AtkinsRéalis

Volume 3, Appendix 17.1 – Flood Risk Assessment

Manchester City Council

October 2024

# FORMER CENTRAL RETAIL PARK – THE PARK

AtkinsRéalis - Sensitive / Sensible

# Notice

This document and its contents have been prepared and are intended solely as information for Manchester City Council and use in relation to The Park Planning Application.

AtkinsRéalis assumes no responsibility to any other party in respect of or arising out of or in connection with this document and/or its contents.

This document has 36 pages including the cover.

## Document history

Document title: Volume 3, Appendix 17.1 – Flood Risk Assessment

| Document reference:<br>Revision | Purpose description | Originated | Checked | Reviewed | Authorised | Date |
|---|---|---|---|---|---|---|
| 1.0 | For client comment | AN | AV | LR | DP | 02/08/2024 |
| 2.0 | For submission | AN | AV | LR | DP | 31/10/2024 |

## Client signoff

| | | |
|---|---|---|
| **Client** | Manchester City Council | **Client signature/date** |
| **Project** | Former Central Retail Park – The Park | |
| **Job number** | 5224911 | |

# Contents


**1. Introduction ..... 4**
1.1 Purpose of this report ..... 4
1.2 Background ..... 4
1.3 Environment Agency Requirements ..... 4
1.4 Flood Risk ..... 4
**2. Site Description ..... 5**
2.1 Existing Site ..... 5
2.2 Proposed Development ..... 5
2.3 Topography ..... 5
2.4 Geology ..... 5
2.5 Soils 6
**3. Existing Data and Information ..... 9**
3.1 Manchester Local Flood Risk Management Strategy (LFRMS) ..... 9
3.2 Irwell Catchment Flood Management Plan ..... 11
3.3 Manchester Strategic Flood Risk Assessment ..... 11
3.4 Environment Agency Flood Map (Flood Map for Planning) ..... 12
3.5 Environment Agency Risk of Flooding from Rivers and Sea ..... 14
3.6 Environment Agency Risk of Flooding from Surface Water[14] ..... 16
3.7 Environment Agency Risk of Flooding from Reservoirs[14] ..... 20
3.8 Groundwater Flooding ..... 20
3.9 Historical Flooding ..... 20
3.10 Site Drainage ..... 20
3.11 Flood Warning ..... 20
**4. Assessment of Flood Risk ..... 21**
4.1 Overview ..... 21
4.2 Sources of Flood Risk ..... 21
4.3 Climate Change ..... 21
**5. Mitigation of Flood Risk ..... 24**
5.1 Fluvial Flooding ..... 24
5.2 Pluvial / Surface Water Flooding ..... 24
5.3 Flooding from Sewers ..... 24
5.4 Flooding from Groundwater ..... 24
5.5 Flooding from Other Sources ..... 24
**6. Conclusions and Recommendations ..... 25**
**Appendix A. Hydraulic Interactions and Groundwater Flooding Issues ..... 27**
**Appendix B. Location of Proposed Development ..... 28**
**Appendix C. Landscape Masterplan of Proposed Development ..... 29**
**Appendix D. River Irwell 10 sub-areas ..... 30**
**Appendix E. Six generic flood risk management policy options[9] ..... 31**
**Appendix F. Table 2: Flood Risk Vulnerability Classification[1] ..... 32**
**Appendix G. Table 3: Flood Risk Vulnerability and Flood Zone Compatibility[1] ..... 33**
**Appendix H. Photographs of the Rochdale Canal Towpath ..... 34**
**Appendix I. Photographs of the New Islington Marina ..... 35**


**Tables**


Table 1-1 Definition of AEP and 'return period' flood events. ..... 5


**Figures**


Figure 2-1 Location of Site and nearby watercourses ..... 7
Figure 2-2 Topographic relief of the Site ..... 8
Figure 3-1 Breach Zones of Canals, Ponds, and Reservoirs ..... 10
Figure 3-2 Areas Susceptible to Groundwater Flooding in Manchester ..... 10
Figure 3-3 Environment Agency Flood Map for Planning ..... 13
Figure 3-4 Environment Agency Flood Risk Map from River and Sea ..... 15
Figure 3-5 Surface water flood risk extent map ..... 17
Figure 3-6 High-risk scenario surface water flood depth map ..... 18
Figure 3-7 Medium-risk scenario surface water flood depth map ..... 19
Figure 4-1 The Irwell Management Catchment peak river flow climate change allowances ..... 23
Figure A-1 Map of the hydraulic interaction within the Manchester City, Salford City, and Trafford Councils from the Manchester LFRMS ..... 27
Figure B-1 Location of the Proposed Development (3363-PLA-00-ZZ-DR-L-0001-Site Location Plan) ..... 28
Figure C-1 – Indicative landscape masterplan of the Proposed Development (3363-PLA-00-ZZ-DR-L-0002-Landscape Masterplan) ..... 29
Figure D-1 River Irwell 10 sub-areas in the Irwell Catchment Flood Management Plan ..... 30
Figure E-1 The six generic flood risk management policy options ..... 31
Figure F-1 Flood Risk Vulnerability Classification ..... 32
Figure G-1 Flood Risk Vulnerability and Flood Zone Compatibility ..... 33
Figure H-1 Photographs of the Rochdale Canal Towpath ..... 34
Figure I- 1 Photographs of the New Islington Marina ..... 35

# 1. Introduction

## 1.1 Purpose of this report

The Site for the Proposed Development will form one part of a wider development of the Former Central Retail Park (FCRP) site. A Strategic Regeneration Framework (SRF) was produced for the entire FCRP site in March 2023[1] which details the context and design drivers behind developing the area into a 'high-quality sustainable office district with an attractive public realm at its centre, including a new green space'. The SRF outlines the phasing of the site in relation to three different developments that are proposed as part of the overall regeneration of the site: Phase 1, Phase 2 and the Proposed Development. This Flood Risk Assessment (FRA) has been prepared in respect of the proposals for the Proposed Development.

This report summarises the assessment of flood risk for the Proposed Development as described in Volume 2, Chapter 2 of the Environment Statement (ES). This report presents the findings of the assessment of flood risk, to and from the Proposed Development, and where necessary provides an appraisal of possible mitigation measures to reduce the flood risks to acceptable levels. The following tasks have been undertaken:

- A review of existing data and information;
- An assessment of the flood risks to the site, and the possible flood risks which could occur as a result of the Proposed Development; and
- Where necessary, an assessment of the proposed measures to reduce the flood risk to acceptable levels.

## 1.2 Background

This study has been carried out in accordance with the National Planning Policy Framework (NPPF)[1]. As part of the planning process, the NPPF requires a FRA from Proposed Developments that are:

- Within flood zones 2 or 3 including minor development and change of use;
- More than 1 hectare (ha) in flood zone 1;
- Less than 1 ha in flood zone 1 with a change of use in development type to a more vulnerable class (for example, from commercial to residential), where the development could be affected by sources of flooding other than rivers and the sea (for example, surface water drains or reservoirs); and/or
- In flood zone 1 with critical drainage problems as notified by the Environment Agency.

The Environment Agency flood maps have been reviewed and shows that the Site falls within flood zone 1.

The broad aim of the NPPF is to reduce the number of people and properties within the natural and built environment at risk of flooding. To achieve this aim, planning authorities are required to ensure that flood risk is properly assessed during the initial planning stages of any development.

Responsibility for this assessment lies with developers and they must demonstrate the following:

- Whether the Proposed Development is likely to be affected by flooding;
- Whether the Proposed Development will increase flood risk to adjacent properties; and
- That the measures proposed to deal with any flood risk are sustainable.

[1] Technical Guidance to the National Planning Policy Framework (publishing.service.gov.uk)

The developer must demonstrate to the Local Planning Authority (LPA) and the Environment Agency that the existing flood risk or the flood risk associated with the Proposed Development can be satisfactorily managed.

## 1.3 Environment Agency Requirements

The detail and complexity of an FRA should reflect the level of risk to the Proposed Development. Guidance is available on the Environment Agency's website[2]. The guidance is based on the requirements for different development scenarios, based on the size of the development and the location within the floodplain. The FRA should contain:

1. A location plan and a site plan. The site plan should show the existing site, development proposals and identify any structures which may affect local hydraulics;
2. Surveys showing existing and proposed site levels;
3. An assessment of the flood risk, including:
    - Consideration of whether the site falls within the functional floodplain;
    - Details of any flood alleviation measures in place;
    - Information on all potential sources of flooding and the impact of flooding on the site;
    - An assessment of how users of the development can avoid exposure to flooding in and around the development, including whether safe access and exit can be provided for routine and emergency access under both frequent and extreme flood conditions;
    - An assessment of how the layout and form of development can be used to reduce or minimise flood risk;
    - An assessment of the capacity of any drains or sewers, existing or proposed, on the site during various flood events;
    - An assessment of the volume of surface water run-off likely to be generated from the Proposed Development, and proposals for surface water management according to sustainable drainage principles, with the aim of not increasing, and where practicable, reducing the rate of runoff from the site as a result of the development;
    - The likely impact of any displaced water on third parties caused by alterations to ground levels or raising flood embankments;
    - The potential impact on rivers or coastal areas, and the likely longer-term stability and sustainability of existing defences;
    - The potential impact of climate change (CC) which could affect the probability and intensity of events in the future;
    - The remaining (known as residual) risks to the site; and
    - Consideration of the proposal relative to any existing Strategic Flood Risk Assessment carried out by the local authority.

## 1.4 Flood Risk

Flood risk includes the statistical probability of an event occurring and the scale of the potential consequences. The risk is estimated from historical data and expressed in terms of the expected frequency (or 'return period') of a flood of a given magnitude. The 10-year, 50-year and 100-year floods have a respective 10%, 2% and 1% chance of occurring in any given year (this is termed the Annual Exceedance Probability [AEP]), however, over a longer

[2] http://www.environment-agency.gov.uk/research/planning/93498.aspx

period the probability of flooding is considerably greater. For example, for the 100-year return period flood, there is a:

- 1% chance of the 100-year flood occurring or being exceeded in any year.
- 26% chance of it occurring or being exceeded in a 30-year period.
- 51% chance of it occurring or being exceeded in a 70-year period.

Table 1-1 provides a summary of the relevant AEP and corresponding return periods.

**Table 1-1 Definition of AEP and 'return period' flood events.**

| AEP (%) | Return period (years) |
|---|---|
| 50% | 2 |
| 10% | 10 |
| 5% | 20 |
| 4% | 25 |
| 2% | 50 |
| 1% | 100 |
| 0.5% | 200 |
| 0.1% | 1,000 |

# 2. Site Description

## 2.1 Existing Site

The proposed Park development (henceforth referred to as the 'Proposed Development') is 0.91 ha in area (henceforth referred to as the 'Site') that is being proposed as part of the wider regeneration of the Former Central Retail Park (FCRP). The Site is currently comprised of vacant hardstanding areas, tree lines, and patches of scattered shrub and grass vegetation throughout. The overall FCRP regeneration also comprises the Phase 1 development adjacent to the northwest of the Proposed Development: Manchester Digital Campus by the Government Property Agency (GPA) and the prospective Phase 2 development adjacent to the east. Phase 1 is anticipated to be constructed prior to the Proposed Development as described in Volume 2, Chapter 2 of the ES.

The Site is located in Ancoats, at the north-eastern fringe of Manchester City Centre; it is bounded by Great Ancoats Street to the south, Cotton Field Park and Co-op Academy New Islington to the north, and ultimately the Phase 1 development to the northwest.

The Proposed Development lies between two canal channels; the Rochdale Canal which is approximately 114 m to the west and the Ashton Canal which is 70 m to the east. The two canals are connected by the New Islington Marina which is directly adjacent to the north of the Proposed Development. The River Medlock is located approximately 550 m to the east of the Site and may be hydraulically connected to the two canal systems that bounds the Site. The Rochdale Canal and Ashton Canals are hydraulically connected with each other, as well as with the River Medlock (see Appendix A). However, the River Medlock is considered sufficiently far enough downstream of the Site to eliminate any of its potential indirect impact to the Proposed Development.

The approximate national grid reference for the Proposed Development is: SJ 85158 98401.

The postcode for the Proposed Development is: M4 5BA.

The location of Proposed Development is shown in Figure 2-1 and Appendix B.

## 2.2 Proposed Development

A full description of the Proposed Development is provided in Volume 2, Chapter 3 of this ES.

The scope of works to construct the Proposed Development excludes the earthworks within the central corridor of the Site as these are to be undertaken by the Phase 1 development. Therefore these are excluded from further consideration in this FRA>

## 2.3 Topography

The Site is situated an average elevation of 48 mAOD with an approximate 5 m ground level change across it, descending from the northeast corner by the New Islington Marina towards the southwest corner by Great Ancoats Street (Figure 2-2)[3].

## 2.4 Geology

A geotechnical desk study of the Site was undertaken using readily available information from online sources, published data, and historical information.

The Site is underlain by the bedrock geology Chester Formation Sandstone[4]. The Chester Formation Sandstone is described by the British Geological Survey (BGS) as "a formation that progressive change in lithology upwards, from coarse- to fine-grained. The gravel is composed of well-rounded pebbles, cobbles, and boulders in the coarse- to fine-granulestone and silty sandstone matrix". The aquifer designation of the bedrock is classed as Principal.

The Site is underlain by the superficial geology of Till, Devensian. The Till, Devensian is referred to as diamicton, which is unsorted to poorly sorted terrigenous sediment matrix of mud or sand containing suspended particles of clay to boulder size materials. The aquifer designation of the superficial drift is classed as Secondary (undifferentiated)[5].

The Site is not within a Source Protection Zone5.

[3] Defra Survey Data Download

[4] GeoIndex - British Geological Survey (bgs.ac.uk)

[5] Magic Map Application (defra.gov.uk)

## 2.5 Soils

Soil information was obtained from Soilscapes viewer[6]. The soil underlying the Proposed Development is Soil Type 17 which is described as slowly permeable, seasonally wet, acid, loamy and clayey soils with impeded drainage. This soil class tends to drain to the stream network. The main risk associated with Soil Type 17 is overland flow from compaction, and the overland flow transporting fine sediments in suspension or solution. However, because the existing hardstanding area will be left in situ and the Proposed Development is to be built on top, the relevance of the underlying Soil Type 17 is redundant.

[6] Soilscapes soil types viewer - Cranfield Environment Centre. Cranfield University (landis.org.uk)

384750 385000 385250 385500

398500

398250

N

Loom St
Blossom St
Cotton St
Hood St
Murray St
New Union St
Chippenham Rd
Gun St
Henry St
A62
Redhill St
Lockyard La
Weybridge Rd
Pickford St
New Islington Free School
Dean St
Port St
A665
Tariff St
Brewer St
Ancoats
Great Ancoats Street
Old Mill St
New Islington
Ducie St
Millbank St
Pollard Street
A662
Jutland St
Store St
Chapeltown St

AtkinsRéalis

Site Boundary
Ashton Canal and Peak Forest Canal (Lower Section)
Rochdale Canal (Western Section)
New Islington Marina

Cheetham Hill
Collyhurst
Miles Platting
Manchester
Ardwick
Brunswick
B5117
A34
A5184
Kilometres
0 1 2

© Environment Agency copyright and/or database right 2024. All rights reserved. Contains Ordnance Survey data © Crown copyright and database right 2024. Contains data from OS Zoomstack

Metres
0 25 50 75 100

*AtkinsRéalis* ©
Consulting Engineers
The Hub
500 Park Ave,
Bristol, South Glos.,
England, BS32 4RZ
Tel: +44(0)1454 662000
Fax: +44(0)1454 663333
www.atkinsrealis.com

Client
Manchester City Council

Project
Former Central Retail Park: The Park

Title
Location of the Former Central Retail Park – The Park

| Sheet Size | Original Scale | Designed / Drawn | Checked | Authorised |
|---|---|---|---|---|
| A3 | 1:2,500 | BT | RS | LR |
| | | Date 30/07/24 | Date 30/07/24 | Date 30/07/24 |

Drawing Number
Figure 2-1

Rev
01

384750
385000
385250
385500
398500
398250
N

AtkinsRéalis

Site Boundary
Ashton Canal and Peak Forest Canal (Lower Section)
Rochdale Canal (Western Section)
New Islington Marina

**Elevation (mAOD)**
60
27

Maxar, Microsoft © Environment Agency copyright and/or database right 2024. All rights reserved.

Metres
0 25 50 75 100

*AtkinsRéalis* ©
Consulting Engineers
The Hub
500 Park Ave,
Bristol, South Glos.,
England, BS32 4RZ
Tel: +44(0)1454 662000
Fax: +44(0)1454 663333
www.atkinsrealis.com

Client
Manchester City Council

Project
Former Central retail Park: The Park

Title
Topographic Relief of the Former Central Retail Park – The Park

| Sheet Size | Original Scale | Designed / Drawn | Checked | Authorised |
|---|---|---|---|---|
| A3 | 1:2,500 | BT | RS | LR |
| | | Date 30/07/24 | Date 30/07/24 | Date 30/07/24 |

Drawing Number
Figure 2-2

Rev
01

# 3. Existing Data and Information

## 3.1 Manchester Local Flood Risk Management Strategy (LFRMS)[7]

Local flood risk within Manchester is widespread and derives from a range of different sources that often interact with each other. For example, surface water flood risk often interacts with sewers, highway gullies, and non-main rivers of which many are culverted or partly culverted and form much of the drainage infrastructure in the City.

One of the two types of canals in Manchester is the broad canal. The Ashton, Rochdale, and Bridgewater Canals are broad canals that were initially built to serve the growing industrial centres of the North West including Manchester during the Industrial Revolution. The canals are fairly shallow with raised embankments in places and are today mainly used for tourism and carrying narrow boats and other small boats. The Bridgewater Canal is owned and operated by the Manchester Ship Canal Company in conjunction with the Bridgewater Canal Trust[8].

The two broad canals that extend from the City Centre and in proximity to the Site are the Ashton Canal and the Rochdale Canal; both are owned by the Canal and River Trust which is also the statutory Navigation Authority for both watercourses.

Under the Flood & Water Management Act 2010, Navigation Authorities do not have a flood risk management function, although they do have a statutory function to maintain their canal for navigation, which does overlap with local flood risk management functions of the LLFA (Local Lead Flood Authority).

The Ashton Canal extends eastwards into Tameside, whilst the Rochdale Canal extends north-eastwards into Oldham, Rochdale, and West Yorkshire. Both canals converge in the City Centre, where it continues for approximately a 4 km stretch until it converges again, with the Bridgewater Canal in Castlefield Basin. The Bridgewater Canal extends south-westwards into Trafford, although there is also an interaction with the River Medlock.

The broad canals do not pose a direct flood risk as they are controlled waterbodies with regulated flows, however, there is residual flood risk from overtopping and bank breaches. The probability of overtopping or a breach occurring is considered to be low, primarily due to the monitoring and maintenance activities of the Canal & River Trust. Both canals have a certain risk of overtopping due to the possibility of high inflows exceeding the capacity of the canal during storm events, particularly the Bridgewater Canal – which the Ashton Canal and Rochdale Canal convey into - because of the interaction with the River Medlock.

The residual flood risk map from canals, ponds, and reservoirs (Figure 3-1) is derived from the best-modelled risk information that was currently available at the time it was produced; hence, there are limitations and caution is needed in the use of this information. As shown in Figure 3-1, the Site falls within the Canals Breach Zone A.

Flood risk from groundwater has not been historically significant in Manchester, as there are no extensive records of historical flooding from groundwater. Although, in recent years there has been an increasing number of flood incidents whereby groundwater and springs have reportedly been the primary source, especially in the areas where no groundwater flooding has been recorded previously. The cause of this is not certain, but a combination of factors including increased rainfall events due to climate change and the upkeep of drainage infrastructure may be responsible for the increased incident of groundwater flooding.

The Environment Agency has identified areas at potential risk of groundwater flooding (Areas Susceptible to Groundwater Flooding) which is a very broad approach founded largely on geology. The detailed mapping of groundwater flood risk is very complex, but the Manchester Salford Trafford Hybrid Strategic Flood Risk Assessment (SFRA) has attempted to refine the risk within the City to some extent based on the best available information at the time it was produced. The SFRA includes information from a number of different sources, including the Environment Agency's potential groundwater rebound areas, groundwater emergence maps produced by the Department for the Environment, Food and Rural Affairs (Defra), data from the Coal Authority and drift geology mapping from the BGS. The information in the Hybrid SFRA should not, however, be viewed as fully comprehensive due to the complex nature of groundwater flooding and there are potentially additional areas of risk within the City.

As shown in Figure 3-2, the Site falls within the areas at risk of groundwater flooding. Nevertheless, the likelihood of groundwater flooding occurring in Manchester is generally low, but if it were to occur, groundwater flooding would generally not pose a significant risk due to the slow rate in which groundwater level rises.

From the Greater Manchester Surface Water Management Plan (SWMP), there is no extensive records of historical flooding from surface water runoff in Manchester, as the lists only contain five incidents between 1911–2012, all of which occurred in south Manchester and a number of which included interactions with rivers. This means before the Flood and Water Management Act 2010, incidents of surface water flooding were not well recorded unlike now. Because the SWMP is not reflective of the true occurrence of surface water flooding before 2012, it is likely more than five incidents of surface water flooding occurred between 1911–2012. Especially since there are hundreds of cases of blocked highway gullies each year, some of which have resulted in properties being flooded. Nevertheless, since 2012, incidents of surface water flooding are now better recorded, which will help inform future maintenance and where necessary work to increase capacity or attenuation within the City's drainage system.

[7] Manchester Local Flood Risk Management Strategy

[8] The Bridgewater Canal

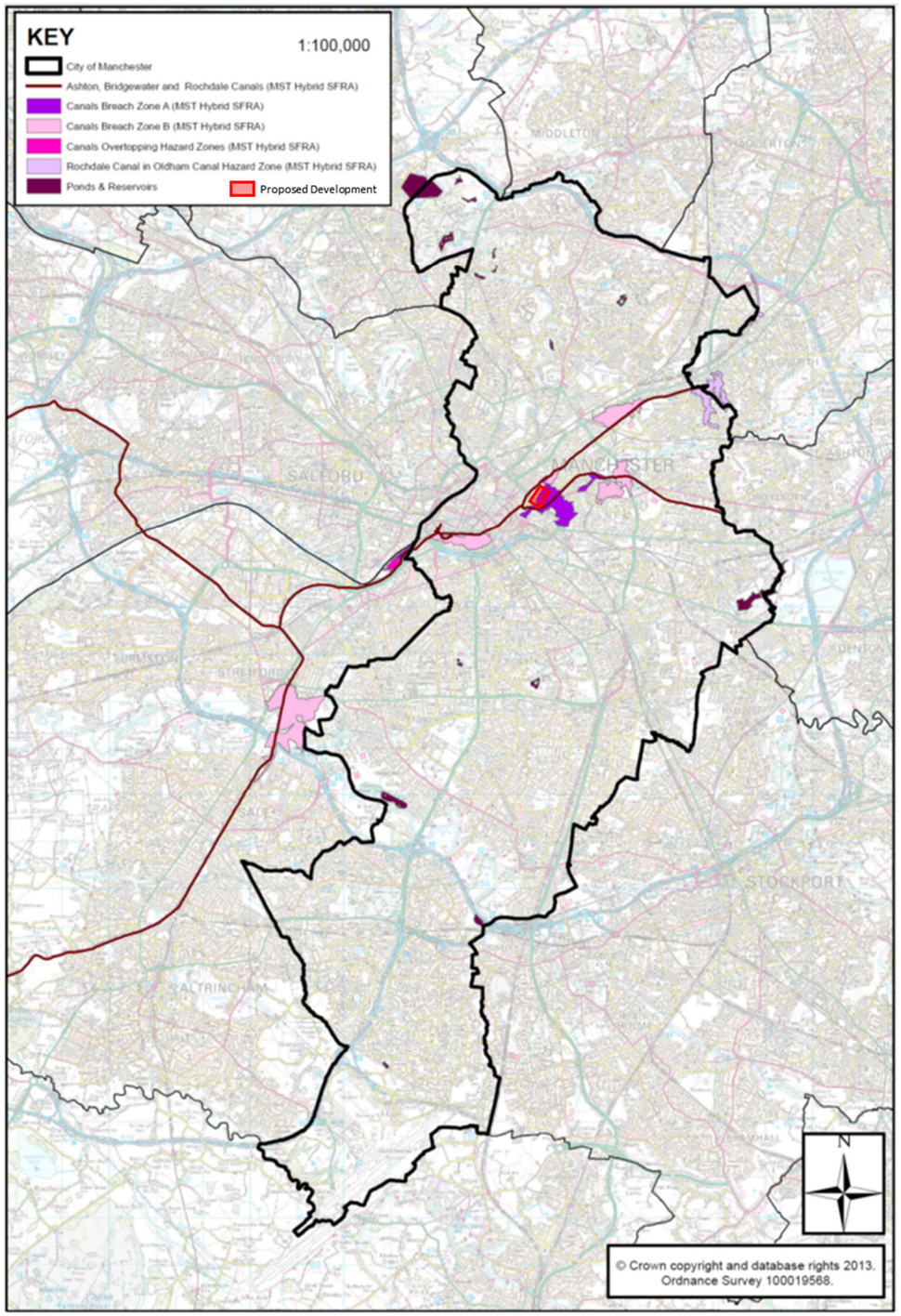



**Figure 3-1 Breach Zones of Canals, Ponds, and Reservoirs**

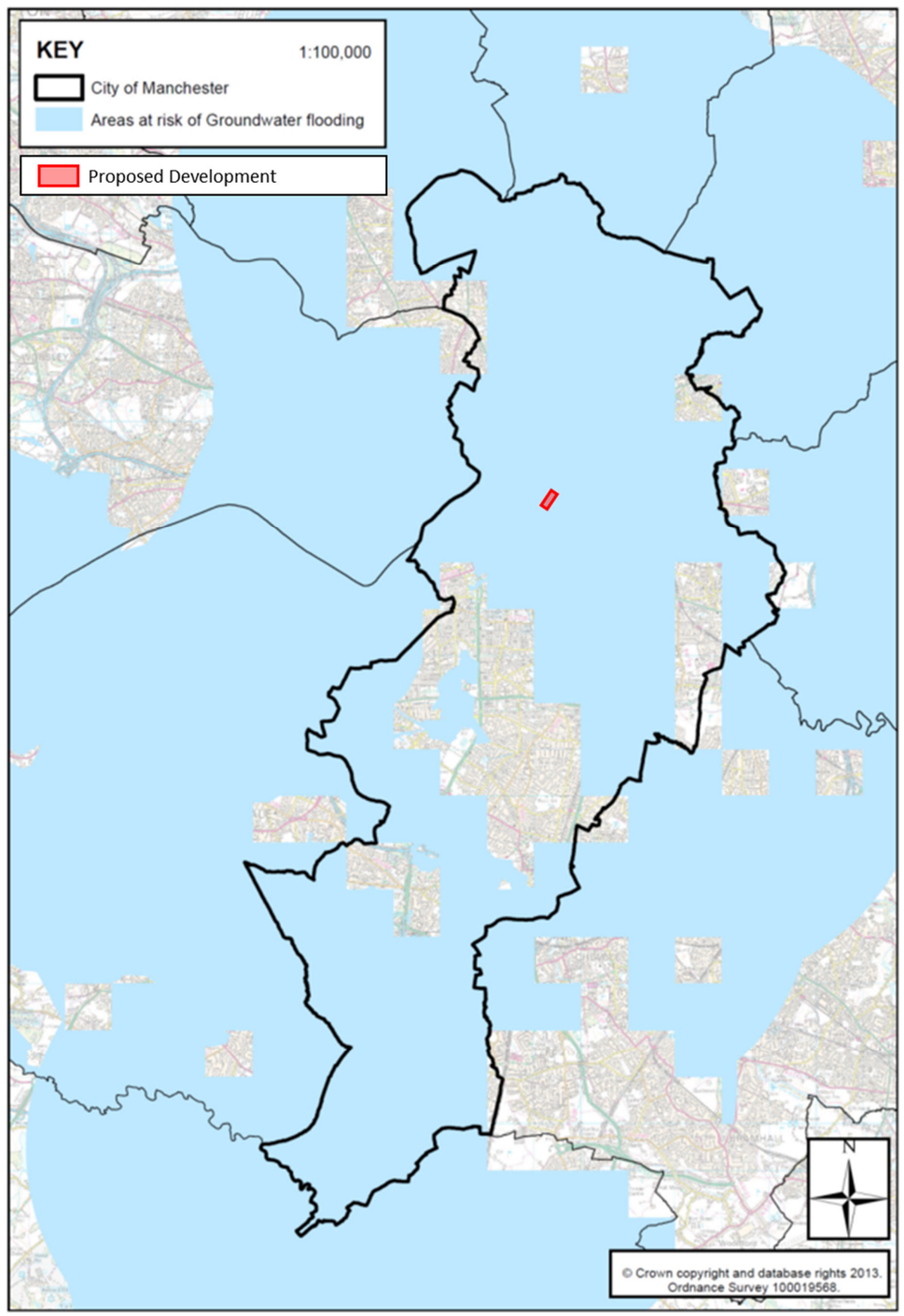



**Figure 3-2 Areas Susceptible to Groundwater Flooding in Manchester**

## 3.2 Irwell Catchment Flood Management Plan[9]

The River Medlock, which is 0.80 km to the east of the Site and may be hydraulically connected to the Rochdale and Ashton Canals, falls within the River Irwell Catchment Flood Management Plan. The Plan is divided into ten distinct sub-areas that have similar physical characteristics, sources of flooding and levels of risk (see Appendix D). These sub-areas will allow the Environment Agency and the Local Authorities to promote flood risk management approaches, policies, and actions that are most appropriate to deliver the various Government and regional strategies. The most appropriate approach to managing flood risk for each sub-area has been identified and allocated one of the six generic flood risk management policies, as shown in Appendix E

The Site falls within sub-area 1 – Manchester City Centre to Irlam. The vision and preferred flood risk management policy for this sub-area is Policy Option 4, which suggests areas of low, moderate, or high flood risk with already effective flood management but may need further action to keep pace with the impact of climate change in the long term. The vision of Policy Option 4 includes taking further action to reduce flood risk which involves assessing socially and environmentally sustainable, technically viable and economically justified options. Future flood risk management activities will also target mitigating the impact of climate change, with a focus on more sustainable and effective methods.

## 3.3 Manchester Strategic Flood Risk Assessment[10]

One of the main sources of flood risk in Manchester is the River Medlock, which flooded the centre of Manchester in 1991 and 2002. The River Medlock, which joins the River Irwell in central Manchester, is extensively culverted. Many culverts are now hidden below ground (referred to as the “hidden rivers of Manchester”) and their conditions are deteriorating, becoming blocked with debris and the cause of localised flooding following heavy rainfall. Many of the main rivers in Manchester including the River Medlock have been straightened and canalised to accelerate the flow of water as well as culverted over significant lengths. Furthermore, many of the channels and culverts have a limited hydraulic capacity and are prone to blockages, which can lead to flooding.

Surface water flooding is also a significant source of flooding, with residual flood risk coming from the Ashton, Rochdale, and Bridgewater Canals and several reservoirs. The interaction between canals and main rivers, particularly in Manchester City Centre, is integral to the understanding of flood risk. The risk of canals flooding is unknown as it depends on several factors including the source of water feeding into the canal, and the materials and condition of the canal embankments. The canals do not pose a direct flood risk, as they are controlled waterbodies with regulated flows and continuously maintained by the Canal & River Trust.

The main flood hazard of the Rochdale Canal and Ashton Canal is the overtopping and/or breach of the canal banks due to high inflow during storm events exceeding the canals’ capacity. Notwithstanding, the specific issues of overtopping the canal banks at the Rochdale Canal and Ashton Canal are consequent to, respectively, possible failure of the raised embankment at Miles Platting and possible blockage of the bywash at Ancoats in flood conditions.

As part of the SFRA, a map was produced identifying areas that are potentially at risk from groundwater flooding, which should be used to scope mitigation measures in site-specific FRAs. The map is based on Environment Agency potential groundwater rebound areas, data from the Coal Authority, BGS drift geology mapping, and Defra Groundwater Emergence Maps. As shown in Appendix A**Error! Reference source not found.**, the Proposed Development does not fall within the potential issues of groundwater flooding.

There are no known reports of groundwater flooding in Manchester. Nevertheless, past studies have identified 15 sites in England where groundwater levels were known to be rising including Trafford Park in Manchester, where groundwater levels rose by about 15 m between 1970–1986[11]. This rise was due to a reduction in abstraction from the Permo-Triassic sandstone aquifer. While the Proposed Development is not within Trafford Park, it is noted that reduced abstraction has also led to groundwater rebound in central Manchester, although levels have now stabilised[12].

Historical records are often anecdotal and incomplete, and difficult to accurately determine the frequency and magnitude of flood events; nevertheless, useful for providing background information. Also, flood risk can change over time because of natural variations in climate, changes in flood risk management activity, and changes in land use as developments have been increasingly built on the floodplain. Due to these changes, flood risk might be higher today than it was in the past, which historical records may not reflect. Historical flood events that occurred in proximity to the Site include flooding in Ancoats by the Ashton Canal in 2007, flooding in the City Centre in 1991 by an unknown source, and the River Medlock on separate occasions.

[9] River_Irwell_Catchment_Flood_Management_Plan.pdf (publishing.service.gov.uk)

[10] Manchester Strategic Flood Risk Assessment (SFRA)

[11] Brassington, F. C., (1990). ‘Rising groundwater levels in the United Kingdom’. *Proceedings of the Institution of Civil Engineers*, vol. 88, part 1, p.1037-1057.

[12] Jacobs. (2004). *Strategy for Flood and Coastal Erosion Risk Management: Groundwater Flooding Scoping Study (LDS 23)*. Final Report produced for Defra, 2 Volumes.

## 3.4 Environment Agency Flood Map (Flood Map for Planning)[13]

The Flood Map published by the Environment Agency contains flood zones for use in accordance with the NPPF and represents the risk of flooding from rivers and the sea. Flood zone 1 represents a low probability of flooding, which means there is less than 0.1% (1 in 1,000 years) annual probability of flooding from rivers or the sea. Flood zone 2 represents a medium probability of flooding, which means there is a 1% (1 in 100 years) to 0.1% (1 in 1,000 years) annual probability of flooding from rivers, or 0.5% (1 in 200 years) to 0.1% (1 in 1,000 years) annual probability of flooding from the sea. Flood zone 3 represents a high probability of flooding, which means there is a 1% (1 in 100 years) or more annual probability of flooding from rivers, or a 0.5% (1 in 200 years) or more annual probability of flooding from the sea.

The Flood Map for Planning is a high-level strategic illustration of the flood risk extent along main rivers, therefore, it does not consider ordinary watercourses including streams, ditches, and canals including the Rochdale Canal and Ashton Canal. In addition, the flood zone extent illustrated in the Flood Map for Planning does not consider the possible impacts of surface water flood risk, the probability of changing flood risk consequential to climate change, and fluvial or coastal flood defences.

The Environment Agency Flood Map for Planning shows the Site falls within flood zone 1; see Figure 3-3.

[13] Flood map for planning - GOV.UK (flood-map-for-planning.service.gov.uk)

384750 385000 385250 385500

398500

398250

N

Loom St
Blossom St
Cotton St
Hood St
Murray St
New Union St
Chippenham Rd
Gun St
Henry St
A62
Redhill St
Pickford St
Lockyard La
Weybridge Rd
New Islington Free School
Dean St
Port St
A665
Tariff St
Brewer St
Ancoats
Great Ancoats Street
Old Mill St
New Islington
A662
Ducie St
Millbank St
Pollard Street
Juland St
Store St
Chapeltown St

AtkinsRéalis

- Site Boundary
- Flood Zone 1
- Flood Zone 2
- Flood Zone 3
- Ashton Canal and Peak Forest Canal (Lower Section)
- Rochdale Canal (Western Section)
- New Islington Marina

Contains Ordnance Survey data © Crown copyright and database right 2024. Contains data from OS Zoomstack

Metres
0 25 50 75 100

*AtkinsRéalis* ©
Consulting Engineers
The Hub
500 Park Ave,
Bristol, South Glos.,
England, BS32 4RZ
Tel: +44(0)1454 662000
Fax: +44(0)1454 663333
www.atkinsrealis.com

Client
Manchester City Council

Project
Former Central Retail Park: The Park

Title
Environment Agency Flood Map for Planning

| Sheet Size | Original Scale | Designed / Drawn | Checked | Authorised |
|---|---|---|---|---|
| A3 | 1:2,500 | BT | RS | LR |
| | | Date 30/07/24 | Date 30/07/24 | Date 30/07/24 |

Drawing Number
Figure 3-3

Rev
02

## 3.5 Environment Agency Risk of Flooding from Rivers and Sea[14]

The Flood Risk from Rivers and Sea is a high-level strategic map of the extent of flood risk from main rivers. The Flood Risk from Rivers and Sea is based on predicted flood and ground levels and considers the presence and effect of flood defences, unlike the Flood Map for Planning. However, flood defences reduce but do not completely avert the chance of flooding as defences can be overtopped or fail.

High risk represents a greater than 3.3% annual probability of flooding. Medium risk represents between 1% to 3.3% annual probability of flooding. Low risk represents between 0.1% to 1% annual probability of flooding. Very low risk represents less than 0.1% annual probability of flooding.

The Environment Agency Risk of Flooding from Rivers and Sea map shows the Proposed Development does not fall within the risk of fluvial flood extent (Figure 3-4).

[14] Learn more about this area's flood risk - Check your long term flood risk - GOV.UK (check-long-term-flood-risk.service.gov.uk)

384750 385000 385250 385500

398500

398250

N

Loom St
Blossom St
Cotton St
Hood St
Murray St
New Union St
Chippenham Rd
Gun St
Henry St
A62
Redhill St
Lockyard La
Weybridge Rd
Pickford St
New Islington Free School
Dean St
Port St
A665
Tariff St
Brewer St
Ancoats
Great Ancoats Street
Old Mill St
New Islington
A662
Ducie St
Millbank St
Pollard Street
Juland St
Store St
Chapeltown St

AtkinsRéalis

- Site Boundary
- Ashton Canal and Peak Forest Canal (Lower Section)
- Rochdale Canal (Western Section)
- New Islington Marina

**Risk of Flooding from Rivers or the Sea**

- High
- Medium
- Low
- Very Low

Contains Ordnance Survey data © Crown copyright and database right 2024. Contains data from OS Zoomstack

Metres
0 25 50 75 100

*AtkinsRéalis* ©
Consulting Engineers
The Hub
500 Park Ave,
Bristol, South Glos.,
England, BS32 4RZ
Tel: +44(0)1454 662000
Fax: +44(0)1454 663333
www.atkinsrealis.com

Client
Manchester City Council

Project
Former Central Retail Park

Title
Environment Agency Risk of Flooding from Rivers or the Sea

| Sheet Size | Original Scale | Designed / Drawn | Checked | Authorised |
|---|---|---|---|---|
| A3 | 1:2,500 | BT | RS | LR |
| | | Date 30/07/24 | Date 30/07/24 | Date 30/07/24 |

Drawing Number
Figure 3-4

Rev
02

## 3.6 Environment Agency Risk of Flooding from Surface Water14

Surface water flooding – also known as flash flooding – occurs when rainwater cannot drain away through the normal drainage systems. This tends to affect areas with impermeable surfaces more severely. Therefore, the rainwater instead pools or flows overground. Surface water flooding can be difficult to predict as it is dependent on rainfall volume and location which are both difficult to forecast. In addition, local features can greatly affect the chances and severity of flooding.

The surface water flood risk maps consider the effect of flood defences in the area. Defences reduce but do not completely stop the chance of flooding as they can be overtopped or fail. The surface water flood maps are not suitable for identifying whether an individual site will flood, as information regarding floor levels, construction characteristics, or designs is not considered.

‘High’ risk of surface water flooding means that the area has a chance of flooding greater than 3.3% each year.
‘Medium’ risk of surface water flooding means that the area has a chance of flooding between 3.3% to 1% each year.
‘Low’ risk of surface water flooding means that the area has a chance of flooding of between 1% to 0.1% each year.
‘Very low’ risk of surface water flooding means that the area has a chance of flooding of less than 0.1% each year.

The surface water flood risk extent shows there is a small area of ‘low’ risk of flooding in the Site; nevertheless, a significant area is at a ‘very low’ risk of surface water flooding (Figure 3-5).

The surface water flood map of the high-risk scenario shows there are no surface water flood depths at the Site (Figure 3-6).

The surface water flood map of the medium-risk scenario shows there are no surface water flood depths at the Site (Figure 3-7).

384750 385000 385250 385500

398500

398250

N

New Union St
Chippenham Rd
Loom St
Blossom St
Cotton St
Hood St
Murray St
Gun St
Henry St
A62
Redhill St
Pickford St
Dean St
Port St
A665
New Islington Free School
Lockyard
Weybridge Rd
Tariff St
Brewer St
Ancoats
Great Ancoats Street
Old Mill St
New Islington
A662
Ducie St
Millbank St
Pollard Street
Jutland St
Chapeltown St

AtkinsRéalis

Site Boundary
Ashton Canal and Peak Forest Canal (Lower Section)
Rochdale Canal (Western Section)
New Islington Marina

**Extent of Flooding from Surface Water**
High
Medium
Low

© Environment Agency copyright and/or database right 2024. All rights reserved. Some features of this information are based on digital spatial data licensed from the Centre for Ecology & Hydrology © NERC (CEH). Defra, Met Office and DARD Rivers Agency © Crown copyright. © Cranfield University. © James Hutton Institute. Contains OS data © Crown copyright and database right 2024. Land & Property Services © Crown copyright and database right. Contains data from OS Zoomstack.

Metres
0 25 50 75 100

*AtkinsRéalis* ©
Consulting Engineers
The Hub
500 Park Ave,
Bristol, South Glos.,
England, BS32 4RZ
Tel: +44(0)1454 662000
Fax: +44(0)1454 663333
www.atkinsrealis.com

Client
Manchester City Council

Project
Former Central Retail Park: The Park

Title
Surface Water Flood Risk Extent

| Sheet Size | Original Scale | Designed / Drawn | Checked | Authorised |
|---|---|---|---|---|
| A3 | 1:2,500 | BT Date 30/07/24 | RS Date 30/07/24 | LR Date 30/07/24 |

Drawing Number
Figure 3-5

Rev
02

384750 385000 385250 385500

398500

398250

N

Loom St
Blossom St
Cotton St
Hood St
Murray St
New Union St
Chippenham Rd
Gun St
Henry St
A62
Redhill St
Lockyard La
Weybridge Rd
Pickford St
New Islington Free School
Dean St
Port St
A665
Tariff St
Brewer St
Ancoats
Great Ancoats Street
Old Mill St
New Islington
Ducie St
Millbank St
Pollard Street
A662
Jutland St
Chapeltown St

AtkinsRéalis

Site Boundary
Ashton Canal and Peak Forest Canal (Lower Section)
Rochdale Canal (Western Section)
New Islington Marina

**Water Depth in a High Risk Scenario**
Below 150mm
150-300mm
300-600mm
600-900mm

© Environment Agency copyright and/or database right 2024. All rights reserved.Some features of this information are based on digital spatial data licensed from the Centre for Ecology & Hydrology © NERC (CEH). Defra, Met Office and DARD Rivers Agency © Crown copyright. © Cranfield University. © James Hutton Institute. Contains OS data © Crown copyright and database right 2024. Land & Property Services © Crown copyright and database right. Contains data from OS Zoomstack

Metres
0 25 50 75 100

*AtkinsRéalis* ©
Consulting Engineers
The Hub
500 Park Ave,
Bristol, South Glos.,
England, BS32 4RZ
Tel: +44(0)1454 662000
Fax: +44(0)1454 663333
www.atkinsrealis.com

Client
Manchester City Council

Project
Former Central Retail Park: The Park

Title
High-Risk Scenario Surface Water Flood Depth

| Sheet Size | Original Scale | Designed / Drawn | Checked | Authorised |
|---|---|---|---|---|
| A3 | 1:2,500 | BT | RS | LR |
| | | Date 30/07/24 | Date 30/07/24 | Date 30/07/24 |

Drawing Number
Figure 3-6

Rev
02

384750 385000 385250 385500

398500

398250

N

Loom St
Blossom St
Cotton St
Hood St
Murray St
New Union St
Chippenham Rd
Gun St
Henry St
A62
Redhill St
Pickford St
New Islington Free School
Lockyard La
Weybridge Rd
Dean St
Port St
A665
Tariff St
Brewer St
Ancoats
Great Ancoats Street
Old Mill St
New Islington
Ducie St
Millbank St
Pollard Street
Jutland St
Chapeltown St

AtkinsRéalis

- Site Boundary
- Ashton Canal and Peak Forest Canal (Lower Section)
- Rochdale Canal (Western Section)
- New Islington Marina

**Water Depth in a Medium Risk Scenario**

- Below 150mm
- 150-300mm
- 300-600mm
- 600-900mm
- 900-1200mm
- Over 1200mm

© Environment Agency copyright and/or database right 2024. All rights reserved.Some features of this information are based on digital spatial data licensed from the Centre for Ecology & Hydrology © NERC (CEH). Defra, Met Office and DARD Rivers Agency © Crown copyright. © Cranfield University. © James Hutton Institute. Contains OS data © Crown copyright and database right 2024. Land & Property Services © Crown copyright and database right. Contains data from OS Zoomstack

Metres
0 25 50 75 100

*AtkinsRéalis* ©
Consulting Engineers
The Hub
500 Park Ave,
Bristol, South Glos.,
England, BS32 4RZ
Tel: +44(0)1454 662000
Fax: +44(0)1454 663333
www.atkinsrealis.com

Client
Manchester City Council

Project
Former Central Retail Park: The Park

Title
Medium-Risk Scenario Surface Water Flood Depth

| Sheet Size | Original Scale | Designed / Drawn | Checked | Authorised |
|---|---|---|---|---|
| A3 | 1:2,500 | BT | RS | LR |
| | | Date 30/07/24 | Date 30/07/24 | Date 30/07/24 |

Drawing Number
Figure 3-7

Rev
02

## 3.7 Environment Agency Risk of Flooding from Reservoirs14

The reservoir flood risk map shows the Site does not fall into the risk of flooding in the unlikely event of a reservoir failure when there is flooding from rivers.

## 3.8 Groundwater Flooding

There are no recorded incidents of groundwater flooding within Manchester; however, the Site does fall within the Areas at risk of Groundwater flooding as shown in Figure 3-2. It is recognised that the risk of groundwater flooding is highly variable, as it is heavily dependent upon local ground conditions at any time and the built environment constructed on the land. The occurrence of groundwater flooding is usually local, unlike fluvial and surface water flooding; hence, does not generally pose a significant risk due to the slow rate at which groundwater flow rises from underground to aboveground as overland flow.

Although no incident of specific groundwater flooding has been identified, this does not eliminate the risk of groundwater flooding at the development site, especially as the risk associated with groundwater flooding is not well understood. It is important to ensure development is not placed at unnecessary risk; hence measures should be in place to ensure no worsening of the existing flood issue within the area. For example, employing Sustainable Drainage Systems (SuDS) such as swales by diverting runoff to groundwater storage. However, increased use of infiltration SuDS may have the potential to increase groundwater flood risk locally, therefore, careful consideration and design are required.

## 3.9 Historical Flooding[15]

The Environment Agency Historic Flood Map shows the maximum extent of individual Recorded Flood Outlines of areas of land that have previously flooded in England from the river, sea, and groundwater springs that meet a set criterion. This, however, 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.

Most records began in 1946, hence, there are limited details about flooding incidents prior to this date. If an area is not covered by the Historic Flood Map, it does not mean that the area has never flooded, only that there are currently no records of flooding in this area that meet the criteria for inclusion. It is also possible that the pattern of flooding in the area has changed and thus the area would now flood or not flood under different circumstances.

The Environment Agency Historic Flood Map shows the Ste has not historically experienced flooding.

## 3.10 Site Drainage

Artificial drainage systems within or near the Site may present a risk of flooding through the capacity exceedance or the structural, hydraulic, geotechnical, mechanical, or operational failure of the infrastructure system or engineering installations. For example, land drainage pumps (their power supplies), sluice gates (the mechanism raising or lowering them), or outfall flap valves. Blockage and structural failure incidents are by nature isolated and unpredictable, occurring as a result of various reasons including poor design, faulty manufacture, inadequate maintenance, improper operation, unforeseen accident, vandalism or sabotage. In the urban areas, the drainage is facilitated by a sewer system.

In Manchester City Centre, rainwater is frequently drained into surface water sewers or sewers, containing both surface and wastewater (combined sewers). Flooding can occur when the sewer is overwhelmed by heavy rainfall, becomes blocked, or there is inadequate capacity to deal with the volume of rainfall draining into it. The Office of Water Trading (Ofwat), Water, and Sewerage companies are required to record internal and external flooding incidents arising from the sewer network either lack of capacity or operational problems. The ‘DG5 register’ defines internal flooding as ‘flooding that enters a building or passes below a suspended floor’. There are currently 229 properties on the DG5 Register in Manchester[16].

If the existing drainage systems are amended or augmented to receive flows from the development, the capacity of these systems could be exceeded and thus lead to flooding at the site.

## 3.11 Flood Warning[17,18]

The Environment Agency operates a Flood Warning service in areas at risk of flooding from rivers by using the latest available technology to monitor rainfall and river levels 24 hours a day to forecast the possibility of flooding.

The site is situated within a larger geographical area of the River Medlock catchment where the Environment Agency provides general early notification of possible flooding, known as Flood Alert. The Proposed development is not within an Environment Agency Flood Warning Area.

---

[15] Defra Data Services Platform

[16] Manchester City Council Preliminary Flood Risk Assessment

[17] Flood Warning Areas - data.gov.uk

[18] Flood Alert Areas - data.gov.uk

# 4. Assessment of Flood Risk

## 4.1 Overview

This FRA has included the following tasks:

- Identification of the site-specific requirements for an FRA for the development of the Site;
- Data collection;
- Assessment of potential risk of flooding to or from the Site;
- Requirements for mitigation measures.

## 4.2 Sources of Flood Risk

There are several sources of flood risk and flood mechanisms which have been investigated as part of this FRA. The sources of flood risk are:

- Fluvial flooding;
- Surface water flooding;
- Groundwater flooding;
- Sewer flooding; and
- Other sources, e.g. reservoir, canal.

### 4.2.1 Fluvial Flood Risk

Based on the Environment Agency Flood Map for Planning, the Site falls within flood zone 1 which represents less than 0.1% (1 in 1,000 years) annual probability of flooding from rivers or the sea (Figure 3-3). Furthermore, based on the Environment Agency Historic Flood Map – the Site is located in an area which has not previously experienced flooding.

In line with the FRA, a Sequential Test is not required as the Site falls outside of flood zones 2 or 3[19]. Furthermore, in accordance with the 'Table 2: Flood Risk Vulnerability Classifications' (Appendix F) and the 'Table 3: Flood Risk Vulnerability and Flood Zone Compatibility' (Appendix G) in the NPPF1, the Proposed Development is classed as a 'Water Compatible' receptor ("Amenity open space") that is situated within flood zone 1, respectively; hence an Exception Test is not required .

### 4.2.2 Surface Water Flood Risk

The Environment Agency surface water flood risk extent (Figure 3-5) shows small areas of 'low' risk of flooding but no surface water flood risk depth at a medium-risk depth scenario (Figure 3-7) within the Site. Nevertheless, the Environment Agency surface water flood maps are not suitable for identifying whether an individual site will flood, as information regarding floor levels, construction characteristics, or designs of structures are not considered.

Based on collated information, there is no recorded incident of surface water flooding within the Site. From this, in conjunction with the Environment Agency surface water flood maps and hydrogeological conditions, it can be deduced that high-intensity rainfall is unlikely to result in surface water ponding within the Site. Notwithstanding, if rainfall intensity exceeds the infiltration capacity of the ground or waterlog the ground beneath, pockets of surface water ponding may arise. However, high-intensity rainfall is unlikely to result in consequential surface water flooding within the Proposed Development based on historical records.

### 4.2.3 Groundwater Flood Risk

The Site falls within the Areas at risk of Groundwater flooding (Figure 3-2). However, there is no recorded incident of groundwater flooding at or within the vicinity of the Site. Nevertheless, this does not mean there is no risk of groundwater flooding. Prolonged periods of rainfall in the surrounding catchment can lead to an increase in groundwater levels and cause groundwater flooding. The groundwater may be in hydraulic continuity with the Rochdale Canal, Ashton Canal, and New Islington Marina although the likelihood is low due to the lining of the canal assets

It is difficult to confirm the possible extent of groundwater flooding within the Site without understanding the local processes and undertaking groundwater monitoring. However, the extent of flooding from groundwater is likely to be masked by flooding from surface water and the canals. Therefore, further assessment is not required.

### 4.2.4 Sewer Flooding

Artificial drainage systems and infrastructure within or in close proximity to the Site may present a risk of flooding through the capacity of the system network being exceeded or the structural, hydraulic, geotechnical, mechanical, or operational failure of the system infrastructure. It is considered the risk from surcharged sewer flooding is low; nevertheless, residual risk remains during extreme events and incidents of sewer blockage.

### 4.2.5 Other Sources

The Rochdale Canal, Ashton Canal, and New Islington Marina are adjacent to the Site. The risk of flooding from the canals is dependent on several factors. Canals are manmade infrastructures that are heavily controlled and thus unlikely to respond in the same way as a natural watercourse during storm events; the risk of canal flooding is instead more likely associated with residual risks. The residual risks of canal flooding include asset (gate) failure, overtopping of canal banks or breaching of embanked reaches. Canals have significant interaction with other water sources including watercourses that feed into them or drains that cross underneath the canals. Notwithstanding, there are no records of historic canal flooding or other artificial infrastructure to or within the vicinity of the Site. The risk of canal flooding to the Proposed Development is low based on historical records and the diligent, continued inspection and maintenance by the Canal and River Trust.

Based on the Environment Agency Risk of Flooding from Reservoirs, the Proposed Development is not at risk of flooding in the unlikely event of a reservoir failure when in conjunction with river flooding. Furthermore, the risk of flooding from reservoir failure is low based on historical flood records and the diligent, continued inspection and maintenance by the operating authority. Reservoirs in the UK have an extremely good safety record with no reservoir failure incidents that resulted in the loss of life since 1925[20].

## 4.3 Climate Change[21]

Climate change is expected to have a major influence on future flood risk. The expectations are that winter floods will occur more often, and in urban areas, flooding from thunderstorms will be more frequent and of increased magnitude.

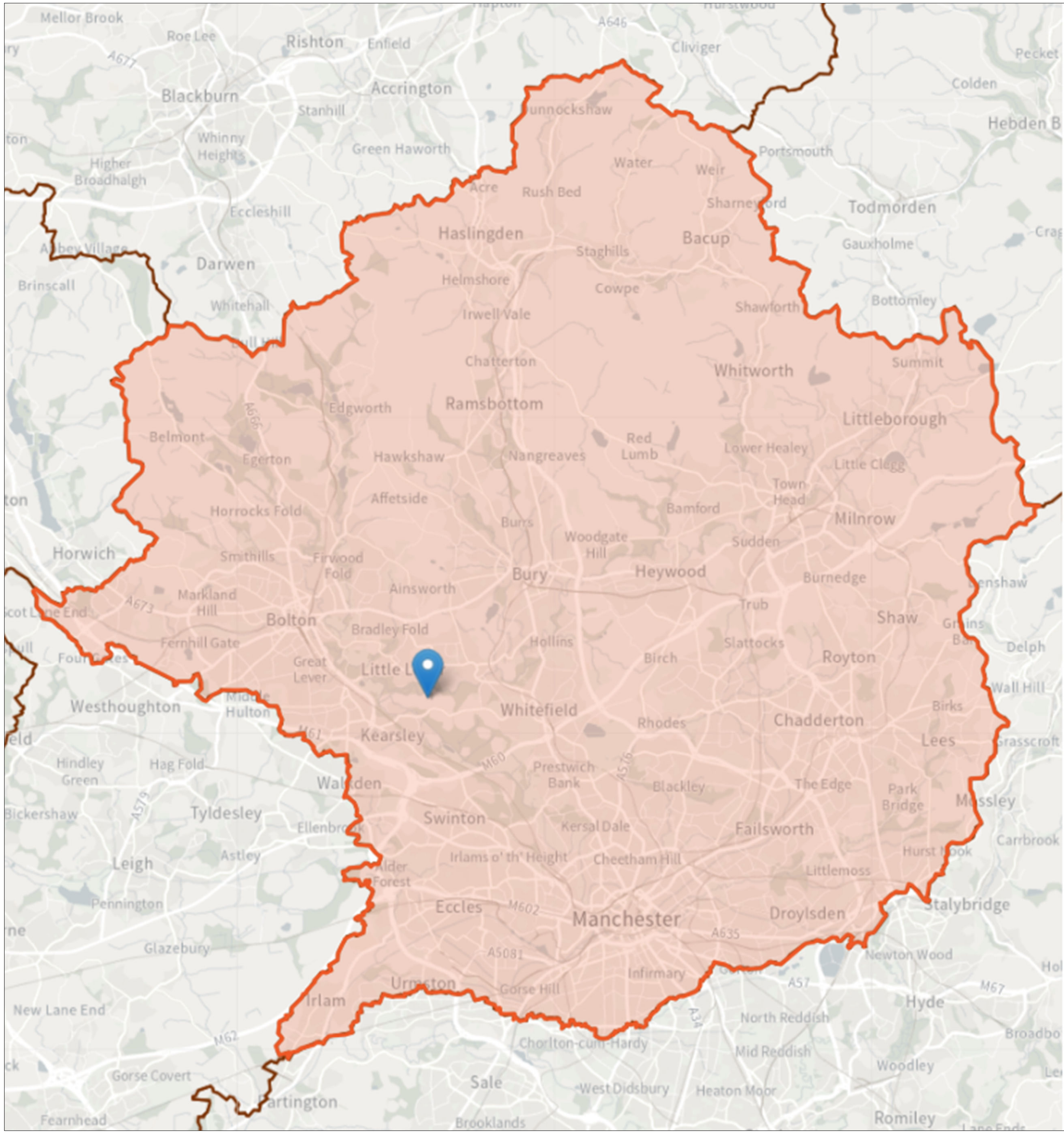
[19] Flood risk assessment: the sequential test for applicants - GOV.UK (www.gov.uk)

[20] Biennial report on reservoir safety: 1 January 2019 to 31 December 2020 - GOV.UK (www.gov.uk)

[21] Climate change allowances for peak river flow in England (data.gov.uk)

The Environment Agency Flood Map does not currently take account of future climate change. The NPPF advises that the effects of climate change at a regional level are likely to increase rainfall intensities and river peak flows; therefore, these impacts should be considered in the preparation of site-specific FRAs.

The Environment Agency Climate Change allowances have been adopted for the use of this study. As shown in Figure 4-1, the Irwell Management Catchment peak river flow allowances were used for the Site, using the 2080s Central 35%, Higher 46%, and Upper 75% climate change allowance.




## Irwell Management Catchment peak river flow allowances

| | Central | Higher | Upper |
|---|---|---|---|
| **2020s** | 12% | 15% | 24% |
| **2050s** | 19% | 26% | 43% |
| **2080s** | 35% | 46% | 75% |

This map contains information generated by UK Centre for Ecology and Hydrology using UK Climate projections.

**Figure 4-1 The Irwell Management Catchment peak river flow climate change allowances**

# 5. Mitigation of Flood Risk

Section 4 identified the potential flood risks to the Proposed Development. This section sets out the principles of how these risks will be mitigated through appropriate design and operation of the Proposed Development.

## 5.1 Fluvial Flooding

On the Environment Agency Flood Map for Planning, the Site is situated in flood zone 1: low probability of flooding (Figure 3-3), a Sequential Test is not required. In conjunction, because the Proposed Development is also classed as 'Water Compatible' ("Amenity open space"), an Exception Test is not required. The majority of the earthworks doe the Site are being undertaken by the Phase 1 development. The earthworks for the remainder of the Site (the dog-leg parallel to Great Ancoats Street and within Cotton Field Park) should not be stored within the surface water flood extent shown in Figure 3-5, where surface water ponding may potentially occur during high storm events. This reduces the incidence of surface water runoff with a high sediment load being washed to the surrounding study area.

## 5.2 Pluvial / Surface Water Flooding

The NPPF requires new developments to neither exacerbate flood risk due to reduction of the current flood storage capacity at the Site or increase runoff from the Proposed Development.

Any surface water flood risk should be managed by directing overland flow away from the infrastructure and assets, then contained/conveyed within the Proposed Development or a drainage system that is appropriately designed to ensure there is no increased off-site overland flow.

A Drainage Strategy has been completed for the Proposed Development, which demonstrates how additional surface water runoff associated with the Proposed Development will be managed.

In accordance with the Flood and Water Management Act 2010: Schedule 3, the LLFA can make it a requirement for new developments in England to incorporate SuDS, not merely recommend it[22]. The Manchester City Council (the LLFA) should hence consider whether to incorporate SuDS as a result of the Proposed Development.

## 5.3 Flooding from Sewers

All new surface water runoff collection and conveyance systems that service the Proposed Development will be designed and installed in accordance with current guidance and regulations. Therefore, the risks of failure of the new onsite drainage systems are not considered significant and no mitigation is required.

## 5.4 Flooding from Groundwater

Upon the evaluation of potential groundwater flood mechanisms and the geological and hydrogeological characteristics of the Site, there are no characteristics that suggest any significant propensity toward groundwater flooding. Any emergence of groundwater at the surface will be managed as part of the Drainage Strategy.

## 5.5 Flooding from Other Sources

The Proposed Development is at low risk of flooding from Rochdale and Ashton Canals or the New Islington Marina despite proximity, or other artificial sources. This is because canals are controlled waterbodies with regulated flows and is continuously maintained by the Canal & River Trust. In the limited likelihood the Rochdale Canal is overtopped or breached, the flood could flow beyond the towpath and into the Site as there are breaks in the boundary of the fence that separate the canal towpath from the Site (see Appendix H); but it is unlikely to spread and affect the Proposed Development area. Notwithstanding, in the unlikely event the New Islington Marina is overtopped, the Proposed Development would flood as it extends to the embankment of the New Islington Marina (see Appendix I). Any residual flooding from canal failure will be managed within the landscaped areas or through the drainage strategy which is proposed as part of the planning application.

The Proposed Development is not at risk of inundation in the unlikely event of a reservoir failure, coinciding with elevated river levels. Due to regular inspection, survey, and maintenance by the operating authorities and the extremely good safety record of no reservoir failure incidents resulting in the loss of life in the UK since 1925 – no mitigating action is deemed necessary.

[22] Sustainable drainage systems review - GOV.UK (www.gov.uk)

# 6. Conclusions and Recommendations

This FRA assesses the potential flood risks to and from the Proposed Development in accordance with the NPPF.

The Environment Agency Flood Map for Planning, and Environment Agency Risk of Flooding from Rivers and Sea map, respectively show the Proposed Development is located in flood zone 1 and does not fall within the risk of flooding from the river (and sea). Hence, no mitigation measures are required.

According to the NPPF, the Proposed Development is categorised as ‘Less Vulnerable’ (“Buildings used for shops, financial, professional and other services”). As such, because it falls within flood zone 1, an Exception Test is not required in accordance with the Flood Risk Vulnerability and Flood Zone ‘Compatibility’.

In line with the FRA, a Sequential Test is also not required as the Site falls within flood zone 1.

The Risk of Flooding from Surface Water map shows there are small pockets of ‘low’ risk of surface water flooding at the Site, with no flood depths in a medium-risk scenario. Nevertheless, a significant area is at a ‘very low’ risk of surface water flooding.

In accordance with the Flood and Water Management Act 2010: Schedule 3, the LLFA can make it a requirement for new developments in England to incorporate SuDS. It should be confirmed with Manchester City Council (the LLFA) whether to incorporate SuDS as a result of the Proposed Development.

Climate change is expected to increase rainfall intensity, which may result in increased surface water runoff and consequently flood risk to the Proposed Development. The impacts of climate change should be considered by designing surface water management to accommodate the predicted effects of climate change in the design life of the Proposed Development.

A residual risk of flooding from the potential failure of artificial drainage systems within the Proposed Development area will always remain. Therefore, the Proposed Development should incorporate features that can mitigate any residual risk of flooding, by providing overland flow paths that are designed to convey flows away from the area.

# APPENDICES

# Appendix A. Hydraulic Interactions and Groundwater Flooding Issues[23]

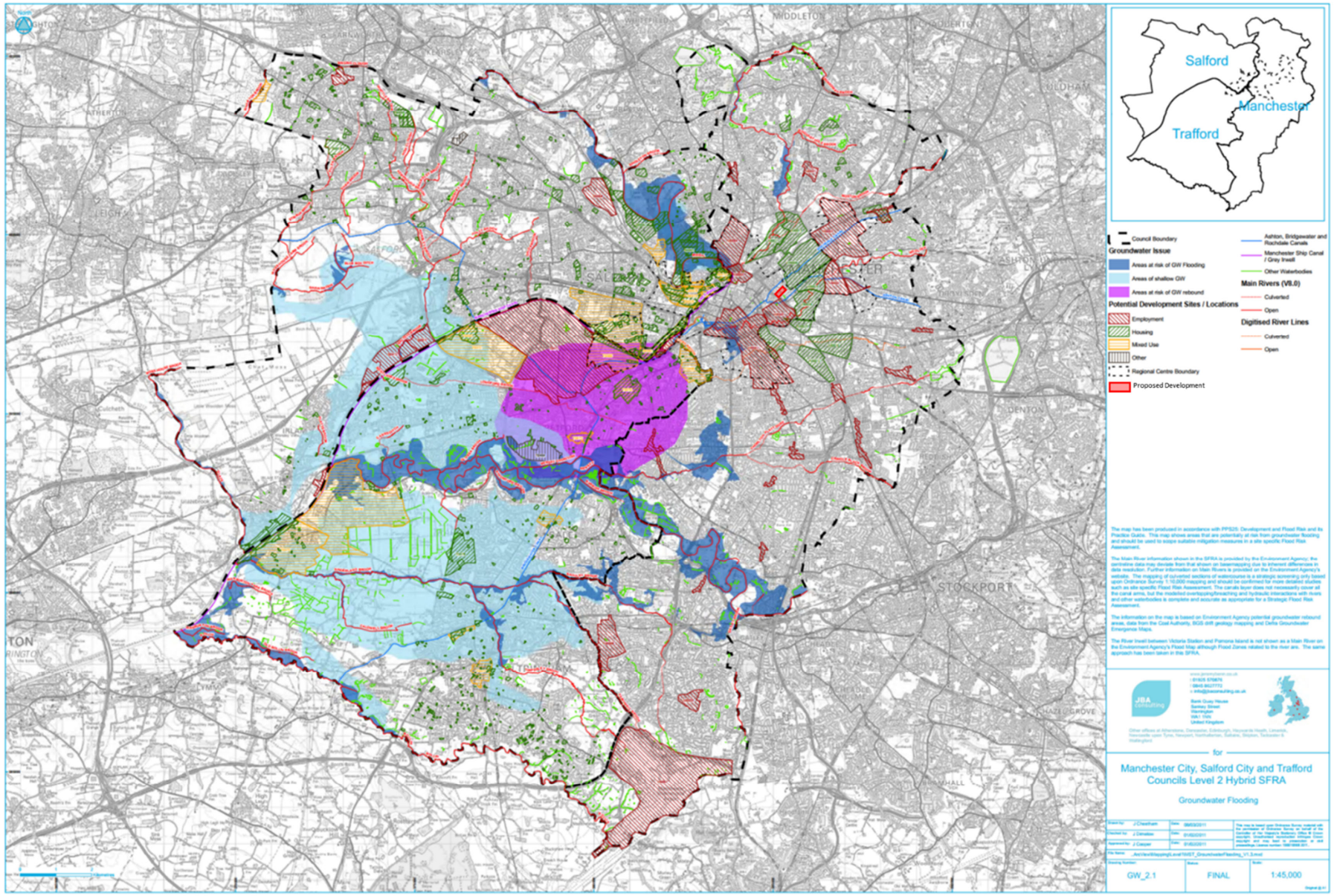



**Figure A-1 Map of the hydraulic interaction within the Manchester City, Salford City, and Trafford Councils from the Manchester LFRMS**

[23] https://www.manchester.gov.uk/download/downloads/id/26467/map_-_mst_hydraulic_interactions_hi_51.pdf

# Appendix B. Location of Proposed Development

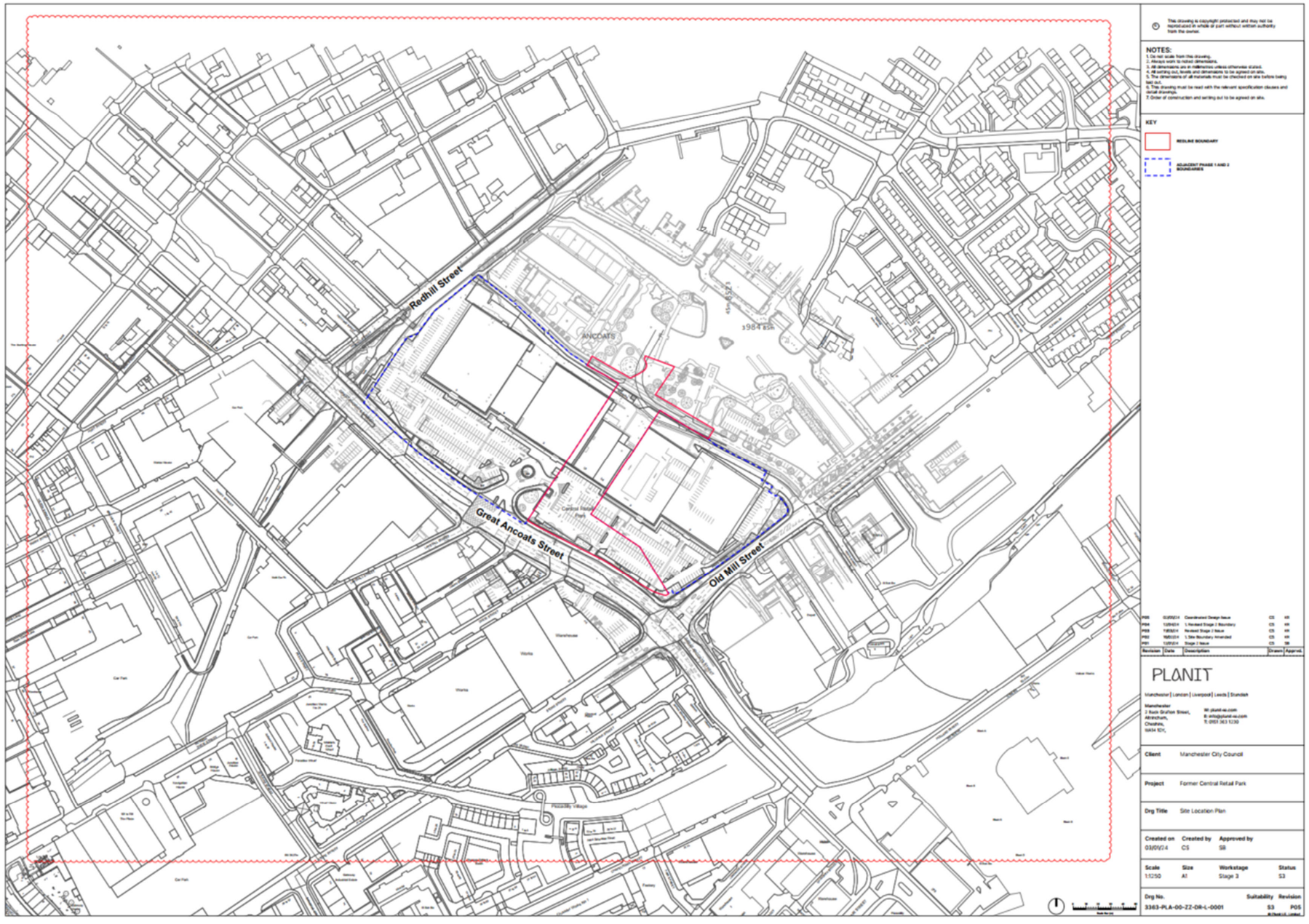



**Figure B-1 Location of the Proposed Development (3363-PLA-00-ZZ-DR-L-0001-Site Location Plan)**

# Appendix C. Landscape Masterplan of Proposed Development




**Figure C-1 – Indicative landscape masterplan of the Proposed Development (3363-PLA-00-ZZ-DR-L-0002-Landscape Masterplan)**

# Appendix D. River Irwell 10 sub-areas[9]

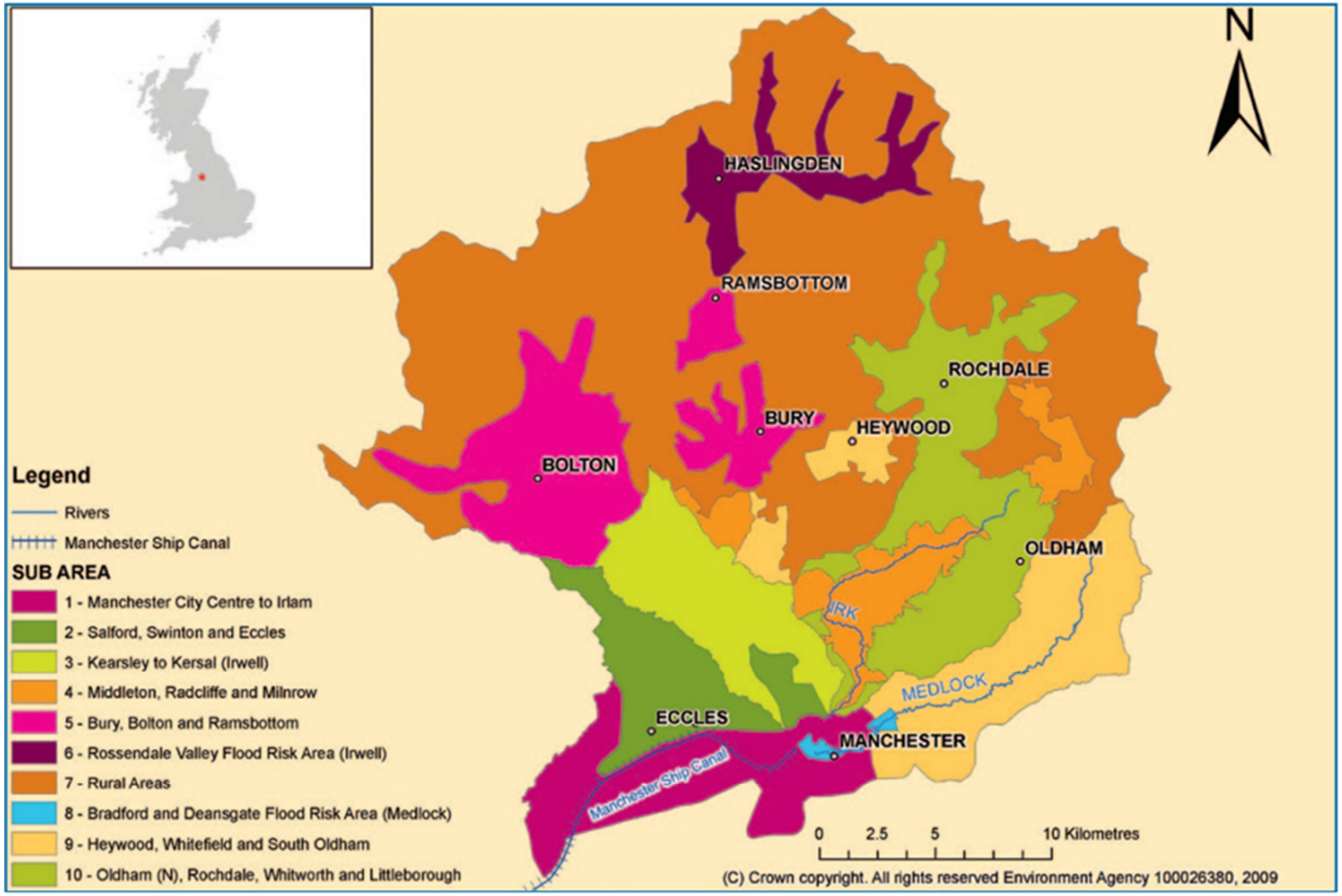



**Figure D-1 River Irwell 10 sub-areas in the Irwell Catchment Flood Management Plan**

# Appendix E. Six generic flood risk management policy options9

**→ Policy 1**

**Areas of little or no flood risk where we will continue to monitor and advise**

This policy will tend to be applied in those areas where there are very few properties at risk of flooding. It reflects a commitment to work with the natural flood processes as far as possible.

**→ Policy 2**

**Areas of low to moderate flood risk where we can generally reduce existing flood risk management actions**

This policy will tend to be applied where the overall level of risk to people and property is low to moderate. It may no longer be value for money to focus on continuing current levels of maintenance of existing defences if we can use resources to reduce risk where there are more people at higher risk. We would therefore review the flood risk management actions being taken so that they are proportionate to the level of risk.

**→ Policy 3**

**Areas of low to moderate flood risk where we are generally managing existing flood risk effectively**

This policy will tend to be applied where the risks are currently appropriately managed and where the risk of flooding is not expected to increase significantly in the future. However, we keep our approach under review, looking for improvements and responding to new challenges or information as they emerge. We may review our approach to managing flood defences and other flood risk management actions, to ensure that we are managing efficiently and taking the best approach to managing flood risk in the longer term.

**→ Policy 4**

**Areas of low, moderate or high flood risk where we are already managing the flood risk effectively but where we may need to take further actions to keep pace with climate change**

This policy will tend to be applied where the risks are currently deemed to be appropriately-managed, but where the risk of flooding is expected to significantly rise in the future. In this case we would need to do more in the future to contain what would otherwise be increasing risk. Taking further action to reduce risk will require further appraisal to assess whether there are socially and environmentally sustainable, technically viable and economically justified options.

**→ Policy 5**

**Areas of moderate to high flood risk where we can generally take further action to reduce flood risk**

This policy will tend to be applied to those areas where the case for further action to reduce flood risk is most compelling, for example where there are many people at high risk, or where changes in the environment have already increased risk. Taking further action to reduce risk will require additional appraisal to assess whether there are socially and environmentally sustainable, technically viable and economically justified options.

**→ Policy 6**

**Areas of low to moderate flood risk where we will take action with others to store water or manage run-off in locations that provide overall flood risk reduction or environmental benefits**

This policy will tend to be applied where there may be opportunities in some locations to reduce flood risk locally or more widely in a catchment by storing water or managing run-off. The policy has been applied to an area (where the potential to apply the policy exists), but would only be implemented in specific locations within the area, after more detailed appraisal and consultation.

**Figure E-1 The six generic flood risk management policy options**

# Appendix F. Table 2: Flood Risk Vulnerability Classification1

| |
|---|
| **Essential infrastructure**<br>• Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk.<br>• Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including electricity generating power stations and grid and primary substations; and water treatment works that need to remain operational in times of flood.<br>• Wind turbines. |
| **Highly vulnerable**<br>• Police stations, ambulance stations and fire stations and command centres and telecommunications installations required to be operational during flooding.<br>• Emergency dispersal points.<br>• Basement dwellings.<br>• Caravans, mobile homes and park homes intended for permanent residential use[3].<br>• Installations requiring hazardous substances consent[4]. (Where there is a demonstrable need to locate such installations for bulk storage of materials with port or other similar facilities, or such installations with energy infrastructure or carbon capture and storage installations, that require coastal or water-side locations, or need to be located in other high flood risk areas, in these instances the facilities should be classified as "essential infrastructure")[5]. |
| **More vulnerable**<br>• Hospitals.<br>• Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels.<br>• Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels.<br>• Non–residential uses for health services, nurseries and educational establishments.<br>• Landfill and sites used for waste management facilities for hazardous waste[6].<br>• Sites used for holiday or short-let caravans and camping, *subject to a specific warning and evacuation plan.*[7] |
| **Less vulnerable**<br>• Police, ambulance and fire stations which are *not* required to be operational during flooding.<br>• Buildings used for shops, financial, professional and other services, |

**Figure F-1 Flood Risk Vulnerability Classification**

# Appendix G. Table 3: Flood Risk Vulnerability and Flood Zone Compatibility[1]

| Flood risk vulnerability classification (see table 2) | | Essential infrastructure | Water compatible | Highly vulnerable | More vulnerable | Less vulnerable |
|---|---|---|---|---|---|---|
| Flood zone (see table 1) | Zone 1 | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Zone 2 | ✓ | ✓ | Exception Test required | ✓ | ✓ |
| | Zone 3a | Exception Test required | ✓ | × | Exception Test required | ✓ |
| | Zone 3b functional floodplain | Exception Test required | ✓ | × | × | × |

**Figure G-1 Flood Risk Vulnerability and Flood Zone Compatibility**

# Appendix H. Photographs of the Rochdale Canal Towpath



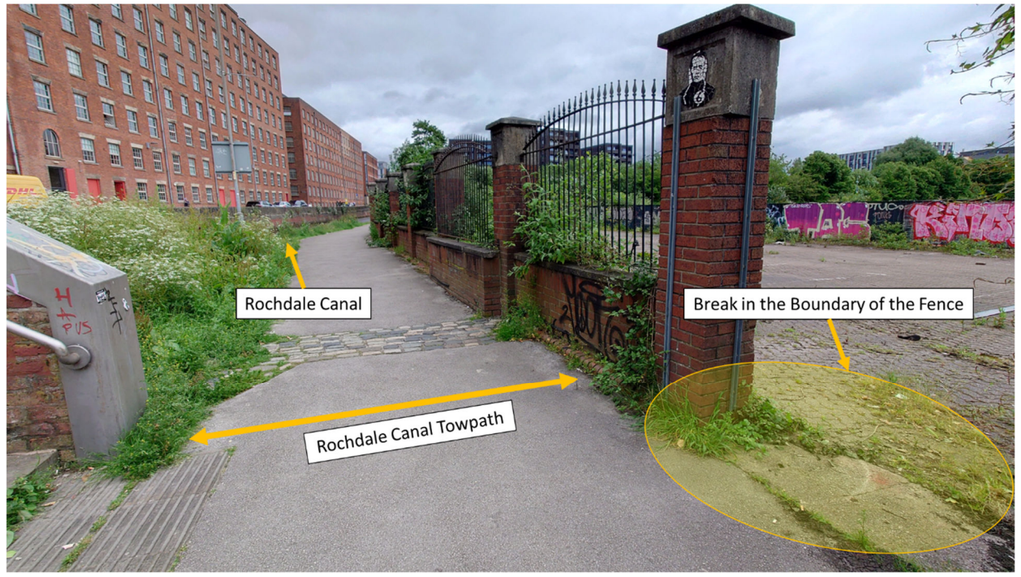




**Figure H-1 Photographs of the Rochdale Canal Towpath**

# Appendix I. Photographs of the New Islington Marina




**Figure I- 1 Photographs of the New Islington Marina**

**AtkinsRéalis**
11 Bressenden Place,
London,
SW1E 5BY

<contact info>

© AtkinsRéalis except where stated otherwise