



The Greenfinch, Didsbury, Manchester

Flood Risk Assessment

Project No.	1582
Revision	Initial Issue
Date	24 th November 2023
Client	Planning Issues Ltd
Prepared	B Fenton
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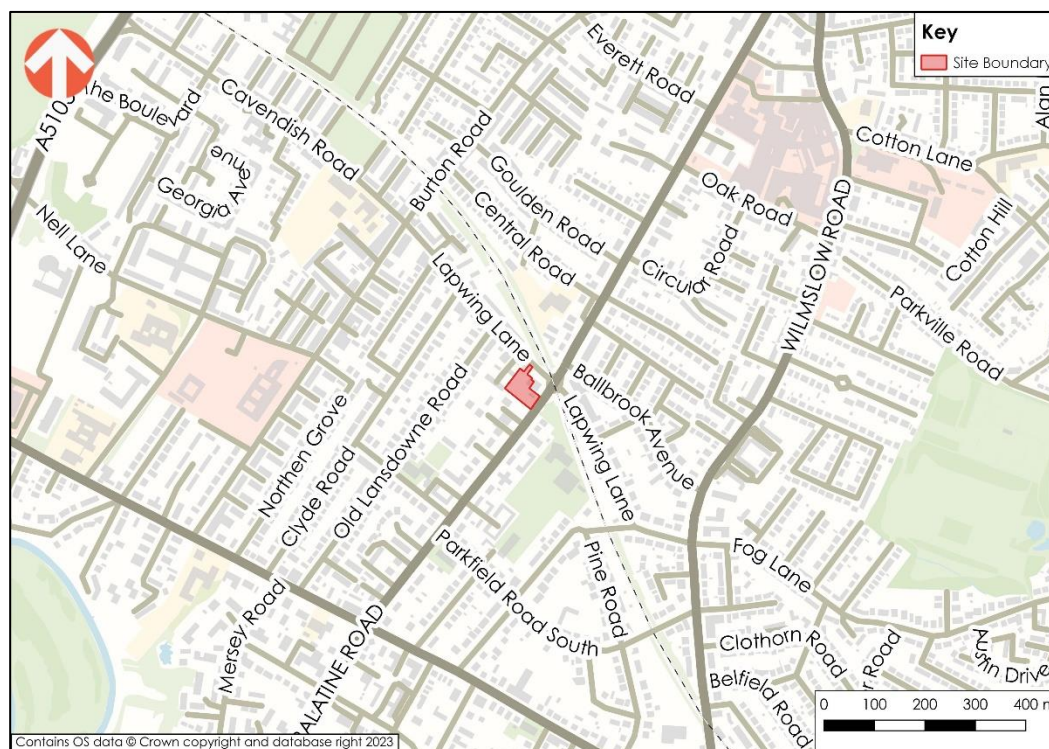
1 Introduction

Introduction & Background

- 1.1 Awcock Ward Partnership has been commissioned by Planning Issues Ltd to prepare a Flood Risk Assessment (FRA) in support of a detailed planning application for the proposed redevelopment of The Greenfinch, Didsbury, Manchester, M20 3ZA.
- 1.2 The development proposes the construction of a new retirement living complex comprising 24 one-bedroom and 13 two-bedroom apartments, together with associated access, parking and amenity space.
- 1.3 The development is located within the grounds of The Greenfinch public house, but does not comprise the public house building itself.
- 1.4 The former public house site is bordered by Lapwing Lane and the Transport for Greater Manchester (TFGM) Metrolink tram line (Pink Line) to the north, Palatine Road (B5167) to the east, and residential dwellings to the south and west.

- 1.5 The location of the site in relation to its surroundings can be seen within Figure 1.1.

Figure 1.1 – Site Location



- 1.6 Manchester City Council (MCC) are the Lead Local Flood Authority (LLFA) and United Utilities (UU) manage sewerage and water supply assets in this region.
- 1.7 This technical summary is based on national guidance – National Standards for sustainable drainage systems (SuDS); the Manchester City, Salford City and Trafford Councils (MSTC) Level 2 Hybrid Strategic Flood Risk Assessment (Hybrid-SFRA) (JBA Consulting, March 2011); and the MCC Local Flood Risk Management Strategy (LFRMS) (March 2014).
- 1.8 This FRA sets out the existing baseline conditions in Section 2, development proposals in Section 3, a proposed Surface Water Management Plan in Section 4, and a foul water strategy in Section 5.

2 Existing Baseline Conditions

Site Topography

- 2.1 The topographic survey by Survey Systems Ltd (August 2020) indicates that the site is flat and largely surfaced by tarmac with boundary shrubs and

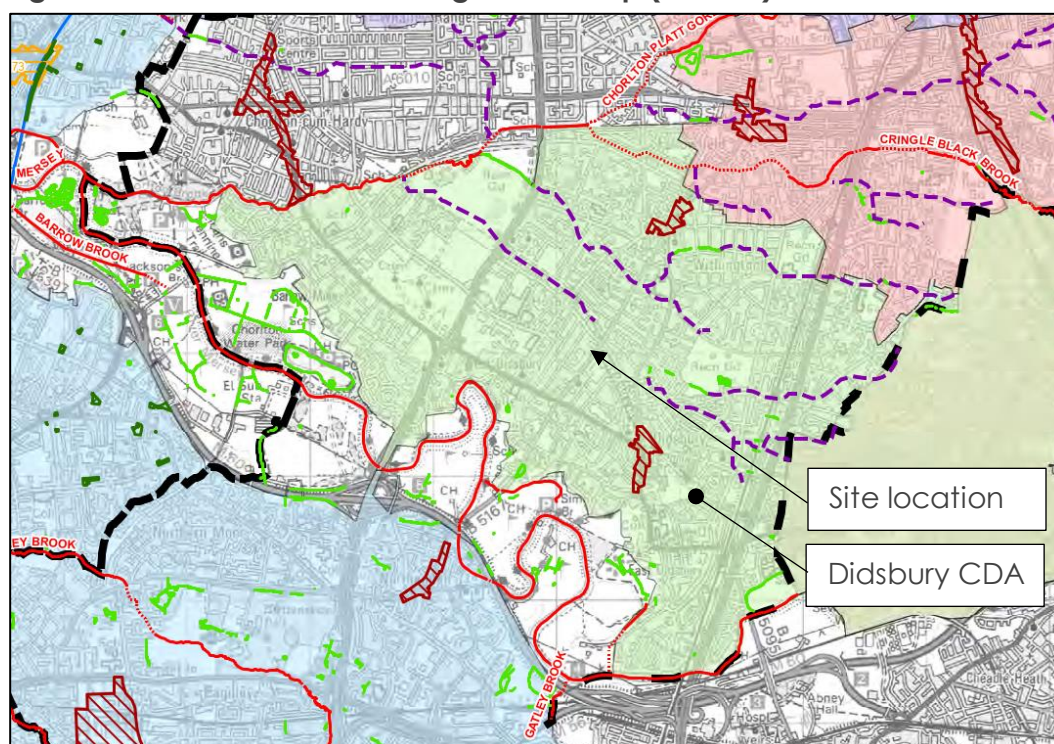
trees. The site gains access from Lapwing Lane at the northern corner of the site.

- 2.2 The existing car park is sloped towards existing drainage channels served by gullies in the west and south of the site; with low points if circa 33mAOD at existing gully locations. The remainder of the site is relatively flat, with a slight fall from east to west, towards the car park. The initial section of the access road presents the high point, at 33.2mAOD, falling gently north, towards Lapwing Lane.
- 2.3 A copy of the survey for the site can be seen within Appendix A.

Designations

- 2.4 The site is located within the Didsbury Critical Drainage Area (CDA) identified by the MSTC Level 2 Hybrid-SFRA (2011) as shown in Figure 2.1. The CDA map is included in Appendix B.

Figure 2.1 – SFRA Critical Drainage Area Map (extract)



- 2.5 The MSTC Hybrid-SFRA recommendation for future surface water management plans (SWMP) within Didsbury CDA is: *“An SWMP should be undertaken that will look in detail at drainage assets and local flood risk and assess feasible options for reducing risk. This should include a drainage strategy for development sites, to identify areas suitable for SUDS and how flood risk can be managed and reduced downstream.”*
- 2.6 The site does not fall within a Nitrate Vulnerable Zone Designation or identified Source Protection Zone.

Existing Flood Risk

- 2.7 We have carried out a desktop assessment of potential flood risks to the site using the Environment Agency's (EA) available online mapping and the MSTC Level 2 Hybrid-SFRA (2011).

Fluvial sources (River flooding)

- 2.8 An extract of the 'Flood Map for Planning' has been reproduced as Figure 2.2 and shows the site as being within 'Flood Zone 1', with less than a 1 in 1,000 annual exceedance probability (AEP) of river or sea flooding (<0.1%).

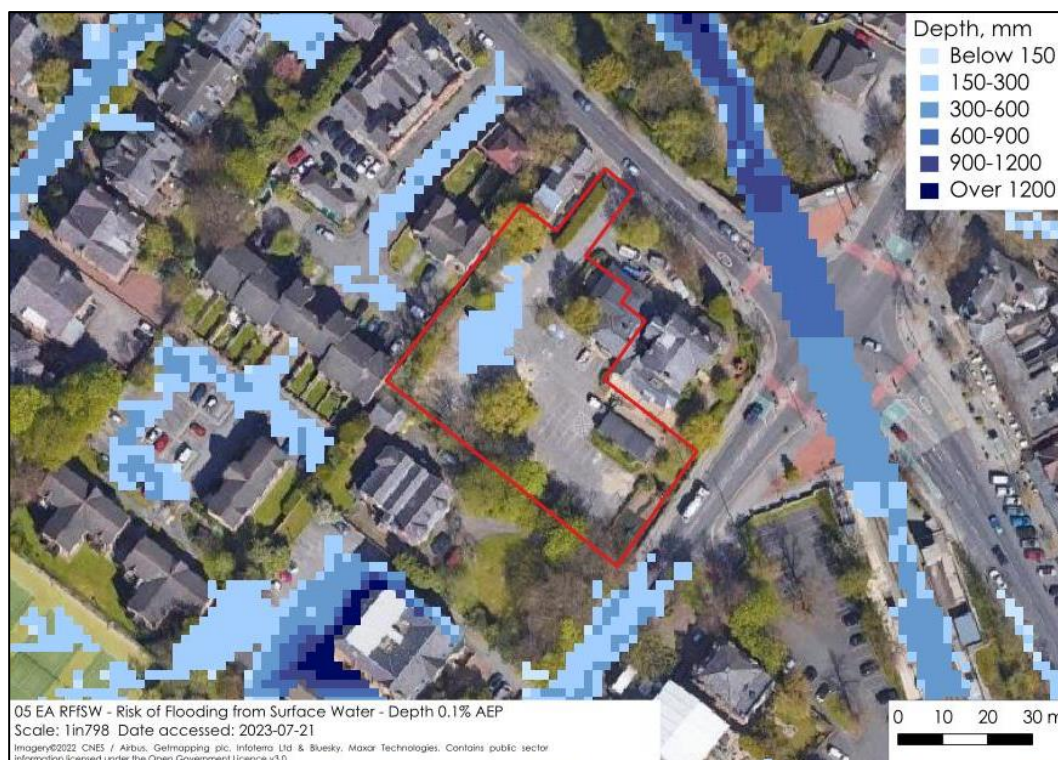
Figure 2.2 – EA Flood Map for Planning



Pluvial sources (surface water flooding)

- 2.9 The EA's 'Flooding from Surface Water' (less than 0.1% annual exceedance probability, AEP) map has been reproduced as Figure 2.3.

Figure 2.3 – EA Extent Flooding from Surface Water (0.1% AEP).



- 2.10 A small area of the west of the site is shown to have 150-300mm depth of surface water flooding. This is associated with surface water runoff within the site boundaries and does not comprise incoming flows from an off-site catchment, therefore this should be mitigated by the redevelopment of the site with an appropriate SWMP.
- 2.11 The local road network remains free of surface water flooding for the 1% AEP (or 1 in 100 year event) with shallow flooding expected for the 0.1% AEP only. Flooding shown in Figure 2.3 on the Lapwing Lane/ Palatine Rd intersection represents flooding on the tram line beneath the intersection and not flooding on the road network itself. Thus, access and egress routes are expected to remain safe during flooding.

Artificial Sources of Flooding

- 2.12 EA mapping indicates the extent of reservoir flooding to the north of the site (Figure 2.4). The extent of flooding remains within the tram line boundary, with the tram line in cut. The site is situated outside the zones that

may flood if local reservoirs should fail, whether or not in combination with river flooding.

Figure 2.4 – Reservoir Flood Mapping



Groundwater Flooding

- 2.13 Based on the MSTC Level 2 Hybrid-SFRA (Drawing GW_2.1, 2011), the site is not at risk of groundwater flooding.

Flood Risk Summary

- 2.14 The site is less than one hectare and is located within Flood Zone 1, however the site is within the Didsbury CDA which necessitates a Flood Risk Assessment (FRA).
- 2.15 In accordance with the Planning Practice Guidance, residential dwellings and residential institutions are considered to be "More Vulnerable". However, with all built development located within 'Flood Zone 1', Table 3 of the Planning Practice Guidance demonstrates that the proposed development use is appropriate for this site.

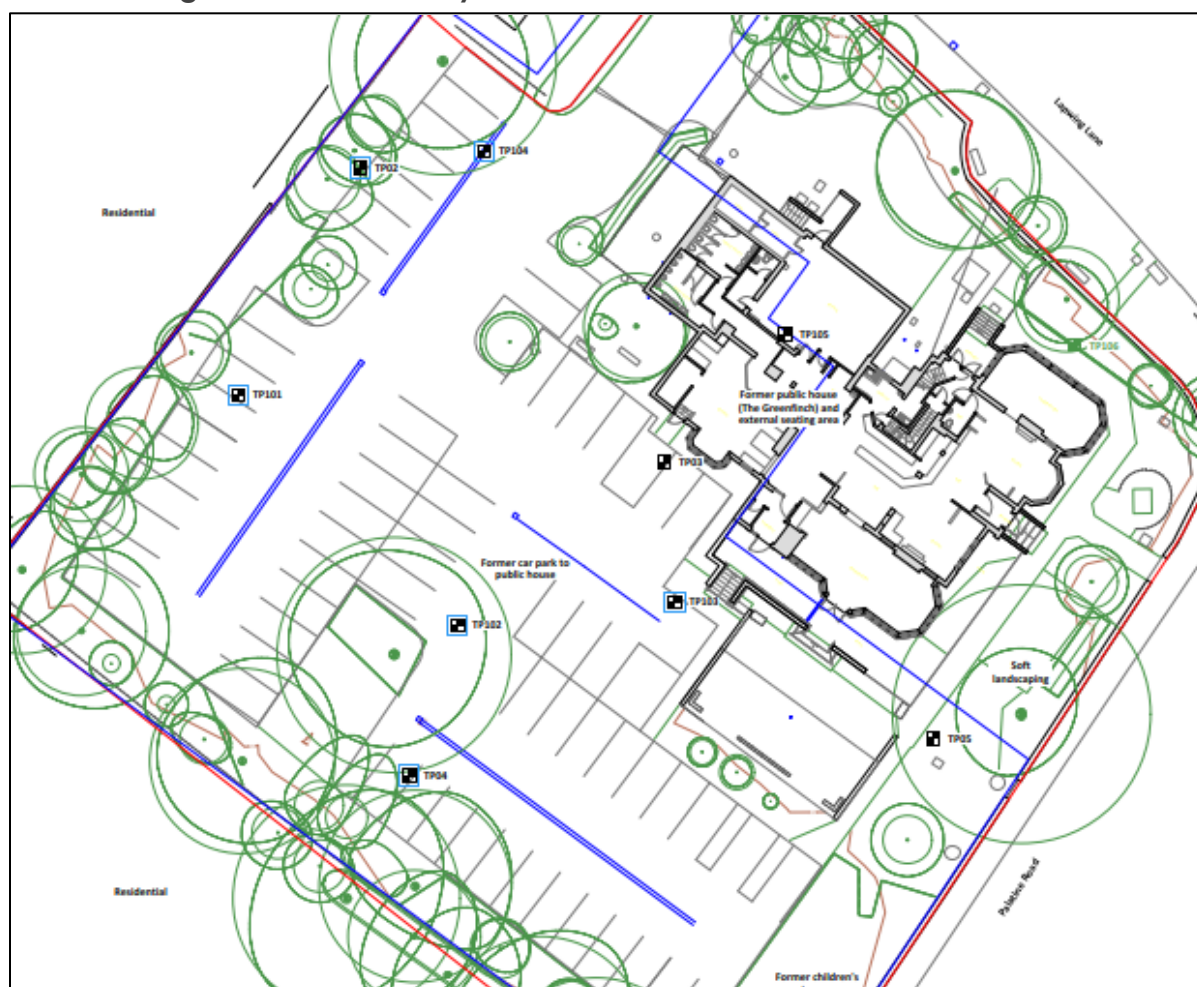
Ground Conditions

- 2.16 Soiltechnics completed a Ground Investigation (GI) Report in August 2023 on the proposed brownfield site. The GI confirms that there are no

significant water features within 250m of the site, and likewise no environmentally sensitive land uses within 500m of the site.

- 2.17 Ground conditions encountered include Made Ground, described as gravels of limestone and brick, to depths of up to 1.2mBGL, and Glaciofluvial Sheet Deposits, described as gravelly slightly clayey sand, to depths beyond 3.2mBGL. This strata is designated as a secondary 'A' aquifer.
- 2.18 The soils report estimates that the Glaciofluvial Sheet Deposits are underlain by an 11m thick layer of Devensian Till strata, an effectively impermeable clay with sand and gravels. This strata is designated as a secondary 'undifferentiated' aquifer.
- 2.19 Soiltechnics (August 2023) reported on soakaway testing, comprising of several trial pit locations with variable results across the site. The report included results from previous soakaway testing carried out in 2021 and 2022. The location of trial pits are shown in Figure 2.5 (extract from GI report) below, with soakaway tests outlined in blue.

Figure 2.5 – Soakaway test locations



- 2.20 No groundwater was encountered in the excavation of the trenches throughout the site, up to depths of 1.8m.
- 2.21 A summary of the average design infiltration rates can be seen in Table 2.1.

Table 2.1 – Soakaway test results

Trial Pit Ref	Number of tests cycles completed	Infiltration Rate (m/s)
TP02 (2021)	1	1.68E-05
TP04 (2021)	1	8.11E-06
TP101 (2022)	2	8.64E-06
TP102 (2022)	3	6.44E-06
TP103 (2022)	2	6.40E-06
TP104 (2022)	2	7.30E-06

- 2.22 It should be noted that only TP102 completed three full cycles, with a worst-case rate of 6.44×10^{-6} m/s, which is only likely to support the use infiltration over a large area, due to the 24-hour half-drain time requirement.
- 2.23 It is considered that the infiltration rates for all other trial pits would likely return a comparable rate to TP102, if the testing had been extended to three complete cycles, with exception to TP02, which presented a marginally better rate of infiltration, but is also located close to the site boundary, within an RPA, and therefore not a location that can support a new soakaway.
- 2.24 Extracts from the Soiltechnics ground investigation (August 2023), including infiltration testing results, have been included within Appendix C of this report.

Existing Site Drainage

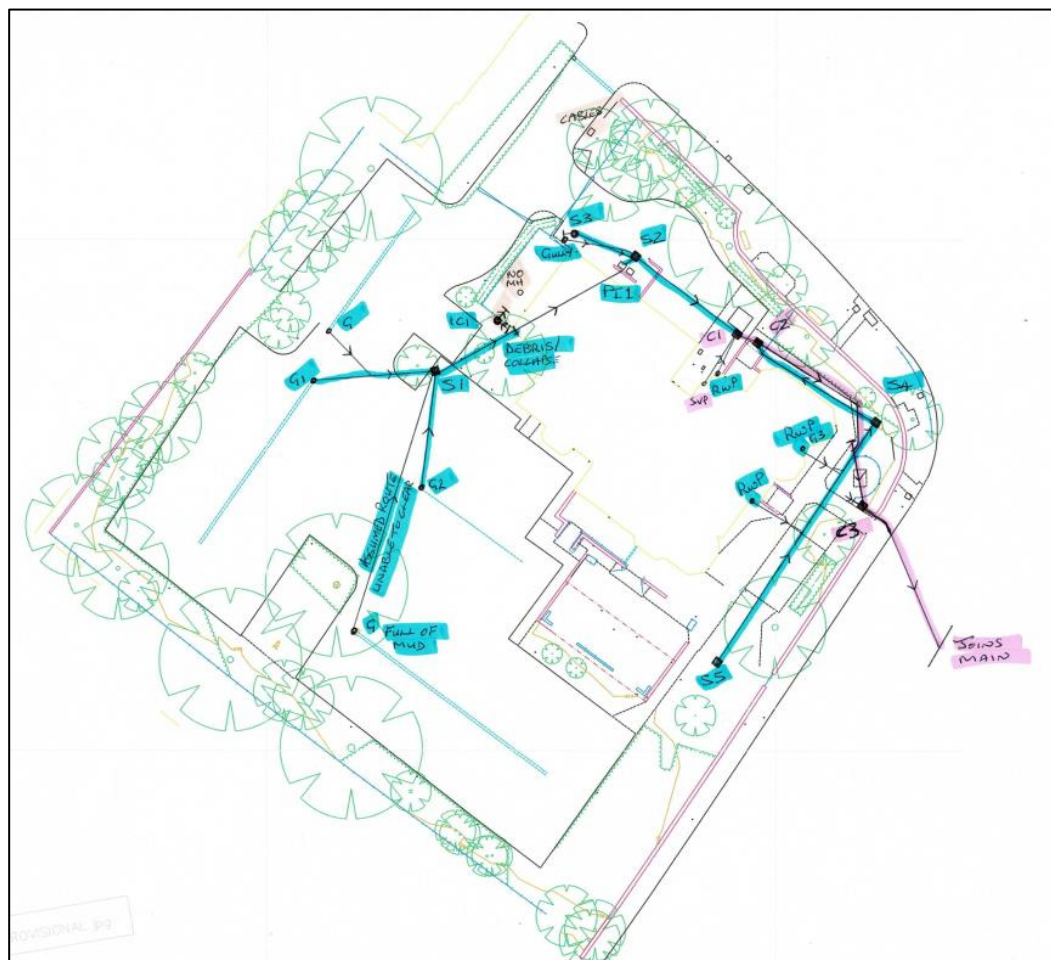
- 2.25 A review of UU's asset records shows two separate public combined sewers that run parallel to the northern and eastern boundaries of the proposed development. These are 375mm and 300mm diameter sewers, located within the carriageway of Lapwing Lane and Palatine Road, respectively. No recorded invert levels are provided on the mapping received.
- 2.26 The UU sewer asset map has been extracted within Figure 2.6, with a copy included in Appendix D.

Figure 2.6 – United Utilities Asset Records



- 2.27 UU records also map a 150mm diameter private combined sewer within the wider Greenfinch public house site. There is no mapped connection point between this private and public combined sewer on UU asset records, however a CCTV survey by Utility Surveys LTD (October 2023) confirms that the existing private combined sewer receives runoff from the application site and connects to the 300mm diameter combined sewer beneath Palatine Road.
- 2.28 Extracts from the CCTV survey are included within Appendix E.
- 2.29 The depth of manhole C3 recorded in the Utility Surveys LTD CCTV survey (October 2023) indicates that the combined sewer beneath Palatine Road adjacent to the site runs at an invert level of circa 3.0mBGL.
- 2.30 The depths of the on-site manholes were recorded in the CCTV survey and varied in depth from 0.86mBGL at the surface water inspection chambers to 2.94mBGL at manhole C3 prior to connection to the public sewer beneath Palatine Road.
- 2.31 An extract from the Utility Surveys LTD CCTV survey can be seen as Figure 2.7, with surface water sewers highlighted blue, and combined in pink. This extract shows the existing drainage routing within the site.

2.32

Figure 2.7 – Indicative existing drainage regime (Utility Surveys LTD)

2.33

The CCTV survey indicated that almost all existing sewer lengths were made from Vitrified Clay, with a few lengths of PVC. Remedial works are required on all lengths, with most issues recorded due to debris or settled deposits within the pipework or slight cracks/ fractures within the pipe or at joints.

2.34

The CCTV survey found the length of pipe between manholes 'S1' and 'S2', shown on Figure 2.7, was fully blocked by debris or a possible collapse approximately halfway along its length. Aside from this, there were no lengths of pipework requiring full replacement.

Existing surface water runoff

2.35

MCC LFRMS (March 2014), paragraph 5.46, states that within CDAs: "developers should aim to minimise surface water runoff from developments, and achieve at least the following runoff rates:

- Greenfield runoff on Greenfield sites up to a 1 in 100 year storm event, including consideration of climate change.

- A 50% runoff rate reduction for Brownfield sites, with an aim of reducing runoff to Greenfield rates up to a 1 in 100 year storm event, including consideration of climate change."

2.36 The equivalent greenfield runoff rates for the site have been calculated using the FEH methodology, with the results summarised within Table 2.2, and the calculation sheet included within Appendix F of this report.

Table 2.2 – Greenfield Runoff Rates

Return Period	Greenfield Rate (l/s/ha)	Pro-Rated Greenfield Rate, 0.306ha (l/s)
Qbar	3.7	1.1
2 year	3.2	1.0
30 years	7.2	2.2
100 years	8.8	2.7

2.37 The brownfield runoff rates for the existing site within the sites redline boundary, comprising the car park and partly demolished roof of the Greenfinch building has been calculated using the Modified Rational Method using a measured existing impermeable area of 0.216ha. The results have been summarised within Table 2.3 below and the calculation sheet included within Appendix G of this report.

Table 2.3 – Brownfield Runoff Rates (0.216ha)

Return Period	Brownfield Rate, 0.216ha (l/s)
2 year	27.9
30 years	51.0
100 years	62.5

2.38 In line with the MCC LFRMS (March 2014), the proposed development should aim to restrict any off-site discharges as close to the greenfield rates (Table 2.2) as practicable and must not exceed 50% of the brownfield rates (Table 2.3).

3 Development Proposal

3.1 The development proposes the construction of a new retirement living complex comprising 24 one-bedroom and 13 two-bedroom apartments.

3.2 The existing car park is to be demolished, with a new parking area and patio installed to the north of the proposed building. The existing vehicular access will be retained. Amenity space is proposed on all sides of the proposed building, as well as parking facility for mobility buggy's.

- 3.3 The former public house does not comprise a part of this application, with the building being redeveloped into offices by others.
- 3.4 A copy of the proposed site layout can be found within Appendix H.

4 Surface Water Management Plan

- 4.1 The site is less than 1ha and is located within Flood Zone 1. However, the site is location within the Didsbury Critical Drainage Area, therefore a Flood Risk Assessment is required.
- 4.2 In line with the MCC LFRMS (March 2014), the proposed surface water management strategy should aim to restrict any off-site discharges as close to the greenfield rates as practicable and must not exceed 50% of the brownfield rates, with the aim of reducing runoff to Greenfield rates up to a 1 in 100 year storm event, including allowance for climate change.
- 4.3 The proposed strategy safeguards against the upper end allowances for climate change (45%) as stipulated for the with the Upper Mersey Management Catchment peak rainfall allowances published by the Department for Environment, Food and Rural Affairs (DEFRA). This will provide betterment over existing brownfield conditions, where the rate and volume of runoff would continue to increase due to climate change.
- 4.4 Soiltechnics (August 2023) reported on soakaway testing, with recorded infiltration rates considered marginal in the northern parking area.
- 4.5 The easements required from structures and trees were drawn, with any space remaining considered appropriate for any infiltration or attenuation feature. The largest space available was in the east of the proposed parking area, with TP103 the closest infiltration testing site with a design infiltration rate of 6.40E-06 m/s.
- 4.6 Causeway FLOW was used to build a model which reflects the maximum potential soakaway feature in this location, with a total area of 144m².
- 4.7 Owing to the low infiltration rates and required factor of safety, it was found that a proposed soakaway covering an area of 144m² would need to be 1.6m deep. At this depth the half-drain time was reported as 6,609 minutes, which far exceeds the 1440 minutes (24-hour) requirement.
- 4.8 The SWMP therefore disregards use of infiltration and instead promotes an attenuated discharge. Copies of the failed soakaway modelling outputs can be found within Appendix I.

- 4.9 In line with the drainage hierarchy, where infiltration is unsuitable, runoff should instead seek to discharge to the nearest available watercourse, however there are none nearby and therefore the nearest and most practicable point of discharge would be the combined sewer beneath Palatine Road, which currently receives unattenuated flows from the brownfield site.
- 4.10 A pre-application connection enquiry has been submitted to UU and their response confirms that flows can be received by the combined network in Palatine Road, at no greater than 2.7 l/s.
- 4.11 Copies of our correspondence with UU can be found within Appendix D.
- 4.12 Runoff generated by impermeable areas will be conveyed via a new surface water network towards a cellular attenuation tank beneath the parking area in the centre of the site, with controlled discharge to the UU combined sewer as agreed.

Attenuated discharge

- 4.13 All surface water flows from the site will pass through a flow control which seeks to reduce the peak rates of runoff to the 1-in-100 year greenfield runoff rate shown in Table 2.2, as agreed with UU.
- 4.14 All chambers immediately upstream of the cellular tank will include silt traps, whilst the tanks themselves will include vented covers or a high-level vent pipe to mitigate air-locks in line with manufacturer recommendations.
- 4.15 Causeway FLOW software has been used to determine the storage requirements for the proposed development. The output of this exercise has been summarised within Table 4.1, with copies of the modelling outputs included within Appendix J.

Table 4.1 – Attenuation Storage Volume

Attenuation Feature	Attenuation Volume m ³
Cellular Tank	90.8
Total	90.8

- 4.16 The proposed development represents an overall reduction in impermeable area compared to the existing site, from 0.216 ha to 0.182 ha. The reduction in impermeable area will result in the volume of runoff from the site decreasing. It is therefore considered that Long-Term Storage is not necessary in this instance.

- 4.17 The future peak rates of discharge have been calculated using Causeway FLOW modelling for the proposed development (Appendix J). The outputs of this exercise can be seen summarised within Table 4.2 below and demonstrate up to 96% reduction in peak flow compared to the existing brownfield site (Table 2.4).

Table 4.2 – Runoff Rate Comparison

Return Period	Existing Brownfield Rates (0.216ha)	Attenuation Tank + Flow Control (0.182ha)	Betterment (compared to existing)
2 years	27.9 l/s	1.9 l/s	93%
30 years	51.0 l/s	2.0 l/s	96%
100 years	62.5 l/s	2.7 l/s	96%

- 4.18 A copy of the preliminary drainage layout can be found on drawing 1582-01-PDL-1001 included within Appendix K, whilst our correspondence with UU can be seen in Appendix D.

Exceedance Events

- 4.19 During exceedance events, runoff will overflow from the drainage systems and away from the building into the car parking area. From here, the external works design of the site should seek to ensure that excess flows are stored aboveground within the car parking area and amenity space.
- 4.20 The volume of exceedance runoff would be reduced in the post-development scenario due to the provision of on-site attenuation and a reduction in drainage catchment, compared to the existing impermeable site, which has no attenuation.
- 4.21 Beyond the 100-year critical storm, exceedance runoff from the proposed drainage network will be directed towards the same exceedance flow route, to the car parking area, where any aboveground capacity can be utilised. Beyond the limits of the site, exceedance flow would continue off-site.

5 Foul Water Strategy

- 5.1 In terms of wastewater connections, the developer is entitled to make a connection to the nearest practical point on the network where the existing sewer is at least the same diameter as the new sewer required to provide capacity for the development.

- 5.2 Under the provisions of the Water Industry Act 1992 (as amended), the developer will need to pay the sewerage undertaker the published sewer connection charges and infrastructure charge per dwelling, and the sewerage undertaker is responsible for any network reinforcement.
- 5.3 Correspondence received from UU confirms that the combined sewer within Palatine Road is their preferred point of discharge for foul flows.
- 5.4 Foul flows generated by the proposed development will drain through a new private foul network and will discharge to UU' adopted 300mm combined sewer beneath Palatine Road to the south east, the same proposed point of discharge as surface water flows.
- 5.5 The proposed foul drainage arrangements can be seen on the preliminary drainage layout drawing 1582-01-PDL-1001 within Appendix K, whilst our correspondence with UU can be seen in Appendix D.

6 Ownership & Maintenance

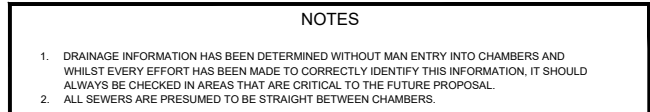
- 6.1 All on-site piped drainage will remain private and will be designed in accordance with Building Regulations Part H and will become the responsibility of the building operator.
- 6.2 The proposed attenuation will also be retained under private ownership and operated and maintained by the operator in accordance with CIRIA C753 and any manufacturer specific guidance.
- 6.3 At the detailed design stage, a 'Drainage Maintenance Plan' will be prepared. The Plan will set out maintenance tasks, responsibilities and frequencies for the entire drainage network.

7 Conclusion

- 7.1 The development proposes the construction of a new retirement living complex comprising 24 one-bedroom and 13 two-bedroom apartments.
- 7.2 The proposed development has been assessed in line with the National Planning Policy Framework, to allow the planning application to be progressed and to show that the development can be undertaken in an acceptable manner from a flood risk perspective.
- 7.3 The proposed development is located within Flood Zone 1 and is not known to be susceptible to flooding from groundwater, infrastructure or artificial sources. Shallow pluvial flooding is shown in the 0.1% annual exceedance

- event, but this can be mitigated through the surface water management plan.
- 7.4 To ensure the development is safe throughout its lifetime, the surface water strategy accounts for runoff in up to the 1 in 100 year return period.
- 7.5 The strategy also safeguards against climate change (45%), providing betterment over existing conditions, where the rate and volume of runoff would continue to increase due to climate change.
- 7.6 Owing to poor rates of infiltration, existing site constraints (RPA's), and lack of available space, it is not possible to implement soakaway drainage, due to the 24-hour half-drain time requirement. Instead, it is proposed that stormwater runoff utilises an attenuated discharge to the adopted combined sewers within Palatine Road, with peak flows limited to 2.7 l/s peak, as agreed with United Utilities. This provides up to 96% betterment compared to the existing site discharge.
- 7.7 During exceedance events, runoff will overflow from the drainage systems and away from the building into the car parking area. From here, the external works design of the site will ensure that any exceedance flows are stored aboveground within the car parking area and amenity space, before continuing off-site.
- 7.8 Foul flows generated by the proposed development will be served by a new private network, with discharge to the same combined manhole as surface water flows, within Palatine Road as agreed with United Utilities.
- 7.9 All on-site proposed drainage will remain private and will be designed in accordance with Building Regulations Part H and CIRIA C753 and will become the responsibility of the building operator.
- 7.10 As the development will be safe from flooding throughout its lifetime and will actively reduce flood risk to properties within the downstream catchment, it is recommended that the Local Planning Authority confirm they have no objections to the proposed development.

Appendix A Topographic Survey

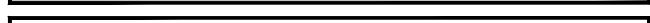


PAS 128 : 2014		
SURVEY CATEGORY	COUNTY LEVEL	CRITERIA USED IN THE DETERMINATION OF QUALITY LEVEL
TYPE-B : DETECTION	Q1-A4	A QUALITY LEVEL OF TYPE-B IS ASSIGNED WHEN IT IS DETERMINED THAT THE UTILITY HAS NOT YET BEEN FOUND OR AN ASSIGNED ROUTE (IN DETECTION POSSIBLE)
	Q1-B3	POSITION OF THE UTILITY DETECTED BY ONE OF THE FOLLOWING (ONE OR DETECTED WITH LIMITED CONFIDENCE IN DEPTH)
	Q1-B2	POSITION AND DEPTH OF THE UTILITY DETECTED BY ONE OF THE FOLLOWING TECHNOLOGIES (ONE OR DETECTED WITH LIMITED CONFIDENCE IN DEPTH)
	Q1-B1	POSITION AND DEPTH OF THE UTILITY DETECTED BY ONE OF THE FOLLOWING TECHNOLOGIES (ONE - GPS DETECTION)

Electronic and/or Ground Penetrating Radar techniques have been used to locate underground utilities and manholes on this project. Geoscientific Systems, Inc. (GSI), has made every endeavor to make sure that the information furnished within this drawing is accurate and to the highest quality. GSI has used any record drawings furnished by the client and/or drawings of previous projects. GSI does not warrant the accuracy of the information shown on this drawing (i.e. pipe sizes and positions) or not guaranteed. Historic record information often incomplete and inaccurate and cannot be relied upon.

GSI is not liable for any topographical survey that has not been controlled by us. Any inaccuracies relating to topographical data are the responsibility of the client. The client is responsible for the accuracy of the information furnished. Depth information of underground services/facilities is stated. Depths are generally within +/- 25% accuracy, but cannot be guaranteed. Any depths shown are drawn as lines to invert (base of drainage channel) unless otherwise stated.

GSI will use skilled staff and modern, calibrated equipment to perform our survey. However, the completeness of any survey is dependent on the quality of the information furnished to GSI. GSI is not responsible for the location of services/structures of particular importance to a project that is strongly advised that discussions be held with GSI regarding any possible limitations or anomalies. It is also strongly advised that third excavators should be undertaken to confirm survey information. We cannot be held responsible for any inaccuracies beyond those that could be reasonably expected to occur.



Client	
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Churchill

Address

Former

Greenfinch Public

House

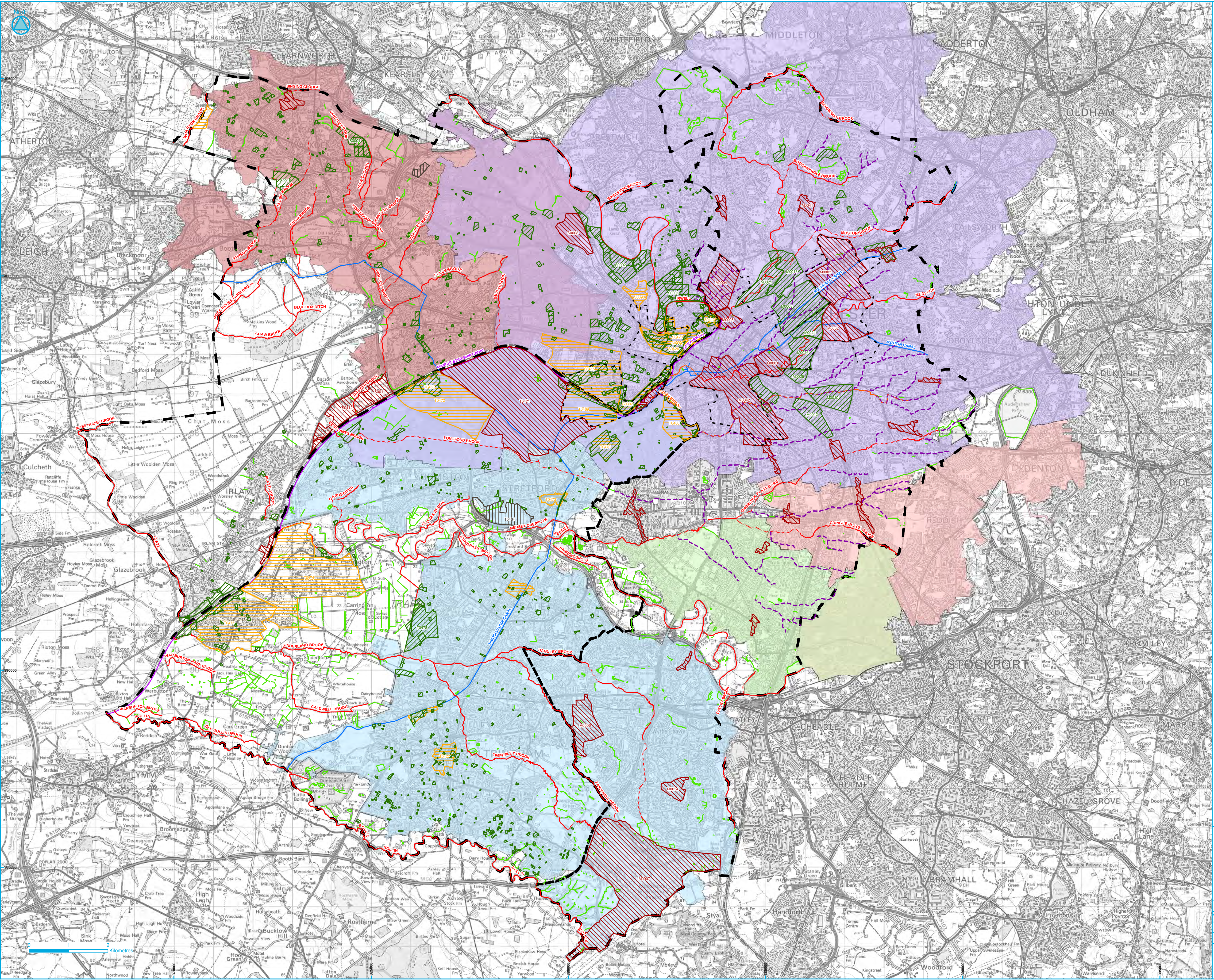
Composite Drawing

Country	Official Group	Official Network	Share
1	2.2	1	2.2

Project Number:	Rev:	Drawn By:	Approved By:
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Appendix B Didsbury Critical Drainage Area



- Council Boundary
- - - Lost Watercourses
- Critical Drainage Areas**
- Conurbation Core
- Didsbury
- Levenshulme and Fallowfield
- Manchester and Trafford South
- Salford North West
- Main Rivers (V8.0)**
- Culverted
- Open
- Digitised River Lines**
- Culverted
- Open
- Potential Development Sites / Locations**
- Employment
- Housing
- Mixed Use
- Other
- - - Regional Centre Boundary
- Ashton, Bridgewater and Rochdale Canals
- Manchester Ship Canal / Grey Inwell
- Other Waterbodies

This map has been produced in accordance with PPS25: Development and Flood Risk.

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 Critical Drainage Areas in the SFRA. Specific drainage requirements are required in these areas to help reduce local flood risk.

Chapter 5 of the Level 2 SFRA covers the flooding from surface water and sewers and how Critical Drainage Areas have been defined.

The Main River information shown in the SFRA is provided by the Environment Agency; the centreline data may deviate from that shown on basemapping due to inherent differences in data resolution. Further information on Main Rivers is provided on the Environment Agency's website. The mapping of culverted sections of watercourse is a strategic screening only based upon Ordnance Survey 1:10,000 mapping and should be confirmed for more detailed studies such as site specific Flood Risk Assessment. The canals layer does not necessarily cover all the canal arms, but the modelled overtopping/breaching and hydraulic interactions with rivers and other waterbodies is complete and accurate as appropriate for a Strategic Flood Risk Assessment.

The River Irwell between Victoria Station and Pomona Island is not shown as a Main River on the Environment Agency's Flood Map although Flood Zones related to the river are. The same approach has been taken in this SFRA.



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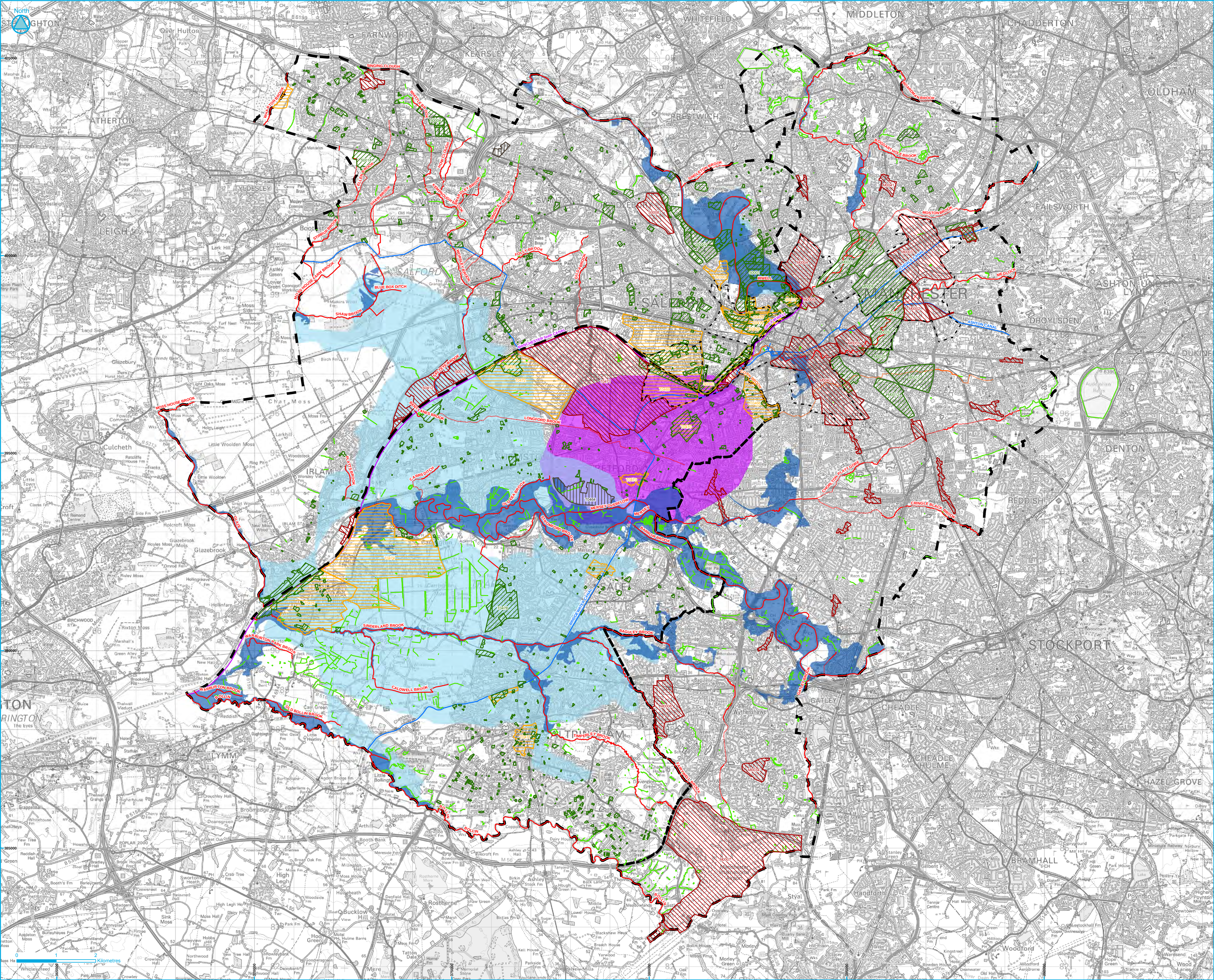


Manchester City, Salford City and Trafford Councils Level 2 Hybrid SFRA

Critical Drainage Areas

Drawn by: J Chestham	Date: 16/03/2011	This map is based upon Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office. © Crown copyright. Unauthorised reproduction infringes Crown copyright and may lead to prosecution or civil proceedings. Licence number: 100016568/2011.
Checked by: J Dimelow	Date: 01/02/2011	
Approved by: J Cooper	Date: 01/02/2011	
File Name: ...ArcViewMapping\Level2\MST_CDA_Current_V1.2.mxd		
Drawing Number: SS_4.5	Status: FINAL	Scale: 1:45,000

Original @ A



- Council Boundary
- Groundwater Issue**
 - Areas at risk of GW Flooding
 - Areas of shallow GW
 - Areas at risk of GW rebound
- Potential Development Sites / Locations**
 - Employment
 - Housing
 - Mixed Use
 - Other
- Main Rivers (V8.0)**
 - Culverted
 - Open
- Digitised River Lines**
 - Culverted
 - Open
- Ashton, Bridgewater and Rochdale Canals
- Manchester Ship Canal / Grey Inwell
- Other Waterbodies

The map has been produced in accordance with PPS25: Development and Flood Risk and its Practice Guide. This map shows areas that are potentially at risk from groundwater flooding and should be used to scope suitable mitigation measures in a site specific Flood Risk Assessment.

The Main River information shown in the SFRA is provided by the Environment Agency; the centreline data may deviate from that shown on basemapping due to inherent differences in data resolution. Further information on Main Rivers is provided on the Environment Agency's website. The mapping of culverted sections of watercourse is a strategic screening only based upon Ordnance Survey 1:10,000 mapping and should be confirmed for more detailed studies such as site specific Flood Risk Assessment. The canals layer does not necessarily cover all the canal arms, but the modelled overtopping/breaching and hydraulic interactions with rivers and other waterbodies is complete and accurate as appropriate for a Strategic Flood Risk Assessment.

The information on the map is based on Environment Agency potential groundwater rebound areas, data from the Coal Authority, BGS drift geology mapping and Defra Groundwater Emergence Maps.

The River Inwell between Victoria Station and Pomona Island is not shown as a Main River on the Environment Agency's Flood Map although Flood Zones related to the river are. The same approach has been taken in this SFRA.

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for

Manchester City, Salford City and Trafford Councils Level 2 Hybrid SFRA

Groundwater Flooding

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Approved by: J Cooper	Date: 01/02/2011	
File Name: ...ArcViewMapping\Level1\MS2_GroundwaterFlooding_V1.3.mxd		
Drawing Number: GW_2.1	Status: FINAL	Scale: 1:45,000
		Original @ A1