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Develop Design Deliver

FRA & Drainage Strategy

26 Deepdale Ave, Withington, Manchester

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CLIENT:

Mr Mohamed Hanif Nazari

Reference: 25/FRA/drainage/SuDS/Deepdale Ave/Manchester

INSTRUCTION:

Hydrotec and Engineering Consultants was commissioned by Mr Mohamed Hanif Nazari to carry out a flood risk assessment and surface water drainage strategy for SuDS design for the proposed residential extension at 26 Deepdale Avenue, Withington, Manchester, M20 1BF.

SCHEME:

Erection of a part single/part two-storey side and single-storey rear extension to form additional living accommodation.

REQUIREMENT:

Flood risk assessment and surface water drainage strategy for the proposed residential extension to assist the planning application.

DOCUMENT REVIEW & APPROVAL

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Executive Summary

A site-specific flood risk assessment (FRA) and surface water drainage strategy were conducted to assist the planning application's requirement for the proposed development on the land at 26 Deepdale Avenue, Withington, Manchester, M20 1BF. The national grid reference number of the development site is SJ 84213 93771 ("the Site").

The proposed development is the erection of a part single/part two-storey side and single-storey rear extension to form additional living accommodation.

The present FRA and surface water drainage strategy of the Site were made with the available information, including the latest Environment Agency's (EA) flood maps and flood modelling data, FEH hydrological data, topographical elevation data (LiDAR), soil map data, borehole data of the British Geological Survey, recent photographs, and sewer maps data of United Utilities.

The present investigation suggests that the Site would remain out of fluvial flood risk at the design event, considering the defended scenarios, including allowance for climate change.

The Site is at a medium surface water flood risk - according to the EA's flood map. However, the hydrological and topographical elevation data suggest that the impact of the overland flow from the Site's surroundings would be minimal. In addition, the Site would not be a flood risk from groundwater or reservoir flows. The Site would also not be considered a sewer water flood risk.

The attenuation storage calculation was performed for the generated surface water runoff within the Site, and no external flow was taken into account from the surrounding areas. The investigation was made at 50% AEP, 10% AEP, 3.3% AEP and 1% AEP, including climate change allowance to assist the sustainable drainage systems (SuDS) design.

The required attenuation storage for the entire site is as follows: for a 3.3% AEP, the requirement is 4m³, while for a 1% AEP, it is 5m³. When considering climate change allowances, these amounts increase to 6m³ and 10m³, respectively.

The proposed side extension would not increase impermeable surface, as it would stay on the existing impermeable land, i.e. concrete pavement. Moreover, the surface area of the proposed side extension is approximately 42m^2, i.e. approximately 13.46% of the total area. Hence, the proposed side extension would not deteriorate the excess surface water runoff to the Site itself or its surrounding areas.

The soil types beneath the Site would not have a good infiltration rate to attenuate excess surface water runoff. Thus, it would also not be suitable to attenuate excess surface water runoff through an underground soakaway on the Site. It would not be feasible to attenuate the excess runoff by a detention pond on the Site due to the space limitations. There is no watercourse in close proximity to the Site.

However, there is an existing combined water sewer with a manhole of the United Utilities underneath the front side of the Site.

Therefore, in the proposed surface water drainage strategy, the excess surface water runoff equivalent to the surface area of the side extension would be stored in an underground storage tank in the front side of the dwelling, e.g. 13.46% of the total volume.

Thus, the on-site surface water attenuation storage for the proposed development would be based on 1% AEP plus a 45% climate change allowance (i.e. 1.34m^3) without deterioration of the Site itself or surrounding areas. The outfall of the stored water would then be discharged into the existing manhole of the sewer drainage network of United Utilities.

Therefore, the size of the geo-cellular attenuation crates for the tank would be 1.5m in length, 1.0m in width and 0.75m in depth. A 300mm thick gravel layer would surround the crates, and the crates' and gravel's combined attenuation storage capacity would be approximately 1.49m^3.

The proposed drainage network for the side extension would be separate (e.g. separate surface and foul water sewers). The diameter of the pipes would be 100mm, and the gradient of the pipes would be a minimum of 1 in 80 to facilitate gravity flow.

In addition, the shrubs along the front side boundary and the garden lawn on the rear side, with permeable topsoil, would assist in improving water quality by reducing suspended solids and silt

materials. It is highly recommended to use water butts to collect roof water for general washing and irrigation, such as gardening. Therefore, the proposed eco-friendly drainage strategy and landscape amenities would assist in creating a better drainage system.

The Site would not pose a risk to fluvial flow and is not considered a risk to surface water drainage. Therefore, the finished ground floor level of the proposed side extension would be the same as the existing dwelling's ground floor level.

Access and egress from the Site during any unexpected flooding incident would be via Deepdale Avenue, located in front of the Site.

The excess generated foul water flow by the proposed side extension was estimated to be approximately 0.003 litres/sec. It should, however, be mentioned that a confirmation of consent agreement from United Utilities will be obtained before utilising the proposed development.

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Abbreviations

AEP	Annual Exceedance Probability
CCA	Climate Change Allowance
DWF	Dry Weather Flow
DTM	Digital Terrain Model
EA	Environment Agency
FEH	Flood Estimation Handbook
FRA	Flood Risk Assessment
LiDAR	Light Detection and Ranging
LLFA	Lead Local Flood Authority
LPA	Local Planning Authority
mAOD	meter Above Ordnance Datum
NGR	National Grid Reference
OS Map	Ordnance Survey Map

SuDS	Sustainable Drainage Systems

1 Introduction

Flood risk and sustainable drainage are crucial considerations for both new and existing development sites. Recent global climate change has exacerbated flooding, increasing the vulnerability of properties, communities, and various aspects of human life. It is important to evaluate the flood risk associated with any new developments. The National Planning Policy Framework (NPPF) guidelines authorise the Environment Agency (EA) and the local planning authority (LPA) to require that all developments undergo a flood risk assessment from multiple sources as part of the planning approval process. These measures not only secure minimal risk to the proposed development site but also reduce risks to other existing developments.

In general, a new development provides enhancements with improved facilities for users and communities. However, it is crucial to ensure that the proposed development does not negatively impact itself or the existing developments in the surrounding areas, both on-site and off-site, during its lifespan. Therefore, it has been established as a policy by the National Planning Policy Framework (NPPF), lead local flood authorities (LLFAs), local planning authorities (LPAs), water utility companies, and other relevant authorities to evaluate and manage the sustainable surface water drainage systems from all potential sources for any proposed development before granting planning permission.

Thus, the aim of the present site-specific flood risk assessment and drainage strategy is to assist planners and designers in designing blue-green sustainable drainage systems for the proposed residential extension and to reduce the flood risk to other existing developments in the surrounding areas.

1.1 Background of the project site

The proposed development (hereafter “the Site”) is the erection of a part single/part two-storey side and single-storey rear extension to form additional living accommodation.

According to the NPPF guidelines, the proposed development would therefore be classified as a more vulnerable category in terms of flood risk vulnerability classification[1].

The Site is located on the land at 26 Deepdale Avenue, Withington, Manchester, M20 1BF. The national grid reference number (NGR) of the Site is SJ 84213 93771. The geographical boundary of the project site lies within Manchester City Council's remit, who is the lead local flood authority (LLFA), providing advice and guidance for sustainable drainage systems (SuDS) for this development site.



Figure no.	**1.1**
Title	The location of the Site
Project name	26 Deepdale Ave, Manchester
Project no.	3092

Legend

The Site's extent

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Figure 1.1: The location and existing condition of the proposed development site.

[1] National Planning Policy Framework - Annex 3: Flood risk vulnerability classification - Guidance - GOV.UK (www.gov.uk)

The existing conditions of the Site comprise a two-storey end terrace house with front and rear amenity spaces. The existing ground conditions on the front side comprise a mix of concrete pavement, compacted soils and some shrubs at the boundary, whereas the rear side consists of paved patios.

Generally, the adjacent area consists of predominantly built-up residential houses with plenty of permeable land surfaces. Deepdale Avenue, the main access road to the Site, is located in front of the Site, specifically on the north side. Platt Brook is located in the north, approximately 70m away from the front side boundary.

Leigh Brook is situated to the east, approximately 85m away from the Site, and part of it is an open channel before it joins Platt Brook and flows westward.



Figure no.	**1.2**	**Legend**	HEC Hydrotec & Engineering Consultants
Title	The layout of the proposed development		
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Project no.	3092		

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Figure 1.2: The layout of the proposed development.

A satellite photograph of the existing project site is shown in Figure 1.1, and the layout of the proposed development is presented in Figure 1.2. Additionally, detailed layouts of the existing and proposed developments are provided in Appendices I and II, respectively.

The total land surface of the proposed development site is approximately 312m^2; however, the surface area of the proposed side extension is approximately 42m^2, and therefore, it would be classified as a minor development - according to the Environment Agency's Standing Advice[2].

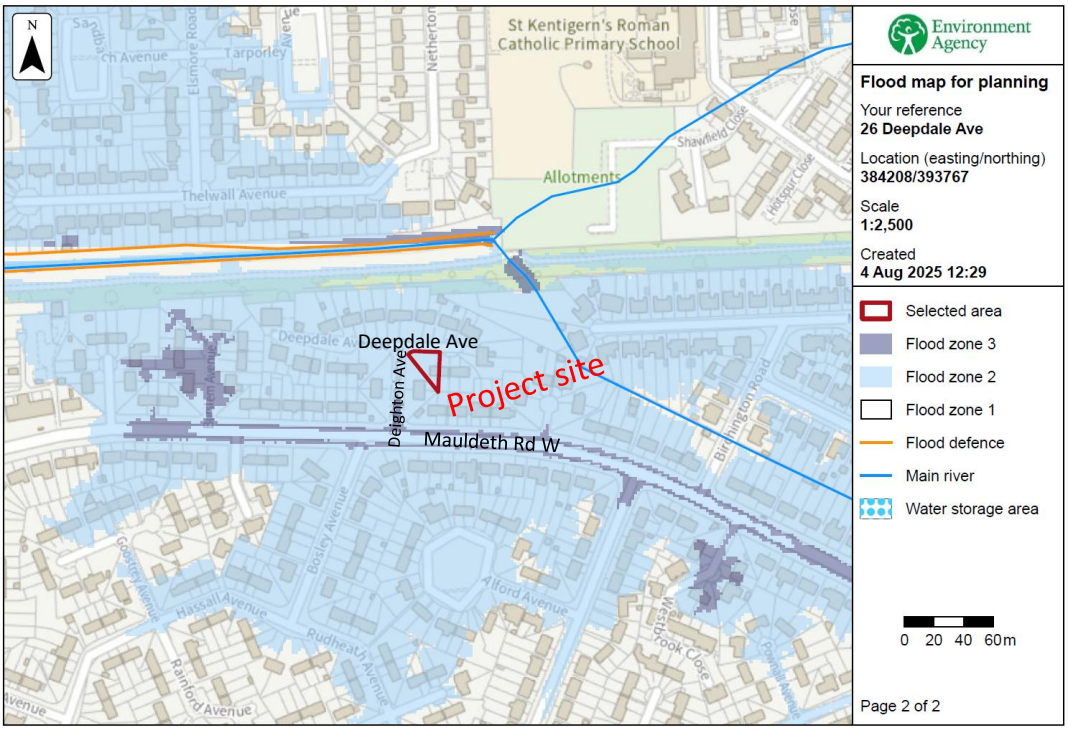
2 Potential sources of the flood risk

The proposed development is the erection of a part single/part two-storey side and single-storey rear extension to form additional living accommodation; thus, it is a requirement by LLFA to ensure the provision of appropriate flood risk assessment and sustainable drainage of the surface water within the development to promote safe and resilient communities, assisted by the Environment Agency[3] (EA) and LLFA.

2.1 Fluvial and coastal flood risk

The Environment Agency's flood map[4] indicates that the Site is located in flood zone 2, a risk of flooding between 1% AEP (Annual Exceedance Probability) and 0.% AEP, i.e. between 1 in 100-year and 1 in 1000-year flood event for the fluvial flow or between 0.5% AEP and 0.1% AEP, i.e. between 1 in 200-year and 1 in 1000-year flood event for coastal flow at the undefended scenarios (Figure 2.1). The Site is located far from the coastal area and, therefore, would not be impacted by coastal flows.

[2] https://www.gov.uk/guidance/flood-risk-and-coastal-change#para51
[3] Flood risk assessments if you're applying for planning permission - GOV.UK (www.gov.uk)
[4] Flood map for planning - GOV.UK (flood-map-for-planning.service.gov.uk)



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Figure no.	**2.1**
Title	EA's flood map - fluvial
Project name	26 Deepdale Ave, Manchester
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Figure 2.1: The fluvial and coastal flood risk at the Site - flood zone 2, the land having flood risk between 1% AEP and 0.1% AEP fluvial flow or between 0.5% AEP and 0.1% AEP coastal flow at the undefended scenarios (reference to the EA's flood map[5]).

Thus, the proposed development site would be a risk to the fluvial flow for the undefended flood scenarios. However, the Site would not be considered a flood storage area. Currently, existing flood defences are in place along the rivers, and therefore, the present site-specific flood risk assessment at the Site is analysed for real-case scenarios, e.g., defended scenarios.

For a detailed fluvial flood risk impact on the Site, the recent fluvial flood modelling data were obtained from the Environment Agency (EA).

[5] https://flood-map-for-planning.service.gov.uk/

The proposed development site is situated within the fluvial flow impact zone of the Chorlton Platt Gore and Cringle Black Brook catchments. Therefore, for the present site-specific flood risk assessment, the latest available modelling studies, Chorlton Platt Gore (2024) and Cringle Black Brook (2017), were considered. Hence, the simulated results would be representative of the present flood risk assessment. The Chorlton Platt Gore 2024[6] studies were conducted in April 2024, whereas the Crigle Black Brook 2017[7] studies were conducted in April 2018.

The simulated fluvial flood extent of Cringle Black Brook 2017 for the undefended scenarios is presented in Appendix III. The simulated results indicate that the front of the Site is located in 0.5% AEP, whereas the rear of the Site is situated in 0.1% AEP.

The proposed development is intended for residential use; therefore, its design life is considered to be 100 years. Thus, the Site would not be regarded as a fluvial flood risk from the Cringle Black Brook for the undefended scenarios.

The simulated fluvial flood extent for Chorlton Platt Gore 2024, under the undefended scenarios, is presented in Appendix IV. It suggests that the rear of the Site is outside the fluvial flood risk, whereas the front side is at a flood risk of 0.1% AEP. Therefore, the Site would not be a fluvial flood risk at the design event.

As the proposed development is intended for residential use, its design life is expected to be 100 years. Thus, the NPPF's guidance suggests the central allowance for peak river flow when considering climate change in flood zones 2 or 3a. The central peak river flow allowance at the Site in the 2080s epoch is 41% for the Cringle Black Brook and 35% for the Chorlton Platt Gore - according to the Environment Agency's climate change allowance guidelines[8].

For the undefended scenarios, the fluvial flood extents for climate change allowance are presented in Appendix V and VI for the Cringle Black Brook 2017 and Chorlton Platt Gore 2024, respectively.

[6] https://www.gov.uk/government/organisations/environment-agency
[7] https://www.gov.uk/government/organisations/environment-agency
[8] Flood risk assessments: climate change allowances - GOV.UK (www.gov.uk)

The simulated results indicate that the Site would be at risk of fluvial flooding from the Cringle Black Brook due to climate change, whereas only the front of the Site would be at risk of fluvial flooding from Chorlton Platt Gore.

There are existing flood defences along Platt Brook, and the locations of these defences are shown in Figure 2.2. The flood defence data, along with the standard of protection, including current conditions, are given in Table 2.1.

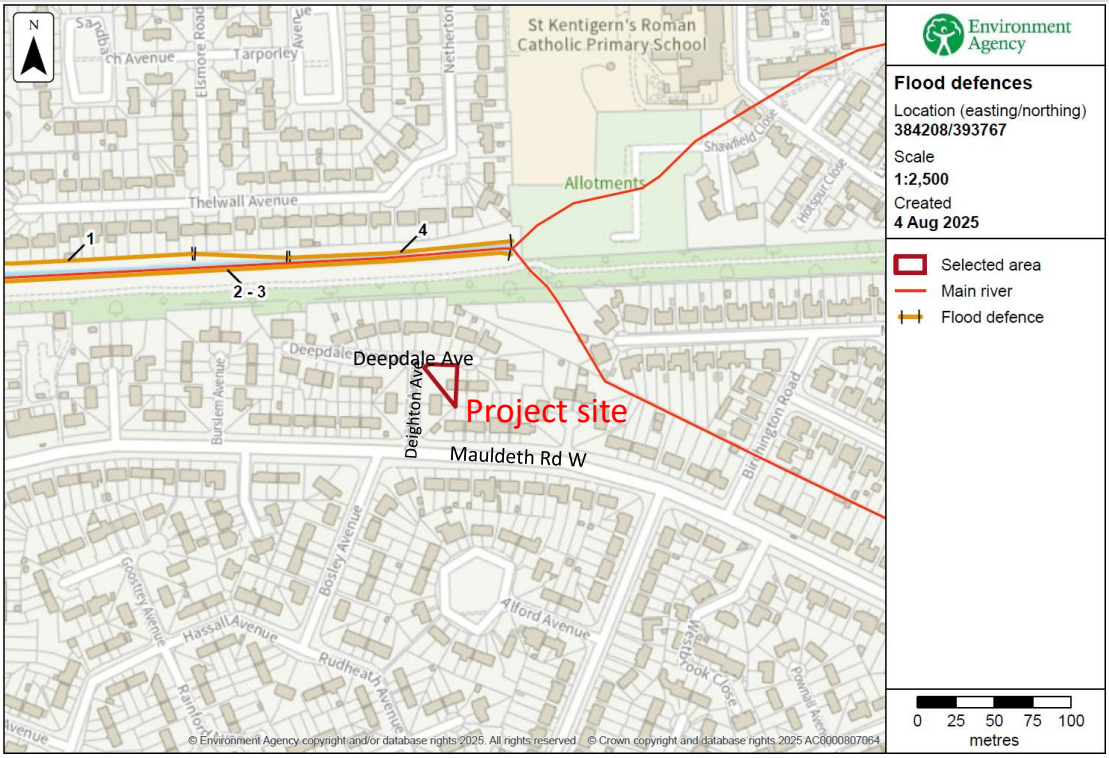


Figure no.	**2.2**
Title	EA's flood map – flood defences
Project name	26 Deepdale Ave, Manchester
Project no.	3092

Legend

The Site's extent

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Figure 2.2: Location of the existing flood defences (reference – EA's flood model[9]).

[9] https://www.gov.uk/government/organisations/environment-agency

Table 2.1: The existing flood defences and standard of protection referenced to the EA's model[10].

Flood defences data

Label	Asset ID	Asset Type	Standard of protection (years)	Current condition	Downstream actual crest level (mAOD)	Upstream actual crest level (mAOD)	Effective crest level (mAOD)
1	32518	Wall	100	Good	31.48	31.84	
2	60038	Embankment	100	Fair	31.39	32.25	
3	59788	Embankment	100	Fair	31.81	32.82	
4	122064	Wall	100	Fair	31.84	31.90	

Any blank cells show where a particular value has not been recorded for an asset.

The flood defence data suggest that the standard of protection of the existing flood defences is 100 years, and therefore, it would be reliable to take into account for the fluvial flood defence at the Site.

The simulated fluvial flood extents for the Cringle Black Brook 2017 are presented in Appendix VII for the defended scenarios. Modelling results suggest that the Site would not be a fluvial flood risk at a 1 in 100-year event; however, it would be a flood risk at a 1 in 1000-year event.

The Chorlton Platt Gore 2024 results in Appendix VIII suggest that the Site would be out of fluvial flood risk.

Thus, it could be concluded that the proposed development would not be a fluvial flood risk at the design event in defended scenarios.

Simulated fluvial flood extents for the climate change allowance are given in Appendix IX and X for the Cringle Black Brook 2017 and Chorlton Platt Gore 2024, respectively, for the defended scenarios.

The modelling results indicate that the Site would be at fluvial flood risk at a 1 in 100-year plus a 41% climate change allowance from the Cringle Black Brook 2017, particularly the front side;

[10] https://www.gov.uk/government/organisations/environment-agency

however, the Site would be out of fluvial flood risk from the Chorlton Platt Gore 2024 at a 1 in 100-year plus a 41% climate change allowance.

For a better understanding of the flood level around the Site, the maximum flood water level in the channel in metres above ordnance datum (mAOD) and the maximum flow in cubic metres per second (m^3/sec) are presented in Appendix XI to XIV for the undefended scenarios, including the location of the modelled nodes.

The Chringle Black Brook 2017 model in Appendix XI suggests that the maximum water level in the nodes (just before the confluence with the Platt Brook) would reach 31.85mAOD at 1% AEP. It should, however, be noted that the ground levels of the Sites are approximately 31.80mAOD at the front side and 32.2mAOD at the rear Side. Therefore, there is a possibility of approximately 0.05m water depth at the front side; however, the rear side would be out of fluvial flood risk in the undefended scenarios.

The maximum flow in the channel would reach 3.96 m^3/sec at a 1 in 100-year event, which would be considered moderate and would not cause any severe structural damage.

The Chorlton Platt Gore 2024 model in Appendix XII suggests that the maximum water level close to the Site (i.e. node 9) is 32.15mAOD at a 1 in 100-year event. It suggests that the Site could have some fluvial flood risk. The maximum flow of the channel is 24.17 m^3/sec. It should, however, be mentioned that the Site is located approximately 70m away from the channel and therefore the fluvial flow would not have a direct impact on the Site.

Considering the climate change allowance, the Cringle Black Brook 2017 model would have a maximum water level of 31.85mAOD, and the Chorlton Platt Gore 2024 model would have a maximum water level of 32.20mAOD. Thus, there would be a minor fluvial flood risk at the Site, considering climate change allowance.

There are existing flood defences with a standard of protection of 100 years, and they are in good condition. Therefore, the defended model results would be more reliable for the present site-specific flood risk assessment.

The maximum floodwater levels and flows for the defended scenarios are given in Appendix XV to XVIII.

The maximum water level at the Cringle Black Brook 2017 model would reach 31.85mAOD, and the Chorlton Platt Gore 2024 model would reach 32.15mAOD at a 1 in 100-year event. This suggests that the Site could be a minor water depth of the fluvial flood risk, particularly the front side, in the case of a flood defence breach.

Considering the climate change allowance at a 1 in 100-year event, the maximum water levels in the channels would be approximately 31.85mAOD and 32.20mAOD at the Cringle Black Brook 2017 model and the Chorlton Platt Gore 2024 model, respectively. This indicates a minor increase in the maximum water level, considering a climate change allowance, and this would not make any significant impact on the fluvial flood risk at the Site, during a flood defence breach.

In order to get the detailed maximum fluvial flood extent and water depth for the defended scenarios, the modelled fluvial extent and height for a few points around the Site are given in Appendix XIX and XX for the Cringle Black Brook 2017 model and the Chorlton Platt Gore 2024 model, respectively.

The simulated model results indicate that there is no flood water depth on the Site up to a 1 in 100-year event, and therefore, the Site would not be a fluvial flood risk for the defended scenarios.

Considering the climate change allowance, the maximum fluvial flood extent, water level and depth for the defended scenarios are provided in Appendix XXI and XXII for the Cringle Black Brook 2017 model and the Chorlton Platt Gore 2024 model, respectively.

The Cringle Black Brook 2017 model results indicate that the Site would be a fluvial flood risk at a 1 in 100-year event plus a 35% climate change allowance. However, the flood risk would be limited to the front side, and the maximum water depth on the Site would be approximately 0.11m, which would stay outside of the dwelling house.

The Chorlton Platt Gore 2024 model results suggest that the Site would not be a fluvial flood risk at a 1 in 100-year event plus a 41% climate change allowance.

Therefore, it could be concluded that the proposed development site would not be a fluvial flood risk at the defended scenarios at the design event (i.e. 1% AEP); however, there would be a minor flood water depth considering the climate change allowance of 35%, particularly the front side up to a depth of 0.11m. This floodwater would stay out of the dwelling house.

2.2 Groundwater or reservoir flood risk

The EA's flood map[11] suggests that the Site is not at risk of flooding from the groundwater flow.

There is no borehole data available on the Site; however, the nearest and recent available borehole data from the British Geological Survey[12] is located approximately 67m away to the north of the Site. The data were recorded in December 1992. The grid location of the test site is easting 384210 and northing 393850; see also Appendix XXIII. The ground level of the test site is 32.23mAOD, whereas the average ground level of the proposed extension is approximately 32.0mAOD, i.e. 0.23m below the test site. The borehole data indicate that there is no groundwater detected at the test site up to a depth of 3.0 below the ground surface. This suggests that the proposed development site would not be a groundwater flood hazard.

The EA's flood map[13] suggests that the Site could be a risk of flooding from the reservoir flow (Figure 2.3). A reservoir is a large natural or artificial lake that is designed to collect and store water. There is no reservoir in close proximity to the Site. Moreover, the flooding from the reservoir is extremely unlikely, and an area is considered at risk if people's lives could be threatened in the event of a dam break or a reservoir failure. Thus, the Site would not be considered a flood risk from the reservoir flow.

[11] https://check-long-term-flood-risk.service.gov.uk/ground-water
[12] https://www.bgs.ac.uk/datasets/geophysical-borehole-logs/
[13] https://check-long-term-flood-risk.service.gov.uk/ground-water

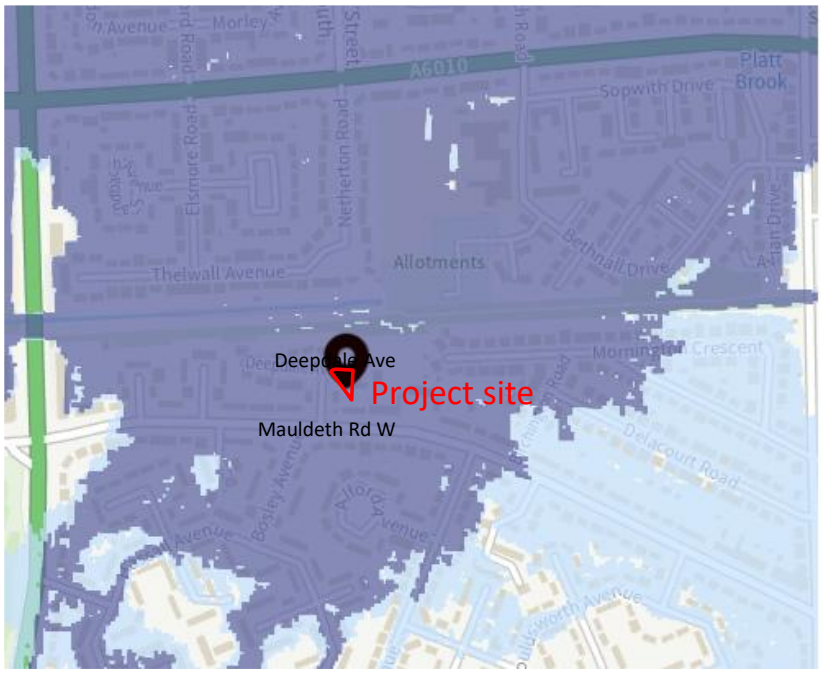


Figure no.	**2.3**
Title	EA's flood map – reservoirs
Project name	26 Deepdale Ave, Manchester
Project no.	3092

Legend

The Site's extent

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Figure 2.3: Reservoir flow at the Site – a flood risk against the reservoir flow (reference to EA's flood map[14]).

2.3 Surface water drainage

The guidance of the Environment Agency and LLFA, based on the national planning policy framework[15] (NPPF), recommends avoiding the increase in surface water flooding through requirements for sustainable drainage systems (SuDS) and minimising the impervious surface area. Moreover, the NPPF para 181 suggests that "when determining any planning applications, local planning authorities should ensure that flood risk is not increased elsewhere. Where appropriate, applications should be supported by a site-specific flood-risk assessment." Therefore, the surface water drainage measures should have a neutral or better effect on the risk

[14] https://check-long-term-flood-risk.service.gov.uk/ground-water
[15] Op. cit.

of flooding both on and off the site, taking into account rain falling on the site and runoff from adjacent areas.

The guidelines of the NPPF, LLFA and EA take a presumption against development in a 1 in 30-year hydrological event to the surface water drainage. Development should only be allowed in an area at risk from a 1 in 100-year event (with climate change allowance (CCA)) if surface water drainage is manageable without any major risk to the development itself or other surrounding areas. It should be shown that in such cases, surface water flows can be contained within the development, and any flooding, flood volumes do not affect third-party lands, flood the property, or obstruct the key access/egress routes.

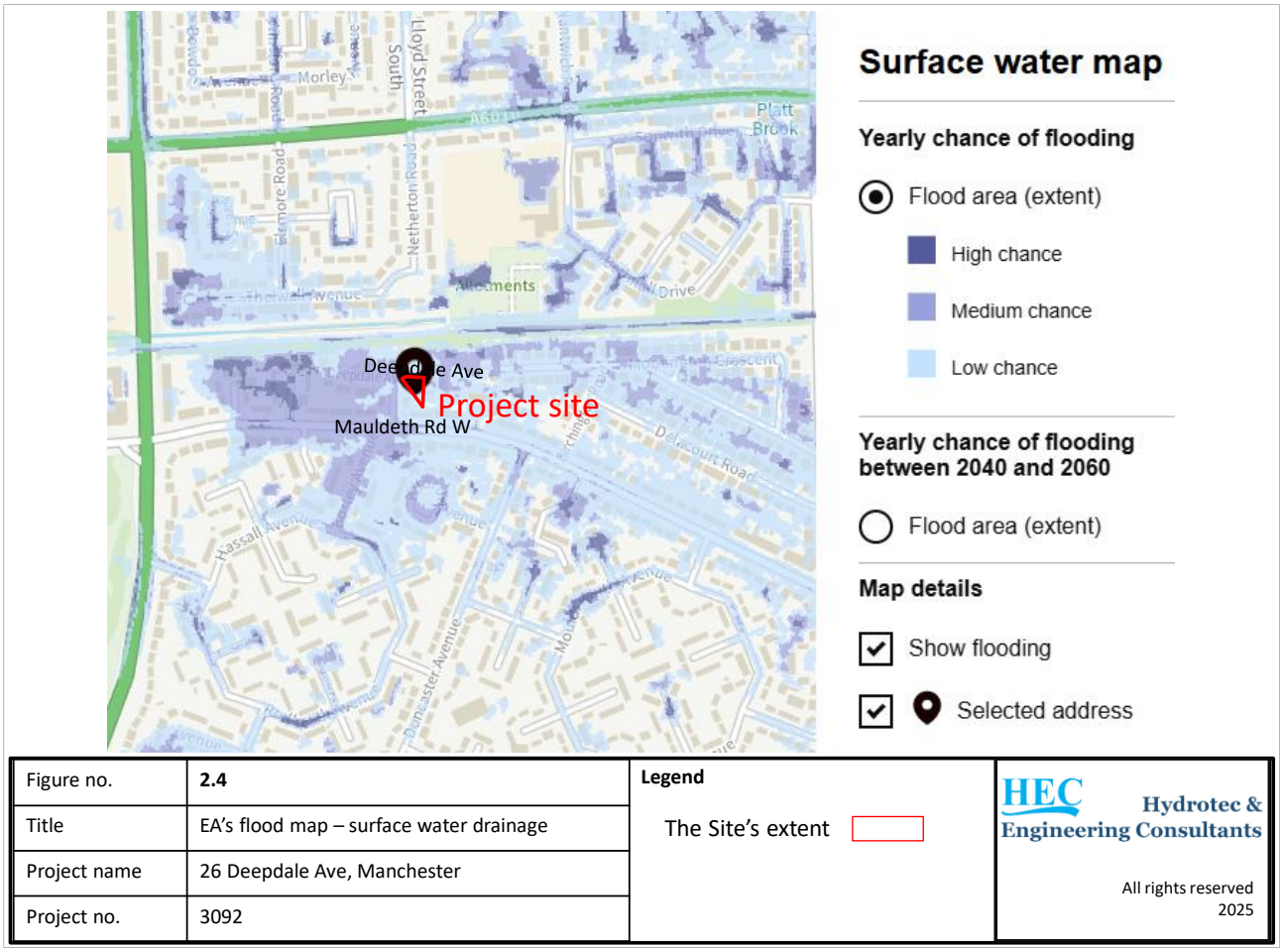


Figure 2.4: Surface water drainage at the Site – a medium flood risk against the surface water flow (reference to the EA's flood map[16]).

[16] https://www.gov.uk/check-long-term-flood-risk

To comply with the guidance for surface water drainage at the site, the mechanisms of surface water flooding, both on-site and off-site, were assessed with appropriate consideration.

The EA's surface water flood map[17] (Figure 2.4) indicates that the Site would stay at a medium flood risk to surface water drainage (i.e. a medium risk means that each year this area has a chance of flooding of between 1% AEP and 3.3% AEP). Therefore, the Site would be considered a medium hazard to surface water drainage.

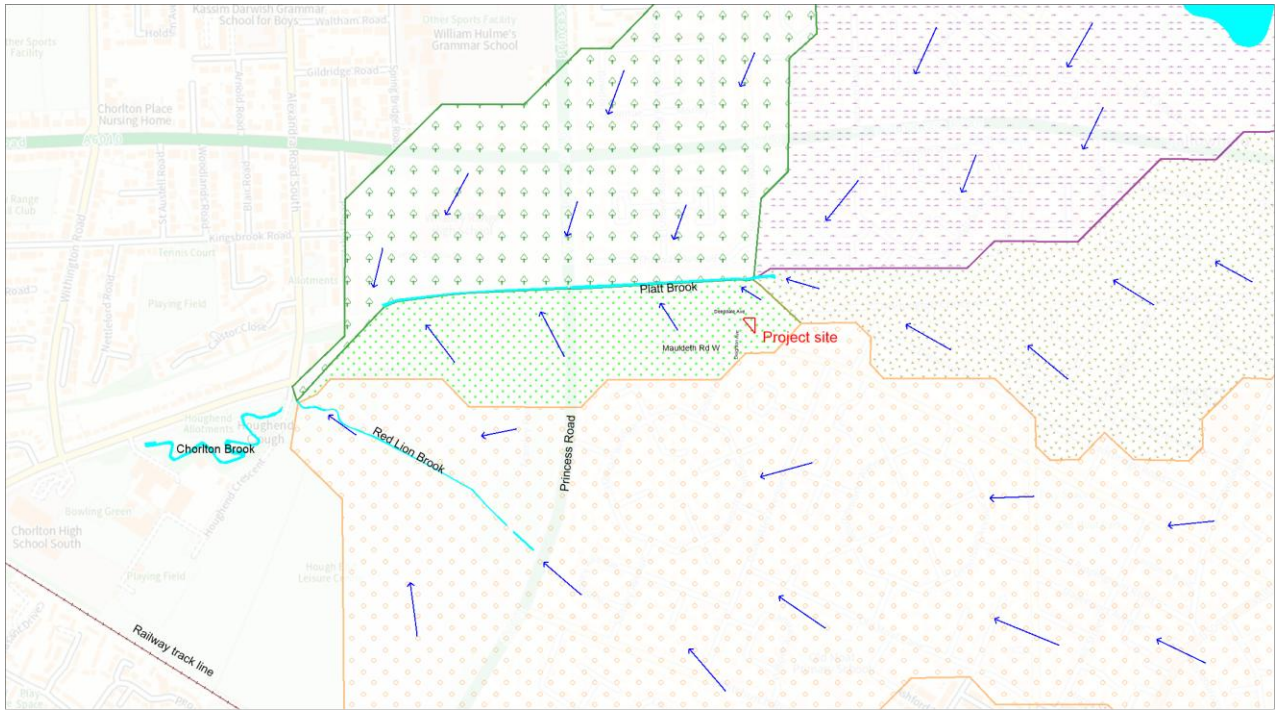


Figure no.	**2.5**
Title	FEH hydrological sub-catchments
Project name	26 Deepdale Ave, Manchester
Project no.	3092

Legend

The Site's extent

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Figure 2.5: The hydrological sub-catchments around the Site (indicative overland flow paths in blue arrow lines), reference to the FEH22[18].

[17] https://check-long-term-flood-risk.service.gov.uk/surface-water
[18] op. cit.

Generally, the surface water overland flow is highly affected by the topographical features, which define hydrological sub-catchments. For a better understanding of the surface water runoff around the Site, the hydrological sub-catchments were obtained from the Flood Estimation Handbook[19] (FEH22) and the data are presented in Figure 2.5.

The hydrological sub-catchments that could potentially impact the Site are presented in Figure 2.5, and the indicative flow paths of the surface water runoff are illustrated by the blue arrow lines.

The Site is located in a hydrological sub-catchment which conveys the overland flow northerly and laterally into Platt Brook. The sub-catchment area in the upstream that could have a possible surface runoff impact on the Site is approximately 0.004km^2, which is relatively very small. Therefore, the generated overland flow by the upstream of this sub-catchment would be relatively less; subsequently, the possible impact of the upstream surface water runoff on the Site would be minimal.

The two sub-catchments located in the east would convey surface water runoff westerly through local channels and discharge into the Platt Brook, and would not have any overland flow contribution to the Site.

The sub-catchment located in the south would also convey overland flow westerly through the local drains and then into the Red Lion Brook. Thus, there would not be any overland flow contribution towards the Site.

Finally, the northern sub-catchment would drain the overland flow southwesterly and laterally into the Plat Brook, staying away from any runoff contribution to the Site.

Thus, the effective overland flow contribution to the Site from the adjacent areas would be very minimal.

[19] Map - FEH Web Service (ceh.ac.uk)

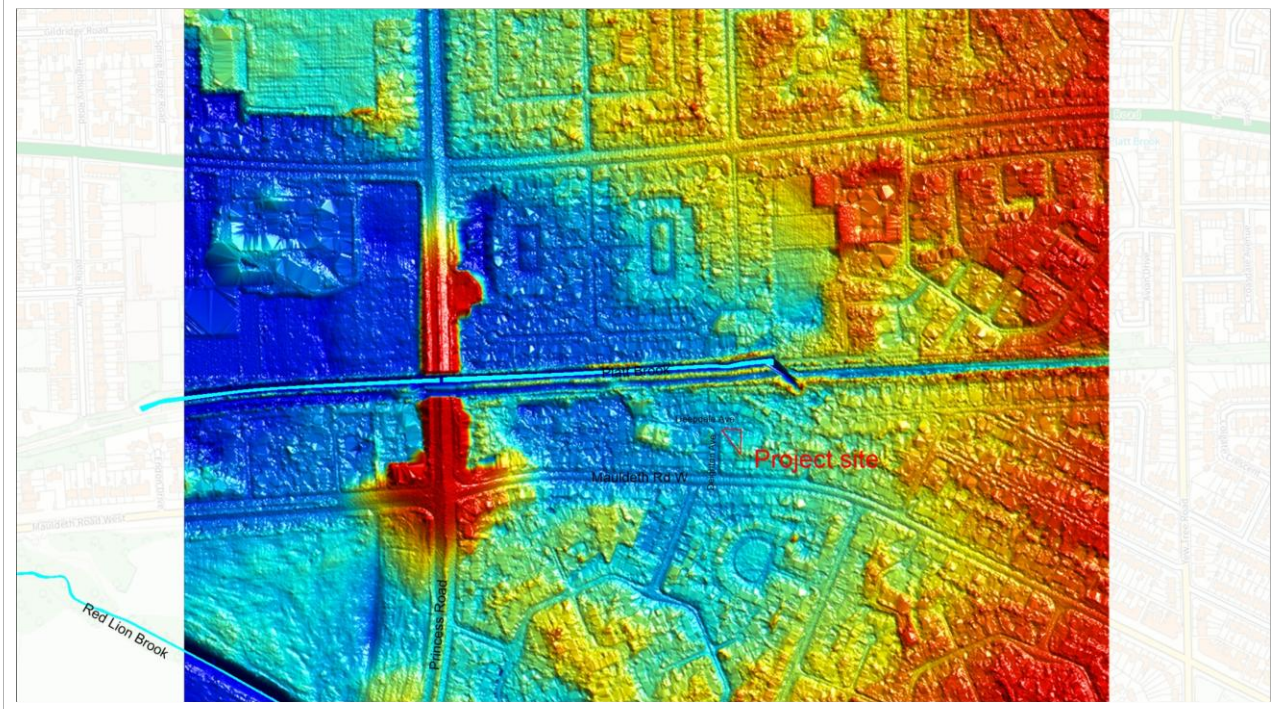


Figure no.	**2.6**
Title	The LiDAR data at the Site
Project name	26 Deepdale Ave, Manchester
Project no.	3092

Legend LiDAR DTM elev., mAOD 30.1 27.57

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Figure 2.6: The LiDAR topographical elevation at the Site.

The intensity and magnitude of the overland flow and its path on the ground surface would have a significant effect due to the ground elevation. Therefore, for an understanding of the complexity of the overland flow mechanisms, the topographical elevation around the Site was assessed based on the recent LiDAR[20] (Light Detection and Ranging) DTM (Digital Terrain Model) data (Figure 2.6).

The LiDAR elevation data suggest that the ground level in the far eastern area is relatively elevated; however, overland flow from this area would be contained within local drains. Moreover, most of the overland flow in the upstream would be intercepted by the existing infrastructures and local drainage networks. Thus, overland flow from the eastern area would not reach around the Site. Subsequently, there would be less surface water hazard to the Site.

[20] https://environment.data.gov.uk/survey

Therefore, the contributing surface water runoff from the off-site to the Site would be minimal. Subsequently, the Site would not be considered an off-site surface water flood risk. Thus, the surface water runoff generated at the proposed development would mainly be from the rainfall on the Site. Therefore, to effectively manage this excess surface water runoff, a drainage strategy is required, aligning with LLFA guidance for sustainable drainage systems (SuDS).

2.4 Sewer flood risk

The proposed development is the erection of a part single/part two-storey side and single-storey rear extension to form additional living accommodation.

The occupants of the existing three-bedroom dwelling have already been generating foul water flow and discharging it into United Utilities sewer drainage networks. However, due to the additional one-bedroom and living facilities, the occupants of the proposed development would generate an additional foul water flow.

The sewer drainage network data (see also Appendix XXIV) obtained from United Utilities indicate that the existing sewer drainage network systems around the Site are combined, i.e. conveying both surface and foul water flow through the same pipe.

A 150 mm diameter combined water sewer under the site conveys flow southward and ultimately discharges into the 600 mm diameter sewer beneath Mauldeth Road West. The sewer on Mauldeth Road West has been upgraded to 750mm, starting from the junction with Deighton Avenue and flowing westward.

There is a combined water manhole located at the front of the site; however, the cover and invert levels of the manhole are not detailed in the United Utilities drainage network map.

In front of the Site, a 150mm diameter combined water sewer beneath Deepdale Avenue conveys flow westerly and then connects to the 225mm diameter sewer in Deighton Avenue, which discharges to Mauldeth Road West.

There are no details of the existing private sewer drainage network of the Site in the United Utilities sewer drainage map. Therefore, a CCTV sewer drainage survey will be conducted to

determine the location, size, condition, and connectivity of the existing private sewers before the proposed drainage network is implemented.

The proposed development is for the side extension of the existing three-bedroom dwelling to form a four-bedroom dwelling, and therefore, there would be a new proposed drainage network in conjunction with the existing drainage network due to the proposed extension.

The proposed drainage network would be separate, i.e. separate surface and foul water drainage pipes. Subsequently, there would be less wastewater flow to the United Utilities drainage networks, benefiting from less wastewater treatment by the sewage treatment works. Thus, it would be suitable to discharge the generated foul water flow from the proposed extension into the existing United Utilities sewer drainage network system. In the proposed development, the existing sewer next to the house (on the west side) will be relocated further to the west, adjacent to the new extension.

For the estimation of the generated foul water by the proposed development, the standard guidelines of foul water design were followed. The foul water generation would be highly variable during the days or nights and throughout the year.

Considering the standard guidelines from the Sewer for Adoption[21], the typical average dry weather flow (DWF) for this type of catchment is considered to be 150 litres per person per day. It is assumed that there would be a maximum of 2 occupants in the proposed additional one-bedroom. Therefore, the additional generated foul water flow by the proposed extension would be approximately 0.003 litres/sec.

The general observation of the sewer drainage networks in the surrounding areas suggests that the proposed side extension of the existing dwelling house would not significantly impact the existing sewer drainage network systems. However, a confirmation of consent agreement from United Utilities will be obtained before the proposed development is utilised.

[21] Sewerage Sector Guidance-approved documents | Water UK

3 Drainage strategy and flood attenuation storage requirements

The proposed development involves the erection of a part single/part two-storey side and single-storey rear extension to form additional living accommodation.

The proposed development is therefore classified as a more vulnerable category - according to the NPPF flood risk vulnerability classification[22].



Figure no.	**3.1**	**Legend**	HEC Hydrotec & Engineering Consultants
Title	Existing ground surface at the front side		
Project name	26 Deepdale Ave, Manchester		
Project no.	3092		

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Figure 3.1: The photograph of the existing ground surface condition at the front side.

[22] National Planning Policy Framework - Annex 3: Flood risk vulnerability classification - Guidance - GOV.UK (www.gov.uk)

The total land surface of the proposed development site is approximately 312m^2; however, the surface area of the proposed side extension is approximately 42m^2, and therefore, it would be classified as a minor development - according to the Environment Agency's Standing Advice.[23]

The existing ground surface on the front side is mostly concrete pavement. Therefore, most of them would be impermeable land; see also a recent photograph in Figure 3.1.

Most of the rear side is also paved with an impermeable concrete surface, see also the recent photograph in Figure 3.2.



Figure no.	**3.2**	**Legend**	HEC Hydrotec & Engineering Consultants
Title	Existing ground surface at the rear side		
Project name	26 Deepdale Ave, Manchester		
Project no.	3092		

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Figure 3.2: The photograph of the existing ground surface condition at the rear side.

[23] https://www.gov.uk/guidance/flood-risk-and-coastal-change#para51

The permeable and impermeable surface areas of the proposed development are given in Table 3.1. The total impervious area of the proposed development is approximately 224m^2, and the permeable area would be approximately 88m^2, containing front and rear gardens with grassland (lawn), trees and shrubs. The ground surface area of the proposed side extension is approximately 42m^2. In other words, the proposed side extension would be approximately 13.5% with respect to the total area of the Site.

Table 3.1: The permeable and impermeable surface area of the post-development at the Site.

Development	Permeable area, m^2	Impermeable area, m^2
Proposed	88	224

The proposed development would slightly modify the existing land surface area. However, it would not increase the impervious area because the proposed side extension would remain within the existing impervious land, i.e. on the concrete pavement.

Moreover, the proposed side extension would provide better sustainable drainage systems with the proposed drainage strategy. Subsequently, there would not be any substantial deterioration of the excess surface water due to the proposed development at the Site itself or its adjacent areas.

However, to comply with the NPPF's local plan policy and LLFA guidelines, the development proposal should aim to achieve greenfield runoff rates and ensure that surface water runoff is managed as close to its source as possible. Subsequently, a proportionate reduction of the generated runoff would be managed on-site.

One of the main objectives of the surface water attenuation storage is that during the storm event, the generated surface water runoff within the Site would be retained on-site for some time. Therefore, the peak flow in the watercourses and/or drainage networks would not be increased substantially to ease the flood risk in the downstream.

The LLFA has an acceptable policy regarding the greenfield runoff rate that permits some discharge from development sites into nearby watercourses and drainage networks. This approach helps reduce both the cost and the land space needed for attenuation storage within the development site.

Table 3.2: The cumulative depth-duration rainfall at 50% AEP, 10% AEP, 3.3% AEP and 1% AEP at the Site.

Duration, mins	Cumulative rainfall depths, mm			
	50% AEP	10% AEP	3.3% AEP	1% AEP
15	7.20	13.98	18.33	23.17
30	9.38	18.36	24.21	30.98
45	10.78	21.08	27.98	36.05
60	11.80	23.18	30.75	39.68
90	14.11	26.27	34.29	43.80
120	16.18	28.58	36.84	46.68
180	18.97	32.09	40.91	51.54
240	21.10	34.79	44.09	55.48
300	22.88	37.04	46.74	58.92
360	24.38	38.98	49.07	61.99
420	25.66	40.66	51.18	64.86
480	26.79	42.16	53.12	67.51
540	27.81	43.53	54.91	69.98
600	28.73	44.80	56.58	72.30

In the present calculation, the greenfield runoff rates were considered based on the HR Wallingford tools[24]. However, the total surface area of the Site is less than the minimum area requirement (i.e. 0.10 hectares) for these tools. Therefore, the minimum greenfield runoff rate of 2.0 litres/sec was adopted. HR Wallingford tools also recommend this value for SuDS design, and this would assist in reducing sedimentation and blockage of drainage pipes.

In order to calculate the generated surface water runoff at the Site, the hydrological data were obtained from the Flood Estimation Handbook[25] (FEH22). The cumulative rainfall depths were calculated, and the values at 1 in 2-year (50% AEP), 1in 10-year (10% AEP), 1 in 30-year (3.3% AEP) and 1 in 100-year (1% AEP) are provided in Table 3.2 up to 600 minutes (i.e. 10.0 hrs).

[24] Online tools for sustainable drainage systems (SuDS) (uksuds.com)
[25] Map - FEH Web Service (ceh.ac.uk).

Table 3.3: Surface water attenuation storage requirements at 50% AEP, 10% AEP, 3.3% AEP and 1% AEP, including climate change allowance at the Site.

Return periods	Storm duration, mins	Greenfield runoff rate, l/s	Volume of the surface water runoff, m^3		
			Total runoff	Attenuation req.	Attenuation req. with CCA
50% AEP	15	2.00	2	0	0
	30	2.00	2	-1	-1
	45	2.00	2	-3	-3
	60	2.00	2	-5	-4
	90	2.00	2	-8	-8
	120	2.00	2	-12	-11
	180	2.00	2	-20	-19
	240	2.00	1	-27	-27
	300	2.00	1	-35	-35
	360	2.00	0	-44	-43
10% AEP	15	2.00	4	2	3
	30	2.00	5	1	3
	45	2.00	6	0	2
	60	2.00	6	-1	0
	90	2.00	6	-5	-3
	120	2.00	6	-8	-6
	180	2.00	6	-16	-14
	240	2.00	6	-23	-21
	300	2.00	5	-31	-29
	360	2.00	4	-39	-37
3.3% AEP	15	2.00	5	4	6
	30	2.00	7	3	6
	45	2.00	8	2	6
	60	2.00	8	1	5
	90	2.00	9	-2	2
	120	2.00	9	-6	-1
	180	2.00	9	-13	-8
	240	2.00	8	-20	-15
	300	2.00	8	-28	-22
	360	2.00	7	-36	-30
1% AEP	15	2.00	7	5	8
	30	2.00	9	5	10
	45	2.00	10	5	10
	60	2.00	11	4	9
	90	2.00	12	1	7
	120	2.00	12	-2	4
	180	2.00	12	-9	-2
	240	2.00	12	-17	-9
	300	2.00	12	-24	-16
	360	2.00	11	-32	-23

The proposed development is intended for residential use; therefore, its design life is expected to be 100 years. Thus, the NPPF's guidance suggests the upper-end allowance for peak rainfall when considering climate change. The upper-end peak rainfall allowances at the Site in the 2070s epochs are 40% and 45% at 3.3% AEP and 1% AEP, respectively - according to the Environment Agency's climate change allowance guidelines[26]. Subsequently, for the climate change allowance (CCA), the peak rainfall was increased by 10%, 20%, 40% and 45% at 50% AEP, 10% AEP, 3.3% AEP and 1% AEP, respectively.

The attenuation storage requirements for the proposed development were calculated at 50% AEP, 10% AEP, 3.3% AEP and 1% AEP, including climate change allowance[27] and the results are presented in Table 3.3. In Table 3.3, the 4th column is the total runoff volume (m^3) generated by the Site; the 5th column is the total runoff volume (m^3) required for attenuation, considering the 2.0 litres/sec greenfield runoff, and the 6th column is the total runoff volume (m^3) required for attenuation with climate change allowance.

The current calculations did not account for any external off-site runoff. The required attenuation storage for the entire site, which has a surface area of 312m², is as follows: for a 3.3% Annual Exceedance Probability (AEP), the requirement is 4m³, while for a 1% AEP, it is 5m³. When considering climate change allowances, these amounts increase to 6m³ and 10m³, respectively

To assess the feasibility of the attenuation for the generated surface water runoff through underground infiltration, the soil types beneath the Site were assessed based on the Soilscapes map data of Cranfield University[28]. Generally, soil types beneath the Site are slowly permeable, seasonally wet, acid-loamy and clayey soils (Figure 3.3).

Therefore, the infiltration rate beneath the Site would not be good, and it would not be suitable for attenuating excess surface water runoff through a soakaway.

[26] Flood risk assessments: climate change allowances - GOV.UK (www.gov.uk)
[27] Peak rainfall climate change allowances by management catchment - GOV.UK (www.gov.uk)
[28] https://www.landis.org.uk/



Figure no.	**3.3**
Title	Soilscapes map data at the Site
Project name	26 Deepdale Ave, Manchester
Project no.	3092

Legend

The Site's extent

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Figure 3.3: The soil types beneath the Site – slowly permeable, seasonally wet, acid-loamy and clayey soils (reference - Soilscapes map data of Cranfield University[29]).

Due to the Site's amenities and space limitations, it would not be feasible to attenuate excess surface water runoff in a detention pond. There is no watercourse in close proximity to the Site; however, an existing combined water sewer operated by United Utilities is located on the front side of the Site.

In addition, there is an existing combined water sewer drainage network of the United Utilities beneath Deepdale Avenue, and there is a manhole located within close proximity to the Site (see Appendix XXIV).

[29] https://www.landis.org.uk/soilscapes/index.cfm

Currently, all on-site surface water runoff is discharged into the nearby overground and/or existing sewer drainage networks. The proposed development would have a relatively minor impact on excess surface water runoff due to the proposed side extension; therefore, it would not increase the excess surface water runoff to the Site compared to the existing condition.

Thus, in the proposed surface water drainage strategy, the excess surface water runoff equivalent to the surface area of the proposed side extension (i.e. 42m^2) would be attenuated in an underground storage tank. The outfall from the underground tank would be discharged to the existing sewer located on the Site in conjunction with the proposed drainage network, taking into account reasonable water quality measures.

In addition, it is also highly recommended to utilise roof water using water butts, attenuating excess surface water runoff.

4 SuDS layout design

The proposed development involves the erection of a part single/part two-storey side and single-storey rear extension to form additional living accommodation. The proposed development would slightly modify the surface water runoff; however, it would not increase the impervious area compared to the existing condition. Moreover, the proposed drainage strategy would provide better sustainable drainage, and therefore, surface water drainage would not significantly deteriorate the Site itself or its surrounding areas.

In addition, to comply with the NPPF's local plan policy and LLFA guidelines and to improve the sustainability of the wider drainage systems, environmental impact and local biodiversity in the surrounding areas - in the proposed surface water drainage strategy, the excess surface water runoff equivalent to the surface area of the proposed side extension (i.e. approximately 13.5% of the entire area) would be attenuated in an underground storage tank at 1 in 100-year plus a 45% climate change allowance.

In other words, the proposed attenuation tank on the front side was designed to accommodate the excess surface water runoff of 1.34m^3. The details of the cross-section of the attenuation tank are given in Appendix XXVI. The size of the geo-cellular attenuation crates would be 1.50m in

length, 1.0m in width and 0.75m in depth. The porosity of the crates is 95%, and therefore, they would hold 1.07m^3 of water. In addition, there are 300 mm-thick gravel layers around the sides, and these porous materials on the sides would hold 0.42m^3 of water, considering the 0.30 porosity of the gravel materials. Therefore, the total attenuation storage capacity of the tank would become approximately 1.49m^3.

At the bottom of the storage tank (attenuation crates), there would be a 300mm thick gravel bed, and this feature would allow the storage capacity of approximately 0.30m^3 of surface water. In addition, stored water would infiltrate the underground through the bottom of the tank whenever it has an available capacity. Subsequently, this would assist in emptying the attenuation tank during the dry period, allowing the available maximum capacity in the next rainfall event.

The proposed drainage network would be separate, i.e. surface water and foul water drainage would be conducted through different pipes. The layout of the drainage network at the Site is shown in Figure 4.1; see also Appendix XXV for details.

The proposed surface water drainage pipes for the side extension would be developed in conjunction with the existing surface water drainage pipes to facilitate the surface water drainage. The outfall from the underground storage tank would be discharged with a 75mm diameter pipe into the existing manhole located on the Site, taking into account reasonable water quality measures.

The remaining surface water runoff would be discharged through the surface water drainage network into the United Utilities' drainage network.

In the proposed sewer drainage network, the diameter of the pipes would be 100mm, and the pipes would be connected with manholes, ACO drains and gullies.

The gradient of the drainage pipes would be a minimum of 1 in 80 to assist in gravity flow. The cover level of the manholes would be at ground level, whereas the invert level would be set to provide the required gradient to facilitate gravity flow.

In the proposed layout, there will be a rear garden with lawn, including shrubs along the front side boundary.

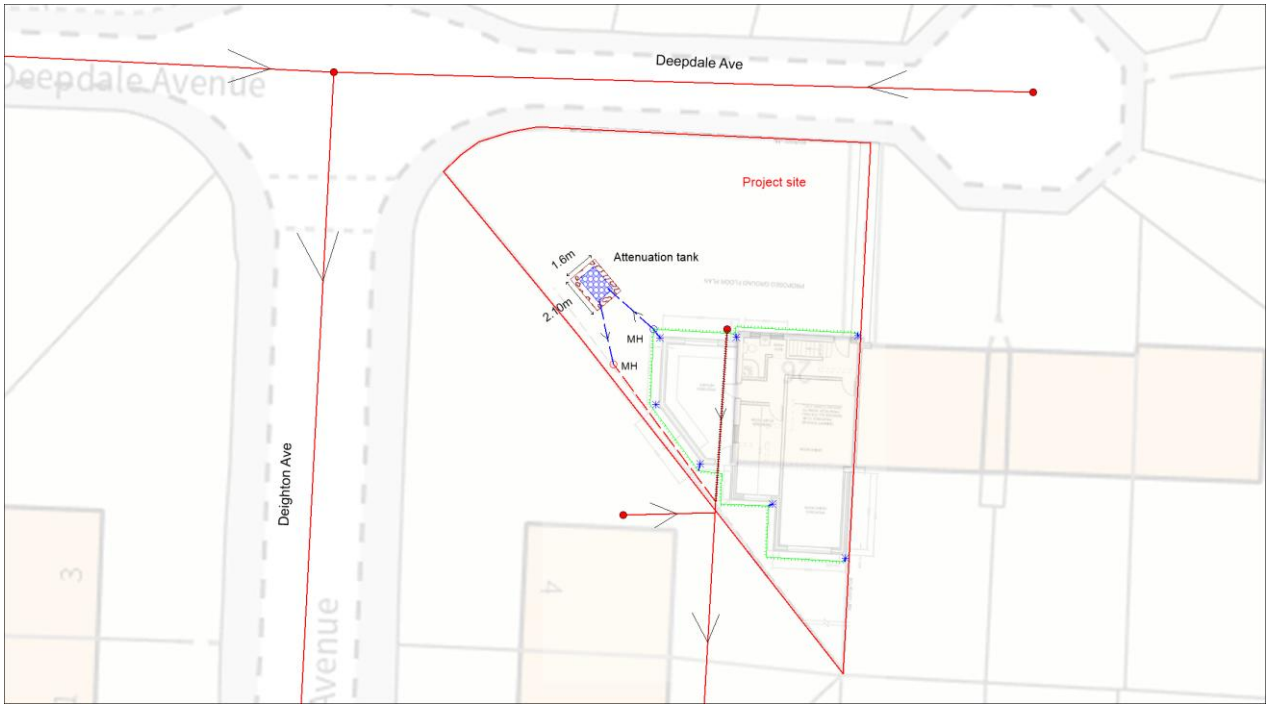


Figure no.	**4.1**
Title	Proposed drainage layout
Project name	26 Deepdale Ave, Manchester
Project no.	3092

Legend

The Site's extent

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Figure 4.1: The proposed drainage strategy layout design at the Site.

Thus, the proposed blue-green SuDS features would significantly improve the local environmental biodiversity and sustainability of surface water drainage compared to the existing condition.

Moreover, it is highly recommended to adopt rainwater harvesting by collecting runoff from the roof surface in water butts (approximately 250 litres, see also a sample in Appendix XXVII) and utilising it for general washing and irrigation, e.g., the rear garden, as well as further attenuation of surface water drainage.

Furthermore, the proposed layout of the development is considered a well-thought, eco-friendly and sustainable drainage system, including a lawn in the rear garden with permeable topsoil, assisting water quality improvement by reducing suspended solids and silt materials.

Therefore, the proposed surface water drainage strategy would be sustainable during the design life of the development without deteriorating the Site itself or other existing developments in the surrounding areas.

5 Management and maintenance plan of drainage infrastructures

The landowner of the dwelling would be legally responsible for the management of the proposed SuDS systems, including periodic inspection and maintenance of the SuDS features and drainage infrastructures within the Site for effective and efficient performance during the design life of the development. The recommended maintenance schedules for the proposed SuDS features are outlined below.

Table 5.1: Operation and maintenance requirements for filter drains.

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter (including leaf litter) and debris from the filter drain surface, access chambers and pre-treatment devices.	Monthly or as required
	Inspect the filter drain surface, inlet/outlet pipework, and control system for blockages, clogging, standing water, and structural damage.	Monthly
	Inspect pre-treatment systems, inlet and perforated pipework for silt accumulation and establish appropriate silt removal frequencies.	Six monthly
	Remove the sediment from pre-treatment devices.	Six-monthly or as required
Occasional maintenance	Remove or control tree roots where they are encroaching on the sides of the filter drain, using the recommended methods.	As required

	At locations with high pollution loads, remove the surface of the geotextile and replace it, and then replace the overlying filter medium.	Five-yearly, or as required
	Clear perforated pipework of blockage.	As required

Table 5.2: Operation and maintenance requirements for an attenuation storage tank.

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then annually
	Remove debris from the catchment surface (where it may cause a risk to performance).	Monthly
	For systems where rainfall infiltrates into the tank from above, check the surface of the filter for blockage by sediment, algae, or matter; remove and replace the surface infiltration medium as necessary.	Annually
	Remove the sediment from pre-treatment structures and/or internal forebays.	Annually, or as required
Remedial actions	Repair/rehabilitate inlet, outlet, overflows, and vents.	As required
Monitoring	Inspect/check all inlets, outlets, vents, and overflows to ensure that they are in good condition and operating as designed.	Annually
	Survey the inside of the tank for sediment build-up and remove it if necessary.	Every 5 years, or as required

6 Finished floor level and access/egress from the Site

The proposed development, which is the erection of a part single/part two-storey side and single-storey rear extension to form additional living accommodation, is classified as a more vulnerable category, according to the NPPF flood risk vulnerability classification[30].

In addition, the surface area of the proposed side extension is less than 250m^2, and therefore, it would be classified as a minor development - according to the Environment Agency's Standing Advice[31].

The site is not at risk of flooding from fluvial flow during the defended scenarios at the design event. Additionally, the surface water drainage poses a low risk and will have minimal impact on the Site, considering the proposed drainage strategy..

Therefore, the finished ground floor level of the proposed side extension would be the same as the existing dwelling's ground floor level.

There would be no issues with access and egress from the proposed development site during evacuation and the movement of emergency vehicles. Deepdale Avenue, which is located in front of the Site, would be used for access and egress during any unexpected flooding incident.

7 Conclusions

A site-specific flood risk assessment and surface water drainage strategy were conducted to assist the sustainable drainage systems (SuDS) design for the proposed development at 26 Deepdale Avenue, Withington, Manchester, M20 1BF.

The proposed development is the erection of a part single/part two-storey side and single-storey rear extension to form additional living accommodation. The Site lies within Manchester City

[30] Op.cit.
[31] Op.cit.

Council's remit, who is the LLFA, providing advice and guidance for sustainable drainage systems for this development site.

The present flood risk assessment and drainage strategy for SuDS, which are the requirements for the planning application, were made with available information, including the latest EA's flood maps and flood modelling data, FEH hydrological data, topographical elevation data (LiDAR), soil map data, borehole data of the British Geological Survey, recent photographs and sewer network data of United Utilities.

The present investigation suggests that the Site is considered to be out of fluvial flood risk at the defended scenarios at a 1 in 100-year event, including climate change allowance.

The proposed development site is a medium risk from the surface water flow - according to the EA's flood map[32]. However, the hydrological and topographical elevation data around the Site indicate that the impact of the surface water runoff from the Site's surrounding areas would be minimal. Thus, the surface water attenuation storage requirements for the Site would only be the generated overland flow by the surface area of the proposed development, and the overland flow from the surrounding areas was not considered. In addition, the Site would not be at risk of groundwater or reservoir flows.

The attenuation storage calculation was performed for the generated surface water runoff within the Site, and no external flow was taken into account from the surrounding areas. The investigation was made at 50% AEP, 10% AEP, 3.3% AEP and 1% AEP, including climate change allowance to assist the sustainable drainage systems (SuDS) design.

The required attenuation storage for the entire site, which has a surface area of 312m², is as follows: for a 3.3% AEP, the requirement is 4m³, while for a 1% AEP, it is 5m³. When considering climate change allowances, these amounts increase to 6m³ and 10m³, respectively.

The soil types beneath the Site are slowly permeable, seasonally wet, acid-loamy and clayey soils, with reference to the Soilscapes map data[33]. Thus, the infiltration rate beneath the soil

[32] Op.cit.
[33] Op.cit.

would not be good, and therefore, it would not be suitable to attenuate the excess surface water runoff through an underground soakaway.

Due to space limitations, it would not be suitable to attenuate excess runoff by a detention pond on the Site.

There is no watercourse in close proximity to the Site. However, there is a sewer drainage network from United Utilities located beneath the site, and a manhole is also present on the site.

There would not be any increase in the impervious surface area compared to the existing condition due to the proposed side extension. Moreover, the surface area of the proposed side extension is approximately 42m^2, i.e. approximately 13.5% of the total area of the Site.

Therefore, in the proposed surface water drainage strategy, the excess surface water runoff equivalent to the surface area of the side extension would be attenuated in an underground storage tank using geo-cellular crates on the front side.

The on-site surface water attenuation storage for the proposed development would be based on 1% AEP plus a 45% climate change allowance (i.e. 1.34m^3) without deterioration of the Site itself or surrounding areas.

Therefore, the size of the attenuation crates for the tank would be 1.50m in length, 1.0m in width and 0.75m in depth. A 300mm thick gravel layer would surround the crates, and the crates' and gravel's combined attenuation storage capacity would be approximately 1.49m^3.

The outfall from the underground storage tank would be made to the combined sewer of United Utilities using a 75mm diameter pipe, taking into account reasonable water quality measures.

In addition, shrubs along the front side boundary and lawn in the garden with permeable topsoil would assist in water quality improvement by reducing suspended solids and silt materials. It is highly recommended to adopt water butts for collecting roof water, which can be utilised for general washing and irrigation, such as gardening. Furthermore, the gullies, manholes, ACO drains and surface water drainage pipes would assist in conveying the excess runoff to the outfalls.

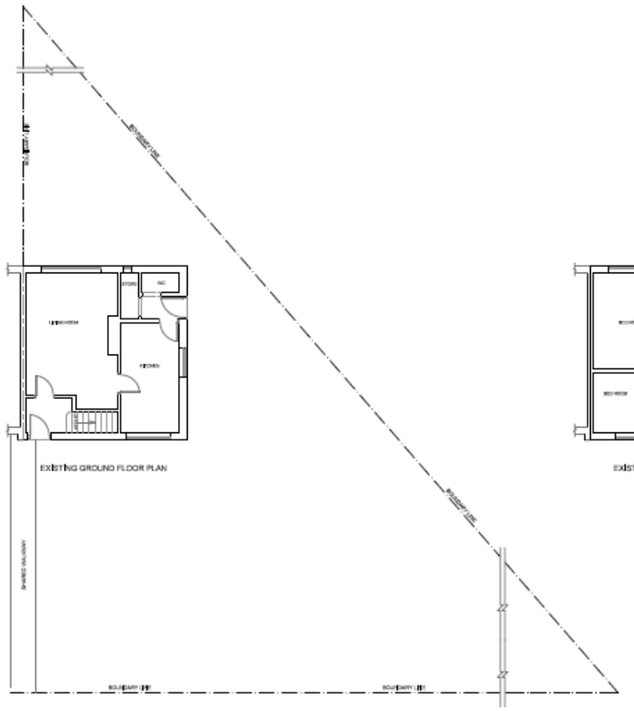
Thus, the proposed drainage layout would be sustainable throughout the development's design life, without deteriorating the Site itself or the surrounding areas.

The Site is not considered to be a surface water flood risk, taking into account the proposed surface water drainage strategy. Therefore, the finished ground floor level of the proposed side extension would be the same as the existing dwelling's ground floor level.

The access and egress from the Site during any expected flooding incident would be at Deepdale Avenue, located in front of the Site.

The excess generated wastewater flow by the proposed side extension was estimated to be approximately 0.003 litres/sec. However, a confirmation of consent agreement from United Utilities will be obtained before utilising the proposed dwelling.

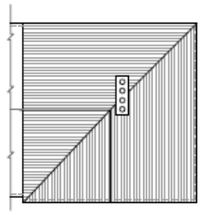
Appendix I: The layout of the existing development.



EXISTING GROUND FLOOR PLAN



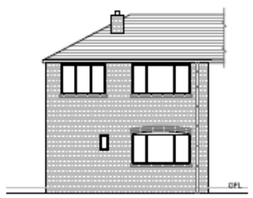
EXISTING FIRST FLOOR PLAN



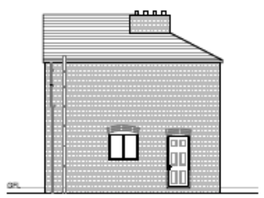
EXISTING ROOF PLAN



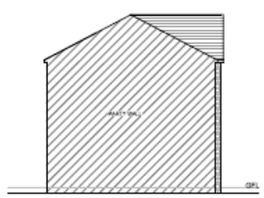
EXISTING FRONT ELEVATION



EXISTING REAR ELEVATION



EXISTING SIDE ELEVATION (WEST VIEW)



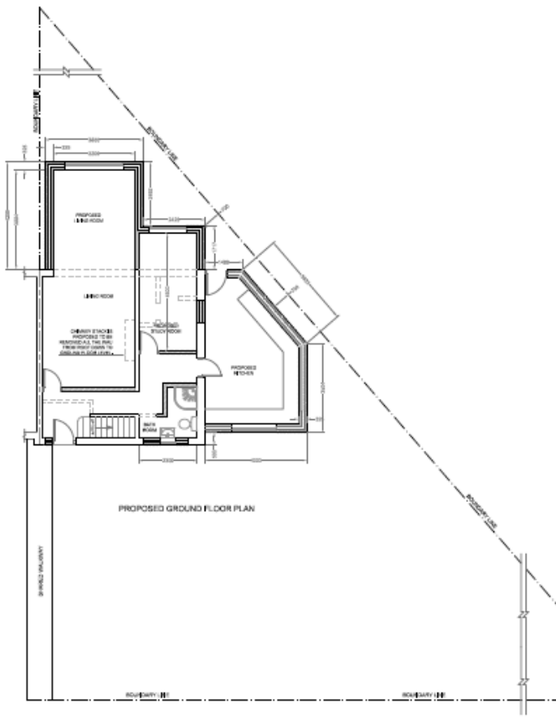
EXISTING SIDE ELEVATION (EAST VIEW)

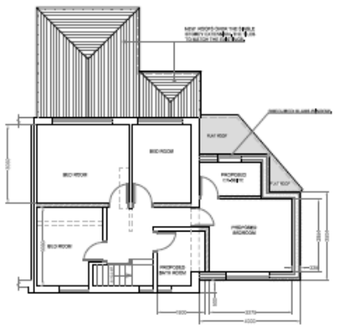
Date	Rev.		Initials	

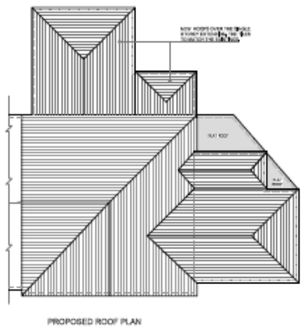
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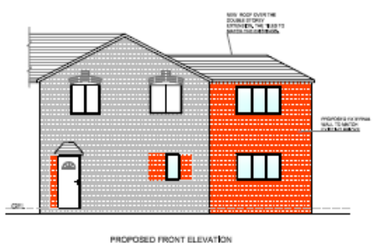
Project: 26 DEEPDALE AVENUE, MANCHESTER, M20 1BF	Client: MR M. NAZARI
Title: EXISTING FLOORS PLANS & ELEVATIONS	
	Date: JUNE 2023
	Scale: 1:100 @ A1 SHEET
	Drawing No.: HS2304 - 01 REV.:

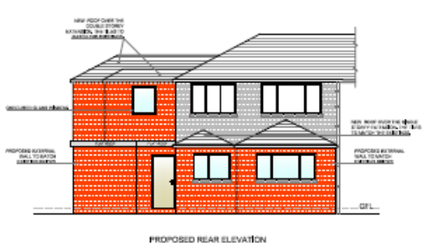
Appendix II: The layout of the proposed development.

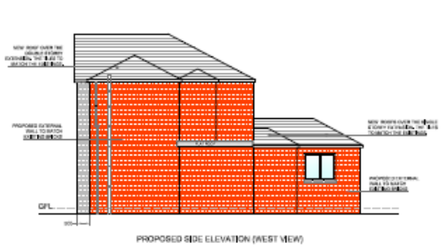


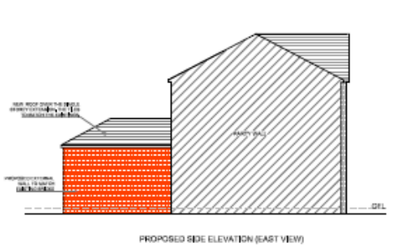








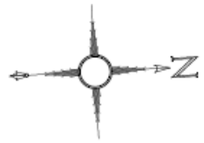


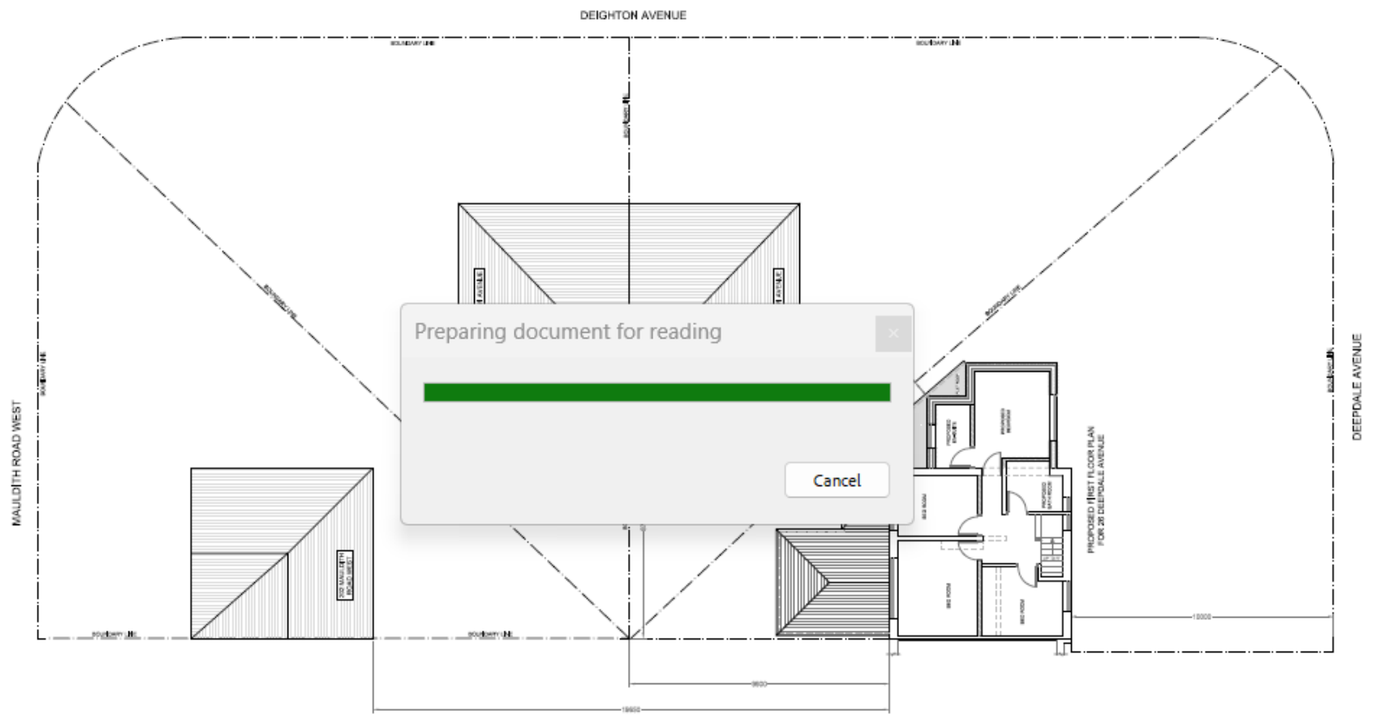


Date	Rev.		Initials

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- THESE DRAWINGS ARE PREPARED FOR PLANNING PURPOSES ONLY.

Project: 26 DEEPDALE AVENUE, MANCHESTER, M20 1BF	Client: MR M. NAZARI
Title: PROPOSED FLOORS PLANS & ELEVATIONS	
	Date: JULY 2023
	Scale: 1:100 @ A1 SHEET
	Drawing No.: HS2304- 02 REV.: A





SCALE BAR 1:100

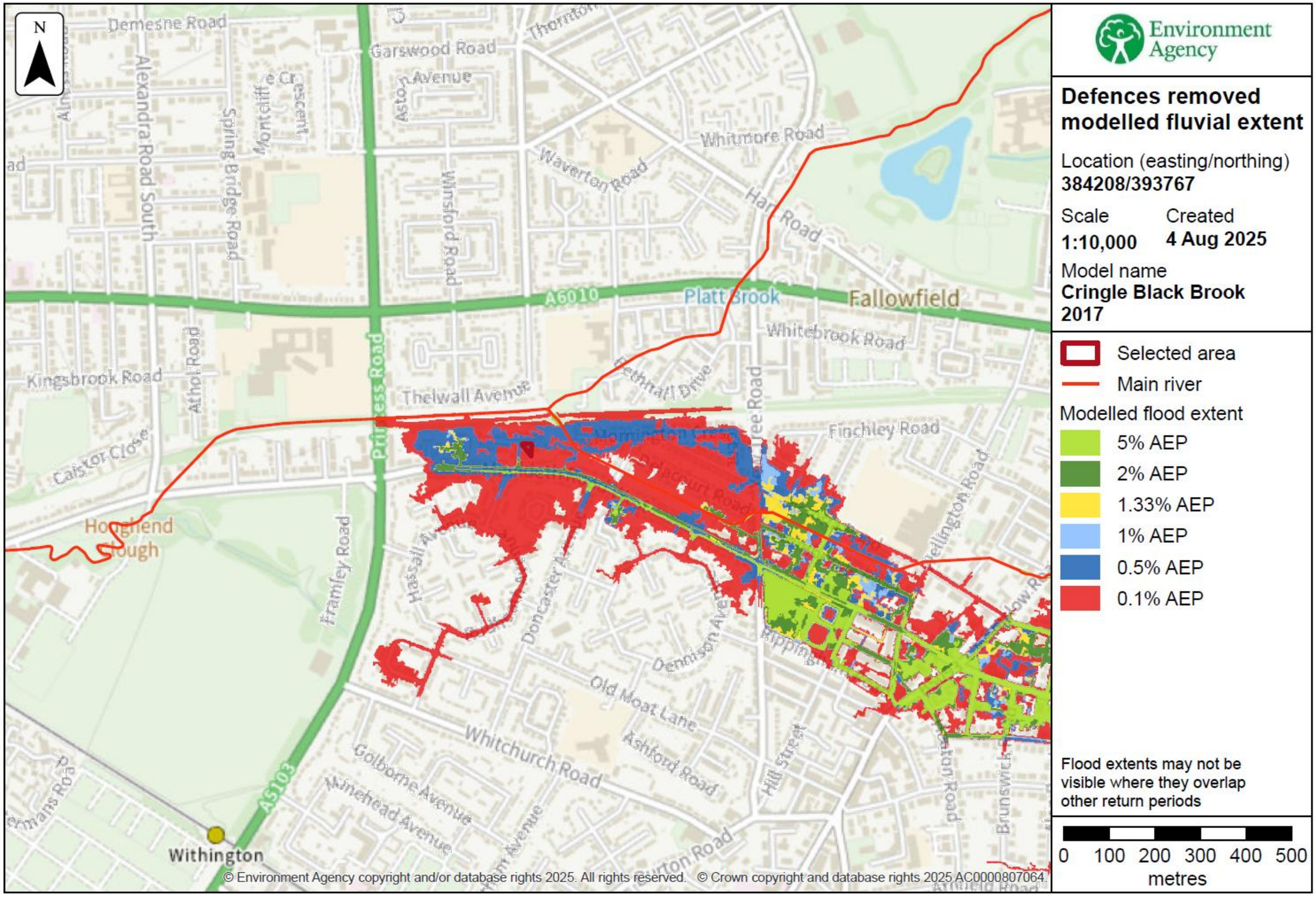
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Date	Rev.		Initials

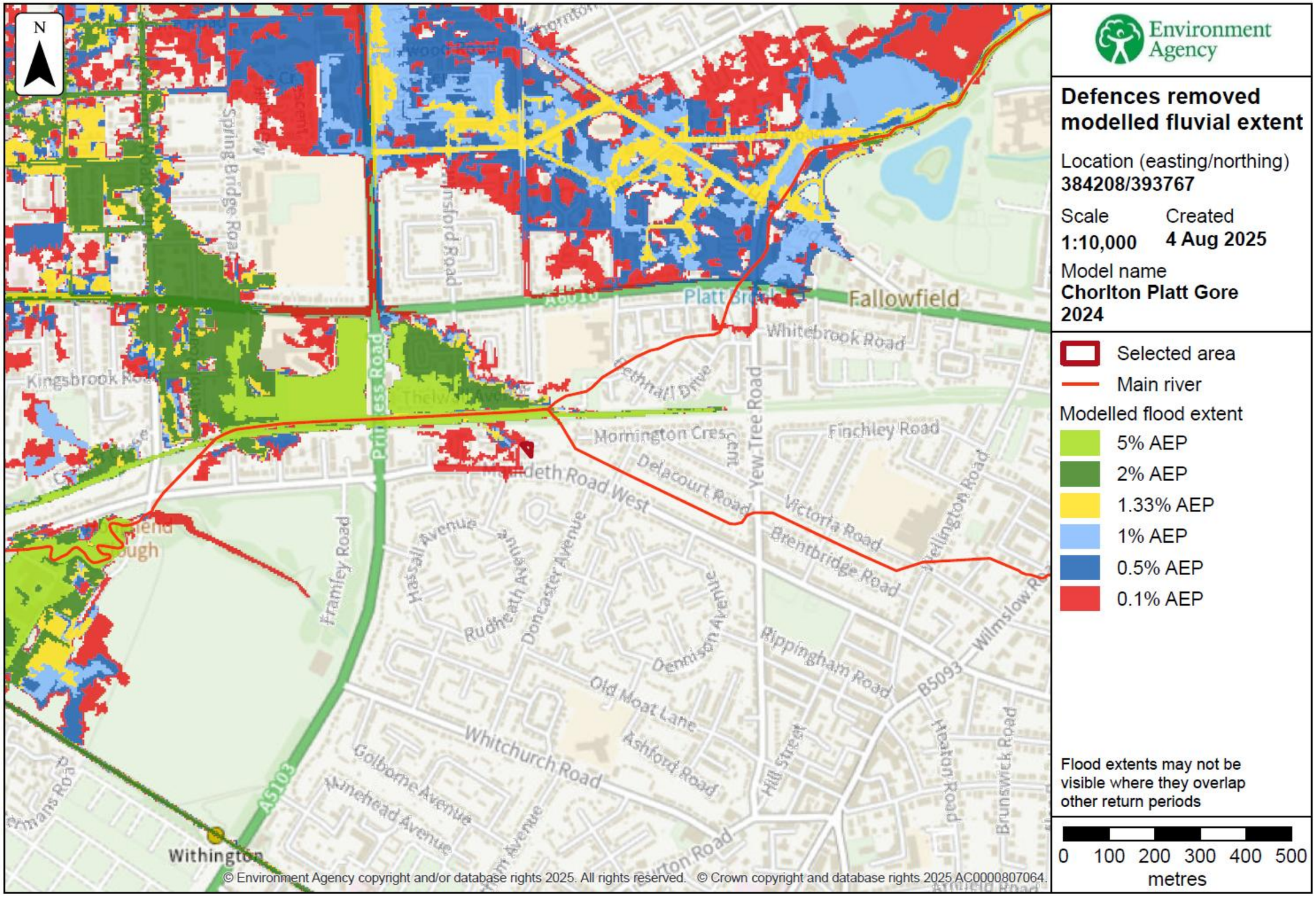
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Project: 26 DEEPDALE AVENUE, MANCHESTER, M20 1BF	Client: MR M. NAZARI
Title: PROPOSED SITE PLAN	
	Date: JULY 2023
	Scale: 1:100 @ A1 SHEET
	Drawing No.: HS2304 - 04 / Rev.: A

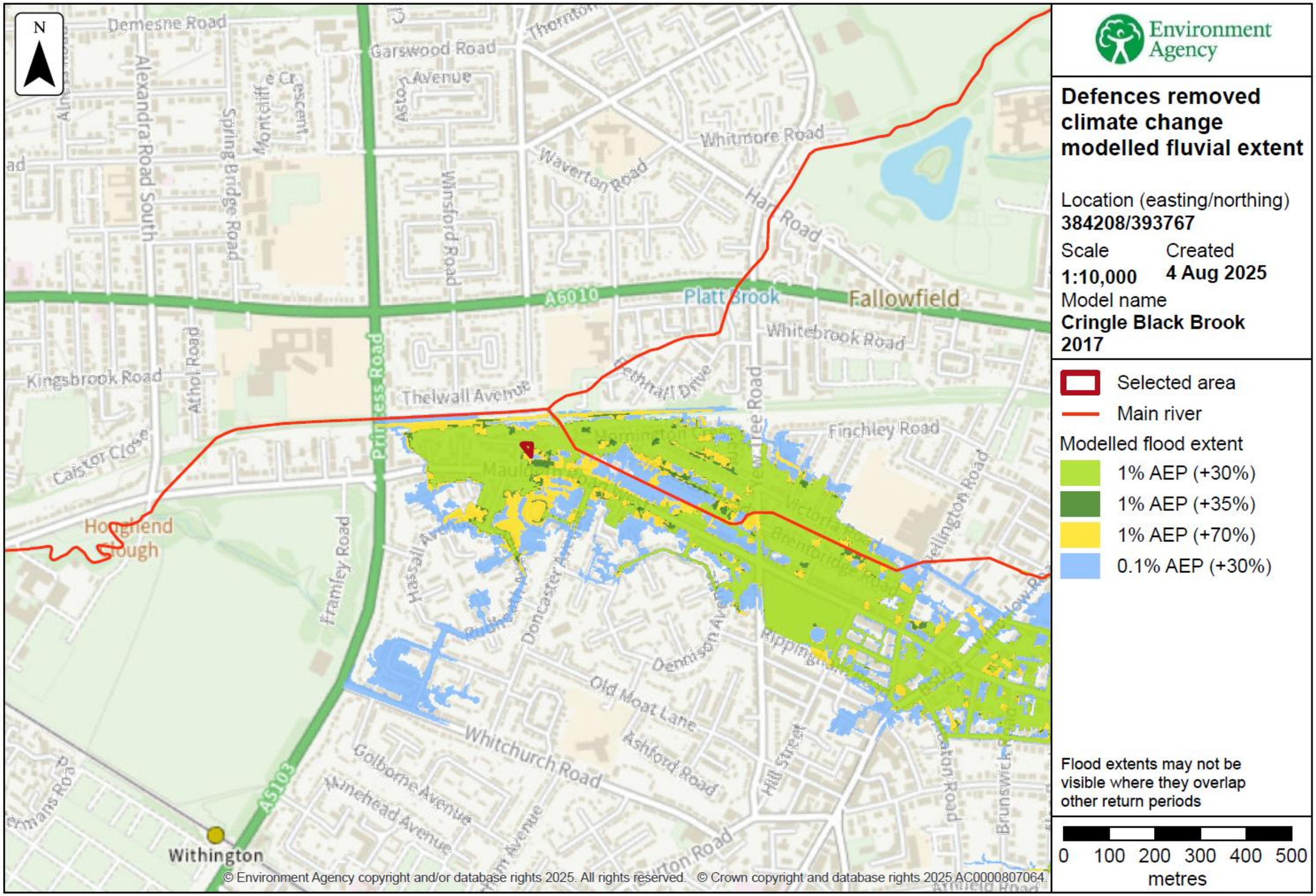
Appendix III: Defences removed – modelled fluvial flood extent, Cringle Black Brook, 2017



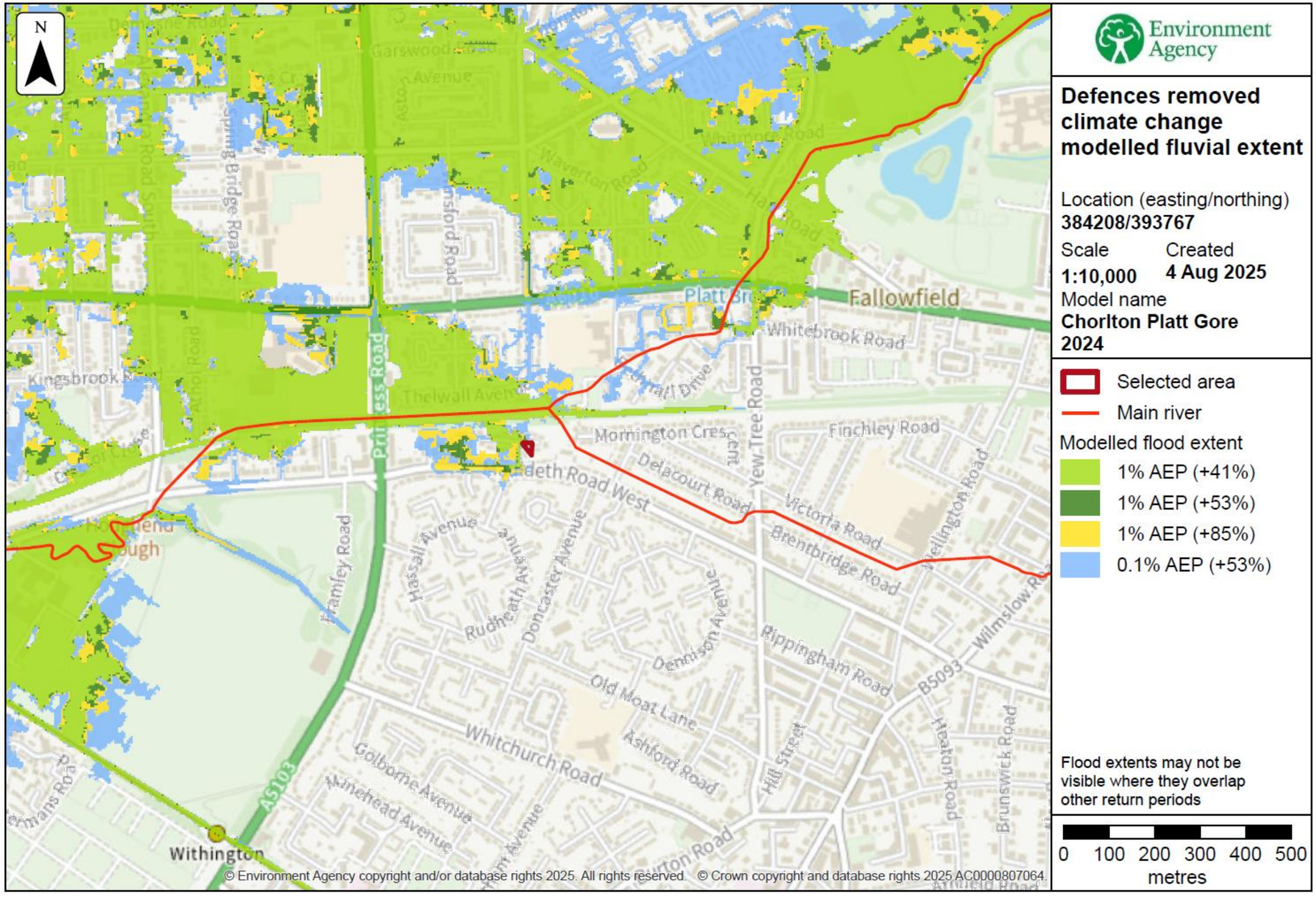
Appendix IV: Defences removed – modelled fluvial flood extent, Chorlton Platt Gore, 2024



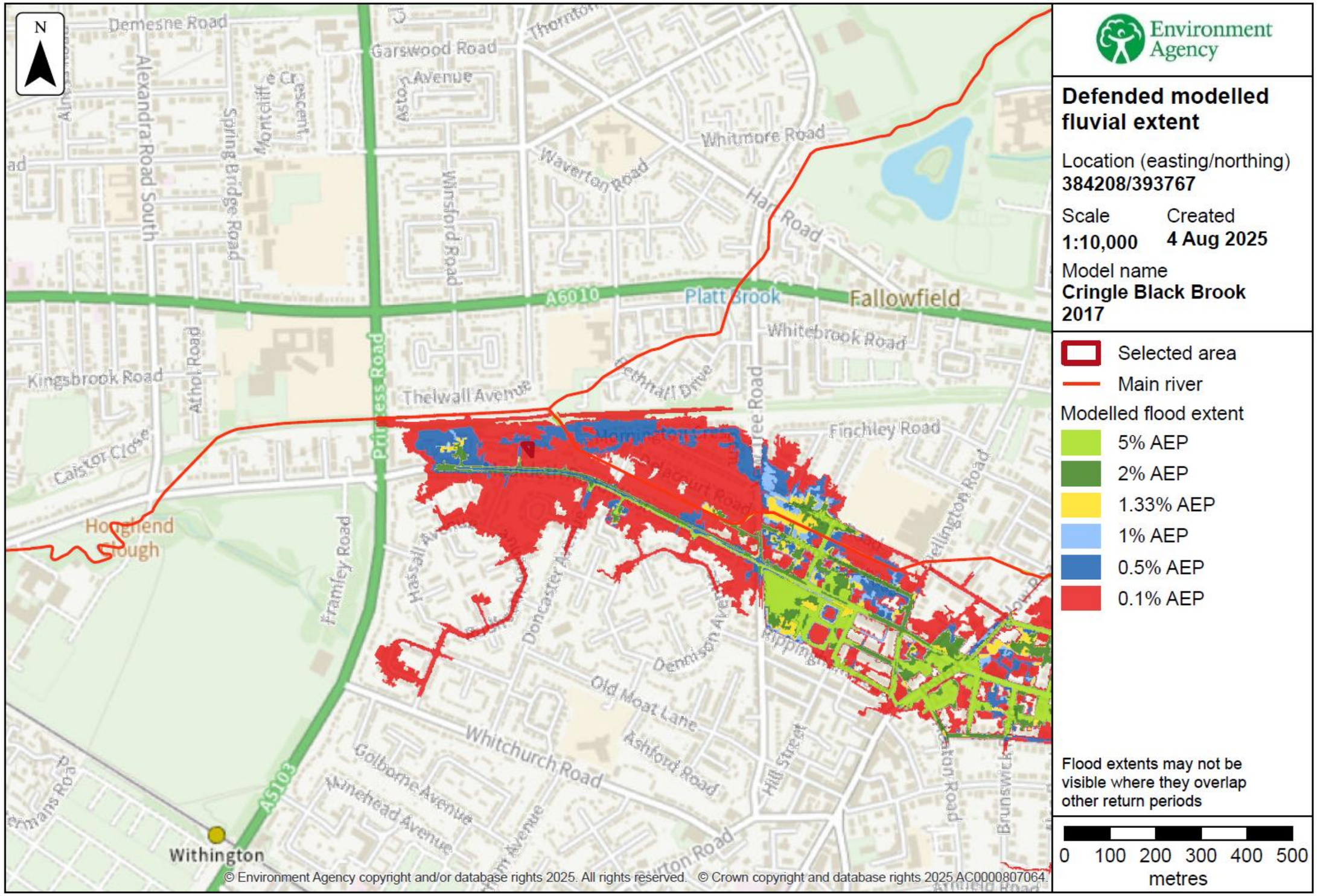
Appendix V: Defences removed – modelled fluvial flood extent for the climate change allowance, Cringle Black Brook, 2017



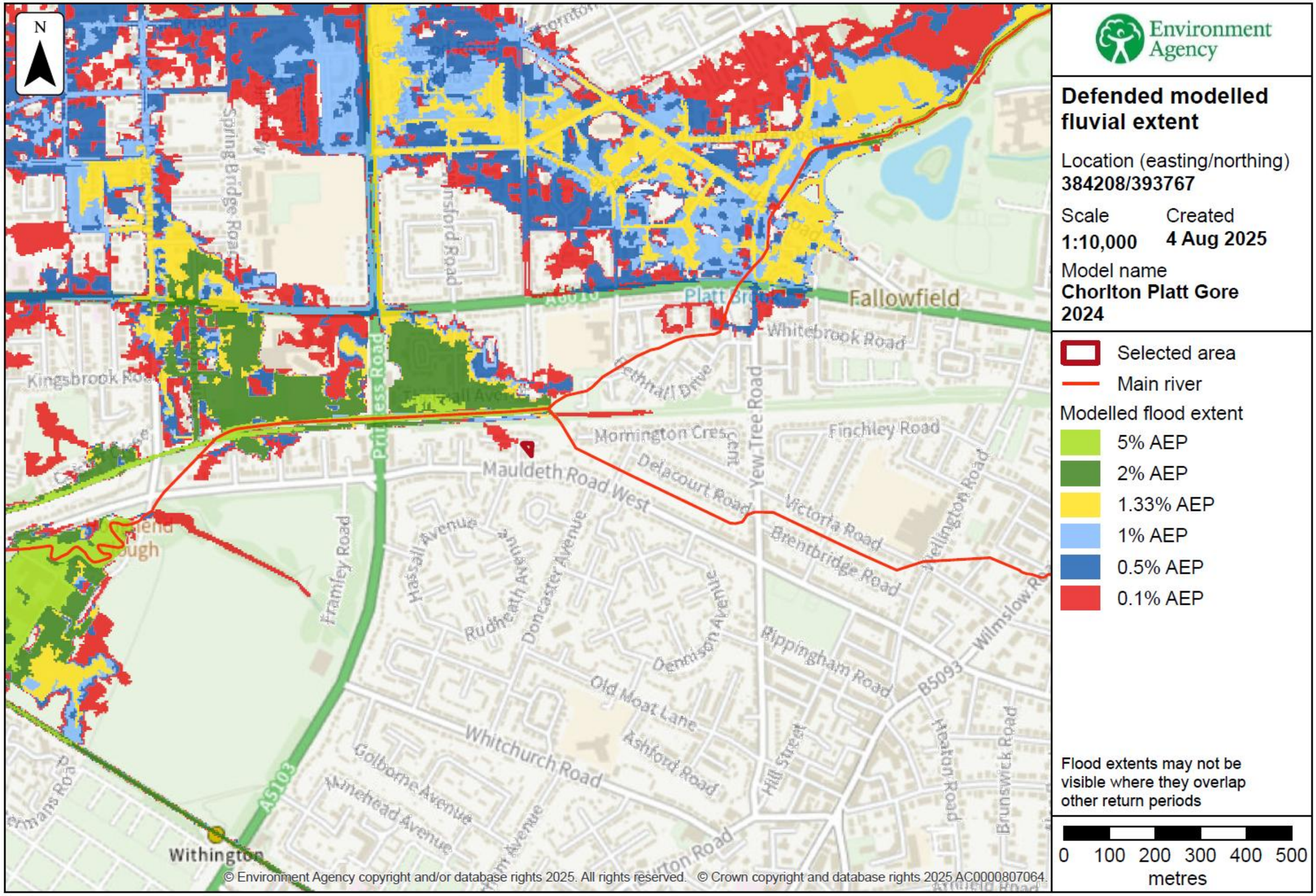
Appendix VI: Defences removed – modelled fluvial flood extent for the climate change allowance, Chorlton Platt Gore, 2024



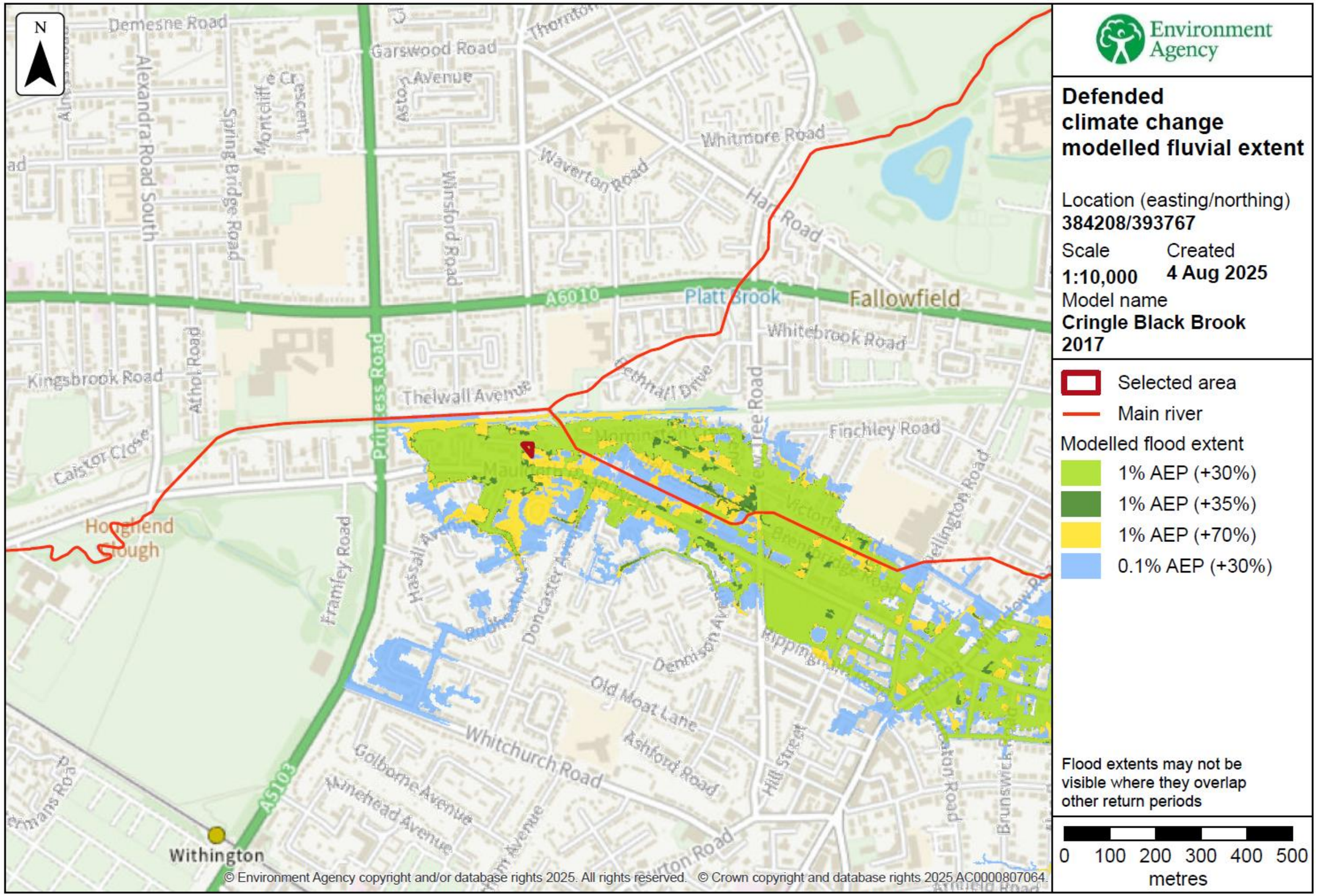
Appendix VII: Defended – modelled fluvial flood extent, Cringle Black Brook, 2017



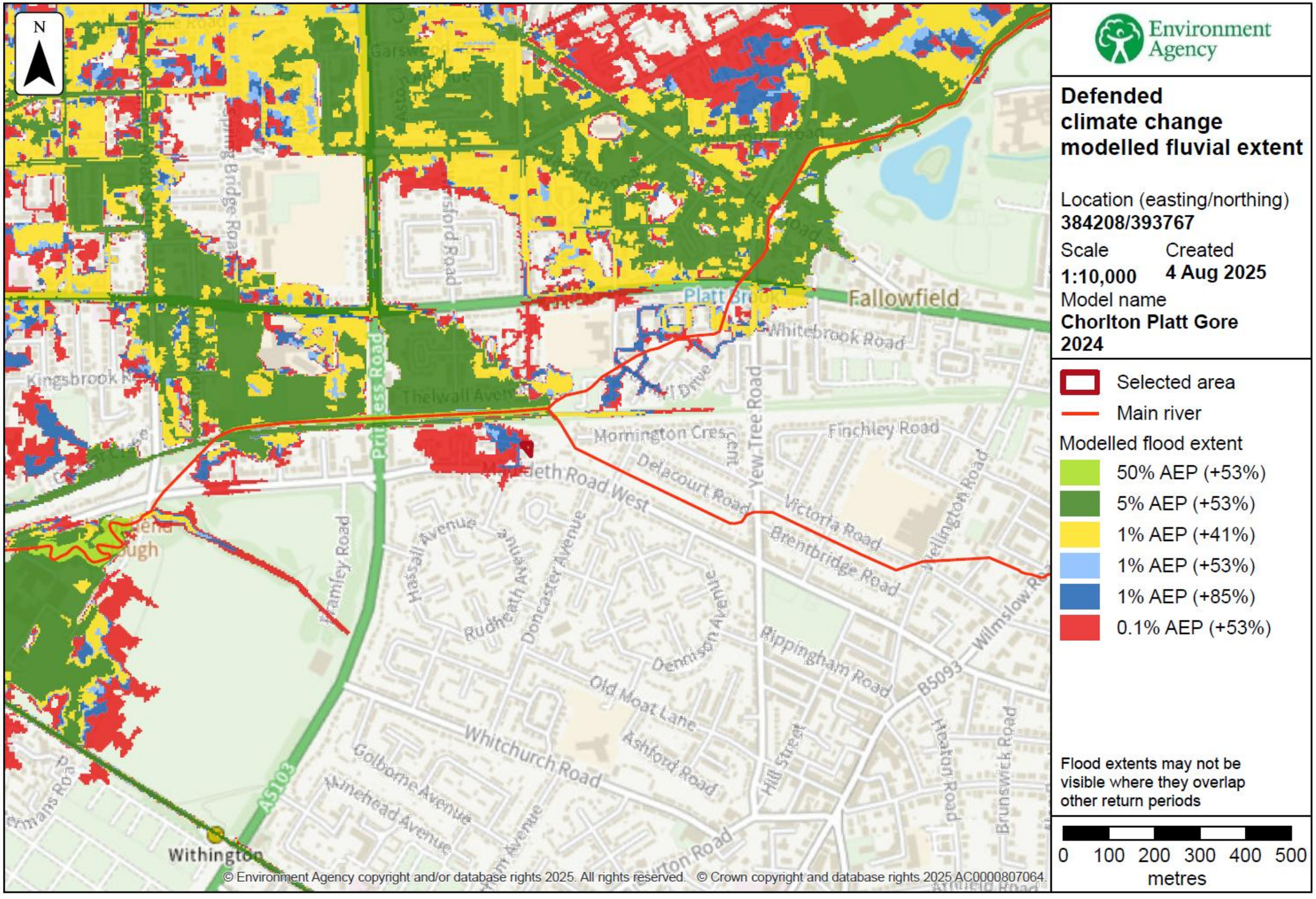
Appendix VIII: Defended – modelled fluvial flood extent, Chorlton Platt Gore, 2024



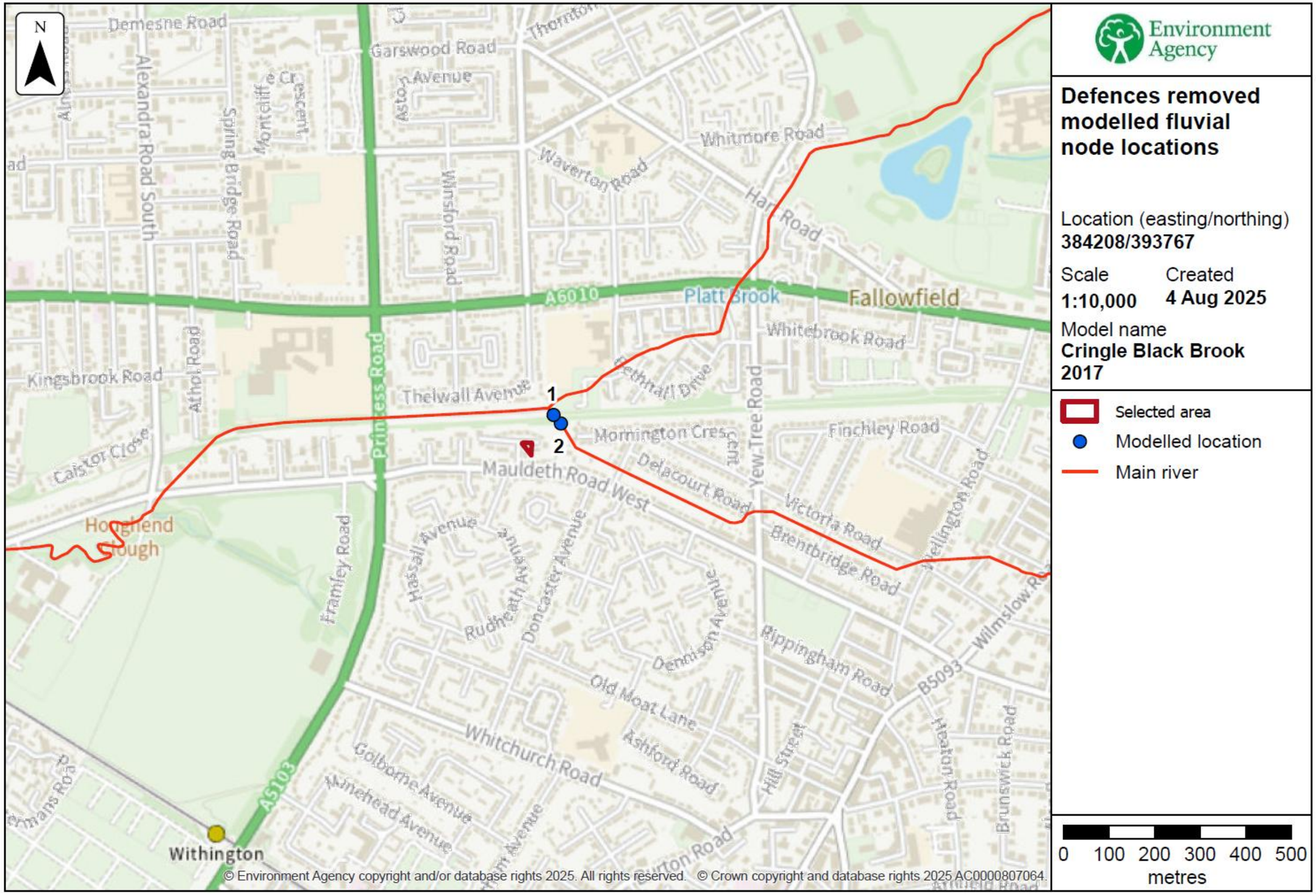
Appendix IX: Defended – modelled fluvial flood extent for the climate change allowance, Cringle Black Brook, 2017



Appendix X: Defended – modelled fluvial flood extent for the climate change allowance, Chorlton Platt Gore, 2024



Appendix XI: Defences removed – modelled fluvial node locations, and level and flow at the nodes, Cringle Black Brook, 2017



Modelled node locations data

Defences removed

Label	Modelled location ID	Easting	Northing	50% AEP	20% AEP	10% AEP	5% AEP	4% AEP	3.33% AEP	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
				Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level
1	1440128	384264	393837	31.85	31.85	31.85	31.85	31.85	31.85	31.85	31.85	31.85	31.85	31.89
2	1440127	384280	393819	31.85	31.85	31.85	31.85	31.85	31.85	31.85	31.85	31.85	31.85	31.89

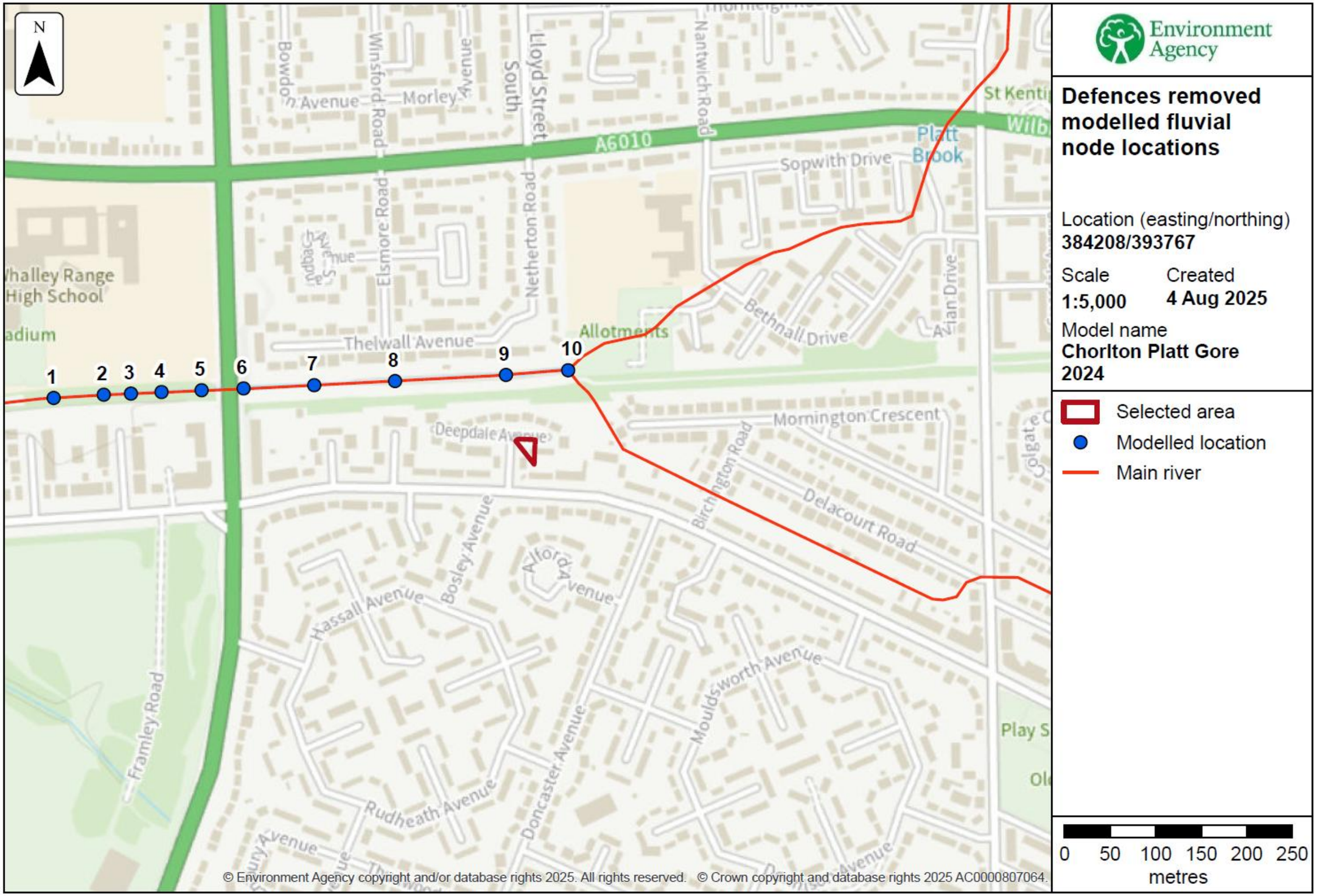
Data in this table comes from the Cringle Black Brook 2017 model.
Level values are shown in mAOD, and flow values are shown in cubic metres per second.
Any blank cells show where a particular scenario has not been modelled for this location.

Defences removed

Label	Modelled location ID	Easting	Northing	50% AEP	20% AEP	10% AEP	5% AEP	4% AEP	3.33% AEP	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
				Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow
1	1440128	384264	393837	3.02	3.68	3.96	3.96	3.96	3.96	3.96	3.96	3.96	3.96	4.24
2	1440127	384280	393819	3.02	3.68	3.96	3.96	3.96	3.96	3.96	3.96	3.96	3.96	3.98

Data in this table comes from the Cringle Black Brook 2017 model.
Level values are shown in mAOD, and flow values are shown in cubic metres per second.
Any blank cells show where a particular scenario has not been modelled for this location.

Appendix XII: Defences removed – modelled fluvial node locations, and level and flow at the nodes, Chorlton Platt Gore, 2024



Modelled node locations data

Defences removed

Label	Modelled location ID	Easting	Northing	50% AEP	20% AEP	10% AEP	5% AEP	3.33% AEP	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
				Level	Level	Level	Level	Level	Level	Level	Level	Level	Level
1	1600820	383688	393822	29.69	29.93	30.18	30.70	30.92	31.01	31.05	31.05	31.11	31.18
2	1600867	383742	393825	30.14	30.36	30.54	30.82	30.96	31.03	31.07	31.07	31.12	31.19
3	1600962	383772	393827	30.33	30.56	30.73	30.91	30.99	31.06	31.09	31.09	31.14	31.21
4	1600822	383806	393828	30.47	30.73	30.89	31.05	31.09	31.13	31.15	31.16	31.18	31.23
5	1600982	383850	393830	30.65	30.92	31.08	31.18	31.21	31.23	31.24	31.28	31.26	31.29
6	1600855	383896	393832	30.63	30.94	31.13	31.27	31.30	31.34	31.36	31.38	31.41	31.49
7	1600854	383973	393836	30.88	31.16	31.34	31.47	31.51	31.54	31.59	31.63	31.68	31.80
8	1600859	384062	393840	31.15	31.39	31.52	31.63	31.66	31.69	31.71	31.73	31.76	31.85
9	1600941	384184	393847	31.44	31.71	31.85	32.0	32.06	32.11	32.14	32.15	32.17	32.22
10	1600837	384252	393852	31.59	31.80	31.93	32.05	32.11	32.15	32.17	32.19	32.21	32.28

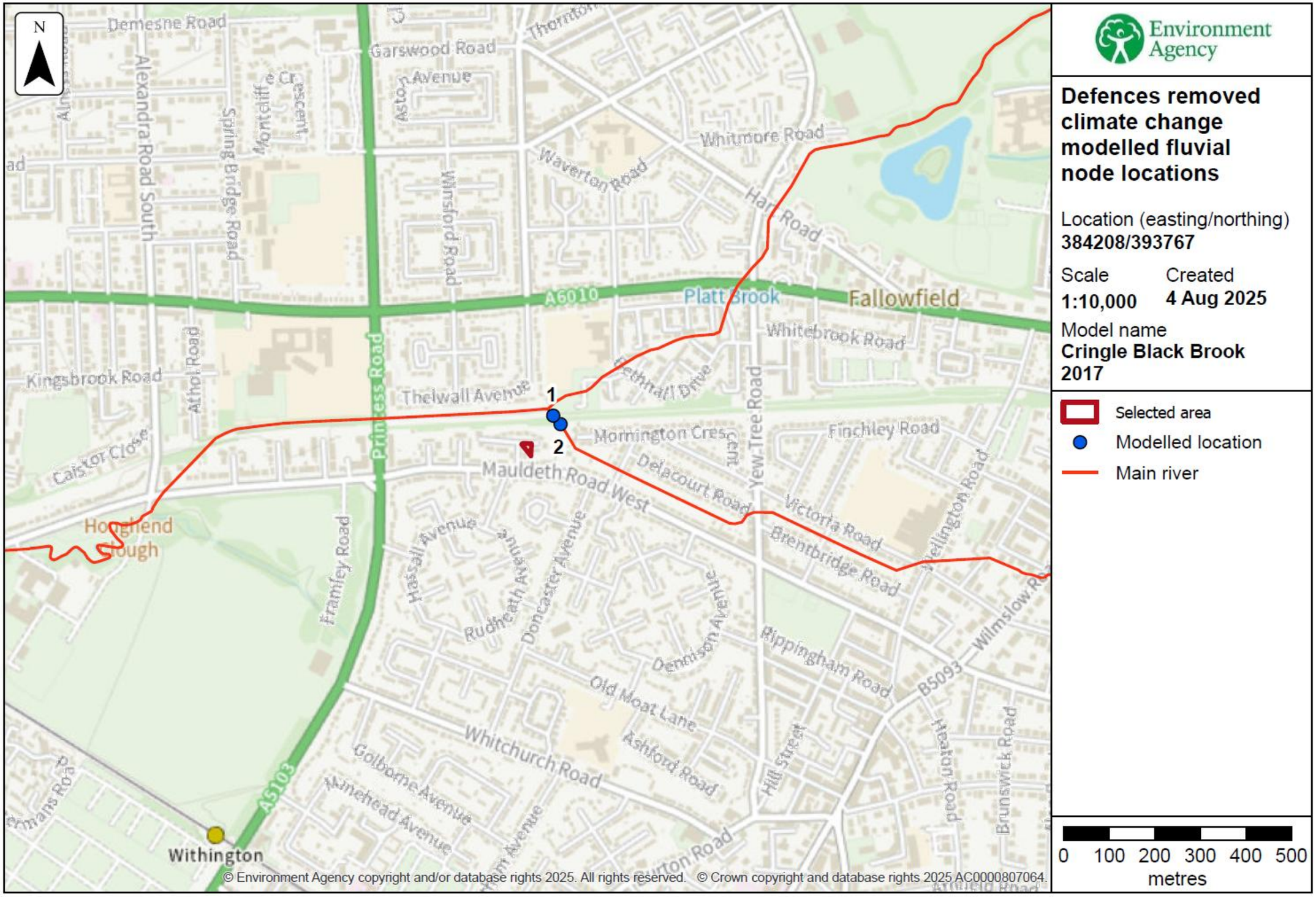
Data in this table comes from the Chorlton Platt Gore 2024 model.
Level values are shown in mAOD, and flow values are shown in cubic metres per second.
Any blank cells show where a particular scenario has not been modelled for this location.

Defences removed

Label	Modelled location ID	Easting	Northing	50% AEP	20% AEP	10% AEP	5% AEP	3.33% AEP	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
				Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow
1	1600820	383688	393822	12.15	16.84	19.73	21.83	22.36	22.64	22.73	23.87	22.84	22.97
2	1600867	383742	393825	12.15	16.84	19.75	21.84	22.26	22.44	22.58	23.72	22.69	22.84
3	1600962	383772	393827	12.15	16.85	19.76	21.77	22.24	22.60	22.74	24.53	23.04	23.45
4	1600822	383806	393828	12.15	16.85	19.77	21.25	21.73	22.21	22.41	24.76	23.62	25.31
5	1600982	383850	393830	12.16	16.85	19.84	22.69	24.01	25.0	26.02	27.10	28.36	31.51
6	1600855	383896	393832	12.16	16.84	19.75	22.38	23.55	24.38	25.21	26.04	27.16	29.43
7	1600854	383973	393836	12.16	16.17	18.16	20.44	21.55	22.43	23.09	23.50	23.61	24.54
8	1600859	384062	393840	12.16	16.87	19.85	23.30	25.02	26.45	27.23	27.83	28.21	29.49
9	1600941	384184	393847	12.17	15.38	17.52	19.99	21.20	22.48	23.52	24.17	24.98	27.99
10	1600837	384252	393852	11.95	16.52	19.52	22.88	24.52	26.21	27.56	28.24	29.25	32.09

Data in this table comes from the Chorlton Platt Gore 2024 model.
Level values are shown in mAOD, and flow values are shown in cubic metres per second.
Any blank cells show where a particular scenario has not been modelled for this location.

Appendix XIII: Defences removed – modelled fluvial node locations, and level and flow at the nodes for the climate change allowance, Cringle Black Brook, 2017



Modelled node locations data

Defences removed climate change

Label	Modelled location ID	Easting	Northing	1% AEP (+30%)	1% AEP (+35%)	1% AEP (+70%)	0.1% AEP (+30%)
				Level	Level	Level	Level
1	1440128	384264	393837	31.85	31.85	31.86	31.91
2	1440127	384280	393819	31.85	31.85	31.85	31.91

Data in this table comes from the Cringle Black Brook 2017 model.
Level values are shown in mAOD, and flow values are shown in cubic metres per second.
Any blank cells show where a particular scenario has not been modelled for this location.

Defences removed climate change

Label	Modelled location ID	Easting	Northing	1% AEP (+30%)	1% AEP (+35%)	1% AEP (+70%)	0.1% AEP (+30%)
				Flow	Flow	Flow	Flow
1	1440128	384264	393837	3.97	3.97	3.97	4.75
2	1440127	384280	393819	3.97	3.97	3.97	3.99

Data in this table comes from the Cringle Black Brook 2017 model.
Level values are shown in mAOD, and flow values are shown in cubic metres per second.
Any blank cells show where a particular scenario has not been modelled for this location.

Appendix XIV: Defences removed – modelled fluvial node locations, and level and flow at the nodes for the climate change allowance, Chorlton Platt Gore, 2024



Modelled node locations data

Defences removed climate change

Label	Modelled location ID	Easting	Northing	1% AEP (+41%)	1% AEP (+53%)	1% AEP (+85%)	0.1% AEP (+53%)
				Level	Level	Level	Level
1	1600820	383688	393822	31.13	31.14	31.18	31.24
2	1600867	383742	393825	31.15	31.16	31.19	31.25
3	1600962	383772	393827	31.16	31.18	31.21	31.26
4	1600822	383806	393828	31.20	31.21	31.23	31.28
5	1600982	383850	393830	31.27	31.28	31.29	31.32
6	1600855	383896	393832	31.44	31.45	31.50	31.57
7	1600854	383973	393836	31.73	31.75	31.81	31.90
8	1600859	384062	393840	31.80	31.81	31.86	31.93
9	1600941	384184	393847	32.20	32.20	32.23	32.26
10	1600837	384252	393852	32.25	32.25	32.29	32.33

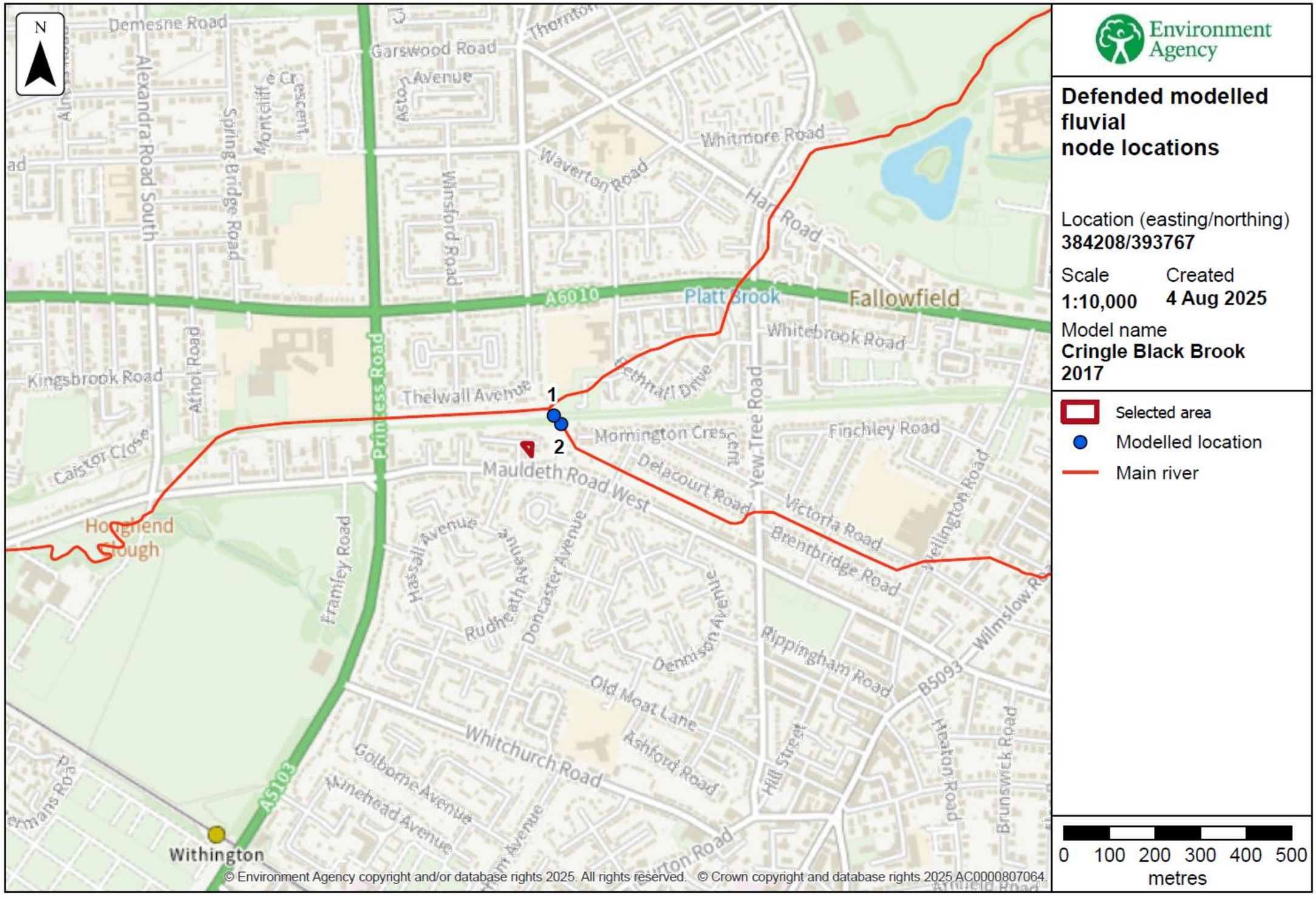
Data in this table comes from the Chorlton Platt Gore 2024 model.
Level values are shown in mAOD, and flow values are shown in cubic metres per second.
Any blank cells show where a particular scenario has not been modelled for this location.

Defences removed climate change

Label	Modelled location ID	Easting	Northing	1% AEP (+41%)	1% AEP (+53%)	1% AEP (+85%)	0.1% AEP (+53%)
				Flow	Flow	Flow	Flow
1	1600820	383688	393822	22.89	22.89	22.91	22.97
2	1600867	383742	393825	22.75	22.78	22.83	23.35
3	1600962	383772	393827	23.18	23.23	23.71	25.08
4	1600822	383806	393828	24.25	24.54	25.66	27.40
5	1600982	383850	393830	29.51	30.11	31.84	34.94
6	1600855	383896	393832	28.10	28.36	29.86	31.81
7	1600854	383973	393836	23.97	23.85	24.26	25.13
8	1600859	384062	393840	28.72	29.02	29.56	30.61
9	1600941	384184	393847	26.14	26.34	28.26	31.83
10	1600837	384252	393852	30.12	30.82	32.46	36.21

Data in this table comes from the Chorlton Platt Gore 2024 model.
Level values are shown in mAOD, and flow values are shown in cubic metres per second.
Any blank cells show where a particular scenario has not been modelled for this location.

Appendix XV: Defended – modelled fluvial node locations, and level and flow at the nodes, Cringle Black Brook, 2017



Modelled node locations data

Defended

Label	Modelled location ID	Easting	Northing	50% AEP	20% AEP	10% AEP	5% AEP	4% AEP	3.33% AEP	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
				Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level
1	1440128	384264	393837	31.85	31.85	31.85	31.85	31.85	31.85	31.85	31.85	31.85	31.85	31.89
2	1440127	384280	393819	31.85	31.85	31.85	31.85	31.85	31.85	31.85	31.85	31.85	31.85	31.89

Data in this table comes from the Cringle Black Brook 2017 model.
Level values are shown in mAOD, and flow values are shown in cubic metres per second.
Any blank cells show where a particular scenario has not been modelled for this location.

Defended

Label	Modelled location ID	Easting	Northing	50% AEP	20% AEP	10% AEP	5% AEP	4% AEP	3.33% AEP	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
				Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow
1	1440128	384264	393837	3.02	3.68	3.96	3.96	3.96	3.96	3.96	3.96	3.96	3.96	4.24
2	1440127	384280	393819	3.02	3.68	3.96	3.96	3.96	3.96	3.96	3.96	3.96	3.96	3.98

Data in this table comes from the Cringle Black Brook 2017 model.
Level values are shown in mAOD, and flow values are shown in cubic metres per second.
Any blank cells show where a particular scenario has not been modelled for this location.

Appendix XVI: Defended – modelled fluvial node locations, and level and flow at the nodes, Chorlton Platt Gore, 2024



Modelled node locations data

Defended

Label	Modelled location ID	Easting	Northing	50% AEP	20% AEP	10% AEP	5% AEP	3.33% AEP	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
				Level	Level	Level	Level	Level	Level	Level	Level	Level	Level
1	1600820	383688	393822	29.69	29.93	30.18	30.82	31.04	31.09	31.11	31.12	31.14	31.18
2	1600867	383742	393825	30.14	30.36	30.54	30.96	31.15	31.19	31.20	31.21	31.23	31.25
3	1600962	383772	393827	30.33	30.56	30.74	31.04	31.21	31.25	31.26	31.26	31.28	31.30
4	1600822	383806	393828	30.48	30.73	30.89	31.14	31.29	31.33	31.34	31.35	31.37	31.41
5	1600982	383850	393830	30.65	30.92	31.08	31.30	31.42	31.46	31.47	31.48	31.50	31.56
6	1600855	383896	393832	30.63	30.95	31.14	31.38	31.52	31.56	31.58	31.59	31.63	31.72
7	1600854	383973	393836	30.88	31.15	31.32	31.52	31.63	31.67	31.68	31.69	31.74	31.84
8	1600859	384062	393840	31.16	31.42	31.58	31.76	31.83	31.86	31.87	31.87	31.93	32.0
9	1600941	384184	393847	31.44	31.71	31.87	32.04	32.10	32.13	32.14	32.15	32.17	32.23
10	1600837	384252	393852	31.59	31.85	32.01	32.17	32.23	32.27	32.28	32.29	32.32	32.37

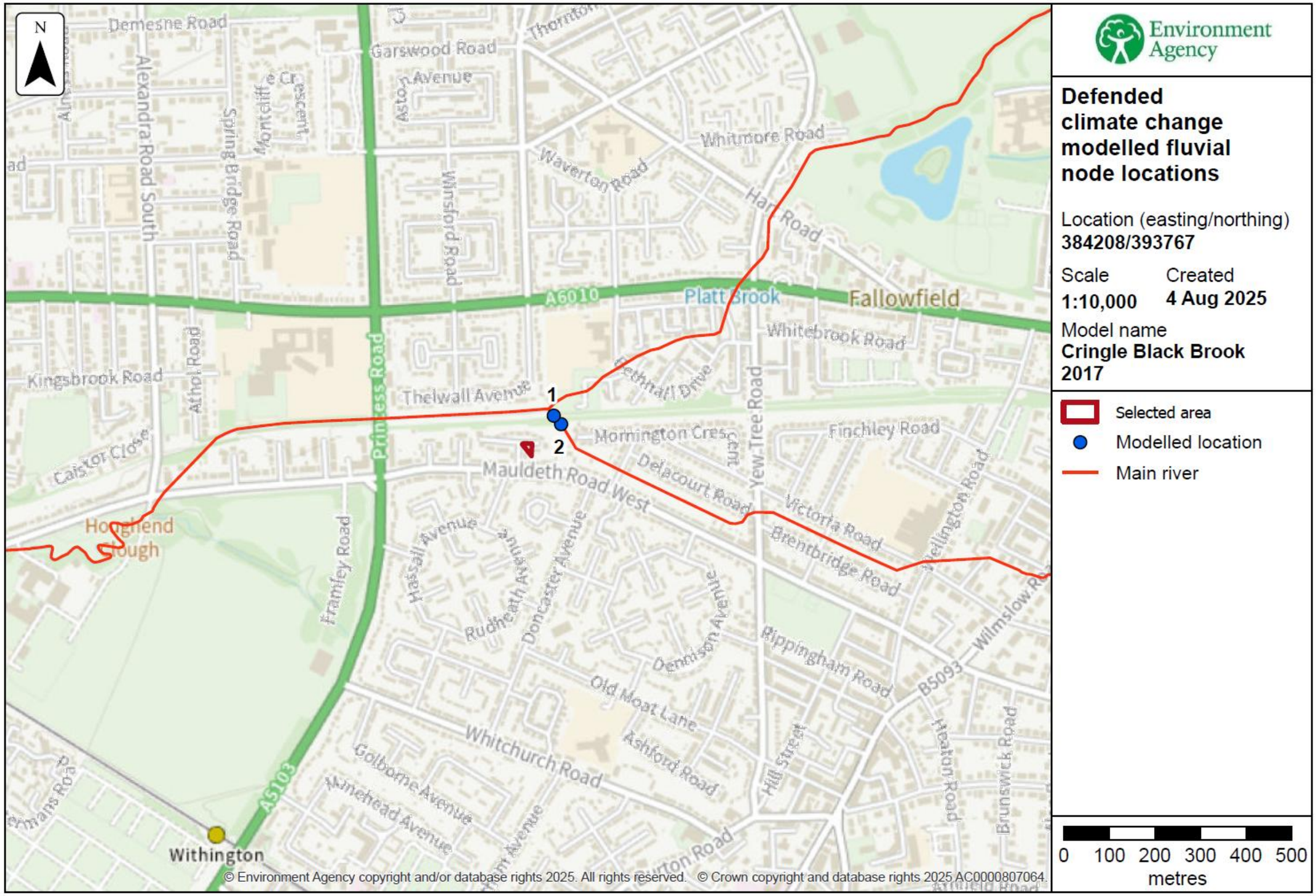
Data in this table comes from the Chorlton Platt Gore 2024 model.
Level values are shown in mAOD, and flow values are shown in cubic metres per second.
Any blank cells show where a particular scenario has not been modelled for this location.

Defended

Label	Modelled location ID	Easting	Northing	50% AEP	20% AEP	10% AEP	5% AEP	3.33% AEP	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
				Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow
1	1600820	383688	393822	12.19	16.86	19.90	23.10	23.99	24.39	24.52	24.64	24.93	25.88
2	1600867	383742	393825	12.19	16.86	19.92	23.21	24.11	24.49	24.69	24.85	25.54	27.90
3	1600962	383772	393827	12.19	16.86	19.93	23.24	24.14	24.55	24.75	25.0	26.17	28.84
4	1600822	383806	393828	12.19	16.87	19.94	23.26	24.20	24.59	24.83	25.01	26.18	28.85
5	1600982	383850	393830	12.19	16.87	19.95	23.30	24.25	24.65	24.91	25.15	26.47	29.67
6	1600855	383896	393832	12.20	16.87	19.96	23.31	24.27	24.71	24.97	25.19	25.95	27.96
7	1600854	383973	393836	12.20	16.87	19.96	23.34	24.32	24.77	25.13	25.28	25.76	27.07
8	1600859	384062	393840	12.20	16.88	19.97	23.39	24.71	25.74	26.12	26.52	27.30	29.20
9	1600941	384184	393847	12.20	16.88	19.97	23.40	25.01	26.56	27.13	27.72	28.92	31.79
10	1600837	384252	393852	11.95	16.52	19.53	22.89	24.47	26.10	26.75	27.38	28.65	31.88

Data in this table comes from the Chorlton Platt Gore 2024 model.
Level values are shown in mAOD, and flow values are shown in cubic metres per second.
Any blank cells show where a particular scenario has not been modelled for this location.

Appendix XVII: Defended – modelled fluvial node locations, and level and flow at the nodes for the climate change allowance, Cringle Black Brook, 2017



Modelled node locations data

Defended climate change

Label	Modelled location ID	Easting	Northing	1% AEP (+30%)	1% AEP (+35%)	1% AEP (+70%)	0.1% AEP (+30%)
				Level	Level	Level	Level
1	1440128	384264	393837	31.85	31.85	31.86	31.91
2	1440127	384280	393819	31.85	31.85	31.85	31.91

Data in this table comes from the Cringle Black Brook 2017 model.
Level values are shown in mAOD, and flow values are shown in cubic metres per second.
Any blank cells show where a particular scenario has not been modelled for this location.

Defended climate change

Label	Modelled location ID	Easting	Northing	1% AEP (+30%)	1% AEP (+35%)	1% AEP (+70%)	0.1% AEP (+30%)
				Flow	Flow	Flow	Flow
1	1440128	384264	393837	3.97	3.97	3.97	4.75
2	1440127	384280	393819	3.97	3.97	3.97	3.99

Data in this table comes from the Cringle Black Brook 2017 model.
Level values are shown in mAOD, and flow values are shown in cubic metres per second.
Any blank cells show where a particular scenario has not been modelled for this location.

Appendix XVIII: Defended – modelled fluvial node locations, and level and flow at the nodes for the climate change allowance, Chorlton Platt Gore, 2024



Modelled node locations data

Defended climate change

Label	Modelled location ID	Easting	Northing	50% AEP (+53%)	5% AEP (+53%)	1% AEP (+41%)	1% AEP (+53%)	1% AEP (+85%)	0.1% AEP (+53%)
				Level	Level	Level	Level	Level	Level
1	1600820	383688	393822	29.97	31.12	31.16	31.16	31.18	31.23
2	1600867	383742	393825	30.39	31.21	31.24	31.24	31.24	31.28
3	1600962	383772	393827	30.59	31.27	31.29	31.29	31.30	31.32
4	1600822	383806	393828	30.76	31.35	31.39	31.39	31.41	31.45
5	1600982	383850	393830	30.95	31.48	31.53	31.54	31.56	31.61
6	1600855	383896	393832	30.98	31.59	31.67	31.69	31.73	31.81
7	1600854	383973	393836	31.18	31.69	31.78	31.80	31.85	31.95
8	1600859	384062	393840	31.45	31.87	31.96	31.97	32.01	32.06
9	1600941	384184	393847	31.74	32.16	32.20	32.21	32.23	32.28
10	1600837	384252	393852	31.89	32.30	32.34	32.35	32.37	32.41

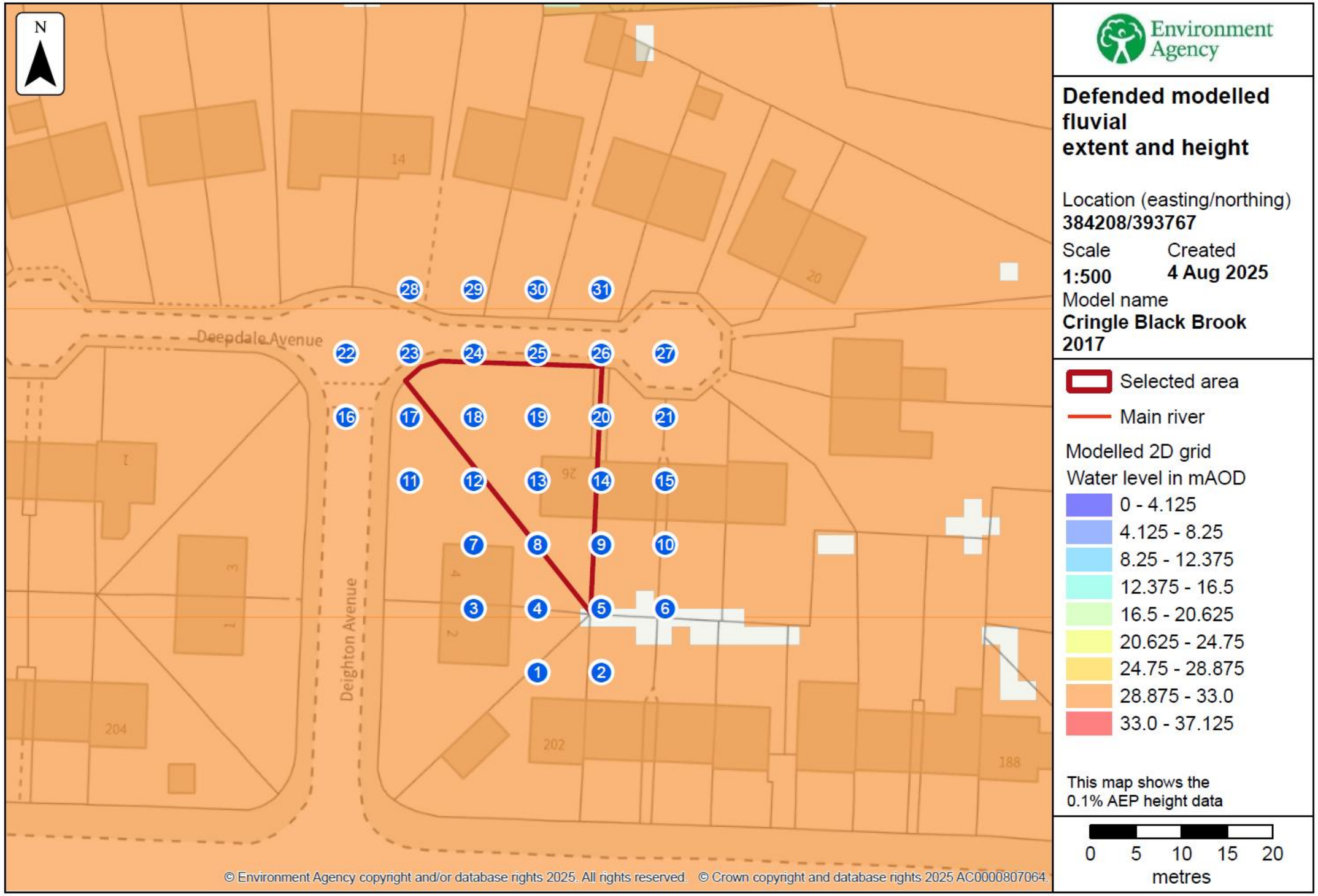
Data in this table comes from the Chorlton Platt Gore 2024 model.
Level values are shown in mAOD, and flow values are shown in cubic metres per second.
Any blank cells show where a particular scenario has not been modelled for this location.

Defended climate change

Label	Modelled location ID	Easting	Northing	50% AEP (+53%)	5% AEP (+53%)	1% AEP (+41%)	1% AEP (+53%)	1% AEP (+85%)	0.1% AEP (+53%)
				Flow	Flow	Flow	Flow	Flow	Flow
1	1600820	383688	393822	17.47	24.61	25.37	25.62	26.14	27.13
2	1600867	383742	393825	17.47	24.77	26.66	27.13	28.13	29.78
3	1600962	383772	393827	17.47	25.03	27.36	27.88	29.08	31.34
4	1600822	383806	393828	17.48	25.03	27.36	27.87	29.09	31.36
5	1600982	383850	393830	17.48	25.17	27.83	28.46	29.96	33.05
6	1600855	383896	393832	17.48	25.21	26.89	27.28	28.13	29.92
7	1600854	383973	393836	17.48	25.30	26.35	26.62	27.17	28.0
8	1600859	384062	393840	17.48	26.55	28.14	28.51	29.35	30.71
9	1600941	384184	393847	17.49	27.77	30.07	30.64	32.03	34.97
10	1600837	384252	393852	17.11	27.41	29.89	30.54	32.19	35.98

Data in this table comes from the Chorlton Platt Gore 2024 model.
Level values are shown in mAOD, and flow values are shown in cubic metres per second.
Any blank cells show where a particular scenario has not been modelled for this location.

Appendix XIX: Defended – modelled fluvial extent and height, Cringle Black Brook, 2017



Sample point data

Defended

Label	Easting	Northing	50% AEP	20% AEP	10% AEP	5% AEP	4% AEP	3.33% AEP	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
			Height	Height	Height	Height	Height	Height	Height	Height	Height	Height	Height
1	384209	393743	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	32.04
2	384216	393743	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	32.05
3	384202	393750	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	32.04
4	384209	393750	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	32.04
5	384216	393750	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	32.05
6	384223	393750	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	32.06
7	384202	393757	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	32.04
8	384209	393757	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	32.04
9	384216	393757	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	32.05
10	384223	393757	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	32.05
11	384195	393764	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	32.04
12	384202	393764	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	32.04

Label	Easting	Northing	50% AEP	20% AEP	10% AEP	5% AEP	4% AEP	3.33% AEP	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
			Height	Height	Height	Height	Height	Height	Height	Height	Height	Height	Height
13	384209	393764	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	32.04
14	384216	393764	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	32.05
15	384223	393764	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	32.05
16	384188	393771	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	32.04
17	384195	393771	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	32.04
18	384202	393771	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	31.70	32.04
19	384209	393771	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	31.70	32.04
20	384216	393771	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	31.74	32.05
21	384223	393771	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	32.05
22	384188	393778	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	32.04
23	384195	393778	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	31.67	32.04
24	384202	393778	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	31.69	32.04

Label	Easting	Northing	50% AEP	20% AEP	10% AEP	5% AEP	4% AEP	3.33% AEP	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
			Height	Height	Height	Height	Height	Height	Height	Height	Height	Height	Height
25	384209	393778	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	31.71	32.05
26	384216	393778	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	31.74	32.05
27	384223	393778	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	32.05
28	384195	393785	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	31.66	32.04
29	384202	393785	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	32.04
30	384209	393785	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	31.71	32.05
31	384216	393785	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	32.05
Max value in selected area:			NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	31.74	32.05

Data in this table comes from the Cringle Black Brook 2017 model. Height values are shown in mAOD, and depth values are shown in metres.
Any blank cells show where a particular scenario has not been modelled for this location.
Cells which contain text 'NoData' for a scenario show that return period has been modelled but there is no flood risk for that return period for that location.
'Max value in selected area' is the deepest depth or highest height at any location within your drawn boundary.

Defended

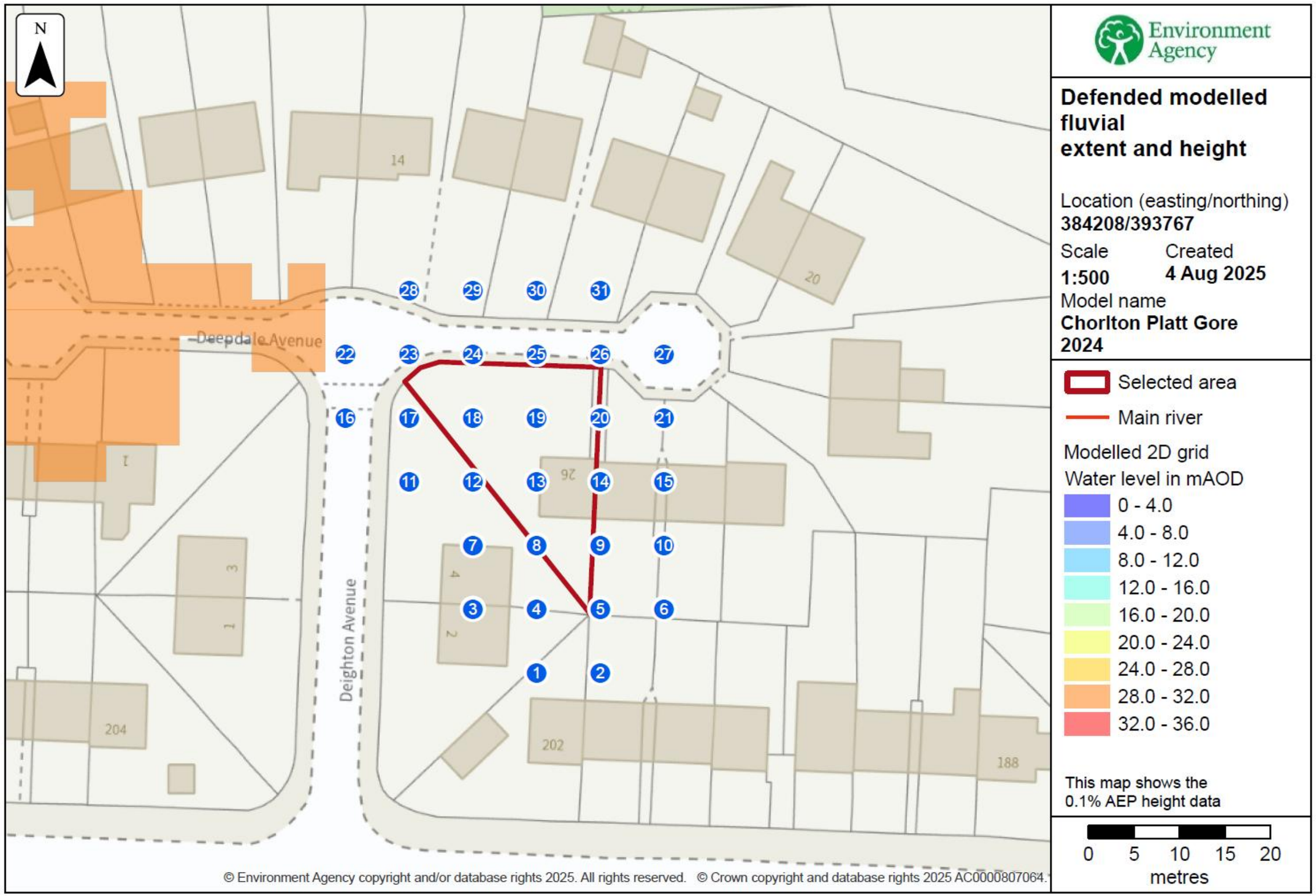
Label	Easting	Northing	50% AEP	20% AEP	10% AEP	5% AEP	4% AEP	3.33% AEP	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
			Depth	Depth	Depth	Depth	Depth	Depth	Depth	Depth	Depth	Depth	Depth
1	384209	393743	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.17
2	384216	393743	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.11
3	384202	393750	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.23
4	384209	393750	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.13
5	384216	393750	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.00
6	384223	393750	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.01
7	384202	393757	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.30
8	384209	393757	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.20
9	384216	393757	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.15
10	384223	393757	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.19
11	384195	393764	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.30
12	384202	393764	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.34

Label	Easting	Northing	50% AEP	20% AEP	10% AEP	5% AEP	4% AEP	3.33% AEP	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
			Depth	Depth	Depth	Depth	Depth	Depth	Depth	Depth	Depth	Depth	Depth
13	384209	393764	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.23
14	384216	393764	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.17
15	384223	393764	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.22
16	384188	393771	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.42
17	384195	393771	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.32
18	384202	393771	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.02	0.37
19	384209	393771	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.02	0.37
20	384216	393771	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.00	0.31
21	384223	393771	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.29
22	384188	393778	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.39
23	384195	393778	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.02	0.40
24	384202	393778	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.02	0.38

Label	Easting	Northing	50% AEP	20% AEP	10% AEP	5% AEP	4% AEP	3.33% AEP	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
			Depth	Depth	Depth	Depth	Depth	Depth	Depth	Depth	Depth	Depth	Depth
25	384209	393778	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.01	0.35
26	384216	393778	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.04	0.34
27	384223	393778	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.26
28	384195	393785	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.06	0.44
29	384202	393785	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.38
30	384209	393785	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.00	0.34
31	384216	393785	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.31
Max value in selected area:			NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.08	0.43

Data in this table comes from the Cringle Black Brook 2017 model. Height values are shown in mAOD, and depth values are shown in metres.
Any blank cells show where a particular scenario has not been modelled for this location.
Cells which contain text 'NoData' for a scenario show that return period has been modelled but there is no flood risk for that return period for that location.
'Max value in selected area' is the deepest depth or highest height at any location within your drawn boundary.

Appendix XX: Defended – modelled fluvial extent and height, Chorlton Platt Gore, 2024



Sample point data

Defended

Label	Easting	Northing	50% AEP	20% AEP	10% AEP	5% AEP	3.33% AEP	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
			Height	Height	Height	Height	Height	Height	Height	Height	Height	Height
1	384209	393743	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
2	384216	393743	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
3	384202	393750	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
4	384209	393750	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
5	384216	393750	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
6	384223	393750	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
7	384202	393757	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
8	384209	393757	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
9	384216	393757	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
10	384223	393757	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
11	384195	393764	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
12	384202	393764	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData

Label	Easting	Northing	50% AEP	20% AEP	10% AEP	5% AEP	3.33% AEP	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
			Height	Height	Height	Height	Height	Height	Height	Height	Height	Height
13	384209	393764	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
14	384216	393764	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
15	384223	393764	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
16	384188	393771	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
17	384195	393771	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
18	384202	393771	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
19	384209	393771	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
20	384216	393771	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
21	384223	393771	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
22	384188	393778	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
23	384195	393778	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
24	384202	393778	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData

Label	Easting	Northing	50% AEP	20% AEP	10% AEP	5% AEP	3.33% AEP	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
			Height	Height	Height	Height	Height	Height	Height	Height	Height	Height
25	384209	393778	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
26	384216	393778	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
27	384223	393778	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
28	384195	393785	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
29	384202	393785	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
30	384209	393785	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
31	384216	393785	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
Max value in selected area:			NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData

Data in this table comes from the Chorlton Platt Gore 2024 model. Height values are shown in mAOD, and depth values are shown in metres.
Any blank cells show where a particular scenario has not been modelled for this location.
Cells which contain text 'NoData' for a scenario show that return period has been modelled but there is no flood risk for that return period for that location.
'Max value in selected area' is the deepest depth or highest height at any location within your drawn boundary.

Defended

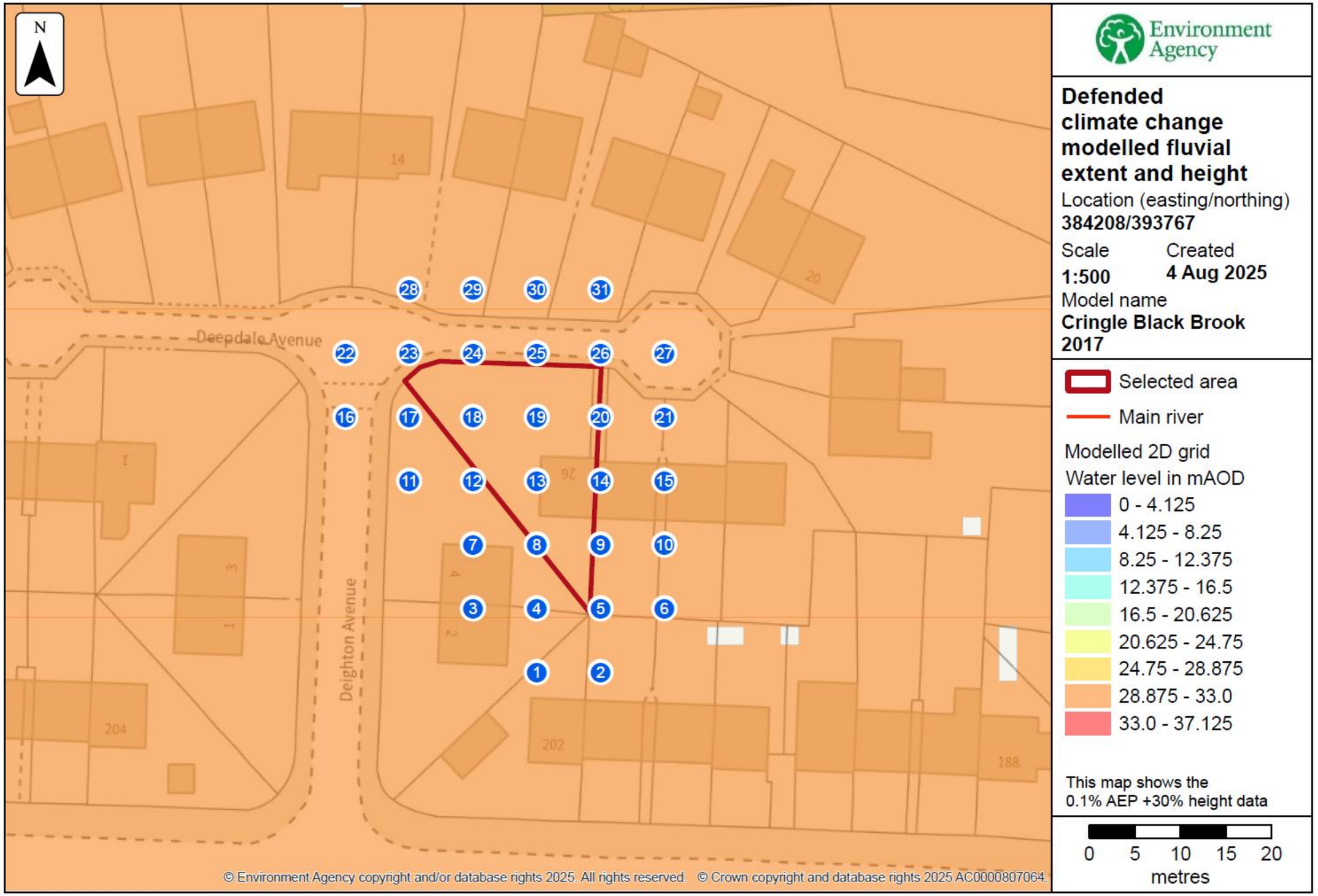
Label	Easting	Northing	50% AEP	20% AEP	10% AEP	5% AEP	3.33% AEP	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
			Depth	Depth	Depth	Depth	Depth	Depth	Depth	Depth	Depth	Depth
1	384209	393743	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
2	384216	393743	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
3	384202	393750	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
4	384209	393750	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
5	384216	393750	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
6	384223	393750	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
7	384202	393757	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
8	384209	393757	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
9	384216	393757	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
10	384223	393757	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
11	384195	393764	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
12	384202	393764	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData

Label	Easting	Northing	50% AEP	20% AEP	10% AEP	5% AEP	3.33% AEP	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
			Depth	Depth	Depth	Depth	Depth	Depth	Depth	Depth	Depth	Depth
13	384209	393764	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
14	384216	393764	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
15	384223	393764	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
16	384188	393771	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
17	384195	393771	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
18	384202	393771	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
19	384209	393771	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
20	384216	393771	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
21	384223	393771	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
22	384188	393778	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
23	384195	393778	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
24	384202	393778	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData

Label	Easting	Northing	50% AEP	20% AEP	10% AEP	5% AEP	3.33% AEP	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
			Depth	Depth	Depth	Depth	Depth	Depth	Depth	Depth	Depth	Depth
25	384209	393778	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
26	384216	393778	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
27	384223	393778	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
28	384195	393785	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
29	384202	393785	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
30	384209	393785	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
31	384216	393785	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
Max value in selected area:			NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData

Data in this table comes from the Chorlton Platt Gore 2024 model. Height values are shown in mAOD, and depth values are shown in metres.
Any blank cells show where a particular scenario has not been modelled for this location.
Cells which contain text 'NoData' for a scenario show that return period has been modelled but there is no flood risk for that return period for that location.
'Max value in selected area' is the deepest depth or highest height at any location within your drawn boundary.

Appendix XXI: Defended – modelled fluvial extent and height for climate change allowance, Cringle Black Brook, 2017



Sample point data

Defended climate change

Label	Easting	Northing	1% AEP (+30%)	1% AEP (+35%)	1% AEP (+70%)	0.1% AEP (+30%)
			Height	Height	Height	Height
1	384209	393743	NoData	NoData	31.91	32.11
2	384216	393743	NoData	NoData	NoData	32.11
3	384202	393750	NoData	NoData	31.91	32.11
4	384209	393750	NoData	NoData	31.91	32.11
5	384216	393750	NoData	NoData	NoData	32.11
6	384223	393750	NoData	NoData	NoData	32.12
7	384202	393757	NoData	31.76	31.91	32.11
8	384209	393757	NoData	NoData	31.91	32.11
9	384216	393757	NoData	NoData	31.93	32.11
10	384223	393757	NoData	NoData	31.93	32.12
11	384195	393764	NoData	NoData	31.91	32.11
12	384202	393764	31.73	31.76	31.91	32.11

Label	Easting	Northing	1% AEP (+30%)	1% AEP (+35%)	1% AEP (+70%)	0.1% AEP (+30%)
			Height	Height	Height	Height
13	384209	393764	NoData	NoData	31.91	32.11
14	384216	393764	NoData	NoData	31.92	32.11
15	384223	393764	NoData	NoData	31.92	32.11
16	384188	393771	31.71	31.76	31.91	32.11
17	384195	393771	NoData	31.76	31.91	32.11
18	384202	393771	31.73	31.76	31.91	32.11
19	384209	393771	31.74	31.76	31.91	32.11
20	384216	393771	31.78	31.79	31.91	32.11
21	384223	393771	31.81	31.83	31.92	32.11
22	384188	393778	31.71	31.76	31.91	32.11
23	384195	393778	31.71	31.76	31.91	32.11
24	384202	393778	31.73	31.76	31.91	32.11

Label	Easting	Northing	1% AEP (+30%)	1% AEP (+35%)	1% AEP (+70%)	0.1% AEP (+30%)
			Height	Height	Height	Height
25	384209	393778	31.74	31.76	31.91	32.11
26	384216	393778	31.78	31.79	31.92	32.11
27	384223	393778	31.80	31.82	31.92	32.11
28	384195	393785	31.71	31.76	31.91	32.11
29	384202	393785	31.71	31.76	31.91	32.11
30	384209	393785	31.73	31.76	31.91	32.11
31	384216	393785	31.78	31.79	31.91	32.11
Max value in selected area:			31.79	31.80	31.92	32.11

Data in this table comes from the Cringle Black Brook 2017 model. Height values are shown in mAOD, and depth values are shown in metres.
Any blank cells show where a particular scenario has not been modelled for this location.
Cells which contain text 'NoData' for a scenario show that return period has been modelled but there is no flood risk for that return period for that location.
'Max value in selected area' is the deepest depth or highest height at any location within your drawn boundary.

Defended climate change

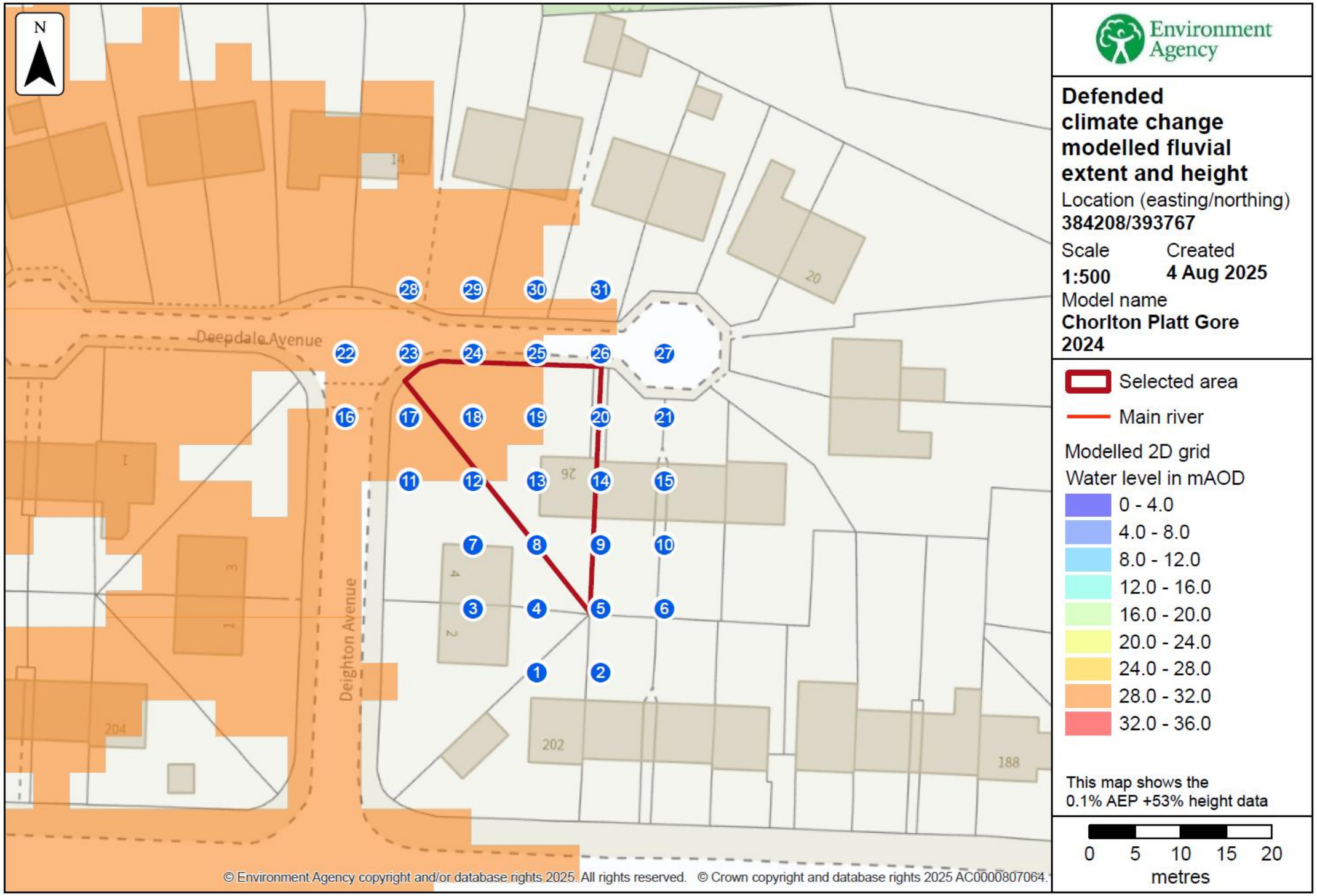
Label	Easting	Northing	1% AEP (+30%)	1% AEP (+35%)	1% AEP (+70%)	0.1% AEP (+30%)
			Depth	Depth	Depth	Depth
1	384209	393743	NoData	NoData	0.04	0.23
2	384216	393743	NoData	NoData	NoData	0.18
3	384202	393750	NoData	NoData	0.10	0.29
4	384209	393750	NoData	NoData	0.01	0.19
5	384216	393750	NoData	NoData	NoData	0.03
6	384223	393750	NoData	NoData	NoData	0.07
7	384202	393757	NoData	0.02	0.17	0.37
8	384209	393757	NoData	NoData	0.07	0.26
9	384216	393757	NoData	NoData	0.03	0.22
10	384223	393757	NoData	NoData	0.06	0.25
11	384195	393764	NoData	NoData	0.17	0.37
12	384202	393764	0.03	0.06	0.21	0.41

Label	Easting	Northing	1% AEP (+30%)	1% AEP (+35%)	1% AEP (+70%)	0.1% AEP (+30%)
			Depth	Depth	Depth	Depth
13	384209	393764	NoData	NoData	0.10	0.29
14	384216	393764	NoData	NoData	0.04	0.23
15	384223	393764	NoData	NoData	0.09	0.28
16	384188	393771	0.09	0.14	0.29	0.49
17	384195	393771	NoData	0.03	0.19	0.38
18	384202	393771	0.06	0.08	0.24	0.43
19	384209	393771	0.06	0.08	0.24	0.43
20	384216	393771	0.04	0.06	0.18	0.37
21	384223	393771	0.05	0.07	0.16	0.36
22	384188	393778	0.05	0.10	0.26	0.45
23	384195	393778	0.06	0.11	0.26	0.46
24	384202	393778	0.06	0.09	0.25	0.44

Label	Easting	Northing	1% AEP (+30%)	1% AEP (+35%)	1% AEP (+70%)	0.1% AEP (+30%)
			Depth	Depth	Depth	Depth
25	384209	393778	0.04	0.06	0.22	0.41
26	384216	393778	0.07	0.09	0.21	0.41
27	384223	393778	0.01	0.03	0.12	0.32
28	384195	393785	0.10	0.15	0.31	0.50
29	384202	393785	0.04	0.09	0.24	0.44
30	384209	393785	0.03	0.06	0.21	0.41
31	384216	393785	0.04	0.05	0.18	0.37
Max value in selected area:			0.12	0.15	0.30	0.49

Data in this table comes from the Cringle Black Brook 2017 model. Height values are shown in mAOD, and depth values are shown in metres.
Any blank cells show where a particular scenario has not been modelled for this location.
Cells which contain text 'NoData' for a scenario show that return period has been modelled but there is no flood risk for that return period for that location.
'Max value in selected area' is the deepest depth or highest height at any location within your drawn boundary.

Appendix XXII: Defended – modelled fluvial extent and height for climate change allowance, Chorlton Platt Gore, 2024



Sample point data

Defended climate change

Label	Easting	Northing	50% AEP (+53%)	5% AEP (+53%)	1% AEP (+41%)	1% AEP (+53%)	0.1% AEP (+53%)
			Height	Height	Height	Height	Height
1	384209	393743	NoData	NoData	NoData	NoData	NoData
2	384216	393743	NoData	NoData	NoData	NoData	NoData
3	384202	393750	NoData	NoData	NoData	NoData	NoData
4	384209	393750	NoData	NoData	NoData	NoData	NoData
5	384216	393750	NoData	NoData	NoData	NoData	NoData
6	384223	393750	NoData	NoData	NoData	NoData	NoData
7	384202	393757	NoData	NoData	NoData	NoData	NoData
8	384209	393757	NoData	NoData	NoData	NoData	NoData
9	384216	393757	NoData	NoData	NoData	NoData	NoData
10	384223	393757	NoData	NoData	NoData	NoData	NoData
11	384195	393764	NoData	NoData	NoData	NoData	31.79
12	384202	393764	NoData	NoData	NoData	NoData	31.81

Label	Easting	Northing	50% AEP (+53%)	5% AEP (+53%)	1% AEP (+41%)	1% AEP (+53%)	0.1% AEP (+53%)
			Height	Height	Height	Height	Height
13	384209	393764	NoData	NoData	NoData	NoData	NoData
14	384216	393764	NoData	NoData	NoData	NoData	NoData
15	384223	393764	NoData	NoData	NoData	NoData	NoData
16	384188	393771	NoData	NoData	NoData	NoData	31.77
17	384195	393771	NoData	NoData	NoData	NoData	31.80
18	384202	393771	NoData	NoData	NoData	NoData	31.81
19	384209	393771	NoData	NoData	NoData	NoData	31.81
20	384216	393771	NoData	NoData	NoData	NoData	NoData
21	384223	393771	NoData	NoData	NoData	NoData	NoData
22	384188	393778	NoData	NoData	NoData	NoData	31.80
23	384195	393778	NoData	NoData	NoData	NoData	31.80
24	384202	393778	NoData	NoData	NoData	NoData	31.81

Label	Easting	Northing	50% AEP (+53%)	5% AEP (+53%)	1% AEP (+41%)	1% AEP (+53%)	0.1% AEP (+53%)
			Height	Height	Height	Height	Height
25	384209	393778	NoData	NoData	NoData	NoData	31.81
26	384216	393778	NoData	NoData	NoData	NoData	NoData
27	384223	393778	NoData	NoData	NoData	NoData	NoData
28	384195	393785	NoData	NoData	NoData	NoData	31.81
29	384202	393785	NoData	NoData	NoData	NoData	31.81
30	384209	393785	NoData	NoData	NoData	NoData	31.81
31	384216	393785	NoData	NoData	NoData	NoData	NoData
Max value in selected area:			NoData	NoData	NoData	NoData	31.81

Data in this table comes from the Chorlton Platt Gore 2024 model. Height values are shown in mAOD, and depth values are shown in metres.
Any blank cells show where a particular scenario has not been modelled for this location.
Cells which contain text 'NoData' for a scenario show that return period has been modelled but there is no flood risk for that return period for that location.
'Max value in selected area' is the deepest depth or highest height at any location within your drawn boundary.

Defended climate change

Label	Easting	Northing	50% AEP (+53%)	5% AEP (+53%)	1% AEP (+41%)	1% AEP (+53%)	0.1% AEP (+53%)
			Depth	Depth	Depth	Depth	Depth
1	384209	393743	NoData	NoData	NoData	NoData	NoData
2	384216	393743	NoData	NoData	NoData	NoData	NoData
3	384202	393750	NoData	NoData	NoData	NoData	NoData
4	384209	393750	NoData	NoData	NoData	NoData	NoData
5	384216	393750	NoData	NoData	NoData	NoData	NoData
6	384223	393750	NoData	NoData	NoData	NoData	NoData
7	384202	393757	NoData	NoData	NoData	NoData	NoData
8	384209	393757	NoData	NoData	NoData	NoData	NoData
9	384216	393757	NoData	NoData	NoData	NoData	NoData
10	384223	393757	NoData	NoData	NoData	NoData	NoData
11	384195	393764	NoData	NoData	NoData	NoData	0.02
12	384202	393764	NoData	NoData	NoData	NoData	0.02

Label	Easting	Northing	50% AEP (+53%)	5% AEP (+53%)	1% AEP (+41%)	1% AEP (+53%)	0.1% AEP (+53%)
			Depth	Depth	Depth	Depth	Depth
13	384209	393764	NoData	NoData	NoData	NoData	NoData
14	384216	393764	NoData	NoData	NoData	NoData	NoData
15	384223	393764	NoData	NoData	NoData	NoData	NoData
16	384188	393771	NoData	NoData	NoData	NoData	0.12
17	384195	393771	NoData	NoData	NoData	NoData	0.00
18	384202	393771	NoData	NoData	NoData	NoData	0.07
19	384209	393771	NoData	NoData	NoData	NoData	0.05
20	384216	393771	NoData	NoData	NoData	NoData	NoData
21	384223	393771	NoData	NoData	NoData	NoData	NoData
22	384188	393778	NoData	NoData	NoData	NoData	0.08
23	384195	393778	NoData	NoData	NoData	NoData	0.07
24	384202	393778	NoData	NoData	NoData	NoData	0.06

Label	Easting	Northing	50% AEP (+53%)	5% AEP (+53%)	1% AEP (+41%)	1% AEP (+53%)	0.1% AEP (+53%)
			Depth	Depth	Depth	Depth	Depth
25	384209	393778	NoData	NoData	NoData	NoData	0.03
26	384216	393778	NoData	NoData	NoData	NoData	NoData
27	384223	393778	NoData	NoData	NoData	NoData	NoData
28	384195	393785	NoData	NoData	NoData	NoData	0.08
29	384202	393785	NoData	NoData	NoData	NoData	0.06
30	384209	393785	NoData	NoData	NoData	NoData	0.04
31	384216	393785	NoData	NoData	NoData	NoData	NoData
Max value in selected area:			NoData	NoData	NoData	NoData	0.11

Data in this table comes from the Chorlton Platt Gore 2024 model. Height values are shown in mAOD, and depth values are shown in metres.
Any blank cells show where a particular scenario has not been modelled for this location.
Cells which contain text 'NoData' for a scenario show that return period has been modelled but there is no flood risk for that return period for that location.
'Max value in selected area' is the deepest depth or highest height at any location within your drawn boundary.

Appendix XXIII: Borehole data, reference to British Geological Survey.

British Geological Survey
BGS ID: 865272 : BGS Reference: SJ89SW389
British National Grid (27700) : 384210,393850

Status Draft 1 Date 11/02/93

SJ89SW389

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Borehole No. 8 Sheet 1 of 1

Contract No.	F9638	Method	Mini Soils Survey	Coords.	8421 9385
Project	Chorlton Brook	Drilling Rig	Portable		
		Diameter	65mm	Ground Level	32.23
Client	National Rivers Authority			Orientation	Vertical
Consultant	Manstock			Date Started	16/12/92
				Date Completed	16/12/92

Description of Strata	Legend	Depth below G.L.	O.D. Level	Sampling			Casing Depth	() & "N"		Install -ation
TOPSOIL: With rootlets and gravel of ash, brick and glass fragments.		0.04	32.19							
(Gradational Boundary) MADE GROUND: Brown clayey coarse gravel of brick, glass and concrete with occasional cobble size fragments.										
		1.00	31.23							
MADE GROUND: Poor sample return - probably medium dense slightly sandy clayey gravel of fill.				D	1.00	1.60				
				S	1.20			"13"		
		2.20	30.03							
MADE GROUND: Brown slightly sandy gravel of fill.				D	2.20	2.80				
				S	2.40			"5"		
		3.00	29.23							
Borehole complete at 3.00m.										

REMARKS - See Header Sheet for:
Key to Symbols and abbreviations
Drilling Details, Progress and Water Strikes
General Notes

Form G112
Version 1.04
Revised 24.09.92

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 865272 : BGS Reference: SJ89SW389
British National Grid (27700) : 384210,393850

Status: Draft 1 — Date 11/02/93

SJ 89 SW 389

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Borehole No. 8 — Header Sheet

Contract No.	F9638	Method	Mini Soils Survey	Coords.	8421 9385
Project	Chorlton Brook	Drilling Rig	Portable		
		Diameter	65mm	Ground Level	32.23
Client	National Rivers Authority			Orientation	Vertical
Consultant	Manstock			Date Started	16/12/92
				Date Completed	16/12/92

PROGRESS

Date	Time	Hole Depth	Casing Depth	Casing Dia.	Water Depth	Remarks
16/12/92	-	3.00	3.00	65	Dry	

WATER STRIKES

Date	Time	Strike	Rise	After n Minutes	Flow	Sealed

DRILLING DETAILS

Chiselling From	Chiselling To	Chiselling Hours	Water added From	Water added To	Remarks

SPT AND CPT DETAILS

Depth	Blows for 75mm Increments
1.20	3,4,3,3,4, 3
2.40	1,2,1,1,2, 1

NOTES

All depths in metres; all diameters in millimetres.

Borehole sunk using Mini Soil Surveys technique.

GROUNDWATER LEVELS ARE SUBJECT TO SEASONAL, TIDAL AND OTHER FLUCTUATIONS AND SHOULD NOT BE TAKEN AS CONSTANT.

Driller	Logged by	Checked by
M.S.S	M.S.S/E.M	

KEY TO SYMBOLS AND ABBREVIATIONS

D	Small Disturbed Sample	W	Water Sample	S	Standard Penetration Test
B	Bulk Disturbed Sample	G	Gas Sample	C	Cone Penetration Test
LB	Large Bulk Disturbed Sample	( )	Blows to drive U100	* *	N for full 300mm penetration
U	Undisturbed U100 Sample	V	Insitu Vane Test	../175	For given penetration (mm)
P	Piston Sample	PR	Pressuremeter Test	../25*	Seating blows only
TW	Thin-wall Sample	K	Permeability Test	NP	No penetration
NR	No Recovery				

Piezometer: Upper Seal; Sand Cell; Piezometer Tip; Lower Seal; Grout

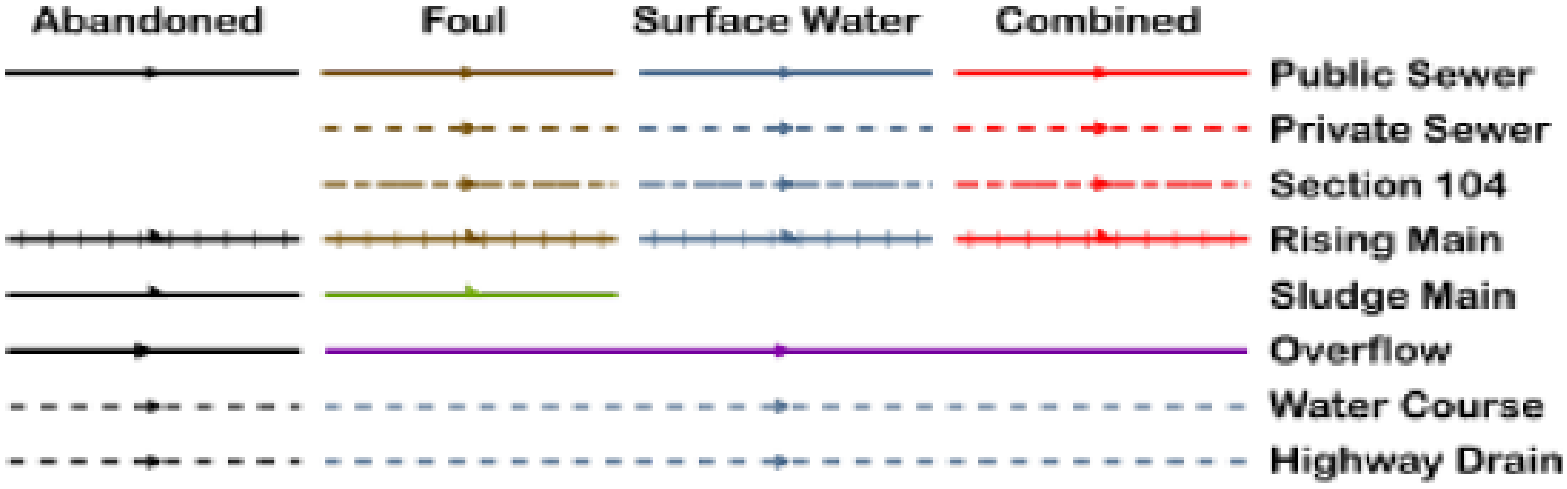
Form G102
Version 1.04
Revised 24.09.92

Contact BGS: ngdc@bgs.ac.uk

Appendix XXIV: Sewer drainage network data at the Site, reference to United Utilities.

United Utilities
Water for the North West

Wastewater Symbology



All point assets follow the standard colour convention: red – combined, brown - foul, blue – surface water, purple - overflow

- Manhole
- Head of System
- Extent of Survey
- Rodding Eye
- Inlet
- Discharge Point
- Vortex
- Penstock
- Washout Chamber
- Valve
- Air Valve
- Non Return Valve
- Soakaway
- Gully
- Cascade
- Flow Meter
- Hatch Box
- Oil Interceptor
- Summit
- Drop Shaft
- Orifice Plate
- Side Entry Manhole
- Outfall
- Screen Chamber
- Inspection Chamber
- Bifurcation Chamber
- Lamp Hole
- T Junction / Saddle
- Catchpit
- Valve Chamber
- Vent Column
- Vortex Chamber
- Penstock Chamber
- Network Storage Tank
- Sewer Overflow
- Ww Treatment Works
- Ww Pumping Station
- Septic Tank
- Control Kiosk
- DNM Network Monitoring Point
- Change of Characteristic



United Utilities
Water for the North West

SEWER RECORDS

Address or Site Reference

26 DEEPDALE AVENUE,
MANCHESTER,
M20 1BF

Scale: 1:1250
Date: 21/08/2025

Printed by: Property Searches

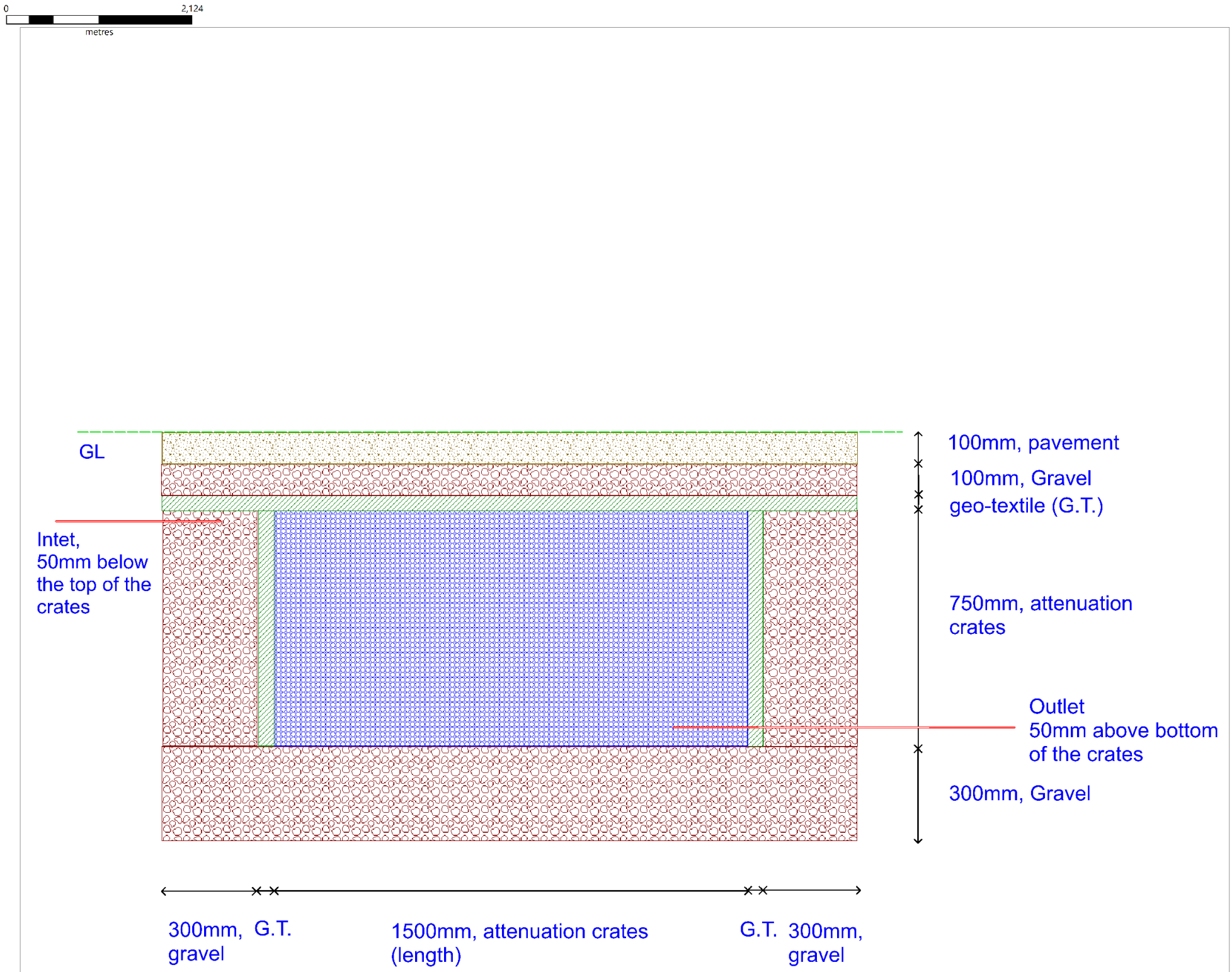
The position of the underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. United Utilities Water will not accept liability for any loss or damage caused by the actual position being different from those shown.

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Appendix XXV: The proposed drainage layout at the Site.



Appendix XXVI: Details of the cross-section of the attenuation tank design at the Site.



Legend

- ground level
- inlet/outlet pipes
- geo-cellular attenuation crates
- gravel layer
- concrete pavement
- geo-textiles (G.T.)

N

Title: Details of attenuation tank design
26 Deepdale Ave, Withington, Manchester

Date: 03/09/2025
Name: M Ahsan
Company: Hydrotec & Engineering Consultants

Scale: 1 in = 0.0929894 m

Projection: British National Grid

Appendix XXVII: A typical vertical water tank for rainwater harvesting (capacity 250 litres).



Appendix XXVIII: A typical ACO drain (channel drainage).

