



Cellars Clough, Marsden

Flood Risk Assessment and Drainage Strategy

September 2025

PREPARED FOR
CS District Ltd

Flood Risk Assessment and Drainage Strategy

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1. Introduction

This Flood Risk Assessment and Drainage Strategy (FRA) has been prepared on behalf of CS District (the 'Applicant') to support a full planning application for the proposed residential development known as Cellars Clough off Manchester Road, near Marsden, Huddersfield (the 'Site'). The description of the development is as follows:

The development comprises the construction of 75 residential dwellings with associated external car parking and amenity space on a 1.49 hectare site approximately 1km to the east of the village of Marsden, Huddersfield.

This report provides an overview of the nature of flood risk to the Site in accordance with current national, regional and local policy and guidance, in addition to details on how this risk will be mitigated throughout the expected lifetime of the development.

In particular, this FRA shall:

- Provide information on the existing hydrological aspects of the Site and identify any changes to this as a result of the proposed development.
- Provide an assessment of the existing and future risk of flooding to the Site from all sources, accounting for effects of climate change, as well as the impact of proposals on flood risk within its vicinity.
- Outline and summarise the guidance and documentation used to inform the above assessment.
- Propose an outline drainage strategy and further measures to mitigate any residual risks of flooding.

This document is based on currently available information held by Civic Engineers and all comments and conclusions contained within are based upon the assumption that the sourced data is reliable. Civic Engineers accepts no liability for any inaccurate conclusions or assumptions resulting from inaccurate information. Proposals presented in this report represent the design intent and may be subject to alteration or adjustment in finalising the detailed design for this project.

2. Existing Site

2.1. Location and Description

The Site is located off Manchester Road, near Marsden, Huddersfield. A location plan is provided in Figure 1.

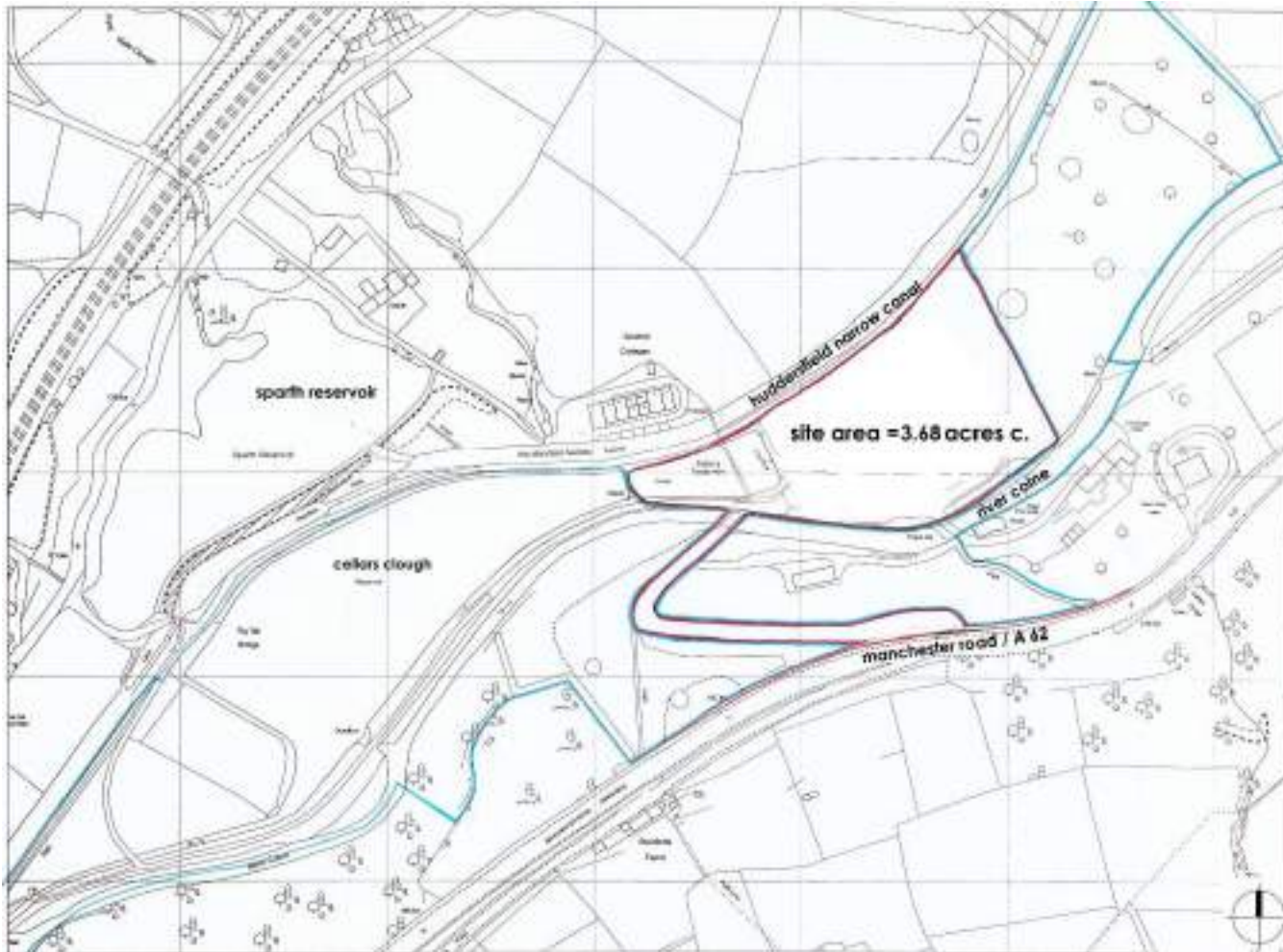


Figure 1: Site location

The nearest post code is HD7 6LY , with the approximate centre of the Site located at National Grid Reference 405831, 412515. The red line boundary encompasses an area of approximately 1.49 hectares.

The existing site generally comprises rough made ground. The site was once a former mill which has been demolished to makeway for a residential development under a previous succesful planning application, foundations for a number of units which were started on site are visible.

The site is bounded to the north by the Huddersfield Narrow Canal tow path, and the River Colne forms the southern boundary. A former mill pond is located to the west which now acts as a fishing pond. The pond comprises 2 no. bays. The larger western bay forms the western site boundary and is currently used as a fishing pond. The smaller eastern bay had been drained down and will form part of the ecological zone and open space for the site.

2.2. Topography

A topographical survey of the Site was conducted by Powers in May 2025 and is provided in Appendix A.

The site levels generally fall in an easterly direction with a typical level of 163m AOD in the west falling to 159m AOD in the east. The tow path to the north of the site has a typical level of 162.5m AOD. The southern boundary is formed by the River Colne with an existing wall, which has a top of wall level varying from 162.7m AOD in the west falling to 159.5m AOD in east. The top of wall level surrounding the former mill pond is approximately 165.5m AOD.

2.3. Geology and Hydrogeology

A Phase 2 intrusive site investigation was undertaken by Enviro Solution Ltd in July 2019 to support the previous planning application and which identified made ground deposits to depths between 0.2m and 3m bgl. The made ground is described as demolition fill material comprising medium dense sandy slightly clayey gravel with frequent cobbles. Beneath the made ground alluvium described a brown/black silty clay was uncovered with a thickness of approximately 1.8m.

The bedrock under the alluvium is described as the Marsden Formation, which comprises two distinct layers. The upper layer consists of weathered sandstone which was recorded to have a maximum thickness of 2.5m, under which the lower part of the formation consists of weathered mud stone.

2.4. Hydrology and Drainage Infrastructure

Water Bodies

The nearest water bodies are the Huddersfield Narrow Canal to the north, and the River Colne which forms the southern boundary.

The Huddersfield Canal has a water levels of approximately 162m AOD, around 2m above the existing site levels. The River Colne levels vary with the topography, falling in an easterly direction. Water levels were generally observed to be between 2-3m below the site level. The main mill pond has a number of flow controls and over flows, and is also connected to the smaller pond which forms part of the development site via a sluice gate.

The smaller mill pond has a sluice inlet into the former mill's turbine, which is connected into the River Colne approximately 200m downstream of the site via a culvert that runs through site.

Foul Drains

Yorkshire Water records have been obtained which indicate that a public combed sewer runs under the River Colne and through the south east corner of the site before heading in an easterly direction. The size and depth of this sewer is unknown. A copy of the sewer records is contained in Appendix B.

3. Proposed Development

An excerpt of the development proposals is shown in shown in Figure 2 below. This drawing is additionally provided in Appendix B.



Figure 2: Proposed Development

The proposals are for the redevelopment of the brownfield site into a residential development comprising 75no. dwellings, with associated car parking and amenity space.

4. Relevant Legislation, Policy and Guidance

This FRA has been produced in accordance with the requirements of the National Planning Policy Framework (NPPF) and Planning Practice Guidance (PPG), as well as the following regional or local policy and documentation:

- Kirklees Local Flood Risk Management Strategy 2024
- Kirklees Local Plan 2019

Particularly relevant aspects of these documents and frameworks are presented below.

4.1. National Planning Policy Framework 2024 & Planning Practice Guidance 2024

The NPPF outlines planning policies within England and provides information on their application. The framework is supported by the PPG, which includes advice on the assessment and management of flood risk during the planning and development process.

With regard to flood risk, the NPPF primarily aims to steer development away from areas with an unacceptable risk of flooding and relocate them in areas deemed more appropriate.

4.1.1. Flood Map for Planning

To support FRAs, the EA’s Flood Map for Planning divides land into Flood Zones, which represent the susceptibility of an area of land to flooding from rivers and seas ignoring the presence of any flood defences. Definitions of each Flood Zone are provided in Table 1.

Figure 3 displays the extent of Flood Zones within the Site. The Site is shown to lie within Flood Zones 1, 2 and 3 and is therefore assessed as having a 1 in 100 (1%) annual probability of flooding from rivers and seas in any given year, without the presence of flood defences.

4.1.2. Sequential Test

A sequential test is one of the primary measures of mitigating flood risk and considers alternative available sites within the vicinity of a proposed development, assessing whether these have a lower risk of flooding than the currently proposed development location with the intention of prioritising development within areas with reduced flood risk.

As the proposed development is in Flood Zone 3 a sequential test is required.

4.1.3. Development Suitability

Where a sequential test has been passed or is not required, a comparison of a site’s flood risk probability and vulnerability, informed by the EA’s Flood Map for Planning and a classification of vulnerability based on land use, determines the suitability of a development within a given location.

Flood Map for Planning

The EA’s Flood Map for Planning divides land into Flood Zones, which represent the susceptibility of an area of land to flooding from rivers and seas ignoring the presence of any flood defences. Definitions of each Flood Zone are provided in Table 1.

Table 1: Reproduction of Table 1 of the Planning Practice Guidance (Flood Risk and Coastal Change), providing definitions of Flood Zones within the Flood Map for Planning.

FLOOD ZONE	DEFINITION
ZONE 1 – LOW PROBABILITY	Land assessed as having a less than 1 in 1000 (<0.1%) annual probability of river or sea flooding in any one year.
ZONE 2 – MEDIUM PROBABILITY	Land assessed as having between 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.
ZONE 3A – HIGH PROBABILITY	Land assessed as having 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.
ZONE 3B – FUNCTIONAL FLOODPLAIN	Land where water from rivers or the sea has to flow or be stored in times of flood. The identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. Functional floodplain will normally comprise: • land having a 1 in 30 (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)

Figure 3 displays the extent of Flood Zones within the Site. The Site is shown to lie within Flood Zones 1, 2 and 3 and is therefore assessed as having a 1 in 100 probability of flooding from rivers and sea.

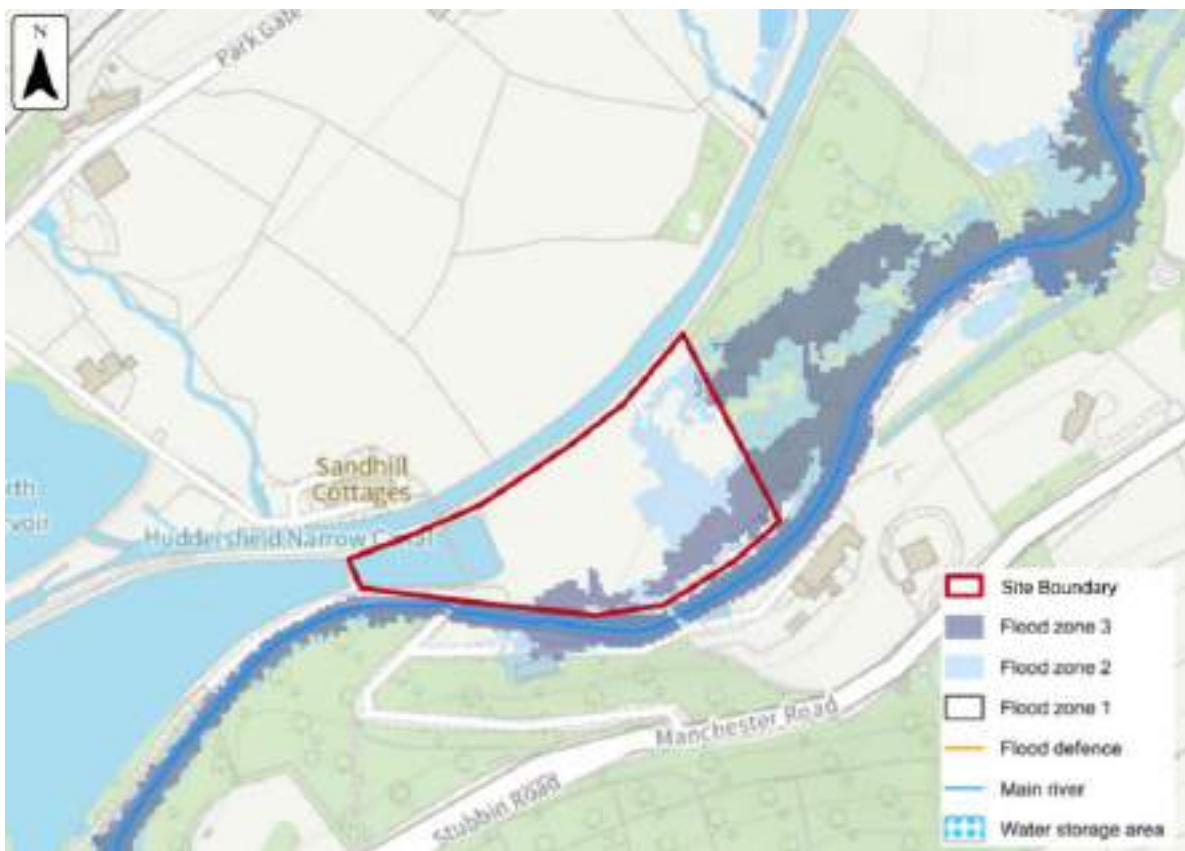


Figure 3: Environment Agency Flood Map for Planning

Flood Vulnerability Classification

The Planning Practice Guidance defines five classifications of flood vulnerability based on development usage: ‘water compatible’, ‘less vulnerable’, ‘more vulnerable’, ‘highly vulnerable’ and ‘essential infrastructure’. Descriptions of developments encompassed by the classifications are provided in Table 3. The development is categorised as more vulnerable based on its planned use.

Assessment

To assess the suitability of a particular development within a given location, is used to compare the proposed development’s flood risk vulnerability with its Flood Zone and defines whether the development is considered appropriate, as well as outlining whether an Exception Test is required. A *More Vulnerable* development within Flood Zone 3 is deemed appropriate(, provided the exception test is passed).

Details of the Sequential Test and Exception Test are outlined in a separate report provided by Zerum.

Table 2: Reproduction of Table 2 of the Planning Practice Guidance (Flood Risk and Coastal Change), showing where development is appropriate based on flood risk vulnerability and Flood Zones.

FLOOD RISK VULNERABILITY CLASSIFICATION		ESSENTIAL INFRASTRUCTURE	HIGHLY VULNERABLE	MORE VULNERABLE	LESS VULNERABLE	WATER COMPATIBLE
FLOOD ZONE	ZONE 1	√	√	√	√	√
	ZONE 2	√	Exception Test Required	√	√	√
	ZONE 3A	Exception Test Required	×	Exception Test Required	√	√
	ZONE 3B	Exception Test Required	×	×	×	√
√ Development is appropriate × Development should not be permitted.						

Table 3: Reproduction of Annex 3 of the National Planning Policy Framework, providing information on flood vulnerability classification.

CLASSIFICATION	DESCRIPTION
ESSENTIAL INFRASTRUCTURE	- Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk. - Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including infrastructure for electricity supply including generation, storage, and distribution systems; including electricity generating power stations, grid and primary substations storage; and water treatment works that need to remain operational in times of flood. - Wind turbines. - Solar farms.
HIGHLY VULNERABLE	- Police and ambulance stations; fire stations and command centres; telecommunications installations required to be operational during flooding. - Emergency dispersal points. - Basement dwellings. - Caravans, mobile homes, and park homes intended for permanent residential use. - Installations requiring hazardous substances consent. (Where there is a demonstrable need to locate such installations for bulk storage of materials with port or other similar facilities, or such installations with energy infrastructure or carbon capture and storage installations, that require coastal or water-side locations, or need to be located in other high flood risk areas, in these instances the facilities should be classified as 'Essential Infrastructure'.)
MORE VULNERABLE	- Hospitals - Residential institutions such as residential care homes, children's homes, social services homes, prisons, and hostels. Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs, and hotels. - Non-residential uses for health services, nurseries, and educational establishments. - Landfill and sites used for waste management facilities for hazardous waste. - Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.
LESS VULNERABLE	- Police, ambulance, and fire stations which are not required to be operational during flooding. - Buildings used for shops; financial, professional, and other services; restaurants, cafes, and hot food takeaways; offices; general industry, storage and distribution; non-residential institutions not included in the 'more vulnerable' class; and assembly and leisure. - Land and buildings used for agriculture and forestry. - Waste treatment (except landfill* and hazardous waste facilities). - Minerals working and processing (except for sand and gravel working). - Water treatment works which do not need to remain operational during times of flood. - Sewage treatment works, if adequate measures to control pollution and manage sewage during flooding events are in place. - Car parks.
WATER-COMPATIBLE DEVELOPMENT	- Flood control infrastructure. - Water transmission infrastructure and pumping stations. - Sewage transmission infrastructure and pumping stations. - Sand and gravel working. - Docks, marinas, and wharves. - Navigation facilities. - Ministry of Defence installations. - Ship building, repairing, and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location. - Water-based recreation (excluding sleeping accommodation). - Lifeguard and coastguard stations. - Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms. - Essential ancillary sleeping or residential accommodation for staff required by uses in this category, subject to a specific warning and evacuation plan.

5. Flood Risk

5.1. Criteria for Assessment

5.1.1. Design Flood

Estimation of probable flood levels across the Site following a flood event is based on the 'design flood'. This is considered to be the following flood events with associated annual probabilities:

- River flooding with an annual probability of 1 in 100 (1%) in any given year.
- Tidal flooding with an annual probability of 1 in 200 (0.5%) in any given year.
- Surface water flooding with an annual probability of 1 in 100 (1%) in any given year.

The above events should include an allowance for climate change, as discussed in Section 5.1.2

As the Site is located in Flood Zone 1, 2 and 3, the design flood is considered to be the 1 in 100 year fluvial flood event (incorporating the relevant climate change allowance).

5.1.2. Climate Change Allowances

To account for changes to peak river flow, peak rainfall intensity, sea level rise, offshore wind speed and extreme wave height as a result of climate change, the EA publishes climate change allowances to enable future flood risk to sites to be assessed and to facilitate resilient design of developments.

EA guidance on the application of climate change allowances provides the following recommendations:

- Residential development should be considered to have a minimum lifetime of 100 years.
- FRAs should assess the upper end allowances for peak rainfall for events with an annual probability of 1 in 30 (3.3%) and 1 in 100 (1%) in any given year.
- FRA's should assess the central allowance for climate change for river flow for more vulnerable development in flood zone 3.
- Developments should be designed to be safe from surface water flooding and not increase flood risk elsewhere based on the upper end allowance for peak rainfall for events with an annual probability of 1 in 100 (1%) in any given year.

The peak river flow and rainfall allowances for the Site are provided in Table 4 and Table 5 respectively. In accordance with the Environment Agency's standing advice, the central allowance should be used for a *More Vulnerable* development in Flood Zone 3,. An upper end allowance is adopted for peak rainfall in the assessment of surface water flood risk in the 1 in 30 year event, with an upper end allowance adopted for peak rainfall in the assessment of surface water flood risk in the 1 in 100 year event. The climate change allowances for the peak river flow and rainfall intensities are based on the EA dataset for the Aire and Calder Management Catchment with the relevant climate change allowances highlighted in blue.

Table 4: Peak river flow allowances for the Aire and Calder Management Catchment.

ALLOWANCE CATEGORY	TOTAL POTENTIAL CHANGE ANTICIPATED FOR THE '2020S' (2015 TO 2039)	TOTAL POTENTIAL CHANGE ANTICIPATED FOR THE '2050S' (2040 TO 2069)	TOTAL POTENTIAL CHANGE ANTICIPATED FOR THE '2080S' (2070 TO 2115)
Upper	24%	31%	51%
Higher	15%	18%	31%
Central	11%	13%	23%

Table 5: Peak rainfall allowances for the Irwell Management Catchment.

ALLOWANCE CATEGORY	TOTAL POTENTIAL CHANGE ANTICIPATED FOR THE '2050S' (UP TO 2060)	TOTAL POTENTIAL CHANGE ANTICIPATED FOR THE '2070S' (2061 TO 2125)
3.3% AEP rainfall event		
Upper end	35%	40%
Central	20%	25%
1% AEP rainfall event		
Upper end	40%	45%
Central	25%	30%

5.2. Historical Flooding

A review of the EA's Recorded Flood Outlines and Historic Flood Map dataset indicates that there have been no recorded incidents of flooding on the Site.

5.3. Fluvial and Tidal Flooding

Fluvial or tidal flooding occurs when the water level in a river or sea rises above the surrounding ground level. Heavy or prolonged rainfall, melting of ice and snow and – in seas and rivers subjected to tidal processes – high tides and storm surges are the primary causes of this source of flooding.

As discussed in Section 4.1.1, the part of the Site is located within Flood Zone 3 indicates that it is at high risk (1 in 100 or 1% annual probability) of fluvial flooding within a given year, not accounting for mitigation provided by existing flood defences.

5.3.1. Impacts of Climate Change

The EA flood map for planning additionally indicates flood risk extents accounting for the impacts of climate change on peak river flow. This mapping incorporates the central climate change allowance for the 2080s epoch and is presented in Figure 4.

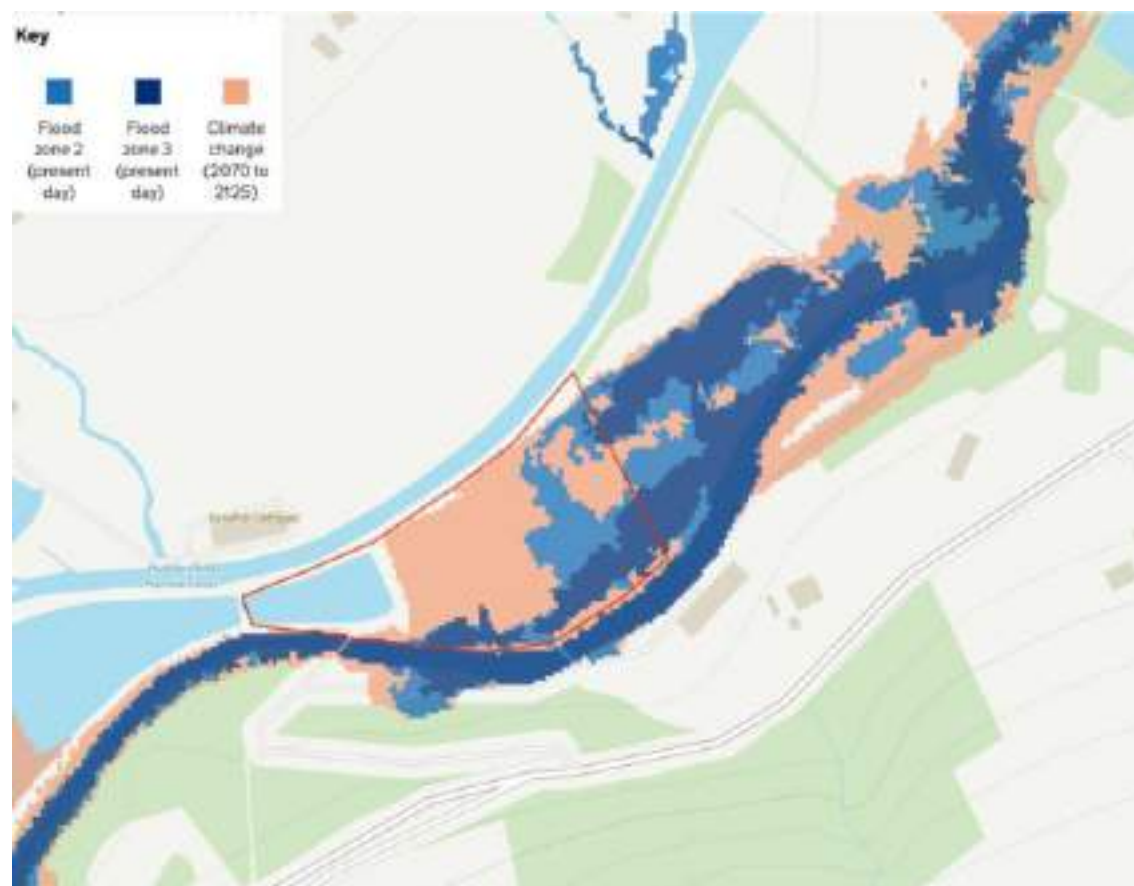


Figure 4: Environment Agency Flood Map for Planning

5.4. Surface Water Flooding

Ponding and heavy flows of water outside of watercourses due to rainfall are termed surface water flooding and typically result due to intense rainfall events which overwhelm drainage systems or the ability of the ground to absorb runoff and/or infiltrate it into underlying strata.

The EA Risk of Flooding from Surface Water (RoFSW) map indicates the likelihood of surface water flooding based on national modelling, with additional input from compatible, local modelling produced by LLFAs.

Mapping within the vicinity of the Site indicates that parts of the site are at high risk of flooding, i.e., more than 3.3% annual probability in any given year (ref. Figure 5).

There is a potential for proposed properties to be affected by this flooding based on the proposals presented in Section 3 and suitable measures should be incorporated within the drainage strategy for the proposed development to mitigate this risk, presented in Section 7.

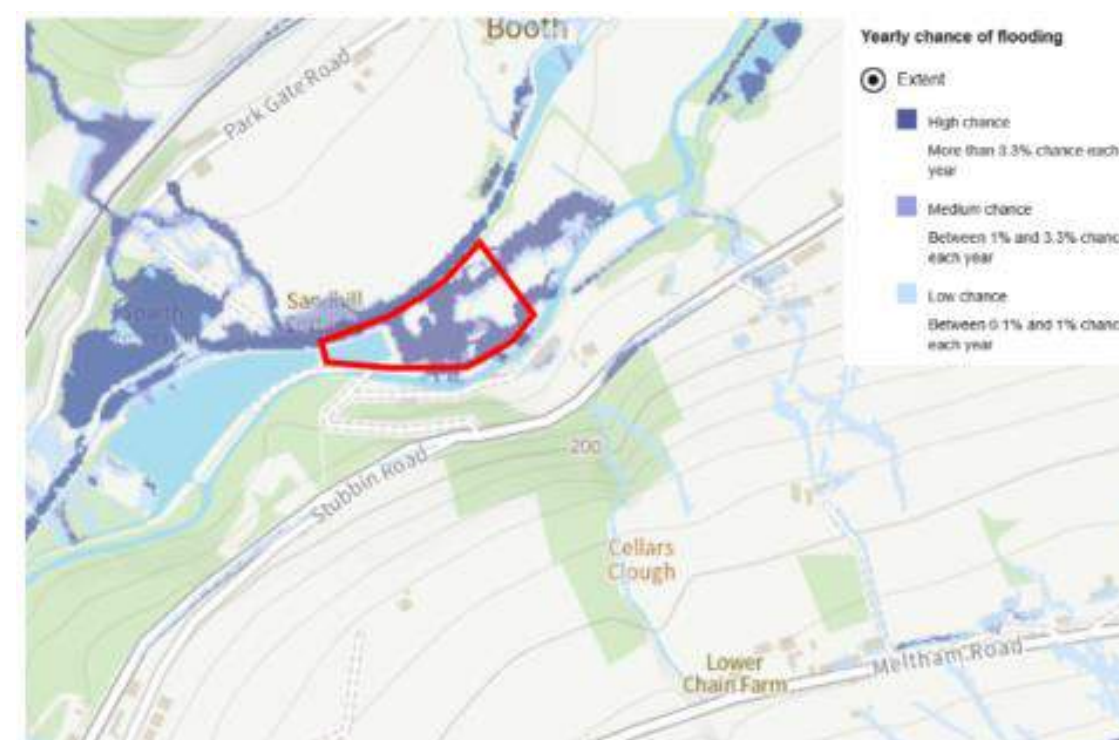


Figure 5: Environment Agency Risk of Flood From Surface Water Map

5.4.1. Impacts of Climate Change

The RoFSW contains additional flood risk extents accounting for the impacts of climate change on peak rainfall. This mapping incorporates the central climate change allowance for the 2050s epoch (25%) and is shown in 6.

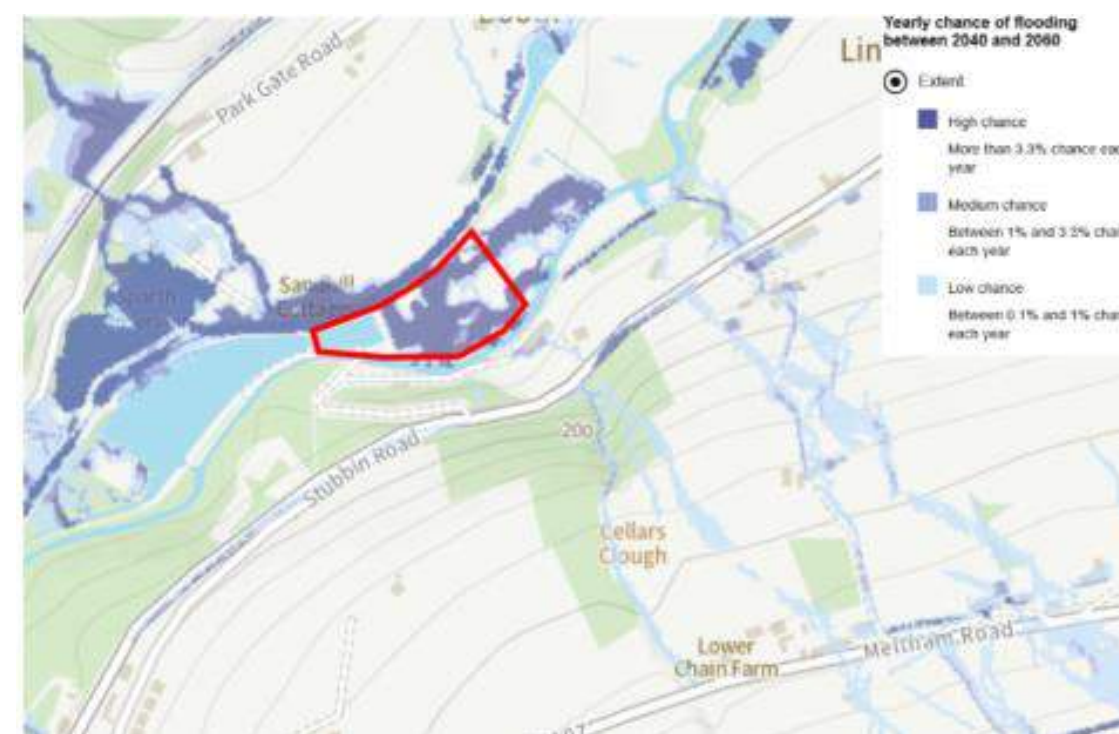


Figure 6: Environment Agency Risk of Flood From Surface Water – Climate Change Applied

5.5. Groundwater Flooding

Groundwater flooding is the result of an elevated underground water table enabling water to permeate to the surface.

The Environment Agency's long term flood risk dataset indicates that the area around the development site is at low risk of ground water flooding.

5.6. Flooding from Reservoirs

The site lies within the Environment Agency's mapped reservoir flood risk zone. The EA dataset does not specify the source reservoir, and several reservoirs are located upstream of the site; however, Sparth Reservoir, located to the northwest, represents the most immediate risk.

Sparth Reservoir is owned and maintained by the Canal & River Trust as a reservoir to support water levels in the Huddersfield Narrow Canal. The structure comprises an earth fill dam with a stone and concrete spillway approximately 8 m in width and 40 m in length. In accordance with the Reservoirs Act, the dam is subject to statutory inspection and maintenance.

Reservoirs may flood in the event of a dam collapse resulting in the release of a significantly large volume of water, however, reservoirs in the UK have an excellent safety record and the probability of such an event is considered extremely low.



Figure 7: Environment Agency Risk of Flood From Reservoirs

5.7. Flooding from Canals

The Huddersfield Narrow Canal forms the northern site boundary. Flood risk associated with canals is generally different from that of natural rivers, as flow volumes and water levels are regulated through engineered structures such as locks, sluices, spillways, and bypass weirs.

The canal level is approximately 162.3m AOD, which is approximately 300mm above the proposed site level along the northern boundary where development levels are proposed to be raised compared to the existing. Taking into account the structural integrity of the canal system, ongoing maintenance by the Canal & River Trust, and the minimal level difference between the canal and the site the risk of flooding is considered low.

5.8. Flooding from Mill Pond

The existing mill pond to be retained (Cellars Clough) is not maintained by the Canal and Rivers Trust and is a potential source of flooding to the site. The condition of the mill pond was previously raised as a concern by Kirklees Council in 2014, where it identified a potential breach risk from the mill ponds. The development proposals include for this pond drained down and will form part of the ecological zone and open space for the site.

5.9. EA Product 4 Data

Flood risk assessment data was obtained from the EA in March 2025, and which included modelled river levels in the River Colne for a variety of events along a series of nodes bounding the site. The node location are presented in Figure 8 below. The EA flood risk assessment data is contained in Appendix C



Figure 8: Environment Agency Flood Risk Data Node Locations

Nodes 3-6 are immediately adjacent to the proposed housing, and modelled water levels for the River Colne have been provided for the 1% AEP event with climate change allowances of both 20% and 30%. As outlined in Section 5.1.2 a climate change allowance of 23% shall be applied to the peak river flows. To provide a robust assessment, the design flood will be taken as the 1% AEP event plus 30% climate change.

5.10. Summary

A summary of the assessed risk of flooding to the Site from various sources is presented in Table 6.

Table 6: Summary of assessed flood risk to the Site.

FLOOD SOURCE	ASSESSED RISK LEVEL				JUSTIFICATION
	High	Medium	Low	Very Low	
Fluvial	X				Development is located within Flood Zone 1,2 and 3 and is therefore at high risk of flooding without mitigation.
Tidal				X	Development is inland and nearby water bodies are not subject to tidal processes.
Surface Water		X			EA RoFSW maps indicate notable extents of low surface water flood risk within the red line boundary, which may impact the development without suitable mitigation. The effects of climate change are anticipated to increase the risk of this flooding to medium in future, however, modelling is not available for the design flood to confirm this.
Groundwater				X	The EA dataset confirms the site is at low risk of ground water flooding
Reservoirs				X	The Site is located within flood extents shown in the EA's Reservoir Flood Extents Dry Day and Wet Day datasets, however is considered to be low risk given that maintenance of reservoirs is regulated by legislation .
Canals			X		The Huddersfield Narrow Canal forms the northern site boundary. Scheme proposals include raising the levels of the site boundary to reduce the risk of a breach scenario.
Mill Ponds			X		The mill pond on the eastern boundary will drained , thereby removing the risk of breaching immediately adjacent the site.

6. Proposed Mitigation

Proposed Levels

The EA flood risk assessment data has been reviewed, and indicates that water levels in the River Colne will vary from 160.92m AOD at the western frontage onto the river, to 159.89m AOD to the eastern site extents during the 1% AEP event with 30% climate change. The topographical survey undertaken in May 2025 indicates that the existing site levels are typically 160.30m AOD in the western part of the site (excluding the existing mill pond which is elevated at around 163m AOD). The site will therefore be at risk of flooding without mitigation. It is therefore proposed that site levels will be raised a minimum of 300mm above the modelled flood level for the 1% AEP event plus 30% climate change in accordance with the EA standing advice.

All FFL's are proposed to be at 162m AOD, which is a minimum of 1.08m above the modelled water level for the design flood at the western end of the site, and the eastern end of the site the free board increases to 2.11m. A minimum freeboard of 0.79m is also provided above the 0.1% AEP event plus 20% climate change. Access route levels have been set at least 300mm above the modelled water level for the design flood.

This design approach ensures all properties are protected from fluvial flooding and safe access is provided at all times.

Compensatory Storage

In order to ensure that properties are protected from fluvial flooding the existing site levels will be raised, which does have the potential to increase flood risk off site due to the displacement of flood storage volume available on site. In order to mitigate this risk an assessment of the volume of water stored during the design flood has been undertaken, based on the modelled river levels for the 1% AEP event plus climate change. The modelling indicates that approximately 476m³ of flood would could be displaced during the flood event. To mitigate this, it is proposed that land beyond the site boundary within the Client's control will be reshaped to prove the volume lost on site. Details can be found on drawing no.3884-CIV-XX-XX-D-C-00001 in Appendix E.

7. Drainage Strategy

7.1. Proposed Surface Water Drainage

The proposed surface water drainage design is to utilise Sustainable Drainage Systems (SuDS) in accordance with the specifications outlined in CIRIA C753 ('The SuDS Manual') as well as best practices defined in other local and national guidance. SuDS incorporate nature-based solutions and aim to mimic natural drainage processes by restricting runoff volumes and rates from developments, encouraging discharge of runoff in line with the natural water cycle (i.e. into waterbodies and aquifers), protecting or enhancing water quality as well as providing increased biodiversity and creating better places to live, work and play, amongst other benefits.

SuDS design is guided by 'four pillars' encompassing these benefits: water quantity, water quality, amenity and biodiversity.

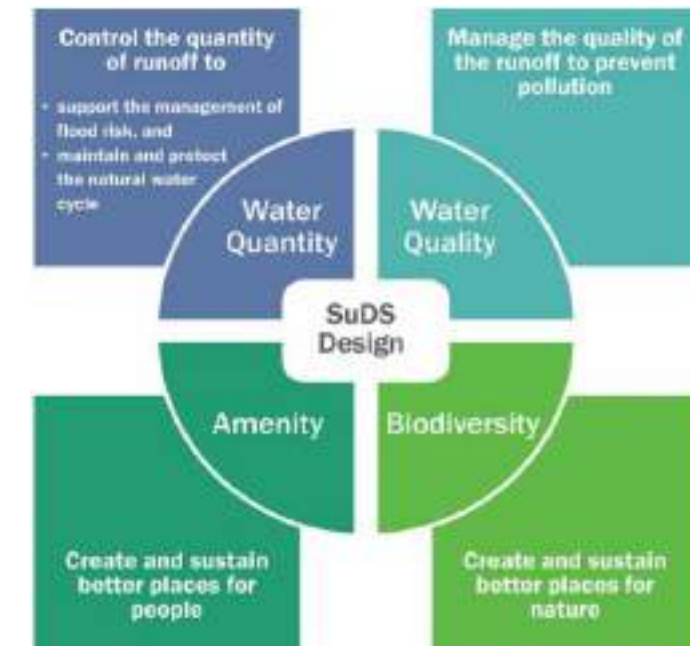


Figure 9. The four pillars of SuDS design (reproduced from Figure 2.1 of CIRIA C753 The SuDS Manual)

In this section, the proposed surface water drainage design is presented in relation to these four pillars.

7.1.1. Strategy Overview

A proposed surface water drainage strategy drawing (drawing no. 3884-CIV-XX-XX-D-C-30001) is provided in Appendix F of this report, highlighting the proposed drainage connection point, indicative piped drainage network and areas of attenuation.

The proposed drainage strategy has been developed to include SuDS components as a primary method of surface water management. Pervious pavements comprising reinforced gravel and reinforced grass surfacing will intercept and treat run-off which will be collected via a network of below ground perforated pipes. The sub-base under these porous surfaces will provide an element of surface water attenuation, however due to the change in external levels across the site additional surface water storage will need to be provided below ground. It is proposed that perforated twin 1500mm pipes surrounded by clean stone are installed to provide the balance of the attenuation, these will also act as a collection drain for the porous surfacing above.

7.1.2. Water Quantity Design

Designing for water quantity involves controlling how fast surface water is discharged (the peak runoff rate) and how much surface water is discharged (the peak runoff volume) from a site, as well as where this runoff is discharged to. As a result of restricting runoff, it is necessary to provide attenuation within the surface water network so that runoff can be temporarily stored on site.

The design criteria related to this SuDS pillar are presented in Table 7, with further information on the derivation of these values provided in this section.

Table 7. Water quantity design criteria

CRITERIA	VALUE
Rainfall Methodology	FEH22
Total Site Area	1.278 ha
Area Positively Drained (Impermeable Area)	n/a
Peak Runoff Rate	4.9 l/s (Q _{BAR})
Discharge Method	SuDS Approach 2 (restriction of discharge rates to equivalent greenfield values only)
Rainfall Climate Change Allowance	45%
Attenuation Requirement (For 1 in 100 year plus 45% climate change storm event)	1,200 m ³

Point of Discharge

In SuDS designs, runoff should be discharged in a manner that closely matches the natural water cycle, where feasible. This means aiming to discharge water into the ground via infiltration or to surface water bodies instead of direct to sewers. The NPPF specifies the following hierarchy of drainage options for the way rainfall leaves a development, in order of most preferred to least preferred:

1. To the ground (infiltration).
2. To a surface water body.
3. To a surface water sewer, highway drain, or another drainage system.
4. To a combined sewer.

Based on the existing information presented in Section 2, these potential discharge options have been assessed and a summary of the feasibility of each option is presented in Table 8.

It is proposed that the surface water network will connect to the River Colne on the southern site boundary at the equivalent greenfield run-off rate. The surface water drainage will connect into the existing site surface water culvert crossing the site which ultimately outfalls into the river, subject to confirming the condition of the existing infrastructure and approval of the discharge rate from the LLFA.

Table 8: Feasibility of surface water discharge options in line with discharge hierarchy presented within National Planning Policy Framework.

SURFACE WATER DISCHARGE OPTION	PROPOSED	JUSTIFICATION
Infiltration	X	As outlined in Section 2.3 a Phase 2 intrusive site investigation indicates that the site is underlain by mudstone bedrock. This typically has infiltration rates less than 10 ⁻⁶ m/s, which is considered to be the threshold at which infiltration as a primary means of disposal is deemed viable within CIRIA C753. <i>Infiltration unlikely to be feasible as a primary means of surface water discharge due to low infiltration rates.</i>
Water Body	✓	The River Colne forms the southern boundary, and an existing surface water outfall is present which serves the site. It is therefore proposed that this forms the surface water outfall.
Surface Water Sewer	X	N/A as outfall to water body is present.
Combined Sewer	X	N/A as outfall to water body is present.

Runoff Rates

When restricting runoff to greenfield rates, two approaches are typically adopted to conform to the 'Non-statutory standards for sustainable drainage systems' published by the Department for Environment, Food and Rural Affairs (DEFRA) in 2015:

- **SuDS Approach 1** – restricting peak 1 in 1 year and 1 in 100 year rates and 1 in 100 year 360 minute discharge volume to equivalent greenfield values, or
- **SuDS Approach 2** – restricting only peak rates up to the 1 in 100 year storm to Q_{BAR} (approximately equal to the 1 in 2.3 year greenfield rate).

The strategy currently proposed utilises SuDS Approach 2 as infiltration rates are not viable to accommodate long-term storage areas required within SuDS Approach 1, which discharge via infiltration or at a lower discharge rate of 2 l/s/ha.

An estimate of Q_{BAR} equal to 4.9 l/s has been determined via the FEH Statistical Method using FEH22 point data obtained for the approximate centroid of the Site. Calculations of this rate have been provided in Appendix G.

A flow control chamber will restrict surface water flows leaving the Site to Q_{BAR} for all storm events up to the 1 in 100 year storm event plus an allowance for climate change (45%, as discussed below and in Section 5) with all excess runoff being attenuated within the proposed surface water network.

Attenuation Requirements

As discussed in Section 5, in determining the attenuation requirements for the development, the design will consider an allowance of 45% climate change on peak rainfall for the 1 in 100 year storm event.

The required volume of attenuation has been calculated using Causeway Flow based on the proposed development impermeable area indicates that approximately 1,200m³ of storage will be required.

Perforated pipes will collect runoff from permeable pavements and rain gardens, the sub-base of the permeable pavement will be used for storage at the lower part of the Site.

7.2. Foul Water Drainage Strategy

Yorkshire Water records have been obtained which indicate that a public combed sewer runs under the River Colne and through the south east corner of the site before heading in an easterly direction. The size and depth of this sewer is unknown. However the ground levels where the sewer is indicated to run is lower than the proposed site levels, and as such a gravity connection into this sewer is considered to be feasible therefore it is proposed that foul drainage from the site will connect into this public sewer.

8. Conclusions

This report has assessed the current and future risk of flooding to a proposed residential-led development at Cellars Clough, Marsden. A drainage strategy for the proposed development is also presented.

The Flood Risk Assessment has been undertaken in accordance with the National Planning Policy Framework (NPPF) and associated guidance on flood risk and coastal change contained within the Planning Practice Guidance.

75 residential dwellings with associated external car parking and amenity space. Full planning permission is being sought for the proposed development.

The proposed development is located within Flood Zones 1, 2 and 3 and is considered "More Vulnerable". Flood Risk from all sources has been considered and mitigation measures proposed to ensure the development is not at risk of flooding and can be safely accessed at all times during the design flood.

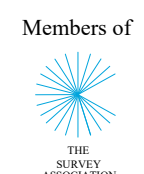
Surface Water discharge for the development will be limited to greenfield runoff rates for the equivalent Site area at 4.9l/s. Attenuation will be provided for a 1 in 100-year storm event including 45% climate change allowance. Where possible SuDS will be incorporated to further improve water quality. Surface water discharge to the River Colne. With the incorporation of the proposed mitigation measures, as described above, the proposed development will comply with National Local Planning Policy.

The surface water connection and discharge rate will be subject to agreement with the LLFA.

Foul drainage from the Site is proposed to discharge into the existing combined sewer located to the southeast of the Site.

The foul connection will be subject to formal agreement with Yorkshire Water under the S106 of the Water Industry Act 1991

Appendix A – Topographical Survey



Legend

[illegible]

Name	Survey	Nothing	Height
1	434260.00	434260.00	160.00
1A	434260.00	434260.00	160.00
1B	434260.00	434260.00	160.00
2	434262.00	434262.00	161.71
2A	434262.00	434262.00	161.71
2B	434262.00	434262.00	161.71
3	434264.00	434264.00	163.43
3A	434264.00	434264.00	163.43
3B	434264.00	434264.00	163.43
4	434266.00	434266.00	165.14
4A	434266.00	434266.00	165.14
4B	434266.00	434266.00	165.14
5	434268.00	434268.00	166.86
5A	434268.00	434268.00	166.86
5B	434268.00	434268.00	166.86
6	434270.00	434270.00	168.57
6A	434270.00	434270.00	168.57
6B	434270.00	434270.00	168.57
7	434272.00	434272.00	170.29
7A	434272.00	434272.00	170.29
7B	434272.00	434272.00	170.29
8	434274.00	434274.00	172.00
8A	434274.00	434274.00	172.00
8B	434274.00	434274.00	172.00
9	434276.00	434276.00	173.71
9A	434276.00	434276.00	173.71
9B	434276.00	434276.00	173.71
10	434278.00	434278.00	175.43
10A	434278.00	434278.00	175.43
10B	434278.00	434278.00	175.43
11	434280.00	434280.00	177.14
11A	434280.00	434280.00	177.14
11B	434280.00	434280.00	177.14
12	434282.00	434282.00	178.86
12A	434282.00	434282.00	178.86
12B	434282.00	434282.00	178.86
13	434284.00	434284.00	180.57
13A	434284.00	434284.00	180.57
13B	434284.00	434284.00	180.57
14	434286.00	434286.00	182.29
14A	434286.00	434286.00	182.29
14B	434286.00	434286.00	182.29
15	434288.00	434288.00	184.00
15A	434288.00	434288.00	184.00
15B	434288.00	434288.00	184.00
16	434290.00	434290.00	185.71
16A	434290.00	434290.00	185.71
16B	434290.00	434290.00	185.71
17	434292.00	434292.00	187.43
17A	434292.00	434292.00	187.43
17B	434292.00	434292.00	187.43
18	434294.00	434294.00	189.14
18A	434294.00	434294.00	189.14
18B	434294.00	434294.00	189.14
19	434296.00	434296.00	190.86
19A	434296.00	434296.00	190.86
19B	434296.00	434296.00	190.86
20	434298.00	434298.00	192.57
20A	434298.00	434298.00	192.57
20B	434298.00	434298.00	192.57
21	434300.00	434300.00	194.29
21A	434300.00	434300.00	194.29
21B	434300.00	434300.00	194.29
22	434302.00	434302.00	196.00
22A	434302.00	434302.00	196.00
22B	434302.00	434302.00	196.00
23	434304.00	434304.00	197.71
23A	434304.00	434304.00	197.71
23B	434304.00	434304.00	197.71
24	434306.00	434306.00	199.43
24A	434306.00	434306.00	199.43
24B	434306.00	434306.00	199.43
25	434308.00	434308.00	201.14
25A	434308.00	434308.00	201.14
25B	434308.00	434308.00	201.14
26	434310.00	434310.00	202.86
26A	434310.00	434310.00	202.86
26B	434310.00	434310.00	202.86
27	434312.00	434312.00	204.57

KEY DIMENSIONS SHOULD BE CHECKED ON SITE
BEFORE COMMENCEMENT OF ANY WORKS

NOTE

Grid and levels related to OS using GPS data

[illegible]













Meridian House
 58/60 Hillside Road, Frodsham, Cheshire WA6 6AG
 Tel: 01928 734473 Fax: 01928 735573
 Email: mail@powerstilton.co.uk
www.powerstilton.co.uk

Cellars Clough Mill

Marsden

Regrade Survey

Client : Citu Group Developments Ltd

Surveyed By : FR

Date : 28/05/25

Drawn By : FR

Drawing No : 743

Checked By : JL

Amendment :

Scale
1:500

Appendix B– Yorkshire Water Records

YORKSHIRE WATER PROTECTION OF MAINS AND SERVICES

1. The position of Yorkshire Water Services Ltd (YWS) apparatus shown on the existing mains record drawing(s) indicates the **general** position and nature of our apparatus and the accuracy of this information cannot be guaranteed. Any damage to YWS apparatus as a result of your works may have serious consequences and you will be held responsible for all costs incurred. Prior to commencing major works, the exact location of apparatus must be determined on site, if necessary by excavating trial holes. The actual position of such apparatus and that of service pipes which have not been indicated must be established on site by contacting the Customer Helpline on 0345 124 24 24 for both water and sewerage.
2. The public sewer and water network is lawfully retained in its existing position and the sewerage and water undertaker is entitled to have it remain so without any disturbance. The provisions of section 159 of the Water Industry Act 1991 provides that the undertaker may "inspect, maintain, adjust, repair or alter" the network. Those rights are given to enable the undertaker to perform its statutory duties. Any development of the land or any other action that unacceptably hindered the exercise of those rights would be unlawful. The provisions contained in Section 185 of the Water Industry Act 1991 state that where it is reasonable to do so, a person may require the water supply undertaker to alter or remove a pipe where it is necessary to enable that person to carry out a proposed change of use of the land. The provisions contained in Section 185 also require the person making the request to pay the full cost of carrying out the necessary works.
3. Ground levels over existing YWS apparatus are to be maintained. Sewers in highways will **generally** be laid to give 1200mm of cover from finished ground level working to kerb races, other permanent identification of the limits of the road or to an agreed line and level. Substantial increases or decreases to this 1200mm depth of cover will result in the sewer being re-laid at your expense. Water mains and services will **generally** be laid with a minimum of 750mm depth of cover however some mains and services usually those installed over 50 years ago may have less ground cover.
4. If surface levels are to be decreased / increased significantly the effects on existing water supply apparatus will be carefully considered and if any alterations are necessary, the costs of the alterations will be recharged to you in full. Outlets on fire hydrants must be no more than 300mm below the new levels and all surface boxes must be adjusted as part of the scheme.
5. To enable future repair works to be carried out without hindrance; any pipe, cable, duct, etc. installed parallel to a water main or service pipe should not be installed directly over or within 300mm of a water main or service pipe or 1000mm of a waste water asset. Where a pipe, cable, duct, etc. crosses a main or service it should preferably cross perpendicular or at an angle of no less than 45° and with a minimum clearance of 150mm. These requirements apply to activities within an existing highway and are relevant to the installation of pipes, cables, ducts, etc. up to and including 250mm in diameter (*see illustration below*). Necessary protection measures for installations greater than 250mm in diameter and/or in private land will need to be agreed on an individual basis. Installations within a new development site must comply with the National Joint Utilities Group publication Volume 2: NJUG Guidelines On The Positioning Of Underground Utilities Apparatus For New Development Sites.
6. All excavation works near to YW apparatus should be by hand digging only.
7. Backfilling with a suitable material to a minimum 300mm above YW apparatus is required.
8. Adequate support must be provided where any works pass under YW apparatus.
9. Jointing chambers, lighting columns and other structures must be installed in such a way that future repair or maintenance works to YW apparatus will not be hindered.
10. Apparatus such as; railings, sign posts, etc. must not be placed in such a way that they prevent access to or full operation of controlling valves, hydrants or similar apparatus. YWS surface boxes must not be covered or buried. Any adjustment, alteration or replacement of manhole covers must be agreed on site prior to the commencement of the works with a YWS Inspector who may be contacted via our Call Centre on 0345 124 24 24.
11. Explosives shall not be used within 100 metres of any Yorkshire Water Services apparatus or installations.
12. Vibrating plant should not be used directly over any apparatus. Movement or operation by vehicles or heavy plant is not to be permitted in the immediate vicinity of YWS plant or apparatus unless there has been prior consultation and, if necessary, adequate protection provided without cost to YWS.
13. **Under no circumstances** should thrust boring or similar trenchless techniques commence until the actual position of the Company's mains/services along the proposed route have been confirmed by trial holes.
14. Any alterations to the highway should be notified following the procedures outlined in the New Road and Street Works Act 1991 Code of Practice; Measures Necessary Where Apparatus Is Affected By Major Works (Diversionsary Works).
15. You will be held responsible for any damage or loss to YWS apparatus during and after completion of work, caused by yourselves, your servant or agent. Any damage caused or observed to YWS plant or apparatus should be immediately reported to YWS. Should YW incur any costs as a result of non-compliance with the above, all costs will be rechargeable in full.
16. You should ensure that nothing is done on the site to prejudice the safety or operation of YWS employees, plant or apparatus.
17. In accordance with the New Roads and Street Works Act 1991, Chapter 22, Part 3, Section 80. The location of any identified YW asset "which is not marked, or is wrongly marked, on the records made available" should be communicated back to Yorkshire Water. The location of the apparatus should be identified on copies of the supplied plans which should be returned to Yorkshire Water (Asset Records Team) with photographic supporting evidence where possible.
18. The Government has decided that responsibility for private sewers serving two or more properties and lateral drains (the section of pipe beyond the boundary of a single property, connecting it to the public sewer) will be transferred to the water companies on Oct 1 2011.

Private pumping stations will also transfer during the period 1 October 2011 – 1 Oct 2016. Records of these assets may not yet be shown on the existing mains record drawing(s). If you encounter any of these assets you must inform Yorkshire Water Services Ltd (YWS).

19. Please note that the information supplied on the enclosed plans is reproduced from Ordnance Survey material with the permission of the Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office, © Crown Copyright. Unauthorised reproduction infringes Crown Copyright and may lead to prosecution or civil proceedings. Licence Number AC0000857457.
20. This information is for guidance only and the position and depth of any YW apparatus is approximate only. Likewise, the nature and condition of any YW apparatus cannot be guaranteed. YW has no responsibility for recording the locations of privately owned apparatus. As of 1 October 2011, there may be some lateral drains and/or public sewers which are not documented on YW records but may still be present. For the avoidance of doubt, this information is not a substitute for appropriate professional and/or legal advice. YW accepts no responsibility for any inaccuracy or omissions in this information. The actual position of YW apparatus must be determined on site by excavating trial holes by hand. YW requires a minimum of two working days' written notice of the intention to excavate any trial holes before any excavation can be undertaken. If there are any queries in this respect please contact Yorkshire Water on 0345 124 24 24.

Property Identifier



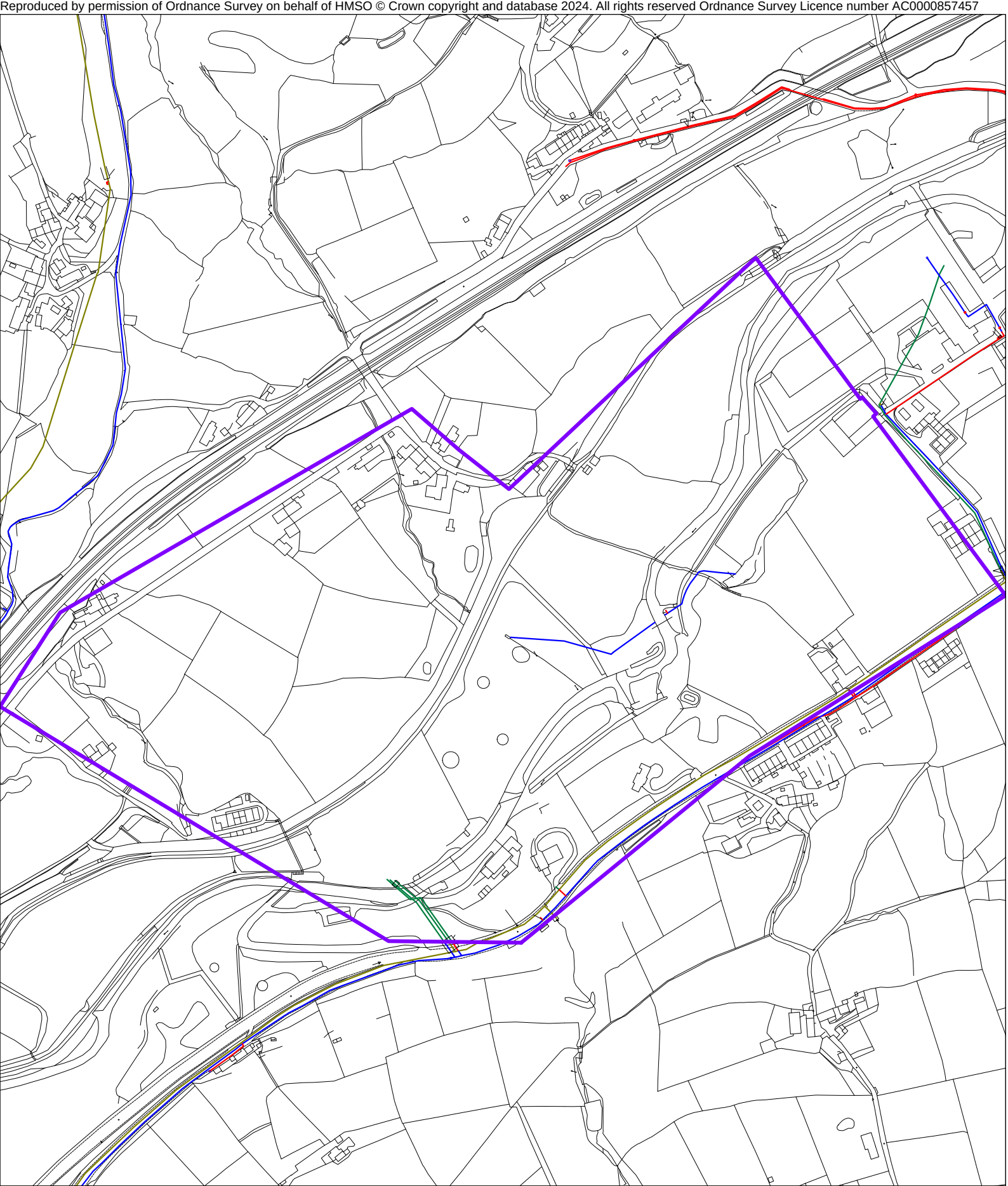
Sewer Legend

	Combined Sewer		S24 Combined Sewer
	Surface Water Sewer		S24 Surface Water Sewer
	Foul Sewer		S24 Foul Sewer
	Section 104 Sewer		Rising Main
	Overflow Sewer		Abandoned Sewer
	Manhole		Syphone Sewer & Vacuum Sewer
	Pumping Station		Public Sewer Treatment Works

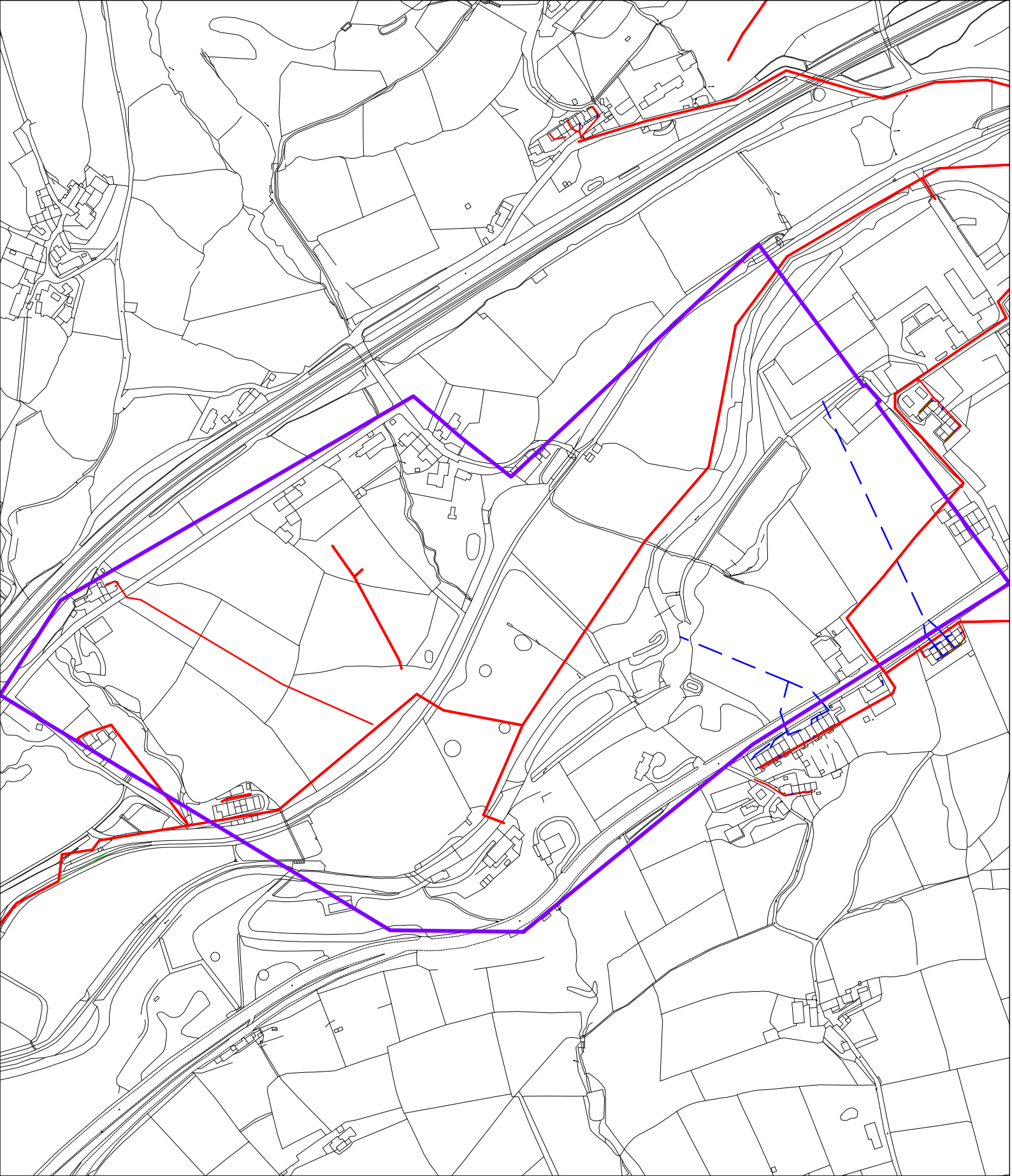
Please note that the direction of flow arrows may not always appear depending on the scale of the map.

Water Legend

	Water Main 4" and below
	Water Main 4" and above
	Raw Water Main
	Private Water Main
	Fire Hydrant
	Pumping Station
	The assets in this area are the responsibility of another Water Undertaker



Public Clean Water Network 12/09/2025 13:14:31 OS Grid Coordinates: 405515 : 412217 Map Name : SE0512SE svcGISSafeMovePD



Public Waste Water Network 12/09/2025 13:14:32 OS Grid Coordinates: 405515 : 412217 Map Name : SE0512SE svcGISSafeMovePD

Appendix C – Development Proposals

total homes = 75

mix

2 beds = 29

3 beds = 36

4 beds = 10

car parking = 117

bike spaces = 206

Sandhill
Cottages

proposed site plan

WIP 19.0.25

REVISIONS

1:250 / 1:500 / 1:1000 0 5/10/20 10/20/40 15/30/60 20/40/80
1:50 / 1:100 / 1:200 0 1/2/4 2/4/8 3/6/12 4/8/16

Drawing Number
ML-CITU-FC003

Title
proposed site plan

Scale @ A1 Revised by Rev
1:250

Drawn SM Reviewed SN Sheet Created 19/09/25

Pipeline
The Studio

PLANNING

Marsden Island

CITU
DESIGN

T: 0113 320235 E: info@citu.co.uk W: www.citu.co.uk

Appendix D – Environment Agency Flood Risk Assessment Data

Environment
Agency

Customer reference number: H182UXMAM64A

Map of Sandhill Cottages site location. The map shows a large area outlined in red, representing the 'Selected area'. A blue line represents the 'Main river'. The map includes a north arrow, a scale bar (0 to 50 metres), and an inset map showing the site's location relative to the River and the Sandhill Cottages. The map also shows surrounding features like 'The Sandhill', 'The Sandhill', and 'The Sandhill'.

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)
- 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

Information that's unavailable

This document **does not** contain:

- past floods
- flood defences and attributes

We do not have past flooding data for this location.

Please note that:

- flooding may have occurred that we do not have records for
- flooding can come from a range of different sources
- we can only supply flood risk data relating to flooding from rivers or the sea

You can contact your Lead Local Flood Authority or Internal Drainage Board to see if they have other relevant local flood information. Please note that some areas do not have an Internal Drainage Board.

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

Surface water and other sources of flooding

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: 2019 Colne Model

Scenario(s): Defended fluvial, defences removed fluvial, defences removed climate change fluvial

Date: 1 August 2019

Model name: 2019 Crowhill Model

Scenario(s): No defences exist fluvial, no defences exist climate change fluvial

Date: 8 January 2019

Model name: 2019 Wessenden Model

Scenario(s): No defences exist fluvial, no defences exist climate change fluvial

Date: 1 August 2019

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

Terminology used

Annual exceedance probability (AEP)

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

Metres above ordnance datum (mAOD)

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

Flood map for planning (rivers and the sea)

Your selected location is in flood zone 3.

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

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

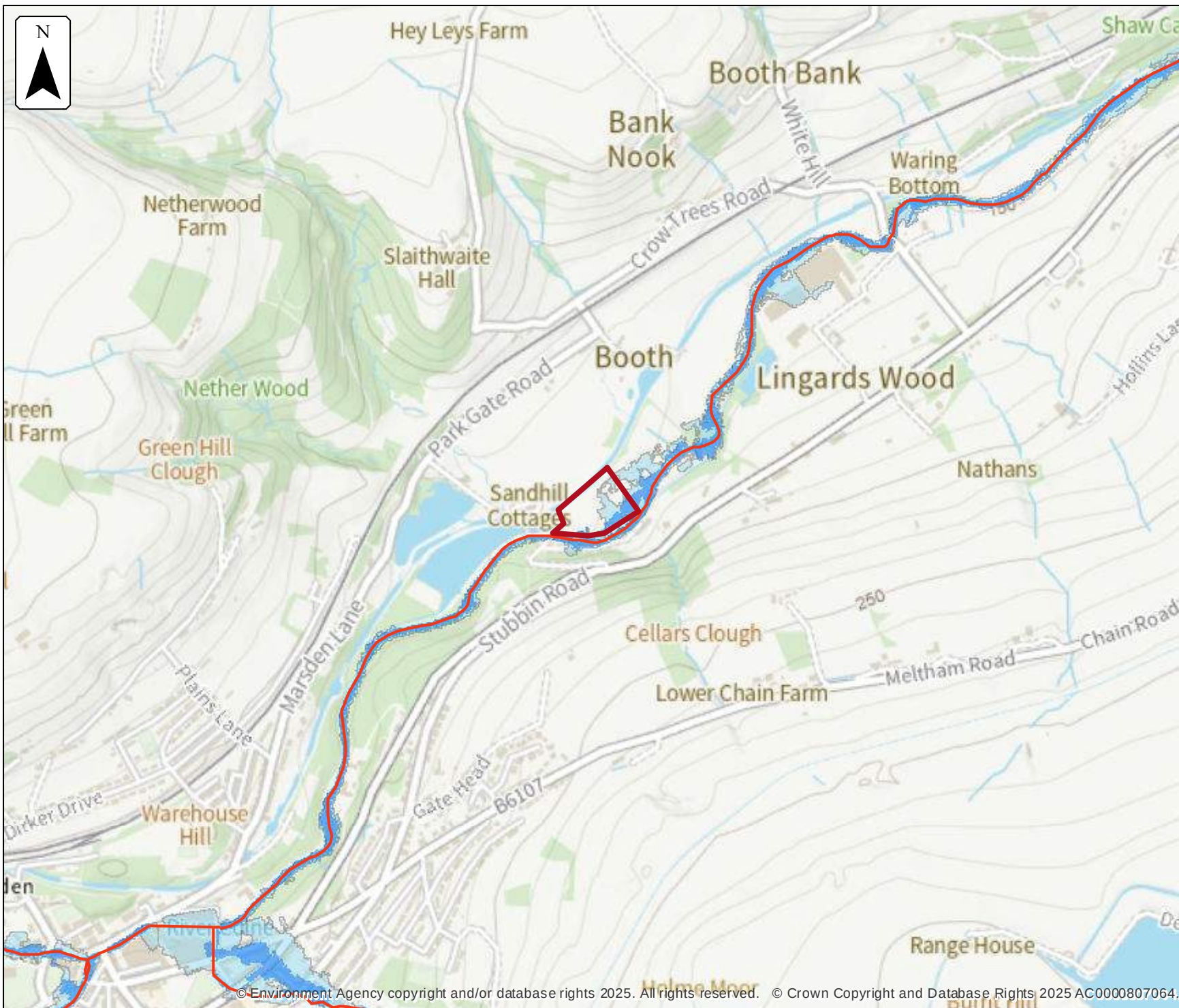
Flood zone 2 shows the area at risk of flooding for an undefended flood event with:

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

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

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

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.



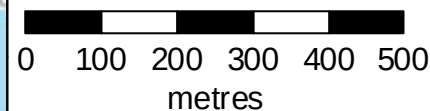
Flood map for planning

Location (easting/northing)
405852/412532

Scale
1:10,000

Created
5 Feb 2025

-  Selected area
-  Main river
-  Flood zone 3
-  Flood zone 2



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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

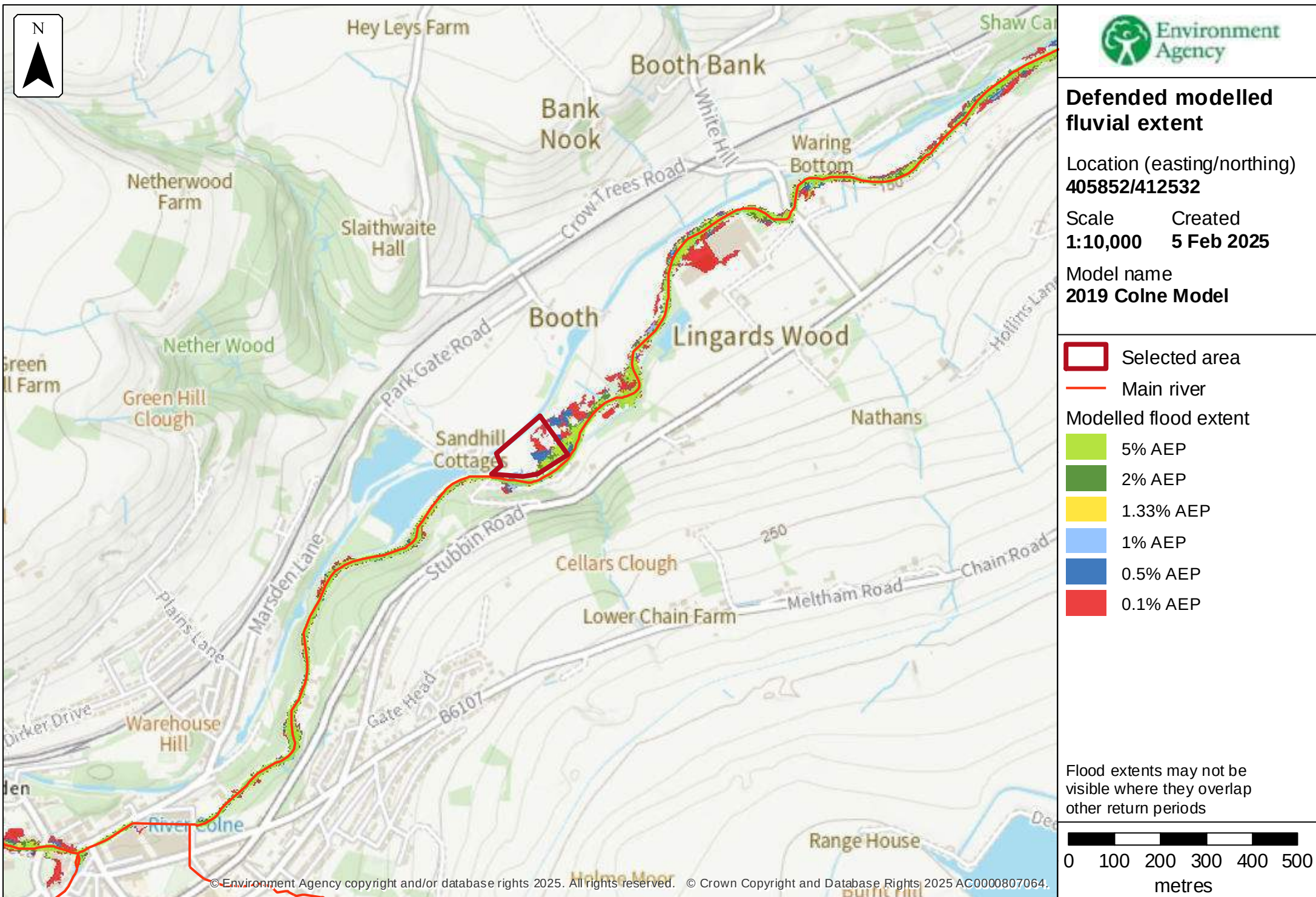
The climate change data included in the models may not include the latest [flood risk assessment climate change allowances](#). Where the new allowances are not available you will need to consider this data and factor in the new allowances to demonstrate the development will be safe from flooding.

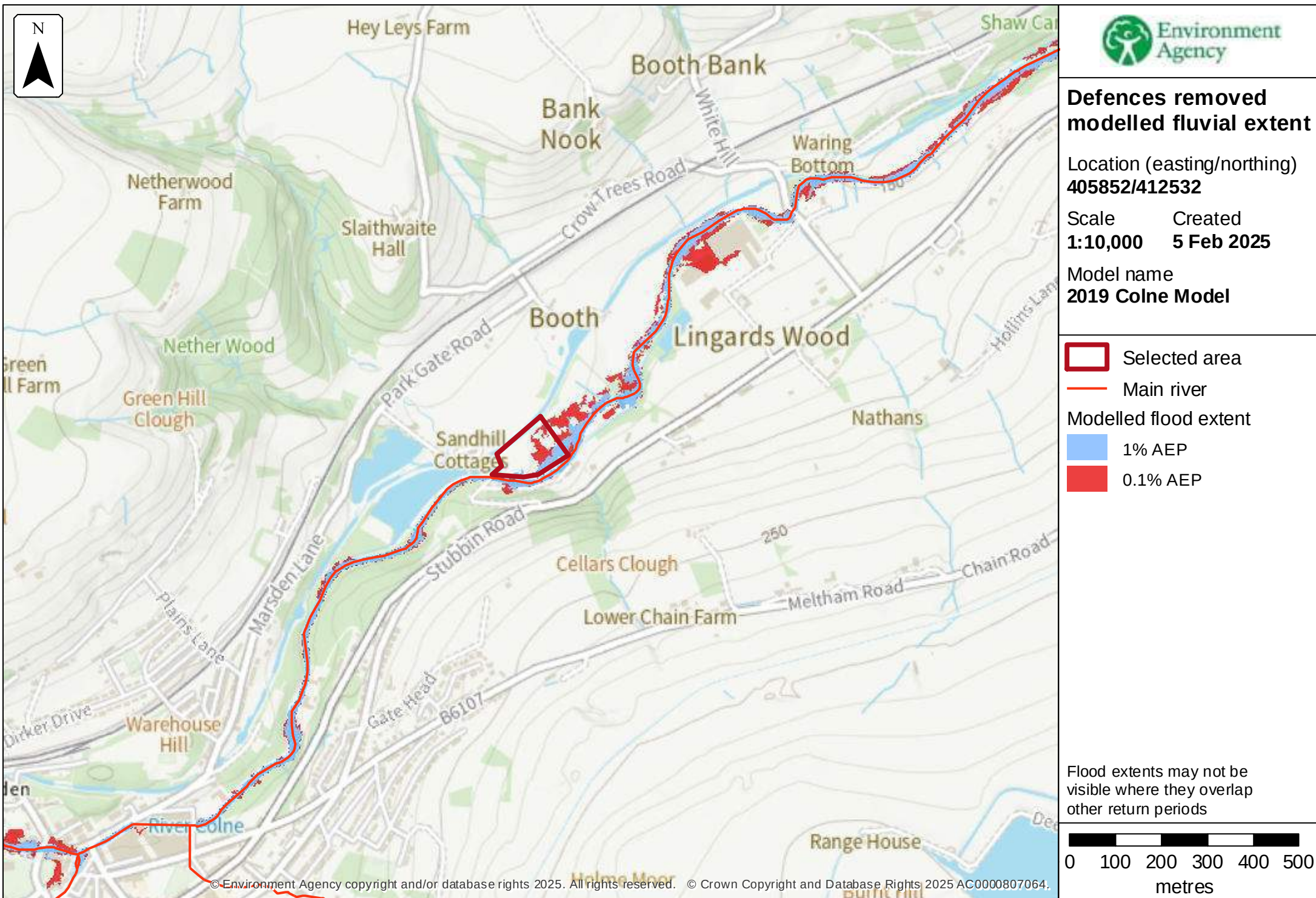
The Environment Agency will incorporate the new allowances into future modelling studies. For now, it's your responsibility to demonstrate that new developments will be safe in flood risk terms for their lifetime.

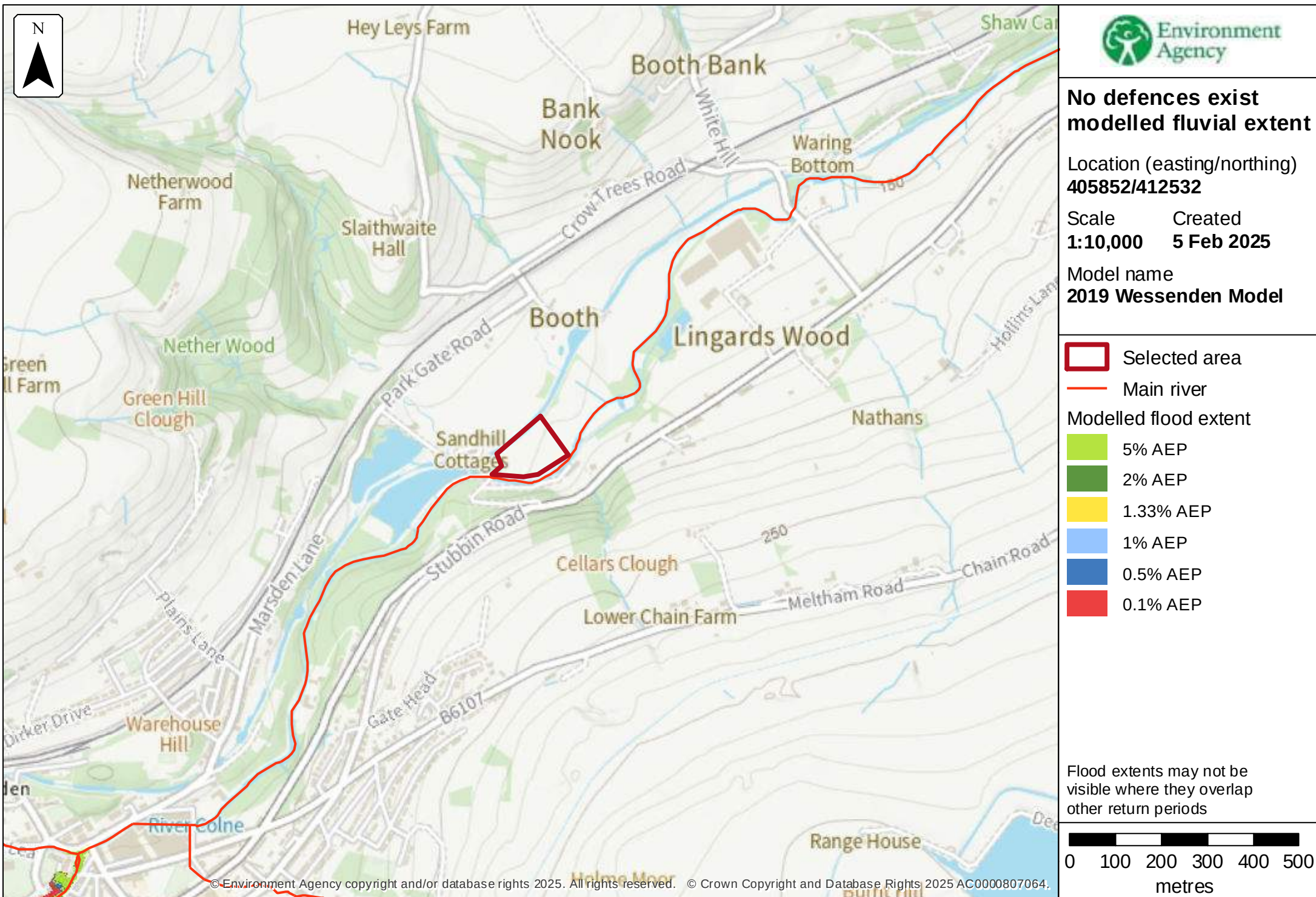
Modelled scenarios

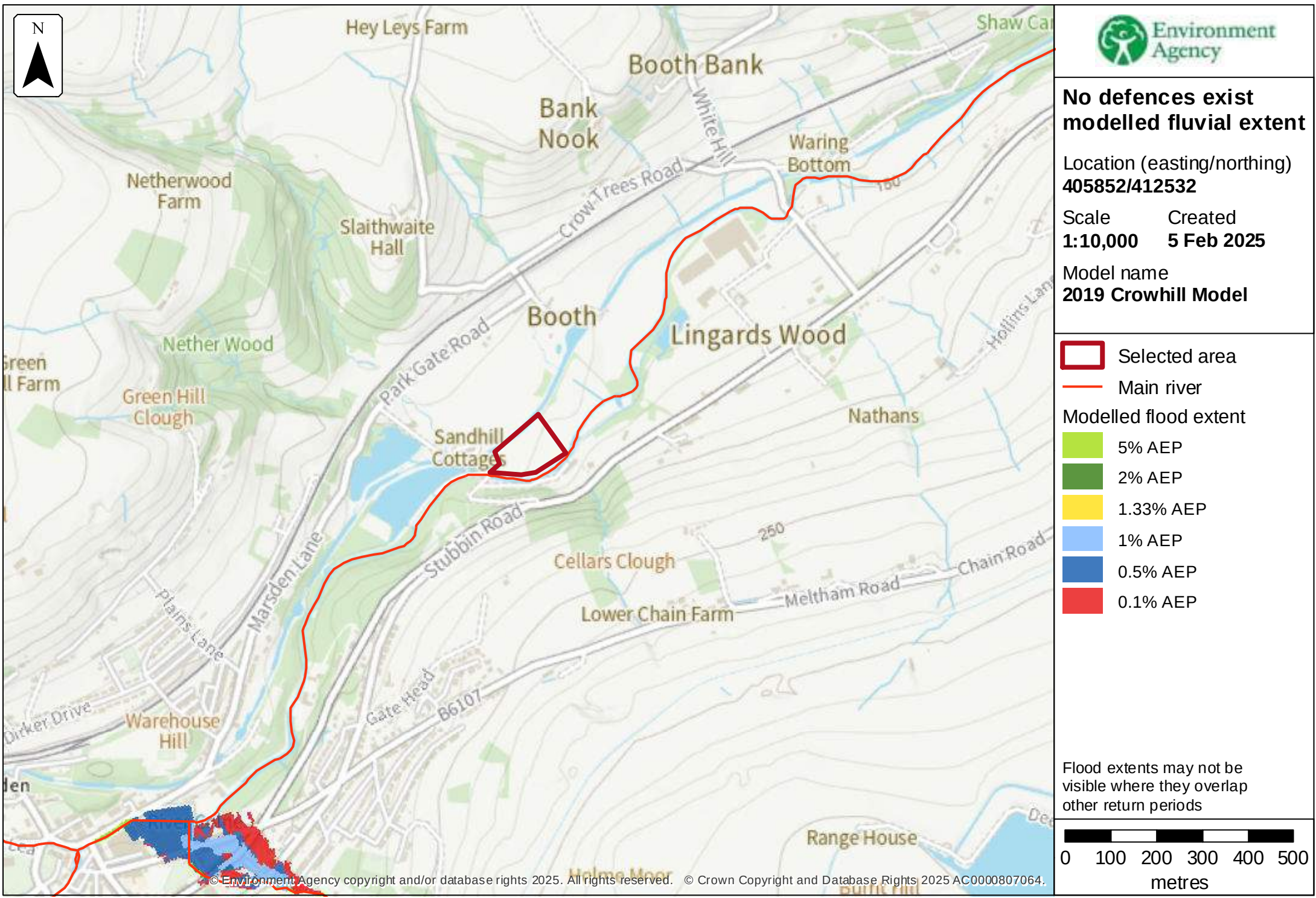
The following scenarios are included:

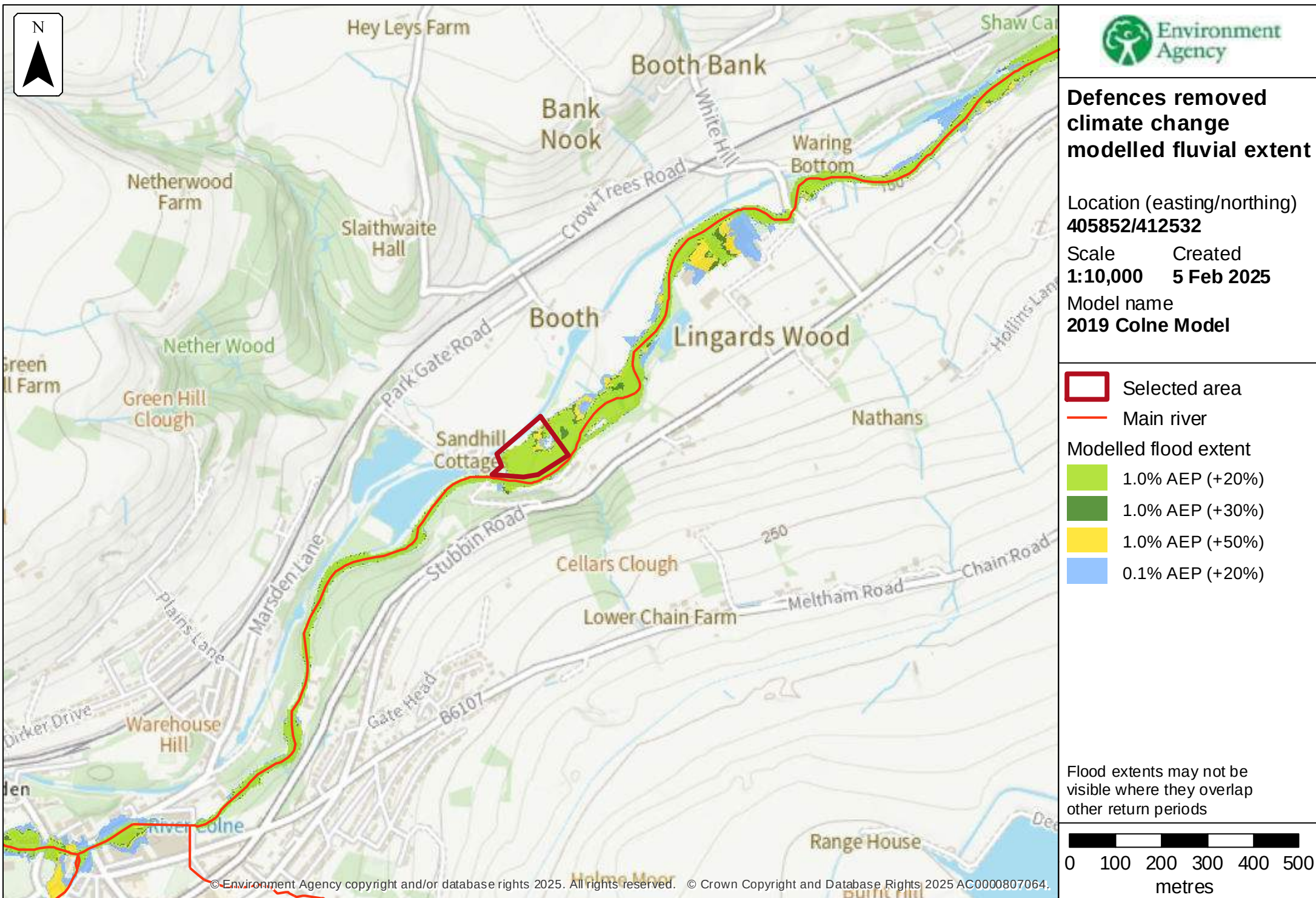
- Defended modelled fluvial: risk of flooding from rivers where there are flood defences
- Defences removed modelled fluvial: risk of flooding from rivers where flood defences have been removed
- No defences exist modelled fluvial: risk of flooding from rivers where there are no flood defences
- Defences 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

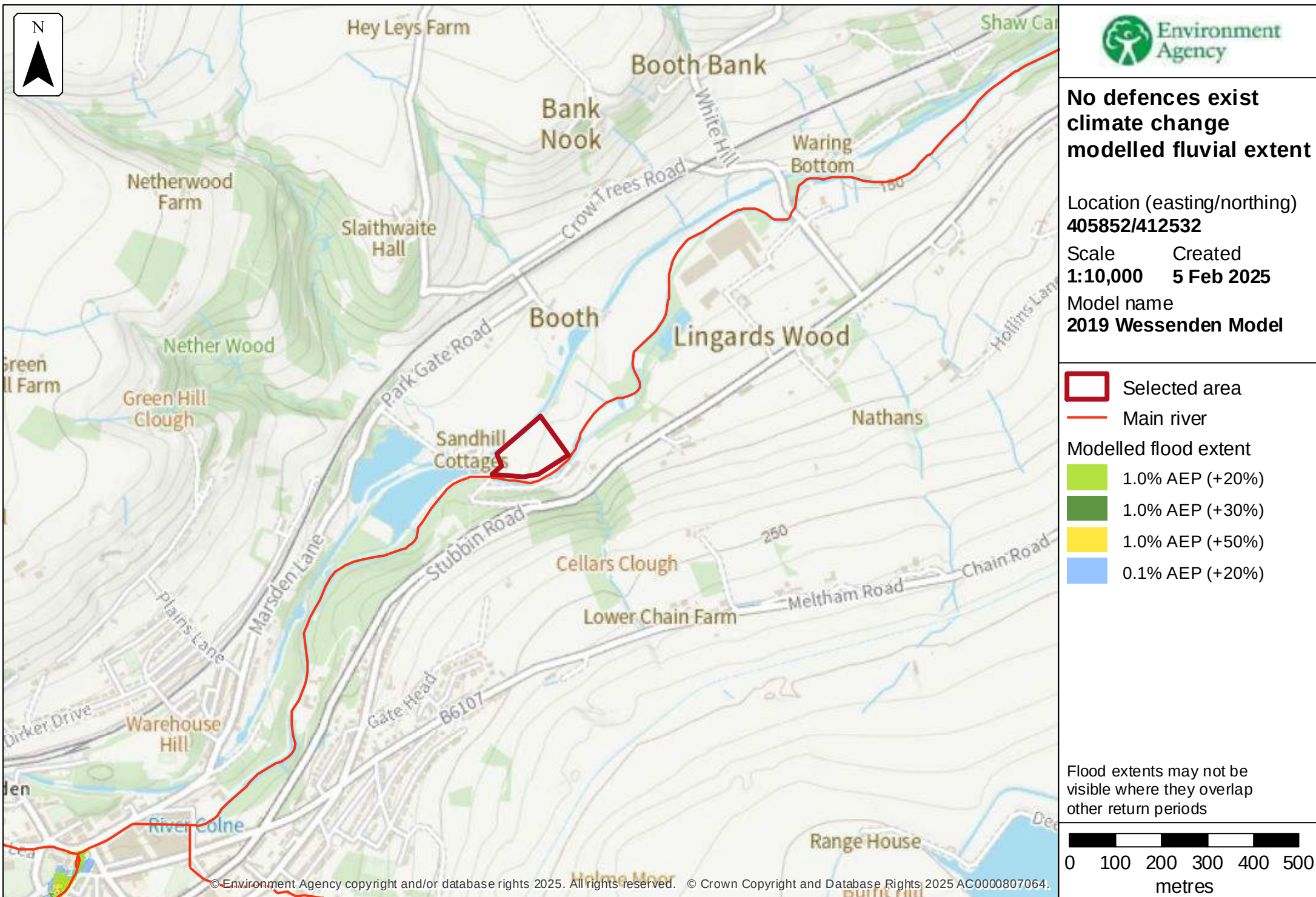


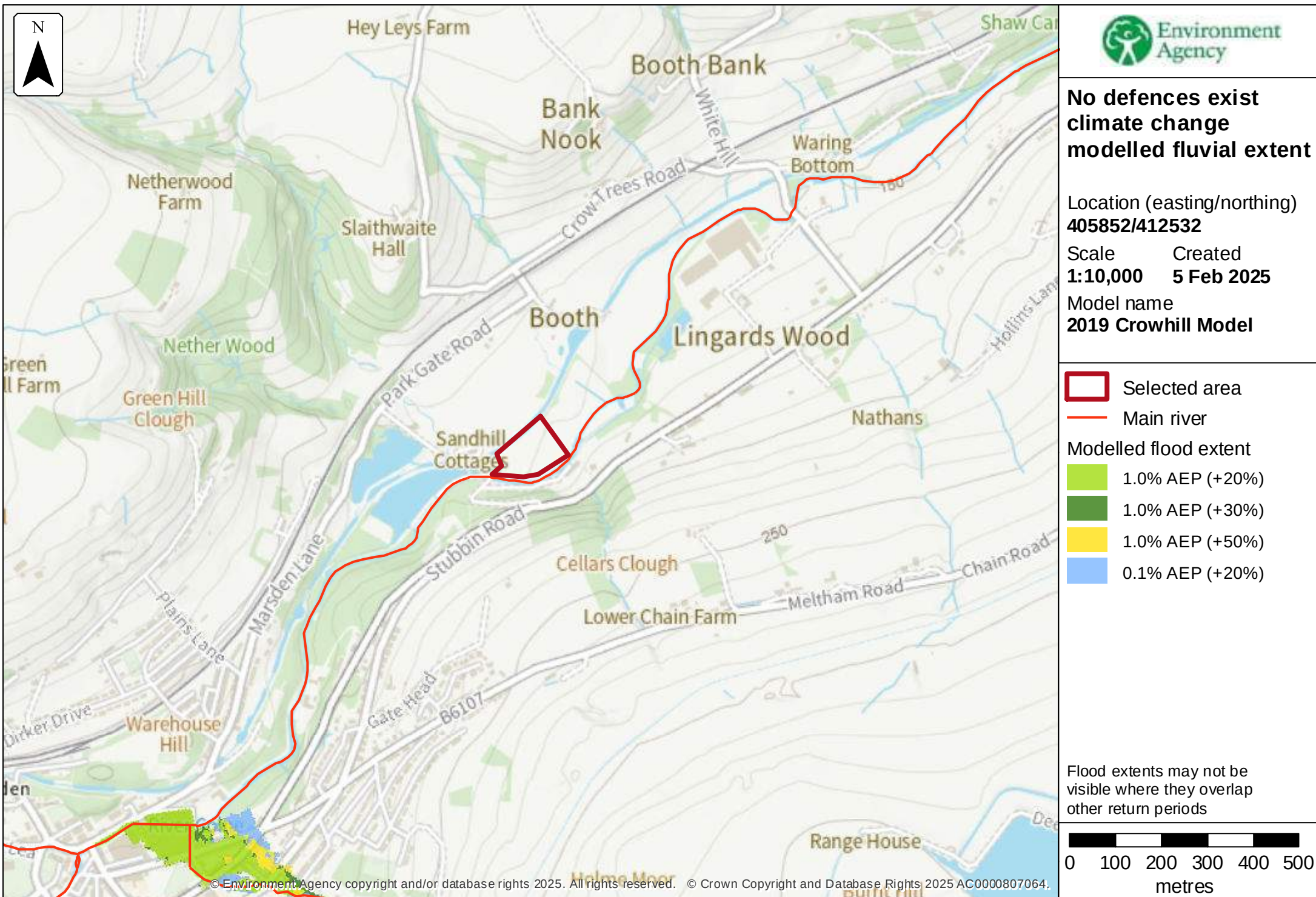














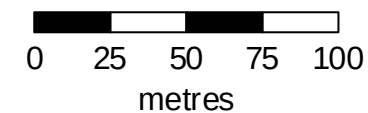
Defended modelled fluvial node locations

Location (easting/northing)
405852/412532

Scale Created
1:2,500 5 Feb 2025

Model name
2019 Colne Model

-  Selected area
-  Modelled location
-  Main river



Modelled node locations data

Defended

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	1198288	405755	412478	160.06	160.25	160.44	160.62	160.68	160.72	160.86	160.96	160.98	161.06	161.16
2	1198187	405773	412474	160.06	160.25	160.44	160.62	160.68	160.72	160.86	160.96	160.98	161.06	161.16
3	1197932	405811	412469	159.69	159.89	160.06	160.21	160.25	160.27	160.34	160.44	160.68	160.92	161.05
4	1197914	405848	412465	159.50	159.69	159.84	160.01	160.08	160.12	160.28	160.41	160.50	160.69	160.92
5	1197850	405880	412475	159.31	159.50	159.66	159.81	159.86	159.88	159.99	160.08	160.14	160.26	160.57
6	1198163	405923	412505	158.90	159.09	159.23	159.32	159.37	159.40	159.50	159.59	159.66	159.80	160.07
7	1198043	405951	412547	158.51	158.65	158.77	158.89	158.93	158.95	159.04	159.12	159.17	159.29	159.54
8	1197816	405955	412554	157.87	158.05	158.22	158.40	158.47	158.51	158.67	158.79	158.85	158.90	159.17
9	1198065	405963	412576	157.57	157.71	157.85	157.99	158.04	158.07	158.20	158.30	158.36	158.47	158.73
10	1198020	405998	412624	156.81	156.90	156.97	157.05	157.07	157.09	157.14	157.18	157.22	157.35	157.73

Data in this table comes from the 2019 Colne Model 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	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	1198288	405755	412478	21.36	27.15	32.94	39.41	42.09	43.64	49.77	55.17	60.47	68.53	92.79
2	1198187	405773	412474	21.36	27.15	32.94	39.41	42.09	43.64	49.77	55.17	60.47	68.53	92.79
3	1197932	405811	412469	22.55	28.74	34.84	41.66	44.44	46.10	52.53	58.19	62.61	72.42	98.98
4	1197914	405848	412465	22.55	28.74	34.84	41.66	44.44	46.10	52.53	58.19	62.61	78.31	98.98
5	1197850	405880	412475	22.55	28.74	34.84	41.66	44.44	46.10	52.53	58.19	62.61	72.42	98.98
6	1198163	405923	412505	22.55	28.74	34.88	41.66	44.44	46.10	52.53	58.19	62.61	73.43	98.97
7	1198043	405951	412547	22.55	28.74	35.0	41.66	44.44	46.10	52.53	58.19	62.61	72.42	98.97
8	1197816	405955	412554	22.55	28.74	35.0	41.66	44.44	46.10	52.53	58.19	62.61	72.42	98.97
9	1198065	405963	412576	22.55	28.74	34.94	41.66	44.44	46.10	52.53	58.19	62.61	72.42	98.97
10	1198020	405998	412624	22.55	28.74	34.94	41.66	44.44	46.10	52.53	58.19	62.61	72.42	98.97

Data in this table comes from the 2019 Colne Model 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.



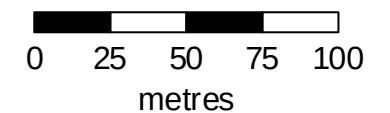
Defences removed modelled fluvial node locations

Location (easting/northing)
405852/412532

Scale Created
1:2,500 5 Feb 2025

Model name
2019 Colne Model

-  Selected area
-  Modelled location
-  Main river



Modelled node locations data

Defences removed

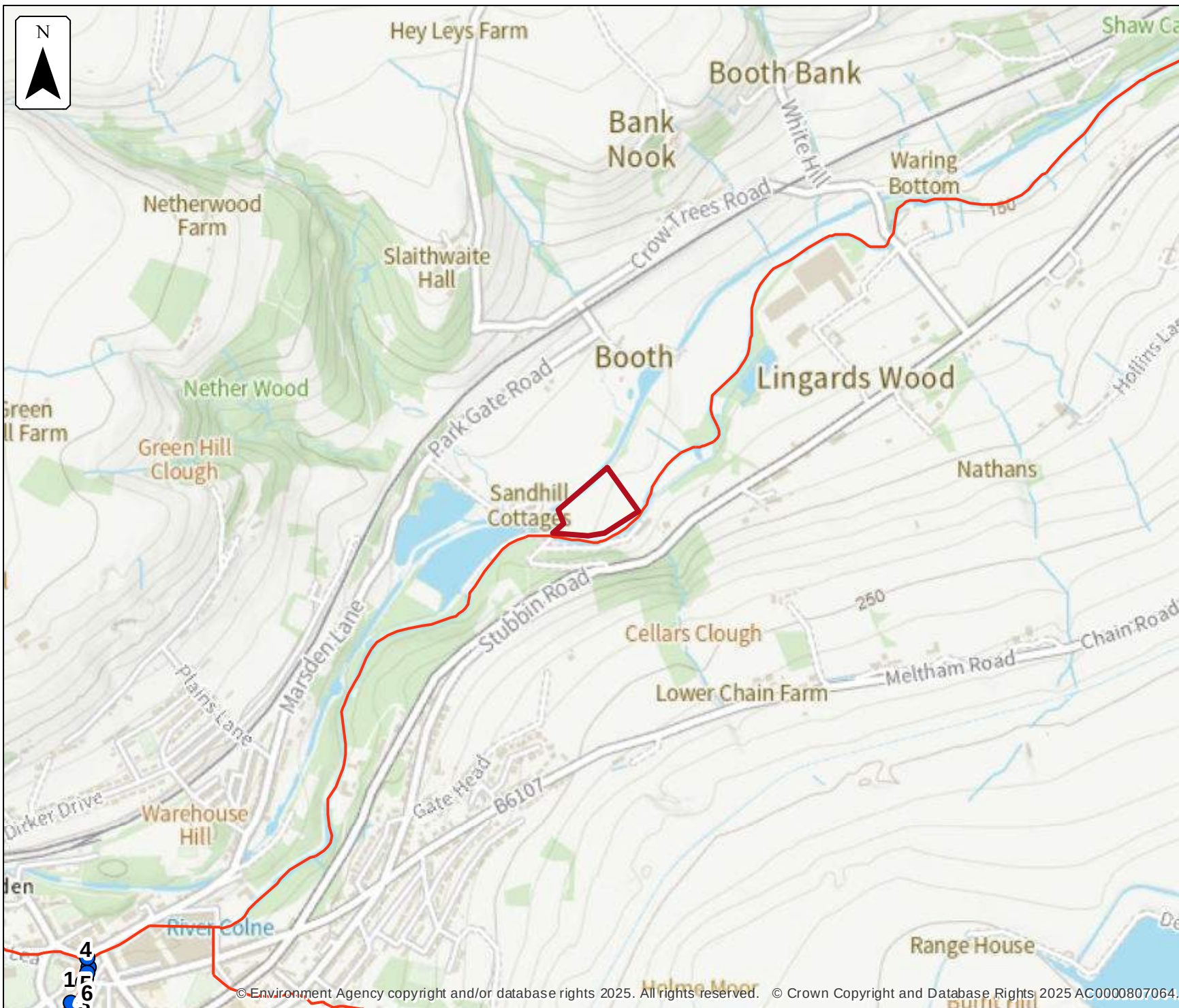
Label	Modelled location ID	Easting	Northing	10% AEP	3.33% AEP	1% AEP	0.1% AEP	10% AEP	3.33% AEP	1% AEP	0.1% AEP
				Level	Level	Level	Level	Flow	Flow	Flow	Flow
1	1198288	405755	412478	160.44	160.72	160.98	161.16	32.94	43.64	60.47	92.79
2	1198187	405773	412474	160.44	160.72	160.98	161.16	32.94	43.64	60.47	92.79
3	1197932	405811	412469	160.06	160.27	160.68	161.05	34.84	46.10	62.61	98.98
4	1197914	405848	412465	159.84	160.12	160.50	160.92	34.84	46.10	62.61	98.98
5	1197850	405880	412475	159.66	159.88	160.14	160.57	34.84	46.10	62.61	98.98
6	1198163	405923	412505	159.23	159.40	159.66	160.07	34.88	46.10	62.61	98.97
7	1198043	405951	412547	158.77	158.95	159.17	159.54	35.0	46.10	62.61	98.97
8	1197816	405955	412554	158.22	158.51	158.85	159.17	35.0	46.10	62.61	98.97
9	1198065	405963	412576	157.85	158.07	158.36	158.73	34.94	46.10	62.61	98.97
10	1198020	405998	412624	156.97	157.09	157.22	157.73	34.94	46.10	62.61	98.97

Data in this table comes from the 2019 Colne Model 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.



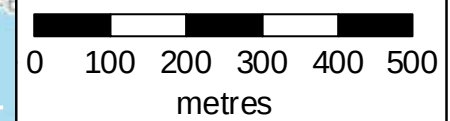
**No defences exist
modelled fluvial
node locations**

Location (easting/northing)
405852/412532

Scale Created
1:10,000 5 Feb 2025

Model name
2019 Wessenden Model

- Selected area
- Modelled location
- Main river



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	1199842	404833	411571	180.45	180.58	180.67	180.77	180.79	180.82	180.89	180.95	181.0	181.12	181.49
2	1199856	404858	411610	180.23	180.31	180.35	180.40	180.41	180.42	180.46	180.48	180.50	180.55	180.66
3	1199839	404862	411618	180.23	180.31	180.35	180.40	180.41	180.42	180.46	180.48	180.50	180.55	180.65
4	1199840	404865	411628	180.20	180.28	180.33	180.38	180.39	180.41	180.45	180.48	180.51	180.57	180.75
5	1199851	404866	411658	178.0	178.0	178.0	178.0	178.0	178.0	178.0	178.0	178.0	178.0	178.0
6	1199831	404867	411639	178.0	178.01	178.01	178.01	178.02	178.02	178.02	178.03	178.03	178.05	178.10

Data in this table comes from the 2019 Wessenden Model 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

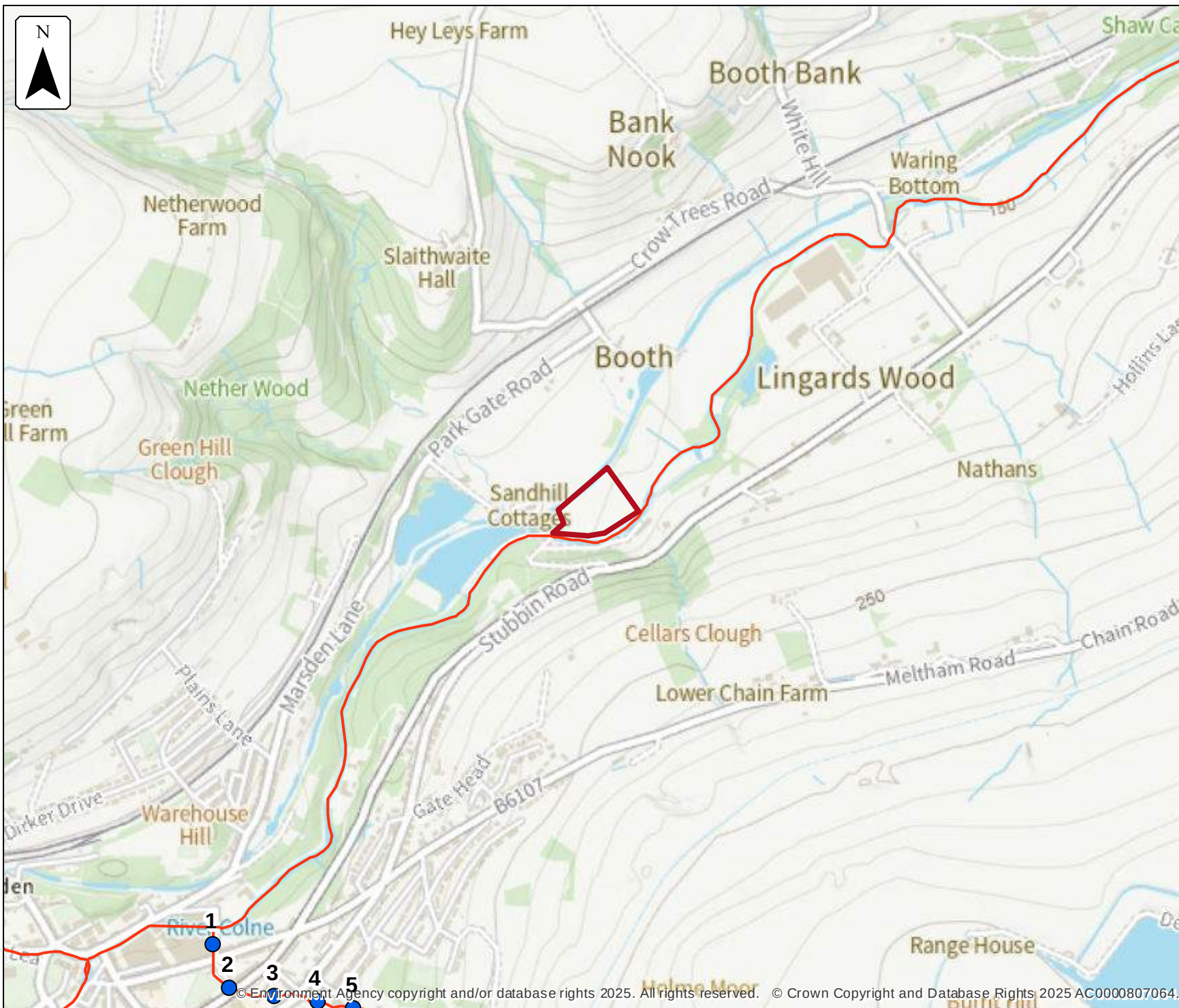
Label	Modelled location ID	Easting	Northing	50% AEP	20% AEP	10% AEP	5% AEP	4% AEP	3.33% AEP	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
				Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow
1	1199842	404833	411571	9.0	12.08	14.41	16.98	17.86	18.63	20.95	22.98	24.54	28.84	41.99
2	1199856	404858	411610	9.0	12.08	14.41	16.98	17.86	18.63	20.95	22.98	24.55	28.84	41.99
3	1199839	404862	411618	9.0	12.08	14.41	16.98	17.86	18.63	20.95	22.98	24.55	28.84	41.99
4	1199840	404865	411628	9.0	12.08	14.41	16.98	17.86	18.63	20.95	22.98	24.55	28.84	41.99
5	1199851	404866	411658	9.0	12.08	14.41	16.98	17.86	18.63	20.95	22.98	24.55	28.84	41.99
6	1199831	404867	411639	9.0	12.08	14.41	16.98	17.86	18.63	20.95	22.98	24.55	28.84	41.99

Data in this table comes from the 2019 Wessenden Model 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.



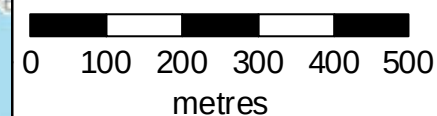
**No defences exist
modelled fluvial
node locations**

Location (easting/northing)
405852/412532

Scale Created
1:10,000 5 Feb 2025

Model name
2019 Crowhill Model

-  Selected area
-  Modelled location
-  Main river



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	1199909	405109	411684	175.81	175.93	176.01	176.11	176.14	176.17	176.24	176.31	176.35	176.40	176.49
2	1199916	405141	411599	184.07	184.13	184.17	184.21	184.22	184.24	184.33	184.43	184.49	184.57	184.68
3	1199927	405227	411583	191.81	191.92	192.0	192.08	192.11	192.14	192.20	192.27	192.30	192.35	192.43
4	1199914	405311	411573	199.72	199.75	199.77	199.80	199.80	199.81	199.83	199.84	199.85	199.86	199.87
5	1199928	405383	411560	207.13	207.29	207.41	207.55	207.60	207.64	207.86	208.48	209.18	210.32	210.55

Data in this table comes from the 2019 Crowhill Model 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	1199909	405109	411684	0.46	0.65	0.79	0.96	1.02	1.07	1.22	1.36	1.44	1.56	1.76
2	1199916	405141	411599	0.46	0.65	0.79	0.96	1.02	1.07	1.22	1.36	1.44	1.56	1.76
3	1199927	405227	411583	0.46	0.65	0.79	0.96	1.02	1.07	1.22	1.36	1.44	1.56	1.74
4	1199914	405311	411573	0.46	0.65	0.79	0.96	1.02	1.07	1.22	1.36	1.44	1.53	1.61
5	1199928	405383	411560	0.46	0.65	0.79	0.96	1.02	1.07	1.22	1.36	1.90	1.98	2.07

Data in this table comes from the 2019 Crowhill Model 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.



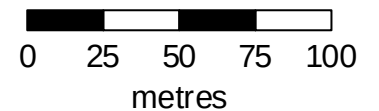
Defences removed climate change modelled fluvial node locations

Location (easting/northing)
405852/412532

Scale Created
1:2,500 5 Feb 2025

Model name
2019 Colne Model

-  Selected area
-  Modelled location
-  Main river



Modelled node locations data

Defences removed climate change

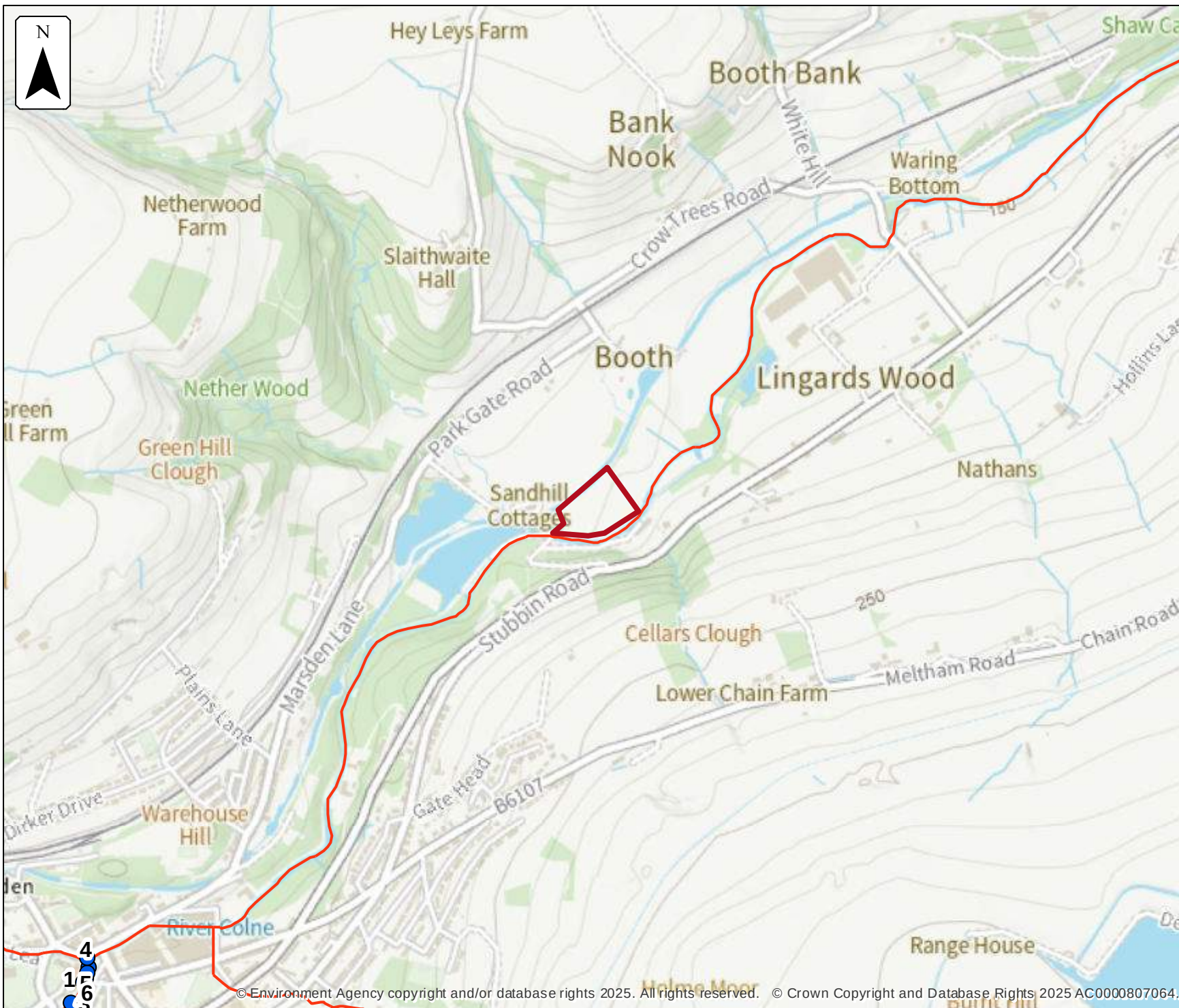
Label	Modelled location ID	Easting	Northing	1% AEP (+20%)	1% AEP (+30%)	1% AEP (+50%)	0.1% AEP (+20%)	1% AEP (+20%)	1% AEP (+30%)	1% AEP (+50%)	0.1% AEP (+20%)
				Level	Level	Level	Level	Flow	Flow	Flow	Flow
1	1198288	405755	412478	161.06	161.09	161.13	161.36	71.25	77.19	89.06	111.25
2	1198187	405773	412474	161.06	161.09	161.13	161.36	71.25	77.19	89.06	111.25
3	1197932	405811	412469	160.91	160.92	161.01	161.21	75.14	81.40	93.92	118.51
4	1197914	405848	412465	160.71	160.77	160.88	161.07	78.44	81.40	93.92	118.51
5	1197850	405880	412475	160.29	160.39	160.53	160.77	75.14	81.40	93.92	118.51
6	1198163	405923	412505	159.82	159.89	160.01	160.16	75.14	81.40	93.92	118.51
7	1198043	405951	412547	159.32	159.38	159.49	159.70	75.14	81.40	93.92	118.51
8	1197816	405955	412554	158.92	158.99	159.12	159.34	75.14	81.40	93.92	118.51
9	1198065	405963	412576	158.49	158.55	158.67	158.88	75.14	81.40	93.92	118.51
10	1198020	405998	412624	157.39	157.49	157.66	158.0	75.14	81.40	93.92	118.51

Data in this table comes from the 2019 Colne Model 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.



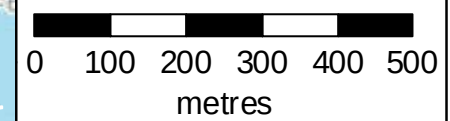
**No defences exist
climate change
modelled fluvial
node locations**

Location (easting/northing)
405852/412532

Scale Created
1:10,000 5 Feb 2025

Model name
2019 Wessenden Model

-  Selected area
-  Modelled location
-  Main river



Modelled node locations data

No defences exist climate change

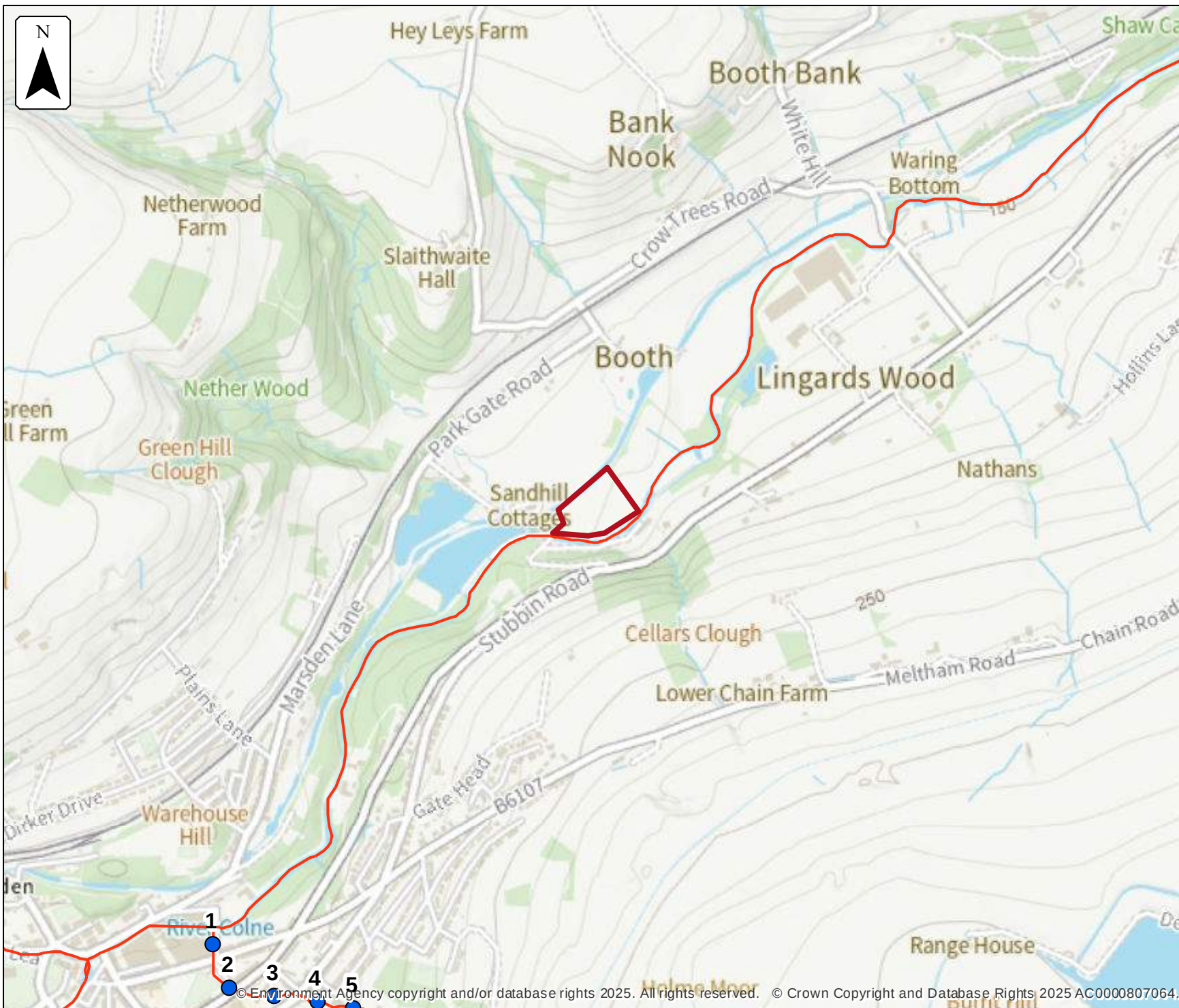
Label	Modelled location ID	Easting	Northing	1% AEP (+20%)	1% AEP (+30%)	1% AEP (+50%)	0.1% AEP (+20%)	1% AEP (+20%)	1% AEP (+30%)	1% AEP (+50%)	0.1% AEP (+20%)
				Level	Level	Level	Level	Flow	Flow	Flow	Flow
1	1199842	404833	411571	181.13	181.20	181.38	181.81	29.47	32.01	36.84	52.18
2	1199856	404858	411610	180.56	180.59	180.61	181.31	29.47	32.60	36.84	50.40
3	1199839	404862	411618	180.55	180.59	180.61	180.98	29.47	32.60	36.84	50.40
4	1199840	404865	411628	180.58	180.62	180.68	180.86	29.47	31.92	36.84	50.40
5	1199851	404866	411658	178.0	178.0	178.0	178.0	29.47	32.34	36.84	50.40
6	1199831	404867	411639	178.05	178.09	178.09	178.19	29.47	31.92	36.84	50.40

Data in this table comes from the 2019 Wessenden Model 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.



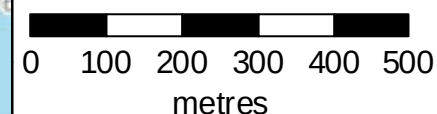
**No defences exist
climate change
modelled fluvial
node locations**

Location (easting/northing)
405852/412532

Scale Created
1:10,000 5 Feb 2025

Model name
2019 Crowhill Model

-  Selected area
-  Modelled location
-  Main river



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Modelled node locations data

No defences exist climate change

Label	Modelled location ID	Easting	Northing	1% AEP (+20%)	1% AEP (+30%)	1% AEP (+50%)	0.1% AEP (+20%)	1% AEP (+20%)	1% AEP (+30%)	1% AEP (+50%)	0.1% AEP (+20%)
				Level	Level	Level	Level	Flow	Flow	Flow	Flow
1	1199909	405109	411684	176.40	176.42	176.43	176.55	1.56	1.59	1.64	1.89
2	1199916	405141	411599	184.57	184.59	184.61	184.74	1.56	1.59	1.64	1.88
3	1199927	405227	411583	192.35	192.37	192.38	192.47	1.56	1.59	1.63	1.86
4	1199914	405311	411573	199.86	199.86	199.86	199.87	1.53	1.55	1.57	1.65
5	1199928	405383	411560	210.32	210.38	210.46	210.62	1.99	1.98	2.05	2.10

Data in this table comes from the 2019 Crowhill Model 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 modelled fluvial extent and height

Location (easting/northing)
405852/412532

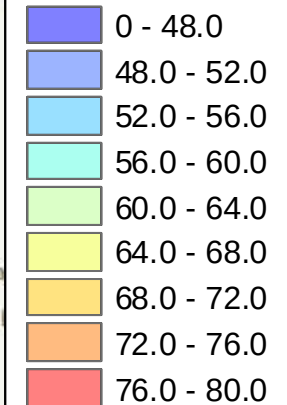
Scale Created
1:1,000 5 Feb 2025

Model name
2019 Colne Model

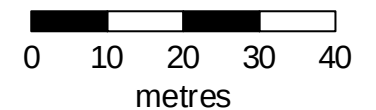
 Selected area

 Main river

Modelled 2D grid
Water level in mAOD



This map shows the
0.1% AEP height data



Sample point data

Defended

Label	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
			Depth	Depth	Depth	Depth	Depth	Depth	Depth	Depth	Depth	Depth	Depth
1	405768	412476	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
2	405796	412476	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
3	405824	412476	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
4	405852	412476	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
5	405880	412476	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
6	405796	412504	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
7	405824	412504	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
8	405852	412504	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
9	405880	412504	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
10	405908	412504	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
11	405768	412532	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
12	405796	412532	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
13	405824	412532	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
14	405852	412532	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
15	405880	412532	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
16	405908	412532	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData

Label	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
			Depth	Depth	Depth	Depth	Depth	Depth	Depth	Depth	Depth	Depth	Depth
17	405936	412532	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
18	405796	412560	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
19	405824	412560	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
20	405852	412560	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
21	405880	412560	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
22	405908	412560	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
23	405852	412588	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
24	405880	412588	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
25	405908	412588	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
26	405880	412616	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
Max value in selected area:			NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData

Data in this table comes from the 2019 Colne Model model.

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

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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.

Defended

Label	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
			Height	Height	Height	Height	Height	Height	Height	Height	Height	Height	Height
1	405768	412476	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
2	405796	412476	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
3	405824	412476	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
4	405852	412476	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
5	405880	412476	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
6	405796	412504	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
7	405824	412504	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
8	405852	412504	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
9	405880	412504	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
10	405908	412504	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
11	405768	412532	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
12	405796	412532	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
13	405824	412532	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
14	405852	412532	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
15	405880	412532	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
16	405908	412532	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
17	405936	412532	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
18	405796	412560	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData

Label	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
			Height	Height	Height	Height	Height	Height	Height	Height	Height	Height	Height
19	405824	412560	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
20	405852	412560	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
21	405880	412560	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
22	405908	412560	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
23	405852	412588	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
24	405880	412588	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
25	405908	412588	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
26	405880	412616	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
Max value in selected area:			NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData

Data in this table comes from the 2019 Colne Model 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.



Defences removed modelled fluvial extent and height

Location (easting/northing)
405852/412532

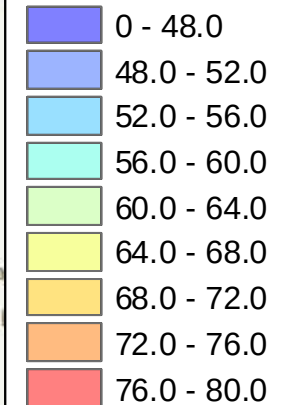
Scale Created
1:1,000 5 Feb 2025

Model name
2019 Colne Model

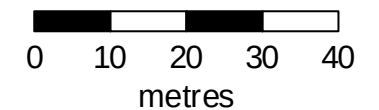
 Selected area

 Main river

Modelled 2D grid
Water level in mAOD



This map shows the
0.1% AEP height data



Sample point data

Defences removed

Label	Easting	Northing	10% AEP	3.33% AEP	1% AEP	0.1% AEP	10% AEP	3.33% AEP	1% AEP	0.1% AEP
			Depth	Depth	Depth	Depth	Height	Height	Height	Height
1	405768	412476	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
2	405796	412476	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
3	405824	412476	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
4	405852	412476	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
5	405880	412476	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
6	405796	412504	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
7	405824	412504	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
8	405852	412504	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
9	405880	412504	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
10	405908	412504	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
11	405768	412532	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
12	405796	412532	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
13	405824	412532	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
14	405852	412532	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
15	405880	412532	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
16	405908	412532	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData

Label	Easting	Northing	10% AEP	3.33% AEP	1% AEP	0.1% AEP	10% AEP	3.33% AEP	1% AEP	0.1% AEP
			Depth	Depth	Depth	Depth	Height	Height	Height	Height
17	405936	412532	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
18	405796	412560	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
19	405824	412560	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
20	405852	412560	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
21	405880	412560	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
22	405908	412560	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
23	405852	412588	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
24	405880	412588	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
25	405908	412588	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
26	405880	412616	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
Max value in selected area:			NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData

Data in this table comes from the 2019 Colne Model 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.



No defences exist modelled fluvial extent and height

Location (easting/northing)
405852/412532

Scale Created
1:1,000 5 Feb 2025

Model name
2019 Crowhill Model

 Selected area

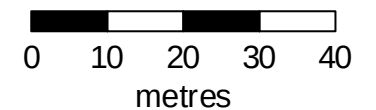
 Main river

Modelled 2D grid

Water level in mAOD

-  0 - 174.0
-  174.0 - 178.625
-  178.625 - 183.25
-  183.25 - 187.875
-  187.875 - 192.5
-  192.5 - 197.125
-  197.125 - 201.75
-  201.75 - 206.375
-  206.375 - 211.0

This map shows the
0.1% AEP height data



Sample point data

No defences exist

Label	Easting	Northing	4% AEP	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP	4% AEP	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
			Depth	Depth	Depth	Depth	Depth	Depth	Height	Height	Height	Height	Height	Height
1	405768	412476	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
2	405796	412476	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
3	405824	412476	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
4	405852	412476	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
5	405880	412476	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
6	405796	412504	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
7	405824	412504	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
8	405852	412504	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
9	405880	412504	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
10	405908	412504	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
11	405768	412532	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
12	405796	412532	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
13	405824	412532	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
14	405852	412532	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
15	405880	412532	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
16	405908	412532	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData

Label	Easting	Northing	4% AEP	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP	4% AEP	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
			Depth	Depth	Depth	Depth	Depth	Depth	Height	Height	Height	Height	Height	Height
17	405936	412532	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
18	405796	412560	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
19	405824	412560	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
20	405852	412560	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
21	405880	412560	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
22	405908	412560	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
23	405852	412588	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
24	405880	412588	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
25	405908	412588	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
26	405880	412616	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
Max value in selected area:			NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData

Data in this table comes from the 2019 Crowhill Model model.

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

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**Defences removed
climate change
modelled fluvial
extent and height**

Location (easting/northing)
405852/412532

Scale Created
1:1,000 5 Feb 2025

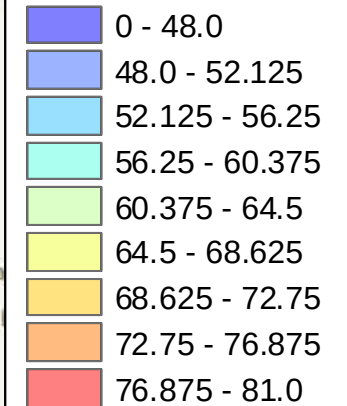
Model name
2019 Colne Model

 Selected area

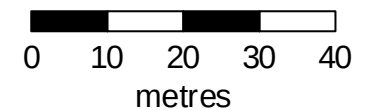
 Main river

Modelled 2D grid

Water level in mAOD



This map shows the
0.1% AEP +20% height data



Sample point data

Defences removed climate change

Label	Easting	Northing	1% AEP (+20%)	1% AEP (+30%)	1% AEP (+50%)	0.1% AEP (+20%)	1% AEP (+20%)	1% AEP (+30%)	1% AEP (+50%)	0.1% AEP (+20%)
			Depth	Depth	Depth	Depth	Height	Height	Height	Height
1	405768	412476	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
2	405796	412476	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
3	405824	412476	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
4	405852	412476	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
5	405880	412476	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
6	405796	412504	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
7	405824	412504	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
8	405852	412504	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
9	405880	412504	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
10	405908	412504	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
11	405768	412532	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
12	405796	412532	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
13	405824	412532	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
14	405852	412532	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
15	405880	412532	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
16	405908	412532	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData

Label	Easting	Northing	1% AEP (+20%)	1% AEP (+30%)	1% AEP (+50%)	0.1% AEP (+20%)	1% AEP (+20%)	1% AEP (+30%)	1% AEP (+50%)	0.1% AEP (+20%)
			Depth	Depth	Depth	Depth	Height	Height	Height	Height
17	405936	412532	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
18	405796	412560	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
19	405824	412560	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
20	405852	412560	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
21	405880	412560	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
22	405908	412560	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
23	405852	412588	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
24	405880	412588	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
25	405908	412588	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
26	405880	412616	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
Max value in selected area:			NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData

Data in this table comes from the 2019 Colne Model model.

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

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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.



**No defences exist
climate change
modelled fluvial
extent and height**

Location (easting/northing)
405852/412532

Scale Created
1:1,000 5 Feb 2025

Model name
2019 Crowhill Model

 Selected area

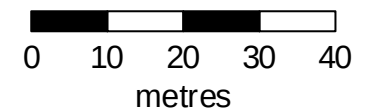
 Main river

Modelled 2D grid

Water level in mAOD

-  0 - 174.0
-  174.0 - 178.625
-  178.625 - 183.25
-  183.25 - 187.875
-  187.875 - 192.5
-  192.5 - 197.125
-  197.125 - 201.75
-  201.75 - 206.375
-  206.375 - 211.0

This map shows the
0.1% AEP +20% height data



Sample point data

No defences exist climate change

Label	Easting	Northing	1% AEP (+20%)	1% AEP (+30%)	1% AEP (+50%)	0.1% AEP (+20%)	1% AEP (+20%)	1% AEP (+30%)	1% AEP (+50%)	0.1% AEP (+20%)
			Depth	Depth	Depth	Depth	Height	Height	Height	Height
1	405768	412476	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
2	405796	412476	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
3	405824	412476	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
4	405852	412476	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
5	405880	412476	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
6	405796	412504	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
7	405824	412504	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
8	405852	412504	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
9	405880	412504	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
10	405908	412504	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
11	405768	412532	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
12	405796	412532	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
13	405824	412532	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
14	405852	412532	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
15	405880	412532	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
16	405908	412532	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData

Label	Easting	Northing	1% AEP (+20%)	1% AEP (+30%)	1% AEP (+50%)	0.1% AEP (+20%)	1% AEP (+20%)	1% AEP (+30%)	1% AEP (+50%)	0.1% AEP (+20%)
			Depth	Depth	Depth	Depth	Height	Height	Height	Height
17	405936	412532	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
18	405796	412560	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
19	405824	412560	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
20	405852	412560	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
21	405880	412560	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
22	405908	412560	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
23	405852	412588	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
24	405880	412588	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
25	405908	412588	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
26	405880	412616	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
Max value in selected area:			NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData

Data in this table comes from the 2019 Crowhill Model 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](#)

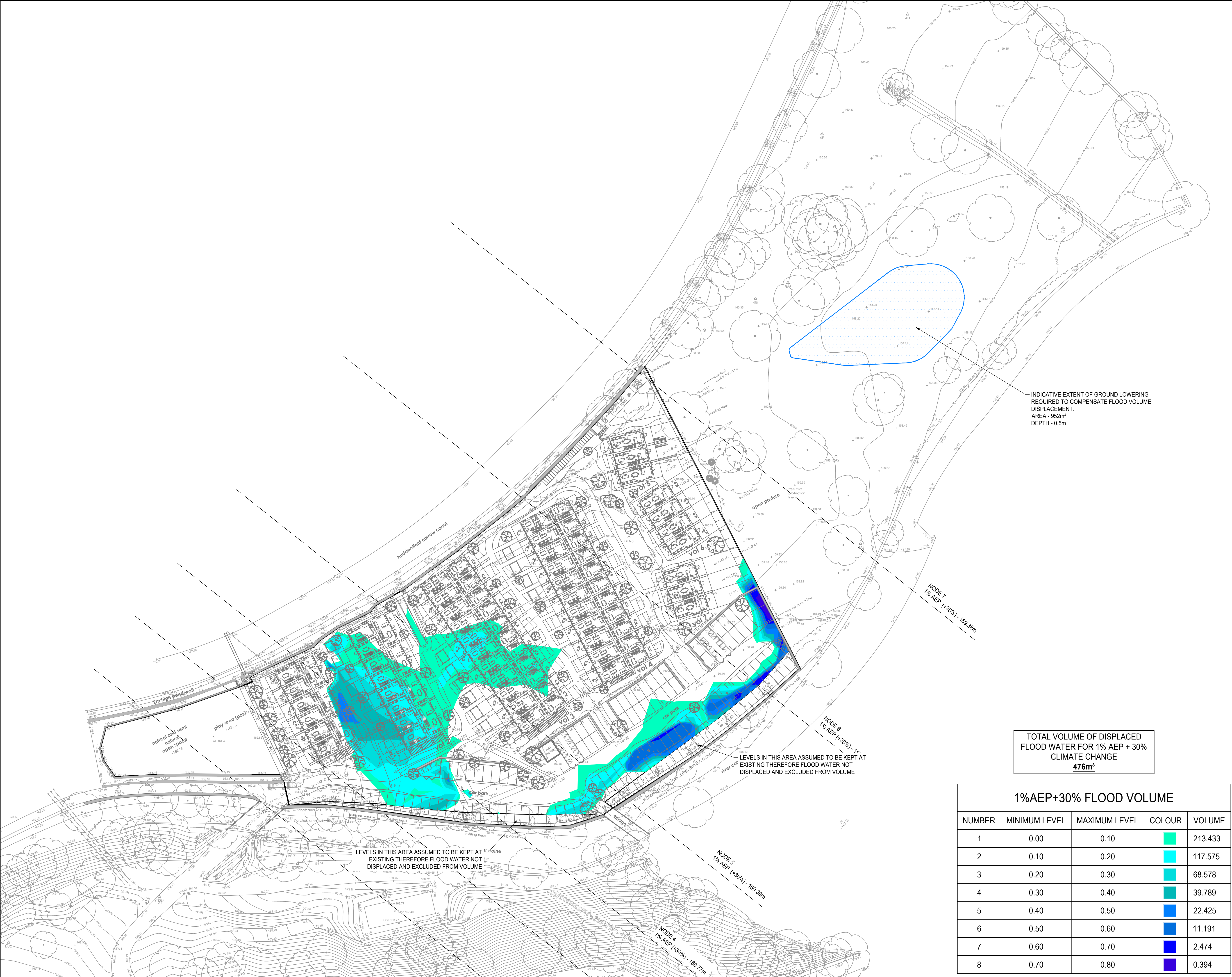
Help and advice

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

Appendix E – Compensatory Storage

FILE LOCATION PATH: P:\PROJECTS\HOT3884\CELLARS CLOUGH, MARSDEN\04 BIM\CIVIL\DRAWINGS\3884-CIV-XX-XX-D-C-00001 1% AEP+30% FLOOD EXTENT.DWG



STANDARD NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECT'S AND ENGINEER'S DRAWINGS AND THE SPECIFICATIONS.

2. THIS DRAWING SHOULD NOT BE SCALED.

3. ALL DIMENSIONS ARE TO BE VERIFIED BY THE CONTRACTOR ON SITE.

4. ALL DISCREPANCIES SHOULD BE REPORTED TO C.A./E.A. PRIOR TO THE COMMENCEMENT OF WORKS.

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NOTES

1. SITE PLAN RECEIVED FROM CITU 15.08.2025, DRG REFERENCE XREF-SITE PLAN.

2. TOPOGRAPHICAL SURVEY RECEIVED FROM CITU 29.07.2025, UNDERTAKEN BY POWERS ON 28.05.2025

3. 1% AEP + 30% CLIMATE CHANGE RIVER FLOOD LEVELS RECEIVED FROM THE ENVIRONMENT AGENCY 05.03.2025.

13.08.25	P01	ISSUED FOR INFORMATION	TC	JF
DATE	REV	DESCRIPTION	DRAWN	CHKD

CIVICENGINEERS

civicingengineers.com

PROJECT

CELLARS CLOUGH
MARSDEN

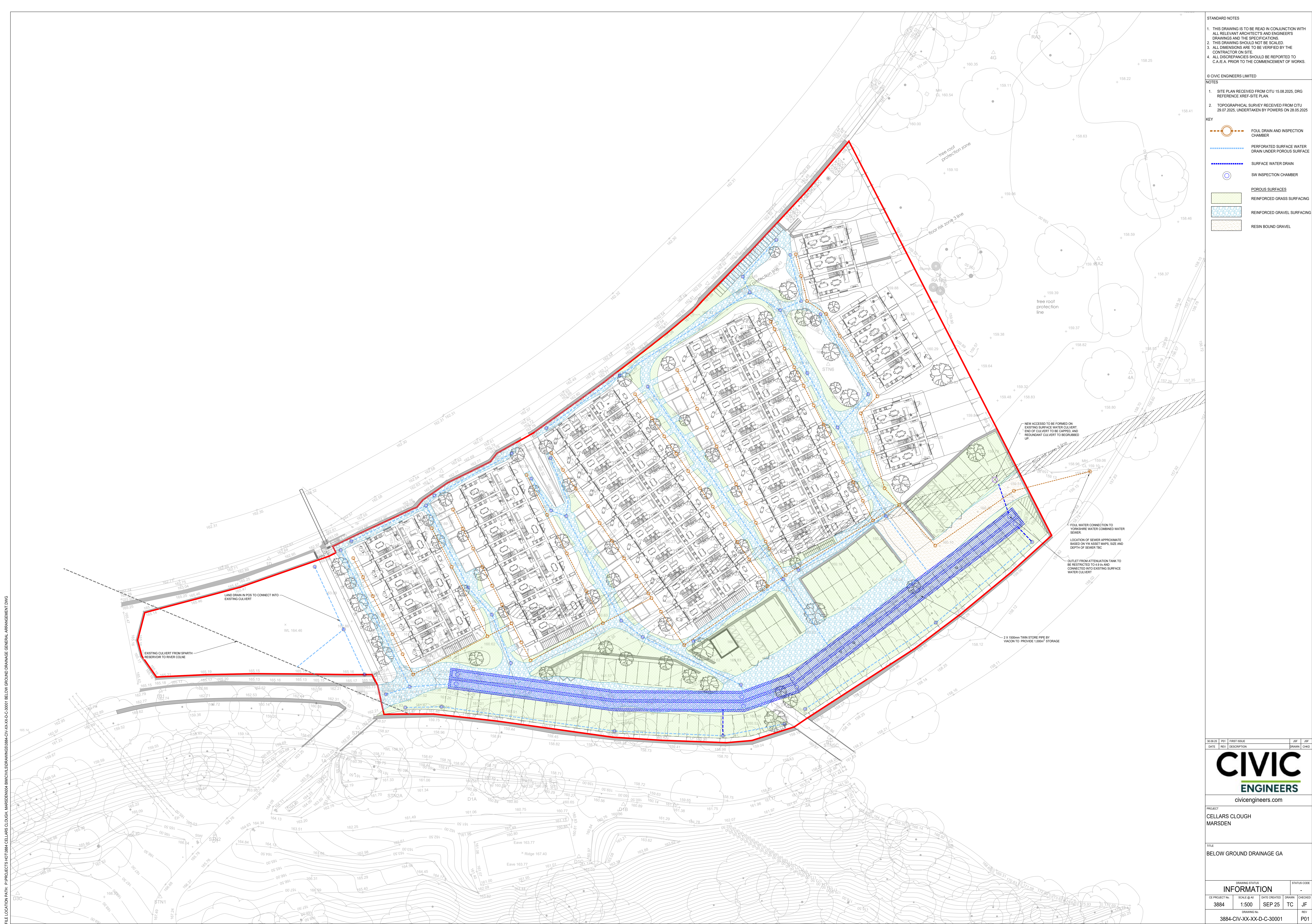
TITLE

1% AEP + 30% CLIMATE CHANGE
FLOOD EXTENT

DRAWING STATUS					STATUS CODE	
INFORMATION					-	
CE PROJECT No.	SCALE @ A1	DATE CREATED	DRAWN	CHECKED	REV	REV
3884	1:500	AUG 25	TC	JF		
DRAWING No.					REV	
3884-CIV-XX-XX-D-C-00001					P01	

Appendix F – Drainage Strategy

FILE LOCATION: PATH: P:\PROJECTS\HOT3884\CELLARS CLOUGH MARS DEN\000 BENCH MARKS\DRAWINGS\3884-CIV-XX-D-C-3001 BELOW GROUND DRAINAGE GENERAL ARRANGEMENT.DWG



STANDARD NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS' DRAWINGS AND THE SPECIFICATIONS.

2. THIS DRAWING SHOULD NOT BE SCALED.

3. ALL DIMENSIONS ARE TO BE VERIFIED BY THE CONTRACTOR ON SITE.

4. ALL DISCREPANCIES SHOULD BE REPORTED TO C.A.I.E.A. PRIOR TO THE COMMENCEMENT OF WORKS.

NOTES

1. SITE PLAN RECEIVED FROM CITI 15.08.2025, DRG REFERENCE XREF-SITE PLAN.

2. TOPOGRAPHICAL SURVEY RECEIVED FROM CITI 29.07.2025, UNDERTAKEN BY POWERS ON 28.05.2025

KEY

FOUL DRAIN AND INSPECTION CHAMBER

PERFORATED SURFACE WATER DRAIN UNDER POROUS SURFACE

SURFACE WATER DRAIN

SW INSPECTION CHAMBER

POROUS SURFACES

REINFORCED GRASS SURFACING

REINFORCED GRAVEL SURFACING

RESIN BOUND GRAVEL

30.09.25

P01

FIRST ISSUE

JBF

JBF

DATE

REV

DESCRIPTION

DRAWN

CHKD

CIVIC

ENGINEERS

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PROJECT

CELLARS CLOUGH
MARS DEN

TITLE

BELOW GROUND DRAINAGE GA

DRAWING STATUS

STATUS CODE

INFORMATION

CE PROJECT No

SCALE @ A0

DATE CREATED

DRAWN

CHECKED

3884

1:500

SEP 25

TC

JF

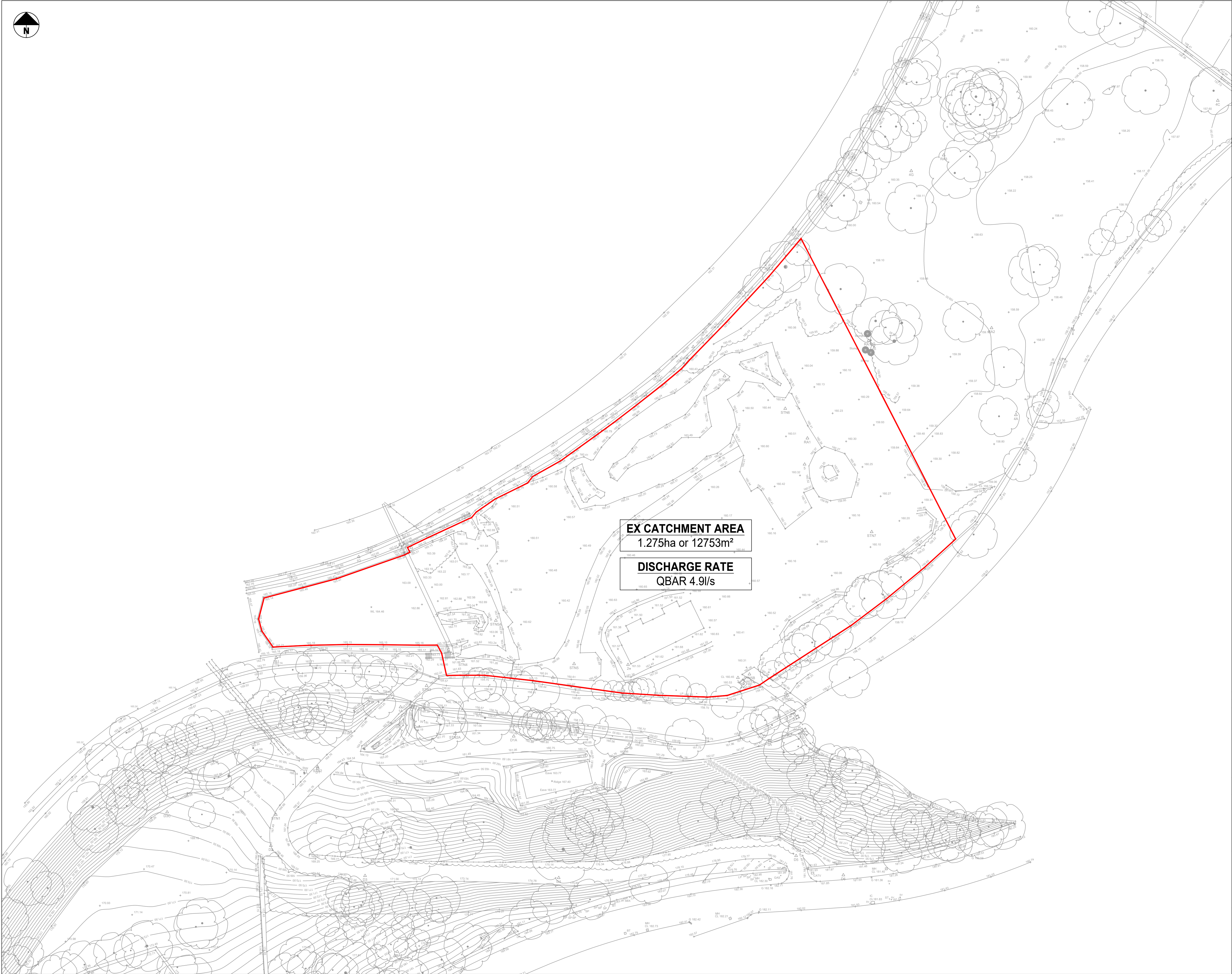
DRAWING No

REV

3884-CIV-XX-XX-D-C-30001

P01

Appendix G - Greenfield Run Off Rate



STANDARD NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECT'S AND ENGINEER'S DRAWINGS AND THE SPECIFICATIONS.
2. THIS DRAWING SHOULD NOT BE SCALED.
3. ALL DIMENSIONS ARE TO BE VERIFIED BY THE CONTRACTOR ON SITE.
4. ALL DISCREPANCIES SHOULD BE REPORTED TO C.A./E.A. PRIOR TO THE COMMENCEMENT OF WORKS.

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- NOTES
1. SITE PLAN RECEIVED FROM CITU 15.08.2025, DRG REFERENCE XREF-SITE PLAN.
 2. TOPOGRAPHICAL SURVEY RECEIVED FROM CITU 29.07.2025, UNDERTAKEN BY POWERS ON 28.05.2025

20.08.25	P01	ISSUED FOR INFORMATION	TC	JF
DATE	REV	DESCRIPTION	DRAWN	CHKD



civicingengineers.com

PROJECT

CELLARS CLOUGH
MARSDEN

TITLE

EXISTING CATCHMENT GA

DRAWING STATUS					STATUS CODE
INFORMATION					-
CE PROJECT No.	SCALE @ A1	DATE CREATED	DRAWN	CHECKED	
3884	1:500	AUG 25	TC	JF	
DRAWING No.					REV
3884-CIV-XX-XX-D-C-10001					P01

CIVIC