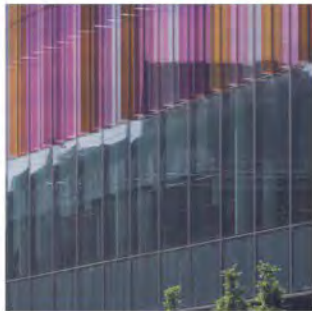
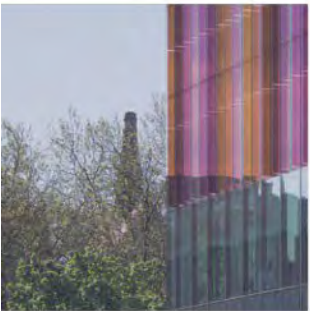
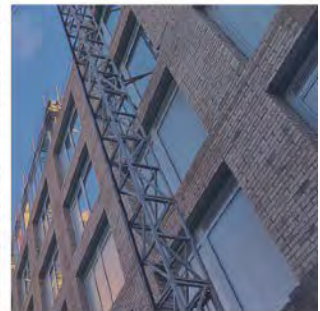
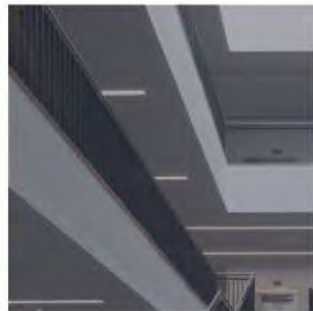
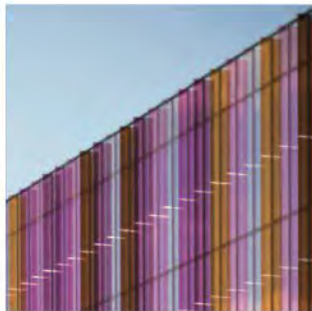
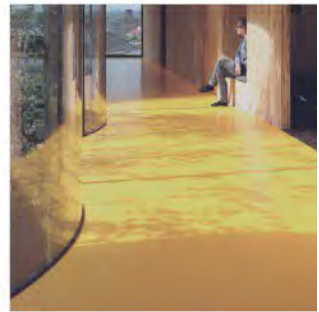


PIXB – Huddersfield

Flood Risk Assessment

Doc Ref: 15106-BKP-XX-XX-RP-C-0001

Date: 18.06.2024



boothking



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1.0 INTRODUCTION & SCOPE

1.1 – Introduction

Booth King Partnership Ltd. (BKP) were commissioned by Whitbread Group PLC to carry out Flood Risk Assessment (FRA) for an extension building at an existing Premier Inn Hotel in St Andrew's Road, Aspley, Huddersfield, HD1 6SB.

This FRA has been prepared in accordance with the National Planning Policy Framework (NPPF), Flood Risk and Coastal Change (www.gov.uk/guidance/flood-risk-and-coastal-change) and Planning Practice Guidance, as well as Environment Agency (EA) Guidance and the local Strategic Flood Risk Assessment (SFRA) Level 1 & 2. A full list of documents used to inform this report is shown in the Reference section.

Although the site has an area of less than 1 hectare, it lies within Flood Zone 3, therefore an FRA is compulsory in accordance with the NPPF. The proposed development should not increase the risk of flooding elsewhere and this FRA has therefore been prepared to demonstrate that this has been achieved. Consideration has also been given to BREEAM accreditation, including the requirements of Pol 03, the risk of pollution to controlled waters and the site conditions prior to, during and after development.

This report aims to identify and assess the risks of all forms of flooding to and from the site and demonstrate how these flood risks will be managed, taking climate change into account. The Flood Risk Assessment also considers the management of surface water run-off and outlines the proposed drainage strategy.

It is the assumption wherever possible that ground levels post-development will remain as close to existing as is practical. If this or other key assumptions change, then the conclusions within this report may need to be reassessed to check that they are still applicable.

This report is based on information obtained from the recently undertaken site topographical and buried utilities survey, and drainage record plans.

1.2 – Scope

Our client Whitbread PLC has requested Booth-King Partnership Ltd. to undertake a flood risk assessment for Flood Zone 3a, a scheme drainage design and provide this drainage strategy for the purposes of planning permission with Kirklees Council for a new 25-bedroom extension, shown in Figure 1.

2.0 EXISTING SITE

2.1 – Location

The site is located at Southgate area in Huddersfield and surrounded by the Huddersfield Broad Canal, the Apsley Wharf and St. Andrew's Road. The site covers an area of approximately 0.29ha and it is located at Ordnance Survey Grid reference E: 415035, N: 416526.

A Site Location Plan can be found in Appendix A.



Figure 1.
Existing Site

2.2 – Site Levels

A topographic survey of the site has been completed and it shows that the site slopes from the northwest towards the southeast boundary with elevation differences of circa 0.1m and 0.56m respectively. Land elevations in the north are approximately 64.56m AOD and approximately 64.02m AOD in the south. Land along the western boundary is at approximately 64.45m AOD and drops to approximately 64.02m AOD at the eastern boundary. A topographic high point at the site has been identified at 64.56m AOD located in the northwestern corner and low point of 64.02m AOD close to the eastern boundary.

The topographical survey is presented Appendix B.

2.3 – Existing Drainage

Separate surface water network and foul water network are identified within the site boundary, servicing the Hotel Main building, Annex and the pub. These networks merge into a combined system within the site, before discharging into a Yorkshire Water Asset located at St. Andrew’s Road.

The existing foul, surface and combined network within the site is private and generally falls under gravity.

Refer to Appendix B for existing site survey and current drainage layout.

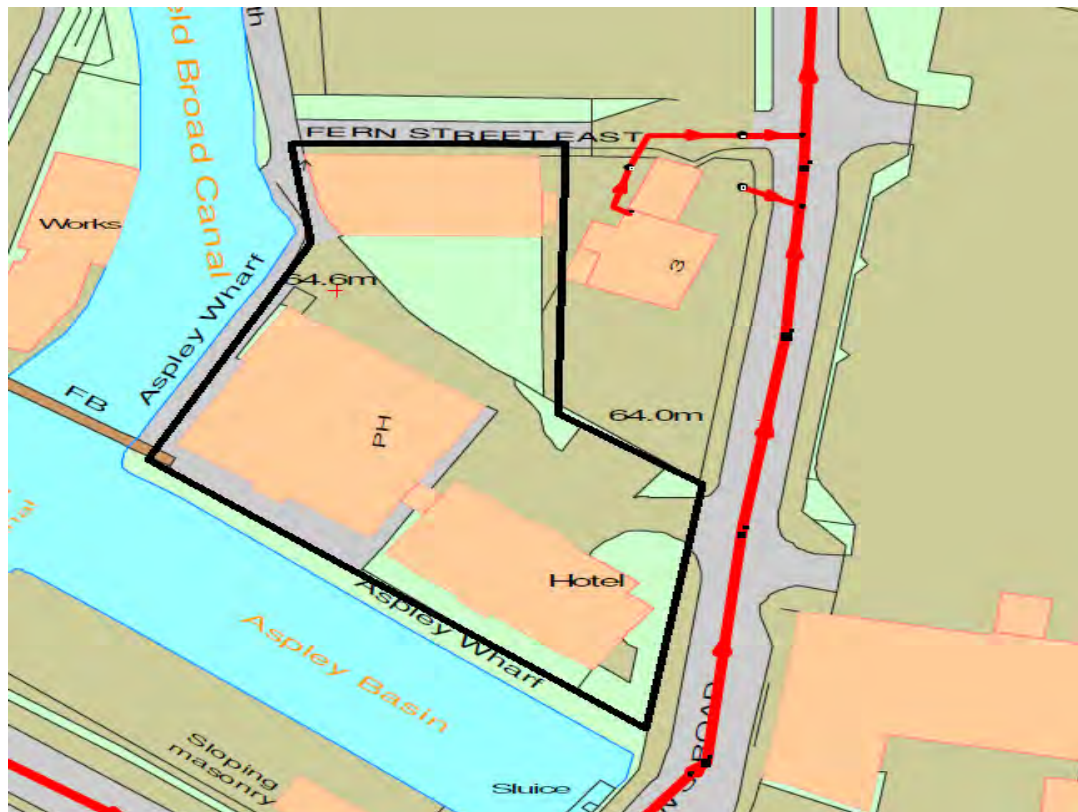


Figure 2.
Yorkshire Water Map Extract

2.4 – Geology

Site Investigation (Ref: CRM.1155.021.GE.R.001. conducted by Enzygo Ltd in June 2015 showed the following:

Geological Unit	Type	Description	Aquifer Classification
Superficial	Alluvium	Clay, silt, sand and gravel	Secondary A
Superficial	Head	Clay, silt, sand and gravel	Secondary (Unspecified)
Solid.	Pennine Lower Coal Measures Formation	Mudstone, Siltstone and Sandstone	Secondary A

Figure 3.
Gound Conditions – Extract (Enzygo Ltd SI Report)

The SI report can be provided upon request.

2.5 – Hydrogeology

The closest watercourse to the site is Huddersfield Canal, which is located 2m west of the site, the Huddersfield Wharf 2m to the south of the site. River Colne is located 90m east of the site

Huddersfield Canal is shown in light green in Figure 4, where River Colne is shown in dark blue.

A Map of the Surrounding Hydrology is presented as Figure 4 below.

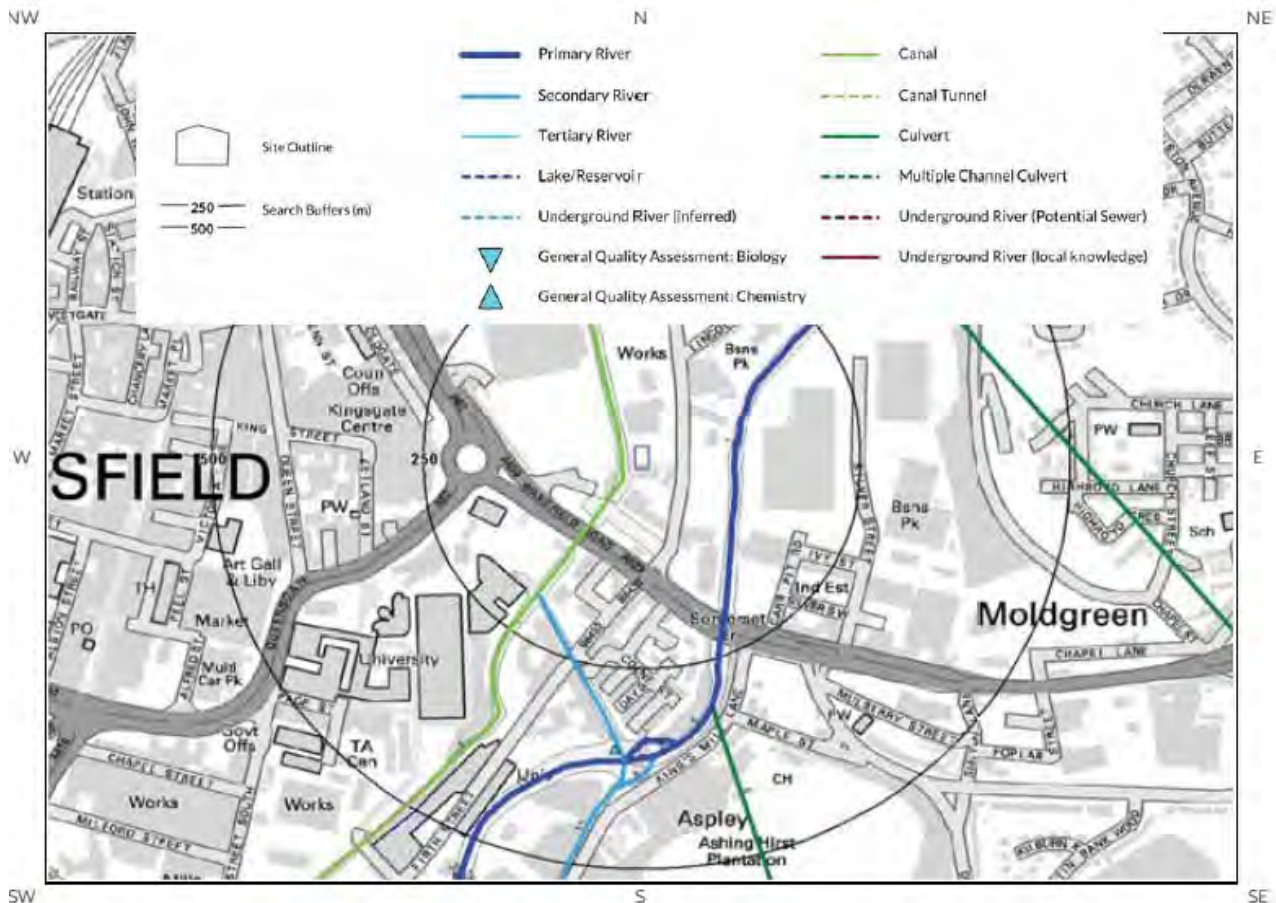


Figure 4.
Surrounding Hydrology

The Environment agency reports 4 surface water abstraction licenses within 500m the nearest being 247m southwest from the Huddersfield Canal, for general cooling, operated by the Canal and River Trust.

3.0 – FLOOD RISK

The Environment Agency Product 4 Flood Maps indicate that the site is located within Flood Zone 2 and 3. The Environment Agency maps indicate that there no record of flood defences helping to reduce flood risk in the area of interest.

The vulnerability of the site to flooding from rivers and other sources has been considered and the local SFRA has been taken into account. Typical sources of flooding include fluvial, tidal, surface water, groundwater and anthropogenic sources such as sewer flooding and reservoir flooding. These are all considered in this Section.

3.1 – Sequential & Exception Test

The probability of flooding from rivers and the sea is modelled by the EA for the whole of the UK and mapped as Flood Zones which categorise areas according to the likelihood of flooding occurring. The zones are defined by the predicted extent of flooding during annual exceedance probability (AEP) events.

The maps are based on a broad assessment of areas using digital mapping techniques. Extracts from the EA flood maps for the site and its surroundings are included here for reference purposes.

The flood zones are defined In Table 3.1 of the NPPF and Kirklees Publication Draft Local Plan Technical Paper: Flood Risk (issued November 201) as follows:

Flood Zone	Definition
Zone 1 – Low Probability	Lowest risk of flooding (less than 1 in 1000 probability per year)
Zone 2 – Medium Probability	Medium risk of flooding (between 1 in 1000 and 1 in 100 probability per year).
Zone 3a – High Probability	High risk areas (usually between 1 in 100 and 1 in 20 probability of flooding in any year).
Zone 3ai – High Probability	Areas which are already developed but have the same risk as Flood Zone 3b (1 in 20 probability per year).
Zone 3b – The Functional Floodplain	The undeveloped functional floodplain where it is desirable for water to be stored in times of flooding (usually greater than 1 in 20 probability of flooding in any year but also including areas which are designed to flood).

Flood Risk Vulnerability and Flood Zone Incompatibility

Table 2 of the NPPF classifies the compatibility of different development end uses, based on their vulnerability to flooding, against the defined flood zones for rivers and sea, and an extract of the table is provided below.

Table 2: Flood risk vulnerability and flood zone ‘incompatibility’

Flood Zones	Flood Risk Vulnerability Classification				
	Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test required	✓	✓	✓
Zone 3a †	Exception Test required †	X	Exception Test required	✓	✓
Zone 3b *	Exception Test required *	X	X	X	✓ *

Key:

✓ Exception test is not required

X Development should not be permitted

The NPPF defines the Flood Risk Classifications within Annex 3, and the definitions are not repeated here.

The proposed development is a residential accommodation in the form of hotel rooms (more vulnerable).

Flood Map for Planning

Key features of the Flood Map for Planning are:

- Where an area benefits from formal flood defences providing a minimum standard of protection, the defended area may be indicated as an area benefiting from flood defences.
- The Flood Zone classifications do not take account of the possible impacts of climate change and consequent changes in the future probability of flooding.
- Flood Zone 3b (functional floodplain) is not separately distinguished from Flood Zone 3a.

As mentioned above the EA Rivers and Sea Flood Map for Planning for the site does not distinguish between Zone 3a, and 3b. However, the Kirklees Publication Draft Local Plan Technical Paper: Flood Risk (issued November 2016) introduces another Flood Zone named Zone 3ai, areas previous developed but have the same risk of flooding as Flood Zone b.

Kirklees Council, as the Leading Planning Authority (LPA), should seek to avoid inappropriate development in areas at risk of flooding by directing development away from areas at highest risk and ensuring that all development does not increase risk and where possible can help reduce risk from flooding to existing communities and development.

At a strategic level, this should be carried out as part of the allocation of sites for development during the Local Plan, by applying the risk-based approach to the allocation of development to avoid flood risk to people and property and manage any residual risk, taking account of the impacts of climate change. This should be done by:

1. Applying the Sequential Test and if the Sequential Test is passed, applying the Exception Test.
2. Safeguarding land from development that is required for current and future flood management; and
3. Using opportunities offered by new development to reduce the causes and impacts of flooding.

Following Figure 4-2: Local Plan Sequential Approach to Allocation (page 34) of the Calder Catchment Strategic Flood Risk Assessment - Volume II Kirklees Council (Final Report, July 2016) (SFRA Level 2)

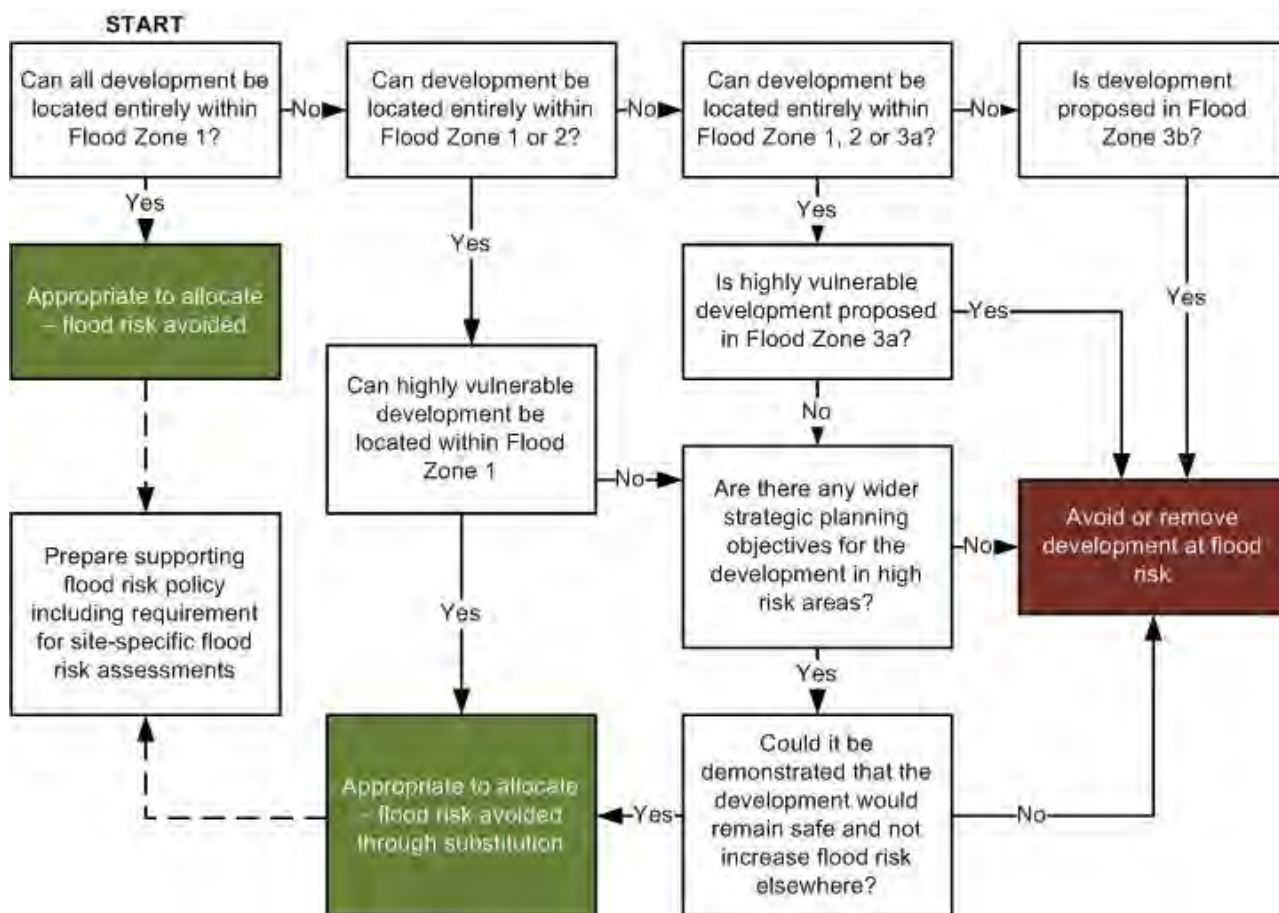


Figure 5.
Extract SFRA Level 2

Following the chart shown figure 6 was generated.

1. The development is located in Flood Zone 3,
2. It is not highly vulnerable. According to Table 2, it classified as “more vulnerable”
3. The development lies within the Area where Leisure and Recreation Properties Uses will normally be permitted according to Unitary Development Plan Huddersfield Town Centre Inset Plan that can be found in Appendix D. Furthermore, Kirklees Unitary Development Plan (September 2007) states in paragraphs 15.30 to 15.36 that *“The Aspley Basin and Chapel Hill areas are two important waterside locations at prominent ‘gateways’ into the town centre. The presence of the river and canal, and the many fine listed buildings dating from the Industrial Revolution create attractive opportunities for the development of leisure and recreation activities. Such uses can contribute to regeneration by creating employment, re-using buildings and sites unsuitable for modern industry and improving the environment.”*
4. The proposed development is to demolish the existing public house and construct an extension to the existing hotel. The risk of the development increasing the flooding elsewhere and remain safe is investigated further within this report.
5. Finally, the development is appropriate to allocate flood risk avoided.

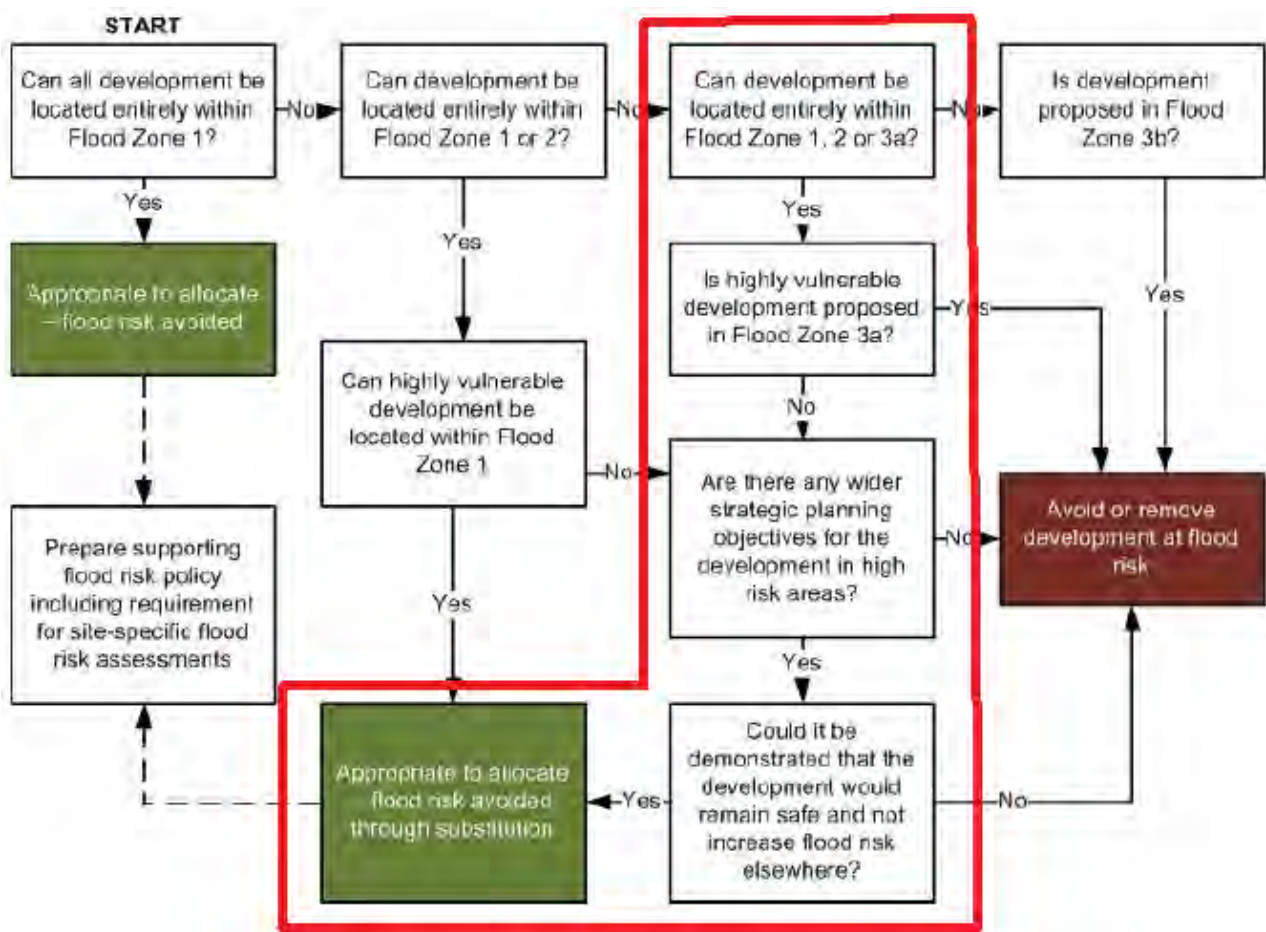


Figure 6.
Extract SFRA Level 2 – Sequential test

Based on the above, one would conclude that the development has passed the sequential test.

Consequently, in accordance with Table 2 of the NPPF, the 'more vulnerable' proposed land use of hotel rooms requires that the Exception Test should be applied. NPPF Paragraph 170 states:

170. The application of the exception test should be informed by a strategic or site-specific flood risk assessment, depending on whether it is being applied during plan production or at the application stage. To pass the exception test it should be demonstrated that:
- a) the development would provide wider sustainability benefits to the community that outweigh the flood risk; and
 - b) the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

Figure 6.
NPPF Paragraph 170 Extract

Paragraph 036 of the Flood risk and coastal change document provides a number of examples of wider sustainability benefits which has been assessed against the proposed development.

The proposed development includes the demolition of the "Aspley Table Table" public house whilst maintaining the main Hotel building and the Annex. A detailed architectural proposal shown In Appendix A will introduce a number of external amenity spaces where both residents and visitors can enjoy the infrastructure providing a significant benefit over the current arrangement.

Via the introduction of additional living spaces within the industrial area, this would assist in rejuvenating the area thereby providing a wider benefit to the community.

The current discharge from the site is understood to be unrestricted, which would potentially experience flow rates of approximately 81.3 l/s for the 1 in 100 year critical storm shown in Appendix F, whereas for the public house and adjacent carpark (total area of 0.098ha) was calculated 22.6 l/s. The proposed drainage solution would provide a maximum flow from the extension and the adjacent carpark not exceeding 3.0 l/s for the critical storm plus climate change allowance, resulting in an approximate reduction in flows of 86.7%, which would represent a significant benefit to the wider area and reduce the risk of flooding further along the network. All calculation can be found in Appendix F.

The introduction of sustainable techniques throughout the development is discussed at length in Section 4 will provide a significant improvement in both amenity and biodiversity presenting a significant improvement over the current arrangement.

3.2 - River and Sea Flooding

The Flood Map for Planning identified that the site was potentially at risk of flooding from rivers, and therefore “Product 4” Detailed Flood Risk Information has been obtained from the EA and is included in Appendix C.

The EA modelled data was taken from the River Colne modelled study. The node points used for this study are sample points 11, 12, 17 and 18 as these are the closest points to the proposed extension. The defended modelled flood depths under various scenarios are presented as Table 3.1 with an undefended scenario presented within Table 3.2. and Table 3.3 the undefended scenario with climate change.

Table 3.1 Defended modelled fluvial depths for the Colne Model

Return Period	11 (mAOD) - Defended	12 (mAOD) - Defended	17 (mAOD) - Defended	18 (mAOD) - Defended
5% (1 in 20 year)	No Data	No Data	No Data	No Data
2% (1 in 50 year)	No Data	No Data	No Data	No Data
1.33% (1 in 75 year)	No Data	No Data	No Data	No Data
1% (1 in 100 year)	No Data	No Data	No Data	No Data
0.1% (1 in 1000 year)	64.61	64.60	64.61	No Data

Table 3.2 Undefended modelled fluvial flood depths for the Colne Model

Return Period	11 (mAOD) - Undefended	12 (mAOD) - Undefended	17 (mAOD) - Undefended	18 (mAOD) - Undefended
5% (1 in 20 year)	No Data	No Data	No Data	No Data
2% (1 in 50 year)	No Data	No Data	No Data	No Data
1.33% (1 in 75 year)	No Data	No Data	No Data	No Data
1% (1 in 100 year)	No Data	No Data	No Data	No Data
0.1% (1 in 1000 year)	64.61	64.60	64.61	No Data

Given that current public house finished floor level are at approximately 64.72mAOD, Undefended flood depths indicate that if the flood risk to the site would not cause a significant threat to life.

Table 3.4 Undefended modelled fluvial flood depths for the Colne Model with Climate Change(%CC)

Return Period	11 (mAOD) - Undefended	12 (mAOD) - Undefended	17 (mAOD) - Undefended	18 (mAOD) - Undefended
1% (1 in 100 year) + 20%	No Data	No Data	No Data	No Data
1% (1 in 100 year) + 30%	64.57	No Data	64.57	No Data
1% (1 in 100 year) + 50%	64.61	64.60	64.61	No Data
0.1% (1 in 1000 year) +20%	64.66	64.64	64.66	64.64

Taking climate change into account, the flood levels vary marginally, and the risk of the new extension to overcome by flood is minimal as the current levels sit at 64.72m AOD, above the worst can scenario of 64.66m AOD.

Flood Defences

The Environment Agency maps indicate that this area is not considered to benefit from flood defences.

Flood Storage Capacity

As the site is located within an area that is not benefiting from flood defences, compensatory flood storage will not be a requirement for the site.

Historic Flood Events

The EA Historical Flood Map (Appendix C) has no records of flooding at the site or within a 250m radius of the site.

3.3 – Implication for Buildings

Although no flooding is estimated to the development during the 0.5% AEP event, in section 3.2 River and Sea Flooding flood levels are noted. finished floor levels (FFLs) should be raised above surrounding ground as a precautionary approach.

Current FFL, where the extension is proposed, is 64.72m AOD. FFLs should be set a minimum of **300mm above** the worst case scenario of flooding 64.66m AOD, raising the FFLs to 64.96m AOD.

3.4 - Surface Water Flooding

The EA’s surface water flood map shown in Figure 7 shows the flooding risk is very low for most of the site, however along the surrounding streets there are areas that are identified as low risk.

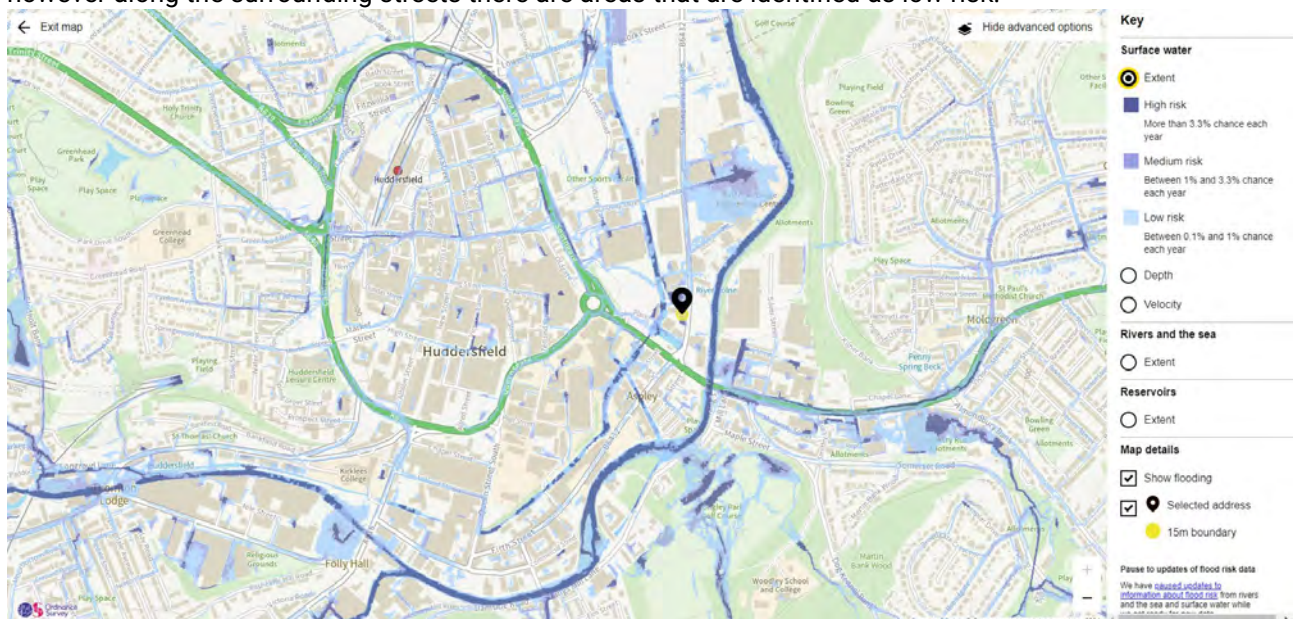


Figure 7.
EA - Surface Water Flooding

The EA mapping shows that these areas of medium to high risk likelihood are predominantly highest along the areas of near the Huddersfield Canal and Wharf. Surface water flood risks usually result from pooling of surface waters and overland flow during heavy rainfall that is not able to drain away quickly enough. This may be caused by inadequate maintenance of the existing system or simply that the density of hard surfaces in the local area are creating an overload of a system designed to deal with smaller volumes of water.

The proposed development should be designed in such a way so that it does not increase the flood risk elsewhere. In additional safe access and egress routes should be maintained. These factors are being considered within the preliminary drainage strategy within Section 5 of this report.

3.3 – Groundwater Flooding

Groundwater flooding is not as well-defined as other sources of flooding, and an assessment of risk often requires consideration of geological conditions. Groundwater flooding occurs when groundwater rises to the ground surface. This may happen during winter and/or after prolonged or heavy rainstorms. There are generally two forms of groundwater flooding: 1. 'clearwater flooding' associated with the water table rising to the surface in areas of permeable bedrock geology such as chalk; and 2. 'river-groundwater interaction' where river levels interact with permeable superficial deposits within river valleys, flooding areas far from the river without necessarily overtopping raised riverbanks.

The Kirklees Council SFRA Level 1, 3.4.1 Areas Susceptible to Groundwater Flooding has assessed the Huddersfield area as having below than 75% potential of groundwater flooding. The risk of groundwater flooding is therefore likely associated with the relative permeability of the underlying strata and the complex hydrological settings in the surrounding area resulting in the possibility of shallow groundwater.

Figure 3-5: Areas Susceptible to Groundwater Flooding

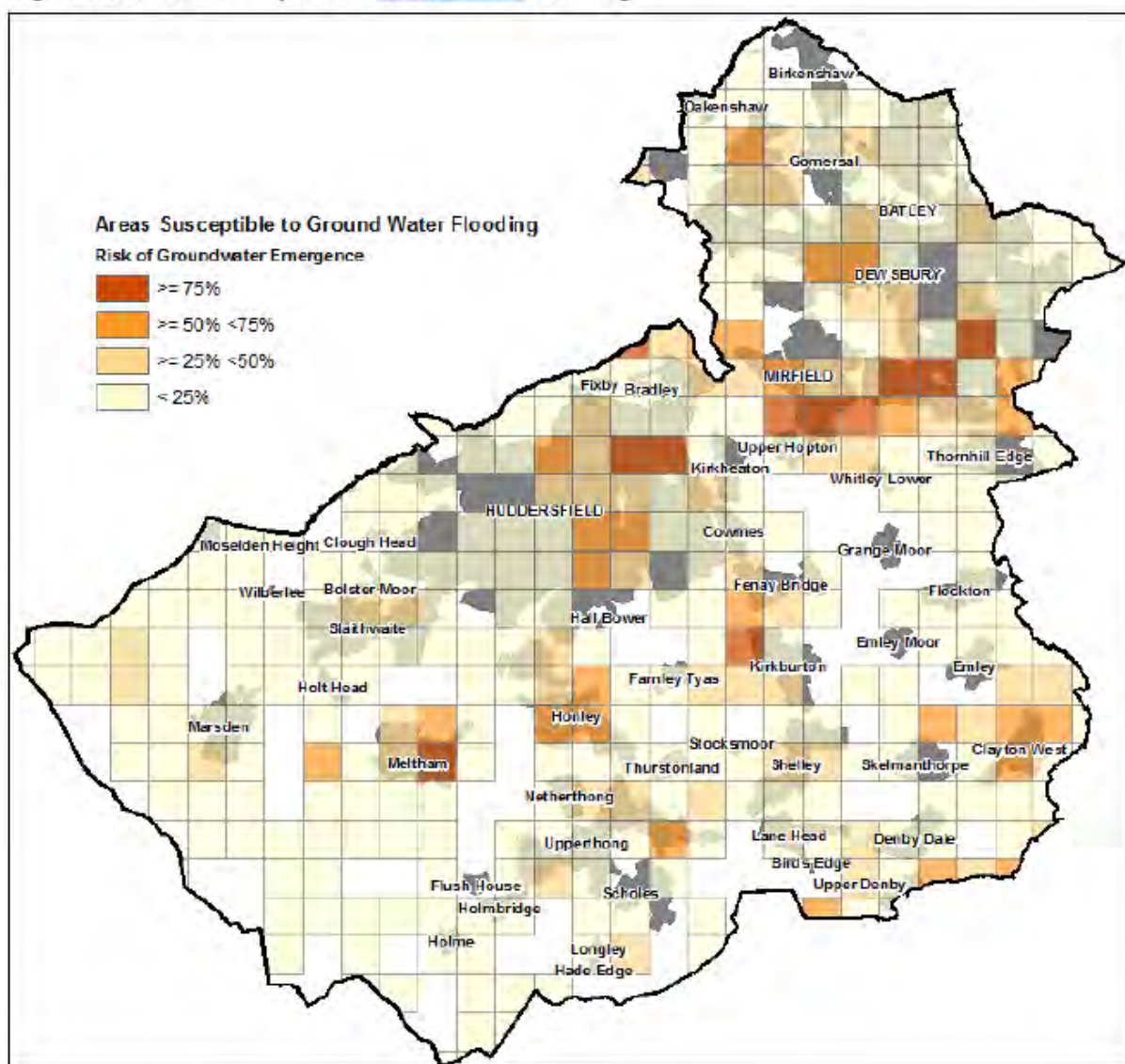


Figure 8.
SFRA Level 1: Areas Susceptible to Groundwater Flooding -Extract

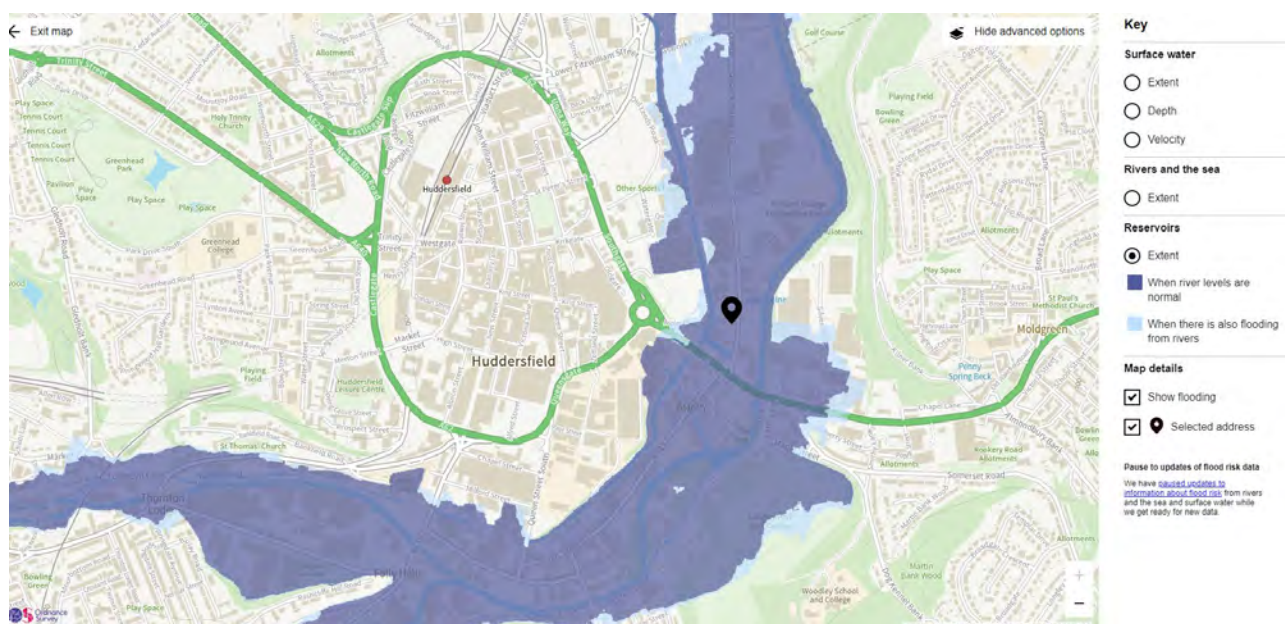
Site Investigation (Ref: CRM.1155.021.GE.R.001. conducted by Enzygo Ltd in June 2015 states that in the Groundwater was not encountered during intrusive works. Subsequent monitoring visit are summarised below:

Exploratory Hole	11-06-15	17-06-15	08-07-15
WS2	Dry	Dry	Dry

As there no conclusive results of groundwater flooding affecting the development, for the purpose of this report the groundwater table is considered to be high.

3.4 – Anthropogenic Sources

There are several reservoirs in the upper regions of the south and west of the district. Seven of these are owned and maintained by the Canal & River Trust. There are also 27 large reservoirs located in the Pennines region that are operated by Yorkshire Water.



Flooding from reservoirs is extremely unlikely. An area is considered at risk if people's lives could be threatened in the event of a dam or reservoir failure, but the associated hazard is high. The EA data indicates that for the site, water depths as a result of reservoir failure are high. Whilst reservoir failure cannot be predicted, it is recommended that the site operators are aware of egress routes and safe places of refuge if this event were to occur.

4.0 – SURFACE WATER

In accordance with the NPPF and SFRA, consideration should be given to natural water flows at the site. The development should not adversely affect flow or increase flood risk elsewhere, including increasing run-off rates. The disposal of surface water should be dealt with in a sustainable way and climate change should also be accounted for. The site drainage strategy is discussed in Section 5.

4.1 – Development Proposals

A Proposed Site Layout has been provided by Allison Pike Architects (Appendix A) and it is understood that the public house “Aspley Table Table” is to be demolished and an extension to be built to the main building of Premier Inn hotel and will comprise 25 bedrooms and a refiguration to the carpark.

4.2 – Climate Change

There is evidence to suggest that the climate is changing with sea levels predicted to continue to rise along with more frequent short-duration, high-intensity rainfall and more frequent periods of long-duration rainfall. The NPPF recommends that the effects of climate change be accounted for in FRA, with consideration of the EA flood maps and local authority SFRA.

Increased rainfall or higher intensity short-duration rainfall may increase as a result of climate change. The Department for Environment Food & Rural Affairs have developed an interactive map and requires all new development to allow for a 45% increase in rainfall to allow for climate change for the Aire and Calder management Catchment area.

A 45% increase for the 1 in 100 year event and 40% for the 1 in 30 year is therefore being allowed for within the new surface water drainage design to take account of climate change. Climate change may also lead to variations in groundwater level which will also be considered during the drainage design.

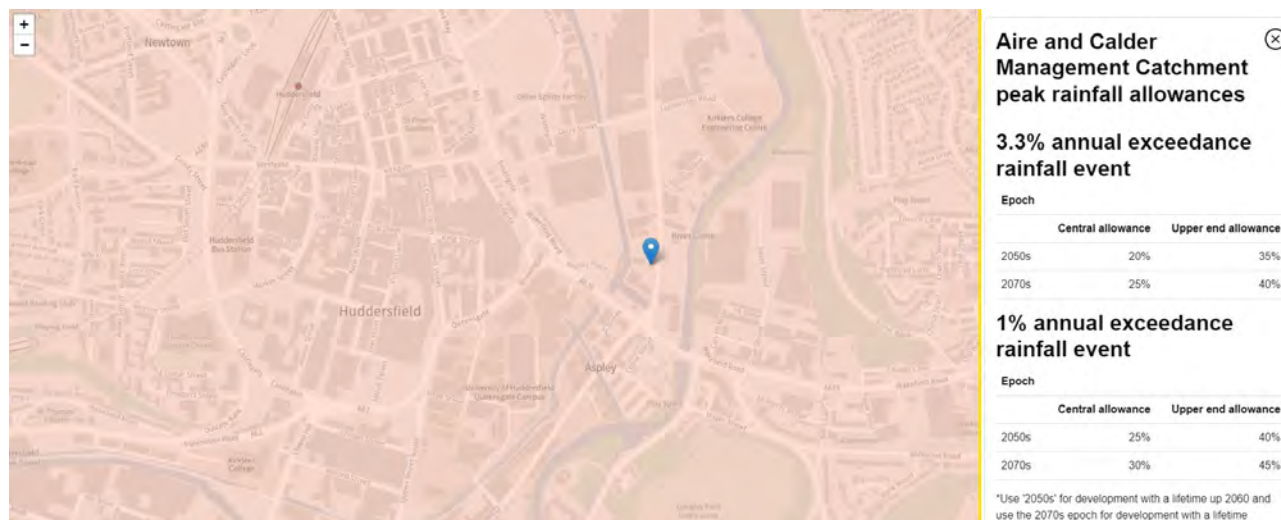


Figure 9
Climate Change Allowance Interactive Map

4.2 – Sustainable Drainage Systems (SuDS)

SUDS are a desirable way to manage surface water disposal within new developments and SUDS methods for surface water drainage management are discussed further within the SUDS Manual.

The types of benefits that can be achieved by SUDS will be dependent on the site, but fit broadly into four categories: water quantity, water quality, amenity and biodiversity. These are also referred to as the four pillars of SUDS design (Figure 10):

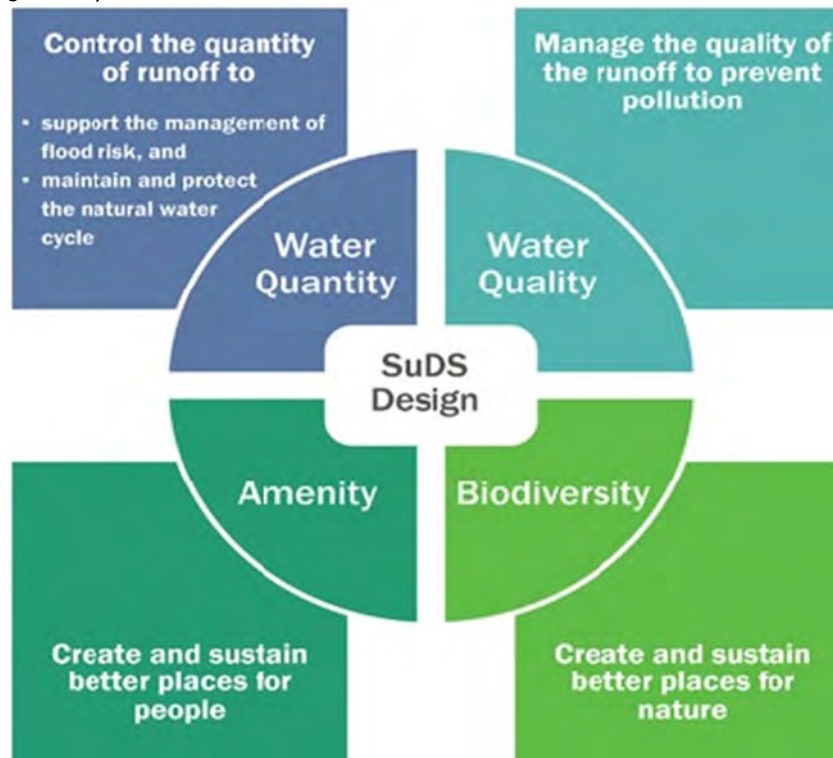


Figure 10.
Four Pillars of SuDS

The proposed development will address the above 4 pillars of SuDS design criteria with the inclusion of a range of sustainable features through a comprehensive treatment train.

- **Water Quantity:** the quantity of run-off from the site will be significantly reduced, as set out in more detail in the Drainage Strategy in Section 5, whilst taking account of likely increases in future rainfall due to climate change.
- **Water Quality:** the quality of run-off from the site will be improved by the inclusion of filter trench. The flows arising from the building roof and the carpark will initially be treated via a network of pipes before arriving at a filter trench. All flows will be collated within the development prior to discharge into a new manhole.
- **Biodiversity** will be addressed by the introduction of a small green areas and vegetation areas around the site, as well as by the inclusion of a significant planting regime creating a better environment for nature to thrive.
- **Amenity** is provided through the proposed green areas, which presents the opportunity to create visually attractive areas within the proposed site which have the ability to connect people to water. Such features have been shown to improve the well-being of people that live within the proposed development.

5.0 – DRAINAGE STRATEGY

It is proposed to erect a new 7000m² extension within the car park of the hotel, refer proposed drainage general arrangement for layout and details provided in Appendix E.

5.1 – Proposed Foul Network

It is proposed to install a new gravity system to the extension which will be tied foul line. The existing foul system falls to the east of the site towards St Andrew's Road and Yorkshire Water Asset.

On review of the site's current capacity, the overall load as outlined below would suggest that the current system is suitable for use with the new extension.

Hotel - Existing	Rooms (2 person)	No.	FLOW (L)		
Hotel Guests (3*)	52	104	250	26000	
Hotel full time day staff		12	90	1080	
Hotel part time staff		10	45	450	
Restaurant (full meals) covers twice per day	104	2	30	6240	
Public House (covers twice per day)	450	2	30	27000	
Drinkers (allow)	350	1	12	4200	
Toilets (WC) per use - allow 1 per cover	250	2	10	5000	
Toilets (Urinal) per use, allow 2 per drinker	250	2	5	2500	
Restaurant full time day staff		5	90	450	
Restaurant part time staff		14	45	630	litre/day
					l/s
			Total	73550	l/s
			Peak (total/10hr/60/60)	flow 2.04	
			Average (total/24hr/60/60)	flow 0.85	

Figure 11.
Flows and loads – Estimate Existing Site Foul Volume

With the demolition of the public house, it is expected for the flows to be reduced.

Hotel - New extension	Rooms (2 person)	No.	FLOW (L)		
Hotel Guests (3*)	25	32	250	8000	
			Total	8000	litre/day
			Peak flow (total/10hr/60/60)	0.22	l/s

			Average flow (total/24hr/60/60)	0.09	l/s
Hotel - Total (inc extension)	Rooms (2 person)	No.	FLOW (L)		
Hotel Guests (3*)	77	154	250	38500	
Hotel full time day staff		12	90	1080	
Hotel part time staff		10	45	450	
Restaurant (full meals) covers twice per day	154	2	30	9240	
Drinkers (allow)	350	1	12	4200	
Toilets (WC) per use - allow 1 per cover	250	2	10	5000	
Toilets (Urinal) per use, allow 2 per drinker	250	2	5	2500	
Restaurant full time day staff		5	90	450	
Restaurant part time staff		14	45	630	
			Total	62050	litre/d ay
			Peak flow (total/10hr/60/60)	1.72	l/s
			Average flow (total/24hr/60/60)	0.72	l/s

Figure 11.
Flows and loads – Estimate Existing Site Foul Volume

A reduction to the foul flow of 0.32 l/s, therefore the existing system should be adequate for the proposed flows.

5.2 – Proposed Surface Water

In accordance with the SUDS hierarchy, it is proposed that the development areas will be provided with a significant treatment train prior to discharge into open swale located north of the site.

In following the standard hierarchy of drainage solutions, consideration should firstly be given to the discharge of surface water runoff by sustainable methods such as infiltration. Review of currently available geological information for the surrounding area and information provided in the Site Investigation Report, it is unknown whereas the groundwater table is located to shallow depths. For the purpose of this report, however, infiltration has been excluded from the calculations.

The carpark will be surfaced in asphalt and drained by an Aco drain.

As per the Kirklees SFRA Level 2: *“the Local Planning Authority may set local requirements for planning permission have the effect of more stringent requirements than these National Standards. More stringent requirements should be considered where current Greenfield sites lie upstream of high risk areas. This could include improvements on Greenfield runoff rates”.*

There are two methods for calculating the greenfield run-off rate: the IH124 method and the ICP method. The IH124 method calculates the peak greenfield run-off flow rates by correlation of the Soil Index Value, the Average Annual Rainfall and the Site Area (SOIL, SAAR and AREA). The IH124 Method should be used for sites in excess of 50 hectares and the resulting discharge is linearly interpolated for the required area. The ICP method uses the IH124 method and automatically interpolates the discharge for sites less than 50 hectares and therefore this is the method that has been used extract shown in Figure 11 and Figure 12 below.

Q_{BAR} (l/s):	1.61	1.61
I in 1 year (l/s):	1.38	1.38
I in 30 years (l/s):	2.81	2.81
I in 100 year (l/s):	3.34	3.34
I in 200 years (l/s):	3.81	3.81

Figure 12.
Greenfield Run Off Calculation

The peak Qbar greenfield discharge rate for the whole site is identified as 1.61 l/s and 3.34l/s for the 1 in 100-year event.

For the proposed development, the extension 700m² and the refiguration of the carpark 280m²:

Q_{BAR} (l/s):	0.61	0.61
1 in 1 year (l/s):	0.52	0.52
1 in 30 years (l/s):	1.06	1.06
1 in 100 year (l/s):	1.26	1.26
1 in 200 years (l/s):	1.44	1.44

Figure 13.
Greenfield Run Off Calculation

The peak Qbar greenfield discharge rate for the whole site is identified as 0.61 l/s and 1.44 l/s for the 1 in 100-year event

Flows arising from the proposed development will be restricted to 3.0 l/s 1 in 100-year (+45%CC) storm.

Attenuation will be provided by a filter trench shown on drawing reference 15106-BKP-XX-XX-DR-C-0511-C01 - Drainage GA shown in Appendix F.

The site drainage network will be designed in accordance with current best practice to have sufficient capacity not to flood both during the critical 1 in 30-year storm (plus 40% allowance for climate change) and 1 in 100-year storm event (plus 45% allowance for climate change). In this way the risk of off-site flooding, which could result in damage to other buildings and essential services, will be minimised and the risk of flooding elsewhere should not be increased as a result of the development proposals.

A Hydrobrake flow control device which controls the rate of discharge into the dedicated surface water sewer to the proposed discharge rate.

Further discussion with the appropriate approving bodies will be required to finalise the Drainage Strategy.

Causeway Flow output for the Critical Storm is enclosed in Appendix G.

6.0 – CONCLUSIONS & RECOMMENDATIONS

6.1 – Conclusions

This Flood Risk Assessment follows guidance set out in the NPPF and the 'Planning Practice Guidance – Flood Risk and Coastal Change' and follows Environment Agency Guidance Note 1.

A review of the EA Indicative Flood Mapping and other relevant data indicates that the site is located within a tidally defined Flood Zone 3 associated with the Rivers Aire, Ouse and Don/Dutch.

There are no recorded historical flood events recorded for the site.

An initial assessment indicates that the primary flood risk at the proposed development is from a tidal source associated with the Rivers Aire, Ouse and Don/Dutch River.

The Environment Agency maps indicate that this area is not considered to benefit from flood defences located along the River Colne.

Given that current site levels are at approximately 64.50m AOD, the EA modelled fluvial data indicates that the site is located within the 1 in 1000 year modelled flood envelope. undefended flood depths indicate that if the present flood defences were not present, the flood risk to the site would not cause a significant threat to life with flood depths of approximately 64.66m AOD, 0.16m above the average site levels.

Current FFL, where the extension is proposed, is 64.72m AOD. FFLs should be set a minimum of **300mm above** the worst case scenario of flooding 64.66m AOD, raising the FFLs to 64.96m AOD.

Surface water run-off produced by the development is recommended to be disposed of via the existing connection to the Yorkshire Water network located at St. Andrew's Road. The discharge rate for the development will not exceed 3.0 l/s.

6.2 – Recommendations

- Current FFL, where the extension is proposed, is 64.72m AOD. FFLs should be set a minimum of 300mm above the worst case scenario of flooding 64.66m AOD, raising the FFLs to 64.96m AOD.
- It is recommended that the site owners sign up to the EA Flood Alert and Warning Scheme and consultation undertaken with the Council's Emergency Planner.
- It is recommended that infiltration testing in accordance with BRE 365 guidelines is conducted to test the viability of infiltration techniques.
- It is recommended that a detailed drainage design is conducted along with consultation with the sewerage undertaker, and the Environment Agency to determine the disposal of surface water from the site.

6.3 – Access and Egress

As dry access and egress may become compromised, it is recommended that an emergency evacuation plan is prepared to the site and consultation with the Local Council's Emergency Planner is undertaken in order to determine any specific considerations with regards to egress.

It should be noted that the proposed extension will remain flood free during a tidal breach event and it is considered safe for site users to remain within the building.

6.4 – Flood Warning and Evacuation Plan

The site is located within an area where the Environment Agency issue Flood Alerts and Warnings. It is recommended that the site owners sign up for this free service.

7.0 – MAINTENANCE PLAN

The Drainage network has been designed with minimal maintenance in mind. The maintenance is generally of a ‘common sense’ approach and is to comprise:

- Regular day to day care: - litter collection, grass cutting and checking the inlets and outlets where water enters or leaves a drainage feature.
- Occasional tasks: - managing vegetation in wet areas and removing any silt that builds up in the drainage features.
- Remedial work: - repairing damage when, and where, necessary.

Specific recommendations for each feature are provided in the following sections and should be referred to in the first instance if there are any issues. Please contact Booth King Partnership Ltd. if any further advice is required.

During the works the Contractor, subject to agreement from their client, will ensure that all drains on which the proposed drainage works rely will be jetted out and made good as required to ensure correct operation.

Maintenance Activity	Required Action	Frequency
Inspection	Inspect for sediment and debris in pre-treatment component such as gullies, sump units and catch pits.	Monthly for the first year and on a 6-monthly basis thereafter.
Gutters	Clear gutters and any leaf guards.	On a 6-monthly basis or as required following inspection regime.
Sump Units	Remove all obstructions and debris from all sump units (gullies, channels and catch pits).	On a 6-monthly basis or as required following inspection regime.
Pipe Work	Inspect all pipework for all silt accumulation and high pressure jet any pipe work which has silt accumulation. Care is to be taken that any silts within the pipework are not flushed using chamber bungs.	On a 6-monthly basis or as required following inspection regime.
Manholes	Covers should be lifted and inspected for litter and debris to ensure that the runs are free flowing.	On a 6-monthly basis or as required following inspection regime.
Flow Control	Check flow control manhole to ensure emptying is occurring. Little to no water should be present after consecutive days of dry weather). Check function of the emergency drain down. Check for build-up of debris and silt. Clear and remove as necessary.	6 monthly basis. After extreme events.

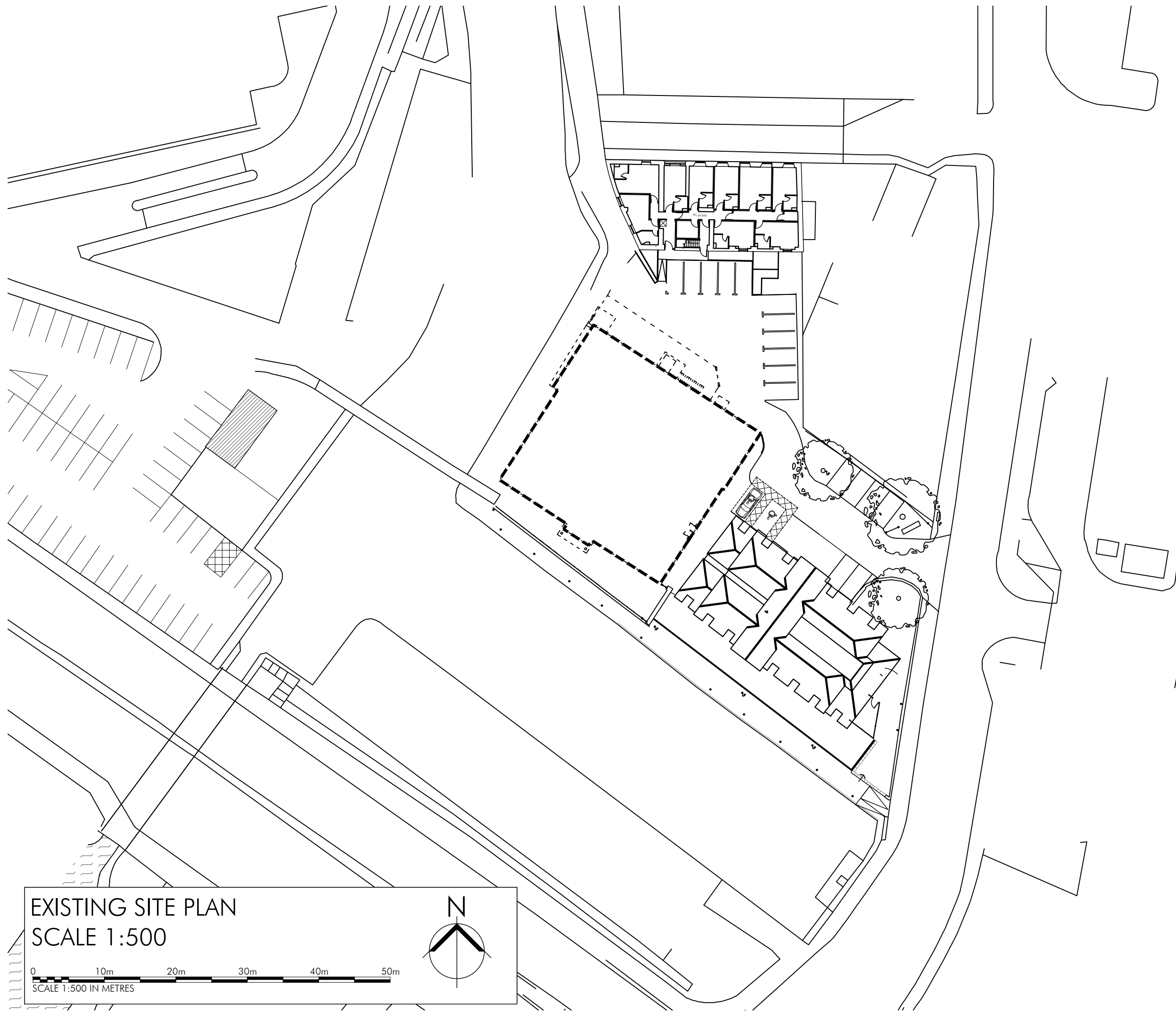
Filter Trench	Ensure that ventilation pipework is free of obstruction. If jetting through the perforated pipe is required, this must be done following the jetting and clearance of upstream sumps.	6 monthly basis. After extreme events.
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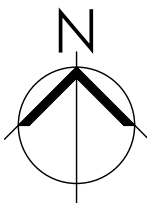
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APPENDIX A - LOCATION PLAN – ARCHITECT’S PROPOSED DEVELOPMENT



EXISTING SITE PLAN
SCALE 1:500



SCALE 1:500 IN METRES

BN DRAWN	DRAWN REVISION	6/3/24 DATE	VER
 ARCHITECTS & DESIGNERS			
<small>7 Buxton Road West, Dinsley, Stockport, Cheshire, SK12 2AE Telephone: 01663 763000 Website: www.allisonpike.com Facsimile: 01663 766772 Email: studio@allisonpike.com</small>			
<small>© Allison Pike Partnership Limited</small>			
PROJECT PREMIER INN EXTENSION WITH BREAKFAST ROOM PREMIER INN HUDDERSFIELD CENTRAL			
TITLE EXISTING SITE PLAN			
SCALE 1:500 @ A3			
JOB No P11074	DRAWING No AP01	REV //	

PLANNING ISSUE

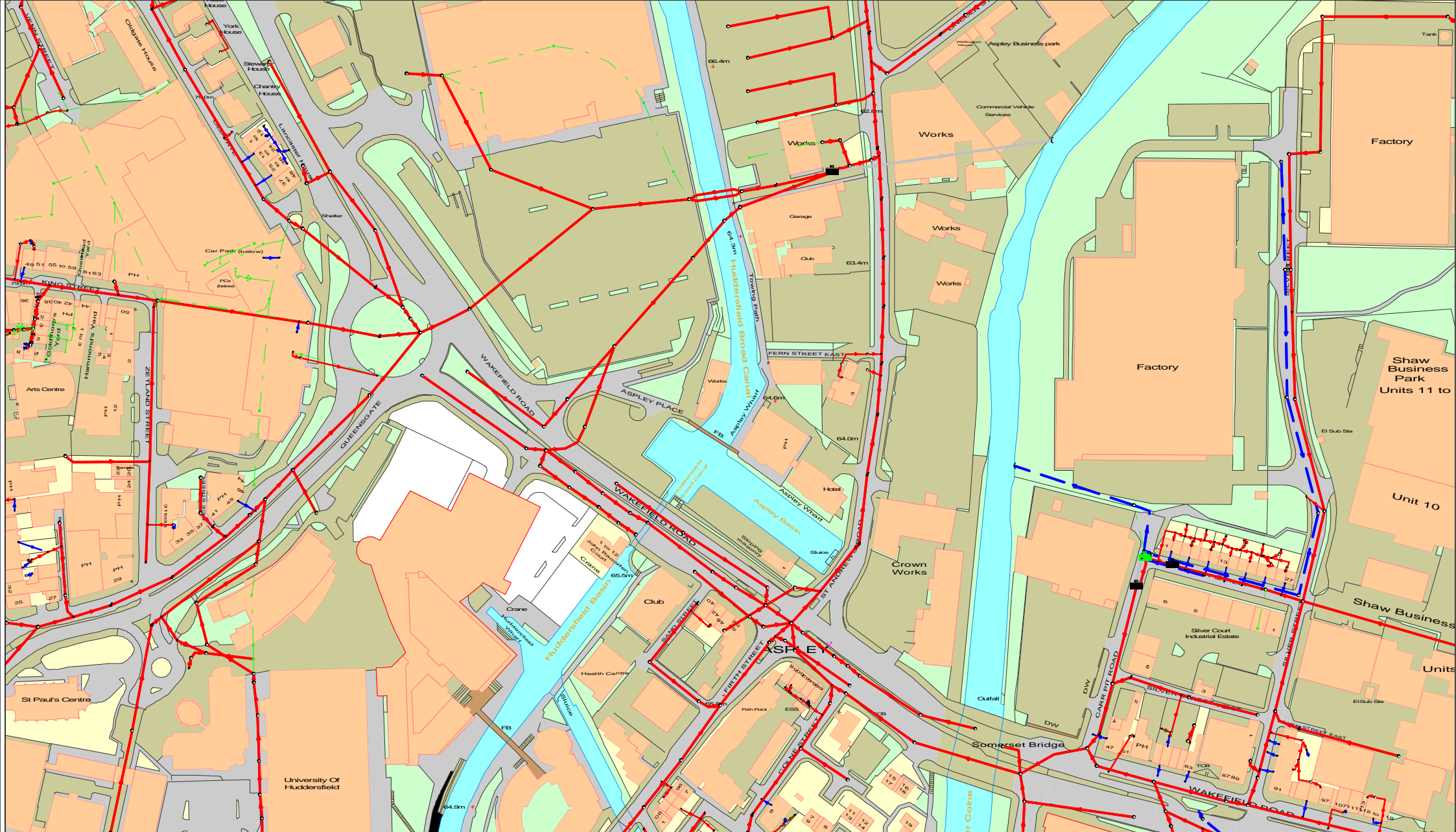




PROPOSED SITE PLAN
SCALE 1:500

0 10m 20m 30m 40m 50m
 SCALE 1:500 IN METRES

PLANNING ISSUE	 ALLISON PIKE ARCHITECTS & DESIGNERS <small>7 Southwell Road, Derby, Derbyshire, DE1 2AE Telephone: 01432 760000 14 Market Street, Leicester, LE1 5DT Telephone: 01533 540773 Email: info@allisonpike.co.uk</small>	
	PROJECT: PREMIER INN EXTENSION WITH BREAKFAST ROOM PREMIER INN HUDDERSFIELD CENTRAL	
	TITLE: PROPOSED SITE PLAN	
	DATE: 14/05/24	
DRAWN BY: WJ074	CHECKED BY: AF10	DATE: 14/05/24

APPENDIX B - EXISTING TOPOGRAPHICAL SURVEY & YORKSHIRE WATER SEWER MAP



	414565 : 416273	Map Name : SE1416SE	Title	Partial Key Foul Sewer = F Combined Sewer = C Surface Water Sewer = SW Trade Sewer = TD Partially Separate = PS	This plan is furnished as a general guide only and no warranty as to its correctness is given or implied. This plan must not be relied upon in the event of excavations or other works made in the vicinity of public sewers. No house or property connections are shown.
		Yorkshire Water, PO Box 500, Halifax Road, Bradford BD6 2LZ Contact Name : Adam GIRDLESTONE Contact Tel :	Notes (Ord) COPYRIGHT STATEMENTS: Reproduced by permission of Ordnance Survey on behalf of HMSO © Crown copyright and database 2014. All rights reserved Ordnance Survey Licence number 100022432		
UPN: Undefined		Originator: Adam GIRDLESTONE, Safemove,		Source : Sewer Network Enquiry	

APPENDIX C – ENVIRONMENT AGENCY PRODUCT 4 INFORMATION



Planning advice for developers – FAQs

INTRODUCTION

Local planning authorities (LPAs) across Yorkshire are required to consult us on [certain planning applications](#) which affect flood risk, groundwater, waste, or water quality.

If your development falls into one of these categories, we'll be invited to comment on your planning application. Your LPA, when considering your application, will take our comments into account.

We've produced this guidance to summarise the environmental issues we're responsible for. The guidance forms part of our free advice service; if you require site-specific or face-to-face advice, we'll need to recover our costs through our [charged advice service](#). Engaging with us early can help you identify the big issues, reduce the chances of subsequent delays and help you design a more sustainable and attractive development.

DEVELOPMENT AND FLOOD RISK

Is my development proposal at risk of flooding?

The [flood map for planning](#) shows where flooding from rivers and the sea may occur. Whilst this map isn't suitable for a detailed flood risk assessment, it'll show which [flood zone](#) your development is located within and therefore will indicate whether further assessment is needed. You should also refer to your LPA's [strategic flood risk assessment](#) which will provide additional local information on flood risk, including the location of functional floodplain and areas which are susceptible to other sources of flooding such as from surface water or reservoirs.

Will my application need to pass the sequential and exception tests?

Local planning authorities apply the [sequential test](#) to steer development towards areas at the lowest risk of flooding. If your proposal is located within flood zones 2 or 3, you should contact your LPA to discuss the sequential test **before** submitting your application. The LPA may require you to submit information with your application in support of the sequential test.

If the LPA confirm that the sequential test has ruled out steering the development to lower risk sites, the development may also need to pass the [exception test](#) by demonstrating that its sustainability benefits outweigh flood risk and that it can be made safe for its lifetime, through the production of a site-specific flood risk assessment. [Planning practice guidance](#) advises when an exception test will be required, which will depend on the [vulnerability of the development](#) and the flood zone it lies within.

Do I need to submit a flood risk assessment with my planning application?

You'll need to submit a flood risk assessment if your application lies within flood zones 2 or 3 or is over 1 hectare within flood zone 1. You'll also need to submit an assessment if your proposal could be affected by sources of flooding other than from rivers or the sea. For certain lower risk applications, we've provided '[flood risk standing advice](#)' which enables local planning authorities to assess flood risk assessments without the need to consult us.

What information should I include in my flood risk assessment?

We recommend that you refer to the checklist for a [site-specific flood risk assessment](#) for detailed advice on what to include in your flood risk assessment. Alongside referring to your LPA's strategic flood risk assessment, you should contact your LPA to find out whether there are any development guidelines which are specific to your locality.

Can I undertake my own flood risk assessment?

Your FRA must be appropriate to the scale, nature and location of the development whilst being credible and fit-for-purpose. Whilst it's possible to undertake your own assessment, most applicants employ suitably experienced professionals. We're not able to recommend specific consultants, but a simple web search should help you source a competent individual or company.

Do I need to consider how climate change will affect my proposal's flood risk?

Yes, you should demonstrate how flood risk will be managed now and over the development's lifetime, taking climate change into account. Please refer to the following [guidance](#) when undertaking your flood risk assessment. In some cases we'll hold the climate change flood data you need. In others you'll need to undertake your own analysis to understand the impacts.

Where can I get modelled or historic flood levels from?

Email our Customers and Engagement team (neyorkshire@environment-agency.gov.uk) to find out whether we have any modelled or historic flood levels available for your development site. A list of the packages of information we're able to provide can be found under the 'get information to complete an assessment' section of the [planning practice guidance](#). They'll aim to provide this information within 20 days. We no longer charge for providing this information.

The risk portrayed by your flood map doesn't seem to reflect the site's actual risk. How do I 'challenge' your flood map?

If you have evidence suggesting that our flood map is inaccurate, please contact our Customers and Engagement team (neyorkshire@environment-agency.gov.uk) who will provide you with any existing data we hold. To formally contest our flood zones, you'll need to submit supporting evidence, such as digital copies of a topographic survey or modelling for quality assurance purposes. Digital files of the proposed new flood zones in ArcMap or MapInfo format should also be supplied. Any new outline data you submit must conform to our flood zones policy, copies of which are available on request.

Whilst we'll usually be happy to review any topographical survey or model prior to the application being submitted, we would have to recover our costs for this work. In some cases where work to review and update our existing models is already underway, we may decline to consider a challenge.

As we have to be certain that the data which informs our flood map is fit-for-purpose, any revisions will need to meet stringent quality checks.

SURFACE WATER AND DRAINAGE

Who's responsible for managing surface water?

[Lead local flood authorities](#) are responsible for providing advice on the management of surface water resulting from new [major](#) development. [Internal drainage boards](#), where established, have permissive powers to manage water levels within their drainage districts, so also play a key role in managing surface water.

Will I need to provide surface water storage and limit the discharge rate?

You should contact your lead local flood authority to discuss surface water discharge rates and storage requirements. Typically, they'll ask that your development does not increase run-off and limits the discharge to the existing greenfield run-off rate (usually 1.4l/s/ha if not calculated).

Do I need to install sustainable drainage systems?

[Sustainable Drainage Systems \(SuDS\)](#) should always be carefully considered in discussion with your lead local flood authority. A SuDS scheme can reduce flood risk, improve water quality, create better habitats for wildlife, and produce pleasant, more amenable places for people.

Infiltration drainage must not, however, pose a risk to groundwater quality. All infiltration SuDS must:

- Meet the groundwater protection criteria set out on [GOV.UK](https://www.gov.uk)
- Not be constructed in ground affected by contamination

Who should I contact about connecting my development to the mains sewer?

Talk to your water company about connecting to their sewerage system. Here are some contact details for water companies operating in the Yorkshire Environment Agency area:

Yorkshire Water	planningconsultation@yorkshirewater.co.uk
Northumbrian Water	developmentenquiries@nwl.co.uk
Severn Trent Water	new.connections@severntrent.co.uk

My development is a long way from the mains sewer. Can I install a 'non-mains' drainage system, such as a package treatment plant?

New development should connect to the public mains sewer wherever possible. Individual treatment plants can deteriorate local water quality and are more challenging to monitor and regulate. If you can't connect to the mains sewer, your planning submission should outline how you will deal with foul drainage discharge. You should include evidence as to why it is not possible to connect to the mains system, including details of any prohibitive costs. Please

note that some 'non-mains' foul water drainage systems will require an environmental permit, irrespective of any planning approval.

OTHER ENVIRONMENTAL CONSIDERATIONS

What other environmental issues will you consider with my planning application?

Your planning application will need to demonstrate that any environmental risks can be managed, through design and construction, for the development's lifetime. Alongside flood risk, the key environmental risks we'll consider are:

- **Land Contamination**
We're mainly interested in those sites where there is a risk of pollution to controlled waters. You should investigate any contamination to see whether the environmental risk or cost of clean-up (remediation) would hinder your proposal. If contamination is known or suspected, a desktop study, investigation, remediation and other works may be required to enable safe development. Our [model procedures for the management of land contamination](#) provide further information.
- **Pollution prevention**
Your application should demonstrate how you'll minimise the risk of pollution from all aspects of your development, including construction and

operation phases. Groundwater can be vulnerable to pollution, as well as rivers and streams. Some areas (source protection zones and aquifers) are especially sensitive to pollutants as they typically supply public drinking water. To find out whether your development is located in an area sensitive to groundwater pollution, visit our interactive [maps](#). Advice on groundwater protection can be found on [GOV.UK](#)

- **Fisheries, biodiversity, geomorphology and protected species**

If your proposal is likely to affect the ecology of a main river, you'll need to carry out a risk assessment. This assessment should show that your development can proceed without demonstrable harm, and should propose mitigation, compensation or enhancements where required. A survey should be carried out if any protected species are thought to be nearby. If this survey confirms the presence of protected species or their habitat, measures should be taken to manage the development's risks. Natural England are the statutory consultee for other biodiversity-related matters. Further information on their remit can be found on [GOV.UK](#)

- **Water framework directive**

If your proposal affects ground or surface waterbodies, you'll need to consider the [Water Framework Directive](#) (WFD) and the actions set out in the [Humber River Basin Management Plan](#). You'll also need to submit a [WFD Assessment](#) demonstrating how the development will prevent deterioration and improve the waterbody's ecological status.

- **River buffer zone**

Your development should ensure that an 8m strip of land (planted with locally appropriate, native species) is left undisturbed next to the bank of any main river. This 'river corridor' will improve habitat connectivity and will ensure we're able to access the bank for any future flood defence construction and maintenance.

- **Culverting**

We're opposed to culverting. Culverts degrade watercourses' ecology and prevent the movement of wildlife and fish. As culverts can easily become blocked, they increase flood risk. They're also difficult to inspect and maintain. We may object to any planning applications involving culverting on a main river and may refuse to grant an environmental permit. Existing culverts should be removed and the river channel and bankside habitat reinstated to restore the ecological continuity of the river channel and its corridor.

Will I need any other Environment Agency permits for my development?

You might need an environmental permit if your development manages or produces waste or emissions that pollute the air, water or land or is work that affects a [main river](#) or a sea defence. The lead local flood authority is responsible for any consents relating to ordinary watercourses.

The [Environmental Permitting Regulations \(England and Wales\) 2015](#) cover water discharges, groundwater activities, flood risk activities, radioactive substances, waste, mining waste and installations. They also include provision for a number of directives including batteries. Further information, including contact details for further permitting related enquiries, can be found [here](#).

As planning and permitting decisions are often closely linked, we have issued detailed [guidance for developments requiring planning permission and environmental permits](#). This guidance explains how, when responding to planning consultations that require environmental permits, we will advise of three possible positions:

- No major permitting concerns
- More detailed consideration is required and parallel tracking is recommended
- Don't proceed – unlikely to grant a permit.

PRE-APPLICATION ADVICE

Can you provide site-specific advice, review a submission document, or attend a site meeting before I submit my planning application?

We encourage you to seek pre-application advice as it can help you solve key environmental issues early, reduce the chance of an objection and help you design a more sustainable development. If you'd like to take advantage of this service, please email our Sustainable Places team so that we can provide further details and estimated costs.

Please note that any pre-application guidance we provide doesn't represent our final view in relation to any future planning application. We recommend that you seek your own expert advice prior to submitting your application.

Who should I contact for further information?

Yorkshire planning enquiries: sp-yorkshire@environment-agency.gov.uk

General enquiries: 03708 506 506

Environment Agency, Lateral, 8 City Walk, Leeds LS11 9AT

<https://www.gov.uk/government/organisations/environment-agency>

The Flood Map for Planning

The Flood Map for Planning (Rivers and Sea) can be viewed and downloaded as a PDF file on GOV.UK by following this link: <https://flood-map-for-planning.service.gov.uk> or downloaded in GIS format under an open data licence from the following address: <https://environment.data.gov.uk/>

Please type Flood Map for Planning in the search box.

What is the Flood Map for Planning?

The Flood Map for Planning provides information on flooding from rivers and the sea for England and Wales. The Flood Map also has information on flood defences and the areas benefiting from those flood defences.

The Flood Map for Planning shows the following:

1. Flood Zone 3 (dark blue area on the enclosed map): natural flood plain area that could be affected by flooding from rivers and/or the sea – not taking into account the presence of any flood defences
 - For flooding from rivers the map indicates the extent of a flood with a 1% (1 in 100) chance of happening each year;
 - For flooding from the sea the map shows the extent of a flood with a 0.5% (1 in 200) chance of happening each year.
2. Flood Zone 2 (light blue area): natural flood plain area that could be affected by flooding from rivers and/or the sea – not taking into account the presence of any flood defences. Flood Zone 2:
 - indicates the extent of a flood with a 0.1% (1 in 1000) chance of happening each year.
 - and/or indicates the greatest recorded historic flood, whichever is greater.
3. Flood defences built in the last five years to protect against river floods with a 1% (1 in 100) chance of happening each year, together with some natural or constructed entities which retain, store or channel water and which may protect against smaller floods.
4. Areas benefiting from flood defences - areas that benefit from the flood defences shown, in the event of a river flood with a 1% (1 in 100) chance of happening each year, or a flood from the sea with a 0.5% (1 in 200) chance of happening each year. If the defences were not there, these areas would flood.

Flood History

See the attached map showing the flood history for this site. The extent of flooding, and/or flood level information is only shown for those watercourses surveyed after the flood. Other flooding may have occurred which is not shown. This is the best information currently available. Please note that for this reason, we are unable to confirm if flooding has occurred at a property scale. The Flood History Map PDF we have provided shows the area of land that has flooded rather than any individual property. Please refer to the attached table detailing the causes of those past floods.

Start date	End date	Source of flood	Cause of flood	Affects location
20 February 2022	28 March 2022	main river	channel capacity exceeded (no raised defences)	No
15 February 2020	19 March 2020	main river	channel capacity exceeded (no raised defences)	No

In the attached list, there may be outlines which have a Flood Map or the Historical Flood Map status of “Considered and Rejected”. This could be for various reasons, including but not limited to the outline consisting of flooding from surface water, overland flow or sewage. It could also be a result of the data being of very poor quality, or in some cases, where changes in the area make a historical flood outline no longer representative of the flood risk, e.g. ground raising or flow path changes.

Water causing flooding can come from different places, for example from rivers or the sea; surface water (i.e. rainwater flowing over or accumulating on the ground before it is able to enter rivers or the drainage system); overflowing or backing up of sewers or drainage systems which have been overwhelmed or from groundwater rising from underground aquifers.

Please note that this record doesn't include all of the flooding that may have occurred including and since 2nd March 2022. Given the process of recording, verifying and updating our record from major floods is extensive and may take a considerable amount of time.

Assets (if applicable)

We have no record of flood defences helping to reduce flood risk in your area of interest.

Please note that information about high ground, structures (such as weirs, control gates or screens) and channels (culverts) are no longer given out in Product 4, unless specifically requested. If you'd like to see this data, please let us know.

Modelling

Please note that whilst the information provided is our best available data, we do not guarantee that is sufficient for land use planning or other such purposes. It is the applicant's responsibility to assess the suitability of the provided model/data for their purposes.

Breach hazard mapping (Product 8) has also been included with the Product 4 where it is available.

Climate Change

Updated guidance on how climate change could affect flood risk to new development - '[Flood risk assessments: climate change allowances](#)' was published on gov.uk on 19 February 2016. You should confirm the flood risk vulnerability classification and lifetime of your proposed development in line with NPPF and apply the appropriate climate change allowances.

Bespoke Flood Risk Assessment (FRA) advice:

If the pre-application advice is required with regards the preparation of a site-specific Flood Risk Assessment, this can be requested via the Yorkshire Sustainable Places team (email: sp-yorkshire@environment-agency.gov.uk). Charges may apply for any advice that is provided, this currently stands at £100 per hour per person. The [.gov.uk](#) pages provide a good starting point on what to include within a site-specific Flood Risk Assessment and can be accessed via <https://www.gov.uk/guidance/flood-risk-assessment-for-planning-applications>. A site-specific Flood Risk Assessment will need to consider flood risks from all sources, including those associated with defence failure (e.g. breach) and accounting for the predicted impacts as a result of climate change. Please contact the Sustainable Places team if you require advice on how to include these within a Flood Risk Assessment.

Other

Surface Water Map

Lead Local Flood Authorities (LLFA) are responsible for managing local flood risk from surface water flooding and groundwater flooding. You should check with the LLFA as they may have more up to date information regarding this type of flooding.

The Risk of Flooding from Surface Water Flood Map can be viewed and downloaded as a PDF file on GOV.UK by following this link: <https://flood-warning-information.service.gov.uk/long-term-flood-risk>

Surface Water Drainage

The Lead Local Flood Authority is the statutory consultee for planning matters relating to surface water drainage, therefore it is recommended they should be consulted separately regarding this.

Surface water discharge from new development should ideally 'mimic' the pre-development situation using a sustainable drainage system so that the flow and volume of water in watercourses is not increased.

A permit may be required, under the Environmental Permitting Regulations 2016 from the Environment Agency for any proposed works or structures in, under, over or within eight metres of a 'main river' (e.g., a new outfall). A permit is separate to and in addition to any planning permission granted. Further details and guidance are available on the GOV.UK website:

<https://www.gov.uk/guidance/flood-risk-activities-environmental-permits>

Risk of Flooding from Reservoirs Map

Outlines and simplified depth and velocity maps can be viewed on our website:

<https://flood-warning-information.service.gov.uk/long-term-flood-risk/#x=438988&y=406600&scale=2>

Please, zoom into the location of interest, and then click on the inundated location for details. As a result a list of reservoirs will be provided with supporting information and a links to other data, such as estimated depths and speed of flooding, at the bottom of the result page.

A map of showing the outlines can also be provided on request.

Flood Warning

The site may be covered by a Flood Warning. To register to receive this service, you can call Floodline 24 hours a day on 0845 988 1188.

LIDAR Data

Please note that our LiDAR data is now available free of charge (Open Data) from <https://environment.data.gov.uk/survey> (once zoomed to the relevant location the available LiDAR products will be listed below the map).

Two LIDAR products are available:

1. Tiled LIDAR data - The full tiled dataset consists of historic LIDAR data which has been gathered since 1998. For some areas we have carried out repeat surveys and data is available in a range of resolutions.
2. Composite LIDAR data - The composite dataset is derived from a combination of our full tiled dataset which has been merged and re-sampled to give the best possible spatial coverage.

Light Detection and Ranging (LIDAR) is an airborne mapping technique, which uses a laser to measure the distance between the aircraft and the ground. This technique results in the production of an accurate, cost-effective terrain model suitable for assessing flood risk and other environmental applications.

The Environment Agency owns two LIDAR systems, which are installed in a survey aircraft along with its other operational remote sensing instruments.

The aircraft is positioned and navigated using Global Positioning System (GPS) corrected to known ground reference points. The aircraft typically flies at a height of about 800 metres above ground level and a scanning mirror allows a swath width of about 600 metres to be surveyed during a flight.

The Rights & Responsibilities of a Riverside Owner

The owner of property adjacent to a watercourse is usually deemed to be the riparian owner and, as such, has both riparian rights and responsibilities with regard to the watercourse within their ownership.

For more information on Rights and Responsibilities of a riverside owner, you can visit our website at:

<https://www.gov.uk/guidance/owning-a-watercourse>

Ordnance Survey Data

Under the terms of our licence agreement with the Ordnance Survey, we are unable to supply the OS data. Under this agreement we can only supply OS data to consultants/contractors carrying out work on our behalf.



Historic flood map

Location (easting/northing)
415037/416511

Scale
1:10,000

Created
9 Apr 2024

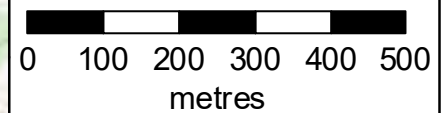
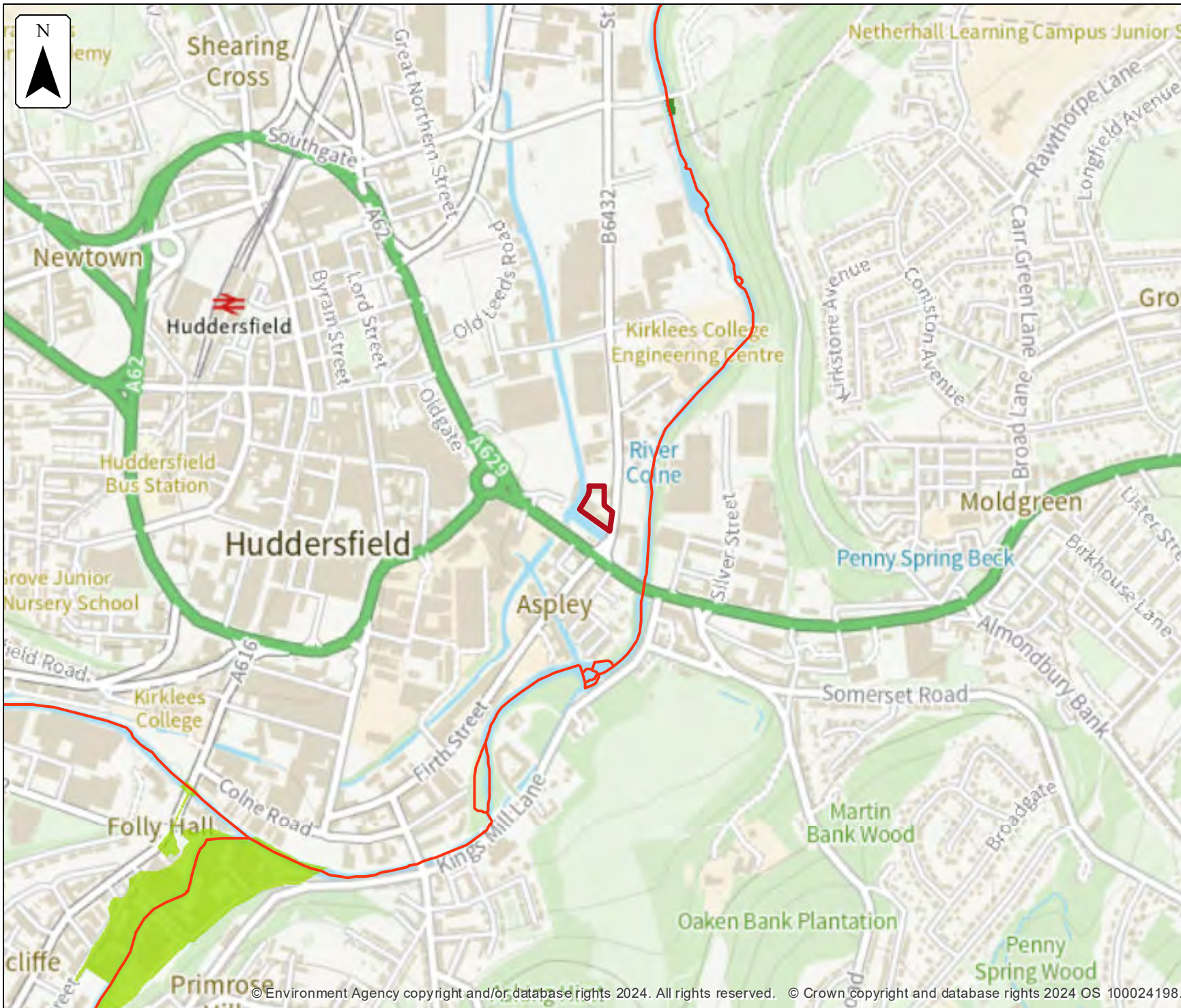
Selected area

Main river

Date of flood event

February, 2022

February, 2020

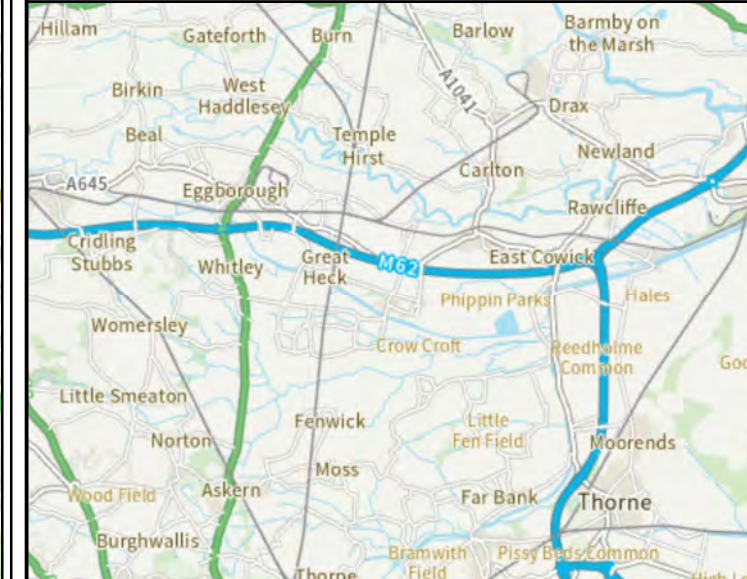


RFI/355477 2011 Huddersfield Study Node Point Map centred on 415037E 416511N



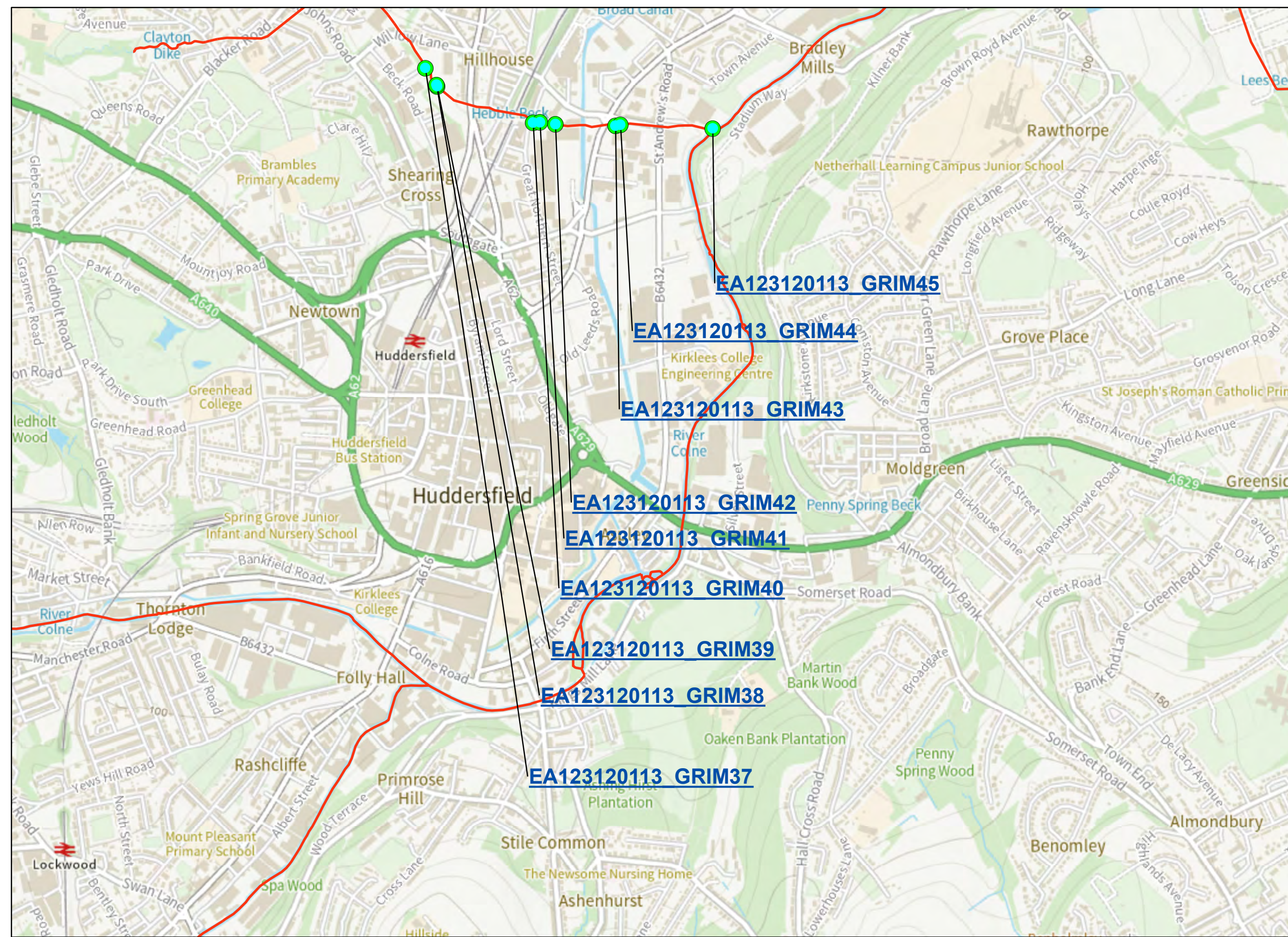
Scale 1:11,000

www.environment-agency.gov.uk



Legend

- 2011 Huddersfield Study - Grimescar Beck / Clayton Dike
- Main River



2011 Huddersfield Model Results (Level - mAOD, Flow - m³s) - RFI/2024/355477																		
Node Point	Annual Exceedance Probability (AEP)																	
	50% AEP (1 in 2)		20% AEP (1 in 5)		10% AEP (1 in 10)		5% AEP (1 in 20)		4% AEP (1 in 25)		2% AEP (1 in 50)		1.33% AEP (1 in 75)		1% AEP (1 in 100)		0.1% AEP (1 in 1000)	
	Max Stage	Max Flow	Max Stage	Max Flow	Max Stage	Max Flow	Max Stage	Max Flow	Max Stage	Max Flow	Max Stage	Max Flow	Max Stage	Max Flow	Max Stage	Max Flow	Max Stage	Max Flow
GRIM01_0325	61.81	2.709	62.01	3.538	62.17	4.249	62.32	5.1	62.38	5.405	62.55	6.776	62.59	7.726	62.61	8.492	62.74	15.386
GRIM01_0898	71.01	2.328	71.23	3.012	71.4	3.597	71.56	4.298	71.62	4.548	71.85	5.681	72.03	6.464	72.15	7.077	73.08	10.93
GRIM01_0967	71.22	1.951	71.37	2.491	71.5	2.954	71.64	3.506	71.69	3.703	71.89	4.599	72.07	5.051	72.18	5.322	73.09	5.879
GRIM01_0311	61.51	2.701	61.69	3.531	61.83	4.241	61.97	5.052	62.02	5.352	62.19	6.751	62.23	7.703	62.25	8.48	62.4	15.413
GRIM01_0507	65.26	2.709	65.45	3.538	65.59	4.249	65.73	5.1	65.78	5.405	65.96	6.776	66.05	7.726	66.09	8.492	66.31	15.386
GRIM01_0575	65.99	2.324	66.19	3.009	66.34	3.593	66.48	4.294	66.54	4.543	66.74	5.672	66.84	6.456	66.89	7.068	67.09	10.969
GRIM01_0903	71.01	2.328	71.23	3.012	71.4	3.597	71.57	4.298	71.63	4.548	71.85	5.681	72.03	6.464	72.15	7.077	73.07	10.93
GRIM01_0555	65.74	2.324	65.94	3.009	66.08	3.593	66.23	4.294	66.28	4.543	66.48	5.672	66.57	6.456	66.62	7.068	66.85	10.969
GRIM01_0000	58.61	2.71	58.61	3.544	58.61	4.257	58.61	5.061	58.61	5.372	59.08	6.778	59.08	7.729	59.28	8.533	59.28	11.745

2011 Huddersfield Model Results (Level - mAOD, Flow - m³s) - RFI/2024/355477		
Node Point	Annual Exceedance Probability (AEP)	
	1% AEP (1 in 100) +20% CC	
	Max Stage	Max Flows
GRIM01_0325	62.67	9.923
GRIM01_0898	72.37	8.224
GRIM01_0967	72.4	5.553
GRIM01_0311	62.3	9.901
GRIM01_0507	66.2	9.923
GRIM01_0575	67.01	8.212
GRIM01_0903	72.37	8.224
GRIM01_0555	66.74	8.212
GRIM01_0000	59.28	9.945

Flood risk assessment data



Location of site: 415037 / 416511 (shown as easting and northing coordinates)

Document created on: 9 April 2024

This information was previously known as a product 4.

Customer reference number: 9U4H5KRAEJAK

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



How to use this information

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

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

Included in this document

In this document you'll find:

- how to find information about surface water and other sources of flooding
- information on the models used
- definitions for the terminology used throughout
- flood map for planning (rivers and the sea)
- historic flooding
- 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:

- flood defences and attributes

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

Surface water and other sources of flooding

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

- surface water
- ordinary watercourses
- reservoirs

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

About the models used

Model name: 2011 Huddersfield Study - Grimescar Beck / Clayton Dike

Scenario(s): No defences exist fluvial

Date: 31 March 2011

Model name: 2019 Colne Model

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

Date: 1 August 2019

Model name: 2019 River Holme 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.







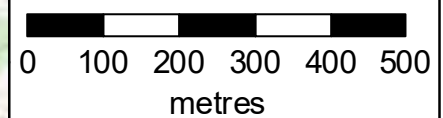
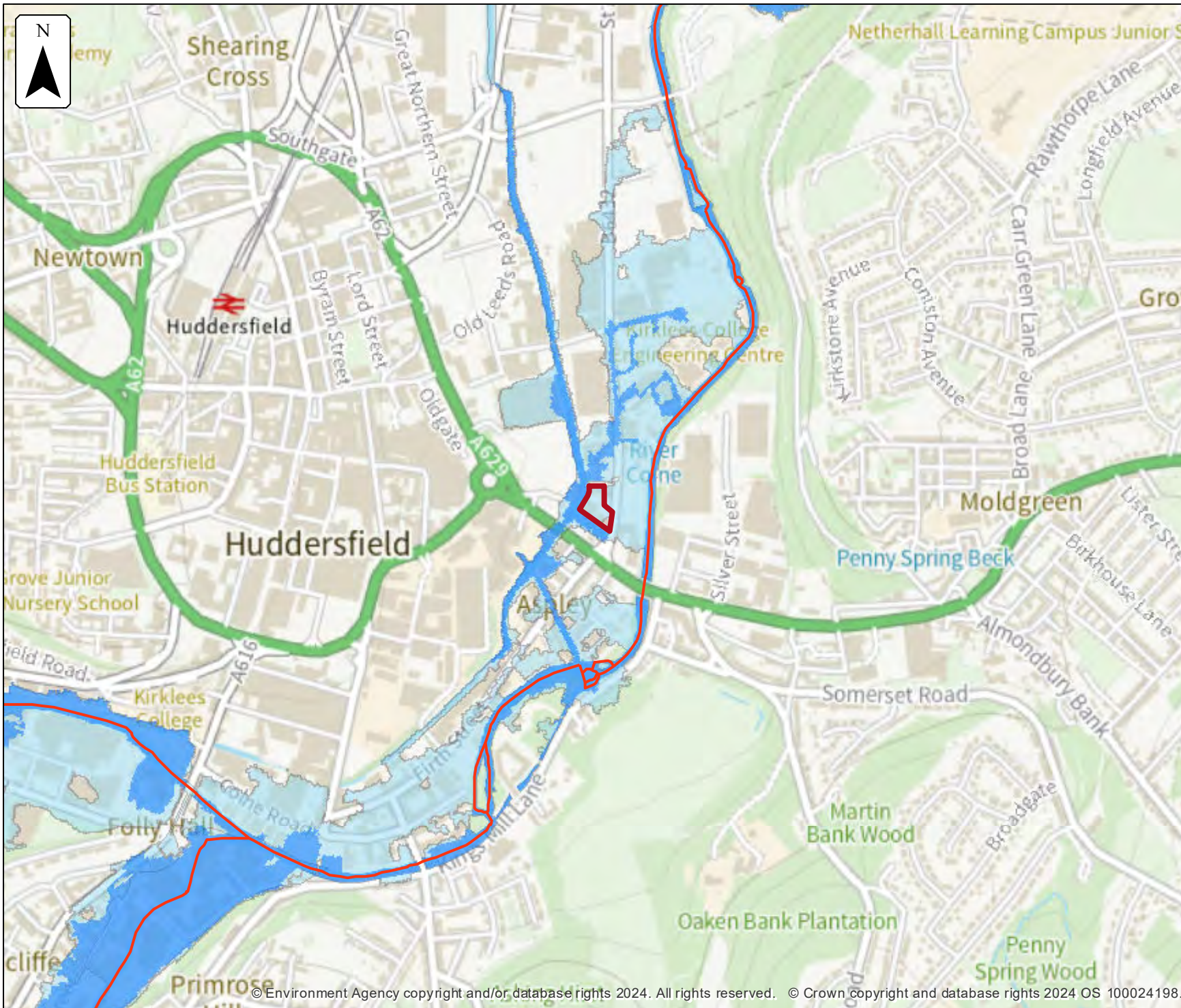
Flood map for planning

Location (easting/northing)
415037/416511

Scale
1:10,000

Created
9 Apr 2024

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



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 extent

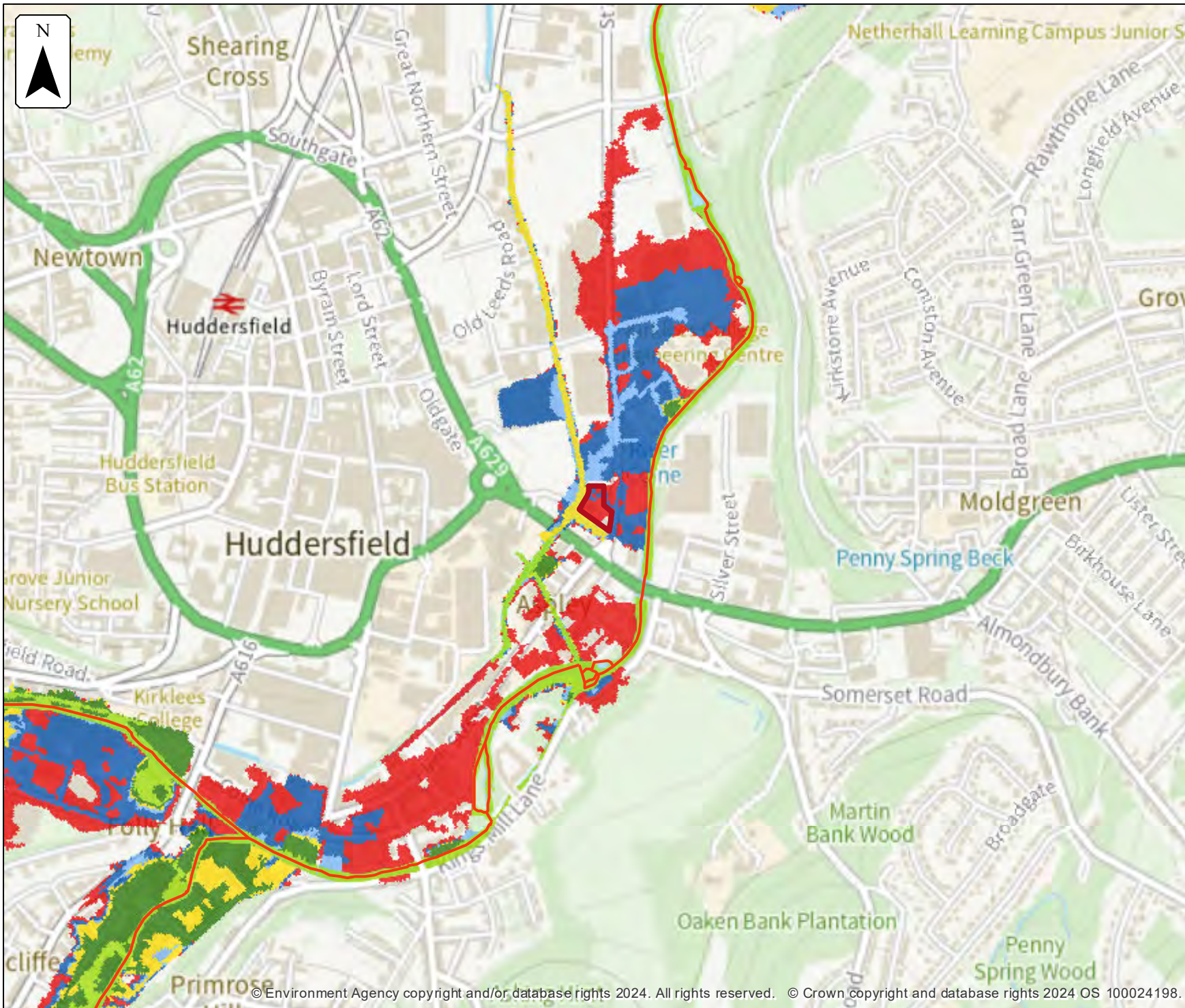
Location (easting/northing)
415037/416511

Scale Created
1:10,000 9 Apr 2024

Model name
2019 Colne Model

- Selected area
- Main river
- Modelled flood extent**
- 5% AEP
- 2% AEP
- 1.33% AEP
- 1% AEP
- 0.5% AEP
- 0.1% AEP

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









Defences removed modelled fluvial extent

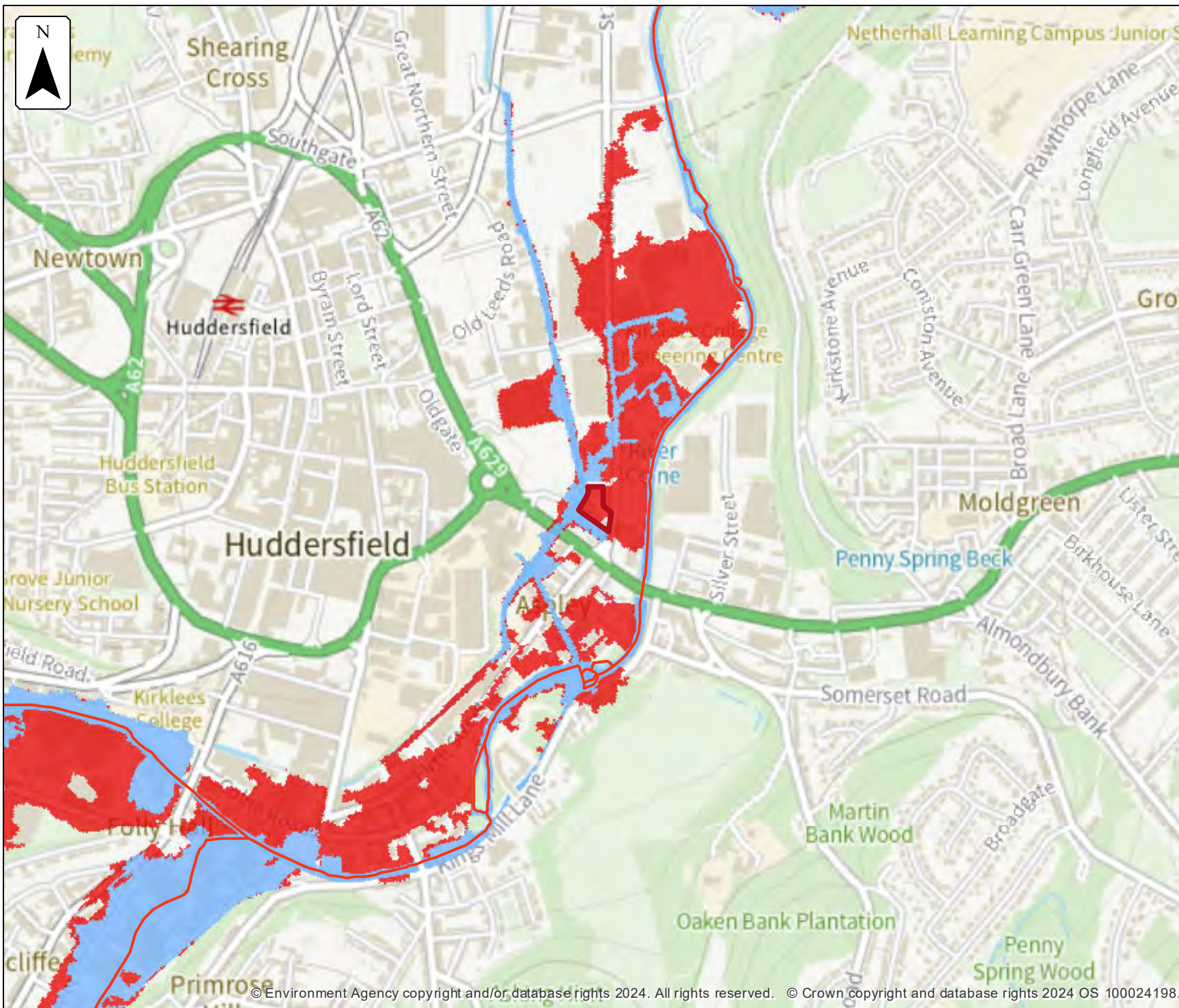
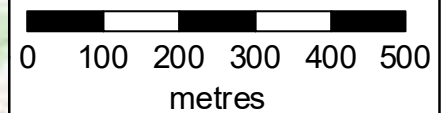
Location (easting/northing)
415037/416511

Scale Created
1:10,000 9 Apr 2024

Model name
2019 Colne Model

-  Selected area
-  Main river
- Modelled flood extent**
-  1% AEP
-  0.1% AEP

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








No defences exist modelled fluvial extent

Location (easting/northing)
415037/416511

Scale Created
1:10,000 9 Apr 2024

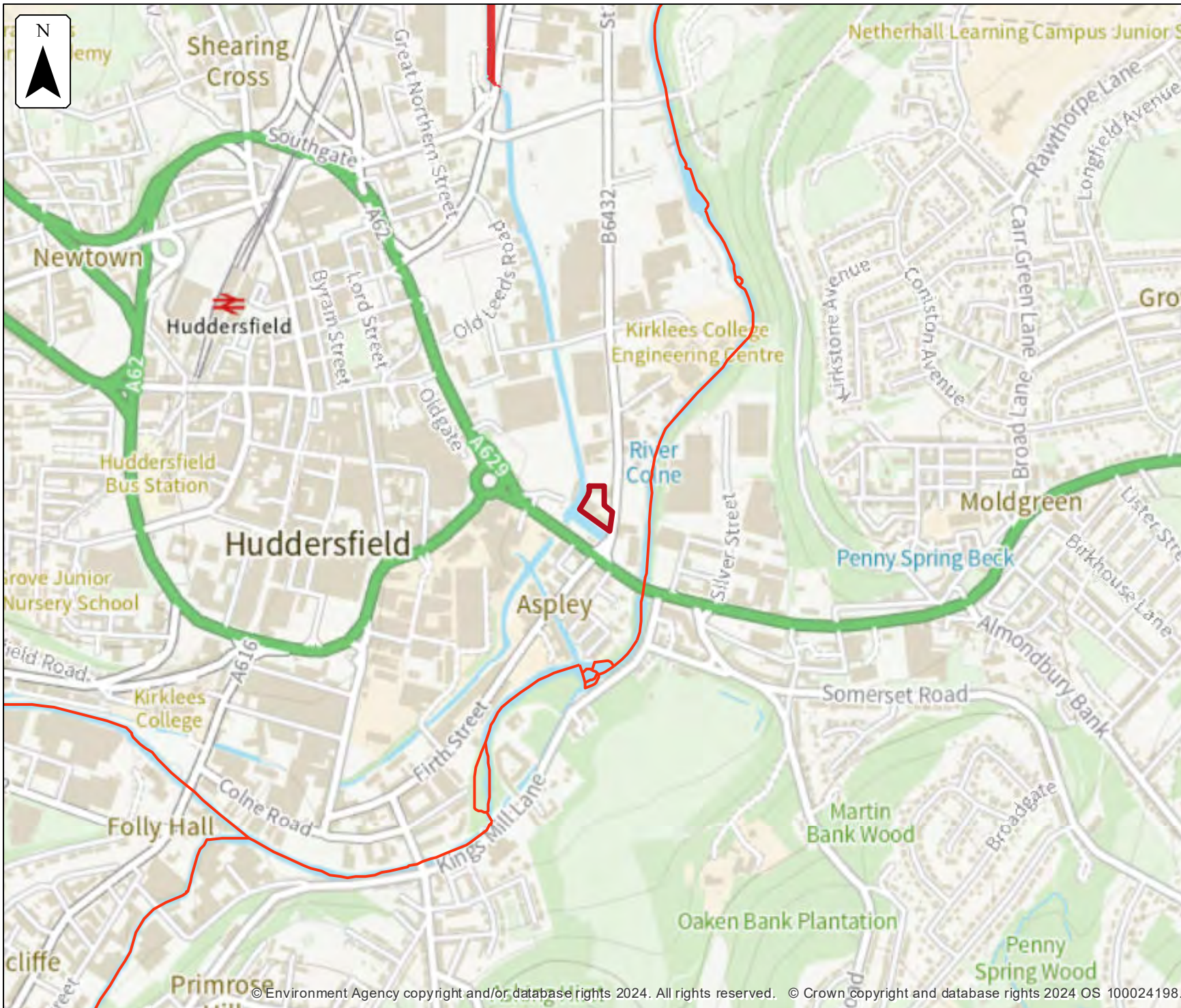
Model name
2011 Huddersfield Study - Grimescar

-  Selected area
-  Main river
-  Modelled flood extent 0.1% AEP

Modelled flood extent

0.1% AEP

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





No defences exist modelled fluvial extent

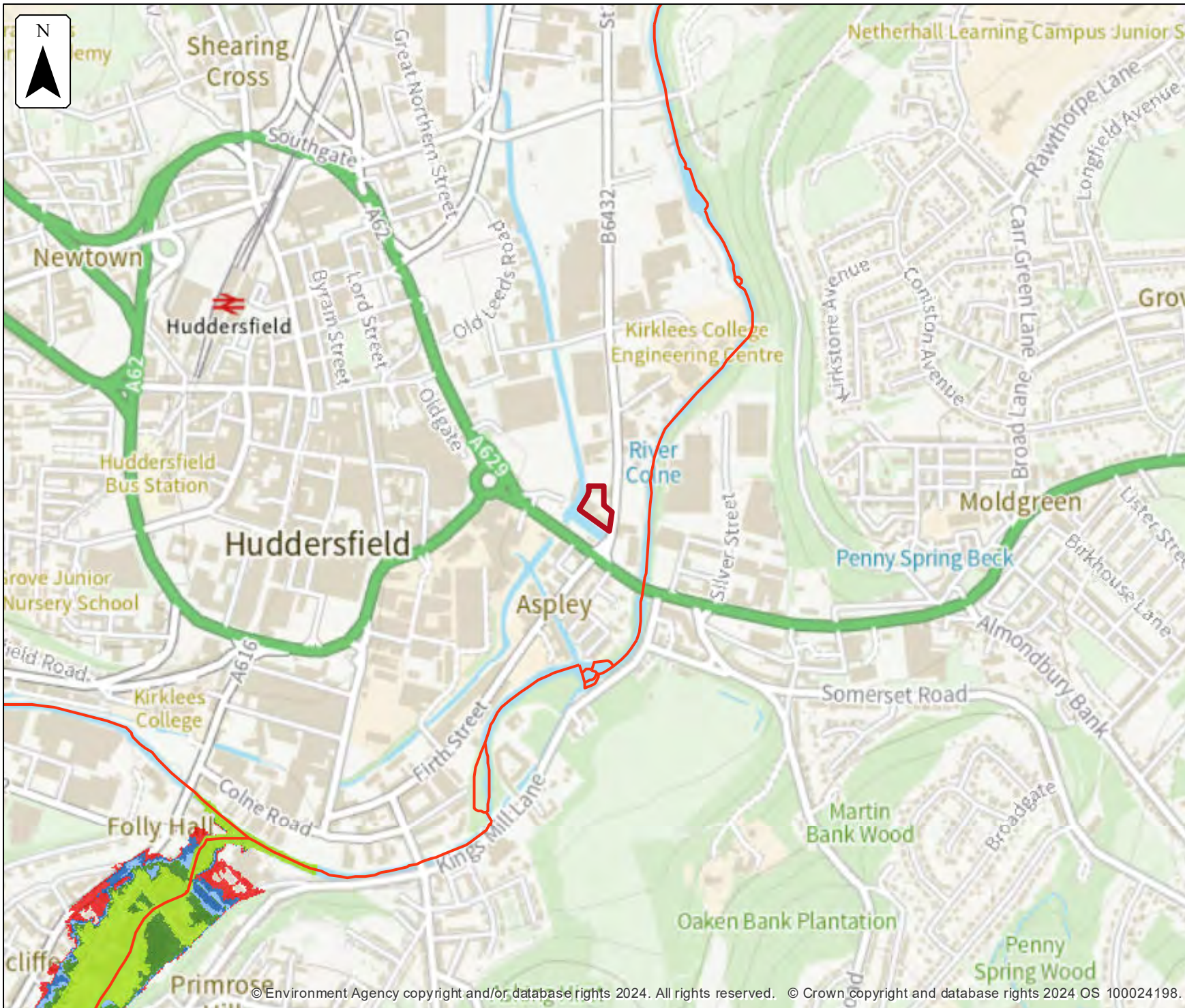
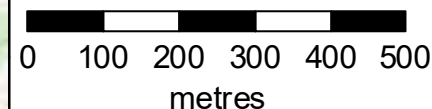
Location (easting/northing)
415037/416511

Scale Created
1:10,000 9 Apr 2024

Model name
2019 River Holme model

- Selected area
- Main river
- Modelled flood extent**
- 5% AEP
- 2% AEP
- 1.33% AEP
- 1% AEP
- 0.5% AEP
- 0.1% AEP

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





Defences removed climate change modelled fluvial extent

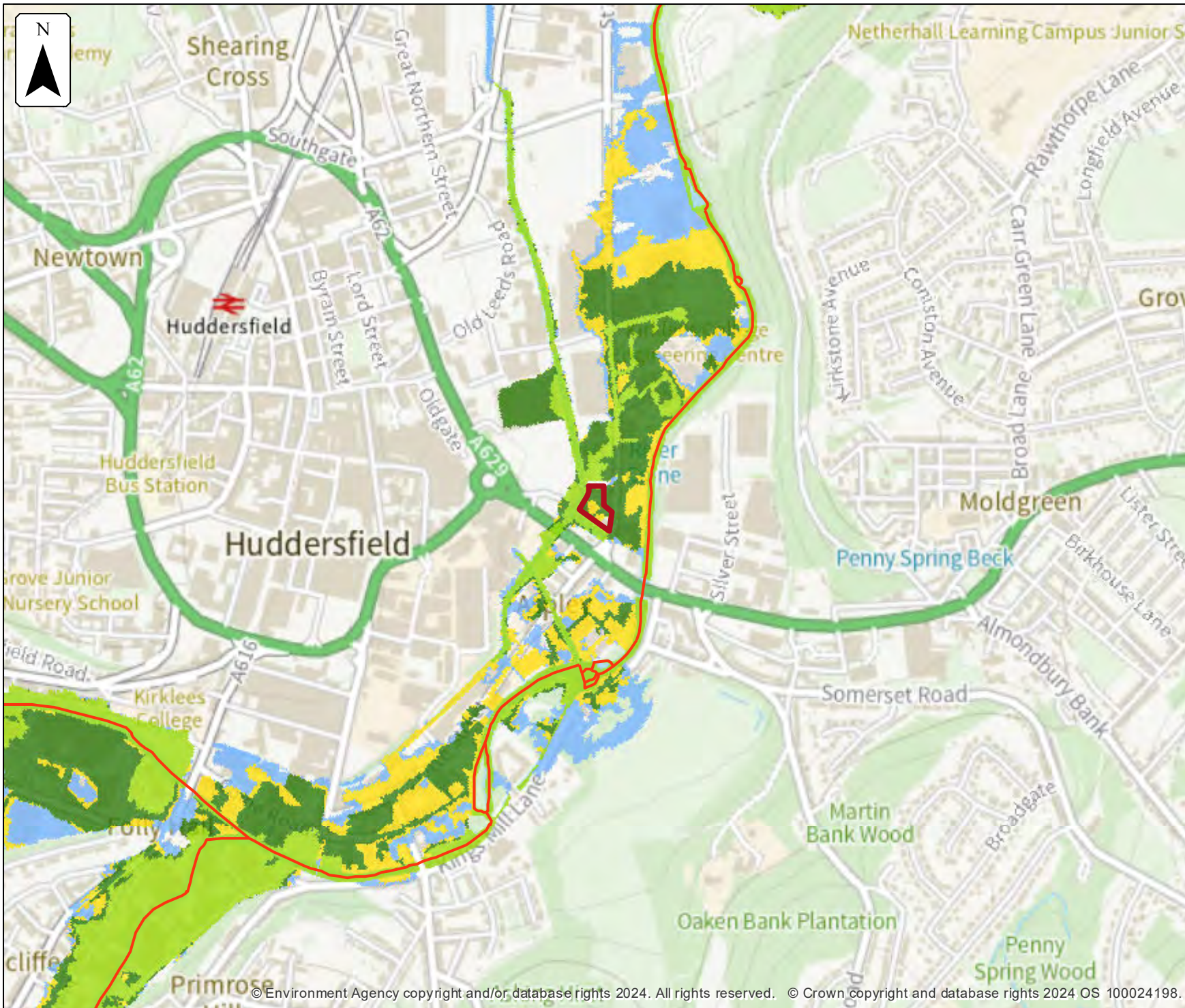
Location (easting/northing)
415037/416511

Scale Created
1:10,000 9 Apr 2024

Model name
2019 Colne Model

- Selected area
- Main river
- Modelled flood extent
 - 1.0% AEP (+20%)
 - 1.0% AEP (+30%)
 - 1.0% AEP (+50%)
 - 0.1% AEP (+20%)

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





No defences exist climate change modelled fluvial extent

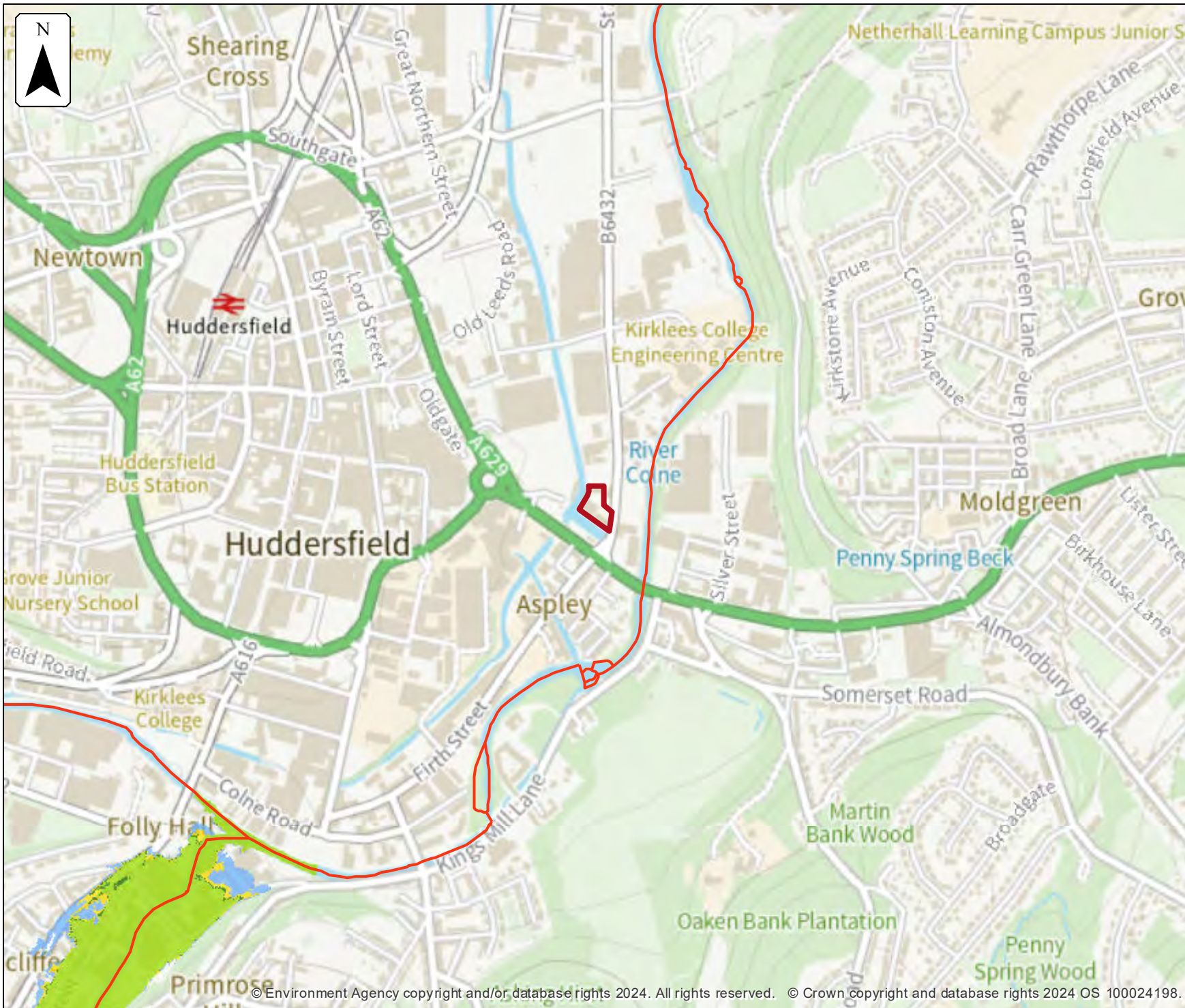
Location (easting/northing)
415037/416511

Scale Created
1:10,000 9 Apr 2024

Model name
**2019 River Holme
model**

- Selected area
- Main river
- Modelled flood extent
 - 1.0% AEP (+20%)
 - 1.0% AEP (+30%)
 - 1.0% AEP (+50%)
 - 0.1% AEP (+20%)

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








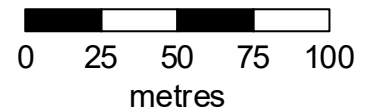
Defended modelled fluvial node locations

Location (easting/northing)
415037/416511

Scale Created
1:2,500 9 Apr 2024

Model name
2019 Colne Model

-  Selected area
-  Modelled location
-  Main river



Modelled node locations data

Defended

Label	Modelled location ID	Easting	Northing	5% AEP		2% AEP		1.33% AEP		1% AEP		0.5% AEP		0.1% AEP	
				Level	Flow	Level	Flow	Level	Flow	Level	Flow	Level	Flow	Level	Flow
1	1198090	415129	416373	62.35	100.52	62.74	123.81	62.93	135.49	63.08	145.75	63.43	169.23	63.96	212.75
2	1197876	415133	416411	62.27	100.52	62.66	123.81	62.84	135.49	62.99	145.75	63.34	169.20	63.87	212.74
3	1198132	415136	416449	62.18	100.52	62.57	123.81	62.75	135.48	62.91	145.74	63.26	169.17	63.78	212.43
4	1198153	415138	416487	62.10	100.52	62.49	123.81	62.67	135.48	62.82	145.74	63.17	169.29	63.72	208.58
5	1197939	415141	416563	61.64	100.51	61.97	123.80	62.13	135.47	62.26	145.74	62.57	169.53	62.97	213.97
6	1198259	415141	416525	61.86	100.51	62.21	123.80	62.38	135.48	62.52	145.74	62.84	169.54	63.30	213.66
7	1197902	415150	416615	61.62	100.51	61.97	123.80	62.13	135.47	62.28	145.73	62.60	170.07	63.02	216.20
8	1198100	415201	416700	61.34	100.51	61.68	123.79	61.85	134.93	62.01	144.20	62.37	165.60	62.85	201.16

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.






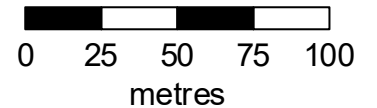
Defences removed modelled fluvial node locations

Location (easting/northing)
415037/416511

Scale Created
1:2,500 9 Apr 2024

Model name
2019 Colne Model

-  Selected area
-  Modelled location
-  Main river



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Modelled node locations data

Defences removed

Label	Modelled location ID	Easting	Northing	5% AEP		2% AEP		1.33% AEP		1% AEP		0.5% AEP		0.1% AEP	
				Level	Flow	Level	Flow	Level	Flow	Level	Flow	Level	Flow	Level	Flow
1	1198090	415129	416373							63.08	145.72			63.96	212.91
2	1197876	415133	416411							62.99	145.72			63.87	212.91
3	1198132	415136	416449							62.91	145.72			63.79	212.60
4	1198153	415138	416487							62.82	145.71			63.72	208.71
5	1197939	415141	416563							62.26	145.71			62.98	214.14
6	1198259	415141	416525							62.52	145.71			63.30	213.82
7	1197902	415150	416615							62.28	145.70			63.02	216.38
8	1198100	415201	416700							62.01	144.17			62.85	201.29

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.






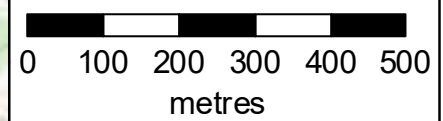
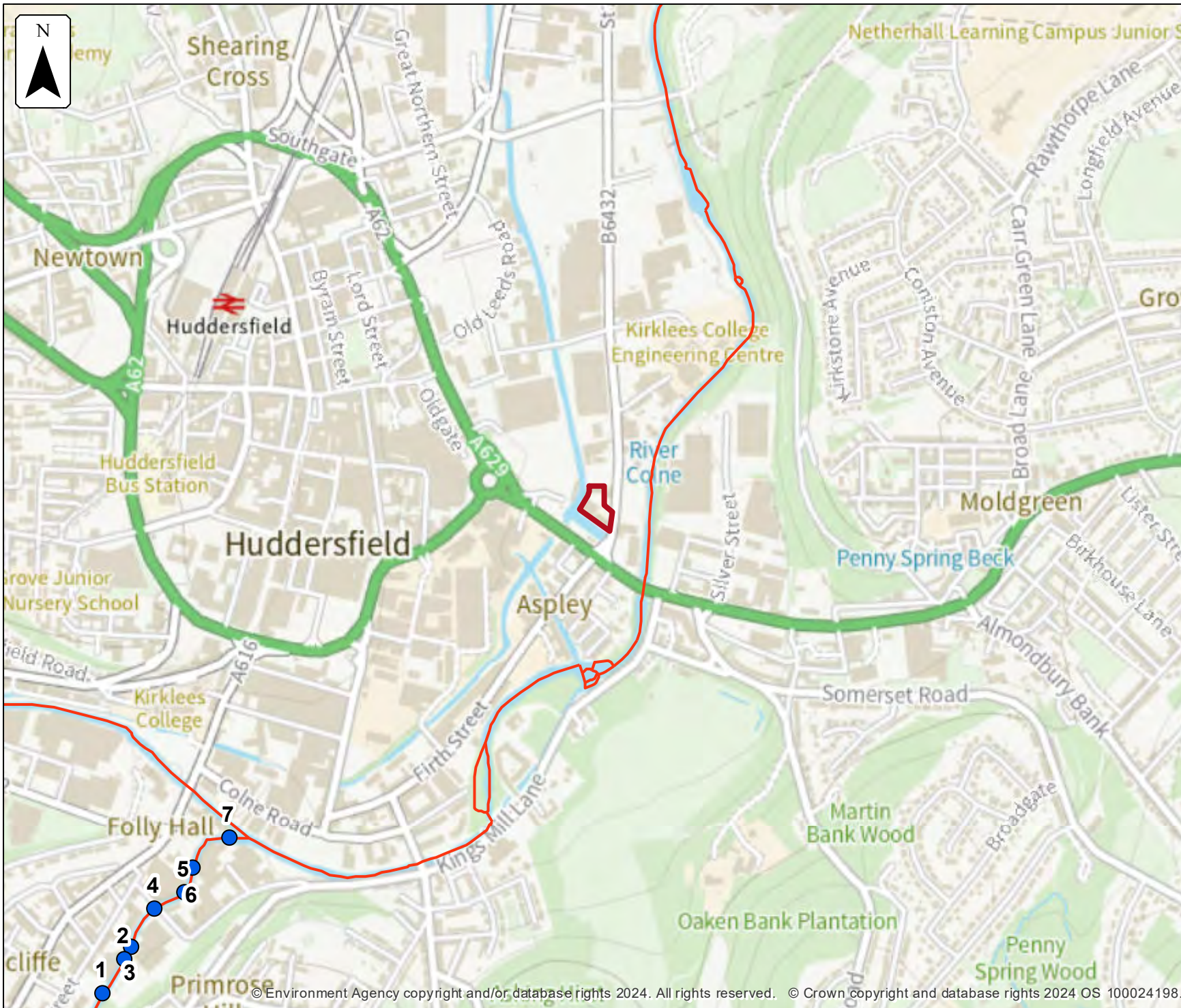
No defences exist modelled fluvial node locations

Location (easting/northing)
415037/416511

Scale Created
1:10,000 9 Apr 2024

Model name
2019 River Holme model

-  Selected area
-  Modelled location
-  Main river



Modelled node locations data

No defences exist

Label	Modelled location ID	Easting	Northing	5% AEP		2% AEP		1.33% AEP		1% AEP		0.5% AEP		0.1% AEP	
				Level	Flow	Level	Flow	Level	Flow	Level	Flow	Level	Flow	Level	Flow
1	1199151	414080	415568	71.16	70.35	71.33	86.0	71.41	93.31	71.46	99.97	71.61	119.41	71.86	162.09
2	1199248	414123	415632	70.97	70.33	71.13	86.33	71.21	93.29	71.26	99.94	71.41	119.38	71.66	162.06
3	1198985	414134	415658	70.93	70.33	71.09	86.76	71.16	93.28	71.21	99.94	71.36	119.37	71.60	162.04
4	1199259	414180	415732	70.76	70.32	70.95	87.74	71.01	93.24	71.06	99.90	71.19	119.35	71.43	162.01
5	1199152	414237	415762	70.14	70.32	70.62	85.19	70.73	93.21	70.77	99.87	70.94	119.34	71.18	161.99
6	1199260	414255	415810	69.45	70.32	69.67	85.06	69.78	93.21	69.87	99.87	70.23	119.33	70.62	161.98
7	1198953	414326	415869	68.88	70.32	69.03	85.23	69.06	93.21	69.06	99.87	69.09	119.33	69.39	161.97

Data in this table comes from the 2019 River Holme 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.






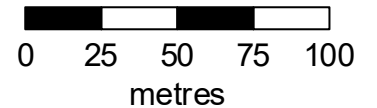
Defences removed climate change modelled fluvial node locations

Location (easting/northing)
415037/416511

Scale Created
1:2,500 9 Apr 2024

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	1.0% AEP (+20%)		1.0% AEP (+30%)		1.0% AEP (+50%)		0.1% AEP (+20%)	
				Level	Flow	Level	Flow	Level	Flow	Level	Flow
1	1198090	415129	416373	63.48	172.57	63.65	185.66	63.96	212.51	64.33	251.29
2	1197876	415133	416411	63.39	172.56	63.56	185.65	63.87	212.50	64.23	251.30
3	1198132	415136	416449	63.31	172.53	63.48	185.52	63.78	212.19	64.14	250.72
4	1198153	415138	416487	63.22	172.70	63.39	185.59	63.71	208.39	64.09	238.58
5	1197939	415141	416563	62.61	173.0	62.75	186.45	62.97	213.73	63.30	247.57
6	1198259	415141	416525	62.88	173.0	63.03	186.45	63.30	213.42	63.68	243.67
7	1197902	415150	416615	62.64	173.66	62.79	187.36	63.02	215.93	63.30	256.40
8	1198100	415201	416700	62.41	168.69	62.58	180.03	62.84	201.03	63.20	228.09

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.






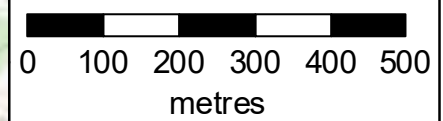
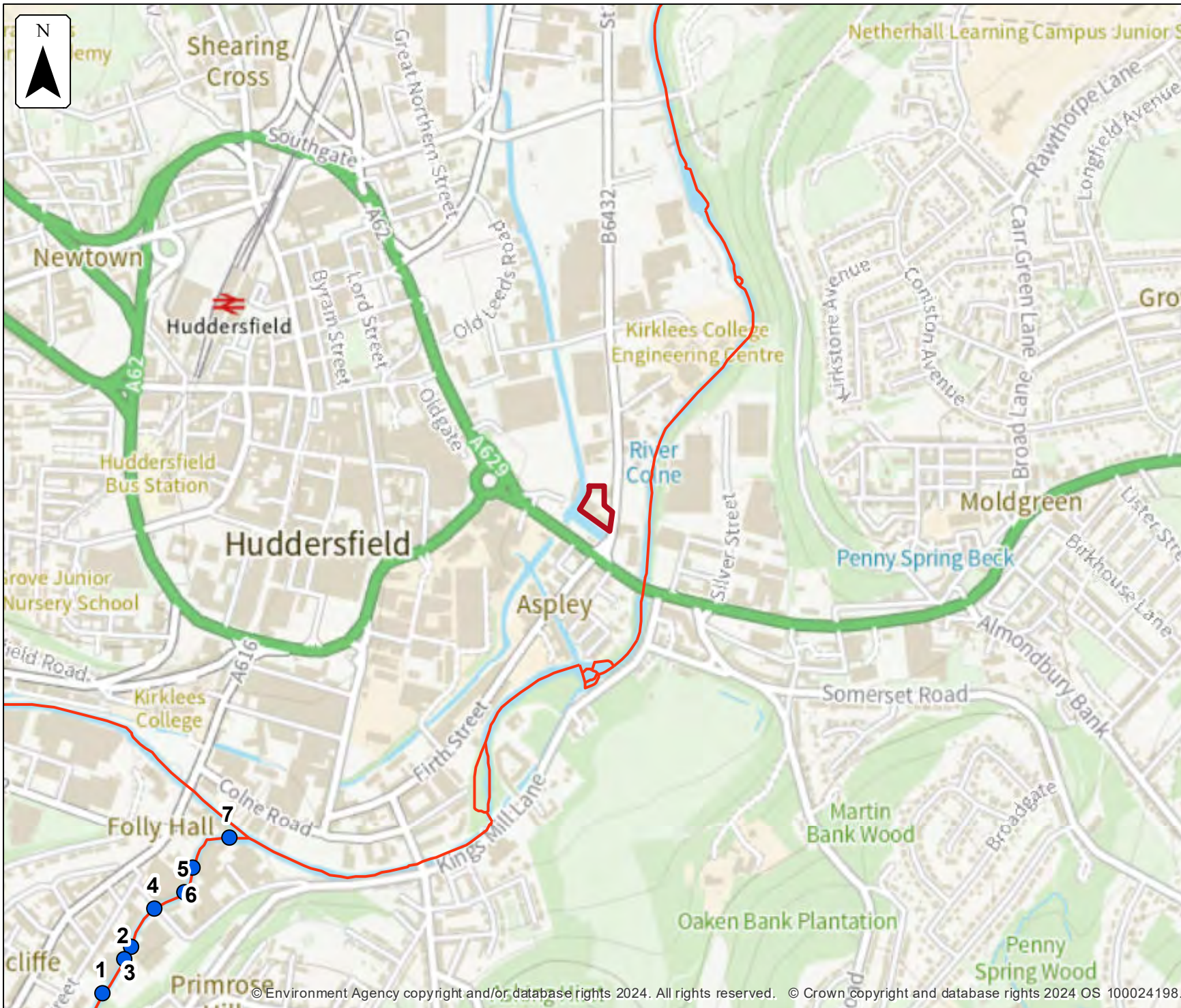
No defences exist climate change modelled fluvial node locations

Location (easting/northing)
415037/416511

Scale Created
1:10,000 9 Apr 2024

Model name
**2019 River Holme
model**

-  Selected area
-  Modelled location
-  Main river



Modelled node locations data

No defences exist climate change

Label	Modelled location ID	Easting	Northing	1.0% AEP (+20%)		1.0% AEP (+30%)		1.0% AEP (+50%)		0.1% AEP (+20%)	
				Level	Flow	Level	Flow	Level	Flow	Level	Flow
1	1199151	414080	415568	71.62	120.54	71.68	129.58	71.79	148.89	72.03	193.33
2	1199248	414123	415632	71.42	120.52	71.47	129.56	71.59	148.85	71.82	193.31
3	1198985	414134	415658	71.36	120.51	71.42	129.55	71.53	148.84	71.76	193.30
4	1199259	414180	415732	71.20	120.50	71.25	129.53	71.36	148.79	71.58	193.27
5	1199152	414237	415762	70.95	120.48	71.0	129.52	71.11	148.77	71.33	193.26
6	1199260	414255	415810	70.24	120.48	70.31	129.51	70.49	148.76	70.86	193.25
7	1198953	414326	415869	69.09	120.48	69.16	129.51	69.29	148.76	69.64	193.23

Data in this table comes from the 2019 River Holme 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.



Defended modelled fluvial extent and height

Location (easting/northing)
415037/416511

Scale Created
1:500 9 Apr 2024

Model name
2019 Colne Model

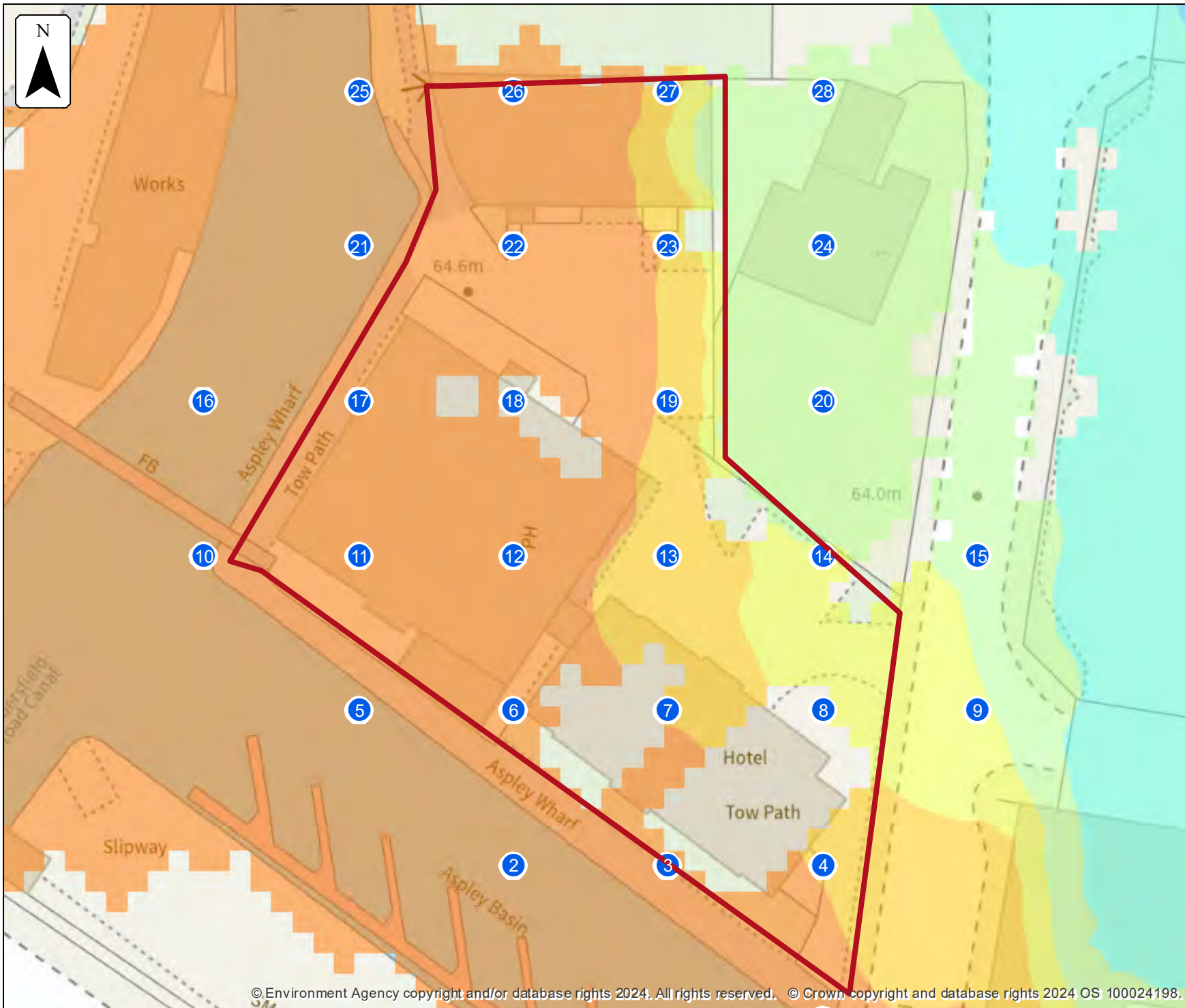
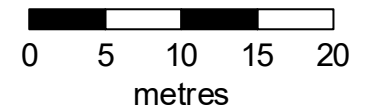
Selected area

Main river

Modelled 2D grid
Water level in mAOD

- 0 - 63.0
- 63.0 - 63.25
- 63.25 - 63.5
- 63.5 - 63.75
- 63.75 - 64.0
- 64.0 - 64.25
- 64.25 - 64.5
- 64.5 - 64.75
- 64.75 - 65.0

This map shows the
0.1% AEP height data



Sample point data

Defended

Label	Easting	Northing	5% AEP		2% AEP		1.33% AEP		1% AEP		0.5% AEP		0.1% AEP	
			Depth	Height	Depth	Height	Depth	Height	Depth	Height	Depth	Height	Depth	Height
1	415059	416461	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
2	415029	416476	1.70	64.01	1.70	64.01	1.73	64.04	2.07	64.38	2.23	64.54	2.31	64.61
3	415044	416476	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.07	64.54	0.12	64.62
4	415059	416476	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.01	64.47
5	415014	416491	1.92	64.00	1.92	64.00	1.95	64.04	2.30	64.38	2.45	64.54	2.53	64.62
6	415029	416491	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.08	64.61
7	415044	416491	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.00	64.48
8	415059	416491	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
9	415074	416491	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.04	63.97	0.09	64.03
10	414999	416506	1.82	64.00	1.82	64.00	1.86	64.04	2.20	64.38	2.36	64.54	2.43	64.62
11	415014	416506	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.05	64.61
12	415029	416506	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.03	64.60
13	415044	416506	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.02	64.36
14	415059	416506	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.07	64.05
15	415074	416506	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.01	63.95	0.02	63.96
16	414999	416521	1.89	64.00	1.89	64.00	1.92	64.04	2.26	64.38	2.42	64.54	2.50	64.62

Label	Easting	Northing	5% AEP		2% AEP		1.33% AEP		1% AEP		0.5% AEP		0.1% AEP		
			Depth	Height	Depth	Height	Depth	Height	Depth	Height	Depth	Height	Depth	Height	
17	415014	416521	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.07	64.61
18	415029	416521	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
19	415044	416521	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.01	64.47
20	415059	416521	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.13	63.33	0.62	63.82
21	415014	416536	1.67	64.00	1.67	64.00	1.70	64.04	2.05	64.38	2.20	64.54	2.28	64.61	
22	415029	416536	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.06	64.58
23	415044	416536	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.00	64.42	0.06	64.49
24	415059	416536	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.40	63.82
25	415014	416551	1.36	64.00	1.36	64.00	1.39	64.04	1.67	64.38	1.83	64.54	1.91	64.61	
26	415029	416551	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.07	64.48	0.18	64.59
27	415044	416551	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.02	64.30
28	415059	416551	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.21	63.82

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.



Defences removed modelled fluvial extent and height

Location (easting/northing)
415037/416511

Scale Created
1:500 9 Apr 2024










Model name
2019 Colne Model

 Selected area

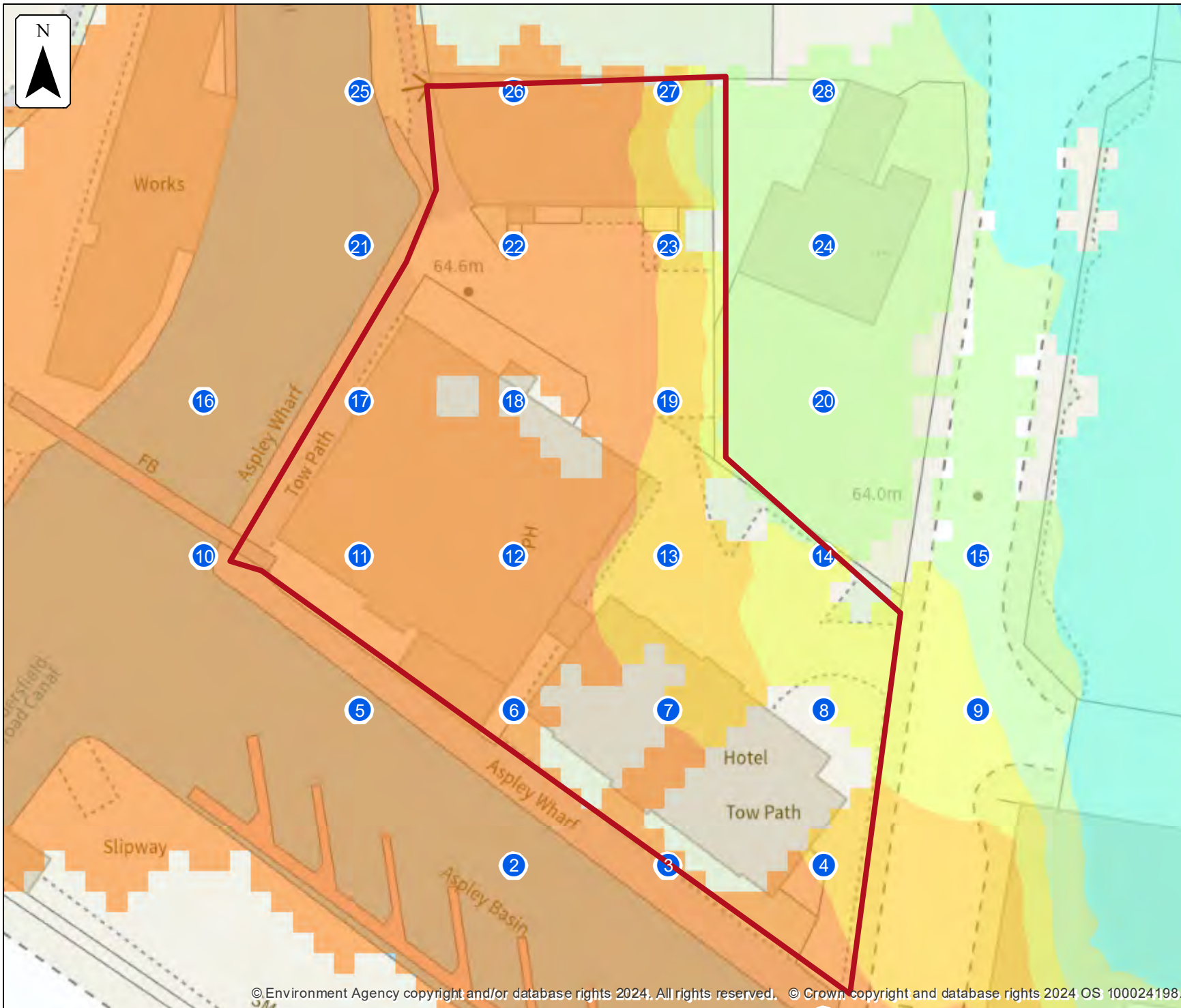
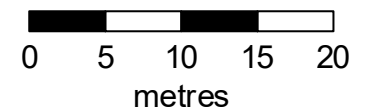
 Main river

Modelled 2D grid

Water level in mAOD

-  0 - 63.0
-  63.0 - 63.25
-  63.25 - 63.5
-  63.5 - 63.75
-  63.75 - 64.0
-  64.0 - 64.25
-  64.25 - 64.5
-  64.5 - 64.75
-  64.75 - 65.0

This map shows the
0.1% AEP height data



Sample point data

Defences removed

Label	Easting	Northing	5% AEP		2% AEP		1.33% AEP		1% AEP		0.5% AEP		0.1% AEP	
			Depth	Height	Depth	Height	Depth	Height	Depth	Height	Depth	Height	Depth	Height
1	415059	416461							NoData	NoData			NoData	NoData
2	415029	416476							2.07	64.38			2.31	64.61
3	415044	416476							NoData	NoData			0.12	64.62
4	415059	416476							NoData	NoData			0.01	64.47
5	415014	416491							2.30	64.38			2.53	64.62
6	415029	416491							NoData	NoData			0.08	64.61
7	415044	416491							NoData	NoData			0.00	64.48
8	415059	416491							NoData	NoData			NoData	NoData
9	415074	416491							NoData	NoData			0.09	64.03
10	414999	416506							2.20	64.38			2.43	64.62
11	415014	416506							NoData	NoData			0.05	64.61
12	415029	416506							NoData	NoData			0.03	64.60
13	415044	416506							NoData	NoData			0.02	64.36
14	415059	416506							NoData	NoData			0.07	64.05
15	415074	416506							NoData	NoData			0.02	63.96
16	414999	416521							2.26	64.38			2.50	64.62

Label	Easting	Northing	5% AEP		2% AEP		1.33% AEP		1% AEP		0.5% AEP		0.1% AEP	
			Depth	Height	Depth	Height	Depth	Height	Depth	Height	Depth	Height	Depth	Height
17	415014	416521							NoData	NoData			0.07	64.61
18	415029	416521							NoData	NoData			NoData	NoData
19	415044	416521							NoData	NoData			0.01	64.47
20	415059	416521							NoData	NoData			0.62	63.82
21	415014	416536							2.05	64.38			2.28	64.61
22	415029	416536							NoData	NoData			0.06	64.58
23	415044	416536							NoData	NoData			0.06	64.49
24	415059	416536							NoData	NoData			0.40	63.82
25	415014	416551							1.67	64.38			1.91	64.61
26	415029	416551							NoData	NoData			0.18	64.59
27	415044	416551							NoData	NoData			0.02	64.30
28	415059	416551							NoData	NoData			0.21	63.82

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.



Defences removed climate change modelled fluvial extent and height

Location (easting/northing)
415037/416511










Scale Created
1:500 9 Apr 2024

Model name
2019 Colne Model

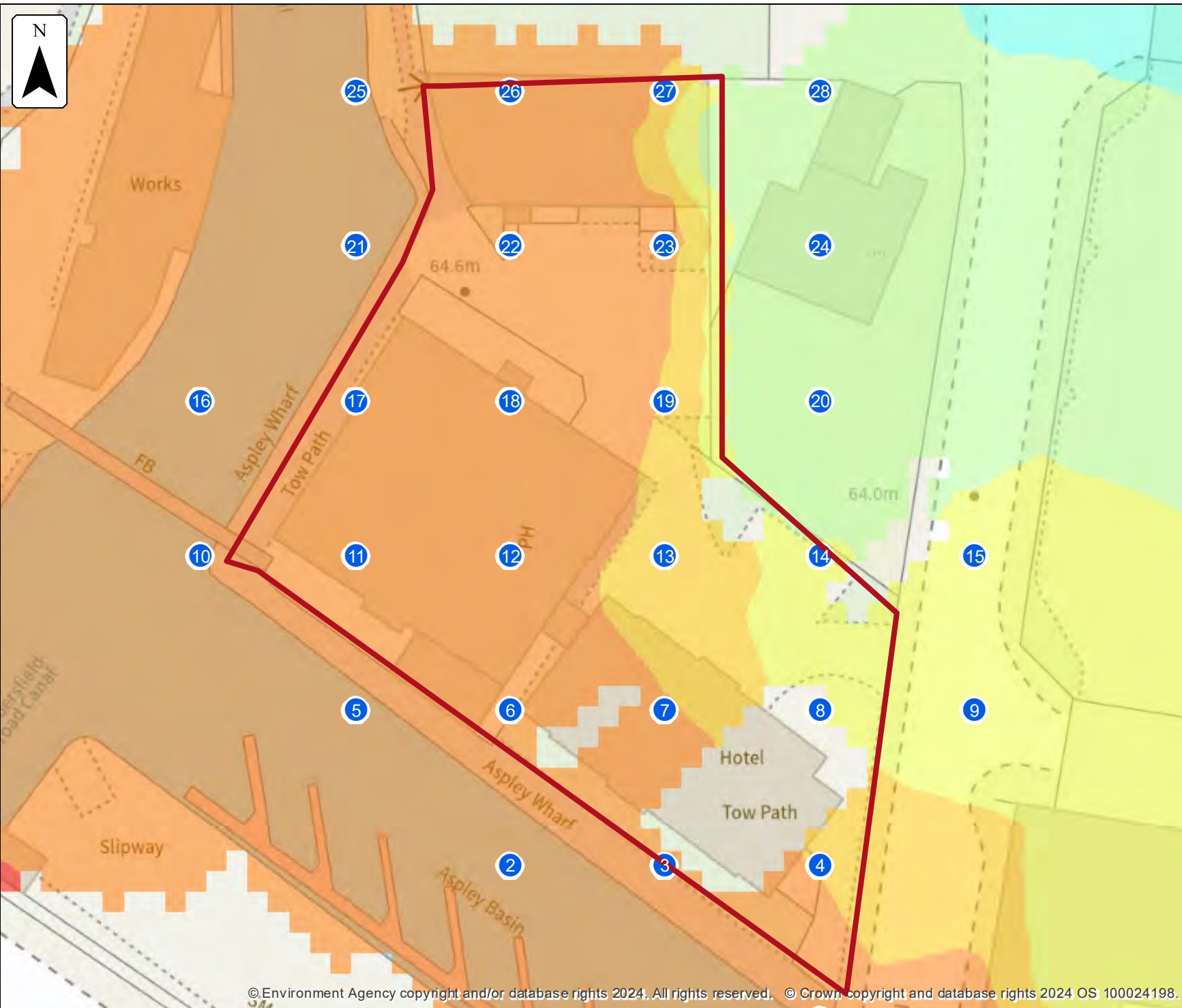
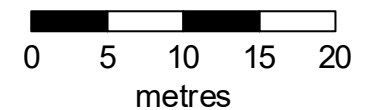
 Selected area

 Main river

Modelled 2D grid
Water level in mAOD

-  0 - 63.0
-  63.0 - 63.25
-  63.25 - 63.5
-  63.5 - 63.75
-  63.75 - 64.0
-  64.0 - 64.25
-  64.25 - 64.5
-  64.5 - 64.75
-  64.75 - 65.0

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%)	
			Depth	Height	Depth	Height	Depth	Height	Depth	Height
1	415059	416461	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
2	415029	416476	1.96	64.26	2.27	64.57	2.31	64.61	2.35	64.66
3	415044	416476	NoData	NoData	0.09	64.57	0.12	64.62	0.16	64.66
4	415059	416476	NoData	NoData	0.00	64.46	0.01	64.47	0.02	64.48
5	415014	416491	2.18	64.26	2.49	64.57	2.53	64.62	2.58	64.66
6	415029	416491	NoData	NoData	0.05	64.57	0.08	64.61	0.13	64.66
7	415044	416491	NoData	NoData	NoData	NoData	0.00	64.48	0.03	64.52
8	415059	416491	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
9	415074	416491	NoData	NoData	0.06	64.00	0.09	64.03	0.16	64.09
10	414999	416506	2.08	64.26	2.39	64.57	2.43	64.62	2.48	64.67
11	415014	416506	NoData	NoData	0.01	64.57	0.05	64.61	0.10	64.66
12	415029	416506	NoData	NoData	NoData	NoData	0.03	64.60	0.07	64.64
13	415044	416506	NoData	NoData	0.01	64.34	0.02	64.36	0.04	64.38
14	415059	416506	NoData	NoData	0.06	64.03	0.07	64.05	0.10	64.08
15	415074	416506	NoData	NoData	0.01	63.95	0.02	63.96	0.09	64.03
16	414999	416521	2.15	64.26	2.46	64.57	2.50	64.61	2.55	64.66

Label	Easting	Northing	1% AEP (+20%)		1% AEP (+30%)		1% AEP (+50%)		0.1% AEP (+20%)	
			Depth	Height	Depth	Height	Depth	Height	Depth	Height
17	415014	416521	NoData	NoData	0.03	64.57	0.07	64.61	0.12	64.66
18	415029	416521	NoData	NoData	NoData	NoData	NoData	NoData	0.03	64.64
19	415044	416521	NoData	NoData	0.00	64.46	0.01	64.47	0.02	64.48
20	415059	416521	NoData	NoData	0.58	63.78	0.62	63.82	0.71	63.90
21	415014	416536	1.93	64.26	2.24	64.57	2.28	64.61	2.33	64.66
22	415029	416536	NoData	NoData	0.03	64.54	0.06	64.58	0.11	64.62
23	415044	416536	NoData	NoData	0.02	64.45	0.06	64.49	0.11	64.54
24	415059	416536	NoData	NoData	0.36	63.78	0.40	63.82	0.48	63.90
25	415014	416551	1.56	64.26	1.86	64.57	1.90	64.61	1.95	64.66
26	415029	416551	NoData	NoData	0.12	64.54	0.18	64.59	0.23	64.65
27	415044	416551	NoData	NoData	NoData	NoData	0.02	64.30	0.06	64.34
28	415059	416551	NoData	NoData	0.17	63.78	0.21	63.82	0.29	63.90

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.

Strategic flood risk assessments

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

This should give you information about:

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

About this data

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

Flood risk activity permits

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

[Find out more about flood risk activity permits](#)

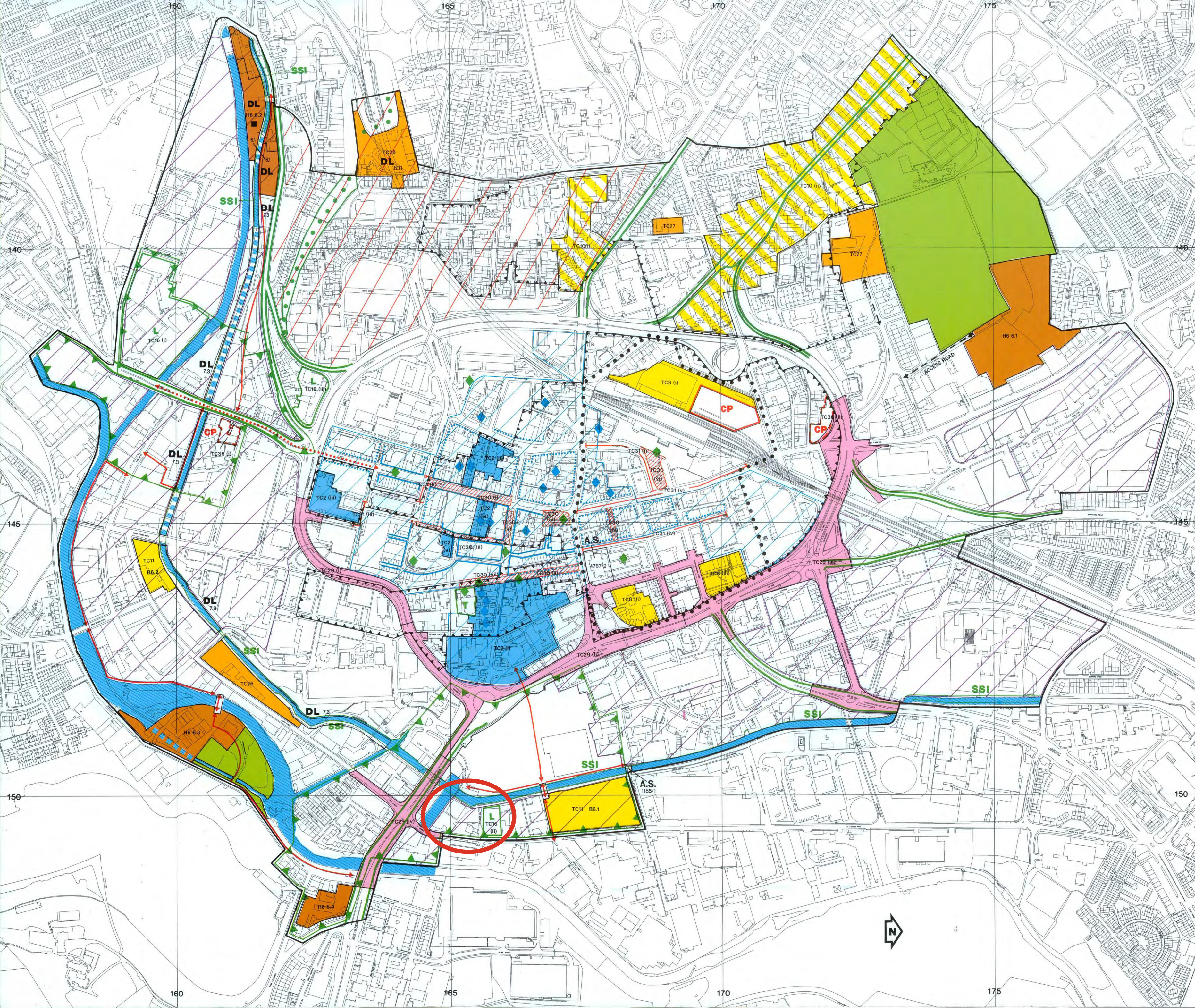
Help and advice

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

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

APPENDIX D – KIRKLEES UNITARY DEVELOPMENT PLAN

Unitary Development Plan Huddersfield Town Centre Inset Plan



- Shopping**
 - TC2 Main Shopping Area
 - TC2 Site for Shopping Development
 - ◆ TC3 Retention and Improvement of Pedestrian Arcades and Yards
 - S11 Primary Shopping Frontage
 - TC5 Secondary Shopping Frontage

- Housing**
 - H6 Site for Housing Development
 - Denotes site built at 1.3.99

- Employment**
 - TC8/T11 Site for Class B1 Uses
 - TC10 Area where the Conversion of Residential Properties to Class B1 Uses will normally be permitted
 - TC12 Area where Industry and Warehousing Development will normally be permitted

- Leisure and Recreation**
 - ▲ TC15 Area where Leisure and Recreation Uses will normally be permitted
 - TC16 Site for Leisure and Recreation Development
 - ↔ TC17 Proposed Walkway
 - ↔ TC18 Proposed Footbridge
 - Para 15.28 Site for New Theatre
 - Para 15.35 (R18 and R19) Existing Waterway to be safeguarded
 - Para 15.35 (R19) Filled-in section of the Huddersfield Narrow Canal to be re-opened

- Environment**
 - BE5-8 Conservation Area
 - D3 Urban Greenspace
 - D6/D7 Green Corridor
 - SSI NE3 Site of Scientific Interest
 - ◆ TC23 Environmental improvements
 - ◆ TC24 Principal Pedestrian Link to the Town Centre
 - Para 15.40 Heritage Area (also Policies TC6, 9, 14, and 21)

- Education**
 - TC26-28 Site for Educational Facilities

- Transportation**
 - T5 Traffic Calming Zone
 - T12 Green Route
 - TC29 Ring Road Improvements
 - TC30 Pedestrianisation
 - TC31 Footway Widening and Other Improvements
 - TC35 New Car Park
 - TC36 Car Park Improvements

- Derelict and Neglected Land**
 - DL1-3 Derelict Land

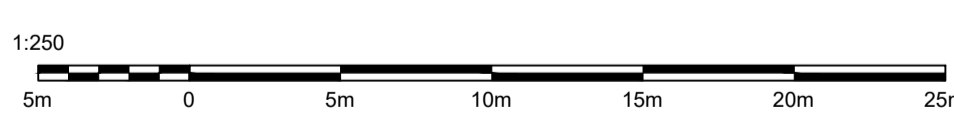
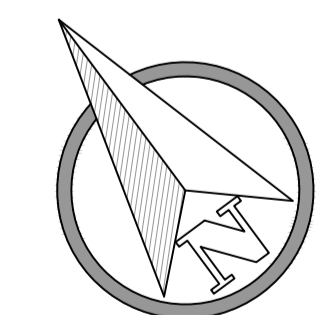
APPENDIX E - PROPOSED DRAINAGE LAYOUT



EXISTING SITE LAYOUT
SCALE 1:250



PROPOSED SITE LAYOUT
SCALE 1:250



NOTES:

- Do not scale from this drawing.
- This drawing is copyright and is sent to you in confidence. It must not be copied, used or disclosed, in whole or in part, to third parties without written permission. It remains the property of Booth King Partnership Ltd. (BKPL) and must be returned on request.
- This drawing is to be read in conjunction with all relevant contractual documents.
- Anyone using this drawing must be aware of their legal duties under the CDM Regulations 2015, refer to the HSE website for further information. BKPL are not Principal Designers.
- All dimensions shown on this drawing are in millimeters unless noted otherwise.
- If the Contractor consider that they do not have sufficient information to safely complete the works detailed on this drawing, they should contact the Engineer.
- All works are to be carried out in accordance with the Building Regulations (as amended) and to the approval of Building Standards.
- This document uses revision codes in accordance with ISO EN 19650: P. Preliminary (non-contractual) - review, comment or approval. C. Contractual - Approved for stage completion.
- This document uses status codes in accordance with ISO EN 19650: Work in progress: S0 - WIP Shared (non-contractual): S1 - Coordination, S2 - Information, S3 - Review, S4 & S5 - Approval. Published (contractual): A1, A2, etc. (where 'n' relates to the project stage).
- This document uses project stages in accordance with the IStructE Structural Plan of Work 2020: 2 - Concept, 3 - Coordination, 4 - Technical Design, 4.5 - Production Design, 5 - Construction, 6 - Handover.
- Only documents with a revision code C# (where '#' relates to a revision number) and status code A5 are suitable for construction.
- Documents with status code A6 indicate final construction ONLY. Any deviations to that which is on site is not the liability of BKPL.

TOPOGRAPHICAL NOTES:

The Topographical and buried services shown on this drawing were provided to Booth King by others. Booth King have not verified this information and therefore we can not guarantee its accuracy. The position and alignment of services may differ from that shown and other buried services may be present.

The contractor must verify the location of all buried services before any excavation or piling works begin. Damage to existing services could present a major health and safety risk plus associated commercial penalties.

Levels information shown is based on information available. This office is to be made aware of any discrepancies found on site.

DRAINAGE AREA CALCULATIONS:

Existing soft landscaping area	= 187m ²
Existing hard landscaping area	= 2669m ²
Proposed soft landscaping area	= 197m ²
Proposed hard landscaping area	= 2659m ²
Net values:	
Decreased hard landscaping area	= 10m ²

DRAINAGE AREAS KEY:

REF.	DESCRIPTION
	Indicates soft landscaping area.
	Indicates hard landscaping area.

C01	19.06.24	STAGE 3 - ISSUED FOR PLANNING	PA
REV.	DATE	REVISION DETAILS	INITIALS
		CURRENT DRAWING REVISION CHECKED BY	EZ
		CURRENT DRAWING REVISION APPROVED BY	EZ

boothking
PARTNERSHIP LIMITED

CONSULTING CIVIL & STRUCTURAL ENGINEERS

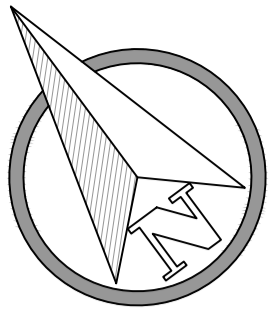
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RAMSBOTTOM | **MANCHESTER** | **EDINBURGH**
Tel: 01706 822 022 | Tel: 0161 694 7087 | Tel: 0131 229 1547

PROJECT: Premier Inn Huddersfield Central

TITLE: Drainage Area GA

DRAWING STATUS:		PROJECT STAGE:			
A3		STAGE 3			
SCALE (A1)	AUTHOR	DATE	REVISION	BKPL No.	
1:250	PA	Jun 24	C01	15106	
DRAWING REF:					
15106-BKP-XX-XX-DR-C-0501					

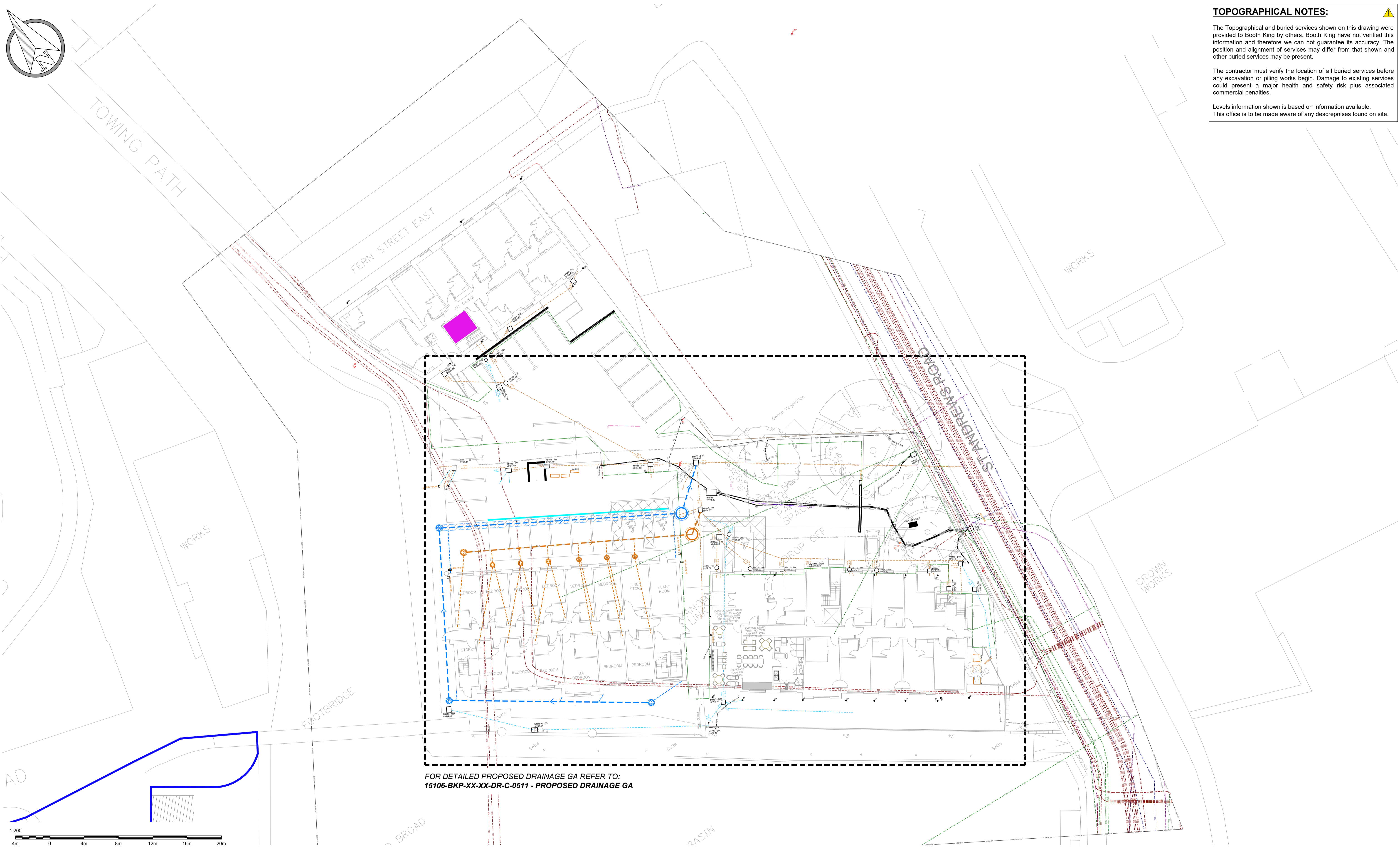


TOPOGRAPHICAL NOTES:

The Topographical and buried services shown on this drawing were provided to Booth King by others. Booth King have not verified this information and therefore we can not guarantee its accuracy. The position and alignment of services may differ from that shown and other buried services may be present.

The contractor must verify the location of all buried services before any excavation or piling works begin. Damage to existing services could present a major health and safety risk plus associated commercial penalties.

Levels information shown is based on information available. This office is to be made aware of any discrepancies found on site.



FOR DETAILED PROPOSED DRAINAGE GA REFER TO:
15106-BKP-XX-XX-DR-C-0511 - PROPOSED DRAINAGE GA

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CURRENT DRAWING REVISION APPROVED BY AI			

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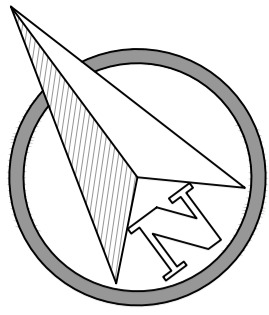
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PROJECT: Premier Inn Huddersfield Central

TITLE: Drainage Key Plan

DRAWING STATUS:		PROJECT STAGE:			
A3		STAGE 3			
SCALE (A1)	AUTHOR	DATE	REVISION	BKPL No.	
1:200	PA	Jun 24	C01	15106	
DRAWING REF:					
15106-BKP-XX-XX-DR-C-0510					



SWMH4 - Hydrobrake Chamber
Flows arising from the development to be restricted to 3.0 l/s

REF.	DESCRIPTION
- * * * * *	Existing drainage to be grubbed up
---	Proposed FW Network
---	Proposed SW Network
---	Aco Drain

TOPOGRAPHICAL NOTES:

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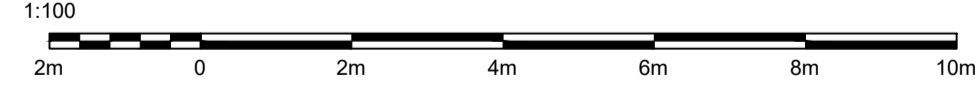
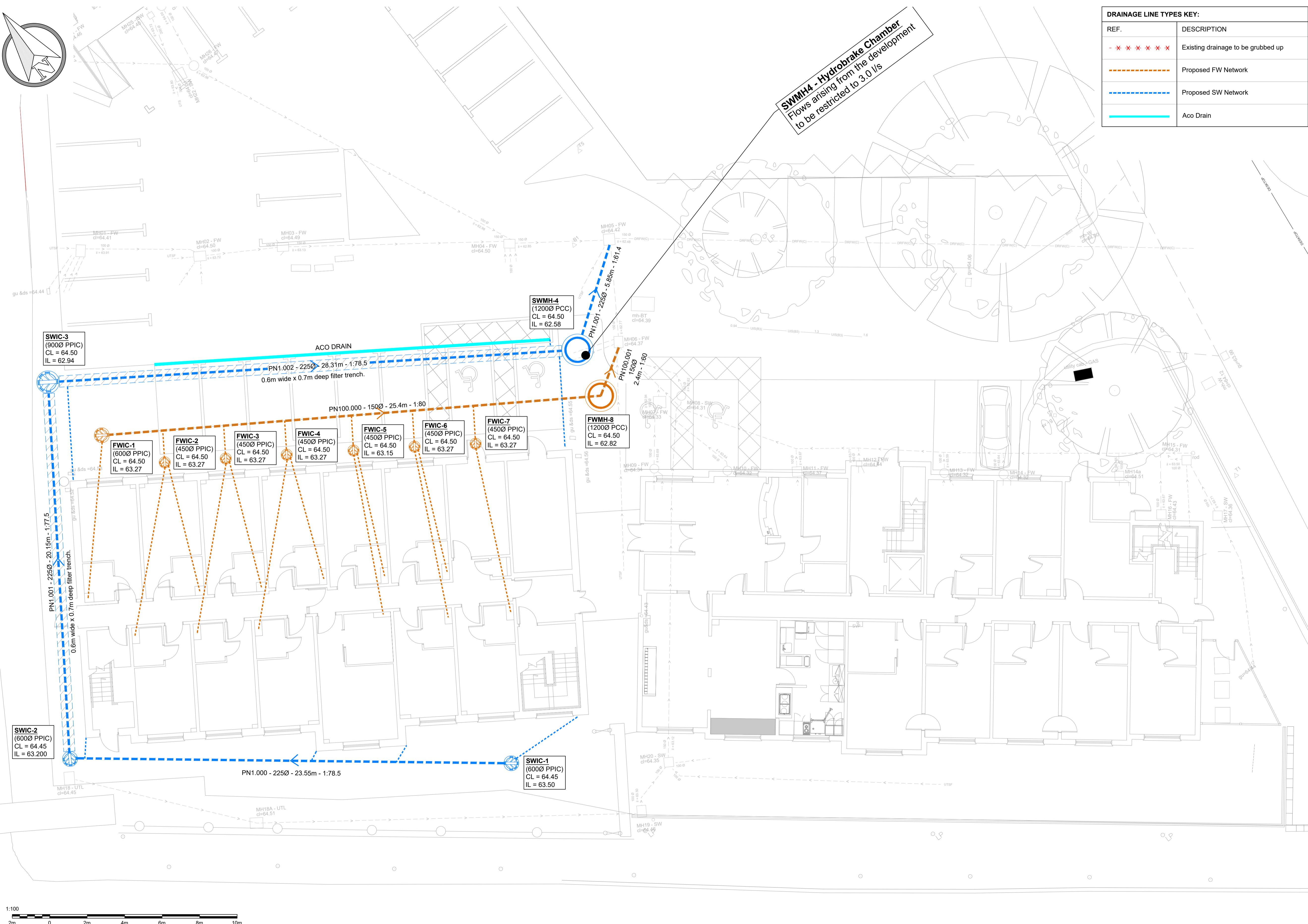
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Levels information shown is based on information available. This office is to be made aware of any discrepancies found on site.

- DRAINAGE NOTES:**
- All adoptable works to be in accordance with SSG appendix C where applicable.
 - All manhole cover levels to be confirmed by Architect.
 - Clay pipes to be flexibly jointed and comply with the requirements of BS EN 295.
 - Concrete pipes to be flexibly jointed and comply with the requirements of BSEN 1916 and BS 5911.
 - Plastic pipes (PVC-U) to be flexibly jointed and comply with the requirements of BS EN 1401-1 1998.
 - All surface water pipes to be laid at a gradient no flatter than 1:80 (UNO).
 - All foul water pipes to be laid at a gradient no flatter than 1:40 (UNO).
 - For minimum depths requiring pipe protection refer to drainage details drawings.
 - Protection to drains and gully connections may be concrete bed surround between cover depths of 450mm to 200mm.
 - Until final surface is placed, heavy traffic is not to be allowed over pipe trenches without special precautions.
 - Pipes and fittings are to be laid in accordance with the manufacturers recommendations.
 - All Manholes should be concrete manhole rings (UNO).
 - All SVP & RWP positions TBC by Architect.
 - Rodding access is to be provided at all pop-ups.
 - For setting out of all pop-up positions refer to Architect's details.
 - Civil engineering contractor to arrange for:
 - Own services and temporary supplies.
 - Pathway & partial closure as deemed required by their method statement. Including costs.
 - Temporary adequate over pumping as deemed required by civil engineers method of construction.
 - The contractor should confirm the locations for existing services prior construction.

DRAINAGE ANNOTATION KEY:

REF.	DESCRIPTION
SW	Surface water drainage
FW	Foul water drainage
CW	Combined water drainage
MH	Manhole
IC	Inspection chamber
PCC	Precast concrete chamber
PPIC	Polypropylene inspection chamber
CL	Cover level (m)
IL	Invert level (m)
Gu	Road gully



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CURRENT DRAWING REVISION APPROVED BY: EZ			

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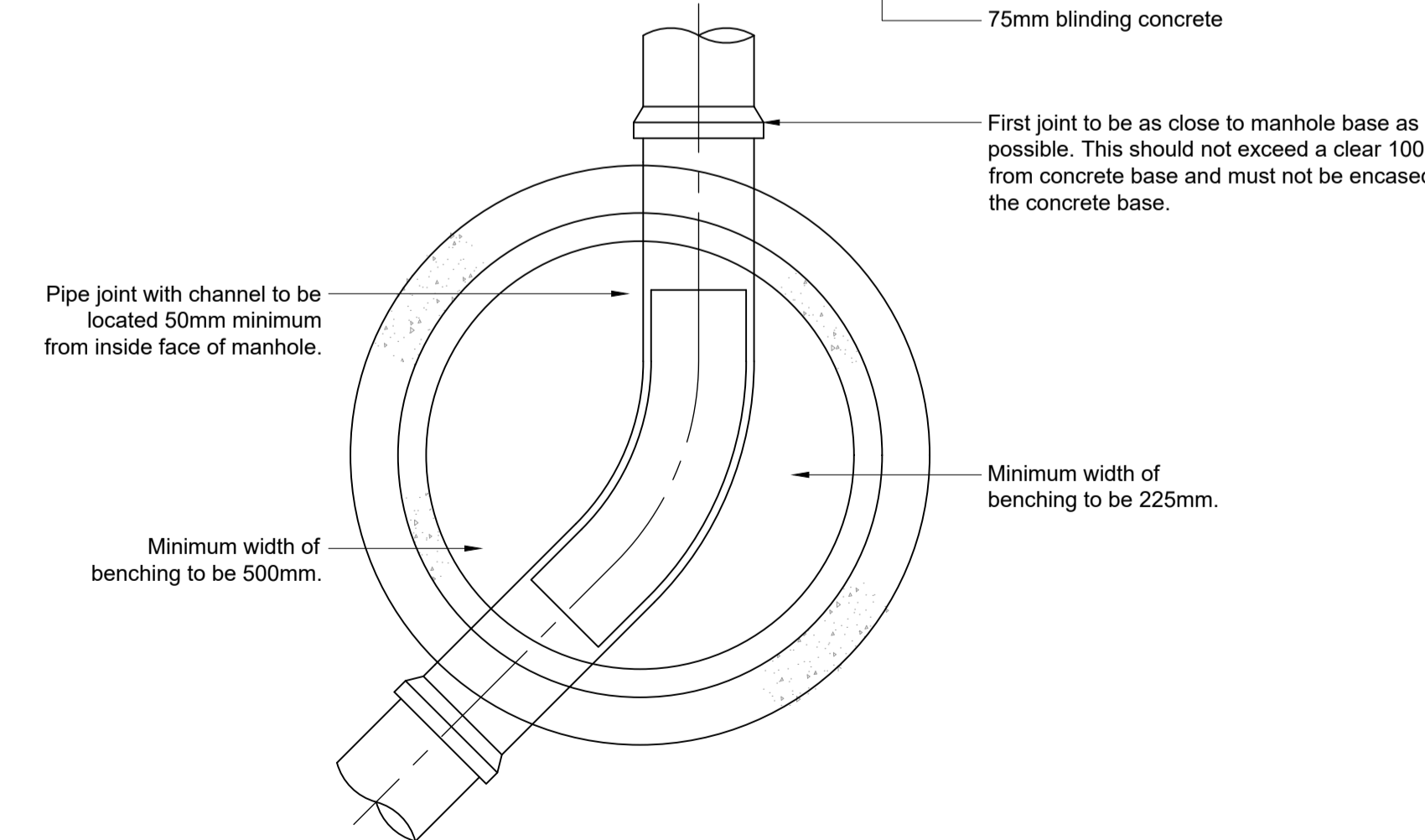
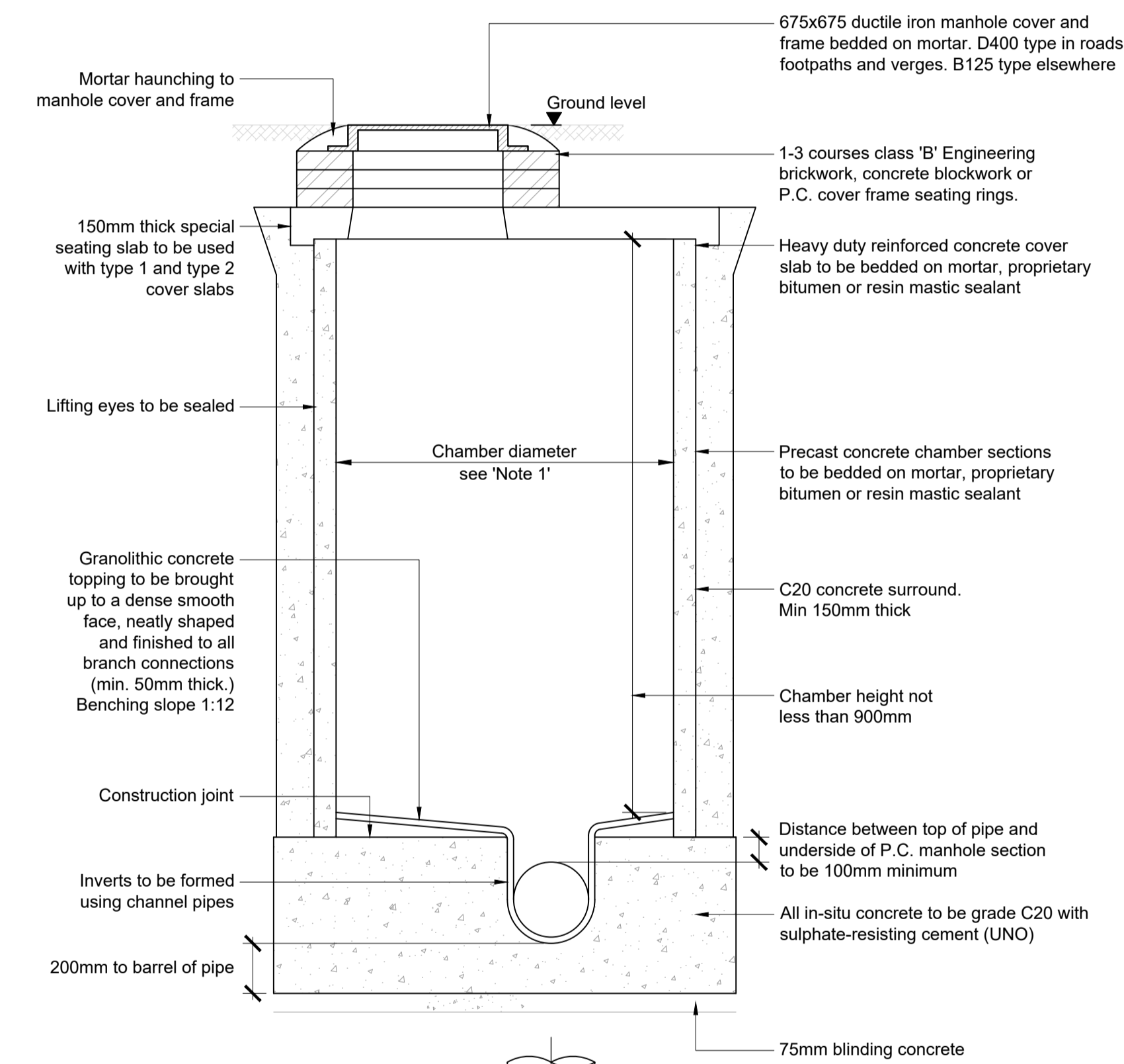
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PROJECT: Premier Inn Huddersfield Central

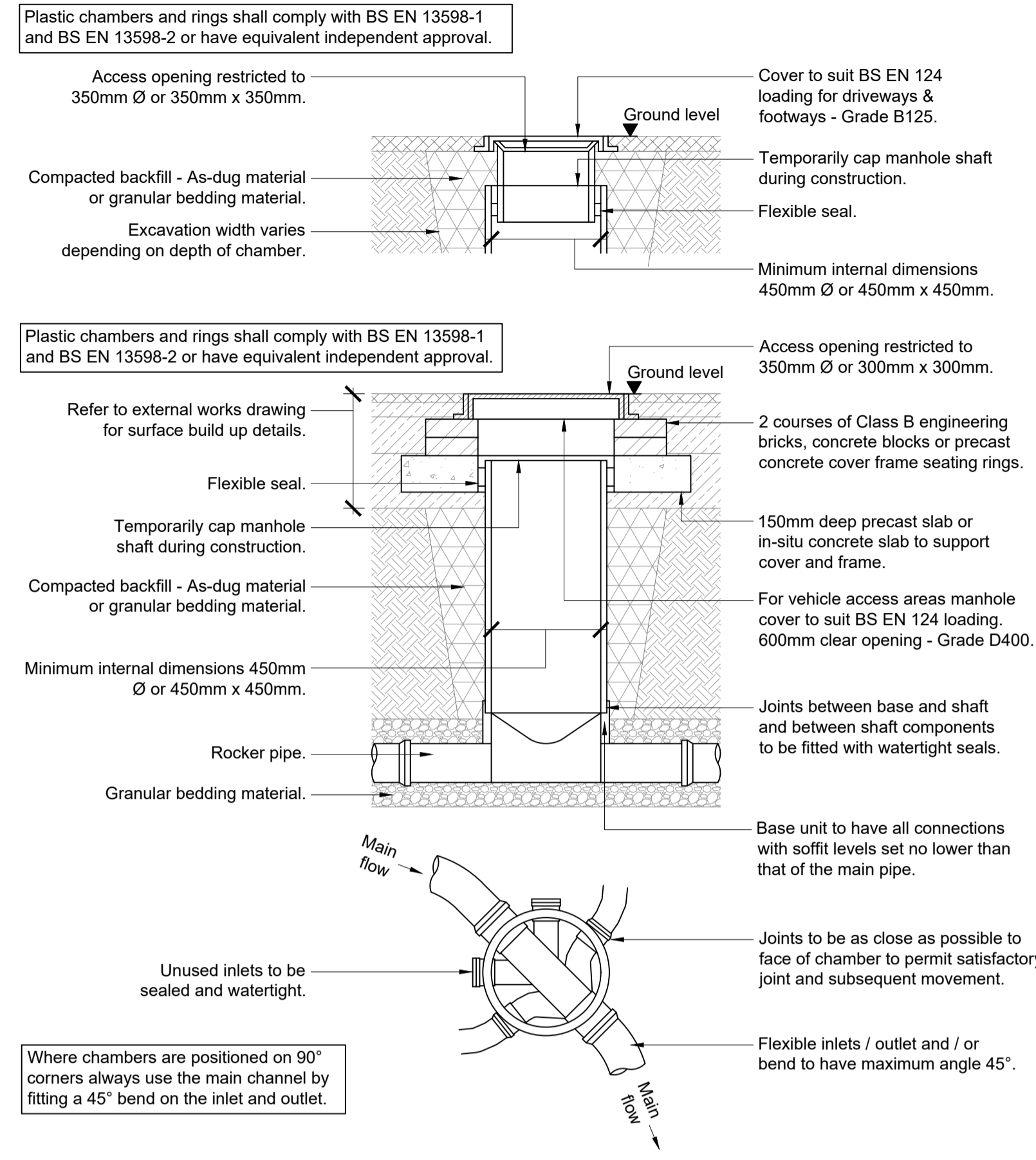
TITLE: Propsoed Drainage GA

DRAWING STATUS:		PROJECT STAGE:			
A3		STAGE 3			
SCALE (A1)	AUTHOR	DATE	REVISION	BKPL No.	
1:100	PA	Jun 24	C01	15106	
DRAWING REF: 15106-BKP-XX-XX-DR-C-0511					

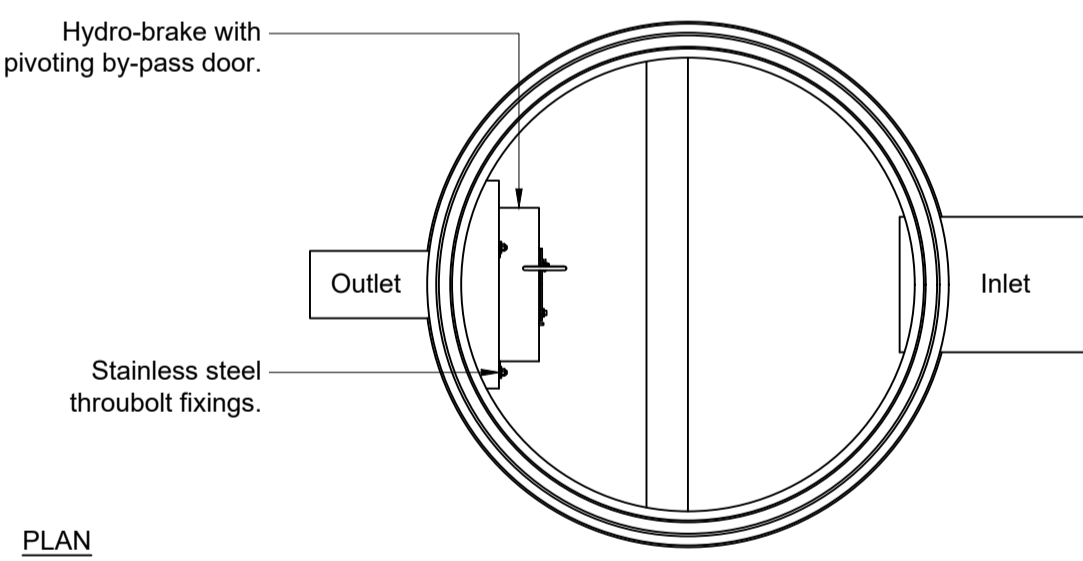


TYPICAL MANHOLE DETAIL
SCALE 1:20

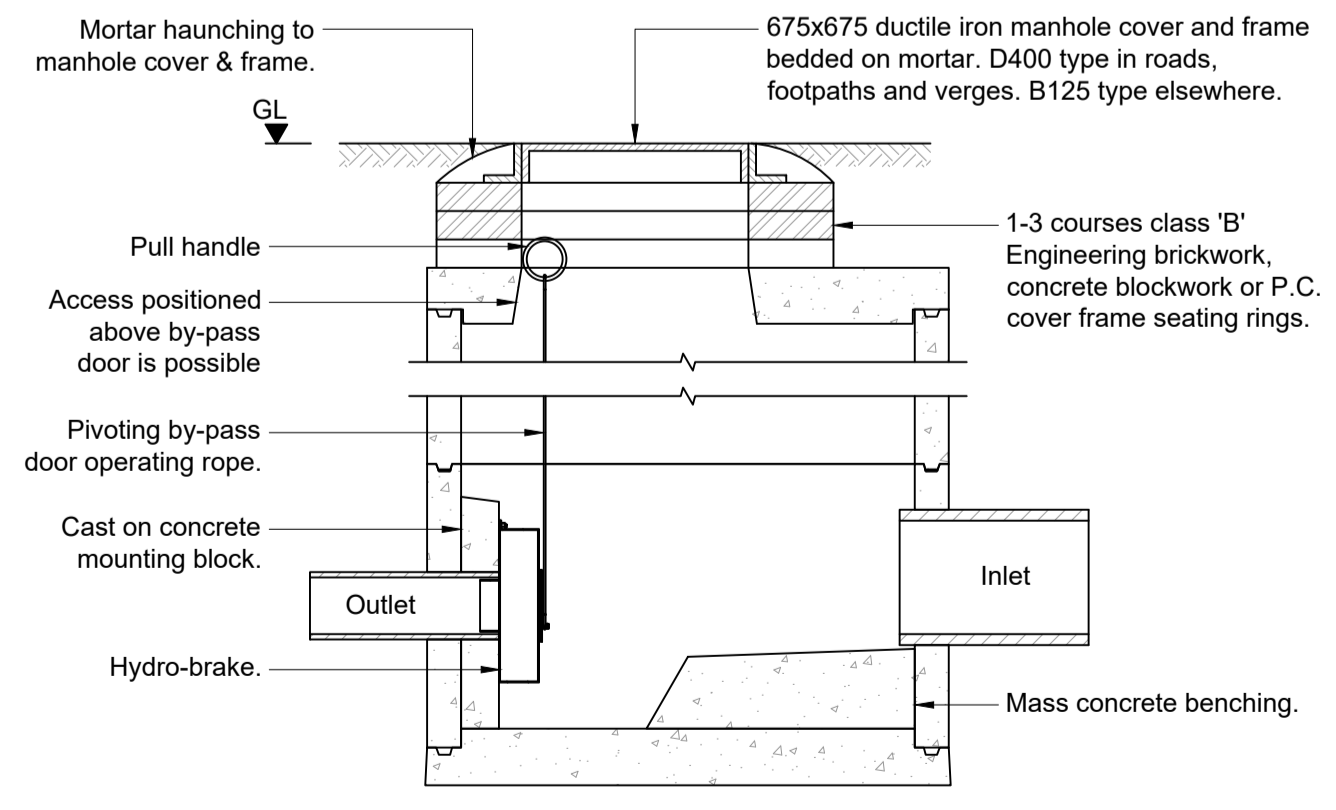
- ADDITIONAL NOTES:**
- Manhole diameter to be as follows :
1200mm Ø (pipe Ø up to 300mm)
1350mm Ø (pipe Ø > 300mm up to 450mm)
1500mm Ø (pipe Ø > 450mm up to 525mm)
1800mm Ø (pipe Ø > 525mm up to 750mm)
2100mm Ø (pipe Ø > 750mm up to 900mm)
 - 1050mm concrete rings may be used where the manhole is of a 'Straight Through' or 'Terminal' type, where the depth to invert does not exceed 2.5m and the pipe diameter is not greater than 150mm.
 - Where the depth to the top of the benching exceeds 3.0m, a type 'Z' manhole shall be used.
 - Manhole construction to be in accordance with the current editions of 'Sewers for Scotland' section 4 and 'Civil Engineering Specification for the Water Industry'.
 - Top and bottom P.C. rings to be plain ended. Channel to be formed using pre-formed half channel.
 - Where pipes are 600mm diameter or greater, handrail, safety chain and toe holes to be provided.
 - Connection to be made soffit/soffit where upstream pipe is smaller than outlet pipe. Invert/ invert when upstream pipe is equal or larger than outlet.
 - A flexible pipe shall be provided as close as feasible to the outside face of the manhole. The next pipe away will be a rocker pipe. See Clause 4.6.6.2.
 - Where there is no change in pipe diameter, the manhole invert shall follow the same gradient as the outgoing sewer.
 - Step irons or otherwise to be fitted as required by the Authority's policy.



TYPICAL INSPECTION CHAMBER DETAIL - TYPE 3 (FLEXIBLE MATERIAL DETAIL)
(Depth from cover level to soffit of pipe 3m)
SCALE 1:20



PLAN



TYPICAL HYDROBRAKE CHAMBER DETAIL
SCALE 1:20

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PROJECT:

**Premier Inn
Huddersfield Central**

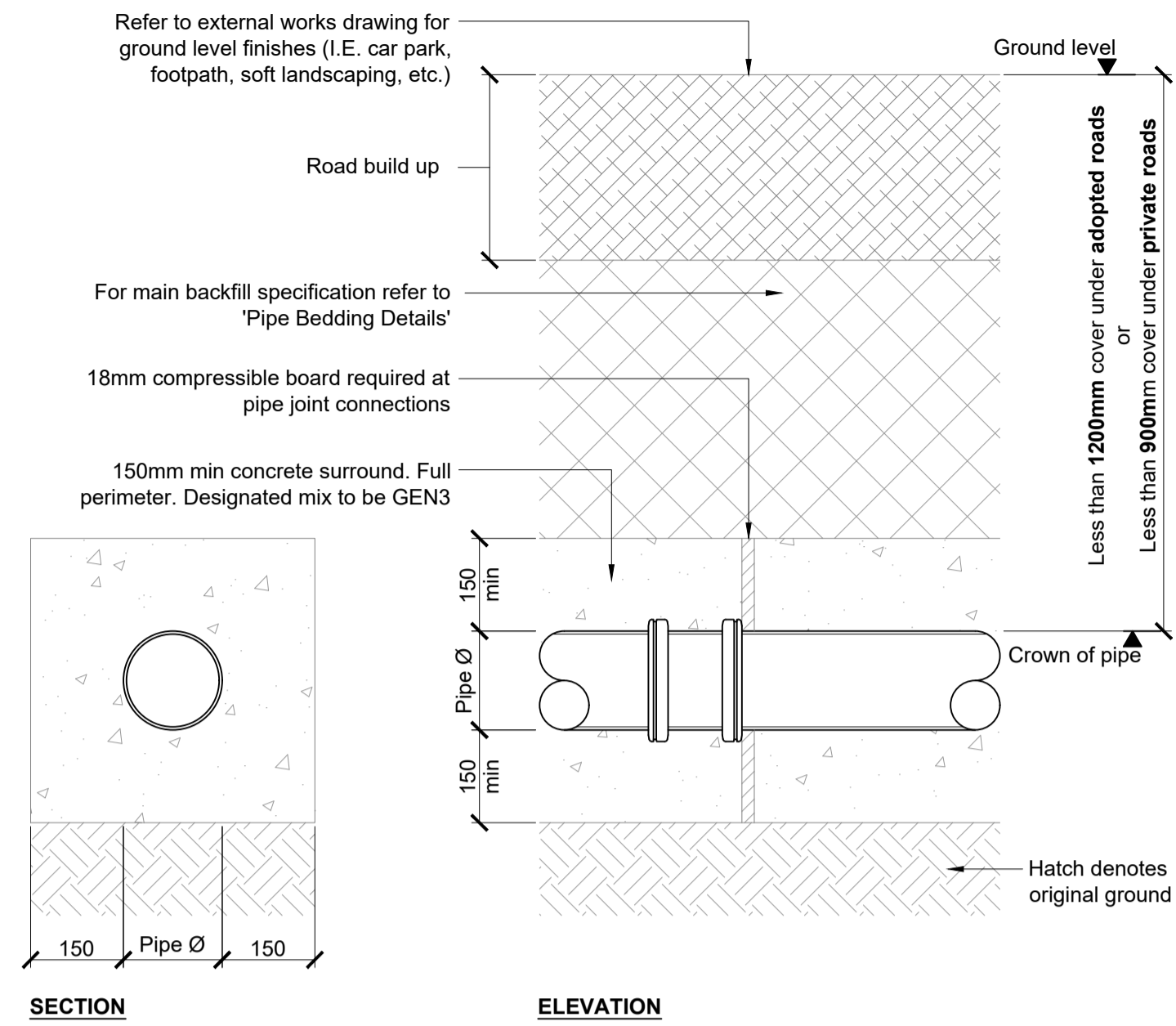
TITLE:

**Drainage Details
Sheet 1**

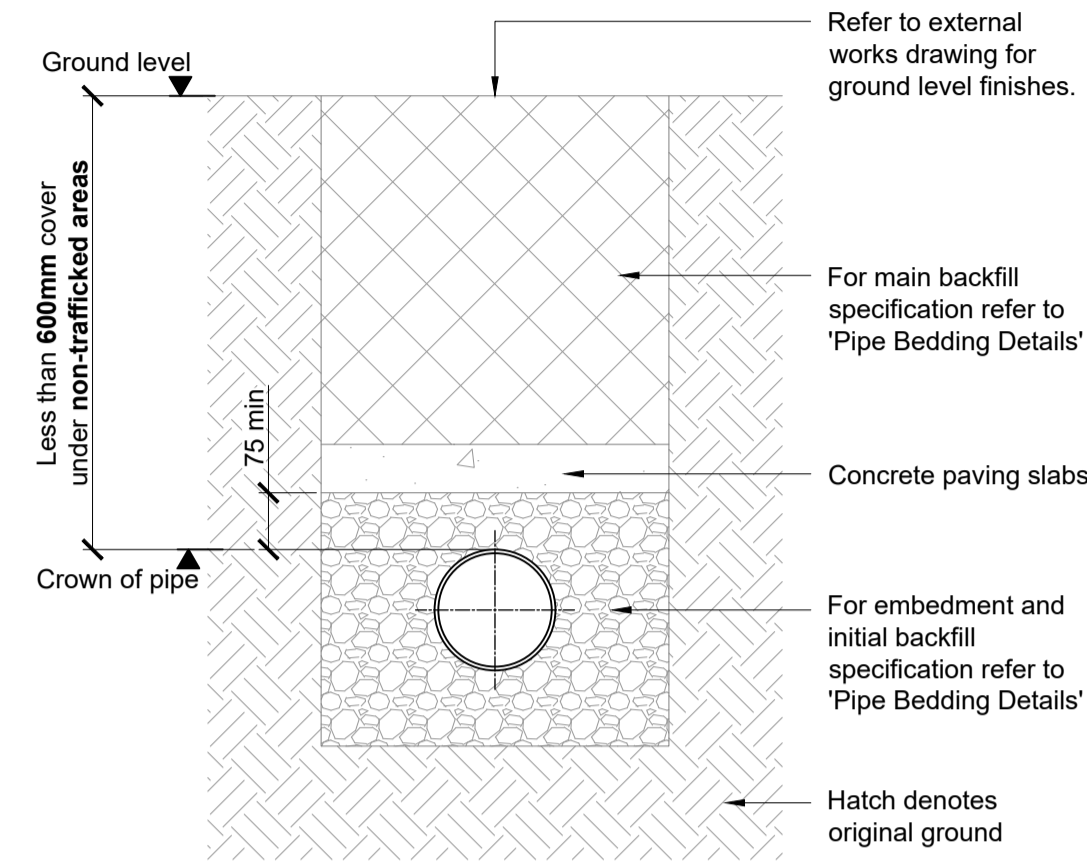
SCALE (A1)	AUTHOR	DATE	REVISION	BKPL No.
As noted	CM	Jun 24	C01	15106

DRAWING REF:

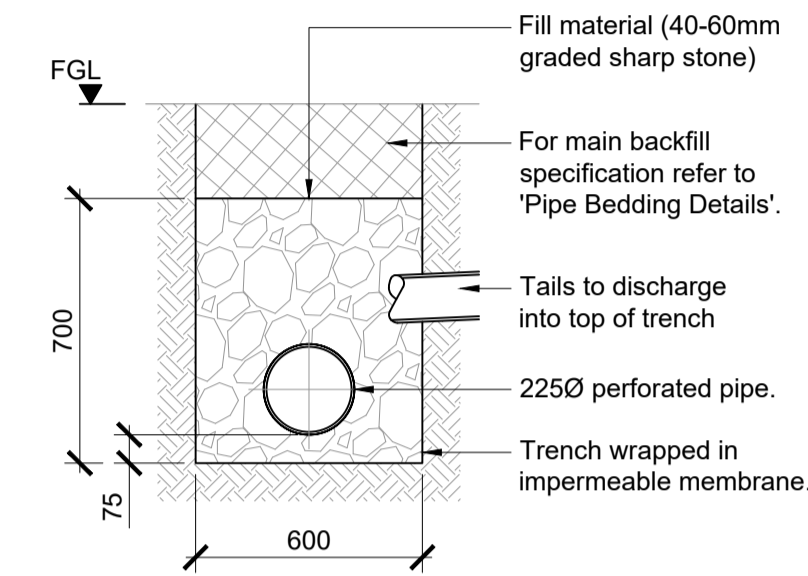
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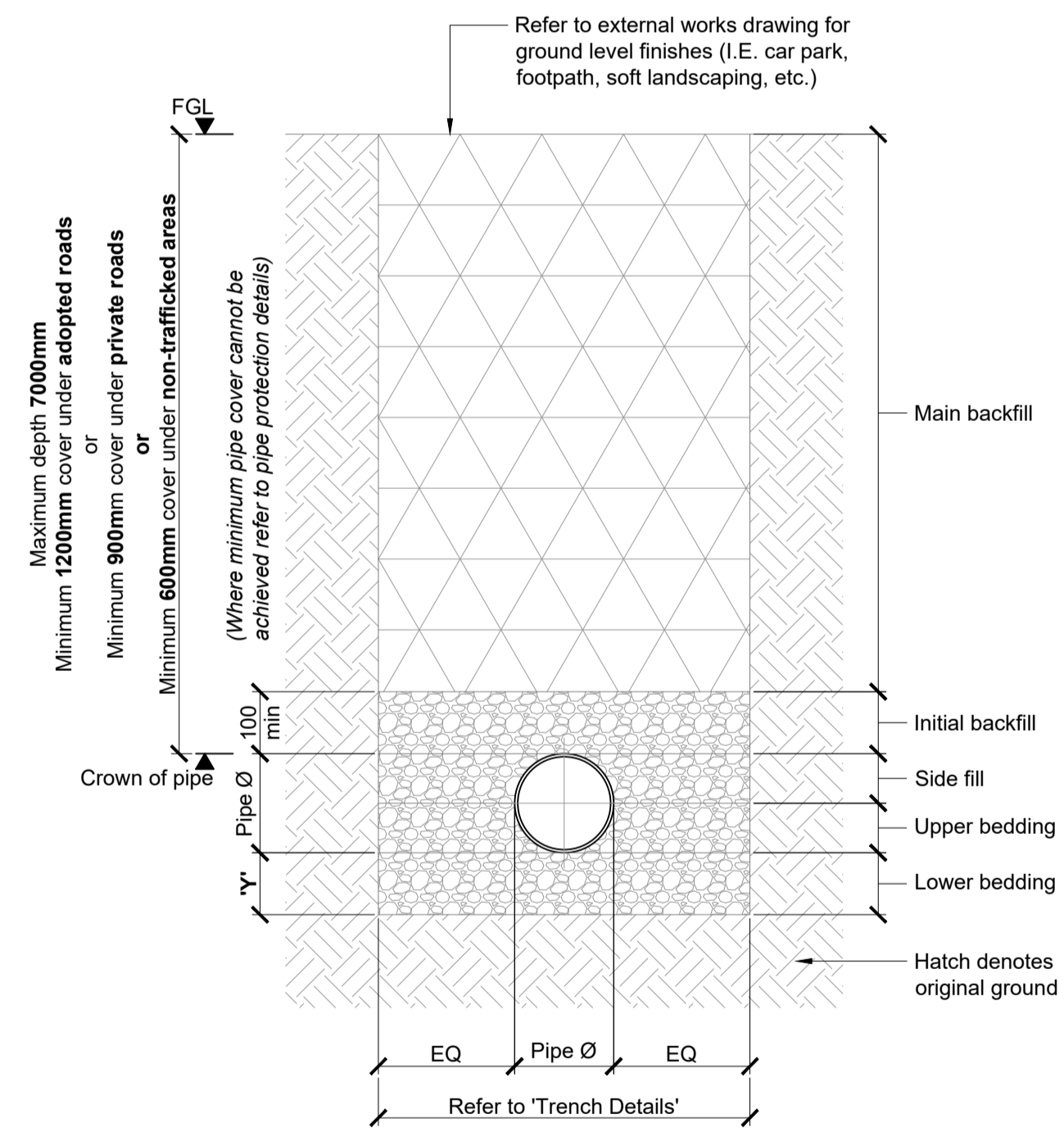
PIPE PROTECTION DETAIL FOR SHALLOW PIPES IN TRAFFICKED AREAS
SCALE 1:10



PIPE PROTECTION DETAIL FOR SHALLOW PIPES IN NON-TRAFFICKED AREAS
SCALE 1:10



TYPICAL FILTER TRENCH DETAIL
SCALE 1:20



TYPICAL PIPE BEDDING DETAILS
SCALE 1:10

TABLE 3 (refer to figure 2)	
MINIMUM LOWER BEDDING DEPTH	
TRENCH BED CONDITIONS	MINIMUM DEPTH (Y)
Usual soil conditions	100mm
Rock or hard soil conditions	150mm

N.B. Information shown in 'Table 3' has been taken from 'BS EN 1610:2015 Construction and testing of drains and sewers - 7.2 Bedding construction types'

TABLE 4 (refer to figure 2)	
BEDDING & BACKFILL MATERIAL	
LOCATION	SUITABLE MATERIAL ('DN' denotes pipe Ø)
Main backfill	As dug material (native soil) may be used as long as it complies with BS EN 1610:2015 Construction and testing of drains and sewers - 5.2.2 Native soil & 'BS 8000-14:1989 Section 3.3'. Initial 300mm of main backfill must be free from stones larger than 40mm, lumps of clay over 75mm, timber, frozen material & vegetable matter. N.B. No mechanical compaction to be applied until first 300mm of main backfill in place.
Initial backfill Side fill	Selected fill or granular fill free from stones larger than 40mm, lumps of clay over 75mm, timber, frozen material & vegetable matter. As dug material (native soil) may be used as long as it complies with BS EN 1610:2015 Construction and testing of drains and sewers - 5.2.2 Native soil & 'BS 8000-14:1989 Section 3.2.3'. N.B. No mechanical compaction to be applied.
Upper bedding Lower bedding	Single sized or graded granular material (from 5mm) not exceeding: - 22mm for DN ≤ 200mm. - 40mm for DN > 200mm up to DN ≤ 600mm. - 60mm for DN > 600mm. - For DN < 100mm all written instructions of the manufacturer shall be complied with. N.B. No mechanical compaction to be applied.

N.B. Information shown in 'Table 4' has been taken from 'BS EN 1610:2015 Construction and testing of drains and sewers' & 'BS 8000-14:1989'

N.B. Assumed normal ground conditions. Special bedding construction will be required where the trench formation has little bearing strength, i.e. Soft ground, running sand, etc. Booth King Partnership Limited to be contacted for revised bedding detail in this circumstance.

N.B. Booth King Partnership Limited advise installer to refer to plastic pipe manufacturers specific bedding details to ensure minimum bedding & backfilling requirements are met.

ALL MATERIAL TO BE PLACED & COMPACTED AS SPECIFIED IN 'BS 8000-14:1989' SECTION 3'

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CURRENT DRAWING REVISION APPROVED BY			EZ
DRAWING STATUS:		PROJECT STAGE:	
A3		STAGE 3	

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PROJECT:

Premier Inn
Huddersfield Central

TITLE:

Drainage Details
Sheet 1

SCALE (A1)	AUTHOR	DATE	REVISION	BKPL No.
As noted	CM	Jun 24	C01	15106

DRAWING REF:

15106-BKP-XX-XX-DR-S-0591

APPENDIX F - SURFACE WATER & FOUL WATER CALCULATIONS

Calculated by: Eleni Zachara

Site name: Premier Inn

Site location: Huddersfield

Site Details

Latitude: 53.64480° N

Longitude: 1.77416° W

Reference: 1938237437

Date: Jun 19 2024 09:21

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Runoff estimation approach

Site characteristics

Total site area (ha):

Methodology

Q_{BAR} estimation method: Calculate from SPR and SAAR

SPR estimation method: Calculate from SOIL type

Notes

(1) Is $Q_{BAR} < 2.0$ l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

Soil characteristics

	Default	Edited
SOIL type:	4	4
HOST class:	N/A	N/A
SPR/SPRHOST:	0.47	0.47

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

Hydrological characteristics

	Default	Edited
SAAR (mm):	865	865
Hydrological region:	3	3
Growth curve factor 1 year:	0.86	0.86
Growth curve factor 30 years:	1.75	1.75
Growth curve factor 100 years:	2.08	2.08
Growth curve factor 200 years:	2.37	2.37

(3) Is $SPR/SPRHOST \leq 0.3$?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited

Q_{BAR} (l/s):	1.61	1.61
1 in 1 year (l/s):	1.38	1.38
1 in 30 years (l/s):	2.81	2.81
1 in 100 year (l/s):	3.34	3.34
1 in 200 years (l/s):	3.81	3.81

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement , which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

Calculated by: Eleni Zachara

Site name: Premier Inn

Site location: Huddersfield

Site Details

Latitude: 53.64485° N

Longitude: 1.77413° W

Reference: 3305655430

Date: Jun 20 2024 15:47

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Runoff estimation approach

Site characteristics

Total site area (ha):

Methodology

Q_{BAR} estimation method: Calculate from SPR and SAAR

SPR estimation method: Calculate from SOIL type

Notes

(1) Is $Q_{BAR} < 2.0$ l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

Soil characteristics

	Default	Edited
SOIL type:	4	4
HOST class:	N/A	N/A
SPR/SPRHOST:	0.47	0.47

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

Hydrological characteristics

	Default	Edited
SAAR (mm):	865	865
Hydrological region:	3	3
Growth curve factor 1 year:	0.86	0.86
Growth curve factor 30 years:	1.75	1.75
Growth curve factor 100 years:	2.08	2.08
Growth curve factor 200 years:	2.37	2.37

(3) Is $SPR/SPRHOST \leq 0.3$?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited

Q_{BAR} (l/s):	0.61	0.61
1 in 1 year (l/s):	0.52	0.52
1 in 30 years (l/s):	1.06	1.06
1 in 100 year (l/s):	1.26	1.26
1 in 200 years (l/s):	1.44	1.44

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Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	1	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	17.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.300	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.79%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
15 minute winter	SMH1	10	63.782	0.062	15.7	0.3003	0.0000	OK
15 minute winter	SMH2	10	62.550	0.130	31.2	0.3356	0.0000	OK
15 minute winter	Yorkshire Water	10	62.232	0.123	30.6	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
15 minute winter	SMH1	1.000	SMH2	15.5	1.302	0.356	0.2527	
15 minute winter	SMH2	1.002	Yorkshire Water	30.6	1.338	0.589	0.7157	14.5

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.79%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
15 minute winter	SMH1	11	63.862	0.142	38.3	0.6892	0.0000	OK
15 minute winter	SMH2	11	62.980	0.560	74.4	1.4457	0.0000	SURCHARGED
15 minute winter	Yorkshire Water	11	62.319	0.210	71.2	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
15 minute winter	SMH1	1.000	SMH2	36.7	2.097	0.842	0.3818	
15 minute winter	SMH2	1.002	Yorkshire Water	71.2	1.789	1.369	1.2202	35.3

Results for 100 year Critical Storm Duration. Lowest mass balance: 99.79%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
15 minute winter	SMH1	12	64.320	0.600	49.2	2.9093	0.0000	FLOOD RISK
15 minute winter	SMH2	11	63.189	0.769	82.9	1.9847	0.0000	SURCHARGED
15 minute summer	Yorkshire Water	11	62.322	0.213	78.9	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
30 minute summer	SMH1	1.000	SMH2	38.7	2.222	0.888	0.3856	
15 minute winter	SMH2	1.002	Yorkshire Water	81.3	2.043	1.563	1.2262	45.2

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	1	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	17.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.300	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.72%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
15 minute winter	SMH1	10	63.251	0.061	5.3	0.1174	0.0000	OK
15 minute winter	SMH2	10	62.888	0.068	10.5	0.1163	0.0000	OK
15 minute winter	SMH3	10	62.540	0.060	10.3	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
15 minute winter	SMH1	1.000	SMH2	5.2	0.973	0.672	0.1217	
15 minute winter	SMH2	1.002	SMH3	10.3	1.950	0.669	0.0281	4.9

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.72%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
15 minute winter	SMH1	12	63.827	0.637	12.9	1.2325	0.0000	SURCHARGED
15 minute winter	SMH2	12	63.279	0.459	20.5	0.7865	0.0000	SURCHARGED
30 minute winter	SMH3	23	62.581	0.101	17.4	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
15 minute winter	SMH1	1.000	SMH2	9.1	1.188	1.177	0.1791	
15 minute winter	SMH2	1.002	SMH3	19.1	2.438	1.238	0.0417	12.0

Results for 100 year Critical Storm Duration. Lowest mass balance: 99.72%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
15 minute winter	SMH1	13	64.302	1.112	16.6	2.1507	0.0000	FLOOD RISK
15 minute winter	SMH2	12	63.563	0.743	24.9	1.2729	0.0000	SURCHARGED
15 minute winter	SMH3	17	62.581	0.101	22.6	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
15 minute winter	SMH1	1.000	SMH2	10.6	1.354	1.375	0.1791	
15 minute winter	SMH2	1.002	SMH3	22.6	2.887	1.467	0.0417	15.4

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	1	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	17.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.300	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
SWIC1	0.005	5.00	64.450	600	415024.002	416494.881	0.950
SWIC2	0.015	5.00	64.450	600	415005.218	416509.090	1.250
SWIC3	0.030	5.00	64.500	900	415016.249	416525.949	1.560
SWMH4	0.030	5.00	64.500	1200	415039.980	416510.506	1.920
MH05	0.000		64.420	1200	415044.861	416514.229	1.940

Links (Input)

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)
1.000	SWIC1	SWIC2	23.553	0.600	63.500	63.200	0.300	78.5	225
1.001	SWIC2	SWIC3	20.147	0.600	63.200	62.940	0.260	77.5	225
1.002	SWIC3	SWMH4	28.313	0.600	62.940	62.580	0.360	78.6	225
1.003	SWMH4	MH05	6.139	0.600	62.580	62.480	0.100	61.4	225

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	23.553	78.5	225	Circular	64.450	63.500	0.725	64.450	63.200	1.025
1.001	20.147	77.5	225	Circular	64.450	63.200	1.025	64.500	62.940	1.335
1.002	28.313	78.6	225	Circular	64.500	62.940	1.335	64.500	62.580	1.695
1.003	6.139	61.4	225	Circular	64.500	62.580	1.695	64.420	62.480	1.715

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	SWIC1	600	Manhole	Adoptable	SWIC2	600	Manhole	Adoptable
1.001	SWIC2	600	Manhole	Adoptable	SWIC3	900	Manhole	Adoptable
1.002	SWIC3	900	Manhole	Adoptable	SWMH4	1200	Manhole	Adoptable
1.003	SWMH4	1200	Manhole	Adoptable	MH05	1200	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
SWIC1	415024.002	416494.881	64.450	0.950	600		0	1.000	63.500	225

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
SWIC2	415005.218	416509.090	64.450	1.250	600		1 1.000	63.200	225
SWIC3	415016.249	416525.949	64.500	1.560	900		0 1.001	63.200	225
SWIC3	415016.249	416525.949	64.500	1.560	900		1 1.001	62.940	225
SWMH4	415039.980	416510.506	64.500	1.920	1200		0 1.002	62.940	225
SWMH4	415039.980	416510.506	64.500	1.920	1200		1 1.002	62.580	225
MH05	415044.861	416514.229	64.420	1.940	1200		0 1.003	62.580	225
MH05	415044.861	416514.229	64.420	1.940	1200		1 1.003	62.480	225

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	17.000	Drain Down Time (mins)	240
Ratio-R	0.300	Additional Storage (m ³ /ha)	20.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

15 | 30 | 60 | 120 | 180 | 240 | 360 | 480 | 600 | 720 | 960 | 1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
30	0	0	0
30	40	0	0
100	0	0	0
100	45	0	0

Node SWMH4 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	62.580	Product Number	CTL-SHE-0072-2200-0900-2200
Design Depth (m)	0.900	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	2.2	Min Node Diameter (mm)	1200

Node SWIC3 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	62.940
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	110

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	16.2	0.0	0.700	16.2	0.0

Node SWIC2 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	63.200
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	92

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	11.6	0.0	0.700	11.6	0.0

Results for 1 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
15 minute winter	SWIC1	11	63.515	0.015	0.5	0.0058	0.0000	OK
15 minute winter	SWIC2	12	63.226	0.026	2.1	0.3179	0.0000	OK
30 minute winter	SWIC3	26	63.047	0.107	4.2	0.6309	0.0000	OK
30 minute winter	SWMH4	24	63.051	0.471	6.5	0.6794	0.0000	SURCHARGED
15 minute summer	MH05	1	62.480	0.000	2.2	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
15 minute winter	SWIC1	1.000	SWIC2	0.5	0.370	0.008	0.0423	
15 minute winter	SWIC2	1.001	SWIC3	1.7	0.455	0.029	0.1469	
15 minute winter	SWIC3	1.002	SWMH4	4.4	0.215	0.076	0.7461	
15 minute winter	SWMH4	Hydro-Brake®	MH05	2.2				4.0

Results for 30 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
15 minute winter	SWIC1	10	63.523	0.023	1.3	0.0089	0.0000	OK
60 minute winter	SWIC2	52	63.486	0.286	8.5	3.4691	0.0000	SURCHARGED
60 minute winter	SWIC3	53	63.486	0.546	8.3	3.2107	0.0000	SURCHARGED
60 minute winter	SWMH4	53	63.486	0.906	6.1	1.3072	0.0000	SURCHARGED
15 minute summer	MH05	1	62.480	0.000	2.2	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
15 minute winter	SWIC1	1.000	SWIC2	1.3	0.409	0.021	0.3365	
15 minute winter	SWIC2	1.001	SWIC3	-10.1	0.453	-0.171	0.6819	
15 minute winter	SWIC3	1.002	SWMH4	-7.2	0.233	-0.123	1.1260	
60 minute winter	SWMH4	Hydro-Brake®	MH05	2.2				17.4

Results for 30 year +40% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
120 minute winter	SWIC1	94	63.784	0.284	1.8	0.1103	0.0000	SURCHARGED
120 minute winter	SWIC2	94	63.784	0.584	5.8	7.0813	0.0000	SURCHARGED
120 minute winter	SWIC3	94	63.784	0.844	5.7	4.9649	0.0000	SURCHARGED
120 minute winter	SWMH4	94	63.784	1.204	4.5	1.7373	0.0000	SURCHARGED
15 minute summer	MH05	1	62.480	0.000	2.2	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
30 minute winter	SWIC1	1.000	SWIC2	-2.1	0.386	-0.036	0.8073	
15 minute winter	SWIC2	1.001	SWIC3	-16.2	-0.468	-0.275	0.8013	
15 minute summer	SWIC3	1.002	SWMH4	-10.6	0.285	-0.180	1.1260	
120 minute winter	SWMH4	Hydro-Brake®	MH05	2.5				31.3

Results for 100 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
120 minute winter	SWIC1	94	63.715	0.215	1.6	0.0834	0.0000	OK
120 minute winter	SWIC2	94	63.714	0.514	6.9	6.2363	0.0000	SURCHARGED
120 minute winter	SWIC3	94	63.714	0.774	5.7	4.5522	0.0000	SURCHARGED
120 minute winter	SWMH4	94	63.714	1.134	4.8	1.6362	0.0000	SURCHARGED
15 minute summer	MH05	1	62.480	0.000	2.2	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
15 minute winter	SWIC1	1.000	SWIC2	1.7	0.429	0.028	0.4867	
15 minute winter	SWIC2	1.001	SWIC3	-14.6	0.490	-0.247	0.8013	
15 minute summer	SWIC3	1.002	SWMH4	-11.2	-0.328	-0.191	1.1260	
120 minute winter	SWMH4	Hydro-Brake®	MH05	2.4				29.4

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
120 minute winter	SWIC1	98	64.231	0.731	2.6	0.2836	0.0000	FLOOD RISK
120 minute winter	SWIC2	98	64.231	1.031	8.3	12.4993	0.0000	FLOOD RISK
120 minute winter	SWIC3	98	64.231	1.291	8.1	7.5919	0.0000	FLOOD RISK
120 minute winter	SWMH4	98	64.230	1.650	5.5	2.3816	0.0000	FLOOD RISK
15 minute summer	MH05	1	62.480	0.000	2.3	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
30 minute winter	SWIC1	1.000	SWIC2	-5.2	0.405	-0.089	0.9367	
15 minute winter	SWIC2	1.001	SWIC3	-21.3	-0.588	-0.360	0.8013	
15 minute winter	SWIC3	1.002	SWMH4	-11.4	-0.287	-0.195	1.1260	
120 minute winter	SWMH4	Hydro-Brake®	MH05	2.9				42.7