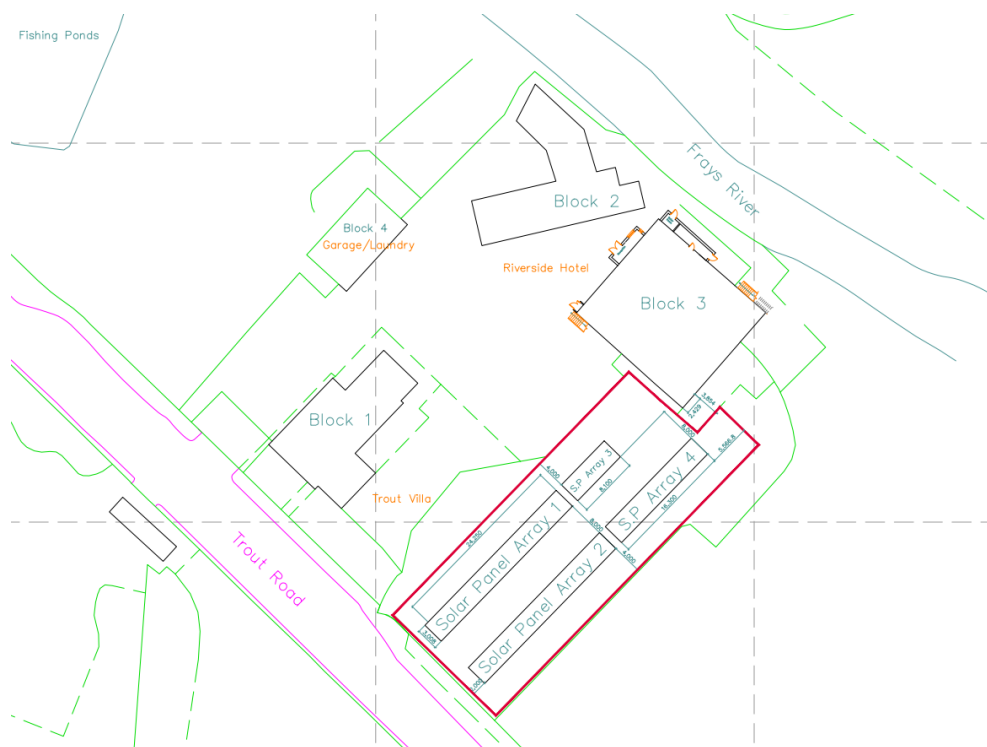




Flood Risk Assessment for a change of use of a greenspace to Photo-Voltaic Panels' site, to serve temporary homeless accommodation - Riverside Hotel, Trout Road, Yiewsley, UB7 7RT

Contract Ref: K0971A

Towers Associates on behalf of Trinity Homeless Projects

Hydro-Logic
Services

part of

Hydro
International

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Quality assurance record

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1	06/09/2021	DG / YZ	YZ	CT	First Issue

Limitation of liability and use

The work described in this report was undertaken for the party or parties stated; for the purpose or purposes stated; to the time and budget constraints stated. No liability is accepted for use by other parties or for other purposes, or unreasonably beyond the terms and parameters of its commission and its delivery to normal professional standards.

Executive summary

This report documents work undertaken by Hydro-Logic Services for Towers Associates on behalf of Trinity Homeless Projects in support of the planning permission for the conversion of a greenspace to Photo-Voltaic Panels site, to serve temporary homeless accommodation on Riverside Hostel, at Trout Road, Yiewsley, UB7 7RT (Grid Ref: 505580, 180539). The aim of this work is to conduct a site-specific Flood Risk Assessment (FRA) for the new development.

The site is outside any critical drainage areas. The proposed development will have no change in impermeable areas as rainwater will be able to infiltrate the ground beneath the panels. Therefore there is no requirement for any designed drainage on the site.

The objectives of this work include:

- To assess flood risk at the development site in terms set in National Planning Policy Framework (NPPF) and Environment Agency (EA) Standing Advice.

The key outcomes of the work so far are:

- The proposed development site is within Flood Zone 3a, at high fluvial flood risk (i.e. greater than 1% AEP), mostly at very low risk of surface flooding and risk from other sources are considered to be low;
- The total impermeable areas will not be changed, and existing drainage arrangement will be maintained;
- The solar panels (electric and vulnerable equipment) should be installed above highest flood level (100 year +20% Climate Change event).

The work delivered the following outputs:

- this Report includes the FRA

1. INTRODUCTION

1.1 Purpose of this Report

Hydro-Logic Services (International) Ltd. (HLS) has been appointed by Towers Associates on behalf of Trinity Homeless Projects for the conversion of a greenspace to Photo-Voltaic Panels at Riverside Hostel, Trout Road, Yiewsley, UB7 7RT (Grid Ref: 505580, 180539). The aim of this work is to conduct a site-specific Flood Risk Assessment (FRA) for the new development.

The report is based on the available flood risk information for the site detailed in Section 1.2 and prepared in accordance with the planning policy requirements set out in Section 1.3. The scope of the FRA is consistent with the 'Site Specific Flood Risk Assessment Checklist' from the National Planning Policy Framework (NPPF) and accompanying Planning Practice Guidance (PPG):

<https://www.gov.uk/guidance/flood-risk-and-coastal-change#Site-Specific-Flood-Risk-Assessment-checklist-section>

1.2 Sources of Information and Consultation

This Report has been informed by:

- Existing Site Plan drawings and respective topographic plan delivered by Emlea Property Services;
- BGS website <http://mapapps.bgs.ac.uk/geologyofbritain/home.html?mode=boreholes>;
- Defra MagicMap <https://magic.defra.gov.uk/magicmap.aspx>;
- Cranfield University Soil Mapping <http://www.landis.org.uk/soilscapes/>;
- The EA online flood maps;
- <https://flood-map-for-planning.service.gov.uk/>;
- <https://flood-warning-information.service.gov.uk/long-term-flood-risk/>;
- CIRIA 'SuDS manual';
- EA Product 4 data

1.3 Policy Context

This report has been prepared in accordance with the relevant national, regional and local planning policy and statutory guidance as follows:

- National policy contained within the National Planning Policy Framework (NPPF) dated March 2019, issued by Communities and Local Government with reference to Section 14 'Meeting the challenge of climate change, flooding and coastal change';
- The NPPF Planning Practice Guidance (PPG) released in March 2014 ('Flood Risk and Coastal Change' section) and updated in February 2016 to incorporate the EA 'Flood Risk Assessments: Climate Change Allowances' guidance; and,
- London Borough of Hillingdon 'Hillingdon Local Plan: Part 1 - Strategic Policies', November 2012)
- London Borough of Hillingdon 'Hillingdon Local Plan Part 2: Development Management Policies', January 2020
- London Borough of Hillingdon 'Hillingdon Local Plan Part 2: Site Allocations and Designations', January 2020

1.4 Structure of this Report

The Report has been prepared based on the following structure:

- Section 2 refers to spatial planning considerations by reference to the proposed land use, flood zoning and NPPF vulnerability;
- Section 3 presents the assessment of existing flood risk at the site;
- Section 4 presents the proposed development;
- Section 5 provides a summary of the assessments.

Additional Appendices are provided that deal with the following:

- Appendix A NPPF Flood risk assessment template;
- Appendix B presents the climate change allowances.

2. SPATIAL PLANNING CONSIDERATION

2.1 Location and Background

The location of the proposed development site is shown in Figure 1 and Figure 2, with location details found in Table 1. The site is located on Trout Road, West Drayton, Uxbridge, UB7 7RT (Grid Ref: 505460, 180633).

The development involves constructing solar panels at the Riverside Hostel. The development site is approximately 0.09ha grass area.

The site is near to Fray's River (a tributary of River Colne which is the river catchment in the Hillingdon area) to the northeast. Part of its southeast boundary is adjacent to a watercourse/ flood spillway linking the Fray's River and Colne Brook via a lake.

The site is outside of any critical drainage area but within the green belt and surrounded by 'Nature Conservation Sites of Metropolitan or Borough Grade I Importance' (Figure 3).

Table 1: Location of the Development Site

Reference	Value
OS X (Eastings)	505460
OS Y (Northings)	180633
Nearest Post Code	UB7 7RT
Lat (WGS84)	N51:30:53 (51.514788)
Long (WGS84)	W0:28:54 (-0.481588)
Nat. Grid	TQ054806 / TQ0546080633

Grid reference details taken from the site <https://www.streetmap.co.uk/>

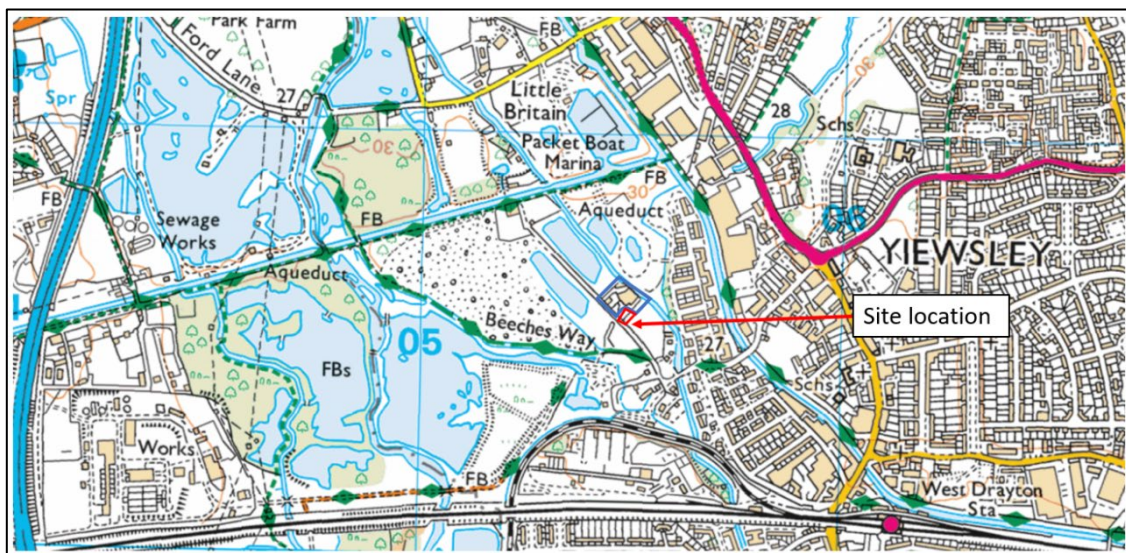


Figure 1: Site Location (Source: Bing Map) showing the site (outlined in red) and field under same ownership (outlined in blue)



Figure 2: Aerial View of the Site (Source: Bing Map) showing the site (outlined in red) and field under same ownership (outlined in blue)

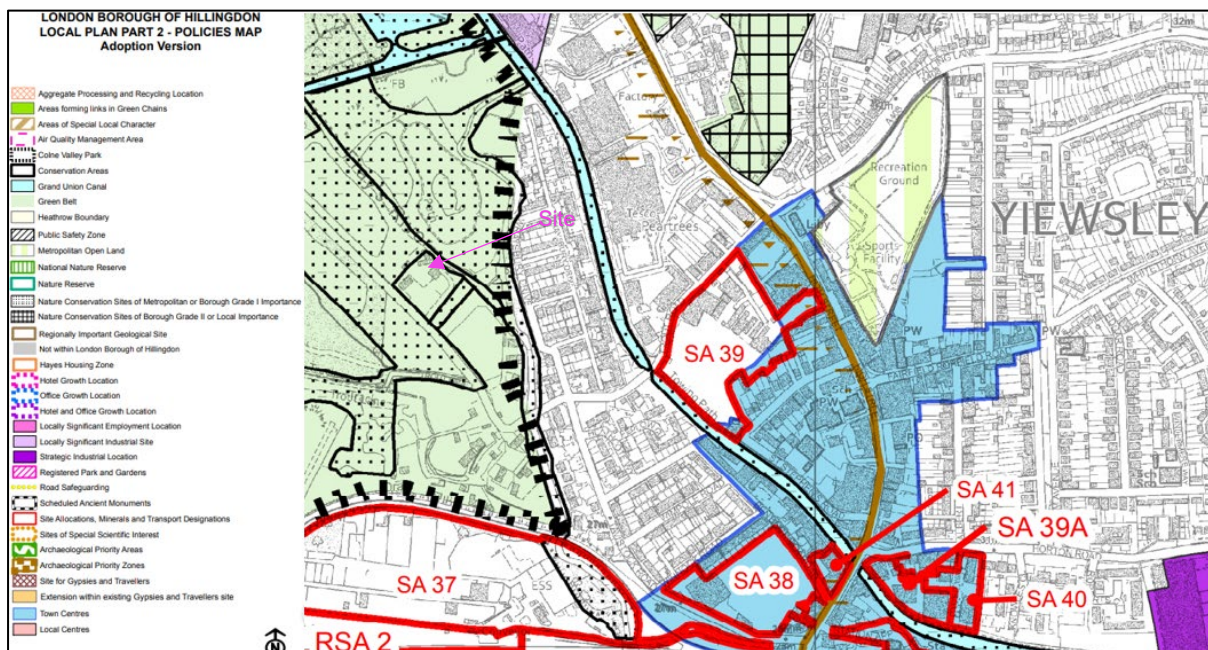


Figure 3: Local Policies Map (Source: Hillingdon Local Plan)

2.2 Topography

The existing ground elevations on site are shown in the topographic drawing (Figure 4) and the LiDAR of 50cm resolution data (Figure 5). The levels indicate that the site is relatively flat and elevated from the rest of the field under the same ownership. Ground levels vary between 27.07mAOD and 27.31mAOD.

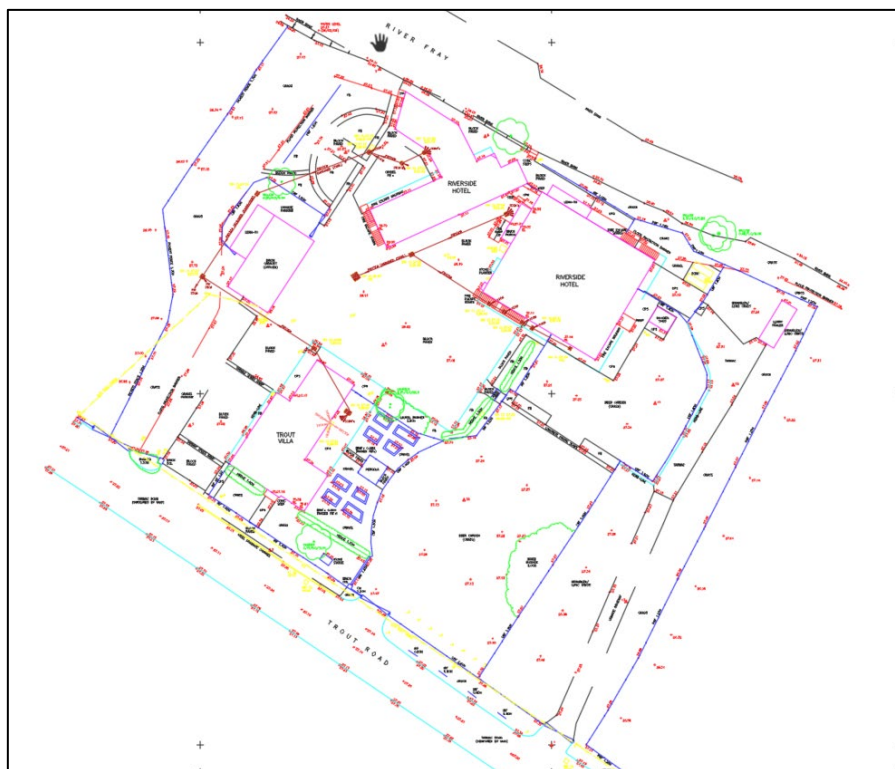


Figure 4: Site Existing Topography (Source: APR Services Drawing No. 25059)

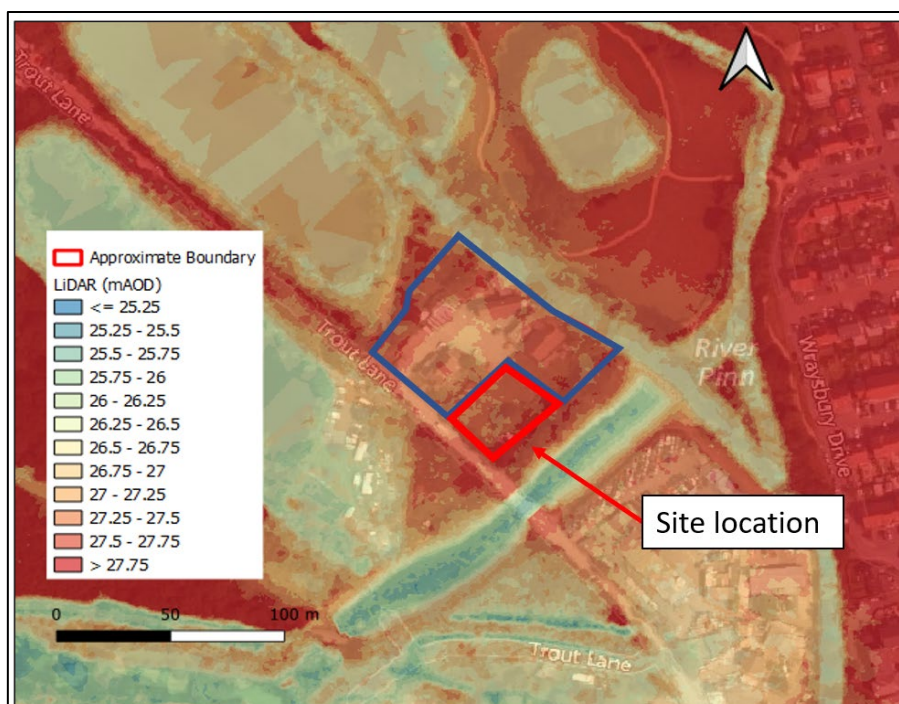


Figure 5: LiDAR of the Site and Surroundings (Source: EA LiDAR of 50cm) showing the site (outlined in red) and field under same ownership (outlined in blue)

2.3 Geology and Soil

The geology at the site has been obtained from the British Geological Survey (BGS) website. The bedrock beneath the site is described as 'London Clay Formation – Clay, Silt And Sand' (Figure 6), classified as a 'Unproductive' aquifer by the EA. The superficial geology of the site is described as 'Alluvium – Clay, Silt, Sand And Gravel' (Figure 7), classified as a 'Secondary A' aquifer by the EA.

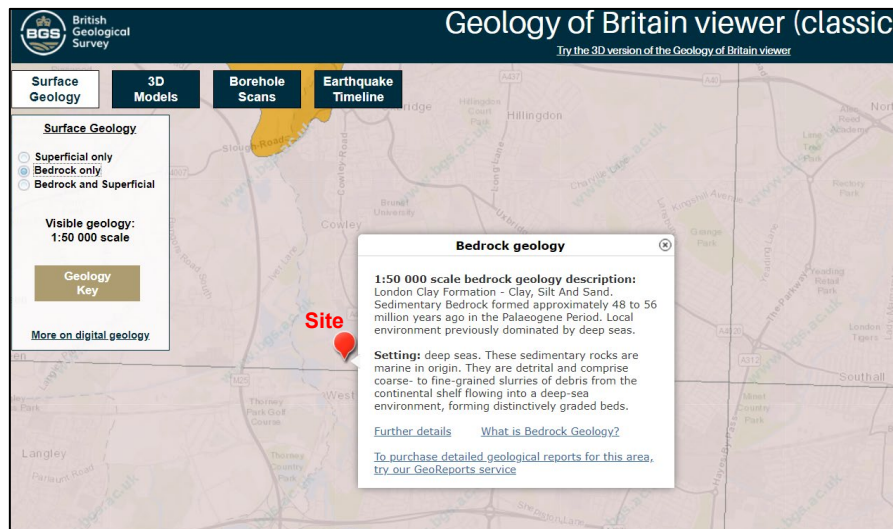


Figure 6: Bedrock underneath the Site (Source: BGS Bedrock Geology Mapping)

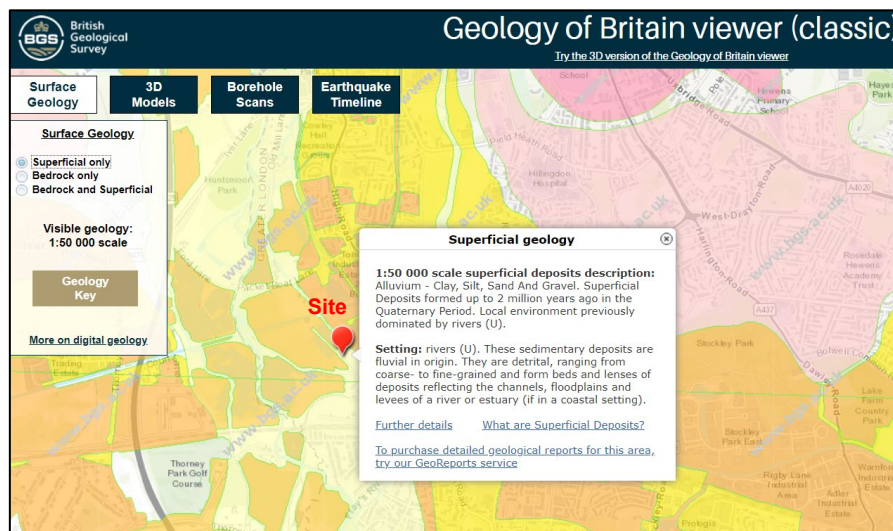


Figure 7: Superficial Deposits underlying the Site (Source: BGS Surface Geology Mapping)

Borehole records collected from the BGS website were reviewed. The nearby non-confidential boreholes in the same strata (Figure 8) published on the BGS website are TW08SE224, TQ08SE225, TQ08SE226 and TQ08SE227, located at approximately 400 m and 450 m to the south of the site. Groundwater table recorded was around 3.8 m ~ 4.6 m below ground.

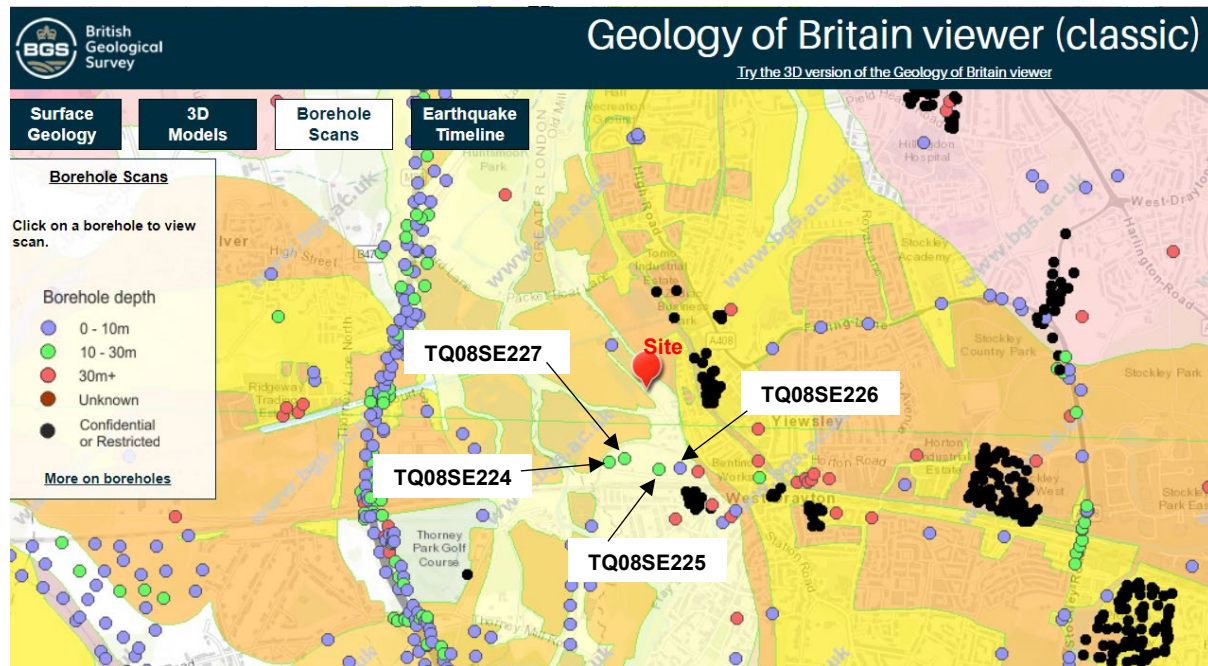


Figure 8: Nearby Borehole Locations (Source: BGS Surface Geology Mapping)

Environment Agency's Source Protection Zone shown in MagicMap (Figure 9) indicates the nearest SPZ is Zone II – Outer Protection Zone, approximately 1.8 km away.

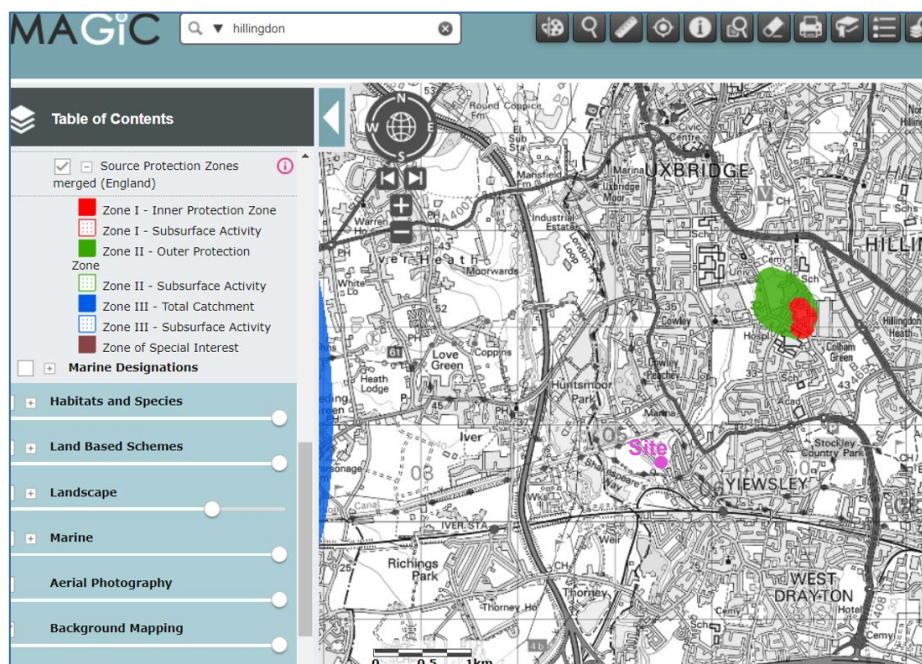


Figure 9: Source Protection Zone Map of the Site (Source: Defra MagicMap)

Soils at the site are described on the Cranfield University 'Soilscapes' website mostly as, 'Loamy and clayey floodplain soils with naturally high groundwater' (Figure 10). This suggest that the site is unlikely to be suitable for any infiltration system.

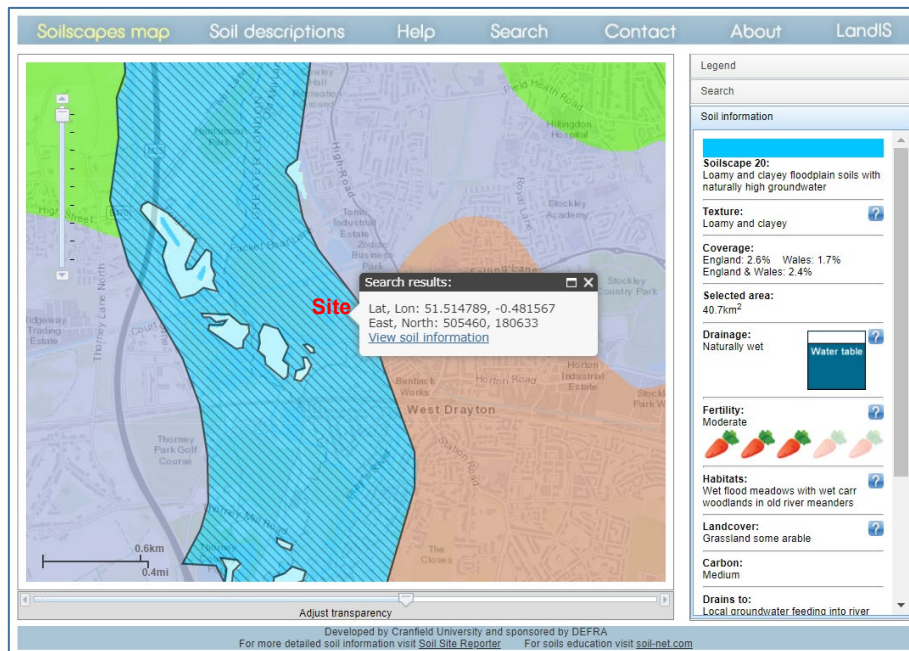


Figure 10: Soil Map of the Site (Source: Cranfield University Soil Mapping)

2.4 Flood Zone

EA's Flood Maps for planning (Figure 11) shows that the site lies marginally in Flood Zone 3 with an Annual Exceedance Probability (AEP) of flooding greater than 1% (1 in 100 year). The EA's Extent of River and the Sea flood maps from online Flood Warning Information Service (Figure 12) suggest the site is marginally within medium risk (i.e. between 1% and 3.3% AEP) and the site is therefore within Flood Zone 3a.



Figure 11: EA flood risk map for planning (Copyright Environment Agency) showing the site (outlined in red) and field under same ownership (outlined in blue)

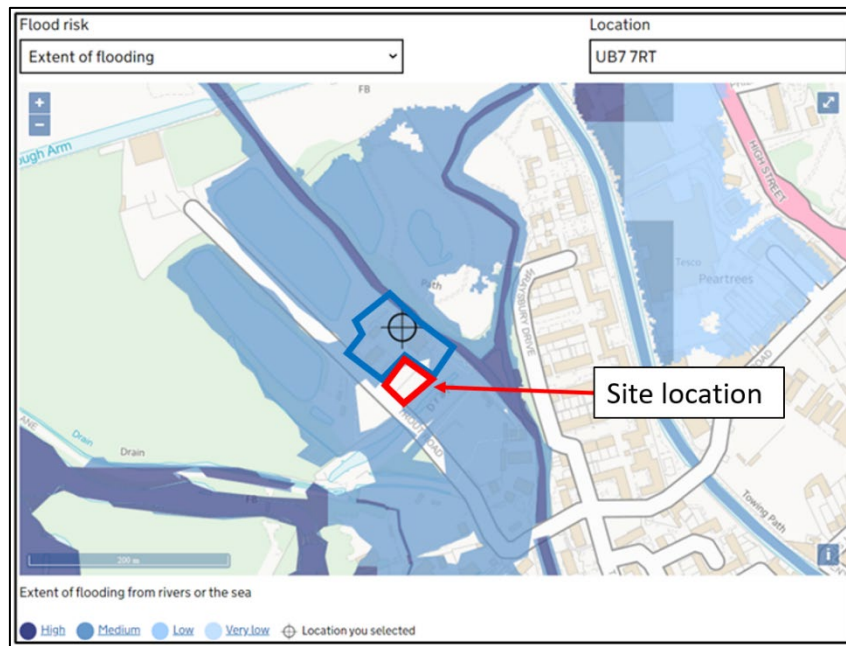


Figure 12: Fluvial Flood Extent (Source: Flood Warning Information Service) showing the site (outlined in red) and field under same ownership (outlined in blue)

This map (Figure 11) suggests there are no local defences and the site does not benefit from flood defences and Hillingdon SFRA (2008) states that Trout Lane area is known to flood and flood waters could connect across the lane between reservoirs. However, EA's Spatial Flood Defence dataset (Figure 13) suggest there is an embankment along a flood spillway to the southeast of the site owned by Environment Agency (asset ID: 437990) and private high ground along the northeast boundary (asset ID:12052). It is known from Client that in 1996 a flood relief scheme was put in place by EA throughout the local area, and a flood barrier was inserted along the rear of the site and along the northwest side of the site by EA.

EA product 4 data were reviewed as they provide predicted levels and extents from detailed hydraulic modelling. The maps of Defended Flood Outlines suggests that the site is defended by Environment Agency flood defences up and including the 1 in 50 year event (Figure 14 and Figure 15). Therefore parts of the site will be at risk of flood in the 1% AEP event (i.e. 1 in 100yr event). Therefore, the site is inside Flood Zone 3a. All the environment Agency information is in Appendix C.

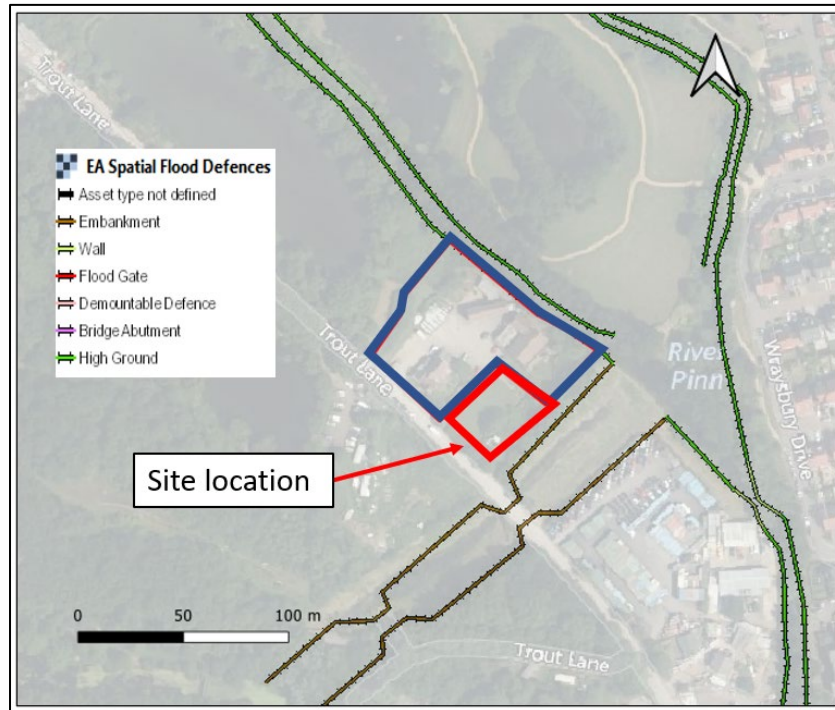


Figure 13: Embankment and High Ground along Watercourses (Source: EA Defence Dataset) showing the site (outlined in red) and field under same ownership (outlined in blue)

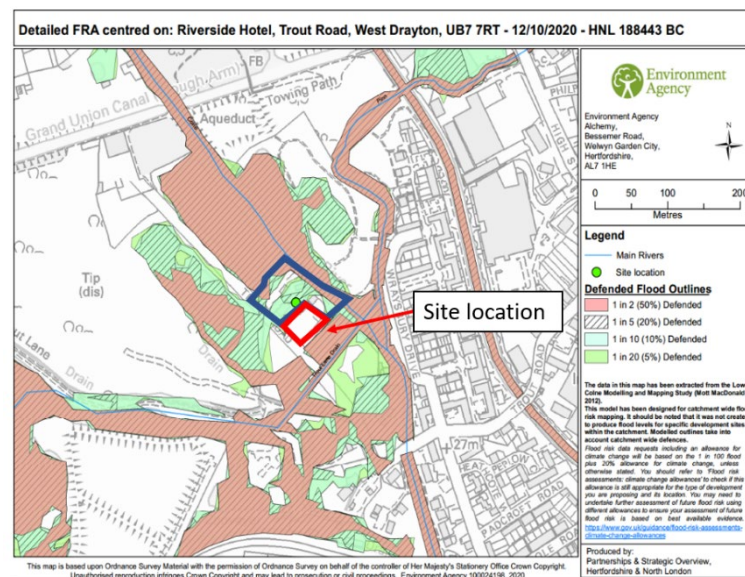


Figure 14: EA Product 4 - Defended Flood Outlines (Source: EA) showing the site (outlined in red) and field under same ownership (outlined in blue)

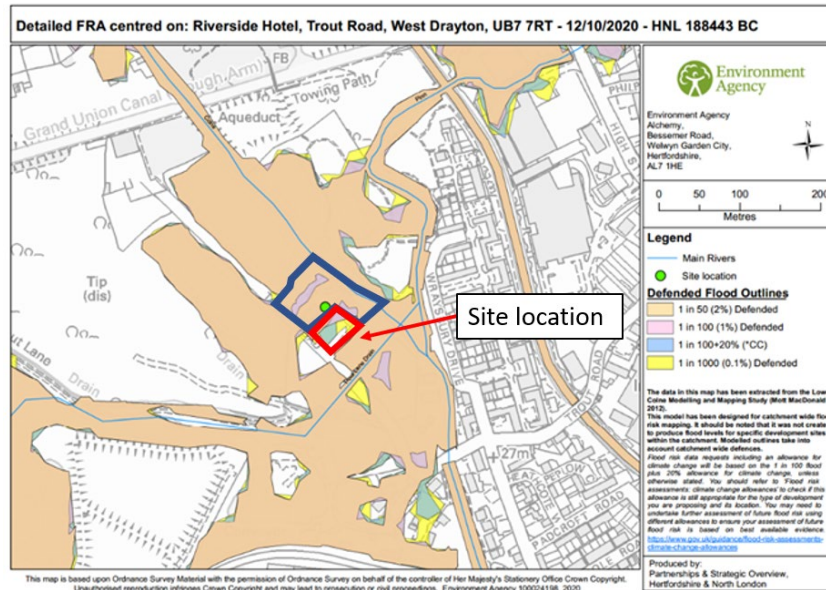


Figure 15: EA Product 4 - Defended Flood Outlines (Source: EA) showing the site (outlined in red) and field under same ownership (outlined in blue)

2.5 NPPF Vulnerability

The development will be classed as 'More Vulnerable' under the NPPF vulnerability classification (Table 2) as this was judged to be the most relevant category. The flood risk vulnerability and flood zone compatibility are displayed in Table 3

As noted in Section 2.4, the site is within Flood Zone 3a according to the EA product 4 data.

Table 2: Flood Risk Vulnerability Classification (Source: NPPF Technical Guide)

More vulnerable (MV)
Hospitals, residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels
Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels.
Non-residential uses for health services, nurseries and educational establishments.
Landfill and sites used for waste management facilities for hazardous waste ⁶ .
Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan. ⁷

Table 3: Flood Risk Vulnerability and flood zone compatibility (Source: NPPF Technical Guide)

Flood Zone	Definition	Essential Infrastructure	Water compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
1	$T > 1,000$	✓	✓	✓	✓	✓
2	$100 < T_{fluv} < 1,000$ $200 < T_{tidal} < 1,000$	✓	✓	Exc. Test	✓	✓
3a	$T_{fluv} < 100$ $T_{tidal} < 200$	Exc. Test	✓	✗	Exc. Test	✓
3b (functional floodplain)	$T_{fluv} < 20$	Exc. Test	✓	✗	✗	✗

As the development is implemented in the existing temporary homeless accommodation on Riverside Hostel and the proposed development is specifically Photo-Voltaic Panels, it is considered to be a development of 'change of use' and there is no need of sequential test and exception test, and therefore should be acceptable for Flood Zone 3a.

3. FLOOD HAZARD FOR EXISTING SITE

3.1 Source of Flood Risk

Flood sources and their possibilities at the site is listed in Table 4, and further described below.

Table 4: Sources of Flood Risks

Key sources of flooding	Possibility at Site
Fluvial (Rivers)	High Risk, Flood Zone 3a (confirmed by EA product 4 data) Figure 11, Figure 12, Figure 14
Tidal	N/A
Groundwater	Low risk Figure 22
Sewers	Considered to be low.
Surface water	Very low risk Figure 17, Figure 18, Figure 19
Reservoirs / canals and other artificial sources	Flooding from reservoir Ruislip Lido (grid reference TQ0862888948), which is owned by London Borough, is extremely unlikely and the risk of flooding to the site considered to be low. Figure 20, Figure 21
Infrastructure failure	Considered to be low.

3.1.1 Flood Risk from River Defence Failure

As discussed in Section 2.3, EA product 4 provides defended fluvial flood extent of 1%AEP (i.e. 1 in 100yr), which confirms that the site is in Flood zone 3a (i.e. high risk of fluvial flooding) and at risk of flooding above the 1 in 50 year event.

The local 2d model node results maps from the EA product 4 (Figure 16) shows that the flood level estimated at the site for 1 in 100 year +20% Climate Change event would be **27.57mAOD**.

The historical flood mapping in the EA product 4 indicates that the site was not affected by any historical flooding.

Therefore, the site is considered to be at high risk of fluvial flooding as a conservative approach.

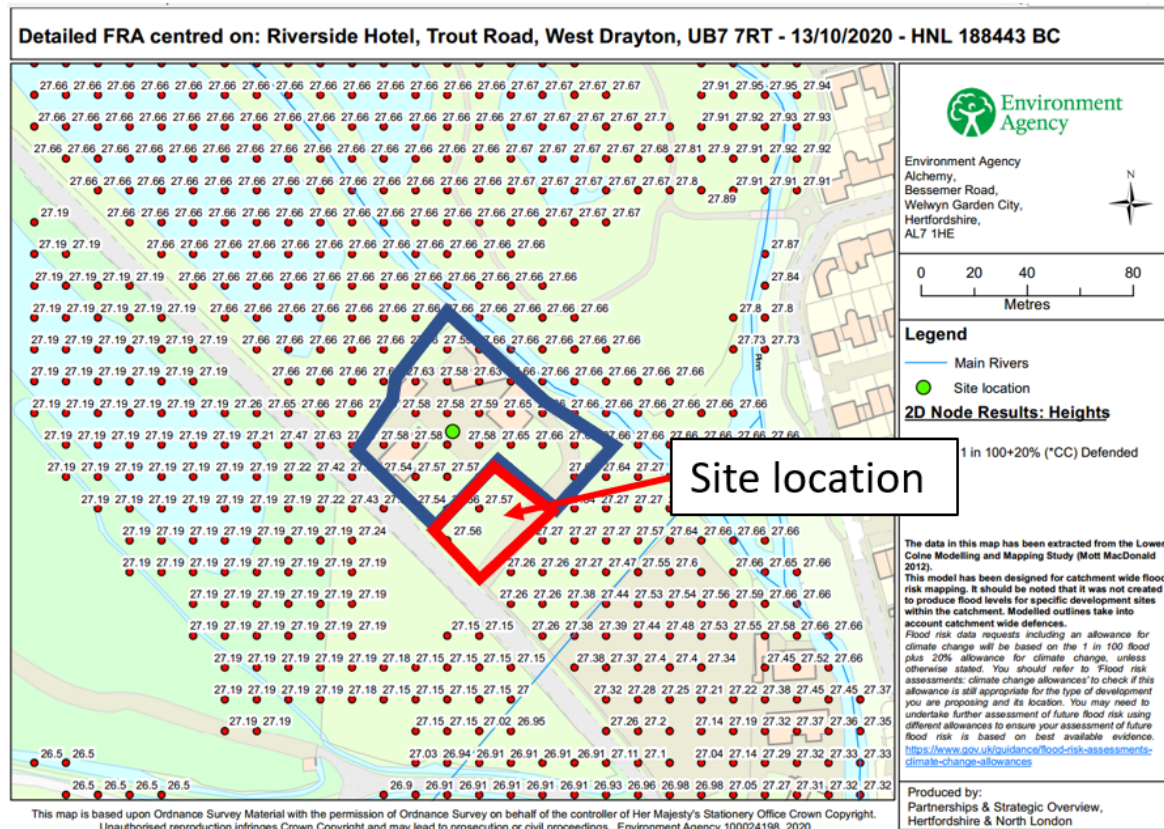


Figure 16: EA Product 4 – 2D Node Results 1 in 100 +20% Climate Change Event (Source: EA 2020) showing the site (outlined in red) and field under same ownership (outlined in blue)

3.1.2 Surface Water

The EA surface flood extents (Figure 17) and flood depths (Figure 18 and Figure 19) have been obtained from the Flood Warning Information Service website and EA open dataset. The whole of the development site is in the very low risk zone (i.e. less than 0.1% AEP). Therefore, surface flooding risk is generally very low.

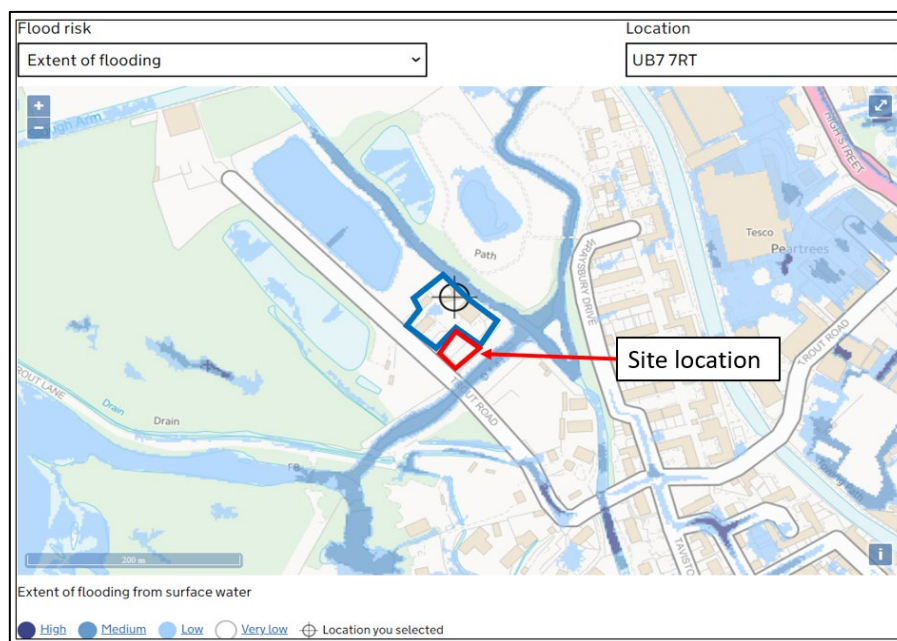


Figure 17: Surface water flood risk map (Copyright Environment Agency) showing the site (outlined in red) and field under same ownership (outlined in blue)



Figure 18: 0.1% AEP Surface Water Depth (Source: EA Open Dataset) showing the site (outlined in red) and field under same ownership (outlined in blue)

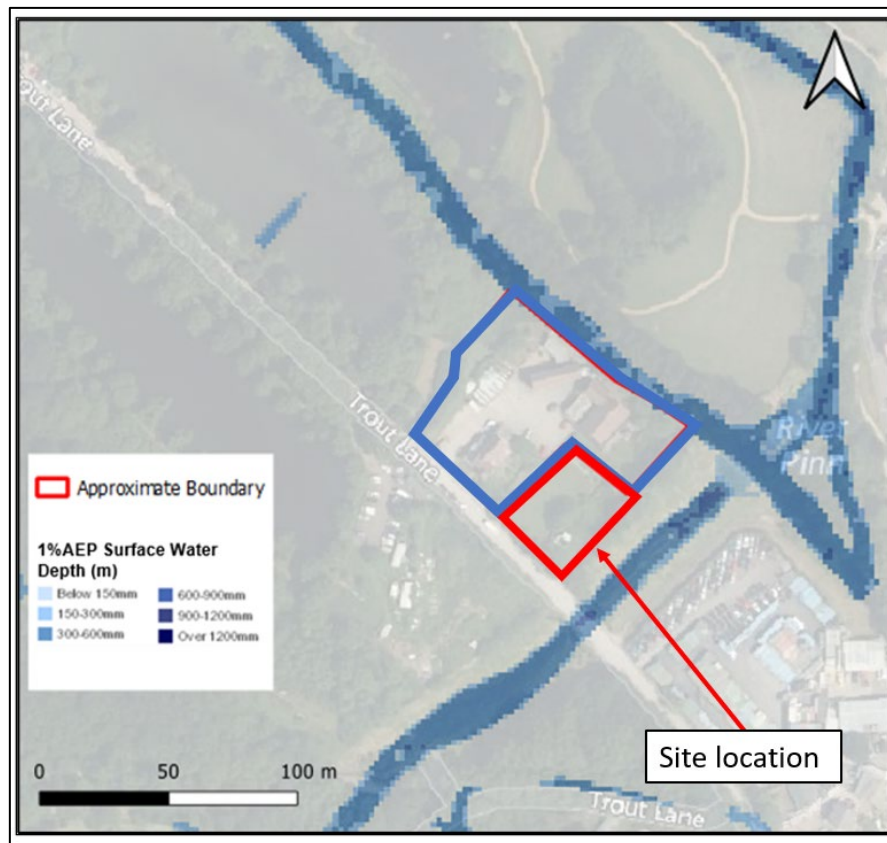


Figure 19: 1% AEP Surface Water Depth (Source: EA Open Dataset) showing the site (outlined in red) and field under same ownership (outlined in blue)

3.1.3 Flood Risk from Reservoir /Canals / Other Artificial Sources

The EA Extent of Flooding from Reservoirs map (Figure 20), based only on large reservoirs (over 25,000 m³ of water), shows that majority of the site is within potential risk of flooding in the event of a breach from reservoirs. The maximum flood depth, as shown in Figure 21, would be over 2 m at the site. The reservoir that could affect this area is Ruislip Lido (grid reference TQ0862888948), which is owned by London Borough of Hillingdon. Flooding from reservoir is considered to be extremely unlikely and the risk of flooding to the site considered to be low.

There is no flood risk from canals or other artificial sources.

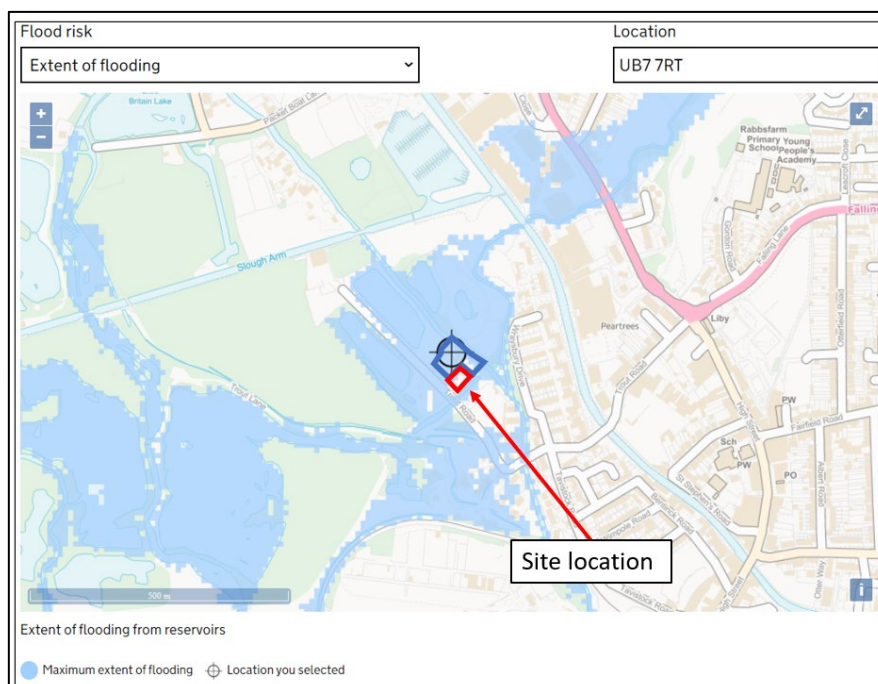


Figure 20: Extent of Flooding from Reservoirs (Source: EA Flood Warning Information Service) showing the site (outlined in red) and field under same ownership (outlined in blue)

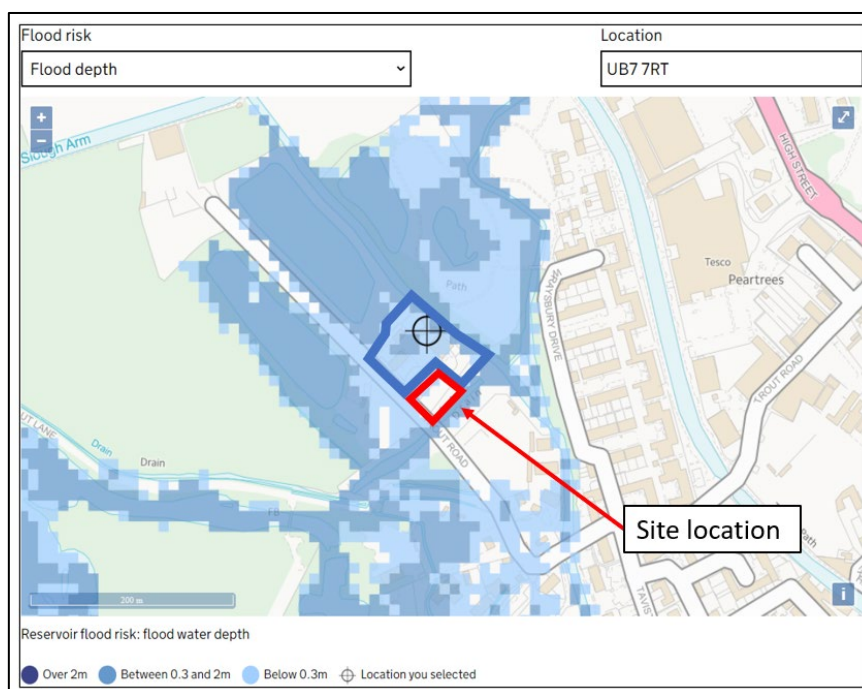


Figure 21: Depth of Flooding from Reservoirs (Source: EA Flood Warning Information Service) showing the site (outlined in red) and field under same ownership (outlined in blue)

3.1.4 Flood Risk from Groundwater

The underline geology and soil, described in Section 2.3, indicate that the site or its surrounding area may have high groundwater table and may be susceptible to flooding. However, borehole records from

the nearby non-confidential boreholes published on BGS website, TW08SE224, TQ08SE225, TQ08SE226 and TQ08SE227, show groundwater tables are at 3.8 m ~ 4.6 m below ground. The Hillingdon SFRA source of flood maps suggest the site has no risk from groundwater flooding.

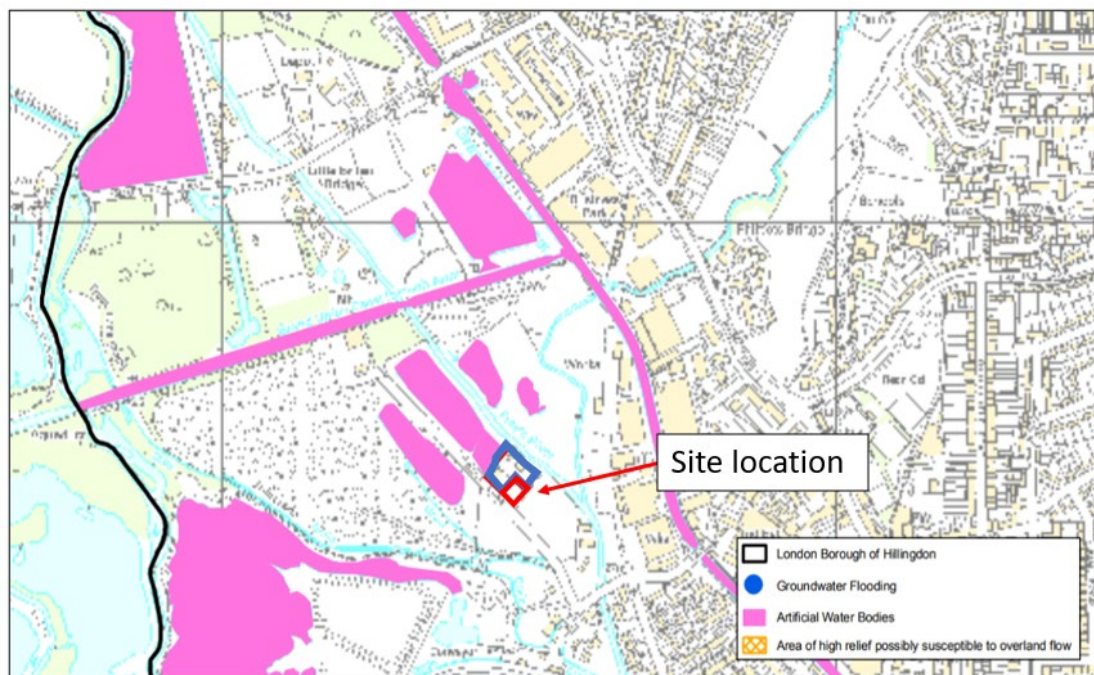


Figure 22: Flood Risk from Groundwater (Source: Hillingdon SFRA 2008) showing the site (outlined in red) and field under same ownership (outlined in blue)

3.1.5 Flood Risk from Sewers

The Appendix B of Hillingdon SFRA provides sewer flooding records of each post code area. In post code with UB7 where the site is located, total number properties flooded from overloaded sewer in last ten years is 21, total number properties flooded by surface water from overloaded sewers in last ten years is 2, and there is no record for foul or combined sewer flooding in the last ten years. Sewer flooding risk is considered to be low given low risk of surface flooding as identified from EA surface flood extent and depth maps.

3.2 Existing Surface Water Drainage Arrangements

Existing surface runoff from the site is likely managed by onsite pipe and the drainage channel in front of the site adjacent to the road. (Figure 23).

The proposed development is a conversion of a greenspace to Photo-Voltaic Panels site.. The proposed development is considered not to change the impermeable areas and the existing drainage arrangement will remain. SuDS infiltration features are likely not suitable for the site due to the background geology and soil. Since the existing site is at low risk from surface flooding (as mentioned above), new arrangement of surface water is not necessary.



4. ASSESSMENT OF FLOOD RISK FOR PROPOSED DEVELOPMENT

4.1 Development Proposals

The proposed development involves the conversion of a greenspace to Photo-Voltaic Panels site.. The development is not considered to change of impermeable area.



Figure 24: Proposed Site (Source: Client) showing the site (outlined in red) and field under same ownership (outlined in blue)

4.2 Fluvial Flood Management

EA product 4 data has confirmed that the site is in Flood Zone 3a. Given the development is not to change the impermeable area or change the existing ground levels, and the fact that it has some flood mitigation measures installed with a raised kerb type flood barrier around the site, no increase in the fluvial flood risk will occur. These measures will be retained.

The water level during the 100 year +20% Climate Change event would be at **27.57mAOD** (EA product 4 information). Given that the highest ground level reaches **27.31 mAOD**, the flood depth will be the best **0.26m**, to decrease flood risk to the solar panels, the flood resistant measure to be put in place is:

- Any electric and vulnerable equipment will be installed **0.2 to 0.3m** above the highest flood level (100 year +20% Climate Change event - **27.57mAOD**). This suggests that the electrics and vulnerable equipment will not be affected by the majority of flood events.

4.3 Surface Water Flooding

The proposed development is for a change of use. According to the surface water maps (section 3.1.2) the buildings are at low risk of surface water flooding. Therefore, it is believed that the proposed development is at low risk of flooding as the proposed development is affecting the existing buildings not the car park.

4.4 Surface Water Management Plan (SWMP)

The proposed development, 'changing of use', would not increase the impermeable surface areas at the site. With existing drainage arrangement retained onsite, the surface flood risk will be as existing. Since the soil and geology suggest SuDS infiltration is unlikely viable and surface flood risk is mostly very low, new SWMP is considered not necessary.

5. SUMMARY & CONCLUSIONS

A summary of the main conclusions for the FRA and SWMP is presented below:

- Development proposals are for the conversion of a greenspace to Photo-Voltaic Panels site, to serve, the temporary homeless accommodation on Riverside Hostel, at Trout Road, Yiewsley, UB7 7RT.
- No additional impermeable areas were proposed;
- The majority of the site is at high fluvial flood risk (i.e. Flood Zone 3a), very low surface water flood risk, and flood risk from other sources are considered to be low;
- Any electric and vulnerable equipment will be installed **0.2 to 0.3m** above the highest flood level (100 year +20% Climate Change event - **27.57mAOD**). This suggests that the electrics and vulnerable equipment will not be affected by the majority of flood events.
- With the inclusion of the above flood resistance measures the solar panels will be at less risk of fluvial flooding than the existing greenspace;
- Existing drainage arrangement will be maintained for the development, which is considered to be sufficient since the existing surface flood risk is mostly very low and SuDS infiltration measures are unlikely viable due to the geology and soil.

6. REFERENCES

Author	Date	Title/Description
DCLG	Mar 2012	Technical Guidance to the National Planning Policy Framework
Ministry of Housing, Communities and Local Government.	2019	National Planning Policy Framework
London Borough Of Hillingdon	Nov 2008	Strategic Flood Risk Assessment

Appendix A: Flood Risk Assessment Template (based on NPPF Practice Guide)

This proforma has been completed in such a way as to identify the sections in the accompanying report where the relevant issues are addressed.

1 Development description and location
1a. What type of development is proposed and where will it be located? A location plan at an appropriate scale should be provided with the FRA, or cross referenced to the main application when it is submitted.
<i>Section 2.1</i>
1b. What is its vulnerability classification? Vulnerability classifications are provided in Table 2, NPPF Technical Guide
<i>Section 2.5</i>
1c. Is the proposed development consistent with the Local Development Documents?
1d. Please provide evidence that the Sequential Test or Exception Test has been applied in the selection of this site for this development type? - Evidence is required that the Sequential Test has been used in allocating the proposed land use proposed for the site and that reference has been made to the relevant Strategic Flood Risk Assessment (SFRA) in selecting development type and design (See paragraphs 157-160, NPPF and paragraphs 3-5, NPPF Technical Guide). Your Local Planning Authority planning officer should be able to provide site-specific guidance on this issue. - Where use of the Exception Test is required, evidence should be provided that all three elements of this test have been passed (see paragraph 160, NPPF and paragraphs 4-5, NPPF Technical Guide). Your Local Planning Authority planning officer should be able to provide site-specific guidance on this issue.
<i>Section 2.5</i>
1e. <i>[Particularly relevant to minor developments (alterations & extensions) & changes of use]</i> Will your proposal increase overall the number of occupants and/or users of the building/land; or the nature or times of occupation or use, such that it may affect the degree of flood risk to these people?
<i>Section 4.1</i>
2. Definition of the flood hazard
2a. What sources of flooding could affect the site? (see paragraph 2, NPPF Technical Guide). This may include hazards such as the sea, reservoirs or canals, which are remote from the site itself, but which have the potential to affect flood risk (see Chapter 3 of the Practice Guide).
<i>Section 3.1</i>
2b. For each identified source, describe how flooding would occur, with reference to any historic records wherever these are available. - An appraisal of each identified source, the mechanisms that could lead to a flood occurring and the pathways that flood water would take to, and across, the site. - Inundation plans, and textual commentary, for historic flood events showing any information available on the mechanisms responsible for flooding, the depth to which the site was inundated, the velocity of the flood water, the routes taken by the flood water and the rate at which flooding occurred.
<i>Section 3.1</i>
2c. What are the existing surface water drainage arrangements for the site? Details of any existing surface water management measures already in place, such as sewers and drains and their capacity.
<i>Section 3.2</i>

3. Probability
3a Which flood zone is the site within?
The flood zones are defined in Table 2, NPPF Technical Guide.
<i>Section 2.4</i>
3b If there is a Strategic Flood Risk Assessment covering this site, what does it show?
The planning authority can advise on the existence and status of the SFRA.
<i>Section 3.1</i>
3c What is the probability of the site flooding taking account of the contents of the SFRA and of any further site-specific assessment?
This may need to include - a description of how any existing flood risk management measures affect the probability of a flood occurring at the site FRA Pro-forma - supporting evidence and calculations for the derivation of flood levels for events with a range of annual probability ☐ inundation plans of, and cross sections through, the existing site showing flood extents and levels associated with events with a range of annual probability ☐ a plan and description of any structures which may influence the probability of a flood occurring at the site. This may include bridges, pipes/ducts crossing a watercourse, culverts, screens, embankments or walls, overgrown or collapsing channels and their likelihood to choke with debris. ☐ details of any modelling studies completed to define the exiting degree of flood risk (Ref Chapter 3 of the PG)
<i>Section 3.1</i>
3d What are the existing rates and volumes of run-off generated by the site?
This should generally be accompanied by calculations of run-off rates and volumes from the existing site for a range of annual probability events (see Section 21 of the NPPF Practice Guide).
4. Climate change
4a How is flood risk at the site likely to be affected by climate change?
Paragraphs 11-15, of the NPPF Technical Guide provide guidance on how to assess the impacts of climate change.
<i>The entire site is at flood zone 3b, at high risk of flooding</i>
5. Detailed development proposals
Where appropriate, are you able to demonstrate how land uses most sensitive to flood damage have been placed in areas within the site that are at least risk of flooding, including providing details of the development layout?
- Reference should be made to Table 2 of the NPPF Technical Guide. - Chapter 4 of the Practice Guide provide guidance on how the sequential approach can be used to inform the lay-out of new development sites.
<i>Section 4.1</i>
6. Flood risk management measures
How will the site be protected from flooding, including the potential impacts of climate change, over the development's lifetime?
This should show that the flood risk management hierarchy has been followed and that flood defences are a necessary solution. This should include details of any proposed flood defences, access/egress arrangements, site drainage systems (including what consideration has been given to the use of sustainable drainage systems) and how these will be accessed, inspected, operated and maintained over the lifetime of the development. This may need to include details of any modelling work undertaken in order to derive design flood levels for the development, taking into account the presence of any new infrastructure proposed.
<i>Section 4.1, 4.2 and 4.4</i>
7. Off site impacts
7a How will you ensure that your proposed development and the measures to protect your site from flooding will not increase flood risk elsewhere?
This should be over the lifetime of the development taking climate change into account. The assessment may need to include:

• ☐ Details of the design basis for any mitigation measures (for example trash screens, compensatory flood storage works and measures to improve flood conveyance). A description of how the design quality of these measures will be assured and of how the access, operation, inspection and maintenance issues will be managed over the lifetime of the development. • ☐ Evidence that the mitigation measures will work, generally in the form of a hydrological and hydraulic modelling report. • An assessment of the potential impact of the development on the river, estuary or sea environment and fluvial/coastal geomorphology. A description of how any impacts will be mitigated and of the likely longer-term sustainability of the proposals.
<i>Section 4</i>
7b How will you prevent run-off from the completed development causing an impact elsewhere? • Evidence should be provided that drainage of the site will not result in an increase in the peak rate or in the volumes of run-off generated by the site prior to the development proceeding.
<i>Section 4</i>
8. Residual risks
8a What flood-related risks will remain after you have implemented the measures to protect the site from flooding? • Designing for event exceedance on site drainage systems is covered in Section 14 of the NPPF Practice Guide.
<i>Section 4.2</i>
8b How, and by whom, will these risks be managed over the lifetime of the development? • Reference should be made to flood warning and evacuation procedures, where appropriate, and to likely above ground flow routes should sewers or other conveyance systems become blocked or overloaded. This may need to include a description of the potential economic, social and environmental consequences of a flood event occurring which exceeds the design standard of the flood risk management infrastructure proposed and of how the design has sought to minimize these – including an appraisal of health and safety issues.
<i>Section 4.2 and 4.4</i>

Appendix B: Climate Change Allowances

B 1. Introduction

In February 2016, the Environment Agency updated the climate change allowances required in Flood Risk Assessments (Environment Agency, 2016); this advice updates previous climate change allowances to support NPPF (2012). Guidance has been provided for:

- peak river flow by river basin district
- peak rainfall intensity
- sea level rise
- offshore wind speed and extreme wave height.

The general guidance is provided in this Appendix. For flood risk assessments and strategic flood risk assessments, assess both the central and upper end allowances to understand the range of impact.

B 2. Peak River Flow Allowances

The peak river flow allowances for flood risk assessments should be applied by reference to the flood zone and vulnerability classification as shown below.

In flood zone 2:

- essential infrastructure – use the higher central and upper end to assess a range of allowances
- highly vulnerable – use the higher central and upper end to assess a range of allowances
- more vulnerable – use the central and higher central to assess a range of allowances
- less vulnerable – use the central allowance
- water compatible – use none of the allowances

In flood zone 3a

- essential infrastructure – use the upper end allowance
- highly vulnerable – development should not be permitted
- more vulnerable – use the higher central and upper end to assess a range of allowances
- less vulnerable – use the central and higher central to assess a range of allowances
- water compatible – use the central allowance

In flood zone 3b

- essential infrastructure – use the upper end allowance
- highly vulnerable – development should not be permitted
- more vulnerable – development should not be permitted
- less vulnerable – development should not be permitted
- water compatible – use the central allowance

If (exceptionally) development is considered appropriate when not in accordance with flood zone vulnerability categories, then it would be appropriate to use the upper end allowance.

Table 5: Peak River Flow Allowances by River Basin District (use 1961 to 1990 baseline)

River basin district	Allowance category	'2020s' (2015 - 2039)	'2050s' (2040 - 2069)	'2080s' (2070 - 2115)
Northumbria	Upper end	20%	30%	50%
	Higher central	15%	20%	25%
	Central	10%	15%	20%
Humber	Upper end	20%	30%	50%
	Higher central	15%	20%	30%
	Central	10%	15%	20%
Anglian	Upper end	25%	35%	65%
	Higher central	15%	20%	35%
	Central	10%	15%	25%
South East	Upper end	25%	50%	105%
	Higher central	15%	30%	45%
	Central	10%	20%	35%
Thames	Upper end	25%	35%	70%
	Higher central	15%	25%	35%
	Central	10%	15%	25%
South West	Upper end	25%	20%	85%
	Higher central	20%	30%	20%
	Central	10%	20%	30%
Severn	Upper end	25%	20%	70%
	Higher central	15%	25%	35%
	Central	10%	20%	25%
Dee	Upper end	20%	30%	45%
	Higher central	15%	20%	25%
	Central	10%	15%	20%
North West	Upper end	20%	35%	70%
	Higher central	20%	30%	35%
	Central	15%	25%	30%
Solway	Upper end	20%	30%	60%
	Higher central	15%	25%	30%
	Central	10%	20%	25%
Tweed	Upper end	20%	25%	45%
	Higher central	15%	20%	25%
	Central	10%	15%	20%

B 3. Peak Rainfall Intensity Allowances

For flood risk assessments and strategic flood risk assessments, both the central and upper end allowances should be used to understand the range of impact.

Table 6: Peak Rainfall Intensity Allowance in Small and Urban Catchments (use 1961 to 1990 baseline)

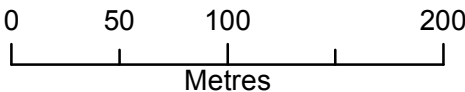
Applies across all of England	Total potential change anticipated for the '2020s' (2015 to 2039)	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2115)
Upper end	10%	20%	40%
Central	5%	10%	20%

Appendix C: Environment Agency Information

Detailed FRA centred on: Riverside Hotel, Trout Road, West Drayton, UB7 7RT - 12/10/2020 - HNL 188443 BC



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



Legend

- Main Rivers
- Site location

Defended Flood Outlines

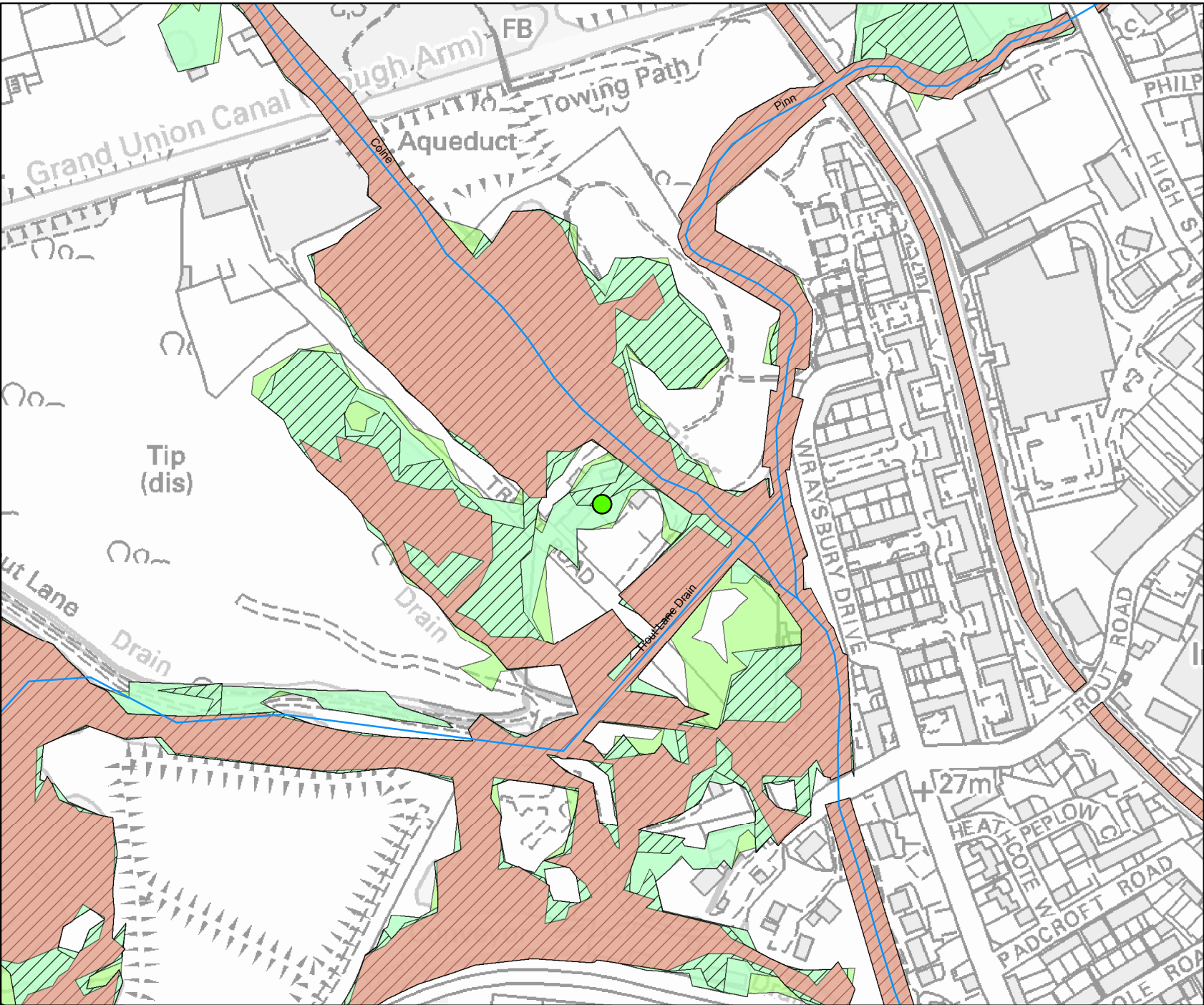
- 1 in 2 (50%) Defended
- 1 in 5 (20%) Defended
- 1 in 10 (10%) Defended
- 1 in 20 (5%) Defended

The data in this map has been extracted from the Lower Colne Modelling and Mapping Study (Mott MacDonald 2012).

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

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

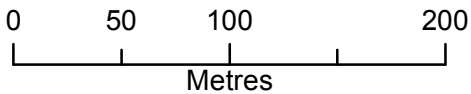
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AL7 1HE



Legend

- Main Rivers
- Site location

Defended Flood Outlines

- 1 in 50 (2%) Defended
- 1 in 100 (1%) Defended
- 1 in 100+20% (*CC)
- 1 in 1000 (0.1%) Defended

The data in this map has been extracted from the Lower Colne Modelling and Mapping Study (Mott MacDonald 2012).

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

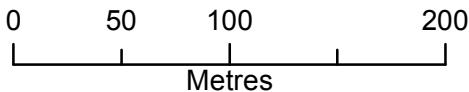
Flood risk data requests including an allowance for climate change will be based on the 1 in 100 flood plus 20% allowance for climate change, unless otherwise stated. You should refer to 'Flood risk assessments: climate change allowances' to check if this allowance is still appropriate for the type of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

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Legend

- Main Rivers
- Site location

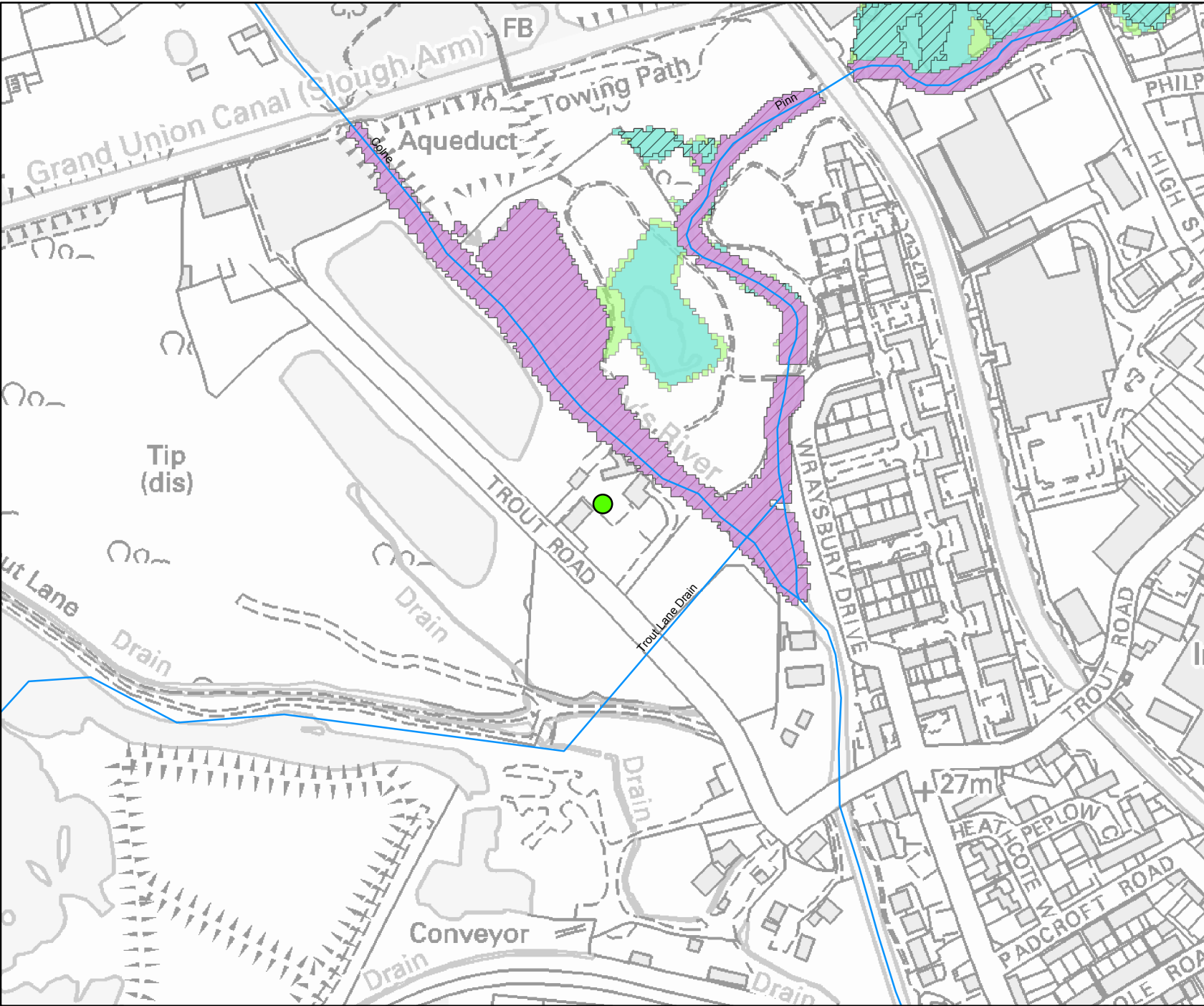
Defended Flood Outlines

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

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

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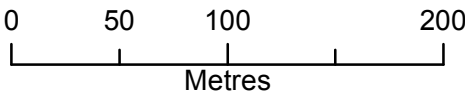


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Legend

- Main Rivers
- Site location

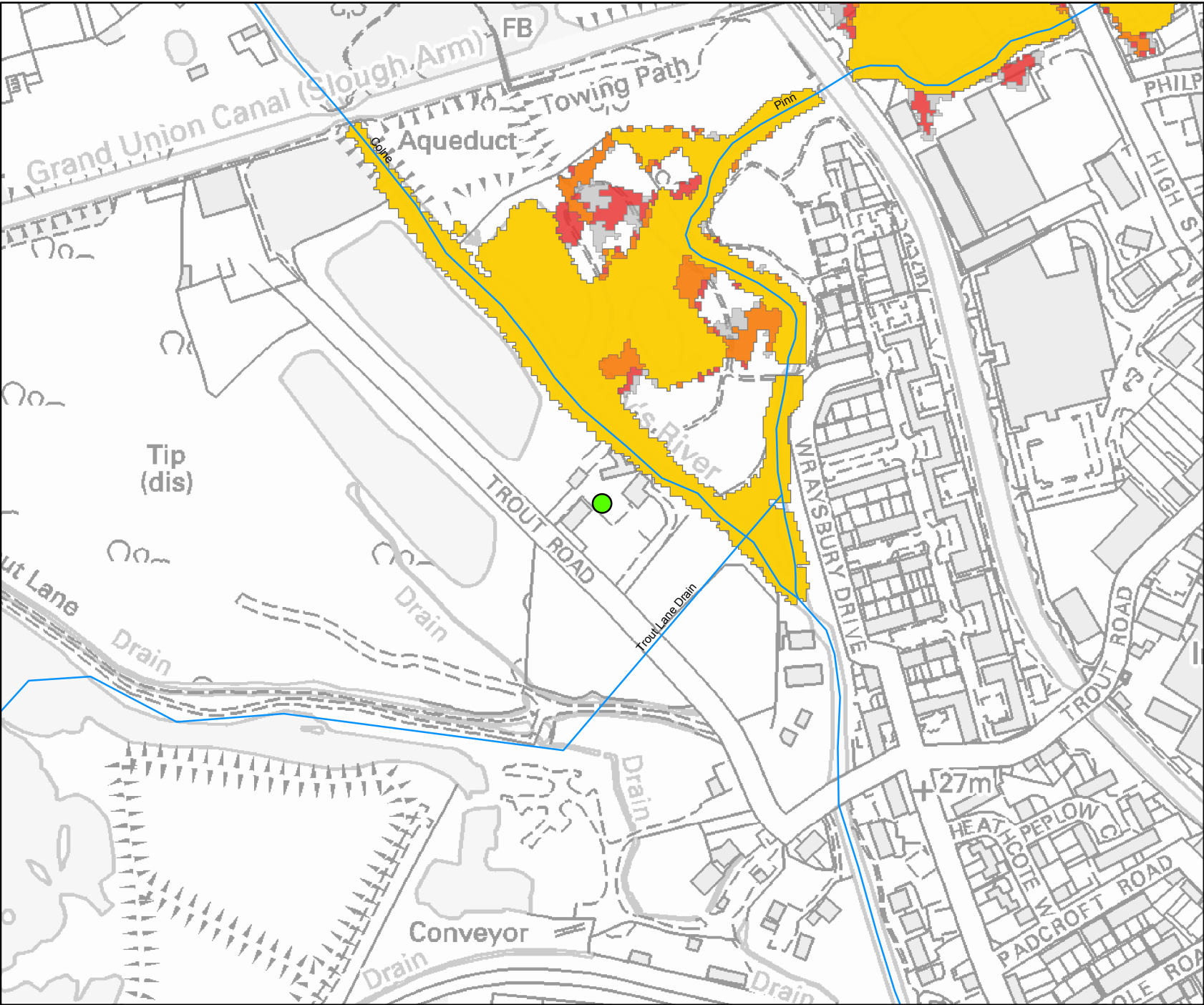
Defended Flood Outlines

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

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

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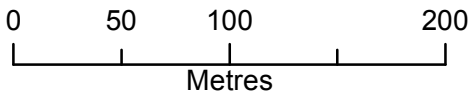


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Legend

- Main Rivers
- Site location

Defended Flood Outlines

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

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

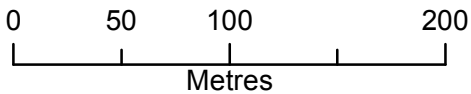
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Legend

- Main Rivers
- Site location

Defended Flood Outlines

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

The data in this map has been extracted from the River Pinn Mapping Study (JBA, 2015). This model has been designed for catchment wide flood risk mapping. It should be noted that it was not created to produce flood levels for specific development sites within the catchment.

Modelled outlines take into account catchment wide defences.

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

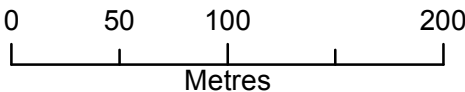
<https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>

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Legend

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- Site location

1D Node Results

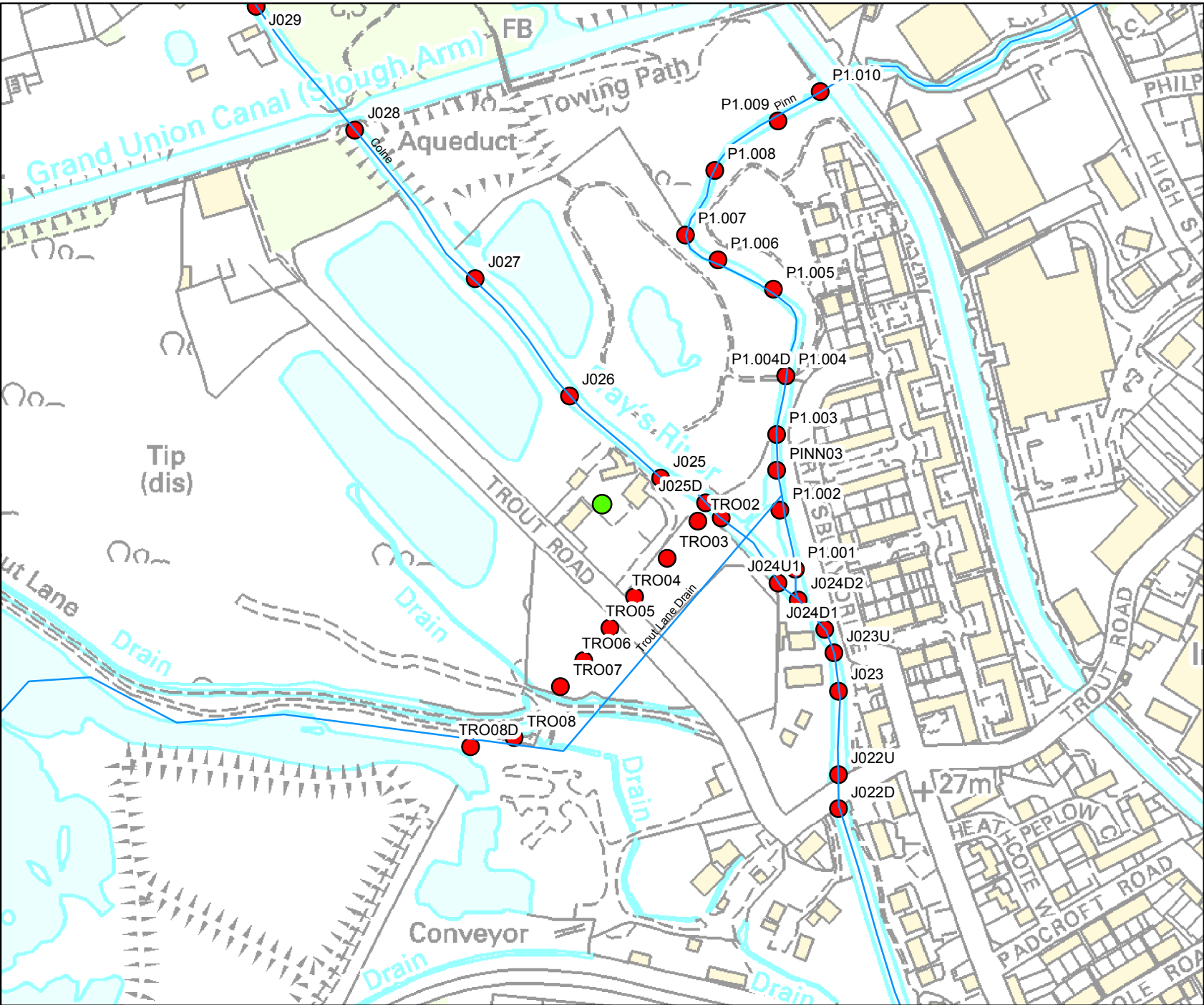
- Node Results

The data in this map has been extracted from the Lower Colne Modelling and Mapping Study (Mott MacDonald 2012).

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

Flood risk data requests including an allowance for climate change will be based on the 1 in 100 flood plus 20% allowance for climate change, unless otherwise stated. You should refer to 'Flood risk assessments: climate change allowances' to check if this allowance is still appropriate for the type of development you are proposing and its location. You may need to undertake further assessment of future flood risk using different allowances to ensure your assessment of future flood risk is based on best available evidence.
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Environment Agency ref: HNL 188443 BC

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

MODELLED FLOOD LEVEL

			Return Period							
Node Label	Easting	Northing	2 yr	5 yr	10 yr	20 yr	50 yr	100 yr	100 yr + 20%	1000 yr
J022D	505617	180424	27.07	27.13	27.15	27.17	27.18	27.18	27.19	27.2
J022U	505617	180446	27.13	27.19	27.22	27.23	27.25	27.25	27.27	27.28
J023	505617	180500	27.19	27.25	27.28	27.3	27.31	27.31	27.33	27.34
J023U	505614	180525	27.23	27.3	27.32	27.34	27.35	27.36	27.38	27.39
J024D1	505608	180540	27.46	27.55	27.59	27.61	27.62	27.63	27.66	27.68
J024D2	505591	180559	27.48	27.56	27.6	27.61	27.63	27.64	27.67	27.68
J024U1	505578	180570	27.48	27.56	27.6	27.61	27.63	27.64	27.67	27.68
J024U2	505541	180612	27.47	27.56	27.6	27.61	27.62	27.64	27.66	27.68
J025	505502	180638	27.47	27.56	27.59	27.61	27.62	27.64	27.66	27.68
J025D	505531	180622	27.47	27.56	27.6	27.61	27.62	27.64	27.66	27.68
J026	505443	180691	27.47	27.56	27.59	27.61	27.62	27.64	27.66	27.68
J027	505382	180767	27.47	27.56	27.59	27.61	27.62	27.64	27.66	27.68
J028	505304	180863	27.47	27.56	27.59	27.61	27.62	27.64	27.67	27.68
J029	505240	180943	27.48	27.56	27.59	27.61	27.62	27.64	27.67	27.7
P1.001	505589	180579	27.48	27.56	27.6	27.61	27.63	27.64	27.67	27.68

P1.002	505579	180617	27.48	27.56	27.59	27.61	27.63	27.64	27.66	27.68
P1.003	505577	180666	27.57	27.67	27.71	27.74	27.76	27.78	27.8	27.82
P1.004	505583	180704	27.63	27.75	27.79	27.83	27.86	27.88	27.9	27.93
P1.004D	505583	180704	27.63	27.75	27.79	27.83	27.86	27.88	27.9	27.93
P1.005	505575	180760	27.68	27.81	27.85	27.89	27.92	27.93	27.95	27.98
P1.006	505539	180779	27.73	27.85	27.9	27.93	27.96	27.98	28	28.03
P1.007	505518	180795	27.75	27.87	27.91	27.95	27.98	28	28.02	28.05
P1.008	505537	180837	27.81	27.96	28.01	28.05	28.09	28.11	28.13	28.16
P1.009	505578	180869	27.87	28.02	28.08	28.13	28.17	28.2	28.23	28.27
P1.010	505605	180888	27.9	28.06	28.11	28.16	28.2	28.23	28.26	28.31
PINN03	505577	180643	27.48	27.56	27.59	27.61	27.63	27.64	27.66	27.68
TRO02	505526	180610	27.08	27.14	27.16	27.17	27.21	27.23	27.27	27.3
TRO03	505506	180586	27.08	27.13	27.15	27.16	27.2	27.23	27.27	27.3
TRO04	505485	180561	27.08	27.13	27.15	27.16	27.2	27.22	27.26	27.29
TRO05	505469	180541	27.04	27.07	27.09	27.09	27.12	27.13	27.15	27.17
TRO06	505452	180520	27.04	27.07	27.08	27.09	27.12	27.13	27.15	27.17
TRO07	505437	180503	27.04	27.07	27.08	27.09	27.11	27.13	27.15	27.16
TRO08	505407	180470	27.02	27.05	27.05	27.06	27.07	27.09	27.1	27.1
TRO08D	505379	180464	27.02	27.05	27.06	27.06	27.08	27.09	27.1	27.1

MODELLED FLOWS

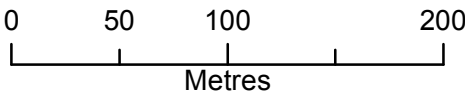
			Return Period							
Node Label	Easting	Northing	2 yr	5 yr	10 yr	20 yr	50 yr	100 yr	100 yr + 20%	1000 yr
J022D	505617	180424	6.2	6.7	6.95	7.01	7.09	7.17	7.34	7.46
J022U	505617	180446	6.2	6.7	6.95	7.01	7.09	7.17	7.34	7.46
J023	505617	180500	6.36	7.26	7.67	7.9	8.1	8.3	8.67	8.98
J023U	505614	180525	6.27	7.04	7.46	7.54	7.68	7.82	8.11	8.34
J024D1	505608	180540	6.27	7.04	7.46	7.54	7.68	7.82	8.11	8.34
J024D2	505591	180559	6.38	7.44	8.13	8.25	8.41	8.69	9.31	9.85
J024U1	505578	180570	0.44	0.41	0.41	0.44	0.49	0.57	1.85	1.76
J024U2	505541	180612	0.44	0.41	0.4	0.43	0.49	0.57	1.71	1.63
J025	505502	180638	0.92	1.03	1.16	1.24	1.58	1.25	2.14	2.18
J025D	505531	180622	1.33	1.5	1.56	1.7	2.03	1.88	2.32	2.56
J026	505443	180691	0.91	1.01	1.13	1.13	1.36	1.24	2.1	2.67
J027	505382	180767	0.53	0.41	0.4	0.43	0.49	0.55	1.61	3.23
J028	505304	180863	0.61	0.67	0.78	1.13	1.32	1.41	2.48	3.25
J029	505240	180943	0.6	0.66	0.73	1.09	1.34	1.42	2.48	3.24
P1.001	505589	180579	8.8	11.01	11.87	12.69	13.41	13.84	14.36	15.12

[illegible]

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Legend

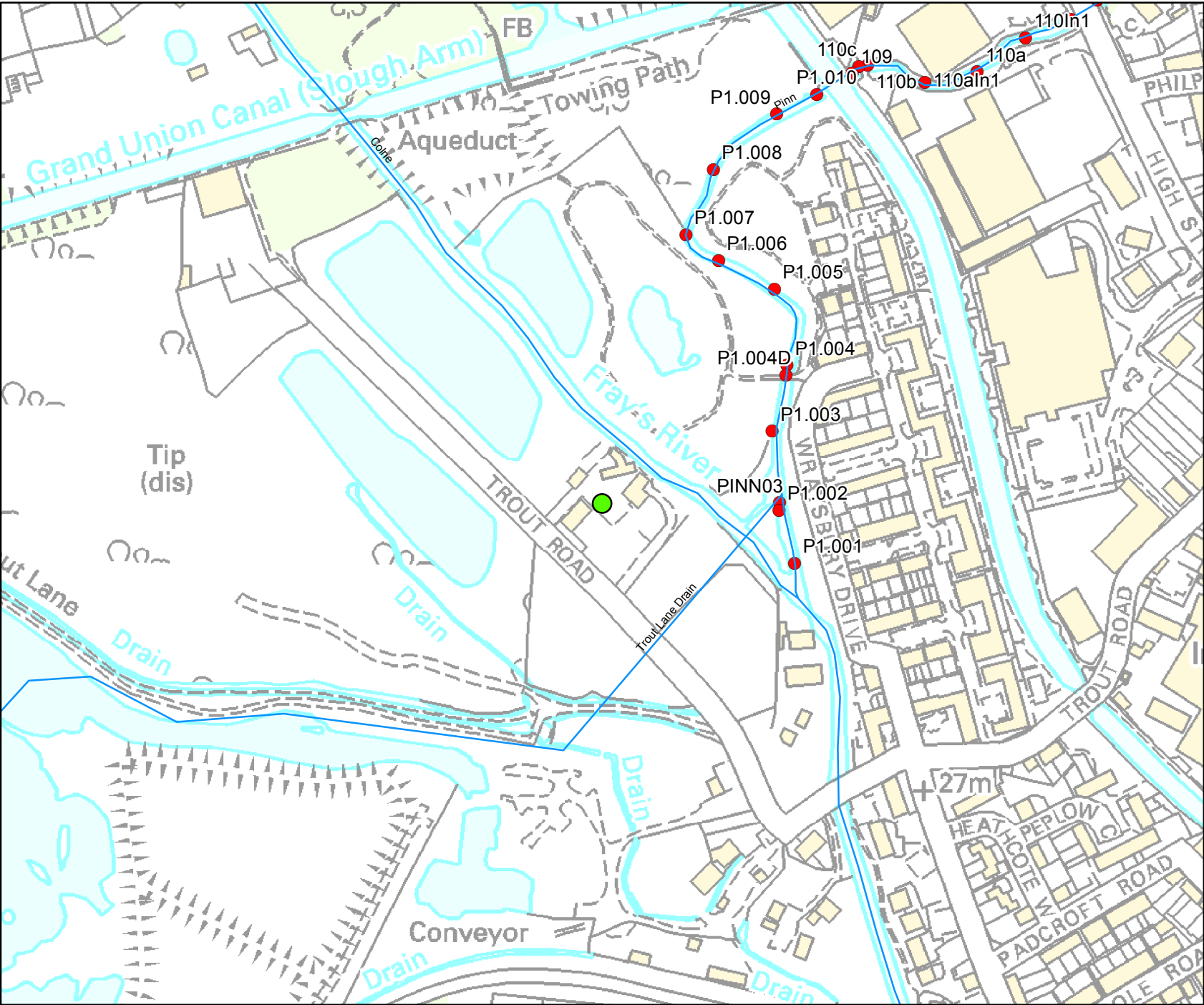
- Main Rivers
- Site location

1D Node Results

- Nodes

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

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Environment Agency ref: HNL 188443 BC

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

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

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

Caution:

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

All flood levels are given in metres Above Ordnance Datum (mAOD)

All flows are given in cubic metres per second (cumecs)

MODELLLED FLOOD LEVEL

[illegible]

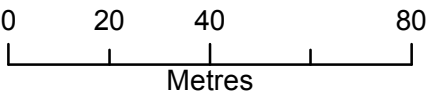
MODELLED FLOWS

Node Label	Easting	Northing	Return Period													
			2 yr	5 yr	10 yr	20 yr	30 yr	50 yr	75 yr	100 yr	100yr + 20%	100yr + 25%	100yr + 35%	100yr + 70%	250 yr	1000yr
11970 001u	505784	180946	8.34	9.73	9.79	9.72	9.67	9.58	9.55	9.53	9.52	9.51	9.51	9.46	9.51	9.41
11970 001d	505767	180935	8.34	9.73	9.79	9.72	9.67	9.58	9.55	9.53	9.52	9.51	9.51	9.46	9.51	9.41
110ln1	505738	180922	8.56	10.11	10.55	10.64	10.69	10.73	10.76	10.79	10.84	10.86	10.88	10.96	10.88	11.02
110a	505706	180900	8.56	10.23	11.32	12.37	12.70	12.88	12.98	13.05	13.17	13.20	13.24	13.39	13.22	13.52
110aln1	505673	180894	8.57	10.23	11.34	12.44	12.81	13.03	13.08	13.13	13.28	13.31	13.36	13.52	13.33	13.65
110b	505636	180905	8.57	10.26	11.59	13.04	13.81	15.22	16.04	16.70	18.22	18.59	19.21	21.15	18.90	23.45
110c	505630	180904	8.57	10.26	11.59	13.04	13.81	15.22	16.04	16.70	18.22	18.59	19.21	21.15	18.90	23.45
109	505626	180899	8.57	10.26	11.59	13.06	13.92	15.51	16.61	17.47	19.66	20.23	21.29	24.31	20.77	27.27
P1.010	505603	180886	8.57	10.26	11.59	13.06	13.92	15.51	16.61	17.47	19.66	20.23	21.29	24.31	20.77	27.27
P1.009	505577	180873	8.57	10.26	11.59	13.06	13.92	15.51	16.61	17.47	19.66	20.23	21.24	23.81	20.76	26.60
P1.008	505536	180837	8.57	10.26	11.59	12.87	13.57	14.93	15.89	16.75	18.61	19.08	19.94	22.25	19.50	24.30
P1.007	505518	180795	8.57	10.26	11.52	12.83	13.52	14.71	15.45	16.04	17.60	18.00	18.76	20.85	18.39	22.83
P1.006	505539	180779	8.57	10.26	11.49	12.64	13.18	14.04	14.53	14.92	15.95	16.23	16.79	18.39	16.52	20.01
P1.005	505575	180760	8.57	10.26	11.49	12.64	13.20	14.12	14.64	15.02	15.94	16.13	16.45	17.38	16.29	18.34
P1.004	505583	180711	8.57	10.26	11.49	12.64	13.20	14.11	14.62	14.99	15.86	16.07	16.43	17.31	16.26	18.02
P1.004D	505583	180704	8.57	10.26	11.49	12.64	13.20	14.11	14.62	14.99	15.86	16.07	16.43	17.31	16.26	18.02
P1.003	505574	180668	8.57	10.26	11.49	12.64	13.20	14.11	14.62	14.99	15.86	16.07	16.44	17.31	16.26	18.03
PINN03	505579	180622	3.33	3.99	4.48	5.24	5.48	5.87	6.09	6.25	6.63	6.72	6.88	7.27	6.81	7.57
P1.002	505579	180617	3.33	3.99	4.48	5.24	5.48	5.87	6.09	6.25	6.63	6.72	6.88	7.27	6.81	7.57
P1.001	505588	180582	3.21	3.84	4.31	5.01	5.24	5.60	5.81	5.96	6.31	6.39	6.54	6.89	6.47	7.18

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Legend

- Main Rivers
- Site location

2D Node Results: Heights

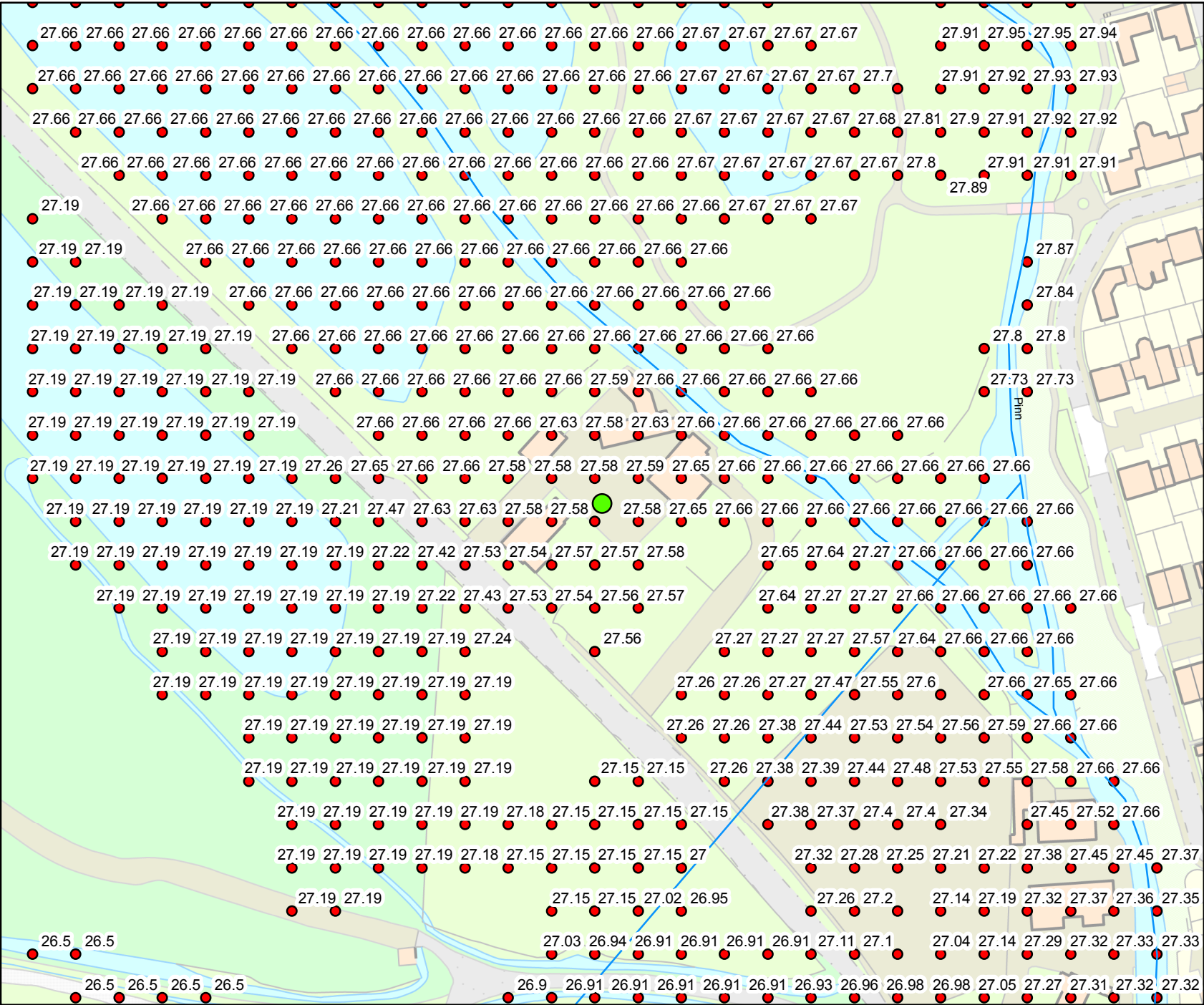
- 1 in 100+20% (*CC) Defended

The data in this map has been extracted from the Lower Colne Modelling and Mapping Study (Mott MacDonald 2012).

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

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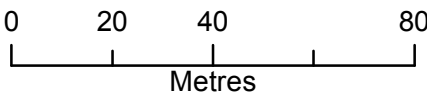


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Legend

- Main Rivers
- Site location

2D Node Results: Heights

- 1 in 2 year (50%) Defended

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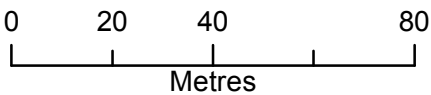
<https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>

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Legend

- Main Rivers
- Site location

2D Node Results: Heights

- 1 in 5 year (20%) Defended

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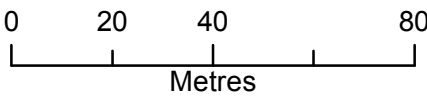
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Legend

- Main Rivers
- Site location

2D Node Results: Heights

- 1 in 20 year (5%) Defended

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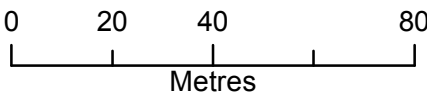
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Legend

- Main Rivers
- Site location

2D Node Results: Heights

- 1 in 30 year (3.33%) Defended

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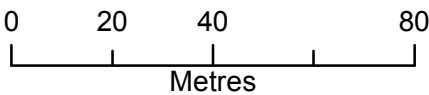
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Legend

- Main Rivers
- Site location

2D Node Results: Heights

- 1 in 50 year (2%) Defended

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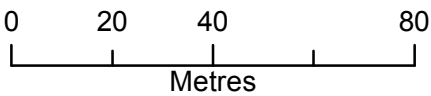
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Legend

- Main Rivers
- Site location

2D Node Results: Heights

- 1 in 75 year (1.33%) Defended

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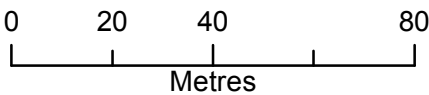
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Legend

- Main Rivers
- Site location

2D Node Results: Heights

- 1 in 100 year (1%) Defended

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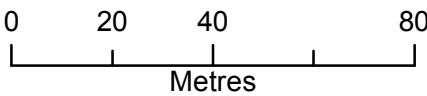
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Legend

- Main Rivers
- Site location

2D Node Results: Heights

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

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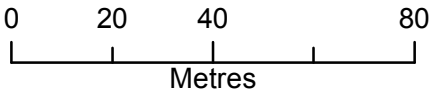
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Legend

- Main Rivers
- Site location

2D Node Results: Heights

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

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

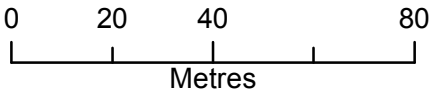
Flood risk data requests including an allowance for climate change will be based on the 1 in 100 flood plus 20% allowance for climate change, unless otherwise stated. You should refer to 'Flood risk assessments: climate change allowances' to check if this allowance is still appropriate for the type of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

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Partnerships & Strategic Overview,
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Detailed FRA centred on: Riverside Hotel, Trout Road, West Drayton, UB7 7RT - 13/10/2020 - HNL 188443 BC



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



Legend

- Main Rivers
- Site location

2D Node Results: Heights

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

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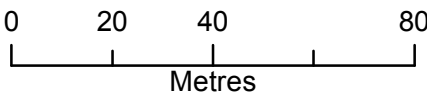
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Legend

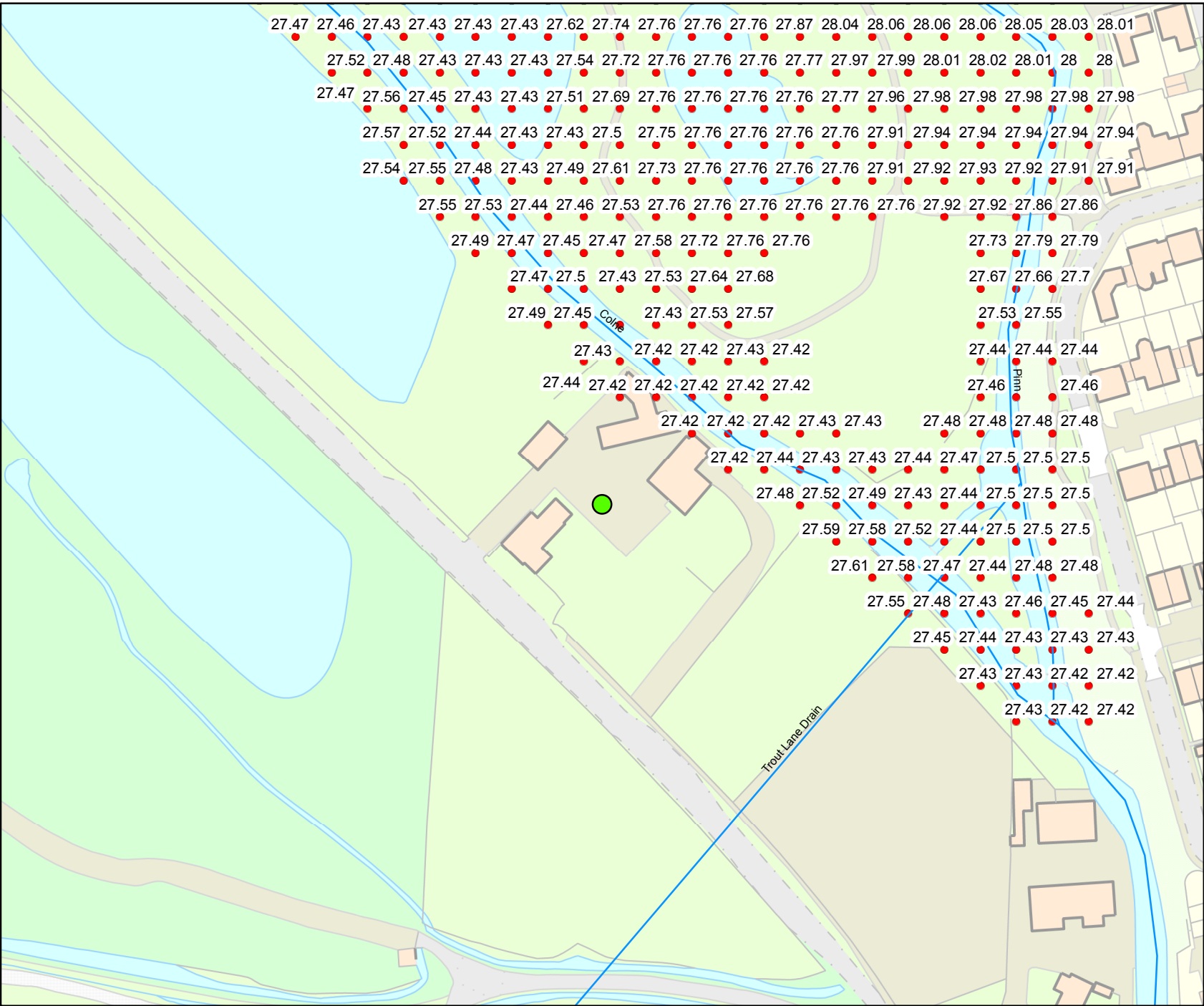
- Main Rivers
- Site location
- 2D Node Results: Heights
- 1 in 100 year + 70% (*CC) Defended

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

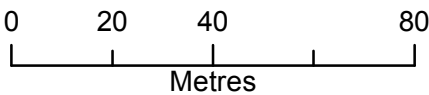
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Legend

- Main Rivers
- Site location

2D Node Results: Heights

- 1 in 250 year (0.4%) Defended

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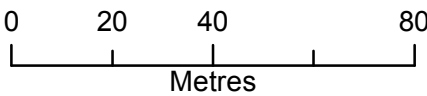
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Legend

- Main Rivers
- Site location

2D Node Results: Heights

- 1 in 1000 year (0.1%) Defended

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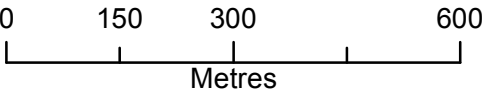
<https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>

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Historic Flood Map centred on: Riverside Hotel, Trout Road, West Drayton, UB7 7RT - 13/10/2020 - HNL 188443 BC



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Legend

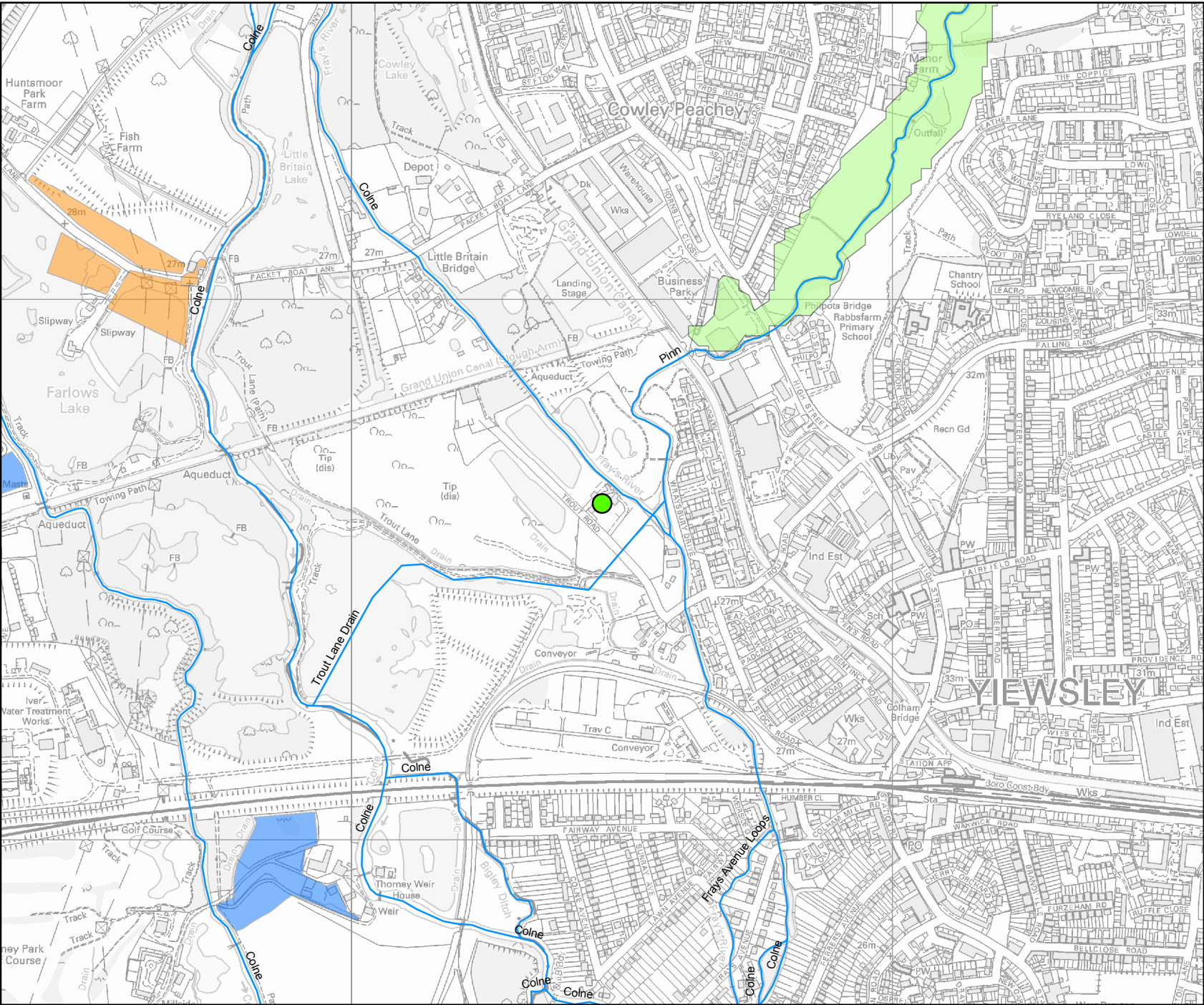
- Main Rivers
- Site location

Flood Event Outlines

- 1987
- 1988
- 2014

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

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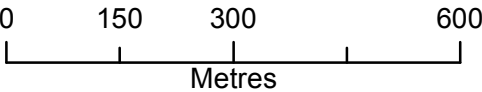


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Historic Flood Map centred on: Riverside Hotel, Trout Road, West Drayton, UB7 7RT - 13/10/2020 - HNL 188443 BC



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Legend

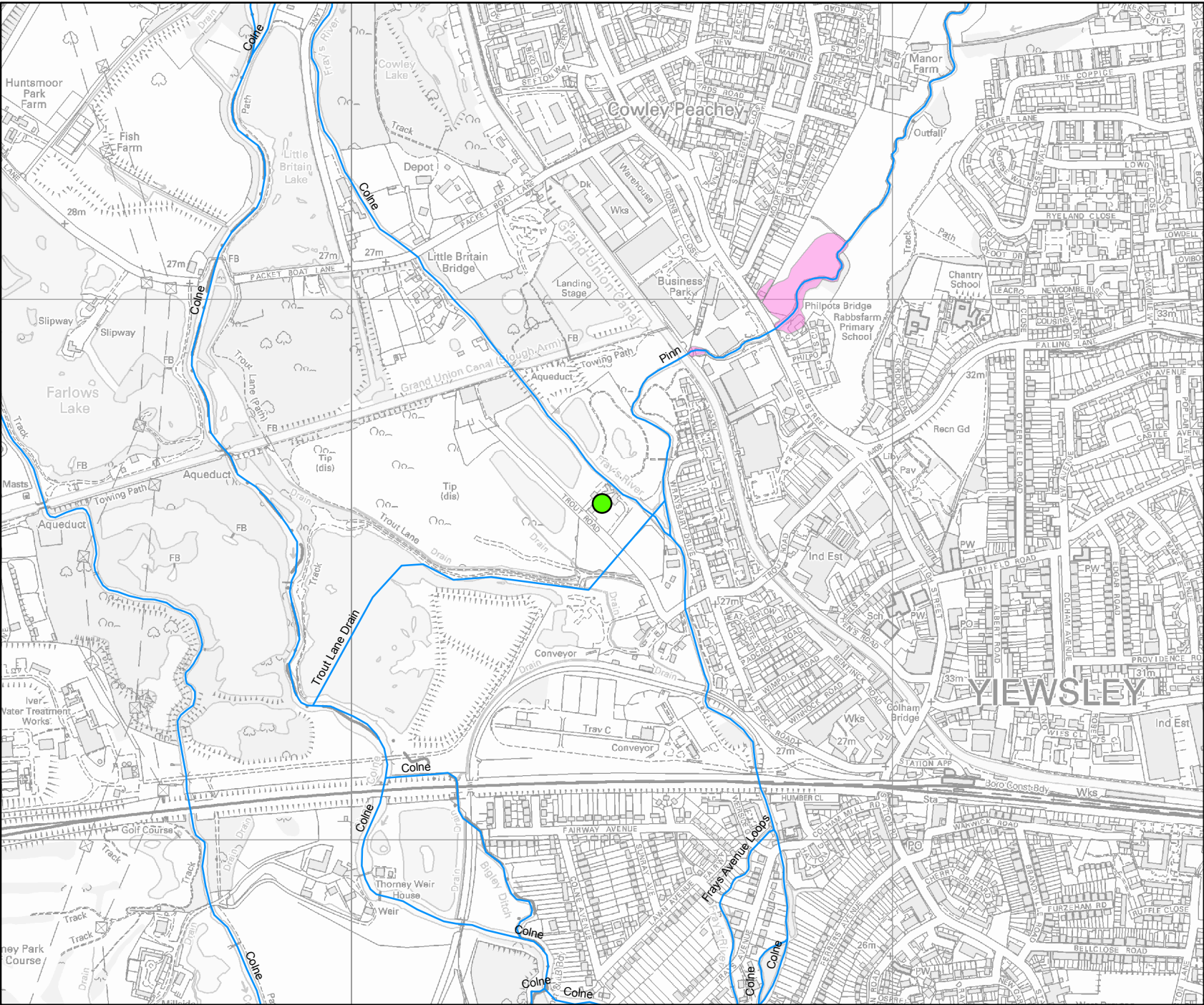
- Main Rivers
- Site location

Flood Event Outlines

- 2009

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

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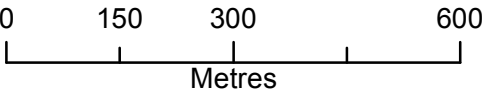


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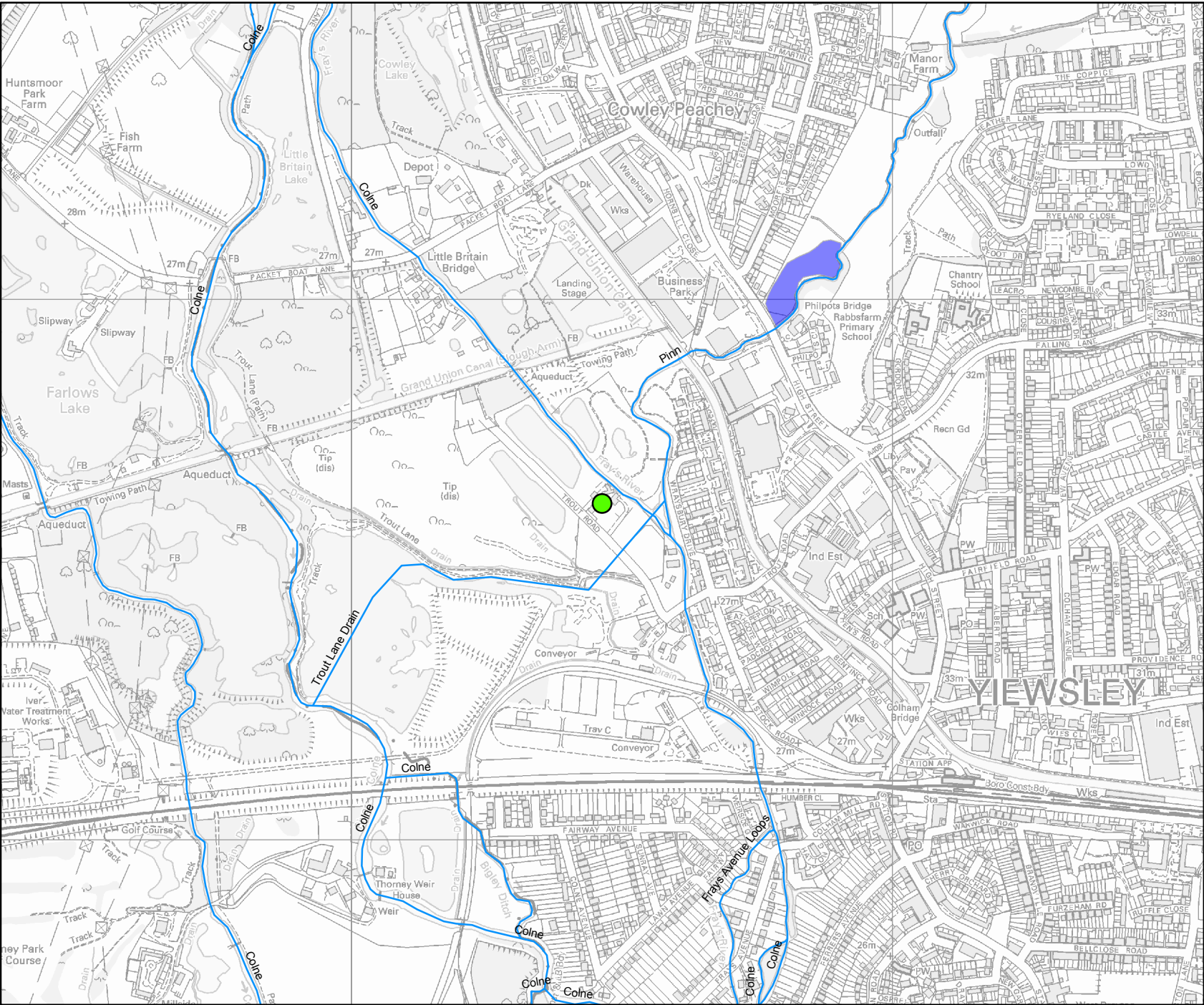
- Main Rivers
- Site location

Flood Event Outlines

- 2013

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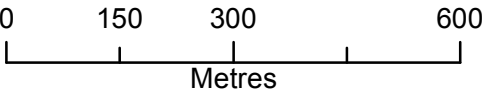


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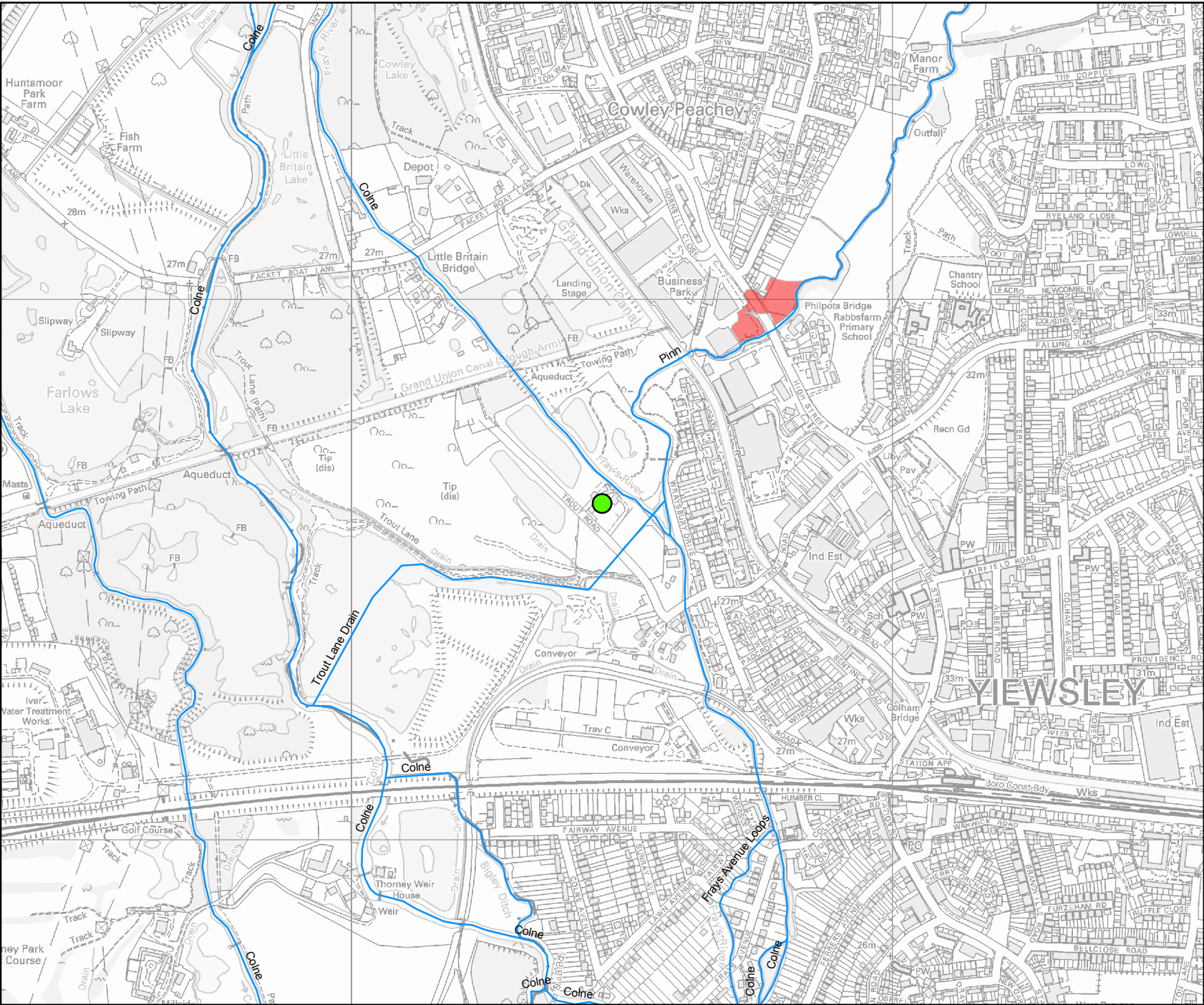
- Main Rivers
- Site location

Flood Event Outlines

2016

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

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