FAR EAST CONSORTIUM FEC – REDBANK & DANTZIC ST, VICTORIA NORTH, MANCHESTER

FLOOD RISK ASSESSMENT AND DRAINAGE STRATEGY REPORT

79268-VICN-WSP-FRA-001

FAR EAST CONSORTIUM FEC – REDBANK & DANTZIC ST, VICTORIA NORTH, MANCHESTER

FLOOD RISK ASSESSMENT AND DRAINAGE STRATEGY REPORT

79268-VICN-WSP-FRA-001

PROJECT NO. 70079268

OUR REF. NO. 79268-VICN-WSP-FRA-001

DATE: April 2023

WSP

8 First Street
Manchester
M15 4RP

Phone: +44 161 200 5000

WSP.com

QUALITY CONTROL

Issue/revision	Revision P01	Revision P02	Revision P03	Revision P04
Remarks	Planning Issue	Updated following EA comments	Paragraph 5.2.13. added	Updated following further EA review
Date	26/04/2023	26/06/2023	06/07/2023	13/07/2023
Prepared by	J Brimblecombe	J Brimblecombe	J Brimblecombe	J Brimblecombe
Signature				Brimblecombe, Jack (UKJEB008) Digitally signed by Brimblecombe, Jack (UKJEB008) DN: cn=Brimblecombe, Jack (UKJEB008), ou=Active, email=Jack.Brimblecombe@wsp.com Date: 2023.07.13 14:24:17 +01'00'
Checked by	S Mostyn	S Mostyn	S Mostyn	S Mostyn
Signature				
Authorised by	R Verity	R Verity	R Verity	R Verity
Signature				
Project number	70079268	70079268	70079268	70079268
Report number	79268-VICN-WSP-FRA-001	79268-VICN-WSP-FRA-001	79268-VICN-WSP-FRA-001	79268-VICN-WSP-FRA-001
File reference				

CONTENTS

1. PROJECT BACKGROUND 5

1.1. APPOINTMENT 5
1.2. AIM OF STUDY 5
1.3. PROPOSED DEVELOPMENT 5
1.4. CONSULTATION 6
1.5. REFERENCE 8
1.6. LIMITATIONS 8

2. PLANNING POLICY AND CONSULTATION 9

2.1. RELEVANT NATIONAL AND LOCAL PLANNING POLICY AND STRATEGY DOCUMENTS 9
2.2. NATIONAL PLANNING POLICY 9
2.3. CONSIDERATION OF CLIMATE CHANGE 10
2.4. LOCAL PLANNING POLICY AND GUIDANCE 11

3. EXISTING SITE 14

3.1. SITE LOCATION 14
3.2. SITE DESCRIPTION 14
3.3. EXISTING DRAINAGE 16
3.5. EXISTING FLOOD DEFENCE INFRASTRUCTURE 17
3.6. GEOLOGY AND HYDROGEOLOGY 17

4. NPPF SEQUENTIAL AND EXCEPTION TEST 19

4.1. THE SEQUENTIAL TEST 19
4.2. THE EXCEPTION TEST 19

5. ASSESSMENT OF FLUVIAL FLOOD RISK 26

5.2. FLUVIAL FLOOD RISK 26

6. FLOOD RISK STRATEGY / MITIGATION - FLUVIAL 32

6.1. APPLICATION 4 – FLOOD RISK STRATEGY 32
6.2. APPLICATION 5 – FLOOD RISK STRATEGY 36
6.3. FLOOD RESISTANCE AND RESILIENCE 40
6.4. EMERGENCY PLAN 40

7. FLOOD RISK FROM OTHER SOURCES 42

7.2. SURFACE WATER FLOODING 42
7.3. SEWER FLOODING 43
7.4. GROUNDWATER FLOODING 43
7.5. ARTIFICIAL SOURCES OF FLOODING 43

8. MITIGATION / MANAGEMENT OF FLOOD RISK FROM OTHER SOURCES 45

8.1. DRAINAGE AND EXCEEDANCE FLOW ROUTES 45
8.2. RESERVOIR FLOODING 46
8.3. FLOOD RISK POST MITIGATION 46

9. SURFACE WATER DRAINAGE STRATEGY 47

9.2. DISPOSAL OF SURFACE WATER 47
9.3. SUDS 50
9.4. WATER QUANTITY 52
9.5. WATER QUALITY 54
9.6. MAINTENANCE 57

10. FOUL DRAINAGE 58

10.1. GENERAL STRATEGY 58
10.2. DISCHARGE RATES 58

TABLES

Table 3-1 – General Site Characteristics 15

Table 5-1 – Application 4 Model Flood Levels 28

Table 5-2 – Application 5 Model Flood Levels 30

Table 8-1 – Degree of Risk from Other Sources Pre / Post Mitigation 46

Table 9-1 – Suitability of SuDS Features for Application 4 50

Table 9-2 – Plot-by-Plot water quantities 54

Table 9-3 –Pollution Mitigation Strategy for Roofs Zone 55

Table 9-4 – Pollution Mitigation Strategy for Private Public Realm Zone 56

Table 9-5 – Pollution Mitigation Strategy for Adoptable Footway Zone 56

Table 10-1 – Application 4 Peak Foul Discharge Rates 58

FIGURES

Figure 1-1 - Development Masterplan 7

Figure 1-2 - Application 5 Proposed Site Plan 8

Figure 3-1 - Site Location Plan: Applications 4 & 5 14

Figure 4-1 - EA Flood Risk and Coastal Change Table 2 19

Figure 5-1 – FEC Baseline Model, Flood Extents 27

Figure 6-1 - WSP Flood Hazard Map 35

Figure 6-2 – Safe Access and Egress Routes – Application 4 36

Figure 6-3 – Flood Resistance and Resilience Section – Plot NT04 38

Figure 6-4 – Safe Egress Route – Application 5 – Plot NT04 39

Figure 7-1 - EA Surface Water Flood Map 42

Figure 7-2 - EA Reservoir Flood Risk Map Extract 44

Figure 9-1 – SuDS & Rainwater Management 51

APPENDICES

APPENDIX A

DEVELOPMENT MASTERPLAN

APPENDIX B

DEVELOPMENT SPECIFICATION REPORT

APPENDIX C

STATUTORY CONSULTATION

APPENDIX D

SITE LOCATION PLAN

APPENDIX E

PUBLIC SEWER RECORDS

APPENDIX F

SEWER DIVERSION PLANS

APPENDIX G

WSP FLOOD MODELLING REPORT

APPENDIX H

FLOOD MITIGATION

APPENDIX I

OVERLAND FLOW PLANS

APPENDIX J

HIF DRAINAGE PROPOSALS

APPENDIX K

DRAINAGE STRATEGY

APPENDIX L

STORAGE CALCULATIONS

APPENDIX M

DRAINAGE MAINTENANCE SCHEDULE

EXECUTIVE SUMMARY

This FRA and Drainage Strategy has been prepared in support of 2no planning applications proposing residential-led mixed-use development at Red Bank and New Town Neighbourhoods, Victoria North, Manchester. The 2no planning applications propose:

- Outline Planning Application (Application 4) (with all matters reserved): Part full planning application proposing the demolition of existing buildings and structures and part outline planning application (with all matters reserved) for the erection of a phased residential led mixed use development across severable plots comprising residential (Use Classes C3 and C2); non-residential floorspace comprising commercial, business, service and community uses (Use Classes E, F and Sui Generis); residents amenity space including within clubhouse buildings; health centre (Use Class E); a primary school (Use Class F); the final surface finish of the highway and footpath consented under HIF permission ref: 133143/VO/2022; creation of new public realm and associated landscaping, car parking provision, cycle storage, and other associated works. and;

- Full Planning Application (Application 5): Full planning application proposing the demolition of existing buildings and structures and erection of a phased residential led mixed use development comprising residential (use class C3 and C2), flexible non-residential floorspace comprising commercial, business, service and community uses (Use Classes E, F and Sui Generis); residential amenity space including within a clubhouse building, with associated car and cycle parking, hard and soft landscaping, improvement works to Dantzic Street, drainage infrastructure and associated engineering works.

As part of Application 4, a suite of Parameter Plans has been submitted for approval which are shown at Figure 1.1 and provided at Appendix A of this report. As part of Application 5, a suite of application drawings including site plans, floorplans and elevations have been submitted for approval. The Proposed Site plans for application 5 are also provided at Appendix A. Chapters 1-5 of the Environmental Statement and the Design and Access Statement plus Supporting Planning Statement submitted in support of both planning applications provide a detailed description of the Application 4 and 5 proposal and should be read prior to this report.

In April 2017, Manchester City Council (MCC) appointed FEC as its Joint Venture (JV) investment and delivery partner, to accelerate the delivery of the Victoria North opportunity. This appointment was the conclusion of an international marketing exercise that commenced in April 2016. Since making this appointment, in February 2019, MCC approved the Northern Gateway Strategic Regeneration Framework (SRF), which provides an updated vision, core objectives and development framework to guide the regeneration of Northern Gateway (now known as Victoria North) with a focus on the provision of housing and supporting infrastructure investment.

The JV has secured £51.6 million from the Government's HIF to help unlock the housing potential at Red Bank. The funding will be used to address a series of up-front infrastructure requirements to support the delivery of the new homes and green spaces at Red Bank. Alongside the delivery of the HIF infrastructure works, JV investment is focused on plot development and housing delivery, whilst also addressing challenges/ opportunities in adjoining neighbourhoods to ensure the delivery of the wider Victoria North Initiative, in accordance with the aspirations and timescales of the SRF.

The infrastructure and enabling works, and the plot development on land controlled and owned by FEC and MCC at Red Bank and New Town to the south of Dantzic Street and north of the railway viaduct constitutes the “development project”. Due to the HIF funding and programme requirements, it was decided to approach the delivery of this development project by progressing a series of planning applications.

FEC’s outline application (Application 4) and full application (Application 5) which this FRA and Drainage Strategy relates to are the fourth and fifth planning applications submitted at the site, but the first applications made by FEC. The application follows the previous grant of planning permissions obtained by MCC for the HIF enabling and infrastructure works. Applications 1, 2 and 3 relate to HIF enabling and infrastructure works and were submitted by MCC. These applications have full planning permission and are summarised below:

- Application 1: MCC Reference: 132252/VO/2021- City Council Development for enabling works including tree and vegetation removal, creation of a temporary haul road and demolition of the Creamline Dairies buildings in association with the future delivery of the new Red Bank Neighbourhood. Granted 23 December 2021.

- Application 2: MCC Reference: 133143/VO/2022- City Council Development for the creation of development platforms, including remediation and earthworks, and change in site levels, to allow delivery of future residential-led development at the Red Bank Neighbourhood, together with the construction of a new road and priority junction from Red Bank, new drainage infrastructure, utility and services connections and diversions, preparatory tree and shrub clearance, and demolition of certain existing structures, along with the creation of new and improved green infrastructure and landscaping including the improvements of St Catherine's Wood to form part of a City River Park, and other associated works. Granted 14 July 2022.

- Application 3: MCC Reference: 135190/VO/2022- City Council Development for utility and services connections and diversions to Dantzic Street, Dalton Street and Collyhurst Road associated with the delivery of future residential-led development at the Red Bank Neighbourhood, Victoria North. Granted 8 December 2022.

The report has been written in due cognisance of the National Planning Policy Framework (NPPF) and the Manchester, Salford and Trafford Strategic Flood Risk Assessment as well as other relevant local and national planning policy and guidance documents.

Fluvial flood risk has not been assessed using the EA Flood Map for Planning for this development. It has been assessed using a model built by the FEC design team known as the *FEC Baseline Model*.

The *FEC Baseline Model* represents the current flood risk to the site and shows that the proposed plots RB06, RB07, RB10, RB16 and RB17 associated with Application 4 are within an area shown to be at risk of flooding form the River Irk. Plots NT02, NT03 and NT04 associated with Application 5 are also shown to be at risk of flooding from the River Irk.

Separate models were built by the FEC team using the *FEC Baseline Model* to represent and assess flood risk as a result of the proposed Application 4 and Application 5 developments. The results of both of these models have shown that, due to the finished floor level of the proposed buildings being set, wherever possible, above the design flood level, there is no adverse impact of flooding as a result of the development

associated with either planning application either on site or elsewhere in the local catchment. This is in line with the requirements of the NPPF.

For Application 4 this was achievable for all development plots. Where this was not achievable for Application 5, and specifically plot NT04, mitigation measures have been agreed with the Environment Agency through consultation.

Flood resistance and resilience measures are recommended across both applications and an Emergency Plan is also recommended with the end user of the site subscribing to the EA Automated Flood Warning System so that site users can be evacuated before the onset of a flood or take safe refuge.

Safe access and egress routes are provided for all development plots for pedestrians and emergency services which are above the design flood level.

The provision of Sustainable Drainage Systems (SuDS) has been considered and, where appropriate, has been included within the surface water drainage proposals. It is proposed that SuDS features will include permeable pavements, rain gardens, below ground attenuation systems and swales as part of the surface water drainage proposals.

It is proposed that for all development plots to the north of the River Irk, surface water from the site will be discharged at a rate of 22 litres per second per hectare into a new primary surface water drainage system proposed as part of the HIF infrastructure planning consent. The HIF surface water drainage system then discharges to the River Irk, at proposed new purpose-built surface water outfalls.

A new surface water carrier drain and outfall to the River Irk will be provided to serve development plots to the south of the River Irk by the FEC team. This carrier drain is required as part of both the Application 4 and 5 planning applications as it intended to serve plots RB16 and RB17 (Application 4) plus NT02 to NT04 (Application 5).

The proposed outfall is below the 30 year river level and therefore a surcharged outfall will need to be assessed and determined post-original planning application determination including impact on proposed site drainage systems and attenuation features. An assessment of the impact on the required attenuation storage volume in the event of a surcharged outfall has been undertaken with a 100-year river level and the 100 year plus climate change rainfall event. In the event of a surcharged outfall, it is anticipated that the required attenuation volume would rise by up to 50%. It is thought to be feasible to accommodate this increase of storage volume within the proposed NT02-04 site area. It is anticipated that the above will be resolved via the provision of a detailed drainage design plan.

A new surface water outfall to the River Irk for plot RB10 only is proposed under Application 4 and is required as this plot is remote from the proposed HIF primary surface water drainage system.

The attenuation volumes to be provided have been designed to ensure that surface water runoff for rainfall events up to and including the 100-year storm plus a 45% allowance for climate change and can be contained within the site safely without causing a risk of flooding to property on the site or elsewhere within the local catchment which is in line with guidance given in the National Planning Policy framework.

It is proposed to discharge foul drainage from the plots associated with Application 4 into either the new primary foul drainage system proposed as part of HIF consent or into the existing United Utilities combined sewerage network. Foul drainage from Application 4 and Application 5 plots to south of River Irk will be discharged directly to the existing combined sewerage system in Dantzic Street.

Water quality has been considered and it is the intention that all areas where possible will receive an appropriate level of pollution prevention and water quality treatment in line with the requirements of the Simple Index Approach as set out in the CIRIA SuDS Manual.

This Flood Risk and Drainage Strategy report concludes that in principle the development is appropriate in its proposed location, can be occupied safely for its lifetime, does not increase flood risk elsewhere in the local catchment and seeks to reduce the risk of flooding overall. This will be secured through the implementation of the recommended flood risk management and mitigation measures and the provision of an Emergency Plan to inform site users what the relevant emergency procedures are in the event of a flood.

It should be noted that Application 4 is to be a phased development and individual phases will be subject to detailed design through a number of detailed applications.

1. PROJECT BACKGROUND

1.1. APPOINTMENT

1.1.1. WSP UK Ltd have been commissioned by Far East Consortium (FEC Ltd), to undertake a Flood Risk Assessment (FRA) and Drainage Strategy Report for a proposed residential-led mixed-use development at Redbank and Dantzic Street, Manchester. This is part of the wider Victoria North Strategic Regeneration Framework (SRF).

1.2. AIM OF STUDY

1.2.1. The aim of this study is to carry out a Flood Risk Assessment and Drainage Strategy of suitable scope and detail to support separate outline and full planning applications for the site.

1.2.2. The outline planning application will hereafter be referred to as Application 4 and is associated with plots RB01-07, RB10, RB12B, RB16 and RB17.

1.2.3. The full planning application will hereafter be referred to as Application 5 and is associated with plots NT02, NT03 and NT04.

1.3. PROPOSED DEVELOPMENT

1.3.1. This FRA and Drainage Strategy has been prepared in support of 2no planning applications proposing residential-led mixed-use development at Red Bank and New Town Neighbourhoods, Victoria North, Manchester. The 2no planning applications propose:

- Outline Planning Application (Application 4) (with all matters reserved): Part full planning application proposing the demolition of existing buildings and structures and part outline planning application (with all matters reserved) for the erection of a phased residential led mixed use development across severable plots comprising residential (Use Classes C3 and C2); non-residential floorspace comprising commercial, business, service and community uses (Use Classes E, F and Sui Generis); residents amenity space including within clubhouse buildings; health centre (Use Class E); a primary school (Use Class F); the final surface finish of the highway and footpath consented under HIF permission ref: 133143/VO/2022; creation of new public realm and associated landscaping, car parking provision, cycle storage, and other associated works. and;

- Full Planning Application (Application 5): Full planning application proposing the demolition of existing buildings and structures and erection of a phased residential led mixed use development comprising residential (use class C3 and C2), flexible non-residential floorspace comprising commercial, business, service and community uses (Use Classes E, F and Sui Generis); residential amenity space including within a clubhouse building, with associated car and cycle parking, hard and soft landscaping, improvement works to Dantzic Street, drainage infrastructure and associated engineering works.

1.3.2. As part of Application 4, a suite of Parameter Plans has been submitted for approval which are shown at Figure 1.1 and provided at Appendix A of this report. As part of Application 5, a suite of application drawings including site plans, floorplans and elevations have been submitted for approval. The Proposed Site plan is also provided at Appendix A. Chapters 1-5 of the Environmental Statement and the Design and Access Statement and Supporting Planning Statement submitted in support of both planning applications provide a detailed description of the Application 4 and 5 proposals.

1.3.3. In April 2017, Manchester City Council (MCC) appointed FEC as its Joint Venture (JV) investment and delivery partner, to accelerate the delivery of the Victoria North opportunity. This appointment was the conclusion of an international marketing exercise that commenced in April 2016. Since making this appointment, in February 2019, MCC approved the Northern Gateway Strategic Regeneration Framework (SRF), which provides an updated vision, core objectives and development framework to guide the regeneration of Northern Gateway (now known as Victoria North) with a focus on the provision of housing and supporting infrastructure investment.

1.3.4. The JV has secured £51.6 million from the Government's HIF to help unlock the housing potential at Red Bank. The funding will be used to address a series of up-front infrastructure requirements to support the delivery of the new homes and green spaces at Red Bank. Alongside the delivery of the HIF infrastructure works, JV investment is focused on plot development and housing delivery, whilst also addressing challenges/ opportunities in adjoining neighbourhoods to ensure the delivery of the wider Victoria North Initiative, in accordance with the aspirations and timescales of the SRF.

1.3.5. The infrastructure and enabling works, and the plot development on land controlled and owned by FEC and MCC at Red Bank and New Town to the south of Dantzic Street and north of the railway viaduct constitutes the "development project". Due to the HIF funding and programme requirements, it was decided to approach the delivery of this development project by progressing a series of planning applications.

1.3.6. FEC's outline application (Application 4) and full application (Application 5) which this FRA and Drainage Strategy relates to are the fourth and fifth planning applications submitted at the site, but the first applications made by FEC. The application follows the previous grant of planning permissions obtained by MCC for the HIF enabling and infrastructure works. Applications 1, 2 and 3 relate to HIF enabling and infrastructure works and were submitted by MCC. These applications have full planning permission and are summarised below:

- Application 1: MCC Reference: 132252/VO/2021- City Council Development for enabling works including tree and vegetation removal, creation of a temporary haul road and demolition of the Creamline Dairies buildings in association with the future delivery of the new Red Bank Neighbourhood. Granted 23 December 2021.

- Application 2: MCC Reference: 133143/VO/2022- City Council Development for the creation of development platforms, including remediation and earthworks, and change in site levels, to allow delivery of future residential-led development at the Red Bank Neighbourhood, together with the construction of a new road and priority junction from Red Bank, new drainage infrastructure, utility and services connections and diversions, preparatory tree and shrub clearance, and demolition of certain existing structures, along with the creation of new and improved green infrastructure and landscaping including the improvements of St Catherine's Wood to form part of a City River Park, and other associated works. Granted 14 July 2022.

- Application 3: MCC Reference: 135190/VO/2022- City Council Development for utility and services connections and diversions to Dantzic Street, Dalton Street and Collyhurst Road associated with the delivery of future residential-led development at the Red Bank Neighbourhood, Victoria North. Granted 8 December 2022.

1.4. CONSULTATION

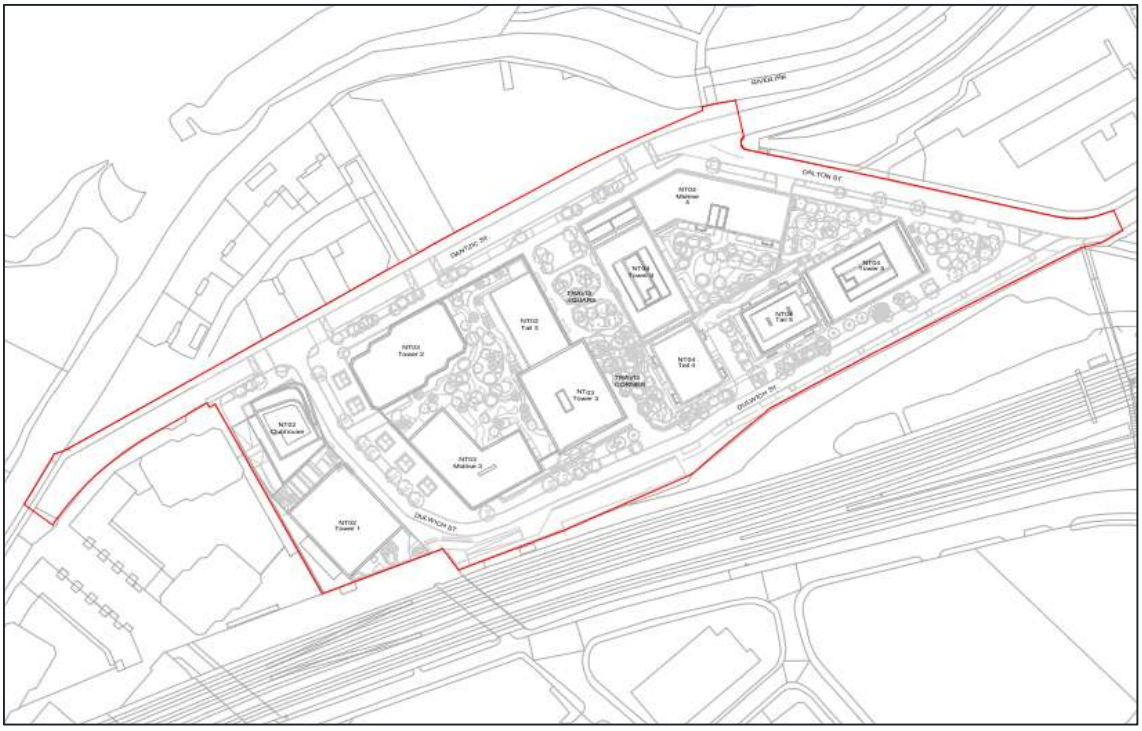
1.4.1. The following statutory consultees were contacted whilst preparing this report:

- Manchester City Council (MCC): Lead Local Flood Authority (LLFA) and Local Highways Authority;
- The Environment Agency (EA); and
- United Utilities (UU).

1.4.2. A record of all the consultations that have taken place is included as Appendix C of this report and the salient points of discussion from each of the statutory consultees are described in detail in the relevant sections of the report.

Figure 1-1 - Development Masterplan

Figure 1-2 - Application 5 Proposed Site Plan



1.5. REFERENCE

1.5.1. This FRA and Drainage Strategy has been developed in due cognisance of all relevant local and national planning policy information as detailed in section 2 of this report, along with any additional requirements as specified by statutory consultees.

1.6. LIMITATIONS

1.6.1. This report has been written using data provided by third parties. Whilst every care has been taken to ensure this information is accurate and up to date, WSP cannot guarantee the accuracy of third party data, and the findings of this report are subject to change if the data is amended or updated after consultation. The recommendations made within this report are subject to review on receipt of further consultation responses.

2. PLANNING POLICY AND CONSULTATION

2.1. RELEVANT NATIONAL AND LOCAL PLANNING POLICY AND STRATEGY DOCUMENTS

2.1.1. The following documents were reviewed as part of this Flood Risk Assessment:

- National Planning Policy Framework (Updated July 2021) and Planning Practice Guidance (Updated July 2021)
- Defra Sustainable Drainage Systems Non-Statutory Technical Standards for Sustainable Drainage Systems (March 2015)
- Sustainable Drainage Systems Written Statement HCWS161 (December 2014)
- Environment Agency Climate Change Guidance (May 2022)
- Manchester, Salford and Trafford Hybrid Strategic Flood Risk Assessment (March 2011)
- Manchester, Salford and Trafford Hybrid Strategic Flood Risk Assessment User Guide (March 2011)
- Flood and Water Management Act (April 2010)

2.2. NATIONAL PLANNING POLICY

NATIONAL PLANNING POLICY FRAMEWORK

2.2.1. The National Planning Policy Framework (NPPF) ensures that flood risk is considered at all stages in the planning process to avoid inappropriate development in areas at risk of flooding and to direct development away from areas of highest flood risk.

2.2.2. Where new development is necessary in such areas, policy aims to make it safe without increasing flood risk elsewhere and, where possible, reducing flood risk overall.

2.2.3. On 6 March 2014 the Department for Communities and Local Government launched the Planning Practice Guidance web resource to supplement the framework. On this date, PPS 25 (Development and Flood Risk) Practice Guide was cancelled and replaced by the Flood Risk and Coastal Change Planning Practice Guidance.

2.2.4. The NPPF was updated on 20th July 2021. The changes relevant to this report are centred around the inclusion of Flood Risk Vulnerability Classification, which grades development vulnerability from essential infrastructure to water-compatible development, and how an exception test should be applied dependant on the vulnerability of the development.

DEFRA NON-STATUTORY TECHNICAL STANDARDS FOR SUSTAINABLE DRAINAGE SYSTEMS (MARCH 2015)

2.2.5. This document sets out non-statutory technical standards for sustainable drainage systems. It should be used in conjunction with the National Planning Policy Framework and Planning Practice Guidance.

2.2.6. For developments which were previously developed, the peak run-off rate from the development to any drain, sewer or surface water body for the 1 in 1-year rainfall event and the 1 in 100-year rainfall event must be as close as reasonably practicable to the greenfield run-off rate from the development for the same rainfall event but should never exceed the rate of discharge from the development prior to redevelopment for that event.

2.2.7. Where reasonably practicable, for developments which have been previously developed, the run-off volume from the development to any highway drain, sewer or surface water body in the 1 in 100-year, 6 hour rainfall event must be constrained to a value as close as is reasonably practicable to the greenfield run-off volume for the same event but should never exceed the run-off volume from the development site prior to redevelopment for that event.

2.2.8. The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur on any part of the site for a 1 in 30-year rainfall event.

2.2.9. The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur during a 1 in 100-year rainfall event in any part of: a building (including a basement); or in any utility plant susceptible to water, (e.g. Pumping Station or Electricity Substation) within the development.

2.2.10. The design of the site must ensure that, so far as is reasonably practicable, flows resulting from rainfall in excess of a 1 in 100-year rainfall event is managed in exceedance routes that minimise the risks to people and property.

SUSTAINABLE DRAINAGE SYSTEMS WRITTEN STATEMENT HCWS161 (DECEMBER 2014)

2.2.11. The Secretary of State for Communities and Local Government laid a Written Ministerial Statement in the House of Commons on 18th December 2014 setting out changes to planning that will apply for major development from 6th April 2015. This confirms that in considering planning applications, local planning authorities should consult the relevant Lead Local Flood Authority on the management of surface water; satisfy themselves that the proposed minimum standards of operation are appropriate and ensure through the use of planning conditions or obligations that there are clear arrangements in place for ongoing maintenance over the lifetime of the development.

2.2.12. Therefore, from 6 April 2015 local planning policies and decisions on planning applications relating to major development are required to ensure that sustainable drainage systems (SuDS) are used for the management of surface water.

2.2.13. Major development is development involving any one or more of the following:

- The winning and working of minerals of the use of land for mineral-working deposits;
- Waste development;
- The provision of 10 dwellings or more;
- The provision of a building or buildings where the floor space to be created by the development is 1,000 square metres or more; or
- Development carried out on a site having an area of 1 hectare or more.

2.3. CONSIDERATION OF CLIMATE CHANGE

2.3.1. The Environment Agency ‘Flood Risk Assessments: Climate Change Allowances’ guidance was updated on 27th May 2022.

2.3.2. The updated guidance for peak river flows advises that:

- '*To ensure the safety of people using the development when designing safe access, escape routes and places of refuge, use the central allowance for all development types except for essential infrastructure. Use the higher central allowance for this'*.
- *'Where it is appropriate to apply a credible maximum scenario, use the upper end allowance'.*
- *'The appropriate allowance to assess off-site impacts and calculate floodplain storage compensation depends on land uses in affected areas. Use the:*
  - *central allowance for most cases*

  higher central allowance when the affected area contains essential infrastructure'.

2.3.3. For peak rainfall the EA Guidance provides an upper end and central allowance depending on epoch; the guidance recommends assessment of both the central and upper end allowances to understand the range of impact. These allowances are detailed in Table 2 (Peak Rainfall Intensity Allowance in Small and Urban Catchments) of the EA guidance.

2.3.4. Sea levels allowances reflect the previous guidance and vary on a regional basis and for each epoch as shown in Table 1 of the EA guidance.

2.3.5. As discussed in the EA Guidance the choice of the appropriate allowance for peak river flow (e.g. central or higher central) should reflect the risk for the proposed development and therefore is linked to the expected hazard, vulnerability and resilience of the scheme; recommendations on the appropriate allowances to be considered are provided in the EA Guidance.

DEVELOPMENT LIFESPAN AND APPLICABLE ALLOWANCES

2.3.6. The contingency allowances for climate change that are potentially applicable to this site are:

Peak River Flows (Irwell Catchment);

- Upper End – 75% for 2070 to 2115
- Higher Central – 46% for 2070 to 2115
- Central – 35% for 2070 to 2115

Peak Rainfall;

- Upper End – 45% for 2070 to 2115
- Central – 30% for 2070 to 2115

2.4. LOCAL PLANNING POLICY AND GUIDANCE

MANCHESTER CITY COUNCIL LOCAL DEVELOPMENT FRAMEWORK CORE STRATEGY

2.4.1. This report has been written in due cognisance of the Manchester City Council Local Development Framework Core Strategy (Adopted July 2012) in particular, policies:

- EN8 – Adaptation to Climate Change;
- EN9 – Green Infrastructure;
- EN14 – Flood Risk and
- EN17 – Water Quality

MANCHESTER, SALFORD AND TRAFFORD STRATEGIC FLOOD RISK ASSESSMENT

2.4.2. The combined Manchester, Salford & Trafford Strategic Flood Risk Assessment (SFRA) and accompanying User Guide was prepared by JBA Consulting in March 2011, in accordance with PPS 25.

2.4.3. *"The SFRA was prepared to inform the preparation of the Local Development Framework and assist the Local Planning Authority in the allocation of sites for future development and general decision making. In addition, the SFRA provides detailed development control recommendations in order to achieve a positive reduction in flood risk within these council areas".*

2.4.4. The site is shown to be located within the Conurbation Core Critical Drainage Area, "*an area within Flood Zone 1 which has critical drainage problems, and which has been notified… [to]…. The local planning authority by the Environment Agency"*.

2.4.5. The SFRA gives the following guidance in relation to surface water runoff from development sites in the area:

"Development has the potential to cause an increase in impermeable area, an associated increase in surface water runoff rates and volumes, and a consequent potential increase in downstream flood risk due to overloading of sewers, watercourses, culverts and other drainage infrastructure. It should be borne in mind that the sewer network in places across the Greater Manchester area was designed to drain less development than exists today. Development (both planned for and urban creep such as windfall development and paving over gardens) has increased the coverage of impermeable surfaces and added flow over time and the network is known to be at capacity in many places.

Managing surface water discharges from new development is therefore crucial in managing and reducing flood risk to new and existing development downstream. Carefully planned development can also play a role in reducing the amount of properties that are directly at risk from surface water flooding. The Planning System has a key role to play in settings standards for sustainable drainage from new developments and ensuring that developments are designed to take account of the risk from surface water flooding.

All development should seek to reduce existing local flooding problems and not add to them. The AGMA authorities are currently developing drainage standards for developments within Critical Drainage Areas and for all other areas. Over time, it is envisaged that local authorities will commission drainage strategies (see below) to determine in more detail, and establish the evidence base for, set reductions in surface water runoff from development sites. These will be used to inform the incorporation of targets and standards in Development Plan Documents, supported by Supplementary Planning Documents, as appropriate. With regard to this, the developer should liaise closely with the Environment Agency, United Utilities and the LPA as soon as possible to determine an appropriate reduction in runoff rate and volume with reference to discharge limits as laid down by any completed SWMP, drainage strategy or local development document for that area. Minimising surface water runoff rates within catchments should be the starting point for negotiations with Developers. In the interim, and based on the technical work undertaken for the SFRA, the following guidance is provided:

- *Development should aim for a minimum reduction in surface water runoff rates of 50% for Brownfield sites, with an aim of reducing runoff to Greenfield rates up to a 1 in 100-year storm event, considering climate change*
- *Development should be designed so that there is no flooding to the development in a 1 in 30-year event and so that there is no property flooding in a 1 in 100-year plus climate change*

event

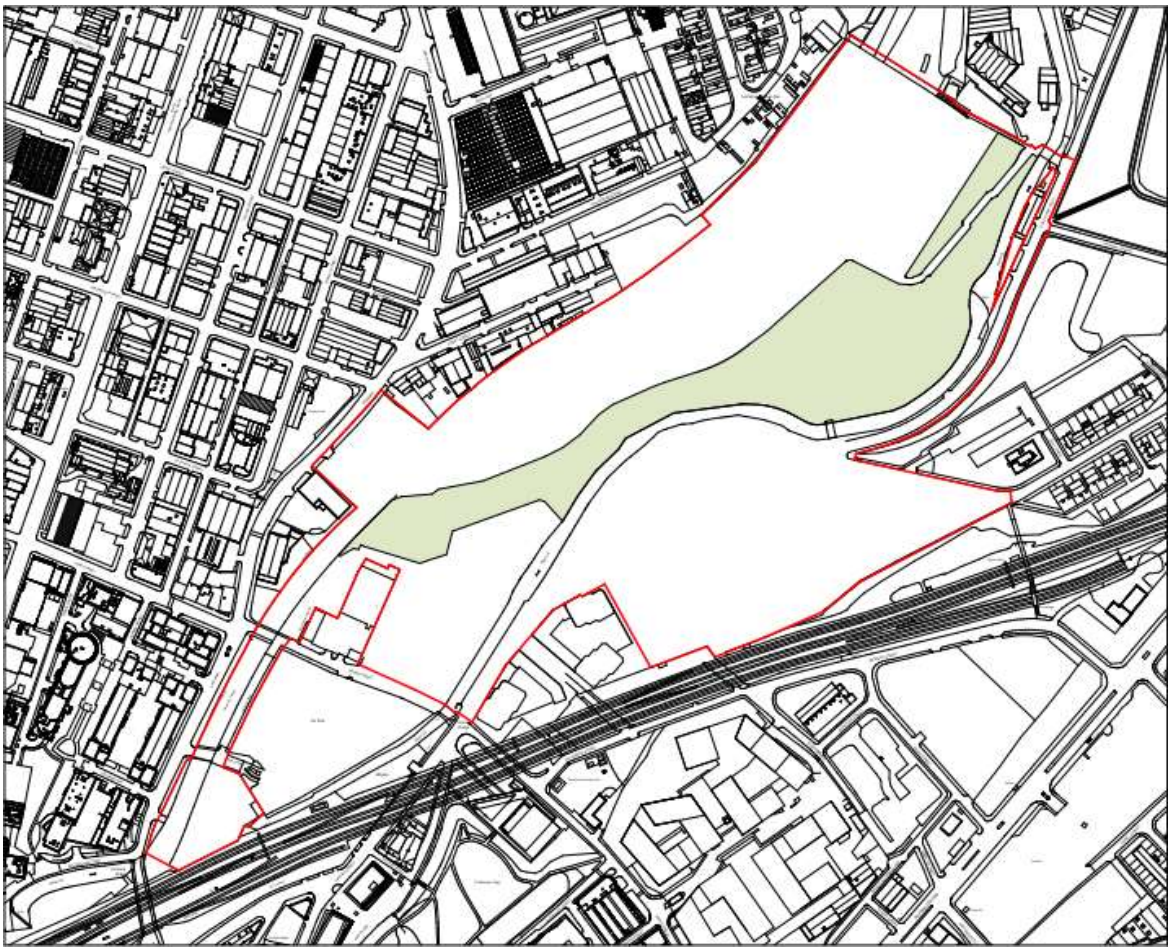
Wherever possible, this should be achieved through the implementation of SUDS. Source control should be considered first. There may be opportunities to deliver SUDS though integrated solutions for collections of strategic sites. The future ownership and maintenance of SUDS systems should be discussed at the planning application stage with the relevant sections of the LPA (including Highways and Drainage), United Utilities and the Environment Agency. This approach should be taken unless the developer can demonstrate that this is not feasible and that there will be no adverse impact caused by the development elsewhere."3. Any exceedance flows within the site should be retained within the site boundaries for all events up to a 1 in 100-year event".

3. EXISTING SITE

3.1. SITE LOCATION

3.1.1. For the purposes of this report the 'existing site' is referred to as the area within the Masterplan boundary shown in Figure 3-1 below and also included within Appendix D. This is the wider site boundary which includes both the Application 4 and Application 5 sites.

Figure 3-1 - Site Location Plan: Applications 4 & 5



3.2. SITE DESCRIPTION

3.2.1. Table 3-1 summarises the general characteristics of the site as it currently exists.

Table 3-1 – General Site Characteristics

Characteristic	Description
Site address (Approximate)	Warford Street, Collyhurst, Manchester, M4 4NL
Grid reference	384,631 (Easting), 399,500 (Northing)
Area (Ha)	11.21 Hectares (Application 4) 2.81 Hectares (Application 5)

3.2.2. The Application 4 area of the site is bound to the north by existing commercial and industrial uses. To the north-east, the HMG Paint complex bounds the Application 4 area. To the east, the Application 4 area is bound by Collyhurst Road and an area of open greenspace. To the south, the Application 4 area includes the proposed Dulwich Street which extends to the railway viaduct to the south of Dantzic Street. To the south-west, the Application 4 area is bound by an area of hardstanding currently in-use as a car park and the Red Bank viaduct. To the west, the Application 4 area is bound by Red Bank Road, along which is a residential neighbourhood consisting of a number of mid-rise buildings.

3.2.3. As described at paragraph 1.3.6, three planning applications submitted by MCC and proposing enabling, infrastructure and utility works funded by the HIF have been granted planning permission. Paragraph 1.3.6 sets out the works proposed by each of MCC's planning applications which enable and prepare the site for FEC's residential led developments proposed in applications 4 and 5. The works include:

- Preparatory tree and vegetation removal,
- Creation of a temporary haul road
- Demolition of the Creamline Dairies buildings and certain existing structures
- Creation of development platforms, including remediation and earthworks, and change in site levels,
- Construction of a new road and priority junction from Red Bank,
- New drainage infrastructure,
- Creation of new and improved green infrastructure and landscaping including the improvements of St Catherine's Wood to form part of a City River Park,
- Utility and services connections and diversions to Dantzic Street, Dalton Street and Collyhurst Road

3.2.4. The Application 5 area of the site is bound to the north by the Travis Island area of Application 4. To the east, the Application 5 area is bound by Dalton Street and a small number of two-storey homes and a mid-rise residential tower building. To the south, the Application 5 area is bound by the railway line into Victoria Station. To the west, the Application 5 area is bound by the emerging Victoria Riverside development.

3.2.5. The Application 5 area of the site largely consists of hardstanding and prepared ground.

3.3. EXISTING DRAINAGE

PUBLIC SEWERS

3.3.1. Reference should be made to the United Utilities Public Sewer Records, a full copy of which is included in Appendix E.

3.3.2. The public sewer records show that the existing wider site, which includes both Application 4 and Application 5, was served by a network of existing public combined sewers some of which will be either abandoned or diverted to facilitate the proposed development.

3.3.3. A large scale diversion is required to an existing 410x410 sewer increasing to 550x640 that currently crosses the proposed location of plot RB04. It is thought that this sewer has significant depth to it which is required to cross the River Irk as the sewer does downstream of the proposed plot location.

3.3.4. The proposed abandonments and diversions have been discussed with United Utilities as part of pre-planning consultations.

3.3.5. The existing sewers which are to be abandoned or diverted are shown on WSP Drawing RDB-WSP-00-XX-DR-UT-005. This drawing is included as Appendix F.

3.3.6. The sewer records show that there is an existing 1500mm diameter combined sewer in Dantzic Street with a combined sewer overflow (CSO) pipe identified at the junction of Dantzic Street and Warford Street.

3.3.7. There are two existing public sewers in Warford Street one of which is an existing 300mm diameter brick combined sewer which crosses the River Irk before connecting into the CSO. The other sewer in Warford Street is the overflow pipe associated with the aforementioned CSO which discharges into the River Irk at the northern end of Warford Street. The Application 4 masterplan has been developed in cognisance of these existing constraints and a no build zone has been applied to the area between plots RB16 & 17. This is referenced on parameter plan RDB-MLM-00-00-DR-AR-211417 and the easements associated with the public sewers in Warford Street will be confirmed once the accurate location has been identified by survey.

3.3.8. The Sewer records show that there are existing public sewers within the boundary of proposed plots NT02-04. These existing sewers are to be abandoned subject to confirmation by survey that they have no existing live connections which need to be maintained.

PRIVATE DRAINAGE

3.4. Any existing private drainage identified on site that are not currently live will be grubbed out to enable the installation of the new site wide drainage network. Existing Watercourses

3.4.1. The closest identified watercourse is the River Irk which runs through the centre of the existing site separating the majority of the Application 4 site from Application 5 as well as RB16 and RB17.

3.4.2. A further existing culverted watercourse, known as Cheetham Hill Junction Drain, was identified by Manchester City Council as possibly passing through the site. The culvert was identified during survey works with the surveyor reporting that the drain runs down the footpath beyond the north-eastern extents of the site and therefore not passing through the site.

3.5. EXISTING FLOOD DEFENCE INFRASTRUCTURE

3.5.1. The EA confirmed that the site is not within an area which benefits from the protection of nearby formal flood defences.

3.6. GEOLOGY AND HYDROGEOLOGY

3.6.1. The following information has been extracted from the Arup Ground Investigation Interpretative Report (Ref: VNIF-ARP-ZZ-YYY-RP-CG-0009, January 2022).

3.6.2. With reference to the geology if the site the Arup report states: '*The solid geology varies from east to west across the site, with the Chester Pebble Beds Formation in the west, Manchester Marls Formation in the centre of the site and the Collyhurst Sandstone Formation in the north-east.*'

3.6.3. As part of the study undertaken by Arup, ground investigations were carried out across the Application 4 site which provides insight into the likely nature and thickness of the superficial deposits and bedrock. A summary of the Arup findings is presented below:

- Redbank Plateau: Made ground of varying thickness (0.8m to 15.7m) overlying superficial deposits of either glacial till or alluvium which in turn is above the solid formations as described in section 3.6.2.
- Redbank Viaduct: Made ground of thickness between 1.8m to 6.4m upon superficial deposits of glacial till and to a lesser extent alluvium which overlies the Chester Pebble Beds Formation encountered at 1.8mbgl to 6.4mbgl.
- St Catherine's Wood: Made ground of thickness 3.0m to 7.5m overlying superficial deposits of glacial till and alluvium upon solid geology of the Chester Pebble Beds and Collyhurst Sandstone formations at 3.3mbgl and 18mbgl respectively.
- Travis Island: Made ground of thickness between 4.0m to >4.65m overlying alluvium. It is noted that the exploratory samples on Travis Island were terminated at a maximum depth of 4.65m.

3.6.4. For Application 5 RoC Consulting completed a Phase 2 Site Investigation of which the findings are presented in 4328-ROC-ZZ-XX-RP-ES-P2-101 which provides a similar insight into the likely nature and thickness of the superficial deposits and bedrock. A summary of the RoC findings is provided below:

- Plot NT02: Made ground of thickness 0.2m to 1.7m characterised as 'demolition fill' overlying Devensian (Glacial) Till upon solid geology of Chester Formation layered upon the Manchester Marls Formation.
- Plot NT03: Made ground of thickness 0.6m to 2.0m described as a 'demolition fill' overlying Devensian Till up to 7.65mbgl which in turn is upon the Chester Formation and Manchester Marls Formation.
- Plot NT04: Made ground across the site of thickness 1.0m to 3.0m overlying Devensian Till that exists up to 10mbgl and sits upon the Manchester Marls Formation.

3.6.5. The Arup Report indicates the following aquifer designations:

- The superficial deposits are classed as a Secondary A Aquifer
- The Manchester Marls Formation is classed as a Secondary B Aquifer
- Chester Pebble Beds Formation and Collyhurst Sandstone Formation are classed as Principal Aquifers

3.6.6. There are three registered groundwater abstractions within 500m of the site.

- Packaging Products Ltd, Collyhurst; 270m north-east; For General Cooling
- Derby Brewery, Cheetham; 400m north-west; For General Cooling
- Derby Brewery, Cheetham; 400m north-west; For Process Water

3.6.7. Groundwater was encountered at various depths across each application area.

3.6.8. The Arup report indicates that on the Application 4 site, groundwater was encountered at 4.95mbgl at BH201 located towards the north-eastern extents of the Redbank Plateau where ground levels are higher. Groundwater was observed at 3.35mbgl at BH212 located to the east of the Redbank Viaduct area at a lower portion of the site.

3.6.9. For Application 5 the RoC Consulting report indicates that groundwater was encountered at a depth of 4.65mbgl at RBH201 which is located at the intersection of Dantzic Street and the existing Dulwich Street at a lower level with respect to the site. Groundwater was observed at 12.52mbgl at RBH210 located at Dulwich Street's interface with Dalton Street corresponding to a point with a higher ground level.

3.6.10. In general, ground water is observed between 3mbgl and 6mbgl across both applications.

4. NPPF SEQUENTIAL AND EXCEPTION TEST

4.1. THE SEQUENTIAL TEST

4.1.1. The Sequential Test, within the National Planning Policy Framework, aims to steer all new developments to areas at the lowest risk of flooding and to ensure that the development type proposed is appropriate by reference to the flood risk.

4.1.2. The proposed Redbank and Dantzic Street development, both Applications 4 and 5, are part of the wider Victoria North Strategic Regeneration Framework (SRF). The VN SRF was endorsed by Manchester City Council in 2019 and is a material consideration for determining planning applications for this area. It is considered that a sequential test has been carried out by the council and that the site is therefore suitable for development.

4.2. THE EXCEPTION TEST

4.2.1. Figure 4-1 below is an extract of the Environment Agency's flood risk and coastal change guidance and illustrates the criteria of when an exception test is required for a proposed development which is set out in the National Planning Policy Framework.

4.2.2. The EA flood map for planning indicates that the site is partially within flood zone 3a.

4.2.3. More vulnerable usages include but are not limited to residential dwellings and buildings used for health services. Despite the likelihood being that all more vulnerable usages will be set at a higher FFL then that of the design flood, the worst case scenario has been considered with more vulnerable usages being at risk of flooding and therefore an exception test is deemed to be required.

Figure 4-1 - EA Flood Risk and Coastal Change Table 2

Flood Zones	Flood Risk Vulnerability Classification				
	Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
Zone 1	✔	✔	✔	✔	✔
Zone 2	✔	Exception Test required	✔	✔	✔
Zone 3a †	Exception Test required †	X	Exception Test required	✔	✔
Zone 3b *	Exception Test required *	X	X	X	✔ *

Key:

✔ Exception test is not required

X Development should not be permitted

4.2.4. The Exception Test requires two additional elements to be satisfied (as set out in paragraph 164 of the National Planning Policy Framework) before allowing development to be allocated or permitted in situations where suitable sites at lower risk of flooding are not available following application of the sequential test.

4.2.5. It should be demonstrated that:

- Development that must be in a flood risk area will provide wider sustainability benefits to the community that outweigh flood risk; and
- The development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

4.2.6. Wording on the Exception Test has been provided below by Avison Young in italic.

The Exception Test has been applied separately to both Application 4 and Application 5.

Application 4 Exception Test

In terms of Application 4, the development that has to be in the flood risk area will provide wider sustainability benefits to the community that outweigh the flood risk. The sustainability benefits that will be delivered by Application are set out below:

Economic

The proposed development will contribute to building a strong, responsive and competitive economy. In particular, the Socio-Economics Chapter 16 of the submitted ES identifies that the social and economic outcomes from the proposed development are:

1. *Generation of both temporary and full-time equivalent construction jobs, including higher skilled professionals and lower skilled jobs. These jobs will be recruited for in accordance with an agreed Local Labour Agreement;*
2. *The demolition and construction phase will generate 4,640 net additional temporary construction jobs over the construction period, of which 1,362 could be taken up by residents in the Manchester City Council authority area;*
3. *These temporary construction jobs would generate £56.8 million in GVA to the regional economy (of which £16.7 million would be generated in the MCC District economy);*
4. *Provide investment into the local area through local job creation and supply chain linkages. The Development would result in a maximum additional population of 6,066 residents. The Development would also expect to support up to 657 net additional jobs regionally, of which 193 would be located in MCC. This would generate up to £24.2 million GVA at the regional level (of which £11.1 million would be generated in the MCC district economy);*
5. *The development would provide a catalyst for further investment and development within the local area, and unlocking the area's potential as part of the wider Victoria North regeneration scheme in accordance with the Northern Gateway SRF;*
6. *Residents of the Development would be anticipated to generate annual expenditure of £44.1 million per annum within the district economy and £5.7 million per annum in additional Council Tax receipts for MCC.*

7. *Job creation through the non-residential elements of the scheme, including a school and healthcare facility, which will draw people to this location providing further economic benefits that will feed back into the wider system and community. The development could create up to 620 operational jobs which would be retained for the lifetime of these uses; and*
8. *Generate increased spending in the local area through the (up to) 3,250 new dwellings, which will subsequently support job creation and support local businesses. The Socio-Economic chapter of the Environment Statement suggest this to be in the region of £6.2 million per annum in household expenditure.*

Social

The proposed development will support the creation of a strong, vibrant and healthy community. In particular, the proposed development will:

1. *Contribute to the delivery of one of the UK's largest and most ambitious urban regeneration projects, Victoria North, in accordance with Manchester Core Strategy Policy SP 1;*
2. *Deliver a well-designed residential scheme of up to 3,250 new homes to provide much needed housing which will meet a demonstrated need, in accordance with Policy H 1. The provision of up to 3,250 net additional units is equivalent to 90% of MCC's annual delivery target of 3,600 units per year (2022 – 2032)) in the Manchester Housing Strategy 2022-2032;*
3. *Provide affordable homes, where evidenced to be financially viable in accordance with Policy H 8 which would make a positive contribution to an identified affordable housing need;*
4. *Bring back into use an important strategic site in very close proximity to the City Centre, enhancing the environment through the delivery of high quality new built development to the area and providing comprehensive high quality landscaping, tree planting and public realm, in accordance with Policy EN 9 of the Manchester Core Strategy;*
5. *Be designed to promote opportunities for interactions between neighbourhoods and to contribute towards the emerging Victoria North community in accordance with the Northern Gateway SRF;*
6. *Consider community safety in the design, layout, and management of the development, in accordance with Policy DM1 of the Manchester Core Strategy;*
7. *Provide a wide range of housing typologies and tenures to cater for the various needs of society such as build to rent, later living and affordable housing.*
8. *Up to 2,750 sqm GIA of primary school uses are proposed which is anticipated to comprise a one form-entry (1FE) primary school of around 210 places. Providing a primary school on-site which would assist in meeting sustainability objectives in promoting active transport to and from school.*

9. *Deliver a sustainable development which is well located next to shops, local services, jobs, transport links in accordance with Policy SP 1 of the Manchester Core Strategy. Additionally the provision of high quality non-residential uses and active frontages in key locations of the site is critical to the development of a high quality sustainable neighbourhood and place-making; and,*
10. *Attract new residents to the area which will broaden the skills base to local employers and potentially benefit local businesses.*

Environmental

As demonstrated within the accompanying technical reports, the proposed development will positively benefit the natural environment in particular, the proposed development will:

9. *Redevelop an under-utilised land resource of a strategic scale to deliver high quality development to meet an identified need within the city.*
10. *Make significant improvement on a heavily contaminated brownfield site.*
1. *Deliver the regeneration of a prominent site which is earmarked for comprehensive redevelopment, greatly improving the area's appearance and streetscape through the creation of high quality places with significant levels of new green infrastructure, public realm and landscaping;*
2. *Deliver a scheme which ensures an efficient mix of land uses whilst taking into account key site considerations and opportunities;*
3. *Provide new and improved green landscaped areas including private and communal gardens, in accordance with Manchester Core Strategy Policy EN 9;*
4. *Retain existing trees where possible and provide extensive new planting scheme, including substantial amounts of high quality soft landscaping and tree planting, in accordance with Policy EN9;*
5. *Will have a significant positive benefit for protected species, in accordance with Manchester Core Strategy Policy EN 15. The vision for the proposed development is Wild Urbanism which includes the creation of new habitats at the site, and the improvement of woodland off-site, in order to provide in excess of 10% biodiversity net gain.*
6. *Deliver homes in a sustainable location within close proximity to existing and future services and facilities as well as public transport infrastructure, which will reduce the need to travel by car. The scheme also incorporates cycle storage for all proposed dwellings and promote walking and cycling through provision of safe routes, in accordance with Policy T 1 of the Manchester Core Strategy; and*
7. *Meeting Climate Change objectives by delivering the aspirations of an enabled net zero development. A comprehensive green and blue infrastructure strategy has informed the application proposals and sustainable building design and construction (including green and brown roofs, SUD's, wholly electric powered development including from renewable*

energy sources) is proposed in accordance with Policy EN 4 of the Manchester Core Strategy.

4.2.7. This report demonstrates that subject to the implementation of the mitigation proposed in Section 6 the proposed development being brought forward under Application 4 will be safe for the entirety of its lifetime.

Application 5 Exception Test

In terms of Application 5, the development that has to be in the flood risk area will provide wider sustainability benefits to the community that outweigh the flood risk. The sustainability benefits that will be delivered by Application are set out below:

Economic

The proposed development will contribute to building a strong, responsive and competitive economy. In particular, the Socio-Economics Chapter 16 of the submitted ES identifies that the social and economic outcomes from the proposed development include:

1. *Generation of both temporary and full-time equivalent construction jobs, including higher skilled professionals and lower skilled jobs. These jobs will be recruited for in accordance with an agreed Local Labour Agreement;*
2. *The demolition and construction phase will generate between 1,877 and 2,047 person years of temporary employment during the 96-month work programme, of which 584 net additional jobs could be taken up by residents in the Manchester City Council area;*
3. *These temporary construction jobs would generate around £18.3 million GVA to the regional economy (of which 5.4 million would be generated by the MCC District Economy);*
4. *Provide investment into the local area through local job creation and supply chain linkages. The Socio-Economic Chapter of the Environment Statement states that the total jobs to be supported by the Development and the supply chain linkages could contribute approximate GVA to the Northwest economy of between £4.2 million and £7.7 million annually in perpetuity;*
5. *This development would provide a catalyst for further investment and development within the local area, and unlocking the area's potential as part of the wider Victoria North regeneration scheme in accordance with the Northern Gateway SRF;*
6. *A significant investment by the developer into the local area, with an estimated build cost of £330-£360 million, as encouraged by Policy EC 1;*
7. *The new households will generate £2,902,515 in Council tax revenue for the local authority per year;*
8. *Job creation through the non-residential elements of the scheme, which will draw people to this location providing further economic benefits that will feed back into the wider system and community. The completed operational development could support between 34 and 210 net additional FTE jobs;*

9. *Generate increased spending in the local area through the 1,551 new dwellings, which will subsequently support job creation and support local businesses. This could be in the region of £28 million per annum in household expenditure; and,*

Social

The proposed development will support the creation of a strong, vibrant and healthy community. In particular, the proposed development will:

10. *Contribute to the delivery of one of the UK's largest and most ambitious urban regeneration projects, Victoria North, in accordance with Manchester Core Strategy Policy SP1;*
11. *Deliver a well-designed residential scheme of 1,551 new homes to provide much needed housing which will meet a demonstrated need, in accordance with Core Strategy Policy H 1. The provision of 1,551 net additional units is equivalent to 43% of MCC's annual delivery target of 3,600 units per year (2022-2032) in the Manchester Housing Strategy 2022-2032;*
12. *Bring back into use an important strategic site in very close proximity to the City Centre, enhancing the environment through the delivery of high quality new built development to the area and providing comprehensive high quality landscaping, tree planting and public realm, in accordance with Policy EN 9 of the Manchester Core Strategy;*
13. *Be designed to promote opportunities for interactions between neighbourhoods and to contribute towards the emerging Victoria North community in accordance with the Northern Gateway SRF;*
14. *Considers community safety in the design, layout, and management of the development, in accordance with Policy DM 1 of the Manchester Core Strategy;*
15. *Provide 5% affordable housing in line with the findings of the Financial Viability Assessment, in accordance with core Strategy Policy H 8. This represents a significant number of homes in a development of this scale. Additionally, FEC will aspire to improve on the 5% provision by utilising grant funding from Homes England. This will make a positive contribution to an identified affordable housing need;*
16. *Deliver a sustainable residential-led regeneration which is well located next to existing shops, local services, jobs, and transport link in accordance with Policy SP 1. Additionally, the provision of high quality non-residential uses and active frontages in key locations of the site is critical to the development of a high quality sustainable neighbourhood and place-making; and,*
17. *Attract new residents to the area which will broaden the skills base to local employers and potentially benefit local businesses.*

Environmental

As demonstrated within the accompanying technical reports, the proposed development will benefit the natural environment. In particular, the proposed development will:

1. *Redevelop an under-utilised land resource of a strategic scale to deliver high quality development to meet an identified need within the city;*
2. *Significantly improve ground conditions through the redevelopment of a heavily contaminated brownfield site;*
3. *Deliver the regeneration of a prominent site which is earmarked for comprehensive redevelopment, greatly improving the area's appearance and streetscape through the creation of high quality places with significant levels of new green infrastructure, public realm and landscaping;*

18. *Provide new and improved green landscaped areas including private and communal gardens, in accordance with Manchester Core Strategy Policy EN 9;*
19. *Provide substantial amounts of high quality soft landscaping and tree planting, in accordance with Policy EN 9;*
20. *Have a significant positive benefit for protected species, in accordance with Manchester Core Strategy Policy EN 15. The vision for the proposed development is 'Wild Urbanism' which includes the creation of new habitats at the site including tree planting around the site, provision of green and brown roofs, sustainable drainage systems and an ecological area in the heart of the development on Travis Square, which results in the development proposing to deliver in excess of 10% biodiversity net gain on site;*
21. *The ESS demonstrates that in terms of the required building emission targets in line with Part L of the Building Regulations (2010), the proposals identify a 40-55% improvement on U-values and a 62% improvement on air permeability. This is a significantly greater improvement that the required 15%, in accordance with Policy EN 6;*
22. *The proposed development will be low carbon and adopts a fabric-first approach to energy efficiency and make use of high-efficiency fixed service in accordance with Core Strategy policy EN4 and EN6;*
23. *Deliver homes in a sustainable location within close proximity to existing and future services and facilities as well as public transport infrastructure, which will reduce the need to travel by car. The scheme also incorporates cycle storage for all proposed dwellings and promote walking and cycling through the provision of safe routes, in accordance with Policy T 1 of the Manchester Core Strategy; and*
24. *Meet Climate Change objectives through the delivery of sustainable built development. A green and blue infrastructure strategy has informed the application proposals and sustainable building design and construction (as detailed within the Sustainability Statement submitted in support of this application) is proposed in accordance with Policy EN 4 of the Manchester Core Strategy.*

4.2.8. This report demonstrates that subject to the implementation of the mitigation proposed in Section 6 the proposed development being brought forward under Application 5 will be safe for the entirety of its lifetime.

5. ASSESSMENT OF FLUVIAL FLOOD RISK

5.1.1. The potential risk of flooding to both Application 4 and Application 5 sites from current and future fluvial sources has been assessed in accordance with the National Planning Policy Framework.

5.1.2. This report will demonstrate that the proposed developments associated with Applications 4 and 5 will be safe for their lifetime (taking into account the impacts of climate change), ensure no increase in fluvial flood risk off-site, and reduce fluvial flood risk where possible, in line with the 'Flood Risk and Coastal Change' Planning Practice Guidance.

5.1.3. The risk of flooding from other sources is discussed in section 7 of this report.

5.2. FLUVIAL FLOOD RISK

FLOOD MAPS

5.2.1. The National Planning Policy Framework (NPPF) categorises flood risk as follows:

- **Zone 1 (low probability)** – Land assessed as having less than a 1 in 1,000 annual probability of river or sea flooding (<0.1%);
- **Zone 2 (medium probability)** – 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%); and
- **Zone 3a (high probability)** - 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%).
- **Zone 3b The Functional Floodplain -** This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map).

5.2.2. Fluvial flood risk has not been assessed using the EA Flood Map for Planning for this development. A model was developed by the HIF team which is known as the *Arup Baseline Model*. This model was approved by the EA in November 2022 and has been used by WSP as the basis on which an *FEC Baseline Model* was created.

5.2.3. A detailed explanation of the modelling work that was carried is provided in the WSP flood modelling report (Ref: 70079268 - Red Bank Flood Modelling TN1) which is included as Appendix G of this report.

5.2.4. The *FEC Baseline Model* represents the existing flood risk to the site from the River Irk. This model shows that plots NT02, NT03 and NT04 (Application 5) are partly within Flood Zone 2 along their frontage with Dantzic Street and are also impacted by the design flood event (100-year + 35% climate change allowance). It should be noted that the impact from the design flood is relatively minor.

5.2.5. The *FEC Baseline Model* also shows that plots RB06, RB07, RB10, RB16 and RB17 (Application 4) are significantly impacted by Flood Zone 2 and a design flood event. This is illustrated in Figure 5-1 below.

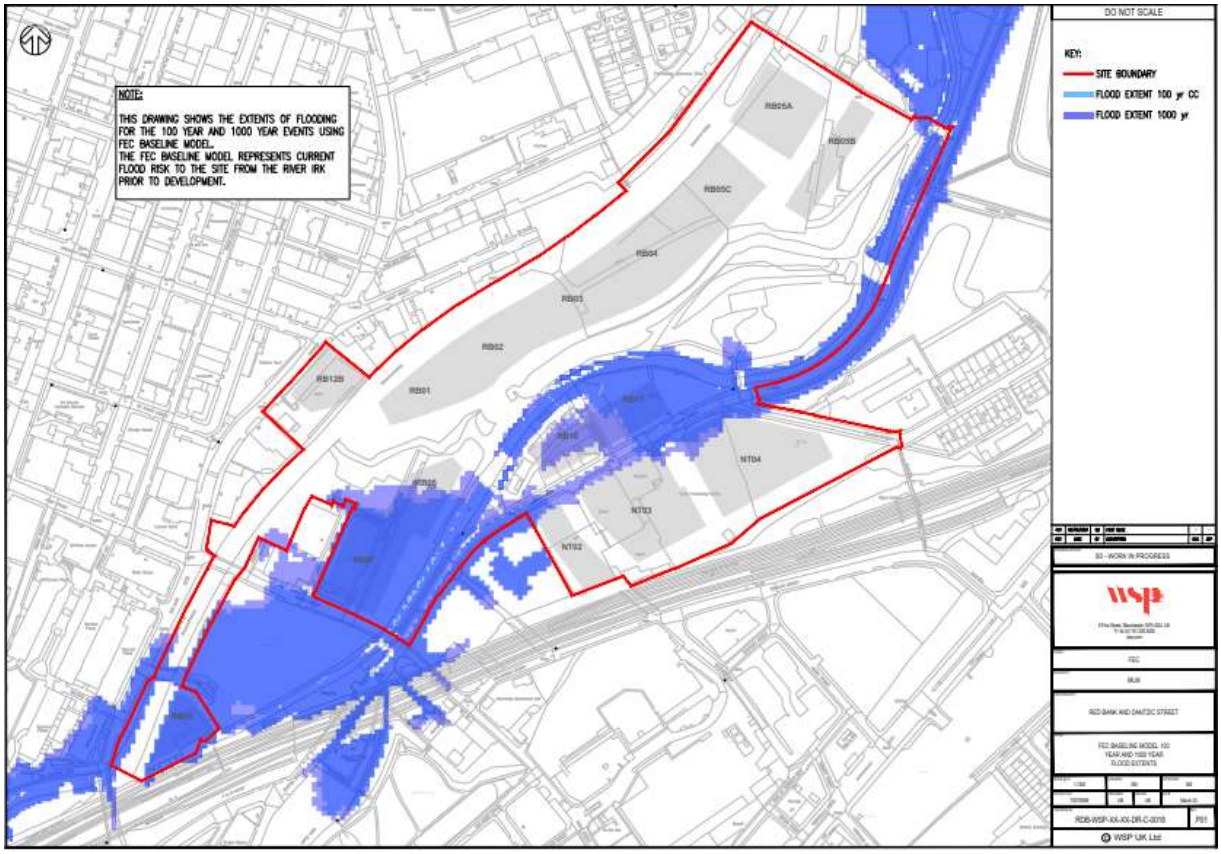


Figure 5-1 – FEC Baseline Model, Flood Extents

5.2.6. As these plots are shown to be at risk of flooding, they have been assessed against the design flood event for the purposes of setting finished floor levels, loss of floodplain compensation storage, safe access and egress and the provision of flood resistance and resilience measures.

5.2.7. The proposed development is a residential-lead mixed-use development comprising of mid to high rise buildings with a variety of uses at ground floor level and mainly residential uses at first floor level and above. Therefore, although the development mainly has 'less vulnerable' uses at ground floor level it is considered to be a 'more vulnerable' development due to its residential nature.

5.2.8. The design flood level for this development is defined as the 100-year event including a 35% allowance for climate change. This is in line with the latest EA guidance on climate allowances for the 2080's epoch for the River Irwell Management Catchment which states that the central allowance should be used for the design flood event for vulnerable uses. The central allowance for the Irwell Management catchment is 35%, the higher central is 46% and the upper end allowance is 76%.

5.2.9. To inform the FEC planning applications, separate models were developed for Application 4 and Application 5 using the *FEC Baseline Model.* This was done so that it could be demonstrated that the separate planning applications can be brought forward independently of each other and that the works carried out under each application would not have an adverse flood risk on the site or elsewhere in the local catchment when compared to the *FEC Baseline Model* in accordance with the requirements of the NPPF. The models developed by WSP for the FEC planning applications are known as:

- *FEC Baseline + Application 4* (hereafter referred to as Application 4 Model). This model was built to represent the area within the outline application red line boundary where relevant to flooding.
- *FEC Baseline + Application 5* (hereafter referred to as Application 5). This model was built to represent the NT02 to NT04 red line boundary area.

Application 4 Model Results

5.2.10. For Application 4, *FEC Baseline Model* was updated to include representation of the elements of the outline application where they are located within the floodplain and therefore displace flood water. This includes representation of the proposed buildings for plots RB06, RB07 and RB10 to the north of the river and plots RB16 and RB17 on Travis Island to the south of the river. In addition to this, site level flood risk mitigation measures that are currently anticipated to be delivered as part of the outline application were also represented in this model. The site level flood risk mitigation measures that have been included in the model are as follows:

- Terraced wetlands along Travis Island;
- Flood defence wall to the west of plot RB16;
- Terracing along the northern bank of the river at RB06, RB07 and RB10.

5.2.11. The results of the Application 4 model show that that there is no adverse impact on flood risk on the site or elsewhere in the local catchment and that in fact the development provides a betterment in areas. This is in line with the requirements of the NPPF.

5.2.12. The design flood extents for the Application 4 model are shown in Figure 5-2 below and the maximum flood level for the design flood are tabulated in Table 5-1.

Table 5-1 – Application 4 Model Flood Levels

Development	Easting	Northing	1 in 100-year (m AOD)	1 in 100-year plus 35% climate change (m AOD) – DESIGN FLOOD	1 in 1000-year (m AOD)
RB10	384,297	399,257	29.76	30.34	30.87
RB06 and RB07	384,504	399,450	30.75	31.20	31.43
RB16 and RB17	384,673	399,514	30.85	31.36	31.62

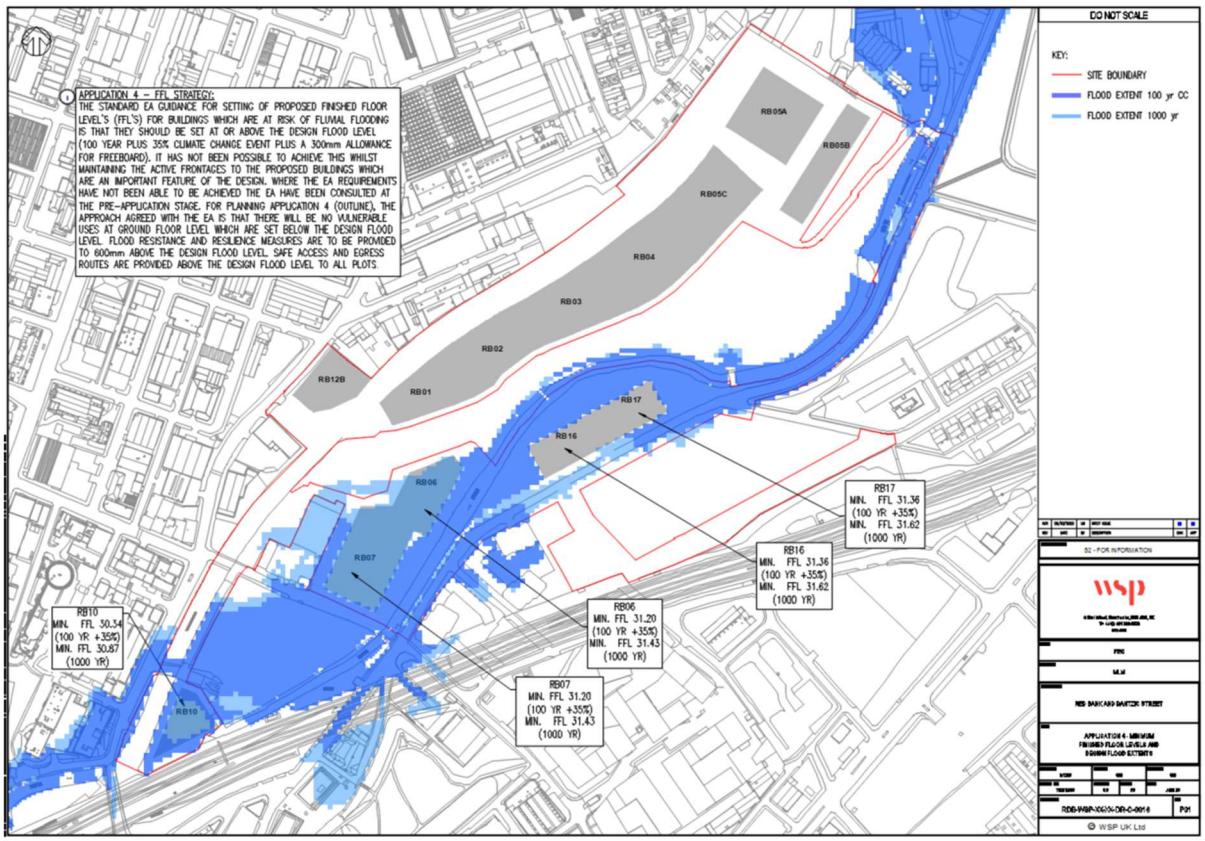


Figure 5-2 - Application 4 Model Flood Extents

5.2.13. Flood resistance and resilience measures necessary to facilitate this development will need to be effectual for the lifetime of the development and on this basis any resistance and resilience features will need to be managed and maintained for the lifetime of the development in accordance with the Environment Agency flood risk planning practise guidance. Residential development can be assumed to have a lifetime of at least 100 years. It should be noted that details of how the currently proposed flood resistance and resilience measures will be managed and maintained will need to be established at the detailed design stage.

Application 5 Model Results

5.2.14. For Application 5, the *FEC Baseline Model* was updated to include the NT02 – NT04 buildings and changes to the public realm on Dantzic Street. The results of the Application 5 model showed negligible impact on water levels across the wider site when compared to the *FEC Baseline Model*. It was reported that the volume of flood water that would be displaced by the plot NT04 building would be minimal, and that any loss of floodplain would be compensated for within the proposed public realm in the widened Dantzic Street streetscape which is illustrated in WSP drawing RDB-WSP-XX-XX-DR-TP-018 found in Appendix H of this report.

5.2.15. The results of the Application 5 model show that that there is no adverse impact on flood risk on the site or elsewhere in the local catchment. This is in line with the requirements of the NPPF.

5.2.16. The design flood extents for the Application 5 model are shown in Figure 5-4 below and the maximum flood level for the design flood are tabulated in Table 5-2.

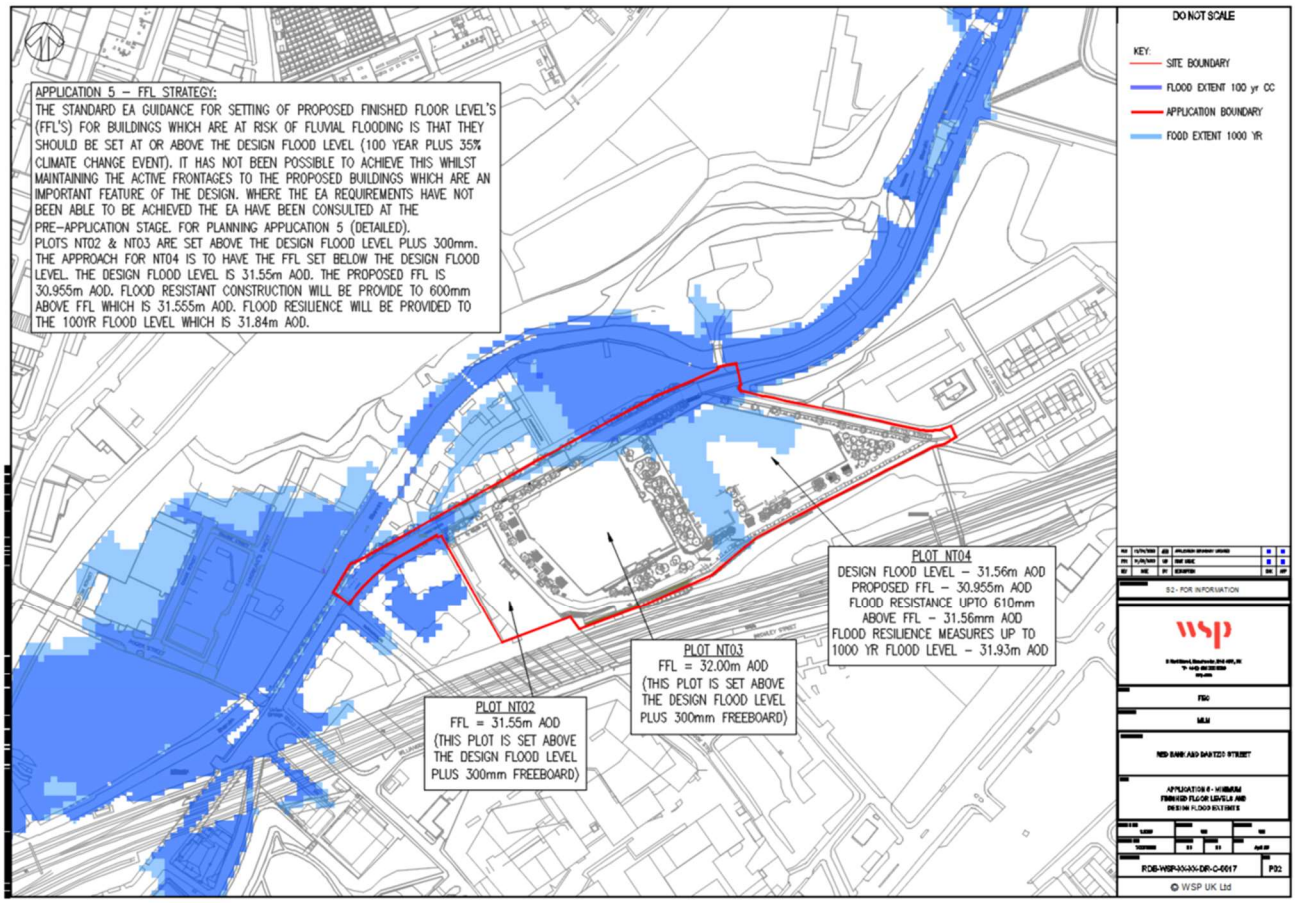


Figure 5-3–Application 5 Model Flood Extents

Table 5-2 – Application 5 Model Flood Levels

Node Ref	Easting	Northing	1 in 100-year (m AOD)	1 in 100-year plus 35% climate change (m AOD) – DESIGN FLOOD	1 in 1000-year (m AOD)
NT02	384,603	399,425	30.55	30.88	31.32
NT03	384,677	399,455	X	31.45	31.79
NT04	384,766	399,495	31.12	31.50	31.93
Outfall 1	384,538	399,466	30.68	31.035	X

5.2.17. The model results show that the design flood level at plot NT02 is 31.88 mAOD, the design flood level at plot NT03 is 31.45 mAOD and the design flood level at plot NT04 is 31.50 mAOD.

APPLICATION 4 AND APPLICATION 5 MODEL – COMBINED EFFECTS

5.2.18. The results of the modelling have shown that both Application 4 and 5 models do not cause any adverse changes in results (water levels/extents) when compared to the undeveloped/present day scenario results outside of the application red line boundary. Therefore, it is unlikely that a combined Application 4/5 model would show detriment. However, it should be noted that the proposals for application 4 are outline and therefore detailed modelling of application 4 has not been undertaken at this stage.

DEMOLITION

5.2.19. Reference should be made to the Macreanor Lavington Demolition Plan for Application 4 which is included as Appendix H of this report. It should be noted that demolition is not assessed within the scope of the modelling works carried out and that demolition of elements interfacing with fluvial zone could result in redistribution of flood water flows but it is considered that this limitation can be appropriately controlled / managed at detailed design stage and via conditional planning requirement governing the submission of a demolition and construction management plan, as necessary, per phase.

6. FLOOD RISK STRATEGY / MITIGATION - FLUVIAL

6.1. APPLICATION 4 – FLOOD RISK STRATEGY

6.1.1. Reference should be made to the WSP drawing RDB-WSP-00-XX-DR-CV-0016 which shows the extent and flood levels for the design flood event associated with Application 4 and is included in Appendix G, along with the record of pre-application consultations with the EA which are included in Appendix C of this report.

6.1.2. The flood model that was used to assess Application 4 is the *FEC Baseline + Full Masterplan* model. The design flood level for Application 4 is defined as the 100-year event plus a 35% allowance for climate change. This is the event that is used when a development is shown to be at risk of fluvial flooding to set finished floor levels, analyse loss of floodplain compensation storage and to demonstrate that safe access and egress routes are available.

6.1.3. The EA were engaged as part of pre-application consultations on the proposed flood risk strategy for Application 4. The proposed flood strategy that has been discussed with the EA is summarised as follows:

- The FFL of all vulnerable uses are set above the design flood level.
- The only uses below the design flood level will be car parking, cycle parking, temporary outdoor market use or any other non-vulnerable use including bin storage.
- Minimum FFL's being proposed for the outline application do not include 300mm allowance for freeboard above the design flood level.
- Flood resistance / resilience will be provided to 600mm above the FFL and design flood level, and this should be managed and maintained for the lifetime of the development as agreed by the local planning authority.
- Where residential lobbies are indicated below the design flood level, alternative means of escape are provided which are above the design flood level.
- If necessary, at the detailed design, compensatory storage will be included as part of the proposed development
- Vulnerable development uses, as per the definitions of vulnerability provided within 'Table 2' the Flood Risk and Costal Change PPG, will not be located within any part of the functional floodplain for the modelled 1 in 30 year storm event at the detailed design stage. It should be noted that the LLFA were contacted to confirm their position on whether the FEC modelled 1 in 30 year event provides an appropriate representation of the functional floodplain or whether the 1 in 30 year event as defined in the Manchester SFRA is more appropriate. We currently await a response on this, however, at detailed stage the 1 in 30 year event that is deemed appropriate by the LLFA will be used for the assessment.
- The demolition plan identifies structures that perform a flood control function to ensure these structures are not removed until the detailed proposals for replacement buildings and structures on these development plots have been granted permission. This will be controlled through a construction management plan that would include details of temporary flood defences to protect up to the 1 in 25 year event.

6.1.4. For Application 4, the plots that are shown to be at risk of flooding are RB06, RB07, RB10, RB16 and RB17. All other plots meet the EA requirement for setting FFL's at or above design flood level including an allowance for climate change and plus a 300mm allowance for freeboard. However, this was not fully achievable for plots RB06, RB07, RB10, RB16 and RB17 whilst maintaining the masterplan design principles.

6.1.5. The proposed FFL's for plots RB06, RB07, RB10, RB16 and RB17 are listed below and these have been set at a minimum of the design flood level including an allowance for climate change but without freeboard:

- RB06 31.20m AOD
- RB07 31.20m AOD
- RB10 30.34m AOD
- RB16 31.36m AOD
- RB17 31.36m AOD

6.1.6. As part of pre-planning consultations, the EA requested justification to explain why a 300mm allowance for freeboard was not achievable. The justification for this was provided by Maccreanor Lavington as the lead masterplan designer and which has subsequently been agreed with the EA is as follows:

General Approach

The project aims to deliver a rich mix of commercial and community uses, particularly so around RB06, RB07, RB10, RB16 and RB17, as these plots directly adjoin the River Irk and are the nearest to Central Manchester. Most of these plots were identified in the Victoria North Strategic Regeneration Framework (SRF) as mixed-use. The plots are envisaged to sit among high-quality public realm and it is critical to the success of the project that the uses within the buildings have a direct relationship with the surrounding public realm. They ground floor uses will be required to be accessible and active, therefore should be at a similar level to those of the adjoining public realm.

RB06 and RB07
The existing levels around these two plots along the river edge and Roger Street are approximately +30.0 AOD. The Union Waterfront needs to remain at +30.0 AOD to provide sufficient flood storage. The design flood level on both the plots is +31.2, therefore approximately 1.2 metres above the existing public realm. Setting FFL at flood level would lead to a 1.2 metre difference between public realm and building ground floor, which careful design could incorporate without detrimental impact on active ground floors. A 300mm freeboard would lead to a 1.5 metre difference in levels, which would have detrimental impact on the quality of the scheme.

RB10
The existing levels around the plots are approximately +29.0 AOD. The public realm around the plot cannot be raised above the flood level as it provides flood storage as well as access to existing Network Rail and other arch uses. The flood level is approximately +30.35, therefore approximately 1.35 metres above the public realm. The illustrative masterplan suggests an outdoor covered market use and residential ancillary use such as bin storage or cycle storage sitting underneath an elevated building. Only the residential lobby and the residential core of the building are proposed to be raised above the flood level. A 1.35 metre difference between public realm and the FFL would at least maintain visual connectivity between the two. A 300mm freeboard would lead to an approximate 1.65 metre difference in levels, which would substantially affect the design quality and legibility of a building entrance and prevent visual surveyance from the building to the public realm.

RB16/17
Dantzic Street is seen as a new high street destination for the Masterplan, with a generous provision of ground and potentially first floor commercial and community uses. Active frontage is not sought to Travis Island Wetlands as substantial level difference will be required to maximise flood storage within them. The existing levels around these two plots along Dantzic Street are approximately +31.0 to +31.5 AOD. The flood level is approximately +31.36 AOD and +31.66 with a 300mm freeboard. As such, there may be instances where freeboard may be achieved for some or the majority of the plots, subject to detailed public

realm and building design. However, we would seek flexibility at this stage to ensure that quality active frontages can be achieved along this key high street location.

6.1.7. In addition to the above, and with respect to the inclusion of flood resistance and resilience measures, the EA stated during pre-application consultation that, *'We welcome the inclusion of flood resistance (water exclusion) / resilience (water ingress) measures to be provided at a minimum 600mm above 'flood levels'. We advise such measures are designed to consider the 0.1% AEP to ensure mitigation for residual flood risk is implemented.'*

6.1.8. It has subsequently been agreed with the EA that for Application 4 a degree of flexibility is appropriate with respect to the level up to which flood resistance will be provided and the level up to which flood resilience will be provided within that 600mm zone. The exact detail of this can then be agreed at the detailed design stage on a plot by plot basis as each plot is brought forward for development.

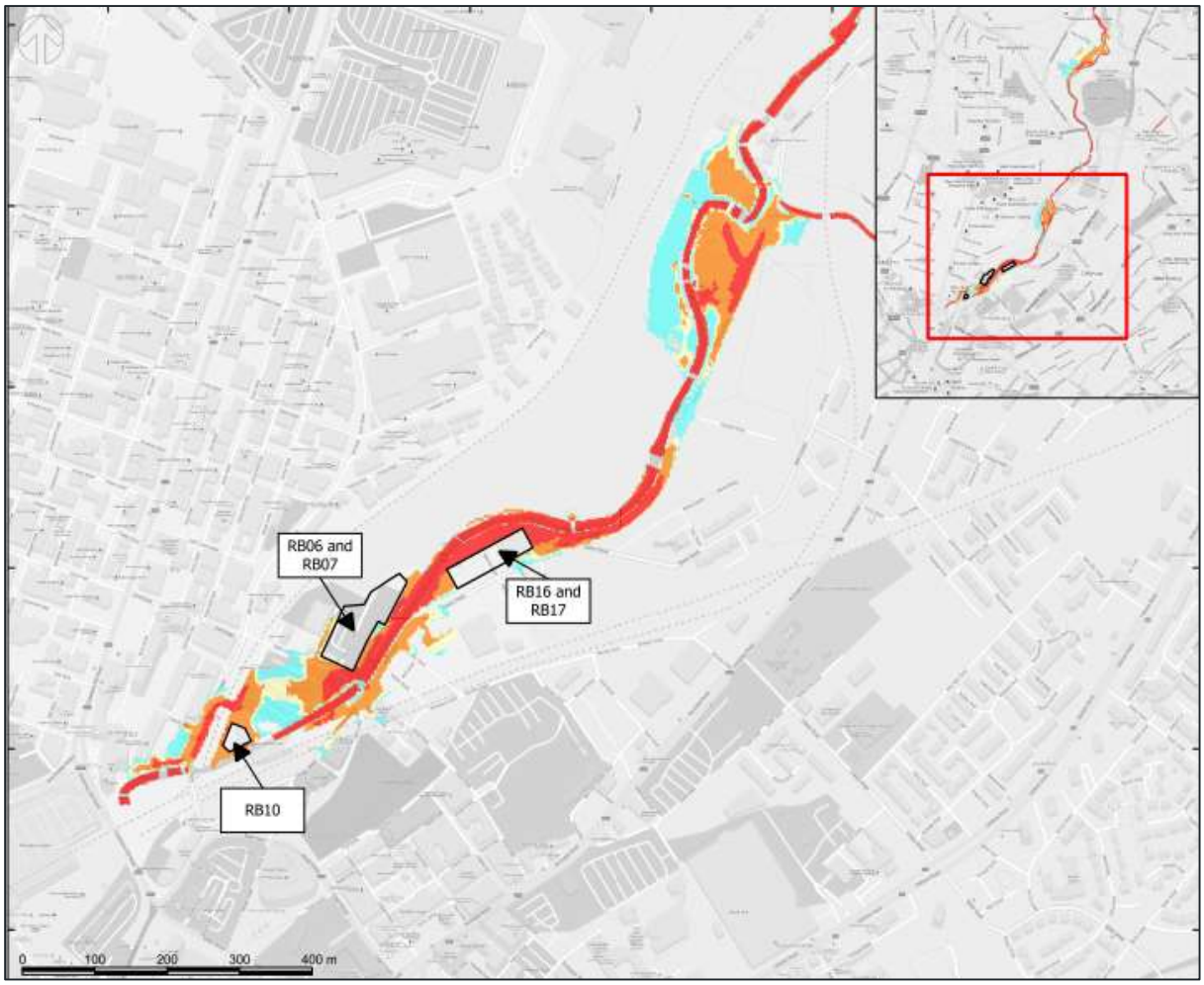
6.1.9. For Application 4, the 1000-year flood level is less than 600mm above the design flood level at all affected plots. Therefore, residual flood risk is mitigated by the flood resistance/resilience measures described in section 6.1.8. above.

6.1.10. In addition to the above, and with respect to safe access and egress, the EA stated during pre-application consultation that, '*The 'Flood Risk and Coastal Change' Planning Practice Guidance (PPG) states that, in determining whether a development is safe, the ability of residents and users to safely access and exit a building during a design flood and to evacuate before an extreme flood needs to be considered.'*

6.1.11. For Application 4, the plots that are shown to be at risk of flooding are RB06, RB07, RB10, RB16 and RB17. It should be noted that safe access and egress is available for all of these plots in the event of a design flood.

6.1.12. Reference should also be made to the WSP Flood Hazard drawing 79268-MR1-018, an extract of which is below as figure 6-1, which shows the extent and depth of flooding during a design flood. . This drawing is also included in Appendix H of this report.

Figure 6-1 - WSP Flood Hazard Map



6.1.13. Specific routes of safe access and egress for pedestrians and vehicles in the event of a design flood have been identified in the Movement Parameter Plan which is included in Appendix A of this report. Safe access and egress routes are also shown in a dashed blue line in figure 6-2 which is an extract from the Design and Access Statement (DAS).

6.1.14. For plots RB06 and RB07 safe access and egress is provided from Roger Street and is provided for RB16 and RB17 via the proposed Dulwich Street.

6.1.15. For plot RB10, safe access and egress for residents, building users and emergency services is provided at first floor level via a new bridge deck which link plot RB10 to the currently disused rail viaduct and can be accessed by pedestrians or vehicles via Redbank.

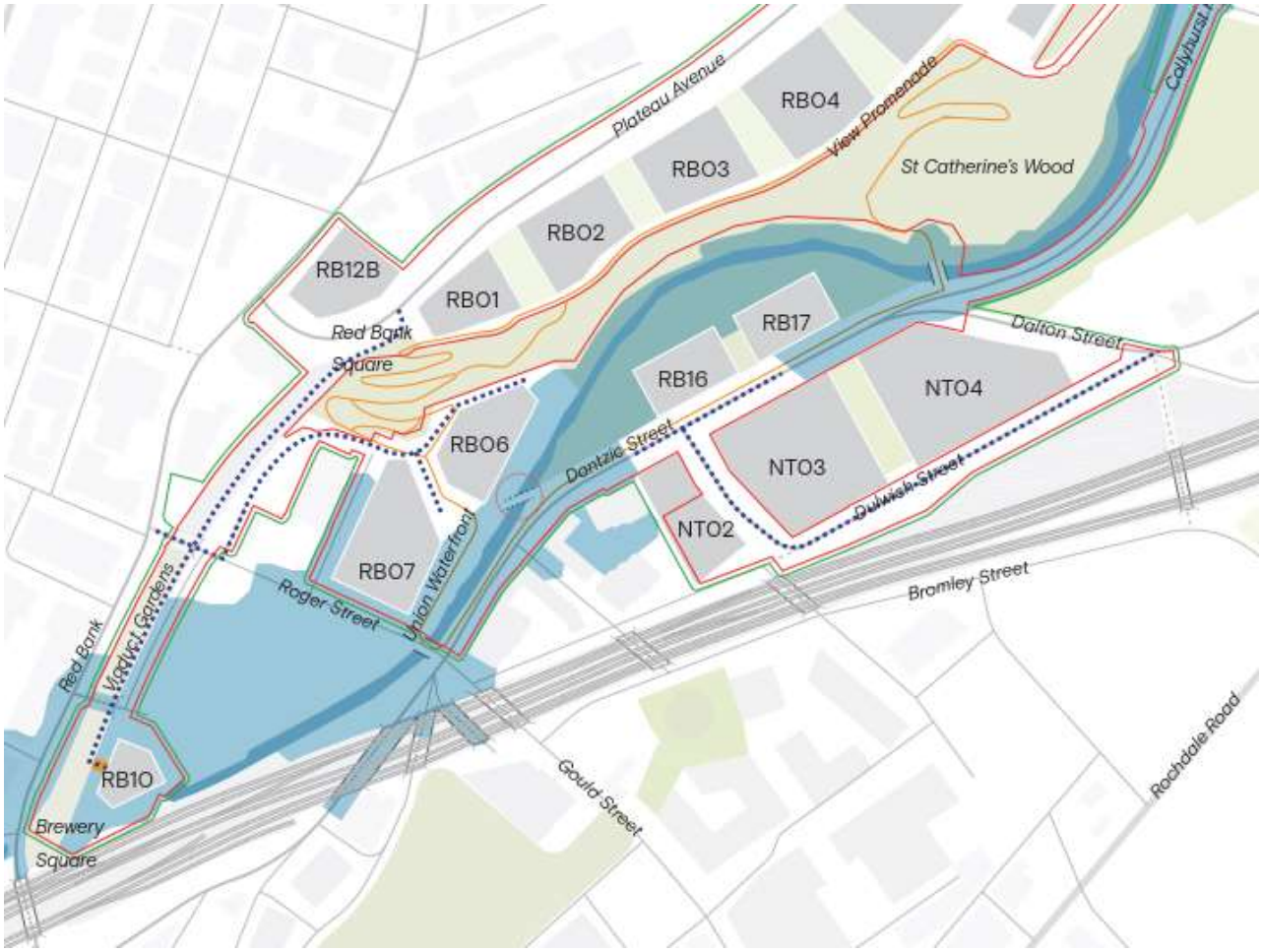


Figure 6-2 – Safe Access and Egress Routes – Application 4

6.1.16. In order to ensure that the proposed Application 4 development can be operated safely for residents and users it is recommended that the end user of the development subscribes to the EA's Automated Flood Warning System and a detailed Emergency Plan is produced so that the end users are aware of procedures to follow in the event of a flood.

6.2. APPLICATION 5 – FLOOD RISK STRATEGY

6.2.1. Reference should be made to figure 5-3 which is an extract of WSP drawing RDB-WSP-00-XX-DR-CV-0017 showing the extent and flood levels for the design flood event associated with Application 5. A copy of this drawing is included in Appendix G of the Flood Modelling Report.

6.2.2. The flood model that was used to assess Application 5 is the *FEC Baseline + Application 5*. The design flood level for Application 5 is also defined as the 100-year event plus a 35% allowance for climate change. This is the event that is used when a development is shown to be at risk of fluvial flooding to set finished floor levels, analyse loss of floodplain compensation storage and to demonstrate that safe access and egress routes are available.

The EA were engaged as part of pre-application consultations with respect to the proposed flood risk strategy for Application 5 and this is summarised as follows:

<u>Plot NT02:</u>

- The FFL for plot NT02 is set above the design flood level.
- NT02 design Flood Level is 30.88m AOD.
- The finished floor level (FFL) of NT02 is at or above 31.55m AOD which is more than 300mm above the design flood level and is also above the 1000-year flood level which is 31.32m AOD.
- Flood resistance or resilience measures are therefore not considered to be required for NT02.

Plot NT03:

- The FFL for plot NT03 is split but all FFL's are set above the design flood level including an allowance for climate change.
- The FFL for the residential access of NT03 is 32.35m AOD and there are commercial FFL's set at 31.84m and 31.72m AOD.
- The design flood Level for NT03 is 31.45m AOD. The FFL of NT03 is therefore 270mm above the worst case design flood level including and allowance for climate change and is also above the 1000-year flood level for NT03 which is 31.79m AOD.
- Flood resistance is not required for this plot.
- Flood resilience measures should be considered up to a minimum of the 1000 year flood level which is 31.79m AOD.

Plot NT04:

6.2.3. Plot NT04 is the only plot with a vulnerable (commercial) use across the masterplan with an FFL which is set below the design flood level.

- The design flood level including an allowance for climate change at NT04 is 31.50m AOD.
- The FFL for the residential access of NT04 is 32.23m AOD which is more than 300mm above the design flood level and is also above the 1000-year flood level which is 31.93m AOD.
- The lowest FFL for plot NT04 is shown to be 30.955m AOD – this is associated with the less vulnerable commercial usages along Dantzic Street.

6.2.4. With respect to mitigation for the commercial usage with floor level below design flood level NT04, the proposals are that flood resistance in the form of an impermeable concrete upstand will be provided to 610mm above FFL which is 31.565m AOD, and that resilience measures up to 300mm above this level which is 31.865m AOD. This is demonstrated in drawing RDB-MLA-2D-XX-AR-21720001 which is shown in Figure 6-3 below and also can be found in Appendix H of this report.

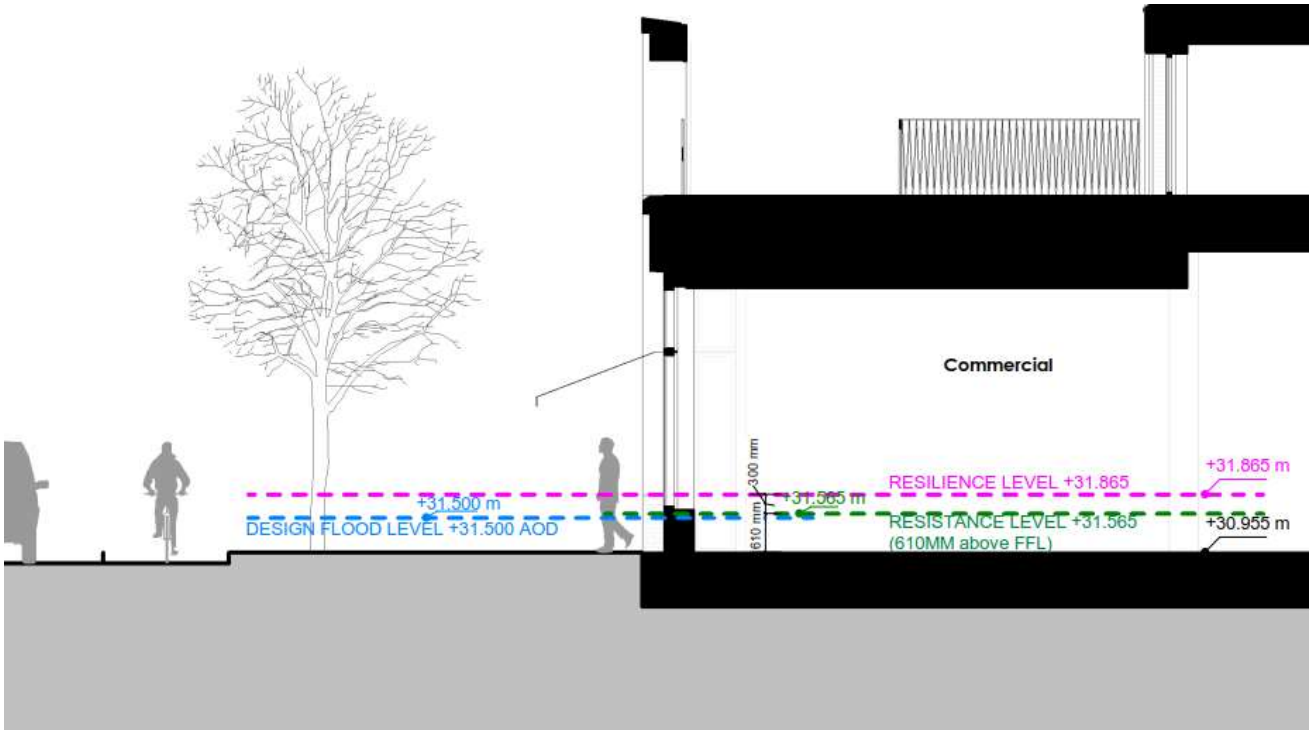


Figure 6-3 – Flood Resistance and Resilience Section – Plot NT04

6.2.5. With regards to the FFL of NT04 being set below design flood level, the justification was provided by Maccreanor Lavington as lead designer of the scheme. This has been shared with the Environment Agency and is agreed in principle. The justification is as below:

NT02 – NT04 General approach

The project aims to deliver a rich mix of commercial and community uses, with a focus on the frontages of NT02-04 on Dantzic Street. Most of these plots were identified in the Victoria North Strategic Regeneration Framework (SRF) as mixed-use. The plots are envisaged to sit among high-quality public realm, and it is critical to the success of the project that the uses within the buildings have a direct relationship with the surrounding public realm. They ground floor uses will be required to be accessible and active, therefore should be at a similar level to those of the adjoining public realm.

NT04

Dantzic Street is seen as a new high street destination for the Masterplan, with a generous provision of ground floor commercial and community uses. NT04 completes this high street at the eastern end. The existing levels to the frontage onto Dantzic Street are approximately 30.5m+ AOD to 31.0m+ AOD. It is proposed to adjust the levels in the public realm at the back of pavement to the proposed FFL level of the commercial units at 30.955m+AOD consistently along the frontage to facilitate level access.

The design flood level for NT04 is 31.50+ AOD, which is 545mm above the proposed FFL. It is proposed to provide flood resistance measures to the façade up to 600mm above the proposed FFL (i.e. up to 31.555m+ AOD) in order to mitigate any potential flooding whilst maintaining level access into the active uses.

6.2.6. Flood doors or retractable flood barriers will be provided at door thresholds. This is aligned with the approach taken for the neighbouring consented Victoria Riverside development and has been

discussed and agreed with the Environment Agency. The consultation with the EA has been provided in Appendix C.

6.2.7. Safe access and egress for the commercial plots will be provided via a ramped corridor to the rear of the units which emerges along Dalton Street at a level of approximately 31.70m so roughly 140mm above design flood level. Reference should be made to the NT04 safe access and egress plan an extract of which is shown in Figure 6-4 below and the full copy of which is included in Appendix H. Site users can then take refuge in a designated area at first floor level of the building for the required duration or until they can be safely evacuated via a dry route for example via Dalton or Dulwich Street.

6.2.8. Reference should also be made to the WSP Flood Hazard drawing 79268-MR1-018, also included in Appendix H, which identifies routes that are not safe for staff, residents, visitors or the emergency services to use during a design flood.

6.2.9. In order to ensure that the proposed Application 5 development can be operated safely for residents and users it is recommended that the end user of the development subscribes to the EA's Automated Flood Warning System and a detailed Emergency Plan is produced so that the end users are aware of procedures to follow in the event of a flood. As per Application 4, the proposed Dulwich Street will provide safe access and egress to the residents and users of the development being progressed under Application 5.

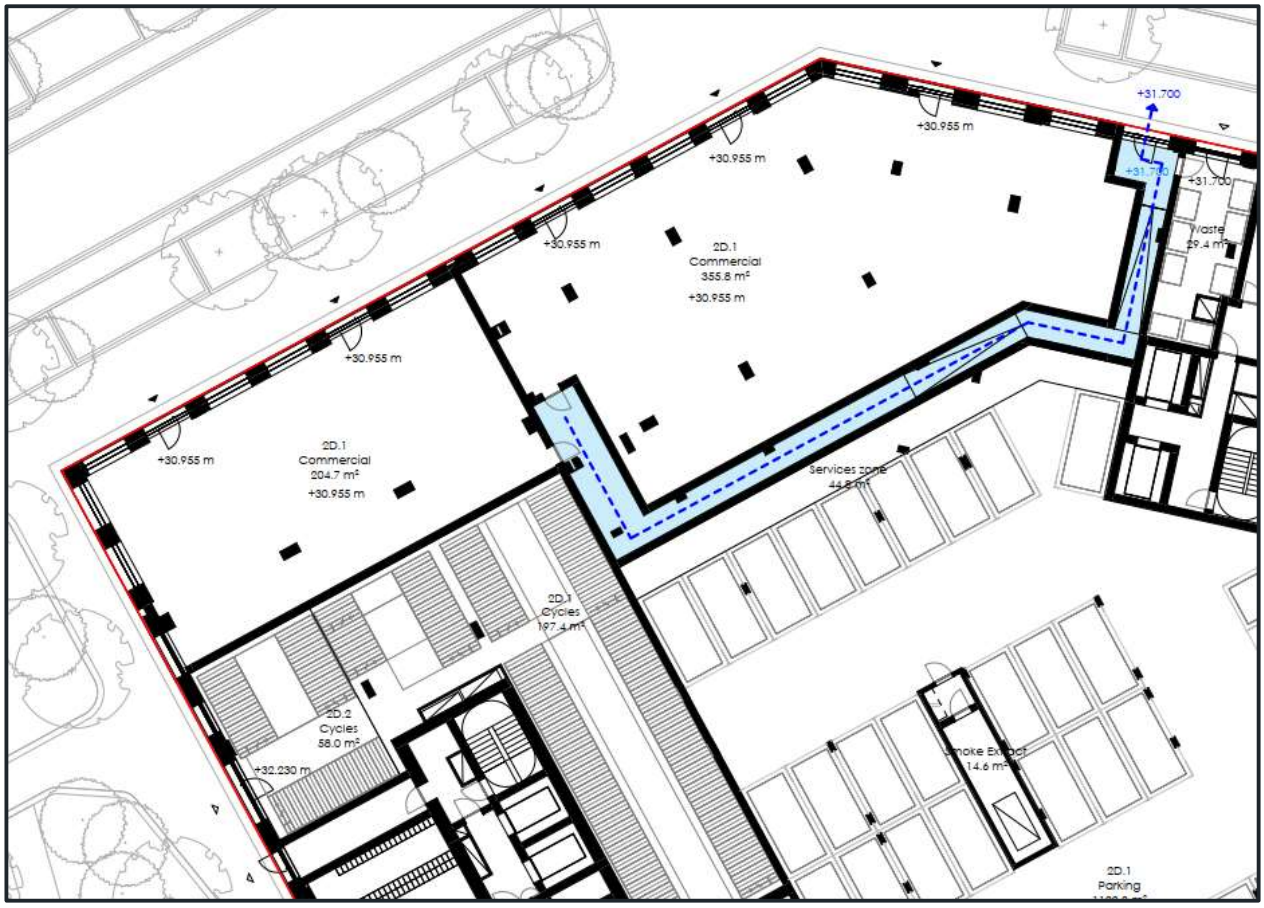


Figure 6-4 – Safe Egress Route – Application 5 – Plot NT04

6.3. FLOOD RESISTANCE AND RESILIENCE

6.3.1. Flood resistance and resilience measures are recommended for both Application 4 and Application 5 and are described in the Flood Risk Strategy section above.

6.3.2. Flood resistance involves keeping water out of the building and is generally done by using impermeable construction materials up to an agreed level including at entrance thresholds. This can be done by using flood resistant sealed doors or retractable flood barriers at door thresholds.

6.3.3. Flood resilience is related to the materials and other methods used to ensure that a flood causes the minimum disruption and that the building can be brought back into use as soon as possible following a flood event.

6.3.4. The EA have indicated through pre-application consultation that there is flexibility in the measures to be put in place for flood resistance and resilience, including what level flood resistance should be provided up to and what level flood resilience should be provided up to. However the EA guidance states that development should be appropriately flood resistant and resilient by:

- using flood resistant materials that have low permeability to at least 600mm above the estimated flood level,
- making sure any doors, windows or other openings are flood resistant to at least 600mm above the estimated flood level,
- using flood resilient materials (for example lime plaster) to at least 600mm above the estimated flood level,
- by raising all sensitive electrical equipment, wiring and sockets to at least 600mm above the estimated flood level,
- making it easy for water to drain away after flooding such as installing a sump and a pump,
- making sure there is access to all spaces to enable drying and cleaning,
- ensuring that soil pipes are protected from back-flow such as by using non-return valves.

6.3.5. The appropriate flood resistance and resilience measures should be considered and specified by the plot architects when each plot is brought forward for development. The relevant guidance documents for the consideration of resistance and resilience measures are as follows:

- Government guidance on flood resilient construction
- CIRIA Code of Practice for property flood resilience
- British Standard 85500 – Flood resistant and resilient construction

6.4. EMERGENCY PLAN

6.4.1. It is a recommendation of this report that an Emergency Plan is put in place for both Application 4 and Application 5 so that users of the developments including staff, residents and visitors are aware of the procedures that need to be followed in the event of a flood so that they can be evacuated before the onset of a flood or escape to a safe refuge above the flood level if required.

6.4.2. The requirements for Emergency Plans are set out in the EA / ADEPT guidance document, 'Flood Risk Emergency Plans for New Development'. The main items for inclusion in an Emergency Plan are listed below. This report includes a significant portion of the key information required as part of an

Emergency Plan including flood levels and safe access and egress routes and flood resistance and resilience measures. However, it is anticipated that an Emergency Plan will be produced for each plot affected by flooding at the detailed design stage when more information is available regarding the end user of the plots and particularly any commercial premises at ground floor level.

- Characterise and quantify the flood risk;
- Subscribe to EA Automated Flood Warning System;
- List relevant flood warnings and estimate the likely lead-time available;
- Detail who is at risk – including vulnerable people and transient users;
- Explain how the EP will be triggered, by who and when;
- Define any areas of responsibility for those participating in the EP;
- Describe what actions are required by the people in the development;
- Set out the type and performance of any flood resistance or resilience measures to be installed prior to a flood;
- Establish safe access and escape routes to a safe location and inform site users of routes that are unsafe;
- Outline the evacuation procedure, place of refuge and related equipment needed to serve occupants for the required duration;
- Detail what emergency service infrastructure and/or contributions are proposed;

;

- Establish procedures for implementing, monitoring and maintaining the plan throughout the lifetime of the development.

7. FLOOD RISK FROM OTHER SOURCES

7.1.1. In addition to fluvial flood risk from the River Irk and in accordance with the NPPF and EA guidelines, flood risk from sources including from flooding from surface water / overland flows, sewer flooding, groundwater flooding and artificial sources of flooding such as from canals or reservoirs have been considered in this flood risk assessment.

7.1.2. The potential risk of flooding to both the Application 4 and Application 5 sites from all current and future sources has been assessed in accordance with the National Planning Policy Framework.

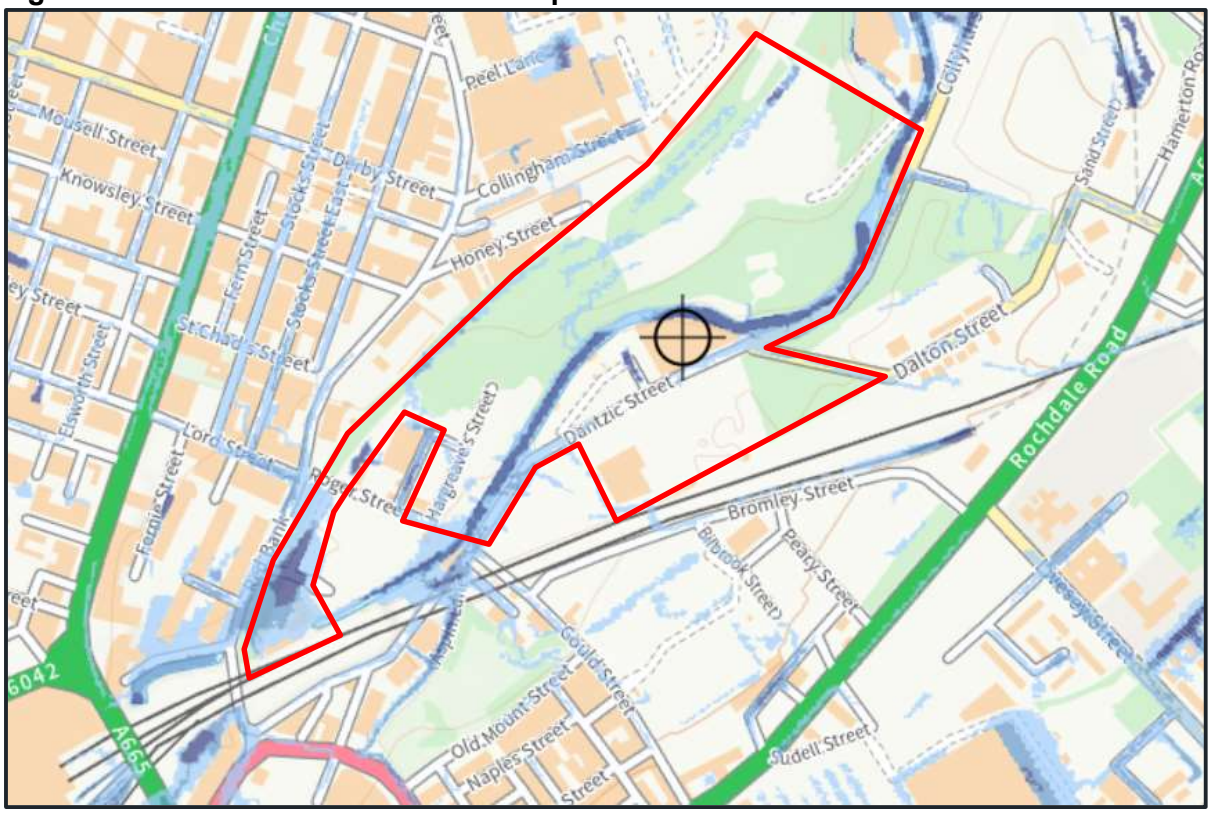
7.1.3. This report will demonstrate that the proposed developments associated with Applications 4 and 5 will be safe for their lifetime (taking into account the impacts of climate change), ensure no increase in flood risk from other sources off-site, and reduce flood risk from other sources where possible, in line with the 'Flood Risk and Coastal Change' Planning Practice Guidance.

7.2. SURFACE WATER FLOODING

7.2.1. The EA descriptions for the High, Medium and Low risk scenarios for surface water flooding are as follows:

- **High risk** means that each year this area has a chance of flooding of greater than 3.3%.
- **Medium risk** means that each year this area has a chance of flooding of between 1% and 3.3%.
- **Low risk** means that each year this area has a chance of flooding of between 0.1% and 1%.
- **Very Low risk** means that each year this area has a chance of flooding of less than 0.1%.

Figure 7-1 - EA Surface Water Flood Map



7.2.1. The Environment Agency Map of long-term flood risk from surface water indicates that there is an area at High risk of surface water flooding around the proposed location of RB10 and Low to Medium risk of flooding to the eastern end of Dantzic Street and Low risk to the western end of Dantzic Street, as well as sporadic areas at low risk of surface water flooding across the site including along Hargreaves Street as well as an isolated area at High risk on Warford Street.

7.2.2. The existing topographical survey information for the site was assessed and the areas shown to be at risk of surface water flooding correlate with topographical low points across the site.

7.2.3. Based on the above, it is considered that although there is a varying degree of surface water flood risk across the site from Low to High risk. Mitigation measures associated with surface water and overland flows are described in section 8.

7.3. SEWER FLOODING

7.3.1. The proposed development contains a network of existing combined public sewers some of which are to be abandoned or diverted as part of the development proposals as described in section 3.3 of this report.

7.3.2. United Utilities were contacted and asked to confirm whether they have any record of flooding from their network within the vicinity of the proposed development. A response is currently awaited.

7.3.1. Manchester City Council were also contacted and provided a flood screening report which is included in Appendix C. The flood screening report advised that an underground car park of a development in proximity to RB10 had been subject to flooding from a combined sewer in September 2016. Other incidents within the site extents generally referred to issues with blocked gullies.

7.3.2. Based on the above, the risk of sewer flooding impacting on the site is considered to be Low.

7.4. GROUNDWATER FLOODING

7.4.1. Groundwater flooding occurs when the water table, the level of water below the ground, rises above the ground surface or into cellars and basements. Groundwater flooding is most likely to occur in low-lying areas underlain by permeable rocks (aquifers). These may be extensive, regional aquifers, such as chalk or sandstone, or may be localised sands or river gravels in valley bottoms underlain by less permeable rocks.

7.4.2. The Manchester City, Salford City and Trafford Councils Level 2 SFRA Groundwater Flood Map (2011) indicates that the site is not at risk of groundwater flooding.

7.4.3. Site investigations carried out by Arup (Application 4) and RoC Consulting (Application 5) indicate that groundwater was encountered at varying depths across the site generally ranging from 3mbgl to 6mbgl as described in section 3.

7.4.4. Based on the above, it is considered that the risk of groundwater flooding to the site is Low.

7.5. ARTIFICIAL SOURCES OF FLOODING

7.5.1. Non-natural or artificial sources of flooding can include canals, reservoirs, lakes, etc. The potential effects of flood risk management infrastructure and other structures need to be considered.

CANAL / RIVER INTERACTION

7.5.2. The closest Canal to the site is the Rochdale Canal which lies approximately 850 metres to the southeast of the site. The Manchester City, Salford City and Trafford Councils Level 2 SFRA Hydraulic Interactions map indicates that the site will not be affected by flooding from this canal.

7.5.3. Therefore, it is considered that the site is Not at risk of flooding from canals or canal and river interaction.

RESERVOIRS

7.5.4. The Environment Agency's Reservoir Flood Risk Map indicates that the site is at risk of flooding in the event of reservoir failure. An extract of which is shown in figure 7-2 below.

7.5.5. The extent of the flooding is exclusive to the lower sections of the site with the proposed plots affected from Application 4 being RB06, RB07, RB10, RB16 and RB17 and those from Application 5 being NT02 to NT04.

7.5.6. With the above in mind, it is considered that the site is at a medium risk of reservoir flooding.

Figure 7-2 - EA Reservoir Flood Risk Map Extract

8. MITIGATION / MANAGEMENT OF FLOOD RISK FROM OTHER SOURCES

8.1. DRAINAGE AND EXCEEDANCE FLOW ROUTES

8.1.1. As part of the development proposals the site is to be provided with new private and adoptable surface water drainage systems which are to be designed to accommodate a 100 year plus climate change rainfall event. This will reduce the risk of flooding from surface water occurring across the site.

8.1.2. The surface water drainage strategy for the site is that all surface water runoff from within the wider development boundary will be collected into new separate private and adoptable surface water drainage systems prior to be discharged to the River Irk at greenfield runoff rates. Therefore, no surface water from the proposed development is to discharge into an existing public sewer and the volume of runoff into the existing public sewerage system will therefore be significantly reduced as a result of the development. This will reduce the risk of flooding from sewers on site and elsewhere in the local catchment.

8.1.3. In addition to the above, there are known combined sewer overflows within and within the vicinity of the site. This reduction in surface water runoff into the combined sewerage system is likely to have the potential to reduce the occurrence of spills into the River Irk from these CSO's.

8.1.1. It should be noted that if a storm event occurs which is in excess of the 100 year plus climate change event or a blockage / collapse occurs which results in local drainage system failure, this will result in flood water arising from the site drainage system which will then be conveyed across the development site as an overland flow.

8.1.2. Reference should be made to the WSP, Exceedance Event - Overland Flow Routes drawings RDB-WSP-00-XX-DR-CV-00200 & 00201 for Application 4 and Application 5 which are included as Appendix I of this report.

8.1.3. The Application 4 drawing demonstrates that overland flows would be safely routed away from buildings and ultimately be conveyed across the site surface towards the River Irk in the event of failure or design exceedance of the proposed site drainage system.

8.1.4. The application 5 drawing shows that overland flows would be safely directed away from buildings and conveyed away from the site along Dantzic Street to the west and Collyhurst Road to the east. There is an instance of a low spot created by a proposed raised pedestrian crossing close to the intersection between Dantzic Street and Dalton Street. In an exceedance event, water will pool here until it exceeds the height of the raised crossing after which it will flow down Collyhurst Road away from site.

8.1.5. In some circumstances, FFL's have been raised above the design flood level from the River Irk, this is the case at plot RB10 which is a low point on the site. Alternative access to and from the RB10 building has been provided at first floor level via a new bridge on to the existing red bank viaduct (proposed Viaduct Gardens).

8.2. RESERVOIR FLOODING

8.2.1. The site is shown to be at risk of flooding in the event of a reservoir failure. This should be documented in the Emergency Plan for the site and an emergency procedure for evacuation of plots that could be affected should be put in place.

8.3. FLOOD RISK POST MITIGATION

8.3.1. Table 8-1 below summarises the findings of the flood risk from other sources assessment both pre and post mitigation.

Table 8-1 – Degree of Risk from Other Sources Pre / Post Mitigation

Source		Flood Risk (Pre Mitigation)	Flood Risk (Post Mitigation)
Surface Water		Low to High	Low
Sewer		Low	Low
Groundwater		Low	Low
Tidal		Not at Risk	Not at risk
Artificial Sources	Reservoir	Medium	Medium
	Canal	Not at Risk	Not at risk

9. SURFACE WATER DRAINAGE STRATEGY

9.1.1. This section sets out the surface water drainage strategy for the outline and detailed planning applications. The outline planning application (Application 4) includes plots RB01 to RB07, RB10, RB12B, RB16 and RB17.

9.1.2. The full planning application (Application 5) includes plots NT02 to NT04 as well as the proposed Dulwich Street and the existing Dantzic Street/Dalton Street highways proposals.

9.1.3. Reference should be made to the indicative only HIF drainage layout drawings which can be found in Appendix J.

9.1.4. As described in section 1, three planning applications submitted by MCC and proposing enabling, infrastructure and utility works funded by the HIF have been granted planning permission. This includes new primary foul and surface water drainage infrastructure to enable the future development proposed under Application 4. It is understood that an option exists for this new drainage infrastructure to be put forward put forward for adoption by United Utilities. Foul and surface water drainage from the plots will be connected into the new adoptable drainage systems installed by the HIF team.

9.1.5. In addition to the adoptable drainage runs the HIF drainage strategy consists of permeable pavements and attenuation features with associated pipework that may not be adopted and will remain private.

9.1.6. The HIF surface water drainage system ultimately discharges to the River Irk via three new outfalls at a rate not exceeding 22l/s/ha. The general surface water drainage strategy was agreed as part of the HIF planning consent (Application 2).

9.1.7. As part of the HIF proposals any existing surface water connections will be diverted from the combined sewer and into the newly installed surface water system.

9.1.8. This report focuses on the drainage strategy for the proposed development plots which are being brought forward by FEC. Reference should be made to the Arup drainage strategy (Report reference VNIF-ARP-ZZ-YYY-RP-CD-0002) which can be found in appendix J.

9.1.9. For details of the surface water drainage proposals for Application 4, reference should be made to the WSP drawing RDB-WSP-00-XX-DR-CV-019904 included in Appendix K, which details the proposed discharge rates and maximum attenuation volumes for .

9.1.10. Reference should be made to WSP drawing RDB-WSP-00-XX-DR-CV-00100 for details of the surface water drainage strategy for Application 5, which is included in Appendix K of this report.

9.1.11. There are a number of existing combined public sewers which cross Application 4 and Application 5 sites some of which are to be either abandoned or diverted. Reference should be made to Consultations with United Utilities found in Appendix C and WSP drawing 14113-WSP-SKX-ZZ-DR-D-0003 which is included in Appendix F of this report and which outline the currently strategy for build overs, diversions and abandonments which has been agreed in principle with United Utilities.

9.2. DISPOSAL OF SURFACE WATER

9.2.1. The method for removal of surface water from the plots has been selected in accordance with the hierarchy outlined in Building Regulations Part H as summarised below:

- Infiltration to the ground
- Discharge to a watercourse
- Connection to a surface water sewer
- Connection to a combined sewer

SOAKAWAYS

Application 4: Redbank Neighbourhood

9.2.2. A detailed assessment of the feasibility of soakaways has been undertaken. A Ground Investigation Interpretive Report was produced by Arup as part of the HIF planning submission, report no. VNIF-ARP-ZZ-YYY-RP-CG-0009. Within the aforementioned report, previous industrial usage is described with significant depths of made ground across the majority of the site with a large section of the north bank of the River Irk having been filled to accommodate the construction of railway sidings. The presence of made ground is prohibitive to drainage through infiltration because of the potential contaminants harboured within the infilled ground.

9.2.3. Discharge of surface water through soakaways is generally not acceptable within five metres of a buildings foundations. Application 4 is focussed on the development of the proposed plots enabled by the primary infrastructure within the HIF proposals. Given that the footprint of the plots will consist mainly of a new building there will be limited scope to provide soakaway drainage.

9.2.4. Based on the above, it is anticipated soakaways and other means of infiltration will largely not be feasible as a means of disposing surface water runoff within the plots covered. This will be reviewed and confirmed upon completion of the site-specific site investigation and if necessary following site remediation.

Application 5: Plots NT02 – NT04

9.2.5. A Site Investigation report for plots NT02, NT03 & NT04 and the Dantzic Street area has been produced by RoC Consulting (4328-ROC-ZZ-XX-RP-ES-P2-101). An assessment for each plot is provided within the report.

9.2.6. Within plot NT02, strong evidence of contamination was observed across numerous exploratory boreholes. Based on this the use of soakaways or other means of infiltration is not considered to be suitable for this plot.

9.2.7. With regards to plots NT03 and NT04 the majority of the plot is proposed to be building footprint which leaves limited space to install a soakaway away from foundations of the proposed buildings.

9.2.8. Further to this, with reference to borehole RBH205 described in the RoC report, there are layers of Devensian Till consisting of clay down to depths of 7.50mbgl whilst groundwater was encountered at 5.42mbgl. Soakaways have to be installed at least one metre above the recorded level of groundwater, which in this instance would result in the bottom of the soakaway being located within a layer of clay.

9.2.9. In summary, it is considered that the use of soakaways for the disposal of surface water from the area considered within Application 5 is unlikely to be feasible.

WATERCOURSE

9.2.10. Surface water from Application 4 is to be discharged to the River Irk via the proposed adoptable site wide HIF drainage system as anticipated to be defined and agreed via the discharge of conditional requirements placed upon Application 2.

Application 4: Redbank Neighbourhood

9.2.11. Plots RB5a to RB5c will discharge to an outfall cored through the river wall towards the upstream end of the site extents.

9.2.12. Plots RB01to RB04; RB06; RB08 & RB12b will discharge to a newly proposed headwall adjacent to RB06.

9.2.13. Plot RB07 will discharge to a further proposed headwall immediately to the south of plot RB07.

9.2.14. Reference should made to the HIF construction drawings provided in Appendix J.

9.2.15. Plot RB10 will discharge to the River Irk via a new outfall. This outfall will not be provided as part of the HIF proposals and will therefore need to be designed, detailed and approved by the EA as part of the design development of the plot.

9.2.16. RB16 and RB17 sit south of the River Irk. It is currently anticipated that these plots will drain to the River Irk via a new surface water carrier drain and outfall in Dantzic Street provided as part of Application 5. Refer to Appendix K for details.

Application 5: Plots NT02 to NT04

9.2.17. It is proposed that the plots that sit within Application 5 will ultimately drain to the River Irk.

9.2.18. A new adoptable surface water carrier drain will be installed in Dalton Street and Dantzic Street which discharges to the River Irk via a proposed new headwall located to the west of Plot RB16. The proposals for the new adoptable carrier drain and outfall have been discussed with United Utilities, the Environment Agency and the Manchester LLFA. A Section 104 application for the adoption of the carrier drain and a detailed application for the construction of the new outfall will be progressed as part of the detailed design following planning approval.

9.2.19. The United Utilities requirements for new outfalls into watercourses is that they should be set at a level of 300mm above the 30 year river level. The EA have also been consulted with regards to the new outfall and stated the following *'there can be differences in design preference of outfalls between the EA and United Utilities (UU), e.g. level of inverts relative to bed / flood level and wingwalls projecting from the bank profile (as required on UU standard details).As we understand the details of the proposed outfall are currently unknown, we would welcome joint discussions with the FEC Project Team and UU to establish suitable design principles and ensuring integration / consideration of its setting within the wider riparian corridor.'*

9.2.20. The 30 year river level has been taken from the FEC Baseline plus NT02 to NT04 model and is 30.400mAOD. The currently proposed outfall level is 27.227mAOD which is the same invert level as the outfall which is being provided for the neighbouring Victoria Riverside development.

9.2.21. Based on the above, the proposed outfall is below the 30 year river level and therefore a surcharged outfall will need to be modelled at detailed design stage including impact on proposed site drainage systems and attenuation features within the lower lying areas of the application site. An assessment of the impact on the required attenuation storage volume in the event of a surcharged outfall has

been undertaken with a 100-year river level and the 100 year plus climate change rainfall event. In the event of a surcharged outfall it is anticipated that the required attenuation volume would rise by up to 50%. It is thought to be feasible to accommodate this increase of storage volume within the proposed NT02-04 site area. This is in line with the approach taken by the neighbouring Victoria Riverside development. .

SURFACE WATER SEWER

9.2.22. As stated above, new surface water drainage is proposed to be provided as part of the HIF works package and Application 5. This new primary surface water drainage infrastructure will collect runoff from the plots across both applications and convey the surface water to proposed new outfalls into the River Irk.

COMBINED SEWER

9.2.23. Discharge of surface water to an existing combined sewer has not been considered for either application since the preferred method of surface water disposal has been identified further up the drainage hierarchy.

9.3. SUDS

9.3.1. A detailed assessment of the suitability of all types of sustainable urban drainage systems (SuDS) has been carried out. Reference The provision of SuDS has been considered and will, where appropriate, be included within the surface water drainage proposals.

Application 4: Redbank Neighbourhood

9.3.2. The suitability of SuDS features for Application 4 has been considered and is provided in table 9-1 below.

Table 9-1 – Suitability of SuDS Features for Application 4

SuDS Feature	Water Quality	Volume Control	Space Available	Storage	Cost	Amenity Value	Overall Suitability
Blue Roof	LOW	LOW	HIGH	MEDIUM	HIGH	LOW	**HIGH**
Green Roof	MEDIUM	MEDIUM	HIGH	LOW	HIGH	MEDIUM	**HIGH**
Rainwater Harvesting	LOW	LOW	HIGH	HIGH	HIGH	LOW	**MEDIUM**
Infiltration Systems	LOW	LOW	HIGH	LOW	MEDIUM	LOW	**LOW**
Hard Engineered Separators	HIGH	LOW	HIGH	LOW	HIGH	LOW	**HIGH**
Filter Drains	HIGH	MEDIUM	MEDIUM	MEDIUM	LOW	LOW	**LOW**
Swales	HIGH	MEDIUM	LOW	HIGH	LOW	MEDIUM	**LOW**

Bioretention Systems	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	HIGH	**MEDIUM**
Tree Pits	MEDIUM	MEDIUM	HIGH	LOW	MEDIUM	HIGH	**MEDIUM**
Permeable Pavements	MEDIUM	HIGH	MEDIUM	MEDIUM	MEDIUM	MEDIUM	**HIGH**
Storage Tanks	LOW	LOW	LOW	HIGH	HIGH	LOW	**HIGH**
Detention Basins	HIGH	HIGH	LOW	HIGH	LOW	MEDIUM	**LOW**
Ponds and Wetlands	HIGH	MEDIUM	LOW	HIGH	MEDUM	HIGH	**LOW**

9.3.3. There is scope to include green SuDS such as swales and raingardens within the public realm between the buildings plots located on the plateau. One way in which this could be achieved is presented below in figure 9-1.

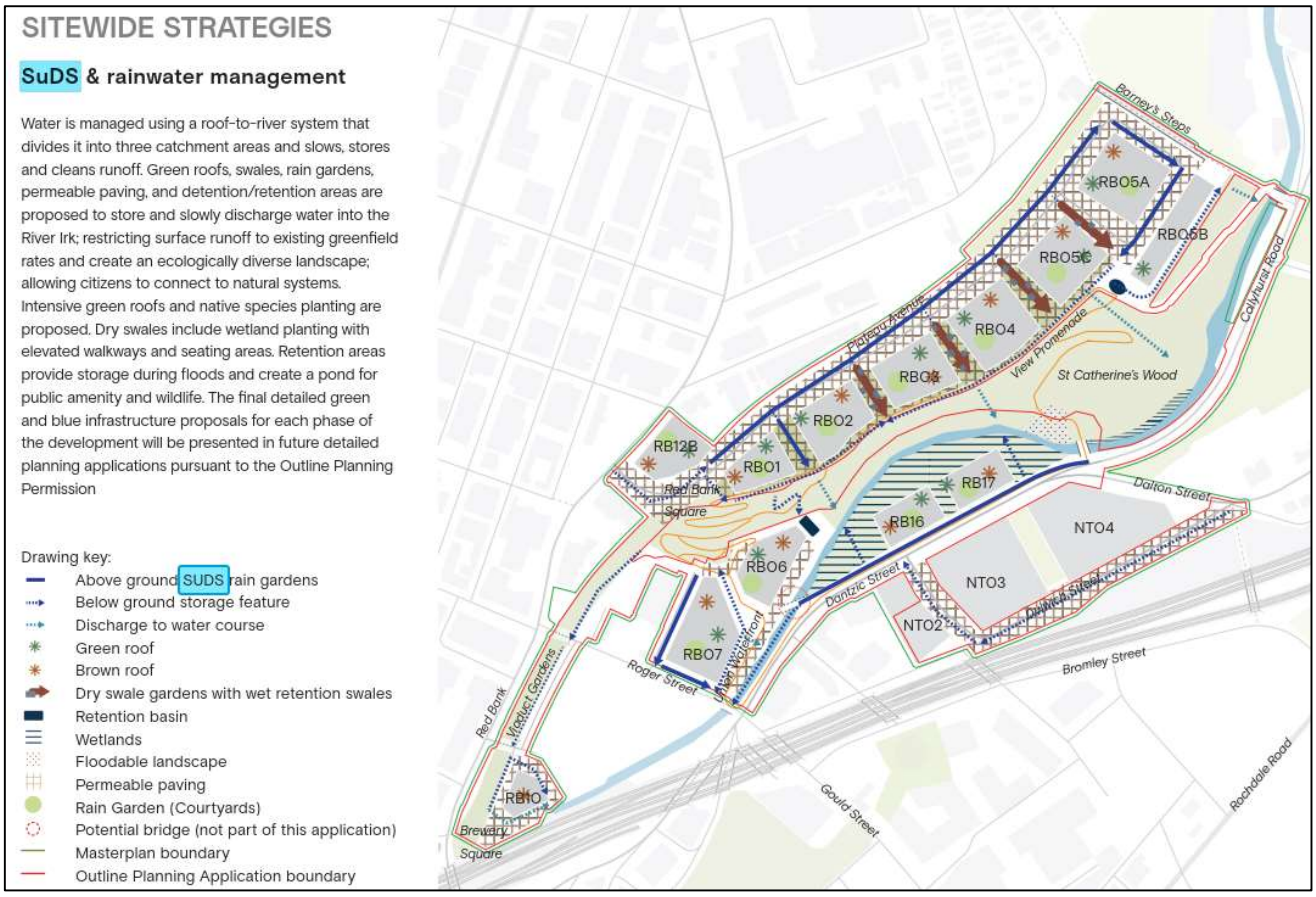


Figure 9-1 – SuDS & Rainwater Management

<u>Application 5: Plots NT02 to NT04</u>

9.3.4. Due to the spatially constrained nature of the site, there is limited scope to incorporate space intensive, green SuDS such as swales or detention basins within the plot boundaries or the public realm.

9.3.5. As a result of this lack of space within the plots, it is anticipated that the SuDS provision within each plot will be provided in the form of underground attenuation tanks located under areas of hard landscaping, or underground car parks found within the plots.

9.3.6. Blue roof systems were considered for the podium areas on plots NT03 and NT04. Following discussions with the wider design team, the application of blue roofs was discounted as an option due to concerns associated with the risk of failure of waterproofing systems and the resulting impact on the building.

9.3.7. The Public Realm areas included within this application, namely Dulwich Street and Travis Square, are thought to be well suited to the implementation of permeable pavements because of their relatively large areas of paving. These permeable pavements will positively drain themselves and act as a conveyance system to underground geo-cellular tanks provided at the foot of each section of permeable which will provide attenuation before runoff is discharged to the main drainage system at a controlled rate. The large flat section towards the top of Dulwich Street will attenuate within the permeable pavement itself due to its flat gradient.

9.3.8. With regards to the Dantzic Street proposals, it is proposed that the highway corridor is widened to provide additional footpath/cycleways. As part of these proposals the carriageway will be lined with a green SuDS corridor which is envisaged to consist of bioretention systems that are connected via underground pipes to form a connected system. These systems will provide water quality treatment and attenuation for runoff from the adjacent new footway through the application of voided stone or geo-cellular crates underneath the planted areas. This constitutes the drainage strategy being put forward for Dantzic Street and Dalton Street for planning.

9.4. WATER QUANTITY

9.4.1. The discharge rates for both applications are based on consultation between Arup and the LLFA as part of the HIF planning application. This consultation is documented in the Arup drainage strategy VNIF-ARP-ZZ-YYYY-RP-CD-0002.

9.4.2. Within the Arup report the surface water runoff rate was proposed to be restricted to 22l/s/ha for each plot for the 1-in-100 year +40% climate change storm in line with the NPPF guidance at the point of submission. The calculations carried out to determine the discharge rate can be found in Appendix C of the Arup drainage strategy report mentioned above.

9.4.3. As and when a rainfall event exceeds the imposed 22l/s/ha restriction on site, a provision of surface water attenuation is required to hold the excess water on site before release to the wider surface water drainage network at the aforementioned agreed rate. It is proposed that attenuation will be provided on a plot-by-plot basis.

9.4.4. Since the original HIF planning submission, the guidance on climate change allowances for rainfall intensities has been updated and the upper end allowance is now advised to be 45% for the 1-in-100 year storm. Therefore, the required site wide attenuation volumes have been estimated using this higher rate.

<u>Application 4: Redbank Neighbourhood</u>

9.4.5. Reference should be made to WSP drawing RDB-WSP-00-XX-DR-CV-019904 which shows the proposed discharge rate and required volume of attenuation for each plot.

9.4.6. These calculations were undertaken using the MicroDrainage Quick Storage Estimate function using a 45% allowance for climate change and assuming 100% impermeability within each plot boundary shown. The Quick Storage Estimate provides a volume range and the top end of the range has been used for the purposes of this report.

9.4.7. Discharge rates for each plot are provided below in table 9-2.

Application 5: Plots NT02 to NT04

9.4.8. For water quantity information on Application 5, reference should be made to WSP drawing RDB-WSP-00-XX-DR-CV-00100 which indicates the discharge rate and required attenuation volume for plots NT02 to NT04 and associated public realm. This is included in Appendix K.

9.4.9. The calculations for the plot attenuation for Application 5 were completed using the MicroDrainage source control detailed design function. This method provides a more accurate estimate of attenuation requirement but in this case did not account for storage provided in the pipe network which can potentially reduce the need for storage. A 45% allowance for climate change was applied, as per Application 4. A record of these calculations is provided in Appendix L of this report.

9.4.10. It is currently proposed that the required attenuation volumes as set out in table 9-2 below for Plots NT02, NT03 and NT04 will be provided by using below ground cellular storage tanks.

9.4.11. In addition to the plan area of the plot, an allowance for the vertical surfaces of the proposed buildings was included. This area was taken as 50% of the area up to 10 storeys high of the tower blocks on each plot, using a worst case wind direction that affected the longest length of building façade. This was only applied to buildings over 10 storeys high. This approach is in line with BS 12056.

9.4.12. The proposed discharge rates based on 22l/s/ha for each plot are provided below in table 9-2. These rates have been pro-rated based on their plan area.

9.4.13. The public realm areas that are being delivered as part of Application 5 have also been considered. This includes Dulwich Street which has a total impermeable area of 0.527ha and Travis Square which has an impermeable area of 0.155ha. Permitted discharges in line with the agreed rate from these locations are 11.6l/s and 3.40l/s respectively with maximum required attenuation volumes of 313m^3 and 92m^3.

9.4.14. It is currently proposed that the required attenuation volumes above for these areas of public realm will be provided using a permeable pavement system with a tanked type 3 MOT voided stone subbase. Type 3 MOT has a void ratio of 30%.

9.4.15. As described in section 9.3.8, it is currently proposed that Dalton Street and Dantzic Street are to be widened therefore increasing the area of adoptable highway in comparison to what currently exists. At present the entirety of the adoptable highway drains at an unrestricted rate to the public combined sewer in the carriageway. The green SuDS corridor is proposed to drain the widened area of public highway which predominantly consists of footway. It is currently proposed that Each footway will have its own distinct SuDS system.

9.4.16. The northern SuDS corridor will drain a footway area of 0.051ha, discharging at 1.12l/s. Maximum storage is therefore anticipated to be 30m^3.

9.4.17. SuDS for the southern footway will drain an impermeable area of 0.183ha, with a discharge of 4.03l/s. Maximum storage for this system is anticipated to be 109m^3.

For the adoptable SuDS corridors the discharge rates specified above are low. These rates are therefore subject to change following detailed discussions with MCC Highways to confirm a suitable minimum discharge rate for the avoidance of blockages.

Table 9-2 – Plot-by-Plot water quantities

Plot		Area (Assumed 100% Impermeable)	Permitted Discharge (l/s)	QSE Max (m^3)
RB01	3A	0.22	4.84	131
RB02	3B	0.36	7.92	214
RB03	3C	0.37	8.14	220
RB04	3D	0.46	10.12	273
RB05C	3E	0.38	8.36	225
RB05A	3F	0.36	7.92	214
RB05B	3G	0.24	5.28	142
RB06	1C	0.26	5.72	155
RB07	1D	0.36	7.92	214
RB10	1A	0.14	3.08	83
RB12B	3H	0.20	4.40	119
RB16	2E	0.18	3.96	107
RB17	2G	0.18	3.96	107
Plots NT02-NT04 attenuation analysed using MicroDrainage 4 Stage Design Guide				Storage (m^3)
NT02	2B	0.23	5.06	156
NT03	2C	0.54	11.88	315
NT04	2D	0.63	13.86	360

9.5. WATER QUALITY

Application 4: Redbank Neighbourhood

9.5.1. It is intended that water quality treatment will be provided to meet the requirements of the Simple Index Approach as set out in the CIRIA C753 SuDS Manual Chapter 26.

9.5.2. Reference should be made to figure 9-1 which shows that a variety of surface SuDS features are to be incorporated into the development of the outline plots which will contribute towards meeting the requirements of the Simple Index Approach. Features being considered include:

- Dry and Wet Swales
- Retention Basins
- Wetlands
- Permeable Pavements
- Rain Gardens

9.5.3. Proprietary treatment systems such as vortex separators may also be included where appropriate and the manufacturer/supplier is able to provide SuDS mitigation indices in accordance with table 26.3 of the SuDS Manual.

Application 5: Plots NT02 to NT04

9.5.4. For water quality design, the full application can be sub-divided into three distinct zones as follows:

- Roofs
- Private Public Realm
- Adoptable Footway

The tables below provide the relevant land use, pollution hazard indices and proposed SuDS features and their associated SuDS mitigation indices for these areas.

Table 9-3 –Pollution Mitigation Strategy for Roofs Zone

Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Residential Roofs	Low	0.2	0.2	0.05
SuDS Mitigation Index				
SPEL Smartceptor (Vortex Separator)		0.5	0.4	0.5
Total SuDS Mitigation Index		0.5 ✓	0.4 ✓	0.5 ✓

Table 9-4 – Pollution Mitigation Strategy for Private Public Realm Zone

Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Individual Property Driveways, residential car parks, low traffic roads (e.g. cul-de-sacs, home zones and general access roads) and non-residential car parking with infrequent change (e.g. schools offices) i.e.<300 traffic movements/day	Low	0.5	0.4	0.4
SuDS Mitigation Index				
Permeable Pavement		0.7	0.6	0.7
Total SuDS Mitigation Index		0.7 ✓	0.6 ✓	0.7 ✓

Table 9-5 – Pollution Mitigation Strategy for Adoptable Footway Zone

Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Individual Property Driveways, residential car parks, low traffic roads (e.g. cul-de-sacs, home zones and general access roads) and non-residential car parking with infrequent change (e.g. schools offices) i.e.<300 traffic movements/day	Low	0.5	0.4	0.4
SuDS Mitigation Index				
Bioretention Systems		0.8	0.8	0.8
Total SuDS Mitigation Index		0.8 ✓	0.8 ✓	0.8 ✓

9.6. MAINTENANCE

9.6.1. Reference should be made to the Drainage Inspection and Maintenance Schedule, which is included as Appendix M of this report and applies to both Application 4 and Application 5.

9.6.2. Responsibilities for the future maintenance of private drainage systems has not been confirmed at this stage. It is expected that full details of ownership and maintenance will be available at discharge of planning condition stage.

10. FOUL DRAINAGE

10.1. GENERAL STRATEGY

Application 4: Redbank Neighbourhood

10.1.1. For details of the foul drainage proposals for Application 4, reference should be made to the WSP Foul Discharge Rate drawing (RDB-WSP-00-XX-DR-CV-019905), which in included in Appendix K of this report.

10.1.2. As described in section 9, new primary drainage infrastructure is being installed as part of the HIF works with the foul drainage provision being adopted by United Utilities (UU). The foul drainage from the proposed plots will connect to the HIF installed drainage via one connection per plot. The HIF drainage is proposed to connect to the existing UU combined sewerage network at two locations, to the existing sewer in Chase Street to the west of the site and to the existing combined sewer that heads south under the River Irwell towards Warford Street.

Application 5: Plots NT02 to NT04

10.1.3. For details of the foul drainage proposals for Application 5, reference should be made to the WSP Drainage Strategy Drawing (RDB-WSP-00-XX-DR-CV-00100) which is included in Appendix K of this report.

10.1.4. A new foul drainage network is proposed for plots NT02 to NT04 which consists of new carrier drains and chambers with connections provided to the proposed structures on site. The new foul drainage system is proposed to connect on to the existing 1550mm diameter UU combined sewer at two existing manholes (UU MH 5401 and UU MH 6401).

10.2. DISCHARGE RATES

Application 4: Redbank Neighbourhood

10.2.1. United Utilities were consulted with regards to the proposed foul water drainage and requested that an estimate of the foul flows generated by the development was provided.

10.2.2. Foul flow rates for Application 4 have been estimated by applying a discharge rate per residential unit to an illustrative number of residential units.

10.2.3. The discharge rate per plot for Application 4 is provided in Table 10-1 below. These figures are subject to detailed design development.

Table 10-1 – Application 4 Peak Foul Discharge Rates

Plot	RB01 3A	RB02 3B	RB03 3C	RB04 3D	RB05a 3E	RB05b 3F	RB05c 3G	RB06 1C	RB07 1D	RB10 1A	RB12B 3H	RB16 2E	RB17 2G
Peak foul discharge rate (l/s)	9.52	8.80	9.10	10.97	10.72	7.38	9.64	15.83	16.31	22.67	5.86	7.61	15.48

Application 5: Plots NT02 to NT04

10.2.4. An assessment of the anticipated peak foul flow from residential dwellings has been calculated based on the population method outlined in BS EN 16933:2-2017 which applies for developments where the proposed upstream population is greater than 500.

10.2.5. Foul flow rates have therefore been calculated using 4000 litres per dwelling per day and 0.6 litres per second for anticipated flows from non-domestic usages as stipulated in BS EN 16933:2-2017.

10.2.6. Table 10-2 below sets out the number of dwellings and floor area of commercial space on a plot-by-plot basis and provides the estimated foul flow generated. These discharge rates are subject to detailed calculations at detailed design stage.

Table 10-2 – Application 5 Foul Discharge Rates

Plot		Number of Homes	Litres per second per dwelling	Domestic foul discharge rate	Non-Domestic GIA (m2)	Non-Domestic foul discharge rate (l/s)	Peak foul discharge rate (l/s)
NT02	2B	316	0.046	14.6	434	0.022	14.62
NT03	2C	579	0.046	26.8	1030	0.052	26.85
NT04	2D	656	0.046	30.4	683	0.034	30.43

Appendix A

DEVELOPMENT MASTERPLAN

Appendix B

DEVELOPMENT SPECIFICATION REPORT

Appendix C

STATUTORY CONSULTATION

Appendix D

SITE LOCATION PLAN

Appendix E

PUBLIC SEWER RECORDS

Appendix F

SEWER DIVERSION PLANS

Appendix G

WSP FLOOD MODELLING REPORT

Appendix H

FLOOD MITIGATION

Appendix I

OVERLAND FLOW PLANS

79268-VICN-WSP-FRA-001

Appendix J

HIF DRAINAGE PROPOSALS

79268-VICN-WSP-FRA-001

Appendix K

DRAINAGE STRATEGY

79268-VICN-WSP-FRA-001

Appendix L

STORAGE CALCULATIONS

79268-VICN-WSP-FRA-001

Appendix M

DRAINAGE MAINTENANCE SCHEDULE

79268-VICN-WSP-FRA-001

8 First Street
Manchester
M15 4RP

wsp.com