FLOOD RISK ASSESSMENT AND DRAINAGE STRATEGY

for

MR J ALPE

PROPOSED RESIDENTIAL AND OFFICE ACCOMMODATION

at

PEEL STREET, CLITHEROE

AUGUST 2024

REFORD

Consulting Engineers Limited

Hindley Fallows, Midgery Lane, Fulwood, Preston, PR2 9SX

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Company number: 09620365 VAT Reg. 215 5638 12

CONTENTS

1. INTRODUCTION

1.1 This flood risk assessment and drainage strategy has been produced on behalf of Mr J Alpe in support of a planning application for the erection of two buildings and associated works in connection with proposed residential and office accommodation on land at Peel Street, Clitheroe. A location plan is included within Appendix A.

1.2 The Flood Risk Assessment (FRA) is compliant with the requirements set out in the National Planning Policy Framework (NPPF) and the Planning Practice Guidance (NPPG) in relation to Flood Risk and Coastal Change, and describes the existing site conditions and proposed development. It assesses the potential sources of flooding to the site from tidal, fluvial, groundwater, surface water and other sources, taking a risk based approach in accordance with National Policy.

Site summary

Site Name	Peel Street
Location	Clitheroe
NGR (approx.)	SD745415
Application site area	Approx. 0.19ha
Development type	Storage buildings with a hardstanding area
Vulnerability	Less Vulnerable
Environment Agency flood mapping	Mainly Flood Zones 2 and 3. Flood Zone 1 lies within the northeastern part of the site.
Local Planning Authority	Ribble Valley Borough Council

2. DESCRIPTION OF THE SITE

Existing site

2.1 The development site lies to the western side of Peel Street, Clitheroe, which forms the eastern boundary of the site. To the east of Peel Street lie residential properties.

2.2 The development site comprises three steel framed buildings with an associated hardstanding area. The area of the site is approx. 0.19ha.

2.3 The Mearley Brook lies along the site's western boundary and flows to the southwest to discharge into the Pendleton Brook and the River Ribble.

Proposed development

2.4 The proposal is for the redevelopment of the site comprising two new buildings for residential and office accommodation with associated car parking. The building containing the residential use will be located within the northern part of the site and the building for the office accommodation will be in the southern part of the site.

2.5 Access to the site will be maintained from Peel Street.

3. SCOPE OF THE ASSESSMENT

Flood risk planning policy

3.1 The National Planning Policy Framework (NPPF) sets out the Government's national policies on different aspects of land use planning in England in relation to flood risk. Supporting Planning Practice Guidance is also available.

3.2 The NPPF sets out the vulnerability to flooding of different land uses. It encourages development to be located away from areas at highest risk (whether existing or future), and states that where development is necessary in such areas, the development should be made safe for its lifetime. It also stresses the importance of preventing increases in flood risk offsite to the wider catchment area.

3.3 The NPPF also states that alternative sources of flooding, other than fluvial (river flooding), should also be considered when preparing a Flood Risk Assessment.

3.4 As set out in the NPPF, local planning authorities should only consider development in flood risk areas appropriate where informed by a site specific Flood Risk Assessment. This document will identify and assess the risk associated with all forms of flooding to and from the development. Where necessary it will demonstrate how these flood risks will be managed so that the development remains safe throughout its lifetime, taking climate change into account.

3.5 This Flood Risk Assessment is written in accordance with the NPPF and the Planning Practice Guidance in relation to Flood Risk and Coastal Change.

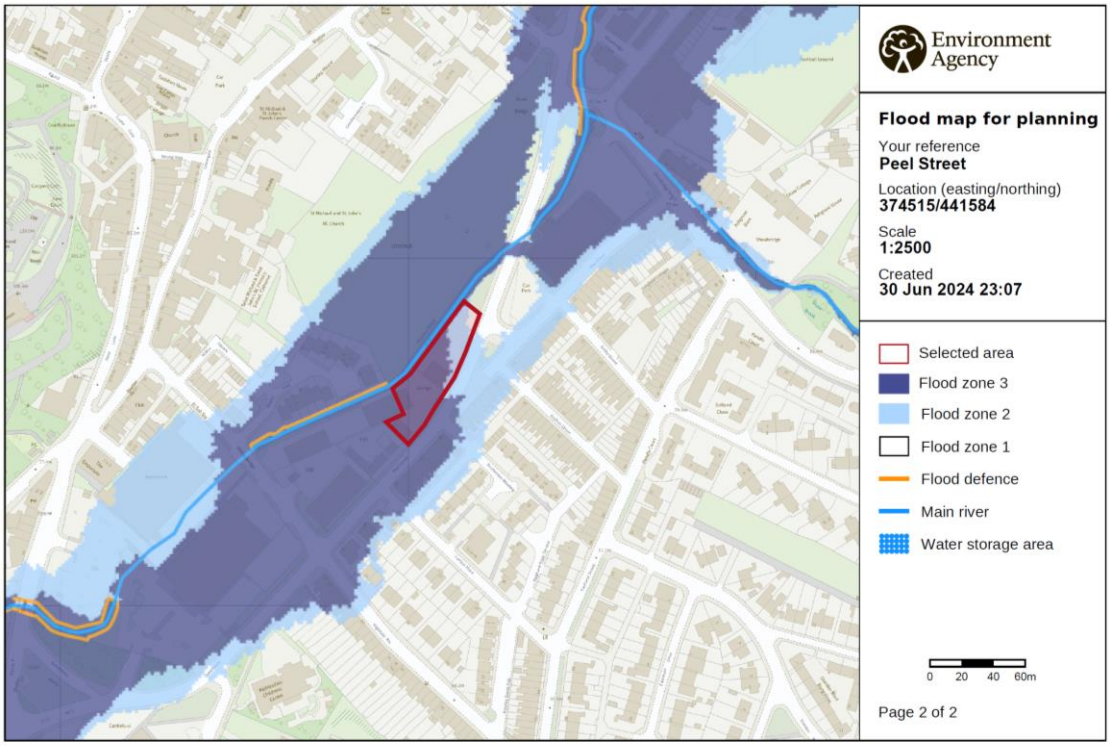
Flood zones

3.6 In investigating the flood risk relating to the site, the Environment Agency flood mapping has been reviewed and has confirmed that the majority of the site lies within Flood Zones 2 and 3. Flood Zone 2 lies within the northern and centre parts of the site and Flood Zone 3 lies within the southern part of the site. An area of Flood Zone 1 lies within the northeastern part of the site.

3.7 Flood Zone 2 is identified as land assessed as having a medium probability of flooding, that is in any year, land that has between a 1% (1 in 100) and 0.1% (1 in 1000) chance of flooding from rivers or the sea. Flood Zone 3 is identified as land assessed as having a high probability of flooding, that is in any year, land that has a 1% (1 in 100) or more chance of flooding from rivers, or a 0.5% (1 in 200) or more chance of flooding from the sea. The flood zones categorisation refers to the probability of river and sea flooding, ignoring the presence of defences.

3.8 The main risk of flooding is fluvial from the Mearley Brook.

3.9 An extract from the Environment Agency's flood zone map for planning is shown below.



Strategic Flood Risk Assessment

3.10 The site is within the area covered by the Ribble Valley Borough Council Revised Strategic Flood Risk Level 1 Assessment, April 2017.

4. CONSULTATIONS AND DATA ACQUISITIONS

Environment Agency

4.1 The Environment Agency flood mapping identifies the majority of the site lies within Flood Zones 2 and 3. Flood Zone 2 lies within the northern and centre parts of the site and Flood Zone 3 lies within the southern part of the site. An area of Flood Zone 1 lies within the northeastern part of the site.

4.2 Product 4 information has been obtained from the Environment Agency and is included within Appendix B. The information gave the following modelled flood levels within the site for the fluvial events from the Mearley Brook 2018 model. The site is not affected by tidal flooding.

Return Period	Fluvial Mearley Brook 2018	
	Defended	Undefended
1%	74.31 – 74.38m AOD	No data
1% + 35%	74.63 – 74.64m AOD	
1% + 70%	74.81 – 74.85m AOD	
0.1%	74.89 – 74.93m AOD	74.80 – 74.84m AOD

4.3 The Environment Agency information identifies that there are no flood defences along the western boundary of the site. Flood defences lie to the southwest of the site on the opposite bank to the site and have a standard of protection of 50 and 100 years. The defences are in a fair condition.

4.4 The site is in an area benefitting from the Environment Agency's flood warning service which provide free flood warnings when flooding is expected to enable the evacuation of people for a range of flooding events up to and including the extreme event.

Site Investigation

4.5 Site investigations have not been carried out on the site. The Soilscapes Viewer has identified that the geology encountered will be slowly permeable seasonally wet acid loamy and clayey soils with impeded drainage.

Topographical survey

4.6 A topographical survey has been carried out for the site. The site levels range from 75.44m AOD in the northeastern corner of the site to 74.30m AOD in the southwestern corner of the site.

4.7 The existing three buildings have floor levels in the order of 74.50m AOD and 74.60m AOD and have a total footprint measured as 380m^2.

4.8 The topographical survey is included within Appendix C.

5. SOURCES OF FLOOD RISK

Potential Sources of Flood Risk

5.1 Potential sources of flood risk to the site are identified below. The significance of these sources is investigated further into Section 6.

Tidal flooding

5.2 The site is not at risk from tidal flooding.

Fluvial flooding

5.3 The Environment Agency flood mapping identifies the majority of the site lies within Flood Zones 2 and 3. Flood Zone 2 lies within the northern and centre parts of the site and Flood Zone 3 lies within the southern part of the site. An area of Flood Zone 1 lies within the northeastern part of the site.

5.4 Product 4 information has been obtained from the Environment Agency. The information gave the following modelled flood levels within the site for the fluvial events from the Mearley Brook 2018 model.

Return Period	Fluvial Mearley Brook 2018	
	Defended	Undefended
1%	74.31 – 74.38m AOD	No data
1% + 35%	74.63 – 74.64m AOD	
1% + 70%	74.81 – 74.85m AOD	
0.1%	74.89 – 74.93m AOD	74.80 – 74.84m AOD

5.5 The site is in an area benefitting from the Environment Agency's flood warning service which provide free flood warnings when flooding is expected to enable the evacuation of people for a range of flooding events up to and including the extreme event.

Canals, reservoirs and other artificial sources

5.6 There are no canals, reservoirs or other artificial sources local to the area.

5.7 The Environment Agency risk of flooding from reservoirs map identifies the site is not at risk of flooding from reservoirs when river levels are normal or when there is also flooding from rivers.

Groundwater

5.8 Groundwater flooding tends to occur after much longer periods of sustained high rainfall. The areas that are at risk tend to be those low-lying areas where the water table is shallow. Flooding tends to occur in areas that are underlain by major aquifers, although groundwater flooding is also noted in localised floodplain sands and gravels. The main causes of groundwater flooding are:

- Natural groundwater rising due to tidal influence, or exceptionally wet periods leading to rapid recharge;
- Groundwater rebound due to cessation of abstraction and mine dewatering;
- Existence of confined aquifers and springs.

Pluvial runoff

5.9 The Environment Agency Risk of Flooding from Surface Water map indicates that with the exception of the northern part of the site which is at very low risk, the site is at a low risk of surface water flooding i.e. this means that each year, this area has a chance of flooding of between 0.1% and 1%.

5.10 It should be noted that surface water 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. In addition, local features can greatly affect the chance and severity of flooding.

Development drainage

5.11 Surface water (including the risk of sewers and culverted watercourses surcharging) poses the highest risk of more frequent flooding. Surface water drainage from new developments is critical in reducing the risk of localised flooding.

5.12 If surface water runoff is not managed appropriately, there may be an increased risk presented elsewhere from development drainage, and the aim should be to implement appropriate sustainable drainage systems (SuDS) to treat and contain flows and mimic the existing conditions.

5.13 Where possible the preference for dealing with surface water runoff from the developed site is for it to infiltrate back into the ground or alternatively to a waterbody or watercourse. Only if it is not possible for either of these options is surface water from the development to be allowed into the public sewers.

Historic flooding

5.14 The Environment Agency Historical Flood Mapping on the GOV.UK website shows that the site has not previously flooded.

6. FLOOD RISK ASSESSMENT

6.1 This section of the Flood Risk Assessment looks at the flood risk to the site before any mitigation measures are put into place and hence identifies where mitigation will be required. Section 7 continues to explain the mitigation measures proposed and the residual risk following implementation of any proposed mitigation.

6.2 The proposal is for the redevelopment of site comprising two new buildings for residential and office accommodation with associated car parking. The building containing the residential use will be located within the northern part of the site and the building for the office accommodation will be in the southern part of the site.

Risk of Flooding to Proposed Development

Tidal and fluvial Flood Risk

6.3 The Environment Agency flood mapping identifies that the majority of the site lies within Flood Zones 2 and 3. Flood Zone 2 lies within the northern and centre parts of the site and Flood Zone 3 lies within the southern part of the site. An area of Flood Zone 1 lies within the northeastern part of the site.

6.4 Modelled flood levels received from the Environment Agency gave the following modelled flood levels within the site for the fluvial events from the Mearley Brook 2018 model. The site is unaffected by tidal flooding.

Return Period	Fluvial Mearley Brook 2018	
	Defended	Undefended
1%	74.31 – 74.38m AOD	No data
1% + 35%	74.63 – 74.64m AOD	
1% + 70%	74.81 – 74.85m AOD	
0.1%	74.89 – 74.93m AOD	74.80 – 74.84m AOD

6.5 A topographical survey has been carried out for the site. The site levels range from 75.44m AOD in the northeastern corner of the site to 74.30m AOD in the southwestern

corner of the site. The existing three buildings have floor levels in the order of 74.50m AOD and 74.60m AOD and a total footprint measured as 380m^2.

6.6 The building containing the residential use will be located within the northern part of the site where existing ground levels range from 75.44m AOD to approx. 74.64m AOD. Comparing the modelled flood levels to the site levels on the topographical survey, the northern part of the proposed residential building is located within Flood Zone 1 with the southern half being located within Flood Zone 2, the defended modelled Flood Zone 2 level within the southern half of the building being at a level of 74.93m AOD.

6.7 The building to be used as office accommodation will be located within the southern part of the site where existing ground levels range from 74.46m AOD to 74.33m AOD. Comparing the modelled flood levels to the site levels on the topographical survey, the building to be used as office accommodation is located wholly in Flood Zone 2 as the defended modelled Flood Zone 3 level for this part of the site is 74.33m AOD.

6.8 Using the maximum modelled flood level for the design flood level, i.e. the 1% plus 35% event which has a maximum modelled flood level within the site of 74.64m AOD, the floor levels of the proposed buildings are to be set at a minimum 74.94m AOD, which is 300mm above the defended modelled flood level for the 1% plus 35% event.

6.9 In addition, the design of the buildings should be appropriately flood resistant and resilient to a distance of 600mm above the design flood level, i.e. at a level of 75.24m AOD.

6.10 The site is in an area benefitting from the Environment Agency's flood warning service which provide free flood warnings when flooding is expected to enable the evacuation of people for a range of flooding events up to and including the extreme event.

Compensatory Flood Storage

6.11 Compensatory flood storage is required where development is planned in undefended areas of floodplain that lie outside the functional floodplain as the capacity of the

floodplain to accommodate floodwater may be reduced and may increase flood risk to properties outside of the development site.

6.12 The proposal is for the redevelopment of the site comprising two new buildings for residential and office accommodation with associated car parking following demolition of the existing buildings within the site. The external site levels are to remain as existing.

6.13 The area of the site that is to be considered is that affected by the 1% plus 35% event, which has a maximum modelled flood level within the site of 74.64m AOD. The existing buildings within the site that are to be demolished lie below this level and their footprint has been measured as 380m^2.

6.14 Only the office building that is to lie within the south of the site lies within the area of the site where the ground levels are below 74.64m AOD. The residential building planned for the northern part of the site lies above 74.64m AOD and will not be affected by the 1% plus 35% event. The footprint of the proposed office building has been measured as 240m^2, which is considerably less than the footprints of the existing buildings that are to be removed. Flood compensation is therefore not required to be provided and there is no material effect on the floodplain due to the proposed development.

Canals, reservoirs and other artificial sources

6.15 There are no canals, reservoirs or other artificial sources local to the area.

6.16 The Environment Agency risk of flooding from reservoirs map identifies the site is not at risk of flooding from reservoirs when river levels are normal or when there is also flooding from rivers.

6.17 The risk of flooding from canals, other artificial sources and reservoirs is therefore low.

Groundwater

6.18 No information has been identified to suggest that the site is susceptible to groundwater flooding.

Pluvial Runoff

6.19 The Environment Agency Risk of Flooding from Surface Water map indicates that with the exception of the northern part of the site which is at very low risk, the site is at a low risk of surface water flooding i.e. this means that each year, this area has a chance of flooding of between 0.1% and 1%.

6.20 The raising of the buildings floor levels to mitigate fluvial flood risk will also mitigate the flood risk from pluvial runoff.

Effect of the Development on the Wider Catchment

Development Drainage

6.21 The proposal is for the redevelopment of site comprising two new buildings for residential and office accommodation with associated car parking.

6.22 The development site comprises three steel framed buildings with an associated hardstanding area. There is very little soft landscaping and therefore the development of the site will not increase the area of impermeable roofs and hardstanding on the site. The surface water runoff from the proposed development is therefore the same as the pre-development runoff rates and therefore no changes to the rain water management of the site. As such there is not the potential to alter the surface water runoff regime of the site, nor to have an adverse effect on flood risk elsewhere in the wider catchment.

7. PREDICTED IMPACTS AND MITIGATION

7.1 This section of the FRA sets out the mitigation measures recommended to reduce the risk of flooding to the proposed development and outlines any residual impacts.

Site arrangements

Safe access and egress

7.2 The site is in an area benefitting from the Environment Agency's flood warning service which provide free flood warnings when flooding is expected to enable the evacuation of people for a range of flooding events up to and including the extreme event.

7.3 Should evacuation be necessary, it should be to the east along one of the side roads from the A671, which lie within Flood Zone 1.

Finished levels

7.4 The floor levels of the proposed buildings are to be set at a minimum 74.94m AOD, which is 300mm above the defended modelled flood level for the 1% plus 35% event. In addition, the design of the buildings should be appropriately flood resistant and resilient to a distance of 600mm above the design flood level, i.e. at a level of 75.24m AOD.

Upstream and downstream effects

7.5 Only the footprint of the proposed office building is lying within the area affected by the 1% plus 35% event and is considerably less than the footprints of the existing buildings that are to be removed. Flood compensation is therefore not required to be provided and there is no material effect on the floodplain due to the proposed development.

7.6 There will not be an increase in the area of roofs and impermeable hardstanding on site and therefore no changes to the rain water management of the site. As such the potential to alter the surface water runoff regime of the site and to have an adverse effect on flood risk elsewhere in the wider catchment is therefore low.

8. DRAINAGE STRATEGY

Surface water drainage

8.1 In accordance with the National Standards for Sustainable Drainage, the drainage strategy should incorporate the use of Sustainable Drainage (SUDS) where possible. The approach promotes the use infiltration features in the first instance. If drainage cannot be achieved solely through infiltration due to site conditions or contamination risks, the preferred options are (in order of preference):

(i) a controlled discharge to a local waterbody or watercourse, or

(ii) a controlled discharge into the public sewer network (depending on availability and capacity).

8.2 The rate and volume of discharge should strive to provide betterment and be restricted to the pre-development values as far as practicable.

8.3 The Soilscapes Viewer has identified that the geology encountered will be slowly permeable seasonally wet acid loamy and clayey soils with impeded drainage and as such infiltration is unlikely to provide a viable drainage solution for surface water runoff generated by the site.

8.4 A private drainage system collects surface water from the existing site.

8.5 The proposal is for the redevelopment of site comprising two new buildings for residential and office accommodation with associated car parking.

8.6 The development site comprises three steel framed buildings with an associated hardstanding area. There is very little soft landscaping and therefore the development of the site will not increase the area of impermeable roofs and hardstanding on the site.

8.7 The surface water runoff from the proposed development is therefore the same as the pre-development runoff rates and therefore no changes to the rain water management of the site. It is therefore intended that surface water runoff from the

developed site will be collected by a private drainage system and discharged via existing outfalls as current, maintaining the status quo.

Foul water drainage

8.8 It is intended that foul water from the proposed buildings will be collected by a private drainage system and discharged into the public sewer system within Peel Street.

9. CONCLUSIONS

9.1 This flood risk assessment has been produced on behalf of Mr J Alpe in support of a planning application for the erection of two buildings and associated works in connection with proposed residential and office accommodation on land at Peel Street, Clitheroe.

9.2 The Environment Agency flood mapping has confirmed that the majority of the site lies within Flood Zones 2 and 3. Flood Zone 2 lies within the northern and centre parts of the site and Flood Zone 3 lies within the southern part of the site. An area of Flood Zone 1 lies within the northeastern part of the site.

9.3 The northern part of the proposed residential building has been determined as lying within Flood Zone 1 with the southern half lying within Flood Zone 2. The building to be used as office accommodation has been determined as lying wholly in Flood Zone 2.

9.4 The floor levels of the proposed buildings are to be set at a minimum 74.94m AOD, which is 300mm above the defended modelled flood level for the 1% plus 35% event. In addition, the design of the buildings should be appropriately flood resistant and resilient to a distance of 600mm above the design flood level, i.e. at a level of 75.24m AOD.

9.5 The risk from canals, reservoirs and other artificial sources is low.

9.6 No information has been identified to suggest that the site is susceptible to groundwater flooding.

9.7 The Environment Agency Risk of Flooding from Surface Water map indicates that with the exception of the northern part of the site which is at very low risk, the site is at a low risk of surface water flooding i.e. this means that each year, this area has a chance of flooding of between 0.1% and 1%. The raising of the buildings floor levels to mitigate fluvial flood risk will also mitigate the flood risk from pluvial runoff.

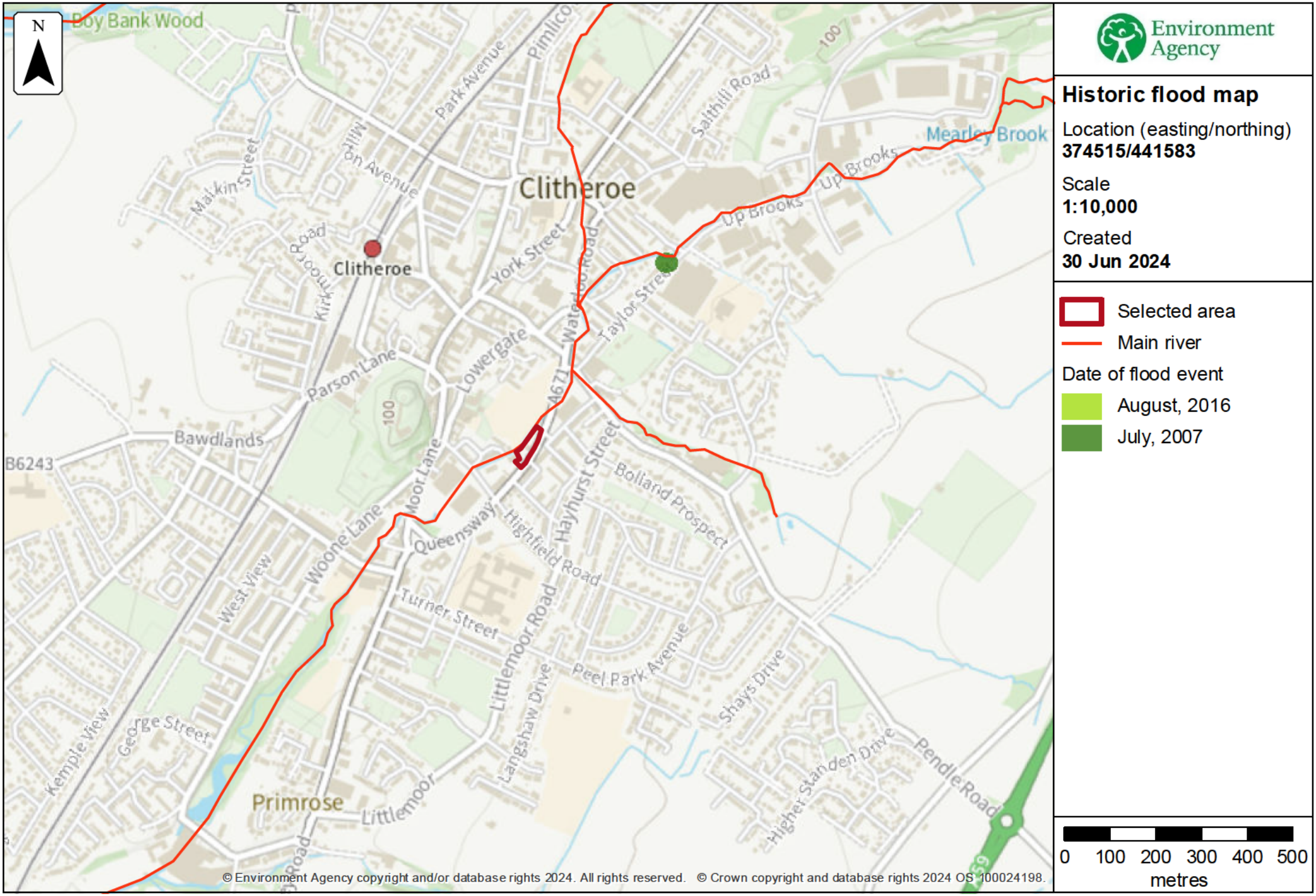
9.8 Flood compensation is not required to be provided and there is no material effect on the floodplain due to the proposed development.

9.9 There is not the potential to alter the surface water runoff regime of the site, nor to have an adverse effect on flood risk elsewhere in the wider catchment.

APPENDIX A

LOCATION PLAN

APPENDIX B



Environment Agency

Historic flood map

Location (easting/northing)
374515/441583

Scale
1:10,000

Created
30 Jun 2024

Selected area

Main river

Date of flood event

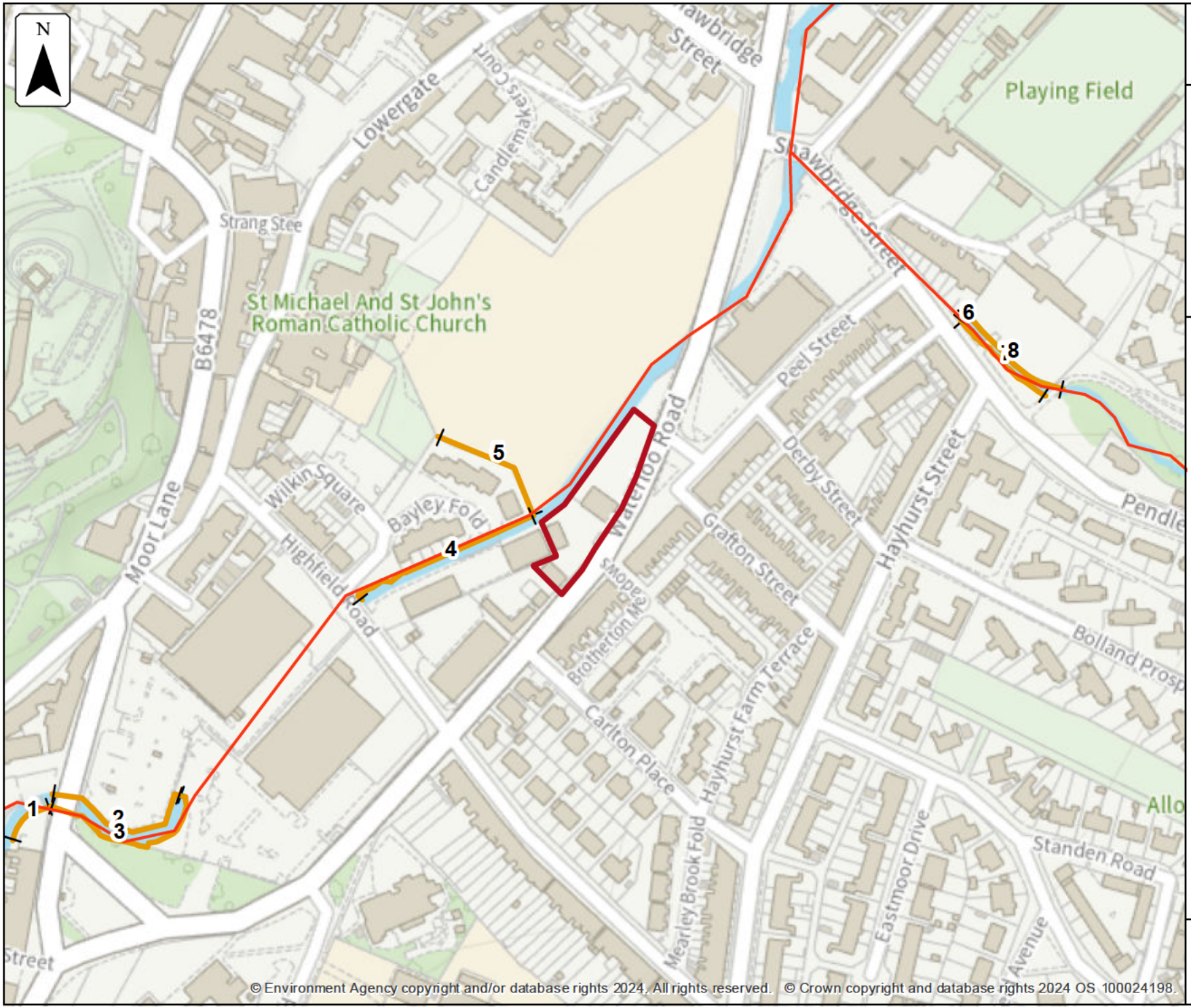
August, 2016

July, 2007

0 100 200 300 400 500
metres

Historic flood event data

Start date	End date	Source of flood	Cause of flood	Affects location
22 August 2016	23 August 2016	main river	channel capacity exceeded (no raised defences)	No
3 July 2007	4 July 2007	ordinary watercourse	obstruction/blockage - culvert	No



Environment Agency

Flood defences

Location (easting/northing)
374515/441583

Scale
1:2,500

Created
30 Jun 2024

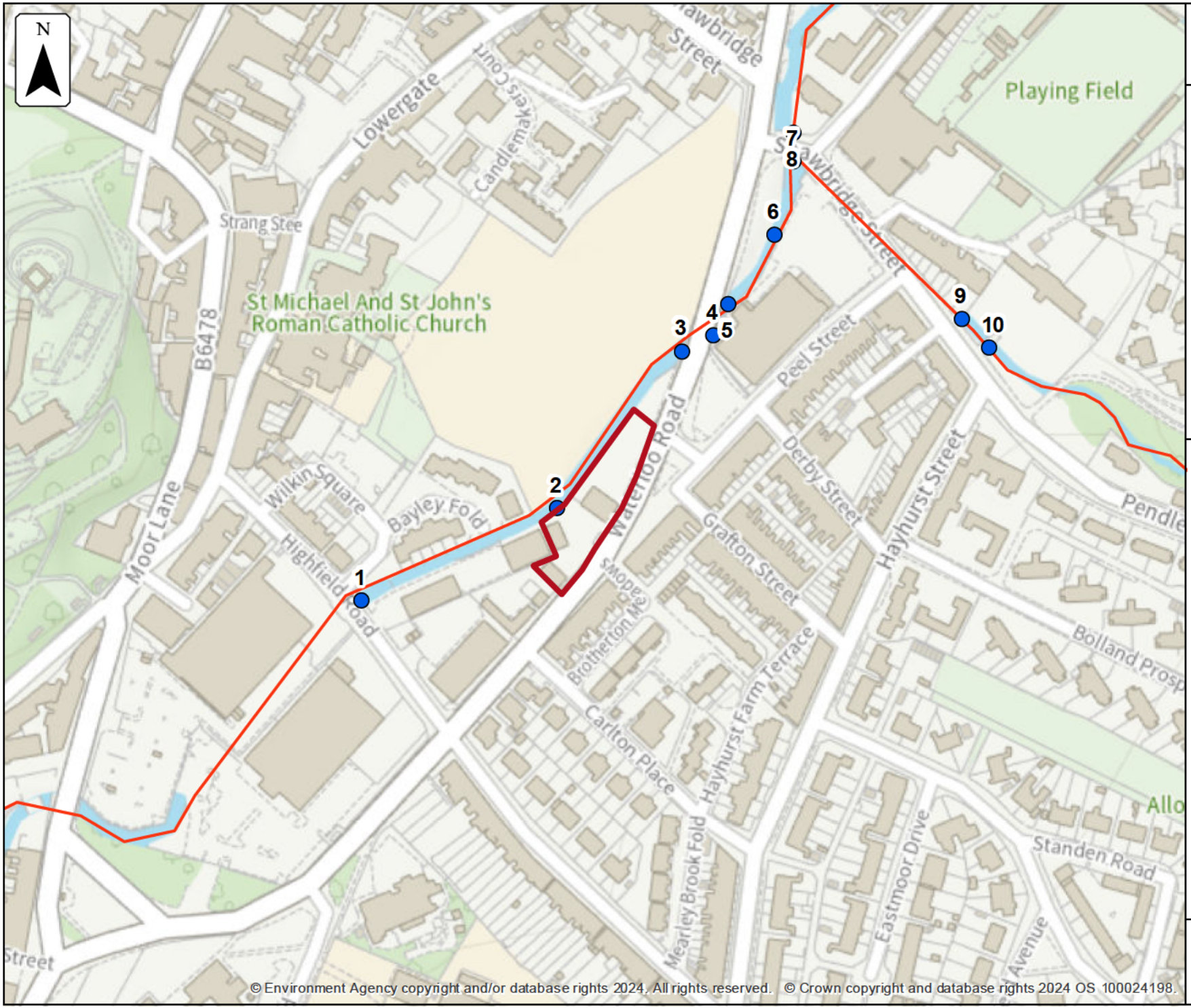
- Selected area
- Main river
- Flood defence

0 25 50 75 100
metres

Flood defences data

Label	Asset ID	Asset Type	Standard of protection (years)	Current condition	Downstream actual crest level (mAOD)	Upstream actual crest level (mAOD)	Effective crest level (mAOD)
1	64401	Wall	10	Fair	72.33	73.65	72.33
2	67007	Wall	100	Fair	74.01	76.82	74.01
3	67006	Wall	10	Fair	73.65	72.86	72.86
4	66677	Wall	100	Fair	74.95	75.76	74.95
5	148799	Embankment	50	Fair	73.79	74.47	73.79
6	536674	Flood Gate		Good	77.10	77.10	77.10
7	148786	Wall	10	Fair	78.25	79.30	78.25
8	150181	Engineered High Ground	10	Fair	78.10	79.90	78.10

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



Environment Agency

Defended modelled fluvial node locations

Location (easting/northing)
374515/441583

Scale
1:2,500

Created
30 Jun 2024

Model name
Mearley Brook 2018

Selected area
Modelled location
Main river

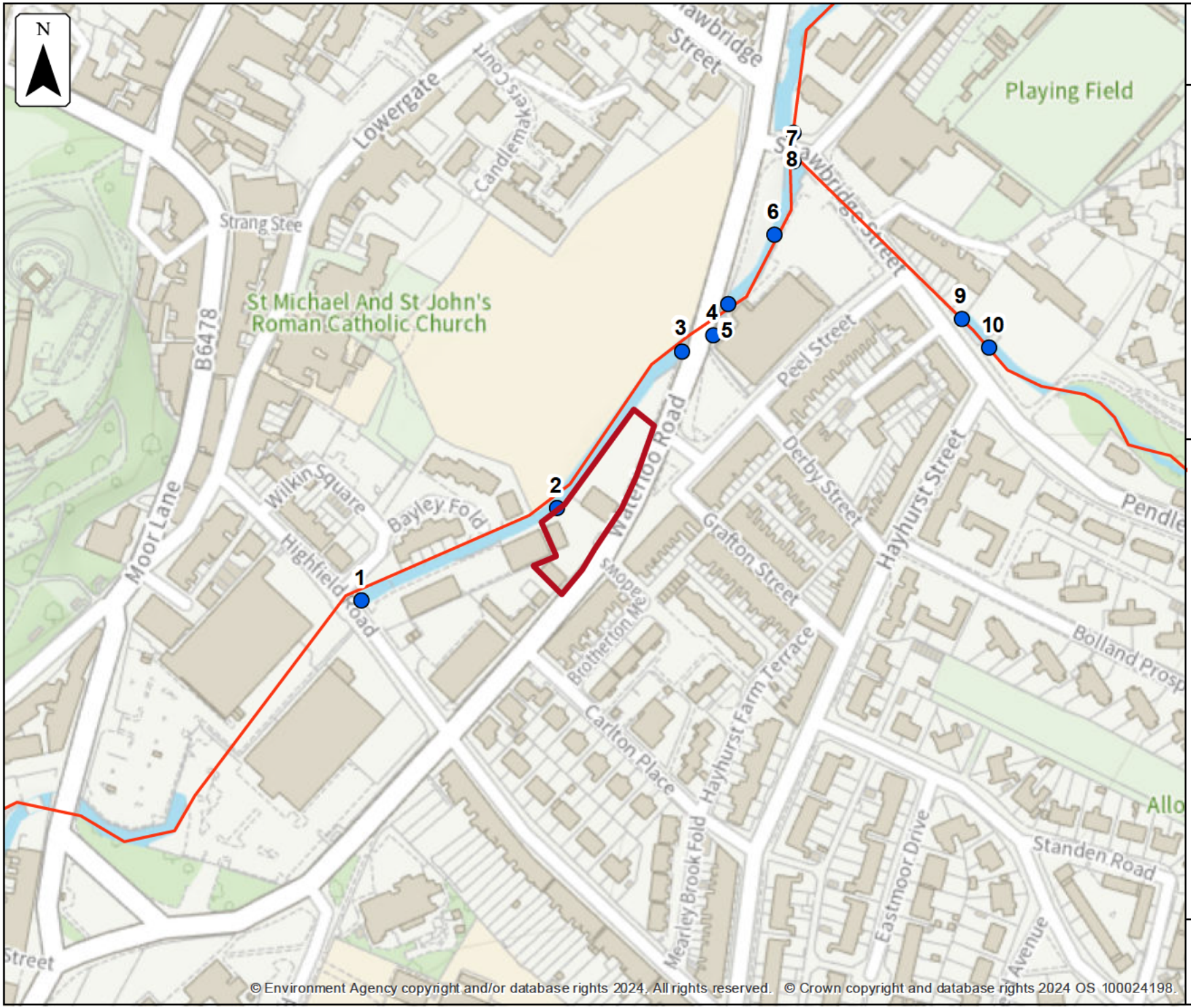
0 25 50 75 100
metres

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	982265	374402	441536	73.18	21.79	73.96	25.24	74.14	26.17	74.24	26.61	74.46	27.15	74.88	27.69
2	982262	374497	441580	73.43	21.32	74.11	24.41	74.27	25.79	74.36	26.86	74.55	28.97	74.90	39.52
3	982451	374558	441657	74.13	21.16	74.25	24.86	74.38	26.35	74.45	27.40	74.62	30.06	74.99	35.68
4	982349	374574	441664	74.14	21.16	74.26	24.86	74.39	26.35	74.47	27.40	74.64	30.06	75.02	35.68
5	982348	374581	441680	73.82	20.30	73.95	23.44	74.03	24.68	74.08	25.54	74.23	27.68	74.65	31.97
6	982284	374604	441713	74.52	18.68	74.73	20.78	74.83	21.60	74.90	22.11	75.06	23.34	75.40	25.27
7	982432	374612	441749	74.97	18.47	75.14	20.17	75.22	20.79	75.27	21.15	75.40	21.88	75.67	22.61
8	982468	374612	441763	75.10	16.27	75.31	17.46	75.39	17.82	75.45	17.97	75.58	18.14	75.83	18.29
9	982264	374694	441672	75.61	2.22	75.83	2.75	76.07	3.02	76.26	3.23	76.85	3.85	77.74	4.69
10	982352	374708	441658	76.58	2.22	76.65	2.75	76.68	3.02	76.72	3.25	76.98	3.86	77.98	6.04

Data in this table comes from the Mearley Brook 2018 model.
Level values are shown in mAOD, and flow values are shown in cubic metres per second.
Any blank cells show where a particular scenario has not been modelled for this location.



Environment Agency

Defended climate change modelled fluvial node locations

Location (easting/northing)
374515/441583

Scale
1:2,500

Created
30 Jun 2024

Model name
Mearley Brook 2018

- Selected area
- Modelled location
- Main river

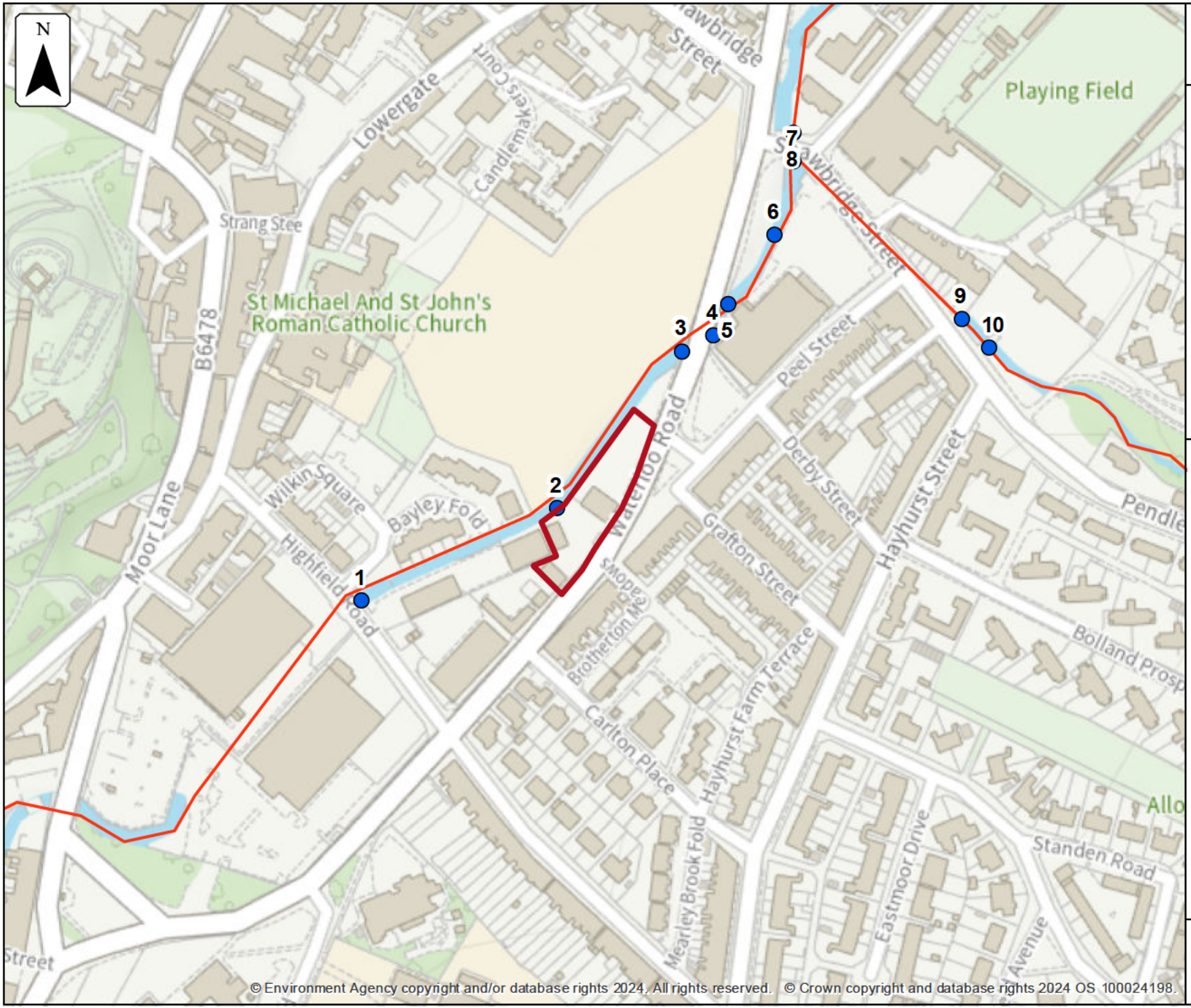
0 25 50 75 100
metres

Modelled node locations data

Defended climate change

Label	Modelled location ID	Easting	Northing	1.0% AEP (+30%)		1.0% AEP (+35%)		1.0% AEP (+70%)		0.1% AEP (+30%)	
				Level	Flow	Level	Flow	Level	Flow	Level	Flow
1	982265	374402	441536	74.55	27.28	74.58	27.35	74.79	27.61	75.10	27.84
2	982262	374497	441580	74.61	31.10	74.64	31.86	74.82	36.99	75.09	45.81
3	982451	374558	441657	74.69	31.27	74.72	31.71	74.90	34.48	75.18	38.24
4	982349	374574	441664	74.71	31.27	74.74	31.71	74.93	34.48	75.24	38.24
5	982348	374581	441680	74.30	28.64	74.33	29.02	74.54	31.08	74.93	33.73
6	982284	374604	441713	75.13	23.86	75.16	24.08	75.32	24.98	75.59	26.04
7	982432	374612	441749	75.45	22.14	75.47	22.24	75.60	22.55	75.84	22.68
8	982468	374612	441763	75.63	18.17	75.65	18.18	75.77	18.25	75.97	18.37
9	982264	374694	441672	77.19	4.19	77.36	4.35	77.71	4.66	77.81	4.74
10	982352	374708	441658	77.32	4.20	77.50	4.35	77.91	5.52	78.16	7.63

Data in this table comes from the Mearley Brook 2018 model.
Level values are shown in mAOD, and flow values are shown in cubic metres per second.
Any blank cells show where a particular scenario has not been modelled for this location.



Environment Agency

Defences removed modelled fluvial node locations

Location (easting/northing)
374515/441583

Scale
1:2,500

Created
30 Jun 2024

Model name
Mearley Brook 2018

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	982265	374402	441536	72.64	21.81					73.04	31.25			74.68	42.34
2	982262	374497	441580	73.16	21.24					73.61	28.0			74.84	30.82
3	982451	374558	441657	74.08	20.51					74.17	26.34			74.89	35.03
4	982349	374574	441664	74.09	20.51					74.18	26.34			74.92	35.03
5	982348	374581	441680	73.79	20.16					73.98	24.87			74.51	31.36
6	982284	374604	441713	74.45	19.54					74.79	22.14			75.34	24.78
7	982432	374612	441749	75.0	19.52					75.22	21.50			75.62	22.07
8	982468	374612	441763	75.15	17.33					75.40	18.42			75.81	18.77
9	982264	374694	441672	75.61	2.22					76.21	3.23			76.53	3.46
10	982352	374708	441658	76.58	2.22					76.72	3.25			76.99	5.70

Data in this table comes from the Mearley Brook 2018 model.
Level values are shown in mAOD, and flow values are shown in cubic metres per second.
Any blank cells show where a particular scenario has not been modelled for this location.

Environment Agency

Defended modelled fluvial extent and height

Location (easting/northing)
374515/441583

Scale
1:500

Created
30 Jun 2024

Model name
Mearley Brook 2018

Selected area

Main river

Modelled 2D grid
Water level in mAOD

- 0 - 74.0
- 74.0 - 74.25
- 74.25 - 74.5
- 74.5 - 74.75
- 74.75 - 75.0
- 75.0 - 75.25
- 75.25 - 75.5
- 75.5 - 75.75
- 75.75 - 76.0

This map shows the 0.1% AEP height data

0 5 10 15 20
metres

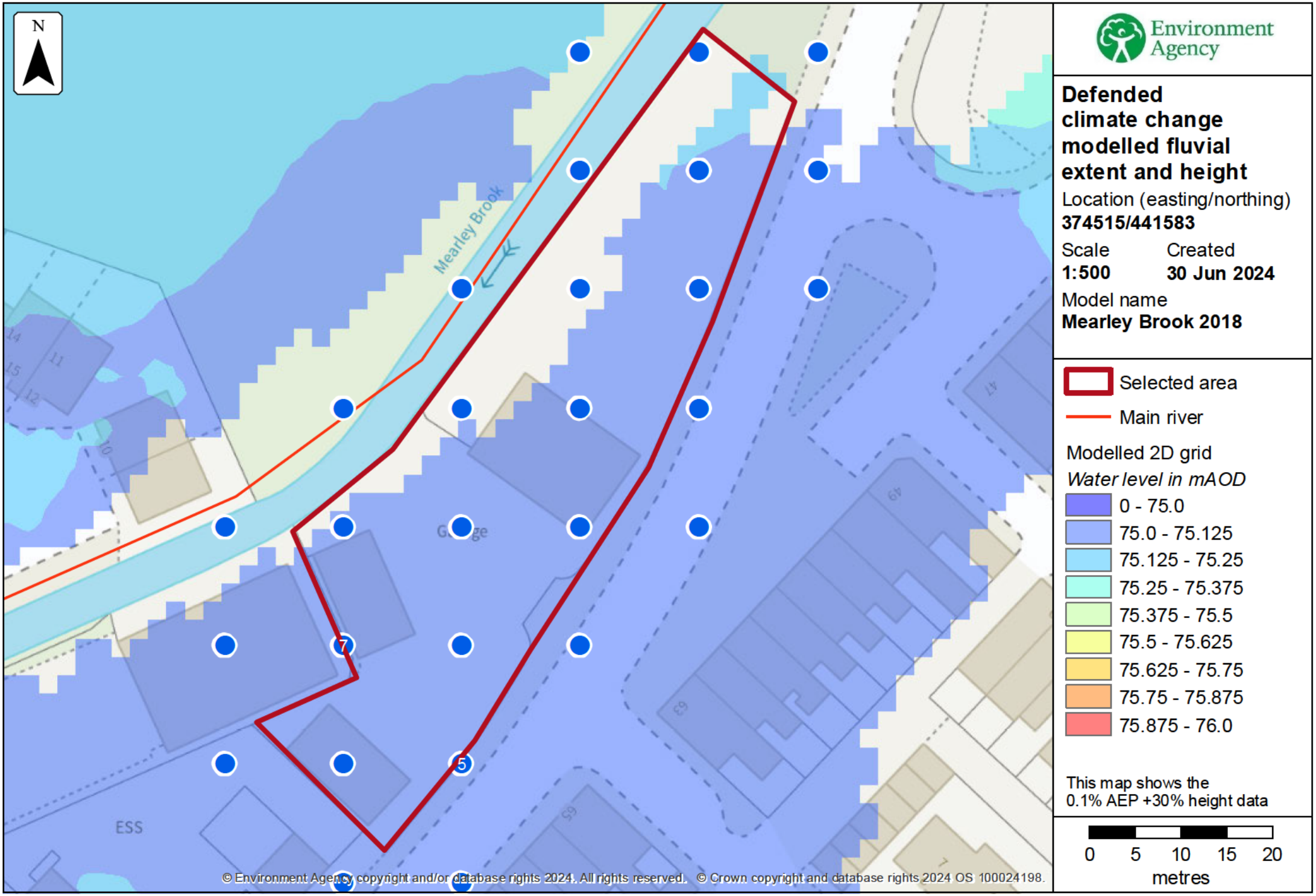
Sample point data

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	374495	441535	NoData	NoData	NoData	NoData	0.22	74.19	0.34	74.31	0.55	74.51	0.93	74.90
2	374508	441535	NoData	NoData	0.05	74.01	0.23	74.19	0.35	74.31	0.56	74.52	0.94	74.90
3	374482	441548	NoData	NoData	NoData	NoData	0.14	74.21	0.25	74.32	0.45	74.52	0.83	74.90
4	374495	441548	NoData	NoData	NoData	NoData	NoData	NoData	0.03	74.32	0.23	74.52	0.61	74.89
5	374508	441548	NoData	NoData	NoData	NoData	0.08	74.21	0.19	74.31	0.40	74.52	0.77	74.90
6	374482	441561	NoData	NoData	0.14	74.07	0.30	74.24	0.40	74.33	0.59	74.52	0.96	74.90
7	374495	441561	NoData	NoData	NoData	NoData	NoData	NoData	0.35	74.33	0.55	74.53	0.92	74.90
8	374508	441561	NoData	NoData	NoData	NoData	0.07	74.24	0.15	74.32	0.35	74.53	0.73	74.90
9	374521	441561	NoData	NoData	NoData	NoData	0.02	74.21	0.13	74.32	0.34	74.53	0.71	74.90
10	374482	441574	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
11	374495	441574	NoData	NoData	NoData	NoData	NoData	NoData	0.11	74.36	0.30	74.54	0.66	74.90
12	374508	441574	NoData	NoData	NoData	NoData	0.05	74.26	0.12	74.33	0.32	74.53	0.69	74.90
13	374521	441574	NoData	NoData	NoData	NoData	NoData	NoData	0.01	74.34	0.19	74.53	0.56	74.91
14	374534	441574	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.12	74.54	0.49	74.91
15	374495	441587	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
16	374508	441587	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	374521	441587	NoData	NoData	NoData	NoData	NoData	NoData	0.04	74.38	0.20	74.54	0.57	74.90
18	374534	441587	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.34	74.91
19	374508	441600	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
20	374521	441600	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
21	374534	441600	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.21	74.92
22	374547	441600	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
23	374521	441613	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
24	374534	441613	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	0.09	74.93
25	374547	441613	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
26	374521	441626	0.22	73.59	0.79	74.16	0.95	74.32	1.03	74.40	1.21	74.57	1.57	74.94
27	374534	441626	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
28	374547	441626	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData

Data in this table comes from the Mearley Brook 2018 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

Defended climate change modelled fluvial extent and height

Location (easting/northing)
374515/441583

Scale
1:500

Created
30 Jun 2024

Model name
Mearley Brook 2018

Selected area

Main river

Modelled 2D grid

Water level in mAOD

- 0 - 75.0
- 75.0 - 75.125
- 75.125 - 75.25
- 75.25 - 75.375
- 75.375 - 75.5
- 75.5 - 75.625
- 75.625 - 75.75
- 75.75 - 75.875
- 75.875 - 76.0

This map shows the 0.1% AEP +30% height data

0 5 10 15 20
metres

Sample point data

Defended climate change

Label	Easting	Northing	1% AEP (+30%)		1% AEP (+35%)		1% AEP (+70%)		0.1% AEP (+30%)	
			Depth	Height	Depth	Height	Depth	Height	Depth	Height
1	374495	441535	0.62	74.59	0.66	74.63	0.84	74.81	1.13	75.10
2	374508	441535	0.63	74.60	0.67	74.63	0.85	74.82	1.13	75.10
3	374482	441548	0.52	74.59	0.56	74.63	0.74	74.81	1.02	75.09
4	374495	441548	0.31	74.59	0.34	74.63	0.52	74.81	0.81	75.09
5	374508	441548	0.47	74.60	0.51	74.63	0.69	74.82	0.97	75.09
6	374482	441561	0.66	74.60	0.69	74.63	0.88	74.81	1.16	75.09
7	374495	441561	0.62	74.60	0.65	74.64	0.84	74.82	1.11	75.09
8	374508	441561	0.43	74.60	0.46	74.64	0.64	74.82	0.92	75.09
9	374521	441561	0.42	74.61	0.45	74.64	0.63	74.82	0.91	75.10
10	374482	441574	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
11	374495	441574	0.37	74.61	0.40	74.64	0.58	74.82	0.85	75.09
12	374508	441574	0.39	74.60	0.42	74.64	0.61	74.82	0.88	75.09
13	374521	441574	0.26	74.61	0.29	74.64	0.48	74.83	0.75	75.10
14	374534	441574	0.19	74.61	0.22	74.64	0.41	74.83	0.68	75.10
15	374495	441587	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
16	374508	441587	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData

Label	Easting	Northing	1% AEP (+30%)		1% AEP (+35%)		1% AEP (+70%)		0.1% AEP (+30%)	
			Depth	Height	Depth	Height	Depth	Height	Depth	Height
17	374521	441587	0.27	74.61	0.31	74.64	0.49	74.82	0.76	75.10
18	374534	441587	NoData	NoData	0.07	74.64	0.26	74.83	0.53	75.10
19	374508	441600	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
20	374521	441600	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
21	374534	441600	NoData	NoData	NoData	NoData	0.12	74.83	0.40	75.11
22	374547	441600	NoData	NoData	NoData	NoData	NoData	NoData	0.21	75.11
23	374521	441613	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
24	374534	441613	NoData	NoData	NoData	NoData	0.03	74.85	0.28	75.11
25	374547	441613	NoData	NoData	NoData	NoData	NoData	NoData	0.03	75.11
26	374521	441626	1.28	74.64	1.31	74.68	1.49	74.86	1.76	75.13
27	374534	441626	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
28	374547	441626	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData

Data in this table comes from the Mearley Brook 2018 model.
Height values are shown in mAOD, and depth values are shown in metres.
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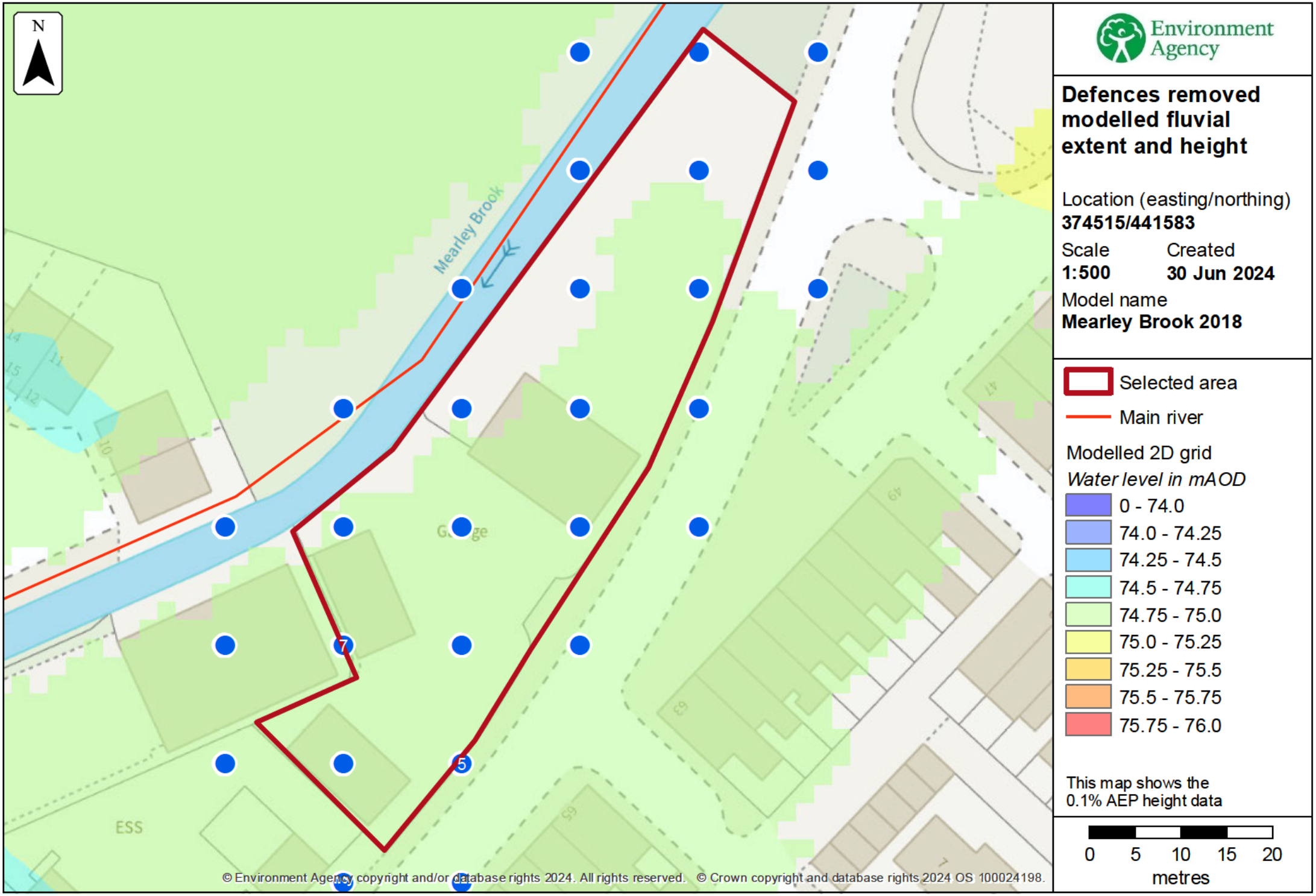

Environment Agency

Defences removed modelled fluvial extent and height

Location (easting/northing)
374515/441583

Scale
1:500

Created
30 Jun 2024

Model name
Mearley Brook 2018

Selected area

Main river

Modelled 2D grid
Water level in mAOD

- 0 - 74.0
- 74.0 - 74.25
- 74.25 - 74.5
- 74.5 - 74.75
- 74.75 - 75.0
- 75.0 - 75.25
- 75.25 - 75.5
- 75.5 - 75.75
- 75.75 - 76.0

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	374495	441535	NoData	NoData					NoData	NoData			0.84	74.80
2	374508	441535	NoData	NoData					NoData	NoData			0.83	74.81
3	374482	441548	NoData	NoData					NoData	NoData			0.73	74.80
4	374495	441548	NoData	NoData					NoData	NoData			0.52	74.81
5	374508	441548	NoData	NoData					NoData	NoData			0.68	74.81
6	374482	441561	NoData	NoData					NoData	NoData			0.86	74.80
7	374495	441561	NoData	NoData					NoData	NoData			0.75	74.81
8	374508	441561	NoData	NoData					NoData	NoData			0.65	74.82
9	374521	441561	NoData	NoData					NoData	NoData			0.64	74.83
10	374482	441574	NoData	NoData					NoData	NoData			NoData	NoData
11	374495	441574	NoData	NoData					NoData	NoData			0.59	74.83
12	374508	441574	NoData	NoData					NoData	NoData			0.60	74.82
13	374521	441574	NoData	NoData					NoData	NoData			0.47	74.84
14	374534	441574	NoData	NoData					NoData	NoData			0.42	74.84
15	374495	441587	NoData	NoData					NoData	NoData			NoData	NoData
16	374508	441587	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	374521	441587	NoData	NoData					NoData	NoData			0.50	74.84
18	374534	441587	NoData	NoData					NoData	NoData			0.28	74.84
19	374508	441600	NoData	NoData					NoData	NoData			NoData	NoData
20	374521	441600	NoData	NoData					NoData	NoData			NoData	NoData
21	374534	441600	NoData	NoData					NoData	NoData			0.16	74.84
22	374547	441600	NoData	NoData					NoData	NoData			NoData	NoData
23	374521	441613	NoData	NoData					NoData	NoData			NoData	NoData
24	374534	441613	NoData	NoData					NoData	NoData			NoData	NoData
25	374547	441613	NoData	NoData					NoData	NoData			NoData	NoData
26	374521	441626	NoData	NoData					NoData	NoData			NoData	NoData
27	374534	441626	NoData	NoData					NoData	NoData			NoData	NoData
28	374547	441626	NoData	NoData					NoData	NoData			NoData	NoData

Data in this table comes from the Mearley Brook 2018 model.
Height values are shown in mAOD, and depth values are shown in metres.
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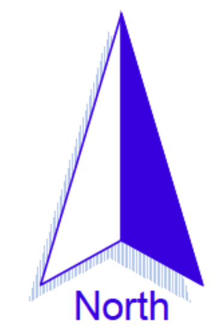
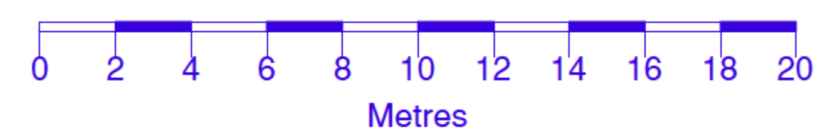
APPENDIX C

Notes

All Dimensions to be checked on site. Walls shown on plans are not to be assumed to be solid & should be checked for thickness, construction, load bearing capacity & stability.





ABBREVIATIONS

BOL	Bollard
CL	Cover Level
EH	Eves Height
GV	Gas Valve
GU	Gully
LP	Lamp Post
MH	Man Hole
RH	Ridge/Roof Height
TF	Top of Fence
TW	Top of Wall
WV	Water Valve

NOTE
All levels and coordinates relate to OSGB36(15) using GNSS data.

Levels defining edge of carriageway are observed at channel (bottom of kerb).

Rev. 0 Description. Issued

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BUILDING & LAND SURVEYORS

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Site Address
Peel Street
Clitheroe, BB7 1RA

Project Description
Existing Site Survey

Drawing Title
Site Survey

Scale	Date	Drawn By
1:200@A1	23/11/2016	SN

Drawing Number
TRI-1870-01