

# **FLOOD RISK ASSESSMENT**

**for**

**RILEY AND SON (E) LIMITED**

**ERECTION OF REPLACEMENT EMPLOYMENT UNIT AND  
EXTENSION TO EXISTING EMPLOYMENT UNIT**

**at**

**UNIT 3, IRWELL INDUSTRIAL ESTATE  
LOWER WOODHILL ROAD, BURY, BL8 1AR**

**DECEMBER 2025**

**REFORD**

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# 1. INTRODUCTION

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- 1.1 This flood risk assessment has been produced on behalf of Riley and Son (E) Limited in support of a planning application for the erection of a replacement employment unit and an extension to an existing employment unit with associated parking changes at the existing Riley Locomotive Engine Works site at Unit 3, Irwell Industrial Estate, Lower Woodhill Road, Bury. A location plan is included within Appendix A.
- 1.2 The Flood Risk Assessment (FRA) is compliant with the requirements set out in the National Planning Policy Framework (NPPF) and the Planning Practice Guidance (NPPG) in relation to Flood Risk and Coastal Change, and describes the existing site conditions and proposed development. It assesses the potential sources of flooding to the site from tidal, fluvial, groundwater, surface water and other sources, taking a risk based approach in accordance with National Policy.

## Site summary

|                                  |                                           |
|----------------------------------|-------------------------------------------|
| Site Name                        | Unit 3, Irwell Industrial Estate          |
| Location                         | Lower Woodhill Road, Bury, BL8 1AR        |
| NGR (approx.)                    | SD798112                                  |
| Application site area            | Approx. 0.9ha                             |
| Development type                 | Employment                                |
| Vulnerability                    | Less Vulnerable                           |
| Environment Agency flood mapping | Flood Zone 3. Access within Flood Zone 2. |
| Local Planning Authority         | Bury Metropolitan Borough Council         |

## 2. DESCRIPTION OF THE SITE

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### Existing site

- 2.1 The site is located within the land area of the established Riley Locomotive Engine Works site located at the eastern end of Lower Woodhill Road off Crostons Road to the northwest of Bury town centre.
- 2.2 The development site comprises the existing employment buildings, yard area and access, which is taken from Lower Woodhill Road.
- 2.3 The site lies within the confluence of the River Irwell that lies along the site's eastern / south eastern boundary and flows south, and the Woodhill Brook that lies along the site's western boundary and flows south. The Woodhill Brook is partly culverted midway along the site's western boundary. Both the River Irwell and the Woodhill Brook are classified as 'Main River'.

### Proposed development

- 2.4 The proposal is for the following:
- The erection of a replacement building of footprint 869m<sup>2</sup>, to form an improved workshop and repair building for engines and rolling stock following the demolition of the three smaller buildings on the southern side of the site, which have a total footprint 632m<sup>2</sup>.
  - An extension to the existing brick frontage element of the unit on the northern part of the site that includes ground floor storage, staff welfare accommodation and first floor ancillary office and administration space. The footprint of the extension is 160m<sup>2</sup>.
  - Enhancement of the operational space around the new buildings to include the relocation of staff parking to the hardstanding area along the site access road.
- 2.5 Access to the site will be maintained from Lower Woodhill Road.

### 3. SCOPE OF THE ASSESSMENT

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#### **Flood risk planning policy**

- 3.1 The National Planning Policy Framework (NPPF) sets out the Government's national policies on different aspects of land use planning in England in relation to flood risk. Supporting Planning Practice Guidance is also available.
- 3.2 The NPPF sets out the vulnerability to flooding of different land uses. It encourages development to be located away from areas at highest risk (whether existing or future), and states that where development is necessary in such areas, the development should be made safe for its lifetime. It also stresses the importance of preventing increases in flood risk offsite to the wider catchment area.
- 3.3 The NPPF also states that alternative sources of flooding, other than fluvial (river flooding), should also be considered when preparing a Flood Risk Assessment.
- 3.4 As set out in the NPPF, local planning authorities should only consider development in flood risk areas appropriate where informed by a site specific Flood Risk Assessment. This document will identify and assess the risk associated with all forms of flooding to and from the development. Where necessary it will demonstrate how these flood risks will be managed so that the development remains safe throughout its lifetime, taking climate change into account.
- 3.5 This Flood Risk Assessment is written in accordance with the NPPF and the Planning Practice Guidance in relation to Flood Risk and Coastal Change.

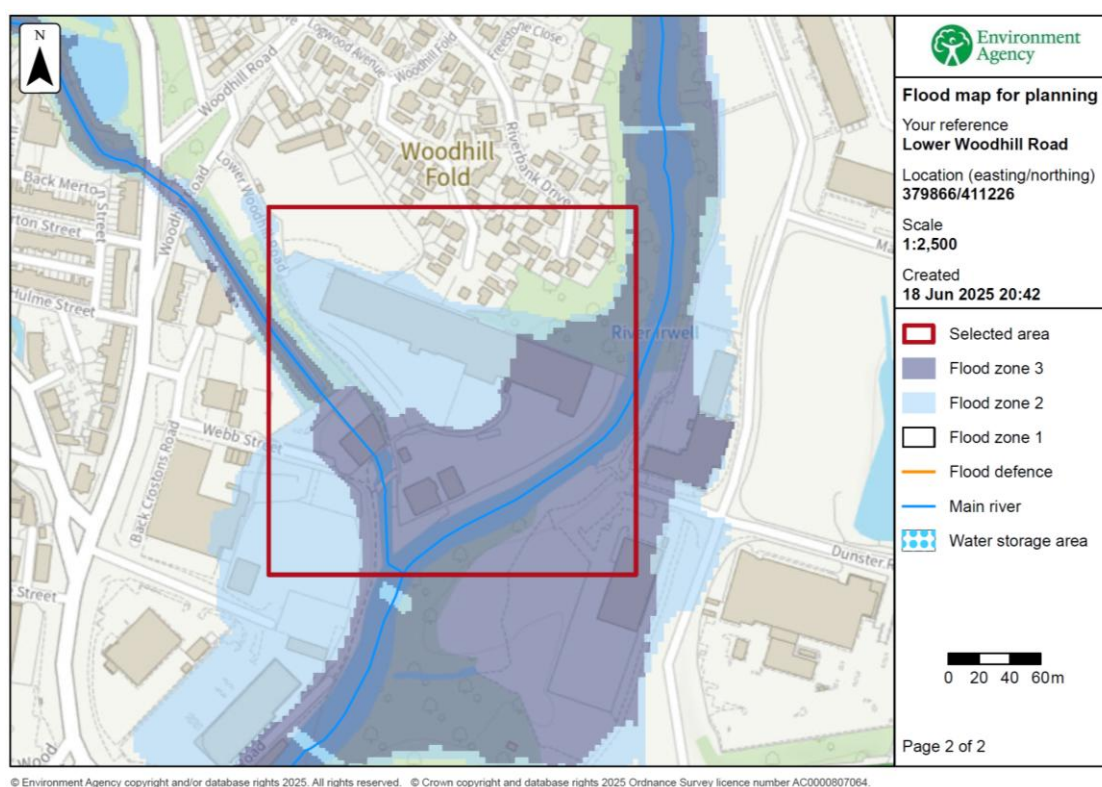
#### **Flood zones**

- 3.6 In investigating the flood risk relating to the site, the Environment Agency flood mapping has been reviewed and has confirmed that the site lies within Flood Zone 3 with the access lying within Flood Zone 2.
- 3.7 Flood Zone 3 is identified as land assessed as having a high probability of flooding, that is in any year, land that has a 1% or more chance of flooding from rivers or a 0.5% or more chance of flooding from the sea. Areas within Flood Zone 2 have between a 0.1%

and 1% probability of flooding from rivers or between a 0.1% and 0.5% probability of flooding from the sea in any given year. The flood zones categorisation refers to the probability of river and sea flooding, ignoring the presence of defences.

3.8 The main risk of flooding is fluvial. There is no tidal flood risk to the site.

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



## Strategic Flood Risk Assessment

3.10 The site is within the area covered by the Level 1 Strategic Flood Risk Assessment for Greater Manchester – Update, Final Report, March 2019, by Jeremy Benn Associates Limited (JBA).

## 4. CONSULTATIONS AND DATA ACQUISITIONS

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### Environment Agency

- 4.1 The Environment Agency flood mapping identifies the site lies within Flood Zone 3 with the access lying within Flood Zone 2. The flood risk is fluvial. There is no tidal flood risk to the site.
- 4.2 Modelled flood levels have been obtained from the Environment Agency and are included within Appendix B. Information was provided from the Kirklees Brook 2008 and Mid Irwell 2017 models. The Kirklees Brook information is for the Woodhill Brook.
- 4.3 The information gave the following modelled flood levels for the relevant node points within the River Irwell and the Woodhill Brook as follows.

| <u>Return Period</u> | <u>Mid Irwell 2017</u> |                   |                 |                   |
|----------------------|------------------------|-------------------|-----------------|-------------------|
|                      | <u>Node 9</u>          |                   | <u>Node 10</u>  |                   |
|                      | <u>Defended</u>        | <u>Undefended</u> | <u>Defended</u> | <u>Undefended</u> |
| 1% AEP               | 80.42m AOD             | 80.50m AOD        | 80.14m AOD      | 80.47m AOD        |
| 1% AEP (+35%)        | 80.94m AOD             |                   | 80.98m AOD      |                   |

| <u>Return Period</u> | <u>Kirklees Brook 2008</u> |                   |                   |
|----------------------|----------------------------|-------------------|-------------------|
|                      | <u>Node 6</u>              | <u>Node 7</u>     | <u>Node 8</u>     |
|                      | <u>Undefended</u>          | <u>Undefended</u> | <u>Undefended</u> |
| 1% AEP               | 81.40m AOD                 | 80.53m AOD        | 80.48m AOD        |
| 1% AEP (+35%)        | 83.23m AOD                 | 83.15m AOD        | 83.15m AOD        |
| 0.1%                 | 83.30m AOD                 | 83.15m AOD        | 83.15m AOD        |

- 4.4 The Environment Agency spatial flood defence database indicates that flood defences are present along the banks of the River Irwell and Woodhill Brook. An extract from the database is below.



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

#### **Site Investigation**

- 4.6 Site investigations have not been carried out on the site. The Soilsmap Viewer has identified that the geology encountered will be freely draining slightly acid loamy soils.

#### **Topographical survey**

- 4.7 A topographical survey has been carried out for the site. The ground levels across the site range between 78.0m AOD and 80.0m AOD with the lowest point within the site being midway along the site's eastern / south eastern boundary.
- 4.8 The existing three smaller buildings on the southern side of the site that are to be demolished have floor levels of 79.60m AOD, 79.80m AOD and 79.85m AOD.
- 4.9 The survey is included within Appendix C.

## 5. SOURCES OF FLOOD RISK

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### Potential Sources of Flood Risk

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

#### *Tidal and fluvial flooding*

- 5.2 The Environment Agency flood mapping identifies the site lies within Flood Zone 3 with the access lying within Flood Zone 2.
- 5.3 Modelled flood levels have been obtained from the Environment Agency. Information was provided from the Kirklees Brook 2008 and Mid Irwell 2017 models.
- 5.4 The site is in an area benefitting from the Environment Agency's flood warning service which provide free flood warnings when flooding is expected to enable the evacuation of people for a range of flooding events up to and including the extreme event.

#### *Canals, reservoirs and other artificial sources*

- 5.5 There are no canals, reservoirs or other artificial sources local to the area.
- 5.6 The Environment Agency risk of flooding from reservoirs map identifies the site is at risk of flooding from reservoirs when river levels are normal.

#### *Groundwater*

- 5.7 Groundwater flooding is caused by the emergence of water from beneath the ground, either at point or diffuse locations and tends to occur after much longer periods of sustained high rainfall. The occurrence of groundwater flooding is usually local and unlike flooding from rivers and the sea, does not generally pose a significant risk to life due to the slow rate at which the water level rises. However, groundwater flooding can cause significant damage to property, especially in urban areas, and can pose further risks to the environment and ground stability. Properties with basements or cellars or properties that are located within areas deemed to be susceptible to

groundwater flooding are at particular risk. Development within areas that are susceptible to groundwater flooding will generally not be suited to SuDS.

- 5.8 The areas that are at risk tend to be those low-lying areas where the water table is shallow. Flooding tends to occur in areas that are underlain by major aquifers, although groundwater flooding is also noted in localised floodplain sands and gravels.

The main causes of groundwater flooding are:

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

#### *Pluvial runoff*

- 5.9 The Environment Agency Risk of Flooding from Surface Water map indicates that the site has a very low yearly chance of surface water flooding except for a small area in the centre of the site that has a low chance and a small area in the eastern part of the site that has a high yearly chance both now and between 2040 and 2060. A very low chance means that each year, this area has less than a 0.1% chance of flooding, a low chance means that each year, this area has between a 0.1% and 1% chance of flooding, and a high chance means more than a 3.3% chance each year. An extract from the surface water map is below.



- 5.10 It should be noted that surface water flooding can be difficult to predict, much more so than river or sea flooding as it is hard to forecast exactly where or how much rain will fall in any storm. In addition, local features can greatly affect the chance and severity of flooding.

#### *Development drainage*

- 5.11 Surface water (including the risk of sewers and culverted watercourses surcharging) poses the highest risk of more frequent flooding. Surface water drainage from new developments is critical in reducing the risk of localised flooding.
- 5.12 If surface water runoff is not managed appropriately, there may be an increased risk presented elsewhere from development drainage, and the aim should be to implement appropriate sustainable drainage systems (SuDS) to treat and contain flows and mimic the existing conditions.
- 5.13 Where possible the preference for dealing with surface water runoff from the developed site is for it to infiltrate back into the ground or alternatively to a waterbody or watercourse. Only if it is not possible for either of these options is surface water from the development to be allowed into the public sewers.

#### **Historic flooding**

- 5.14 The Environment Agency has identified that flooding occurred from the Woodhill Brook in February 2020 where it lies along the western boundary of the site, but the flooding didn't affect the site.
- 5.15 Anecdotally, the site has been previously been affected by flooding on two occasions, once in December 2015 as a result of Storm Desmond where the measured water level reached a height of 79.62m AOD, and the date of the other storm event is unknown but the measured water level reached a height of 79.02m AOD.

## 6. FLOOD RISK ASSESSMENT

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

### **Risk of Flooding to Proposed Development**

#### *Environment Agency Flood Zone mapping*

- 6.2 The Environment Agency flood mapping identifies the site lies within Flood Zone 3 with the access lying within Flood Zone 2. The flood risk is fluvial. There is no tidal flood risk to the site.

#### *Fluvial Flood Risk*

- 6.3 Modelled flood levels have been obtained from the Environment Agency. Information was provided from the Kirklees Brook 2008 and Mid Irwell 2017 models. The Kirklees Brook information is for the Woodhill Brook.
- 6.4 The information gave the following modelled flood levels for the relevant node points within the River Irwell and the Woodhill Brook as follows.

| <u>Return Period</u> | <u>Mid Irwell 2017</u> |                   |                 |                   |
|----------------------|------------------------|-------------------|-----------------|-------------------|
|                      | <u>Node 9</u>          |                   | <u>Node 10</u>  |                   |
|                      | <u>Defended</u>        | <u>Undefended</u> | <u>Defended</u> | <u>Undefended</u> |
| 1% AEP               | 80.42m AOD             | 80.50m AOD        | 80.14m AOD      | 80.47m AOD        |
| 1% AEP (+35%)        | 80.94m AOD             |                   | 80.98m AOD      |                   |

| <u>Return Period</u> | <u>Kirklees Brook 2008</u> |                   |                   |
|----------------------|----------------------------|-------------------|-------------------|
|                      | <u>Node 6</u>              | <u>Node 7</u>     | <u>Node 8</u>     |
|                      | <u>Undefended</u>          | <u>Undefended</u> | <u>Undefended</u> |
| 1% AEP               | 81.40m AOD                 | 80.53m AOD        | 80.48m AOD        |
| 1% AEP (+35%)        | 83.23m AOD                 | 83.15m AOD        | 83.15m AOD        |
| 0.1%                 | 83.30m AOD                 | 83.15m AOD        | 83.15m AOD        |

6.5 The Irwell Management Catchment Peak River Flow climate change central allowance for the 2080's is 35%. The design flood for the development site is therefore the defended 1% AEP plus 35% event, for which the modelled level appropriate for the development site is 80.98m AOD taken from the Mid Irwell model using Node 10, which is just upstream from the confluence of the 'Main Rivers', and this level is similar to that which was used for an approved industrial bale store building on the eastern side of the site yard in 2021.

6.6 Each part of the proposal is addressed as follows.

The erection of a replacement building of footprint 869m<sup>2</sup>, to form an improved workshop and repair building for engines and rolling stock following the demolition of the three smaller buildings on the southern side of the site, which have a total footprint 632m<sup>2</sup>.

6.7 The existing three buildings that are to be demolished have floor levels of 79.60m AOD, 79.80m AOD and 79.85m AOD.

6.8 It will not be possible for the floor level of the replacement building to be raised above the design flood level of 80.98m AOD due to operational access requirements. It is therefore intended that the floor level of the new replacement building will not be any higher than the floor level of the three buildings that are to be demolished and the building will be allowed to flood, a water entry strategy being utilised should a flood event occur.

6.9 The building is to be accessed from the eastern elevation via a series of large roller shutter doors. Large roller shutter doors are also located within the western elevation. The doors to the building are to operate as a flood alleviation method to enable flood water, should it occur, to enter the building and then drain back into the river, so maintaining the flood storage and capacity of the site and not diverting flood waters onto wider neighbouring areas.

6.10 It is also recommended that when the new building is constructed that flood resilience measures are incorporated to a minimum height of 600mm above the design flood level at a level of 81.58m AOD. This level is 1.96m above the measured water level

that was reached during the December 2015 Storm Desmond event. These measures would be expected to provide a degree of protection to the building should flooding occur.

An extension to the existing brick frontage element of the unit on the northern part of the site that includes ground floor storage, staff welfare accommodation and first floor ancillary office and administration space. The footprint of the extension is 160m<sup>2</sup>.

- 6.11 The ground floor level of the building to be extended is 78.75m AOD.
- 6.12 Being an extension, it will not be possible for floor levels of the buildings to be raised above this level. It is therefore intended that the new extension will have a similar floor level to the building to which it will be attached. It is therefore intended to prioritise excluding flood water from the building extension where possible, should it arise. Measures that can be taken are to store sand bags for placing at the entrances to the building, covers for any air bricks and plugs for the toilets. The ground floor of the extension is to be used for storage to limit damage should flooding occur.
- 6.13 It is also recommended that when the new building is constructed that flood resilience measures should be incorporated to a minimum height of 600mm above the design flood level at a level of 81.58m AOD. This level is 1.96m above the measured water level that was reached during the December 2015 Storm Desmond event. These measures would be expected to provide a degree of protection to the building should flooding occur.

Enhancement of the operational space around the new buildings to include the relocation of staff parking to the hardstanding area along the site access road.

- 6.14 Ground levels within the site will not be raised above the existing ground level and therefore the flood risk to these areas is unchanged.

#### *Flood storage compensation*

- 6.15 Ground levels within the site will not be raised and any excavated material arising from the site during construction works will be removed and deposited off site.

- 6.16 The total footprint of the new buildings is 1,029m<sup>2</sup> and the total footprint of the buildings to be demolished is 632m<sup>2</sup>. The difference in footprint is therefore 397m<sup>2</sup>.
- 6.17 A flood storage compensation scheme will be provided within the site by allowing the new replacement building to flood should a flood event occur, allowing a water entry strategy to be implemented and help to assist with the free flow of flood water. The footprint of the new replacement building is 869m<sup>2</sup>, and this area is more than adequate to compensate for the footprint area of 397m<sup>2</sup> that would be lost developing the site.
- 6.18 This proposal is similar to that which was approved for an industrial bale store building on the eastern side of the site yard in 2021.

*Emergency evacuation plan*

- 6.19 The site is in an area benefitting from the Environment Agency's flood warning service which provide free flood warnings when flooding is expected to enable the evacuation of people for a range of flooding events up to and including the extreme event, which should be signed up to.
- 6.20 Access to the site is taken from Lower Woodhill Road. Should evacuation be necessary the nearest area of Flood Zone 1 is the northern part of Lower Woodhill Road where it joins Woodhill Road. The remainder of the access lies within Flood Zone 2.
- 6.21 If it is not possible to evacuate safely from the site, or if during evacuation flood waters are confronted then refuge shall be taken within the first floor of the ancillary office and administration space. At this location, personnel will be safe above predicted flood water levels, and may remain until rescued or flooding has subsided or Environment Agency Flood Warnings are no longer active.

*Canals, reservoirs and other artificial sources*

- 6.22 There are no canals, reservoirs or other artificial sources local to the area.
- 6.23 The Environment Agency risk of flooding from reservoirs map identifies the site is at risk of flooding from reservoirs when river levels are normal. Reservoirs are inspected

and maintained in accordance with the Reservoirs Act, with necessary works undertaken when needed to resolve defects. The probability of reservoir failure is therefore very low.

- 6.24 The risk of flooding from canals, other artificial sources and reservoirs is therefore considered to be very low.

#### *Groundwater*

- 6.25 Groundwater flooding is not considered to be a major issue.

#### *Pluvial Runoff*

- 6.26 The Environment Agency Risk of Flooding from Surface Water map indicates that the site has a very low yearly chance of surface water flooding except for a small area in the centre of the site that has a low chance and a small area in the eastern part of the site that has a high yearly chance both now and between 2040 and 2060.
- 6.27 The mitigation measures against fluvial flood risk will also provide mitigation against surface water flooding.

### **Effect of the Development on the Wider Catchment**

#### *Development Drainage*

- 6.28 The proposed development will not introduce an additional area of impermeable hardstanding on site and will therefore not have the potential to alter the surface water runoff regime of the site nor to have an adverse effect on flood risk elsewhere in the wider catchment.
- 6.29 As such there will be no change to the flood risk upstream or downstream of this location and the risk of flooding from the development drainage is low.

## 7. PREDICTED IMPACTS AND MITIGATION

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

### **Site arrangements**

#### *Safe access and egress*

- 7.2 The site is in an area benefitting from the Environment Agency's flood warning service which provide free flood warnings when flooding is expected to enable the evacuation of people for a range of flooding events up to and including the extreme event and should be signed up to.
- 7.3 Should evacuation be necessary the nearest area of Flood Zone 1 is the northern part of Lower Woodhill Road where it joins Woodhill Road. The remainder of the access lies within Flood Zone 2. If it is not possible to evacuate safely from the site, or if during evacuation flood waters are confronted then refuge shall be taken within the first floor of the ancillary office and administration space.

#### *Finished levels*

- 7.4 The floor level of the new replacement building to form an improved workshop and repair building will not be any higher than the floor level of the three buildings that are to be demolished and will be allowed to flood, a water entry strategy being utilised should a flood event occur.
- 7.5 The extension to the existing brick frontage element of the unit on the northern part of the site will have a similar floor level to the building to which it will be attached and it is intended to prioritise excluding flood water from the building extension where possible, should it arise.
- 7.6 Ground levels within the site will not be raised above the existing ground level and therefore the flood risk to these areas is unchanged.

- 7.7 Flood resilience measures should be incorporated to a minimum height of 600mm above the design flood level at a level of 81.58m AOD.

*Upstream and downstream effects*

- 7.8 A flood storage compensation scheme will be provided within the site by allowing the new replacement building to form an improved workshop and repair building to flood should a flood event occur, allowing a water entry strategy to be implemented and help to assist with the free flow of flood water.
- 7.9 The proposed development will not introduce an additional area of impermeable hardstanding on site and will therefore not have the potential to alter the surface water runoff regime of the site nor to have an adverse effect on flood risk elsewhere in the wider catchment.
- 7.10 There will be no change to the flood risk upstream or downstream of this location.

## 8. CONCLUSIONS

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- 8.1 This flood risk assessment has been produced on behalf of Riley and Son (E) Limited in support of a planning application for the erection of a replacement employment unit and an extension to an existing employment unit with associated parking changes at the existing Riley Locomotive Engine Works site at Unit 3, Irwell Industrial Estate, Lower Woodhill Road, Bury.
- 8.2 The Environment Agency flood mapping identifies the site lies within Flood Zone 3 with the access lying within Flood Zone 2.
- 8.3 The new replacement building to form an improved workshop and repair building will be allowed to flood, a water entry strategy being utilised should a flood event occur. The extension to the existing brick frontage element of the unit on the northern part of the site will prioritise excluding flood water from the building extension where possible, should it arise.
- 8.4 Ground levels within the site will not be raised and any excavated material arising from the site during construction works will be removed and deposited off site.
- 8.5 Flood resilience measures should be incorporated to a minimum height of 600mm above the design flood level at a level of 81.58m AOD.
- 8.6 A flood storage compensation scheme will be provided within the site by allowing the new replacement building to form an improved workshop and repair building to flood should a flood event occur, allowing a water entry strategy to be implemented and help to assist with the free flow of flood water.
- 8.7 The risk of flooding from canals, other artificial sources and reservoirs is considered to be very low.
- 8.8 Groundwater flooding is not considered to be a major issue.
- 8.9 The Environment Agency Risk of Flooding from Surface Water map indicates that the site has a very low yearly chance of surface water flooding except for a small area in the centre of the site that has a low chance and a small area in the eastern part of the

site that has a high yearly chance both now and between 2040 and 2060. The mitigation measures against fluvial flood risk will also provide mitigation against surface water flooding.

- 8.10 There is not the potential to alter the surface water runoff regime of the site, nor to have an adverse effect on flood risk elsewhere in the wider catchment.
- 8.11 There will be no change to the flood risk upstream or downstream of this location.

## APPENDIX A

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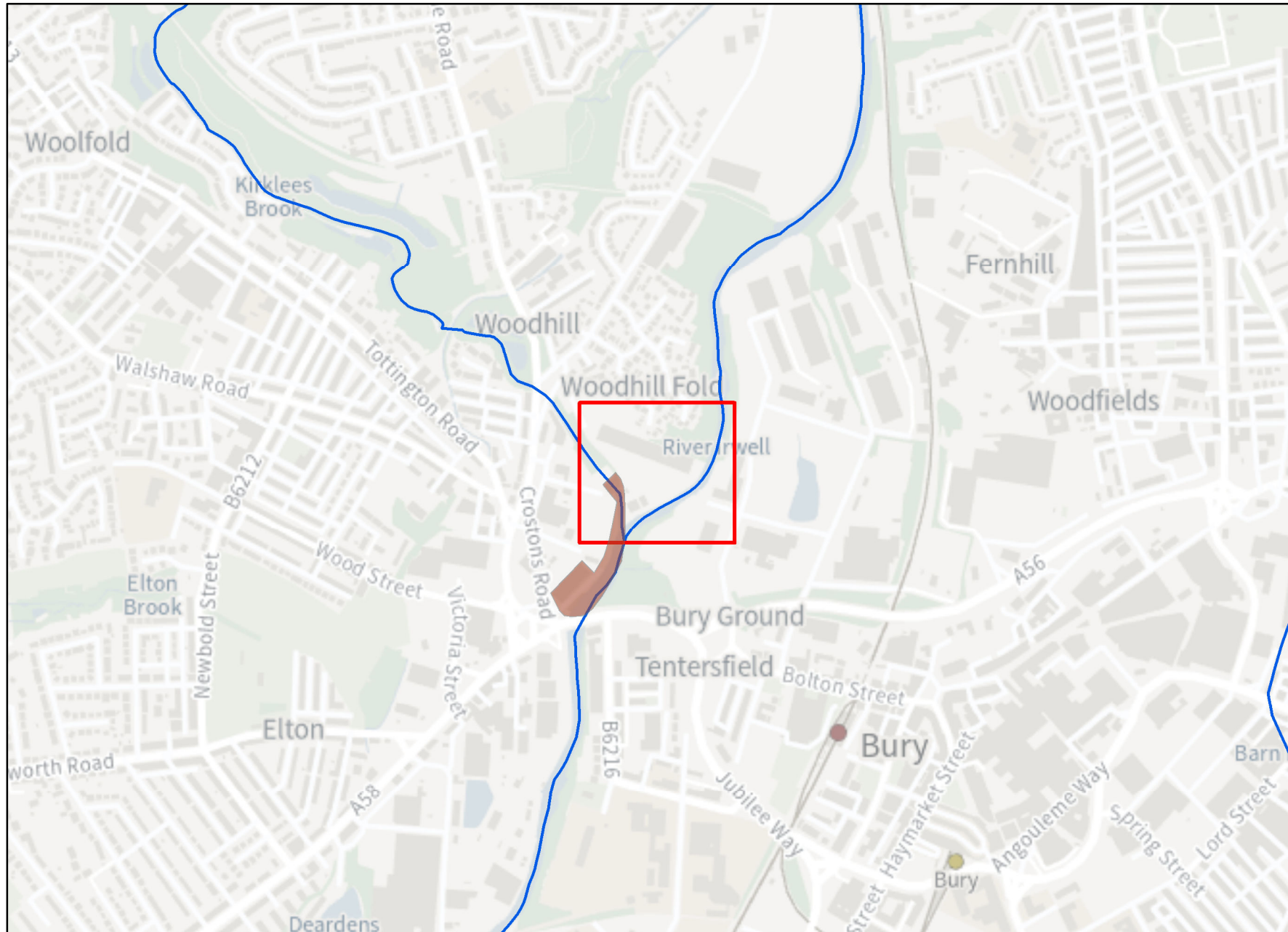
**LOCATION PLAN**

## APPENDIX B

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# Recorded Flood Outline Map Centred on Lower Woodhill Road, Bury, BL8 1AA

Created 25/06/2025 [EIR2025/14380]



1:10,001



## Legend

 Site Location

### Recorded Flood Outline

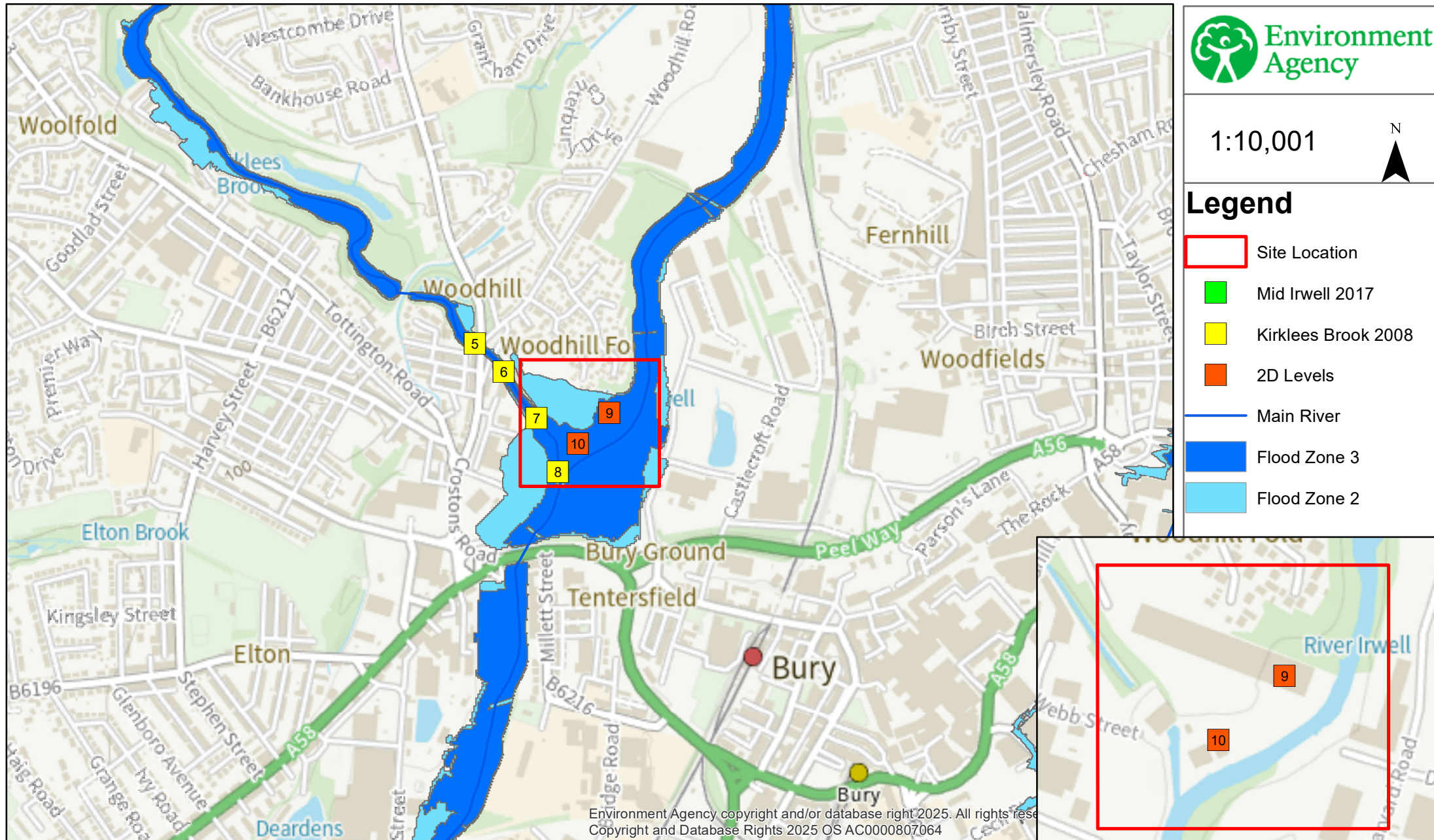
#### Start Date

 09/02/2020

 Main River

# Detailed Flood Map Centred on Lower Woodhill Road, Bury, BL8 1AA

Created 25/06/2025 [EIR2025/14380]



| Map Reference | Model Node Reference    | Existing | Neighbouring | Data                          | Underserved             |                         |                          |                         |                         |                         |                            |                          |                            |                             | Defended                |                         |                          |                         |                         |                         |                            |                          |                            |                             |                                               |                                               |                                               |
|---------------|-------------------------|----------|--------------|-------------------------------|-------------------------|-------------------------|--------------------------|-------------------------|-------------------------|-------------------------|----------------------------|--------------------------|----------------------------|-----------------------------|-------------------------|-------------------------|--------------------------|-------------------------|-------------------------|-------------------------|----------------------------|--------------------------|----------------------------|-----------------------------|-----------------------------------------------|-----------------------------------------------|-----------------------------------------------|
|               |                         |          |              |                               | 50 % AEP (1 in 2 years) | 20 % AEP (1 in 5 years) | 10 % AEP (1 in 10 years) | 5 % AEP (1 in 20 years) | 4 % AEP (1 in 25 years) | 2 % AEP (1 in 50 years) | 1.33 % AEP (1 in 75 years) | 1 % AEP (1 in 100 years) | 0.5 % AEP (1 in 200 years) | 0.1 % AEP (1 in 1000 years) | 50 % AEP (1 in 2 years) | 20 % AEP (1 in 5 years) | 10 % AEP (1 in 10 years) | 5 % AEP (1 in 20 years) | 4 % AEP (1 in 25 years) | 2 % AEP (1 in 50 years) | 1.33 % AEP (1 in 75 years) | 1 % AEP (1 in 100 years) | 0.5 % AEP (1 in 200 years) | 0.1 % AEP (1 in 1000 years) | 1 % AEP (1 in 100 years) + 30% Climate Change | 1 % AEP (1 in 100 years) + 30% Climate Change | 1 % AEP (1 in 100 years) + 70% Climate Change |
| 1             | ea013_0248_RVWD05_2546  | 300008   | 411325       | Modelled Water Level (m aodR) | 79.08                   | 79.49                   | 79.77                    | 80.03                   | 80.11                   | 80.40                   | 80.72                      | 80.90                    | 80.91                      | 80.83                       | 79.09                   | 79.49                   | 79.77                    | 80.03                   | 80.12                   | 80.41                   | 80.58                      | 80.63                    | 80.89                      | 81.13                       | 81.33                                         | 81.26                                         | 81.59                                         |
|               |                         |          |              | Modelled Flow (cumecs)        | 113.89                  | 149.86                  | 179.82                   | 207.83                  | 216.15                  | 256.42                  | 282.72                     | 302.24                   | 334.30                     | 517.93                      | 114.26                  | 150.10                  | 178.69                   | 218.22                  | 218.98                  | 237.84                  | 280.81                     | 290.14                   | 323.71                     | 404.09                      | 506.44                                        | 384.70                                        | 471.54                                        |
| 2             | ea013_0248_RVWD05_2415  | 379971   | 411002       | Modelled Water Level (m aodR) | 78.85                   | 79.26                   | 79.54                    | 79.79                   | 79.87                   | 80.15                   | 80.36                      | 80.47                    | 80.64                      | 82.15                       | 78.86                   | 79.26                   | 79.54                    | 79.79                   | 79.88                   | 80.16                   | 80.34                      | 80.38                    | 80.62                      | 81.01                       | 80.78                                         | 80.88                                         | 81.56                                         |
|               |                         |          |              | Modelled Flow (cumecs)        | 113.78                  | 149.92                  | 172.89                   | 208.84                  | 208.85                  | 242.96                  | 263.38                     | 283.38                   | 312.25                     | 524.76                      | 114.14                  | 147.10                  | 172.85                   | 199.15                  | 209.62                  | 244.34                  | 264.44                     | 273.14                   | 311.53                     | 379.04                      | 345.63                                        | 361.04                                        | 443.33                                        |
| 3             | ea013_0248_RVWD05_2157  | 379802   | 411028       | Modelled Water Level (m aodR) | 79.81                   | 79.23                   | 79.52                    | 79.75                   | 79.87                   | 80.16                   | 80.36                      | 80.48                    | 80.69                      | 82.80                       | 79.82                   | 79.23                   | 79.52                    | 79.79                   | 79.87                   | 80.17                   | 80.35                      | 80.40                    | 80.66                      | 81.34                       | 81.16                                         | 82.08                                         | 82.08                                         |
|               |                         |          |              | Modelled Flow (cumecs)        | 113.08                  | 144.62                  | 168.85                   | 193.97                  | 202.24                  | 234.07                  | 256.20                     | 272.97                   | 299.03                     | 309.45                      | 113.43                  | 144.92                  | 168.95                   | 193.79                  | 202.72                  | 235.10                  | 255.35                     | 265.97                   | 297.71                     | 305.70                      | 303.33                                        | 305.02                                        | 307.72                                        |
| 4             | ea013_0248_RVWD05_20384 | 379744   | 410051       | Modelled Water Level (m aodR) | 77.47                   | 77.91                   | 78.20                    | 78.47                   | 78.67                   | 78.88                   | 78.09                      | 79.25                    | 79.50                      | 81.04                       | 77.48                   | 78.09                   | 78.47                    | 78.87                   | 79.90                   | 77.91                   | 78.13                      | 78.47                    | 79.99                      | 79.74                       | 79.84                                         | 79.84                                         | 80.49                                         |
|               |                         |          |              | Modelled Flow (cumecs)        | 123.58                  | 162.57                  | 193.19                   | 224.99                  | 235.67                  | 274.62                  | 303.05                     | 325.04                   | 361.58                     | 557.03                      | 124.62                  | 162.95                  | 193.29                   | 224.89                  | 238.17                  | 277.11                  | 301.40                     | 312.74                   | 357.71                     | 433.00                      | 396.71                                        | 412.13                                        | 605.34                                        |

| Map Reference | Model Node Reference | Existing | Neighbouring        | Data                | Defended                 |                         |                         |                         |                            |                          |                                                 |                                                 |                            |                          | Underserved             |                         |                         |                            |                          |                            |  |  |  |  |
|---------------|----------------------|----------|---------------------|---------------------|--------------------------|-------------------------|-------------------------|-------------------------|----------------------------|--------------------------|-------------------------------------------------|-------------------------------------------------|----------------------------|--------------------------|-------------------------|-------------------------|-------------------------|----------------------------|--------------------------|----------------------------|--|--|--|--|
|               |                      |          |                     |                     | 10 % AEP (1 in 10 years) | 5 % AEP (1 in 20 years) | 4 % AEP (1 in 25 years) | 2 % AEP (1 in 50 years) | 1.33 % AEP (1 in 75 years) | 1 % AEP (1 in 100 years) | 1 % AEP (1 in 100 years) + 30% increase in flow | 1 % AEP (1 in 100 years) + 35% increase in flow | 0.5 % AEP (1 in 200 years) | 10 % AEP (1 in 10 years) | 5 % AEP (1 in 20 years) | 4 % AEP (1 in 25 years) | 2 % AEP (1 in 50 years) | 1.33 % AEP (1 in 75 years) | 1 % AEP (1 in 100 years) | 0.5 % AEP (1 in 200 years) |  |  |  |  |
| 9             | 20 Levels            | 379929   | 411235              | Height Grid (m AOD) | 79.55                    | 79.92                   | 79.91                   | 80.16                   | 80.37                      | 80.42                    | 80.64                                           | 80.84                                           | 81.23                      | 79.55                    | 79.81                   | 79.90                   | 80.14                   | 80.39                      | 80.50                    | 81.10                      |  |  |  |  |
|               |                      |          |                     | Depth Grid (Meters) | 0.17                     | 0.44                    | 0.52                    | 0.78                    | 1.00                       | 1.05                     | 1.47                                            | 1.56                                            | 1.75                       | 0.17                     | 0.43                    | 0.52                    | 0.77                    | 1.01                       | 1.12                     | 1.72                       |  |  |  |  |
| 379515        |                      | 412874   | Height Grid (m AOD) | 79.81               | 79.81                    | 79.80                   | 80.15                   | 80.38                   | 80.14                      | 80.87                    | 80.98                                           | 81.19                                           | 79.85                      | 79.81                    | 79.89                   | 80.13                   | 80.37                   | 80.47                      | 81.16                    |                            |  |  |  |  |
|               |                      |          | Depth Grid (Meters) | 0.34                | 0.69                     | 0.67                    | 0.80                    | 1.13                    | 1.19                       | 1.64                     | 1.75                                            | 1.97                                            | 0.33                       | 0.69                     | 0.67                    | 0.91                    | 1.15                    | 1.26                       | 1.94                     |                            |  |  |  |  |

Model data taken from M40 Intel 2017  
AEP - Annual Exceedence Probability  
m aodR - metres above ordnance datum (Newlyn)  
cumecs - cubic metres per second

Notes: <sup>a</sup>Climate Change Scenario - 30%, 35% and 70% increases in flow calculated for the 2080's (2070 - 2115). Please see <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances> for more information regarding the new climate change guidance. The location of the site and the type (vulnerability) of development determines the climate change allowance to consider in any flood risk assessment.

| Map Reference | Model Node Reference   | Existing | Neighbouring | Data                          | Underserved              |                             |                                                            |                                                            |
|---------------|------------------------|----------|--------------|-------------------------------|--------------------------|-----------------------------|------------------------------------------------------------|------------------------------------------------------------|
|               |                        |          |              |                               | 1 % AEP (1 in 100 years) | 0.1 % AEP (1 in 1000 years) | 1 % AEP (1 in 100 years) + 70% Climate Change <sup>a</sup> | 1 % AEP (1 in 100 years) + 30% Climate Change <sup>a</sup> |
| 5             | ea013_0288_KRWK01_0353 | 379657   | 411374       | Modelled Water Level (m aodR) | 83.01                    | 84.07                       | 83.00                                                      | 83.64                                                      |
|               |                        |          |              | Modelled Flow (cumecs)        | 20.00                    | 37.50                       | 34.00                                                      | 27.00                                                      |
| 6             | ea013_0288_KRWK01_0286 | 379716   | 411318       | Modelled Water Level (m aodR) | 81.59                    | 83.27                       | 83.23                                                      | 83.23                                                      |
|               |                        |          |              | Modelled Flow (cumecs)        | 20.30                    | 38.30                       | 34.41                                                      | 27.41                                                      |
| 7             | ea013_0288_KRWK01_0150 | 379781   | 411224       | Modelled Water Level (m aodR) | 80.63                    | 83.15                       | 83.15                                                      | 83.15                                                      |
|               |                        |          |              | Modelled Flow (cumecs)        | 20.30                    | 38.30                       | 34.51                                                      | 27.41                                                      |
| 8             | ea013_0288_KRWK01_0900 | 379824   | 411116       | Modelled Water Level (m aodR) | 80.48                    | 83.15                       | 83.15                                                      | 83.15                                                      |
|               |                        |          |              | Modelled Flow (cumecs)        | 20.30                    | 38.30                       | 34.51                                                      | 27.41                                                      |

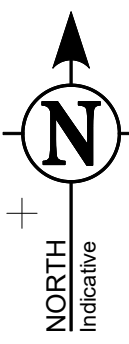
| Map Reference | Model Node Reference | Existing | Neighbouring | Data                | Underserved              |                                                            |                             |
|---------------|----------------------|----------|--------------|---------------------|--------------------------|------------------------------------------------------------|-----------------------------|
|               |                      |          |              |                     | 1 % AEP (1 in 100 years) | 1 % AEP (1 in 100 years) + 30% Climate Change <sup>a</sup> | 0.1 % AEP (1 in 1000 years) |
| 1             | 20 Levels            | 379929   | 411235       | Depth Grid (Meters) |                          |                                                            | 3.87                        |
| 2             |                      | 379515   | 412874       | Depth Grid (Meters) | 1.12                     | 1.31                                                       | 3.78                        |

Model data taken from Kirkless Brook 2006  
AEP - Annual Exceedence Probability  
m aodR - metres above ordnance datum (Newlyn)  
cumecs - cubic metres per second

Notes: <sup>a</sup>Climate Change Scenario - 30% and 70% increases in flow calculated for the 2080's (2070 - 2115). Please see <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances> for more information regarding the new climate change guidance. The location of the site and the type (vulnerability) of development determines the climate change allowance to consider in any flood risk assessment.

## APPENDIX C

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## ABBREVIATIONS & SYMBOLS

[illegible]

### Topographical Surveys

Trees are drawn to scale showing the average canopy spread. Descriptions and heights should be used as a guide only.

All below ground details including drainage, voids and services have been identified from above ground and therefore all details relating to these features including: sizes, depth, description etc will be approximate only. All critical dimensions and connections should be checked and verified prior to starting work.

Detail, services and features may not have been surveyed if obstructed or not reasonably visible at the time of the survey.

Surveyed physical features may not necessarily represent the legal boundary line.

## Measurements to internal wa

above the floor level and the wall assumed to be vertical.

The contractor

The accuracy of the digital data is the same as the plotting scale implies. All dimensions are in metres unless otherwise stated.

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This drawing should only be scaled using digital methods.

| SURVEY CONTROL CO-ORDINATES |            |            |        |
|-----------------------------|------------|------------|--------|
| Name                        | Easting    | Northing   | Height |
| GS01                        | 379949.239 | 411199.507 | 78.276 |
| GS1A                        | 379906.830 | 411223.984 | 78.295 |
| GS1B                        | 379961.683 | 411242.733 | 80.050 |
| GS1C                        | 379938.525 | 411251.551 | 79.673 |
| GS02                        | 379912.961 | 411184.386 | 78.534 |
| GS03                        | 379850.053 | 411181.555 | 79.575 |
| GS04                        | 379820.763 | 411227.317 | 82.534 |

The coordinate system established for this survey is related to Ordnance Survey (OS) National Grid at multiple points using GNSS with a scale factor of 1.000.

The level datum established for this survey is related to Ordnance Survey (OS) using GPS Smartnet.

To avoid discrepancies within the survey, adding to the survey or setting out points from the survey, any coordinated data must be directly derived from the original survey control. Survey Solutions are not responsible for any third-party adding survey data to the existing information.

|     |             |       |      |      |
|-----|-------------|-------|------|------|
| REV | DESCRIPTION | DRAWN | APPR | DATE |
|-----|-------------|-------|------|------|



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0845 040 5969  
[survey-solutions.co.uk](http://survey-solutions.co.uk)

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LONDON-EAST / MANCHESTER / NEWCASTLE / NORWICH / NOTTINGHAM / THAMES VALLEY

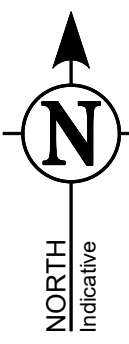
PROJECT TITLE  
Irwell Works, Unit 3, Bury,  
Lower Woodhouse Road, Bury, BL8 1AA

DRAWING DETAIL  
TOPOGRAPHICAL SURVEY  
Sheet 1 of 2

|                                    |       |
|------------------------------------|-------|
| CLIENT                             | SCALE |
| Maybern Planning & Development Ltd | 1:200 |
|                                    |       |

|                                |                           |                  |                   |                          |
|--------------------------------|---------------------------|------------------|-------------------|--------------------------|
| SURVEYOR<br>GS                 | SURVEY DATE<br>17.07.2025 | CHECKED BY<br>SR | APPROVED BY<br>SR | DWG STATUS<br>Final      |
| DRAWING NUMBER<br>78970MCLS-01 |                           |                  | REVISION          | ISSUE DATE<br>22.07.2025 |



[illegible]

Trees are drawn to scale showing the average canopy spread. Descriptions and heights should be used as a guide only.

All building names, descriptions, number of storeys, construction type including roof line details are indicative only and taken externally from ground level.

All below ground details including drainage, voids and services have been identified from above ground and therefore all details relating to these features including: sizes, depth, description etc will be approximate only. All critical dimensions and connections should be checked and verified prior to starting work.

Detail, services and features may not have been surveyed if obstructed or not reasonably visible at the time of the survey.

Surveyed physical features may not necessarily represent the legal boundary line.

Measurements to internal walls are taken to the wall finishes at approx 1m above the floor level and the wall assumed to be vertical.

### General

The contractor must check and verify all site and building dimensions, levels, utilities and drainage details and connections prior to commencing work. Any

The accuracy of the digital data is the same as the plotting scale implies. All dimensions are in metres unless otherwise stated.

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This drawing should only be scaled using digital methods.

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|-----------------------------|------------|------------|--------|
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| GS1C                        | 379938.525 | 411251.551 | 79.673 |
| GS02                        | 379912.961 | 411184.386 | 78.534 |
| GS03                        | 379850.053 | 411181.555 | 79.575 |
| GS04                        | 379820.763 | 411227.317 | 82.534 |

SURVEY GRID AND LEVEL DATUM

The coordinate system established for this survey is related to Ordnance Survey (OS) National Grid at multiple points using GNSS with a scale factor of 1.000.

The level datum established for this survey is related to Ordnance Survey (OS) using GPS Smartnet.

To avoid discrepancies within the survey, adding to the survey or setting out points from the survey, any coordinated data must be directly derived from the original survey control. Survey Solutions are not responsible for any third-party adding survey data to the existing information.

|     |             |       |      |      |
|-----|-------------|-------|------|------|
| REV | DESCRIPTION | DRAWN | APPR | DATE |
|-----|-------------|-------|------|------|



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LONDON-EAST / MANCHESTER / NEWCASTLE / NORWICH / NOTTINGHAM / THAMES VALLEY

PROJECT TITLE  
Inwell Works, Unit 3, Bury,  
Lower Woodhills Road, Bury, BL8 1AA

DRAWING DETAIL  
TOPOGRAPHICAL SURVEY  
Sheet 2 of 2

|                                              |                |
|----------------------------------------------|----------------|
| CLIENT<br>Maybern Planning & Development Ltd | SCALE<br>1:200 |
|----------------------------------------------|----------------|

|                                |                           |                  |                   |                          |
|--------------------------------|---------------------------|------------------|-------------------|--------------------------|
| SURVEYOR<br>GS                 | SURVEY DATE<br>17.07.2025 | CHECKED BY<br>SR | APPROVED BY<br>SR | DWG STATUS<br>Final      |
| DRAWING NUMBER<br>78970MCLS-01 |                           |                  | REVISION          | ISSUE DATE<br>22.07.2025 |

