

Flood Risk Assessment
AEG9174_WF12_Kirklees_01

Site Address: 3, 5 and 7 Mill Street East
Kirklees
WF12 9AQ

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UK Experts in Flood Modelling, Flood Risk Assessments, and Surface Water Drainage Strategies

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Document Issue Record

Project: Flood Risk Assessment

Prepared for: Adrian Rose

Reference: AEG9174_WF12_Kirklees_01

Site Location: 3, 5 and 7 Mill Street East, Kirklees, WF12 9AQ

Issue	Date	Author	Check	Auth.	Comments
1	04/11/2025	Abbie Betts	DC	NB	First issue

Please Note:

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Summary

Development Description	Existing	Proposed
Development Type	Garage, storage areas, vacant terraced properties.	Change of use to Childrens home.
EA Vulnerability Classification	Less Vulnerable	More Vulnerable.
Ground Floor Level	Approximately 38.3m AOD (metres Above Ordnance Datum) in the west and 36.7mAOD in the east.	The proposed development is a change of use, with no change in the building footprint or ground floor levels.
Level of Sleeping Accommodation	N/A[1]	The site is located outside of the 1% annual exceedance probability (AEP) fluvial flood extent, including allowances for climate change. The building footprint is entirely situated above the 1% AEP + climate change flood level, including the sleeping accommodation situation on the first floor.
Surface Water Drainage	N/A[1]	Small scale SuDS are recommended such as rainwater harvesting butts and SuDS planters retrofitted to existing rainwater downpipes, to provide a betterment over existing rates.
Site Size	Approximately 4770m^2	No change
Development Size	Approximately 290m^2	No change
Risk to Development	**Summary**	**Comment**
EA Flood Zone	Flood Zone 2	The site lies within Flood Zone 2, representing a medium probability of fluvial flooding. Environment Agency modelling shows the site is above the 1% AEP (1 in 100-year) + 20% climate change design flood level, with only residual, low-likelihood flooding possible during extreme 0.1% AEP events. Mitigation measures are recommended in Section 5.
Flood Source	Fluvial	
SFRA Available	Calder Catchment Strategic Flood Risk Assessment - Volume I (Calder Catchment Area, 2016) and Calder Catchment Strategic	

	Flood Risk Assessment - Volume II Kirklees Council (Kirklees Council, 2016)	
Management Measures	**Summary**	**Comment**
Ground floor level above extreme flood levels	No.	The site lies within the modelled 0.1% AEP flood extent. A range of mitigation measures have been suggested. These include the use of property flood resilience and resistance measures to, along with the provision of safe refuge at first-floor level, ensuring occupants can remain safe and dry during an extreme flood event.
Safe Access/Egress Route	Yes	Safe access and egress will be maintained during the design flood event. In the event of the extreme 0.1% AEP flood, safe refuge will be available at first-floor level, and a Flood Warning and Evacuation Plan will be prepared to ensure the safety of occupants.
Flood Resilient Design	Yes	Refer to Section 5.
Site Drainage Plan	N/A[1]	There will be no increase in building footprint or surface water runoff. Rainwater downpipes to be retained and runoff discharged as existing.
Flood Warning and Evacuation Plan	Yes	The site lies within the modelled 0.1% AEP flood extent, and a Flood Warning and Evacuation Plan is recommended to ensure the safety of occupants during such events.
Offsite Impacts	**Summary**	**Comment**
Displacement of floodwater	No	The proposed development is a change of use, with no change in the building footprint or ground floor levels.
Increase in surface run-off generation	N/A[1]	There will be no increase in building footprint or surface water runoff. Rainwater downpipes to be retained and runoff discharged as existing.
Impact on hydraulic performance of channels	N/A[1]	The proposed development is located approximately 86 m south of the River Calder.

[1] not required for this assessment

[2] data not available.

1. Introduction

1.1. Aegaea were commissioned by Rose Consulting to undertake a Flood Risk Assessment (FRA) to facilitate a planning application for the proposed development. This FRA has been prepared in accordance with the requirements set out in the National Planning Policy Framework (NPPF) and the associated Planning Practice Guidance.

1.2. This FRA is intended to support a full planning application and as such the level of detail included is commensurate and subject to the nature of the proposals.

Site Overview

1.3. The site of the proposed development is 3, 5, and 7 Mill Street East, Kirklees, WF12 9AQ (Figure 1). The existing site currently comprises of a garage, an associated storage yard, and a set of three vacant terraced houses currently used as storage buildings. It is understood that the proposed development comprises an application for the change of use of a storage building (B8) as a children's home for up to four children, with a manager/deputy and up to two carers staying overnight working on a rota basis (C2).

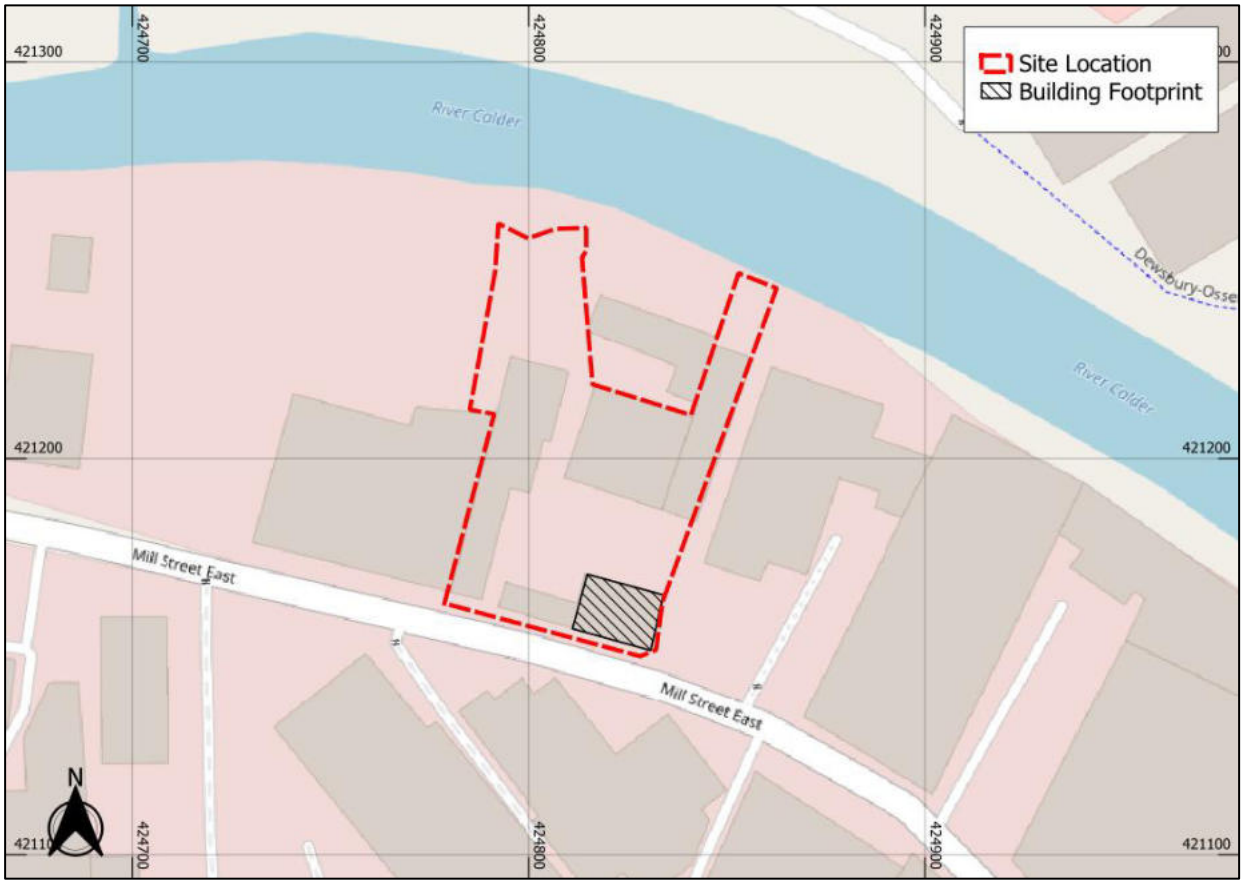

Figure 1: Site Location (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © https://www.openstreetmap.org and contributors)

1.4. In the absence of a topographical survey, Environment Agency Light Detection and Ranging (LiDAR) data Digital Terrain Model has been used to review the topography of the site. LiDAR data shows the ground elevation of the site varies between approximately 38.3m AOD (metres Above Ordnance Datum) in the north and 36.7m AOD in the south. Analysis of topographic levels indicates that the site generally slopes with a fall to the south (Figure 2). The ground floor of the building to be developed lies at approximately 37.3m AOD.

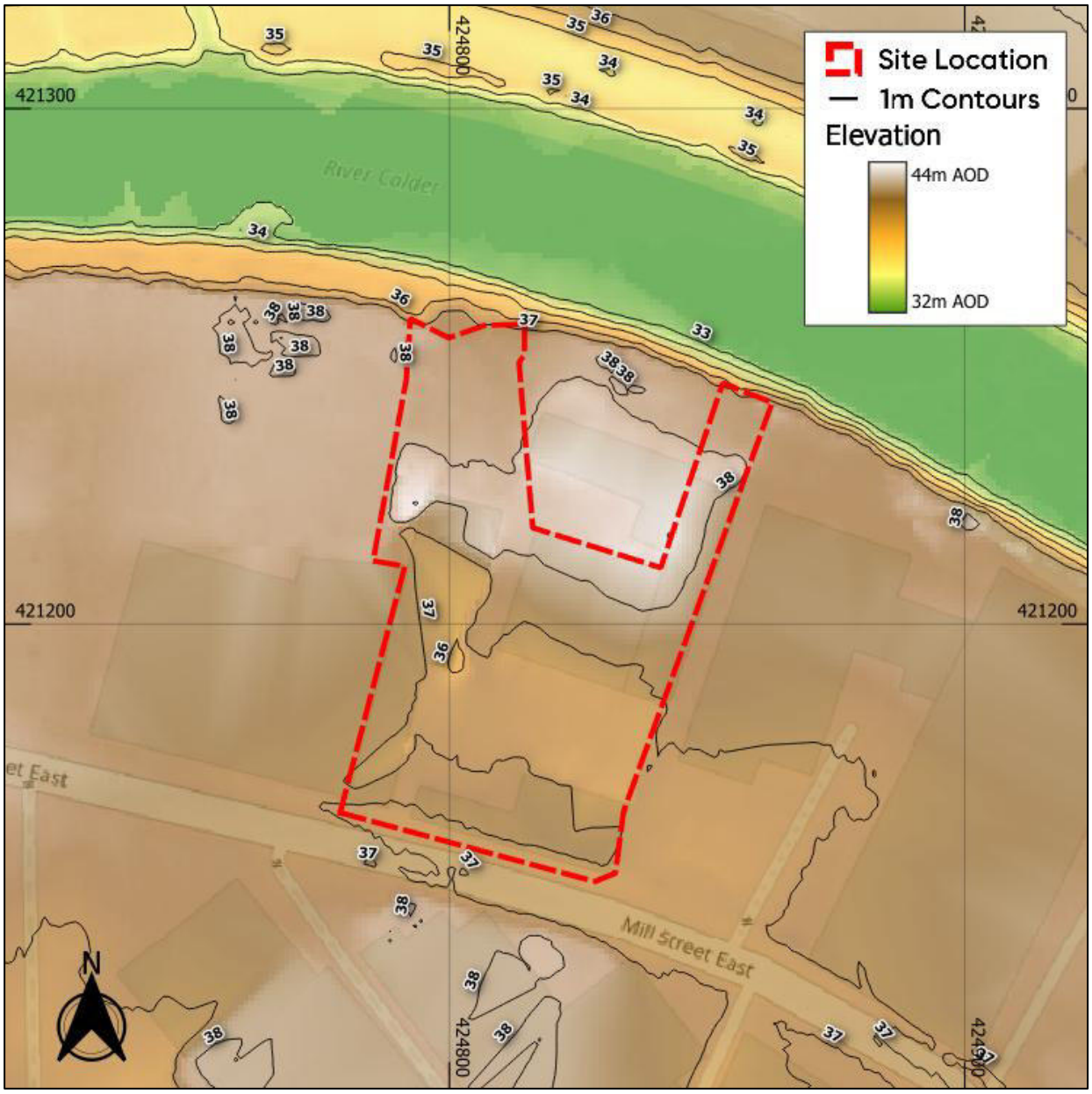

Figure 2: Site Topography (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © https://www.openstreetmap.org and contributors. Contains public sector information licensed under the Open Government Licence v3.0)

1.5. Kirklees Council is the Local Planning Authority (LPA) for the site and also the designated Lead Local Flood Authority (LLFA). The site sits within the Environment Agency's Yorkshire region.

Planning Policy and Guidance

1.6. UK government planning guidance states[1] that an FRA is required for developments which are:

- ***in flood zone 2*** *or 3 including minor development and* ***change of use***
- *more than 1 hectare (ha) in flood zone 1*
- *less than 1 ha in flood zone 1, including a change of use in development type to a more vulnerable class (for example from commercial to residential), where they could be affected by sources of flooding other than rivers and the sea (for example surface water drains, reservoirs)*
- *in an area within flood zone 1 which has critical drainage problems as notified by the Environment Agency*

1.7. The site lies within Flood Zone 2, as defined by the Environment Agency's Flood Map for Planning. The proposed development involves a change of use of the existing building to form residential accommodation, which is classified as a 'More Vulnerable' use under the Planning Practice Guidance (PPG).

1.8. In accordance with Paragraph 167 of the National Planning Policy Framework (NPPF, 2024) a site-specific Flood Risk Assessment (FRA) is therefore required to accompany the application, as the development involves a change of use to a more vulnerable classification within Flood Zone 2.

1.9. The objective of this FRA is to demonstrate that the proposals are acceptable in terms of flood risk. This report summarises the findings of the study and specifically addresses the following issues in the context of the current legislative regime:

- Fluvial/tidal flood risk
- Surface water flood risk
- Risk of flooding from other sources

1 https://www.gov.uk/guidance/flood-risk-assessment-for-planning-applications#when-you-need-an-assessment

2. Planning Policy

2.1. Inappropriate development in a flood risk area could pose significant risk in terms of personal safety and damage to property for the occupiers of the development or for people elsewhere. The approach taken in the assessment of flood risk at the planning stage is set out in national, regional, and local planning policy and associated guidance. This section summarises the key policies and guidance relevant to the proposed development.

National Planning Policy Framework (NPPF)

2.2. The National Planning Policy Framework[2] (NPPF) (MHCLG, 2024) which includes UK Government policy on development and flood risk states:

> *170. 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.*
>
> *176. Applications for some minor development and changes of use should also not be subject to the sequential test, nor the exception test [set out below], but should still meet the requirements for site-specific flood risk assessments set out in footnote 63.*
>
> *181. 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.*

2.3. Footnote 63 of the NPPF states:

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2 https://www.gov.uk/guidance/national-planning-policy-framework, last updated Dec 2024

A site-specific flood risk assessment should be provided for all development in Flood Zones 2 and 3. In Flood Zone 1, an assessment should accompany all proposals involving: sites of 1 hectare or more; land which has been identified by the Environment Agency as having critical drainage problems; land identified in a strategic flood risk assessment as being at increased flood risk in future; or land that may be subject to other sources of flooding, where its development would introduce a more vulnerable use.

2.4. Flood Zones in England are defined as follows:

Table 1: Flood Zone Definitions

Flood Zone	Definition
Zone 1 Low Probability	Land having less than 1 in 1,000 annual probability of river or sea flooding (all land outside Zones 2 and 3).
Zone 2 Medium Probability	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding.
Zone 3a High Probability	Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding.
Zone 3b The Functional Floodplain	This zone comprises land where water from rivers or the sea has to flow or be stored in times of flood. 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). Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map)

2.5. An FRA should be appropriate to the scale, nature, and location of the development. It should identify and assess the risk from all sources of flooding to and from the development and demonstrate how any flood risks will be managed over the lifetime of the development.

2.6. An assessment of hydrological impacts should be undertaken, including to surface water runoff and impacts to drainage networks in order to demonstrate how flood risk to others will be managed following development and taking climate change into account.

Local Plan

2.7. The Local Plan prepared by the Local Planning Authority, Kirklees Council, sets out the policies for development in the local area.

2.8. Policy LP27 Flood risk outlines the requirements for new development within the area. It states:

- *Proposals for development which require a Sequential Test in accordance with national planning guidance will need to demonstrate that development has been directed to areas at the lowest probability of flooding, following a sequential risk based approach.*
- *The whole Kirklees district should be the starting point for the sequential test with applicants required to provide justification where a smaller area of search is proposed. If following application of the sequential test, there are no reasonably available sites which could accommodate the development in zones with a lower probability of flooding, it should also be demonstrated that a sequential approach has been applied within sites.*
- *This is to ensure that highly vulnerable and more vulnerable uses are directed towards the areas of lowest flood risk within the site. Proposals will also need to demonstrate that the exception test is passed, where applicable, as set out in national planning policy.*
- *Proposals within flood zone 3ai will be assessed in accordance with national policies relating to flood zone 3a but with all of the following additional restrictions:*

a) no new highly vulnerable or more vulnerable uses will be permitted;

b) less vulnerable uses may only be permitted provided that the sequential test has been passed and;

c) where extensions are linked operationally to an existing business or,

d) where redevelopment of a site provides buildings with the same or a smaller footprint;

e) all proposals will be expected to include flood mitigation measures such as compensatory storage which should be identified and considered through a site specific Flood Risk Assessment;

f) development will not be permitted on any part of the site identified through a site specific Flood Risk Assessment as performing a functional floodplain role.

- *Proposals must be supported by an appropriate site specific Flood Risk Assessment in line with national planning policy. This must take account of all sources of flooding set out in the Strategic Flood Risk Assessment and demonstrate that the proposal will be safe throughout the lifetime of the development (taking account of climate change).*

- *The proposal must also not increase flood risk elsewhere and where possible should reduce flood risk.*
- *Mitigation measures, where necessary, should be proposed.*
- *Proposals involving building over existing culverts or the culverting or canalisation of water courses will not be permitted unless it can be demonstrated to be in the interests of public safety or to provide essential infrastructure and that there will be no detrimental effect on flood risk and biodiversity.*
- *Where feasible, development proposals should incorporate re-opening of culverts, modification of canalised water courses and consideration of mitigation measures to achieve a more natural and maintainable state.*
- *Proposals for natural management such as targeted vegetation planting in upper catchments and along river banks will be supported in appropriate locations where consistent with national and local plan policies and relevant water catchment management plans to reduce flood risk and improve water quality.*

Sequential and Exception Tests

2.9. The Sequential and Exception Tests are applied in specific cases defined by UK Government policy. Their purpose is to drive development to areas of low flood risk and to support developments which improve flood risk for developments in areas at risk of flooding.

2.10. Paragraph 176 of the National Planning Policy Framework (2024) states that minor development and changes of use (other than to caravan, camping, or park-home sites) should not normally be subject to the Sequential or Exception Tests, but must still be supported by a site-specific Flood Risk Assessment (FRA) demonstrating that the development will be safe for its lifetime and will not increase flood risk elsewhere.

2.11. The proposal involves a change of use from B8 (Storage and Distribution) to C2 (Children's Home) within an existing building. No increase in footprint, land-raising, or external works is proposed. The site lies within Flood Zone 2 but outside the 1 % AEP (1-in-100-year) + 20 % climate-change flood extent, as confirmed by Environment Agency model data.

2.12. In line with paragraph 176, the proposal constitutes a change of use and therefore does not require either the Sequential or Exception Tests, provided that the accompanying FRA demonstrates that the development will remain safe for its lifetime and will not increase flood risk elsewhere.

Summary

2.13. This flood risk assessment has been prepared with due consideration to the above local and national policy.

3. Consultation and Review

Consultation

3.1. The Environment Agency have provided the Product 4 (P4) data for the 2015 Batley Beck Mapping Study, 2015 Calder and Canals Study, 2011 River Calder Study, and the 2018 Chickenley Beck Model.

3.2. Correspondence is included within Appendix B.

Documents and Online Mapping

3.3. Local Governments and Lead Local Flood Authorities provide documents which contain data and policies on flood risk and new development in their areas. These documents are introduced and briefly summarised below. For the purposes of this FRA, these documents have been reviewed for relevant information and any relevant data is discussed within the appropriate sub heading of this report.

3.4. The following sources of information have been reviewed for this assessment:

- Flood Map for Planning on the Environment Agency website *https://flood-map-for-planning.service.gov.uk/*
- Long Term Flood Risk Information on the Environment Agency website *https://www.gov.uk/check-long-term-flood-risk*
- National Planning Policy Framework (NPPF) (Ministry of Housing, Communities and Local Government, 2024)
- Planning Practice Guidance - Flood Risk and Coastal Change (Ministry of Housing, Communities and Local Government, 2022)
- Geoindex Onshore (British Geological Survey, 2024)
- Kirklees Local Plan (Kirklees Council, 2019) [3]
- Preliminary Flood Risk Assessment (Kirklees Council, 2011) [4]
- Calder Catchment Strategic Flood Risk Assessment - Volume I (Calder Catchment Area, 2016) [5] and Calder Catchment Strategic Flood Risk Assessment - Volume II Kirklees Council (Kirklees Council, 2016) [6]
- Leeds City Council Strategic Flood Risk Assessment. (Leeds City Council, 2022) [7]

3 https://www.kirklees.gov.uk/beta/planning-policy/pdf/local-plan-strategy-and-policies.pdf
4 https://www.kirklees.gov.uk/beta/flooding-and-drainage/pdf/PreliminaryFloodRisk.pdf
5 https://www.kirklees.gov.uk/beta/planning-policy/pdf/flood-risk/strategic-flood-risk-assessment-1.pdf
6 https://www.kirklees.gov.uk/beta/planning-policy/pdf/flood-risk/strategic-flood-risk-assessment-2.pdf
7 https://www.leeds.gov.uk/docs/Local%20Plan%20Update/Local%20Plan%20Update%20-%20SFRA%202022.pdf

- Local Flood Risk Management Strategy (Kirklees Council, 2013) [8]

Preliminary Flood Risk Assessment (PFRA)

3.5. The PFRA, published in 2011, is a high-level appraisal of flood risk across Lead Local Flood Authority Kirklees Council. The flood risk from all sources, including fluvial, surface water, groundwater, and surcharged sewers is evaluated. It is the basis upon which the Local Flood Risk Management Strategy is produced.

3.6. The PFRA summarises historical flood incidents in Kirklees Council. The site is not recorded as having been affected by any flood event.

Strategic Flood Risk Assessment (SFRA)

3.7. The SFRA, published in 2016 and 2016, provides the evidence base for the Local Planning Authority Kirklees Council Local Plan and guidance for consideration when determining planning applications. The SFRA seeks to place new development into areas of lower flood risk taking into account current flood risk, future flood risk, and the effect a proposed development would have on the risk of flooding.

3.8. The SFRA mapping provided by Kirklees Council has been used throughout production of this report as a source of information, particularly pertaining to historical flood incidents.

Local Flood Risk Management Strategy (LFRMS)

3.9. The Local Flood Risk Management Strategy sets out roles and responsibilities for flood risk management, assesses the risk of flooding in the area, where funding can be found to manage flood risk, and the policies, objectives, and actions of the Lead Local Flood Authority.

3.10. The Kirklees Council LFRMS is used within this report to identify any flood management infrastructure and historical incidences of flooding.

8 https://www.kirklees.gov.uk/beta/flooding-and-drainage/pdf/local-flood-risk-management-full-strategy.pdf

4. Sources of Flood Risk

Fluvial

4.1. The EA's Flood Map for Planning identifies areas at risk of flooding from both fluvial (river) and tidal (coastal) sources. Flooding from watercourses arises when flows exceed the capacity of the channel, or where a restrictive structure is encountered, resulting in water overtopping the banks into the floodplain.

Main Rivers and Ordinary Watercourses

4.2. The site is located in close proximity to three main rivers. The site is approximately 5m south of the River Calder, however the proposed development is approximately 86m south of the river.

4.3. The site is also 110m south-east of the Batley Beck, which forms a confluence with the River Calder. The site is also located approximately 985m west of the Chickenly Beck.

4.4. There are no Ordinary Watercourses located within the vicinity of the site.

EA Flood Map for Planning

4.5. According to the EA's Flood Map for Planning, the site is located within Flood Zone 2. Flood Zone 2 denotes a risk of flooding from fluvial sources between a 1 in 100 (1%) and 1 in 1000 (0.1%) annual probability. An area of Flood Zone 3 is located directly north of the site boundary, however this is restricted to the river channel. Flood Zone 3 denotes a risk of flooding from fluvial sources with a 1 in 100 (1%) annual probability or greater.

4.6. According to the EA's Flood Zones plus Climate Change Allowance Extents dataset, the modelled climate change flood zones do not encroach any further towards the site, indicating that future fluvial flood risk to the site is not expected to increase under projected climate change conditions.

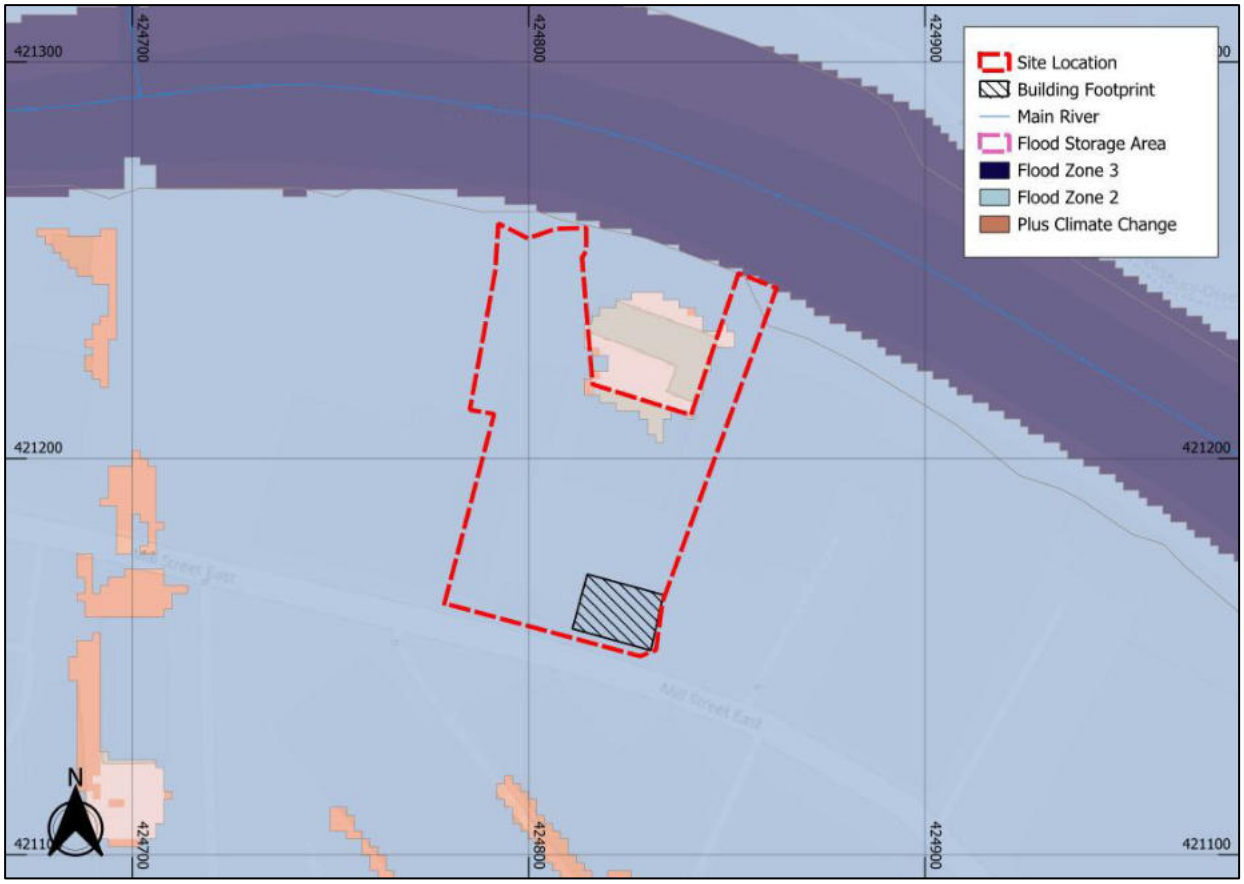


Figure 3: EA Flood Map for Planning (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © https://www.openstreetmap.org and contributors. Contains public sector information licensed under the Open Government Licence v3.0)

Historical Fluvial Flooding

4.7. There is no record of historical fluvial flooding across the majority of the site. According to the EA Recorded Flood Outlines dataset, a small area in the northern part of the site lies within the extent of a historic flood event that occurred in 2015, when the River Calder exceeded its channel capacity before the installation of raised flood defences.

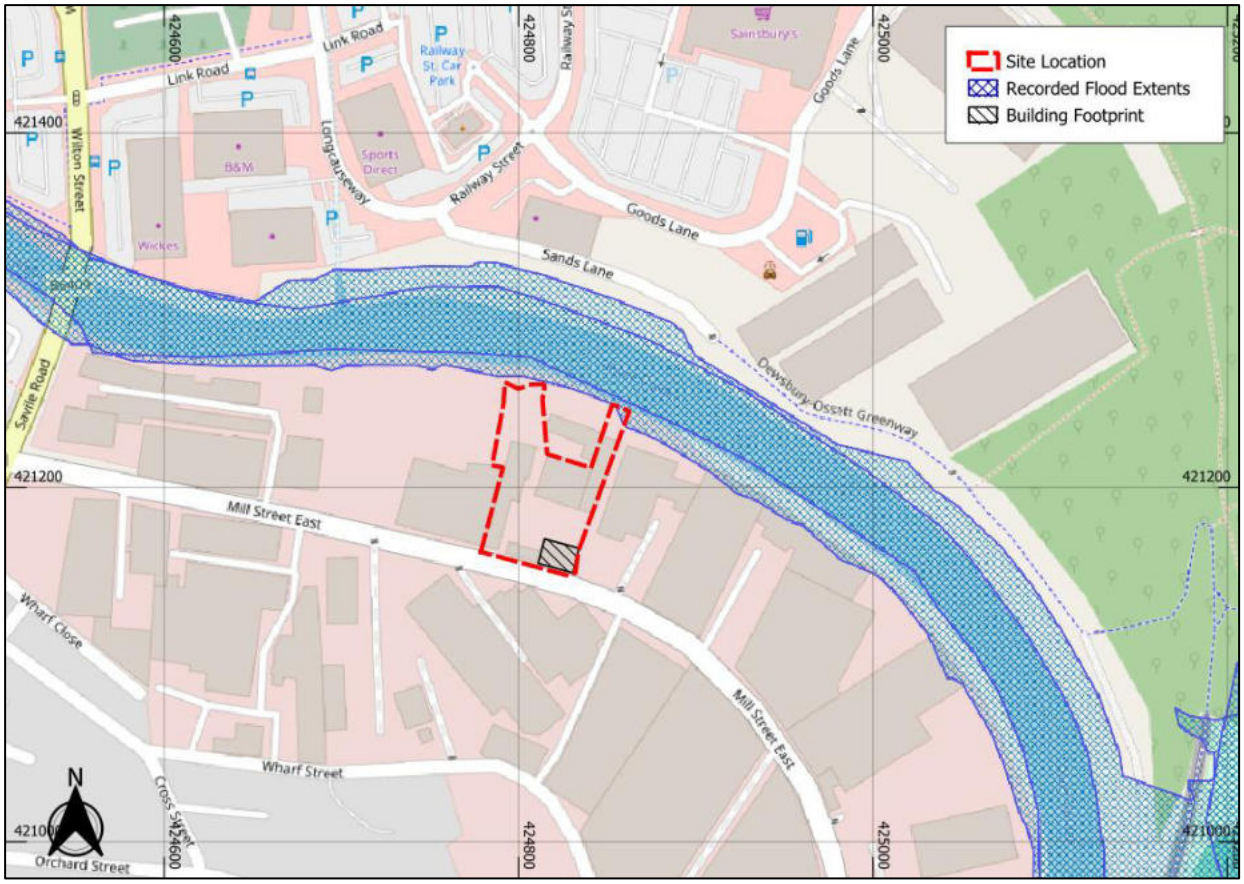


Figure 4: EA Historic Flood Mapping (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © https://www.openstreetmap.org and contributors. Contains public sector information licensed under the Open Government Licence v3.0)

EA Product Data

4.8. The EA has provided outputs from four key modelling studies to assess the fluvial flood risk to the site and the proposed development. The models used are the 2015 Batley Beck Mapping Study, the 2015 River Calder and Canals Study, the 2011 River Calder Modelling Study and the 2018 Chickenley Beck Model.

4.9. The studies incorporate a range of scenarios to illustrate flood risk under current and future climate conditions, both with and without the protection offered by existing flood defences.

2015 Batley Beck Mapping Study

4.10. This model provides present day and climate change defended and undefended modelled scenarios for the Batley Beck.

2015 Calder and Canals - downstream of Sowerby Bridge

4.11. This model includes three scenarios that consider the effect of the river/canal system In the area: present day undefended and defended, and climate change defended modelled scenarios.

2011 River Calder - Calder

4.12. This older model, only models the worst-case (undefended) scenarios for the River Calder: present day and climate change undefended scenarios.

2018 Chickenley Beck Model

4.13. This model, dated 1 November 2018, focuses on the risk from Chickenley Beck and includes the present day and climate change undefended modelled scenarios.

4.14. The studies incorporate a range of scenarios including defended and undefended conditions for both fluvial present-day and climate change scenarios. The climate change scenarios include various climate change allowances (such as +20%, +30%, and +50% to the 1% AEP event).

4.15. The Environment Agency's peak river flow data for the Aire and Calder Management Catchment indicates a central allowance of 23%. The EA model only includes the 1 in 100-year event plus a 20% climate change allowance, which has therefore been used as the most appropriate scenario to represent potential peak river flows.

Batley Beck Mapping Study

Present Day Analysis (Defended)

4.16. Based on the Batley Beck modelling study (2015), the site is located outside of all modelled present-day flood extents (Figure 5). Based on the Environment Agency's flood extent mapping, the far north of the wider site may be affected during the 0.1% (1 in 1,000-year) flood event, however, the proposed building is located outside of these flood extents.

4.17. Mill Street East, which provides access and egress for the site is also located outside of all modelled present day flood events.

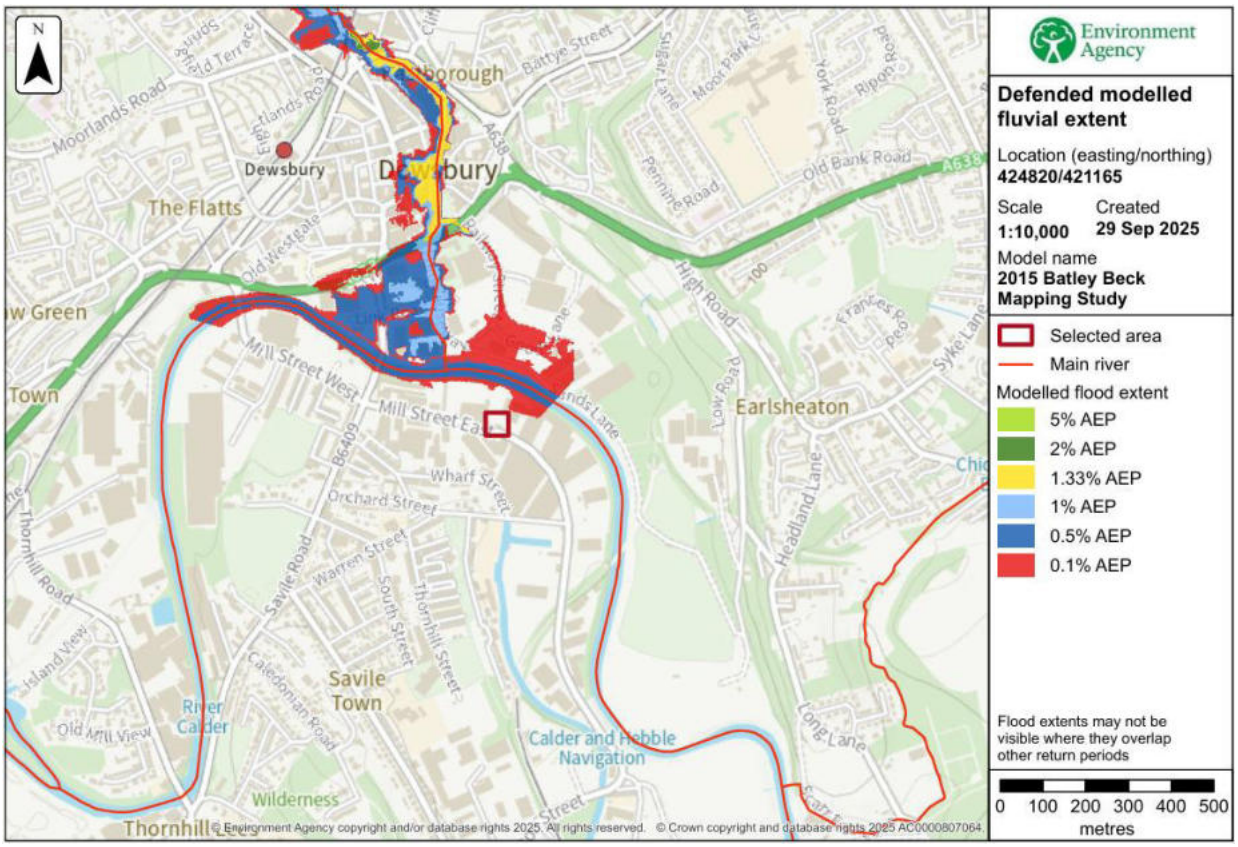


Figure 5: Present day flood extents from the 2015 Batley Beck Study.

Climate Change Analysis (Defended)

4.18. Based on the Batley Beck modelling study (2015), the climate change 1% (1 in 100-year) plus 20% allowance flood extent has been reviewed to assess the potential impact of climate change on flood risk at the site.

4.19. The results indicate that the site and the building footprint is located outside of the modelled flood extent for this scenario, suggesting that the proposed development is not at risk of fluvial flooding under the 1% plus 20% climate change conditions (Figure 6).

4.20. Mill Street East, which provides access and egress for the site is also located outside of all modelled climate change flood events.

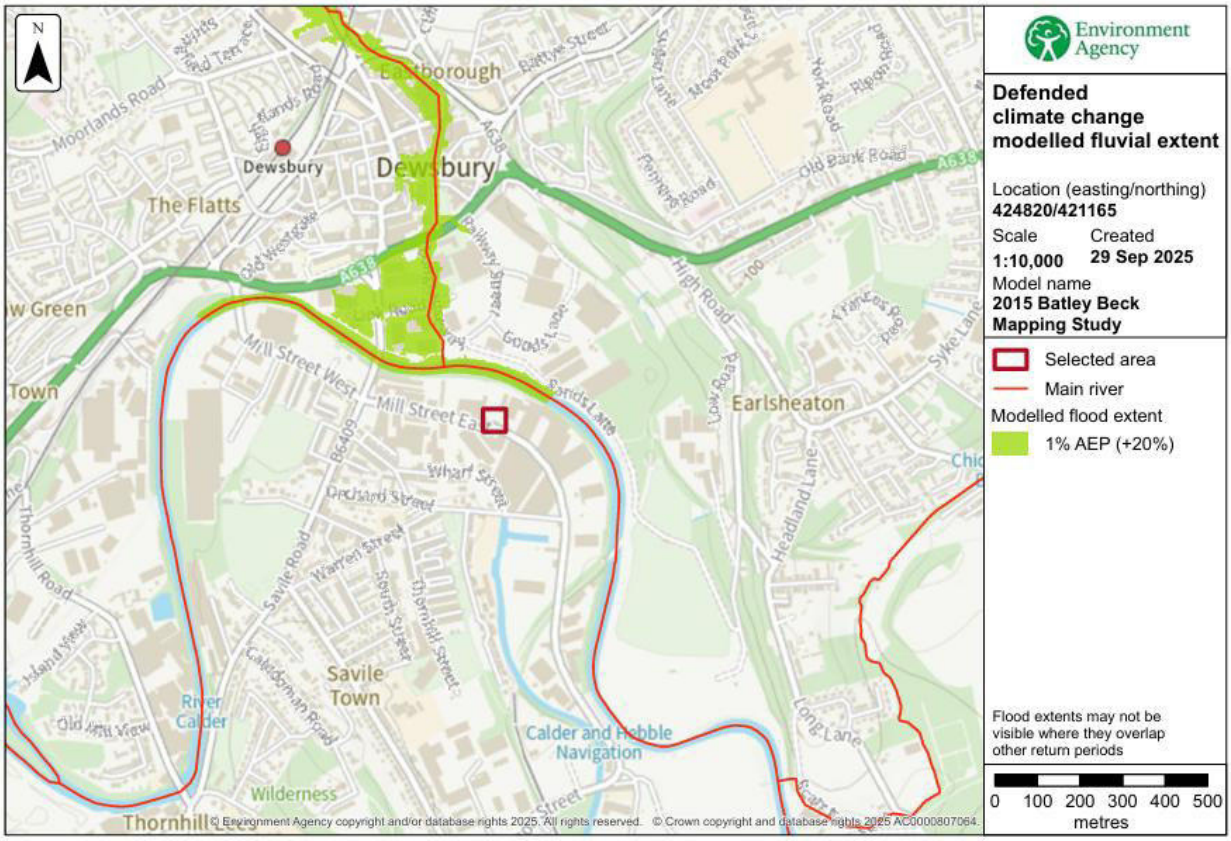


Figure 6: Climate change (1% + 20% CC) flood extents from the 2015 Batley Beck Study.

Calder and Canals Modelling Study (2015)

Present day Analysis

4.21. Based on the Calder and Canals Modelling Study (2015), the site is located outside of all modelled defended flood extents up to and including the 0.5% AEP (1 in 200 year) flood event (Figure 7). However, the model indicates that the site may be affected during the defended 0.1% AEP (1 in 1,000-year) flood events.

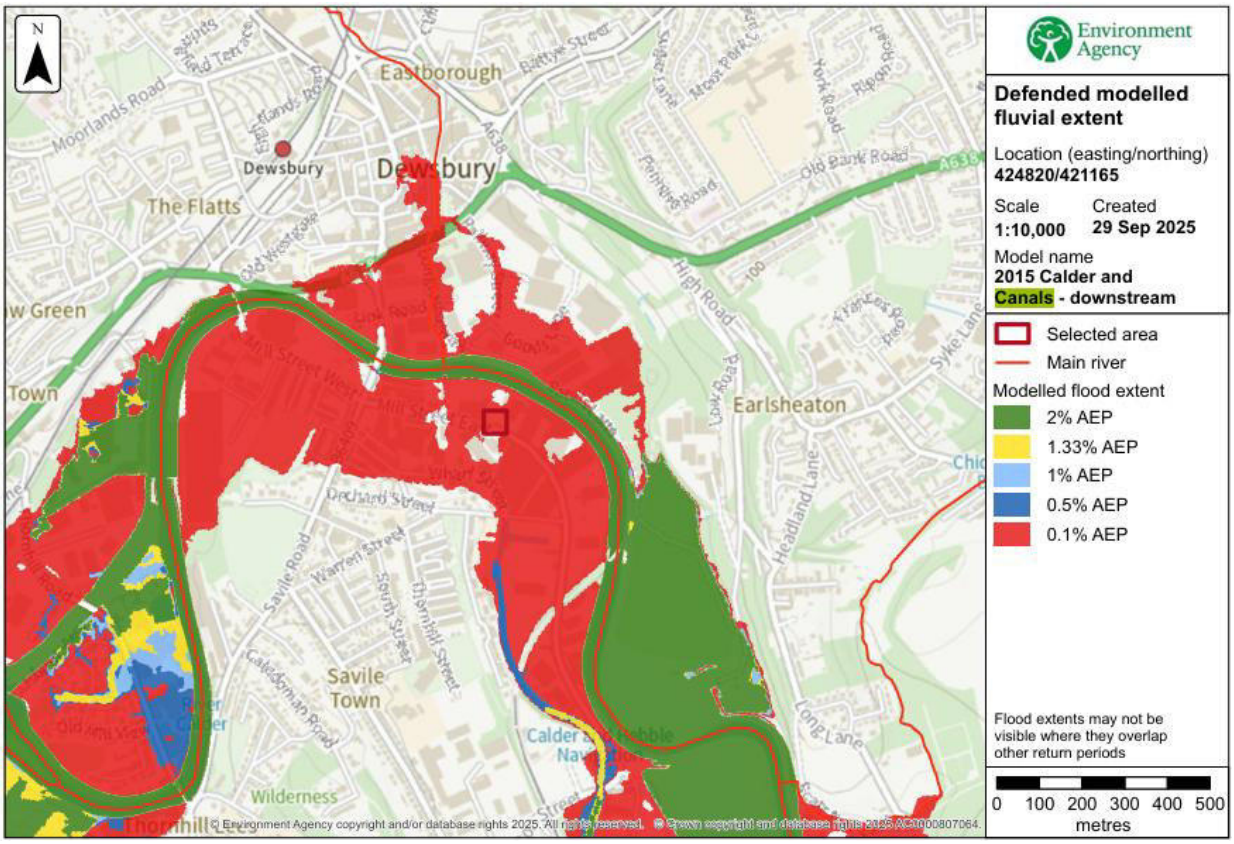


Figure 7: Present day defended flood extents from the 2015 Calder and Canals Study

4.22. Based on the modelled node location data for node 1129800, the predicted flood level for the extreme 1000 year event is 37.59 mAOD (Table 3). Given a minimum on-site level of 36.70 mAOD, this would equate to a potential flood depth on site of approximately 0.89m**.**

4.23. Based on Google Street View imagery (accessed 04/11/2025), the entrances to the building proposed for conversion are raised approximately 0.56 metres above surrounding ground level, meaning that the ground floor level of the building is approximately 37.3m AOD. Therefore, the building footprint could experience flood depths of approximately 0.29m AOD.

Table 2: Calder and Canals Modelling Study Defended Flood Levels

	Modelled Scenarios (Defended) Flood Level (m AOD)				
Node Ref	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
Node 1129800 (Location 8)	No flooding	No flooding	No flooding	No flooding	37.59

4.24. In the undefended present-day scenario, the site is expected to be affected during the 0.1% AEP (1 in 1,000-year) flood event (Figure 8).

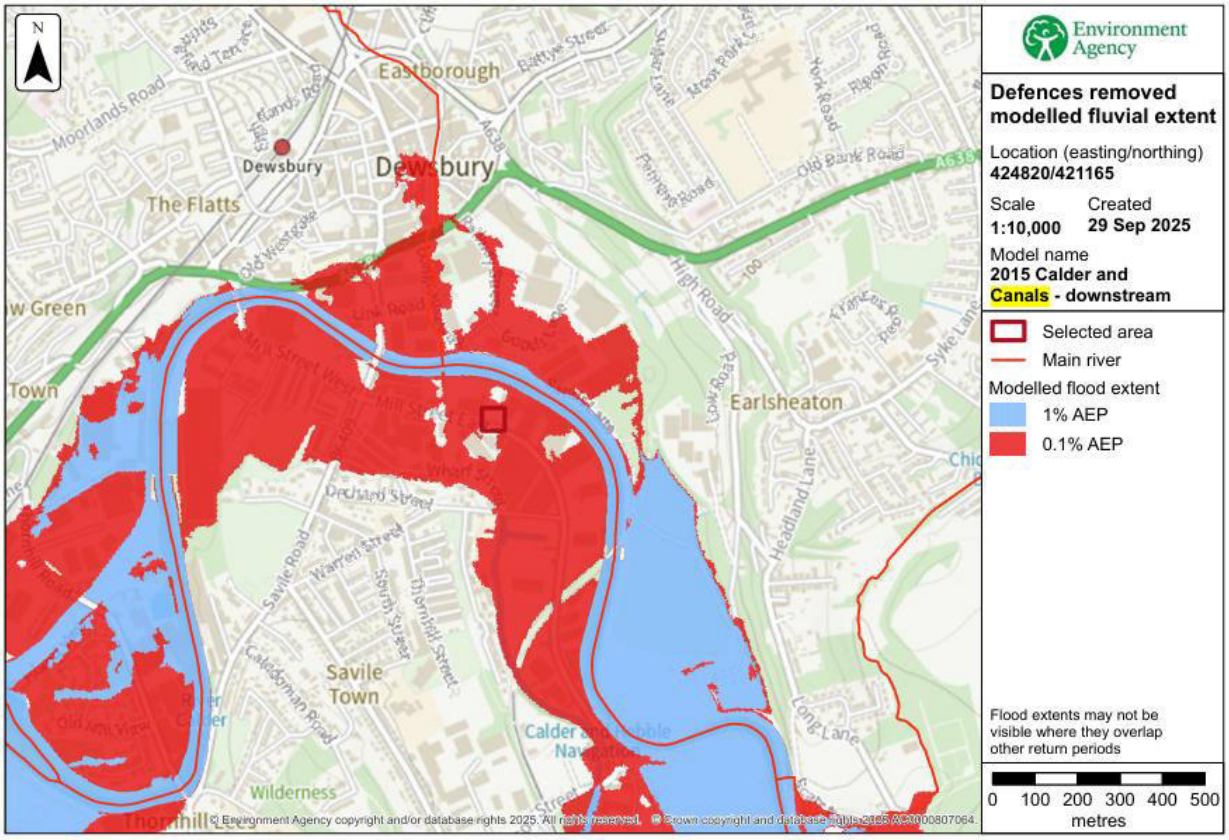


Figure 8: Present day undefended flood extents from the 2015 Calder and Canals Study

4.25. Based on the modelled node location data for node 1129800 indicates a predicted flood level of 37.59 mAOD (Table 4), resulting in flood depths of approximately 0.88 m on site. However, as the ground level of the proposed building sits at approximately 37.3m AOD, predicted flood depths within the building footprint are approximately 0.28m.

Table 3: Calder and Canals Modelling Study Undefended Flood Levels

	Modelled Scenarios (Undefended) Flood Level (m AOD)				
Node Ref	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
Node 1129800 (Location 8)	No flooding	No flooding	No flooding	No flooding	37.58

4.26. This 0.1% AEP (1 in 1,000-year) scenario represents a residual event, which is a very low-likelihood flood that could occur in exceptional circumstances, such as an event exceeding the design capacity of existing defences or their partial failure. The probability of such an event occurring is extremely low, and therefore this scenario is considered a residual risk rather than a design event.

4.27. It is noted that Mill Street East, which provides access and egress for the site is also located within the defended and undefended modelled 0.1% AEP flood event.

Climate Change Analysis

4.28. Based on the defended climate change fluvial flood extents from the Calder and Canals Modelling Study (2015), the site is located outside of the modelled 1% AEP (1 in 100-year) plus 20% climate change flood extent. The modelled node location data for node 1129800 indicates a maximum predicted flood level of 36.15 mAOD, which is below the minimum on-site level of 36.70m AOD and the ground floor level of 37.30m AOD.

4.29. This confirms that the site is not expected to be impacted by fluvial flooding during the defended 1% + 20% climate change event (Figure 9).

4.30. Mill Street East is also located outside of the climate change flood extent.

4.31.

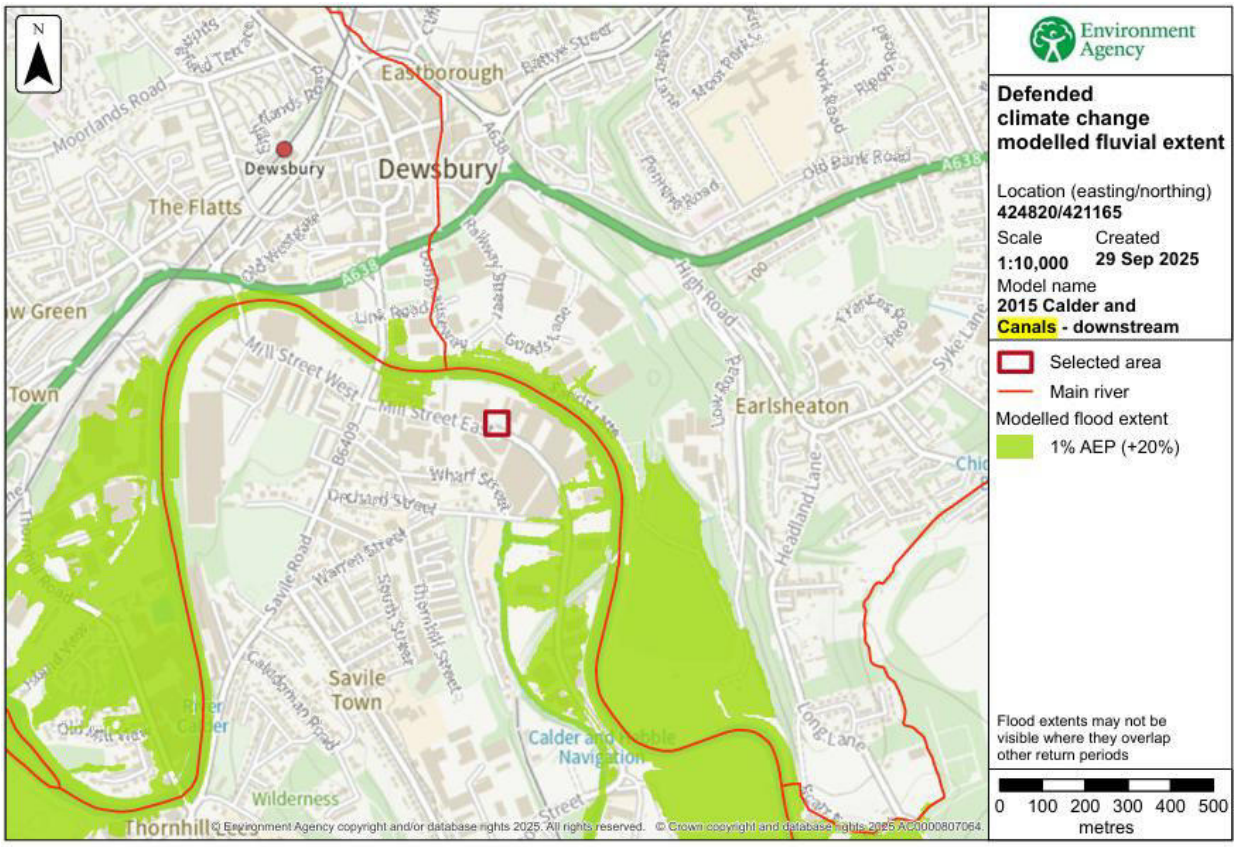


Figure 9: Climate change defended flood extents from the 2015 Calder and Canals Study

River Calder Modelling Study (2011)

Present Day Analysis (Undefended)

4.32. The River Calder Modelling Study is comprised of undefended scenarios only, which is not considered representative of the actual risk to the site.

4.33. Based on the River Calder Modelling Study (2011), the site is located within the modelled flood extents from the 2% AEP (1 in 50-year) event onwards, as shown in Figure 10.

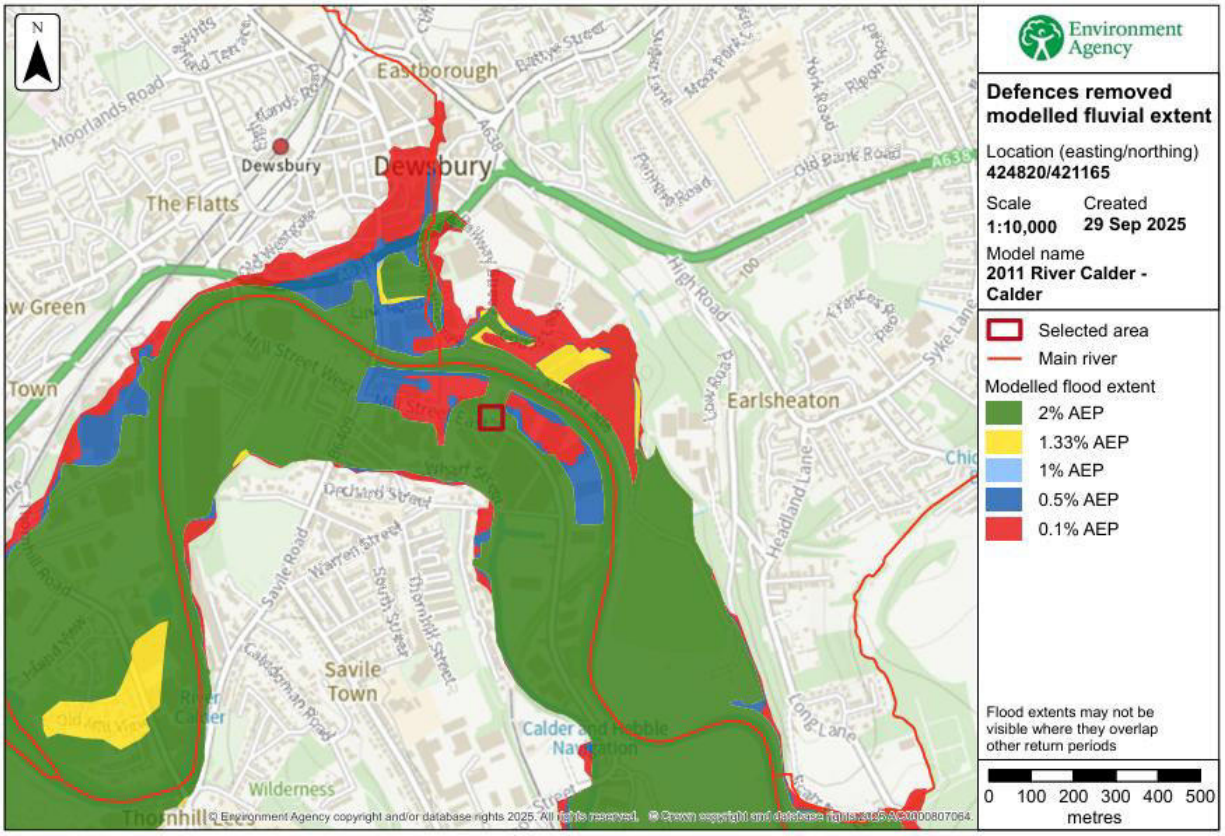


Figure 10: Present day undefended flood extents from the 2011 River Calder Modelling Study

4.34. Modelled node location data for node 1129800 indicates that the site is impacted during the 2% AEP, 1.33% AEP, 1% AEP, 0.5% AEP, and 0.1% AEP events. Mill Street East is also located within these modelled flood events.

4.35. However, as the ground level of the building footprint sits at approximately 37.3m AOD, the building is only expected to be impacted by flooding in the 0.1% AEP event, with predicted depths of approximately 0.52m.

Table 4: River Calder Modelling Study Undefended Flood Levels

	Modelled Scenarios (Undefended) Flood Level (m AOD)				
Node Ref	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
Node 1129800 (Location 8)	36.75	36.83	36.88	37.0	37.82

4.36. It should be noted that these results are derived from undefended model scenarios, which assume that all local flood defences are removed. As such, they represent a residual, low-likelihood scenario that does not reflect the presence of existing defences. These outputs should therefore be viewed as a conservative indication of potential flood risk under extreme, unlikely conditions.

Climate Change Analysis (Undefended)

4.37. Based on the undefended climate change fluvial flood extents from the River Calder Modelling Study (2011), the site is located within the modelled extents for the 1% AEP (1 in 100-year) plus 20% climate change event (Figure 11). Mill Street East is also located within these modelled flood events.

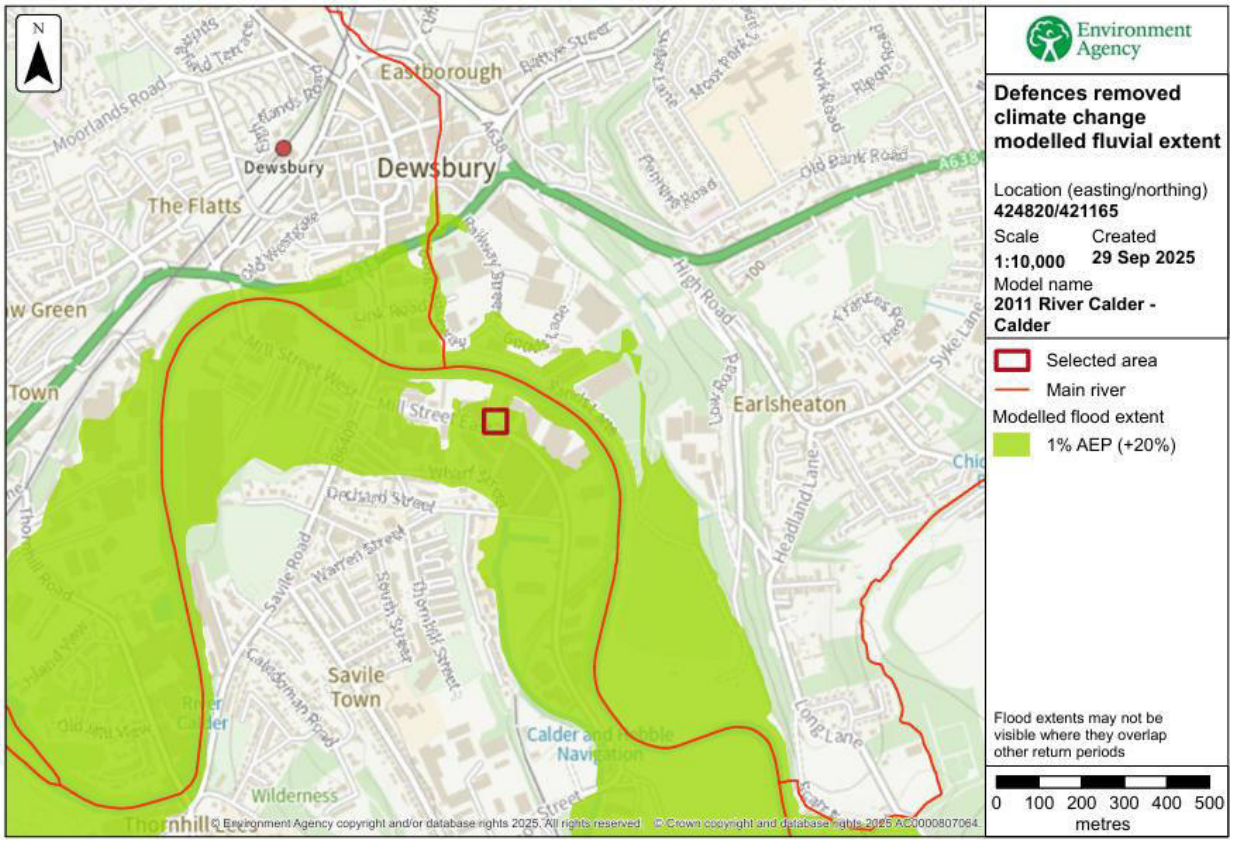


Figure 11: Climate change undefended flood extents from the 2011 River Calder Modelling Study

4.38. Modelled node location data for node 1129800 indicates a predicted flood level of 37.07 mAOD, which is below the minimum the ground floor level of 37.30m AOD of the proposed building.

4.39. Across the rest of the site, this corresponds to a potential flood depth of approximately 0.37m.

Chickenley Beck Model (2018)

4.40. Based on the undefended present-day fluvial flood extents from the Chickenley Beck Model (2018), the site and Mill Street East are located outside of all modelled flood extents up to and including the 0.1% AEP (1 in 1,000-year) event (Figure 12).

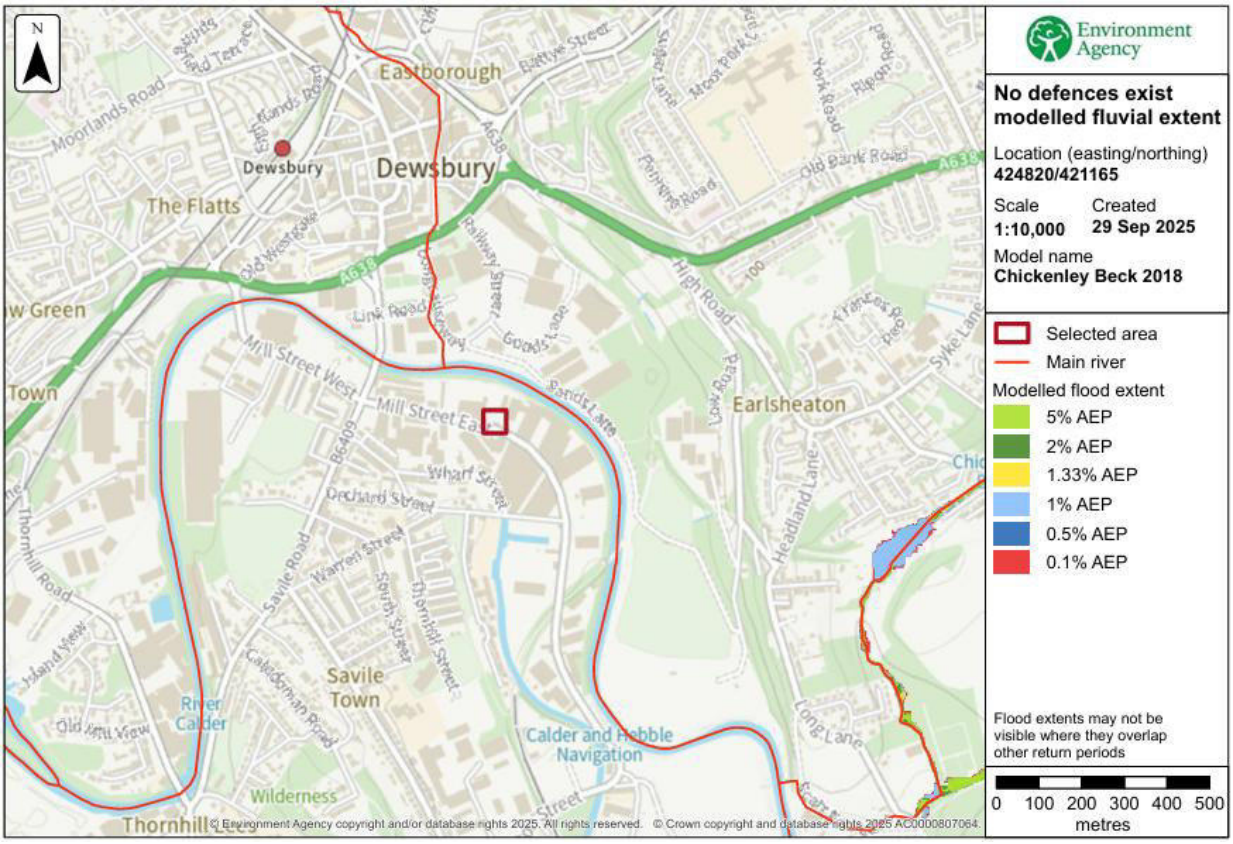


Figure 12: Present day undefended flood extents from the 2018 Chickenly Beck Model

4.41. Furthermore, review of the undefended climate change fluvial flood extents from the same model confirms that the site is located outside of all modelled climate change flood extents (Figure 13), indicating that Chickenley Beck does not pose a fluvial flood risk to the proposed development under either present-day or climate change conditions.

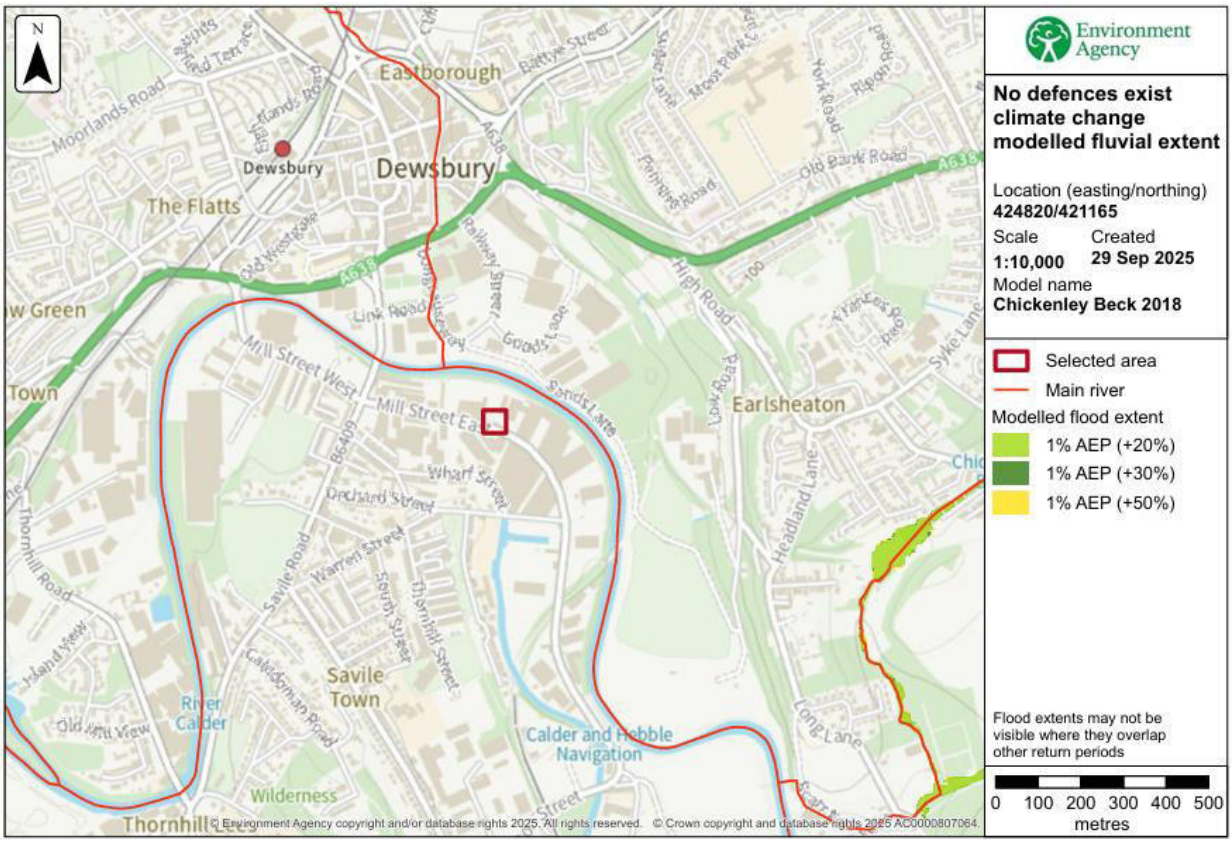


Figure 13: Climate change undefended flood extents from the 2011 River Calder Modelling Study

Fluvial Flood Risk Summary

4.42. The majority of the site is located in Flood Zone 2, according to the EA's Flood Map for Planning.

4.43. The Environment Agency has provided outputs from four key modelling studies to assess fluvial flood risk at the site: the 2015 *Batley Beck Mapping Study*, the 2015 *Calder and Canals Modelling Study*, the 2011 *River Calder Modelling Study*, and the 2018 *Chickenley Beck Model*. Together, these cover defended and undefended scenarios under both present-day and climate-change conditions.

4.44. The Batley Beck Mapping Study confirms that the site and proposed building lie outside all defended flood extents for both present-day and 1 % AEP + 20 % climate-change scenarios. Only the far north of the wider site is marginally affected during the 0.1 % (1 in 1000 year) event, however the proposed building lies clear of this area.

4.45. The Calder and Canals Study indicates that the site remains dry in all defended events up to the 0.5 % AEP (1 in 200 year) scenario. Flooding is only modelled in the defended 0.1 % AEP event, with a predicted flood level of 37.59 m AOD (node 1129800). Given the lowest site level of 36.70 m AOD and the ground-floor level of 37.30 m AOD, this equates to an estimated flood depth of 0.29 m at the building threshold during this very low-probability residual event.

4.46. Under the defended 1 % AEP + 20 % climate-change scenario, the predicted level (36.15 m AOD) is below both ground and floor levels, confirming no flooding to the building or access routes.

4.47. The River Calder Modelling Study (undefended) represents a conservative worst-case. It indicates potential flooding from the 2 % AEP event onward, with depths up to 0.52m in the extreme 0.1 % AEP scenario. As these results assume total absence of flood defences, they represent a residual, low-likelihood scenario.

4.48. The Chickenley Beck Model (2018) confirms the site and Mill Street East are outside all modelled flood extents for both present-day and climate-change scenarios, indicating no fluvial influence from Chickenley Beck.

4.49. Across all studies, flooding occurs in residual undefended or 0.1 % AEP (1 in 1 000-year) events, which have an extremely low probability of occurrence.

4.50. Accordingly, based on the design event (1 % AEP + 20 % climate-change) from the Batley Beck Mapping Study, the site and proposed building are located outside the modelled fluvial flood extent.

4.51. Fluvial flood risk to the development is therefore considered to be low.

Tidal

4.52. Tidal flooding occurs when a high tide and high winds combine to elevate sea levels. An area behind coastal flood defences can still flood if waves overtop the defences or break through them. Tidal flooding can also occur a long way from the coast by raising river levels. Water may overtop the river bank or river defences when tide levels are high. The site is a significant distance from any tidal source and above the anticipated extreme tidal levels, even when considering the impacts of climate change. The risk of flooding from tidal sources is low.

4.53. The site is located approximately 90km inland and lies at a minimum elevation of approximately 36.7m AOD. Therefore, the site is outside of anticipated extreme tidal levels, even when considering the impacts of climate change.

4.54. As such, the risk of tidal flooding to the site is low.

Canals

4.55. The Calder and Canals Modelling Study (2015) likely represents both the river and canal network interactions, as suggested by the model title and supported by the Leeds City Council SFRA (2022), which notes that the study covers navigation and canalised reaches of the River Calder system.

4.56. Based on this, it is possible that canal flooding could occur in conjunction with fluvial flooding from the River Calder, and the site could therefore be affected during the defended 0.1% AEP (1 in 1,000-year) event (refer to the Fluvial Flood Risk section above).

4.57. It must be noted that the Canal & River Trust (CRT) is responsible for maintaining canal levels across England and generally regulates water levels using reservoirs, feeders, and boreholes, transferring water within the wider canal system as necessary. As a result, canal water levels are actively managed, and the likelihood of an uncontrolled flood event originating from the Calder and Hebble Navigation Canal is considered to be low. Furthermore, the 0.1% AEP event

represents a residual, very low-likelihood scenario that would only occur under extreme or exceptional conditions.

4.58. Based on the available evidence, including the defended modelling results and canal management arrangements, the overall risk of flooding to the site from canals is considered to be low.

Pluvial

4.59. Pluvial flooding can occur during prolonged or intense storm events when the infiltration potential of soils, or the capacity of drainage infrastructure is overwhelmed leading to the accumulation of surface water and the generation of overland flow routes.

4.60. The National Flood Risk Assessment (NaFRA2), published in January 2025, has updated the Risk of Flooding from Surface Water (RoFSW) products, which shows the chance of flooding from surface water to areas of land. The RoFSW products are an assessment of where surface water flooding may occur when rainwater does not drain away through normal drainage systems or soak into the ground but lies in or flows over the ground instead. It includes information about flooding extents and depths, including the potential impact of climate change on flood risk based on the latest UK climate projections (UKCP18).

4.61. Risk is displayed as one of three likelihood categories:

High - greater than or equal to 1 in 30 (3.3%) chance of flooding in any year.

Medium – Less than 1 in 30 (3.3%) but greater than or equal to 1 in 100 (1%) chance of flooding in any given year.

Low – Less than 1 in 100 (1%) but greater than or equal to 1 in 1000 (0.1%) chance of flooding in any given year. 4.20. T

Very Low - Less than 1 In 1000 (0.1%) chance of flooding In any given year.

The RoFSW depth mapping shows the annual chance of flooding (based on the three risk categories listed above) beyond a specific depth, for depths at the following intervals from 20cm to 120cm:

- 0.2m, 0.3m, 0.6m, 0.9m, 1.2m

Present Day Scenarios

4.62. Examination of the EA's of the Environment Agency's Flood Risk from Surface Water (RoFSW) mapping, indicates that the majority of the building footprint has a medium chance of flooding, with a small area of low chance in the west. A small area along the south-east corner of the site, including the southern boundary of the building footprint, has a high chance of surface water flooding.

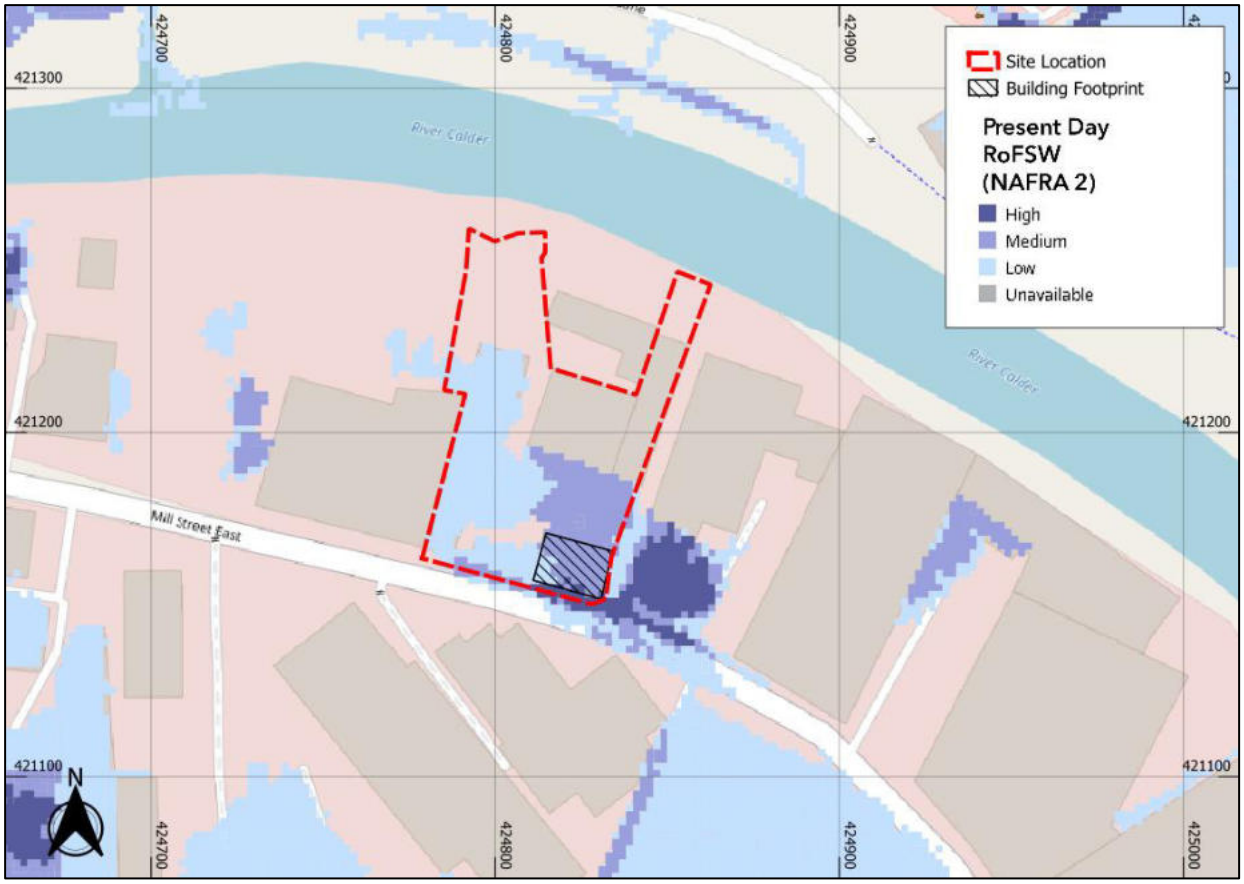


Figure 14: EA Surface Water Flood Risk Mapping (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © https://www.openstreetmap.org and contributors. Contains public sector information licensed under the Open Government Licence v3.0)

4.63. The majority of Mill Street East, to the south of the site, has a very low chance of flooding, however areas with a low chance of flooding and small areas with a medium and high chance of flooding are present adjacent to the southern boundary of the building footprint.

4.64. The surface water flood risk affecting the site is associated with areas of ponding relating to topographic depressions in the south of the site.

RoFSW Present Day Depth Analysis

4.65. Analysis of the 0.2 m flood depth interval mapping indicates that the majority of the site has a very low chance of flood depths exceeding 0.2 m (Figure 15). Western areas of the site and land to the north of the building footprint have a low chance of flooding. Small areas to the north of the building footprint have a medium chance of flood depths exceeding 0.2 m.

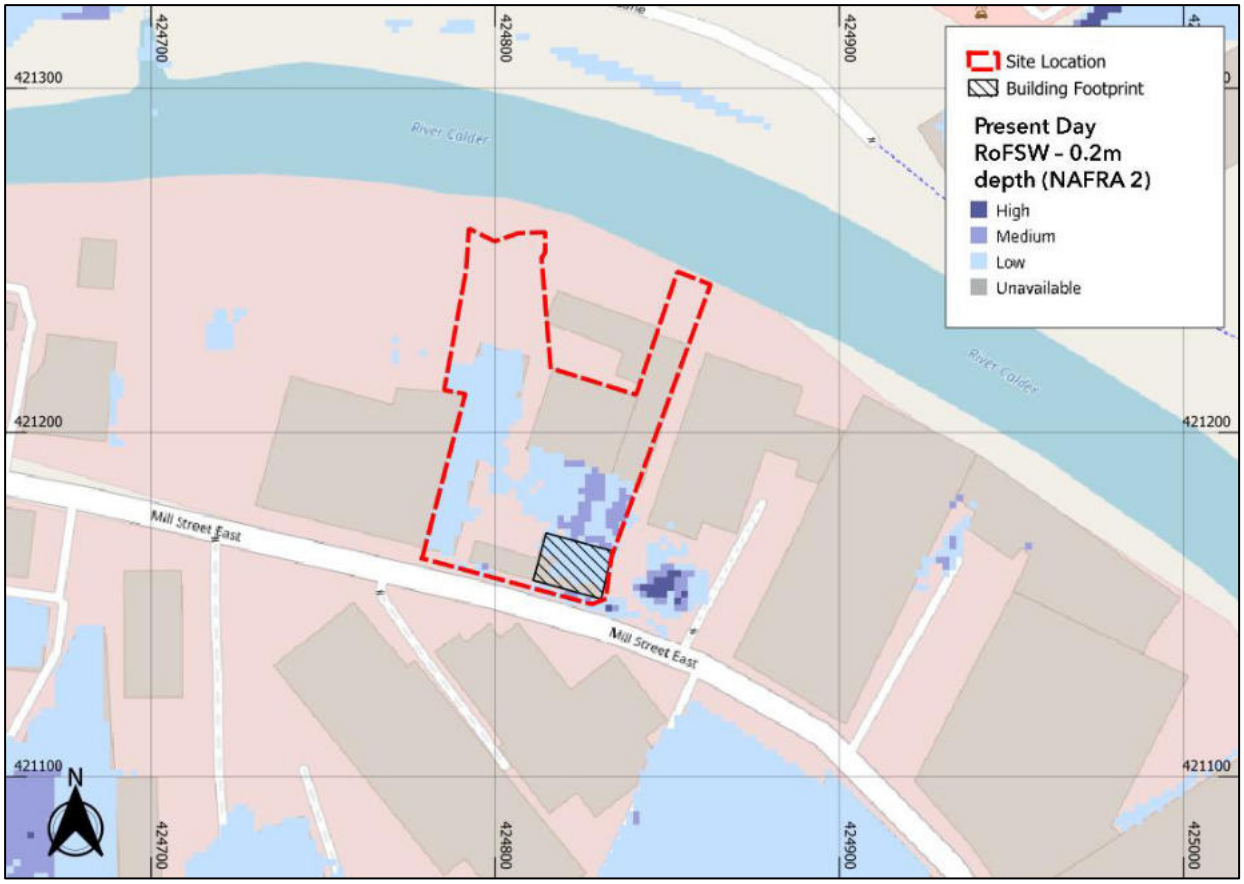


Figure 15: EA Surface Water Flood Risk Mapping Present Day Depth >0. 2m (Base map and data from Google Hybrid © Contains public sector information licensed under the Open Government Licence v3.0)

4.66. The majority of the building footprint has a low chance of flood depths exceeding 0.2 m, while the southern perimeter of the building footprint is located outside of all surface water flood chance categories.

4.67. Review of the higher flood depth intervals (0.3 m, 0.6 m, 0.9 m, and 1.2 m) indicates that most of the site remains at a very low chance of flooding from surface water sources (Figure 16). An area to the north of the building footprint and another along the western boundary of the site have a low chance of flood depths exceeding 0.3 m. Very small, isolated areas to the north of the building footprint have a medium chance of flood depths exceeding 0.3 m. Very small areas in the west of the site have a low chance of flood depths exceeding 0.6m.

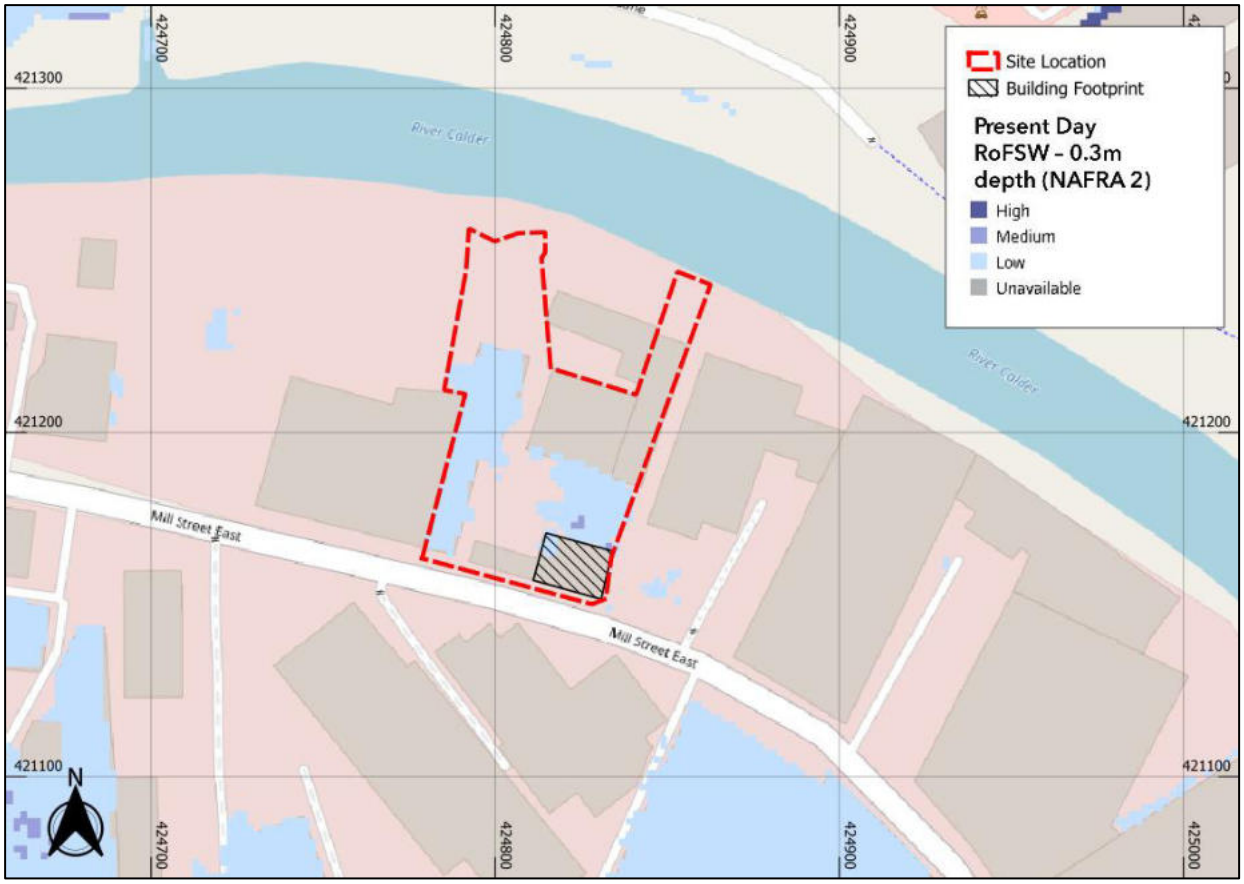


Figure 16: EA Surface Water Flood Risk Mapping Present Day Depth >0.3m (Base map and data from Google Hybrid © Contains public sector information licensed under the Open Government Licence v3.0)

4.68. Based on Google Street View imagery (accessed 04/11/2025), the entrances to the building proposed for conversion are raised approximately 0.56 metres above surrounding ground level, and all doorways are accessed via stairs on both sides of the property. Therefore, ingress of surface water into the building via these doorways is considered unlikely. However, as a precautionary approach, mitigation recommendations are provided in Section 5.

4.69. It is also noted that Mill Street East, which provides access and egress to the site, lies outside all modelled surface water flood extents, ensuring safe access and egress can be maintained.

Climate Change Surface Water Flood Risk

4.70. Analysis of the climate change RoFSW flood depth mapping indicates that flood extents and depths across the site are expected to remain broadly similar to present-day conditions under all modelled flood chance events, although the probability of flooding may increase in some areas (Figure 17).

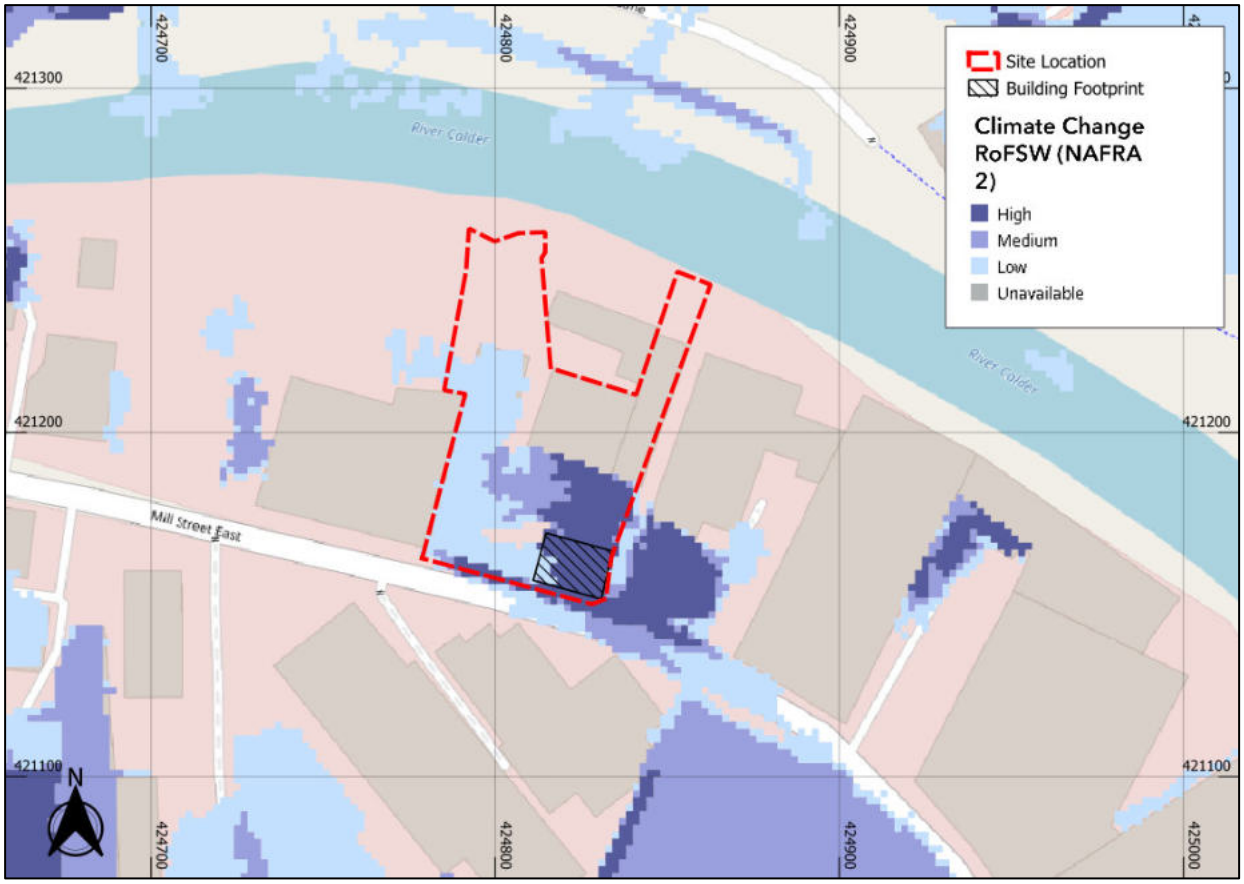


Figure 17: EA Surface Water Flood Risk Mapping climate change extent (Base map and data from Google Hybrid © Contains public sector information licensed under the Open Government Licence v3.0)

4.71. Under the climate change scenarios, the majority of the building footprint and area to the north of the building footprint have a high chance of flooding from surface water. The southern boundary of the site also has a high chance of flooding. The area of medium chance also is expected to increase slightly across the centre of the site.

RoFSW Climate Change Depth Analysis

4.72. Analysis of the 0.2 m flood depth interval mapping, incorporating climate change allowances, indicates that predicted flood depths across the site are generally comparable to present-day conditions. The majority of the building footprint and areas to the north of the building footprint are expected to have a medium chance of flood depths exceeding 0.2m (Figure 18).

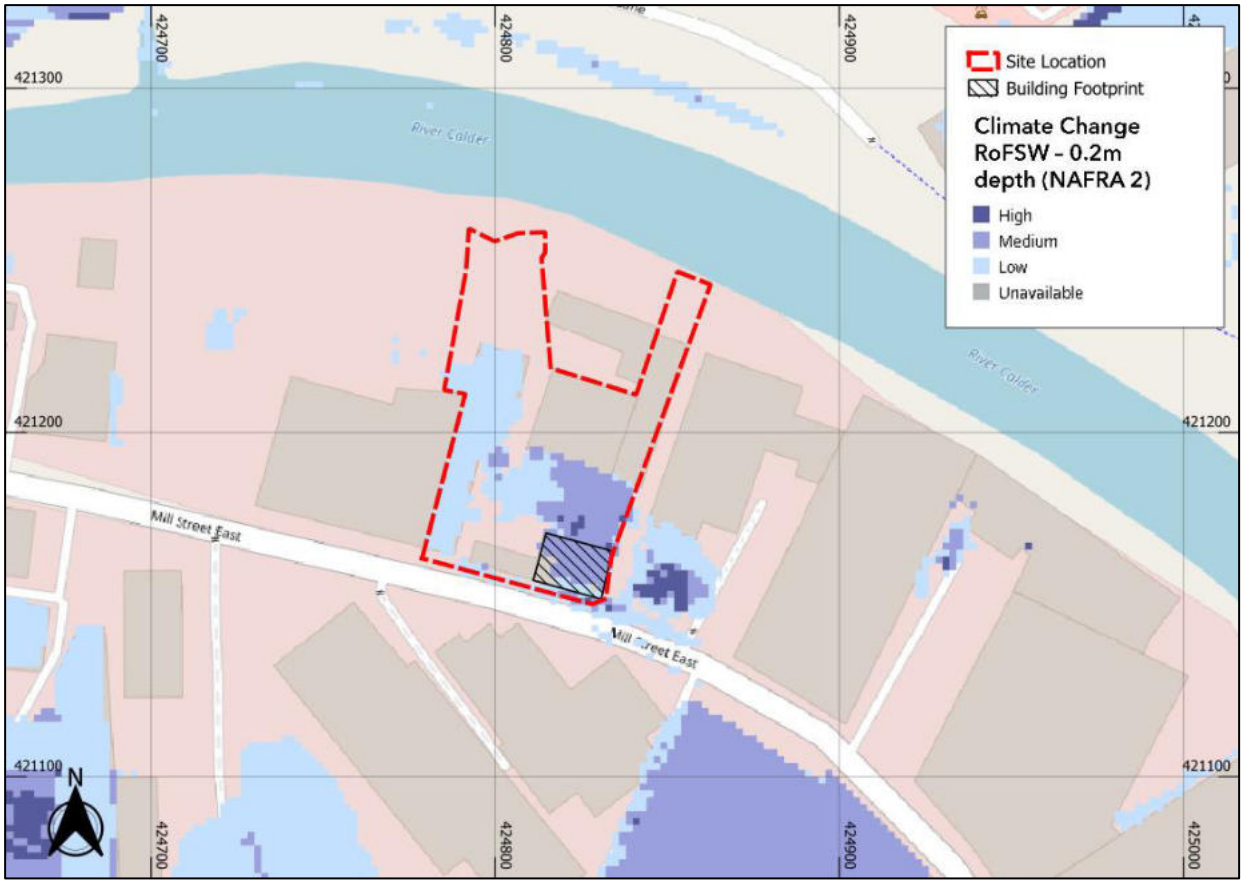


Figure 18: EA Surface Water Flood Risk Mapping Climate Change Depth >0. 2m (Base map and data from Google Hybrid © Contains public sector information licensed under the Open Government Licence v3.0)

4.73. Analysis of the higher flood depth intervals (0.3 m, 0.6 m, 0.9 m, and 1.2 m) indicates that the site remains predominantly outside the low, medium, and high chance flood extents under both present-day and future climate conditions (Figure 19). Flood depths exceeding 0.3 m are projected to remain broadly consistent with present-day scenarios. Western areas of the building footprint have a low chance of flood depths exceeding 0.3 m, while larger areas to the north of the building footprint have a medium chance of flood depths exceeding 0.3 m. Mill Street East lies outside all modelled surface water flood extents, ensuring safe access and egress can be maintained.

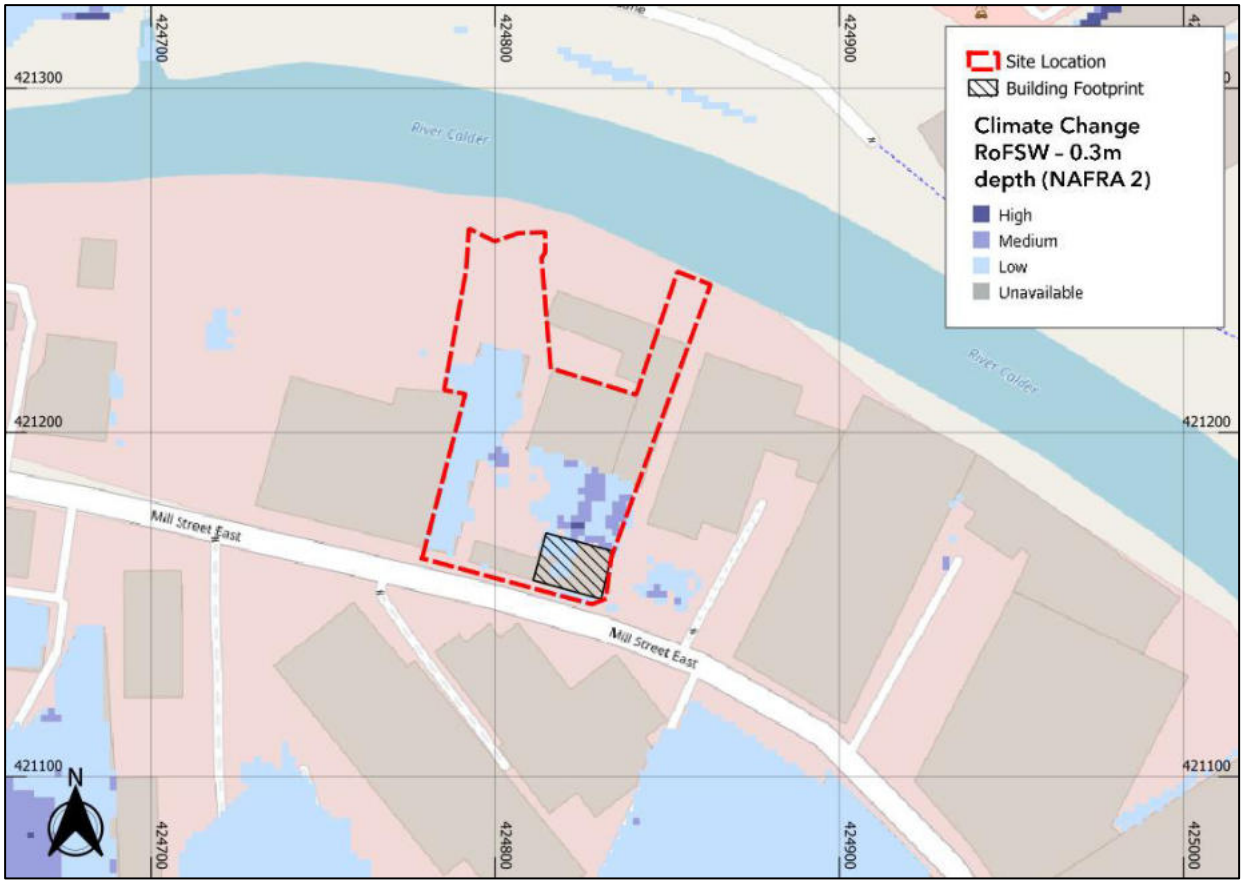


Figure 19: EA Surface Water Flood Risk Mapping Climate Change Depth >0. 3m (Base map and data from Google Hybrid © Contains public sector information licensed under the Open Government Licence v3.0)

4.74. Under climate change conditions, surface water ingress to the building remains unlikely, as the entrances are raised approximately 0.56 metres above ground level and accessed via steps. As a precautionary measure, mitigation measures are outlined in Section 5.

Pluvial Flood Risk Summary

4.75. Examination of the Environment Agency's Flood Risk from Surface Water (RoFSW) mapping indicates that, under present-day scenarios, the majority of the building footprint has a medium chance of flooding, while the southern boundary has a high chance of surface water flooding. Under climate change, the building has a high chance of surface water flooding.

4.76. Analysis of flood depth interval mapping confirms that isolated areas to the north and west of the building footprint have a low to medium chance of flood depths exceeding 0.3 m.

4.77. Given the ground floor level is located at 37.3m AOD, the risk to the building footprint is low. Furthermore, the most vulnerable parts of the development (i.e. bedrooms) are located on the first floor.

4.78. The SFRA provides mapping of historical surface water flood incident records kept by the local authority. No historical surface water incidents have been recorded in the vicinity of the site.

4.79. Mill Street East, which provides access and egress to the site, is largely outside the modelled surface water flood extents, ensuring safe access and egress can be maintained.

4.80. As such, the risk of surface water flooding to the site is low. As a precaution, mitigation measures are proposed in Section 5.

Reservoirs

4.81. Large waterbodies or reservoirs that have walls built above the surrounding ground level pose a risk of flooding. Walls could fail due to old age, accident, or because excess flood water has been added to the reservoir. Although a breach is unlikely the consequences would be significant, leading to rapid inundation of the downstream floodplain.

4.82. According to the EA's Flood Risk from Reservoirs mapping the site is at risk of flooding in the dry and wet day events of a breach at the Scammonden reservoir (Figure 20). A dry day event represents a reservoir failure under normal, non-flooded river conditions, whereas a wet day event assumes the breach occurs during an extreme fluvial flood, resulting in greater downstream flooding. The wet day scenario therefore represents the worst-case condition for reservoir breach modelling.

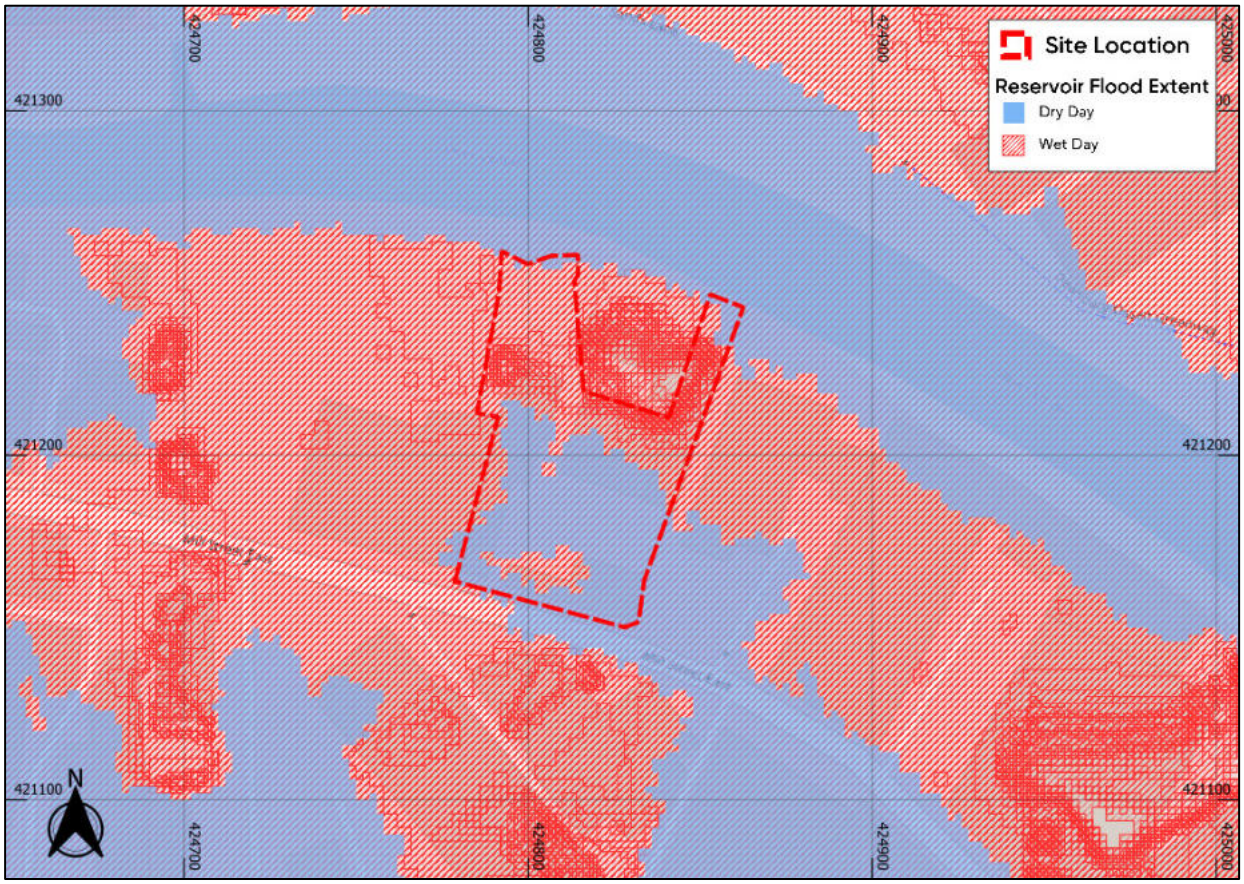


Figure 20: EA Reservoir Flood Risk Mapping (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). ©https://www.openstreetmap.org and contributors. Contains public sector information licensed under the Open Government Licence v3.0)

4.83. All large reservoirs must be inspected and supervised by reservoir panel engineers as detailed by the Reservoirs Act 1975 in England and Wales. The EA are responsible to ensure that reservoirs are regularly inspected, and essential safety work carried out. As reservoirs are highly

managed the maximum flood extent provided in the EA Risk of Flooding from Reservoirs mapping is considered a worst-case scenario.

4.84. Based on the information above, flooding from reservoirs may be considered as low risk.

Groundwater

4.85. Groundwater flooding occurs in areas where underlying geology is permeable and water can rise within the strata sufficiently to breach the surface.

4.86. The British Geological Survey's (BGS) mapping shows superficial deposits of Till, Devensian comprising diamicton underlying the site. The bedrock underlying the site is Pennine Lower Coal Measures Formation, comprised of mudstone, siltstone and sandstone. The diamicton till is typically of low permeability, restricting vertical movement of groundwater. The underlying Coal Measures strata has variable permeability, with sandstone layers being relatively permeable and the mudstones and siltstones forming impermeable geology. Consequently, localised perched groundwater may occur where seepage is impeded by less permeable layers.

4.87. The closest historical BGS borehole to the site (BGS Ref: SE22SE368 from 1973), located approximately 200m west of the site boundary, confirms that the site is underlain by around 6.0m of clay, gravel and sands. This suggests variable ground conditions, with alternating low-permeability clay and more permeable sand and gravel layers. No groundwater has been identified by the historic BGS borehole.

4.88. The 2016 SFRA presents the EA's Areas Susceptible to Groundwater Flooding mapping, which assesses the future risk of groundwater flooding. This mapping consists of 1km grid squares and shows the proportion of each which is at risk of groundwater flooding. The site is within a 1km cell which is >= 75% at risk of groundwater flooding in the future, shown by the blue square (Figure 21).

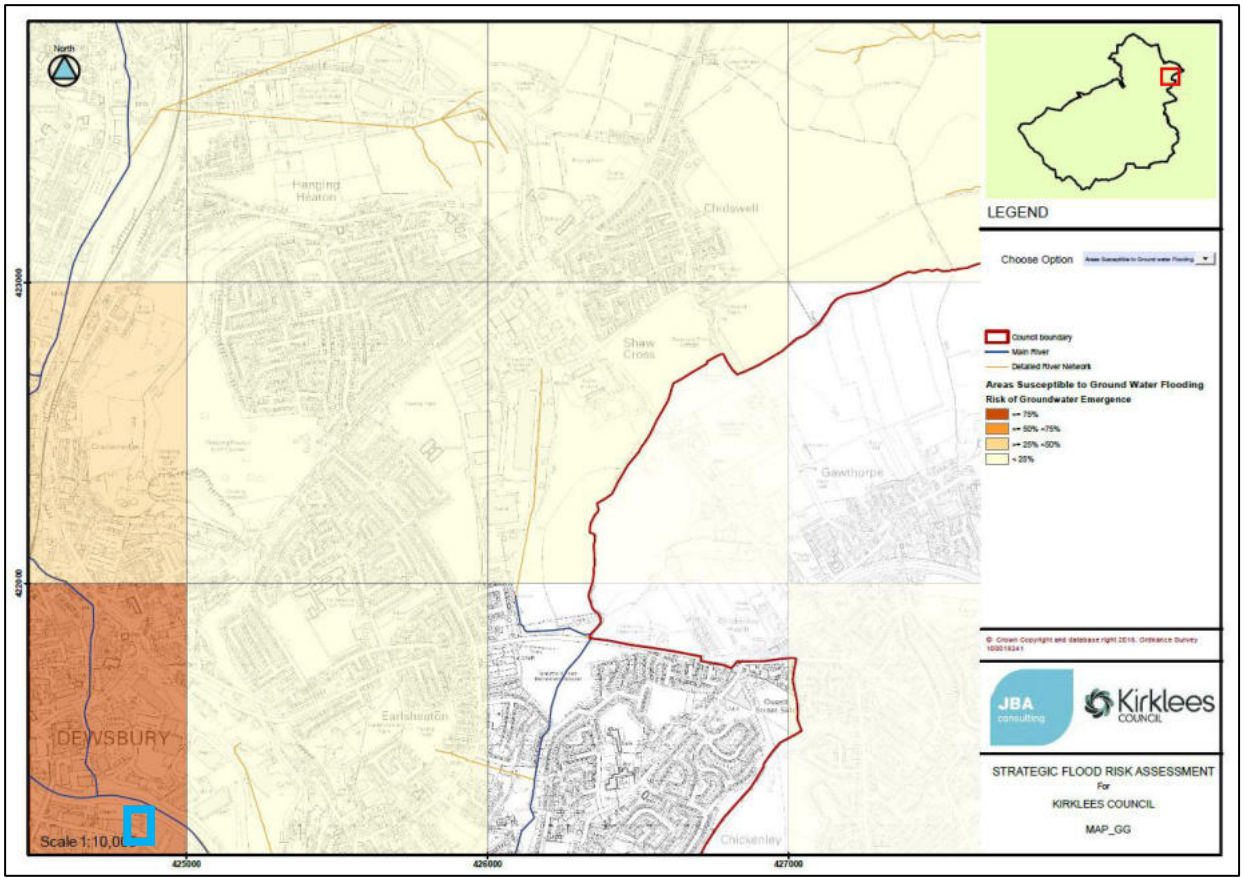


Figure 21: Areas Susceptible to Groundwater Flooding mapping from the 2016 SFRA

4.89. It should be noted that the 2016 SFRA identifies no recorded incidents of groundwater flooding within the district, including the Dewsbury area and the River Calder corridor. While localised seepage can occur in low-lying valley areas or where permeable sandstone layers outcrop, there is no evidence of historic groundwater flooding at the site or its immediate surroundings.

4.90. According to the EA's Long Term Flood Risk map, the site is not located within a groundwater flood alert area. The development proposal does not include any change to the foundations or fabric of the existing building.

4.91. The building footprint includes an existing basement. Mitigation measures recommended for surface water flooding would also provide a level of protection against potential groundwater ingress. Furthermore, the most vulnerable parts of the development (i.e. sleeping areas) are located on the first floor; therefore, the use of the basement is considered less vulnerable.

4.92. On this basis, the risk of groundwater emergence at the site is considered low.

Sewers

4.93. Foul or surface water sewers can be a cause of flooding if the drainage network becomes overwhelmed, either by blockage or due to local development beyond the designed capabilities of the drainage system.

4.94. The 2016 SFRA provides DG5 information from Yorkshire Water, which indicates that there have been no historic sewer flood events on site or within the surrounding area (Figure 22).

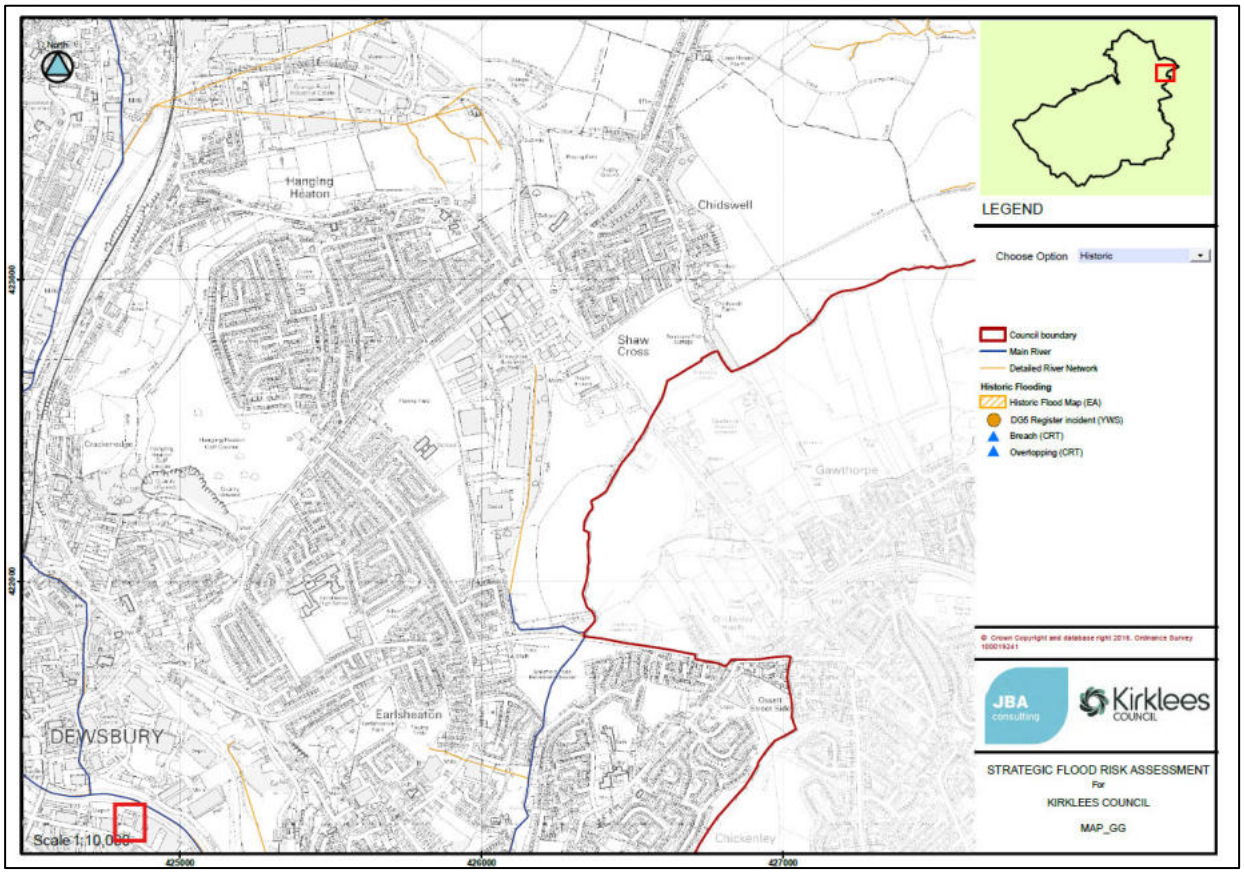


Figure 22: Yorkshire Water DG5 sewer flood incidents mapping from the 2016 SFRA

4.95. It is also noted in the 2016 SFRA that the site does not fall within a designated Critical Drainage Area.

4.96. The development is therefore considered to be at low risk of flooding from sewers. As a precautionary measure, non-return valves should be incorporated into the proposed dwellings to prevent potential backflow in the event of surcharge within the sewer network.

5. Flood Risk Mitigation

Fluvial

5.1. The Environment Agency has provided outputs from four modelling studies to assess the fluvial flood risk to the site. The site is considered to be outside the 1% AEP plus 20% Climate Change design flood event.

5.2. However, the site is expected to be impacted during a residual, low-likelihood flood event. This residual risk is identified in the Defended scenario from the Calder and Canals Study, which predicts a flood level of 37.59m AOD at the nearest modelled node. The ground floor level of the building is approximately 37.3m AOD. Therefore, the building footprint could experience flood depths of approximately 0.29m AOD

5.3. This risk is compounded by the older River Calder model which, without defences, indicates flooding could begin from the 2% AEP event onwards, with depths of up to 1.12m in the 0.1% AEP event.

5.4. The site lies predominantly within Flood Zone 2 according to the Environment Agency's Flood Map for Planning. Outputs from four EA modelling studies confirm that the site and proposed building are located outside all modelled flood extents for the 1% AEP (1-in-100-year) plus 20% climate change event.

5.5. The building's ground-floor level, at approximately 37.30 m AOD, is above the modelled 1% AEP + 20% climate-change flood level of 36.15 m AOD. Flooding is only indicated during residual 0.1% AEP (1-in-1,000-year) scenarios, with a maximum predicted depth of approximately 0.52 m at the building threshold. The existing basement will not be used for sleeping accommodation and any internal alternations should be constructed to be water-resistant.

5.6. Accordingly, the site and proposed development are situated outside the design flood extent, and fluvial flood risk to the development is considered to be low.

Flood Resilience and Resistance Measures

5.7. The proposed development's ground floor level does not require elevation above the residual flood level, as the site is outside the design flood extent. The building benefits from a degree of resistance as the existing entrances are raised approximately 0.56m above the surrounding ground level.

5.8. To manage the consequences of the predicted flood depths during the extreme residual flood events, the ground floor of the existing building should incorporate flood resilient materials and construction up to a height sufficient to manage this ingress, ensuring the building can be quickly brought back into use without significant refurbishment.

5.9. It is recommended that appropriate flood resilience and resistance measures should be incorporated as a part of the development proposal (where applicable), in accordance with the CLG Report, Improving the Flood Performance of New Buildings - Flood Resilient Construction (2007) including measures such as the below:

- *Raised wiring and power outlets at ground floor level should be raised as high as possible above FFLs of the proposed development.*
- *Units within the proposed development to be raised on legs above plinth and not sit directly onto the flooring.*
- *Non-return valves should be installed around the property and in the basement. Maintenance of these valves is important to ensure their continued effectiveness so should be maintained in line with manufactures recommendations.*
- *All new plumbing insulation, including in the basement, is to be of closed cell design.*
- *External timber cladding and internal finishes should be water-resistant; sacrificial linings can be used where appropriate to minimize flood damage.*
- *Insulation to be low adsorption board or semi rigid self-draining wool bats.*

Groundwater

5.10. The site plan includes an existing basement level. The basement will not be used for highly vulnerable purposes, such as sleeping accommodation. Any internal changes to the basement should be designed with flood resilience / water resistant measures.

Pluvial

5.11. Examination of the EA's RoFSW mapping indicates that the majority of the overall site is subject to a very low chance of surface water flooding. However, during the present day surface water flood events, the majority of the building footprint has a medium chance of flooding, with a small area of low chance along its western edge. In the climate change scenario, the building footprint is located within the high chance scenario.

5.12. Analysis of flood depth mapping confirms that most of the site remains at a very low chance of flooding. Isolated areas to the north and west of the building footprint show a low to medium chance of flood depths exceeding 0.3m in both present-day and future climate scenarios. Ingress of surface water into the building through the doorways is considered unlikely, as the existing entrances are raised approximately 0.56m above surrounding ground levels.

5.13. Given the low overall risk, no further specific mitigation measures are required. The flood resilience and resistance measures recommended for managing the fluvial residual risk will also provide protection to the building from the shallow surface water flood risk.

Reservoirs, Tidal, Canals, and Sewers

5.14. Flood risk from other sources is deemed to be low, therefore mitigation is not required.

Increase to Flood Risk Elsewhere

5.15. The existing site comprises a garage, associated storage yard, and a terrace of three vacant dwellings currently used as storage buildings. The proposed development involves a change of use of one of the buildings to a children's home for up to four children. There are no proposed extensions, ground-level alterations, or changes to the existing building footprint.

5.16. In accordance with Paragraph 178b of the NPPF (2024), development should not increase flood risk elsewhere. As the proposal does not increase the impermeable area on site it will not result in any increase in flood risk elsewhere.

Flood Warnings

5.17. The site Is located in an area where the EA provide specific flood alerts and warnings. The site is located within a Flood Alert Area (Lower River Calder catchment) and a Flood Warning Area (River Calder at Dewsbury)

5.18. Flood warnings/alerts can be enforced at any time of the day or night. Signing up for this service provides site owners some notice before a flood event. The amount of time afforded before a flood occurs depends on the site-specific location (e.g. proximity to the source of flooding, topography of the surrounding area) and the flood mechanism (e.g. bank over topping versus a breach event). Flood alerts and warnings provide site managers with time to take necessary action, e.g. communication of the risk of flooding to occupants/employees etc, evacuation of occupants offsite or to a safe level, removal of valuable items out of reach of flooding and the mounting of site-specific flood defences.

Access and Egress

5.19. Mill Street East is located outside of the design flood event (1% AEP +20% Climate Change), therefore during this scenario, safe access and egress is provided on Mill Street East in both directions.

5.20. While Mill Street East lies outside the design fluvial flood event, it is located within the 0.1% AEP residual fluvial flood event extent. The road lies at approximately 36.9m AOD, which is significantly below the extreme flood event level.

5.21. Given that Mill Street East is affected during the extreme 0.1% AEP flood event, a Flood Warning and Evacuation Plan (FWEP) should be provided for the site. This plan will confirm that safe refuge is available, as internal access to an upper floor will be maintained above all predicted flood levels.

5.22. Furthermore, the plan must include procedures for staff to sign up for and actively monitor the EA Flood Alerts and Warnings and detail the safe evacuation of occupants.

6. Conclusions

6.1. This FRA has been undertaken with reference to the requirements of NPPF and Planning Practice Guidance with respect to the development at 3, 5 and 7 Mill Street East, Kirklees, WF12 9AQ. It has been written to support a planning application and prepared with due consideration to the nature of the proposed development to provide the appropriate level of detail.

6.2. An assessment of the risk of flooding from all sources has been undertaken and is summarised in the table below:

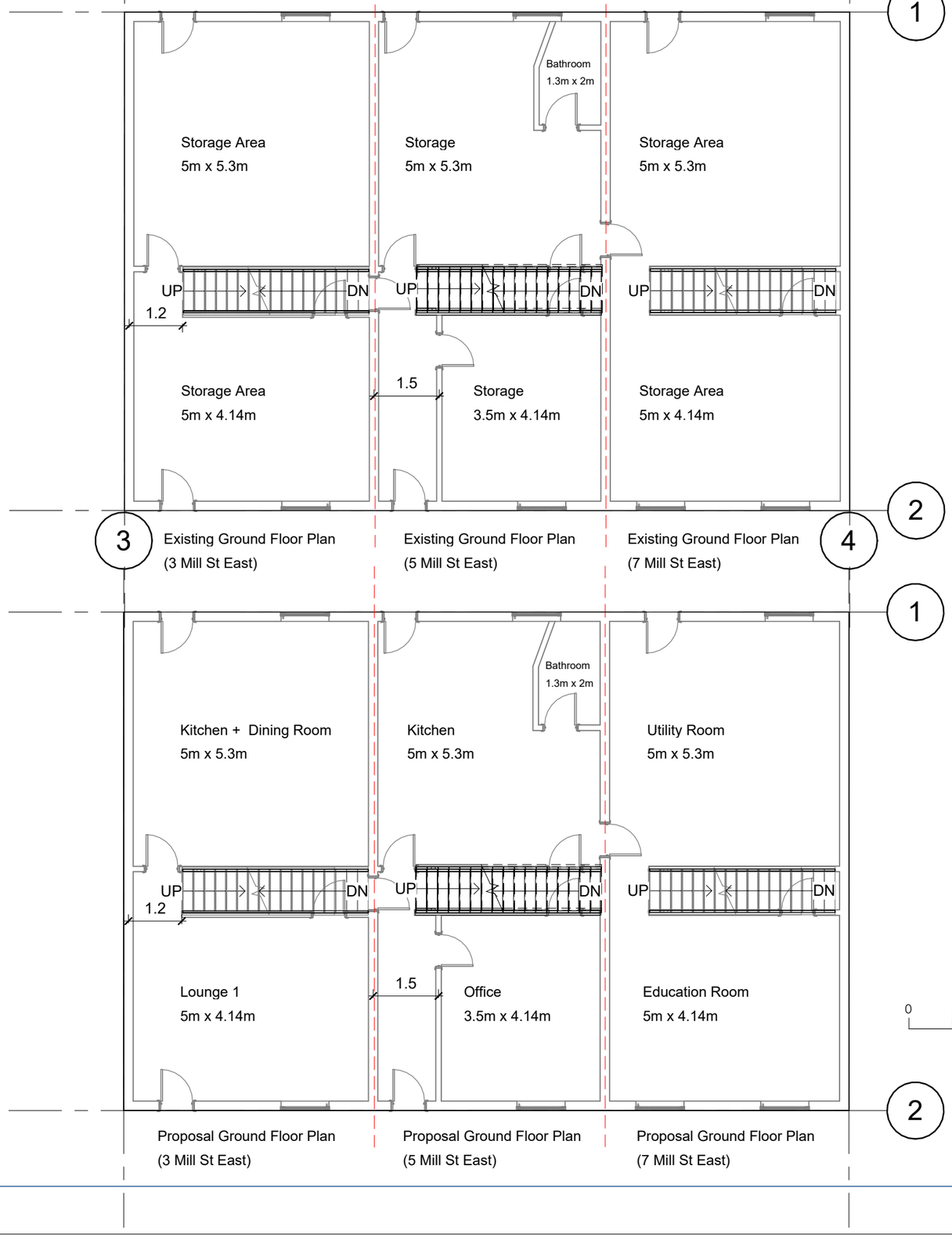
Source of Flooding	Flood Risk Summary
Fluvial	The site lies predominantly within Flood Zone 2 according to the Environment Agency's Flood Map for Planning. Outputs from four EA modelling studies confirm that the site and proposed building are located outside all modelled flood extents for the 1% AEP (1-in-100-year) plus 20% climate change event. The building's ground-floor level, at approximately 37.30 m AOD, is above the modelled 1% AEP + 20% climate-change flood level of 36.15 m AOD. Flooding is only indicated during residual 0.1% AEP (1-in-1,000-year) scenarios, with a maximum predicted depth of approximately 0.29 m at the building threshold. The existing basement will not be used for sleeping accommodation and any internal alternations should be constructed to be water-resistant. Accordingly, the site and proposed development are situated outside the design flood extent, and fluvial flood risk to the development is considered to be low. Safe access and egress to and from the site can be maintained via Cliff Mill Street East during the design event. However, during the extreme 0.1% AEP flood event, Mill Street East is affected; therefore, a Flood Warning and Evacuation Plan (FWEP) should be prepared to address residual flood risks, outlining triggers for action, evacuation routes, and responsibilities. Staff should sign up to the EA Flood Warning Service to ensure the safety of staff and residents.
Pluvial	EA RoFSW mapping indicates that the building footprint has a high chance of flooding with an allowance for climate change, however there is a low chance of flood depths exceeding 0.3m. The building threshold is raised by 0.56m, therefore flood risk to the building is low. No additional measures are required beyond those proposed for managing fluvial residual risk, which will also provide adequate protection against shallow surface-water flooding.
Groundwater	The site plan includes an existing basement level. The basement will not be used for highly vulnerable purposes, such as sleeping accommodation. Any internal changes to the basement should be designed with flood resilience / water resistant measures. No additional measures are required beyond those proposed for managing fluvial residual risk, which will also provide adequate protection against groundwater flooding.
Tidal	The site is considered to be at low risk from other sources.

Reservoirs Sewers Canals	

6.3. The FRA supports the planning application and demonstrates that there is an acceptable level of flood risk to the site if the mitigation strategies recommended are implemented in the scheme. The development does not increase flood risk off site or to the wider area.

6.4. This Flood Risk Assessment should be submitted as part of the planning application to satisfy the requirements under NPPF.

Appendix A - Development Proposals



3 Existing Ground Floor Plan (3 Mill St East)

Existing Ground Floor Plan (5 Mill St East)

Existing Ground Floor Plan (7 Mill St East)

Proposal Ground Floor Plan (3 Mill St East)

Proposal Ground Floor Plan (5 Mill St East)

Proposal Ground Floor Plan (7 Mill St East)

Notes:

Sample Notes

REV	DESCRIPTION	BY	DATE

STATUS: Project Status

MANZIL STUDIO

CLIENT: Robert Bamling

ARCHITECT: Manzil Studio Ltd

SITE: 3-5-7 Mill St East

TITLE: Change of Use- Ground Floor

SCALE A	DRAWN:	CHECKED:
1 : 100	26/08/25 Ebrahim	Ebrahim

PROJECT NO:	DRAWING NO:	REVISION:
	A101	

3

4

1

Storage Area
5m x 3m

Office
5m x 3m

Storage Area
5m x 3m

1.6
2.1
Bathroom
1.6
3.4

UP
DN
DN
UP
DN

Storage Area
5m x 4.14m

Office
5m x 4.14m

Storage Area
5m x 4.14m

7

Existing First Floor Plan
(3 Mill St East)

Existing First Floor Plan
(5 Mill St East)

Existing First Floor Plan
(7 Mill St East)

8

2

5

En Suite
1.6
2.0

Bedroom 1 Young Person
5m x 3m

En Suite
1.6
2.0

Staff Bedroom 1
5m x 3m

En Suite
1.6
2.0

Bedroom 3 Young Person
5m x 3m

1.6
2.1
Bathroom
1.6
3.4

UP
DN
DN
UP
DN

1.0

2.0
En Suite
1.6

Bedroom 2
Young
Person
5m x 3.14m

2.0
En Suite
1.6

Staff Bedroom 2
5m x 4.14m

2.0
En Suite
1.6

Bedroom 4 Young
Person
5m x 4.14m

6

Proposal First Floor Plan
(3 Mill St East)

Proposal First Floor Plan
(5 Mill St East)

Proposal First Floor Plan
(7 Mill St East)

0 1 2 3 4m
1:100

-

-

1

A106

Notes:

Sample Notes

REV	DESCRIPTION	BY	DATE

STATUS: Project Status

MANZIL STUDIO

CLIENT: Robert Bamling

ARCHITECT: Manzil Studio Ltd

SITE: 3-5-7 Mill St East

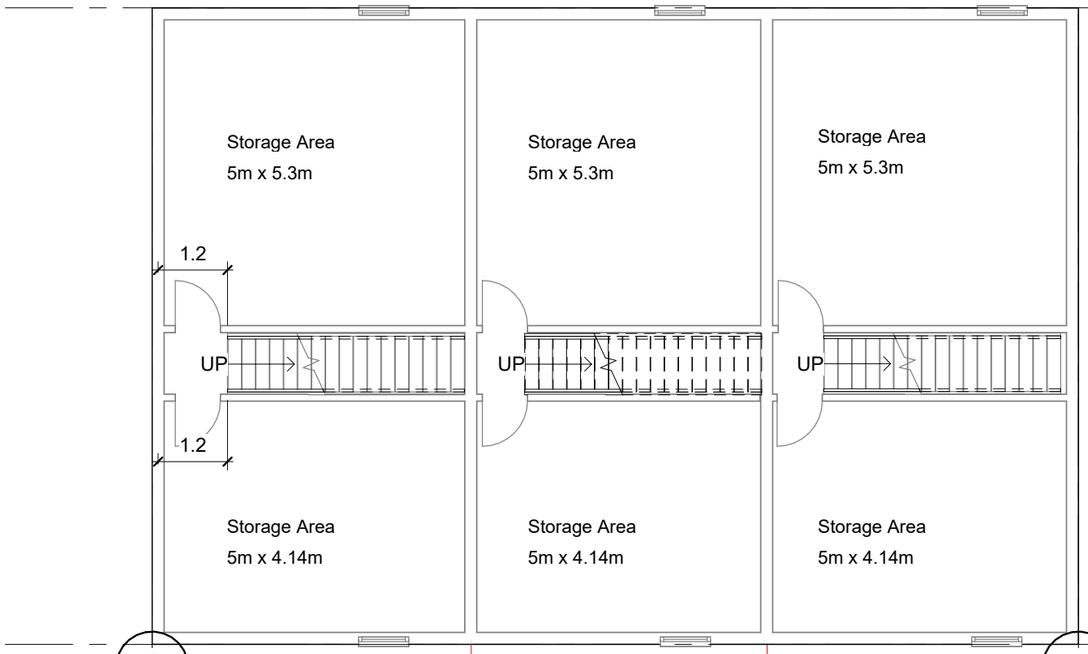
TITLE: Change of Use- First Floor

SCALE A1		DRAWN:	CHECKED:
1 : 100	26/08/25	Ebrahim	Ebrahim
PROJECT NO:	DRAWING NO:		REVISION:
	A102		

3

4

1



3

4

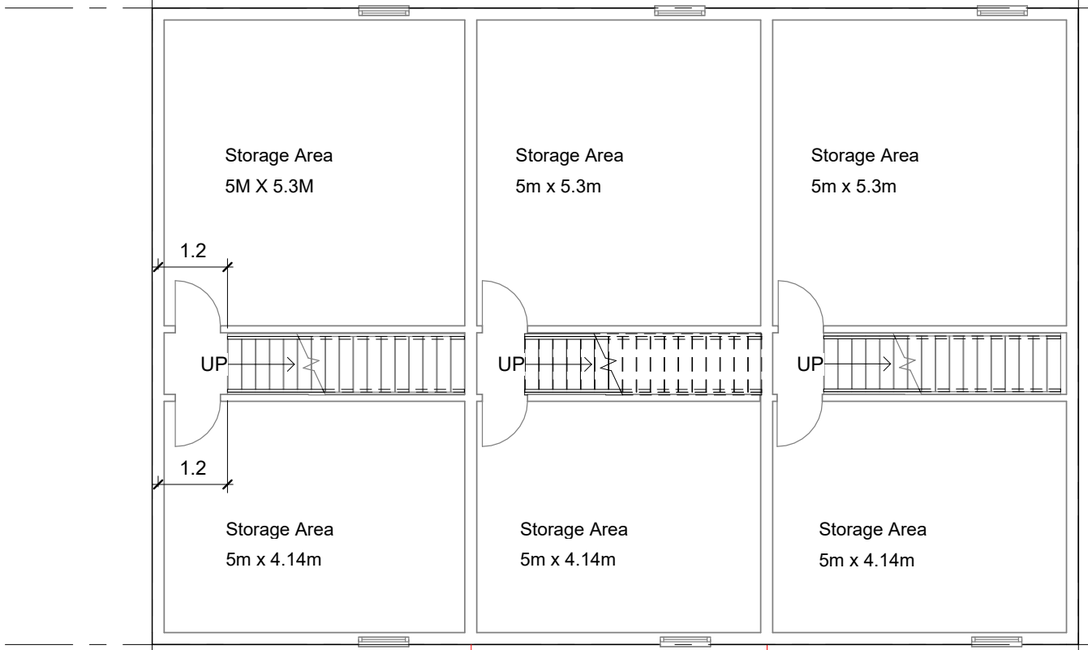
2

Existing Basement Floor Plan
(3 Mill St East)

Existing Basement Floor Plan
(5 Mill St East)

Existing Basement Floor Plan
(7 Mill St East)

1



2

Proposal Basement Floor Plan
(3 Mill St East)

Proposal Basement Floor Plan
(5 Mill St East)

Proposal Basement Floor Plan
(7 Mill St East)

0 1 2 3 4m
1:100

Notes:

Sample Notes

REV	DESCRIPTION	BY	DATE

STATUS: Project Status

MANZIL STUDIO

CLIENT: Robert Bamling

ARCHITECT: Manzil Studio Ltd

SITE: 3-5-7 Mill St East

TITLE: Change of Use-Basement

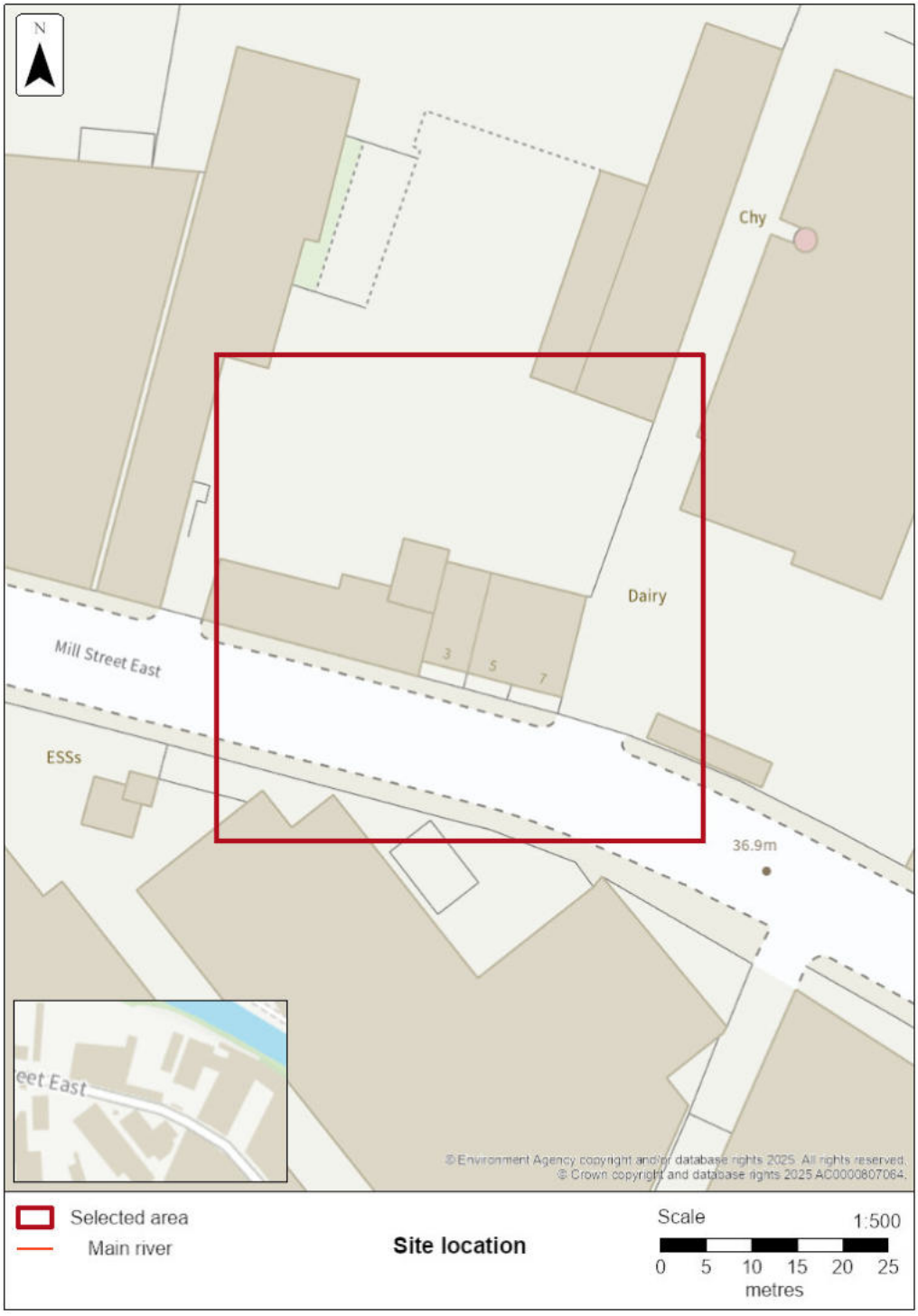
SCALE A1		DRAWN:	CHECKED:
1 : 100	26/08/25	Ebrahim	Ebrahim
PROJECT NO:	DRAWING NO:		REVISION:
	A104		

Appendix B - Environment Agency Product Data

Flood risk assessment data

Location of site: 424820 / 421165 (shown as easting and northing coordinates)
Document created on: 29 September 2025
This information was previously known as a product 4.
Customer reference number: D8RC3ET5HFN7

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 Kirklees District.

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

About the models used

Model name: 2011 River Calder - Calder
Scenario(s): Defences removed fluvial, defences removed climate change fluvial
Date: 31 March 2011

Model name: 2015 Batley Beck Mapping Study
Scenario(s): Defended fluvial, defences removed fluvial, defended climate change fluvial, defences removed climate change fluvial
Date: 30 November 2015

Model name: 2015 Calder and Canals - downstream of Sowerby Bridge
Scenario(s): Defended fluvial, defences removed fluvial, defended climate change fluvial
Date: 31 March 2014

Model name: Chickenley_Beck_Model_2018
Scenario(s): No defences exist fluvial, no defences exist climate change fluvial
Date: 1 November 2018

These models contain 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 2.

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

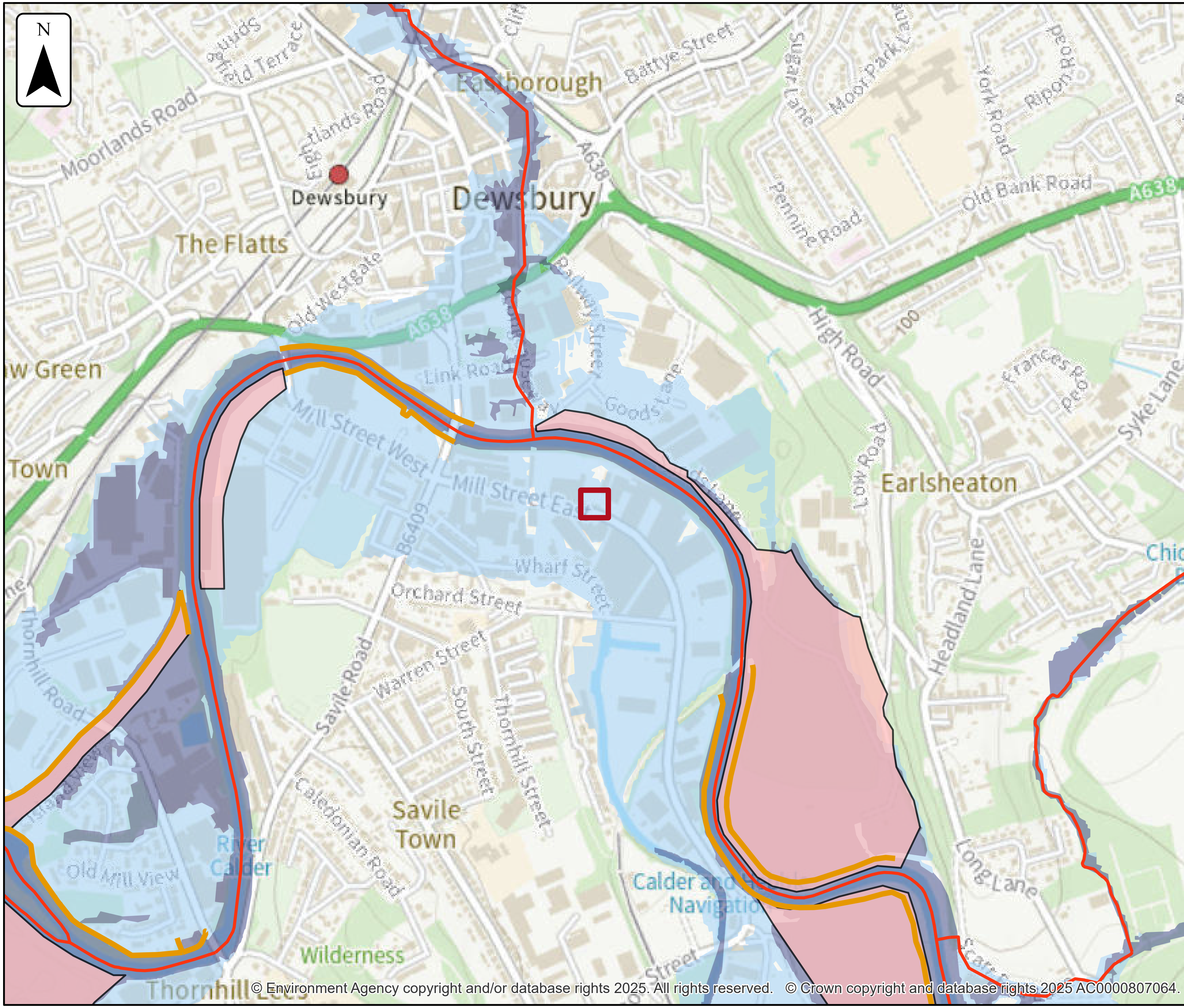
- 0.5% or greater probability of occurring in any year for flooding from the sea
- 1% or greater probability of occurring in any year for fluvial (river) flooding

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)
424820/421165

Scale
1:10,000

Created
29 Sep 2025

- Selected area
- Main river
- Flood defence
- Water storage area
- 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

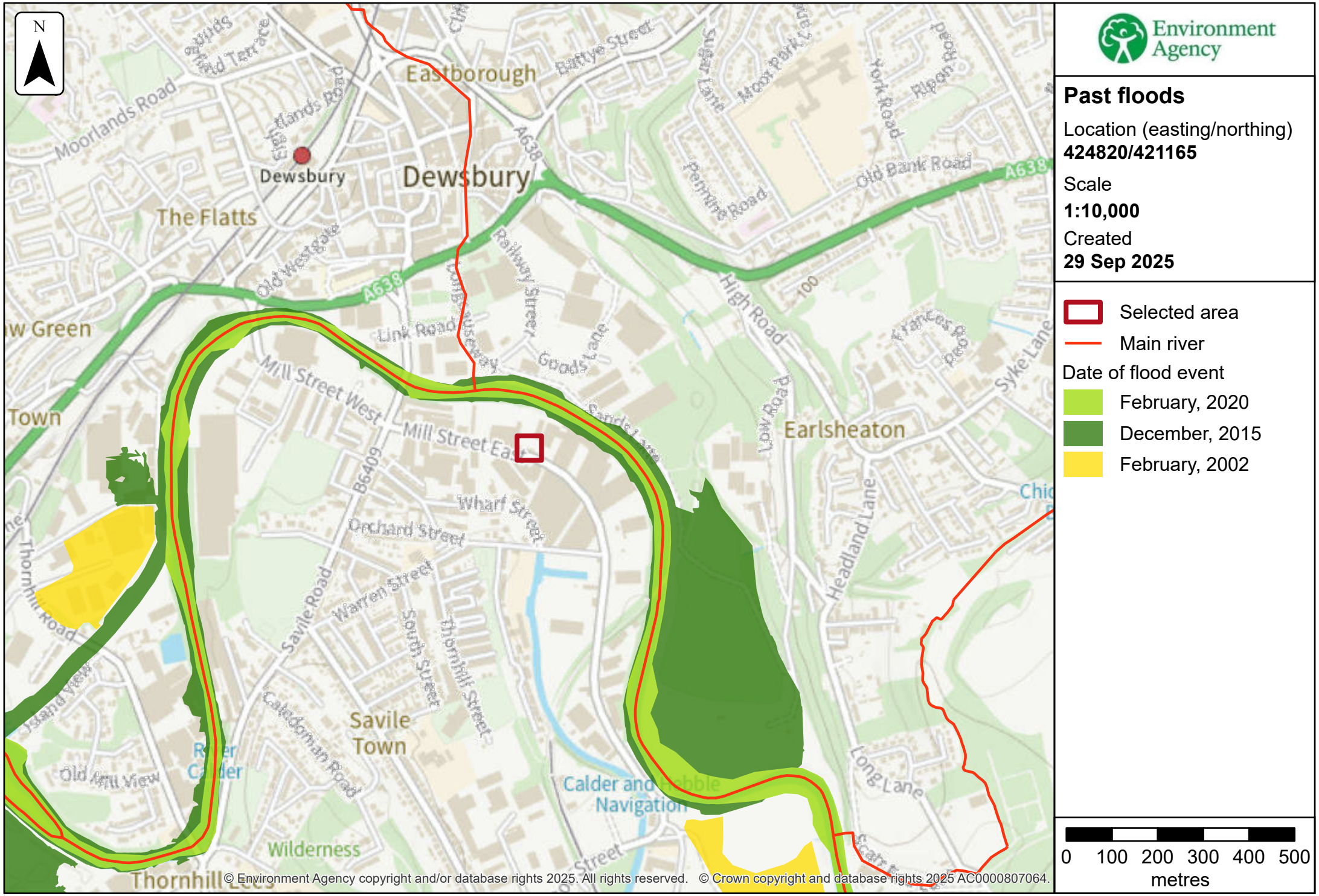
The recorded flood outlines are a geographical information system (GIS) data layer that show our verified records of areas that have flooded in the past from:

- 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 Kirklees District 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)
424820/421165

Scale
1:10,000

Created
29 Sep 2025

- Selected area
- Main river

Date of flood event

- February, 2020
- December, 2015
- February, 2002

0 100 200 300 400 500
metres

Data on past flood events

Start date	End date	Source of flood	Cause of flood	Affects location
8 February 2020	19 March 2020	main river	channel capacity exceeded (no raised defences)	No
25 December 2015	29 December 2015	main river	channel capacity exceeded (no raised defences)	No
10 February 2002	13 February 2002	main river	channel capacity exceeded (no raised defences)	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)
424820/421165

Scale
1:2,500

Created
29 Sep 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	26969	Wall	50	Fair	36.98	39.55	
2	28432	Engineered High Ground	50	Good	32.94	38.96	
3	27831	Engineered High Ground	50	Good	33.93	35.49	
4	26924	Engineered High Ground	50	Fair	35.27	37.77	

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

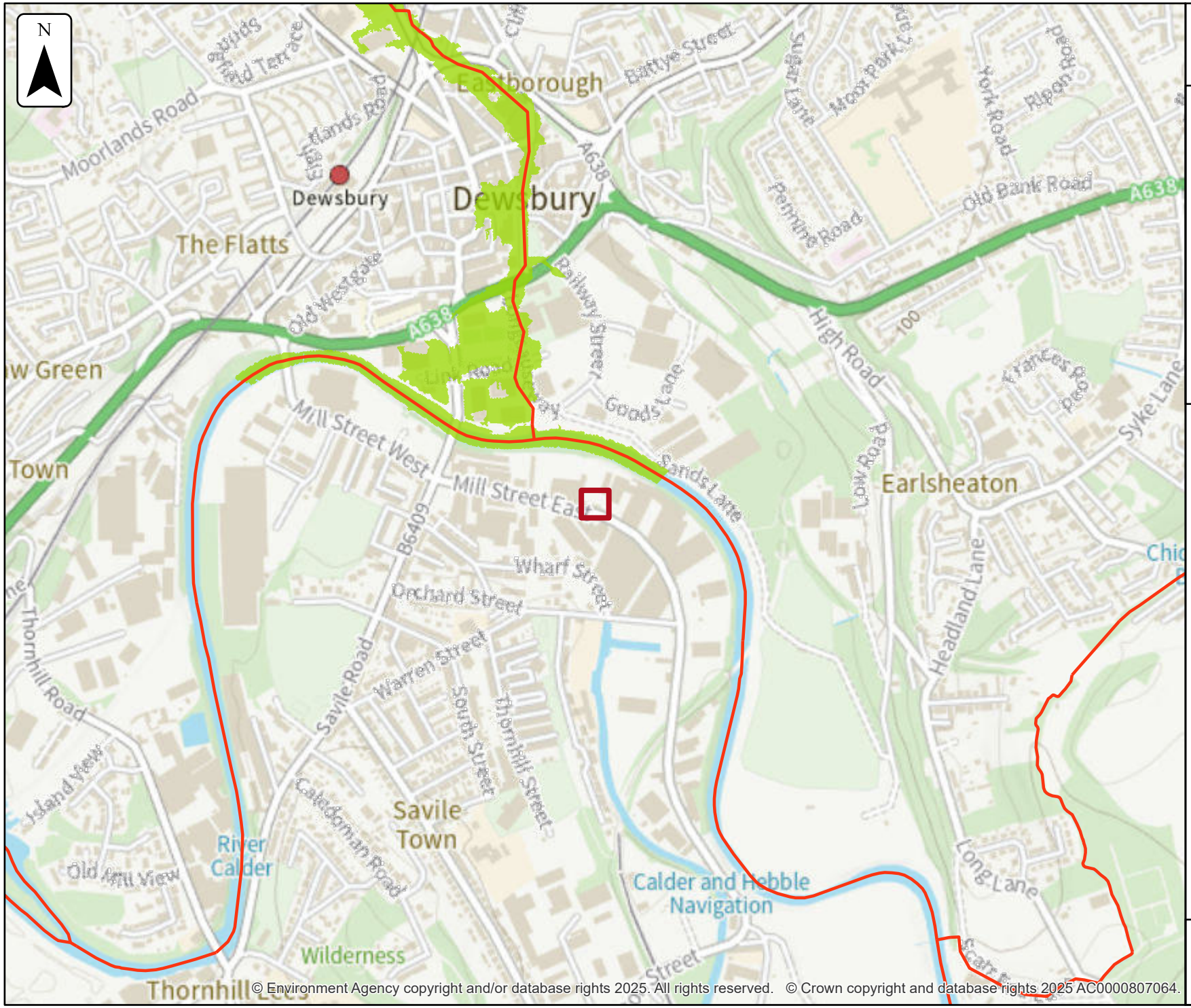
The climate change data included in the models may not include the latest flood risk assessment climate change allowances. Where the new allowances are not available you will need to consider this data and factor in the new allowances to demonstrate the development will be safe from flooding.

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
- No defences exist modelled fluvial: risk of flooding from rivers where there are no flood defences
- 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
- No defences exist climate change modelled fluvial: risk of flooding from rivers where there are no flood defences, including estimated impact of climate change



Environment Agency

Defences removed climate change modelled fluvial extent

Location (easting/northing)
424820/421165

Scale
1:10,000

Created
29 Sep 2025

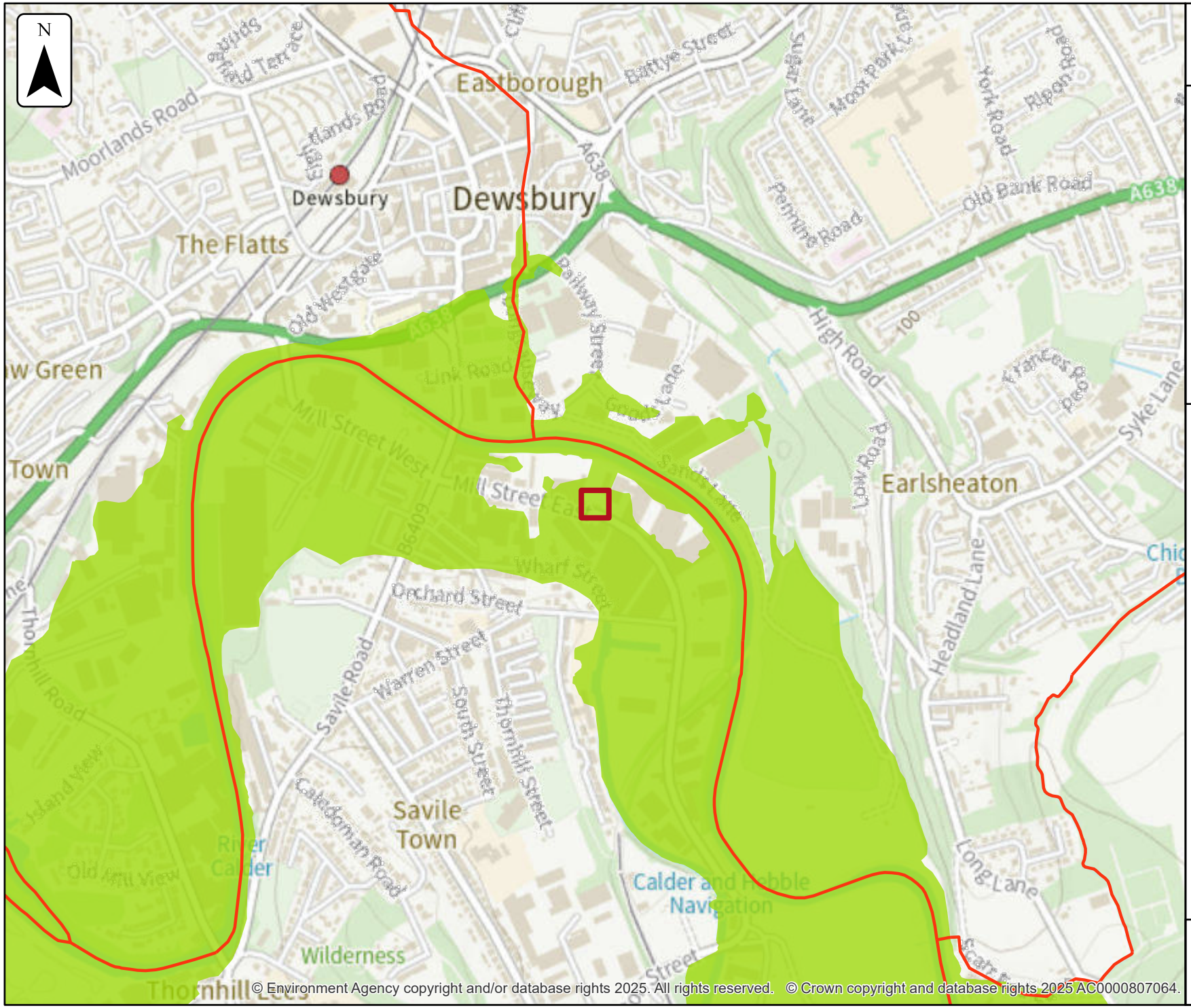
Model name
2015 Batley Beck Mapping Study

- Selected area
- Main river

Modelled flood extent
- 1% AEP (+20%)

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 extent

Location (easting/northing)
424820/421165

Scale
1:10,000

Created
29 Sep 2025

Model name
2011 River Calder - Calder

Selected area

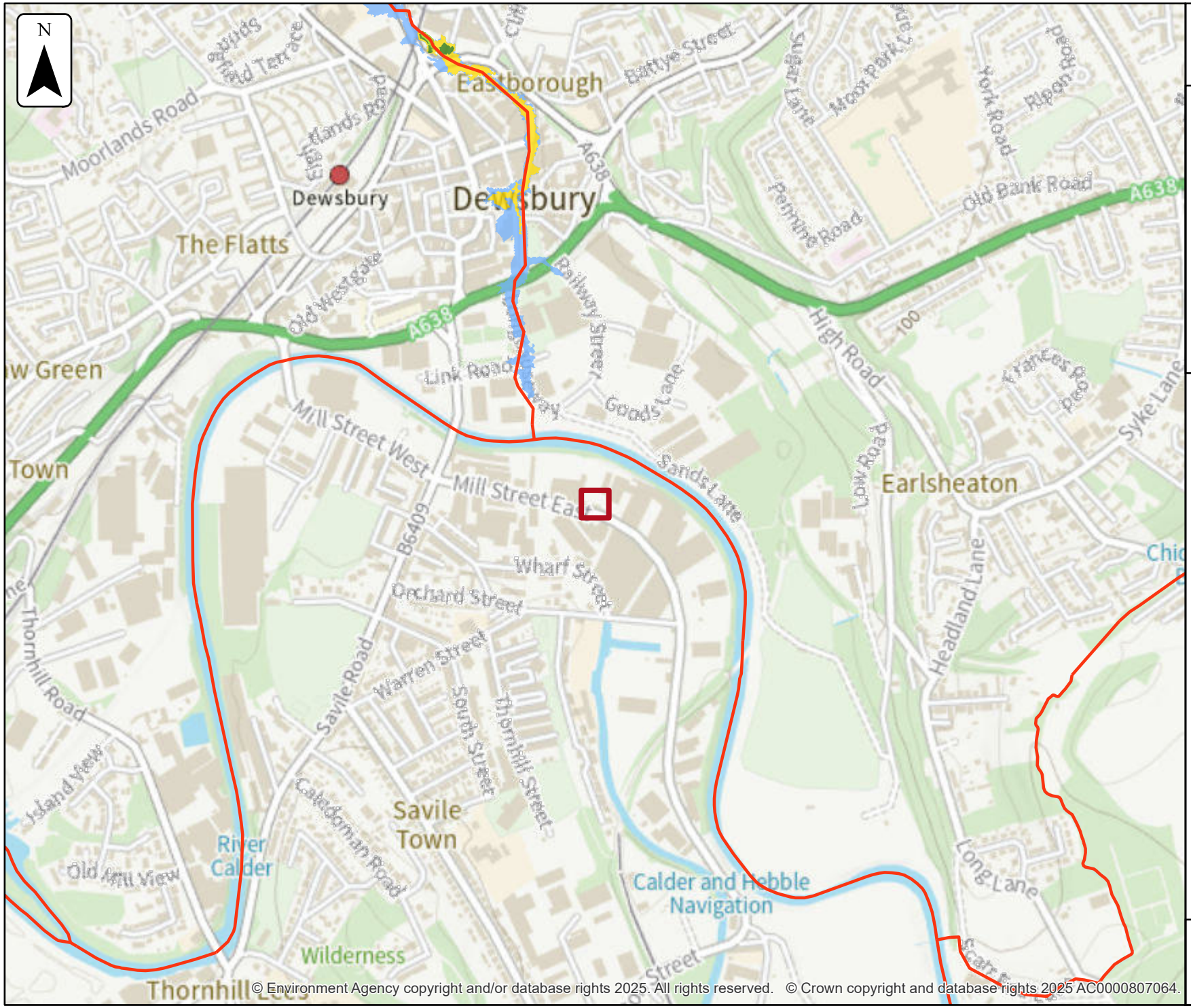
Main river

Modelled flood extent

1% AEP (+20%)

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 extent

Location (easting/northing)
424820/421165

Scale
1:10,000

Created
29 Sep 2025

Model name
2015 Batley Beck Mapping Study

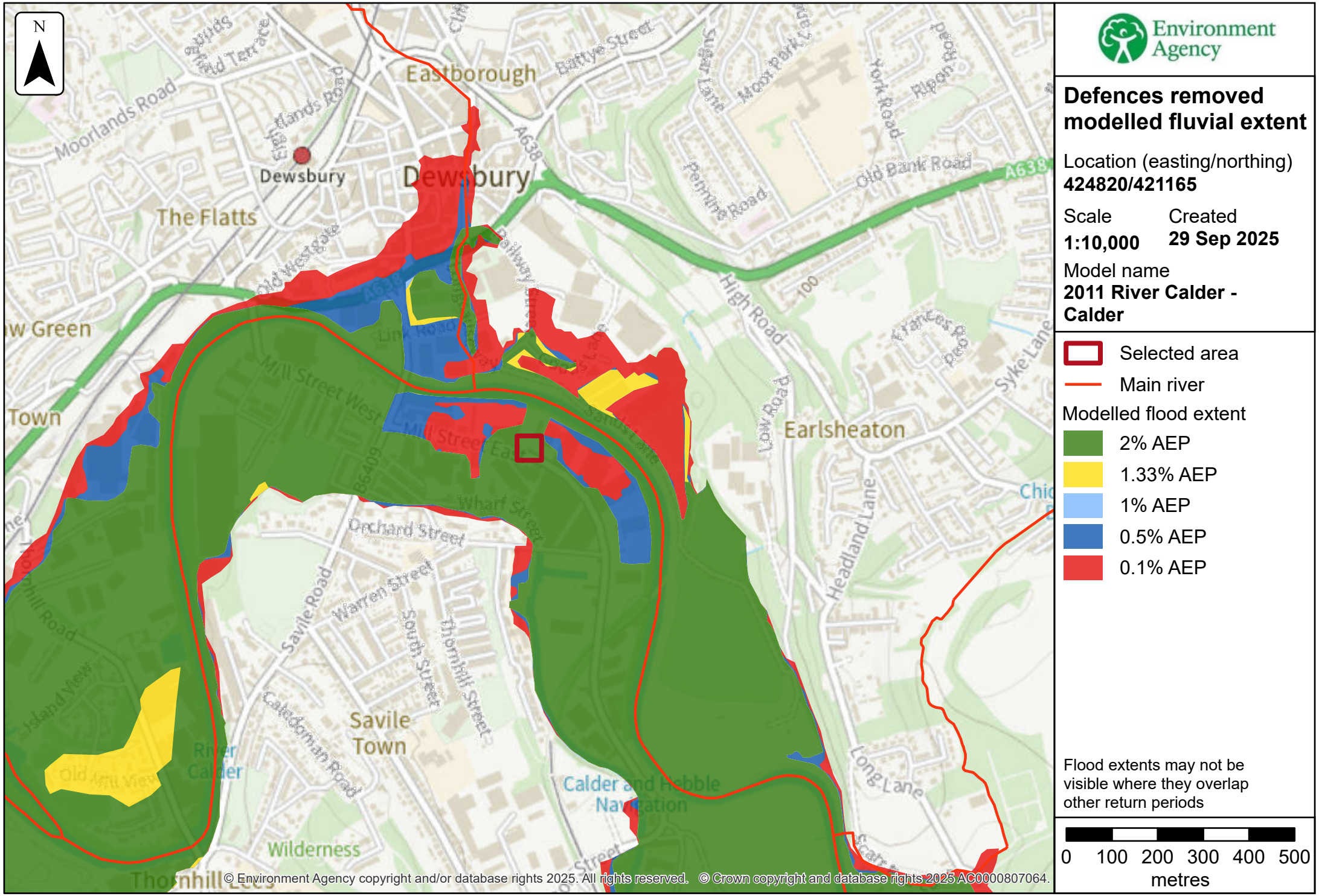
- Selected area
- Main river

Modelled flood extent

- 5% AEP
- 2% AEP
- 1.33% AEP
- 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 extent

Location (easting/northing)
424820/421165

Scale
1:10,000

Created
29 Sep 2025

Model name
2011 River Calder - Calder

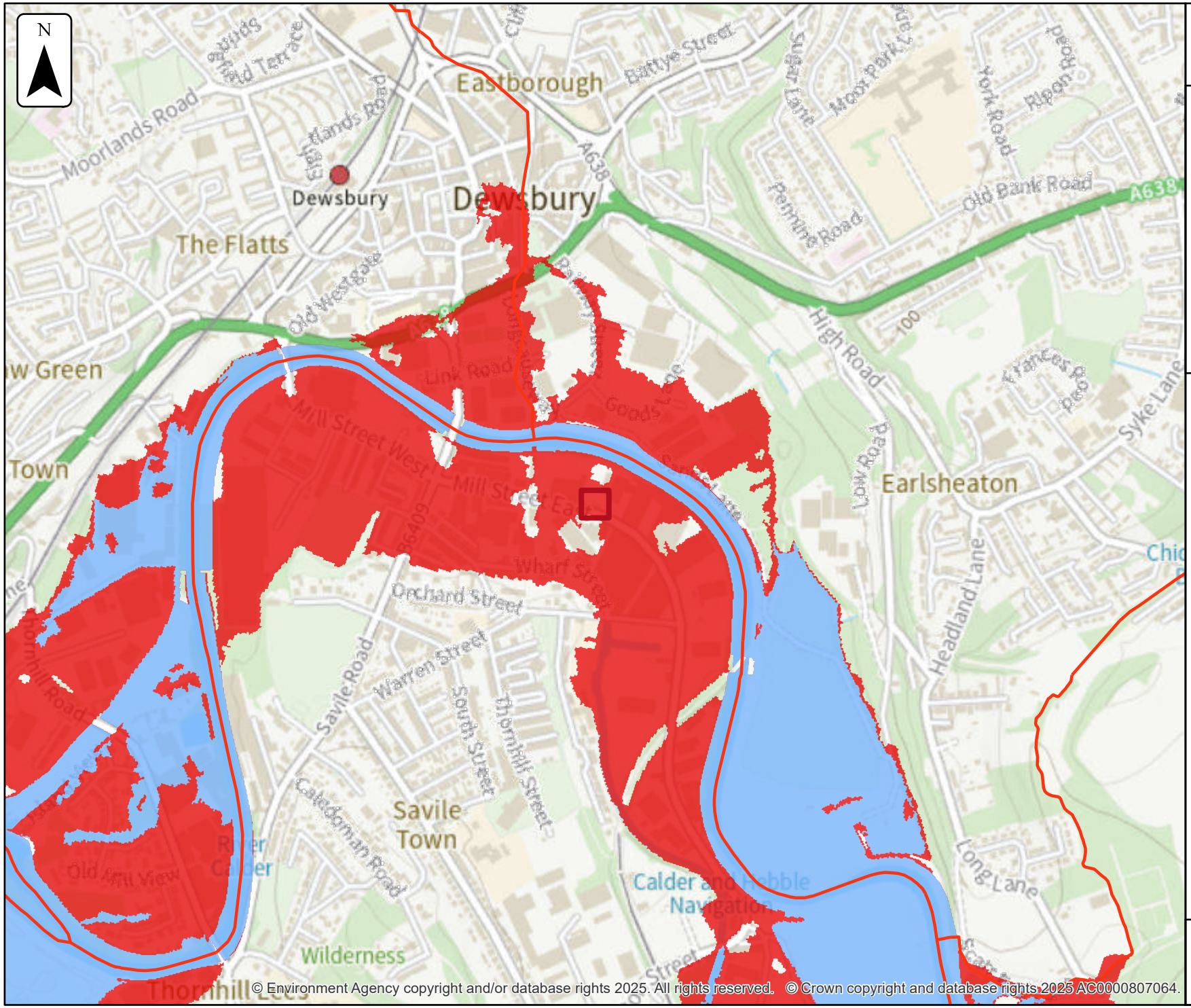
- Selected area
- Main river

Modelled flood extent

- 2% AEP
- 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 extent

Location (easting/northing)
424820/421165

Scale
1:10,000

Created
29 Sep 2025

Model name
2015 Calder and Canals - downstream

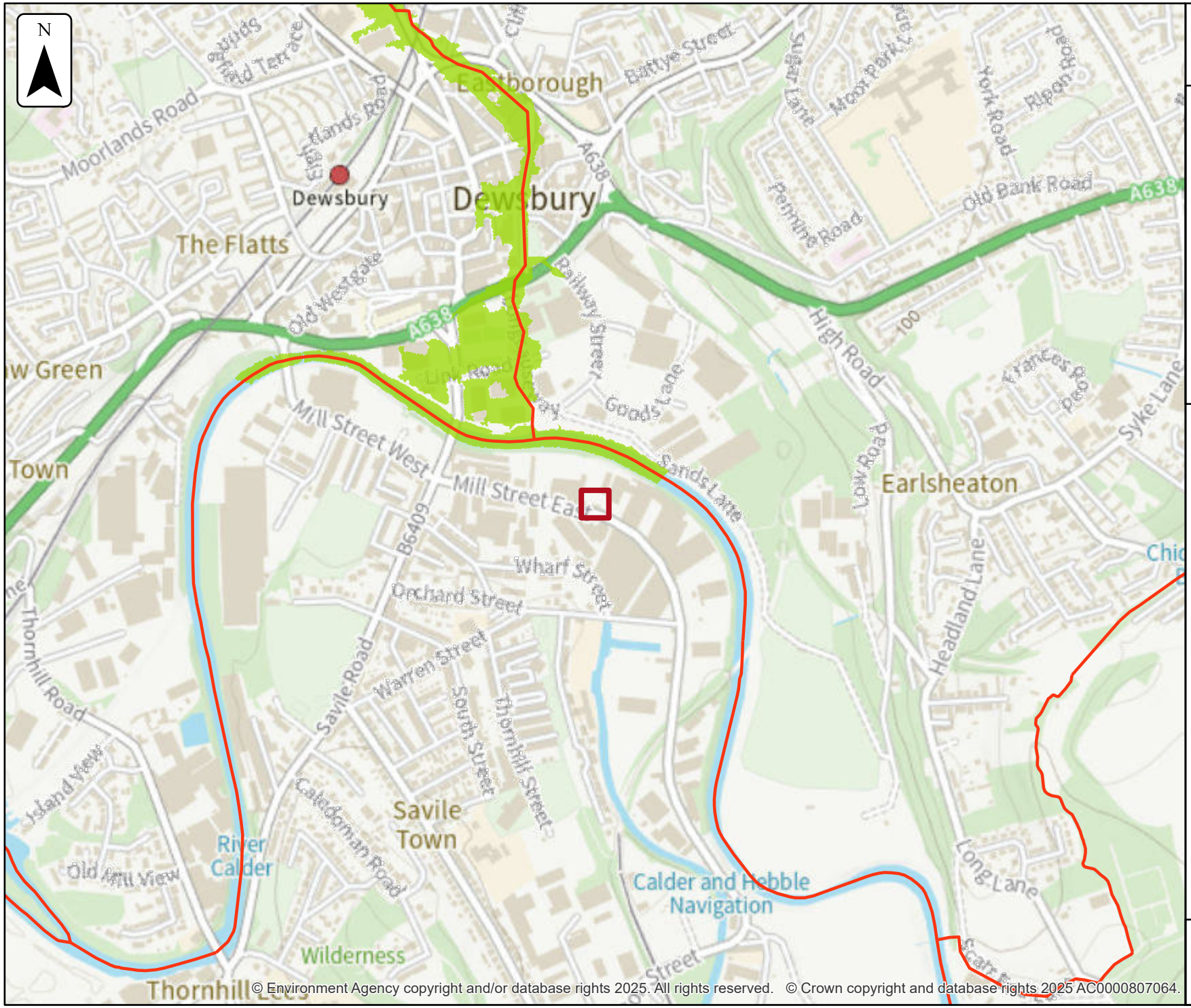
- Selected area
- Main river

Modelled flood extent

- 1% 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 climate change modelled fluvial extent

Location (easting/northing)
424820/421165

Scale
1:10,000

Created
29 Sep 2025

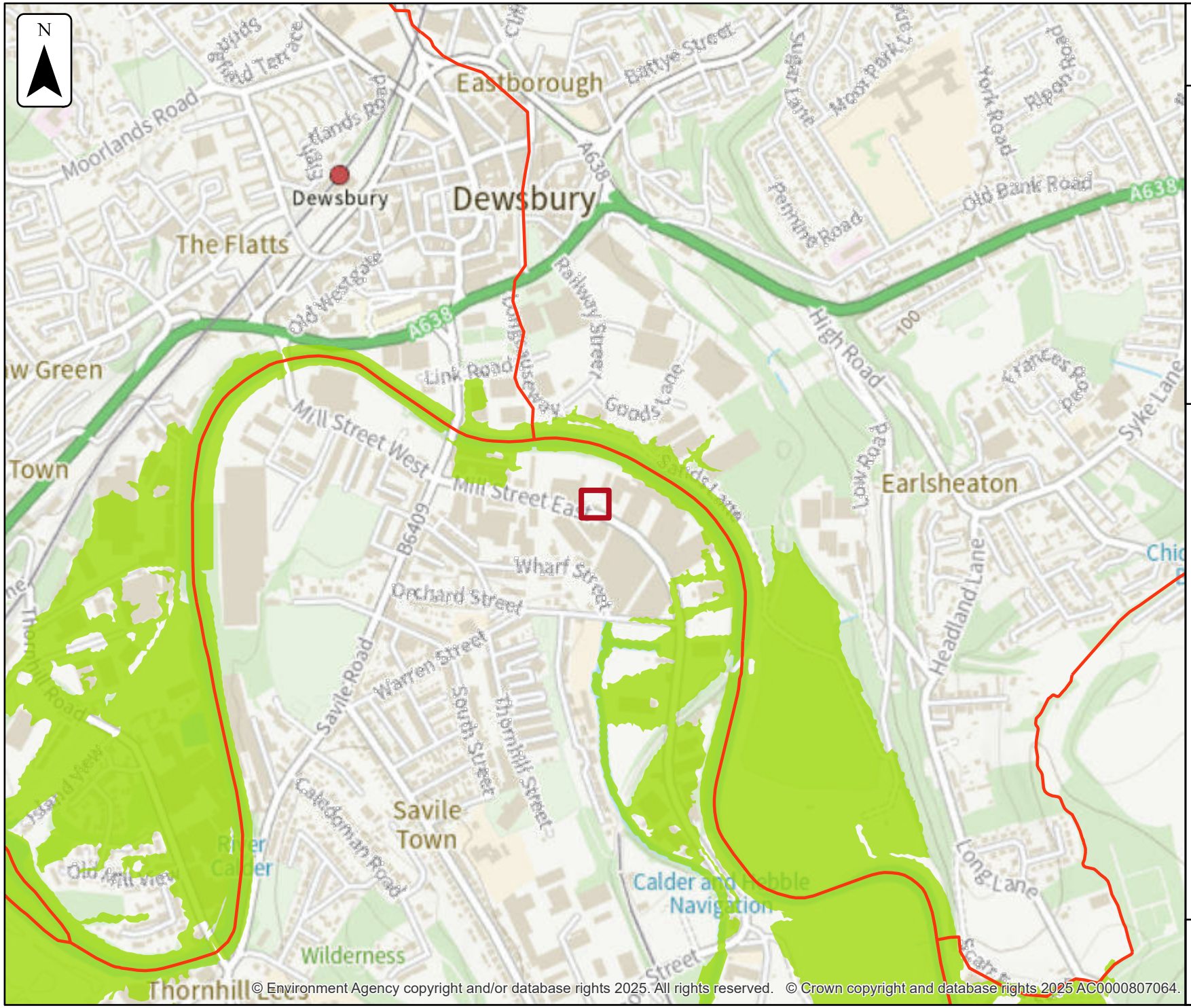
Model name
2015 Batley Beck Mapping Study

- Selected area
- Main river

Modelled flood extent
- 1% AEP (+20%)

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 extent

Location (easting/northing)
424820/421165

Scale
1:10,000

Created
29 Sep 2025

Model name
2015 Calder and Canals - downstream

Selected area

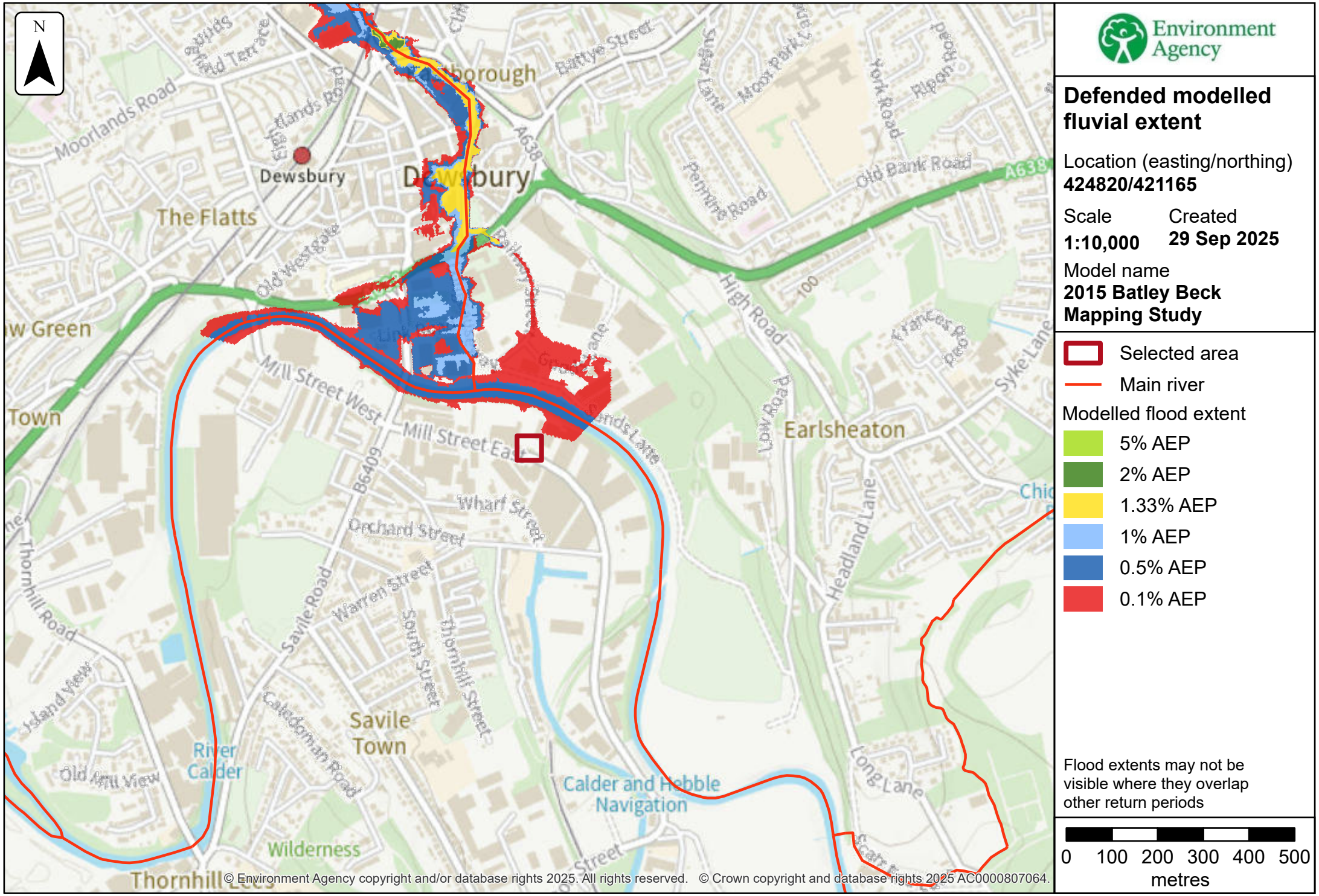
Main river

Modelled flood extent

1% AEP (+20%)

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

0 100 200 300 400 500
metres



Environment Agency

Defended modelled fluvial extent

Location (easting/northing)
424820/421165

Scale
1:10,000

Created
29 Sep 2025

Model name
2015 Batley Beck Mapping Study

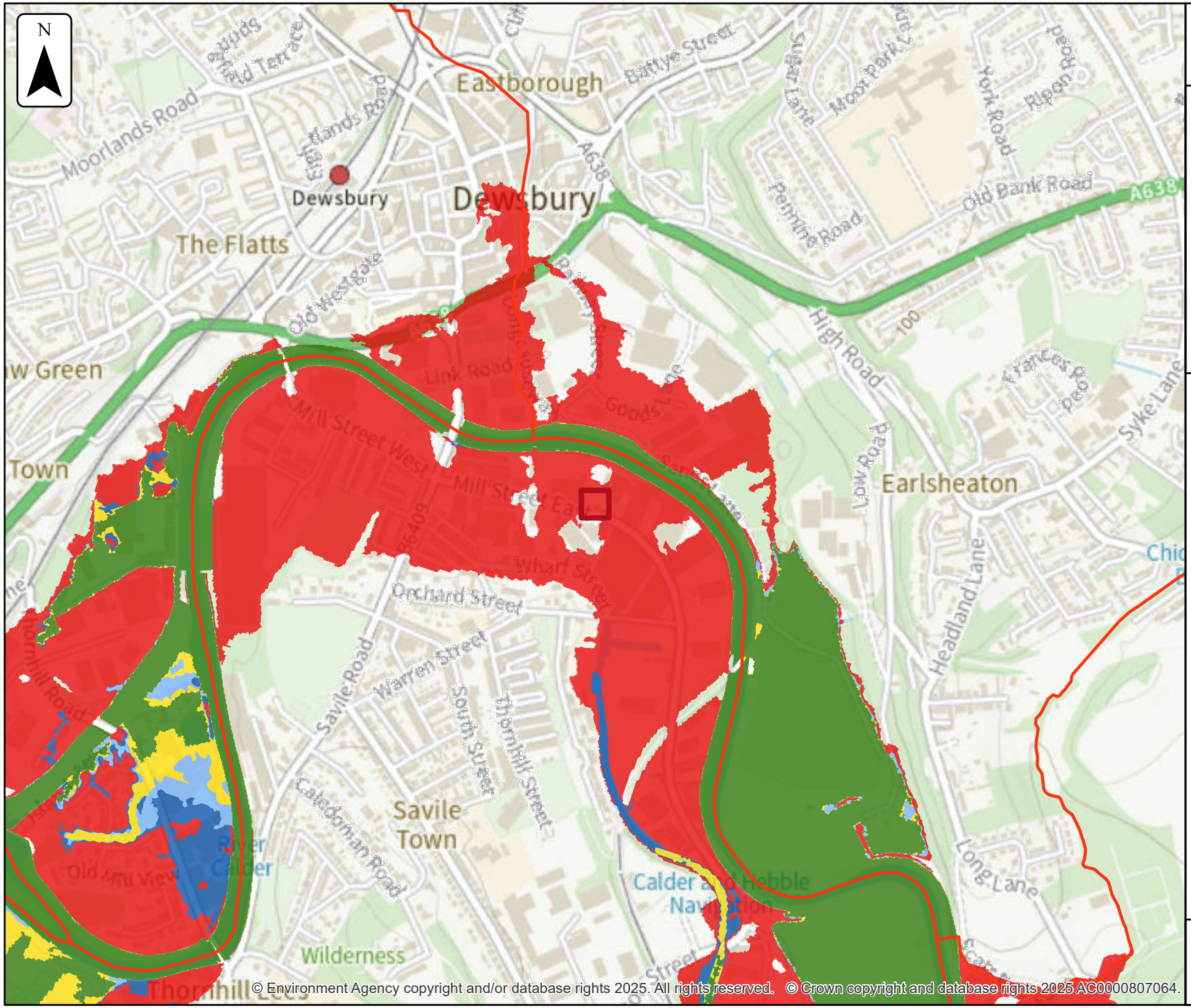
- Selected area
- Main river

Modelled flood extent

- 5% AEP
- 2% AEP
- 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 extent

Location (easting/northing)
424820/421165

Scale
1:10,000

Created
29 Sep 2025

Model name
2015 Calder and Canals - downstream

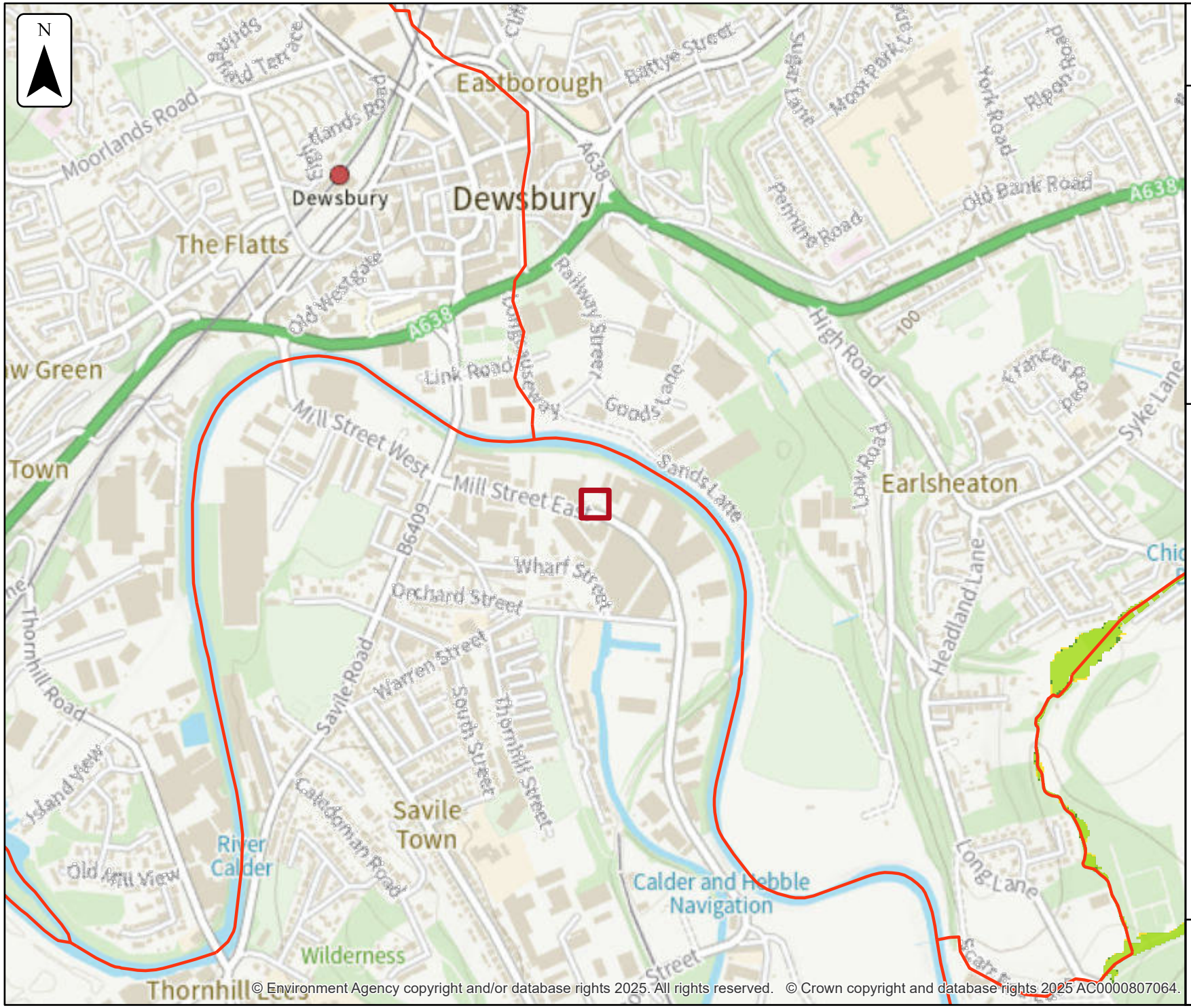
- Selected area
- Main river

Modelled flood extent

- 2% AEP
- 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

No defences exist climate change modelled fluvial extent

Location (easting/northing)
424820/421165

Scale
1:10,000

Created
29 Sep 2025

Model name
Chickenley Beck 2018

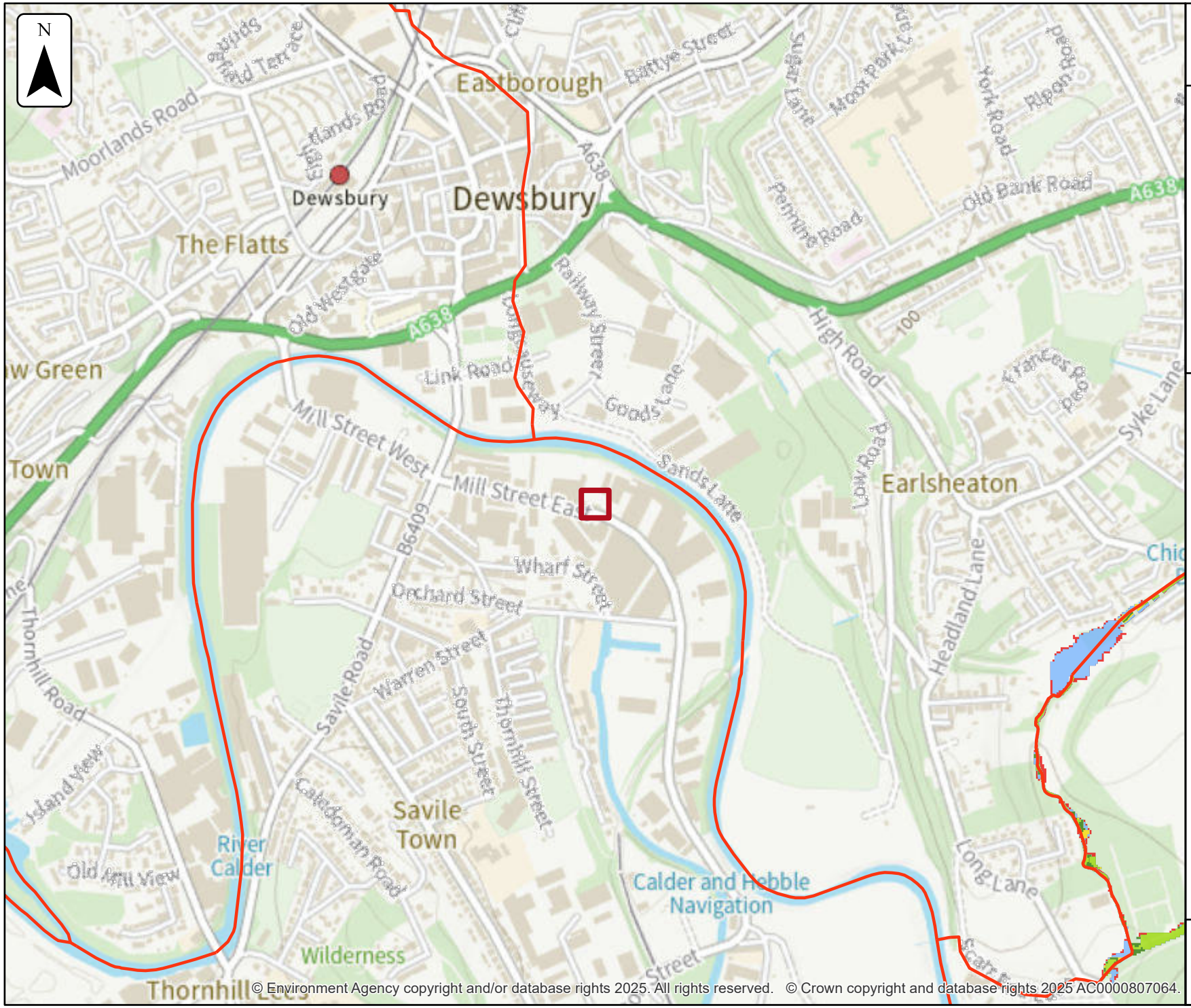
- Selected area
- Main river

Modelled flood extent

- 1% AEP (+20%)
- 1% AEP (+30%)
- 1% AEP (+50%)

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

0 100 200 300 400 500
metres



Environment Agency

No defences exist modelled fluvial extent

Location (easting/northing)
424820/421165

Scale
1:10,000

Created
29 Sep 2025

Model name
Chickenley Beck 2018

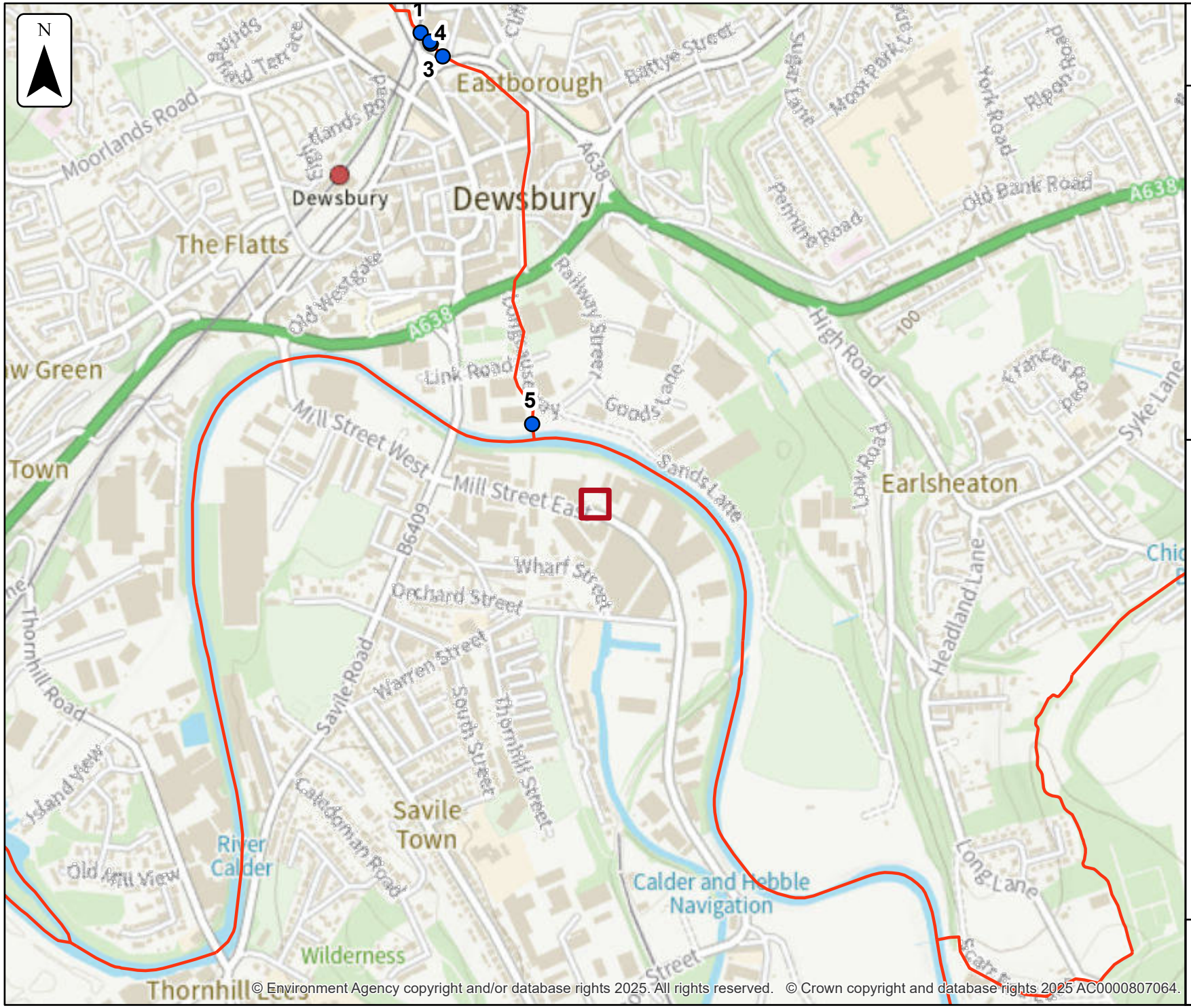
- Selected area
- Main river

Modelled flood extent

- 5% AEP
- 2% AEP
- 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 climate change modelled fluvial node locations

Location (easting/northing)
424820/421165

Scale
1:10,000

Created
29 Sep 2025

Model name
2015 Batley Beck Mapping Study

- Selected area
- Modelled location
- Main river

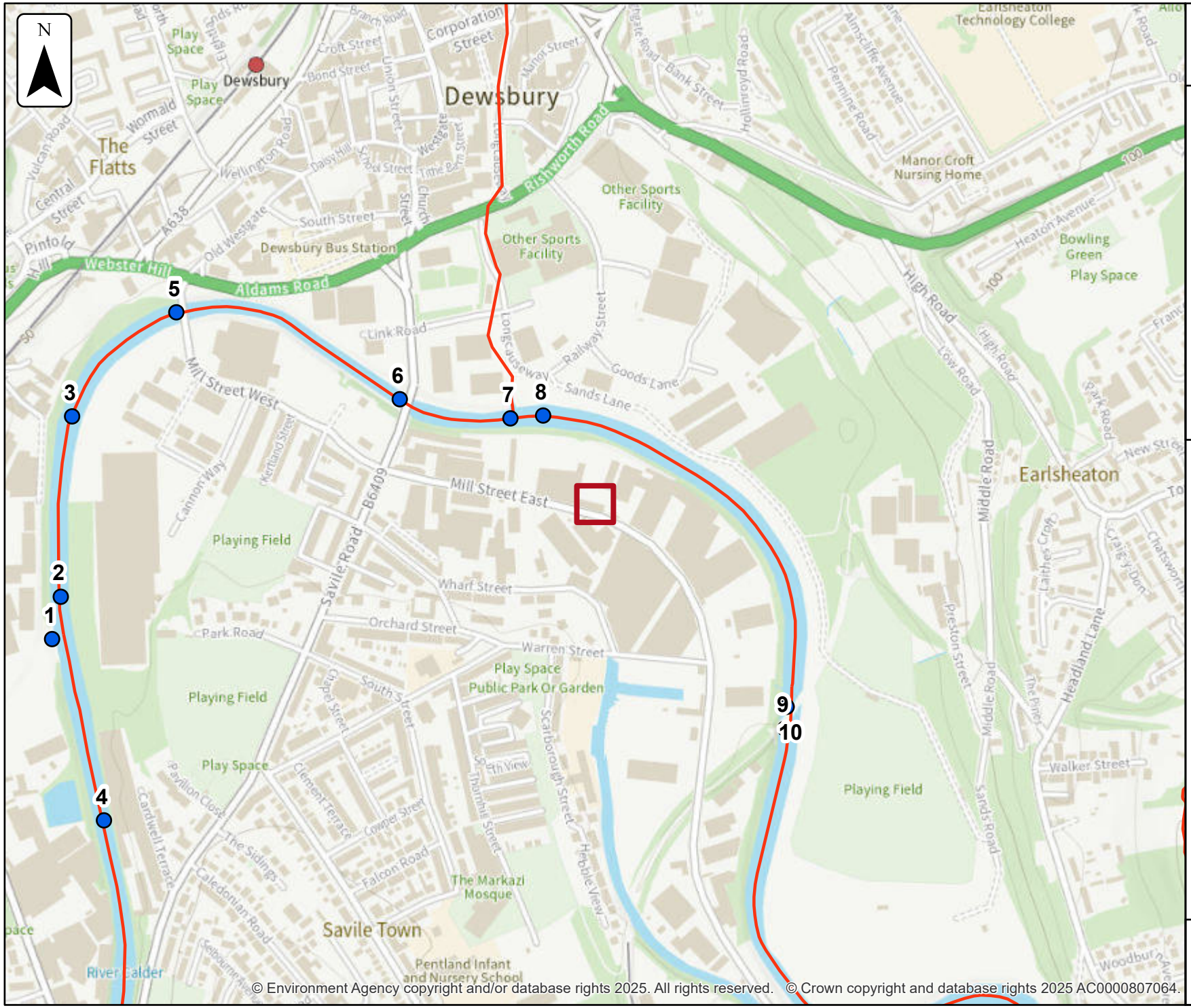
0 100 200 300 400 500
metres

Modelled node locations data

Defences removed climate change

Label	Modelled location ID	Easting	Northing	1% AEP (+20%)	1% AEP (+20%)
				Level	Flow
1	977815	424480	422083	42.14	26.23
2	977750	424498	422066	42.18	30.41
3	977789	424500	422062	42.18	28.82
4	977892	424523	422037	42.09	26.43
5	977831	424697	421321	36.79	27.12

Data in this table comes from the 2015 Batley Beck Mapping Study 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 node locations

Location (easting/northing)
424820/421165

Scale
1:7,500

Created
29 Sep 2025

Model name
2011 River Calder - Calder

- Selected area
- Modelled location
- Main river

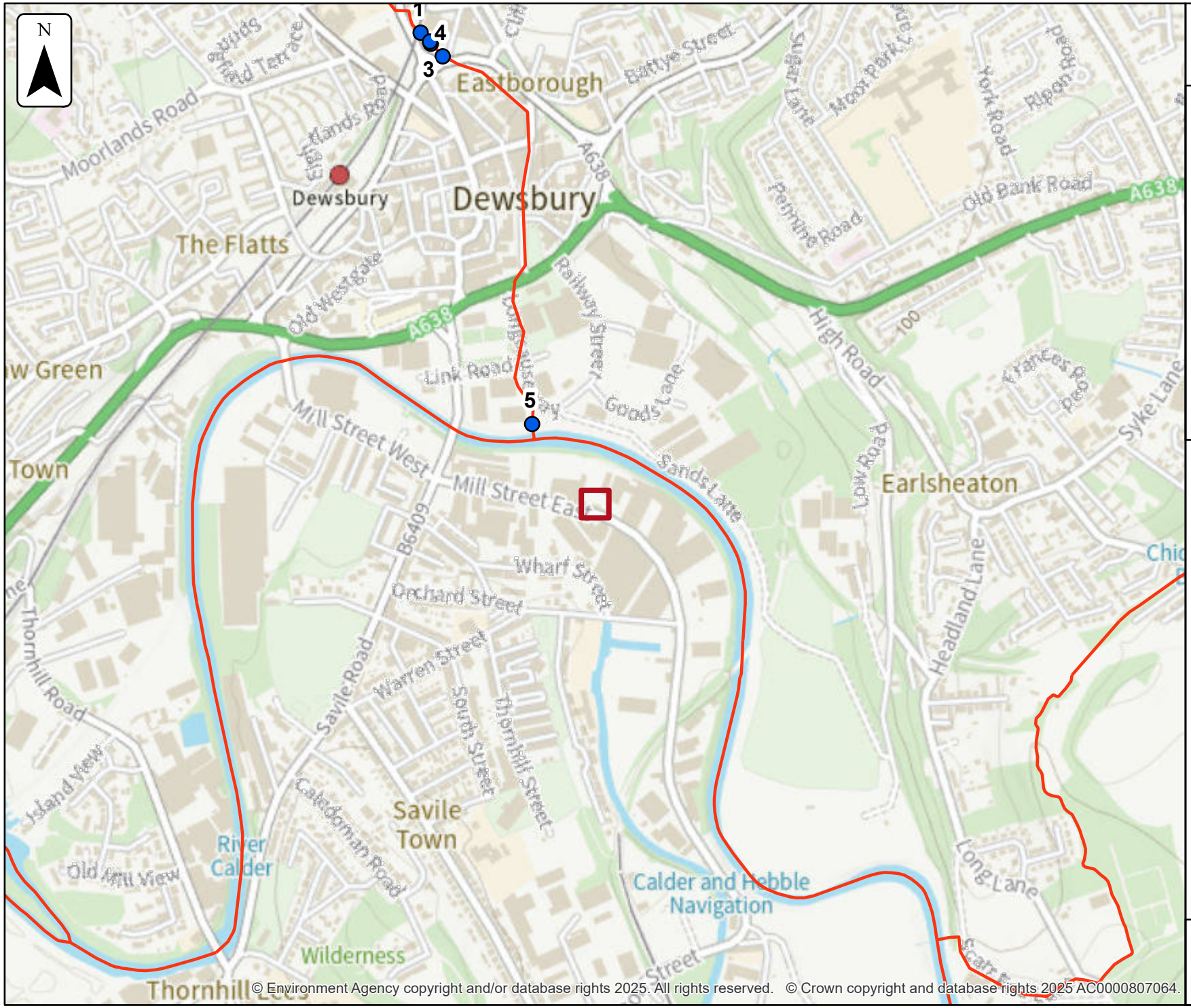
0 100 200 300
metres

Modelled node locations data

Defences removed climate change

Label	Modelled location ID	Easting	Northing	1% AEP (+20%)	1% AEP (+20%)
				Level	Flow
1	89252	424027	420968	38.96	119.50
2	233814	424039	421030	38.15	533.60
3	323938	424056	421293	37.91	533.58
4	56457	424103	420703	38.33	414.42
5	32107	424208	421445	37.56	533.57
6	34304	424535	421318	37.40	533.56
7	190194	424696	421290	37.01	533.48
8	94209	424744	421294	37.07	536.37
9	350256	425097	420837	36.50	535.02
10	150896	425100	420869	36.52	535.02

Data in this table comes from the 2011 River Calder - Calder 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 modelled fluvial node locations

Location (easting/northing)
424820/421165

Scale
1:10,000

Created
29 Sep 2025

Model name
2015 Batley Beck Mapping Study

- Selected area
- Modelled location
- Main river

0 100 200 300 400 500
metres

Modelled node locations data

Defences removed

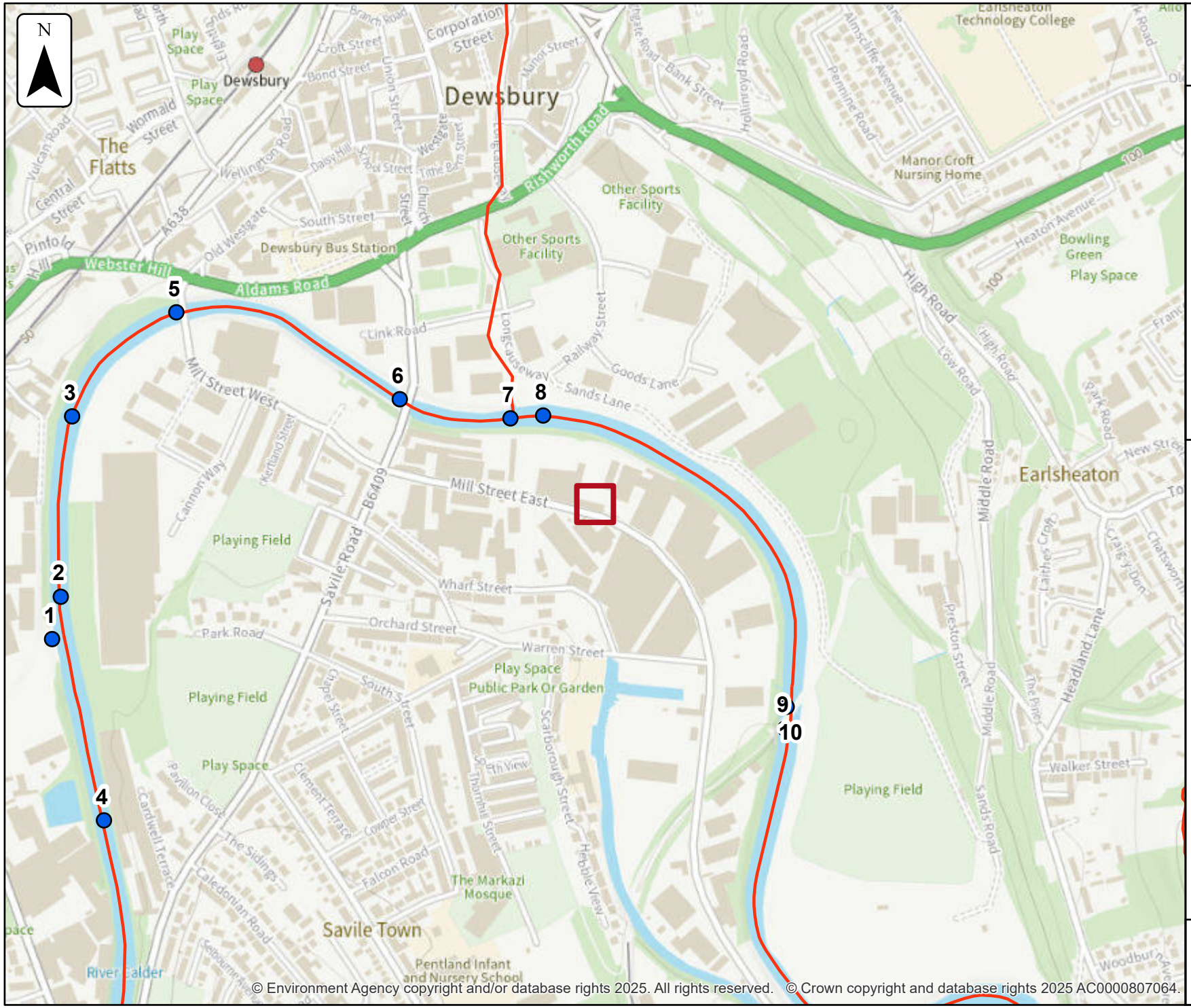
Label	Modelled location ID	Easting	Northing	50% AEP	20% AEP	10% AEP	5% AEP	3.33% AEP	2% AEP	1.33% AEP	1% AEP
				Level	Level	Level	Level	Level	Level	Level	Level
1	977815	424480	422083	39.45	39.76	40.10	40.74	41.12	41.38	41.92	41.97
2	977750	424498	422066	39.56	39.96	40.29	40.84	41.19	41.45	41.97	42.02
3	977789	424500	422062	39.56	39.96	40.29	40.84	41.19	41.45	41.97	42.02
4	977892	424523	422037	39.39	39.76	40.08	40.68	41.06	41.31	41.88	41.93
5	977831	424697	421321	35.51	35.51	36.0	36.0	36.27	36.27	36.64	36.79

Data in this table comes from the 2015 Batley Beck Mapping Study model.
Level values are shown in mAOD, and flow values are shown in cubic metres per second.
Any blank cells show where a particular scenario has not been modelled for this location.

Defences removed

Label	Modelled location ID	Easting	Northing	50% AEP	20% AEP	10% AEP	5% AEP	3.33% AEP	2% AEP	1.33% AEP	1% AEP
				Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow
1	977815	424480	422083	10.72	14.41	17.55	19.07	21.02	22.83	25.20	26.32
2	977750	424498	422066	10.72	14.42	17.63	19.18	21.04	22.98	25.63	26.64
3	977789	424500	422062	10.73	14.43	17.65	19.20	21.05	23.0	26.02	26.41
4	977892	424523	422037	10.74	14.45	17.58	19.31	21.08	23.05	25.44	26.10
5	977831	424697	421321	13.16	17.62	24.40	27.69	25.08	25.54	26.48	26.56

Data in this table comes from the 2015 Batley Beck Mapping Study 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 modelled fluvial node locations

Location (easting/northing)
424820/421165

Scale
1:7,500

Created
29 Sep 2025

Model name
2011 River Calder - Calder

- Selected area
- Modelled location
- Main river

0 100 200 300
metres

Modelled node locations data

Defences removed

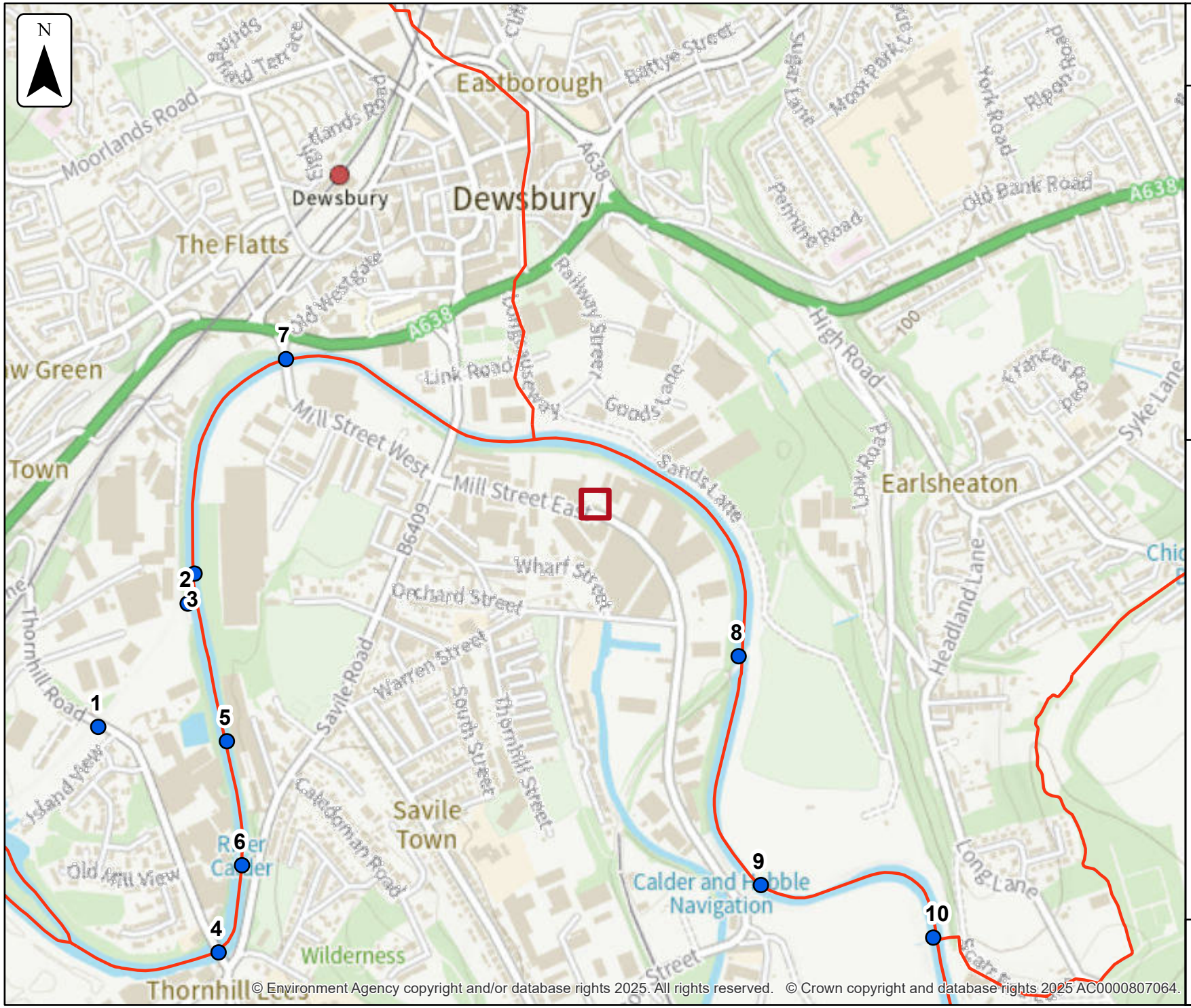
Label	Modelled location ID	Easting	Northing	10% AEP	4% AEP	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
				Level	Level	Level	Level	Level	Level	Level
1	89252	424027	420968	37.41	37.97	38.34	38.57	38.65	38.84	39.75
2	233814	424039	421030	37.01	37.33	37.53	37.64	37.72	37.99	39.20
3	323938	424056	421293	36.79	37.12	37.30	37.41	37.49	37.75	38.90
4	56457	424103	420703	37.28	37.57	37.74	37.84	37.92	38.17	39.32
5	32107	424208	421445	36.55	36.85	37.02	37.12	37.19	37.43	38.56
6	34304	424535	421318	36.43	36.73	36.89	36.98	37.04	37.28	38.22
7	190194	424696	421290	36.31	36.59	36.72	36.80	36.84	36.95	37.89
8	94209	424744	421294	36.32	36.61	36.75	36.83	36.88	37.0	37.82
9	350256	425097	420837	35.66	35.92	36.07	36.16	36.23	36.40	37.25
10	150896	425100	420869	35.68	35.93	36.08	36.17	36.25	36.42	37.32

Data in this table comes from the 2011 River Calder - Calder 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	10% AEP	4% AEP	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
				Flow	Flow	Flow	Flow	Flow	Flow	Flow
1	89252	424027	420968	48.05	70.29	88.02	99.72	103.61	113.25	163.69
2	233814	424039	421030	334.38	380.74	414.90	436.58	454.0	500.44	801.17
3	323938	424056	421293	334.20	380.65	414.85	436.52	453.98	500.41	806.81
4	56457	424103	420703	286.91	310.89	327.25	337.18	350.55	387.53	644.10
5	32107	424208	421445	334.06	380.60	414.82	436.47	453.96	500.39	804.58
6	34304	424535	421318	334.0	380.57	414.80	436.44	453.95	500.37	803.03
7	190194	424696	421290	333.92	380.53	414.78	436.40	453.94	500.35	883.48
8	94209	424744	421294	335.84	382.68	417.09	438.84	456.47	503.08	804.31
9	350256	425097	420837	335.36	382.16	416.36	438.0	455.73	502.14	799.76
10	150896	425100	420869	335.36	382.16	416.36	438.0	455.73	502.14	799.76

Data in this table comes from the 2011 River Calder - Calder 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 modelled fluvial node locations

Location (easting/northing)
424820/421165

Scale
1:10,000

Created
29 Sep 2025

Model name
2015 Calder and Canals - downstream

Selected area
Modelled location
Main river

0 100 200 300 400 500
metres

Modelled node locations data

Defences removed

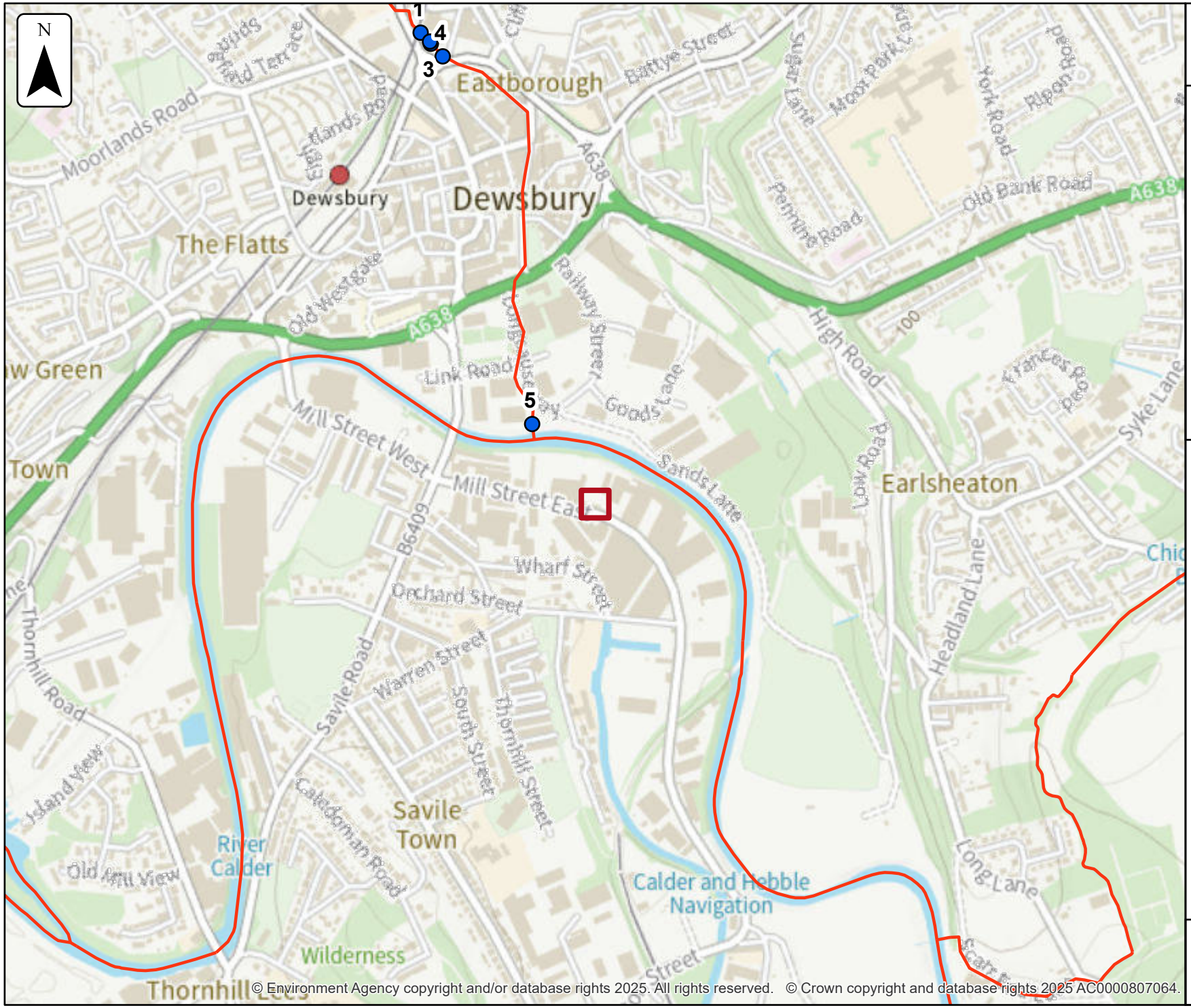
Label	Modelled location ID	Easting	Northing	50% AEP	20% AEP	10% AEP	4% AEP	3.33% AEP	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
				Level	Level	Level	Level	Level	Level	Level	Level	Level	Level
1	1129695	423852	420731	36.71	37.27	37.87	38.58	38.66	38.81	38.93	39.09	39.17	40.57
2	1129880	424026	420971	36.69	37.24	37.85	38.55	38.63	38.78	38.90	39.05	39.13	40.31
3	1129898	424040	421030	36.17	36.66	36.97	37.32	37.40	37.59	37.73	37.93	38.0	39.43
4	1129677	424087	420292	37.07	37.52	37.80	38.09	38.17	38.36	38.52	38.68	38.81	40.16
5	1130123	424103	420703	36.55	37.02	37.31	37.62	37.70	37.89	38.04	38.28	38.31	39.82
6	1129626	424132	420462	36.77	37.23	37.52	37.82	37.90	38.10	38.25	38.45	38.53	39.98
7	1130066	424218	421447	35.71	36.21	36.49	36.83	36.91	37.07	37.21	37.40	37.46	38.78
8	1129800	425099	420869	34.92	35.37	35.57	35.84	35.89	35.98	36.06	36.20	36.23	37.58
9	1130236	425143	420423	34.59	35.06	35.25	35.56	35.61	35.70	35.77	35.93	35.93	37.35
10	1129675	425478	420321	34.30	34.79	34.99	35.32	35.38	35.50	35.58	35.79	35.78	37.12

Data in this table comes from the 2015 Calder and Canals - downstream of Sowerby Bridge model.
Level values are shown in mAOD, and flow values are shown in cubic metres per second.
Any blank cells show where a particular scenario has not been modelled for this location.

Defences removed

Label	Modelled location ID	Easting	Northing	50% AEP	20% AEP	10% AEP	4% AEP	3.33% AEP	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
				Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow
1	1129695	423852	420731	23.58	41.90	65.30	98.94	102.89	110.62	116.73	159.30	129.03	273.80
2	1129880	424026	420971	23.54	41.83	65.07	98.69	102.74	110.63	116.65	124.36	128.94	195.31
3	1129898	424040	421030	211.90	247.11	267.64	285.17	292.64	314.18	332.81	354.04	366.97	528.0
4	1129677	424087	420292	212.20	247.34	267.99	285.63	292.86	314.98	332.94	325.88	367.81	423.10
5	1130123	424103	420703	212.02	247.20	267.78	285.38	292.72	314.83	332.90	325.82	367.84	439.09
6	1129626	424132	420462	212.11	247.27	267.87	285.45	292.78	314.33	332.89	325.72	367.56	426.11
7	1130066	424218	421447	235.08	288.73	332.29	383.27	395.13	424.48	449.32	480.46	495.46	736.60
8	1129800	425099	420869	236.85	291.23	334.76	385.96	397.28	427.55	451.25	484.44	495.17	677.18
9	1130236	425143	420423	236.37	290.45	322.65	360.22	364.21	378.72	394.92	415.17	424.60	642.82
10	1129675	425478	420321	235.83	283.60	305.54	347.17	351.09	361.36	367.38	384.37	379.39	620.50

Data in this table comes from the 2015 Calder and Canals - downstream of Sowerby Bridge 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 node locations

Location (easting/northing)
424820/421165

Scale
1:10,000

Created
29 Sep 2025

Model name
2015 Batley Beck Mapping Study

- Selected area
- Modelled location
- Main river

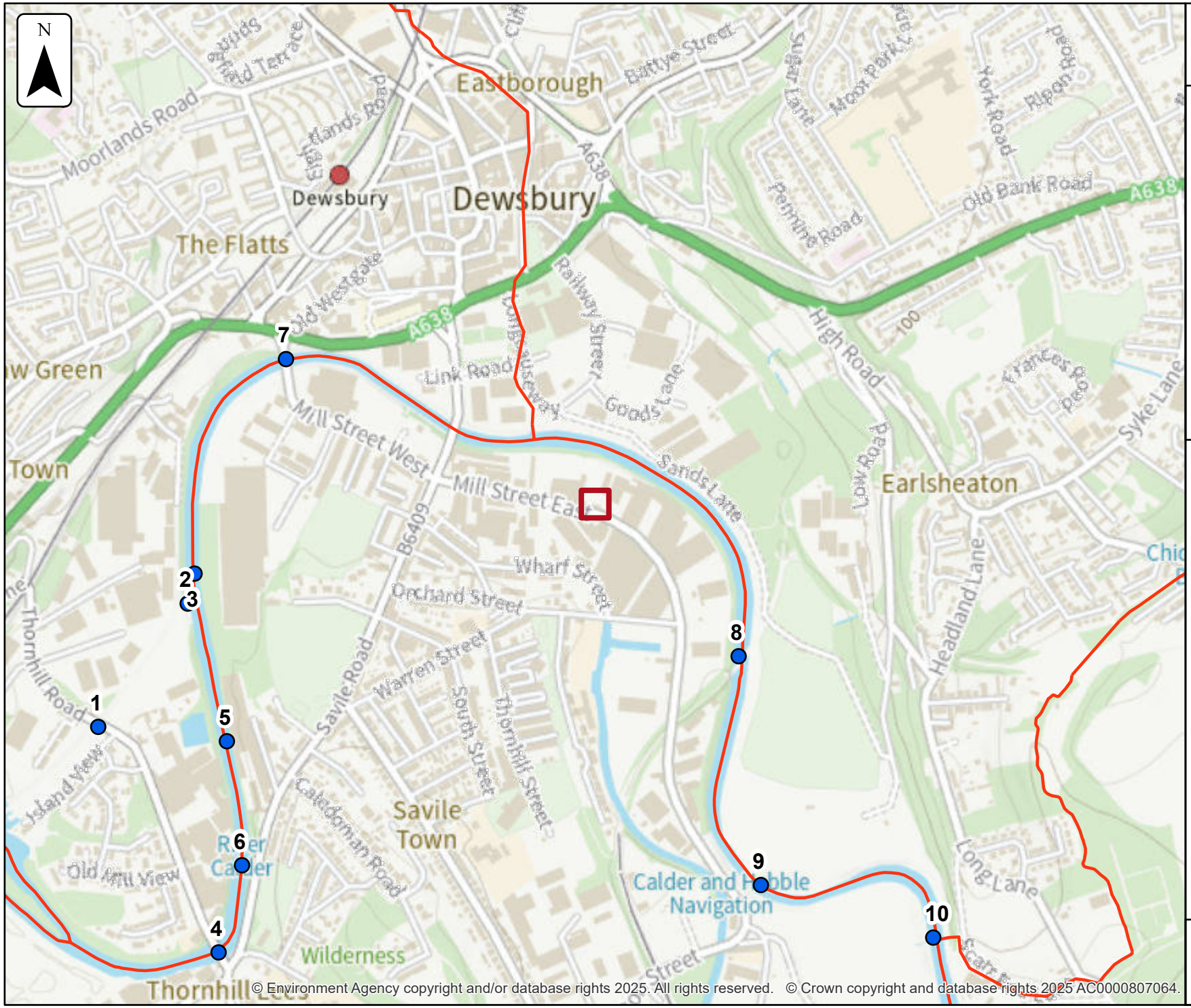
0 100 200 300 400 500
metres

Modelled node locations data

Defended climate change

Label	Modelled location ID	Easting	Northing	1% AEP (+20%)	1% AEP (+20%)
				Level	Flow
1	977815	424480	422083	42.12	26.18
2	977750	424498	422066	42.16	29.91
3	977789	424500	422062	42.17	28.42
4	977892	424523	422037	42.07	26.37
5	977831	424697	421321	36.79	27.04

Data in this table comes from the 2015 Batley Beck Mapping Study 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 node locations

Location (easting/northing)
424820/421165

Scale
1:10,000

Created
29 Sep 2025

Model name
2015 Calder and Canals - downstream

Selected area
Modelled location
Main river

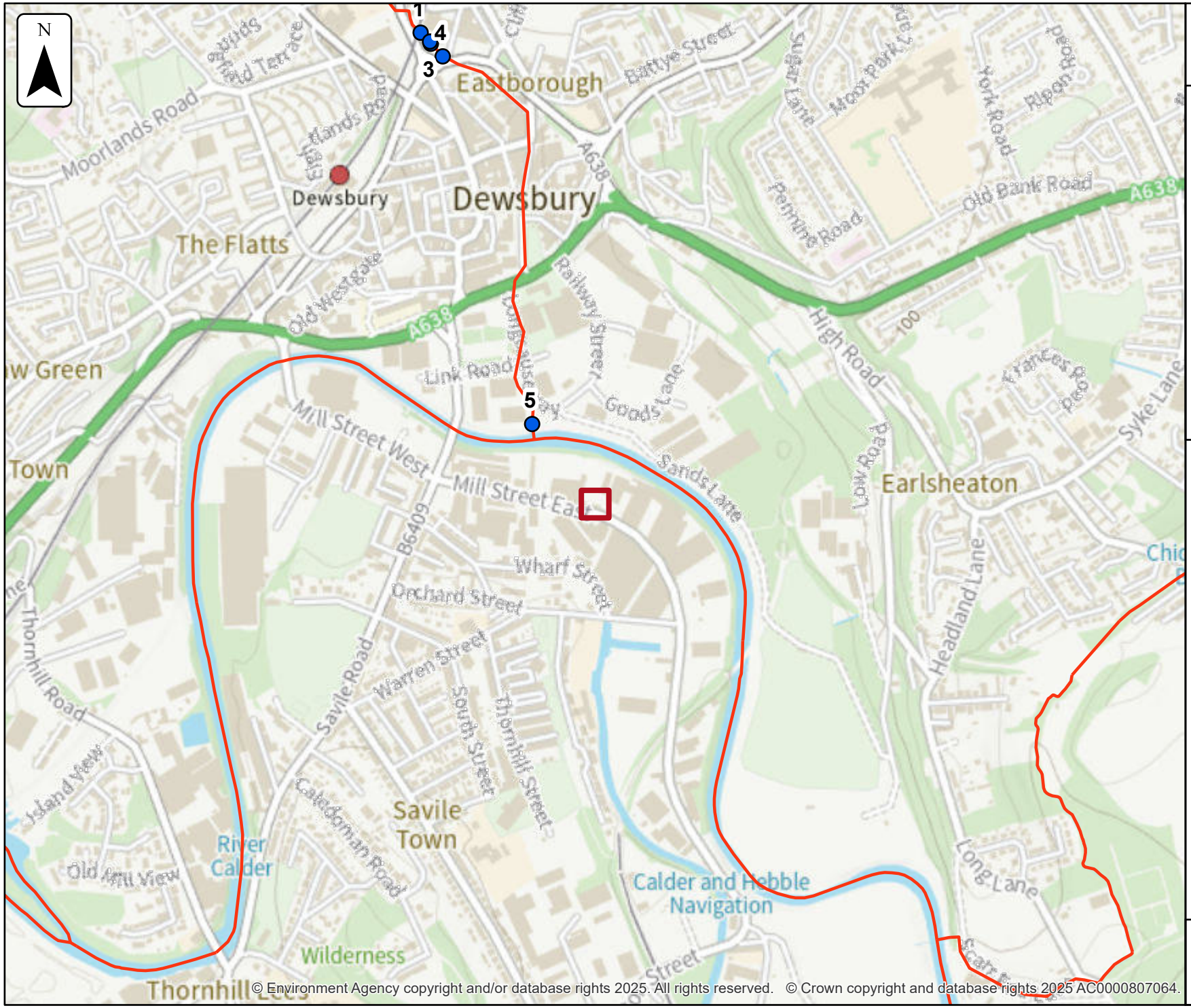
0 100 200 300 400 500
metres

Modelled node locations data

Defended climate change

Label	Modelled location ID	Easting	Northing	1% AEP (+20%)	1% AEP (+20%)
				Level	Flow
1	1129695	423852	420731	39.39	225.37
2	1129880	424026	420971	39.27	136.50
3	1129898	424040	421030	38.40	428.16
4	1129677	424087	420292	39.19	351.67
5	1130123	424103	420703	38.84	353.16
6	1129626	424132	420462	38.99	351.15
7	1130066	424218	421447	37.81	571.13
8	1129800	425099	420869	36.45	559.20
9	1130236	425143	420423	36.15	480.94
10	1129675	425478	420321	36.11	390.0

Data in this table comes from the 2015 Calder and Canals - downstream of Sowerby Bridge 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 node locations

Location (easting/northing)
424820/421165

Scale
1:10,000

Created
29 Sep 2025

Model name
2015 Batley Beck Mapping Study

Selected area
Modelled location
Main river

0 100 200 300 400 500
metres

Modelled node locations data

Defended

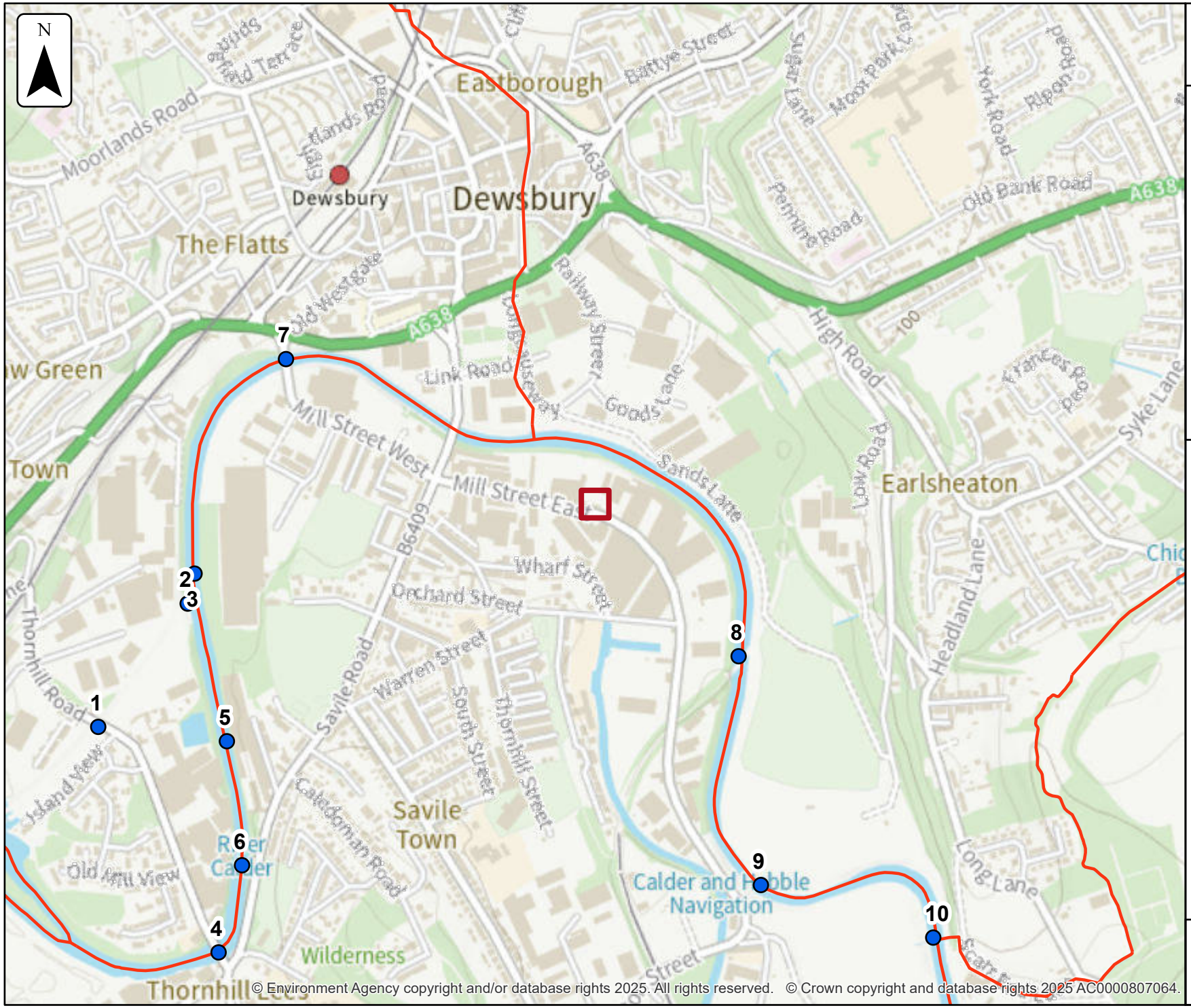
Label	Modelled location ID	Easting	Northing	50% AEP	20% AEP	10% AEP	5% AEP	3.33% AEP	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
				Level	Level	Level	Level	Level	Level	Level	Level	Level	Level
1	977815	424480	422083	39.45	39.76	40.10	40.83	41.25	41.54	41.94	41.98	42.12	42.40
2	977750	424498	422066	39.56	39.96	40.29	40.94	41.32	41.62	42.0	42.04	42.16	42.34
3	977789	424500	422062	39.56	39.96	40.29	40.94	41.32	41.62	42.0	42.04	42.17	42.34
4	977892	424523	422037	39.38	39.76	40.08	40.77	41.19	41.49	41.90	41.95	42.07	42.34
5	977831	424697	421321	35.51	35.51	36.0	36.0	36.27	36.27	36.64	36.79	36.79	36.97

Data in this table comes from the 2015 Batley Beck Mapping Study model.
Level values are shown in mAOD, and flow values are shown in cubic metres per second.
Any blank cells show where a particular scenario has not been modelled for this location.

Defended

Label	Modelled location ID	Easting	Northing	50% AEP	20% AEP	10% AEP	5% AEP	3.33% AEP	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
				Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow
1	977815	424480	422083	10.71	14.42	17.57	20.10	20.78	22.66	24.97	26.03	26.18	26.0
2	977750	424498	422066	10.72	14.43	17.66	19.86	20.89	22.87	25.33	26.28	29.81	41.46
3	977789	424500	422062	10.72	14.43	17.68	20.26	20.92	22.89	25.68	26.14	28.35	40.99
4	977892	424523	422037	10.73	14.45	17.60	19.97	21.04	22.98	25.34	26.0	26.37	26.48
5	977831	424697	421321	13.15	17.64	24.40	27.80	25.32	25.87	26.51	26.59	27.02	28.18

Data in this table comes from the 2015 Batley Beck Mapping Study 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 node locations

Location (easting/northing)
424820/421165

Scale
1:10,000

Created
29 Sep 2025

Model name
2015 Calder and Canals - downstream

- Selected area
- Modelled location
- Main river

0 100 200 300 400 500
metres

Modelled node locations data

Defended

Label	Modelled location ID	Easting	Northing	50% AEP	20% AEP	10% AEP	4% AEP	3.33% AEP	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
				Level	Level	Level	Level	Level	Level	Level	Level	Level	Level
1	1129695	423852	420731	37.47	38.16	38.33	38.84	38.90	39.02	39.09	39.25	39.28	40.56
2	1129880	424026	420971	37.44	38.13	38.30	38.81	38.87	38.98	39.04	39.20	39.20	40.30
3	1129898	424040	421030	36.14	36.84	37.0	37.55	37.64	37.81	37.90	38.03	38.24	39.42
4	1129677	424087	420292	36.86	37.55	37.71	38.29	38.39	38.56	38.66	38.76	39.01	40.14
5	1130123	424103	420703	36.42	37.12	37.28	37.86	37.95	38.15	38.26	38.33	38.65	39.81
6	1129626	424132	420462	36.61	37.31	37.47	38.04	38.14	38.32	38.43	38.51	38.80	39.96
7	1130066	424218	421447	35.68	36.38	36.52	37.05	37.13	37.29	37.38	37.55	37.67	38.77
8	1129800	425099	420869	34.89	35.52	35.61	36.0	36.04	36.13	36.18	36.58	36.35	37.59
9	1130236	425143	420423	34.57	35.21	35.29	35.73	35.76	35.84	35.89	36.30	36.06	37.36
10	1129675	425478	420321	34.28	34.96	35.04	35.52	35.59	35.70	35.77	36.07	35.98	37.14

Data in this table comes from the 2015 Calder and Canals - downstream of Sowerby Bridge model.
Level values are shown in mAOD, and flow values are shown in cubic metres per second.
Any blank cells show where a particular scenario has not been modelled for this location.

Defended

Label	Modelled location ID	Easting	Northing	50% AEP	20% AEP	10% AEP	4% AEP	3.33% AEP	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
				Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow
1	1129695	423852	420731	49.13	77.83	86.29	120.69	127.97	145.38	157.47	142.06	198.85	272.65
2	1129880	424026	420971	49.07	77.66	86.01	112.01	115.07	120.86	123.76	132.08	132.29	194.67
3	1129898	424040	421030	182.22	234.35	248.27	305.75	316.81	339.57	352.79	350.51	401.97	525.96
4	1129677	424087	420292	182.50	234.60	248.58	298.41	305.59	318.80	324.28	344.47	344.14	426.11
5	1130123	424103	420703	182.33	234.45	248.39	298.32	305.58	318.77	324.19	344.25	344.93	437.89
6	1129626	424132	420462	182.42	234.51	248.48	298.20	305.41	318.60	325.38	344.36	344.19	425.45
7	1130066	424218	421447	231.0	311.82	334.09	417.56	431.80	461.44	478.63	482.27	538.71	733.71
8	1129800	425099	420869	232.72	313.82	336.74	419.53	433.39	461.94	478.20	484.44	531.72	672.73
9	1130236	425143	420423	232.24	310.47	327.25	380.90	387.89	407.77	419.03	466.02	458.60	643.80
10	1129675	425478	420321	231.71	297.51	309.28	357.80	361.36	367.90	371.34	448.97	378.87	617.29

Data in this table comes from the 2015 Calder and Canals - downstream of Sowerby Bridge model.
Level values are shown in mAOD, and flow values are shown in cubic metres per second.
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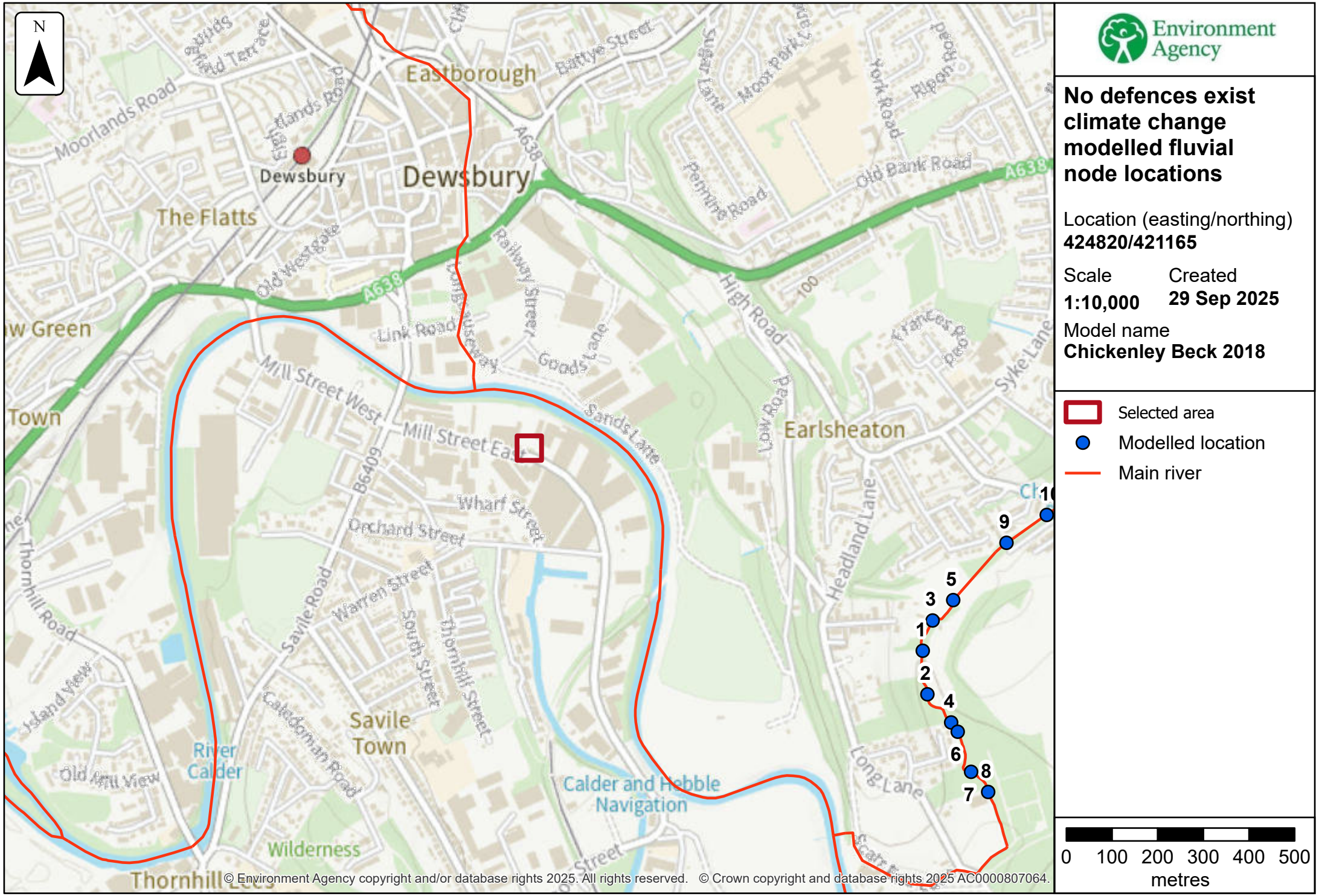


Environment Agency

No defences exist climate change modelled fluvial node locations

Location (easting/northing)
424820/421165

Scale
1:10,000

Created
29 Sep 2025

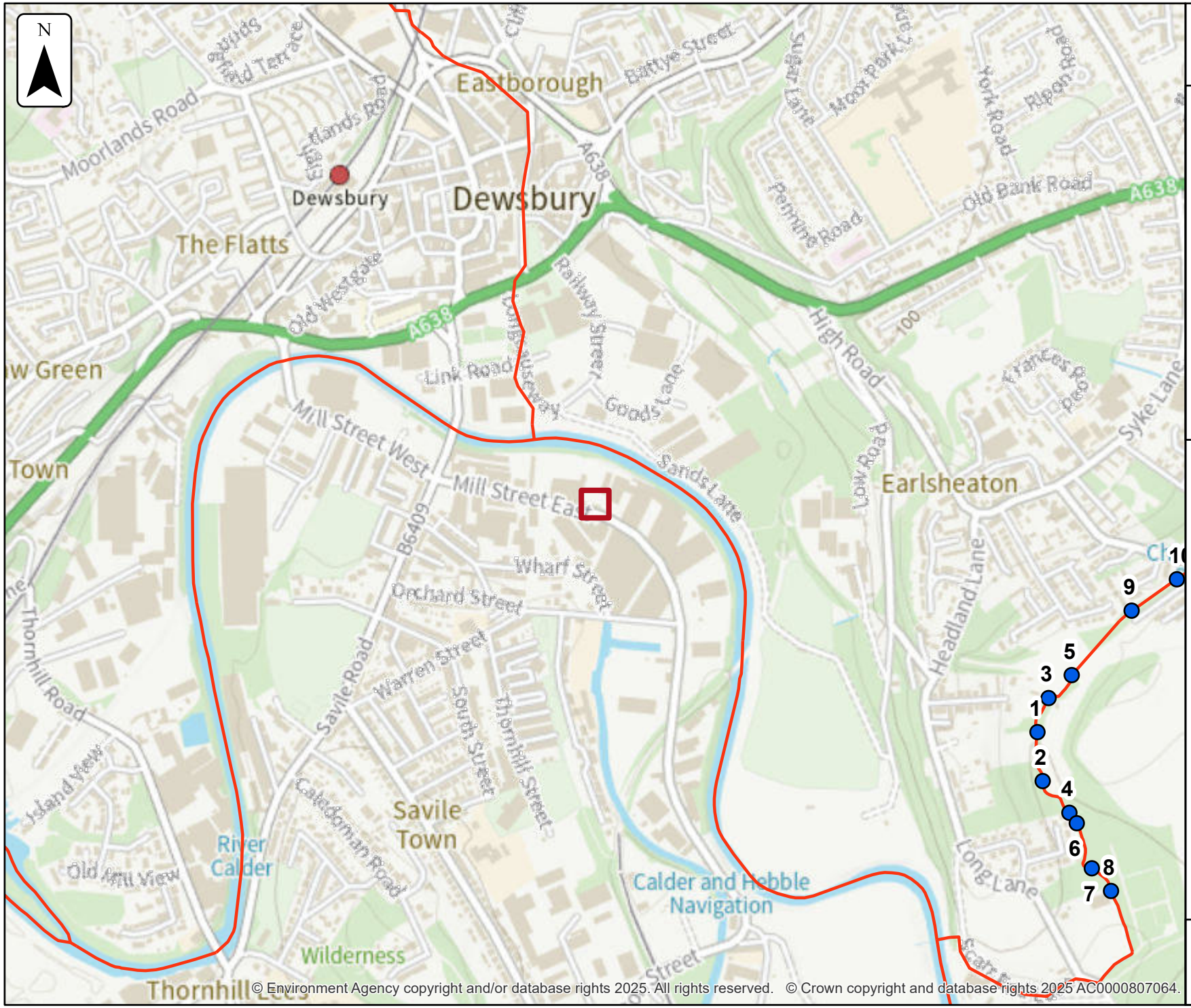
Model name
Chickenley Beck 2018

Modelled node locations data

No defences exist climate change

Label	Modelled location ID	Easting	Northing	1% AEP (+20%)	1% AEP (+30%)	1% AEP (+50%)	1% AEP (+20%)	1% AEP (+30%)	1% AEP (+50%)
				Level	Level	Level	Flow	Flow	Flow
1	955867	425681	420721	48.70	48.75	48.82	2.91	3.38	4.07
2	955726	425692	420626	46.70	46.74	46.81	3.34	3.81	4.66
3	955741	425703	420787	49.54	49.59	49.66	2.61	3.0	3.66
4	955743	425744	420564	44.54	44.57	44.62	3.52	3.92	4.71
5	955865	425748	420832	50.24	50.31	50.41	2.14	2.14	2.16
6	955837	425758	420544	44.31	44.34	44.44	3.22	3.46	3.80
7	955795	425787	420456	41.81	41.83	41.93	3.40	3.63	4.28
8	955779	425825	420412	39.55	39.59	39.70	4.01	4.33	5.42
9	955728	425865	420958	57.02	57.05	57.08	2.52	2.84	3.33
10	955852	425953	421019	57.88	57.92	57.97	2.39	2.67	3.09

Data in this table comes from the Chickenley Beck Model 2018 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

No defences exist modelled fluvial node locations

Location (easting/northing)
424820/421165

Scale
1:10,000

Created
29 Sep 2025

Model name
Chickenley Beck 2018

Selected area
Modelled location
Main river

0 100 200 300 400 500
metres

Modelled node locations data

No defences exist

Label	Modelled location ID	Easting	Northing	50% AEP	20% AEP	10% AEP	5% AEP	4% AEP	3.33% AEP	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
				Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level
1	955867	425681	420721	48.44	48.50	48.54	48.59	48.60	48.61	48.64	48.66	48.66	48.71	48.93
2	955726	425692	420626	46.42	46.48	46.53	46.57	46.58	46.60	46.64	46.66	46.67	46.70	46.92
3	955741	425703	420787	49.25	49.32	49.38	49.42	49.43	49.44	49.47	49.48	49.49	49.55	49.76
4	955743	425744	420564	44.24	44.33	44.40	44.45	44.47	44.49	44.51	44.52	44.53	44.54	44.73
5	955865	425748	420832	49.84	49.93	49.99	50.04	50.05	50.07	50.10	50.12	50.14	50.24	50.50
6	955837	425758	420544	43.90	44.01	44.10	44.16	44.18	44.18	44.21	44.24	44.26	44.31	44.52
7	955795	425787	420456	41.53	41.60	41.65	41.69	41.70	41.71	41.74	41.76	41.77	41.81	42.08
8	955779	425825	420412	39.16	39.25	39.32	39.37	39.39	39.41	39.46	39.49	39.51	39.55	39.85
9	955728	425865	420958	54.46	54.50	54.53	54.56	54.57	54.58	55.12	55.96	56.42	57.02	57.11
10	955852	425953	421019	57.58	57.64	57.68	57.72	57.73	57.74	57.77	57.81	57.83	57.88	58.03

Data in this table comes from the Chickenley Beck Model 2018 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.

No defences exist

Label	Modelled location ID	Easting	Northing	50% AEP	20% AEP	10% AEP	5% AEP	4% AEP	3.33% AEP	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
				Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow
1	955867	425681	420721	1.22	1.54	1.81	2.05	2.13	2.21	2.43	2.51	2.57	2.94	5.39
2	955726	425692	420626	1.36	1.73	2.04	2.32	2.42	2.51	2.78	2.92	3.01	3.34	6.19
3	955741	425703	420787	1.08	1.36	1.59	1.80	1.86	1.93	2.08	2.12	2.21	2.62	4.60
4	955743	425744	420564	1.42	1.80	2.13	2.42	2.52	2.62	2.91	3.07	3.18	3.53	6.06
5	955865	425748	420832	0.98	1.22	1.42	1.60	1.66	1.72	1.82	1.93	2.11	2.14	2.15
6	955837	425758	420544	1.42	1.80	2.13	2.42	2.52	2.62	2.88	2.99	3.06	3.22	4.90
7	955795	425787	420456	1.55	1.92	2.20	2.45	2.53	2.60	2.85	3.01	3.11	3.40	5.22
8	955779	425825	420412	1.56	2.0	2.36	2.69	2.80	2.92	3.24	3.47	3.61	4.01	7.30
9	955728	425865	420958	0.95	1.18	1.37	1.54	1.59	1.65	1.82	1.92	1.99	2.53	3.80
10	955852	425953	421019	0.86	1.06	1.22	1.37	1.42	1.46	1.62	1.75	1.87	2.40	3.31

Data in this table comes from the Chickenley Beck Model 2018 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.

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 Kirklees District.

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 Yorkshire Environment Agency team at neyorkshire@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