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FLOOD RISK ASSESSMENT

AT

HUDDERSFIELD RD, MIRFIELD

FOR

SS COMPONENTS

E26/8391/FR01A
Rev A – May 2026

MARCH 2026

Haigh Huddleston Associates is the trading name of Haigh Huddleston Associates Limited
Registered Office: Unit 4, Midgley Business Park, Bar Lane, Midgley, Wakefield, WF4 4JJ
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1.0 INTRODUCTION

1.1 This report is commissioned to investigate and report on the Flood Risk for this site in accordance Planning Practise Guidance- Flood Risk and Coastal Change September 2025 and the proposals for drainage of this site when redeveloped as residential land. The report is based on information supplied by the client and from relevant authorities in both written and verbal format. Some of this information is in verbal form only. No liability can be accepted for information supplied by third parties which is subsequently found to be inaccurate or incorrect.

2.0 THE SITE

2.1 The site is located in an industrial estate to the south of Huddersfield Road, Mirfield and is situated around Ordnance Survey grid reference 419358, 420222. A site location plan is in Appendix A.

2.2 The area to be developed consists of a vehicle storage area to the south of the existing commercial unit. To the west is a positively drained access road with further commercial units beyond. To the south is a raised storage area and disused railway viaduct with the River Calder beyond. To the east are further commercial units.

2.3 The site surface consists of well compacted soils and gravels, with a slight dip in the centre of the existing storage area. It is currently used for the storage of vehicles and is not positively drained. An access road extends from the north and western boundaries of the development area to Huddersfield Road to the north.

2.4 The topographic survey provided indicates the following site levels in the vicinity of the proposed planning application. On the southern boundary with the raised storage area site levels vary from 45.98-45.65m AOD, on the access road to the west, site levels vary from 46.01-45.66m AOD, with a fall to the north. The building to the north has a finished floor level of approximately 45.70m AOD, and the eastern boundary varies from 45.61-45.94m AOD, with a slight fall to the north. In the centre of the site, the lowest ground level shown is 45.58m AOD.

2.5 From the north of the site, the ground levels rise to 51.5m AOD where the access road meets Huddersfield Road to the north of the development.

2.6 No site investigation works have been undertaken on site to date, but the Geological Maps of Great Britain on the BGS website show the site is overlain by alluvium consisting of clays, silt, sand and gravel. The bedrock is shown to be the Lower Coal Measures Formation consisting of Mudstone, Siltstone and Sandstone (Fig 1).

Fig 1 Extract from Geological Map SE 12 SE (Clifton)

3.0 PROPOSED DEVELOPMENT AND DRAINAGE CONSTRAINTS

3.1 It is understood that the proposed development consists of constructing a new single storey brick and portal frame commercial unit to the south of the existing unit, over the existing storage area. In addition to this, a formal parking area is to be formed, which will require drainage. A copy of the planning layout is attached in the appendices.

3.2 There is no positive drainage recorded serving the existing storage area, with a slight dip in the centre of the land leading to historical ponding of surface water. There are channel drains and gullies serving the existing access to the west of the proposed development, channel drains to the north of the existing unit, and the roof of the existing unit is served by several downpipes. There are existing manholes located in the north east and south west of the development area, although there are no records of what these serve and if they are surface or foul water.

3.3 No site investigation works have taken place, and from the recorded geology of the site of alluvium overlying the Lower Coal Measures, it is considered unlikely that infiltration methods would be a suitable long term form of surface water disposal. Due to the close proximity of the site to the River Calder it is considered likely that there will be a high groundwater table, so for the purposes of this FRA, it will be considered that infiltration methods are not suitable.

3.4 It is therefore proposed to connect to the existing surface water system serving the existing commercial unit to the north of the proposed development. The final discharge would need to be reduced to 70% of the existing discharge rate with attenuation provided for the 1 in 100 year + 45% climate change events.

3.5 The proposed foul discharge will need to connect to the existing foul drainage system serving the existing commercial units on site.

3.6 It is recommended a site investigation is undertaken to identify the drainage serving the existing buildings on site and determine the outfall location for the drainage. This will determine the attenuation proposals based on the depth of the existing drainage systems serving the site.

4.0 FLOOD RISK

4.1 On reviewing the Environment Agency websites flood risk maps, the majority of the development site currently falls within flood zone 3: which is designated as high probability of flooding from sea or rivers greater than 1.0%(ie 1 in 100 year) probability of flooding (Fig 1). The available EA plans indicate that the flooding does not appear to be directly from the River Calder to the south west of the site, but more indirectly through the commercial development located to the west of the site. The area on the opposite side of the River Calder is designated as a water storage area, although this appears to be under utilised and is not shown to flood.

The hierarchy of flood zones are described as:

Flood Zone 1: Low Probability. Land assessed as having a less than 1 in 1000 chance of river and sea flooding in any year (<0.1%).

Flood Zone 2: Medium Probability. Land assessed as having between a 1 in 100 and 1 in 1000 chance of river flooding (1% 0.1%) and between a 1 in 200 and 1 in 1000 chance of sea flooding (0.5% 0.1%) in any year.

Flood Zone 3: High Probability. Land assessed as having a 1 in 100 or greater chance of river flooding (>1%) and 1 in 200 or greater chance of sea flooding (>0.5%) in any year.

The site is therefore considered to be at risk from fluvial flooding from rivers or sea more frequently than the 1 in 100 year flood events. The proposed commercial use of the site would be classified as Less Vulnerable in Table 2: Flood Risk Vulnerability Classification in the Planning Practise Guidance- Flood Risk and Coastal Change September 2025. In accordance with that table the proposed development would be considered to be appropriate for the site.

4.2 The depth of flooding map indicates there is a low chance (between 0.1 and 1.0%) of flood waters on the site reaching 0.9m (Fig 3). This correlates with the information provided by the EA and included in Appendix C which gives an interpolated depth of flooding of approximately 0.8m for the 1 in 100 year event based on the modelled levels upstream and downstream of the development site. There is not a significant increase in the flood zones shown due to climate change, therefore it is not anticipated there will be significant increase in the water

levels on site when the climate change storm events are considered. The data shows that the site has not flooded in the five flood events since 2002.

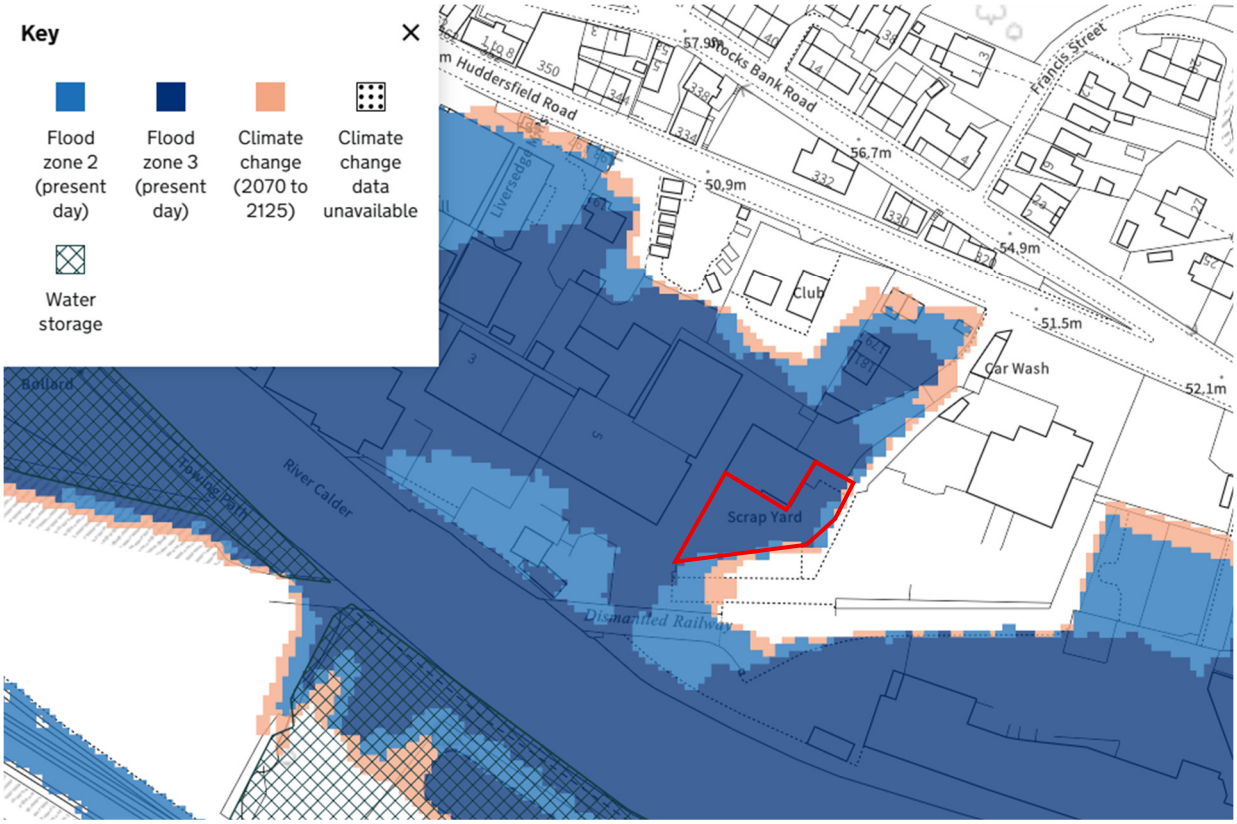


Fig 2 Flood Risk Map with climate change – Environment Agency Plan

Fig 3 Flood Risk Map – Depth up to 0.9m from Rivers and Sea

4.3 The site is in an area where there is a high chance of flooding from water falling on the site, with potential run-off from higher ground to the west and north of the development area (Fig 4). The depth of flooding is mostly shown to be less than 0.6m deep for the 1 in 100 year storm events (Fig 5).

Fig 4 Surface Water Flood Risk Map - Extent

Fig 5 Surface Water Flood Risk Map - Depth

4.4 The site falls within an area subject to flooding from reservoirs when river levels are normal according to the EA maps. We consider the risk of such a source of flooding would be low. The site does not fall within a flood warning zone.

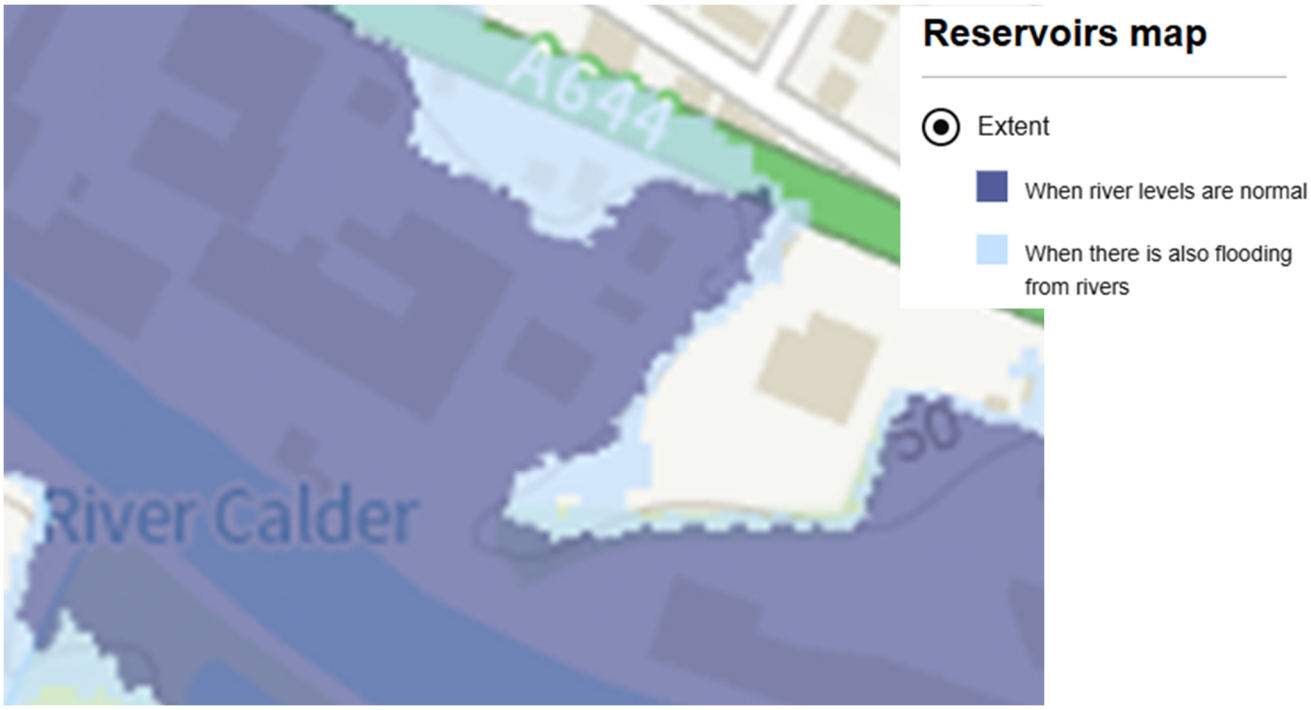


Fig 6 Reservoir Flood Risk Map - Extent

4.5 There are a few potential flooding mechanisms that the Planning Practise Guidance- Flood Risk and Coastal Change September 2025 now requires to be evaluated for each proposed development site. Each method of flooding requires an assessment to be made on its probability relative to the site development. The normal requirement of the document is for no flooding of properties for storms up to a 1% probability or a once in a 100 years storm. The risk assessment also includes for flooding both on site and off site, and the effects of the development on the downstream catchment or the flow regime of the watercourse. NPPG also requires that the effects of severe storms above the normal 1% probability are reviewed together with the effects of climatic change relating to the design life of the development.

4.6 It also requires that the effects of climate change are taken into account together with the impacts of extreme events and flood defence failures. Prior to this the Sequential Test, and where necessary, the Exception test as outlined in Planning Practise Guidance- Flood Risk and Coastal Change September 2025, must also be applied to each development site. These aspects are not covered in this report.

4.7 The Planning Practise Guidance- Flood Risk and Coastal Change September 2025 requires that each flooding mechanism is addressed and levels of risk evaluated. We consider there are four main risks of flooding to the site. The alternative mechanisms are not applicable to this site.

- Inundation from floodwaters leaving watercourses or rivers entering the site. This can include the effects on culverted watercourses and where the risk of blockage can occur from breach scenarios.
- Rainwater falling on the site and not being able to leave the site at sufficient rate to prevent flooding on the site.
- Overland flows from adjacent land sites due to surcharging of sewerage systems or other watercourses.
- The impact of the developed site on the existing drainage systems and off-site surface water systems must also be assessed as part of this flood risk assessment.

5.0 DISCUSSION OF FLOOD RISKS

5.1 Flood Risk from Watercourses, River & Tidal

5.1.1 The proposed development area falls within the 0.1% an 1% probability Flood Risk Maps (Zone 2 and 3) as published by the Environment Agency. The proposed commercial use of the site is categorised as less vulnerable and the risk of flooding of the site from River and Sea is considered acceptable for this type of development on this site.

5.1.2 The development site is indicated to be benefiting from flood defences. The flood defences layer generally indicate areas of land that benefit from the presence of defences in a 1 in 100yr chance of flooding from rivers or 1 in 200yr chance of flooding from sea. i.e. if the defences were not there, these areas would flood in a 1 in 100yr event. Please note there is an assumption that the flood defences will act perfectly in the event of the flood event occurring, this assumes that they are in good condition and that they have been regularly maintained and inspected.

5.1.3 The site should be included within the flood warning area designated by the E.A. for the Kirklees Catchment. We would consider that it would be necessary to evacuate the site for flood events up to the 1 in 100 year event.

5.1.4 The proposed building use however suggests that the risk of flooding to the depths calculated may not be a problem but the risk of damage to the contents of the building have to be considered. The possible inundation of the buildings would mean the risk of the building becoming isolated, cannot be ignored.

5.1.5 The risk of isolation would remain if personnel were not able to evacuate during major flood events. We would recommend that a refuge area is provided on site above the anticipated flood level. Although a refuge area could be provided within the buildings above the flood levels, the safer solution would be to evacuate the buildings if a flood warning exists for this area of the River Calder Catchment. The number of personnel affected by this would be very limited and they would not be present overnight.

5.1.6 Safe access to the site. As indicated in the Flood map for Planning there are widespread areas adjacent the River Calder that fall within Flood Zone 3 but are defended from inundation by flood barrages and river defenses. The consequences of any breach or mechanical failure of these defences the residual risk is high. In view of the fact that most of the area, however there is safe egress to Huddersfield Road to the north of the site which lies outside the designated flood zones, even when future climate change is considered. In view of this residual risk we would recommend that the site is closed down and evacuated whenever there is a high flood risk.

5.1.7 Also guidance may be given by the Local Authority, emergency services and the EA if a flooding event is threatened. The occupiers of the property should be aware of where these sources publish such advice and respond accordingly. There are a number of booklets and information guides issued by the EA regarding the dangers of flood waters and how the effects can be mitigated before, during and after flooding events.

5.1.8 It is recommended a Flood Management plan is produced and maintained by the property management company for the site. This should include details of what action to take in the event of receiving a flood event warning or when there have not been any warnings issued. The Management company will be required to store Flood Emergency Kit on site and would need to liaise with Kirklees Council Emergency Planning Department, the EA and the Emergency services in the event of a flood warning or sudden flooding event.

5.2 **Risk of Flooding from overland flows from adjacent land.**

5.2.1 The site lies in an area of land where there is a general fall towards the site from the north, south, east and west, with a small depression located centrally within the site. This is reflected by the surface water flood risk maps showing ponding in the proposed development area, which indicates the depth to be less than 600mm for up to the 1 in 100 year storm events.

5.2.2 It is not shown to reach this depth to the east of the proposed building where the proposed parking and egress from the site are located. There is therefore considered to be a low risk of flooding from overland flows from adjacent land.

5.3 **Risk of Flooding from Rainwater Falling on Site**

5.3.1 The existing risk of flooding from water falling on site is shown to be relatively low with small localised flooding in low spots on site that aren't of significant depth. This would be removed through the new drainage system on site. The impermeable area of the site will increase significantly due to the development, and this would increase the run off from the site. This would increase the flood risk to down stream properties unless attenuation measures and restriction of flows took place.

5.3.2 The normal hierarchy for surface water discharge in accordance with current planning and SUDS policies is as follows:

1. The use of infiltration systems such as Soakaways.
2. Discharge to nearby rivers or watercourses with the use of attenuation.
3. Discharge to existing public sewer network with the use of attenuation.

5.3.3 No site investigation works have taken place, and from the recorded geology of the site of alluvium overlying the Lower Coal Measures, it is considered unlikely that infiltration methods would be a suitable long term form of surface water disposal. Due to the close proximity of the site to the River Calder it is considered that there could be a high groundwater table, so for the purposes of this FRA, it will be considered that infiltration methods are not suitable.

5.3.4 The existing commercial property has a positively drained roof area of 420m^2. Based on a 50mm/hr rainfall intensity, discharge rates from the existing site for the 1 in 1 year storm event can be calculated as follows:

2.78 x 0.042ha x 50mm/hr = 5.8 l/s

In order to provide a betterment on the existing arrangement, we would therefore recommend that the proposed discharge rate for the development is a 30% reduction of existing which works out at:

5.8 x 0.7 = 4.0 l/s

5.3.5 Therefore the development should drain to the existing surface water drainage system serving the adjacent development at a restricted discharge rate of 4.0 l/s. The roof run-off from the existing commercial property will need to be diverted through the proposed surface water system.

5.3.6 With attenuation of flows there would have to be a storm-water storage facility. The use of above storage systems such as swales, detention basins or ponds, would provide the most sustainable urban drainage system. However, due to the restricted size of the development, a detention basin would entail significant land up take. For the onsite sewerage system there is a need for underground tanks to provide sufficient attenuation storage for the site. Based on this criteria, the estimated volumes of storage required are shown in the attached calculation sheets. For this run off the storage volumes require 18-30 cu.m for the 30 year storm, and 46-72 cu.m for the 100 year storm when 45% extra for climatic change is added.

5.3.7 The use of below ground storage facilities on their own, may not provide a suitable level of treatment of the run off from the site and biological systems, at source, may be needed to ensure contaminants are dealt with prior to discharge of site. The use of open swales and ponds would allow the use of reed beds and other organic systems to be employed so should still be considered in the final designs. Primary treatment for the roads would be the use of trapped gullies for all hard standings. The use of filter drains adjacent to private drives or permeable paving on private drives would also provide a first stage treatment of run off from drives and allow a discharge into the top soils on site. Rainwater butts may also be provided to enable some recycling of run off from the roofs and paved areas. The use of green roofs is not considered appropriate in this development. As discussed in 5.3.6, the small nature of the site means the use of open swales and ponds are not considered feasible for the development.

5.3.8 The size of the storm water storage facilities would need to be determined accurately in the final detailed designs and determined by the invert level of the existing lateral connection and proposed final ground levels. These should be all in accordance with the current PPG. The volumes of storage can include flooding to roads and designated areas such as carpark areas or public open space for the 100 year storm with 45% allowance for climate change, but must ensure that no buildings are flooded.

5.4 **Impact on existing drainage systems.**

5.4.1 A drainage survey of the site is recommended to understand the current outfall arrangements and ensure that they are in reasonable condition.

5.4.2 Attenuation has been provided for a significantly increased return period of 1 in 100 years plus 45% climate change, with a discharge restricted to 70% of the existing. In real terms this would lead to a reduced flood risk offsite due to the restricted flows off-site for these storm events. This will ensure that there should be no increase in the flood risk to properties off site or in the drainage networks downstream of the site.

5.4.3 The area to be developed is currently used for storage and parking. Due to the proximity of the property to the existing access, and vehicle access requirements for loading/unloading, there will be a minimal change to ground levels and the loss of flood storage area will also be minimal.

5.4.4 In addition to this, the proposed building which will be designed to be flooding will not represent a significant decrease in the volume of flood storage in this area over the current usage for parking and storage. However, if required, a sub-floor void can be incorporated into the building construction to provide compensatory flood storage volume. This compensatory flood storage volume would be separate from the attenuation provided as part of the surface water drainage system.

6.0 FUTURE MAINTENANCE

6.1 It is proposed for the surface water system serving the development to remain private and will remain the responsibility of the site owner. In particular, the proposed attenuation to be provided for the site will need to be maintained along with the flow control device.

6.2 The maintenance requirements of the attenuation are dependent on whether an attenuation tank, storage crates or oversized pipes are proposed. This will depend on the final site levels and the invert level of the existing lateral connection to determine the most economic attenuation solution

7.0 CONCLUSIONS

7.1 The area of the site to be developed currently falls within Flood Zone 3 as defined by the EA Flood maps. The development falls into the category of less vulnerable land use and therefore is considered acceptable subject to resolution of the residual risks to an acceptable level.

7.2 The site should be evacuated in the event of extreme flood events being forecast. The site is not to cater for any overnight working or accommodation unless a full risk assessment is prepared. The site will need to have flows attenuated to reduce the flows below current levels and previous levels.

7.3 The existing drainage serving the property should be properly maintained to ensure there are no risks of blockages that could adversely affect the property or adjacent buildings.

7.4 By closing the facilities and implementing an evacuation of the site for any flood warning for events above the 1 in 30 years, the site can function effectively and safely. All personnel should be made aware of the flood evacuation requirements and the location of the exits. Exits should be kept clear of any obstructions at all times. All services including electrical services should be located above the maximum flood levels.

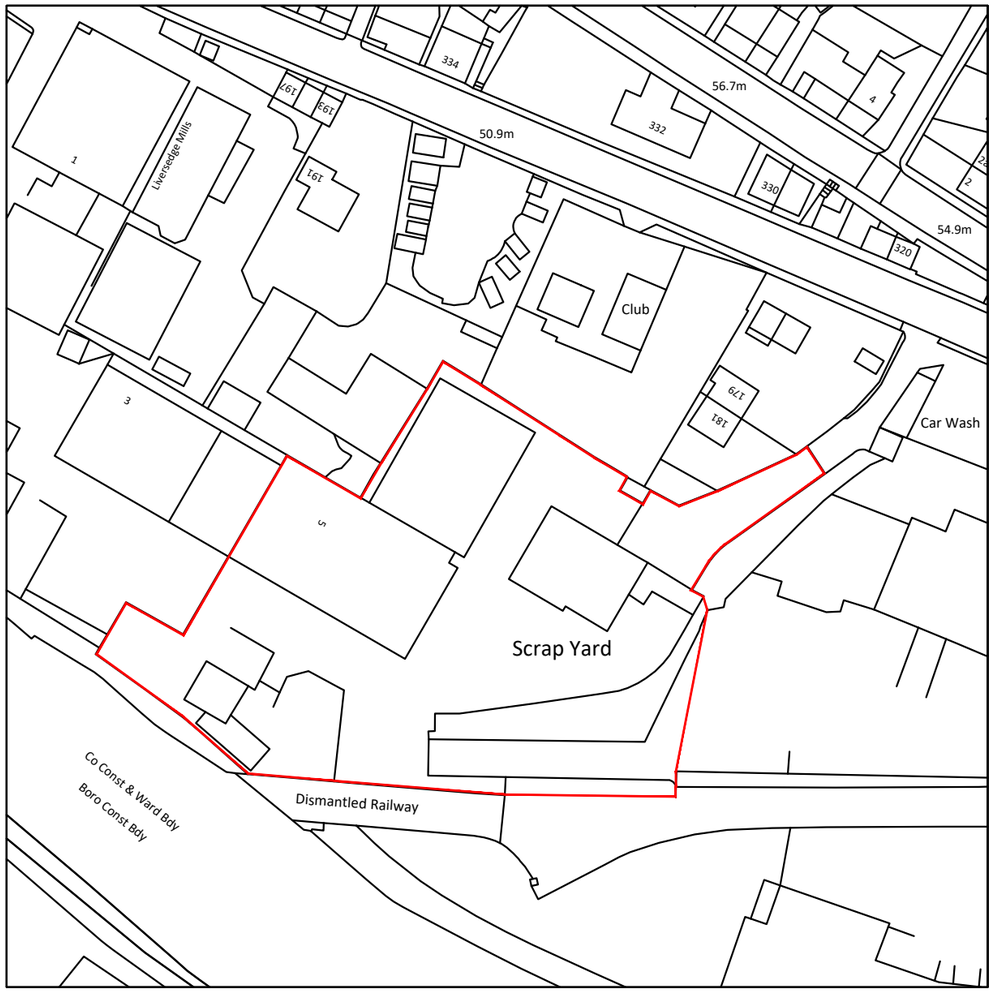
7.5 We consider that we have shown that the site can be developed, and this report has assessed the risk to occupiers on site and those in the downstream or upstream catchment. It outlines acceptable measures to develop the site in accordance with the EA requirements.

7.6 If the recommendations within this report are adopted for providing attenuation up to and including the 1 in 100 year + 45% climate change storm events and the flow from site restricted to a maximum of 4.0 l/s, there will be a reduction in the flood risk both to the proposed properties on site, as well as the existing properties downstream of the site.

MARTIN HUDDLESTON. MEng

APPENDIX A

LOCATION PLAN
PLANNING LAYOUT
TOPOGRAPHICAL SURVEY



Location Plan 1:1250

North

Planning drawings only - Not to be used for construction purposes.

Client	
Project	SS Components Ltd Huddersfield Road Mirfield WF14 9DQ
Title	Existing Elevations & Plan
Scale: 1:1250 @ A3	Date:
Drawn: AC	Checked:
Drawing No.	Rev.

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ARCHITECTURAL SERVICES FOR DOMESTIC EXTENSIONS, ALTERATIONS AND NEW BUILDS

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5

Ramp

Dismantled Railway

North

Planning drawings only - Not to be used for construction purposes.

Client	
Project	SS Components Ltd Huddersfield Road Mirfield WF14 9DQ
Title	Site Plan
Scale	1:200 @ A2
Date	
Drawn	AC
Checked	
Drawing No.	2024-SSC-PL-04
Rev.	

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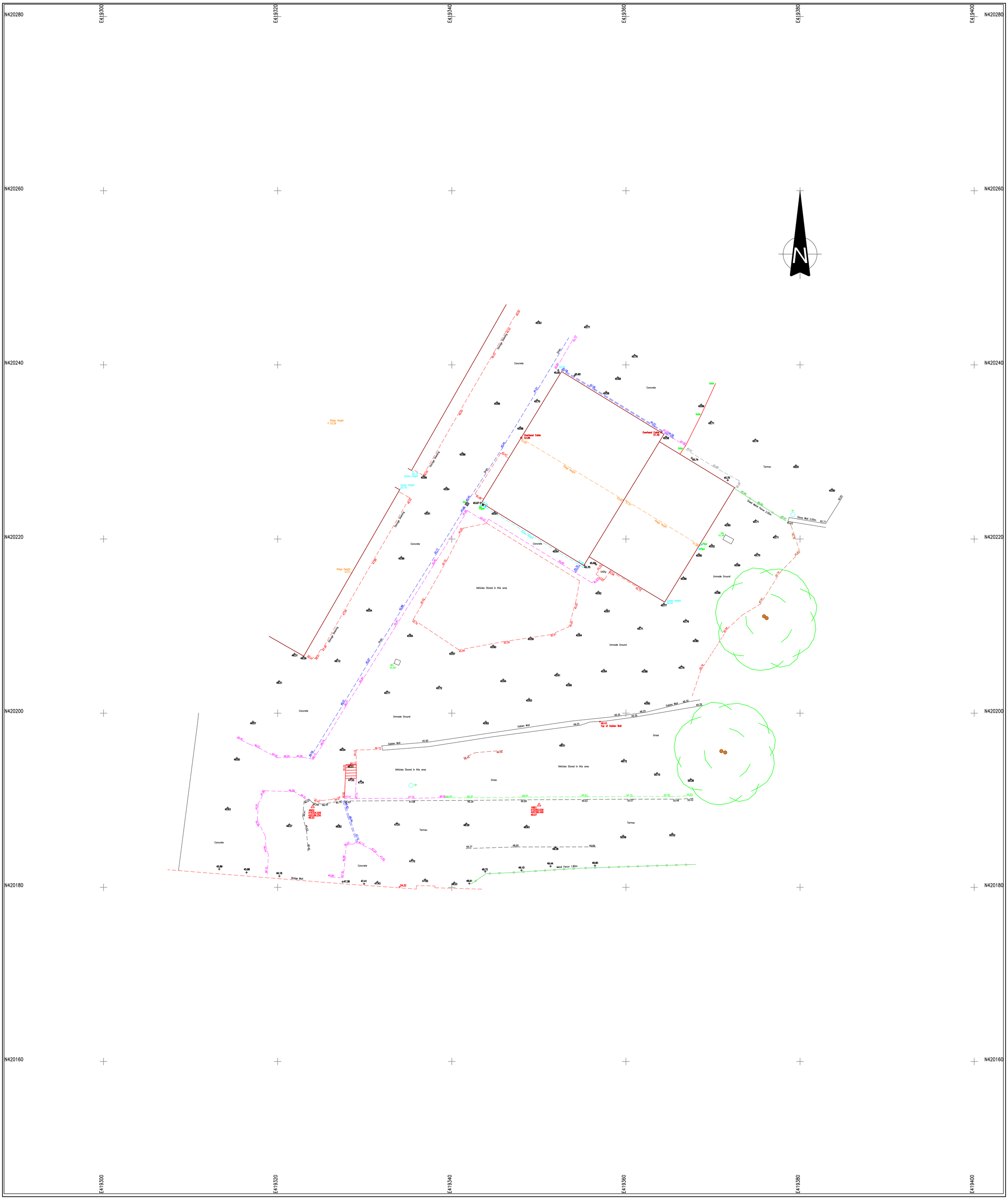

SYMBOL LEGEND

- Borehole
- Benchmark
- Bollard
- Bus Stop
- Electric Box
- Electricity Pole
- Fence Post
- Gas Stop Valve
- Gate Post
- Gas Marker
- Gully
- Gas Well
- Kerb Outlet
- Litter Bin
- Leachate Chamber
- Lamp Post
- Manhole Point
- MH Triangular
- Wooden Peg
- Ground Marker
- Marker Post
- Pylon
- Rodding Eye
- Sample Point
- Sign Post
- Spot Height
- Eave Level
- Ridge Level
- Stile
- Survey Station
- Traffic Camera
- Telephone Box
- Trial Pit
- Telegraph Pole
- Deciduous Tree
- Road Sign
- Valve
- Vent
- Water Meter
- Letter Box
- MH Circular
- Knockout Pot

LINETYPE LEGEND

- Bridge
- Bottom of Bank
- Building
- Canopy Edge
- Concrete Edge
- Ditch
- Drop Kerb
- Overhead Cable
- Fence
- Gate
- Kerb
- Path
- Pipe Line
- River
- Surface Water Drain
- Railway Line
- Road Centre Line
- Tarmac Edge
- Top of Bank
- Track
- Wall
- Verge
- Flagstone Paving
- Stone
- Hedgeline
- Grass Edge

MANHOLE LEGEND

MHCT	Cable Television
MHEL	Electricity
MHGA	Gas
MHSW	Surface Water
MHFW	Foul Water
MHBT	British Telecom
MHWT	Water

ABBREVIATIONS

LP.	Lamp Post
TP.	Telegraph Pole
EP.	Electricity Pole
SP.	Sign Post
TS.	Tarffic Sign
BS.	Bus Stop
GM.	Gas Marker Monument
MH.	Manhole
GU.	Gully
FH.	Fire Hydrant
CATV.	Cable Television Point
WM.	Water Meter
WSV.	Water Stop Valve
GSV.	Gas Stop Valve
RE.	Rodding Eye
GU.	Gully
FH.	Fire Hydrant
CATV.	Cable Television Point
WM.	Water Meter
WSV.	Water Stop Valve
GSV.	Gas Stop Valve
RE.	Rodding Eye

SURVEY IS ORIENTED TO ORDNANCE SURVEY NATIONAL GRID. POSITIONS FIXED BY GPS ACTIVE NETWORK TO CREATE A FLAT. PLANE LOCAL CO-ORDINATE SYSTEM. LEVELS TO OSGM15.

THIS SURVEY SHOWS PHYSICAL SITE BOUNDARIES ONLY. CONFIRMATION OF LEGAL OWNERSHIP BOUNDARIES SHOULD BE OBTAINED BY REFERENCE TO THE H.M. LAND REGISTRY TITLE PLAN

THE PLAN SCALE IS FOR GUIDANCE ONLY.
DO NOT SCALE DIRECTLY .
IF IN DOUBT, CONSULT LATITUDE SURVEYS

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CLIENT

REV.	DESCRIPTION	DATE

JOB TITLE

SS COMPONENTS, HUDDERSFIELD ROAD, MIRFIELD

DRAWING TITLE

TOPOGRAPHICAL SURVEY

DRAWN	SIGNATURE	DATE	STATUS
KB		18/12/2023	FOR COMMENT ☐
			FOR APPROVAL ☐
			DRAFT ☐
			FINAL ☑
APPROVED	SIGNATURE	DATE	

SCALE	SHEET	DRAWING NO.	REVISION
1:200	A1	SS5000-001	-

APPENDIX B

EA FLOOD MAP

Flood map for planning

Your reference	Location (easting/northing)	Created
8386 HUDDERSFIELD ROAD	**419333/420215**	**20 January 2026 15:49**

Your selected location is in flood zone 3, an area with a high probability of flooding.

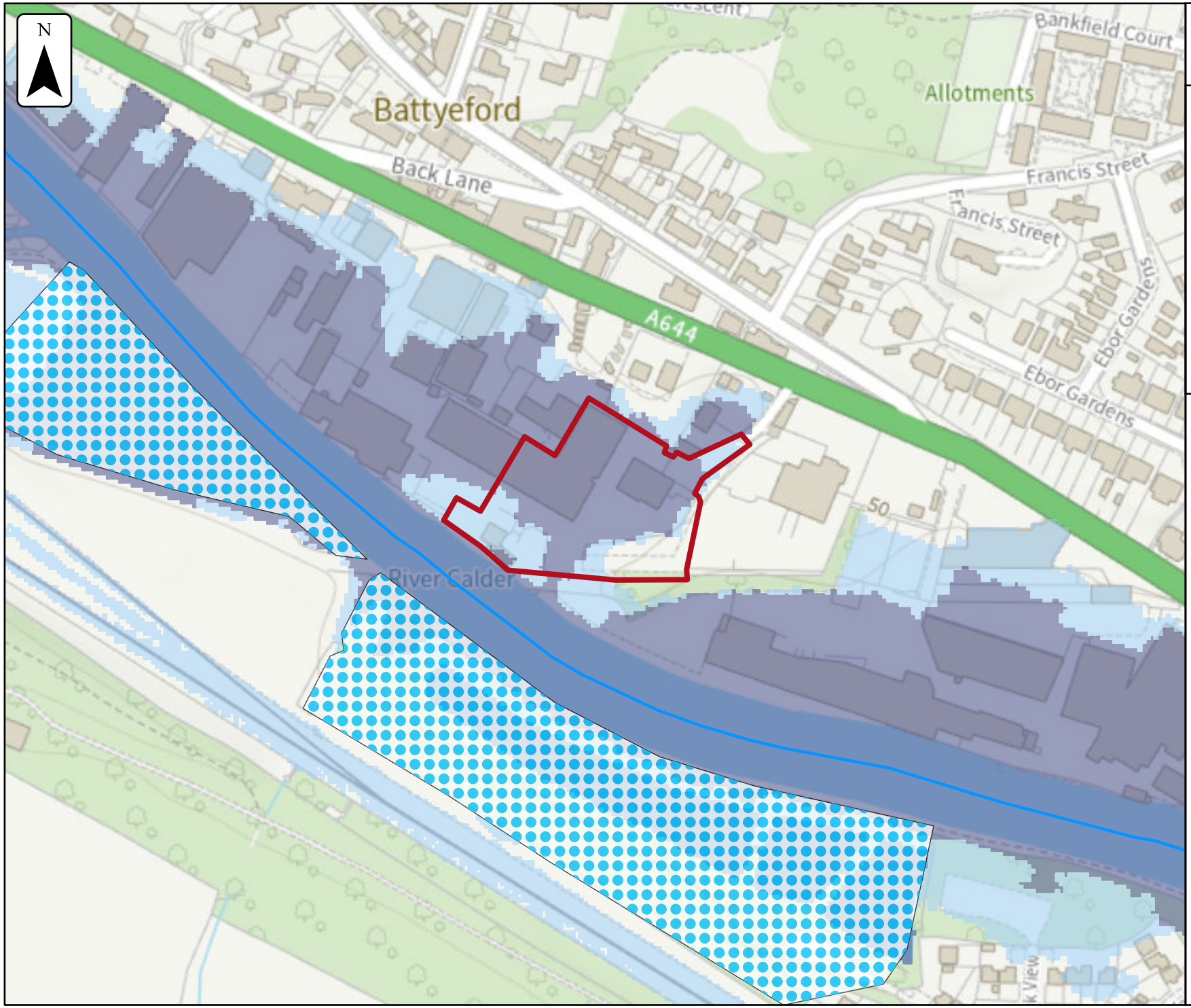
This means:

- you must complete a flood risk assessment for development in this area
- you should follow the Environment Agency's standing advice for carrying out a flood risk assessment (see https://www.gov.uk/guidance/flood-risk-assessment-standing-advice)

Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.



Environment Agency

Flood map for planning

Your reference
8386 HUDDERSFIELD ROAD

Location (easting/northing)
419333/420215

Scale
1:2,500

Created
20 Jan 2026 15:49

- Selected area
- Flood zone 3
- Flood zone 2
- Flood zone 1
- Flood defence
- Main river
- Water storage area

0 20 40 60 m

Flood risk assessment data

Location of site: 419333 / 420215 (shown as easting and northing coordinates)
Document created on: 20 January 2026
This information was previously known as a product 4.
Customer reference number: N521TFUMDB4P

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

APPENDIX C

EA FLOOD RISK INFORMATION

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
- modelled data
- information about strategic flood risk assessments
- information about this data
- information about flood risk activity permits
- help and advice

Information that's unavailable

This document **does not** contain:

- flood defences and attributes

We aren't able to display flood defence locations and attributes as there are no formal flood defences in the area of interest.

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

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 3.

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

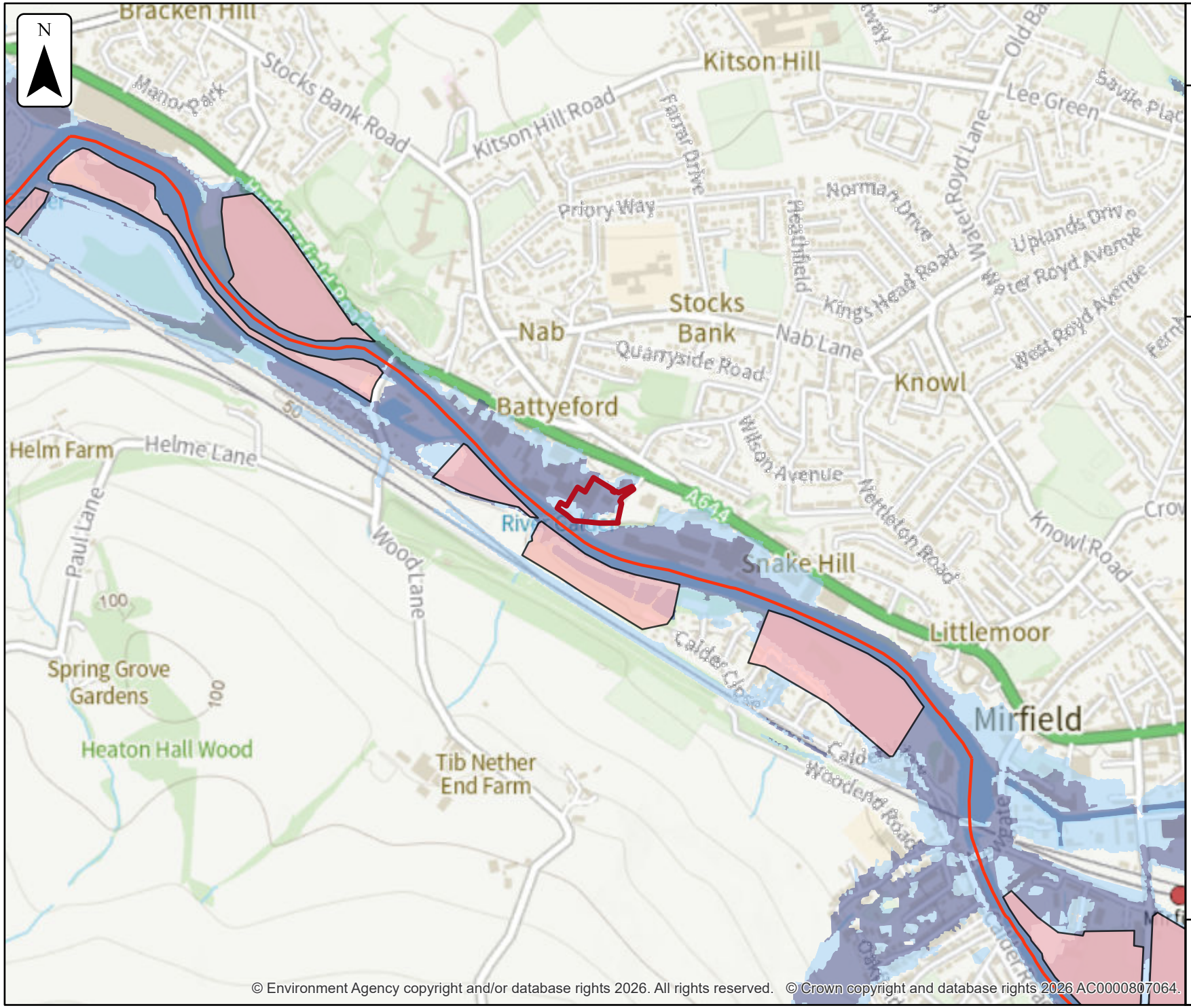
- 0.5% or greater probability of occurring in any year for flooding from the sea
- 1% or greater probability of occurring in any year for fluvial (river) flooding

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

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

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

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



Environment Agency

Flood map for planning

Location (easting/northing)
419333/420215

Scale
1:10,000

Created
20 Jan 2026

- Selected area
- Main river
- 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

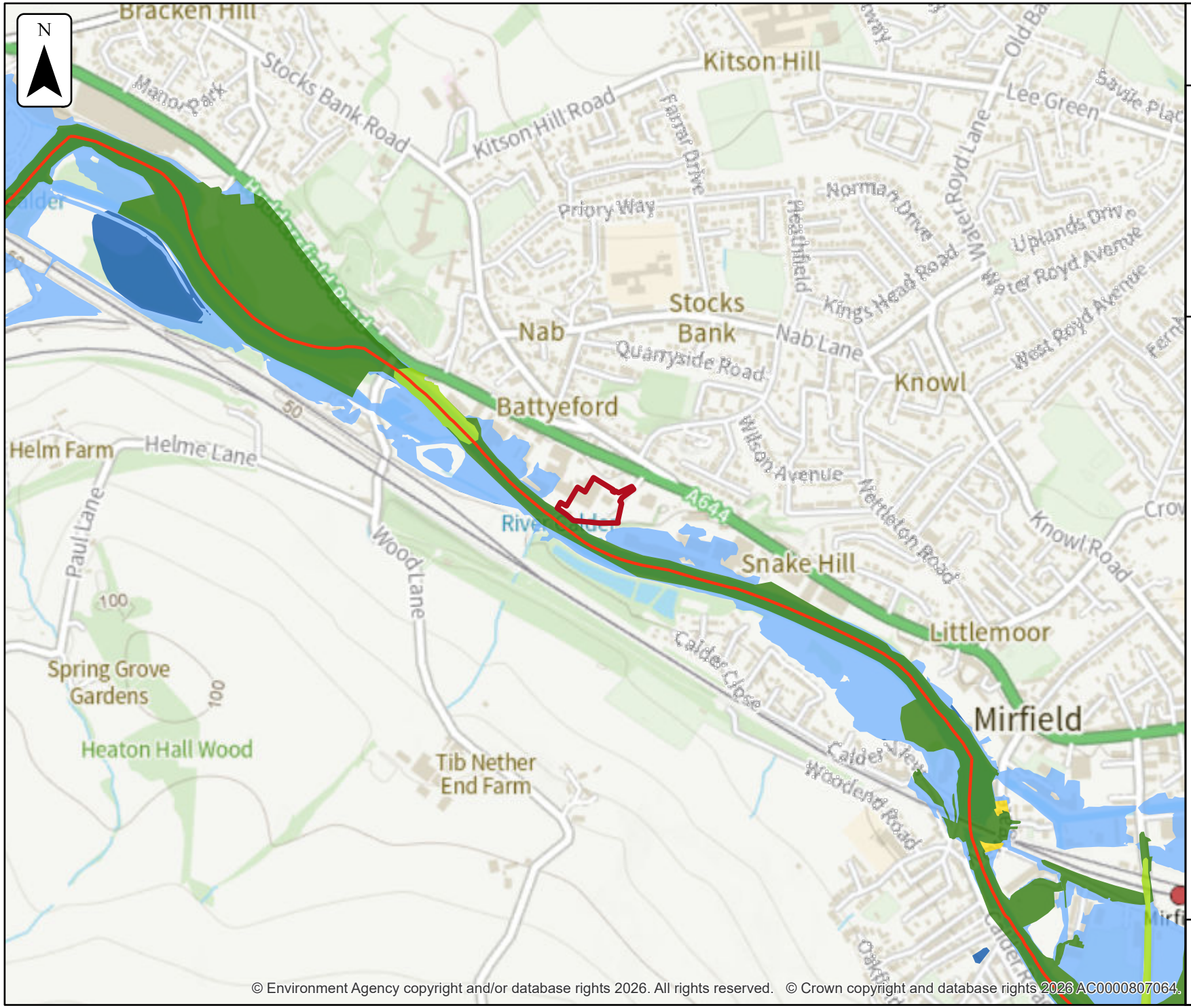
The recorded flood outlines are a geographical information system (GIS) data layer that show our verified records of areas that have flooded in the past from:

- 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)
419333/420215

Scale
1:10,000

Created
20 Jan 2026

- Selected area
- Main river

Date of flood event

- February, 2022
- February, 2020
- March, 2019
- 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
20 February 2022	28 March 2022	main river	channel capacity exceeded (no raised defences)	No
8 February 2020	19 March 2020	main river	channel capacity exceeded (no raised defences)	No
14 March 2019	17 March 2019	main river	unknown	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

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

Climate change

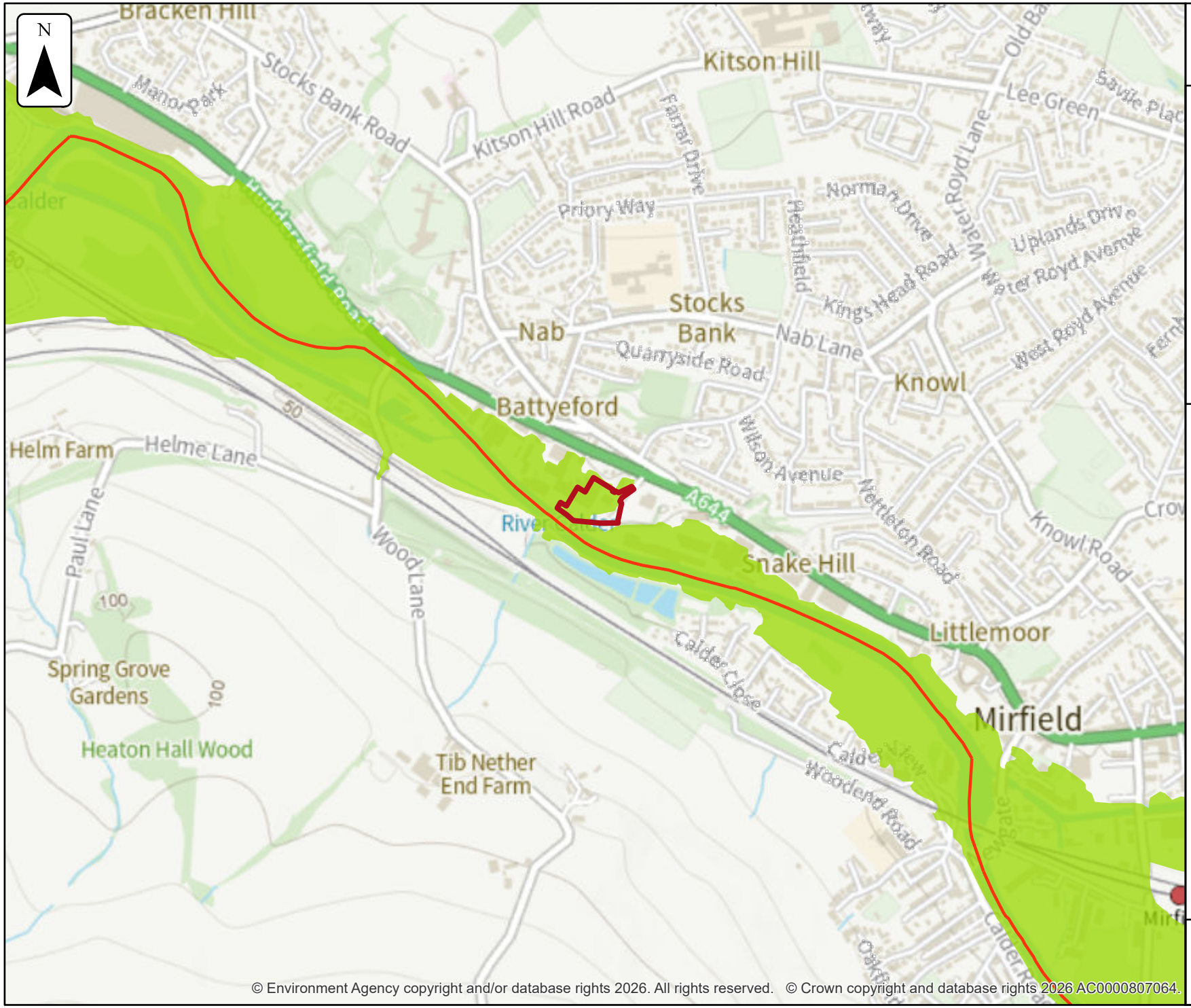
The climate change data included in the models may not include the latest flood risk assessment climate change allowances. Where the new allowances are not available you will need to consider this data and factor in the new allowances to demonstrate the development will be safe from flooding.

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

Modelled scenarios

The following scenarios are included:

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



Environment Agency

Defences removed climate change modelled fluvial extent

Location (easting/northing)
419333/420215

Scale
1:10,000

Created
20 Jan 2026

Model name
2011 River Calder - Calder

Selected area

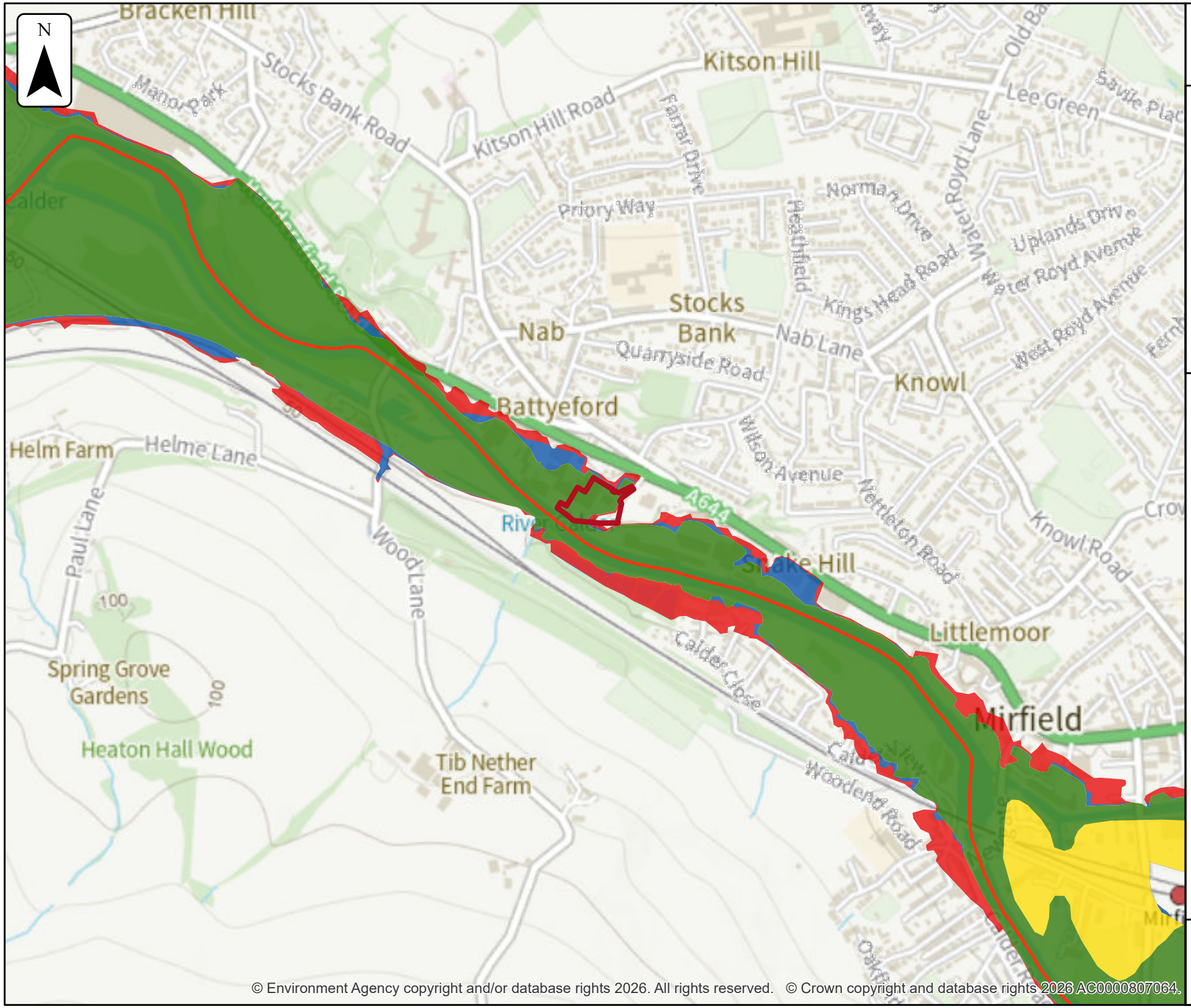
Main river

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)
419333/420215

Scale
1:10,000

Created
20 Jan 2026

Model name
2011 River Calder - Calder

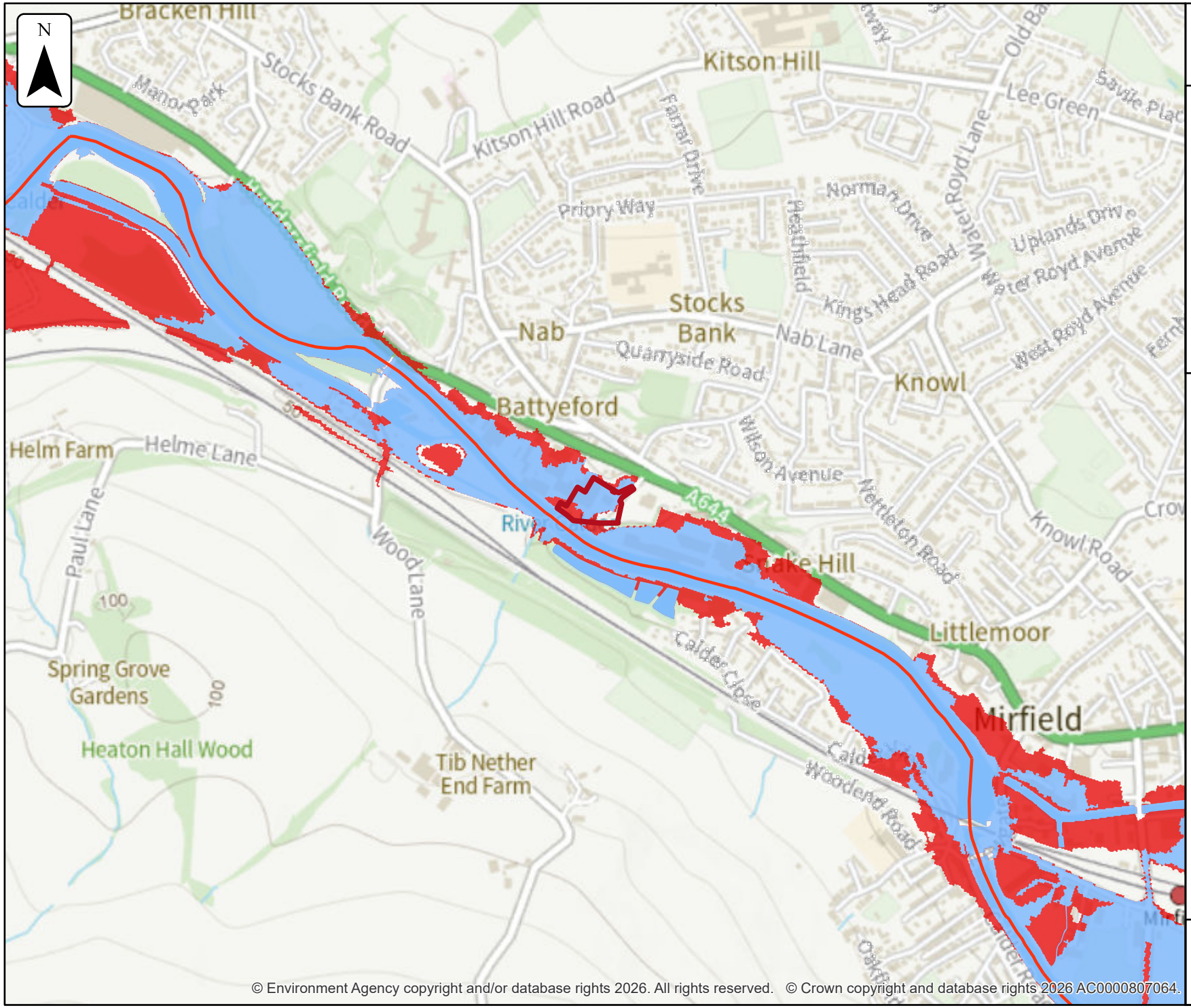
- Selected area
- Main river

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)
419333/420215

Scale
1:10,000

Created
20 Jan 2026

Model name
2015 Calder and Canals - downstream

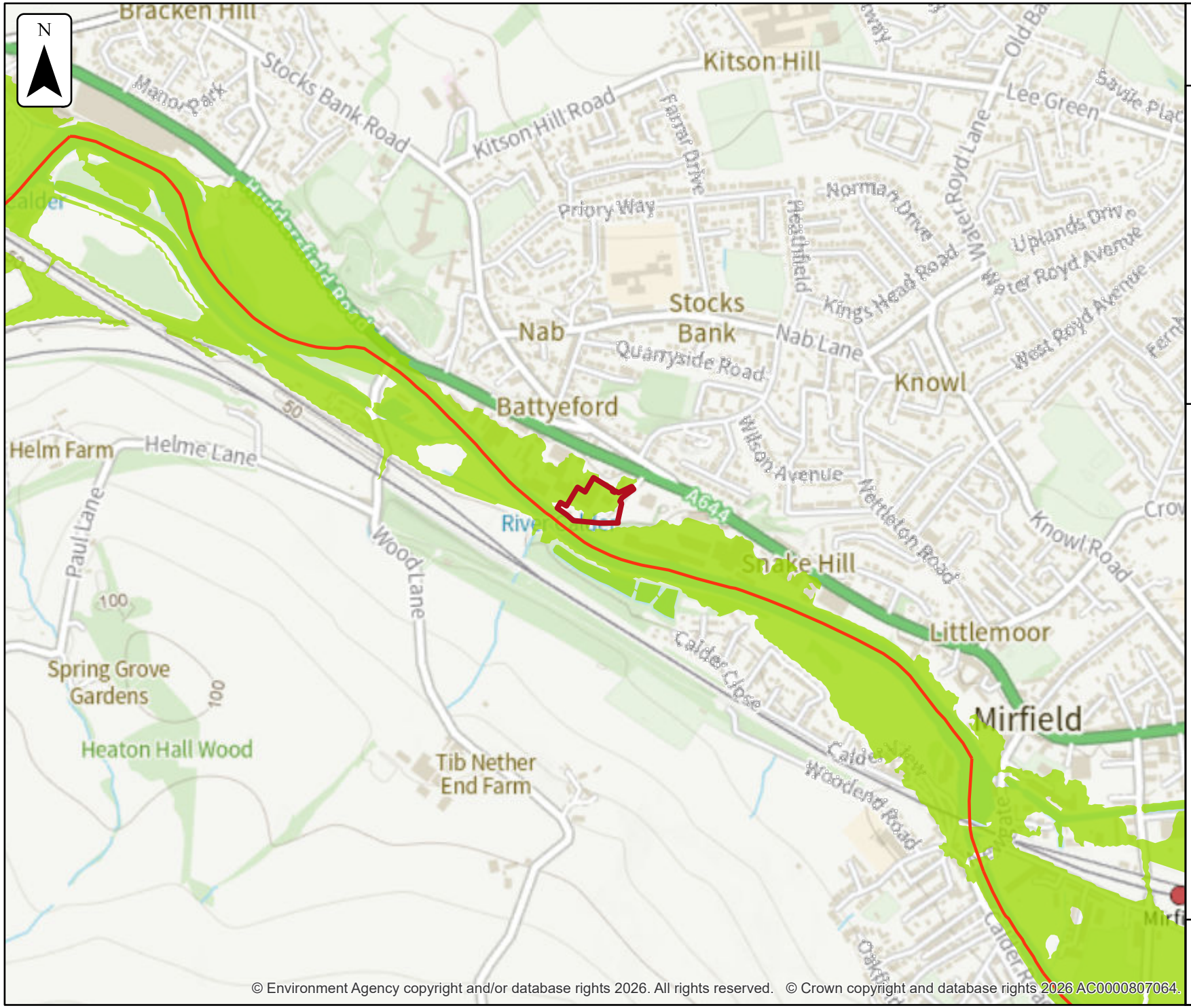
- Selected area
- Main river

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)
419333/420215

Scale
1:10,000

Created
20 Jan 2026

Model name
2015 Calder and Canals - downstream

Selected area

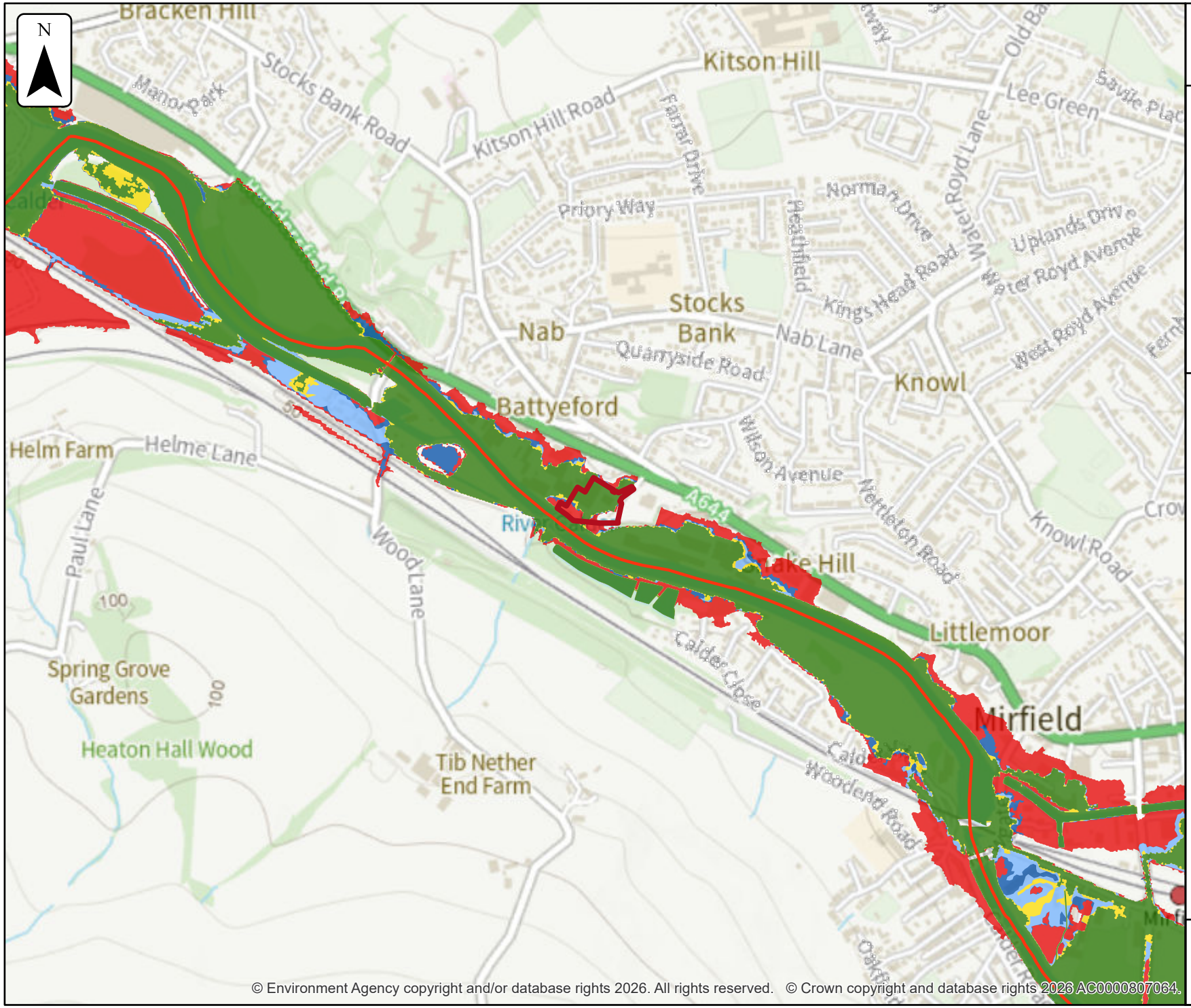
Main river

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)
419333/420215

Scale
1:10,000

Created
20 Jan 2026

Model name
2015 Calder and Canals - downstream

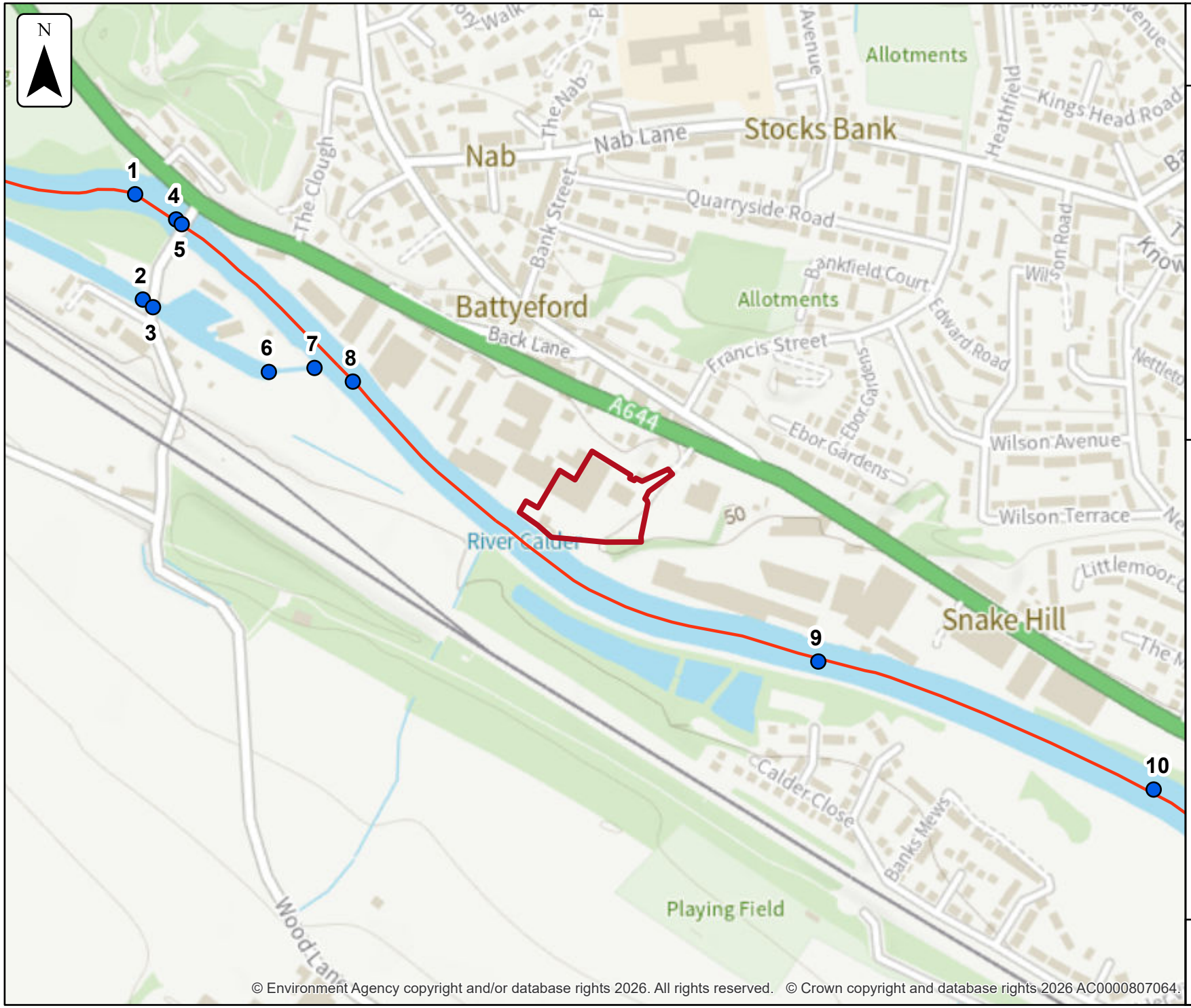
- Selected area
- Main river

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

Defended modelled fluvial node locations

Location (easting/northing)
419333/420215

Scale
1:5,000

Created
20 Jan 2026

Model name
2015 Calder and Canals - downstream

- Selected area
- Modelled location
- Main river

0 50 100 150 200 250
metres

Modelled node locations data

Defended

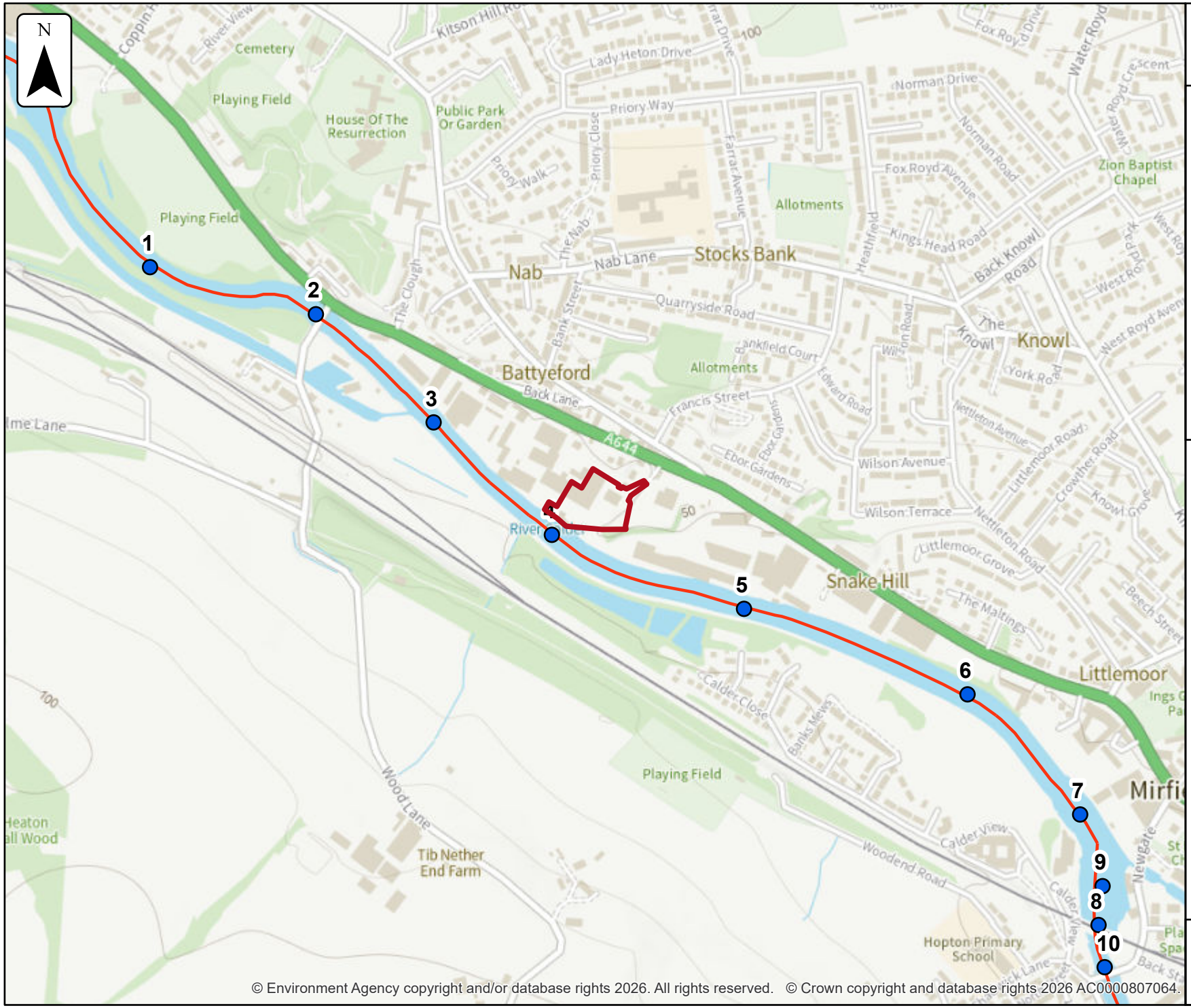
Label	Modelled location ID	Easting	Northing	50% AEP	20% AEP	10% AEP	4% AEP	3.33% AEP	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
				Level	Level	Level	Level	Level	Level	Level	Level	Level	Level
1	1129939	418885	420517	45.45	46.08	46.20	46.75	46.83	47.02	47.17	47.19	47.48	48.52
2	1130237	418893	420414	46.04	46.31	46.37	46.49	46.65	46.77	46.85	47.19	47.48	48.51
3	1129921	418903	420407	46.04	46.31	46.37	46.49	46.65	46.77	46.85	47.19	47.49	48.51
4	1129682	418925	420492	45.43	46.05	46.17	46.73	46.80	46.99	47.13	47.16	47.48	48.66
5	1130136	418931	420488	45.38	45.97	46.09	46.59	46.64	46.79	46.90	46.93	47.18	48.66
6	1129966	419016	420344	46.04	46.31	46.37	46.49	46.65	46.77	46.85	47.19	47.43	48.54
7	1129767	419060	420348	45.24	45.80	45.90	46.39	46.42	46.54	46.64	46.69	46.93	48.15
8	1129763	419097	420334	45.22	45.78	45.88	46.36	46.38	46.49	46.58	46.65	46.79	48.12
9	1129715	419551	420062	44.91	45.40	45.49	45.86	45.90	46.0	46.07	46.16	46.23	47.53
10	1129969	419877	419937	44.76	45.23	45.32	45.68	45.73	45.83	45.90	45.92	46.07	47.31

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	1129939	418885	420517	230.90	313.80	331.24	420.50	429.07	458.37	480.28	481.15	520.23	786.0
2	1130237	418893	420414	0.73	0.73	0.73	1.40	2.97	3.17	3.60	2.59	5.70	57.21
3	1129921	418903	420407	0.73	0.73	0.73	1.40	2.97	3.17	3.60	2.59	5.58	57.20
4	1129682	418925	420492	231.28	315.36	333.28	423.81	433.01	463.66	487.38	485.29	510.17	681.0
5	1130136	418931	420488	231.28	315.36	333.28	423.81	433.01	463.66	487.38	485.29	510.17	681.12
6	1129966	419016	420344	0.78	0.78	0.78	1.33	3.36	6.75	9.98	1.71	46.44	14.02
7	1129767	419060	420348	0.79	0.79	0.79	1.33	1.33	1.33	1.33	1.71	4.10	13.78
8	1129763	419097	420334	231.64	315.57	334.06	424.05	436.33	471.63	499.31	486.12	552.72	806.08
9	1129715	419551	420062	231.57	314.73	332.62	421.51	431.90	461.48	483.94	481.87	536.99	803.37
10	1129969	419877	419937	231.53	312.47	329.82	407.59	415.15	439.79	458.34	483.25	501.75	806.52

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.



Modelled node locations data

Defences removed

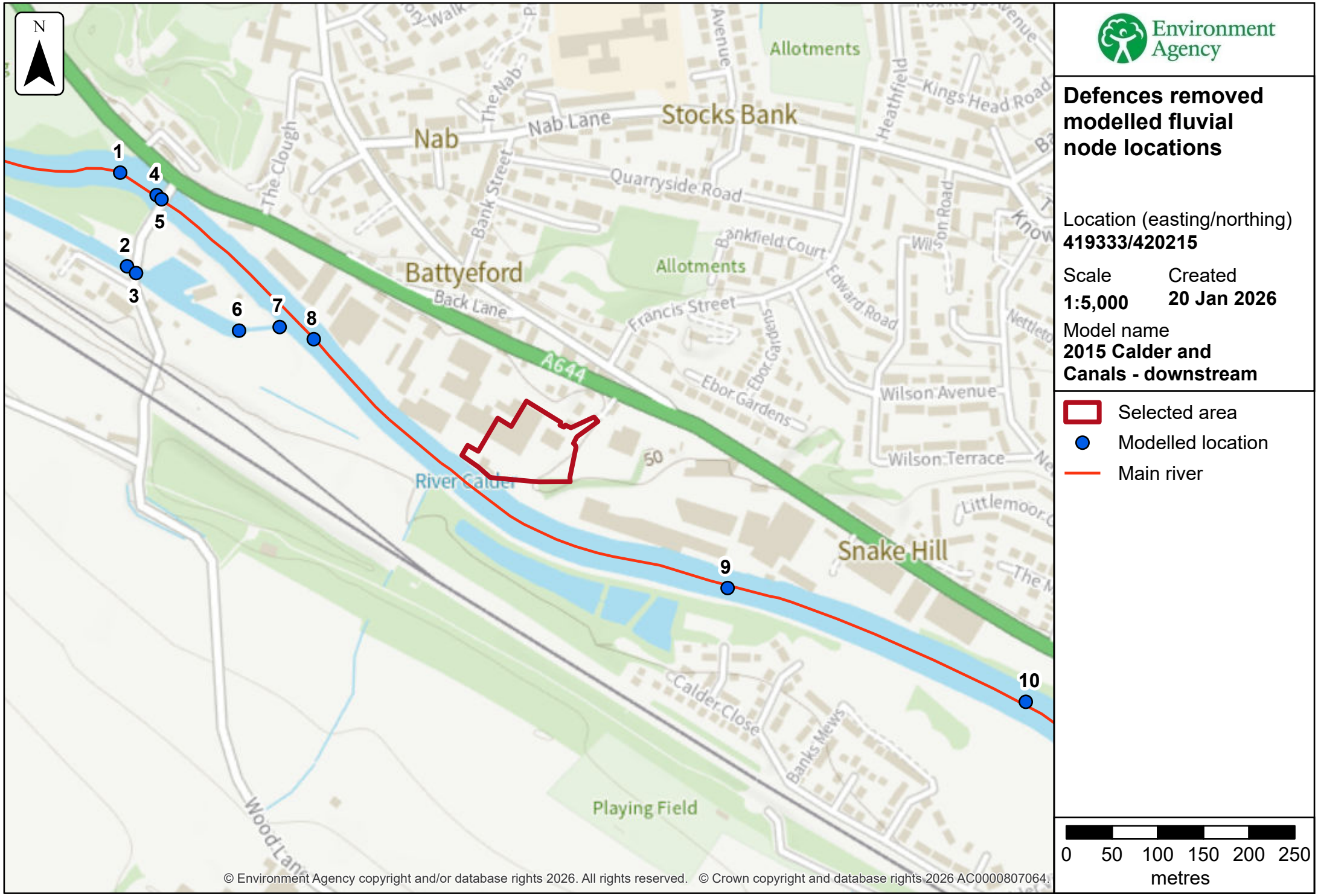
Label	Modelled location ID	Easting	Northing	10% AEP	4% AEP	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
				Level	Level	Level	Level	Level	Level	Level
1	258062	418683	420561	46.37	46.73	46.99	47.17	47.30	47.60	48.82
2	190115	418925	420492	46.16	46.50	46.75	46.92	47.05	47.37	48.65
3	234623	419097	420335	45.89	46.20	46.44	46.59	46.70	46.97	48.30
4	262962	419270	420170	45.70	45.94	46.13	46.25	46.33	46.54	47.72
5	213461	419551	420062	45.47	45.69	45.84	45.94	46.01	46.18	47.21
6	331771	419877	419937	45.32	45.54	45.72	45.82	45.90	46.09	47.31
7	72820	420042	419762	45.20	45.41	45.57	45.67	45.75	45.93	47.17
8	165659	420069	419601	44.24	44.61	44.90	45.06	45.18	45.46	47.0
9	139742	420075	419657	45.14	45.35	45.51	45.61	45.68	45.86	47.11
10	305294	420078	419539	44.12	44.47	44.74	44.90	45.01	45.28	46.81

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	258062	418683	420561	335.02	388.24	430.18	455.85	478.52	535.89	822.21
2	190115	418925	420492	334.88	388.09	429.95	455.60	478.26	535.27	788.86
3	234623	419097	420335	334.81	387.95	429.77	455.40	478.05	535.04	787.85
4	262962	419270	420170	334.75	387.89	429.60	455.30	477.93	534.87	787.20
5	213461	419551	420062	332.48	382.28	425.47	453.46	475.32	529.89	805.22
6	331771	419877	419937	332.25	382.59	426.19	455.01	477.63	534.75	843.08
7	72820	420042	419762	332.21	382.57	426.11	454.97	477.59	534.75	842.23
8	165659	420069	419601	332.06	377.29	414.10	438.44	457.24	504.21	736.50
9	139742	420075	419657	332.22	382.56	426.12	455.01	477.58	534.76	841.91
10	305294	420078	419539	332.0	377.21	413.90	438.18	456.90	503.68	734.29

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)
419333/420215

Scale
1:5,000

Created
20 Jan 2026

Model name
2015 Calder and Canals - downstream

- Selected area
- Modelled location
- Main river

0 50 100 150 200 250
metres

Modelled node locations data

Defences removed

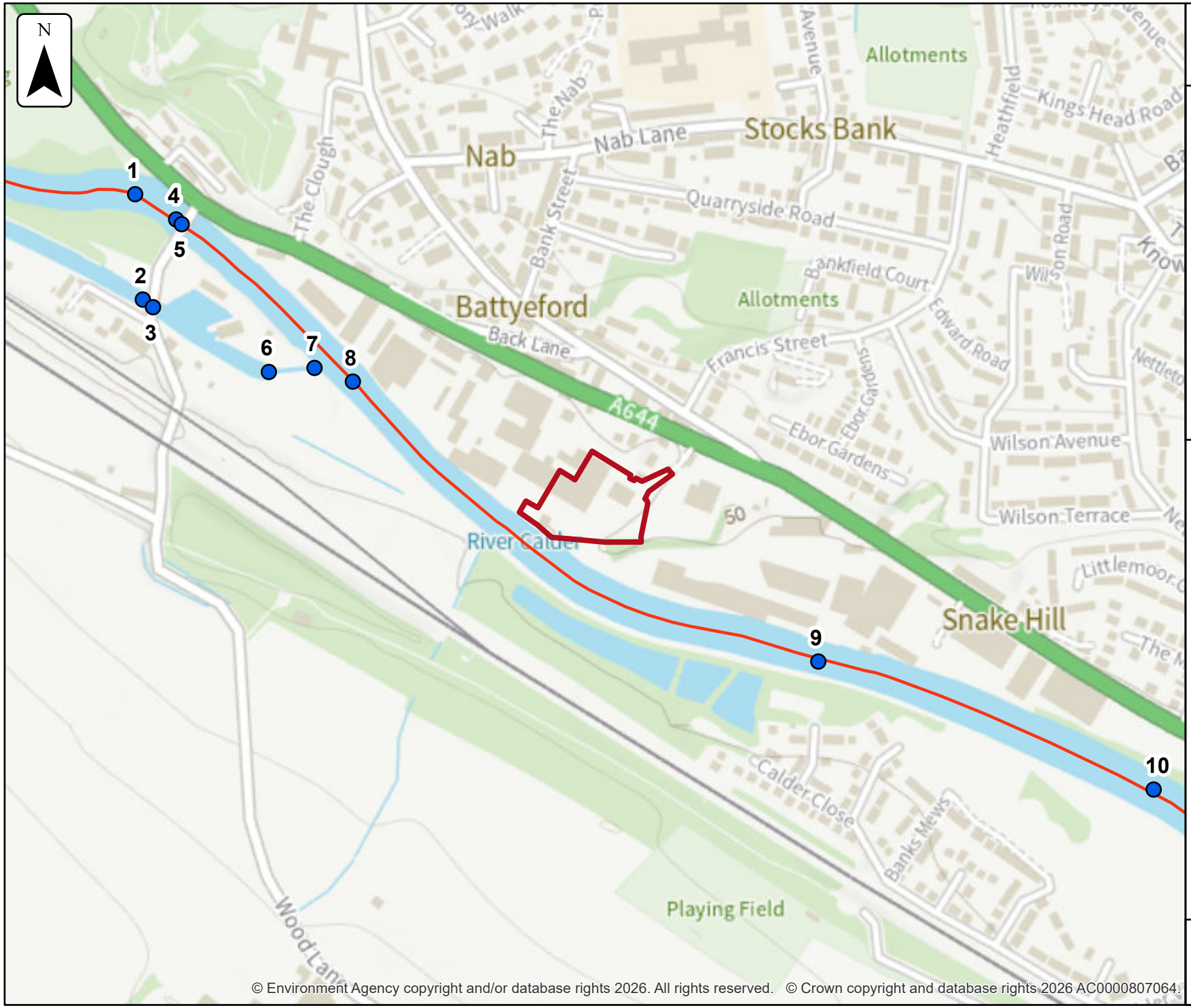
Label	Modelled location ID	Easting	Northing	10% AEP	4% AEP	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
				Level	Level	Level	Level	Level	Level	Level
1	1129939	418885	420517	46.18	46.53	46.74	46.87	46.92	47.24	48.49
2	1130237	418893	420414	46.37	46.44	46.46	46.62	46.92	46.81	48.51
3	1129921	418903	420407	46.37	46.44	46.46	46.62	46.92	46.81	48.51
4	1129682	418925	420492	46.15	46.50	46.71	46.84	46.88	47.18	48.66
5	1130136	418931	420488	46.06	46.37	46.55	46.65	46.88	46.94	48.66
6	1129966	419016	420344	46.37	46.44	46.46	46.62	46.92	46.80	48.55
7	1129767	419060	420348	45.88	46.17	46.34	46.41	46.60	46.65	48.15
8	1129763	419097	420334	45.86	46.14	46.31	46.38	46.56	46.60	48.12
9	1129715	419551	420062	45.47	45.69	45.81	45.89	46.06	46.06	47.54
10	1129969	419877	419937	45.29	45.51	45.63	45.70	45.89	45.88	47.32

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	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	1129939	418885	420517	326.43	378.83	412.70	429.87	474.89	483.0	782.41
2	1130237	418893	420414	1.34	1.34	1.34	2.18	1.67	2.31	57.16
3	1129921	418903	420407	1.34	1.34	1.34	2.18	1.67	2.31	57.19
4	1129682	418925	420492	330.28	385.43	419.88	438.80	480.18	498.80	678.25
5	1130136	418931	420488	330.28	385.43	419.88	438.80	480.16	498.80	678.17
6	1129966	419016	420344	1.33	1.33	1.33	2.54	1.33	7.56	13.88
7	1129767	419060	420348	1.33	1.33	1.33	1.33	1.33	1.33	13.84
8	1129763	419097	420334	330.01	385.13	419.27	441.33	492.27	510.49	807.67
9	1129715	419551	420062	329.46	381.89	416.57	436.77	479.65	495.67	808.36
10	1129969	419877	419937	326.25	374.34	404.31	421.64	454.78	470.09	804.30

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)
419333/420215

Scale
1:5,000

Created
20 Jan 2026

Model name
2015 Calder and Canals - downstream

- Selected area
- Modelled location
- Main river

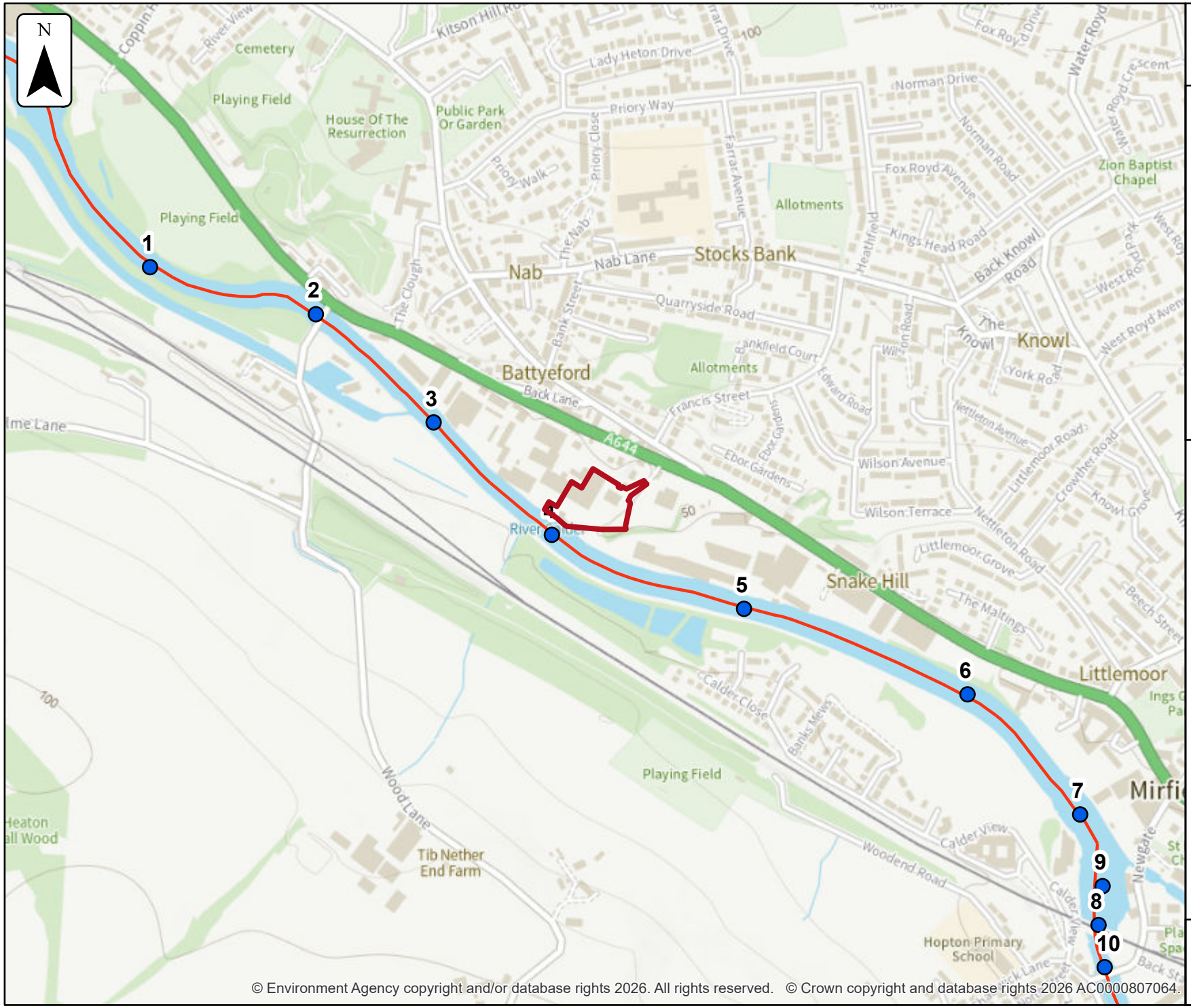
0 50 100 150 200 250
metres

Modelled node locations data

Defended climate change

Label	Modelled location ID	Easting	Northing	1% AEP (+20%)	1% AEP (+20%)
				Level	Flow
1	1129939	418885	420517	47.75	538.30
2	1130237	418893	420414	47.83	13.53
3	1129921	418903	420407	47.83	13.53
4	1129682	418925	420492	47.76	526.26
5	1130136	418931	420488	47.39	526.26
6	1129966	419016	420344	47.75	60.12
7	1129767	419060	420348	47.10	6.35
8	1129763	419097	420334	46.94	593.36
9	1129715	419551	420062	46.35	575.44
10	1129969	419877	419937	46.20	532.50

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

Defences removed climate change modelled fluvial node locations

Location (easting/northing)
419333/420215

Scale
1:7,500

Created
20 Jan 2026

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	258062	418683	420561	47.76	566.34
2	190115	418925	420492	47.53	564.73
3	234623	419097	420335	47.11	564.47
4	262962	419270	420170	46.64	564.36
5	213461	419551	420062	46.26	558.74
6	331771	419877	419937	46.19	565.26
7	72820	420042	419762	46.02	565.21
8	165659	420069	419601	45.63	528.88
9	139742	420075	419657	45.95	565.25
10	305294	420078	419539	45.45	528.24

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.

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

APPENDIX D

PRELIMINARY DRAINAGE CALCULATIONS

Storage Estimate

Return Period (years)	1
Climate Change (%)	0
Impermeable Area (ha)	0.126
Peak Discharge (l/s)	4.000
Infiltration Coefficient (m/hr) (leave blank if no infiltration)	
Required Storage (m^3)	Calc
from	4
to	9

Storage Estimate

Return Period (years)	30
Climate Change (%)	0
Impermeable Area (ha)	0.126
Peak Discharge (l/s)	4.000
Infiltration Coefficient (m/hr) (leave blank if no infiltration)	
Required Storage (m^3)	Calc
from	18
to	30

Storage Estimate

Return Period (years)	100
Climate Change (%)	0
Impermeable Area (ha)	0.126
Peak Discharge (l/s)	4.000
Infiltration Coefficient (m/hr) (leave blank if no infiltration)	
Required Storage (m^3)	Calc
from	27
to	44

Storage Estimate

Return Period (years)	100
Climate Change (%)	45
Impermeable Area (ha)	0.126
Peak Discharge (l/s)	4.000
Infiltration Coefficient (m/hr) (leave blank if no infiltration)	
Required Storage (m^3)	Calc
from	46
to	72