

BDP Civil and Structural Engineering Group

August 2024

Flood Risk Assessment & Outline Drainage Strategy Report

Dewsbury Market

Project No: P3001350

Doc No: DMTP-BDP-00-XX-RP-C-00001

Issue: Planning Issue

Rev:P02

BDP.

Document Control

Revision	Description	Author	Approved	Date
P02	Planning Issue	JB	PS	12.08.24

Author

Jack Bradbury
Civil Engineer

Signature

Date

_____ 12/08/2024 _____

Approved

Phil Simcock
Civil and Structural Engineering Director

Signature

Date

_____ 12/08/2024 _____

This report is prepared for the sole benefit of our client Kirklees Council.

Building Design Partnership does not accept liability, with respect to the contents of this report, to any third party, without BDP's express permission.

Contents

1.0	Executive Summary	3
2.0	Introduction	5
2.1	Appointment and Brief	5
2.2	Sources of information	5
2.3	Limitations.....	5
3.0	Site Context	6
3.1	Site Location	6
3.2	Site Characterisation/ Land-Use	6
3.3	Topography.....	7
3.4	Geology.....	7
3.5	Hydrogeology.....	7
3.6	Existing Public Sewers.....	7
3.7	Existing Private Drainage.....	8
3.8	Watercourses, Land Drainage and other Waterbodies	8
4.0	Policy and Guidance	9
4.1	National Planning Policy Framework (NPPF).....	9
4.2	Flood Risk Regulations 2009: Preliminary Assessment Report for Kirklees	9
4.3	Calder Catchment Strategic Flood Risk Assessment (SFRA), JBA Consulting	9
4.5	Kirklees Council's Local Flood Risk Management Strategy (LFRMS) 2012.....	10
5.0	Sources of Flood Risk	12
5.1	Fluvial Flood Risk.....	12
5.2	Pluvial Flood Risk	15
5.3	Sewer Flood Risk	15
5.4	Groundwater Flood Risk	16
5.5	Flooding from Other Sources/Infrastructure Failure	16
5.6	Summary of Flood Risk.....	17
6.0	Surface Water Management Strategy	18
6.1	Existing Site Drainage Regime	18
6.2	Pre-development Surface water Runoff	18
6.3	Post-development Surface water Runoff	19
6.4	Methods of Surface Water Management	20
6.5	Sustainable urban Drainage Systems (SuDS).....	20
6.6	Outline Surface Water Drainage Strategy.....	22
7.0	Foul Water Drainage Strategy	24
8.0	Conclusion	25
Appendix A:	Site Location Plan	26
Appendix B:	Proposed Masterplan Layout	27
Appendix C:	Proposed Below Ground Drainage Strategy	28
Appendix D:	Existing Sewer Plans	29
Appendix E:	Consultation	30

1.0 Executive Summary

Building Design Partnership (BDP) have been commissioned by Kirklees Council to carry out a formal site-specific Flood Risk Assessment and Outline Drainage Strategy for the proposed development. The proposed site is located in Dewsbury at postcode, WF13 1QE.

The proposed development includes the refurbishment of the existing Dewsbury Market Hall and Covered Market alongside the redevelopment of the external market stall area.

The site is located within Dewsbury Town Centre, a designated area for regeneration, as indicated in Kirklees Council's Dewsbury Town Centre Strategic Development Framework 2018 & Delivery Programme.

The site is brownfield in nature, currently occupied by the existing Market Hall building and surrounding hardstanding areas, which are positively drained to the surrounding sewer network and culverted watercourse.

A copy of the Proposed Site Masterplan can be found within Appendix B.

Batley Beck, a culverted main river, runs from west to east along the northern boundary of the market. The Environment Agency's Flood Map for Planning identified the north and east of the site to be predominantly located in Flood Zone 2 (medium risk) with a small area of Flood Zone 3 (high risk) encroaching along the boundaries. The remainder of the site is in Flood Zone 1, defined as having a 'low' probability of flooding from Batley Beck.

The head of the Batley Beck culvert is located approximately 70m upstream of the site and returns to an open channel at its confluence with the River Calder. As such, any flooding associated with the watercourse is expected to be a result of overtopping of the Beck's embankments. Based on flood level data obtained from the Environment Agency during the 1 in 100 year plus 20% event Batley Beck is likely to overtop its bank by up to 350mm, from the north and east of the site. The River Calder catchment suggests planning for a climate event that occurs once every 100 years, plus an additional 23% to account for climate change. The EA data allows for a 20% increase in climate change, this aligns closely with the recommended adjustment for climate change.

In order to reduce the impact of any potential fluvial or pluvial flooding at the site ground levels should be profiled to direct any overland flows away from the built development and level accesses, towards the nearest drainage point. It is also recommended that any electrical sockets and valuable items are stored a minimum of 350mm above proposed ground level within the market building. Future occupants are also encouraged to sign up to the Environment Agency's free flood warning service to receive alerts of any potential flood events in the area. Due to the renovations to the development a sub-station and plant room are also proposed which are at risk of flooding. Modelling the flood levels for a 1 in 100-year event plus 20% for climate change indicate the depth of flooding for the substation is 355mm and 260mm for the water feature plant room, requiring all electrical and valuable items to be above this depth from finished floor level.

A review of available data also identified the site to be at potential risk of groundwater flooding at the surface, although the Kirklees Council's Strategic Flood Risk Assessment (SFRA) did not specify any significant issues in the area. The proposals also do not include any basement areas, therefore the risk of groundwater affecting the site is regarded as low.

All other sources of flooding were assessed and regarded as having a low residual risk.

Dewsbury Market is currently 100% impermeable and a CCTV survey and GPR survey confirmed the existing market hall and hardstanding areas to be positively drained to the public combined sewers on Foundry Street, Cloth Hall Street and Crackenedge Lane and to the culverted watercourse, Batley Beck. The location of the existing rainwater pipes will be amended to suit the new market proposals however there are no proposed changes to the building footprint, therefore the catchment areas and connection points into the nearby sewers will remain as existing, subject to agreement with Yorkshire Water and the Lead Local Flood Authority (LLFA). As such there will be no change in the rate or volume of runoff from the market hall.

The northern part of the outdoor market is shown to discharge into the culverted watercourse. Due to the potential impact to the structural integrity of the culvert the Environment Agency have advised that no further connections are proposed to the culvert. Therefore, for the outdoor market area, the surface water drainage strategy proposes to retain the existing outfall connections into the combined sewer on Cloth Hall Street and the culverted watercourse. In accordance with local policy and Environment Agency guidance a 30% reduction on existing rates is to be implemented and an application of 30% to peak rainfall is to be applied to account for climate change over the lifetime of the development. In discussions with the LLFA it has been agreed that the introduction of 40% more

soft landscaped areas provides the required 30% reduction in discharge rates. Therefore, no restricted rates have been applied. Any surface water run-off from the remaining impermeable paving will flow onto soft landscaped permeable areas or into a series of slot drains which will use the existing connections to the combined sewer and culverted watercourse.

For the Market Hall the location of the wastewater appliances is proposed to be located to the northern part of the indoor market. The outfall location into the existing combined sewer on Crackenedge Lane is to be retained. A water feature is to be proposed in the external market area therefore a foul pipe with a non-return valve will be required from the plant room to the combined sewer.

A copy of the Outline Proposed Below Ground Drainage Strategy Plan is included within Appendix D.

The Flood Risk Assessment is considered to be commensurate with the development proposals and in summary, the development can be considered appropriate for Flood Zone 2, in accordance with the NPPF and Local Planning Policy/Core Strategy, and subject to the mitigation measures proposed.

2.0 Introduction

2.1 Appointment and Brief

Building Design Partnership (BDP) have been commissioned by Kirklees Council to carry out a formal site-specific Flood Risk Assessment and Outline Drainage Strategy Report in support of a Full Planning Application, for the proposed development at Dewsbury Market, WF13 1QE.

The proposals include the refurbishment of the existing Dewsbury Market Hall building and indoor market and the redevelopment of the outdoor Market area. A copy of the Proposed Masterplan can be found in Appendix B.

This Flood Risk Assessment has been prepared in accordance with the National Planning Policy Framework (NPPF) and the accompanying Technical Guidance to assess all forms of flooding including the management of surface water on-site.

2.2 Sources of information

This Report summarises data supplied or provided from the following external sources listed below.

Table 1: Existing available information

Source of Information	Author	Date
Flood Risk Regulations: 2009	Kirklees Council	2009
Calder Catchment Strategic Flood Risk Assessment	JBA Consulting	2016
Local Flood Risk Management Strategy	Kirklees Council	2013

2.3 Limitations

This report has been prepared for exclusive use by our client Kirklees Council, for the purpose of assisting them in evaluating the potential risk of flooding associated with the site, proposed drainage strategy and in making a Planning Application.

Building Design Partnership (BDP) accepts no liability for any use of this document other than by its client and only for the purposes, stated in the document, for which it was prepared and provided. No person other than the client may copy (in whole or in part) use or rely on the contents of this document, without the prior written permission of BDP. Any advice, opinions or recommendations within this document should be read and relied upon only in the context of the document as a whole.

BDP has endeavoured to assess all information provided to them during this appraisal. The report summarises from a number of external sources and cannot offer any guarantees or warranties for the completeness or accuracy of information relied upon.

This report addresses the flood risk posed to and from the proposed development, the extent of which is shown on the Proposed Plan contained within Appendix B. This report has been undertaken with the assumption that the site will be developed in accordance with the above proposals without significant change. The conclusions resulting from this study are not necessarily indicative of future conditions or operating practices at or adjacent to the site.

3.0 Site Context

3.1 Site Location

The site is located in Dewsbury town centre, north-east of Huddersfield. The Ordnance Survey grid reference at the centre of the site is 424619 E, 421944 N. An approximate postcode for the site is WF13 1QE. A Site location plan is included in Appendix A.



Figure 1: Aerial image of the site (Google.co.uk/maps)

3.2 Site Characterisation/ Land-Use

Key features of the existing site have been summarised below.

Table 2: Summary of site characteristics

Site Area	<p>The planning application site area is approximately 1.09 hectare (ha).</p> <p>The proposed development consists of the refurbishment of the existing Market Hall and indoor market and the redevelopment of the outdoor area.</p>
-----------	--

Site Description and Current Use		<p>The entirety of the site is considered to be brownfield. It is currently covered by existing structures and hardstanding areas, which are positively drained.</p> <p>The current buildings / structures include Dewsbury Market Hall and the Covered Market with various internal retail stalls.</p>
Boundaries	North	Whitehall Way
	East	Crackenedge Lane
	South	Corporation Street
	West	Foundry Street
Access	Vehicular	The site can be accessed via entrances on Whitehall Way and Foundry Street.
	Pedestrian	Access is available from all surrounding roads.

3.3 Topography

A topographical survey of the site was undertaken by Plowman Craven in June 2021. The site is relatively flat with a slight fall to the north and east. Existing ground levels are shown to range from approximately 41.33m above Ordnance Datum (AOD) in the west decreasing to 38.12m AOD in the east.

3.4 Geology

From the Silkstone phase 2 Ground Investigation Report, the Soil Site Report: Made ground was encountered at all exploratory holes to depths of between 0.8m and 2.60m below ground level. This comprises a surface capping of concrete or brick paving with bedding sand, sometimes above a sand and gravel sub-base, concrete or stone cobbles. This is underlain by a predominantly granular fill typically comprising a dark grey sandy gravel or gravelly sand of ash, sandstone, concrete, clinker and slag.

An infiltration test has been conducted and has shown the site to have an infiltration rate of 4.6×10^{-6} m/s. This is lower than the recommended rate for use in infiltrating SuDS and has therefore been discounted as the primary form of surface water disposal from hardstanding areas.

3.5 Hydrogeology

A review of DEFRA's Aquifer designation Map indicates that the site is underlain by a Secondary A Aquifer at both bedrock and superficial level.

The ground water vulnerability map also shows that the site is located in an area with a medium vulnerability to a pollutant discharged at ground level.

3.6 Existing Public Sewers

Yorkshire Water are the local Water Authority serving the area where Dewsbury Market is located. Based on available sewer records, which can be found in Appendix E, there is an existing combined sewer running through the centre of the site on Cloth Hall Street, to the east on Crackenedge Lane and partially on Whitehall Way to the north of the site. In addition, there is a surface water sewer running along Foundry Street (south west of the site), and partially along Corporation Street (south). These are assumed to discharge into the culverted watercourse, Batley Beck.

Following consultation with Yorkshire Water the revised discharge rate is to not be greater than 50.8 l/s.

4.0 Policy and Guidance

This report takes into account the provisions of the development plan and a range of other material considerations. However, it is the Government's National Planning Policy Framework (NPPF), Local Council's Policies and CIRIA document C624, which provide the most up to date and specific guidance on the Scope of Flood Risk Assessments.

4.1 National Planning Policy Framework (NPPF)

The National Planning Policy Framework (NPPF) was first published in England in March 2012 and a revised version was published on 20th July 2021. As a result, all previous Planning Policy Guidance Notes (PPGs) and Planning Policy Statements (PPSs) were superseded. This included PPS25: Development and Flood Risk, along with its supplement on Development and Coastal Change.

One of the main aims of the NPPF is to ensure that flood risk is taken into account at all stages of the planning process to avoid inappropriate development in areas at risk of flooding and to direct development away from areas of highest risk. It advises that where new development is necessary in areas of higher risk, this should be safe, without increasing flood risk elsewhere, and where possible should reduce flood risk overall.

Table 2 from the 'Flood Risk and Coastal Change Guidance' (2014) defines the type and nature of different development classifications in the context of their flood risk vulnerability. This should be compared against 'Table 3: Flood Risk Vulnerability and Flood Zone 'compatibility' to determine the risk of flooding to a proposed development.

4.2 Flood Risk Regulations 2009: Preliminary Assessment Report for Kirklees

Kirklees Council's Preliminary Flood Risk Assessment (PFRA) was written in 2009. The report assists Kirklees Council in meeting their duties as a Lead Local Flood Authority (LLFA), assists in managing local flood risk and delivering the requirements of the Flood Risk Regulations (2009).

The regulations require LLFAs, through the Preliminary Flood Risk Assessment (PRFA) process, to carry out a high-level screening to determine whether there is a local flood risk within their LLFA boundary based on past (historic) and future (potential) flood risk data. This information is assembled in this report with a supporting spreadsheet and is used to identify Flood Risk Areas.

*"Lack of information on past flooding incidents and limited understanding of future flood risk means that this initial PFRA for Kirklees provides only an indicative assessment of local flood risk. The threshold for significant flooding has been set at such a high level that Kirklees can make no case to identify a **European** significant Flood Risk Area within the PFRA. Whilst there is little evidence available to quantify specific flood risk, the report clearly confirms that, in general terms, Kirklees is at locally high risk from surface water flooding with around 35,000 people, across the district, at risk from a rainfall event with a 0.5% chance of occurring. "*

"The PFRA, the Councils recently completed Surface Water Management Plan and the forthcoming Local Flood Risk Strategy will provide the framework to develop a better understanding of both past and future local flood risk, in preparation for the next cycle of local flood risk assessment in 2017."

4.3 Calder Catchment Strategic Flood Risk Assessment (SFRA), JBA Consulting

Local Planning Authorities are required to produce Local Development Frameworks, which are a portfolio of Local Development Documents (LDD's) that collectively deliver the spatial planning strategy for the Authority area. The LDD's undergo a Sustainability Appraisal which assists Planning Authorities in ensuring their policies fulfil the principles of sustainability. Strategic Flood Risk Assessments are one of the documents to be used as the evidence base for planning decisions and are a component of the Sustainability Appraisal process. Therefore, SFRA's should be used in the review or production of LDD's.

SFRA's assess the risk associated with all types of flooding and provide the information required to identify the amount of development permitted in an area; how the drainage systems in the area should function and also how the risks in vulnerable areas can be reduced and/or mitigated. The National Planning Policy Framework states that

Regional Planning Bodies (RPB's) or Local Planning Authorities (LPA's) should prepare SFRA's in consultation with the Environment Agency.

Calder Catchment Strategic Flood Risk Assessment (SFRA) – Volume I, April 2016, JBA Consulting

JBA Consulting prepared this report for Kirklees Council as an update of the existing Level 1 Strategic Flood Risk Assessment. The aim of this report is to provide Kirklees Council with adequate flood risk information to inform the sequential approach across the district (as defined in PPS25) and detailed information for the application of the PPS25 Exception Test to key development areas.

The Level 1 SFRA has been produced in two volumes, one generic 'front end' document applicable to all councils making up Volume I, and three separate documents aimed at each Council making up Volume II. Volume I introduces the SFRA and provides background information on flood risk.

Calder Catchment Strategic Flood Risk Assessment (SFRA) – Volume II (Kirklees Council), July 2016, JBA Consulting

Volume II report covers the Planning Framework and flood risk policy whilst assessing actual flood risk, flood risk relative to proposed development sites and conclusions and recommendations for further work.

This document summarises Kirklees's development and planning context, flood risk and strategic overview of flood risk.

The above document(s) state that:

“Development sites could be allocated or granted planning permission where a Sequential Test and an Exception Test (if required) are passed. In addition, a site is likely to be permitted without the need to assess flood risk where the proposed use is for open space. Assuming the site is not to include any development and is to be left open then proposal is likely to be acceptable from a flood risk point of view. For such sites, opportunities for flood storage should be explored however as part of a Flood Risk Assessment (FRA).”

4.4 Critical Drainage Area (CDA)

- Kirklees Council's SFRA states that a CDA is an area contributing surface water runoff, either as direct overland flow or from the existing sewer network, which causes flooding at locations, within that area, or at an area where development pressure could increase the strain on a system already at capacity. The risk of flooding is thereby confirmed, either by historical evidence, through an assessment of the updated Flood Map for Surface Water or through 'on the ground' local evidence provided by the Council drainage engineers.
- A CDA therefore has areas within it where surface water flood risk exists (flood prone areas within a CDA) and areas where properties, although not directly at risk, contribute to that flood risk (upstream areas in a CDA directly affecting flood prone areas).
- Dewsbury does not appear in the list of nine indicative CDA's covering several communities in Kirklees.

4.5 Kirklees Council's Local Flood Risk Management Strategy (LFRMS) 2012

- The commencement of the Flood Risk Regulations 2009 and the Flood and Water Management Act 2010 introduces new statutory roles for Kirklees Council.
- The Flood and Water Management Act places new responsibilities on Kirklees Council, the main ones being:
 - Locally leading on flood management
 - Mapping and registering flood defence assets including those in private ownership
 - Designating third party assets
 - A duty to investigate the causes of flooding
 - The technical approval body for Sustainable Drainage Systems (SuDS)
 - The management and maintenance of adopted SuDS systems
- Kirklees Council must develop, maintain, apply and monitor a strategy for local flood risk management in its area for the following forms of flood risk:
 - Surface runoff
 - Groundwater and
 - Ordinary watercourses

This strategy sets out how Kirklees Council will take on the challenges posed by flood risk by setting local objectives and stating how these will be achieved. It also reflects the needs and priorities identified by local people, business and flood risk partners.

The strategy sets out:

- The risk management authorities in Kirklees
- The flood risk management functions that may be exercised by those authorities in Kirklees
- The objectives for managing local flood risk
- The measures proposed to achieve those objectives
- How and when the measures are expected to be implemented
- The assessment of local flood risk for the purpose of the strategy
- How and when the strategy is to be reviewed
- How the strategy contributes to the achievement of wider environmental objectives

5.0 Sources of Flood Risk

5.1 Fluvial Flood Risk

The Environment Agency Flood Zone Map indicates that the proposed development lies within Flood Zone 2 (medium risk) with areas in the north and east partially located in Flood Zone 3 (high risk). The south west of the site is in Flood Zone 1 (low risk).

These Flood Zones are defined as follows:

- Flood Zone 1: Land assessed as having less than 1 in 1000 annual probability of flooding from rivers (<0.1%).
- Flood Zone 2: Land assessed as having between a 1 in 100 and 1 in 1000 annual probability of flooding from rivers (1%-0.1%).
- Flood Zone 3: Land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%)

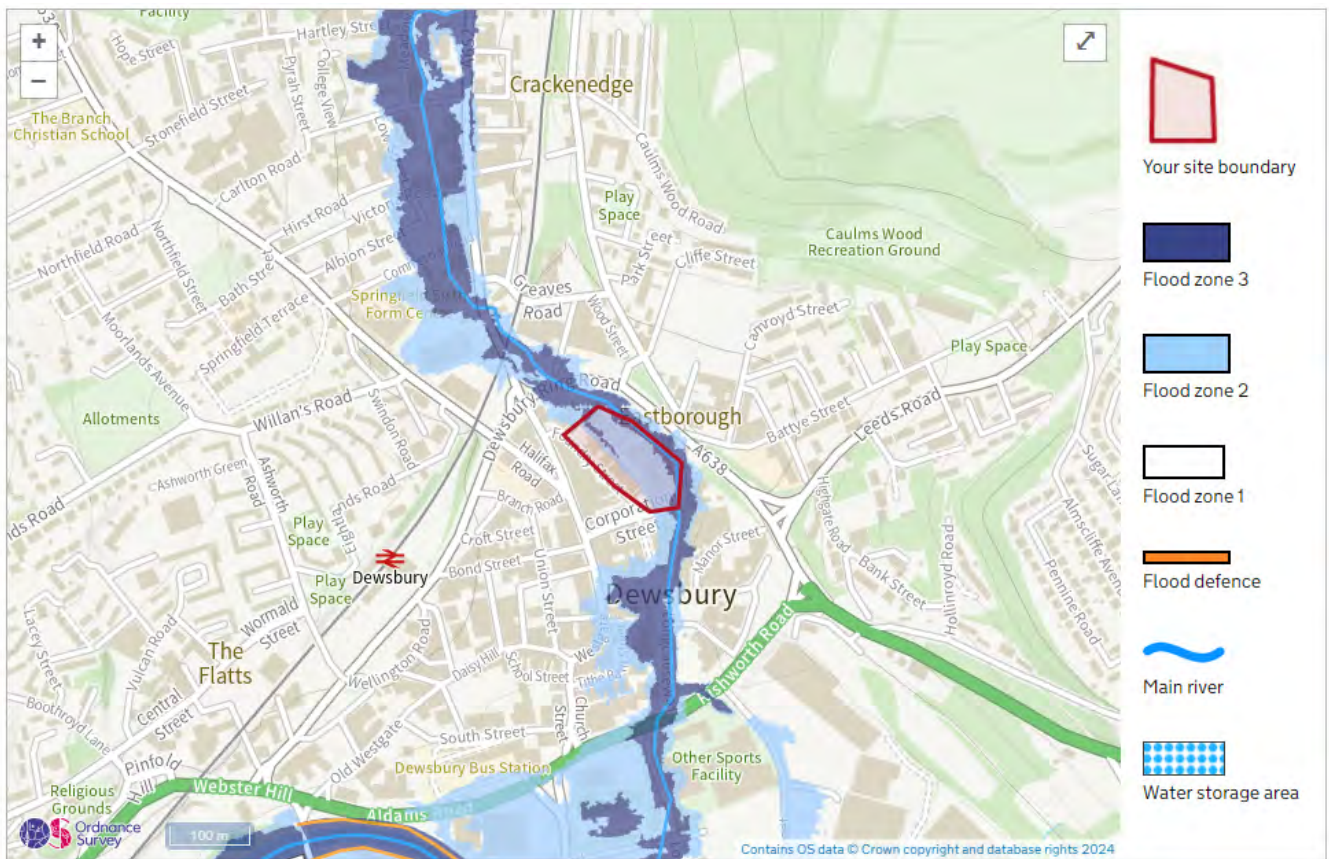


Figure 3: Environment Agency Flood Map for Planning - Flooding from Rivers and Sea (Gov.uk)

Flood model data obtained from the Environment Agency shows ten nodes within the vicinity of key infrastructure on the site. Flood level data for a range of return periods for these nodes are tabulated below:

Node Ref	Return Period Flood Levels (mAOD)				
	75	100	101*	200	1000
4	N/A	N/A	39.54	39.54	39.57
5	N/A	N/A	38.76	38.75	39.19
9	N/A	N/A	39.71	39.71	39.76
10	38.88	38.89	38.99	38.99	39.25
15	N/A	N/A	39.42	39.42	39.65

16	39.08	39.15	39.30	39.29	39.54
22	39.18	39.25	39.44	39.42	39.72
21	N/A	N/A	39.74	39.74	39.95
23	N/A	40.29	40.44	40.44	40.68
24	N/A	N/A	N/A	N/A	40.41

*101 represents the 1 in 100 year plus 20% climate change event

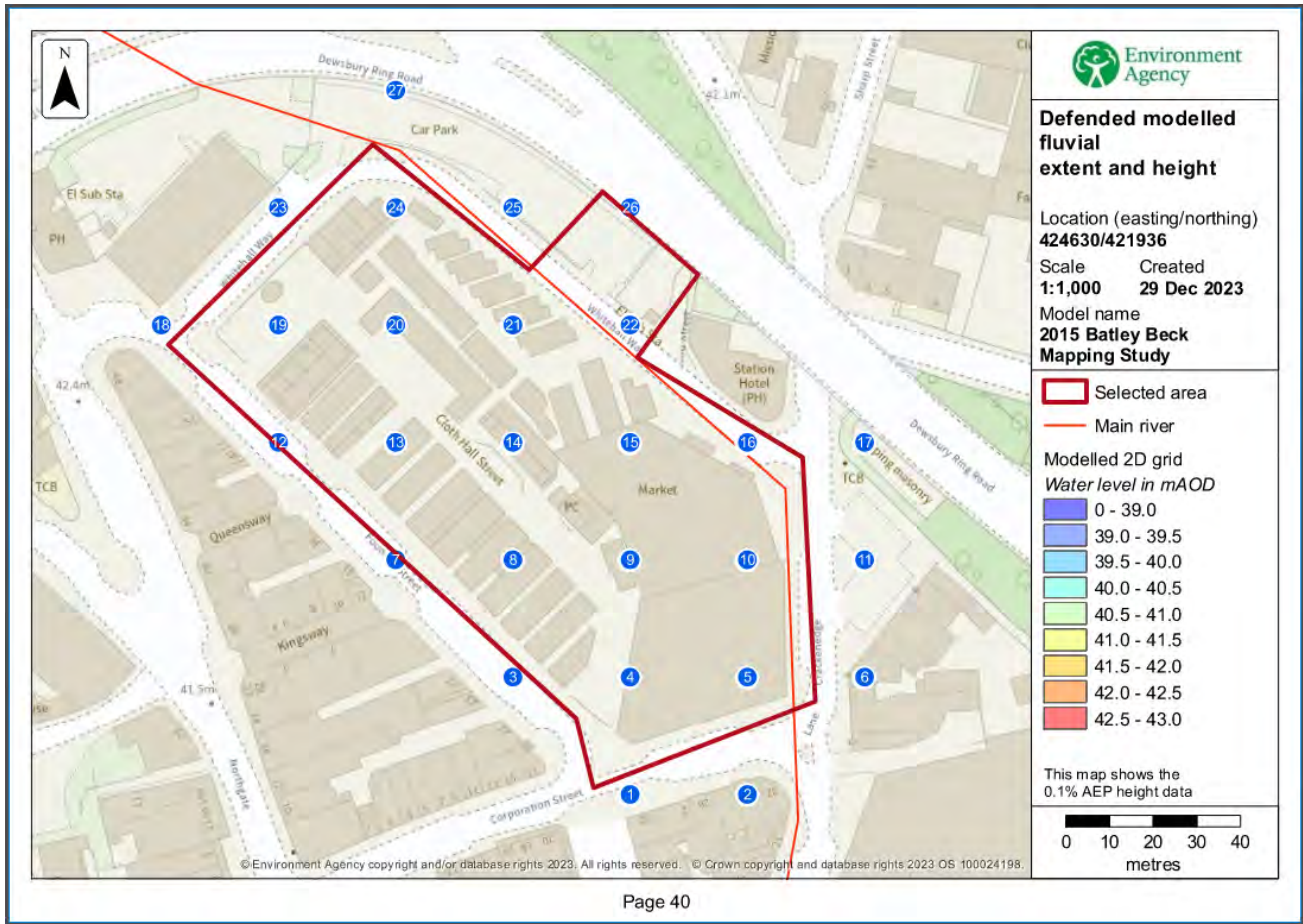


Figure 4: Environment Agency Flood Data

The modelled EA flood data indicates that during a 1 in 100 year event water overtops the culvert upstream of the site. Flows enter the site from the north on Whitehall Way and the East off Crackenedge Lane.

A comparison of topographical survey data against the modelled flood levels indicate that flood waters are likely to reach 40.46mAOD in the east. As such the north of the site is confirmed to lie in flood zone 3 where the flood depth is at its highest at an estimated 350mm. The drawing in Appendix G compares the flood heights from the EA modelled data with the finished flood levels to calculate the flood depth across the site. These flood depths could then be used to accurately locate flood resilient measures.

Furthermore, the Environment Agency do not have any records of flooding occurring at the site.

Taking this into account the site is considered to be at medium to low risk of fluvial flooding.

Flood level data obtained from the Environment Agency is included in Appendix H.

5.1.1 Climate Change

The site proposals are for the refurbishment of the retail units within the existing Market Hall and erection of new temporary outdoor market stalls, which are classed as less vulnerable development under the NPPF flood risk classification. In accordance with Environment Agency guidance the central allowance should be used when assessing the impact of climate change on less vulnerable development. Therefore, for the Calder catchment an application of 23% should be applied to the 100 year return period. The EA data has accounted for a 20% increase in climate change, which closely aligns with the recommended adjustment for climate change and is therefore considered to be acceptable for use within this assessment.

The Flood level data from the Environment Agency has been compared against the ground levels to calculate the worst-case flood depth for a 1 in 100 year event plus 20% for climate change, which is estimated to be 350mm at reference point 16. This point is the highest flood depth within the market footprint. The flood depth for the substation is estimated at 355mm, according to data from point 22. In the west of the site, where the plant room is proposed, the flood level is estimated to be 260mm based on data from point 23. Given the proximity of the culverted watercourse, the north and east areas of the market development are likely at the highest risk of flooding. However, the proposed soft landscaping and large public realm area should help intercept and infiltrate floodwater across the site. This is further explained within the drawing in Appendix G.

5.1.2 Mitigation Measures

Since Batley Beck could overtop by up to 350mm, as a worst-case scenario the Market could be flooded up to a depth of 350mm along the north boundary of the site. The flood level at the north of the market structure is estimated to be 39.445mAOD based on the finished floor level of 39.095mAOD. Since the market hall is an existing structure the finished floor level cannot be raised above the flood level therefore flood resilient measures are to be incorporated into the fabric of the building.

In order to provide protection against a potential flood event it is recommended that any electrical sockets and valuable items are elevated 350mm above existing ground levels within the Market Hall and outdoor stalls. It is also recommended that flood resistance/resilient materials are implemented, where possible, up to 350mm above existing ground for sections of the building located in the north-east of the site. Should flood water enter the market building and collect in the low point of the market in the south-east louvres will prevent water accumulating and rising above the designed flood depth. A sump will also be proposed in the southeast corner to accommodate for the pumping of flood water, if required after the flood event is over. The drawing in Appendix G analyses the modelled flood data against the proposed levels across the site.

In the sub-station and plant room all electrical and valuable items will be above the modelled flood level which is 39.545mAOD and 40.42mAOD respectively.

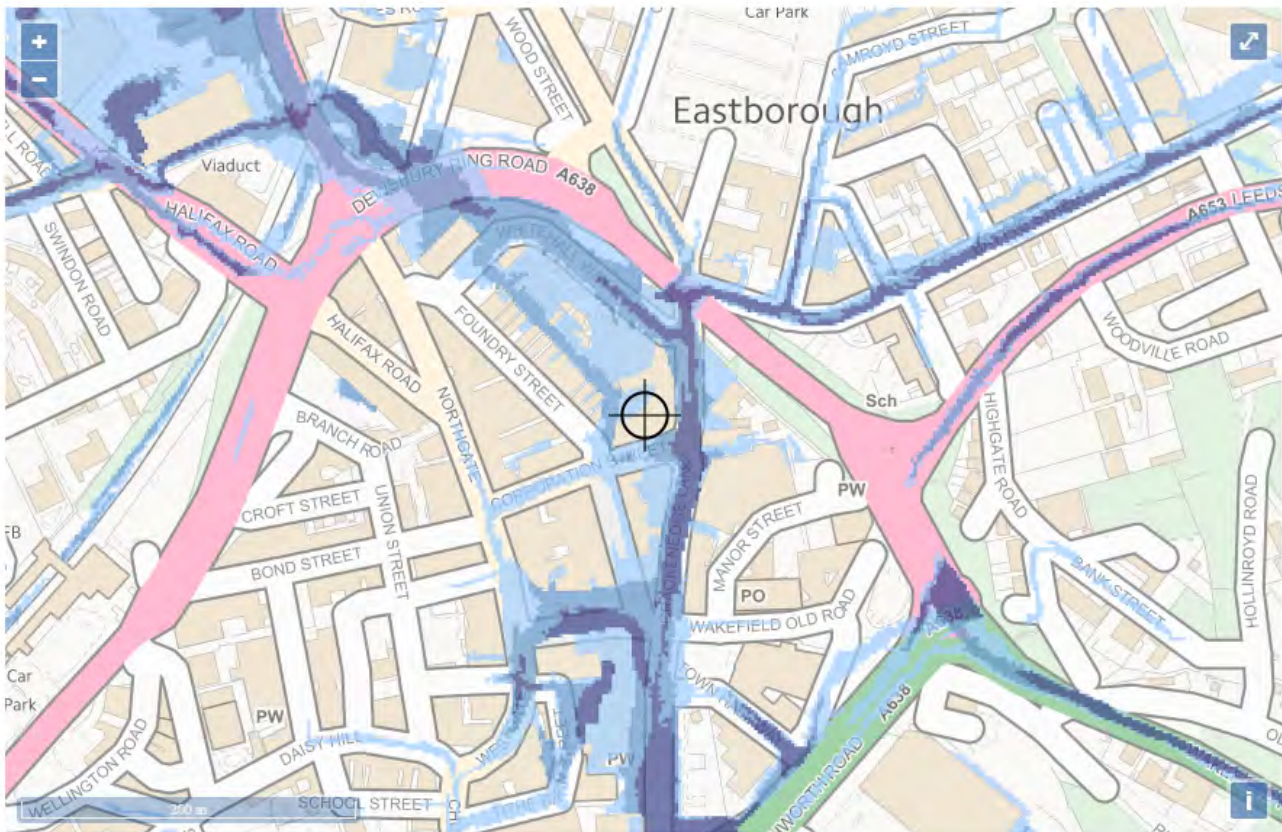
During an extreme storm event people within the Market hall will have safe egress from the site using the doors in the west of the market building.

The site is in an area benefitting from the Environment Agency's free flood warning service. Future occupants are encouraged to sign up to the flood warning service to receive alerts of any potential flood events in the future.

A sketch showing the comparison in flood levels against proposed ground levels can be found in Appendix G.

5.2 Pluvial Flood Risk

Pluvial flooding is defined as flooding resulting from rainfall-generated overland flow before runoff enters any watercourse or sewer. It is usually associated with high intensity rainfall events but can also occur with low intensity rainfall or melting snow where ground is saturated, frozen, developed or otherwise has low permeability resulting in overland flow and ponding in depressions in the topography. Large catchment areas are particularly prone to this type of flooding.



Extent of flooding from surface water

● High ● Medium ● Low ○ Very low ⊕ Location you selected

Figure 6: Environment Agency Flood Map for Planning – Extent of flooding from surface water (Source: <https://flood-warning-information.service.gov.uk>)

The majority of the site is considered to be at very low to low risk of surface water flooding. However, it is indicated that Cloth Hall Street and small areas in the north east are at medium risk. These are assumed to be associated with the existing topography and local lower laying areas.

The areas at medium risk are predominantly confined to the existing highways and are considered to be drained via the existing drainage network where possible. The site will introduce soft landscape areas to provide a betterment by decreasing the impermeable area. Furthermore, the proposed drainage strategy for the development will be designed to ensure no flooding occurs during the 1 in 100 year event plus 20% for climate change. Therefore, the risk of flooding from overland flow is considered to be low.

5.3 Sewer Flood Risk

The flood maps provided within Kirklees Council's Strategic Flood Risk Assessment (SFRA) do not show any historic incidences of sewer flooding recorded as part of Yorkshire Water's DG5 register. The site is also not located within a designated Critical Drainage Area (CDA), and the proposed drainage strategy aims to reduce flows to the public sewer thereby providing a betterment on the overall network, therefore the risk of flooding from sewers is regarded as low.

5.4 Groundwater Flood Risk

In general terms groundwater flooding can occur from three main sources, raised water tables, seepage and percolation, and groundwater recovery or rebound. If groundwater levels are naturally close to the surface, then this can present a flood risk during intense rainfall.

The Envirocheck Groundwater Flooding Susceptibility map shows the site to lie in an area with potential for groundwater flooding to occur at the surface and the Extended Soil report mentions that the “soils are seasonally waterlogged by fluctuating groundwater and with relatively slow lateral saturated conductivity.” However, the SFRA has not specified any significant issues associated with groundwater flooding.

No basement structures are proposed as part of the new development; therefore, the risk of flooding is regarded as low.

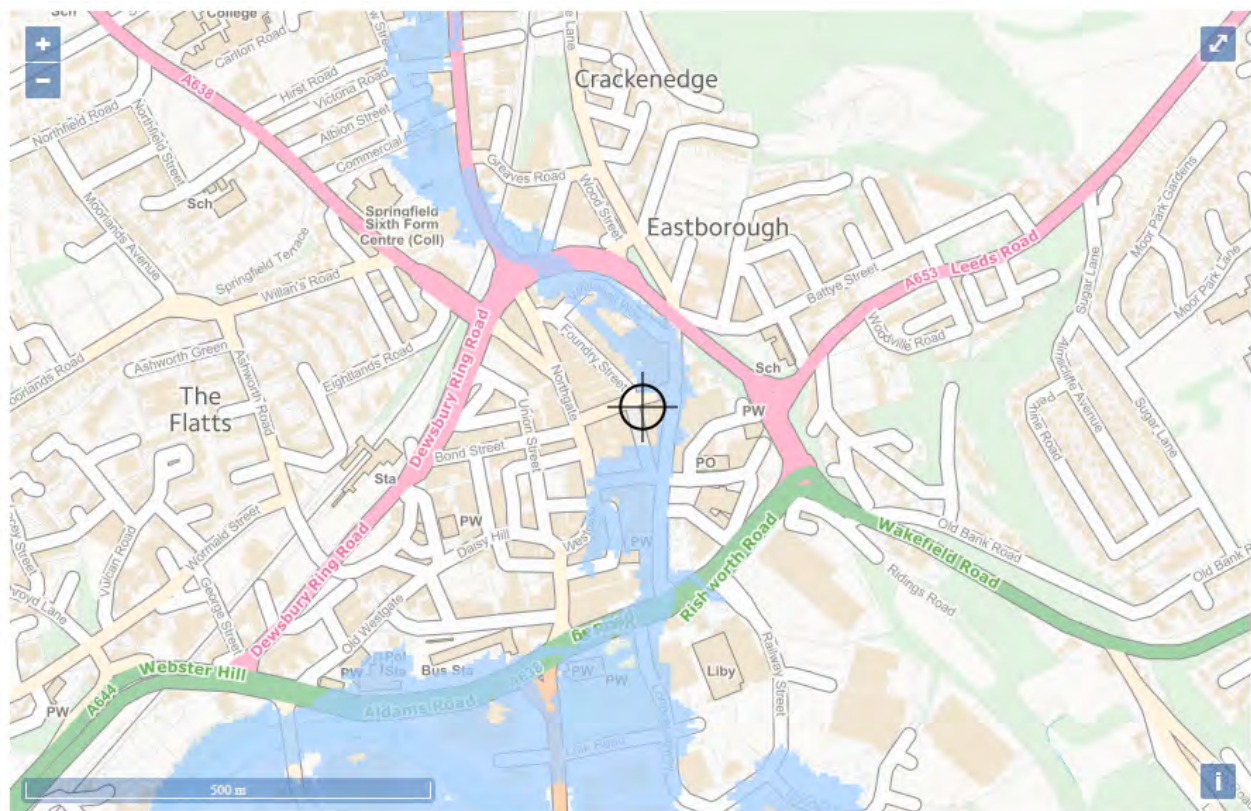
5.5 Flooding from Other Sources/Infrastructure Failure

Non-natural or artificial sources of flooding can include reservoirs, lakes and canals etc. The Environment Agency’s map showing the extent of flooding from reservoirs indicates the site is partially located within the maximum extent of flooding from a reservoir.

The map shows the estimated flood depth and velocity from a potential flood as being below 0.3m and 0.5m/s respectively indicating a low risk of danger to residents.

Furthermore, in reference to the DEFRA’s ‘Reservoir Safety’ Document “England has an excellent reservoir safety record, and there have been no dam breaches resulting in the loss of life since reservoir safety legislation was first introduced in 1930.”

As such, the risk of flooding from reservoirs is regarded as low.



Extent of flooding from reservoirs

● Maximum extent of flooding ⊕ Location you selected

Figure 7: Environment Agency Flood Map for Planning – Extent of flooding from reservoirs
(Source: <https://flood-warning-information.service.gov.uk>)

5.6 Summary of Flood Risk

Taking into consideration the evidence collated and the implementation of the recommended mitigation measures, the flood risk proposed to the development can be summarised as indicated in the table below:

Table 3: Summary of mitigates sources of flood risk

Source	Mitigated Risk
Fluvial	Medium
Coastal – Sea	N/A
Coastal – Estuarine	N/A
Pluvial Flooding	Low
Sewer - SWS, FWS, CS, CSO	Low
Groundwater	Low
Other Sources	Low

The proposed development is for retail and can be considered as ‘Less vulnerable’ *within Table 3: Flood Risk Vulnerability and flood zone ‘compatibility’* in the Technical Guidance for the NPPF. This type of development would be wholly appropriate for Flood Zone 2/3.

Table 4 – Extract from Table 3: Flood Risk Vulnerability and Flood Zone Compatibility (Technical Guidance for NPPF, Gov.co.uk)

Flood Zones	Flood Risk Vulnerability Classification				
	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test Required	✓	✓	✓
Zone 3a	Exception Test Required	X	Exception Test Required	✓	✓
Zone 3b	Exception Test Required	X	X	X	✓

Key:

✓ Development is appropriate

X Development should not be permitted

6.0 Surface Water Management Strategy

6.1 Existing Site Drainage Regime

The site is currently comprised of external market stalls with a hardstanding area surrounding the existing market building. The site is currently drained by a series of slot drains which drain to a culverted watercourse in the north and a combined sewer in the south of the site. A CCTV survey has confirmed the condition of the existing drainage, and no remediation works are required. The existing market hall drainage flows through downpipes through pipes which flow underneath the market structure before discharging to the east to the culverted watercourse.

6.2 Pre-development Surface water Runoff

The site is brownfield in nature and is currently occupied by 100% hardstanding areas and buildings, which are confirmed to be positively drained via a CCTV survey.

At present, there are four primary drainage catchments and outfall locations that have been identified from the CCTV Survey. The table for Figure 9 summarises the existing drainage catchment areas, which are also identified on BDP's Existing Drainage Areas drawing **DMTP-BDP-00-XX-DR-C-52100**, within Appendix C.



Figure 8: Extract from – DMTP-BDP-00-XX-DR-C-52100 Existing Drainage Areas

Table 5: Drainage Catchment Areas and Outfall Locations

Catchment Area Ref.	Impermeable Hardstanding Area (ha)	Proposed Impermeable Hardstanding Area (ha)	Difference between existing and proposed (ha)	Outfall Location
A	0.24	0.06	0.18	Discharges to culverted watercourse, Batley Beck
B	0.48	0.27	0.19	Discharges to public combined sewer on Cloth Hall Street
C	0.07	0.07	0	Discharges to public combined sewer on Foundry Street
D	0.21	0.21	0	Discharges to culverted watercourse, Batley Beck
E	0.17	0.17	0	Discharges to culverted watercourse, Batley Beck

The external structure of the Market Hall building and existing canopy are to be refurbished however the building footprint and drainage regime will not be changed.

6.3 Post-development Surface water Runoff

The introduction of soft landscaped areas throughout the site has reduced the impermeable area by 40% providing a betterment to the site. It was agreed with the LLFA (Appendix H) that this provided the required reduction in discharge rates leaving the site in accordance with local policy. As a result, attenuation is not required to limit the discharge of surface water from the site. However, the implementation of SuDs is still encouraged to provide a further betterment to runoff rates and additional benefits to water quality and the environment as described in the CIRIA SUDS Manual.

In May 2022, the Environment Agency released updated climate change allowances for peak rainfall intensities which should be applied to new developments. Table 6 demonstrates the climate change allowances with central and upper end being considered. In addition, a 1 in 30-year rainfall event must now also be modelled.

Based on the nature of the development, a lifespan of 60 years is anticipated. The potential climate change allowance for 3.3% annual exceedance rainfall event considering 2070 to 2115 ranges between 25% for the central allowance and 45% for the upper end allowance. As the lifespan of the project falls between 2061 and 2100 the design will consider an allowance of 30% climate change on peak rainfall intensity for all calculations.

Table 7: Extract of Environment Agency Guidance - Peak Rainfall Allowances for Aire and Calder Management Catchment

3.3% Annual Exceedance Rainfall Event	Central Allowance	Upper End Allowance
2050s	20%	35%
2070s	25%	40%

1% Annual Exceedance Rainfall Event	Central Allowance	Upper End Allowance
2050s	25%	40%
2070s	30%	45%

6.4 Methods of Surface Water Management

In accordance with Building Regulations and the NPPF Drainage Hierarchy the management and discharge of surface water from a development should be applied in the order of priority as listed.

- 1) Disposal to ground via infiltration, and where this is not practicable;
- 2) Disposal to a watercourse, and where this is not practicable;
- 3) Disposal to a surface water sewer or highway drain, and where this is not practicable;
- 4) Disposal to a combined sewer.

No surface water will be allowed to connect to a foul sewer.

The feasibility of each disposal method has been assessed and summarised in the Table 7.

Table 8: Feasibility of disposal methods for surface water discharge

Method	Comments	Feasible
Infiltration	Geological conditions described in section 3.4 confirmed the site to be underlain by clay with low permeability and the infiltration rates from the soakaway testing are lower than the recommended rate.	N
Watercourse	The culverted Batley Beck river flows across the north of the site beneath Whitehall Way.	Y
Surface Water Sewer	There is a surface water sewer on Whitehall Way which discharges to the culverted watercourse. In discussions the EA stated the drainage strategy mustn't but existing infrastructure under further pressure therefore the drainage catchments will discharge as existing. There is also an existing surface water sewer along foundry Street south of the site however due to the higher levels of these manholes they weren't feasible to outfall to.	Y
Combined Water Sewer	There is a combined sewer flowing through the middle of the site along Cloth Hall Street.	Y

Based on the underlying ground conditions and location of the site, the most appropriate method for the discharge of surface water runoff is to retain the existing catchments used across the site. Therefore, the surface water in the north will discharge to the culverted watercourse and all other water will flow through channel/slot drains into the combined sewer.

6.5 Sustainable urban Drainage Systems (SuDS)

The general principle of the surface water drainage strategy for the development site is to collect runoff from buildings and hardstanding areas and attenuate at source, with a controlled discharge to the surrounding network.

The CIRIA SuDS Manual encourages the use of the 'SuDS management train' concept to manage runoff. The hierarchy of techniques to be used is:

1. Prevention – Prevention of runoff by good site design and reduction of impermeable areas.
2. Source Control – Dealing with water where and when it falls (e.g., infiltration techniques).
3. Site Control – Management of water in the local area (e.g., swales, detention basins).
4. Regional Control – Management of runoff from sites (e.g., balancing ponds, wetlands).

Various SuDS methods have been summarised in Table 8 to assess and establish which are most feasible for the site.

Table 9: Summary of potential SuDS features and feasibility within the proposed drainage strategy

Suds Method	Comments	Feasible
Green & Blue Roof	The market hall is an existing building and a green/blue roof cannot retrospectively be installed to the existing structure.	N
Rainwater Harvesting	The market drainage is to remain as existing and no changes will be made to the external market structure.	N
Permeable Paving	Although infiltration testing proved unfeasible for the discharge to ground, a lined granular sub base could be proposed to discharge runoff to the main drainage network. However, after discussions with the LLFA, permeable paving was considered unviable in the area of the outdoor market due to the large mortar joints required in between the block paving. This does not have the aesthetic appeal the client is looking for and could be a point of weakness for the large HGV's which will need to access the site.	N
Swales	Based on the layout of the site, it is unlikely that the use of swales will be feasible.	N
Channels and Rills	It is possible to implement channels and rills within the proposed landscaping plan to convey rainwater runoff.	Y
Filter Drains	It is feasible to implement filter drains within the proposed strategy to store and convey runoff.	Y
Infiltration Basin	Based on the geology of the site, it is unlikely that the use of infiltration basins will be feasible.	N
Rain Garden	It is feasible for rain gardens to be incorporated into the landscaped areas within the proposed plan.	Y
Detention Basin	Due to the sites levels and limited space it is not viable to provide a detention basin.	N
Retention Pond	Due to the sites levels and limited space it is not viable to provide a detention basin.	N
Geocellular Storage Systems	Geo-cellular tanks can be accommodated under the outdoor market area, due to the site not requiring attenuation they are still feasible to be proposed on site.	Y

The type of land use is considered to be the primary influencing factor in the quality of urban surface water runoff. The indicative pollution hazard indices for the land uses associated with the proposed development have been extracted from Table 26.14 of the SuDS Manual and have been tabulated below.

Table 10: Extracted from Table 26.2 Pollution hazard indices for different land use classifications (CIRIA SuDS Manual C753)

Land use	Pollution hazard level	Total suspended solids (TSS)	Hydro-carbons	Metals
Other roofs (typically commercial / industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Commercial yard and delivery areas, non-residential car parking with frequent change (e.g. hospitals, retail), all roads except low traffic roads and trunk roads/motorways	Medium	0.7	0.6	0.7
Total	Low	1.0	0.8	0.75

In order to provide adequate treatment to the site, the proposed SuDS components should have a total pollution mitigation index greater than or equal to the pollution hazard index of the land use. The surface water drainage strategy proposes the use of tree pits and permeable surfaces in the play area. The mitigation indices for these SuDS feature, tabulated below, are shown to be greater than the pollution indices from the proposed land use and are therefore considered appropriate to mitigate potential pollutants from the site.

Table 11: Extracted from Table 26.3 Indicative SuDS mitigation indices for discharges to surface waters (CIRIA SuDS Manual C753)

Types of SuDS Components	Mitigation Indices		
	Total suspended solids (TSS)	Metals	Hydrocarbons
Permeable Pavement	0.7	0.6	0.7
Bioretention System	0.8	0.8	0.8
Total	1.5	1.4	1.5

Further design of the SUDs features will be undertaken at the detailed design stage in conjunction with the design of the piped drainage systems.

6.6 Outline Surface Water Drainage Strategy

The proposed drainage strategy is to be developed in accordance with current best practice and is to be designed not to flood for the critical 1 in 30-year flood event. Flood water generated for up to the critical 1 in 100-year plus climate change storm event is permitted but shall be constrained within the areas on site so as not to cause damage to buildings, essential services or adjoining developments.

The market hall is to be refurbished, the structure will remain as existing however the roof and the rainwater discharge method is being amended. The existing drainage regime has a number of downpipes discharging into a channel drain on the west of the market. One downpipe connects directly to the below ground drainage where a combined sewer is present. The proposed discharge method involves using downpipes around the market's perimeter. Water collected by these downpipes will be directed into a surface water channel running around the structure's perimeter. The drainage strategy will incorporate the existing channel drain located in the northeast of the development. The existing drainage catchment plan is attached in Appendix C.

The existing outdoor market area is entirely comprised of hard landscaping. The development proposals include the incorporation of green spaces in the west of the site which significantly decreases the impermeable area of the site by 40%. In coordination with the LLFA it was agreed this will provide the 30% reduction on existing discharge rates.

Total Area of Proposed Site (m2)	Total Area of Proposed Soft Landscaping (m2)	Total Area of Proposed Hard Landscaping (m2)	Increase in soft landscaping (%)
5957	2349	3608	39.4

The above values are subject to change following further design development.

After consultations with the LLFA it was confirmed that attenuation to limit the runoff discharging from the site is unnecessary for the site, due to the significant increase in soft landscaping. Soft landscaping has been introduced to decrease the impermeable area and provide a betterment to runoff rates. Where soft landscaping cannot be used a series of slot/channel drains will be installed to drain the external market area. Due to slot/channel drains being present on the site these will be incorporated where possible into the drainage strategy. In line with the current drainage regime the design of the surface water drainage strategy will retain the existing outfall connections to the public combined sewer on Cloth Hall Street and the culverted watercourse. To further reduce the risk of flooding a non-return valve will be installed on the outfall connection to the combined sewer to mitigate the risk of the sewer backing up.

Due to the high permeability of the play area surface infiltration can be considered. Furthermore, during extreme rain events there will be low levels of pedestrian foot traffic therefore, the low infiltration rate is considered sufficient to drain the area. The sub-base has been increased to between 300mm – 560mm to accommodate runoff for a 1 in 100 year plus 30% climate change event to reduce the risk of surface water flooding. The gradient of the sub-base is 1:58 in comparison to the 1:43 of the ground level.

To provide further betterment to the site, tree pits containing geo-cellular storage structures are to be proposed with a total area of attenuation totalling 21m³. This will also improve the water quality discharged into the combined sewer. In a storm event which exceeds the conditions designed for the flood water will spill into the proposed drainage alongside soft landscaped areas. A flood route exceedance plan is attached in Appendix I.

A hydraulic model of the proposed surface water network shows a combined discharge rate of 32.8 l/s entering the combined sewer. This is less than the rate specified by Yorkshire Water in the pre-development enquiry of 50.8 l/s and therefore meets the requirements for discharging into the sewer.

It is not anticipated that the new drainage network will be offered for adoption to Yorkshire Water. It is important that any drainage systems that are not offered for adoption to either the Water Company or the Local Authority have an appropriate maintenance regime scheduled and an appropriate management company appointed to carry out the works.

A copy of the proposed drainage strategy and calculations is included in Appendix D.

7.0 Foul Water Drainage Strategy

The only existing foul drainage are within the market building which outfalls to the combined drain on cloth hall street.

The proposed foul drainage strategy will include new foul drainage pipes from the refurbished market and the water feature plant room. The foul water from the water feature plant room will have a non-return valve as it is discharging into a combined sewer. The estimated discharge rate is calculated to be 0.654 l/s based on guidance within the Design and Construction Guidance for the size of the development.

S106 approval will be required from Yorkshire Water for any new connections to the public combined sewer.

The foul water system will be designed and constructed in accordance with the current Building Regulations, BS EN:752 drainage and sewer systems outside buildings, the local authority building control specifications and requirements, Design and Construction Guidance (DCG) and the Civil Engineering Specification for the Water Industry 7th Edition.

The proposed drainage strategy plan is enclosed in Appendix D.

Foul discharge rates for the proposed site have been calculated in accordance with the Design and Construction Guidance

8.0 Conclusion

The Environment Agency's Flood Map for planning identifies the site to be predominantly located in Flood zone 2 with small areas in Zone 3. The site also has no history of flooding in the past.

When analysing the Batley Beck flood level data from the EA it was determined in the market building a flood resilience depth of 350mm from FFL would need to be incorporated. As the building is to be internally renovated there were limited options to increase floor levels to reduce the flood risk. The analysis was carried out using the 1 in a 100 year +20% climate change figures due to the River Calder catchment figure of 1 in a 100 year +23% climate change. In order for the water to disperse from the market building louvres will be installed on the southern and eastern walls. This also decreases the risk of flood water rising above the level of flood resilient construction.

Surface Water flooding was identified as having a low risk to the site. To provide a betterment to the area the introduction of 40% more soft landscaping replacing impermeable hardstanding provides the 30% betterment on brownfield discharge rates as agreed in discussions with the LLFA. These discussions with the LLFA stated there is no limit on discharge rate therefore the site will not require attenuation.

An appropriate management and maintenance plan should be enforced to ensure the drainage infrastructure remains in good condition and the risk of surface water flooding is reduced.

Taking the above information into account the Flood Risk Assessment is considered to be commensurate with the development proposals and can be considered appropriate for Flood Zone 2/3. In accordance with the NPFF and Local Planning Policy/Core Strategy, and to subject to the mitigation measures proposed.

Appendix A: Site Location Plan

Appendix B: Proposed Masterplan Layout



- KEY**
- ALL PAVING PATTERNS REPRESENT YORKSTONE DIAMOND SAWN PAVING IN VARIOUS LAYING PATTERNS AND DIMENSIONS
 - GRANITE FEATURE PAVING IN THREE VARYING BURN TONES IN VARIOUS LAYING PATTERNS AND DIMENSIONS
 - HAZARD WARNING TACTILE AND BLISTER PAVING TO ADAPTABLE HIGHWAY STANDARDS
 - PROPOSED GRANITE NATURAL STONE EDGE
 - PROPOSED GRANITE NATURAL STONE PAVING BAND
 - PROPOSED METAL EDGE
 - PROPOSED LOW STONE WALL
 - PROPOSED RETRACTABLE & STATIC BOLLARDS
 - PROPOSED 450mm HIGH 200mm WETH RASED PLANTER WITH NATURAL STONE FINISH
 - PROPOSED STONE BENCH WITH TIMBER SEAT AND BACK AND ARM RESTS
 - PROPOSED SMALLER POWER SOURCE (FOR MARKET STALLS)
 - PROPOSED LARGER POWER SOURCE (FOR EVENTS)
 - PROPOSED LIGHT COLUMN
 - EXISTING TREES RETAINED
 - PROPOSED TREES
 - PROPOSED SPECIMEN SHRUBS
 - PROPOSED MIXED PLANTING
 - PROPOSED LAWN
 - PROPOSED WATER FEATURE
 - PROPOSED SCULPTURE TO ARTISTS DETAIL
 - PROPOSED CYCLE STANDS

BUILDING DESIGN PARTNERSHIP SHALL HAVE NO RESPONSIBILITY FOR ANY USE MADE OF THIS DOCUMENT OTHER THAN THAT FOR WHICH IT WAS PREPARED AND ISSUED.

ALL DIMENSIONS SHOULD BE CHECKED ON SITE. DO NOT SCALE FROM THIS DRAWING.

ANY DRAWING ERRORS OR OMISSIONS SHOULD BE BROUGHT TO THE ATTENTION OF BUILDING DESIGN PARTNERSHIP AT THE ADDRESS SHOWN BELOW.

NOTES

TO BE READ WITH OTHER BDP LANDSCAPE DRAWINGS AND DOCUMENTS

- DMTP-BDP-05-XX-RP-2-0004 Dewsbury Market and the Park Design and Access Statement
- DMTP-BDP-TP-SL-PL-L-90102
- DMTP-BDP-TP-SL-PL-L-90601

NOTE:
- PLAY AREA AND WATER FEATURE TO BE DEVELOPED DURING NEXT WORK STAGE.

P02 PLANNING ISSUE RN NO 12.08.24

FIRST ISSUE

DATE: 12.08.24



Kirklees Council
Civic Centre 3
Market Street
Huddersfield
HD1 2TG

BDP.

11 Duise Street
P.O. Box 83, Fircroft Basin
Manchester, M20 3JA
United Kingdom
T +44 (0)161 629 2200
F +44 (0)161 629 2205
www.bdp.com

Dewsbury Market

P3001350

Landscape Masterplan

1:350 @A1

FEB '24

DMTP-BDP-TP-SL-PL-L-90100 P02



Appendix C: Existing Drainage Catchment Plan



KEY
 - - - - - ASSUMED ROUTE OF CULVERTED WATERCOURSE
 ——— EXISTING SURFACE WATER CONNECTIONS
 ——— EXISTING COMBINED WATER CONNECTIONS

BUILDING DESIGN PARTNERSHIP SHALL HAVE NO RESPONSIBILITY FOR ANY USE MADE OF THIS DOCUMENT OTHER THAN FOR THAT WHICH IT WAS PREPARED AND ISSUED.
 ALL DIMENSIONS SHOULD BE CHECKED ON SITE.
 DO NOT SCALE FROM THIS DRAWING.
 ANY DRAWING ERRORS OR DIVERGENCES SHOULD BE BROUGHT TO THE ATTENTION OF BUILDING DESIGN PARTNERSHIP AT THE ADDRESS SHOWN BELOW.

1. ALL DIMENSIONS ARE IN METRES UNLESS STATED OTHERWISE.
2. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ARCHITECTURAL AND ENGINEERING DETAILS, DRAWINGS AND SPECIFICATIONS.
3. EXISTING DRAINAGE, MANHOLE POSITIONS, LEVELS AND CONNECTIONS ARE BASED ON AVAILABLE INFORMATION OBTAINED FROM THE FOLLOWING SOURCES. NO WARRANTY AS TO THE ACCURACY OF THE INFORMATION IS GIVEN OR IMPLIED.
 - TEAM DRAINAGE CCTV SURVEY
 - PLOWMAN CRAVEN GPR SURVEY
 - KIRKLEES COUNCIL EXISTING DRAINAGE PLANS
4. TOPOGRAPHICAL INFORMATION PROVIDED WITHIN THIS DRAWING IS AN INDICATION OF EXISTING LEVELS ACROSS SITE.

P01 FOR INFORMATION JB EH 26/07/24

REVISION	DESCRIPTION	DRAWN	CHECKED	DATE
KEY PLAN				



BDP.

11 Ducie Street
 PO BOX 85
 Picadilly Basin
 Manchester
 M60 3JA
 United Kingdom
 T +44 [0]161 828 2200
 www.bdp.com

PROJECT TITLE
DEWSBURY MARKET, HUDDERSFIELD

BDP JOB NUMBER: **P3001350** | ISO 27001 CLASSIFICATION: **COMMERCIAL IN CONFIDENCE**

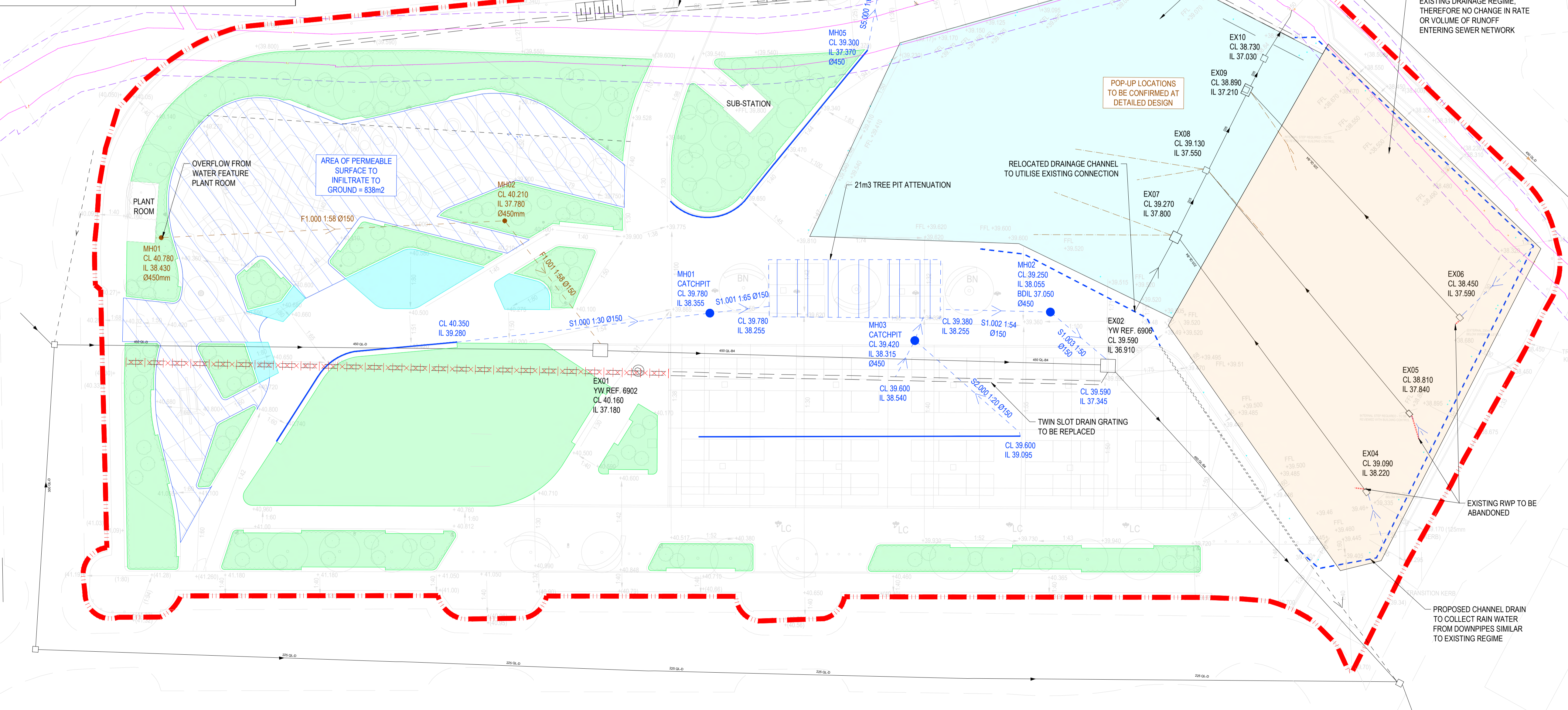
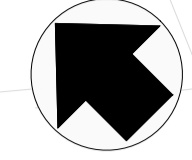
DRAWING TITLE: **EXISTING DRAINAGE CATCHMENT AREAS AND OUTFALL LOCATIONS** | SCALE: **1:500 @ A2**
 DATE: **26/07/24**

DRAWING No.: **DMTP-BDP-00-XX-DR-C-52100** | REVISION: **P01**

Appendix D: Drainage Strategy

LEGEND

- EXISTING COMBINED SEWER
- EXISTING SURFACE WATER SEWER
- EXISTING TWIN SLOT DRAIN TO BE ABANDONED
- EXISTING TWIN SLOT DRAIN GRATING TO BE REPLACED
- PROPOSED SURFACE WATER DRAINAGE
- PROPOSED SURFACE WATER MANHOLE
- PROPOSED CHANNEL DRAIN
- PROPOSED SLOT DRAIN
- PROPOSED PERMEABLE SURFACE
- PROPOSED TREE PIT WITH GEOCELLULAR STORAGE
- PROPOSED FOUL DRAINAGE
- SITE BOUNDARY
- PROPOSED SOFT LANDSCAPING
- CULVERTED WATERCOURSE EXTENTS
- CULVERTED WATERCOURSE OFFSET
- PROPOSED WATER FEATURE

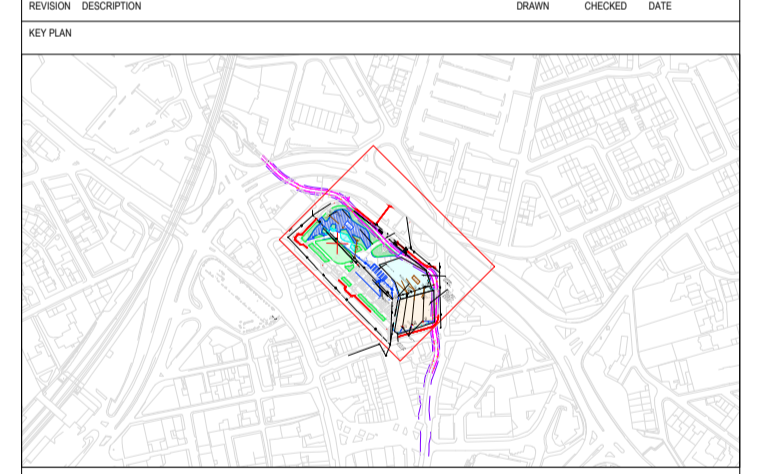


BUILDING DESIGN PARTNERSHIP SHALL HAVE NO RESPONSIBILITY FOR ANY USE MADE OF THIS DOCUMENT OTHER THAN FOR THAT WHICH IT WAS PREPARED AND ISSUED.
 ALL DIMENSIONS SHOULD BE CHECKED ON SITE.
 DO NOT SCALE FROM THIS DRAWING.
 ANY DRAWING ERRORS OR DIVERGENCES SHOULD BE BROUGHT TO THE ATTENTION OF BUILDING DESIGN PARTNERSHIP AT THE ADDRESS SHOWN BELOW.

NOTES

1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE STATED. WHERE THERE APPEARS TO BE A CONFLICT BETWEEN DIMENSIONS OR WHERE DIMENSIONS CANNOT BE DETERMINED FROM THE DRAWINGS, CONSULT THE ENGINEER BEFORE PROCEEDING WITH THE WORK.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL ARCHITECTS, ENGINEERS AND SPECIALIST DRAWINGS AND SPECIFICATIONS.
3. THIS DRAWING IS BASED ON:
 - 3.1. GPR AND TOPOGRAPHICAL SURVEY - PLOWMAN CRAVEN OCT 2021
 - 3.2. LANDSCAPE GENERAL ARRANGEMENT - DMTP-BDP-TP-SL-PL-L-90101
 - 3.3. LANDSCAPE SITE LEVELS PLAN - DMTP-BDP-TP-SL-PL-L-90601
4. NEW CONNECTIONS TO THE PUBLIC SEWER ARE SUBJECT TO SECTION 106 OF THE WATER INDUSTRY ACT 1991 APPROVAL. NO WORKS AFFECTING THE PUBLIC SEWERAGE SYSTEM MAY BE CARRIED OUT WITHOUT UUS PRIOR WRITTEN CONSENT
5. THE PROPOSED BUILDING OUTLINES SHOWN ON THIS DRAWING ARE FOR INFORMATION ONLY. REFER TO ARCHITECTS PLANS FOR PRECISE LOCATION SETTING OUT INFORMATION AND DETAILS.

P02 PLANNING ISSUE JB PS 12/08/24
 P01 STAGE 3 DRAFT SUBMISSION JB EH 26/07/24

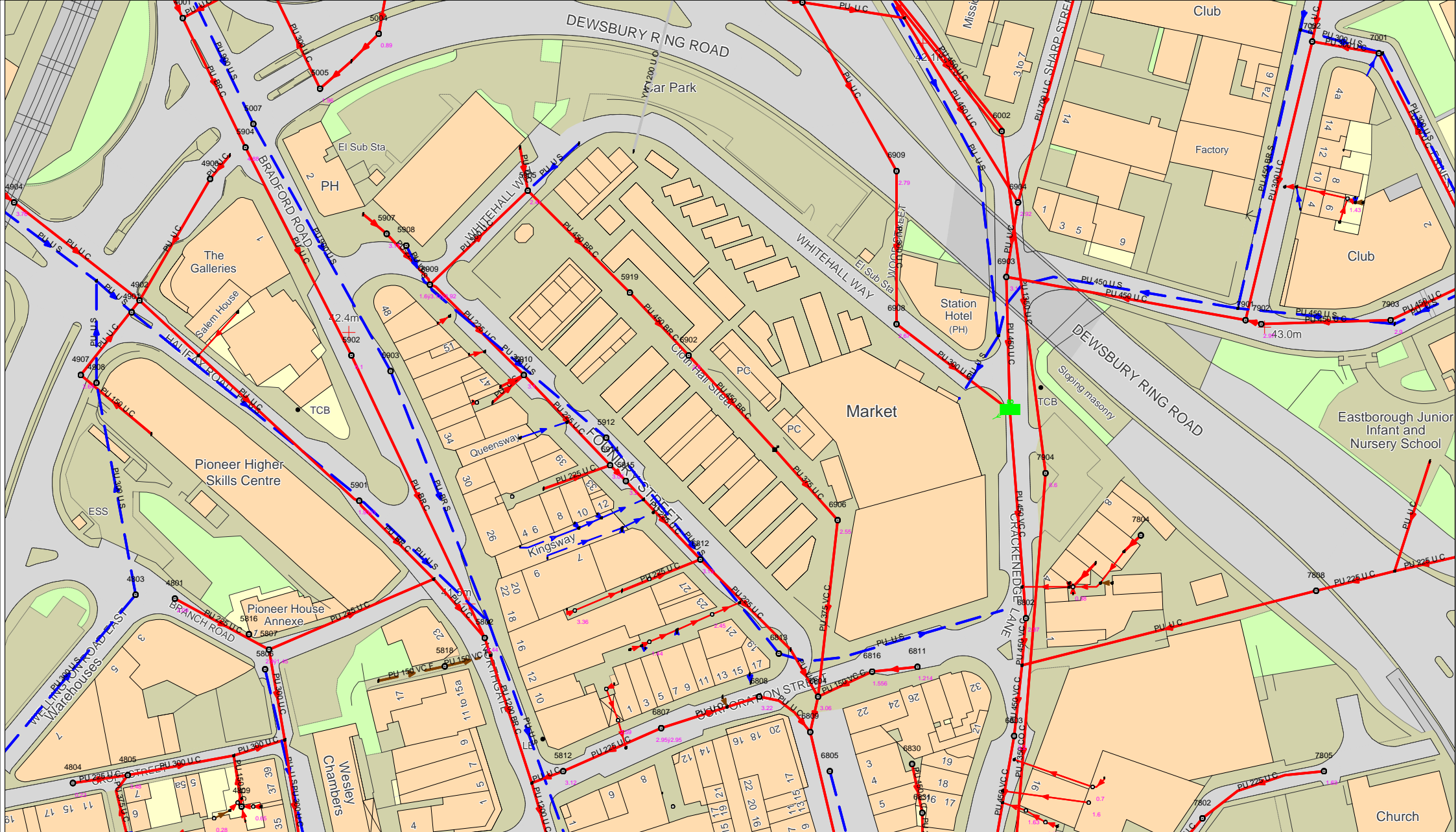



Kirklees COUNCIL
 Kirklees Council
 Civic Centre 3
 Market Street
 Huddersfield
 HD1 2TG

BDP.
 11 Ducie Street
 PO BOX 85
 Piccadilly Basin
 Manchester
 M60 3JA
 United Kingdom
 T +44 [0]161 828 2200
 www.bdp.com

PROJECT TITLE DEWSBURY MARKET	
REF OR NUMBER P3001350	90 909 CLASSIFICATION COMMERCIAL IN CONFIDENCE
DRAWING TITLE DRAINAGE STRATEGY	SCALE 1:250 @ A1
DRAWING NO. DMTP-BDP-00-XX-DR-C-52001	DATE 18/07/2024
REVISION P02	

Appendix E: Yorkshire Water Sewer Records



<p>424453 : 421829</p>  <p>Yorkshire Water, PO Box 500, Halifax Road, Bradford BD6 2LZ Contact Name : G Mullaney Contact Tel :</p>	<p>Map Name : SE2421NW</p>	<p>Title</p> <p>Notes</p> <p>(Ody) COPYRIGHT STATEMENTS: Reproduced by permission of Ordnance Survey on behalf of HMSO © Crown copyright and database 2014. All rights reserved Ordnance Survey Licence number 100022432</p>	<p>Partial Key</p> <p>Foul Sewer = F Combined Sewer = C Surface Water Sewer = SW Trade Sewer = TD Partially Separate = PS</p> <p>Date Req : 02/05/2024, 15:16:24</p> <p>Source : Sewer Network Enquiry</p>	<p>This plan is furnished as a general guide only and no warranty as to its correctness is given or implied. This plan must not be relied upon in the event of excavations or other works made in the vicinity of public sewers. No house or property connections are shown.</p> <p>Date Gen : 02/05/2024, 15:16:43</p>
---	----------------------------	--	--	---

Appendix F: Environment Agency Flood Data

Flood risk assessment data



Location of site: 424630 / 421936 (shown as easting and northing coordinates)
Document created on: 29 December 2023
This information was previously known as a product 4.
Customer reference number: 274VTTYUTMWW

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)
- historic flooding
- 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
- climate change modelled data
- information about strategic flood risk assessments
- information about this data
- information about flood risk activity permits
- help and advice

Not included in this document

This document does not include a Flood Defence Breach Hazard Map.

If your location has a reduced flood risk from rivers and sea because of defences, you need to request a Flood Defence Breach Hazard Map and information about the level of flood protection offered at your location from the Yorkshire Environment Agency team at neyorkshire@environment-agency.gov.uk. This information will only be available if modelling has been carried out for breach scenarios.

Include a site location map in your request.

Surface water and other sources of flooding

Use the [long term flood risk service](#) to find out about the risk of flooding from:

- surface water
- ordinary watercourses
- reservoirs

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

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 occurring 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

This data is updated on a quarterly basis as better data becomes available.









Flood map for planning

Location (easting/northing)
424630/421936

Scale
1:10,000

Created
29 Dec 2023

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



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






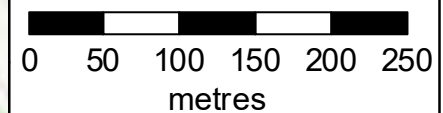
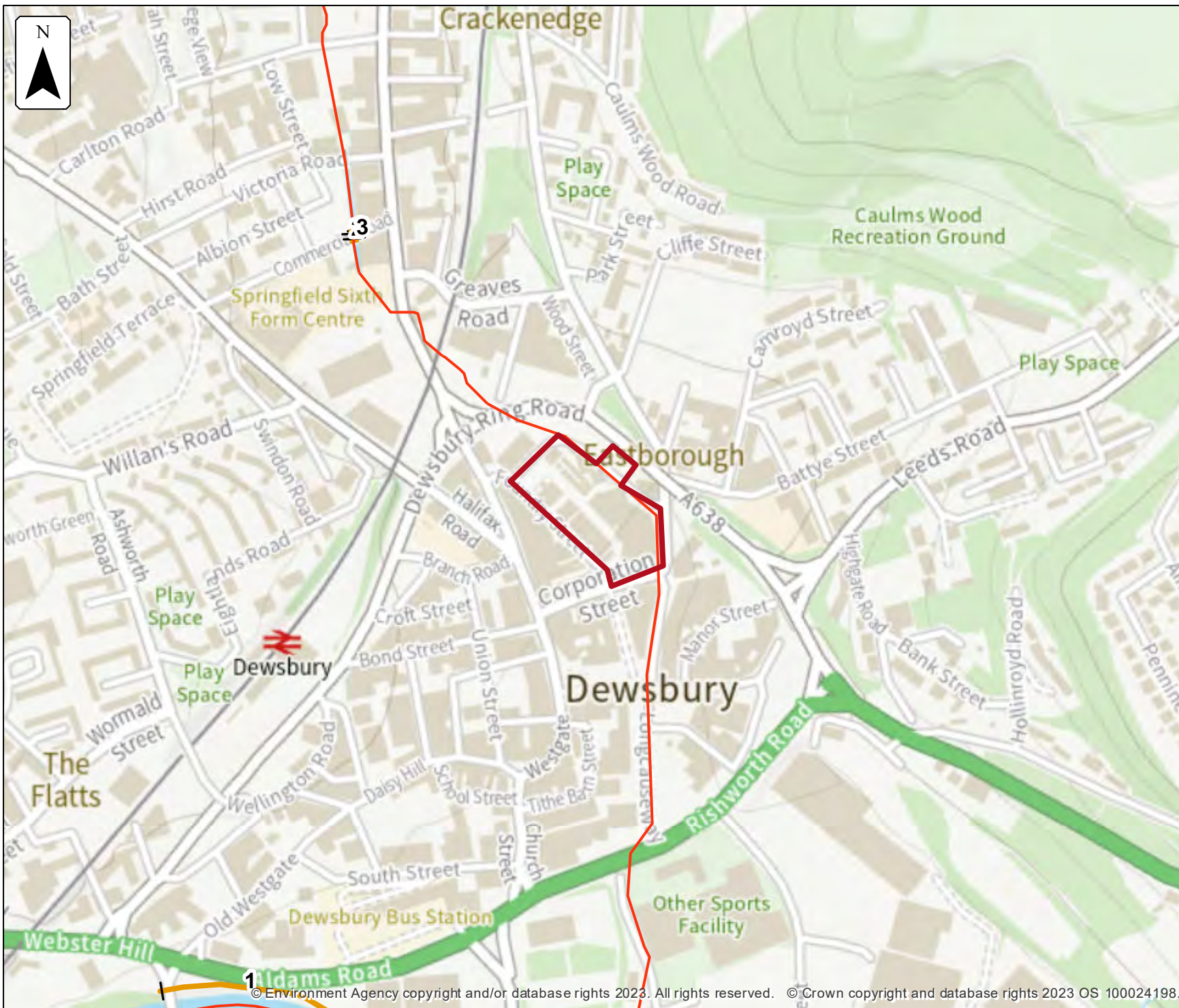
Flood defences

Location (easting/northing)
424630/421936

Scale
1:5,000

Created
29 Dec 2023

-  Selected area
-  Main river
-  Flood defence



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	48514	Bridge Abutment					
3	154762	Bridge Abutment					

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

Modelled data

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

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

Climate change

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

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

Modelled scenarios

The following scenarios are included:

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



Defended modelled fluvial extent

Location (easting/northing)
424630/421936

Scale Created
1:10,000 29 Dec 2023

Model name
2015 Calder and Canals - downstream

Selected area

Main river

Modelled flood extent

2% AEP

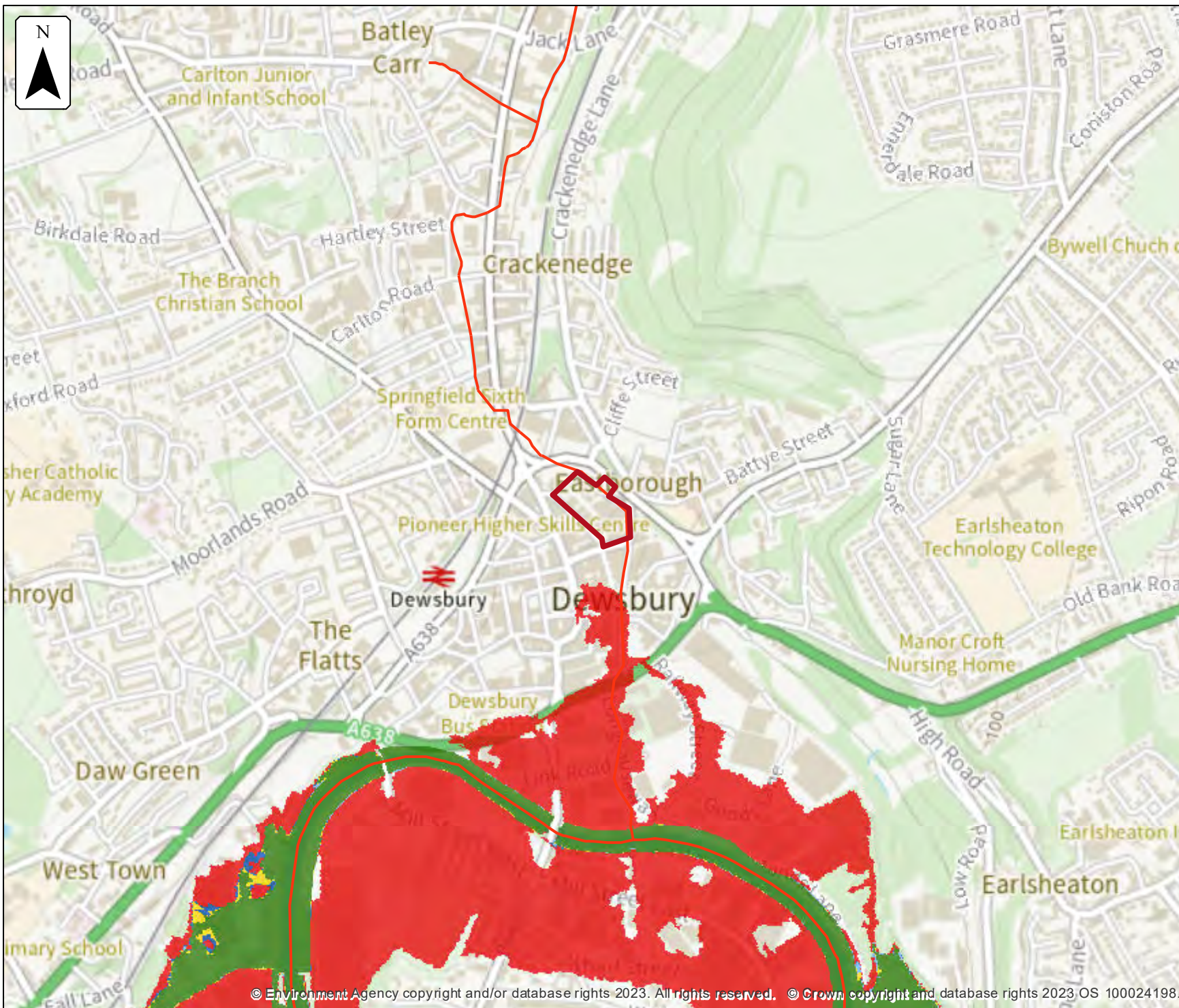
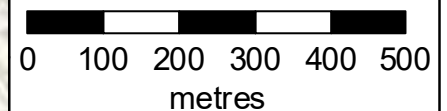
1.33% AEP

1% AEP

0.5% AEP

0.1% AEP

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





Defended modelled fluvial extent

Location (easting/northing)
424630/421936


Scale Created
1:10,000 29 Dec 2023


Model name
2015 Batley Beck Mapping Study


 Selected area


 Main river


Modelled flood extent


 5% AEP

 2% AEP

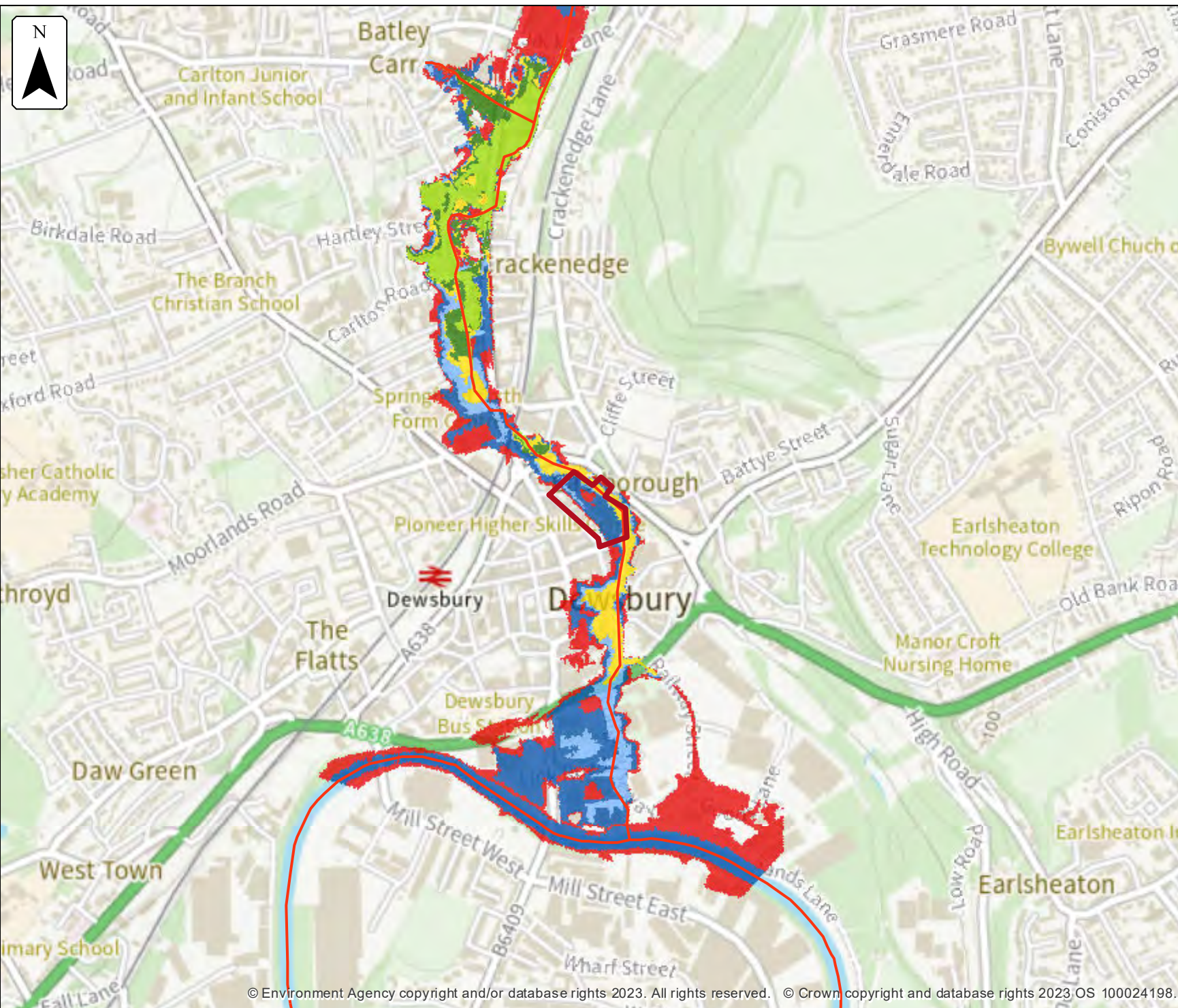
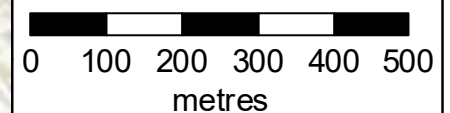
 1.33% AEP

 1% AEP

 0.5% AEP

 0.1% AEP

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





Defences removed modelled fluvial extent

Location (easting/northing)
424630/421936


Scale Created
1:10,000 29 Dec 2023


Model name
**2015 Calder and
Canals - downstream**

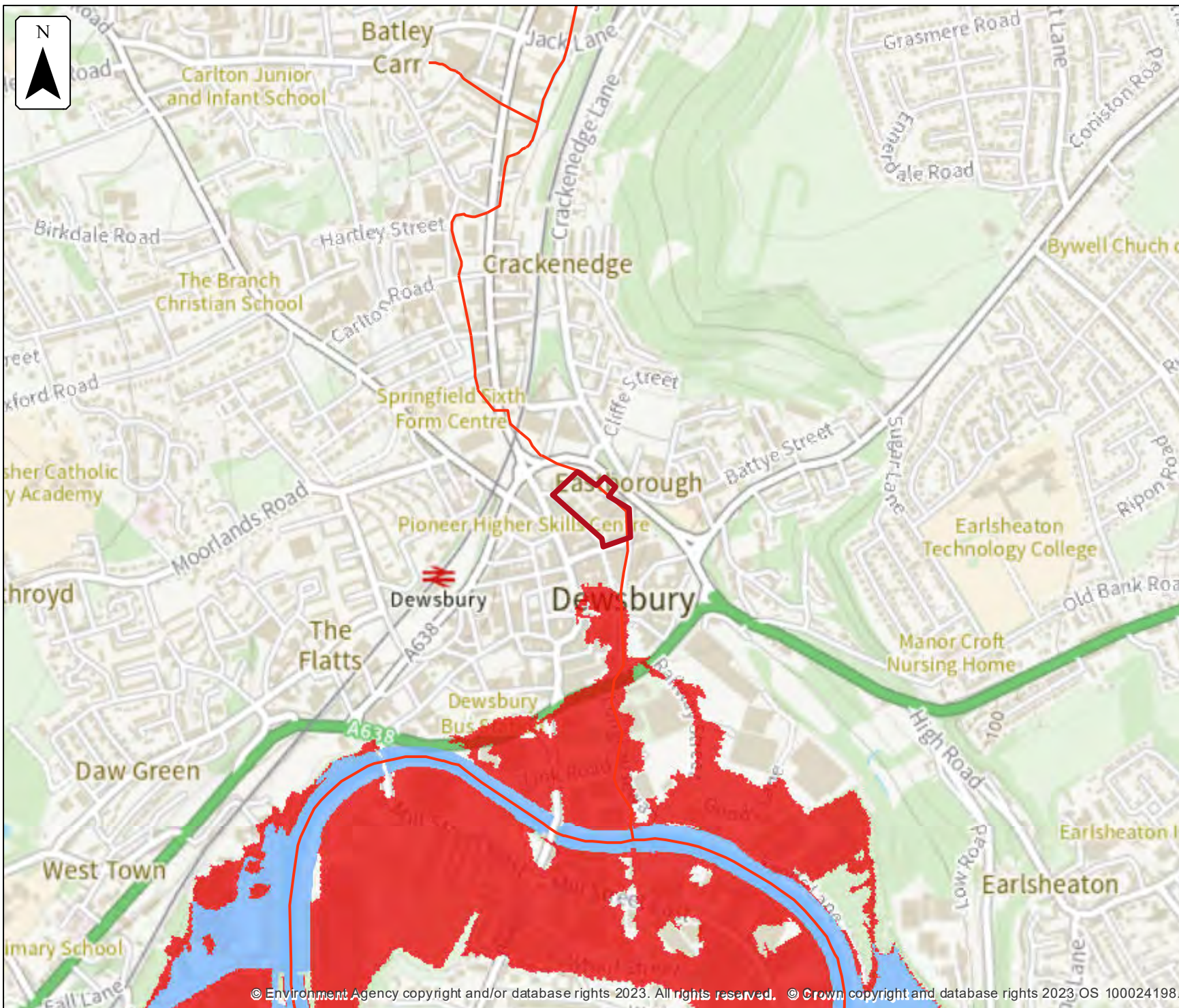
 Selected area

 Main river

Modelled flood extent

 1% AEP

 0.1% AEP



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





Defences removed modelled fluvial extent

Location (easting/northing)
424630/421936

Scale Created
1:10,000 29 Dec 2023

Model name
2011 River Calder - Calder

Selected area

Main river

Modelled flood extent

2% AEP

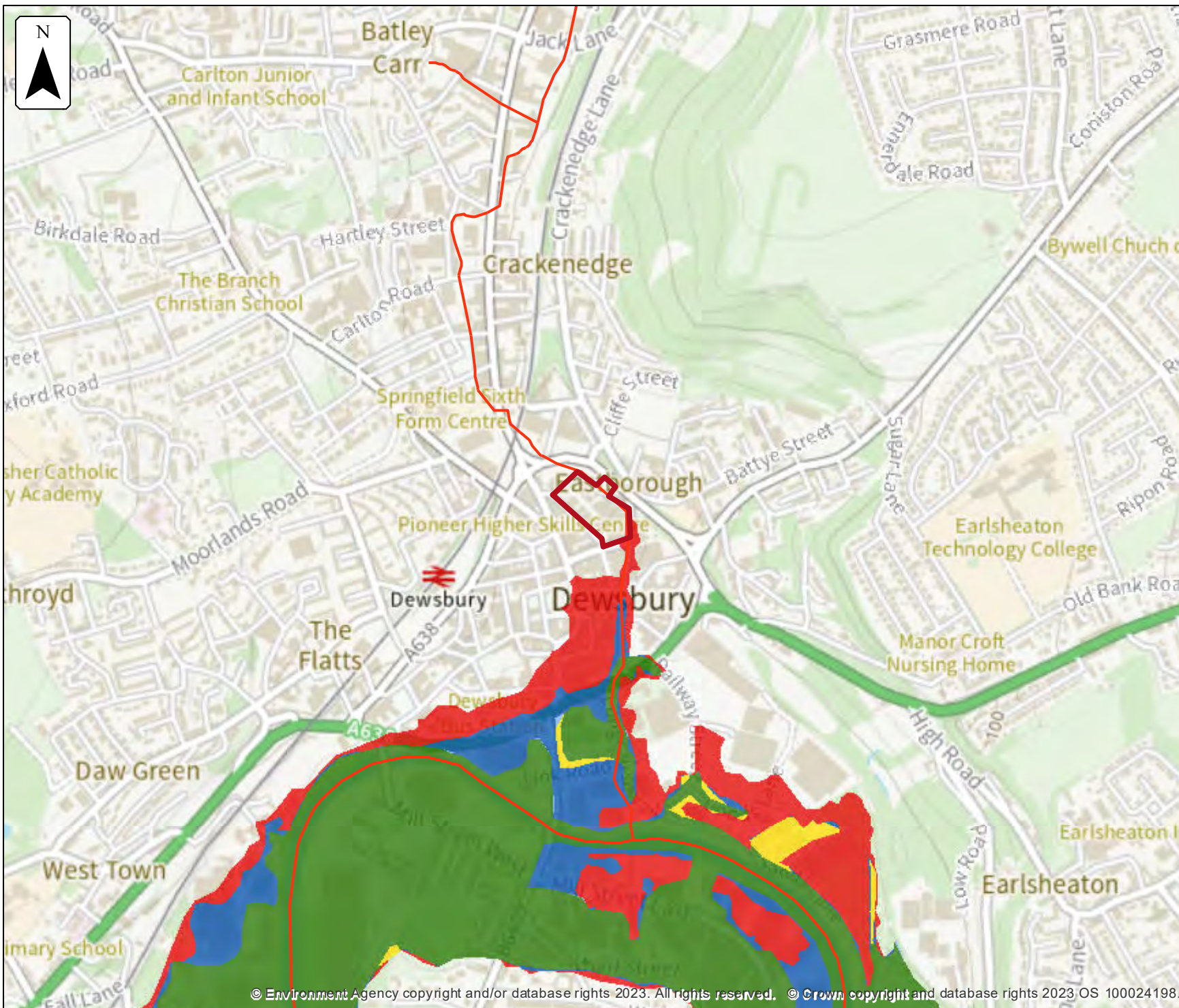
1.33% AEP

1% AEP

0.5% AEP

0.1% AEP

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





Defences removed modelled fluvial extent

Location (easting/northing)
424630/421936


Scale Created
1:10,000 29 Dec 2023


Model name
**2015 Batley Beck
Mapping Study**


 Selected area


 Main river

Modelled flood extent

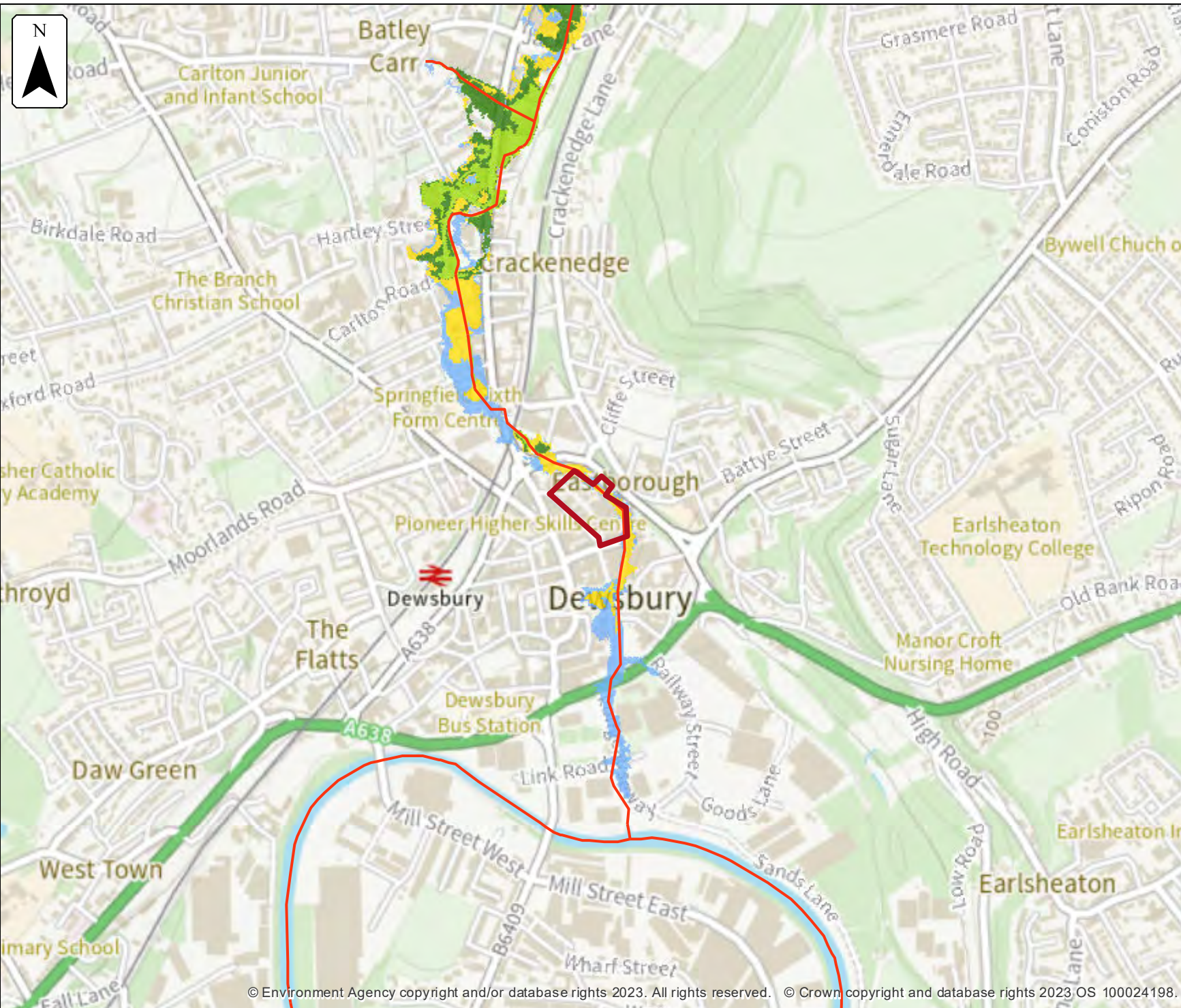
 5% AEP

 2% AEP

 1.33% AEP

 1% AEP

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








Defended climate change modelled fluvial extent

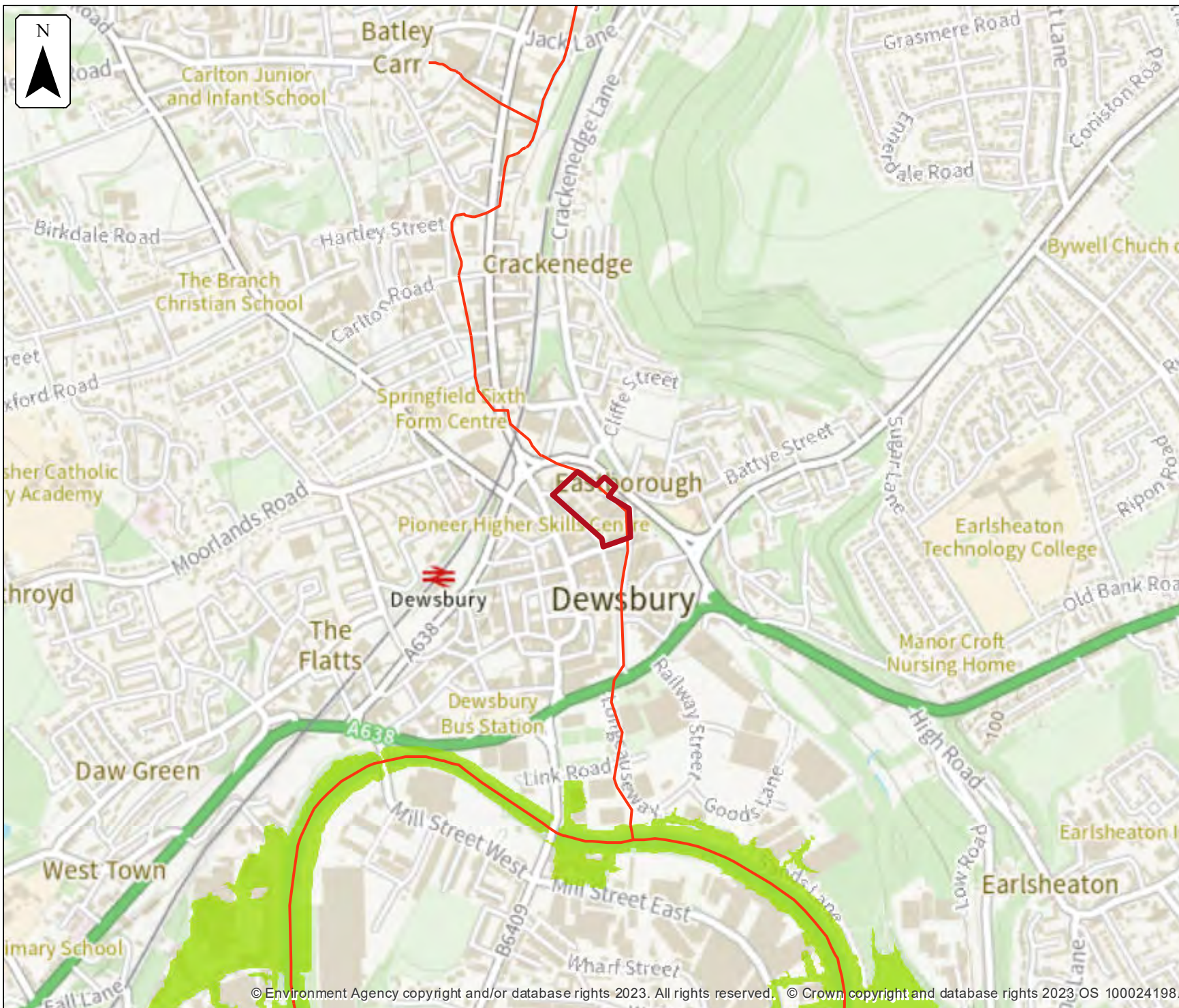
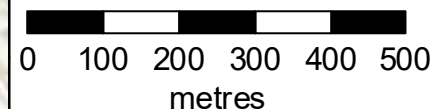
Location (easting/northing)
424630/421936

Scale Created
1:10,000 29 Dec 2023

Model name
**2015 Calder and
Canals - downstream**

-  Selected area
-  Main river
- Modelled flood extent
-  1.0% AEP (+20%)

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








Defended climate change modelled fluvial extent

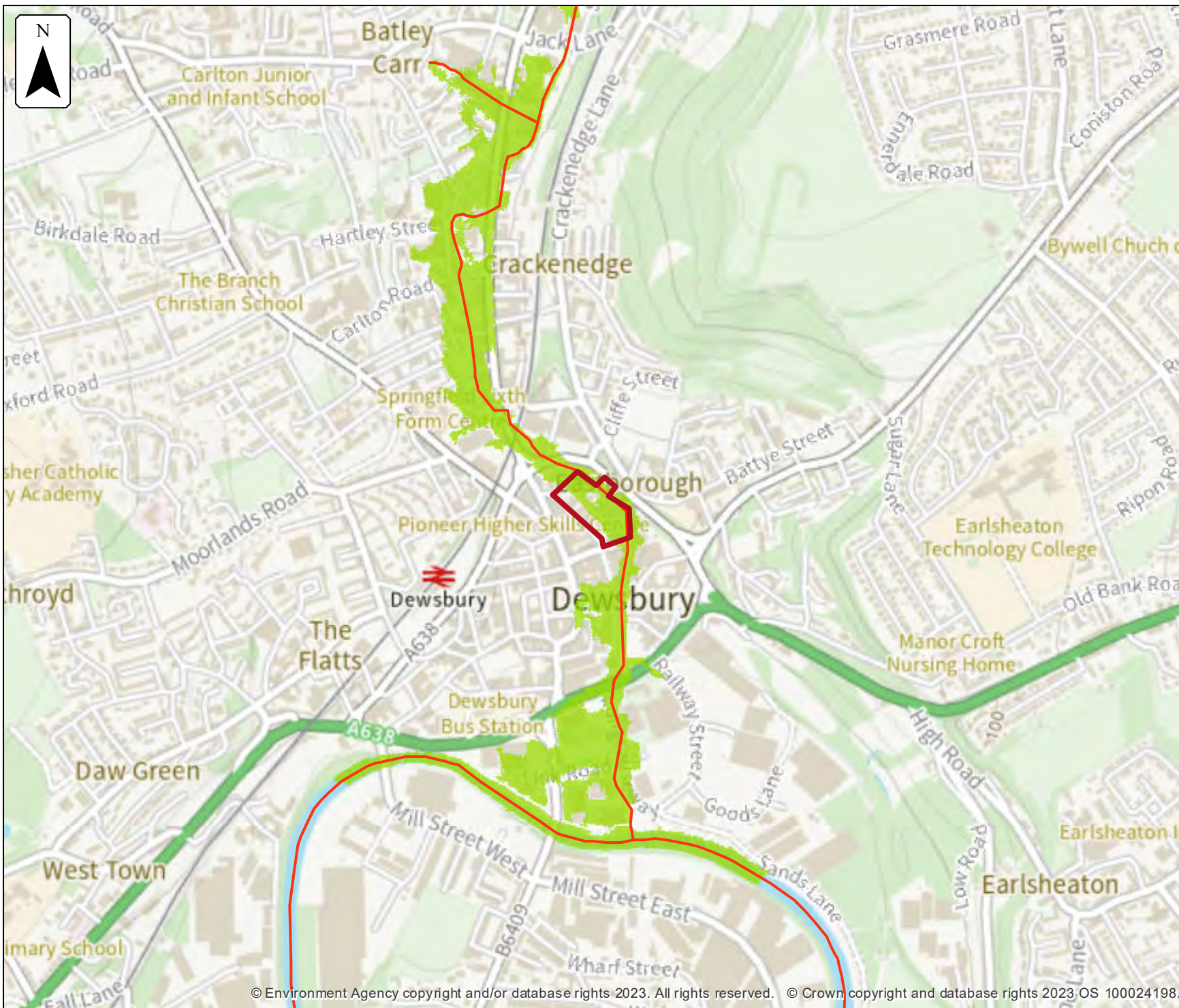
Location (easting/northing)
424630/421936

Scale Created
1:10,000 29 Dec 2023

Model name
**2015 Batley Beck
Mapping Study**

-  Selected area
-  Main river
- Modelled flood extent
-  1.0% AEP (+20%)

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








Defences removed climate change modelled fluvial extent

Location (easting/northing)
424630/421936

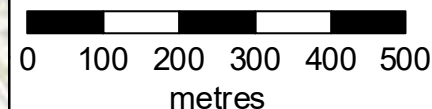
Scale Created
1:10,000 29 Dec 2023

Model name
**2011 River Calder -
Calder**

-  Selected area
-  Main river
- Modelled flood extent
 -  1.0% AEP (+20%)



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








Defences removed climate change modelled fluvial extent

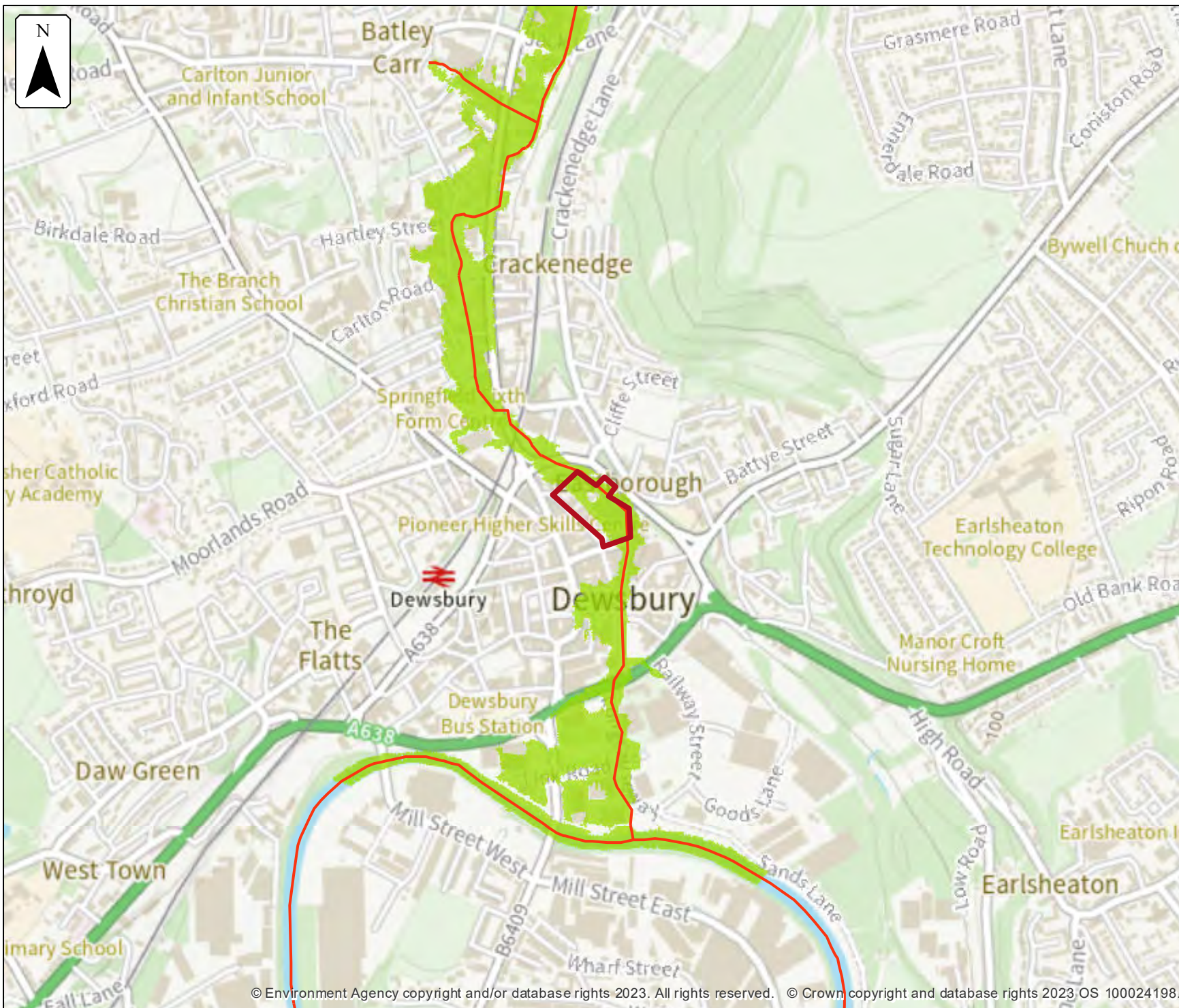
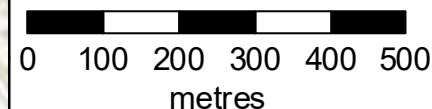
Location (easting/northing)
424630/421936

Scale Created
1:10,000 29 Dec 2023

Model name
**2015 Batley Beck
Mapping Study**

-  Selected area
-  Main river
- Modelled flood extent
-  1.0% AEP (+20%)

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








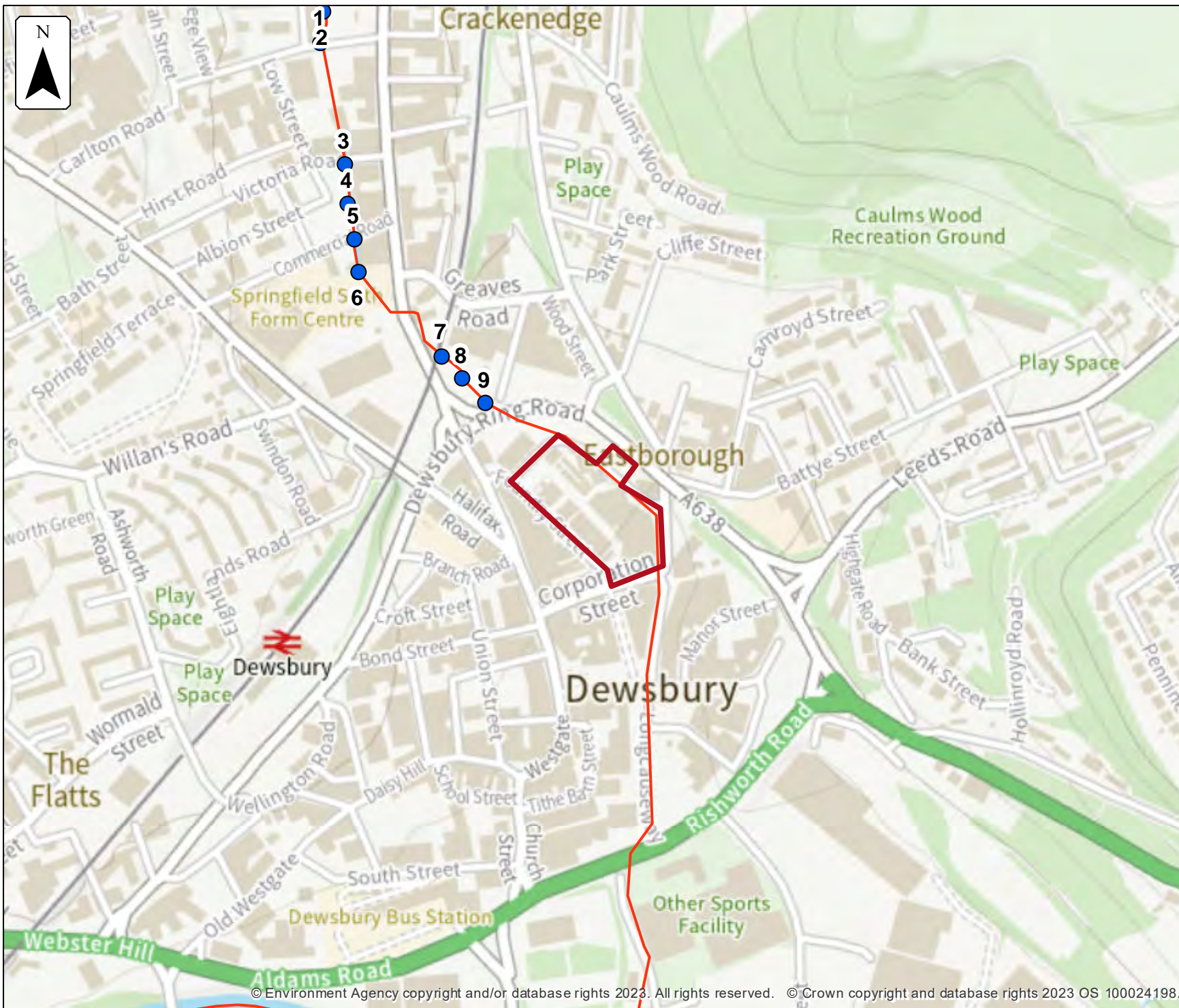
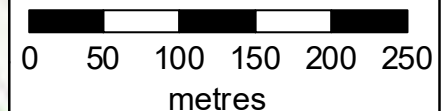
Defended modelled fluvial node locations

Location (easting/northing)
424630/421936

Scale Created
1:5,000 29 Dec 2023

Model name
2015 Batley Beck Mapping Study

-  Selected area
-  Modelled location
-  Main river



© Environment Agency copyright and/or database rights 2023. All rights reserved. © Crown copyright and database rights 2023 OS 100024198.

Modelled node locations data

Defended

Label	Modelled location ID	Easting	Northing	5% AEP		2% AEP		1.33% AEP		1% AEP		0.5% AEP		0.1% AEP	
				Level	Flow	Level	Flow	Level	Flow	Level	Flow	Level	Flow	Level	Flow
1	978117	424363	422387	42.50	19.29	42.94	21.27	43.78	21.84	44.0	22.21	44.16	22.91	44.38	23.89
2	978091	424366	422417	42.74	19.29	43.11	20.74	43.86	21.23	44.04	21.60	44.18	22.10	44.38	22.70
3	977950	424387	422269	42.06	19.37	42.66	21.38	43.43	21.89	43.70	22.20	43.88	22.90	44.08	23.88
4	977828	424390	422230	41.79	19.50	42.64	22.48	43.37	24.71	43.71	24.24	43.90	24.09	44.11	23.72
5	977876	424396	422196	41.45	19.55	42.42	22.53	43.01	24.74	43.40	24.38	43.68	24.25	43.89	24.30
6	977775	424400	422165	41.25	19.58	42.40	22.61	43.0	24.98	43.28	26.04	43.52	26.17	43.76	26.01
7	977815	424480	422083	40.83	20.10	41.54	22.66	41.94	24.97	41.98	26.03	42.12	26.18	42.40	26.0
8	977789	424500	422062	40.94	20.26	41.62	22.89	42.0	25.68	42.04	26.14	42.17	28.35	42.34	40.99
9	977892	424523	422037	40.77	19.97	41.49	22.98	41.90	25.34	41.95	26.0	42.07	26.37	42.34	26.48

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.






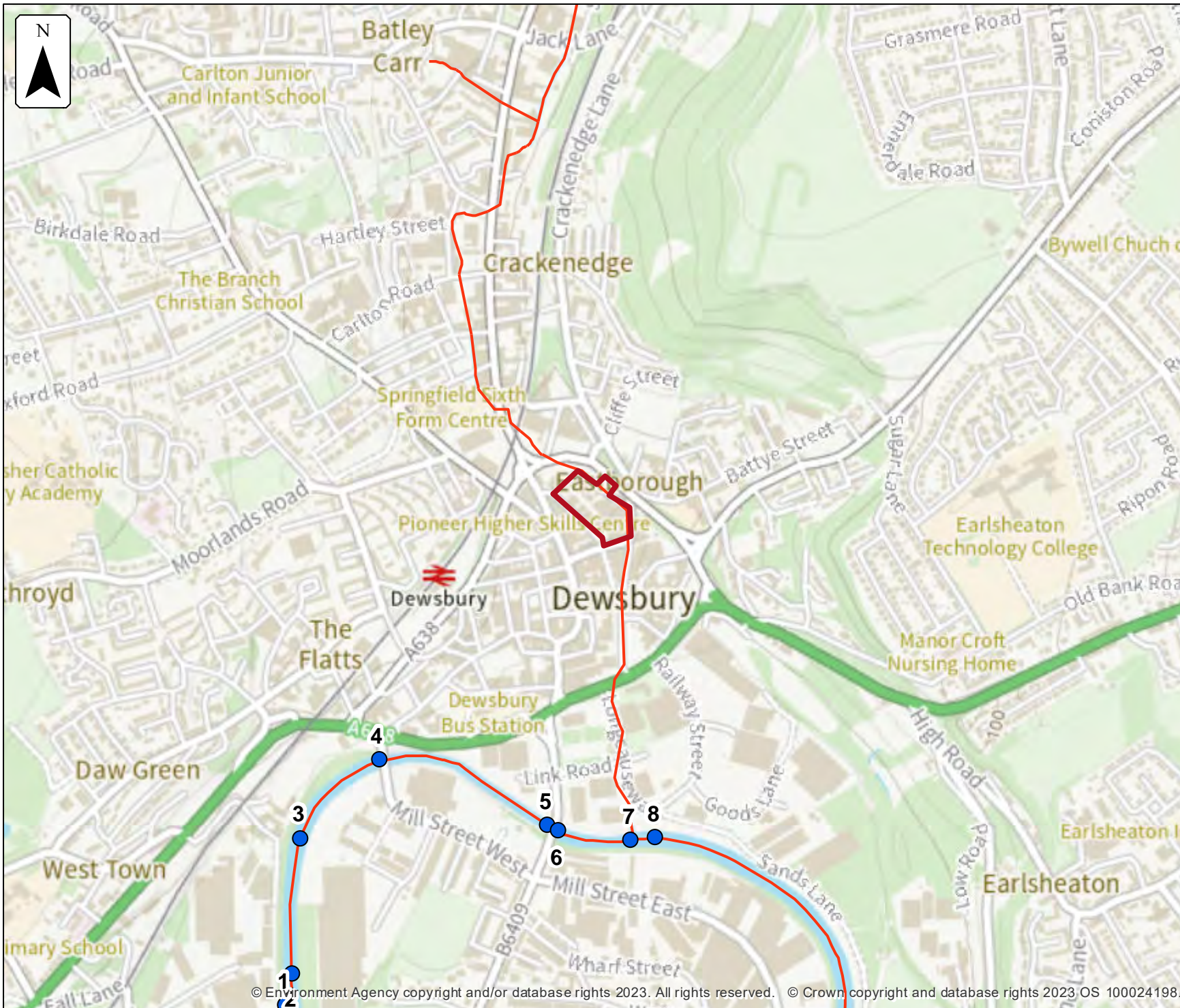
Defences removed modelled fluvial node locations

Location (easting/northing)
424630/421936

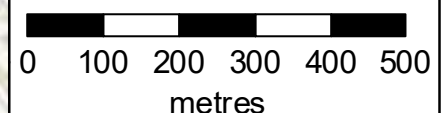
Scale Created
1:10,000 29 Dec 2023

Model name
2011 River Calder - Calder

-  Selected area
-  Modelled location
-  Main river



© Environment Agency copyright and/or database rights 2023. All rights reserved. © Crown copyright and database rights 2023 OS 100024198.



Modelled node locations data

Defences removed

Label	Modelled location ID	Easting	Northing	5% AEP		2% AEP		1.33% AEP		1% AEP		0.5% AEP		0.1% AEP	
				Level	Flow	Level	Flow	Level	Flow	Level	Flow	Level	Flow	Level	Flow
1	89252	424027	420968			38.34	88.02	38.57	99.72	38.65	103.61	38.84	113.25	39.75	163.69
2	233814	424039	421030			37.53	414.90	37.64	436.58	37.72	454.0	37.99	500.44	39.20	801.17
3	323938	424056	421293			37.30	414.85	37.41	436.52	37.49	453.98	37.75	500.41	38.90	806.81
4	32107	424208	421445			37.02	414.82	37.12	436.47	37.19	453.96	37.43	500.39	38.56	804.58
5	34304	424535	421318			36.89	414.80	36.98	436.44	37.04	453.95	37.28	500.37	38.22	803.03
6	152469	424556	421307			36.83	414.80	36.92	436.44	36.97	453.95	37.14	500.37	38.18	803.03
7	190194	424696	421290			36.72	414.78	36.80	436.40	36.84	453.94	36.95	500.35	37.89	883.48
8	94209	424744	421294			36.75	417.09	36.83	438.84	36.88	456.47	37.0	503.08	37.82	804.31

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.






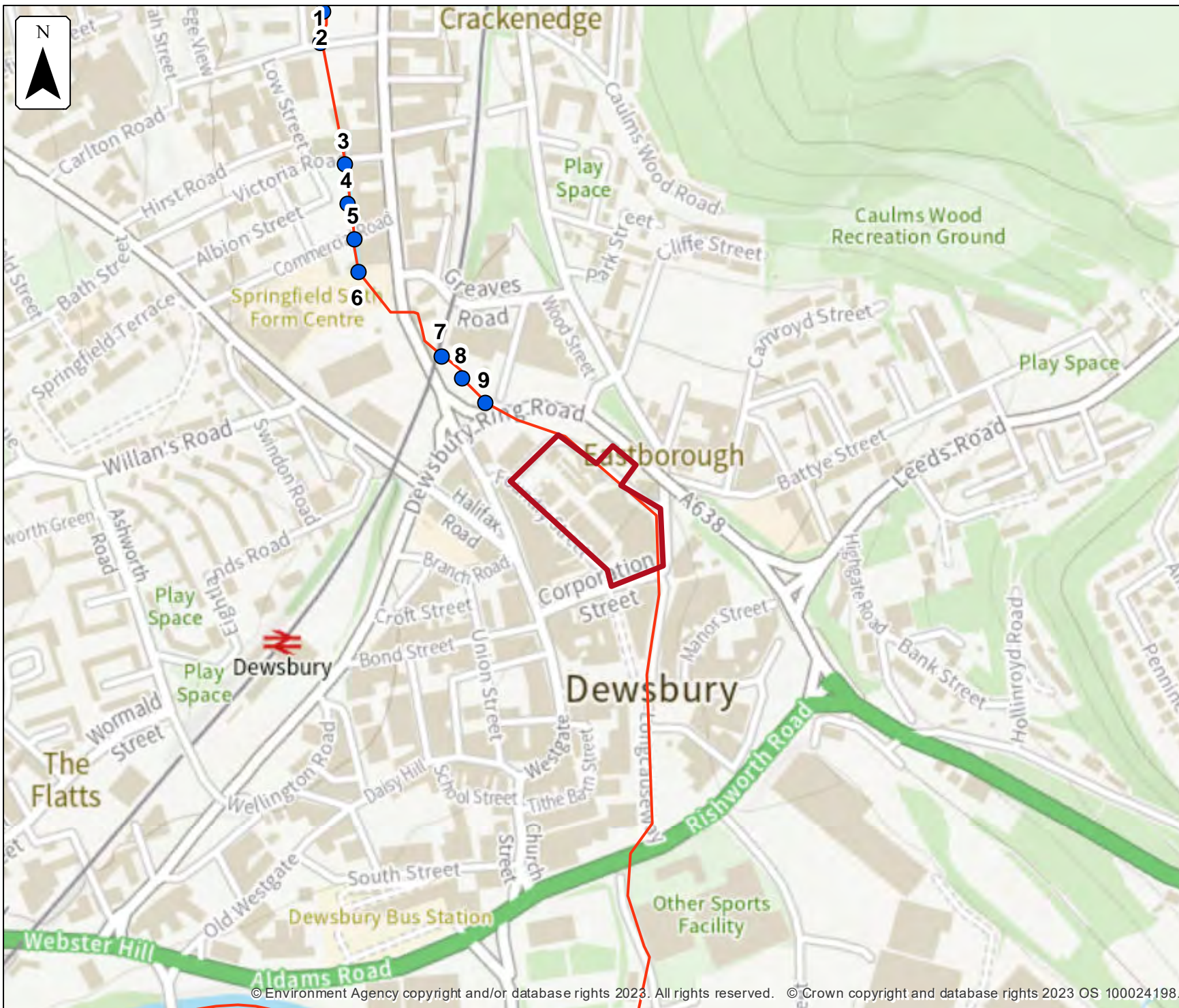
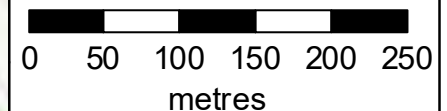
Defences removed modelled fluvial node locations

Location (easting/northing)
424630/421936

Scale Created
1:5,000 29 Dec 2023

Model name
**2015 Batley Beck
Mapping Study**

-  Selected area
-  Modelled location
-  Main river



© Environment Agency copyright and/or database rights 2023. All rights reserved. © Crown copyright and database rights 2023 OS 100024198.

Modelled node locations data

Defences removed

Label	Modelled location ID	Easting	Northing	5% AEP		2% AEP		1.33% AEP		1% AEP		0.5% AEP		0.1% AEP	
				Level	Flow	Level	Flow	Level	Flow	Level	Flow	Level	Flow	Level	Flow
1	978117	424363	422387	42.46	18.83	42.87	22.19	43.76	24.01	44.02	23.61				
2	978091	424366	422417	42.70	18.83	43.13	20.01	43.92	20.04	44.06	19.60				
3	977950	424387	422269	42.02	18.84	42.52	22.31	43.36	24.01	43.74	23.61				
4	977828	424390	422230	41.74	18.96	42.50	22.45	43.31	25.03	43.75	24.67				
5	977876	424396	422196	41.38	18.96	42.27	22.54	42.92	25.05	43.46	24.74				
6	977775	424400	422165	41.15	18.96	42.25	22.66	42.91	25.21	43.32	26.34				
7	977815	424480	422083	40.74	19.07	41.38	22.83	41.92	25.20	41.97	26.32				
8	977789	424500	422062	40.84	19.20	41.45	23.0	41.97	26.02	42.02	26.41				
9	977892	424523	422037	40.68	19.31	41.31	23.05	41.88	25.44	41.93	26.10				

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.






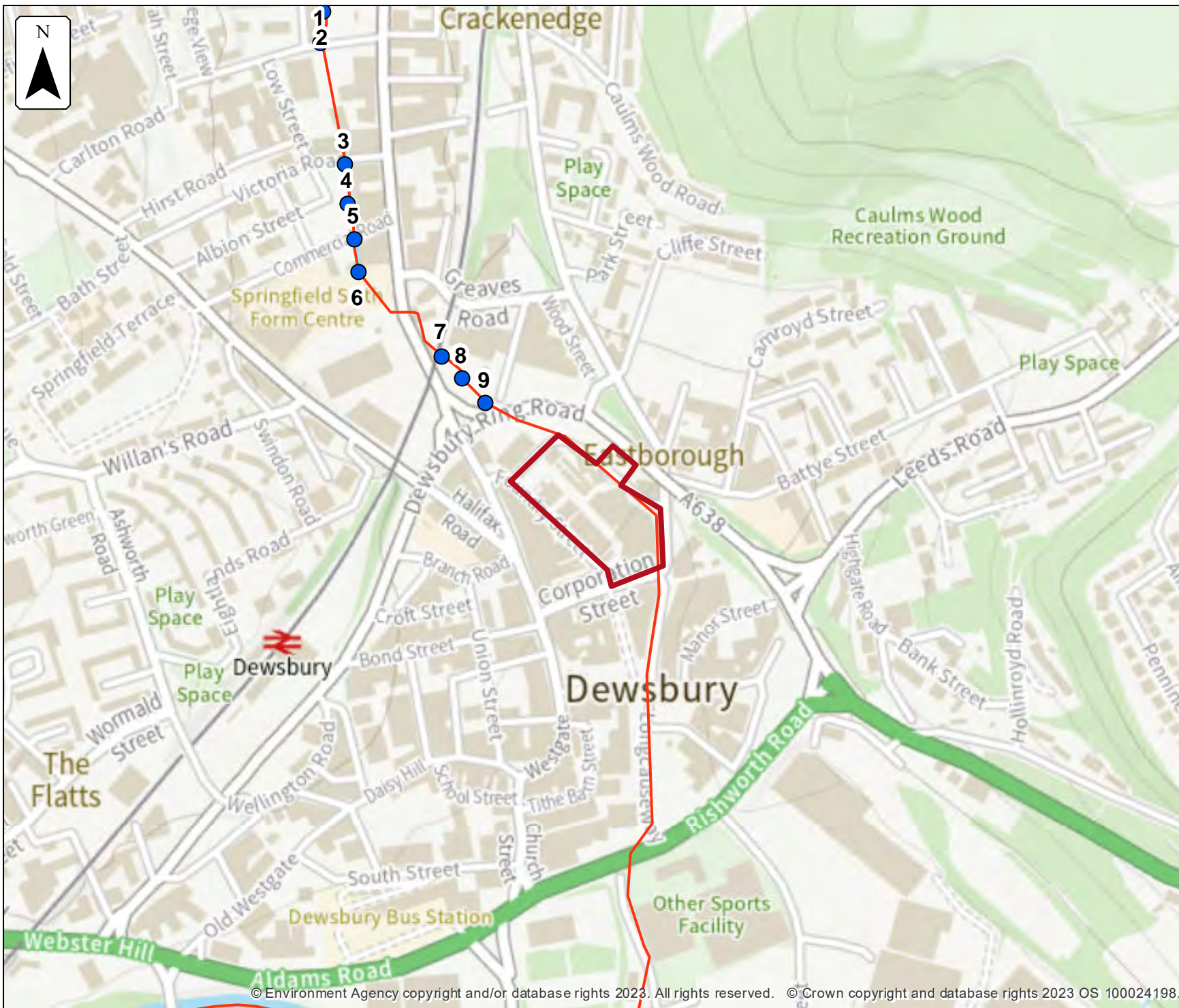
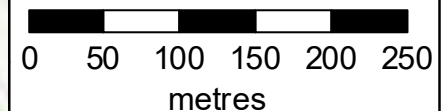
Defended climate change modelled fluvial node locations

Location (easting/northing)
424630/421936

Scale Created
1:5,000 29 Dec 2023

Model name
2015 Batley Beck Mapping Study

-  Selected area
-  Modelled location
-  Main river



© Environment Agency copyright and/or database rights 2023. All rights reserved. © Crown copyright and database rights 2023 OS 100024198.

Modelled node locations data

Defended climate change

Label	Modelled location ID	Easting	Northing	1.0% AEP (+20%)	
				Level	Flow
1	978117	424363	422387	44.16	22.93
2	978091	424366	422417	44.18	22.12
3	977950	424387	422269	43.88	22.93
4	977828	424390	422230	43.90	24.10
5	977876	424396	422196	43.68	24.25
6	977775	424400	422165	43.53	26.17
7	977815	424480	422083	42.12	26.18
8	977789	424500	422062	42.17	28.42
9	977892	424523	422037	42.07	26.37

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.






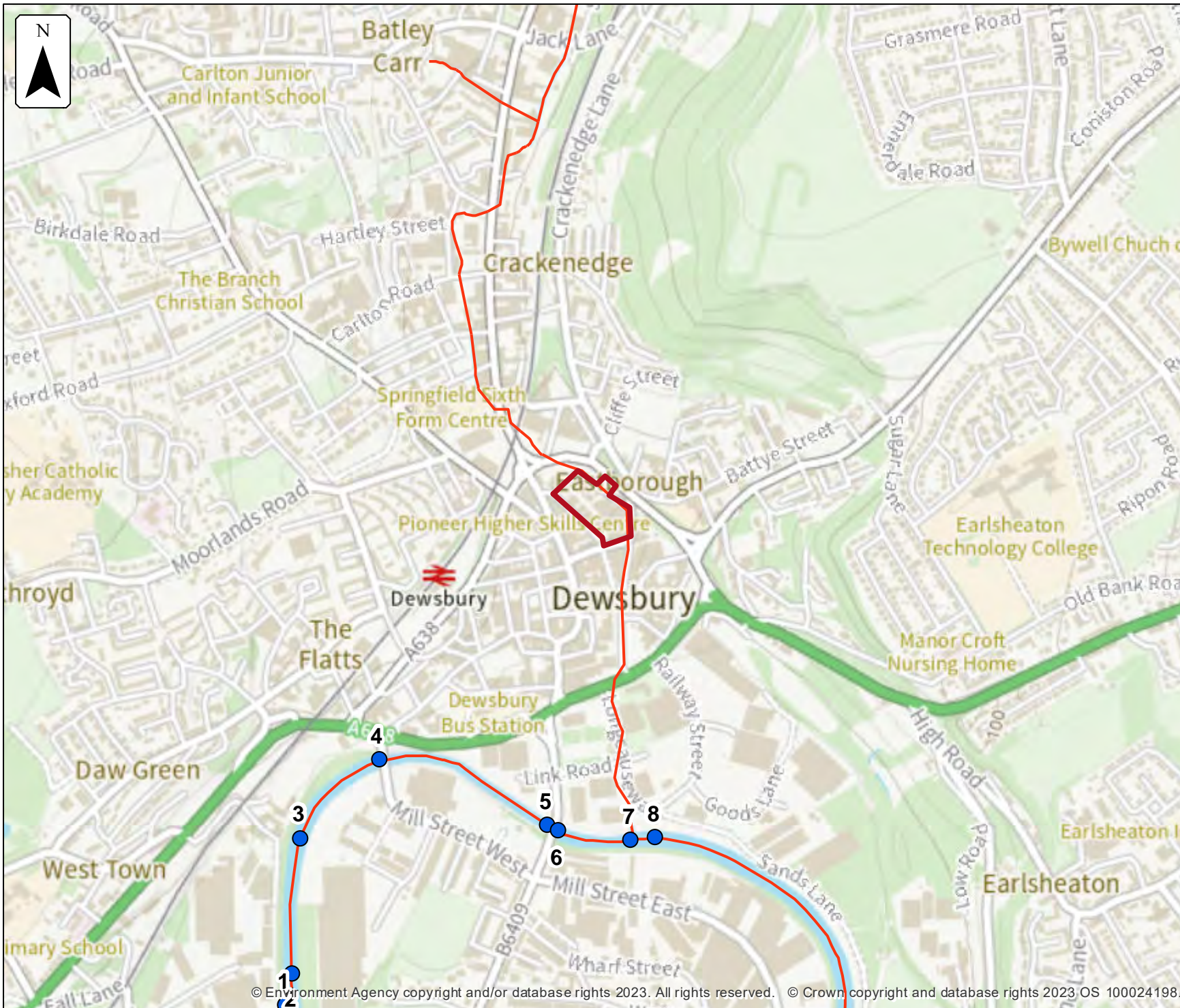
Defences removed climate change modelled fluvial node locations

Location (easting/northing)
424630/421936

Scale Created
1:10,000 29 Dec 2023

Model name
**2011 River Calder -
Calder**

-  Selected area
-  Modelled location
-  Main river



Modelled node locations data

Defences removed climate change

Label	Modelled location ID	Easting	Northing	1.0% 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	32107	424208	421445	37.56	533.57
5	34304	424535	421318	37.40	533.56
6	152469	424556	421307	37.23	533.56
7	190194	424696	421290	37.01	533.48
8	94209	424744	421294	37.07	536.37

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.






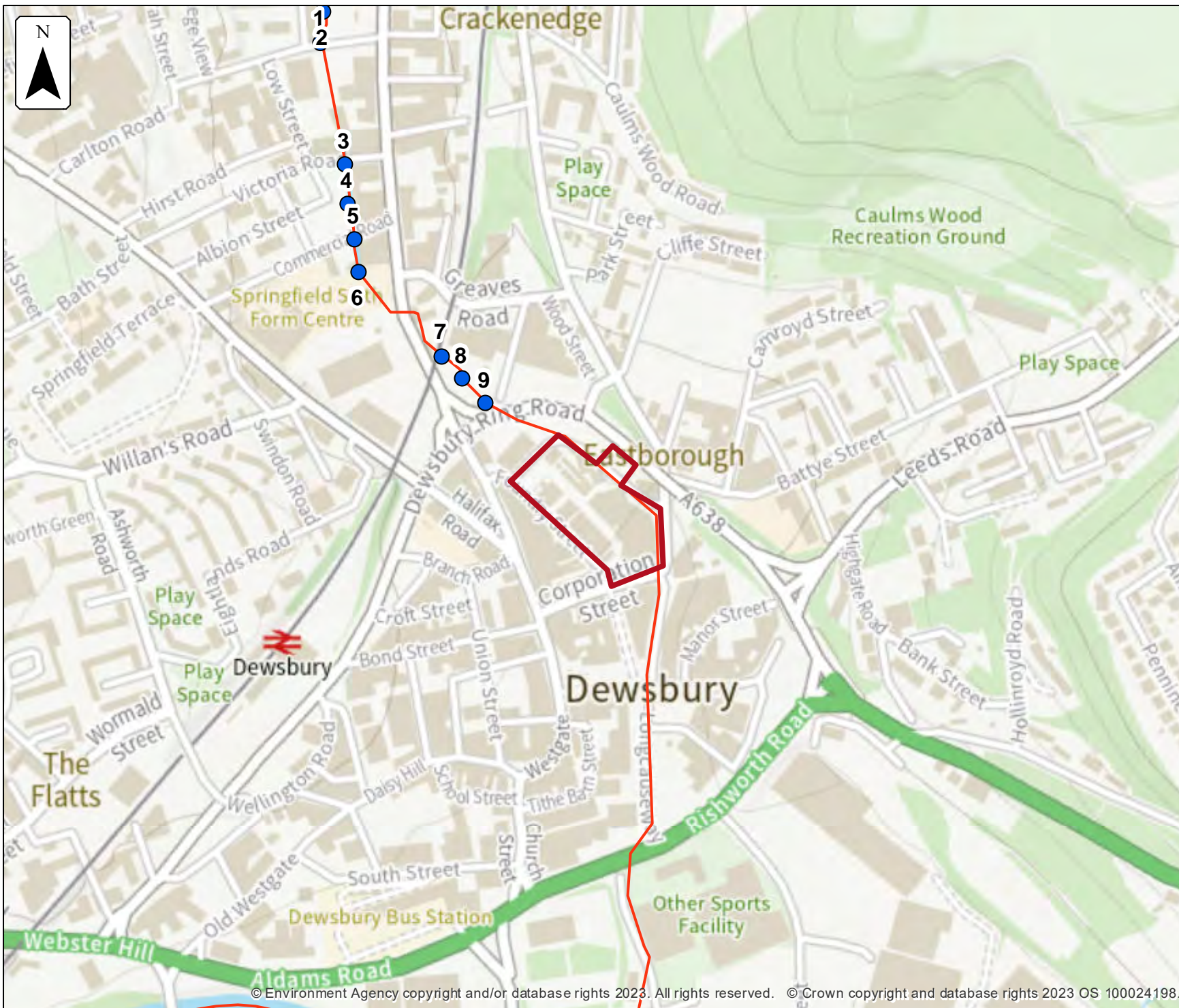
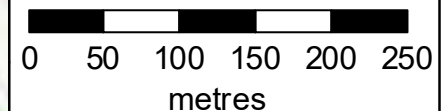
Defences removed climate change modelled fluvial node locations

Location (easting/northing)
424630/421936

Scale Created
1:5,000 29 Dec 2023

Model name
**2015 Batley Beck
Mapping Study**

-  Selected area
-  Modelled location
-  Main river



© Environment Agency copyright and/or database rights 2023. All rights reserved. © Crown copyright and database rights 2023 OS 100024198.

Modelled node locations data

Defences removed climate change

Label	Modelled location ID	Easting	Northing	1.0% AEP (+20%)	
				Level	Flow
1	978117	424363	422387	44.18	23.64
2	978091	424366	422417	44.19	19.67
3	977950	424387	422269	43.92	23.63
4	977828	424390	422230	43.92	24.58
5	977876	424396	422196	43.70	24.67
6	977775	424400	422165	43.54	26.22
7	977815	424480	422083	42.14	26.23
8	977789	424500	422062	42.18	28.82
9	977892	424523	422037	42.09	26.43

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 modelled fluvial extent and height

Location (easting/northing)
424630/421936

Scale Created
1:1,000 29 Dec 2023

Model name
2015 Batley Beck Mapping Study

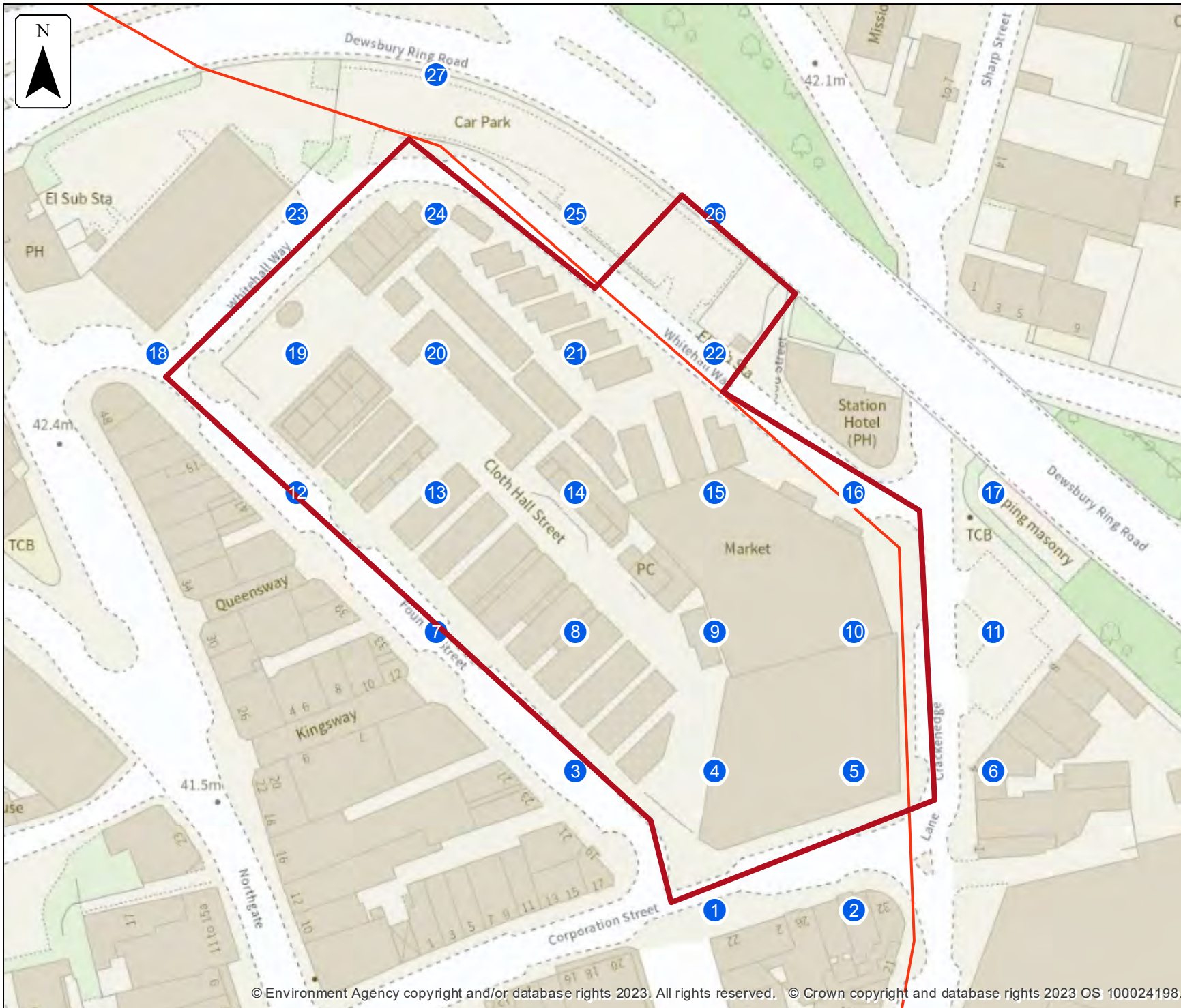
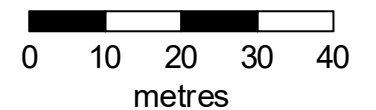
Selected area

Main river

Modelled 2D grid
Water level in mAOD

- 0 - 39.0
- 39.0 - 39.5
- 39.5 - 40.0
- 40.0 - 40.5
- 40.5 - 41.0
- 41.0 - 41.5
- 41.5 - 42.0
- 42.0 - 42.5
- 42.5 - 43.0

This map shows the 0.1% AEP height data



Sample point data

Defended

Label	Easting	Northing	5% AEP		2% AEP		1.33% AEP		1% AEP		0.5% AEP		0.1% AEP	
			Depth	Height	Depth	Height	Depth	Height	Depth	Height	Depth	Height	Depth	Height
1	424653	421858	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
2	424680	421858	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.06	38.75	0.48	39.18
3	424626	421885	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
4	424653	421885	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.03	39.54	0.06	39.57
5	424680	421885	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.20	38.75	0.64	39.19
6	424707	421885	NoData	NoData	NoData	NoData	0.11	38.39	0.21	38.49	0.47	38.75	0.91	39.19
7	424599	421912	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
8	424626	421912	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.03	40.00
9	424653	421912	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.04	39.71	0.09	39.76
10	424680	421912	NoData	NoData	NoData	NoData	0.01	38.88	0.01	38.89	0.06	38.99	0.32	39.25
11	424707	421912	NoData	NoData	NoData	NoData	NoData	NoData	0.02	38.77	0.11	38.87	0.51	39.26
12	424572	421939	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
13	424599	421939	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
14	424626	421939	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.06	40.03	0.16	40.14
15	424653	421939	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.03	39.42	0.24	39.65
16	424680	421939	NoData	NoData	NoData	NoData	0.14	39.08	0.20	39.15	0.34	39.29	0.60	39.54

Label	Easting	Northing	5% AEP		2% AEP		1.33% AEP		1% AEP		0.5% AEP		0.1% AEP		
			Depth	Height	Depth	Height	Depth	Height	Depth	Height	Depth	Height	Depth	Height	
17	424707	421939	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	
18	424545	421966	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	
19	424572	421966	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.05	40.56
20	424599	421966	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.12	40.18	0.34	40.40
21	424626	421966	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.01	39.74	0.21	39.95
22	424653	421966	NoData	NoData	NoData	NoData	0.11	39.18	0.18	39.25	0.35	39.42	0.65	39.72	
23	424572	421993	NoData	NoData	NoData	NoData	NoData	NoData	0.10	40.29	0.24	40.44	0.49	40.68	
24	424599	421993	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.23	40.41
25	424626	421993	NoData	NoData	NoData	NoData	0.00	39.67	0.02	39.72	0.11	39.82	0.28	40.00	
26	424653	421993	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	
27	424599	422020	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	

Data in this table comes from the 2015 Batley Beck Mapping Study model.

Height values are shown in mAOD, and depth values are shown in metres.

Any blank cells show where a particular scenario has not been modelled for this location.

Cells which contain text 'NoData' for a scenario show that return period has been modelled but there is no flood risk for that return period for that location.



Defences removed modelled fluvial extent and height

Location (easting/northing)
424630/421936

Scale Created
1:1,000 29 Dec 2023

Model name
**2015 Batley Beck
Mapping Study**

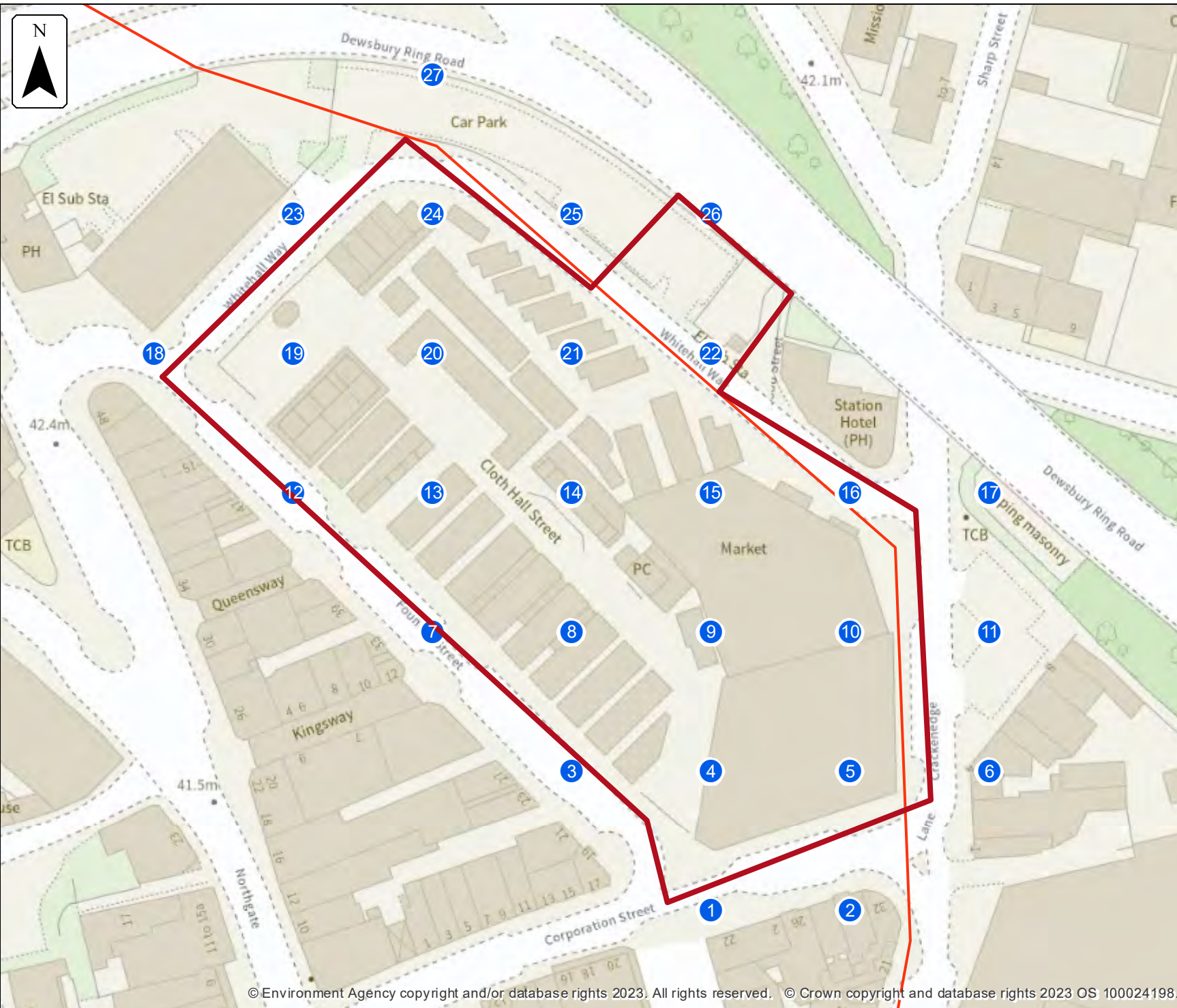
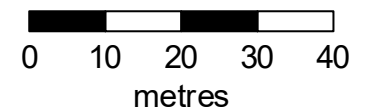
Selected area

Main river

Modelled 2D grid
Water level in mAOD

- 0 - 38.0
- 38.0 - 38.625
- 38.625 - 39.25
- 39.25 - 39.875
- 39.875 - 40.5
- 40.5 - 41.125
- 41.125 - 41.75
- 41.75 - 42.375
- 42.375 - 43.0

This map shows the
1.0% AEP height data



Sample point data

Defences removed

Label	Easting	Northing	5% AEP		2% AEP		1.33% AEP		1% AEP		0.5% AEP		0.1% AEP	
			Depth	Height	Depth	Height	Depth	Height	Depth	Height	Depth	Height	Depth	Height
1	424653	421858	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData				
2	424680	421858	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData				
3	424626	421885	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData				
4	424653	421885	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData				
5	424680	421885	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData				
6	424707	421885	NoData	NoData	NoData	NoData	0.04	38.30	0.16	38.44				
7	424599	421912	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData				
8	424626	421912	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData				
9	424653	421912	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData				
10	424680	421912	NoData	NoData	NoData	NoData	NoData	NoData	0.01	38.89				
11	424707	421912	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData				
12	424572	421939	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData				
13	424599	421939	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData				
14	424626	421939	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData				
15	424653	421939	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData				
16	424680	421939	NoData	NoData	NoData	NoData	0.11	39.05	0.17	39.12				

Label	Easting	Northing	5% AEP		2% AEP		1.33% AEP		1% AEP		0.5% AEP		0.1% AEP	
			Depth	Height	Depth	Height	Depth	Height	Depth	Height	Depth	Height	Depth	Height
17	424707	421939	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData				
18	424545	421966	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData				
19	424572	421966	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData				
20	424599	421966	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData				
21	424626	421966	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData				
22	424653	421966	NoData	NoData	NoData	NoData	0.07	39.14	0.15	39.22				
23	424572	421993	NoData	NoData	NoData	NoData	NoData	NoData	0.07	40.25				
24	424599	421993	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData				
25	424626	421993	NoData	NoData	NoData	NoData	NoData	NoData	0.01	39.68				
26	424653	421993	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData				
27	424599	422020	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData				

Data in this table comes from the 2015 Batley Beck Mapping Study model.

Height values are shown in mAOD, and depth values are shown in metres.

Any blank cells show where a particular scenario has not been modelled for this location.

Cells which contain text 'NoData' for a scenario show that return period has been modelled but there is no flood risk for that return period for that location.



Defended climate change modelled fluvial extent and height

Location (easting/northing)
424630/421936

Scale Created
1:1,000 29 Dec 2023

Model name
**2015 Batley Beck
Mapping Study**

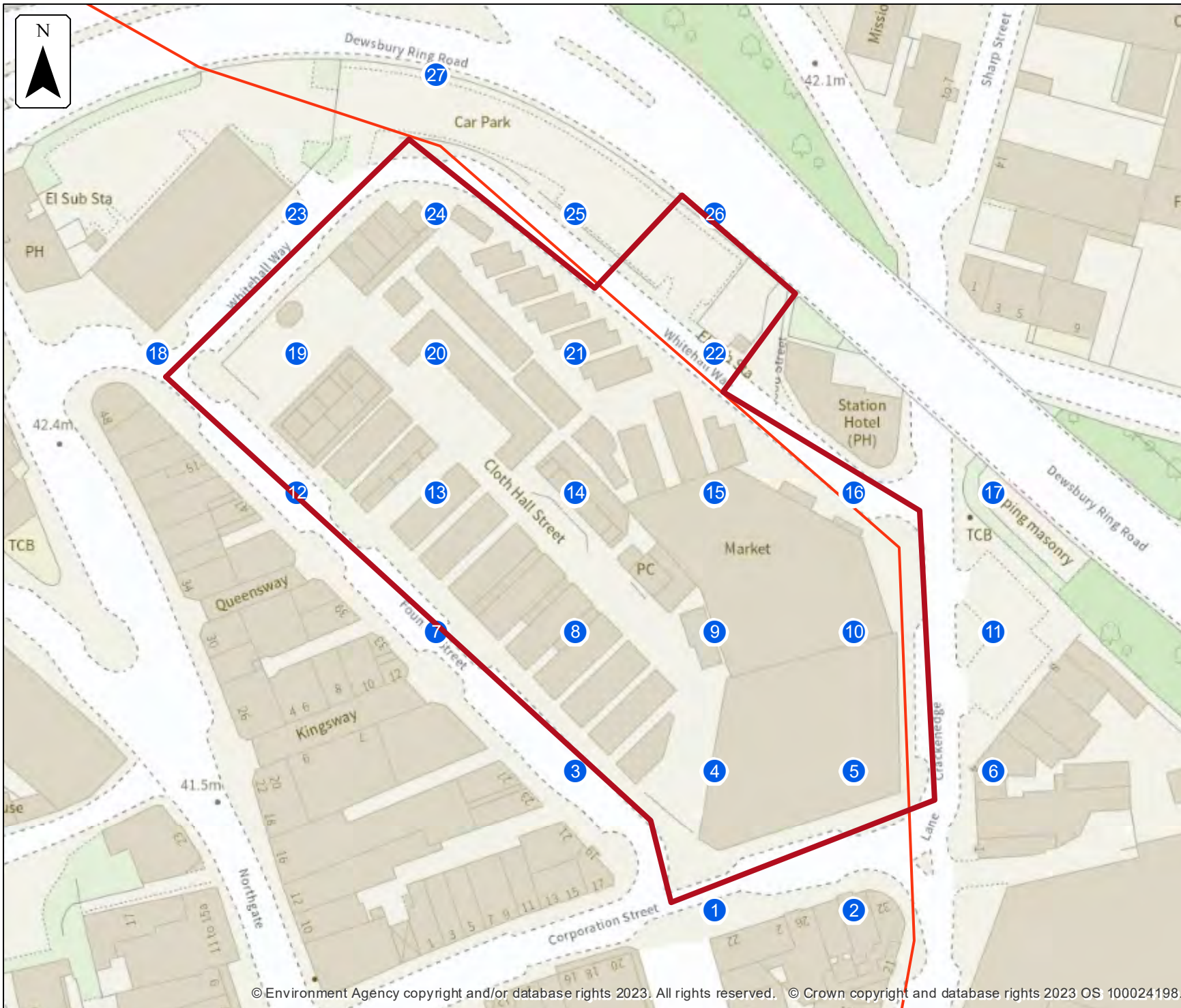
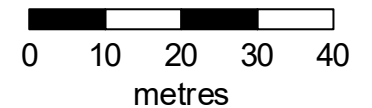
Selected area

Main river

Modelled 2D grid
Water level in mAOD

- 0 - 38.0
- 38.0 - 38.625
- 38.625 - 39.25
- 39.25 - 39.875
- 39.875 - 40.5
- 40.5 - 41.125
- 41.125 - 41.75
- 41.75 - 42.375
- 42.375 - 43.0

This map shows the
1.0% AEP +20% height data



Sample point data

Defended climate change

Label	Easting	Northing	1% AEP (+20%)	
			Depth	Height
1	424653	421858	NoData	NoData
2	424680	421858	0.06	38.75
3	424626	421885	NoData	NoData
4	424653	421885	0.03	39.54
5	424680	421885	0.20	38.76
6	424707	421885	0.48	38.76
7	424599	421912	NoData	NoData
8	424626	421912	NoData	NoData
9	424653	421912	0.04	39.71
10	424680	421912	0.06	38.99
11	424707	421912	0.13	38.88
12	424572	421939	NoData	NoData
13	424599	421939	NoData	NoData
14	424626	421939	0.06	40.03
15	424653	421939	0.03	39.42
16	424680	421939	0.35	39.29

Label	Easting	Northing	1% AEP (+20%)	
			Depth	Height
17	424707	421939	NoData	NoData
18	424545	421966	NoData	NoData
19	424572	421966	NoData	NoData
20	424599	421966	0.12	40.18
21	424626	421966	0.01	39.74
22	424653	421966	0.35	39.42
23	424572	421993	0.25	40.44
24	424599	421993	NoData	NoData
25	424626	421993	0.11	39.83
26	424653	421993	NoData	NoData
27	424599	422020	NoData	NoData

Data in this table comes from the 2015 Batley Beck Mapping Study model.

Height values are shown in mAOD, and depth values are shown in metres.

Any blank cells show where a particular scenario has not been modelled for this location.

Cells which contain text 'NoData' for a scenario show that return period has been modelled but there is no flood risk for that return period for that location.



Defences removed climate change modelled fluvial extent and height

Location (easting/northing)
424630/421936

Scale Created
1:1,000 29 Dec 2023

Model name
**2015 Batley Beck
Mapping Study**

Selected area

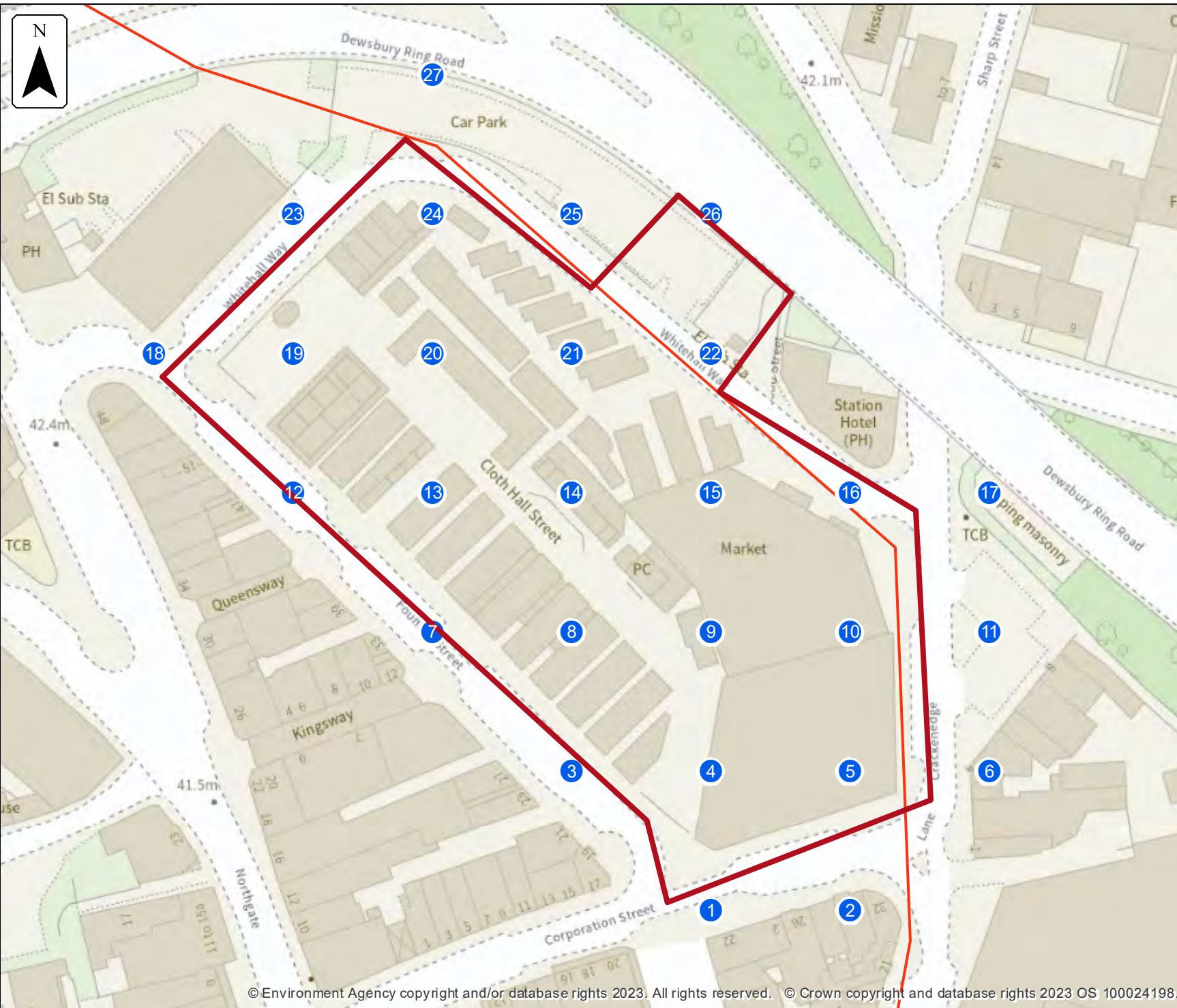
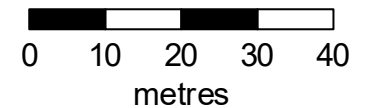
Main river

Modelled 2D grid

Water level in mAOD

- 0 - 38.0
- 38.0 - 38.625
- 38.625 - 39.25
- 39.25 - 39.875
- 39.875 - 40.5
- 40.5 - 41.125
- 41.125 - 41.75
- 41.75 - 42.375
- 42.375 - 43.0

This map shows the
1.0% AEP +20% height data



Sample point data

Defences removed climate change

Label	Easting	Northing	1% AEP (+20%)	
			Depth	Height
1	424653	421858	NoData	NoData
2	424680	421858	0.08	38.78
3	424626	421885	NoData	NoData
4	424653	421885	0.03	39.54
5	424680	421885	0.23	38.79
6	424707	421885	0.51	38.79
7	424599	421912	NoData	NoData
8	424626	421912	NoData	NoData
9	424653	421912	0.04	39.71
10	424680	421912	0.06	38.99
11	424707	421912	0.14	38.89
12	424572	421939	NoData	NoData
13	424599	421939	NoData	NoData
14	424626	421939	0.07	40.04
15	424653	421939	0.03	39.42
16	424680	421939	0.35	39.30

Label	Easting	Northing	1% AEP (+20%)	
			Depth	Height
17	424707	421939	NoData	NoData
18	424545	421966	NoData	NoData
19	424572	421966	NoData	NoData
20	424599	421966	0.13	40.19
21	424626	421966	0.01	39.74
22	424653	421966	0.37	39.44
23	424572	421993	0.26	40.46
24	424599	421993	NoData	NoData
25	424626	421993	0.13	39.84
26	424653	421993	NoData	NoData
27	424599	422020	NoData	NoData

Data in this table comes from the 2015 Batley Beck Mapping Study model.

Height values are shown in mAOD, and depth values are shown in metres.

Any blank cells show where a particular scenario has not been modelled for this location.

Cells which contain text 'NoData' for a scenario show that return period has been modelled but there is no flood risk for that return period for that location.

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

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 G: Flood Depths Across the Site

BDP.

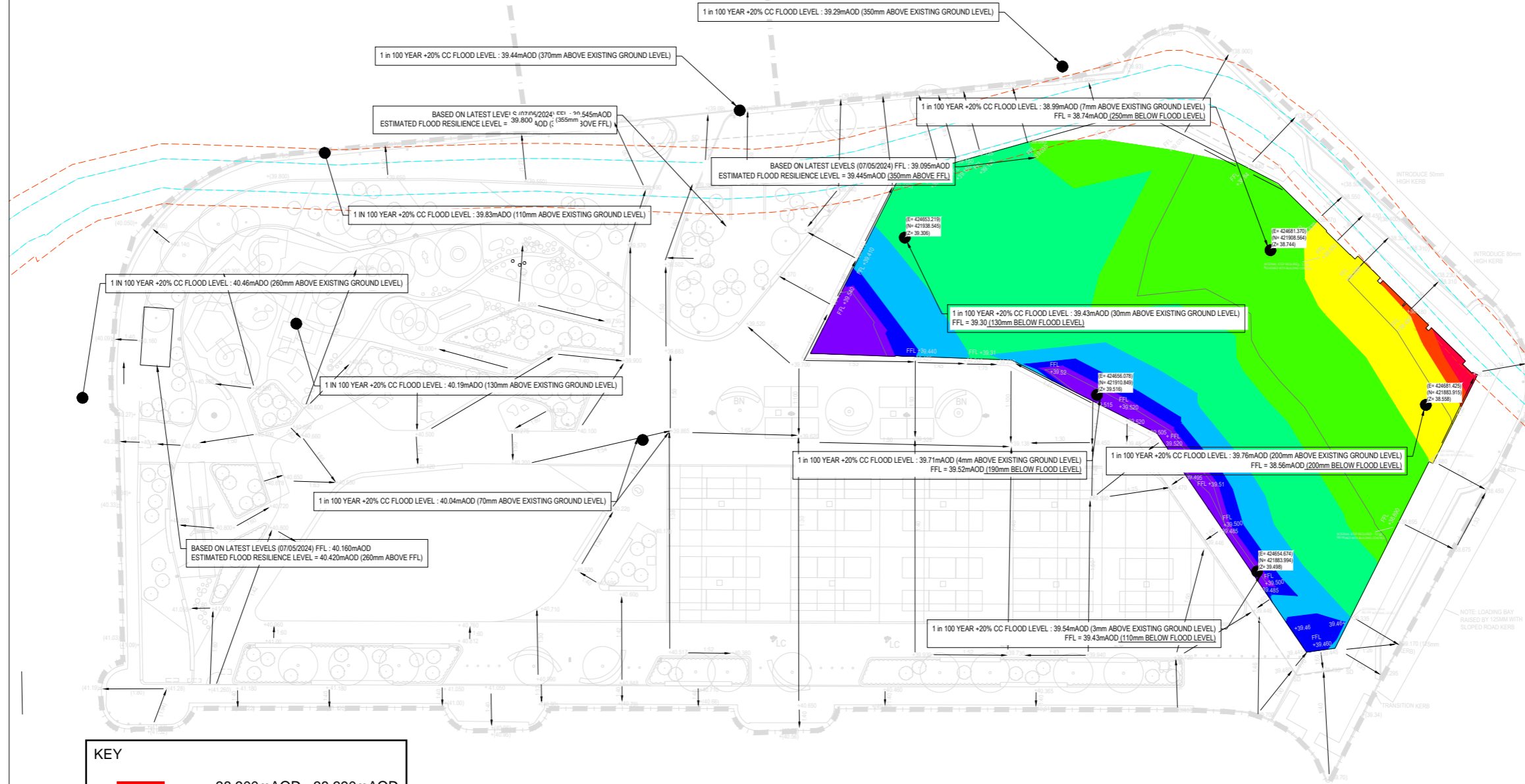
Civil & Structural Sketchbook

DEWSBURY MARKET

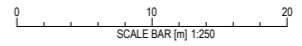
Sketchbook 1 - FLOOD LEVELS

12.12.2024

ALL FLOOD LEVEL DATA BASED ON REPORT RECEIVED FROM THE ENVIRONMENT AGENCY 05/01/2024. ALL PROPOSED LEVELS HAVE BEEN OBTAINED FROM DRAWING: DMTP-BDP-TP-SL-PL-L-90601



KEY	
■	38.300m AOD - 38.390m AOD
■	38.390m AOD - 38.440m AOD
■	38.440m AOD - 38.670m AOD
■	38.670m AOD - 39.095m AOD
■	39.095m AOD - 39.340m AOD
■	39.340m AOD - 39.440m AOD
■	39.440m AOD - 39.485m AOD
■	39.485m AOD - 39.654m AOD



JOB TITLE DEWSBURY MARKET

JOB NUMBER P3001350

MADE BY JB DATE 12/08/2024

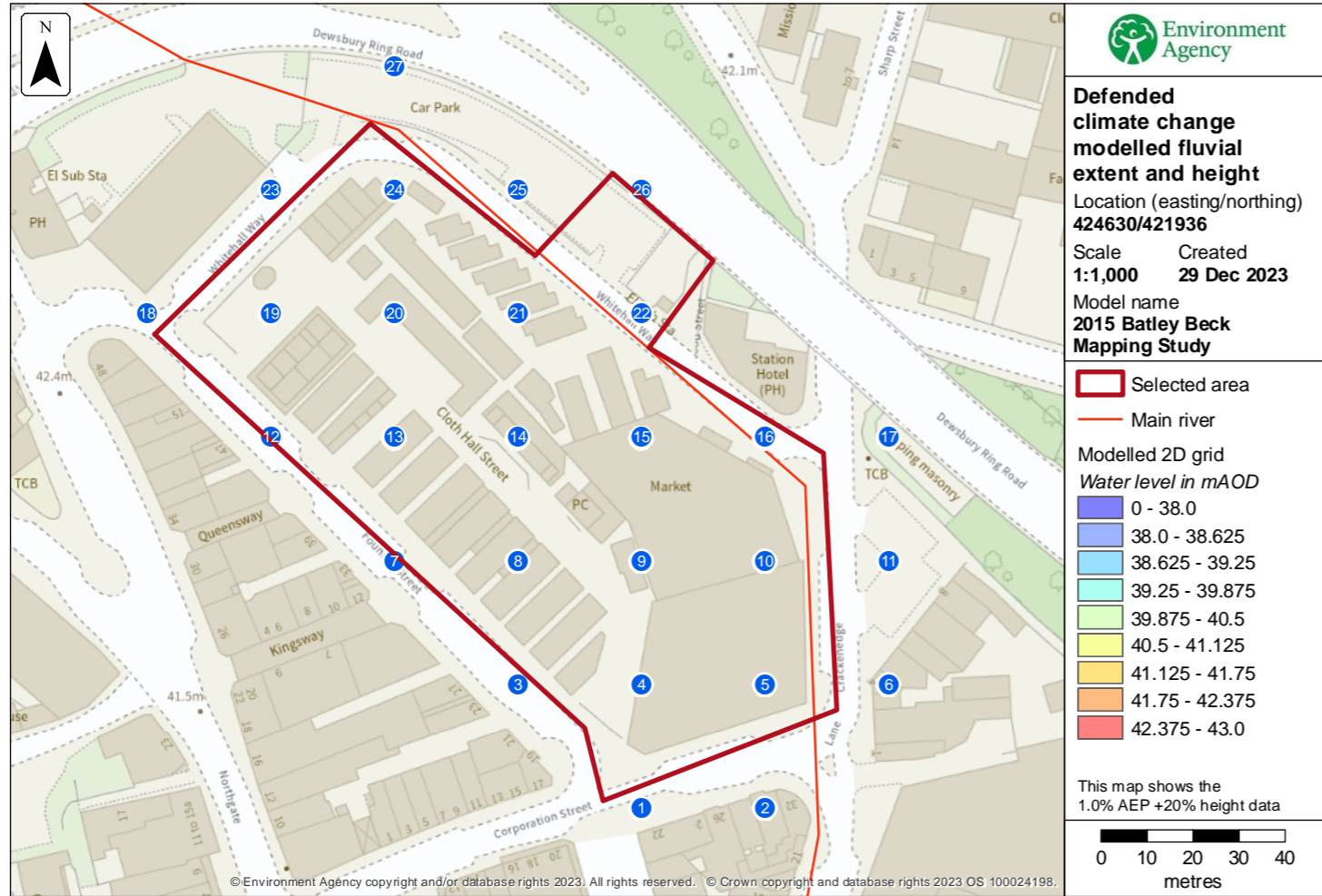
STRUCTURE FLOOD LEVELS

SKETCH NUMBER SK-C-0027

CHECKED BY PS DATE 12/08/2024

Civil & Structural Sketch





Sample point data

Defensed climate change

Label	Easting	Northing	1% AEP (+20%)	
			Depth	Height
1	424653	421858	NoData	NoData
2	424680	421858	0.06	38.75
3	424626	421885	NoData	NoData
4	424653	421885	0.03	39.54
5	424680	421885	0.20	38.76
6	424707	421885	0.48	38.76
7	424599	421912	NoData	NoData
8	424626	421912	NoData	NoData
9	424653	421912	0.04	39.71
10	424680	421912	0.06	38.99
11	424707	421912	0.13	38.88
12	424572	421939	NoData	NoData
13	424599	421939	NoData	NoData
14	424626	421939	0.06	40.03
15	424653	421939	0.03	39.42
16	424680	421939	0.35	39.29

Label	Easting	Northing	1% AEP (+20%)	
			Depth	Height
17	424707	421939	NoData	NoData
18	424545	421966	NoData	NoData
19	424572	421966	NoData	NoData
20	424599	421966	0.12	40.18
21	424626	421966	0.01	39.74
22	424653	421966	0.35	39.42
23	424572	421993	0.25	40.44
24	424599	421993	NoData	NoData
25	424626	421993	0.11	39.83
26	424653	421993	NoData	NoData
27	424599	422020	NoData	NoData

JOB TITLE **DEWSBURY MARKET**

JOB NUMBER **P3001350**

MADE BY **JB** DATE **07/06/2024**

STRUCTURE **FLOOD LEVELS**

SKETCH NUMBER **SK-C-0027**

CHECKED BY **DN** DATE **07/06/2024**

Civil & Structural Sketch



Sample point data

Defended climate change

Label	Easting	Northing	1% AEP (+20%)	
			Depth	Height
1	424653	421858	NoData	NoData
2	424680	421858	0.06	38.75
3	424626	421885	NoData	NoData
4	424653	421885	0.03	39.54
5	424680	421885	0.20	38.76
6	424707	421885	0.48	38.76
7	424599	421912	NoData	NoData
8	424626	421912	NoData	NoData
9	424653	421912	0.04	39.71
10	424680	421912	0.06	38.99
11	424707	421912	0.13	38.88
12	424572	421939	NoData	NoData
13	424599	421939	NoData	NoData
14	424626	421939	0.06	40.03
15	424653	421939	0.03	39.42
16	424680	421939	0.35	39.29

JOB TITLE DEWBSURY MARKET

JOB NUMBER P3001350

MADE BY JB DATE 07/06/2024

STRUCTURE FLOOD LEVELS

SKETCH NUMBER SK-C-027

CHECKED BY DN DATE 07/06/2024

Civil & Structural Sketch

BDP.

Appendix H: LLFA Correspondence

Jack Bradbury

From: Paul Farndale <Paul.Farndale@kirklees.gov.uk>
Sent: 31 January 2024 22:42
To: Jack Bradbury
Subject: FW: Dewsbury Market - LLFA Involvement
Attachments: Dewsbury Market meeting 9 June 2021.docx; SK-C-52001 Stage 2 Drainage.pdf; Dewsbury Market Discharge Rate.pdf; 21157 Dewsbury Market P2 GI Report Rev1.pdf

You don't often get email from paul.farndale@kirklees.gov.uk. [Learn why this is important](#)

Hello Jack,

As long as you can demonstrate 30% reduction to both systems that should be fine.

Kind regards,

Paul Farndale
Team Leader (Acting)
Flood Management & Drainage (LLFA)
Kirklees Council

From: Rashid Mahmood <Rashid.Mahmood@kirklees.gov.uk>
Sent: Wednesday, January 24, 2024 3:20 PM
To: Paul Farndale <Paul.Farndale@kirklees.gov.uk>
Subject: FW: Dewsbury Market - LLFA Involvement

Paul – one for you
Rashid

From: Jack Bradbury <Jack.Bradbury@bdp.com>
Sent: Wednesday, January 24, 2024 1:07 PM
To: Rashid Mahmood <Rashid.Mahmood@kirklees.gov.uk>
Subject: Dewsbury Market - LLFA Involvement

CAUTION: External email. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hi Rashid,

I am currently working on the Dewsbury Market project and as we are entering the next design stage, we wanted to check our assumptions for discharge rate and locations of discharge are suitable for the new development.

There is a plan attached showing the nature of the planned works and the locations we are proposing to discharge too. We worked on the site previously under a different masterplan proposal and it was agreed that we would keep the catchment areas the same and reduce the discharge rate by 30% as it is a brownfield site. We are proposing two points of discharge, the play area and areas in the north (0.085ha) to discharge to the public watercourse and the majority of the site in the south (0.308ha) to discharge to the existing combined sewer on Cloth Hall Street. There is

a reduction in the impermeable area across the site therefore, no increase in surface water runoff generated from the site. As we don't want to impact the condition of the existing structure, we are not discharging the whole site to the culverted watercourse as previously agreed with the EA. Infiltration was considered however, an infiltration test was undertaken and unsuccessful (see SI report attached) therefore discharging to the public sewer and watercourse is required.

The proposed discharge rate to the culverted watercourse is 8.27 l/s and for discharging to the combined sewer 29.97 l/s. The calculations are attached.

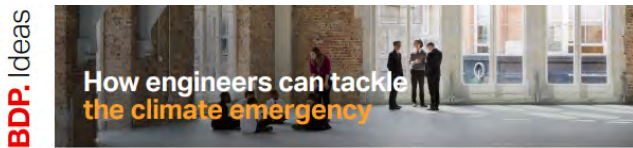
If you require any more information or have another contact, I should discuss this with please let me know.

Kind Regards,

Jack Bradbury
Civil Engineer

BDP
Postal address:
11 Ducie Street, PO Box 85, Piccadilly Basin
Manchester M60 3JA, United Kingdom
Location postcode for sat nav purposes: M1 2JB

T [+44 161 828 2377](tel:+441618282377)
www.bdp.com



[Email Disclaimer](#)



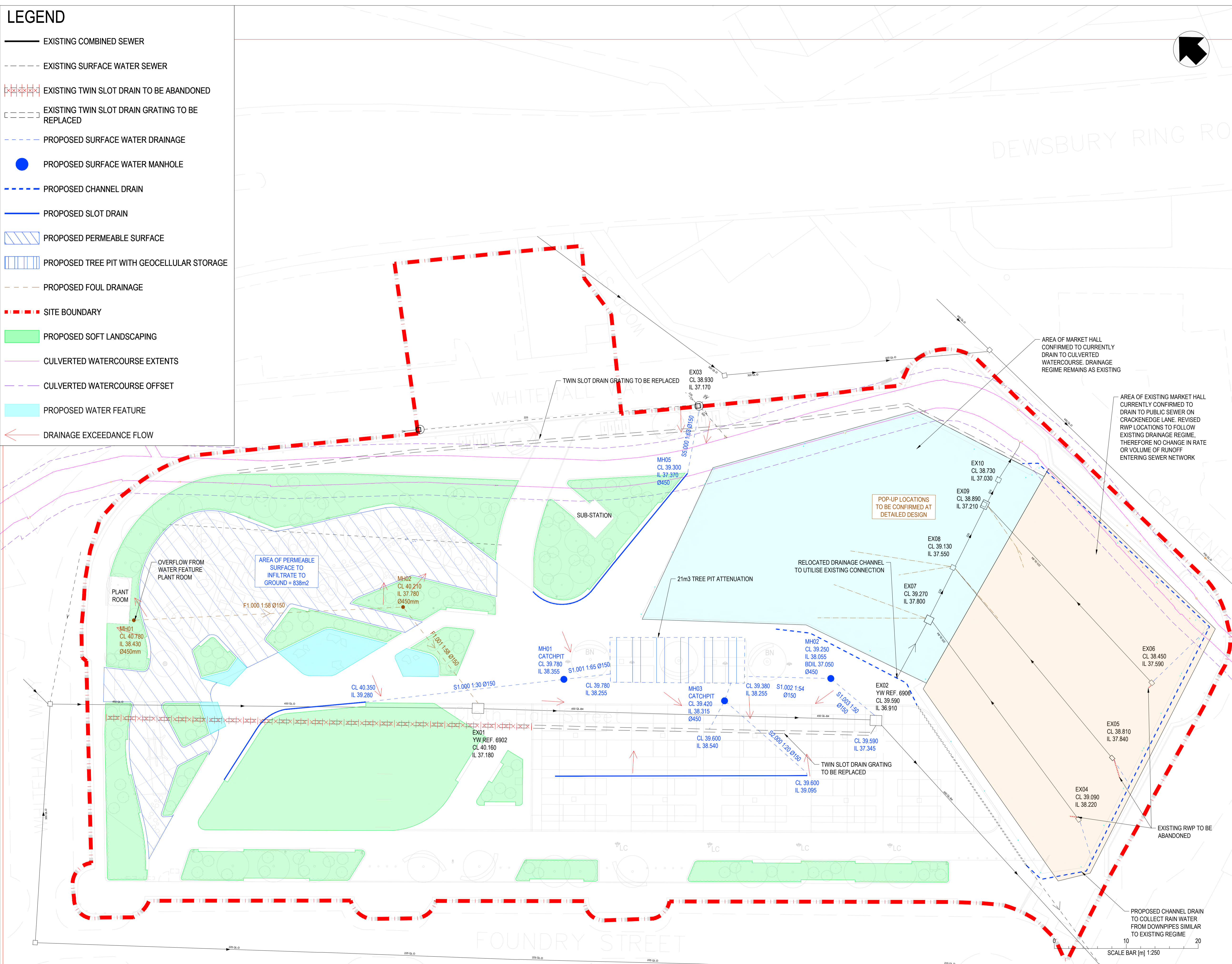
[Website](#) | [News](#) | [Email Updates](#) | [Facebook](#) | [Twitter](#)

This email and any attachments are confidential. If you have received this email in error – please notify the sender immediately, delete it from your system, and do not use, copy or disclose the information in any way. Kirklees Council monitors all emails sent or received.

Appendix I: Flood Exceedance Plan

LEGEND

- EXISTING COMBINED SEWER
- EXISTING SURFACE WATER SEWER
- EXISTING TWIN SLOT DRAIN TO BE ABANDONED
- EXISTING TWIN SLOT DRAIN GRATING TO BE REPLACED
- PROPOSED SURFACE WATER DRAINAGE
- PROPOSED SURFACE WATER MANHOLE
- PROPOSED CHANNEL DRAIN
- PROPOSED SLOT DRAIN
- PROPOSED PERMEABLE SURFACE
- PROPOSED TREE PIT WITH GEOCELLULAR STORAGE
- PROPOSED FOUL DRAINAGE
- SITE BOUNDARY
- PROPOSED SOFT LANDSCAPING
- CULVERTED WATERCOURSE EXTENTS
- CULVERTED WATERCOURSE OFFSET
- PROPOSED WATER FEATURE
- DRAINAGE EXCEEDANCE FLOW

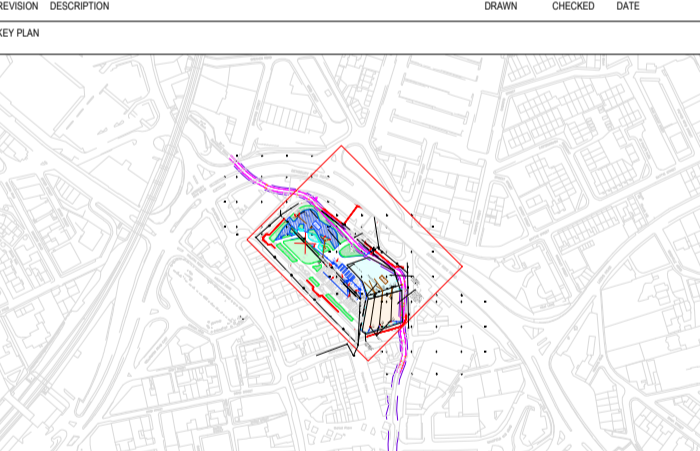


BUILDING DESIGN PARTNERSHIP SHALL HAVE NO RESPONSIBILITY FOR ANY USE MADE OF THIS DOCUMENT OTHER THAN FOR THAT WHICH IT WAS PREPARED AND ISSUED.
 ALL DIMENSIONS SHOULD BE CHECKED ON SITE.
 DO NOT SCALE FROM THIS DRAWING.
 ANY DRAWING ERRORS OR DIVERGENCES SHOULD BE BROUGHT TO THE ATTENTION OF BUILDING DESIGN PARTNERSHIP AT THE ADDRESS SHOWN BELOW.

NOTES

1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE STATED. WHERE THERE APPEARS TO BE A CONFLICT BETWEEN DIMENSIONS OR WHERE DIMENSIONS CANNOT BE DETERMINED FROM THE DRAWINGS, CONSULT THE ENGINEER BEFORE PROCEEDING WITH THE WORK.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL ARCHITECTS, ENGINEERS AND SPECIALIST DRAWINGS AND SPECIFICATIONS.
3. THIS DRAWING IS BASED ON:
 - 3.1. GPR AND TOPOGRAPHICAL SURVEY - PLOWMAN CRAVEN OCT 2021
 - 3.2. LANDSCAPE GENERAL ARRANGEMENT - DMTP-BDP-TP-SL-PL-L-96101
 - 3.3. LANDSCAPE SITE LEVELS PLAN - DMTP-BDP-TP-SL-PL-L-96601
4. NEW CONNECTIONS TO THE PUBLIC SEWER ARE SUBJECT TO SECTION 106 OF THE WATER INDUSTRY ACT 1991 APPROVAL. NO WORKS AFFECTING THE PUBLIC SEWERAGE SYSTEM MAY BE CARRIED OUT WITHOUT UU'S PRIOR WRITTEN CONSENT
5. THE PROPOSED BUILDING OUTLINES SHOWN ON THIS DRAWING ARE FOR INFORMATION ONLY. REFER TO ARCHITECTS PLANS FOR PRECISE LOCATION SETTING OUT INFORMATION AND DETAILS.

P02 PLANNING ISSUE JB PS 12/08/24
 P01 STAGE 3 DRAFT SUBMISSION JB EH 26/07/24



Kirklees COUNCIL
 Kirklees Council
 Civic Centre 3
 Market Street
 Huddersfield
 HD1 2TG

BDP.
 11 Ducie Street
 PO BOX 85
 Piccadilly Basin
 Manchester
 M60 3JA
 United Kingdom
 T +44 [0]161 828 2200
 www.bdp.com

PROJECT TITLE		DEWSBURY MARKET	
DRAWING NUMBER	P3001350	PROJECT CLASSIFICATION	COMMERCIAL IN CONFIDENCE
DRAWING TITLE	DRAINAGE EXCEEDANCE PLAN		
SCALE	1:250 @ A1		
DATE	26/07/2024		
DRAWING NO.	DMTP-BDP-00-XX-DR-C-52002	REVISION	P02