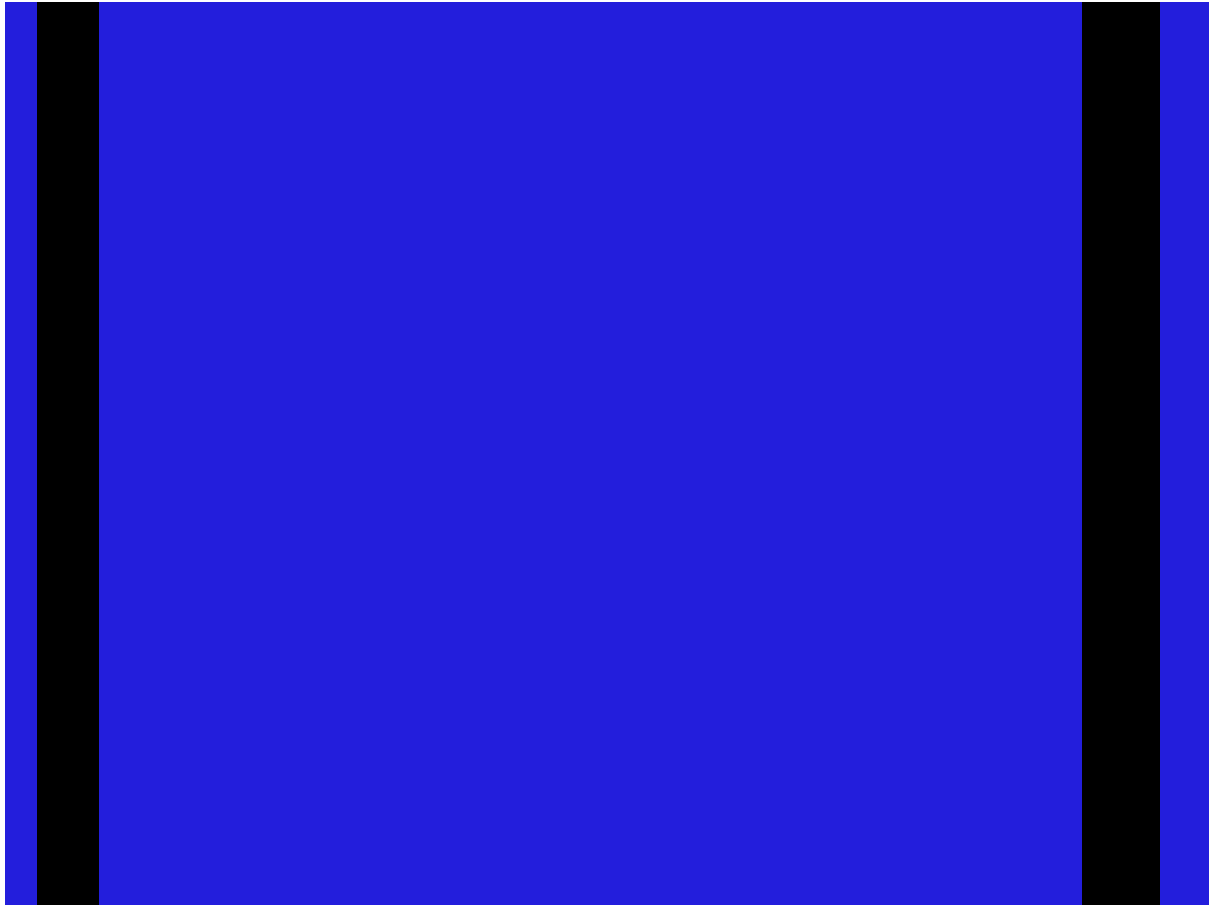


## Boothroyden Road Flood Risk Assessment

Document no: UU-80065519-JAC-ZZ-00-AS-Z-0001  
Version: P02

United Utilities  
UU.80065519

Boothroyden Road  
2 April 2024



## Boothroyden Road Flood Risk Assessment

|                          |                                 |                         |                                 |
|--------------------------|---------------------------------|-------------------------|---------------------------------|
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| <b>Project name:</b>     | Boothroyden Road                |                         |                                 |
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| <b>Version:</b>          | P02                             | <b>Prepared by:</b>     | Ellie Rigby                     |
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|         |                |             |             |          |

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### Jacobs U.K. Limited

5 First Street  
Manchester M15 4GU  
United Kingdom

T +44 (0)161 235 6000  
F +44 (0)161 235 6001  
[www.jacobs.com](http://www.jacobs.com)

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## Executive summary

Jacobs UK Ltd has been commissioned by United Utilities (UU) to undertake a Flood Risk Assessment (FRA) to support a planning application and Flood Risk Activity Permit (FRAP) application for the proposed improvement works to Boothroyden Road Combined Sewer Overflow (CSO). The proposed works would involve the construction of a below-ground storm water detention tank, with a capacity of 2,000m<sup>3</sup>, to increase the sewer network capacity and reduce the frequency of combined sewage overflow spills into the River Irk. Temporary works during the 11-month construction period would involve installation of a temporary bridge across the river, and temporary ground level raising of an access track and compound area, to facilitate access to the site.

The site is within Flood Zone 3 and therefore the works fall under the National Planning Policy Framework (NPPF) requirements for an FRA. The site is currently at medium to high risk of fluvial flooding due to its proximity to the River Irk, a statutory Main River. The proposed permanent works (detention tank and associated kiosk and pressure relief column) would be at least eight metres away from the riverbank and are not expected to impact fluvial flood risk to the site or elsewhere. Some of the proposed temporary works (bridge abutments and ground level raising of the access track) would be in closer proximity to the riverbank and could temporarily reduce floodplain storage capacity by approximately 42.5m<sup>3</sup>. Based on model data available, it is not possible to prove whether this reduction in floodplain capacity is within Flood Zone 3b (functional floodplain) or not. However, the Environment Agency's (EA) Risk of Flooding from Rivers and Sea data suggests the land is at risk during 1% - 0.1% Annual Exceedance Probability (AEP) flood events, so is likely outside of Flood Zone 3b (Figure 2). The impact of this small loss is likely to be a temporary increase in flood risk to the open space around the site, should flooding occur during the 11-month construction period.

Access to the site would be restricted during a 1% AEP fluvial event as some of the site would be expected to flood. However, this is unlikely to impact the construction or operation of the site as the detention tank would still be expected to function and access is not expected to be required during times of flooding.

The site is at high risk of surface water flooding on the north bank. The proposed temporary compound and access track could increase the impermeable area by up to 1,015m<sup>2</sup>. Any change in surface water risk around the compound is expected to be mitigated through temporary drainage; the access track is already at low risk, but any overland flow would be directed towards the river, where the track leads to.

The risk of sewer flooding to the site itself is not expected to change, but will remain a low risk due to the presence of sewer infrastructure and a residual risk of failure. However, the proposed works are expected to reduce the risk of sewer flooding to surrounding properties and infrastructure as the storm water detention tank will improve the sewer network capacity.

The risk of flooding from groundwater and other sources (tidal and canals) is considered unlikely and the proposed development is not expected to impact these sources of flood risks to the site or elsewhere. Groundwater ingress during excavation would be addressed by de-watering.

Similarly, the risk of flooding from an uncontrolled release of water from reservoirs is considered unlikely. However, if this risk did occur during construction when river levels were also high, the risk to the site and surrounding land may be increased due to the temporary reduction in floodplain capacity as a result of the temporary ground raising. However, this is very unlikely to occur during the 11-month construction.

During the 50-year lifespan of the development, climate change is likely to increase the frequency and severity of rainfall events. Therefore, the risk of flooding to the site from fluvial and surface water sources will likely increase over time which could mean the site is more regularly inaccessible due to being flooded. The proposed development is water compatible and automatically operated though, so access during a flood is not expected to be necessary.

As discussed in Section 2.1.2, according to the NPPF, essential infrastructure or water-compatible infrastructure within Flood Zone 3b (functional floodplain) should be design and structured to:

- remain operational and safe for users in times of flood;
- result in no net loss of floodplain storage; and
- not impede water flows and not increase flood risk elsewhere.

Although based on available data (Appendix H) it is not possible to prove whether the proposed development is within Flood Zone 3b or not, taking a conservative approach and assuming it is within the functional floodplain, this FRA has concluded that:

- The proposed development would remain operational in times of flood. Access would likely be restricted during 1% AEP fluvial events (or surface water flood events during construction) due to part of the site being flooded. However access is not necessary during a flood and operational measures will be used to reduce the risk of maintenance staff being on site during a flood event;
- The proposed permanent works are not expected to notably impact floodplain storage capacity. Temporary works, including ground level raising to facilitate the access bridge abutments and access track, would likely temporarily reduce floodplain storage by around 42.5m<sup>3</sup>. However, this land is likely outside of Flood Zone 3b and the loss would be for a maximum 11-month construction period, so given the small volume of loss and relative levels, would likely have minor impact to flood levels in open areas rather than impact properties or infrastructure in the unlikely event of a major flood; and
- The proposed permanent works are not expected to impede water flows or increase flood risk elsewhere. Temporary works, including the bridge, access track, and compound, may increase flood risk to the site and immediate surrounding area, therefore temporary drainage would be provided to reduce this increased risk.

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## Acronyms and abbreviations

|      |                                       |
|------|---------------------------------------|
| AEP  | Annual Exceedance Probability         |
| BGS  | British Geological Survey             |
| CC   | Climate Change                        |
| CSO  | Combined Sewer Overflow               |
| EA   | Environment Agency                    |
| FMfP | Flood Map for Planning                |
| FRAP | Flood Risk Activity Permit            |
| FRA  | Flood Risk Assessment                 |
| GMCA | Greater Manchester Combined Authority |
| NPPF | National Planning Policy Framework    |
| PFRA | Preliminary Flood Risk Assessment     |
| PPG  | Planning Practice Guidance            |
| RBC  | Rochdale Metropolitan Borough Council |
| SFRA | Strategic Flood Risk Assessment       |
| UU   | United Utilities                      |

## **1. Introduction**

### **1.1 Background**

Jacobs UK Ltd has been commissioned by United Utilities (UU) to undertake a Flood Risk Assessment (FRA) to support a planning application and Flood Risk Activity Permit (FRAP) application for the proposed improvement works to Boothroyden Road Combined Sewer Overflow (CSO). The works are being carried out with the aim of reducing the overflow spills into the River Irk and therefore improving the water quality of the watercourse and reducing the risk of sewer flooding to properties and infrastructure. UU has a responsibility under the Flood and Water Management Act 2010 for managing the risk of flooding from foul or combined sewer systems within its ownership. The works would enable UU to comply with the Environment Agency's (EA) requirements to reduce storm overflow spills so that they do not discharge above an average of ten rainfall events per year. The project is therefore being carried out as part of UU's Better Rivers scheme to improve the water quality of watercourses.

The aim of this FRA is to assess flood risk to, and arising from, the proposed CSO works, hereafter referred to as the proposed development, and the measures for managing any risks. The FRA will consider the proposed development with regard to National Planning Policy Framework (NPPF) and Planning Practice Guidance (PPG). Flood risk from a variety of sources including rivers, surface water, sewers, groundwater, reservoirs, and other sources (tidal and canals) will be assessed.

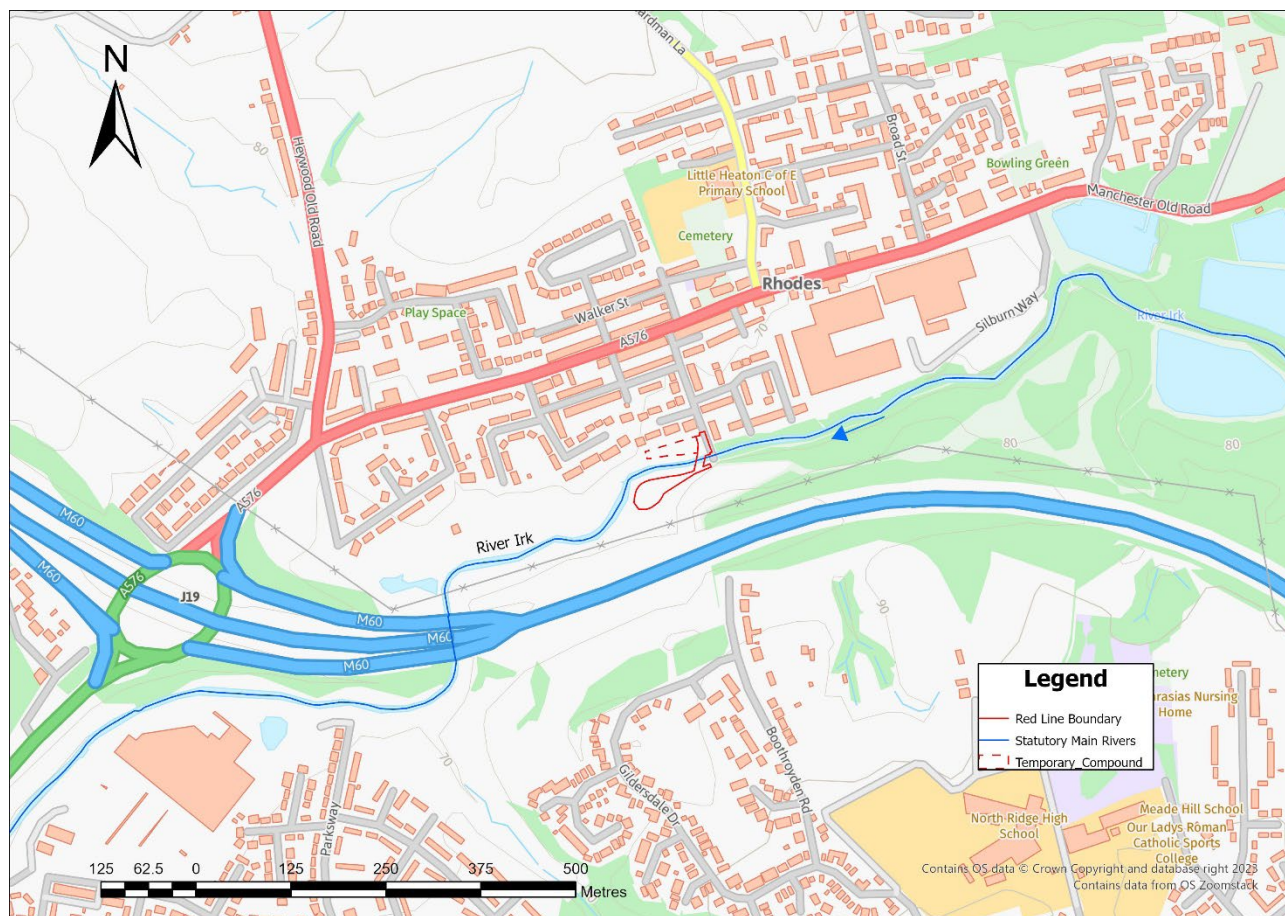
### **1.2 Existing Site**

Boothroyden Road CSO, hereafter referred to as the site, is located on the River Irk in Middleton, Manchester (Figure 1). The River Irk is a statutory Main River which flows from east to west across the site and eventually joins the River Irwell near Manchester Victoria railway station. Storm water from combined sewer pipes is released into an existing underground CSO chamber, from which it is then released via overflow pipes into the River Irk via an outfall.

During heavy rainfall events, the capacity of the existing combined sewer network is sometimes exceeded, so to prevent people's homes, roads and open spaces from being inundated with a mix of rainwater and foul water from the network backing up, the CSO allows the combined sewer system to outfall into the watercourse and therefore help reduce the risk of sewage flooding homes and businesses. The existing CSO outfalls on the left (south) bank of the River Irk at National Grid Reference: SD8498004970.

There is also an existing footbridge adjacent to the site, upstream of the CSO. The bridge provides pedestrian access across the River Irk from Boothroyden Road to the open space south of the river. According to topographic survey data (Appendix F), the bridge has a soffit of 68.63mAOD. No works or alterations are proposed to this existing bridge.

On the left and right bank of the River Irk at the site, there is uninhabited vegetated land between the river and residential properties to the north, and the M60 to the south. There are footpaths on the south bank alongside the route of the river, and from the bridge across the river between Boothroyden Road and the M60. The proposed works will be carried out within this vegetated land.



**Figure 1 Site Location**

## 1.3 Description of the Proposed Scheme

To reduce the frequency of CSO spills into the watercourse, the sewer network capacity must be increased to allow a greater volume of storm water to be attenuated within the system. It should be noted that the proposed works are not expected to completely prevent CSO spills, however the frequency of spills would be reduced.

The proposed works assessed as part of this FRA are shown in drawings included within Appendix B to Appendix F and include:

### Permanent Works

- Installation of new underground storm water detention tank, with a volume of 2,000m<sup>3</sup>
- Associated new manhole, valve chamber, kiosk, and security fencing around the detention tank

### Temporary works

- Construction of a temporary bridge across the River Irk for construction traffic, to be removed once remaining construction works are complete. The bridge would be in situ for approximately 11 months. The proposed temporary bridge would have a soffit no lower than the existing bridge immediately upstream (68.63mAOD)

- Construction of a temporary works compound on the north bank of the river, including car parking area, stores, welfare unit, and vehicle turning point
- Temporary raising of ground levels by 150mm to accommodate the temporary compound on the north bank (Appendix F). It is expected that ground levels would be raised for approximately 11 months during construction and then re-instated to original levels
- Temporary raising of ground levels by 150mm to accommodate the access track on the south bank to facilitate vehicular access to the detention tank (Appendix F). It is expected that ground levels would be raised for approximately 11 months during construction and then re-instated to original levels
- Temporary raising of ground levels by an estimated maximum of 630mm to accommodate the temporary bridge abutments and to infill from the road level to temporary bridge level (Appendix E). It is expected that ground levels would be raised for approximately 11 months during construction and then re-instated to original levels
- Vegetation clearance, including tree removal, to enable access to the working area

Construction is currently proposed to begin in Autumn 2024. All works, apart from the temporary access bridge, are understood to be located at least eight metres away from the bank of the Main River. Construction is expected to take 11 months.

It is understood that the existing CSO outfall is being retained, i.e. no additional outfall is being constructed and no permanent in-channel works are planned.

### **1.4 Limitations and Assumptions**

The FRA was undertaken with the following limitations and assumptions:

- The study was desk-based and no site visit was undertaken to verify the state of the watercourse, riverbanks or flood defences nearby and vulnerability of nearby properties or infrastructure to flooding
- No hydraulic modelling has been undertaken as part of this assessment so the FRA has based the assessment of fluvial flood risk on model data provided by the EA
- The study was based on the design drawings available at the time of writing
- No groundwater monitoring has been undertaken so the groundwater flood risk assessment is based on British Geological Survey mapping only
- It is assumed that the proposed works will be undertaken using best practise techniques and appropriate safe systems of works will be in place to help mitigate any potential flood risk impacts from the scheme

## 2. Planning Policy

The aim of this section of the report is to introduce the main aspects of the national and local planning policies that are relevant to the proposed development in terms of flood risk.

### 2.1 National Planning Policy Framework

In England, development and flood risk is guided by the National Planning Policy Framework (NPPF). The principal aim of the NPPF is to avoid inappropriate development in areas at risk of flooding by directing development away from areas at highest risk and where development is necessary, making it safe without increasing flood risk elsewhere.

#### 2.1.1 Assessment of Flood Risk

As part of the FRA, the NPPF requires that developers consider not just the flood risk to the development but also the impact that the proposed development might have on flood risk elsewhere. All sources of flood risk should be assessed, including fluvial, coastal, surface water, groundwater, and artificial drainage systems, and infrastructure failure.

The flood risk from Main Rivers and the sea is assessed using the Environment Agency National Fluvial and Coastal Flood Map, also called the Flood Map for Planning (FMfP). This map has three main zones of risk:

- **Zone 1 'Low probability of flooding'** – This zone comprises land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding (<0.1 %) in any year
- **Zone 2 'Medium probability of flooding'** – This zone comprises land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1 % – 0.1 %), or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5 % – 0.1 %) in any year
- **Zone 3 'High probability of flooding'** – This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1 %), or a 1 in 200 or greater annual probability of flooding from the sea (>0.5 %) in any year
- **Flood Zone 3b 'The Functional Floodplain'** – A sub-part of Zone 3, this zone comprises land where water has to flow or be stored in times of flood. This zone is not normally included within the national FMfP and is calculated where necessary using detailed hydraulic modelling and is typically defined as: areas having a 1 in 30 or greater annual probability of flooding ( $\geq 3.3\%$ AEP); 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% annual probability of flooding).

The National Planning Policy Framework (NPPF) (DLUHC, 2023) requires an FRA to be produced where development sites are:

- located in Flood Zone 1 with critical drainage problems (as notified to the local planning authority by the Environment Agency) or are greater than one hectare in size;
- all proposals for new development (including minor development and change of use) in Flood Zone 2 and 3;
- on land identified in a strategic flood risk assessment as being at increased flood risk in future; or
- where proposed development or a change of use to a more vulnerable class may be subject to other sources of flooding.

According to the Environment Agency's FMfP (Appendix A), the proposed development site is within Flood Zone 3 and therefore the falls under the NPPF requirements for an FRA.

## 2.1.2 The Sequential Test

A primary aim of the NPPF is that areas at little or no risk of flooding from any source are developed in preference to areas at higher risk. This is achieved through applying the Sequential Test to the location of proposed development site. The NPPF states that:

*'The aim [of the Sequential Test] is to steer new development to Flood Zone 1 (areas with a low probability of river or sea flooding).*

*'Where there are no reasonably available sites in Flood Zone 1, local planning authorities in their decision making should take into account the flood risk vulnerability of land uses and consider reasonably available sites in Flood Zone 2 (areas with a medium probability of river or sea flooding), applying the Exception Test if required.'*

*'Only where there are no reasonably available sites in Flood Zones 1 or 2 should the suitability of sites in Flood Zone 3 (areas with a high probability of river or sea flooding) be considered, taking into account the flood risk vulnerability of land uses and applying the Exception Test if required.'*

The proposed development (permanent works) involves improvement works to an existing structure (Boothroyden Road CSO) and therefore its location is already prescribed. The proposed detention tank needs to be connected to the existing CSO chamber. Other alternative locations for the detention tank have been studied, such as the north area of the riverbank (River Irk), but due to the volume required to be attenuated (2000m<sup>3</sup>), construction on the north bank would not be achievable due to lack of available space. Similarly, locating the tank further back from the south area of the riverbank would not be feasible as space is limited by the M60 motorway and associated embankments. East or west of the existing CSO chamber are not appropriate locations for the proposed tank either because of pipe connections with the existing infrastructure and/or lack of available area. The temporary bridge cannot be located in an area of lower flood risk as it needs to provide vehicular access across the river to the CSO.

The table below illustrates the flood risk vulnerability categories and flood zone compatibility matrix for the UK. The proposed development, including storm water detention and associated temporary works are classed as water-compatible and therefore appropriate in Flood Zone 3. An exception test is not required to demonstrate that the water-compatible development should be permitted in Flood Zone 3. However, the following advice is given;

\*In Flood Zone 3b (functional floodplain) essential infrastructure that has to be there and has passed the Exception Test and water-compatible uses, should be design and structured to:

- remain operational and safe for users in times of flood;
- result in no net loss of floodplain storage; and
- not impede water flows and not increase flood risk elsewhere.

**Table 1 Flood risk vulnerability and flood zone compatibility**

| Flood Zones | Flood Risk Vulnerability Classification |                         |                 |                 |                  |
|-------------|-----------------------------------------|-------------------------|-----------------|-----------------|------------------|
|             | Essential infrastructure                | Highly vulnerable       | More vulnerable | Less vulnerable | Water-compatible |
| Zone 1      | ✓                                       | ☐                       | ☐               | ☐               | ☐                |
| Zone 2      | ☐                                       | Exception Test required | ☐               | ☐               | ☐                |

| Flood Zones | Flood Risk Vulnerability Classification |                          |                          |                          |                            |
|-------------|-----------------------------------------|--------------------------|--------------------------|--------------------------|----------------------------|
|             | Essential infrastructure                | Highly vulnerable        | More vulnerable          | Less vulnerable          | Water-compatible           |
| Zone 3a     | Exception Test required                 | <b>X</b>                 | Exception Test required  | <input type="checkbox"/> | <input type="checkbox"/>   |
| Zone 3b     | Exception Test required                 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> * |

### 2.1.3 Climate Change

The NPPF requires new development to consider the effect of climate change on long term flood risk to developments.

Within the UK, climate change is expected to increase the frequency of short-duration, high-intensity rainfall events, as well as long-duration rainfall events. These changes, which are already being observed, will have an impact on flood risk.

Current Environment Agency climate change allowance guidance suggests the central peak river flow allowance should be used for water compatible development within Flood Zone 3 (EA, 2022). For the Irwell catchment, this means an uplift of 19% for development with a lifespan up to the 2050s and a 35% allowance for development with a lifespan up to the 2080s. The proposed detention tank would have a design life of 50 years, so the 2080s climate change epoch should be considered.

No hydraulic modelling has been carried out as part of this FRA, however fluvial flood levels have been provided by the Environment Agency from their 'Irk, Moston and Whit Brook 2007' model and these include a 20% climate change allowance. It is noted that the 20% allowance was based on the climate change guidance available in 2007.

## 2.2 Local Planning Policy

National planning policy is supplemented at a local level by additional plans and policies set out in local planning documents (Unitary Development Plans, Local Development Frameworks, Local Plans etc.), supported by Strategic Flood Risk Assessments and Supplementary Planning Documents.

Locally set flood risk policies relate to specific, local issues such as drainage requirements for development within critical drainage areas, restrictions on infill development or minimum threshold levels for properties within the floodplain. Details of key points from relevant policy documents have been identified and presented below.

Rochdale Borough Council (RBC) is the Lead Local Flood Authority (LLFA) for the area in which the proposed development is located and is responsible for the publication of local flood risk strategies.

### 2.2.1 Strategic Flood Risk Assessment, 2019

The Level 1 Strategic Flood Risk Assessment (SFRA) for Greater Manchester - Update (JBA, 2019) is a key document outlining the local flood risk from all sources and acts as an evidence base for flood risk policies, and to identify suitable areas for future development. The SFRA quotes the PPG advice that site-specific FRAs assessments should "demonstrate to the decision-maker how flood risk will be managed now and over the development's lifetime, taking climate change into account, and with regard to the vulnerability of its users". The SFRA also states that site-specific FRAs should demonstrate:

- Whether the development will increase flood risk elsewhere;