KRYPTONSTRUCTURE
CIVIL & STRUCTURAL ENGINEERS

Flood Risk Assessment

For The Project At

Land Of Bretton Street, Dewsbury

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Land off Bretton Street, Dewsbury

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EXECUTIVE SUMMARY

The Site would be expected to remain dry in all but the most extreme conditions. The consequences of flooding are acceptable, and the development would be in accordance with the requirements of the National Planning Policy Framework (NPPF). The Proposed Development would be operated with minimal risk from flooding, would not increase flood risk elsewhere and is compliant with the requirements of the NPPF.

The Proposed Development should not therefore be precluded on the grounds of flood risk or drainage.

1.0 INTRODUCTION

1.1 Background

This Flood Risk Assessment (FRA) has been prepared by Krypton Structure Ltd at the request of Jade3 Architecture Ltd to support a planning application for the construction of an industrial unit ("the Proposed Development") on land off Bretton Street, Dewsbury ("the Site").

This FRA has been carried out in accordance with guidance contained in the National Planning Policy Framework (NPPF)\ associated Planning Practice Guidance on flood risk and coastal change[2] (PPG) and the PPG 'Site-specific flood risk assessment checklist'. This FRA identifies and assesses the risks of all forms of flooding to and from the development and demonstrates how these flood risks will be managed so that the development remains safe throughout the lifetime, taking climate change into account.

It is recognised that developments which are designed without regard to flood risk may endanger lives, damage property, cause disruption to the wider community, damage the environment, be difficult to insure and require additional expense on remedial works. The development design should be such that future users will not have difficulty obtaining insurance or mortgage finance, or in selling all or part of the development, as a result of flood risk issues.

1.2 National Planning Policy Framework (NPPF)

One of the key 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 exceptionally necessary in areas of higher risk, this should be safe. without increasing flood risk elsewhere, and where possible, reduce flood risk overall. A risk-based approach is adopted at stages of the planning process, applying a source pathway receptor model to planning and flood risk. To demonstrate this, an FRA is required and should include:

- whether a proposed development is likely to be affected by current or future flooding from all sources;
- whether it will increase flood risk elsewhere;
- whether the measures proposed to deal with these effects and risks are appropriate;
- if necessary, provide the evidence to the Local Planning Authority (LPA) that the Sequential Test can be applied; and
- whether the development will be safe and pass part c) of the Exception Test if this is appropriate.

The report findings are based upon professional judgement and are summarised below with detailed recommendations provided at the end of the report. The report includes rainfall data from the Flood Estimation Handbook (FEH) and hydrogeological information from the British

[1] Ministry for Housing, Communities and Local Government (2024) National Planning Policy Framework: https://assets.publishing.service.gov.uk/media/675abd214cbda57cacd3476e/NPPF-December-2024.pdf
[2] Communities and Local Government (2022) Planning Practice Guidance - Flood Risk and Coastal Change: https://www.gov.uk/guidance/flood-risk-and-coastal-change

from the Flood Estimation Handbook (FEH) and hydrogeological information from the British Geological Survey (BGS). The assessment will summarise and refer to these datasets in the text.

1.3 Report Structure

This FRA has the following report structure:

- Section 2 describes the location and the existing and Proposed Development;
- Section 3 outlines the flood risk to the existing and Proposed Development;
- Section 4 outlines the mitigation measures used to manage the overall level of flood risk; and
- Section 5 presents a summary and conclusions

2.0 LOCATION & DEVELOPMENT DESCRIPTION

2.1 Site Location

The Site is located on land off Bretton Street, Dewsbury (see Figure 1). The National Grid Reference (NGR) of the Site is 425006, 420227.

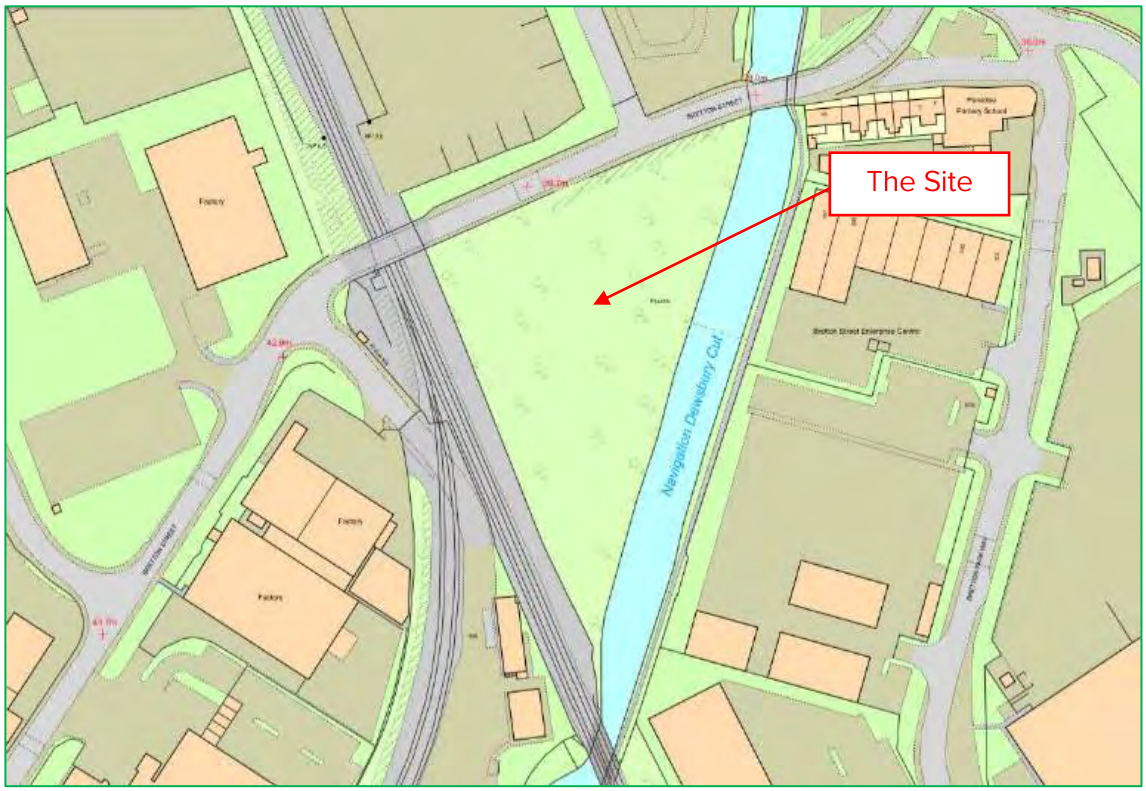


Figure 1 - Site Location

2.2 Existing Development

The existing Site consists of circa 2 acres of vacant land (see Appendix 1).

2.3 Proposed Development

The Proposed Development is for the construction of an industrial unit (see Appendix 1). Further details with regard to the Proposed Development can be found in the accompanying information submitted with the planning application.

2.4 Ground Levels

A topographical survey of the Site has recently been undertaken (see Appendix 2). The Site falls from west to east, with a maximum ground level of 37.67 metres Above Ordnance Datum (mAOD) to the west and a minimum ground level of 35.25mAOD to the east adjacent to the Calder & Hebble Navigation. However, it should be noted that the majority of the Site has a ground level above 35.78mAOD.

2.5 Catchment Hydrology

The Calder & Hebble Navigation is located adjacent to the eastern boundary of the Site. The River Calder is located approximately 150m to the northeast of the Site and the Chickenley Beck is located approximately 760m to the east of the Site. The Batley Beck is located approximately 1.50km to the north of the Site.

2.6 Ground Conditions

The British Geological Survey (BGS) map[3] shows that the bedrock deposits at the Site consist of the Pennine Lower Coal Measures Formation – mudstone, siltstone and sandstone. The superficial deposits for the majority of the Site consist of Alluvium – clay, silt, sand and gravel and a small section, along the eastern boundary, consists of River Terrace Deposits – sand and gravel.

Information from the National Soil Resources Institute[4] details the majority of the Site area being situated on slowly permeable seasonally wet acid loamy and clayey soils with a small area to the northeast of the Site being situated on loamy and clayey floodplain soils with naturally high groundwater.

[3] https://mapapps2.bgs.ac.uk/geoindex/home.html?_ga=2.14476159.932338379.1655890995-1831306757.1655472887
[4] http://www.landis.org.uk/soilscapes/

3.0 FLOOD RISK

3.1 Sources of Flooding

All sources of flooding have been considered, these are; fluvial (river) flooding, tidal (coastal) flooding, groundwater flooding, surface water (pluvial) flooding, sewer flooding and flooding from artificial drainage systems/infrastructure failure.

3.2 Environment Agency

Information regarding the current flood risk at the application Site and local flood defences has been obtained from the Environment Agency (see Appendix 3).

3.3 Climate Change

Projections of future climate change, in the UK, indicate more frequent, short-duration, high intensity rainfall and more frequent periods of long duration rainfall. Guidance included within the NPPF recommends that the effects of climate change are incorporated into FRA's. Recommended precautionary sensitivity ranges for peak rainfall intensities and peak river flows are outlined in the flood risk assessments: climate change allowances guidance[5]. Table 1 shows the peak river flow allowances by river management catchment.

The flood risk assessments: climate change allowances guidance recommends that the central allowances are used to assess climate change throughout the lifetime of the development which is 100 years. Therefore, the fluvial design event for the Site is the 1 in 100 year (+23%) event.

Table 1 - Peak River Flow Allowances by River Catchment

River Catchment	Allowance Category	2020s	2050s	2080s
Aire and Calder Management Catchment	Upper	+24%	+31%	+51%
	Higher	+15%	+18%	+31%
	Central	+11%	+13%	+23%

3.4 Environment Agency Flood Zones

A review of the Environment Agency's Flood Zones indicates that the majority of the Site is located within Flood Zone 2 and therefore has a 'medium probability' of flooding, with between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% - 0.1%) in any year, as shown in Figure 2. A small proportion of the Site to the north and on the western boundary is located within Flood Zone 1 and therefore has a 'low probability' of flooding with less than a 1 in 1000 annual probability of river flooding in any year (<0.1%).

A very small proportion of the Site on the eastern boundary is located within Flood Zone 3 and therefore has a 'high probability' of flooding with a 1 in 100 or greater annual probability of river flooding (>1%) in any year. Flood Zone 3 is located on the very edge of the Site.

The Flood Zones are the current best information on the extent of the extremes of flooding from rivers or the sea that would occur without the presence of flood defences, because these can be breached, overtopped and may not be in existence for the lifetime of the development. They show the worst case scenario. The Environment Agency Flood Zones and acceptable

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

development types are explained in Table 2. Table 2 shows that some development types are generally acceptable in Flood Zones 1, 2, and 3.

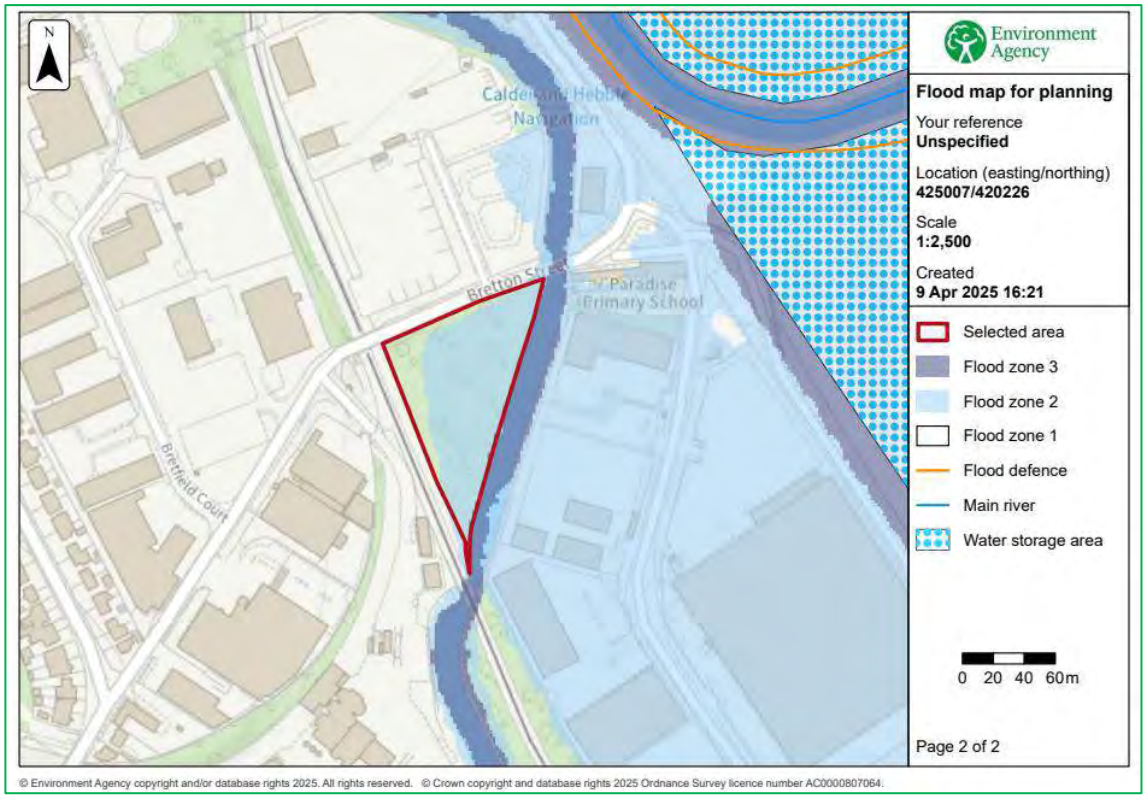


Figure 2 - Environment Agency Flood Zones

Table 2 - Environment Agency Flood Zones and Appropriate Land Use

Flood Zone	Probability	Explanation	Appropriate Land Use
Zone 1	Low	Less than a 1 in 1000 annual probability of river or sea flooding in any year (<0.1%)	All development types generally acceptable
Zone 2	Medium	Between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% - 0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% 0.1%) in any year	Most development type are generally acceptable
Zone 3a	High	A 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year	Some development types not acceptable
Zone 3b	'Functional Floodplain'	This zone comprises land where water from rivers or the sea has to flow or be stored in times of flood. The identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. Functional floodplain will normally comprise:	Some development types not acceptable

		• land having a 3.3% or greater annual probability of flooding, with any existing flood risk management infrastructure operating effectively; or • land that is designed to flood (such as a flood attenuation scheme), even if it would only flood in more extreme events (such as 0.1% annual probability of flooding). Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map)	

3.5 Flood Vulnerability

In the PPG appropriate uses have been identified for the Flood Zones. Applying the Flood Risk Vulnerability Classification in the PPG, the proposed use is classified as 'less vulnerable'. Table 3 of this report and the PPG state that 'less vulnerable' uses are appropriate within Flood Zones 1 and 2 after the completion of a satisfactory FRA.

Table 3 - Flood Risk Vulnerability and Flood Zone 'Compatibility'

Flood Risk Vulnerability Classification	Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	✓	Exception test required	✓	✓
Zone 3a	Exception test required	✓	×	Exception test required	✓
Zone 3b 'Functional Floodplain'	Exception test required	✓	×	×	×

Key: *✓: Development is appropriate, ×: Development should not be permitted.*

3.6 Historic Flooding

Environment Agency data shows that the Site has not historically flooded (see Figure 3). However, the Environment Agency has confirmed that areas within the vicinity of the Site have historically flooded in February 2002, December 2015 and February 2020 due to channel capacity being exceeded but these flood events did not affect the Site.

There are no records of anecdotal information of flooding at the Site including within the British Hydrological Society "Chronology of British Hydrological Events". No other historical records of flooding for the Site have been recorded. Therefore, it has been concluded that the Site has not flooded within the recent past.

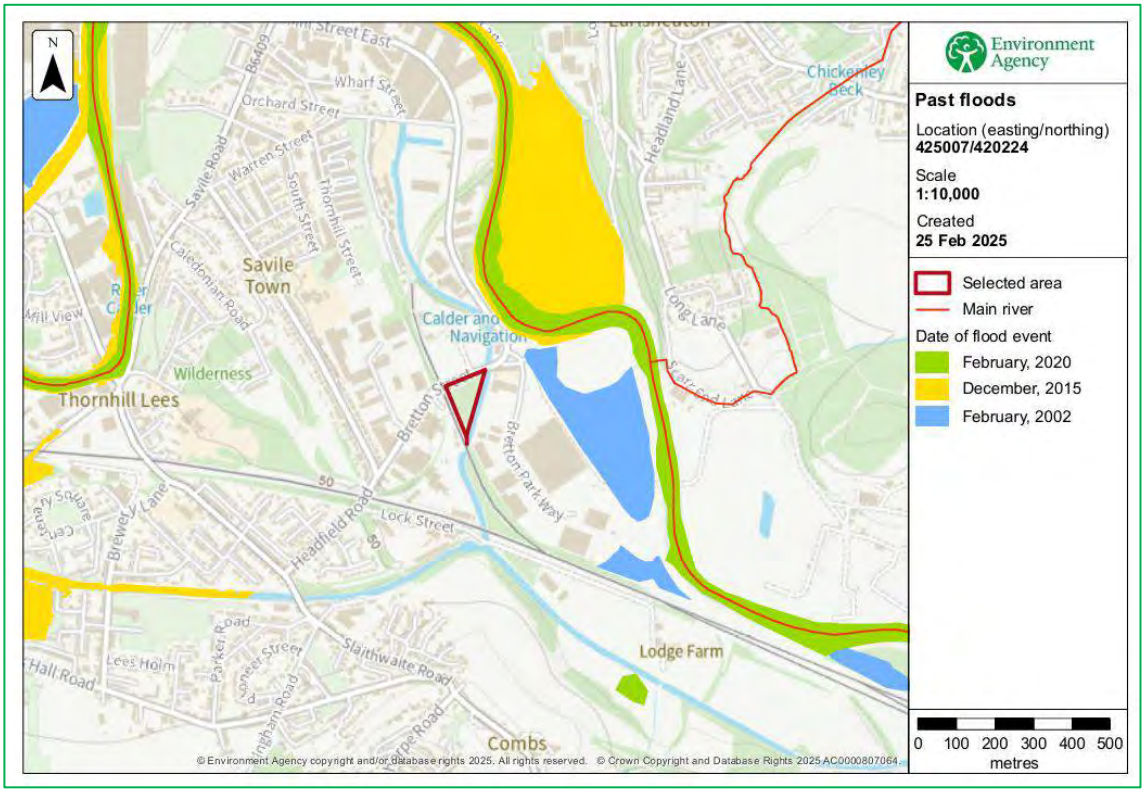


Figure 3 - Environment Agency Historic Flood Outline

3.7 Existing and Planned Flood Defence Measures

The Environment Agency data shows that there are flood defence measures within the vicinity of the Site which have a 1 in 50 year Standard of Protection (SoP) (see Table 4 and Figure 4). Further property level protection measures will be used to protect the Site from flooding these are discussed in Section 4.0.

Table 4 - Existing Flood Defences

Label	Asset ID	Asset Type	Standard of Protection (years)	Condition	Downstream actual Crest Level (mAOD)	Upstream actual Crest Level (mAOD)
1	52235	Embankment	50	-	36.81	40.20
2	171516	Embankment	50	-	35.27	35.23
3	26923	Embankment	50	-	35.24	36.80
4	26922	Embankment	50	-	35.42	35.24

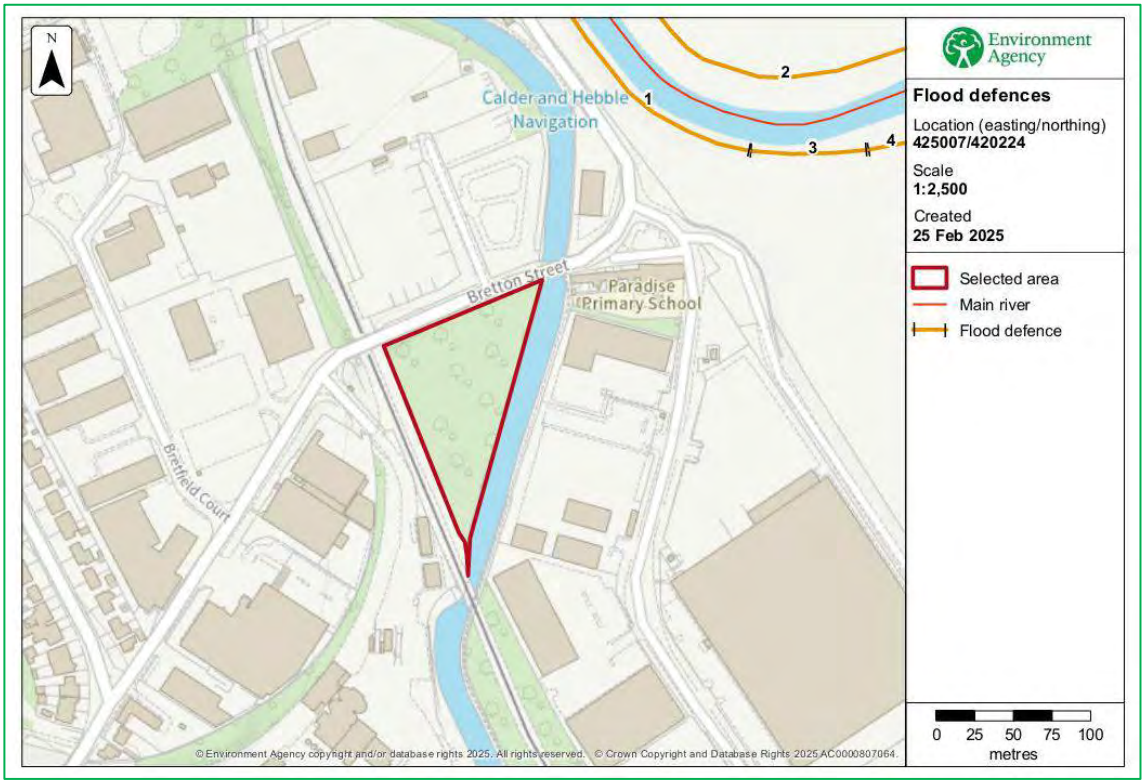


Figure 4 - Environment Agency Flood Defences Map

3.8 Fluvial (River) Flooding

The principal flood risk posed to the Site is from fluvial flooding. The Site is located within the vicinity of the River Calder together with the Chickenley Beck and the Batley Beck. The Environment Agency has provided modelled data for a number of watercourses, the modelled water levels have been compared to the ground level of the Site and areas within the vicinity of the Site to assess the flood risk at the Site in detail.

The fluvial design event for the Site is the 1 in 100 year (+23%) event, to take account of the +23% climate allowance the 1 in 100 year (+20%) event has been used in this case as a proxy for the 1 in 100 year (+23%) event due to the very small difference between the two events.

Chickenley Beck

The Environment Agency has provided modelled flood data for the undefended Chickenley Beck 2018 model. Figures 5 and 6 show the Environment Agency modelled flood outlines for the undefended events.

The Environment Agency data shows that the Site will not be inundated with floodwater for all events up to and including the undefended 1 in 100 year (+50%) and 1 in 1000 year events. The Site will be flood free during the defended and undefended 1 in 100 year (+23%) event, which is the design flood event for the Site.

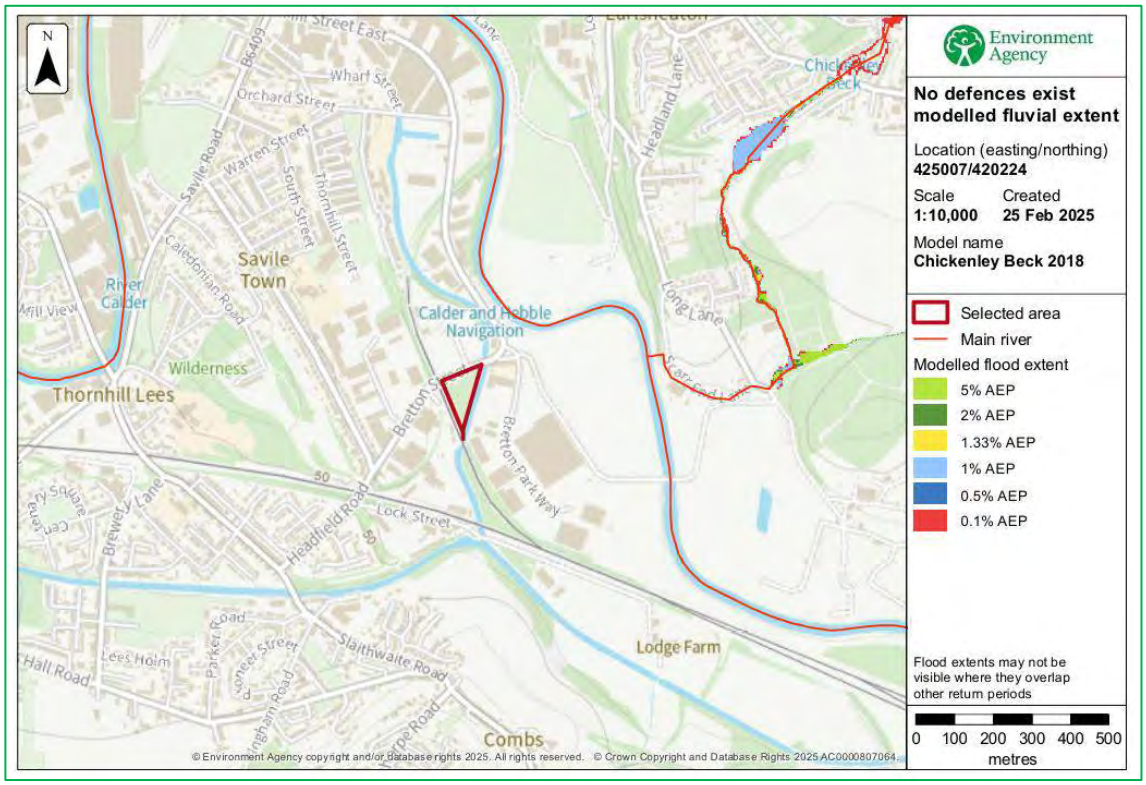


Figure 5 - Environment Agency Undefended Modelled Flood Outlines: 2018 Chickenley Beck Model

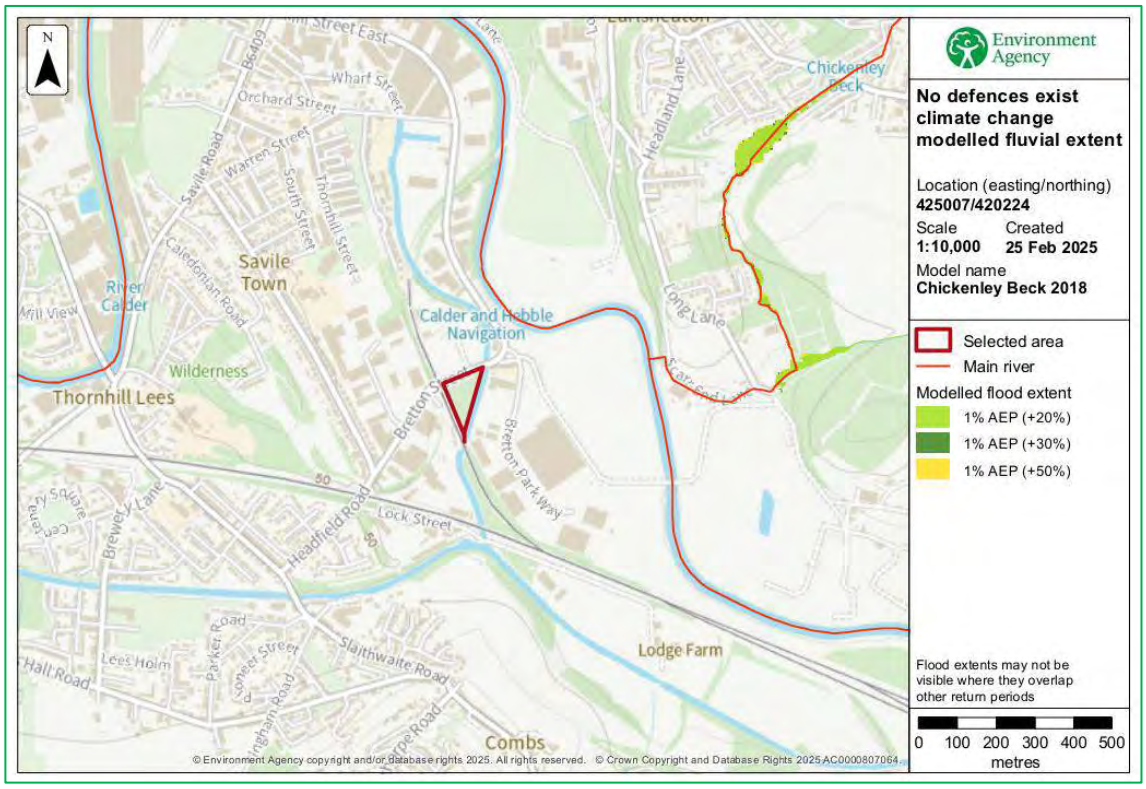


Figure 6 - Environment Agency Undefended Modelled Climate Change Flood Outlines: 2018 Chickenley Beck Model

Given the scale and nature of the Proposed Development and the size and location of the Chickenley Beck it has been concluded that fluvial flooding from the Chickenley Beck poses a negligible flood risk to the Site and the risk of fluvial flooding is considered to be not significant.

Batley Beck

The Environment Agency has provided modelled flood data for the defended Batley Beck 2015 model. Figure 7 shows the Environment Agency modelled flood outlines for the defended events.

The Environment Agency data shows that the Site will not be inundated with floodwater for all events up to and including the defended 1 in 1000 year event. The Site will be flood free during the defended 1 in 100 year (+23%) event, which is the design flood event for the Site.

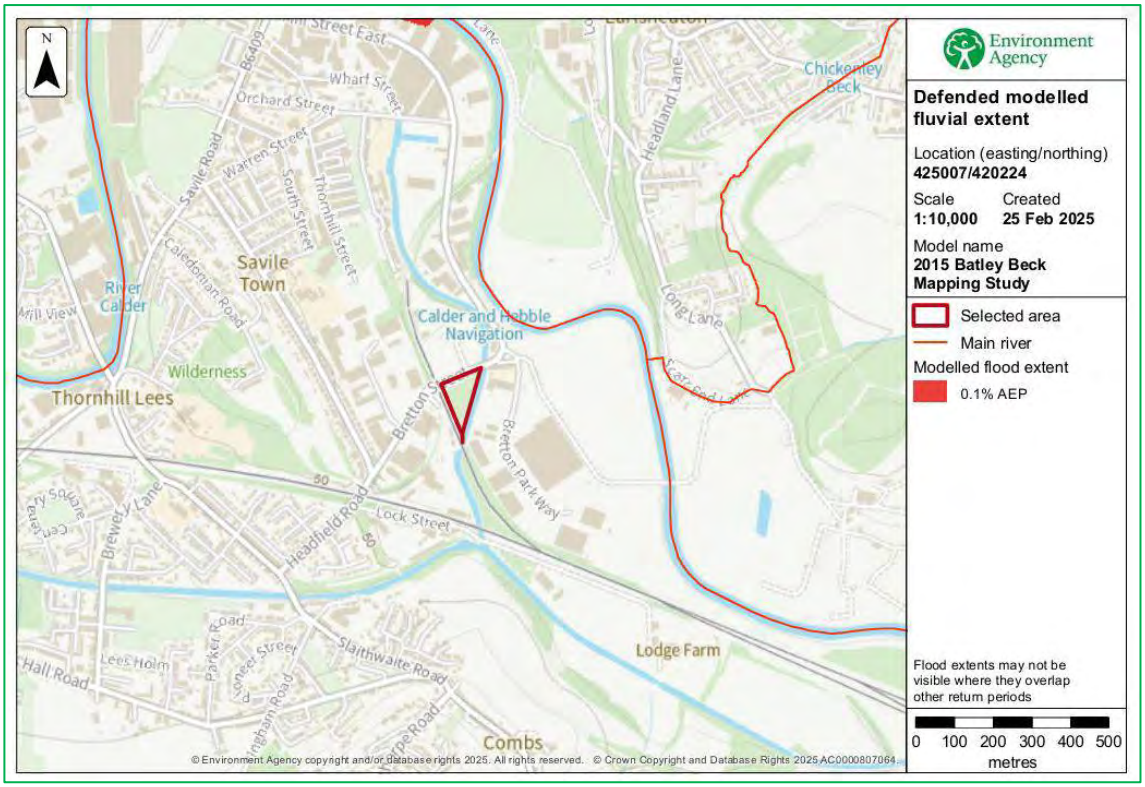


Figure 7 - Environment Agency Defended Modelled Flood Outlines: 2015 Batley Beck Model

Given the scale and nature of the Proposed Development and the size and location of the Batley Beck it has been concluded that fluvial flooding from the Batley Beck poses a negligible flood risk to the Site and the risk of fluvial flooding is considered to be not significant.

River Calder and Calder & Hebble Navigation

The River Calder is located approximately 150m to the northeast of the Site and the Calder & Hebble Navigation is located on the eastern boundary of the Site. The fluvial flood posed to the Site is a combination of flooding from the River Calder and the Calder & Hebble Navigation.

Defended Scenario

The Environment Agency data shows that there are flood defence measures within the vicinity of the Site which have a 1 in 50 SoP. The Environment Agency defended data from the 2015 Calder and Canals Downstream defended model is shown in Table 5. Node 9 is the closest

node to the Site at NGR 425143 420423, which is located approximately 150m to the north of the Site located within the channel of the River Calder, and has been compared to the ground levels of the Site and areas within the vicinity of the Site to assess the flood risk at the Site in detail. Figure 8 shows the model node locations. Figures 9 and 10 show the Environment Agency defended modelled flood outlines.

The defended modelled water levels experienced at the Site would be lower than those shown in Table 5 as these are in channel water levels for the River Calder approximately 150m to the north of the Site. The distance between the Site and the River Calder would create a small head and the local topography would reduce the impact of flooding at the Site.

The majority of the Site will not be inundated with floodwater for all events up to and including the defended 1 in 100 year (+20%) and 1 in 200 year events. The actual flood risk posed to the majority of the Site is greater than the defended 1 in 100 year (+20%) and 1 in 200 year events as the Site would be flood free during this events. The majority of the Site will be flood free during the defended 1 in 100 year (+23%) event, which is the design flood event for the Site. The only areas which may be inundated with floodwater would be immediately adjacent to the Calder & Hebble Navigation on the eastern boundary of the Site where ground levels are lower. The west of the Site will only be inundated with floodwater during the defended 1 in 1000 year event.

Table 5 - Environment Agency Defended Modelled Data: 2015 Calder and Canals Downstream Model

Parameter	Return Period (years)										
	2	5	10	25	30	50	75	100	100 (+20%)	200	1000
Water Level (mAOD)	34.57	35.21	35.29	35.73	35.76	35.84	35.89	36.30	36.15	36.06	37.36

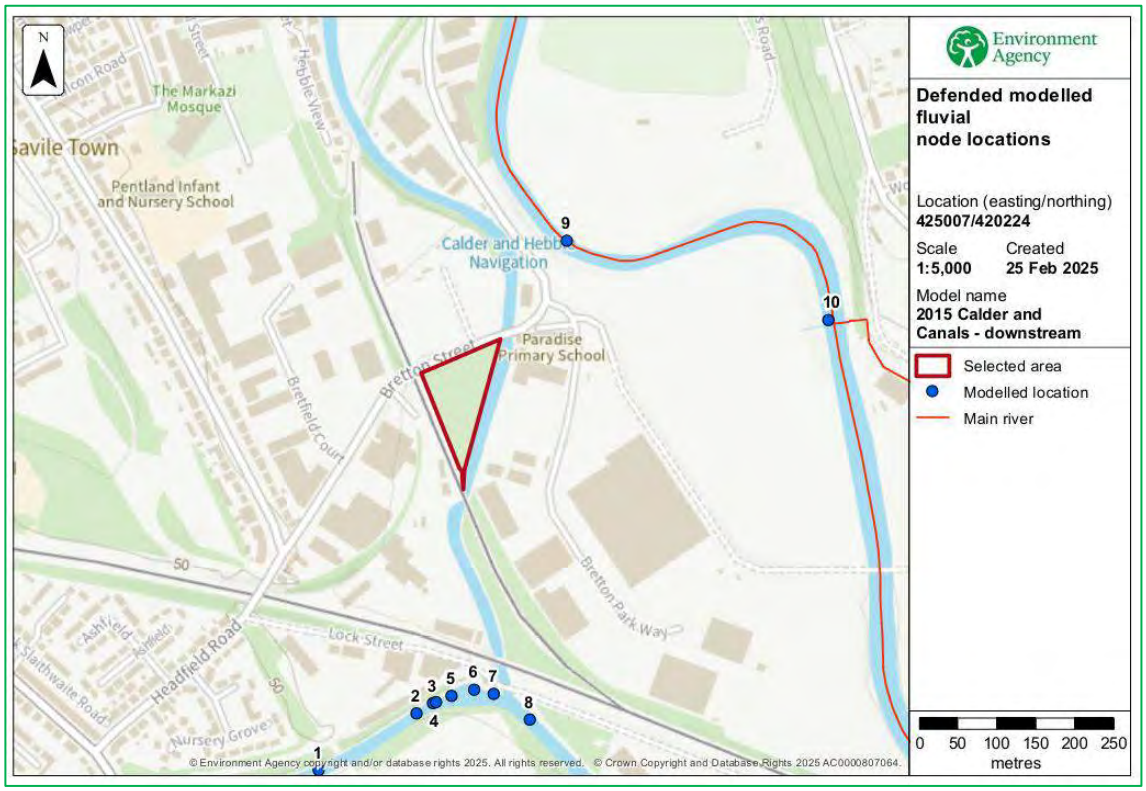


Figure 8 - Environment Agency Modelled Nodes Location Map

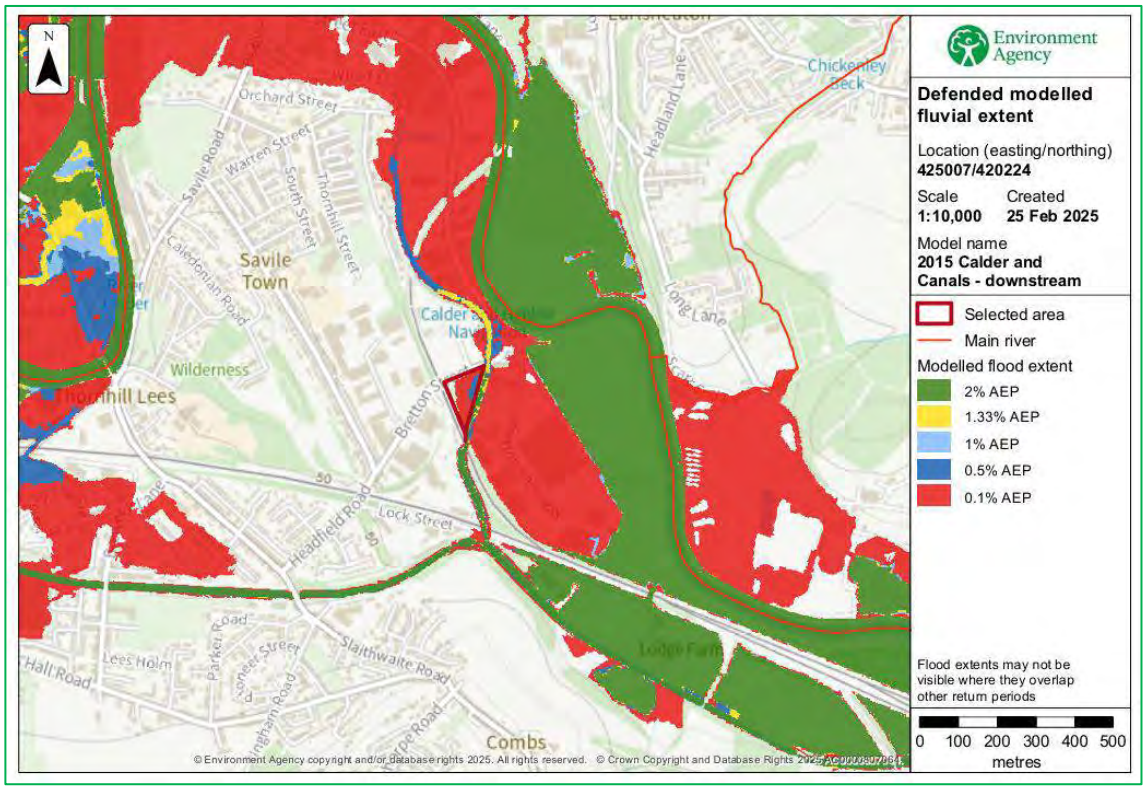


Figure 9 - Environment Agency Defended Modelled Flood Outlines: 2015 Calder and Canals Downstream Model

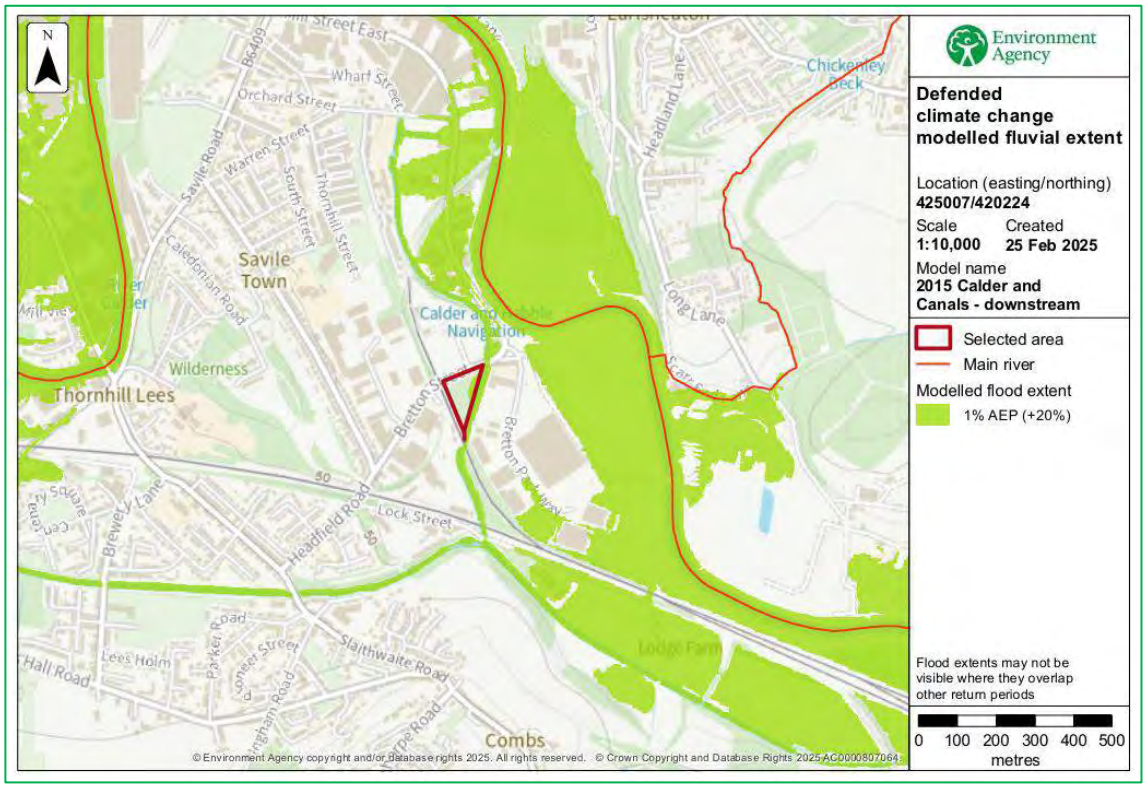


Figure 10 - Environment Agency Defended Modelled Climate Change Flood Outlines: 2015 Calder and Canals Downstream Model

Undefended Scenario

Considerable investment has been made in the provision of the flood defences to protect the Site from fluvial flooding. However, the flood defences can only protect up to a point, they may malfunction, can be breached and have a finite structure life. Therefore, there is a residual risk of fluvial flooding. The condition of the defences is fair therefore; it is unlikely that a breach in the flood defences would occur.

If the flood defences were not there, the area would be flooded. However, an area of land may benefit from the presence of flood defences even if the flood defences are overtopped, the presence of the flood defences means that the floodwater does not extend as far as it would if the flood defences were not there.

The Environment Agency undefended data from the 2015 Calder and Canals Downstream undefended model is shown in Table 6. Node 9 is the closest node to the Site at NGR 425143 420423, which is located approximately 150m to the north of the Site located within the channel of the River Calder, and has been compared to the ground levels of the Site and areas within the vicinity of the Site to assess the flood risk at the Site in detail. Figure 8 shows the model node locations. Figure 11 shows the Environment Agency undefended modelled flood outlines.

The undefended modelled water levels experienced at the Site would be lower than those shown in Table 6 as these are in channel water levels for the River Calder approximately 150m to the north of the Site.

The majority of the Site will not be inundated with floodwater for all events up to and including the undefended 1 in 100 year event. The residual flood risk posed to the majority of the Site is greater than the undefended 1 in 100 year event as the Site would be flood free during this event. The majority of the Site will be flood free during the undefended 1 in 100 year (+23%)

event, which is the design flood event for the Site. The only areas which may be inundated with floodwater would be immediately adjacent to the Calder & Hebble Navigation on the eastern boundary of the Site where ground levels are lower. The west of the Site will only be inundated with floodwater during the undefended 1 in 1000 year event.

Table 6 - Environment Agency Undefended Modelled Data: 2015 Calder and Canals Downstream Model

Parameter	Return Period (years)						
	10	25	50	75	100	200	1000
Water Level (mAOD)	35.25	35.56	35.70	35.77	35.93	35.93	37.35

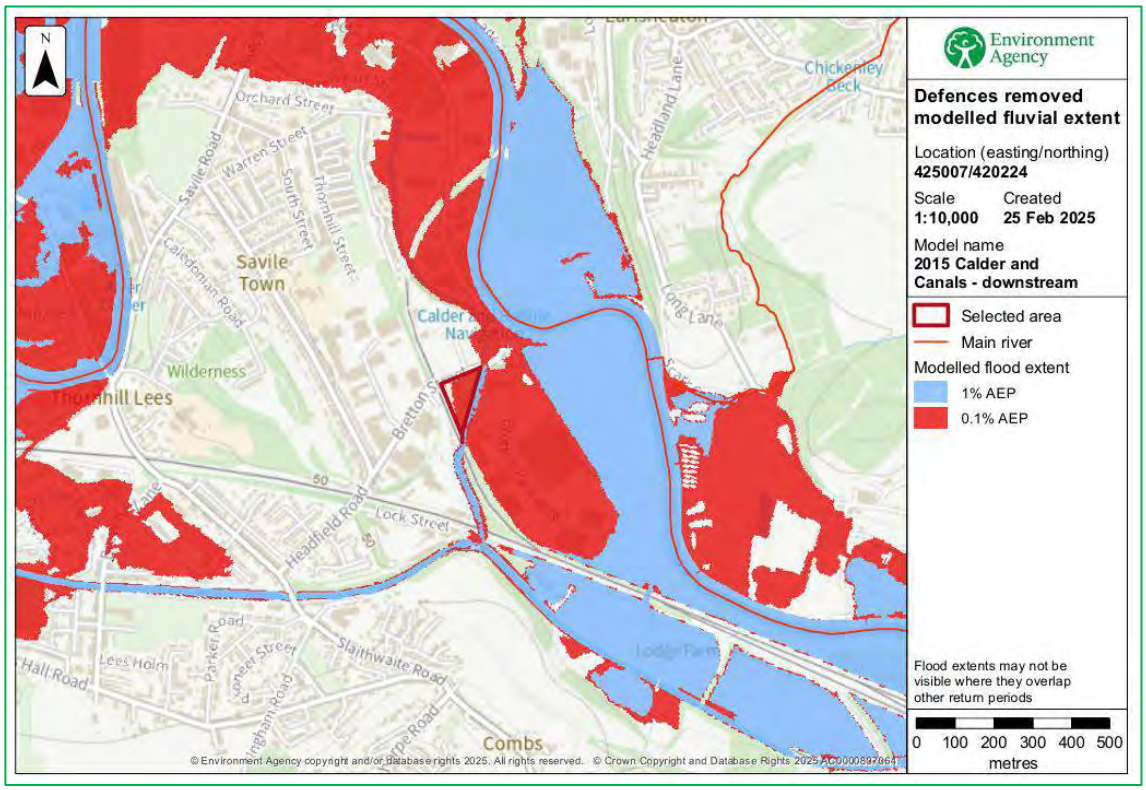


Figure 11 - Environment Agency Undefended Modelled Flood Outlines: 2015 Calder and Canals Downstream Model

Summary

The mechanism for flooding at this location is generally prolonged episodes of high rainfall, which affords good time for flood warnings to be issued. The likelihood of a rapid water level rise and possible rapid inundation of urban areas posing a risk to life is considered to be minimal with a forewarning of two (2) days of a pending flood event.

The distance between the Site and the River Calder would create a small head and the local topography would reduce the impact of flooding at the Site. Any flooding at the Site would result in a 'low' flood hazard with a 'flood zone with shallow flowing water or deep standing water' as per Table 13.1 of the R & D document - Flood Risk Assessment Guidance for New developments FD2320/TR2.

The Site is located within a low risk area where the onset of flooding is very gradual (many hours) as per Flood Risk Assessment Guidance for New Development Phase 2, R&D Technical Report FD2320/TR2. The speed of inundation and rate of floodwater rise would be low.

Flood risk to the Site from fluvial sources can be considered to be limited. Any overbank flow would follow the contours of the surrounding area and would flow away from the Site rather than flowing towards the Site.

Given the scale and nature of the Proposed Development and the size and location of the fluvial flooding sources it has been concluded that fluvial flooding from the River Calder and the Calder & Hebble Navigation poses a low flood risk to the Site and the risk of fluvial flooding is considered to be of medium significance. The risk from flooding will be mitigated by using a number of property level protection measures to manage and reduce the overall flood risk at the Site (see Section 4.0).

3.9 Tidal (Coastal) Flooding

The Site is not located within the vicinity of tidal flooding sources and the risk of tidal flooding is considered to be not significant.

3.10 Groundwater Flooding

Groundwater flooding is defined as the emergence of groundwater at the ground surface or the rising of groundwater into man-made ground under conditions where the normal range of groundwater levels is exceeded.

Groundwater flooding tends to occur sporadically in both location and time. When groundwater flooding does occur, it tends to mostly affect low-lying areas, below surface infrastructure and buildings (for example, tunnels, basements and car parks) underlain by permeable rocks (aquifers). Site ground conditions suggest a low potential for groundwater flooding. Environment Agency data shows that flooding from groundwater is unlikely in this area. The risk of flooding from groundwater flooding is considered to be not significant.

3.11 Surface Water (Pluvial) Flooding

The Site is not situated near to large areas of poor permeability or areas with the geology and/or topography which may result in surface water flooding. The Site surroundings are relatively flat and there are no large catchments that would tend to generate surface water runoff towards the Site. Surface water flow flooding tends to occur sporadically in both location and time such surface water flows would tend to be confined to the streets around the Proposed Development.

The Environment Agency Surface Water flood map shows that for the present day the Site has a very low to low risk of surface water flooding with less than a 1 in 1000 (0.1%) to a 1 in 100 (1%) annual probability of flooding in any year, as shown in Figure 12.

The Environment Agency Surface Water flood map shows that when climate change is taken into account that the Site has a very low to a medium risk of surface water flooding with less than a 1 in 1000 (0.1%) to a 1 in 30 (3.33%) annual probability of flooding in any year between 2040 and 2060, as shown in Figure 13.

The areas shown to be at risk of surface water flooding are associated with low spots on the Site. Therefore it has been concluded that surface water flooding poses a low flood risk to the Site and the risk of surface water flooding is considered to be low significance. The risk from

this source will be further mitigated by using a number of property level protection measures to manage and reduce the overall flood risk at the Site (see Section 4.0).

Figure 12 - Environment Agency Surface Water Flood Map: Present Flooding Extent

Figure 13 - Environment Agency Surface Water Flood Map: Future Flooding Extent (between 2040 and 2060)

3.12 Sewer Flooding

Sewer flooding occurs when urban drainage networks become overwhelmed and maximum capacity is reached. This can occur if there is a blockage in the network causing water to back up behind it or if the sheer volume of water draining into the system is too great to be handled. Sewer flooding tends to occur sporadically in both location and time such flood flows would tend to be confined to the streets around the development.

There are existing sewers located within the vicinity of the Site and these will inevitably have a limited capacity so in extreme conditions there would be surcharges, which may in turn cause flooding. Flood flows could also be generated by burst water mains, but these would tend to

be of a restricted and much lower volume than weather generated events and so can be discounted for the purposes of this assessment.

Given the design parameters normally used for drainage design in recent times and allowing for some deterioration in the performance of the installed systems, which are likely to have been in place for many years, an appropriate flood risk probability from this source could be assumed to have a return period in the order of 1 in 10 to 1 in 20 years. The provision of adequate level difference between the ground floors and adjacent ground level would reduce the annual probability of damage to property from this source to 1 in 100 years or less. Therefore, the risk of flooding from sewer flooding is considered to be not significant.

3.13 Flooding from Artificial Drainage Systems/Infrastructure Failure

The Site is located within the vicinity of reservoirs. The Environment Agency Reservoir Flood Map shows that the Site is at risk of flooding from reservoir failure where there is also flooding from rivers (see Figure 14). This map shows the largest area that might be flooded if a reservoir were to fail and release the water it holds. The Environment Agency Reservoir flood map has been prepared for emergency planning purposes and for this reason they reflect a worst case scenario. Since this is a prediction of a worst case scenario, it's unlikely that any actual flood would be this large.

Reservoir flooding is extremely unlikely; reservoirs in the UK have a very good safety record. There has been no loss of life in the UK from reservoir flooding since 1925. Since then reservoir safety legislation has been introduced to make sure reservoirs are well maintained.

The hazard is well managed through effective legislation and it is unlikely that the impact zone downstream of these reservoirs should not allow the Proposed Development. Reservoir flooding poses a very low flood risk to the Site.

There are no other nearby artificial water bodies, reservoirs, water channels and artificial drainage systems that could be considered a flood risk to the Site. The risk of flooding from artificial drainage systems/infrastructure failure is considered to be not significant.

Figure 14 - Environment Agency Reservoir Flood Map

3.14 The Effect of the Development on Flood Risk

Based on the available information, the Site is currently protected by fluvial flood defences. There is therefore currently no presence of flood flow routes or floodplain storage on Site. The Proposed Development would therefore not result in any impedance of flood flows or displacement of existing floodplain with the existing flood defences to be maintained and improved in the future to further ensure the development is not within an area susceptible to flood flows and floodplain in normal operation.

In the context of a catastrophic failure of existing defences, the built area associated with the development would have no material adverse impact on flood flow routes or floodplain displacement in any case given the significant flooding which would be present in the immediate area in this breach scenario.

3.15 Summary of Site Specific Flood Risk

A summary of the sources of flooding and a review of the risk posed by each source at the Site is shown in Table 8.

Table 8 - Risk Posed by Flooding Sources

Sources of Flooding	Potential Flood Risk	Potential Source	Probability/Significance
Fluvial Flooding	Yes	River Calder and Calder & Hebble Navigation	Medium
Tidal Flooding	No	None Reported	None
Groundwater Flooding	No	None Reported	None
Surface Water Flooding	Yes	Low Spots/Poor Permeability	Low
Sewer Flooding	No	None Reported	None
Flooding from Artificial Drainage Systems/Infrastructure Failure	Yes	Reservoirs	None

The Site is unlikely to flood except in extreme conditions, the primary, but unlikely, flood risk posed to the Site is from fluvial water flooding from the River Calder and the Calder & Hebble Navigation. The fluvial flood posed to the Site is a combination of flooding from the River Calder and the Calder & Hebble Navigation.

The majority of the Site is located within Flood Zone 2 and therefore has a 'medium probability' of flooding, with between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% - 0.1%) in any year. A small proportion of the Site to the north and on the western boundary is located within Flood Zone 1 and therefore has a 'low probability' of flooding with less than a 1 in 1000 annual probability of river flooding in any year (<0.1%). A very small proportion of the Site on the eastern boundary is located within Flood Zone 3 and therefore has a 'high probability' of flooding with a 1 in 100 or greater annual probability of river flooding (>1%) in any year. Flood Zone 3 is located on the very edge of the Site. However, it should be noted that the Site has no history of flooding and the Environment Agency data shows that there are flood defence measures within the vicinity of the Site which have a 1 in 50 SoP.

In the PPG appropriate uses have been identified for the Flood Zones. Applying the Flood Risk Vulnerability Classification in the PPG, the proposed use is classified as 'less vulnerable', 'less vulnerable' uses are appropriate within Flood Zones 1, 2 and 3 after the completion of a satisfactory FRA.

Defended Scenario

The majority of the Site will not be inundated with floodwater for all events up to and including the defended 1 in 100 year (+20%) and 1 in 200 year events. The actual flood risk posed to the majority of the Site is greater than the defended 1 in 100 year (+20%) and 1 in 200 year events as the Site would be flood free during this events. The majority of the Site will be flood free during the defended 1 in 100 year (+23%) event, which is the design flood event for the Site. The only areas which may be inundated with floodwater would be immediately adjacent to the Calder & Hebble Navigation on the eastern boundary of the Site where ground levels are lower. The west of the Site will only be inundated with floodwater during the defended 1 in 1000 year event.

Undefended Scenario

The majority of the Site will not be inundated with floodwater for all events up to and including the undefended 1 in 100 year event. The residual flood risk posed to the majority of the Site is greater than the undefended 1 in 100 year event as the Site would be flood free during this event. The majority of the Site will be flood free during the undefended 1 in 100 year (+23%) event, which is the design flood event for the Site. The only areas which may be inundated with floodwater would be immediately adjacent to the Calder & Hebble Navigation on the eastern boundary of the Site where ground levels are lower. The west of the Site will only be inundated with floodwater during the undefended 1 in 1000 year event.

Summary

The mechanism for flooding at this location is generally prolonged episodes of high rainfall, which affords good time for flood warnings to be issued. The likelihood of a rapid water level rise and possible rapid inundation of urban areas posing a risk to life is considered to be minimal with a forewarning of two (2) days of a pending flood event.

The distance between the Site and the River Calder would create a small head and the local topography would reduce the impact of flooding at the Site. Any flooding at the Site would result in a 'low' flood hazard with a 'flood zone with shallow flowing water or deep standing water' as per Table 13.1 of the R & D document - Flood Risk Assessment Guidance for New developments FD2320/TR2.

The Site is located within a low risk area where the onset of flooding is very gradual (many hours) as per Flood Risk Assessment Guidance for New Development Phase 2, R&D Technical Report FD2320/TR2. The speed of inundation and rate of floodwater rise would be low.

Given the scale and nature of the Proposed Development and the size and location of the fluvial flooding sources it has been concluded that fluvial flooding from the River Calder poses a low flood risk to the Site and the risk of fluvial flooding is considered to be of **medium significance.** A secondary flooding source has been identified which may pose a **low significant** risk to the Site. This is:

- Surface Water Flooding

The risk from all sources will be further mitigated by using a number of property level protection measures to manage and reduce the overall flood risk at the Site (see Section 4.0). The application is for a new, suitable flood-resilient design. The exposure of people and property will be reduced and minimised. The chance of flooding each year is low each year. This takes into account the effect of any flood defences that may be located within the vicinity of the Site as well property level protection measures.

4.0 RISK MANAGEMENT

4.1 Introduction

The flood risk at this location is considered suitable for the Proposed Development within the NPPF. In this flood zone, developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area through the layout and form of the development and the use of flood mitigation measures.

The flooding sources will be mitigated on the Site by using a number of techniques, and mitigation strategies to manage and reduce the overall flood risk at the Site. This will ensure the development will be safe and there is:

- Minimal risk to life;
- Minimal disruption to people living and working in the area;
- Minimal potential damage to property;
- Minimal impact of the Proposed Development on flood risk generally; and;
- Minimal disruption to natural heritage.

The flood risk at the Site will be reduced by mitigation measures; these are discussed in more detail below.

4.2 Sequential Arrangement

The sequential approach has been applied within the Site by locating the most vulnerable elements of the development in the lowest risk areas. The industrial unit will be constructed to the west of the Site where ground levels are higher and flood free during the 1 in 100 (+23%) year event.

4.3 Finished Floor Levels

The industrial unit will be constructed to the west of the Site where ground levels are higher and the finished floor levels will be raised above the existing ground levels. The finished floor levels will therefore be located a minimum of 300mm above the defended 1 in 100 yer (+20%) event water level of 36.15mAOD. The industrial unit will therefore be flood free during the defended and undefended 1 in 100 year (+23%) event, which is the design flood event for the Site.

It is recognised however that owing to limited headroom constraints, massing, planning policy and Building Regulations it is considered impractical to raise the finished floor levels further. Therefore, in order to mitigate against this, it is recommended that the occupants of the Site are sign up to receive flood warnings from the Environment Agency and a Flood Plan to a safe area away from the building during times of flood is developed.

A combination of resistance (proofing) and resilience measures will be included to provide further protection. This is discussed below.

4.4 Flood Resistance Measures

Flood risk can be mitigated through the design of the building. Flood resistance measures are measures that help resist floodwaters entering a property (airbrick covers are an example of a flood resistance measure). Flood resistant measures will be used, including:

- The walls of the building/s will be thick.
- Concrete floors will be used.
- Sealant will be used around external doors and windows.
- All external doors and windows will be constructed from hard wearing materials.
- All windows will be a minimum of 1000mm above the ground level.
- Fit non-return valves/anti flow valves at last point of inspection chamber before connection to existing drains.
- There will be no air bricks.
- Ground levels will slope away from the building.

The above flood resistance measures will prevent/reduce the water entering the building/s. The building construction as well as the entrances will not be watertight and will allow water to pass through and flood the building internally. The entrance will have a degree of resilience against wind loading and driving rain, however, the reveals are do not incorporate water resistant seals or sufficient compression to resist floodwater ingress.

4.5 Flood Resilience Measures

The Flood resilience measures are designed in such a way as to reduce the cost and time required to reinstate the property should it be flooded (tiled floors are an example of a flood resilience measure). The building will be constructed in such a way that although floodwater may enter the building, elements that are damaged by floodwater can be easily repaired or replaced. This is a form of flood resilience. They are suitable as no other measure is practicable.

Robust materials and finishes will be used, including:

- Laying 1 or 2 layers of plasterboards at base of internal studwork construction to ground floors.
- Fixings to be galvanised/stainless steel or copper - no mild steel to be used - cause rust/staining or walls.
- Water resistant render.
- Low permeability paints to be used rather than emulsion - allows walls to dry out quickly.
- Cavities insulated with Polyisocyanurate (PIR) closed cell type insulation (e.g. celotex).
- All electrics wiring, switches, sockets, socket outlets, gas meters etc. to be located a minimum of 450mm above the finished floor level.

4.6 Flood Warning

The Site is located in a flood risk area therefore; the Site will participate in the Environment Agency flood warning telephone service. The Site will register contact details with the Environment Agency' Flood Warnings Service (Floodline 0845 988 1188) in order to receive Flood Warnings. The Environment Agency operate a free flood warning service providing alerts by phone, text or email when flooding is anticipated providing an opportunity for home owners

to take necessary precautions, giving enough time for the building to be safely evacuated and mitigation measures to be put in place.

All occupants/visitors of the Site will be made aware of the Environment Agency Floodline telephone number (Call Floodline on 0345 988 1188 or 0845 988 1188 to get more information) and the three Flood Warning Codes and their meaning. The owner of the Site will carry out the role of Flood Warden for the Site and ensure they have an understanding of the flood mechanisms of the Site and will ensure that the safety of the occupants and visitors will not be compromised.

The Environment Agency uses three Flood Warnings Codes. They can be issued in any order, usually ending with an 'all clear'. They are issued by the Environment Agency through their website and Floodline Warning Service. The flood warning will be passed onto the occupier/visitors of the Site verbally, by telephone and/or in person. It will be ensured that everyone receives the flood warnings when required.

4.7 Flood Plan

A Flood Plan outlining the precautions and actions you should take when a flood event is anticipated to help reduce the impact and damage flooding may cause will be developed. Sensible precautions would include raising electrical items, moving valuable items off the ground or where possible moving them to a higher floor, rolling up carpets and rugs and turning off utilities. In addition, consider what actions you would take should the property need to be evacuated including access and egress routes and preparing a flood kit in advance containing warm clothing, medication, a torch, food and wellingtons.

The Flood Plan is a 'living' document and therefore should be periodically reviewed and updated to provide advice and guidance to occupants in the event of an extreme flood. The Flood Plan will therefore reduce the vulnerability of the occupants to flooding and makes them aware of the mechanisms of flooding at the Site.

Residual Risk

If flooding starts to affect the Site without any pre-warning i.e. in real time (e.g. through a failure of the flood warning delivery) the following actions will be taken:

- Occupants and visitors should consider evacuating the Site.
- If flood levels continue to rise, occupants and visitors are advised to evacuate before safe access is lost. Occupants and visitors should monitor the flood progression and evacuate.

The Flood Warden will monitor flood levels and keep occupants and visitors informed and will decide whether to initiate the Flood Plan. If required a 'safe haven' can also be maintained and may be required in very extreme events if a flood warning has not been received.

4.8 Safe Access and Egress Routes

The NPPF requires that, where required, safe access and escape is available to/from new developments in flood risk areas. Access routes should be such that occupants can safely access and exit buildings in design flood conditions. These routes must also provide the emergency services with access to the development during a flood event and enable flood defence authorities to carry out any necessary duties during the period of flood.

A safe access and egress route, including emergency access can be maintained for vehicles and/or by foot via the Site along Bretton Street to the south west and then south along Headfield Road. The Safe Access and Egress Route shown in Figure 15 indicates the exit route that all people (i.e. occupants and visitors) on the Site should follow once a flood warning has been received. People should make their way to areas outside of the flood zone.

The likelihood of a rapid river level rise and possible rapid inundation of urban areas posing a risk to life is considered to be minimal. In the event of a Flood Warning, vital belongings, including waterproof clothing, necessary medication and essentials will be collected. It should be ensured that all occupiers and visitors to the Site are accounted for, and then exit the Site using the route shown in Figure 15.

Facilities such as community centres, shops etc. are located to the south of the Site which may be used in the event of a flood event. There may also be large areas than those shown in Figure 2 that are flood free located nearer and within the vicinity of the Site.

The Site to the west will be flood free during the defended and undefended 1 in 100 year (+23%) event, which is the design flood event for the Site. Therefore, safe access and egress can be maintained in accordance with the NPPF and Environment Agency Guidance.

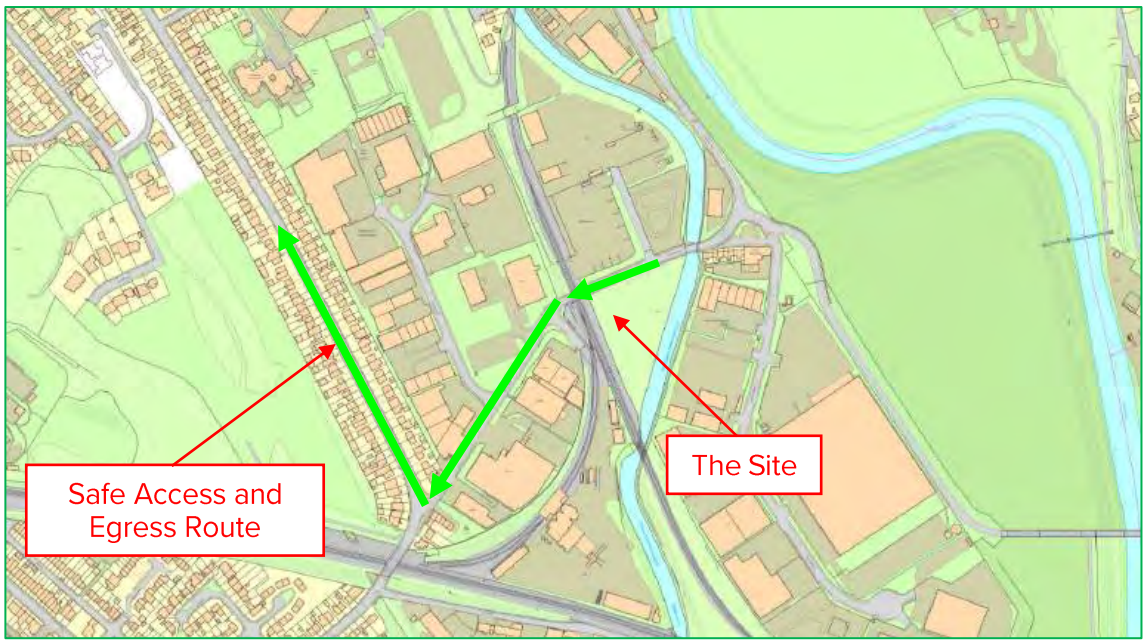


Figure 15 - Safe Access and Egress Routes

4.9 Flood Warning Codes / Flood Evacuation Procedures

In order for the following evacuation procedures to be effective:

- The Site will participate in the Environment Agency flood warning telephone service. The Site will register contact details with the Environment Agency' Flood Warnings Service (Floodline 0345 988 1188) in order to receive Flood Warnings/Alerts.
- The flood warning will be passed onto the visitors of the Site verbally, by telephone and/or in person. It will be ensured that everyone receives the flood warnings when required.

Flood Alert

'Flooding of low-lying land and roads is expected. Be aware, be prepared, watch out!'.

The Environment Agency will issue a Flood Alert status when flooding is possible, based upon weather and river/sea conditions. Be prepared to act on your flood plan. At this stage occupants and visitors should make themselves aware of the Flood Plan and evacuation routes. Prepare a flood kit of essential items. Monitor local water levels and the flood forecast.

Flood Warning

'Flooding of homes and businesses is expected. Act now!'.

The Flood Warning alert will be issued when water levels are rising, and further rain is expected. The Site will be evacuated. Move family, pets and valuables to a safe place.

Safe access and egress, including emergency access can be maintained for vehicles and/or by foot. Water, electricity and gas supplies should be located and switched off before evacuating. The Environment Agency Floodline on 0345 988 1188 to get more information should be contacted to get more information, periodically and listen to and watch for weather and flood warnings on local radio and television stations.

Severe Flood Warning

'Severe Flooding is expected. There is extreme danger life and property. Act now!'.

If the Site has not already been evacuated, it will be evacuated immediately. Co-operate with the emergency services and call 999 if immediately in danger. Safe access and egress, including emergency access can be maintained for vehicles and/or by foot.

Warning No Longer in Force

'Flood Watches or Flood Warnings are no longer in force for this area'.

Occupants and visitors should contact the Council to check that it is safe to return to the Site. Please be careful water may be around for several days. If there is any doubt that appliances may be water damaged, they must be checked before switching the power or gas back on.

Contact your insurance company as soon as possible to get their approval before arranging any clean-up or repairs.

4.10 Flooding Consequences

The mitigation measures detailed above show that the flood risk can be effectively managed and therefore the consequences of flooding are acceptable. The Site is unlikely to flood except in extreme conditions. This takes into account the property level protection measures.

5.0 SUMMARY AND CONCLUSIONS

5.1 Introduction

This report presents a FRA in accordance with the NPPF for the Proposed Development on Land off Bretton Street, Dewsbury.

This FRA identifies and assesses the risks of all forms of flooding to and from the development and demonstrates how these flood risks will be managed so that the development remains safe throughout the lifetime, taking climate change into account.

5.2 Flood Risk

The Site is unlikely to flood except in extreme conditions, the primary, but unlikely, flood risk posed to the Site is from fluvial water flooding from the River Calder and the Calder & Hebble Navigation. The fluvial flood posed to the Site is a combination of flooding from the River Calder and the Calder & Hebble Navigation.

The majority of the Site is located within Flood Zone 2 and therefore has a 'medium probability' of flooding, with between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% - 0.1%) in any year. A small proportion of the Site to the north and on the western boundary is located within Flood Zone 1 and therefore has a 'low probability' of flooding with less than a 1 in 1000 annual probability of river flooding in any year (<0.1%). A very small proportion of the Site on the eastern boundary is located within Flood Zone 3 and therefore has a 'high probability' of flooding with a 1 in 100 or greater annual probability of river flooding (>1%) in any year. Flood Zone 3 is located on the very edge of the Site. However, it should be noted that the Site has no history of flooding and the Environment Agency data shows that there are flood defence measures within the vicinity of the Site which have a 1 in 50 SoP.

In the PPG appropriate uses have been identified for the Flood Zones. Applying the Flood Risk Vulnerability Classification in the PPG, the proposed use is classified as 'less vulnerable', 'less vulnerable' uses are appropriate within Flood Zones 1, 2 and 3 after the completion of a satisfactory FRA.

Defended Scenario

The majority of the Site will not be inundated with floodwater for all events up to and including the defended 1 in 100 year (+20%) and 1 in 200 year events. The actual flood risk posed to the majority of the Site is greater than the defended 1 in 100 year (+20%) and 1 in 200 year events as the Site would be flood free during this events. The majority of the Site will be flood free during the defended 1 in 100 year (+23%) event, which is the design flood event for the Site. The only areas which may be inundated with floodwater would be immediately adjacent to the Calder & Hebble Navigation on the eastern boundary of the Site where ground levels are lower. The west of the Site will only be inundated with floodwater during the defended 1 in 1000 year event.

Undefended Scenario

The majority of the Site will not be inundated with floodwater for all events up to and including the undefended 1 in 100 year event. The residual flood risk posed to the majority of the Site is greater than the undefended 1 in 100 year event as the Site would be flood free during this event. The majority of the Site will be flood free during the undefended 1 in 100 year (+23%) event, which is the design flood event for the Site. The only areas which may be inundated with floodwater would be immediately adjacent to the Calder & Hebble Navigation on the eastern

boundary of the Site where ground levels are lower. The west of the Site will only be inundated with floodwater during the undefended 1 in 1000 year event.

Summary

The mechanism for flooding at this location is generally prolonged episodes of high rainfall, which affords good time for flood warnings to be issued. The likelihood of a rapid water level rise and possible rapid inundation of urban areas posing a risk to life is considered to be minimal with a forewarning of two (2) days of a pending flood event.

The distance between the Site and the River Calder would create a small head and the local topography would reduce the impact of flooding at the Site. Any flooding at the Site would result in a 'low' flood hazard with a 'flood zone with shallow flowing water or deep standing water' as per Table 13.1 of the R & D document - Flood Risk Assessment Guidance for New developments FD2320/TR2.

The Site is located within a low risk area where the onset of flooding is very gradual (many hours) as per Flood Risk Assessment Guidance for New Development Phase 2, R&D Technical Report FD2320/TR2. The speed of inundation and rate of floodwater rise would be low.

Given the scale and nature of the Proposed Development and the size and location of the fluvial flooding sources it has been concluded that fluvial flooding from the River Calder poses a low flood risk to the Site and the risk of fluvial flooding is considered to be of **medium significance.** A secondary flooding source has been identified which may pose a **low significant** risk to the Site. This is:

- Surface Water Flooding

The risk from all sources will be further mitigated by using a number of property level protection measures to manage and reduce the overall flood risk at the Site. The application is for a new, suitable flood-resilient design. The exposure of people and property will be reduced and minimised. The chance of flooding each year is low each year. This takes into account the effect of any flood defences that may be located within the vicinity of the Site as well property level protection measures.

5.3 Risk Management

The flood risk at the Site will be reduced by mitigation measures, discussed below.

Sequential Arrangement: The sequential approach has been applied within the Site by locating the most vulnerable elements of the development in the lowest risk areas. The industrial unit will be constructed to the west of the Site where ground levels are higher and flood free during the 1 in 100 (+23%) year event.

Finished Floor Levels: The industrial unit will be constructed to the west of the Site where ground levels are higher and the finished floor levels will be raised above the existing ground levels. The finished floor levels will therefore be located a minimum of 300mm above the defended 1 in 100 yer (+20%) event water level of 36.15mAOD. The industrial unit will therefore be flood free during the defended and undefended 1 in 100 year (+23%) event, which is the design flood event for the Site.

It is recognised however that owing to limited headroom constraints, massing, planning policy and Building Regulations it is considered impractical to raise the finished floor levels further. Therefore, in order to mitigate against this, it is recommended that the occupants of the Site are sign up to receive flood warnings from the Environment Agency and a Flood Plan to a safe area away from the building during times of flood is developed.

A combination of resistance (proofing) and resilience measures will be included to provide further protection. This is discussed below.

Flood Resistance Measures: Flood resistant measures will be used, including:

- The walls of the building/s will be thick.
- Concrete floors will be used.
- Sealant will be used around external doors and windows.
- All external doors and windows will be constructed from hard wearing materials.
- All windows will be a minimum of 1000mm above the ground level.
- Fit non-return valves/anti flow valves at last point of inspection chamber before connection to existing drains.
- There will be no air bricks.
- Ground levels will slope away from the building.

Flood Resilience Measures: Robust materials and finishes will be used, including:

- Laying 1 or 2 layers of plasterboards at base of internal studwork construction to ground floors.
- Fixings to be galvanised/stainless steel or copper - no mild steel to be used - cause rust/staining or walls.
- Water resistant render.
- Low permeability paints to be used rather than emulsion - allows walls to dry out quickly.
- Cavities insulated with Polyisocyanurate (PIR) closed cell type insulation (e.g. celotex).
- All electrics wiring, switches, sockets, socket outlets, gas meters etc. to be located a minimum of 450mm above the finished floor level.

Flood Warning: The Site is located in a flood risk area therefore; the Site will participate in the Environment Agency flood warning telephone service. The Site will register contact details with the Environment Agency' Flood Warnings Service (Floodline 0845 988 1188) in order to receive Flood Warnings.

Flood Plan: A Flood Plan outlining the precautions and actions you should take when a flood event is anticipated to help reduce the impact and damage flooding may cause will be developed.

Safe Access and Egress Routes: A safe access and egress route, including emergency access can be maintained for vehicles and/or by foot via the Site along Bretton Street to the south west and then south along Headfield Road. The Safe Access and Egress Route indicates the exit route that all people (i.e. occupants and visitors) on the Site should follow once a flood warning has been received. People should make their way to areas outside of the flood zone.

The Site to the west will be flood free during the defended and undefended 1 in 100 year (+23%) event, which is the design flood event for the Site. Therefore, safe access and egress can be maintained in accordance with the NPPF and Environment Agency Guidance

Flood Warning Codes / Flood Evacuation Procedures: The flood evacuation procedures have been developed so that the Site can be safely evacuated. The property will participate in the Environment Agency flood warning telephone service. The Site will register contact details with

the Environment Agency' Flood Warnings Direct Service (Floodline 0345 988 1188) in order to receive Flood Warnings. Flood warning will be passed onto the visitors of the Site verbally, by telephone and/or in person. It will be ensured that everyone receives the flood warnings when required.

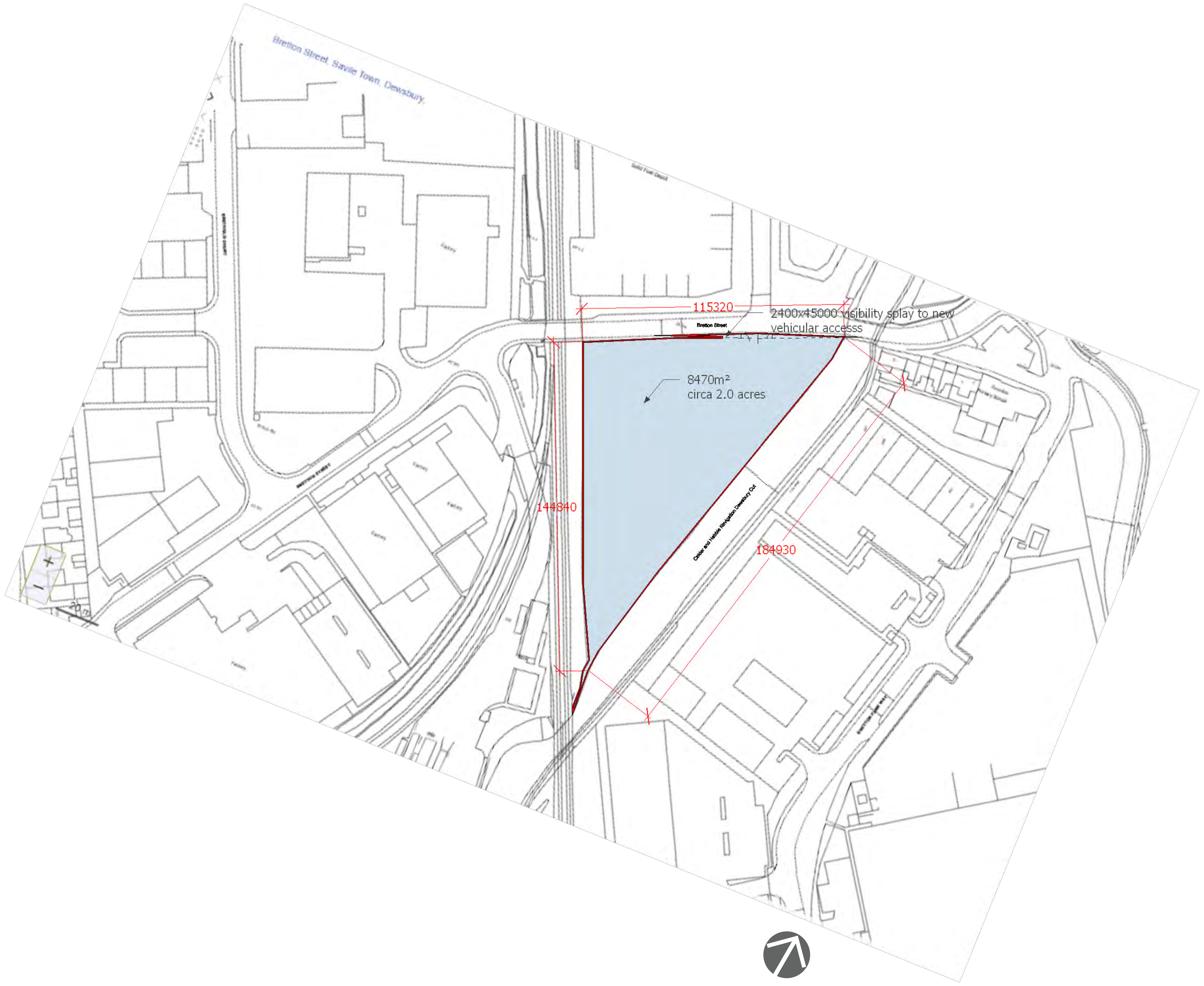
5.4 Conclusion

In conclusion, the Proposed Development, would be expected to remain dry in all but the most extreme conditions. Providing the recommendations made in this FRA are instigated, flood risk from all sources would be minimised, the consequences of flooding are acceptable and the development would be in accordance with the requirements of the NPPF.

This FRA demonstrates that the Proposed Development would be operated with minimal risk from flooding, would not increase flood risk elsewhere and is compliant with the requirements of the NPPF. The development should not therefore be precluded on the grounds of flood risk.

APPENDICES

APPENDIX 1 – Existing and Proposed Site Layout



North 1:1250

Jade3 Architecture Ltd

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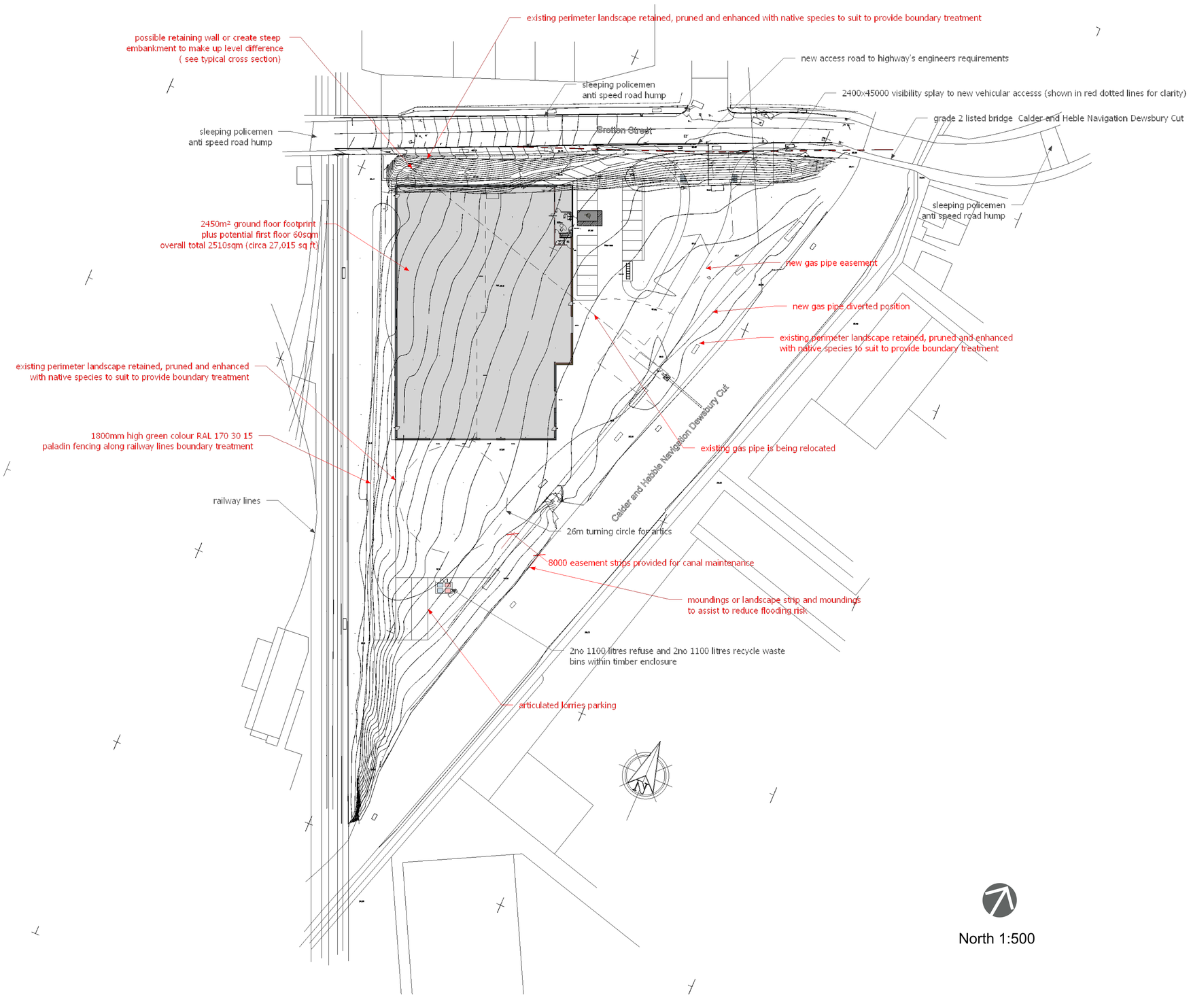
bretton Street
dewsbury

Project No.	Project Title		
2024 Enquiry 51	**existing location red lines small scale**		
Drawn By	Reviewed By	Scale	Date
	MC	**1:1250 @A1 size**	**7/1/2025**
Drawn No.	Reviewed Title		Revision
100			

Important Notice
Do not scale off this drawing. Critical dimensions should be checked on site prior to works commencing. Dimensional conflicts should be brought to the company's attention as soon as they become apparent. Failure to do so could render the contractor liable for subsequent losses. Copyright in this drawing and any work executed from this drawing remians the property of Jade3 Architecture Ltd.



North 1:500

revisions
A 28.3-2025
site access entrance radii updated to highways requirements

B 14-5-2025
site levels added and notes on boundary treatment added

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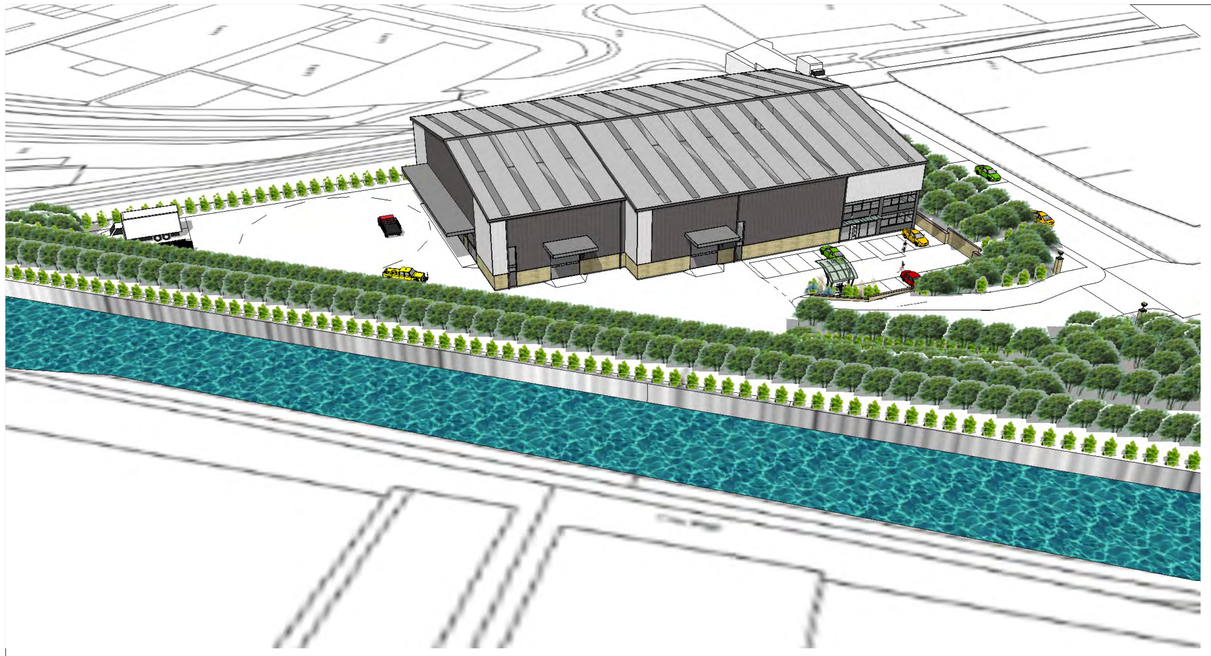
Project No.	Project Title		
2024 Enquiry 51	**proposed site location**		
Drawn By	Reviewed By	Scale	Date
	MC	**1:500 @A1 size**	**7/1/2025**
Drawn No.	Reviewed Title		Revision
102			A



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bretton Street
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Project No.
2024
Enquiry 51

Project Title
proposed aerial views 2

Drawn By

Reviewed By
MC

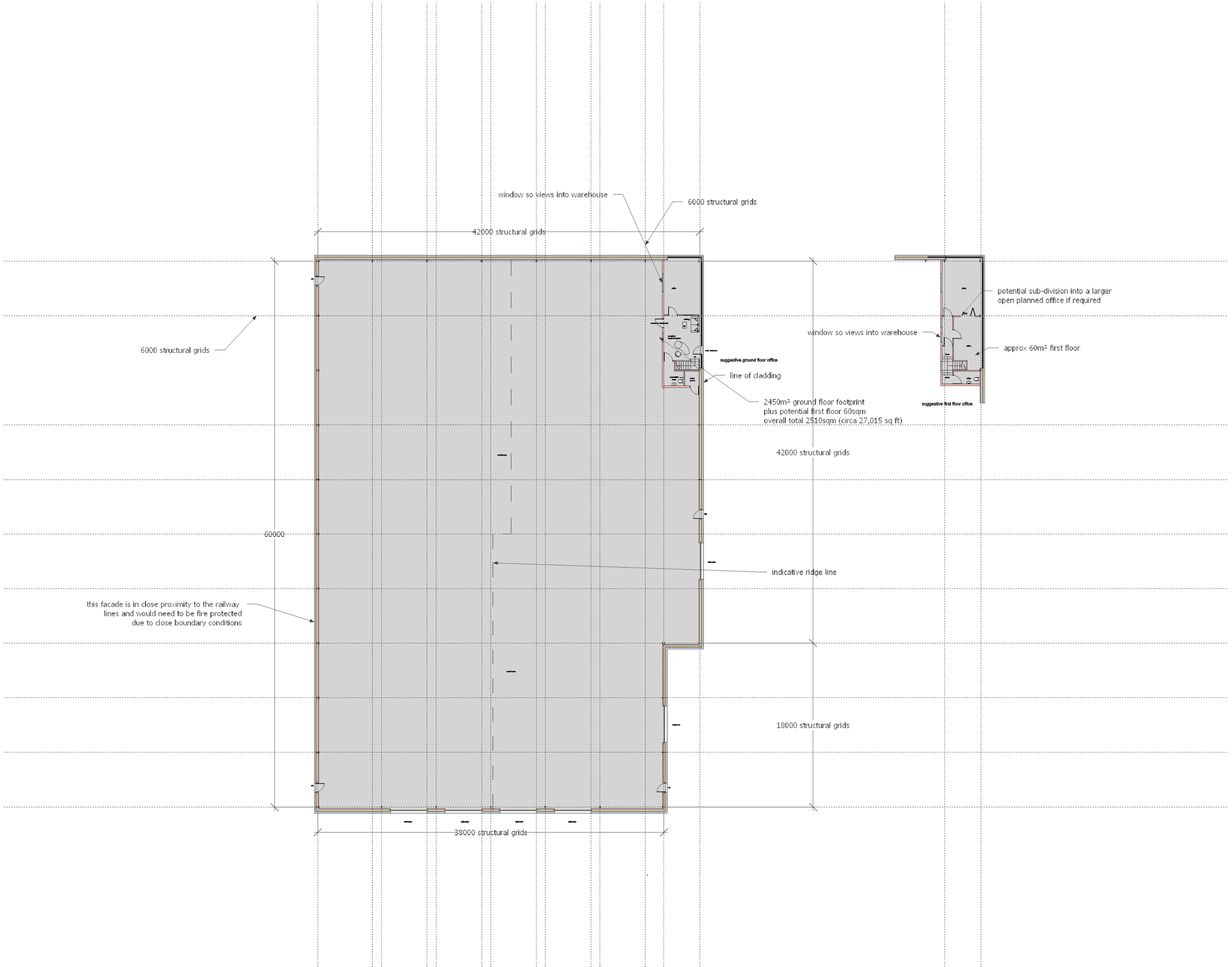
Scale
n/a@A1 size

Date
7/1/2025

Drawn No.
107

Reviewed Title

Revision



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bretton Street
dewsbury

Project No.
2024 Enquiry 51

Project Title
proposed ground and first

Drawn By

Reviewed By
MC

Scale
1:200 @A1 size

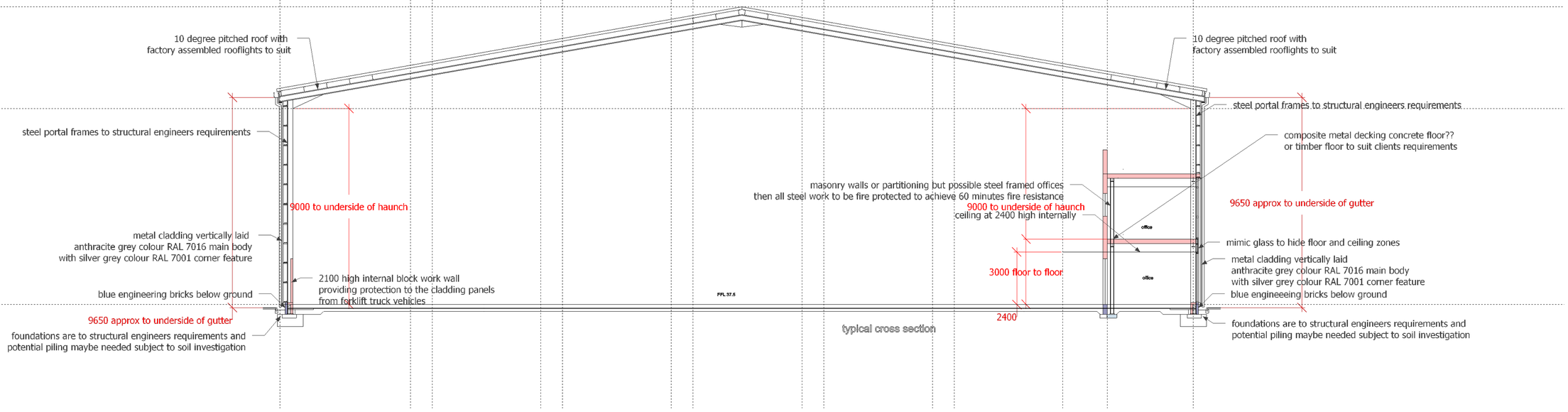
Date
7/1/2025

Drawn No.
103

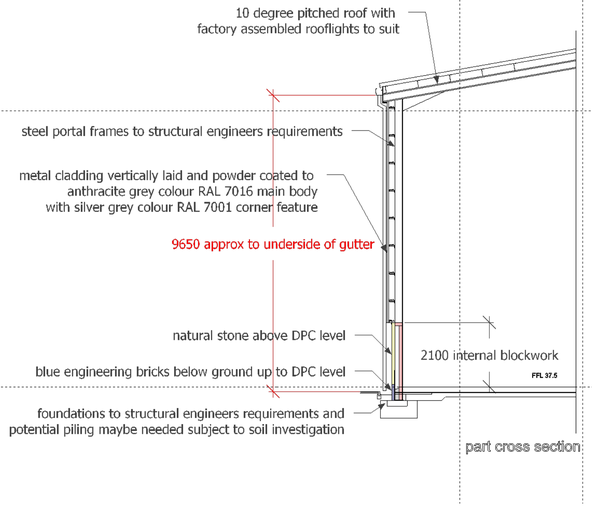
Reviewed Title

Revision

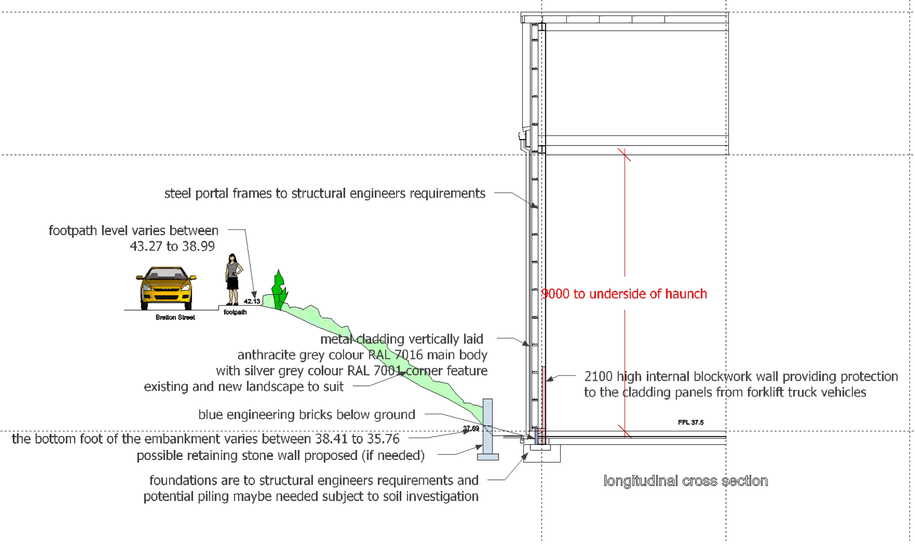
Important Notice
Do not scale from this drawing. Critical dimensions should be checked on site prior to works commencing. Dimensional conflicts should be brought to the company's attention as soon as they become apparent. Failure to do so could render the contractor liable for subsequent losses. Copyright in this drawing and any work executed from this drawing remians the property of Jade3 Architecture Ltd.



typical cross section



part cross section



longitudinal cross section

revisions
A 14-5-2025
Additional section of Bretton street added to longitudinal cross section

Jade3 Architecture Ltd

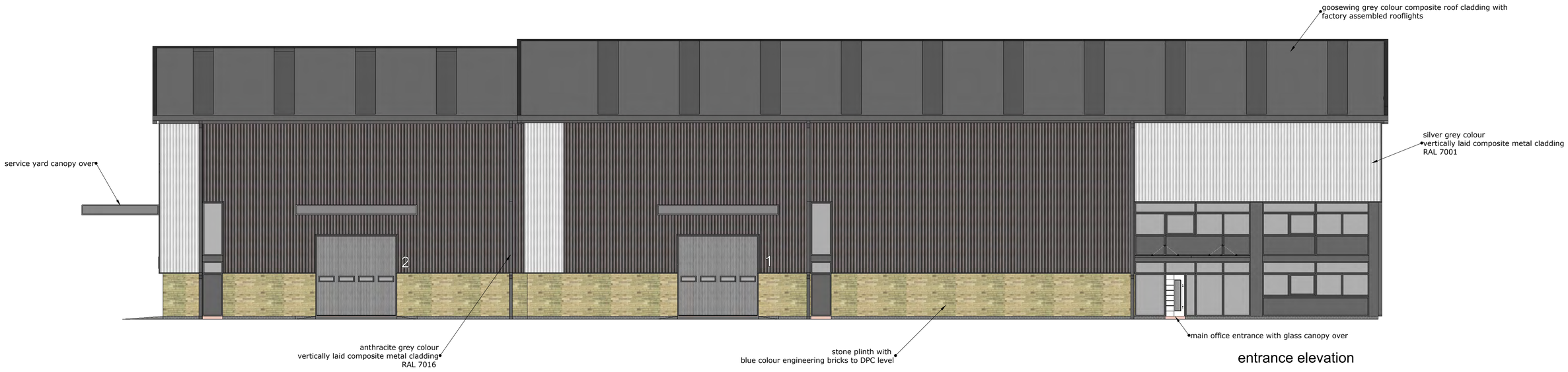
Jade3 Architecture Ltd, Studio 114, Westbourne Road, Huddersfield HD1 4LF
Cellphone. 07939 746097 www.jade3architecture.co.uk

bretton Street
dewsbury

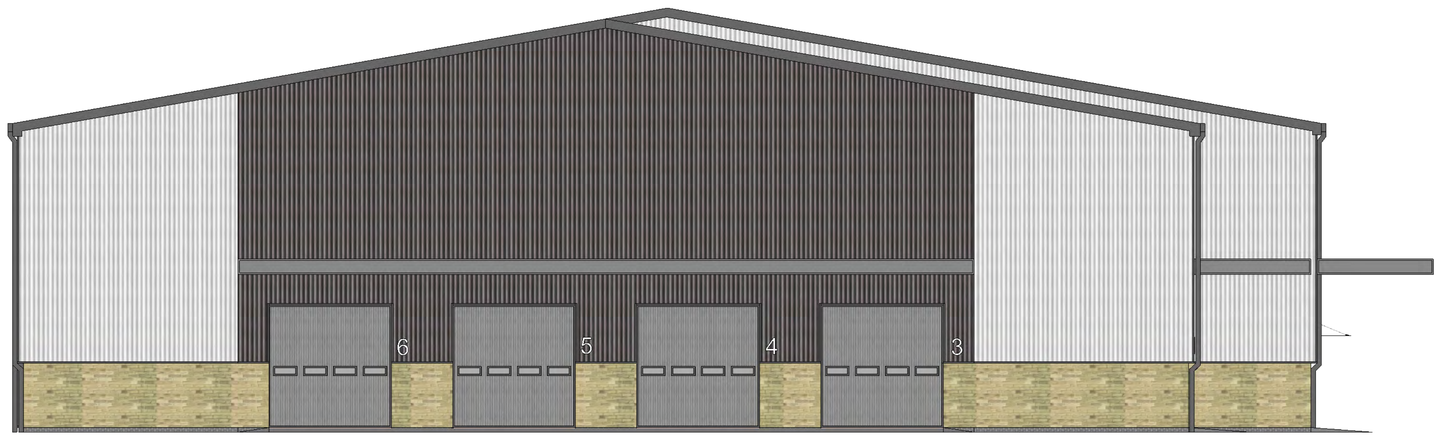
Project No.	Project Title
2024 Enquiry 51	**proposed sections**

Drawn By	Reviewed By	Scale	Date
	MC	**1:100 @A1 size**	**7/1/2025**

Drawn No.	Reviewed Title	Revision
104		**A**



entrance elevation



service yard elevation

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bretton Street
dewsbury

Project No.
2024
Enquiry 51

Project Title
proposed entrance and service yard elevations

Drawn By

Reviewed By
MC

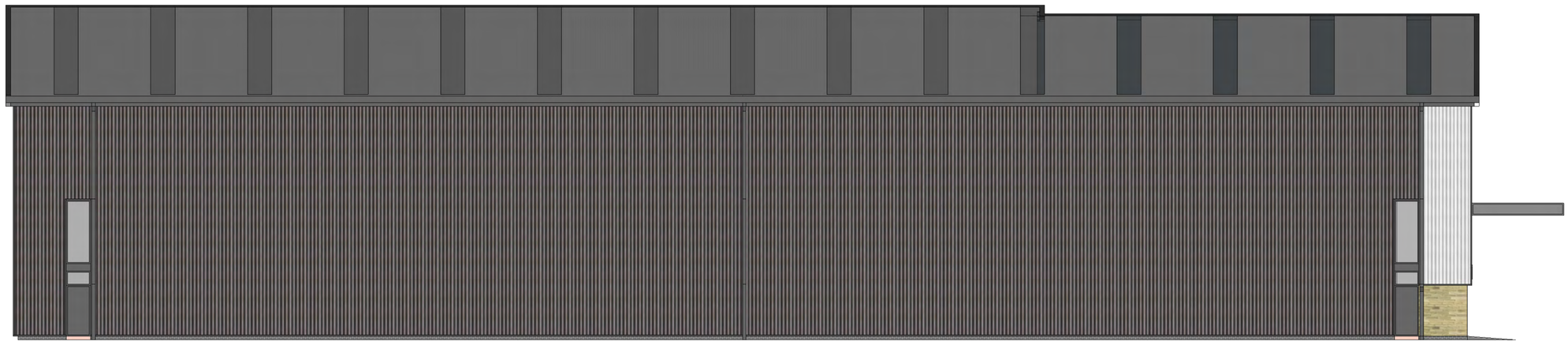
Scale
1:100@A1 size

Date
7/1/2025

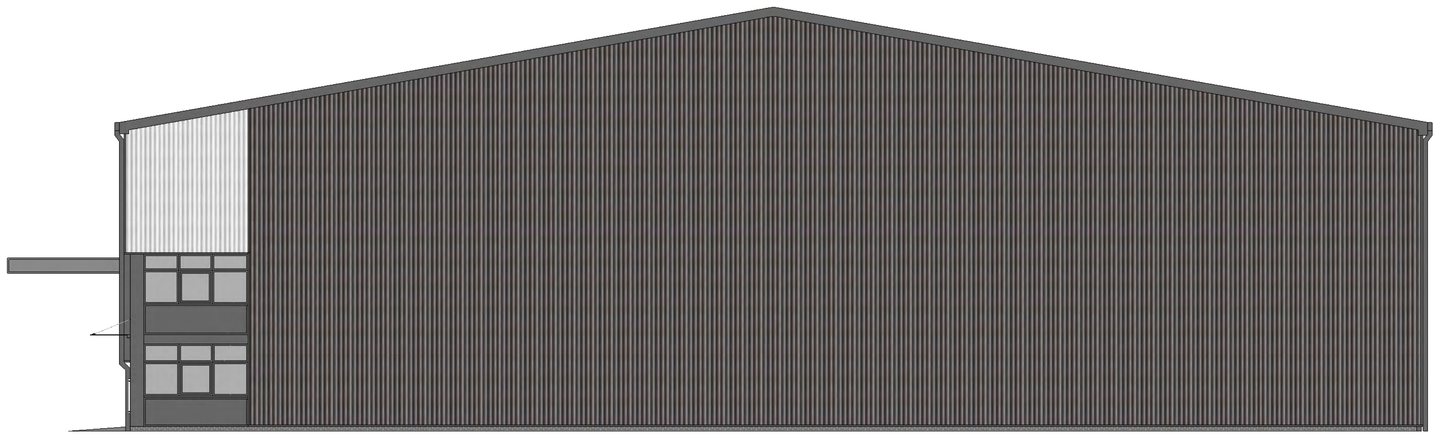
Drawn No.
108

Reviewed Title

Revision



Railway lines elevation



bretton street elevation

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bretton Street
dewsbury

Project No.	Project Title
2024 Enquiry 51	**proposed railway lines and bretton street elevations**

Drawn By	Reviewed By	Scale	Date
	MC	**1:100@A1 size**	**7/1/2025**

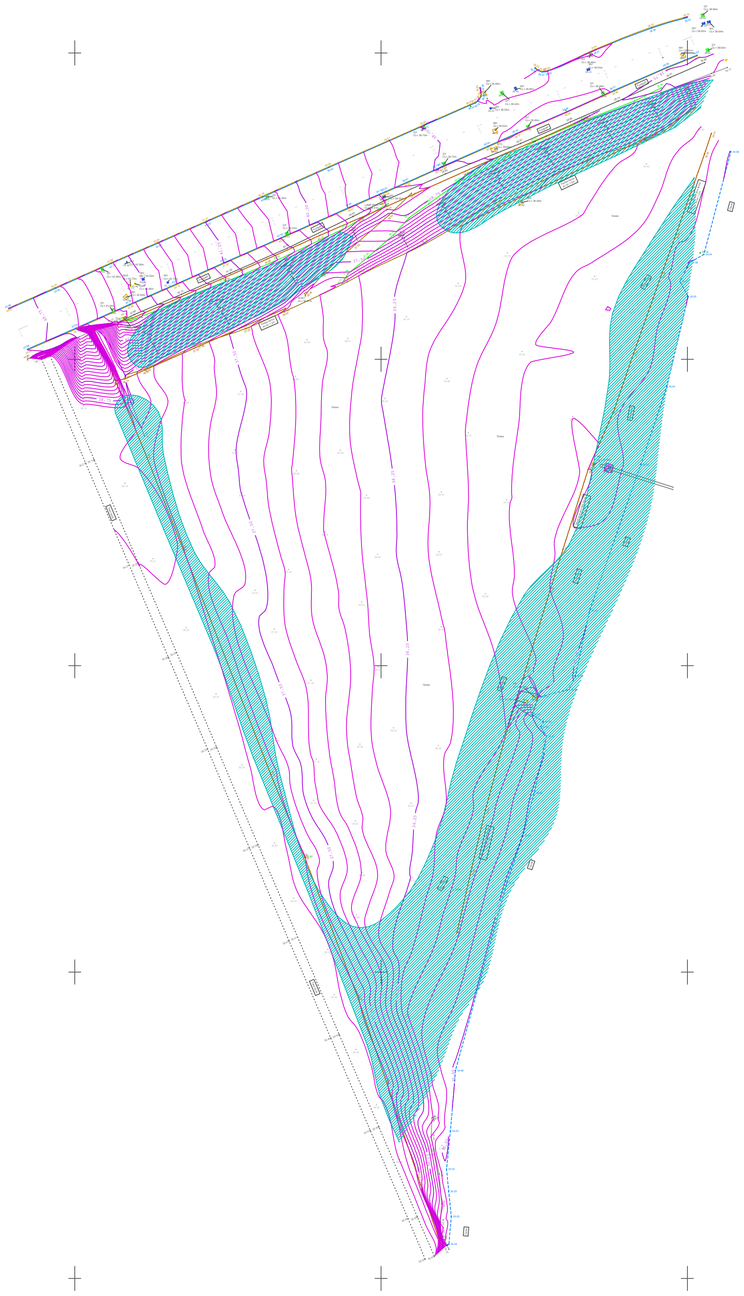
Drawn No.	Reviewed Title	Revision
109		

APPENDIX 2 – Topographical Survey

A Revision

SGS-UAO-001

E423000N

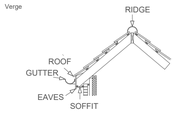


Scale 1:500 — 0 10 20 30 40 50

Features

- Building Line
- Bottom of bank
- British Telecom overhead cable
- Electricity Overhead Cable
- Road Channel
- Cliff Face
- Channel
- Centreline
- Concrete
- Tree Canopy Line
- Change surface
- Kerb Channel
- Kerb Dropped
- Kerb Top
- Manhole Outline
- Manhole Circular
- Manhole Diagonal
- Manhole Rectangular
- Manhole Square
- Manhole Triangular
- Road Gully
- Overhead Cable
- Overhead Wires
- Retaining Wall
- Road
- Road Sign
- Sign Post
- Slope Indicator
- Top of Bank
- Track
- Verge
- Ditch Base
- Ditch Top
- Drain
- Electricity Pylon
- Edge of Footway
- Edge of Grass
- Metal Fence
- Timber Fence
- Fence C/L
- Fence P/R
- Fire Hydrant
- Footpath
- Foundations
- Gate
- Hedge
- Edge of Hedge
- Inspection Cover
- Junction Box
- Wall
- Wall with width
- Edge of water
- Vegetation line
- Edge of roof
- Boundary polygon

Tree



Building position

- Ground level
- Spot level
- RD- Ridge height
- EV- Eave heigh
- MH- Manhole
- GY- Gully
- BO- Bollard
- TOW- Top of wall
- TOT- Top of tree
- TOF- Top of fence
- TOV- Top of vegetation
- TOH- Top of hedge
- DP- Down pipe/ Soil pipe
- GUT- Gutter
- CL- Ceiling Level
- RF- Roof level

ALL SURVEY DATA TO ORDNANCE SURVEY COORDINATES

ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE STATED.

ANY CRITICAL DIMENSIONS AND MEASUREMENTS SHOULD BE BASED ON THE ORIGINAL DIGITAL DATA AND CONFIRMED WITH SGS SURVEYS.
ANY ERRORS SHOULD BE NOTIFIED TO SGS SURVEYS.

NO ATTEMPT HAS BEEN MADE TO ENTER ANY CONFINED SPACES ON THIS SITE. WE HAVE MEASURED INVERT DEPTHS, ESTIMATED PIPE SIZES AND SHOWN THE DIRECTION OF FLOW ONLY WHERE DRAIN RUNS ARE ACTIVE AT THE TIME OF SURVEY. INSPECTION COVERS WHICH WE WERE UNABLE TO LIFT BY MANUAL METHODS ARE DENOTED AS MH (UTL). WE DID NOT QUOTE FOR THE USE OF HYDRAULIC LIFTING EQUIPMENT.

DRAINAGE RUNS BETWEEN INSPECTION COVERS HAVE NOT BEEN INVESTIGATED. ANY SHOWN ARE ESTIMATED AND NOT CONFIRMED. ALL DRAINAGE RUNS SHOULD BE PROVED BY DYE TRACING AND IF NECESSARY BY RADIO DETECTION METHODS PRIOR TO ANY DESIGN WORK. ALL PIPE SIZES AND CONNECTIONS SHOULD ALSO BE CONFIRMED WITH YOUR LOCAL DRAINAGE AUTHORITY PRIOR TO ANY DESIGN WORK.

THERE MAY BE INSPECTION COVERS ON SITE WHICH WERE NOT VISIBLE AT THE TIME OF SURVEY. THEY MAY HAVE BEEN BURIED OR COVERED BY VEGETATION. YOU SHOULD CONSULT YOUR LOCAL DRAINAGE AUTHORITY OR COMMISSION A CCTV DRAINAGE SURVEY TO ENSURE THAT YOU LOCATE ANY MISSING COVERS OR DRAINAGE RUNS.

REV	Date	Created By	Comments
A	04.03.25	GS	First Issue

Scale at A1: 1:500

Project Number: SGS-UAO-001

Drawing Status

- [x] Existing Topographic Survey
- [ ] As Built Survey
- [ ] For Information

SGS SURVEYS LTD

Client: Jade 3 Architecture

Project: Dewsbury road

Title: Topographical Survey

SGS-UAO-001 — A Revision

Sheet Size A1 841 x 594

Plot Date:04 March 2025 Plot Style: Acad.ctb Saved By: Gsmol on 04 March 2025

Plot Scale Check 100mm

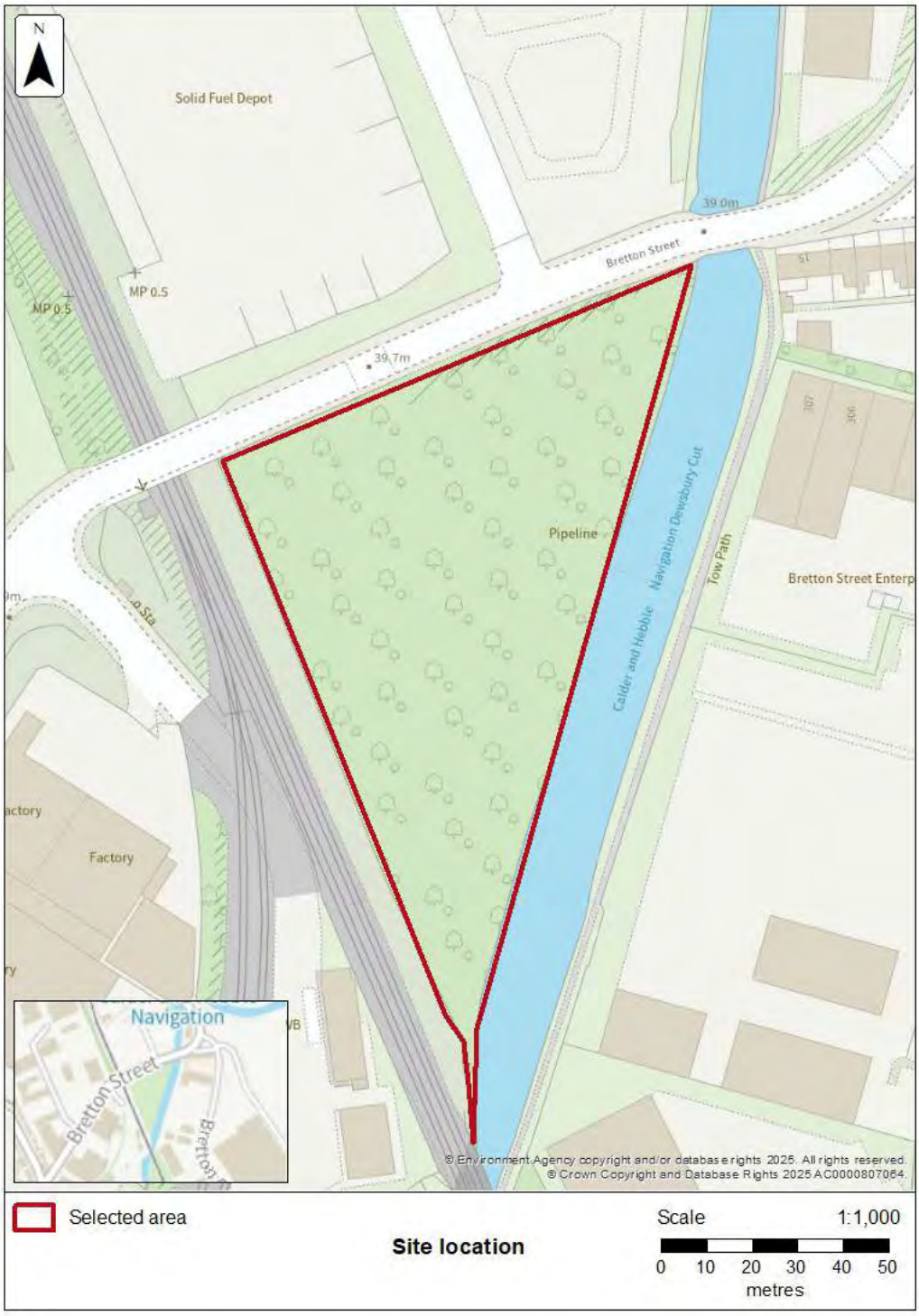
File Path:C:\Users\gsmol\Documents\Clients\250227 Dewsbury\DWG\Topo Survey Rev A.dwg

APPENDIX 3 – Environment Agency Data

Flood risk assessment data

Location of site: 425007 / 420224 (shown as easting and northing coordinates)
Document created on: 25 February 2025
This information was previously known as a product 4.
Customer reference number: 7XDR1B8F7P3P

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



How to use this information

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

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

Included in this document

In this document you'll find:

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

Surface water and other sources of flooding

Use the long term flood risk service to find out about the risk of flooding from:

- surface water
- ordinary watercourses
- reservoirs

Or you can contact your Lead Local Flood Authority for further information.

Your Lead Local Flood Authority is Kirklees District.

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

About the models used

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

Model name: 2015 Batley Beck Mapping Study
Scenario(s): Defended fluvial
Date: 30 November 2015

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

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

These models contain the most relevant data for your area of interest.

Terminology used

Annual exceedance probability (AEP)

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

Metres above ordnance datum (mAOD)

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

Flood map for planning (rivers and the sea)

Your selected location is in flood zone 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

The flood zones are not currently being updated. The last update was in November 2023. Some of the flood zones may have changed, however all source data is included in the models below.

Environment Agency

Flood map for planning

Location (easting/northing)
425007/420224

Scale
1:10,000

Created
25 Feb 2025

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

0 100 200 300 400 500
metres

Past floods

Past flood events included in this document

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

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

Data limitations

The outlines do not include flooding from:

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

Changes to flood defences

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

What the recorded flood outlines dataset is

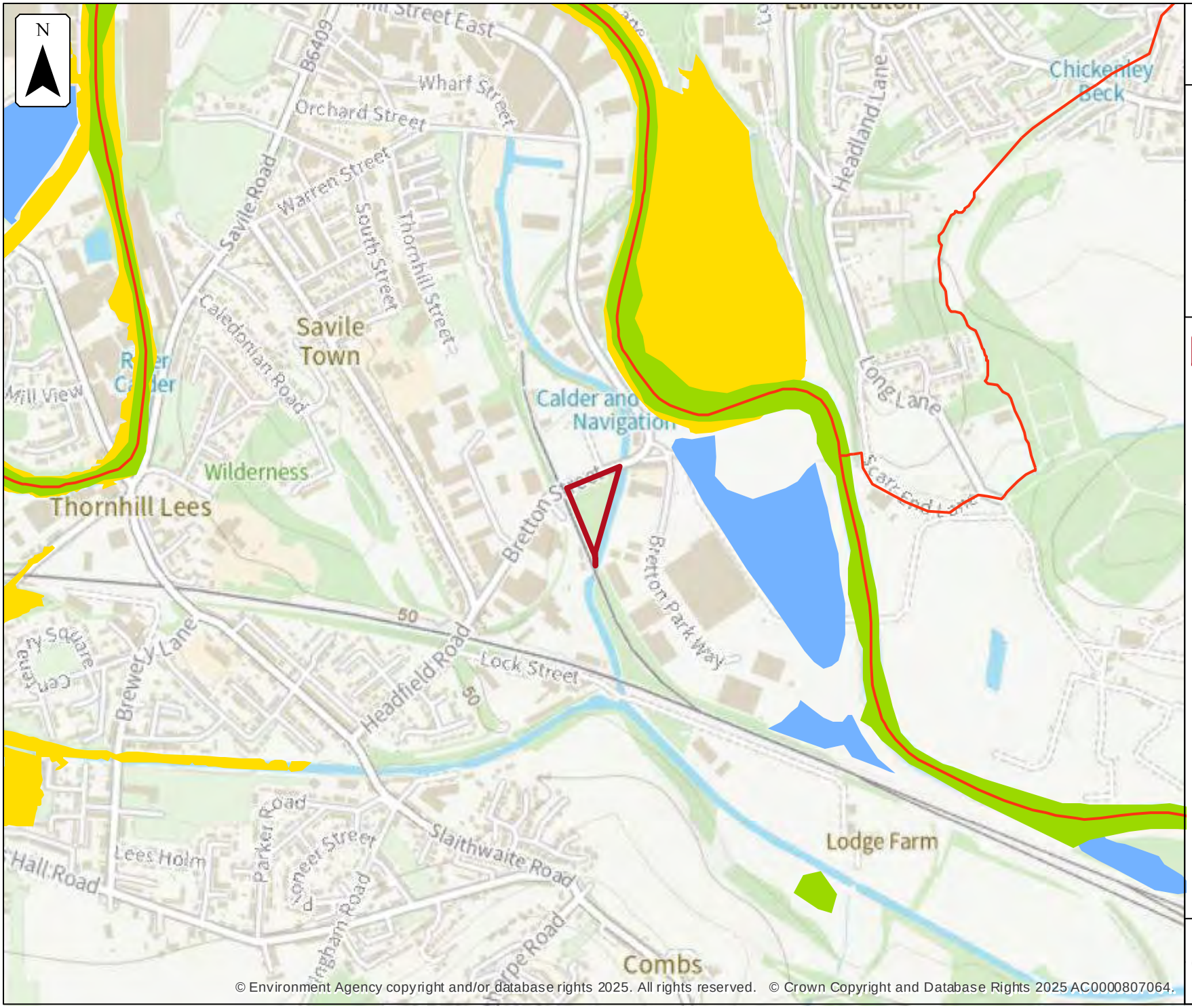
The recorded flood outlines are a geographical information system (GIS) data layer that show our verified records of areas that have flooded in the past from:

- rivers
- the sea
- groundwater
- surface water

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

Get flood information from other organisations

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



Environment Agency

Past floods

Location (easting/northing)
425007/420224

Scale
1:10,000

Created
25 Feb 2025

Selected area

Main river

Date of flood event

February, 2020

December, 2015

February, 2002

0 100 200 300 400 500
metres

Data on past flood events

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

Flood defences and attributes

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

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

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

Use this information:

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

Environment Agency

Flood defences

Location (easting/northing)
425007/420224

Scale
1:2,500

Created
25 Feb 2025

Selected area
Main river
Flood defence

0 25 50 75 100
metres

Flood defences data

Label	Asset ID	Asset Type	Standard of protection (years)	Current condition	Downstream actual crest level (mAOD)	Upstream actual crest level (mAOD)	Effective crest level (mAOD)
1	52235	Embankment	50		36.81	40.20	
2	171516	Embankment	50		35.27	35.23	
3	26923	Embankment	50		35.24	36.80	
4	26922	Embankment	50		35.42	35.24	

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

Modelled data

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

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

Climate change

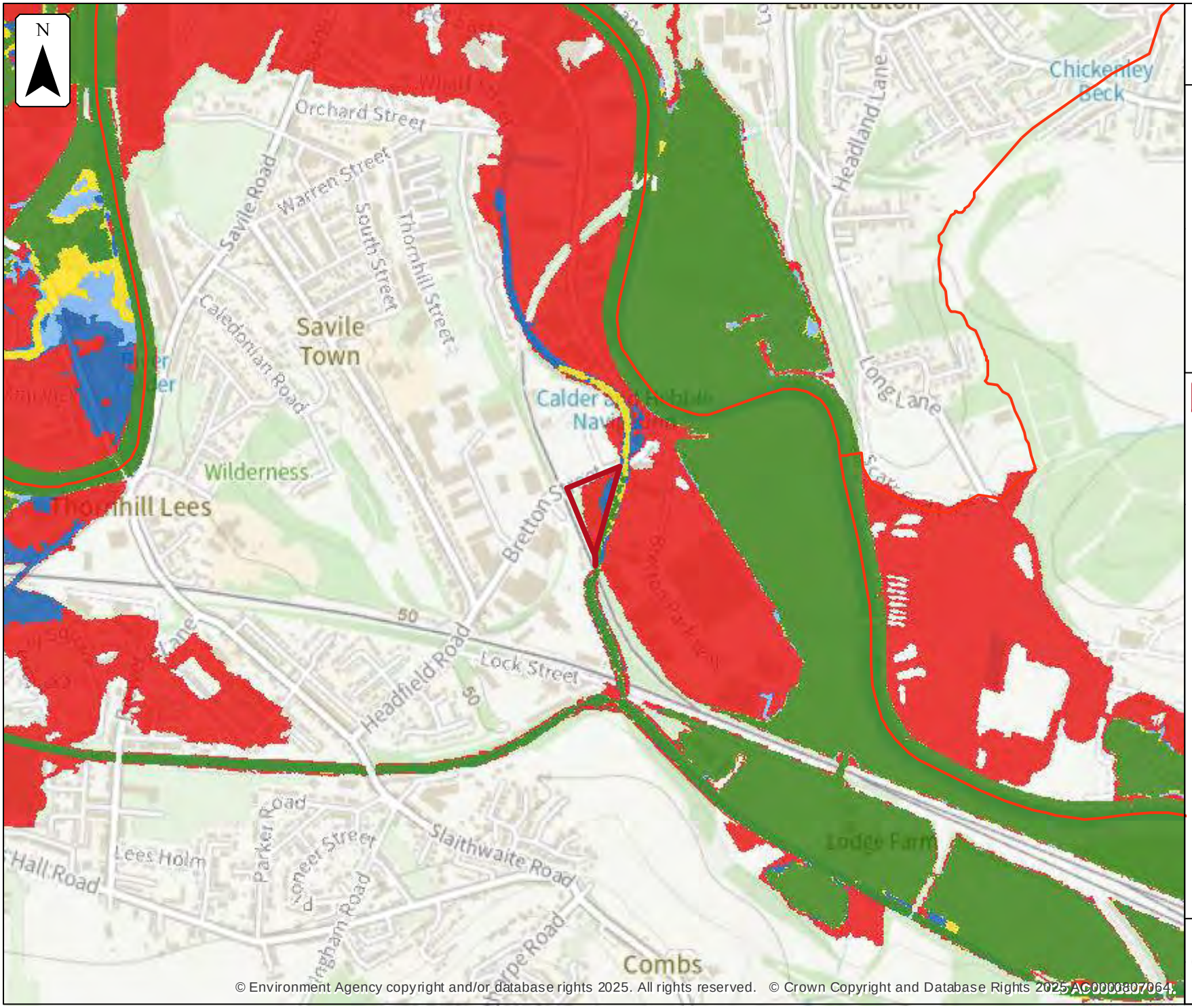
The climate change data included in the models may not include the latest flood risk assessment climate change allowances. Where the new allowances are not available you will need to consider this data and factor in the new allowances to demonstrate the development will be safe from flooding.

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

Modelled scenarios

The following scenarios are included:

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



Environment Agency

Defended modelled fluvial extent

Location (easting/northing)
425007/420224

Scale
1:10,000

Created
25 Feb 2025

Model name
2015 Calder and Canals - downstream

- Selected area
- Main river

Modelled flood extent

- 2% AEP
- 1.33% AEP
- 1% AEP
- 0.5% AEP
- 0.1% AEP

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

0 100 200 300 400 500
metres

Environment Agency

Defended modelled fluvial extent

Location (easting/northing)
425007/420224

Scale
1:10,000

Created
25 Feb 2025

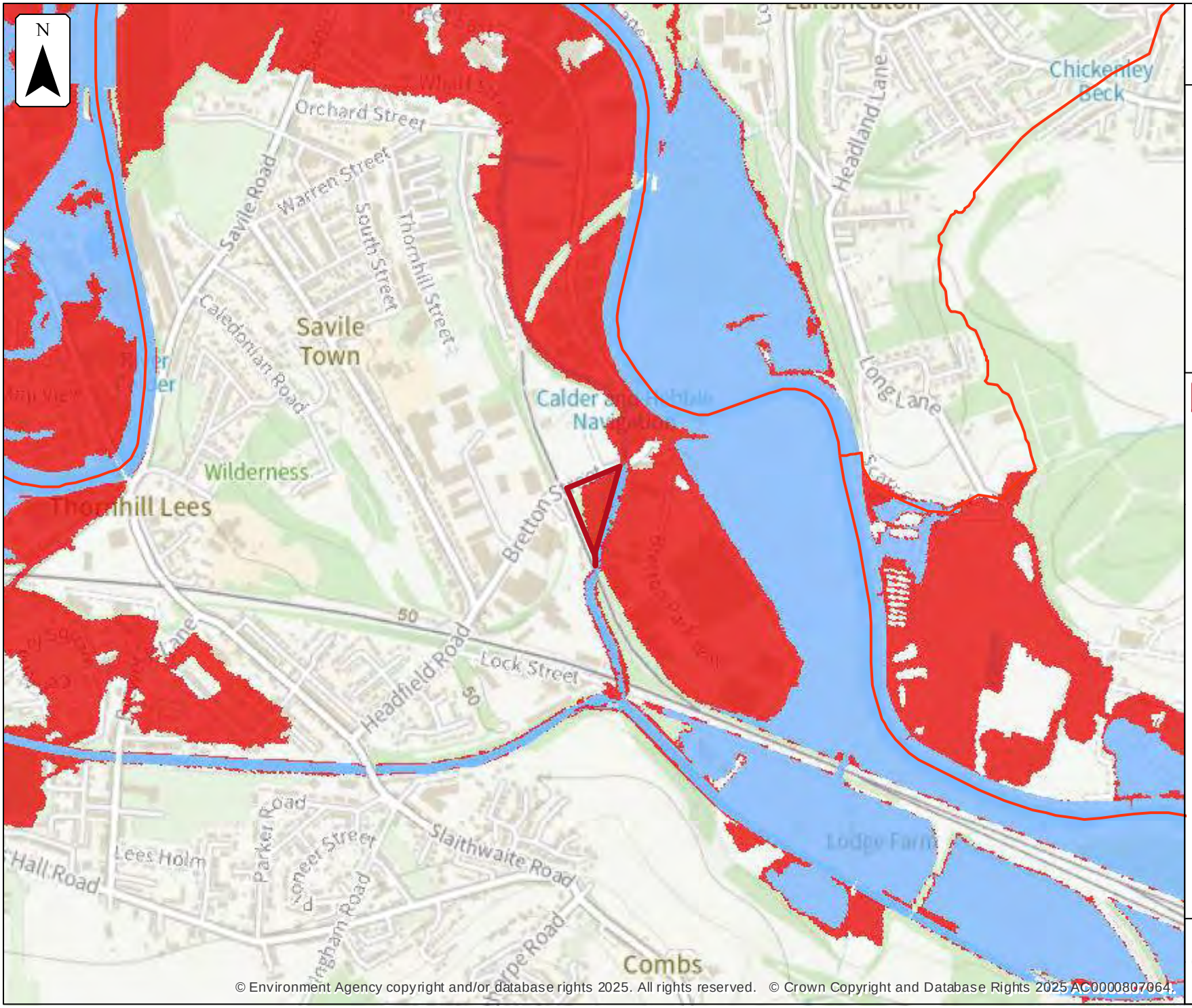
Model name
2015 Batley Beck Mapping Study

- Selected area
- Main river

Modelled flood extent
- 0.1% AEP

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

0 100 200 300 400 500
metres



Environment Agency

Defences removed modelled fluvial extent

Location (easting/northing)
425007/420224

Scale
1:10,000

Created
25 Feb 2025

Model name
2015 Calder and Canals - downstream

Selected area

Main river

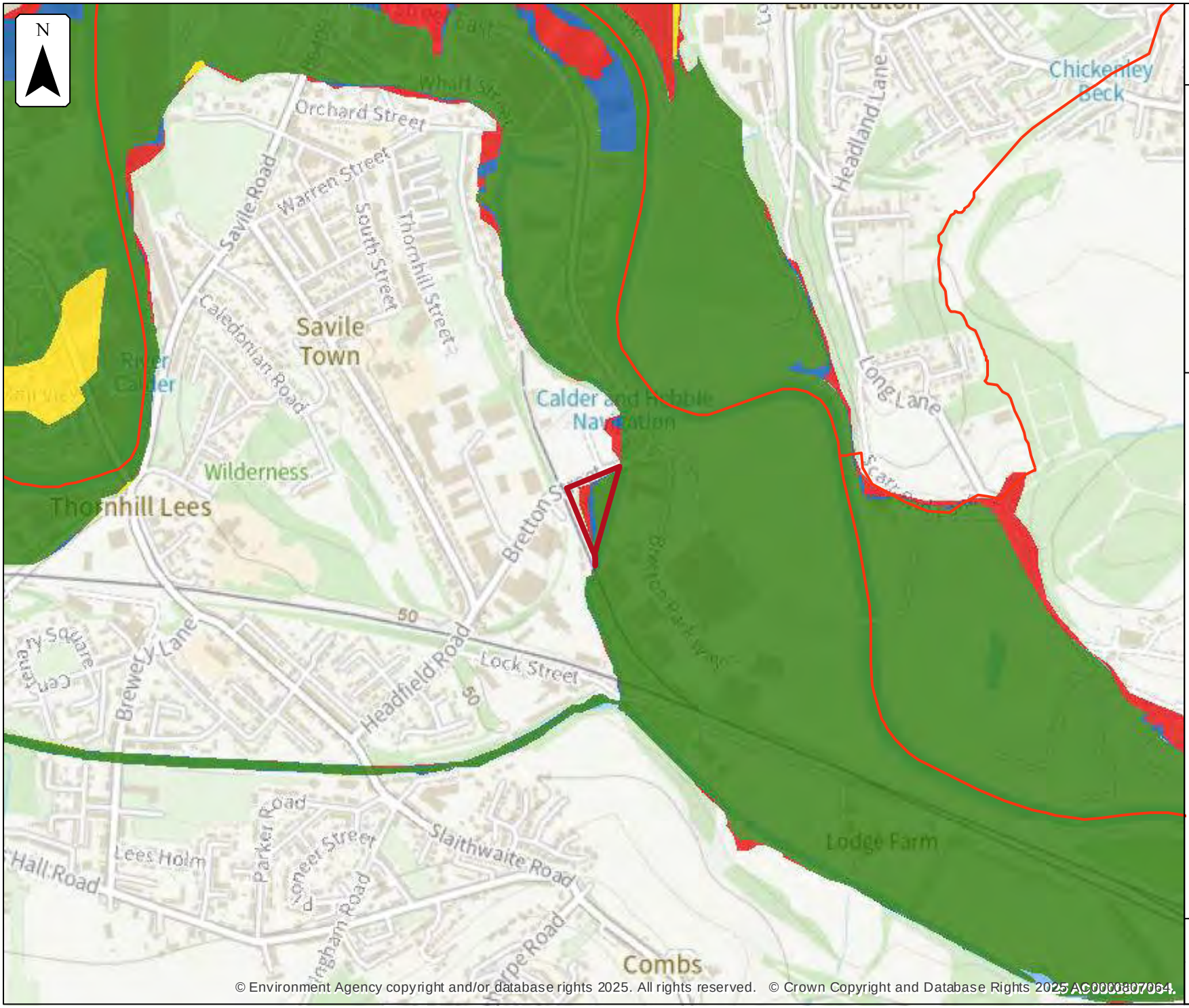
Modelled flood extent

1% AEP

0.1% AEP

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

0 100 200 300 400 500
metres



Environment Agency

Defences removed modelled fluvial extent

Location (easting/northing)
425007/420224

Scale
1:10,000

Created
25 Feb 2025

Model name
2011 River Calder - Calder

- Selected area
- Main river

Modelled flood extent

- 2% AEP
- 1.33% AEP
- 1% AEP
- 0.5% AEP
- 0.1% AEP

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

0 100 200 300 400 500
metres

Environment Agency

No defences exist modelled fluvial extent

Location (easting/northing)
425007/420224

Scale
1:10,000

Created
25 Feb 2025

Model name
Chickenley Beck 2018

- Selected area
- Main river

Modelled flood extent

- 5% AEP
- 2% AEP
- 1.33% AEP
- 1% AEP
- 0.5% AEP
- 0.1% AEP

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

0 100 200 300 400 500
metres

Environment Agency

Defended climate change modelled fluvial extent

Location (easting/northing)
425007/420224

Scale
1:10,000

Created
25 Feb 2025

Model name
2015 Calder and Canals - downstream

Selected area

Main river

Modelled flood extent

1% AEP (+20%)

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

0 100 200 300 400 500
metres

Environment Agency

Defences removed climate change modelled fluvial extent

Location (easting/northing)
425007/420224

Scale
1:10,000

Created
25 Feb 2025

Model name
2011 River Calder - Calder

Selected area

Main river

Modelled flood extent

1% AEP (+20%)

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

0 100 200 300 400 500
metres

Environment Agency

No defences exist climate change modelled fluvial extent

Location (easting/northing)
425007/420224

Scale
1:10,000

Created
25 Feb 2025

Model name
Chickenley Beck 2018

Selected area

Main river

Modelled flood extent

1% AEP (+20%)

1% AEP (+30%)

1% AEP (+50%)

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

0 100 200 300 400 500
metres

Environment Agency

Defended modelled fluvial node locations

Location (easting/northing)
425007/420224

Scale
1:5,000

Created
25 Feb 2025

Model name
2015 Calder and Canals - downstream

Selected area
Modelled location
Main river

0 50 100 150 200 250
metres

Modelled node locations data

Defended

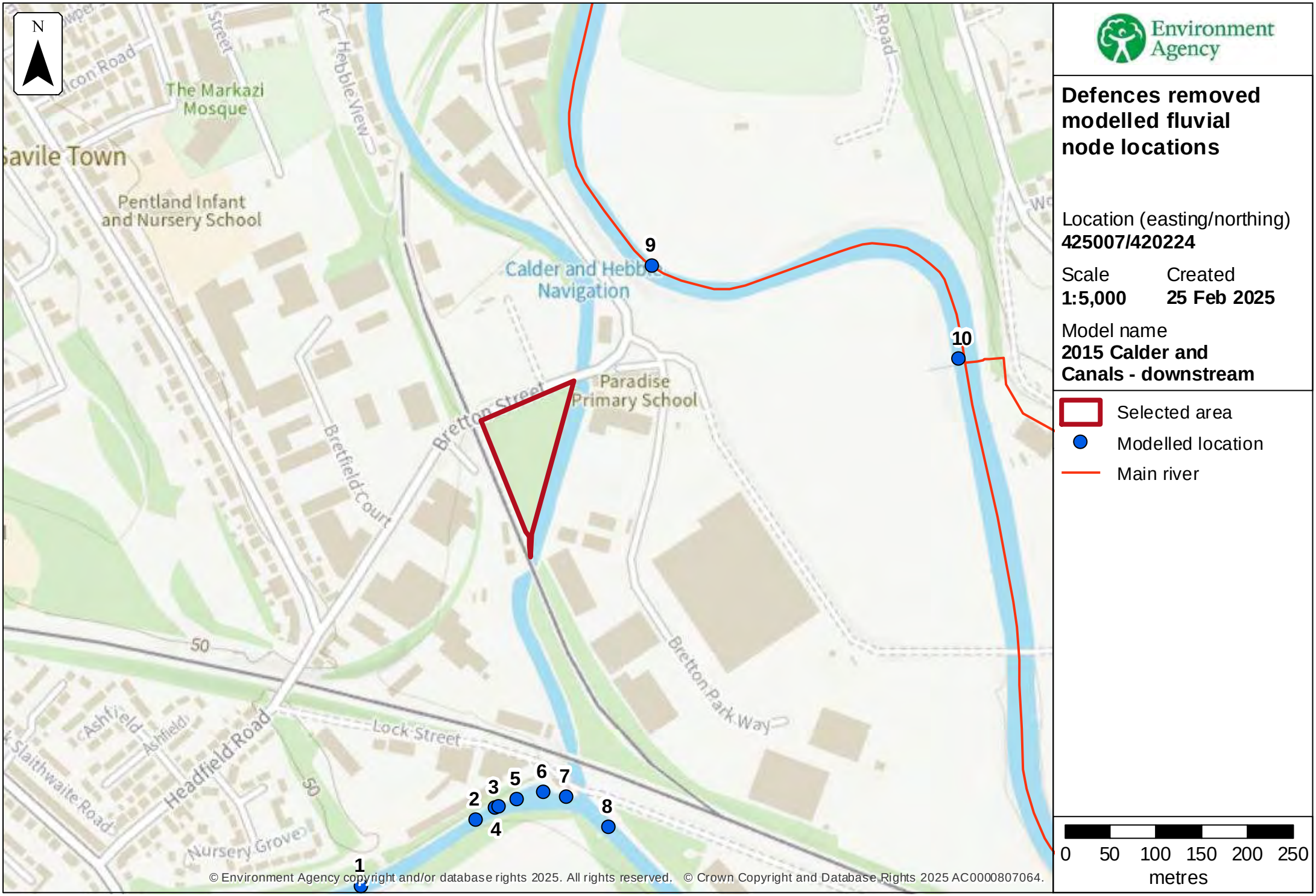
Label	Modelled location ID	Easting	Northing	50% AEP	20% AEP	10% AEP	4% AEP	3.33% AEP	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
				Level	Level	Level	Level	Level	Level	Level	Level	Level	Level
1	1130041	424824	419743	37.83	37.83	37.83	38.0	38.0	38.0	38.0	38.0	38.12	39.68
2	1129984	424950	419816	37.83	37.83	37.83	38.0	38.0	38.0	38.0	38.0	38.12	39.67
3	1129923	424971	419829	37.83	37.83	37.83	38.0	38.0	38.0	38.0	38.0	38.12	39.60
4	1130114	424974	419830	37.28	37.28	37.28	38.0	38.0	38.0	38.0	38.0	38.0	39.50
5	1130044	424994	419839	36.29	36.29	36.29	36.67	36.70	36.74	36.77	36.56	36.87	39.47
6	1129909	425024	419847	36.29	36.29	36.29	36.67	36.70	36.74	36.77	36.56	36.87	39.47
7	1130233	425049	419841	35.58	35.59	35.58	36.50	36.50	36.50	36.50	36.50	36.50	37.97
8	1129920	425095	419808	34.82	34.82	34.82	35.45	35.47	35.52	35.54	35.23	35.62	36.43
9	1130236	425143	420423	34.57	35.21	35.29	35.73	35.76	35.84	35.89	36.30	36.06	37.36
10	1129675	425478	420321	34.28	34.96	35.04	35.52	35.59	35.70	35.77	36.07	35.98	37.14

Data in this table comes from the 2015 Calder and Canals - downstream of Sowerby Bridge model.
Level values are shown in mAOD, and flow values are shown in cubic metres per second.
Any blank cells show where a particular scenario has not been modelled for this location.
If no level or flow data is available for a scenario, no table will be shown.

Defended

Label	Modelled location ID	Easting	Northing	50% AEP	20% AEP	10% AEP	4% AEP	3.33% AEP	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
				Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow
1	1130041	424824	419743	1.66	1.68	1.69	1.81	1.81	1.81	1.81	1.83	1.87	21.44
2	1129984	424950	419816	1.70	1.70	1.70	1.81	1.81	1.81	1.81	1.82	1.87	21.42
3	1129923	424971	419829	1.70	1.70	1.70	1.81	1.81	1.81	1.81	1.81	1.87	19.70
4	1130114	424974	419830	1.28	1.28	1.28	1.34	1.34	1.34	1.34	1.34	1.34	13.83
5	1130044	424994	419839	1.28	1.28	1.28	1.34	1.34	1.34	1.34	1.34	1.34	15.58
6	1129909	425024	419847	1.28	1.28	1.28	1.34	1.34	1.34	1.34	1.34	1.34	15.67
7	1130233	425049	419841	1.28	1.28	1.28	1.34	1.34	1.34	1.34	1.34	1.34	15.44
8	1129920	425095	419808	1.74	1.74	1.74	1.93	1.93	1.93	1.93	1.95	2.17	38.58
9	1130236	425143	420423	232.24	310.47	327.25	380.90	387.89	407.77	419.03	466.02	458.60	643.80
10	1129675	425478	420321	231.71	297.51	309.28	357.80	361.36	367.90	371.34	448.97	378.87	617.29

Data in this table comes from the 2015 Calder and Canals - downstream of Sowerby Bridge model.
Level values are shown in mAOD, and flow values are shown in cubic metres per second.
Any blank cells show where a particular scenario has not been modelled for this location.
If no level or flow data is available for a scenario, no table will be shown.


N
The Markazi Mosque
Savile Town
Pentland Infant and Nursery School
Calder and Hebble Navigation
Paradise Primary School
Bretton Street
Bretfield Court
Bretton Park Way
Lock Street
Headfield Road
Ashfield
Slaithwaite Road
Nursery Grove
Hebble View
50
1
2
3
4
5
6
7
8
9
10
Environment Agency
Defences removed modelled fluvial node locations
Location (easting/northing)
425007/420224
Scale
1:5,000
Created
25 Feb 2025
Model name
2015 Calder and Canals - downstream
Selected area
Modelled location
Main river
0 50 100 150 200 250
metres
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Modelled node locations data

Defences removed

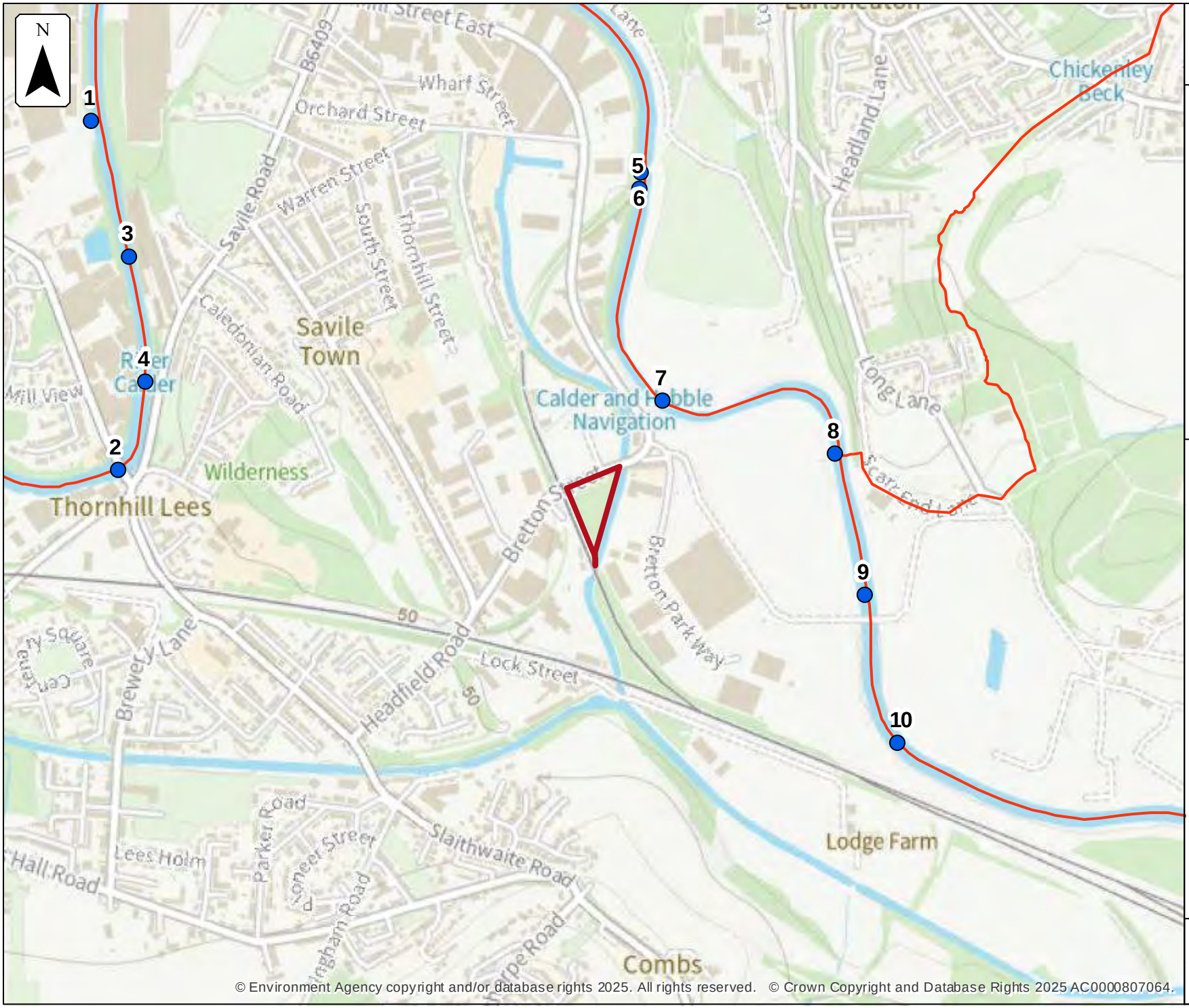
Label	Modelled location ID	Easting	Northing	10% AEP	4% AEP	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
				Level	Level	Level	Level	Level	Level	Level
1	1130041	424824	419743	38.0	38.0	38.0	38.0	38.0	38.01	39.70
2	1129984	424950	419816	38.0	38.0	38.0	38.0	38.0	38.01	39.69
3	1129923	424971	419829	38.0	38.0	38.0	38.0	38.0	38.01	39.62
4	1130114	424974	419830	38.0	38.0	38.0	38.0	38.0	38.0	39.52
5	1130044	424994	419839	36.56	36.56	36.62	36.67	36.56	36.77	39.49
6	1129909	425024	419847	36.56	36.56	36.62	36.67	36.56	36.77	39.49
7	1130233	425049	419841	36.50	36.50	36.50	36.50	36.50	36.50	37.98
8	1129920	425095	419808	35.0	35.23	35.37	35.43	35.0	35.53	36.43
9	1130236	425143	420423	35.25	35.56	35.70	35.77	35.93	35.93	37.35
10	1129675	425478	420321	34.99	35.32	35.50	35.58	35.79	35.78	37.12

Data in this table comes from the 2015 Calder and Canals - downstream of Sowerby Bridge model.
Level values are shown in mAOD, and flow values are shown in cubic metres per second.
Any blank cells show where a particular scenario has not been modelled for this location.
If no level or flow data is available for a scenario, no table will be shown.

Defences removed

Label	Modelled location ID	Easting	Northing	10% AEP	4% AEP	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
				Flow	Flow	Flow	Flow	Flow	Flow	Flow
1	1130041	424824	419743	1.81	1.81	1.81	1.81	1.86	1.81	21.84
2	1129984	424950	419816	1.81	1.81	1.81	1.81	1.85	1.81	21.83
3	1129923	424971	419829	1.81	1.81	1.81	1.81	1.85	1.81	20.07
4	1130114	424974	419830	1.34	1.34	1.34	1.34	1.34	1.34	14.09
5	1130044	424994	419839	1.34	1.34	1.34	1.34	1.34	1.34	15.89
6	1129909	425024	419847	1.34	1.34	1.34	1.34	1.34	1.34	15.98
7	1130233	425049	419841	1.34	1.34	1.34	1.34	1.34	1.34	15.76
8	1129920	425095	419808	1.93	1.93	1.93	1.93	1.94	1.93	39.29
9	1130236	425143	420423	322.65	360.22	378.72	394.92	415.17	424.60	642.82
10	1129675	425478	420321	305.54	347.17	361.36	367.38	384.37	379.39	620.50

Data in this table comes from the 2015 Calder and Canals - downstream of Sowerby Bridge model.
Level values are shown in mAOD, and flow values are shown in cubic metres per second.
Any blank cells show where a particular scenario has not been modelled for this location.
If no level or flow data is available for a scenario, no table will be shown.



Environment Agency

Defences removed modelled fluvial node locations

Location (easting/northing)
425007/420224

Scale
1:10,000

Created
25 Feb 2025

Model name
2011 River Calder - Calder

Selected area
Modelled location
Main river

0 100 200 300 400 500
metres

Modelled node locations data

Defences removed

Label	Modelled location ID	Easting	Northing	10% AEP	4% AEP	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
				Level	Level	Level	Level	Level	Level	Level
1	89252	424027	420968	37.41	37.97	38.34	38.57	38.65	38.84	39.75
2	71600	424079	420289	37.74	37.98	38.12	38.20	38.29	38.52	39.55
3	56457	424103	420703	37.28	37.57	37.74	37.84	37.92	38.17	39.32
4	169494	424133	420462	37.45	37.71	37.87	37.96	38.05	38.30	39.44
5	350256	425097	420837	35.66	35.92	36.07	36.16	36.23	36.40	37.25
6	150896	425100	420869	35.68	35.93	36.08	36.17	36.25	36.42	37.32
7	211188	425143	420423	35.32	35.62	35.81	35.92	36.0	36.18	37.08
8	233424	425478	420321	35.05	35.33	35.51	35.62	35.71	35.93	36.91
9	36263	425537	420045	34.93	35.21	35.40	35.52	35.61	35.82	36.84
10	107468	425599	419757	34.75	35.0	35.16	35.26	35.33	35.51	36.44

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.
If no level or flow data is available for a scenario, no table will be shown.

Defences removed

Label	Modelled location ID	Easting	Northing	10% AEP	4% AEP	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
				Flow	Flow	Flow	Flow	Flow	Flow	Flow
1	89252	424027	420968	48.05	70.29	88.02	99.72	103.61	113.25	163.69
2	71600	424079	420289	287.69	311.49	327.74	337.61	350.90	388.38	634.86
3	56457	424103	420703	286.91	310.89	327.25	337.18	350.55	387.53	644.10
4	169494	424133	420462	287.40	311.25	327.55	337.44	350.75	387.92	634.16
5	350256	425097	420837	335.36	382.16	416.36	438.0	455.73	502.14	799.76
6	150896	425100	420869	335.36	382.16	416.36	438.0	455.73	502.14	799.76
7	211188	425143	420423	333.96	379.98	414.51	435.98	453.88	500.49	795.23
8	233424	425478	420321	333.22	378.66	413.19	434.21	451.91	498.40	791.46
9	36263	425537	420045	332.72	378.25	412.65	433.40	450.91	496.96	789.22
10	107468	425599	419757	332.62	378.22	412.57	433.30	450.78	496.59	788.64

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.
If no level or flow data is available for a scenario, no table will be shown.

Environment Agency

No defences exist modelled fluvial node locations

Location (easting/northing)
425007/420224

Scale
1:7,500

Created
25 Feb 2025

Model name
Chickenley Beck 2018

- Selected area
- Modelled location
- Main river

0 100 200 300
metres

Modelled node locations data

No defences exist

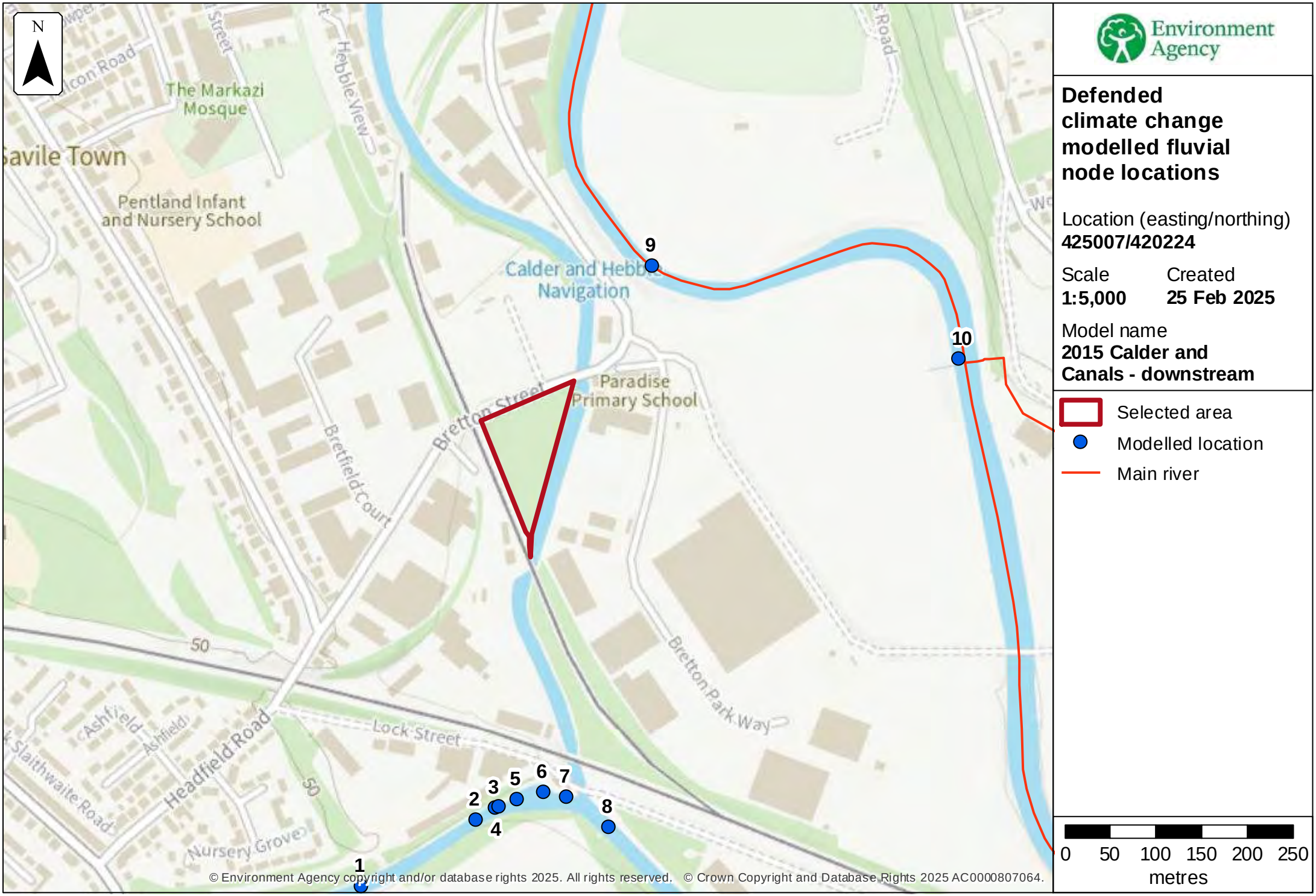
Label	Modelled location ID	Easting	Northing	50% AEP	20% AEP	10% AEP	5% AEP	4% AEP	3.33% AEP	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
				Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level
1	955800	425681	420678	47.45	47.53	47.60	47.65	47.67	47.68	47.71	47.72	47.73	47.77	47.96
2	955867	425681	420721	48.44	48.50	48.54	48.59	48.60	48.61	48.64	48.66	48.66	48.71	48.93
3	955726	425692	420626	46.42	46.48	46.53	46.57	46.58	46.60	46.64	46.66	46.67	46.70	46.92
4	955738	425728	420588	44.72	44.80	44.85	44.90	44.91	44.92	44.96	44.98	45.0	45.05	45.26
5	955743	425744	420564	44.24	44.33	44.40	44.45	44.47	44.49	44.51	44.52	44.53	44.54	44.73
6	955807	425769	420516	43.29	43.37	43.45	43.51	43.52	43.54	43.58	43.60	43.62	43.65	43.88
7	955782	425773	420474	42.42	42.46	42.48	42.49	42.50	42.50	42.51	42.52	42.52	42.54	42.61
8	955763	425806	420239	35.44	35.53	35.60	35.66	35.67	35.68	35.72	35.75	35.77	35.81	36.02
9	955870	425809	420439	40.86	40.90	40.94	40.97	40.98	40.99	41.02	41.04	41.04	41.07	41.23
10	955819	425861	420315	37.27	37.36	37.42	37.47	37.48	37.50	37.56	37.59	37.61	37.65	37.78

Data in this table comes from the Chickenley Beck Model 2018 model.
Level values are shown in mAOD, and flow values are shown in cubic metres per second.
Any blank cells show where a particular scenario has not been modelled for this location.
If no level or flow data is available for a scenario, no table will be shown.

No defences exist

Label	Modelled location ID	Easting	Northing	50% AEP	20% AEP	10% AEP	5% AEP	4% AEP	3.33% AEP	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
				Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow
1	955800	425681	420678	1.28	1.62	1.91	2.17	2.26	2.34	2.58	2.70	2.77	3.09	5.76
2	955867	425681	420721	1.22	1.54	1.81	2.05	2.13	2.21	2.43	2.51	2.57	2.94	5.39
3	955726	425692	420626	1.36	1.73	2.04	2.32	2.42	2.51	2.78	2.92	3.01	3.34	6.19
4	955738	425728	420588	1.42	1.80	2.13	2.42	2.52	2.62	2.91	3.07	3.18	3.53	6.51
5	955743	425744	420564	1.42	1.80	2.13	2.42	2.52	2.62	2.91	3.07	3.18	3.53	6.06
6	955807	425769	420516	1.52	1.94	2.30	2.62	2.73	2.84	3.15	3.36	3.50	3.89	6.44
7	955782	425773	420474	1.52	1.94	2.30	2.61	2.71	2.81	3.11	3.31	3.43	3.79	6.31
8	955763	425806	420239	1.91	2.40	2.85	3.23	3.35	3.50	3.93	4.23	4.45	5.0	7.95
9	955870	425809	420439	1.55	1.98	2.34	2.67	2.78	2.89	3.21	3.43	3.57	3.97	7.23
10	955819	425861	420315	1.59	2.03	2.40	2.74	2.86	2.97	3.31	3.54	3.69	4.11	7.42

Data in this table comes from the Chickenley Beck Model 2018 model.
Level values are shown in mAOD, and flow values are shown in cubic metres per second.
Any blank cells show where a particular scenario has not been modelled for this location.
If no level or flow data is available for a scenario, no table will be shown.


N
The Markazi Mosque
Savile Town
Pentland Infant and Nursery School
Calder and Hebble Navigation
Paradise Primary School
Bretton Street
Bretfield Court
Bretton Park Way
Lock Street
Headfield Road
Ashfield
Slaithwaite Road
Nursery Grove
Hebble View
50
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Environment Agency
Defended climate change modelled fluvial node locations
Location (easting/northing)
425007/420224
Scale
1:5,000
Created
25 Feb 2025
Model name
2015 Calder and Canals - downstream
Selected area
Modelled location
Main river
0 50 100 150 200 250
metres
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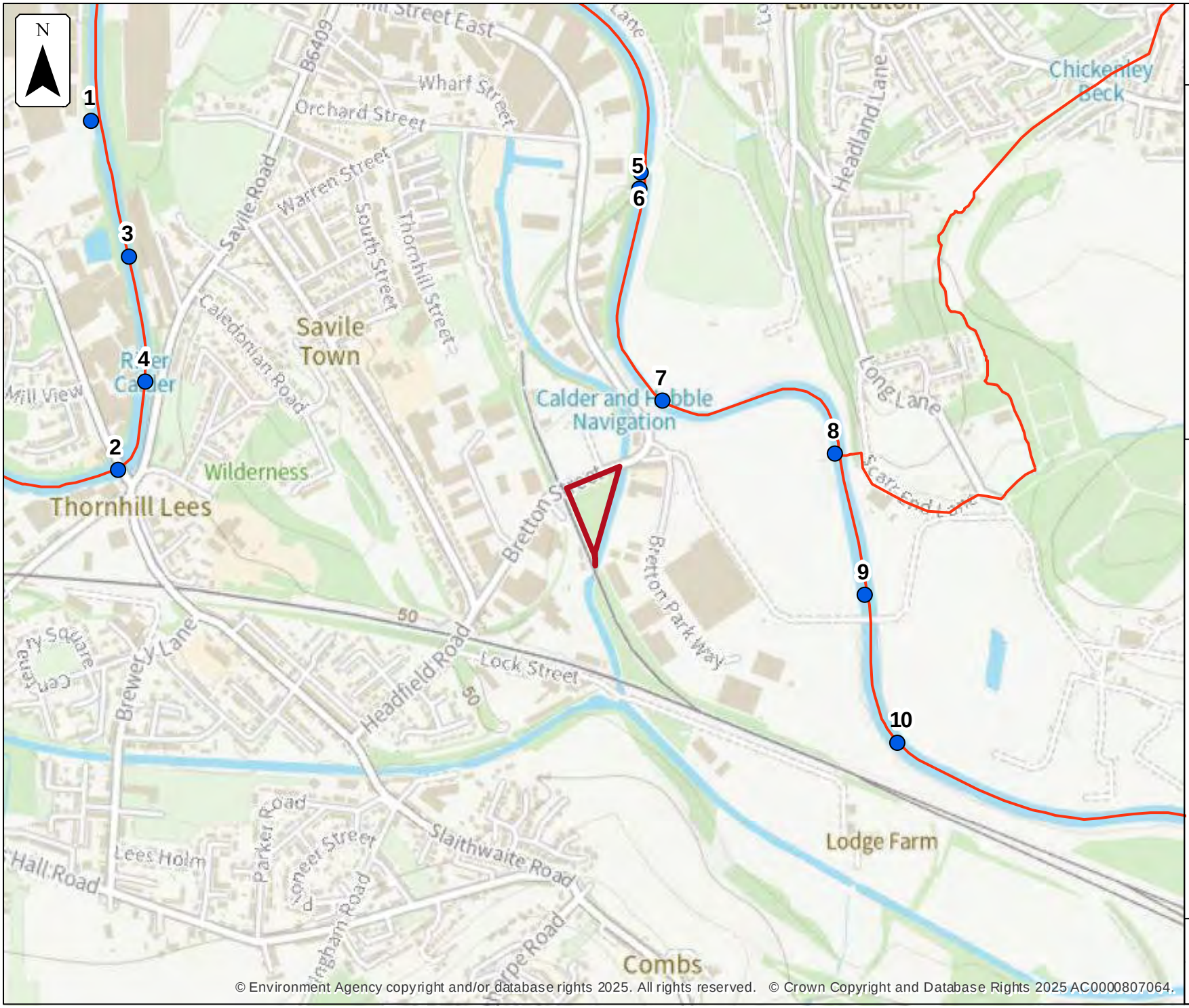
Modelled node locations data

Defended climate change

Label	Modelled location ID	Easting	Northing	1% AEP (+20%)	1% AEP (+20%)
				Level	Flow
1	1130041	424824	419743	38.69	4.21
2	1129984	424950	419816	38.69	4.21
3	1129923	424971	419829	38.68	4.21
4	1130114	424974	419830	38.46	2.13
5	1130044	424994	419839	38.01	2.23
6	1129909	425024	419847	38.02	2.24
7	1130233	425049	419841	37.24	2.12
8	1129920	425095	419808	35.68	3.79
9	1130236	425143	420423	36.15	480.94
10	1129675	425478	420321	36.11	390.0

Data in this table comes from the 2015 Calder and Canals - downstream of Sowerby Bridge model.
Level values are shown in mAOD, and flow values are shown in cubic metres per second.
Any blank cells show where a particular scenario has not been modelled for this location.
If no level or flow data is available for a scenario, no table will be shown.



Environment Agency

Defences removed climate change modelled fluvial node locations

Location (easting/northing)
425007/420224

Scale
1:10,000

Created
25 Feb 2025

Model name
2011 River Calder - Calder

Selected area
Modelled location
Main river

0 100 200 300 400 500
metres

Modelled node locations data

Defences removed climate change

Label	Modelled location ID	Easting	Northing	1% AEP (+20%)	1% AEP (+20%)
				Level	Flow
1	89252	424027	420968	38.96	119.50
2	71600	424079	420289	38.66	415.23
3	56457	424103	420703	38.33	414.42
4	169494	424133	420462	38.45	414.77
5	350256	425097	420837	36.50	535.02
6	150896	425100	420869	36.52	535.02
7	211188	425143	420423	36.29	532.84
8	233424	425478	420321	36.05	530.25
9	36263	425537	420045	35.95	528.56
10	107468	425599	419757	35.62	528.13

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.
If no level or flow data is available for a scenario, no table will be shown.

Environment Agency

No defences exist climate change modelled fluvial node locations

Location (easting/northing)
425007/420224

Scale
1:7,500

Created
25 Feb 2025

Model name
Chickenley Beck 2018

Selected area

Modelled location

Main river

0 100 200 300
metres

Modelled node locations data

No defences exist climate change

Label	Modelled location ID	Easting	Northing	1% AEP (+20%)	1% AEP (+30%)	1% AEP (+50%)	1% AEP (+20%)	1% AEP (+30%)	1% AEP (+50%)
				Level	Level	Level	Flow	Flow	Flow
1	955800	425681	420678	47.76	47.82	47.87	3.06	3.57	4.32
2	955867	425681	420721	48.70	48.75	48.82	2.91	3.38	4.07
3	955726	425692	420626	46.70	46.74	46.81	3.34	3.81	4.66
4	955738	425728	420588	45.05	45.09	45.16	3.53	3.96	4.88
5	955743	425744	420564	44.54	44.57	44.62	3.52	3.92	4.71
6	955807	425769	420516	43.65	43.68	43.76	3.89	4.23	5.14
7	955782	425773	420474	42.54	42.54	42.57	3.79	4.10	4.96
8	955763	425806	420239	35.81	35.84	35.91	4.99	5.26	6.30
9	955870	425809	420439	41.06	41.08	41.14	3.96	4.30	5.37
10	955819	425861	420315	37.65	37.66	37.72	4.10	4.41	5.52

Data in this table comes from the Chickenley Beck Model 2018 model.
Level values are shown in mAOD, and flow values are shown in cubic metres per second.
Any blank cells show where a particular scenario has not been modelled for this location.
If no level or flow data is available for a scenario, no table will be shown.

Environment Agency

Defended modelled fluvial extent and height

Location (easting/northing)
425007/420224

Scale
1:1,000

Created
25 Feb 2025

Model name
2015 Batley Beck Mapping Study

Selected area

Main river

Modelled 2D grid
Water level in mAOD

- 0 - 37.0
- 37.0 - 49.5
- 49.5 - 62.0
- 62.0 - 74.5
- 74.5 - 87.0
- 87.0 - 99.5
- 99.5 - 112.0
- 112.0 - 124.5
- 124.5 - 137.0

This map shows the 0.1% AEP height data

0 10 20 30 40
metres

Sample point data

Defended

Label	Easting	Northing	0.1% AEP	0.1% AEP
			Depth	Height
1	425002	420102	NoData	NoData
2	425002	420127	NoData	NoData
3	425002	420152	NoData	NoData
4	425027	420152	NoData	NoData
5	424977	420177	NoData	NoData
6	425002	420177	NoData	NoData
7	425027	420177	NoData	NoData
8	424977	420202	NoData	NoData
9	425002	420202	NoData	NoData
10	425027	420202	NoData	NoData
11	424952	420227	NoData	NoData
12	424977	420227	NoData	NoData
13	425002	420227	NoData	NoData
14	425027	420227	NoData	NoData
15	425052	420227	NoData	NoData
16	424952	420252	NoData	NoData

Label	Easting	Northing	0.1% AEP	0.1% AEP
			Depth	Height
17	424977	420252	NoData	NoData
18	425002	420252	NoData	NoData
19	425027	420252	NoData	NoData
20	425052	420252	NoData	NoData
21	424977	420277	NoData	NoData
22	425002	420277	NoData	NoData
23	425027	420277	NoData	NoData
24	425052	420277	NoData	NoData
25	425052	420302	NoData	NoData
Max value in selected area:			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.
If no height or depth data is available for a scenario, no table will be shown.
'Max value in selected area' is the deepest depth or highest height at any location within your drawn boundary.

Strategic flood risk assessments

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

This should give you information about:

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

Your Lead Local Flood Authority is Kirklees District.

About this data

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

Flood risk activity permits

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

Find out more about flood risk activity permits

Help and advice

Contact the Yorkshire Environment Agency team at neyorkshire@environment-agency.gov.uk for:

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