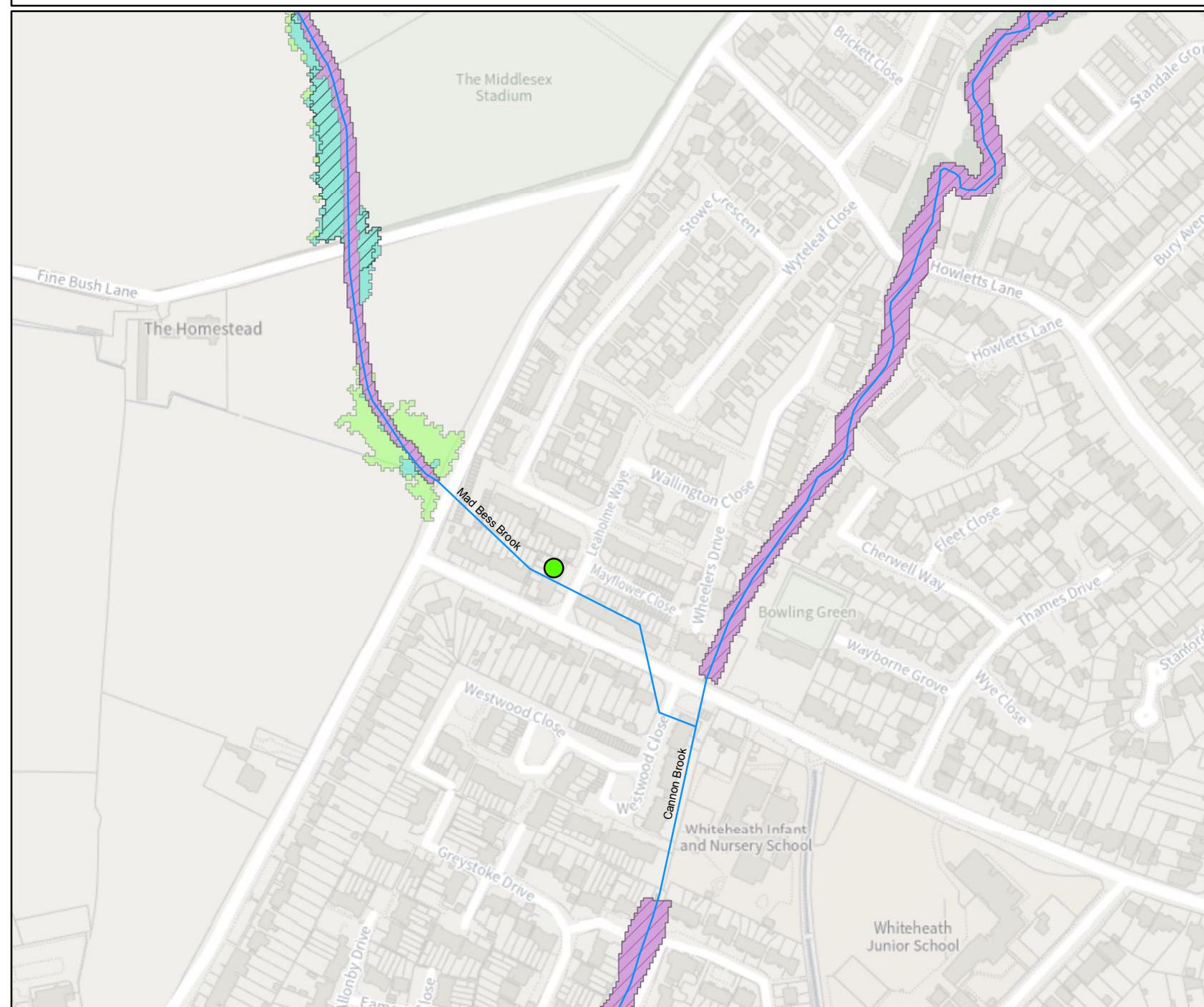
If not already listed, it is recommended that the property is registered with the EA's Flood Warning Service.

Note:

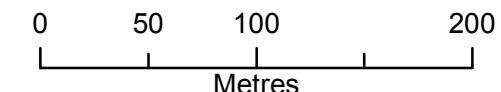
This report has been prepared for the purposes of submitting for planning to the local planning authority for review, in relation to the associated flood risk for the proposed development and uses the most up-to-date information available to us at the time. It should not be relied upon by anyone else or used for any other purpose. This report is confidential to our Client; it should only be shown to others with their permission. We retain copyright of this report which should only be reproduced with our permission.

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Signature			
Date	4 May 2022	4 May 2022	4 May 2022

Appendix A - Environment Agency Product 4 Information



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



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).

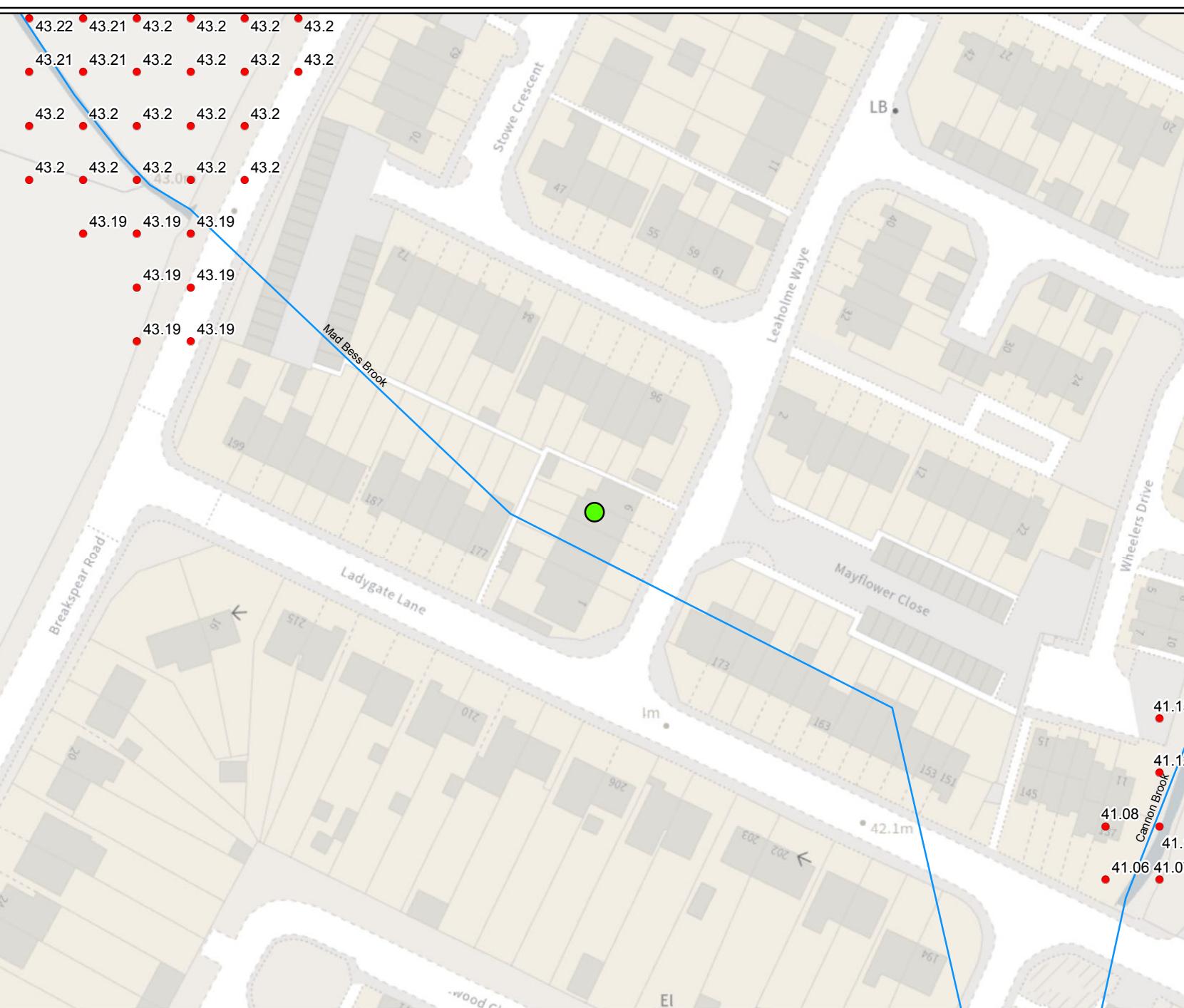
This model has been designed for catchment wide flood risk mapping. It should be noted that it was not created to produce flood levels for specific development sites within the catchment.

Modelled outlines take into account catchment wide defences.

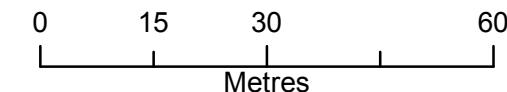
Flood risk data requests including an allowance for climate change will be based on the 1 in 100 flood plus 20% allowance for climate change, unless otherwise stated. You should refer to 'Flood risk assessments: climate change allowances' to check if this allowance is still appropriate for the type of 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>

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Hertfordshire & North London



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Legend

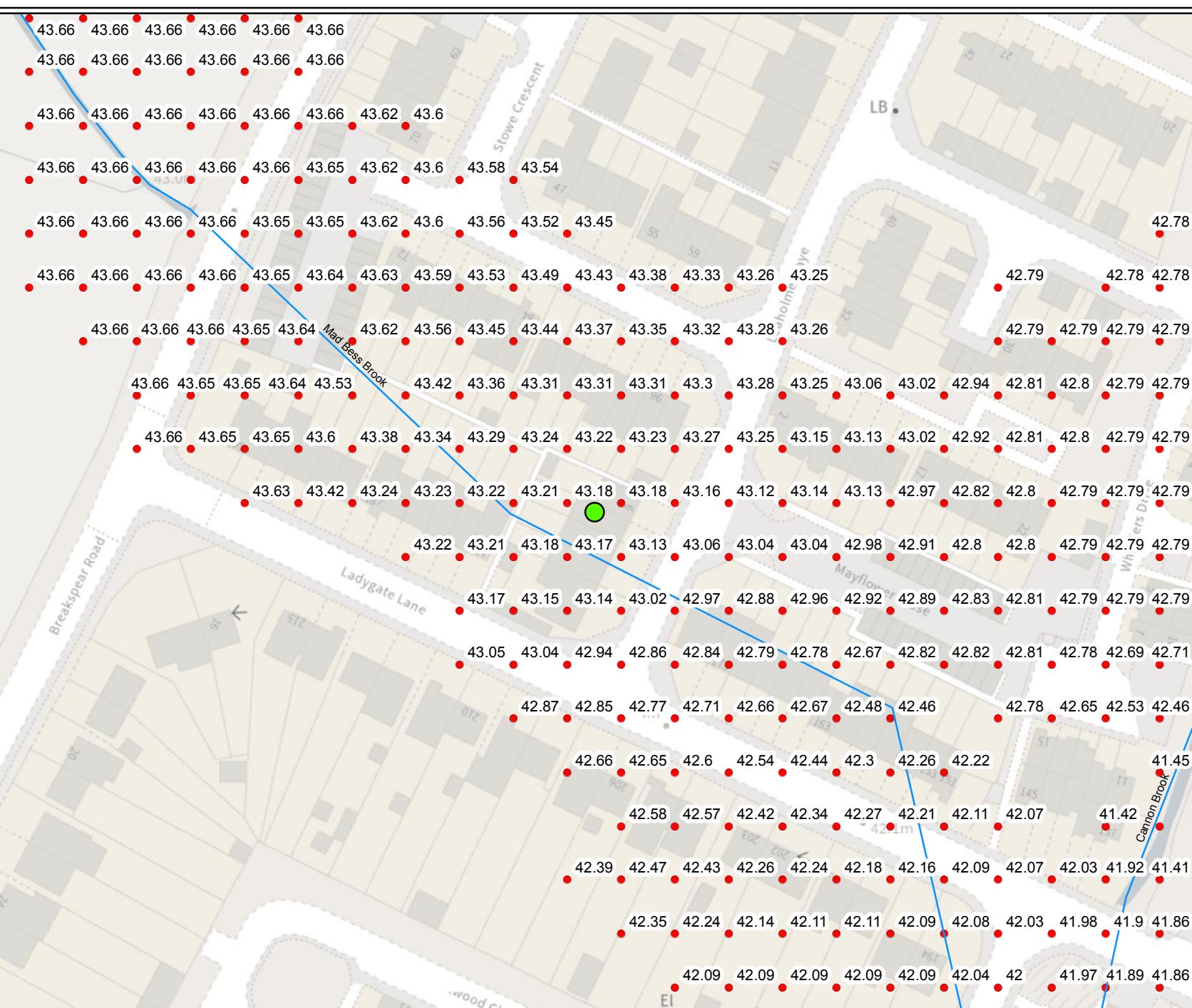
- Main Rivers
- Site location

2D Node Results: Height

- 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>

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A horizontal number line starting at 0 and ending at 60. Tick marks are present at 15, 30, and 45. The word "Metres" is written below the line.

79 | Legend

— Main Rivers
● Site location

2D Node Results: Height

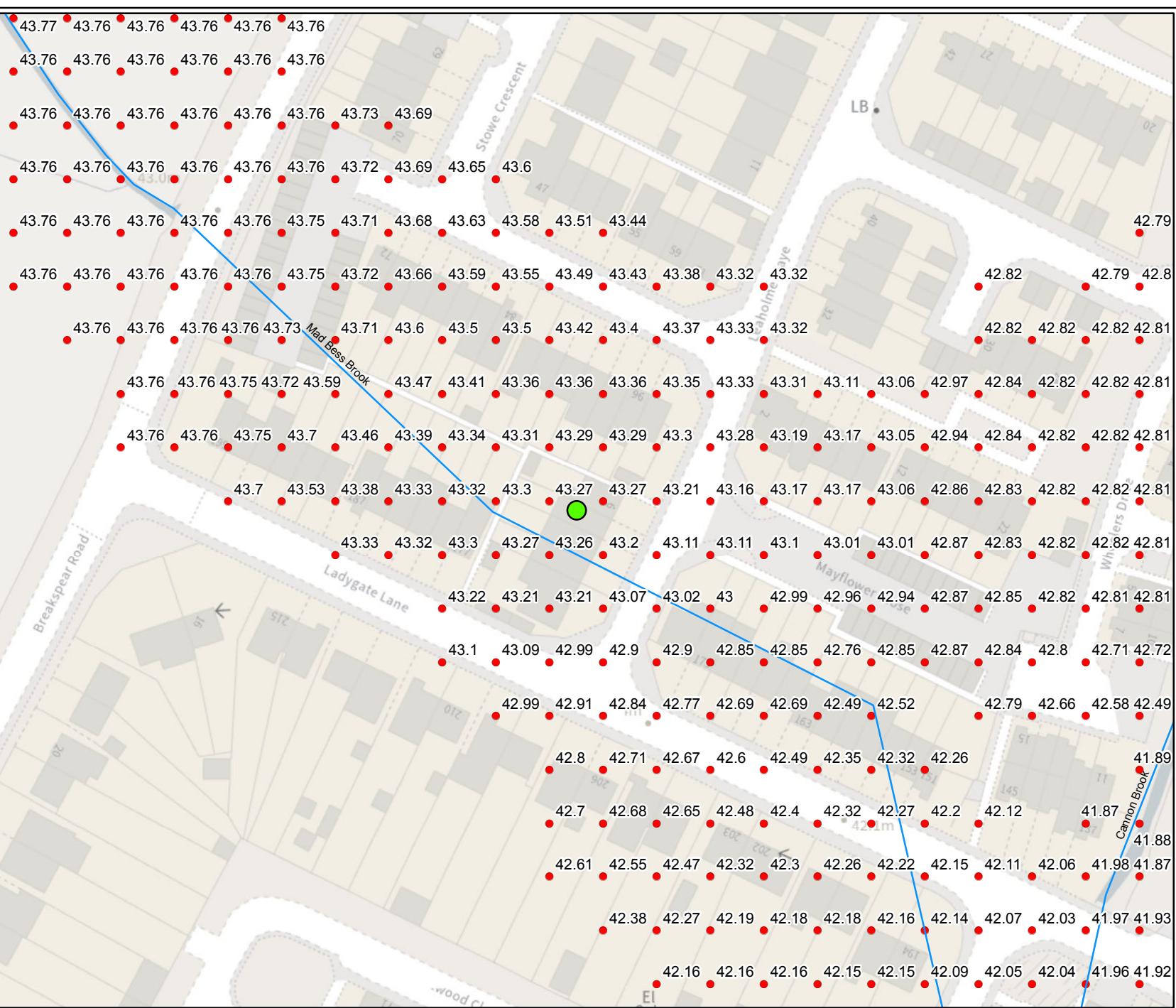
- 1 in 100 year + 35% (*CC) Defended

The data in this map has been extracted from the River Pinn Mapping Study (JBA, 2015).

46 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.

45 Modelled outlines take into account catchment wide differences.

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0 15 30 60
Metres

Legend

- Main Rivers
- Site location

2D Node Results: Height

- 1 in 1000 year (0.1%) Defended

The data in this map has been extracted from the River Pinn Mapping Study (JBA, 2015).

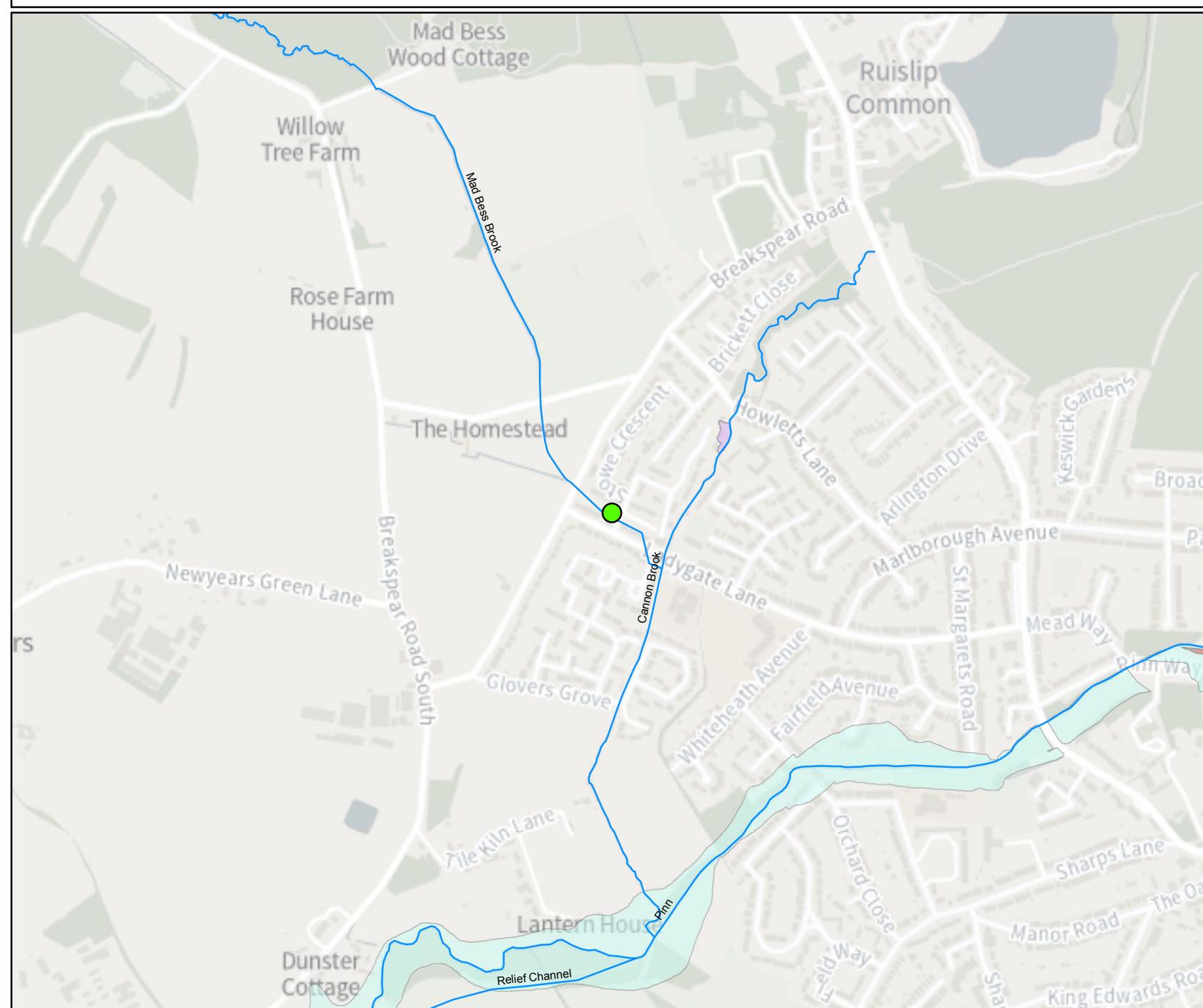
This model has been designed for catchment wide flood risk mapping. It should be noted that it was not created to produce flood levels for specific development sites within the catchment.

Modelled outlines take into account catchment wide defences.

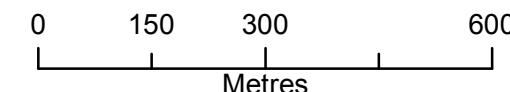
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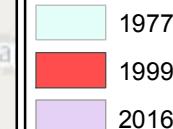
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AL7 1HE



Legend

- Main Rivers
- Site location

Flood Event Outlines



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 data in 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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