FLOOD RISK ASSESSMENT & DRAINAGE STRATEGY

MIX Manchester - Phase 1 Planning Application

for

Airport City Limited Partnership



06/03/2026

CIVIL | STRUCTURAL | GEOTECHNICAL | GEO-ENVIRONMENTAL ENGINEERING SERVICES

COMPLEX CHALLENGES ...
MADE SIMPLE

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1.0 INTRODUCTION

1.1 Appointment

RoC Consulting has been commissioned to provide a Flood Risk Assessment and Drainage Strategy in support of a Hybrid Planning Application on land known as MIX Manchester (formerly Airport City North) to the North of the M56 Spur, off Enterprise Way and Thorley Lane.

1.2 Proposed Development

The Hybrid Planning Applications seeks the following:

1. Full planning permission for development of mid -tech units (Use Class E.g.(i, ii, iii)) and multi -storey car park (Use Class Sui Generis), alongside ancillary commercial uses (Class E) with associated access, servicing, public realm and landscaping.

2. Outline planning permission for development of a range of uses (comprising Use Class E.g., B2, C1) alongside a Multi -Storey Car Park (Use Class Sui Generis) and ancillary commercial uses (Class E), with associated access, servicing, public realm and landscaping. All matters reserved for future determination save for primary access.

The development area extends to approximately 12.016 hectares (ha), 4.566 ha is associated with the Detailed Element and the 7.45ha is associated with the Outline Element. The tables below provide a summary of the quantum of development associated with each.

Detailed Element		
Building	**Unit**	**GIA (sqm)**
A1	A1.1	675
	A1.2	645
	A1.3	520
	A1.4	520
	A1.5	475
A2	A2.1	615
	A2.2	590
	A2.3	775
	A2.4	805
A5	A5.1	475
	A5.2	475
A7	-	180
E1	MSCP	41,253
TOTAL		**48,003****

** In addition to the above figure of 48,003m2, an additional area of 3,172m2 has been added as a floorspace buffer to account for GEA and a total of 51,175m2 has been considered for assessment purposes within this report as a worst case scenario.

Outline Element	
Parcel	**GIA (sqm)**
A	49,500
B	23,100
C	17,820
D	16,060
TOTAL	**106,480**

The application site comprises previously developed (brownfield) land which has been subject to/ associated with a number of previous planning applications. These are:

- **CDN/21/0776** - Discharge of Condition 6 (Construction Management Plan) attached to planning permission 121323/FO/2018.
- **CDN/21/0776** - Discharge of condition numbers 5 (glint and glare assessment), 8(contaminated land part A), 9 (Local labour agreement) and 20 (highway works) attached to Planning Permission reference 121323/FO/2018.
- **132132/NMC/2021** - Non-material amendments to conditions 5 (glint and glare) and 12 (fume extraction) of planning approval reference 121323/FO/2018.
- **126461/NMC/2020** – Non-material amendment application to planning approval reference 124745/FO/2019 to allow for: the removal of the requirement of a number of elements from condition 7 (drainage); and condition 8 (Road Junction details) to allow for a change in timescale's for the delivery of the Enterprise Way vehicular access.
- **124745/FO/2019** - Enabling works in connection with Airport City North, including brook diversion, construction of the World Way roundabout retaining wall and construction of the access road and swale
- **121323/FO/2018** - Erection of: two 6 storey office buildings (Class B1(a) comprising 8,567 sqm of net internal floorspace in Plot E2 and 8,581 sqm of net internal floorspace in Plot E3) and ground floor commercial space (Class A1,A2,A3,A4,A5, B1(a) or D1 (excluding Places of Worship) uses only; 9 storey multi-storey car park (1,497 spaces) including 1,812 sqm of ground floor commercial space (Class A1-A5, B1(a) or D1 (excluding Places of Worship) uses only), pedestrian and vehicular access arrangements, temporary (5 years) surface level car parking (202 spaces) and associated infrastructure works including brook diversion and landscaping.

- **121270/OO/2018** - Outline application with all matters to be considered for development comprising: The erection of a 6 storey building comprising 26,803 sqm gross office floorspace (use class B1(a)) and erection of a 6 storey multi-storey car park to provide 1,147 parking spaces, landscaping and public realm, with vehicular access onto Enterprise Way and associated works (Phase 1); and, Outline application with all matters reserved for 39,673 sq. m gross office space (use class B1(a)) and associated car parking (maximum 832 spaces) (Phases 2 and 3).
- **116021/NMC/2017** - Non-Material Amendment to planning permission 100268/FO/2012/S to allow for the replacement of gabion-retained grass bank with a decorated block wall.
- **115826/FO/2017** - Installation of a pedestrian and cyclist bridge across the M56 motorway spur, passenger lift, and associated works.
- **10831/OO/2012/S2** - Outline planning application for Airport City North, comprising of Class B1(a) office space (113,433 square metres); Class B1(c) and Class B2 light and general industrial space (49,046 square metres); Class C1 hotels (47,398 square metres); Class A1, A2, A3, A4, A5, D1 and D2 accommodation (5,761 square metres) and associated parking and public realm works
- **100268/FO/2012/S2** - Diversion of part of Thorley Lane and Outwood Lane West through the creation of a new link road.
- **099732/FO/2012/S2 & 094336/FO/2010/S2** – Proposed use of land for 3,155 vehicles for temporary periods.
- **087396/OO/2008/S2** - Outline Application of (i) The erection of 6,038 square metres of office space (Class B1); three hotels (Class C1) of up to 500 bedrooms, with ancillary facilities including conference facilities, health and fitness club and bar and restaurant; 205 residential units (Class C3) (access only) (ii) The erection of a 6,300 square metres of car dealership (access, layout and scale only).
- **078993/00/2006/S2** - OUTLINE APPLICATION for the erection of a Class B1 Business Park, totalling 50,185 square metres of floorspace, with associated car parking and landscaping and highway works, including a realigned and improved Thorley Lane/Outwood Lane West junction and improvements to junction 5 of the M56 motorway.

The proposed development site is located wholly within Flood Zone 1 as defined on the Environment Agency's flood map for planning.

A Site Location Plan for the development is included in Appendix A with a copy of the current proposed Illustrative Masterplan and Landscape Masterplan contained in Appendix B.

1.3 Aim of the Report

The aim of this report is to undertake a Flood Risk Assessment and Drainage Strategy in accordance with the National Planning Policy Framework (NPPF) and current guidance for the purposes of providing a baseline assessment of flood risk.

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.

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
- Identify potential constraints imposed by the regulatory bodies including the Environment Agency, Local Water Authority and Lead Local Flood Authority

As part of the development of this report, information has been obtained from United Utilities (UU), the Environment Agency (EA) and Landmark.

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, identifying potential constraints imposed by drainage and in supporting the planning process.

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 RoC 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 Masterplan layouts 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.

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 Councils Strategic Flood Risk Assessment (SFRA) alongside CIRIA Guidance and the Non-Statutory Technical Standards for SuDS which provide the most up to date and specific guidance on the scope of Flood Risk Assessments and surface water management for developments.

2.1 National Planning Policy Framework

The NPPF was published in England in March 2012 and most recently revised in December 2024 before being further amended in February 2025.

This revised framework replaces the previous NPPF, revised in July 2018, updated in February 2012, revised in July 2021, updated in September 2023 and revised in December 2023.

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, flooding and coastal change is set out in section 14 paragraphs 161-186, with the approach to planning for flood risk between paragraphs 170-182.

In March 2014 the Planning Practice Guidance web resource was launched to support the NPPF. A specific Flood Risk and Coastal Change PPG was published which provides guidance on how flood risk should be assessed during the planning and development process. This document was last updated in August 2022.

2.2 Planning Practice Guidance – Flood Risk & Coastal Change

The Planning Practice Guidance, Flood Risk & Coastal Change, advises how to take account of and address the risks associated with flooding and coastal change in the planning process.

The document gives further context and detail to local authorities and developers about how national policy with respect to Flood Risk is to be understood and implemented.

A significantly revised PPG on Flood Risk & Coastal Change was released in August 2022 to reflect changes to the NPPF (made in 2018, 2019 and 2021) whilst also incorporating learning from practice that has been gathered since the PPG was first published in 2014.

In particular, more clarity was provided around when and how the sequential and exception tests should be applied, making roles and responsibilities for carrying out the tests clearer along with advice on how planning authorities can apply the tests more consistently and efficiently.

2.3 Sequential Test

The NPPF and accompanying PPG describe the principles of the Sequential Test, which aims to steer new development to areas with the lowest probability of flooding, taking all sources of flood risk and climate change into account (fluvial, pluvial, tidal, ground water and sewers).

Where it is not possible to locate development in low-risk areas, the Sequential Test should compare reasonably available sites:

- Within medium risk areas; and
- Then, only where there are no reasonably available sites in low and medium risk areas, within high-risk areas.

The presence of any existing flood risk management infrastructure should be ignored, as the long-term funding, maintenance and renewal of this is uncertain. Furthermore, climate change will also impact on the level of protection this infrastructure will offer through the lifetime of the development.

The PPG is explicit in its assertion that other forms of flooding need to be treated consistently with fluvial flooding and that all sources of flood risk are to be taken into account. Should a site be at risk from any source of flooding, then the Sequential Test needs to be satisfied, regardless of whether the proposed development is able to mitigate these issues through design. The only exceptions to this are:

- The site is allocated in the local development plan and was subject to the Sequential Test at plan making stage for a use consistent with the development that is being proposed.
- The site is at low risk from all sources of flooding.
- Where a site-specific flood risk assessment demonstrates that no built development within the site boundary, including access or escape routes, land raising or other potentially vulnerable elements, would be located on an area that would be at risk of flooding from any source, now and in the future (having regard to potential changes in flood risk).

With respect to the proposed development, and as detailed in the following sections of this report, the site is located wholly within Flood Zone 1 and therefore this would satisfy the requirements of the Sequential Test.

2.4 Exception Test

If following application of the Sequential Test it has been agreed with the LPA that no suitably alternative sites are available and it is not possible for the development to be located in areas with a lower probability of flooding, the Exception Test must be applied if required.

The Exception Test process is defined in the NPPF. It provides a method of managing flood risk whilst still allowing necessary development to occur.

Where required, suitable information would need to be provided to ensure that the development can pass both parts of the Exception Test by:

- Demonstrating that the development would provide wider sustainability benefits to the community that outweigh the flood risk (part a).
- Referring to wider sustainability objectives in the Sustainability Appraisal. These generally consider matters such as biodiversity, green infrastructure, historic environment, climate change adaptation, flood risk, green energy, pollution, health, transport etc.
- Detailing the suitability issues the development will address and how doing it will outweigh the flood risk concerns for the site e.g., by facilitating wider regeneration of an area, contributing to the local economy, providing community facilities, infrastructure that benefits the wider area, etc.
- Demonstrating that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall (part b).
- Demonstrating that the site will be safe, and the people will not be exposed to hazardous flooding from any source. The site-specific FRA should consider actual and residual risk and how this will be managed over the lifetime of the development, including:
    - The design of any flood defence infrastructure, including operation and maintenance.
    - Availability of dry access and egress routes during a flood.
    - Design of the development to manage and reduce flood risk wherever possible i.e., through SuDS, including for designated ownership and maintenance procedures.
    - Resident awareness through appropriate emergency plans and signposting / signage.
    - Emergency planning and flood warning and evacuation procedures, including whether the development would increase the pressure on emergency services to rescue people during a flood event; and
    - Any funding arrangements required for implementing mitigation measures, maintenance procedures.

The first part of the test reflects on the wider sustainability benefits of the development, which should be tested against the aims and objectives of Local Plan policy. Spatial planning issues such as transport, housing economic growth, natural resources, regeneration, biodiversity and the historic environment can influence the overall suitability and sustainability of development at a particular site.

The second part of the Exception Test relates to the safety of the development and the need to not increase flood risk elsewhere. Appropriate application of the flood risk management hierarchy of 'Avoid – Substitute – Control – Mitigate' can increase the safety of a development, however it is the responsibility of the developer to demonstrate that any measures proposed are sufficient.

The requirement for the Exception Test is dependent upon the vulnerability of the proposed development in line with Tabe 2 of the NPPF and Annex 3 (Flood risk Vulnerability Classification).

As the development is commercial, this is classed as 'Less Vulnerable'. On the basis that the site is located in fluvial Flood Zone 1 then the Exception Test can be considered not to be required.

2.5 Manchester City Council Level 2 SFRA, 2011

The joint Manchester, Salford & Trafford Strategic Flood Risk Assessment (SFRA) and accompanying User Guide was prepared by JBA Consulting in March 2011.

The Greater Manchester Combined Authority Level 1 Strategic Flood Risk Assessment for Greater Manchester – Update was prepared by JBA Consulting with the Final Report dated March 2019.

The Greater Manchester Level 2 Hybrid Strategic Flood Risk Assessment Main Report was prepared by JBA Consulting with the Final Report dated October 2020.

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

The SFRA provides a comprehensive, high-level overview of flood risks from all sources (river, surface water, sewer, and groundwater) to support the Greater Manchester Spatial Framework (GMSF), later known as Places for Everyone.

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

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

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

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

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

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

The SFRA recognises Manchester Airport as a Strategic Employment Site and indicates that limited areas of this are within Flood Zone 3 and Flood Zone 2. The MIX Manchester development is not identified as being located in either of these Zones. The site is however indicated to be located in the Manchester & Trafford South Critical Drainage Area.

The SFRA indicates that the Strategic Employment site is suitable for development subject to a site-specific FRA and there are no specific risks to the site area indicated within the SFRA.

2.6 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 Manchester City Council) as designated Lead Local Flood Authorities to prepare a number of key documents including a Preliminary Flood Risk Assessment which focuses on local flood risk from surface water, groundwater, ordinary watercourses and canals.

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.

2.7 Manchester City Council 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 risk management strategy, published by the Environment Agency.
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 and 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.

2.8 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.

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 run-off, the flow rates and the volumes of run-off, 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.

2.9 Manchester City Council SuDS Requirements

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 B 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;
- 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.

2.10 Non-Statutory Technical Standards for SuDS, 2025

The national standards document provides information for designers, property developers, local authorities and other interested parties, such as sewerage undertakers and the Environment Agency.

These standards are intended for application in the design of surface water drainage systems for new infrastructure and development, whether on greenfield or brownfield sites. They are not designed to apply to retrofit SuDS designs, which often have different objectives and face broader constraints, although they do serve as s starting point for retrofit design.

The principles for surface water drainage design explain the objectives and approach for applying the standards.

There are 2 types of standards:

- the hierarchy standard (standard 1) gives criteria for prioritising the choice of final runoff destination
- fixed standards (standards 2 to 7) state the minimum design criteria that all surface water drainage systems should satisfy and how they should be built, maintained and operated

The 7 standards are complementary, and the delivery of each standard should support delivery of the other standards. A surface water drainage system design that delivers multiple benefits will include a range of features and each of these should contribute to the delivery of several, if not all, of the standards.

The 7 standards are:

- Standard 1: runoff destinations
- Standard 2: management of everyday rainfall (interception)
- Standard 3: management of extreme rainfall and flooding
- Standard 4: water quality
- Standard 5: amenity
- Standard 6: biodiversity
- Standard 7: design of drainage for construction, operation, maintenance, decommissioning and structural integrity.

3.0 SITE CONTEXT

The proposed MIX Manchester development is located on land to the north of the A56 spur, immediately south of Wythenshawe and to the north of Manchester Airport, within Woodhouse Park ward. The Application Site sits approximately 8.9km southwest of Stockport town centre at National Grid Reference (NGR) SJ 81876 85845.

The Application Site is bounded to the north by Thorley Lane and Enterprise Way, to the east by Enterprise Way, to the south by Ringway Road West and the M56, and to the west by the M56.
It is also intersected by Enterprise Way, dividing the Application Site into two separate areas: Parcel A (west) and Units A1, A2, A5, A7 and E1 alongside Parcels B, C and D located on the opposite side of Enterprise Way.

The western portion of the site is irregular in shape and currently occupied by the active Manchester Airport Jetpark car park.

The eastern area of the site is also irregular in shape and predominantly covered by soft standing in the southern area and comprises land that was previously subject to a package of enabling works with public footpath leading to pedestrian bridge across the M56. Hard cover aggregate material surfaces the northern area, which is currently being used as a car park for the construction of the Dakota Hotel to the north.

3.1 Site Characterisation / Land Use

Development Area		The gross site area is approximately 12.016ha. The detailed element extends to 4.566 ha with the remaining outline element comprising 7.45ha.
Existing Surfaces and Current Use		The western portion of the site is irregular in shape and occupied by the active Manchester Airport Jetpark car park; surface coverings comprise both soft cover and hard cover with asphalt roadways. The eastern area of the site is also irregular in shape and predominantly covered by soft standing in the southern area which comprises land that was previously subject to enabling works and an asphalt public footpath. Hard cover aggregate material surfaces the northern area, which is currently being used for workers associated with the construction of the adjacent Dakota hotel.
Boundaries	North	Enterprise Way beyond which lies the Dakota Hotel and residential properties.
	South	Ringway Road West and Airport Spur, beyond which lies the Tribe Hotel which is linked to the site via a pedestrian footbridge
	East	Thorley Lane and Painswick Park
	West	Manchester Airport, car parks, Aviator Way & Manchester Business Park
Access	Vehicles	Access can be obtained from both Thorley Lane and Enterprise Way
	Pedestrians / Cycles	Access to the eastern part of the site can be obtained via the existing Jetpark entrance. Access to the western portion can be obtained from Enterprise Way. As noted above, a pedestrian footpath runs through the site which links to Manchester Airport.

3.2 Topography

A topographic survey of the development site has been undertaken by Survey Operations and is provided in Appendix C for review.

The area of development located on the eastern side of Enterprise Way, was previously subject to a package of Enabling Works in 2019/20 which included bulk earthworks re-modelling to create development plateaus. The survey indicates that levels generally fall from southeast to northwest ranging from 71.5mAOD down to 69.15mAOD at the boundary.

The area of development located on the western side of Enterprise Way is an operational car park. The survey indicates that this is relatively flat, with levels largely at around 70.5mAOD. However, there is a similar fall in a north-westerly direction towards Thorley Lane where levels are around 69.3mAOD along the edge of the existing open watercourse channel.

3.3 Geology

The bedrock geology across the Application Site is composed of the Bollin Mudstone Member, which comprises weak mudstones and siltstones. The superficial geological units across the Application Site are Devensian till deposits, comprising clay (with occasional sand, gravel or silt).

Made ground has been identified in some locations on-site and may be expected to be found in areas of former farm buildings or tracks and associated with workings for the M56 spur.

Information from site investigation work that has been completed across the Application Site is in agreement with the geological mapping. Bedrock has typically been found at a depth of 3m to 6m below ground level (bgl).

Strata	Description	Est. Thickness	Permeability
Topsoil	Locally identified within soft landscaped areas within the eastern area of the site consisting of brown silty gravelly sand.	0.02 m	
Made Ground	Described in the eastern area of the site as consisting of embankment fill, locally identified, in the southern part of the site (near M56) reworked clay and a gravelly clay with gravels consisting of brick, asphalt, concrete and mudstone.	0.60 m to 1.50 m (Variable)	
Devensian Till	Described in detail within the eastern area of the site consisting of Clay with variable quantities of sands and gravels, locally identified silt mixtures and Sand strata with variable quantities of clay and gravel.	4.20 m to 7.00 m	
Bollin Mudstone Member	Mudstone encountered at variable shallow depths	18.00 m (proven thickness)	

Information from the British Geological Survey (BGS) website indicates there are six publicly available BGS historical boreholes located on or within 250 m of the site, a selection of which are presented in Appendix D.

The LANDIS soils database indicates that the soils are slowly permeable, seasonally wet, slightly acidic but base-rich loamy and clayey soils with impeded drainage.

3.4 Hydrogeology

Reference to the DEFRA 'Magic Map' online Aquifer Designation Map indicates the following:

- The site is underlain by a secondary undifferentiated aquifer relating to the superficial desposits of Devensian Clay

- The site is underlain by a secondary B aquifer relating to the bedrock geology of the Bollin Mudstone Formation.

The presence of low permeability clay at relatively shallow depths beneath the site, while restricting downwards migration, may increase the potential for lateral migration of shallow groundwater.

The anticipated depth to groundwater is unknown although it is likely that shallow water may be present in any made ground deposits present.

3.5 Groundwater 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.

Groundwater Source Protection Zones (SPZs) are not present either on-site or within the study area.

The Groundsure report for the proposed development area does not show any drinking water abstractions, groundwater abstractions or surface water abstractions within the boundaries (this information is provided for the Groundsure report by the Environment Agency).

There is no active discharge consents located within the development boundary or within 250m.

3.6 Watercourses, Land Drainage and other Waterbodies

Baguely Brook is present approximately 200m to the north. It begins downstream of Painswick Pond and flows in a north-westerly direction where it joins with Fairywell Brook to form Sinderland Brook approximately 5km north of the study area.

Both Baguley Brook and Fairywell Brook have been quite extensively modified through culverting in large areas due to the urban catchment, most notable in the residential areas to the far north of the Proposed Development (Woodhouse Park and Wythenshawe).

There is a tributary of Baguley Brook within the application area. It is culverted wholly through the eastern portion where it crosses Enterprise Way and exits into a hard engineered open channel. From here, it flows along the northern boundary before crossing Thorley Road in culvert and discharges to Painswick Pond further north.

This tributary is relatively minor and has an estimated peak flow of around 443 l/s or 0.443 cumecs based on an assessment undertaken by AECOM as part of the Enterprise Way highway scheme (which includes an allowance for climate change).

A copy of the existing watercourse network plan is provided in Appendix E.

3.7 Existing Public & Private Drainage

There is no public sewerage infrastructure within, and in the vicinity of, the development site shown on United Utilities sewer records

However, the Enterprise Way Link Road contains a number of existing foul and surface water drains which have been installed to serve both the highway works and surrounding masterplan area. In particular a number of foul and surface water stub connections have been provided to serve future development. Those of relevance to the application area include 4 No. 150mm diameter foul connections and 2 no. Surface water (225mm/ 600mm).

It is understood that these have been adopted by United Utilities but are not yet shown on records.

The foul water connections discharge into 150mm/ 300mm diameter foul drains which in turn connect into the existing United Utilities public sewer network at the junction of Bailey Lane and Hilary Road.

The surface water connections all discharge into the Enterprise Way drainage network which comprises oversized pipework to provide attenuation before it discharges to the local watercourse at a restricted rate.

Within both the eastern and western sections of the application site, a small network of surface water drains are present which serve the existing areas of hardstanding associated with the retained car parking.

A copy of United Utilities sewer records is provided in Appendix F with a copy of the AECOM Enterprise Way as-built drainage scheme in Appendix G.

3.8 Historical Flood Records

Manchester City Council Flood Risk Management Team have confirmed that they do not hold any recorded incidents of flooding within the site or close vicinity.

No records of historic sewer flooding were recorded at, or in the vicinity of the site in the SFRA.

An internet-based search did not uncover any flooding incidents.

4.0 FLOOD RISK APPRAISAL

4.1 Summary of Potential Sources

The table below summarises the flood risk across the site from various potential sources, these are then discussed in more detail in the proceeding sections.

Source of Flooding	Risk	Notes
Fluvial	**Low**	EA flood mapping indicates that the site is located in Flood Zone 1 This is an area with a low probability of flooding, defined as having a less than 1 in 1,000 (<0.1%) annual probability of flooding from rivers or the sea. A culverted ordinary watercourse is present within the eastern development area which continues through the western portion of the site in a hard engineered open channel. The catchment area and flow for this feature are not significant and there are no know flooding issues. The risk of fluvial flooding is considered to be **Low**.
Pluvial	**Low**	Surface water flood maps indicate some isolated areas of flooding for the 30, 100 and 1,000 year return periods across both the Outline and Full Application Sites. However, following a review of these against the topographic survey, they are all generally associated with existing open and culverted watercourse features along with local depressions and valleys in the topography. As the site is to be re-developed extensively, any other areas of surface water flooding will be managed/ mitigated as part of the development drainage design. The impact on the proposed development from surface water flooding is therefore considered to be **Low.**
Tidal	**N/A**	There is no risk of tidal flooding to the site.
Groundwater	**Low**	Reference to the Groundsure report for the Application Site indicates that there is a negligible risk of groundwater flooding. The bedrock deposits are classed as a secondary B aquifer, with superficial geological units defined as secondary undifferentiated aquifers. There are no Groundwater Source Protection Zones (SPZ's) present, nor are there any active discharge consents located within 250m of the Application Site. Soilscape (England) describes the site as having slowly permeable, seasonally wet, slightly acid but base-rich loamy and clayey soils with impeded drainage.

		BGS Groundwater Susceptibility mapping indicates that the site contains no inland geological indicators of flooding, and it is an area that has potential for groundwater flooding to property situated below ground level. No basements are to be provided as part of the development proposals. The risk of groundwater flooding to the development is considered to be **Low**.
Canal	**N/A**	The site is not located in the vicinity of any canals.
Sewer	**Low**	United Utilities sewer records indicate that sewerage infrastructure in the vicinity of the site is limited. There are no records of historic sewer flooding at, or in the vicinity of the proposed development. The topography of the site will largely follow existing and therefore it is considered that any potential exceedance flow, should it ever occur, would be contained within the road corridor and conveyed away from development towards the watercourse network. The proposed site surface water drainage system will be designed to maintain the 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 the 100 year plus climate change event can be retained safely on the surface. The impact on the proposed development from sewer flooding is therefore considered to be **Low.**

4.2 Fluvial Flood Risk

The Environment Agency and SFRA Flood Maps all indicate that the site is located in fluvial Flood Zone 1.

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

- Zone 1 (low probability) – Land assessed as having less than a 1 in 1,000 annual probability of river or sea flooding (<0.1%);

- Zone 2 (medium probability) – Land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%), or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5% – 0.1%) in any year; and

- Zone 3a (high probability) - Land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%), or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.

- Zone 3b The Functional Floodplain - This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the EA. (Not separately distinguished from Zone 3a on the Flood Map).

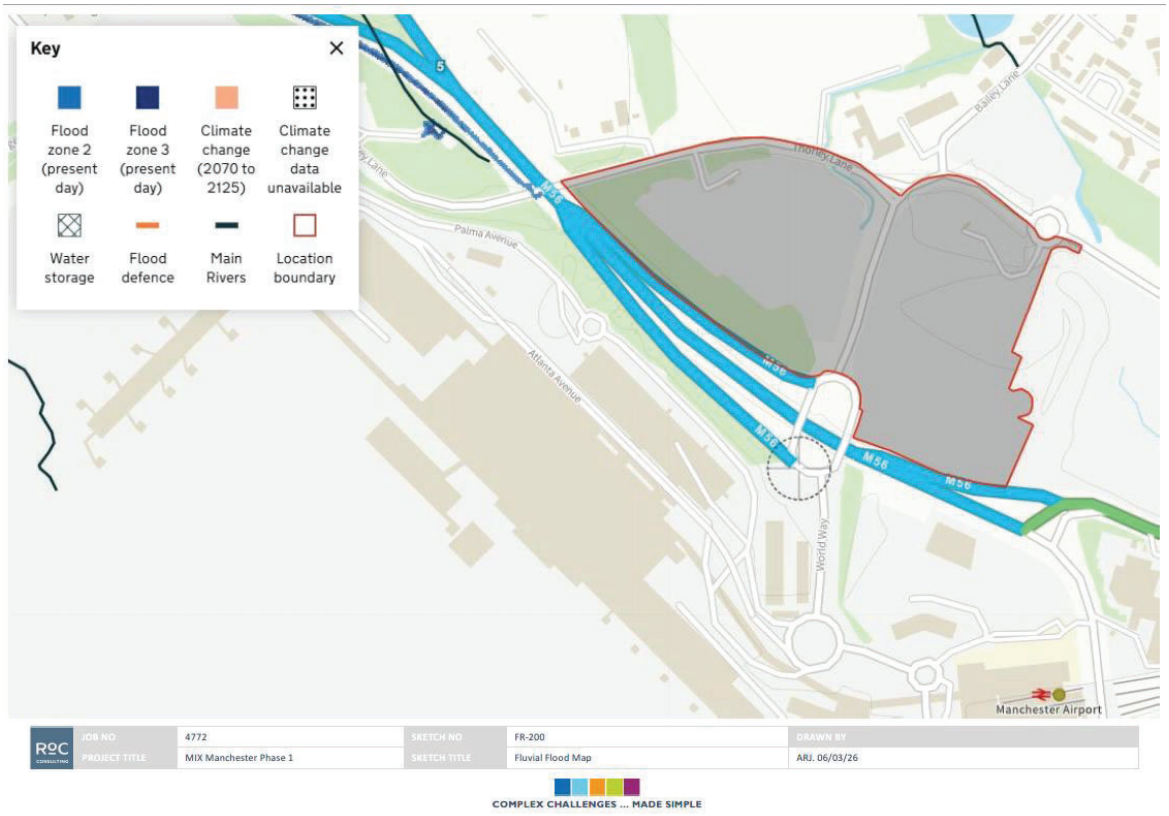


Figure 4.0 – Fluvial Flood Risk

As discussed in Section 3.6, there is a tributary of Baguley Brook within the application area. It is culverted wholly through the eastern portion where it crosses Enterprise Way and exits into a hard engineered open channel. From here, it flows along the northern boundary through Parcel A before crossing Thorley Road in culvert and discharges to Painswick Pond further north.

This tributary is relatively minor and has an estimated peak flow of around 443 l/s or 0.443 cumecs based on an assessment undertaken by AECOM as part of the Enterprise Way highway scheme (which includes an allowance for climate change).

It is intended that the open section present in the Parcel A will be culverted to facilitate development, subject to receiving land drainage consent from the LLFA.

Taking the above into consideration, the risk to the site from Fluvial Flooding is considered to be **LOW**.

4.3 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 flood mapping some isolated areas of flooding for the 30, 100 and 1,000 year return periods across the proposed development area.

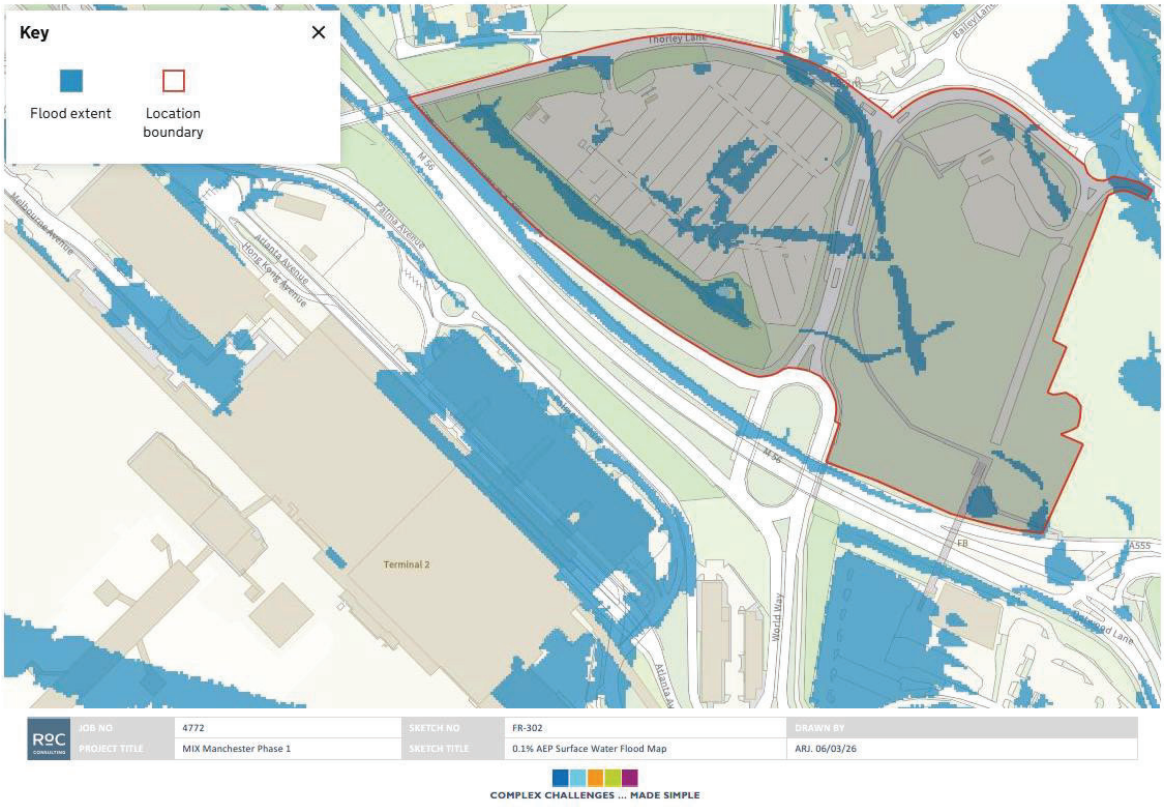


Figure 4.1 – 0.1% AEP Pluvial Flood Risk

This largely appears to correlate with the line of the existing ordinary watercourse which was partly culverted as part of previous enabling works in 2019/20.

The proposed levels strategy and topography of the existing surrounding area means that there is little likelihood of significant flows impacting on the proposed development or on land and property adjacent to the development. The proposed site levels mimic the existing topography which generally drains towards Enterprise Way/ Thorley Lane and provision for existing overland flow routes has been made within the levels strategy.

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

As both sites will be re-developed, with new surface water drainage and attenuation installed to capture run-off, the risk to the proposed development from surface water flooding is considered to be **LOW**.

4.4 Tidal Flood Risk

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

4.5 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.

If groundwater levels are naturally close to the surface, then this can present a flood risk during intense rainfall.

An intrusive investigation will be undertaken at detailed design stage to establish exact ground water levels and how they fluctuate seasonally. If required, measures will be introduced into the drainage scheme to deal with high ground water to ensure that flooding to property does not occur.

Given the nature of the development proposals, no basements are to be provided and therefore there will be no property located below ground level.

The SFRA identifies the site as not being in an area that is potentially susceptibility to groundwater flooding.

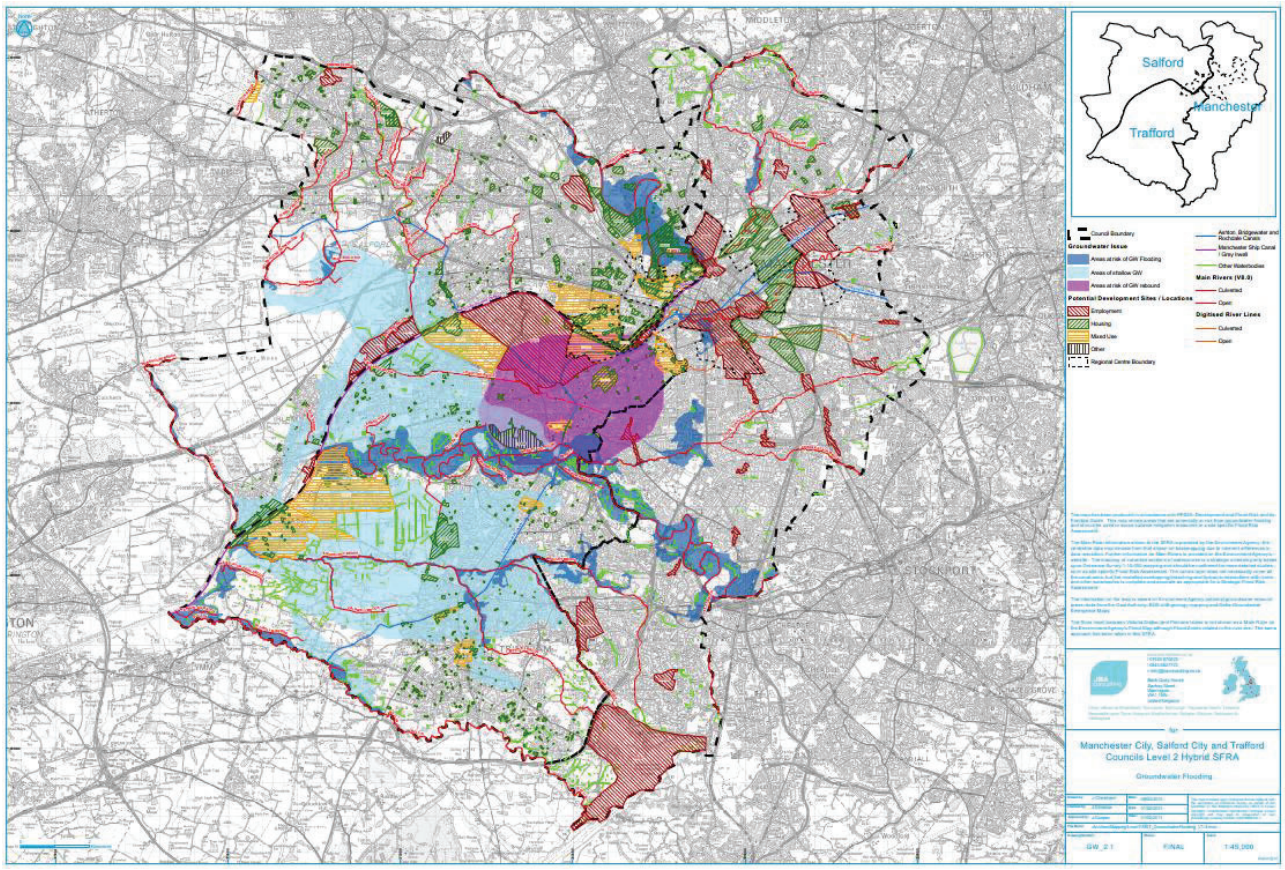


Figure 4.2 – SFRA Groundwater Flood Risk

British Geological Survey (BGS) Susceptibility mapping indicates that the site is an area that has both a negligible risk of groundwater flooding and the potential for groundwater flooding to property situated below ground level.

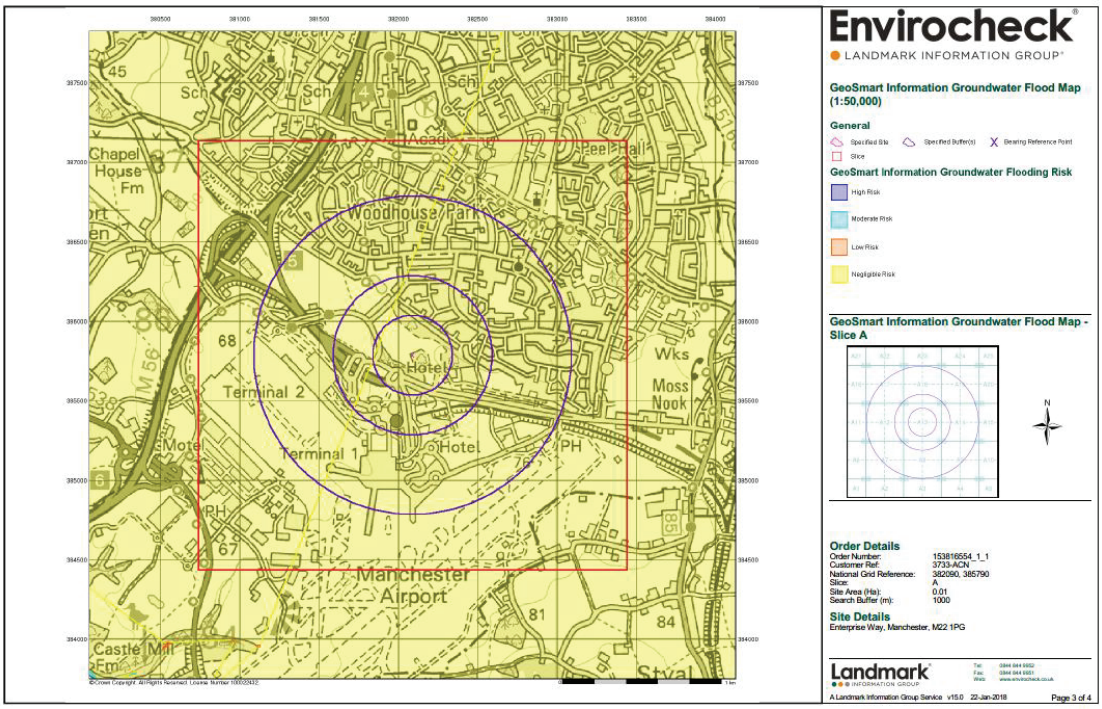


Figure 4.3 – Geosmart Groundwater Flood Map

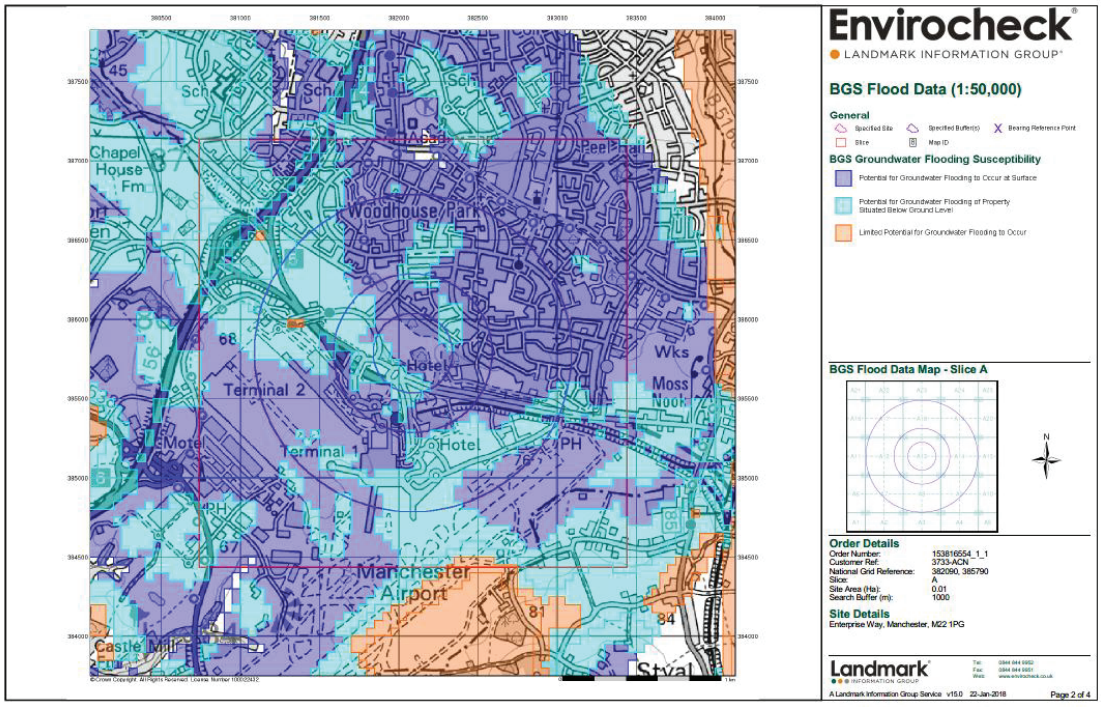


Figure 4.4 – BGS Flood Map

Superficial Geology at the site comprises predominantly Devensian Till, which comprises predominantly clay with pockets of sand and gravel.

Bedrock at the site comprises mudstone of the Bollin Mudstone Formation which is typically weathered to clay at shallow depths.

The bedrock deposits underlying the Application Site are classed as a secondary B aquifer, with superficial geological units defined as secondary undifferentiated aquifers. There are no Groundwater Source Protection Zones (SPZ's) present, nor are there any active discharge consents located within 250m of the Application Site.

It is therefore considered that the risk to the proposed development from groundwater is **LOW.**

4.6 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 therefore not considered to be any risk of flooding to the site from canals.

4.7 Sewer Flood Risk

Flooding from the sewer network can occur when flow entering the system, such as an urban storm water drainage system, exceeds its available discharge capacity, the system becomes blocked, or it cannot discharge due to a high-water level in the receiving watercourse. Pinch points and failures within the drainage network may also restrict flows. Water then begins to back up through the sewers and surcharge through manholes, potentially flooding highways, and properties.

There are no records of historic sewer flooding at, or in the vicinity of the study area. The topography of the Proposed Development will broadly follow existing and therefore it is considered that any flooding to the public sewers within the surrounding highway network, should it ever occur, would be contained within the road corridor and conveyed away from the development.

The proposed site surface water drainage system will be designed to maintain the 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 the 100 year plus climate change event can be retained safely on the surface.

Taking all the above into consideration, the risk of flooding to the development from surcharged drains or sewers can be considered as **LOW**.

4.8 Critical Drainage Area

The Manchester City, Salford City and Trafford Councils Level 2 Hybrid SFRA identifies the site as being located within a Critical Drainage Area. These are areas where:

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

The existing public sewer network in Enterprise Way, along with the culverted watercourse, have been specifically designed and installed to serve the proposed development site and wider area. The risk of surcharge, network failure or blockage can therefore be considered low.

In addition, the proposed site surface water drainage will restrict flows in line with previously agreed discharge rates, provide an appropriate amount of attenuation storage and consider the long-term effects of climate change. This will mitigate any impact on the local watercourse and sewer networks.

The measures outlined are considered to provide suitable mitigation and will not increase flood risk to the proposed development or any adjacent land and property.

4.9 Flood Risk Vulnerability Classification

The proposed development is commercial and can be considered ‘Less Vulnerable’ within Table 3: 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.

Figure 4.5 - Table 3: Flood risk Vulnerability and flood zone ’compatibility’

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

5.0 SURFACE WATER DRAINAGE STRATEGY

5.1 Runoff Destination

The National Standards for Sustainable Drainage Systems (SuDS) dictate a priority list of surface water run-off destinations, stating the following:

A 'SuDS approach' shall be adopted to address the management of surface water by the development and where it should be discharged. Runoff shall be treated as a resource and managed in a way that avoids negative impacts of the development on flood risk, the morphology and water quality of receiving waters and the associated ecology. Runoff from the development shall be discharged to the following final destinations, to the maximum extent practicable, in accordance with the below hierarchy:

- Priority 1 – Collected for non-potable use;
- Priority 2 – Infiltration to ground;
- Priority 3 - Discharged to an above ground surface water body;
- Priority 4 – Discharged to a surface water sewer, or another piped surface water drainage system
- Priority 5 – Discharged to a combined sewer.

Priority 1 – Collected for non-potable use
The proposed development is commercial and is considered to have a relatively low demand for non-potable water that could be re-used. The feasibility therefore of introducing a rainwater harvesting system to serve each individual building has been considered impracticable and has not been taken forward as a method of surface water management.

Priority 2 – Infiltration to ground
At this stage, no testing has been undertaken across the site from which to accurately determine the sites potential suitability for infiltration-based drainage solutions.

Specific testing, in accordance with BRE365, will be undertaken in support of future design proposals and it is intended that wherever possible infiltration SuDS will be utilised to dispose of surface water run-off.

However, based on the anticipated ground conditions that are expected to be encountered across the site, it is considered that infiltration-based methods are unlikely to be suitable as a primary measure for the disposal of surface water runoff.

Should testing demonstrate average or poor permeability then any SuDS systems, such as permeable pavements, would be designed for 'Partial Infiltration' with onward conveyance to site wide attenuation features.

Priority 3 - Discharge to an above ground surface water body
As described in Section 3.6, the nearest surface water feature is an Ordinary Watercourse that flows through the development site. This is partly culverted with the remainder comprising a hard engineered open channel formed with gabion baskets.

The culverted section is located in the eastern part of the development and based on its level and position within the site, a connection to this is not considered to be practicable.

Notwithstanding, the open section which flows through the western development area is considered to offer a suitable outfall point and therefore a positive connection to this for Parcel A is to be provided.

Gravity drainage is expected to be feasible given the level of the watercourse in relation to the site. However, this would need to be formally confirmed at the appropriate time when a more detailed strategy is developed.

Whilst discharge by infiltration will be prioritised wherever possible, it is not expected to be feasible and therefore a connection to the existing watercourse network will be required.

Priority 4 – Discharge to a surface water sewer or drain
The Enterprise Way Link Road contains a number of existing surface water drains which have been installed to serve both the highway works and surrounding masterplan. In particular a 600mm diameter stub connection has been provided at the entrance to the eastern site area to serve future development.

This surface water drainage system flows eastward where it discharges to a further Ordinary Watercourse which is also a tributary of Baguley Brook.

On the basis that infiltration is not expected to be feasible and a direct connection to the culverted watercourse within this part of the development site is not practicable then discharge via the existing surface water sewer network is required.

Priority 5 – Discharged to a combined sewer
There are no combined sewers in close proximity to the development site. Nevertheless, there is no requirement to utilise this for the disposal of surface water runoff due to the availability of higher priority options as described above. This has therefore not been considered further.

5.2 Runoff Rate

The existing site is brownfield and can be classed as both permeable and impermeable due to the range of surfacing that is currently present.

However, based on the nature of the development proposals there will be an increase in impermeable area over existing and therefore the runoff generated will increase.

For the purposes of calculating potential restricted discharge figures, the existing greenfield run-off rates have been calculated using the Institute of Hydrology Report 124 Flood Estimation for Small Catchments (1991) via the greenfield run-off estimation tool on the UK SuDS Website www.uksuds.com

The IH124 publication provides the essential design elements for determining the estimated Greenfield run-off rate which is based on the site area, soil type, and average annual rainfall, which is influenced by the location of the site within the United Kingdom. This methodology is recommended within the joint DEFRA & Environment Agency Technical Report SC030219 'Rainfall run-off management for development' (2013).

The analysis for determining the peak Greenfield discharge rate uses 50ha in the formula and linearly interpolates the flow rate value based on the ratio of the development to 50ha.

The table below summarises the existing greenfield run-off rates generated for a range of storm return periods.

Gross Area (ha)	Q1	QBAR	Q30	Q100
50	253.8	291.7	495.9	606.8
l/s/ha	5.08	5.83	9.91	12.13

Notwithstanding the above, AECOM agreed restricted discharge rates with Manchester City Council as Lead Local Flood Authority for the whole masterplan area as part of their drainage strategy for the Enterprise Way Link Road (100268/FO/2012/S2). The surface water drainage system has been designed to accommodate flows from the proposed development site at a maximum rate of 5 litres per second per hectare.

This rate is marginally less than the calculated Q1 greenfield runoff figure above and therefore it is proposed that the new surface water drainage system will restrict discharge from the site to the pre-agreed 5.0 l/s/ha.

As indicated in Section 5.1, the proposed development will require two outfall points. The eastern part of the site which comprises both Detailed and Outline Elements will discharge via the existing Enterprise Way surface water drainage system. The western part of the site, which comprises the Outline Element Parcel A, will discharge via the existing Ordinary Watercourse within the development boundary.

The table below details the proposed restricted discharge rates for each outfall point.

Restricted Discharge Rates					
Outfall Location	**Parcel**	**Units**	**Gross Area (ha)**	**Impermeable Area (ha)**	**Q (l/s)**
East Enterprise Way Sewer	B, C, D	A1, A2, A5, A7, E1	5.11	3.85	25.55
West Ordinary Watercourse	A		5.48	3.60	27.41

5.3 Sustainable Drainage Systems

Current policy and best practice encourages the use of Sustainable Drainage Systems (SuDS) and in particular infiltration systems.

The Environment Agency recommends that “surface water run-off should be controlled as near to its source as possible through a sustainable drainage approach to surface water management.

As indicated in Section 5.1, infiltration-based drainage solutions are anticipated to not be feasible, and the proposed method of disposal will be to the ordinary watercourse network both directly and indirectly.

It is intended that permeable paving will be employed extensively across the proposed development alongside bio-retention planting and filter drains. These will act as a first stage of capture and treatment before conveying onto the below ground geocellular attenuation tanks installed beneath the access roads.

No new standing water features are proposed and all new Sustainable Drainage System (SuDS) features comprise of swales along with bio-retention and softscape features. All new SuDS features that may hold open water above ground will be typically dry and will have a drain down time of less than 48 hours.

A copy of the drainage strategy drawings for the development are contained in L and M.

5.4 Hydraulic Design

Micro drainage software by Innovyze has been used to design the proposed piped network and attenuation for the eastern part of the development as this contains the detailed elements of the hybrid planning application.

The surface water drainage network has been designed to satisfy the following performance criteria.

- No surcharging for the critical 2-year return period storm event

- No flooding of the network for the critical 30-year return period storm event
- No significant surface flooding for the critical 100-year plus climate change return period.

The extracts below show the results from micro drainage for the critical 2-year, 30 year+40% CC and 100 year +45% CC storm event ranked by Maximum Level.

Climate change allowances for the 3.3% and 1% AEP events are based on the Upper End Allowances defined by the Environment Agency for the Upper Mersey Management Catchment.

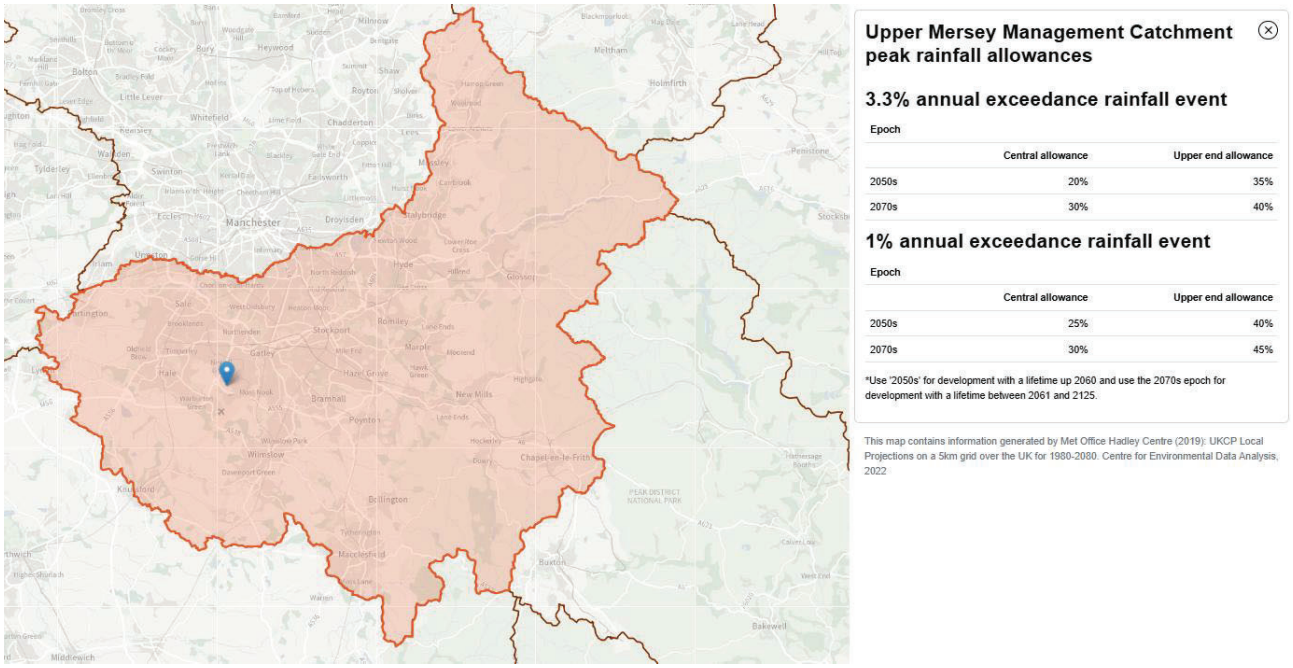


Figure 5.0 Climate Change Allowances

2 year return period Critical Summary of Results by Maximum Level (Rank 1)

Pipe Number	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Maximum Vol (m³)	Discharge Vol (m³)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	1.00	15 minute 2 year Summer I+0%	71.770	70.583	-0.067	0.000	0.58	0.088	3.829		8.7	OK
2.000	FD-1	15 minute 2 year Summer I+0%	72.000	70.533	-0.117	0.000	0.68	0.050	19.296		44.1	OK
1.001	1.01	15 minute 2 year Summer I+0%	71.740	70.434	-0.148	0.000	0.51	0.314	23.126		52.9	OK
3.000	1.02	15 minute 2 year Summer I+0%	71.830	70.588	-0.242	0.000	0.07	0.060	2.283		5.2	OK
3.001	1.03	15 minute 2 year Summer I+0%	71.950	70.537	-0.170	0.000	0.56	0.630	36.526		70.1	OK
4.000	1.04	15 minute 2 year Summer I+0%	71.970	70.737	-0.225	0.000	0.00	0.000	0.000		0.0	OK
4.001	1.05	15 minute 2 year Summer I+0%	71.970	70.631	-0.225	0.000	0.00	0.000	0.000		0.0	OK
3.002	1.06	15 minute 2 year Summer I+0%	71.990	70.422	-0.138	0.000	0.72	1.751	39.398		75.5	OK
3.003	1.07	15 minute 2 year Summer I+0%	71.500	68.905	-0.136	0.000	0.73	0.414	39.399		75.1	OK
1.002	1.08	15 minute 2 year Summer I+0%	71.660	68.837	-0.156	0.000	0.76	0.931	62.525		127.1	OK
5.000	ST-1	15 minute 2 year Summer I+0%	71.470	69.804	-0.141	0.000	0.30	0.090	4.492		10.3	OK
1.003	1.09	15 minute 2 year Summer I+0%	71.270	68.647	-0.283	0.000	0.50	1.164	74.604		140.3	OK
6.000	ST-2	15 minute 2 year Summer I+0%	70.990	68.682	-0.139	0.000	0.56	0.176	14.949		34.2	OK
7.000	ST-3	15 minute 2 year Summer I+0%	71.150	68.706	-0.123	0.000	0.64	0.194	17.306		39.5	OK
1.004	1.10	60 minute 2 year Summer I+0%	70.930	68.453	-0.328	0.000	0.32	75.325	166.307		84.7	OK
1.005	1.11	120 minute 2 year Summer I+0%	70.730	68.419	-0.277	0.000	0.41	50.821	209.352		89.1	OK
8.000	ST-4	15 minute 2 year Summer I+0%	71.030	68.643	-0.109	0.000	0.72	0.210	21.283		48.6	OK
1.006	1.12	60 minute 2 year Summer I+0%	70.790	68.414	-0.265	0.000	0.32	1.273	187.898		101.0	OK
1.007	1.13	60 minute 2 year Summer I+0%	70.610	68.400	-0.226	0.000	0.28	2.086	206.113		106.2	OK
1.008	1.14	120 minute 2 year Summer I+0%	70.410	68.377	-0.104	0.000	0.22	6.230	291.767		79.8	OK
9.000	ST-5	15 minute 2 year Summer I+0%	71.210	68.691	-0.212	0.000	0.19	0.093	5.008		11.4	OK
9.001	1.15	360 minute 2 year Summer I+0%	71.110	68.296	-0.464	0.000	0.02	0.334	23.948		4.3	OK
10.000	ST-6	15 minute 2 year Summer I+0%	70.920	68.596	-0.103	0.000	0.76	0.217	20.325		46.4	OK
11.000	FD-2	15 minute 2 year Summer I+0%	70.825	68.534	-0.159	0.000	0.45	0.039	11.490		26.3	OK
9.002	1.16	360 minute 2 year Summer I+0%	70.770	68.296	-0.366	0.000	0.05	64.828	116.471		11.6	OK
12.000	ST-7	15 minute 2 year Summer I+0%	70.770	68.489	-0.115	0.000	0.69	0.203	18.484		42.2	OK
9.003	1.17	360 minute 2 year Summer I+0%	70.770	68.296	-0.268	0.000	0.07	104.044	165.397		16.4	OK
13.000	FD-3	15 minute 2 year Summer I+0%	70.610	68.495	-0.100	0.000	0.88	0.076	41.243		94.3	OK
9.004	1.18	360 minute 2 year Summer I+0%	70.770	68.298	-0.240	0.000	0.10	1.884	284.590		20.8	OK
14.000	1.19	360 minute 2 year Summer I+0%	70.480	68.297	-0.266	0.000	0.00	0.838	-0.053		0.3	OK
9.005	D-1	360 minute 2 year Summer I+0%	70.600	68.297	-0.225	0.000	0.08	5.225	283.764		19.6	OK*
9.006	1.20	360 minute 2 year Summer I+0%	70.340	68.291	-0.157	0.000	0.07	211.745	294.449		20.5	OK
9.007	1.21	120 minute 2 year Summer I+0%	70.390	68.292	-0.085	0.000	0.08	5.686	-30.328		19.3	OK
15.000	FD-4	120 minute 2 year Summer I+0%	70.340	68.324	-0.059	0.000	0.46	0.067	53.382		27.5	OK
1.009	1.22	120 minute 2 year Summer I+0%	70.340	68.320	0.271	0.000	0.26	9.113	308.576		25.2	SURCHARGED

Figure 5.1 - 2 Year Return Period Critical Results Summary

30 year return period Critical Summary of Results by Maximum Level (Rank 1)

Pipe Number	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Maximum Vol (m³)	Discharge Vol (m³)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	1.00	15 minute 30 year Summer I+40%	71.770	71.057	0.407	0.000	1.53	0.624	10.133		23.0	SURCHARGED
2.000	FD-1	15 minute 30 year Summer I+40%	72.000	71.132	0.482	0.000	1.77	0.220	51.061		114.3	SURCHARGED
1.001	1.01	15 minute 30 year Summer I+40%	71.740	70.915	0.332	0.000	1.29	1.216	61.196		135.1	SURCHARGED
3.000	1.02	15 minute 30 year Summer I+40%	71.830	71.466	0.636	0.000	0.27	1.053	6.028		18.7	SURCHARGED
3.001	1.03	15 minute 30 year Summer I+40%	71.950	71.452	0.745	0.000	1.86	3.614	96.656		230.9	SURCHARGED
4.000	1.04	15 minute 30 year Summer I+40%	71.970	70.847	-0.115	0.000	0.04	0.119	0.000		1.5	OK
4.001	1.05	15 minute 30 year Summer I+40%	71.970	70.873	0.018	0.000	0.15	0.736	0.007		5.9	SURCHARGED
3.002	1.06	15 minute 30 year Summer I+40%	71.990	70.901	0.341	0.000	2.33	6.023	104.264		243.9	SURCHARGED
3.003	1.07	15 minute 30 year Summer I+40%	71.500	69.949	0.908	0.000	2.37	2.259	104.264		243.8	SURCHARGED
1.002	1.08	15 minute 30 year Summer I+40%	71.660	69.583	0.591	0.000	2.23	2.730	165.340		375.7	SURCHARGED
5.000	ST-1	15 minute 30 year Summer I+40%	71.470	69.873	-0.072	0.000	0.79	0.168	11.887		27.1	OK
1.003	1.09	15 minute 30 year Summer I+40%	71.270	69.137	0.207	0.000	1.46	3.794	196.247		408.6	SURCHARGED
6.000	ST-2	360 minute 30 year Winter I+40%	70.990	69.103	0.282	0.000	0.21	0.653	110.516		12.7	SURCHARGED
7.000	ST-3	360 minute 30 year Winter I+40%	71.150	69.104	0.275	0.000	0.24	0.645	127.982		14.7	SURCHARGED
1.004	1.10	360 minute 30 year Winter I+40%	70.930	69.102	0.321	0.000	0.31	268.814	639.787		82.5	SURCHARGED
1.005	1.11	360 minute 30 year Winter I+40%	70.730	69.096	0.399	0.000	0.20	155.314	545.998		43.7	SURCHARGED
8.000	ST-4	360 minute 30 year Winter I+40%	71.030	69.098	0.346	0.000	0.27	0.725	157.322		18.5	SURCHARGED
1.006	1.12	360 minute 30 year Winter I+40%	70.790	69.093	0.414	0.000	0.19	4.150	700.038		60.0	SURCHARGED
1.007	1.13	360 minute 30 year Winter I+40%	70.610	69.091	0.466	0.000	0.18	4.908	779.987		67.0	SURCHARGED
1.008	1.14	480 minute 30 year Winter I+40%	70.410	69.075	0.594	0.000	0.15	9.743	970.223		54.6	SURCHARGED
9.000	ST-5	480 minute 30 year Winter I+40%	71.210	69.050	0.147	0.000	0.06	0.499	39.894		3.5	SURCHARGED
9.001	1.15	480 minute 30 year Winter I+40%	71.110	69.049	0.289	0.000	0.02	2.534	64.596		5.5	SURCHARGED
10.000	ST-6	480 minute 30 year Winter I+40%	70.920	69.050	0.351	0.000	0.23	0.731	161.631		14.2	SURCHARGED
11.000	FD-2	480 minute 30 year Winter I+40%	70.825	69.050	0.357	0.000	0.14	0.184	91.413		8.0	SURCHARGED
9.002	1.16	480 minute 30 year Winter I+40%	70.770	69.049	0.388	0.000	0.04	280.836	165.865		8.3	SURCHARGED
12.000	ST-7	480 minute 30 year Winter I+40%	70.770	69.050	0.446	0.000	0.21	0.838	146.826		12.8	SURCHARGED
9.003	1.17	480 minute 30 year Winter I+40%	70.770	69.049	0.486	0.000	0.05	336.338	117.590		11.3	SURCHARGED
13.000	FD-3	480 minute 30 year Winter I+40%	70.610	69.051	0.456	0.000	0.27	0.233	328.038		28.7	SURCHARGED
9.004	1.18	480 minute 30 year Winter I+40%	70.770	69.049	0.511	0.000	0.08	5.285	441.455		16.4	SURCHARGED
14.000	1.19	480 minute 30 year Winter I+40%	70.480	69.049	0.486	0.000	0.00	2.751	-1.531		0.1	SURCHARGED
9.005	D-1	2880 minute 30 year Summer I+40%	70.600	68.523	0.000	0.000	0.05	10.129	1224.872		13.0	SURCHARGED*
9.006	1.20	480 minute 30 year Winter I+40%	70.340	69.048	0.599	0.000	0.09	562.232	170.745		26.9	SURCHARGED
9.007	1.21	480 minute 30 year Winter I+40%	70.390	69.069	0.691	0.000	0.10	8.768	162.978		23.1	SURCHARGED
15.000	FD-4	480 minute 30 year Winter I+40%	70.340	69.073	0.690	0.000	0.30	0.279	203.671		18.0	SURCHARGED
1.009	1.22	480 minute 30 year Winter I+40%	70.340	69.072	1.022	0.000	0.26	12.707	1325.431		25.5	SURCHARGED

Figure 5.2 - 30 Year+40% Return Period Critical Results Summary

100 year return period Critical Summary of Results by Maximum Level (Rank 1)

Pipe Number	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Maximum Vol (m³)	Discharge Vol (m³)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	1.00	15 minute 100 year Summer I+45%	71.770	71.770	1.120	0.072	2.04	1.503	13.548		30.7	FLOOD
2.000	FD-1	15 minute 100 year Summer I+45%	72.000	71.898	1.248	0.000	2.33	0.436	68.273		151.1	FLOOD RISK
1.001	1.01	15 minute 100 year Summer I+45%	71.740	71.533	0.951	0.000	1.67	1.915	81.822		175.2	FLOOD RISK
3.000	1.02	15 minute 100 year Summer I+45%	71.830	71.834	1.004	3.968	0.84	5.232	8.084		58.7	FLOOD
3.001	1.03	15 minute 100 year Summer I+45%	71.950	71.917	1.211	0.000	2.33	4.437	129.259		289.2	FLOOD RISK
4.000	1.04	15 minute 100 year Summer I+45%	71.970	71.099	0.137	0.000	0.08	0.404	-0.002		3.1	SURCHARGED
4.001	1.05	15 minute 100 year Summer I+45%	71.970	71.104	0.248	0.000	0.22	1.115	0.003		9.1	SURCHARGED
3.002	1.06	15 minute 100 year Summer I+45%	71.990	71.120	0.560	0.000	2.90	6.410	139.423		303.3	SURCHARGED
3.003	1.07	15 minute 100 year Summer I+45%	71.500	70.555	1.514	0.000	2.85	4.216	139.238		293.9	SURCHARGED
1.002	1.08	15 minute 100 year Summer I+45%	71.660	70.025	1.032	0.000	2.79	4.265	220.412		468.5	SURCHARGED
5.000	ST-1	15 minute 100 year Summer I+45%	71.470	69.945	0.000	0.000	1.06	0.249	15.893		36.4	OK
1.003	1.09	720 minute 100 year Winter I+45%	71.270	69.686	0.756	0.000	0.18	5.207	870.254		51.1	SURCHARGED
6.000	ST-2	720 minute 100 year Winter I+45%	70.990	69.684	0.863	0.000	0.16	1.310	174.873		10.1	SURCHARGED
7.000	ST-3	720 minute 100 year Winter I+45%	71.150	69.684	0.855	0.000	0.19	1.301	202.534		11.7	SURCHARGED
1.004	1.10	720 minute 100 year Winter I+45%	70.930	69.684	0.903	0.000	0.24	428.634	1027.943		63.7	SURCHARGED
1.005	1.11	720 minute 100 year Winter I+45%	70.730	69.684	0.987	0.000	0.13	240.343	898.201		28.3	SURCHARGED
8.000	ST-4	720 minute 100 year Winter I+45%	71.030	69.688	0.936	0.000	0.21	1.392	249.025		14.5	SURCHARGED
1.006	1.12	720 minute 100 year Winter I+45%	70.790	69.687	1.007	0.000	0.12	5.660	1143.500		39.5	SURCHARGED
1.007	1.13	720 minute 100 year Winter I+45%	70.610	69.692	1.067	0.000	0.12	6.438	1271.783		46.9	SURCHARGED
1.008	1.14	720 minute 100 year Winter I+45%	70.410	69.694	1.212	0.000	0.14	11.318	1362.967		52.5	SURCHARGED
9.000	ST-5	720 minute 100 year Winter I+45%	71.210	69.696	0.793	0.000	0.06	1.231	58.361		3.4	SURCHARGED
9.001	1.15	720 minute 100 year Winter I+45%	71.110	69.696	0.936	0.000	0.02	4.178	94.053		5.5	SURCHARGED
10.000	ST-6	720 minute 100 year Winter I+45%	70.920	69.697	0.998	0.000	0.23	1.462	237.685		14.0	SURCHARGED
11.000	FD-2	720 minute 100 year Winter I+45%	70.825	69.696	1.003	0.000	0.13	0.367	134.526		7.9	SURCHARGED
9.002	1.16	720 minute 100 year Winter I+45%	70.770	69.696	1.034	0.000	0.04	445.848	213.377		9.8	SURCHARGED
12.000	ST-7	720 minute 100 year Winter I+45%	70.770	69.697	1.093	0.000	0.20	1.570	215.940		12.5	SURCHARGED
9.003	1.17	720 minute 100 year Winter I+45%	70.770	69.696	1.132	0.000	0.10	489.371	124.705		23.8	SURCHARGED
13.000	FD-3	720 minute 100 year Winter I+45%	70.610	69.697	1.102	0.000	0.26	0.416	483.054		28.2	SURCHARGED
9.004	1.18	720 minute 100 year Winter I+45%	70.770	69.695	1.157	0.000	0.12	6.928	602.621		27.0	SURCHARGED
14.000	1.19	600 minute 100 year Winter I+45%	70.480	69.694	1.131	0.000	0.01	4.393	-2.837		1.2	SURCHARGED
9.005	D-1	2880 minute 100 year Summer I+45	70.600	68.523	0.000	0.000	0.07	10.619	1589.807		16.7	SURCHARGED*
9.006	1.20	600 minute 100 year Winter I+45%	70.340	69.695	1.246	0.000	0.09	747.359	18.098		25.9	SURCHARGED
9.007	1.21	600 minute 100 year Winter I+45%	70.390	69.693	1.315	0.000	0.09	10.356	9.295		22.0	SURCHARGED
15.000	FD-4	600 minute 100 year Winter I+45%	70.340	69.693	1.310	0.000	0.34	0.454	287.505		20.2	SURCHARGED
1.009	1.22	720 minute 100 year Winter I+45%	70.340	69.692	1.642	0.000	0.26	14.855	1841.400		25.5	SURCHARGED

Figure 5.3 - 100 Year+45% Return Period Critical Results Summary

The results demonstrate that the surface water drainage system is able to operate satisfactorily with only a nominal amount of flooding in the 100 year +45% return period. This amounts to circa 4m^3 which would be safely stored on the surface before draining back into the drainage system.

A full copy of the micro drainage calculations is provided in Appendix N.

For Parcel A which forms the Outline Element of the western part of the development, The Microdrainage Quick Storage Estimate tool has been used estimate the storage volume required on-site for the 30 and 100-year storm events plus an allowance for climate change. These are detailed in the table below.

Parcel A - Preliminary Attenuation Volume				
Gross Area (ha)	**Impermeable Area (ha)**	**Max Discharge (l/s)**	**Q30+40% Volume (m3)**	**Q100+45% Volume (m3)**
5.48	3.60	27.4	1,737	2,451

Full hydraulic calculations will be undertaken as part of a future reserved matters application.

6.0 FOUL WATER DRAINAGE STRATEGY

It is proposed to install a new foul water drainage system to serve the proposed development which will utilise the existing drainage infrastructure provided by AECOM as part of the Enterprise Way link road.

Stub connections have been provided at appropriate locations around the boundary which will be used for the disposal of foul drainage. This foul drainage network connects into the United Utilities public sewer network and will be adopted by them through a S104/S106 agreement at the appropriate time when development comes forward.

Preliminary calculations have been undertaken for the development which estimate a peak foul discharge of 10.0 l/s. This is indicative only and subject to confirmation at detailed design stage.

The foul water strategy drawing for the site is shown alongside the surface water drainage scheme in Appendix L & M.

It is anticipated that a gravity connection to this existing foul drainage will be achievable based on the installed depths.

7.0 FLOOD RISK MITIGATION MEASURES

7.1 Development Levels

The proposed development site is located in Flood Zone 1. The only restriction therefore in flood risk terms on finished floor levels is that they should be set a minimum of 150mm above proposed ground levels with external areas designed to fall away from buildings wherever possible.

Where there are low spots in the topography within areas proposed for development, levels will be adjusted to ensure that surface water ponding does not occur, and exceedance flow paths are maintained.

Finished surface levels for the site have been produced to help inform finished floor levels, determine appropriate areas for surface water attenuation/ SuDS features and provide a high-level assessment of cut / fill volumes.

Generally, proposed site levels are largely to remain at or around existing, with some raising / lowering required to achieve suitable gradients to proposed access roads, development areas and facilitate drainage.

A copy of these drawings is contained in Appendix O.

7.2 Safe Access & Egress

A safe access and egress route with a 'very low' hazard rating is required for any development located in areas at risk of flooding. This should be provided to an area that is wholly outside of the 1% AEP plus climate change flood extent.

As the site is primarily located in fluvial Flood Zone 1, then safe access and egress for site occupants and visitors is not considered to be an issue.

7.3 Proposed Drainage

The new foul and surface water drainage systems that will serve the development will be designed to maintain flows below ground / within surface attenuation features where applicable.

Surface levels and gradients will be directed to gullies, channels, bioretention green SuDS features or direct through permeable surfacing to prevent the pooling and collection of water above ground.

Generally, surface flooding of areas will be minimised and there is expected there will be none except for the most extreme events. However, this would quickly drain back into the on-site drainage system and therefore not pose a risk.

Should pumping stations be provided where gravity drainage is not feasible, these will be designed with sufficient emergency storage to avoid any potential flooding in the event of a power cut or pump failure.

As with any drainage system, blockages within the foul and surface water sewer systems constructed to serve the development have the potential to cause flooding or disruption. Any drainage systems which are not to be offered for adoption to either the Water Company or the Local Authority will have a suitable maintenance regime scheduled and an appropriate management company appointed to carry out the works.

8.0 MANAGEMENT PLAN

The proposed drainage system for the development adopts SuDS measures alongside traditional drainage techniques. It is important that these are maintained to ensure that all elements operate effectively for their lifetime.

Like any drainage system, maintenance is a necessary and important consideration of Sustainable Drainage System (SUDS) design. If systems are properly monitored and maintained, any deterioration in performance can often be managed out.

Effective maintenance will help to ensure that the SuDS features continue to function as they were intended and keep hydraulic capacity and pollutant removal efficiency of the systems at design levels.

Based on the nature of the development, it is anticipated that the foul and surface water drainage systems would remain private and have a management company appointed to provide regular and re-active maintenance as necessary.

Requirements for the ongoing maintenance of the drainage network will form part of the Operation and Maintenance manual for the site. Any specialist or proprietary products specified at detailed design stage (e.g. hydrodynamic seperators) should have a specific maintenance regime which will be included in the document.

The table provides preliminary details on the recommended maintenance requirements for the drainage scheme. This will be updated as necessary post-planning following detailed design and included within the Operation and Maintenance Plan.

Drainage Feature		Action Required	Typical Frequency
Gully's & Channels	Occasional Maintenance	Inspect cover and frame for any defects, repair and replace as necessary.	Quarterly
		Inspect channels for the build-up of silt and debris. Removal of silt and debris by means of vacuum suction and or jetting/ rodding.	
		Inspect sumps and outgoing pipework for the build-up of silt and debris. Removal of silt and debris by means of vacuum suction and or jetting/ rodding.	
Manholes/ Catchpits	Occasional Maintenance	Inspect chamber cover and frame for any defects, repair and replace as necessary. Inspect chamber interior and incoming/ outgoing pipes for the build-up of silt and debris. Removal of silt and debris by means of vacuum suction and or jetting/ rodding. Ensure manhole access steps/ ladders are secured and inspect for corrosion.	Quarterly
Hydrodynamic Separator	Regular Maintenance	Normally, little maintenance is required as there are no moving parts within the device. However, it is recommended that each unit should be inspected for debris or blockages	6 monthly to determine rate of sediment accumulation then as required.
Filter drains	Regular Maintenance	Remove litter (including leaf litter) and debris from filter drain surface, access chambers and pre-treatment devices	Monthly
		Inspect filter drain surface, inlet/outlet pipework and control systems for blockages, clogging, standing water and structural damage	Monthly
		Inspect pre-treatment systems, inlets and perforated pipework for silt accumulation and establish appropriate silt removal frequencies	Six monthly
	Occasional Maintenance	Remove or control tree roots where they are encroaching the sides of the filter drain using recommended methods	As required

		At locations with high pollution loads remove surface geotextile and replace, and replace overlying filter medium	As required
		Clear perforated pipework of blockages	As required
Permeable Surfaces	Regular Maintenance	Remove litter (including leaf litter) and debris from the surface	Monthly or as required
		Inspect permeable surfacing and rake/ scarify any granular areas which become over compacted to improve performance. Make good any defects to the surface ensuring consistent even gradients	Monthly for 3 months then 6 monthly
	Occasional Maintenance	Manage other vegetation and remove nuisance plants/ weeds.	Monthly then as required
Geocellular Attenuation	Regular Maintenance	Inspect and identify any areas that are not operating correctly. If required take remedial actions	Monthly for 3 months then annually.
		Remove debris from the catchment surface i.e. driveways and associated hardstanding areas	Monthly
		Remove sediment from inlet manhole	Annually or as required
	Occasional Maintenance	Repair/ rehabilitate inlets and vents	As required
		Inspect/ check all inlets and vents to ensure they are in good conditions and operating as designed.	Annually
		Survey drainage system up to tank for sediment build-up and remove if necessary	As required
Flow Control Devices	Regular Maintenance	Normally, little maintenance is required as there are no moving parts within the device. However, it is recommended that each unit should be inspected for debris or blockages	Monthly for 3 months then 6 monthly

9.0 SUMMARY

9.1 Flood Risk

The Environment Agency and SFRA Flood Maps all indicate that the proposed development site is located in fluvial Flood Zone 1.

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

Zone 1 (low probability) – Land assessed as having less than a 1 in 1,000 annual probability of river or sea flooding (<0.1%)

The Flood Risk Assessment has reviewed all sources of flood risk to both the proposed development and to the 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 will it increase flood risk off-site.

There are some isolated areas of surface water flooding indicated within the site. However, these are all generally associated with existing depressions and low points in the topography. As the site is to be re-developed any areas of surface water flooding will be managed / mitigated as part of the development drainage design. The proposed levels strategy and topography of the existing surrounding area means that there is little likelihood of significant flows impacting on the proposed development or on land and property adjacent to the development.

The development is always accessible for emergency access and egress as the flood plain does not extend into the area proposed for development.

9.2 Surface Water

Surface water run-off from the site is to be controlled to a maximum rate of 5.0 l/s/ha. This was agreed by AECOM with MCC LLFA for the whole masterplan area as part of the drainage design for the Enterprise Way Link Road (100268/FO/2012/S2). This rate is lower than the calculated Q1 greenfield runoff figure and therefore offers a significant betterment then the pre-development scenario.

Ground conditions are expected to preclude the use of infiltration-based drainage solutions. However, testing will be undertaken at the appropriate time to confirm the sites infiltration potential and provide more detail on groundwater levels.

The proposed development will outfall to the existing local ordinary watercourse network both directly and indirectly. The eastern part of the development will connect into the existing surface water drainage system in Enterprise Way with the western extent utilising the watercourse within the site boundary.

The table below details the proposed restricted discharge rates.

Restricted Discharge Rates			
Outfall Location	**Gross Area (ha)**	**Impermeable Area (ha)**	**Q (l/s)**
East of Enterprise Way outfall to Adopted Sewer	5.11	3.85	25.55
West of Enterprise Way outfall to Ordinary Watercourse	5.48	3.60	27.41

It is proposed that the existing hard engineering watercourse that flows through Parcel A will be culverted to facilitate development. This will be subject to Land Drainage Consent.

The total volume of attenuation required has been calculated as 4,688m^3. This includes a 45% allowance for climate change.

9.3 Foul Water

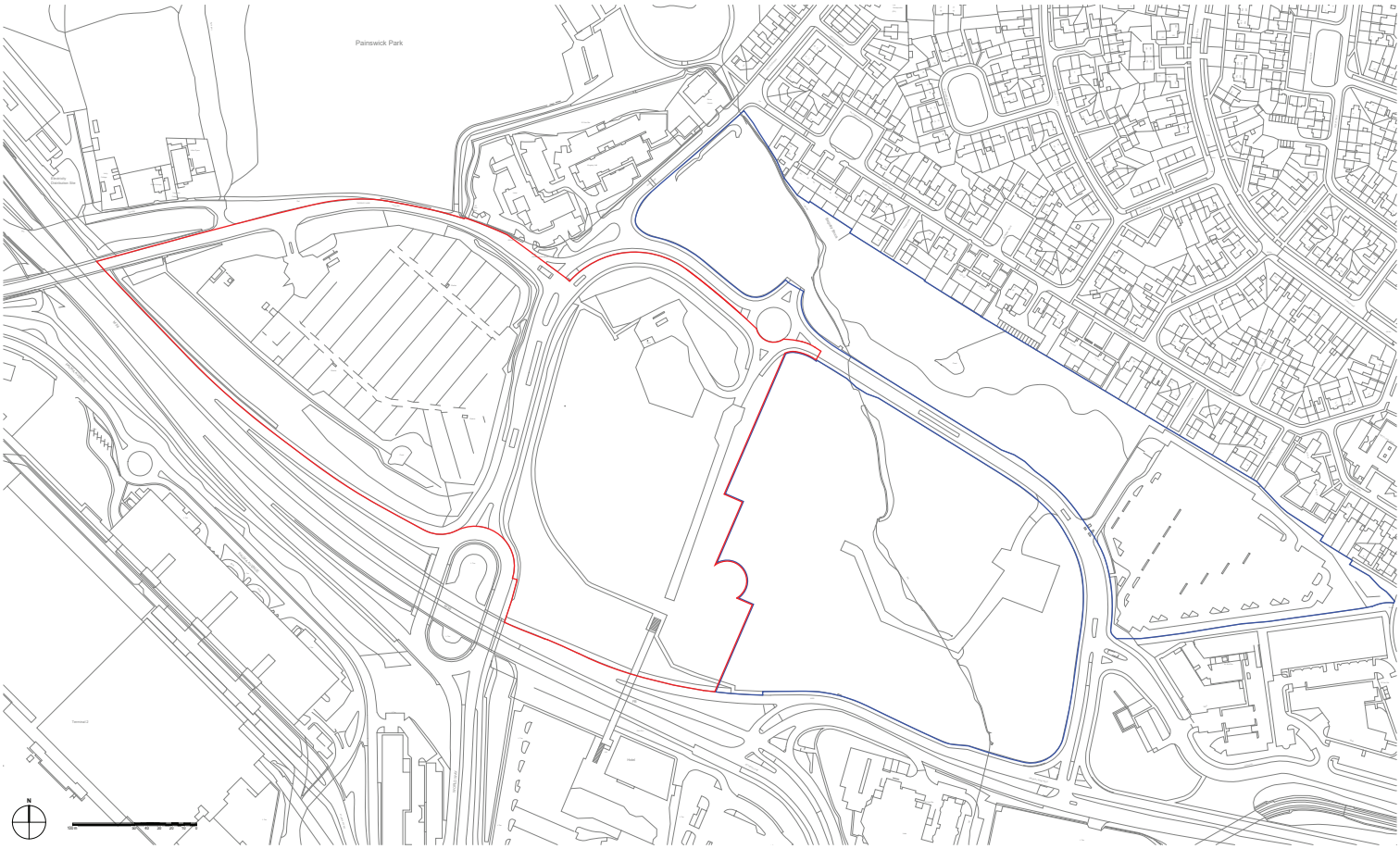
It is proposed to install a new foul water drainage system to serve the proposed development which will utilise the existing drainage infrastructure provided by AECOM as part of the Enterprise Way link road.

Stub connections have been provided at appropriate locations around the boundary which will be used for the disposal of foul drainage. This foul drainage network connects into the United Utilities public sewer network and will be adopted by them through a S104/S106 agreement at the appropriate time when development comes forward.

Preliminary calculations have been undertaken for the development which estimate a peak foul discharge of 10.0 l/s. This is indicative only and subject to confirmation at detailed design stage.

APPENDIX A – LOCATION PLAN

A0



Site Location Plan
1 : 1000

NOTES

Planning Application Boundary

Additional Land within Ownership of Applicant

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REVISIONS

REV.	DATE	AMENDMENT
P01	03/02/26	Planning Boundaries
P02	03/02/26	Planning Boundary Updated
P03	11/03/26	For Planning

KEYPLAN

CLIENT
Airport City Limited Partnership

PROJECT
MIX Manchester

SCALE@A0	DATE	ORIGINATOR	CHECKED	AUTHORISED
1 : 1000	11/03/26	JD	CP	PC

DESCRIPTION
Site Location Plan

STAGE
Stage 3

SR NO.
7092

SHEPPARD ROBSON
77 Parkway Camden Town London NW1 7PU
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STATUS PURPOSE FOR ISSUE
S2
Planning

DRAWING NO.
7092-SRA-ZZ-ZZ-DR-A-02010

REV.
P03

APPENDIX B – MASTERPLAN



BOUNDARY KEY

- Full Planning Boundary
- Outline Planning Boundary

NOTE

General Arrangement Plan to be read in conjunction with drawings:
3223-PLA-XX-XX-DR-L-0002 - Illustrative Masterplan
3223-PLA-XX-XX-DR-L-0003 - Interim Landscaping Plan
2332-PLA-XX-XX-DR-L-0005 - Phasing Strategy
3223-PLA-XX-XX-DR-L-1000- Hardworks General Arrangement Plan
3223-PLA-XX-XX-DR-L-1001- Edging General Arrangement Plan
3223-PLA-XX-XX-DR-L-2000- Trees General Arrangement Plan
3223-PLA-XX-XX-DR-L-2001- Planting General Arrangement Plan
3223-PLA-XX-XX-DR-L-2002- Tree Constraints Plan
3223-PLA-XX-XX-DR-L-4000 - Furniture General Arrangment Plan
3223-PLA-XX-XX-DR-L-4001 - Boundaries Plan

Revision	Date	Description	Drawn	Apprvd.
P08	19/03/26	Planning Issue	SY	RM
P07	12/03/26	Planning Issue	SY	RM
P06	03/03/26	Minor amends to layout	SY	RM
P05	13/02/26	Initial Issue	SY	RM
P04	02/02/26	Updated boundary	AS	AS

Client	Manchester Airport Group
Project	Manchester Airport City North Phase 1
Drg Title	General Arrangement Plan All Matters Layout

Created on	Created by	Approved by
10/11/25	AS / SY	RM

Scale	Size	Workstage	Status
1:500	A1	RIBA 3	

Drg No.	Suitability	Revision
3223-PLA-XX-XX-DR-L-0001	S3	P08

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5. The dimensions of all materials must be checked on site before being laid out.
6. This drawing must be read with the relevant specification clauses and detail drawings.
7. Order of construction and setting out to be agreed on site.

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BOUNDARY KEY

- Planning Application Boundary
- Outline Development Parcels

Revision	Date	Description	Drawn	Approvd.
P05	03/02/2026	Initial Issue	SY	RM

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Client	Manchester Airport Group
Project	Manchester Airport City North Phase 1
Drg Title	General Arrangement Outline Masterplan

Created on	Created by	Approved by
10/11/25	AS / SY	RM

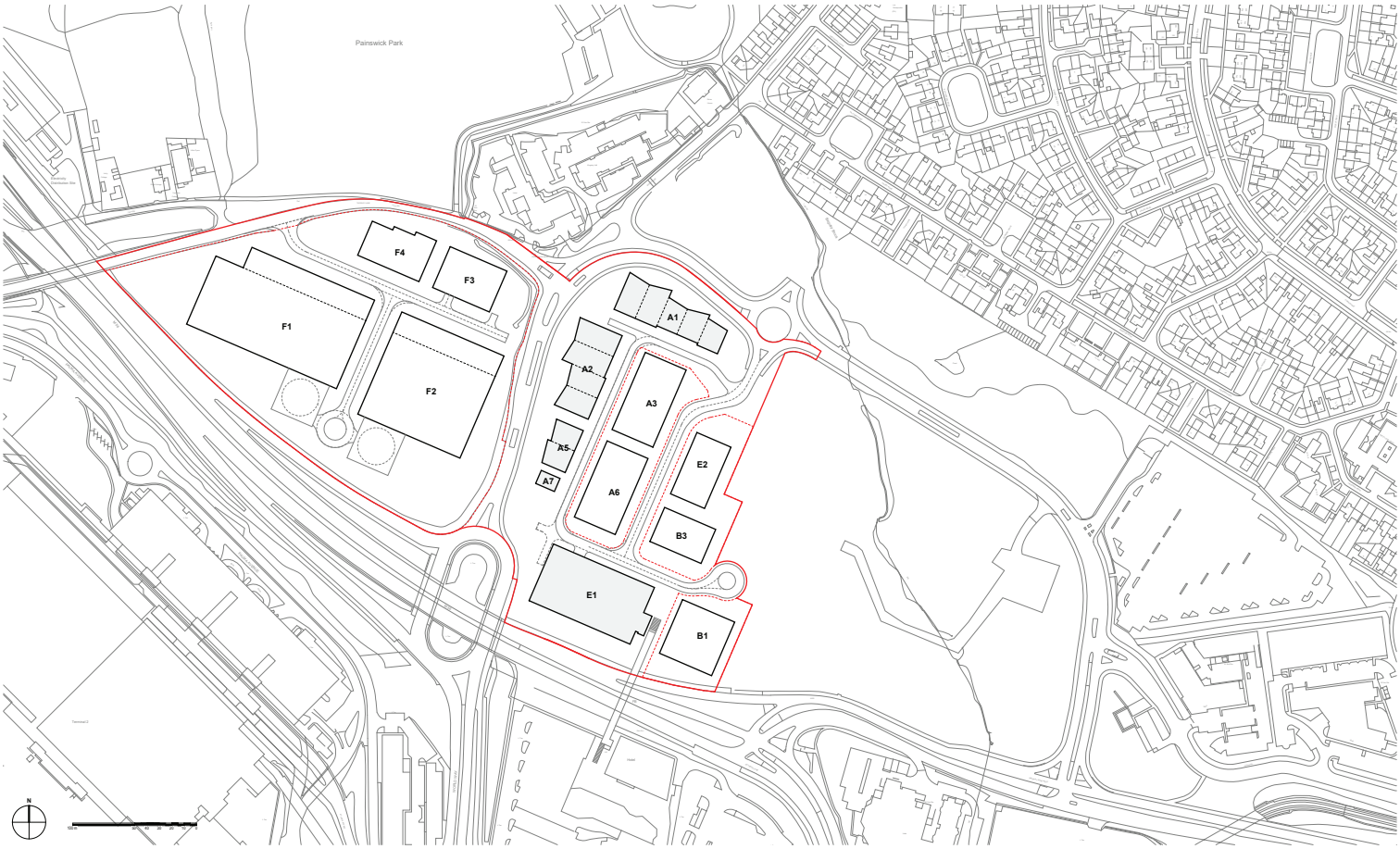
Scale	Size	Workstage
1:1000	A1	RIBA 3

Drg No.	Suitability	Revision
3223-PLA-XX-XX-DR-L-0002	S3	P05

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NOTE

General Arrangement Plan to be read in conjunction with drawings:
3223-PLA-XX-XX-DR-L-0005- Phasing Strategy
3223-PLA-XX-XX-DR-L-1000- Hardworks General Arrangement Plan
3223-PLA-XX-XX-DR-L-1001- Edging General Arrangement Plan
3223-PLA-XX-XX-DR-L-2000- Trees General Arrangement Plan
3223-PLA-XX-XX-DR-L-2001- Planting General Arrangement Plan
3223-PLA-XX-XX-DR-L-2002- Tree Constraints Plan
3223-PLA-XX-XX-DR-L-3000- Levels General Arrangment Plan
3223-PLA-XX-XX-DR-L-4000- Furniture General Arrangment Plan



Illustrative Masterplan
1 : 1000

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NOTES

- Planning Application Boundary
- Outline Development Parcels
- Proposed Building Footprints for Detailed Approval
- Illustrative Building Plots for Approval in Outline (all matters reserved, save for primary access)

REVISIONS

REV.	DATE	AMENDMENT
P01	03/02/26	Planning Boundaries
P02	03/02/26	Planning Boundary Updated
P03	11/02/26	For Planning

KEYPLAN

CLIENT
Airport City Limited Partnership

PROJECT
MIX Manchester

SCALE@A3	DATE	ORIGINATOR	CHECKED	AUTHORISED
1 : 1000	11/02/26	JD	CP	PC

DESCRIPTION
Illustrative Masterplan

STAGE
Stage 3

SR NO.
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STATUS PURPOSE FOR ISSUE
S2
Planning

DRAWING NO.
7092-SRA-ZZ-ZZ-DR-A-02050

REV.
P03

APPENDIX C – TOPO SURVEY



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Levels in parenthesis indicate top of walls.

Utilities added to Survey Operations drawing number 25J289.

SURVEY STATIONS

Name	Easting	Northing	Height
DC12	381656.06	386043.00	70.15
PA4	381830.12	385990.99	70.52
CA1	381616.86	386035.29	70.40
CA2	381666.15	386044.44	70.01
CA3	381729.53	386032.73	69.51
CA4	381902.83	385686.39	71.61
CA5	381890.52	385706.61	72.00

STANDARD REFERENCE & ABBREVIATIONS

1	2	3
4	5	6
	7	8

9

Sheet Layout

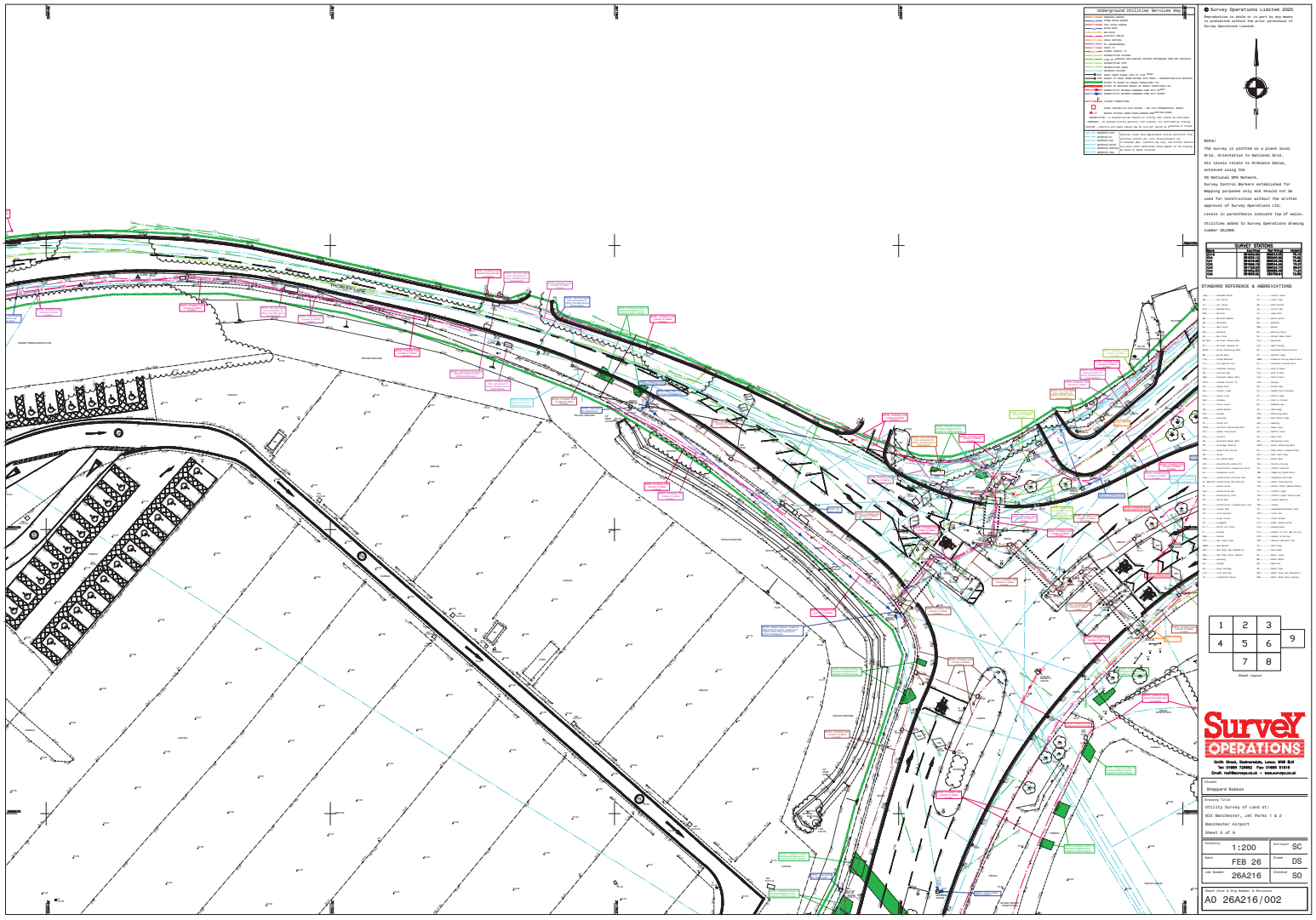
Survey Operations
Smith Street, Skelmersdale, Lancs. WN8 8LN
Tel: 01695 725662 Fax: 01695 51816
Email: mail@survops.co.uk – www.survops.co.uk

Client
Sheppard Robson

Drawing Title
Utility Survey of Land at:
MIX Manchester, Jet Parks 1 & 2
Manchester Airport
Sheet 1 of 9

Scale(s)	1:200	Surveyor	SC
Date	FEB 26	Drawn	DS
Job Number	26A216	Checked	SO

Sheet Size & Drg Number & Revision
A0 26A216/001



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Levels in parenthesis indicate top of walls.
Utilities added to Survey Operations drawing number 26A288.

SURVEY STATIONS

	Eastings	Northings	Height
SS1	374911.71	389349.94	77.50
SS2	374911.71	389349.94	77.50
SS3	374911.71	389349.94	77.50
SS4	374911.71	389349.94	77.50
SS5	374911.71	389349.94	77.50
SS6	374911.71	389349.94	77.50

STANDARD REFERENCE & ABBREVIATIONS

ABUT	Abutment	CH	Church Tower
AC	Air Valve	CI	Cast Iron
AIR	Air Valve	CL	Cable Link
AM	Ammeter	CLK	Clock
AN	Anchor Bolt	CO	Cable Outlet
AP	Access Point	COL	Column
APP	Approach	COM	Comms
ARCH	Arch	CONC	Concrete
ASH	Ash Tree	CP	Control Point
AT Box	Air Valve Telemetry Box	CR	Crossroad
AV	Air Valve	CRT	Cable Route Terminal Box
AVC	Air Valve Chamber	CS	Cast Stone
AW	Air Valve	CSP	Cast Stone Pillar
B	Bollard	CTRL	Control Box
BAR	Barrier	CV	Culvert
BB	Bus Stop	D	Drain
BC	Bollard Cover	DC	Drain Cover
BCN	Beacon	DCB	Drain Catch Pit
BD	Bollard Down	DCP	Drain Catch Pit
BDY	Boundary	DE	Drain End
BE	Bollard Electric	DEC	Decorative
BEN	Bench	DEP	Depth
BH	Borehole	DET	Detector
BHC	Borehole Cover	DG	Drain Gully
BI	Bollard Illuminated	DH	Drain Head
BIN	Bin	DI	Drain Inlet
BL	Bollard Light	DIA	Diameter
BLD	Building	DIS	Distribution Box
BLK	Block	DM	Drain Manhole
BM	Bench Mark	DO	Drain Outlet
BOL	Bollard	DP	Drain Pipe
BOU	Boundary Post	DR	Drain Rodding Eye
BP	Bollard Post	DS	Drain Soil Pipe
BR	Bollard Reflector	DT	Drain Trap
BRK	Brick	DV	Drain Vent
BS	Bollard Solar	E	East
BT	Bollard Telephone	EB	Electricity Box
BU	Bollard Up	EC	Electricity Cover
BUS	Bus Stop	ECB	Electricity Cable Box
BW	Bollard White	EL	Electricity Link
BX	Box	ELB	Electricity Box
C	Cable	ELC	Electricity Cover
CAB	Cabinet	ELE	Electricity
CAM	Camera	ELEC	Electricity
CAN	Canopy	ELP	Electricity Pole
CAP	Capstan	EM	Electricity Meter
CAT	Cathodic Test Point	EMB	Embankment
CB	Catch Pit	ENG	Engineering
CBC	Catch Pit Cover	EP	Electricity Pole
CBL	Cable	ES	Electricity Substation
CBT	Cable Transformer	ESC	Electricity Substation Cover
CC	Cable Chamber	EST	Estate
CCC	Cable Chamber Cover	ET	Electricity Transformer
CCTV	CCTV Camera	EX	Existing
CD	Cable Duct	F	Fence
CE	Cable End	FB	Flower Bed
CEM	Cemetery	FBD	Fuse Box Down
CF	Cable Feeder	FBU	Fuse Box Up
CH	Cable Head	FC	Fence Corner
CHA	Chamber	FD	Fence Down
CHC	Chamber Cover	FE	Fence End
CHI	Chimney	FEA	Feature
CHP	Chimney Pot	FH	Fire Hydrant
CHR	Chair	FIG	Figure
CHU	Church	FL	Flood Light
CI	Cast Iron	FLA	Flagpole
CL	Cable Link	FLG	Flagstone
CLK	Clock	FM	Flow Meter
CO	Cable Outlet	FN	Fence Node
COL	Column	FO	Fibre Optic
COM	Comms	FOC	Fibre Optic Chamber
CONC	Concrete	FOP	Fibre Optic Pillar
CP	Control Point	FP	Footpath
CR	Crossroad	FPC	Footpath Cover
CRT	Cable Route Terminal Box	FPO	Footpath Opening
CS	Cast Stone	FR	Fence Run
CSP	Cast Stone Pillar	FRP	Fence Rail Post
CTRL	Control Box	FS	Fence Start
CV	Culvert	FT	Fence Terminal
D	Drain	FU	Fence Up
DC	Drain Cover	G	Gully
DCB	Drain Catch Pit	GAB	Gabion
DCP	Drain Catch Pit	GAR	Garage
DE	Drain End	GAT	Gate
DEC	Decorative	GB	Grit Bin
DEP	Depth	GC	Gully Cover
DET	Detector	GCP	Ground Control Point
DG	Drain Gully	GD	Guard Rail
DH	Drain Head	GDN	Garden
DI	Drain Inlet	GEN	Generator
DIA	Diameter	GH	Gully Head
DIS	Distribution Box	GI	Gully Inlet
DM	Drain Manhole	GL	Gas Light
DO	Drain Outlet	GLB	Gas Light Box
DP	Drain Pipe	GLC	Gas Light Cover
DR	Drain Rodding Eye	GLP	Gas Light Post
DS	Drain Soil Pipe	GM	Gas Meter
DT	Drain Trap	GN	Gas Node
DV	Drain Vent	GO	Gas Outlet
E	East	GP	Guard Post
EB	Electricity Box	GPO	General Post Office
EC	Electricity Cover	GR	Grass
ECB	Electricity Cable Box	GRA	Grave
EL	Electricity Link	GRD	Guard Rail Down
ELB	Electricity Box	GRE	Greenhouse
ELC	Electricity Cover	GRU	Guard Rail Up
ELE	Electricity	GS	Gas Service
ELEC	Electricity	GSC	Gas Service Cover
ELP	Electricity Pole	GT	Gate
EM	Electricity Meter	GTD	Gate Down
EMB	Embankment	GTU	Gate Up
ENG	Engineering	GV	Gas Valve
EP	Electricity Pole	GVC	Gas Valve Cover
ES	Electricity Substation	H	Hedge
ESC	Electricity Substation Cover	HB	Hedge Bottom
EST	Estate	HC	Hedge Corner
ET	Electricity Transformer	HD	Hedge Down
EX	Existing	HE	Hedge End
F	Fence	HEA	Heritage
FB	Flower Bed	HH	Hand Hole
FBD	Fuse Box Down	HL	Hedge Level
FBU	Fuse Box Up	HN	Hedge Node
FC	Fence Corner	HR	Hedge Run
FD	Fence Down	HS	Hedge Start
FE	Fence End	HT	Hedge Top
FEA	Feature	HU	Hedge Up
FH	Fire Hydrant	I	Inspection Chamber
FIG	Figure	IC	Inspection Chamber Cover
FL	Flood Light	ICP	Inspection Chamber Pillar
FLA	Flagpole	IL	Invert Level
FLG	Flagstone	IP	Inspection Pit
FM	Flow Meter	IPC	Inspection Pit Cover
FN	Fence Node	IRR	Irrigation
FO	Fibre Optic	J	Junction
FOC	Fibre Optic Chamber	JB	Junction Box
FOP	Fibre Optic Pillar	JC	Junction Box Cover
FP	Footpath	K	Kerb
FPC	Footpath Cover	KD	Kerb Down
FPO	Footpath Opening	KE	Kerb End
FR	Fence Run	KEP	Kerb End Point
FRP	Fence Rail Post	KU	Kerb Up
FS	Fence Start	L	Lamp
FT	Fence Terminal	LAM	Lamp
FU	Fence Up	LB	Lamp Bracket
G	Gully	LC	Lamp Column
GAB	Gabion	LCP	Lamp Column Pillar
GAR	Garage	LD	Level Down
GAT	Gate	LEV	Level
GB	Grit Bin	LG	Lamp Gantry
GC	Gully Cover	LIB	Library
GCP	Ground Control Point	LL	Lamp Link
GD	Guard Rail	LP	Lamp Post
GDN	Garden	LPC	Lamp Post Cover
GEN	Generator	LPO	Lamp Post Opening
GH	Gully Head	LT	Lamp Top
GI	Gully Inlet	LTD	Lamp Top Down
GL	Gas Light	LTU	Lamp Top Up
GLB	Gas Light Box	LU	Level Up
GLC	Gas Light Cover	M	Manhole
GLP	Gas Light Post	MB	Mail Box
GM	Gas Meter	MC	Manhole Cover
GN	Gas Node	MD	Manhole Down
GO	Gas Outlet	MEM	Memorial
GP	Guard Post	MET	Meter
GPO	General Post Office	MH	Manhole
GR	Grass	MHC	Manhole Cover
GRA	Grave	MK	Mark
GRD	Guard Rail Down	MON	Monument
GRE	Greenhouse	MP	Marker Post
GRU	Guard Rail Up	MPC	Marker Post Cover
GS	Gas Service	MU	Manhole Up
GSC	Gas Service Cover	N	North
GT	Gate	NB	Notice Board
GTD	Gate Down	NC	Non Conductive
GTU	Gate Up	NCP	Non Conductive Pillar
GV	Gas Valve	NT	Network Terminal
GVC	Gas Valve Cover	O	Overhead Line
H	Hedge	OB	Overhead Line Bracket
HB	Hedge Bottom	OC	Overhead Line Column
HC	Hedge Corner	OCP	Overhead Line Column Pillar
HD	Hedge Down	OG	Overhead Line Gantry
HE	Hedge End	OHL	Overhead Line
HEA	Heritage	OP	Overhead Line Pole
HH	Hand Hole	P	Post
HL	Hedge Level	PB	Post Box
HN	Hedge Node	PC	Post Cover
HR	Hedge Run	PCP	Post Cover Pillar
HS	Hedge Start	PD	Post Down
HT	Hedge Top	PE	Pole End
HU	Hedge Up	PED	Pedestrian
I	Inspection Chamber	PH	Pothole
IC	Inspection Chamber Cover	PHO	Phone
ICP	Inspection Chamber Pillar	PK	Park
IL	Invert Level	PL	Pole Link
IP	Inspection Pit	PLA	Planter
IPC	Inspection Pit Cover	PLT	Plant
IRR	Irrigation	PM	Parking Meter
J	Junction	PN	Pole Node
JB	Junction Box	PO	Post Office
JC	Junction Box Cover	POL	Pole
K	Kerb	POR	Porch
KD	Kerb Down	PP	Power Pole
KE	Kerb End	PPC	Power Pole Cover
KEP	Kerb End Point	PPP	Power Pole Pillar
KU	Kerb Up	PR	Pole Run
L	Lamp	PS	Pole Start
LAM	Lamp	PT	Pole Terminal
LB	Lamp Bracket	PU	Pole Up
LC	Lamp Column	PUB	Public House
LCP	Lamp Column Pillar	PV	Pavement
LD	Level Down	PW	Pedestrian Walkway
LEV	Level	PWR	Power
LG	Lamp Gantry	R	Rail
LIB	Library	RAD	Radio
LL	Lamp Link	RB	Rail Bracket
LP	Lamp Post	RC	Rail Column
LPC	Lamp Post Cover	RCP	Rail Column Pillar
LPO	Lamp Post Opening	RD	Road
LT	Lamp Top	RE	Rail End
LTD	Lamp Top Down	REC	Recreation
LTU	Lamp Top Up	RG	Rail Gantry
LU	Level Up	RL	Rail Link
M	Manhole	RN	Rail Node
MB	Mail Box	RO	Road
MC	Manhole Cover	RP	Rail Post
MD	Manhole Down	RPC	Rail Post Cover
MEM	Memorial	RPP	Rail Post Pillar
MET	Meter	RR	Rail Run
MH	Manhole	RS	Rail Start
MHC	Manhole Cover	RT	Rail Terminal
MK	Mark	RU	Rail Up
MON	Monument	S	South
MP	Marker Post	SA	Sample Point
MPC	Marker Post Cover	SB	Stop Box
MU	Manhole Up	SC	Stop Cock
N	North	SCH	School
NB	Notice Board	SCP	Stop Cock Pillar
NC	Non Conductive	SD	Soil Down
NCP	Non Conductive Pillar	SE	Soil End
NT	Network Terminal	SEA	Seat
O	Overhead Line	SEC	Security
OB	Overhead Line Bracket	SG	Signal
OC	Overhead Line Column	SH	Shrub
OCP	Overhead Line Column Pillar	SHE	Shed
OG	Overhead Line Gantry	SHO	Shop
OHL	Overhead Line	SI	Soil Inlet
OP	Overhead Line Pole	SIG	Signal
P	Post	SIGN	Sign
PB	Post Box	SL	Soil Link
PC	Post Cover	SLB	Soil Box
PCP	Post Cover Pillar	SLC	Soil Cover
PD	Post Down	SLP	Soil Pipe
PE	Pole End	SM	Soil Manhole
PED	Pedestrian	SN	Soil Node
PH	Pothole	SO	Soil Outlet
PHO	Phone	SP	Soil Pipe
PK	Park	SPC	Soil Pipe Cover
PL	Pole Link	SPP	Soil Pipe Pillar
PLA	Planter	SR	Soil Run
PLT	Plant	SS	Soil Start
PM	Parking Meter	ST	Soil Terminal
PN	Pole Node	STA	Station
PO	Post Office	STR	Street
POL	Pole	SU	Soil Up
POR	Porch	SUB	Substation
PP	Power Pole	SV	Soil Vent
PPC	Power Pole Cover	SVC	Soil Vent Cover
PPP	Power Pole Pillar	SW	Soil Waste
PR	Pole Run	SWC	Soil Waste Cover
PS	Pole Start	SWP	Soil Waste Pipe
PT	Pole Terminal	T	Tree
PU	Pole Up	TB	Traffic Bollard
PUB	Public House	TBC	Traffic Bollard Cover
PV	Pavement	TC	Traffic Control
PW	Pedestrian Walkway	TCB	Traffic Control Box
PWR	Power	TCC	Traffic Control Cover
R	Rail	TCP	Traffic Control Pillar
RAD	Radio	TD	Traffic Down
RB	Rail Bracket	TE	Tree Edge
RC	Rail Column	TEL	Telephone
RCP	Rail Column Pillar	TG	Traffic Light
RD	Road	TGB	Traffic Light Box
RE	Rail End	TGC	Traffic Light Cover
REC	Recreation	TGP	Traffic Light Post
RG	Rail Gantry	TH	Tree Hedge
RL	Rail Link	TL	Traffic Light
RN	Rail Node	TLB	Traffic Light Box
RO	Road	TLC	Traffic Light Cover
RP	Rail Post	TLP	Traffic Light Post
RPC	Rail Post Cover	TM	Traffic Meter
RPP	Rail Post Pillar	TN	Tree Node
RR	Rail Run	TO	Tree Outside
RS	Rail Start	TP	Telephone Post
RT	Rail Terminal	TPC	Telephone Post Cover
RU	Rail Up	TR	Tree Run
S	South	TRA	Traffic
SA	Sample Point	TRE	Tree
SB	Stop Box	TS	Tree Start
SC	Stop Cock	TT	Tree Terminal
SCH	School	TU	Tree Up
SCP	Stop Cock Pillar	TV	Television
SD	Soil Down	TW	Traffic Warning
SE	Soil End	TWC	Traffic Warning Cover
SEA	Seat	TWP	Traffic Warning Post
SEC	Security	U	Unknown
SG	Signal	UB	Unknown Box
SH	Shrub	UC	Unknown Cover
SHE	Shed	UCP	Unknown Cover Pillar
SHO	Shop	UP	Unknown Pipe
SI	Soil Inlet	UPC	Unknown Pipe Cover
SIG	Signal	UPP	Unknown Pipe Pillar
SIGN	Sign	V	Valve
SL	Soil Link	VB	Valve Box
SLB	Soil Box	VC	Valve Cover
SLC	Soil Cover	VCP	Valve Cover Pillar
SLP	Soil Pipe	VP	Vent Pipe
SM	Soil Manhole	W	West
SN	Soil Node	WB	Water Box
SO	Soil Outlet	WC	Water Cover
SP	Soil Pipe	WCP	Water Cover Pillar
SPC	Soil Pipe Cover	WE	Weir
SPP	Soil Pipe Pillar	WEL	Well
SR	Soil Run	WG	Wing Wall
SS	Soil Start	WH	Water Hydrant
ST	Soil Terminal	WL	Water Level
STA	Station	WM	Water Meter
STR	Street	WN	Water Node
SU	Soil Up	WO	Water Outlet
SUB	Substation	WP	Water Pipe
SV	Soil Vent	WPC	Water Pipe Cover
SVC	Soil Vent Cover	WPP	Water Pipe Pillar
SW	Soil Waste	WR	Water Run
SWC	Soil Waste Cover	WS	Water Start
SWP	Soil Waste Pipe	WT	Water Terminal
T	Tree	WU	Water Up
TB	Traffic Bollard	WV	Water Valve
TBC	Traffic Bollard Cover	WVC	Water Valve Cover
TC	Traffic Control	WW	Water Well
TCB	Traffic Control Box	X	Unknown
TCC	Traffic Control Cover	XB	Unknown Box
TCP	Traffic Control Pillar	XC	Unknown Cover
TD	Traffic Down	XCP	Unknown Cover Pillar
TE	Tree Edge	XP	Unknown Pipe
TEL	Telephone	XPC	Unknown Pipe Cover
TG	Traffic Light	XPP	Unknown Pipe Pillar
TGB	Traffic Light Box		
TGC	Traffic Light Cover		
TGP	Traffic Light Post		
TH	Tree Hedge		
TL	Traffic Light		
TLB	Traffic Light Box		
TLC	Traffic Light Cover		
TLP	Traffic Light Post		
TM	Traffic Meter		
TN	Tree Node		
TO	Tree Outside		
TP	Telephone Post		
TPC	Telephone Post Cover		
TR	Tree Run		
TRA	Traffic		
TRE	Tree		
TS	Tree Start		
TT	Tree Terminal		
TU	Tree Up		
TV	Television		
TW	Traffic Warning		
TWC	Traffic Warning Cover		
TWP	Traffic Warning Post		
U	Unknown		
UB	Unknown Box		
UC	Unknown Cover		
UCP	Unknown Cover Pillar		
UP	Unknown Pipe		
UPC	Unknown Pipe Cover		
UPP	Unknown Pipe Pillar		
V	Valve		
VB	Valve Box		
VC	Valve Cover		
VCP	Valve Cover Pillar		
VP	Vent Pipe		
W	West		
WB	Water Box		
WC	Water Cover		
WCP	Water Cover Pillar		
WE	Weir		
WEL	Well		
WG	Wing Wall		
WH	Water Hydrant		
WL	Water Level		
WM	Water Meter		
WN	Water Node		
WO	Water Outlet		
WP	Water Pipe		
WPC	Water Pipe Cover		
WPP	Water Pipe Pillar		
WR	Water Run		
WS	Water Start		
WT	Water Terminal		
WU	Water Up		
WV	Water Valve		
WVC	Water Valve Cover		
WW	Water Well		
X	Unknown		
XB	Unknown Box		
XC	Unknown Cover		
XCP	Unknown Cover Pillar		
XP	Unknown Pipe		
XPC	Unknown Pipe Cover		
XPP	Unknown Pipe Pillar		

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Sheet Layout

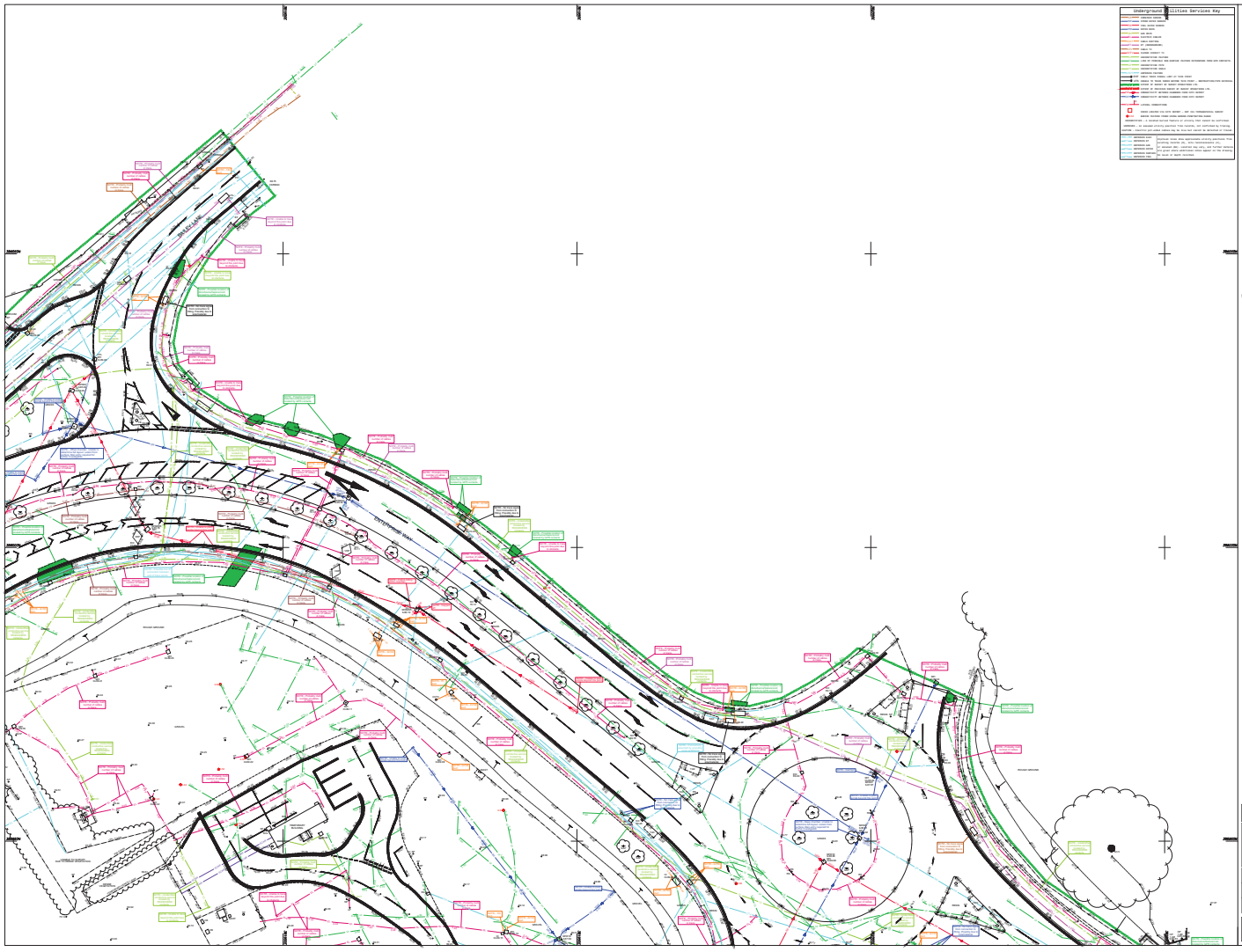
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Client
Sheppard Robson

Drawing Title
Utility Survey of Land at:
M56 Manchester, Jet Parks 1 & 2
Manchester Airport
Sheet 2 of 9

Scale(s)	1:200	Surveyor	SC
Date	FEB 26	Drawn	DS
Job Number	26A216	Checked	SO

Sheet Size & Dwg Number & Revision
A0 26A216/002



Underground Utilities Services Key

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Levels in parenthesis indicate top of walls.
Utilities added to Survey Operations drawing number 26L288.

SURVEY STATIONS

Point	Eastings	Northings	Height
SO1	374911.71	388145.94	77.50
SO2	374911.71	388145.94	77.50
SO3	374911.71	388145.94	77.50
SO4	374911.71	388145.94	77.50
SO5	374911.71	388145.94	77.50
SO6	374911.71	388145.94	77.50

STANDARD REFERENCE & ABBREVIATIONS

Sheet Layout

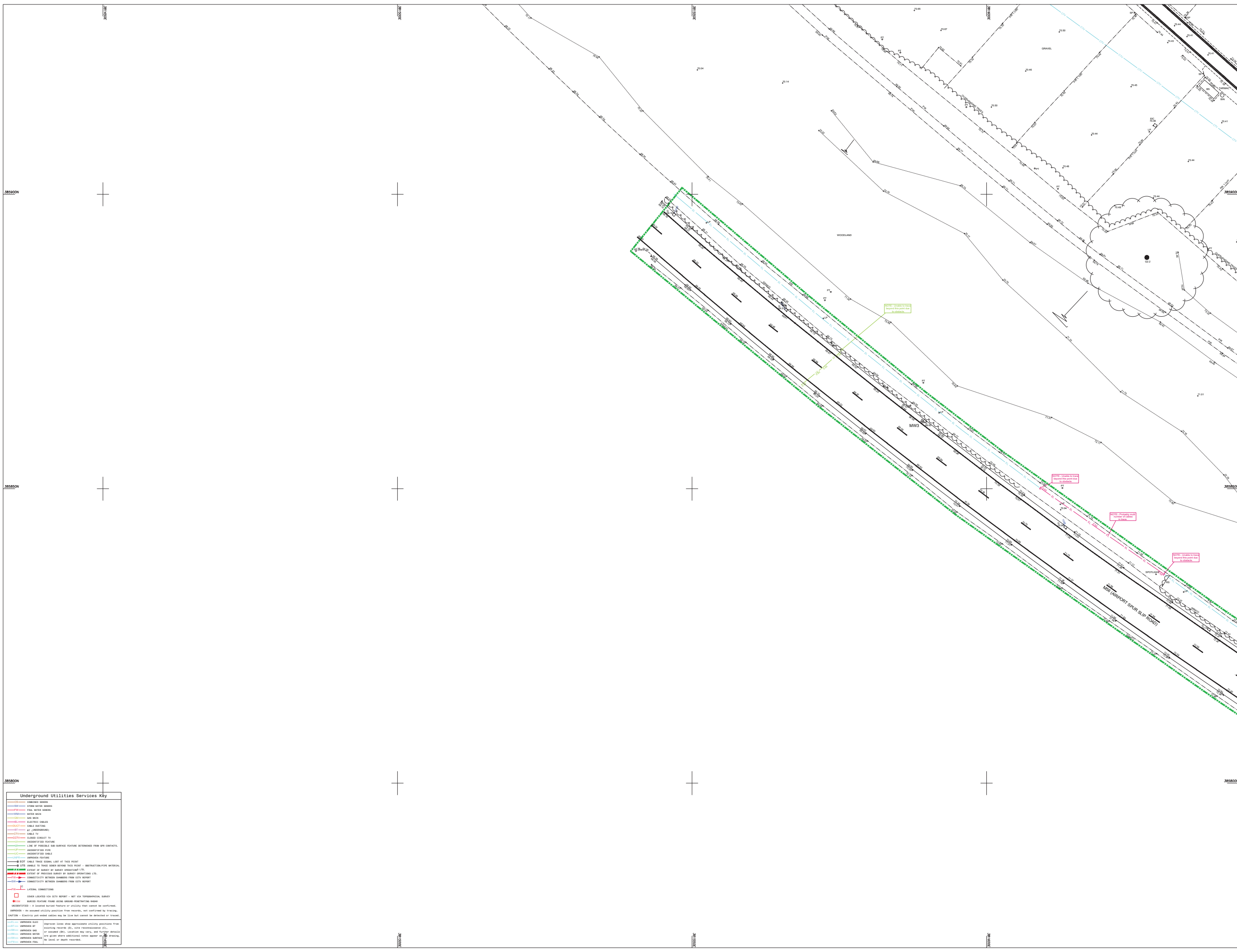
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Client
Sheppard Robson

Drawing Title
Utility Survey of Land at:
M56 Manchester, Jet Parks 1 & 2
Manchester Airport
Sheet 3 of 9

Scale(s)	1:200	Surveyor	SC
Date	FEB 26	Drawn	DS
Job Number	26A216	Checked	SO

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Levels in parenthesis indicate top of walls.

Utilities added to Survey Operations drawing number 25J289.

SURVEY STATIONS

Name	Easting	Northing	Height
DC12	381656.06	386043.00	70.15
PA4	381830.12	385990.99	70.52
CA1	381616.86	386035.29	70.40
CA2	381666.15	386044.44	70.01
CA3	381729.53	386032.73	69.51
CA4	381902.83	385686.39	71.61
CA5	381890.52	385706.61	72.00

STANDARD REFERENCE & ABBREVIATIONS

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	7	8	

Sheet Layout

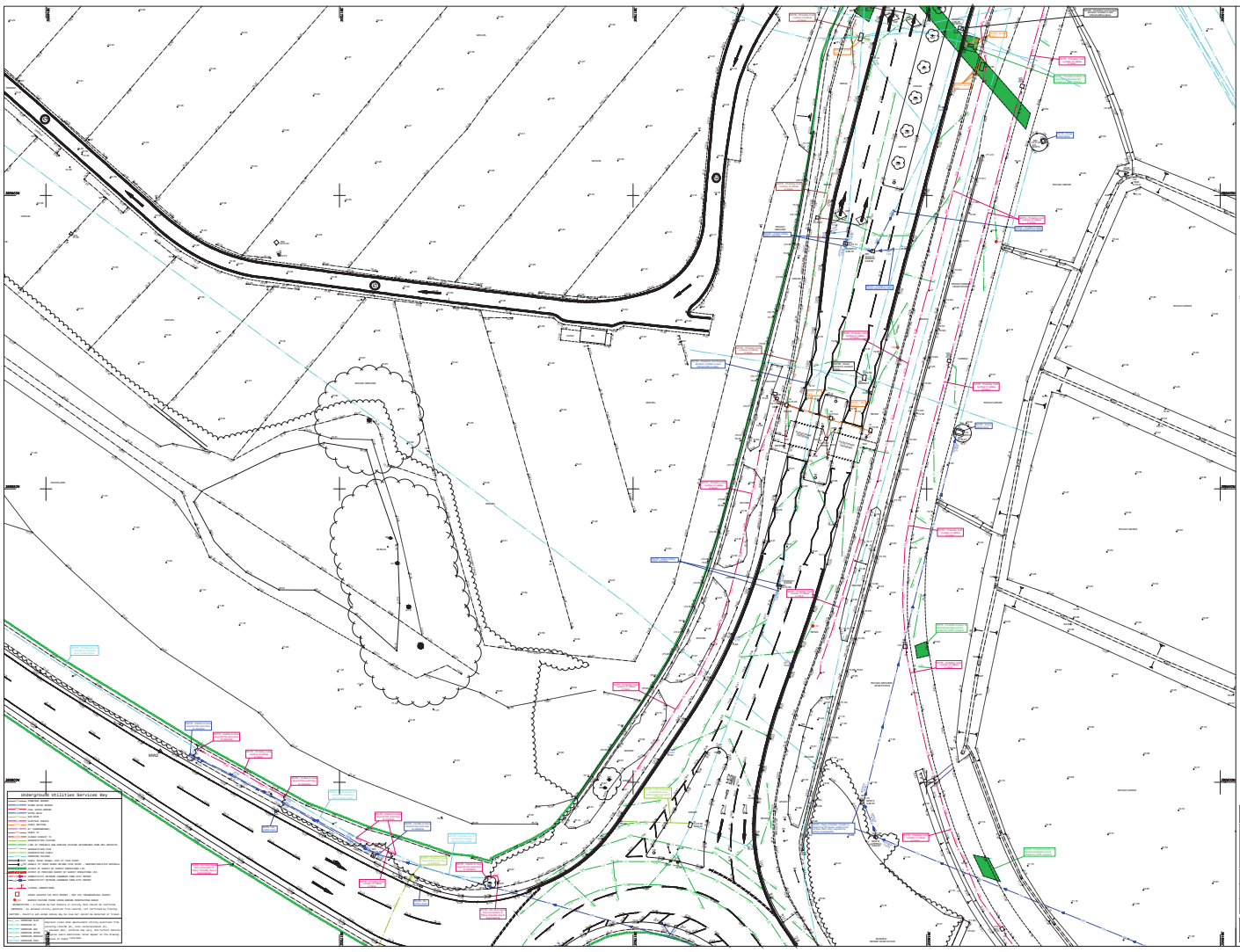
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Client
Sheppard Robson

Drawing Title
Utility Survey of Land at:
MIX Manchester, Jet Parks 1 & 2
Manchester Airport
Sheet 4 of 9

Scale(s)	1:200	Surveyor	SC
Date	FEB 26	Drawn	DS
Job Number	26A216	Checked	SO

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Levels in parenthesis indicate top of walls.
Utilities added to Survey Operations drawing number 26L288.

SURVEY STATIONS			
STN	EASTING	NORTHING	HEIGHT
STN1	384311.71	388144.84	77.50
STN2	384311.71	388144.84	77.50
STN3	384311.71	388144.84	77.50
STN4	384311.71	388144.84	77.50
STN5	384311.71	388144.84	77.50

STANDARD REFERENCE & ABBREVIATIONS

AB	Access Barrier	CH	Catch Head
AC	Air Valve	CI	Cast Iron
AV	Air Valve	CL	Cable Link
BB	Bollard	CO	Cable Outlet
BC	Bollard Cover	CP	Cable Pole
BH	Borehole	CS	Cable Strip
BO	Boundary Post	CT	Cable Trough
BP	Bollard Post	CV	Cable Valve
BS	Bollard Stump	DB	Direction Board
BT	Bollard Top	DC	Drainage Channel
BU	Bollard Unit	DI	Drainage Inlet
BW	Bollard Wire	DP	Drainage Pipe
CB	Catch Basin	DW	Drainage Well
CC	Concrete Cover	EC	Electricity Cover
CH	Chamber	EM	Electricity Meter
CM	Cable Marker	EP	Electricity Pole
CP	Concrete Post	ES	Electricity Sub Station
CS	Concrete Slab	FB	Flower Bed
CT	Concrete Tank	FC	Fence Corner
CV	Concrete Valve	FH	Fire Hydrant
DB	Distribution Box	FP	Fence Post
DC	Drainage Channel	GB	Grass Bank
DI	Drainage Inlet	GC	Gas Cover
DP	Drainage Pipe	GM	Gas Meter
DW	Drainage Well	GP	Gas Pipe
EC	Electricity Cover	GR	Grass Ramp
EM	Electricity Meter	GV	Gas Valve
EP	Electricity Pole	HC	Hedge Cut
ES	Electricity Sub Station	HE	Hedge
FB	Flower Bed	HG	Hedge
FC	Fence Corner	HR	Hedge Row
FH	Fire Hydrant	HT	Hedge Trim
FP	Fence Post	IC	Inspection Cover
GB	Grass Bank	IL	Invert Level
GC	Gas Cover	IP	Iron Pipe
GM	Gas Meter	KB	Kerb Block
GP	Gas Pipe	KC	Kerb Corner
GR	Grass Ramp	KD	Kerb Dropped
GV	Gas Valve	KE	Kerb End
HC	Hedge Cut	KR	Kerb Radius
HE	Hedge	LA	Lay-by
HG	Hedge	LB	Letter Box
HR	Hedge Row	LC	Lamp Column
HT	Hedge Trim	LD	Landscaping Area
IC	Inspection Cover	LE	Level
IL	Invert Level	LG	Lighting
IP	Iron Pipe	LP	Lamp Post
KB	Kerb Block	LS	Landscaping Strip
KC	Kerb Corner	MB	Marker Post
KD	Kerb Dropped	MH	Manhole
KE	Kerb End	MK	Mark
KR	Kerb Radius	MP	Marker Post
LA	Lay-by	NP	Notice Post
LB	Letter Box	OB	Object
LC	Lamp Column	OH	Overhead Cable
LD	Landscaping Area	PA	Parking Area
LE	Level	PB	Post Box
LG	Lighting	PC	Pedestrian Crossing
LP	Lamp Post	PD	Paved Area
LS	Landscaping Strip	PE	Pedestrian Guard Rail
MB	Marker Post	PH	Public Telephone
MH	Manhole	PI	Pipe
MK	Mark	PL	Planter
MP	Marker Post	PM	Parking Meter
NP	Notice Post	PO	Post
OB	Object	PP	Power Pole
OH	Overhead Cable	PS	Pump Station
PA	Parking Area	PT	Path
PB	Post Box	PU	Pedestrian Guard Rail Upright
PC	Pedestrian Crossing	RA	Rodding Access
PD	Paved Area	RB	Retaining Wall
PE	Pedestrian Guard Rail	RC	Road Crossing
PH	Public Telephone	RD	Road
PI	Pipe	RE	Reference
PL	Planter	RG	Rail Guard
PM	Parking Meter	RL	Road Level
PO	Post	RM	Road Marking
PP	Power Pole	RP	Road Post
PS	Pump Station	RR	Railway
PT	Path	RS	Road Sign
PU	Pedestrian Guard Rail Upright	SA	Service Area
RA	Rodding Access	SB	Soil Boring
RB	Retaining Wall	SC	Service Cover
RC	Road Crossing	SD	Soil Drain
RD	Road	SE	Service
RE	Reference	SG	Signal
RG	Rail Guard	SH	Shrub
RL	Road Level	SI	Silt Trap
RM	Road Marking	SK	Sketch
RP	Road Post	SL	Sign Post
RR	Railway	SM	Soil Pipe
RS	Road Sign	SN	Sign
SA	Service Area	SO	Soil Vent Pipe
SB	Soil Boring	SP	Spot Level
SC	Service Cover	SR	Surface Water Gully
SD	Soil Drain	SS	Stainless Steel
SE	Service	ST	Stream
SG	Signal	SU	Surface Water Manhole
SH	Shrub	SV	Sluice Valve
SI	Silt Trap	SW	Surface Water Pipe
SK	Sketch	TA	Tactile Paving
SL	Sign Post	TB	Telegraph Board
SM	Soil Pipe	TC	Traffic Control
SN	Sign	TD	Traffic Count Device
SO	Soil Vent Pipe	TE	Telephone Exchange
SP	Spot Level	TF	Traffic Light
SR	Surface Water Gully	TG	Traffic Light Control Box
SS	Stainless Steel	TH	Telephone
ST	Stream	TK	Tank
SU	Surface Water Manhole	TL	Telephone Kiosk
SV	Sluice Valve	TM	Tide Mark
SW	Surface Water Pipe	TN	Transformer
TA	Tactile Paving	TP	Telegraph Pole
TB	Telegraph Board	TR	Traffic Signal
TC	Traffic Control	TS	Traffic Sign
TD	Traffic Count Device	TT	Traffic Light Control Box
TE	Telephone Exchange	TV	Television
TF	Traffic Light	TW	Tramway
TG	Traffic Light Control Box	UC	Underground Cable
TH	Telephone	UP	Utility Pole
TK	Tank	VA	Valve
TL	Telephone Kiosk	VC	Vehicle Crossing
TM	Tide Mark	VP	Vent Pipe
TN	Transformer	WA	Water Tap
TP	Telegraph Pole	WB	Water Board
TR	Traffic Signal	WC	Water Cover
TS	Traffic Sign	WE	Weir
TT	Traffic Light Control Box	WG	Wing
TV	Television	WH	Wheel
TW	Tramway	WK	Wash
UC	Underground Cable	WL	Water Level
UP	Utility Pole	WM	Water Meter
VA	Valve	WP	Water Pipe
VC	Vehicle Crossing	WT	Water Tap (Stopcock)
VP	Vent Pipe	WV	Water Valve (Sluice)
WA	Water Tap		
WB	Water Board		
WC	Water Cover		
WE	Weir		
WG	Wing		
WH	Wheel		
WK	Wash		
WL	Water Level		
WM	Water Meter		
WP	Water Pipe		
WT	Water Tap (Stopcock)		
WV	Water Valve (Sluice)		

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4	5	6
7	8	9

Sheet Layout

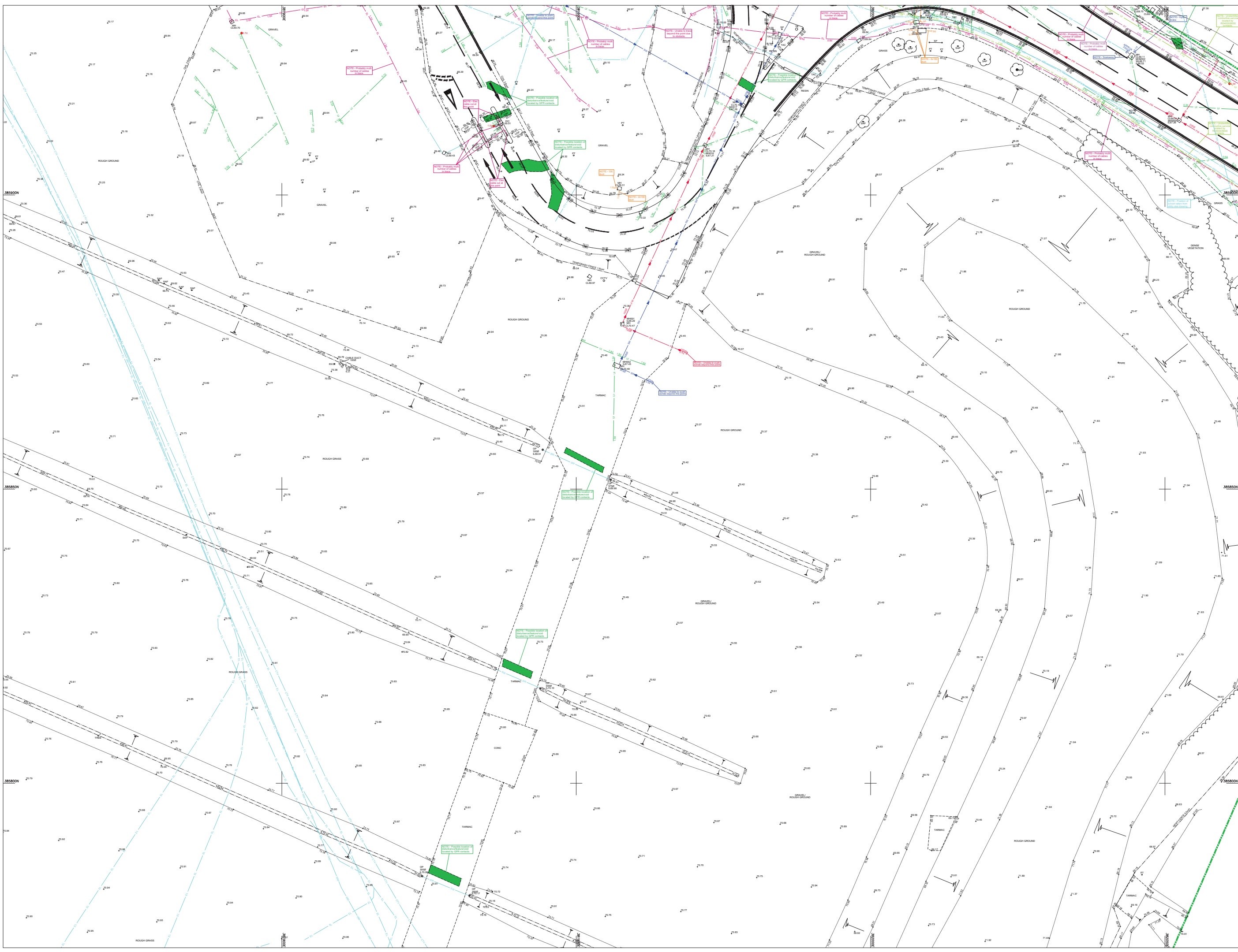
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Client
Sheppard Robson

Drawing Title
Utility Survey of Land at:
M20 Manchester, Jet Parks 1 & 2
Manchester Airport
Sheet 5 of 9

Scale(s)	1:200	Surveyor	SC
Date	FEB 26	Drawn	DS
Job Number	26A216	Checked	SO

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Levels in parenthesis indicate top of walls.

Utilities added to Survey Operations drawing number 25J289.

SURVEY STATIONS

Name	Easting	Northing	Height
DC12	381656.06	386043.00	70.15
PA4	381830.12	385990.99	70.52
CA1	381616.86	386035.29	70.40
CA2	381666.15	386044.44	70.01
CA3	381729.53	386032.73	69.51
CA4	381902.83	385686.39	71.61
CA5	381890.52	385706.61	72.00

STANDARD REFERENCE & ABBREVIATIONS

(AR).........Assumed Route	IL..........Invert Level
AB..........Air Brick	IP..........Inlet Pipe
AV..........Air Valve	KO..........Kerb Outlet
B/W.........Barbed Wire	LB..........Letter Box
BAR.........Barrier	LP..........Lamp Post
BB..........Belisha Beacon	MG..........Multi-Girth
BH..........Borehole	MH..........Manhole
BL..........Bed Level	MKR.........Marker
BOL.........Bollard	MP..........Mooring Point
BS..........Bus Stop	NP..........Street Name Plate
BT Box......British Telecom Box	O/H.........Overhead
BT..........British Telecom IC	O/P.........Open Paling
BRTW........Brick Retaining Wall	OE..........Overhead Electric Wire
BW..........Brick Wall	OP..........Outfall Pipe
C/B.........Close Boarded	OSBM........Ordnance Survey Bench Mark
C/I.........Corrugated Iron	OT..........Overhead Telecom Wire
C/P.........Chestnut Paling	P/C.........Post & Chain
CB..........Control Box	P/R.........Post & Rail
CBW.........Concrete Block Wall	P/W.........Post & Wire
CCTV........Closed Circuit TV	PAV.........Paving
CD..........Cable Duct	PB..........Pillar Box
CEL.........Cellar Light	PC..........Pedestrian Crossing
CH/L........Chain Link	PP..........Petrol Pump
CHY.........Chimney	PT..........Post or Pillar
CL..........Cover Level	RE..........Rodding Eye
CM..........Cable Marker	RS..........Road Sign
COL.........Column	RTW.........Retaining Wall
CONC........Concrete	RWP.........Rain Water Pipe
CP..........Catch Pit	SAP.........Sapling
CRTW........Concrete Retaining Wall	SL..........Sump Level
CTV.........Cable Television	SOL.........Soffit Level
CUL.........Culvert	SP..........Sign Post
CW..........Concrete Block Wall	SPL.........Springing Level
DC..........Drainage Channel	SRTW........Stone Retaining Wall
DPC.........Damp Proof Course	SV..........Stop Valve (unspecified)
DR..........Drain	SVP.........Soil Vent Pipe
DSW.........Dry Stone Wall	SW..........Stone Wall
ECP.........Electricity Cable Pit	TAC.........Tactile Paving
EIC.........Electricity Inspection Cover	TB..........Traffic Bollard
EJ..........Expansion Joint	TBM.........Temporary Bench Mark
EJB.........Electricity Junction Box	TCB.........Telephone Call Box
EL SUB STN..Electricity Sub Station	TFR.........Taken From Records
EL..........Eaves Level	TIE.........Anchor Point (Masts/Poles)
ELB.........Electricity Box	TL..........Traffic Light
EP..........Electricity Pole	TLB.........Traffic Light Control Box
ER..........Earth Rod	TM..........Ticket Machine
ETL.........Electricity Transmission Line	TMC.........Tarmac
FB..........Flower Bed	TP..........Telecommunications Pole
FH..........Fire Hydrant	TPIT........Trial Pit
FL..........Floor Level	TS..........Trash Screen
FP..........Flagpole	U/C.........Under Construction
G*.*........Girth (of tree)	U/G.........Underground
G...........Gulley	UTL.........Unable to Lift (MH,IC etc)
GAB.........Gabion	UTS.........Unable to Survey
GIP.........Gas Inlet Pipe	VDP.........Vehicle Detector Pad
GMKR........Gas Marker	VP..........Vent Pipe
GST.........Gas Stop Tap (Domestic)	W/M.........Wire Mesh
GSV.........Gas Stop Valve (Mains)	WL..........Water Level
HSE.........Housing	WM..........Water Meter
HT..........Height	WO..........Wash Out
HV..........High Voltage	WP..........Waste Pipe
I/R.........Iron Railing	WST.........Water Stop Tap (domestic)
IC..........Inspection Cover	WSV.........Water Stop Valve (mains)

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	7	8	

Sheet Layout

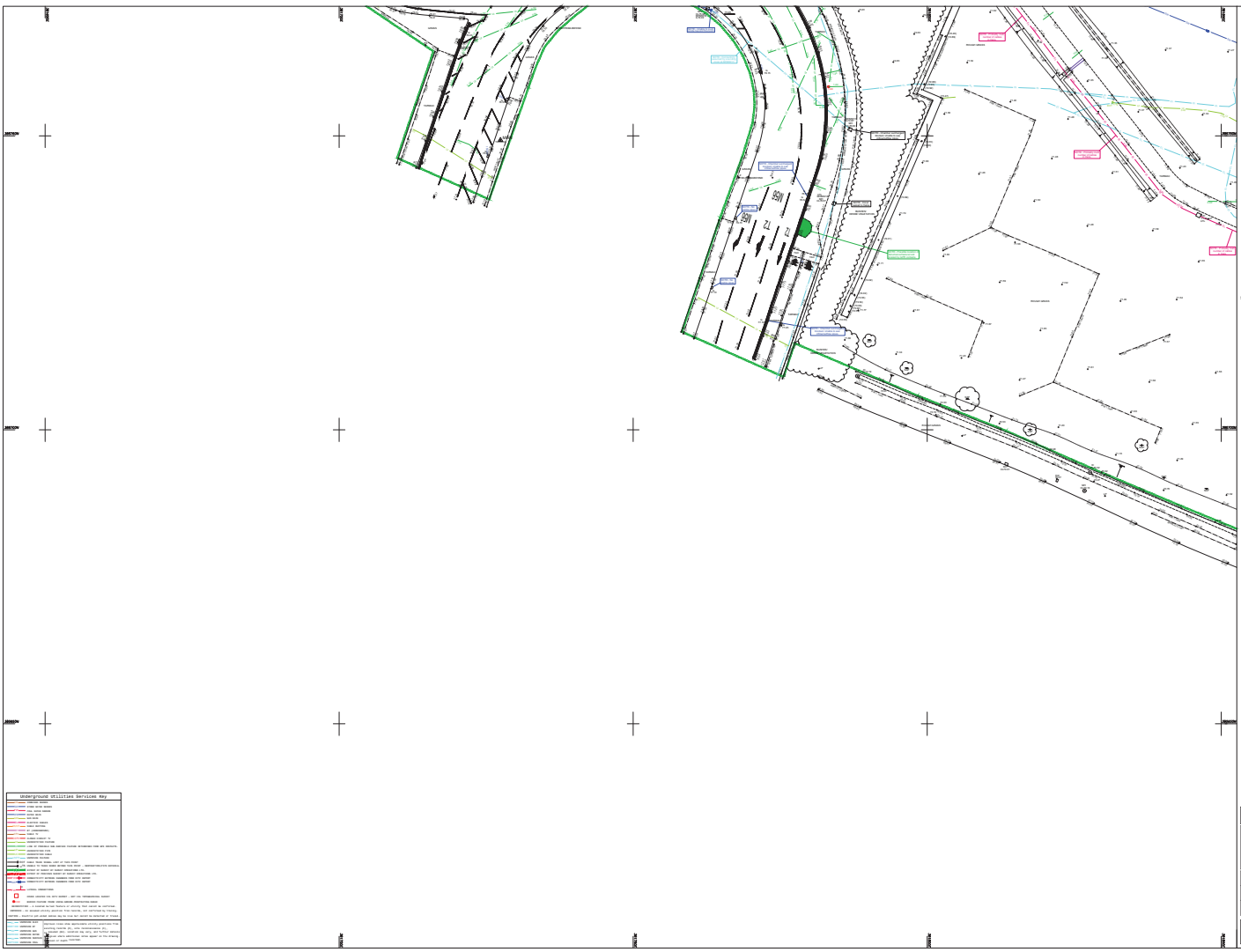
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Client
Sheppard Robson

Drawing Title
Utility Survey of Land at:
MIX Manchester, Jet Parks 1 & 2
Manchester Airport
Sheet 6 of 9

Scale(s)	1:200	Surveyor	SC
Date	FEB 26	Drawn	DS
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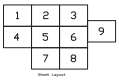
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Levels in parenthesis indicate top of walls.
Utilities added to Survey Operations drawing number 26L288.

SURVEY STATIONS

No.	Eastings	Northings	Height
CP1	384911.71	389749.94	77.07
CP2	384911.71	389749.94	77.07
CP3	384911.71	389749.94	77.07
CP4	384911.71	389749.94	77.07
CP5	384911.71	389749.94	77.07
CP6	384911.71	389749.94	77.07

STANDARD REFERENCE & ABBREVIATIONS

AB.....Access Barrier	CL.....Column Locked
AC.....Air Valve	CO.....Cover Only
AI.....Air Valve	CP.....Cash Payment
AM.....Air Valve	CR.....Cash Register
AR.....Anchor	CS.....Cable Shelf
BB.....Bollard Beacon	DA.....Alarm Bells
BC.....Bollard	DB.....Bollard
BE.....Bell Event	DD.....Bollard
BH.....Bollard	DE.....Diesel Gas Vent
BP.....Bus Stop	DH.....Overhead
BT.....Bollard Telecom Bx	DP.....Down Pipe
BU.....Bollard Telecom Ex	DR.....Distribution Box
CB.....Cable Box	DS.....Surface Pipe
CC.....Cable Chamber	EA.....Electricity Service Box
CH.....Rectangular Cov	EC.....Overhead Telecom Wire
CI.....Circular Cover	EE.....Earth Rod
CL.....Control Box	EH.....Earth & Wire
CM.....Concrete Mast Base	EJ.....Earth & Wire
CP.....Combat Control Tr	EL.....Flooding
CS.....Cable Earth	EM.....Climber Bar
CT.....Cable Marker	EP.....Electricity Pole (Timber)
CV.....Cross Lined	ES.....Bollard Sign
CW.....Crossing	ET.....Post or Corner
DA.....Drainage Gully	EV.....Ventilating Pipe
DB.....Drainage Manhole	EW.....Electricity Box
DM.....Manhole	FB.....Embarking Box
DW.....Concrete	FD.....Electricity Pole
EA.....Earth Pit	FE.....Spigot
EB.....Electricity Warning Box	FH.....Fire Hydrant
EC.....Cable Transformer	FP.....Gate Post
EH.....Access	FT.....Flag Post
EP.....Electricity Meter Box	GA.....Gate/Flag Locked
ES.....Electricity Service Box	GB.....Gate/Flag Locked Box
EV.....Electricity Pole No.	GC.....Gate/Flag Locked Post
FB.....Fuse Box	GD.....Gate/Flag Post
FC.....Dry Riser Box	GE.....Glass Box
FD.....Electricity Pole (Wood)	GF.....Gate/Flag Opening
FE.....Electricity Telephone Pedal	GG.....Traffic Barrier
FF.....Expansion Joint	GH.....Tapping Point Box
FG.....Electricity Junction Box	GI.....Telephone Point Box
FH.....Electricity Box Electricity Pole	GJ.....Clear View Display
FI.....Fuse Box	GK.....Gate/Flag Locked (Timber)
FJ.....Electricity Box	GL.....Traffic Light
FK.....Electricity Pole	GM.....Traffic Light Control Box
FL.....Electricity Box	GN.....Traffic Bollard
FM.....Electricity Transformer Cover	GO.....Guard
FN.....Flood Wall	GP.....Telecommunications Box
FO.....Fire Hydrant	GQ.....Fuse Box
FP.....Flood Level	GR.....Crash Barrier
FQ.....Flood Level	GS.....Telecommunications
FR.....Earth (Off Site)	GT.....Gate/Post
FS.....Gulley	GU.....Cable To Lift (BT etc)
FT.....Gulley	GV.....Cable To Pump
FU.....Gulley Catchpit	GW.....Telecommunications Box
FW.....Gas Marker	GX.....Earth Post
GA.....Gas Stop Tap (Ground Lv)	GY.....Wire Rope
GB.....Gas Stop Valve (Basin)	HA.....Water Valve
GC.....Gas Valve	HB.....Water Valve
GD.....Gauge	HC.....Water Cock
GE.....High Voltage	HD.....Water Tap
GH.....Fire Hydrant	HE.....Water Stop Tap (Boundary)
GI.....Inspection Hood	HF.....Water Stop Valve (Basin)



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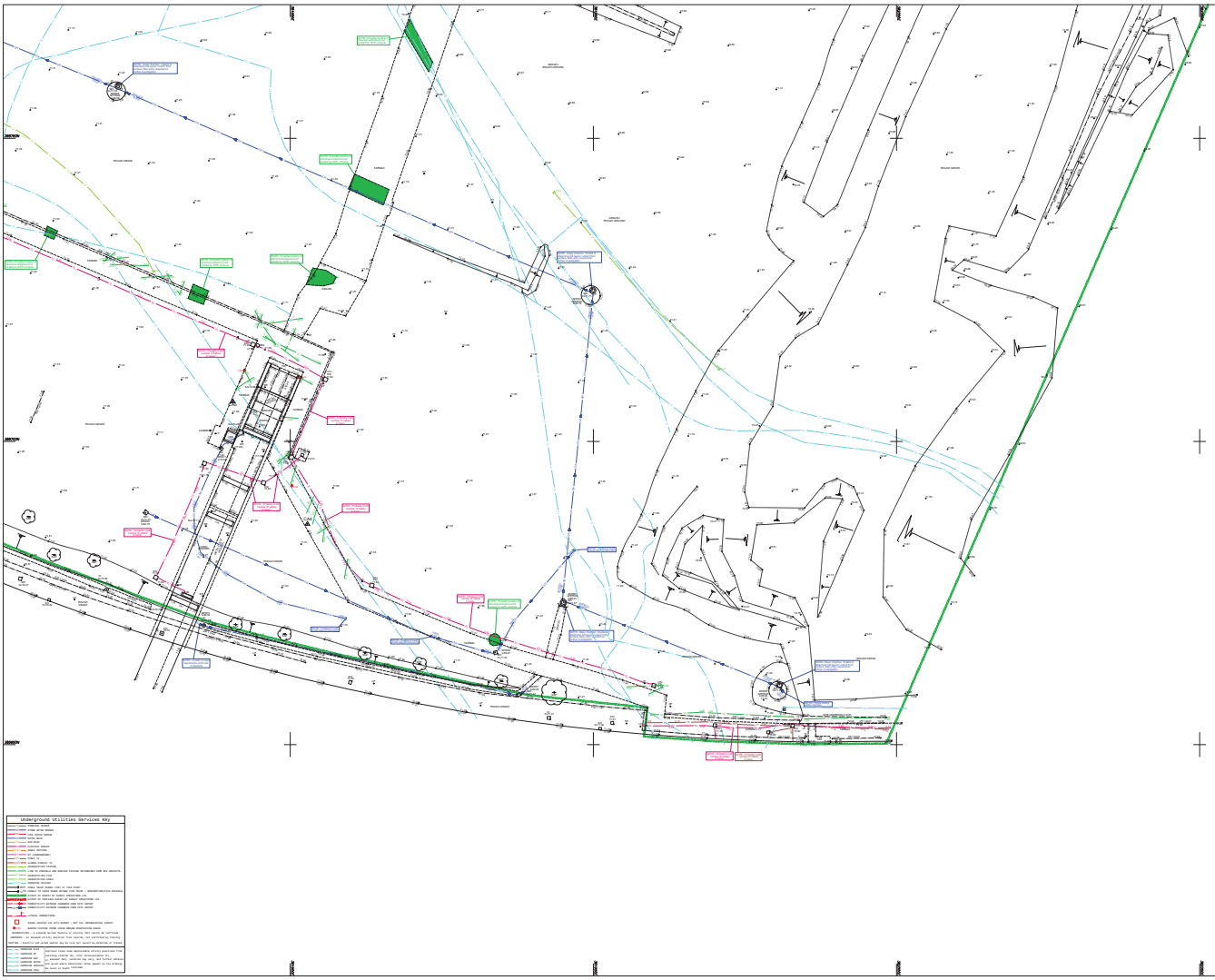
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Sheppard Robson

Drawing Title
Utility Survey of Land at:
Mill Manchester, Jet Parks 1 & 2
Manchester Airport
Sheet 7 of 9

Scale(s)	1:200	Surveyor	SC
Date	FEB 26	Drawn	DS
Job Number	26A216	Checked	SO

Sheet Size & Org Number & Revision
A0 26A216/007

Underground Utilities Services Key



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Note:
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Levels in parenthesis indicate top of walls.
Utilities added to Survey Operations drawing number 26A206.

SURVEY STATIONS

Point	Eastings	Northings	Height
CP1	384911.71	389249.94	77.50
CP2	384911.71	389249.94	77.50
CP3	384911.71	389249.94	77.50
CP4	384911.71	389249.94	77.50
CP5	384911.71	389249.94	77.50
CP6	384911.71	389249.94	77.50

STANDARD REFERENCE & ABBREVIATIONS

ABC ..... Access Gate	CL ..... Coach Level
AC ..... Air Valve	CP ..... Crash Pad
AL ..... Alarm	CR ..... Back Rester
ALM ..... Alarm Call	CS ..... Cable Box
APP ..... Approach	CT ..... Cable Duct
AR ..... Archway	CV ..... Culvert
ASH ..... Ash Tree	DAV ..... Davit
AT ..... Anchor	DB ..... Direct Buried Fibre
AT Box ..... Air Test Terminal Box	DC ..... Overhead
AT1 ..... Air Test Terminal 1	DF ..... Down Pipe
AT2 ..... Air Test Terminal Post	DH ..... Double Handed Arm
AV ..... Air Val Post	DP ..... Surface Pipe
B ..... Area Drain	DWB ..... Distance Survey Mark Bolt
BAL ..... Rectangular Inlet	DY ..... Overhead Telecom Wire
BB ..... Bollard Bollard	E ..... Electricity
BC ..... Electric Box	EB ..... Cast Iron Box
BMB ..... Benchmark Mount Bolt	EB ..... Cast Iron Wire
BOL ..... Bollard Cement Tr	EL ..... Flooring
BS ..... Bollard Bolt	EL ..... Chicken Wire
BSC ..... Bollard Concrete	EP ..... Electricity Post Crossing
BSL ..... Bollard Light	ES ..... Electric Sign
BSP ..... Bollard	F ..... Fuel or Cotton
BT ..... Bollard Bollard	FB ..... Flooring Bar
BW ..... Bollard Wood	FC ..... Flooring Bar
BWB ..... Bollard	FEN ..... Embossing Wire
BWP ..... Bollard	FH ..... Wire Fence Post
C ..... Bollard Cut	FLP ..... Flagging
CAB ..... Bollard Crossing Wire	FP ..... Flagging Post
CAT ..... Cable Telecommun	FS ..... Gate Post
CB ..... Bollard	G ..... Sign Post
CBB ..... Bollard Wood Wire	GB ..... Marking Level
CBC ..... Bollard Concrete	GC ..... Marking Level Wire
CBL ..... Bollard Cast Iron	GL ..... Grid Iron Lighted Post
CBP ..... Bollard	GP ..... Cast Iron Post
CBW ..... Dry Stone Wall	GR ..... Stone Wall
CC ..... Electricity Cable Cut	GT ..... Traffic Marking
CCC ..... Electricity Telephone Cable	GW ..... Traffic Bollard
CE ..... Expansion Joint	GWB ..... Telegraphy Bollard Wire
CEB ..... Electricity Junction Box	GY ..... Telephone Wire
CF ..... Electricity Telephone Cable	H ..... Cable Line Stopcock
CH ..... Cable Duct	HB ..... Telephone Junction Box
CHB ..... Chisel Bolt	HC ..... Telephone Junction Box
CL ..... Cycle Symbol	HP ..... Fire Hydrant
CL ..... Cable Level	HS ..... Cable Stopcock
CLB ..... Electricity Cut Lines	HT ..... Cable Stopcock
CLP ..... Bollard	HV ..... Cable To Earth (No. Of Wire)
CM ..... Bollard	HW ..... Cable To Survey
CMB ..... Bollard Wood Bolt	HWB ..... Cable To Telephone Box
CMBC ..... Bollard Bollard	I ..... Earth Post
CMP ..... Bollard Bolt (No. Unmarked)	IC ..... Wire Fence
CMW ..... Bollard Stop Valve (Water)	IL ..... Water Level
CO ..... Bollard	IP ..... Water Pipe
CP ..... Bollard	IW ..... Water Bolt
CPC ..... Bollard Bollard	J ..... Water Tap (Stopcock)
CPP ..... Bollard	JC ..... Water Stop Valve (Water)
CR ..... Bollard Bollard	

1 2 3 9
4 5 6
7 8

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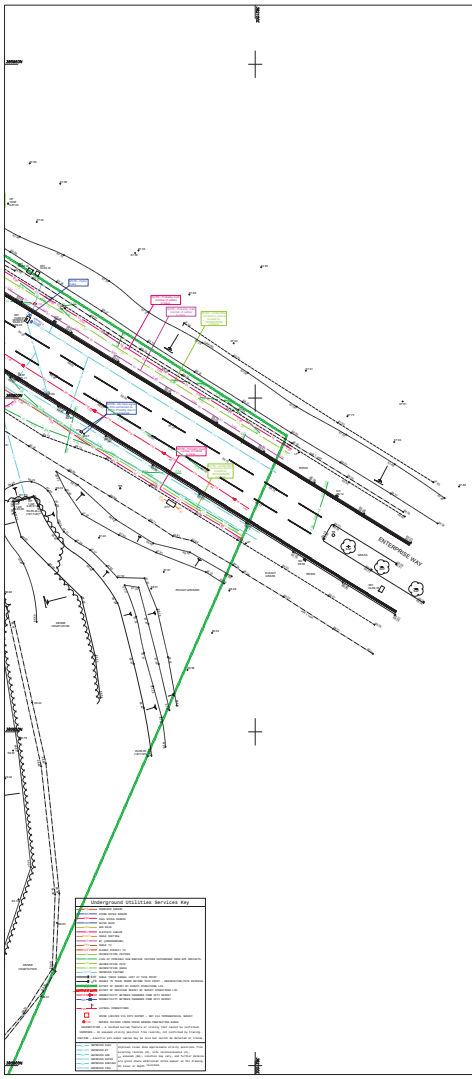
Client
Sheppard Robson

Drawing Title
Utility Survey of Land at:
M56 Manchester, Jet Parks 1 & 2
Manchester Airport
Sheet 8 of 9

Scale(s)	1:200	Surveyor	SC
Date	FEB 26	Drawn	SD
Job Number	26A216	Checked	SO

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A0 26A216/008

Underground Utilities Services Key



Underground Utilities Services Key

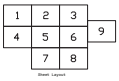
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Utilities added to Survey Operations drawing number 26L288.

SURVEY STATIONS			
Name	Eastings	Northings	Height
CP1	384815.71	389345.94	77.50
CP2	384815.71	389345.94	77.50
CP3	384815.71	389345.94	77.50
CP4	384815.71	389345.94	77.50
CP5	384815.71	389345.94	77.50
CP6	384815.71	389345.94	77.50

STANDARD REFERENCE & ABBREVIATIONS

(285)——Recorded Depth	TC——Traffic Count
AB——Air Valve	TD——Trial Dig
AC——Asp Carpark	TH——Trial Hole
ACC——Access	TK——Tanker Park
ADS——Advert	TP——Timber Post
AE——Aerial Mast	TR——Traffic Rail
AG——Allotment Gate	TS——Traffic Sign
AH——Anchor	TW——Tactile Warning
AM——Ant Mound	UB——Bollard
AP——Asp Path	UC——Uncertain Depth
APP——Asp Step	UG——Ground Gas Vent
AT Box——Air Diff. Transmit Box	UH——Overhead
AV——Air Vent	UP——Open Pipeline
AW——Asp Wall/Kerb	UPVC——Unplasticised PVC
BB——Bridle Bar	US——Surface Pipe
BC——Bus Stop	VMH——Victorian Survey Bench Mark
C.V.——Cross Culvert	WC——Overhead Telegraph Wire
CB——Catch Basin	WD——Wood Post
CC——Control Box	WE——Weir & Gate
CHA——Concrete Hard Area	WG——Post & Wire
CL——Centre Line	WH——Fencing
CO——Cable Duct	WL——Chain Link
COL——Column	WM——Wall Mounted Lamp
CP——Concrete Post	WP——Wooden Post
CPU——Concrete Pedestal	WR——Railway Line
CR——Cattle Grid	WS——Wooden Stile
CRO——Crossing	WT——Water Tank
CS——Concrete Step	WW——Wrought Iron
CT——Cable TV	XB——Cross Beam
CW——Concrete Wall	XC——Cross Channel
D——Drain	XP——Cross Pipe
DA——Drain Access	XR——Cross Rail
DB——Distribution Box	YC——Yard Channel
DC——Drain Chamber	YD——Yard Drain
DCC——Drain Chamber Cover	YG——Yard Gully
DCP——Drain Chamber Post	YH——Yard Hydrant
DCW——Drain Chamber Wall	YM——Yard Manhole
DG——Drain Gully	YP——Yard Pump
DH——Drain Hydrant	YS——Yard Sump
DM——Drain Manhole	YT——Yard Tap
DP——Down Pipe	YW——Yard Well
DPC——Damp Proof Course	ZA——Zebra Crossing
DS——Down Stand	ZB——Zebra Crossing
DT——Drain Trough	ZC——Zebra Crossing
E——Electric	ZD——Zebra Crossing
EB——Electric Box	ZE——Zebra Crossing
EC——Electric Cable	ZF——Zebra Crossing
EM——Electric Meter	ZG——Zebra Crossing
EP——Electric Pole	ZH——Zebra Crossing
ES——Electric Sign	ZI——Zebra Crossing
F——Fence	ZJ——Zebra Crossing
FB——Flower Bed	ZK——Zebra Crossing
FC——Fence Corner	ZL——Zebra Crossing
FE——Fence End	ZM——Zebra Crossing
FG——Flood Gate	ZN——Zebra Crossing
FH——Fire Hydrant	ZO——Zebra Crossing
FL——Flood Level	ZP——Zebra Crossing
FM——Flow Meter	ZQ——Zebra Crossing
FP——Flag Pole	ZR——Zebra Crossing
G——Gas	ZS——Zebra Crossing
GA——Gas Valve	ZT——Zebra Crossing
GB——Grit Bin	ZU——Zebra Crossing
GC——Gas Cap	ZV——Zebra Crossing
GD——Guide Post	ZW——Zebra Crossing
GM——Gas Meter	ZX——Zebra Crossing
GP——Gas Pump	ZY——Zebra Crossing
GR——Grating	ZZ——Zebra Crossing
GV——Gas Valve	
H——Hedge	
HB——Hedge Bottom	
HC——Hedge Centre	
HH——Hedge Top	
HT——Hedge Top	
I——Inspection Cover	



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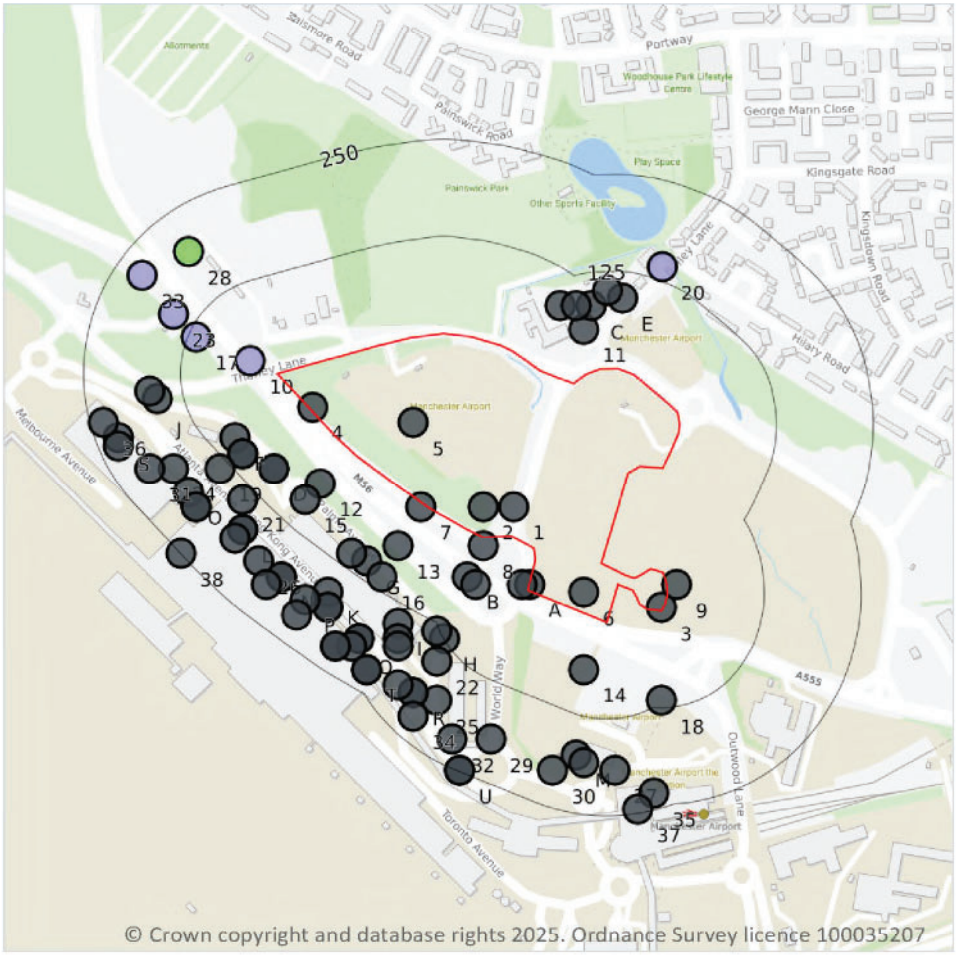
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Manchester Airport
Sheet 9 of 9

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Job Number	26A216	Checked	SO

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APPENDIX D – BOREHOLE RECORDS

16 Boreholes



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16.1 BGS Boreholes

Records within 250m	91

The Single Onshore Boreholes Index (SOBI); an index of over one million records of boreholes, shafts and wells from all forms of drilling and site investigation work held by the British Geological Survey. Covering onshore and nearshore boreholes dating back to at least 1790 and ranging from one to several thousand metres deep.

Features are displayed on the Boreholes map on **page 84 >**

ID	Location	Grid reference	Name	Length	Confidential	Web link
1	On site	381760 385820	AIRPORT ACCESS - STAGE 2 M3	-	Y	N/A
2	On site	381720 385820	SECOND TERMINAL, MANCHESTER AIRPORT 21	-	Y	N/A
3	On site	381950 385690	SECOND TERMINAL, MANCHESTER AIRPORT 25	-	Y	N/A

ID	Location	Grid reference	Name	Length	Confidential	Web link
4	**On site**	**381500 385950**	**SECOND PASSENGER TERMINAL, MANCHESTER AIRPORT TP3**	**-**	**Y**	**N/A**
5	**On site**	**381630 385930**	**SECOND PASSENGER TERMINAL MANCHESTER AIRPORT TP7**	**-**	**Y**	**N/A**
6	**On site**	**381850 385710**	**SECOND PASSENGER TERMINAL MANCHESTER AIRPORT TP10**	**-**	**Y**	**N/A**
A	**On site**	**381780 385720**	**SECOND TERMINAL, MANCHESTER AIRPORT R9**	**-**	**Y**	**N/A**
7	5m SW	381640 385820	AIRPORT ACCESS - STAGE 2 M4	-	Y	N/A
A	9m W	381770 385720	SECOND TERMINAL, MANCHESTER AIRPORT 24	-	Y	N/A
8	11m S	381720 385770	AIRPORT ACCESS - STAGE 2 M1	-	Y	N/A
9	13m E	381970 385720	SECOND PASSENGER TERMINAL MANCHESTER AIRPORT TP11	-	Y	N/A
10	39m NW	381420 386010	M56 WIDENING JUNCTIONS 4 - 6 CH22	10.0	N	915590 ↗
B	54m S	381700 385730	AIRPORT ACCESS - STAGE 2 M7	-	Y	N/A
11	56m N	381850 386050	ETROP GREEN 5	-	Y	N/A
12	59m SW	381510 385850	AIRPORT ACCESS - STAGE 2 M6	-	Y	N/A
B	61m S	381710 385720	AIRPORT ACCESS - STAGE 2 M2	-	Y	N/A
13	63m SW	381610 385770	AIRPORT ACCESS - STAGE 2 M5	-	Y	N/A
14	68m S	381850 385610	SECOND TERMINAL, MANCHESTER AIRPORT 26	-	Y	N/A
C	82m N	381860 386080	ETROP GREEN 3	-	Y	N/A
C	83m NE	381820 386080	ETROP GREEN 1	-	Y	N/A
15	87m SW	381490 385830	MHR AIRPORT TERMINAL2 TP2/53T	-	Y	N/A
D	87m SW	381450 385870	MANCHESTER AIRPORT - TERMINAL 2 2/53	-	Y	N/A
D	87m SW	381450 385870	MANCHESTER AIRPORT - TERMINAL 2 2/54	-	Y	N/A
C	87m N	381840 386080	ETROP GREEN 2	-	Y	N/A
E	91m N	381900 386090	ETROP GREEN 6	-	Y	N/A
F	96m SW	381400 385910	MHR AIRPORT TERMINAL2 TP2/52T	-	Y	N/A
E	101m N	381880 386100	ETROP GREEN 4	-	Y	N/A
G	103m SW	381570 385750	MANCHESTER AIRPORT - TERMINAL 2 2/55	-	Y	N/A
F	103m SW	381410 385890	MHR AIRPORT TERMINAL2 BH2/53	-	Y	N/A

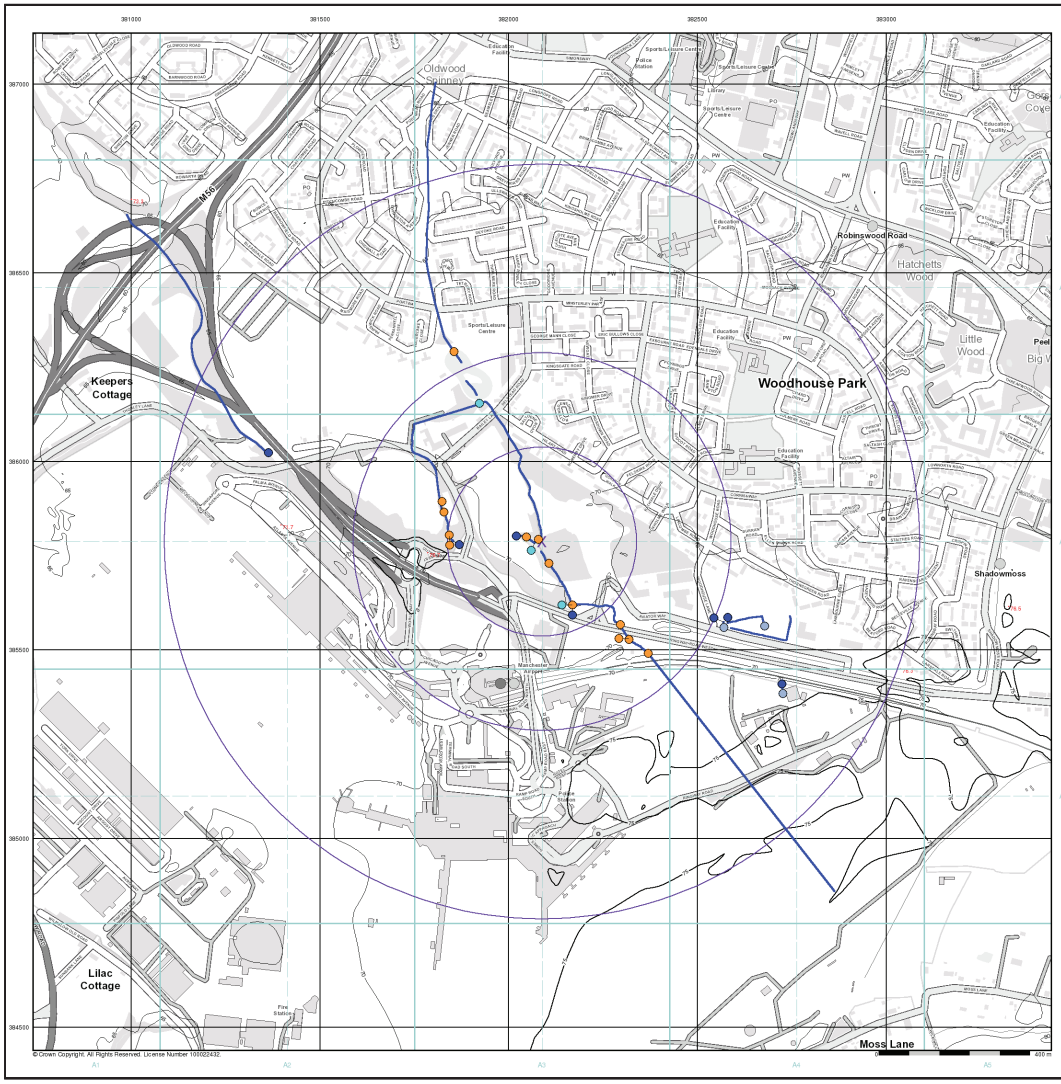
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F	103m SW	381410 385890	MHR AIRPORT TERMINAL2 BH2/54	-	Y	N/A
G	106m SW	381550 385760	MHR AIRPORT TERMINAL2 BH2/55	-	Y	N/A
16	107m SW	381590 385730	MHR AIRPORT TERMINAL2 TP2/54T	-	Y	N/A
17	115m NW	381350 386040	M56 WIDENING JUNCTIONS 4 - 6 CH4	9.63	N	915571 ↗
18	116m S	381950 385570	SECOND PASSENGER TERMINAL MANCHESTER AIRPORT TP15	-	Y	N/A
H	124m SW	381670 385650	MANCHESTER AIRPORT - TERMINAL 2 2/56	-	Y	N/A
H	129m SW	381660 385660	MHR AIRPORT TERMINAL2 BH2/56	-	Y	N/A
19	138m SW	381380 385870	SECOND TERMINAL, MANCHESTER AIRPORT 2	-	Y	N/A
20	143m N	381951 386131	NEAR MOSS HOUSE 11	7.92	N	914666 ↗
21	144m SW	381410 385830	SECOND TERMINAL, MANCHESTER AIRPORT R2	-	Y	N/A
I	149m SW	381610 385670	SECOND PASSENGER TERMINAL MANCHESTER AIRPORT TP9	-	Y	N/A
22	150m SW	381660 385620	MHR AIRPORT TERMINAL2 TP2/55T	-	Y	N/A
23	155m NW	381320 386070	M56 WIDENING JUNCTIONS 4 - 6 CH23	10.0	N	915591 ↗
J	158m W	381300 385960	MHR AIRPORT TERMINAL2 TP2/51T	-	Y	N/A
K	164m SW	381520 385710	SECOND TERMINAL, MANCHESTER AIRPORT R4	-	Y	N/A
J	166m W	381290 385970	MANCHESTER AIRPORT SECOND PASSENGER TERMINAL TP 1/14	-	Y	N/A
I	167m SW	381610 385650	SECOND TERMINAL, MANCHESTER AIRPORT 33	-	Y	N/A
L	171m SW	381410 385790	MHR AIRPORT TERMINAL2 BH2/67	-	Y	N/A
L	171m SW	381410 385790	MHR AIRPORT TERMINAL2 BH2/68	-	Y	N/A
I	175m SW	381610 385640	SECOND TERMINAL, MANCHESTER AIRPORT 8	-	Y	N/A
M	176m S	381840 385500	AIRLINE OFFICE DEVELOPMENT MANCHESTER AIRPORT 2	-	Y	N/A
K	180m SW	381520 385690	MHR AIRPORT TERMINAL2 BH2/71	-	Y	N/A
K	180m SW	381520 385690	MHR AIRPORT TERMINAL2 BH2/72	-	Y	N/A
24	182m SW	381320 385870	MHR AIRPORT TERMINAL2 TP2/57T	-	Y	N/A
M	183m S	381850 385490	AIRLINE OFFICE DEVELOPMENT MANCHESTER AIRPORT 3	-	Y	N/A
N	184m SW	381460 385730	MHR AIRPORT TERMINAL2 BH2/70	-	Y	N/A

ID	Location	Grid reference	Name	Length	Confidential	Web link
N	184m SW	381460 385730	MHR AIRPORT TERMINAL2 BH2/69	-	Y	N/A
25	185m SW	381660 385570	SECOND TERMINAL, MANCHESTER AIRPORT R5	-	Y	N/A
L	185m SW	381400 385780	MHR AIRPORT TERMINAL2 TP2/58T	-	Y	N/A
26	187m SW	381430 385750	SECOND TERMINAL, MANCHESTER AIRPORT 5	-	Y	N/A
O	188m SW	381340 385840	MHR AIRPORT TERMINAL2 BH2/62	-	Y	N/A
P	190m SW	381490 385700	MHR AIRPORT TERMINAL2 TP2/59T	-	Y	N/A
27	191m S	381890 385480	AIRLINE OFFICE DEVELOPMENT MANCHESTER AIRPORT 4	-	Y	N/A
Q	191m SW	381560 385650	MHR AIRPORT TERMINAL2 BH2/73	-	Y	N/A
Q	191m SW	381560 385650	MHR AIRPORT TERMINAL2 BH2/74	-	Y	N/A
O	194m SW	381350 385820	MHR AIRPORT TERMINAL2 BH2/65	-	Y	N/A
O	194m SW	381350 385820	MHR AIRPORT TERMINAL2 BH2/66	-	Y	N/A
28	195m NW	381340 386150	M56 WIDENING JUNCTIONS 4 - 6 CH5	12.0	N	915572 ↗
29	196m S	381730 385520	SECOND TERMINAL, MANCHESTER AIRPORT 13	-	Y	N/A
R	198m SW	381630 385580	MHR AIRPORT TERMINAL2 BH2/77	-	Y	N/A
R	198m SW	381630 385580	MHR AIRPORT TERMINAL2 BH2/78	-	Y	N/A
30	203m S	381810 385480	AIRLINE OFFICE DEVELOPMENT MANCHESTER AIRPORT 1	-	Y	N/A
N	204m SW	381440 385720	MANCHESTER AIRPORT SECOND PASSENGER TERMINAL 1/47	-	Y	N/A
Q	205m SW	381550 385640	MHR AIRPORT TERMINAL2 TP2/60T	-	Y	N/A
31	205m SW	381290 385870	MHR AIRPORT TERMINAL2 BH2/61	-	Y	N/A
R	208m SW	381610 385590	MHR AIRPORT TERMINAL2 TP2/61T	-	Y	N/A
P	212m SW	381480 385680	MANCHESTER AIRPORT SECOND PASSENGER TERMINAL 1/41	-	Y	N/A
Q	216m SW	381530 385640	MANCHESTER AIRPORT SECOND PASSENGER TERMINAL 1/35	-	Y	N/A
Q	216m SW	381530 385640	MANCHESTER AIRPORT SECOND PASSENGER TERMINAL 1/36R	-	Y	N/A
32	216m SW	381680 385520	MHR AIRPORT TERMINAL2 BH2/64	-	Y	N/A
33	216m NW	381280 386120	M56 WIDENING JUNCTIONS 4 - 6 CH3	9.63	N	915570 ↗

ID	Location	Grid reference	Name	Length	Confidential	Web link
34	219m SW	381630 385550	MHR AIRPORT TERMINAL2 BH2/63	-	Y	N/A
S	221m W	381250 385910	SECOND TERMINAL, MANCHESTER AIRPORT 20	-	Y	N/A
T	221m SW	381570 385610	MHR AIRPORT TERMINAL2 BH2/76	-	Y	N/A
T	221m SW	381570 385610	MHR AIRPORT TERMINAL2 BH2/75	-	Y	N/A
S	225m SW	381250 385900	SECOND PASSENGER TERMINAL, MANCHESTER AIRPORT TP4	-	Y	N/A
35	229m S	381940 385450	SECOND TERMINAL, MANCHESTER AIRPORT 32	-	Y	N/A
36	233m W	381230 385930	MHR AIRPORT TERMINAL2 TP2/56T	-	Y	N/A
37	244m S	381920 385430	SECOND TERMINAL, MANCHESTER AIRPORT R10	-	Y	N/A
U	248m S	381690 385480	MANCHESTER AIRPORT - TERMINAL 2 2/57	-	Y	N/A
U	248m S	381690 385480	MANCHESTER AIRPORT - TERMINAL 2 2/58	-	Y	N/A
38	250m SW	381330 385760	SECOND TERMINAL, MANCHESTER AIRPORT 4	-	Y	N/A

This data is sourced from the British Geological Survey.

APPENDIX E – EXISTING WATER NETWORK



Envirocheck®

LANDMARK INFORMATION GROUP®

OS Water Network Lines Map (1:10,000)

General

- Specified Site
- Specified Buffer(s)
- X Bearing Reference Point

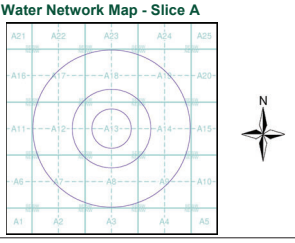
OS Water Network Data

- Canal
- Reservoir
- Foreshore
- Marsh
- Tidal River
- Inland River
- Drain
- Other
- Lake
- Transfer
- Lock Or Flight Of Locks
- Sea
- Junction
- Outlet
- Pseudo
- Source
- Other

Contours (height in meters)

- Standard Contour
- Master Contour
- Spot Height
- MLW Mean Low Water
- MHW Mean High Water

OS Water Network Map - Slice A



Order Details

Order Number:	153816554_1_1
Customer Ref:	3733-ACN
National Grid Reference:	382090, 385790
Slice:	A
Site Area (Ha):	0.01
Search Buffer (m):	1000

Site Details

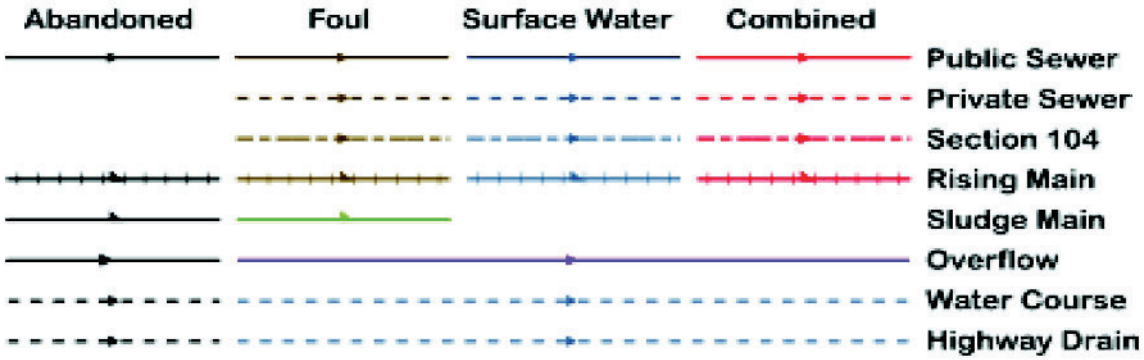
Enterprise Way, Manchester, M22 1PG

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Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk

APPENDIX F – UU SEWER RECORDS

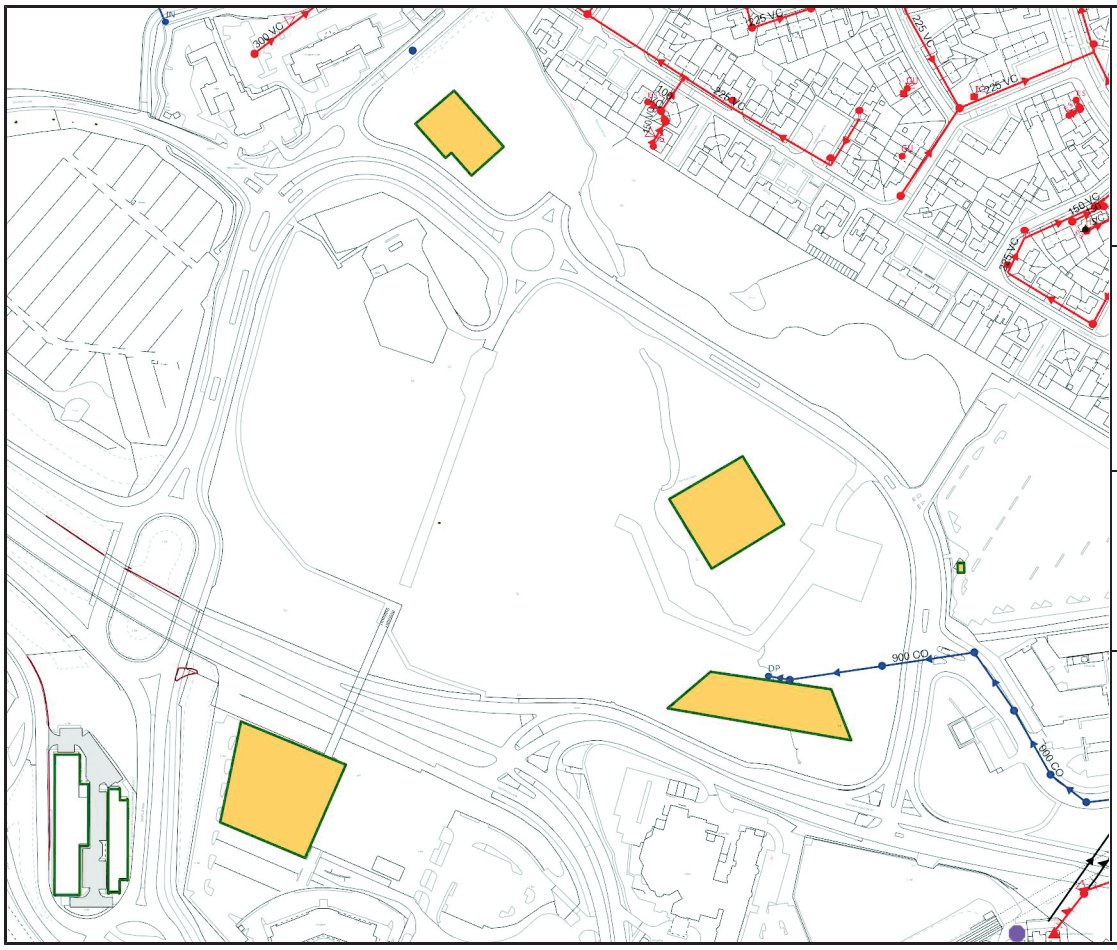
United Utilities
Water for the North West

Wastewater Symbology



All point assets follow the standard colour convention: red – combined, brown - foul, blue – surface water, purple - overflow

- Manhole
- HS Head of System
- ES Extent of Survey
- RE Rodding Eye
- IN Inlet
- DP Discharge Point
- HY Vortex
- PE Penstock
- WO Washout Chamber
- VA Valve
- AV Air Valve
- NRV Non Return Valve
- SO Soakaway
- GU Gully
- CA Cascade
- FM Flow Meter
- HA Hatch Box
- OI Oil Interceptor
- SM Summit
- DS Drop Shaft
- OP Orifice Plate
- Side Entry Manhole
- Outfall
- Screen Chamber
- IC Inspection Chamber
- Bifurcation Chamber
- LH Lamp Hole
- T Junction / Saddle
- CA Catchpit
- VC Valve Chamber
- Vent Column
- Vortex Chamber
- Penstock Chamber
- T Network Storage Tank
- V Sewer Overflow
- WwTW Ww Treatment Works
- Ww Pumping Station
- ST Septic Tank
- CK Control Kiosk
- DNM Network Monitoring Point
- Change of Characteristic



United Utilities
Water for the North West

SEWER RECORDS

Address or Site Reference

MIX Manchester MIX Manchester
M56 Ringway,
MANCHESTER AIRPORT,
Manchester

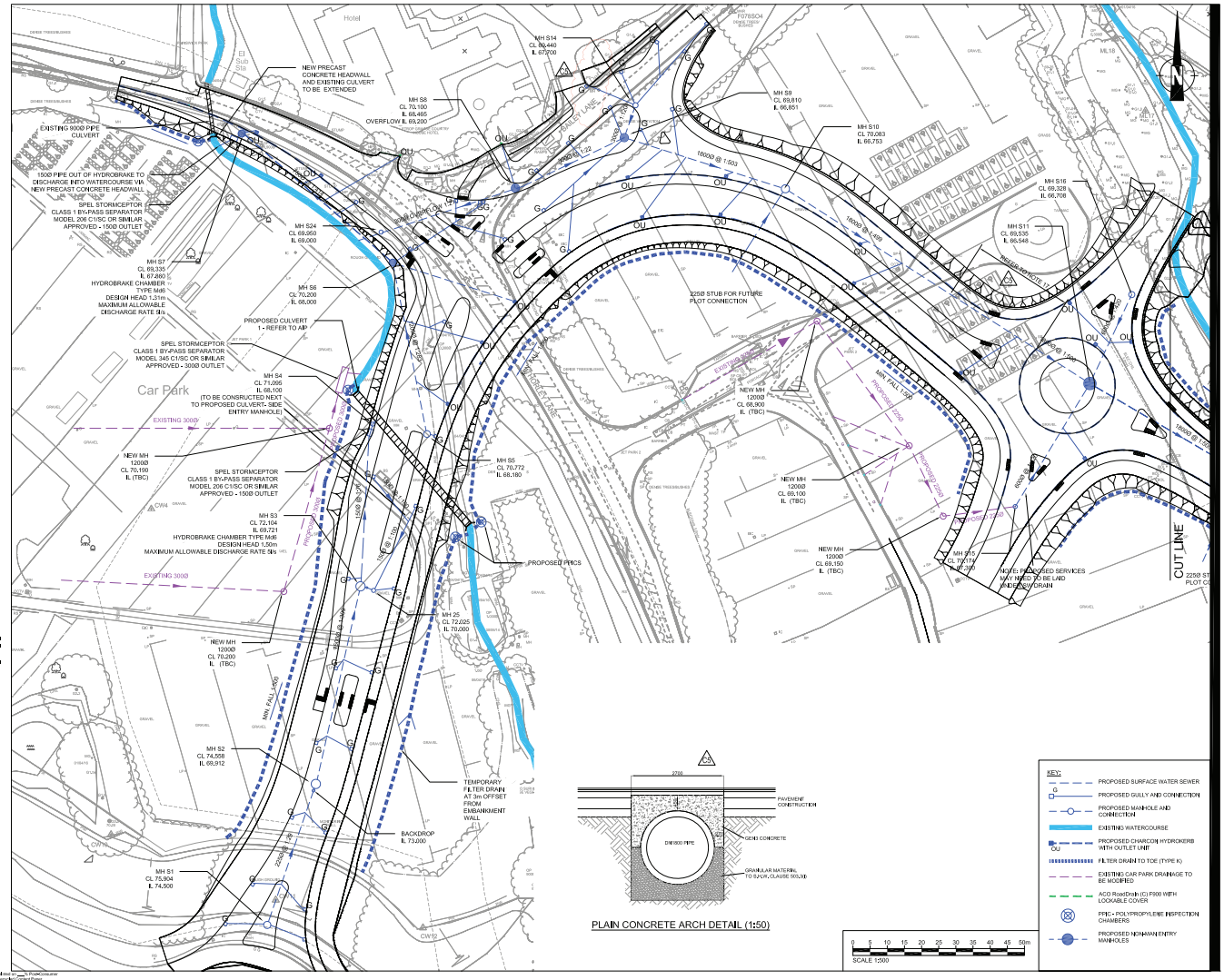
Scale: 1:2500
Date: 26/11/2025

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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APPENDIX G – AECOM DRAINAGE RECORDS



PLAIN CONCRETE ARCH DETAIL (1:50)

KEY:
- PROPOSED SURFACE WATER SEWER
- PROPOSED GULLY AND CONNECTION
- PROPOSED MANHOLE AND CONNECTION
- EXISTING WATERCOURSE
- PROPOSED CHARCON HYDROKERB WITH OUTLET UNIT
- FILTER DRAIN TO TOE (TYPE K)
- EXISTING CAR PARK DRAINAGE TO BE MODIFIED
- ACO RoadDrain (C) F900 WITH LOCKABLE COVER
- PRC - POLYPROPYLENE INSPECTION CHAMBERS
- PROPOSED NON-MAN ENTRY MANHOLES

0 5 10 15 20 25 30 35 40 45 50m
SCALE 1:500

AECOM

PROJECT
Airport City North
Spine Road 2015

CLIENT
北京建工国际 BCEG INTERNATIONAL

CONSULTANT
AECOM Manchester
Bridgewater House, Whitworth Street,
Manchester, M1 6LT
0161 907 3500 tel 0161 907 3599 fax
www.aecom.com

NOTES
1. ALL PIPE DIAMETERS ARE IN MILLIMETRES AND ALL LEVELS ARE IN METRES UNLESS OTHERWISE STATED.
2. ALL MANHOLES TO BE IN ACCORDANCE TO SEWERS FOR ADOPTION 7TH EDITION.
3. WHERE 'SIMILAR OR APPROVED' APPLIES THIS IS TO BE REFERRED TO THE DESIGNER.
4. ALL GULLY TAILS ARE 150mm DIAMETER UNLESS OTHERWISE STATED
5. PIPE BEDDING AND SURROUND SHALL BE:
- TYPE Z TO STANDARD DETAIL D10 WHERE COVER <900mm IN TRAFFICKED AREA.
- TYPE A TO STANDARD DETAIL D7 WHERE COVER <900mm IN NON-TRAFFICKED AREA.
- TYPE S TO STANDARD DETAIL D6 WHERE COVER >900mm IN TRAFFICKED AREA.
- TYPE B TO STANDARD DETAIL D9 WHERE COVER >900mm IN NON-TRAFFICKED AREA.
6. GULLIES SHALL BE TO STANDARD DETAIL D12. DOUBLE GULLIES SHALL BE TO STANDARD DETAIL D13. GULLY GRATINGS SHALL BE TO STANDARD DETAIL D47.
7. PIPE JOINTS SHALL BE FLEXIBLE TO STANDARD DETAIL D5.
8. REFER TO DRAWING NO.47070180_ACNSR_2003-2004 FOR SURFACE WATER DRAINAGE LONG-SECTIONS.
9. REFER TO DRAWING NO.47070180_ACNSR_2005 FOR SURFACE WATER MANHOLE SCHEDULE.
10. REFER TO DRAWING NO.47070180_ACNSR_2006 & 2007 FOR PROPOSED CULVERT AND HEADWALL DETAILS.
11. ALL INTERCEPTORS SHALL BE ALARMED WITH A VISUAL BEACON. THE ALARM SHALL BE SOLAR POWERED WITH THE FACILITY FOR A BACK UP LV SUPPLY.
12. ALL TRENCHES FOR PROPOSED DRAINAGE IN THE FOOTPRINT OF THE PROPOSED CARRIAGEWAY SHALL BE BACKFILLED WITH 6F2/6F5 MATERIAL TO SUB-FORMATION LEVEL.
13. EXISTING CAR PARK DRAINAGE WILL REQUIRE INVESTIGATION (AND LIKELY EXCAVATION) TO ESTABLISH EXISTING LEVELS.
14. SURFACE WATER STUBS FOR FUTURE CONNECTIONS SHALL BE CAPPED AND MARKED WITH A MARKER POST.
15. WHERE LAND DRAINAGE OUTFALLS TO WATERCOURSES (ALTHOUGH SMALL) HEADWALLS SHALL BE INSTALLED TO MANUFACTURERS DETAILS.
16. NON-MAN ENTRY MANHOLES ARE TO BE CONSTRUCTED IN A MANNER THAT ALLOWS THE COVER SLAB OPENING TO BE POSITIONED OVER THE CHANNEL.
17. WHERE COVER IS LESS THAN 750mm - USE PLAIN CONCRETE ARCH PROTECTION DETAIL.

ISSUE/REVISION

C5	22.8.17	DETAIL ADDED
C4	09/01/17	MH INVERTS REVISED FOLLOWING TOS
C3	21/11/16	NEW PIPES ADDED (OVERBOARD)
C2	06/10/16	HEADWALL NOTES ADDED
C1	22/09/16	FOR CONSTRUCTION
C6	12/09/17	GULLEY APPENDED TO FOOTPATH
P/R	DATE	DESCRIPTION

PROJECT NUMBER
47070180

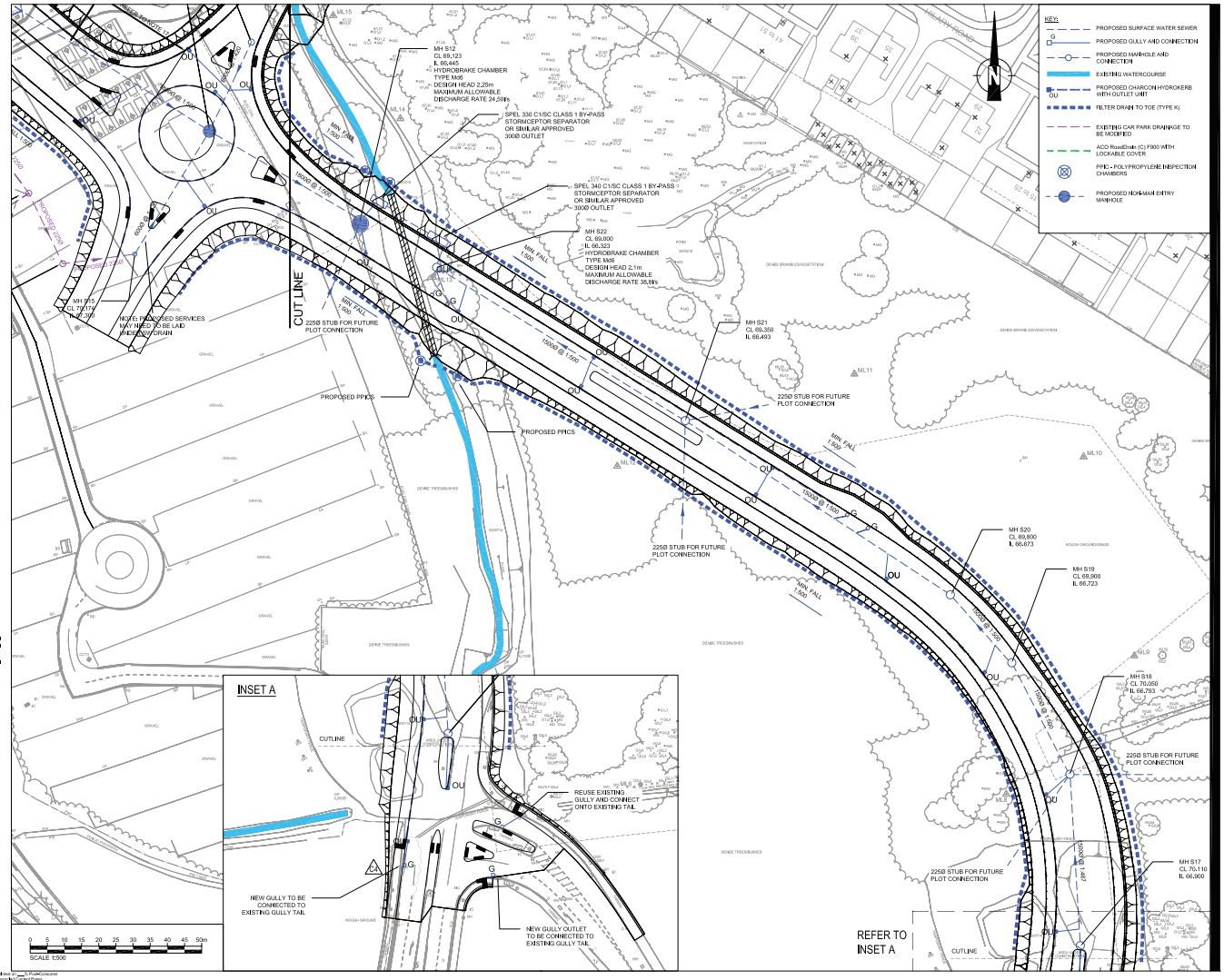
SHEET TITLE
Surface Water Drainage
Sheet 1

SHEET NUMBER
47070180_ACN_C_2000 C5

Project Manager: H.Hyde Designer: DOLS Checked: HB Approved: JW ISO A1 594mm x 841mm

Last saved by: MEL.JAYNE.2017-09-15 Last Plotted: 2017-09-15
P:\Manchester\CIVILMEP_2015\B_DRAWINGS\NONMAP DRAWINGS\FOR CONSTRUCTION\FOR BCEG\47070180_ACN_C_2000 C5 2001 C4 PROPOSED SW DRAINAGE.DWG

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AECOM

PROJECT

Airport City North
Link Road 2016

CLIENT

北京建工国际 BCEG INTERNATIONAL

CONSULTANT

AECOM Manchester
Bridgewater House, Whitworth Street,
Manchester, M1 6LT
0161 907 3500 tel 0161 907 3599 fax
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NOTES

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15. WHERE LAND DRAINAGE OUTFALLS TO WATERCOURSES ALTHOU GH SMALL HEADWALLS SHALL BE INSTALLED TO MANUFACTURERS DETAILS.
16. NON-MAN ENTRY MANHOLES ARE TO BE CONSTRUCTED IN A MANNER THAT ALLOWS THE COVER SLAB OPENING BE TO POSITIONED OVER THE CHANNEL.

ISSUE/REVISION

C4	12/09/17	FOR CONSTRUCTION
C3	21/11/16	ISSUED/REPLACED (OTHER REVISIONS AS CLOUDED)
C2	06/10/16	HEADWALL NOTES ADDED
C1	21/09/16	FOR CONSTRUCTION
R1	16/08/16	AMENDED Ø AND LEVELS
I/R	DATE	DESCRIPTION

PROJECT NUMBER

47070180

SHEET TITLE

Surface Water Drainage
Sheet 2

SHEET NUMBER

47070180_ACN_C_2001 C4

Project Management Hybrids Designed _ DGLS Checked _ NB Approved _ JH ISO A1 594mm x 841mm
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Project Management Hybrid | Designed: JOCE | Checked: MB | Approved: JM | ISO A1 594mm x 841mm

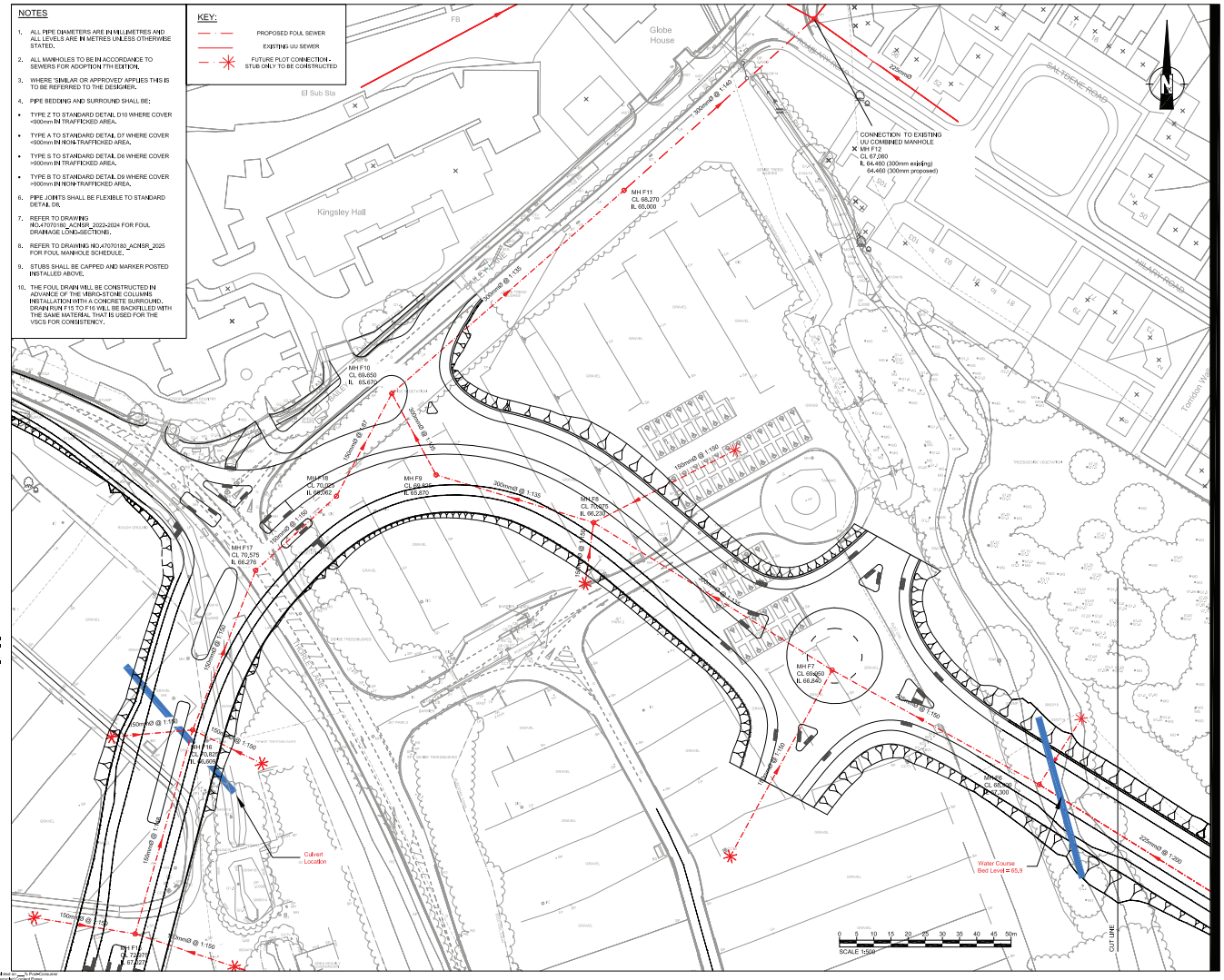
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NOTES

1. ALL PIPE DIAMETERS ARE IN MILLIMETRES AND ALL LEVELS ARE IN METRES UNLESS OTHERWISE STATED.
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   - TYPE S TO STANDARD DETAIL D6 WHERE COVER >900mm IN TRAFFICKED AREA.
   - TYPE B TO STANDARD DETAIL D9 WHERE COVER >900mm IN NON-TRAFFICKED AREA.
5. PIPE JOINTS SHALL BE FLEXIBLE TO STANDARD DETAIL D8.
7. REFER TO DRAWING NO.47070180_ACNSR_2022-2024 FOR FOUL DRAINAGE LONG-SECTIONS.
8. REFER TO DRAWING NO.47070180_ACNSR_2025 FOR FOUL MANHOLE SCHEDULE.
9. STUBS SHALL BE CAPPED AND MARKER POSTED INSTALLED ABOVE.
10. THE FOUL DRAIN WILL BE CONSTRUCTED IN ADVANCE OF THE VIBRO-STONE COLUMNS INSTALLATION WITH A CONCRETE SURROUND. DRAIN RUN F15 TO F16 WILL BE BACKFILLED WITH THE SAME MATERIAL THAT IS USED FOR THE VSCS FOR CONSISTENCY.

KEY:

- PROPOSED FOUL SEWER
- EXISTING UU SEWER
- FUTURE PLOT CONNECTION - STUB ONLY TO BE CONSTRUCTED



AECOM

PROJECT

Airport City North

Spine Road 2015

CLIENT

北京建工国际 BCEG INTERNATIONAL

CONSULTANT

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www.aecom.com

CONSULTANTS

Street Lighting Designer
AMEY
Factory Lane
Manchester M9 8AB
0161 277 6770 tel
www.Amey.co.uk

Design of Pedestrian Crossings and Signalised Junctions
TFGM
2 PiccadillyPlace
Manchester M1 3BG
0161 224 1000 tel
www.tfgm.com

ISSUE/REVISION

C2	24/01/17	NOTE 10 ADDED
C1	22/09/16	FOR CONSTRUCTION
R4	15/09/16	COVER & INVERT LEVELS REVISED
I/R	DATE	DESCRIPTION

PROJECT NUMBER

47070180

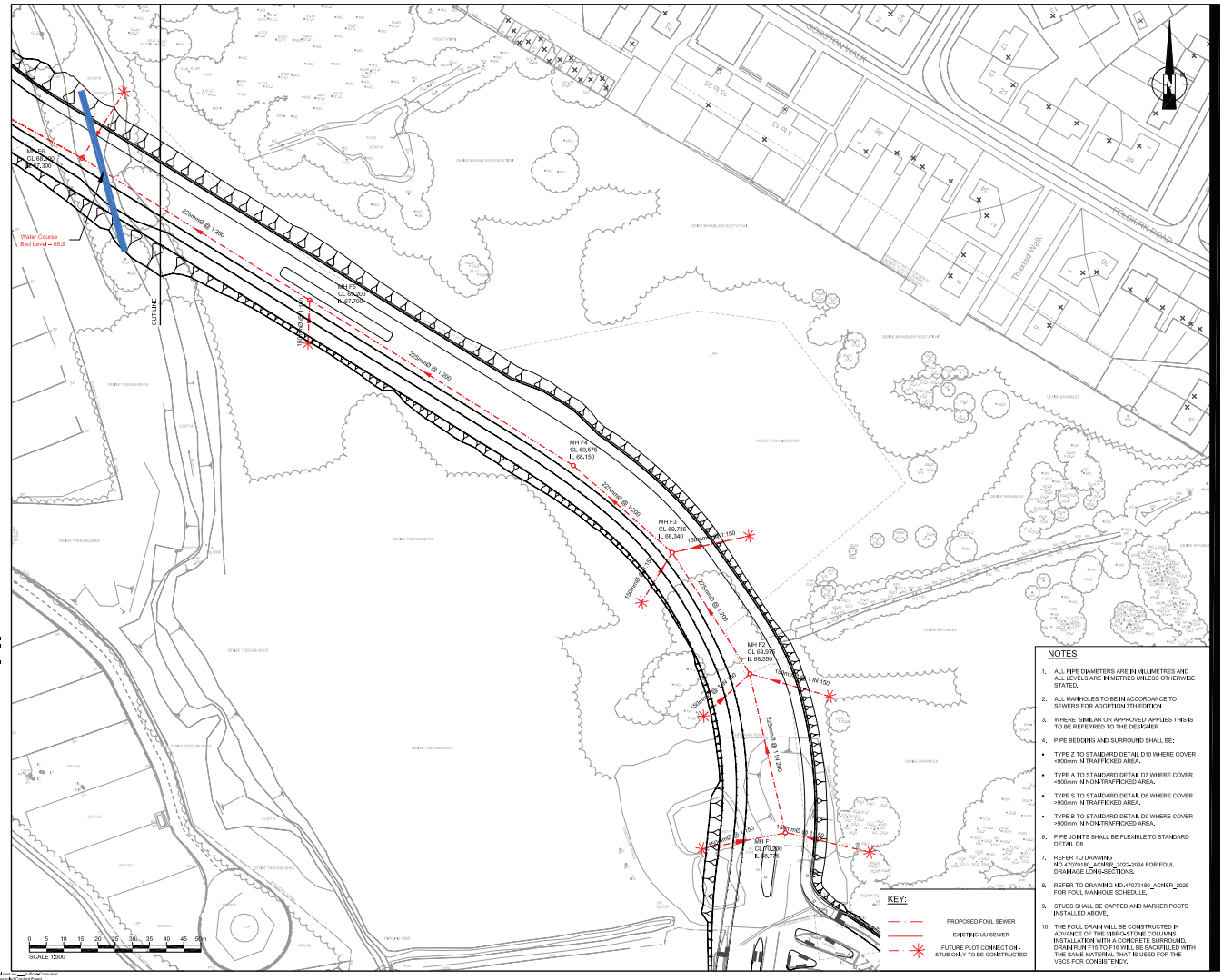
SHEET TITLE

Proposed Foul Drainage
Sheet 1

SHEET NUMBER

47070180_ACN_C_2020 C2

Please consider the environment before printing this drawing
Recycled Content Paper



KEY:

- PROPOSED FOUL SEWER
- EXISTING UU SEWER
- FUTURE PLOT CONNECTION - STUB ONLY TO BE CONSTRUCTED

NOTES

1. ALL PIPE DIAMETERS ARE IN MILLIMETRES AND ALL LEVELS ARE IN METRES UNLESS OTHERWISE STATED.
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   - TYPE A TO STANDARD DETAIL D7 WHERE COVER <900mm IN NON-TRAFFICKED AREA.
   - TYPE S TO STANDARD DETAIL D8 WHERE COVER >900mm IN TRAFFICKED AREA.
   - TYPE B TO STANDARD DETAIL D9 WHERE COVER >900mm IN NON-TRAFFICKED AREA.
5. PIPE JOINTS SHALL BE FLEXIBLE TO STANDARD DETAIL D8.
6. REFER TO DRAWING NO.A7070180_ACNSR_2022-2024 FOR FOUL DRAINAGE LONG-SECTIONS.
7. REFER TO DRAWING NO.A7070180_ACNSR_2025 FOR FOUL MANHOLE SCHEDULE.
8. STUBS SHALL BE CAPPED AND MARKER POSTS INSTALLED ABOVE.
9. THE FOUL DRAIN WILL BE CONSTRUCTED IN ADVANCE OF THE VIBRO-STONE COLUMNS INSTALLATION WITH A CONCRETE SURROUND. DRAIN RUN F15 TO F16 WILL BE BACKFILLED WITH THE SAME MATERIAL THAT IS USED FOR THE VSCS FOR CONSISTENCY.

AECOM

PROJECT

Airport City North

Spine Road 2015

CLIENT

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CONSULTANT

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TFGM
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Manchester M1 3BG
0161 224 1000 tel
www.tfgm.com

ISSUE/REVISION

I/R	DATE	DESCRIPTION
C2	24/01/17	NOTE 10 ADDED
C1	22/09/16	FOR CONSTRUCTION
R4	15/09/16	COVER & INVERT LEVELS REVISED

PROJECT NUMBER

47070180

SHEET TITLE

Proposed Foul Drainage
Sheet 2

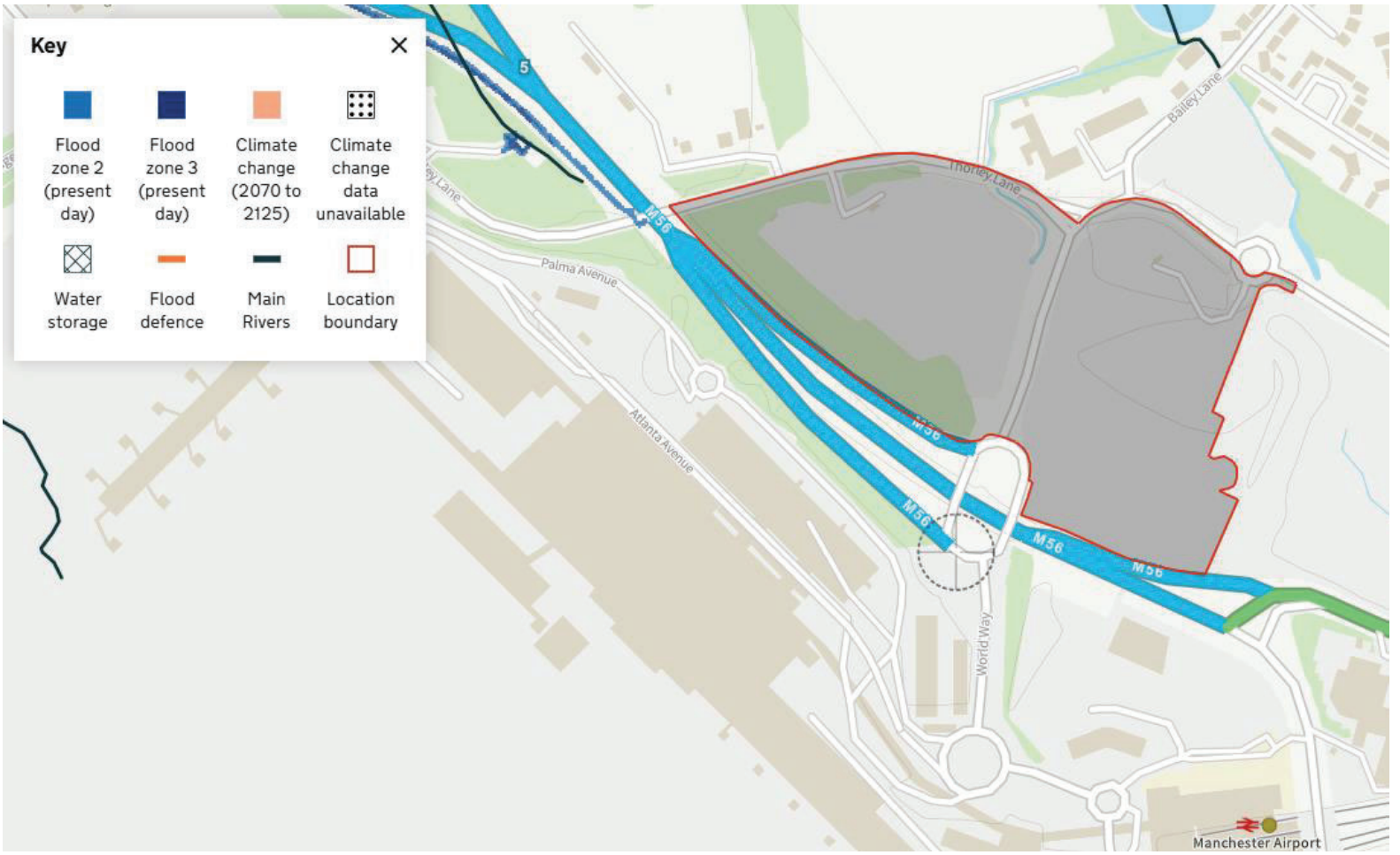
SHEET NUMBER

47070180_ACN_C_2021 C2

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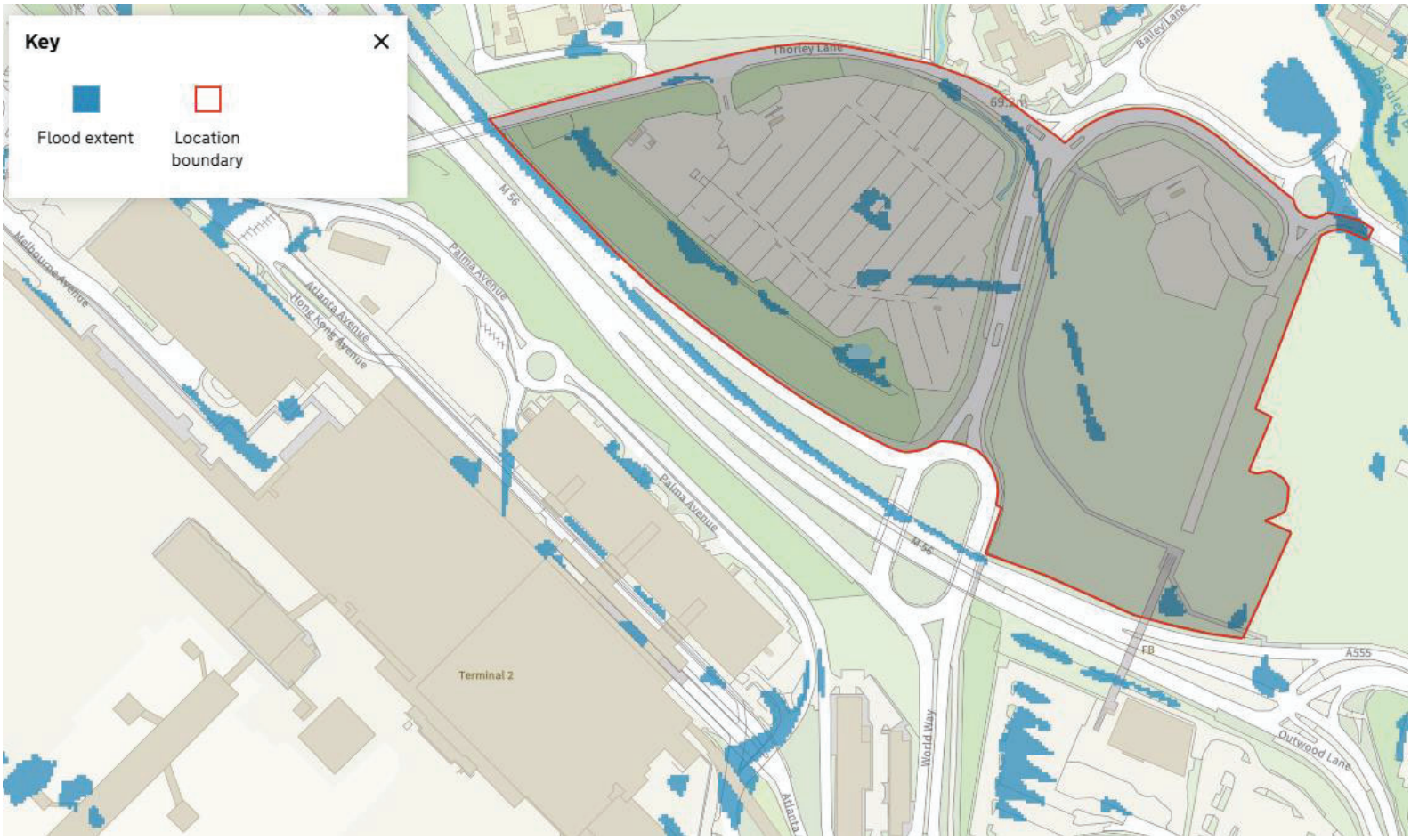
APPENDIX H – FLUVIAL FLOOD MAP



JOB NO	4772	SKETCH NO	FR-200	DRAWN BY	
PROJECT TITLE	MIX Manchester Phase 1	SKETCH TITLE	Fluvial Flood Map		ARJ. 06/03/26

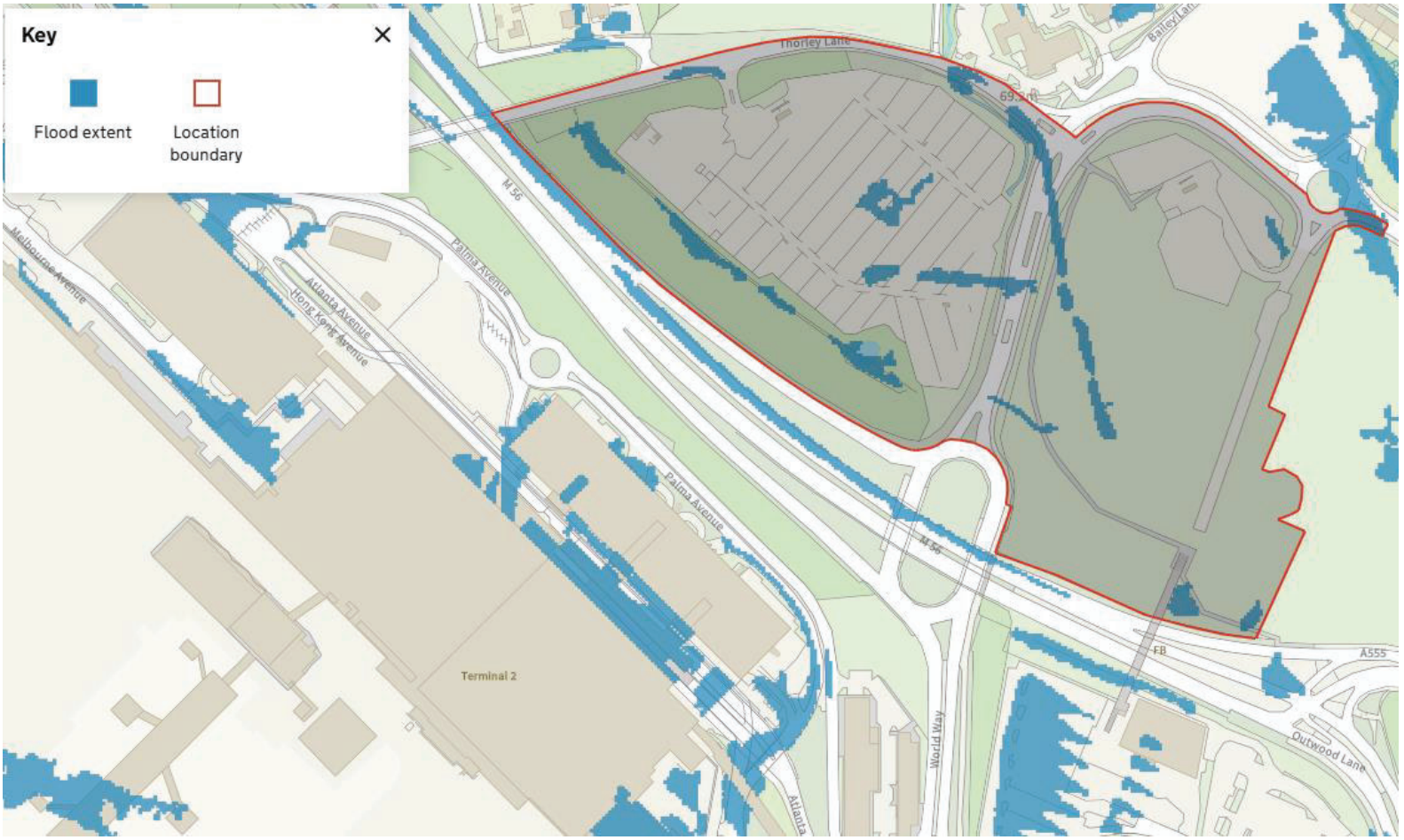
COMPLEX CHALLENGES ... MADE SIMPLE

APPENDIX I – PLUVIAL FLOOD MAP



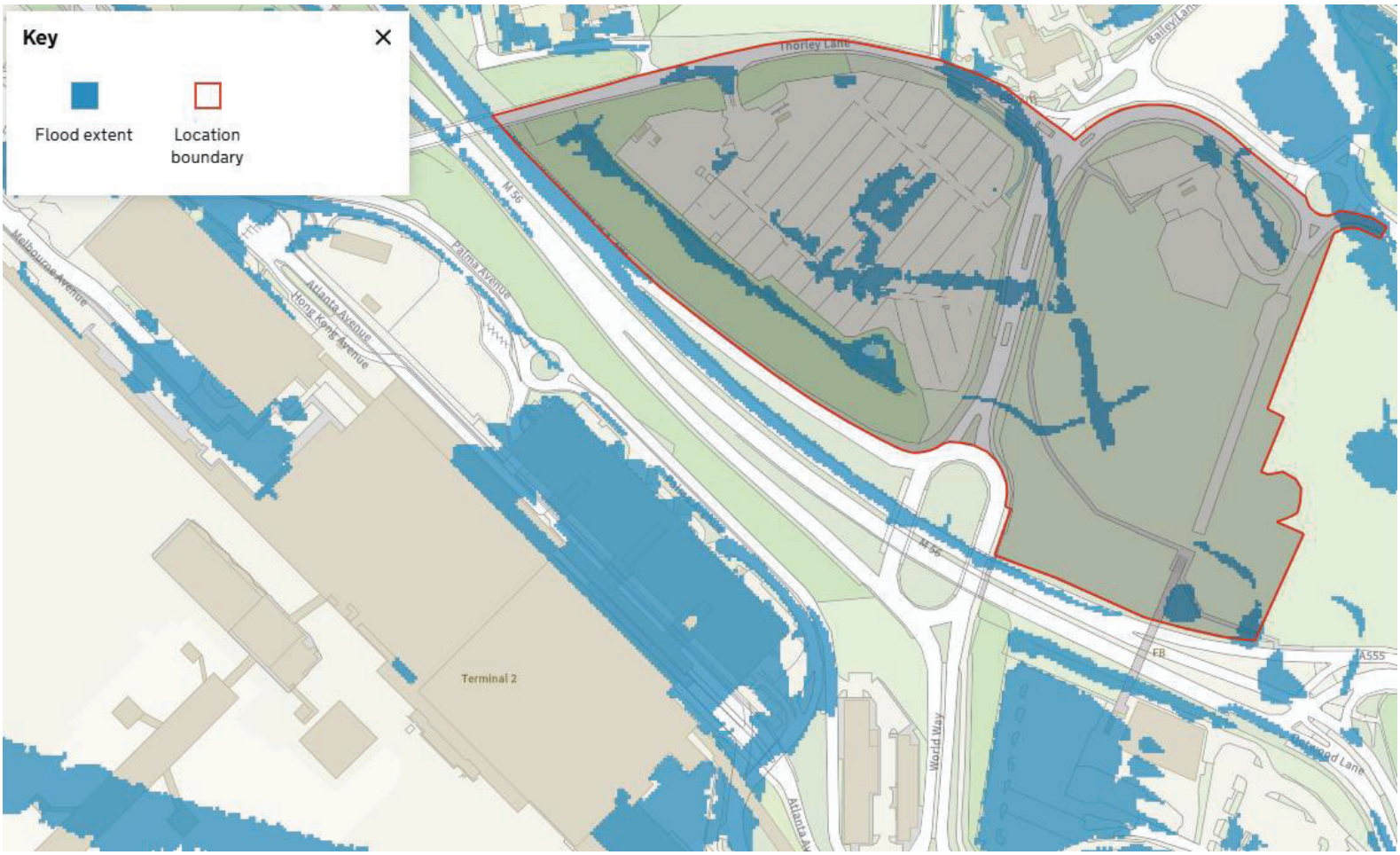
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PROJECT TITLE	MIX Manchester Phase 1	SKETCH TITLE	3.33% AEP Surface Water Flood Map		ARJ. 06/03/26

COMPLEX CHALLENGES ... MADE SIMPLE



RSC CONSULTING	JOB NO	4772	SKETCH NO	FR-301	DRAWN BY
	PROJECT TITLE	MIX Manchester Phase 1	SKETCH TITLE	1% AEP Surface Water Flood Map	ARJ. 06/03/26

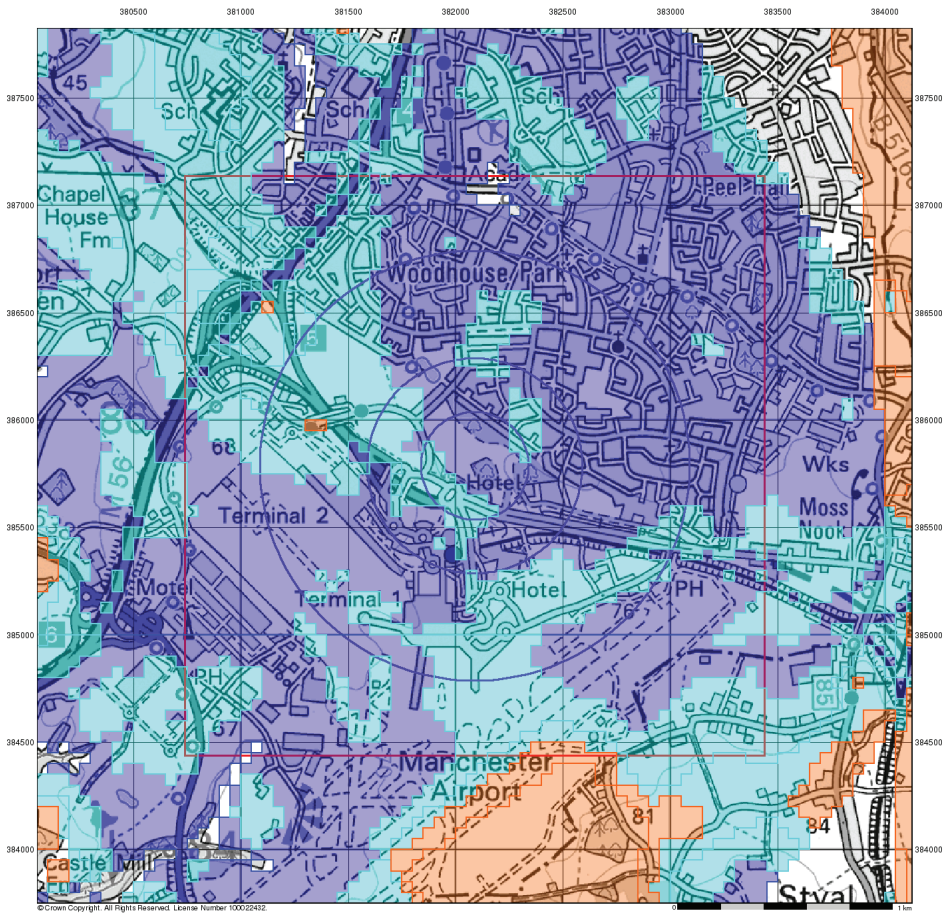
COMPLEX CHALLENGES ... MADE SIMPLE



JOB NO	4772	SKETCH NO	FR-302	DRAWN BY	
PROJECT TITLE	MIX Manchester Phase 1	SKETCH TITLE	0.1% AEP Surface Water Flood Map		ARJ. 06/03/26

COMPLEX CHALLENGES ... MADE SIMPLE

APPENDIX J – GROUNDWATER FLOOD MAPS



Envirocheck®

LANDMARK INFORMATION GROUP®

BGS Flood Data (1:50,000)

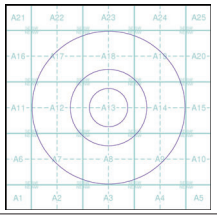
General

Specified Site | Specified Buffer(s) | Bearing Reference Point | Slice | Map ID

BGS Groundwater Flooding Susceptibility

- Potential for Groundwater Flooding to Occur at Surface
- Potential for Groundwater Flooding of Property Situated Below Ground Level
- Limited Potential for Groundwater Flooding to Occur

BGS Flood Data Map - Slice A



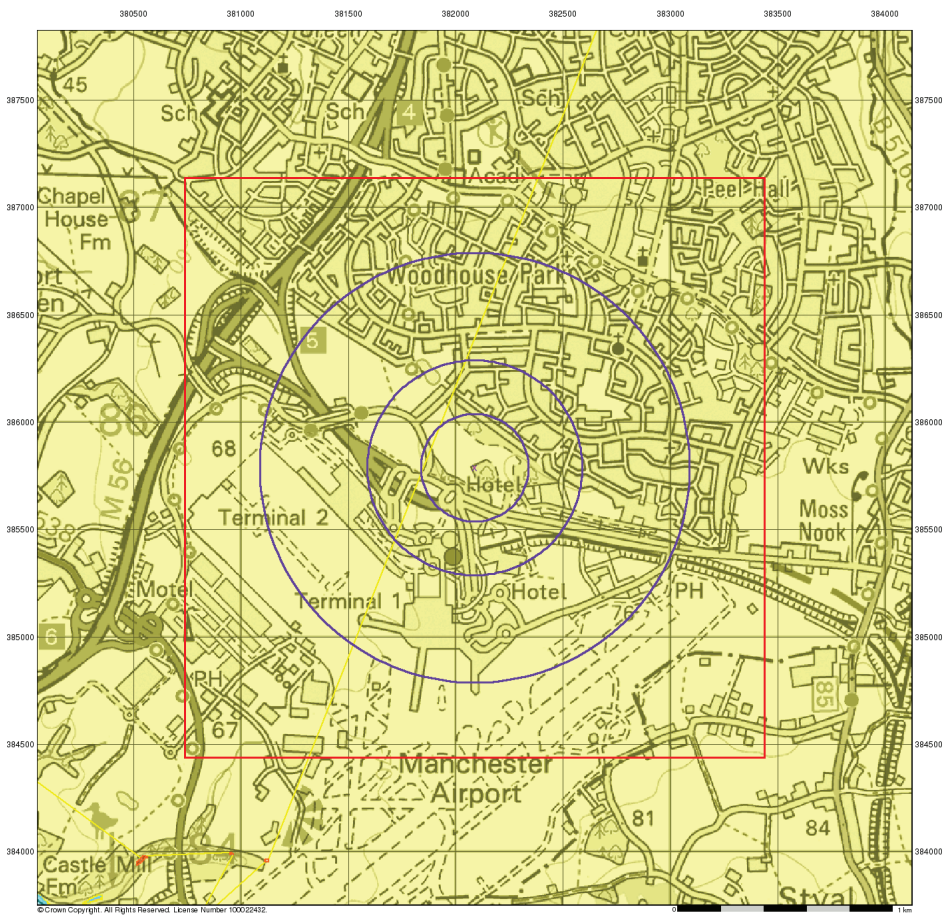
Order Details

Order Number:	153816554_1_1
Customer Ref:	3733-ACN
National Grid Reference:	382090, 385790
Slice:	A
Site Area (Ha):	0.01
Search Buffer (m):	1000

Site Details

Enterprise Way, Manchester, M22 1PG

Landmark® INFORMATION GROUP
Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



Envirocheck®

LANDMARK INFORMATION GROUP®

GeoSmart Information Groundwater Flood Map (1:50,000)

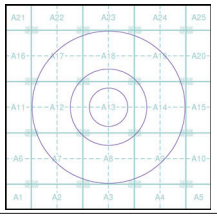
General

Specified Site | Specified Buffer(s) | Bearing Reference Point | Slice

GeoSmart Information Groundwater Flooding Risk

- High Risk
- Moderate Risk
- Low Risk
- Negligible Risk

GeoSmart Information Groundwater Flood Map - Slice A



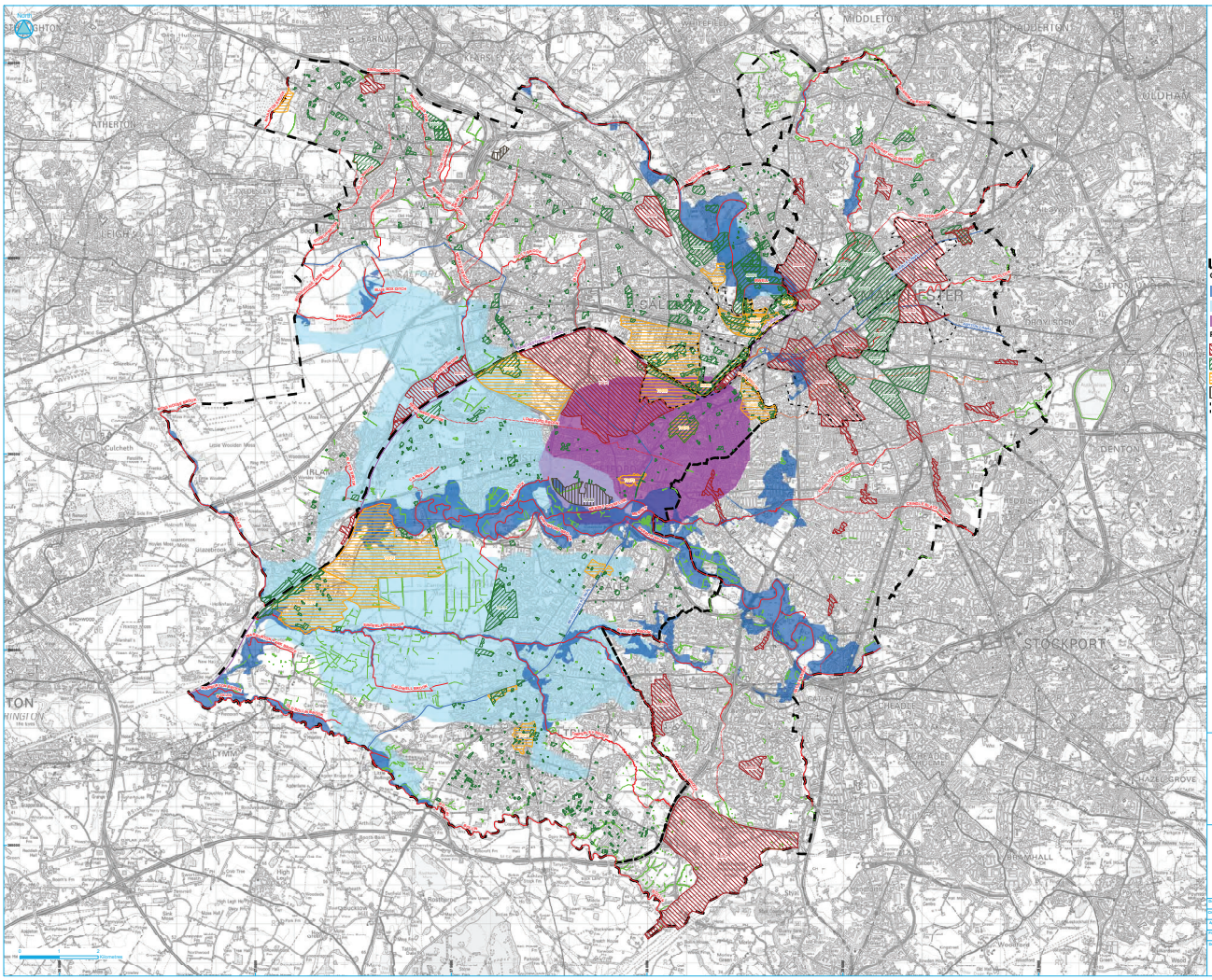
Order Details

Order Number:	153816554_1_1
Customer Ref:	3733-ACN
National Grid Reference:	382090, 385790
Slice:	A
Site Area (Ha):	0.01
Search Buffer (m):	1000

Site Details

Enterprise Way, Manchester, M22 1PG

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Fax: 0844 844 9951
Web: www.envirocheck.co.uk



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
- Regional Centre Boundary

- Ashton, Bridgewater and Rochdale Canals
- Manchester Ship Canal / Grey Irwell
- Other Waterbodies

Main Rivers (V8.0)

- Culverted
- Open

Digitised River Lines

- Culverted
- Open

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 on the Ordnance Survey 1:10,000 basemapping at the time of the assessment. It is not suitable for such as site specific Flood Risk Assessments. 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.

JBA Consulting
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for

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

Groundwater Flooding

Drawn by: J Cheatham	Date: 08/02/2011	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 100019285	
Checked by: J Dimelow	Date: 01/02/2011		
Approved by: J Cooper	Date: 01/02/2011		
File Name:	J:\cc\Vest\Mapping\Level1\MST_GroundwaterFlooding_V1.3.mxd		
Drawing Number: GW_2.1	Status: FINAL	Scale: 1:45,000	

Original @ A1

APPENDIX K – GREENFIELD RUNOFF

Greenfield runoff rate estimation tool

www.uksuds.com | Greenfield runoff rate estimation tool (https://www.uksuds.com/)

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Project details

Date	06/03/2026
Calculated by	Andy James
Reference	4772
Model version	2.2.3

Location

Site name	MIX Manchester
Site location	Parcel A



Site easting (British National Grid)	381690
Site northing (British National Grid)	385927

Site details

Total site area (ha)	50 ha

Greenfield runoff

Method

Method	IH124

IH124

	My value		Map value
SAAR (mm)	823 mm		823
How should SPR be derived?	WRAP soil type		
WRAP soil type	4		4
SPR	0.47		
QBar (IH124) (l/s)	291.7 l/s		

Growth curve factors

	My value		Map value
Hydrological region	10		10
1 year growth factor	0.87		
2 year growth factor	0.93		
10 year growth factor	1.38		
30 year growth factor	1.7		
100 year growth factor	2.08		
200 year growth factor	2.37		

Results

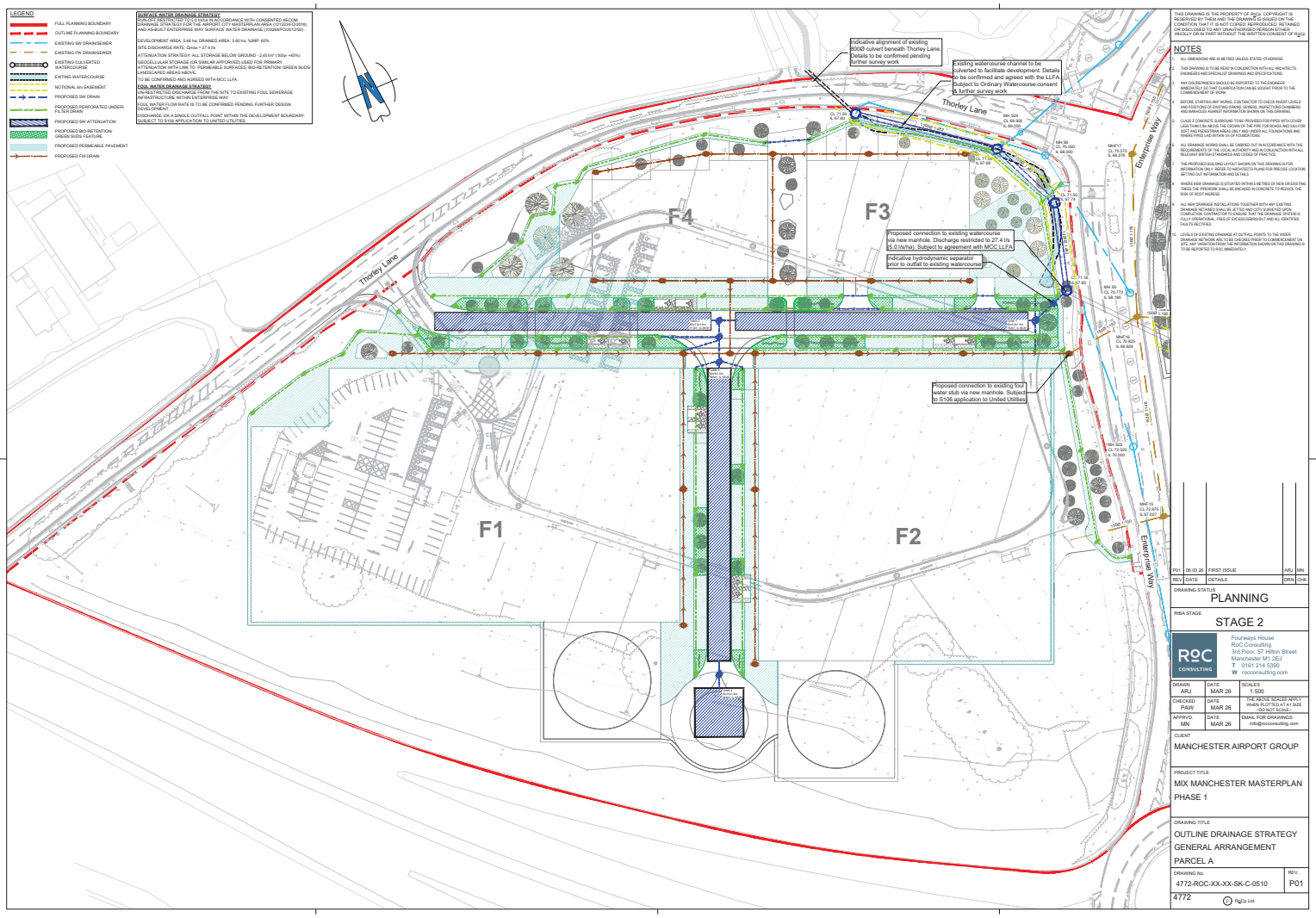
Method	IH124
Flow rate 1 year (l/s)	253.8 l/s
Flow rate 2 year (l/s)	271.4 l/s
Flow rate 10 years (l/s)	402.6 l/s
Flow rate 30 years (l/s)	495.9 l/s
Flow rate 100 years (l/s)	606.8 l/s
Flow rate 200 years (l/s)	691.4 l/s

Please note runoff estimation is subject to significant uncertainty. Results are therefore normally reported to only 1 decimal place. Where 2 decimal places are provided, this does not indicate accuracy to this level, it has been adopted to prevent 'zero' figures from being reported. Outputs less than 0.01 l/s are reported as 0.01 l/s.

Disclaimer

This report was produced using the Greenfield runoff rate estimation tool (2.2.3) developed by HR Wallingford and available at uksuds.com (https://www.uksuds.com/). The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at uksuds.com/terms-conditions (https://www.uksuds.com/terms-conditions). The outputs from this tool have been used to estimate Greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, Centre for Ecology and Hydrology, Wallingford Hydrosolutions or any other organisation for the use of these data in the design or operational characteristics of any drainage scheme.

APPENDIX L – OUTLINE DRAINAGE STRATEGY



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2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL ARCHITECTS, ENGINEERS AND SPECIALIST 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. BEFORE STARTING ANY WORKS, CONTRACTOR TO CHECK INVERT LEVELS AND POSITIONS OF EXISTING DRAINS, SEWERS, INSPECTIONS CHAMBERS AND MANHOLES AGAINST INFORMATION SHOWN ON THIS DRAWING.
5. CLASS Z CONCRETE SURROUND TO BE PROVIDED FOR PIPES WITH COVER LESS THAN 0.9m ABOVE THE CROWN OF THE PIPE FOR ROADS AND 0.6m FOR SOFT AND PEDESTRIAN AREAS ONLY AND UNDER ALL FOUNDATIONS AND RAISING PIPE LAID BELOW 0.1% OF FOUNDATIONS.
6. ALL DRAINAGE WORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH THE REQUIREMENTS OF THE LOCAL AUTHORITY AND IN CONJUNCTION WITH ALL RELEVANT CODES OF STANDARDS AND CODES OF PRACTICE.
7. THE PROPOSED BUILDING LAYOUT SHOWN ON THIS DRAWING IS FOR INFORMATION ONLY. REFER TO ARCHITECTS PLANS FOR PRECISE LOCATION SETTING OUT INFORMATION AND DETAILS
8. WHERE NEW DRAINAGE IS SITUATED WITHIN 2 METRES OF NEW OR EXISTING TREES THE PERSONS SHALL BE ENCASED IN CONCRETE TO REDUCE THE RISK OF ROOT INGRESS.
9. ALL NEW DRAINAGE INSTALLATIONS TOGETHER WITH ANY EXISTING DRAINAGE SYSTEMS AFFECTED BY THE WORKS SHALL BE TESTED ON COMPLETION. CONTRACTOR TO ENSURE THAT THE DRAINAGE SYSTEM IS FULLY OPERATIONAL, FREE OF EXCESS DEBRIS/SILT AND ALL IDENTIFIED FAULTS RECTIFIED.
10. LEVELS OF EXISTING DRAINAGE AT OUTFALL POINTS TO THE WIDER DRAINAGE NETWORK ARE TO BE CHECKED PRIOR TO COMMENCEMENT ON SITE. ANY VARIATION FROM THE INFORMATION SHOWN ON THIS DRAWING IS TO BE REPORTED TO ROC IMMEDIATELY.

REV.	DATE	DETAILS	ORIN	CHK
P01	06.03.26	FIRST ISSUE	ARJ	MN

DRAWING STATUS: PLANNING
RIBA STAGE: STAGE 2

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ARJ	MAR 26	1:500
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PAW	MAR 26	
APPRVD	DATE	EMAIL FOR DRAWINGS
MN	MAR 26	info@roconsulting.com

CLIENT: MANCHESTER AIRPORT GROUP

PROJECT TITLE: MIX MANCHESTER MASTERPLAN PHASE 1

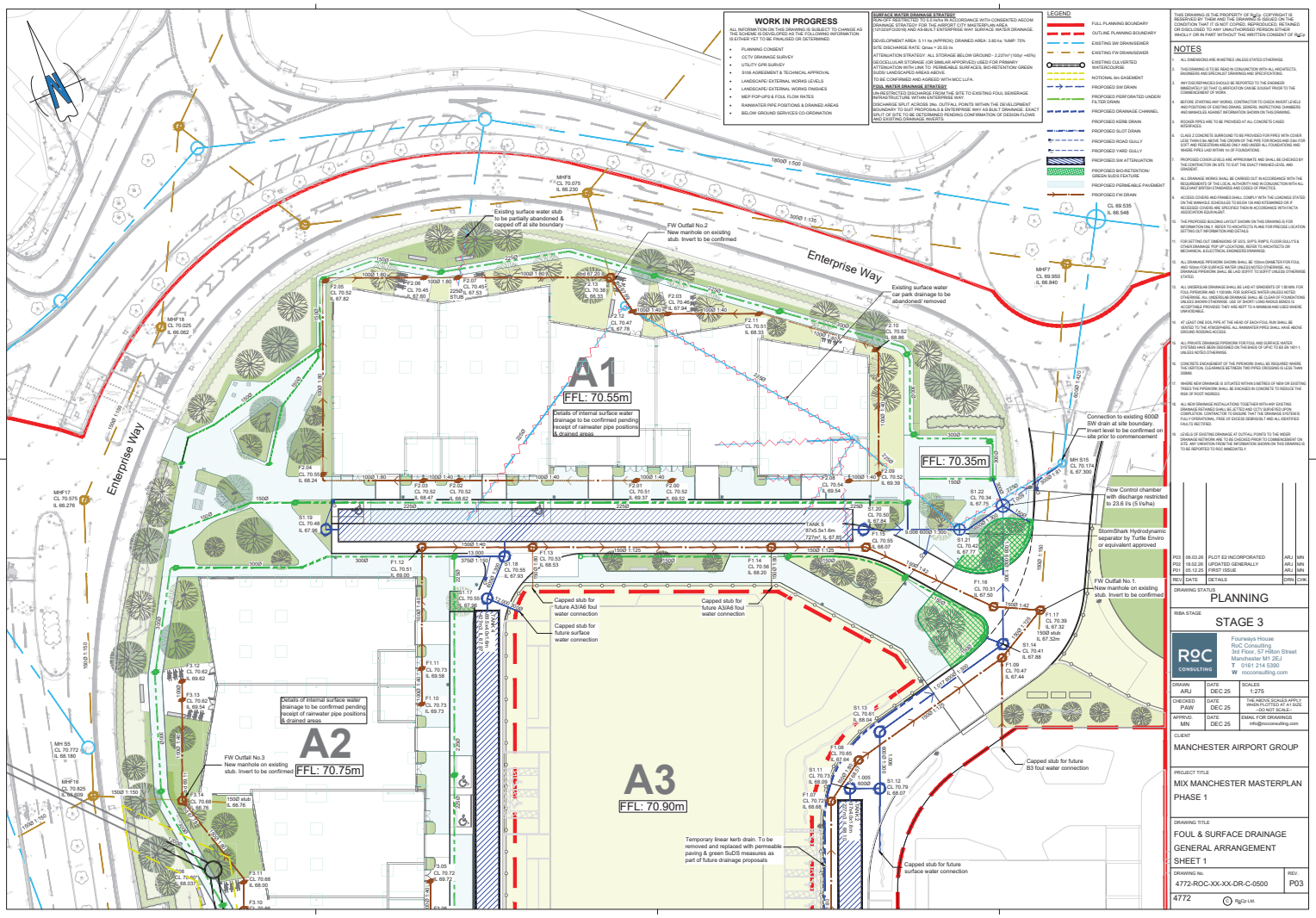
DRAWING TITLE: OUTLINE DRAINAGE STRATEGY GENERAL ARRANGEMENT PARCEL A

DRAWING No.: 4772-ROC-XX-XX-SK-C-0510
REV.: P01

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APPENDIX M – DETAILED DRAINAGE STRATEGY



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3. ANY DISCREPANCIES SHOULD BE REPORTED TO THE ENGINEER IMMEDIATELY SO THAT CLARIFICATION CAN BE SOUGHT PRIOR TO THE COMMENCEMENT OF WORK.
4. BEFORE STARTING ANY WORKS, CONTRACTOR TO CHECK INVERT LEVELS AND POSITIONS OF EXISTING DRAINS, SEWERS, INSPECTIONS CHAMBERS AND MANHOLES AGAINST INFORMATION SHOWN ON THIS DRAWING.
5. ROCKER PIPES ARE TO BE PROVIDED AT ALL CONCRETE CASED INTERFACES.
6. CLASS Z CONCRETE SURROUND TO BE PROVIDED FOR PIPES WITH COVER LESS THAN 0.9m ABOVE THE CROWN OF THE PIPE FOR ROADS AND 0.6m FOR SOFT AND PEDESTRIAN AREAS ONLY AND UNDER ALL FOUNDATIONS AND MASS FILL AND WITHIN 1m OF FOUNDATIONS.
7. PROPOSED COVER LEVELS ARE APPROXIMATE AND SHALL BE CHECKED BY THE CONTRACTOR ON SITE TO SUIT THE EXACT FINISHED LEVEL AND GRADIENT.
8. ALL DRAINAGE WORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH THE REQUIREMENTS OF THE LOCAL AUTHORITY AND IN CONJUNCTION WITH ALL RELEVANT BRITISH STANDARDS AND CODES OF PRACTICE.
9. ACCESS COVERS AND FRAMES SHALL COMPLY WITH THE LOADINGS STATED ON THE MANHOLE SCHEDULES TO BS EN 124 AND ATTENDINGS OR IF RECESSED COVERS ARE SPECIFIED THEN IN ACCORDANCE WITH HATCA ASSOCIATION EQUIVALENT.
10. THE PROPOSED BUILDING LAYOUT SHOWN ON THIS DRAWING IS FOR INFORMATION ONLY. REFER TO ARCHITECTS PLANS FOR PRECISE LOCATION SETTING OUT INFORMATION AND DETAILS.
11. FOR SETTING OUT DIMENSIONS OF S2/3, S3/P3, RWP'S, FLOOR GULLY'S & OTHER DRAINAGE 'POP-UP' LOCATIONS, REFER TO ARCHITECTS OR MECHANICAL ENGINEERS DRAWINGS.
12. ALL DRAINAGE PIPEWORK SHOWN SHALL BE 100mm DIAMETER FOR FOUL AND 150mm FOR SURFACE WATER UNLESS NOTED OTHERWISE. ALL DRAINAGE PIPEWORK SHALL BE LAID EVENLY TO GRADIENTS AS STATED.
13. ALL UNDERSLAB DRAINAGE SHALL BE LAID AT GRADIENTS OF 1:80 MIN. FOR FOUL PIPEWORK AND 1:100 MIN. FOR SURFACE WATER UNLESS NOTED OTHERWISE. ALL UNDERSLAB DRAINAGE SHALL BE CLEAR OF FOUNDATIONS UNLESS SHOWN OTHERWISE. USE OF SHORT LONG RADIUS BENDS IS ACCEPTABLE PROVIDED THEY ARE KEPT TO A MINIMUM AND USED WHERE UNAVOIDABLE.
14. AT LEAST ONE SOIL PIPE AT THE HEAD OF EACH FOUL RUN SHALL BE VENTED TO THE ATMOSPHERE. ALL RAINWATER PIPES SHALL WHERE ABOVE GROUND ACCESS.
15. ALL PRIVATE DRAINAGE PIPEWORK FOR FOUL AND SURFACE WATER SYSTEMS WAS BEEN DESIGNED ON THE BASIS OF UPVC TO BS EN 1401-1, UNLESS NOTED OTHERWISE.
16. CONCRETE ENCASEMENT OF THE PIPEWORK SHALL BE REQUIRED WHERE THE VERTICAL CLEARANCE BETWEEN TWO PIPES CROSSING IS LESS THAN 300MM.
17. WHERE NEW DRAINAGE IS SITUATED WITHIN 5 METRES OF NEW OR EXISTING TREES THE PIPEWORK SHALL BE ENCASED IN CONCRETE TO REDUCE THE RISK OF ROOT INGRESS.
18. ALL NEW DRAINAGE INSTALLATIONS TOGETHER WITH ANY EXISTING DRAINAGE RETAINED SHALL BE LETTED AND CCTV SURVEYED UPON COMPLETION OF THE WORKS TO ENSURE THAT THE SYSTEM IS FULLY OPERATIONAL, FREE OF SAGGES DAMAGED T AND ALL IDENTIFIED FAULTS RECTIFIED.
19. LEVELS OF EXISTING DRAINAGE AT OUTFALL POINTS TO THE MAIN ENTERPRISE WAY TO BE VERIFIED PRIOR TO COMMENCEMENT ON SITE. ANY DISCREPANCIES BETWEEN THIS DRAWING IS TO BE REPORTED TO ROC IMMEDIATELY.

REV	DATE	DETAILS	ORIN	CHK
P03	06.03.26	PLOT E2 INCORPORATED	ARJ	MN
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P01	05.12.25	FIRST ISSUE	ARJ	MN

DRAWING STATUS: PLANNING

RIBA STAGE: STAGE 3

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CHECKED: MN	DATE: DEC 25	THE ABOVE SCALES APPLY WHEN PLOTTED AT A1 SIZE. —DO NOT SCALE—
APPROVD: MN	DATE: DEC 25	EMAIL FOR DRAWINGS: info@roconsulting.com

CLIENT: MANCHESTER AIRPORT GROUP

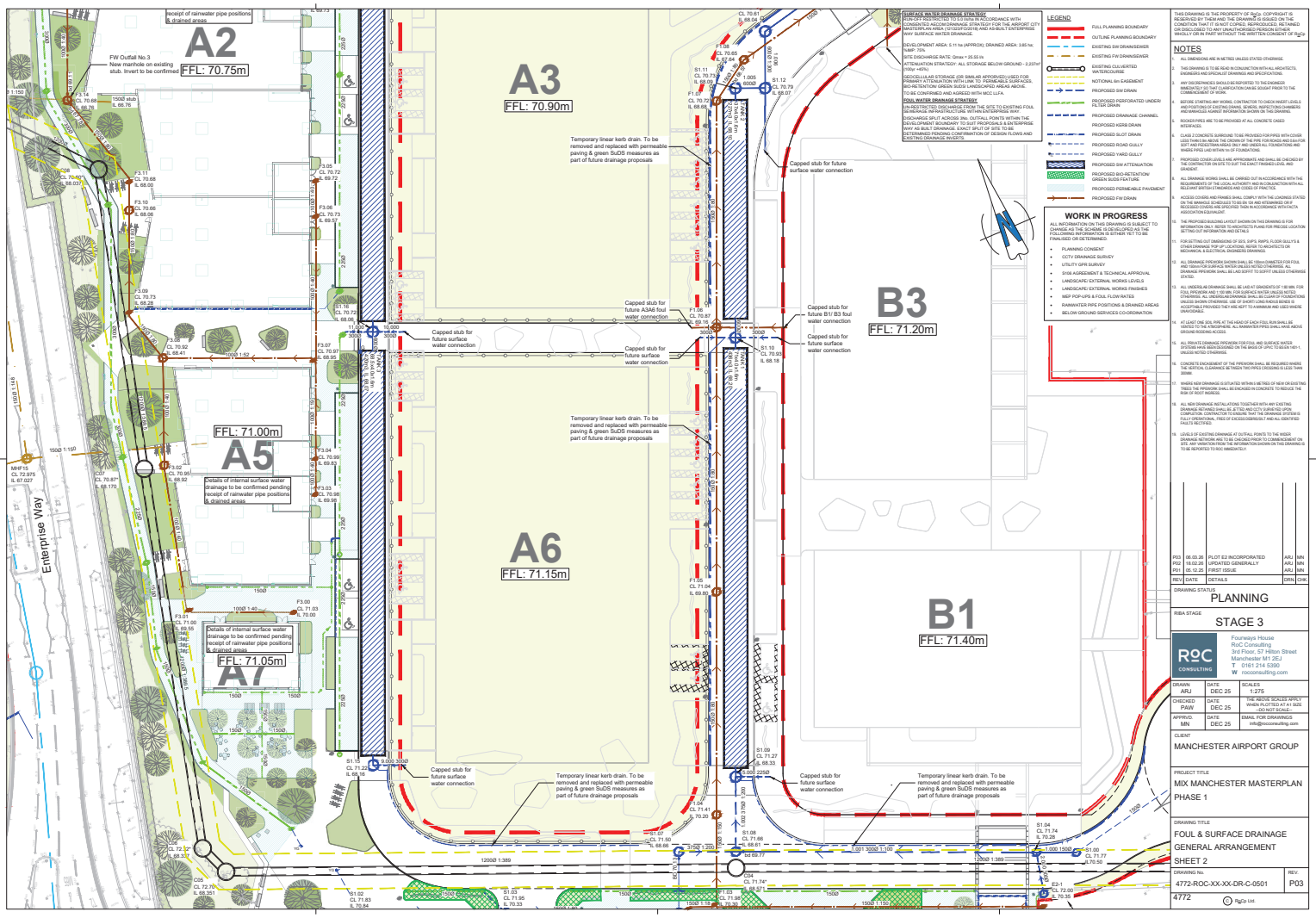
PROJECT TITLE: MIX MANCHESTER MASTERPLAN PHASE 1

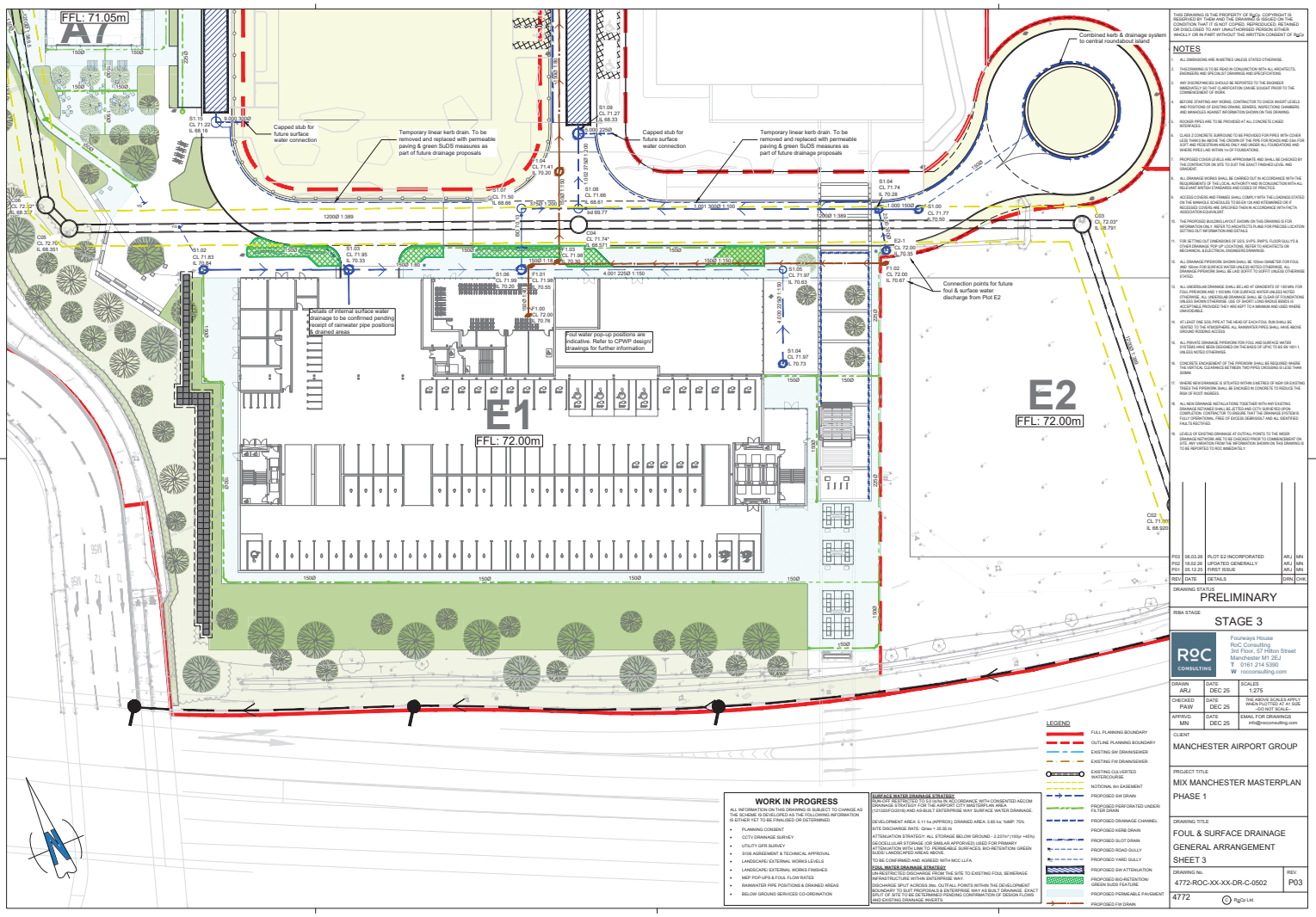
DRAWING TITLE: FOUL & SURFACE DRAINAGE GENERAL ARRANGEMENT SHEET 1

DRAWING No.	REV.
4772-ROC-XX-XX-DR-C-0500	P03

4772

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A2
FFL: 70.75m
A3
FFL: 70.90m
B3
FFL: 71.20m
A5
FFL: 71.00m
A6
FFL: 71.15m
B1
FFL: 71.40m
A7
FFL: 71.05m
Enterprise Way
Temporary linear kerb drain. To be removed and replaced with permeable paving & green SuDS measures as part of future drainage proposals
Capped stub for future surface water connection
Capped stub for future A3/A6 foul water connection
Capped stub for future B1/ B3 foul water connection
Details of internal surface water drainage to be confirmed pending receipt of rainwater pipe positions & drained areas
FW Outfall No.3 New manhole on existing stub. Invert to be confirmed
LEGEND
FULL PLANNING BOUNDARY
OUTLINE PLANNING BOUNDARY
EXISTING SW DRAIN/SEWER
EXISTING FW DRAIN/SEWER
EXISTING CULVERTED WATERCOURSE
NOTIONAL 6m EASEMENT
PROPOSED SW DRAIN
PROPOSED PERFORATED UNDER FILTER DRAIN
PROPOSED DRAINAGE CHANNEL
PROPOSED KERB DRAIN
PROPOSED SLOT DRAIN
PROPOSED ROAD GULLY
PROPOSED YARD GULLY
PROPOSED SW ATTENUATION
PROPOSED BIO-RETENTION/ GREEN SUDS FEATURE
PROPOSED PERMEABLE PAVEMENT
PROPOSED FW DRAIN
WORK IN PROGRESS
ALL INFORMATION ON THIS DRAWING IS SUBJECT TO CHANGE AS THE SCHEME IS DEVELOPED AS THE FOLLOWING ITEMS ARE EITHER YET TO BE FINALISED OR DETERMINED:
PLANNING CONSENT
CCTV DRAINAGE SURVEY
UTILITY GPR SURVEY
SYAS AGREEMENT & TECHNICAL APPROVAL
LANDSCAPE/ EXTERNAL WORKS LEVELS
LANDSCAPE/ EXTERNAL WORKS FINISHES
MEP POP-UPS & FOUL FLOW RATES
RAINWATER PIPE POSITIONS & DRAINED AREAS
BELOW GROUND SERVICES CO-ORDINATION
SURFACE WATER DRAINAGE STRATEGY
RUN-OFF RIVS DIRECTED TO S-S WITH IN ACCORDANCE WITH CONSENTED AECOM DRAINAGE STRATEGY FOR THE AIRPORT CITY ENTERPRISE AREA (DOCUMENT REF) AND AS-BUILT ENTERPRISE WAY SURFACE WATER DRAINAGE.
DEVELOPMENT AREA: 5.11 ha (APPROX); DRAINED AREA: 3.85 ha; %IMP: 75%
SITE DISCHARGE RATE: Qmax = 26.55 l/s
ATTENUATION STRATEGY: ALL STORAGE BELOW GROUND - 2,237m³ (35%/ +40%)
GEOCELLULAR STORAGE (OR SIMILAR APPROVED) USED FOR PRIMARY ATTENUATION WITH LINK TO PERMEABLE SURFACES, BIO-RETENTION/ GREEN SUDS/ LANDSCAPED AREAS ABOVE.
TO BE CONFIRMED AND AGREED WITH MCC/ LLFA
FOUL WATER DRAINAGE STRATEGY
UNRESTRICTED DISCHARGE FROM THE SITE TO EXISTING FOUL SEWERAGE INFRASTRUCTURE WITHIN ENTERPRISE WAY.
DISCHARGE SPLIT ACROSS 3No. OUTFALL POINTS WITHIN THE DEVELOPMENT BOUNDARY TO SUIT PROPOSALS & ENTERPRISE WAY AS BUILT DRAINAGE. EXACT SPLIT OF SITE TO BE DETERMINED PENDING CONFIRMATION OF DESIGN FLOWS AND EXISTING DRAINAGE INVERTS.
NOTES
1. ALL DIMENSIONS ARE IN METRES UNLESS STATED OTHERWISE.
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5. ROCKER PIPES ARE TO BE PROVIDED AT ALL CONCRETE CASED INTERFACES.
6. CLASS Z CONCRETE SURROUND TO BE PROVIDED FOR PIPES WITH COVER LESS THAN 0.9m ABOVE THE CROWN OF THE PIPE FOR ROADS AND 0.6m FOR SOFT AND PEDESTRIAN AREAS ONLY AND UNDER ALL FOUNDATIONS AND WHERE PIPES LIAD WITHIN ¼ OF FOUNDATIONS.
7. PROPOSED COVER LEVELS ARE APPROXIMATE AND SHALL BE CHECKED BY THE CONTRACTOR ON SITE TO SUIT THE EXACT FINISHED LEVEL AND GRADIENT.
8. ALL DRAINAGE WORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH THE REQUIREMENTS OF THE LOCAL AUTHORITY AND IN CONJUNCTION WITH ALL RELEVANT BRITISH STANDARDS AND CODES OF PRACTICE.
9. ACCESS COVERS AND FRAMES SHALL COMPLY WITH THE LOADINGS STATED ON THE MANHOLE SCHEDULES TO BS EN 124 AND ATTENHINGS ON E RECESSED COVERS ARE SPECIFIED THEN IN ACCORDANCE WITH FACTA ASSOCIATION EQUIVALENT.
10. THE PROPOSED BUILDING LAYOUT SHOWN ON THIS DRAWING IS FOR INFORMATION ONLY. REFER TO ARCHITECTS PLANS FOR PRECISE LOCATION SETTING OUT INFORMATION AND DETAILS
11. FOR SETTING OUT DIMENSIONS OF SOS, SVPS, RWPS, FLOOR GULLYS & OTHER DRAINAGE POP-UP LOCATIONS, REFER TO ARCHITECTS OR MEP/HVAC ENGINEERS DRAWINGS.
12. ALL DRAINAGE PIPEWORK SHOWN SHALL BE 100mm DIAMETER FOR FOUL AND 150mm FOR SURFACE WATER UNLESS NOTED OTHERWISE. ALL DRAINAGE PIPEWORK SHALL BE LAID EVENLY TO SUFFIX UNLESS OTHERWISE STATED.
13. ALL UNDERSLAB DRAINAGE SHALL BE LAID AT GRADIENTS OF 1:80 MIN. FOR FOUL PIPEWORK AND 1:100 MIN. FOR SURFACE WATER UNLESS NOTED OTHERWISE. ALL UNDERSLAB DRAINAGE SHALL BE CLEAR OF FOUNDATIONS UNLESS SHOWN OTHERWISE. USE OF SHORT/ LONG RADIUS BENDS IS ACCEPTABLE PROVIDED THEY ARE KEPT TO A MINIMUM AND USED WHERE UNAVOIDABLE.
14. AT LEAST ONE SOIL PIPE AT THE HEAD OF EACH FOUL RUN SHALL BE VENTED TO THE ATMOSPHERE. ALL RAINWATER PIPES SHALL HAVE ABOVE GROUND RODDING ACCESS
15. ALL PRIVATE DRAINAGE PIPEWORK FOR FOUL AND SURFACE WATER SYSTEMS HAVE BEEN DESIGNED ON THE BASIS OF UPVC TO BS EN 1401-1 UNLESS NOTED OTHERWISE.
16. CONCRETE ENCASEMENT OF THE PIPEWORK SHALL BE REQUIRED WHERE THE VERTICAL CLEARANCE BETWEEN TWO PIPES CROSSING IS LESS THAN 300MM.
17. WHERE NEW DRAINAGE IS SITUATED WITHIN 5 METRES OF NEW OR EXISTING TREES THE PIPEWORK SHALL BE ENCASED IN CONCRETE TO REDUCE THE RISK OF ROOT INGRESS.
18. ALL NEW DRAINAGE INSTALLATIONS TOGETHER WITH ANY EXISTING DRAINAGE RETAINED SHALL BE JETTED AND CCTV SURVEYED UPON COMPLETION OF WORKS TO ENSURE THAT THE SYSTEM IS CLEAN AND FULLY OPERATIONAL, FREE OF EXCESS DEBRIS/DUST AND ALL IDENTIFIED FAULTS RECTIFIED.
19. LEVELS OF EXISTING DRAINAGE AT OUTFALL POINTS TO THE WIDER SITE AND INVERTS ARE TO BE CHECKED PRIOR TO COMMENCEMENT ON SITE AND NOTIFICATION OF ANY DISCREPANCIES FROM SHOWN ON THIS DRAWING IS TO BE REPORTED TO ROC IMMEDIATELY.
P03 06.03.26 PLOT E2 INCORPORATED ARJ MN
P02 18.02.26 UPDATED GENERALLY ARJ MN
P01 05.12.25 FIRST ISSUE ARJ MN
REV DATE DETAILS DRN CHK
DRAWING STATUS
PLANNING
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DATE DEC 25
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DATE DEC 25
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PROJECT TITLE
MIX MANCHESTER MASTERPLAN
PHASE 1
DRAWING TITLE
FOUL & SURFACE DRAINAGE GENERAL ARRANGEMENT SHEET 2
DRAWING No. 4772-ROC-XX-XX-DR-C-0501
REV. P03
4772
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4. BEFORE STARTING ANY WORKS, CONTRACTOR TO CHECK INVERT LEVELS AND POSITIONS OF EXISTING DRAINS, SEWERS, INSPECTIONS CHAMBERS AND MANHOLES AGAINST INFORMATION SHOWN ON THIS DRAWING.
5. ROCKER PIPES ARE TO BE PROVIDED AT ALL CONCRETE CASED INTERFACES.
6. CLASS Z CONCRETE SURROUND TO BE PROVIDED FOR PIPES WITH COVER LESS THAN 0.9m ABOVE THE CROWN OF THE PIPE FOR ROADS AND 0.6m FOR SOFT AND PEDESTRIAN AREAS ONLY AND UNDER ALL FOUNDATIONS AND WHERE PIPES LAID WITHIN ¼ OF FOUNDATIONS.
7. PROPOSED COVER LEVELS ARE APPROXIMATE AND SHALL BE CHECKED BY THE CONTRACTOR ON SITE TO SUIT THE EXACT FINISHED LEVEL AND GRADIENT.
8. ALL DRAINAGE WORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH THE REQUIREMENTS OF THE LOCAL AUTHORITY AND IN CONJUNCTION WITH ALL RELEVANT BRITISH STANDARDS AND CODES OF PRACTICE.
9. ACCESS COVERS AND FRAMES SHALL COMPLY WITH THE LOADINGS STATED ON THE MANHOLE SCHEDULES TO BS EN 124 AND HTD/MANHOLES OR IF RECESSED COVERS ARE SPECIFIED THEN IN ACCORDANCE WITH HATCH ASSOCIATES EQUIPMENT.
10. THE PROPOSED BUILDING LAYOUT SHOWN ON THIS DRAWING IS FOR INFORMATION ONLY. REFER TO ARCHITECTS PLANS FOR PRECISE LOCATION SETTING OUT INFORMATION AND DETAILS.
11. FOR SETTING OUT DIMENSIONS OF SOS, SVPS, RWPS, FLOOR GULLYS & OTHER DRAINAGE 'POP UP' LOCATIONS, REFER TO ARCHITECTS OR MECHANICAL & ELECTRICAL ENGINEERS DRAWINGS.
12. ALL DRAINAGE PIPEWORK SHOWN SHALL BE 100mm DIAMETER FOR FOUL AND 150mm FOR SURFACE WATER UNLESS NOTED OTHERWISE. ALL DRAINAGE PIPEWORK SHALL BE LAID SOFFIT TO SOFFIT UNLESS OTHERWISE STATED.
13. ALL UNDERSLAB DRAINAGE SHALL BE LAID AT GRADIENTS OF 1:150 MIN. FOR FOUL PIPEWORK AND 1:100 MIN. FOR SURFACE WATER UNLESS NOTED OTHERWISE. ALL UNDERSLAB DRAINAGE SHALL BE CLEAR OF FOUNDATIONS UNLESS SHOWN OTHERWISE. USE OF SHORT LONG RADIUS BENDS IS ACCEPTABLE PROVIDED THEY ARE ≤22½° TO A MINIMUM AND USED WHERE UNAVOIDABLE.
14. AT LEAST ONE SOIL PIPE AT THE HEAD OF EACH FOUL RUN SHALL BE VENTED TO THE ATMOSPHERE. ALL RAINWATER PIPES SHALL HAVE ABOVE GROUND ACCESS.
15. ALL PRIVATE DRAINAGE PIPEWORK FOR FOUL AND SURFACE WATER SYSTEMS HAVE BEEN DESIGNED ON THE BASIS OF UPVC TO BS EN 1401-1, UNLESS NOTED OTHERWISE.
16. CONCRETE ENCASEMENT OF THE PIPEWORK SHALL BE REQUIRED WHERE THE VERTICAL CLEARANCE BETWEEN TWO PIPES CROSSING IS LESS THAN 300MM.
17. WHERE NEW DRAINAGE IS SITUATED WITHIN 5 METRES OF NEW OR EXISTING TREES THE PIPEWORK SHALL BE ENCASED IN CONCRETE TO REDUCE THE RISK OF ROOT INGRESS.
18. ALL NEW DRAINAGE INSTALLATIONS TOGETHER WITH ANY EXISTING DRAINAGE RETAINED SHALL BE JETTED AND CCTV SURVEYED UPON COMPLETION OF THE WORKS TO ENSURE THAT THE SYSTEM IS LEFT IN A FULLY OPERATIONAL FREE OF SAGGED DAMAGED AND ALL IDENTIFIED FAULTS RECTIFIED.
19. LEVELS OF EXISTING DRAINAGE AT OUTFALL POINTS TO THE MOOR BROOK AND WATERCOURSE ARE TO BE CONFIRMED PRIOR TO COMMENCEMENT ON SITE. ANY VARIATION FROM THE INFORMATION SHOWN ON THIS DRAWING IS TO BE REPORTED TO ROC IMMEDIATELY.

REV	DATE	DETAILS	DRN	CHK
P03	06.03.26	PLOT E2 INCORPORATED	ARJ	MN
P02	19.02.26	UPDATED GENERALLY	ARJ	MN
P01	05.12.25	FIRST ISSUE	ARJ	MN

DRAWING STATUS: PRELIMINARY

RIBA STAGE: STAGE 3

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DRAWN: ARJ	DATE: DEC 25	SCALES: 1:275
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APPRVD: MN	DATE: DEC 25	EMAIL FOR DRAWINGS: info@rocconsulting.com

CLIENT: MANCHESTER AIRPORT GROUP

PROJECT TITLE: MIX MANCHESTER MASTERPLAN PHASE 1

DRAWING TITLE: FOUL & SURFACE DRAINAGE GENERAL ARRANGEMENT SHEET 3

DRAWING No.: 4772-ROC-XX-XX-DR-C-0502 REV.: P03

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WORK IN PROGRESS

ALL INFORMATION ON THIS DRAWING IS SUBJECT TO CHANGE AS THE SCHEME IS DEVELOPED AS THE FOLLOWING INFORMATION IS EITHER YET TO BE FINALISED OR DETERMINED:

- PLANNING CONSENT
- CCTV DRAINAGE SURVEY
- UTILITY GPR SURVEY
- S106 AGREEMENT & TECHNICAL APPROVAL
- LANDSCAPE/ EXTERNAL WORKS LEVELS
- LANDSCAPE/ EXTERNAL WORKS FINISHES
- MEP POP-UPS & FOUL FLOW RATES
- RAINWATER PIPE POSITIONS & DRAINED AREAS
- BELOW GROUND SERVICES CO-ORDINATION

SURFACE WATER DRAINAGE STRATEGY

RUN-OFF RESTRICTED TO 5.0 l/s/ha IN ACCORDANCE WITH CONSENTED AECOM DRAINAGE STRATEGY FOR THE AIRPORT CITY MASTERPLAN AREA (13122/FS/03/16) AND AS-BUILT ENTERPRISE WAY SURFACE WATER DRAINAGE.

DEVELOPMENT AREA: 5.11 ha (APPROX) DRAINED AREA: 3.85 ha; %IMP: 70%

SITE DISCHARGE RATE: Qmax = 35.59 l/s

ATTENUATION STRATEGY: ALL STORAGE BELOW GROUND - 2,237m³ (100yr +45%) GEOCELLULAR STORAGE (OR SIMILAR APPROVED) USED FOR PRIMARY ATTENUATION AND LINK TO PERMEABLE SURFACES, BIO-RETENTION/ GREEN ROOFS WHERE APPLICABLE.

TO BE CONFIRMED AND AGREED WITH MCC LLFA.

FOUL WATER DRAINAGE STRATEGY

ON-SITE RESTRICTED DISCHARGE FROM THE SITE TO EXISTING FOUL SEWERAGE INFRASTRUCTURE WITHIN ENTERPRISE WAY.

DISCHARGE SPLIT ACROSS 2No. OUTFALL POINTS WITHIN THE DEVELOPMENT BOUNDARY TO SUIT PROPOSALS & ENTERPRISE WAY AS BUILT DRAINAGE. EXACT FLOW RATES TO BE CONFIRMED PENDING CONFIRMATION OF DESIGN FLOWS AND EXISTING DRAINAGE INVERTS.

LEGEND

- FULL PLANNING BOUNDARY
- OUTLINE PLANNING BOUNDARY
- EXISTING SW DRAIN/SEWER
- EXISTING FW DRAIN/SEWER
- EXISTING CULVERTED WATERCOURSE
- NOTIONAL 6m EASEMENT
- PROPOSED SW DRAIN
- PROPOSED PERFORATED UNDER FILTER DRAIN
- PROPOSED DRAINAGE CHANNEL
- PROPOSED KERB DRAIN
- PROPOSED SLOT DRAIN
- PROPOSED ROAD GULLY
- PROPOSED YARD GULLY
- PROPOSED SW ATTENUATION
- PROPOSED BIO-RETENTION/ GREEN SUDS FEATURE
- PROPOSED PERMEABLE PAVEMENT
- PROPOSED FW DRAIN

COMPLEX CHALLENGES ...
MADE SIMPLE

APPENDIX N –DETAILED DRAINAGE CALCULATIONS

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	2	PIMP (%)	100
M5-60 (mm)	18.000	Add Flow / Climate Change (%)	0
Ratio R	0.359	Minimum Backdrop Height (m)	0.000
Maximum Rainfall (mm/hr)	150	Maximum Backdrop Height (m)	0.000
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	0.900
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	1.000	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	1.686	4-8	2.115	8-12	0.058

Total Area Contributing (ha) = 3.858

Total Pipe Volume (m³) = 149.965

Network Design Table for Storm

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	6.750	0.068	100.0	0.052	5.00	0.0	0.600	o	150	Pipe/Conduit	
S2.000	6.679	0.067	100.0	0.262	5.00	0.0	0.600	o	300	Pipe/Conduit	
S1.001	50.848	0.508	100.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S3.000	24.604	0.123	200.0	0.031	5.00	0.0	0.600	o	300	Pipe/Conduit	
S3.001	29.215	0.146	200.0	0.465	0.00	0.0	0.600	o	375	Pipe/Conduit	
S4.000	15.926	0.106	150.0	0.000	5.00	0.0	0.600	o	225	Pipe/Conduit	
S4.001	44.257	0.295	150.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S3.002	10.357	0.052	200.0	0.039	0.00	0.0	0.600	o	375	Pipe/Conduit	
S3.003	9.646	0.048	200.0	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
S1.002	12.674	0.063	200.0	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
S5.000	5.893	0.059	100.0	0.061	5.00	0.0	0.600	o	225	Pipe/Conduit	
S1.003	74.330	0.149	500.0	0.103	0.00	0.0	0.600	o	600	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	59.27	5.11	70.500	0.052	0.0	0.0	0.0	1.00	17.8	11.1
S2.000	59.46	5.07	70.350	0.262	0.0	0.0	0.0	1.57	111.1	56.3
S1.001	56.82	5.65	70.283	0.314	0.0	0.0	0.0	1.57	111.1	64.4
S3.000	58.07	5.37	70.530	0.031	0.0	0.0	0.0	1.11	78.3	6.5
S3.001	56.40	5.75	70.332	0.496	0.0	0.0	0.0	1.28	141.1	101.0
S4.000	58.62	5.25	70.737	0.000	0.0	0.0	0.0	1.07	42.4	0.0
S4.001	55.60	5.94	70.631	0.000	0.0	0.0	0.0	1.07	42.4	0.0
S3.002	55.06	6.08	70.186	0.535	0.0	0.0	0.0	1.28	141.1	106.4
S3.003	54.56	6.20	68.666	0.535	0.0	0.0	0.0	1.28	141.1	106.4
S1.002	53.99	6.35	68.543	0.849	0.0	0.0	0.0	1.43	228.1	165.5
S5.000	59.44	5.08	69.720	0.061	0.0	0.0	0.0	1.31	52.0	13.1
S1.003	50.00	7.49	68.330	1.013	0.0	0.0	0.0	1.08	306.0	182.9

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Network Design Table for Storm

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
S6.000	6.050	0.040	150.0	0.203	5.00	0.0	0.600	o	300	Pipe/Conduit	
S7.000	7.175	0.048	150.0	0.235	5.00	0.0	0.600	o	300	Pipe/Conduit	
S1.004	42.188	0.084	500.0	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
S1.005	5.053	0.017	300.0	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
S8.000	10.882	0.073	150.0	0.289	5.00	0.0	0.600	o	300	Pipe/Conduit	
S1.006	9.613	0.054	178.0	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
S1.007	25.562	0.144	178.0	0.154	0.00	0.0	0.600	o	600	Pipe/Conduit	
S1.008	23.427	0.132	177.5	0.117	0.00	0.0	0.600	o	600	Pipe/Conduit	
S9.000	5.509	0.037	150.0	0.068	5.00	0.0	0.600	o	300	Pipe/Conduit	
S9.001	73.320	0.098	750.0	0.044	0.00	0.0	0.600	o	600	Pipe/Conduit	
S10.000	5.602	0.037	150.0	0.276	5.00	0.0	0.600	o	300	Pipe/Conduit	
S11.000	4.602	0.031	150.0	0.156	5.00	0.0	0.600	o	300	Pipe/Conduit	
S9.002	73.395	0.098	750.0	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
S12.000	6.021	0.040	150.0	0.251	5.00	0.0	0.600	o	300	Pipe/Conduit	
S9.003	7.684	0.026	300.0	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
S13.000	8.501	0.057	150.0	0.560	5.00	0.0	0.600	o	375	Pipe/Conduit	
S9.004	4.563	0.015	300.0	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
S14.000	30.234	0.040	750.0	0.000	5.00	0.0	0.600	o	600	Pipe/Conduit	
S9.005	55.727	0.074	750.0	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
S9.006	21.233	0.071	300.0	0.144	0.00	0.0	0.600	o	600	Pipe/Conduit	
S9.007	8.393	0.028	300.0	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
S15.000	4.883	0.033	150.0	0.348	5.00	0.0	0.600	o	300	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)
S6.000	59.43	5.08	68.521	0.203	0.0	0.0	0.0	1.28	90.6	43.6
S7.000	59.36	5.09	68.529	0.235	0.0	0.0	0.0	1.28	90.6	50.4
S1.004	48.02	8.14	68.181	1.451	0.0	0.0	0.0	1.08	306.0	251.6
S1.005	47.85	8.20	68.096	1.451	0.0	0.0	0.0	1.40	396.0	251.6
S8.000	59.13	5.14	68.452	0.289	0.0	0.0	0.0	1.28	90.6	61.7
S1.006	47.60	8.29	68.079	1.740	0.0	0.0	0.0	1.82	515.2	299.1
S1.007	46.95	8.53	68.025	1.894	0.0	0.0	0.0	1.82	515.2	321.1
S1.008	46.37	8.74	67.882	2.011	0.0	0.0	0.0	1.82	516.0	336.7
S9.000	59.46	5.07	68.603	0.068	0.0	0.0	0.0	1.28	90.6	14.6
S9.001	53.58	6.46	68.160	0.112	0.0	0.0	0.0	0.88	249.2	21.7
S10.000	59.45	5.07	68.399	0.276	0.0	0.0	0.0	1.28	90.6	59.3
S11.000	59.52	5.06	68.393	0.156	0.0	0.0	0.0	1.28	90.6	33.5
S9.002	48.91	7.85	68.062	0.544	0.0	0.0	0.0	0.88	249.2	96.1
S12.000	59.43	5.08	68.304	0.251	0.0	0.0	0.0	1.28	90.6	53.9
S9.003	48.63	7.94	67.964	0.795	0.0	0.0	0.0	1.40	396.0	139.6
S13.000	59.34	5.10	68.220	0.560	0.0	0.0	0.0	1.48	163.1	120.0
S9.004	48.47	7.99	67.938	1.355	0.0	0.0	0.0	1.40	396.0	237.2
S14.000	57.17	5.57	67.963	0.000	0.0	0.0	0.0	0.88	249.2	0.0
S9.005	45.57	9.05	67.923	1.355	0.0	0.0	0.0	0.88	249.2	237.2
S9.006	44.94	9.30	67.848	1.499	0.0	0.0	0.0	1.40	396.0	243.2
S9.007	44.69	9.40	67.778	1.499	0.0	0.0	0.0	1.40	396.0	243.2
S15.000	59.50	5.06	68.083	0.348	0.0	0.0	0.0	1.28	90.6	74.8

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Network Design Table for Storm

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
S1.009	12.277	0.150	81.8	0.000	0.00	0.0	0.600	o	300	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)
S1.009	59.24	5.12	67.750	0.000	23.6	0.0	0.0	1.74	122.9	23.6

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Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
S1.00	71.770	1.270	Open Manhole	1200	S1.000	70.500	150				
SFD-1	72.000	1.650	Open Manhole	600	S2.000	70.350	300				
S1.01	71.740	1.457	Open Manhole	1200	S1.001	70.283	300	S1.000	70.433	150	
								S2.000	70.283	300	1
S1.02	71.830	1.300	Open Manhole	1200	S3.000	70.530	300				
S1.03	71.950	1.618	Open Manhole	1500	S3.001	70.332	375	S3.000	70.407	300	
S1.04	71.970	1.233	Open Manhole	1200	S4.000	70.737	225				
S1.05	71.970	1.339	Open Manhole	1200	S4.001	70.631	225	S4.000	70.631	225	
S1.06	71.990	1.804	Open Manhole	1500	S3.002	70.186	375	S3.001	70.186	375	
								S4.001	70.336	225	
S1.07	71.500	2.834	Open Manhole	1500	S3.003	68.666	375	S3.002	70.134	375	1468
S1.08	71.660	3.117	Open Manhole	1500	S1.002	68.543	450	S1.001	69.774	300	1081
								S3.003	68.618	375	
SST-1	71.470	1.750	Open Manhole	1200	S5.000	69.720	225				
S1.09	71.270	2.940	Open Manhole	1800	S1.003	68.330	600	S1.002	68.479	450	
								S5.000	69.661	225	956
SST-2	70.990	2.469	Open Manhole	1200	S6.000	68.521	300				
SST-3	71.150	2.621	Open Manhole	1200	S7.000	68.529	300				
S1.10	70.930	2.749	Open Manhole	1800	S1.004	68.181	600	S1.003	68.181	600	1
								S6.000	68.481	300	
								S7.000	68.481	300	1
S1.11	70.730	2.634	Open Manhole	1800	S1.005	68.096	600	S1.004	68.096	600	
SST-4	71.030	2.578	Open Manhole	1200	S8.000	68.452	300				
S1.12	70.790	2.711	Open Manhole	1800	S1.006	68.079	600	S1.005	68.079	600	
								S8.000	68.379	300	
S1.13	70.610	2.585	Open Manhole	1800	S1.007	68.025	600	S1.006	68.025	600	
S1.14	70.410	2.528	Open Manhole	1800	S1.008	67.882	600	S1.007	67.882	600	
SST-5	71.210	2.607	Open Manhole	1200	S9.000	68.603	300				
S1.15	71.110	2.950	Open Manhole	1800	S9.001	68.160	600	S9.000	68.566	300	106
SST-6	70.920	2.521	Open Manhole	1200	S10.000	68.399	300				
SFD-2	70.825	2.432	Open Manhole	600	S11.000	68.393	300				
S1.16	70.770	2.708	Open Manhole	1800	S9.002	68.062	600	S9.001	68.062	600	1
								S10.000	68.362	300	
								S11.000	68.362	300	1
SST-7	70.770	2.466	Open Manhole	1200	S12.000	68.304	300				
S1.17	70.770	2.806	Open Manhole	1800	S9.003	67.964	600	S9.002	67.964	600	
								S12.000	68.264	300	
SFD-3	70.610	2.390	Open Manhole	600	S13.000	68.220	375				
S1.18	70.770	2.832	Open Manhole	1800	S9.004	67.938	600	S9.003	67.938	600	
								S13.000	68.163	375	
S1.19	70.480	2.517	Open Manhole	1800	S14.000	67.963	600				
SD-1	70.600	2.677	Junction		S9.005	67.923	600	S9.004	67.923	600	
								S14.000	67.923	600	
S1.20	70.340	2.492	Open Manhole	1800	S9.006	67.848	600	S9.005	67.848	600	
S1.21	70.390	2.612	Open Manhole	1800	S9.007	67.778	600	S9.006	67.778	600	
SFD-4	70.340	2.257	Open Manhole	600	S15.000	68.083	300				
S1.22	70.340	2.590	Open Manhole	2100	S1.009	67.750	300	S1.008	67.750	600	
								S9.007	67.750	600	
								S15.000	68.050	300	301
S	70.174	2.574	Open Manhole	0		OUTFALL		S1.009	67.600	300	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S1.00	381925.188	385737.411	381925.188	385737.411	Required	

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Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
SFD-1	381916.334	385733.969	381916.334	385733.969	Required	
S1.01	381918.995	385740.096	381918.995	385740.096	Required	
S1.02	381809.968	385775.960	381809.968	385775.960	Required	
S1.03	381832.564	385766.225	381832.564	385766.225	Required	
S1.04	381893.719	385722.502	381893.719	385722.502	Required	
S1.05	381900.027	385737.125	381900.027	385737.125	Required	
S1.06	381859.389	385754.654	381859.389	385754.654	Required	
S1.07	381863.494	385764.162	381863.494	385764.162	Required	
S1.08	381872.355	385760.351	381872.355	385760.351	Required	
SST-1	381882.777	385769.664	381882.777	385769.664	Required	
S1.09	381877.364	385771.993	381877.364	385771.993	Required	
SST-2	381901.198	385842.662	381901.198	385842.662	Required	
SST-3	381913.342	385837.425	381913.342	385837.425	Required	
S1.10	381906.753	385840.266	381906.753	385840.266	Required	
S1.11	381923.425	385879.021	381923.425	385879.021	Required	
SST-4	381923.752	385867.019	381923.752	385867.019	Required	
S1.12	381928.062	385877.011	381928.062	385877.011	Required	
S1.13	381931.875	385885.835	381931.875	385885.835	Required	
S1.14	381956.868	385891.198	381956.868	385891.198	Required	

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Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
SST-5	381826.862	385795.899	381826.862	385795.899	Required	
S1.15	381821.803	385798.080	381821.803	385798.080	Required	
SST-6	381855.934	385863.206	381855.934	385863.206	Required	
SFD-2	381846.565	385867.247	381846.565	385867.247	Required	
S1.16	381850.792	385865.427	381850.792	385865.427	Required	
SST-7	381884.001	385928.525	381884.001	385928.525	Required	
S1.17	381879.806	385932.844	381879.806	385932.844	Required	
SFD-3	381877.506	385941.552	381877.506	385941.552	Required	
S1.18	381885.317	385938.198	381885.317	385938.198	Required	
S1.19	381859.359	385954.361	381859.359	385954.361	Required	
SD-1	381887.121	385942.389			No Entry	
S1.20	381938.293	385920.322	381938.293	385920.322	Required	
S1.21	381957.790	385911.914	381957.790	385911.914	Required	
SFD-4	381966.350	385917.589	381966.350	385917.589	Required	
S1.22	381966.145	385912.710	381966.145	385912.710	Required	
S	381978.137	385915.340			No Entry	

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.052	0.052	0.052
2.000	-	-	100	0.262	0.262	0.262
1.001	-	-	100	0.000	0.000	0.000
3.000	-	-	100	0.031	0.031	0.031
3.001	-	-	100	0.465	0.465	0.465
4.000	-	-	100	0.000	0.000	0.000
4.001	-	-	100	0.000	0.000	0.000
3.002	-	-	100	0.039	0.039	0.039
3.003	-	-	100	0.000	0.000	0.000
1.002	-	-	100	0.000	0.000	0.000
5.000	-	-	100	0.061	0.061	0.061
1.003	-	-	100	0.103	0.103	0.103
6.000	-	-	100	0.203	0.203	0.203
7.000	-	-	100	0.235	0.235	0.235
1.004	-	-	100	0.000	0.000	0.000
1.005	-	-	100	0.000	0.000	0.000
8.000	-	-	100	0.289	0.289	0.289
1.006	-	-	100	0.000	0.000	0.000
1.007	-	-	100	0.154	0.154	0.154
1.008	-	-	100	0.117	0.117	0.117
9.000	-	-	100	0.068	0.068	0.068
9.001	-	-	100	0.044	0.044	0.044
10.000	-	-	100	0.276	0.276	0.276
11.000	-	-	100	0.156	0.156	0.156
9.002	-	-	100	0.000	0.000	0.000
12.000	-	-	100	0.251	0.251	0.251
9.003	-	-	100	0.000	0.000	0.000
13.000	-	-	100	0.560	0.560	0.560
9.004	-	-	100	0.000	0.000	0.000
14.000	-	-	100	0.000	0.000	0.000
9.005	-	-	100	0.000	0.000	0.000
9.006	-	-	100	0.144	0.144	0.144
9.007	-	-	100	0.000	0.000	0.000
15.000	-	-	100	0.348	0.348	0.348
1.009	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				3.858	3.858	3.858

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	0.000
Hot Start (mins)	0	Inlet Coeffiecient	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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 5 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Storm Duration (mins)	30
Ratio R	0.359		

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Online Controls for Storm

Hydro-Brake® Optimum Manhole: S1.22, DS/PN: S1.009, Volume (m³): 17.1

Unit Reference	MD-SHE-0198-2560-2575-2560
Design Head (m)	2.575
Design Flow (l/s)	25.6
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	198
Invert Level (m)	67.750
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1800

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.575	25.5	Kick-Flo®	1.561	20.1
Flush-Flo™	0.752	25.5	Mean Flow over Head Range	-	22.3

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	6.8	0.800	25.5	2.000	22.6	4.000	31.6	7.000	41.3
0.200	18.6	1.000	25.1	2.200	23.7	4.500	33.4	7.500	42.7
0.300	22.3	1.200	24.3	2.400	24.7	5.000	35.1	8.000	44.1
0.400	23.9	1.400	22.6	2.600	25.7	5.500	36.8	8.500	45.4
0.500	24.8	1.600	20.4	3.000	27.5	6.000	38.4	9.000	46.7
0.600	25.3	1.800	21.5	3.500	29.6	6.500	39.9	9.500	47.9

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Storage Structures for Storm

Tank or Pond Manhole: S1.10, DS/PN: S1.004

Invert Level (m) 68.200

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	272.0	1.600	272.0	1.601	0.0

Tank or Pond Manhole: S1.11, DS/PN: S1.005

Invert Level (m) 68.100

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	142.0	1.600	142.0	1.601	0.0

Tank or Pond Manhole: S1.16, DS/PN: S9.002

Invert Level (m) 68.070

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	263.0	1.600	263.0	1.601	0.0

Tank or Pond Manhole: S1.17, DS/PN: S9.003

Invert Level (m) 67.970

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	290.0	1.600	290.0	1.601	0.0

Tank or Pond Manhole: S1.20, DS/PN: S9.006

Invert Level (m) 67.850

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	454.0	1.600	454.0	1.601	0.0

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

Simulation Criteria

Areal Reduction Factor 1.000 | Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 | MADD Factor * 10m³/ha Storage 0.000
Hot Start Level (mm) 0 | Inlet Coeffiecient 0.800
Manhole Headloss Coeff (Global) 0.500 | Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 | Number of Offline Controls 0 | Number of Time/Area Diagrams 0
Number of Online Controls 1 | Number of Storage Structures 5 | Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR | M5-60 (mm) 18.000 | Cv (Summer) 0.850
Region England and Wales | Ratio R 0.358 | Cv (Winter) 0.850

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

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880
Return Period(s) (years) 2, 30, 100
Climate Change (%) 0, 40, 45

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)
S1.000	S1.00	15 Summer	2	+0%	30/15 Summer	100/15 Summer			70.583	-0.067
S2.000	SFD-1	15 Summer	2	+0%	30/15 Summer				70.533	-0.117
S1.001	S1.01	15 Summer	2	+0%	30/15 Summer				70.434	-0.148
S3.000	S1.02	15 Summer	2	+0%	30/15 Summer	100/15 Summer			70.588	-0.242
S3.001	S1.03	15 Summer	2	+0%	30/15 Summer				70.537	-0.170
S4.000	S1.04	15 Summer	2	+0%	100/15 Summer				70.737	-0.225
S4.001	S1.05	15 Summer	2	+0%	30/15 Summer				70.631	-0.225
S3.002	S1.06	15 Summer	2	+0%	30/15 Summer				70.422	-0.138
S3.003	S1.07	15 Summer	2	+0%	30/15 Summer				68.905	-0.136
S1.002	S1.08	15 Summer	2	+0%	30/15 Summer				68.837	-0.156
S5.000	SST-1	15 Summer	2	+0%					69.804	-0.141
S1.003	S1.09	15 Summer	2	+0%	30/15 Summer				68.647	-0.283
S6.000	SST-2	15 Summer	2	+0%	30/15 Summer				68.682	-0.139
S7.000	SST-3	15 Summer	2	+0%	30/15 Summer				68.706	-0.123
S1.004	S1.10	60 Summer	2	+0%	30/15 Summer				68.453	-0.328
S1.005	S1.11	120 Summer	2	+0%	30/15 Summer				68.419	-0.277
S8.000	SST-4	15 Summer	2	+0%	30/15 Summer				68.643	-0.109
S1.006	S1.12	60 Summer	2	+0%	30/15 Summer				68.414	-0.265
S1.007	S1.13	60 Summer	2	+0%	30/15 Summer				68.400	-0.226
S1.008	S1.14	120 Summer	2	+0%	30/15 Summer				68.377	-0.104
S9.000	SST-5	15 Summer	2	+0%	30/180 Summer				68.691	-0.212
S9.001	S1.15	360 Summer	2	+0%	30/120 Summer				68.296	-0.464
S10.000	SST-6	15 Summer	2	+0%	30/15 Summer				68.596	-0.103
S11.000	SFD-2	15 Summer	2	+0%	30/15 Summer				68.534	-0.159
S9.002	S1.16	360 Summer	2	+0%	30/120 Summer				68.296	-0.366
S12.000	SST-7	15 Summer	2	+0%	30/15 Summer				68.489	-0.115
S9.003	S1.17	360 Summer	2	+0%	30/60 Summer				68.296	-0.268
S13.000	SFD-3	15 Summer	2	+0%	30/15 Summer				68.495	-0.100
S9.004	S1.18	360 Summer	2	+0%	30/60 Summer				68.298	-0.240
S14.000	S1.19	360 Summer	2	+0%	30/60 Summer				68.297	-0.266
S9.005	SD-1	360 Summer	2	+0%					68.297	-0.225
S9.006	S1.20	360 Summer	2	+0%	30/30 Summer				68.291	-0.157
S9.007	S1.21	120 Summer	2	+0%	30/15 Summer				68.292	-0.085
S15.000	SFD-4	120 Summer	2	+0%	30/15 Summer				68.324	-0.059
S1.009	S1.22	120 Summer	2	+0%	2/15 Summer				68.320	0.271

PN	US/MH Name	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1.00	0.000	0.58			8.7	OK	1
S2.000	SFD-1	0.000	0.68			44.1	OK	
S1.001	S1.01	0.000	0.51			52.9	OK	
S3.000	S1.02	0.000	0.07			5.2	OK	3
S3.001	S1.03	0.000	0.56			70.1	OK	
S4.000	S1.04	0.000	0.00			0.0	OK	
S4.001	S1.05	0.000	0.00			0.0	OK	
S3.002	S1.06	0.000	0.72			75.5	OK	
S3.003	S1.07	0.000	0.73			75.1	OK	

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

PN	US/MH Name	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.002	S1.08	0.000	0.76			127.1	OK	
S5.000	SST-1	0.000	0.30			10.3	OK	
S1.003	S1.09	0.000	0.50			140.3	OK	
S6.000	SST-2	0.000	0.56			34.2	OK	
S7.000	SST-3	0.000	0.64			39.5	OK	
S1.004	S1.10	0.000	0.32			84.7	OK	
S1.005	S1.11	0.000	0.41			89.1	OK	
S8.000	SST-4	0.000	0.72			48.6	OK	
S1.006	S1.12	0.000	0.32			101.0	OK	
S1.007	S1.13	0.000	0.28			106.2	OK	
S1.008	S1.14	0.000	0.22			79.8	OK	
S9.000	SST-5	0.000	0.19			11.4	OK	
S9.001	S1.15	0.000	0.02			4.3	OK	
S10.000	SST-6	0.000	0.76			46.4	OK	
S11.000	SFD-2	0.000	0.45			26.3	OK	
S9.002	S1.16	0.000	0.05			11.6	OK	
S12.000	SST-7	0.000	0.69			42.2	OK	
S9.003	S1.17	0.000	0.07			16.4	OK	
S13.000	SFD-3	0.000	0.88			94.3	OK	
S9.004	S1.18	0.000	0.10			20.8	OK	
S14.000	S1.19	0.000	0.00			0.3	OK	
S9.005	SD-1	0.000	0.08			19.6	OK*	
S9.006	S1.20	0.000	0.07			20.5	OK	
S9.007	S1.21	0.000	0.08			19.3	OK	
S15.000	SFD-4	0.000	0.46			27.5	OK	
S1.009	S1.22	0.000	0.26			25.2	SURCHARGED	

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 5 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.000 Cv (Summer) 0.850
Region England and Wales Ratio R 0.358 Cv (Winter) 0.850

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

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880
Return Period(s) (years) 2, 30, 100
Climate Change (%) 0, 40, 45

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)
S1.000	S1.00	15 Summer	30	+40%	30/15 Summer	100/15 Summer			71.057	0.407
S2.000	SFD-1	15 Summer	30	+40%	30/15 Summer				71.132	0.482
S1.001	S1.01	15 Summer	30	+40%	30/15 Summer				70.915	0.332
S3.000	S1.02	15 Summer	30	+40%	30/15 Summer	100/15 Summer			71.466	0.636
S3.001	S1.03	15 Summer	30	+40%	30/15 Summer				71.452	0.745
S4.000	S1.04	15 Summer	30	+40%	100/15 Summer				70.847	-0.115
S4.001	S1.05	15 Summer	30	+40%	30/15 Summer				70.873	0.018
S3.002	S1.06	15 Summer	30	+40%	30/15 Summer				70.901	0.341
S3.003	S1.07	15 Summer	30	+40%	30/15 Summer				69.949	0.908
S1.002	S1.08	15 Summer	30	+40%	30/15 Summer				69.583	0.591
S5.000	SST-1	15 Summer	30	+40%					69.873	-0.072
S1.003	S1.09	15 Summer	30	+40%	30/15 Summer				69.137	0.207
S6.000	SST-2	360 Winter	30	+40%	30/15 Summer				69.103	0.282
S7.000	SST-3	360 Winter	30	+40%	30/15 Summer				69.104	0.275
S1.004	S1.10	360 Winter	30	+40%	30/15 Summer				69.102	0.321
S1.005	S1.11	360 Winter	30	+40%	30/15 Summer				69.096	0.399
S8.000	SST-4	360 Winter	30	+40%	30/15 Summer				69.098	0.346
S1.006	S1.12	360 Winter	30	+40%	30/15 Summer				69.093	0.414
S1.007	S1.13	360 Winter	30	+40%	30/15 Summer				69.091	0.466
S1.008	S1.14	480 Winter	30	+40%	30/15 Summer				69.075	0.594
S9.000	SST-5	480 Winter	30	+40%	30/180 Summer				69.050	0.147
S9.001	S1.15	480 Winter	30	+40%	30/120 Summer				69.049	0.289
S10.000	SST-6	480 Winter	30	+40%	30/15 Summer				69.050	0.351
S11.000	SFD-2	480 Winter	30	+40%	30/15 Summer				69.050	0.357
S9.002	S1.16	480 Winter	30	+40%	30/120 Summer				69.049	0.388
S12.000	SST-7	480 Winter	30	+40%	30/15 Summer				69.050	0.446
S9.003	S1.17	480 Winter	30	+40%	30/60 Summer				69.049	0.486
S13.000	SFD-3	480 Winter	30	+40%	30/15 Summer				69.051	0.456
S9.004	S1.18	480 Winter	30	+40%	30/60 Summer				69.049	0.511
S14.000	S1.19	480 Winter	30	+40%	30/60 Summer				69.049	0.486
S9.005	SD-1	2880 Summer	30	+40%					68.523	0.000
S9.006	S1.20	480 Winter	30	+40%	30/30 Summer				69.048	0.599
S9.007	S1.21	480 Winter	30	+40%	30/15 Summer				69.069	0.691
S15.000	SFD-4	480 Winter	30	+40%	30/15 Summer				69.073	0.690
S1.009	S1.22	480 Winter	30	+40%	2/15 Summer				69.072	1.022

PN	US/MH Name	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1.00	0.000	1.53			23.0	SURCHARGED	1
S2.000	SFD-1	0.000	1.77			114.3	SURCHARGED	
S1.001	S1.01	0.000	1.29			135.1	SURCHARGED	
S3.000	S1.02	0.000	0.27			18.7	SURCHARGED	3
S3.001	S1.03	0.000	1.86			230.9	SURCHARGED	
S4.000	S1.04	0.000	0.04			1.5	OK	
S4.001	S1.05	0.000	0.15			5.9	SURCHARGED	
S3.002	S1.06	0.000	2.33			243.9	SURCHARGED	
S3.003	S1.07	0.000	2.37			243.8	SURCHARGED	

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

PN	US/MH Name	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.002	S1.08	0.000	2.23			375.7	SURCHARGED	
S5.000	SST-1	0.000	0.79			27.1	OK	
S1.003	S1.09	0.000	1.46			408.6	SURCHARGED	
S6.000	SST-2	0.000	0.21			12.7	SURCHARGED	
S7.000	SST-3	0.000	0.24			14.7	SURCHARGED	
S1.004	S1.10	0.000	0.31			82.5	SURCHARGED	
S1.005	S1.11	0.000	0.20			43.7	SURCHARGED	
S8.000	SST-4	0.000	0.27			18.5	SURCHARGED	
S1.006	S1.12	0.000	0.19			60.0	SURCHARGED	
S1.007	S1.13	0.000	0.18			67.0	SURCHARGED	
S1.008	S1.14	0.000	0.15			54.6	SURCHARGED	
S9.000	SST-5	0.000	0.06			3.5	SURCHARGED	
S9.001	S1.15	0.000	0.02			5.5	SURCHARGED	
S10.000	SST-6	0.000	0.23			14.2	SURCHARGED	
S11.000	SFD-2	0.000	0.14			8.0	SURCHARGED	
S9.002	S1.16	0.000	0.04			8.3	SURCHARGED	
S12.000	SST-7	0.000	0.21			12.8	SURCHARGED	
S9.003	S1.17	0.000	0.05			11.3	SURCHARGED	
S13.000	SFD-3	0.000	0.27			28.7	SURCHARGED	
S9.004	S1.18	0.000	0.08			16.4	SURCHARGED	
S14.000	S1.19	0.000	0.00			0.1	SURCHARGED	
S9.005	SD-1	0.000	0.05			13.0	SURCHARGED*	
S9.006	S1.20	0.000	0.09			26.9	SURCHARGED	
S9.007	S1.21	0.000	0.10			23.1	SURCHARGED	
S15.000	SFD-4	0.000	0.30			18.0	SURCHARGED	
S1.009	S1.22	0.000	0.26			25.5	SURCHARGED	

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

Simulation Criteria

Areal Reduction Factor 1.000 | Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 | MADD Factor * 10m³/ha Storage 0.000
Hot Start Level (mm) 0 | Inlet Coeffiecient 0.800
Manhole Headloss Coeff (Global) 0.500 | Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 | Number of Offline Controls 0 | Number of Time/Area Diagrams 0
Number of Online Controls 1 | Number of Storage Structures 5 | Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR | M5-60 (mm) 18.000 | Cv (Summer) 0.850
Region England and Wales | Ratio R 0.358 | Cv (Winter) 0.850

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

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880
Return Period(s) (years) 2, 30, 100
Climate Change (%) 0, 40, 45

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)
S1.000	S1.00	15 Summer	100	+45%	30/15 Summer	100/15 Summer			71.770	1.120
S2.000	SFD-1	15 Summer	100	+45%	30/15 Summer				71.898	1.248
S1.001	S1.01	15 Summer	100	+45%	30/15 Summer				71.533	0.951
S3.000	S1.02	15 Summer	100	+45%	30/15 Summer	100/15 Summer			71.834	1.004
S3.001	S1.03	15 Summer	100	+45%	30/15 Summer				71.917	1.211
S4.000	S1.04	15 Summer	100	+45%	100/15 Summer				71.099	0.137
S4.001	S1.05	15 Summer	100	+45%	30/15 Summer				71.104	0.248
S3.002	S1.06	15 Summer	100	+45%	30/15 Summer				71.120	0.560
S3.003	S1.07	15 Summer	100	+45%	30/15 Summer				70.555	1.514
S1.002	S1.08	15 Summer	100	+45%	30/15 Summer				70.025	1.032
S5.000	SST-1	15 Summer	100	+45%					69.945	0.000
S1.003	S1.09	720 Winter	100	+45%	30/15 Summer				69.686	0.756
S6.000	SST-2	720 Winter	100	+45%	30/15 Summer				69.684	0.863
S7.000	SST-3	720 Winter	100	+45%	30/15 Summer				69.684	0.855
S1.004	S1.10	720 Winter	100	+45%	30/15 Summer				69.684	0.903
S1.005	S1.11	720 Winter	100	+45%	30/15 Summer				69.684	0.987
S8.000	SST-4	720 Winter	100	+45%	30/15 Summer				69.688	0.936
S1.006	S1.12	720 Winter	100	+45%	30/15 Summer				69.687	1.007
S1.007	S1.13	720 Winter	100	+45%	30/15 Summer				69.692	1.067
S1.008	S1.14	720 Winter	100	+45%	30/15 Summer				69.694	1.212
S9.000	SST-5	720 Winter	100	+45%	30/180 Summer				69.696	0.793
S9.001	S1.15	720 Winter	100	+45%	30/120 Summer				69.696	0.936
S10.000	SST-6	720 Winter	100	+45%	30/15 Summer				69.697	0.998
S11.000	SFD-2	720 Winter	100	+45%	30/15 Summer				69.696	1.003
S9.002	S1.16	720 Winter	100	+45%	30/120 Summer				69.696	1.034
S12.000	SST-7	720 Winter	100	+45%	30/15 Summer				69.697	1.093
S9.003	S1.17	720 Winter	100	+45%	30/60 Summer				69.696	1.132
S13.000	SFD-3	720 Winter	100	+45%	30/15 Summer				69.697	1.102
S9.004	S1.18	720 Winter	100	+45%	30/60 Summer				69.695	1.157
S14.000	S1.19	600 Winter	100	+45%	30/60 Summer				69.694	1.131
S9.005	SD-1	2880 Summer	100	+45%					68.523	0.000
S9.006	S1.20	600 Winter	100	+45%	30/30 Summer				69.695	1.246
S9.007	S1.21	600 Winter	100	+45%	30/15 Summer				69.693	1.315
S15.000	SFD-4	600 Winter	100	+45%	30/15 Summer				69.693	1.310
S1.009	S1.22	720 Winter	100	+45%	2/15 Summer				69.692	1.642

PN	US/MH Name	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1.00	0.072	2.04			30.7	FLOOD	1
S2.000	SFD-1	0.000	2.33			151.1	FLOOD RISK	
S1.001	S1.01	0.000	1.67			175.2	FLOOD RISK	
S3.000	S1.02	3.968	0.84			58.7	FLOOD	3
S3.001	S1.03	0.000	2.33			289.2	FLOOD RISK	
S4.000	S1.04	0.000	0.08			3.1	SURCHARGED	
S4.001	S1.05	0.000	0.22			9.1	SURCHARGED	
S3.002	S1.06	0.000	2.90			303.3	SURCHARGED	
S3.003	S1.07	0.000	2.85			293.9	SURCHARGED	

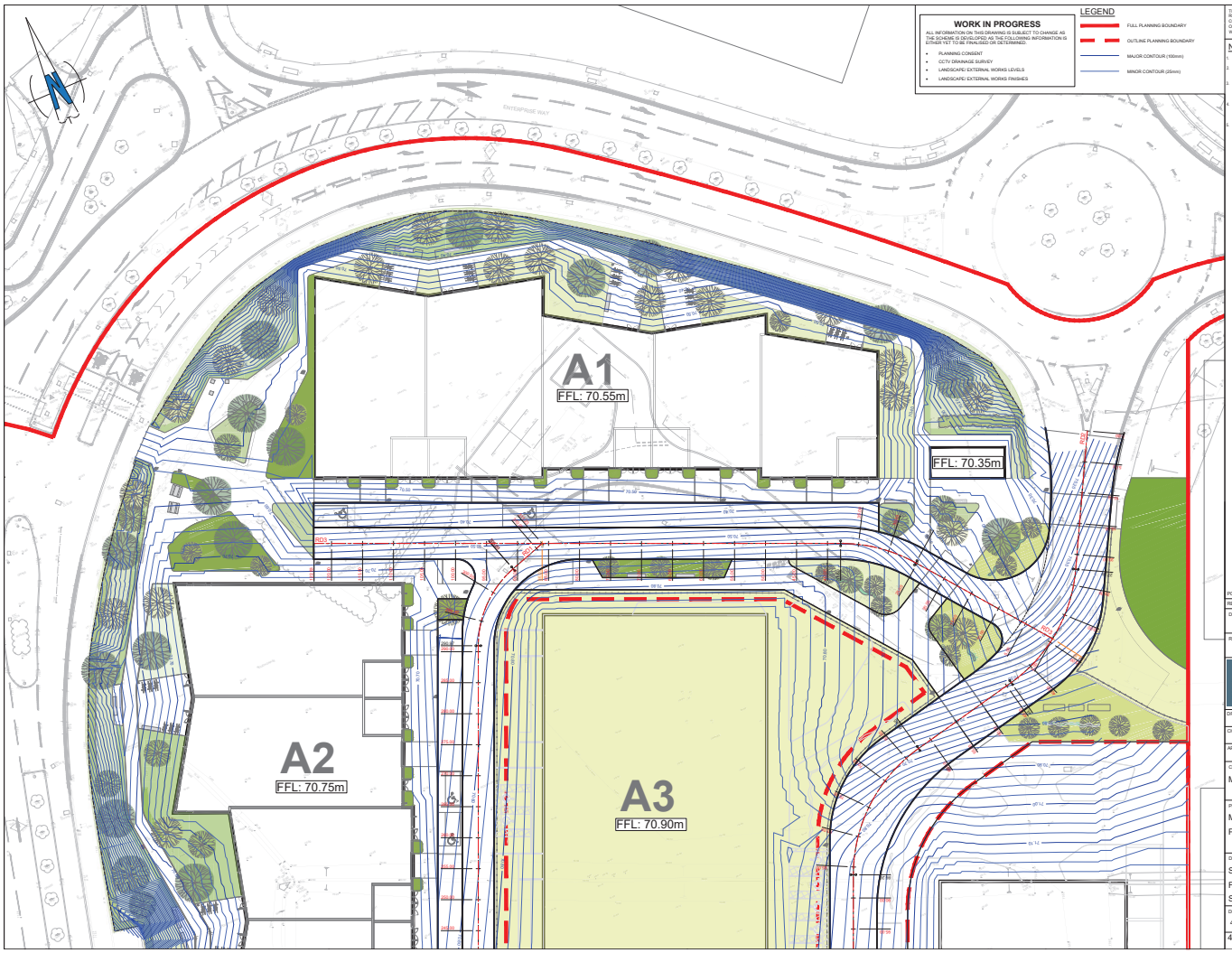
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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.002	S1.08	0.000	2.79			468.5	SURCHARGED	
S5.000	SST-1	0.000	1.06			36.4	OK	
S1.003	S1.09	0.000	0.18			51.1	SURCHARGED	
S6.000	SST-2	0.000	0.16			10.1	SURCHARGED	
S7.000	SST-3	0.000	0.19			11.7	SURCHARGED	
S1.004	S1.10	0.000	0.24			63.7	SURCHARGED	
S1.005	S1.11	0.000	0.13			28.3	SURCHARGED	
S8.000	SST-4	0.000	0.21			14.5	SURCHARGED	
S1.006	S1.12	0.000	0.12			39.5	SURCHARGED	
S1.007	S1.13	0.000	0.12			46.9	SURCHARGED	
S1.008	S1.14	0.000	0.14			52.5	SURCHARGED	
S9.000	SST-5	0.000	0.06			3.4	SURCHARGED	
S9.001	S1.15	0.000	0.02			5.5	SURCHARGED	
S10.000	SST-6	0.000	0.23			14.0	SURCHARGED	
S11.000	SFD-2	0.000	0.13			7.9	SURCHARGED	
S9.002	S1.16	0.000	0.04			9.8	SURCHARGED	
S12.000	SST-7	0.000	0.20			12.5	SURCHARGED	
S9.003	S1.17	0.000	0.10			23.8	SURCHARGED	
S13.000	SFD-3	0.000	0.26			28.2	SURCHARGED	
S9.004	S1.18	0.000	0.12			27.0	SURCHARGED	
S14.000	S1.19	0.000	0.01			1.2	SURCHARGED	
S9.005	SD-1	0.000	0.07			16.7	SURCHARGED*	
S9.006	S1.20	0.000	0.09			25.9	SURCHARGED	
S9.007	S1.21	0.000	0.09			22.0	SURCHARGED	
S15.000	SFD-4	0.000	0.34			20.2	SURCHARGED	
S1.009	S1.22	0.000	0.26			25.5	SURCHARGED	

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APPENDIX O – DEVELOPMENT LEVELS



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- PLANNING CONSENT
- CCTV DRAINAGE SURVEY
- LANDSCAPE/ EXTERNAL WORKS LEVELS
- LANDSCAPE/ EXTERNAL WORKS FINISHES

LEGEND

- FULL PLANNING BOUNDARY
- OUTLINE PLANNING BOUNDARY
- MAJOR CONTOUR (100mm)
- MINOR CONTOUR (25mm)

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REV	DATE	DETAILS	DRN	CHK
P01	06.02.25	FIRST ISSUE	ARJ	MN

DRAWING STATUS: DRAFT

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CHECKED: PAW	DATE: FEB 26	THE ABOVE SCALES APPLY WHEN PLOTTED AT A1 SIZE. —DO NOT SCALE—
APPRVD: MN	DATE: FEB 26	EMAIL FOR DRAWINGS: info@rocconsulting.com

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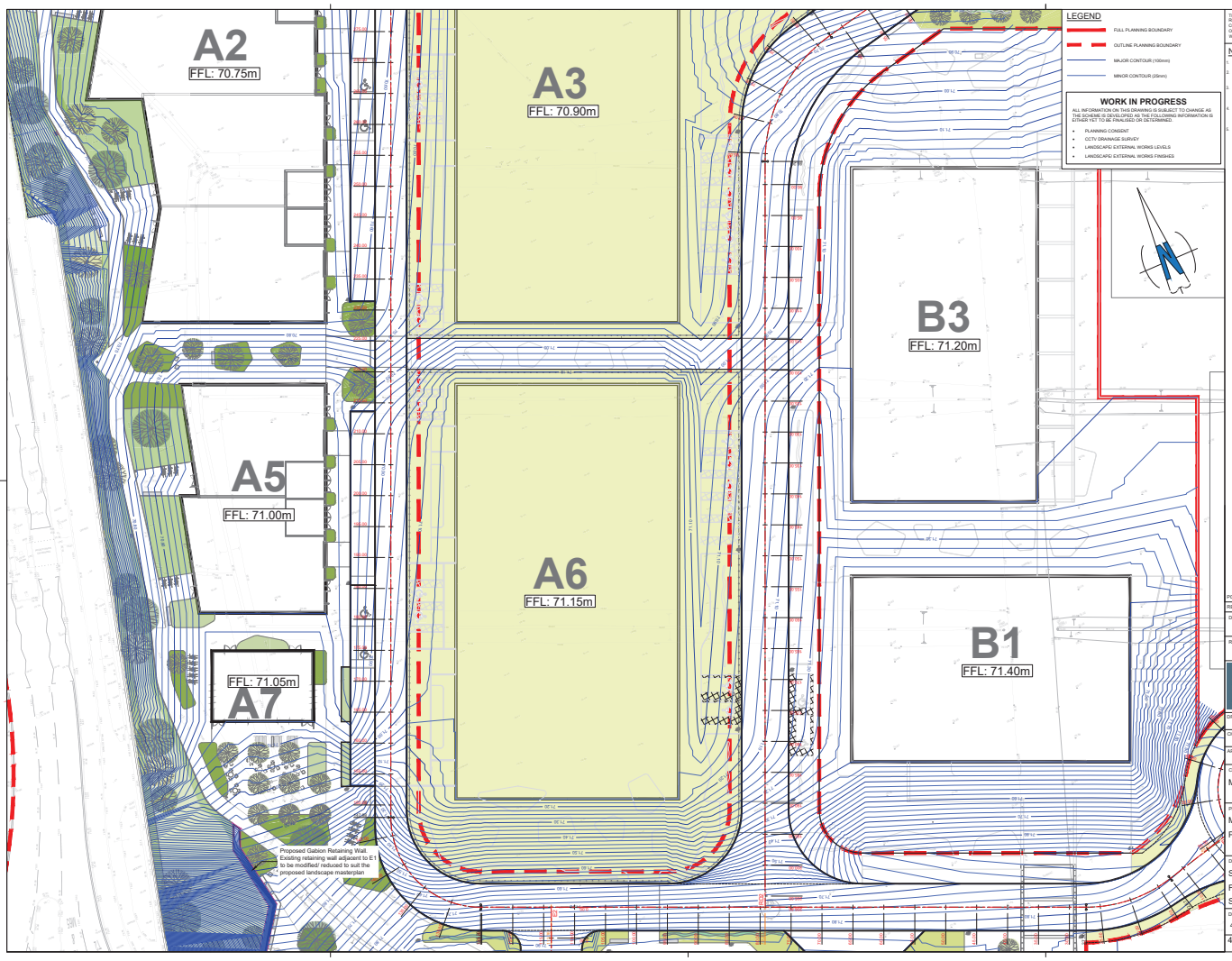
PROJECT TITLE: MIX MANCHESTER MASTERPLAN PHASE 1

DRAWING TITLE: SITE WIDE LEVELS FINISHED CONTOURS SHEET 1

DRAWING No.	REV.
4772-ROC-XX-XX-DR-C-0600	P01

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P01	06.02.26	FIRST ISSUE	ARJ	MN

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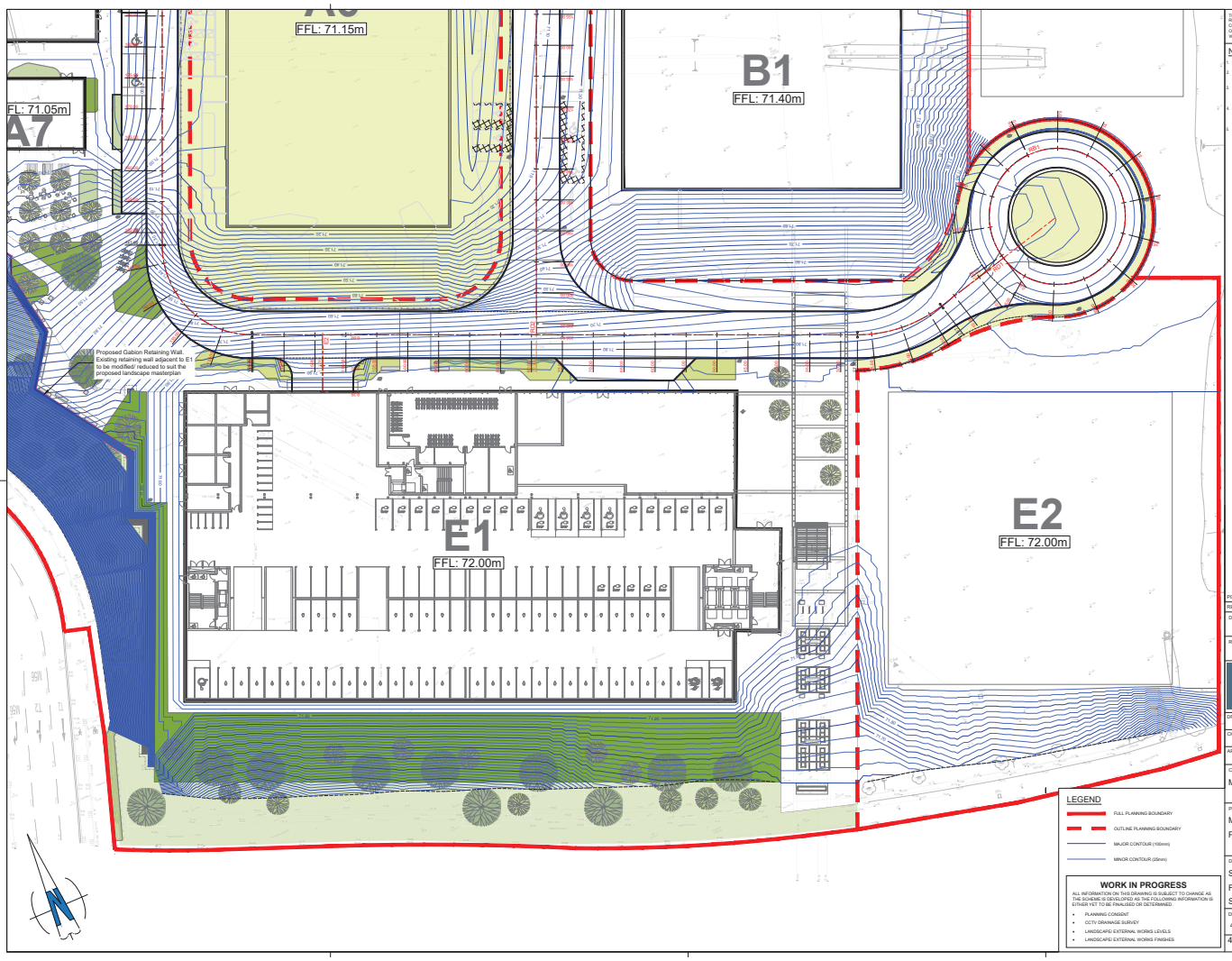
PROJECT TITLE: MIX MANCHESTER MASTERPLAN PHASE 1

DRAWING TITLE: SITE WIDE LEVELS FINISHED CONTOURS SHEET 2

DRAWING No.: 4772-ROC-XX-XX-DR-C-0601 REV.: P01

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P01	06.02.26	FIRST ISSUE	ARJ	MN

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CLIENT: MANCHESTER AIRPORT GROUP

PROJECT TITLE: MIX MANCHESTER MASTERPLAN PHASE 1

DRAWING TITLE: SITE WIDE LEVELS FINISHED CONTOURS SHEET 3

DRAWING No.	REV.
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APPENDIX P – FOUL FLOW CALCULATIONS

FOUL FLOW DISCHARGE

Project: MIX Manchester **Job No. :** 4772

Table 2 (BS EN 12056-2:2000) -Typical values of discharge units

Type of appliance	*System I*	*System II*	*System III*	*System IV*
Washbasin, bidet	0.5	0.3	0.3	0.3
Shower without plug	0.6	0.4	0.4	0.4
Shower with plug	0.8	0.5	1.3	0.5
Single urinal with cistern	0.8	0.5	0.4	0.5
Urinal with fluching valve	0.5	0.3	0.8	0.3
Slab urinal	0.2	0.2	0.2	0.2
Bath	0.8	0.6	1.3	0.5
Kitchen Sink	0.8	0.6	1.3	0.5
Dishwasher (household)	0.8	0.6	0.2	0.5
Washing machine up to 6kg	0.8	0.6	0.6	0.5
Washing machine up to 12kg	1.5	1.2	1.2	1.0
WC with 4.0l Cistern	-	1.8	-	-
WC with 6.0l Cistern	2.0	1.8	1.2 to 1.7	2.0
WC with 7.5l Cistern	2.0	1.8	1.4 to 1.8	2.0
WC with 9.0l Cistern	2.5	2.0	1.6 to 2.0	2.5
Floor gully DN 50	0.8	0.9	-	0.6
Floor gully DN 70	1.5	0.9	-	1.0
Floor gully DN 100	2.0	1.2	-	1.3

Table 3 (BS EN 12056-2:2000) -Typical values of discharge units

Usage of appliance	K
Intermittent use, e.g. in dwelling, guesthouse, office	0.5
Frequent use, e.g. in hospital, school, restaurant, hotel	0.7
Congested use, e.g.in toilets and/or showers open to public	1.0
Special use, e.g. in laboratory	1.2

Use K = 0.5

Unit A1.1, A1.2, A1.3, A1.4, A1.5	DU	No of Units	Total DU
Toilets			
Washbasin	0.3	20	6.00
WC with 6.0l cistern	1.8	20	36.00
Dishwasher	0.6	10	6.00
Kitchen Sink	0.6	10	6.00
Floor Gully DN100	1.2	5	6.00
TOTAL			**60.00**

Unit A2.1, A2.2, A2.3, A2.4	DU	No of Units	Total DU
Washbasin	0.3	16	4.80
WC with 6.0l cistern	1.8	16	28.80
Dishwasher	0.6	8	4.80
Kitchen Sink	0.6	8	4.80
Floor Gully DN100	1.2	4	4.80
TOTAL			**48.00**

Unit A5.1, A5.2	DU	No of Units	Total DU
Washbasin	0.3	8	2.40
WC with 6.0l cistern	1.8	8	14.40
Dishwasher	0.6	4	2.40
Kitchen Sink	0.6	4	2.40
Floor Gully DN100	1.2	2	2.40
TOTAL			**24.00**

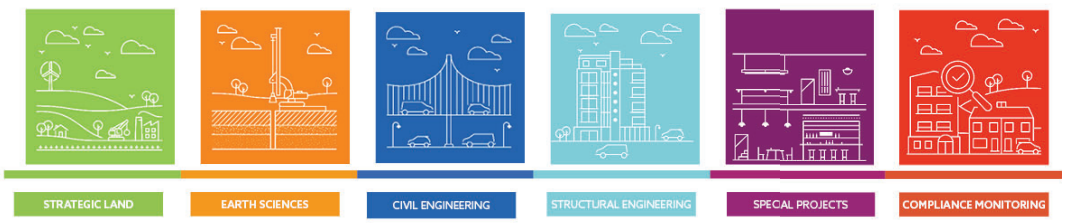
Unit A7	DU	No of Units	Total DU
Washbasin	0.3	4	1.20
WC with 6.0l cistern	1.8	4	7.20
Dishwasher	0.6	2	1.20
Kitchen Sink	0.6	2	1.20
Floor Gully DN100	1.2	1	1.20
TOTAL			**12.00**

Unit E1 MSCP	DU	No of Units	Total DU
Washbasin	0.3	6	1.80
WC with 6.0l cistern	1.8	6	10.80
Shower without plug	0.4	4	1.60
TOTAL			**14.20**

ΣDU =	158.20	
Qreq = √ΣDU =	12.58	l/s
Qreq = K√ΣDU =	6.29	l/s
Total Flow Rate=	**6.29**	**l/s**

Outline Development			
Unit	**Flow/m2/Day**	**Area (m2)**	**Total DWF**
A3 & A6	300	23,100	0.80
B3 & E2	300	17,820	0.62
B1	300	16,060	0.56
F1, F2, F4	300	35,200	1.22
F3 (MSCP)	300	14,300	0.50
TOTAL			**3.70**

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