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FLOOD RISK ASSESSMENT AND DRAINAGE STRATEGY

Client:	**Beech York Ltd**
Site Address:	**Beech Avenue, Holgate** **York** **YO24 4JL**
Project Number:	**23438**
Report Reference:	**23438-DCE-XX-XX-T-C-001-P02**
Date:	**14/03/2024**

DUDLEYS
CONSULTING ENGINEERS

CONTENTS

Revision	Date	Author	Checked by;	Comments
P01	02/02/2024	Seb Reid	Seb Reid	Initial Issue
P02	14/03/2024	Seb Reid	Seb Reid	Issued for Planning

1.0 INTRODUCTION

1.1 Dudleys Consulting Engineers have prepared this site-specific Flood Risk Assessment and Drainage Strategy for the addition of four new affordable properties to the rear of an existing block of affordable homes on Beech Avenue, York.

1.2 The assessment investigates the potential flood risk impacts of the proposed development in accordance with the National Planning Policy Framework (NPPF) and supporting Planning Practice Guidance. This FRA is considered proportionate to the degree of flood risk and to the scale, nature, and location of the development.

1.3 This Flood Risk Assessment has been carried out generally in accordance with:

- National Planning Policy Framework (July 2021)
- Planning Practice Guidance: Flood Risk and Coastal Change (August 2022)
- BS8533:2017 “Assessing and managing flood risk in development, Code of Practice”
- CIRIA Report C753” The SUDS Manual” 2015
- Environment Agency Report SC030219 Rainfall Runoff Management for Developments.
- City of York Council - Strategic Flood Risk Assessment 2015
- City of York Council – Local Flood Risk Management Strategy
- City of York Council – Sustainable Urban Drainage Systems Guidance 2018

2.0 CONSULTATION AND EVIDENCE

2.1 The site is located within York City Council, which is the Lead Local Flood Authority as well as the planning authority for the proposed development.

2.2 Yorkshire Water is the Water authority, and they will be consulted during the planning process.

2.3 The Environment Agency data for site has been included within Appendix C and D for reference purposes.

2.4 Planning policy requires that the site be developed in accordance with NPPF requirements in terms of flood risk management, climate change allowances and reduced runoff from the development.

2.5 SuDS design guidance requires sustainable drainage systems to be provided for the management of the surface water runoff for redeveloped areas.

2.6 Planning policy requires that the site be developed in accordance with NPPF requirements in terms of flood risk management, climate change allowances and reduced runoff from the development.

3.0 SITE DESCRIPTION

3.1 The site is on Beech Avenue, York and this is located to the south west of the train station and the East Coast Main Line. The site is remote from the River Ouse and Foss which are the main sources of flooding in York City Centre and these are located to the North and East.

3.2 The approximate grid reference of the site is E458575, N451100.

3.3 The site is located opposite the Holgate Allotments and playing fields for the Our Lady Queen of Martyrs Catholic Primary School. Beyond these areas is Holgate Beck. This beck flows from south to north towards the East Coast Main Line and is culverted under the A59 and the Holgate Engineering Works before emerging at Millenium Park and the River Ouse to the North West. The culverts under the engineering works, railway and roads provide a throttling effect on Holgate Beck causing flooding upstream.

3.4 The development area is a mix of brownfield development (existing buildings, driveways and garages) and greenfield area (gardens). The existing residential buildings, which are being retained, have existing connections to the Yorkshire Water combined sewer and these are to be retained.

3.5 The gardens and driveway, on which the new access, car parking and the residential properties are to be positioned, is generally flat with levels around 9.9m AOD. The existing residential properties have a finished floor level of 10.4m AOD on the ground floor. The existing properties have level access to the front of the properties, and have a 150mm step to the rear, with their gardens falling towards the proposed development. These levels are shown in the Topographical Survey in Appendix A.

3.6 Through the gardens is an existing Yorkshire Water combined sewer which serves the existing properties in terms of both foul and rainwater. This existing sewer has a 3m easement on both sides and this is accommodated within the development.

Figure 1: Site Location Plan

4.0 SITE PROPOSALS

4.1 The proposed layout for the scheme is shown in Figure 2 below and in Appendix B.

4.2 The proposed layout shows the four new properties in the rear gardens and their respective parking bays and driveway.

4.3 An existing right of way to the allotments to the rear of the development is retained to one side of the properties. To the other side is the parking and cycle storage. New cycle storage is being provided for the existing residences.

4.4 The proposed residential properties and access is constructed on a mix of existing hardstanding and green areas. The existing hardstanding has no identifiable drainage system from the topo and CCTV survey and these areas are considered to be greenfield.

4.5 The proposed impermeable area is 565m^2.

4.6 The greenfield runoff rate, QBAR, for the site is 0.4l/s as assessed via the UKSuds.com online tool. This output is in the drainage strategy at the rear of this document.

4.7 City of York Council SUDS policy permits the use of small orifice flow controls subject to maintenance considerations and it is reasonable for minimum orifice of 70mm to be permitted which is large enough to ensure that most detritus can pass through the system without blockage.

4.8 On this basis, it is proposed that a 2l/s discharge rate from the development to the sewer is to be used for any surface water discharge from the site.

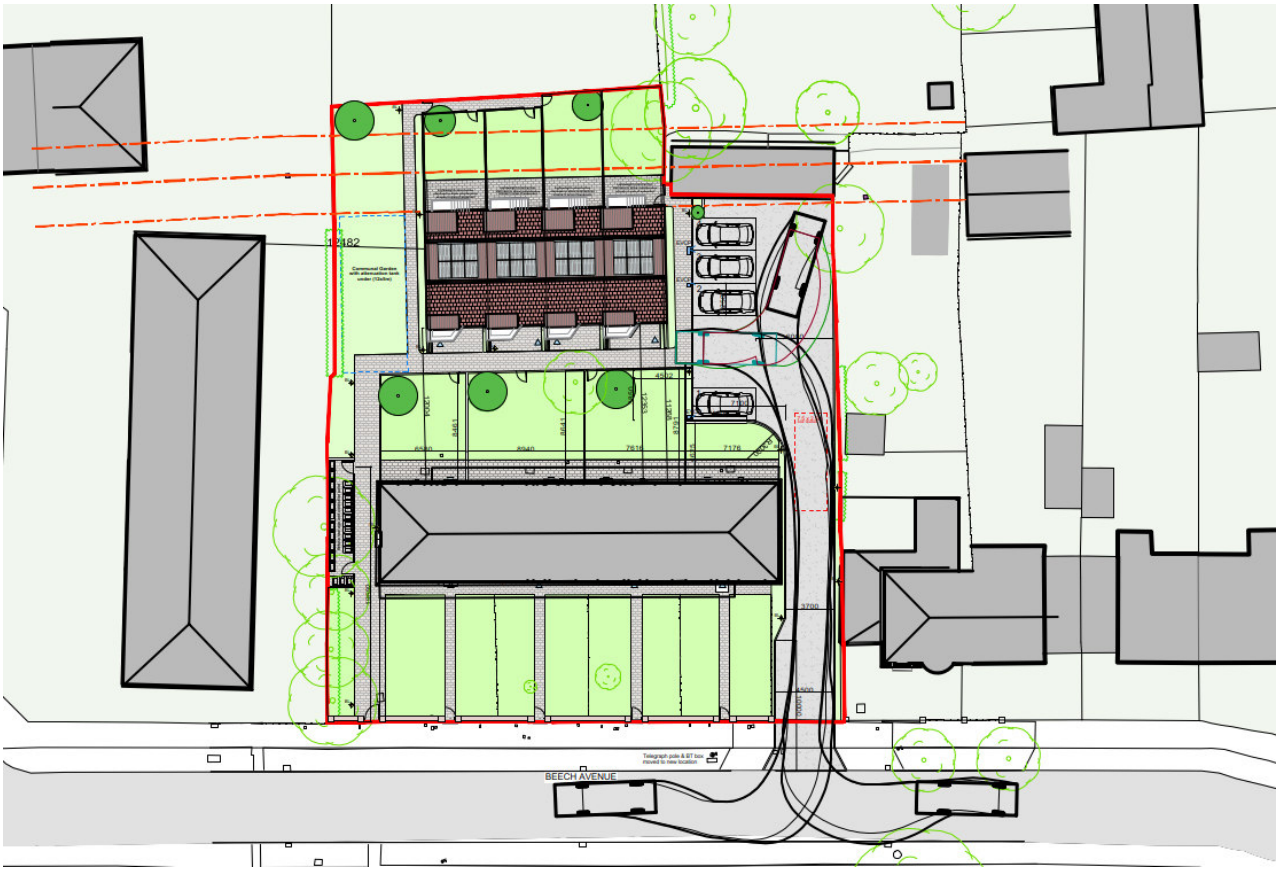


Figure 2: Proposed Development Layout

5.0 FLOOD RISK VULNERABILITY

5.1 The Flood Risk Vulnerability Classification has been determined in accordance with Planning Practice Guidance, Flood Risk and Coastal Change.

5.2 The Flood Risk Vulnerability Classification is 'More Vulnerable'. This classification is in accordance with National Planning Policy Framework, Annex 3.

6.0 FLOOD ZONE COMPATIBILITY

6.1 The site is located within Flood Zone 3 as indicated on the Environment Agency Flood Zone map in Appendix C. For this site to be acceptable, a Sequential and Exception Test is required.

6.2 The Flood Zone Compatibility has been reviewed in accordance with Planning Practice Guidance, Flood Risk and Coastal Change, paragraph 078 Table 2. This compatibility is summarised in Table 1 below.

Table 1: Flood Risk Vulnerability Classification 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 †	✗	Exception Test required	✓	✓
Zone 3b *	Exception Test required *	✗	✗	✗	✓*

Where:

✗ Development should not be permitted.

✓ Development is appropriate.

6.3 This area within Flood Zone 3 includes the existing properties and all the neighbouring properties and extends down to the Holgate Beck watercourse.

6.4 The proposed development is for the provision of affordable housing and is located in existing gardens and is an infill development which has the impact of increasing residential density in an area of high demand for affordable housing. The development is being designed with sustainability in mind and do

a good specification with the intention of ensuring that flood risk is not increased because of the development. The development provides community benefit and providing improvements for existing residents in the form of improved access to their properties and the allotments, and providing cycle storage facilities.

6.5 The development has been designed to ensure that any areas that are at risk of flooding are not being occupied overnight and all overnight habitable areas are above the flood level. The properties are designed to be flood compatible and to allow for flood storage within their design to minimise any loss in flood storage in the area.

6.6 The sequential and exception tests are to be undertaken by others, but in accordance with the NPPF, based on the above sustainability and community benefits, and with suitable flood risk mitigation in place, the development should be suitable in Flood Zone 3.

7.0 FLUVIAL FLOODING (FLOODING FROM RIVERS AND THE SEA)

7.1 Fluvial flooding occurs when high flows exceed the capacity of the river channel and spill out onto the floodplain, usually after a period of prolonged or heavy rainfall.

7.2 The Environment Agency Flood Map (rivers and sea) below shows that the proposed development is in an area of medium risk of flooding having between 1 in 100 and 1 in 30 annual probability of flooding from rivers.

7.3 Figure 3 below shows the outlines of the risk of flooding from rivers and the sea overlaid with the site boundary.

Figure 3: Fluvial Flood Risk Map (EA Mapping)

7.4 The historical flooding map shows flooding on the site up to 1982. However further records do not show any flooding beyond this event. It is likely that wider improvements to flood defences and water management has resulted in a reduced occurrence in flooding since the 1980s event.

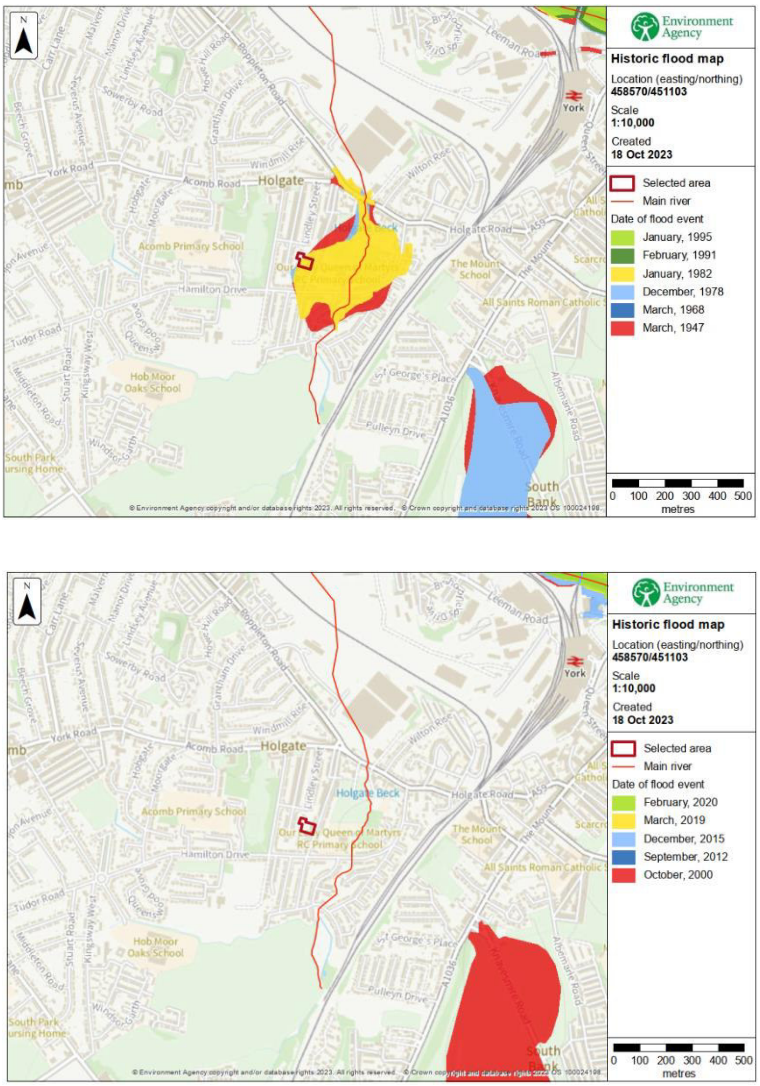


Figure 4 - Historical Flooding

7.5 While the site is not officially defended by any EA or LLFA maintained defences, there is natural high ground which has been formed alongside Holgate Beck and these act as a natural defence against flooding, if unmaintained. They have been ignored for the purposes of the flood mapping as they are not to be relied upon, but they have likely had an impact on a reduction in flooding at the site since the 1980s.

7.6 The EA have undertaken modelling at the site as part of the 2016 modelling exercises. The summary of these exercises are in Table 1 below. The findings of this modelling exercise and maps are in Appendix D.

Table 1 – EA flood Data (Node 1170550) (2016 York Detailed Flood Model Results)

Flood Event	Climate Change	Flood Height (mAOD) - Defended	Flood Height (mAOD) – Defences Removed
5% AEP	0%	9.72	11.41
2% AEP	0%	9.98	11.58
1% AEP	0%	10.14	11.62
1% AEP +CC	20%	10.31	11.70
1% AEP +CC	30%	10.39	11.74
1% AEP +CC	50%	10.55	11.82
0.5% AEP	0%	10.33	11.71
0.1% AEP	0%	10.87	11.98
Depth Height Modelling			
1% AEP +CC	50%	12.42	12.17

7.7 The City of York Council SFRA states that finished floor levels should be raised above the modelled 1 in 100 year flood level. (Para 4.1.85) and buildings should be designed to be resilient when flooding occurs beyond these levels.

7.8 Based on the above modelling, a floor level of 10.14m + 600mm = 10.74mAOD would be appropriate for areas which are not inhabited overnight.

7.9 It should be noted that this level of the property would be flooded should the defences be breached or there was a very significant event.

7.10 The entrance hall of the residential properties is 10.00mAOD which is below the flood level. This entrance hall will be constructed from flood resistant methods and this may include flood barriers for the entrance door. Stairs at this level will rise 1.35m to the first habitable floor, containing dining room and a living room and this has a level at and this is at 11.35mAOD. This first floor is not to be used for overnight occupation and would be constructed using flood resilient methods. The first floor for overnight habitation is 1.35m above this, at 12.70mAOD and this floor has the kitchen and a bedroom.

7.11 The majority of the footprint of the building at the ground floor level, 10.00mAOD will be designed to be permeable for flood water flows and to allow for storage of flood water on within the ground floor areas due to voids constructed within the fabric of the building.

7.12 As the flooding impacting the site is due to the throttling of the Holgate Beck culvert under the engineering works and railway, it is unlikely that the development of the site will worsen the flood

risk as the flooding will come from Beech Avenue and pond around the site. This is evident in the flood modelling which shows a consistent plateau level of flooding on each of the water depth models across the site and at all of the stations modelled along Holgate Beck. It is unlikely that any water displaced by the small ground floor footprint of the building would have an impact of a flood event.

7.13 The levels across the site are at or slightly below existing ground levels reducing the impact of the development on flooding in the area.

8.0 PLUVIAL FLOODING (FLOODING FROM SURFACE WATER)

8.1 The Environment Agency Flood Map showing Risk of Flooding from Surface Water is shown below. This type of flooding can be difficult to predict, much more so than river or sea flooding as it is hard to forecast exactly where or how much rain will fall in any storm.

8.2 The map below indicates that the site is at a low risk of surface water flooding with flooding occurring outside the site boundary with some occurring within the “dished” area in the gardens. This dished area is the location of the new properties and the attenuation tank. The flow control will be designed with a grid cover to allow for water to continue to be stored in this area and a flood exceedance route exists around the southern boundary allowing for a route for water to leave the site.

8.3 On this basis, the risk of flooding from surface water is medium.

Figure 5: Pluvial Flood Risk Map

9.0 GROUNDWATER FLOODING

9.1 Groundwater flooding occurs when water levels in the ground rise above surface levels this is more likely to occur in low lying areas.

9.2 The geology maps available from the British Geological Survey show that the solid bedrock geology underlying the site is Sherwood Sandstone Group consisting of sandstone. The superficial deposits are clay.

9.3 Cranfield University Soilscapes map shows that the site is in a slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils. The map information also states that the site has impeded drainage which shows that there is a less probability of ground water to seep into the ground or from the ground.

9.4 The current site levels are lower than the surrounding areas, with the neighbouring properties falling into the gardens on which the new properties are proposed. Levels will be raised on the site to allow for level access and the finished floor levels with drainage provided to manage runoff.

9.5 On this basis it is assumed that as the groundwater is not laterally moving across the site, and the groundwater flooding risk is likely to be low.

10.0 EXISTING INFRASTRUCTURE FLOODING

10.1 Flooding caused by the existing infrastructure network occurs when the network is over capacity or there is a blockage or failure in the existing system.

10.2 The existing site is positively drained with no flooding from the existing sewers within the site. The existing residential properties drain to an existing combined sewer in Beech Avenue, while the existing combined sewer running behind the proposed residential properties carries foul and surface water from adjacent properties. The CCTV survey of this sewer has shown that the pipe is free flowing with a number of old connections leading into the site, probably from previous buildings. While there is no record of previous blockages or flooding from this source, it is a possibility. The CCTV Survey is in Appendix A.

10.3 Given that the existing sewers are within the flood zone 3 area, it is expected that during flooding events the sewers will become fully flooded and foul effluent and surface water from the site may be surcharged. The design for the site should take this into account so that it does not become an issue and as at the very least, it may be beneficial to provide non-return valves at each property to allow homeowners to protect their properties should flooding occur.

10.4 On the basis of the limited available information, it is assumed that flooding from sewers is medium, based on the sewers being located in the flood zone area.

11.0 FLOODING FROM RESERVOIRS

11.1 Reservoir flooding is unlikely to happen. There has been no loss of life in the UK from reservoir flooding since 1925 and even with recent events, measures are in place to monitor and protect reservoirs in event of an unlikely catastrophic event. All large reservoirs must be inspected and supervised by reservoir panel engineers. As the enforcement authority for the Reservoirs Act 1975 in England, the Environment Agency ensure that reservoirs are inspected regularly, and essential safety work is carried out. These laws are being currently reviewed and it is expected that the requirements for monitoring and maintenance will become more stringent.

11.2 However, in the unlikely event that a reservoir dam failed, a large volume of water would escape at once and flooding could happen with little or no warning.

11.3 The Environment Agency Map showing Risk of Flooding from Reservoirs is shown below.

11.4 The site and the surrounding area have a risk of flooding should a reservoir flood while there is otherwise widespread high-water levels in rivers. It is likely that existing defences could be overwhelmed, and, in this case, water would enter the site. In this circumstance, the ground floor of any properties within the site would be flooded.

11.5 In this case, there is a medium risk of flooding from reservoirs.

Figure 6: Reservoir Flood Risk Map (Wet Day)

12.0 DRAINAGE ASSESSMENT

Proposed Foul Water Network

12.1 The proposed foul network will need to accommodate foul water flows from the residential properties and the network will consist of a small private foul drainage system, which is then connected to the Yorkshire Water system via a combined demarcation manhole.

12.2 As the Yorkshire Water sewer runs parallel to the new properties, individual foul connections are an option if this is the preference of the developer.

12.3 A S106 agreement for each connection will be required with Yorkshire Water.

Proposed Surface Water Network

12.4 The existing site is greenfield and has been assessed on a greenfield basis.

12.5 Surface water discharge will follow the ground, watercourse, sewer, hierarchy in accordance with the principles laid down in CIRIA Report 697 'The SUDS Manual' 2016 and in accordance with the COYC SUDS Guidance. The drainage strategy for the site has considered the potential for discharge in accordance with the hierarchy.

12.6 Re-use of Water on Site: The properties will have a garden and there are nearby allotments who may benefit from rainwater being retained on site for irrigation. Rainwater harvesting via the use of water butts and similar features should be considered as this will reduce some of the water flow into the surface water drainage system, however under current COYC LLFA policies, these storage features cannot be considered as attenuation features and counted as reducing runoff from the site.

12.7 Discharge into a soakaway: The Cranfield University Soilscapes map shows that the site will have only negligible infiltration. The map information also states that the site has impeded drainage which shows that there is a less probability of ground water to seep into the ground. While soakaway tests are to be undertaken to confirm this, it is believed at this stage that infiltration will not be a viable option for this development. The constraints between existing residential buildings and the 5m distance from a soakaway to the building lines included with Building Regulation Part H, also means that soakaway as a principal form of surface water discharge is unlikely to be viable on this project. If infiltration at low rates is viable, then there is potential for small areas, such as patios and footways, to infiltrate into the ground rather than be positively drained into the sewer.

12.8 Discharge into the adjacent watercourse: The site is remote from the nearest watercourse, Holgate Beck and there are no identifiable surface water sewers to this watercourse accessible to this site. It is unknown if the Yorkshire water sewers discharge to this watercourse.

12.9 Discharge into a surface water sewer: There is no existing surface water sewer located nearby the site for a direct discharge.

12.10 Discharge into a highway drain: There may be existing highway drainage which the site can utilise or may already be connected to. However there is no evidence of this on the CCTV survey or topo survey.

12.11 Discharge into Combined Sewer: An existing 225mm combined sewer has been identified behind the site and this sewer is used for neighbouring properties' rainwater connections. Given the lack of other options, this is the preferred connection point. Approval from Yorkshire Water will be required for this under a S106 agreement.

12.12 The site is greenfield and a greenfield runoff rate for the small site was calculated at 0.4l/s. To enable a minimum orifice size of 70mm on the flow control which will be maintainable by the property owners, it is proposed that the discharge rate from the hardstanding areas and the roof drainage is restricted to 2l/s in all storm events. This will be achieved through the provision of a vortex flow control prior to the connection to the Yorkshire Water system.

12.13 In accordance with City of York Council SUDS Guidance, the scheme will be designed to accommodate the 1:100 + 30% climate change within the site boundary and this will be achieved through the use of an underground attenuation tank located under the allotment accesses.

12.14 A drainage strategy layout and calculations is included within Appendix E.

13.0 FLOOD RISK MITIGATION MEASURES

13.1 The proposed development is in Flood Zone 3 and the site is at risk of flooding from Holgate Beck.

13.2 Minimum habitable FFL for the new development should be set at or above 10.74m AOD. Any floors below this level should be designed to be flood resistant and constructed using flood compatible methods such as high-level electrical sockets, non-return on drainage at this level, tiled walls with water resistant insulation and covering, tiled floors and flood measures on doors and air bricks.

13.3 The upper floors will be able to be constructed using normal methods.

13.4 To reduce the impact of the development on other properties, and to allow for water to move through and around the property, part of the ground floor level will consist of voids which are used for bin and cycle storage. These areas will be accessible via a gate and a gapped brick wall.

13.5 In case the combined sewer servicing the property floods, non-return valves at each property will be provided to prevent surcharge into the buildings. The surface water system will be designed to overflow into the gardens away from any neighbouring properties.

13.6 In the case of a flood warning, users should avoid the flood prone areas surrounding the site and proper warning signs should be available to notify the flood prone areas surrounding the site. A flood evacuation plan may be necessary for the site to ensure that residents are fully aware of the risks and the planning for flooding in the area.

13.7 The residential properties are designed to allow residents to stay in place without any loss of function or loss of habitable space due to flooding. The accesses to the properties around the eastern elevation will likely be flooded, but a stepped access into the garden will be available.

14.0 MAINTENANCE STRATEGY

14.1 Maintenance and suitable management of all drainage aspects is required to ensure that the systems are operating correctly to ensure water quality and effluent quality and subsequently reducing the risk of flooding on the site.

14.2 The maintenance of the existing drainage facilities within the site boundary are the responsibility of the owner/occupier and must be undertaken by a competent contractor and existing drainage systems should be maintained to prevent nuisance to others.

14.3 The drainage system is designed to be low maintenance with siltation control measures and bypass measures in place to ensure that the tank and flow control can be easily cleaned and maintained via a jetting process.

14.4 A log of all maintenance activities is to be kept and made available to the LPA and / or the LLFA on request.

15.0 CONCLUSION AND RECOMMENDATIONS

15.1 The site is in Flood Zone 3 but the benefit that the site will bring to the community in terms of providing affordable high-quality homes on an in-fill development will outweigh the impact on flooding. The proposed development will have a negligible change on the flooding impact at this location.

15.2 The site is a high risk of flooding from rivers and the sea and a medium risk from pluvial sources.

15.3 The site is at medium risk of reservoir flooding.

15.4 It is expected that the sewers servicing the site, being in the flood zone 3 area, are at risk of flooding, but this will be considered in the design and be suitably mitigated in the building.

15.5 The site will utilise a sustainable drainage system to reduce runoff from the site and direct it to the combined sewer at a minimum practicable rate, 2l/s.

15.6 The buildings are designed with flooding in mind and the ground floor is designed to be flood resistant and no overnight habitable space is on the ground floor or first floor. The ground floor is an entrance hall with stairs to the first floor, which is at a level exceeding the 1:100 flood level + 600mm, 10.74mAOD. The level of this floor is 11.35mAOD. Overnight habitable floors are at a level of 12.7m.

15.7 The buildings are designed to be porous to flood water and voids are designed within its structure to allow this.

15.8 While the site is Flood Zone 3, the above measures mean that this development will provide a benefit to the area and have a negligible impact on flooding.

Sebastian Reid CEng MICE MCIHT

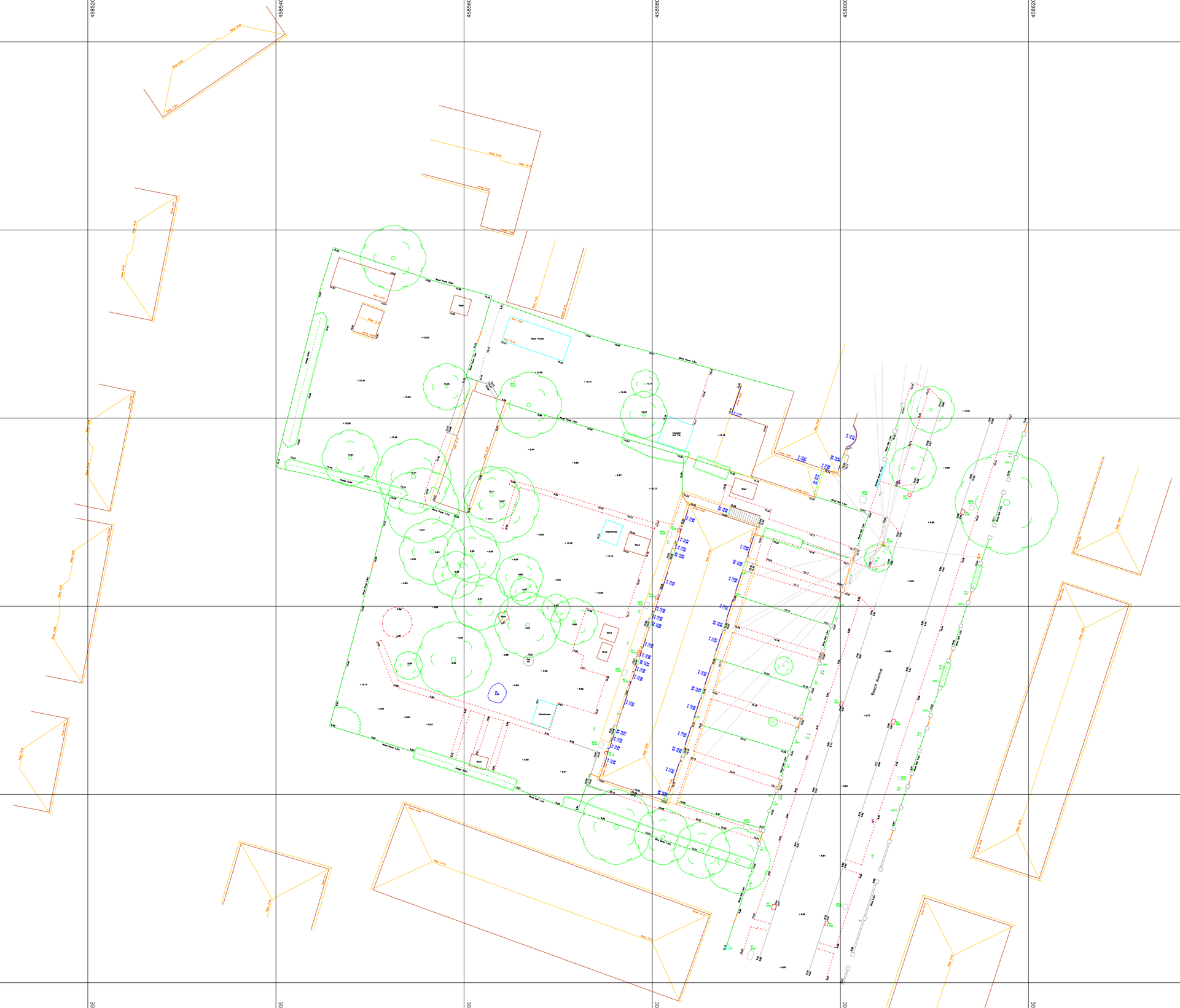
Associate

On behalf of Dudleys Consulting Engineers

APPENDIX A – EXISTING SITE TOPOGRAPHICAL SURVEY AND CCTV CURVEY

458500E 458520E 458540E 458560E 458580E 458600E 458620E 458640E

451160N 451140N 451120N 451100N 451080N 451060N



KEY

- BUILDING
- WALL
- ELEVATED FEATURE
- TRACK
- CANOPY
- FENCE
- KERB
- MISCELLANEOUS
- O/H WIRE

SPOT LEVEL	100.00 +
TOP OF WALL	+
DOWNPIPE	
LAMP POST	LP
SIGN POLE	SP
TELEGRAPH POLE	TP
ELECTIC POLE	E
SERVICE COVER	
GULLY	

E	ELECTRIC
GU	GULLY
W	WATER
G	GAS
MHCL	MANHOLE COVER LEVEL
SV	STOP VALVE
BT	TELECOMS
VM	VIRGIN MEDIA

Note: Survey is to OSGB36(15) grid and all levels relate to OSTN15 datum.

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Project

64–78 Beech Avenue
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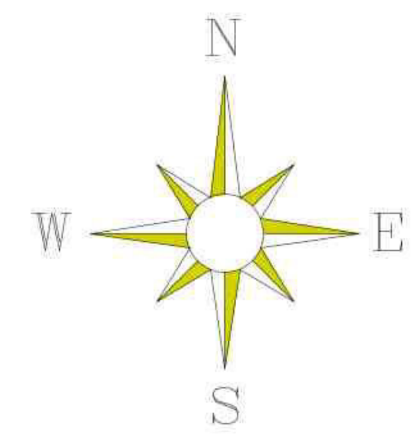
YO24 4JL

Title	Topographic Survey	
Date	06/11/23	Scale 1:200@A1
Drawn by	TFS	
Drawing No.	BAH/TS/200	Rev.



KEY FOR UNDERGROUND SERVICES

- Foul water
- Surface water
- Other
- Gas — GAS
- Electric — E
- Telephone — BT
- Cable TV — CATV
- Unidentified — U
- Water
- Closed Circuit TV — CCTV
- Communications — COM
- Heating Pipe — HP
- Empty Duct — ED
- Fibre Optics — FO
- Vents — V
- Pipe — PIPE
- Traffic Signal — TS
- Gauge Lines — G
- Vapor Recovery — VR
- Offsets — O
- Fuel — F

Where chamber extents are significantly greater than the cover size, their approximate extents are shown thus:

ABBREVIATION KEY

AR	assumed route	PTG	pipe to ground
BB	base bend	PTS	pipe to surface
BD	backdrop	RE	rodding eye
BL	bed level	RWP	rainwater pipe
CL	cover level	SV	stop valve
CR	cable riser	SVP	soil vent pipe
DP	down pipe	TE	trapped exit
EOT	end of trace	TFR	taken from records
EP	electricity pole	TP	telegraph pole
FH	fire hydrant	UTF	unable to find
G	gully	UTL	unable to lift
GV	gas valve	UTS	unable to survey
HOR	head of run	UTT	unable to trace
HL	high level	VP	vent pipe
IC	inspection chamber	WL	water level
IL	invert level	WM	water meter
MH	manhole	WO	wash out valve
PR	pipe riser	D	depth

UTILITY SURVEY NOTES

ELECTROMAGNETIC AND/OR GROUND PENETRATING RADAR TECHNIQUES HAVE BEEN USED TO LOCATE AND MAP UNDERGROUND UTILITIES AND FEATURES ON THIS DRAWING. MAPMATIC HAVE MADE EVERY ENDEAVOUR TO MAKE SURE THAT THE INFORMATION CONTAINED WITHIN THIS DRAWING IS ACCURATE AND OF THE HIGHEST QUALITY. HOWEVER, THE RESULTS FROM THESE TYPES OF SURVEYS ARE NOT INFALLIBLE AND SHOULD THE LOCATION OR DEPTH OF SERVICES/FEATURES BE OF PARTICULAR IMPORTANCE TO A PROJECT, THEN IT IS STRONGLY ADVISED THAT TRIAL EXCAVATIONS SHOULD BE UNDERTAKEN TO CONFIRM SURVEY RESULTS.

MAPMATIC HAVE USED ALL RECORD DRAWINGS THAT WERE AVAILABLE TO US BY THE CLIENT OR BY THE STATUTORY UTILITY PROVIDERS AT THE TIME OF THE SURVEY. ANY INFORMATION TAKEN FROM THESE DRAWINGS (IE PIPE SIZES, MATERIAL) IS NOT GUARANTEED. SERVICES LOCATED FROM RECORD DRAWINGS WILL BE SHOWN AND ANNOTATED AS TAKEN FROM RECORDS (TFR). HISTORIC RECORD INFORMATION IS OFTEN INCOMPLETE/INACCURATE AND CANNOT BE RELIED UPON.

A SINGLE LINE INDICATING A UTILITY MAY INDICATE THE PRESENCE OF MULTIPLE SERVICES WITHIN CLOSE PROXIMITY TO EACH OTHER. WHERE A SINGLE LINE TYPE IS SHOWN WE RECOMMEND HAND DIGGING WITHIN 0.5m. TO EXPOSE HIDDEN SERVICES.

WHERE QUOTED, DEPTH INFORMATION OF UNDERGROUND SERVICES/FEATURES IS STATED. DEPTHS ARE GENERALLY +/- 10% ACCURATE, BUT CANNOT BE GUARANTEED. ANY DEPTHS SHOWN ARE USUALLY TO THE TOP OF THE SERVICE/FEATURE. GRAVITY SEWERS AND DRAINS ARE USUALLY TO INVERT (BASE OF DRAINAGE CHANNEL) UNLESS OTHERWISE STATED.

AT MAPMATIC WE USE SKILLED STAFF AND MODERN CALIBRATED EQUIPMENT TO PERFORM OUR SURVEYS. HOWEVER, THE COMPLETENESS OF ANY UNDERGROUND SURVEY CANNOT BE 100% GUARANTEED AND WE CANNOT BE HELD RESPONSIBLE FOR ANY INACCURACIES BEYOND THOSE THAT COULD BE REASONABLY EXPECTED BY A COMPETENT COMPANY.

CONTRACTORS UTILIZING OUR DRAWINGS FOR INTRUSIVE WORK SHOULD TAKE ALL REASONABLE MEASURES TO WORK SAFELY IN ACCORDANCE WITH HSG47 GUIDELINES "AVOIDING DANGER FROM UNDERGROUND SERVICES".

SITE SPECIFIC NOTES:-

THE TOPOGRAPHICAL SURVEY WAS SUPPLIED BY A THIRD PARTY THEREFORE MAPMATIC ACCEPTS NO RESPONSIBILITY FOR THE ACCURACY OF THIS SURVEY.

MAPMATIC STRONGLY RECOMMEND OBTAINING SEWER STATS FROM THE UTILITY PROVIDER PRIOR TO ANY PLANNING AND DESIGN WITHIN THE SURVEY AREA.

REV	DATE	DESCRIPTION OF WORK	SURVEYOR	CHECKED BY

MAPMATIC
MEASURED SURVEYS
SETTING OUT • UTILITY SURVEYS • CCTV SURVEYS • CAMERA SURVEYS • FLOOD RISK ASSESSMENT
AERIAL SURVEYS • EARTHWORK CALCULATIONS • MEASURED BUILDING SURVEYS • TOPOGRAPHICAL SURVEYS
Mapmatic, Unit 14, Prime Parkway, Derby, DE1 3QB
Tel: 01332 650 580 www.mapmatic.com Email: info@mapmatic.com

CLIENT
Brown And Company

PROJECT
Beech Avenue
York

TITLE
CCTV DRAINAGE Survey

Scale	1: 200@A1	Date	22.12.2023
Drawn	CC	Checked	TH
Level datum	GNSS	Grid orientation	GNSS
Job number	6476	Revision	0
Drawing no.	0001	Sheet	1 of 1

Notes:

All critical measurements should be checked on site prior to design. No liability will be taken for this plan if passed onto 3rd parties. Trees and other survey data may be omitted due to dense vegetation. Some services may have been omitted due to parked vehicles and vegetation. Please note the drainage information has been ascertained by visual inspection from the surface and therefore values are estimated.

This survey has been orientated to the Ordnance Survey (OS) national grid via a Global Navigation Satellite System (GNSS) and the OS Active Network (OS NET). A true OSGB36 coordinate has been established near to the site centre via a transformation using the OSTN15 & OSGM15 transformation models. The survey has been correlated to this point and a further one or more OSGB36 points established to create a true OS bearing for angle orientation. No scale factor has been applied to the survey therefore the coordinates shown are arbitrary and not true OS coordinates.
Please refer to the survey station table to enable establishment of the on-site grid.

RICS ICES

APPENDIX B – PROPOSED MASTERPLAN AND BUILDING ELEVATIONS AND FLOOR PLANS

PROPOSED: SITE PLAN

N

Do not scale from this drawing

Drawing to be read in conjunction with the specification document

Contractor to check all dimensions on site and notify Vincent and Brown of any discrepancies prior to commencement of the works

- Site Boundary
- Location of S24 sewer with 3m easement
- Sewer manhole
- Retained trees
- Proposed tree planting
- Private gardens
- Porous tarmaccadam

KEY

revision	date	description	drawn	ck'd
P01	12/02/24	Initial Planning Stage Issue	SC	NB
P01	01/02/24	Initial Planning Stage Issue	SC	NB
F09	24/01/24	Layout options for new floor plans	SC	SC
F09	23/01/24	Layout options for new floor plans	TT	SC
F08	05/01/24	Layout options for flood mitigation	SPC	NB
F07	21/11/23	Addition of combined sewer from topo and adjusted layout to suit	SPC	NB
F06	29/09/23	Addition of combined sewer and adjusted layout to suit	SPC	NB
F05	01/06/23	Revised garage location 62 Beech Ave	SPC	NB
F04	26/05/23	New garage to 62 Beech Ave	SPC	NB
F03	11/05/23	Removal of garage to 62	SPC	NB
F02	11/05/23	Revised passing space	SPC	NB
F01	04/05/23	Optional blue line boundary addition	SPC	NB

brown +company

project:
Beech Avenue, Holgate
York YO24 4JL

drawing:
Proposed Site Plan
.
.

date: 14/03/24
status: PLANNING

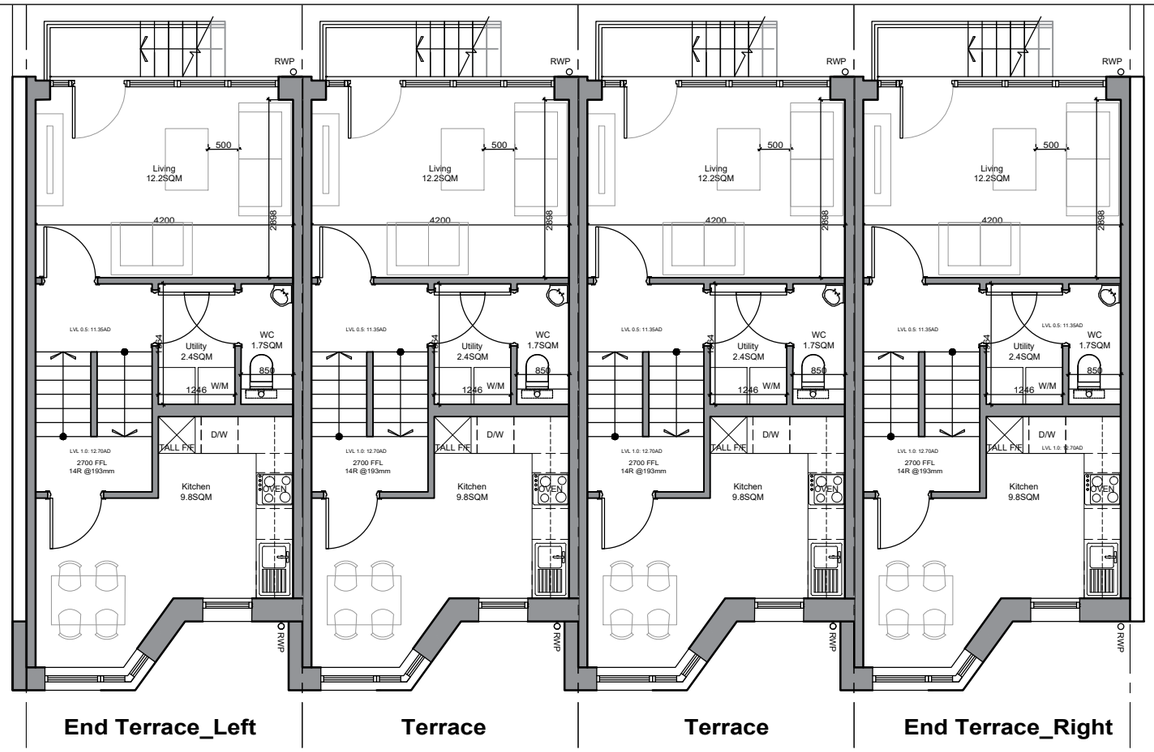
scale: 1:500 @ A3
0 25

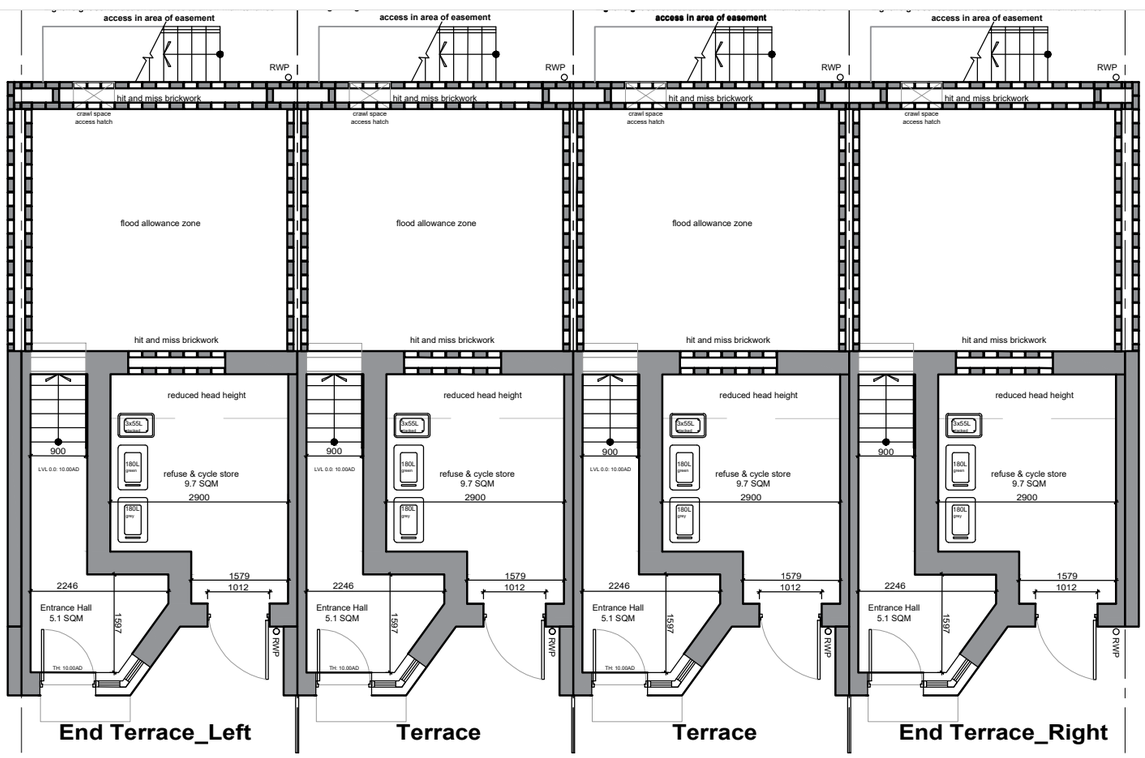
job number	author	zone	level	type	role	drawing number	revision
23034	BC	ZZ	00	DR	A	1050	P01

Do not scale from this drawing

Drawing to be read in conjunction with the specification document

Contractor to check all dimensions on site and notify Vincent and Brown of any discrepancies prior to commencement of the works





PROPOSED: GROUND, UPPER GROUND & FIRST FLOOR HOUSE PLANS

N

revision	date	description	drawn	ck'd
P02	14/03/24	Planning Stage Issue	RC	NB
P01	12/02/24	Initial Planning Stage Issue	SC	NB
P01	02/02/24	Part M4(1) compliance	SC	SC
F01	24/01/24	Issued for meeting	SC	SC
F01	23/01/24	Issued for meeting	TT	JDC

brown +company

project:
Beech Avenue, Holgate
York YO24 4JL

drawing:
Ground, Upper Ground & First Floor House Plans
.

date: 14/03/24

status: PLANNING

scale: 1:100 @ A3
0 5

job number	author	zone	level	type	role	drawing number	revision
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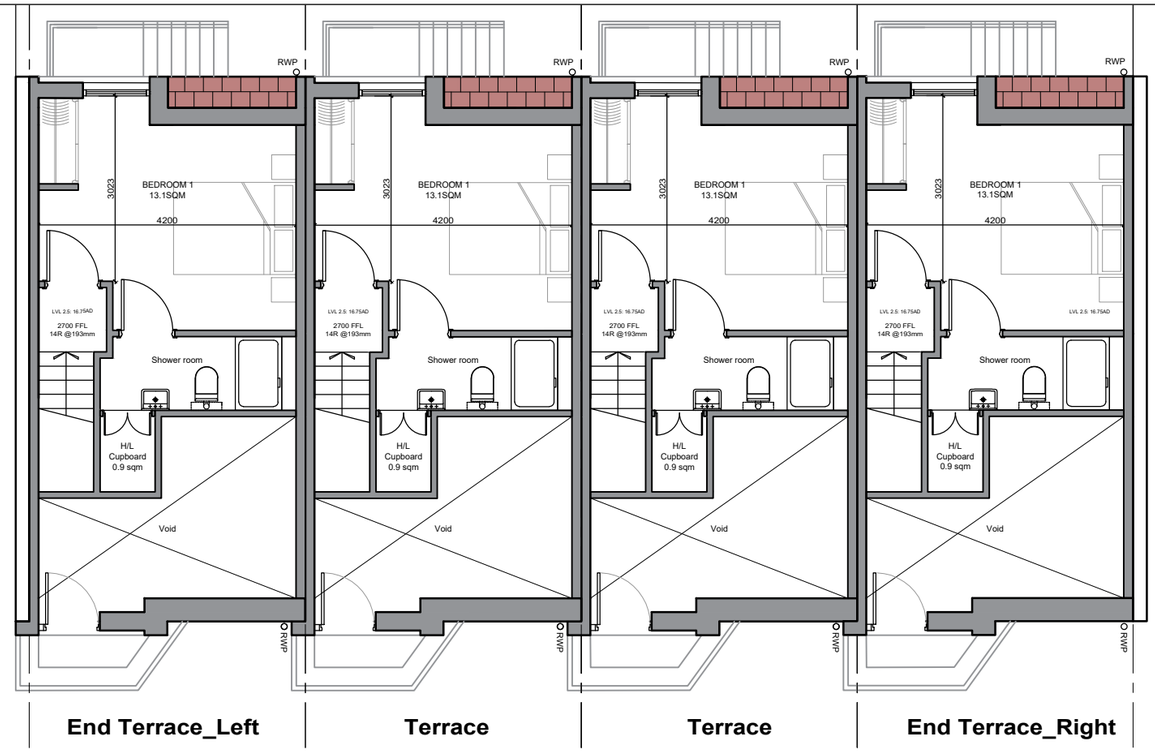
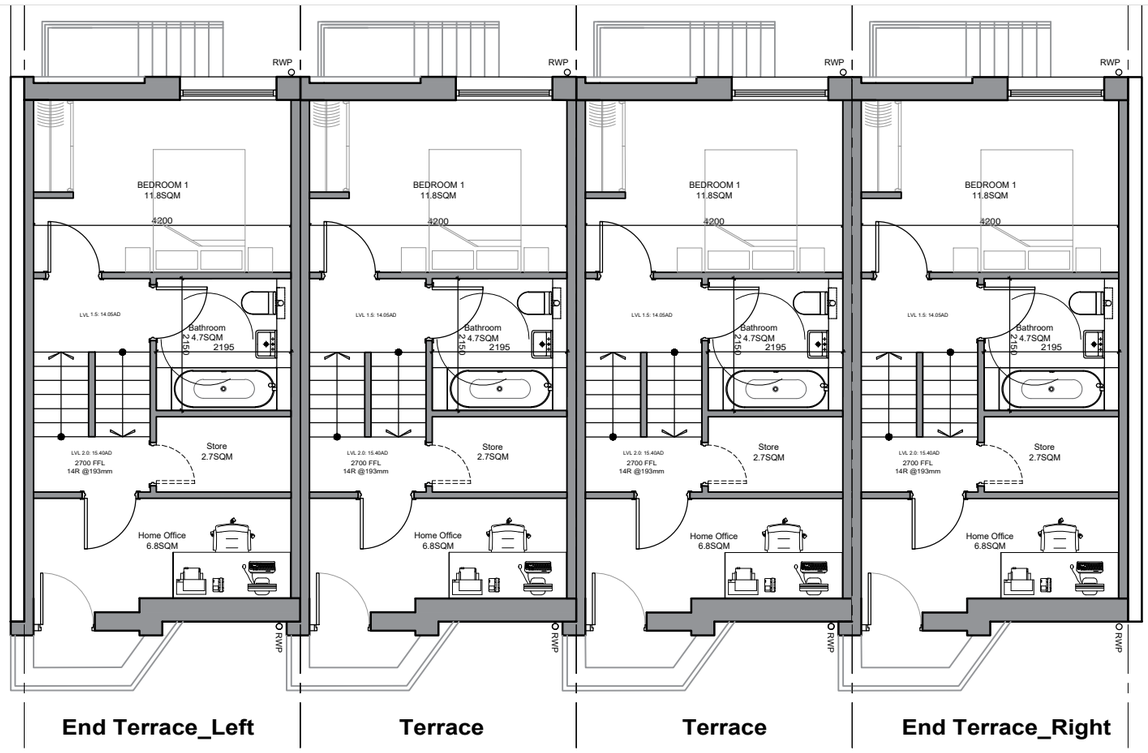




PROPOSED: HOUSE PLANS - LEVELS 1.5, 2.0 and 2.5

N

Do not scale from this drawing

Drawing to be read in conjunction with the specification document

Contractor to check all dimensions on site and notify Vincent and Brown of any discrepancies prior to commencement of the works

revision	date	description	drawn	ck'd
P02	14/03/24	Planning Stage Issue	RC	NB
P01	12/02/24	Initial Planning Stage Issue	SC	NB
P01	02/02/24	Part M4(1) compliance	SC	SC
F01	24/01/24	Issued for meeting	SC	SC
F01	23/01/24	Issued for meeting	TT	JDC

brown +company

project:
Beech Avenue, Holgate
York YO24 4JL

drawing:
House Plans
Levels 1.5, 2.0 and 2.5
.

date: 14/03/24

status: PLANNING

scale: 1:100 @ A3

0 5

job number	author	zone	level	type	role	drawing number	revision
23034	BC	ZZ	01	DR	A	1101	P02

Do not scale from this drawing

Drawing to be read in conjunction with the specification document

Contractor to check all dimensions on site and notify Vincent and Brown of any discrepancies prior to commencement of the works

01 - Pantile roof tile

02 - Clay capped angle ridge tile

03 - Flat roof with photovoltaic cells

04 - Bay window flat roof

05 - Concrete coping

06 - uPVC rainwater goods

07 - Ridge tile

08 - Dormer window

KEY

PROPOSED: ROOF PLAN

N

revision	date	description	drawn	ck'd
P02	14/03/24	Planning Stage Issue	RC	NB
P01	12/02/24	Initial Planning Stage Issue	SC	NB
F01	24/01/24	Issued for meeting	SC	SC
F01	23/01/24	Issued for meeting	TT	JDC

brown +company

project:
Beech Avenue, Holgate
York YO24 4JL

drawing:
Roof Plan

.

date: 14/03/24

status: PLANNING

scale: 1:100 @ A3

0 5

job number	author	zone	level	type	role	drawing number	revision
23034	BC	ZZ	03	DR	A	1104	P02

APPENDIX C – ENVIRONMENT AGENCY FLOOD MAP FOR PLANNING

Flood map for planning

Your reference	Location (easting/northing)	Created
Beech Avenue	**458572/451105**	**31 Jan 2024 16:06**

Your selected location is in flood zone 3, an area with a high probability of flooding.

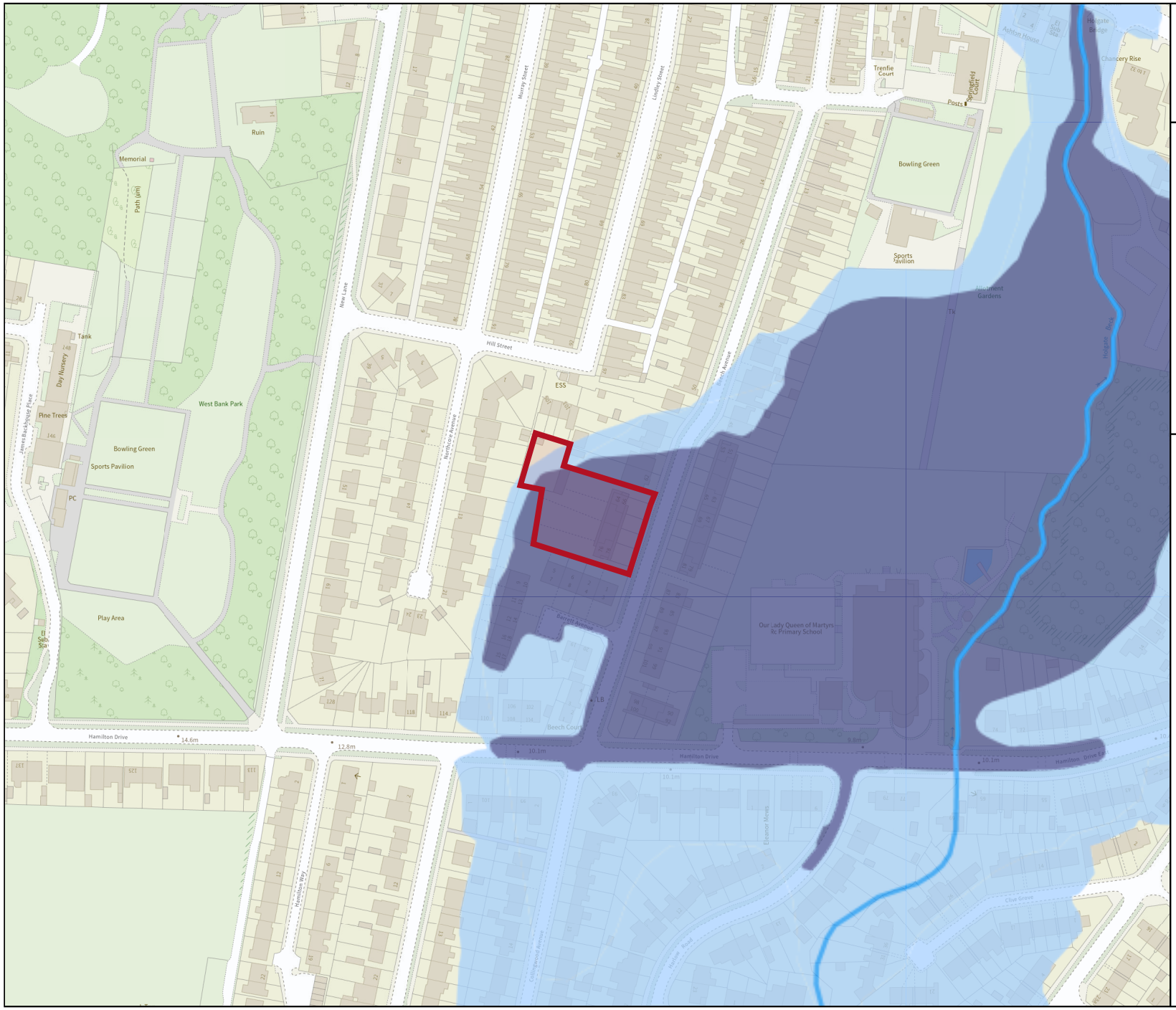
This means:

- you must complete a flood risk assessment for development in this area
- you should follow the Environment Agency's standing advice for carrying out a flood risk assessment (see www.gov.uk/guidance/flood-risk-assessment-standing-advice)

Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.



Environment Agency

Flood map for planning

Your reference
Beech Avenue

Location (easting/northing)
458572/451105

Scale
1:2500

Created
31 Jan 2024 16:06

- Selected area
- Flood zone 3
- Flood zone 2
- Flood zone 1
- Flood defence
- Main river
- Water storage area

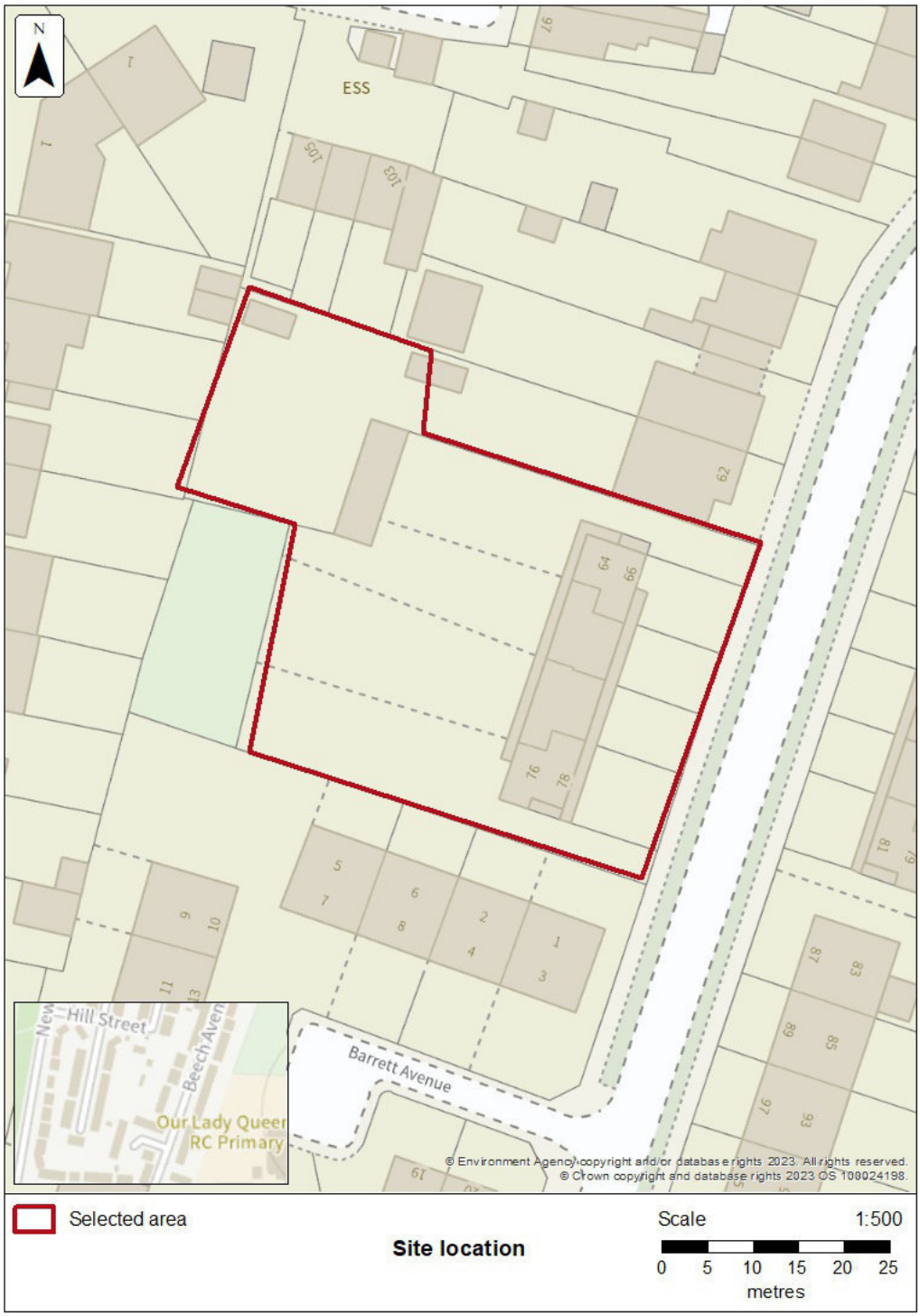
0 20 40 60m

APPENDIX D – ENVIRONMENT AGENCY FLOOD MODELLING DATA

Flood risk assessment data

Location of site: 458570 / 451103 (shown as easting and northing coordinates)
Document created on: 18 October 2023
This information was previously known as a product 4.
Customer reference number: 7MX1DKG5CUE8

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



How to use this information

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

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

Included in this document

In this document you'll find:

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

Not included in this document

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

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

Include a site location map in your request.

Surface water and other sources of flooding

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

- surface water
- ordinary watercourses
- reservoirs

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

About the models used

Model name: 2016 Holgate Beck Modelling CoY
Scenario(s): Defended fluvial, defences removed fluvial, defended climate change fluvial, defences removed climate change fluvial
Date: 31 July 2016

Model name: 2016 York Detailed Model
Scenario(s): Defended fluvial, defences removed fluvial, defended climate change fluvial, defences removed climate change fluvial
Date: 1 October 2016

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

Terminology used

Annual exceedance probability (AEP)

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

Metres above ordnance datum (mAOD)

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

Flood map for planning (rivers and the sea)

Your selected location is in flood zone 3.

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

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

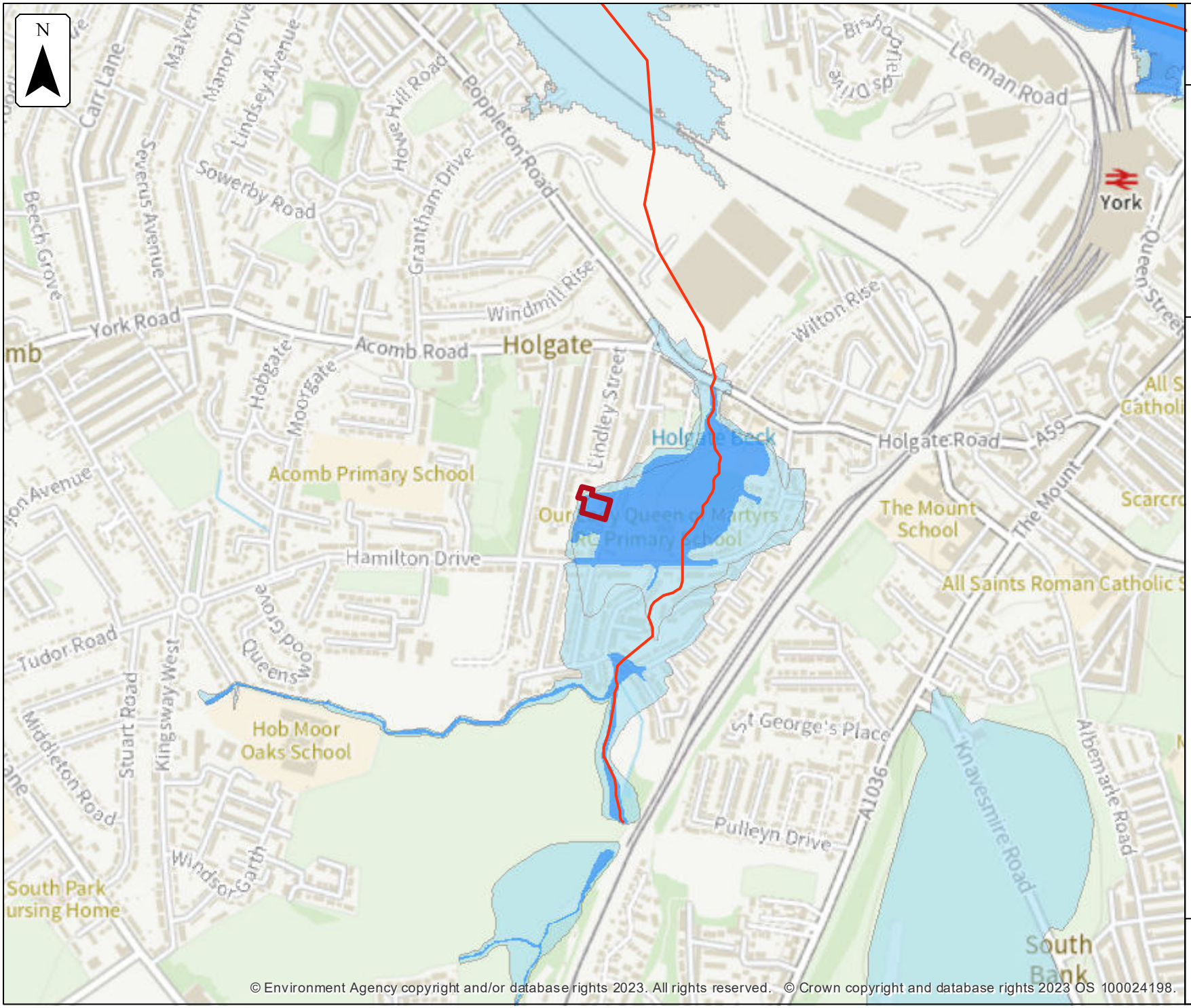
Flood zone 2 shows the area at risk of flooding for an undefended flood event with:

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

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

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

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



Environment Agency

Flood map for planning

Location (easting/northing)
458570/451103

Scale
1:10,000

Created
18 Oct 2023

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

0 100 200 300 400 500
metres

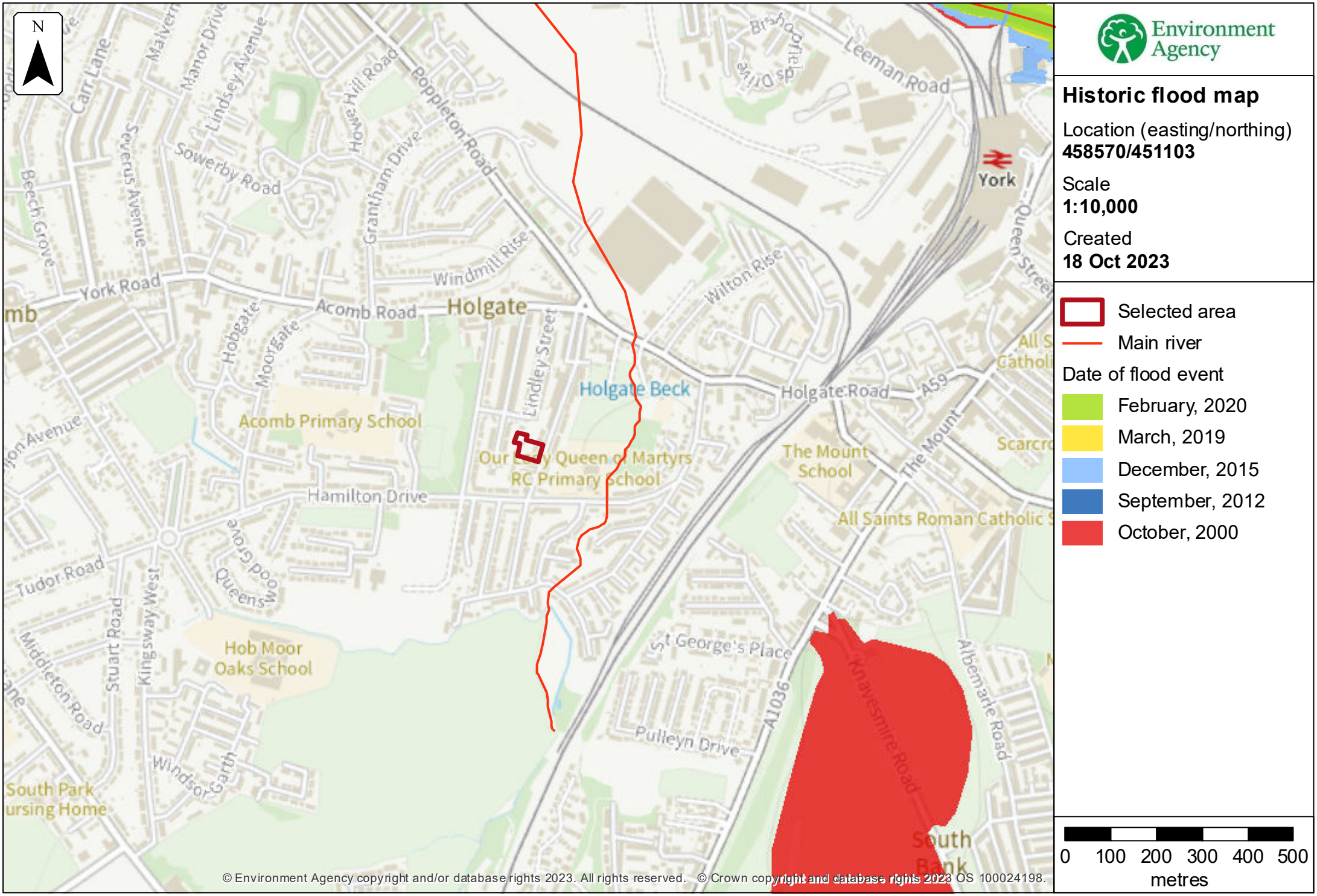
Historic flooding

This map is an indicative outline of areas that have previously flooded. Remember that:

- our records are incomplete, so the information here is based on the best available data
- it is possible not all properties within this area will have flooded
- other flooding may have occurred that we do not have records for
- flooding can come from a range of different sources - we can only supply flood risk data relating to flooding from rivers or the sea

You can also 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.

Download recorded flood outlines in GIS format


N
Environment Agency
Historic flood map
Location (easting/northing)
458570/451103
Scale
1:10,000
Created
18 Oct 2023
Selected area
Main river
Date of flood event
February, 2020
March, 2019
December, 2015
September, 2012
October, 2000
0 100 200 300 400 500
metres
Holgate
Holgate Beck
Acomb Primary School
Our Lady Queen of Martyrs RC Primary School
The Mount School
All Saints Roman Catholic
Hob Moor Oaks School
South Park Nursing Home
York
Holgate Road
Acomb Road
York Road
Hamilton Drive
Tudor Road
Pulleyn Drive
St George's Place
Knavesmire Road
A1036
A59
Leeman Road
Queen Street
Lindley Street
Windmill Rise
Wilton Rise
Sowerby Road
Poppleton Road
Grantham Drive
Howe Hill Road
Lindsey Avenue
Manor Drive
Carr Lane
Beech Grove
Severus Avenue
Hobgate
Moorgate
Albemarle Road
The Mount
Middleton Road
Stuart Road
Kingsway West
Windsor Garth
Queens Grove
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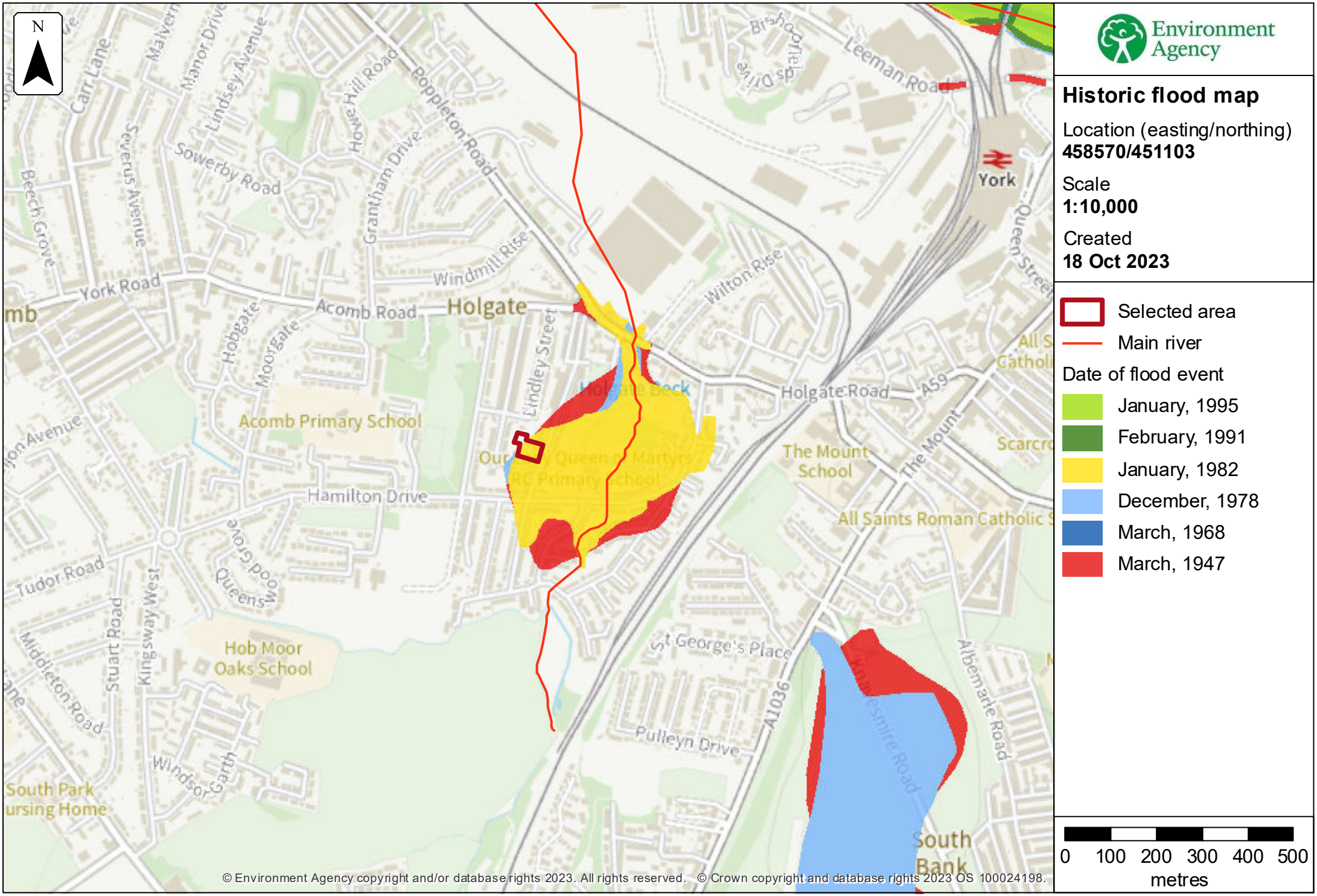
N
Environment Agency
Historic flood map
Location (easting/northing)
458570/451103
Scale
1:10,000
Created
18 Oct 2023
Selected area
Main river
Date of flood event
January, 1995
February, 1991
January, 1982
December, 1978
March, 1968
March, 1947
0 100 200 300 400 500
metres
Holgate
York Road
Acomb Road
Windmill Rise
Holgate Road
Acomb Primary School
Hamilton Drive
Hob Moor Oaks School
The Mount School
All Saints Roman Catholic
South Bank
Pulleyn Drive
St George's Place
Leeman Road
York
Poppleton Road
Sowerby Road
Tudor Road
Middleton Road
Windsor Garth
Lindley Street
Wilton Rise
Queen Street
A59
A1036
Albemarle Road
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Historic flood event data

Start date	End date	Source of flood	Cause of flood	Affects location
15 February 2020	19 March 2020	ordinary watercourse	channel capacity exceeded (no raised defences)	No
8 February 2020	14 February 2020	main river	channel capacity exceeded (no raised defences)	No
14 March 2019	17 March 2019	main river	unknown	No
25 December 2015	29 December 2015	main river	channel capacity exceeded (no raised defences)	No
24 September 2012	29 September 2012	main river	channel capacity exceeded (no raised defences)	No
30 October 2000	15 November 2000	unknown	overtopping of defences	No
28 January 1995	4 February 1995	unknown	overtopping of defences	No
21 February 1991	27 February 1991	unknown	overtopping of defences	No
3 January 1982	16 January 1982	unknown	overtopping of defences	Yes
24 December 1978	31 December 1978	main river	channel capacity exceeded (no raised defences)	Yes
24 March 1968	26 March 1968	main river	channel capacity exceeded (no raised defences)	No
20 March 1947	24 March 1947	main river	channel capacity exceeded (no raised defences)	Yes

Flood defences and attributes

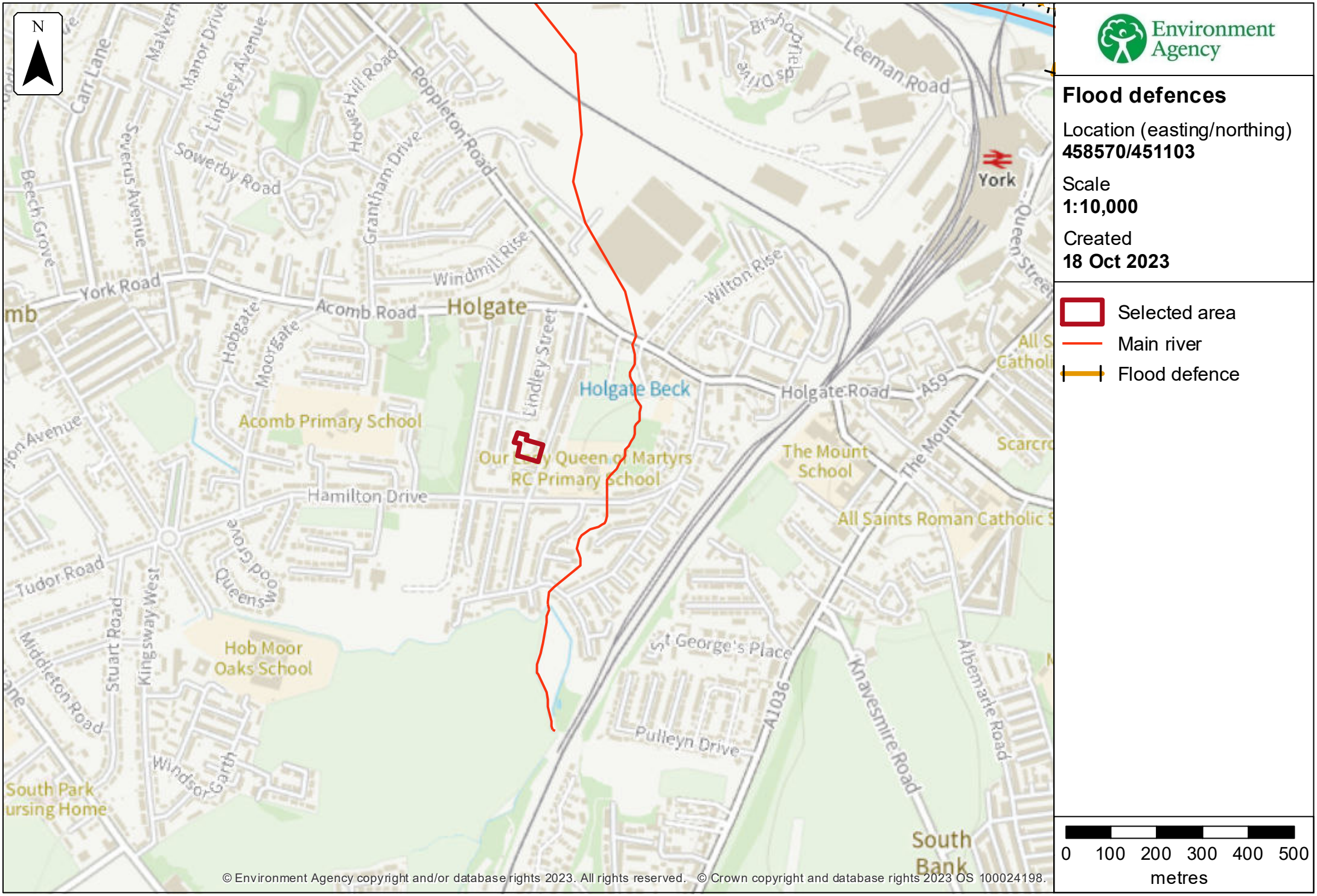
The flood defences map shows the location of the flood defences present.

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

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

Use this information:

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


N
Environment Agency
Flood defences
Location (easting/northing)
458570/451103
Scale
1:10,000
Created
18 Oct 2023
Selected area
Main river
Flood defence
0 100 200 300 400 500
metres
Holgate
Holgate Beck
Acomb Primary School
Our Lady Queen of Martyrs RC Primary School
Hob Moor Oaks School
The Mount School
All Saints Roman Catholic
South Park Nursing Home
South Bank
York
Carr Lane
Manor Drive
Lindsey Avenue
Severus Avenue
Howe Hill Road
Poppleton Road
Sowerby Road
Grantham Drive
Beech Grove
York Road
Windmill Rise
Acomb Road
Hobgate
Moorgate
Lindley Street
Wilton Rise
Leeman Road
Queen Street
Holgate Road
A59
The Mount
Hamilton Drive
Tudor Road
Queens Grove
Middleton Road
Stuart Road
Kingsway West
Windsor Garth
Pulleyn Drive
St George's Place
A1036
Knavesmire Road
Albemarle Road
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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	329371	Flood Gate		Good	10.61	10.61	
2	329370	Flood Gate		Very good	10.64	10.63	
3	757317	Wall		Fair			
4	757318	Wall		Fair			

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

Modelled data

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

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

Climate change

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

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

Modelled scenarios

The following scenarios are included:

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

Environment Agency

Defended modelled fluvial extent

Location (easting/northing)
458570/451103

Scale
1:10,000

Created
18 Oct 2023

Model name
2016 York Detailed Model

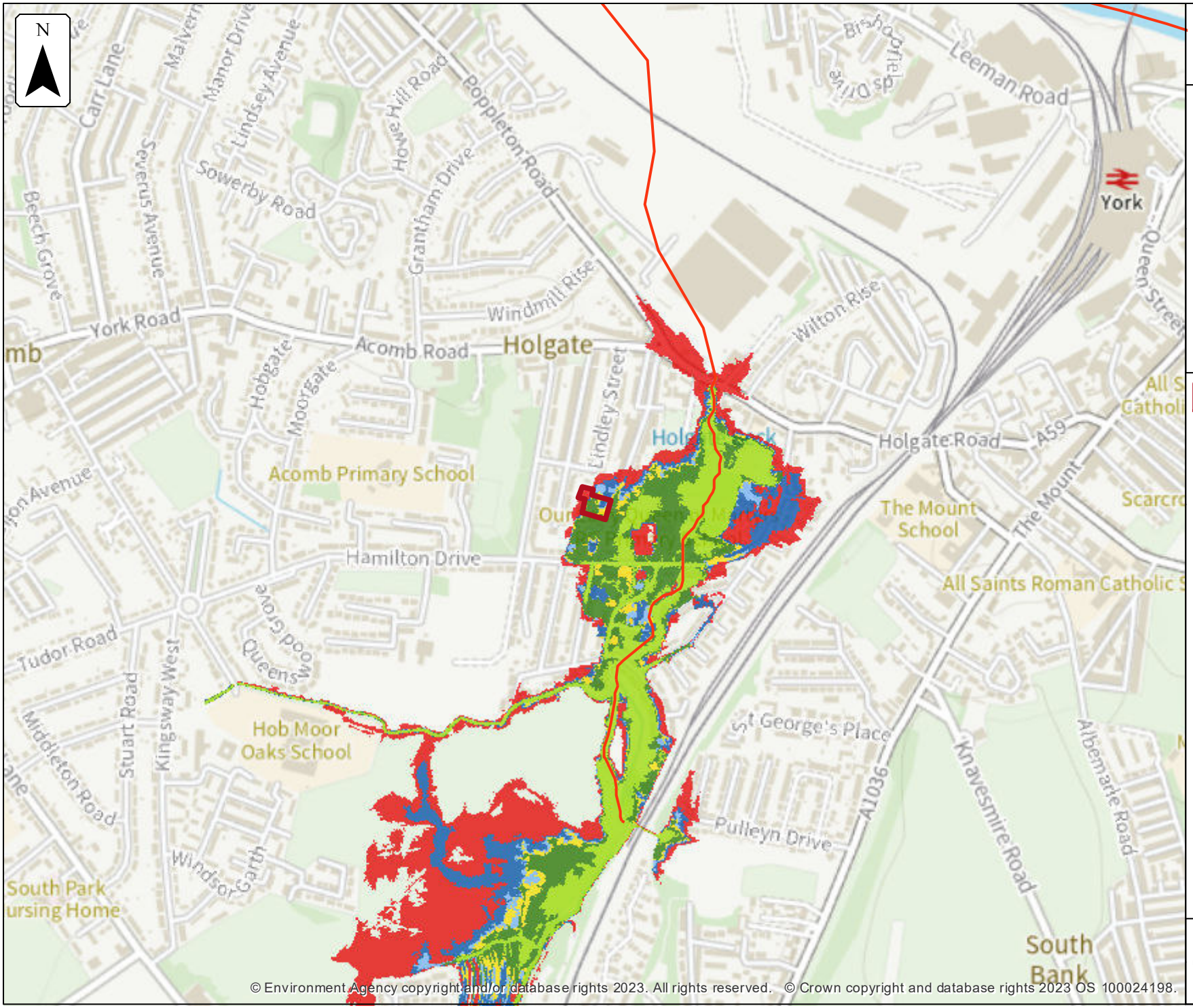
- Selected area
- Main river

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

0 100 200 300 400 500
metres



Environment Agency

Defended modelled fluvial extent

Location (easting/northing)
458570/451103

Scale
1:10,000

Created
18 Oct 2023

Model name
2016 Holgate Beck Modelling CoY

- Selected area
- Main river

Modelled flood extent

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

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

0 100 200 300 400 500
metres

Environment Agency

Defences removed modelled fluvial extent

Location (easting/northing)
458570/451103

Scale
1:10,000

Created
18 Oct 2023

Model name
2016 York Detailed Model

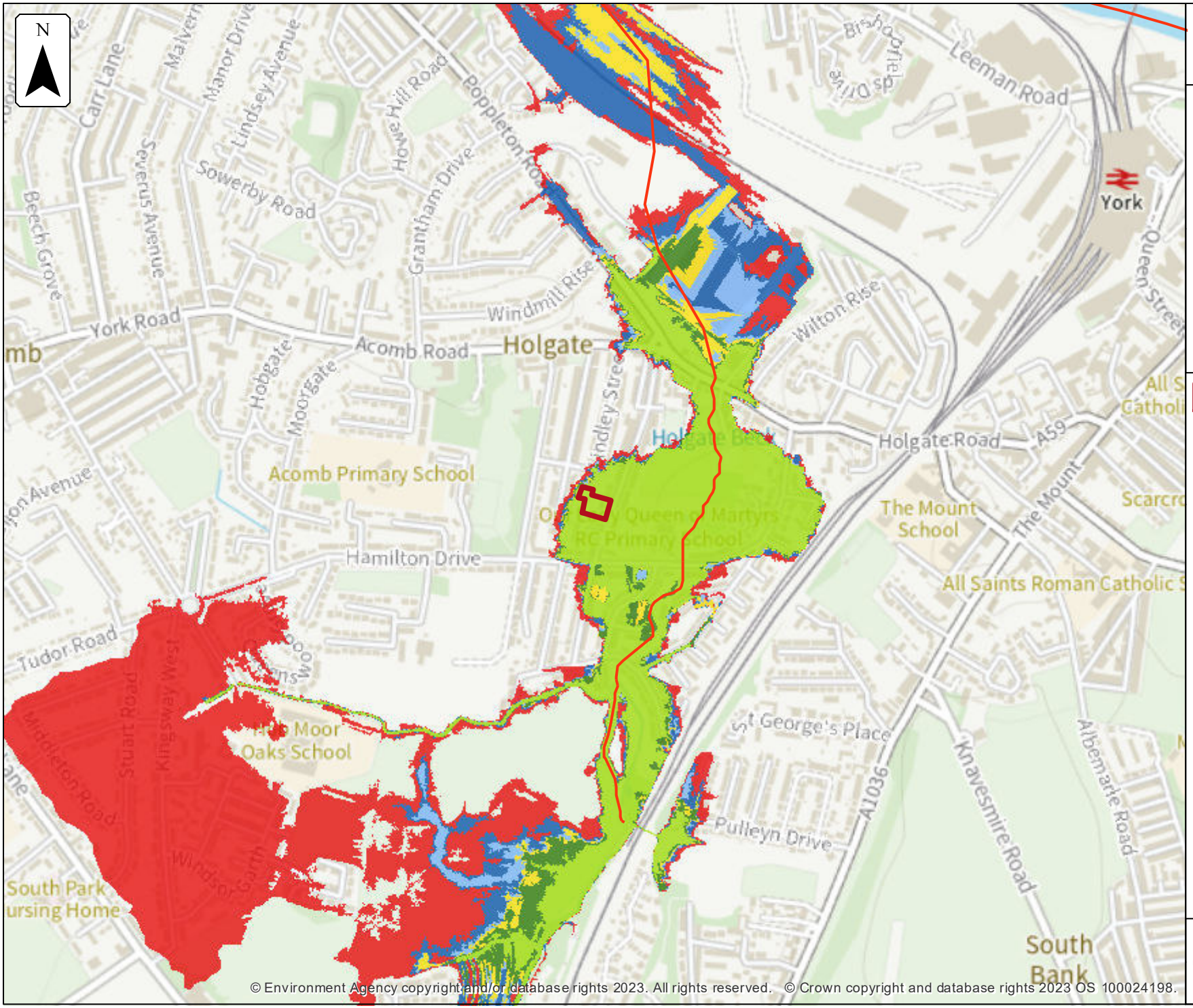
- Selected area
- Main river

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

0 100 200 300 400 500
metres



Environment Agency

Defences removed modelled fluvial extent

Location (easting/northing)
458570/451103

Scale
1:10,000

Created
18 Oct 2023

Model name
2016 Holgate Beck Modelling CoY

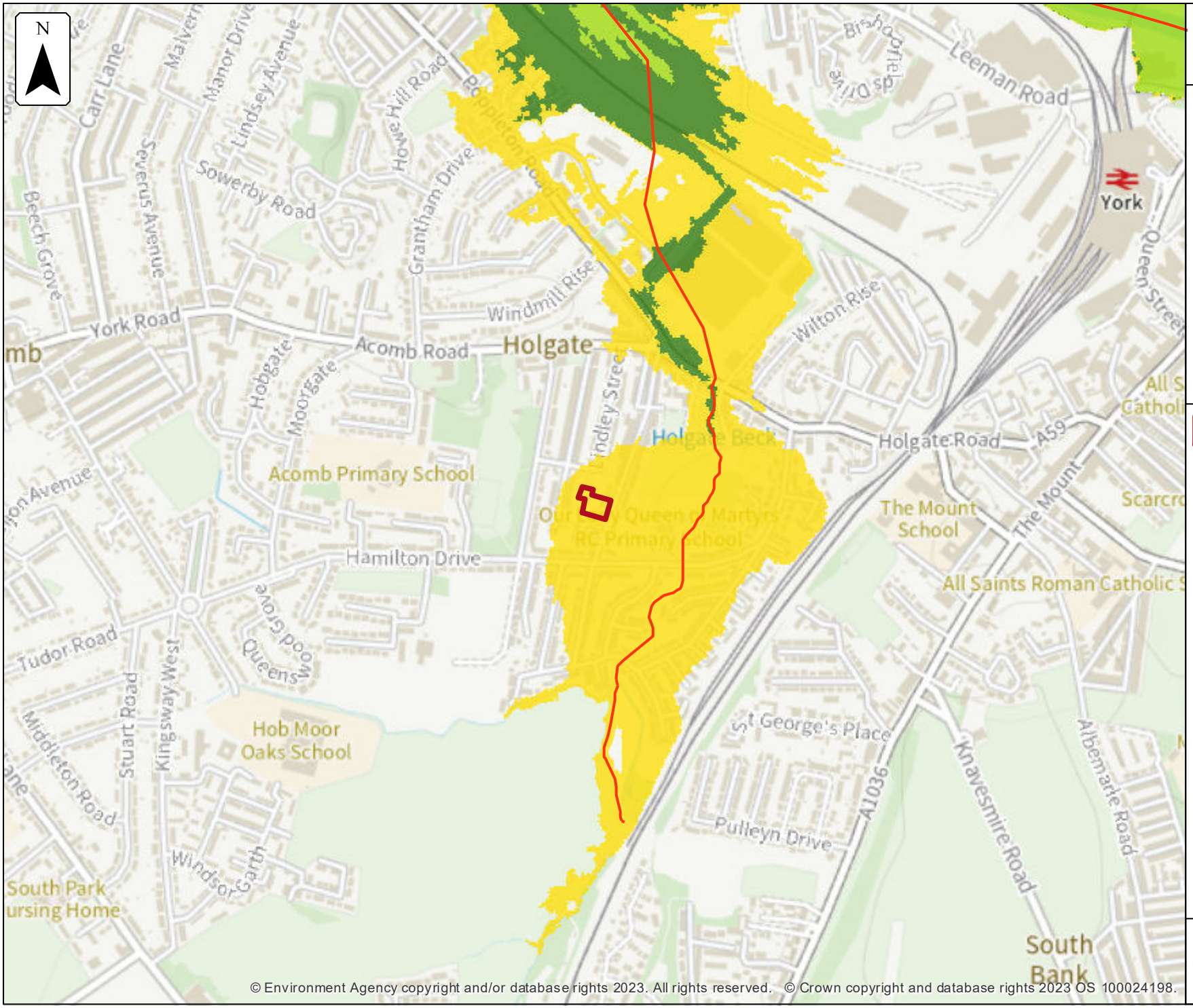
- Selected area
- Main river

Modelled flood extent

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

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

0 100 200 300 400 500
metres



Environment Agency

Defended climate change modelled fluvial extent

Location (easting/northing)
458570/451103

Scale
1:10,000

Created
18 Oct 2023

Model name
2016 York Detailed Model

- Selected area
- Main river

Modelled flood extent

- 1.0% AEP (+20%)
- 1.0% AEP (+30%)
- 1.0% AEP (+50%)

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

0 100 200 300 400 500
metres

Environment Agency

Defended climate change modelled fluvial extent

Location (easting/northing)
458570/451103

Scale
1:10,000

Created
18 Oct 2023

Model name
2016 Holgate Beck Modelling CoY

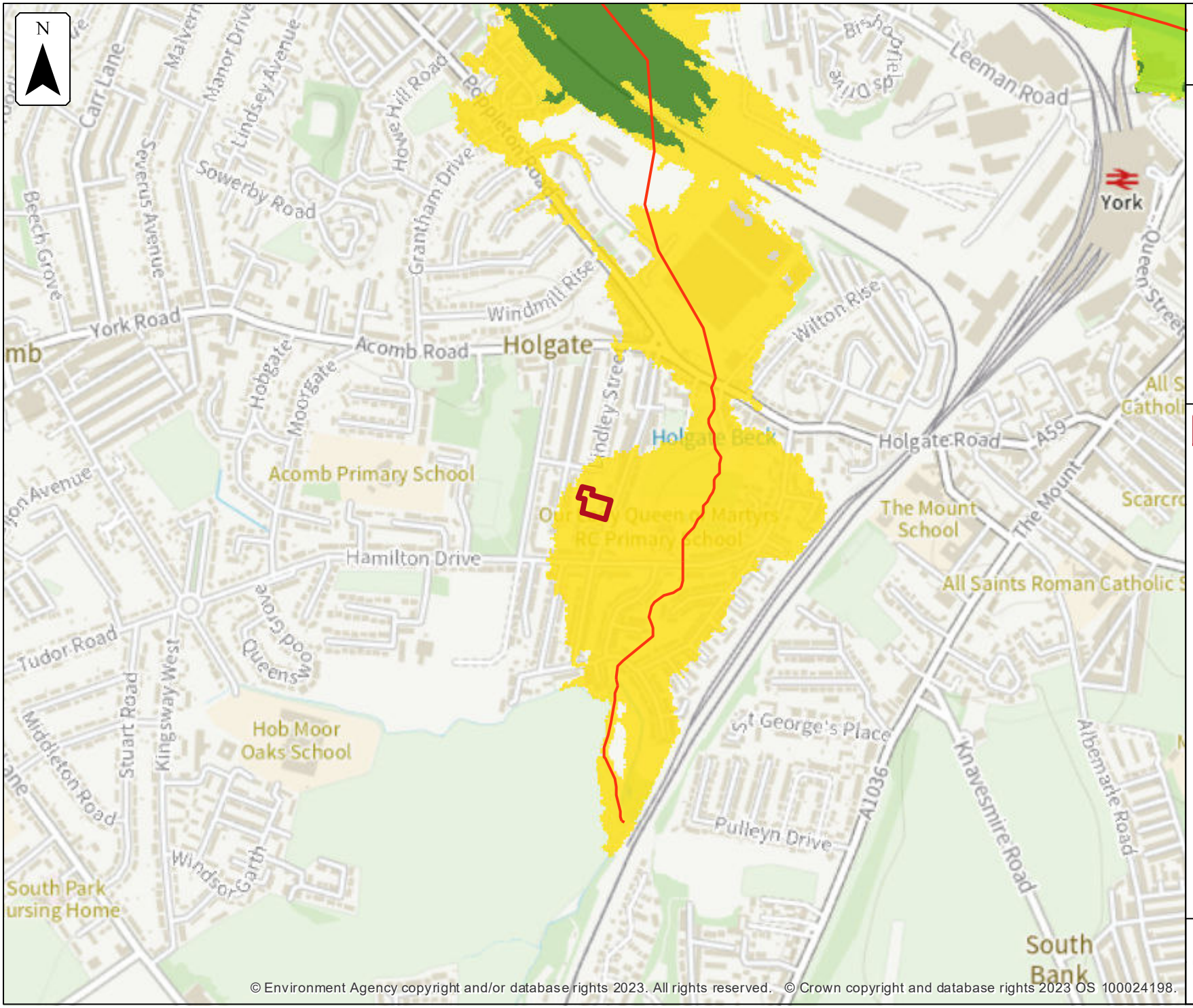
- Selected area
- Main river

Modelled flood extent

- 1.0% AEP (+20%)
- 1.0% AEP (+30%)
- 1.0% AEP (+50%)

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)
458570/451103

Scale
1:10,000

Created
18 Oct 2023

Model name
2016 York Detailed Model

Selected area

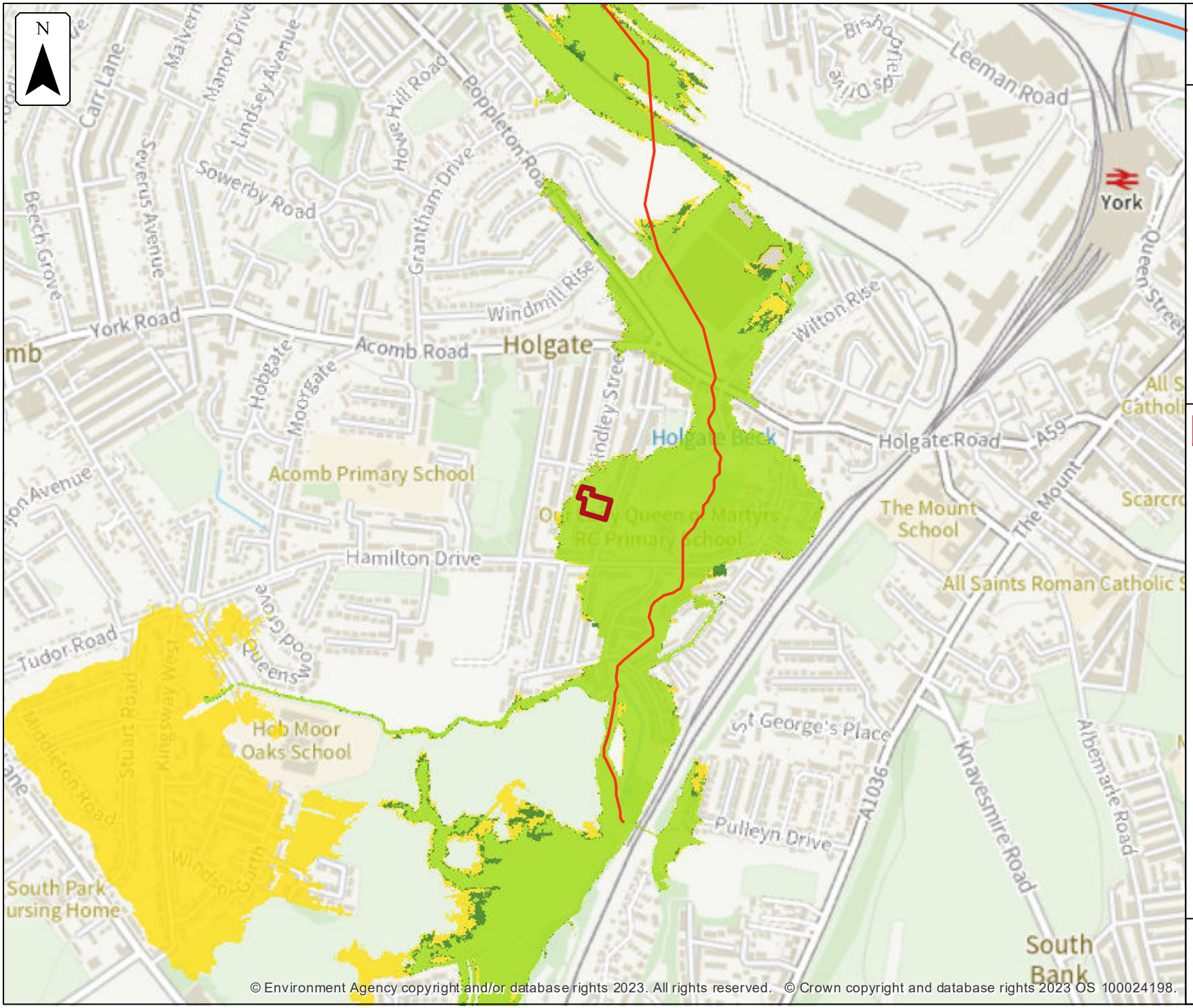
Main river

Modelled flood extent

- 1.0% AEP (+20%)
- 1.0% AEP (+30%)
- 1.0% AEP (+50%)

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)
458570/451103

Scale
1:10,000

Created
18 Oct 2023

Model name
2016 Holgate Beck Modelling CoY

- Selected area
- Main river

Modelled flood extent

- 1.0% AEP (+20%)
- 1.0% AEP (+30%)
- 1.0% AEP (+50%)

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

0 100 200 300 400 500
metres

Environment Agency

Defended modelled fluvial node locations

Location (easting/northing)
458570/451103

Scale
1:10,000

Created
18 Oct 2023

Model name
2016 York Detailed Model

- Selected area
- Modelled location
- Main river

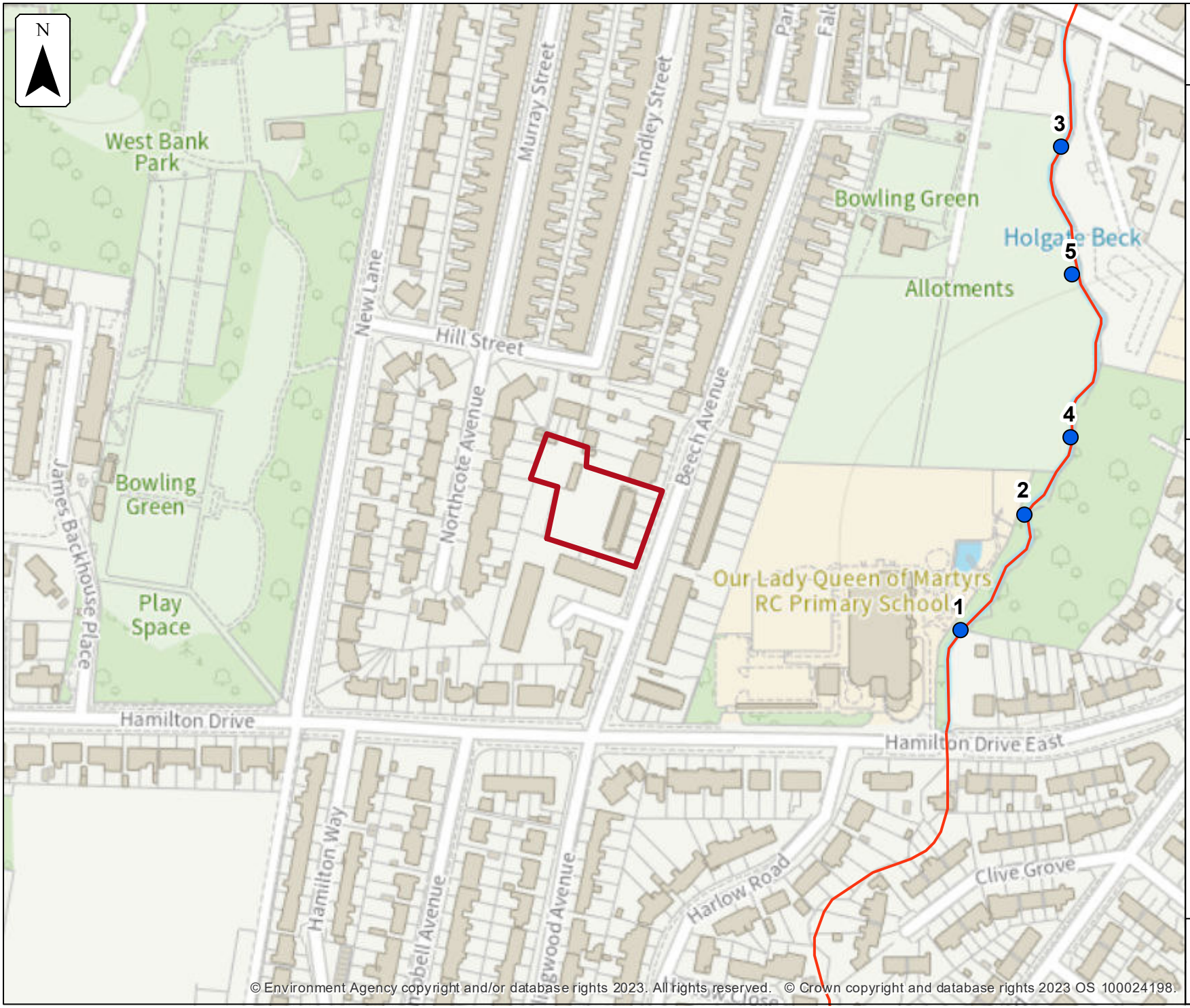
0 100 200 300 400 500
metres

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	730819	459611	452052	10.08	511.35	10.39	569.11	10.47	592.20	10.58	608.13	6.81	102.92	11.42	778.81
2	730818	459620	452057	10.05	512.43	6.80	102.92	6.80	103.16	10.50	608.13	6.80	102.92	6.81	105.42

Data in this table comes from the 2016 York Detailed 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 node locations

Location (easting/northing)
458570/451103

Scale
1:2,500

Created
18 Oct 2023

Model name
2016 Holgate Beck Modelling CoY

Selected area
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	1170587	458748	451041	9.72	4.48	9.98	5.80	10.07	6.46	10.14	6.99	10.33	8.44	10.87	12.42
2	1170550	458780	451098	9.71	3.85	9.98	4.08	10.07	4.16	10.14	4.23	10.33	4.38	10.87	5.97
3	1170607	458797	451277	9.70	3.20	9.98	3.12	10.07	3.06	10.14	3.05	10.32	2.96	10.86	3.08
4	1170563	458802	451135	9.71	2.84	9.98	2.89	10.07	2.90	10.14	2.90	10.33	3.03	10.87	4.29
5	1170567	458803	451215	9.71	3.47	9.98	3.55	10.07	3.62	10.14	3.67	10.33	3.72	10.87	3.68

Data in this table comes from the 2016 Holgate Beck Modelling CoY 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)
458570/451103

Scale
1:10,000

Created
18 Oct 2023

Model name
2016 York Detailed Model

- Selected area
- Modelled location
- Main river

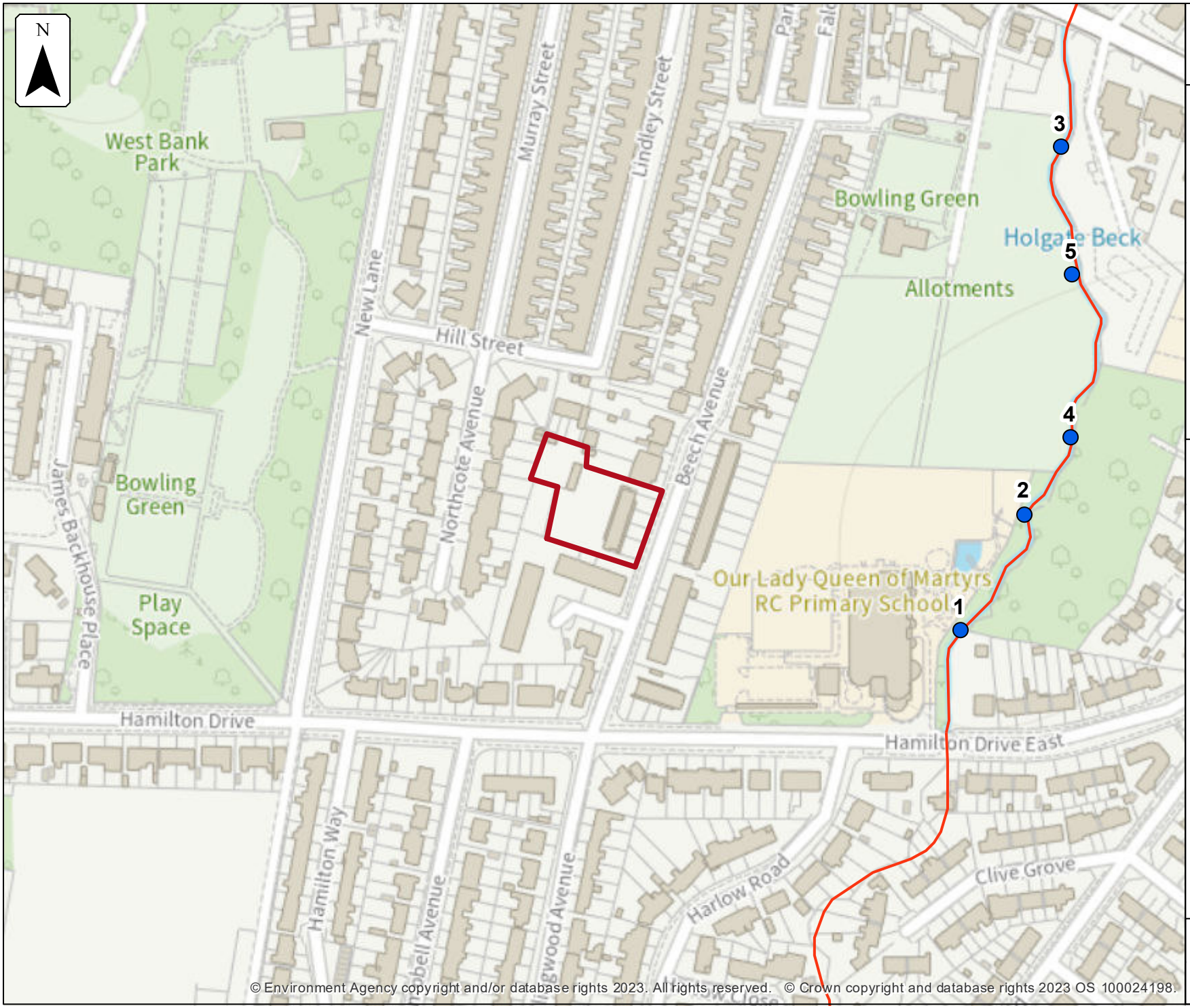
0 100 200 300 400 500
metres

Modelled node locations data

Defences removed

Label	Modelled location ID	Easting	Northing	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	730819	459611	452052	10.05	510.19	10.32	562.40	10.44	586.72	10.52	603.60	10.76	652.85	11.37	781.26
2	730818	459620	452057	10.0	510.19	10.26	562.40	10.37	586.72	10.45	603.60	10.68	652.85	11.25	781.26

Data in this table comes from the 2016 York Detailed 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)
458570/451103

Scale
1:2,500

Created
18 Oct 2023

Model name
2016 Holgate Beck Modelling CoY

Selected area
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	1170587	458748	451041	11.41	3.47	11.52	4.52	11.58	5.09	11.62	5.52	11.71	6.82	11.98	11.57
2	1170550	458780	451098	11.41	2.46	11.52	3.19	11.58	3.72	11.62	4.14	11.71	5.33	11.98	8.74
3	1170607	458797	451277	11.41	1.76	11.52	2.66	11.58	3.20	11.62	3.64	11.71	4.88	11.98	8.62
4	1170563	458802	451135	11.41	2.05	11.52	2.79	11.58	3.30	11.62	3.74	11.71	4.99	11.98	8.51
5	1170567	458803	451215	11.41	1.82	11.52	2.69	11.58	3.23	11.62	3.67	11.71	4.92	11.98	8.71

Data in this table comes from the 2016 Holgate Beck Modelling CoY 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 climate change modelled fluvial node locations

Location (easting/northing)
458570/451103

Scale
1:10,000

Created
18 Oct 2023

Model name
2016 York Detailed Model

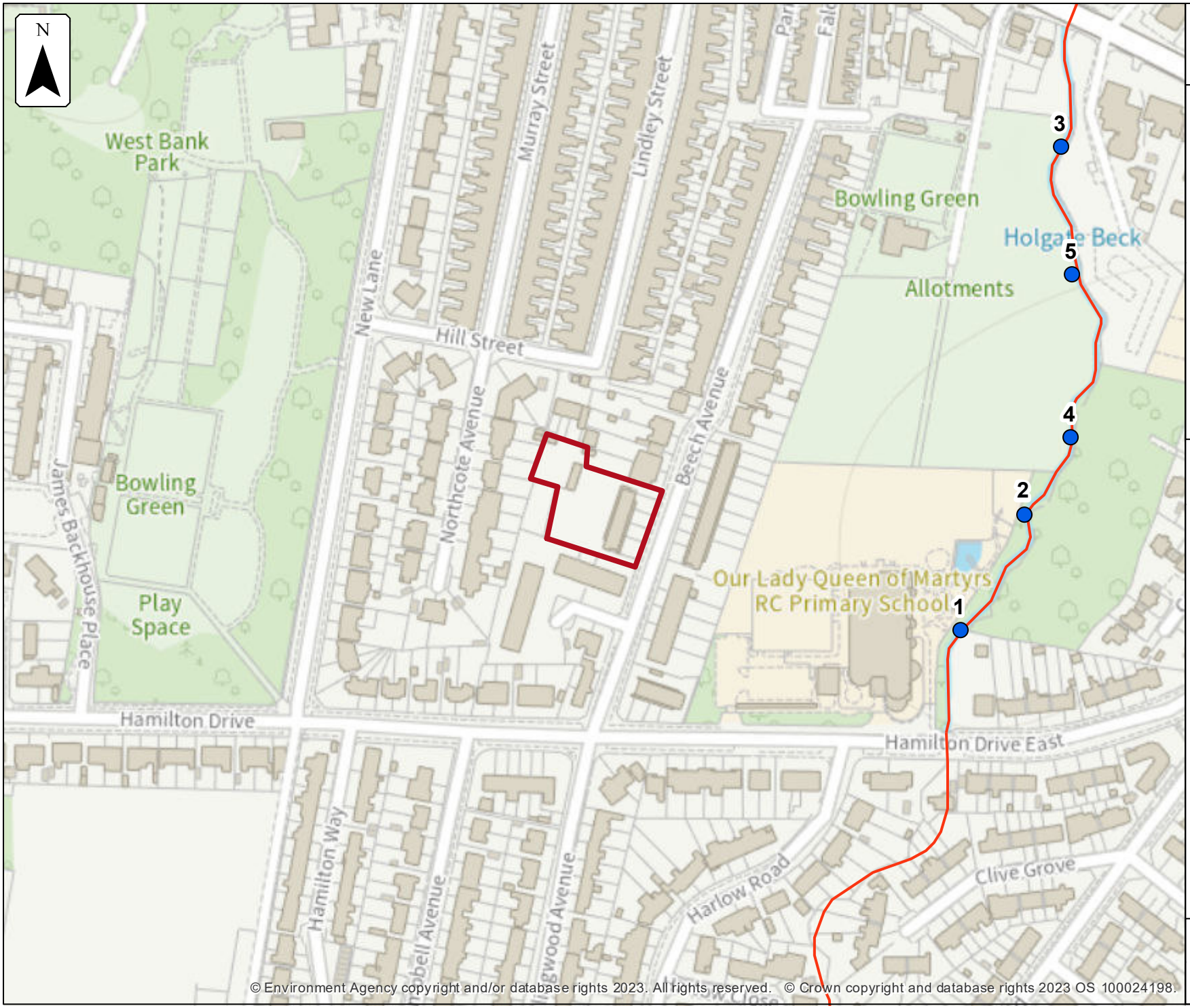
Selected area
Modelled location
Main river

Modelled node locations data

Defended climate change

Label	Modelled location ID	Easting	Northing	1.0% AEP (+20%)		1.0% AEP (+30%)		1.0% AEP (+50%)	
				Level	Flow	Level	Flow	Level	Flow
1	730819	459611	452052	6.81	102.92	11.31	759.72	12.02	862.48
2	730818	459620	452057	6.80	102.92	11.19	759.72	11.65	862.48

Data in this table comes from the 2016 York Detailed 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 climate change modelled fluvial node locations

Location (easting/northing)
458570/451103

Scale
1:2,500

Created
18 Oct 2023

Model name
2016 Holgate Beck Modelling CoY

- Selected area
- Modelled location
- Main river

0 25 50 75 100
metres

Modelled node locations data

Defended climate change

Label	Modelled location ID	Easting	Northing	1.0% AEP (+20%)		1.0% AEP (+30%)		1.0% AEP (+50%)	
				Level	Flow	Level	Flow	Level	Flow
1	1170587	458748	451041	10.31	8.32	10.39	8.97	10.55	10.15
2	1170550	458780	451098	10.31	4.37	10.39	4.44	10.55	4.84
3	1170607	458797	451277	10.31	2.99	10.39	2.95	10.55	2.95
4	1170563	458802	451135	10.31	2.99	10.39	3.23	10.55	3.65
5	1170567	458803	451215	10.31	3.74	10.39	3.78	10.55	3.83

Data in this table comes from the 2016 Holgate Beck Modelling CoY 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)
458570/451103

Scale
1:10,000

Created
18 Oct 2023

Model name
2016 York Detailed Model

- Selected area
- Modelled location
- Main river

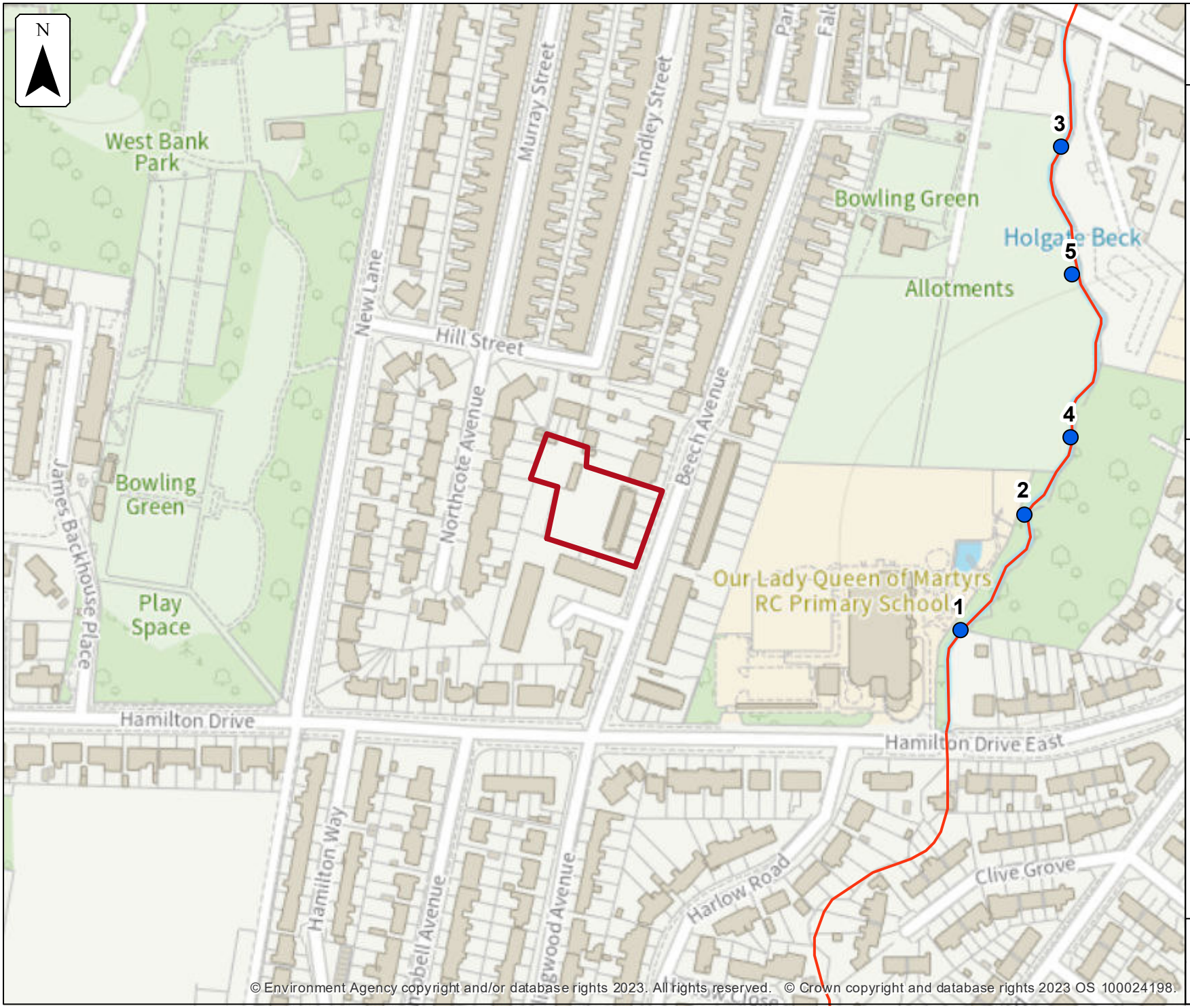
0 100 200 300 400 500
metres

Modelled node locations data

Defences removed climate change

Label	Modelled location ID	Easting	Northing	1.0% AEP (+20%)		1.0% AEP (+30%)		1.0% AEP (+50%)	
				Level	Flow	Level	Flow	Level	Flow
1	730819	459611	452052	11.05	716.10	11.28	765.97	11.93	869.20
2	730818	459620	452057	10.95	716.10	11.16	765.97	11.60	869.20

Data in this table comes from the 2016 York Detailed 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)
458570/451103

Scale
1:2,500

Created
18 Oct 2023

Model name
2016 Holgate Beck Modelling CoY

- Selected area
- Modelled location
- Main river

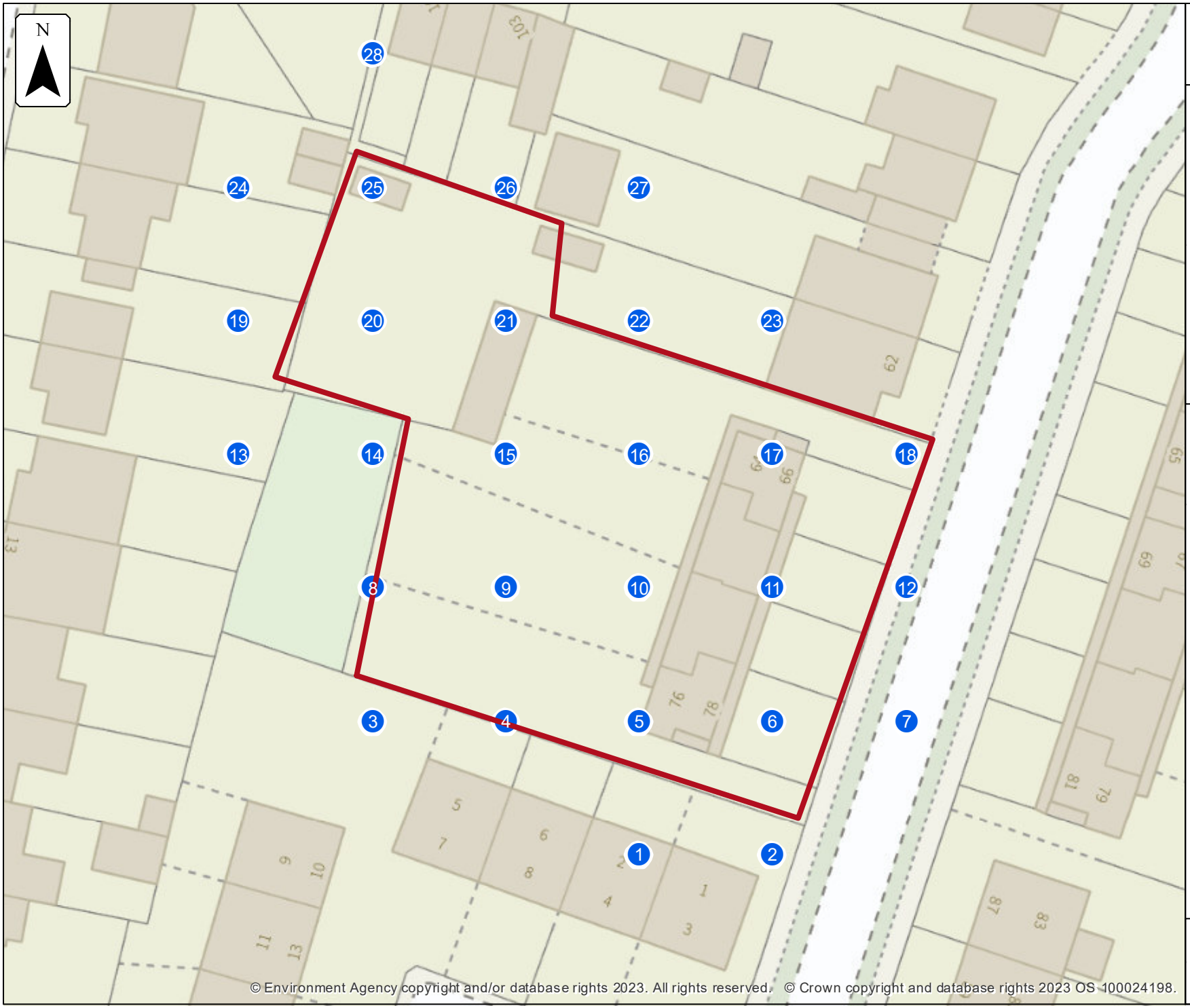
0 25 50 75 100
metres

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%)	
				Level	Flow	Level	Flow	Level	Flow
1	1170587	458748	451041	11.70	6.72	11.74	7.35	11.82	8.65
2	1170550	458780	451098	11.70	5.23	11.74	5.75	11.82	6.71
3	1170607	458797	451277	11.70	4.76	11.74	5.32	11.82	6.39
4	1170563	458802	451135	11.70	4.88	11.74	5.43	11.82	6.47
5	1170567	458803	451215	11.70	4.80	11.74	5.36	11.82	6.45

Data in this table comes from the 2016 Holgate Beck Modelling CoY 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)
458570/451103

Scale
1:500

Created
18 Oct 2023

Model name
2016 York Detailed Model

Selected area

Main river

Modelled 2D grid

Water level in mAOD

- 0 - 31
- 31 - 31.5
- 31.5 - 32
- 32 - 32.5
- 32.5 - 33
- 33 - 33.5
- 33.5 - 34
- 34 - 34.5
- 34.5 - 35

This map shows the 0.1% AEP height data

0 5 10 15 20
metres

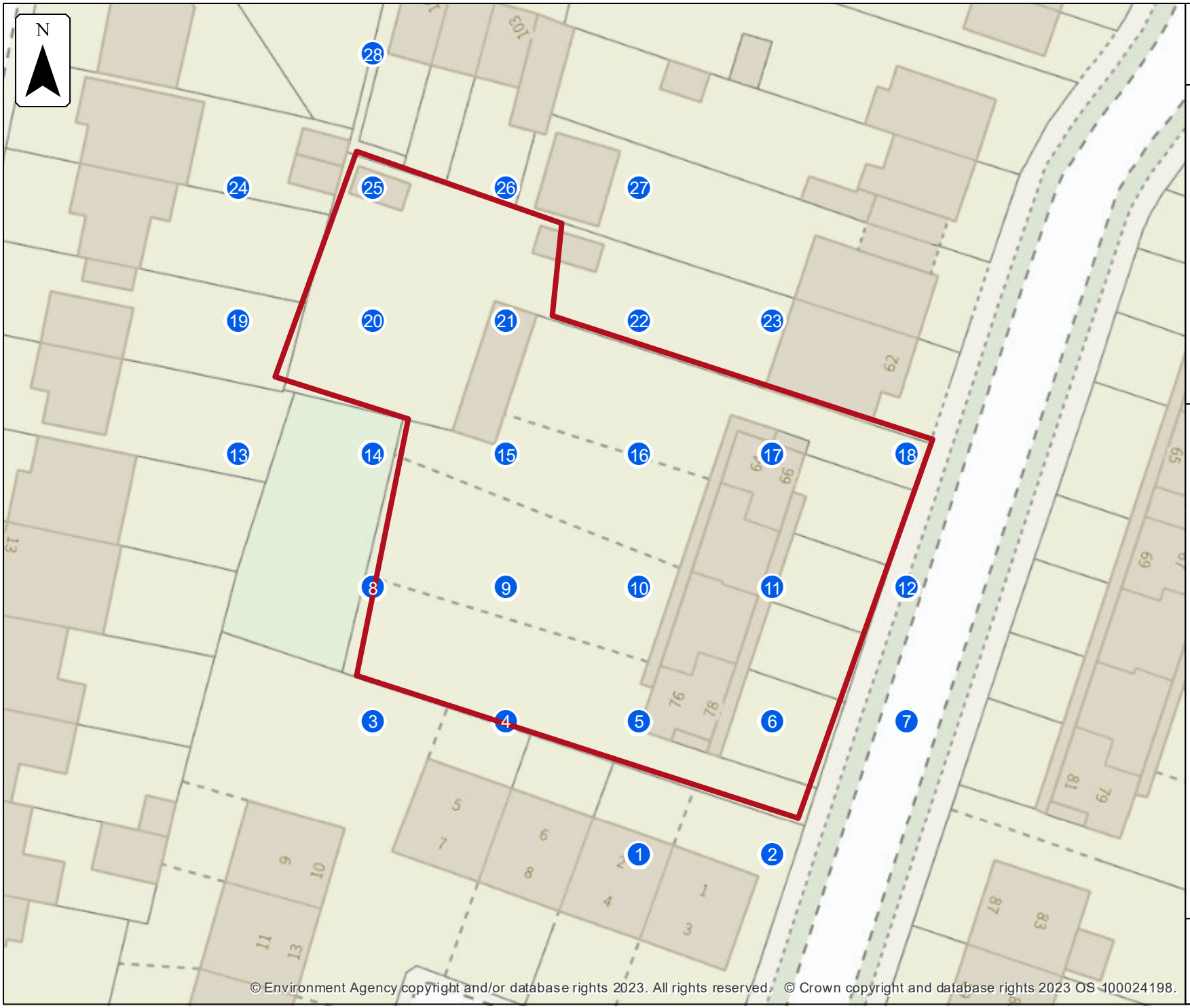
Sample point data

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	458574	451069	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
2	458587	451069	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
3	458548	451082	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
4	458561	451082	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
5	458574	451082	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
6	458587	451082	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
7	458600	451082	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
8	458548	451095	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
9	458561	451095	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
10	458574	451095	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
11	458587	451095	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
12	458600	451095	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
13	458535	451108	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
14	458548	451108	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
15	458561	451108	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
16	458574	451108	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	458587	451108	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
18	458600	451108	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
19	458535	451121	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
20	458548	451121	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
21	458561	451121	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
22	458574	451121	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
23	458587	451121	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
24	458535	451134	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
25	458548	451134	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
26	458561	451134	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
27	458574	451134	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
28	458548	451147	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData

Data in this table comes from the 2016 York Detailed 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 modelled fluvial extent and height

Location (easting/northing)
458570/451103

Scale
1:500

Created
18 Oct 2023

Model name
2016 York Detailed Model

Selected area

Main river

Modelled 2D grid

Water level in mAOD

- 0 - 31
- 31 - 31.5
- 31.5 - 32
- 32 - 32.5
- 32.5 - 33
- 33 - 33.5
- 33.5 - 34
- 34 - 34.5
- 34.5 - 35

This map shows the 0.1% AEP height data

0 5 10 15 20
metres

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	458574	451069	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
2	458587	451069	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
3	458548	451082	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
4	458561	451082	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
5	458574	451082	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
6	458587	451082	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
7	458600	451082	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
8	458548	451095	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
9	458561	451095	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
10	458574	451095	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
11	458587	451095	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
12	458600	451095	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
13	458535	451108	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
14	458548	451108	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
15	458561	451108	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
16	458574	451108	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	458587	451108	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
18	458600	451108	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
19	458535	451121	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
20	458548	451121	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
21	458561	451121	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
22	458574	451121	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
23	458587	451121	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
24	458535	451134	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
25	458548	451134	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
26	458561	451134	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
27	458574	451134	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
28	458548	451147	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData

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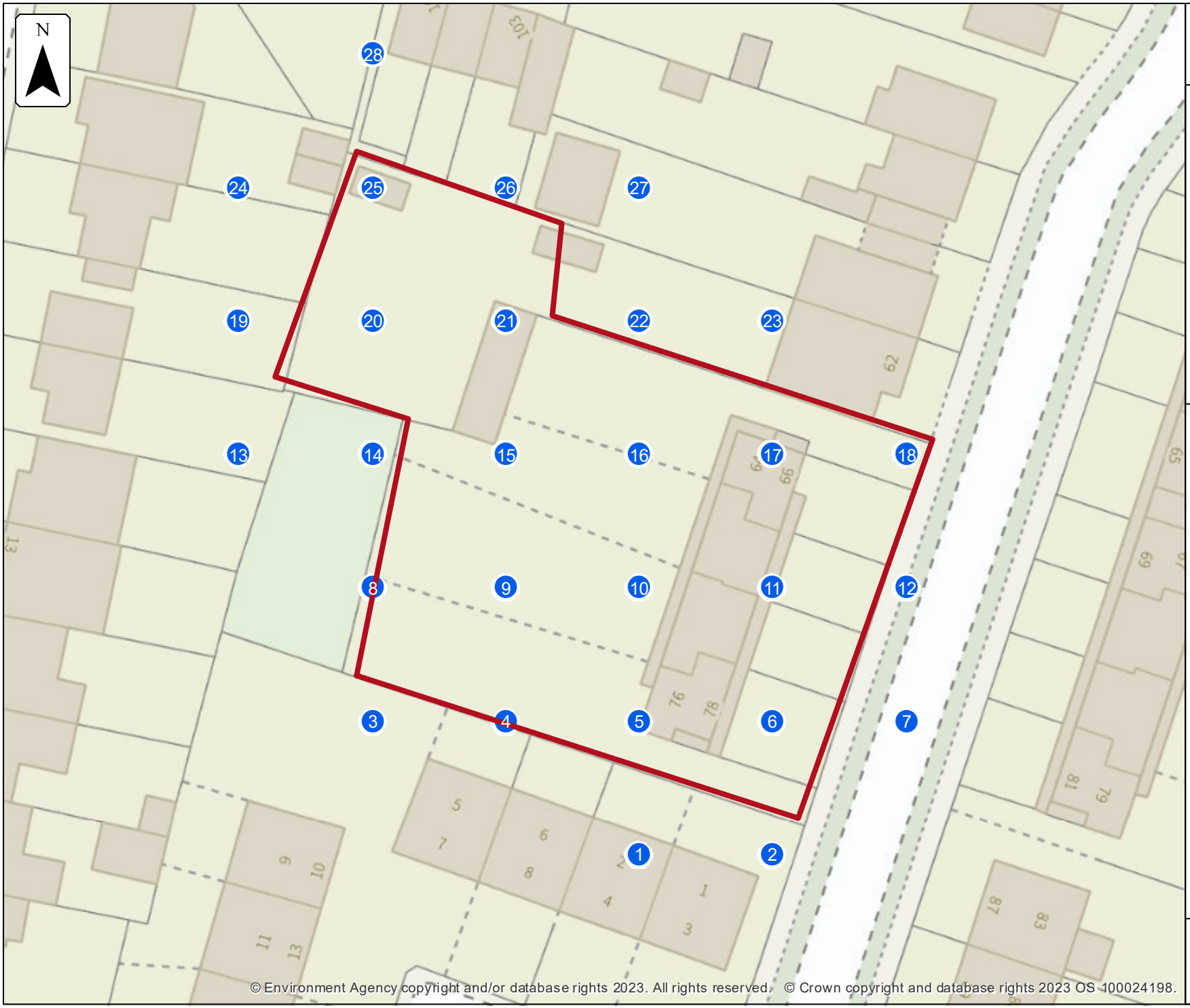


Environment Agency

Defended climate change modelled fluvial extent and height

Location (easting/northing)
458570/451103

Scale
1:500

Created
18 Oct 2023

Model name
2016 York Detailed Model

Selected area

Main river

Modelled 2D grid
Water level in mAOD

- 0 - 12.0
- 12.0 - 12.125
- 12.125 - 12.25
- 12.25 - 12.375
- 12.375 - 12.5
- 12.5 - 12.625
- 12.625 - 12.75
- 12.75 - 12.875
- 12.875 - 13.0

This map shows the 1.0% AEP +50% height data

0 5 10 15 20
metres

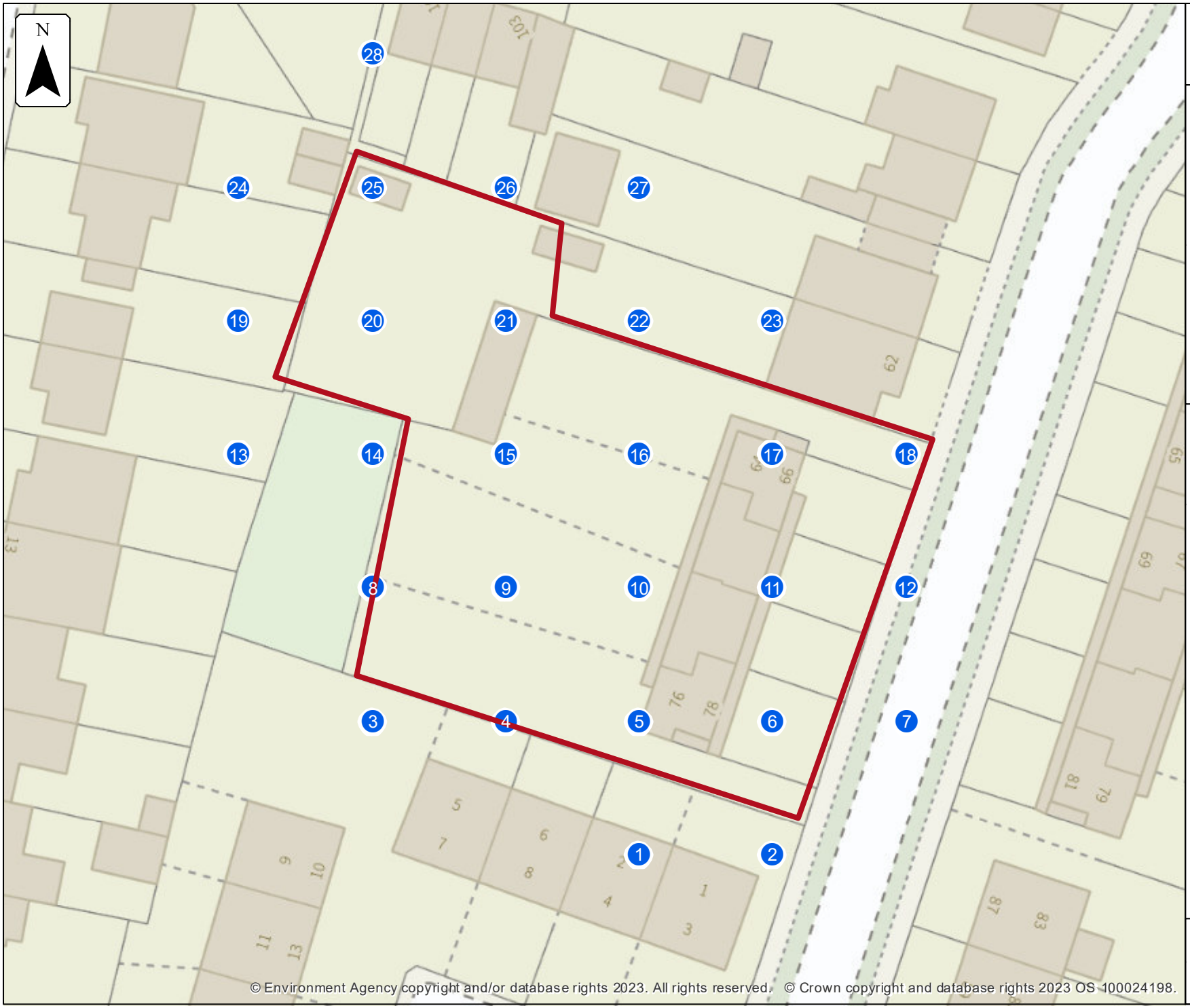
Sample point data

Defended climate change

Label	Easting	Northing	1% AEP (+20%)		1% AEP (+30%)		1% AEP (+50%)	
			Depth	Height	Depth	Height	Depth	Height
1	458574	451069	NoData	NoData	NoData	NoData	2.63	12.42
2	458587	451069	NoData	NoData	NoData	NoData	2.58	12.42
3	458548	451082	NoData	NoData	NoData	NoData	2.42	12.42
4	458561	451082	NoData	NoData	NoData	NoData	2.64	12.42
5	458574	451082	NoData	NoData	NoData	NoData	2.50	12.42
6	458587	451082	NoData	NoData	NoData	NoData	2.47	12.42
7	458600	451082	NoData	NoData	NoData	NoData	2.69	12.42
8	458548	451095	NoData	NoData	NoData	NoData	2.27	12.42
9	458561	451095	NoData	NoData	NoData	NoData	2.59	12.42
10	458574	451095	NoData	NoData	NoData	NoData	2.58	12.42
11	458587	451095	NoData	NoData	NoData	NoData	2.34	12.42
12	458600	451095	NoData	NoData	NoData	NoData	2.64	12.42
13	458535	451108	NoData	NoData	NoData	NoData	1.63	12.42
14	458548	451108	NoData	NoData	NoData	NoData	2.16	12.42
15	458561	451108	NoData	NoData	NoData	NoData	2.46	12.42
16	458574	451108	NoData	NoData	NoData	NoData	2.52	12.42

Label	Easting	Northing	1% AEP (+20%)		1% AEP (+30%)		1% AEP (+50%)	
			Depth	Height	Depth	Height	Depth	Height
17	458587	451108	NoData	NoData	NoData	NoData	2.24	12.42
18	458600	451108	NoData	NoData	NoData	NoData	2.46	12.42
19	458535	451121	NoData	NoData	NoData	NoData	1.29	12.42
20	458548	451121	NoData	NoData	NoData	NoData	1.68	12.42
21	458561	451121	NoData	NoData	NoData	NoData	2.35	12.42
22	458574	451121	NoData	NoData	NoData	NoData	2.49	12.42
23	458587	451121	NoData	NoData	NoData	NoData	2.33	12.42
24	458535	451134	NoData	NoData	NoData	NoData	1.11	12.42
25	458548	451134	NoData	NoData	NoData	NoData	1.40	12.42
26	458561	451134	NoData	NoData	NoData	NoData	2.01	12.42
27	458574	451134	NoData	NoData	NoData	NoData	2.33	12.42
28	458548	451147	NoData	NoData	NoData	NoData	0.82	12.42

Data in this table comes from the 2016 York Detailed 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)
458570/451103

Scale
1:500

Created
18 Oct 2023

Model name
2016 York Detailed Model

Selected area

Main river

Modelled 2D grid
Water level in mAOD

- 0 - 12.0
- 12.0 - 12.125
- 12.125 - 12.25
- 12.25 - 12.375
- 12.375 - 12.5
- 12.5 - 12.625
- 12.625 - 12.75
- 12.75 - 12.875
- 12.875 - 13.0

This map shows the 1.0% AEP +50% height data

0 5 10 15 20
metres

Sample point data

Defences removed climate change

Label	Easting	Northing	1% AEP (+20%)		1% AEP (+30%)		1% AEP (+50%)	
			Depth	Height	Depth	Height	Depth	Height
1	458574	451069	NoData	NoData	NoData	NoData	2.45	12.17
2	458587	451069	NoData	NoData	NoData	NoData	2.34	12.17
3	458548	451082	NoData	NoData	NoData	NoData	2.26	12.17
4	458561	451082	NoData	NoData	NoData	NoData	2.35	12.17
5	458574	451082	NoData	NoData	NoData	NoData	2.30	12.17
6	458587	451082	NoData	NoData	NoData	NoData	2.26	12.17
7	458600	451082	NoData	NoData	NoData	NoData	2.42	12.17
8	458548	451095	NoData	NoData	NoData	NoData	2.09	12.17
9	458561	451095	NoData	NoData	NoData	NoData	2.31	12.17
10	458574	451095	NoData	NoData	NoData	NoData	2.30	12.17
11	458587	451095	NoData	NoData	NoData	NoData	2.15	12.17
12	458600	451095	NoData	NoData	NoData	NoData	2.30	12.17
13	458535	451108	NoData	NoData	NoData	NoData	1.25	12.17
14	458548	451108	NoData	NoData	NoData	NoData	1.94	12.17
15	458561	451108	NoData	NoData	NoData	NoData	2.26	12.17
16	458574	451108	NoData	NoData	NoData	NoData	2.24	12.17

Label	Easting	Northing	1% AEP (+20%)		1% AEP (+30%)		1% AEP (+50%)	
			Depth	Height	Depth	Height	Depth	Height
17	458587	451108	NoData	NoData	NoData	NoData	2.01	12.17
18	458600	451108	NoData	NoData	NoData	NoData	2.14	12.17
19	458535	451121	NoData	NoData	NoData	NoData	0.83	12.17
20	458548	451121	NoData	NoData	NoData	NoData	1.52	12.17
21	458561	451121	NoData	NoData	NoData	NoData	2.11	12.17
22	458574	451121	NoData	NoData	NoData	NoData	2.24	12.17
23	458587	451121	NoData	NoData	NoData	NoData	2.07	12.17
24	458535	451134	NoData	NoData	NoData	NoData	0.62	12.17
25	458548	451134	NoData	NoData	NoData	NoData	1.02	12.17
26	458561	451134	NoData	NoData	NoData	NoData	1.55	12.17
27	458574	451134	NoData	NoData	NoData	NoData	2.07	12.17
28	458548	451147	NoData	NoData	NoData	NoData	0.59	12.17

Data in this table comes from the 2016 York Detailed 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 E – DRAINAGE STRATEGY AND MODELLING

NORTH

DO NOT SCALE

DESIGNERS HAZARD IDENTIFICATION

IT IS ASSUMED THAT ALL WORKS WILL BE UNDERTAKEN BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT. IN ADDITION TO THE HAZARDS TYPICALLY ASSOCIATED WITH THE TYPES OF CONSTRUCTION DETAILED ON THIS DRAWING, ANY KNOWN ABNORMAL HAZARDS SPECIFIC TO THIS SCHEME HAVE BEEN IDENTIFIED.

ABNORMAL HAZARD REFERENCE

NOTES

1. DO NOT SCALE FROM THIS DRAWING.
2. THIS DRAWING IS TO BE REPRODUCED IN COLOUR.
3. IF ANY DISCREPANCIES ARE FOUND IN THIS DRAWING, PLEASE REPORT TO DUDLEYS CONSULTING ENGINEERS.
4. THIS DRAWING HAS BEEN ORIENTATED TO OS BRITISH NATIONAL GRID (EPSG:27700 OSGB36). EXISTING SURVEY STATIONS ARE SHOWN ON THE TOPOGRAPHICAL SURVEY.
5. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH RELEVANT ARCHITECTS' AND ENGINEERS' DRAWINGS AND THE FOLLOWING SPECIFICATIONS:
   5.1. ENGSPEC 06 - ROAD, PAVING AND CAR PARKING AREAS
   5.2. ENGSPEC 17 - DRAINAGE WORK
   5.3. ENGSPEC 24 - SPECIFICATION FOR HIGHWAY DRAINAGE
6. THIS DRAWING IS BASED ON THE FOLLOWING INFORMATION:
   6.1. BAH/TS/200 - TOPOGRAPHICAL SURVEY BY OAKWOOD DATED NOV 23
   6.2. 23034-1057 - SITE LAYOUT PLAN BY BROWN + COMPANY DATED JANUARY 24
7. ALL WORK TO BE UNDERTAKEN IN ACCORDANCE WITH THE CURRENT EDITION OF THE BUILDING REGULATIONS, SEWERAGE SECTOR CODES OF PRACTICE, AND THE RELEVANT LOCAL HIGHWAY AUTHORITY STANDARDS.
8. DISCHARGE FROM SITE TO BE RESTRICTED TO GREENFIELD RUNOFF RATES (2L/S) AND ATTENUATED TO ALLOW 1:100 + 30%CC TO BE STORED ON SITE.
9. DISCHARGE OF WATER TO COMBINED SEWER BEHIND THE SITE, SUBJECT TO APPROVAL FROM YORKSHIRE WATER AND S106 AGREEMENT.

KEY

- EXISTING COMBINED SEWER (YW)
- EXISTING FOUL DRAIN
- EXISTING SURFACE WATER DRAIN
- PROPOSED FOUL DRAIN
- PROPOSED SURFACE WATER DRAIN
- PROPOSED COMBINED DRAIN
- PROPOSED CHANNEL DRAIN
- PROPOSED GULLY
- PROPOSED ATTENUATION TANK
- 00.000 EXISTING LEVEL
- 00.000 PROPOSED LEVEL
- FLOOD EXCEEDANCE ROUTE

DATE	REVISION DESCRIPTION	BY	CHK.	REV.
14.03.24	REVISED SITE LAYOUT FOR PLANNING	SDR	SDR	P02
02.02.24	INITIAL ISSUE	SDR	SDR	P01

DUDLEYS CONSULTING ENGINEERS
Tithe House
35 Town Street
Leeds, LS18 5LJ
0113 258 3611
info@dudleys.co.uk

PROJECT
BEECH AVENUE
HOLGATE, YORK
YO24 4JL

TITLE
DRAINAGE STRATEGY

SCALE	PAPER	STATUS
1:100	A1	PRELIMINARY

DRAWING NO. 23438-DCE-XX-XX-D-C-100 REV. P02

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Seb Reid
Site name:	Beech Ave
Site location:	York

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.

Site Details

Latitude:	53.95278° N
Longitude:	1.10924° W
Reference:	1850883474
Date:	Jan 24 2024 12:00

Runoff estimation approach

IH124

Site characteristics

Total site area (ha): 0.1

Methodology

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

Soil characteristics

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

Hydrological characteristics

	Default	Edited
SAAR (mm):	601	601
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

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.

(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.

(3) Is SPR/SPRHOST ≤ 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):	0.4	0.4
1 in 1 year (l/s):	0.35	0.35
1 in 30 years (l/s):	0.71	0.71
1 in 100 year (l/s):	0.84	0.84
1 in 200 years (l/s):	0.96	0.96

StormBrake™
Performance Report

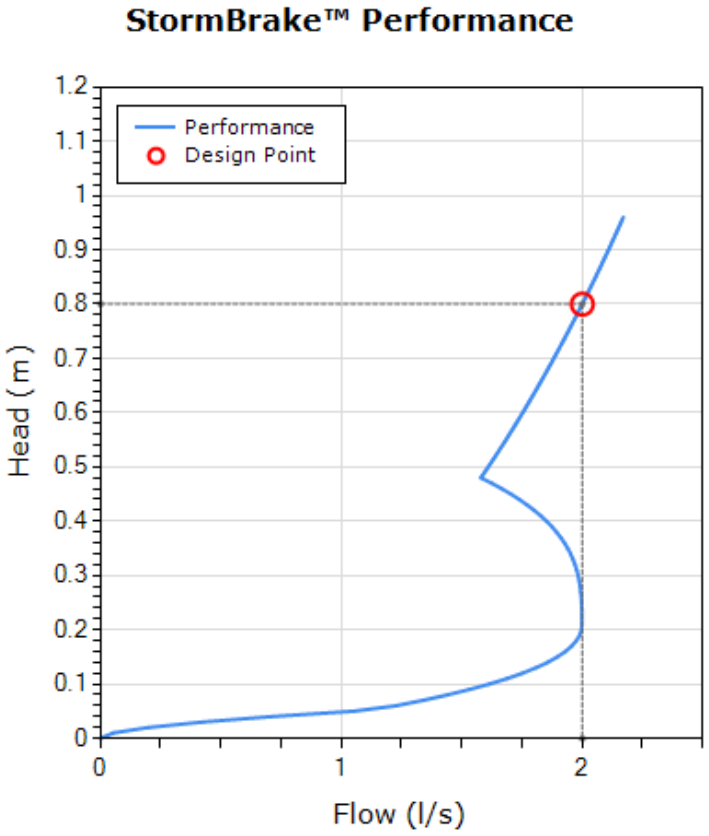
fpmccann

wrc approved™
PT/398/0217

StormBrake™ Performance Report

WRC approved PT/398/0217

Contractor:	Dudleys Consulting Engineers L	Head(m):	0.8
Site:	Beech Avenue	Flow(l/s):	2
Date:	31/01/2024	Chamber Ref:	
Created By:	Seb Reid	Mounting Style:	LUGS (Default)
Device Ref:	FPM-SB1-00800-00200-0100		



	Head (m)	Flow (l/s)
Design Point	0.80	2.00
Flush Flow	0.21	2.00
Kick Back	0.48	1.58

	Dims (mm)
Min. Chamber Diameter	1200
Min. Outlet Pipe Diameter	100
Min. Sump Depth	210

Head (m)	Flow (l/s)
0	0.00
0.03	0.51
0.07	1.30
0.1	1.61
0.13	1.82
0.17	1.94
0.2	2.00
0.23	2.00
0.26	2.00
0.3	1.98
0.33	1.96
0.36	1.92
0.4	1.86
0.43	1.77
0.46	1.65
0.5	1.60
0.53	1.65
0.56	1.70
0.6	1.75
0.63	1.79
0.66	1.83
0.7	1.88
0.73	1.92
0.76	1.96
0.79	1.99
0.83	2.03
0.86	2.07
0.89	2.10
0.93	2.14
0.96	2.17

The unique performance characteristics of this StormBrake™ are derived from extensive dynamic modelling using parametric experimental testing and computational fluid dynamics.

Knockloughrim Precast Office:
T. 028 79549026

Ellistown Precast Office:
T. 01530 240000

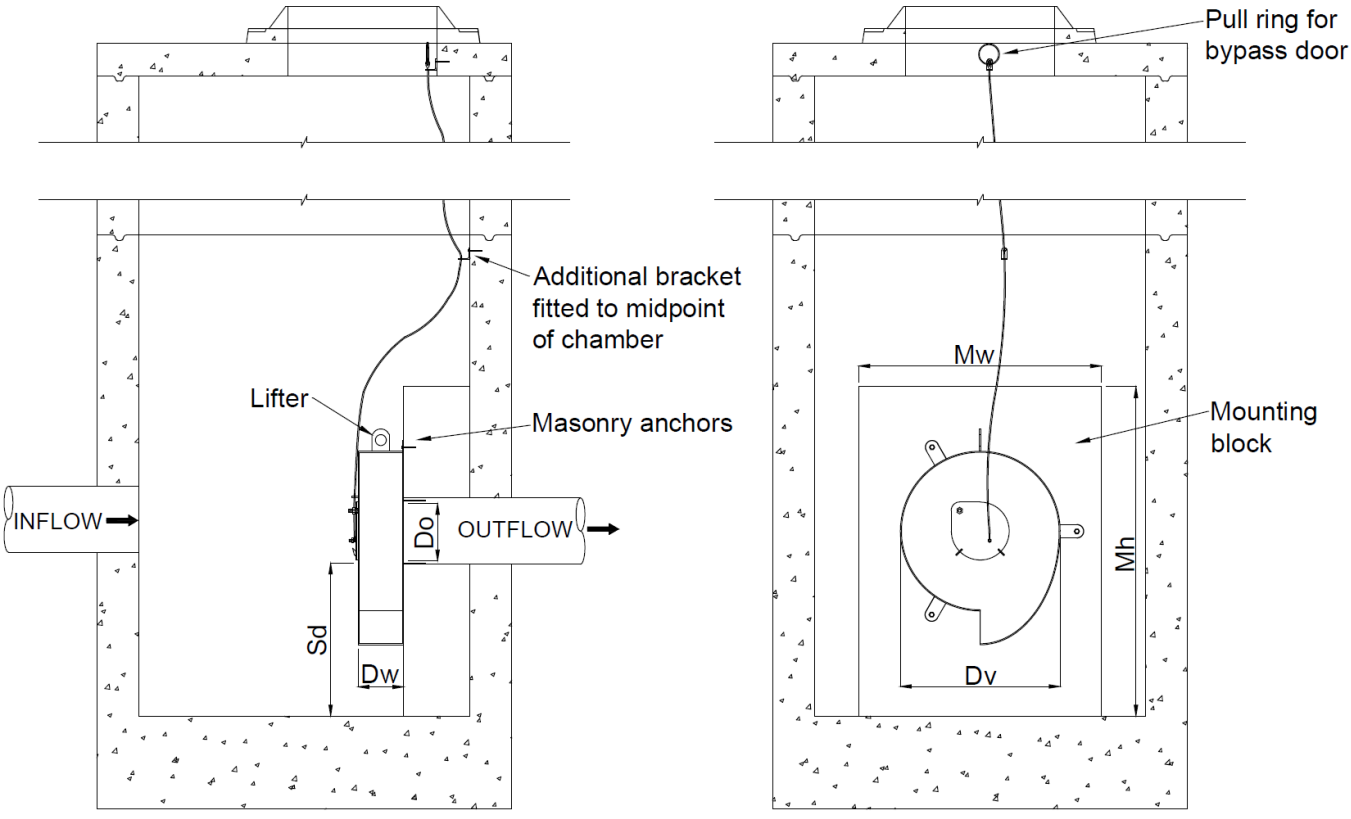
Email: info@fpmccann.co.uk
Web: www.fpmccann.co.uk

StormBrake™ Performance Report

wrc approved PT/398/0217

INSTALLATION INSTRUCTIONS

1. Position the StormBrake™ so that the inlet is at the bottom and the device outlet is in line with the chamber outlet pipe.
2. Mark the locations of the mounting points on the chamber/mounting wall.
3. Using the marked locations, drill holes to the required thickness and depth for the supplied masonry anchors (M10 throughbolts require 11 mm holes). Fit the bolts to the holes.
4. Attach the StormBrake™ to the anchor points, ensuring the neoprene gasket is flush with the chamber wall, and fasten the device by tightening the bolts. This will compress the neoprene gasket to provide a watertight seal between the StormBrake™ and the wall.
5. Fix the stainless steel wire cable from the front bypass door to the underside of the manhole cover, vertically above the device. A secondary bracket is supplied and should be fitted halfway up the chamber to guide the bypass door cable to the top.
6. Adjust the length of the bypass door cable accordingly, so that it reaches the ground level whilst ensuring the bypass door can open if required. Ensure the bypass door is closed for normal operating conditions.



Geometry	Annotation	(mm)
Device Vortex Diameter	Dv	304
Device Width	Dw	73
Device Orifice	Do	70
Sump Depth (outlet Ø100mm)	Sd	210
Mounting Block Width	Mw	540
Mounting Block Height	Mh	580

Dimensions quoted are minimum values based on the geometry of this unique StormBrake™ unit. These ensure the device can be fitted to the flow control chamber without restriction and meet the performance specification.

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)	19.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	0.450
CV	1.000	Include Intermediate Ground	✓
Time of Entry (mins)	4.00	Enforce best practice design rules	x

Nodes

	Name	Area (ha)	T of E (mins)	Cover Level (m)	Node Type	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
✓	S1.01	0.035	4.00	10.185	Manhole	450	458574.988	451112.005	0.600
✓	S1.02	0.013	4.00	9.975	Manhole	600	458566.729	451085.430	0.741
✓	S2.01	0.013	4.00	9.970	Manhole	450	458560.951	451109.744	0.620
✓	S1.03	0.000		9.900	Manhole	1200	458553.913	451089.345	0.800
✓	C1.06			9.925	Manhole	1200	458552.613	451089.963	0.840

Links

	Name	US Node	DS Node	Length (m)	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	Link Type	T of C (mins)	Rain (mm/hr)
✓	1.000	S1.01	S1.02	27.829	9.585	9.309	0.276	100.8	150	Circular	4.46	50.0
✓	1.001	S1.02	S1.03	13.401	9.234	9.100	0.134	100.0	225	Circular	4.63	50.0
?	2.000	S2.01	S1.03	21.579	9.350	9.175	0.175	123.3	150	Circular	4.40	50.0
✓	1.002	S1.03	C1.06	1.439	9.100	9.085	0.015	96.0	150	Circular	4.66	50.0

	Name	US Node	DS Node	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Minimum Depth (m)	Maximum Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
✓	1.000	S1.01	S1.02	1.000	17.7	6.3	0.450	0.516	0.450	0.516	0.035	0.0	62	0.917
✓	1.001	S1.02	S1.03	1.307	52.0	8.7	0.516	0.575	0.516	0.575	0.048	0.0	62	0.975
?	2.000	S2.01	S1.03	0.903	16.0	2.3	0.470	0.575	0.470	0.575	0.013	0.0	39	0.648
✓	1.002	S1.03	C1.06	1.026	18.1	11.0	0.650	0.690	0.650	0.690	0.061	0.0	85	1.076

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	27.829	100.8	150	Circular	10.185	9.585	0.450	9.975	9.309	0.516
1.001	13.401	100.0	225	Circular	9.975	9.234	0.516	9.900	9.100	0.575
2.000	21.579	123.3	150	Circular	9.970	9.350	0.470	9.900	9.175	0.575
1.002	1.439	96.0	150	Circular	9.900	9.100	0.650	9.925	9.085	0.690

Link	US Node	Dia (mm)	Node Type	DS Node	Dia (mm)	Node Type
1.000	S1.01	450	Manhole	S1.02	600	Manhole
1.001	S1.02	600	Manhole	S1.03	1200	Manhole
2.000	S2.01	450	Manhole	S1.03	1200	Manhole
1.002	S1.03	1200	Manhole	C1.06	1200	Manhole

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Node Type	Connections	Link	IL (m)	Dia (mm)	Link Type
S1.01	458574.988	451112.005	10.185	0.600	450	Manhole	 0	1.000	9.585	150	Circular
S1.02	458566.729	451085.430	9.975	0.741	600	Manhole	 1	1.000	9.309	150	Circular
							0	1.001	9.234	225	Circular
S2.01	458560.951	451109.744	9.970	0.620	450	Manhole	 0	2.000	9.350	150	Circular
S1.03	458553.913	451089.345	9.900	0.800	1200	Manhole	 1	2.000	9.175	150	Circular
							2	1.001	9.100	225	Circular
							0	1.002	9.100	150	Circular
C1.06	458552.613	451089.963	9.925	0.840	1200	Manhole	1 	1.002	9.085	150	Circular

Simulation Settings

Rainfall Methodology	FSR	Summer CV	1.000	Drain Down Time (mins)	240
FSR Region	England and Wales	Winter CV	1.000	Additional Storage (m³/ha)	0.0
M5-60 (mm)	19.000	Analysis Speed	Normal	Check Discharge Rate(s)	x
Ratio-R	0.400	Skip Steady State	x	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 %)
2	0	0	0
30	0	0	0
100	30	0	0

Node S1.03 Online StormBrake™ Control

Flap Valve	x	Design Depth (m)	0.800	Min Outlet Diameter (m)	0.100
Replaces Downstream Link	✓	Design Flow (l/s)	2.0	Min Node Diameter (mm)	1200
Invert Level (m)	9.100	Product Code	FPM-SB1-00800-00200-1100		

Node S1.03 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	9.100
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	106

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	60.0	0.0	0.500	60.0	0.0	0.501	0.0	0.0

Results for 2 year Critical Storm Duration. Lowest mass balance: 99.92%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S1.01	10	9.660	0.075	8.5	0.0119	0.0000	OK
15 minute summer	S1.02	10	9.313	0.079	11.7	0.0225	0.0000	OK
15 minute summer	S2.01	10	9.396	0.046	3.2	0.0074	0.0000	OK
120 minute summer	S1.03	80	9.209	0.109	5.9	6.3202	0.0000	OK
15 minute summer	C1.06	1	9.085	0.000	1.5	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	S1.01	1.000	S1.02	8.5	0.978	0.479	0.2410	
15 minute summer	S1.02	1.001	S1.03	11.8	1.441	0.226	0.1280	
15 minute summer	S2.01	2.000	S1.03	3.2	0.699	0.199	0.0979	
120 minute summer	S1.03	StormBrake™	C1.06	1.7				11.3

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.92%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S1.01	10	9.703	0.118	16.2	0.0188	0.0000	OK
15 minute summer	S1.02	10	9.344	0.110	22.1	0.0312	0.0000	OK
15 minute summer	S2.01	10	9.415	0.065	6.0	0.0104	0.0000	OK
120 minute summer	S1.03	86	9.322	0.222	11.2	12.9240	0.0000	SURCHARGED
15 minute summer	C1.06	1	9.085	0.000	1.9	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	S1.01	1.000	S1.02	16.1	1.111	0.911	0.4033	
15 minute summer	S1.02	1.001	S1.03	22.1	1.533	0.426	0.2519	
15 minute summer	S2.01	2.000	S1.03	6.0	0.828	0.375	0.1559	
120 minute summer	S1.03	StormBrake™	C1.06	2.0				21.2

Results for 100 year +30% CC Critical Storm Duration. Lowest mass balance: 99.92%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S1.01	10	10.089	0.504	27.2	0.0801	0.0000	FLOOD RISK
120 minute winter	S1.02	116	9.533	0.299	10.1	0.0847	0.0000	SURCHARGED
120 minute winter	S2.01	116	9.533	0.183	2.7	0.0292	0.0000	SURCHARGED
120 minute winter	S1.03	116	9.533	0.433	12.4	25.1924	0.0000	SURCHARGED
15 minute summer	C1.06	1	9.085	0.000	2.0	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	S1.01	1.000	S1.02	25.4	1.445	1.439	0.4823	
15 minute summer	S1.02	1.001	S1.03	35.0	1.589	0.674	0.4423	
15 minute summer	S2.01	2.000	S1.03	10.1	0.939	0.632	0.2625	
600 minute winter	S1.03	StormBrake™	C1.06	2.0				52.1