REPORT

NPPF Flood Risk Assessment

178 Lockwood Road, Lockwood, Huddersfield, HD1 3QR

Client: Mr Hasan

Reference: 6795-AEA-ZZ-XX-RP-Z-0001

Status: S3/P01.01

Date: 01 September 2022

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Executive Summary

Royal HaskoningDHV has been appointed by Mr Hasan to undertake a National Planning Policy Framework (NPPF) [1] compliant Flood Risk Assessment (FRA) for the Development Proposals located at 178 Lockwood Road, Lockwood, Huddersfield, HD1 3QR.

It is understood that the development is for the construction of an extension to the existing Lockwood Tyres and Service Centre.

According to the Flood Risk and Coastal Change Planning Policy Guidance, the Development Proposal would be classified as a Minor Development.

According to Annex 3 of the NPPF, the Development Proposal's Vulnerability Classification is "Less vulnerable".

The key findings of the Flood Risk Assessment are as follows:

- The Development Proposals are not considered to be at risk of tidal flooding.
- The risk to the Development Proposals from fluvial (river) flooding is considered to be very low, as Application Site is unaffected in the 1 in 20 Year, 1 in 100 Year and 1 in 1000 Year flood event, as defined by the Environment Agency Product 4 dataset.
- The risk to the Development Proposals from surface water flooding is considered to be very low, as the Application Site is unaffected for the 1 in 30 Year, 1 in 100 Year and 1 in 1000 Year flood events, as defined by the Environment Agency Risk of Flooding from Surface Water dataset.
- The site is located in an area that is highly susceptible to groundwater flooding. If perched groundwater is encountered during construction, it would need to be mitigated for by appropriate construction techniques and in accordance with an appropriate method statement, to ensure Health and Safety and Environmental permitting requirements are satisfied.

A summary of the flood risk for the Application Site for each source requiring consideration under the NPPF is presented as Table 1, overleaf.

The Flood Risk Assessment has been undertaken in accordance with the requirements of the NPPF and it can be demonstrated that the Development Proposals are compatible with the predicted flood risk profile, including climate change allowance over the development lifetime.

It should be noted that the Development Proposals are not predicted to increase the risk of flooding to others over the development lifetime. Consequently, it is concluded that, with regards to the Flood Risk requirements of the NPPF, the Development Proposals are acceptable.

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Table 1: Flood Risk Overview

Criteria	Summary
Site Setting	
Site Address	178 Lockwood Road, Lockwood, Huddersfield, HD1 3QR
Client Name	Mr Hasan
Redline Site Boundary	440 m^2
Ordnance Survey Grid Reference	413862mE, 415504 mN
Fluvial Climate Change Catchment Area	Aire and Calder
Development Classification	
Major or Minor Development?	Minor Development
Vulnerability Classification	Less vulnerable
Development Proposals	It is understood that the development is for the construction of an extension to the existing Lockwood Tyres and Service Centre.
Sequential Test	If the Application Site has not been allocated through the Local Plan process, a Sequential Test may be required. This should be confirmed with the Local Planning Authority.
Exception Test	Based on the flood risk vulnerability and flood zone 'compatibility' table within the flood risk and coastal change guidance (Table 3), the development is classified as Appropriate, and therefore the Exception Test is not required.
Site Parameters	
Topographic Levels (LiDAR)	Average Topographic Level 72.8 m AOD
Ordinary Watercourses (within 500m)	Highest Topographic Level 73.5 m AOD
Main Rivers (within 500m)	River Holme
BGS Hydrogeological Setting	Potential for groundwater flooding to occur at the surface
BGS Lithology	Aquifers in which flow is virtually all through fractures and other discontinuities: Moderately productive aquifer
BGS Borehole Record	Superficial Geology: Alluvium - Clay, silt, sand and gravel
Intrusive Onsite Ground Investigations	Bedrock Geology: Pennine Lower Coal Measures Formation - Mudstone, siltstone and sandstone
Flood Risk	
Historic Records	There are no recorded instances of flooding on the Environment Agency's Historic or Recorded flood data, within 500m of the site. (Figure 10)
Flood Map for Planning Classification	Flood Zone 1 and is in an area that does not benefit from flood defences. (Figure 6)
Tidal Flood Risk	The Development Proposals are not shown to be at risk of tidal flooding.
Fluvial Flood Risk	The Development Proposals are not shown to be at risk of fluvial flooding for a 1 in 100 year event.
Surface water Flood Risk	Based on the Environment Agency's risk of flooding from surface water mapping the site is classified as being at Very Low Risk of flooding from surface water. The Development Proposals are not shown to be at risk of surface water flooding for the 1 in 30, 1 in 100 or 1 in 1000 year event.
Groundwater Flood Risk	High Risk – mitigation measures are considered necessary
Sewer Flooding Risk	Where sewers exist, there is a residual risk of sewer flooding as a result of either a failure, usually a collapse or blockage, or as a result of the system's capacity being exceeded.
Sewer Flooding Mitigation	Adopting a precautionary approach to the potential for sewer flooding or other events that exceed the design standard of infrastructure, appropriate mitigation measures should be included in the design of all new buildings and, where practicable, in the refurbishment or change of use of existing buildings.
Residual Risk: Flood Defence Breach	Flood Defence Breach: The site is indicated to not be located in an area that benefits from the presence of flood defences. Therefore, the site is not indicated to be at risk as consequence of a breach of flood defences.
Residual Risk: Reservoir Failure	The Environment Agency risk of reservoir flooding indicates that the site is at risk as a result of a modelled reservoir failure.
Canal Failure	According to the CEH Canals data, there are no canals within 500m of the site, therefore it is not anticipated that the site is at risk as a result of a canal breach.
Offsite Impacts	

Criteria	Summary
Floodplain Displacement	As the Application Site is not shown to be at risk from fluvial flooding, floodplain displacement is unlikely to occur. Therefore, floodplain compensation is not anticipated to be required.

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1 Introduction

Royal HaskoningDHV has been appointed by Mr Hasan to undertake a National Planning Policy Framework (NPPF) [1] compliant Flood Risk Assessment (FRA) for the Development Proposals located at 178 Lockwood Road, Lockwood, Huddersfield, HD1 3QR. The site will hereafter be referred to as the Application Site.

The purpose of this assessment is to demonstrate that the Development Proposal can be satisfactorily accommodated without worsening flood risk for the area and without placing the development itself at risk of flooding. This assessment has been written in accordance with national guidance provided within the NPPF, the Planning Guidance, Flood risk and coastal change [2], DEFRA's National Standards for Sustainable Drainage [3], and Local Guidance and Policy Documents.

1.1 Site Overview

The Application Site is located at Ordnance Survey grid reference 413,862 mE, 415,504 mN, and the redline boundary includes an area of 440 m^2 (0.044 Ha), as indicated on Figure 1.

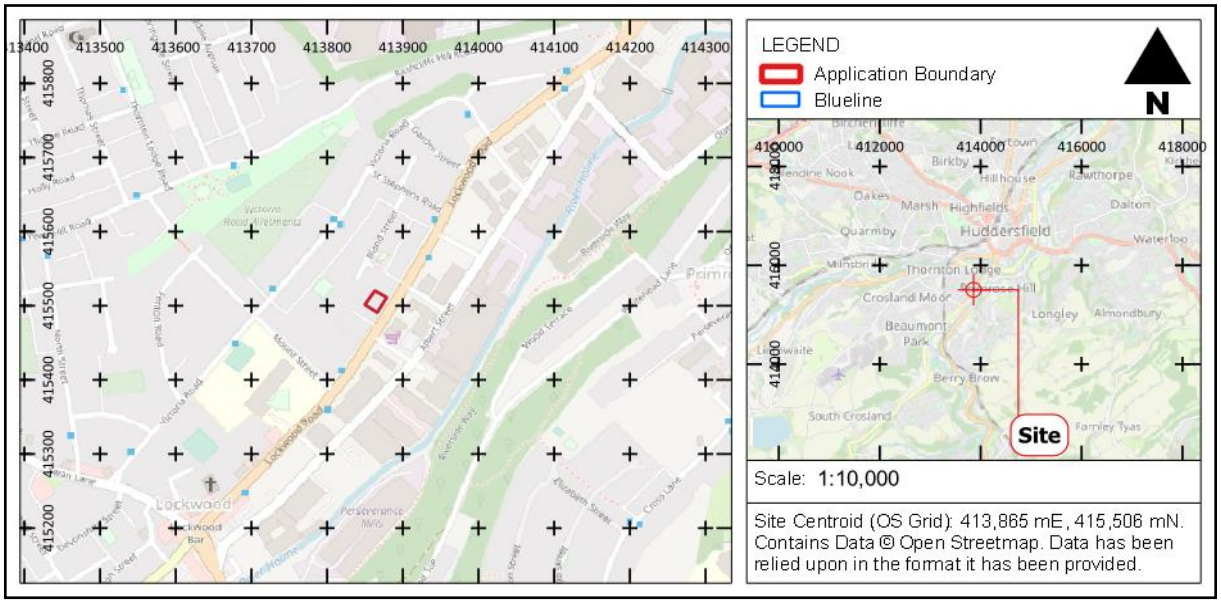

Figure 1: Site Location Plan

1.2 Current Site Usage

The Application Site is currently a commercial usage, formed of a building, carparking and soft landscaping, as shown in Figure 2.

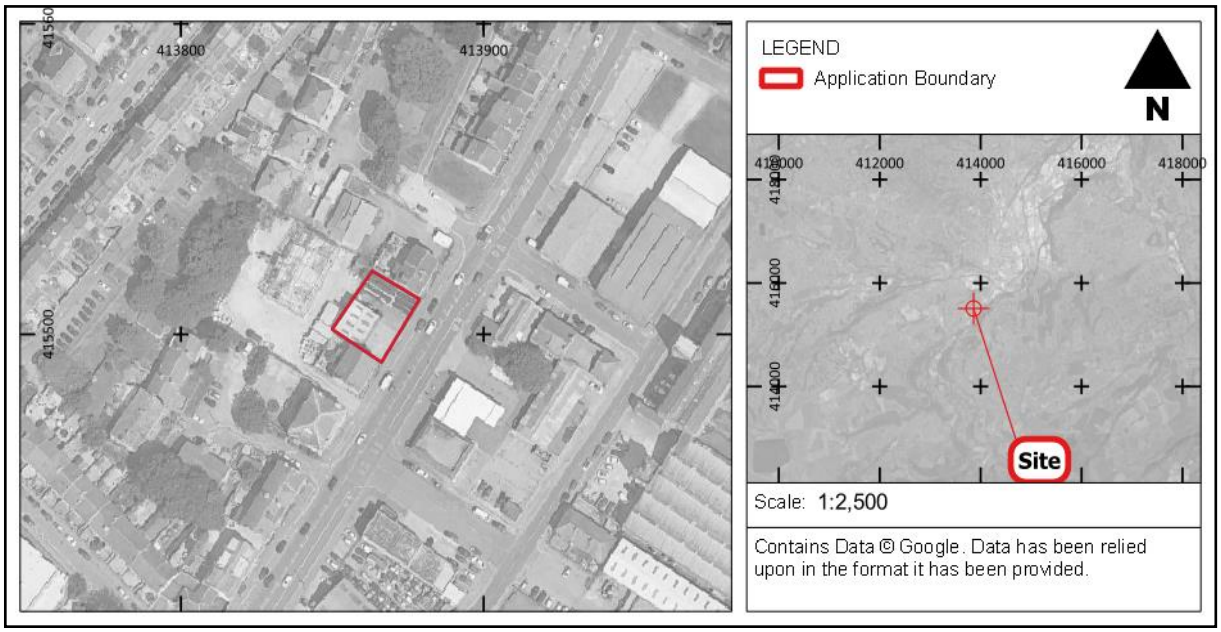

Figure 2: Aerial Photograph

1.3 Development Proposals

It is understood that the development is for the construction of an extension to the existing Lockwood Tyres and Service Centre, replacing part of the service yard, hereafter referred to as the Development Proposals.

1.4 Development Vulnerability Classification

The vulnerability classifications are summarised in Annex 3 of the NPPF identifies that the Development Proposals are **"Less Vulnerable"**.

1.5 Specific Requirement for Extensions and Change of Use.

Paragraph 168 of the NPPF states:

Applications for some minor development and changes of use (Footnote 56) should not be subject to the sequential or exception tests but should still meet the requirements for site-specific flood risk assessments set out in footnote 55.

Footnote 56:

This includes householder development, small non-residential extensions (with a footprint of less than 250m^2) and changes of use; except for changes of use to a caravan, camping or chalet site, or to a mobile home or park home site, where the sequential and exception tests should be applied as appropriate

Footnote 55:

A site-specific flood risk assessment should be provided for all development in Flood Zones 2 and 3. In Flood Zone 1, an assessment should accompany all proposals involving: sites of 1 hectare or more; land

which has been identified by the Environment Agency as having critical drainage problems; land identified in a strategic flood risk assessment as being at increased flood risk in future; or land that may be subject to other sources of flooding, where its development would introduce a more vulnerable use

The development proposals are for a Minor Extension, and therefore under Footnote 56, the Sequential Test, and therefore the Exception Test do not need to be applied.

However, as per Paragraph 051 of the Planning Practice Guidance (PPG) [2] for Flood Risk and Coastal Changes, updated in August 2022:

Applications for minor development involving extensions or additions should still meet the requirements to provide a site-specific flood risk assessment (as per footnote 55 of the National Planning Policy Framework). A pragmatic approach should be taken to the scope and level of detail of the assessment – a shorter, simpler assessment is likely to be sufficient in most such cases. As a minimum, the assessment needs to show that the development will be safe for its users for the intended lifetime of the development, without increasing flood risk elsewhere, and be sufficiently flood resistant and resilient to the level and nature of the flood risk.

The Flood Risk Assessment for this minor development will demonstrate the above points.

1.6 Site Topography

Ground levels within the Application Site have been determined by reviewing Environment Agency 2m LiDAR data. On average, the ground levels are 72.8 m AOD, with a highest topographic level of 73.5 m AOD (see Figure 3).

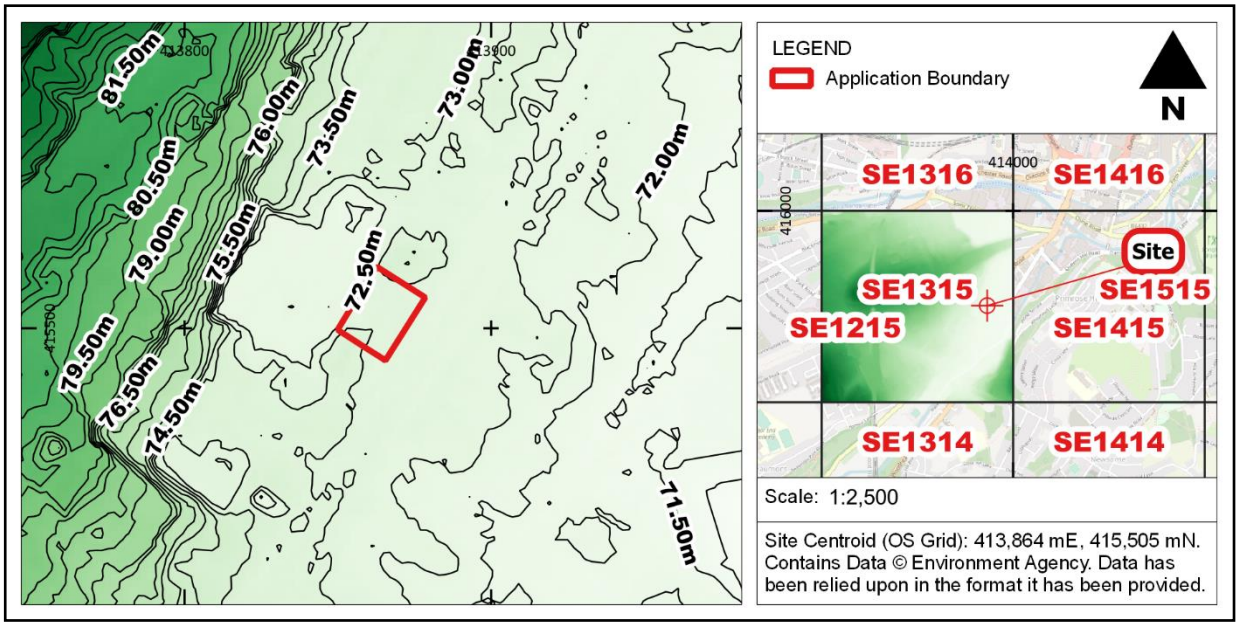

Figure 3: Site Topography

1.7 Nearby Watercourses

The River Holme is located approximately 150m to the south-east of the Application Site (Figure 4).

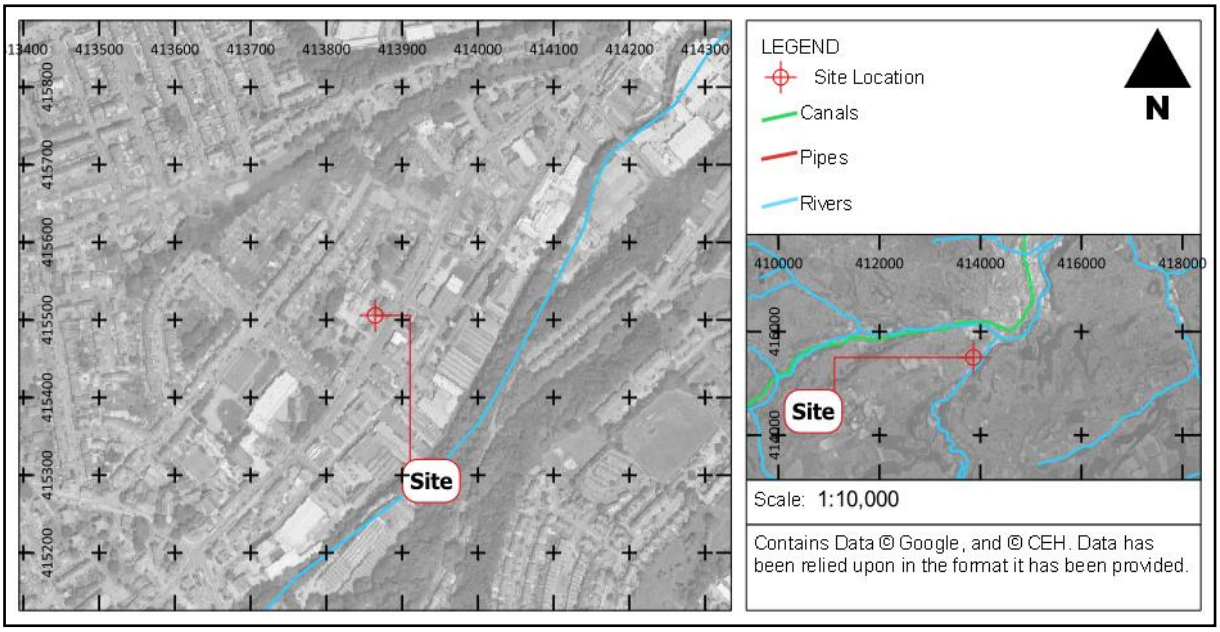

Figure 4: Ordinary Watercourses

2 Scope of Assessment

Under Section 14 of the NPPF, a Flood Risk Assessment (FRA) is required for Development Proposals which meet a range of conditions[1].

The NPPF states that a FRA needs to consider the risk of flooding to a property or site and demonstrate that the site will be safe over its lifetime (including identification of appropriate mitigation measures). The FRA also needs to demonstrate that the proposals will not increase flood risk to others. The sources of flooding that need to be assessed are from the following sources:

i. **Fluvial (River) flooding**. When flows within watercourses exceed the capacity of the watercourse, causing out of bank flows and resulting in flooding of adjacent areas.

ii. **Groundwater flooding.** Usually, the result of prolonged wet weather, causing groundwater levels to rise sufficiently to either emerge at surface or to cause flooding of below ground infrastructure, such as basements.

iii. **Surface water (Surface Water) flooding**. When rainfall causes overland flow rates and volumes which exceed the capacity of the drainage network, causing flooding to land that is normally dry.

iv. **Tidal flooding.** When high tide events overtop the shoreline to cause flooding to land behind.

As well as considering the risk of flooding from these primary sources, a FRA needs to consider residual risks. The likelihood of these types of flooding occurring is much lower than the primary sources of flooding discussed above. The residual flood risks to be considered are:

i. **Sewer flooding.** The public sewer network within the UK is formed of a combination of lost rivers, old sewers, former private sewer systems, and more recent sewers installed to support developments. This results in a network that has areas that a prone to being overwhelmed or blocked. Areas with a history of sewer flooding are more likely (without intervention) to experience flood events in the future.

ii. **Flood defence failure.** The consequence of a failure of part of a flood defence could result in the rapid release of water in an area that would otherwise not be at risk of flooding. If such an event were to occur, there could be very little warning time and therefore it is unlikely that prior evacuation from an area at risk could be achieved.

iii. **Reservoir failure**. Although the likelihood of reservoir failure resulting in widespread flooding is extremely low[2] [4], the consequences of such an event need to be considered to inform appropriate emergency planning.

iv. **Canal failure.** Canal Failure could result in flooding if a section of raised canal, either on an embankment or on a viaduct, was to fail.

[1] *i. Development in Flood Zones 2 and 3. ii. In Flood Zone 1, an assessment should accompany all proposals involving: sites of 1 hectare or more; iii. Land which has been identified by the Environment Agency as having critical drainage problems; iv. Land identified in a strategic flood risk assessment as being at increased flood risk in future; or, v. Land that may be subject to other sources of flooding, where its development would introduce a more vulnerable use.*

[2] Environment Minister Richard Benyon said: “While the risk of a reservoir failure is extremely low the safety of the public must remain our top priority and where there is even a small risk we need to make sure that we are prepared.”

3 Relevant Policy and Guidance

This Flood Risk Assessment has been developed in accordance with the guidance and legislation set out in the below documents:

3.1 National Policy

- Water Industry Act (1999) [5]
- EU Water Framework Directive (2000) [6]
- EU Floods Directive (2007) [7]
- The Flood Risk Regulations (2009) [8]
- Flood and Water Management Act (2010) [9]
- The Building Regulations, Part H (2015) [10]
- Town and Country Planning, Development Management Procedure, (England) Order (2015) [11]
- British Standards, Drain and sewer systems outside buildings (BS EN 752:2017) [12]
- National Planning Policy Framework (NPPF, 2021) [1]

3.2 National Guidance

- Non-statutory Sustainable Drainage Technical Standards (2015) [13]
- Flood Risk and Coastal Change Planning Practice Guidance (PPG, 2022) [14]
- CiRIA SuDS Manual (C753, 2015) [16]
- Sector Guidance in relation to the adoption of sewerage assets by sewerage companies in England (October 2019) [17]
- Preparing a Flood Risk Assessment: Standing Advice, Environment Agency, and DEFRA (2022) [18]
- Flood Risk Assessments: Climate Change Allowances, Environment Agency (2020) [19]

3.3 Local Policy

- Kirklees Local Flood Risk Management Strategy (LFRMS) (2012) – Kirklees Local Flood Risk Management Strategy
- Kirklees Surface Water Management Plan (SWMP) (2011) – Kirklees Surface Water Management Plan
- Kirklees Preliminary Flood Risk Assessment (2009) – Preliminary Flood Risk Assessment (kirklees.gov.uk)
- Kirklees/Calder Catchment Strategic Flood Risk Assessment (2016) – Calder Catchment Strategic Flood Risk Assessment (SFRA) – Volume I (kirklees.gov.uk) and Calder Catchment Strategic Flood Risk Assessment (SFRA) – Volume II (kirklees.gov.uk)

3.4 Local Guidance

- Kirklees Local Plan (2019) – Kirklees Local Plan Strategy and Policies

3.5 Flood Zone Classification

The EA Flood Map for Planning (Figure 5) demonstrates that the Development Proposals are located within an area defined as Flood Zone 1.

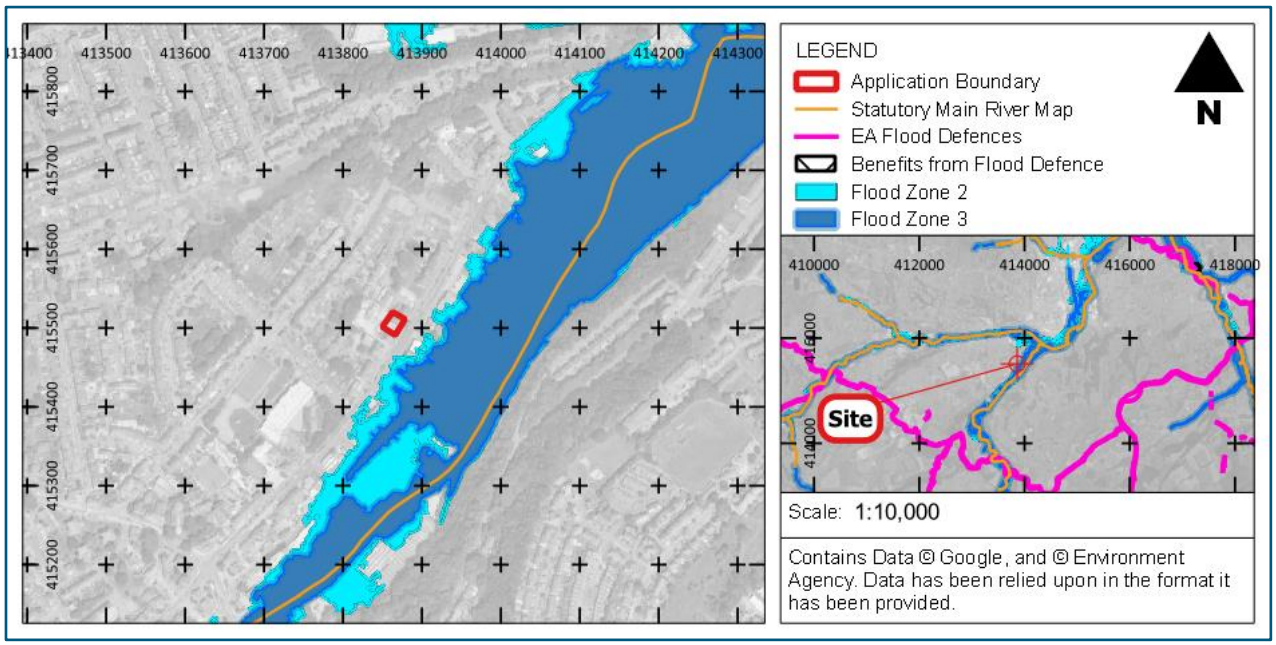

Figure 5: EA Flood Map for Planning

Table 1 of the Flood Risk and Coastal Change Guidance [2], reproduced in Table 2, presents the flood zone definitions.

Table 2: Flood Risk and Coastal Change, Table 1

Flood Zone	Probability	Description
1	Low Probability.	This zone comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any year (<0.1%).
2	Medium Probability.	This zone comprises land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% to 0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% to 0.1%) in any year.
3a	High Probability.	This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.
3b	The Functional Floodplain.	This zone comprises land where water has to flow or be stored in times of flood. The identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. Functional floodplain will normally comprise of: a. land having a 1 in 30 or greater annual probability of flooding (>3.3%), with any existing flood risk management infrastructure operating effectively; or b. land that is designed to flood (such as a flood attenuation scheme), even if it would only flood in more extreme events (such as 1 in 1000 (0.1%) annual probability of flooding). Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Flood Zone 3b is not distinguished from Zone 3a on the Flood Map).

3.6 Climate Change Allowances

The Environment Agency published guidance on climate change allowances for Flood Risk Assessments in February 2016, with the latest update in May 2022 [19].

The current Environment Agency climate change allowances are classified on how likely that scenario is predicted to occur, based on percentile of the scenario.

3.6.1 Tidal Climate Change Allowances

Tidal Climate Change Allowances are determined by the predicted increase in sea levels. These are determined by regional variations, which are based on the River Basin District under consideration.

The Application Site is located in the Humber area of England. The 2125 Higher Central Climate Change allowance for sea level rise total until 2125 is 1.15m and the Upper End allowance is 1.55m compared to the 1981 to 2000 baseline.

3.6.2 Fluvial Climate Change Allowances

Fluvial Climate Change Allowances are determined by the predicted increase in peak river flows. These are determined by regional variations, which are based on the management catchments.

The guidance also sets out which climate change allowance should be used for different development Vulnerability Classifications.

The Application Site is located in the Aire and Calder management catchment. The 2080 Central Climate Change allowance for peak river flows is 23%, compared to the 1981 to 2000 baseline.

3.6.3 Surface water Climate Change Allowances

Surface water Climate Change Allowances are determined by the predicted increase in peak rainfall intensity. These are determined by regional variations, which are based on the management catchments. Management catchments are sub-catchments of river basin districts.

The Application Site is located in the Aire and Calder management catchment. Climate change allowances are based on a 1981 to 2000 baseline. The 2070, 30 Year Central Climate Change allowance for peak rainfall intensity is 25%. The 2070, 100 Year Upper End Climate Change allowance for peak rainfall intensity is 30%.

4 Flood Risk: Historic Records

4.1 Recorded Flooding

The Environment Agency publishes records of historic flooding[4] and this data has been reviewed. There are no recorded instances of flooding on the Environment Agency's Historic or Recorded flood data, within 500m of the site (Figure 6).

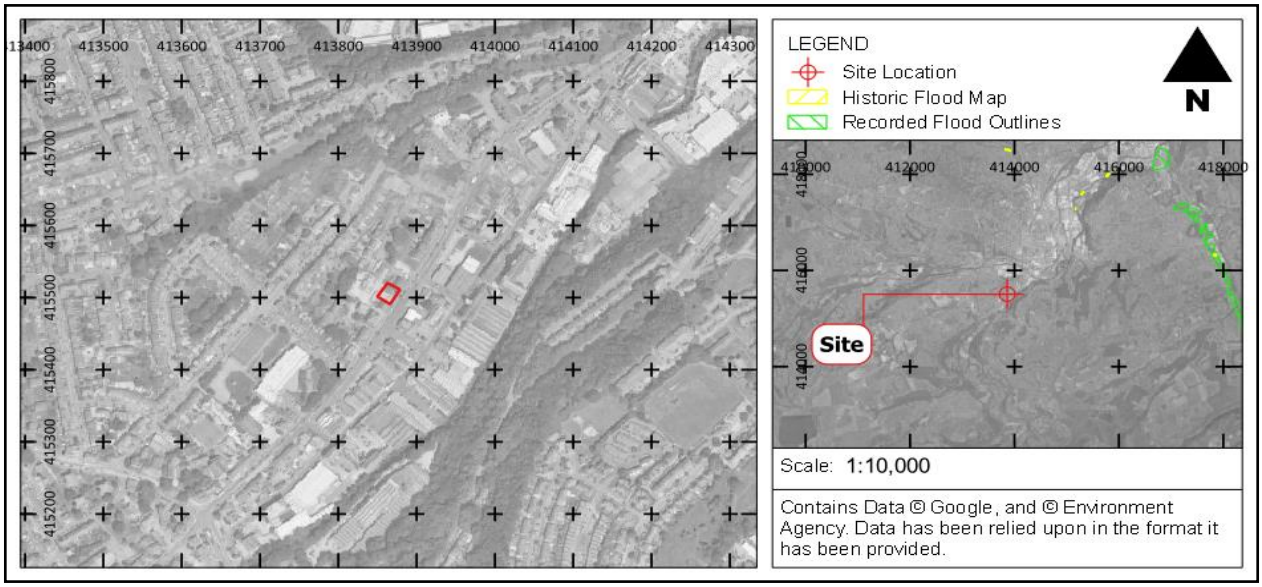

Figure 6: EA Historic and Recorded Flood Outlines

4.2 Site Owner Recorded Flooding

The site owner has provided no details of flooding having affected the Application Site.

[4] Historic Flood Map - data.gov.uk

5 Flood Risk: Tidal Flooding

5.1 Tidal Flood Risk Analysis

Comparison of the Environment Agency's Coastal Design Sea Levels (Humber region) with the ground level at the Application Site is presented in Table 3.

As demonstrated below, the average ground level of the site is topographically greater than the coastal design sea levels, by nearly 70m. Consequently, the Development Proposals are not at risk of tidal flooding.

Table 3: Environment Agency 2018 Coastal Design Sea Levels

Baseline Tidal Flood Risk	1 in 200 RP (Medium Risk)	1 in 1,000 RP (Low Risk)
Coastal Design Sea Level	3.74 mAOD	3.92 mAOD
Average Ground Level at Site	72.8 mAOD	
Predicted Flood Depth (no mitigation)	N/A	
At risk of tidal flooding?	No	

5.2 With Climate Change Tidal Flood Risk

By application of the Environment Agency's climate change allowances, the predicted future tidal flood level can be calculated, as summarised in Table 4.

Table 4: Predicted Tidal Flood Level in 2125 for a range of return periods

Future Tidal Flood Risk	1 in 200 RP (Medium Risk	1 in 1,000 RP (Low Risk)
Coastal Design Sea Level	3.74 mAOD	3.92 mAOD
Climate Change Allowance (Upper End)	1.55m	
Future Design Sea Level (2125)	5.29 mAOD	5.47 mAOD
Average Ground Level at Site (LiDAR)	72.8 mAOD	
Predicted Flood Depth (no mitigation)	N/A	
At risk of tidal flooding?	No	

The current ground level at the Application Site is approximately 67m above the predicted future 1 in 1,200 RP with the Climate Change allowance up until 2125. Therefore, the Application Site is at Very Low Risk of tidal flooding.

6 Flood Risk: Fluvial Flooding

6.1 Fluvial Flood Risk Analysis

The Environment Agency's flood level information has been provided as part of the data request sent to the Agency. This information was taken from the Colne Model (2019) and the River Holme Model (2019). The EA dataset is included in Appendix B of this report.

The nearest data node to the site is Node 4 of the Product 4 dataset. Thus, the modelled fluvial flood levels used in this analysis have been taken from this node.

Comparison of the predicted flood levels with the ground level at the Application Site is presented in Table 5The analysis demonstrates that the average ground level of the site is topographically higher than the modelled flood levels for all assessed events (1:20-year, 1:100-year and 1:1,000-year). As such, it is considered that the Development Proposals should not be at risk of fluvial flooding, in the baseline scenarios.

Table 5.

The analysis demonstrates that the average ground level of the site is topographically higher than the modelled flood levels for all assessed events (1:20-year, 1:100-year and 1:1,000-year). As such, it is considered that the Development Proposals should not be at risk of fluvial flooding, in the baseline scenarios.

Table 5: Environment Agency Fluvial Flood Levels

Baseline Fluvial Flood Risk	1 in 20 RP (High Risk)	1 in 100 RP (Medium Risk)	1 in 1,000 RP (Low Risk)
Predicted Fluvial Flood Levels	72.06 mAOD	72.31 mAOD	72.71 mAOD
Average Ground Level at Application Site	72.8 mAOD		
Predicted Flood Depth (no mitigation)	Not Affected		
At risk of fluvial flooding?	No		

6.2 With Climate Change Fluvial Flood Risk

The Environment Agency data provided does not include the latest climate change allowances. As such, through utilising the available data, it was possible to interpolate the 1 in 100 Year plus 23% Climate Change flood level.

Table 6: Predicted Fluvial Flood Level for a range of return periods

Future Fluvial Flood Risk	1 in 100 RP plus 20% Climate Change	1 in 100 RP plus 30% Climate Change	1 in 100 RP plus 23% Climate Change
Predict Fluvial Flood Levels	72.49 mAOD	72.56 mAOD	72.52 mAOD
Average Ground Level at Site	72.80 mAOD		
Predicted Flood Depth (no mitigation)	Not Affected	Not Affected	Not Affected
Design Flood Level (Climate Change) including 300m Freeboard	72.82 mAOD		
At risk of fluvial flooding?	No	No	No

Through this assessment it was determined that the Development Proposals are unaffected by fluvial flooding for the Central climate change scenario in the 2080 epoch.

7 Flood Risk: Surface Water Flooding

7.1 Surface Water Flood Risk Analysis

The Environment Agency's Surface Water Flood Risk maps have been reviewed to determine the risk of flooding to the site from surface water sources.

The Application Site is located outside the EA Risk of Flooding from Surface Water extents for the 1 in 30 Year (Figure 7), 1 in 100 Year (Figure *8*) and 1 in 1000 Year (Figure 9) events. Consequently, the Development Proposals could also be considered to be unaffected by surface water flooding, in the baseline scenarios.

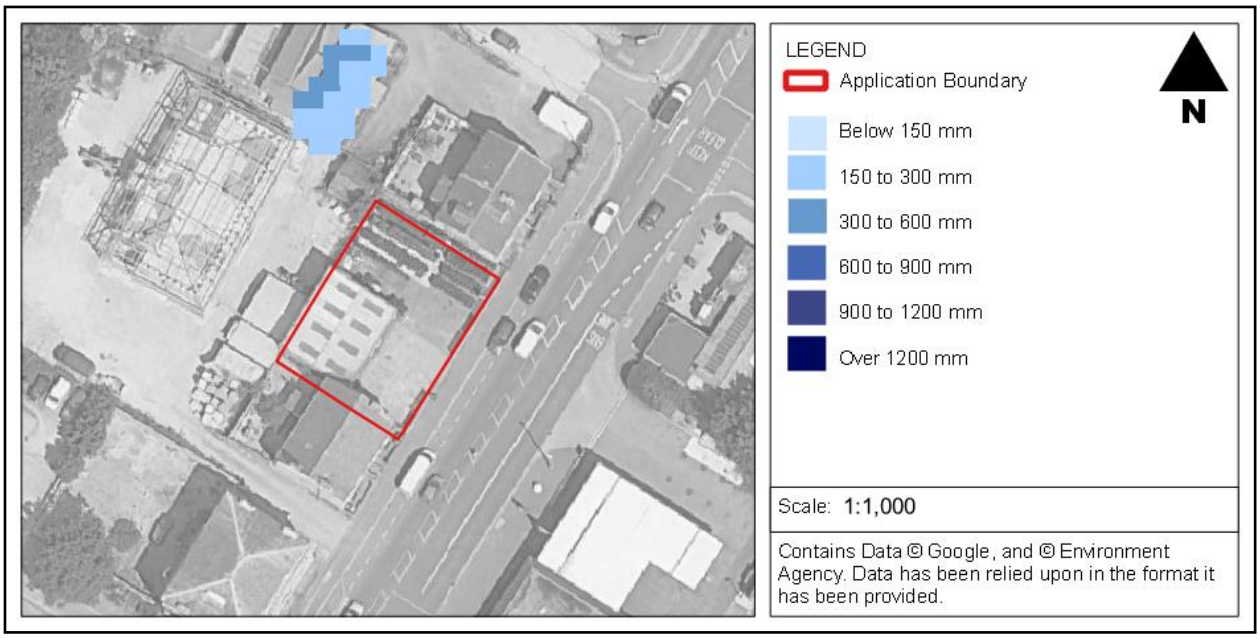

Figure 7: EA Risk of Flooding from Surface Water Map, 1 in 30 Year Event

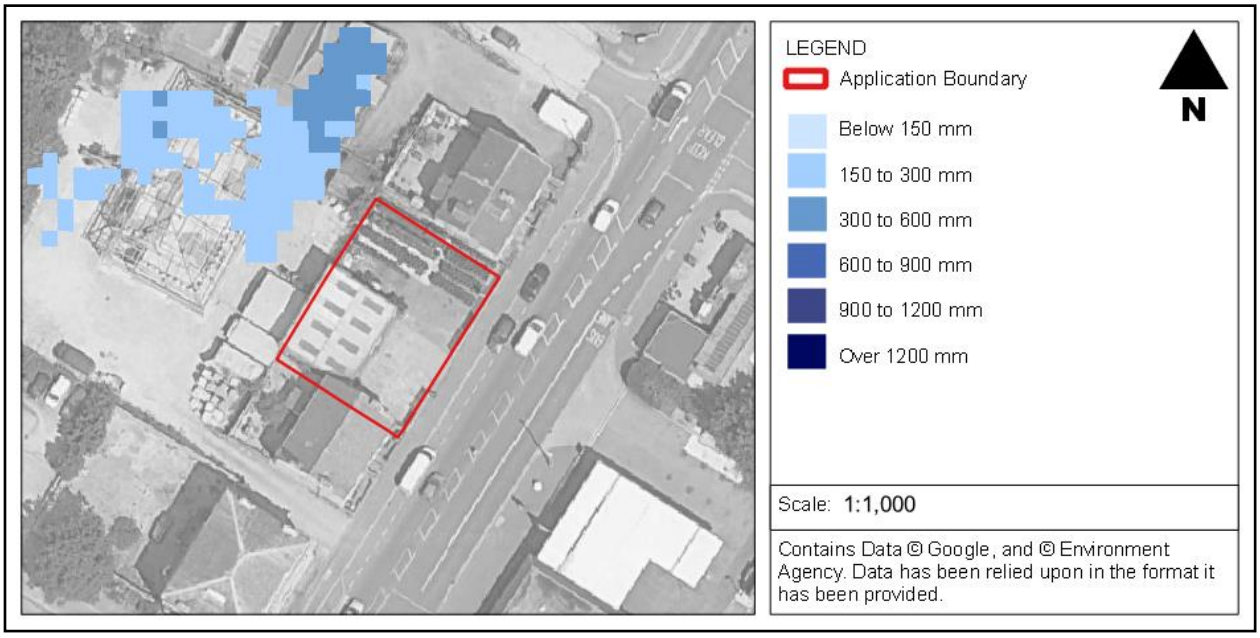

Figure 8: EA Risk of Flooding from Surface Water Map, 1 in 100 Year Event

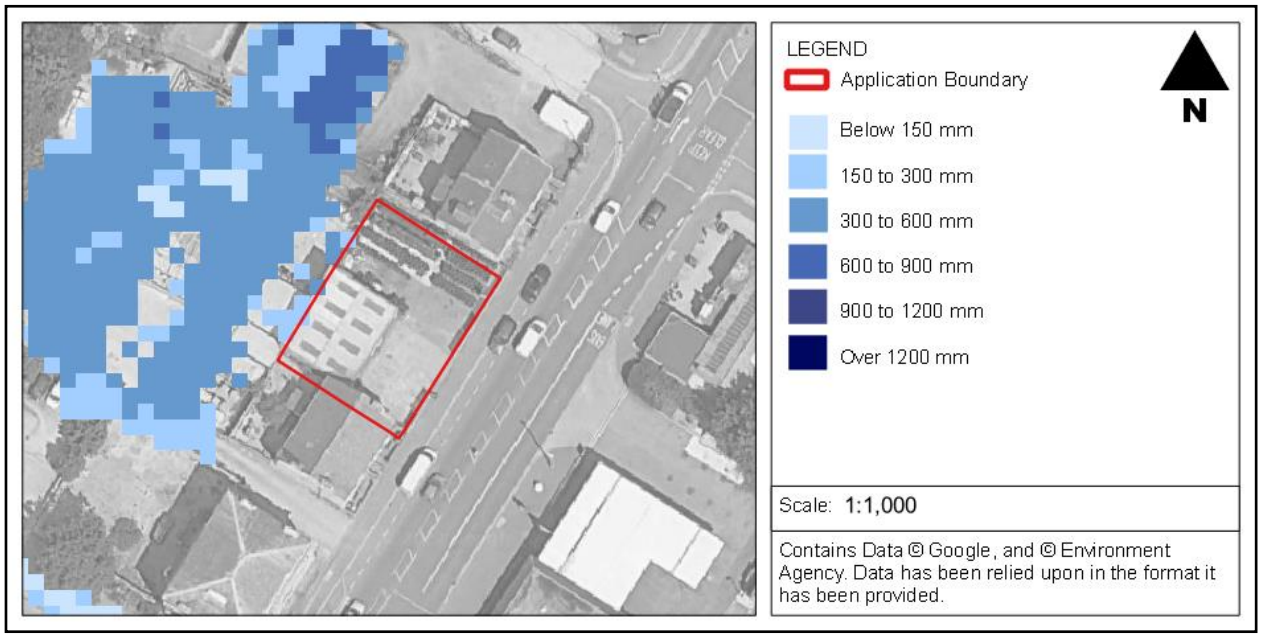

Figure 9: EA Risk of Flooding from Surface Water Map, 1 in 1000 Year Event

7.2 With Climate Change Surface water Flood Risk

The current Environment Agency surface water flood risk maps currently do not incorporate predicted climate change allowances. However, due to the predicted increases in peak rainfall intensity, it is likely that surface water flood depths will increase over the lifetime of the development.

8 Flood Risk: Groundwater Flooding

8.1 Groundwater Flood Risk Analysis

The British Geological Survey's (BGS) Areas Susceptible to Groundwater Flooding (AStGW) dataset has been used to determine the groundwater flood risk to the Development Proposals. This mapping has four categories:

- Unaffected (Very Low Risk);
- Limited potential for groundwater flooding to occur (Low Risk);
- Potential for groundwater flooding of property situated below ground level (Medium Risk);
- Potential for groundwater flooding to occur at surface (High Risk).

By reviewing the British Geological Survey AStGW, the groundwater flood risk to the Development Proposals is classified as having potential for groundwater flooding to occur at the surface (High Risk).

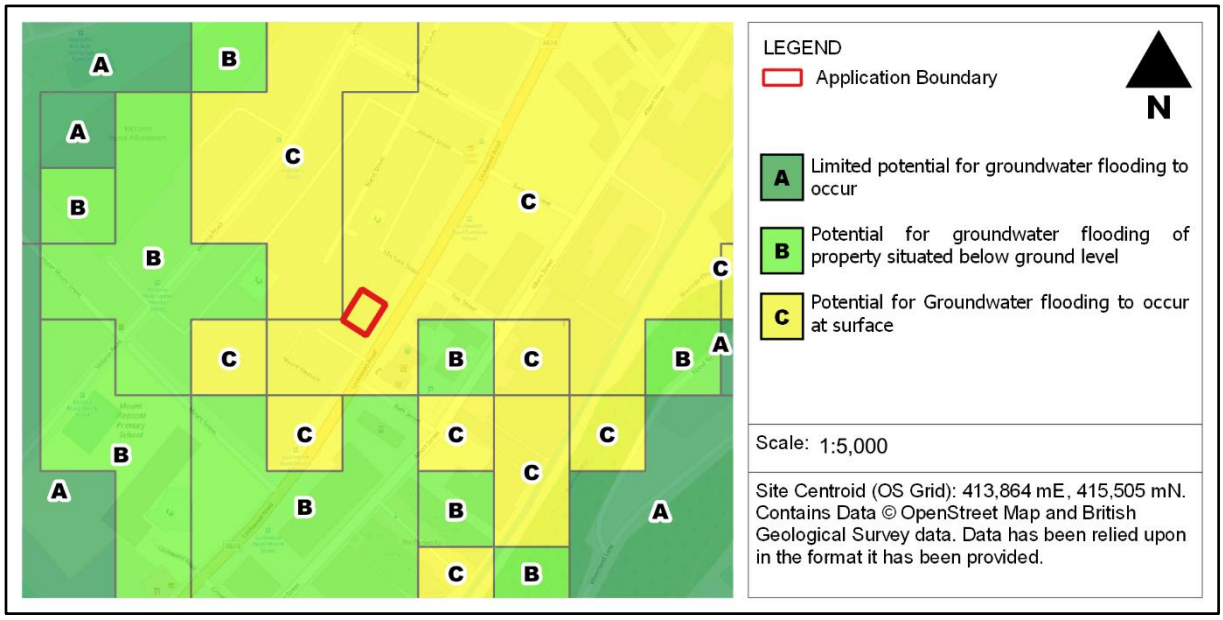

Figure 10: British Geological Survey AStGW Mapping

8.2 Mitigation Measures

Perched groundwater may be present below areas of the Application Site and could be encountered during the below ground civil engineering works. The perched groundwater, if encountered, would need to be mitigated for by appropriate construction techniques and in accordance with an appropriate method statement, to ensure Health and Safety and Environmental permitting requirements are satisfied.

9 Flood Risk: Sewer Flooding

9.1 Baseline Sewer Flood Risk

Sewer asset records and the SFRA have been reviewed, to determine if the Application Site is located in proximity of a public sewer system or has a recorded history of sewer flooding within 250m of the Application Site.

There is no evidence that the Application Site has experienced sewer flooding in the past. As the Development Proposals are for an extension to the existing development, there will likely be no increased risk of sewer flooding as a result of the Development Proposals.

9.2 Mitigation Measures

To minimise the potential for sewer flooding, foul and surface water sewer systems should be kept separate and non-return valves or similar protection measures should be installed, to prevent the public sewers from surcharging into the lateral drains serving properties.

10 Residual Flood Risk

Residual risks are those remaining after applying the sequential approach to the location of development and taking mitigating actions.

10.1 Flood Defence Breach Analysis

The Application Site is not in an area that benefits from flood defences according to the EA Flood Map; therefore, the Application Site is not at residual risk of a flood defence breach and no specific mitigation measures are required.

10.2 Reservoir Failure

The Environment Agency risk of reservoir flooding indicates that the site is at risk as a result of a modelled reservoir failure (Figure 11).

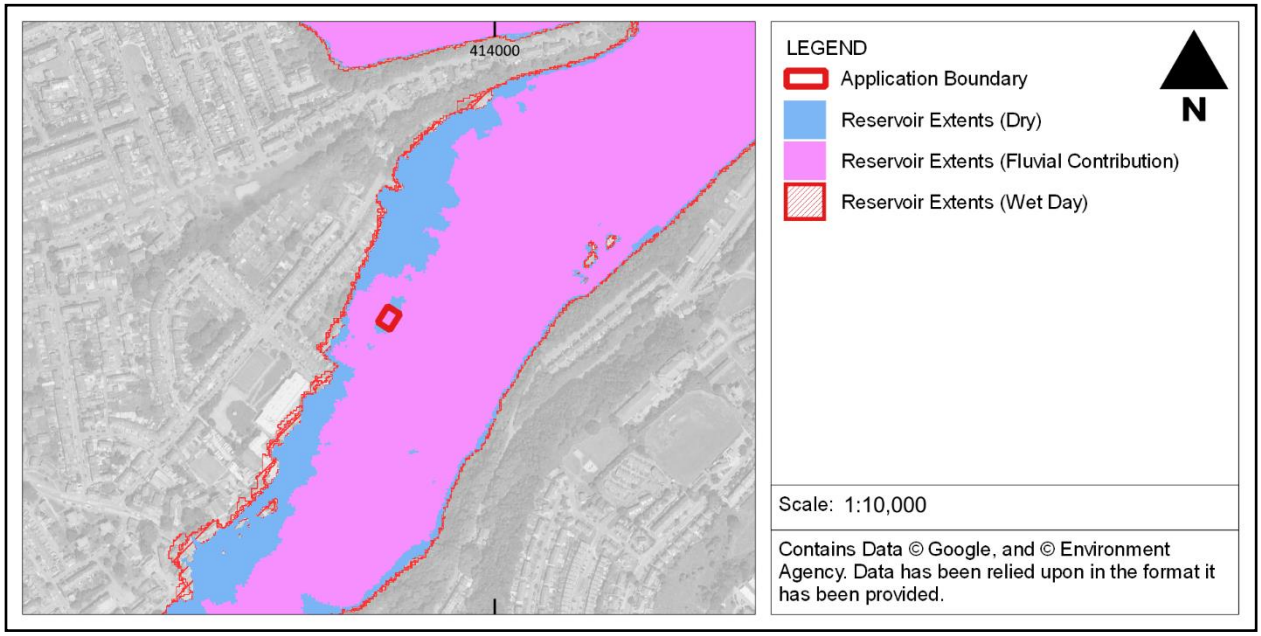

Figure 11: Environment Agency, Risk of Reservoir Flooding

10.3 Canal Failure

Canal Failure could result in flooding if a section of raised canal, either on an embankment or on a viaduct, was to fail.

As the Application Site is not within 1km of a raised canal, it is considered that the residual risk of canal flooding is low.

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11

11 Conclusions

Royal HaskoningDHV has been appointed by Mr Hasan to undertake a National Planning Policy Framework (NPPF) [1] compliant Flood Risk Assessment (FRA) for the Development Proposals located at 178 Lockwood Road, Lockwood, Huddersfield, HD1 3QR.

It is understood that the development is for the construction of an extension to the existing Lockwood Tyres and Service Centre.

According to the Flood Risk and Coastal Change Planning Policy Guidance, the Development Proposal would be classified as a Minor Development.

According to Annex 3 of the NPPF, the Development Proposal's Vulnerability Classification is "Less vulnerable".

The key findings of the Flood Risk Assessment are as follows:

- The Development Proposals are not considered to be at risk of tidal flooding.
- The risk to the Development Proposals from fluvial (river) flooding is considered to be very low, as Application Site is unaffected in the 1 in 20 Year, 1 in 100 Year and 1 in 1000 Year flood event, as defined by the Environment Agency Product 4 dataset.
- The risk to the Development Proposals from surface water flooding is considered to be very low, as the Application Site is unaffected for the 1 in 30 Year, 1 in 100 Year and 1 in 1000 Year flood events, as defined by the Environment Agency Risk of Flooding from Surface Water dataset.
- The site is located in an area that is highly susceptible to groundwater flooding. If perched groundwater is encountered during construction, it would need to be mitigated for by appropriate construction techniques and in accordance with an appropriate method statement, to ensure Health and Safety and Environmental permitting requirements are satisfied.

A summary of the flood risk for the Application Site for each source requiring consideration under the NPPF is presented as Table 1.

The Flood Risk Assessment has been undertaken in accordance with the requirements of the NPPF and it can be demonstrated that the Development Proposals are compatible with the predicted flood risk profile, including climate change allowance over the development lifetime.

It should be noted that the Development Proposals are not predicted to increase the risk of flooding to others over the development lifetime. Consequently, it is concluded that, with regards to the Flood Risk requirements of the NPPF, the Development Proposals are acceptable.

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12 Glossary

Term	Definition
AEP	Annual Exceedance Probability is the probability of a rainfall or tidal event occurring within any one year. For example, an event of a 100 year return period has an AEP of 1:100 or 1%.
Flood Defences	Artificial structures maintained to a set operational level designed to protect land people and property from Tidal and Fluvial flood sources to an established chance of happening in any year threshold.
Flood Source: Fluvial (River)	When flows within watercourses exceed the capacity of the watercourse causing out of bank flows.
Flood Source: Groundwater	Groundwater flooding is usually the result of prolonged wet weather causing groundwater levels to rise sufficiently to either emerge at surface or to cause flooding of below ground infrastructure, such as basements.
Flood Source: Surface water	When rainfall causes overland flows which exceed the capacity of the drainage network, causing flooding to land that is normally dry.
Flood Source: Tidal	When high tide events overtop the shoreline to cause flooding to land behind.
Flood Zone 1	Low Probability. Land defined as having a less than 1:1000 annual probability of flooding from tidal and fluvial sources.
Flood Zone 2	Medium Probability. Land defined as having a risk of fluvial flooding between 1:100 annual probability and 1:1000 annual probability. Or Land defined as having a risk of tidal flooding between 1:200 annual probability and 1:1000 annual probability.
Flood Zone 3 (A)	High Probability. Land defined as having a fluvial risk of 1:100 annual probability or greater. Or a tidal risk of 1:200 annual probability or greater.
Flood Zone 3 (B)	Functional Floodplain. Defined by SFRA's as areas where floodwater is stored during lower AEP events, typically the 1:20 annual probability.
Flood Zone Map	The Environment Agency has produced a mapping data set which covers England and provides the general extents of Flood Zones 1, 2, and 3. However the national data set available online does not differentiate between Flood Zone 3 (A) and 3 (B).
LiDAR	"Light Detection and Ranging (LIDAR) is an airborne mapping technique, which uses a laser to measure the distance between the aircraft and the ground. Up to 500,000 measurements per second are made of the ground, allowing highly detailed terrain models to be generated at spatial resolutions of between 25cm and 2 metres." EA LiDAR
Main River	Defined on the Main River map and relate to rivers on which the Environment Agency have powers to carry out flood defence works.
Minor Development	Minor non-residential extensions: industrial/commercial/leisure etc extensions with a footprint less than 250 square metres. Alterations: development that does not increase the size of buildings eg alterations to external appearance. Householder development: For example; sheds, garages, games rooms etc within the curtilage of the existing dwelling, in addition to physical extensions to the existing dwelling itself. This definition excludes any Development Proposals that would create a separate dwelling within the curtilage of the existing dwelling eg subdivision of houses into flats. Paragraph: 046 Reference ID: 7-046-20140306, Revision date: 06 03 2014 https://www.gov.uk/guidance/flood-risk-and-coastal-change#minor-development-to-flood-risk
m AOD	Metres Above Ordnance Datum.
OS	Ordnance Survey

Term	Definition
Ordinary Watercourse	A watercourse which does not form part of a Main River, works on Ordinary Watercourses usually require consent from either the Lead Local Flood Authority, or the Internal Drainage Board (where one exists).
Qbar	Qbar is the mean annual maximum flow rate, for a catchment which has an equivalent return period of 1 in 2.3 years
Return Period	The return period of a flood might be 100 years; otherwise expressed as its probability of occurring being 1 in 100, or 1% in any one year. If a flood with such a return period occurs, then this does not mean the next will occur in about one hundred years' time - instead, it means that, in any given year, there is a 1% chance that it will happen, regardless of when the last similar event was. Or, put differently, it is 10 times less likely to occur than a flood with a return period of 10 years (or a probability of 10%).
SuDS	Sustainable Drainage Systems, which are designed to manage surface water flows in order to mimic the Greenfield run-off from an undeveloped site.
Urban Creep	Urban creep is the conversion of permeable surfaces to impermeable over time e.g. surfacing of front gardens to provide additional parking spaces, extensions to existing buildings, creation of large patio areas.

Appendix

A. Development Proposals

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ENVIRONMENTAL ASSESSMENT
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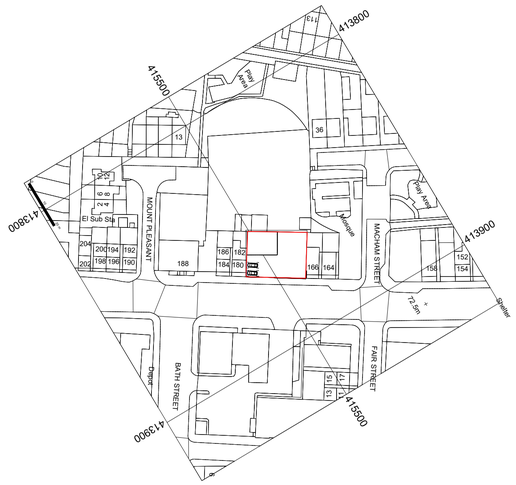

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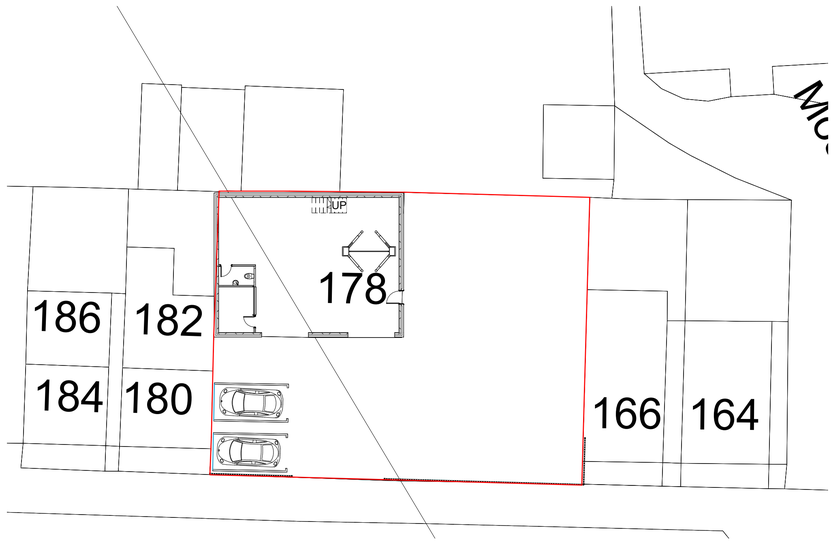
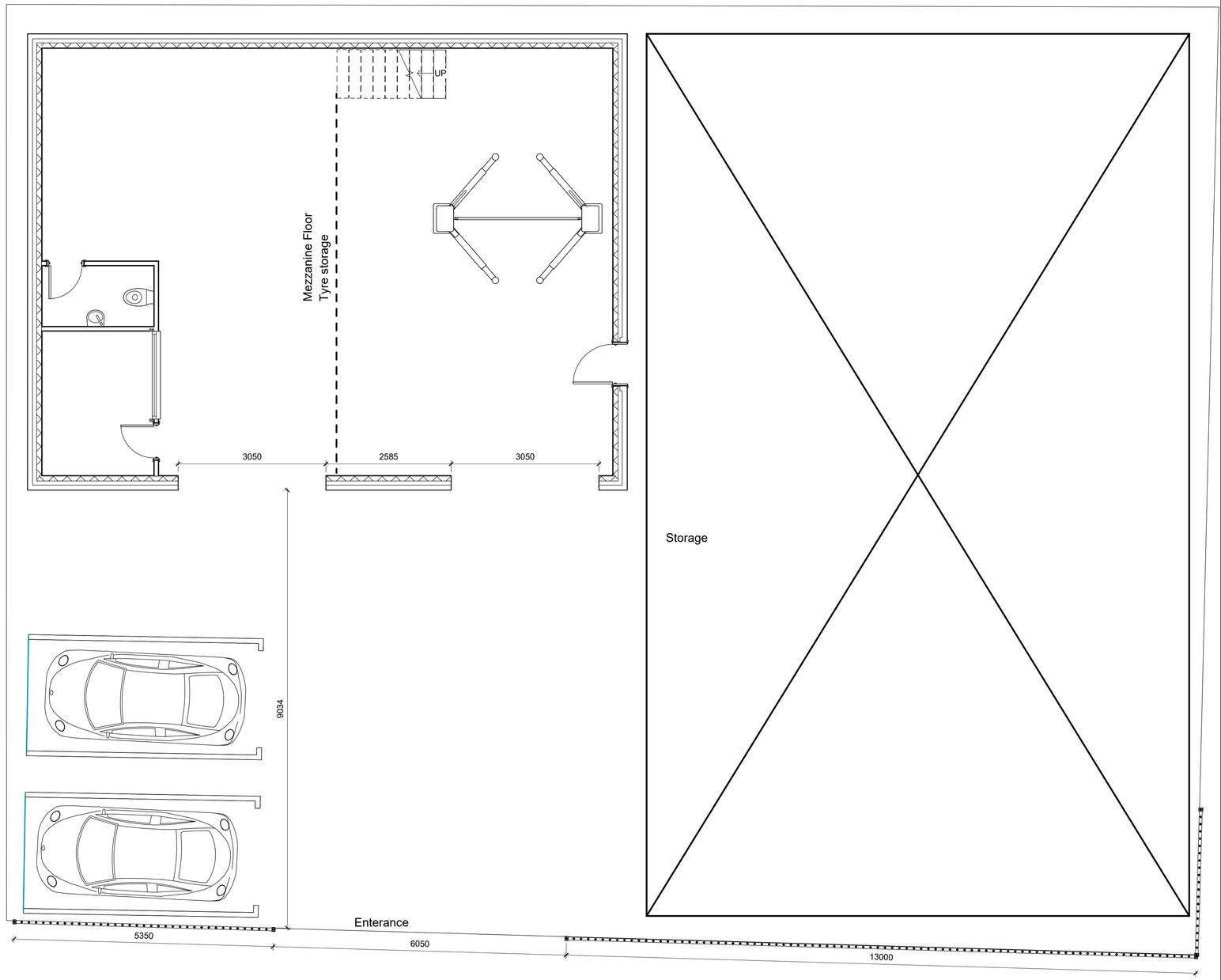


Site Plan
1:200



Existing Ground Floor
1:50

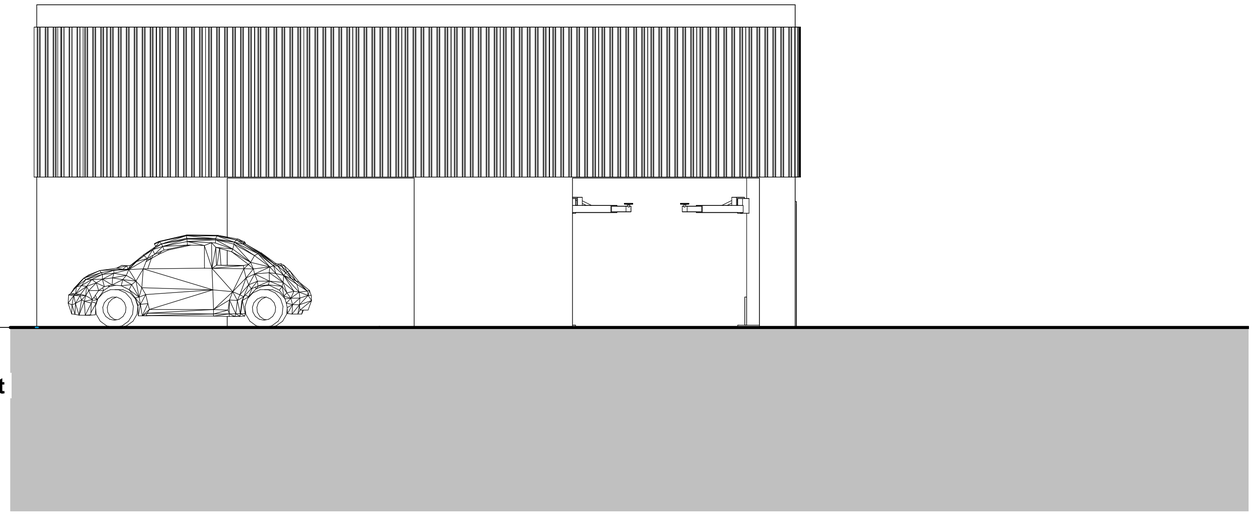
TREND
ARCHITECTURE
T: 01484 941051
plan@trendarchitecture.co.uk
www.trendarchitecture.co.uk

Project Name
Lockwood Tyres, 178 Lockwood Road, Huddersfield, HD1 3QR

Drawing Title:
Site Plan And Existing Ground Floor

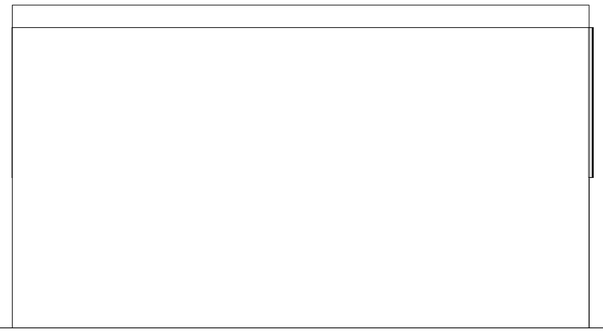
Drawing Number:	Scale:
TR-A22-0601-001	As indicated@A1
Date: 23/06/22	Revision: Approver
Drawn By: AM	Checked by: JA

Reason For Issue:
Planning

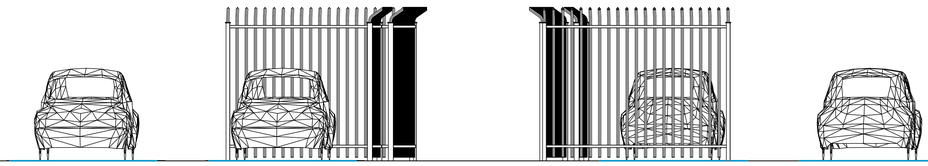


Proposed Front Elevation
1:50

Existing Rear Elevation
1:50



Proposed Left Elevation
1:50



Proposed Right Elevation
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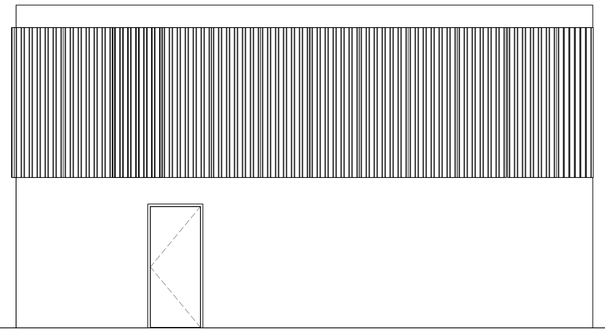

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Project Name
Lockwood Tyres, 178 Lockwood Road, Huddersfield, HD1 3QR

Drawing Title:
Existing Elevations

Drawing Number:	Scale:
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Date: 23/06/22	Revision: Approver
Drawn By: Author	Checked by: Checker

Reason For Issue:
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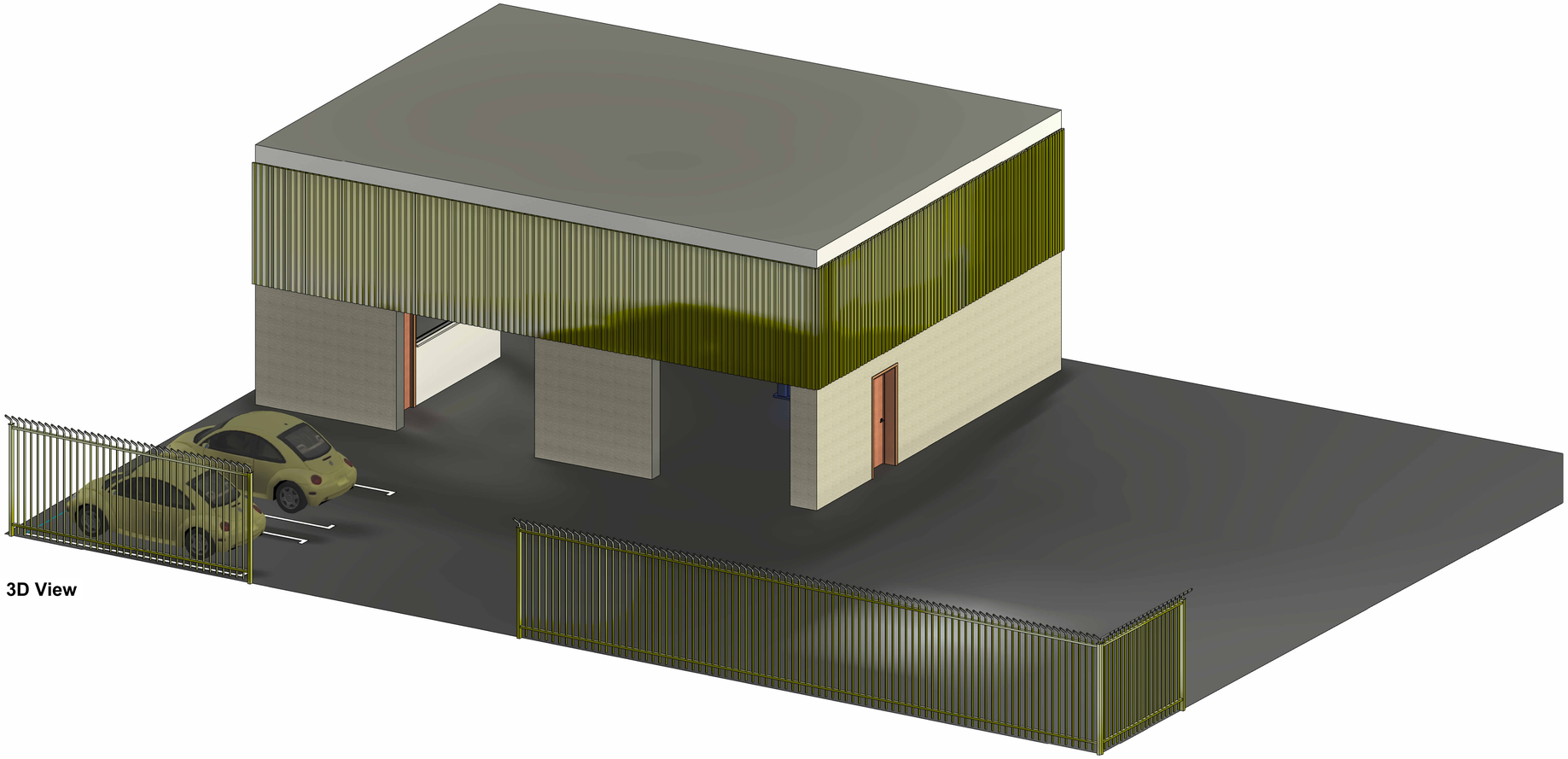
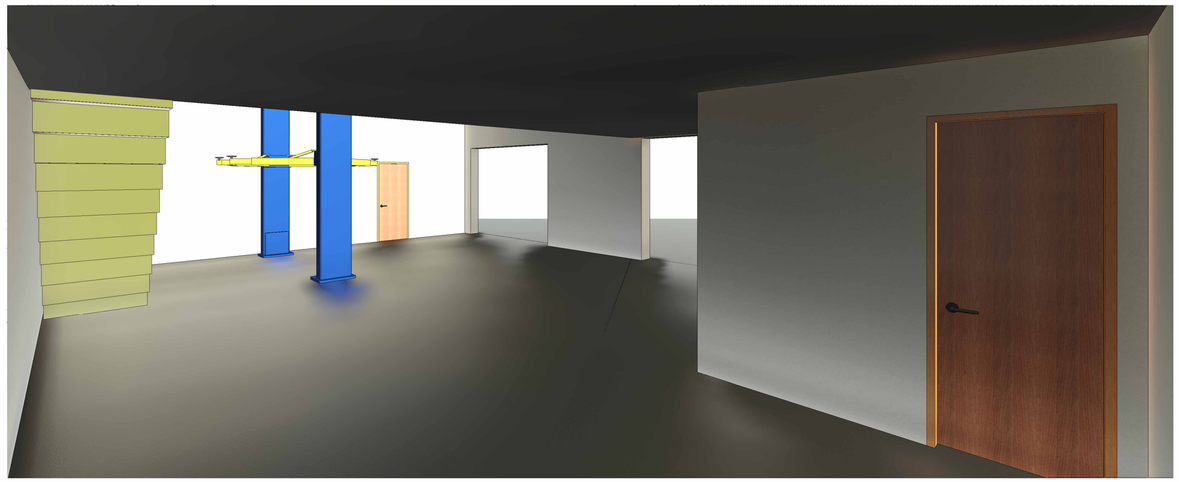


Existing 3D View

Existing Outside View



Existing Inside View

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Project Name
Lockwood Tyres, 178 Lockwood Road,
Huddersfield, HD1 3QR

Drawing Title:
3D View

Drawing Number:	Scale:
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Date: 23/06/22	Revision: Approver
Drawn By: AM	Checked by: JA

Reason For Issue:
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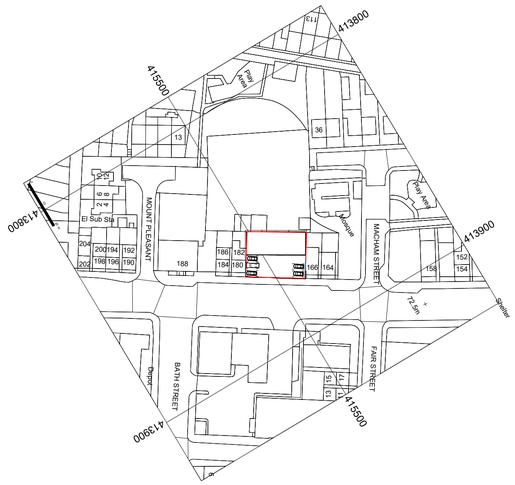

Location

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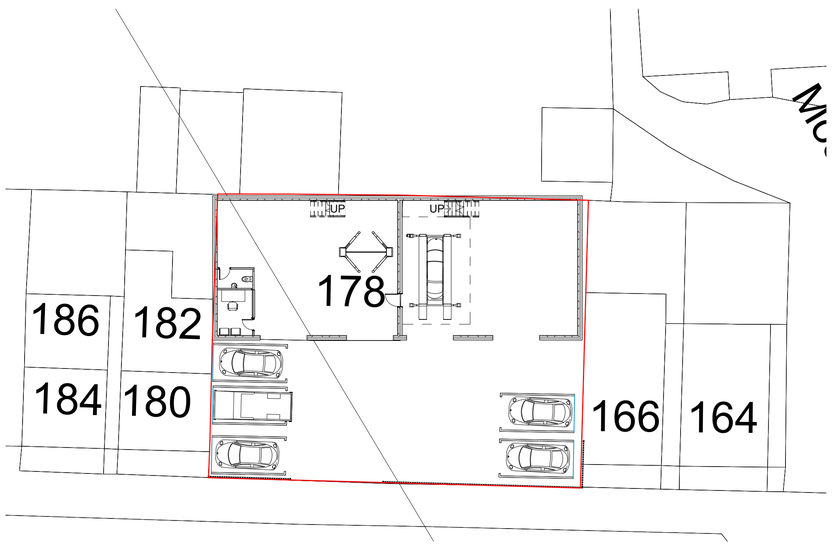

Site Plan

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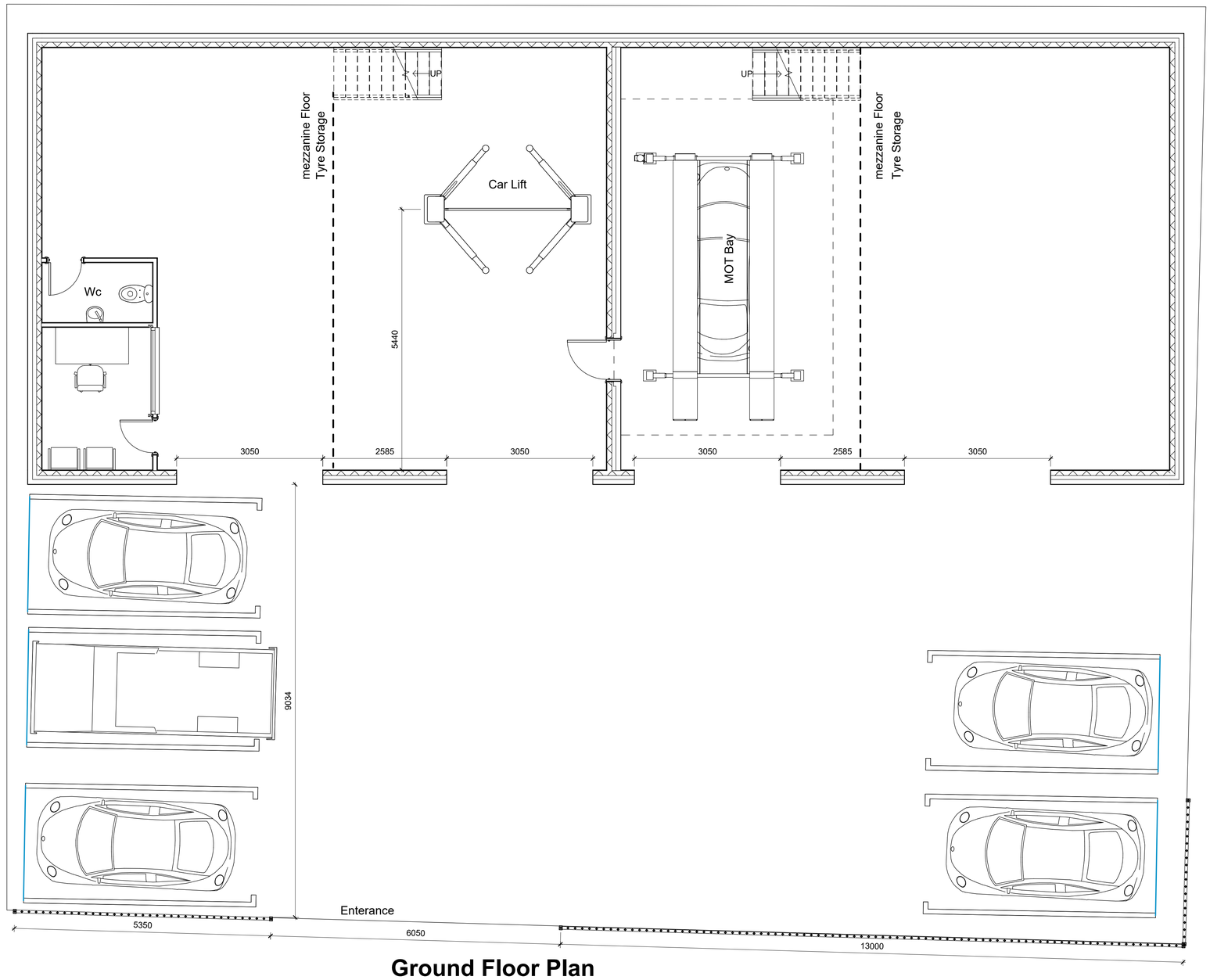

Ground Floor Plan

1:50

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Project Name
Lockwood Tyres, 178 Lockwood Road, Huddersfield, HD1 3QR

Drawing Title:
Location Site And Ground Floor Plans

Drawing Number:	Scale:
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Date: 20/06/22	Revision: Approver
Drawn By: AM	Checked by: JA

Reason For Issue:
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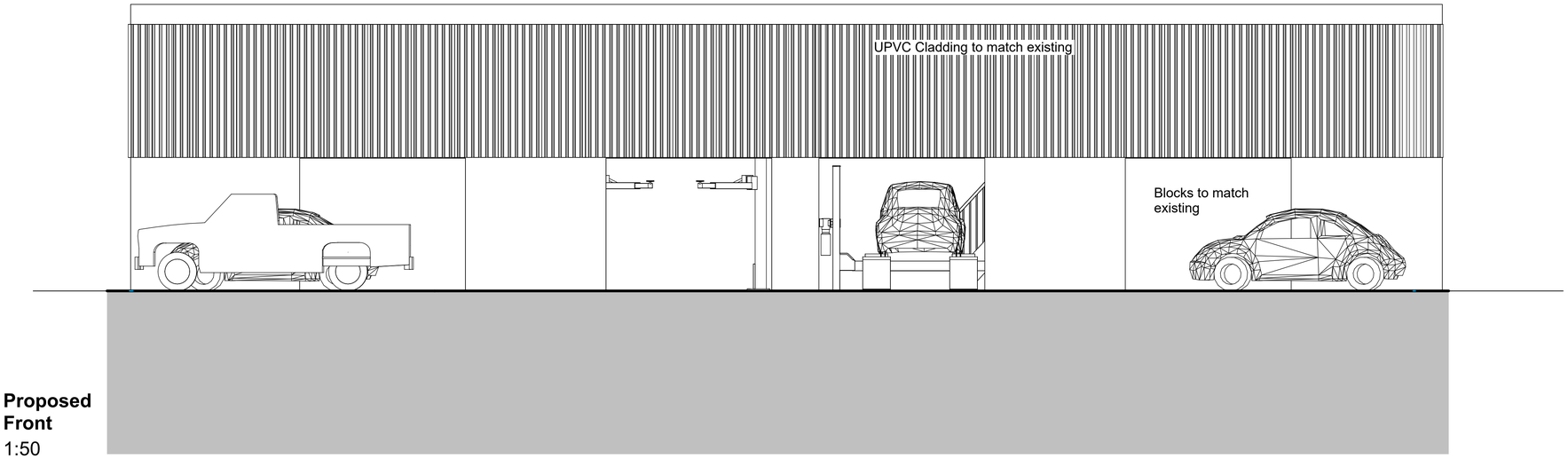
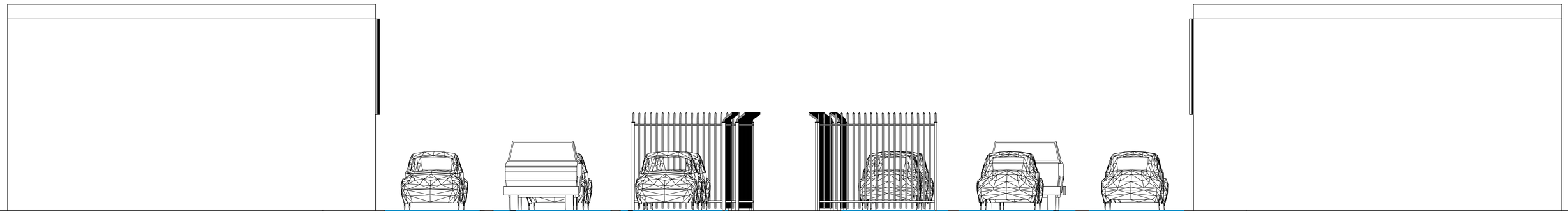


Proposed Front
1:50



Proposed Left
1:50

Proposed Right
1:50

Proposed Rear
1:50

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Project Name
Lockwood Tyres, 178 Lockwood Road, Huddersfield, HD1 3QR

Drawing Title:
Proposed Elevations

Drawing Number:	Scale:
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Date: 20/06/22	Revision: Approver
Drawn By: AM	Checked by: JA

Reason For Issue:
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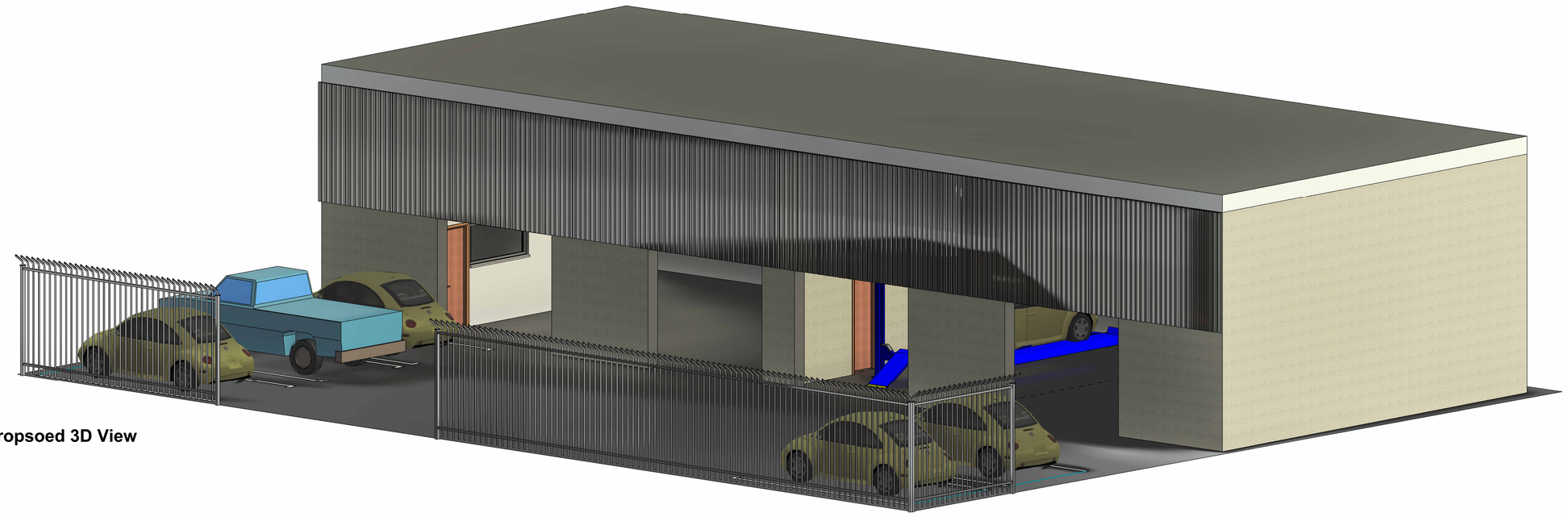
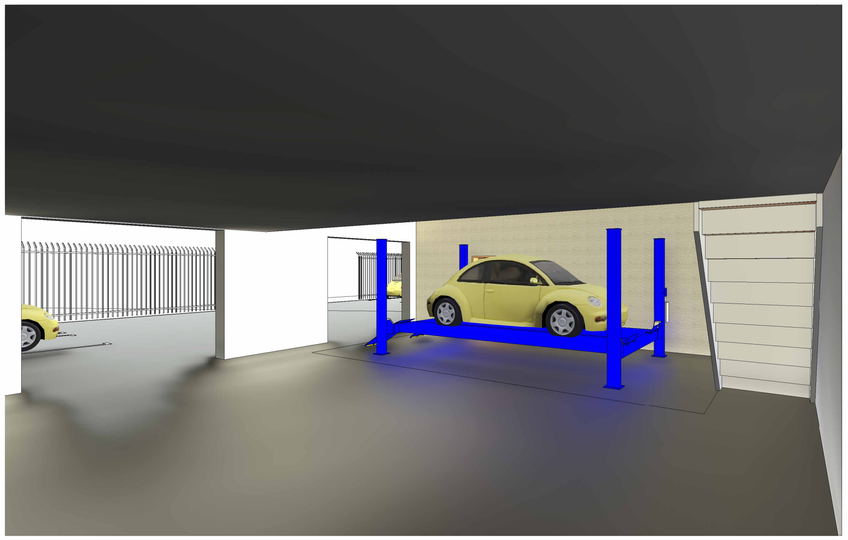
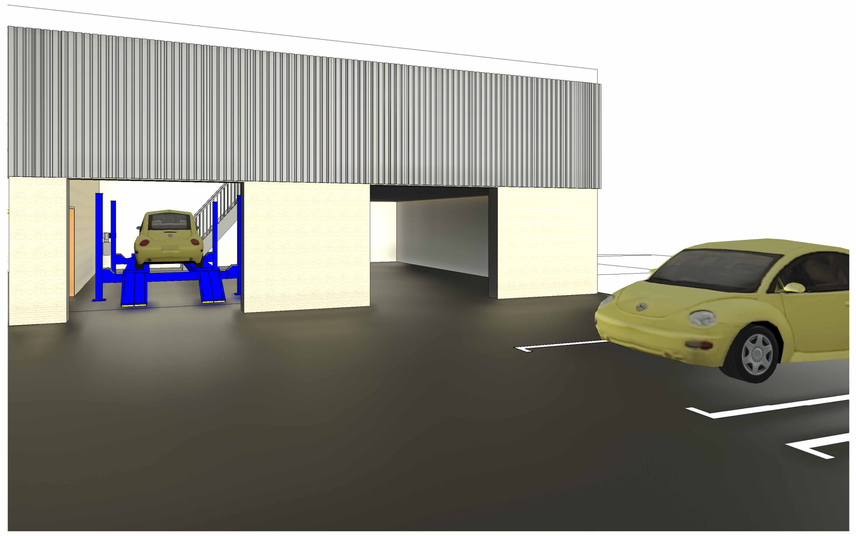


Propsoed 3D View



Propsed Garage (Inside)



Proposed Garage (Outside)

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Project Name
Lockwood Tyres, 178 Lockwood Road, Huddersfield, HD1 3QR

Drawing Title:
Proposed 3D views

Drawing Number:	Scale:
TR-A22-0601-006	@A1
Date: 20/06/22	Revision: Approver
Drawn By: AM	Checked by: JA

Reason For Issue:
Planning

Appendix

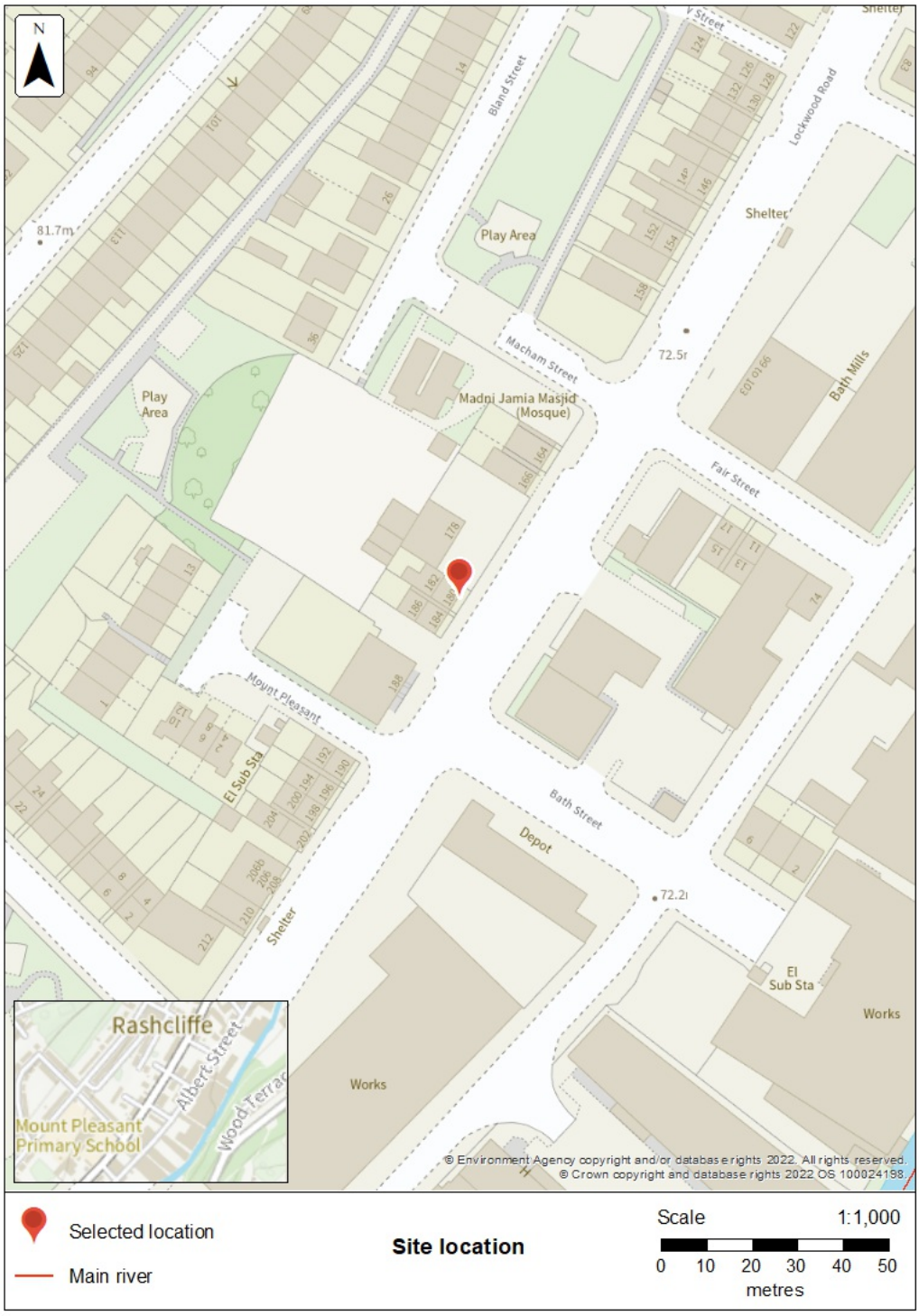
B. Third Party Data

AMBIENTAL
ENVIRONMENTAL ASSESSMENT
a company of Royal HaskoningDHV

Flood risk assessment data

Location of site: 413863 / 415488 (shown as easting and northing coordinates)
Document created on: 14 July 2022
This information was previously known as a product 4.
Customer reference number: BV33477TXVET

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)
- flood defences and attributes
- 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:

- historic flooding

We do not have historic flooding data for this location.

Please note that:

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

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

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: 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 occuring in any one year, is described as 1% AEP.

Metres above ordnance datum (mAOD)

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

Flood map for planning (rivers and the sea)

Your selected location is in flood zone 1.

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

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

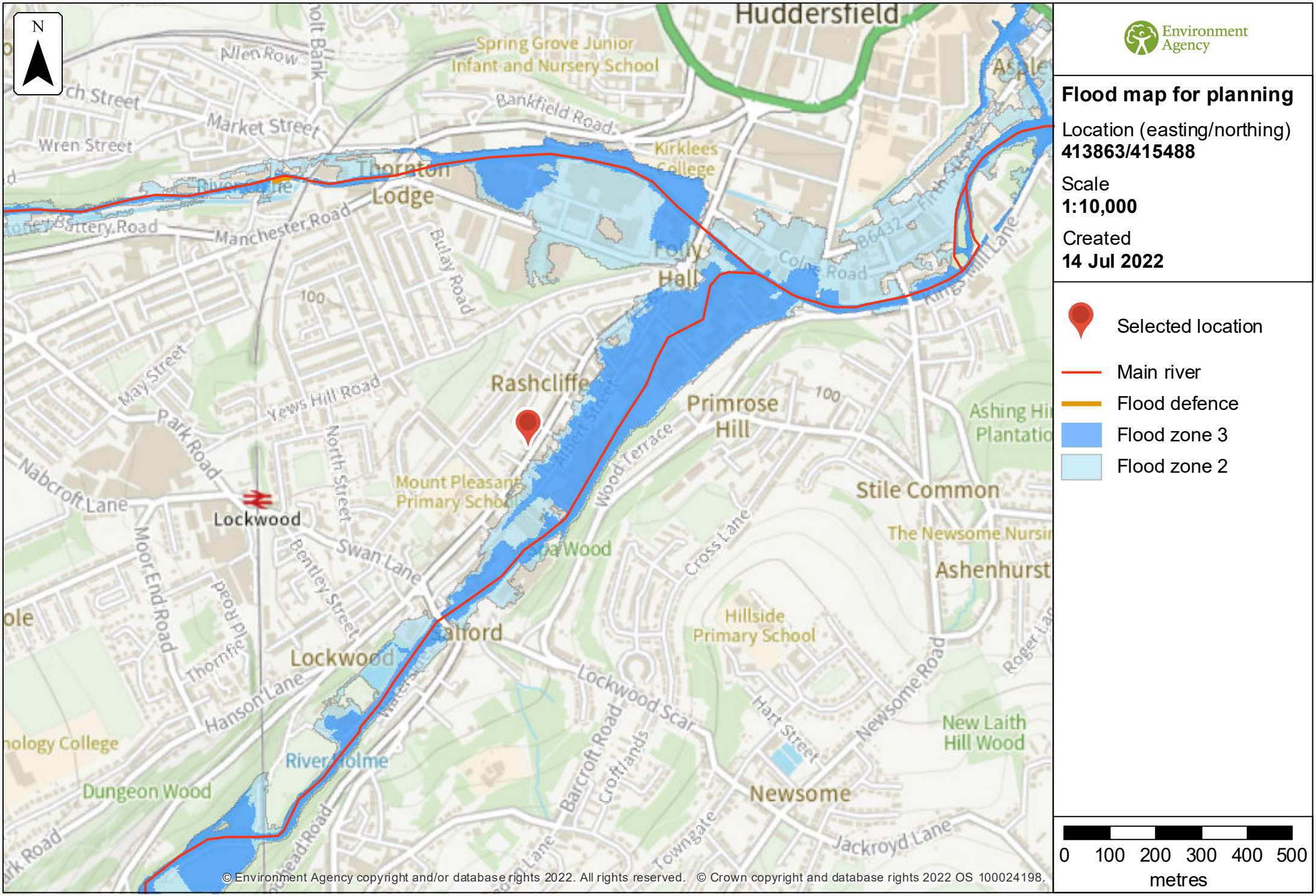
Flood zone 2 shows the area at risk of flooding for an undefended flood event with:

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

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

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

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



Environment Agency

Flood map for planning

Location (easting/northing)
413863/415488

Scale
1:10,000

Created
14 Jul 2022

- Selected location
- Main river
- Flood defence
- Flood zone 3
- Flood zone 2

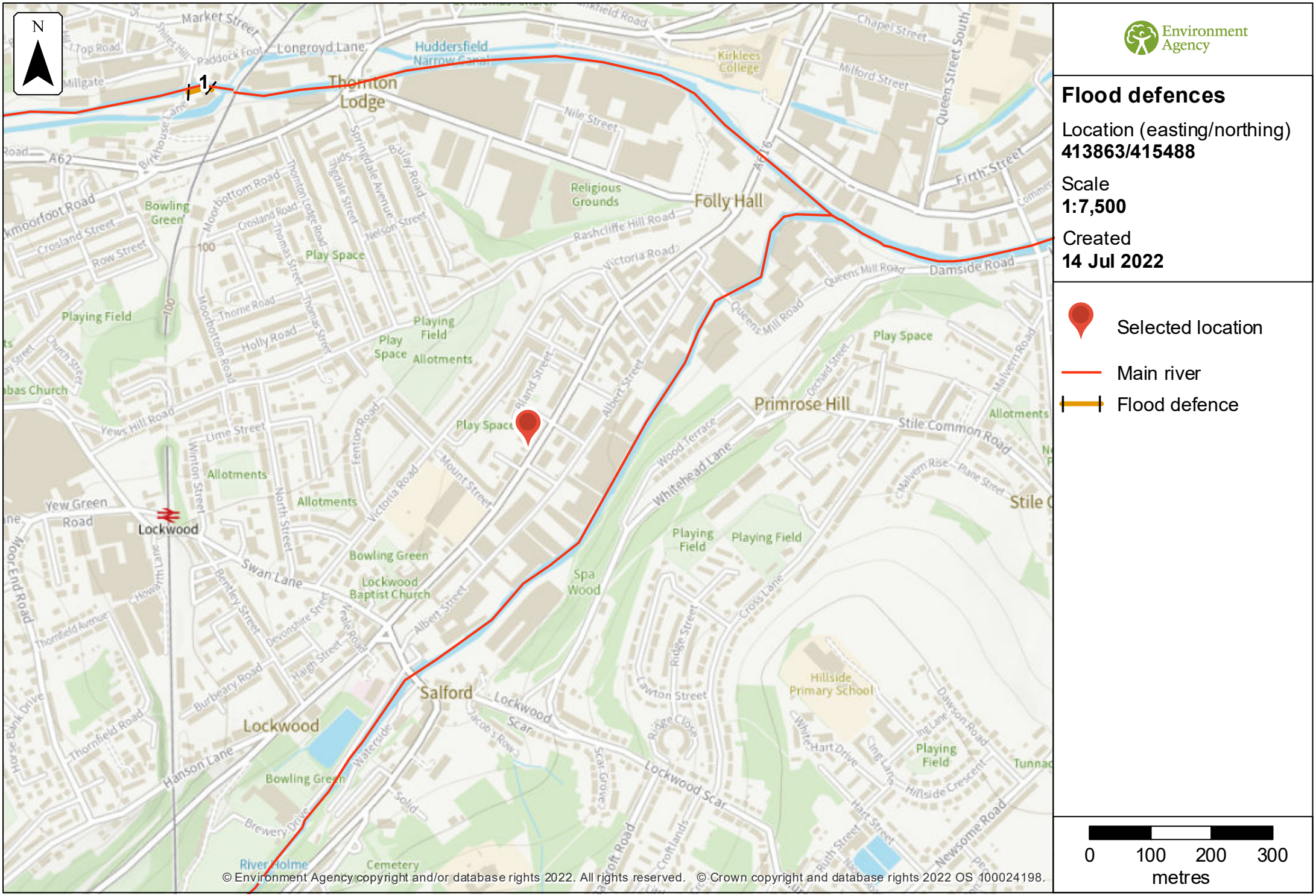
0 100 200 300 400 500
metres

Flood defences and attributes

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

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

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



Environment Agency

Flood defences

Location (easting/northing)
413863/415488

Scale
1:7,500

Created
14 Jul 2022

Selected location

Main river

Flood defence

0 100 200 300
metres

Flood defences data

Label	Asset ID	Asset Type	Standard of protection (years)	Current condition	Downstream actual crest level (mAOD)	Upstream actual crest level (mAOD)	Effective crest level (mAOD)
1	27681	Wall	20		78.96	77.80	

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

Modelled data

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

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

Climate change

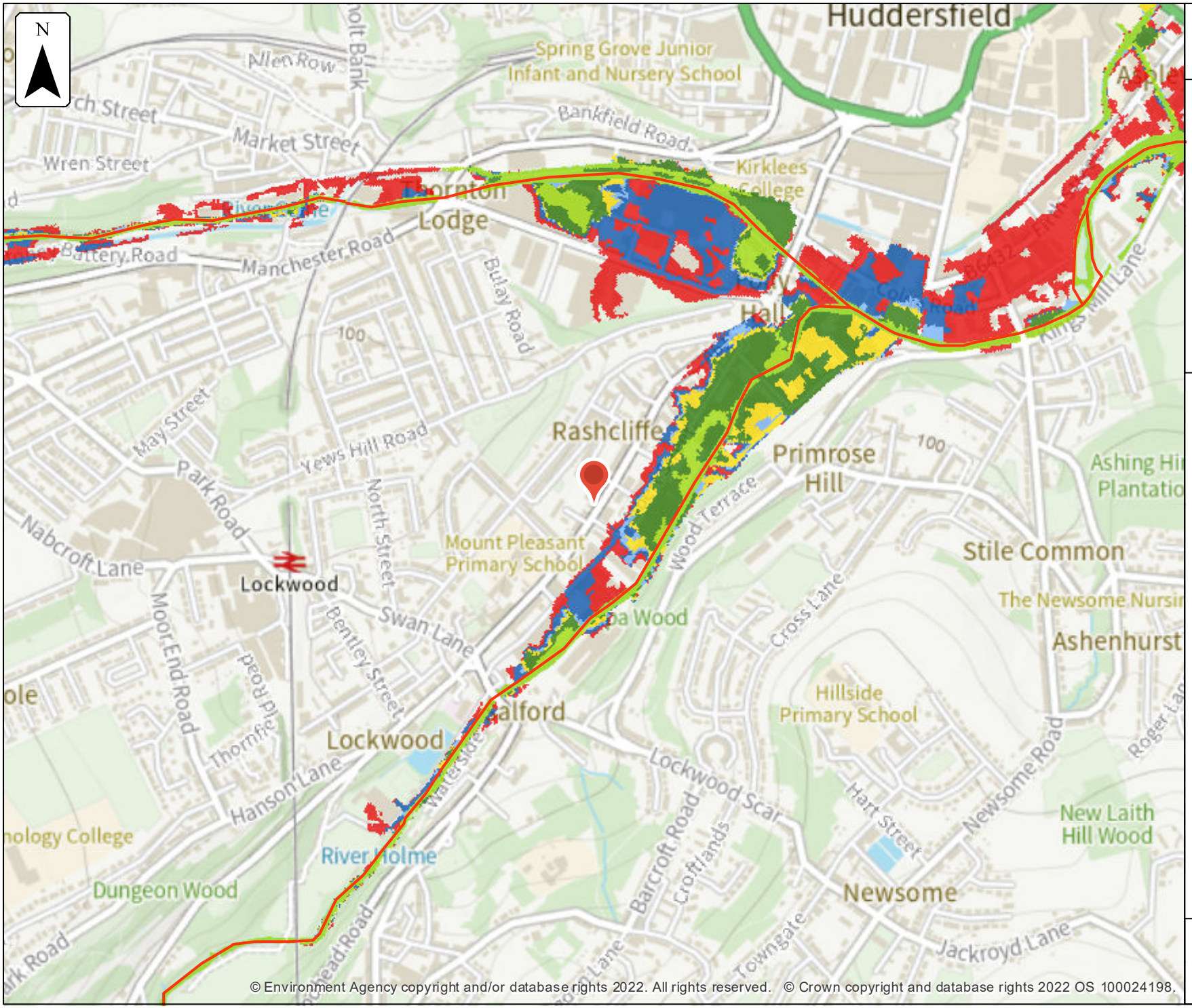
The climate change data included in the models may not include the latest flood risk assessment climate change allowances. Where the new allowances are not available you will need to consider this data and factor in the new allowances to demonstrate the development will be safe from flooding.

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

Modelled scenarios

The following scenarios are included:

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



Environment Agency

Defended modelled fluvial extent

Location (easting/northing)
413863/415488

Scale
1:10,000

Created
14 Jul 2022

Model name
2019 Colne Model

Selected location

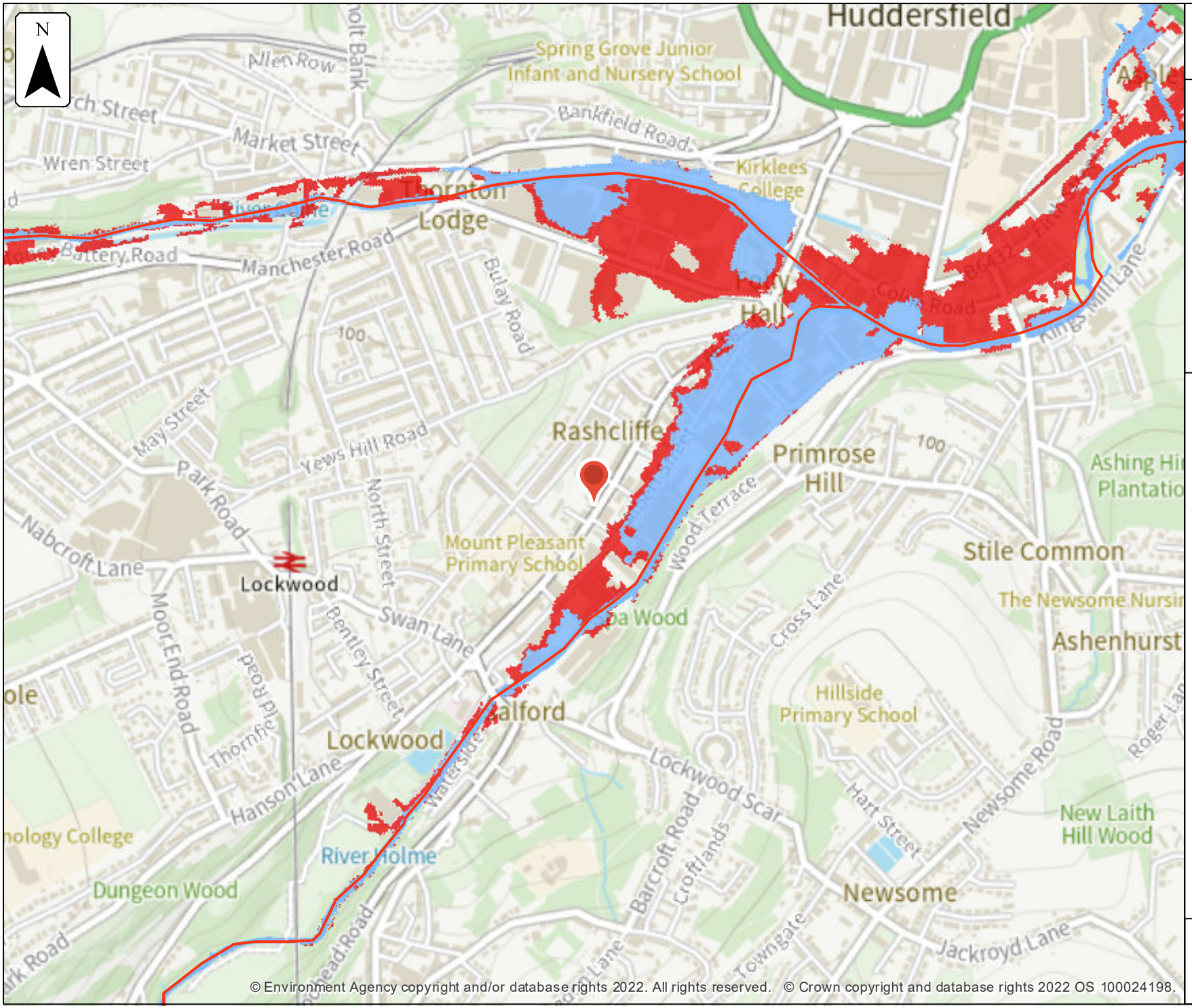
Main river

Modelled flood extent

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

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

0 100 200 300 400 500
metres



Environment Agency

Defences removed modelled fluvial extent

Location (easting/northing)
413863/415488

Scale
1:10,000

Created
14 Jul 2022

Model name
2019 Colne Model

Selected location

Main river

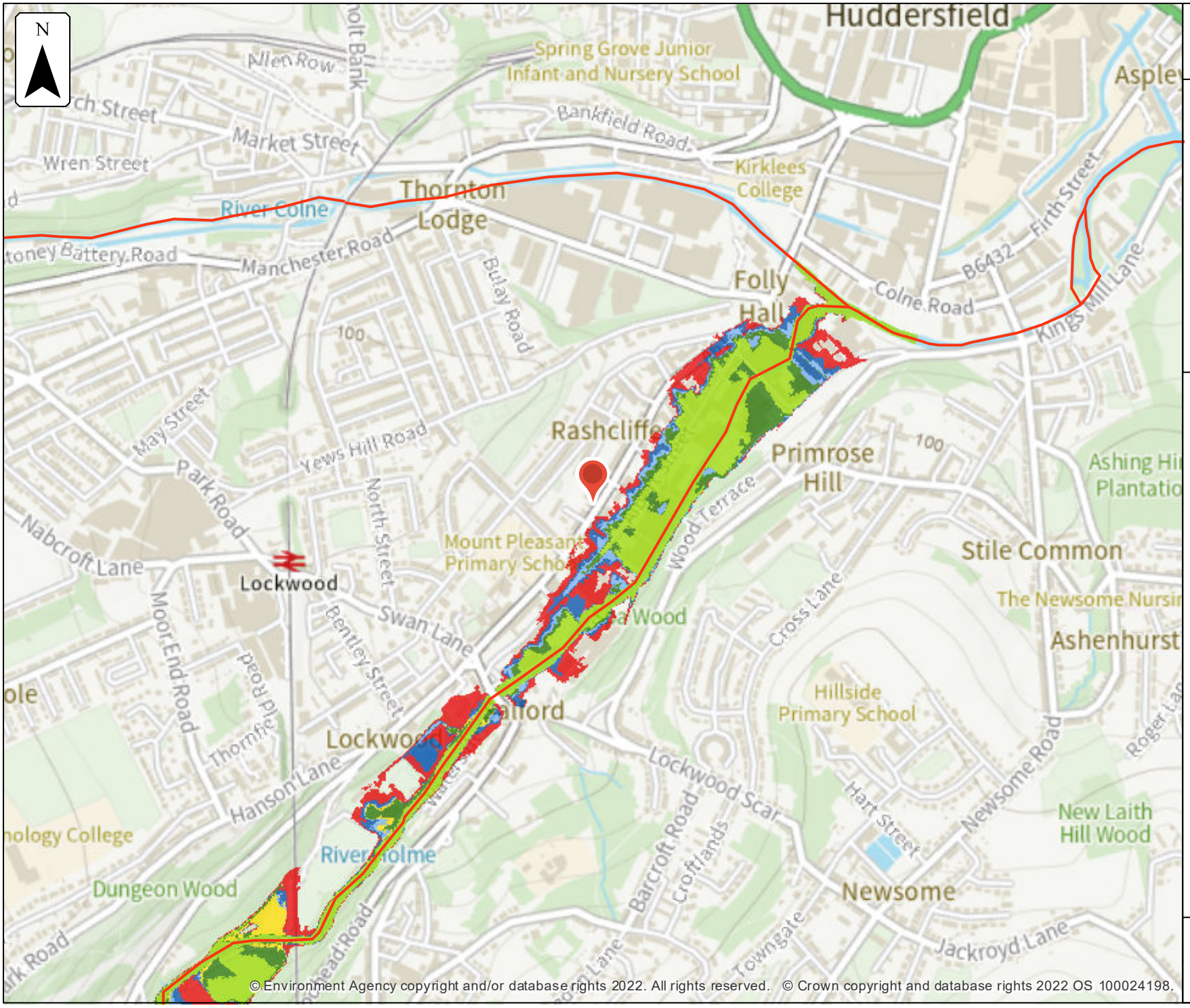
Modelled flood extent

1% AEP

0.1% AEP

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

0 100 200 300 400 500
metres



Environment Agency

No defences exist modelled fluvial extent

Location (easting/northing)
413863/415488

Scale
1:10,000

Created
14 Jul 2022

Model name
2019 River Holme model

Selected location

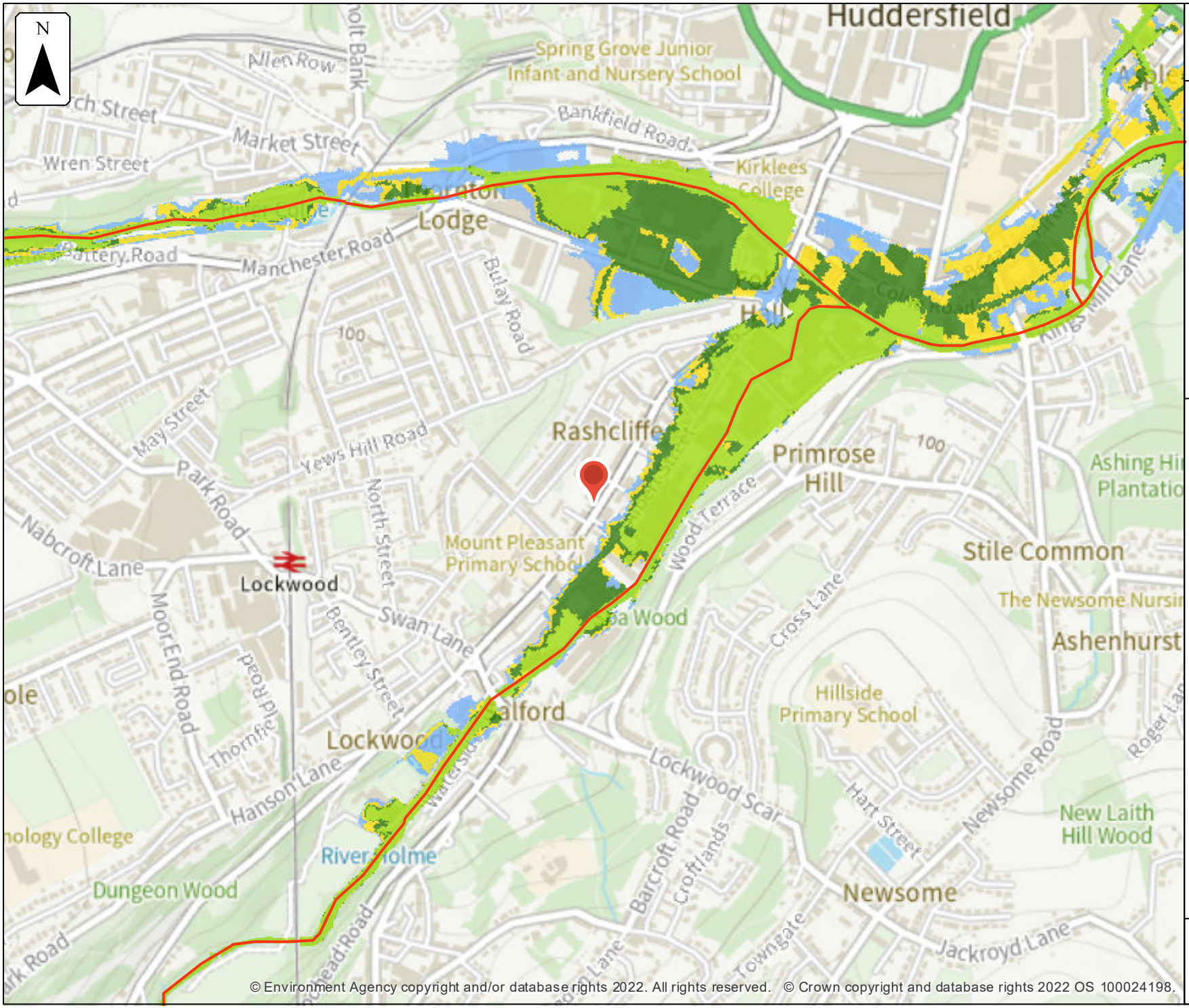
Main river

Modelled flood extent

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

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

0 100 200 300 400 500
metres



Environment Agency

Defences removed climate change modelled fluvial extent

Location (easting/northing)
413863/415488

Scale
1:10,000

Created
14 Jul 2022

Model name
2019 Colne Model

Selected location

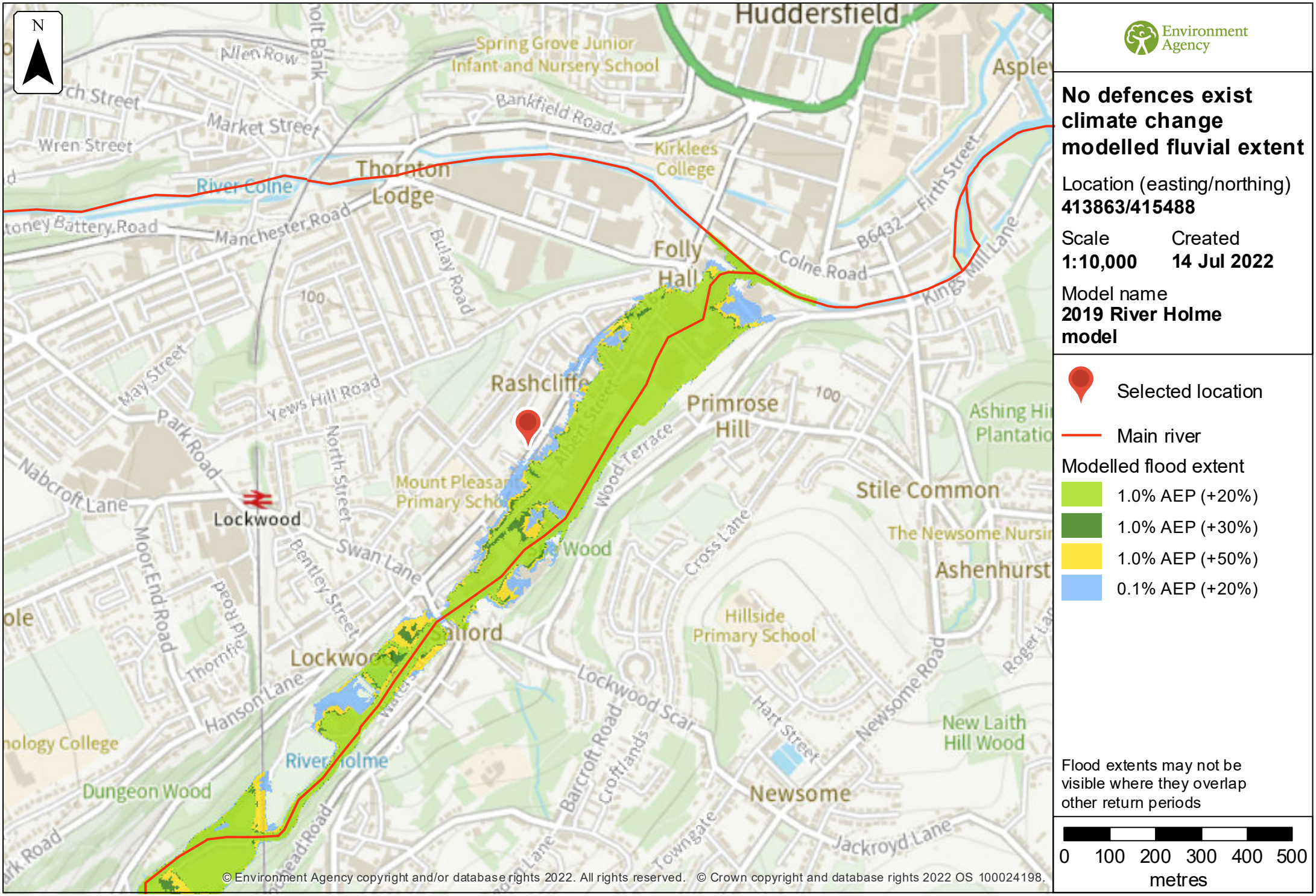
Main river

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

0 100 200 300 400 500
metres



Environment Agency

No defences exist climate change modelled fluvial extent

Location (easting/northing)
413863/415488

Scale
1:10,000

Created
14 Jul 2022

Model name
2019 River Holme model

Selected location

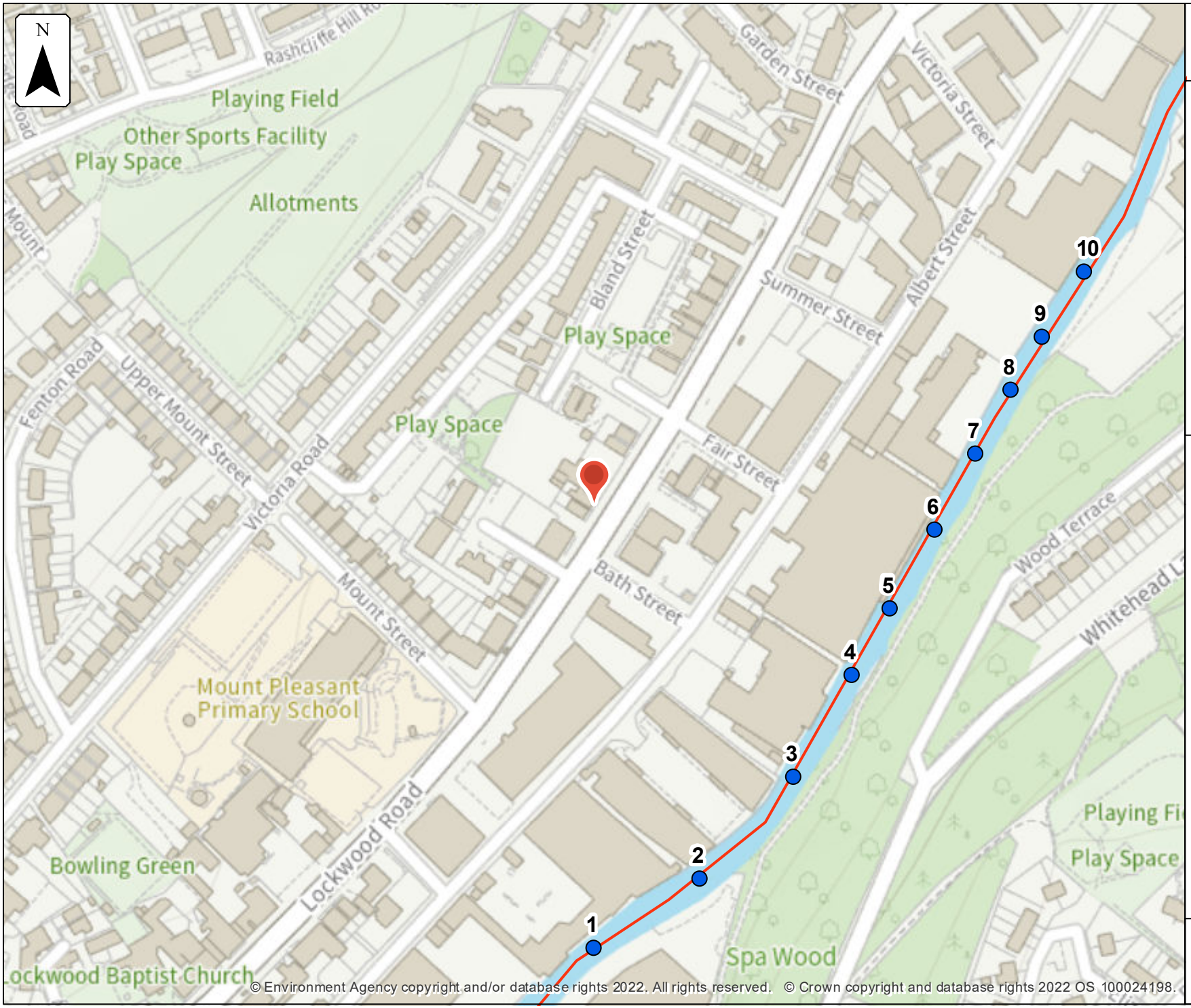
Main river

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

0 100 200 300 400 500
metres



Environment Agency

Defended modelled fluvial node locations

Location (easting/northing)
413863/415488

Scale
1:2,500

Created
14 Jul 2022

Model name
2019 Colne Model

Selected location

Modelled location

Main river

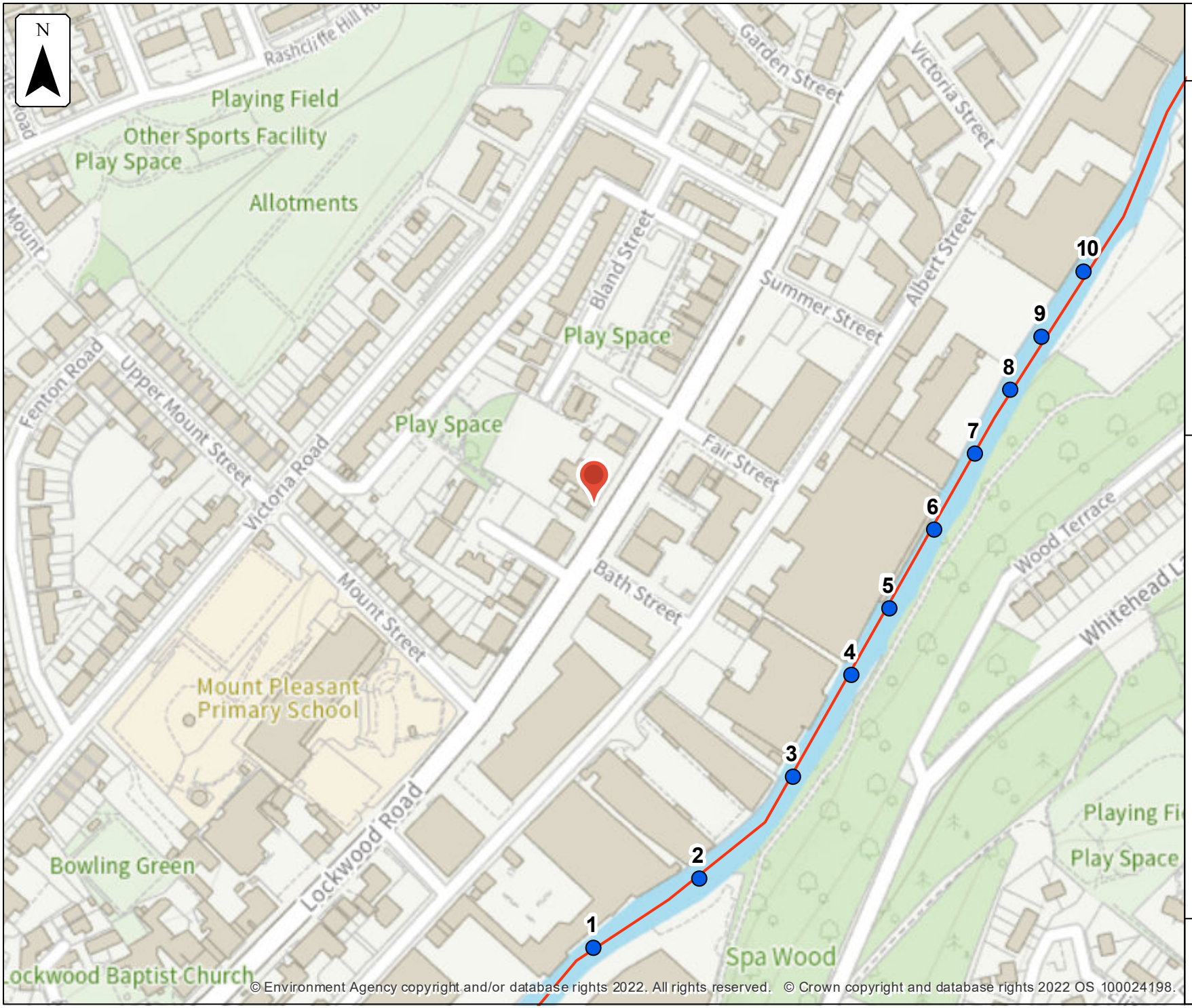
0 25 50 75 100
metres

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	1197909	413863	415271	72.47	54.90	72.69	63.90	72.83	69.71	72.93	74.08	73.19	85.81	73.46	97.23
2	1197940	413914	415304	72.29	54.90	72.51	63.89	72.64	69.84	72.72	74.65	72.95	88.77	73.16	104.19
3	1197991	413960	415354	72.11	54.90	72.33	63.89	72.46	69.85	72.54	74.65	72.75	88.73	72.94	103.86
4	1198178	413988	415404	71.89	54.90	72.11	63.89	72.22	69.82	72.30	74.54	72.48	88.29	72.63	103.25
5	1197986	414007	415436	71.47	54.89	71.66	63.60	71.78	68.83	71.85	72.91	72.02	84.52	72.19	97.19
6	1198141	414029	415474	71.27	54.89	71.47	63.66	71.58	69.09	71.65	73.18	71.80	84.40	71.95	95.99
7	1198142	414048	415512	71.13	54.68	71.36	62.62	71.49	67.29	71.56	70.97	71.73	80.71	71.91	90.78
8	1197976	414065	415543	71.04	54.87	71.28	62.28	71.43	66.08	71.51	69.35	71.68	78.30	71.87	87.25
9	1198219	414081	415569	70.95	54.87	71.22	61.03	71.39	63.12	71.47	65.70	71.65	73.67	71.84	82.19
10	1197886	414101	415600	70.84	54.87	71.12	61.01	71.31	62.87	71.39	65.29	71.57	72.89	71.74	82.42

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.



Environment Agency

Defences removed modelled fluvial node locations

Location (easting/northing)
413863/415488

Scale
1:2,500

Created
14 Jul 2022

Model name
2019 Colne Model

Selected location

Modelled location

Main river

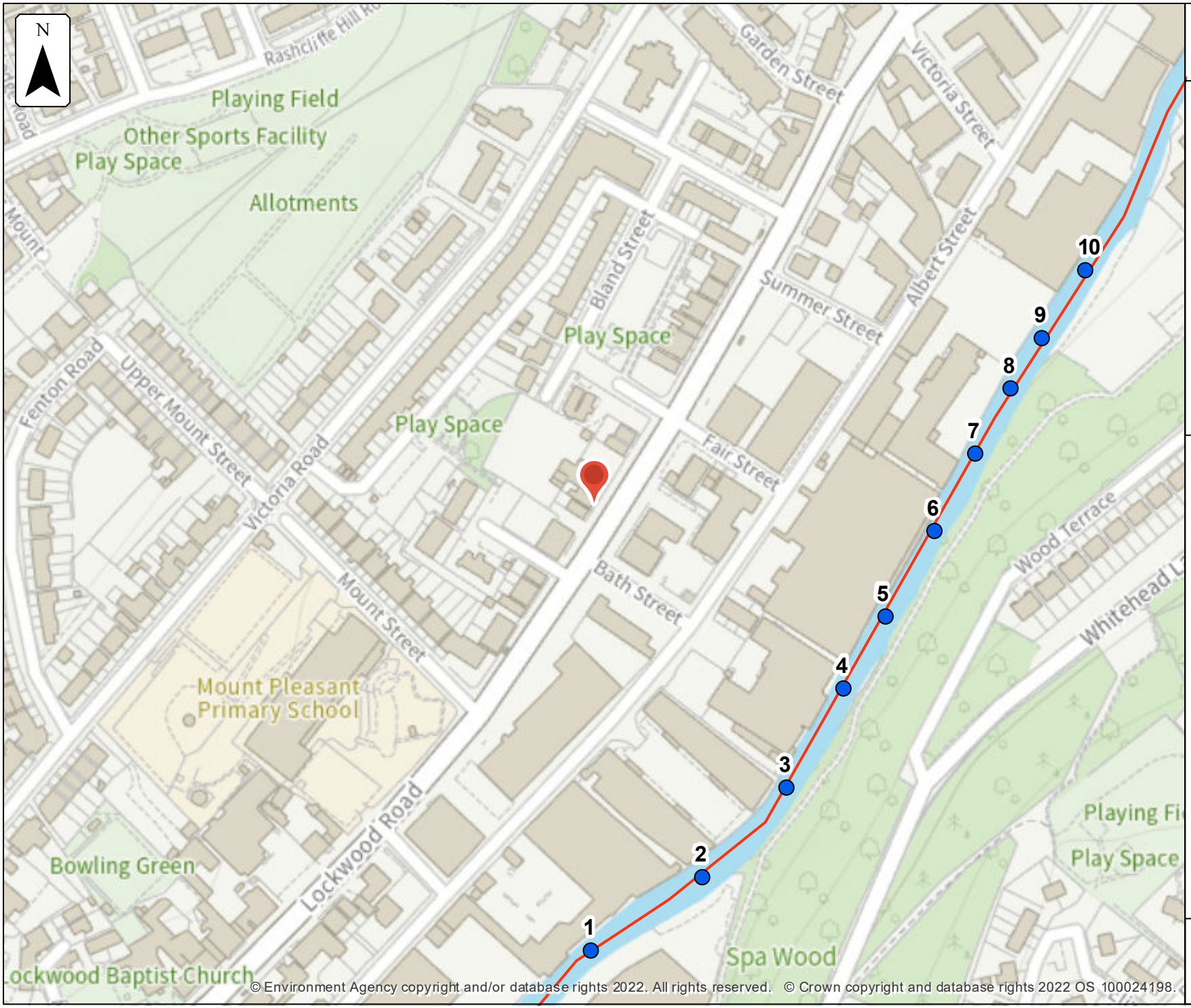
0 25 50 75 100
metres

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	1197909	413863	415271							72.93	74.08			73.46	97.24
2	1197940	413914	415304							72.72	74.65			73.16	104.17
3	1197991	413960	415354							72.54	74.65			72.94	103.86
4	1198178	413988	415404							72.30	74.54			72.63	103.22
5	1197986	414007	415436							71.85	72.91			72.19	97.19
6	1198141	414029	415474							71.65	73.18			71.95	96.0
7	1198142	414048	415512							71.56	70.97			71.91	90.75
8	1197976	414065	415543							71.51	69.35			71.87	87.25
9	1198219	414081	415569							71.47	65.70			71.84	82.18
10	1197886	414101	415600							71.39	65.29			71.74	82.41

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.



Environment Agency

No defences exist modelled fluvial node locations

Location (easting/northing)
413863/415488

Scale
1:2,500

Created
14 Jul 2022

Model name
2019 River Holme model

Selected location

Modelled location

Main river

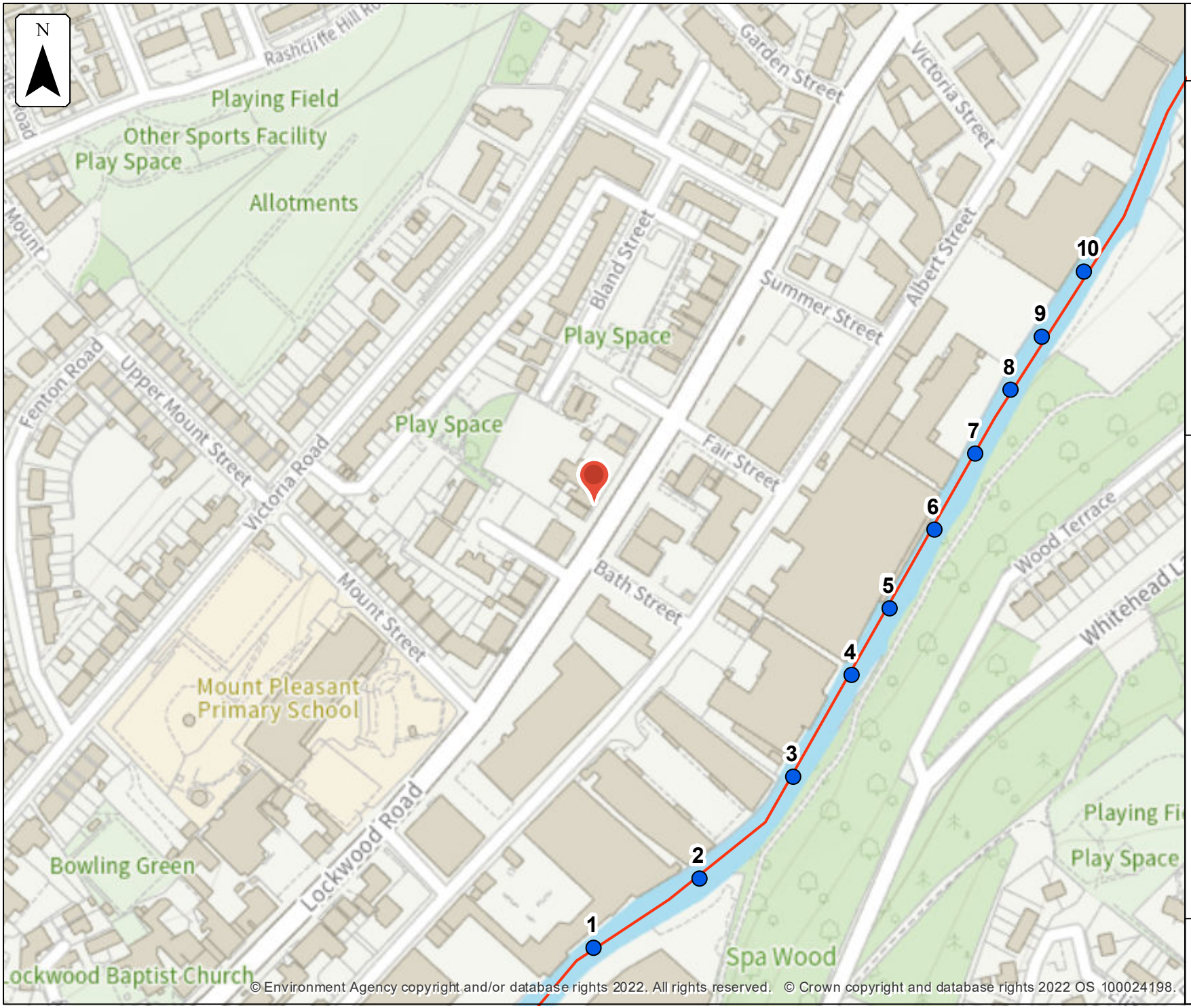
0 25 50 75 100
metres

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	1198881	413861	415270	72.69	70.40	72.89	85.39	72.98	93.37	73.04	100.02	73.20	119.48	73.67	162.19
2	1199173	413916	415305	72.46	70.39	72.69	85.38	72.77	93.37	72.85	100.01	73.03	119.48	73.34	162.17
3	1198878	413957	415349	72.17	70.39	72.28	85.36	72.45	93.36	72.52	100.01	72.70	119.47	72.98	162.16
4	1199127	413984	415397	72.06	70.39	72.21	85.37	72.26	93.36	72.31	100.0	72.44	119.46	72.71	162.15
5	1199294	414004	415432	71.80	70.38	71.98	85.36	72.06	93.35	72.11	100.0	72.25	119.46	72.49	162.14
6	1199053	414028	415474	71.55	70.37	71.75	85.71	71.83	93.34	71.88	100.0	72.03	119.45	72.29	162.13
7	1199040	414048	415512	71.33	70.36	71.54	85.56	71.62	93.34	71.68	99.99	71.84	119.44	72.11	162.11
8	1199041	414066	415544	71.15	70.35	71.38	85.63	71.47	93.32	71.54	99.98	71.70	119.42	71.96	162.10
9	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
10	1199325	414102	415601	71.07	70.34	71.24	85.87	71.31	93.30	71.37	99.96	71.50	119.40	71.75	162.07

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.



Environment Agency

Defences removed climate change modelled fluvial node locations

Location (easting/northing)
413863/415488

Scale
1:2,500

Created
14 Jul 2022

Model name
2019 Colne Model

Selected location

Modelled location

Main river

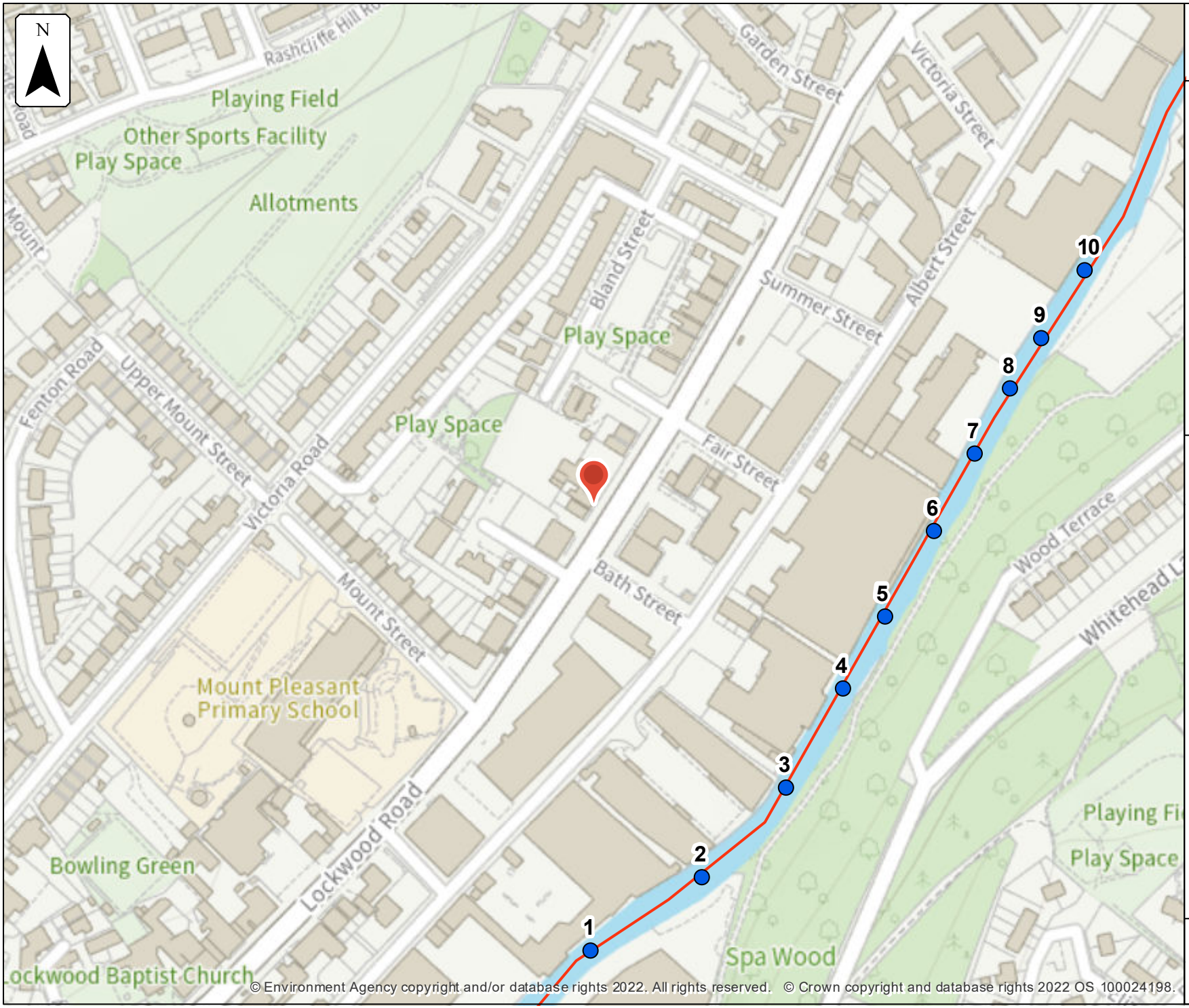
0 25 50 75 100
metres

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	1197909	413863	415271	73.20	86.33	73.33	91.34	73.53	100.23	73.72	108.70
2	1197940	413914	415304	72.96	89.43	73.06	96.02	73.21	108.42	73.35	120.38
3	1197991	413960	415354	72.76	89.39	72.85	95.89	72.98	108.0	73.11	119.67
4	1198178	413988	415404	72.49	88.94	72.56	95.34	72.65	107.26	72.75	118.54
5	1197986	414007	415436	72.02	85.06	72.09	90.37	72.23	100.77	72.35	110.67
6	1198141	414029	415474	71.80	84.90	71.87	89.92	71.99	99.18	72.10	108.16
7	1198142	414048	415512	71.74	81.13	71.82	85.43	71.95	93.60	72.07	101.59
8	1197976	414065	415543	71.69	78.70	71.77	82.60	71.91	89.77	72.04	96.89
9	1198219	414081	415569	71.66	74.03	71.74	77.81	71.88	84.46	72.02	90.85
10	1197886	414101	415600	71.58	73.25	71.65	77.50	71.78	84.94	71.90	92.25

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.



Environment Agency

No defences exist climate change modelled fluvial node locations

Location (easting/northing)
413863/415488

Scale
1:2,500

Created
14 Jul 2022

Model name
2019 River Holme model

Selected location

Modelled location

Main river

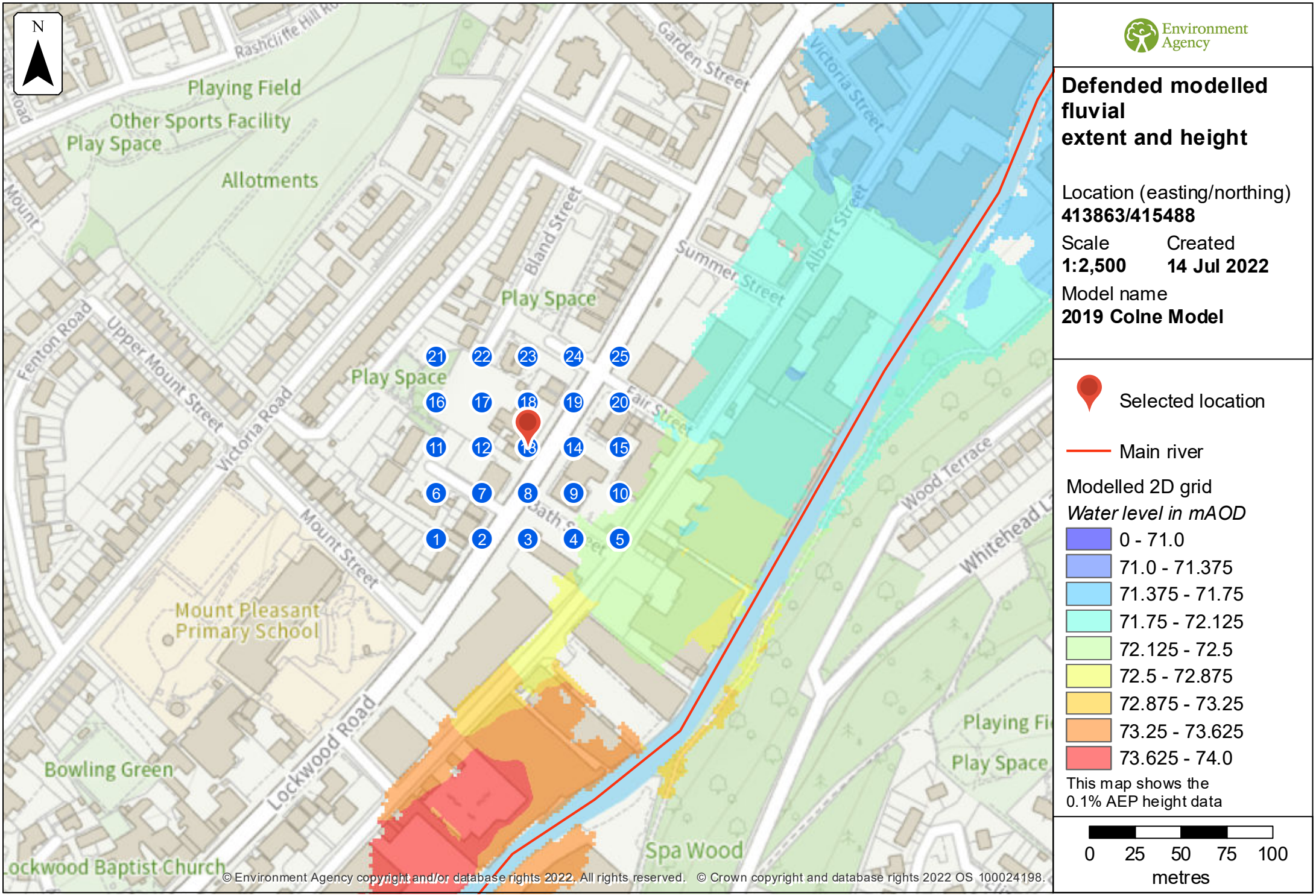
0 25 50 75 100
metres

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	1198881	413861	415270	73.21	120.60	73.44	130.49	73.59	149.02	73.83	193.40
2	1199173	413916	415305	73.04	120.60	73.12	129.63	73.25	149.0	73.51	193.39
3	1198878	413957	415349	72.71	120.59	72.78	129.62	72.91	148.98	73.13	193.38
4	1199127	413984	415397	72.45	120.58	72.51	129.62	72.63	148.97	72.87	193.37
5	1199294	414004	415432	72.25	120.58	72.31	129.61	72.42	148.95	72.64	193.36
6	1199053	414028	415474	72.04	120.57	72.10	129.60	72.22	148.94	72.45	193.36
7	1199040	414048	415512	71.85	120.56	71.91	129.59	72.03	148.93	72.27	193.35
8	1199041	414066	415544	71.70	120.55	71.77	129.59	71.89	148.91	72.12	193.34
9	1199151	414080	415568	71.62	120.54	71.68	129.58	71.79	148.89	72.03	193.33
10	1199325	414102	415601	71.51	120.53	71.57	129.57	71.68	148.87	71.91	193.32

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.



Environment Agency

Defended modelled fluvial extent and height

Location (easting/northing)
413863/415488

Scale
1:2,500

Created
14 Jul 2022

Model name
2019 Colne Model

Selected location

Main river

Modelled 2D grid
Water level in mAOD

- 0 - 71.0
- 71.0 - 71.375
- 71.375 - 71.75
- 71.75 - 72.125
- 72.125 - 72.5
- 72.5 - 72.875
- 72.875 - 73.25
- 73.25 - 73.625
- 73.625 - 74.0

This map shows the 0.1% AEP height data

0 25 50 75 100
metres

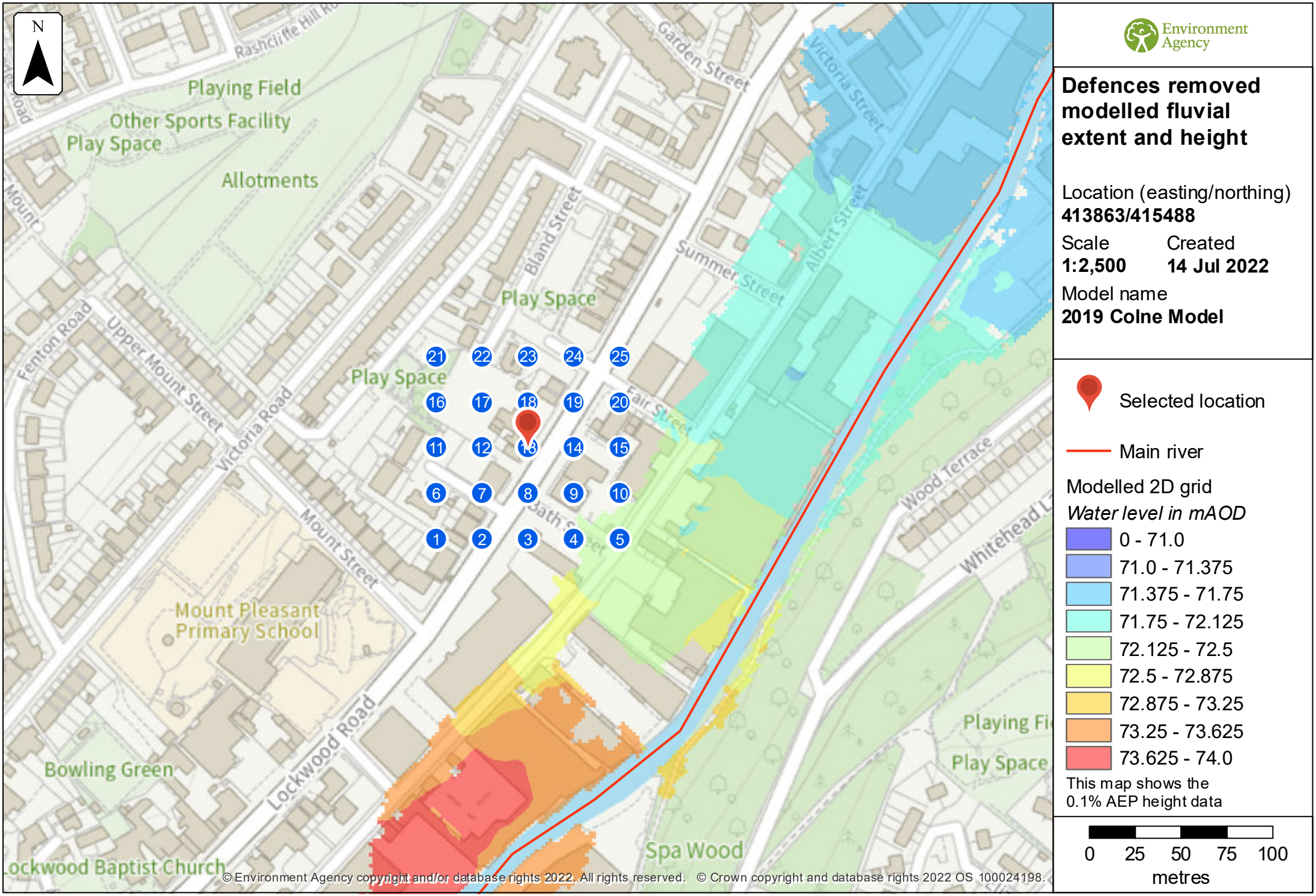
Sample point data

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	413813	415438	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
2	413838	415438	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
3	413863	415438	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
4	413888	415438	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
5	413913	415438	NoData	NoData	NoData	NoData	NoData	NoData	0.01	72.00	0.12	72.15	0.31	72.34
6	413813	415463	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
7	413838	415463	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
8	413863	415463	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
9	413888	415463	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
10	413913	415463	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
11	413813	415488	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
12	413838	415488	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
13	413863	415488	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
14	413888	415488	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
15	413913	415488	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
16	413813	415513	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData

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	413838	415513	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
18	413863	415513	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
19	413888	415513	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
20	413913	415513	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
21	413813	415538	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
22	413838	415538	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
23	413863	415538	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
24	413888	415538	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
25	413913	415538	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData

Data in this table comes from the 2019 Colne Model model.
Height values are shown in mAOD, and depth values are shown in metres.
Any blank cells show where a particular scenario has not been modelled for this location.
Cells which contain text 'NoData' for a scenario show that return period has been modelled but there is no flood risk for that return period for that location.


N
Environment Agency
Defences removed modelled fluvial extent and height
Location (easting/northing)
413863/415488
Scale
1:2,500
Created
14 Jul 2022
Model name
2019 Colne Model
Selected location
Main river
Modelled 2D grid
Water level in mAOD
0 - 71.0
71.0 - 71.375
71.375 - 71.75
71.75 - 72.125
72.125 - 72.5
72.5 - 72.875
72.875 - 73.25
73.25 - 73.625
73.625 - 74.0
This map shows the 0.1% AEP height data
0 25 50 75 100
metres
Playing Field
Other Sports Facility
Play Space
Allotments
Play Space
Play Space
Mount Pleasant Primary School
Bowling Green
Spa Wood
Garden Street
Victoria Street
Albert Street
Summer Street
Bland Street
Fair Street
Bath Street
Mount Street
Upper Mount Street
Victoria Road
Fenton Road
Lockwood Road
Wood Terrace
Whitehead
Rashcliffe Hill
Mount
Road
Playing Fi
Play Space
ockwood Baptist Church
21 22 23 24 25
16 17 18 19 20
11 12 13 14 15
6 7 8 9 10
1 2 3 4 5
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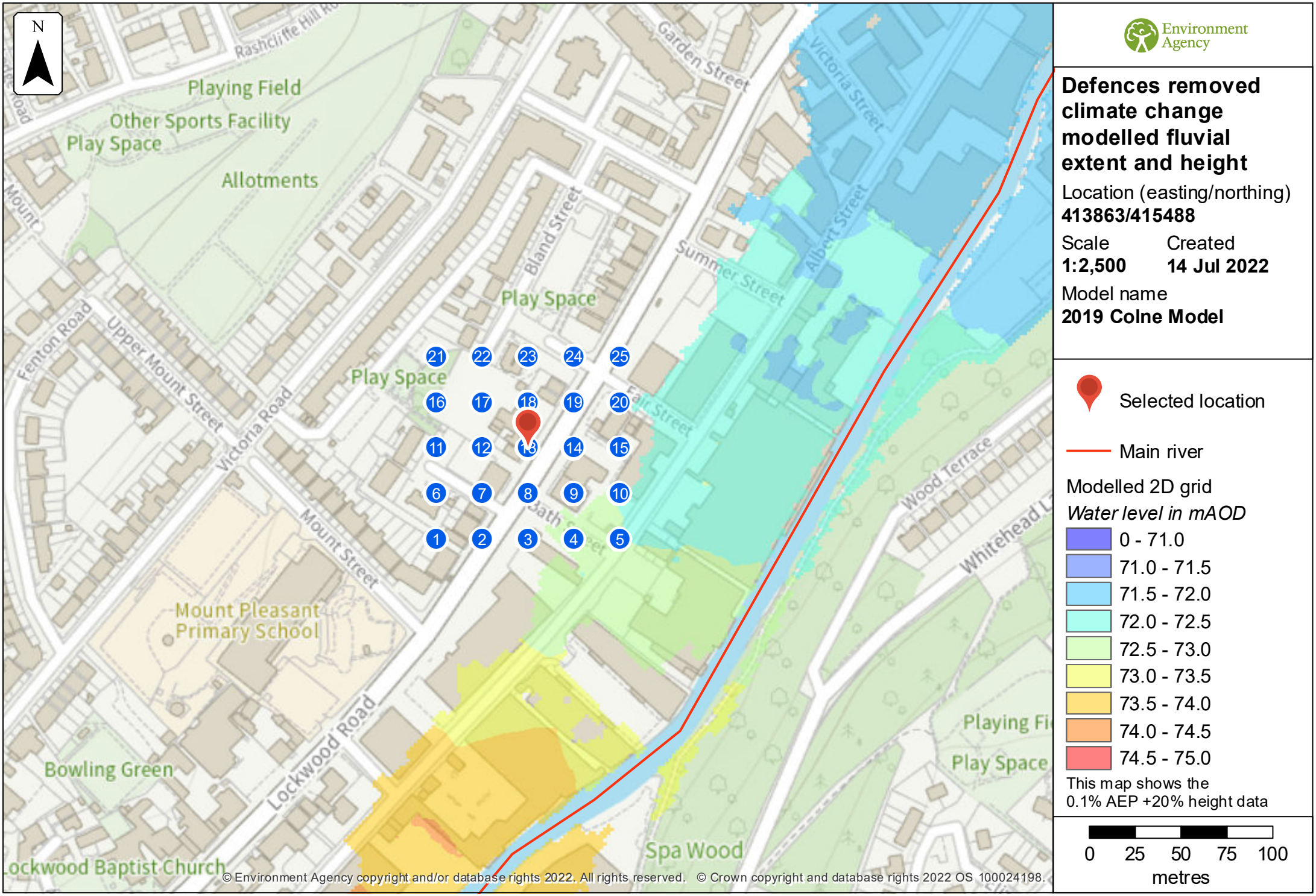
Sample point data

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	413813	415438							NoData	NoData			NoData	NoData
2	413838	415438							NoData	NoData			NoData	NoData
3	413863	415438							NoData	NoData			NoData	NoData
4	413888	415438							NoData	NoData			NoData	NoData
5	413913	415438							0.01	72.00			0.31	72.34
6	413813	415463							NoData	NoData			NoData	NoData
7	413838	415463							NoData	NoData			NoData	NoData
8	413863	415463							NoData	NoData			NoData	NoData
9	413888	415463							NoData	NoData			NoData	NoData
10	413913	415463							NoData	NoData			NoData	NoData
11	413813	415488							NoData	NoData			NoData	NoData
12	413838	415488							NoData	NoData			NoData	NoData
13	413863	415488							NoData	NoData			NoData	NoData
14	413888	415488							NoData	NoData			NoData	NoData
15	413913	415488							NoData	NoData			NoData	NoData
16	413813	415513							NoData	NoData			NoData	NoData

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	413838	415513							NoData	NoData			NoData	NoData
18	413863	415513							NoData	NoData			NoData	NoData
19	413888	415513							NoData	NoData			NoData	NoData
20	413913	415513							NoData	NoData			NoData	NoData
21	413813	415538							NoData	NoData			NoData	NoData
22	413838	415538							NoData	NoData			NoData	NoData
23	413863	415538							NoData	NoData			NoData	NoData
24	413888	415538							NoData	NoData			NoData	NoData
25	413913	415538							NoData	NoData			NoData	NoData

Data in this table comes from the 2019 Colne Model model.
Height values are shown in mAOD, and depth values are shown in metres.
Any blank cells show where a particular scenario has not been modelled for this location.
Cells which contain text 'NoData' for a scenario show that return period has been modelled but there is no flood risk for that return period for that location.



Environment Agency

Defences removed climate change modelled fluvial extent and height

Location (easting/northing)
413863/415488

Scale
1:2,500

Created
14 Jul 2022

Model name
2019 Colne Model

Selected location

Main river

Modelled 2D grid
Water level in mAOD

- 0 - 71.0
- 71.0 - 71.5
- 71.5 - 72.0
- 72.0 - 72.5
- 72.5 - 73.0
- 73.0 - 73.5
- 73.5 - 74.0
- 74.0 - 74.5
- 74.5 - 75.0

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

0 25 50 75 100
metres

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	413813	415438	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
2	413838	415438	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
3	413863	415438	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
4	413888	415438	NoData	NoData	NoData	NoData	0.04	72.42	0.18	72.55
5	413913	415438	NoData	NoData	0.22	72.25	0.35	72.38	0.50	72.53
6	413813	415463	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
7	413838	415463	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
8	413863	415463	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
9	413888	415463	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
10	413913	415463	NoData	NoData	NoData	NoData	NoData	NoData	0.11	72.48
11	413813	415488	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
12	413838	415488	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
13	413863	415488	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
14	413888	415488	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
15	413913	415488	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
16	413813	415513	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData

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	413838	415513	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
18	413863	415513	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
19	413888	415513	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
20	413913	415513	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
21	413813	415538	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
22	413838	415538	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
23	413863	415538	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
24	413888	415538	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
25	413913	415538	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData

Data in this table comes from the 2019 Colne Model model.
Height values are shown in mAOD, and depth values are shown in metres.
Any blank cells show where a particular scenario has not been modelled for this location.
Cells which contain text 'NoData' for a scenario show that return period has been modelled but there is no flood risk for that return period for that location.

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