

Flood Risk Assessment & Outline Drainage Strategy

Moss Lane East

for

CS Moss Lane East Ltd



13/10/2022



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1.0 Introduction

1.1 Appointment

RoC Consulting has been commissioned to provide a site-specific Flood Risk Assessment and Outline Drainage Strategy in support of a planning application for the redevelopment of an existing residential dwelling on Moss Lane East, Manchester.

1.2 Proposed Development

The Site comprises of land and property at 466-472 Moss Lane and is located within the Moss Side area of Manchester not far from the junction with Oxford Road and directly opposite Whitworth Park. Heald Place lies to the east with Parkfield Street to the west.

Two semi-detached buildings occupy the site comprising a number of self-contained apartments. One of the buildings is Grade 2 listed and will be retained and enhanced with the other demolished to make way for new flats.

The intention is to utilise the existing listed building as a hub for student amenities, including private study booths, collaboration space and lounges with up to 261 beds occupying the new build spread across 9 storeys.

The site is currently almost entirely hard surfaced with asphalt although some small areas of landscaping exist along the sites northern boundary and to the south of the existing buildings.

1.3 Aim of the Report

The aim of this report is to undertake a Flood Risk Assessment in accordance with the National Planning Policy Framework (NPPF) and current guidance to support a planning application for the site.

The detail and complexity of a Flood Risk Assessment should reflect the level of risk to the site. The NPPF is the official document and together with local planning standards regulates the assessment of flood risks and their appropriate mitigations to the planning process.

This report assesses flood risk to the site and any impact on flood risk to adjacent land and property as a result of the development proposals.



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This report is intended to provide information and present proposals relating to the following:

- The existing topography, geology and hydrogeology across the development
- The existing surface and foul water drainage systems within the vicinity of the site
- Identify existing overland flow paths
- Assess the risk of flooding due to fluvial, tidal, groundwater, surface water, flows from surcharged sewers and risks for other possible sources
- Develop mitigation measures for flood risk if required
- Potential constraints imposed by the regulatory bodies including the Environment Agency, Local Water Authority and Lead Local Flood Authority
- Develop an outline foul and surface water drainage strategy

As part of the development of this FRA, information has been obtained from United Utilities (UU).

The flood mapping information contained within this report has been obtained from the Environment Agency (EA) online flood maps.

1.4 Limitations

This report has been prepared for exclusive use by the client for the purpose of assisting them in evaluating the potential risk of flooding associated with the site, potential constraints imposed by drainage and in making a planning application.

RoC Consulting accepts no liability for any use of this document other than by the client (or its representatives acting on behalf of the client) and only for the purposes, stated in the document, for which it was prepared and provided. No person other than the client may copy (in whole or in part) use or rely on the contents of this document, without the prior written permission of RoC Consulting. Any advice, opinions or recommendations within this document should be read and relied upon only in the context of the document as a whole.

RoC Consulting has endeavoured to assess all information provided to them during this appraisal. The report summarises from several external sources and cannot offer any guarantees or warranties for the completeness or accuracy of information relied upon.

The Flood Risk Assessment addresses the flood risk posed to and from the proposed development, the extent of which is shown on the CarsonSall Layout Plans within Appendix B. This report has been undertaken with the assumption that the site will be developed in accordance with the above proposals without significant change. The conclusions resulting from this study are not necessarily indicative of future conditions or operating practices at or adjacent to the site.

Intrusive investigation works have not been completed for the site and it is therefore recommended that this is carried out prior to detailed design stage.



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It is also recommended that further drainage investigations are undertaken to the public sewers in both Heald Place and Moss Lane East to establish their alignment and depth. This was unable to be determined during the initial survey work.

2.0 Policy & Guidance

In carrying out our assessment and preparing this report, regard has been taken of the provisions of the development plans and a range of other material considerations. However, it is the Governments National Planning Policy Framework, Manchester City Council's Strategic and Preliminary Flood Risk Assessments (PFRA/ SFRA), the Local Flood Risk Management Strategy, LLFA SuDS Requirements for New Developments, CIRIA Guidance and the Non-Statutory Technical Standards for SUDS which provides the most up to date and specific guidance on the scope of Flood Risk Assessments and surface water management.

2.1 National Planning Policy Framework

The National Planning Policy Framework (NPPF) was published in England in March 2012, updated in July 2018 and most recently revised in July 2021.

The key aim of the NPPF is to ensure sustainable development through the planning process, taking into account the risks from climate change, flood risk and coastal change to avoid inappropriate development in areas at risk and directing development away from areas of high risk.

It advises that where development is necessary in areas of high risk, it should be safe, and that flood resilience should also be incorporated into the design. It also advises of the fact that new developments should not increase flood risk elsewhere and new developments should aid in mitigating flood risk to the wider area.

The NPPF's advice on climate change, flood and coastal change is set out in section 14 paragraphs 152-173, with the approach to planning for flood risk between paragraphs 159-169.

A Technical Guidance document was published in March 2012 to support the NPPF, which provided guidance on how flood risk should be assessed during the planning and development process. This document has been replaced online at www.gov.uk by the Planning Practice Guidance.

2.2 Planning Practice Guidance – Climate Change, Flood Risk & Coastal Change

The guidance on flood risk and coastal change is intended to help local planning authorities in the preparation of Local Plans, and neighbourhoods in preparing neighbourhood plans. It is also relevant to planning applications and, application for prior approval for certain types of permitted development.

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For further guidance, it is recommended that the Environment Agency (EA) be contacted on applications where there is a risk of flooding i.e., sites within Flood Zones 2 and 3. There is also information on the role of Lead Local Flood Authorities (LLFA's) and when their advice may need to be sought in considering planning applications e.g. in critical drainage areas.

The document gives guidance on how flood risk should be assessed and accounted for within the context of the development:

- Flood zones - Table 1
- Flood risk vulnerability classification - Table 2
- Flood risk vulnerability and flood zone compatibility - Table 3
- The sequential test - if required
- The exception test - if required

2.3 Flood and Water Management Act 2010

This Flood Risk Assessment and Preliminary Drainage Strategy has been prepared in consultation with regulatory bodies and third parties. The views, advice and recommendations provided by the regulatory bodies and third parties represent their current standards and procedures.

The Flood and Water Management Act 2010 received Royal Assent on the 8th April 2010. This Act provides duties on the Environment Agency, Local Authorities, developers and other bodies to manage flood risks. The Act has significant planning and design implications for developers.

The main areas affecting developers are:

- The LLFA became responsible for developing, maintaining and applying local flood risk strategy, which must be consistent with national strategy and have input from the designated 'Flood Management Authorities' (FMA), which in addition to the council/unitary authority normally include the EA and local water company
- The LLFA is required to approve and may adopt sustainable urban drainage systems (SUDS). The LLFA may be either a Unitary or County Council
- Non-statutory technical standards have been produced by Defra for England and the Welsh government for Wales. There is a requirement that SUDS will be designed and constructed in accordance with these which are consistent with the SUDS Manual. A practice guidance document was produced by the LASOO advisory group in support of the Non-Statutory technical standards. In August 2019, LASOO was replaced with the Association of SUDS Authorities (ASA), the 'standards' remain current. A number of local authorities have also produced their own policy and guidance



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- The SUDS approval process is with the LLFA and the planning authority as part of the planning application. It should be noted that not all planning authorities are the LLFA and as such approval would be required from both authorities.

2.4 Manchester City Council Strategic Flood Risk Assessment, 2011

Local Planning Authorities are required to produce Local Development Frameworks (LDF), which are a portfolio of local development documents that collectively deliver the spatial planning strategy for the authority area.

The LDF's undergo a Sustainability Appraisal which assists Planning Authorities in ensuring their policies fulfil the principles of sustainability. Strategic Flood Risk Assessments (SFRAs) are one of the documents to be used as the evidence base for planning decisions and are a component of the sustainability appraisal process. Therefore, SFRAs should be used in the review or production of LDF's.

SFRA's assess the risk associated with all types of flooding and provides the information required to identify the amount of development permitted in an area; how the drainage systems in the area should function and how the risks in vulnerable areas can be reduced and/or mitigated. The National Planning Policy Framework states that Regional Planning Bodies (RPB's) or Local Planning Authorities should prepare SFRA's in consultation with the Environment Agency.

Manchester City, Salford City and Trafford Councils in partnership with JBA Consulting, produced the Level 1 and Level 2 SFRA, User Guide and Maps across four separate report volumes.

The SFRA indicates that the site is located in Flood Zone 1. The site also lies within the Conurbation Core Critical Drainage area.

2.5 Manchester City Council Preliminary Flood Risk Assessment, 2011

The Flood Risk Regulations (the Regulations), which came into force on the 10th December 2009, and the Flood & Water Management Act (FWMA) which gained Royal Assent on the 8th April 2010 require all unitary authorities (such as Stockport Council) as designated Lead Local Flood Authorities to prepare a number of key documents including a Preliminary Flood Risk Assessment (PFRA) which focuses on local flood risk from surface water, groundwater, ordinary watercourses and canals.

The table below shows the elements of work required under the regulations.

Stage	Assessment of Plan	Description
1.0	Prepare a preliminary assessment report	The PFRA should focus on local flood risk from surface water, groundwater, ordinary watercourses and canals
2.0	Determination and identification of flood risk areas	Flood risk areas are of significant risk identified on the basis of the findings of the PFRA, national criteria set by the UK Government secretary of state and guidance provided by the Environment Agency
3.0	Prepare flood hazard maps and flood risk maps in relation to each relevant flood risk area	The hazard and risk maps will show the likely extent depth, direction, speed of flow and probability of possible floods and their consequences
4.0	Prepare a flood risk management plan in relation to each relevant flood risk area	The flood risk management plans will set out what the risk management objectives are, the measures proposed to achieve those objectives and how the measures are to be implemented

The PFRA completes the first two stages in the process. The identification of flood risk areas will establish where the final two stages of preparing hazard and risk maps and flood risk management plans are required.

The PFRA, maps and plans form part of the local Flood Risk Management Strategy that Manchester City Council as LLFA are required to prepare under the Flood and Water Management Act. This strategy sets out how the LLFA will manage local flood risk in their area and will cover areas not identified as being significant flood risk under the regulations.

2.6 Manchester City Local Flood Risk Management Strategy, 2014

As Lead Local Flood Authority, Manchester City Council has a duty to develop, maintain, apply and monitor a strategy for local flood risk management. The local strategy will complement and support the National Flood and Coastal Risk Management Strategy, published by the Environment Agency (2011) and updated in August 2019.

The Manchester City Local Flood Risk Management Strategy (2014) focuses on local flood risk from surface water, groundwater and ordinary watercourses but also considers flooding from rivers. It identifies responsibilities for flooding within the Borough and the action plan identifies flood management actions designed to address flood risk.

The objectives of the strategy are to:

- Ensure that local flood risk is properly managed by using the full range of options in a coordinated way
- Reduce the likelihood, severity and consequences of flooding from Ordinary Watercourses, from Groundwater, and from Surface Water runoff
- Seek opportunities to improve water quality and biodiversity through flood risk management activities

The LFRMS does not identify the development site as being one of the main areas specifically at risk from flooding.

2.7 SuDS Requirement for New Developments, Manchester City Council

The Lead Local Flood Authority have published a document that provides guidance on drainage and flood risk for new developments. A copy of this can be found in Appendix C of this report.

In order to avoid objection, the following three elements of evidence are required to be submitted:

1. Surface Water Management Statement for the site is submitted that is in line with the requirement of the NPPF Planning Practice Guidance
 - *'New development should only be considered in areas at risk of flooding if priority has been given to the use of sustainable drainage systems. Additionally, and more widely, when considering major development, as defined in the Town and Country Planning (Development Management Procedure) (England) Order 2015, sustainable drainage systems should be provided unless demonstrated to be inappropriate'.*
 - *The strategy should be accompanied by at least an outline layout of the proposed drainage systems with space allocation for the proposed attenuation in line with the relevant flow reduction requirements.*
2. Evidence that drainage hierarchy has been applied in line with NPPF PPG requirements. The aim should be to discharge surface water run-off as high up the following hierarchy of drainage options as reasonably practicable:
 - *into the ground (infiltration);*
 - *to a surface water body;*
 - *to a surface water sewer, highway drain, or other drainage system;*
 - *to a combined sewer.*

3. Evidence that one viable solution for draining the site is secured:

- *Results of ground investigation carried out under Building Research Establishment Digest 365. Site investigations should be undertaken in locations and at proposed depths of the proposed infiltration devices. Proposal of the attenuation that is achieving half emptying time within 24 hours. If no ground investigations are possible or infiltration is not feasible on site, evidence of alternative surface water disposal routes (as follows) is required.*
- *Where surface water is connected to Main Rover, any works within or adjacent to the river that would affect it would require consent from Environment Agency. An email of acceptance of proposed flows and/or new connection will suffice.*
- *Where surface water is connected to the public sewer, agreement in principle from United Utilities is required that there is adequate spare capacity in the existing system taking future development requirements into account. An email of acceptance of proposed flows and/or new connection will suffice.*
- *Where surface water is connected to the ordinary watercourse, agreement in principle from Manchester City Council as Lead Local Flood Authority is required. Please note that all new connections to the watercourses shall comply with reduction of flows to Greenfield runoff rates. An email of acceptance of proposed flows and/or new connection will suffice.*
- *Where surface water is connected to ordinary watercourse, any works within or adjacent to the watercourse that would affect it would require consent from Manchester City Council as Lead Local Flood Authority.*

In order to avoid or discharge a drainage condition, the following evidence is required.

- Evidence of consideration of green SuDS solution wherever practicable and viable in line with NPPF PPG Paragraph 051. SuDS should be designed to:
 - *reduce the causes and impacts of flooding;*
 - *remove pollutants from urban run-off at source;*
 - *combine water management with green space with benefits for amenity, recreation and wildlife wherever practicable.*
- For Greenfield site developments, details of surface water attenuation that offers a reduction in surface water runoff rate in line with the Manchester Trafford and Salford Strategic Flood Risk Assessment, i.e. to the Greenfield runoff rates;
- For Brownfield site developments, for all sites located within Conurbation Core Critical Drainage Areas, details of surface water attenuation that offers a reduction in surface water runoff rate in line with the Manchester Trafford and Salford Strategic Flood Risk Assessment, i.e. at least a 50% reduction in runoff rate compared to the existing rates with an aim to reduce to Greenfield runoff rates wherever practicable;



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- Where surface water runoff is to be disposed through infiltration, details of surface water attenuation that is adequate for infiltration capacity of the underlying soil is required. This capacity has to be assessed through site investigation carried out in line with Building Research Establishment Digest 365. Site investigations should be undertaken in locations and at proposed depths of the proposed infiltration devices. Half emptying time of proposed attenuation within 24 hours should be achieved.
- Evidence that the drainage system has been designed (unless an area is designated to hold and/or convey water as part of the design) so that flooding does not occur during a 1 in 100 year rainfall event in any part of a building; The NPPF suggests that 'for events with a return-period in excess of 30 years, surface flooding of open spaces such as landscaped areas or car parks is acceptable for short periods, but the layout and landscaping of the site should aim to route water away from any vulnerable property, and avoid creating hazards to access and egress routes. No flooding of property should occur as a result of a one in 100 year storm event (including an appropriate allowance for climate change)'.
- Assessment of overland flow routes for extreme events that is diverted away from buildings providing long and cross sections for the proposed drainage system and finished floor levels.
- Evidence that runoff volume in the 1 in 100 year, 6 hours rainfall shall be constrained to a value as close as is reasonably practical to the Greenfield runoff volume for the same event, but never to exceed the runoff volume from the development site prior to redevelopment;
- Hydraulic calculation of the proposed drainage system;
- Design construction drawings of proposed SuDS elements and flow controls;
- For sites where proposed development would cause unusual pollution risk to surface water (large car park areas (>50 parking spaces) or industrial estates), evidence of pollution control measures (preferably through SuDS) is required.
- Where an application is part of a larger site which already has planning permission it is essential that the new proposal does not compromise the drainage scheme already approved.

2.8 CIRIA Guidance Development & Flood Risk

The CIRIA Guidance publication “C624 Development and Flood Risk – Guidance for the Construction Industry” defines 3 levels of FRA which can be undertaken:

FRA Level	Description / Scope
Level 1	Screening Study to identify whether there are any flooding or surface water management issues related to a development site that may warrant further consideration. This should be based on readily available existing information, including the SFRA, Environment Agency Flood Map and Standing Advice.
Level 2	Scoping Study to be undertaken if the Level 1 FRA indicates that the site may lie within an area that is at risk of flooding or that the site may increase flood risk due to increased run-off. This Study should confirm the sources of flooding which may affect the site and should include the following: • an appraisal of the availability and adequacy of existing information • a qualitative appraisal of the flood risk posed to the site, and potential impact of the development on flood risk elsewhere • an appraisal of the scope of possible measures to reduce the flood risk to acceptable levels. The Scoping Study may identify that sufficient quantitative information is already available to complete a FRA appropriate to the scale and nature of the development.
Level 3	Detailed Study to be undertaken if the Level 2 FRA concludes that further quantitative analysis is required to assess flood risk issues related to the development site. The Study should include: • quantitative appraisal of the potential flood risk to the development • quantitative appraisal of the potential impact of development site on flood risk elsewhere • quantitative demonstration of the effectiveness of any proposed mitigation measures

This report will follow the format of a Level 2 Scoping Study.

2.9 C753 The SuDS Manual

This document provides best practice guidance on the planning, design, construction, operation, and maintenance of sustainable drainage systems (SuDS). This document provides detail on all the typical sustainable drainage systems and details on how they can be interconnected to not only provide the required drainage performance but also act as pollution control whilst enhancing the site wide Masterplan proposals.



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SuDS should not be thought of as an individual component, but as an interconnected system designed to manage, treat, and make best use of surface water, from where it falls as rain to the point at which it is discharged into the receiving environment beyond the boundaries of the site.

A central design concept for SuDS is the SuDS Management Train. This describes the use of a sequence of components that collectively provides the necessary processes to control the frequency of runoff, the flow rates and the volumes of runoff, and to reduce concentrations of contaminants to acceptable levels. There are six specific functions provided by SuDS components. They are not independent, and one component may provide two or more functions.

2.10 Non-Statutory Technical Standards for SuDS, 2015

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

The technical standards prescribe requirements for both Peak Flow and Volume Control with an emphasis on ensuring that these do not exceed the pre-development case and, where practicable, should not exceed greenfield rates and volumes for the 1 in 1 year and 1 in 100 year rainfall events.

For developments which were previously developed, the peak runoff 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 runoff 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.



3.0 Site Context

The site is located within the Moss Side area of Manchester and comprises a roughly square plot of land currently occupied by two detached properties with basement structures in use as new flats.

The site is centred around NGR: SJ 84850 95667. The nearest postcode of M14 4PJ. The total red line site application boundary is approximately 0.18ha.

A Site Location Plan is within Appendix A of this report.

3.1 Site Characterisation / Land Use

Development Area		The gross site area is approximately 0.18ha. Under the current proposals the site will provide 261 beds across 9 storeys alongside amenity space, laundry facilities, gym, collaboration spaces etc.
Existing Surfacing and Current Use		The site is currently occupied by two existing residential apartment buildings and associated external hard and soft landscaping. The car park to the rear is surfaced in Asphalt with some turfed areas and planting to the front of the properties.
Boundaries	North	B5219 Moss Lane East beyond which lies Whitworth Park
	South	Existing car park beyond which lie further residential properties
	East	Heald Place and a hand car wash
	West	Parkfield Street which provides access to Gateshead Close and further residential properties.
Access	Vehicles	The site is accessible from Heald Place
	Pedestrians/Cycles	The site is accessible from Moss Lane East and Heald Place

A proposed site layout plan is within Appendix B of this report.

3.2 Topography

A topographic survey of the development site has been undertaken, a copy of which is within Appendix D of this report.

The topography of the site is generally level with a general fall from northeast to southwest. Levels in the northeast corner are around 37.78mAOD with levels in the southwest around 37.16mAOD.

3.3 Geology

Reference to the online British Geological Survey (BGS) map for the site indicates the following ground model:

Drift Geology: Till, Devensian - Diamicton
Solid Geology: Chester Formation – Sandstone

Soilscape England describes the soils as 'slowly permeable seasonally wet acid loamy and clayey soils with impeded drainage'.

A search has also been completed using the BGS Borehole Scans facility to establish what (if any) historic site investigation or borehole data may be available for the development. The table below details the two closest available scans.

BHID	Direction	Distance	Made Ground	Clay	Sandstone
SJ89NE38	East	170m	1.22	12.19	13.11
SJ89NW147	West	400m	0.91	10.67	Not Encountered

There are no geological faults or features indicated within 500m of the site.

3.4 Hydrogeology

Reference to the DEFRA 'Magic Map' online Aquifer Designation Map indicates that the underlying superficial deposits are classed as a Secondary Aquifer (undifferentiated). The underlying Bedrock Geology is described as a Principal aquifer.

Secondary Undifferentiated classification is assigned in cases where it has not been possible to attribute category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type.

Principal aquifers are layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water



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supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as major aquifer.

3.5 Ground Water Protection Zones

The Environment Agency have defined Source Protection Zones (SPZs) for 2,000 groundwater sources such as wells, boreholes and springs used for public drinking water supply. These zones show the risk of contamination from any activities that might cause pollution in the area. The closer the activity, the greater the risk. The maps show three main zones (inner, outer, and total catchment) and a fourth zone of special interest, which the Environment Agency occasionally applies, to a groundwater source.

The proposed development site is located within Source Protection Zone 3 (Total Catchment).

The site is not located in close proximity to any sensitive groundwater abstraction points (e.g., for a potable water supply well). The nearest water abstraction point is indicated 996m to the northwest relating to Heineken UK Ltd. Water is abstracted from groundwater for use in general cooling associated with breweries.

The nearest surface water feature is indicated 915m to the southwest in the form of the Chorlton Brook. Water quality of this receptor (as indicated from a sampling point 969m to the south) indicates a GQA Grade of "B" (good) and a flow rate of less than 0.31 cumecs.

There are no active surface water abstractions at the site or within 500m of the site boundary.

The nearest discharge consent is indicated 131m to the north held by United Utilities for the release of storm sewage overflow into Malkin Brook Tributary Corn Brook.

No historic pollution incidents have been noted in close proximity to the site.

The development of the site would be undertaken in a manner to ensure that no contamination of groundwater occurred.

3.6 Watercourses, Land Drainage, and other Waterbodies

As noted above, the nearest surface water feature is Chorlton Brook which is located circa 915m to the southwest of the site and is culverted.

A historic record drawing from circa 1850 identifies what appears to be a watercourse through the site which is culverted further to the south. However, no evidence of this can be found on site or any other record of it. Further investigations will be undertaken as part of future site investigation work to try and determine whether this feature is culverted beneath the site.

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Historic OS Map, Circa 1850

No other water features are present in the vicinity.

3.7 Existing Flood Defences and other Structures

There are no formal flood defences in the vicinity of the site.

3.8 Existing Public Sewers

United Utilities Sewer Records show that the highways surrounding the development site are well served by a network of existing sewers (refer to Appendix E), these include:

- 450 & 375mm diameter Combined Sewers in Parkfield Street and Heald Place
- 2250 & 750x1060mm Combined Sewers in Moss Lane East.

The combined sewers in Parkfield Street and Heald Place both flow northwards and connect into the 750x1060 sewer in Moss Lane East which flows in westerly direction along with the 2250 brick sewer.

A small cluster of inspection chambers are indicated within the site itself, but no size information or connectivity is shown.

3.9 Existing Private Sewers

A drainage CCTV survey was undertaken by Drain Alert in July 2022. This indicates that the site comprises two separate combined drainage networks, each serving roughly half of the existing site and discharging to Parkfield Street and Heald Place respectively.

The outfall to Parkfield Street is 150mm diameter and Heald Place 225mm diameter. It was not possible to survey the sewers in Heald Place and Moss Lane East however, the sewer in Parkfield Street was surveyed at a depth of around 4.6mbgl.

Temporary traffic management will be required to carry out further works within the adopted highway and it is recommended that this is undertaken prior to works commencing on site.

A copy of the manhole records from the drainage survey are contained within Appendix E. Information from the survey, including assumed drainage areas, has been replicated on the drawing in Appendix G.

3.10 Historical Flood Records

No records of historical flooding in the vicinity are recorded in the SFRA.

An internet-based search uncovered a Manchester Evening News article from July 2019 which included a photograph of flooding on Moss Lane East near Whitworth Park following a period of extended heavy rainfall.

The image (provided below) shows water shooting out of a manhole cover presumably due to the system being severely surcharged. The image was taken at the junction with Heald Place opposite the hand car wash and based on United Utilities records and proximity of the manhole it appears to be affecting the existing 2250 diameter brick combined sewer.

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Moss Lane East Flooding, Manchester Evening News, July 2019

No other flooding incidents were recorded at or in the vicinity of the site.

A pre-planning enquiry has been sent to United Utilities which included any records of DG5 sewer flooding. At the time of writing, a response was awaited and therefore details will be entered into a new revision of this report in the next design stage.

3.11 Flood Mapping

3.11.1 EA Flood Zone Map

The Environment Agency Flood Map indicates that the proposed development is located in Flood Zone 1 (low risk).

Flood Zone 1 is land designated as having a greater than 1 in 1,000 annual probability of flooding from rivers.

Flood zone designations ignore the presence of any flood defences and only considers flooding from fluvial and tidal sources.



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3.11.2 SFRA Flood Zones Map

The Manchester City Council SFRA flood zone map also indicate the site is located in Flood Zone 1

3.11.3 SFRA Groundwater Flood Map

The Manchester City Council SFRA Groundwater Flooding map indicates that the site is not in an area at risk of groundwater flooding.

3.11.4 SFRA Surface water Flood Map

The Manchester City Council SFRA surface water flood maps indicate that the site is not in an area at risk of surface water flooding.

4.0 Surface Water Management

4.1 Introduction

The National Planning Policy Framework (NPPF) and accompanying Technical Guidance indicate that surface water run-off should be controlled as near to its source as possible through a sustainable drainage approach to surface water management.

Consideration should therefore firstly be given to using sustainable drainage (SuDS) techniques including soakaways, infiltration trenches, permeable pavements, grassed swales, ponds and wetlands to reduce flood risk by attenuating the rate and quantity of surface water run-off from a site. This approach can also offer other benefits in terms of promoting groundwater recharge, water quality improvement and amenity enhancements. Approved document Part H of the Building Regulations (2015) sets out a hierarchy for the disposal of surface water which encourages a SuDS approach.

4.2 Pre-Development Surface Water Runoff

The total area within the site boundary is approximately 0.18ha. This is currently primarily comprised of the two detached buildings, one of which is to be retained, and associated areas of hardstanding alongside some very minor areas of soft landscaping.

For the purposes of determining the existing rate of surface water runoff the site is considered to be brownfield and the drainage CCTV survey demonstrates that the surface water run-off is drained to both the public combined sewers in Parkfield Street and Heald Place. The sewer records indicate that these then discharge to the 750 x 1060 combined sewer in Moss Lane East.

The drainage survey has been used to help calculate the existing rate of run-off by modelling the system in Microdrainage. This method allows estimation of the amount of run-off that is likely to be generated from an urban area based on surveyed pipe sizes and invert depths.

Impermeable areas were measured from the topographic survey and can be found alongside a layout of the existing drainage on the drawing in Appendix G of this report.

The table below summarises the existing brownfield run-off rates for the development across a range of storm return periods.

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NETWORK	OUTFALL	GROSS AREA	DRAINED. AREA	Q ₁ (L/S)	Q ₃₀ (L/S)	Q ₁₀₀ (L/S)
1	Heald Place	0.187 ha	0.063 ha	7.0	20.0	25.8
2	Parkfield St		0.062 ha	6.7	19.5	25.2
Total				13.7	39.5	51.0

Existing run-off calculations are within Appendix H of this report.

4.3 Methods of Surface Water Management

There are three methods that have been reviewed for the management and discharge of surface water which are detailed below; these may be applied individually or collectively to form a complete strategy. They should be applied in the order of priority as listed.

- Discharge via infiltration
- Discharge to watercourse
- Discharge to public sewerage system

Discharge via Infiltration

Any impermeable areas that can drain to a soakaway or an alternative method of infiltration would significantly improve the sustainability of any surface water systems.

At the time of writing an intrusive investigation for the development site was not available to assess ground conditions. However, RoC Consulting has undertaken a Phase 1 Desk Study for the site which provides information on expected ground conditions from the British Geological Survey and nearby bore hole data.

These indicate Made Ground up to depths of 1.22m, underlain by clays for a further 10-12m. Sandstone bedrock was encountered in one borehole at over 13m.

Furthermore, the constraints of the site also limit the space available to place a suitably sized soakaway whilst maintaining the minimum distances to existing/ proposed buildings.

Taking this into consideration, infiltration is not expected to be a feasible method of surface water disposal for the development. However, it is recommended that some infiltration testing is



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undertaken as part of any future site investigation works at the site so that this can be ruled out and satisfactory evidence provided to the LLFA and United Utilities as necessary.

Discharge to Watercourse

As indicated earlier in this report, the nearest watercourse to the site is Chorlton Brook which is located circa 915m to the southwest of the site and is culverted.

No other water features are present in the vicinity.

On this basis, this method of surface water disposal has not been considered further.

Discharge to Public Sewer

The only public sewerage infrastructure in the vicinity of the site are all combined sewers. On the basis that infiltration is not considered to be viable, there are no surface water sewers or watercourses in the vicinity and the existing development discharges to the public combined sewer network at two separate locations then this is the only viable solution.

It is therefore proposed that the development will mimic the existing drainage regime and discharge surface water to the combined sewer network in Heald Place subject to agreement with United Utilities and the Lead Local Flood Authority.

Further drainage investigation work will be required to establish the alignment and level of the existing public sewer however, based on the survey work undertaken to date it is expected to be deep enough to obtain a connection.

A pre-development enquiry has been submitted to United Utilities. At the time of writing, a response was awaited and therefore details will be entered into a new revision of this report in the next design stage.

4.4 Proposed Restricted Discharge Rates

Manchester City Council SuDS Requirement for Developers states that:

“For Brownfield site developments, for all sites located within Conurbation Core Critical Drainage Areas, details of surface water attenuation that offers a reduction in surface water runoff rate in line with the Manchester Trafford and Salford Strategic Flood Risk Assessment, i.e. at least a 50% reduction in runoff rate compared to the existing rates with an aim to reduce to Greenfield runoff rates wherever practicable.”

Given the small development footprint and limited space within which to incorporate SuDS features and attenuation it is not considered practicable to restrict flows to Greenfield run-off rates due to the extremely low flow rate.

It is therefore intended that discharge from the site will be restricted to 50% of the existing Q1 run-off rate subject to agreement with both United Utilities and the LLFA. This will ensure that the proposed development will not increase flood risk elsewhere.

Existing brownfield run-off rates have been calculated and are presented in Section 4.2 above. A 50% reduction on the Q1 discharge rate is presented in the table below.

GROSS AREA	IMP. AREA	Q₁ (L/S)	50% Q₁ (L/S)
0.187 ha	0.125 ha	13.7	6.85

4.5 Attenuation Requirements

The proposed restricted discharge rate above and development run-off generated by proposed impermeable areas results in a storage requirement during periods of intense rainfall.

The Microdrainage Source Control Quick Storage Estimate design software has been used to estimate the maximum storage volume required on-site for the Q₃₀ and Q₁₀₀-year storm events plus an allowance for climate change.

Proposed impermeable areas have been measured from the architects layout.

Attenuation Volume				
Gross Area (ha)	Imp. Area (ha)	Max. Discharge (l/s)	Q₃₀ Volume (m3)	Q₁₀₀+40% Volume (m3)
0.187	0.156	6.85	29	68

It should be noted that these figures are indicative only and should not be relied upon for contractual or cost commitment purposes.

Given the constraints of the site and requirement to pick up RWP connections from basement level, it is proposed that the attenuation tank will also need to be located beneath the basement with flows being lifted up to a higher level via a package pumping station.

Alternative solutions for locating the attenuation tank, with a view to also removing the package pumping station, will be explored at detailed design stage.

4.6 Surface Water Runoff Volume

It is a requirement of the Non-Statutory Sustainable Drainage Technical Standard that:

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S5 *Where reasonably practicable, for developments which have been previously developed, the runoff 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 runoff volume for the same event, but should never exceed the runoff volume from the development site prior to redevelopment for that event.*

S6 *Where it is not reasonably practicable to constrain the volume of runoff to any drain, sewer or surface water body in accordance with **S5** above the runoff volume must be discharge at a rate that does not adversely affect flood risk.*

Where possible, to comply with the above SuDS techniques should be used to allow any additional volume to infiltrate naturally, therefore preventing this from discharging to receiving waters.

Where infiltration is not possible then the additional volume should be discharged at flow rates below 2 l/s/ha.

Compliance with the above can be technically difficult to achieve for sites of this nature and therefore the requirements for any long-term storage would need to be explored further at detailed design stage in consultation with the LLFA.

The LLFA could require discharge to be reduced to greenfield rates (Q_{bar}) where long term storage cannot be provided. This would have the effect of increasing overall attenuation storage volumes with the $Q_{100}+40\%$ figure increasing to circa $93m^3$ from $68m^3$.

5.0 Foul Water Management

5.1 Introduction

It is proposed to install a new foul drainage system to serve the development.

The foul water system will be designed and constructed in accordance with the current Building Regulations, BS EN:752 'Drainage and Sewer Systems Outside Buildings', the Local Authority Building Control specifications and requirements, Sewerage Sector Guidance (Appendix C) and the Civil Engineering Specification for the Water Industry.

5.2 Foul Water Capacity & Point of Connection

At the time of writing details of foul flow rates generated by the development were not available. However, as a rough estimate, based on the appliances shown on the architect's layout and in accordance with BS EN 12056-2:2000 the approximate peak foul flow would be in the region of 13.04 l/s.

A pre-development enquiry has been submitted to United Utilities based on the above. At the time of writing, a response was awaited and therefore details will be entered into a new revision of this report in the next design stage.

Based on the drainage CCTV survey it is not possible to utilise an existing connection to the public sewer network and therefore it is proposed to combine with the surface water at the final manhole and discharge to the 375mm diameter sewer in Heald Place.

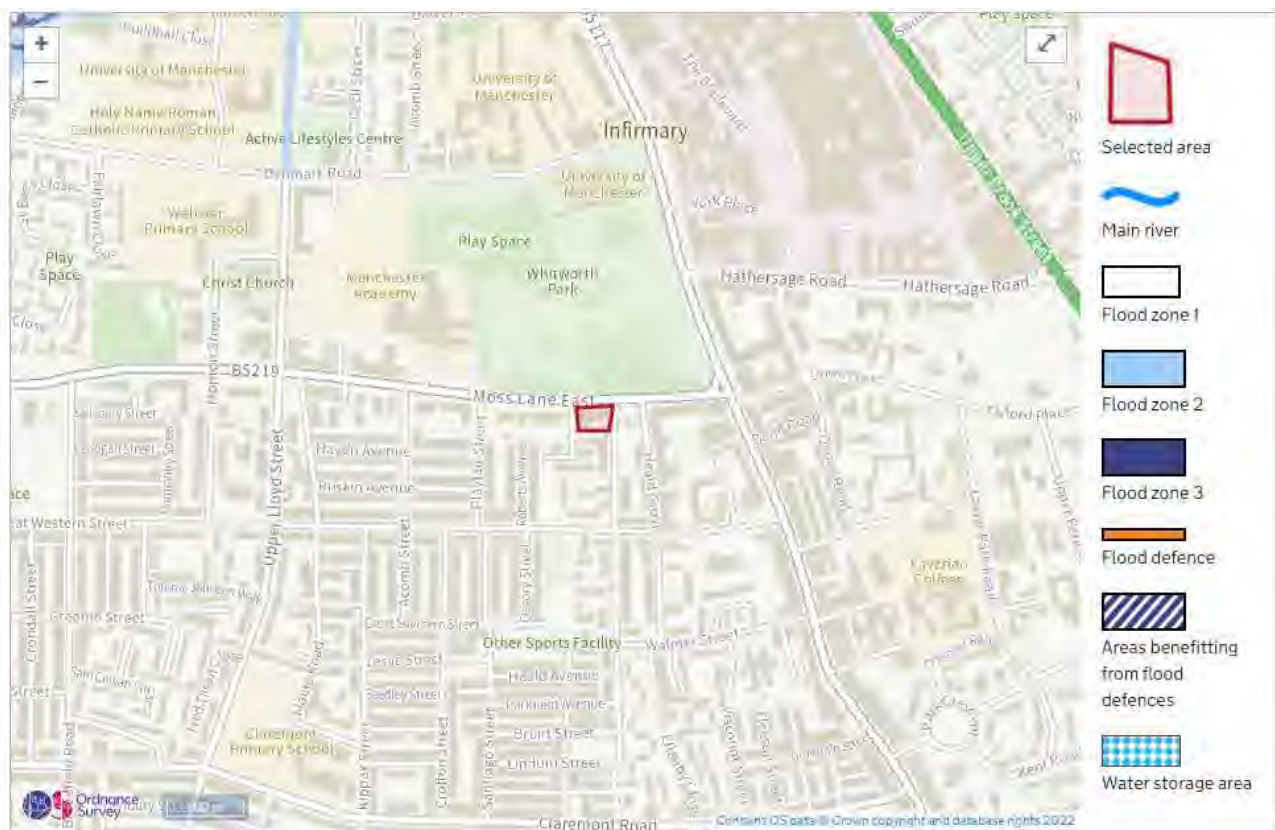
Similar to surface water, there are foul connections within the basement which need to be picked up and therefore it is currently proposed that a package pumping station will be provided to lift flows up to a higher level. From here they will be able to discharge via gravity.

It is intended that this will be reviewed further at detailed design stage with a view to limiting the amount of foul drainage that requires pumping.

6.0 Sources of Flood Risk

6.1 Fluvial Flood Risk

Information relating to fluvial flood risk at the site has been obtained via and Environment Agency online flood mapping.



Examination of the Environment Agency online flood map above indicates that the site is located in Flood Zone 1.

Flood Zone 1 is defined within the NPPF as a site to have a greater than 1 in 1000 (1-0.1%) probability of river flooding in any one year.

The nearest water feature to the development is the culverted Chorlton Brook which is located almost 1km away.

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Taking the above into consideration, it is considered that the residual risk of fluvial flooding to the site is LOW.

6.2 Pluvial Flood Risk

Pluvial flooding is defined as flooding resulting from rainfall generated overland flow before run-off enters any watercourse or sewer.

It is usually associated with high intensity rainfall events but can also occur with low intensity rainfall or melting snow where ground is saturated, frozen, developed or otherwise has low permeability resulting in overland flow and ponding in depressions in the topography. Large catchment areas are particularly prone to this type of flooding.



The Environment Agency pluvial flood map indicates that the site is not an area potentially susceptible to pluvial flooding.

The only flows that are therefore likely to be present on site are from direct rainfall on areas of hardstanding.

Overland flow paths on site and exceedance events will be catered for within the detailed design/levels strategy. This in conjunction with a new drainage system would be sufficient to maintain a **Low** level of risk from pluvial flooding.

6.3 Tidal Flood Risk

The site is not considered to be at risk of tidal flooding due to its inland location.

6.4 Groundwater Flood Risk

In general terms, groundwater flooding can occur from three main sources, raised water tables, seepage and percolation, and groundwater recovery or rebound. If groundwater levels are naturally close to the surface, then this can present a flood risk during intense rainfall.

The Manchester City Council SFRA identifies that the site is not at risk of groundwater flooding.

An intrusive investigation should be undertaken in advance of detailed design stage to establish exact ground water levels and how they fluctuate seasonally. If required, measures would need to be introduced into the drainage scheme to deal with high groundwater to ensure that flooding to property does not occur. Given the development proposals include for the retention of an existing basement and construction of a new one then measures may be required prevent the ingress of groundwater.

It is considered that any groundwater issues can be mitigated as required, subject to further investigation, at the detailed drainage design stage. The risk to the site from groundwater flooding is therefore considered **Low**.

6.5 Artificial Source – Canal Flood Risk

Generally, canals are owned and operated by the Canals & Rivers Trust (CRT). Water levels are regulated between normal and statutory levels by means of weirs and sluice gates and whilst a breach or overtopping of the structure is unlikely, the possible flood risk needs to be assessed.

There are no canals in close proximity to the site.

There is not considered to be any risk of flooding to the site from canals.

6.6 Artificial Source – Sewer Flood Risk

Given the topography of the site and the surrounding area it is unlikely that flooding from existing surcharged public sewers would impact on the proposed development site as it would likely be limited to the surrounding highway network and directed away from the development.

A response was awaited with respect to DG5 sewer flooding in the area however, an internet-based search did reveal that a sewer in Moss Lane East did surcharge during a period of extended heavy rainfall in July 2019. This is understood not to have affected the proposed development site and all flooding was contained within the highway.

The new development proposed site surface water drainage system will be designed to maintain surface water flows below ground for up to and including the 1 in 100 year return period as a minimum. Flows above this and up to 100 year plus 40% allowance for climate change will be retained safely within the site.

It is considered that the risk of flooding to the site from surcharged sewers can be considered as **Low**.

6.7 Artificial Source – Reservoir Flood Risk

Review of the below Environment Agency reservoir flood map indicates that the site could be affected by reservoir flooding should this also occur at the same time as River Flooding.



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However, despite this the risk of reservoir flooding in the UK is very low as reservoirs are inspected regularly and any essential maintenance is carried out. Furthermore, the likelihood of this occurring at the same time as a fluvial flood event is experienced in the area are very remote. The risk of flooding from reservoirs is therefore considered **Low**.

6.8 Flood Risk Vulnerability Classification

The proposed development is primarily residential and can be considered as 'More Vulnerable' within Table 2: Flood Risk Vulnerability Classification in the NPPF.

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

Key: * Development is appropriate
* Development should not be permitted

Table 3: Flood risk Vulnerability and flood zone 'compatibility'

*'Technical Guidance to the National Planning Policy Framework (NPPF)**

This type of development would be wholly appropriate for Flood Zone 1.

7.0 Residual Risks and Impacts

7.1 Flood Risk Management Measures

The surface water drainage management measures outlined above would ensure that run-off from the proposed development would not exceed the existing scenario and a betterment would be provided for larger return periods.

As a result of the restricted flow rate and proposed impermeable area, attenuation is required in the form of site control measures. Any new private drainage system will be designed in accordance with current design guidance and standards and attenuation will be provided along with potential SuDS measures such as permeable pavements and filter strips.

The use of SuDS measures, with controlled release of surface water to the combined sewer network will help to mitigate any potential flood risk impact from the development on the public sewer system.

Finished site levels will be engineered to provide positive drainage where required and prevent ponding. The accumulation of standing water will therefore not occur and thus not pose a risk.

Gradients of the hardstanding areas, where possible, will be designed to fall away from buildings such that any overland flow resulting from extreme events would be channelled away from entrances.

7.2 Off Site Impacts

The existing site primarily comprises two existing buildings and associated areas of hardstanding with limited soft landscaping. However, there will be a slight increase in impermeable area when compared to existing.

A survey of the existing drainage network will be undertaken in due course however, it is considered likely that the existing site will discharge flows unrestricted to the public sewer network.

To ensure that the proposed development will not increase flood risk elsewhere, surface water drainage discharge will be restricted. This restricted discharge in conjunction with surface water attenuation on site will mitigate against flood risk to other land.

By reducing the post development peak run-off prior to its point of discharge from the site, this will reduce the potential for surface water flooding on the downstream network.

7.3 Residual Risks

The development and its drainage system will be designed to cope with the intense storm events up to and including the 100 year return period rainfall event with an allowance for climate change. If an extreme rainfall event exceeds the design criteria for the drainage network, it is likely that there will be some overland flows which are unable to enter the system.

Any overland flows generated by the proposed development will be directed away from any adjacent existing properties surrounding the site and towards the road network where it can follow natural flow paths.

As with any drainage system, blockages within the surface water system have potential to cause flooding or disruption. An appropriate maintenance regime is to be scheduled with a management company appointed to carry out the works.

7.4 Pollution Control

In accordance with CIRIA C753 publication 'The SuDS Manual' (2015), residential roofs and other roofs have a very low and low pollution hazard level respectively.

No parking is to be provided on the site and so this has not been considered.

The table below indicates the pollution hazard indices which is based on Table 26.2 from the SuDS Manual.

Pollution Hazard Indices				
Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Residential Roofs	Very Low	0.2	0.2	0.05

Surface water treatment (removal of oils / silts, metals etc) may be required prior to discharge to the combined sewer system; this will be discussed further with United Utilities at detailed design stage.

If required, where possible, SuDS components will be used to provide the necessary level of treatment. Where this is not achievable then proprietary treatment systems will be included such as Bypass, Full Retention of Hydrodynamic Separators.

8.0 Summary

The proposed development proposes the demolition of an existing former apartment building and construction of new student accommodation comprising 261 beds alongside resident facilities across a gross site area of approximately 0.187ha.

The site is in an area identified as having a low probability of flooding on the Environment Agency Flood Map and is located in Flood Zone 1.

The Flood Risk Assessment (FRA) has reviewed all sources of flood risk to both the proposed development and to existing adjacent properties as a result of the development proposals, including fluvial, tidal, pluvial, groundwater, sewers and flooding from artificial sources. This report demonstrates that the development site is not at significant flood risk, nor does it increase flood risk off-site.

A pre-development enquiry has been submitted to United Utilities. At the time of writing, a response was awaited and therefore details will be entered into a new revision of this report in the next design stage.

The primary option for surface water disposal would ordinarily be via infiltration. However, based on anticipated ground conditions and constraints of the site this is not considered to be feasible and therefore discharge will be to the public combined sewer network as per the existing site regime. This will be subject to agreement in principle with UU and the LLFA.

Discharge from the site would be restricted to 6.85 l/s which represents the existing calculated Q_1 brownfield runoff rate with a 50% betterment applied in accordance with local planning policy.

Further drainage survey work will be required to establish the precise alignment and level of the existing public sewer in Heald Place.

Foul water drainage is intended to combine with the surface water drainage system at the final outfall and will also discharge to the existing 375mm dia. sewer in Heald Place subject to UU approval.

This Flood Risk Assessment and Outline Drainage Strategy is considered to be commensurate with the development proposals and in summary, the development can be considered appropriate for Flood Zone 1 in accordance with the NPPF.



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APPENDIX A – LOCATION PLAN



Site Location Plan

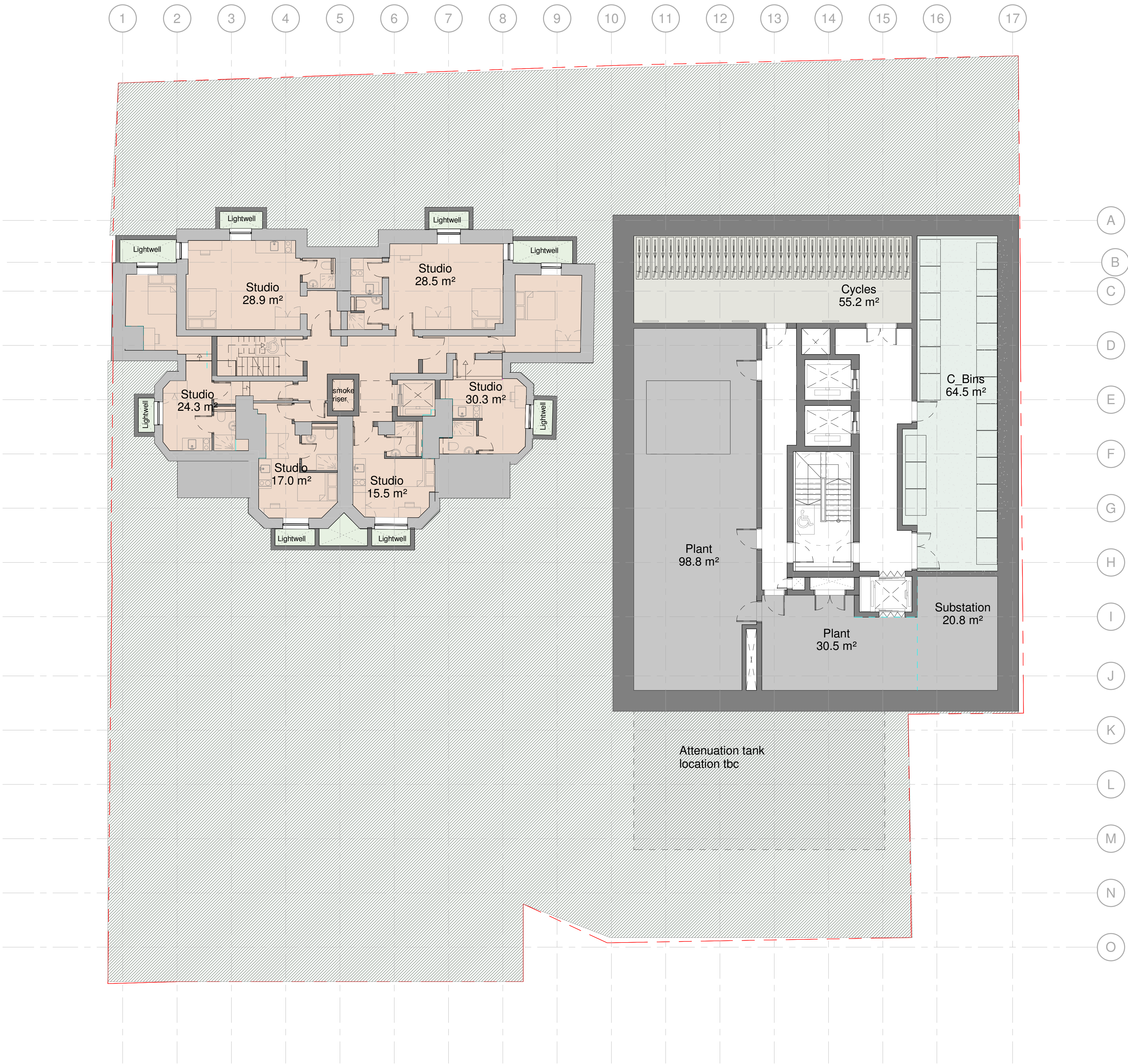
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APPENDIX B – DEVELOPMENT LAYOUT



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0 2 4

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A1

A3

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North

West

East

South

East-CY

South-CY

A

B

C

KEY

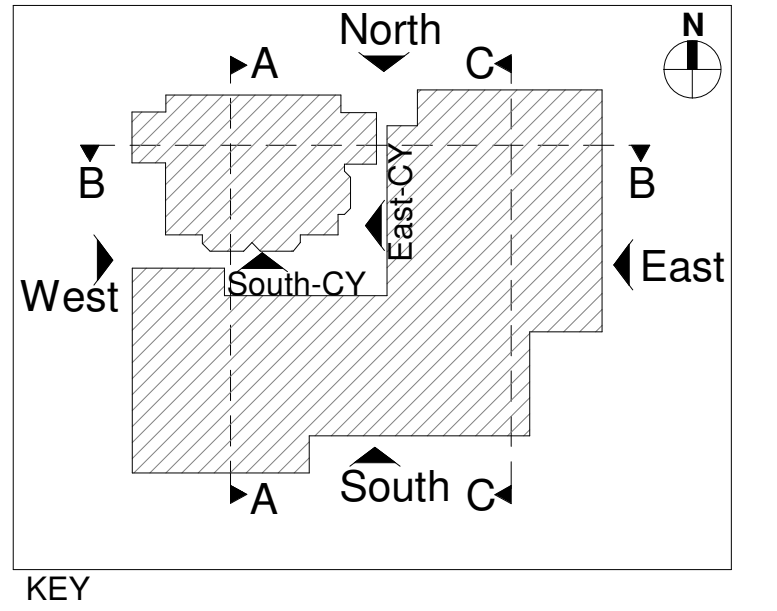
R2	08/08/22	General update	CB	CS
R1	08/07/22	Layout amendments	CB	CS
	25/05/22	General update	CB	
REV	DATE	NOTE	DWN CHCK	
Services:				
Futureserv				
Structures:				
ROC Consulting				
Client:				
CS Moss Lane East Ltd				
Project:				
Moss Lane East				
466-472 Moss Lane East, Manchester M14 4PJ				
Drawing Title:				
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Proposed GA plan				
Project No:	Sheet No:	Stage:		
1094	099	INFO		
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KEY

DRAFT

R2 08/08/22 General update CB CS
R1 08/07/22 Layout communal amended CB CS
10/06/22 DTM issue CB CS

REV DATE NOTE DWN CHCK

Services:
Futureserv

Structures:
ROC Consulting

Client:
CS Moss Lane East Ltd

Project:
Moss Lane East
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Drawing Title:
GA - Ground Floor
Proposed GA plan

Project No: 1094 Sheet No: 100 Stage: INFO

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APPENDIX C – LLFA SUDS GUIDANCE

Lead Local Flood Authority - Manchester City Council

SuDS Requirements for New Developments

The Government has strengthened planning policy on the provision of sustainable drainage systems (SuDS) for 'major' planning applications which is being introduced from 6 April 2015 (Paragraph 103 of National Planning Policy Framework and Ministerial Statement on SuDS).

Changes were made to the Town and Country Planning Policy and Guidance to give Local Authority Planning Departments the responsibility for ensuring that new developments are drained in a sustainable way, through the planning process, in consultation with the Lead Local Flood Authorities. As per the guidance issued by the Department of Communities and Local Government (DCLG), all 'major' planning applications being determined from 6 April 2015, must consider sustainable drainage systems.

Decisions about the suitability of sustainable drainage provision are made by the Local Planning Authority. However, under the new consultation arrangements Manchester City Council, in its role as Lead Local Flood Authority, is a statutory consultee for all major applications with regards to sustainable drainage. All 'major' planning applications submitted from 15 April 2015 are required to include a Surface Water Drainage Statement.

Developers submitting the planning application to Manchester City Council are advised to:

- Assess the suitability of sustainable drainage systems in accordance with: paragraphs 051, 079 and 080 of the revised NPPF Planning Practice Guidance (PPG) for Flood Risk and Coastal Change.

Design sustainable drainage systems in line with national Non-Statutory Technical Standards for SuDS: <https://www.gov.uk/government/publications/sustainable-drainage-systems-non-statutory-technical-standards>

and local policies DM1, EN08, EN14 and EN17 of the Core Strategy.

- Assess surface water attenuation requirements that offer a reduction in surface water runoff rate in line with the 'Manchester City, Salford City and Trafford Councils Level 2 Hybrid SFRA, User Guide, Final, dated May 2010'. (Section 3.4.1 Critical Drainage Areas, page 31). Please note that all new connections to the watercourses shall comply with reduction of flows to Greenfield runoff rates.

http://www.manchester.gov.uk/downloads/download/3871/strategic_flood_risk_assessment-manchester_salford_trafford

- Submit hydraulic calculations and drawings to support the design along with proposed standards of operation and maintenance in accordance with paragraph 081 of NPF (PPG).
- It will be essential that the type of sustainable drainage system for a site, along with details of its extent/position, is identified at the design stage of the whole scheme. This information will be required for both outline and full applications so it is clearly demonstrated that the SuDS can be accommodated within the development that is proposed. It will no longer be acceptable to leave the design of SuDS to a later stage to be dealt with by planning conditions.

- Surface water run-off should be controlled as near to its source as possible through a sustainable drainage approach to surface water management. SuDS seek to mimic natural drainage systems and retain water on or near to the site, when rain falls, in contrast to traditional drainage approaches, which tend to pipe water off-site as quickly as possible. SuDS therefore offer significant advantages over conventional piped drainage systems.

Applicants are strongly advised to discuss their proposals with relevant planning officers at the pre-application stage to ensure that an acceptable SuDS scheme is submitted.

Minimum requirements for approval

In order to avoid objection, the following three elements of evidence are required:

- Surface Water Management Statement for the site is submitted that is in line with requirement of NPPF PPG Paragraph 079:
 - “New development should only be considered appropriate in areas at risk of flooding if priority has been given to the use of sustainable drainage systems. Additionally, and more widely, when considering major development, as defined in the Town and Country Planning (Development Management Procedure) (England) Order 2015, sustainable drainage systems should be provided unless demonstrated to be inappropriate”.
 - The strategy should be accompanied by at least an outline layout of the proposed drainage systems with space allocation for the proposed attenuation in line with relevant flow reduction requirements.
- Evidence that drainage hierarchy has been applied in line with NPPF PPG Paragraph 080. The aim should be to discharge surface run off as high up the following hierarchy of drainage options as reasonably practicable:
 - into the ground (infiltration);
 - to a surface water body;
 - to a surface water sewer, highway drain, or another drainage system;
 - to a combined sewer.
- Evidence that one viable solution for draining the site is secured:
 - Results of ground investigation carried out under Building Research Establishment Digest 365. Site investigations should be undertaken in locations and at proposed depths of the proposed infiltration devices. Proposal of the attenuation that is achieving half emptying time within 24 hours. If no ground investigations are possible or infiltration is not feasible on site, evidence of alternative surface water disposal routes (as follows) is required.
 - Where surface water is connected to Main River, any works within or adjacent to the river that would affect it would require consent from Environment Agency. An email of acceptance of proposed flows and/or new connection will suffice.
 - Where surface water is connected to the public sewer, agreement in principle from United Utilities is required that there is adequate spare capacity in the existing system taking future development requirements into account. An email of acceptance of proposed flows and/or new connection will suffice.

Where surface water is connected to the ordinary watercourse, agreement in principle from Manchester City Council as Lead Local Flood Authority is required. Please note that all new connections to the watercourses shall comply with reduction of flows to Greenfield runoff rates. An email of acceptance of proposed flows and/or new connection will suffice.

- Where surface water is connected to ordinary watercourse, any works within or adjacent to the watercourse that would affect it would require consent from Manchester City Council as Lead Local Flood Authority. Consent forms can be obtained on the website at:

http://www.manchester.gov.uk/downloads/download/5567/land_drainage_consent_and_guidance.com

Avoiding or discharging drainage condition

- Evidence of consideration of green SuDS solution wherever practicable and viable in line with NPPF PPG Paragraph 051. SuDS should be designed to:
 - reduce the causes and impacts of flooding;
 - remove pollutants from urban run-off at source;
 - combine water management with green space with benefits for amenity, recreation and wildlife wherever practicable.
- For Greenfield site developments, details of surface water attenuation that offers a reduction in surface water runoff rate in line with the Manchester Trafford and Salford Strategic Flood Risk Assessment, i.e. to the Greenfield runoff rates;
- For Brownfield site developments, for all sites located within Conurbation Core Critical Drainage Areas, details of surface water attenuation that offers a reduction in surface water runoff rate in line with the Manchester Trafford and Salford Strategic Flood Risk Assessment, i.e. at least a 50% reduction in runoff rate compared to the existing rates with an aim to reduce to Greenfield runoff rates wherever practicable;
- Where surface water runoff is to be disposed through infiltration, details of surface water attenuation that is adequate for infiltration capacity of the underlying soil is required. This capacity has to be assessed through site investigation carried out in line with Building Research Establishment Digest 365. Site investigations should be undertaken in locations and at proposed depths of the proposed infiltration devices. Half emptying time of proposed attenuation within 24 hours should be achieved.
- Evidence that the drainage system has been designed (unless an area is designated to hold and/or convey water as part of the design) so that flooding does not occur during a 1 in 100 year rainfall event in any part of a building; The NPPF suggests that ‘for events with a return-period in excess of 30 years, surface flooding of open spaces such as landscaped areas or car parks is acceptable for short periods, but the layout and landscaping of the site should aim to route water away from any vulnerable property, and avoid creating hazards to access and egress routes. No flooding of property should occur as a result of a one in 100 year storm event (including an appropriate allowance for climate change)’.
- Assessment of overland flow routes for extreme events that is diverted away from buildings providing long and cross sections for the proposed drainage system and

finished floor levels;

- Evidence that runoff volume in the 1 in 100 year, 6 hours rainfall shall be constrained to a value as close as is reasonably practical to the Greenfield runoff volume for the same event, but never to exceed the runoff volume from the development site prior to redevelopment;
- Hydraulic calculation of the proposed drainage system;
- Design construction drawings of proposed SuDS elements and flow controls;
- For sites where proposed development would cause unusual pollution risk to surface water (large car park areas (>50 parking spaces) or industrial estates), evidence of pollution control measures (preferably through SuDS) is required.
- Where an application is part of a larger site which already has planning permission it is essential that the new proposal does not compromise the drainage scheme already approved.

SuDS Maintenance

Maintenance of SuDS is essential for its proper operation and a clear management and maintenance plan for the lifetime of the development is required as part of the planning application.

In considering a development that includes a sustainable drainage system, Manchester City Council as local planning authority will want to be satisfied that the proposed minimum standards of operation are appropriate and that there are clear arrangements in place for ongoing maintenance. Information sought by Manchester City Council would be no more than necessary, having regard to the nature and scale of the development concerned in line with NPPF Paragraph 081.

In some instances where no clear adoption of the drainage system is proposed, a drainage maintenance condition could be attached to the planning applications. In order to discharge this condition, the following evidence should be provided following *construction*:

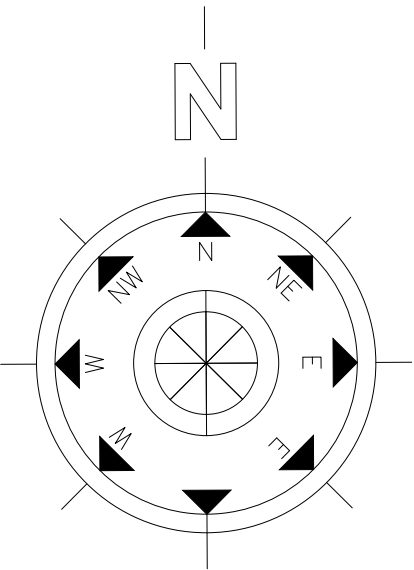
- Verification report providing photographic evidence of construction as per design drawings;
- As built construction drawings if different from design construction drawings;
- Management and maintenance plan for the lifetime of the development which shall include the arrangements for adoption by any public body or statutory undertaker, or any other arrangements to secure the operation of the sustainable drainage scheme throughout its lifetime.

Applicants are strongly advised to discuss their proposals with relevant planning officers at the pre-application stage to ensure that an acceptable SuDS scheme is submitted.



COMPLEX CHALLENGES ...
MADE SIMPLE

APPENDIX D – TOPOGRAPHIC SURVEY



ABBREVIATIONS

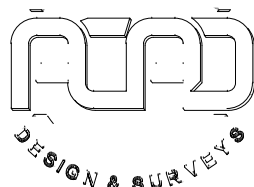
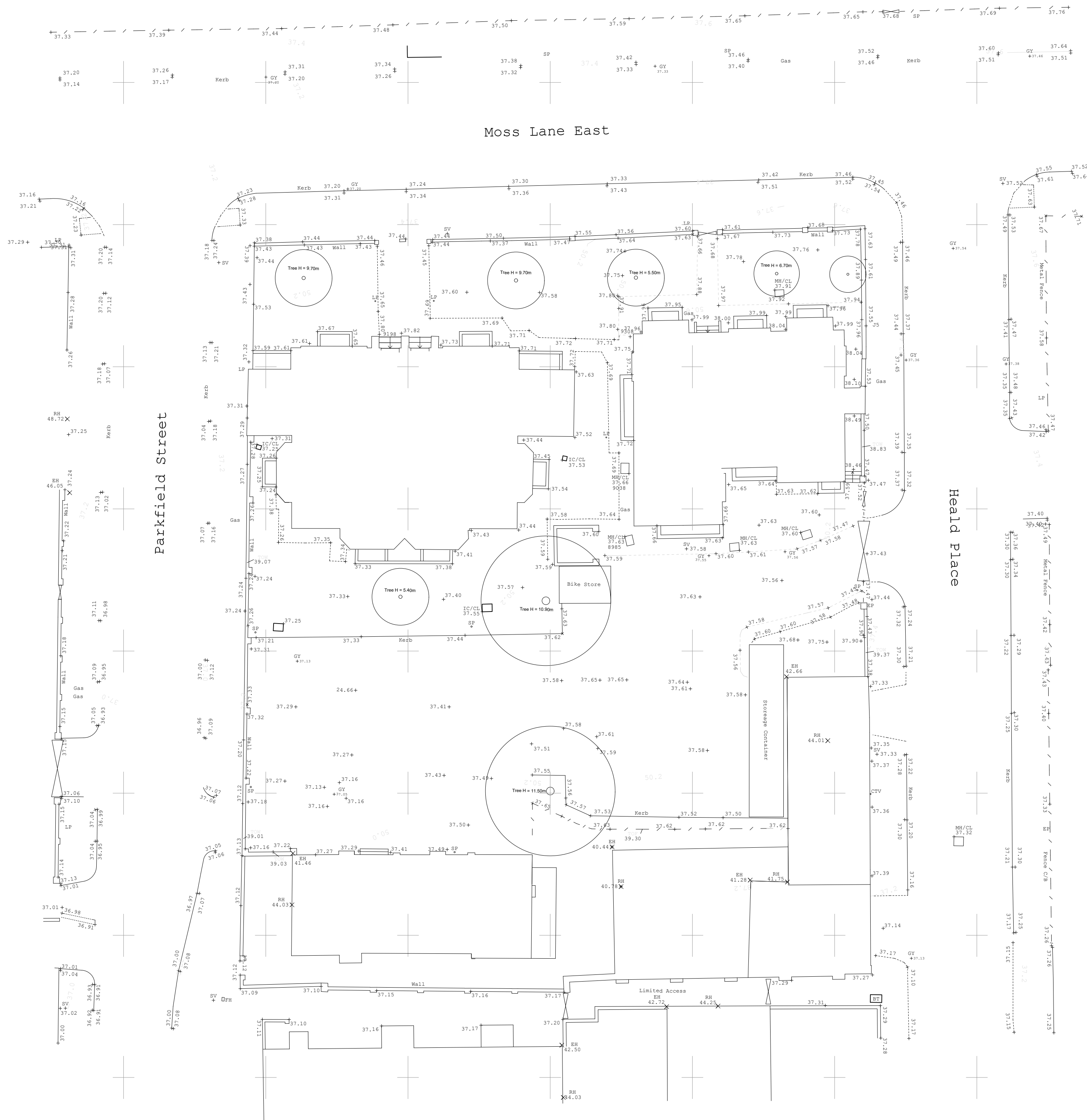
BOL	Bollard
BT	BT Cover
CB	Control Box
CH	Ceiling Height
CL	Cover Level
DK	Drop Kerb
EH	Eaves Height
FH	Fire Hydrant
FFL	Finished Floor Level
FP	Flag Pole
GAS	Gas Valve
GY	Gully
IC	Inspection Cover
LC	Lighting Cover
LP	Lamp Post
MH	Man Hole
PH	Parapet Height
RH	Ridge/Roof Height
RWP	Rain Water Pipe
SP	Sign Post
SV	Stop Valve
TF	Top of Fence
TL	Threshold Level
TP	Telegraph Pole
TS	Traffic Signal
TH	Top of Hedge
TW	Top of Wall
U/S	Under Side
WP	Water Pipe
WV	Water Valve

NOTE

The survey grid shown on this drawing is positioned on Ordnance Survey (OS) National Grid, obtained by multiple network RTK GPS observations

All levels are in metres and are above Ordnance Survey Newlyn Datum derived by multiple network RTK GPS observations

Levels defining edge of carriageway are observed at channel (bottom of kerb)



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DRAWING TITLE

TOPOGRAPHICAL SURVEY

ADDRESS

466-470 MOSS LANE EAST, MANCHESTER, M14 4PJ.

CLIENT

RUSSELL BOLTON CONSULTING

PROJECT

466-470 MOSS LANE EAST

DRAWN BY

JW

CHECKED BY

PST

SCALE

1/200@A1

REV.

DATE

21/06/2022

DRAWING FILE

AC202380

DRAWING NUMBER

AC202380/01

REV. NO.

DESCRIPTION TO REVISION

REV. BY

DATE



COMPLEX CHALLENGES ...
MADE SIMPLE

APPENDIX E – SEWER RECORDS



Scale: 1:1250
Date: 10/01/2022

SEWER RECORDS

Address or Site Reference: 466-468 MOSS LANE EAST, MANCHESTER, M14 4PJ

Printed by: Property Searches



The position of the underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. United Utilities Water will not accept liability for any loss or damage caused by the actual position being different from those shown.

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Manhole Record Card

Number	MH1	Date Of Survey	18/07/2022
Status	PR	Function	C
		Type	

Cover Details:

Square Recta ☐ Double Triang ☐ Single Triangl ☐ Circular ☐ Multiple ☐ Hinged ☐ Lockable ☐

CoverLevel Cover Load Class

Cover	530 X 680	Chamber	1003 X 700	EvidenceOfSurcharge	☐
Shaft	0 X 0	ShaftDepth	0	ToxicAtmosphere	☐
Brick	☒	Precast Concrete	☐	PVC	☐
Reducing Slab	☐	Taper	☐	Side Entry	☐
		No.Land	0	Step Irons	☒
				Ladder	☐

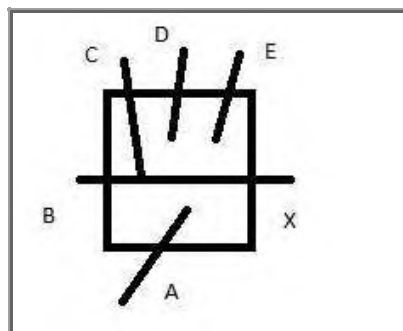
PlanPhoto



LocationPhoto



PlanofManhol



Chamber Conditions:

Cover	OK	Shaft	OK
Irons/Ladder	OK	Chamber	OK
Benching/Channel	OK		

Pipe	Invert L	DepthFr	UpstreamRe	Downstream	Pipe Sh	SizeHeight	SizeWidth	Pipe Material	Lining Material
A	36.470	1.13	Gully		C		100	VC	
B	35.190	2.41	MH2		C		225	VC	
C	35.300	2.30	int sp		C		100	VC	
D	35.300	2.30	int sp		C		100	VC	
E	35.300	2.30	int sp		C		100	VC	
X	35.170	2.43		sewer	C		225	VC	

Disclaimer - Any dimensions and levels provided on this form should be checked before being relied upon. It is the responsibility of the customer to verify all information given with regards to the drainage prior to designing or commencing any work on site.



Manhole Record Card

Number	MH2	Date Of Survey	01/08/2022
Status	PR	Function	F
		Type	M

Cover Details:

Square Recta ☒ Double Triang ☐ Single Triangl ☐ Circular ☐ Multiple ☐ Hinged ☐ Lockable ☐

CoverLevel Cover Load Class

Cover	530 X 680	Chamber	1003 X 700	EvidenceOfSurcharge	☐
Shaft	0 X 0	ShaftDepth	0	ToxicAtmosphere	☐
Brick	☐	Precast Concrete	☒	PVC	☐
Reducing Slab	☐	Taper	☐	Side Entry	☐
		No.Land	0	Step Irons	☒
				Ladder	☐

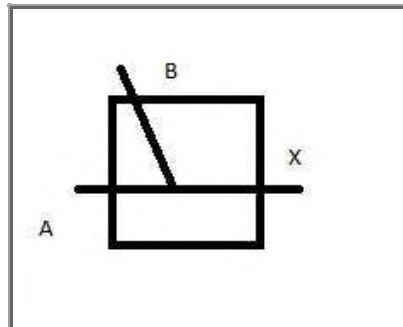
PlanPhoto



LocationPhoto



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Chamber Conditions:

Cover	OK	Shaft	OK
Irons/Ladder	OK	Chamber	OK
Benching/Channel	OK		

Pipe	Invert L	DepthFr	UpstreamRe	Downstream	Pipe Sh	SizeHeight	SizeWidth	Pipe Material	Lining Material
A	35.300	2.30	MH		C		225	VC	
B	35.450	2.15	RWP		C		100	VC	
X	35.270	2.33		MH1	C		225	VC	

Disclaimer - Any dimensions and levels provided on this form should be checked before being relied upon. It is the responsibility of the customer to verify all information given with regards to the drainage prior to designing or commencing any work on site.



Manhole Record Card

Number	MH3	Date Of Survey	18/07/2022
Status	PR	Function	C
		Type	M

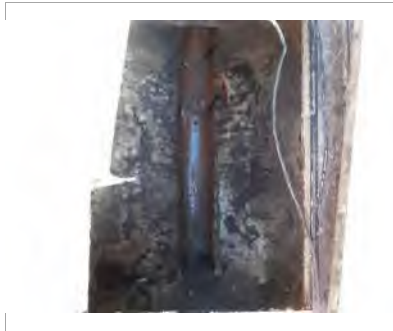
Cover Details:

Square Recta ☒ Double Triang ☐ Single Triangl ☐ Circular ☐ Multiple ☐ Hinged ☐ Lockable ☐

CoverLevel Cover Load Class

Cover	530 X 680	Chamber	1003 X 700	EvidenceOfSurcharge	☐
Shaft	0 X 0	ShaftDepth	0	ToxicAtmosphere	☐
Brick	☐	Precast Concrete	☒	PVC	☐
Reducing Slab	☐	Taper	☐	Side Entry	☐
		No.Land	0	Step Irons	☒
				Ladder	☐

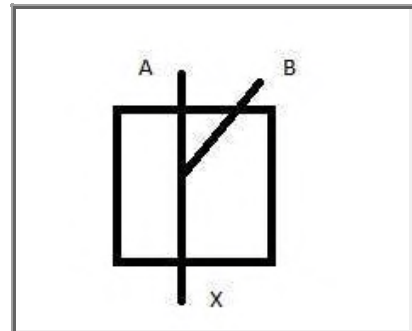
PlanPhoto



LocationPhoto



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Chamber Conditions:

Cover	OK	Shaft	OK
Irons/Ladder	OK	Chamber	OK
Benching/Channel	OK		

Pipe	Invert L	DepthFr	UpstreamRe	Downstream	Pipe Sh	SizeHeight	SizeWidth	Pipe Material	Lining Material
A	36.990	0.64	INT SP		C		150	VC	
B	37.030	0.60	RWP		C		100	VC	
X	36.960	0.67		MH2	C		150	VC	

Disclaimer - Any dimensions and levels provided on this form should be checked before being relied upon. It is the responsibility of the customer to verify all information given with regards to the drainage prior to designing or commencing any work on site.



Manhole Record Card

Number	MH4	Date Of Survey	18/07/2022
Status	PR	Function	C
		Type	M

Cover Details:

Square Recta	☒	Double Triang	☐	Single Triangl	☐	Circular	☐	Multiple	☐	Hinged	☐	Lockable	☐
CoverLevel	37.66	Cover Load Class	H										

Cover	600	X	450	Chamber	1003	X	700	EvidenceOfSurcharge	☐
Shaft	0	X	0	ShaftDepth	0	ToxicAtmosphere	☐		
Brick	☐	Precast Concrete	☒	PVC	☐	Segments	☐	No.RegCourses	
Reducing Slab	☐	Taper	☐	Side Entry	☐	No.Land	0	Step Irons	☐
								Ladder	☐

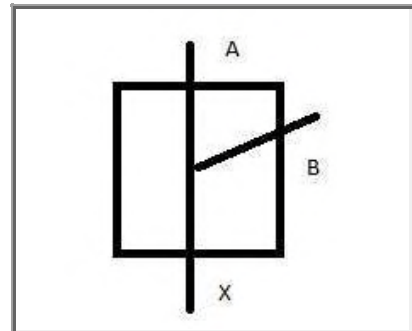
PlanPhoto



LocationPhoto



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Chamber Conditions:

Cover	OK	Shaft	OK
Irons/Ladder	OK	Chamber	OK
Benching/Channel	OK		

Pipe	Invert L	DepthFr	UpstreamRe	Downstream	Pipe Sh	SizeHeight	SizeWidth	Pipe Material	Lining Material
A	37.090	0.57	SP		C		100	VC	
B	37.110	0.55	SP		C		100	VC	
X	37.060	0.60		MH3	C		100	VC	

Disclaimer - Any dimensions and levels provided on this form should be checked before being relied upon. It is the responsibility of the customer to verify all information given with regards to the drainage prior to designing or commencing any work on site.



Manhole Record Card

Number	MH5	Date Of Survey	18/07/2022
Status	PR	Function	C
		Type	M

Cover Details:

Square Recta ☒ Double Triang ☐ Single Triangl ☐ Circular ☐ Multiple ☐ Hinged ☐ Lockable ☐

CoverLevel Cover Load Class

Cover	300 X 300	Chamber	225 X 0	EvidenceOfSurcharge	☐
Shaft	0 X 0	ShaftDepth	0	ToxicAtmosphere	☐
Brick	☐	Precast Concrete	☐	PVC	☒
Reducing Slab	☐	Taper	☐	Side Entry	☐
		No.Land	0	Step Irons	☐
		Segments	☐	No.RegCourses	☐
				Ladder	☐

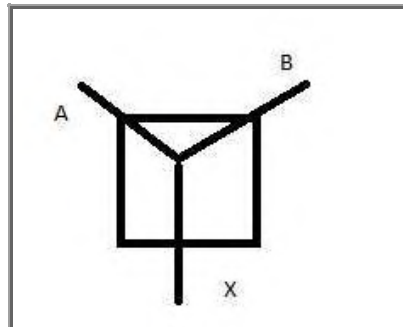
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LocationPhoto



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Chamber Conditions:

Cover	OK	Shaft	OK
Irons/Ladder	OK	Chamber	OK
Benching/Channel	OK		

Pipe	Invert L	DepthFr	UpstreamRe	Downstream	Pipe Sh	SizeHeight	SizeWidth	Pipe Material	Lining Material
A	36.960	0.57	RWP		C		100	PVC	
B	36.960	0.57	SVP		C		100	PVC	
X	36.940	0.59		MH5A	C		100	PVC	

Disclaimer - Any dimensions and levels provided on this form should be checked before being relied upon. It is the responsibility of the customer to verify all information given with regards to the drainage prior to designing or commencing any work on site.



Manhole Record Card

Number	MH6	Date Of Survey	18/07/2022
Status	PR	Function	C
		Type	M

Cover Details:

Square Recta ☒ Double Triang ☐ Single Triangl ☐ Circular ☐ Multiple ☐ Hinged ☐ Lockable ☐

CoverLevel Cover Load Class

Cover	530 X 680	Chamber	1003 X 700	EvidenceOfSurcharge	☐
Shaft	0 X 0	ShaftDepth	0	ToxicAtmosphere	☐
Brick	☐	Precast Concrete	☒	PVC	☐
Reducing Slab	☐	Taper	☐	Side Entry	☐
		No.Land	0	Step Irons	☐
		Segments	☐	No.RegCourses	☐
		Ladder	☐		

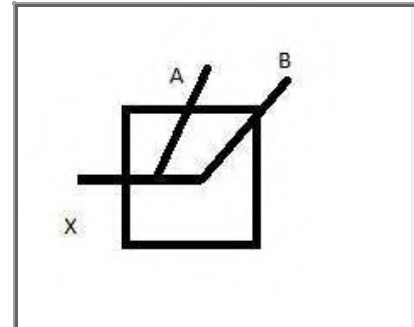
PlanPhoto



LocationPhoto



PlanofManhol



Chamber Conditions:

Cover	OK	Shaft	OK
Irons/Ladder	OK	Chamber	OK
Benching/Channel	OK		

Pipe	Invert L	DepthFr	UpstreamRe	Downstream	Pipe Sh	SizeHeight	SizeWidth	Pipe Material	Lining Material
A	35.950	1.60	RWP		C		100	VC	
B	35.970	1.58	MH5A		C		100	VC	
X	35.900	1.65		MH7	C		150	VC	

Disclaimer - Any dimensions and levels provided on this form should be checked before being relied upon. It is the responsibility of the customer to verify all information given with regards to the drainage prior to designing or commencing any work on site.



Manhole Record Card

Number	MH7	Date Of Survey	18/07/2022
Status	PR	Function	F
		Type	M

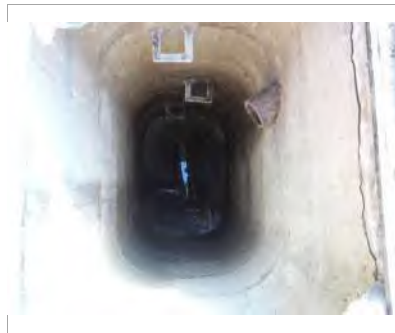
Cover Details:

Square Recta ☒ Double Triang ☐ Single Triangl ☐ Circular ☐ Multiple ☐ Hinged ☐ Lockable ☐

CoverLevel Cover Load Class

Cover	530 X 680	Chamber	1003 X 700	EvidenceOfSurcharge	☐
Shaft	0 X 0	ShaftDepth	0	ToxicAtmosphere	☐
Brick	☐	Precast Concrete	☒	PVC	☐
Reducing Slab	☐	Taper	☐	Side Entry	☐
		No.Land	0	Step Irons	☒
				Ladder	☐

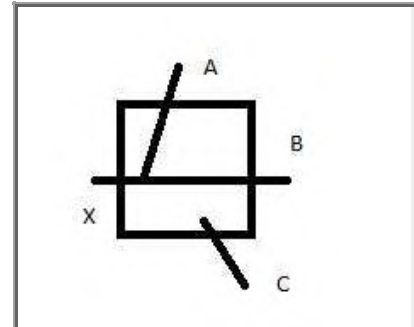
PlanPhoto



LocationPhoto



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Chamber Conditions:

Cover	OK	Shaft	OK
Irons/Ladder	OK	Chamber	OK
Benching/Channel	OK		

Pipe	Invert L	DepthFr	UpstreamRe	Downstream	Pipe Sh	SizeHeight	SizeWidth	Pipe Material	Lining Material
A	34.970	2.28	MH8		C		100	VC	
B	34.950	2.30	MH6		C		150	VC	
C	36.450	0.80	GULLY		C		100	VC	
X	34.910	2.34		SEWER	C		150	VC	

Disclaimer - Any dimensions and levels provided on this form should be checked before being relied upon. It is the responsibility of the customer to verify all information given with regards to the drainage prior to designing or commencing any work on site.



Manhole Record Card

Number	MH8	Date Of Survey	18/07/2022
Status	PR	Function	C
		Type	M

Cover Details:

Square Recta ☒ Double Triang ☐ Single Triangl ☐ Circular ☐ Multiple ☐ Hinged ☐ Lockable ☐

CoverLevel Cover Load Class

Cover	300 X 300	Chamber	225 X 0	EvidenceOfSurcharge	☐
Shaft	0 X 0	ShaftDepth	0	ToxicAtmosphere	☐
Brick	☐	Precast Concrete	☐	PVC	☒
Reducing Slab	☐	Taper	☐	Side Entry	☐
		No.Land	0	Step Irons	☐
		Segments	☐	No.RegCourses	
				Ladder	☐

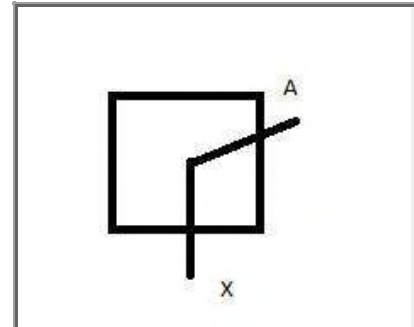
PlanPhoto



LocationPhoto



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Chamber Conditions:

Cover	OK	Shaft	OK
Irons/Ladder	OK	Chamber	OK
Benching/Channel	OK		

Pipe	Invert L	DepthFr	UpstreamRe	Downstream	Pipe Sh	SizeHeight	SizeWidth	Pipe Material	Lining Material
A	36.970	0.28	RWP		C		100	PVC	
X	36.950	0.30		MH7	C		100	PVC	

Disclaimer - Any dimensions and levels provided on this form should be checked before being relied upon. It is the responsibility of the customer to verify all information given with regards to the drainage prior to designing or commencing any work on site.



Manhole Record Card

Number	MH12	Date Of Survey	18/07/2022
Status	PR	Function	C
		Type	M

Cover Details:

Square Recta ☒ Double Triang ☐ Single Triangl ☐ Circular ☐ Multiple ☐ Hinged ☐ Lockable ☐

CoverLevel Cover Load Class

Cover	300 X 300	Chamber	225 X 0	EvidenceOfSurcharge	☐
Shaft	0 X 0	ShaftDepth	0	ToxicAtmosphere	☐
Brick	☐	Precast Concrete	☐	PVC	☒
Reducing Slab	☐	Taper	☐	Side Entry	☐
		No.Land	0	Step Irons	☐
		Segments	☐	No.RegCourses	
		Ladder	☐		

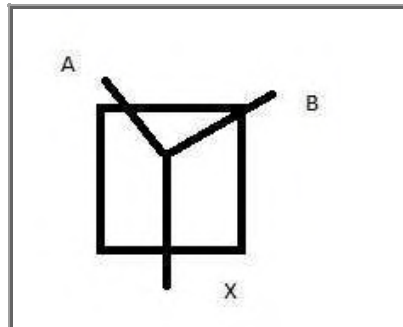
PlanPhoto



LocationPhoto



PlanofManhol



Chamber Conditions:

Cover	OK	Shaft	OK
Irons/Ladder	OK	Chamber	OK
Benching/Channel	OK		

Pipe	Invert L	DepthFr	UpstreamRe	Downstream	Pipe Sh	SizeHeight	SizeWidth	Pipe Material	Lining Material
A	36.710	0.62	SP		C		100	PVC	
B	36.710	0.62	RWP		C		100	PVC	
X	36.690	0.64		main line	C		100	PVC	

Disclaimer - Any dimensions and levels provided on this form should be checked before being relied upon. It is the responsibility of the customer to verify all information given with regards to the drainage prior to designing or commencing any work on site.



Manhole Record Card

Number	MH10	Date Of Survey	18/07/2022
Status	PR	Function	C
		Type	M

Cover Details:

Square Recta	☒	Double Triang	☐	Single Triangl	☐	Circular	☐	Multiple	☐	Hinged	☐	Lockable	☐
CoverLevel	0.00	Cover Load Class	H										

Cover	530	X	680	Chamber	1003	X	700	EvidenceOfSurcharge	☐
Shaft	0	X	0	ShaftDepth	0	ToxicAtmosphere	☐		
Brick	☐	Precast Concrete	☐	PVC	☐	Segments	☐	No.RegCourses	
Reducing Slab	☐	Taper	☐	Side Entry	☐	No.Land	0	Step Irons	☐
								Ladder	☐

PlanPhoto



LocationPhoto



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Chamber Conditions:

Cover	OK	Shaft	OK
Irons/Ladder	OK	Chamber	OK
Benching/Channel	OK		

filled with debris, water main stop valve

Disclaimer - Any dimensions and levels provided on this form should be checked before being relied upon. It is the responsibility of the customer to verify all information given with regards to the drainage prior to designing or commencing any work on site.



Manhole Record Card

Number	MH9	Date Of Survey	18/07/2022
Status	PR	Function	C
		Type	M

Cover Details:

Square Recta	☒	Double Triang	☐	Single Triangl	☐	Circular	☐	Multiple	☐	Hinged	☐	Lockable	☐
CoverLevel	0.00	Cover Load Class	H										

Cover	530	X	680	Chamber	600	X	800	EvidenceOfSurcharge	☐
Shaft	0	X	0	ShaftDepth	0	ToxicAtmosphere	☐		
Brick	☒	Precast Concrete	☐	PVC	☐	Segments	☐	No.RegCourses	
Reducing Slab	☐	Taper	☐	Side Entry	☐	No.Land	0	Step Irons	☐
								Ladder	☐

PlanPhoto



LocationPhoto



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Chamber Conditions:

Cover	OK	Shaft	OK
Irons/Ladder	OK	Chamber	OK
Benching/Channel	OK		

blocked chamber (surcharged) water main stop valve

Disclaimer - Any dimensions and levels provided on this form should be checked before being relied upon. It is the responsibility of the customer to verify all information given with regards to the drainage prior to designing or commencing any work on site.



Manhole Record Card

Number	MH13	Date Of Survey	18/07/2022
Status	PU	Function	C
		Type	M

Cover Details:

Square Recta	☒	Double Triang	☐	Single Triangl	☐	Circular	☐	Multiple	☐	Hinged	☐	Lockable	☐
CoverLevel	36.96	Cover Load Class	H										

Cover	520	X	0	Chamber	600	X	950	EvidenceOfSurcharge	☐
Shaft	0	X	0	ShaftDepth	0	ToxicAtmosphere	☐		
Brick	☐	Precast Concrete	☐	PVC	☐	Segments	☐	No.RegCourses	
Reducing Slab	☐	Taper	☐	Side Entry	☐	No.Land	0	Step Irons	☒
								Ladder	☐

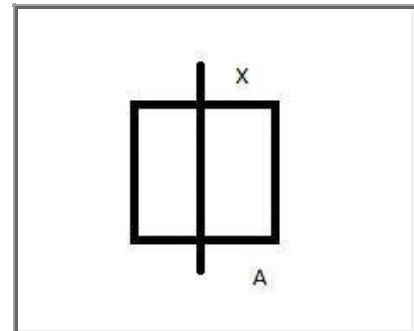
PlanPhoto



LocationPhoto



PlanofManhol



Chamber Conditions:

Cover	OK	Shaft	OK
Irons/Ladder	OK	Chamber	OK
Benching/Channel	OK		

Pipe	Invert L	Depth	Fr	UpstreamRe	Downstream	Pipe Sh	Size	Height	Size	Width	Pipe Material	Lining Material
A	32.370	4.59	8602			C			450		VC	
X	32.340	4.62		8609		C			450		VC	

Disclaimer - Any dimensions and levels provided on this form should be checked before being relied upon. It is the responsibility of the customer to verify all information given with regards to the drainage prior to designing or commencing any work on site.



Manhole Record Card

Number	MH5A	Date Of Survey	22/07/2020
Status	PR	Function	C
		Type	M

Cover Details:

Square Recta	☒	Double Triang	☐	Single Triangl	☐	Circular	☐	Multiple	☐	Hinged	☐	Lockable	☐
CoverLevel	37.60	Cover Load Class	H										

Cover	600	X	450	Chamber	1200	X	0	EvidenceOfSurcharge	☐
Shaft	0	X	0	ShaftDepth	0	ToxicAtmosphere	☐		
Brick	☐	Precast Concrete	☒	PVC	☐	Segments	☐	No.RegCourses	
Reducing Slab	☐	Taper	☐	Side Entry	☐	No.Land	0	Step Irons	☐
								Ladder	☐

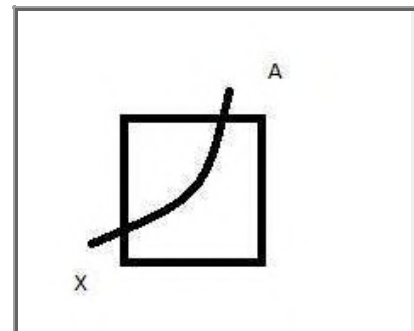
PlanPhoto



LocationPhoto



PlanofManhol



Chamber Conditions:

Cover	OK	Shaft	OK
Irons/Ladder	OK	Chamber	OK
Benching/Channel	OK		

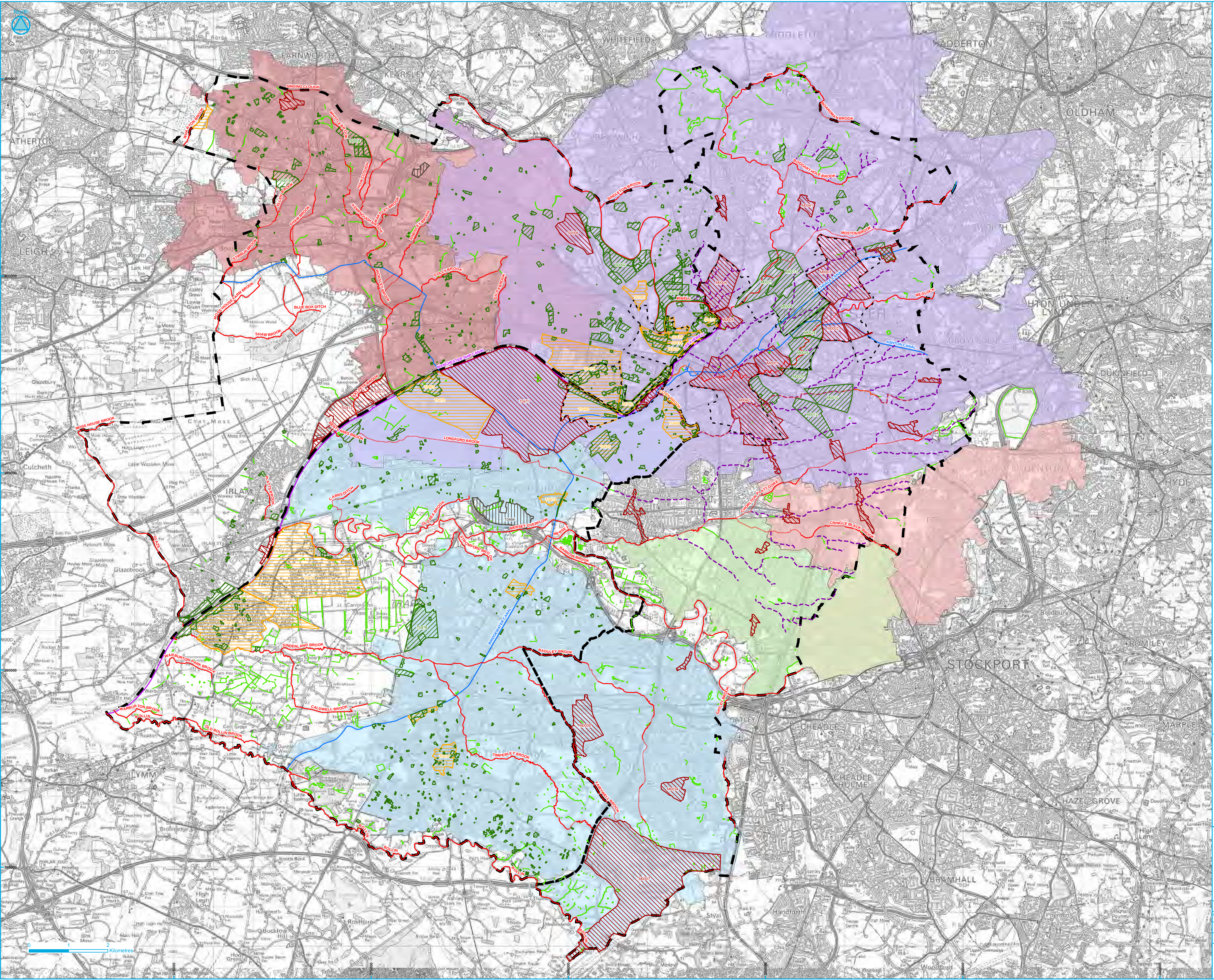
Pipe	Invert L	DepthFr	UpstreamRe	Downstream	Pipe Sh	SizeHeight	SizeWidth	Pipe Material	Lining Material
A	36.180	1.42	MH5		C		100	VC	
X	36.140	1.46		MH6	C		100	VC	

Disclaimer - Any dimensions and levels provided on this form should be checked before being relied upon. It is the responsibility of the customer to verify all information given with regards to the drainage prior to designing or commencing any work on site.



COMPLEX CHALLENGES ...
MADE SIMPLE

APPENDIX F – SFRA MAPS



- 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 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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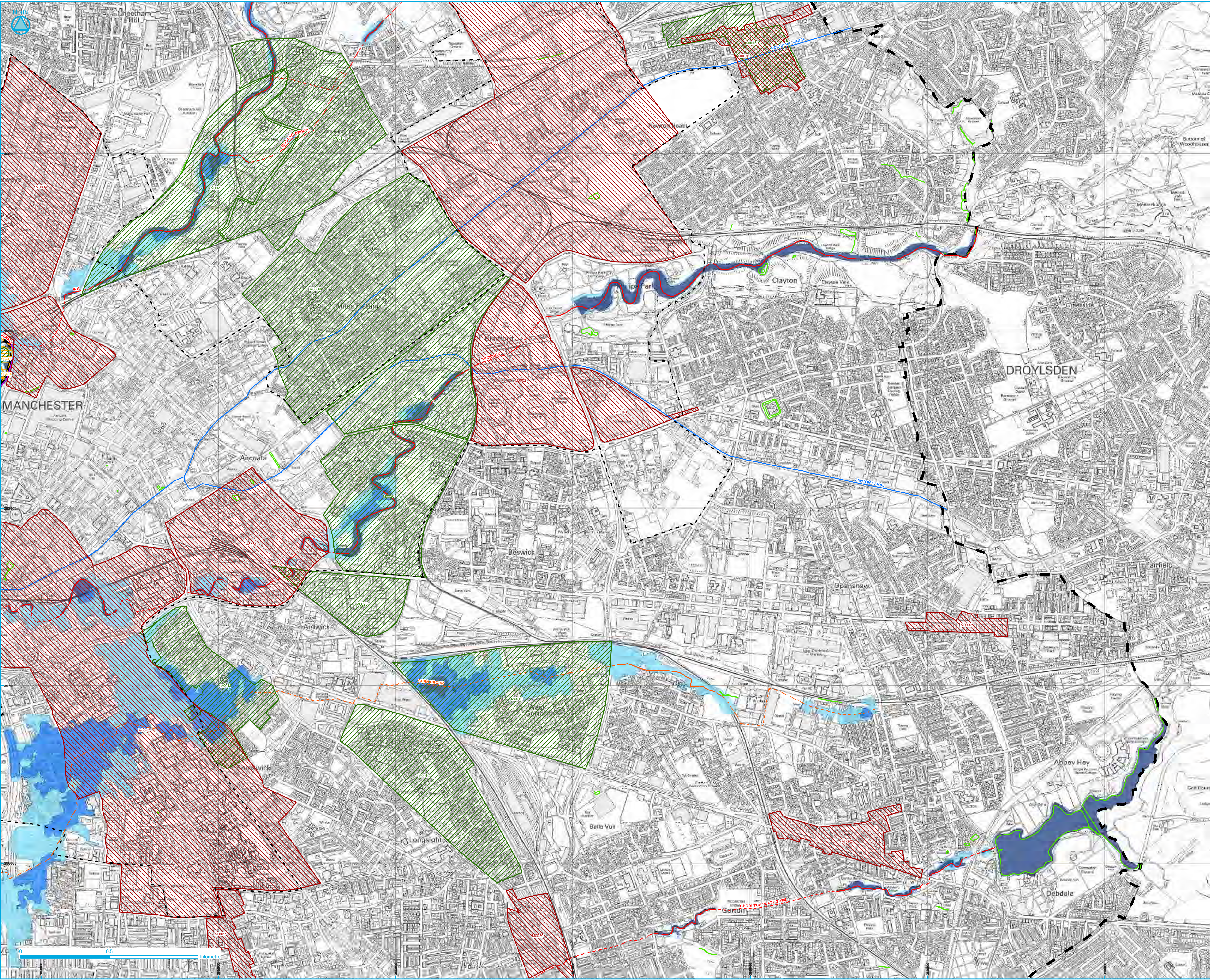
— for —

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

Critical Drainage Areas

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Checked by: J Dimelow	Date: 01/02/2011	
Approved by: J Cooper	Date: 01/02/2011	
File Name: ...ArcViewMapping\Level2MST_CDA_Current_V1.2.mxd		
Drawing Number: SS_4.5	Status: FINAL	Scale: 1:45,000

Original @ A



Council Boundary

Flood Zones

- Flood Zone 3b (Functional Floodplain)
- Flood Zone 3a (V3.15)
- Flood Zone 2 (V3.15)

Potential Development Sites / Locations

- Employment
- Housing
- Mixed Use
- Other

Regional Centre Boundary

Ashton, Bridgewater and Rochdale Canals

Manchester Ship Canal / Grey Inwell

Other Waterbodies

Main Rivers (V8.0)

- Culverted
- Open

Digitised River Lines

- Culverted
- Open

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

It is a Level 1 SFRA key output which shows Main Rivers, other watercourses and Flood Zones, including the Functional Floodplain (as defined in annex D table D.1 of PPS25), overlaid by previously allocated development sites or sites to be considered in the future.

PPS25 divides the country into three basic Flood Zones; Flood Zones 1, 2 and 3, corresponding to areas of low, medium and high flood risk, respectively. The Flood Zones provided are based upon the Environment Agency's Flood Map (version 3.15 issued in September 2009). They refer to the probability of flooding from rivers and ignore the presence of defences because these can be breached, overtopped or fail to operate during the lifetime of the development. They do not consider other forms of flooding and do not take account of climate change.

The Flood Zone maps also contain the undefended modelled outlines for the Manchester Ship Canal and outlines for the Grey Inwell. It is understood that the Grey Inwell outlines were integrated into the national Flood Map in March 2010 and the undefended model outlines for parts of the Sinderland and Timperley Brooks will become integrated into the national Flood Map in June 2010.

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 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.

This map should be used to facilitate the undertaking of the Sequential Test by planners and developers. The SFRA has produced a further suite of flood maps following its assessment of other sources of flooding and the implications of climate change and these should be used in conjunction with this map.

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for

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

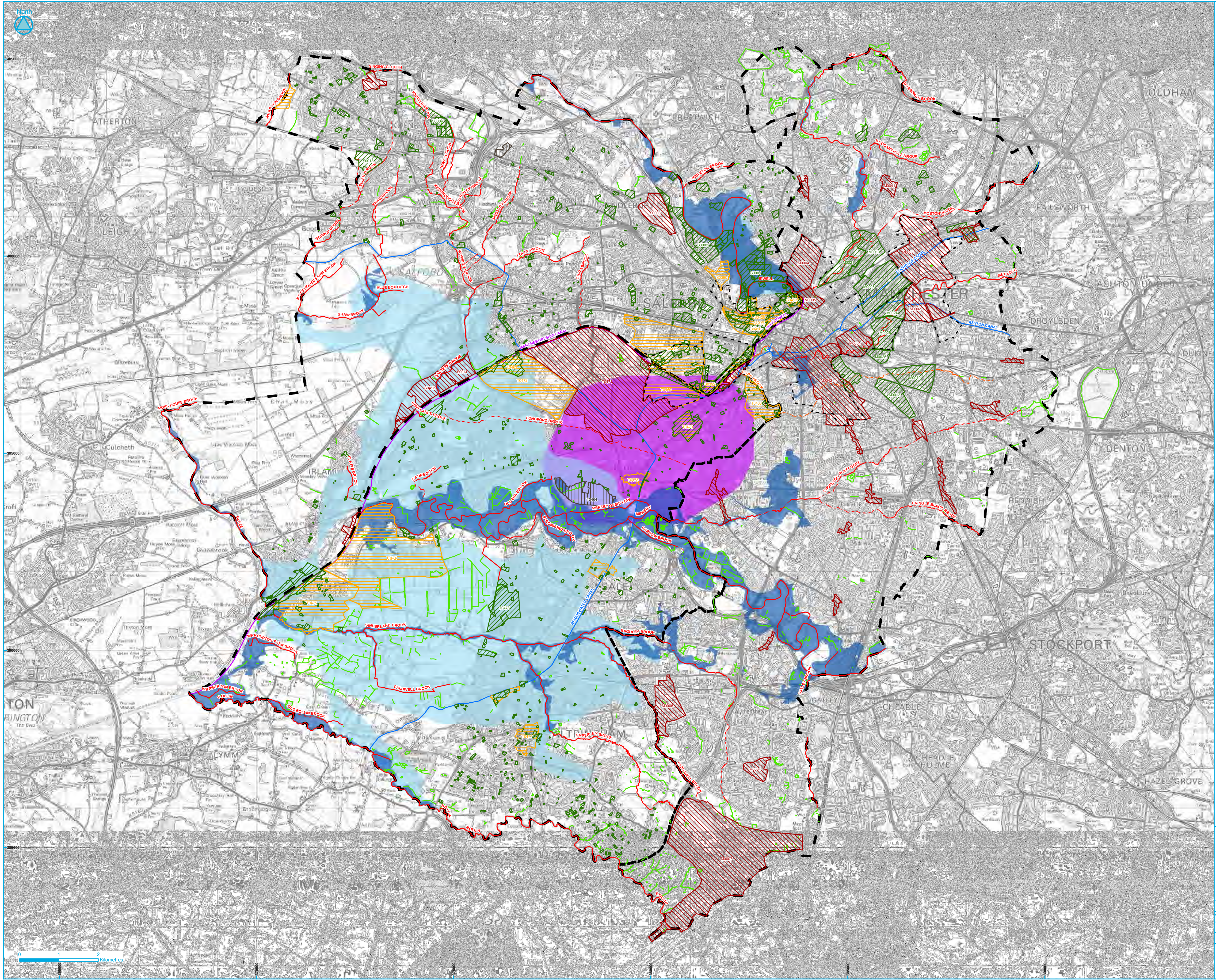
PPS25 Flood Zones

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Checked by: J Dimelow	Date: 22/11/2010	
Approved by: H O'Callaghan	Date: 22/11/2010	

File Name: ..ArcView\Mapping\Level1\MST_FloodZones_V1.3.mxd

Drawing Number:	Status:	Scale:
FL_1.2 F	FINAL	1:10,000

Original @ A1



- 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
- Regional Centre Boundary**
- Ashton, Bridgewater and Rochdale Canals**
- Manchester Ship Canal / Grey Irwell**
- 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 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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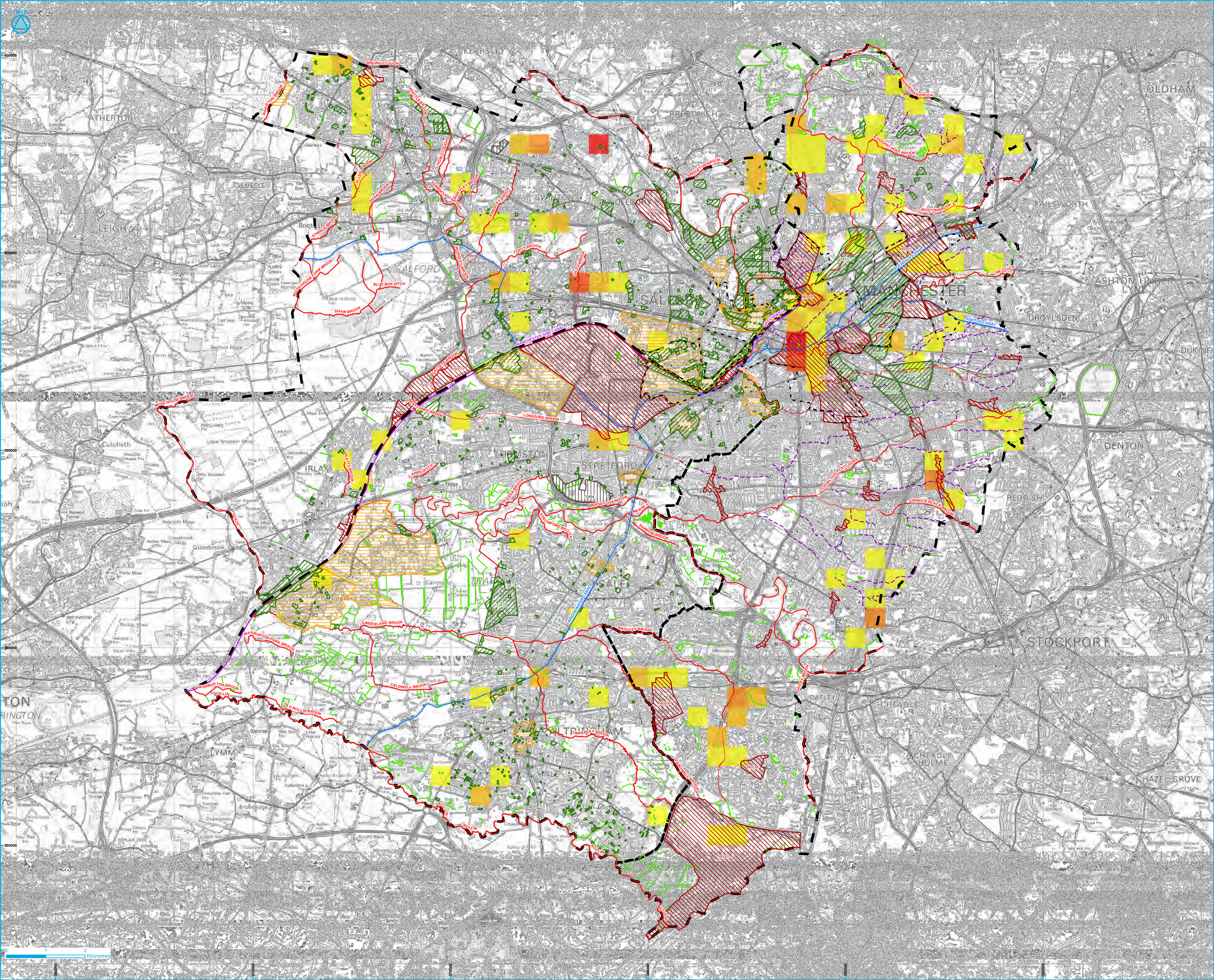
for

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\MST_GroundwaterFlooding_V1.3.mxd		
Drawing Number: GW_2.1	Status: FINAL	Scale: 1:45,000

Original @ A1



- Council Boundary**
- Lost Watercourses**
- Number Of Properties At Risk**
- Main Rivers (V8.0)**
- Digitised River Lines**
- Potential Development Sites / Locations**

This map has been produced in addition to the requirements of PPS25: Development and Flood Risk.

This map shows the results of an assessment of surface water flood risk to properties. This shows the number of properties that could potentially be affected by such flooding if a 1 in 200 year rainfall event were to occur.

The data shown in this map has been used to scope the coverage of Critical Drainage Areas.

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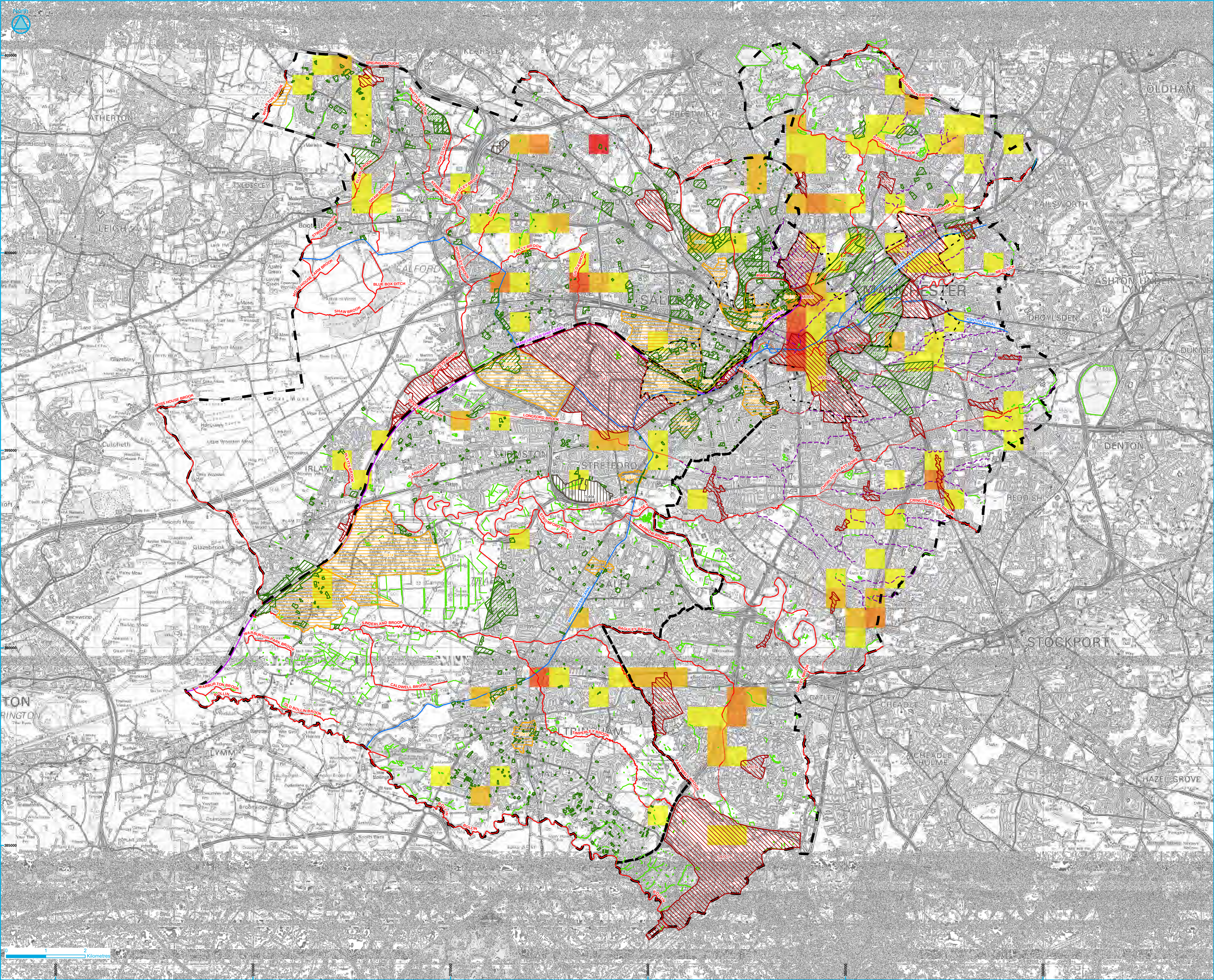
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Manchester City, Salford City and Trafford Councils Level 2 Hybrid SFRA

Surface Water Flooding Risk Assessment - Current Scenario

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Approved by: J Cooper	Date: 01/02/2011	
File Name: ...ArcViewMapping\Level2\MST_SurfaceWaterFloodingRiskAssessment_Current_V1.2.mxd		
Drawing Number: SS_4.3	Status: FINAL	Scale: 1:45,000



- Council Boundary
- Lost Watercourses
- 1 - 5
- 5 - 20
- 20 - 50
- 50 - 100
- 100 - 154
- Employment
- Housing
- Mixed Use
- Other
- Regional Centre Boundary
- Ashton, Bridgewater and Rochdale Canals
- Manchester Ship Canal / Grey Inwell
- Other Waterbodies
- Main Rivers (V8.0)**
 - Culverted
 - Open
- Digitised River Lines**
 - Culverted
 - Open
- Potential Development Sites / Locations**
 - Employment
 - Housing
 - Mixed Use
 - Other

This map has been produced in addition to the requirements of PPS25: Development and Flood Risk.

This map shows the results of an assessment of surface water flood risk to properties in the future. This shows the number of properties that could potentially be affected by such flooding if a 1 in 200 year rainfall event were to occur. This map can be used to assess the sensitivity of surface water flood risk to climate change and urban development.

The data shown in this map has been used to scope the coverage of Critical Drainage Areas.

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 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

Surface Water Flooding Risk Assessment - Future Scenario

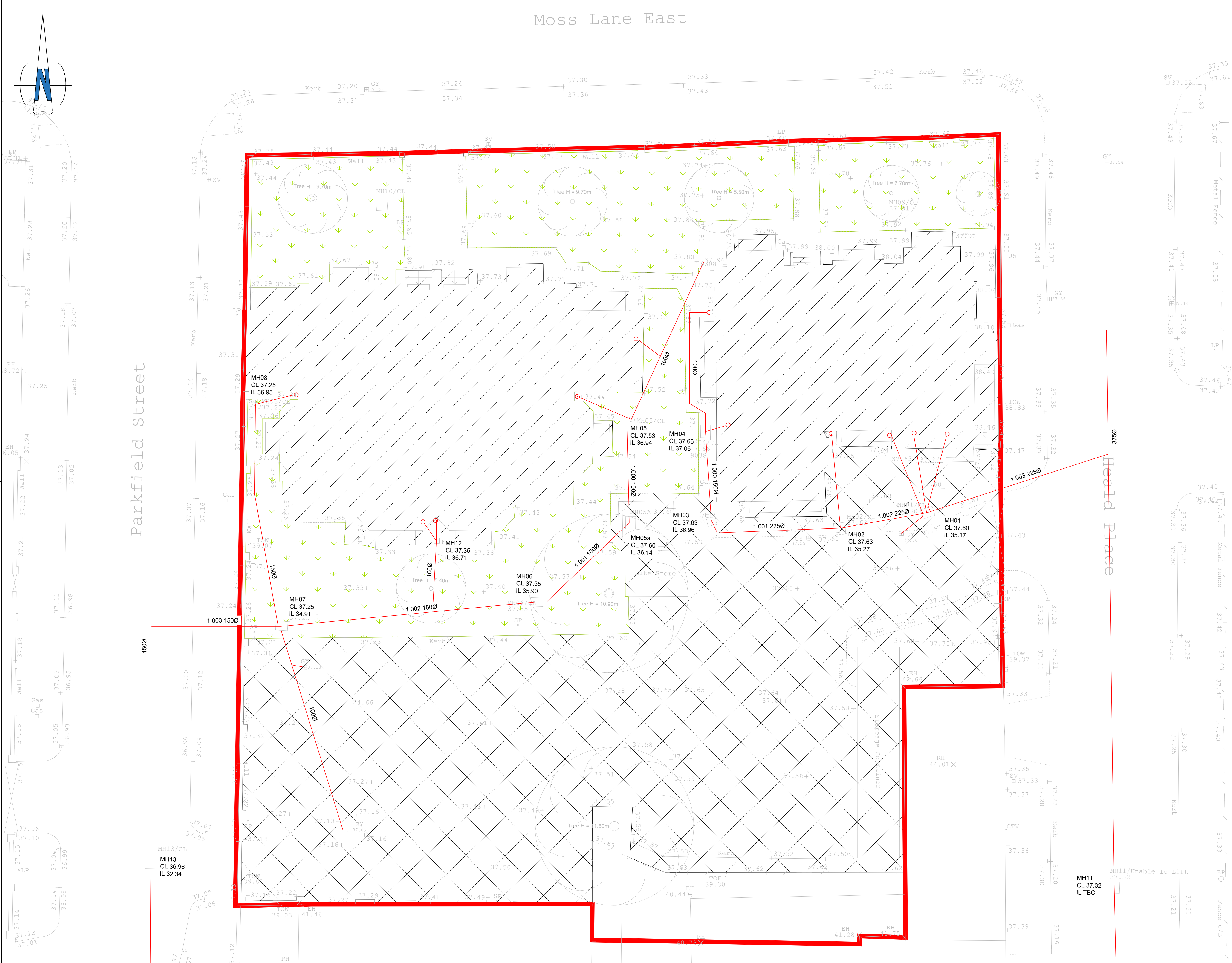
Drawn by: J Cheetham	Date: 08/03/2011	This map is based upon Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office. © Crown copyright. Unauthorised reproduction infringes Crown copyright and may lead to prosecution or civil proceedings. Licence number: 100016688 2011.
Checked by: J Dimelow	Date: 01/02/2011	
Approved by: J Cooper	Date: 01/02/2011	
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Drawing Number:	Status:	Scale:
SS_4.4	FINAL	1:45,000

Original @ A1



COMPLEX CHALLENGES ...
MADE SIMPLE

APPENDIX G – EXISTING DRAINAGE AREAS



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NOTES

General Notes

1. All dimensions are in metres unless stated otherwise.
2. This drawing shall be read in conjunction with all other relevant engineering details, drawings and specifications.
3. Any discrepancies should be reported to the engineer immediately so that clarification can be sought prior to the commencement of work.
4. Underground services may be present in the area. Contractor is to confirm the precise line and depth of any services prior to the commencement of any excavation works

LEGEND

	Site Boundary	(0.187ha)
	Existing Building	(0.050ha)
	Existing Hardstanding	(0.075ha)
	Existing Landscaping	(0.044ha)

P2	18.09.22	ISSUED WITH FRA	ARJ	MN
P1	24.05.22	ISSUED WITH FRA	ARJ	MN
REV	DATE	DETAILS	DRN	CHK

DRAWING STATUS
PRELIMINARY

RIBA STAGE
STAGE 2

Commercial Wharf
6 Commercial Street
Manchester M15 4PZ
T 0161 214 5390
W rocconsulting.com

DRAWN ARJ	DATE 24.05.22	SCALES SCALE
CHECKED MN	DATE 24.05.22	THE ABOVE SCALES APPLY WHEN PLOTTED AT A1 SIZE -DO NOT SCALE-
APPRVD. ROC	DATE 24.05.22	EMAIL FOR DRAWINGS info@rocconsulting.com

CLIENT
CITYSIDE

PROJECT TITLE
Moss Lane East

DRAWING TITLE
**Flood Risk Assessment
Existing Drainage
and Catchment Areas**

DRAWING No. 4453/ROC/XX/XX/DR/FRA01	REV. P2
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COMPLEX CHALLENGES ...
MADE SIMPLE

APPENDIX H – EXISTING DRAINAGE CALCULATIONS

ROC Consulting		Page 1
Commercial Wharf 6 Commercial Street Manchester M15 4PZ		
Date 16/09/2022 12:59 File 220916 Extg Network.MDX	Designed by andyj Checked by	
XP Solutions	Network 2020.1	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm 1

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	1	PIMP (%)	100
M5-60 (mm)	18.000	Add Flow / Climate Change (%)	0
Ratio R	0.360	Minimum Backdrop Height (m)	0.000
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	0.000
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm 1

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.060	4-8	0.003

Total Area Contributing (ha) = 0.063

Total Pipe Volume (m³) = 1.021

Network Design Table for Storm 1

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	5.104	0.025	204.2	0.021	4.00	0.0	0.600	o	150	Pipe/Conduit	
S1.001	7.410	1.690	4.4	0.042	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.002	5.067	0.100	50.7	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.003	10.942	0.216	50.7	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	50.00	4.12	37.060	0.021	0.0	0.0	0.0	0.70	12.4	2.9
S1.001	50.00	4.14	36.960	0.063	0.0	0.0	0.0	6.29	250.2	8.6
S1.002	50.00	4.19	35.270	0.063	0.0	0.0	0.0	1.84	73.2	8.6
S1.003	49.82	4.29	35.170	0.063	0.0	0.0	0.0	1.84	73.2	8.6

ROC Consulting		Page 2
Commercial Wharf 6 Commercial Street Manchester M15 4PZ		
Date 16/09/2022 12:59 File 220916 Extg Network.MDX	Designed by andyj Checked by	
XP Solutions	Network 2020.1	

Area Summary for Storm 1

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	User	-	100	0.021	0.021	0.021
1.001	User	-	100	0.042	0.042	0.042
1.002	-	-	100	0.000	0.000	0.000
1.003	-	-	100	0.000	0.000	0.000
Total				Total	Total	Total
				0.063	0.063	0.063

Free Flowing Outfall Details for Storm 1

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D, L (mm)	W (mm)
---------------------	--------------	--------------	--------------	------------------	-----------	--------

S1.003	S	37.320	34.954	0.000	0	0
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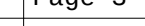
Simulation Criteria for Storm 1

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start (mins)	0	Inlet Coefficient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Storm Duration (mins)	30
Ratio R	0.360		

ROC Consulting		Page 3
Commercial Wharf 6 Commercial Street Manchester M15 4PZ		
Date 16/09/2022 12:59 File 220916 Extg Network.MDX	Designed by andyj Checked by	
XP Solutions	Network 2020.1	

1 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Storm 1

Simulation Criteria

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	OFF
Inertia Status	OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160
Return Period(s) (years)	1
Climate Change (%)	0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water
									Level (m)
S1.000	S04	15 Summer	1	+0%					37.113
S1.001	S03	15 Winter	1	+0%					36.988
S1.002	S02	15 Winter	1	+0%					35.330
S1.003	S01	15 Winter	1	+0%					35.221

PN	US/MH Name	Surcharged	Flooded	Flow / Cap.	Overflow (l/s)	Half Drain	Pipe	Status	Level Exceeded
		Depth (m)	Volume (m³)			Time (mins)	Flow (l/s)		
S1.000	S04	-0.097	0.000	0.27			2.7	OK	
S1.001	S03	-0.197	0.000	0.04			7.0	OK	
S1.002	S02	-0.165	0.000	0.16			7.0	OK	
S1.003	S01	-0.174	0.000	0.11			7.0	OK	

ROC Consulting		Page 1
Commercial Wharf 6 Commercial Street Manchester M15 4PZ		
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XP Solutions	Network 2020.1	

Network 2020.1

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm 2

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	1	PIMP (%)	100
M5-60 (mm)	18.000	Add Flow / Climate Change (%)	0
Ratio R	0.357	Minimum Backdrop Height (m)	0.000
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	0.000
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm 2

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.061	4-8	0.001

Total Area Contributing (ha) = 0.062

Total Pipe Volume (m³) = 0.494

Network Design Table for Storm 2

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	5.936	0.452	13.1	0.014	4.00	0.0	0.600	o	100	Pipe/Conduit	
S1.001	7.040	0.538	13.1	0.000	0.00	0.0	0.600	o	100	Pipe/Conduit	
S1.002	14.890	0.990	15.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S1.003	7.284	2.270	3.2	0.048	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	50.00	4.05	36.940	0.014	0.0	0.0	0.0	2.14	16.8	1.9
S1.001	50.00	4.10	36.488	0.014	0.0	0.0	0.0	2.15	16.9	1.9
S1.002	50.00	4.20	35.900	0.014	0.0	0.0	0.0	2.61	46.1	1.9
S1.003	49.91	4.22	34.910	0.062	0.0	0.0	0.0	5.67	100.2	8.4

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Area Summary for Storm 2

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	User	-	100	0.014	0.014	0.014
1.001	-	-	100	0.000	0.000	0.000
1.002	-	-	100	0.000	0.000	0.000
1.003	User	-	100	0.015	0.015	0.015
	User	-	100	0.033	0.033	0.048
				Total	Total	Total
				0.062	0.062	0.062

Free Flowing Outfall Details for Storm 2

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D, L (mm)	W (mm)
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S1.003	S	36.980	32.640	0.000	0	0
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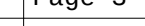
Simulation Criteria for Storm 2

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start (mins)	0	Inlet Coefficient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Storm Duration (mins)	30
Ratio R	0.360		

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1 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Storm 2

Simulation Criteria

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	OFF
Inertia Status	OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160
Return Period(s) (years)	1
Climate Change (%)	0

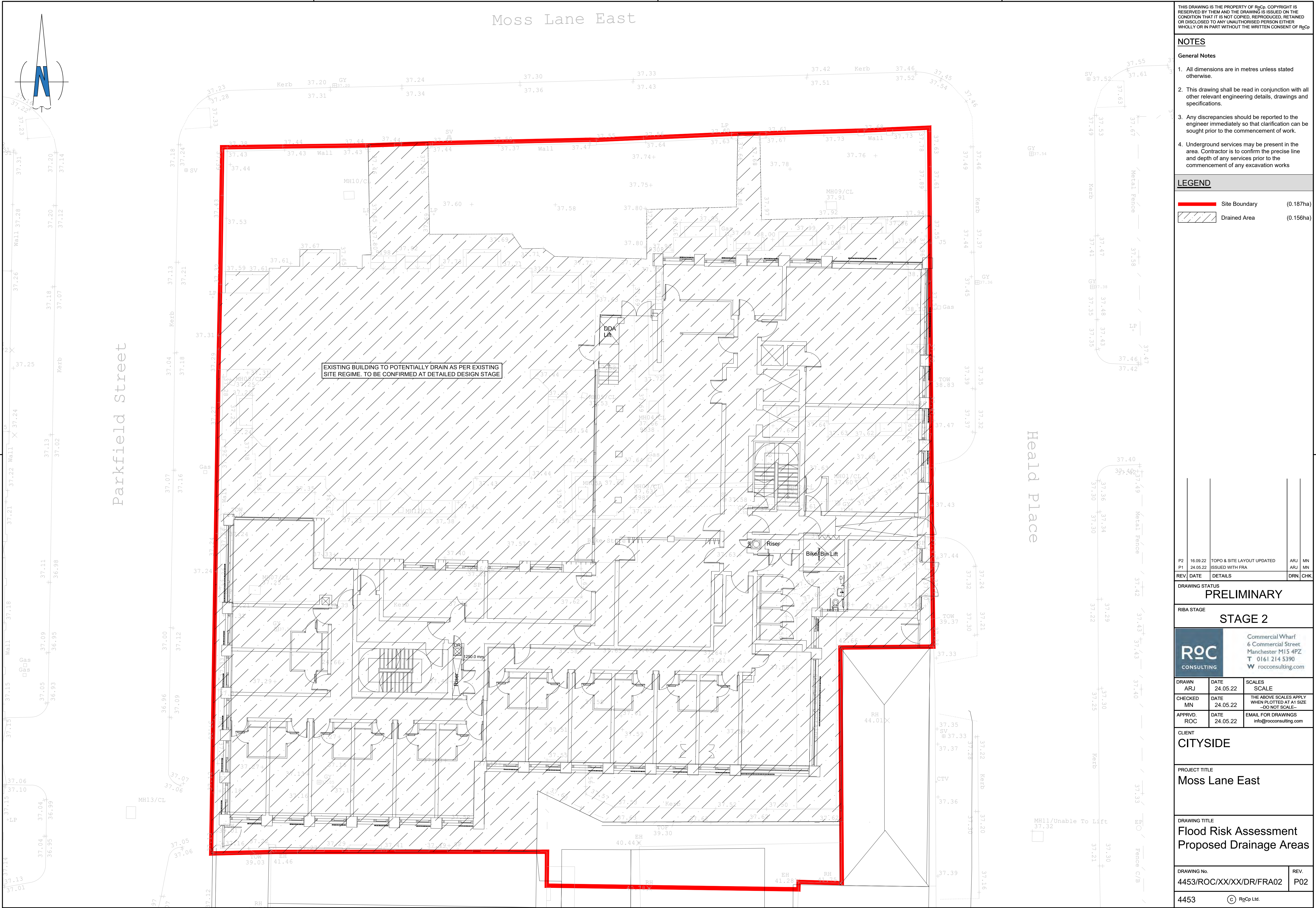
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water
									Level (m)
S1.000	S05	15 Winter	1	+0%					36.963
S1.001	S05a	15 Summer	1	+0%					36.511
S1.002	S06	15 Summer	1	+0%					35.920
S1.003	S07	15 Winter	1	+0%					34.938

PN	US/MH Name	Surcharged	Flooded	Flow / Cap.	Overflow (l/s)	Half Drain	Pipe	Status	Level Exceeded
		Depth (m)	Volume (m³)			Time (mins)	Flow (l/s)		
S1.000	S05	-0.077	0.000	0.12			1.8	OK	
S1.001	S05a	-0.077	0.000	0.12			1.8	OK	
S1.002	S06	-0.130	0.000	0.04			1.8	OK	
S1.003	S07	-0.122	0.000	0.08			6.7	OK	



COMPLEX CHALLENGES ...
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APPENDIX I – PROPOSED DRAINAGE AREAS



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- NOTES**
- General Notes**
1. All dimensions are in metres unless stated otherwise.
 2. This drawing shall be read in conjunction with all other relevant engineering details, drawings and specifications.
 3. Any discrepancies should be reported to the engineer immediately so that clarification can be sought prior to the commencement of work.
 4. Underground services may be present in the area. Contractor is to confirm the precise line and depth of any services prior to the commencement of any excavation works

LEGEND		
	Site Boundary	(0.187ha)
	Drained Area	(0.156ha)

P2	16.09.22	TOPO & SITE LAYOUT UPDATED	ARJ	MN
P1	24.05.22	ISSUED WITH FRA	ARJ	MN
REV	DATE	DETAILS	DRN	CHK

DRAWING STATUS
PRELIMINARY

RIBA STAGE
STAGE 2

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DRAWN ARJ	DATE 24.05.22	SCALES SCALE
CHECKED MN	DATE 24.05.22	THE ABOVE SCALES APPLY WHEN PLOTTED AT A1 SIZE —DO NOT SCALE—
APPRVD. ROC	DATE 24.05.22	EMAIL FOR DRAWINGS info@roccoconsulting.com

CLIENT
CITYSIDE

PROJECT TITLE
Moss Lane East

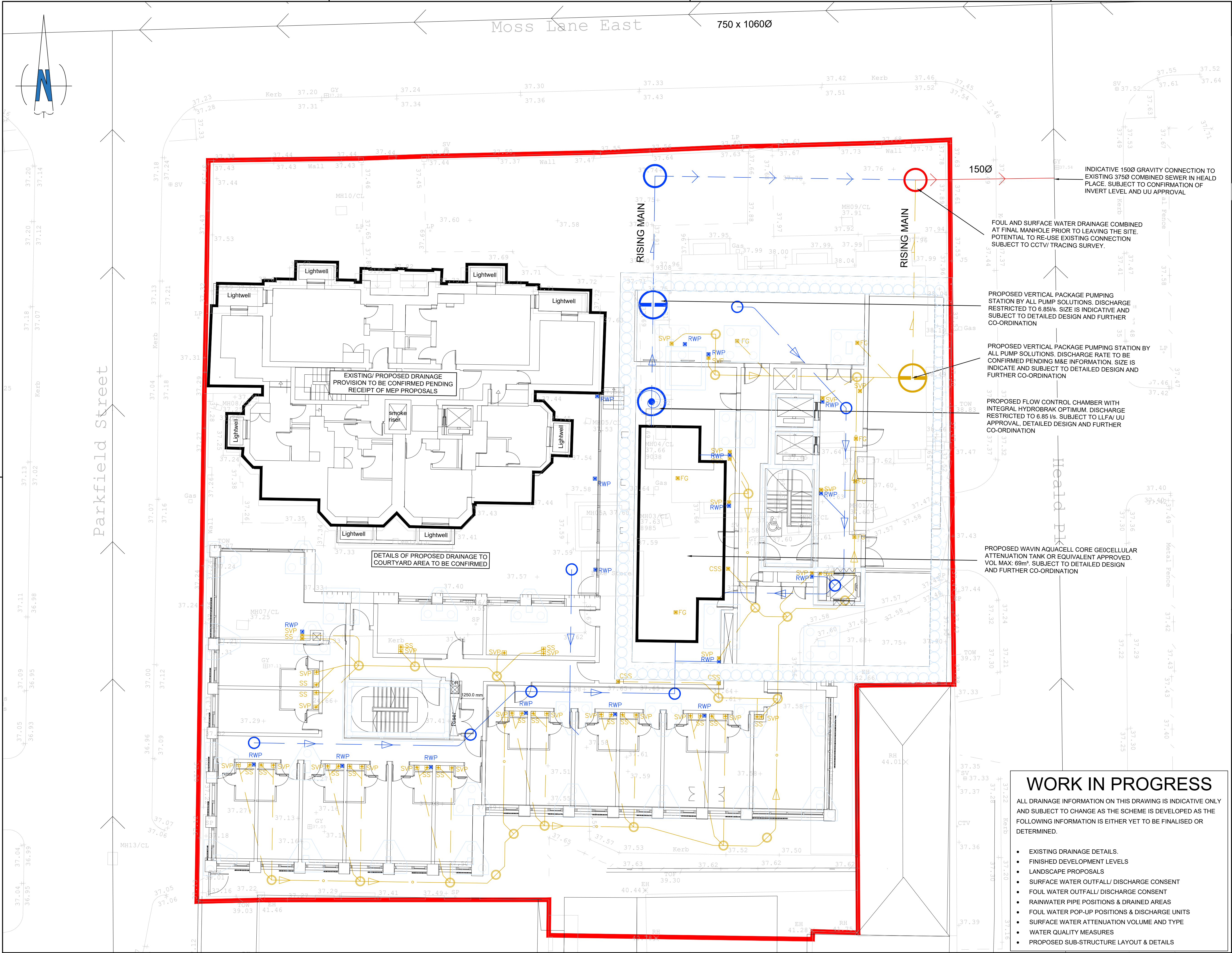
DRAWING TITLE
**Flood Risk Assessment
Proposed Drainage Areas**

DRAWING No. 4453/ROC/XX/XX/DR/FRA02	REV. P02
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COMPLEX CHALLENGES ...
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APPENDIX J – DRAINAGE STRATEGY



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NOTES

General Notes

- All dimensions are in metres unless stated otherwise.
- This drawing shall be read in conjunction with all other relevant engineering details, drawings and specifications.
- Any discrepancies should be reported to the engineer immediately so that clarification can be sought prior to the commencement of work.
- Underground services may be present in the area. Contractor is to confirm the precise line and depth of any services prior to the commencement of any excavation works

LEGEND

- Site Boundary
- SW Drain & Manhole/ Inspection Chamber
- FW Drain & Manhole/ Inspection Chamber
- SW Attenuation Tank

P3	16.09.22	UPDATED TO SUIT CCTV SURVEY	ARJ	MN
P2	24.08.22	ARCHITECT LAYOUTS UPDATED	JBN	MN
P1	21.06.22	FIRST ISSUE	ARJ	MN
REV	DATE	DETAILS	DRN	CHK

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PROJECT TITLE
Moss Lane East

DRAWING TITLE
Outline Drainage Strategy

DRAWING No.	4453/ROC/XX/XX/DR/C/DS01	REV.	P03
4453	ROC Ltd.		

WORK IN PROGRESS

ALL DRAINAGE INFORMATION ON THIS DRAWING IS INDICATIVE ONLY AND SUBJECT TO CHANGE AS THE SCHEME IS DEVELOPED AS THE FOLLOWING INFORMATION IS EITHER YET TO BE FINALISED OR DETERMINED.

- EXISTING DRAINAGE DETAILS.
- FINISHED DEVELOPMENT LEVELS
- LANDSCAPE PROPOSALS
- SURFACE WATER OUTFALL/ DISCHARGE CONSENT
- FOUL WATER OUTFALL/ DISCHARGE CONSENT
- RAINWATER PIPE POSITIONS & DRAINED AREAS
- FOUL WATER POP-UP POSITIONS & DISCHARGE UNITS
- SURFACE WATER ATTENUATION VOLUME AND TYPE
- WATER QUALITY MEASURES
- PROPOSED SUB-STRUCTURE LAYOUT & DETAILS



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