

FORMER MONDI/HOLCOMBE MILL,
BRIDGE STREET, RAMSBOTTOM, BURY

FLOOD RISK AND DRAINAGE ASSESSMENT

Final Report v1.0

October 2023

Report Title	Land at Former Mondi/Holcombe Mill, Ramsbottom, Bury Flood Risk and Drainage Assessment Final Report v1.0
Client	Eccleston Homes Ltd
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1 INTRODUCTION

1.1 Purpose of Report

Weetwood Services Ltd ('Weetwood') has been instructed by Eccleston Homes Ltd to prepare a Flood Risk and Drainage Assessment (FRDA) report to accompany a planning application for the proposed redevelopment of land at the former Mondi/Holcombe Mill located off Bridge Street, Ramsbottom ("the site") for residential use.

The assessment has been undertaken in accordance with the requirements of the revised National Planning Policy Framework (NPPF) updated on 5 September 2023 and the Planning Practice Guidance (PPG) updated on 25 August 2022.

1.2 Background

A planning application for the "*Erection of 73 no. dwellings including the retention and conversion of 2 existing buildings to residential use (5 no. units), the retention of a chimney and the demolition of a derelict building, together with engineering operations to create a development platform and associated parking, landscaping, drainage, the layout of internal estate roads and footways and other associated works*" at site was submitted to Bury Metropolitan Borough Council on 14 August 2020 (application ref: 65844).

The planning application was accompanied by the following reports prepared by Weetwood:

- Flood Risk Assessment report (FRA) prepared by Weetwood (report ref: 4714/FRA/Final/v1.2/2020-08-07; Issue date 7 August 2020);
- Drainage Assessment report prepared by Weetwood (report ref: 4714/DA/Final/v1.0/2020-08-07; Issue date 7 August 2020);
- Drainage Assessment report prepared by Weetwood (report ref: 4714/DA/Final/v1.3/2022-01-18; Issue date 18 January 2022);
- Flood Plan prepared by Weetwood (report ref: 4714/FP/Final/v1.0/2020-11-18; Issue date 18 November 2020).

The Planning Officer's report prepared for the application stated the following in respect of flood risk and drainage and included the recommendation of "*Minded to Approve*" to the planning committee:

- *The application site is a former mill site which has partially been cleared and is largely situated within flood zone 3.*
- *There is historical evidence that the site has flooded, namely in the recent Storm Eva and Storm Clara flood events experienced in 2015 and 2020.*
- *A Flood Risk Assessment (FRA) was submitted with the application and further information has been provided over the course of the application. The proposed development would involve the creation of a development platform for the proposed dwellings to ensure that the finished floor levels for the dwellings would be set above the flood levels. The Environment Agency have considered the FRA, which has assessed the predominant fluvial flood risk to the site and proposed measures to mitigate the risks. The FRA identifies that there is some risk associated with access/egress from the site during a design event or more extreme events. The applicant has proposed management of these risks via a Flood Plan.*
- *The Environment Agency has no objections to the proposed development, subject to the inclusion of conditions relating to finished floor levels.*
- *The Emergency Planning team have been consulted on the Flood Plan and their comments are awaited. These will be reported in the Supplementary Report.*
- *The issue of surface water drainage has been considered and further information submitted during the course of the application. The applicant has agreed to increase the size of the pipes within the site, which allows for the greater retention of water within the site. As a larger volume of water would be retained within the site, the proposed development would not increase the risk of flooding from surface water drainage. The Drainage Section has no objections, subject to the inclusion of a condition relating to Drainage Assessment and United Utilities has no objections, subject to the inclusion of conditions relating to foul and surface water drainage.*

- *Therefore, the proposed development would not increase flood risk to the site or increase flood risk downstream. The proposed development would not impact adversely upon the foul and surface water drainage. Therefore, the proposed development would comply with Policies EN5/1 and EN7/5 of the Bury Unitary Development Plan*

Planning permission was refused by way of a decision letter dated 7 June 2022 and the following reason for refusal relating to flood risk was given:

“Notwithstanding the provisions of the development and associated mitigation, the proposed development is located in flood zone 3, which has flooded in 2015 and would lead to increased flooding in the vicinity of the site from surface water and the combined sewer network. The proposed development would conflict with Policy EN5/1 - New Development and Flood Risk of the Bury Unitary Development Plan and Section 14 of the National Planning Policy Framework”.

A planning appeal was subsequently made by Eccleston Homes against refusal to the grant of planning permission (appeal ref: APP/T4210/W/22/3302543). The appeal was dismissed by the Planning Inspectorate by way of an Appeal Decision dated 14 February 2023. The Planning Inspector raised the following flood risk matters where insufficient evidence had been provided to demonstrate that the development would be safe and would not increase flood risk elsewhere:

1. The proposed development could increase the risk of flooding from the existing United Utilities combined sewer;
2. The site may be at risk of groundwater flooding;
3. Safe access and egress may not be available to the existing buildings that are to be converted because finished floor levels are below the adjacent carriageway;
4. Safe refuge is unavailable to the ground floor units within existing buildings that are to be converted;
5. Whilst Bury Metropolitan Borough Council supported the Flood Plan in principle, it had not been approved prior to determination of the planning application.

The proposed scheme has subsequently been updated and the issues specifically raised by the Planning Inspector have been addressed in the following ways:

1. United Utilities has confirmed that the proposed development would not increase the risk of flooding from the combined sewer network (refer **Section 5.5**);
2. The site is assessed to be at low risk of flooding from groundwater (refer **Section 4.9**) and any residual risks can be appropriately mitigated (refer **Section 5.4**);
3. The existing buildings that were to be converted have been removed from the scheme (refer **Appendix A**);
4. As above;
5. Safe access and egress is indicated to be available turning left onto Bridge Street, the residential development platform is shown to remain dry in all but the defence failure scenario and finished floor levels would be raised to prevent flooding of the residential dwellings in the defence failure scenario (refer **Section 5.2** and **Section 5.3**). As such, a Flood Plan is no longer considered necessary to manage the residual risk of flooding to the proposed residential development.

1.3 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 |
| Section 3 | Presents national and local flood risk and drainage planning policy |
| Section 4 | Assesses the potential risk of flooding to the development site |
| Section 5 | Presents flood risk mitigation measures based on the findings of the assessment |
| Section 6 | Presents an assessment of surface water drainage |
| Section 7 | Presents an assessment of foul water drainage |
| Section 8 | Presents the key findings and the recommendations |

1.4 Relevant Documents

The assessment has been informed by the following documents:

- [Ref 1] Bury Unitary Development Plan, Bury Council, August 1997
- [Ref 2] Bury Local Plan - Topic Paper 6 Flood Risk, Bury Council, October 2018
- [Ref 3] Bury Local Flood Risk Management Strategy, Bury Council, April 2018
- [Ref 4] Preliminary Flood Risk Assessment, Bury Council, May 2011
- [Ref 5] Greater Manchester Level 1 Strategic Flood Risk Assessment - Update, Final Report, March 2019
- [Ref 6] Greater Manchester Level 2 Hybrid Strategic Flood Risk Assessment - Main Report, Final Report, October 2020
- [Ref 7] Mid Irwell Modelling Study, Final Report, JBA Consulting, November 2018
- [Ref 8] Section 19 Flood Investigation Report - Greater Manchester 26 December 2015, Jointly prepared by 8 of the 10 Greater Manchester Authorities, the Environment Agency, and United Utilities, Published September 2016
- [Ref 9] Desk Study and Ground Investigation Report, Betts Geo Consulting Engineers, Report Ref. 19ECH016/DSGI, Rev 02, November 2019. (Submitted separately)

1.5 Third Party Surveys

The assessment has been informed by the following third party surveys:

- Walkover Survey of Mill Race and Stream, Eccleston Homes Ltd, May 2021 (refer **Appendix B**)
- Topographical Survey, Urban Contours Ltd, November 2019 (refer **Appendix C**)
- Combined Sewer Investigation, Eccleston Homes Ltd, October 2021 (refer **Appendix H**).

2 SITE DETAILS AND PROPOSED DEVELOPMENT

2.1 Site Location

The approximately 2.85 hectare (ha) site is located in Ramsbottom and is bounded by Bridge Street/Peel Brow to the north, the River Irwell to the east, Ramsbottom Cricket Club to the south, and Ramsbottom Station and the associated heritage railway line to the west, as shown in **Figure 1**. The site is located at OS NGR SD 794 167.

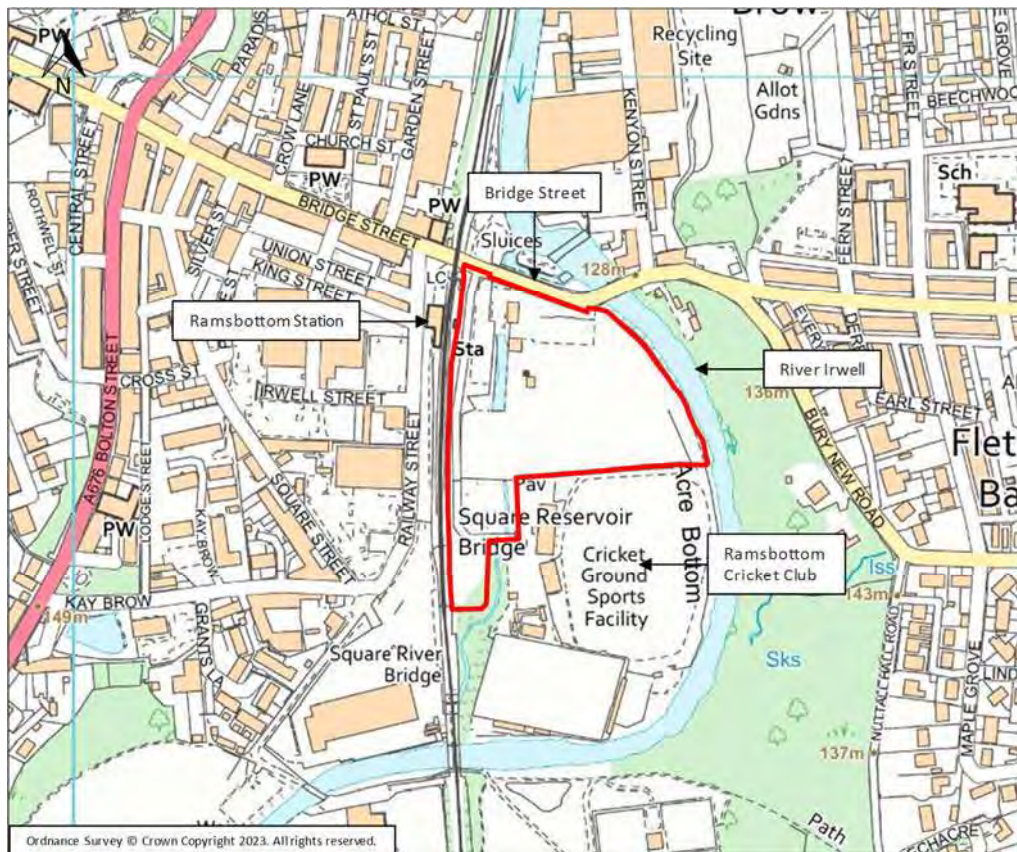


Figure 1: Site Location

2.2 Site Description

The site comprises a roughly triangular parcel of land forming the former Mondi/Holcombe Mill (the “main part of the site”) to the north of Ramsbottom Cricket Club, and an irregularly shaped spur to the south-west of the site (the “southern spur”).

The main part of the site is almost entirely covered in hardstanding formed of concrete slabs, whilst the southern spur comprises two grassy mounds and the Ramsbottom Cricket Club access road (refer **Figure 2**, **Figure 3** and **Figure 4**).

The former paper mill and most ancillary buildings were demolished in 2012. The following buildings remain: two 2-storey stone buildings (referenced in this report as Building A and Building B); a brick building (referenced as Building C), and a brick chimney (refer **Figure 2** and **Figure 5**).

Vehicular access to the site is available from the existing unnamed road that adjoins Bridge Street. This access is also used by the Ramsbottom Cricket Club.

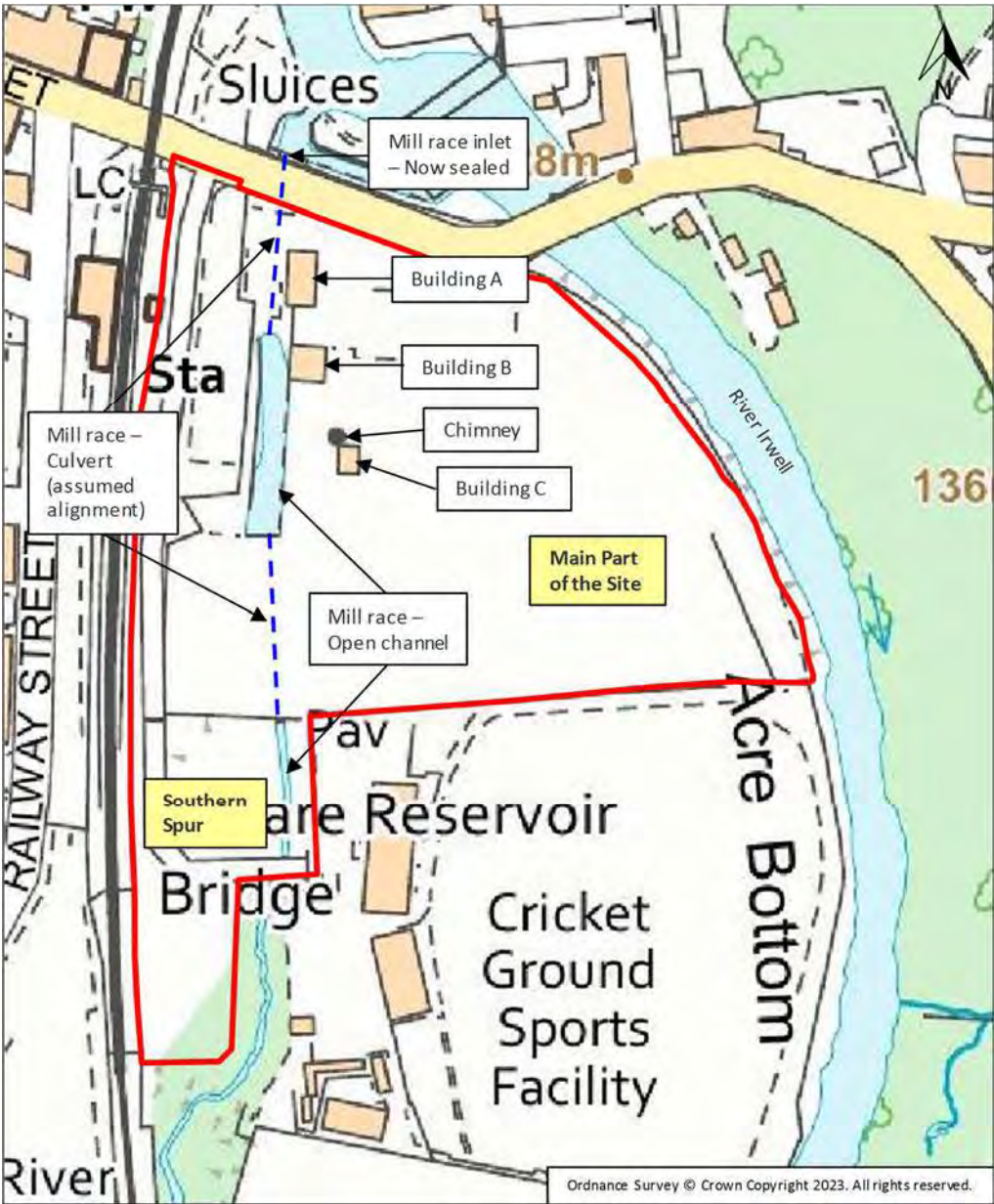


Figure 2: Site Features

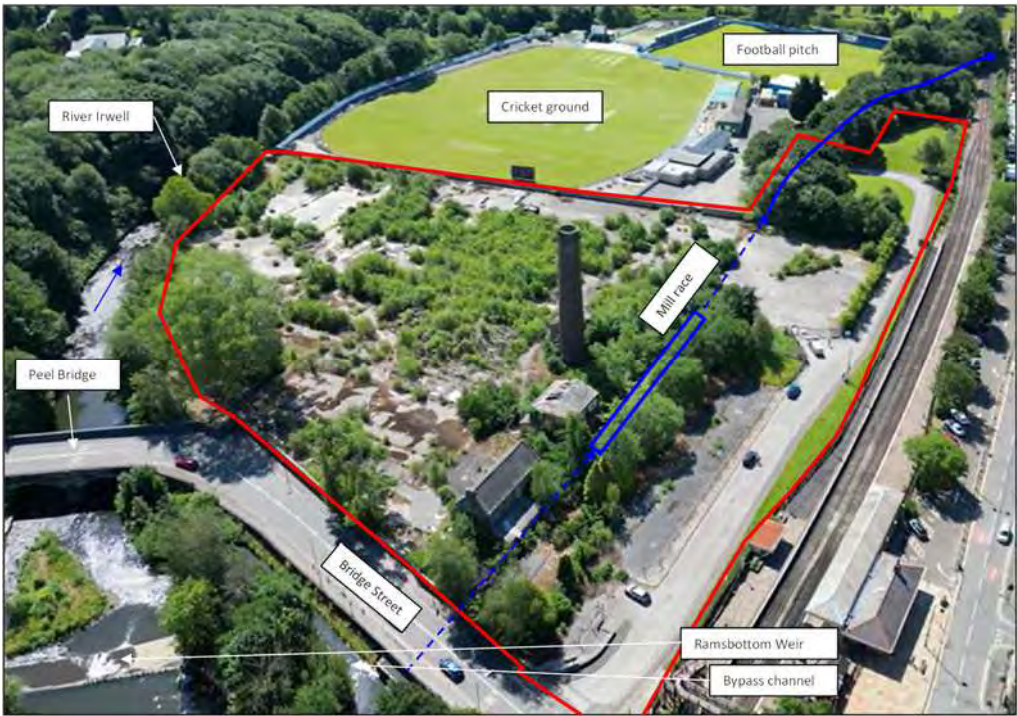


Figure 3: View of Site Looking South
(Drone Footage taken on 7 July 2023)

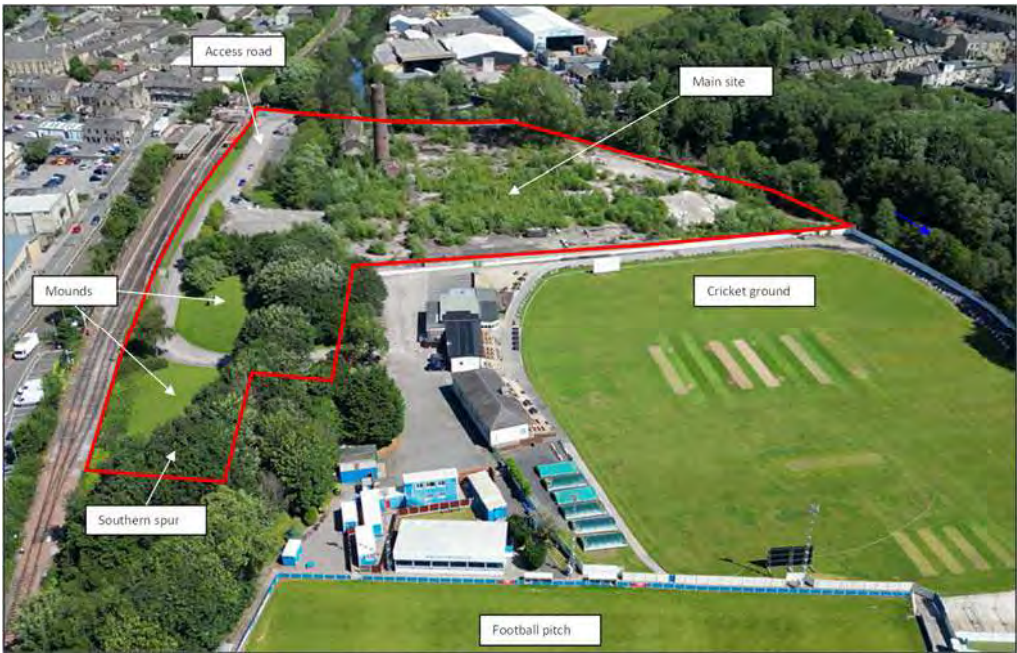


Figure 4: View of Site Looking North
(Drone Footage taken on 7 July 2023)



Figure 5: View of Existing Buildings
(Drone Footage taken on 7 July 2023)

2.3 Proposed Development

The development proposals comprise the demolition of Building A, Building B and Building C, the erection of 57 residential dwellings with associated public open space, and the construction of a new car park to serve the local area. The NPPF classifies residential development as More Vulnerable to flood risk.

The development will continue to be accessed via Bridge Street in the location of the existing unnamed road, and an emergency access will also be provided onto Bridge Street approximately 50 m further east.

The proposed layout is presented in **Appendix A**.

2.4 Waterbodies in the Vicinity of the Site

The River Irwell, a designated main river, flows in a principally southerly direction in the vicinity of the site.

Approximately 30 m north of Bridge Street, the river flows over Ramsbottom Weir, a circa 34 m long broad-crested weir. Under normal flow conditions, there is a significant fall in river levels across the weir. A canoe bypass channel has been installed on the right bank adjacent to Bridge Street (refer **Figure 6** and **Figure 7**).

A mill race runs through the western part of the site parallel to the existing unnamed road. Historically, the mill race took flows from the River Irwell via an inlet located to the north of Bridge Street (refer **Figure 6** and **Figure 8**). The inlet to the mill race is understood to have been sealed and the mill race does not convey any flows directly from the river.

A walkover survey undertaken by Eccleston Homes identified the following (all distances approximate) (refer **Appendix B**):

- 5 m south of Bridge Street: A manhole assumed to be located on the mill race
- 25 m south of the manhole: A pipe outlet (dimensions unknown)
- 70 m length of open channel
- 45 m long circular pipe (600 mm diameter)
- 40 m length of open channel
- Pipe under the access road to Ramsbottom Cricket Club and Ramsbottom United Football Club (600 mm diameter)
- 150 m length of open channel
- Circular pipe under railway embankment (750 mm diameter)
- Outfall to River Irwell.



Figure 6: River Irwell Immediately Upstream of Bridge Street/Peel Bridge
(Drone Footage taken on 7 July 2023)



Figure 7: Peel Bridge Looking Downstream (South)



Figure 8: Mill Race Inlet (Now Sealed) (Looking South)

2.5 Ground Conditions

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

A ground investigation undertaken by Betts Geo Environmental Ltd in 2019 [Ref 9] identified the following:

- Ground conditions typically consist of a concrete slab overlying a very sandy gravel of limestone or sandstone, overlying a further concrete slab and sub-base.
- Made Ground was observed to a depth of up to 4.5 m below ground level (bgl).
- Natural cohesive strata (clay and silt, often sandy) was recorded to a depth of approximately 23.0 m bgl, and natural granular deposits (sand, gravel) were recorded to a depth of up to 9.5 m bgl.
- Shale bedrock was recorded from 23.0 m bgl.
- Post-fieldwork monitoring recorded groundwater at within a number of the exploratory holes between 2.85 and 4.15 m bgl.
- Soakaway tests were not undertaken due to anticipated contamination and the depth of Made Ground.

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

2.6 Site Levels

A topographic survey of the site has been undertaken by Urban Contours Ltd and is provided in **Appendix C**. A digital terrain map of the site derived from Environment Agency LiDAR data is presented by **Figure 9**.

Ground levels across the site are generally in the range 125.5 – 126.0 m AOD, rising to the west to tie into the site/Cricket Club access road where levels are in the range 127.0 – 127.4 m AOD. Levels along Bridge Street adjacent to the northern boundary are in the range 126.2 – 127.2 m AOD. There are two small areas of higher ground on the main part of the site that are believed to be associated with spoil material, and two grassy mounds in the southern spur (all to circa 130.0 m AOD).

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

Ground levels to the south of the site are 2.0 – 4.2 m lower than the site itself, e.g. ground levels across the Cricket Club are generally at 123.5 m AOD, whilst the football pitch to the south of the cricket ground is lower still at circa 123.2 m AOD.

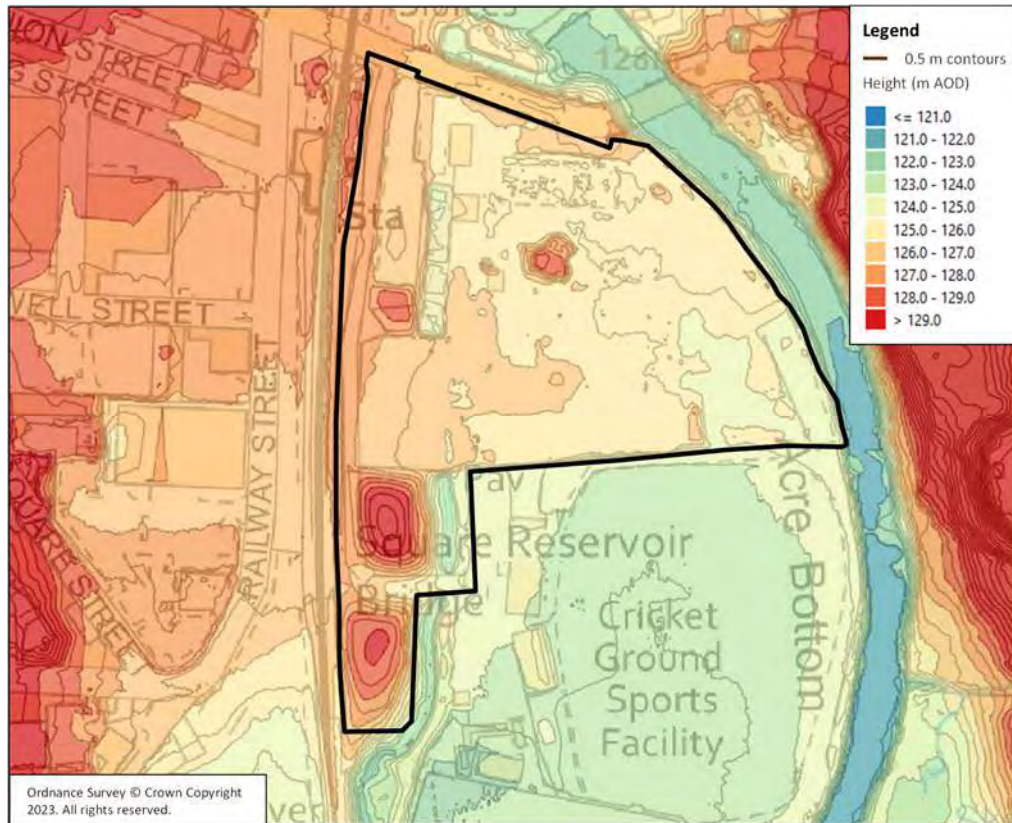


Figure 9: Digital Terrain Model from LiDAR Data

3 PLANNING POLICY AND GUIDANCE

3.1 National Planning Policy and Guidance

The thrust of national planning policy, as articulated in the NPPF is that inappropriate development in areas at risk of flooding should be avoided where possible, as summarised below:

- Inappropriate development in areas at risk of flooding should be avoided and that development should be directed away from areas at highest risk (whether existing or future), but where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere (NPPF para. 159).
- The policy of seeking to steer development to areas with the lowest risk of flooding, from any source, is implemented through the application of the flood risk sequential test. Development should not be allocated or permitted if there are reasonably available sites, appropriate for the proposed development in areas with a lower risk of flooding. The sequential approach should be used in areas known to be at risk now or in the future from any form of flooding (NPPF para. 162).
- If it is not possible for 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 test will depend on the potential vulnerability of the site and of the vulnerability of the development proposed (as set out in Annex 3 of NPPF; also PPG Table 2 and Table 3) (NPPF para. 163). For example, the exception test need not be applied for less vulnerable development in any flood zone, or for more vulnerable development in flood zones 1 or 2.
- Where the exception test must be applied, application of the 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: (a) the development would provide wider sustainability benefits to the community that outweigh the flood risk; (b) 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 para. 164). Both elements of the test should be satisfied for the development to be permitted (NPPF para. 165).
- A site-specific flood risk assessment should be provided for all development in flood zones 2 and 3 [whilst] in flood zone 1, an assessment should accompany all proposals involving: sites of 1 ha or more; land which has been identified by the Environment Agency as having critical drainage problems; land identified in a strategic flood risk assessment as being at increased flood risk in future; or land that may be subject to other sources of flooding, where its development would introduce a more vulnerable use (NPPF para. 167).
- Development should not increase flood risk elsewhere (NPPF para. 167).
- Development should only be allowed in areas at risk of flooding where the flood risk assessment (and the sequential and exception tests, as required), demonstrate that: a) within the site, the most vulnerable development is located in areas of lowest flood risk (unless there are overriding reasons to prefer a different location); b) the development is appropriately flood resistant and resilient such that, in the event of a flood, it could be quickly brought back into use without significant refurbishment; c) the development incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate; d) any residual (flood) risk can be safely managed; and e) safe access and escape routes are included where appropriate, as part of an agreed emergency plan (NPPF para.167).
- Applications for some minor development and changes of use should not be subject to the sequential or exception tests (NPPF para. 168). The exceptions are stated in Footnote 56.
- Major development should incorporate sustainable drainage systems unless there is clear evidence that this would be inappropriate. The systems should: a) take account of advice from the lead local flood authority; b) have appropriate proposed minimum operational standards; c) have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development; and d) where possible, provide multifunctional benefits (NPPF para. 169).

Guidance on application of the sequential and exception test is provided in the PPG. For example:

- The approach is designed to ensure that areas at little or no risk of flooding from any source are developed in preference to areas at higher risk. This means avoiding, so far as possible, development

- in current and future (i.e. taking climate change into account) medium and high flood risk areas considering all sources of flooding including areas at risk of surface water flooding (PPG para. 23).
- Where it is not possible to locate development in low risk areas, the sequential test should go on to compare reasonably available sites within medium risk areas and then, only where there are no reasonably available sites in low and medium risk areas, within high risk areas (PPG para. 24).
 - Initially, the presence of existing flood risk management infrastructure should be ignored, as the long-term funding, maintenance and renewal of this infrastructure is uncertain. Climate change will also impact upon the level of protection infrastructure will offer throughout the lifetime of development (PPG para. 24).
 - The sequential test should be applied to 'Major' and 'Non-major development' proposed in areas at risk of flooding, but it will not be required where; the site has been allocated for development and subject to the test at the plan making stage (provided the proposed development is consistent with the use for which the site was allocated and provided there have been no significant changes to the known level of flood risk to the site, now or in the future which would have affected the outcome of the test); the site is in an area at low risk from all sources of flooding, unless the Strategic Flood Risk Assessment, or other information, indicates there may be a risk of flooding in the future; the application is for a development type that is exempt from the test, as specified in footnote 56 of the NPPF (PPG para. 27).
 - For individual planning applications subject to the sequential test, the area to apply the test will be defined by local circumstances relating to the catchment area for the type of development proposed. For some developments this may be clear, for example, the catchment area for a school. In other cases, it may be identified from other Plan policies. For example, where there are large areas in Flood Zones 2 and 3 (medium to high probability of flooding) and development is needed in those areas to sustain the existing community, sites outside them are unlikely to provide reasonable alternatives. Equally, a pragmatic approach needs to be taken where proposals involve comparatively small extensions to existing premises (relative to their existing size), where it may be impractical to accommodate the additional space in an alternative location. For nationally or regionally important infrastructure the area of search to which the Sequential Test could be applied will be wider than the local planning authority boundary (PPG para. 27).
 - 'Reasonably available sites' are those in a suitable location for the type of development with a reasonable prospect that the site is available to be developed at the point in time envisaged for the development. These could include a series of smaller sites and/or part of a larger site if these would be capable of accommodating the proposed development. Such lower-risk sites do not need to be owned by the applicant to be considered 'reasonably available' (PPG para. 28).
 - The exception test should only be applied as set out in Table 2 [of the PPG ("Flood Risk Vulnerability and Flood Zone Incompatibility")] and only if the sequential test has shown that there are no reasonably available, lower risk sites, suitable for the proposed development, to which the development could be steered (PPG para. 32).

Non-statutory technical standards for sustainable drainage published by DEFRA in March 2015 set out how surface water runoff generated during the present day 1 in 30 and 1 in 100 AEP rainfall events and for events exceeding the present day 1 in 100 AEP event should be managed, how peak runoff rates should be restricted and how runoff volumes should be controlled.

3.2 Local Planning Policy and Guidance

Adopted Bury Unitary Development Plan, 1997

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

Policy EN5/1 - New Development and Flood Risk states:

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.*

Bury Local Plan

Bury MBC commenced preparation of a new Local Plan in March 2015. 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 Water Framework Directive

The Water Framework Directive (WFD) provides a legal framework for the protection, improvement and sustainable use of inland surface waters, groundwater, transitional waters, and coastal waters across England, and seeks to:

- Prevent deterioration in the status of aquatic ecosystems, protect them and improve the ecological condition of waters
- Achieve at least 'good' status for all waterbodies by 2015
- Promote the sustainable use of water as a natural resource
- Conserve habitats and species that depend directly on water
- Progressively reduce or phase out the release of individual pollutants or groups of pollutants that present a significant threat to the aquatic environment
- Progressively reduce the pollution of groundwater and prevent or limit the entry of pollutants; and
- Contribute to mitigating the effects of floods and droughts.

The WFD applies to any proposed development which has the potential to impact on a waterbody. Where this is the case, the Environment Agency may require evidence demonstrating that the proposed development does not compromise the aims of the WFD.

3.4 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 Environment Agency for any permanent or temporary works, including works:

- In, over or under a designated main river
- Within 8 m of the top of bank of a designated main river or of the landward toe of a flood defence (16 m if it is a tidal main river or a sea 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 Flood Risk from Rivers and from the Sea (Flood Map for Planning)

The Environment Agency Flood Map for Planning (Rivers and Sea)³ (**Figure 10**) indicates the western edge of the site to be located in flood zone 1 (circa 5%), with most of the remaining part of the site indicated to be in flood zone 3 (circa 80%). A small part of the site located between the areas indicated to be in flood zones 1 and 3, is indicated to be in flood zone 2 (circa 15%), although over half of this is associated with the existing open channel of the mill race.

Table 1 of the PPG defines flood zones as follows:

- Flood zone 1: Low Probability. Land having a less than 0.1% annual exceedance probability (AEP) of river or sea flooding (shown as 'Clear' on the Flood Map for Planning)
- Flood zone 2: Medium Probability. Land having between a 1.0% and 0.1% AEP of river flooding or between a 0.5% and 0.1% AEP of sea flooding
- Flood zone 3a: High Probability. Land having a 1.0% or greater AEP of river flooding; or Land having a 0.5% or greater AEP of sea flooding
- Flood zone 3b: Functional Floodplain. Land where water from rivers or the sea has to flow or be stored in times of flood. The functional floodplain will normally comprise: Land having a 3.3% or greater AEP of flooding, with any existing flood risk management infrastructure operating effectively; or land that is designed to flood (such as a flood attenuation scheme), even if it would only flood in more extreme events (such as 0.1% AEP of flooding).

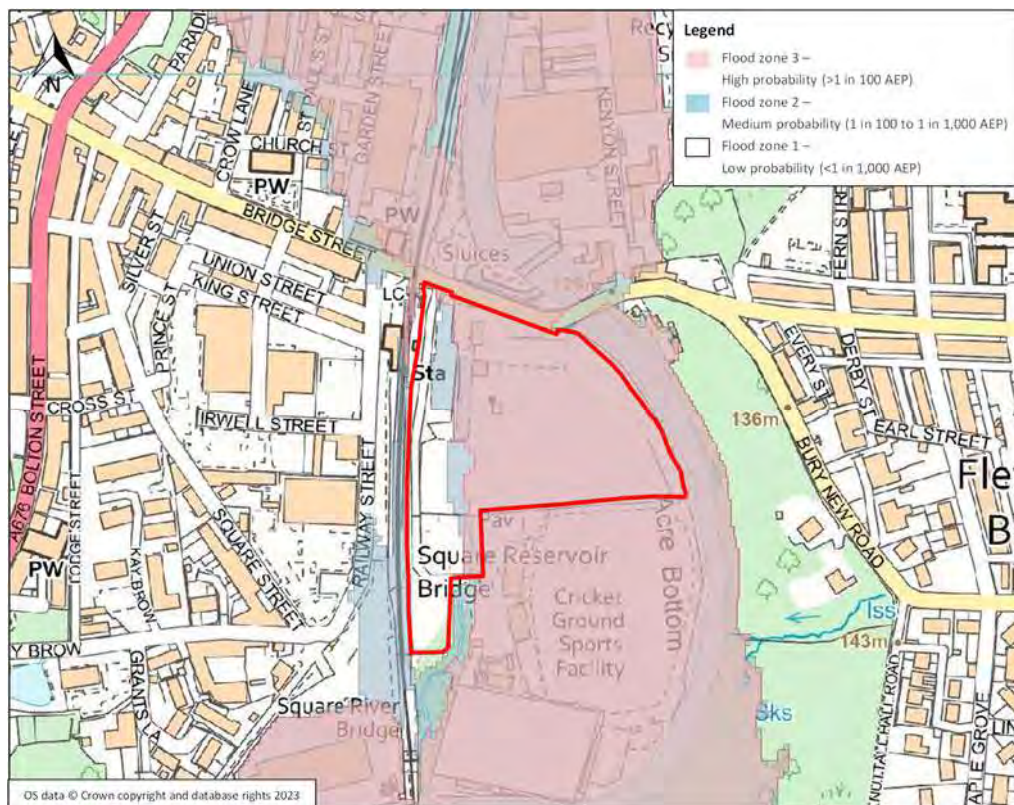


Figure 10: Flood Map for Planning

Source: gov.uk website; Accessed: July 2023

³ <https://flood-map-for-planning.service.gov.uk/>

The zones presented on the Flood map for Planning do not take account of the possible impact of climate change on flood risk, nor do they take into account the effect of flood defences.

The Flood Map for Planning does not show the functional floodplain (flood zone 3b). However, Appendix B (interactive map 5) of the Level 1 Strategic Flood Risk Assessment [ref 5] confirms that no part of the site is located in flood zone 3b (functional floodplain).

4.2 Historical Records of Flooding

The definitive record of historic flooding is the Environment Agency Historic Flood Map⁴. According to the GOV.UK website:

“The Historic Flood Map is a GIS layer showing the maximum extent of individual Recorded Flood Outlines from river, the sea and groundwater springs that meet a set criteria. It shows areas of land that have previously been subject to flooding in England. This excludes flooding from surface water, except in areas where it is impossible to determine whether the source is fluvial or surface water but the dominant source is fluvial. The majority of records began in 1946 when predecessor bodies to the Environment Agency started collecting detailed information about flooding incidents, although we hold limited details about flooding incidents prior to this date.”

A review of the Historic Flood Map (also provided on Appendix B (interactive map 5) of the Level 1 Strategic Flood Risk Assessment [ref 5]) confirms that no part of the site is located in flood zone 3b (functional floodplain). confirms that there is no record of historic flooding of the site in the dataset.

The absence of a record of site flooding in the Historic Flood Map it does not mean that the area has never flooded, rather that the Environment Agency does not currently have records of flooding that meet the quality criteria for inclusion.

A comprehensive review of historic flooding in the Ramsbottom district, compiled from a number of sources is presented in the 2018 Mid Irwell Modelling Study report (ref 7]. The review references flooding in Ramsbottom in 1856, 1881, 1935, 1946, 1954, 1964, 1980, 1992, 1995, 1999, 2002, 2004, 2007, 2009, and most recently in 2015.

The records repeatedly reference the affected areas as being located to the north of Ramsbottom railway station (e.g. Athol Street, Crow Lane, Garden Street, Rook Street), Kenyon Street, and of Bridge Street. However, no specific reference is made to flooding of the site. The records also attribute flooding to both the River Irwell and to surface water runoff, and often both.

The report [Ref 7] states that the flood event that occurred in December 2015 (often referred to as “the Boxing Day flood”) appears to be the largest flood event on record, with a return period estimated to be between 120 years and 140 years at Irwell Vale and Bury respectively. The impact of the flooding resulted in eight of the ten Greater Manchester authorities, the Environment Agency, and United Utilities, jointly preparing a flood investigation report [ref 8]. The nature of the Boxing Day flood, and the associated flooding in Ramsbottom is summarised below.

According to Table 3 of [Ref 8] internal flooding was recorded at 54 properties in Ramsbottom. The flooding was attributed to surface water flooding (11 properties) and flooding from the River Irwell (43 properties). Specific reference is made to anecdotal reports of surface water on Kenyon Street ponding behind the flood wall, and of damage to a surface water culvert at the junction of Crow Lane and Bridge Street, leading to “large additional volumes of water flowing along Crow Lane”. The report references the river level at Ramsbottom as being estimated to occur once every 100 to 200 years, which is consistent with the estimated return period stated in [Ref 7].

⁴ <https://data.gov.uk/dataset/76292bec-7d8b-43e8-9c98-02734fd89c81/historic-flood-map>

According to [Ref 7], the Environment Agency commissioned a survey of wrack marks of areas affected by flooding in December 2015, including Ramsbottom. Figure 5.11 of [Ref 7] confirms that wrack marks were observed on Kenyon Street, immediately upstream of Ramsbottom Bridge, on Garden Street and Bridge Street, at the Ramsbottom United Football Ground, and in Nuttall Park. However, no wrackmarks were observed on the site. This is consistent with [Ref 8] which states that the cricket and football ground grounds were flooded (but again, no mention of flooding of the site).

Since the 2018 Mid Irwell Modelling Study report [Ref 7] and the 2016 flood investigation report [ref 8] were published, a further flood event occurred in February 2020 (Storm Ciara) affecting Ramsbottom. According to Environment Agency records⁵, the maximum recorded river level at Ramsbottom Weir was approximately 0.3 lower for this event than the December 2015 event. No flood investigation report has been prepared by the Bury Council for the 2020 event; however, a report in the Bury Times (13 February 2020) specifically identifies Peel Brow and Kenyon Street, and also Nuttall Park as affected areas.

It is concluded that whilst land to the north of Bridge Street and to the south of the application site experienced flooding in December 2015, there are no records of the site having directly flooded from the River Irwell.

4.3 Flood Defence Assets

Environment Agency records indicate that both banks of the River Irwell adjacent to the eastern boundary of the site constitute formal flood defences formed of Natural High Ground, i.e. the ground is not raised/embanked. To the north of Bridge Street, formal flood defences comprise of a Walls and “Engineered High Ground” (left bank) and Walls, Natural High Ground, and Engineered High Ground (right bank). (Refer **Figure 11**).

A low stone wall runs along the northern edge of Bridge Street from Peel Bridge to a location opposite the junction of the site access road and Bridge Street. Although not classified as a formal flood defence, the wall does nevertheless perform a flood defence role.

4.4 Sequential Test and Exception Test

A Flood Risk Sequential & Exception Test Assessment report has been prepared by Lichfields and is presented separately. The report demonstrates that there are no sequentially preferable sites, and that the proposals pass the Exception Test.

⁵ Hydrology Data Explorer; <https://environment.data.gov.uk/hydrology/explore>

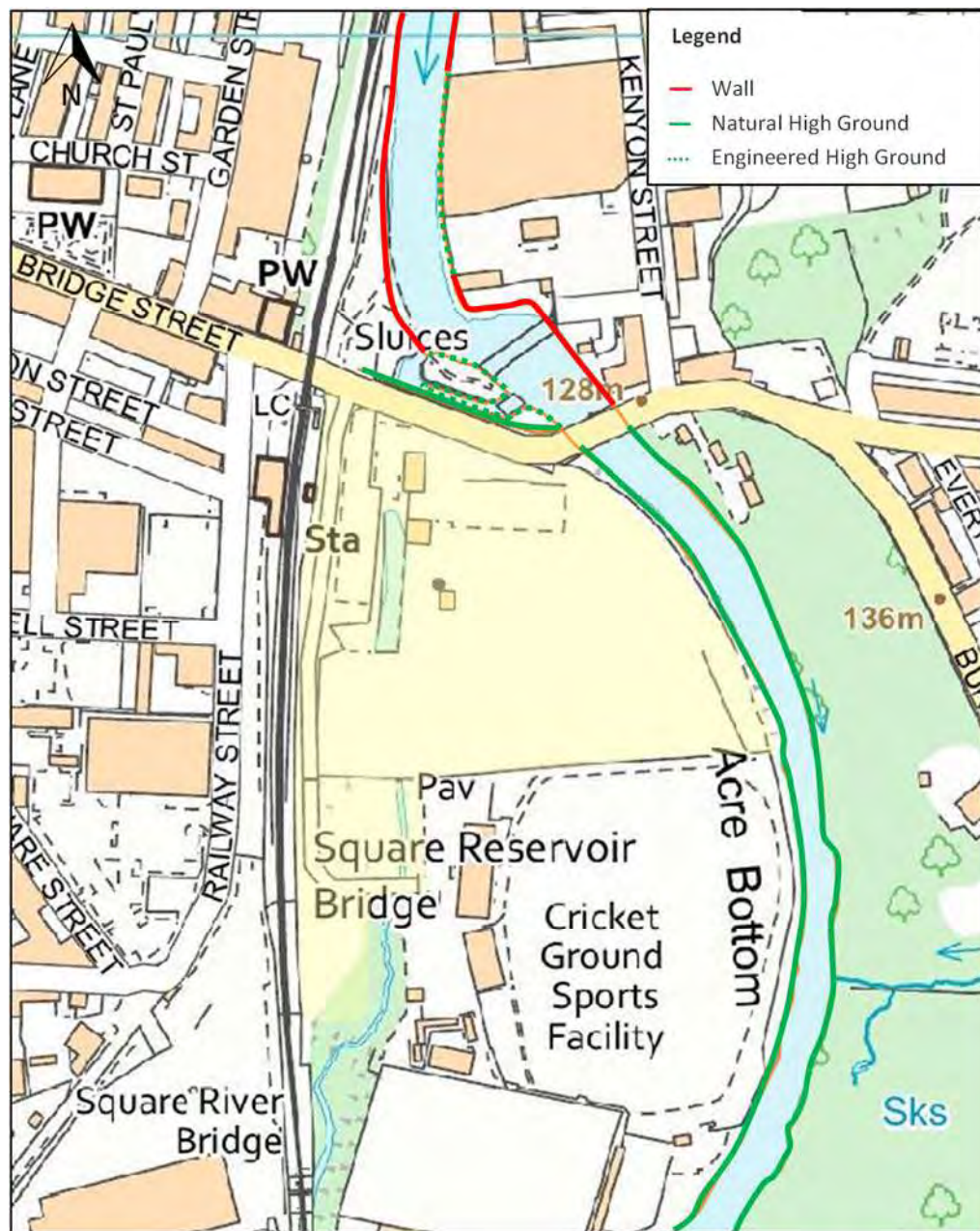


Figure 11: Formal Flood Defence Assets

Source: gov.uk website; Accessed: July 2023

4.5 Flood Risk from the River Irwell (Fluvial)

4.5.1 Introduction

The extents of flooding presented by the Flood Map for Planning are derived from outputs from a 1D/2D hydraulic model of the River Irwell developed on behalf of the Environment Agency to update floodplain mapping along the corridors of the River Irwell between Rawtenstall in Lancashire and Bury in Greater Manchester, and the River Ogden (the Mid Irwell Modelling Study [ref 7]).

The hydraulic model developed during the Mid Irwell Modelling Study has been provided to Weetwood by the Environment Agency for use under licence for this assessment. This model is referred to as “the supplied model”.

The supplied model has been modified for use for assessing flood risk at the site and to inform the proposed flood mitigation measures. The amendments to the supplied model are described in **Section 4.4.2** and **Section 4.4.3** below.

4.5.2 Truncation of the Supplied Model

The supplied model has been truncated to reduce model run times, thereby enabling a range of scenarios to be assessed within a reasonable timeframe. The amended model is referred to as the “site specific model”.

The 1D and 2D elements of the supplied 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 supplied and site specific models are presented by **Figure 12**.

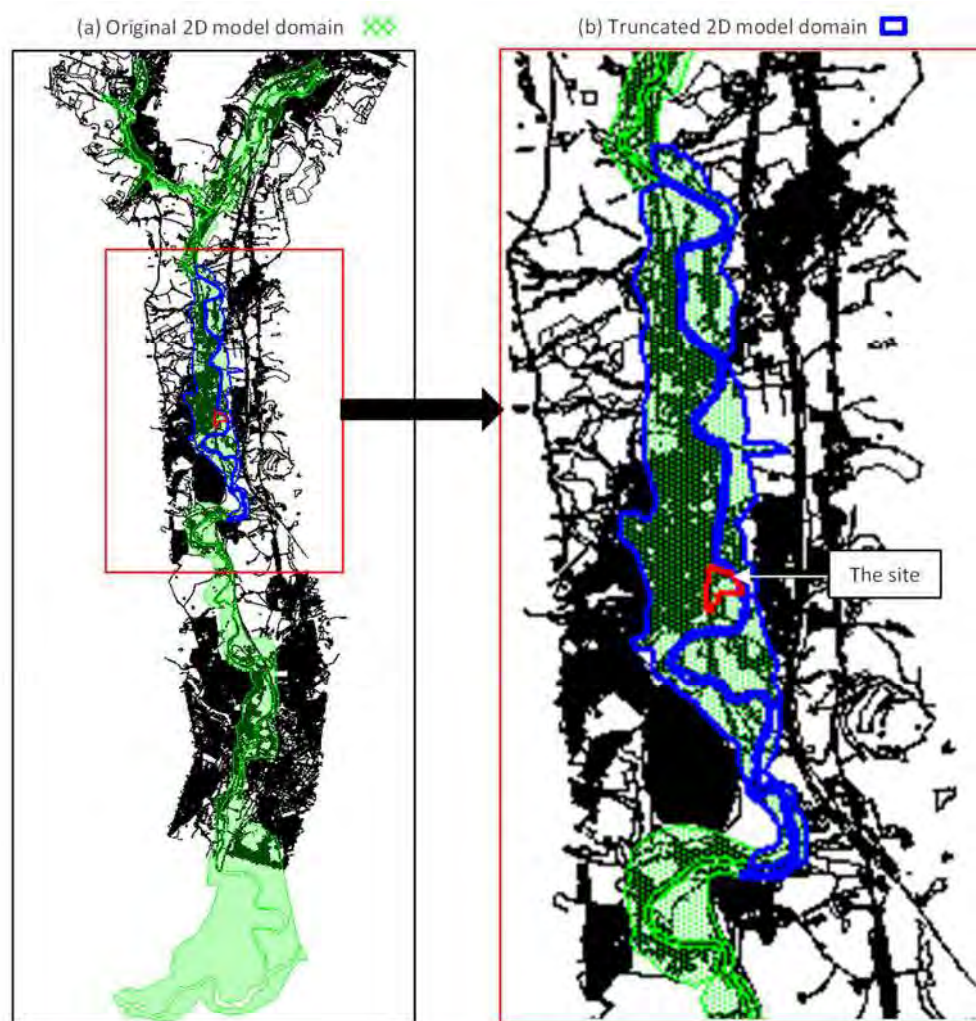


Figure 12: 2D Model Domain

The points at which the supplied model has been truncated are approximately 3.0 km upstream 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).

The inflows to the supplied model have been updated to reflect the reduction in the extent of the model domain. The supplied model included 28 inflow boundaries, 22 of which are applied outside of the site specific model domain and 2 of which are located partially within the site specific model domain.

Inflow boundaries LAT_I18 and LAT_I16 are only partially located within the site specific 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.

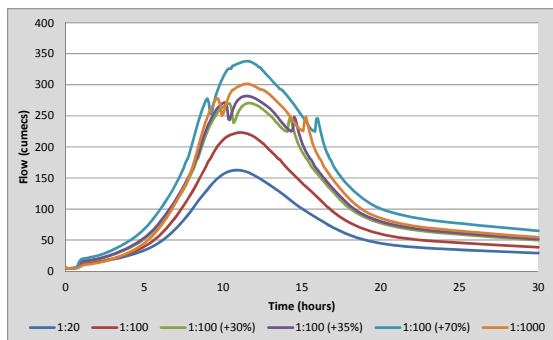
The peak flows for LAT_I18 and LAT_I16 have been reduced to take account of the length of the model over which the lateral inflows are applied within the site specific model domain. The original and revised peak flows at LAT_I18 and LAT_I16 are provided in **Table 1**.

The inflow boundaries located upstream of the site specific model domain have been replaced by a single Flow-Time boundary output directly from the results of the supplied model at model node IRWE07_02247. A Head-Time boundary was incorporated at the downstream extent of the site specific model domain and was output directly from the results of the supplied model at model node IRWE06_01276.

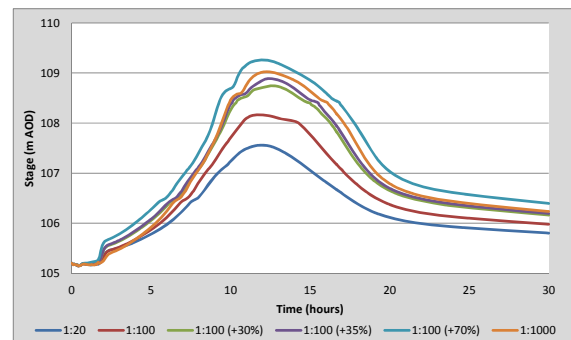
The hydrographs extracted from the supplied model and input to the site specific model at node IRWE07_02247 are presented in **Figure 13a** and the stage-time graphs extracted from the supplied model and applied to the site specific model at node IRWE06_01276 are presented in **Figure 13b**.

Table 1: Peak Flows – LAT_I18 and LAT_I16

Flood Event (AEP)	LAT_I18		LAT_I16	
	Original	Revised	Original	Revised
5.0%	3.69	1.22	7.78	6.72
1.0%	6.33	2.10	10.94	9.45
1.0% (+30%)	8.23	2.72	14.22	12.29
1.0% (+35%)	8.55	2.83	14.77	12.76
1.0% (+70%)	10.77	3.56	18.60	16.07
0.1%	9.59	3.17	15.28	13.21



(a) Inflow Hydrographs – Node IRWE07_02247



(b) Downstream Boundary – Node IRWE07_02247

Figure 13: Model Hydrographs

The results from the supplied model have been compared to those output from the site specific model to assess the impact of the truncation on the model results (**Appendix D**).

The observed changes in modelled flood depth from truncating the supplied model are generally shown to be less than 5 mm for the 5.0%, 1.0%, 1.0% (+30%) and 0.1% AEP events. There is an area upstream of the site where larger changes in flood depths are observed; these discrepancies result from model instabilities in this location. Larger discrepancies in modelled flood depth for the 1.0% (+35%) and 1.0% (+70%) AEP events also relate to the model instabilities upstream of the site which result in large volume errors where water erroneously enters the model domain.

4.5.3 Model Development

The site specific 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 within the site and walls along Bridge Street 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 14**.

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.

Finally, the topographical survey information has been used to improve the representation of Peel Bridge. 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.

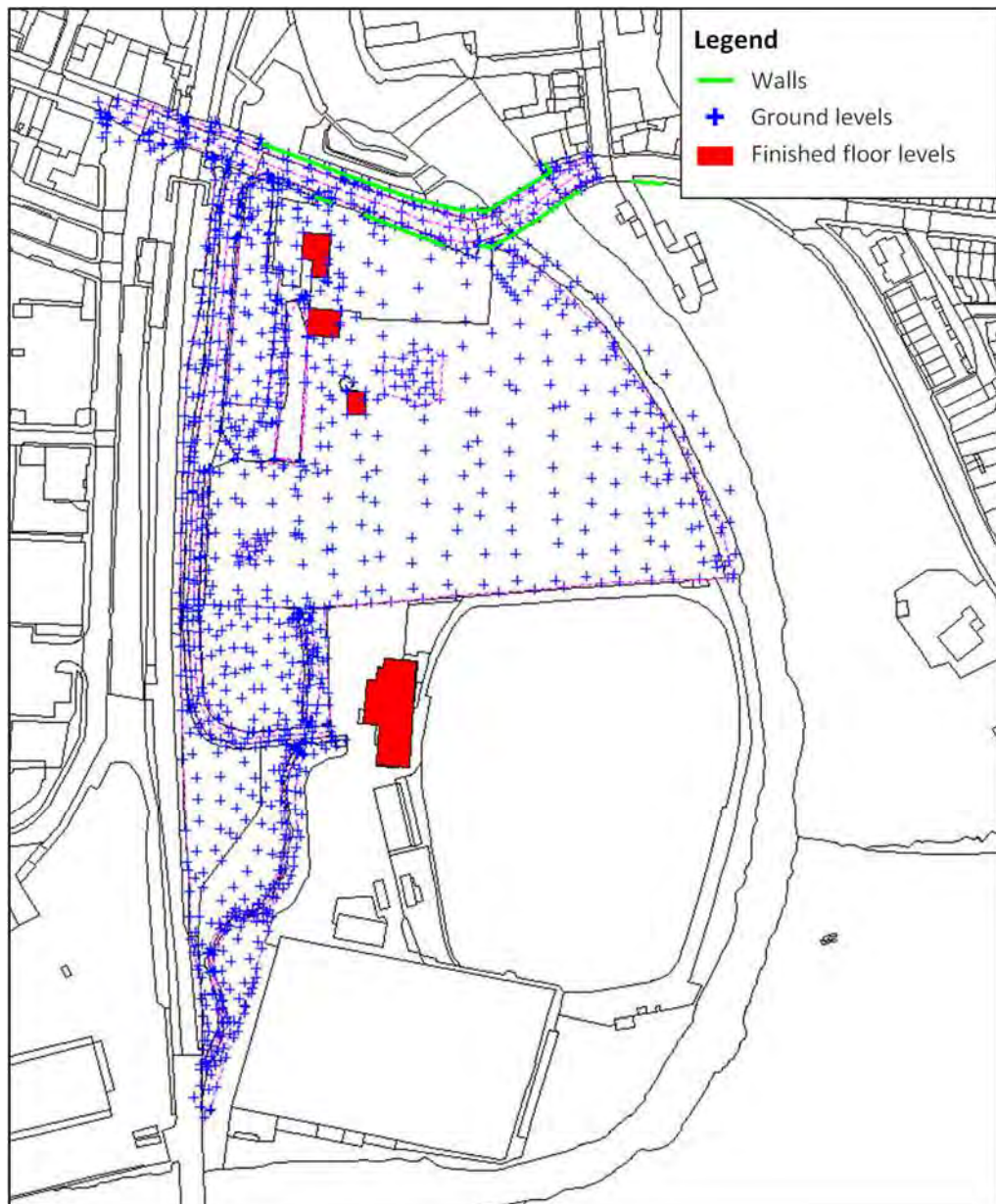


Figure 14: Topographic Representation

4.5.4 Environment Agency Review of the Site Specific Model

The site specific model was supplied to the Environment Agency on 19 October 2020 for review. The Environment Agency stated by way of a letter dated 20 November 2020 (EA reference: SO/2020/120565/02-L01): “... we have now reviewed the detailed modelling files subsequently provided to us and used to support the FRA. Our reviewer has confirmed that the modelling is acceptable and fit for purpose.” A copy of the letter is provided in **Appendix E**.

Given that no further changes have been made to the site specific model, the model is still regarded as being fit for purpose. Accordingly, no further review of the hydraulic model by the Environment Agency should be necessary; however, model files could be provided on request.

4.5.5 Modelled Flood Depths and Extents

Model output plots illustrating maximum flood extents and depths for the 3.3%, 1.0%, 1.0% climate change and 0.1% AEP events are provided in **Appendix F**.

The current Environment Agency guidance⁶ on climate change allowances states that the “Central Allowance” should be used to assess the effect of climate change on flood risk for the lifetime of More Vulnerable development located in flood zones 2 and 3a. The Central Allowance for the Irwell management catchment is 35% for the 2080’s climate epoch.

The model outputs indicate that the south-east corner of the site is subject to minor flooding in the 3.3% AEP event, with the extent of flooding increasing during more extreme events. The flooding that occurs during the 3.3% and 1.0% AEP events results from water coming out of bank of the River Irwell adjacent to the eastern boundary of the site. However, during the 1.0% plus climate change and 0.1% AEP events, floodwater is also indicated to cross Bridge Street and enter the north-west corner of the site before re-entering the River Irwell directly or via the mill race.

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
3.3%	125.80	125.14	0.36	0.14
1.0%	126.03	125.52	0.52	0.14
1.0% climate change	127.45	125.94	1.41	0.35
0.1%	127.57	126.04	1.53	0.41

4.6 Flood Risk from Surface Water (Pluvial)

The Flood Risk from Surface Water maps (**Figure 15** and **Figure 16**) indicate 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 surface water also shown to enter the site via Bridge Street.

It should be noted that the Flood Risk from Surface Water maps present outputs from a simplified 2D direct rainfall hydraulic model and Environment Agency guidance⁷ states “Due to the modelling techniques used, the mapping picks out depressions in the ground surface and simulates some flow along natural drainage channels, rivers, low areas in floodplains, and flow paths between buildings. Although the maps appear to show flooding from ordinary watercourses, they should not be taken as definitive mapping of flood risk from these as the conveyance effect of ordinary watercourses or drainage channels is not explicitly modelled.”

As such, the Flood Risk from Surface Water maps are considered to overestimate the risk of flooding at the site because the hydraulic modelling upon which they are based does not explicitly represent drainage channels and consequently underestimates conveyance along the mill race. On this basis, surface water

⁶ Flood Risk Assessments: climate change allowances (<https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>)

⁷ Environment Agency, What is the Risk of Flood from Surface Water map, Report version 2.0, April 2019

runoff entering the site would be expected to enter the mill race as shallow overland flow before being directed off-site and back into the River Irwell.

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

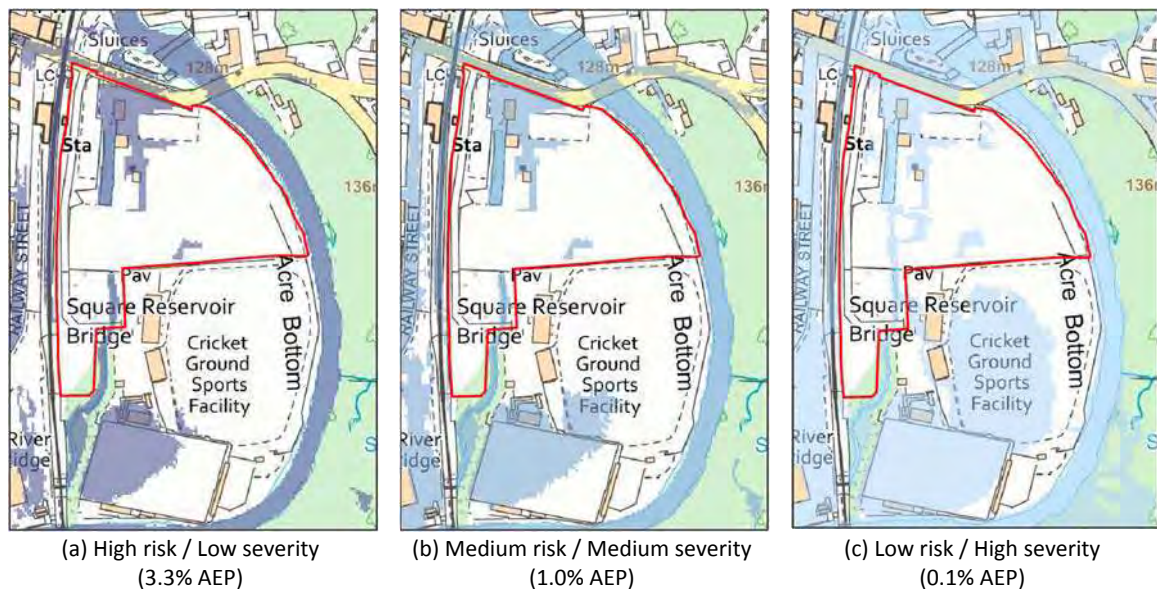


Figure 15: Flood Risk from Surface Water (Extent)

Source: gov.uk website; Accessed: July 2023

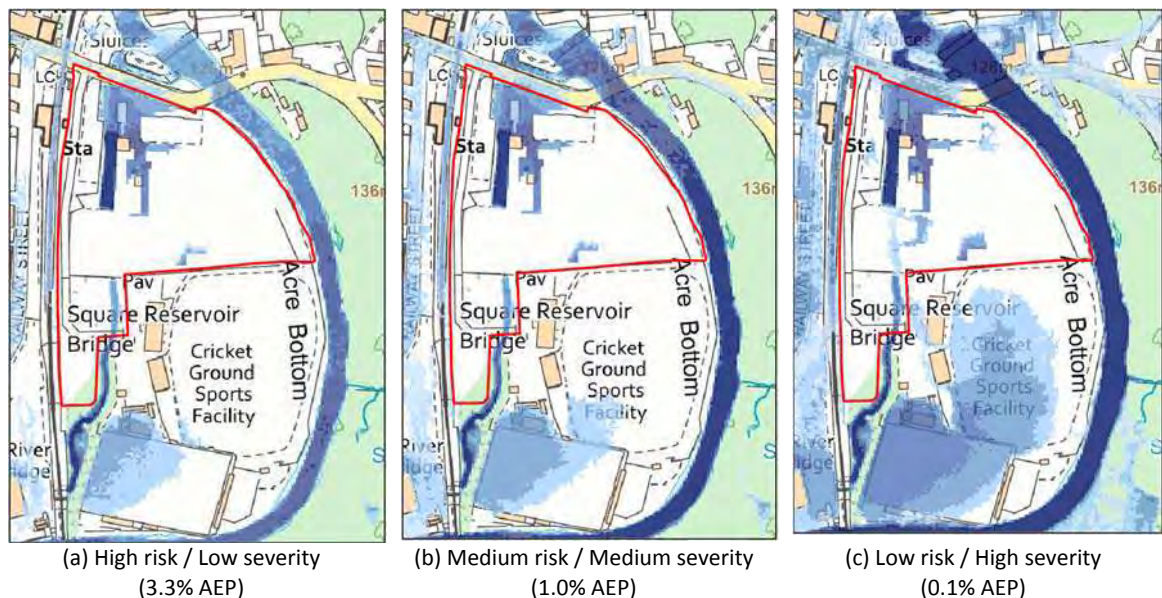


Figure 16: Flood Risk from Surface Water (Maximum Depth)

Source: gov.uk website; Accessed: July 2023

4.7 Flood Risk from Sewers

The United Utilities public sewer record (**Appendix G**) indicates that a 900/1000 mm diameter combined water sewer is present along the eastern boundary of the site and beyond the southern site boundary. The

record also shows a 300 mm diameter combined sewer serving the site and joining the 900 mm combined sewer in the south-east corner of the main part of the site (manhole reference 4601).

A combined sewer investigation undertaken by Eccleston Homes (refer **Appendix H**) confirmed the presence of the combined sewers.

There is a residual risk of flooding at the site associated with the capacity of the combined sewer being exceeded, particularly at manhole ref: 4701 where the 1000 mm diameter and 300 mm diameter pipes crossing the River Irwell enter a single 900 mm diameter pipe. However, any floodwater emanating from this manhole would not be able to pond at the site to a significant depth due to the topography and would be directed into the River Irwell overland.

4.8 Flood Risk from Reservoirs, Canals and Other Artificial Sources

The Flood Risk from Reservoirs map (**Figure 17**) indicates that the site may be at risk from flooding in the event of a failure of the impounding structure at the Calf Hey Reservoir located approximately 5 km north-west of the site. 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.

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.

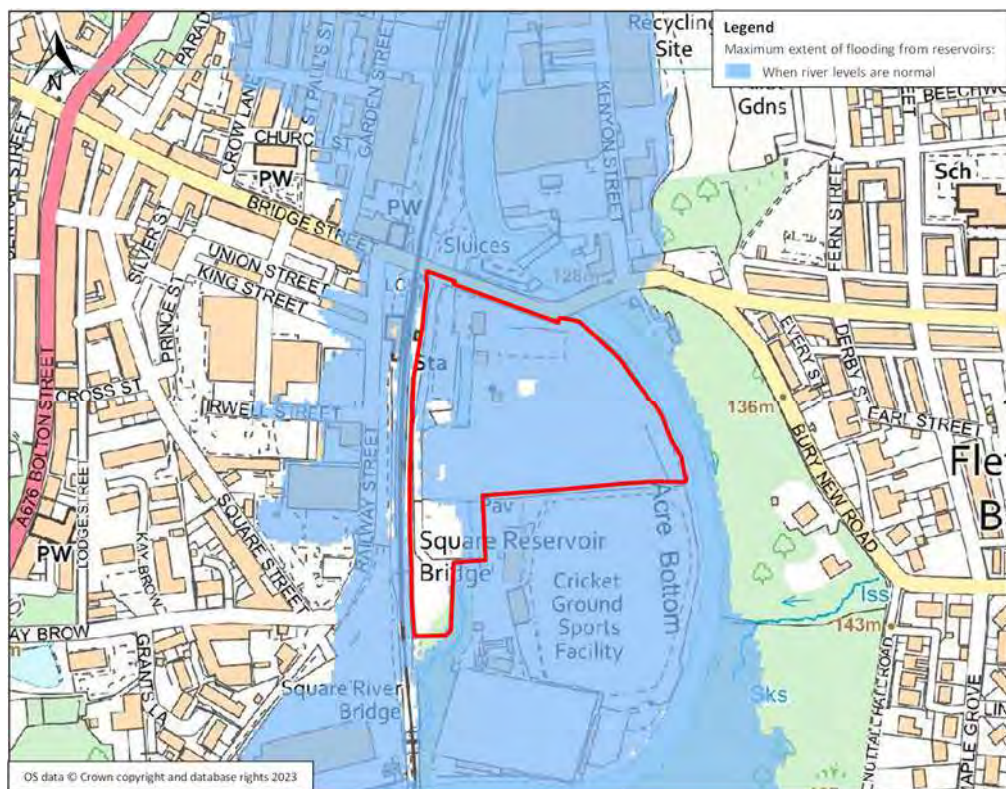


Figure 17: Flood Risk from Reservoirs

Source: gov.uk website; Accessed: July 2023

4.9 Flood Risk from Groundwater

According to the BGS Groundwater Flooding Hazard map (**Figure 18**) 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. The

presence of the mill race and the River Irwell on/adjacent to the site would also limit the degree to which groundwater levels could rise before water is conveyed away from the site.

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.

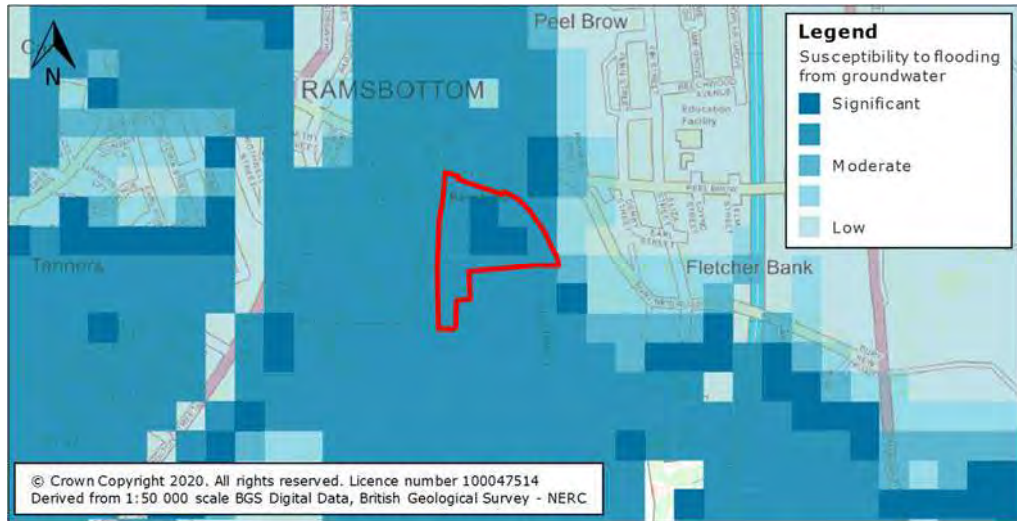


Figure 18: Groundwater Flooding Hazard Map
(Source: Findmaps)

5 FLOOD RISK MITIGATION MEASURES

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

5.1 Site Wide Flood Alleviation

To mitigate the risk of flooding to the site it is proposed to:

- Construct an approximately 30 m wide second stage channel along the eastern boundary of the site.
- Remove the existing boundary walls along the northern boundary of the site adjacent to the proposed car park. Levels within the car park will be designed to direct any floodwater entering the site via Bridge Street into the existing mill race.
- Upgrade the existing 600 mm diameter mill race culvert that crosses the site to a 2000 x 1200 mm box culvert.

The indicative levels and arrangement of the second stage channel, car park and mill race culvert are presented by **Figure 19**. It is noted that existing ground levels should be retained in the location of the United Utilities manholes within the second stage channel.

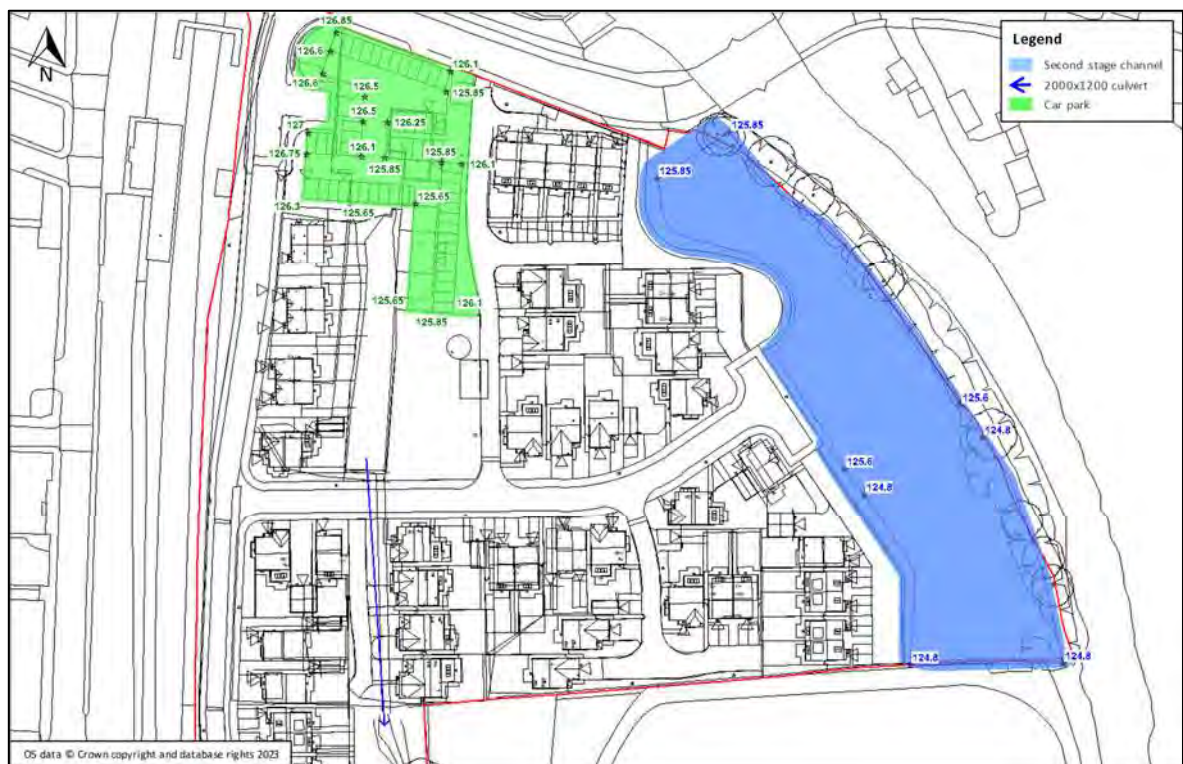


Figure 19: Flood Alleviation Measures

5.2 Development Platform and Finished Floor Levels

It is proposed to raise the residential development platform above peak flood levels in the 0.1% AEP event and to raise finished floor levels above peak flood levels in the 1.0% climate change AEP event, assuming that the existing wall along the northern edge of Bridge Street has collapsed (see Section 5.3 below).

The modelled development platform and finished floor levels are presented by **Figure 20**. However, proposed ground and finished floor levels should be confirmed at the discharge of condition stage following the proposed highway and external works design. The site specific hydraulic model should be used to confirm that proposed ground and finished floor levels satisfy the above requirements.

Raising the development platform and finished floor levels would mitigate the residual risk of flooding associated with a blockage of Peel Bridge because floodwaters overtopping Bridge Street are heavily influenced by the weir located directly upstream. Flood levels on Bridge Street are up to 0.95 m higher than in-channel flood levels directly upstream of Peel Bridge in a 1.0% climate change AEP event.

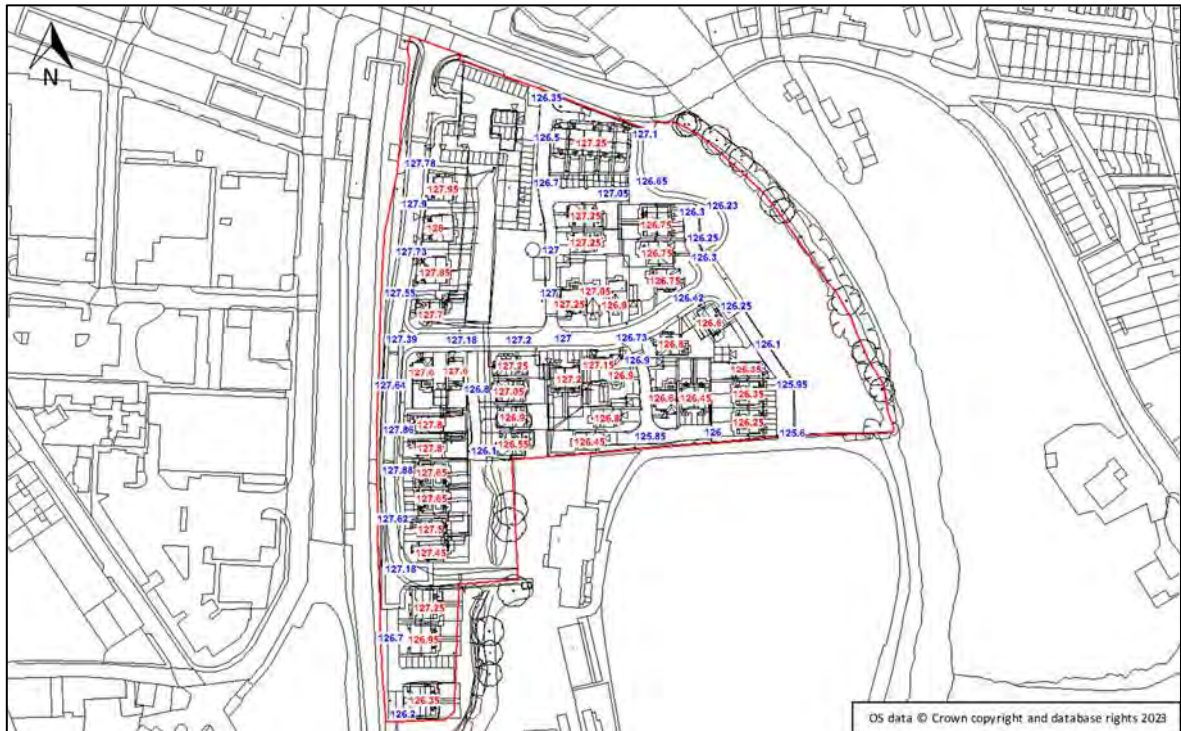


Figure 20: Modelled Development Platform and Finished Floor Levels

5.3 Proposed Scenario Flood Risk Modelling (Fluvial)

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

Model output plots are provided in **Appendix I** and indicate that flooding of the residential development platform would only occur in the 1.0% climate change AEP event when the wall along the northern edge of Bridge Street collapses. Modelled flood depths across the residential development platform are generally shown to be less than 0.25 m and the residential dwellings are shown to remain dry.

Flooding of Bridge Street in the location of the site access is also shown to occur, but flood depths are generally less than 0.15 m and the flood hazard rating when turning left onto Bridge Street is low (refer to **Appendix J**). As such, safe access and egress routes onto site are available.

Flooding of the proposed car park occurs in the 1.0% climate change AEP event, with flood depths indicated to be a maximum of approximately 0.50 m. The flood hazard rating within the car park is shown to range from low to significant and closure of the car park should therefore be considered if a flood warning is issued.

5.4 Managing Other Sources of Flood Risk

The proposed flood mitigation measures have been specifically designed to mitigate the risk of fluvial flooding at the site. However, the design of the proposed car park, upgrade of the mill race culvert and raising development platform levels would also mitigate the risk of surface water flooding at the site that results from off-site flows. The risk of surface water flooding from rain falling directly onto the site would be mitigated through implementation of the proposed surface water drainage strategy (refer to **Section 6**).

Creation of the second stage channel, which is lower than the proposed residential development platform, would also mitigate the risk of flooding at the site from the combined sewer and groundwater flooding on the development platform.

5.5 Flood Risk Elsewhere

The baseline and proposed scenario hydraulic model results have been used to assess the changes in modelled flood depth that result from the proposed development in the 3.3%, 1.0% and 1.0% climate change AEP events, as illustrated by the model outputs plots provided in **Appendix K**.

The proposed development is generally shown to have a negligible impact on flood risk elsewhere, with a small area of increased flood depths observed adjacent to the south-east corner of the site on the cricket ground. However, flood depths to the south of the site are more generally shown to reduce in the 1.0% climate change AEP event.

Flood depths along the southern edge of Bridge Street directly adjacent to the site are also shown to increase in the 1.0% climate change AEP event. However, the increases in modelled flood depth primarily result from a reduction in site levels that extend onto Bridge Street as a result of the hydraulic model cell size (4.0 m).

The model output plot provided in **Appendix L** presents the changes in modelled flood level on Bridge Street that result from the proposed development in the 1.0% climate change AEP event. The results indicate that flood levels generally reduce, with minor increases predicted to occur within two cells spanning the site boundary and a small portion of a third cell, thereby demonstrating that the proposed development would not increase the risk of flooding on Bridge Street.

Finally, United Utilities has confirmed by way of an email dated 9 October 2023 (refer **Appendix M**) that the additional foul loading associated with the proposed development would result in *“no deterioration to the flood risk of any nodes / manholes that are hydraulically connected to the development flow conveyance sewers”* and that *“there is no threat of flooding to the new properties given the respective predicted Top Water Levels (TWL) in the new foul sewers and the FFL of the properties within the development site”*. As such, the proposed development would not increase the risk of flooding from the existing combined sewer.

6 SURFACE WATER MANAGEMENT

6.1 Surface Water Drainage at the Existing Site

Gullies are present along the existing access road, indicating that approximately 0.187 ha of the existing site is served by a formal surface water drainage system. The drainage system is ultimately expected to outfall to the River Irwell.

An additional 2.087 ha of the site is shown to comprise areas of hardstanding and is believed to have been served by a formal surface water drainage system prior to demolition of the Mondi/Holcombe Paper Mill. Surface water runoff generated across the areas of hardstanding would now be expected to flow overland into the River Irwell.

The remaining 0.580 ha of the site comprises areas of short grass and woodland.

The greenfield runoff rates for the undeveloped parts of the site have been calculated using the ICP SUDS method within MicroDrainage, and runoff rates from the existing impermeable areas have been calculated using the Modified Rational Method. The calculated runoff rates are presented in **Table 3** and details of the input parameters and the output results are provided in **Appendix N** and **Appendix O** respectively.

Table 3: Peak Runoff Rate - Existing Site

Rainfall Event (AEP)	Permeable Runoff Rate 0.580 ha (l/s)	Impermeable Runoff Rate 2.274 ha (l/s)	Total (l/s)
100%	5.6	203.5	209.1
50%	6.0	263.3	269.3
3.3%	11.0	497.8	508.8
1.0%	13.4	640.3	653.7

6.1 Surface Water Drainage at the Redeveloped Site

6.1.1 Disposal of Surface Water

In accordance with the NPPG⁸, surface water runoff should be disposed of according to the following hierarchy: Into the ground (infiltration); To a surface water body; To a surface water sewer, highway drain, or another drainage system; To a combined sewer.

The disposal of surface water by infiltration is not considered to be feasible at the site given the presence of made ground and anticipated contamination. As such, it is proposed to discharge surface water to the existing mill race, which ultimately discharges to the River Irwell.

6.1.2 Post Development Impermeable Area

The area of impermeable surfaces at the redeveloped site has been calculated to be 1.425 ha based upon the proposed site layout. This is a 0.849 ha reduction in impermeable surfaces compared to the existing site and would result in a significant reduction in the volume of surface water being discharged from the site.

6.1.3 Peak Flow Control

It is proposed to restrict the maximum rate at which surface water is discharged from the developed site to 142.5 l/s. This represents a 30% reduction in the peak runoff rate from the existing impermeable surfaces during the 100% AEP rainfall event.

The modelled surface water discharge rates from the redeveloped site for a range of annual probability events are presented in **Table 4**. The proposals reduce the maximum rate at which surface water leaves the site by a minimum of 58.5% in the 50% AEP event and a maximum of 78.3% in the 1.0% AEP event, even when

⁸ Paragraph 080, Reference ID: 7-080-20150323

considering a 45% increase in rainfall intensity in order to allow for climate change in accordance with Environment Agency guidance⁹.

Table 4: Peak Discharge Rate – Redeveloped Site

Rainfall Event (AEP)	Discharge Rate (l/s)	Reduction (%)
100%	Cannot be assessed using FEH13 rainfall data	
50%	111.7	58.5
3.3% (+40% climate change)	142.1	72.1
1.0% (+45% climate change)	142.1	78.3

6.1.4 Attenuation Storage

Attenuation storage for the proposed residential development will be provided within the proposed pipe network, and a geocellular tank will be provided to attenuate surface water runoff from the proposed car park. The preliminary surface water drainage layout is provided in **Appendix P**.

The proposed surface water drainage network has been modelled using MicroDrainage and has been designed to manage the 1.0% AEP rainfall event +45% climate change below ground (**Appendix Q**).

6.1.5 Exceedance Routes

Flows resulting from rainfall in excess of the 1.0% AEP rainfall event +45% climate change will be managed in exceedance routes, as illustrated by **Appendix R**. Flood flows will be directed towards carriageways, away from built development and ultimately to the River Irwell.

6.1.6 Pollution Control

Water quality treatment will be provided by discharging surface water to the existing mill race located at the site. The mill race will effectively function as a swale because it no longer receives flows from the River Irwell.

Additional SuDS features, such as permeable paving across the car park parking bays and residential driveways may be incorporated into the surface water drainage strategy at the detailed design stage to provide additional water quality treatment.

6.1.7 Adoption and Maintenance of SuDS

The pipe network, designed in accordance with the Water UK Design and Construction Guidance document (May 2021), may be adopted by the sewerage undertaker. An indicative maintenance schedule is presented in **Table 5**.

⁹ Flood Risk Assessments: climate change allowances (<https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>)

Table 5: Maintenance Requirements

Schedule	Required action	Frequency
Mill Race		
Regular maintenance	Remove litter and debris	Monthly, or as required
	Manage vegetation and remove nuisance plants	As required
	Inspect inlets and outlets for blockages, and clear if required	Monthly
Remedial actions	Repair erosion or other damage	As required
	Remove and dispose of oil or petrol residues using safe standard practices	As required
	Remove build-up of sediment	As required
Permeable Paving		
Regular maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations.
Occasional maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds or management using glyphosphate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the level of the paving	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material	
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth- if required, take remedial action	Three-monthly, 48h after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies accumulation rates and establish appropriate removal frequencies	Annually
	Monitor inspection chambers	

7 FOUL WATER MANAGEMENT

7.1 Existing Assets

The United Utilities public sewer record (**Appendix G**) indicates that the following wastewater assets are present at the site:

- 900 / 1000 mm diameter combined water sewer located along the eastern boundary of the site, directly adjacent to the River Irwell
- 300 mm diameter combined water sewer located in the eastern corner of the site, connecting to the 900 / 1000 mm diameter sewer along the sites eastern boundary
- 1000 mm diameter combined water sewer crossing the southern half of the site.

A survey of the existing drainage infrastructure at the site (**Appendix H**) confirms that the site previously discharged to the 900 / 1000 mm diameter combined water sewer at manhole MH4601 via the 300 mm diameter combined water sewer.

It is estimated that the foul discharge rate from the former Mondi/Holcombe Paper Mill was 4.6 l/s based upon the Water UK Design and Construction Guidance document. However, the total discharge to the combined sewer is expected to have been higher given the likely presence of additional surface water connections.

7.2 New Connections

Under the Water Industry Act (1991), developers have a right to connect foul water flows from new developments to the public sewer network. The Act places a general duty on sewerage undertakers to provide the additional capacity that may be required to accommodate additional flows and loads arising from new domestic development.

United Utilities has advised by way of a Pre Development Enquiry email dated 10 June 2021 that foul flows from the site will be allowed to discharge to the public combined sewer at an unrestricted rate (**Appendix S**). The peak design flow rate from the site is calculated to be 2.6 l/s based upon the Water UK Design and Construction Guidance document.

It is noted that the lead local flood authority previously raised concerns that the proposed foul discharge from the site may exacerbate existing flooding issues associated with the public combined sewer network.

United Utilities has confirmed by way of an email dated 9 October 2023 (refer **Appendix M**) that the additional foul loading associated with the proposed development would result in *“no deterioration to the flood risk of any nodes / manholes that are hydraulically connected to the development flow conveyance sewers”* and that *“there is no threat of flooding to the new properties given the respective predicted Top Water Levels (TWL) in the new foul sewers and the FFL of the properties within the development site”*.

Based upon the above, the proposed development would not be expected to increase the risk of flooding from the public combined sewer network. The preliminary foul water drainage layout is provided in **Appendix P**.

8 SUMMARY AND RECOMMENDATIONS

This report has been prepared on behalf of Eccleston Homes to accompany a planning application for the proposed redevelopment of the former Mondi/Holcombe Mill located off Bridge Street, Ramsbottom for residential use.

The development proposals comprise the demolition of existing buildings (excluding the chimney), the erection of 57 residential dwellings with associated public open space, and the construction of a new car park to serve the local area.

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 3.3% 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 1.0% AEP event, with a maximum flood depth of approximately 1.1 m occurring in the south-east of the site in the 0.1% 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 and all other identified sources will be mitigated through the implementation of the following measures:

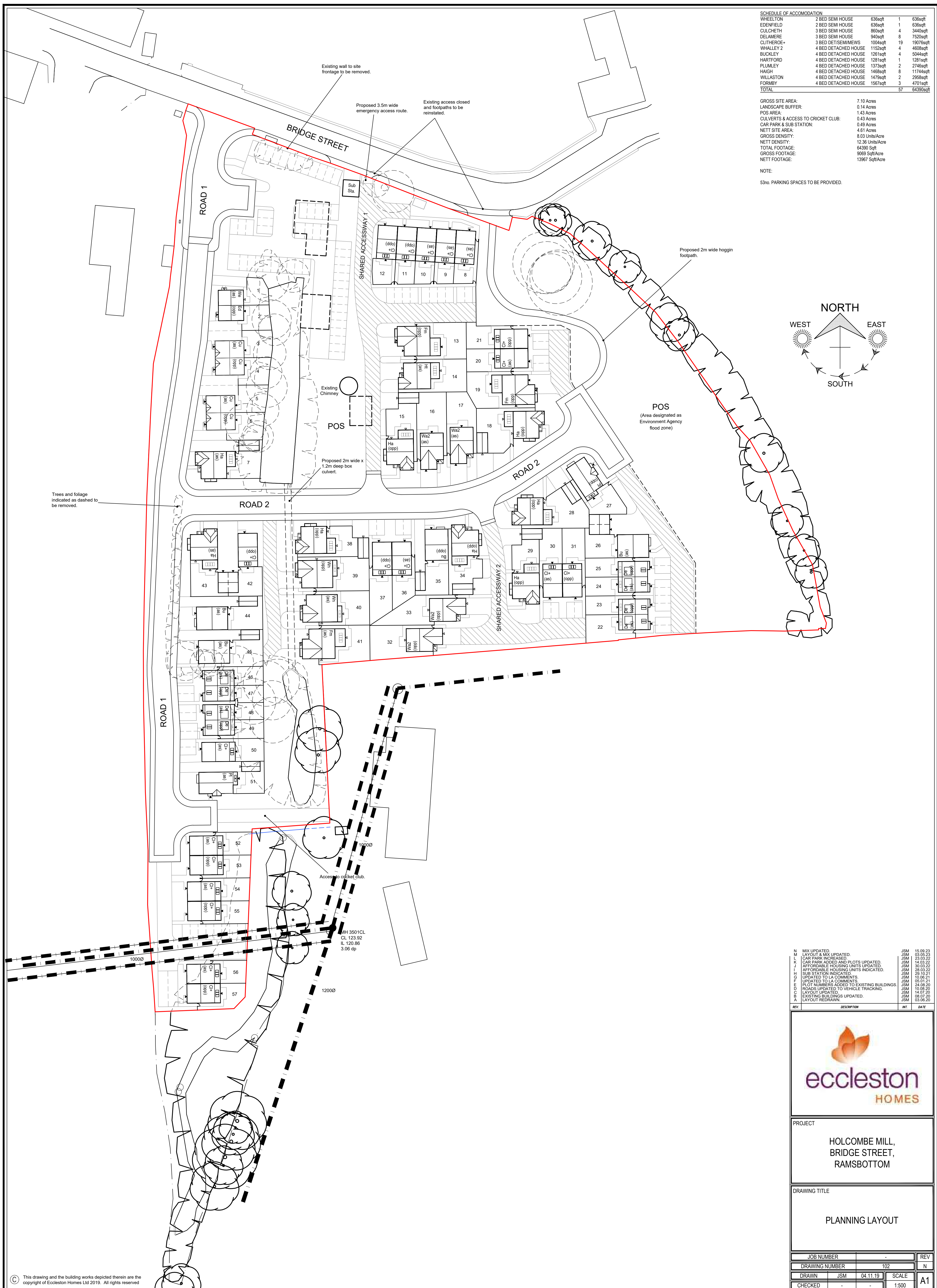
- 30 m wide second stage channel to be provided along the eastern boundary of the site;
- Remove existing boundary walls along the northern boundary of the site adjacent to the proposed car park;
- Design the car park levels to direct any floodwater entering the site via Bridge Street into the existing 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 0.1% AEP flood levels;
- Raise finished floor levels above the peak 1.0% climate change AEP flood levels assuming a collapse of the wall along the northern edge of Bridge Street (i.e. the wall failure scenario);
- Raise finished floor levels a minimum of 0.15 m above finished development platform levels;
- Construct an appropriately designed surface water drainage system.

The proposed development is generally shown to have a negligible impact on flood risk elsewhere, with small areas of increased flood depths observed adjacent to the south-east corner of the site. However, flood risk to the south of the site and on Bridge Street are more generally shown to reduce in the 1.0% climate change AEP event.

Surface water runoff from the redeveloped site can be sustainably managed in accordance with planning policy and the proposed development would not be expected to increase the risk of flooding from the public combined sewer network

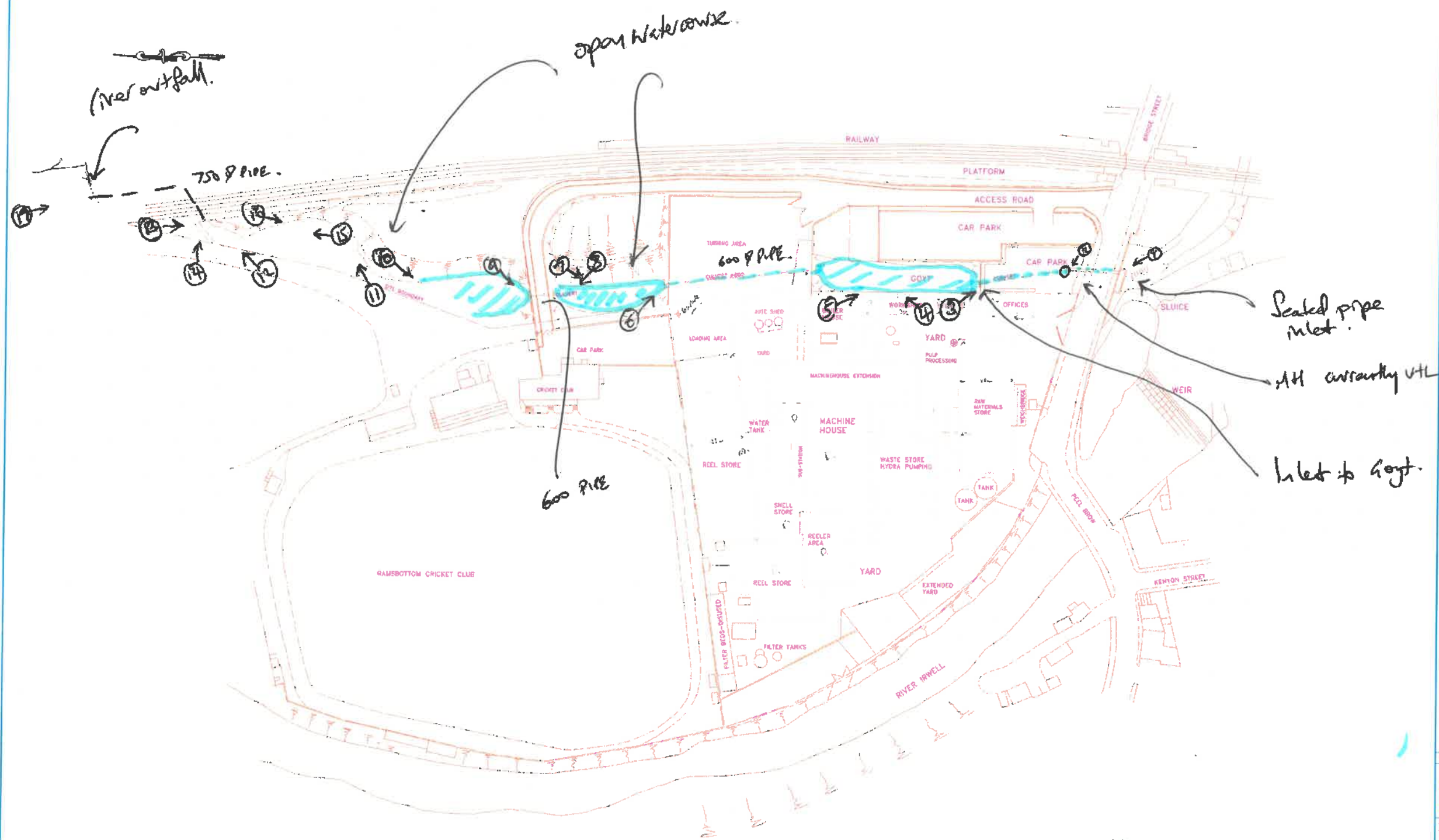
APPENDIX A

Proposed Site Plan



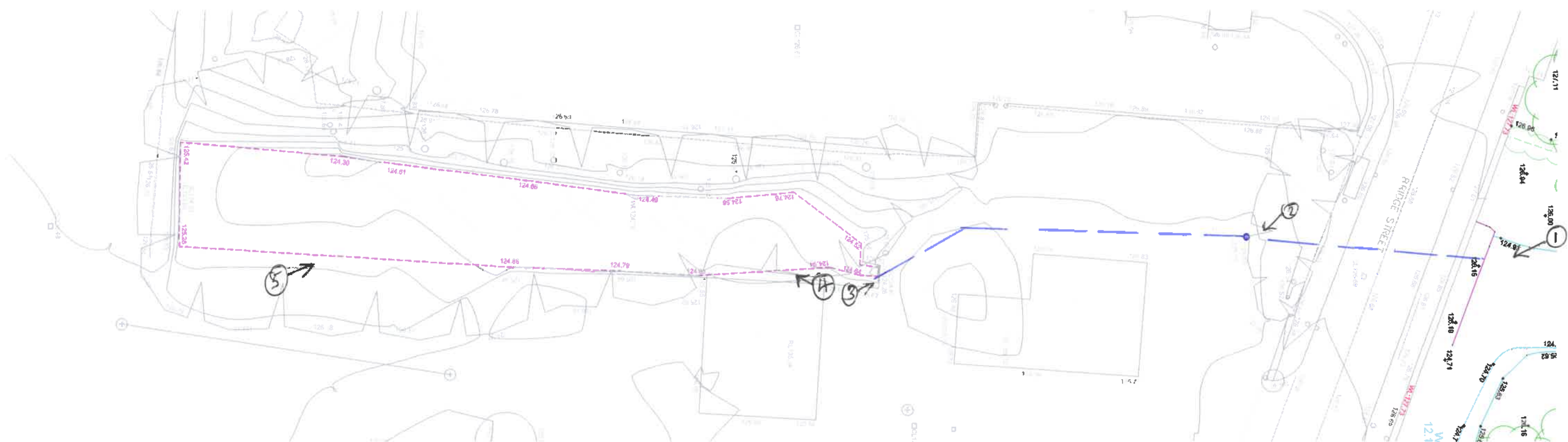
APPENDIX B

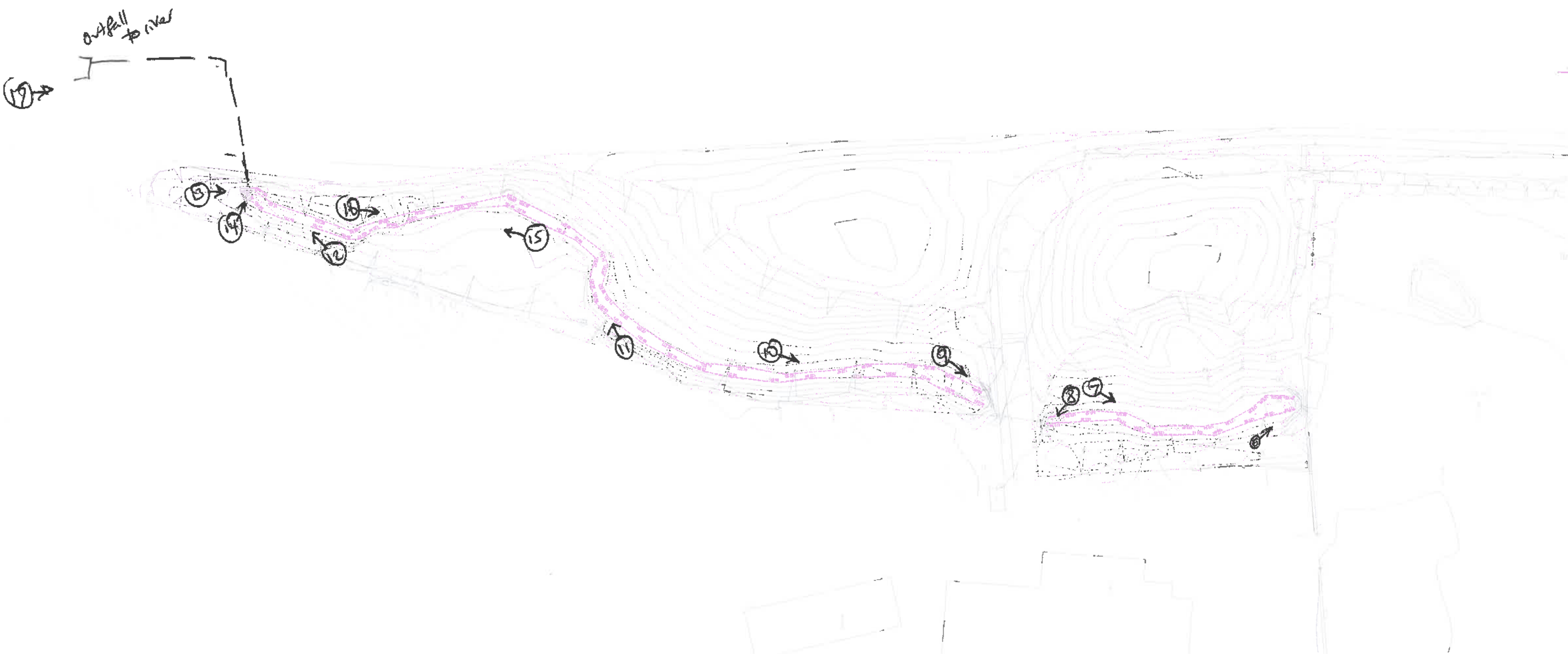
Walkover Survey of Mill Race and Stream



Photos.
 ①
 number d.
 location.

DANISCO PAPER LTD	
HOLCOMBE MILL	
RAMSBOTTOM	
1:500	
FEB 99	
LAYOUT OF MILL	
SITE SURVEY	
1000	
01	







1 – Blanked off pipe inlet



2 – MH on pipe



3 – inlet to Goyt lodge



4 – Goyt Lodge



5 – Goyt Lodge



6 – Pipe Outlet to stream



7 – Stream looking north towards 6



8 – Upstream Pipe / headwall beneath Cricket Club access road



9 – Downstream Pipe / headwall beneath Cricket Club access road



10 – Stream northwards towards 9



11 – Stream looking south



12 – Grill to pipe inlet beneath railway embankment



13 – Grill to pipe inlet beneath railway embankment



14 – Pipe inlet beneath railway embankment (taken through grill)



15 – stream looking south



16 – stream looking north



17 – Outfall to River Irwell

APPENDIX C

Topographical Survey

	Walls	BS	Bus Stop
	Drp Line / Canopy	BT	British Telecom
	Top of Bank	FI	Fire Hydrant
	Bottom of Bank	ST	Stop Sign
	Foghorn	WST	Stop Sign
	Hedge	WO	Wash Out
	Control	AV	Air Valve
	Tree	MER	Service Marker
	Vegetation	CTV	Cable TV
	Gate	GP	Gate Post
	EP	LP	Lamp Post
	TP	SP	Electricity Post
	IP	TP	Telegraph Post
	IC	TL	Traffic Light
	CL	RHP	Road Name Plate
	IS	BOL	Bollard
	G	STAY	Cable Stay
	KO	ESC	Electric Inspection Cover
	NI	GAS	Gas Inspection Cover
	BD	TB	Top of Bank
	RL	ROB	Bottom of Bank
	FFL	ERT	Earth not
	SOF	DK	Drop Kerb
	OE	OHE	Overhead Electric C
	CRF	OTB	Overhead 6T Cable
	PRF	FRP	Fence
	FWF	FWB	Flower Bed
	BWF	TWPT	Trial Pit
	PLF	P	Pole
	IR		
	CLF		
	PPF		

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 D

Truncated Model Accuracy Verification



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KEY:

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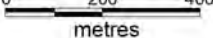
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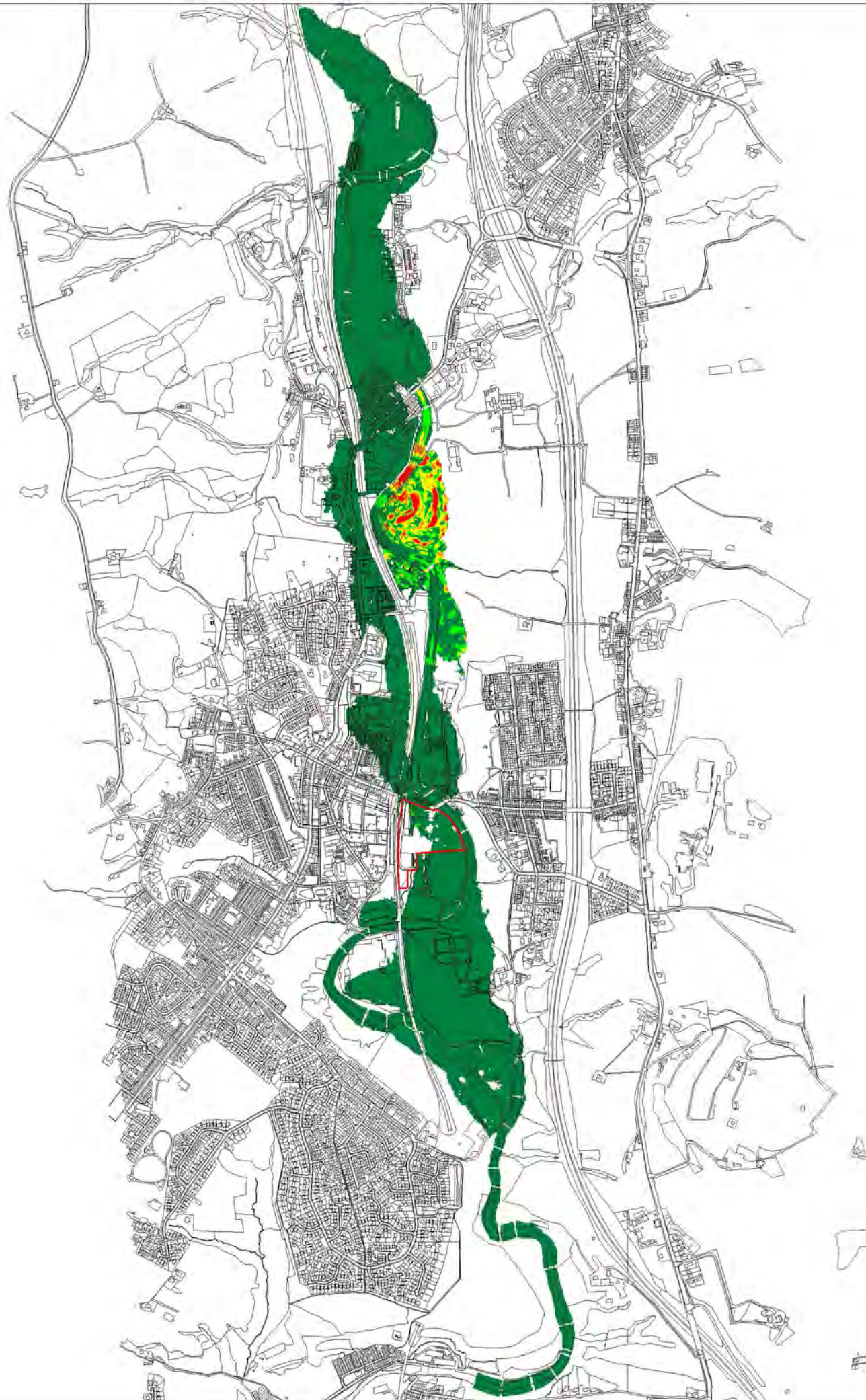
- < 0.005 m
- 0.005 - 0.010 m
- 0.010 - 0.020 m
- 0.020 - 0.030 m
- > 0.030 m

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:	Checked:	Date:	
JA	AE	20 January 2020	
Drawing No:			Rev:
4714_005-EA_Q0020_d			A



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- > 0.030 m

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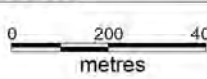
70 Cowcross Street
London
EC1M 6EJ

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

Client: **Eccleston Homes**

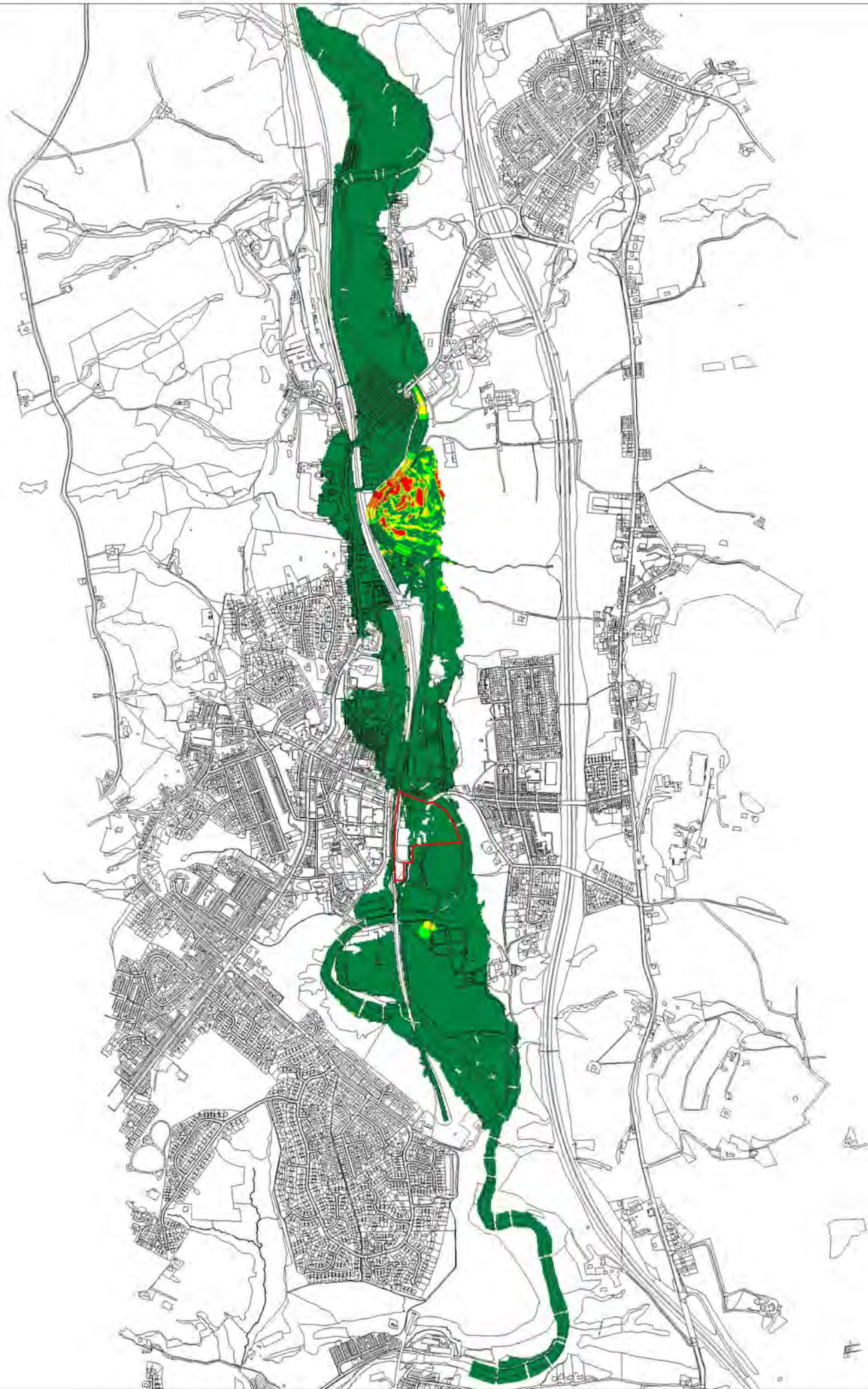
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Drawing Title: **Truncated Model Accuracy
1:100 AEP Event**

Map Orientation:  Scale 

Drawn: JA	Checked: AE	Date: 20 January 2020
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Drawing No: 4714_005-EA_Q0100_d	Rev: A
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0.020 - 0.030 m
> 0.030 m

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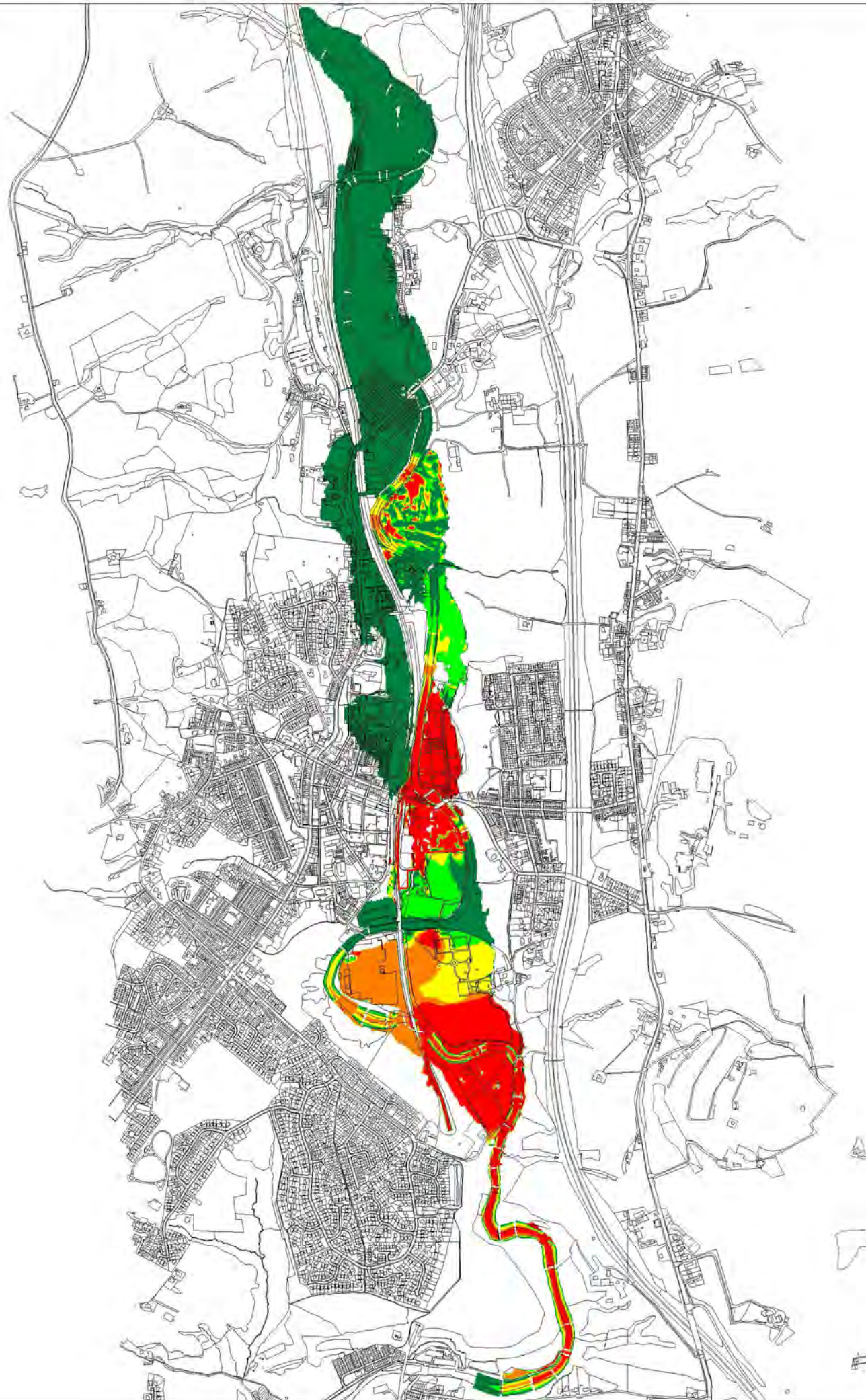
Project Title: **Holcombe Mill, Ramsbottom**

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

Map Orientation:		Scale	
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Drawn:	Checked:	Date:
JA	AE	20 January 2020

Drawing No:	Rev:
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- 0.010 - 0.020 m
- 0.020 - 0.030 m
- > 0.030 m

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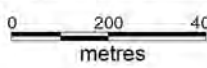
70 Cowcross Street
London
EC1M 6EJ

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

Client: **Eccleston Homes**

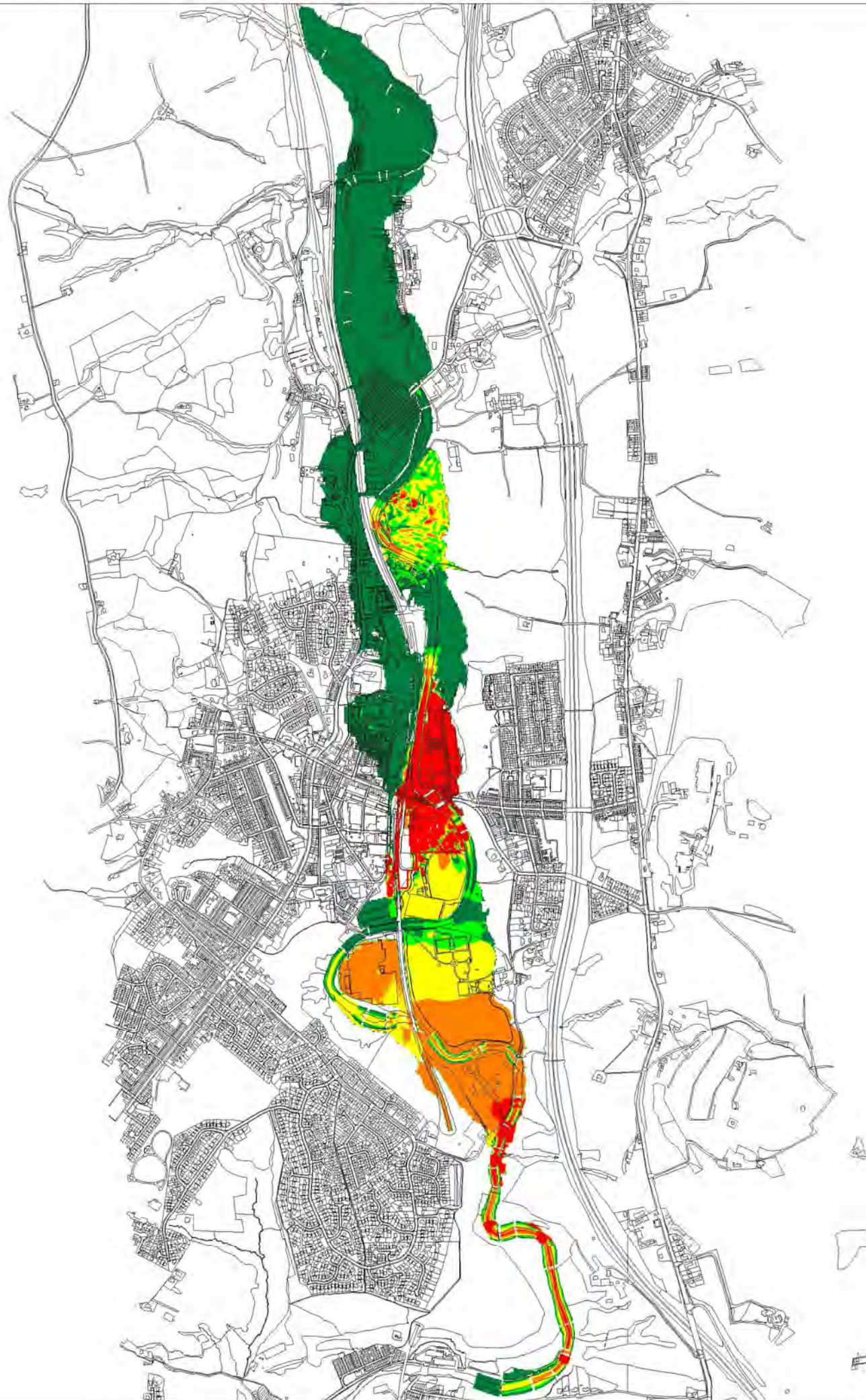
Project Title: **Holcombe Mill, Ramsbottom**

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

Map Orientation:  Scale: 

Drawn:	Checked:	Date:
JA	AE	20 January 2020

Drawing No:	Rev:
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Depth (metres)

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

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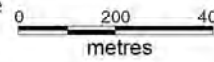
70 Cowcross Street
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EC1M 6EJ

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

Client:
Eccleston Homes

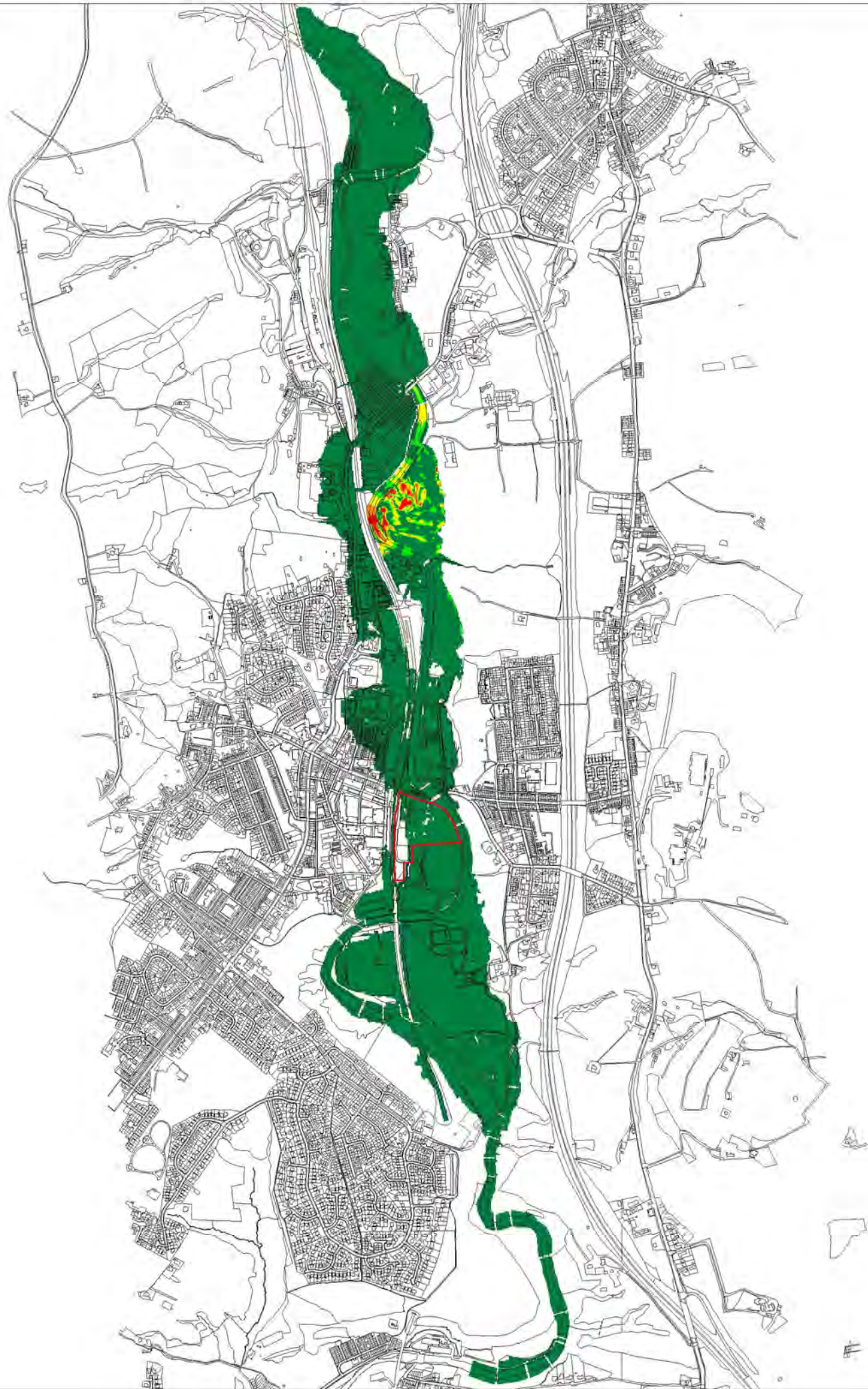
Project Title:
Holcombe Mill, Ramsbottom

Drawing Title:
**Truncated Model Accuracy
1:100 AEP (+70%) Event**

Map Orientation:  Scale 

Drawn: JA	Checked: AE	Date: 20 January 2020
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Drawing No: 4714_005-EA_Q0100CC70_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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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	
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Drawn:	Checked:	Date:
JA	AE	20 January 2020

Drawing No:	Rev:
4714_005-EA_Q1000_d	A

APPENDIX E

Environment Agency Correspondence

Bury Metropolitan Borough Council
Town Hall Knowsley Street
Bury
Lancashire
BL9 0SW

Our ref: SO/2020/120565/02-L01
Your ref: 65844
Date: 20 November 2020

Dear Sir/Madam

ERECTION OF 72 NO. DWELLINGS INCLUDING THE RETENTION AND CONVERSION OF 2 EXISTING BUILDINGS TO RESIDENTIAL USE (5 NO. UNITS), THE RETENTION OF A CHIMNEY AND THE DEMOLITION OF A DERELICT BUILDING, TOGETHER WITH ENGINEERING OPERATIONS TO CREATE A DEVELOPMENT PLATFORM AND ASSOCIATED PARKING, LANDSCAPING, DRAINAGE, THE LAYOUT OF INTERNAL ESTATE ROADS AND FOOTWAYS AND OTHER ASSOCIATED WORKS FORMER MONDI/HOLCOMBE MILL, BRIDGE STREET, RAMSBOTTOM, BURY, BL0 0BS

Thank you for consulting the Environment Agency on further details relating to the above application.

Environment Agency position

Further to our comments relating to this application (our ref: SO/2020/120565/01) we have now reviewed the detailed modelling files subsequently provided to us and used to support the FRA. Our reviewer has confirmed that the modelling is acceptable and fit for purpose. The model reviewer's spreadsheet of comments is attached for information.

Although the modelling is deemed acceptable the issues raised in our last response do still need to be clarified. We asked for some clarification regarding the slight variation in flood extents on the site in relation to the 1% AEP baseline event presented by the mapping in appendix D. Our modeller believes this may be related to updates to the baseline model in relation to levels along Bridge Street. We again recommend comment is made on this by the applicant's engineers to explain the differences.

The previous comments made in relation to safe access/egress from the site must also be clarified. We suggest that the velocities and hazards of flood water from the modelling be assessed against the "Flood Risks to People" - R&D Report FD2321/TR and Table 13.1 of FD2320. Access egress routes should be within the white cells of the table representing low hazard when assessed against the design flood including at least

Environment Agency
Richard Fairclough House Knutsford Road, Warrington, WA4 1HT.
Customer services line: 03708 506 506
www.gov.uk/environment-agency

Cont/d..

35% climate change allowance.

Overcoming our objection

The FRA should be revised to address the issues raised above and in our earlier response.

If this cannot be achieved, we are likely to maintain our objection. Please consult us on any revised FRA and we will respond within 21 days of receiving it.

Yours faithfully

Mrs SYLVIA WHITTINGHAM
Planning Advisor

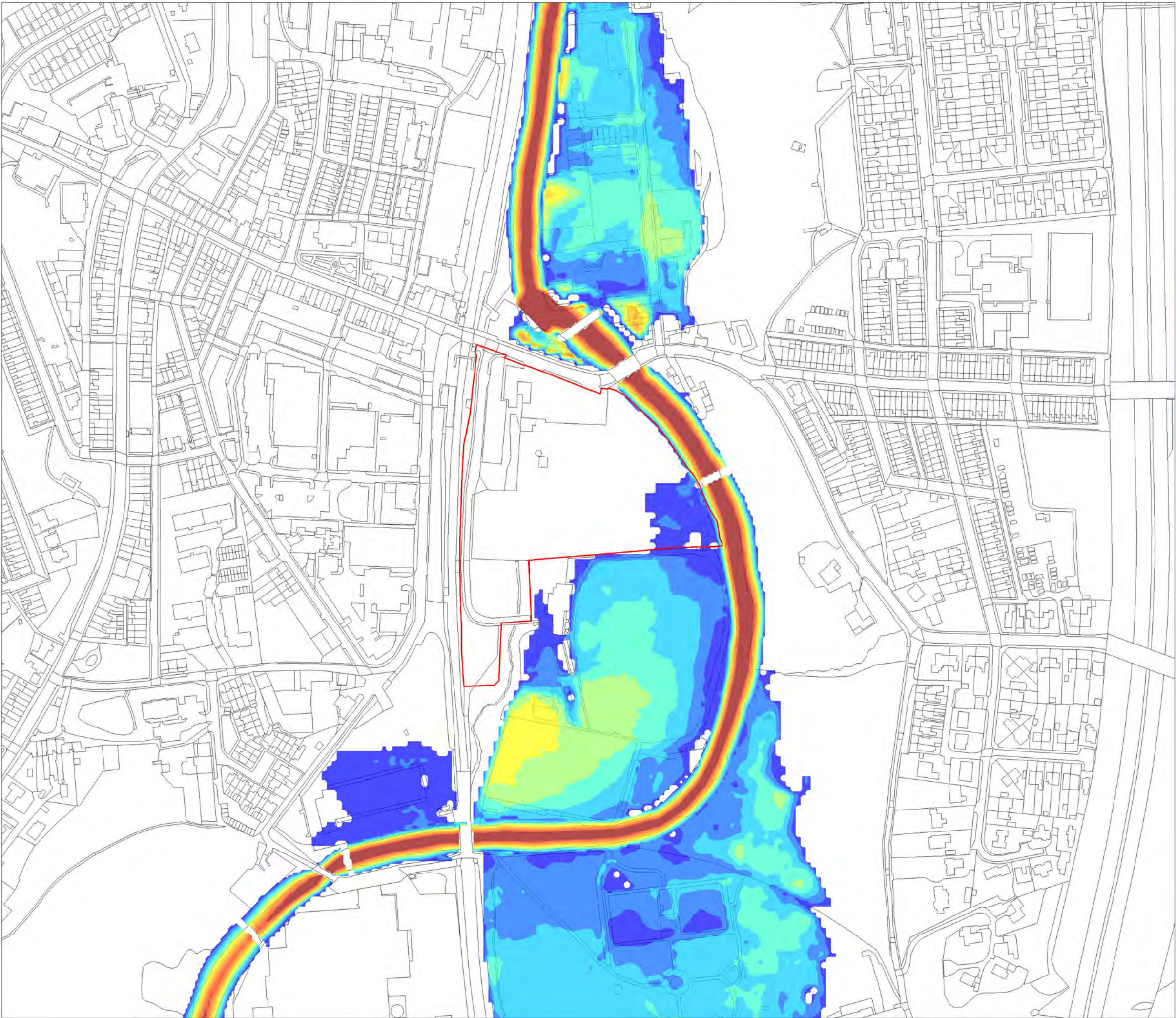
Direct dial 0203 0251059

Direct e-mail sylvia.whittingham@environment-agency.gov.uk

Spreadsheet attached

APPENDIX F

Model Output Plots – Baseline Scenario



Notes:

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KEY:

— Site Location

Depth (metres)

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- 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
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- 2.00 to 2.25
- 2.25 to 2.50
- > 2.50

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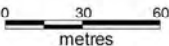
Park House
Ffordd Byrnwr Gwair
Mold
CH7 1FQ

Tel: 01352 700045
Email: info@weetwood.net

Client:
Eccleston Homes

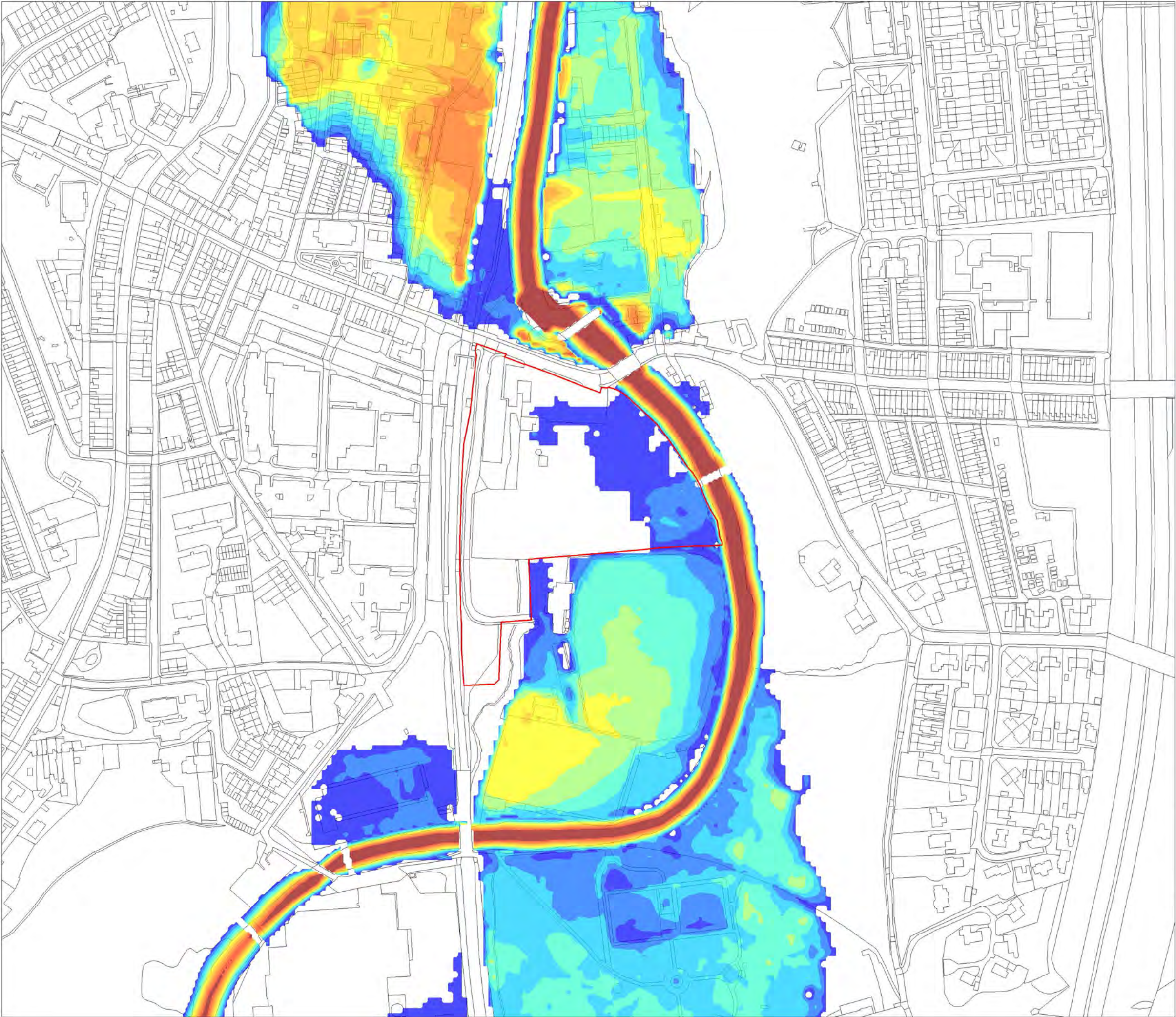
Project Title:
Holcombe Mill, Ramsbottom

Drawing Title:
**Baseline Scenario
3.3% AEP Event**

Map Orientation:  Scale: 

Drawn: JA	Checked: KT	Date: 11 October 2023
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Drawing No: 4714_026_Q0030_d	Rev: A
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- 0.25 to 0.50
- 0.50 to 0.75
- 0.75 to 1.00
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- 1.25 to 1.50
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- 2.00 to 2.25
- 2.25 to 2.50
- > 2.50

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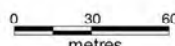
70 Cowcross Street
London
EC1M 6EJ

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

Client: **Eccleston Homes**

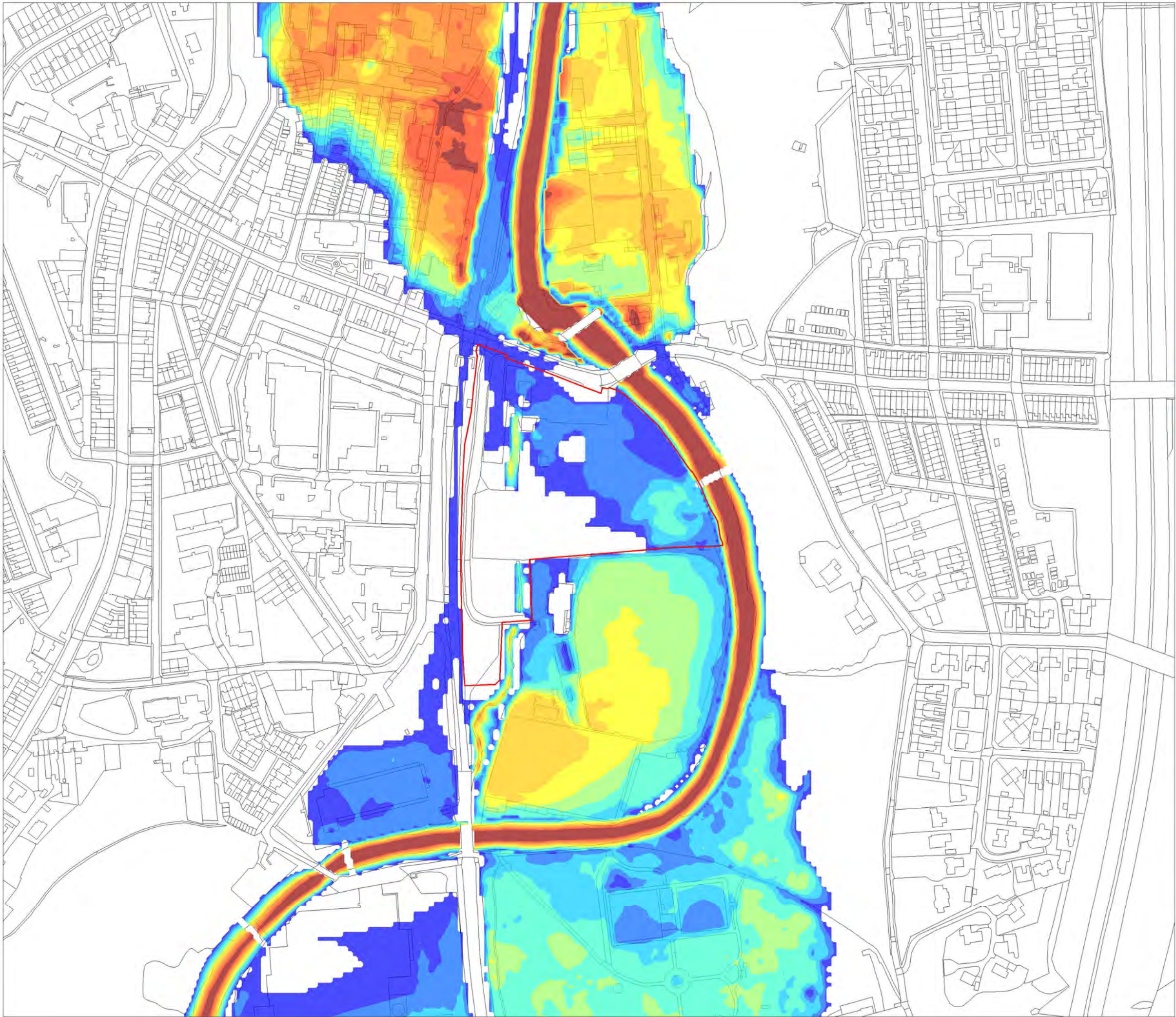
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Drawing Title: **Baseline Scenario
1.0% AEP Event**

Map Orientation:  Scale: 

Drawn: JA Checked: KT Date: 14 July 2020

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
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- 2.00 to 2.25
- 2.25 to 2.50
- > 2.50

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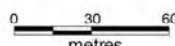
70 Cowcross Street
London
EC1M 6EJ

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

Client: **Eccleston Homes**

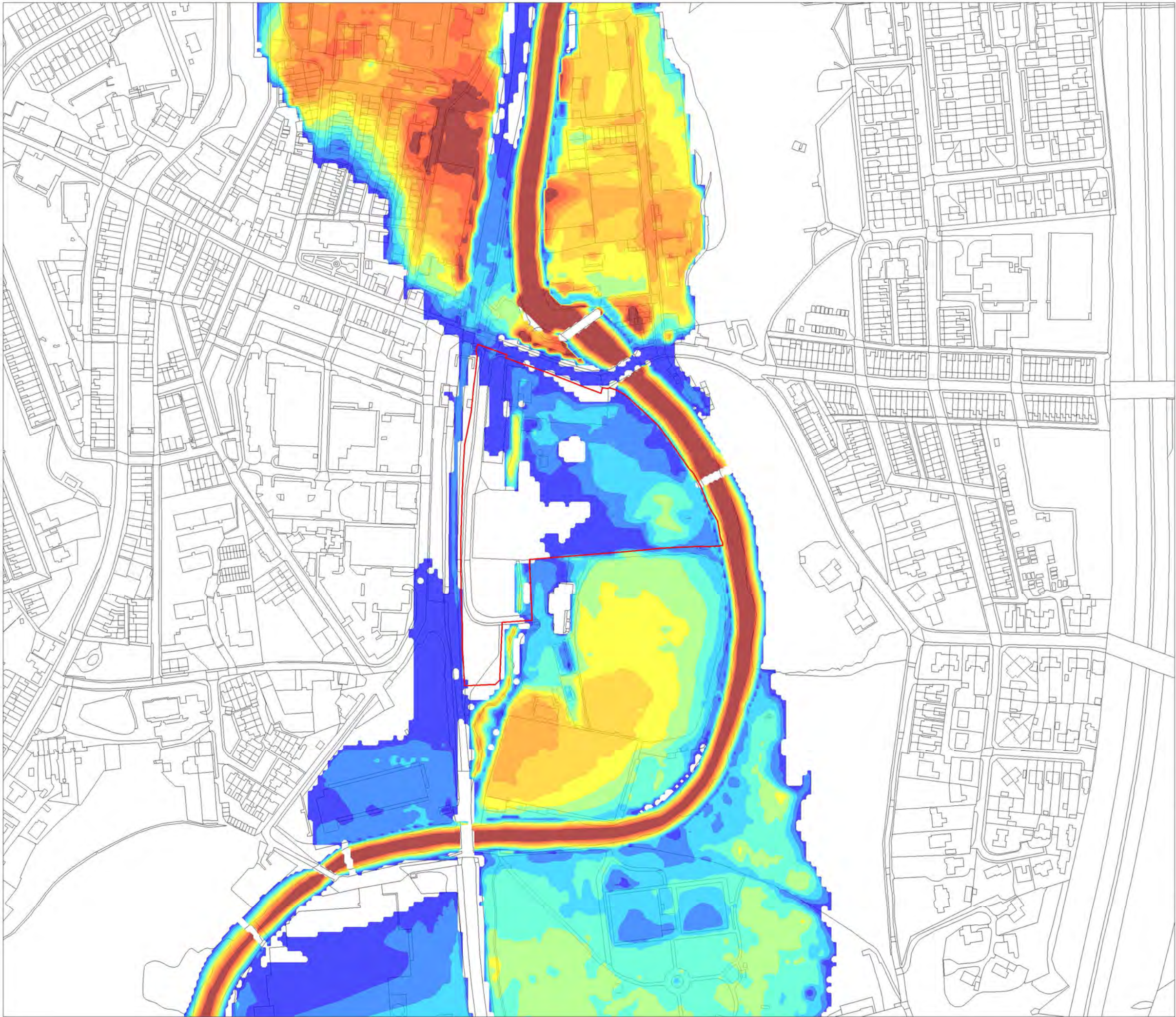
Project Title: **Holcombe Mill, Ramsbottom**

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

Map Orientation:  Scale: 

Drawn: JA	Checked: KT	Date: 14 July 2020
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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
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 - > 2.50

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Development • Planning • Environment

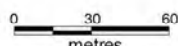
70 Cowcross Street
London
EC1M 6EJ

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

Client: **Eccleston Homes**

Project Title: **Holcombe Mill, Ramsbottom**

Drawing Title: **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
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APPENDIX G

Public Sewer Record