The Orchard, Whalley

Flood Risk Assessment

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Client Name: Jack Carruthers

Client Address: The Orchard Ribble Valley Ltd, 4 Abbeycroft, The Sands, Whalley, Clitheroe, England, BB7 9TN

Site Address: The Orchard, Ridding Lane, Whalley (NGR: 372860,436125)

Control Sheet

Rev	Description	Checked	Issued	Date
P01	First Issue	CJS	CJS	22/08/2025
P02	Client Comments Addressed	CJS	CJS	03/10/2025

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1.0 Introduction

1.1 Project Background

Curtins was instructed by Wilson Mason LLP to undertake a Flood Risk Assessment (FRA) for the development of a site known as The Orchard, Whalley. The nearest post code is BB7 9TN and the site is centred on National Grid Reference (NGR) 372860mE 436125mN.

The report provides information on the nature of flood risk at the site and follows Government guidance with regards to development and flood risk and is based on currently available information.

1.2 Scope of Assessment

The assessment is to be undertaken in accordance with the standing advice and requirements of the Environment Agency (EA) for Flood Risk Assessments as outlined in the Communities and Local Governments Planning Policy Guidance (PPG), Flood risk and coastal change, to the National Planning Policy Framework (NPPF).

The redline site area is 1.2 hectares (ha) and confirms the full extent of the application site.

Following scrutiny of the Environment Agency (EA) flood zone maps it has been identified that the site boundary falls wholly within the flood risk classification.

- Flood Zone 3 (FZ3) (High probability of flooding from Rivers and Sea). Land having a 1% AEP (1 in 100) or greater annual probability of river flooding; or Land having a 0.5%AEP (1 in 200) or greater annual probability of sea flooding. (Land shown in dark blue on the Flood Map).

A FRA is required to accompany a planning application, as the site is both is larger than 1ha and lies in part within FZ3. The FRA is required to address all sources of potential flood risk and take into account the management of surface water run-off. The FRA should also consider the impact of climate change both to and from development proposals.

The National Planning Policy Framework (NPPF) was published on 27th March 2012, revised on the 24th July 2018 and updated on the 19th February 2019, 20th July 2021, 20th December 2023 and 12 December 2024, replacing all previous national planning policy documents. Chapter 14[1] of the NPPF address the challenge of climate change, flooding and coastal change.

Paragraph 181 makes Sustainable Urban Drainage Systems (SuDS) a requirement for the determination of all planning applications, unless there is clear evidence that this would be inappropriate.

[1]https://www.gov.uk/guidance/national-planning-policy-framework/14-meeting-the-challenge-of-climate-change-flooding-and-coastal-change

Paragraph 182 states that applications which could affect drainage on or around the site should incorporate sustainable drainage systems to control flow rates and reduce volumes of runoff, and which are proportionate to the nature and scale of the proposal. These should provide multifunctional benefits wherever possible, through facilitating improvements in water quality and biodiversity, as well as benefits for amenity

Based on the development proposed, discussed in Section 2, SuDS will not be a requirement on this site.

The assessment will:

- Investigate all potential risks of flooding to the site,
- Consider the impact the development may have elsewhere with regards to flooding.
- Consider proposals to mitigate any potential risk of flooding determined to be present.

This report reviews the following information:

- Environment Agency Flood Map for Planning (FMfP).
- Environment Agency Product 4 Data
- Environment Agency Risk of Flooding from Surface Water (RoFSW).
- UK Government Long Term Flood Risk Information for reservoir flooding.
- Environment Agency historic flood maps.
- National River Flow Archive (NRFA) Gauging Station Data (Station 71004 - Calder at Whalley Weir)
- Flood Estimation Handbook (FEH) Revitalised Flood Hydrograph (ReFH) method for deriving peak flow and hydrograph shapes.
- Ribble Valley Borough Council Adopted Core Strategy, December 2014.
- Ribble Valley Borough Council Strategic Flood Risk Assessment Level 1, April 2017.
- Ground level data taken from Environment Agency 1m resolution Light Detection and Ranging (LiDAR) data.

2.0 Development Proposals

2.1 Proposed Development

The site is currently used to host events whereby a Tipi Tent is erected in the northern part of the site. Temporary structures can only be in place for a maximum of 28 days. Planning permission is now being sought for the Tipi Tent structure to remain in place on a recurring annual basis over the summer months (May through September) and be used for recreational health and wellness events only. No sleeping accommodation within the new proposals. Figure 2-1 shows the Tipi Tent in-situ under the current arrangements.

Figure 2-1: Development Proposal

2.2 Vulnerability

On the basis of the development proposal and reference to NPPF Annex 3 and Planning Practice Guidance Table 2[2] (PPF Reference ID: 7-079-20220825), the vulnerability classification of the proposed development use will constitute a Water Compatible classification: *Amenity open space, nature conservation and biodiversity,* ***outdoor sports and recreation*** *and essential facilities such as changing rooms.*

[2] https://www.gov.uk/guidance/flood-risk-and-coastal-change#Table-2-Flood-Risk-Vulnerability-Classification

2.3 Estimated Lifecycle of Development

The current EA guidance on planning flood risk suggests a design life of non-residential development of at least 75 years. However, as a temporary structure a design life of significantly less is appropriate. For the purpose of this FRA the design life is taken as no more than 15 years.

3.0 Site Characterisation

3.1 Site Description

The site is located in the Lancashire village of Whalley and comprises of open grassland. The site is bounded; to the north by the public highway Ridding Lane and the Sands, which hosts the Whalley Abbey East Gatehouse, a substantial two-storey 14th-century sandstone structure that once served as the ceremonial entrance to a powerful Cistercian monastery; to the south by the River Calder flowing east to west to confluence with the River Ribble some 2km northwest. To the west lies the Whalley Viaduct, also known as "Whalley Arches", renowned as the longest and largest brick-built railway viaduct in the county. Constructed between 1846 and 1850, it features 48 round arches and stands c.21m high, carrying the Ribble Valley Railway Line over the River Calder. To the east, lies residential property and open grassland, with the English Martyrs RC Church and ruins of Whalley Abbey beyond.

Figure 3-1: Site Location Plan

3.2 Topography

EA LiDAR Composite Digital Terrain Model (DTM), flown in 2022, has been used to describe the topography of the site. Generally, the site is level, lying at an elevation of 43.0mAOD. The top of river bank to the south is c.43.0mAOD and land continues to gently rise within the site to the northeast to c.43.60mAOD along the southern boundary before falling again to 42.60mAOD as a shallow depression running northwest-southeast across the centre of the site, to then rise north-eastwards again to reach a maximum height of 43.70mAOD in the northeast corner adjacent the Sands.

The river level, as recorded by the LiDAR survey is c.40.00mAOD.

Figure 3-2 provides a visualisation of the site topography.

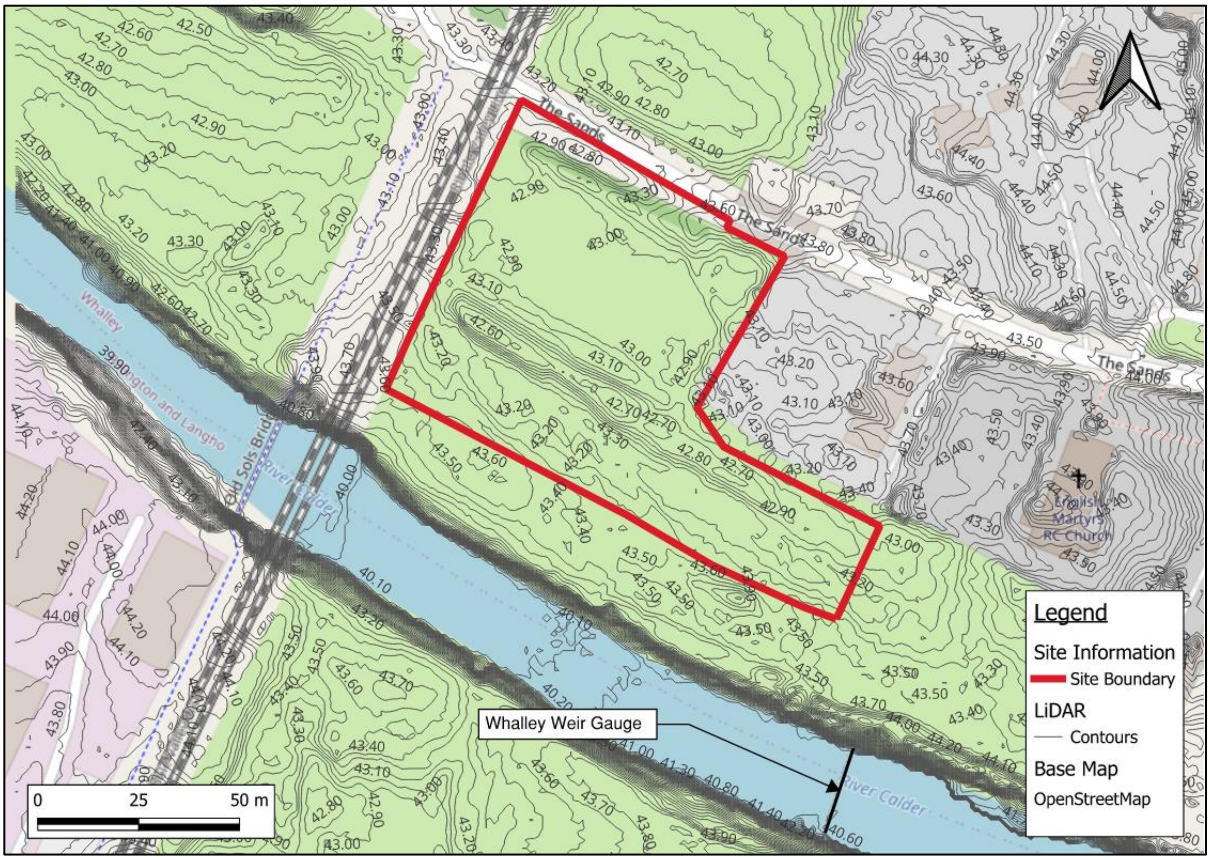


Figure 3-2: Site Topography

3.3 Waterbodies

The following waterbodies have been identified within and vicinity of the site:

- River Calder lies within the south of the site, flowing east to west. The river is designated as 'Main River' and falls under the jurisdiction of the Environment Agency.

3.4 Hydrology

The site lies in the River Calder Hydrological Catchment, having an area to the site of 316km^2. The Calder is part of the larger Ribble catchment. Its source lies in the moors above Burnley, and it flows westward through towns such as Padiham and Whalley before joining the River Ribble approximately four miles before Ribchester.

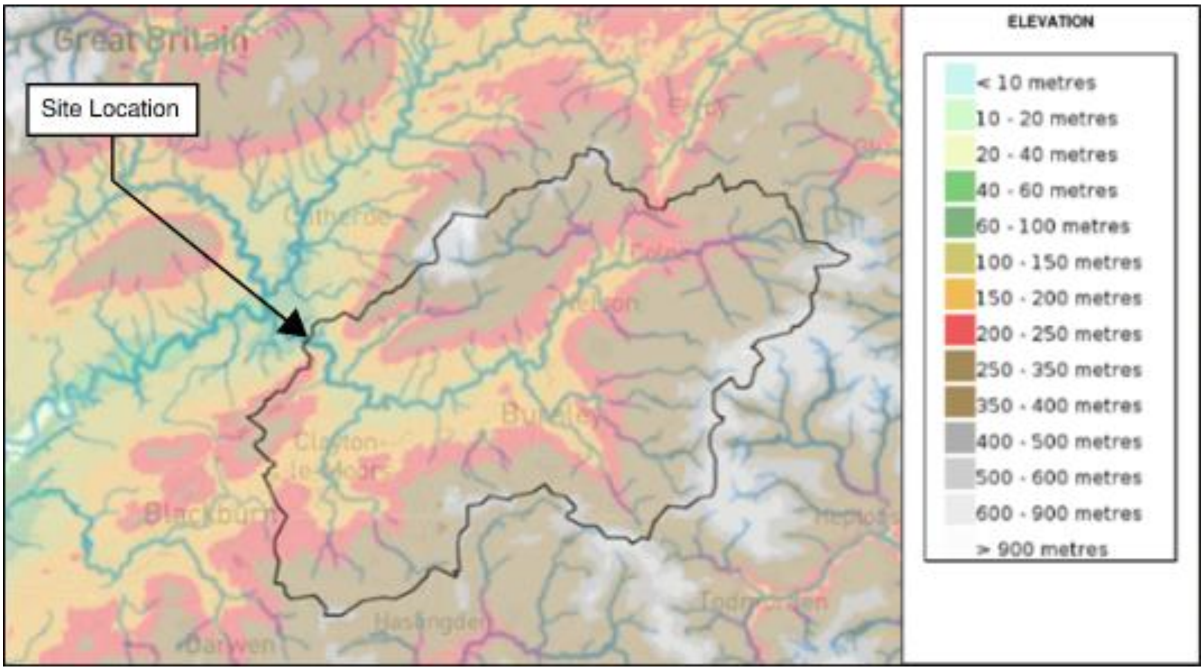


Figure 3-3: Hydrologic Catchment to Whalley Weir (immediately east the site)

In its upper reaches, the River Calder responds rapidly to heavy rainfall in its steep, confined upper channel. Response times are slower in its flatter, lower reaches, where floodwaters will leave the river channel and inundate the floodplain.

River flows and levels are recorded by the Environment Agency at Whalley Weir gauging station, located immediately east of the site. The highest recorded flow of 501.5m^3/s occurred on 26 December 2015 (during Storm Desmond), resulting in a flood level of 44.284mAOD, 4.462m above the river gauge datum of 39.822mAOD.

3.5 Geology and Hydrogeology

The British Geological Survey (BGS)[3] 1:50,000 mapping records (Bedrock and Superficial Editions) indicates the following geological and hydrogeological succession underlying the site:

[3] British Geological Survey, GeoIndex Onshore, Superficial Deposits and Bedrock Geology, 1:50,000.

Table 3-1: Geological / Hydrogeological Succession

Geology	Associated Hydrogeological Classification
BGS Records do not indicate the presence of Made Ground beneath the site.	N/A
Alluvium[1]	Secondary A Aquifer[3]
Mudstone – Bowland Shale Formation[2]	Secondary Undifferentiated Aquifer[4]

Notes:

1. *Alluvium is a general term for clay, silt, sand and gravel. It is the unconsolidated detrital material deposited by a river, stream or other body of running water as a sorted or semi-sorted sediment in the bed of the stream or on its floodplain or delta. Normally soft to firm consolidated, compressible silty clay, but can contain layers of silt, sand, peat and basal gravel.*
2. *Mudstone is a fine-grained sedimentary rock formed from compacted mud and clay particles in calm, low-energy environments like lakebeds and the deep sea. It is a type of mudrock and is distinguished from shale by its lack of fissility, meaning it does not easily split into thin layers*
3. *A Secondary A aquifer is a geological layer of permeable rock that can support local water supplies and, in some cases, forms an important source of base flow for rivers and wetlands.*
4. *A Secondary Undifferentiated aquifer is a geological layer of predominantly low-permeability rock that can store and provide only limited amounts of groundwater. It is distinguished by its low water yield and is typically composed of layers*

The site is not recorded within a Source Protection Zone (SPZ). The are no licensed potable groundwater abstractions within 1km of the site boundary.

3.6 Existing Drainage

The site is undeveloped. No drainage infrastructure has been identified within the site. Surface water naturally discharges to ground by infiltration.

A number of highway gulleys have been identified within The Sands and Ridding Lane. It is anticipated that these discharge to the River Calder.

4.0 Planning Policy

4.1 National Planning Policy

Paragraph 170 of the NPPF[4] states that: Inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk (whether existing or future). Where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere.

Paragraph 181 of the NPPF states 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. Development should only be allowed in areas at risk of flooding where, in the light of this assessment (and the sequential and exception tests, as applicable) it can be demonstrated that:

a) within the site, the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location;
b) the development is appropriately flood resistant and resilient such that, in the event of a flood, it could be quickly brought back into use without significant refurbishment;
c) it incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate;
d) any residual risk can be safely managed; and
e) safe access and escape routes are included where appropriate, as part of an agreed emergency plan.

4.2 Local Planning Policy

The Ribble Valley Council Local Development Framework (LDF) provides the basis for planning decisions in the Ribble Valley and sets the pattern for development and investment over a period to 2028.

The Core Strategy, adopted 16 December 2014, is the Central document to the LDF. The Core Strategy (CS) and Development Management Policies (DPD) sets out the overall strategic direction for planning by providing policies to guide decisions on planning applications over the period to 2028.

The CS and DPD Document contains a set of development management policies for the local planning authority area of Ribble Valley. When a planning application is submitted, the Authority uses development management policies (planning policies) alongside other policies in the Core Strategy to help it assess whether the application should be granted planning permission.

[4] https://assets.publishing.service.gov.uk/media/675abd214cbda57cacd3476e/NPPF-December-2024.pdf

The relevant CS Policy to flood risk is identified as:

- DME6: WATER MANAGEMENT

> **DME6: WATER MANAGEMENT**
>
> DEVELOPMENT WILL NOT BE PERMITTED WHERE THE PROPOSAL WOULD BE AT AN UNACCEPTABLE RISK OF FLOODING OR EXACERBATE FLOODING ELSEWHERE.
>
> APPLICATIONS FOR DEVELOPMENT SHOULD INCLUDE APPROPRIATE MEASURES FOR THE CONSERVATION,PROTECTION AND MANAGEMENT OF WATER SUCH THAT DEVELOPMENT CONTRIBUTES TO:
>
> 1. PREVENTING POLLUTION OF SURFACE AND / OR GROUNDWATER
>
> 2. REDUCING WATER CONSUMPTION
>
> 3. REDUCING THE RISK OF SURFACE WATER FLOODING (FOR EXAMPLE THE USE OF SUSTAINABLE DRAINAGE SYSTEMS (SUDS))
>
> AS A PART OF THE CONSIDERATION OF WATER MANAGEMENT ISSUES, AND IN PARALLEL WITH FLOOD MANAGEMENT OBJECTIVES, THE AUTHORITY WILL ALSO SEEK THE PROTECTION OF THE BOROUGH'S WATER COURSES FOR THEIR BIODIVERSITY VALUE.
>
> ALL APPLICATIONS FOR PLANNING PERMISSION SHOULD INCLUDE DETAILS FOR SURFACE WATER DRAINAGE AND MEANS OF DISPOSAL BASED ON SUSTAINABLE DRAINAGE PRINCIPLES. THE USE OF THE PUBLIC SEWERAGE SYSTEM IS THE LEAST SUSTAINABLE FORM OF SURFACE WATER DRAINAGE AND THEREFORE DEVELOPMENT PROPOSALS WILL BE EXPECTED TO INVESTIGATE AND IDENTIFY MORE SUSTAINABLE ALTERNATIVES TO HELP REDUCE THE RISK OF SURFACE WATER FLOODING AND ENVIRONMENTAL IMPACT.
>
> It is important to ensure the water environment including the use of water, pollution and flood risk can be adequately controlled through the development management process to deliver the development strategy and its strategic framework as envisaged in the Core Strategy.

4.3 Site Specific Flood Risk Categorisation

To assess the NPPF flood risk classification for the site, the first step is to inspect both the EA web-based flood mapping data for flooding from rivers and sea and the Local Planning Authority SFRA (where available) and surface water and reservoirs. The rivers and sea flood map is used to inform planning of a sites Flood Zone(s); however, the surface water and reservoir flood maps should also be used to identify other flood risks.

From the Environment Agency flooding from rivers and seas map, presented later, it can be seen that a large area of the site is classified as Flood Zone 3 (FZ3) (High Probability: Land having a 1% (1 in 100-yr) or greater annual probability of river flooding; or Land having a 0.5% (1 in 200-yr) or greater annual probability of sea flooding (Land shown in dark blue on the Flood Map).

The site is also in an area that does not benefit from formal flood defences. Flood defences reduce the probability of flooding from a particular source (a river or the sea) but do not completely remove the risk. They can fail or a flood could happen which is larger than the one the defence is designed to protect against.

Paragraph 078[5] states the identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. Functional floodplain will normally comprise:

- land having a 3.3% or greater annual probability of flooding, with any existing flood risk management infrastructure operating effectively; or
- land that is designed to flood (such as a flood attenuation scheme), even if it would only flood in more extreme events (such as 0.1% annual probability of flooding).

However, if FZ3b has been defined and mapped by local planning authorities (LPAs) in their strategic flood risk assessments these should be used.

The Level 1 Strategic Flood Risk Assessment (SFRA)[6] has not identified areas of Flood Zone 3b and defers this to be undertaken in a Level 2 SFRA.

In its opening remarks however, the Level 1 SFRA states:

"After consultation with the Environment Agency and the Lead Local Flood Authority (Lancashire County Council) it was considered that, given the specific locations of the allocations proposed within the Housing and Economic Development DPD, a Level 2 SFRA is not required at this stage."

In March 2025, The Environment Agency have revised how the Flood Zones are produced as part of the new National Flood Risk Assessment (NaFRA2). This uses new national modelling alongside local models. The updated Flood Zones will combine several datasets to create a picture of flood risk, including:

- Undefended – flood defences are removed or de-activated
- Defended – existing flood defences are present and operational

[5] https://www.gov.uk/guidance/flood-risk-and-coastal-change#para78
[6] https://www.ribblevalley.gov.uk/downloads/download/358/strategic-flood-risk-assessment-level-1-revised-2017

- Recorded Flood Outlines – from past floods
- Other suitable data from third parties.

The mapping data also includes land having a 3.3% or greater annual probability of flooding with defences present, thereby notionally defining Flood Zone 3b extent.

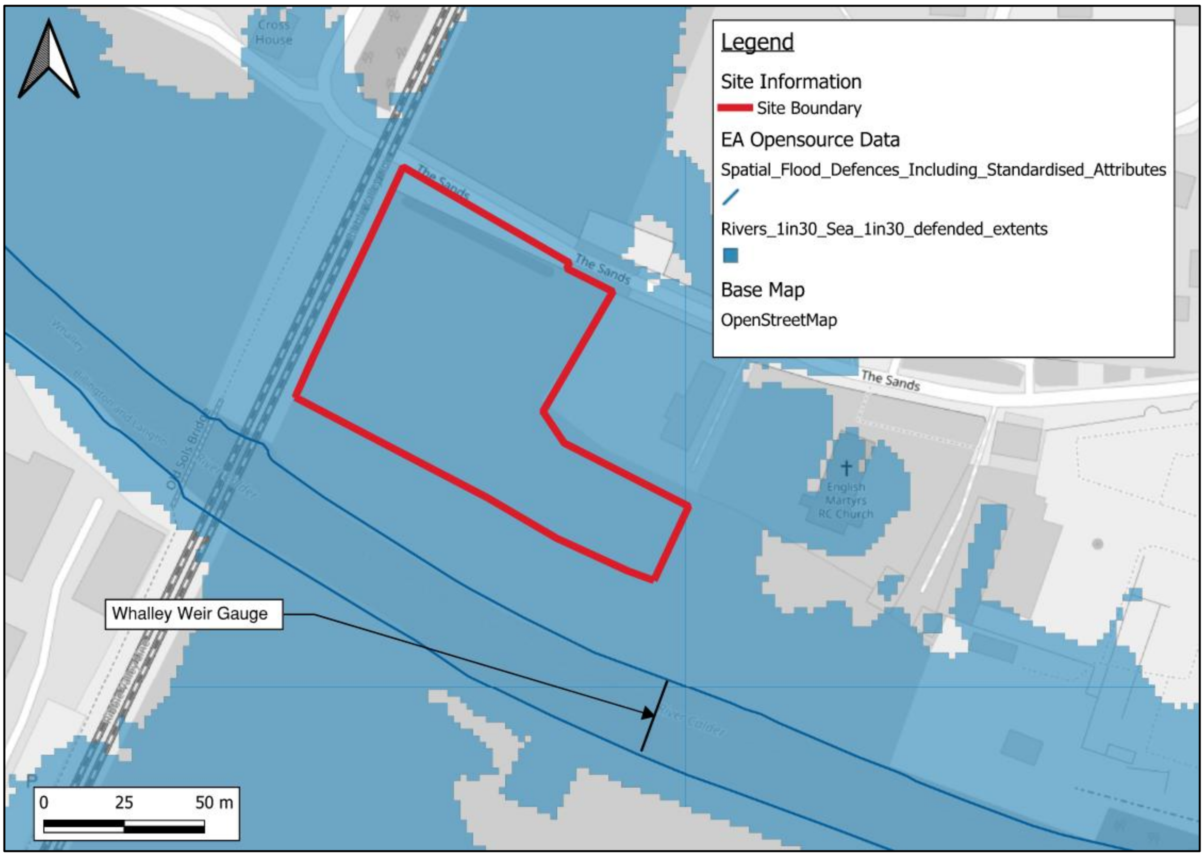


Figure 4-1: 3.3%AEP (1 in 30-year) NaFRA2 defended flood extents

For the purpose of this assessment, the site is classified as being in FZ3b.

4.4 Site Specific Flood Zone Compatibility

The development proposal for the site falls within the following category:

- Water Compatible classification: *Amenity open space, nature conservation and biodiversity,* ***outdoor sports and recreation*** *and essential facilities such as changing rooms.*

These types of development are classed as 'Water Compatible' development in the Flood Risk Vulnerability Classification with reference to NPPF Table 2[7].

[7] https://www.gov.uk/guidance/flood-risk-and-coastal-change#Table-2-Flood-Risk-Vulnerability-Classification

Figure 4-2: NPPF Flood Risk Vulnerability Classification (reproduced from Table 2[7])

Flood Zones	Flood Risk Vulnerability Classification				
	Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test required	✓	✓	✓
Zone 3a †	Exception Test required †	×	Exception Test required	✓	✓
Zone 3b *	Exception Test required *	×	×	×	✓*

Key:

✓ Development is appropriate

× Development should not be permitted

Notes

† In Flood Zone 3a essential infrastructure should be designed and constructed to remain operational and safe in times of flood.

” * “ In Flood Zone 3b (functional floodplain) essential infrastructure that has to be there and has passed the Exception Test

4.5 Climate Change

Guidance on the impacts of climate change on flood risk is provided on the GOV.UK website page ‘Flood risk assessment: climate change allowances[8]. This was initially published on the 19th February 2016 and was last updated on 27th May 2022.

The guidance covers the impacts on peak river flow, peak rainfall intensity, sea level rise, offshore wind speed and extreme wave height.

It is anticipated that the lifespan of the development will be no longer than 15 years. If operational in 2025, the design life will be to 2040. This would mean that climate change has to be considered using the 2020’s epoch uplifts i.e. 2015 to 2039.

For Water Compatible uses in FZ3b, the guidance states the Central Climate Change Allowance should be used for fluvial flood risk.

In respect to peak river flow, the site lies in the Ribble Management Catchment. Current published allowances as shown in the climate change allowance table presented as Figure 4-1 below:

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

Ribble Management Catchment peak river flow allowances

	Central	Higher	Upper
2020s	16%	19%	27%
2050s	23%	29%	44%
2080s	36%	46%	71%

Figure 4-3: Environment Agency Climate Change Allowance (Peak River Flow)

In assessing impacts of climate change for the site, the increase in peak river flow is considered within Section 6, Flood Risk Mitigation.

5.0 Assessment of Flood Risk

5.1 Sources of Flood Risk

This study assesses the risk from different types of flooding to the development and the risk of flooding from the development, taking into consideration climate change, as well as how flood risks should be managed. The approach to assessing flood risk at the development site was informed by the requirements of NPPF in conjunction with the client and Environment Agency requirements.

5.2 Environment Agency Online Flood Map for Planning

The Environment Agency (EA) provide an online map that identifies flood zone locations for planning purposes. An extract of this can be seen in Figure 5-1.

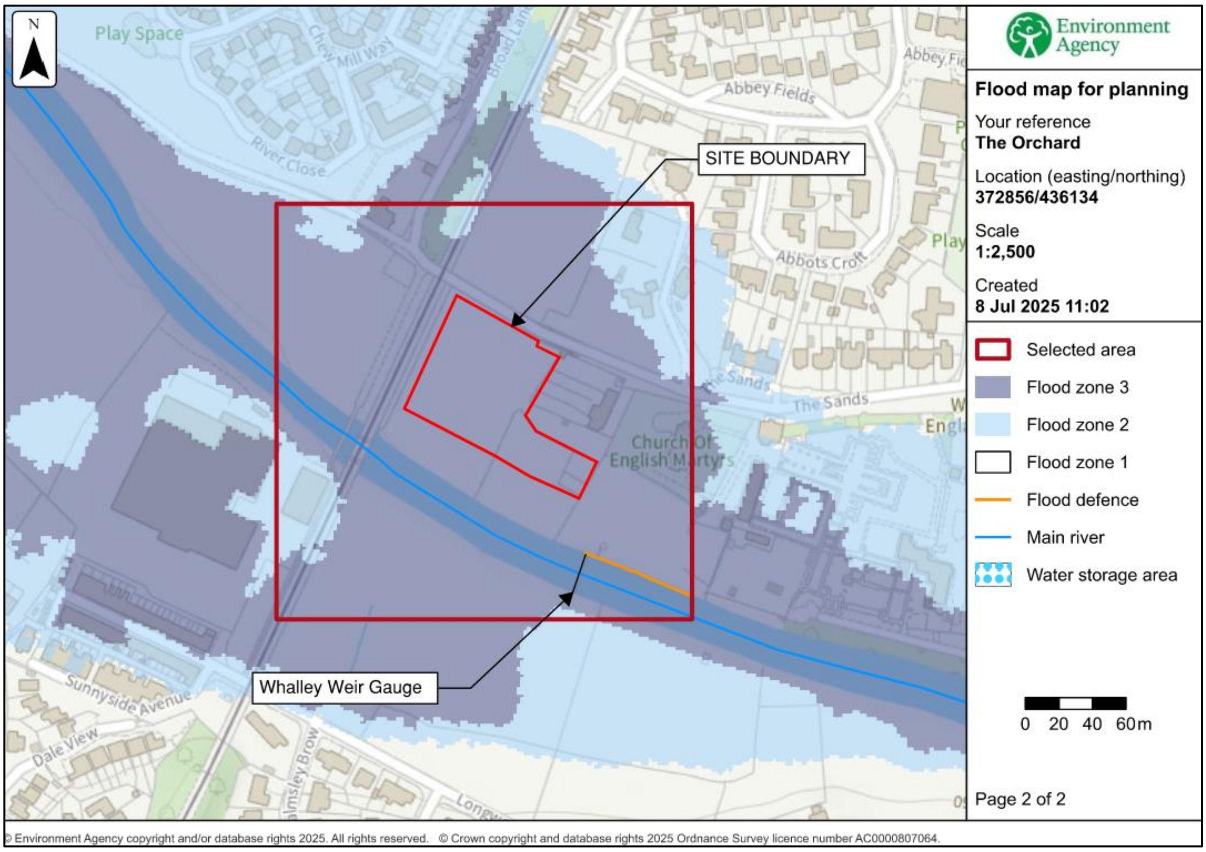


Figure 5-1: Environment Agency Flood Map for Planning (Rivers and Sea)

From the Environment Agency flooding from rivers and sea map:

- Zone 1 Low Probability: Land having a less than 0.1% (1 in 1,000) annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map – all land outside Zones 2 and 3)

- Zone 2 Medium Probability: Land having between a 1% (1 in 100) and 0.1% (1 in 1,000) annual probability of river flooding; or land having between a 0.5% (1 in 200) and 0.1% (1 in 1,000) annual probability of sea flooding. (Land shown in light blue on the Flood Map).
- Zone 3a High Probability: Land having a 1% (1 in 100-yr) or greater annual probability of river flooding; or Land having a 0.5% (1 in 200-yr) or greater annual probability of sea flooding (Land shown in dark blue on the Flood Map).

The flood map also contains the following information, where present:

- Flood defences built in the last five years to protect against river floods with a 1% (1 in 100-yr) chance of happening each year, together with some natural or constructed entities which retain, store or channel water and which may protect against smaller floods.
- Areas benefiting from flood defences - areas that benefit from the flood defences shown, in the event of a river flood with a 1% (1 in 100-yr) chance of happening each year, or a flood from the sea with a 0.5% (1 in 200-yr) chance of happening each year. If the defences were not there, these areas would flood.

It can be seen from the mapping that the site is located within the dark blue shading noted on the drawing key as Flood Zone 3, suggesting the site is at **HIGH** risk of river or sea flooding.

The River Calder, lying directly to the south of the site to which the flood zones are associated with are identified as Main River by the blue line. A flood defence is located on right (north) bank of the river at the Whalley Weir, extending approximately 70m upstream (eastwards).

The River Calder is Main River and as such falls under the jurisdiction of the Environment Agency, and where available detailed flood modelling results, including mapped extents, flood levels, flows and flood hazard maps can be requested under a EA licence.

The EA confirmed that hydrologic, hydraulic modelling and flood risk mapping has been undertaken for the River Calder under the title Whalley 2017. The outputs of this model have been made available and are discussed in Section 5.4 below.

5.3 Historic Flooding

The EA has provided an historic flood event map as part of the Product 4 flood risk data pack for the site. The main floods affecting the area in the vicinity of the site are listed in Table 5-1 below.

Table 5-1: Past Flood Events

Start Date	End Date	Source of Flooding	Cause of Flooding	Affects Location	AMAX Rank	Flow (m^3/s)	Stage (mAOD)
31-Dec-24	01-Jan-25	Unknown	Unknown	Yes	N/A		
09-Feb-20	10-Feb-20	Main River	Overtopping of defences	Yes	2	422.60	44.21
26-Dec-15	27-Dec-15	Main River	Channel capacity exceeded (no raised defences)	Yes	1	501.50	44.46
22-Jun-12	23-Jun-12	Main River	Local drainage/surface water	Yes	3	330.10	43.94
26-Oct-00	27-Oct-00	Main River	Channel capacity exceeded (no raised defences)	Yes	No Record		
11-Dec-99	12-Dec-99	Ordinary Watercourse	Obstruction/blockage - debris screen	No	N/A		

River flows and levels are recorded by the Environment Agency at Whalley Weir gauging station, located immediately east of the site, available from the National River Flow Archive[9]. The highest recorded flow of 501.5m^3/s occurred on 26 December 2015 (during Storm Desmond), resulting in a flood level of 44.284mAOD, 4.462m above the river gauge datum of 39.822mAOD.

Based on observed flows and levels from the Whalley Gauging Weir immediately east of the site, the site has flooded at least three times in the last thirteen years.

On respect to 31 December 2024, the owners of the site do not recall any flooding to the site during this event, which was not from the River according to the event record.

Using the Flood Estimation Handbook WINFAP[10] Single Site Analysis, the rarity of the events can be estimated from the gauge record at Whalley Weir.

The three highest Annual Maxima (AMAX) events have been estimated to have rarity of:

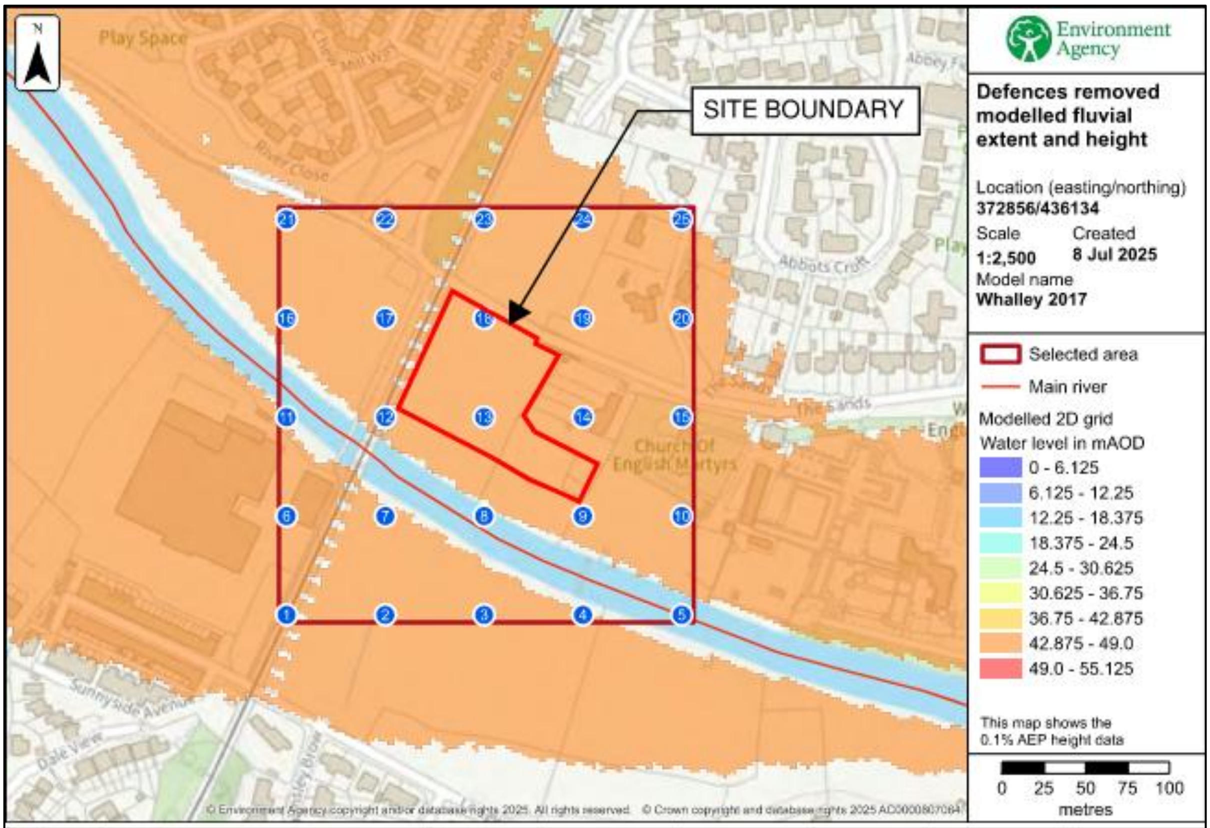
- December 2015 - 0.4% AEP (1 in 250-years)
- February 2020 – 1%AEP (1 in 100-years)
- June 2012 – 3.33%AEP (1 in 30-years)

5.4 Fluvial Flood Risk to the Site

As discussed above, the EA developed a detailed hydrologic and hydraulic model[11] of the River Calder through Whalley, completed in August 2017. Outputs from this modelling include river channel flood levels and flows, floodplain flood levels and mapped flood extents for a both undefended and defended scenarios, which are on the whole identical as the River Calder is undefended, with the exception of the short length of defence upstream of the Whalley Weir Gauging Station which is reported to provide Standard of Protection up to the 20% AEP (1 in 5-year) flood event. The undefended dataset alone is therefore considered sufficient to underact the assessment of flood risk.

The EA Product 4 data comprising flow and level results for both river channel and floodplain levels are provided in Appendix A. An extract of the map and table showing 2D modelled flood levels at discreet points for the undefended scenario is presented below as Figure 4-4.

9 https://nrfa.ceh.ac.uk/data/station/info/71004
10 https://www.hydrosolutions.co.uk/software/winfap-5/
11 Whalley 2017



Label	Easting	Northing	50% AEP		10% AEP		4% AEP		1.33% AEP		1% AEP		0.5% AEP		0.1% AEP		1% AEP +(15%)	
			Level	Depth	Level	Depth	Level	Depth	Level	Depth	Level	Depth	Level	Depth	Level	Depth	Level	Depth
1	372736	436015	NoData	NoData	NoData	NoData	43.68	0.50	43.93	0.74	43.99	0.81	44.20	1.02	44.83	1.64	44.17	0.99
2	372795	436015	NoData	NoData	NoData	NoData	43.68	0.69	43.93	0.93	43.99	1.00	44.21	1.21	44.85	1.86	44.18	1.18
3	372854	436015	NoData	NoData	NoData	NoData	NoData	NoData	43.93	0.19	44.00	0.26	44.21	0.47	44.86	1.12	44.18	0.44
4	372913	436015	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	44.24	0.08	44.87	0.67	44.21	0.07
5	372972	436015	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
6	372736	436074	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	44.15	0.05	44.83	0.73	44.12	0.02
7	372795	436074	NoData	NoData	NoData	NoData	43.65	0.26	43.90	0.51	43.96	0.57	44.18	0.79	44.84	1.45	44.15	0.76
8	372854	436074	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
9	372913	436074	NoData	NoData	NoData	NoData	43.78	0.06	43.98	0.23	44.03	0.29	44.23	0.48	44.86	1.12	44.20	0.45
10	372972	436074	NoData	NoData	NoData	NoData	NoData	NoData	44.18	0.06	44.23	0.11	44.40	0.29	44.90	0.78	44.37	0.25
11	372736	436133	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
12	372795	436133	NoData	NoData	NoData	NoData	43.63	0.15	43.88	0.40	43.95	0.46	44.16	0.67	44.82	1.32	44.13	0.64
13	372854	436133	NoData	NoData	43.09	0.32	43.59	0.82	43.89	1.11	43.96	1.18	44.18	1.40	44.84	2.06	44.15	1.37
14	372913	436133	NoData	NoData	NoData	NoData	43.60	0.43	43.90	0.73	43.97	0.80	44.19	1.02	44.83	1.66	44.16	0.99
15	372972	436133	NoData	NoData	NoData	NoData	NoData	NoData	43.91	0.15	43.98	0.22	44.20	0.45	44.86	1.10	44.17	0.42
16	372736	436192	NoData	NoData	NoData	NoData	43.27	0.18	43.57	0.48	43.64	0.55	43.88	0.78	44.67	1.58	43.84	0.75
17	372795	436192	NoData	NoData	43.00	0.03	43.42	0.45	43.76	0.79	43.83	0.87	44.07	1.11	44.78	1.81	44.04	1.07
18	372854	436192	NoData	NoData	43.08	0.26	43.57	0.75	43.87	1.05	43.94	1.12	44.16	1.35	44.82	2.01	44.13	1.31
19	372913	436192	NoData	NoData	NoData	NoData	NoData	NoData	43.87	0.25	43.94	0.32	44.17	0.55	44.83	1.20	44.14	0.51
20	372972	436192	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	44.84	0.45	NoData	NoData
21	372736	436251	NoData	NoData	NoData	NoData	NoData	NoData	43.47	0.43	43.55	0.51	43.79	0.75	44.64	1.60	43.75	0.71
22	372795	436251	NoData	NoData	NoData	NoData	NoData	NoData	43.79	0.22	43.87	0.29	44.10	0.53	44.79	1.22	44.07	0.50
23	372854	436251	NoData	NoData	NoData	NoData	NoData	NoData	43.87	0.24	43.94	0.30	44.17	0.51	44.82	1.17	44.14	0.48
24	372913	436251	NoData	NoData	NoData	NoData	43.57	0.16	43.87	0.46	43.94	0.53	44.17	0.76	44.82	1.41	44.14	0.73
25	372972	436251	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData

Figure 5-2: Modelled Flood Levels (Defences Removed)

The modelling results indicate that the site is at first risk of flooding during the 10% AEP event, with a flood level of 43.09mAOD. Labels 13 and 18 suggest the flood depth is up to c.320mm. When reviewing site levels from the EA LiDAR DTM, it can be seen that these points are at localised low spots, particularly Label 13 which coincides with the depression running northwest to southeast. It is probable the Tipi Tent continues to be erected in the northern part of the site, where ground levels are c.42.90mAOD. The depth of flooding across this part of the site during the 10% AEP event is c.200mm.

River bank top levels adjacent to the site lie between 43.14mAOD downstream, rising to 43.47mAOD upstream. Bank top at the Whalley Weir is 43.99mAOD. These levels suggest that the flooding to the site is a result of overtopping of the river bank either upstream or downstream and the propagation of floodwater along the floodplain.

Flood levels in the site for the 3.33%AEP, used to define the functional floodplain are not included in the model results. However, the higher probability 4%AEP event provides a flood level of 43.59mAOD.

For the 1%AEP event, the predicted flood level is 43.96mAOD, with site flooding to a depth of 1.12m.

5.5 Modelled Climate Change Results

Climate change results from the EA's detailed hydraulic model[12] of the River Calder through Whalley have also been provided for the 15%,increase to the 1% AEP (100-yr) peak river flows. The climate change flood levels and depths have been appended to the table in Figure 5-2 above.

The 1% AEP plus 15% climate change flood level for the site is stated as 44.15mAOD, broadly equal to the present day 0.5% AEP (1 in 200-year) flood level. In this scenario, the site is predicted to flood to a depth of 1.37m.

5.6 Design Flood Level

The Environment Agency Flood Risk and Coastal Change Guidance[13] defines the "Design Flood" as

- river flooding likely to occur with a 1% annual probability (a 1 in 100 chance each year); or tidal flooding with a 0.5% annual probability (1 in 200 chance each year); or
- surface water flooding likely to occur with a 1% annual probability (a 1 in 100 chance each year),
- plus an appropriate allowance for climate change.

The 1% annual probability (a 1 in 100 chance each year) predicted flood level is taken from the EA Product 4 data as:

Fluvial Flood Risk:

- 43.96mAOD, the 1% AEP (1 in 100-yr) event

[12] Whalley 2017
[13] https://www.gov.uk/guidance/flood-risk-and-coastal-change

When considering climate change, the estimated lifecycle of the development, given its temporary nature has been taken as no more than 15 years as discussed in Section 2.3. This takes the design life to a maximum year of 2040. Climate change is therefore considered using the 2020's epoch uplifts i.e. 2015 to 2039. For Water Compatible uses in FZ3b, the current EA guidance states the Central Climate Change Allowance should be used for fluvial flood risk which is stated for the Ribble Management Catchment as 16%.

Model results provided as Product 4 data, include a climate change allowance as a 15% increase in the 1% AEP in peak river flow. Given the development proposal, this is considered an appropriate allowance.

The 1% annual probability (a 1 in 100 chance each year) plus climate change predicted flood level is taken from the EA Product 4 data as:

Fluvial Flood Risk:

44.15mAOD, the 1% AEP (1 in 100-yr) +15% event.

The design flood level is therefore 44.15mAOD.

5.7 Surface Water Flooding to the Site

Surface water flooding can be caused when rainwater during extreme rainfall events does not drain away through the normal drainage system or soak into the ground with flooding occurring, principally from manholes and gullies. Surcharging sewers can result in overland flows which if originating at a higher elevation than a development site can potentially pose a flood risk.

From the UK Government's Risk of Flooding from Surface Water (RoFSW, extent of flooding) map shown in Figure 5-2 above, the level of surface water flood risk is expressed as;

- Very low risk – meaning that that each year this area has a chance of flooding of less than 0.1%.
- Low risk – meaning that each year this area has a chance of flooding of between 0.1% and 1%.
- Medium risk means that each year this area has a chance of flooding of between 1% and 3.3%.
- High risk means that each year this area has a chance of flooding of greater than 3.3%.

Figure 5-2 below shows the overall risk of flooding from surface water to the site and the locations and probabilities of flood depths exceeding 200mm, 300mm and 600mm.

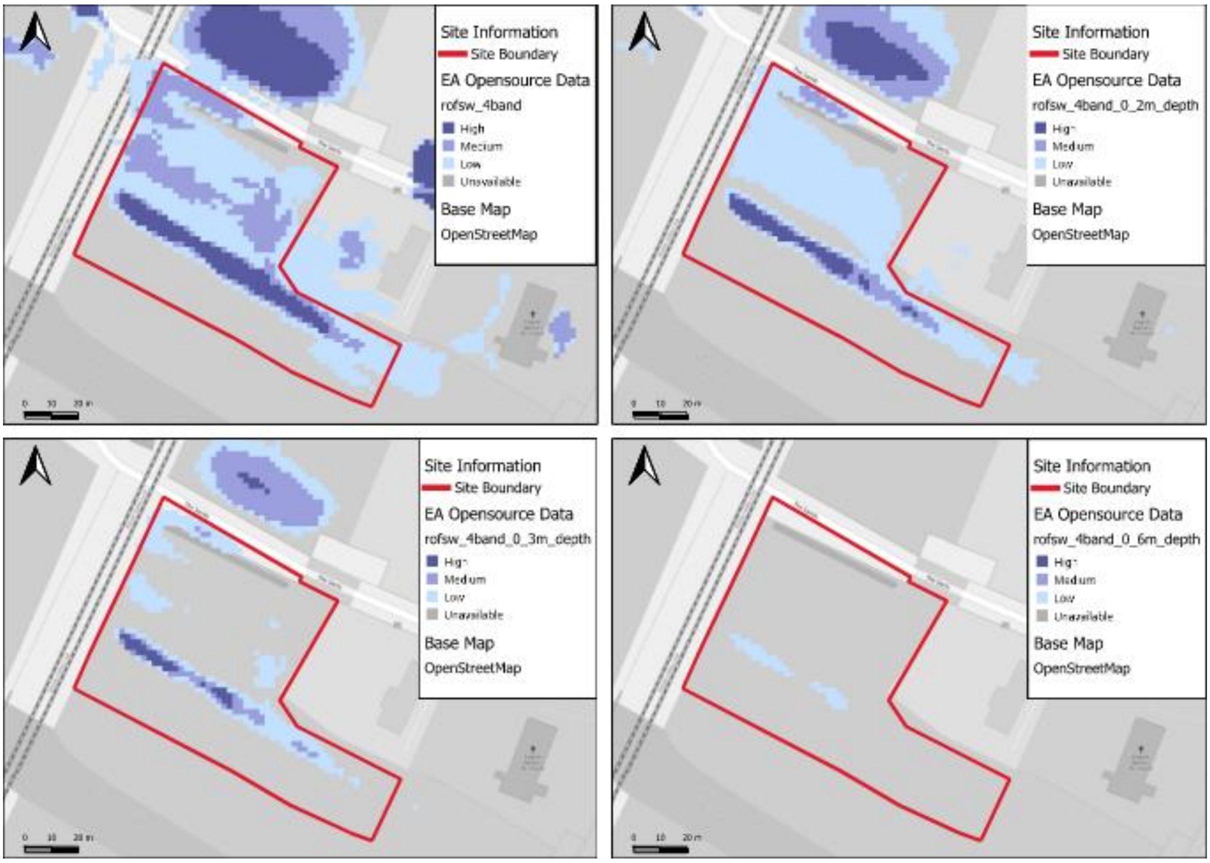


Figure 5-3: Risk of Flooding from Surface Water (RoFSW) Extents and Depth Probability

Overall, the site is at risk of flooding across the high to low probability rainfall events. The mapping indicates that surface water flood risk is due to ponding, coincidental to the topography. There is no indication of significant surface water flow paths through the site.

The associated depths of flooding indicate, with the exception of the lower lying area aligned northwest to southeast, there is Low (less than 1%) to no (less than 0.1%) ('Unavailable') probability of flood depths exceeding 200mm across the majority of the site though there are small pockets there is a low probability of depths may exceeding 300mm.

The impact of flooding from surface water is therefore considered to be **LOW**.

5.8 Reservoir Flooding

The Environment Agency provides details and mapping to show flood risk from reservoirs. This is the risk of catastrophic failure and given that the majority of reservoirs in this area are maintained by United Utilities or the Canal and River Trust, the probability of such failure is **VERY LOW**. The names and ownership of the reservoirs in the catchment which could affect the site are presented in Table 5-1 below. An extract of the map is shown in Figure 5-3.

Table 5-2: Reservoir Ownership of Reservoirs which could affect the site

Name	Owner
Mitchells House No.1	United Utilities PLC
Mitchells House No.2	United Utilities PLC
Coldwell Upper	United Utilities PLC
Churn Clough	United Utilities PLC
Cant Clough	United Utilities PLC
Swinden No.1	United Utilities PLC
Ogden Lower	United Utilities PLC
Lower Coldwell	United Utilities PLC
Dean Clough Upper	United Utilities PLC
Laneshaw	United Utilities PLC
Ogden Upper	United Utilities PLC
Blackmoss Lower	United Utilities PLC
Dean Clough Lower	United Utilities PLC
Blackmoss Upper	United Utilities PLC
Swinden No.2	United Utilities PLC
Hurstwood	United Utilities PLC
Barrowford	Canal & River Trust
Rishton	Canal & River Trust
Whitemoor	Canal & River Trust
Upper Foulridge	Canal & River Trust
Lower Foulridge	Canal & River Trust
Audley	Mr N G Starkie
Top Lodge (Barrow)	MCCARTHY CARAVANS LIMITED

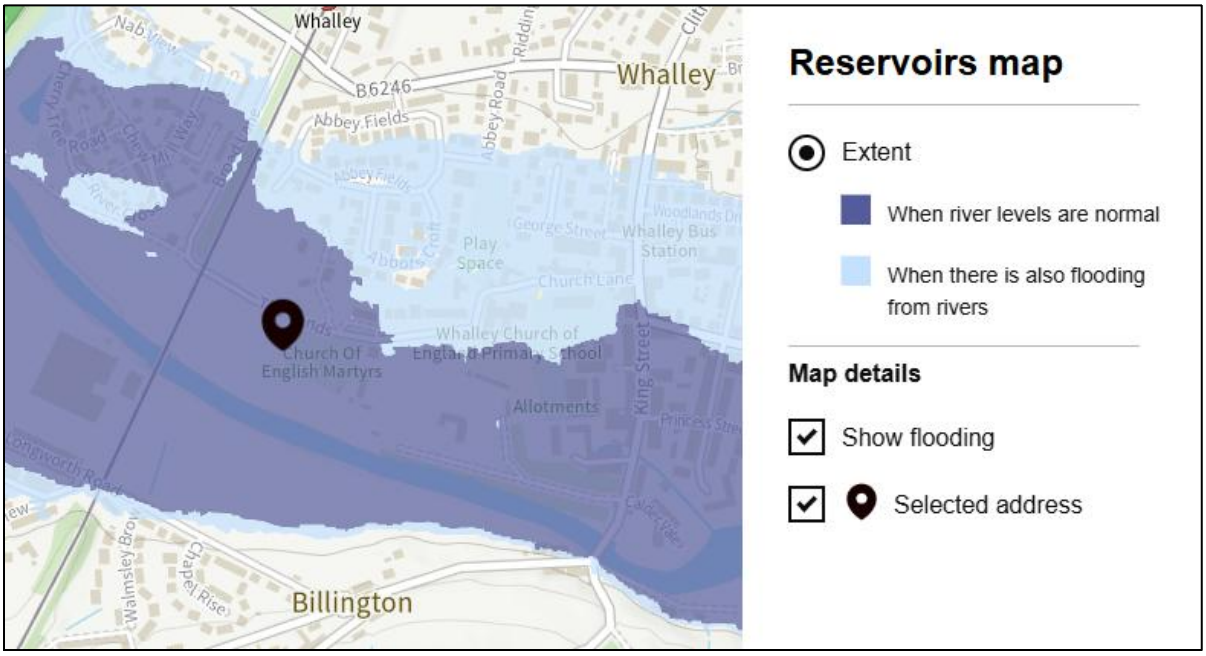


Figure 5-4: Environment Agency Flood Risk from Reservoirs – Extent of Flooding

5.9 Flooding from Groundwater

Groundwater flooding is caused by the emergence of water from beneath the ground, either at point or diffuse locations. The occurrence of groundwater flooding is usually local and unlike flooding from rivers, the sea, surface water or reservoirs, does not generally pose a significant risk to life due to the slow rate at which the water level rises. However, groundwater flooding can cause significant damage to property, especially in urban areas, and can pose further risks to the environment and ground stability.

There are several mechanisms that increase the risk of groundwater flooding including prolonged rainfall, high in-bank river levels, artificial structures, groundwater rebound, and mine water rebound. Properties with basements or cellars or properties that are located within areas deemed to be susceptible to groundwater flooding are at particular risk. Development within areas that are susceptible to groundwater flooding will generally not be suited to SuDS; however, this is dependent on detailed site investigation and risk assessment at the FRA stage.

The EA long term flood risk service reports that “flooding from groundwater is unlikely in this area”. The site is therefore considered to be at **VERY LOW** of flooding from this source.

5.10 Flooding from Canals and Artificial Waterbodies

There are no canals in the vicinity of the site.

Based on current understanding of the Artificial Water Bodies adjacent to the site, the risk of flooding from this source is considered to be **NO RISK**.

5.11 Public Sewers, Highway Drainage Flooding and Infrastructure Failure

No incidents of flooding within the site have been identified by this assessment.

Based on current understanding of the drainage systems within and in the vicinity of the site, the risk of flooding from this source is considered **VERY LOW**.

5.12 Summary of Flood Risk

From the evidence collated, the main types of flooding that may apply to the proposed development site are as follows:

- Historic Flooding – **THREE SIGNIFICANT FLUVIAL EVENTS IN LAST TEN YEARS**
- Fluvial flooding to the site – **HIGH**
- Surface water flooding to the site – **LOW TO HIGH**
- Impact of Surface water flooding to the site – **LOW**
- Reservoir flooding to the site – **VERY LOW**
- Groundwater flooding to the site – **VERY LOW**
- Canals and Artificial Sources –**NO RISK**
- Public Sewers, Highway Drainage and Infrastructure flooding to the site – **VERY LOW**

6.0 Flood Risk Mitigation

6.1 Fluvial Flood Risk Mitigation

The development site lies within Flood Zone 3b, with Water Compatible Development proposed which is considered appropriate within this flood Zone.

This assessment has concluded that the site is at risk from fluvial flooding during the 10%AEP (1 in 10-year) event.

By the nature of the proposed development, Finished Floor Levels are not a material consideration for this development as the Tipi Tent is set at ground level.

It is recommended however that the Tipi Tent is located in an area of the site of lower flood risk i.e., where ground levels are higher if possible, acknowledging that the ground over the base area of the Tipi also needs to be relatively level to meet the usage requirements.

6.2 Compensatory Storage

By the nature of the 'structure' of the Tipi Tent, flood water can pass unimpeded into and out of the structure. No floodplain volume will be lost as a result of the Tipi Tent being located on the floodplain. Compensatory Storage is not therefore required.

6.3 Surface Water Flooding to the site Mitigation

Based on the above assessment, the risk of surface water flooding to the site is considered to range from low to high across the site. When considering the impact of surface water flooding, the probability of flood depths reaching 200mm in the northern portion of the site is considered low.

As with fluvial flood risk, it is recommended that the Tipi Tent is located in an area of the site of lower flood risk i.e., where ground levels are higher if possible, acknowledging that the ground over the base area of the Tipi also needs to be relatively level to meet the usage requirements.

6.4 Surface Water Flooding from the site Mitigation

Surface water runoff from the Tipi will discharge to ground around the perimeter of the structure. There will be no increase in runoff from the site and therefore the risk of flooding to the site or elsewhere post-development is deemed low.

6.5 Reservoir Flooding Mitigation

There are reservoirs within the wider vicinity of the site. The EA Flood Risk from Reservoir map indicates the site is at risk from this source. However flooding from reservoirs is extremely rare and no specific measures are required at this location to mitigate against reservoir flooding.

6.6 Groundwater Flood Mitigation

Groundwater flooding tends to be more persistent than other sources of flooding, typically lasting for weeks or months rather than hours or days. Groundwater flooding does not generally pose a significant risk to life due to the slow rate at which the water level rises; however, it can cause significant risk to property.

The site is considered at very low risk of groundwater flooding based on the evidence from geological data and no specific mitigation measures are required at this location.

6.7 Public Sewer, Highway Drainage Flooding and Infrastructure Failure Mitigation

No incidents of flooding within the site or adjacent highway have been identified by this assessment.

No specific measures are therefore required within the development site to mitigate against flooding from sewers, highway drains or other infrastructure.

6.8 Canal and Artificial Waterbodies Flooding Mitigation

There are no canals in the vicinity of the site.

No specific measures are therefore required within the development site to mitigate against flooding from these sources.

6.9 Flood Resistance and Resilience

The Design Flood Level has been determined as 44.15mAOD, giving a flood depth in the north of the site of c.1.3m (Figure 5-2, Node Label 18). For the 10%AEP Flood and 4% AEP Flood, modelled depths are 0.26m and 0.75m respectively.

It is not anticipated that there will be any sited infrastructure within the Tipi tent e.g. electrical or gas supply.

In respect to resistance and resilience, it is recommended that guy ropes and pegs are checked and secured regularly as part of a routine maintenance protocol to minimise the risk of loss of the Tipi Tent should a significant fluvial flood event occur.

7.0 Managing Residual Flood Risk

7.1 Residual Risk

Residual risks are those remaining after applying the sequential approach to the location of development and taking mitigating actions. In this case, the residual risk is the risk of fluvial flooding from events greater than the mitigation measures have been designed for. The following sections describe how and by whom this risks should be managed for this site.

7.2 Flood Hazard

The flood hazard mapping was not provided as a part of the Calder 2017 river modelling outputs. In lieu of this, and to provide a broad understanding of the flood hazard to the site, a 2D hydraulic model has been developed by Curtins using the industry approved Flood Modeller software. The model has been developed using the EA's 1m LiDAR DTM to represent the river channel and floodplain topography. The 1% AEP plus 15% flow hydrography has then been routed through the 2D model to derive floodplain depths and velocities in the vicinity of the site. Depth results were found to compare favourably with those provided in the Product 4 data.

The peak flood hazard maps were configured to record the U.K. Hazard Rating as proposed in the flood risks to people guidance (FD2321[14]). This uses the formula: D*(V+0.5)+DF, where D = depth, V = velocity and DF = debris factor. This formula is assessed at each time step of the model since peak hazard may not necessarily be synchronous with peak depth and/or velocity.

The debris factor can be set in a number of ways but the most recent guidance[15] is to use a depth varying debris factor with a non-zero value at low flood depths. These debris factors are given in table below.

Table 7-1: Conservative Debris Factors

Depths	Debris Factor (Conservative Approach)
0 to 0.25 m	0.5
0.25 to 0.75 m	1
d>0.75 m and/or v>2	1

[14] Defra and Agency (2006) The Flood Risks to People Methodology, Flood Risks to People Phase 2, FD2321 Technical Report 1, HR Wallingford et al. did the report for Defra/EA Flood and Coastal DefenceR&D Programme, March 2006. http://sciencesearch.defra.gov.uk/Document.aspx?Document=FD2321_3436_TRP.pdf)

[15] SUPPLEMENTARY NOTE ON FLOOD HAZARD RATINGS AND THRESHOLDS FOR DEVELOPMENT PLANNING AND CONTROL PURPOSE – Clarification of the Table 13.1 of FD2320/TR2 and Figure 3.2 of FD2321/TR1. (http://randd.defra.gov.uk/Document.aspx?Document=FD2321_7400_PR.pdf)

UK Flood Hazard can be recorded in two different formats. The ZUK0 format saves the hazard value as the direct outcome of the formula D*(V+0.5)+DF for each active cell. The ZUK1 format records the hazard as an integer value corresponding to the flood hazard category (given in the Flood Hazard Rating table below) according to DEFRA guidance FD2321.

The ZUK1 option can be very useful for producing simple colour coded maps of hazard category but since the May 2008 technical note recommended altering the bounds of the hazard categories (see Table below)

Table 7-2: Flood Hazard Rating

2D Model ZUK1 categories		Current Guidance	
Flood Hazard Rating	**Hazard to people**	**Flood Hazard Rating**	**Hazard to people**
0	No Hazard	0	No Hazard
< 0.75	Low Hazard	< 0.75	Very Low Hazard
0.75 - 1.25	Moderate Hazard	0.75 - 1.25	Danger for Some
1.25 - 2.50	Significant Hazard	1.25 - 2.50	Danger for Most
> 2.50	Extreme Hazard	> 2.50	Danger for All

Figure 7-1 below shows the flood hazard across the site and wider area.

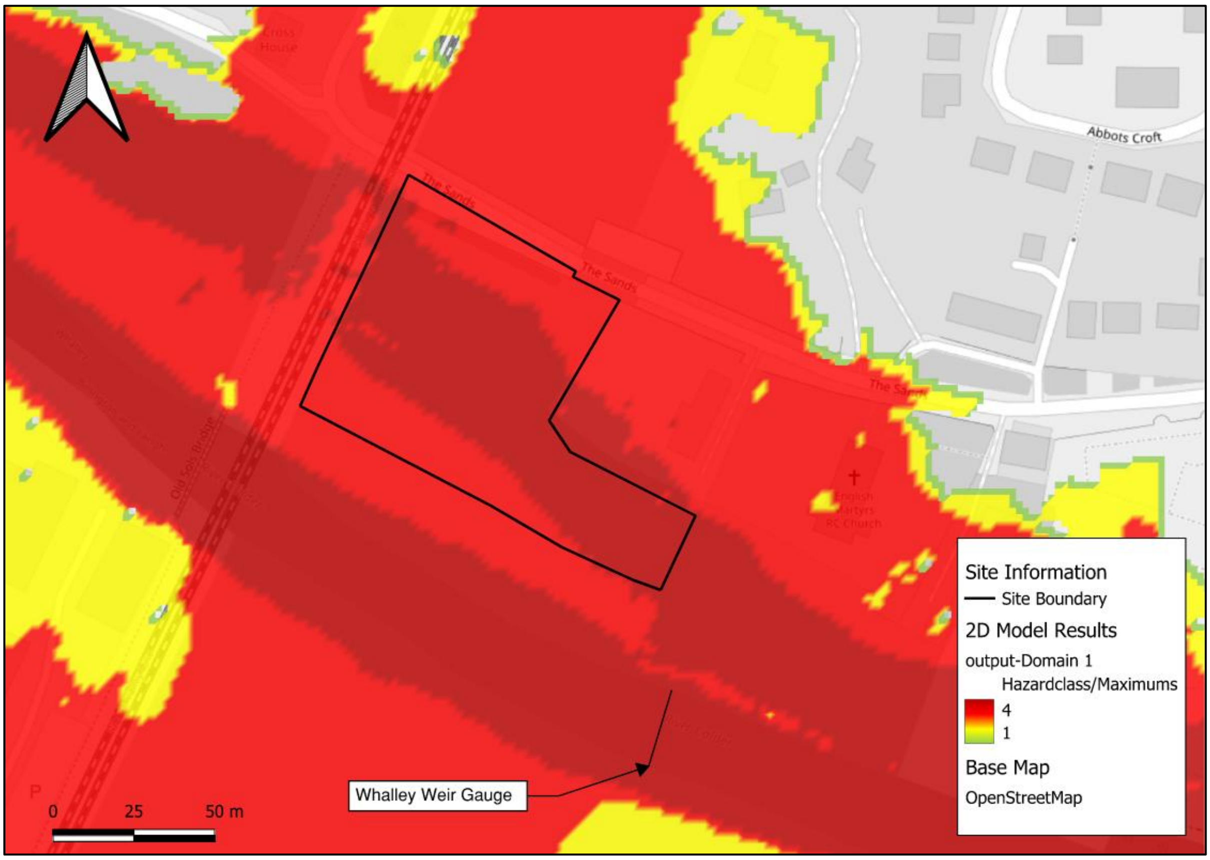


Figure 7-1: Flood Hazard Grid – 1% AEP +15% (1 in 100-year plus climate change)

Using this figure, a rating of **Danger for All** should be applied to the site.

The hazard mapping also shows areas of Danger for Most in the north of the site; hazard reduces further and south of the site though it is not recommended leaving the site to the south as this is towards the river.

Site access and egress should be made from The Sands highway.

7.3 Probability of Flooding Occurring in the Summer months

Historically, fluvial flood events are evidenced to occur in Autumn to Spring Months, typically October to March. In respect to the River Calder, the AMAX[16] data for the Whalley Weir tends to support this, with the three of the four highest recorded events, indicated to have overtopped the river bank have occurred in Autumn and Winter. The fourth occurred in June.

However, recent analysis by the insurer Aviva and published by The Flood Hub[17] reveals a trend towards an increased likelihood of floods occurring outside of traditional 'flood season' – typically October to March – and in the summer months though this does not differentiate between pluvial and fluvial sources. The research does also acknowledge that winter floods tend to be caused by rivers bursting their banks after prolonged periods of rain where the ground is already saturated and floods during the summer are often caused by heavy, intense and slow-moving downpours falling onto dry ground following hot, dry weather.

Bank full flow is identified by review of the gauging station data as 4.054m above the gauge datum. The corresponding gauged flow is 308m^3/s, which broadly corresponds to the modelled 3.33%AEP (1 in 30-year) flood.

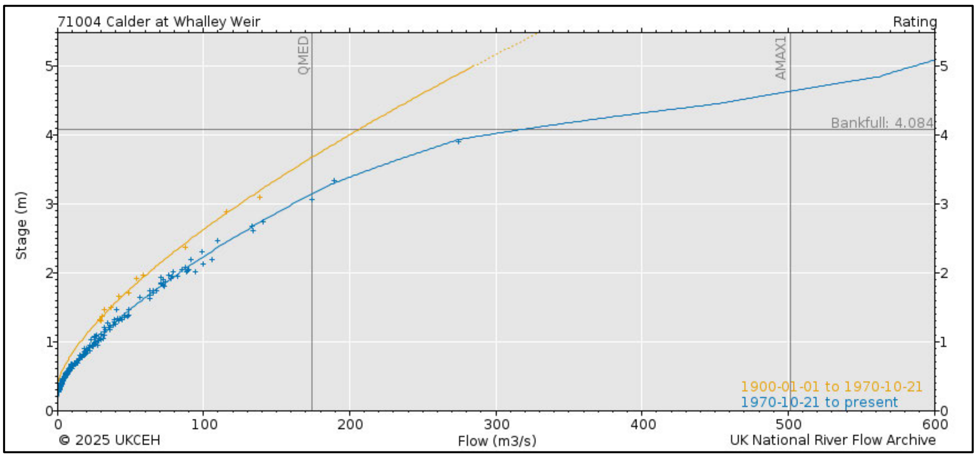


Figure 7-2: Peak Flow Rating Curve.

[16] https://nrfa.ceh.ac.uk/data/station/peakflow/71004#amax
[17] https://thefloodhub.co.uk/news/increase-in-floods-during-summer-months-analysis-reveals/

Though the probability of a flood of certain magnitude remains the same over each and every year e.g. there is 5% chance or less of the river levels exceeding the bank top and the site flooding in any one year remains the same, the likelihood of this occurring in the summer months, when the Tipi Tent is pitched is much less.

The EA, in its Fluvial Design Guide[18], when considering undertaking works in or adjacent to a river or constructing temporary works (structures to enable the river works to be undertaken), assess the probability of a flood event equalling or exceeding the flow of a specified return period during the construction period. This is given as:

$$P = 100 - 100\left(1 - \frac{1}{T}\right)^{d}$$

Where:

- P = probability that the 1 in T year flood flow will be exceeded (%)
- T = return period of flow in years – the inverse of the annual probability
- d = duration of construction (years).

The same approach can be taken to assess the probability of a flood event equalling or exceeding the flow of a specified return period during the months the Tipi Tent is pitched.

Considering the 10%AEP (1 in 10-year), event, the return period identified when flooding is first predicted on the site, over a five month summer period (0.417 years), the probability of the site flooding from the River Calder is 4.2%. Modelled flood depths on the site are c.260mm.

Considering the 3.33%AEP (1 in 30-year), event, the return period identified when levels exceed bank top at the nearby Whalley Weir Gauging Station, over a five month summer period (0.417 years), the probability of the site flooding from the River Calder is 1.4%. Modelled flood depth for this event is interpolated as c.780mm

When considering the design flood, 1%AEP+15% which is seen to be equivalent to the present day 0.5% AEP (1 in 200-year flood event), the probability of the site being impacted by a flood of this magnitude occurring over a five month summer period (0.417 years) is 0.21%. Modelled flood depths on the site for this event are 1.35m

Over the period when the Tipi Tent would be on site, the residual risk is considered relatively Low (4.2%) in respect to the flooding of the site and very low (0.21%) in respect to the design flood event occurring over the same period.

[18] https://www.gov.uk/flood-and-coastal-erosion-risk-management-research-reports/fluvial-design-guide

7.4 Speed of Onset

All flood events differ in that the speed in which river levels rise are directly related the intensity and duration of rainfall and the antecedent ground conditions i.e. catchment wetness and river baseflow.

For the purpose of this assessment, the standard design hydrograph shape has been derived using catchment descriptors and the Flood Estimation Handbook (FEH) Revitalised Rainfall Runoff (ReFH2) method. The design storm duration has been selected by the ReFH method as 13 hours and a flood hydrograph peak of 308m^3/s which is the bank full flow at the Whalley Weir Gauging Station.

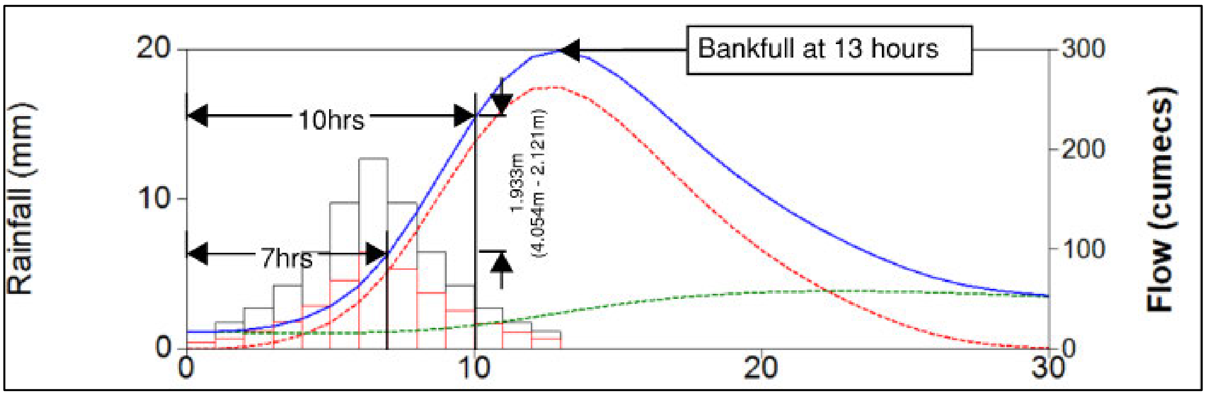


Figure 7-3: Speed of Onset for Design Flood Event

The response of river levels at the Whalley Weir Gauging Station to rainfall is around 4 hours (the lag time) and the bank full river levels are reached 13 hours in to the event.

The onset of flooding is therefore estimated to be 13 hours into a flood event which would provide ample time to evacuate the site and take appropriate actions to secure or remove the structure.

The rate of raise of the river has also been estimated over the steepest portion of the hydrograph as 0.64m / hour.

7.5 Flood Warning

The site, as with the majority of Whalley lies within an EA Flood Warning Area, see Figure 7-4.

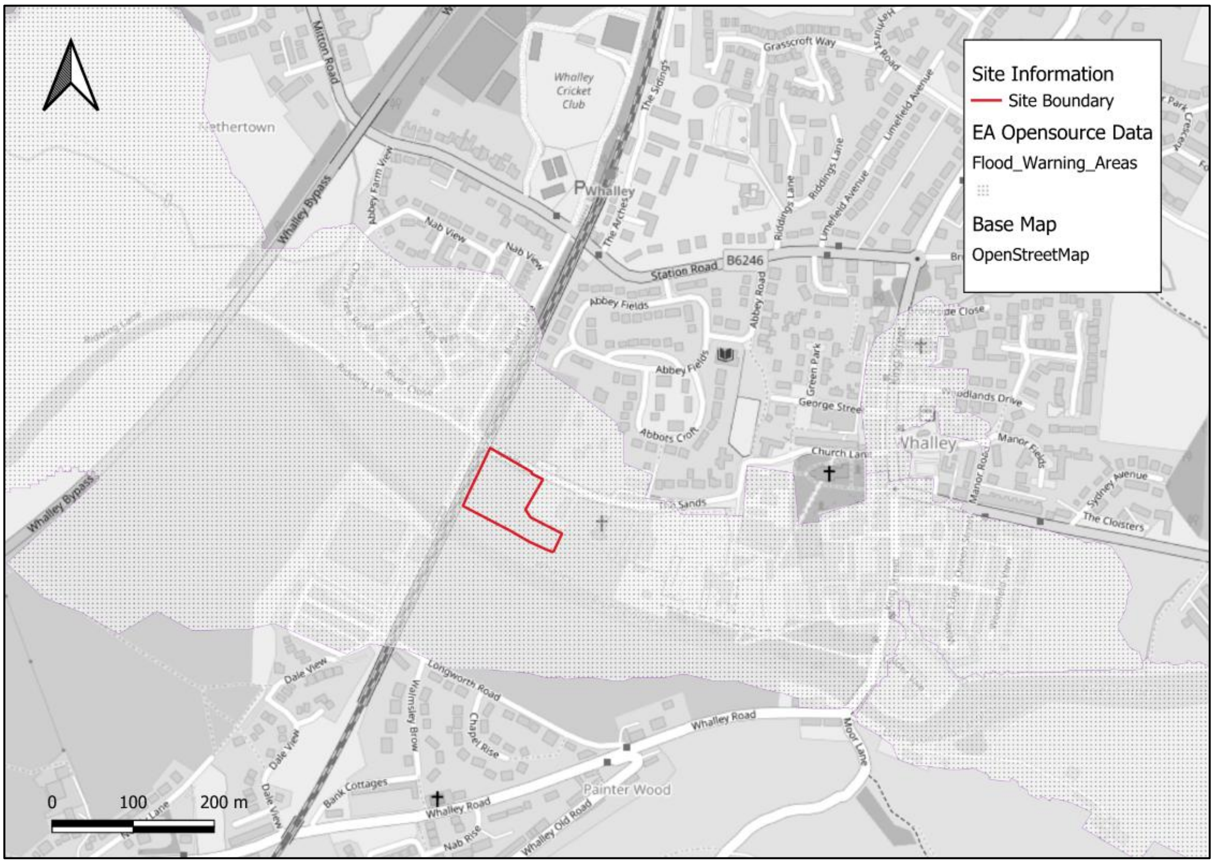


Figure 7-4: Flood Waring Area

The Flood Waring Area is the River Calder at Whalley, between Accrington Rd, Judge Walmsley Mill and Hackings Caravan Park and covers King Street south of Accrington Road, Princess St, Queen St, and in the vicinity of the Abbey, Judge Walmsley Mill, and Hackings Caravan Park.

If not already registered, the site owners should do so to receive warnings directly from the EA' s service. https://www.gov.uk/sign-up-for-flood-warnings

It is considered that once received, site owners and staff take appropriate action to advise visitors appropriately on what actions to take.

7.6 Evacuation Plan

A flood warning and evacuation plan is important at any site that invites the general public on the premises, including sites with a Water Compatible classification: Amenity open space, nature conservation and biodiversity, outdoor sports and recreation sites used for recreation.

It is anticipated that as an existing operational business, an appropriate plan in place. It is recommended that this be reviewed in respect of the addition of planned duration the TiPi Tent will be on site and at regular intervals as safe access and egress routes may change over time.

8.0 Conclusions and Recommendations

In consideration of the flood risk assessment and outline drainage strategy for the site, the following conclusions and recommendations are made:

- This Flood Risk Assessment has been conducted to accompany a planning permission for a Tipi Tent structure to remain in place on a recurring annual basis over the summer months (May through September) and be used for recreational health and wellness events only on an undeveloped site in Whalley.
- The development is concluded by this assessment to meet the criteria as Water Compatible Development; *Amenity open space, nature conservation and biodiversity,* ***outdoor sports and recreation*** *and essential facilities such as changing rooms.*
- As a temporary structure, for the purpose of this FRA, the design life is taken as no more than 15 years.
- The Environment Agency Flood Map for Planning (FMfP) shows the site to lie entirely in Flood Zone 3 (FZ3) (High Probability: Land having a 1% (1 in 100-yr) or greater annual probability of river flooding.
- The Level 1 Strategic Flood Risk Assessment SFRA undertaken by Ribble Valley Council to support Local Development Framework (LDF) does not identify areas of Flood Zone 3b (functional floodplain). The EA's National Flood Risk Assessment (NaFRA2) shows the site as having a 3.3% or greater annual probability of flooding with defences present, thereby notionally defining Flood Zone 3b extent. It is therefore concluded the site lies in Flood Zone 3b (FZ3b).
- EA model results provided as Product 4 data indicate the site is at first risk of flooding from the 10%AEP event, further concluding the site lies in FZ3b.
- It is also concluded that based on the NPPF Flood Risk Vulnerability Classification, the proposed development is appropriate in this Flood Zone, (FZ3b).
- A design flood level has been determined from the EA Product 4 data and appropriate climate change uplift and stated design life of 15 years. The design flood level is **44.15mAOD.** This calculates to a depth of flooding in the north of the site of 1.35m above ground level
- The modelled flood level for the 10% AEP event in the north of site is 43.08mAOD, resulting a flood depth of 260mm.
- The site is also a risk of flooding from surface water. From a review of the Risk of Flooding from Surface Water (RoFSW) it is concluded that flooding takes the form of ponding within lower lying areas of the site. Surface Water is not indicated to flow in or out of the site. The flood extent maps indicate the risk of flooding to be high. A review of the depth maps shows the probability of flood depths exceeding 200mm across the majority of the site to be LOW.

- The assessment concludes the risk of flooding from reservoirs, groundwater, canals and artificial waterbodies and public sewer and highway drainage to be low or very low. No mitigation measures are required against these sources of flood risk.
- In respect to fluvial and surface water flood risk mitigation, there is not requirement to recommend a finished floor level as the TiPi Tent is located directly onto existing ground. It is recommend that the Tent is sited in the north of the site. LiDAR data suggests ground levels in this area lie between 42.90mAOD and 43.10mAOD.
- The Tipi Tent will allow flood water to freely pass though it. Therefore there is no loss in floodplain volume associated with the plan area of the structure and no compensatory storage is required.
- No mitigation measures are specifically required in respect to flood resistance and resilience as it is not anticipated the TiPi Tent will have fixed utilities such as electricity or gas. It is recommended that it is recommended that guy ropes and pegs are checked and secured regularly as part of a routine maintenance protocol to minimise the risk of loss of the Tipi Tent should a significant fluvial flood event occur.
- Residual risks have been identified. It is concluded that the site lies in an area of Extreme Flood Hazard. Using the hazard mapping, it is recommended that site access and egress should be made to from the north of the site should evacuation need to be made.
- The probability of flooding of the site occurring over the summer months, when the TiPi Tent is continually sited has been assessed using the EA' approach to assessing risk during river works construction periods or to temporary works. Over the summer period, it is concluded that the site has a 4.2% chance of flooding. This uses the return period, the 10% AEP, when flooding is first predicted by the EA's river modelling. Given the depth of flooding is predicted as c.260mm, It is concluded the overall risk is Low.
- In respect to the design flood occurring during the same period, the probability is 0.21% and therefore concluded as very low.
- The speed of onset of flooding has been assessed using the industry standard revitalised rainfall runoff (ReFH2) flood estimation method and catchment descriptors to derive a design flood hydrograph. It is concluded that the site may be at first risk of flooding (the onset) approximately 13 hours into a significant flood event.
- The area (Whalley) lies within an EA flood warning area and automated warnings are provided to individuals and business who sign up to the service. It is recommended the owners of the site sign up to the EA Flood Warning Service.
- Based on the provision of flood warnings and the determined onset of flooding, it is concluded that the prosed development will be safe in respect to its users.
- It is recommended that a flood warning and evacuation plan is prepared and maintained for the duration of the development, and made available to site users.

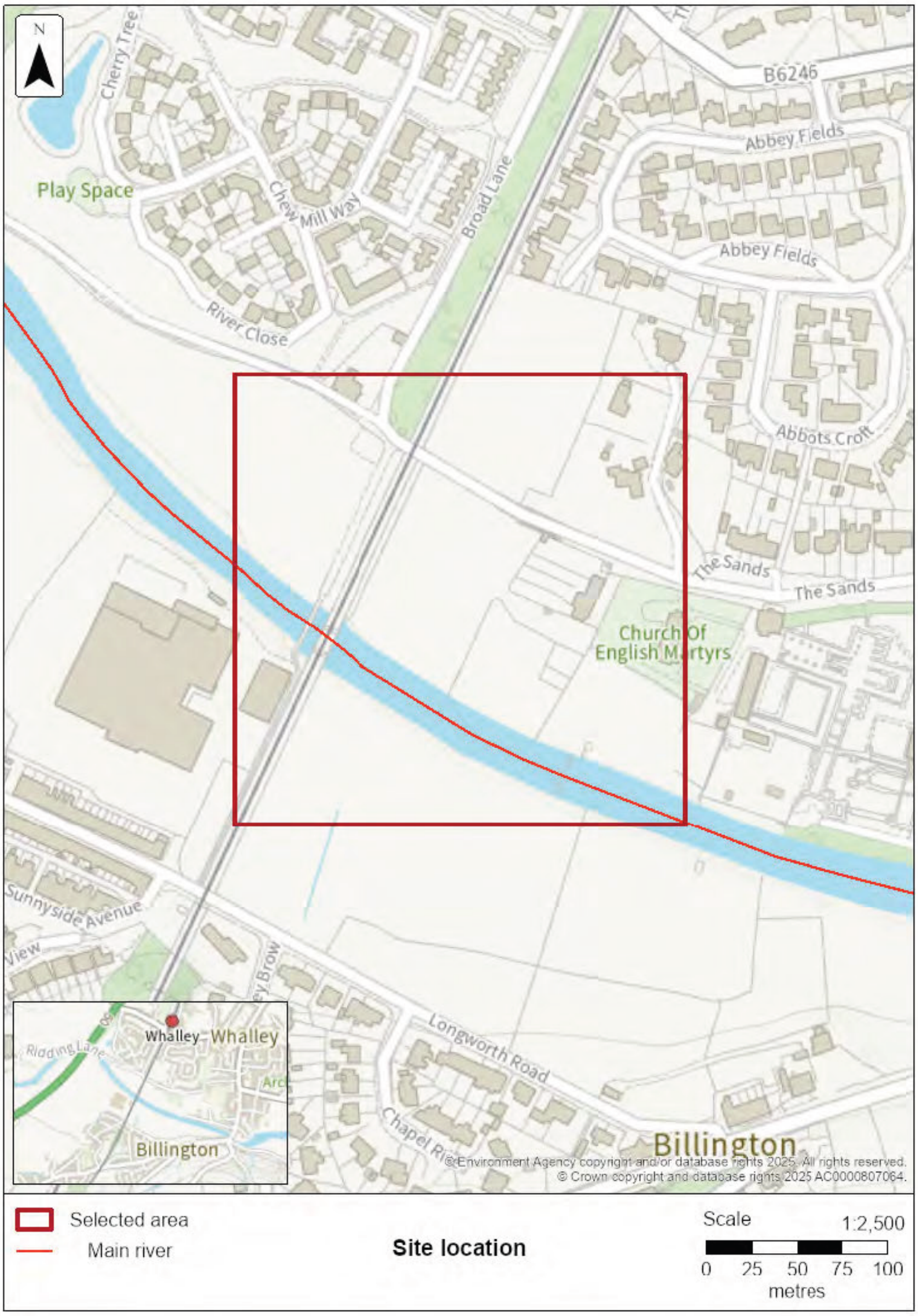
Appendices

Appendix A Environment Agency Product 4

Flood risk assessment data

Location of site: 372856 / 436134 (shown as easting and northing coordinates)
Document created on: 8 July 2025
This information was previously known as a product 4.
Customer reference number: 3T6RF16VHY2F

Map showing the location that flood risk assessment data has been requested for.



How to use this information

You can use this information as part of a flood risk assessment for a planning application. To do this, you should include it in the appendix of your flood risk assessment.

We recommend that you work with a flood risk consultant to get your flood risk assessment.

Included in this document

In this document you'll find:

- how to find information about surface water and other sources of flooding
- information on the models used
- definitions for the terminology used throughout
- flood map for planning (rivers and the sea)
- past floods
- flood defences and attributes
- information to help you assess if there is a reduced flood risk from rivers and the sea because of defences
- modelled data
- information about strategic flood risk assessments
- information about this data
- information about flood risk activity permits
- help and advice

Surface water and other sources of flooding

When using the surface water map on the check your long term flood risk service the following considerations apply:

- surface water extents are suitable for use in planning
- surface water climate change scenarios may help to inform risk assessments, but the available data fall short of what is required to assess planned development
- surface water depth information should not be used for planning purposes

To find out about other factors that might affect the flood risk of this location, you should also check:

- reservoir flood risk
- groundwater flood risk - you could use the British Geological Survey groundwater flooding data, groundwater: current status and flood risk and the guide on mining and groundwater constraints for development - further information may be available from the lead local flood authority (LLFA)
- your local planning authority's SFRA, which includes future flood risk

Your Lead Local Flood Authority is Lancashire County.

For information about sewer flooding, contact the relevant water company for the area.

About the models used

Model name: Whalley 2017
Scenario(s): Defended fluvial, defences removed fluvial, defended climate change fluvial, defences removed climate change fluvial
Date: 11 August 2017

This model contains the most relevant data for your area of interest.

Terminology used

Annual exceedance probability (AEP)

This refers to the probability of a flood event occurring in any year. The probability is expressed as a percentage. For example, a large flood which is calculated to have a 1% chance of occuring in any one year, is described as 1% AEP.

Metres above ordnance datum (mAOD)

All flood levels are given in metres above ordnance datum which is defined as the mean sea level at Newlyn, Cornwall.

Flood map for planning (rivers and the sea)

Your selected location is in flood zone 3.

Flood zone 3 shows the area at risk of flooding for an undefended flood event with a:

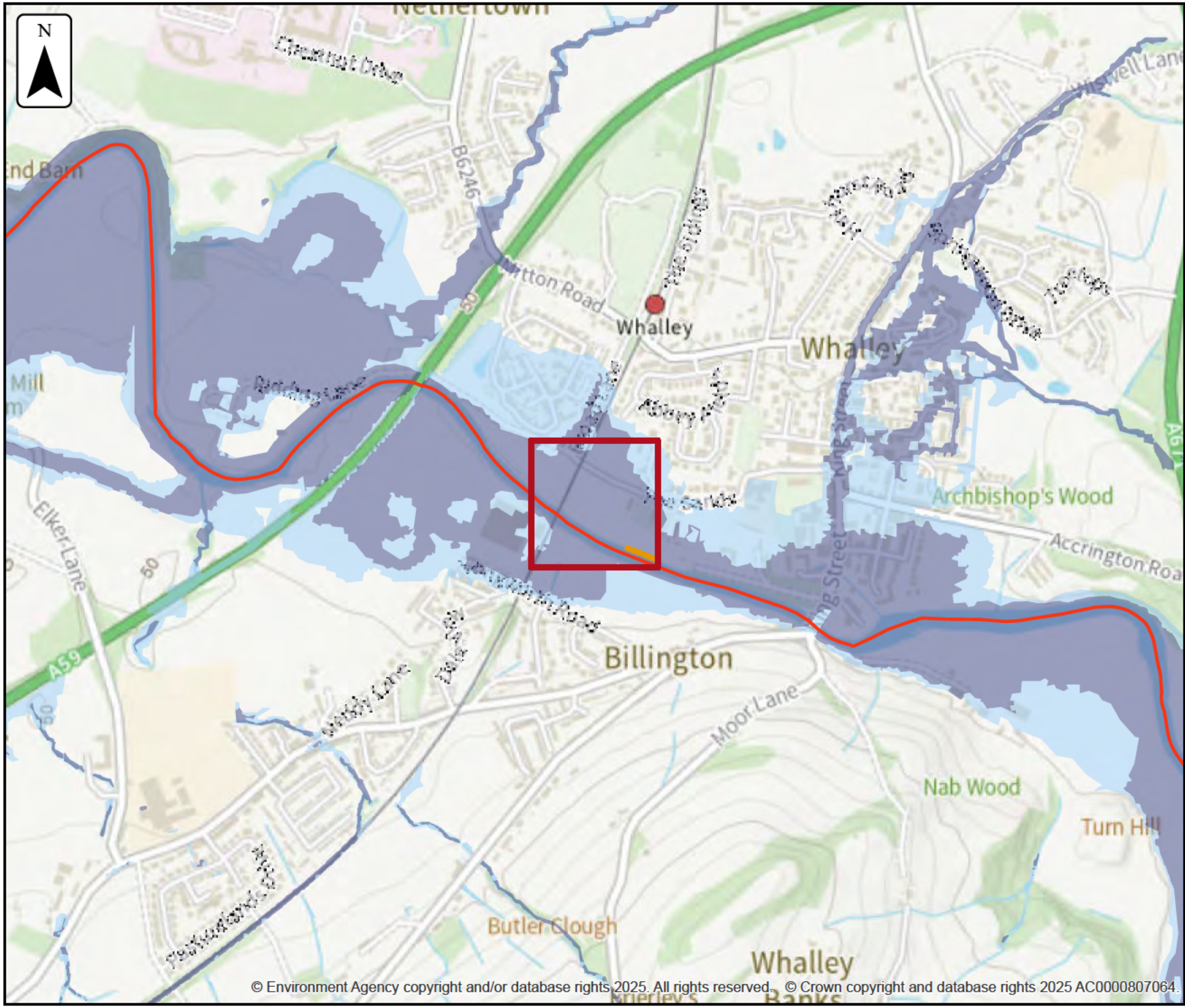
- 0.5% or greater probability of occurring in any year for flooding from the sea
- 1% or greater probability of occurring in any year for fluvial (river) flooding

Flood zone 2 shows the area at risk of flooding for an undefended flood event with:

- between a 0.1% and 0.5% probability of occurring in any year for flooding from the sea
- between a 0.1% and 1% probability of occurring in any year for fluvial (river) flooding

It's important to remember that the flood zones on this map:

- refer to the land at risk of flooding and do not refer to individual properties
- refer to the probability of river and sea flooding, ignoring the presence of defences
- do not take into account potential impacts of climate change



Environment Agency

Flood map for planning

Location (easting/northing)
372856/436134

Scale
1:10,000

Created
8 Jul 2025

- Selected area
- Main river
- Flood defence
- Flood Zone 3
- Flood Zone 2

0 100 200 300 400 500
metres

Past floods

Past flood events included in this document

The recorded flood outlines included in this document are for areas of land local to your site location that have been flooded by any of these sources:

- ephemeral water
- main rivers
- ordinary watercourses
- the sea
- unknown

Data limitations

The outlines do not include flooding from:

- drainage where rainfall has led to surface water ponding or overland runoff
- artificial, water-bearing sewer, water supply and wastewater treatment pipelines

Changes to flood defences

The defences (also known as assets) that were in place may also have changed. For example, assets may have been built more recently than the last recorded flood outline.

What the recorded flood outlines dataset is

The recorded flood outlines are a geographical information system (GIS) data layer that show our verified records of areas that have flooded in the past from:

- rivers
- the sea
- groundwater
- surface water

Download the complete recorded flood outlines dataset, which includes data quality flags for outlines recorded after April 2020. This indicates the confidence we have in an outline.

Get flood information from other organisations

Contact Lancashire County Lead Local Flood Authority (LLFA) and your drainage board to get information about past flooding caused by surface water or drainage systems.

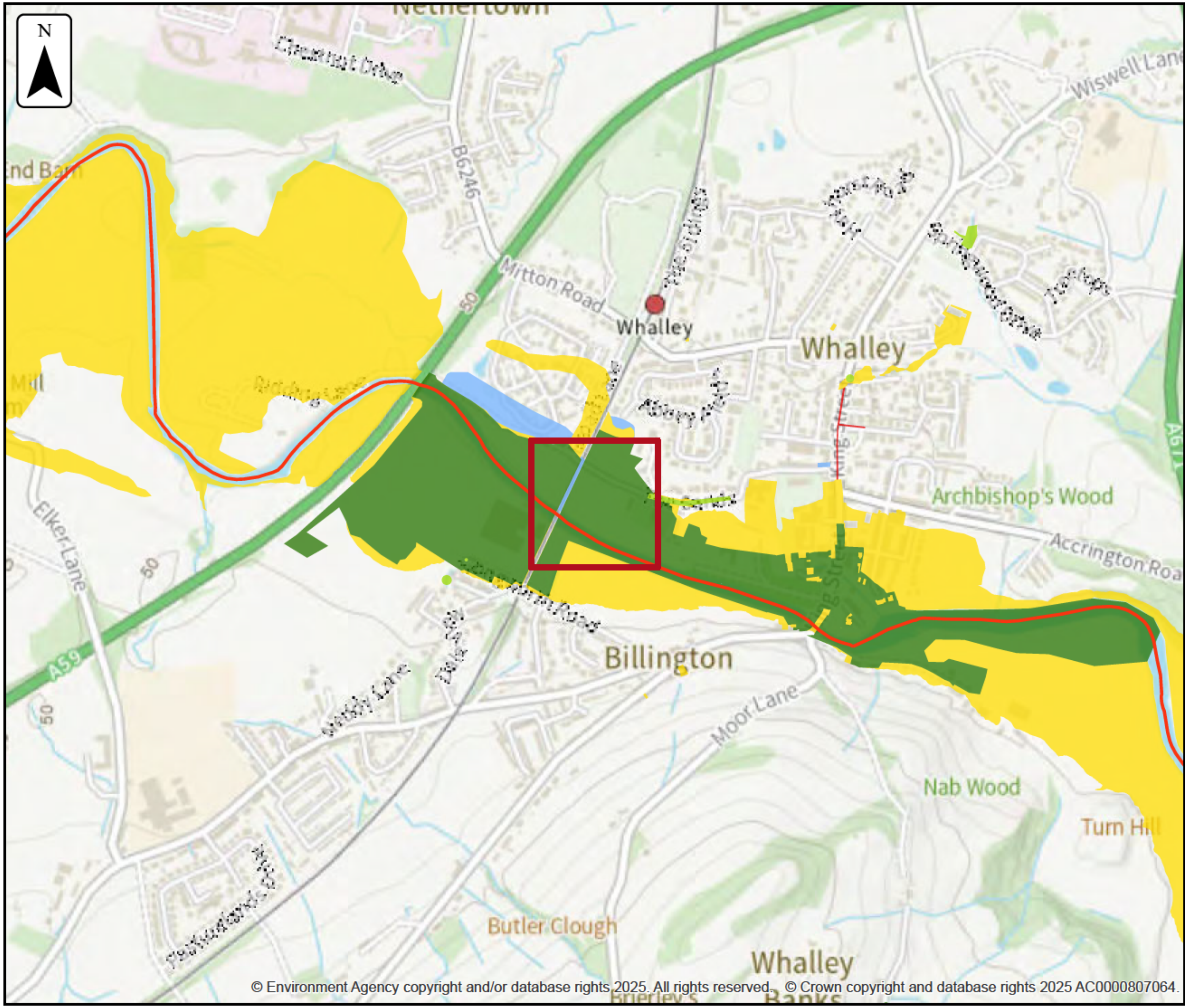
Environment Agency

Past floods

Location (easting/northing)
372856/436134

Scale
1:10,000

Created
8 Jul 2025



Selected area
Main river
Date of flood event
December, 2024
February, 2020
December, 2015
June, 2012
October, 2000
December, 1999

0 100 200 300 400 500
metres

Data on past flood events

Start date	End date	Source of flood	Cause of flood	Affects location
31 December 2024	1 January 2025	unknown	unknown	Yes
9 February 2020	10 February 2020	main river	overtopping of defences	Yes
26 December 2015	27 December 2015	main river	channel capacity exceeded (no raised defences)	Yes
22 June 2012	23 June 2012	unknown	local drainage/surface water	Yes
26 October 2000	27 October 2000	main river	channel capacity exceeded (no raised defences)	Yes
11 December 1999	12 December 1999	ordinary watercourse	obstruction/blockage - debris screen	No

Flood defences and attributes

The flood defences map shows the location of the flood defences present.

The flood defences data table shows the type of defences, their condition and the standard of protection. It shows the height above sea level of the top of the flood defence (crest level). The height is In mAOD which is the metres above the mean sea level at Newlyn, Cornwall.

It's important to remember that flood defence data may not be updated on a regular basis. The information here is based on the best available data.

Use this information:

- to help you assess if there is a reduced flood risk for this location because of defences
- with any information in the modelled data section to find out the impact of defences on flood risk

Environment Agency

Flood defences

Location (easting/northing)
372856/436134

Scale
1:2,500

Created
8 Jul 2025

Selected area
Main river
Flood defence

0 25 50 75 100
metres

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	64827	Embankment	5	Poor	43.90	43.90	43.90

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

Modelled data

This section provides details of different scenarios we have modelled and includes the following (where available):

- outline maps showing the area at risk from flooding in different modelled scenarios
- modelled node point map(s) showing the points used to get the data to model the scenarios and table(s) providing details of the flood risk for different return periods
- map(s) showing the approximate water levels for the return period with the largest flood extent for a scenario and table(s) of sample points providing details of the flood risk for different return periods

Climate change

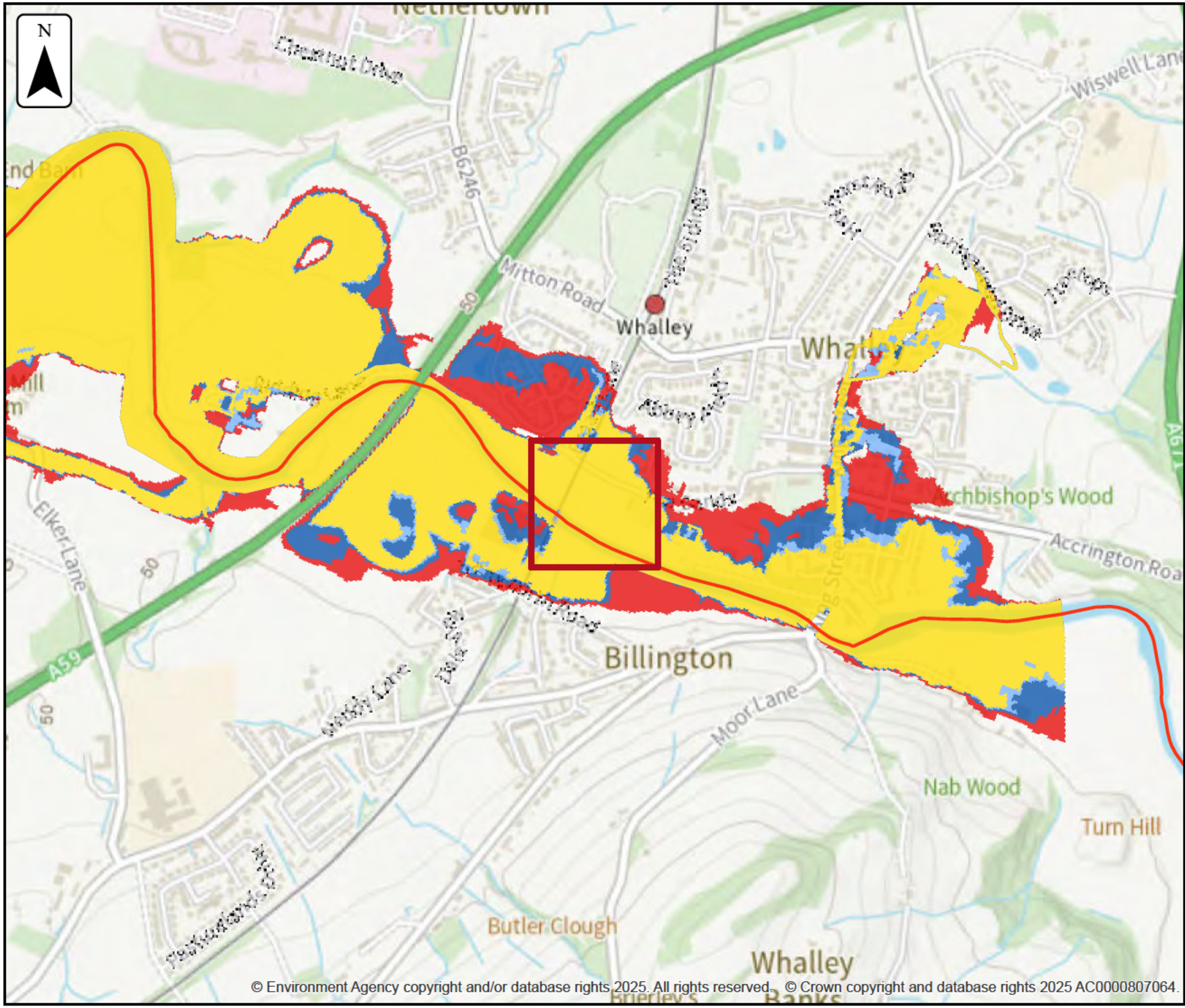
The climate change data included in the models may not include the latest flood risk assessment climate change allowances. Where the new allowances are not available you will need to consider this data and factor in the new allowances to demonstrate the development will be safe from flooding.

The Environment Agency will incorporate the new allowances into future modelling studies. For now, it's your responsibility to demonstrate that new developments will be safe in flood risk terms for their lifetime.

Modelled scenarios

The following scenarios are included:

- Defended modelled fluvial: risk of flooding from rivers where there are flood defences
- Defences removed modelled fluvial: risk of flooding from rivers where flood defences have been removed
- Defended climate change modelled fluvial: risk of flooding from rivers where there are flood defences, including estimated impact of climate change
- Defences removed climate change modelled fluvial: risk of flooding from rivers where flood defences have been removed, including estimated impact of climate change



Environment Agency

Defended modelled fluvial extent

Location (easting/northing)
372856/436134

Scale
1:10,000

Created
8 Jul 2025

Model name
Whalley 2017

Selected area

Main river

Modelled flood extent

1.33% AEP

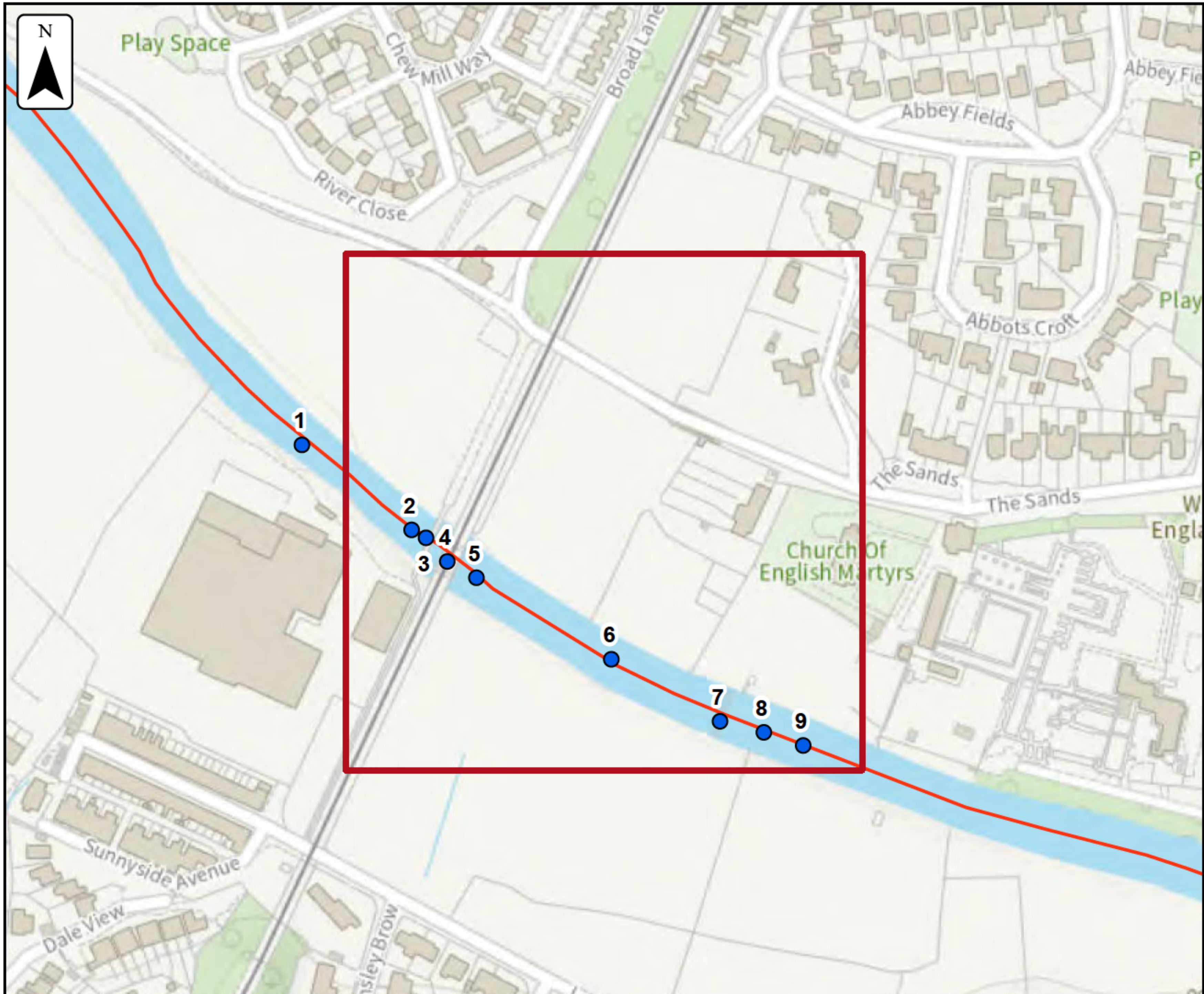
1% AEP

0.5% AEP

0.1% AEP

Flood extents may not be visible where they overlap other return periods

0 100 200 300 400 500
metres



Environment Agency

Defended modelled fluvial node locations

Location (easting/northing)
372856/436134

Scale
1:2,500

Created
8 Jul 2025

Model name
Whalley 2017

Selected area

Modelled location

Main river

0 25 50 75 100
metres

Modelled node locations data

Defended

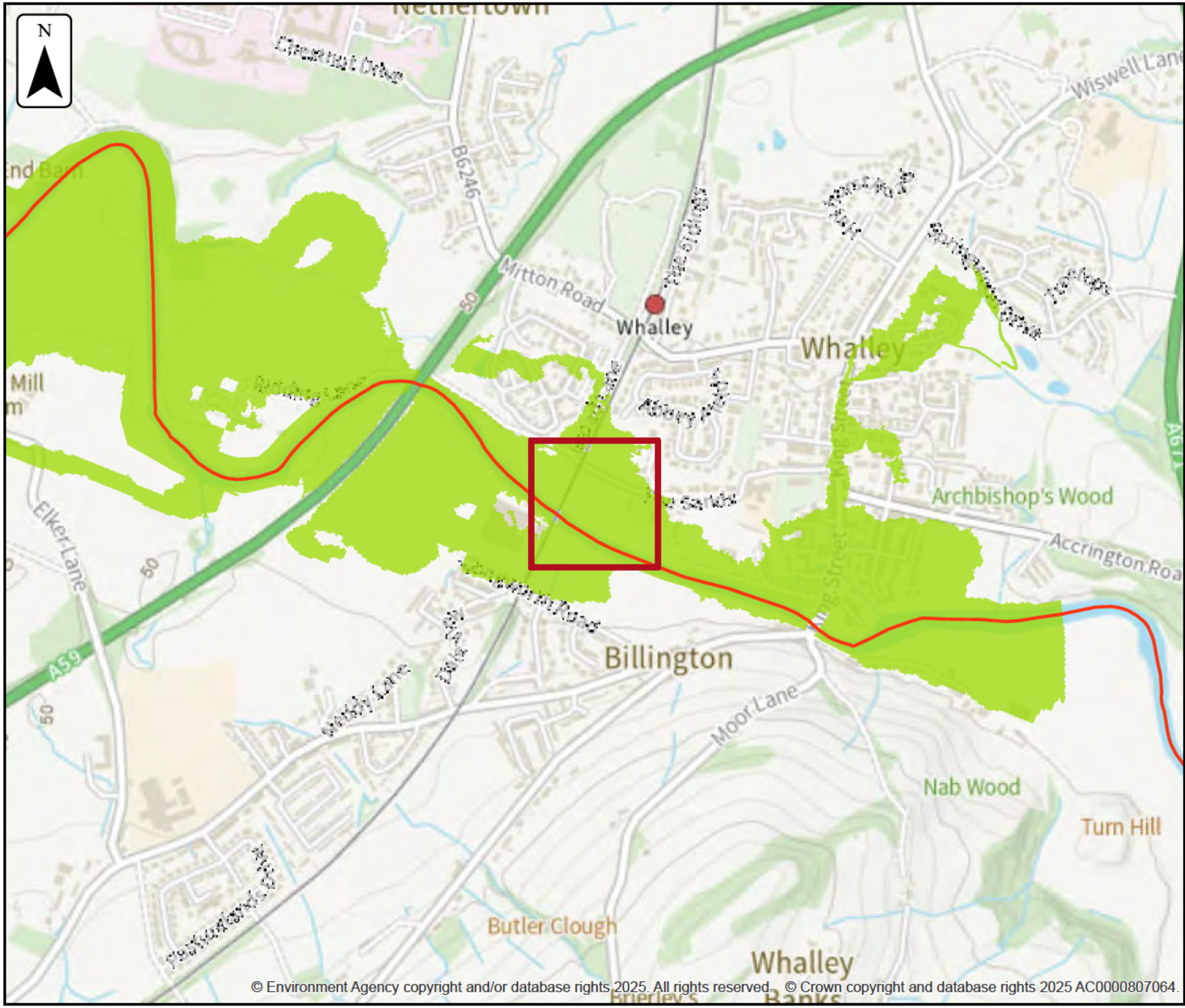
Label	Modelled location ID	Easting	Northing	50% AEP	10% AEP	4% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
				Level	Level	Level	Level	Level	Level	Level
1	931621	372711	436167	42.44	42.99	43.26	43.53	43.60	43.83	44.65
2	931660	372763	436126	42.70	43.34	43.59	43.84	43.91	44.13	44.82
3	931645	372770	436122	42.70	43.34	43.59	43.84	43.91	44.13	44.82
4	931641	372780	436111	42.72	43.35	43.61	43.86	43.93	44.15	44.82
5	931683	372794	436103	42.73	43.38	43.63	43.88	43.95	44.17	44.84
6	931684	372859	436064	42.86	43.51	43.73	43.95	44.02	44.22	44.86
7	931654	372911	436034	42.97	43.64	43.86	44.06	44.10	44.27	44.89
8	931681	372932	436029	43.0	43.66	43.89	44.10	44.15	44.32	44.92
9	931631	372951	436022	43.04	43.71	43.95	44.16	44.20	44.40	44.99

Data in this table comes from the Whalley 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	10% AEP	4% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
				Flow	Flow	Flow	Flow	Flow	Flow	Flow
1	931621	372711	436167	171.21	246.16	273.90	299.29	307.02	337.79	413.01
2	931660	372763	436126	171.24	246.27	276.69	308.74	317.68	353.75	458.82
3	931645	372770	436122	171.24	246.27	276.69	308.74	317.68	353.75	458.82
4	931641	372780	436111	171.24	246.27	276.28	307.84	316.98	355.25	465.26
5	931683	372794	436103	171.23	245.36	274.80	306.99	315.95	353.18	466.60
6	931684	372859	436064	171.23	246.09	284.70	325.06	335.55	379.38	502.93
7	931654	372911	436034	171.24	246.38	288.35	339.32	353.73	408.81	547.0
8	931681	372932	436029	171.23	246.37	288.33	339.37	353.79	409.33	550.26
9	931631	372951	436022	171.22	246.38	288.32	339.56	354.35	408.95	553.41

Data in this table comes from the Whalley 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.



Environment Agency

Defended climate change modelled fluvial extent

Location (easting/northing)
372856/436134

Scale
1:10,000

Created
8 Jul 2025

Model name
Whalley 2017

Selected area

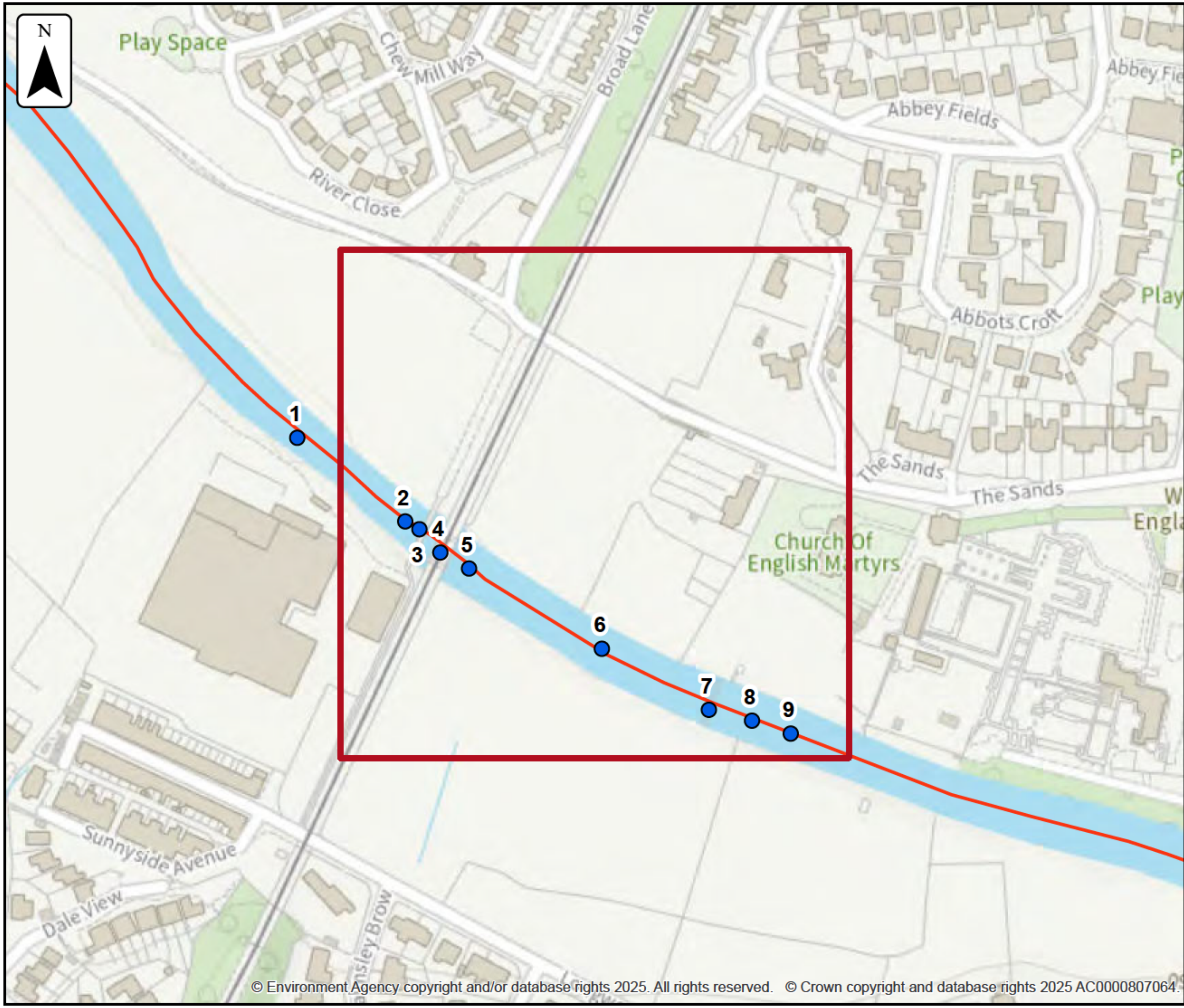
Main river

Modelled flood extent

1% AEP (+15%)

Flood extents may not be visible where they overlap other return periods

0 100 200 300 400 500
metres



Environment Agency

Defended climate change modelled fluvial node locations

Location (easting/northing)
372856/436134

Scale
1:2,500

Created
8 Jul 2025

Model name
Whalley 2017

Selected area
Modelled location
Main river

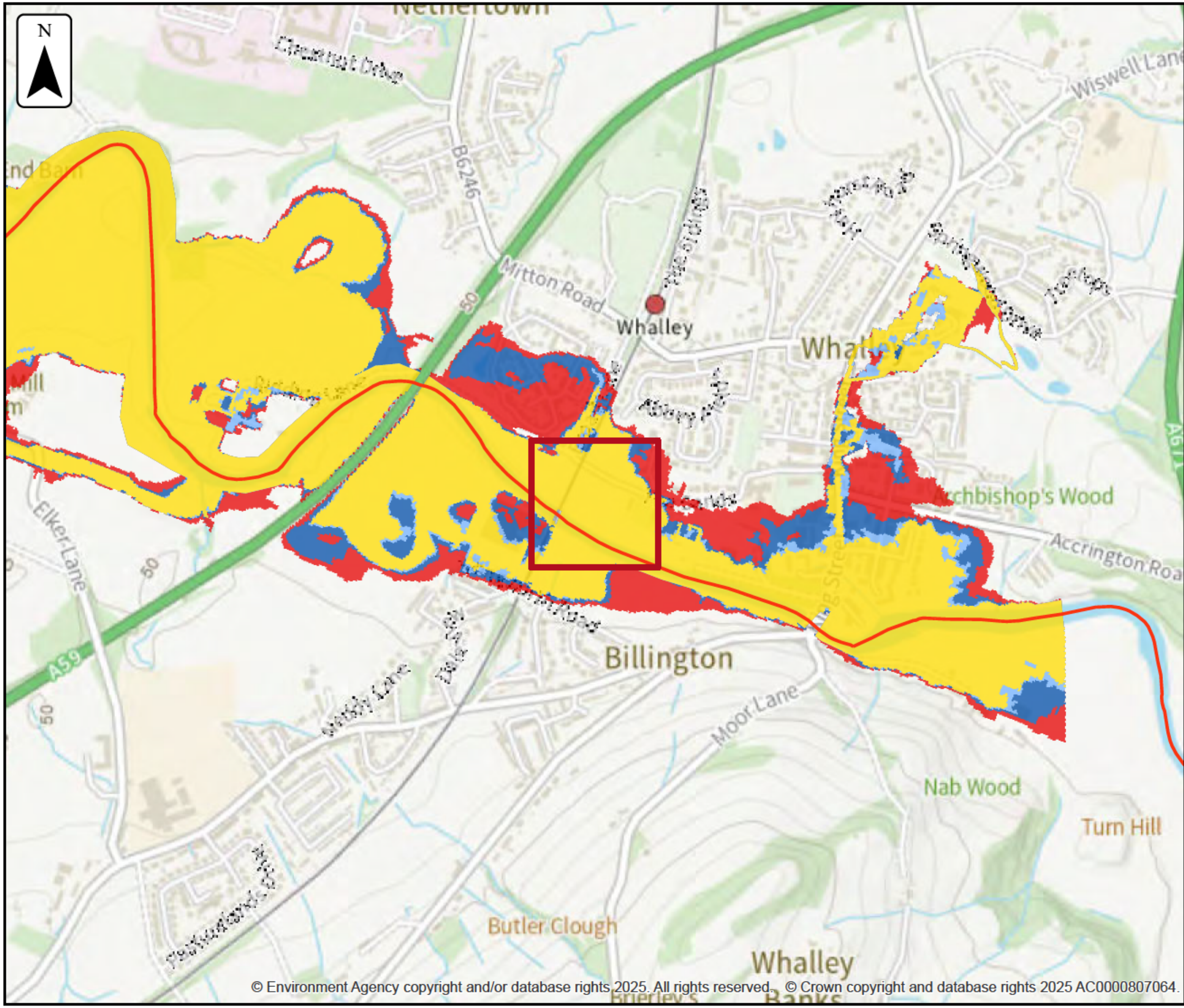
0 25 50 75 100
metres

Modelled node locations data

Defended climate change

Label	Modelled location ID	Easting	Northing	1% AEP (+15%)	1% AEP (+15%)
				Level	Flow
1	931621	372711	436167	43.80	332.88
2	931660	372763	436126	44.10	348.33
3	931645	372770	436122	44.10	348.33
4	931641	372780	436111	44.12	349.19
5	931683	372794	436103	44.14	347.06
6	931684	372859	436064	44.19	372.26
7	931654	372911	436034	44.25	400.65
8	931681	372932	436029	44.29	401.02
9	931631	372951	436022	44.37	400.91

Data in this table comes from the Whalley 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 modelled fluvial extent

Location (easting/northing)
372856/436134

Scale
1:10,000

Created
8 Jul 2025

Model name
Whalley 2017

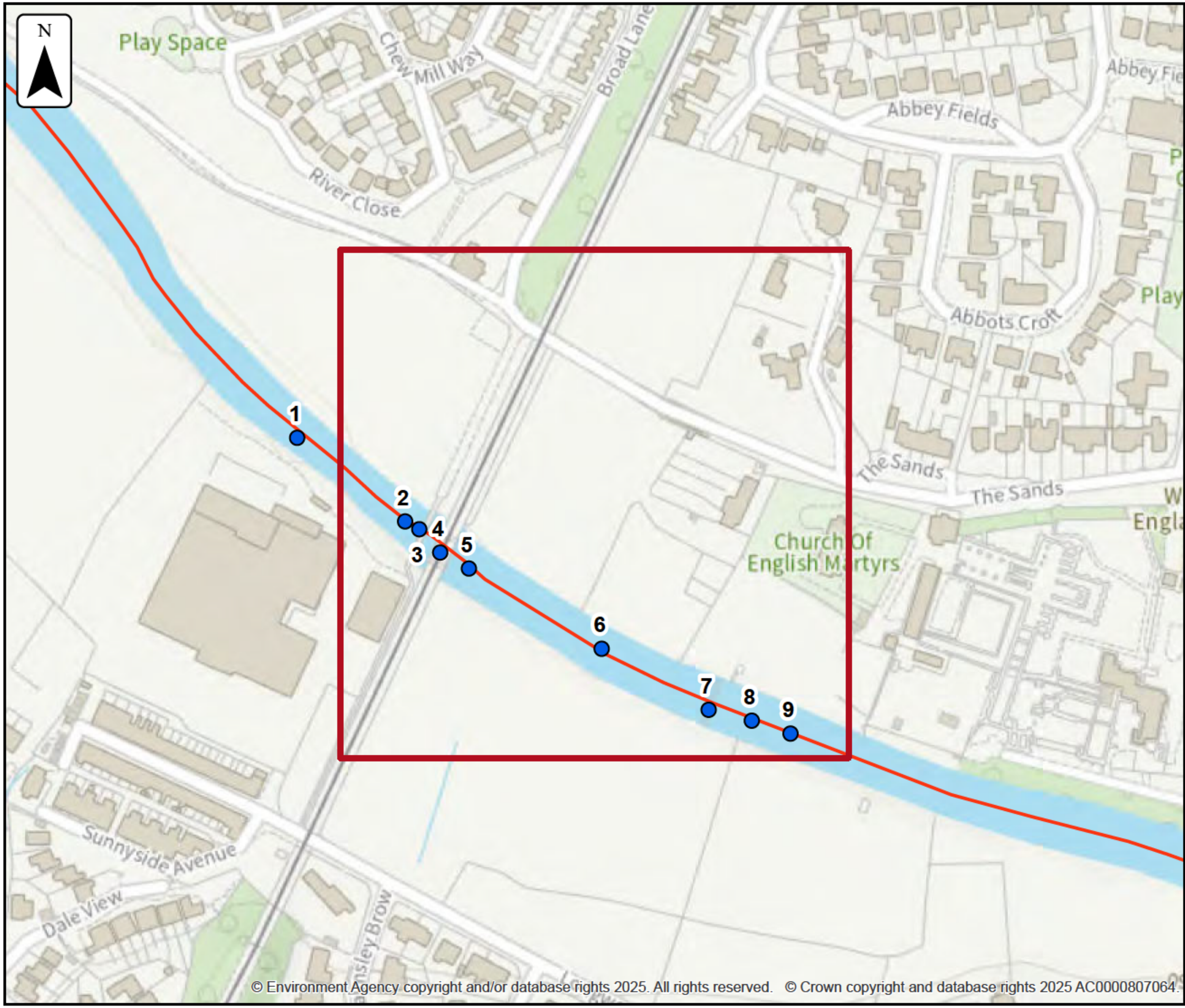
- Selected area
- Main river

Modelled flood extent

- 1.33% AEP
- 1% AEP
- 0.5% AEP
- 0.1% AEP

Flood extents may not be visible where they overlap other return periods

0 100 200 300 400 500
metres



Environment Agency

Defences removed modelled fluvial node locations

Location (easting/northing)
372856/436134

Scale
1:2,500

Created
8 Jul 2025

Model name
Whalley 2017

Selected area
Modelled location
Main river

0 25 50 75 100
metres

Modelled node locations data

Defences removed

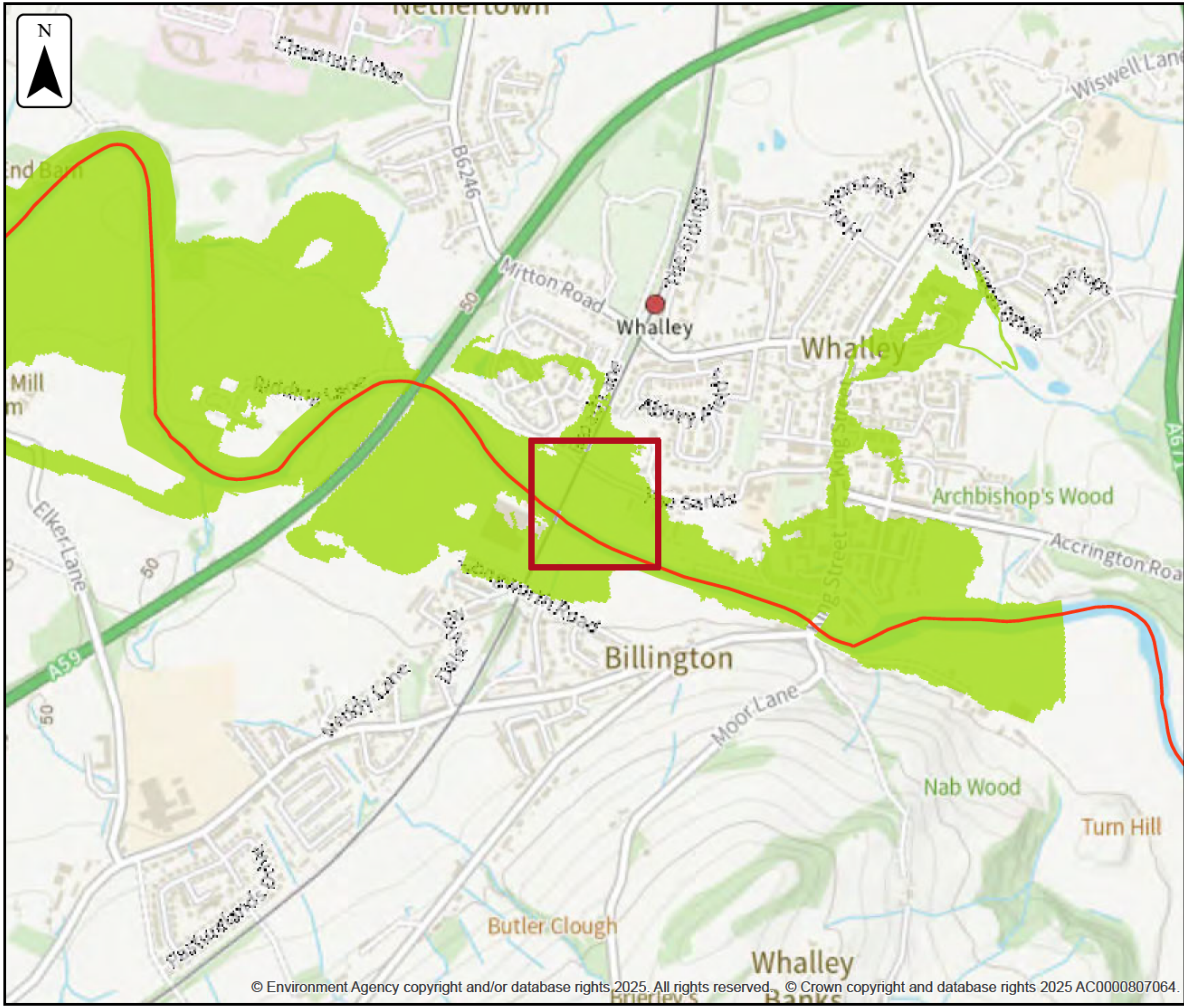
Label	Modelled location ID	Easting	Northing	50% AEP	10% AEP	4% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
				Level	Level	Level	Level	Level	Level	Level
1	931621	372711	436167	42.44	43.08	43.26	43.53	43.60	43.83	44.65
2	931660	372763	436126	42.70	43.40	43.59	43.84	43.91	44.13	44.82
3	931645	372770	436122	42.70	43.40	43.59	43.84	43.91	44.13	44.82
4	931641	372780	436111	42.72	43.42	43.61	43.86	43.93	44.15	44.82
5	931683	372794	436103	42.73	43.44	43.63	43.88	43.95	44.17	44.84
6	931684	372859	436064	42.86	43.57	43.73	43.95	44.02	44.22	44.86
7	931654	372911	436034	42.97	43.69	43.86	44.06	44.10	44.27	44.89
8	931681	372932	436029	43.0	43.72	43.90	44.10	44.14	44.32	44.92
9	931631	372951	436022	43.04	43.76	43.95	44.15	44.20	44.39	44.99

Data in this table comes from the Whalley 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	10% AEP	4% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
				Flow	Flow	Flow	Flow	Flow	Flow	Flow
1	931621	372711	436167	171.21	246.97	273.92	299.34	307.09	337.99	413.11
2	931660	372763	436126	171.24	246.98	276.71	308.84	317.83	354.14	458.94
3	931645	372770	436122	171.24	246.98	276.71	308.84	317.83	354.14	458.94
4	931641	372780	436111	171.24	246.98	276.29	307.96	317.16	355.66	465.33
5	931683	372794	436103	171.23	246.98	274.82	307.14	316.16	353.69	466.72
6	931684	372859	436064	171.23	246.97	284.73	325.30	335.86	380.13	502.98
7	931654	372911	436034	171.24	246.98	288.35	339.70	354.19	409.94	547.16
8	931681	372932	436029	171.23	246.98	288.36	339.74	354.23	410.55	550.21
9	931631	372951	436022	171.22	246.99	288.38	340.02	354.99	410.45	553.29

Data in this table comes from the Whalley 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.



Environment Agency

Defences removed climate change modelled fluvial extent

Location (easting/northing)
372856/436134

Scale
1:10,000

Created
8 Jul 2025

Model name
Whalley 2017

Selected area

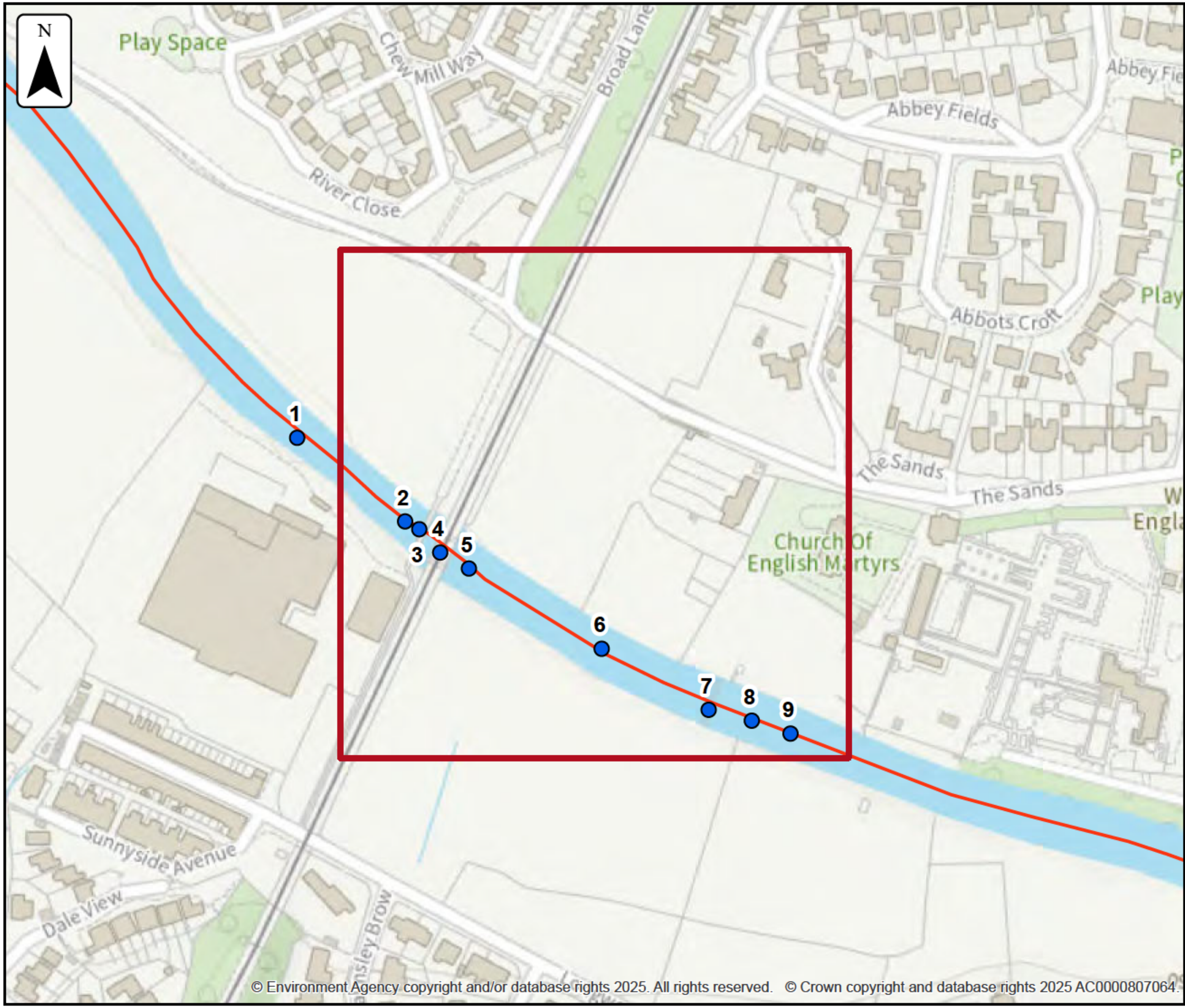
Main river

Modelled flood extent

1% AEP (+15%)

Flood extents may not be visible where they overlap other return periods

0 100 200 300 400 500
metres



Environment Agency

Defences removed climate change modelled fluvial node locations

Location (easting/northing)
372856/436134

Scale
1:2,500

Created
8 Jul 2025

Model name
Whalley 2017

Selected area
Modelled location
Main river

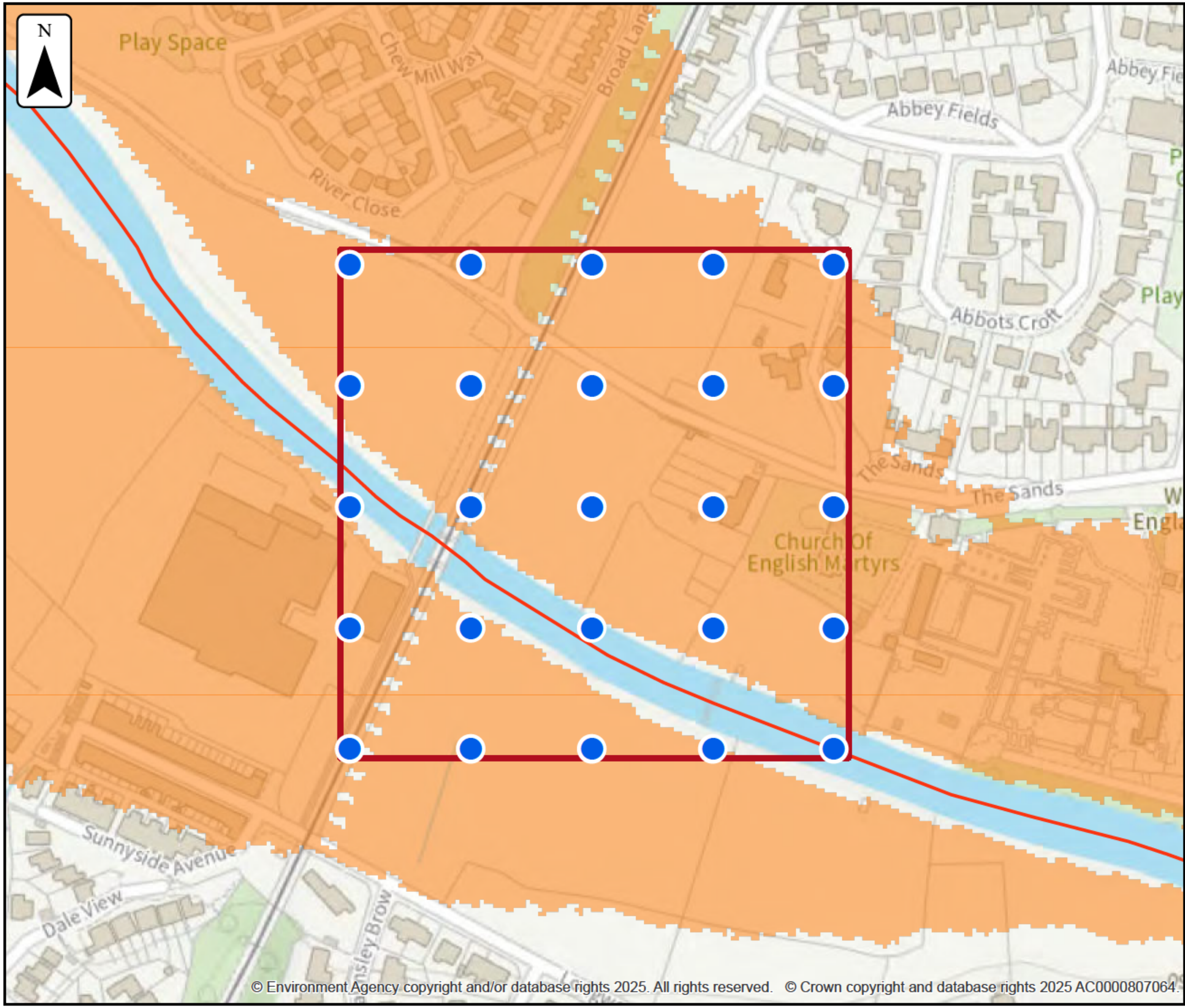
0 25 50 75 100
metres

Modelled node locations data

Defences removed climate change

Label	Modelled location ID	Easting	Northing	1% AEP (+15%)	1% AEP (+15%)
				Level	Flow
1	931621	372711	436167	43.80	333.08
2	931660	372763	436126	44.10	348.85
3	931645	372770	436122	44.10	348.85
4	931641	372780	436111	44.12	349.72
5	931683	372794	436103	44.14	347.71
6	931684	372859	436064	44.19	373.24
7	931654	372911	436034	44.24	402.05
8	931681	372932	436029	44.29	402.44
9	931631	372951	436022	44.36	402.60

Data in this table comes from the Whalley 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.



Environment Agency

Defended modelled fluvial extent and height

Location (easting/northing)
372856/436134

Scale
1:2,500

Created
8 Jul 2025

Model name
Whalley 2017

Selected area

Main river

Modelled 2D grid
Water level in mAOD

- 0 - 6.125
- 6.125 - 12.25
- 12.25 - 18.375
- 18.375 - 24.5
- 24.5 - 30.625
- 30.625 - 36.75
- 36.75 - 42.875
- 42.875 - 49.0
- 49.0 - 55.125

This map shows the 0.1% AEP height data

0 25 50 75 100
metres

Sample point data

Defended

Label	Easting	Northing	50% AEP	10% AEP	4% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
			Height	Height	Height	Height	Height	Height	Height
1	372736	436015	NoData	NoData	43.68	43.93	43.99	44.20	44.83
2	372795	436015	NoData	NoData	43.68	43.93	43.99	44.21	44.85
3	372854	436015	NoData	NoData	NoData	43.93	44.00	44.21	44.86
4	372913	436015	NoData	NoData	NoData	NoData	NoData	44.24	44.87
5	372972	436015	NoData	NoData	NoData	NoData	NoData	NoData	NoData
6	372736	436074	NoData	NoData	NoData	NoData	NoData	44.15	44.83
7	372795	436074	NoData	NoData	43.65	43.90	43.96	44.18	44.85
8	372854	436074	NoData	NoData	NoData	NoData	NoData	NoData	NoData
9	372913	436074	NoData	NoData	43.78	43.98	44.03	44.23	44.86
10	372972	436074	NoData	NoData	NoData	44.20	44.25	44.42	44.90
11	372736	436133	NoData	NoData	NoData	NoData	NoData	NoData	NoData
12	372795	436133	NoData	NoData	43.63	43.88	43.95	44.16	44.82

Label	Easting	Northing	50% AEP	10% AEP	4% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
			Height	Height	Height	Height	Height	Height	Height
13	372854	436133	NoData	43.09	43.59	43.89	43.96	44.18	44.84
14	372913	436133	NoData	NoData	43.60	43.90	43.97	44.19	44.83
15	372972	436133	NoData	NoData	NoData	43.91	43.98	44.21	44.86
16	372736	436192	NoData	NoData	43.27	43.57	43.64	43.88	44.67
17	372795	436192	NoData	43.00	43.42	43.76	43.83	44.08	44.78
18	372854	436192	NoData	43.08	43.57	43.87	43.94	44.16	44.82
19	372913	436192	NoData	NoData	NoData	43.87	43.94	44.17	44.83
20	372972	436192	NoData	NoData	NoData	NoData	NoData	NoData	44.84
21	372736	436251	NoData	NoData	NoData	43.47	43.55	43.79	44.64
22	372795	436251	NoData	NoData	NoData	43.79	43.87	44.10	44.79
23	372854	436251	NoData	NoData	NoData	43.87	43.94	44.17	44.82
24	372913	436251	NoData	NoData	43.57	43.87	43.94	44.17	44.82

Label	Easting	Northing	50% AEP	10% AEP	4% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
			Height	Height	Height	Height	Height	Height	Height
25	372972	436251	NoData	NoData	NoData	NoData	NoData	NoData	NoData
Max value in selected area:			42.86	43.80	44.04	44.27	44.32	44.52	45.07

Data in this table comes from the Whalley 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	10% AEP	4% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
			Depth	Depth	Depth	Depth	Depth	Depth	Depth
1	372736	436015	NoData	NoData	0.50	0.74	0.81	1.02	1.64
2	372795	436015	NoData	NoData	0.69	0.93	1.00	1.21	1.86
3	372854	436015	NoData	NoData	NoData	0.19	0.26	0.47	1.12
4	372913	436015	NoData	NoData	NoData	NoData	NoData	0.08	0.67
5	372972	436015	NoData	NoData	NoData	NoData	NoData	NoData	NoData
6	372736	436074	NoData	NoData	NoData	NoData	NoData	0.05	0.73
7	372795	436074	NoData	NoData	0.26	0.51	0.57	0.79	1.45
8	372854	436074	NoData	NoData	NoData	NoData	NoData	NoData	NoData
9	372913	436074	NoData	NoData	0.06	0.23	0.29	0.48	1.12
10	372972	436074	NoData	NoData	NoData	0.09	0.13	0.31	0.78
11	372736	436133	NoData	NoData	NoData	NoData	NoData	NoData	NoData
12	372795	436133	NoData	NoData	0.15	0.40	0.46	0.67	1.32

Label	Easting	Northing	50% AEP	10% AEP	4% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
			Depth	Depth	Depth	Depth	Depth	Depth	Depth
13	372854	436133	NoData	0.32	0.82	1.11	1.18	1.40	2.06
14	372913	436133	NoData	NoData	0.43	0.73	0.80	1.02	1.66
15	372972	436133	NoData	NoData	NoData	0.16	0.22	0.45	1.10
16	372736	436192	NoData	NoData	0.18	0.48	0.55	0.78	1.58
17	372795	436192	NoData	0.03	0.45	0.79	0.87	1.11	1.81
18	372854	436192	NoData	0.26	0.75	1.05	1.12	1.35	2.01
19	372913	436192	NoData	NoData	NoData	0.25	0.32	0.55	1.20
20	372972	436192	NoData	NoData	NoData	NoData	NoData	NoData	0.45
21	372736	436251	NoData	NoData	NoData	0.43	0.51	0.75	1.60
22	372795	436251	NoData	NoData	NoData	0.22	0.29	0.53	1.22
23	372854	436251	NoData	NoData	NoData	0.24	0.30	0.51	1.17
24	372913	436251	NoData	NoData	0.16	0.46	0.53	0.76	1.41

Label	Easting	Northing	50% AEP	10% AEP	4% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
			Depth	Depth	Depth	Depth	Depth	Depth	Depth
25	372972	436251	NoData	NoData	NoData	NoData	NoData	NoData	NoData
Max value in selected area:			0.33	0.97	1.23	1.48	1.55	1.77	2.44

Data in this table comes from the Whalley 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.
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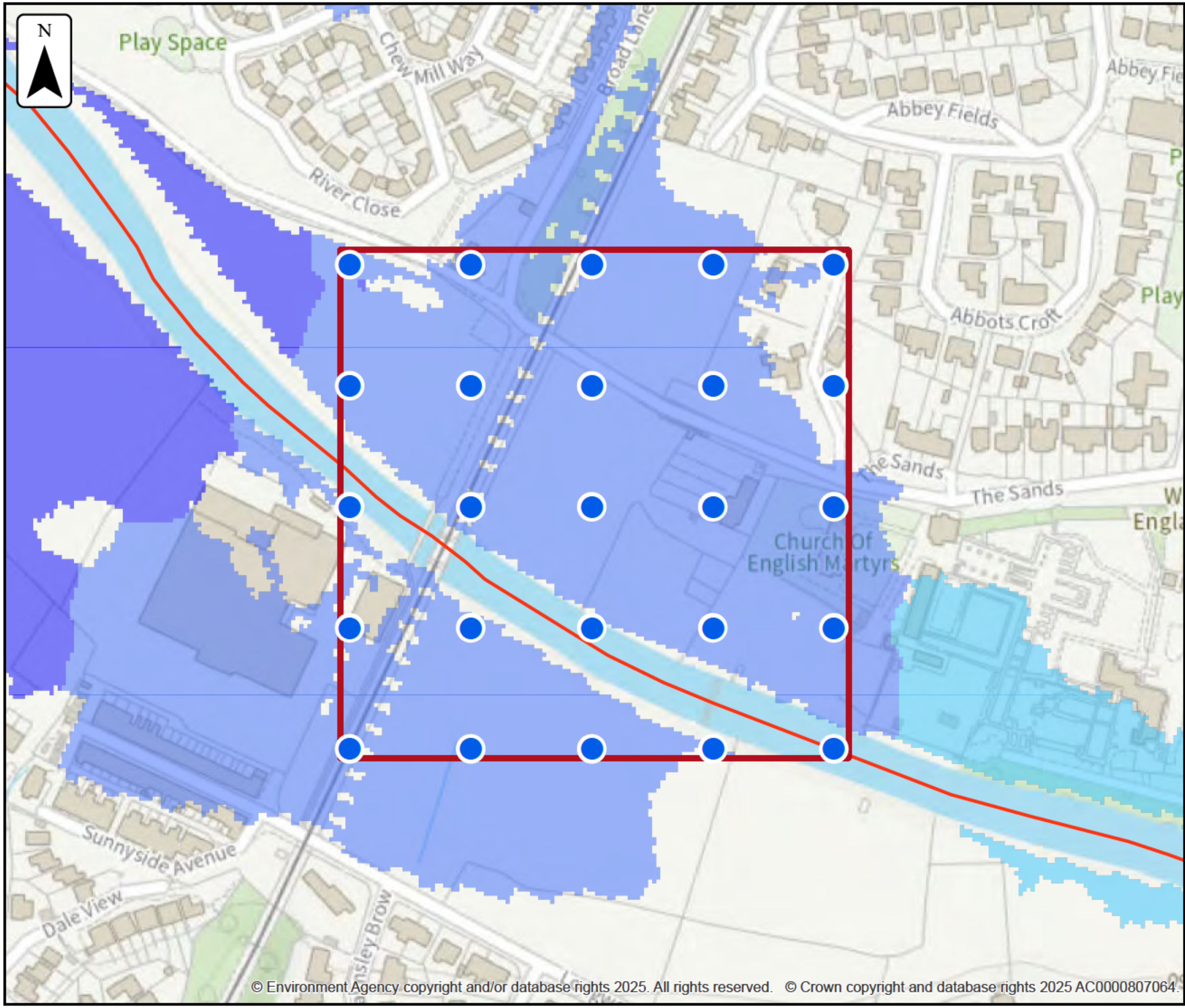
'Max value in selected area' is the deepest depth or highest height at any location within your drawn boundary.



Environment Agency

Defended climate change modelled fluvial extent and height

Location (easting/northing)
372856/436134

Scale
1:2,500

Created
8 Jul 2025

Model name
Whalley 2017

Selected area

Main river

Modelled 2D grid
Water level in mAOD

43 - 43.75
43.75 - 44.5
44.5 - 45.25
45.25 - 46.0
46.0 - 46.75
46.75 - 47.5
47.5 - 48.25
48.25 - 49.0
49.0 - 49.75

This map shows the 1% AEP +15% height data

0 25 50 75 100
metres

Sample point data

Defended climate change

Label	Easting	Northing	1% AEP (+15%)	1% AEP (+15%)
			Height	Depth
1	372736	436015	44.17	0.99
2	372795	436015	44.18	1.18
3	372854	436015	44.18	0.44
4	372913	436015	44.21	0.07
5	372972	436015	NoData	NoData
6	372736	436074	44.12	0.02
7	372795	436074	44.15	0.76
8	372854	436074	NoData	NoData
9	372913	436074	44.20	0.45
10	372972	436074	44.39	0.27
11	372736	436133	NoData	NoData
12	372795	436133	44.13	0.65

Label	Easting	Northing	1% AEP (+15%)	1% AEP (+15%)
			Height	Depth
13	372854	436133	44.15	1.37
14	372913	436133	44.16	0.99
15	372972	436133	44.18	0.42
16	372736	436192	43.84	0.75
17	372795	436192	44.04	1.07
18	372854	436192	44.13	1.32
19	372913	436192	44.14	0.52
20	372972	436192	NoData	NoData
21	372736	436251	43.75	0.71
22	372795	436251	44.07	0.50
23	372854	436251	44.14	0.48
24	372913	436251	44.14	0.73

Label	Easting	Northing	1% AEP (+15%)	1% AEP (+15%)
			Height	Depth
25	372972	436251	NoData	NoData
Max value in selected area:			44.49	1.74

Data in this table comes from the Whalley 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.
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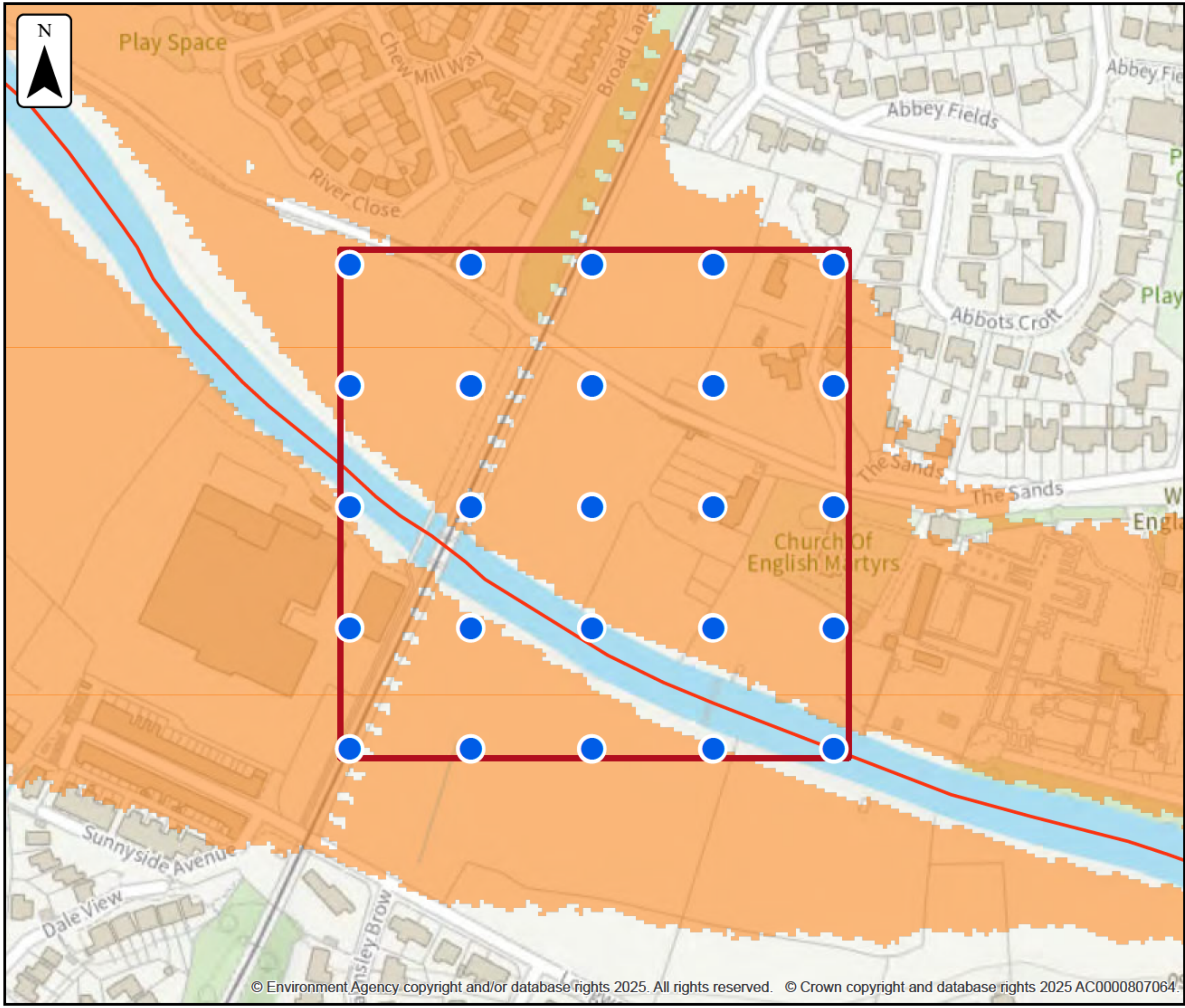
'Max value in selected area' is the deepest depth or highest height at any location within your drawn boundary.



Environment Agency

Defences removed modelled fluvial extent and height

Location (easting/northing)
372856/436134

Scale
1:2,500

Created
8 Jul 2025

Model name
Whalley 2017

Selected area

Main river

Modelled 2D grid
Water level in mAOD

- 0 - 6.125
- 6.125 - 12.25
- 12.25 - 18.375
- 18.375 - 24.5
- 24.5 - 30.625
- 30.625 - 36.75
- 36.75 - 42.875
- 42.875 - 49.0
- 49.0 - 55.125

This map shows the 0.1% AEP height data

0 25 50 75 100
metres

Sample point data

Defences removed

Label	Easting	Northing	50% AEP	10% AEP	4% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
			Height	Height	Height	Height	Height	Height	Height
1	372736	436015	NoData	NoData	43.68	43.93	43.99	44.20	44.83
2	372795	436015	NoData	NoData	43.68	43.93	43.99	44.21	44.85
3	372854	436015	NoData	NoData	NoData	43.93	44.00	44.21	44.86
4	372913	436015	NoData	NoData	NoData	NoData	NoData	44.24	44.87
5	372972	436015	NoData	NoData	NoData	NoData	NoData	NoData	NoData
6	372736	436074	NoData	NoData	NoData	NoData	NoData	44.15	44.83
7	372795	436074	NoData	NoData	43.65	43.90	43.96	44.18	44.84
8	372854	436074	NoData	NoData	NoData	NoData	NoData	NoData	NoData
9	372913	436074	NoData	NoData	43.78	43.98	44.03	44.23	44.86
10	372972	436074	NoData	NoData	NoData	44.18	44.23	44.40	44.90
11	372736	436133	NoData	NoData	NoData	NoData	NoData	NoData	NoData
12	372795	436133	NoData	NoData	43.63	43.88	43.95	44.16	44.82

Label	Easting	Northing	50% AEP	10% AEP	4% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
			Height	Height	Height	Height	Height	Height	Height
13	372854	436133	NoData	43.09	43.59	43.89	43.96	44.18	44.84
14	372913	436133	NoData	NoData	43.60	43.90	43.97	44.19	44.83
15	372972	436133	NoData	NoData	NoData	43.91	43.98	44.20	44.86
16	372736	436192	NoData	NoData	43.27	43.57	43.64	43.88	44.67
17	372795	436192	NoData	43.00	43.42	43.76	43.83	44.07	44.78
18	372854	436192	NoData	43.08	43.57	43.87	43.94	44.16	44.82
19	372913	436192	NoData	NoData	NoData	43.87	43.94	44.17	44.83
20	372972	436192	NoData	NoData	NoData	NoData	NoData	NoData	44.84
21	372736	436251	NoData	NoData	NoData	43.47	43.55	43.79	44.64
22	372795	436251	NoData	NoData	NoData	43.79	43.87	44.10	44.79
23	372854	436251	NoData	NoData	NoData	43.87	43.94	44.17	44.82
24	372913	436251	NoData	NoData	43.57	43.87	43.94	44.17	44.82

Label	Easting	Northing	50% AEP	10% AEP	4% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
			Height	Height	Height	Height	Height	Height	Height
25	372972	436251	NoData	NoData	NoData	NoData	NoData	NoData	NoData
Max value in selected area:			42.86	43.80	44.04	44.24	44.30	44.49	45.07

Data in this table comes from the Whalley 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.

Defences removed

Label	Easting	Northing	50% AEP	10% AEP	4% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
			Depth	Depth	Depth	Depth	Depth	Depth	Depth
1	372736	436015	NoData	NoData	0.50	0.74	0.81	1.02	1.64
2	372795	436015	NoData	NoData	0.69	0.93	1.00	1.21	1.86
3	372854	436015	NoData	NoData	NoData	0.19	0.26	0.47	1.12
4	372913	436015	NoData	NoData	NoData	NoData	NoData	0.08	0.67
5	372972	436015	NoData	NoData	NoData	NoData	NoData	NoData	NoData
6	372736	436074	NoData	NoData	NoData	NoData	NoData	0.05	0.73
7	372795	436074	NoData	NoData	0.26	0.51	0.57	0.79	1.45
8	372854	436074	NoData	NoData	NoData	NoData	NoData	NoData	NoData
9	372913	436074	NoData	NoData	0.06	0.23	0.29	0.48	1.12
10	372972	436074	NoData	NoData	NoData	0.06	0.11	0.29	0.78
11	372736	436133	NoData	NoData	NoData	NoData	NoData	NoData	NoData
12	372795	436133	NoData	NoData	0.15	0.40	0.46	0.67	1.32

Label	Easting	Northing	50% AEP	10% AEP	4% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
			Depth	Depth	Depth	Depth	Depth	Depth	Depth
13	372854	436133	NoData	0.32	0.82	1.11	1.18	1.40	2.06
14	372913	436133	NoData	NoData	0.43	0.73	0.80	1.02	1.66
15	372972	436133	NoData	NoData	NoData	0.15	0.22	0.45	1.10
16	372736	436192	NoData	NoData	0.18	0.48	0.55	0.78	1.58
17	372795	436192	NoData	0.03	0.45	0.79	0.87	1.11	1.81
18	372854	436192	NoData	0.26	0.75	1.05	1.12	1.35	2.01
19	372913	436192	NoData	NoData	NoData	0.25	0.32	0.55	1.20
20	372972	436192	NoData	NoData	NoData	NoData	NoData	NoData	0.45
21	372736	436251	NoData	NoData	NoData	0.43	0.51	0.75	1.60
22	372795	436251	NoData	NoData	NoData	0.22	0.29	0.53	1.22
23	372854	436251	NoData	NoData	NoData	0.24	0.30	0.51	1.17
24	372913	436251	NoData	NoData	0.16	0.46	0.53	0.76	1.41

Label	Easting	Northing	50% AEP	10% AEP	4% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
			Depth	Depth	Depth	Depth	Depth	Depth	Depth
25	372972	436251	NoData	NoData	NoData	NoData	NoData	NoData	NoData
Max value in selected area:			0.33	0.97	1.23	1.48	1.55	1.77	2.44

Data in this table comes from the Whalley 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.
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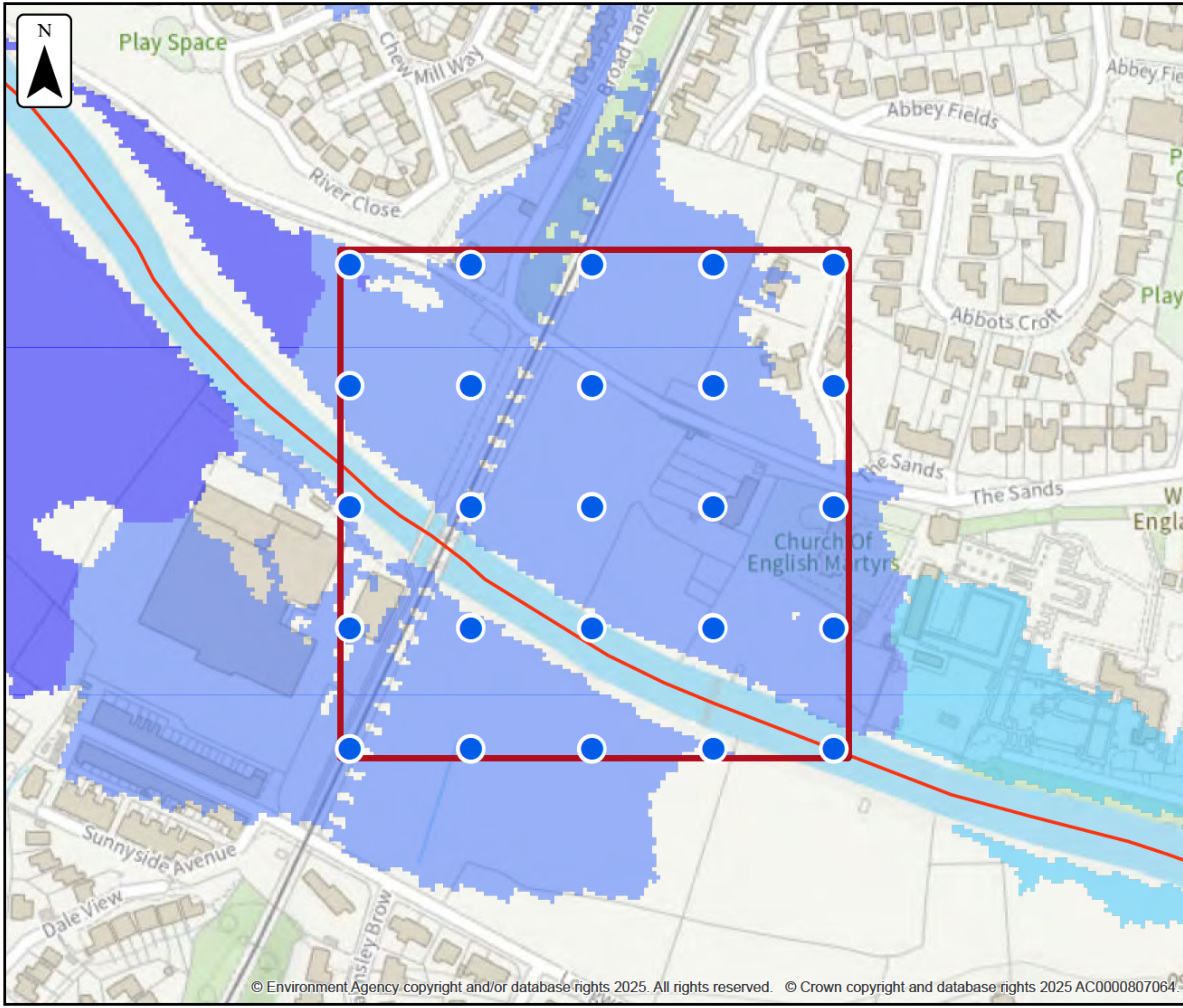
'Max value in selected area' is the deepest depth or highest height at any location within your drawn boundary.



Environment Agency

Defences removed climate change modelled fluvial extent and height

Location (easting/northing)
372856/436134

Scale
1:2,500

Created
8 Jul 2025

Model name
Whalley 2017

Selected area

Main river

Modelled 2D grid
Water level in mAOD

- 43 - 43.75
- 43.75 - 44.5
- 44.5 - 45.25
- 45.25 - 46.0
- 46.0 - 46.75
- 46.75 - 47.5
- 47.5 - 48.25
- 48.25 - 49.0
- 49.0 - 49.75

This map shows the 1% AEP +15% height data

0 25 50 75 100
metres

Sample point data

Defences removed climate change

Label	Easting	Northing	1% AEP (+15%)	1% AEP (+15%)
			Height	Depth
1	372736	436015	44.17	0.99
2	372795	436015	44.18	1.18
3	372854	436015	44.18	0.44
4	372913	436015	44.21	0.07
5	372972	436015	NoData	NoData
6	372736	436074	44.12	0.02
7	372795	436074	44.15	0.76
8	372854	436074	NoData	NoData
9	372913	436074	44.20	0.45
10	372972	436074	44.37	0.25
11	372736	436133	NoData	NoData
12	372795	436133	44.13	0.64

Label	Easting	Northing	1% AEP (+15%)	1% AEP (+15%)
			Height	Depth
13	372854	436133	44.15	1.37
14	372913	436133	44.16	0.99
15	372972	436133	44.17	0.42
16	372736	436192	43.84	0.75
17	372795	436192	44.04	1.07
18	372854	436192	44.13	1.31
19	372913	436192	44.14	0.51
20	372972	436192	NoData	NoData
21	372736	436251	43.75	0.71
22	372795	436251	44.07	0.50
23	372854	436251	44.14	0.48
24	372913	436251	44.14	0.73

Label	Easting	Northing	1% AEP (+15%)	1% AEP (+15%)
			Height	Depth
25	372972	436251	NoData	NoData
Max value in selected area:			44.46	1.74

Data in this table comes from the Whalley 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.

Strategic flood risk assessments

We recommend that you check the relevant local authority's strategic flood risk assessment (SFRA) as part of your work to prepare a site specific flood risk assessment.

This should give you information about:

- the potential impacts of climate change in this catchment
- areas defined as functional floodplain
- flooding from other sources, such as surface water, ground water and reservoirs

Your Lead Local Flood Authority is Lancashire County.

About this data

This data has been generated by strategic scale flood models and is not intended for use at the individual property scale. If you're intending to use this data as part of a flood risk assessment, please include an appropriate modelling tolerance as part of your assessment. The Environment Agency regularly updates its modelling. We recommend that you check the data provided is the most recent, before submitting your flood risk assessment.

Flood risk activity permits

Under the Environmental Permitting (England and Wales) Regulations 2016 some developments may require an environmental permit for flood risk activities from the Environment Agency. This includes any permanent or temporary works that are in, over, under, or nearby a designated main river or flood defence structure.

Find out more about flood risk activity permits

Help and advice

Contact the Cumbria and Lancashire Environment Agency team at inforequests.cmblnc@environment-agency.gov.uk for:

- more information about getting a product 5, 6, 7 or 8
- general help and advice about the site you're requesting data for