



(dp)²

1812

Oldham street hotel

Manchester

Flood Risk Assessment

1812-OSH-DP2-A180-RP-XX-9041

Rev P02

DP Squared Ltd

Suite 3, Unit 8
Pennine Industrial Park
Valley Road
Hebden Bridge
HX7 7BZ

www.dpsquared.net

Flood Risk Assessment
Oldham street hotel

For

Jadebricks

September 2022

Ref : 1812-OSH-DP2-A180-RP-XX-9041

Report prepared by C Vose

BSc



Report checked by E Strouts

MEng CEng MStructE PG Dip Law



Report approved by D Paine

BEng CEng MICE



Rev	Date	By	Comment
P01	01 Sept 2022	ES	Draft issue
P02	07 Sept 2022	ES	Revised from comments

This report has been prepared for the sole use of Jadebricks. This report should not be passed to or relied upon by any Third Party without the express written permission of DP Squared.

Contents

Executive Summary	4
1.0 Introduction	7
1.1 Terms of Reference	7
1.2 Objectives	7
1.3 Data Sources	7
2.0 Planning Policy Context	9
2.1 Approach to the Assessment	9
2.2 National Planning Policy Framework (NPPF)	9
3.0 Details of the Site	16
3.1 Site Details	16
3.2 Site Description	17
3.3 Proposed Development Details	17
4.0 Historic Flooding	18
4.1 Internet Search	18
4.2 MST Level 1 SFRA March 2010	18
4.3 Critical Drainage Areas	18
5.0 Initial Evaluation of Flood Risk	21
5.1 The Environment Agency Flood Map	21
5.2 Sources of Flooding	21
6.0 Quantitative Flood Risk Assessment	24
6.1 Pluvial Flooding & Overland Flow	24
7.0 Mitigation Measures	27
7.1 Finished Development Levels	27
7.2 Flood Resistance/Resilience Measures	27
8.0 Conclusions & Recommendations	29

Executive Summary

DP Squared have been appointed by Jadebricks, to provide a Flood Risk Assessment in support of the planning application for the combined sites of 68/70 Oldham Street and 61 Spear Street in Manchester.

The proposed development site is located within Flood Zones 1 and therefore has a low risk of fluvial flooding.

An initial assessment indicates that the primary flood risk at the proposed development is from the pluvial (surface water) flooding within the local vicinity.

Consideration has also been given to the site flooding from secondary sources such as groundwater; artificial water bodies; infrastructure failure and ponding.

The buildings on the site for 68/70 Oldham Street are currently empty and have been for some years. They have had various functions over their lifetime including public houses and retail.

The NQ1 building at 61 Spear Street on the site is recently vacated and was being used as offices. The building was originally small factory.

Development proposals comprise of the following:

Partial demolition of existing buildings, conversion of existing warehouse building, rooftop extension and new building of 10 storeys to create aparthotel and flexible commercial uses.

Critical Drainage Areas

The SFRA has developed Critical Drainage Areas where:

1. There is a high risk of localised flooding from ordinary watercourses, including culverts surcharging and overland surface water flows, including the potential for flooding from the sewer network due to failure/ blockage or exceedance events when the storm return period is greater than the sewer was designed for; or
2. Where there are areas of significant redevelopment planned that could have a significant impact on surface water runoff to local watercourses and the sewer network.

Figure 5-1 Manchester, Salford and Trafford CDAs overview identifies that the application site is located within the Conurbation Core, the reason for the area being considered a CDA are outlined below for reference:

- Localised flooding problems in central Manchester and Salford. Includes
- Lower Broughton which was focus of Defra Making Space for Water IUD pilot.
- Focus of major regeneration and redevelopment that could have a significant impact on surface water runoff to local watercourses and the sewer network.
- Many lost watercourses that are interconnected with the sewers, canals and open channel watercourses that pose a significant risk.

- SFRA analysis shows significant surface water flooding hotspots between the Irk and Medlock and in Crumpsall, Cheetham Hill, Clifton Green, Newtown, Charlestown and Broughton.
- 5 postcode areas with over 10 properties affected in the DG5 register.

Pluvial (Surface Water) Flooding/Overland Flow

The Environment Agency's Surface Water Flood Map identifies that the application site has a low and medium risk associated with pluvial (surface water) flooding.

The highway facing the north of the site onto Oldham Street is highlighted as low risk, the south/east of the site facing Back Spear Street and Spear Street is considered to have a medium risk associated with surface water flooding.

A review of the Environment Agency's Surface Water Flood Map has been undertaken to determine the depth and velocity of the surface water flow route associated with the proposed development site.

In conclusion, the application site is considered to flood during the low-risk event, minor flooding during the medium risk event and no flooding during the most frequent high-risk event.

Measures have been taken to prevent and minimise the damage to the ground floor and basement of the property in the event of a flood.

Flood Mitigation Measures

Finished Ground Floor Levels

Finished ground floor levels of the building will be set no less than 150mm above existing ground level, in accordance with buildings located within Flood Zone 1, with the addition of 600mm flood resilience/resistance measures.

It is emphasised that sleeping accommodation will be located above ground floor level.

Flood Resilience/Resistance for ground and basement

Flood Resilience/Resistance Measures to be Incorporated into the building set 0.600m above the proposed finished floor levels.

- Careful consideration of materials: use low permeability materials to limit water penetration if dry proofing required. Consider applying a water-resistant coating.
- Avoid use of gypsum plaster and plasterboards; use more flood resistant linings (e.g., hydraulic lime, ceramic tiles). Avoid use of stud partition walls.
- Wall sockets will be raised to as high as is feasible and practicable in order to minimise damage if flood waters inundate the property i.e., 600mm above floor levels.
- Any wood fixings on ground floor will be robust and/or protected by suitable coatings in order to minimise damage during a flood event.
- Airbricks will be raised to as high as is feasible and practicable i.e., 600mm above floor levels
- Storage of any materials or possessions that may be susceptible to flood damage should be stored at a level of 600mm above floor levels to limit the damage caused in the event of a flood.

- Locate electrical, gas and telephone equipment and systems above flood level i.e., 600mm above floor levels.
- Mountable/demountable flood barriers for large opening such as doors and shutters or flood specific doors at ground level.
- Non-return valves to be fitted to drainage serving the site, to prevent back flow.
- Drainage strategy for basement including sumps and pumps to used be in the event of a flood.

1. Introduction

1.1. Terms of Reference

DP Squared have been appointed by Jadebricks, to provide a Flood Risk Assessment in support of the planning application for the site at 68/70 Oldham Street which includes the NQ1 building on Spear Street in Manchester.

The proposed development site is located within Flood Zones 1 and therefore has a low risk of fluvial flooding.

It is usual for the Environment Agency to raise an objection to development applications within the floodplain, or Zones 2 and 3 of the flood map, until the issue of flood risk has been properly evaluated. The Agency will also object to developments where the total site area is in excess of 1 Hectare until suitable consideration has been given to the management of surface water runoff.

1.2. Objectives

The objective of this assessment is to evaluate the following issues in regard to flood risk at the application site.

- Suitability of the proposed development in accordance with current planning policy.
- Identify the risk to both the proposed development and people from all forms of flooding.
- Provide a preliminary assessment of foul and surface water management.
- Increasing the risk of flooding elsewhere e.g., surface water flows and flood routing.
- Recommendation of appropriate measures to mitigate against flooding both within the proposed development, and neighbouring land and property.

1.3. Data Sources

This assessment is based on desk-top study of information from the following sources:

- National Planning Policy Framework (2018)
- Planning Practice Guidance at www.gov.uk
- Building Regulations Approved Document H
- Environment Agency Flood Mapping
- Manchester, Salford and Trafford Strategic Flood Risk Assessment Level 1 (2010)
- Manchester, Salford and Trafford Strategic Flood Risk Assessment Level 2 (2011)
- MST and Environment Agency Strategic Flood Risk Assessment Joint Statement (2011)

- British Geological Society – Historic Borehole Logs
- Cranfield University's Soilscape Viewer
- CIRIA C697 The SUDS Manual
- Chronology of British Hydrological Events (Dundee University)
- R&D Technical Report FD2320/TR2 (2005)

2. Planning Policy Context

2.1. Approach to the Assessment

An initial assessment indicates that the primary flood risk at the proposed development is from the pluvial (surface water) flooding within the local vicinity.

Consideration has also been given to the site flooding from secondary sources such as groundwater; artificial water bodies; infrastructure failure and ponding.

The requirements for flood risk assessments are generally as set out in the 'Technical Guidance to the National Planning Policy Framework', updated in July 2018; and in more detail from the Environment Agency's 'Standing Advice on Flood Risk' available from

<https://www.gov.uk/government/publications/national-planning-policy-framework--3>.

2.2. National Planning Policy Framework (NPPF)

The information provided in the flood risk assessment should be credible and fit for purpose.

Site-specific flood risk assessments should always be proportionate to the degree of flood risk and make optimum use of information already available, including information in a Strategic Flood Risk Assessment for the area, and the interactive flood risk maps available on the Environment Agency's website.

A flood risk assessment should also be appropriate to the scale, nature and location of the development.

2.2.1. Site Specific Flood Risk Assessment Checklist

The following checklist has been extracted from Flood Risk & Coastal Change Section available from www.gov.uk, updated in July 2018.

1. Development site and location

Provide a description of the site you are proposing to develop, including, or making reference to, a location map which clearly indicates the development site.

- A. Where is the development site located? (e.g., postal address or national grid reference)
- B. What is the current use of the site? (e.g., undeveloped land, housing, shops, offices)
- C. Which Flood Zone (for river or sea flooding) is the site within? (i.e., Flood Zone 1, Flood Zone 2, Flood Zone 3).

Check the Flood Map for Planning (Rivers and Sea) and the Strategic Flood Risk Assessment for the area available from the local planning authority.

2. Development proposals

Provide a general summary of the development proposals, including, or making reference to, an existing block plan and a proposed block plan, where appropriate.

- A. What are the development proposal(s) for this site? Will this involve a change of use of the site and, if so, what will that change be?
- B. In terms of vulnerability to flooding, what is the vulnerability classification of the proposed development?
- C. What is the expected or estimated lifetime of the proposed development likely to be? (E.g., less than 20 years, 20-50 years, 50-100 years?).

3. Sequential test

For developments in flood zones 2 or 3 only.

(If the development site is wholly within flood zone 1, this section can be skipped - go to section 4).

Describe how the sequential test has been applied to the development (if required, and as set out in paragraphs 101-104 of the National Planning Policy Framework); and provide the evidence to demonstrate how the requirements of the test have been met.

See paragraph 033 of the NPPF guidance for further information. (It is recommended that the Developer or Agent contacts the LPA to confirm whether the sequential test should be applied and to ensure the appropriate level of information is provided).

- A. What other locations with a lower risk of flooding have you considered for the proposed development?
- B. If you have not considered any other locations, what are the reasons for this?
- C. Explain why you consider the development cannot reasonably be located within an area with the lowest probability of flooding (flood zone 1); and, if your chosen site is within flood zone 3, explain why you consider the development cannot reasonably be located in flood zone 2.
- D. As well as flood risk from rivers or the sea, have you taken account of the risk from any other sources of flooding in selecting the location for the development?

Exception test

Provide the evidence to support certain development proposals in flood zones 2 or 3 if, following application of the sequential test, it is appropriate to apply the exception test, as set out in paragraphs 102-104 of the National Planning Policy Framework.

It is advisable to contact the local planning authority to confirm whether the exception test needs to be applied and to ensure the appropriate level of information is provided.

- A. Would the proposed development provide wider sustainability benefits to the community? If so, could these benefits be considered to outweigh the flood risk to and from the proposed development?

- B. How can it be demonstrated that the proposed development will remain safe over its lifetime without increasing flood risk elsewhere?
- C. Will it be possible for the development to reduce flood risk overall (e.g., through the provision of improved drainage)?

4. Climate Change

How is flood risk at the site likely to be affected by climate change? (The local planning authority's Strategic Flood Risk Assessment should have taken this into account). Further advice on how to take account of the impacts of climate change in flood risk assessments is available from the Environment Agency.

5. Site specific flood risk

Describe the risk of flooding to and from the proposed development over its expected lifetime, including appropriate allowances for the impacts of climate change. It would be helpful to include any evidence, such as maps and level surveys of the site, flood datasets (e.g., flood levels, depths and/or velocities) and any other relevant data, which can be acquired through consultation with the Environment Agency, the lead local flood authority for the area, or any other relevant flood risk management authority. Alternatively, you may consider undertaking or commissioning your own assessment of flood risk, using methods such as computer flood modelling.

- A. What is/ are the main source(s) of flood risk to the site? (E.g., tidal/sea, fluvial or rivers, surface water, groundwater, other?). You should consider the flood mapping available from the Environment Agency, the Strategic Flood Risk Assessment for the area, historic flooding records and any other relevant and available information.
- B. What is the probability of the site flooding, taking account of the maps of flood risk available from the Environment Agency, the local planning authority's Strategic Flood Risk Assessment and any further flood risk information?
- C. Are you aware of any other sources of flooding that may affect the site?
- D. What is the expected depth and level for the design flood? See paragraph 055 of the NPPF guidance for information on what is meant by a "design flood". If possible, flood levels should be presented in metres above Ordnance Datum (i.e., the height above average sea level).
- E. Are properties expected to flood internally in the design flood and to what depth? Internal flood depths should be provided in metres.
- F. How will the development be made safe from flooding and the impacts of climate change, for its lifetime? Further information can be found in paragraphs 054 and 059 (including on the use of flood resilience and resistance measures) of the NPPF guidance.
- G. How will you ensure that the development and any measures to protect the site from flooding will not cause any increase in flood risk off-site and elsewhere? Have you taken into account the impacts of climate change, over the expected lifetime of the development? (e.g., providing compensatory flood storage which has been agreed with the Environment Agency).
- H. Are there any opportunities offered by the development to reduce the causes and impacts of flooding?

6. Surface water management*

Describe the existing and proposed surface water management arrangements at the site using sustainable drainage systems wherever appropriate, to ensure there is no increase in flood risk to others off-site.

- A. What are the existing surface water drainage arrangements for the site?
- B. If known, what (approximately) are the existing rates and volumes of surface water run-off generated by the site?
- C. What are the proposals for managing and discharging surface water from the site, including any measures for restricting discharge rates? For major developments (e.g., of ten or more homes or major commercial developments), and for all developments in areas at risk of flooding, sustainable drainage systems should be used, unless demonstrated to be inappropriate.
- D. How will you prevent run-off from the completed development causing an impact elsewhere?
- E. Where applicable, what are the plans for the ongoing operation and/or maintenance of the surface water drainage systems?

7. Occupants and users of the development

Provide a summary of the numbers of future occupants and users of the new development; the likely future pattern of occupancy and use; and proposed measures for protecting more vulnerable people from flooding.

- A. Will the development proposals increase the overall number of occupants and/or people using the building or land, compared with the current use? If this is the case, by approximately how many will the number(s) increase?
- B. Will the proposals change the nature or times of occupation or use, such that it may affect the degree of flood risk to these people? If this is the case, describe the extent of the change.
- C. Where appropriate, are you able to demonstrate how the occupants and users that may be more vulnerable to the impact of flooding (e.g., residents who will sleep in the building; people with health or mobility issues; etc.) will be located primarily in the parts of the building and site that are at lowest risk of flooding? If not, are there any overriding reasons why this approach is not being followed?

8. Residual risk

Describe any residual risks that remain after the flood risk management and mitigation measures are implemented, and to explain how these risks can be managed to keep the users of the development safe over its lifetime.

- A. What flood related risks will remain after the flood risk management and mitigation measures have been implemented?
- B. How, and by whom, will these risks be managed over the lifetime of the development? (e.g., putting in place flood warning and evacuation plans).

9. Flood risk assessment credentials

Provide details of the author and date of the flood risk assessment.

- A. Who has undertaken the flood risk assessment?
- B. When was the flood risk assessment completed?

Other considerations

* Managing surface water

The site-specific flood risk assessment will need to show how surface water runoff generated by the developed site will be managed. In some cases, it may be advisable to detail the surface water management for the proposed development in a separate drainage strategy or plan. You may like to discuss this approach with the lead local flood authority.

Surface water drainage elements of major planning applications (e.g., of ten or more homes) are reviewed by the lead local flood authority for the area. As a result, there may be specific issues or local policies, for example the Local Flood Risk Management Strategy or Surface Water Management Plan, that will need to be considered when assessing and managing surface water matters.

It is advisable to contact the appropriate lead local flood authority prior to completing the surface water drainage section of the flood risk assessment, to ensure that the relevant matters are covered in sufficient detail.

Proximity to Main Rivers

If the development of the site involves any activity within specified distances of main rivers, a flood risk activity permit may be required in addition to planning permission.

For non-tidal main rivers, a flood risk activity permit may be required if the development of the site is within 8 metres of a river, flood defence structure or culvert.

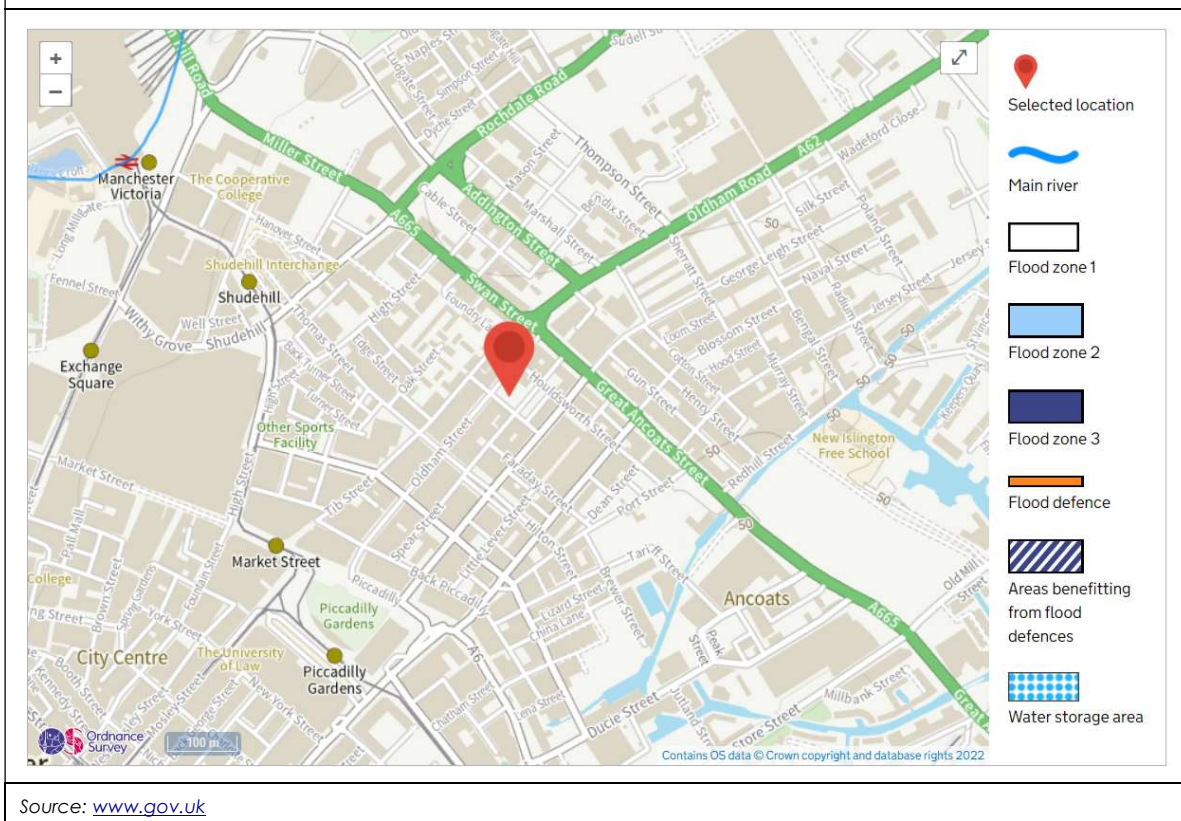
For tidal main rivers, a flood risk activity permit may be required if the development of the site is within 16 metres of a river, flood defence structure or culvert.

Details on obtaining a Flood Risk Activity Permit are available from the Environment Agency.

2.2.2. Sources of Flooding

- **Rivers (fluvial):** Flooding occurs when flow within river channels exceeds capacity; and the type of flood event experienced e.g., flash flooding; depends upon the characteristics of the river catchment.
- **The Sea (tidal):** Flooding at low lying coastline and tidal estuaries is caused by storm surges and high tides; with overtopping and breach failure of sea defences possible during extreme storm events.
- **Pluvial (surface flooding or overland flows):** Heavy rainfall, which is unable to soak away via infiltration or enter drainage systems can flow overland, resulting in localised flooding. Topography generally influences the direction and depth of flooding caused by this mechanism.
- **Groundwater:** Caused when ground water levels rise to the surface; and is most likely to occur in low lying areas underlain by aquifers.
- **Sewers and drains:** Generally, occurs in more urban areas; where sewers and drains are overwhelmed by heavy rainfall or blocked pipes and gullies.
- **Artificial Sources (reservoirs, canals, lakes and ponds):** Reservoir and canal flooding may occur as a result of capacity exceedance or structural failure.

Figure 2.1: The Environment Agency Flood Map



2.2.3. Flood Zones

- **Flood Zone 1:** Low probability (less than 1 in 1000 year (<0.1% AEP) annual probability of river or sea flooding in any year).
- **Flood Zone 2:** Medium probability (between 1 in 100 year (1.0% AEP) and 1 in 1000 year (0.1% AEP) annual probability of river flooding; or between 1 in 200 year (0.2% AEP) and 1 in 1000 year (0.1% AEP) annual probability of sea flooding in any year).
- **Flood Zone 3a:** High probability (1 in 100 year (1.0% AEP) or greater annual probability of river flooding in any year or 1 in 200 year (0.5% AEP) or greater annual probability of sea flooding in any year).
- **Flood Zone 3b:** This zone comprises land where water has to flow or be stored in times of flood. Land which would flood with an annual probability of 1 in 20 (5% AEP), or is designed to flood in an extreme flood (0.1%) should provide a starting point for discussions to identify functional floodplain.

2.2.4. Vulnerability of Different Development Types

- **Essential Infrastructure:** Transport infrastructure (railways and motorways etc...); utility infrastructure (primary sub-stations, water treatment facilities; power stations; and wind turbines).
- **Water Compatible Development:** Flood control infrastructure; water and sewage infrastructure; navigation facilities.
- **Highly Vulnerable:** Emergency services; basement dwellings; mobile home parks; industrial or other facilities requiring hazardous substance consent.
- **More Vulnerable:** Hospitals; residential dwellings; educational facilities; landfill sites caravan and camping sites.
- **Less Vulnerable:** Commercial premises; emergency services not required during a flood; agricultural land.

2.2.5. Climate Change

Table 1: Peak Rainfall Intensity Allowance

Applied Across All of England	2050's	2070's
Upper End	40%	50%
Central	25%	35%

Due to the development having a proposed life span in excess of 50 years, 50% should be applied to rainfall intensity when developing the drainage strategy, to account for climate change over the lifetime of the development,

3. Details of the Site

3.1. Site Details

Table 2: Development Location

Site Name:	68/70 Oldham Street, Manchester (including 61 Spear Street)
Purpose of Development:	Hotel
Existing Land Use:	Commercial / Retail
OS NGR:	SJ8459198572
Country:	England
County:	Greater Manchester
Local Planning Authority:	Manchester City Council
Lead Local Flood Authority	Manchester City Council
Internal Drainage Board:	Not Applicable
Other Authority (e.g., British Waterways/ Harbour Authority)	Not Applicable

Location Plan:



Source: DP²

3.2. Site Description

The buildings on the site are 68/70 Oldham Street and the NQ1 building at 61 Spear Street.

68/70 Oldham Street are currently empty and have been for some years. They have had various functions over their lifetime including public houses and retail.

The NQ1 building at 61 Spear Street on the site is recently vacated, it was being used as offices.. The building was originally small factory.

Figure 3.1: Existing Site Viewed South East from Oldham Road



Source: Google

3.3. Proposed Development Details

Development proposals comprise of the following:

Retention of the buildings at 68/70 Oldham street onto Oldham street, demolition of existing 68/70 buildings at the rear of the site, conversion of existing warehouse building, rooftop extension and new building of 10 storeys to create aparthotel and flexible commercial uses.

4. Historic Flooding

4.1. Internet Search

An internet search for historic flooding within the vicinity came back with no results concerning Oldham Street, Manchester.

4.2. MST Level 1 SFRA March 2010

Manchester, Salford, Trafford Level 1 Strategic Flood Risk Assessment was undertaken by JBA and completed in March 2010. Table 2.5 Historical Flood Events does not specifically identify the area as having suffered from historic flooding in the past.

4.3. Critical Drainage Areas

The Town and Country Planning Order 200611 defines Critical Drainage Areas as "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". However, the Environment Agency Standing Advice also recognises the part that SFRAs play in identifying areas with drainage problems and in doing so highlighting areas that need an FRA to consider drainage in detail.

Certain locations are particularly sensitive to an increase in the rate of surface water runoff and/or volume from new development. There are generally known local flooding problems associated with these areas. These areas have been defined as CDAs in the SFRA. Specific drainage requirements are required in these areas to help reduce local flood risk. These are areas with complex surface water flooding problems that would benefit from a Surface Water Management Plan and subsequent drainage strategy.

The SFRA has developed Critical Drainage Areas where:

1. There is a high risk of localised flooding from ordinary watercourses, including culverts surcharging and overland surface water flows, including the potential for flooding from the sewer network due to failure/ blockage or exceedance events when the storm return period is greater than the sewer was designed for; or
2. Where there are areas of significant redevelopment planned that could have a significant impact on surface water runoff to local watercourses and the sewer network.

Figure 5-1 Manchester, Salford and Trafford CDAs overview identifies that the application site is located within the Conurbation Core, the reason for the area being considered a CDA are outlined below for reference:

- Localised flooding problems in central Manchester and Salford. Includes
- Lower Broughton which was focus of Defra Making Space for Water IUD pilot.
- Focus of major regeneration and redevelopment that could have a significant impact on surface water runoff to local watercourses and the sewer network.

- Many lost watercourses that are interconnected with the sewers, canals and open channel watercourses that pose a significant risk.
- SFRA analysis shows significant surface water flooding hotspots between the Irk and Medlock and in Crumpsall, Cheetham Hill, Clifton Green, Newtown, Charlestown and Broughton.
- 5 postcode areas with over 10 properties affected in the DG5 register.

Conurbation Core CDA Surface water flow paths in this CDA are largely linked to the natural floodplains of 'hidden' or 'lost' culverted watercourses that run through this area, particularly in Manchester city centre.

The most widespread surface water flooding is predicted in the city centre between the Irk and the Medlock with the density of properties at risk to surface water flooding in excess of 100 per 0.25 km². Other hotspots identified are Salford adjacent to Gilda Brook; Crumpsall and Cheetham Hill in Manchester adjacent to the Irk; Clifton Green; Newtown; Charlestown and Broughton. The worst of these is Crumpsall where in excess of 100 properties are predicted to be affected.

In the case of Lower Broughton and Charlestown in Salford, the problem is further exacerbated by the presence of river flood defences that would not allow excess surface water into the river system. In this case ponding would occur behind the defences, with the potential to form areas of deep and static water that would exacerbate any fluvial flooding that occurred at the same time.

Areas predicted to be most susceptible to climate change are the city centre and Cheetham Hill.

Recommended allowable discharge rates for CDAs and other areas

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 run off 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 to deliver Greenfield runoff on Greenfield sites up to a 1 in 100 year storm event, considering climate change**
- **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**

5. Initial Evaluation of Flood Risk

5.1. The Environment Agency Flood Map

The Environment Agency Flood Map illustrated within Figure 2.1, confirms that proposed development is located within Flood Zone 1.

The definition for each of the flood zones highlighted above is provided for reference within Section 2.2.3 of this report.

5.2. Sources of Flooding

Table 3: Possible Flooding Mechanisms

Source/Pathway	Significant?	Comment/Reason
Fluvial	No	Flood Zone 1
Canal	No	Not Applicable
Tidal/Coastal	No	Not Applicable
Reservoir	No	EA Map shows that the site will not be affected by reservoir flooding.
Pluvial (urban drainage)	No	Site will require a drainage strategy
Groundwater	No	SFRA states that groundwater flooding within the area is not considered to be a significant risk
Surface Water Flooding	Yes	Site is located within an area that has a low and medium risk of flooding. The site is also located within a CDA.
Overland Flow	Yes	Site has a low and medium risk of surface water flooding
Blockage	No	Not Applicable
Infrastructure failure	No	Not Applicable
Rainfall Ponding	No	No areas of ponding identified within the boundary of the site.

From the initial assessment it is concluded that the primary source of flood risk will be from surface water and overland flows.

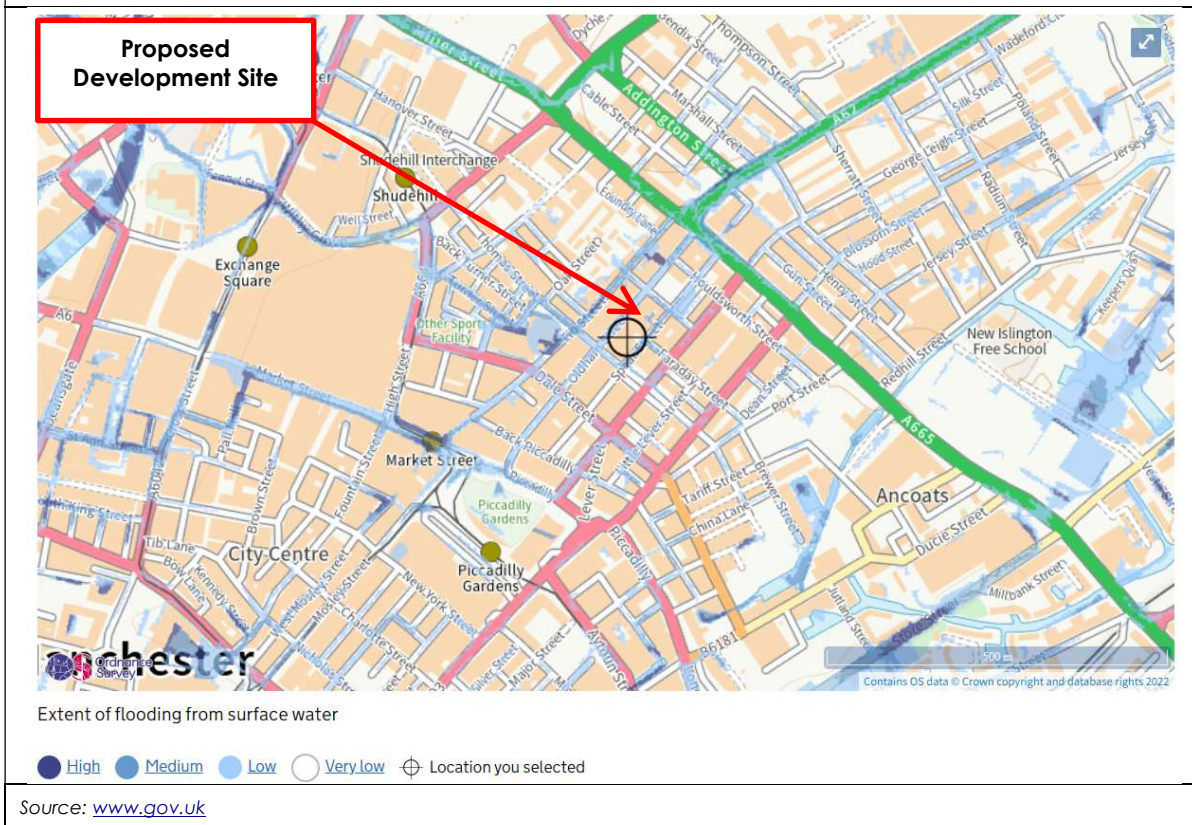
Surface Water Flooding / Overland Flow

The Environment Agency's Surface Water Flood Map identifies that the application site has a low and medium risk associated with pluvial (surface water) flooding.

- **Low risk** means that this area has a chance of flooding of between 0.1% and 1% each year. Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding.
- **Medium risk** means that this area has a chance of flooding of between 1% and 3.3% each year. Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding.

- The highway facing the north of the site onto Oldham Street is highlighted as low risk, the south/east of the site facing Back Spear Street and Spear Street is considered to have a medium risk associated with surface water flooding.

Figure 5.1: Environment Agency Surface Water Flood Map



Taking the above into consideration flooding from this mechanism requires further evaluation which has been undertaken within Section 6 of this report.

Pluvial: Exceedance and Local System Failure (Sewer Flooding)

The following text has been extracted from CIRIA 2906 'Managing Extreme Events by Designing for Exceedance January 2013':

'Climate change and urbanisation is already contributing to increased surface water flooding, where the capacity of the existing drainage systems are overwhelmed (or exceeded).

The traditional approach to fixing the problem is to build bigger pipes or provide underground storage. Ofwat, the Environment Agency and others believe that this approach is unsustainable and unaffordable and are encouraging sewerage undertakers, Lead Local Flood Authorities and highway authorities to look at different approaches to managing sewer and surface water flooding.

One approach being promoted is "designing for exceedance."

Designing for exceedance is an approach to manage flood risk (particularly from extreme events) by planning, designing and retrofitting drainage schemes that can safely accommodate rainfall and flooding that exceeds their design capacity (normally a 1 in 30 rainfall event). This is often achieved by considering flood pathways (such as managing runoff on highways) or providing additional storage (preferably on the surface through car parks, or multifunctional detention basins).

In England and Wales Sewers for Adoption and the National Planning Policy Framework encourage the consideration of drainage exceedance, it is a flexible approach to manage extreme events that can be used to reduce the need for more traditional, expensive underground approaches to manage surface water and often complement sustainable drainage and other local urban design initiatives.'

The impact of extreme rainfall events and/or local system failure will therefore need to be assessed as part of the overall surface water management strategy for the proposed development.

6. Quantitative Flood Risk Assessment

6.1. Pluvial Flooding & Overland Flow

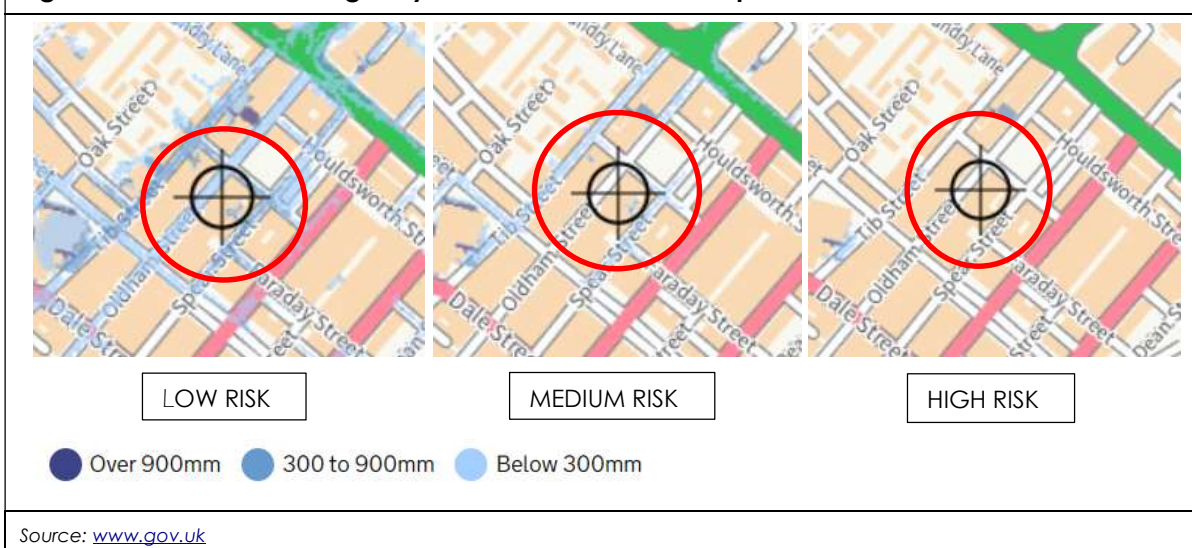
6.1.1. General

The Environment Agency's Surface Water Flood Map identifies that the application site has a low and medium risk associated with pluvial (surface water) flooding.

The highway facing the north of the site onto Oldham Street is highlighted as low risk, the south/east of the site facing Back Spear Street and Spear Street is considered to have a medium risk associated with surface water flooding.

A review of the Environment Agency's Surface Water Flood Map has been undertaken to determine the depth and velocity of the surface water flow route associated with the proposed development site.

Figure 6.1: Environment Agency Surface Water Flood Depth

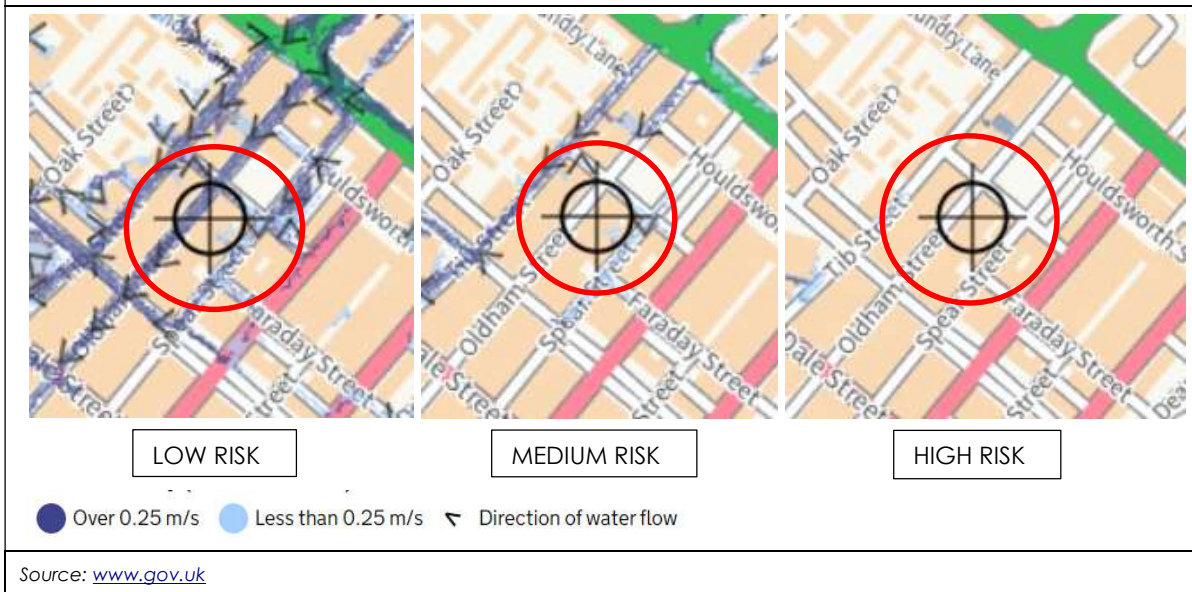


6.1.2. Low Risk Event

A review of the EA Surface Water Flood Map during the low-risk event shows that the frontage of the property is affected from a flow route flowing south east within Oldham Road, the rear of the property is affected from an accumulation of water within Spear Street.

During the low-risk event (1:1000 year) the depths and velocities at the site are identified below:

- Depth - Frontage = Less than 300mm, Rear = Between 300-900mm
- Velocity – Frontage = Over 0.25m/s, Rear = Less than 0.25m/s

Figure 6.2: Environment Agency Surface Water Flood Velocity

6.1.3. Medium Risk Event

A review of the EA Surface Water Flood Map during the medium risk event shows that the flow route within Oldham Road is no longer visible, however the rear of the property is affected by a small amount of ponding associated with Spear Street.

During the medium risk event (1:100 year) the magnitude of flooding has significantly reduced compared to the low risk even, the depths and velocities are identified below:

- Depth - Frontage = No Flooding, Rear = Less than 300mm
- Velocity – Frontage = No Flooding, Rear = Less than 0.25m/s

6.1.4. High Risk Event

A review of the EA Surface Water Flood Map during the high-risk event shows that no surface water flooding occurs.

It is noted that the depth of flooding has significantly reduced compared to the medium risk event.

During the high-risk event (1:30 year) the flooding does not encroach the building, the depths and velocities are identified below:

- Depth - Frontage = No Flooding, Rear = No Flooding
- Velocity – Frontage = No Flooding, Rear = No Flooding

6.1.5. Pluvial: Conclusion

In conclusion, the application site is considered to flood during the low-risk event, minor flooding during the medium risk event and no flooding during the most frequent high-risk event.

Measures have been taken to prevent and minimise the damage to the ground floor and basement of the property in the event of a flood, these are outlined within Section 7 of this report.

7. Mitigation Measures

7.1. Finished Development Levels

Finished floor levels of the building will be set no less than 150mm above existing ground level, in accordance with buildings located within Flood Zone 1, with the addition of 600mm flood resilience/resistance measures.

It is emphasised that sleeping accommodation will be located above ground floor level.

7.2. Flood Resistance/Resilience Measures

In order to provide an extra element of safety flood resilience/resistance measures as outlined below will be incorporated into the buildings design set 600mm above finished floor levels.

Flood proofing is a technique by which buildings are designed to withstand the effects of flooding. There are two main categories of flood proofing, which are dry proofing and wet proofing.

Dry proofing methods are designed to keep water out of the building, and wet proofing methods are designed to improve the ability of the property to withstand effects of flooding once the water has entered the building.

In addition, fixtures and fittings should be built to withstand immersion in water or designed to be easily replaced.

Identified below are flood proofing measures which can be incorporated within the design for the proposed redevelopment works. Such measures are put forward in accordance with 'Development and Flood Risk Guidance for the Construction Industry' CIRIA C624.

It would be preferable to avoid external doors as this would remove a potential point of flood inflows. However, since free access and egress into the building will be required, flood resistant doors and/or the use of flood resistant stop logs or flood boards should be considered.

Full details of manufacturers or suppliers of flood protection equipment may be obtained from the Flood Protection Association (website: www.thefpa.org.uk).

Flood Resilience/Resistance Measures to be Incorporated into the building set 0.600m above the proposed finished floor levels

- Careful consideration of materials: use low permeability materials to limit water penetration if dry proofing required. Consider applying a water-resistant coating.
- Avoid use of gypsum plaster and plasterboards; use more flood resistant linings (e.g., hydraulic lime, ceramic tiles). Avoid use of stud partition walls.
- Wall sockets will be raised to as high as is feasible and practicable in order to minimise damage if flood waters inundate the property i.e., 600mm above floor levels.
- Any wood fixings on ground floor will be robust and/or protected by suitable coatings in order to minimise damage during a flood event.
- Airbricks will be raised to as high as is feasible and practicable i.e., 600mm above floor levels

- Storage of any materials or possessions that may be susceptible to flood damage should be stored at a level of 600mm above floor levels to limit the damage caused in the event of a flood.
- Locate electrical, gas and telephone equipment and systems above flood level i.e., 600mm above floor levels.
- Mountable/demountable flood barriers for large opening such as doors and shutters or flood specific doors at ground level.
- Non-return valves to be fitted to drainage serving the site, to prevent back flow.
- Drainage strategy for basement including sumps and pumps to used be in the event of a flood.

8. Conclusions & Recommendations

Critical Drainage Areas

The SFRA has developed Critical Drainage Areas where:

1. There is a high risk of localised flooding from ordinary watercourses, including culverts surcharging and overland surface water flows, including the potential for flooding from the sewer network due to failure/ blockage or exceedance events when the storm return period is greater than the sewer was designed for; or
2. Where there are areas of significant redevelopment planned that could have a significant impact on surface water runoff to local watercourses and the sewer network.

Figure 5-1 Manchester, Salford and Trafford CDAs overview identifies that the application site is located within the Conurbation Core, the reason for the area being considered a CDA are outlined below for reference:

- Localised flooding problems in central Manchester and Salford. Includes
- Lower Broughton which was focus of Defra Making Space for Water IUD pilot.
- Focus of major regeneration and redevelopment that could have a significant impact on surface water runoff to local watercourses and the sewer network.
- Many lost watercourses that are interconnected with the sewers, canals and open channel watercourses that pose a significant risk.
- SFRA analysis shows significant surface water flooding hotspots between the Irk and Medlock and in Crumpsall, Cheetham Hill, Clifton Green, Newtown, Charlestown and Broughton.
- 5 postcode areas with over 10 properties affected in the DG5 register.

Pluvial (Surface Water) Flooding/Overland Flow

The Environment Agency's Surface Water Flood Map identifies that the application site has a low and medium risk associated with pluvial (surface water) flooding.

The highway facing the north of the site onto Oldham Street is highlighted as low risk, the south/east of the site facing Back Spear Street and Spear Street is considered to have a medium risk associated with surface water flooding.

A review of the Environment Agency's Surface Water Flood Map has been undertaken to determine the depth and velocity of the surface water flow route associated with the proposed development site.

In conclusion, the application site is considered to flood during the low-risk event, minor flooding during the medium risk event and no flooding during the most frequent high-risk event.

Measures should be taken to prevent and minimise the damage to the ground floor and basement of the property in the event of a flood.

Flood Mitigation Measures

Finished Floor Levels

Finished floor levels of the building will be set no less than 150mm above existing ground level, in accordance with buildings located within Flood Zone 1, with the addition of 600mm flood resilience/resistance measures.

It is emphasised that sleeping accommodation will be located above ground floor level.

Flood Resilience/Resistance

Flood Resilience/Resistance Measures to be Incorporated into the building set 0.600m above the proposed finished floor levels.

- Careful consideration of materials: use low permeability materials to limit water penetration if dry proofing required. Consider applying a water-resistant coating.
- Avoid use of gypsum plaster and plasterboards; use more flood resistant linings (e.g., hydraulic lime, ceramic tiles). Avoid use of stud partition walls.
- Wall sockets will be raised to as high as is feasible and practicable in order to minimise damage if flood waters inundate the property i.e., 600mm above floor levels.
- Any wood fixings on ground floor will be robust and/or protected by suitable coatings in order to minimise damage during a flood event.
- Airbricks will be raised to as high as is feasible and practicable i.e., 600mm above floor levels
- Storage of any materials or possessions that may be susceptible to flood damage should be stored at a level of 600mm above floor levels to limit the damage caused in the event of a flood.
- Locate electrical, gas and telephone equipment and systems above flood level i.e., 600mm above floor levels.
- Mountable/demountable flood barriers for large opening such as doors and shutters or flood specific doors at ground level.
- Non-return valves to be fitted to drainage serving the site, to prevent back flow.
- Drainage strategy for basement including sumps and pumps to used be in the event of a flood.