

HOLCOMBE MILL, RAMSBOTTOM

FLOOD RISK ASSESSMENT

Final Report v1.2

August 2020

Report Title	Holcombe Mill, Ramsbottom Flood Risk Assessment Final Report v1.2
Client	Eccleston Homes
Date of issue	7 August 2020

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1 INTRODUCTION

1.1 PURPOSE OF REPORT

Weetwood Services Ltd ('Weetwood') has been instructed by Eccleston Homes to prepare a Flood Risk Assessment (FRA) report to accompany a planning application for the proposed redevelopment of Holcombe Mill, Ramsbottom.

The assessment has been undertaken in accordance with the requirements of the National Planning Policy Framework (NPPF) updated on 19 February 2019 and the National Planning Practice Guidance (NPPG) updated on 1 October 2019.

1.2 STRUCTURE OF THE REPORT

The report is structured as follows:

Section 1	Introduction and report structure
Section 2	Provides background information relating to the development site, the development proposals, ground conditions and existing site access arrangements
Section 3	Presents national and local flood risk planning policy
Section 4	Assesses the potential sources of flooding to the development site
Section 5	Presents flood risk mitigation measures based on the findings of the assessment
Section 6	Presents a summary of key findings and recommendations

1.3 RELEVANT DOCUMENTS

The assessment has been informed by the following documents:

- Bury Local Plan Topic Paper 6 Flood Risk, Bury Council, October 2018
- Bury Local Flood Risk Management Strategy, Bury Council, April 2018
- Preliminary Flood Risk Assessment, Bury Council, May 2011
- Level 2 Strategic Flood Risk Assessment (SFRA), Bury, Rochdale and Oldham, November 2009
- Level 1 SFRA, Association of Greater Manchester Authorities, August 2008
- Bury Unitary Development Plan, Bury Council, August 1997

2 SITE DETAILS AND PROPOSED DEVELOPMENT

2.1 SITE LOCATION

The approximately 2.85 hectare (ha) site is located to the south of Bridge Street at the former Holcombe Mill, at Ordnance Survey National Grid Reference SD 793 167, as shown in **Figure 1**.

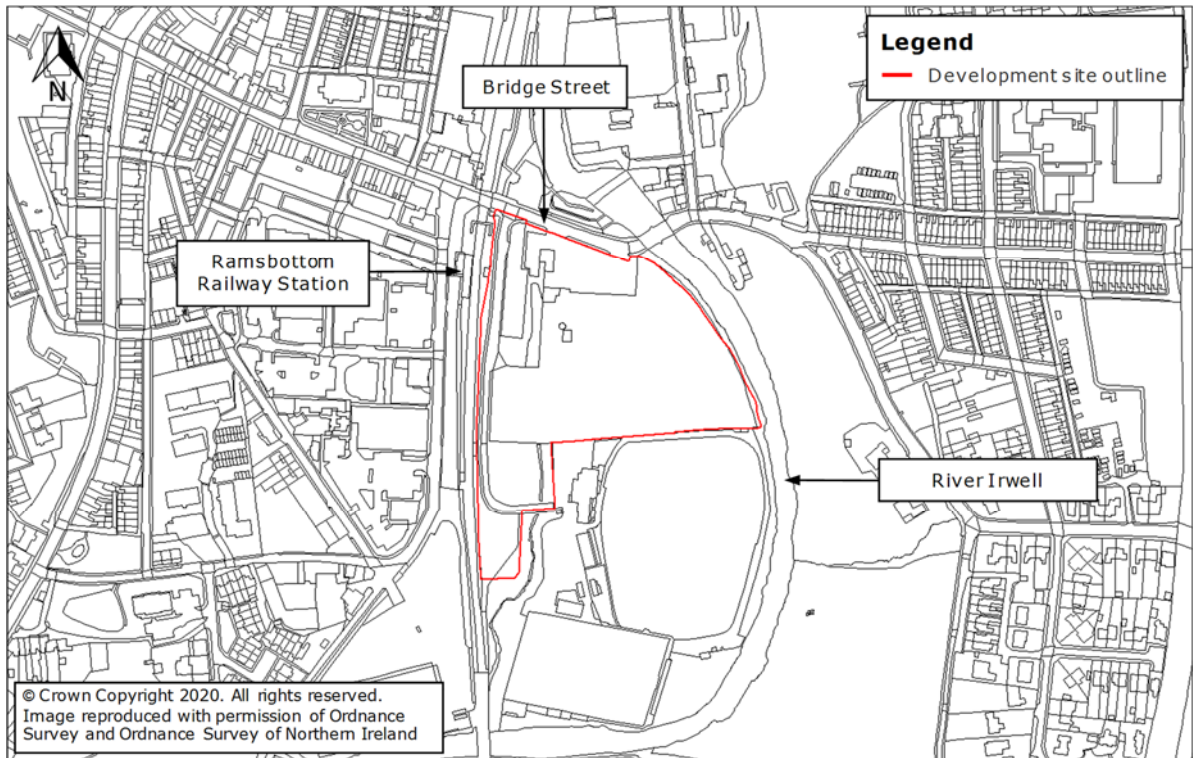


Figure 1: Site Location

2.2 EXISTING AND PROPOSED DEVELOPMENT

The existing site comprises derelict land previously occupied by the Mondi/Holcombe Paper Mill. The mill was demolished in 2012 and all that remains are 3 no. small buildings and the industrial chimney.

The development proposals are for the erection of 67 new residential dwellings, refurbishment of 2 existing buildings to provide 5 residential dwellings, retention of the chimney and demolition of final derelict building (**Appendix A**).

The NPPG classifies residential development as more vulnerable land use.

2.3 WATERBODIES IN THE VICINITY OF THE SITE

The River Irwell flows in a principally southerly direction in the vicinity of the site and flows directly around the sites eastern boundary. The River Irwell is classified as a main river.

A mill race previously flowed through the western portion of the site. The inlet to the mill race is understood to have been sealed and the mill race is therefore only expected to convey flows resulting from direct rainfall or floodwaters entering the site overland.

2.4 GROUND CONDITIONS

British Geological Survey (BGS) Surface Geology mapping¹ indicates that the bedrock underlying the site comprises mudstone and siltstone of the Marsden Formation, which is overlain by clay, silt, sand and gravel (alluvium).

The intrusive ground investigation undertaken by Betts Geo Environmental Ltd indicates that the site is underlain by made ground with deposits of clay, silt, sand and gravel generally encountered between 1.3 and 3.0 metres below ground level (m bgl).

Groundwater was encountered within a number of the exploratory holes between 2.6 and 4.0 m bgl.

DEFRA mapping classifies the bedrock and superficial deposits at the site as Secondary A aquifers and the site is not shown to be located within a designated Groundwater Source Protection Zone.

2.5 SITE LEVELS

A topographic survey of the site has been undertaken by Urban Contours Ltd and is provided in **Appendix B**.

Site levels are generally shown to fall from west to east with levels ranging between approximately 127.8 and 124.7 metres Above Ordnance Datum (m AOD).

Two large material stockpiles also appear to be present in the south-west corner of the site with crest levels ranging between 130.2 and 129.1 m AOD.

2.6 ACCESS AND EGRESS

Vehicular access to the site is provided along its northern boundary via Bridge Street.

2.7 FLOOD ZONE DESIGNATION

Flood zones refer to the probability of river and sea flooding. The NPPG defines flood zones as follows:

- Flood Zone 1: Low Probability. Land having a less than 1:1,000 annual probability of river or sea flooding.
- Flood Zone 2: Medium Probability. Land having between a 1:100 and 1:1,000 annual probability of river flooding; or Land having between a 1:200 and 1:1,000 annual probability of sea flooding.
- Flood Zone 3a: High Probability. Land having a 1:100 or greater annual probability of river flooding; or Land having a 1:200 or greater annual probability of sea flooding.
- Flood Zone 3b: Functional Floodplain. Land where water has to flow or be stored in times of flood.

The flood zones are shown on the Environment Agency (EA) Flood Map for Planning.

The flood zones shown on the flood map are defined by the predicted extent of flooding during the present day 1:100 (non-tidal rivers), 1:200 (tidal rivers and sea) and 1:1000 (rivers and sea) annual exceedance probability (AEP) events. The zones do not take account of the possible impacts of climate change and consequent changes in the future probability of flooding.

Flood Zone 3b (functional floodplain) is not separately distinguished on the Flood Map for Planning but is usually identified by local planning authorities in their Strategic Flood Risk Assessments. The boundary of Flood Zone 3b is normally defined as land that would flood during the present day 1:20 AEP event, although definitions may vary particularly in some districts particularly in urban areas.

Where an area benefits from formal flood defences providing a minimum standard of protection, the defended area may be indicated as an area benefiting from flood defences. However, not all areas are indicated as such,

¹ <http://mapapps.bgs.ac.uk/geologyofbritain/home.html>

and unless specifically indicated, the Flood Map for Planning conservatively shows land at risk of flooding in the absence of flood defences.

According to the Flood Map for Planning (**Figure 2**) the site is located in part Flood Zone 3, Flood Zone 2 and Flood Zone 1 and benefits from the presence of flood defences.

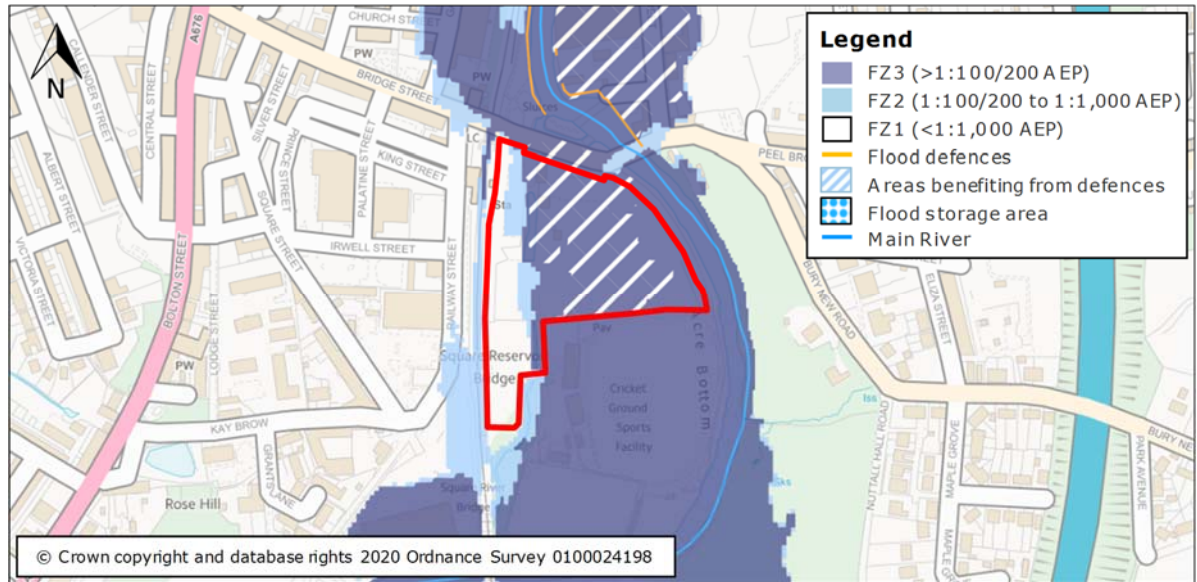


Figure 2: Flood Map for Planning
(Source: gov.uk website)

3 PLANNING POLICY AND GUIDANCE

3.1 NATIONAL PLANNING POLICY AND GUIDANCE

The NPPF sets out government's planning policies for England and how these are expected to be applied. The NPPF seeks to ensure that flood risk is taken into account at all stages in the planning process and is appropriately addressed.

Footnote 50 of the NPPF states that a site-specific flood risk assessment should be submitted for all development proposed in Flood Zone 2 and Flood Zone 3 whilst in Flood Zone 1, an assessment should accompany all proposals involving: sites of 1 hectare or more; land identified as having critical drainage problems or as being at increased flood risk in future; or land that may be subject to other sources of flooding, where its development would introduce a more vulnerable use.

NPPF paragraph 155 states that inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk but accepts that where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere. The policy of seeking to direct development away from areas at highest risk of flooding is implemented through the application of the sequential test (NPPF paragraph 158).

Paragraph 159 of the NPPF states that if it is not possible for a development to be located in zones with a lower risk of flooding, taking into account wider sustainable development objectives, the exception test may have to be applied.

The need for the exception test will depend on the flood zone of the site and of the vulnerability of the development proposed (as set out in NPPG Table 2 and 3).

NPPF paragraph 160 states that application of the exception test for development proposals at the application stage should be informed by a site-specific flood risk assessment. For the test to be passed it should be demonstrated that: the development would provide wider sustainability benefits to the community that outweigh the flood risk; and the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

NPPF Paragraph 161 states that both elements of the exception test should be satisfied for development to be permitted.

3.2 LOCAL PLANNING POLICY AND GUIDANCE

3.2.1 Adopted Bury Unitary Development Plan, 1997

The Bury Unitary Development Plan (UDP) was adopted by Bury Metropolitan Borough Council (MBC) on 29 August 1997. Bury MBC is now working to replace the adopted UDP with a new document called the Bury Local Plan. Until the new Local Plan is produced the UDP will continue to be used to make planning decisions.

The following policies are relevant in respect of flood risk:

EN5 - Flood Protection and Defence

The Council will seek to control development in a manner consistent with flood protection and the maintenance of flood defence systems.

EN5/1 - New Development and Flood Risk

The Council will not permit new development, including the raising of land and the intensification of development, where such development would be at risk from flooding, would be likely to increase the risk of flooding elsewhere, or would adversely affect river flood defences. When assessing proposals against this policy, the following criteria will apply:

- *the impact on the floodplain;*
- *the increase in surface water run-off as a result of the proposal;*
- *the impact on fluvial flood defences;*
- *the incorporation of mitigating works.*

3.2.2 Bury Local Plan

Bury MBC has commenced preparation of a new Local Plan. The Local Plan will set out a range of planning policies that will seek to support or restrict development up to 2035 and will zone land for specific uses. Once adopted, it will replace the Bury UDP.

3.3 ENVIRONMENTAL PERMITTING AND LAND DRAINAGE CONSENT

Under the Environmental Permitting (England and Wales) Regulations 2016 an Environmental Permit for Flood Risk Activities² is required from the EA for any permanent or temporary works:

- In, over or under a designated main river
- Within eight metres of the top of bank of a designated main river or of the landward toe of a flood defence.

In addition, any permanent or temporary works within the floodplain of a designated main river may also require an Environmental Permit for Flood Risk Activities. A permit is separate to and in addition to any planning permission granted.

Land drainage consent may be required from the lead local flood authority or drainage board for work to an ordinary watercourse.

Undertaking activities controlled by local byelaws also requires the relevant consent.

² <https://www.gov.uk/guidance/flood-risk-activities-environmental-permits>

4 REVIEW OF FLOOD RISK

4.1 FLUVIAL FLOOD RISK – RIVER IRWELL

The extents of flooding presented by the Flood Map for Planning are based upon the EA 1D - 2D Flood Modeller - TUFLOW hydraulic model of the River Irwell³.

The EA hydraulic model has been used to undertake a detailed assessment of the risk of flooding at the site and to inform the proposed flood mitigation measures required to facilitate redevelopment of the site.

4.1.1 Hydraulic Model Truncation

The EA River Irwell hydraulic model has been truncated to reduce model run times, enabling a range of scenarios to be assessed within a reasonable timeframe.

The 1D and 2D elements of the hydraulic model have been truncated upstream and downstream of the site at model nodes IRWE07_02247 and IRWE06_01276, reducing the extent of the 2D model domain from approximately 1,138 ha to 195 ha.

The extents of the original and truncated hydraulic models are presented by **Figure 3**.

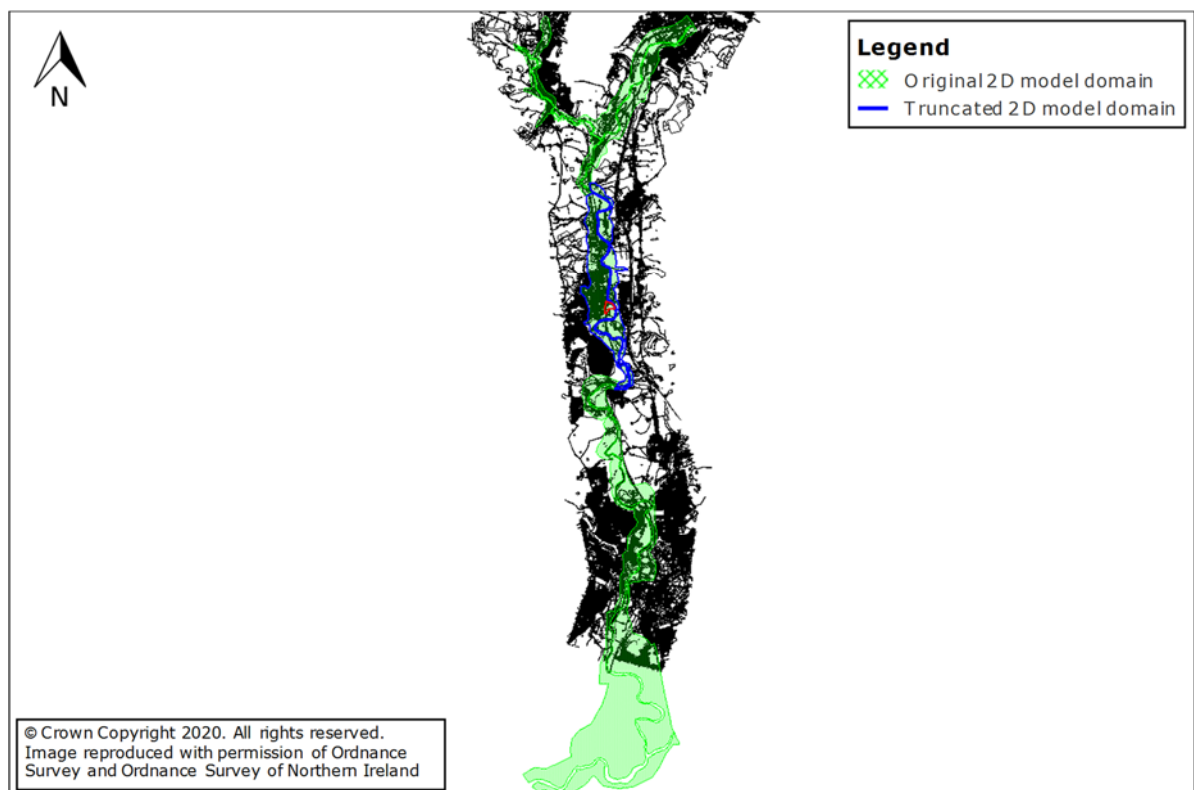


Figure 3: 2D Model Domain

The points at which the hydraulic model has been truncated are approximately 3.0 km upstream of the site and 2.8 km downstream of the site. These locations are considered to be appropriate because flows are shown to be contained within the banks of the channel (i.e. within the 1D domain).

³ Mid Irwell Modelling Study, Final Report, JBA Consulting, November 2018

The inflows to the hydraulic model were updated to reflect the reduction in the extent of the model domain. The original EA River Irwell hydraulic model included 28 inflow boundaries, 22 of which are applied outside of the truncated model domain and 2 of which are located partially within the truncated model domain.

Inflow boundaries LAT_I18 and LAT_I16 are only partially located within the truncated model domain. The flows associated with these boundaries are applied as Lateral Inflows with the proportion of the total flow applied to each model node based upon the distance to the downstream node.

The peak flows for LAT_I18 and LAT_I16 have been reduced to take account of the length of the model over which the lateral inflows are applied within the truncated model domain. The original and revised peak flows at LAT_I18 and LAT_I16 are provided in **Table 1**.

Table 1: Peak Flows – LAT_I18 and LAT_I16

Flood Event (AEP)	LAT_I18		LAT_I16	
	Original	Revised	Original	Revised
1:20	3.69	1.22	7.78	6.72
1:100	6.33	2.10	10.94	9.45
1:100 (+30%)	8.23	2.72	14.22	12.29
1:100 (+35%)	8.55	2.83	14.77	12.76
1:100 (+70%)	10.77	3.56	18.60	16.07
1:1,000	9.59	3.17	15.28	13.21

The inflow boundaries located upstream of the truncated model domain were replaced by a single Flow-Time boundary that was output directly from the results of the EA River Irwell hydraulic model at model node IRWE07_02247. The hydrographs extracted from the EA hydraulic model and input to the truncated hydraulic model at model node IRWE07_02247 are presented in **Figure 4**.

A Head-Time boundary was incorporated at the downstream extent of the truncated model domain and was output directly from the results of the EA River Irwell hydraulic model at model node IRWE06_01276. The stage-time graphs that have been extracted from the EA hydraulic model and applied to the truncated hydraulic model at model node IRWE06_01276 are presented in **Figure 5**.

The results from the existing EA hydraulic model have been compared to those output from the truncated hydraulic model to assess the impact of the truncation on the model results (**Appendix C**).

The observed changes in modelled flood depth from truncating the hydraulic model are generally shown to be less than 5 mm for the 1:20, 1:100, 1:100 (+30%) and 1:1,000 AEP events. However, it is noted that there is an area upstream of the site where larger changes in flood depths are observed. These changes result from model instabilities in this location.

Larger discrepancies in modelled flood depth are observed in the 1:100 (+35%) and 1:100 (+70%) AEP events. These discrepancies also relate to the model instabilities upstream of the site which result in large volume errors where water erroneously enters the model domain.

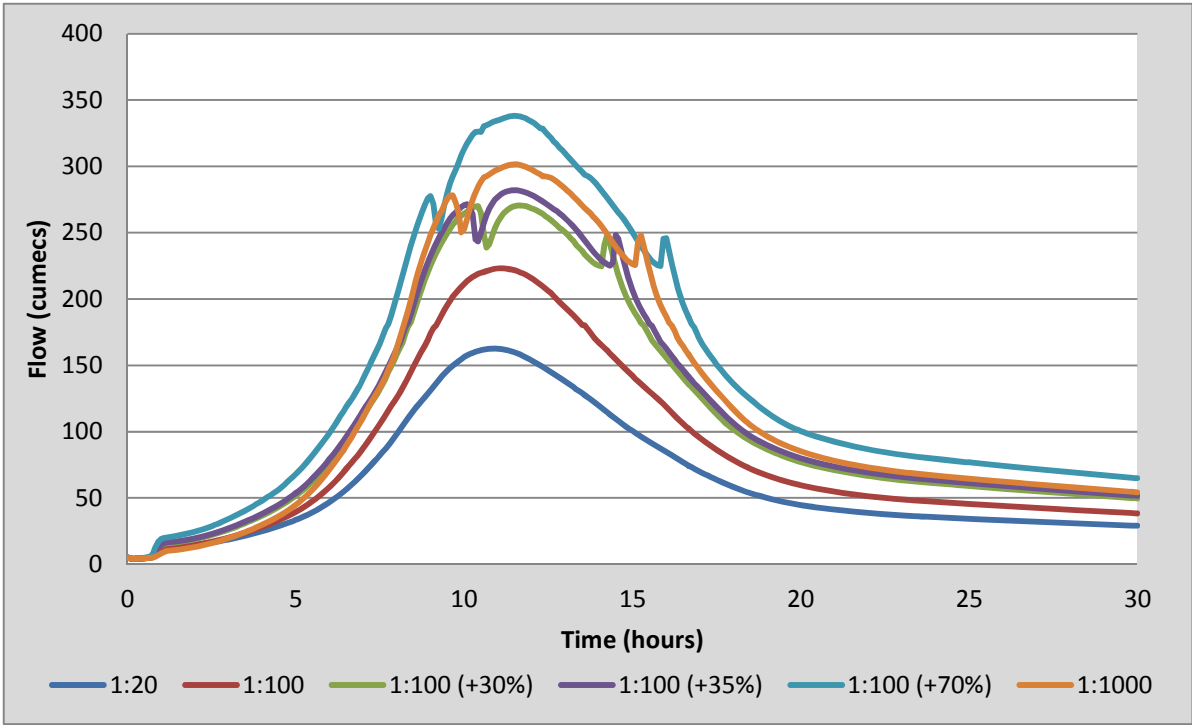


Figure 4: Inflow Hydrographs – Node IRWE07_02247

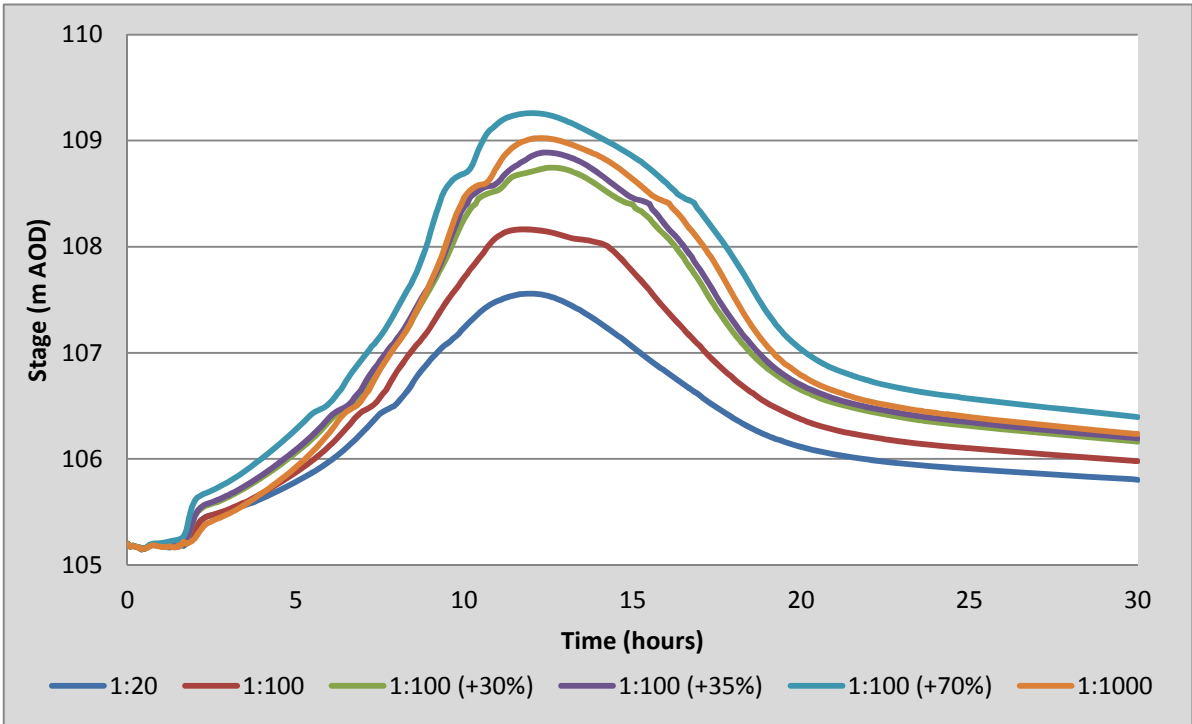


Figure 5: Downstream Boundary – Node IRWE07_02247

4.1.2 Hydraulic Model Development

The model has been updated to resolve the model instability issues identified upstream of the site. The material file was updated to remove a track along the top of east bank of the channel, increasing the Manning's coefficient from 0.022 to 0.060.

The hydraulic model was also updated to include topographical survey information of the site and Bridge Street. Existing ground levels, finished floor levels of existing buildings and walls that would be expected to influence flood flow paths have been incorporated into the hydraulic model in accordance with the general schematisation presented by **Figure 6**.

In addition to the above, the two 600 mm diameter culverts along the mill race have been incorporated into the hydraulic model to allow water to exit the site.

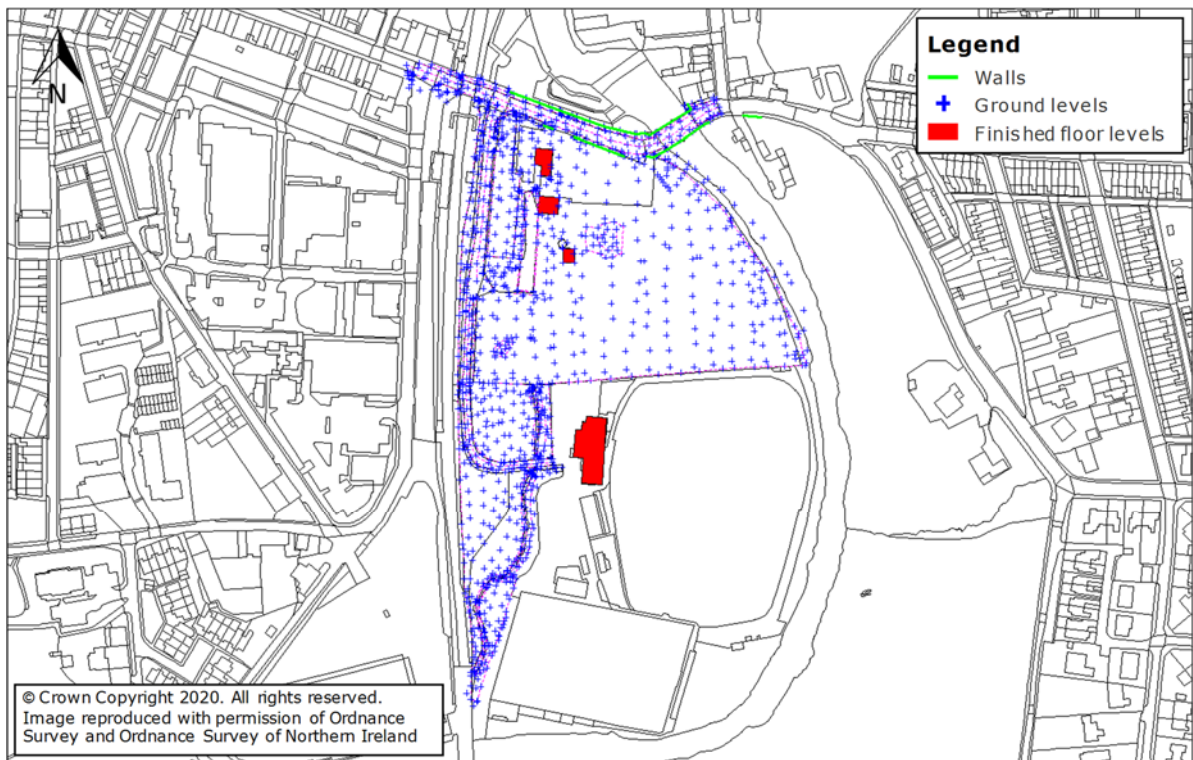


Figure 6: Topographic Representation

Finally, the topographical survey information has been used to represent the road bridge adjacent to the site. The bridge deck was originally represented in the 1D domain of the hydraulic model using a spill unit. However, the truncated model has been updated to provide a 2D representation of the bridge deck.

4.1.3 Modelled Flood Depths and Extents

Model output plots illustrating maximum flood extents / depths for the 1:20, 1:100, 1:100 climate change and 1:1,000 AEP events are provided in **Appendix D**.

The model outputs indicate that the site is subject to minor flooding in the 1:20 AEP event, with flooding limited to the south-east corner of the site. More significant flooding is shown to occur across the eastern portion of the site in events exceeding the 1:100 AEP event, with a maximum flood depth of approximately 1.2 m occurring in the south-east of the site in the 1:100 (+70%) AEP event.

The modelled flood levels and depths for the aforementioned events are presented in **Table 2**.

Table 2: Modelled Flood Levels / Depths

Flood Event (AEP)	Level (m AOD)		Depth (m)	
	Max	Ave. Max	Max	Ave. Max
1:20	125.69	125.02	0.29	0.09
1:100	126.03	125.52	0.52	0.14
1:100 (+30%)	127.37	125.86	1.33	0.32
1:100 (+35%)	127.45	125.94	1.41	0.35
1:100 (+70%)	127.80	126.16	1.68	0.50
1:1,000	127.57	126.04	1.53	0.41

4.2 FLOOD RISK FROM SURFACE WATER

The Flood Risk from Surface Water map (**Figure 7**) indicates that the majority of the site is at a 'Very Low' risk of flooding. Areas of 'High' flood risk generally appear to be restricted to the pond and channel associated with the mill race, with several isolated areas also shown to be at risk of flooding from surface water.

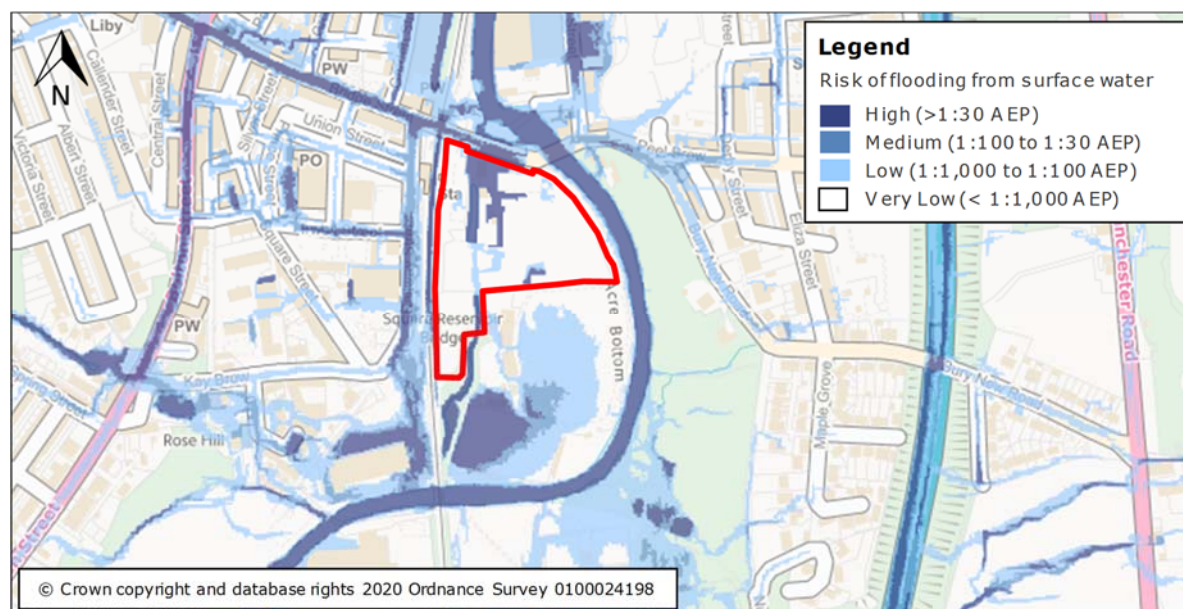


Figure 7: Flood Risk from Surface Water
(Source: gov.uk website)

The topographical survey indicates that the propensity for surface water to pond at the site is limited to the mill race, with flood depths not expected to exceed 0.1 m across the ground surface.

In addition to the above, gullies are present along the existing access road, indicating that parts of the site are served by a formal surface water drainage system. The drainage system would be expected to further reduce the risk of surface water flooding at the site.

4.3 FLOOD RISK FROM RESERVOIRS, CANALS AND OTHER ARTIFICIAL SOURCES

The Flood Risk from Reservoirs map (**Figure 8**) indicates that the site may be at risk from reservoir flooding. However, all large reservoirs are regularly inspected by reservoir panel engineers with essential safety work carried out. As detailed on the gov.uk website, reservoir flooding is therefore extremely unlikely to occur.

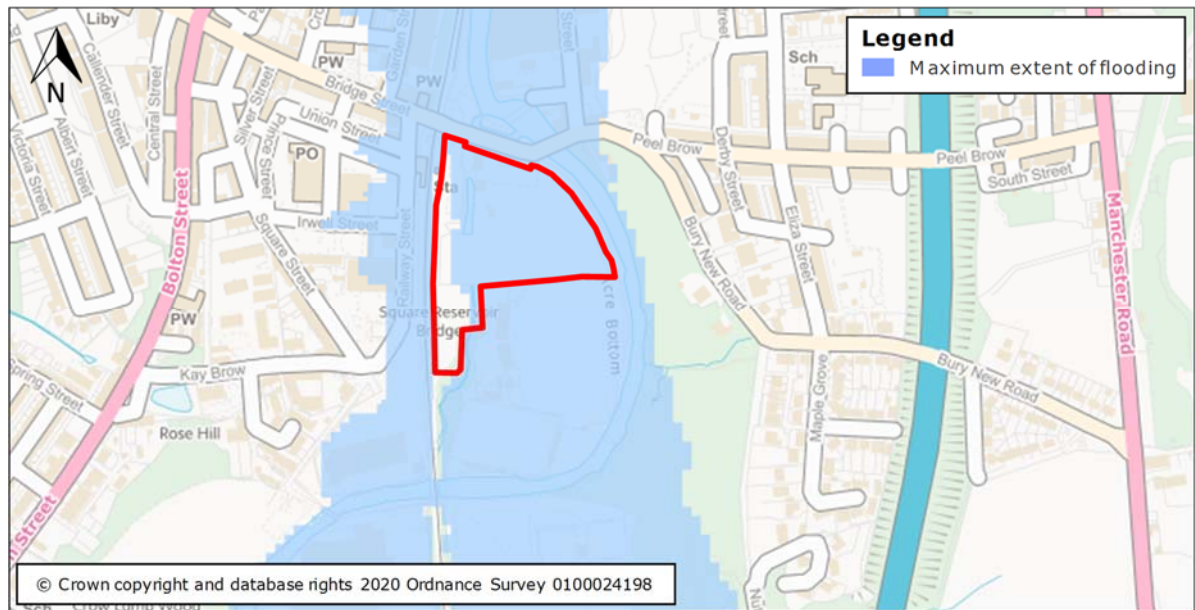


Figure 8: Flood Risk from Reservoirs
(Source: gov.uk website)

There are no canals or other impounded waterbodies located within the immediate vicinity of the site. As such, the site is assessed not to be at risk of flooding from canals or other artificial sources.

4.4 FLOOD RISK FROM GROUNDWATER

According to the BGS Groundwater Flooding Hazard map (**Figure 9**) the sites susceptibility to groundwater flooding is moderate to significant.

The BGS Groundwater Flooding Hazard map is considered to overstate the risk of groundwater flooding at the site because the intrusive ground investigation found groundwater to be a minimum of 2.6 m bgl.

Furthermore, the site is covered almost entirely by hardstanding and the low permeability of concrete / tarmac would be expected to significantly reduce the risk of groundwater emergence. On this basis, the risk of groundwater flooding at the site is assessed to be low.

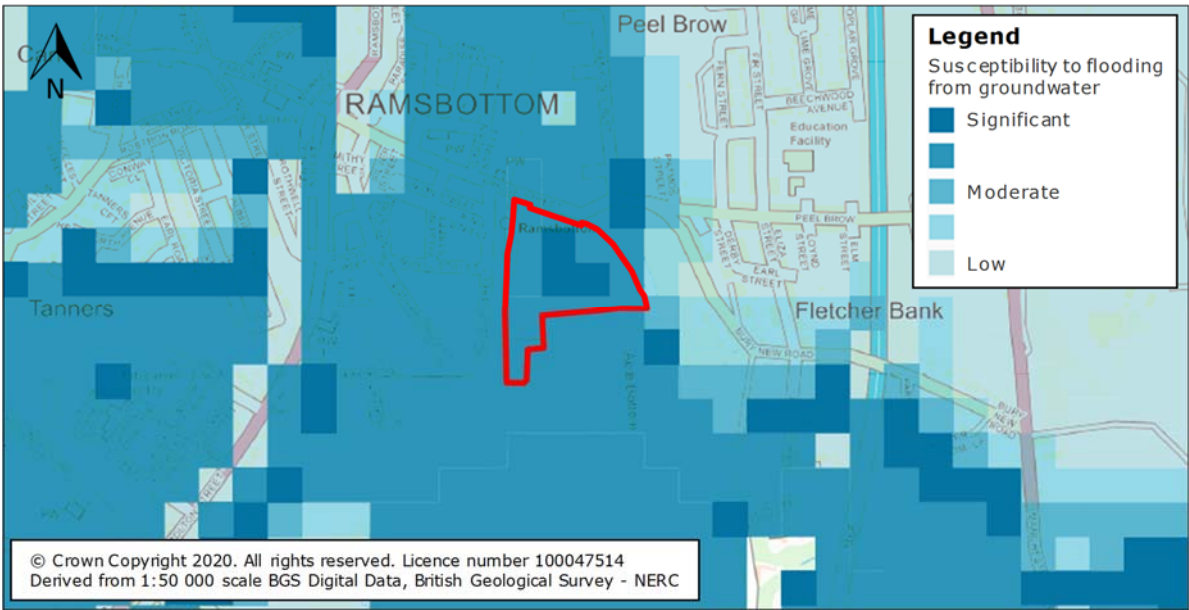


Figure 9: Groundwater Flooding Hazard Map
(Source: Findmaps)

5 FLOOD RISK MITIGATION MEASURES

The flood risk to the site from the River Irwell will be mitigated through the implementation of the measures proposed within the following section of this report.

5.1 FLOOD ALLEVIATION SCHEME

It is proposed to construct an approximately 30 m wide flood relief channel along the west bank of the River Irwell / eastern boundary of the site. Levels fall from 125.85 m AOD at the northern extent of the channel to 124.80 m AOD at the southern extent.

It is also proposed to remove the existing boundary walls along the sites northern boundary, lower ground levels east of the site access to 125.55 m AOD and upgrade the existing 600 mm diameter mill race culvert that crosses the site, providing a 2000 x 1200 mm box culvert.

The indicative arrangement of the flood relief channel, flood storage area and mill race culvert is presented by **Figure 10**. Consent should be sought from the EA for the proposed works within the vicinity of the River Irwell.

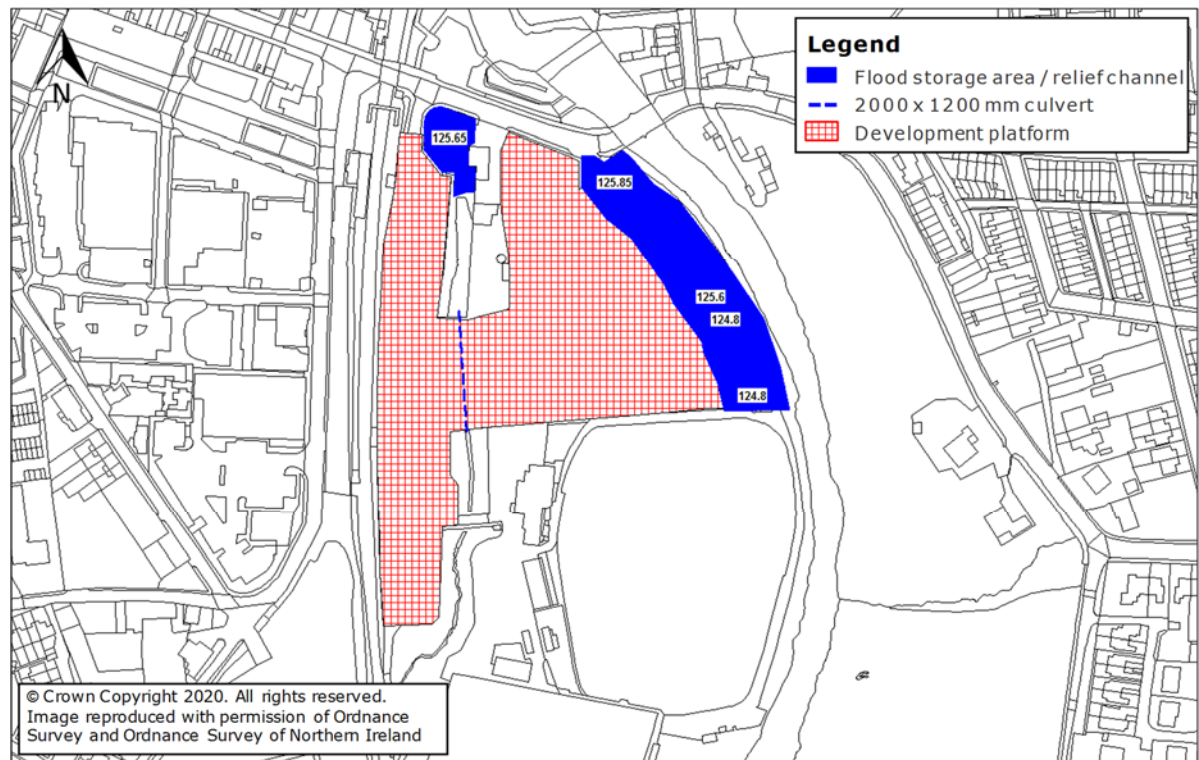


Figure 10: Flood Alleviation Measures

5.2 DEVELOPMENT PLATFORM AND FINISHED FLOOR LEVELS

It is proposed to raise the development platform above peak flood levels in the 1:1000 AEP event. This will prevent flooding of the development platform in all but the extreme 1 in 100 (+70%) AEP flood event, where limited flooding of the site access roads will be permitted. The development plots will be raised above the peak 1 in 100 (+70%) AEP flood levels to ensure that they remain flood free.

Proposed minimum development platform levels are presented by **Figure 11**.

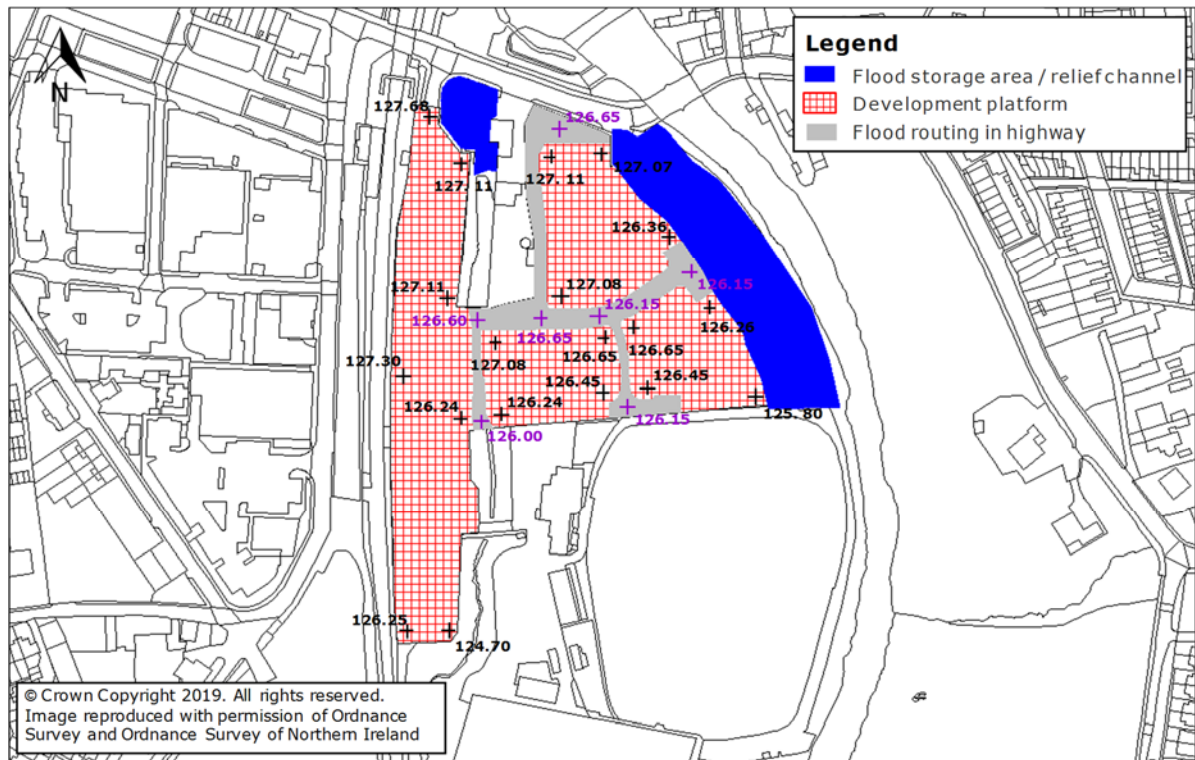


Figure 11: Minimum Development Platform Levels

Raising the development plots above the peak 1 in 100 (+70%) AEP flood levels would be expected to mitigate the residual risk of flooding associated with a blockage of the Bridge Street bridge because floodwaters overtopping Bridge Street are heavily influenced by the weir located directly upstream. Flood levels upstream of the weir are approximately 0.91 m higher than those directly upstream of the bridge.

Finished floor levels of the newly constructed residential dwellings should be set a minimum of 0.15 m above finished development platform levels, effectively providing a minimum 0.15 m freeboard above the peak 1:100 (+70%) AEP flood levels.

Finished floor levels of the refurbished residential dwellings should be set at a minimum of 126.09 m AOD, the peak 1:100 (+35%) AEP flood level.

5.3 PROPOSED SCENARIO FLOOD RISK MODELLING

The proposed flood risk mitigation measures detailed above have been incorporated into the hydraulic model and run for the full range of annual probability events.

Model output plots are provided in **Appendix E** and indicate that flooding of the development platform would only be expected to occur in the 1:100 (+70%) AEP event, with flooding limited to the site access roads at depths of less than 0.50 m.

Flooding of the refurbished residential dwellings would also be expected to occur in the 1:1,000 and 1:100 (+70%) AEP events, to maximum depths of 0.32 m and 1.02 m respectively. However, first floor levels would be significantly above the peak 1:100 (+70%) AEP flood level, providing safe refuge in the unlikely event that flooding occurs.

5.4 FLOOD RISK ELSEWHERE

Any proposal to modify ground levels should demonstrate that there is no increase in flood risk to the development itself, or to any existing buildings which are known to, or are likely to flood.

Developers must ensure there will be no loss of flood flow or flood storage capacity for floods up to the severity of the 1:100 AEP fluvial event. Whilst not specified by the NPPF, the EA recommends that this should be the case over the lifetime of development (i.e. should take into account climate change).

The baseline and proposed scenario hydraulic model results have been used to assess the changes in flood risk that result from the proposed development in the 1:20, 1:100, 1:100 (+30%) and 1:100 (+35%) AEP events, as illustrated by the model outputs plots provided in **Appendix F**.

The proposed development is generally shown to have a negligible impact on flood risk elsewhere, with isolated areas of increased flood depths observed adjacent to the south-east corner of the site. However, flood risk to the south of the site is more generally shown to reduce significantly in the 1:100 AEP climate change events.

5.5 FLOOD RESISTANT AND RESILIENT CONSTRUCTION

Flood resistant and resilient construction techniques should be incorporated into the design of the refurbished residential dwellings, in line with government guidance⁴. These include design features and finish materials to minimise the entry of water and/or reduce the damage in the unlikely event of the development being inundated.

5.6 FLOOD PLAN

It is recommended that a Flood Plan is prepared in consultation with Bury Council emergency planning team. The objectives of the plan would be to reduce the risk to property and life by ensuring that all residents are aware of the potential risk of flooding and the procedures that should be implemented in the event that flooding is expected or has occurred.

This would be achieved by:

- Setting out the measures that would need to be taken if flooding is forecast, during flooding and following an 'all-clear' notification;
- Summarising the roles and responsibilities for flood response and management; and
- Describing how flood warnings are issued, flood warning codes and what they mean, and other sources of flood information

The site is included in an Environment Agency flood alert and warning area. This provides the opportunity for the relevant response procedures set out in the Flood Plan to be invoked in response to receipt of a flood warning from the Environment Agency.

⁴ Improving the Flood Performance of New Buildings: Flood Resilient Construction. Dept for Communities and Local Government. May 2007.

6 SUMMARY AND RECOMMENDATIONS

This report has been prepared on behalf of Eccleston Homes to accompany a planning application for the proposed redevelopment of Holcombe Mill, Ramsbottom.

The development proposals are for the erection of 67 new residential dwellings, refurbishment of 2 existing buildings to provide 5 residential dwellings, retention of the chimney and demolition of final derelict building.

According to the Flood Map for Planning the site benefits from the presence of flood defences and is located in part Flood Zone 3, Flood Zone 2 and Flood Zone 1.

The extents of flooding presented by the Flood Map for Planning are based upon the Environment Agency hydraulic model of the River Irwell. The EA hydraulic model has been used to undertake a detailed assessment of the risk of flooding at the site and to inform the proposed flood mitigation measures required to facilitate redevelopment of the site.

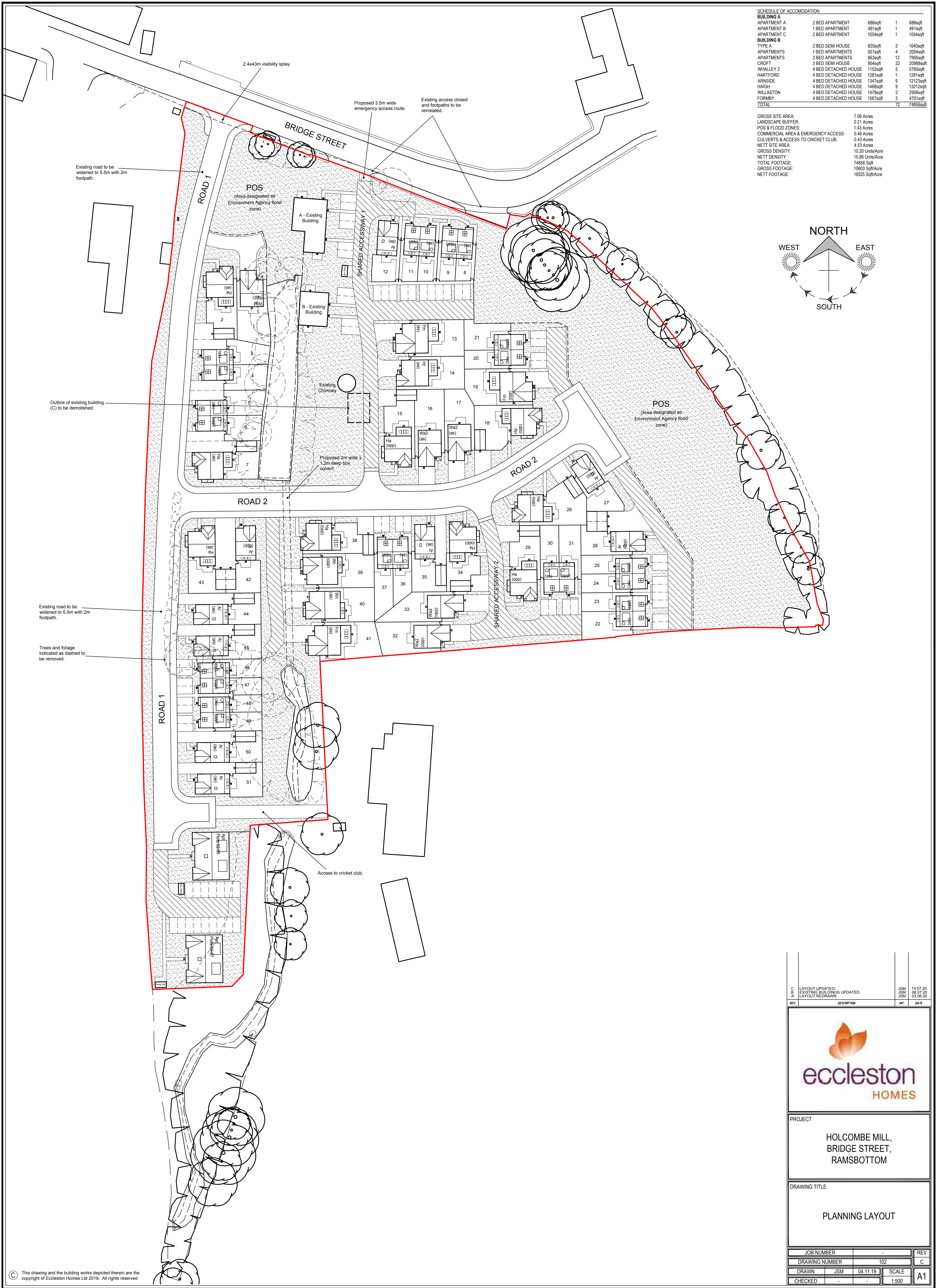
The hydraulic model outputs indicate that the existing site is subject to minor flooding in the 1:20 AEP event, with flooding limited to the south-east corner of the site. More significant flooding is shown to occur across the eastern portion of the site in events exceeding the 1:100 AEP event, with a maximum flood depth of approximately 1.2 m occurring in the south-east of the site in the 1:100 (+70%) AEP event.

The site is generally considered to be at a low risk of flooding from surface water, groundwater and reservoirs and is assessed not to be at risk of flooding from canals or other artificial water bodies.

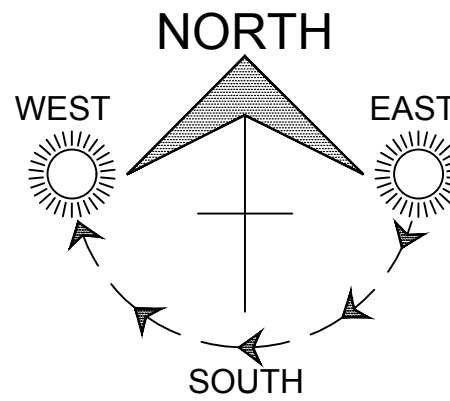
The flood risk to the site from the River Irwell will be mitigated through the implementation of the following measures:

- 30 m wide flood relief channel to be provided along the eastern boundary of the site;
- Remove existing boundary walls along the northern boundary of the site;
- Lower ground levels directly east of the site access to direct floodwater towards the mill race;
- Upgrade the existing 600 mm diameter culvert crossing the site with a 2000 x 1200 mm culvert;
- Raise the proposed development platform above the peak 1:1000 AEP flood levels;
- Raise the proposed development plots above the peak 1:100 (+70%) AEP flood levels whilst routing floodwater along the site access roads;
- Raise finished floor levels of the newly constructed residential dwellings a minimum of 0.15 m above finished development platform levels;
- Raise finished floor levels of the refurbished residential dwellings above the peak 1:100 (+35%) AEP flood levels; and
- Prepare a Flood Plan in consultation with Bury Council emergency planning team.

APPENDIX A:	Development Proposals
-------------	-----------------------



SCHEDULE OF ACCOMODATION					
BUILDING A					
APARTMENT A	2 BED APARTMENT	688sqft	1	688sqft	
APARTMENT B	1 BED APARTMENT	491sqft	1	491sqft	
APARTMENT C	2 BED APARTMENT	1054sqft	1	1054sqft	
BUILDING B					
TYPE A	2 BED SEMI HOUSE	820sqft	2	1640sqft	
APARTMENTS	1 BED APARTMENTS	501sqft	4	2004sqft	
APARTMENTS	2 BED APARTMENTS	663sqft	12	7956sqft	
CROFT	3 BED SEMI HOUSE	954sqft	22	20988sqft	
WHALLEY 2	4 BED DETACHED HOUSE	1152sqft	5	5760sqft	
HARTFORD	4 BED DETACHED HOUSE	1281sqft	1	1281sqft	
ARNISIDE	4 BED DETACHED HOUSE	1347sqft	9	12123sqft	
HAIGH	4 BED DETACHED HOUSE	1468sqft	9	13212sqft	
WILLASTON	4 BED DETACHED HOUSE	1479sqft	2	2958sqft	
FORMBY	4 BED DETACHED HOUSE	1567sqft	3	4701sqft	
TOTAL			72	74856sqft	
GROSS SITE AREA:					
LANDSCAPE BUFFER:		7.06 Acres			
POS & FLOOD ZONES:		0.21 Acres			
COMMERCIAL AREA & EMERGENCY ACCESS:		1.43 Acres			
CULVERTS & ACCESS TO CRICKET CLUB:		0.46 Acres			
NETT SITE AREA:		0.43 Acres			
GROSS DENSITY:		4.53 Units/Acre			
NETT DENSITY:		10.20 Units/Acre			
TOTAL FOOTAGE:		15.89 Units/Acre			
GROSS FOOTAGE:		74856 Sqft			
NETT FOOTAGE:		10603 Sqft/Acre			
		16525 Sqft/Acre			



C
B
A

LAYOUT UPDATED.
EXISTING BUILDINGS UPDATED.
LAYOUT REDRAWN.

JSM
JSM
JSM

14.07.20
08.07.20
03.06.20

REV	DESCRIPTION	DATE
1	LAYOUT REDRAWN.	03.06.20

PROJECT

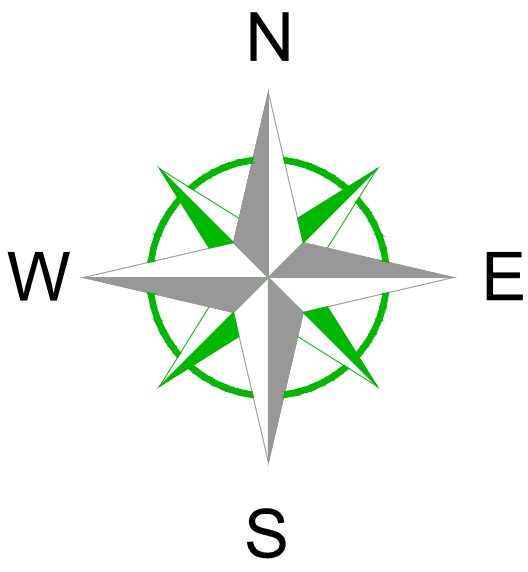
HOLCOMBE MILL,
BRIDGE STREET,
RAMSBOTTOM

DRAWING TITLE

PLANNING LAYOUT

JOB NUMBER	-	REV	C
DRAWING NUMBER	102	SCALE	A1
DRAWN	JSM	04.11.19	1:500
CHECKED	-	-	-

APPENDIX B:	Topographic Survey
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Legend

Walls	BS	Bus Stop
Kerb line	BT	British Telecom
Drip Line / Canopy	PH	Fire Hydrant
Top of Bank	WSV	Stop valve
Bottom of Bank	WST	Stop Tap
Fence	WO	Wash Out
Footpath	AV	Air Valve
Hedge	MOR	Service Marker
Control	RE	Rocking eye
Tree	CTV	Cable TV
Vegetation	GP	Gate Post
Gate	LP	Lamp Post
△STN	SP	Sign Post
	EP	Electricity Post
	TP	Telegraph Post
	TL	Traffic light
	RNP	Road Name Plate
	BOL	Bollard
	STAY	Cable Stay
	EIC	Electric Inspection Cover
	GAS	Gas Inspection Cover
	TOB	Top of Bank
	BOB	Bottom of Bank
	ER	Earth rod
	DK	Drop Kerb
	OHE	Overhead Electric Cable
	CHBT	Overhead BT Cable
	FTP	Footpath
	FWB	Flower Bed
	TBIT	Trial Pit
	P	Pole

DRAINAGE ATTRIBUTES	IC	Inspection chamber
	CL	Cover level
	IL	Invert level
	P (in G0.25	Pipe invert (diagonal)
	GV	Gully
	KO	Kerb Outlet
	MH	Manhole

BUILDING DATUM:	RL	Ridge Line
	FFL	Finished Floor Level
	SOF	Soft Level

FENCE TYPES:	CBF	Close Board
	PRF	Post and Rail
	PWF	Post and Wire
	BWF	Barbed Wire
	PLF	Post and lath
	IR	Iron Railings
	CLF	Chain Link
	PFF	Post and Panel

Rev	Date	Description	Drawn
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PROJECT
ECCLESTONE HOMES
RAMSBOTTOM
BL0 9AG

TITLE
TOPOGRAPHICAL
SURVEY

SCALE 1: 500	DATE 22.11.2019	DRAWN GY	CHECKED BY
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Level datum OSBG 36(15)

Job number RAMS-TOPO-001

Drawing No. RAMS-TOPO-001

Rev.

Notes:
This plan has been surveyed to the scale shown.
Caution should be exercised when enlargements are made.
All critical dimensions should be confirmed on site prior to the commencement of any works.
All dimensions have been measured or estimated from ground level.
Tree species shown should be treated with caution and expert identification is advised.
Pipe sizes are estimated from a surface inspection only.
Due to Health and Safety requirements.
Every effort is made to identify all visible above ground features, however it should be borne in mind that there may be items obscured at the time of the survey.
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APPENDIX C:	Truncated Model Accuracy
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KEY:

— Site Location

Depth (metres)

- < 0.005 m
- 0.005 - 0.010 m
- 0.010 - 0.020 m
- 0.020 - 0.030 m
- > 0.030 m

Weetwood
Development • Planning • Environment

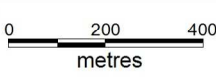
70 Cowcross Street
London
EC1M 6EJ

Tel: 0203 757 5444
Email: info@weetwood.net

Client:
Eccleston Homes

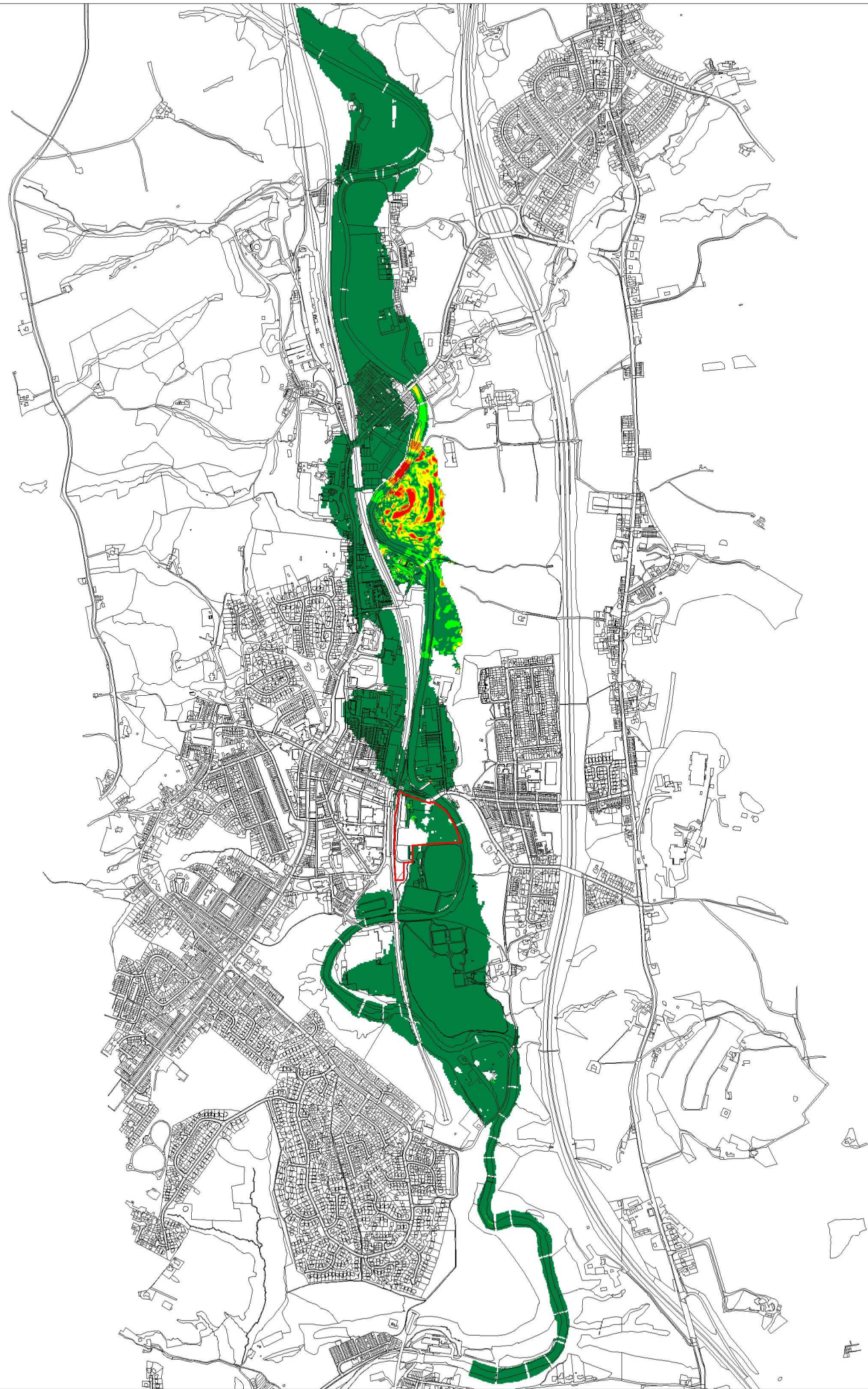
Project Title:
Holcombe Mill, Ramsbottom

Drawing Title:
**Truncated Model Accuracy
1:20 AEP Event**

Map Orientation:  Scale 

Drawn: JA	Checked: AE	Date: 20 January 2020
---------------------	-----------------------	---------------------------------

Drawing No: 4714_005-EA_Q0020_d	Rev: A
---	------------------



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KEY:

— Site Location

Depth (metres)

- < 0.005 m
- 0.005 - 0.010 m
- 0.010 - 0.020 m
- 0.020 - 0.030 m
- > 0.030 m

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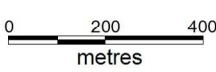
70 Cowcross Street
London
EC1M 6EJ

Tel: 0203 757 5444
Email: info@weetwood.net

Client:
Eccleston Homes

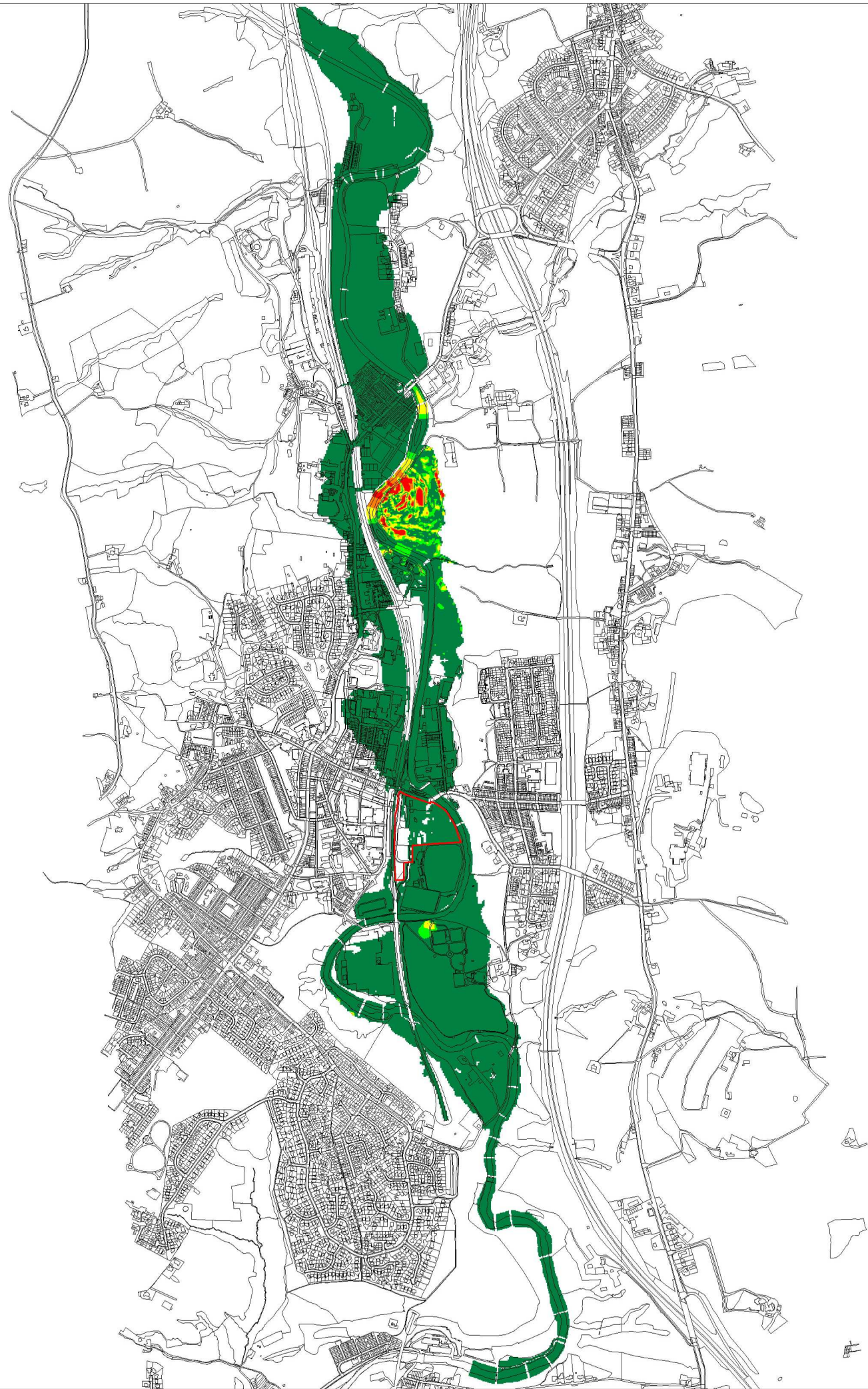
Project Title:
Holcombe Mill, Ramsbottom

Drawing Title:
**Truncated Model Accuracy
1:100 AEP Event**

Map Orientation:  Scale 

Drawn: JA	Checked: AE	Date: 20 January 2020
---------------------	-----------------------	---------------------------------

Drawing No: 4714_005-EA_Q0100_d	Rev: A
---	------------------



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KEY:

— Site Location

Depth (metres)

- < 0.005 m
- 0.005 - 0.010 m
- 0.010 - 0.020 m
- 0.020 - 0.030 m
- > 0.030 m

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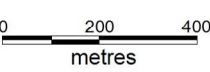
70 Cowcross Street
London
EC1M 6EJ

Tel: 0203 757 5444
Email: info@weetwood.net

Client:
Eccleston Homes

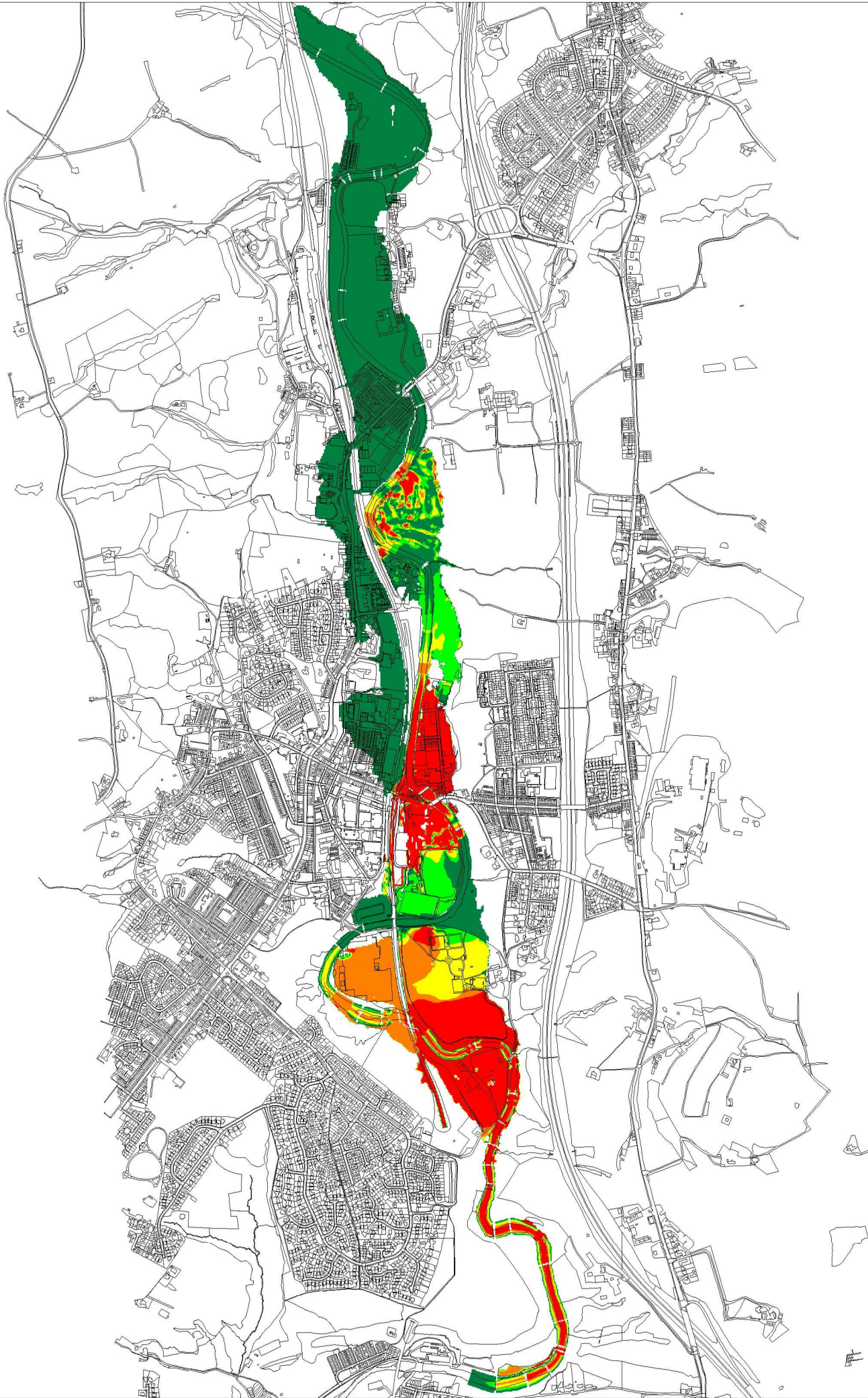
Project Title:
Holcombe Mill, Ramsbottom

Drawing Title:
**Truncated Model Accuracy
1:100 AEP (+30%) Event**

Map Orientation:  Scale 

Drawn: JA	Checked: AE	Date: 20 January 2020
---------------------	-----------------------	---------------------------------

Drawing No: 4714_005-EA_Q0100CC30_d	Rev: A
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Depth (metres)

- < 0.005 m
- 0.005 - 0.010 m
- 0.010 - 0.020 m
- 0.020 - 0.030 m
- > 0.030 m

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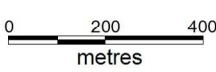
70 Cowcross Street
London
EC1M 6EJ

Tel: 0203 757 5444
Email: info@weetwood.net

Client:
Eccleston Homes

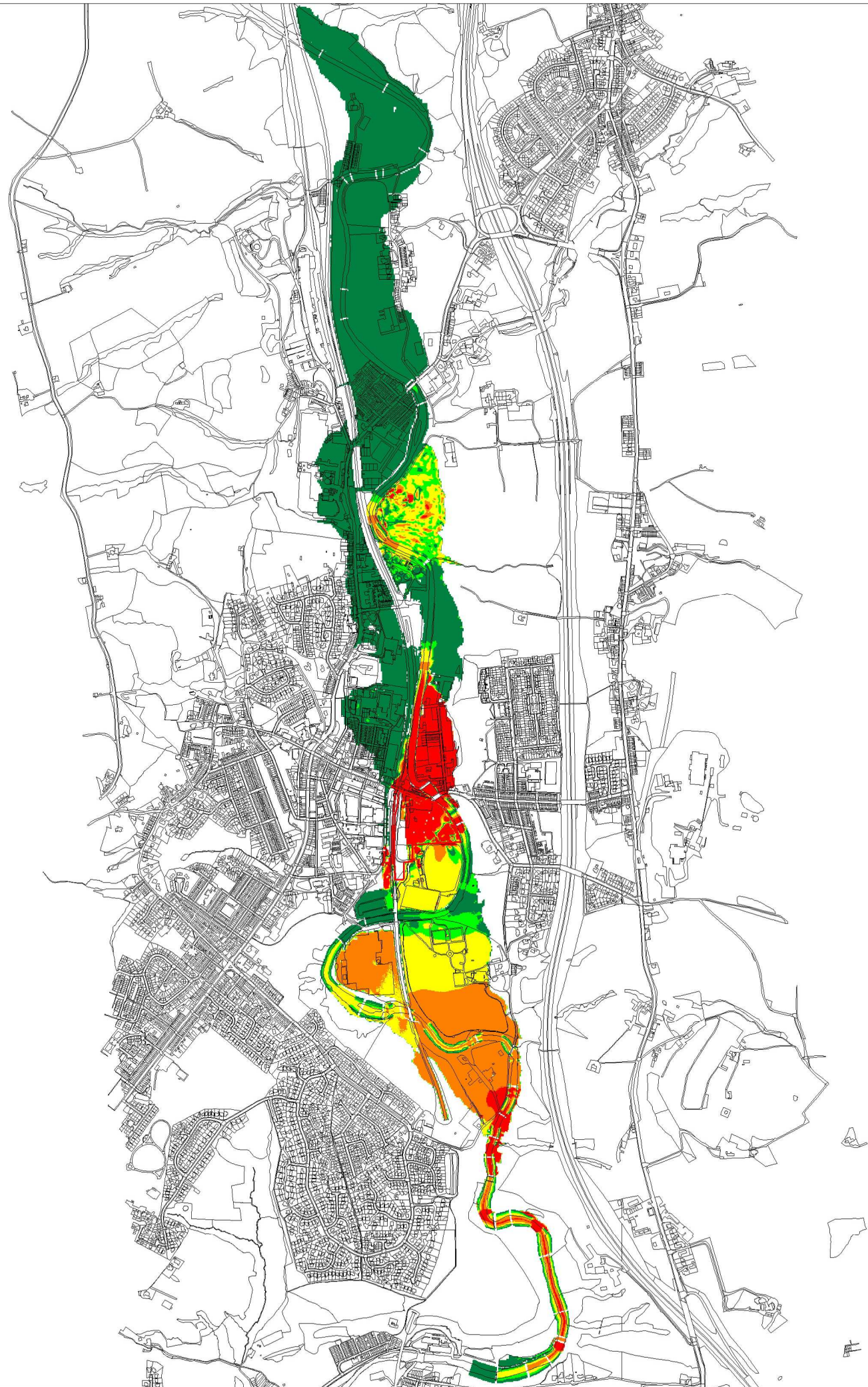
Project Title:
Holcombe Mill, Ramsbottom

Drawing Title:
**Truncated Model Accuracy
1:100 AEP (+35%) Event**

Map Orientation:  Scale 

Drawn: JA	Checked: AE	Date: 20 January 2020
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Drawing No: 4714_005-EA_Q0100CC35_d	Rev: A
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KEY:

— Site Location

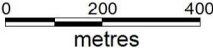
Depth (metres)

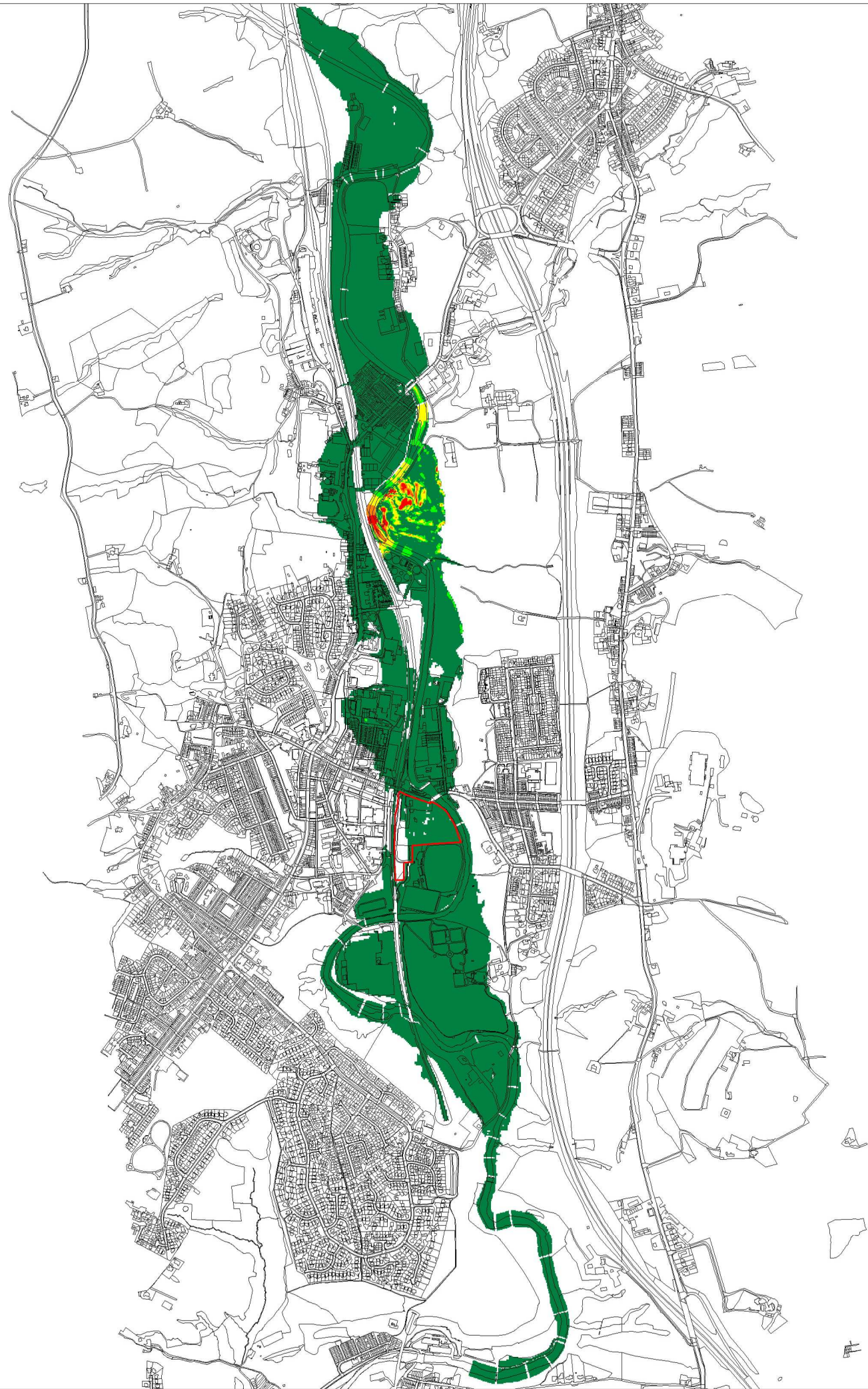
- < 0.005 m
- 0.005 - 0.010 m
- 0.010 - 0.020 m
- 0.020 - 0.030 m
- > 0.030 m

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70 Cowcross Street
London
EC1M 6EJ

Tel: 0203 757 5444
Email: info@weetwood.net

Client:		Eccleston Homes	
Project Title:			
Holcombe Mill, Ramsbottom			
Drawing Title:			
Truncated Model Accuracy 1:100 AEP (+70%) Event			
Map Orientation:		Scale	
			
Drawn:		Checked:	
JA		AE	
Date:		20 January 2020	
Drawing No:			Rev:
4714_005-EA_Q0100CC70_d			A



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KEY:

— Site Location

Depth (metres)

- < 0.005 m
- 0.005 - 0.010 m
- 0.010 - 0.020 m
- 0.020 - 0.030 m
- > 0.030 m

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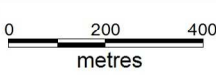
70 Cowcross Street
London
EC1M 6EJ

Tel: 0203 757 5444
Email: info@weetwood.net

Client:
Eccleston Homes

Project Title:
Holcombe Mill, Ramsbottom

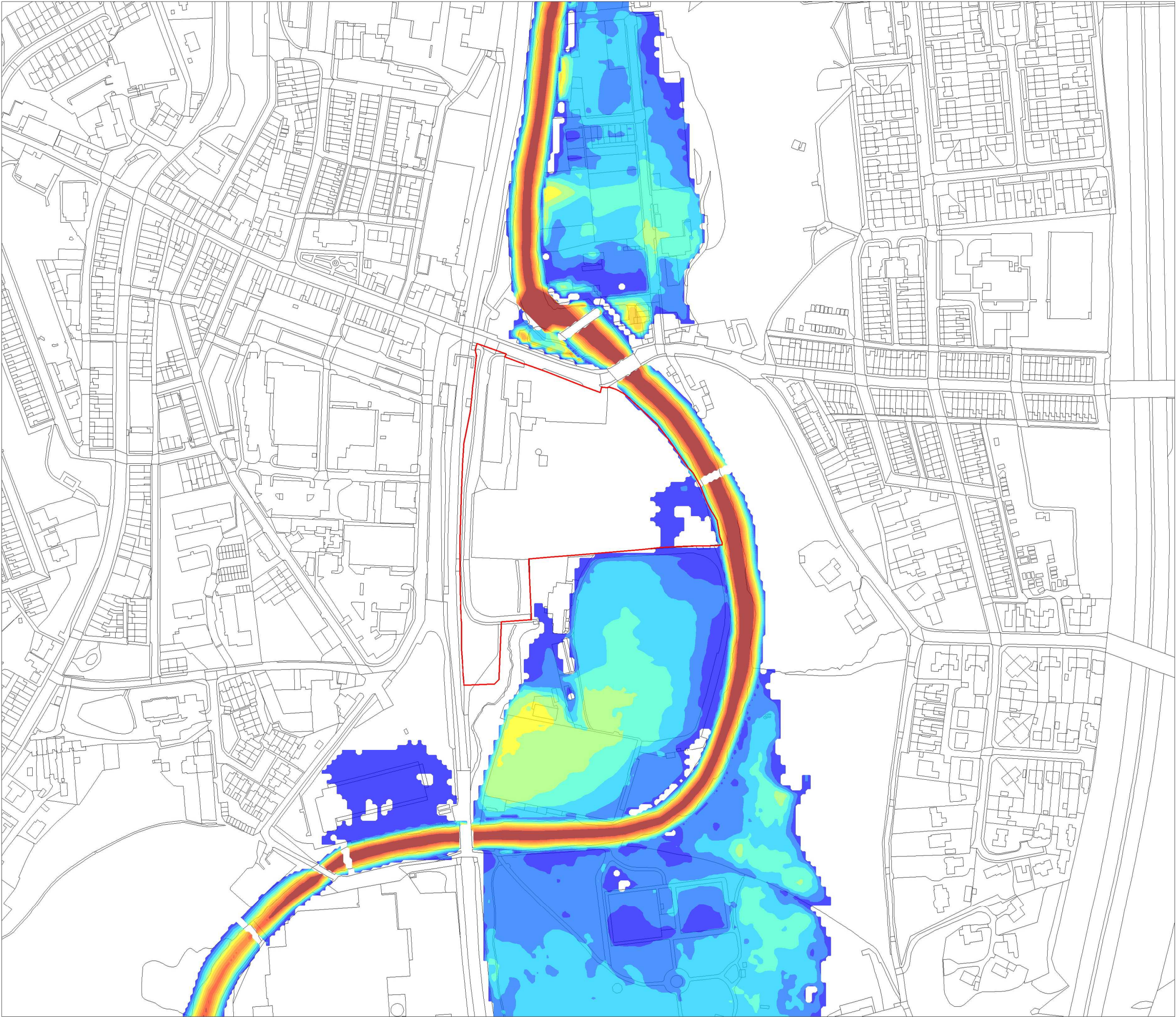
Drawing Title:
**Truncated Model Accuracy
1:1000 AEP Event**

Map Orientation:  Scale 

Drawn: JA	Checked: AE	Date: 20 January 2020
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Drawing No: 4714_005-EA_Q1000_d	Rev: A
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APPENDIX D:	Model Output Plots – Baseline Scenario
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- Notes:
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KEY:

— Site Location

Depth (metres)

- 0.00 to 0.25
- 0.25 to 0.50
- 0.50 to 0.75
- 0.75 to 1.00
- 1.00 to 1.25
- 1.25 to 1.50
- 1.50 to 1.75
- 1.75 to 2.00
- 2.00 to 2.25
- 2.25 to 2.50
- > 2.50

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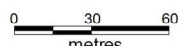
70 Cowcross Street
London
EC1M 6EJ

Tel: 0203 7575 444
Email: info@weetwood.net

Client: **Eccleston Homes**

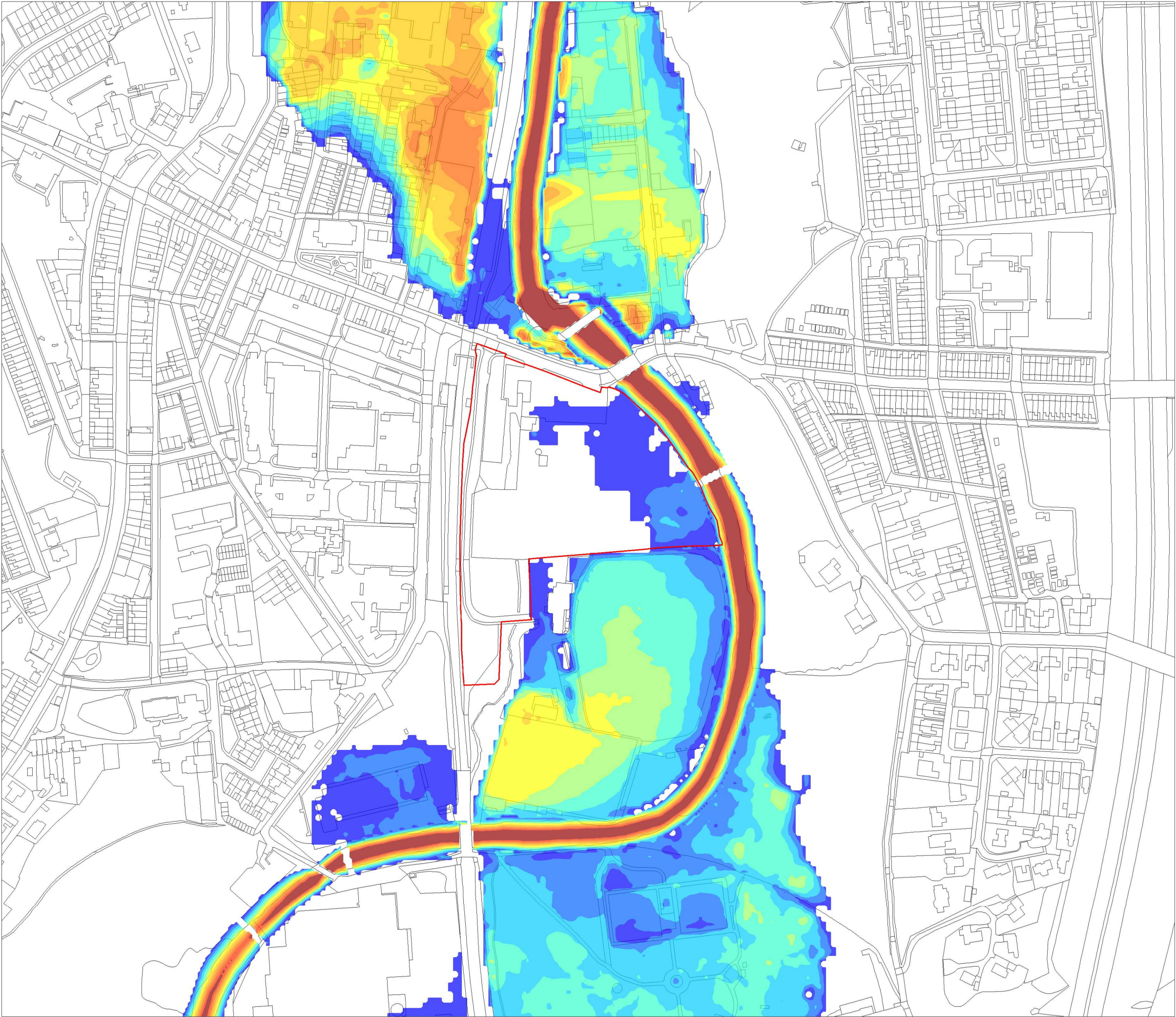
Project Title: **Holcombe Mill, Ramsbottom**

Drawing Title: **Baseline Scenario
5.0% AEP Event**

Map Orientation:  Scale: 

Drawn: JA	Checked: KT	Date: 14 July 2020
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Drawing No: 4714_026_Q0020_d	Rev: A
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KEY:

— Site Location

Depth (metres)

- 0.00 to 0.25
- 0.25 to 0.50
- 0.50 to 0.75
- 0.75 to 1.00
- 1.00 to 1.25
- 1.25 to 1.50
- 1.50 to 1.75
- 1.75 to 2.00
- 2.00 to 2.25
- 2.25 to 2.50
- > 2.50

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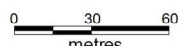
70 Cowcross Street
London
EC1M 6EJ

Tel: 0203 7575 444
Email: info@weetwood.net

Client: **Eccleston Homes**

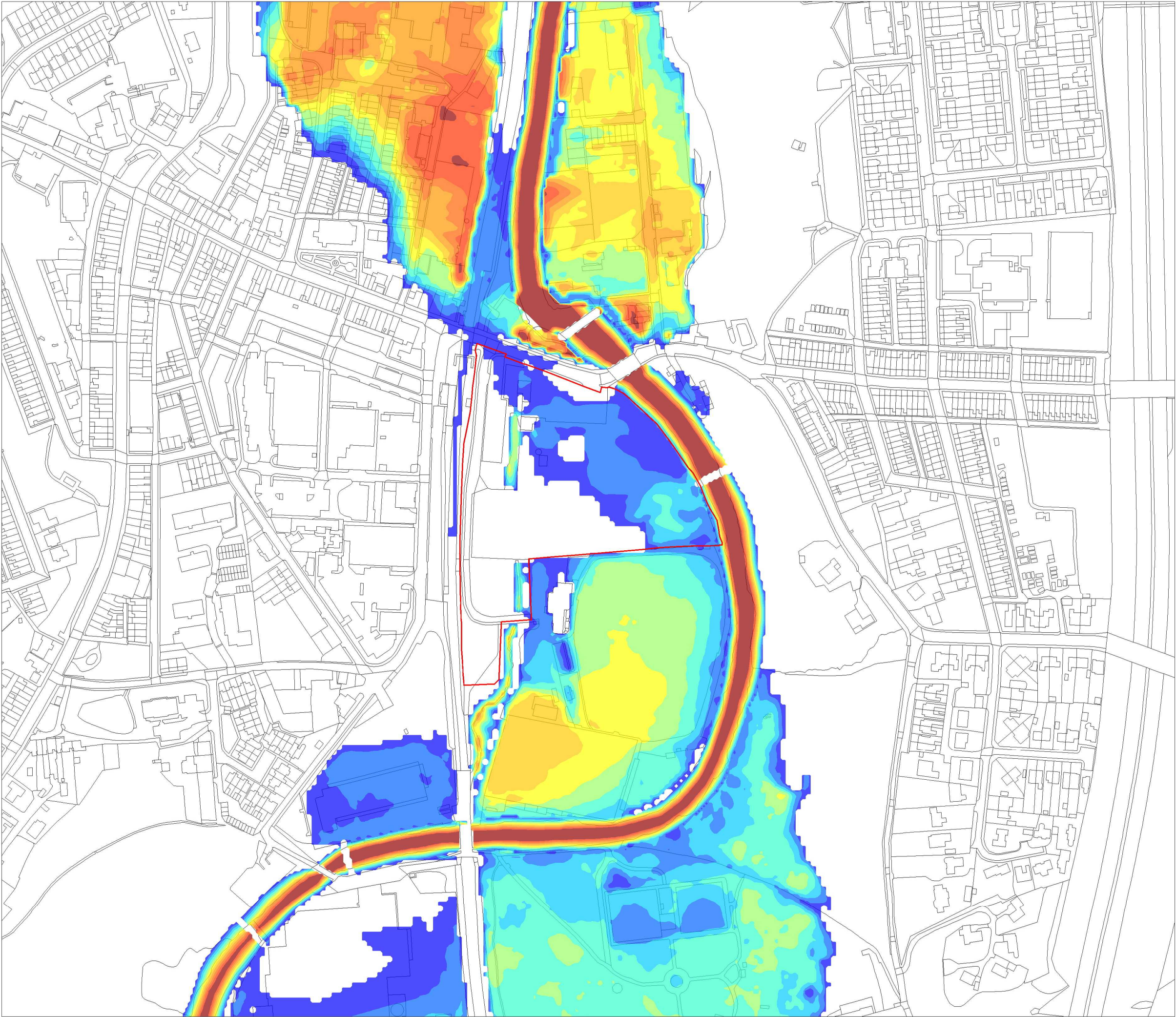
Project Title: **Holcombe Mill, Ramsbottom**

Drawing Title: **Baseline Scenario
1.0% AEP Event**

Map Orientation:  Scale: 

Drawn: JA	Checked: KT	Date: 14 July 2020
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Drawing No: 4714_026_Q0100_d	Rev: A
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KEY:

— Site Location

Depth (metres)

- 0.00 to 0.25
- 0.25 to 0.50
- 0.50 to 0.75
- 0.75 to 1.00
- 1.00 to 1.25
- 1.25 to 1.50
- 1.50 to 1.75
- 1.75 to 2.00
- 2.00 to 2.25
- 2.25 to 2.50
- > 2.50

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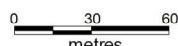
70 Cowcross Street
London
EC1M 6EJ

Tel: 0203 7575 444
Email: info@weetwood.net

Client: **Eccleston Homes**

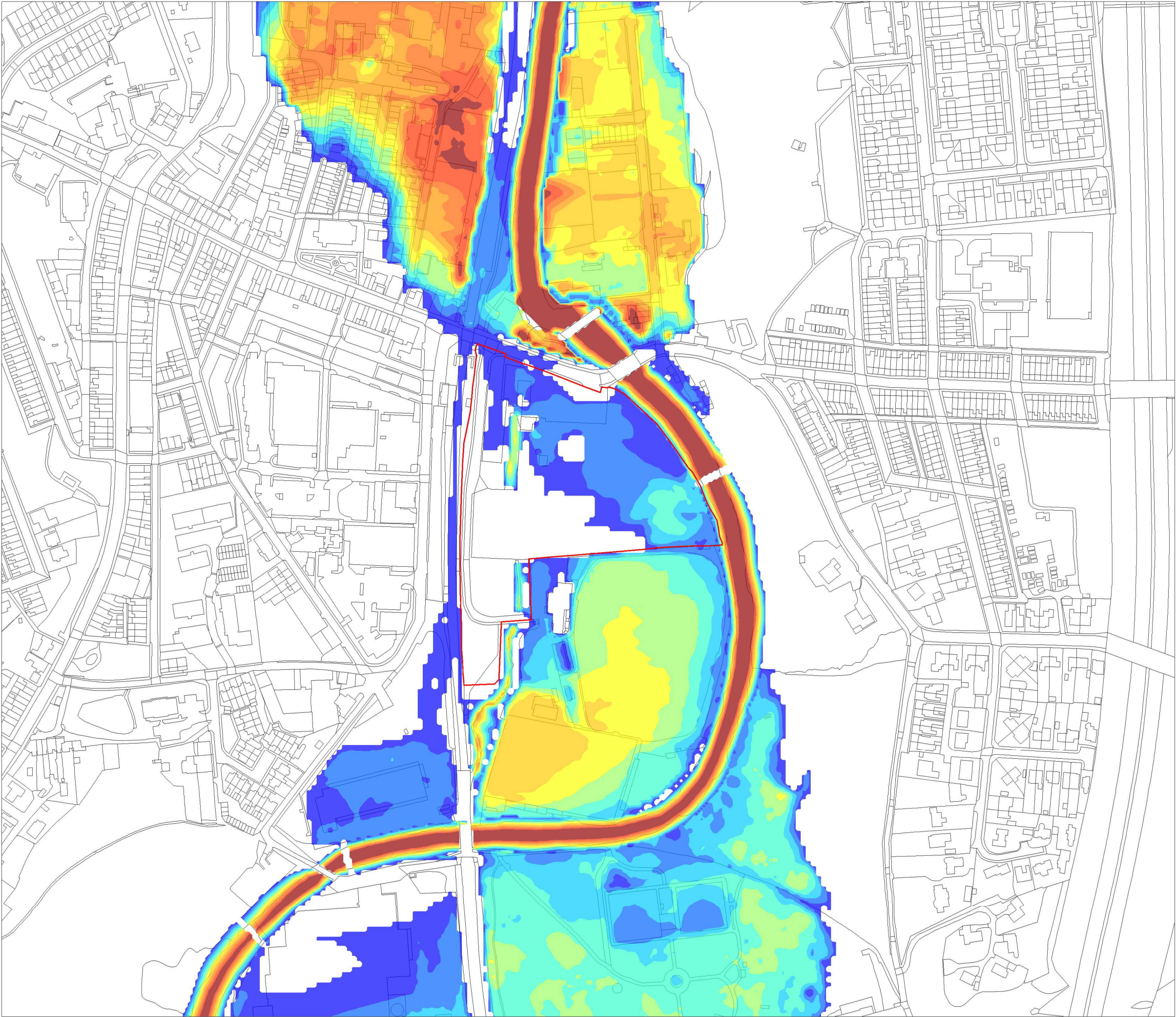
Project Title: **Holcombe Mill, Ramsbottom**

Drawing Title: **Baseline Scenario
1.0% AEP (+30%) Event**

Map Orientation:  Scale: 

Drawn: JA	Checked: KT	Date: 14 July 2020
--------------	----------------	-----------------------

Drawing No: 4714_026_Q0100_CC30_d	Rev: A
--------------------------------------	-----------



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KEY:

— Site Location

Depth (metres)

- 0.00 to 0.25
- 0.25 to 0.50
- 0.50 to 0.75
- 0.75 to 1.00
- 1.00 to 1.25
- 1.25 to 1.50
- 1.50 to 1.75
- 1.75 to 2.00
- 2.00 to 2.25
- 2.25 to 2.50
- > 2.50

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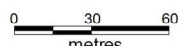
70 Cowcross Street
London
EC1M 6EJ

Tel: 0203 7575 444
Email: info@weetwood.net

Client: **Eccleston Homes**

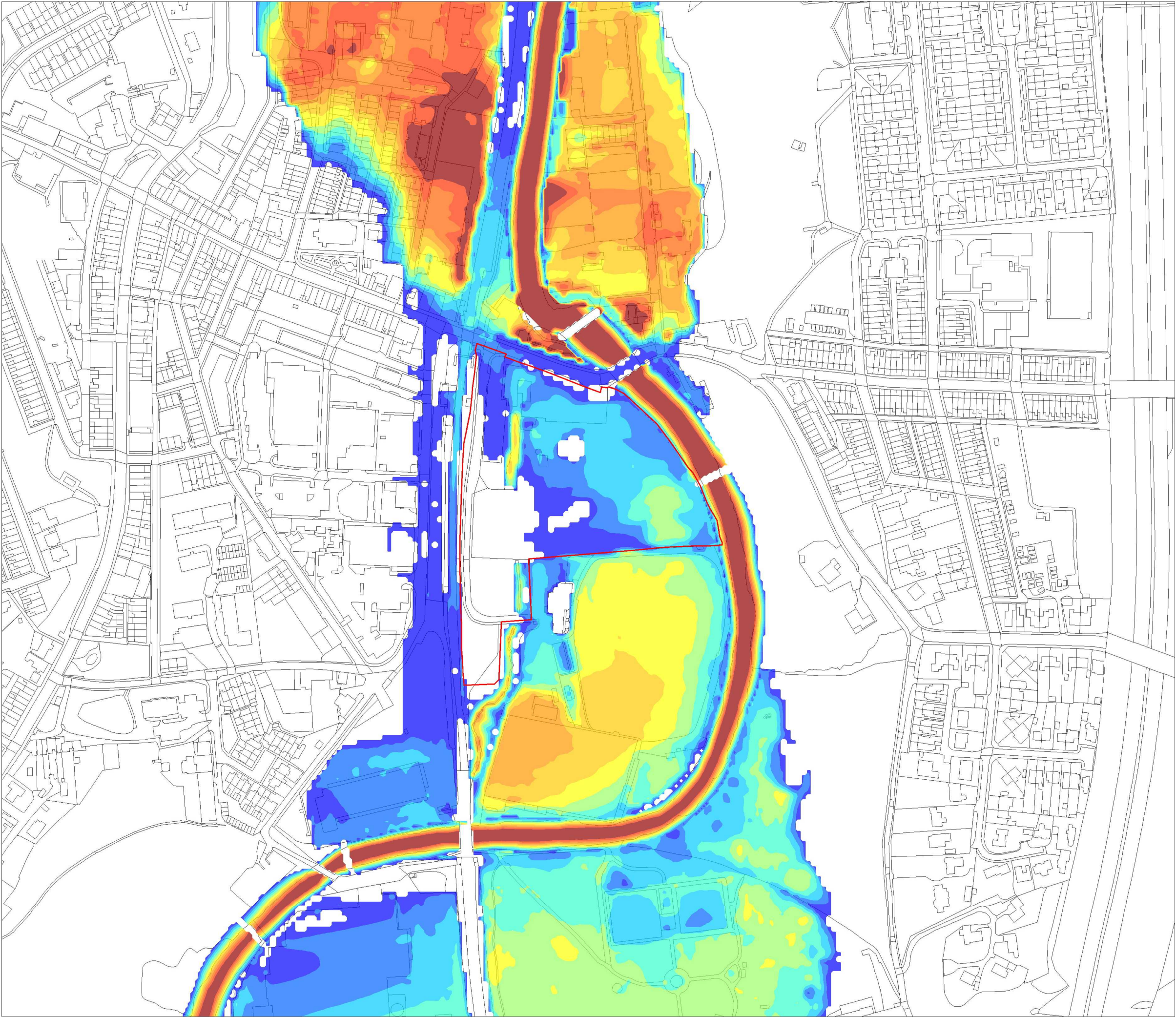
Project Title: **Holcombe Mill, Ramsbottom**

Drawing Title: **Baseline Scenario
1.0% AEP (+35%) Event**

Map Orientation:  Scale: 

Drawn: JA	Checked: KT	Date: 14 July 2020
--------------	----------------	-----------------------

Drawing No: 4714_026_Q0100_CC35_d	Rev: A
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KEY:

— Site Location

Depth (metres)

- 0.00 to 0.25
- 0.25 to 0.50
- 0.50 to 0.75
- 0.75 to 1.00
- 1.00 to 1.25
- 1.25 to 1.50
- 1.50 to 1.75
- 1.75 to 2.00
- 2.00 to 2.25
- 2.25 to 2.50
- > 2.50

Weetwood
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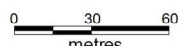
70 Cowcross Street
London
EC1M 6EJ

Tel: 0203 7575 444
Email: info@weetwood.net

Client: **Eccleston Homes**

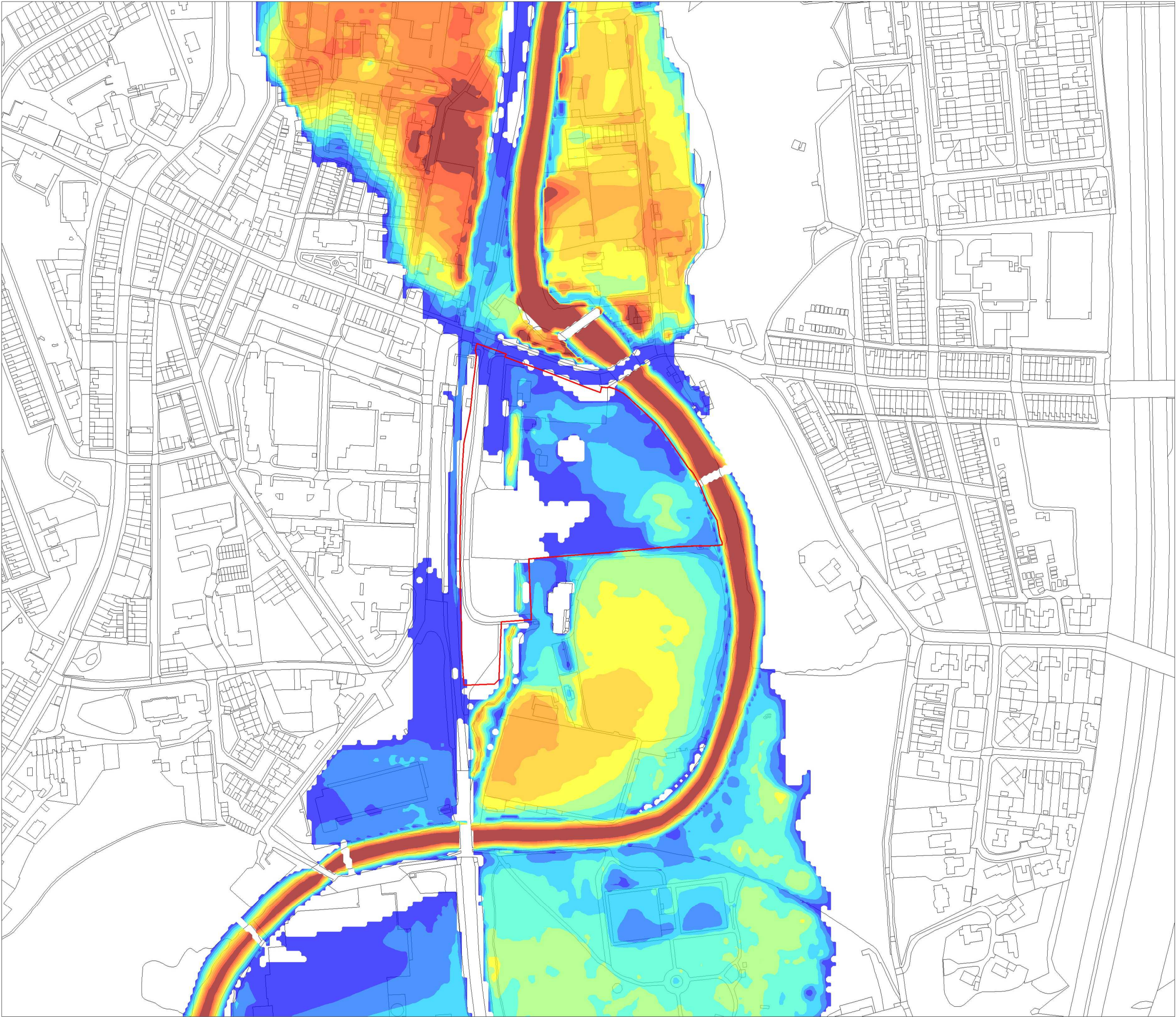
Project Title: **Holcombe Mill, Ramsbottom**

Drawing Title: **Baseline Scenario
1.0% AEP (+70%) Event**

Map Orientation:  Scale: 

Drawn: JA	Checked: KT	Date: 14 July 2020
--------------	----------------	-----------------------

Drawing No: 4714_026_Q0100_CC70_d	Rev: A
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KEY:

— Site Location

Depth (metres)

- 0.00 to 0.25
- 0.25 to 0.50
- 0.50 to 0.75
- 0.75 to 1.00
- 1.00 to 1.25
- 1.25 to 1.50
- 1.50 to 1.75
- 1.75 to 2.00
- 2.00 to 2.25
- 2.25 to 2.50
- > 2.50

Weetwood
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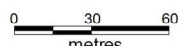
70 Cowcross Street
London
EC1M 6EJ

Tel: 0203 7575 444
Email: info@weetwood.net

Client: **Eccleston Homes**

Project Title: **Holcombe Mill, Ramsbottom**

Drawing Title: **Baseline Scenario
0.1% AEP Event**

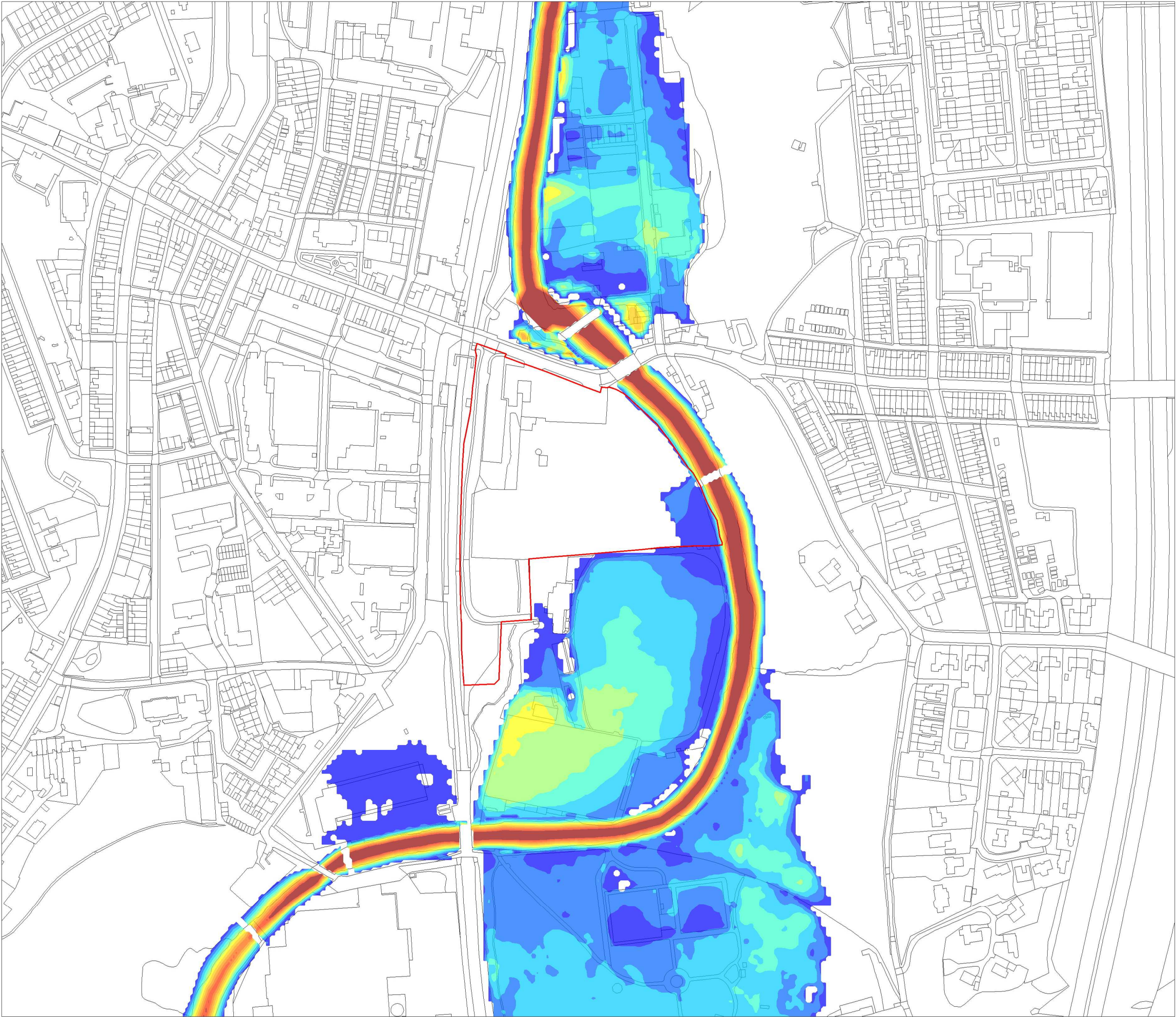
Map Orientation:  Scale: 

Drawn: JA	Checked: KT	Date: 14 July 2020
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Drawing No: 4714_026_Q1000_d	Rev: A
---------------------------------	-----------

APPENDIX E:

Model Output Plots – Proposed Scenario



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KEY:

— Site Location

Depth (metres)

- 0.00 to 0.25
- 0.25 to 0.50
- 0.50 to 0.75
- 0.75 to 1.00
- 1.00 to 1.25
- 1.25 to 1.50
- 1.50 to 1.75
- 1.75 to 2.00
- 2.00 to 2.25
- 2.25 to 2.50
- > 2.50

Weetwood
Development • Planning • Environment

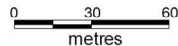
70 Cowcross Street
London
EC1M 6EJ

Tel: 0203 7575 444
Email: info@weetwood.net

Client: **Eccleston Homes**

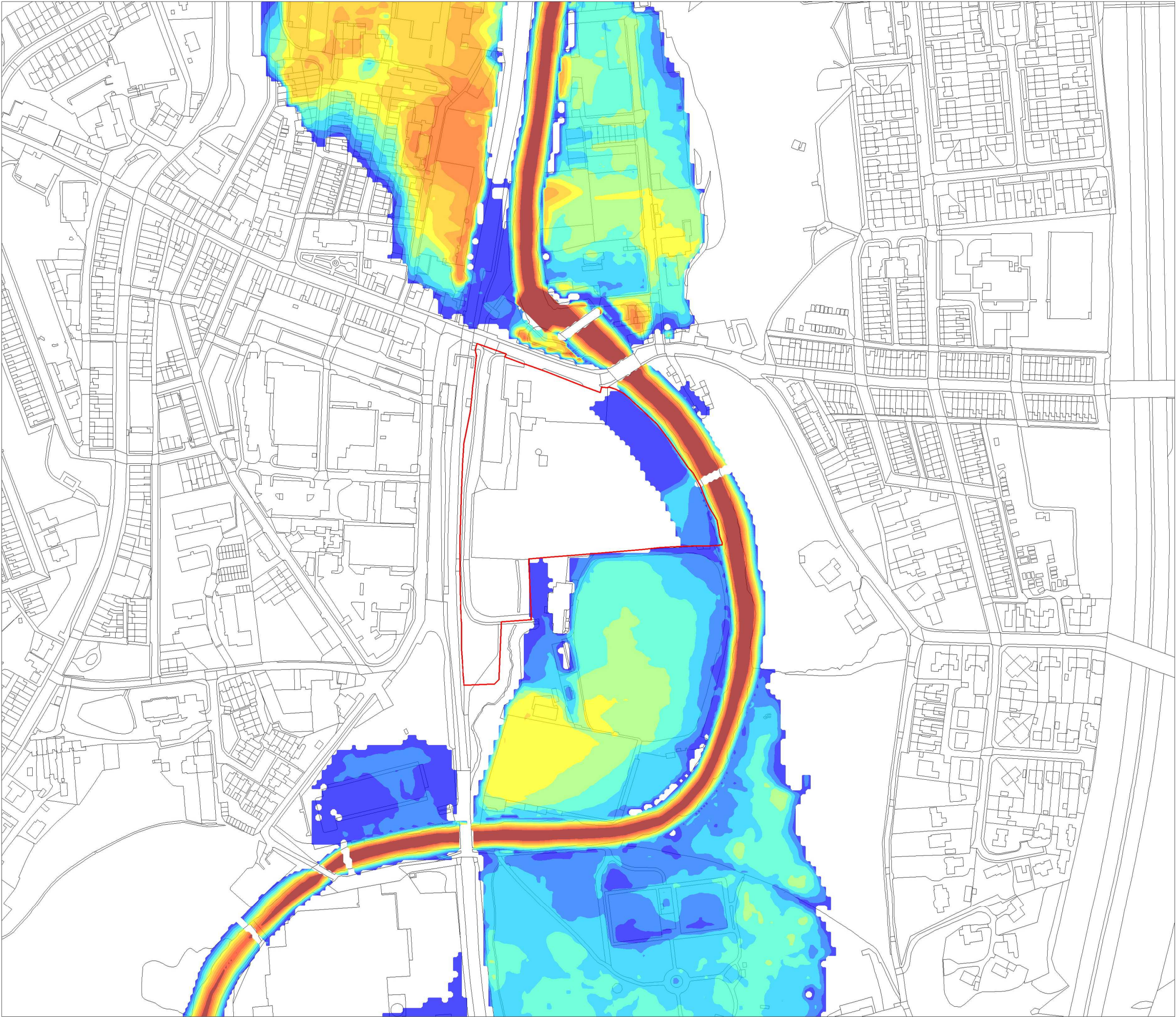
Project Title: **Holcombe Mill, Ramsbottom**

Drawing Title: **Proposed Scenario
5.0% AEP Event**

Map Orientation:  Scale: 

Drawn: JA	Checked: KT	Date: 14 July 2020
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Drawing No: 4714_034_Q0020_d	Rev: A
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KEY:

— Site Location

Depth (metres)

- 0.00 to 0.25
- 0.25 to 0.50
- 0.50 to 0.75
- 0.75 to 1.00
- 1.00 to 1.25
- 1.25 to 1.50
- 1.50 to 1.75
- 1.75 to 2.00
- 2.00 to 2.25
- 2.25 to 2.50
- > 2.50

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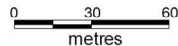
70 Cowcross Street
London
EC1M 6EJ

Tel: 0203 7575 444
Email: info@weetwood.net

Client: **Eccleston Homes**

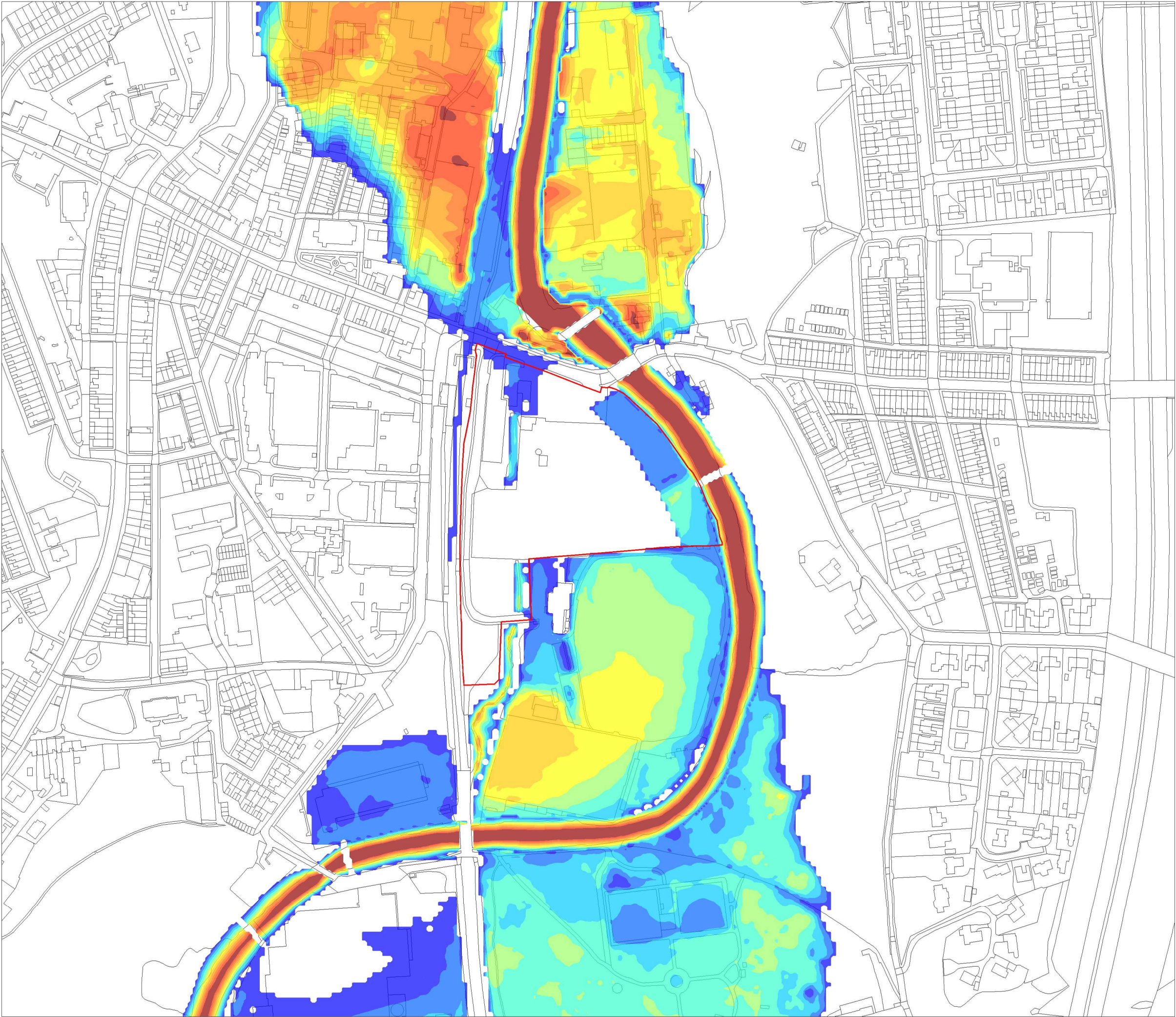
Project Title: **Holcombe Mill, Ramsbottom**

Drawing Title: **Proposed Scenario
1.0% AEP Event**

Map Orientation:  Scale: 

Drawn: JA	Checked: KT	Date: 14 July 2020
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Drawing No: 4714_034_Q0100_d	Rev: A
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KEY:

— Site Location

Depth (metres)

- 0.00 to 0.25
- 0.25 to 0.50
- 0.50 to 0.75
- 0.75 to 1.00
- 1.00 to 1.25
- 1.25 to 1.50
- 1.50 to 1.75
- 1.75 to 2.00
- 2.00 to 2.25
- 2.25 to 2.50
- > 2.50

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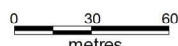
70 Cowcross Street
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Tel: 0203 7575 444
Email: info@weetwood.net

Client: **Eccleston Homes**

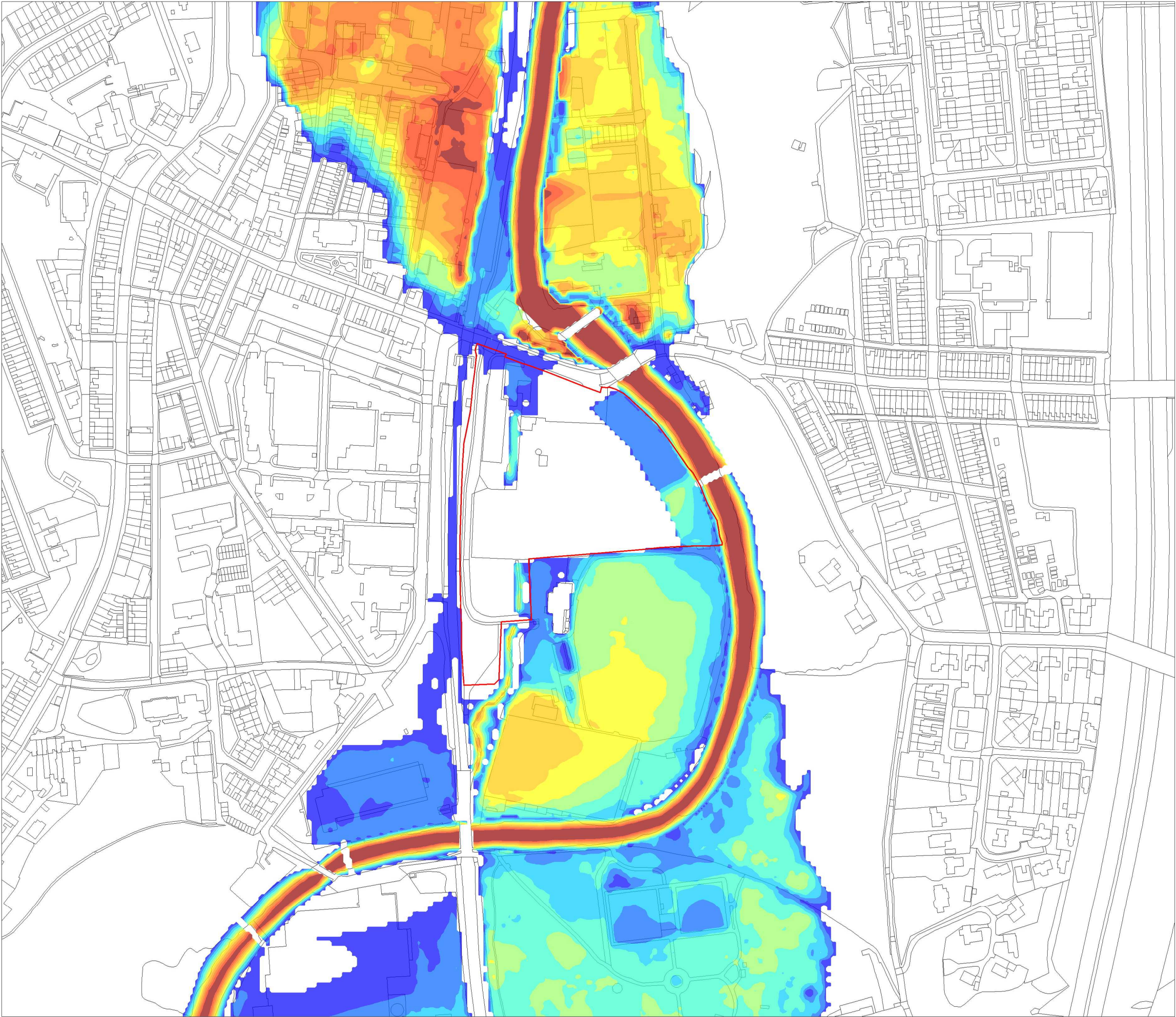
Project Title: **Holcombe Mill, Ramsbottom**

Drawing Title: **Proposed Scenario
1.0% AEP (+30%) Event**

Map Orientation:  Scale: 

Drawn: JA	Checked: KT	Date: 14 July 2020
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Drawing No: 4714_034_Q0100_CC30_d	Rev: A
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KEY:

— Site Location

Depth (metres)

- 0.00 to 0.25
- 0.25 to 0.50
- 0.50 to 0.75
- 0.75 to 1.00
- 1.00 to 1.25
- 1.25 to 1.50
- 1.50 to 1.75
- 1.75 to 2.00
- 2.00 to 2.25
- 2.25 to 2.50
- > 2.50

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Client: **Eccleston Homes**

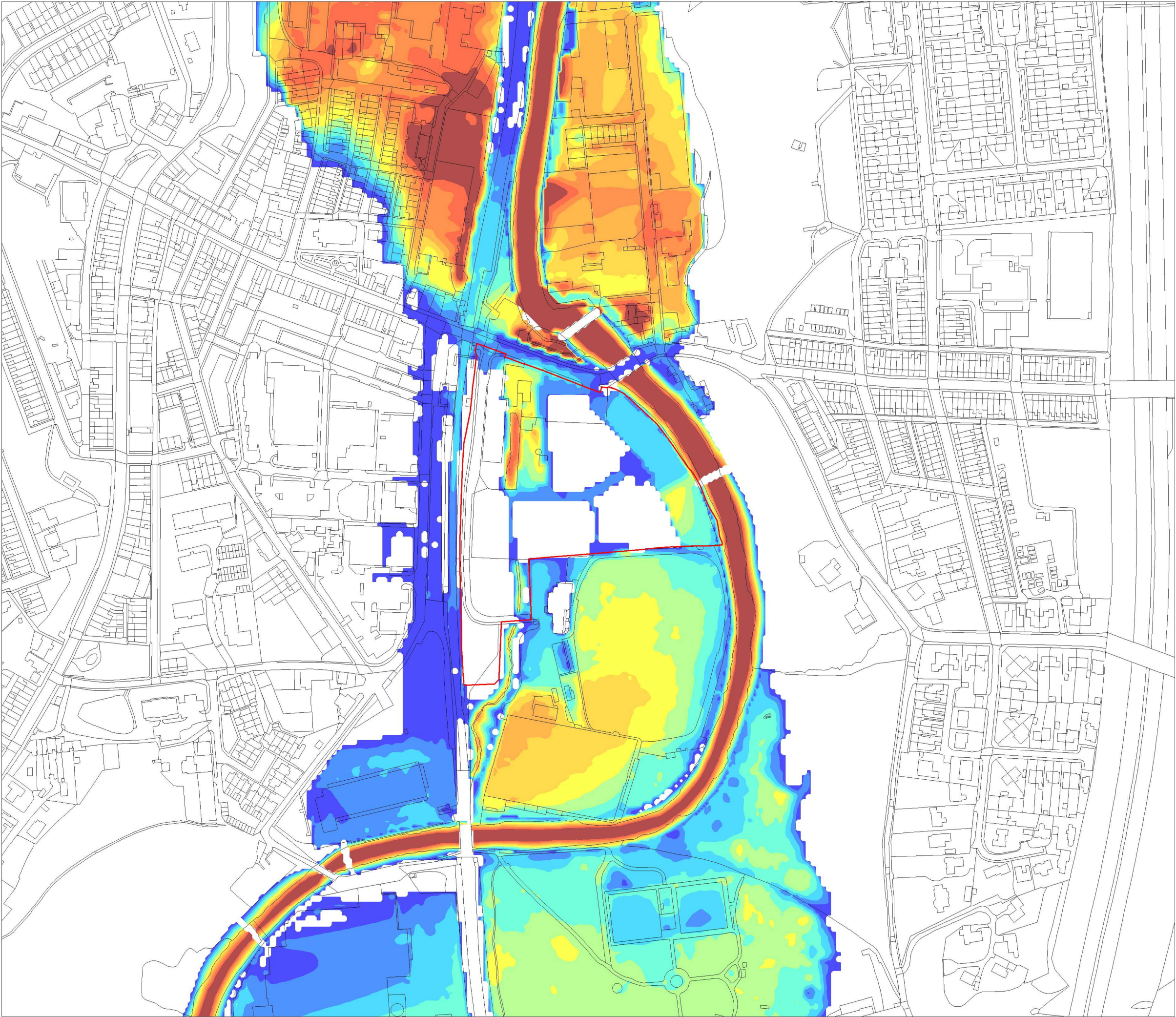
Project Title: **Holcombe Mill, Ramsbottom**

Drawing Title: **Proposed Scenario
1.0% AEP (+35%) Event**

Map Orientation:
Scale:

Drawn: JA	Checked: KT	Date: 14 July 2020
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Drawing No: 4714_034_Q0100_CC35_d	Rev: A
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KEY:

— Site Location

Depth (metres)

- 0.00 to 0.25
- 0.25 to 0.50
- 0.50 to 0.75
- 0.75 to 1.00
- 1.00 to 1.25
- 1.25 to 1.50
- 1.50 to 1.75
- 1.75 to 2.00
- 2.00 to 2.25
- 2.25 to 2.50
- > 2.50

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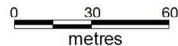
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Client: **Eccleston Homes**

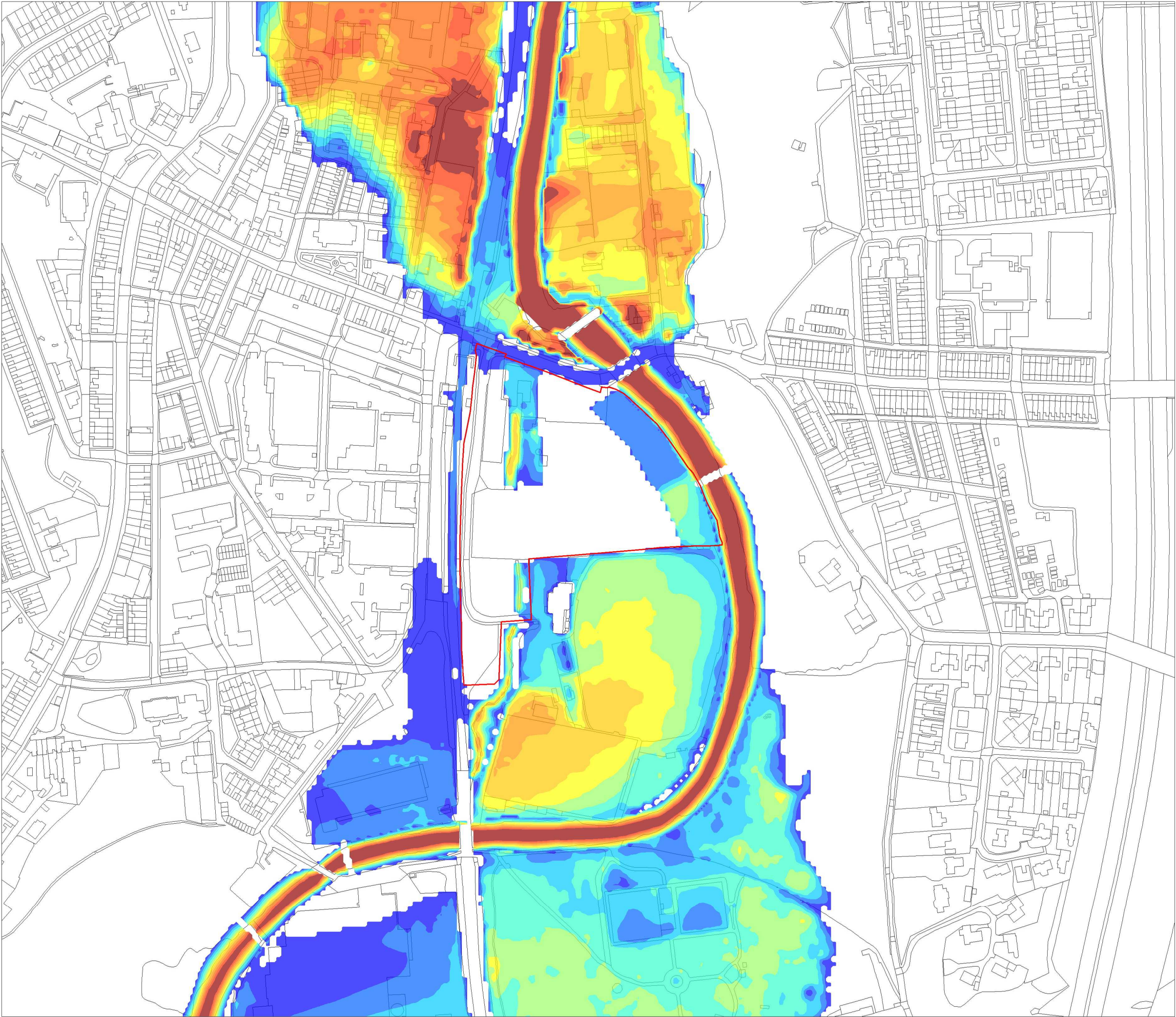
Project Title: **Holcombe Mill, Ramsbottom**

Drawing Title: **Proposed Scenario
1.0% AEP (+70%) Event**

Map Orientation:  Scale: 

Drawn: JA	Checked: KT	Date: 24 July 2020
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Drawing No: 4714_041_Q100_CC70_d	Rev: A
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KEY:

— Site Location

Depth (metres)

- 0.00 to 0.25
- 0.25 to 0.50
- 0.50 to 0.75
- 0.75 to 1.00
- 1.00 to 1.25
- 1.25 to 1.50
- 1.50 to 1.75
- 1.75 to 2.00
- 2.00 to 2.25
- 2.25 to 2.50
- > 2.50

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Project Title: **Holcombe Mill, Ramsbottom**

Drawing Title: **Proposed Scenario
0.1% AEP Event**

Map Orientation:

Scale:

Drawn:
JA

Checked:
KT

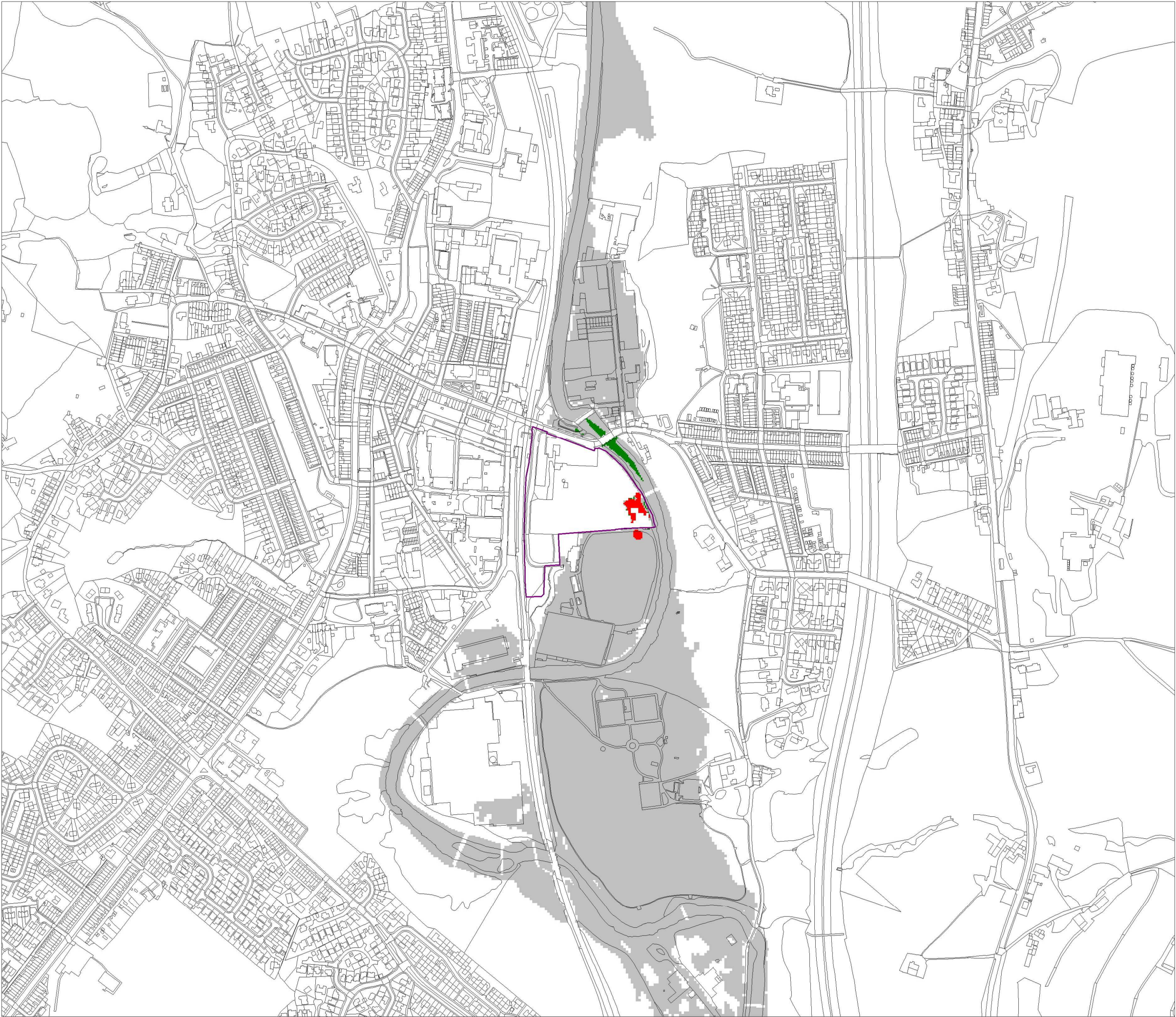
Date:
14 July 2020

Drawing No:
4714_034_Q1000_d

Rev:
A

APPENDIX F:

Model Output Plots – Flood Risk Comparison



- Notes:
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KEY:

Site Location

Depth (metres)

- Decrease (> 0.03m)
- No Change (+/- 0.03m)
- Increase (> 0.03m)

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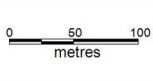
70 Cowcross Street
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Email: info@weetwood.net

Client:
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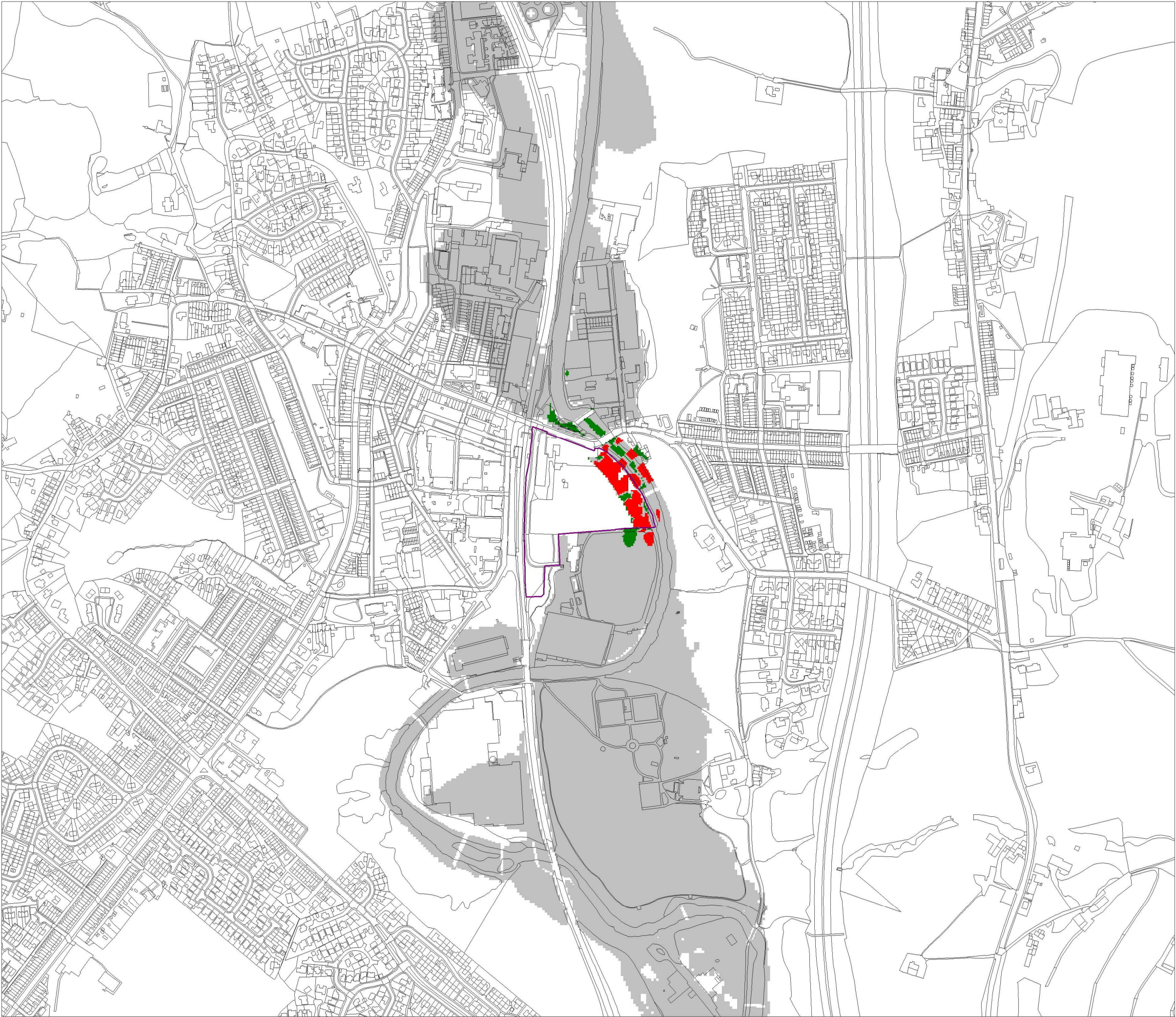
Project Title:
Holcombe Mill, Ramsbottom

Drawing Title:
**Flood Risk Comparison
5.0% AEP Event**

Map Orientation:  Scale: 

Drawn: JA	Checked: KT	Date: 14 July 2020
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Drawing No: 4714_034-026_Q0020_d	Rev: A
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KEY:

Site Location

Depth (metres)

- Decrease ($> 0.03\text{m}$)
- No Change ($\pm 0.03\text{m}$)
- Increase ($> 0.03\text{m}$)

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Client: **Eccleston Homes**

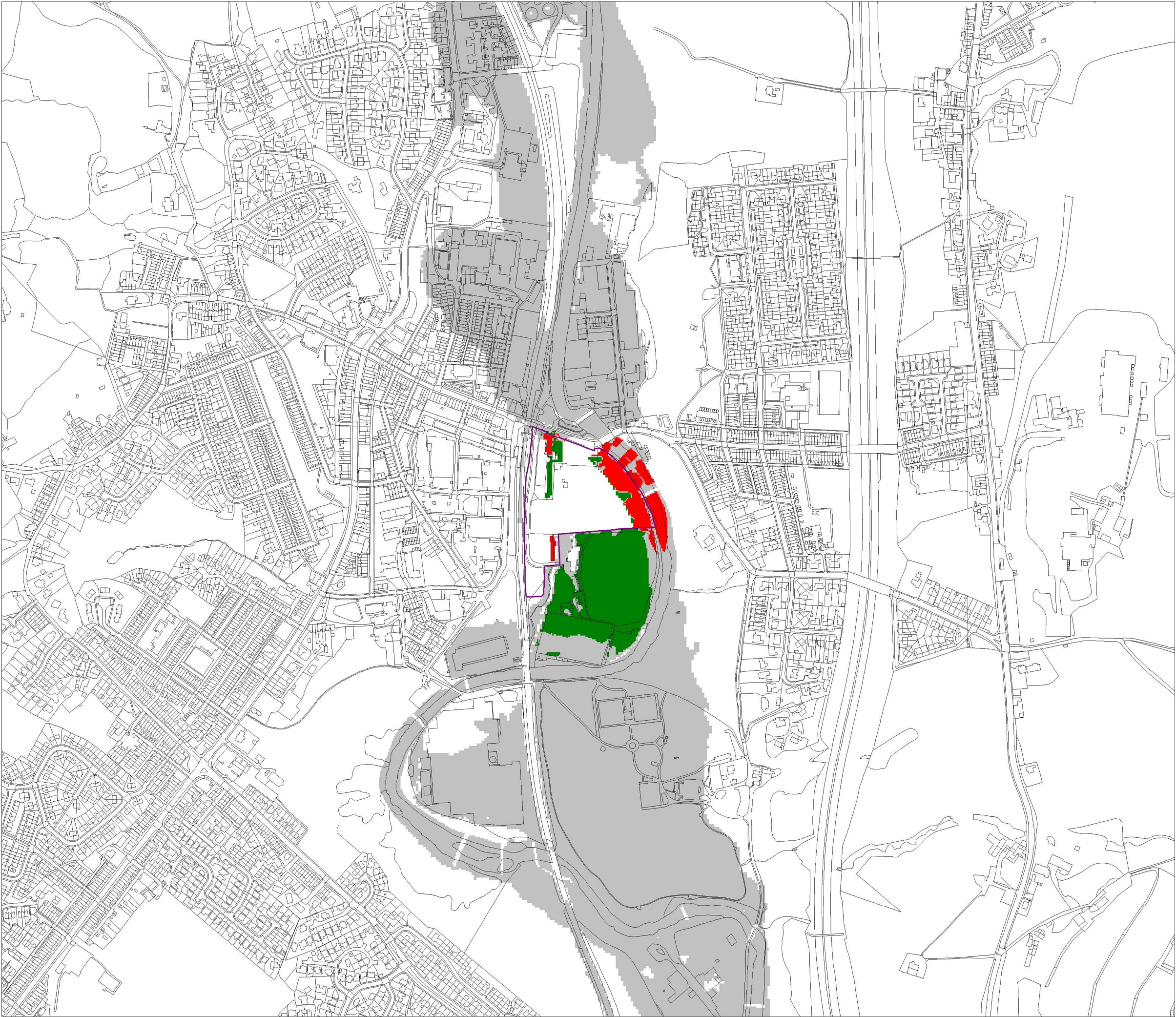
Project Title: **Holcombe Mill, Ramsbottom**

Drawing Title: **Flood Risk Comparison
1.0% AEP Event**

Map Orientation:  Scale: 

Drawn: JA	Checked: KT	Date: 14 July 2020
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Drawing No: 4714_034-026_Q0100_d	Rev: A
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KEY:

Site Location

Depth (metres)

- Decrease (> 0.03m)
- No Change (+/- 0.03m)
- Increase (> 0.03m)

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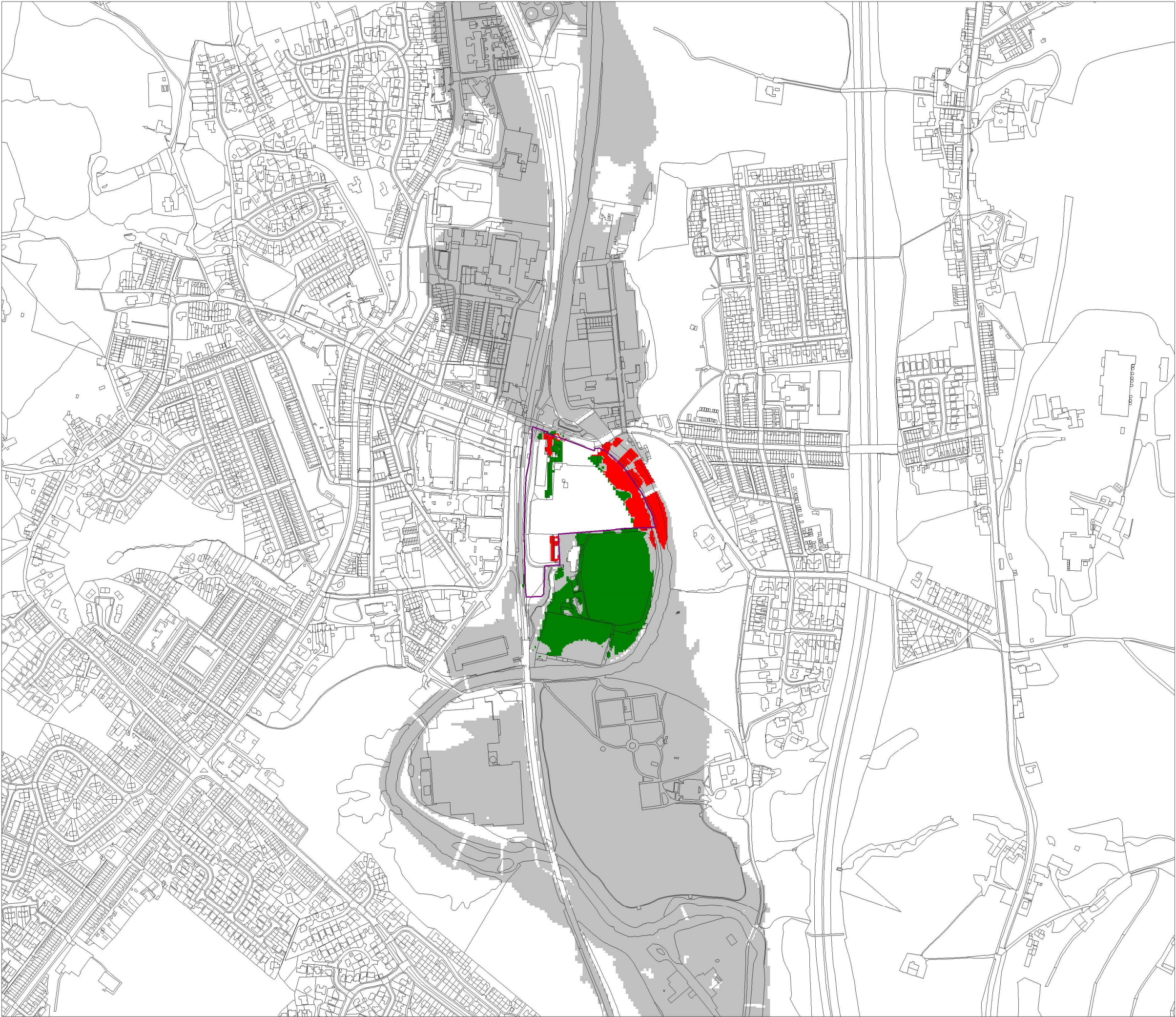
Project Title:
Holcombe Mill, Ramsbottom

Drawing Title:
Flood Risk Comparison
1.0% AEP (+30%) Event

Map Orientation:
Scale:

Drawn: JA	Checked: KT	Date: 14 July 2020
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Drawing No: 4714_034-026_Q0100_CC30_d	Rev: A
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KEY:

Site Location

Depth (metres)

- Decrease (> 0.03m)
- No Change (+/- 0.03m)
- Increase (> 0.03m)

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Client: **Eccleston Homes**

Project Title: **Holcombe Mill, Ramsbottom**

Drawing Title: **Flood Risk Comparison
1.0% AEP (+35%) Event**

Map Orientation:



Scale: 0 50 100 metres

Drawn:

JA

Checked:

KT

Date:

14 July 2020

Drawing No:

4714_034-026_Q0100_CC35_d

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Flood Consequences Assessments
Surface Water Drainage
Foul Water Drainage
Environmental Impact Assessments
River Realignment and Restoration
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