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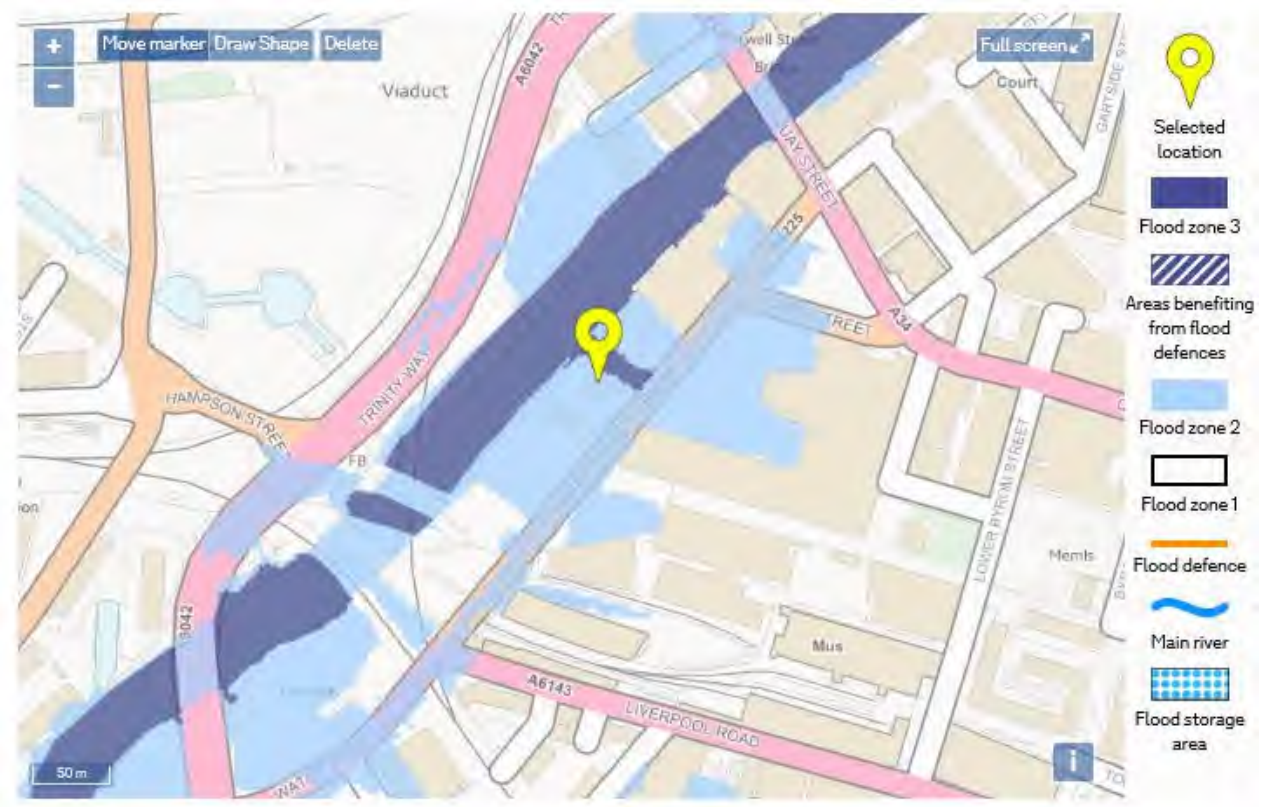
18th March 2020

Union Living Limited Tower 2, St Johns - Flood Risk and Drainage Summary

Flood Risk

A Flood Risk Assessment (FRA) and Surface Water Drainage Statement, referenced AR/NAK/3233/JULY 2015 has been prepared by ROC Consulting in August 2016 for the St Johns Masterplan. Subsequently, a Drainage Strategy, referenced SJQ099-CUR-00-XX-RP-C-92001-V02 has been prepared by Curtins Consulting in May 2019, which develops the masterplan drainage strategy.

Union Living Ltd Tower 2, St Johns site is located within Flood Zone 2 and Flood Zone 3 as shown below.



The previously submitted Flood Risk Assessment to support planning application references 114385/FO/2016 and 121511/FO/2018, the Flood Risk Assessment and Surface Water Drainage Statement, referenced AR/NAK/3233/JULY 2015 and Drainage Strategy, referenced SJQ099-CUR-00-XX-RP-C-92001-V02 are provided within the Appendix.

The information appended is therefore re-submitted to support the current application by Union Living Limited.

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The assessment identifies the following key mitigation for the masterplan, which are relative to the site:

- The Flood Risk Assessment bases the benchmark for protection on the Environment Agency detailed hydraulic model 1 in 100yr plus climate change water level of 26.600m AoD. Typical freeboard of 600mm is normally applied to development; however, the FRA confirms that a freeboard of 300mm can be applied because of the confidence in the modelling predictions. As such, the preferred ground floor levels for any new buildings is 26.900m AoD.
- The ground floor levels for Tower 2 site are set at 26.900m AoD and the basement is accessible only by the ground floor with no access available via other plots and therefore the basement is protected up to a level of 26.900m AoD.
- The levels strategy should also be developed so that all landscaped areas are profiled as such, that they convey water away from the building and into lower lying areas served by the site surface water drainage network.
- Further flood risk considerations which will be necessary as development progresses includes preparation of a flood warning and emergency response plan for areas located within Flood Zone 2.
- The part of the site that lies within The Flood Zone 3 is the existing basin to the River Irwell. The area is to be water compatible and levels within Flood Zone 3 areas are to be maintained therefore no mitigation measures required.

Foul Drainage

A Masterplan foul drainage strategy drawing, referenced SJQ-099-CUR-XX-XX-DR-C-92556, can be found in Appendix G of the Drainage Strategy Document, referenced SJQ099-CUR-00-XX-RP-C-92001-V02.

A separate foul and surface water system is proposed for Tower 2 and will be retained as a private network. The foul drainage from the building will be connected to the existing public combined sewer in Water Street, east of the site.

All drainage within basements are proposed to be suspended below the ground floor slab and discharged to the private drainage network at high level. All drainage required at basement level are to be drained to sumps and pumped into the gravity drainage system and is designed as part of the above ground drainage systems.

The proposed foul outfall is to be submitted and approved by United Utilities under Section 106 Agreement.

Surface Water Drainage

A Masterplan surface water drainage strategy drawing, referenced SJQ-099-CUR-XX-XX-DR-C-92550, can be found in Appendix G of the Drainage Strategy document, referenced SJQ099-CUR-00-XX-RP-C-92001-V02.

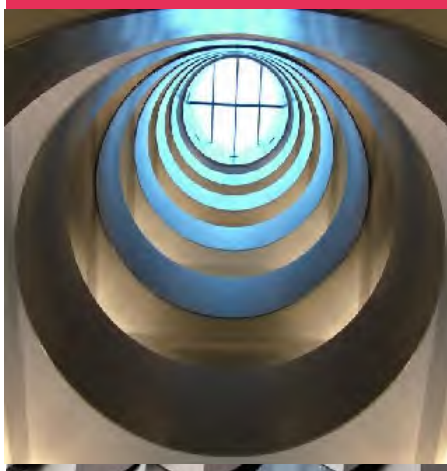
A separate foul and surface water system is proposed for Tower 2 and will be retained as a private network.

Any new development site drainage should be designed in accordance with current best practice to provide adequate capacity not to flood for the critical 1 in 30-year storm event and flood water generated from up to the

critical 1 in 100-year plus climate change storm event shall be constrained within the areas on site so not to cause damage to buildings, essential services or adjoining developments & services.

The proposed surface water strategy will therefore consist of a newly constructed surface water system which will outfall into the River Irwell via three new outfalls. The outfalls are detailed as northern, central and southern outfalls. The Tower 2 site connects into the Southern Outfall via the private Factory drainage network.

Agreements are currently ongoing with regards to the discharge to the River Irwell via the three outfalls.









St John's Masterplan, Manchester

Drainage Strategy

Curtins Ref: SJQ099-CUR-00-XX-RP-C-92001

Revision: V02

Issue Date: 01 May 2019

Client Name: Allied London

Client Address: HQ Building, 2nd Floor, 2 Atherton Street, Manchester, M3 3GS

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Control Sheet

Rev	Description	Issued by	Checked	Date
V01	First Issue	CG	CG	11/03/2019
V02	Updated to include SW Calculations	CG	CG	01/05/2019

This report has been prepared for the sole benefit, use, and information for the client. The liability of Curtins with respect to the information contained in the report will not extend to any third party.

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Proposed Masterplan

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United Utilities correspondence

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Proposed Drainage Layout

Proposed Foul Water Catchments

Proposed Surface Water Catchments

Appendix H

Surface Water Central Outfall Calculations:

- 1 Year
- 1 Year with surcharged outfall of 26.600)
- 30 Year
- 30 Year (with surcharged outfall of 26.600)
- 100 Year +20%cc
- 100 Year +20%cc (with surcharged outfall of 26.600)

1.0 Introduction

1.1 Project Background

1.1.1 Curtins was appointed by Allied London to provide a Drainage Strategy for the proposed development masterplan infrastructure works at St John's, Manchester City Centre. The nearest postcode to the site is M3 3GS, and the site is centred around Grid Reference 383117, 398053.

1.1.2 The report provides information on the nature of flood risk at the site, following Government guidance with regards to development and flood risk. The report outlines the drainage requirements for the proposed site, with regards to relevant Standards, Guidance, and good practice.

1.1.3 The report is based on currently available information and preliminary discussions.

1.1.4 Proposals contained or forming part of this report represent the design intent and may be subject to alteration or adjustment in completing the detailed design for this project. Where such adjustments are undertaken as part of the detailed design and are deemed a material deviation from the intent contained in this document, prior approval shall be obtained from the relevant authority in advance of commencing such works.

1.1.5 Where the proposed works to which this report refers are undertaken more than twelve months following the issue of this report, Curtins shall reserve the right to re-validate the findings and conclusions by undertaking appropriate further investigations at no cost to Curtins.

1.2 Proposed Development

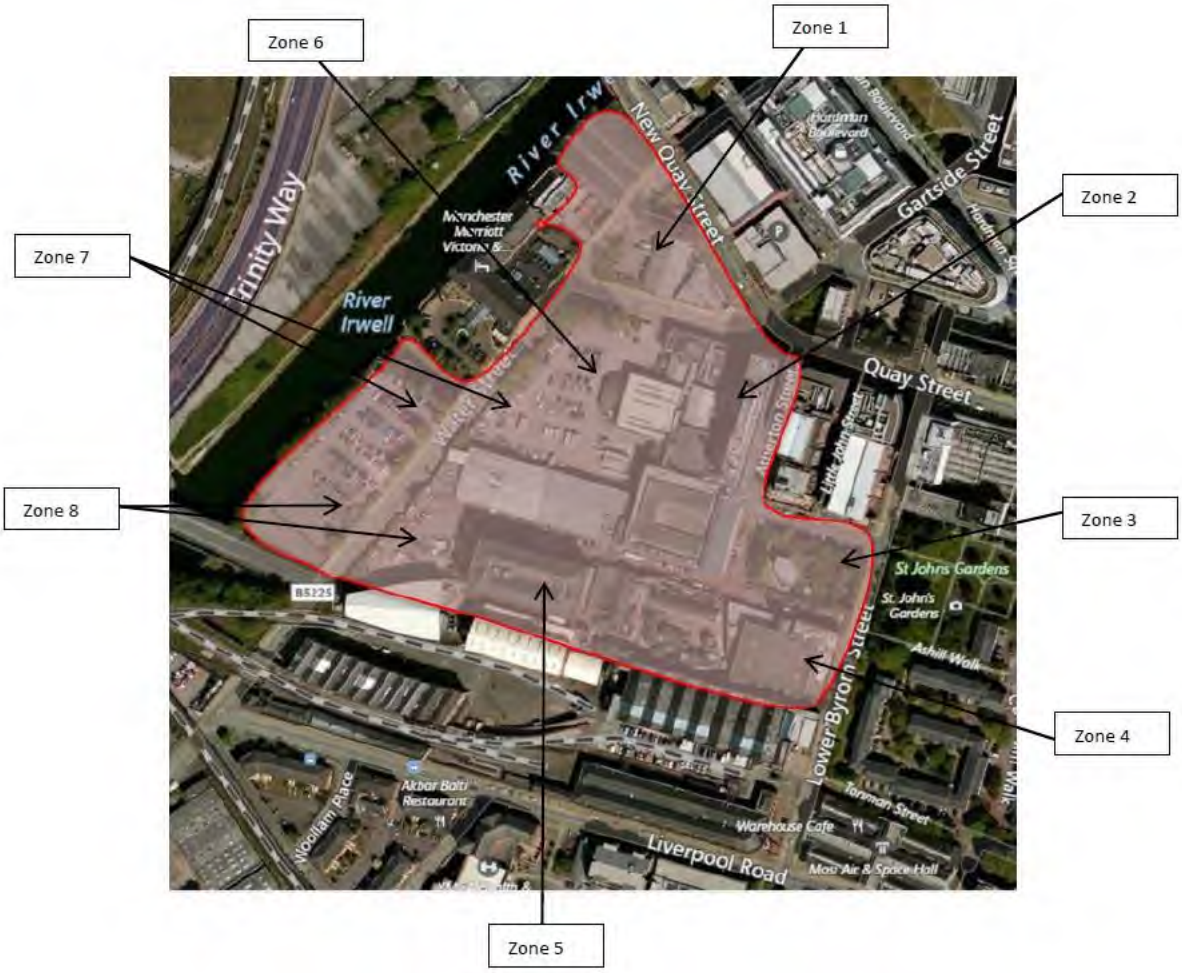
1.2.1 The St John's Development comprises the following plots and as illustrated in Figure 1.:

- Zone 1 – St John's Place/Albert Loft (Blocks A, B, C and D)
- Zone 2 – Old Granada Studios
- Zone 3 – Breeze Studios
- Zone 4 – South Village
- Zone 5 – Bonded Warehouse (Stage 2 is outside the current scope of the masterplan)
- Zone 6 – Manchester Goods Yard
- Zone 7 – Tower 1 and Tower 2
- Zone 8 – Factory

1.2.2 The current Proposed Masterplan is enclosed in *Appendix A*.

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Figure 1: St John's Masterplan Development Plots



1.2.3 Where plot specific design is detailed in the report, it should be noted that some plot designs are further advanced than others and at this stage the report covers the general principles.

2.0 Flood Risk Summary

2.1.1 ROC Consulting completed a Flood Risk Assessment (FRA) and Surface Water Drainage Statement for the St John's and Trinity Islands Development sites.

2.1.2 The Factory (Zone 8) has not been assessed as part of this FRA and Surface Water Drainage Statement, although a separate FRA report for the Factory was produced by ROC Consulting. This report is also referred to when addressing matters relating to The Factory (where necessary), however any flood protection for the Factory should be addressed separately by the plot design team and is not covered in this report.

2.1.3 This section of the report summarises the main conclusions from the previous assessments and strategy by ROC and informs the main elements to take the design forward.

2.1.4 The Flood Risk Assessment bases the benchmark for protection on the Environment Agency detailed hydraulic model 1 in 100yr plus climate change water level of **26.600m AOD.**

2.1.5 Typical freeboard of 600mm is normally applied to development; however, the FRA confirms that a freeboard of 300mm can be applied because of the confidence in the modelling predictions. As such, the preferred ground floor levels for any new buildings is **26.900m AOD**.

2.1.6 Building Levels should be set as high as physically possible, accounting for the surround constraints (Water Street) and the requirement to provide DDA compliant access. Individual plots therefore need to be assessed individually. MCC advise to provide floor levels that can be achieved as opposed to setting a minimum floor level.

2.1.7 Where the floor level of 26.900m AoD cannot be achieved, the FRA confirms that Less Vulnerable commercial use is located at ground level and additional flood mitigation measure would need to be implemented. Specific implications on property insurance would also need to be assessed in this scenario.

2.1.8 At present the proposed ground floor levels for all plots (Zones 1 – 7) are proposed to be at or above 26.900m AoD, with the exception of Old Granada Studios, where existing levels are at approximately 26.500m AoD. It is also noted that there is an existing lower ground floor level to Bonded Warehouse and there are basements proposed within some of the new development plots; and therefore, access and flood risk needs to be specifically addressed.

2.1.9 The FRA makes recommendations for the basement design and should be referred to for further information.

Old Granada Studios Ground Floor

2.1.10 The existing finished floor levels to the ground floor of Granada Studios are at approximately **26.500m AoD.** Although generally overland ground levels would protect overland flows from entering the property

up to 26.600m AoD, the proposed drainage network will surcharge during storm events. During the 100-year event, where a 26.600m level surcharge is present at the outfall, the system could flood up to approximately 26.650m and would back up into the Old Granada Studios ground floor. Therefore, the proposed masterplan drainage system is designed with non-return valves along the M1 Boulevard, where flood levels could back up and raise above chamber cover levels or channel levels and enter Old Granada Studios.

Bonded Warehouse Lower Ground Floor

2.1.11 The existing finished floor levels to the lower ground floor of Bonded Warehouse are at approximately **25.84m AoD.** Although generally overland ground levels would protect overland flows from entering the property up to 26.600m AoD, the proposed drainage network will surcharge during storm events. During the 100-year event if a 26.600m level surcharge is present at the outfall, the system could flood up to approximately 26.650m and would back up into the Bonded Warehouse Lower ground floor. The Bonded Warehouse existing drainage network currently discharge via The Factory plot and therefore as part of the Factory design, the Bonded Warehouse surface water drainage will be directed via the Factory drainage system into the masterplan surface water network. It has been advised that any surface water drainage connection with a cover level lower than 26.650m has a non-return valve installed downstream to prevent backing up from the main drainage system.

Basement to St John's Place (Zone 1)

2.1.12 This proposed basement sits on the boundary between Flood Zone 1 and Flood Zone 2 and the access into the ramp is located within Flood Zone 1. The level of the proposed basement access is proposed to be at approximately 27.500m AoD and therefore will provide a physical barrier for overland flow flood routing including the necessary 300mm freeboard.

Basements; Manchester Good Yard and Tower 1

2.1.13 These development plots are partly within Flood Zone 2 and are fully constrained in terms of access due to the existing ground levels along Water Street. The ability to physically increase the access level of the ramp above the flood level is extremely constrained, however levels at this ramp are proposed to be at 26.900m AoD and therefore will provide a physical barrier for overland flow flood routing including the necessary 300mm freeboard. It may be necessary to locally raise levels in Water Street to achieve this level, subject to co-ordination with services and adjacent properties.

2.1.14 The design levels should be assessed as the design progresses to ensure that this is compliant.

2.1.15 The levels strategy will also be developed so that all landscaped areas are profiled as such, that they convey water away from the building and basement car park entrance and into lower lying areas served by the site surface water drainage network.

2.1.16 **Further flood risk considerations which will be necessary as development progresses includes preparation of a flood warning and emergency response plan for areas located within Flood Zone 2 and this is generally all ground and lower ground floor areas of the masterplan.**

3.0 Drainage Strategy

3.1 Existing Drainage

3.1.1 The public sewer records have been obtained for the development site, and are enclosed in *Appendix B*.

3.1.2 The public sewer records indicate that the following public sewers are located within and in the vicinity of the site:

- There is an existing 375mm diameter combined public sewer within Water Street flowing in a north-east direction which turns into Quay St flowing east and increases to a 675mm diameter sewer. The sewer currently drains an area of Water Street and is assumed to also drain Quay Street. This sewer also collects the existing drainage from the majority of the Old Granada Studios building.
- There is an existing 225mm diameter combined public sewer within Water Street flowing in a north-east direction which connects into an existing 610 x 900mm brick sewer in New Quay Street which flowis south-east. The 225mm sewer appears to drain an area of Water Street and collects drainage from Back Quay Street.
- There is an existing Combined Sewer Overflow (CSO) on the brick sewer in New Quay Street upstream of the point the 225mm sewer connects. The overflow pipe (650 x 1200mm brick sewer) from the CSO flows south-west within water street parallel to the 225mm combined sewer and outfalls into the River Irwell within Zone 1 adjacent to the Marriott Hotel.
- There is an existing pumped sewer From the Marriott Hotel which connects into the 375mm sewer in Quay Street.
- There is an existing 375mm combined public sewer within Atherton Street which flows in a northerly direction and connects into the 675mm combined public sewer in Quay Street. The sewer appears to drain Atherton Street, properties east of Atherton Street (from the sewers in St John Street) and some areas of the existing Old Granada Studios building.
- There is an existing 520 x 690mm brick combined sewer in Grape Street (private road) which flows in a north-westerly direction to an existing CSO located within Grape Street. The sewer appears to split at the CSO to a 300mm sewer and a 580 x 610 mm overflow pipe. The overflow pipe discharges towards Water Street and north-east towards the River Irwell adjacent to the Canal Basin. The 300mm sewer connects into the 300mm combined sewer in Water Street which flows away in a south-westerly direction. The sewer in Grape Street appears to drain Lower Byrom Street, the existing properties east of Lower Byrom Street and the properties north and south of Grape Street (including some of the Old Granada Studios and Bonded Warehouse).

3.1.3 The majority of the existing public sewers will be maintained throughout development, however there will be a requirement for localised diversion works to be completed. Section 3.2 discusses this in further detail.

3.1.4 The GPR Survey identifies that there is a vast amount of existing private sewers within the development masterplan boundary. It is assumed that the majority of private drainage; as part of plots will be removed within plot boundaries, particularly where complete reconstruction is proposed; and specifically, where there are basements proposed. However, there are some plots (OGS and Bonded Warehouse) which will retain some or all of its existing structure and will therefore retain the existing drainage provision. It will therefore be necessary to complete detailed surveys to understand the routes of the drainage within plots for detailed plot drainage design.

3.1.5 The existing GPR Utilities Survey is enclosed in *Appendix C*.

3.2 Drainage Diversions

3.2.1 There are two combined public sewer diversions required within the overall footprint of the proposed masterplan development. Each diversion requires Section 185 Agreements with United Utilities to be in place.

Diversion 1

3.2.2 This is required to facilitate the development of St John's Place and requires the divestiture of one sewer and the diversion of the sewer with Quay Street. Currently there is a single 375mm diameter United Utilities adopted combined water sewer within Water Street which turns into Quay St and increases to a 675mm diameter sewer. The sewer currently drains an area of Water Street and is assumed to also drain Quay Street. There is also a 225mm diameter United Utilities combined water sewer within Water Street which appears to drain an area of Water Street.

3.2.3 The sewer diversion proposal is to abandon the existing 375/675mm sewer within Quay Street and pick up the existing 375mm sewer at Water Street replacing the 225mm diameter sewer which runs within Water Street up to New Quay Street to provide additional capacity.

3.2.4 The Section 185 diversion agreement for this work is currently in place and the work is currently being completed as part of the initial Masterplan Infrastructure enabling works. The proposed diversion layout is enclosed in *Appendix D.*

Diversion 2

3.2.5 This is required as part of the Factory development; this diversion applies to the section of the existing brick sewer within Grape Street and is required to accommodate the foundation solution for the building. This work will be completed as part of the Factory (Zone 8) Infrastructure works and is understood that some of this works has been implemented as part of the Factory enabling works.

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3.3 Proposed Foul Water Drainage

3.3.1 A separate foul and surface water system is proposed for new areas on site. The proposed system will be retained as a private network, although all main drainage under communal public realm and private roads will be designed to adoptable standards.

3.3.2 The general principal for the foul drainage from the plots will be to connect to new foul sewers located within the public realm and private roads which will then connect into the existing surrounding public sewer network. Some of the development plots are proposed to connect directly into the surrounding existing public sewer network.

3.3.3 The proposed outfalls have been approved in principle with United Utilities and we are currently in the process of agreeing specific Section 106 Agreements with United Utilities, subject to final co-ordination of exact connection points. Refer to the United Utilities correspondence enclosed in *Appendix E*.

3.3.4 All drainage within buildings with basements are proposed to be suspended below the ground floor slab and discharged to the masterplan drainage network at high level. All drainage required at basement level are to be drained to sumps and pumps into the gravity drainage system and is designed as part of the above ground drainage systems. Necessary storage and maintenance of these systems is to be detailed by the above ground drainage designer.

3.3.5 The following table summarises each plot outfalls:

Table 1: Plot Foul Water Outfalls

Zone		Conditions/Constraints
Zone 1 - St Johns Place	The east side will connect via various outfalls into the combined public sewer within Water Street and Quay Street. The West side will connect into the combined public sewer within Water Street.	1. Basement Drainage TBC (pumped) 2. United Utilities S106 Approval Required.
Zone 2 – Old Granada Studios	As this plot includes retention of parts of the existing building it is anticipated that some of the existing drainage connections into the combined public sewer will be maintained. New drainage points along the north and west may connect via existing outfalls, however new drain points within the southern and western area of the plot will be directed into a newly constructed foul network along the M1 corridor and connect into the combined public sewer in Grape Street.	1. CCTV and Internal drainage survey required to confirm extents of drainage to be maintained. 2. Combined sewer quantities to be confirmed. 3. United Utilities S106 Approval Required.
Zone 3 - Breeze Studios	As this section sits north of the existing unfilled (listed) Canal Arm along Grape Street, it is anticipated that connections from this plot will connect into the	1. Combined sewer quantities to be confirmed.

	combined sewer network within Atherton Street/Lower Byrom Street.	2. United Utilities S106 Approval Required.
Zone 4 – South Village	To connect into the existing combined public sewer in Grape Street.	1. Basement Drainage TBC (pumped) 2. Combined sewer quantities to be confirmed. – By Others 3. United Utilities S106 Approval Required.
Zone 5 – Bonded Warehouse	To connect into the Factory foul drainage system, which then connects into the combined public sewer in Grape Street.	1. Combined sewer quantities as existing connections. 2. United Utilities S106 Approval Required.
Zone 6 - Manchester Goods Yard	The eastern areas of the plot to connect to a newly constructed foul network along the M1 corridor and connect into the combined public sewer in Grape Street. The western areas of the plot will connect into the existing combined sewer in Water Street.	1. Basement Drainage TBC (pumped) 2. United Utilities S106 Approval Required.
Zone 7 – T1/T2	The East and West side will connect into the combined public sewer within Water Street.	1. Basement Drainage TBC (pumped) 2. United Utilities S106 Approval Required.
Zone 8 - Factory	The east side will connect into the combined public sewer in Grape Street. The west side will connect into the combined public sewer within Water Street.	1. Combined sewer quantities to be confirmed – By Others 2. United Utilities S106 Approval Required.

3.3.6 Drainage serving kitchens in commercial hot food premises should be fitted with a grease separator complying with BS EN 1825-1:2004 and designed in accordance with BS EN 1825-2:2002 or other effective means of grease removal. It is assumed that to provide a level of flexibility within the plots that where grease separation is required that, above ground treatment (enzyme treatment or similar) will be implemented, unless confirmed otherwise.

3.3.7 A swimming pool is proposed within the Old Granada Studios and therefore flow rates form this should be agreed with United Utilities. It will also be necessary to apply for a trade effluent discharge licence via a retailer, who will agree this with United Utilities.

3.3.8 Any temporary discharge requirements are to be designed and co-ordinated by the Contractor.

3.3.9 The Proposed Drainage Strategy Layout and Foul Flow Catchments drawings are enclosed in *Appendix G.*

3.4 Proposed Surface Water Drainage

3.4.1 A separate foul and surface water system is proposed for new areas on site. The proposed system will be retained as a private network, although all main drainage under communal public realm and private roads will be designed to adoptable standards.

3.4.2 Any new development site drainage should be designed in accordance with current best practice to provide adequate capacity not to flood for the critical 1 in 30-year storm event and flood water generated from up to the critical 1 in 100-year plus climate change storm event shall be constrained within the areas on site so not to cause damage to buildings, essential services or adjoining developments & services.

3.4.3 In February 2016, the Environment Agency released updated climate change allowances for peak rainfall intensities which should be applied to new developments. Table 2 demonstrates the climate change allowances with central and upper end allowances being considered.

3.4.4 Based on the nature of the development, a lifespan in excess of 60 years is anticipated. Therefore, the potential climate change allowance for 2070-2115 ranges between 20% for the central allowance and 40% for the upper end allowance. As such, the appraisal will take into account the average allowance of 30%, for climate change on peak rainfall intensity.

Table 2: (Extract Environment Agency Guidance) Peak Rainfall Intensity Allowance in small and urban catchments

Applies across all of England	Total potential change anticipated for the '2020s' (2015 to 2039)	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2115)
Upper end	10%	20%	40%
Central	5%	10%	20%

3.4.5 In in following the standard hierarchy of drainage solutions, consideration should firstly be given to the discharge of surface water runoff by sustainable methods such as infiltration.

Infiltration

3.4.6 At the time of writing the FRA and Drainage Statement, a site wide Phase 1 Desk Study had been completed and an intrusive investigation completed for the South Village site. The results of which confirmed that the site is underlain by relatively shallow glacial sand and gravels underlain by a Principal Sandstone bedrock aquifer. The site is not said to be located within any Environment Agency groundwater source protection zones, although the River Irwell watercourse is present along the site's western boundary. Theoretically, the use of soakaway drainage methods could be applied to the site

(subject to completion of infiltration tests). However, following the ongoing intrusive investigation works completed for South Village, infiltration was precluded and not considered a viable option for surface water disposal as part of the FRA and Drainage Statement.

3.4.7 Following further assessment of the additional masterplan site investigation works this reinforced the view that infiltration would not be a viable solution.

3.4.8 Made Ground deposits were encountered in all exploratory holes, to depths of between 0.60m and 6.25m below ground level. It is likely that this is associated with the historic canal wall which historically underlies the site. Elsewhere, a maximum thickness of 3.40m below ground level was recorded.

3.4.9 The site has a long-standing industrial heritage and the use of infiltration techniques has the potential to mobilise sources of contamination within site soils which could, in turn, have an impact on surface water quality with the adjacent River Irwell.

3.4.10 Bedrock was encountered in all of the progressed cable percussive and rotary open hole boreholes from depths of 3.05m to 7.45m below ground level to a maximum recorded depth of >55.00m below ground level.

3.4.11 Groundwater was encountered at depths between 1.97m and 4.44m below ground level. This is likely to constrain infiltration and water storage potential.

3.4.12 Based on the above, infiltration is not considered as a viable solution for surface water discharge.

Discharge to Watercourse

3.4.13 The nearest watercourse is the River Irwell, which runs along the western development boundary of the masterplan site.

3.4.14 The FRA and Drainage Statement addressed two options for discharge, with the initial discharge to be investigated as preference to connect to the River Irwell via a newly constructed private surface water sewer network. The alternative (second) option is to discharge into the combined sewer network.

3.4.15 As the detailed design has progressed, it has confirmed that it will be a viable solution to connect to the River Irwell via installation of a dedicated private surface water network which would pick up the generated flows and discharge them through the creation of a number of new outfalls into the River Irwell. Through initial discussions with the navigation authority (Manchester Ship Canal Company – MSCC & Peel) it is likely that there would be no requirement to limit the peak flows but there would be a requirement to limit the discharge velocity. In order to prevent the outfall interfering with craft using the River Irwell the outflow velocity cannot exceed 3m/s.

3.4.16 The possibility of using an un-restricted outfall in to the River Irwell has also been discussed with the Lead Local Flood Authority, Manchester City Council. They have advised that they would have no objection to the proposal.

3.4.17 The following conditions would need to be accounted for in the proposed design:

- Confirmation that the proposed outfall will not have a detrimental effect on the existing spur of the Manchester and Salford junction canal which still connects to the River Irwell.
- The ability to provide a network with the necessary falls whilst complying with the level constraints dictated by the River Irwell and the requirement to locate the outfall 300mm above the normal water level.
- Outfall Agreement – Peel / Manchester Ship Canal for discharge of flows.
- Land Drainage Consent – Manchester City Council for Outfall Construction.
- Highway Licence – Manchester City Council for the installation of a private sewer within the adopted highway for crossing of Water Street.

Discharge to Surface Water Sewer

3.4.18 There are no dedicated surface water public sewers within the development masterplan site and therefore this option has not been assessed.

Discharge to Combined Water Sewer

3.4.19 As the proposed strategy has established that a surface water network can be accommodated into the River Irwell, the proposal to connect to the combined sewer system has not been further assessed in detail.

Proposed Discharge solution

3.4.20 The proposed surface water strategy will therefore consist of a newly constructed surface water sewer system which will outfall into the River Irwell via three new outfalls. The outfalls are detailed as northern, central and southern outfalls.

- The northern outfall will accommodate flows from Zone 1 (west of Water Street) and will be direct to the River Irwell.
- The central outfall will accommodate flows from Zone 1, 2, 3, 4, 5, 6, 7 and 8 (east of Water Street) and will be via the Canal Basin.
- The southern outfall will accommodate flows from Zone 7 and 8 (west of Water Street) and will be direct to the River Irwell.

3.4.21 There will be a localised requirement for some plots to connect to the combined public sewer network. This is due to the fact that these developments for the majority, involve the refurbishment of the existing buildings and the reuse of the existing below ground drainage network. This will only be confirmed through the investigation of the below ground building drainage network using CCTV survey techniques.

3.4.22 In addition to this, it is noted that there may also be a requirement to connect the Breeze Studio to the combined sewer network and some of the externa areas to the east of Old Granada Studios due to the existing unfilled canal preventing passage to the new surface water network within Grape Street.

3.4.23 The conditions noted previously have been assessed through the progression of the design:

3.4.24 *Confirmation that the proposed outfall will not have a detrimental effect on the existing spur of the Manchester and Salford junction canal which still connects to the River Irwell.*

Curtins commissioned Waterco Consultants to complete a study of the Canal Basin to incorporate the proposed surface water discharge from the development into the canal basin. The inflows from the development were based on the development proposals at the time of the assessment. Although some areas of the design have changed, generally the catchments and main drainage is as modelled at the time.

To summarise the Waterco report, the inflows from the surface water drainage network have been modelled for 100 year with 30%cc and a check on 100 year +40%cc. There is an increase in water levels at the basin (up to 1-3mm) within the surrounding areas and was therefore considered negligible and would have minor impact.

The existing water levels adjacent to the are canal are:
26.070 - 100 year +30%cc
26.335 - 100 year +40%cc

With the development outfall flows, the water levels at the same location are:
26.071 - 100 year +30%cc
26.338 - 100 year +40%cc

The above was agreed in correspondence with eth Lead Local flood Authority dated 13th June 2018, enclosed in *Appendix F*.

3.4.25 *The ability to provide a network with the necessary falls whilst complying with the level constraints dictated by the River Irwell and the requirement to locate the outfall 300mm above the normal water level.*

The proposed invert level has been set based on the original ROC strategy (IL 22.114) and this was validated against the existing canal wall construction and confirmed to be the preferred level due to the step in the canal basin wall where the perimeter path runs**.** At the time of the design, the information held was the Canal Topographical survey which recorded the water level as 21.160m, therefore previous advice was to set the outfall a minimum of 300mm above the 'normal 'water level which 22.114m achieved.

Following receipt of the EA Model flood levels and the Waterco flood modelling report it was confirmed that the flood levels within the Irwell are at approximately 23.28m upstream and 23.17m

downstream during a 1 in 2-year event, therefore we would assume that the flood level at the canal basin would be at approximately 23.22m. This would result in the proposed surface water main line being surcharged during the 1 in 2-year event. All incoming connections from the masterplan plots into the surcharged sewer line are via backdrops or steep connections and therefore would be un-surcharged during the 1 in 2-year event. The above was agreed in correspondence with the Lead Local flood Authority dated 13th June 2018, enclosed in *Appendix F*.

3.4.26 *Outfall Agreement – Peel / Manchester Ship Canal for discharge of flows.*

Agreements are currently ongoing with regards to the discharge to the River Irwell via the three outfalls. At present the Factory Design team are currently designing the Southern Outfall to the River Irwell and the Northern Outfall into the River Irwell is not complete. The maximum velocities from the Central Outfall into the Canal Basin achieve velocities less than 3 m/s for up to the 100 Year event +30% climate change without a surcharged outfall and with a surcharged outfall up to 26.600m AoD.

3.4.27 *Land Drainage Consent – Manchester City Council for Outfall Construction.*

Agreements are currently ongoing with regards to the discharge to the River Irwell via the three outfalls. At present the Factory Design team are currently designing the Southern Outfall to the River Irwell and the Northern Outfall into the River Irwell is not complete. The Central Outfall proposals into the Canal Basin have been issued to the Lead Local Flood Authority initially and detailed design is almost complete and will be submitted for Land Drainage Consent in due course.

3.4.28 *Highway Licence – Manchester City Council for the installation of a private sewer within the adopted highway for crossing of Water Street.*

The Central Outfall proposals into the Canal Basin requires agreement with Manchester City Council Highways, initial proposals have been issued to Highways and detailed design is almost complete and will be submitted for the Licence once further intrusive works are completed to determine buildability.

3.4.29 All drainage within buildings with basements are proposed to be suspended below the ground floor slab and discharged to the masterplan drainage network at high level. All drainage required at basement level are to be drained to sumps and pumps into the gravity drainage system and is designed as part of the above ground drainage systems. Necessary storage and maintenance of these systems is to eb detailed by the above ground drainage designer.

3.4.30 The following table summarises each plot outfalls:

Table 2: Plot Surface Water Outfalls

Zone		Conditions/Constraints
Zone 1 - St Johns Place	East and West side of Water Street to connect into a newly constructed surface water network which will outfall into the	1. Max Outfall 3m/s velocity. 2. MSCC Outfall Consent Required

	Irwell. This Outfall will be detailed as the Northern Outfall.	3. Land Drainage Consent Required 4. Minimum Cover Levels +26.6. 5. Highway Licence Required. 6. Basement drainage TBC
Zone 2 – Old Granada Studios	As this plot includes retention of parts of the existing building it is anticipated that some of the existing drainage connections into the combined public sewer will be maintained. Newly constructed areas will be directed into a newly constructed surface water network which will outfall into the Irwell via the existing Canal Basin. This Outfall will be detailed as the Central Outfall.	1. CCTV and Internal drainage survey required to confirm extents of drainage to be maintained. 2. Combined sewer quantities to be confirmed. 3. Max Outfall 3m/s velocity. 4. MSCC Outfall Consent Required 5. Land Drainage Consent Required 6. Minimum Cover Levels +26.6. 7. Highway Licence Required.
Zone 3 - Breeze Studios	As this section sits north of the existing unfilled (listed) Canal Arm along Grape Street, it is anticipated that connections from this plot will connect into the combined sewer network within Atherton Street/Lower Byron Street.	1. Combined sewer quantities to be confirmed. 2. 50% Restriction into the sewers required. 3. Attenuation will be required. 4. United Utilities S106 Approval Required.
Zone 4 – South Village	To connect into a newly constructed surface water network which will outfall into the Irwell via the existing Canal Basin. This Outfall will be detailed as the Central Outfall.	1. Max Outfall 3m/s velocity. 2. MSCC Outfall Consent Required 3. Land Drainage Consent Required 4. Minimum Cover Levels +26.6. 5. Highway Licence Required.
Zone 5 – Bonded Warehouse	To connect into a newly constructed surface water network which will outfall into the Irwell via the existing Canal Basin. This Outfall will be detailed as the Central Outfall. This plot will require temporary connection into the Factory drainage system until the Surface Water system is in place.	1. Max Outfall 3m/s velocity. 2. MSCC Outfall Consent Required 3. Land Drainage Consent Required 4. Minimum Cover Levels +26.6. 5. Highway Licence Required.
Zone 6 - Manchester Goods Yard	To connect into a newly constructed surface water network which will outfall into the Irwell via the existing Canal Basin. This Outfall will be detailed as the Central Outfall.	1. Max Outfall 3m/s velocity. 2. MSCC Outfall Consent Required 3. Land Drainage Consent Required 4. Minimum Cover Levels +26.6. 5. Highway Licence Required. 6. Basement Drainage TBC

Zone 7 – T1/T2	To connect into a newly constructed surface water network. The T1 (east) Tower will outfall into the Irwell via the existing Canal Basin. This Outfall will be detailed as the Central Outfall. The T2 (west) Tower will outfall into the Irwell within this plot. This Outfall will be detailed as the Southern Outfall.	1. Max Outfall 3m/s velocity. 2. MSCC Outfall Consent Required 3. Land Drainage Consent Required 4. Minimum Cover Levels +26.6. 5. Highway Licence Required. 6. Basement Drainage TBC
Zone 8 - Factory	To connect into a newly constructed surface water network which will outfall into the Irwell. The east will outfall into the Irwell via the existing Canal Basin. This Outfall will be detailed as the Central Outfall. The west will outfall into the Irwell within this plot. This Outfall will be detailed as the Southern Outfall.	1. Max Outfall 3m/s velocity. 2. MSCC Outfall Consent Required 3. Land Drainage Consent Required 4. Minimum Cover Levels +26.6. 5. Highway Licence Required.

3.4.31 For all of the proposed outfalls, a river wall survey & assessment will be required to determine the design & construction methodology for the outfalls.

3.4.32 Surface water run-off from hard paved areas at risk of contamination should receive a level of treatment. This could be provided using: Oil Interceptors, Trapped Gullies, Smart Sponge gullies and/or Permeable Paving.

3.4.33 In accordance with Environment Agency guidance PPG3, treatment should be provided for any areas proposed for:

- Service Yard areas (vehicle maintenance areas, refuelling areas),
- Car parking areas which exceed 800m² or 50 car parking spaces,
- Oil storage areas; and
- Roads

3.4.34 The proposal for pollution protection should be agreed with Manchester City Council. Correspondence with the Lead Local Flood Authority confirms that all service areas require a level of treatment, refer to the correspondence enclosed in *Appendix F.*

3.4.35 It is therefore proposed that all main service vehicle routing drainage will pass through a form of treatment. The FRA and Drainage Statement confirms that use of SuDS within the development will be limited; which is typical for an inner-city development site. The following SuDS type was therefore ruled out at planning stage.

- Ponds
- Swales
- Filter Strips

3.4.36 Therefore, the current design proposes installation of smart filter chambers downstream of main line drainage channels.

3.4.37 The Proposed Drainage Strategy Layout and Surface Water Flow Catchments drawings are enclosed in *Appendix G.*

3.4.38 The Proposed Surface Water Drainage Calculations for the Central Outfall are enclosed in *Appendix H* and cover the following scenario's:

- 1 Year
- 1 Year with surcharged outfall of 26.600)
- 30 Year
- 30 Year (with surcharged outfall of 26.600)
- 100 Year +20%cc
- 100 Year +20%cc (with surcharged outfall of 26.600)

3.4.39 The peak velocities at the outfall pipe are provided for each scenario.

3.4.40 Any temporary discharge requirements are to be designed and co-ordinated by the Contractor.

3.4.41 The final design of the drainage networks shall be in accordance with the legislation set by the Environment Agency, Manchester City Council, United Utilities and Manchester Ship Canal Company.

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4.0 Maintenance

4.1 Responsibilities

4.1.1 A suitable maintenance strategy should be adopted to ensure the drainage network is cleaned regularly and the routine maintenance and cleansing regime should be documented.

4.1.2 All drainage within the site will be private, but to adoptable standards. The private drainage system will therefore be maintained by the land owner.

4.1.3 Where any existing public sewers are present within the masterplan, they will be maintained by United Utilities. Access for maintenance will be required. Public sewers are present along Quay Street, Atherton Street, Water Street, Lower Byrom Street and Grape Street. Grape Street is a private road within the masterplan.

4.1.4 There are no known highway drains, however there are various highway gullies and connections to the public sewer network which will be maintained by Manchester City Council Highways. Access for maintenance will be required. Highway gullies are present along Quay Street, Atherton Street, Water Street, Lower Byrom Street.

4.1.5 Table 3 identifies maintenance responsibilities for drainage components.

Table 3: Maintenance Responsibilities

Plot Foul Drainage	Property Owner (plot)
Plot Surface Water Drainage	Property Owner (plot)
Masterplan Foul Drainage (private land/highway)	Property Owner (Masterplan)
Masterplan Surface Water (private land/highway)	Property Owner (Masterplan)
Existing Highway Surface Water Drainage	Manchester County Council
Existing Public Sewers	United Utilities

4.2 General Maintenance Requirements

4.2.1 This section is intended to give an overview of the operation and maintenance for the drainage features included with the drainage strategy and in relation to typical details. Where proprietary products are specified, the manufacturer's instructions and recommendations should be followed in priority to this document unless specifically noted otherwise due to project constraints.

4.2.2 The recommended operations and frequencies are typical only and should be more frequent initially to ensure that there are no unforeseen issues with the operation and then adjusted to suit the site requirements.

4.2.3 It is recommended that the drainage system is inspected as a minimum twice a year, with the system also being inspected after any major storm event. Significant sediment deposition is likely in areas used for storage, so a post clean-up operation may be required including the removal of litter, vegetation, sewerage debris and larger objects.

4.2.4 The surface water network has been designed to accommodate the 1 in 100-year storm rainfall event plus an allowance for climate change particular to the requirements of the site. It may be that the exceedance flows above the 1 in 30-year storm rainfall event are stored within the site partially above ground, on non-habitable external landscaping, parking or other space. As the flows are generally being attenuated on site and within SuDS features there will be a period of time after storm events where the network is still partially or fully surcharged and is draining down. Where this surcharging is still present after 48hrs appropriate action should be taken as noted in this section.

4.3 Components

4.3.1 The following components have been included within the drainage design for the proposed development:

- Inspection and Manhole Chambers
- Pipes
- Gullies and Channels
- Outfall Headwall
- Smart Filter Chamber
- Non-Return Valve

4.3.2 The maintenance strategy should be adopted to ensure the drainage network is cleaned regularly and the routine maintenance and cleansing regime should be documented.

4.3.3 Maintenance of the drainage network will be the responsibility of an on-site facilities management team.

4.3.4 It is recommended that the drainage system is inspected as a minimum twice a year, with the system also being inspected after any major storm event.

4.3.5 Significant sediment deposition is likely in areas used for storage, so a post clean-up operation may be required including the removal of litter, vegetation, sewerage debris and larger objects.

4.3.6 Long-term management practices include monthly sweeping of external paved areas. The sweeping program will remove sand and contaminants directly from paved surfaces before they become mobilised during storm events and transported to the drainage system.

4.3.7 During the winter months, drainage features such as gullies and channels should be cleared of ice, snow, debris or litter

4.3.8 Sediment/material removal should be undertaken in consultation with the environmental regulator to confirm appropriate protocols; especially where run-off is taken from potentially contaminated areas such as the filter drains and the upstream/downstream chambers.

4.3.9 A copy of the final construction drainage layout should be provided in the final Operations and Maintenance Manual.

4.4 Inspection and Manhole Chambers

4.4.1 Access points have been located at the head of each run, at a change in direction and at a change of pipe size in accordance with Building Regulations Part H.

4.4.2 The appropriate health and safety equipment must be used when accessing manholes. Confined space certificates must be held by any personnel entering a manhole and the appropriate permits should be obtained from the Maintenance Manager prior to any access.

4.5 Pipes

4.5.1 Pipes are proprietary products and the materials can vary across the site and as such where used, the manufacturer's recommendations should be followed. Regardless of the product used, the pipes should be fully compliant with the Engineers drainage specification.

4.5.2 Pipes are intended to be the main conveyance across the development and where oversized they form the attenuation volume required by the limitation of the discharge rate/velocities. They are generally intended to be dry except for during rainfall events. These should be designed to be self-cleaning where possible for smaller diameter pipes, and for larger diameters the risk is reduced due to the overall pipe size.

4.5.3 Access for maintenance is provided through access chambers and manholes.

4.5.4 Regular inspection and maintenance is important to identify areas which may have been obstructed/clogged and may not be drainage correctly thus exposing the development to a greater level of flood risk.

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Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required).	Initial Inspection should be provided as post construction CCTV survey.	N/A
Regular maintenance\ inspection	Inspect for evidence of poor operation via water level in chambers. If required, take remedial action.	3-monthly, 48 hours after large storms.
	Check and remove large vegetation growth near pipe runs.	Monthly or as required
Remedial Action	Rod through poorly performing runs as initial remediation.	As required.
	If continued poor performance jet and CCTV survey poorly performing runs.	As required.
	Seek advice as to remediation techniques suitable for the type of performance issue and location.	As required If above does not improve performance.

4.6 Drainage Gullies and Channels

4.6.1 Channels and gullies should be inspected and cleaned in accordance with the manufacturer's details. Channel units can be cleaned through the use of a high-pressure hose; this can be fed into the channel system through access units strategically placed along the channel run. The throat section of channel units should be kept clear at all times to ensure uninterrupted flow of surface water into the drainage channel and any debris within the throat should be removed.

4.6.2 Locking bolts should be replaced and sufficiently tightened, taking care that the bolt heads do not stand above the top surface of the cover or grate. If covers are allowed to move within their frame, this may cause damage to the frame or seating.

4.6.3 Sediment\material removal should be undertaken in consultation with the environmental regulator to confirm appropriate protocols; especially where run-off is taken from potentially contaminated areas such as the car park channels.

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required).	Initial Inspection including channel outlet boxes.	Half yearly and after large storms.
Regular maintenance\ inspection	Litter and debris removal	Monthly or as required.
	Check and remove large vegetation growth near channel runs.	Monthly or as required
	Inspect for evidence of poor operation and/or weed growth. If required, take remedial action. Inspect silt accumulation rates and establish appropriate brushing frequencies. Silt can also be caused by adjacent landscaping areas which should be reprofiled to provide a flat area or berm adjacent to the paving.	3-monthly, 48 hours after large storms.
Remedial Action	Inspect access/outlet boxes and rod through poorly performing channels and outlets as initial remediation.	As required.

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4.7 Outfall Headwall

4.7.1 The proposed surface water outfalls are proposed to connect into the River Irwell (Northern and Southern Outfalls) or into the Canal Basin (Central Outfall).

4.7.2 The outfalls are located within the watercourse walls and therefore should not be flush with the wall to minimise scour. Appropriate scour protection will be required to the base of the Canal Basin due to the volume of water entering this outfall and the height at which it enters the basin.

4.7.3 Screens are required to the outfall pipe which will minimise larger debris entering the site drainage system during heavy rainfall events and to prevent access from people. Access to the screens should be managed by the onsite maintenance team. Any access within the River Irwell will be subject to agreement with Manchester Ship Canal Company and Manchester Lead Local Flood Authority. Any access to the Canal basin will be subject to agreement with Manchester Lead Local Flood Authority.

4.7.4 Appropriate method statements should be provided for managing the safety of personnel accessing the screens for maintenance.

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required).	Inspect outlets for blockages, and clear if possible. If faults persist, appropriate access with relevant RAMS required to inspect and remove blockages.	Monthly and after large storms.
Regular maintenance\ inspection	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then six monthly.
	Debris removal from catchment surface (where may cause risks to performance).	Monthly
	Remove sediment from pre-treatment structures and filter chambers upstream.	Annually (or as required after heavy rainfall events)

Remedial Actions	Repair/rehabilitation of outlets.	As required.

4.8 Smart Filter Chamber

4.8.1 The smart filters are intended for treatment for water quality.

4.8.2 The Smart Filters are specified as Naylor Smart Filter and are proprietary products and therefore manufacturer's recommendations should also be taken in to consideration.

4.8.3 Access for maintenance has been provided.

4.8.4 Sediment\material removal should be undertaken in consultation with the environmental regulator to confirm appropriate protocols; especially where run-off is taken from potentially contaminated areas such as the chamber containing smart filters.

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required).	Inspect inlets and outlets for blockages, and clear if required. If faults persist jetting and CCTV survey may be required.	Monthly and after large storms.
Regular maintenance\ inspection	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then six monthly.
	Debris removal from catchment surface (where may cause risks to performance).	Monthly
	Remove sediment from pre-treatment structures and filter chambers.	Annually (or as required after heavy rainfall events)

Remedial Actions	Repair/rehabilitation of inlets/outlets.	As required.

4.9 Non-Return Valves

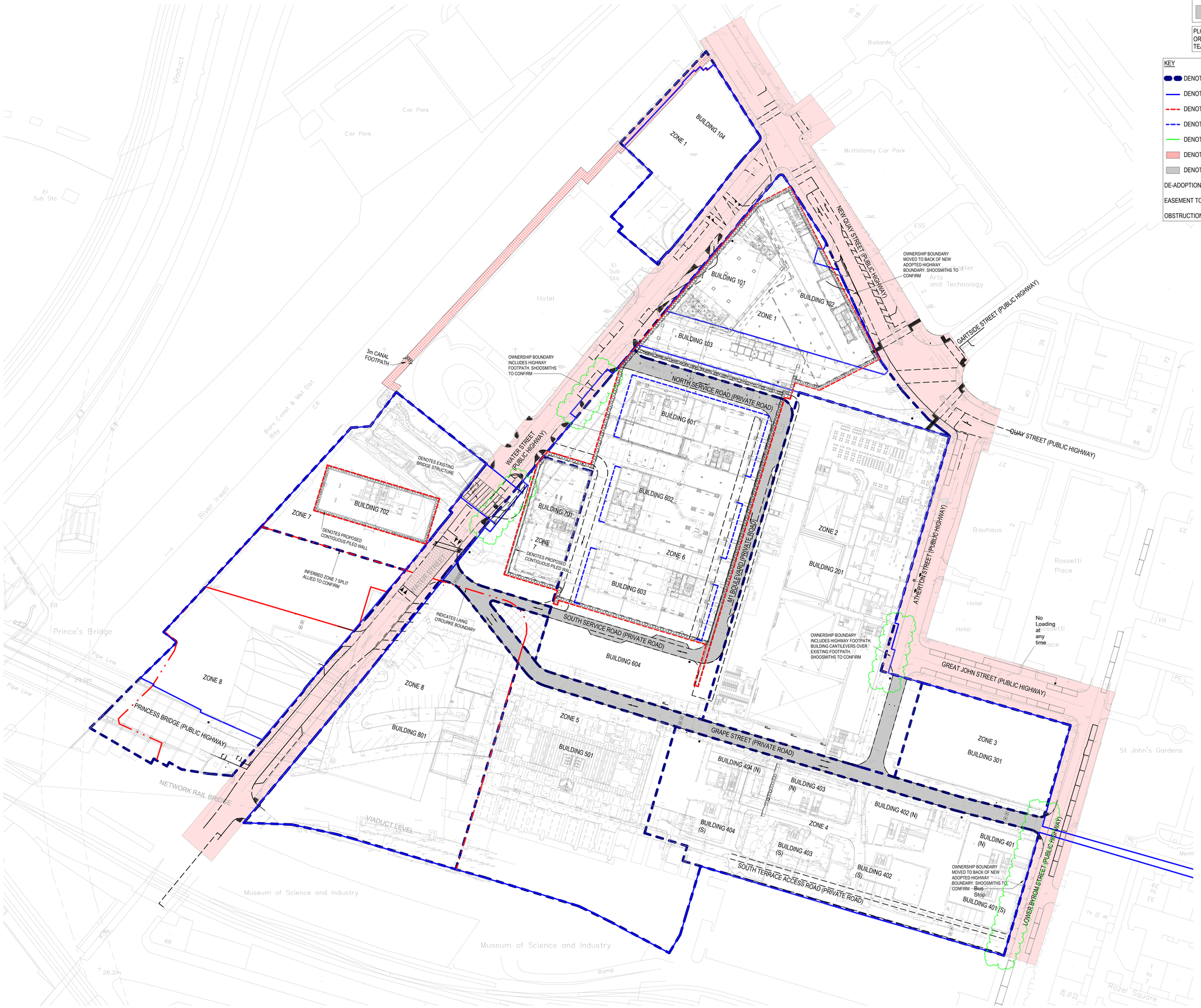
4.9.1 The non-return valves are specified for flood protection and are proposed within the main drainage system locally to Old Granada Studios where ground levels are lower than the maximum predicted flood level.

4.9.2 The non-return valves are proprietary products and therefore manufacturer's recommendations should also be taken in to consideration. Access for maintenance has been provided within chambers.

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required).	Initial Inspection	Half yearly and after large storms.
Regular maintenance\ inspection	Litter and debris removal	Monthly or as required.
	Inspect for evidence of poor operation. If required, take remedial action.	3-monthly, 48 hours after large storms.
Remedial Action	Inspect valves and rod through poorly performing valves as initial remediation.	As required.

Appendix A

Proposed Masterplan



PLOT DEFINITION LEGEND

DENOTES INFRASTRUCTURE AND TECHNICAL MASTERPLAN DESIGN TEAM RESPONSIBILITY

PLOT DESIGN TEAMS NEED TO DISCUSS ANY OVERSAILS OR UNDERSAILS WITH THE TECHNICAL MASTERPLAN TEAM

KEY

- DENOTES PLOT DEFINITIONS - PLOT DESIGN TEAMS
- DENOTES OWNERSHIP BOUNDARY - SHOOSMITHS
- DENOTES UNDERSAIL OF BUILDING
- DENOTES OVERSAIL OF BUILDING
- DENOTES EXTENT OF EXISTING BUILDING
- DENOTES PUBLIC HIGHWAY - TM TEAM
- DENOTES PRIVATE CARRIAGEWAY - TM TEAM

DE-ADOPTION/STOPPING UP PROCESS - VECTOS/SHOOSMITHS

EASEMENT TO SHIP CANAL TBC -

OBSTRUCTIONS - TUNNEL/CANAL -

GENERAL NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.
2. DO NOT SCALE THIS DRAWING. ANY AMBIGUITIES, OMISSIONS AND ERRORS ON DRAWINGS SHALL BE BROUGHT TO THE ENGINEERS ATTENTION IMMEDIATELY. ALL DIMENSIONS MUST BE CHECKED / VERIFIED ON SITE.
3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
4. FOR GENERAL NOTES REFER TO DRAWING.

THIS TECHNICAL MASTERPLAN DRAWING COMPILES DESIGN INFORMATION DRAWN FROM VARIOUS SOURCES AND REMAINS THE RESPONSIBILITY OF THE RELEVANT DESIGN TEAM. THIS DRAWING DOES NOT INFER DESIGN RESPONSIBILITY BUT SIMPLY ADDRESSES PLOT RELATIONSHIPS AND CHALLENGES TO BE RESOLVED BY THE RELEVANT PLOT DESIGNERS.

ZONE	ARCHITECT	CIVIL/STRUCTURAL	M&E	TRANSPORT
1	DOMAXIS	CURTINS	CWC	VECTOS
2	3D REID	CURTINS	CWC	VECTOS
3				
4	CHAPMAN TAYLOR	RoC	CWC	VECTOS
5	ALLIED LONDON	CURTINS	CWC	VECTOS
6	CHAPMAN TAYLOR	CURTINS	CWC	VECTOS
7	DCM	CURTINS	CWC	VECTOS
8	OMA	BURO HAPPOLD	BDP	VECTOS

Rev:	Description:	Date:	By:	Chkd:
L	SJP2 LAYOUT UPDATED. BASEMENT UPDATED TO SUIT LATEST EXTENT	16.01.19	AM	AI
K	SJP2 LAYOUT UPDATED. BASEMENT UPDATED TO SUIT LATEST EXTENT	07.12.18	AM	AI
J	SJP2 LAYOUT UPDATED. BASEMENT UPDATED TO SUIT LATEST EXTENT	16.10.18	AM	AI
H	BASEMENT BOUNDARY UPDATED TO SUIT LATEST LAYOUT. SJP2 LAYOUT UPDATED. MGY LAYOUT UPDATED	28.09.18	AM	AI
G	VECTOS LATEST HIGHWAY PLAN INCORPORATED. FOUNDATIONS TO AUTOMATIC BOLLARDS ADDED. PLOT RESPONSIBILITY BOUNDARIES UPDATED TO SUIT HIGHWAY ALIGNMENT.	30.04.18	AM	AI
F	BOUNDARY BETWEEN MGY AND OGS UPDATED TO SUIT DESIGN TEAM COMMENTS. EXISTING MCC BRIDGE STRUCTURE ADDED. PILE LINE ADJACENT TO MCC BRIDGE UPDATED. BOLLARD POSITIONS UPDATED TO SUIT VECTOS LATEST. SUBSTATION RELOCATED TO BUILDING 601.	07.03.18	AM	KM
E	NEW ROAD LAYOUT UPDATED TO SUIT VECTOS UPDATED LAYOUT. OWNERSHIP BOUNDARYS DISCUSSED WITH SHOOSMITHS. SUBSTATION ADDED.	05.02.18	AM	KM
D	BOUNDARY TO FACTORY UPDATED	21.12.17	AM	KM
C	BUILDING NUMBERS UPDATED.	19.12.17	AM	KM
B	GRAPE STREET UPDATED TO SUIT DESIGN TEAM UPDATES. PLOT NUMBERS UPDATED.	11.12.17	AM	KM
A	UPDATED TO SUIT LATEST TECHNICAL MASTERPLAN DISCUSSIONS	17.11.17	AM	KM

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Status: PRELIMINARY

Project: ST JOHNS MASTERPLAN

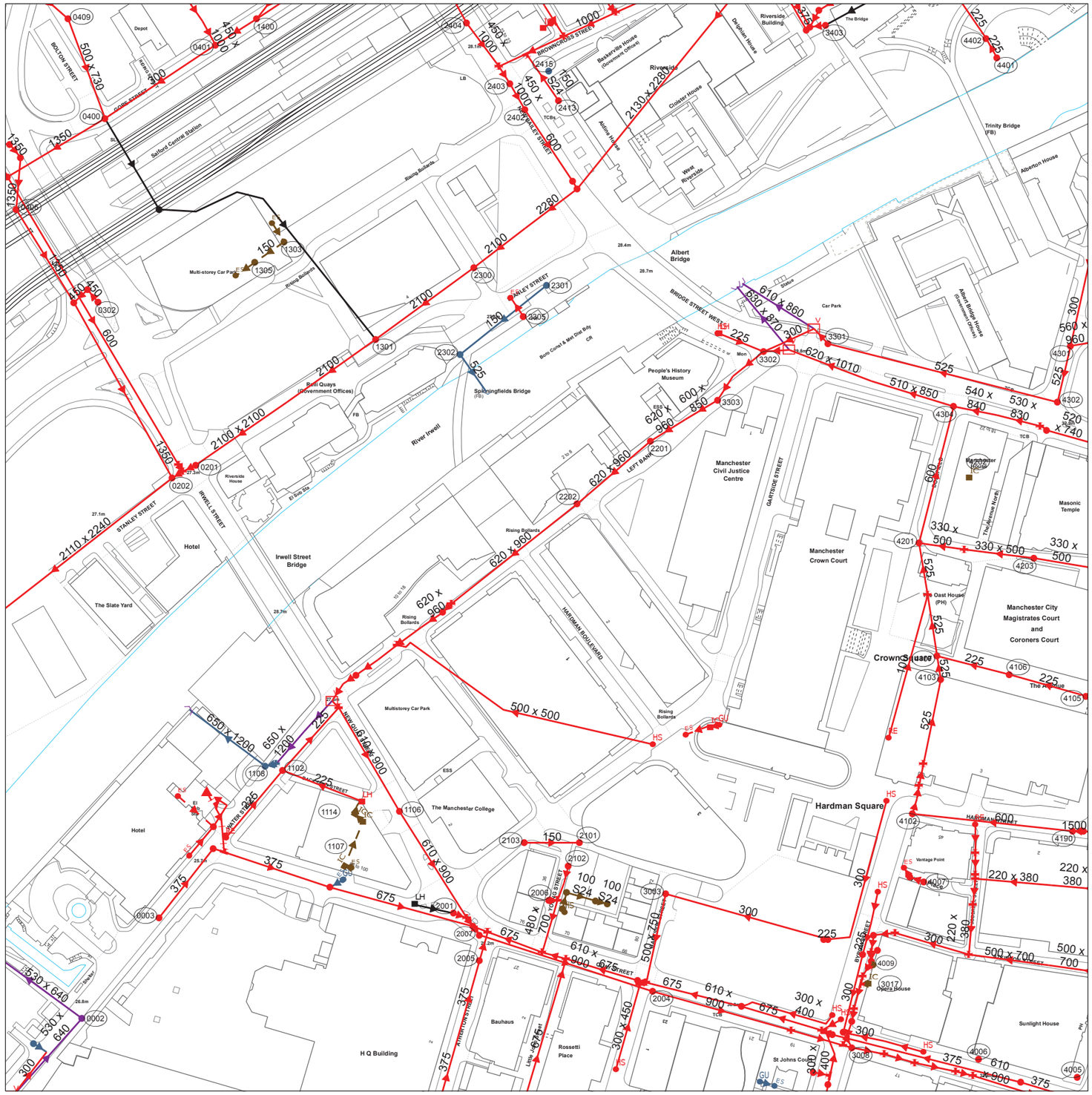
Drg Title: TECHNICAL MASTERPLAN

Project No:	Size:	Date:	Drawn By:	Designed By.	Checked By.
065330	A0	NOV 17	AJM	KM	KM
	Scale: As indicated				

Project:	Location:	Originator:	Volume:	Level:	Type:	Discipline:	Category / Number:	Rev:
SJQ	099	CUR - XX -	XX -	DR -	S -		20050 -	L

Appendix B

Proposed United Utilities Public Sewer Records



Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
0001	26.17	SW	23.61	300		CI	VC	7.21	
0002	26.65	CV							
0003	25.85	CO	23.9	375		CI	CO	40.61	226
0101	25.65	CO							
0103		CO							
0201	27.49	CO	0	2100		CI	CO	6.71	
0202		CO	0	2110	2240	EG	BR	138.22	
0301	26.21	CO							
0302	26.59	CO	24.24	450		CI	PVC	7.64	16
0303	26.4	CO	23.75	450		CI	PVC	8.65	216
0400	29.16	CO	20.53	1350		CI	CO	52.48	
0401	29.25	CO							
0404		CO							
0406		CO	0	1350		CI	CO	50.59	
0407		CO							
0408		CO							
0409		CO							
1001	26.7	CO	23.4	675		CI	CO	68.41	
1102	26.48	CO							
1104	27.31	CO	23.02	680	810	EG	BR	7.21	
1106	27.68	CO	22.82	610	900	EG	BR	57.98	
1107		FO							
1108		SW							
1110		FO							
1114		FO							
1301	27.47	CO							
1303		FO		150		CI	VC	16.62	
1305		FO							
1400	29.28	CO	25.29	300		CI	VC	22.47	118
2001	27.9	CO	0	900		CI	VC	6.32	
2002	28.04	CO	22.74	610	900	EG	BR	84.12	1402
2003	29.3	CO							
2004	29.38	CO	22.66	610	900	EG	BR	66.48	
2005	28.13	CO							
2006	28.55	CO	26.22	150		CI	VC	4	
2007		CO							
2019		FO							
2020		FO							
2021		FO		100		CI	VC	5.74	
2022		FO							
2101									
2102	28.41	CO	25.48	460	730	EG	BR	8.25	
2103		CO		150		CI	VC	25.45	
2201	27.65	CO							
2202	27.41	CO	23.07	620	960	EG	BR	74.03	
2203	26.62	CO	22.95	620	960	EG	BR	12.21	
2300	27.47	CO	18.62	2100		CI	CO	56.24	
2301		SW	0	150		CI	VC	51.22	
2302		SW							
2305		CO		225		CI	VC	10.52	
2400	28.37	CO							
2401	28.33	CO							
2402	28.08	CO	23.24	600		CI	CO	39.66	97
2403	28.1	CO							
2404	28.16	CO							
2409		CO							
2410		CO							
2413		CO		150		CI	PF	26.13	
2415		SW							
3001		CO							
3003	29	CO	23.4	500	750	UN	VC	41.98	
3004	30.09	CO							
3005	30.09	CO	28.98	225		CI	VC	2	
3006	30.86	CO	27.63	300		CI	VC	37.11	161
3007	30.93	CO	27.38	300		CI	VC	8.06	17
3008	30.99	CO	22.48	610	900	EG	BR	15.3	
3009	30.93	CO	23.25	450		CI	VC	11.7	
3011	30.95	CO							
3012	31.73	CO							
3017		FO							
3091	30.2	CO							
3101		CO							
3301	30.19	CO							
3302	29.15	CO							
3303	28.28	CO	23.33	600	850	EG	BR	17.49	
3401		CO	0	375		CI	VC	41.21	
3402		CO							
3403		CO	0	375		CI	CO	7.26	
3404	22.27	CO							
4003	30.83	CO	26.11	450		CI	VC	8.06	
4005		CO							
4006		CO							
4007		CO		225		CI	VC	6.69	
4008		CO		225		CI	VC	4.94	
4009		FO		150		CI	VC	2.16	
4010		CO							
4013		CO							
4021		CO	0	450		CI	VC	8.06	
4102	30.97	CO							
4103	31.14	CO							
4105		CO							
4106		CO							
4107	0	CO							
4110		CO							
4190	32.98	CO	28.27	600		CI	CO	74.43	90
4201	30.53	CO							
4202		FO							
4203		CO							
4301	33.01	CO							
4302	32.79	CO							
4303	33.01	CO							
4304	31.63	CO							
4401		CO	0	225		CI	VC	10.3	
4402		CO	0	225		CI	VC	58.84	
0004		CO							
0104		CO							
0108		CO		225		CI	CI	15.81	
0410		CO	26.42	450	1000	FT	BR	12.53	
1002		SW							
1111		CO	0	620	960	EG	BR	9.46	
1112		CO	0	640	1260	EG	BR	12.21	
1113		OV	0	650	1200	UN	BR	19.85	
1115		FO							
1116		FO							
1119		CO							
1201		CO	0	620	820	EG	BR	25	
1302		CO	0	2100	2100	SQ	CO	51.04	
2009		CO	0	300	450	UN	VC	40.52	
2012		CO							
2016		CO							
2017		CO	0	480	700	EG	BR	33.54	
2018		CO							
2023		FO		100		CI	VC	1.86	
2104		CO	0	500	500	SQ	BR	130.79	
2304		CO	18.64	2100		CI	CO	29.75	2974
2408		CO							
2411		CO							
2512		CO							
2513		CO							
3010		SW							
3013		CO	0	300	400	UN	CO	42.68	
3016		CO	0	100		CI	CO	10.3	
3022		CO							
3103		CO							
3311		CO							
3312		CO	23.46	620	960	EG	BR	18.87	
4001		CO							
4002		CO							
4004		CO							
4005		CO	0	225		CI	VC	15.52	
4015		CO	0	300		CI	VC	14.32	
4092		CO	0	300		CI	CO	18.68	
4104		CO							
4113		CO	0	300		CI	VC	75.3	
4306		CO							
4307		CO	24.62	620	1010	EG	BR	40.55	61
4308		CO							
0200		CO							
0203		CO	0	600		CI	BR	5.83	
1103		CO							

Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
1109		SW	0	630	1220	EG	BR	5.1	
1118		CO							
1190		CO							
1200		CO							
2008		CO							
2010		CO							
2011		CO							
2013		CO							
2014		CO							
2015		CO							
2090		CO							
2206		CO	0	620	960	EG	BR	5.66	
2405		CO							
2406		CO	0	1000		CI	GRP	26.4	
2407		CO							
2412		CO							
2414		CO							
3002		CO							
3014		CO							
3018		CO	0	450		CI	VC	15.52	
3019		CO	0	610	900	EG	BR	29.12	
3020		CO	0	450		CI	VC	6.08	
3021		CO							
3023		CO							
3024		CO							
3090		CO							
3304		CO							
4014		CO							
4016		CO	0	220	380	EG	BR	23.09	
4017		CO	0	610	900	EG	BR	14.56	
4018		CO	0	610	900	EG	BR	19.42	
4019		CO	0	610	900	EG	BR	8.25	
4020		CO	0	610	900	EG	BR	56.61	
4022		CO	0	450		CI	VC	4	
4023		CO							
4090		CO							
4091		CO	0	220	380	EG	BR	12.04	
4115		CO	0	220	380	EG	BR	10	
4122		CO							
4123		CO							
4206		CO							
4207		CO							
4305		CO							
0403		CO							
1002		CO							
0107		CO		225		CI	CI	13.43	
1105		CO	22.88	610	900	EG	BR	59.99	1500
3305		CO							
3306	29.93	CO	24.27	610	860	RE	BR	39.13	

WASTE WATER SYMBOLOGY

Foul Surface Combined Overflow

Manhole
Manhole, Side Entry
MainSewer, Public
MainSewer, Private
MainSewer, S104
Rising Main, Public
Rising Main, Private
Rising Main, S104
Highway Drain, Private

Foul Surface Combined

WW Site Termination
Air Valve
Cascade
Non Return Valve
Extent of Survey
Flow Meter
Gulley
Hatch Box
Head of System
Hydrobrake / Vortex
Inlet
Inspection Chamber
Bifurcation
Catchpit
Contaminated Surface Water
WW Pumping Station
Sludge Pumping Station
Sewer Overflow
TJunction/Saddle
LampHole
OilInterceptor
PenStock
Pump
RoddingEye
Soakaway
Summit
Valve
Valve Chamber
Washout Chamber
DropShaft
WW Treatment Works
Septic Tank
Vent Column
Network Storage Tank
Orifice Plate
Vortex Chamber
Penstock Chamber
Blind Manhole
Foul Surface Combined Overflow
Screen Chamber
Discharge Point
Outfall

Sludge Main, Public
Sludge Main, Private
Sludge Main, S104

ABANDONED PIPE
MainSewer
Rising Main
Highway Drain
Sludge Main

Control Kiosk
Unspecified

LEGEND

MANHOLE FUNCTION

FO	Foul
SW	Surface Water
CO	Combined
OV	Overflow

SEWER SHAPE

CI	Circular	TR	Trapezoidal
EG	Egg	AR	Arch
OV	Oval	BA	Barrel
FT	Flat Top	HO	HorseShoe
RE	Rectangular	UN	Unspecified
SQ	Square		

SEWER MATERIAL

AC	Asbestos Cement	DI	Ductile Iron
BR	Brick	PVC	Polyvinyl Chloride
PE	Polyethylene	CI	Cast Iron
RP	Reinforced Plastic Matrix	SI	Spun Iron
CO	Concrete	ST	Steel
CSB	Concrete Segment Bolted	VC	Vitrified Clay
CSU	Concrete Segment Unbolted	PP	Polypropylene
CC	Concrete Box Culverted	PF	Pitch Fibre
PSC	Plastic/Steel Composite	MAC	Masonry, Coursed
GRC	Glass Reinforced Concrete	MAR	Masonry, Random
GRP	Glass Reinforced Plastic	U	Unspecified

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OS Sheet No: sj8398sw
Scale: 1:1250 Date: 09/02/2018
199 Nodes
Sheet 1 of 1

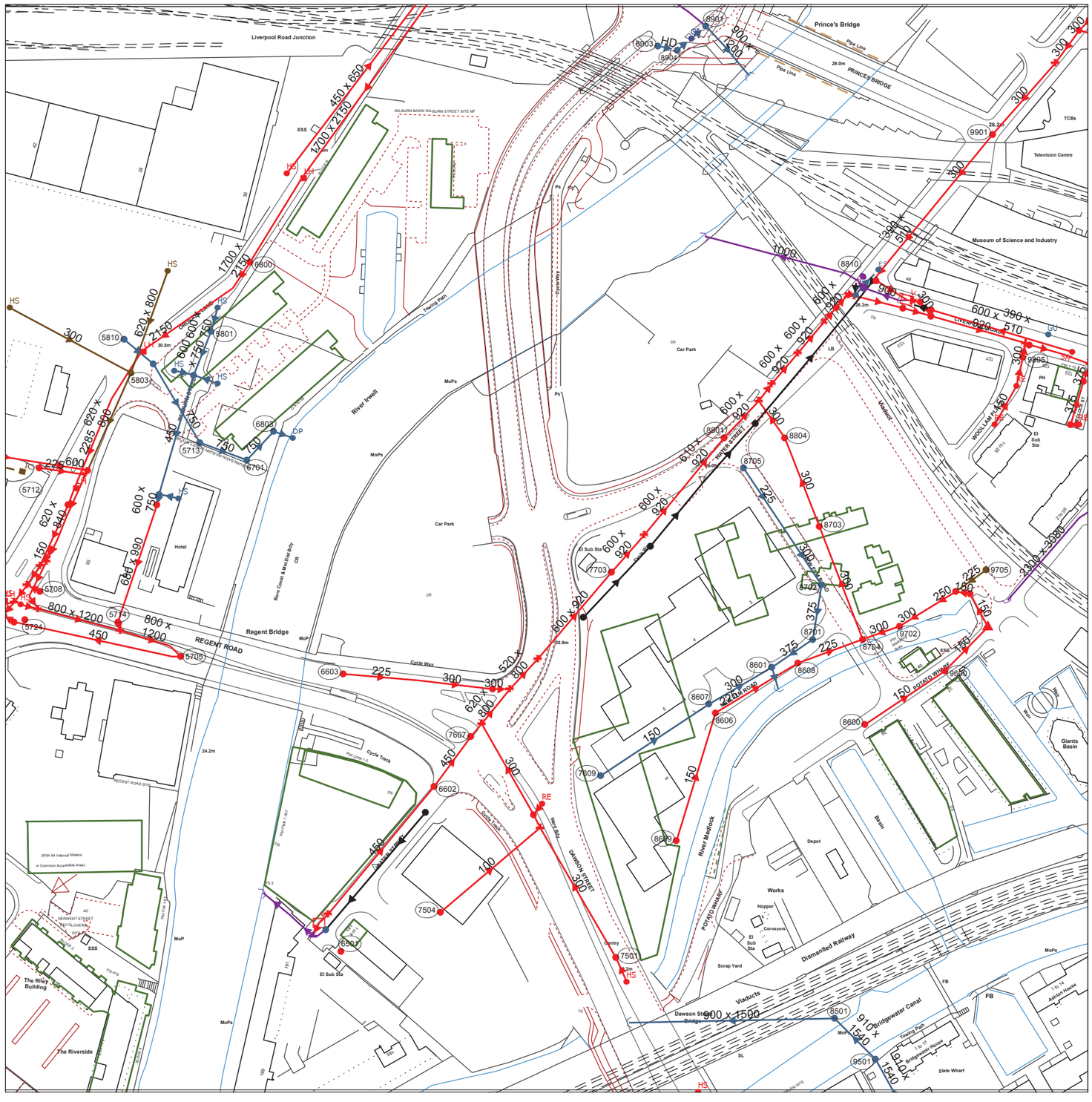
United Utilities
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SEWER RECORDS

Printed By: Property Searches

OS Sheet No: sj8398sw

Scale: 1:1250 Date: 09/02/2018



Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
5700	28.88	SW							
5702	30.68	CO							
5704	30.74	CO							
5705		CO							
5706		CO	0	680	990	EG	VC	56.92	
5707		CO							
5708		CO	0	150		CI	VC	6.71	
5709		CO	0	150		CI	VC	8.6	
5712		FO							
5713	28.2	SW	24.43	750		CI	CO	23.11	51
5714		CO	0	800	1200	EG	VC	4.12	
5720		CO		225		CI	VC	21.52	
5724		CO							
5800	29.06	SW	25.86	450		CI	VC	57.28	83
5801	29.21	SW	0	600	750	RE	BR	21.54	
5803	30.93	FO	27.03	620	800	EG	BR	49.24	115
5810	30.67	SW		750		CI	CO	17.58	
5812	30.65	SW	25.03	750		CI	CO	42.24	70
6501	25.1	CO							
6504	25	SW	21.55	610	1550	EG	BR	21.87	
6602	25.54	CO							
6603	27.8	CO	24	225		CI	VC	35.13	110
6701	26.39	SW							
6800	28.65	CO	0	1700	2150	AR	BR	14.42	
6803	25.73	SW							
7501	28.1	CO	23.41	300		CI	VC	76.17	254
7504		CO	0	100		CI	CO	60.31	
7601	26.07	CO							
7605	26.68	CO	23.09	300		CI	VC	48.37	
7607	26.21	CO							
7609	26.52	SW	23.71	150		CI	VC	59.91	
7703	25.81	CO							
8501		SW	0	900	1500	UN	CO	95.02	
8600		CO	0	150		CI	VC	44.49	
8601	26.41	SW							
8606	26.46	CO							
8607	26.44	SW							
8608	26.42	CO							
8609		CO	0	150		CI	VC	61.68	
8701	26.44	SW	23.44	375		CI	CO	23.02	77
8702	26.47	SW							
8703	26.23	CO	23.33	300		CI	VC	44.01	339
8704	26.52	CO							
8705	26.12	SW	24.73	225		CI	VC	32.45	74
8801	25.93	CO	22.55	600	920	EG	BR	28.35	
8804	27.08	CO	23.18	300		CI	VC	20.81	
8808	26.07	CO							
8809	26.2	OV							
8810	26.1	OV	22.39	1000		CI	BR	74.47	
8901		SW	0	900	1200	EG	BR	30.17	
8903		SW		0		UN	UN	9.13	
8904		SW		0		UN	UN	8.43	
9501		SW	0	910	1540	UN	CO	26.75	
9600		CO							
9702	25.88	CO	23.58	300		CI	VC	18.03	164
9703	25.88	CO	19.09	250		CI	VC	15.26	
9704		CO	0	150		CI	VC	6.72	
9705	25.83	FO	23.66	225		CI	VC	17.2	4
9802	27.01	CO							
9805	27.41	CO							
9806	27.43	CO							
9807	26.52	CO							
9808	27.56	CO	22.37	600	920	EG	BR	14.52	
9812	26.82	CO							
9813	26.62	CO	22.92	300		CI	CO	2.77	6
9814	26.56	CO							
9815	26.18	CO							
9901	26.17	CO							
9903	26.37	CO	23.46	300		CI	VC	18.6	
5701		CO							
5710		SW	0	150		CI	VC	9.22	
5715		CO	0	800	1200	EG	VC	8.25	
5716		CO	0	1200		CI	VC	7.21	
5719		CO	0	880	1000	EG	VC	11.18	
5804		SW	0	225		CI	VC	9.22	
5805		SW	0	225		CI	VC	11.7	
5806		FO	0	620	800	EG	BR	49.98	
5807		CO	0	2285		CI	VC	52.93	
5808		SW	0	600	750	RE	BR	11.4	
5809		FO	0	300		CI	VC	63.53	
6503		CO							
6507		OV	0	610	1550	HO	BR	15.62	
6605		CO							
6801		CO	0	2150		CI	BR	77.12	
6901		CO	0	450	650	EG	BR	125.6	
7503		CO	0	300		CI	VC	12.08	
8707		SW							
8708		CO							
8805		CO							
8905		SW							
9701		CO	21.34	300		CI	VC	15.26	
9810		CO	22.92	390	510	UN	CO	67.82	71
9811		CO							
9817		CO		300		CI	VC	9.51	
9819		SW							
9902		CO	22.92	390	510	EG	BR	30.39	
5703		CO							
5711		CO	0	800	1200	EG	VC	31.11	
5717		CO	0	1000		CI	VC	17.89	
5718		CO	0	150		CI	VC	10	
5721		CO							
5722		CO	0	150		CI	VC	10.82	
5723		CO							
5725		CO	0	800	1200	EG	VC	39.29	
5802		CO							
6505		CO							
6591		OV							
6900		CO							
7606		CO							
7608		CO							
7690		CO							
7691		CO							
7705		CO							
8811		SW	0	600	920	EG	BR	18.44	
8812		CO							
8813		CO							
8814		CO							
8817		CO							
8890		CO							
8909		CO							
9904		CO	0	300		CI	VC	43.93	
6601	25.51	SW							
6604		SW							
7702	25.89	CO							
7704	25.94	CO							
8706		CO							
8803	26.04	CO							
6502		CO	0	300		CI	VC	6.81	
9700		CO							
9818	26.52	CO							

WASTE WATER SYMBOLOGY

Foul Surface Combined Overflow

Manhole
Manhole, Side Entry
MainSewer, Public
MainSewer, Private
MainSewer, S104
Rising Main, Public
Rising Main, Private
Rising Main, S104
Highway Drain, Private

Foul Surface Combined

WW Site Termination
Air Valve
Cascade
Non Return Valve
Extent of Survey
Flow Meter
Gulley
Hatch Box
Head of System
Hydrobrake / Vortex
Inlet
Inspection Chamber
Bifurcation
Catchpit
Contaminated Surface Water
WW Pumping Station
Sludge Pumping Station
Sewer Overflow
TJunction/Saddle
LampHole
OilInterceptor
PenStock
Pump
RoddingEye
Soakaway
Summit
Valve
Valve Chamber
Washout Chamber
DropShaft
WW Treatment Works
Septic Tank
Vent Column
Network Storage Tank
Orifice Plate
Vortex Chamber
Penstock Chamber
Blind Manhole
Foul Surface Combined Overflow
Screen Chamber
Discharge Point
Outfall

Sludge Main, Public
Sludge Main, Private
Sludge Main, S104

ABANDONED PIPE

MainSewer
Rising Main
Highway Drain
Sludge Main

Control Kiosk
Unspecified

LEGEND

MANHOLE FUNCTION

FO	Foul
SW	Surface Water
CO	Combined
OV	Overflow

SEWER SHAPE

CI	Circular	TR	Trapezoidal
EG	Egg	AR	Arch
OV	Oval	BA	Barrel
FT	Flat Top	HO	HorseShoe
RE	Rectangular	UN	Unspecified
SQ	Square		

SEWER MATERIAL

AC	Asbestos Cement	DI	Ductile Iron
BR	Brick	PVC	Polyvinyl Chloride
PE	Polyethylene	CI	Cast Iron
RP	Reinforced Plastic Matrix	SI	Spun Iron
CO	Concrete	ST	Steel
CSB	Concrete Segment Bolted	VC	Vitrified Clay
CSU	Concrete Segment Unbolted	PP	Polypropylene
CC	Concrete Box Culverted	PF	Pitch Fibre
PSC	Plastic/Steel Composite	MAC	Masonry, Coursed
GRC	Glass Reinforced Concrete	MAR	Masonry, Random
GRP	Glass Reinforced Plastic	U	Unspecified

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OS Sheet No: SJ8297NE
Scale: 1:1250 Date: 23/03/2017
130 Nodes
Sheet 1 of 1

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SEWER RECORDS

Printed By: Property Searches

OS Sheet No: SJ8297NE

Scale: 1:1250 Date: 23/03/2017



Refno	Cover	Func	Invert	Size.x	Size.y	Shape	Matl	Length	Grad
0501		CO							
0701	25.6	SW	24.47	225		CI	VC	17.03	
0702	25.59	SW	24.74	225		CI	VC	8.94	
0703	25.81	OV	22.78	2300	3080	UN	BR	128.36	
0704	26.25	CO	23.77	225		CI	VC	23.54	81
0805	29.54	CO							
0901	26.68	SW	23.4	400		CI	VC	5	26
1601	33.23	CO							
1703	31.99	CO							
1708	32.57	CO	26.15	600	650	UN	CO	56.75	
1709	31.39	CO							
1791	29.37	CO							
1901	28.95	CO							
1906		CO							
2501	31.09	CO	24.95	300		CI	VC	68.82	299
2502	29.53	CO							
2503	32.16	CO							
2601	33.75	CO	26.77	1500		CI	CO	91.92	919
2701	33.05	CO	28.12	300		CI	BR	10.2	
2702	33.12	CO	25.87	1500		CI	CO	14.56	
2703	33.04	CO	25.9	1500		CI	CO	14.56	
2704	33.44	CO	30.36	480	710	FT	BR	19.65	
2706	32.91	CO							
2707	33.5	CO	22.19	600	900	EG	BR	63.16	1263
2801	33.17	CO	30.67	300		CI	BR	20.88	54
2802		CO		150		CI	VC	10.86	
2804		SW		100		CI	VC	15.07	
2806	33.42	CO	31.38	225		CI	VC	32.7	
2808		CO	30.28	375		CI	CO	21.19	54
2901		CO		225		CI	VC	9.54	
2902		CO	0	675		CI	VC	66.76	
2903	32.21	CO							
2906		CO		225		CI	VC	38.34	
3501	32.11	CO							
3502		CO							
3503	32.24	CO							
3504	31.9	CO	30	300	400	EG	VC	30.07	15
3505		CO		100		CI	VC	3.08	
3512		SW							
3513	0	FO							
3514		SW							
3601	34.38	CO	26.9	375		CI	VC	28.65	
3603		CO	0	560	760	UN	BR	5.39	
3605		CO							
3612		CO							
3690	34.2	CO	27.14	1500		CI	CO	48.77	139
3691	33.4	CO							
3692	33.74	CO	0	500	750	UN	BR	41.15	
3701	34.12	CO							
3702	34.7	CO							
3703	34.32	CO							
3707	34.62	CO							
3710		CO		225		CI	VC	12.82	
3711		CO							
3804	34.07	CO	33.04	225		CI	VC	33.53	17
3805	33.63	CO	31.01	225		CI	VC	9.22	33
3806	33.49	CO							
3807	33.44	CO							
3808		CO							
3901	33.28	CO	29.58	540	650	FT	BR	48.27	
4501	33.52	CO							
4506		CO							
4507		CO							
4508		CO							
4509		FO							
4510		CO							
4512		SW							
4608		CO	0	2400		CI	BR	27.9	
4609		CO							
4704	35.36	CO							
4706		CO		150		CI	VC	2.11	
4707		CO							
4710		FO							
4711		FO		150		CI	VC	10.2	
4712		FO							
4713		FO							
4714		FO							
4715		CO		225		CI	VC	8.51	
4801	34.39	CO							
4802	34.21	CO							
4803	34.44	CO	31.43	460	530	UN	BR	43.97	92
4804	35.23	CO							
4805	35.27	CO							
4808	35.15	CO	31.85	450	660	UN	BR	25	
4809		CO		0		CI	VC	6.15	
4812		CO		225		CI	VC	4.05	
4902		CO							
4904		CO		150		CI	VC	2.78	
4905		CO							
9026		CO	0	600	750	UN	CO	16.81	
3100		CO		150		CI	VC	11.49	
0708		OV	0	540	840	UN	BR	21.1	
0905		SW	23.21	500	700	UN	BR	5.11	27
0906		OV	23.89	560	630	UN	BR	45.54	52
0907		CO	24.9	570	640	FT	BR	9.79	98
1602		CO	0	300	400	UN	CO	48.92	
1702		CO	0	450		CI	CO	12.37	
1704		CO	0	100		CI	CO	33.12	
1902		CO	0	500	750	UN	VC	6.42	
1904		CO							
1905		CO							
2602		CO	0	150		CI	VC	20	
2603		CO	0	150		CI	VC	15.62	
2605		CO							
2606		CO							
2705		SW							
2708		CO	0	375	500	UN	BR	26.4	
2710		CO	0	100		CI	VC	39.22	
2711		CO	0	450		CI	CO	11.4	
2713		CO	30.62	1500		CI	CO	11.18	
2714		CO							
2715		CO	31.22	600	650	UN	CO	24.04	
2800		CO	0	400	600	UN	CO	12.28	
2803		CO							
2807		CO	0	400	600	UN	CO	23.22	
2904		CO	0	500	720	UN	VC	32.35	
3506		CO	0	100		CI	VC	80.75	
3507		CO	27.93	225		CI	VC	30.07	15
3509		CO		100		CI	VC	4.71	
3511		CO							
3600		CO	0	150		CI	VC	3.78	
3604		CO	0	560	760	UN	VC	31.62	
3607		CO							
3608		CO							
3611		CO							
3613		SW							
3704		CO	0	500	750	UN	CO	67.08	
3705		CO	22.11	600	900	EG	BR	36.25	3625
3706		CO							
3708		CO	0	100		CI	VC	22.47	
3715		CO							
3801		CO							
3802		CO							
3904		CO							
3905		CO							
3906		CO							
4505		CO							
4511		SW							
4514		SW							
4603		CO	0	550	830	UN	VC	79.39	
4604		CO							
4605		CO	0	600	1050	UN	BR	53.38	
4703		CO	0	375	500	UN	VC	22.47	
4705		CO	0	580	630	UN	BR	23.77	
4719		FO							
4720		FO							
4792		CO	0	500	750	UN	BR	46.82	
4806		CO	0	450	600	UN	CO	38.9	
4807		CO	0	450	660	UN	BR	8.54	
4813		CO		150		CI	VC	39.09	

Refno	Cover	Func	Invert	Size.x	Size.y	Shape	Matl	Length	Grad
4901		CO	0	450	600	UN	CO	54.08	
6400		CO	0	1500		CI	CO	4.52	
0705		OV							
0706		OV							
0890		CO							
0902		CO							
1603		CO							
1605		CO							
1700		CO							
1706		CO							
1707		CO							
1790		CO							
1792		CO							
1903		CO							
2604		CO	0	300	400	UN	CO	88.8	
2709		CO							
2712		CO							
2790		CO	0	1500		CI	CO	63.89	
2791		CO							
2809		CO							
2900		CO							
3508		CO							
3602		CO	0	500	750	UN	BR	6.71	
3606		CO							
3609		CO							
3610		CO							
3714		CO							
3716		CO							
3902		CO	0	540	650	FT	BR	10.44	
3903		CO							
4601		CO							
4607		CO							
4690		CO							
4691		CO							
4692		CO							
4702		CO							
4709		CO							
4717		CO							
4790		CO							
4791		CO	0	500	750	UN	BR	67.07	
4800		CO							
4810		CO							
4811		CO							
4903		CO							
4906		CO							
2802		CO							
2803		CO							
2804		CO							
2905		CO							
0903		CO	25.45	300		CI	VC	95.49	48
0904		CO							
1701		CO							
4701		CO	31.33	550	630	UN	BR	24.72	

WASTE WATER SYMBOLOGY

Foul / Surface / Combined / Overflow

- Manhole
- Manhole, Side Entry
- MainSewer, Public
- MainSewer, Private
- MainSewer, S104
- Rising Main, Public
- Rising Main, Private
- Rising Main, S104
- Highway Drain, Private

Foul / Surface / Combined

- WW Site Termination
- Air Valve
- Cascade
- Non Return Valve
- Extent of Survey
- Flow Meter
- Gulley
- Hatch Box
- Head of System
- Hydrobrake / Vortex
- Inlet
- Inspection Chamber
- Bifurcation
- Catchpit
- Contaminated Surface Water
- WW Pumping Station
- Sludge Pumping Station
- Sewer Overflow
- T Junction/Saddle
- LampHole
- OilInterceptor
- PenStock
- Pump
- RoddingEye
- Soakaway
- Summit
- Valve
- Valve Chamber
- Washout Chamber
- DropShaft
- WW Treatment Works
- Septic Tank
- Vent Column
- Network Storage Tank
- Orifice Plate
- Vortex Chamber
- Penstock Chamber
- Blind Manhole

- Sludge Main, Public
- Sludge Main, Private
- Sludge Main, S104

ABANDONED PIPE

- MainSewer
- Rising Main
- Highway Drain
- Sludge Main

Foul / Surface / Combined / Overflow

- Screen Chamber
- Discharge Point
- Outfall

- Control Kiosk
- Unspecified

LEGEND

MANHOLE FUNCTION

FO	Foul
SW	Surface Water
CO	Combined
OV	Overflow

SEWER SHAPE

CI	Circular	TR	Trapezoidal
EG	Egg	AR	Arch
OV	Oval	BA	Barrel
FT	Flat Top	HO	HorseShoe
RE	Rectangular	UN	Unspecified
SQ	Square		

SEWER MATERIAL

AC	Asbestos Cement	DI	Ductile Iron
BR	Brick	PVC	Polyvinyl Chloride
PE	Polyethylene	CI	Cast Iron
RP	Reinforced Plastic Matrix	SI	Spun Iron
CO	Concrete	ST	Steel
CSB	Concrete Segment Bolted	VC	Vitrified Clay
CSU	Concrete Segment Unbolted	PP	Polypropylene
CC	Concrete Box Culverted	PF	Pitch Fibre
PSC	Plastic/Steel Composite	MAC	Masonry, Coursed
GRC	Glass Reinforced Concrete	MAR	Masonry, Random
GRP	Glass Reinforced Plastic	U	Unspecified

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OS Sheet No: sj8397nw

Scale: 1:1250 Date: 09/02/2018

203 Nodes

Sheet 1 of 1

United Utilities

helping life flow smoothly

SEWER RECORDS

OS Sheet No: sj8397nw

Scale: 1:1250 Date: 09/02/2018

Printed By: Property Searches

Appendix C

GPR Utilities Survey

SW	STORM WATER SEWERS
FW	FOUL WATER SEWERS
WM	WATER MAIN
GM	GAS MAIN
EL	ELECTRIC CABLES
DUCT	CABLE DUCTING
BT	BT (UNDERGROUND)
CCTV	CABLE TV
CCTV	CLOSED CIRCUIT TV
UI	UNIDENTIFIED FEATURE
UP	UNIDENTIFIED PIPE
UC	UNIDENTIFIED CABLE
UNPR	UNPROVEN FEATURE
BW	END OF TRACE
FW	LATERAL CONNECTIONS
	EXTENT OF SURVEY BY SURVEY OPERATIONS LTD.
0.0d	EXTENT OF SURVEY BY SURVEY OPERATIONS LTD.(DEC 16) BURIED FEATURE FOUND USING RADAR
FW	CONNECTIVITY BETWEEN CHAMBERS FROM CCTV REPORT
BW	BURIED FEATURE FOUND USING RADAR

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B: Mala Geoscience Ground Probing Radar

NOTE 2

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Levels in parenthesis indicate top of walls

Revision - Date - Description
A - 22/12/16 - Additional topographical and GPR survey information added.

All drainage information must be verified with local authority records before use.

SURVEY STATIONS

Name	Easting	Northing	Height
CW1	383263.80	397956.37	31.61
CW2	383237.69	397869.12	33.07
CW3	383207.18	397771.97	32.95
CW4	383180.53	397684.51	28.03
CW5	383001.12	397843.51	26.03
CW6	382893.27	397877.75	26.22
CW7	382971.13	397971.46	26.25
CW8	383069.09	398069.93	26.21
CW9	383144.89	398181.36	27.75
CW10	383208.42	398075.02	27.95
SO12	383302.98	398053.10	28.97
SO13	383332.98	398053.10	28.97
CW11	383228.56	398079.33	28.32

STANDARD REFERENCE & ABBREVIATIONS

(AB).....Assumed Route
AB.....Air Brick
AV.....Air Valve
B/W.....Barbed Wire
BAR.....Barrier
BB.....Bellcote Beacon
BH.....Bermshole
BL.....Bed Level
BOL.....Bollard
BS.....Box Stop
BT Box.....British Telecom Box
BT.....British Telecom 22
BRTW.....Brick Retaining Wall
BW.....Brick Wall
C/B.....Close Boarded
C/I.....Corrugated Iron
C/P.....Chestnut Paling
CB.....Control Box
CBW.....Concrete Block Wall
CCTV.....Closed Circuit TV
CD.....Cable Duct
CEL.....Cellar Light
CHL.....Chain Link
CHY.....Chimney
CL.....Cover Level
CM.....Cable Marker
COL.....Column
CONC.....Concrete
CP.....Catch Pit
CRTW.....Concrete Retaining Wall
CTV.....Cable Television
CUL.....Culvert
CW.....Concrete Block Wall
DC.....Drainage Channel
DPC.....Damp Proof Course
DR.....Drain
DSW.....Dry Stone Wall
ECP.....Electricity Cable Pit
EIC.....Electricity Inspection Cover
EJ.....Expansion Joint
EJB.....Electricity Junction Box
EL SUB STN..Electricity Sub Station
EL.....Eaves Level
ELB.....Electricity Box
EP.....Electricity Pole
ER.....Earth Rod
ETL.....Electricity Transmission Line
FB.....Flower Bed
FH.....Fire Hydrant
FL.....Floor Level
FP.....Flagpole
G^.....Girth (of tree)
G.....Gully
GAB.....Gabion
GIP.....Gas Inlet Pipe
GMK.....Gas Marker
GOT.....Gas Stop Tap (Domestic)
GSV.....Gas Stop Valve (Mains)
HGE.....Hedge
HT.....Height
HV.....High Voltage
I/R.....Iron Railing
IC.....Inspection Cover
IL.....Invert Level
IP.....Iron Pipe
KO.....Kerb Outlet
LB.....Letter Box
LP.....Lamp Post
MBL.....Multi-Girth
MH.....Manhole
MKR.....Marker
MP.....Mooring Point
NP.....Street Name Plate
O/H.....Overhead
O/P.....Open Paving
OE.....Overhead Electric Wire
OF.....Outfall Pipe
OSBM.....Ordnance Survey Bench Mark
OT.....Overhead Telecom Wire
P/C.....Post & Chain
P/R.....Post & Rail
P/W.....Post & Wire
PAV.....Paving
PB.....Pillar Box
PC.....Pedestrian Crossing
PP.....Petrol Pump
PT.....Post or Pillar
RE.....Reading Eye
RS.....Road Sign
RTN.....Retaining Wall
RWP.....Rain Water Pipe
SAP.....Sapling
SL.....Sump Level
SOL.....Soffit Level
SP.....Sign Post
SPL.....Springing Level
STRTW.....Stone Retaining Wall
SV.....Stop Valve (unspecified)
SVP.....Soil Vent Pipe
SW.....Stone Wall
TAC.....Tactile Paving
TB.....Traffic Bollard
TBM.....Temporary Bench Mark
TCB.....Telephone Call Box
TFR.....Taken From Records
TIE.....Anchor Point (Masts/Poles)
TL.....Traffic Light
TLB.....Traffic Light Control Box
TM.....Ticket Machine
TMC.....Tarmac
TP.....Telecommunications Pole
TPIT.....Trial Pit
TS.....Trash Screen
U/C.....Under Construction
U/G.....Underground
UTL.....Unable to Lift (MH,IC etc)
UTS.....Unable to Survey
VDF.....Vehicle Detector Pad
VP.....Vent Pipe
W/M.....W/c Mesh
WL.....Water Level
WM.....Water Meter
WO.....Wash Out
WP.....Waste Pipe
WSC.....Water Stop Tap (domestic)
WSV.....Water Stop Valve (mains)

5	6
7	8

Sheet Layout

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Client
Crookes Walker Consulting

Drawing Title
Utility Survey at:
St Johns Scheme,
Manchester.

Scale(s)	1:200	Surveyor	TW
Date	Jan 17	Drawn	IT/MP/PM
Job Number	16E088	Checked	TP

Sheet Size & Drg Number & Revision
A0 16E088/005 A



- SW — STORM WATER SEWERS
- FW — FOUL WATER SEWERS
- WM — WATER MAIN
- GM — GAS MAIN
- EL — ELECTRIC CABLES
- DUCT — CABLE DUCTING
- BT — BT (UNDERGROUND)
- CCTV — CABLE TV
- CCTV — CLOSED CIRCUIT TV
- UI — UNIDENTIFIED FEATURE
- UP — UNIDENTIFIED PIPE
- UC — UNIDENTIFIED CABLE
- UNPR — UNPROVEN FEATURE
- SW — END OF TRACE
- FW / C — LATERAL CONNECTIONS
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Name	Easting	Northing	Height
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CW2	383237.69	397869.12	33.07
CW3	383207.18	397771.97	32.95
CW4	383102.86	397803.53	30.33
CW5	383001.12	397843.51	28.03
CW6	382893.27	397877.75	26.22
CW7	382971.13	397971.46	26.25
CW8	383069.09	398069.93	26.21
CW9	383144.89	398181.38	27.75
CW10	383208.42	398075.02	27.95
SO12	383288.98	398045.86	29.37
SO13	383302.96	398093.10	28.97
CW11	383228.56	398079.33	28.32

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
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CW..........Concrete Block Wall	SPL.........Springing Level
DC..........Drainage Channel	SRTW........Stone Retaining Wall
DPC.........Damp Proof Course	SV..........Stop Valve (unspecified)
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GST.........Gas Stop Tap (Domestic)	W/M.........Wire Mesh
GSV.........Gas Stop Valve (Mains)	WL..........Water Level
HSE.........Housing	WM..........Water Meter
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CW5	383031.23	397643.51	28.03
CW6	382893.27	397877.75	26.22
CW7	382971.13	397971.46	26.25
CW8	383069.09	398069.93	26.21
CW9	383144.89	398181.36	27.72
CW10	383208.42	398075.02	27.90
CW12	383303.62	398033.10	28.97
SS13	383342.96	398133.10	28.97
CW11	383228.56	398079.33	28.32

STANDARD REFERENCE & ABBREVIATIONS

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AV.....Air Valve
B/W.....Barbed Wire
BAR.....Barrier
BB.....Bellzhe Beacon
BH.....Borehole
BL.....Bed Level
BOL.....Bollard
BS.....Bus Stop
BT Box.....British Telecom Box
BT.....British Telecom It
BWTH.....Brick Retaining Wall
BW.....Brick Wall
C/B.....Close Boarded
C|.....Corrugated Iron
C/P.....Chestnut Paling
CB.....Control Box
CBW.....Concrete Block Wall
CCTV.....Closed Circuit TV
CD.....Cable Duct
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CHL.....Chain Link
CHY.....Chimney
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DPC.....Damp Proof Course
DR.....Drain
DRW.....Dry Stone Wall
ECP.....Electricity Cable Pit
EIC.....Electricity Inspection Cover
Ex.....Expansion Joint
EJB.....Electricity Junction Box
El Sub STN.Electricity Sub Station
EL.....Eaves Level
ELB.....Electricity Box
EP.....Electricity Pole
ER.....Earth Rod
ETL.....Electricity Transmission Line
FB.....Flower Bed
FH.....Fire Hydrant
FL.....Floor Level
FP.....Flagpole
G^.....Grate (of tree)
G.....Gulley
GAB.....Gabion
GIP.....Gas Inlet Pipe
GMKR.....Gas Marker
GST.....Gas Stop Tap (Domestic)
GSV.....Gas Stop Valve (Mains)
HSE.....Housing
HT.....Height
HV|.....High Voltage
I/R.....Iron Railing
IC.....Inspection Cover
IL.....Invert Level
IP.....Inlet Pipe
KO.....Kerb Outlet
LB.....Letter Box
LP.....Lamp Post
ML.....Multi-Girth
MH.....Manhole
MKR.....Marker
MP.....Mooring Point
NS.....Street Name Plate
O/H.....Overhead
O/P.....Open Paving
OE.....Overhead Electric Wire
OF.....Outfall Pipe
OSBM.....Ordnance Survey Bench Mark
OT.....Overhead Telecom Wire
P|E.....Post & Chain
P/R.....Post & Rail
P/W.....Post & Wire
PAV.....Paving
PB.....Pillar Box
PC.....Pedestrian Crossing
PF.....Petrol Pump
PT.....Post or Pillar
RE.....Reading Eye
RS.....Road Sign
RTW.....Retaining Wall
RWP.....Rain Water Pipe
SAP.....Sapling
SL.....Sump Level
SO.....Soffit Level
SP.....Sign Post
SPL.....Springing Level
SRTW.....Stone Retaining Wall
SV.....Stop Valve (unspecified)
SVP.....Soil Vent Pipe
SW.....Stone Wall
TAC.....Tactile Paving
TB.....Traffic Bollard
TBM.....Temporary Bench Mark
TCB.....Telephone Call Box
TFH.....Taken From Records
TIE.....Anchor Point (Masts/Poles)
TL.....Traffic Light
TLB.....Traffic Light Control Box
TR.....Ticket Machine
TRE.....Tree
TP.....Telecommunications Pole
TP|T.....Trial Pit
TS.....Trash Screen
U/C.....Under Construction
U/G.....Underground
UTL.....Unable to Lift (MH,IC etc)
UTS.....Unable to Survey
VDP.....Vehicle Detector Pad
VP.....Vent Pipe
W/B.....Bird Mesh
WL.....Water Level
WM.....Water Meter
WO.....Wash Out
WP.....Waste Pipe
WSP.....Water Stop Tap (Domestic)
WSV.....Water Stop Valve (Mains)

5	6
7	8

Sheet Layout

Survey Operations
Smith Street, Skelmersdale, Lancs. WN8 8LN
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Email: mail@survops.co.uk - www.survops.co.uk

Client
Crookes Walker Consulting

Drawing Title
Utility Survey at:
St Johns Scheme,
Manchester.

Scale(s)	1:200	Surveyor	TW
Date	Jan 17	Drawn	IT/MP/PM
Job Number	16E088	Checked	TP

Sheet Size & Drg Number & Revision
A0 16E088/007 A

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Note:
Orientation to Existing Site Grid.
All levels relate to Existing Site Datum.
Survey Control Markers established for Mapping purposes only and should not be used for Construction without the written approval of Survey Operations Ltd.
Levels in parenthesis indicate top of walls

Revision - Date - Description
A - 22/12/16 - Additional topographical and GPR survey information added.

All drainage information must be verified with local authority records before use.

SURVEY STATIONS

Name	Easting	Northing	Height
CW1	383263.80	397956.37	31.61
CW2	383237.69	397969.12	33.07
CW3	383207.18	397771.97	32.95
CW4	383201.12	397844.51	28.05
CW5	383001.12	397843.51	28.03
CW6	382893.27	397877.75	26.22
CW7	382971.13	397971.46	26.25
CW8	383069.09	398069.93	26.21
CW9	383144.89	398181.36	27.75
CW10	383208.42	398075.02	27.95
CW11	383328.56	398079.33	28.32
SG13	383302.66	398083.10	28.97
CW11	383228.56	398079.33	28.32

STANDARD REFERENCE & ABBREVIATIONS

AM(.....Assumed Mains
AB.....Air Brick
AV.....Air Valve
BW.....Barbed Wire
BAR.....Barrier
BB.....Bellshe Beacon
BH.....Borehole
BL.....Bed Level
BOL.....Bollard
BS.....Bus Stop
BT Box.....British Telecom Box
BT.....British Telecom It
BRTN.....Brick Retaining Wall
BW.....Brick Wall
C/B.....Close Boarded
C/I.....Corrugated Iron
C/P.....Chestnut Paling
CB.....Control Box
CBM.....Concrete Block Wall
CCTV.....Closed Circuit TV
CD.....Cable Duct
CEL.....Cellar Light
CH/L.....Chain Link
CHY.....Chimney
CL.....Cover Level
CM.....Cable Marker
COL.....Column
CONC.....Concrete
CR.....Concrete Retaining Wall
CTV.....Cable Television
CUL.....Culvert
CW.....Concrete Block Wall
DC.....Drainage Channel
DPC.....Damp Proof Course
DR.....Drain
DRW.....Dry Stone Wall
ESP.....Electricity Cable Pit
ESI.....Electricity Inspection Cover
EJ.....Expansion Joint
EJB.....Electricity Junction Box
EL Sub Sta.Electricity Sub Station
EL.....Eaves Level
ELB.....Electricity Box
EP.....Electricity Pole
ER.....Earth Rod
ETL.....Electricity Transmission Line
FB.....Flower Bed
FH.....Fire Hydrant
FL.....Floor Level
FP.....Flagpole
G^.....Girth (of tree)
G.....Gulley
GAB.....Gabion
GIP.....Gas Inlet Pipe
GMR.....Gas Marker
GOT.....Gas Stop Tap (Domestic)
GSV.....Gas Stop Valve (Mains)
HSE.....Housing
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IL.....Invert Level
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KO.....Kerb Outlet
LB.....Letter Box
LP.....Lamp Post
ML.....Multi-Girth
MH.....Manhole
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MP.....Mooring Point
NP.....Street Name Plate
O/H.....Overhead
O/P.....Open Paling
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P/E.....Post & Chain
P/W.....Post & Rail
P/W.....Post & Wire
PAV.....Paving
PB.....Pillar Box
PC.....Pedestrian Crossing
PP.....Petrol Pump
PT.....Post or Pillar
PW.....Peeling Eye
RB.....Road Sign
RTW.....Retaining Wall
RWP.....Rain Water Pipe
RWG.....Rain Water Gully
SAP.....Sapling
SL.....Sump Level
SP.....Springing Level
SRTW.....Stone Retaining Wall
SV.....Stop Valve (unspecified)
SVP.....Soil Vent Pipe
TBM.....Temporary Bench Mark
TCB.....Telephone Call Box
TPA.....Taken From Records
TSE.....Anchor Point (Gastc/Poles)
TL.....Traffic Light
TLB.....Traffic Light Control Box
TM.....Ticket Machine
TW.....Tarmac
TP.....Telecommunications Pole
TPIT.....Trial Pit
TS.....Trash Screen
U/C.....Under Construction
U/G.....Underground
UTL.....Unable to Lift (MH,SC etc)
UTS.....Unable to Survey
VDP.....Vehicle Detector Pad
VP.....Vent Pipe
W/V.....Wash Out
WBF.....Water Bib
WC.....Water Cock
WF.....Water Fountain
WM.....Water Meter
WP.....Water Pipe
WSV.....Water Stop Tap (domestic)
WSV.....Water Stop Valve (mains)

SW STORM WATER SEWERS
FW FOUL WATER SEWERS
WM WATER MAIN
GM GAS MAIN
EL ELECTRIC CABLES
DUCT CABLE DUCTING
BT (UNDERGROUND) CABLE TV
CCTV CLOSED CIRCUIT TV
UI UNIDENTIFIED FEATURE
UP UNIDENTIFIED PIPE
UC UNIDENTIFIED CABLE
UNPR UNPROVEN FEATURE
SW END OF TRACE
P/E LATERAL CONNECTIONS
EXTENT OF SURVEY BY SURVEY OPERATIONS LTD
EXTENT OF SURVEY BY SURVEY OPERATIONS LTD (DEC 16)
UNDERGROUND FEATURE FOUND USING RADAR
CONNECTIVITY BETWEEN CHAMBERS FROM CCTV REPORT
BURIED FEATURE FOUND USING RADAR

UNIDENTIFIED - A buried feature or utility that has been located, but we are unable to state what it is.
UNPROVEN - The assumed location of a reported feature or utility, usually taken from records, but not found during the utility trace due to various conditions.
CAUTION - Electric pot ended cables, even when they are live, are unable to be detected or traced.

UNDERGROUND UTILITIES SERVICES DISCLAIMER

We have endeavoured to locate existing services using records provided by Statutory Authorities as a guide. Some apparatus were untraceable and details have therefore been taken from Utility Record Drawings, which may be of poor quality. Consequently we cannot guarantee accuracy of information taken from such records.

Where indicated, no allowance has been made for sub-surface entry into manholes, other chambers or confined spaces below ground level. Therefore any details relating to depths, sizes etc, are taken from the surface and as such will be approximate.

We have endeavoured to supply you with the most accurate data possible by using methods and equipment that are at the forefront of our industry. We have taken great care in the detection of pipework and buried features, but as with all methods of detecting underground or buried utilities the information provided is based on results obtained from electromagnetic techniques, and as such may be liable to distortion or errors beyond the reasonable control of the operator or his instruments.

It is the responsibility of the user under Health & Safety (HSG47) Guidelines to satisfy himself of the suspected location of any services prior to excavation of the services shown.

NOTE 1

This utility survey has been undertaken using:
A: Radiodetection RD4000 + RD4000 TID
B: Tele Geoscience Ground Probing Radar

NOTE 2

Power carrying features shown on this drawing are shown as an individual service line. This does not necessarily represent the number of cables actually present and it is possible that there could be multi numbers of cables including HV, LV and communications transmission cables following the same trace line. These could be at different depths, the trace signal from the deeper cables being masked by signal emitted from the shallower service above. Cable runs could also be present running parallel to the single line shown.

5	6
7	8

Sheet Layout

Survey Operations
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Client
Crookes Walker Consulting

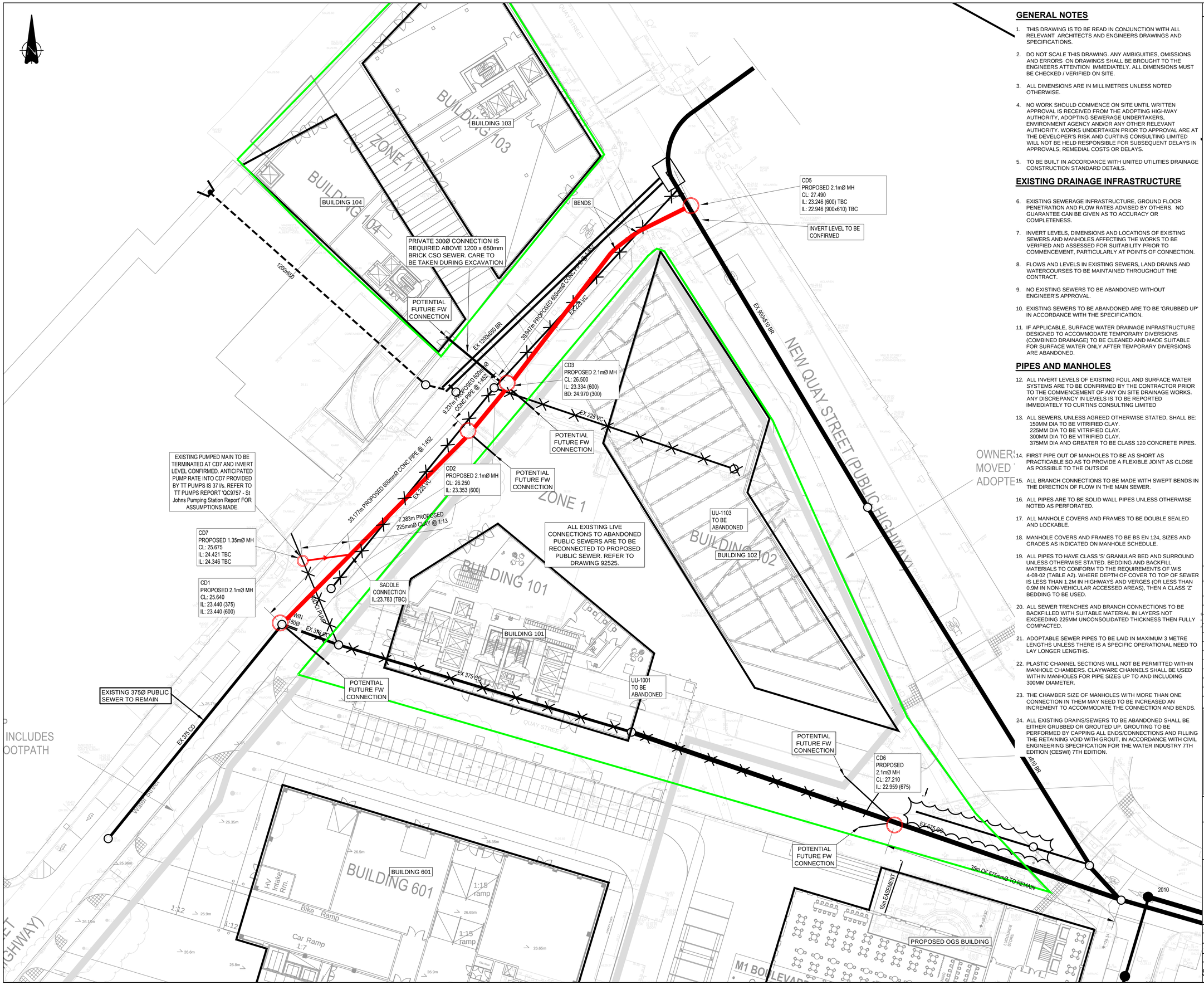
Drawing Title
Utility Survey at:
St Johns Scheme,
Manchester.

Scale(s)	1:200	Surveyor	TW
Date	Jan 17	Drawn	IT/MP/PM
Job Number	16E088	Checked	TP

Sheet Size & Drg Number & Revision
A0 16E088/008 A

Appendix D

Proposed Public Sewer Diversion Layout – Section 185 Agreement (Diversion 1)



GENERAL NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.
2. DO NOT SCALE THIS DRAWING. ANY AMBIGUITIES, OMISSIONS AND ERRORS ON DRAWINGS SHALL BE BROUGHT TO THE ENGINEERS ATTENTION IMMEDIATELY. ALL DIMENSIONS MUST BE CHECKED / VERIFIED ON SITE.
3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
4. NO WORK SHOULD COMMENCE ON SITE UNTIL WRITTEN APPROVAL IS RECEIVED FROM THE ADOPTING HIGHWAY AUTHORITY, ADOPTING SEWERAGE UNDERTAKERS, ENVIRONMENT AGENCY AND/OR ANY OTHER RELEVANT AUTHORITY. WORKS UNDERTAKEN PRIOR TO APPROVAL ARE AT THE DEVELOPER'S RISK AND CURTINS CONSULTING LIMITED WILL NOT BE HELD RESPONSIBLE FOR SUBSEQUENT DELAYS IN APPROVALS, REMEDIAL COSTS OR DELAYS.
5. TO BE BUILT IN ACCORDANCE WITH UNITED UTILITIES DRAINAGE CONSTRUCTION STANDARD DETAILS.

EXISTING DRAINAGE INFRASTRUCTURE

6. EXISTING SEWERAGE INFRASTRUCTURE, GROUND FLOOR PENETRATION AND FLOW RATES ADVISED BY OTHERS. NO GUARANTEE CAN BE GIVEN AS TO ACCURACY OR COMPLETENESS.
7. INVERT LEVELS, DIMENSIONS AND LOCATIONS OF EXISTING SEWERS AND MANHOLES AFFECTING THE WORKS TO BE VERIFIED AND ASSESSED FOR SUITABILITY PRIOR TO COMMENCEMENT, PARTICULARLY AT POINTS OF CONNECTION.
8. FLOWS AND LEVELS IN EXISTING SEWERS, LAND DRAINS AND WATERCOURSES TO BE MAINTAINED THROUGHOUT THE CONTRACT.
9. NO EXISTING SEWERS TO BE ABANDONED WITHOUT ENGINEER'S APPROVAL.
10. EXISTING SEWERS TO BE ABANDONED ARE TO BE 'GRUBBED UP' IN ACCORDANCE WITH THE SPECIFICATION.
11. IF APPLICABLE, SURFACE WATER DRAINAGE INFRASTRUCTURE DESIGNED TO ACCOMMODATE TEMPORARY DIVERSIONS (COMBINED DRAINAGE) TO BE CLEANED AND MADE SUITABLE FOR SURFACE WATER ONLY AFTER TEMPORARY DIVERSIONS ARE ABANDONED.

PIPES AND MANHOLES

12. ALL INVERT LEVELS OF EXISTING FOUL AND SURFACE WATER SYSTEMS ARE TO BE CONFIRMED BY THE CONTRACTOR PRIOR TO THE COMMENCEMENT OF ANY ON SITE DRAINAGE WORKS. ANY DISCREPANCY IN LEVELS IS TO BE REPORTED IMMEDIATELY TO CURTINS CONSULTING LIMITED
13. ALL SEWERS, UNLESS AGREED OTHERWISE STATED, SHALL BE:
    150MM DIA TO BE VITRIFIED CLAY.
    225MM DIA TO BE VITRIFIED CLAY.
    300MM DIA TO BE VITRIFIED CLAY.
    375MM DIA AND GREATER TO BE CLASS 120 CONCRETE PIPES.
14. FIRST PIPE OUT OF MANHOLES TO BE AS SHORT AS PRACTICABLE SO AS TO PROVIDE A FLEXIBLE JOINT AS CLOSE AS POSSIBLE TO THE OUTSIDE
15. ALL BRANCH CONNECTIONS TO BE MADE WITH SWEPT BENDS IN THE DIRECTION OF FLOW IN THE MAIN SEWER.
16. ALL PIPES ARE TO BE SOLID WALL PIPES UNLESS OTHERWISE NOTED AS PERFORATED.
17. ALL MANHOLE COVERS AND FRAMES TO BE DOUBLE SEALED AND LOCKABLE.
18. MANHOLE COVERS AND FRAMES TO BE BS EN 124, SIZES AND GRADES AS INDICATED ON MANHOLE SCHEDULE.
19. ALL PIPES TO HAVE CLASS 'S' GRANULAR BED AND SURROUND UNLESS OTHERWISE STATED. BEDDING AND BACKFILL MATERIALS TO CONFORM TO THE REQUIREMENTS OF WIS 4-08-02 (TABLE A2). WHERE DEPTH OF COVER TO TOP OF SEWER IS LESS THAN 1.2M IN HIGHWAYS AND VERGES (OR LESS THAN 0.9M IN NON-VEHICULAR ACCESSED AREAS), THEN A CLASS 'Z' BEDDING TO BE USED.
20. ALL SEWER TRENCHES AND BRANCH CONNECTIONS TO BE BACKFILLED WITH SUITABLE MATERIAL IN LAYERS NOT EXCEEDING 225MM UNCONSOLIDATED THICKNESS THEN FULLY COMPACTED.
21. ADOPTABLE SEWER PIPES TO BE LAID IN MAXIMUM 3 METRE LENGTHS UNLESS THERE IS A SPECIFIC OPERATIONAL NEED TO LAY LONGER LENGTHS.
22. PLASTIC CHANNEL SECTIONS WILL NOT BE PERMITTED WITHIN MANHOLE CHAMBERS. CLAYWARE CHANNELS SHALL BE USED WITHIN MANHOLES FOR PIPE SIZES UP TO AND INCLUDING 300MM DIAMETER.
23. THE CHAMBER SIZE OF MANHOLES WITH MORE THAN ONE CONNECTION IN THEM MAY NEED TO BE INCREASED AN INCREMENT TO ACCOMMODATE THE CONNECTION AND BENDS.
24. ALL EXISTING DRAINS/SEWERS TO BE ABANDONED SHALL BE EITHER GRUBBED OR GROUTED UP. GROUTING TO BE PERFORMED BY CAPPING ALL ENDS/CONNECTIONS AND FILLING THE RETAINING VOID WITH GROUT, IN ACCORDANCE WITH CIVIL ENGINEERING SPECIFICATION FOR THE WATER INDUSTRY 7TH EDITION (CESWI) 7TH EDITION.

KEY:

- SITE BOUNDARY
- PROPOSED 600mmØ DIVERTED COMBINED SEWER
- PROPOSED MANHOLE
- EXISTING PUBLIC COMBINED SEWER TO REMAIN
- EXISTING PUBLIC COMBINED SEWER TO BE ABANDONED
- EXISTING PUBLIC SURFACE WATER SEWER TO REMAIN
- PROPOSED CONTIG WALL

Rev:	Description:	Date:	By:	Chkd
C08	UPDATED TO INCLUDE UU COMMENTS	22.11.18	CD	CG
C07	PIPE DIAMETER OUT OF CD7 AMENDED AND BOUNDARY UPDATE	15.11.18	CD	CG
C06	BOUNDARY UPDATED	08.11.18	MJ	CD
C05	DIVERTED PUMP MAIN INCLUDED	22.10.18	CD	CG
C04	CD2 AND CD3 UPDATED	25.09.18	TG	CD
C03	UPDATED TO SUIT UU COMMENTS	03.09.18	ZG	CG
C02	SEWER DIVERSION AMENDED. CD4 OMITTED.	10.08.18	ZG	CD
C01	UPDATED TO CONSTRUCTION	27.06.18	TG	CD
P05	NOTE AMENDED	09.03.18	CD	CG
P04	FOR APPROVAL	09.03.18	ZG	CD
P03	FOR APPROVAL	21.02.18	CD	CG
P02	FOR APPROVAL	05.02.18	CD	CG
P01	FOR APPROVAL	21.12.17	TG	CG

curtins
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Civils & Structures • Transport Planning • Environmental • Infrastructure • Geotechnical • Conservation & Heritage • Principal Designer
Birmingham • Bristol • Cambridge • Cardiff • Douglas • Dublin • Edinburgh • Glasgow • Kendal • Leeds • Liverpool • London • Manchester • Nottingham

Status: CONSTRUCTION

Project: ST JOHNS, MANCHESTER.

Drg Title: WATER STREET PROPOSED SEWER DIVERSION LAYOUT

Size:	Date:	Drawn By:	Designed By:	Checked By:
A1	21.12.2017	TG	CD	CG
Scale: 1:250				

Project No:	Originator:	Zone:	Level:	Type:	Discipline:	Category / Number:	Rev:
SJQ-099-	CUR -	XX -	XX -	DR -	C -	92501	-C08

\\mafs02\Projects\067001 - 068000\067376 - St Johns Infrastructure\QMS 4 Production\4B Models & Drawings_Civils\CIVILD

Appendix E

United Utilities correspondence

Chloé Grimsley

From: O'Brien, Neil <Neil.O'Brien@uuplc.co.uk>
Sent: 19 April 2018 13:57
To: Chloé Grimsley; Wastewater Developer Services
Subject: RE: REPEAT21: PDE 4200020014 due 12.03.18 : St John's Masterplan, Manchester

Chloe,

The foul flows from the development will be allowed to drain to the public combined sewer network at an unrestricted rate, as it is UU's responsibility to ensure your development can drain foul flows freely. The replacement combined sewer will likely have the necessary capacity to accommodate the foul flows from your development.

Regards

Neil

From: Chloé Grimsley [mailto:Chloe.Grimsley@curtins.com]
Sent: 05 April 2018 09:19
To: O'Brien, Neil <Neil.O'Brien@uuplc.co.uk>; Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>
Subject: RE: REPEAT 1: PDE 4200020014 due 12.03.18 : St John's Masterplan, Manchester

Hi Neil,

Further to my email below, please could you advise whether the flows through the replacement sewer is acceptable based on the gradient confirmed by Buro Happold – 1 in 95.

Kind Regards,
Chloé

Chloé Grimsley Principal Engineer
Curtins
T. 0161 236 2394 | chloe.grimsley@curtins.com

From: Chloé Grimsley
Sent: 16 March 2018 10:58
To: 'O'Brien, Neil' ; Wastewater Developer Services
Subject: RE: REPEAT 1: PDE 4200020014 due 12.03.18 : St John's Masterplan, Manchester

Hi Neil,

In response to your email below, we will contact Waterplus and obtain the information required for the swimming pool trade effluent.

In relation to the public sewer relay, do your comments regarding suitable capacity still stand based on the gradients advised from Buro Happold?

*We have details of the upstream manhole (ex mh 0903) CL: 28.36**, IL: 24.37**. Downstream at manhole (ex mh 9903 Water St) CL: 26.35, **IL: 23.38.** The length of pipe, on the line of existing sewer is 95.0m thus meaning a gradient of 1/95.*
Taken from the HR Wallingford hydraulic flow tables the above gives us an approx. capacity of 100l/s. (Ks = 1.50 mm for foul flows).

Proposals for the basements are to drain foul gullies to private pumps up to the public network to ensure we do not increase flood risk to the basement.

All surface water from the development is proposed to discharge to a new private surface water network, which will outfall into the Irwell. The only exception to this will be the existing below slab drainage for Old Granada Studios (areas which are existing will retain as existing) and the Breeze Studios - which will need to be connected to the public sewer network due to the existing subterranean canal severing this plot from the rest of the masterplan.

If you require any further information, please let me know.

Kind Regards,
Chloé

Chloé Grimsley Principal Engineer
Curtins
T. 0161 236 2394 | chloe.grimsley@curtins.com

From: O'Brien, Neil [mailto:Neil.O'Brien@uuplc.co.uk]
Sent: 14 March 2018 15:23
To: Chloé Grimsley <Chloe.Grimsley@curtins.com>; Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>
Subject: REPEAT 1: PDE 4200020014 due 12.03.18 : St John's Masterplan, Manchester

Chloe,

If the hotel is going to generate non-domestic sewage (overflow/backwash from the swimming pools) they will need to apply for a Trade Effluent consent from one of the number of Trade Effluent providers on the market.

United Utilities believe that the existing combined sewer network has the necessary capacity to accommodate the foul flows from the development. Thus the foul flows will be allowed to drain to the public combined sewer network at an unrestricted rate. The connection(s) to the public sewer can be at a point(s) convenient to yourself. It may be wise to meeting the requirements of Part H1 Section 2.9 and 2.10 of the Building Regulation and not connect basements/low lying areas directly to the sewer network.

United Utilities would like to see all the surface water from the proposed development drain to the proposed private surface water network, United Utilities have no objection to you exercising your rights under the Water Industry Act (WIA) and draining your premises to the nearest public sewer.

Regards

Neil

From: Chloé Grimsley [mailto:Chloe.Grimsley@curtins.com]
Sent: 13 March 2018 12:47

To: O'Brien, Neil ; Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>
Subject: RE: PDE 4200020014 due 12.03.18 : St John's Masterplan, Manchester
Importance: High

Hi Neil,

Thanks you for your response.

Please see attached Application form and drainage layout in PDF.
I have also resent the link below, as this contains the foul calcs.
https://we.tl/Nbr3lfdooe

With regards to the pools within the Old Granada Studio's plot, they are within the hotel and bar areas therefore commercial use.

I will request that Buro Happold confirm regarding the gradient of the sewer to be relayed, we want to ensure that the sewer installed is sufficient to avoid reconstruction through the building plot down the line.

Kind Regards,
Chloé

Chloé Grimsley Principal Engineer
Curtins
T. 0161 236 2394 | chloe.grimsley@curtins.com

From: O'Brien, Neil [mailto:Neil.O'Brien@uuplc.co.uk]
Sent: 12 March 2018 14:56
To: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>; Chloé Grimsley <Chloe.Grimsley@curtins.com>
Subject: RE: PDE 4200020014 due 12.03.18 : St John's Masterplan, Manchester

Chloe,

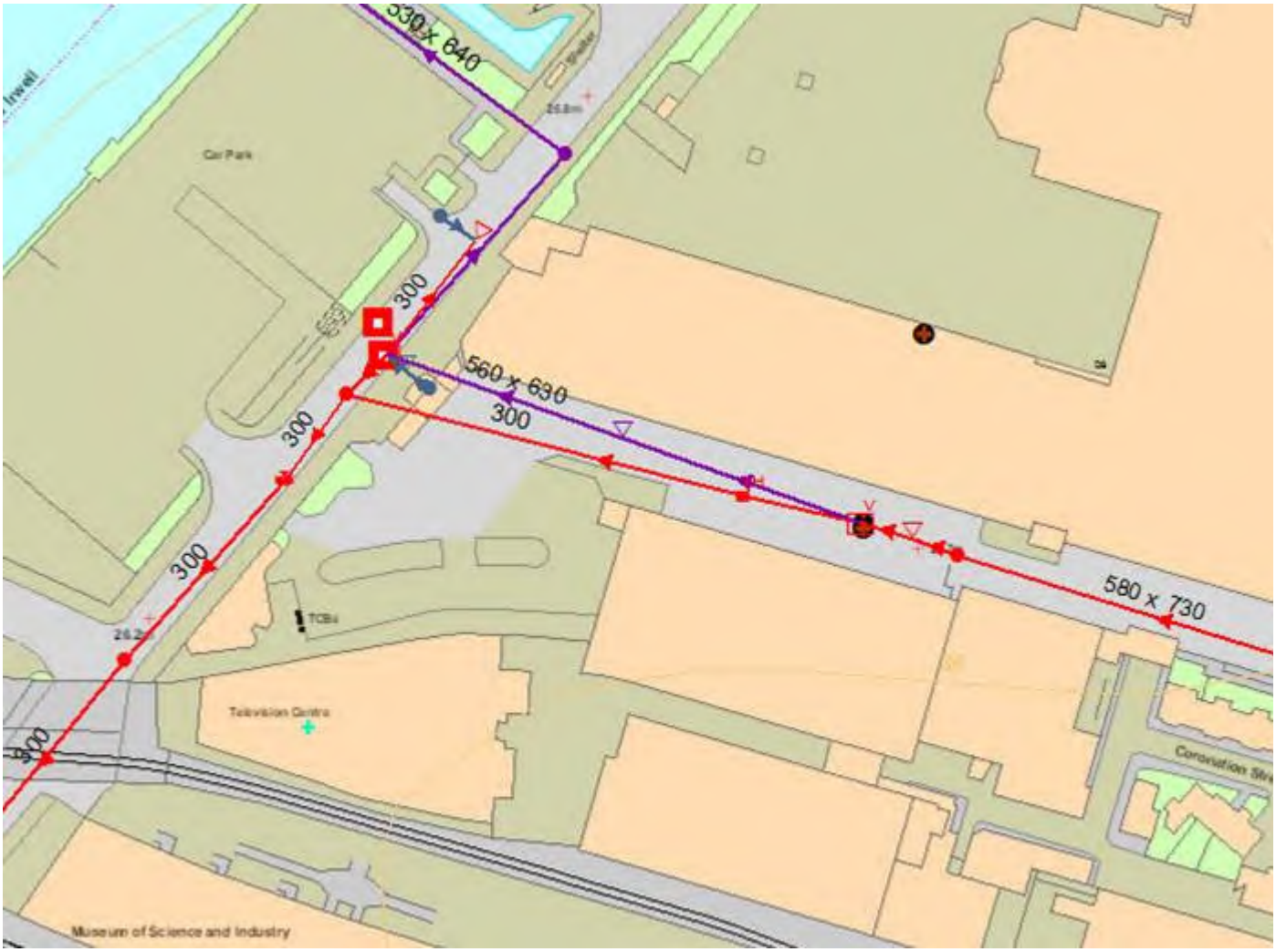
Unfortunately, the 'we transfer' link is 'no longer available'. Please could you send over a PDF.

I assume the 'sewer replacement section in Grape Street' referred to in your e-mail is the sewer shown below. Assuming the new 300mm sewer will have the same gradient as the old sewer then the new sewer will have a capacity of around 150l/s. Any capacity issues on the public sewer network would be a matter for UU to resolve.

Are the roof top swimming pools on the top of residential tower block for use by the residents only rather than for commercial use?

Regards

Neil



From: Wastewater Developer Services
Sent: 26 February 2018 15:39
To: O'Brien, Neil
Subject: PDE 4200020014 due 12.03.18 : St John's Masterplan, Manchester

From: Chloé Grimsley [mailto:Chloe.Grimsley@curtins.com]
Sent: 26 February 2018 11:21
To: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>
Cc: Carl Dawson <Carl.Dawson@curtins.com>; Paul Thomson <Paul.Thomson@BuroHappold.com>
Subject: RE: St John's Masterplan, Manchester

Good Morning Sir/Madam,

Please refer to the link below to the Pre-Development Enquiry for the proposed St John's development in Manchester City Centre.
https://we.tl/oRDpIubw86

We have previously discussed this at high-level with Neil O'Brien, however require formal review to assess the suitability of proposed connections.

We are preparing the masterplan infrastructure drainage which will service the 8 Zones across the masterplan.

Surface Water

The proposal is to remove surface water from the current sit and discharge into new private surface water sewers which will outfall into the Irwell. The exception to this is for Zones 2 and 3.
Refer to drawing SJQ-099-CUR-XX-XX-DR-C-95702-P01 for Zoning.

Zone 2- Old Granada Studio's
The existing building will be partially demolished (western elevation) with new structures proposed. The proposals are to utilise existing drainage outfalls within the existing footprint, meaning that existing flows will be maintained. Where new connections are formed, we will direct any new outfalls to the new surface water drainage system, where possible.

Zone 3 – Breeze Studio's
The proposals for this plot are currently unknow, however the existing site currently discharges to the combined sewers within Atherton Street. As the existing Canal Arm severs this plot from the new sewer system at Grape Street, it is proposed that this plot connects to the public sewer system at Atherton with a 50% reduction in surface water flows proposed. Details of this will be provided when plot details are known.

Foul Water
With regards to the foul drainage proposals, each plot will connect to the existing public sewer system at various locations. The Proposed Drainage Strategy is attached identifying where each plot is to connect to the wider network.

We have also received flow calculations from the plot designers based on the discharge unit method (with an allowance of 20% for contingencies for design changes). As flows generated from this method are very conservative, we have also approximated flows using the population method with assumptions from the accommodation schedule. A design note is included for this method.
We have summarised both DU and population method flows on the Foul Catchment drawing (attached).

Specifically please could you confirm the suitability to connect to the public sewers based on the flows provided and that capacity is available.

Please note, there are two roof top swimming pools proposed within the Zone 2 plot, we assume this will have a backwash flow restriction imposed from each- please advise requirements to agree this; will it be via UU or Waterplus?

We would also draw your attention to the sewer replacement section in Grape Street which proposes removal of the current brick sewer and replacement (assumed as 300mm replacement sewer at present- TBC). This falls within Zone 8 plot works and is being designed by the Civil Engineer for this plot (Buro Happold). Buro Happold have previously discussed this replacement works with Phil Harper, however this was prior to the knowledge of the masterplan flows passing through the replacement section. Please advise of the suitability of this replacement sewer as a 300mm sewer given the flows proposed to discharge via this section. I have attached a sketch mark-up showing the flows which potentially pass through the sewer relay sections- which are approximately 149 l/s based on the Discharge Unit Method and 13.34 l/s based on the Population method (plus 10 l/s backwash). Please advise whether this is sufficient as a 300mm psewer.

If you require any further information, please let me know.

Kind Regards,
Chloé

Chloé Grimsley
Principal Engineer
T. 0161 236 2394
chloe.grimsley@curtins.com

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17-19 Whitworth Street West
Manchester M1 5WG

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EMGateway3.uuplc.co.uk made the following annotations

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Appendix F

Lead Local Flood Authority correspondence

Chloé Grimsley

From: e.ainsworth@manchester.gov.uk on behalf of floodriskmanagement@manchester.gov.uk
Sent: 01 March 2019 14:10
To: Chloé Grimsley
Subject: RE: St Johns Masterplan, Manchester
Attachments: 04909 Rev E.pdf; RA15 - safe use of site tools.doc; RAMS 008-Outfall works.doc; St Johns Outfall connection.pptx; RA10a - Outfall Drainage works.doc; RA05 Concreting.doc; RA02 Use of mobile plant.doc; Linkflote - Technical Data - Load Capabilities.pdf; SJQ-099-CUR-XX-XX-DR-C-92550-P05_PROPOSED DRAINAGE LAYOUT - DRAFT.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

Hi Chloe,

Thanks for the information. We confirm that it is sufficient to be included as part of the land drainage consent documentation.

Kind regards

Flood Risk Management
Highways Service, Growth and Neighbourhoods Directorate
Manchester City Council
Tel: 0161 219 6295
Email: floodriskmanagement@manchester.gov.uk
Web: http://www.manchester.gov.uk/

POSTAL ADDRESS: Manchester City Council, Public Realm, The Neighbourhood Service, PO Box 532, Town Hall, Manchester M60 2LA

Chloé Grimsley <Chloe.Grimsley@curtins.com> 15/02/2019 12:37	To	"floodriskmanagement@manchester.gov.uk" <floodriskmanagement@manchester.gov.uk>,
	cc	
	Subject	RE: St Johns Masterplan, Manchester

Good Afternoon Zorica,

With regards to the above development, the design has been progressed for the surface water outfall into the Canal Basin. We are now proposing to discharge into the canal basin via the void below the existing bridge structure on Water Street. We are currently liaising with Victor Nwegbu regarding the licence required to cross the highway with the private pipe.

With regards to the Outfall detail, we have prepared the attached sketch, which we assume will require Land Drainage Consent for and I have provided the contractors current methodology for installation. Please could you advise whether this information is sufficient to be sent with the Land Drainage Consent application or whether we need to consider anything further.

If you require any further information, please let me know.

Kind Regards,
Chloé

Chloé Grimsley Principal Engineer
Curtins
T. 0161 236 2394 | chloe.grimsley@curtins.com

From: Chloé Grimsley
Sent: 20 June 2018 10:55
To: 'floodriskmanagement@manchester.gov.uk' <floodriskmanagement@manchester.gov.uk>
Subject: RE: St Johns Masterplan, Manchester

Good Morning Zorica,

Thank you for reviewing, we will retain the design as it stands (IL 22.114) and we will remove the flap valve.

We will issue the updated design as soon as it is available.

Kind Regards,
Chloé

Chloé Grimsley Principal Engineer
Curtins
T. 0161 236 2394 | chloe.grimsley@curtins.com

From: z.todorovic@manchester.gov.uk [mailto:z.todorovic@manchester.gov.uk] **On Behalf Of** floodriskmanagement@manchester.gov.uk
Sent: 20 June 2018 10:51
To: Chloé Grimsley <Chloe.Grimsley@curtins.com>
Cc: floodriskmanagement@manchester.gov.uk
Subject: RE: St Johns Masterplan, Manchester

Hi Chloe

Thanks for the email. Your responses seem to address the concerns that we are having with regards to the impact of the submerged outfall and siltation. Please proceed with development of the drainage scheme along the lines proposed below and send us the proposal once it is finalised.

If you want to discuss something meanwhile please let us know.

Regards

Zorica

Flood Risk Management
Highways Service, Growth and Neighbourhoods Directorate
Manchester City Council
Tel: 0161 219 6295
Email: floodriskmanagement@manchester.gov.uk
Web: http://www.manchester.gov.uk/

POSTAL ADDRESS: Manchester City Council, Public Realm, The Neighbourhood Service, PO Box 532, Town Hall, Manchester M60 2LA

Chloé Grimsley <Chloe.Grimsley@curtins.com> 14/06/2018 16:02	To "floodriskmanagement@manchester.gov.uk" <floodriskmanagement@manchester.gov.uk>, cc Subject RE: St Johns Masterplan, Manchester

Good Afternoon Zorica,

Thank you for your email below.

We have reviewed the proposed design and agree that the non-return/flap valve would have a negative impact on the system preventing flows into the basin for the majority of the time. We would therefore not propose to install a flap valve.

In response to your specific queries:

1) How would the proposed drainage network operate with constantly submerged outfall and what is the flood risk on site as a result of this?

The proposed invert level has been set based on the original ROC strategy (IL 22.114) and this was validated against the existing canal wall construction and confirmed to be the preferred level due to the step in the canal basin wall where the perimeter path runs **(see proposed outfall sketch and photograph attached).** At the time of the design, the information we held was the Canal Topographical survey which recorded the water level as 21.160m, therefore previous advice was to set the outfall a minimum of 300mm above the 'normal ' water level which 22.114m achieved.

Following receipt of the EA Model flood levels and the Waterco flood modelling report it was confirmed that the flood levels within the Irwell are at approximately 23.28m upstream and 23.17m downstream during a 1 in 2 year event, therefore we would assume that the flood level at the canal basin would be at approximately 23.22m. (**I have attached the EA Flood Levels for information).** This would result in the proposed surface water system being surcharged during the 1 in 2 year event for the extents shown in pink on the attached plan. All incoming connections from the masterplan plots into the surcharged sewer line are via backdrops or steep connections and therefore would be un-surcharged.

Please could you review if this would be acceptable?

We could look at raising the outfall invert level to somewhere between 23m-23.4m, although this would require:

- reconfiguration at the canal basin for the outfall pipe to remove the existing perimeter path (locally to the outfall)
- protection to the footpath opposite the outfall with a new wall to prevent spills onto the footpath from the outfall.
- full re co-ordination on site with other services, the water street bridge construction etc; and
- a recheck of the system capacities/design.

I have attached a sketch to show this potential option.

2) What is the risk of this outfall being permanently blocked with silt having in mind its low elevation with the basin?

The canal bed in 1-2 metres lower than the outfall invert level of 22.114m and therefore unlikely to accumulate form the canal bed. From the proposed surface water system, we have proposed a series of filter chambers for all external access routes, which require passage through catchpit manholes with sumps and will collect the majority of silt. We can propose additional catchpit chambers where necessary.

Please could you advise if you are satisfied with the current proposals of if you require any additional information.

Kind Regards,
Chloé

Chloé Grimsley Principal Engineer
Curtins
T. 0161 236 2394 | chloe.grimsley@curtins.com

From: z.todorovic@manchester.gov.uk [mailto:z.todorovic@manchester.gov.uk] **On Behalf Of** floodriskmanagement@manchester.gov.uk
Sent: 13 June 2018 12:05
To: Chloé Grimsley <Chloe.Grimsley@curtins.com>

Cc: floodriskmanagement@manchester.gov.uk
Subject: RE: St Johns Masterplan, Manchester

Hi Chloe

As discussed over the phone this morning, the modelled impact of the drainage system discharge on the water levels in the basin and the canal is acceptable.

However, our main concern is related to the drainage system itself. Looking at the levels in the canal, it appears that the proposed drainage outfall is constantly submerged so preventing free outfall into the canal as planned. High water levels in the basin and the canal would prevent the proposed flap valve operating.

It is necessary to understand:

1) How would the proposed drainage network operate with constantly submerged outfall and what is the flood risk on site as a result of this?
2) What is the risk of this outfall being permanently blocked with silt having in mind its low elevation with the basin?

Thanks

Zorica

Flood Risk Management
Highways Service, Growth and Neighbourhoods Directorate
Manchester City Council
Tel: 0161 219 6295
Email: floodriskmanagement@manchester.gov.uk
Web: http://www.manchester.gov.uk/

POSTAL ADDRESS: Manchester City Council, Public Realm, The Neighbourhood Service, PO Box 532, Town Hall, Manchester M60 2LA

Chloé Grimsley <Chloe.Grimsley@curtins.com>

25/05/2018 10:10

To "floodriskmanagement@manchester.gov.uk" <floodriskmanagement@manchester.gov.uk>, "z.todorovic@manchester.gov.uk" <z.todorovic@manchester.gov.uk>,
cc
Subject RE: St Johns Masterplan, Manchester

Good Morning Zorica,

Thank you for your response.

With regards to the floor levels, I believe 300mm freeboard was the ideal floor level (26.900), with pre-planning agreement (as part of the FRA) to achieve as high a floor level as possible but acknowledged that there may be constraints where tying into

existing highway levels.

With regards to the pollution measures, we have currently identified filter chambers for all vehicle access routes and therefore we will look to rationalise this if possible.

Please could you confirm if you have reviewed the canal basin study incorporating the proposed surface water into the canal basin? I have reattached a link with the information, for your review.
https://we.tl/bmTeGgMBES

Kind Regards,
Chloé

Chloé Grimsley Principal Engineer
Curtins
T. 0161 236 2394 | chloe.grimsley@curtins.com

From: z.todorovic@manchester.gov.uk [mailto:z.todorovic@manchester.gov.uk] **On Behalf Of** floodriskmanagement@manchester.gov.uk
Sent: 23 May 2018 14:28
To: Chloé Grimsley <Chloe.Grimsley@curtins.com>
Cc: floodriskmanagement@manchester.gov.uk
Subject: Re: St Johns Masterplan, Manchester

Chloe

Thanks for the email.

With regards to the floor revels, they would need to be set 300mm above the predicted water levels.

With regards to pollution mitigation measures, we do not request them for access roads, but for carparks that have more than 50 parking bays and for all service yards. In our discussion for this location we were referring to pollution mitigation for the service yard only. We can't recall that you have proposed a car park with more than 50 spaces.

Kind regards

Zorica

Flood Risk Management
Highways Service, Growth and Neighbourhoods Directorate
Manchester City Council
Tel: 0161 219 6295
Email: floodriskmanagement@manchester.gov.uk
Web: http://www.manchester.gov.uk/

POSTAL ADDRESS: Manchester City Council, Public Realm, The Neighbourhood Service, PO Box 532, Town Hall, Manchester M60 2LA

Chloé Grimsley <Chloe.Grimsley@curtins.com> 10/05/2018 08:51	
To	"e.ainsworth@manchester.gov.uk" <e.ainsworth@manchester.gov.uk>, "z.todorovic@manchester.gov.uk" <z.todorovic@manchester.gov.uk>,
cc	"floodriskmanagement@manchester.gov.uk" <floodriskmanagement@manchester.gov.uk>
Subject	St Johns Masterplan, Manchester

Good Morning Esther/Zorica,

Further to our meeting back in February regarding the St Johns Development, work has progressed with regards to the drainage design and we have now have a copy of the canal basin study incorporating the proposed surface water into the canal basin.

Waterco have completed the simulations on our behalf and inflows from the development have been based on Curtins latest surface water designed model.
I have attached a copy of the Curtins latest Drainage Strategy Layout for information.

To summarise the Waterco report, the inflows from the surface water drainage network have been modelled for 100 year with 30%cc and a check on 100 year +40%cc and there is an increase in flood levels (up to 1-3mm) within the surrounding areas, however this is considered negligible and would have minor impact.

The existing water levels adjacent to the are canal are:
26.070 - 100 year +30%cc
26.335 - 100 year +40%cc

With the development outfall flows, the water levels at the same location are:
26.071 - 100 year +30%cc
26.338 - 100 year +40%cc

Please refer to page 30 of the Waterco report from the below link:
https://we.tl/o6uCvDLuvX

Please could you review and confirm if this is acceptable for the proposed discharge location.

In addition to this, we note that the Curtins proposal is designed up to the 100 year +30%cc event with an allowance of a surcharged outfall of 26.600m, although levels in the Irwell appear to be lower (as noted above). However our design will continue to base the surcharged outfall assumption on worst case scenario of 26.600- as previously agreed. We have also completed a check on flood risk for up to the 100 year +40%cc within the drainage system.

As part of the strategy we have developed so far, we discussed during our meeting that surface water treatment would be required for main vehicle routes. I noted from our discussion that SuDs features were not desirable due to the acceptability of flows into the watercourse therefore, we have currently proposed intermediate filter chambers; such as the Naylor chambers (as specified on the BBC project). However the client has queried the requirement as this was not required for the Spinningfields development.

I understand that current guidance to comply with the WFD and CIRIA is to treat the potentially polluted water, however if you could look into this for me it would be appreciated.

If you require any further information, please let me know.
Kind Regards,
Chloé

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chloe.grimsley@curtins.com

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Minutes

Present: **CG** Chloé Grimsley (Curtins)
EA Esther Ainsworth (MCC LLFA)
ZT Zorica Todorovic (MCC LLFA)

Apologies: N/A

Project: St John's Masterplan, Manchester

Job No: 067376

Date: 9th February 2018

ITEM		ACTION
1.0	**CG** provided an overview of the masterplan scheme, with reference to previous planning approvals. Discussion to relate to requirements to discharge planning conditions. **ZT** confirmed that it would be difficult to assess drainage on a plot by plot basis for each planning application. CG agreed to submit masterplan Drainage Layout with plot drainage submissions.	**CG**
2.0	**CG** confirmed that there are three proposed surface water outfalls; two of which are direct to the Irwell and one of which is direct to the Canal basin. The client is liaising with Peel(MSCC) with regards to licence to discharge SW to the Irwell. **EA** confirmed that Land Drainage Consent may also be required from MCC for the SW outfalls. **EA** confirmed that it may not be necessary for LDC for the two outfalls direct to the Irwell but LDC will be required for the Canal Basin Outfall. All outfall proposals can be reviewed at the time and **EA** will confirm if required as it relates to in-channel works.	**CG**
3.0	**CG** confirmed that flood levels provided by the Environment Agency of 26.600 were being used to set development plot levels. Floor Levels generally 26.900 for FFL's with access to the car park to be reviewed. Any deviation of levels to be agreed but main concern was Car Park Access along Water Street. Flow routing would be required to confirm if lowering of levels would increase the frequency of flooding. **CG** confirmed that protection of 26.600 was targeted at the access.	**N/A**
4.0	**CG** confirmed that the majority of surface water was to be discharged into the Irwell via a new SW system. **ZT** confirmed that they were happy with this and would not expect to see SuDS retention features due to the allowance of discharging into the watercourse and that they understand MSCC require the water.	**N/A**
5.0	**CG** requested confirmation of requirements to treat on site surface water prior to discharge to the Irwell. **ZT** confirmed that all vehicular routes and	**N/A**

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	service areas (which are private) will need to be passed through a treatment system. General external areas for pedestrians do not require surface water treatment. **CG** confirmed that treatment was likely to be proprietary systems such as filter chambers or interceptors and this was accepted. ZT also referenced point 4 and advised that introducing retention features for treatment would limit flows and not concur with the pre- planning strategy of allowing water to enter the Irwell at MSCC agreement.	

Chloé Grimsley

From: e.ainsworth@manchester.gov.uk on behalf of floodriskmanagement@manchester.gov.uk
Sent: 02 February 2018 08:10
To: Chloé Grimsley
Subject: RE: St John's, Manchester

Hi Chloe,

We have availability next Friday 9th February am for a meeting if this is suitable?

Kind regards
Esther

Flood Risk Management
Highways Service, Corporate Core
Manchester City Council
Tel: 0161 219 6295
Email: floodriskmanagement@manchester.gov.uk
Web: http://www.manchester.gov.uk/

POSTAL ADDRESS: Manchester City Council, Public Realm, The Neighbourhood Service, PO Box 532, Town Hall, Manchester M60 2LA

Chloé Grimsley <Chloe.Grimsley@curtins.com> 31/01/2018 08:49	To "'e.ainsworth@manchester.gov.uk'" <e.ainsworth@manchester.gov.uk>, cc "floodriskmanagement@manchester.gov.uk" <floodriskmanagement@manchester.gov.uk> Subject RE: St John's, Manchester

Good Morning Esther,

Further to my email below, I have a few other queries regarding flood level information and level of protection required to properties. I wondered to avoid issuing numerous emails (as I know you are all very busy)whether you would be available for a meeting maybe an hour at some point within the next few days to run through how the development design is progressing and how we can cover drainage and flood risk elements.

I have attached some recent correspondence with the EA, for information. This will form some of the discussion in addition to the below information request.

Kind Regards,
Chloé

Chloé Grimsley Principal Engineer
Curtins
T. 0161 236 2394 | chloe.grimsley@curtins.com

From: Chloé Grimsley
Sent: 25 January 2018 10:08
To: e.ainsworth@manchester.gov.uk
Cc: 'floodriskmanagement@manchester.gov.uk' <floodriskmanagement@manchester.gov.uk>
Subject: FW: St John's, Manchester

Good Morning Esther,

Thank you for your comments below, we have completed a masterplan surface water model including a surcharge level of 26.6m at the outfall to check for surface water drainage flood risk. We are also commissioning flood modelling to be completed within the canal basin to assess the new surface water outfall impact.

In addition to the below comments, I have a few more queries in respect of requirements to be included within the design of the above masterplan drainage infrastructure.

- The client is liaising with Peel(MSCC) with regards to licence to discharge- which I believe are in final stages of agreement. Please can you confirm if we also need to apply for Land Drainage Consent from MCC? There are three proposed surface water outfalls; two of which are direct to the Irwell and one of which is direct to the Canal basin.
- Surface Water Treatment- All existing highways will drain as per the current method. All new highway and service areas for vehicles (which are private) will be passed through a treatment system. At this stage, it is likely to be proprietary systems such as filter chambers or interceptors. Where possible, plots will treat surface water prior to connection to the masterplan drainage (where there is opportunity to, if there are spaces between building and plot boundaries). SuDS retention options will be limited due to basement extents and vehicle routing but where there is opportunity to within plots we will advise to use. Please confirm the above is acceptable.

If you require any further information, please let me know.
Kind Regards,
Chloé

Chloé Grimsley Principal Engineer
Curtins
T. 0161 236 2394 | chloe.grimsley@curtins.com

From: e.ainsworth@manchester.gov.uk [mailto:e.ainsworth@manchester.gov.uk] **On Behalf Of** floodriskmanagement@manchester.gov.uk
Sent: 03 January 2018 12:42
To: Chloé Grimsley <Chloe.Grimsley@curtins.com>
Subject: Re: St John's, Manchester

Hi Chloe,

Use of the 26.6 mAOD level is fine to use as the basis of your assessment but can you also do a sensitivity test on this level to understand the impact on the drainage system.

Kind regards

Flood Risk Management
Highways Service, Corporate Core
Manchester City Council
Tel: 0161 219 6295
Email: floodriskmanagement@manchester.gov.uk
Web: http://www.manchester.gov.uk/

POSTAL ADDRESS: Manchester City Council, Public Realm, The Neighbourhood Service, PO Box 532, Town Hall, Manchester M60 2LA

Chloé Grimsley <Chloe.Grimsley@curtins.com> 18/12/2017 15:43	To "e.ainsworth@manchester.gov.uk" <e.ainsworth@manchester.gov.uk>, cc "floodriskmanagement@manchester.gov.uk" <floodriskmanagement@manchester.gov.uk> Subject St John's, Manchester

Good Afternoon Esther,

We have recently been commissioned to design the proposed Infrastructure (surface water drainage) for the proposed St Johns Masterplan development, in Manchester City Centre.
I have attached a site location plan for information and I believe you previously liaised with ROC Consulting regarding this project pre-planning who completed the FRA and Drainage Strategy for the planning application.

The surface water from the existing site is being taken out of the combined sewer system to be discharged into a new surface water network into the MSC via three new outfalls.
We are currently liaising with Peel with respects to restrictions and licences.

One of the outfalls discharges into an existing canal basin within the development ownership, and we are preparing for the diligence check to ensure that the additional surface water discharge does not flood the canal basin (central outfall).
We have been liaising with a consultant to complete the modelling of the canal basin on our behalf.

When the FRA and DS was produced, a 20% climate change figure was available from the EA flood model, which set the surcharged outfall at 26.6 in this event.
We are currently planning to model the drainage network assuming a maximum surcharged outfall of 26.600 to confirm the impact on the Canal Basin.

The EA have confirm that they are currently remodelling the MSC/Irwell model but is not due and that the LLFA should confirm the surcharged level we should apply at the outfall. Please see attached from John Ruckledge.

- Please could you confirm if it is acceptable to use the 26.6m level based on the 100 year+20% event to base the surcharged outfall level for the drainage system?

If you require any further information, please let me know.

Kind Regards,
Chloé

Chloé Grimsley
Principal Engineer
T. 0161 236 2394
chloe.grimsley@curtins.com

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----- Message from "Ruckledge, John" <john.ruckledge@environment-agency.gov.uk> on Mon, 18 Dec 2017 15:17:35 +0000 -----

To:	Chloé Grimsley <Chloe.Grimsley@curtins.com>
cc:	"Thomas, Sandrine" <sandrine.thomas@environment-agency.gov.uk>
Subject:	RE: St John's Masterplan, Manchester City Centre

Chloé

The river model for the Irwell at this reach is currently being updated to take account of recently completed flood alleviation measures upstream. The existing climate change results would be based on the old 20% allowance. The updated model will include results for 35% & 70% climate change allowances. This model update has been delayed although It should be available in the next few months.

Climate change allowance for surface water drainage design and what level of surcharge to consider at the outfalls is a matter for the LLFA or utilities company to advise on.

John Ruckledge
Flood Risk Officer
Greater Manchester, Merseyside & Cheshire Area
Environment Agency | Richard Fairclough House, Knutsford Road, Warrington, WA4 1HT

john.ruckledge@environment-agency.gov.uk
External: 020 302 50692

Changes to the way we charge our customers

The Environment Agency is proposing new charges for permits starting in April 2018. You can view and comment on the proposed changes via our e consultation tool here.
The consultation period ends on the 12th Jan 2018.

For further information on flood risk activity permits or activities affecting "main river" watercourses, please follow this link:-

https://www.gov.uk/guidance/flood-risk-activities-environmental-permits

From: Chloé Grimsley [mailto:Chloe.Grimsley@curtins.com]
Sent: 18 December 2017 08:47
To: Ruckledge, John <john.ruckledge@environment-agency.gov.uk>; Thomas, Sandrine <sandrine.thomas@environment-agency.gov.uk>
Subject: St John's Masterplan, Manchester City Centre
Importance: High

Hi John/Sandrine,

I hope you are both well.

I have a query on a development site in Manchester City Centre and I'm not sure which of you would cover this site.

The development has planning and we are developing the Surface Water Design based on another Consultants FRA and Drainage Strategy.
I have attached a site location plan and a site wide masterplan for information.

The surface water from the development is being taken out of the combined sewer system to be discharged into a new surface

water network into the MSC via three new outfalls
We are currently liaising with Peel with respects to restrictions and licences.

One of the outfalls discharges into an existing canal basin within the development ownership, and through liaising with MCC LLFA they have requested a diligence check to ensure that the additional surface water discharge does not flood the canal basin.

We have been liaising with a consultant to complete the modelling of the canal basin on our behalf, and we will provide them with details of the surface water outfall flow rate.

My query relates to the climate change allowance applicable to the modelling. The consultant will be requesting the latest model information from the EA, however from review of the FRA produced previously, a flood level of 26.6 has been provided and assume this was based on a flat 20% cc allowance.
Please could you advise:

- What the current model climate change allowance is; and
- Whether this allowance is sufficient to use and simulate for the model we are producing for the basin?

If you require any further information, please let me know.

Kind Regards,
Chloé

Chloé Grimsley
Principal Engineer
T. 0161 236 2394
chloe.grimsley@curtins.com

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----- Message from "Ruckledge, John" <john.ruckledge@environment-agency.gov.uk> on Mon, 29 Jan 2018 13:54:06 +0000 -----

To:	Chloé Grimsley <Chloe.Grimsley@curtins.com>
cc:	"Thomas, Sandrine" <sandrine.thomas@environment-agency.gov.uk>
Subject:	RE: St John's Masterplan, Manchester City Centre

Chloé

I'm not sure why the data request from 2014 was issued with the 2011 SFRA results. Around that time it was decided that the 2010 MSC results would be issued as I understand this model includes more detailed representation of the canal sluice gates. With regard to the 0.1% AEP results from the 2010 MSC model, we have low confidence in these. The model update should address this.

The update that is currently on-going will revise the flows based on the recent flood alleviation scheme completed in Salford. It will also include results for 35% & 70% climate change allowance. You'll need to make some assessment of this in your FRA.

John Ruckledge
Flood Risk Officer
Greater Manchester, Merseyside & Cheshire Area
Environment Agency | Richard Fairclough House, Knutsford Road, Warrington, WA4 1HT

john.ruckledge@environment-agency.gov.uk
External: 020 302 50692

Changes to the way we charge our customers

The Environment Agency is proposing new charges for permits starting in April 2018. You can view and comment on the proposed changes via our e consultation tool here.
The consultation period ends on the 26th Jan 2018.

For further information on flood risk activity permits or activities affecting "main river" watercourses, please follow this link:-

https://www.gov.uk/guidance/flood-risk-activities-environmental-permits

From: Chloé Grimsley [mailto:Chloe.Grimsley@curtins.com]
Sent: 26 January 2018 14:21
To: Ruckledge, John <john.ruckledge@environment-agency.gov.uk>
Cc: Thomas, Sandrine <sandrine.thomas@environment-agency.gov.uk>
Subject: RE: St John's Masterplan, Manchester City Centre

Hi John,

I have received the attached information regarding the latest model for the Irwell.
The information is noted as from the Manchester Ship Canal 2010 model, however the information used by the Engineer who wrote the FRA for the site, is the Grey Irwell 2011 Study.

The 2011 levels highlight a 1%+cc flood level of 26.600, which is the basis of the masterplan strategy for floor level protection, however the 2010 model (received today) indicates a 1%+cc flood level if 26.11-26.20 (nodes 3-4).
We are happy to continue on the basis that the flood protection should be 26.600+, however we are currently instructing modelling works to check the canal basin flood risk and want to make sure that the 2010 model is more accurate than the 2011 model.

I am aware that the model is being updated, however as development is progressing now, we need to ensure that we have the most accurate of the available data.
Please could you advise?

Kind Regards,
Chloé

Chloé Grimsley Principal Engineer
Curtins
T. 0161 236 2394 | chloe.grimsley@curtins.com

From: Ruckledge, John [mailto:john.ruckledge@environment-agency.gov.uk]
Sent: 18 December 2017 15:18
To: Chloé Grimsley <Chloe.Grimsley@curtins.com>
Cc: Thomas, Sandrine <sandrine.thomas@environment-agency.gov.uk>
Subject: RE: St John's Masterplan, Manchester City Centre

Chloé

The river model for the Irwell at this reach is currently being updated to take account of recently completed flood alleviation measures upstream. The existing climate change results would be based on the old 20% allowance. The updated model will include results for 35% & 70% climate change allowances. This model update has been delayed although It should be available in the next few months.

Climate change allowance for surface water drainage design and what level of surcharge to consider at the outfalls is a matter for the LLFA or utilities company to advise on.

John Ruckledge
Flood Risk Officer
Greater Manchester, Merseyside & Cheshire Area
Environment Agency | Richard Fairclough House, Knutsford Road, Warrington, WA4 1HT

john.ruckledge@environment-agency.gov.uk
External: 020 302 50692

Changes to the way we charge our customers

The Environment Agency is proposing new charges for permits starting in April 2018. You can view and comment on the proposed changes via our e consultation tool here.
The consultation period ends on the 12th Jan 2018.

For further information on flood risk activity permits or activities affecting "main river" watercourses, please follow this link:-

https://www.gov.uk/guidance/flood-risk-activities-environmental-permits

From: Chloé Grimsley [mailto:Chloe.Grimsley@curtins.com]
Sent: 18 December 2017 08:47
To: Ruckledge, John <john.ruckledge@environment-agency.gov.uk>; Thomas, Sandrine <sandrine.thomas@environment-agency.gov.uk>
Subject: St John's Masterplan, Manchester City Centre
Importance: High

Hi John/Sandrine,

I hope you are both well.

I have a query on a development site in Manchester City Centre and I'm not sure which of you would cover this site.

The development has planning and we are developing the Surface Water Design based on another Consultants FRA and Drainage Strategy.
I have attached a site location plan and a site wide masterplan for information.

The surface water from the development is being taken out of the combined sewer system to be discharged into a new surface water network into the MSC via three new outfalls
We are currently liaising with Peel with respects to restrictions and licences.

One of the outfalls discharges into an existing canal basin within the development ownership, and through liaising with MCC LLFA they have requested a diligence check to ensure that the additional surface water discharge does not flood the canal basin.

We have been liaising with a consultant to complete the modelling of the canal basin on our behalf, and we will provide them with details of the surface water outfall flow rate.

My query relates to the climate change allowance applicable to the modelling. The consultant will be requesting the latest model information from the EA, however from review of the FRA produced previously, a flood level of 26.6 has been provided and assume this was based on a flat 20% cc allowance.
Please could you advise:

- What the current model climate change allowance is; and
- Whether this allowance is sufficient to use and simulate for the model we are producing for the basin?

If you require any further information, please let me know.

Kind Regards,
Chloé

Chloé Grimsley **Principal Engineer** T. 0161 236 2394 **chloe.grimsley@curtins.com**	
Merchant Exchange 17-19 Whitworth Street West Manchester M1 5WG	

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Appendix G

Proposed Drainage Layout

Proposed Foul Water Catchments

Proposed Surface Water Catchments

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GENERAL NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.
2. DO NOT SCALE THIS DRAWING. ANY AMBIGUITIES, OMISSIONS AND ERRORS ON DRAWINGS SHALL BE BROUGHT TO THE ENGINEERS ATTENTION IMMEDIATELY. ALL DIMENSIONS MUST BE CHECKED / VERIFIED ON SITE.
3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.

DRAINAGE NOTES

PROPOSED COMBINED SEWER DIVERSION SUBJECT TO SECTION 185 AGREEMENT WITH UNITED UTILITIES. REFER TO DRAWING 067376-CUR-00-XX-DR-C-92501.

PROPOSED SURFACE WATER CATCHMENT DRAWING 067376-CUR-00-XX-DR-C-92555.

PROPOSED FOUL WATER CATCHMENT DRAWING 067376-CUR-00-XX-DR-C-92556.

PROPOSED FOUL CONNECTIONS TO COMBINED PUBLIC SEWER WILL BE SUBJECT TO A POTENTIAL SECTION 106 AGREEMENT.

PROPOSED SURFACE WATER OUTFALL SUBJECT TO AGREEMENTS WITH PEEL HOLDINGS. MAX VELOCITY 3m/s.

LAND DRAINAGE CONSENT REQUIRED FROM MANCHESTER CITY COUNCIL LLFA FOR WORKS TO EXISTING RIVER WALLS TO CONSTRUCT OUTFALLS.

PROPOSED SURFACE WATER SEWER WITHIN ADOPTED HIGHWAY SUBJECT TO LICENCE FROM MANCHESTER CITY COUNCIL.

SURFACE WATER OUTFALL SUBJECT TO COMPLETION OF FLOOD MODELING FOR OVERALL STRATEGY, SURCHARGE & FLOOD RISK CHECK.

SURFACE DRAINAGE, MANHOLE COVER AND INVERT LEVELS SHOWN ARE INDICATIVE ONLY AND ARE SUBJECT TO DETAILED DESIGN.

PUBLIC SEWER REQUIREMENTS WITHIN GRAPE STREET/ZONE 8 TO BE CONFIRMED BY ZONE 8 PLOT DESIGNERS.

PROPOSED DRAINAGE SUBJECT TO CHANGE FOLLOWING CO-ORDINATION WITH EXISTING AND PROPOSED SERVICE ROUTES.

ALL EXTERNAL TRAFFICKED AREAS AND TRAFFICKED AREAS BEING DRAINED VIA UNDERSLUNG DRAINAGE, NOT PASSING THROUGH SMART FILTER CHAMBER TO RECEIVE A LEVEL OF SURFACE WATER TREATMENT PRIOR TO DISCHARGE. PLOT DESIGNER TO CONFIRM TYPE.

PPICS TO BE SET TO APPROPRIATE LEVEL TO COLLECT PLOT DRAINAGE. LEVELS TBC.

DRAINAGE PROPOSALS WITHIN GRAPE STREET ARE SUBJECT TO PHASING OF WORKS. CO-ORDINATION REQUIRED WITH SOUTH VILLAGE.

DRAINAGE RUNS TO HAVE CLASS 'S' BEND AND SURROUND. DRAINAGE RUNS WILL REQUIRE CONCRETE PROTECTION WHERE COVER TO PIPE IS LESS THAN 1.2m. FINISHED LEVELS WILL IMPACT DEPENDING ON DEPTH.

WORKS TO PUBLIC SEWER IN GRAPE STREET BY OTHERS TO BE PROVIDED.

DRAINAGE ROUTING FOR T1 TO BE CONFIRMED. ANY DRAINAGE WORKS WITHIN WATER STREET WILL REQUIRE A HIGHWAY AGREEMENT.

Rev:	Description:	Date:	By:	Chkd:
P06	STAGE 4 UPDATE	04.04.19	CD	CG
P05	STAGE 4 UPDATE	19.02.19	CD	CG
P04	STAGE 4	21.08.18	CD	CG
P03	STAGE 3 - UPDATE	04.05.18	CD	CG
P02	STAGE 3	18.02.18	CD	CG
P01	FIRST ISSUE	22.12.17	CD	CG

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Status: STAGE 4

Project: ST JOHNS

Drg Title: PROPOSED DRAINAGE LAYOUT

Size:	Date:	Drawn By:	Designed By:	Checked By:
A1	22.12.17	CD	CD	CG
Scale: 1:500				

Project No:	Originator:	Zone:	Level:	Type:	Discipline:	Category / Number:	Rev:
SJQ-099-	CUR -	XX -	XX -	DR -	C -	92550	- P06

\\mafs02\Projects\067001 - 068000\067376 - St Johns Infrastructure\QMS 4 Production\4B Models & Drawings_Civil C\CAD\

KEY:

- PLOT BOUNDARIES
- EXISTING PUBLIC COMBINED SEWER
- EXISTING PUBLIC COMBINED SEWER TO BE ABANDONED
- EXISTING PUBLIC SURFACE SEWER
- PROPOSED SURFACE WATER DRAINAGE
- PROPOSED FOUL WATER DRAINAGE
- PROPOSED COMBINED PUBLIC SEWER

- GATIC SLOT DRAIN. SIZED AS SHOWN
- GATIC SLOT DRAIN ACCESS BOX
- GATIC SLOT DRAIN SILT BOX
- SMART FILTER CHAMBER
- UNDER SLUNG DRAINAGE TO BE DESIGNED AND CONFIRMED BY M&E ENGINEER
- BACKDROP REQUIRED TO MANHOLE
- EXISTING BRIDGE STRUCTURE. EXACT POSITION AND SETTING OUT TO BE CONFIRMED.

- SURFACE WATER PLOT CONNECTION
- FOUL WATER PLOT CONNECTION
- SURFACE WATER DRAINAGE (PROGRAMME OF WORKS TBC)
- SURFACE WATER PPIC
- FOUL WATER PPIC
- REFERENCE OF CONNECTION THROUGH CAPPING BEAM/WALL
- PROPOSED SEWER DIVERSION BY OTHERS

- FLAP VALVE TO BE INSTALLED TO INCOMING PIPE AS INDICATED. ALTHON FLAP VALVE OR SIMILAR APPROVED. TYPE TBC.

REFER TO DRAWINGS 92555 AND 92556 FOR SURFACE AND FOUL WATER CATCHMENT LAYOUTS. THESE SHOW THE DIRECTION IN WHICH FOUL FLOWS AND SURFACE WATER HARD STANDING/ROOF AREAS ARE TO BE DIRECTED TO. THE DESIGN WILL REQUIRE UPDATING SHOULD ANY OF THESE CATCHMENTS CHANGE.

REFER TO DRAWING 92563 FOR MANHOLE SCHEDULE AND DETAILS, PIPES PASSING THROUGH WALL SCHEDULE AND SMART FILTER CHAMBER DETAILS.

FOR A1 - Y1 REFERENCES REFER TO PIPES PASSING THROUGH WALL SCHEDULE.

FOR a, b AND c BACKDROP REFERENCES REFER TO MANHOLE SCHEDULE.

PROPOSED SURFACE WATER MANHOLE SCHEDULE - REFER TO SFA 7th EDITION											
MH REF	EASTING	NORTHING	CL (mAOD)	IL (mAOD)	DEPTH TO SOFFIT	DS PIPE DIA (mm)	MH DIA (mm)	MH TYPE	COVER SIZE (mm)	COVER CLASS	COMMENTS
S1	383153.540	398077.831	26.700	23.842	2.108	750	1800	TYPE 2	600 X 600	D400	
S2	383142.029	398041.311	26.700	23.792	2.158	750	1800	TYPE 2	600 X 600	D400	
S3	383132.811	398010.146	26.700	23.751	2.199	750	1800	TYPE 2	600 X 600	D400	
S4	383183.820	397936.896	30.850	27.076	3.024	750	1800	TYPE 1B	600 X 600	D400	BD: 29.150 (150 VERTICAL DROP)
S5	383117.970	397961.879	29.050	22.390	5.910	750	2100	TYPE 1B	600 X 600	D400	BDa: 26.986 (750 VERTICAL DROP), BDb: 27.524 (300 VERTICAL DROP). JL AMPS BENCHING SYSTEM REQUIRED.
S6	383124.579	397981.986	26.700	22.363	3.587	750	2100	TYPE 1B	600 X 600	D400	BD: 23.714 (450 VERTICAL DROP)
S7	383066.153	397999.592	26.900	22.285	3.865	750	1800	TYPE 1B	600 X 600	D400	BD: 24.550 (300 VERTICAL DROP)
S8	383053.558	397980.377	27.400	22.303	4.347	750	1800	TYPE 1B	600 X 600	D400	BD: 25.800 (225 VERTICAL DROP)
S9	383059.883	398001.488	26.900	22.274	3.876	750	1800	TYPE 1B	600 X 600	D400	
S10	383033.477	398016.231	26.800	22.201	3.849	750	1800	TYPE 1B	600 X 600	D400	
S11	383054.079	398045.762	26.800	23.500	2.850	450	1500	TYPE 2	600 X 600	D400	
S12	383048.127	398035.006	26.800	22.144	3.831	825	2400	TYPE 1B	600 X 600	D400	BD: 23.377 (375 VERTICAL DROP)
OUTFALL 1	383031.056	398048.641	23.616	22.114	0.677	825	N/A	N/A	N/A	N/A	
S13 - BY OTHERS TBC											
S14 - BY OTHERS TBC											
S15 - BY OTHERS TBC											
OUTFALL 2 - BY OTHERS TBC											
S16	383122.458	398211.086	26.900	24.019	2.506	375	1500	TYPE 2	600 X 600	D400	
OUTFALL 3	383121.089	398213.249	24.970	24.010	0.585	375	NA	NA	NA	NA	
S100	383158.363	398084.648	26.750	24.367	2.083	300	600	PPIC	600 X 600	D400	NON ENTRY. 350 DIA REDUCER CAP REQUIRED.
S101	383152.881	398080.398	26.750	24.700	1.825	225	600	PPIC	600 X 600	D400	NON ENTRY. 350 DIA REDUCER CAP REQUIRED.
S102	383144.635	398052.878	26.750	24.700	1.825	225	600	PPIC	600 X 600	D400	NON ENTRY. 350 DIA REDUCER CAP REQUIRED.
S103	383142.903	398047.097	26.750	24.700	1.825	225	600	PPIC	600 X 600	D400	NON ENTRY. 350 DIA REDUCER CAP REQUIRED.
S104	383146.201	398039.736	26.550	24.450	1.875	225	600	PPIC	600 X 600	D400	NON ENTRY. 350 DIA REDUCER CAP REQUIRED.
S105	383139.858	398036.935	26.750	24.700	1.825	225	600	PPIC	600 X 600	D400	NON ENTRY. 350 DIA REDUCER CAP REQUIRED.
S106	383137.113	398008.532	26.550	24.376	1.949	225	600	PPIC	600 X 600	D400	NON ENTRY. 350 DIA REDUCER CAP REQUIRED.
S107	383130.430	398004.945	26.750	24.700	1.825	225	600	PPIC	600 X 600	D400	NON ENTRY. 350 DIA REDUCER CAP REQUIRED.
S108	383130.779	397985.622	26.550	24.900	1.200	450	1500	TYPE 2	600 X 600	D400	
S109	383129.211	397980.327	26.550	24.800	1.300	450	1500	TYPE 2	600 X 600	D400	
S110	383184.792	397940.269	30.800	29.250	1.400	150	600	PPIC	600 X 600	D400	NON ENTRY. 350 DIA REDUCER CAP REQUIRED.
S111	383132.381	397957.941	29.400	27.645	1.455	300	1200	TYPE 2	600 X 600	D400	
S112	383127.880	397959.608	29.300	27.545	1.455	300	1200	TYPE 2	600 X 600	D400	
S113	383115.336	397953.625	29.200	27.610	1.290	300	1200	TYPE 2	600 X 600	D400	
S114	383070.986	398001.195	26.900	24.600	2.000	300	1200	TYPE 2	600 X 600	D400	
S115	383066.658	397994.098	26.900	24.000	2.675	225	600	PPIC	600 X 600	D400	NON ENTRY. 350 DIA REDUCER CAP REQUIRED.
S116	383060.535	397977.478	27.500	26.000	1.275	225	600	PPIC	600 X 600	D400	NON ENTRY. 350 DIA REDUCER CAP REQUIRED.
S117	383057.029	397978.997	27.500	25.900	1.375	225	600	PPIC	600 X 600	D400	NON ENTRY. 350 DIA REDUCER CAP REQUIRED.
S118	383039.829	398015.686	26.800	24.700	1.800	300	1200	TYPE 2	600 X 600	D400	
S119	383041.147	398020.302	26.800	24.600	1.900	300	1200	TYPE 2	600 X 600	D400	
S120	383048.699	398027.762	26.900	24.700	1.975	225	600	PPIC	600 X 600	D400	NON ENTRY. 350 DIA REDUCER CAP REQUIRED.
S121	383048.870	398028.351	26.900	24.700	1.975	225	600	PPIC	600 X 600	D400	NON ENTRY. 350 DIA REDUCER CAP REQUIRED.
S122	383055.818	398051.558	26.900	24.700	1.900	300	1500	TYPE 2	600 X 600	D400	

PROPOSED FOUL WATER MANHOLE SCHEDULE - REFER TO SFA 7th EDITION											
MH REF	EASTING	NORTHING	CL (mAOD)	IL (mAOD)	DEPTH TO SOFFIT	DS PIPE DIA (mm)	MH DIA (mm)	MH TYPE	COVER SIZE (mm)	COVER CLASS	COMMENTS
F1	383147.048	398050.964	26.600	25.100	1.200	300	1350	TYPE 2	1200 X 675	D400	
F2	383144.421	398041.278	26.600	25.041	1.259	300	1350	TYPE 2	1200 X 675	D400	
F3	383134.049	398006.543	26.600	24.828	1.472	300	1350	TYPE 2	1200 X 675	D400	
F4	383126.153	397979.966	26.600	24.665	1.635	300	1350	TYPE 2	600 X 600	D400	
F5	383058.003	398000.533	26.900	24.268	2.332	300	1350	TYPE 2	600 X 600	D400	
F6	383041.852	398009.883	26.800	24.138	2.362	300	1350	TYPE 2	600 X 600	D400	
F7	383013.302	398023.751	26.700	24.392	2.158	150	1200	TYPE 2	600 X 600	D400	
F8	383020.205	398016.845	26.420	23.564	2.556	300	1200	TYPE 2	600 X 600	D400	
F9	383075.338	398074.234	26.600	24.100	2.350	150	1200	TYPE 2	600 X 600	D400	
F100	383145.998	398056.857	26.750	26.100	0.500	150	450	PPIC	600 X 600	D400	NON ENTRY. 350 DIA REDUCER CAP REQUIRED.
F101	383143.845	398049.673	26.750	26.100	0.500	150	450	PPIC	600 X 600	D400	NON ENTRY. 350 DIA REDUCER CAP REQUIRED.
F102	383146.051	398040.793	26.550	25.322	1.078	150	450	PPIC	600 X 600	D400	NON ENTRY. 350 DIA REDUCER CAP REQUIRED.
F103	383137.315	398009.478	26.550	25.131	1.269	150	450	PPIC	600 X 600	D400	NON ENTRY. 350 DIA REDUCER CAP REQUIRED.
F104	383131.647	398008.961	26.750	26.100	0.500	150	450	PPIC	600 X 600	D400	NON ENTRY. 350 DIA REDUCER CAP REQUIRED.
F105	383129.494	398001.777	26.750	26.100	0.500	150	450	PPIC	600 X 600	D400	NON ENTRY. 350 DIA REDUCER CAP REQUIRED.
F106	383128.066	397979.600	26.550	24.900	1.500	150	450	PPIC	600 X 600	D400	NON ENTRY. 350 DIA REDUCER CAP REQUIRED.
F107	383078.025	398000.234	26.900	24.700	2.050	150	450	PPIC	600 X 600	D400	NON ENTRY. 350 DIA REDUCER CAP REQUIRED.
F108	383053.449	398010.572	26.900	24.700	2.050	150	600	PPIC	600 X 600	D400	NON ENTRY. 350 DIA REDUCER CAP REQUIRED.
F109	383058.683	397983.149	27.400	24.500	2.750	150	600	PPIC	600 X 600	D400	NON ENTRY. 350 DIA REDUCER CAP REQUIRED.
F110	383078.384	398057.080	26.900	24.700	2.050	150	450	PPIC	600 X 600	D400	NON ENTRY. 350 DIA REDUCER CAP REQUIRED.
F111	383070.859	398059.358	26.900	24.500	2.250	150	1200	TYPE 2	600 X 600	D400	
F112	383182.442	398091.007	26.900	TBC	TBC	150	450	PPIC	600 X 600	D400	NON ENTRY. 350 DIA REDUCER CAP REQUIRED.

PROPOSED INVERT LEVEL TO PASS THROUGH BASEMENT WALL.					
REF	IL (mAOD)	USE	U/S DIA (mm)	D/S DIA (mm)	D/S CHAMBER
A1	24.750	SURFACE	2 X 150	225	S101
B1	24.750	SURFACE	2 X 150	225	S102
C1	24.750	SURFACE	150	150	S103
D1	24.750	SURFACE	2 X 150	225	S105
E1	24.750	SURFACE	2 X 150	225	S107
F1	24.750	SURFACE	150	150	REF TO MGY PLOT DRAINAGE
G1	24.750	SURFACE	3 X 150	300	REF TO MGY PLOT DRAINAGE
H1	24.750	SURFACE	4 X 150	300	REF TO MGY PLOT DRAINAGE
J1	24.750	SURFACE	2 X 150	300	REF TO MGY PLOT DRAINAGE
K1	24.750	FOUL	150	150	F107
L1	24.750	SURFACE	2 X 150	300	S114
M1	24.750	FOUL	2 X 150	150	F109
N1	24.750	SURFACE	2 X 150	225	S120
O1	24.750	SURFACE	2 X 150	225	S121
P1	23.525	SURFACE	450	450	S11
Q1	24.750	SURFACE	4 X 150	450	S122
R1	24.750	SURFACE	150	450	INTERNAL 450 DIA PIPE
S1	24.750	FOUL	2 X 150	150	F111
T1	24.750	FOUL	150	150	F110
U1	TBC	FOUL	150	225	CD1 (S185)
V1	TBC	FOUL	150	225	CD2 (S185)
W1	TBC	FOUL	150	225	CD3 (S185)
X1	TBC	SW	225	450	INTERNAL 450 DIA PIPE
Y1	TBC	FOUL	150	150	F112

THE ABOVE INVERT LEVELS AND PIPE SIZES ARE TO BE CHECKED BY ARCHITECT AND M&E ENGINEER TO CONFIRM IF SUITABLE FALLS CAN BE ACHIEVED UNDER THE BUILDINGS TO THE OUTFALL LOCATIONS.

NAYLOR - SMART FILTER CHAMBERS		
REF	PRODUCT NUMBER	DIMENSIONS WxLxH
SFA-1	SF03.2A	1.2 x 1.8 x 2.0
SFA-2	SF03.1B	0.8 x 1.2 x 1.2
SFA-3	SF03.2A	1.2 x 1.8 x 2.0
SFA-4	SF03.2B	1.2 x 1.8 x 2.0

GENERAL NOTES:

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3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.

Rev:	Description:	Date:	By:	Chkd:
P05	STAGE 4 UPDATE	04.04.19	CD	CG
P04	SEE REVISION CLOUDS	06.03.19	CD	CG
P03	STAGE 4 UPDATE	19.02.19	CD	CG
P02	STAGE 4	21.08.18	CD	CG
P01	STAGE 3	19.02.18	TG	CG

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Status: STAGE 4 UPDATE

Project: ST JOHNS

Drg Title: MANHOLE SCHEDULE

Size:	Date:	Drawn By:	Designed By:	Checked By:
A1	19.02.18	TG	CD	CG
Scale: NTS				

Project No:	Originator:	Zone:	Level:	Type:	Discipline:	Category / Number:	Rev:
SJQ-099	- CUR -	XX -	XX -	DR -	C -	92563	-P05

\\mafs02\Projects\067101 - 068000\067376 - St Johns Infrastructure\2MS 4 Production\4B Models & Drawings_Civil-CI\CAD\

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3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.

NOTES:

1) OUTFALL DISCHARGE RATES UNRESTRICTED AS AGREED.
2) MAXIMUM VELOCITY OF 3 m/s FOR ALL STORM EVENTS UP TO 1 IN 100 YEAR PLUS CLIMATE CHANGE.

ST JOHNS - PROPOSED SURFACE WATER CATCHMENTS

NETWORK 1

PIPE NUMBER	AREA (m2)	AREA (ha)
1.000	888	0.09
1.001	0	0.00
1.002	3566	0.36
1.003	2898	0.29
1.004	3706	0.37
2.000	9478	0.95
1.005	168	0.02
1.006	915	0.09
1.007	12147	1.21
1.008	587	0.06
1.009	1383	0.14
1.010	802	0.08
3.000	7476	0.75
3.001	0	0.00
3.002	0	0.00
3.003	383	0.04
1.011	383	0.04
TOTAL AREA	44780	4.48

NETWORK 2

PIPE NUMBER	AREA (m2)	AREA (ha)
10.000	2048	0.20
10.001	0	0.00
11.000	5528	0.55
10.002	0	0.00
TOTAL AREA	7576	0.76

NETWORK 3

PIPE NUMBER	AREA (m2)	AREA (ha)
20.000	2268	0.23
TOTAL AREA	2268	0.23

Rev:	Description:	Date:	By:	Chkd:
P01	STAGE 3	18.02.18	CD	CG

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Status: STAGE 3

Project: ST JOHNS

Drg Title: PROPOSED SURFACE WATER CATCHMENT PLAN

Size:	Date:	Drawn By:	Designed By:	Checked By:
A1	18.02.18	CD	CD	CG

Scale: 1:500

Project No:	Originator:	Zone:	Level:	Type:	Discipline:	Category / Number:	Rev:
SJQ-099-	CUR -	XX -	XX -	DR -	C -	92555	- P01

\\mafs01\Projects\067001 - 068000\067376 - St Johns Infrastructure\OAS 4 Production\4B Models & Drawings_Civil CICAD\

BLOCK D
Du METHOD = 13.2l/s
Pp METHOD = 1.04l/s

BLOCK C
Du METHOD = 4.26l/s
Pp METHOD = 0.2l/s

Existing V&A - 37l/s (TBC)

BLOCK B
Du METHOD = 15l/s
Pp METHOD = 0.7l/s

BLOCK C
Du METHOD = 4.26l/s
Pp METHOD = 0.2l/s

BLOCK B
Du METHOD = 15l/s
Pp METHOD = 0.7l/s

S106 - 2
(UU REF:TBC)

NETWORK 2

BLOCK MGY
Du METHOD = 2.6l/s
Pp METHOD = 0.26l/s

BLOCK MGY
Du METHOD = 2.6l/s
Pp METHOD = 0.26l/s

TOWER 1
Du METHOD = 14.4l/s
Pp METHOD = 7.08l/s

BLOCK MGY
Du METHOD = 2.6l/s
Pp METHOD = 0.26l/s

OGS (ZONE 4)
Du METHOD = 7.04l/s
Pp METHOD = 0.34l/s

OGS (ZONE 5)
Du METHOD = 7.04l/s
Pp METHOD = 0.34l/s
BACKWASH = 16.8l/s

OGS (ZONE 2)
Du METHOD = 7.04l/s
Pp METHOD = 0.34l/s

TOWER 2
Du METHOD = 28.8l/s
Pp METHOD = 14.16l/s

NETWORK 3

S106 - 1
(UU REF:TBC)

TOWER 1
Du METHOD = 14.4l/s
Pp METHOD = 7.08l/s

NETWORK 1

TOWER 3
Du METHOD = 2.4l/s
Pp METHOD = 0.07l/s

MGY
Du METHOD = 2.6l/s
Pp METHOD = 0.26l/s

BLOCK MGY
Du METHOD = 2.6l/s
Pp METHOD = 0.26l/s

BLOCK MGY
Du METHOD = 2.6l/s
Pp METHOD = 0.26l/s

OGS (ZONE 1)
Du METHOD = 1.6l/s
Pp METHOD = 0.34l/s

OGS BUILDING (HOTEL, ZONE 5)
14l/s PLUS 20% ADDITIONAL FLOW
ASSUMED FOR POOL BACKWASH.
DISCHARGE RATE TO BE CONFIRMED
BY UNITED UTILITIES.

NO.1 GRAPE ST
Du METHOD = 8.52l/s
Pp METHOD = 0.26l/s

OGS (ZONE 1)
Du METHOD = 0.8l/s
Pp METHOD = 0.34l/s

OGS (ZONE 6)
Du METHOD = 14.6l/s
Pp METHOD = 0.34l/s

BREEZE
Du METHOD = 2.4l/s
Pp METHOD = 0.07l/s

FACTORY
BY OTHERS

BONDED
Du METHOD = 8.52l/s
Pp METHOD = 0.38l/s

STAGE 2
Du METHOD = 2.4l/s
Pp METHOD = 0.14l/s

SOUTH VILLAGE
Du METHOD = 6l/s
Pp METHOD = 1.07l/s

SOUTH VILLAGE
Du METHOD = 6l/s
Pp METHOD = 1.07l/s

SOUTH VILLAGE
Du METHOD = 6l/s
Pp METHOD = 1.07l/s

SOUTH VILLAGE
Du METHOD = 6l/s
Pp METHOD = 1.07l/s

SOUTH VILLAGE
BY OTHERS.

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3. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
4. ALL GREASE SEPARATION TREATMENT TO BE ABOVE GROUND UNLESS SPECIFIED OTHERWISE.
5. SPECIFIED FLOWS ARE BASED ON THE FOLLOWING:
   - DU VALUES BASED ON CWC BUILDING DRAINAGE FLOWS +20% (based on sketch with flows received 26.01.18) BURO HAPPOLD FLOWS FOR ZONE 8.
   - POP VALUES BASED ON REVIEW OF ACCOMMODATION SCHEDULE AND REVIEW WITH BRITISH WATER VALUES. (accommodation schedule dated 23.01.18)

KEY:

- EXISTING COMBINED PUBLIC SEWERS
- EXISTING COMBINED PUBLIC SEWERS TO BE ABANDONED
- EXISTING SURFACE WATER PUBLIC SEWERS
- PROPOSED FOUL WATER DRAINAGE
- PROPOSED COMBINED PUBLIC SEWER
- PROPOSED CONTIGUOUS WALL
- INFRASTRUCTURE WORKS ZONE
- EXISTING HIGHWAY BOUNDARY
- PLOT BOUNDARY / AREAS

SECTION AGREEMENT REFERENCES AND FLOW RATES

S106 - 1 (UU REF:TBC)
MAX DISCHARGE RATE DISCHARGE UNIT METHOD 76.02l/s
MAX DISCHARGE RATE POPULATION METHOD 23.89l/s

S106 - 2 (UU REF:TBC)
MAX DISCHARGE RATE DISCHARGE UNIT METHOD 17.00l/s
MAX DISCHARGE RATE POPULATION METHOD 7.34l/s

Rev:	Description:	Date:	By:	Chkd:
P02	UPDATED FOUL FLOWS	18.04.19	CD	CG
P01	FIRST ISSUE	21.02.18	CD	CG

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Status: PRELIMINARY

Project: ST JOHNS

Drg Title: PROPOSED FOUL WATER DRAINAGE STRATEGY AND CATCHMENTS

Size:	Date:	Drawn By:	Designed By:	Checked By:
A1	18.02.18	ZG	CD	CG
Scale: NTS				

Project No:	Originator:	Zone:	Level:	Type:	Discipline:	Category / Number:	Rev:
SJQ-099-	CUR -	XX -	XX -	DR -	C -	92556	- P02

\\mafs02\Projects\067001 - 068000\067376 - St Johns Infrastructure\QMS 4 Production\4B Models & Drawings_Civil-C\CAD\

Appendix H

Surface Water Central Outfall Calculations:

- 1 Year
- 1 Year with surcharged outfall of 26.600)
- 30 Year
- 30 Year (with surcharged outfall of 26.600)
- 100 Year +20%cc
- 100 Year +20%cc (with surcharged outfall of 26.600)

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Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	1.594	4-8	2.719	8-12	0.028

Total Area Contributing (ha) = 4.341

Total Pipe Volume (m^3) = 194.158

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Existing Network Details 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
1.000	8.351	0.075	111.3	0.157	5.00	0.0	0.600	o	300	Pipe/Conduit
2.000	2.651	0.333	8.0	0.000	5.00	0.0	0.600	o	225	Pipe/Conduit
1.001	27.496	0.036	763.8	0.044	0.00	0.0	0.600	o	750	Pipe/Conduit
3.000	1.468	0.369	4.0	0.000	5.00	0.0	0.600	o	225	Pipe/Conduit
1.002	5.965	0.008	745.6	0.000	0.00	0.0	0.600	o	750	Pipe/Conduit
4.000	1.368	0.377	3.6	0.000	5.00	0.0	0.600	o	225	Pipe/Conduit
1.003	4.832	0.006	805.3	0.000	0.00	0.0	0.600	o	750	Pipe/Conduit
5.000	1.000	0.050	20.0	0.000	5.00	0.0	0.600	o	225	Pipe/Conduit
5.001	4.459	0.130	34.3	0.000	5.00	0.0	0.600	o	225	Pipe/Conduit
1.004	5.775	0.008	721.9	0.325	0.00	0.0	0.600	o	750	Pipe/Conduit
6.000	1.362	0.388	3.5	0.000	5.00	0.0	0.600	o	225	Pipe/Conduit
1.005	26.725	0.036	742.4	0.000	0.00	0.0	0.600	o	750	Pipe/Conduit

Network Results Table

PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)
1.000	24.367	0.157	0.0	1.49	105.3
2.000	24.700	0.000	0.0	4.67	185.5
1.001	23.842	0.201	0.0	1.00	443.9
3.000	24.700	0.000	0.0	6.61	262.7
1.002	23.806	0.201	0.0	1.02	449.3
4.000	24.700	0.000	0.0	6.92	275.1
1.003	23.798	0.201	0.0	0.98	432.1
5.000	24.500	0.000	0.0	2.94	116.9
5.001	24.450	0.000	0.0	2.24	89.1
1.004	23.795	0.526	0.0	1.03	456.7
6.000	24.700	0.000	0.0	7.03	279.7
1.005	23.787	0.526	0.0	1.02	450.3

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Existing Network Details 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
7.000	1.000	0.050	20.0	0.000	5.00	0.0	0.600	o	225	Pipe/Conduit
7.001	4.595	0.100	45.9	0.000	5.00	0.0	0.600	o	225	Pipe/Conduit
1.006	6.676	0.009	741.8	0.212	0.00	0.0	0.600	o	750	Pipe/Conduit
8.000	1.430	0.433	3.3	0.000	5.00	0.0	0.600	o	225	Pipe/Conduit
1.007	22.666	0.028	809.5	0.000	0.00	0.0	0.600	o	750	Pipe/Conduit
9.000	3.510	0.100	35.1	0.000	5.00	0.0	0.600	o	150	Pipe/Conduit
9.001	63.369	0.084	754.4	0.948	5.00	0.0	0.600	o	750	Pipe/Conduit
10.000	4.800	0.100	48.0	0.000	5.00	0.0	0.600	o	300	Pipe/Conduit
10.001	3.317	0.103	32.2	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit
9.002	7.060	0.010	706.0	0.000	0.00	0.0	0.600	o	750	Pipe/Conduit
11.000	8.640	0.086	100.5	0.017	5.00	0.0	0.600	o	300	Pipe/Conduit
9.003	21.165	0.027	783.9	0.226	0.00	0.0	0.600	o	750	Pipe/Conduit

Network Results Table

PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)
7.000	24.426	0.000	0.0	2.94	116.9
7.001	24.376	0.000	0.0	1.93	76.9
1.006	23.751	0.738	0.0	1.02	450.5
8.000	24.700	0.000	0.0	7.25	288.4
1.007	23.742	0.738	0.0	0.98	431.0
9.000	29.250	0.000	0.0	1.70	30.1
9.001	27.076	0.948	0.0	1.01	446.7
10.000	27.645	0.000	0.0	2.28	160.8
10.001	27.545	0.000	0.0	2.78	196.5
9.002	26.992	0.948	0.0	1.05	461.9
11.000	27.610	0.017	0.0	1.57	110.9
9.003	22.390	1.191	0.0	0.99	438.1

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Existing Network Details 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
12.000	5.523	0.100	55.2	0.000	5.00	0.0	0.600	o	450	Pipe/Conduit
12.001	4.920	0.100	49.2	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit
1.008	61.021	0.078	782.3	0.167	0.00	0.0	0.600	o	750	Pipe/Conduit
13.000	5.092	0.050	101.8	0.130	5.00	0.0	0.600	o	300	Pipe/Conduit
14.000	5.517	1.190	4.6	0.000	5.00	0.0	0.600	o	225	Pipe/Conduit
1.009	6.550	0.011	595.5	0.092	0.00	0.0	0.600	o	750	Pipe/Conduit
15.000	12.032	0.829	14.5	0.577	5.00	0.0	0.600	o	375	Pipe/Conduit
16.000	9.463	1.363	6.9	0.546	5.00	0.0	0.600	o	300	Pipe/Conduit
17.000	3.820	0.100	38.2	0.000	5.00	0.0	0.600	o	225	Pipe/Conduit
17.001	3.736	0.100	37.4	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit
15.001	22.031	0.037	595.4	0.093	0.00	0.0	0.600	o	750	Pipe/Conduit
1.010	30.243	0.073	414.3	0.000	0.00	0.0	0.600	o	750	Pipe/Conduit
1.011	14.672	0.036	407.6	0.208	0.00	0.0	0.600	o	750	Pipe/Conduit

Network Results Table

PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)
12.000	24.900	0.000	0.0	2.74	435.8
12.001	24.800	0.000	0.0	2.90	461.9
1.008	22.363	2.096	0.0	0.99	438.5
13.000	24.600	0.130	0.0	1.56	110.1
14.000	24.000	0.000	0.0	6.12	243.3
1.009	22.285	2.318	0.0	1.14	503.4
15.000	23.500	0.577	0.0	4.78	527.6
16.000	24.136	0.546	0.0	6.00	424.3
17.000	26.000	0.000	0.0	2.12	84.4
17.001	25.900	0.000	0.0	2.15	85.4
15.001	22.303	1.216	0.0	1.14	503.4
1.010	22.274	3.534	0.0	1.37	604.6
1.011	22.201	3.742	0.0	1.38	609.6

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Existing Network Details 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
18.000	8.783	0.100	87.8	0.000	5.00	0.0	0.600	o	300	Pipe/Conduit
18.001	6.573	1.985	3.3	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit
1.012	5.960	0.014	425.7	0.000	0.00	0.0	0.600	o	750	Pipe/Conduit
19.000	5.401	2.024	2.7	0.000	5.00	0.0	0.600	o	225	Pipe/Conduit
1.013	0.600	0.001	600.0	0.000	0.00	0.0	0.600	o	750	Pipe/Conduit
20.000	5.144	2.025	2.5	0.000	5.00	0.0	0.600	o	225	Pipe/Conduit
1.014	2.722	0.006	453.7	0.000	0.00	0.0	0.600	o	750	Pipe/Conduit
21.000	80.018	0.000	0.0	0.402	5.00	0.0	0.600	o	450	Pipe/Conduit
21.001	41.100	0.000	0.0	0.110	0.00	0.0	0.600	o	450	Pipe/Conduit
21.002	17.300	0.000	0.0	0.041	0.00	0.0	0.600	o	450	Pipe/Conduit
21.003	5.500	0.000	0.0	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit
21.004	9.200	0.000	0.0	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit
21.005	3.500	0.025	140.0	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit
22.000	6.000	0.060	100.0	0.046	5.00	0.0	0.600	o	450	Pipe/Conduit

Network Results Table

PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)
18.000	24.700	0.000	0.0	1.68	118.6
18.001	24.600	0.000	0.0	8.70	614.9
1.012	22.165	3.742	0.0	1.35	596.4
19.000	24.700	0.000	0.0	8.07	320.9
1.013	22.151	3.742	0.0	1.14	501.5
20.000	24.700	0.000	0.0	8.27	328.9
1.014	22.150	3.742	0.0	1.31	577.5
21.000	23.525	0.402	0.0	0.00	0.0
21.001	23.525	0.512	0.0	0.00	0.0
21.002	23.525	0.553	0.0	0.00	0.0
21.003	23.525	0.553	0.0	0.00	0.0
21.004	23.525	0.553	0.0	0.00	0.0
21.005	23.525	0.553	0.0	1.72	273.0
22.000	24.700	0.046	0.0	2.03	323.4

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Existing Network Details 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
21.006	12.293	0.123	99.9	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit
1.015	21.848	0.055	397.2	0.000	0.00	0.0	0.600	oo	525	Double Pipe

Network Results Table

PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)
21.006	23.500	0.599	0.0	2.03	323.4
1.015	22.144	4.341	0.0	1.12	483.9

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Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backd (mm
S100	26.750	2.383	Open Manhole	600	1.000	24.367	300				
S101	26.750	2.050	Open Manhole	600	2.000	24.700	225				
S1	26.700	2.858	Open Manhole		1.001	23.842	750	1.000	24.292	300	
								2.000	24.367	225	
S102	26.750	2.050	Open Manhole		3.000	24.700	225				
JUNCTION 1	26.700	2.894	Junction		1.002	23.806	750	1.001	23.806	750	
								3.000	24.331	225	
S103	26.750	2.050	Open Manhole		4.000	24.700	225				
JUNCTION 2	26.700	2.902	Junction	0	1.003	23.798	750	1.002	23.798	750	
								4.000	24.323	225	
PLOT01	26.500	2.000	Open Manhole	600	5.000	24.500	225				
S104	26.500	2.050	Open Manhole	600	5.001	24.450	225	5.000	24.450	225	
S2	26.700	2.908	Open Manhole		1.004	23.795	750	1.003	23.792	750	
								5.001	24.320	225	
S105	26.750	2.050	Open Manhole		6.000	24.700	225				
JUNCTION 3	26.700	2.913	Junction	0	1.005	23.787	750	1.004	23.787	750	
								6.000	24.312	225	
PLOT02	26.500	2.074	Open Manhole	600	7.000	24.426	225				
S106	26.500	2.124	Open Manhole	600	7.001	24.376	225	7.000	24.376	225	
S3	26.700	2.949	Open Manhole		1.006	23.751	750	1.005	23.751	750	
								7.001	24.276	225	
S107	26.750	2.050	Open Manhole		8.000	24.700	225				
JUNCTION 4	26.700	2.958	Junction	0	1.007	23.742	750	1.006	23.742	750	
								8.000	24.267	225	
S110	30.800	1.550	Open Manhole	600	9.000	29.250	150				
S4	30.780	3.704	Open Manhole		9.001	27.076	750	9.000	29.150	150	1
S111	29.400	1.755	Open Manhole	1200	10.000	27.645	300				
S112	29.400	1.855	Open Manhole		10.001	27.545	300	10.000	27.545	300	
JUNCTION 5	29.400	2.408	Junction	0	9.002	26.992	750	9.001	26.992	750	
								10.001	27.442	300	
S113	29.210	1.600	Open Manhole	600	11.000	27.610	300				
S5	29.210	6.820	Open Manhole	1800	9.003	22.390	750	9.002	26.982	750	4
								11.000	27.524	300	4
S108	26.550	1.650	Open Manhole	1500	12.000	24.900	450				
S109	26.550	1.750	Open Manhole	1500	12.001	24.800	450	12.000	24.800	450	
S6	26.830	4.467	Open Manhole	1800	1.008	22.363	750	1.007	23.714	750	1
								9.003	22.363	750	
								12.001	24.700	450	2

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Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Bac
S114	26.900	2.300	Open Manhole	1200	13.000	24.600	300				
S115	26.900	2.900	Open Manhole	600	14.000	24.000	225				
S7	26.830	4.545	Open Manhole	1800	1.009	22.285	750	1.008	22.285	750	
								13.000	24.550	300	
								14.000	22.810	225	
Factory MH	26.720	3.220	Open Manhole	1350	15.000	23.500	375				
EX Bonded MH	27.400	3.264	Open Manhole	1200	16.000	24.136	300				
S116	27.500	1.500	Open Manhole	600	17.000	26.000	225				
S117	27.500	1.600	Open Manhole	600	17.001	25.900	225	17.000	25.900	225	
S8	27.400	5.097	Open Manhole	1800	15.001	22.303	750	15.000	22.671	375	
								16.000	22.773	300	
								17.001	25.800	225	
S9	27.400	5.134	Open Manhole	1800	1.010	22.274	750	1.009	22.274	750	
								15.001	22.266	750	
S10	27.000	4.799	Open Manhole		1.011	22.201	750	1.010	22.201	750	
S118	26.800	2.100	Open Manhole	1200	18.000	24.700	300				
S119	26.800	2.200	Open Manhole		18.001	24.600	300	18.000	24.600	300	
JUNCTION 5	26.900	4.735	Junction		1.012	22.165	750	1.011	22.165	750	
								18.001	22.615	300	
S120	26.900	2.200	Open Manhole		19.000	24.700	225				
JUNCTION 6	26.900	4.749	Junction		1.013	22.151	750	1.012	22.151	750	
								19.000	22.676	225	
S121	26.900	2.200	Open Manhole		20.000	24.700	225				
JUNCTION 7	26.900	4.750	Junction	0	1.014	22.150	750	1.013	22.150	750	
								20.000	22.675	225	
U-SLUNG 1	26.900	3.375	Junction		21.000	23.525	450				
U-SLUNG 2	26.900	3.375	Junction		21.001	23.525	450	21.000	23.525	450	
U-SLUNG 3	26.900	3.375	Junction		21.002	23.525	450	21.001	23.525	450	
U-SLUNG 4	26.900	3.375	Junction		21.003	23.525	450	21.002	23.525	450	
U-SLUNG 5	26.900	3.375	Junction	0	21.004	23.525	450	21.003	23.525	450	
U-SLUNG 6	26.650	3.125	Open Manhole	1800	21.005	23.525	450	21.004	23.525	450	
S122	26.650	1.950	Open Manhole	1500	22.000	24.700	450				
S11	26.650	3.150	Open Manhole	1500	21.006	23.500	450	21.005	23.500	450	
								22.000	24.640	450	
S12	26.650	4.506	Open Manhole	2400	1.015	22.144	525	1.014	22.144	750	
								21.006	23.377	450	
	23.600	1.511	Open Manhole	0		OUTFALL		1.015	22.089	525	

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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	300	S100	26.750	24.367	2.083	Open Manhole	600
2.000	o	225	S101	26.750	24.700	1.825	Open Manhole	600
1.001	o	750	S1	26.700	23.842	2.108	Open Manhole	1800
3.000	o	225	S102	26.750	24.700	1.825	Open Manhole	600
1.002	o	750	JUNCTION 1	26.700	23.806	2.144	Junction	
4.000	o	225	S103	26.750	24.700	1.825	Open Manhole	600
1.003	o	750	JUNCTION 2	26.700	23.798	2.152	Junction	
5.000	o	225	PLOT01	26.500	24.500	1.775	Open Manhole	600
5.001	o	225	S104	26.500	24.450	1.825	Open Manhole	600
1.004	o	750	S2	26.700	23.795	2.155	Open Manhole	1800
6.000	o	225	S105	26.750	24.700	1.825	Open Manhole	600

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	8.351	111.3	S1	26.700	24.292	2.108	Open Manhole	1800
2.000	2.651	8.0	S1	26.700	24.367	2.108	Open Manhole	1800
1.001	27.496	763.8	JUNCTION 1	26.700	23.806	2.144	Junction	
3.000	1.468	4.0	JUNCTION 1	26.700	24.331	2.144	Junction	
1.002	5.965	745.6	JUNCTION 2	26.700	23.798	2.152	Junction	
4.000	1.368	3.6	JUNCTION 2	26.700	24.323	2.152	Junction	
1.003	4.832	805.3	S2	26.700	23.792	2.158	Open Manhole	1800
5.000	1.000	20.0	S104	26.500	24.450	1.825	Open Manhole	600
5.001	4.459	34.3	S2	26.700	24.320	2.155	Open Manhole	1800
1.004	5.775	721.9	JUNCTION 3	26.700	23.787	2.163	Junction	
6.000	1.362	3.5	JUNCTION 3	26.700	24.312	2.163	Junction	

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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.005	o	750	JUNCTION 3	26.700	23.787	2.163	Junction	
7.000	o	225	PLOT02	26.500	24.426	1.849	Open Manhole	600
7.001	o	225	S106	26.500	24.376	1.899	Open Manhole	600
1.006	o	750	S3	26.700	23.751	2.199	Open Manhole	1800
8.000	o	225	S107	26.750	24.700	1.825	Open Manhole	600
1.007	o	750	JUNCTION 4	26.700	23.742	2.208	Junction	
9.000	o	150	S110	30.800	29.250	1.400	Open Manhole	600
9.001	o	750	S4	30.780	27.076	2.954	Open Manhole	1800
10.000	o	300	S111	29.400	27.645	1.455	Open Manhole	1200
10.001	o	300	S112	29.400	27.545	1.555	Open Manhole	1200
9.002	o	750	JUNCTION 5	29.400	26.992	1.658	Junction	
11.000	o	300	S113	29.210	27.610	1.300	Open Manhole	600

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.005	26.725	742.4	S3	26.700	23.751	2.199	Open Manhole	1800
7.000	1.000	20.0	S106	26.500	24.376	1.899	Open Manhole	600
7.001	4.595	45.9	S3	26.700	24.276	2.199	Open Manhole	1800
1.006	6.676	741.8	JUNCTION 4	26.700	23.742	2.208	Junction	
8.000	1.430	3.3	JUNCTION 4	26.700	24.267	2.208	Junction	
1.007	22.666	809.5	S6	26.830	23.714	2.366	Open Manhole	1800
9.000	3.510	35.1	S4	30.780	29.150	1.480	Open Manhole	1800
9.001	63.369	754.4	JUNCTION 5	29.400	26.992	1.658	Junction	
10.000	4.800	48.0	S112	29.400	27.545	1.555	Open Manhole	1200
10.001	3.317	32.2	JUNCTION 5	29.400	27.442	1.658	Junction	
9.002	7.060	706.0	S5	29.210	26.982	1.478	Open Manhole	1800
11.000	8.640	100.5	S5	29.210	27.524	1.386	Open Manhole	1800

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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
9.003	o	750	S5	29.210	22.390	6.070	Open Manhole	1800
12.000	o	450	S108	26.550	24.900	1.200	Open Manhole	1500
12.001	o	450	S109	26.550	24.800	1.300	Open Manhole	1500
1.008	o	750	S6	26.830	22.363	3.717	Open Manhole	1800
13.000	o	300	S114	26.900	24.600	2.000	Open Manhole	1200
14.000	o	225	S115	26.900	24.000	2.675	Open Manhole	600
1.009	o	750	S7	26.830	22.285	3.795	Open Manhole	1800
15.000	o	375	Factory MH	26.720	23.500	2.845	Open Manhole	1350
16.000	o	300	EX Bonded MH	27.400	24.136	2.964	Open Manhole	1200
17.000	o	225	S116	27.500	26.000	1.275	Open Manhole	600
17.001	o	225	S117	27.500	25.900	1.375	Open Manhole	600
15.001	o	750	S8	27.400	22.303	4.347	Open Manhole	1800

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
9.003	21.165	783.9	S6	26.830	22.363	3.717	Open Manhole	1800
12.000	5.523	55.2	S109	26.550	24.800	1.300	Open Manhole	1500
12.001	4.920	49.2	S6	26.830	24.700	1.680	Open Manhole	1800
1.008	61.021	782.3	S7	26.830	22.285	3.795	Open Manhole	1800
13.000	5.092	101.8	S7	26.830	24.550	1.980	Open Manhole	1800
14.000	5.517	4.6	S7	26.830	22.810	3.795	Open Manhole	1800
1.009	6.550	595.5	S9	27.400	22.274	4.376	Open Manhole	1800
15.000	12.032	14.5	S8	27.400	22.671	4.354	Open Manhole	1800
16.000	9.463	6.9	S8	27.400	22.773	4.327	Open Manhole	1800
17.000	3.820	38.2	S117	27.500	25.900	1.375	Open Manhole	600
17.001	3.736	37.4	S8	27.400	25.800	1.375	Open Manhole	1800
15.001	22.031	595.4	S9	27.400	22.266	4.384	Open Manhole	1800

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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.010	o	750	S9	27.400	22.274	4.376	Open Manhole	1800
1.011	o	750	S10	27.000	22.201	4.049	Open Manhole	1800
18.000	o	300	S118	26.800	24.700	1.800	Open Manhole	1200
18.001	o	300	S119	26.800	24.600	1.900	Open Manhole	1200
1.012	o	750	JUNCTION 5	26.900	22.165	3.985	Junction	
19.000	o	225	S120	26.900	24.700	1.975	Open Manhole	600
1.013	o	750	JUNCTION 6	26.900	22.151	3.999	Junction	
20.000	o	225	S121	26.900	24.700	1.975	Open Manhole	600
1.014	o	750	JUNCTION 7	26.900	22.150	4.000	Junction	
21.000	o	450	U-SLUNG 1	26.900	23.525	2.925	Junction	
21.001	o	450	U-SLUNG 2	26.900	23.525	2.925	Junction	
21.002	o	450	U-SLUNG 3	26.900	23.525	2.925	Junction	
21.003	o	450	U-SLUNG 4	26.900	23.525	2.925	Junction	

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.010	30.243	414.3	S10	27.000	22.201	4.049	Open Manhole	1800
1.011	14.672	407.6	JUNCTION 5	26.900	22.165	3.985	Junction	
18.000	8.783	87.8	S119	26.800	24.600	1.900	Open Manhole	1200
18.001	6.573	3.3	JUNCTION 5	26.900	22.615	3.985	Junction	
1.012	5.960	425.7	JUNCTION 6	26.900	22.151	3.999	Junction	
19.000	5.401	2.7	JUNCTION 6	26.900	22.676	3.999	Junction	
1.013	0.600	600.0	JUNCTION 7	26.900	22.150	4.000	Junction	
20.000	5.144	2.5	JUNCTION 7	26.900	22.675	4.000	Junction	
1.014	2.722	453.7	S12	26.650	22.144	3.756	Open Manhole	2400
21.000	80.018	0.0	U-SLUNG 2	26.900	23.525	2.925	Junction	
21.001	41.100	0.0	U-SLUNG 3	26.900	23.525	2.925	Junction	
21.002	17.300	0.0	U-SLUNG 4	26.900	23.525	2.925	Junction	
21.003	5.500	0.0	U-SLUNG 5	26.900	23.525	2.925	Junction	

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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
21.004	o	450	U-SLUNG 5	26.900	23.525	2.925	Junction	
21.005	o	450	U-SLUNG 6	26.650	23.525	2.675	Open Manhole	1800
22.000	o	450	S122	26.650	24.700	1.500	Open Manhole	1500
21.006	o	450	S11	26.650	23.500	2.700	Open Manhole	1500
1.015	oo	525	S12	26.650	22.144	3.981	Open Manhole	2400

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
21.004	9.200	0.0	U-SLUNG 6	26.650	23.525	2.675	Open Manhole	1800
21.005	3.500	140.0	S11	26.650	23.500	2.700	Open Manhole	1500
22.000	6.000	100.0	S11	26.650	24.640	1.560	Open Manhole	1500
21.006	12.293	99.9	S12	26.650	23.377	2.823	Open Manhole	2400
1.015	21.848	397.2		23.600	22.089	0.986	Open Manhole	0

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Setting Out Information - Site Coordinates (Storm)

PN	USMH Name	Dia/Len (mm)	Width (mm)	US Easting (m)	US Northing (m)	Layout (North)
1.000	S100	600		383158.363	398084.648	
2.000	S101	600		383152.881	398080.398	
1.001	S1	1800		383153.540	398077.831	
3.000	S102	600		383144.635	398052.878	
1.002	JUNCTION 1			383145.336	398051.588	
4.000	S103	600		383142.903	398047.097	
1.003	JUNCTION 2			383143.556	398045.895	
5.000	PLOT01	600				
5.001	S104	600		383146.201	398039.736	
1.004	S2	1800		383142.029	398041.311	
6.000	S105	600		383139.858	398036.935	
1.005	JUNCTION 3			383140.508	398035.739	
7.000	PLOT02	600				
7.001	S106	600		383137.113	398008.532	
1.006	S3	1800		383132.811	398010.146	
8.000	S107	600		383130.430	398004.945	

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Setting Out Information - Site Coordinates (Storm)

PN	USMH Name	Dia/Len (mm)	Width (mm)	US Easting (m)	US Northing (m)	Layout (North)
1.007	JUNCTION 4			383131.112	398003.689	
9.000	S110	600		383184.792	397940.269	
9.001	S4	1800		383183.820	397936.896	
10.000	S111	1200		383132.381	397957.941	
10.001	S112	1200		383127.880	397959.608	
9.002	JUNCTION 5			383124.571	397959.374	
11.000	S113	600		383115.336	397953.625	
9.003	S5	1800		383117.970	397961.879	
12.000	S108	1500		383130.779	397985.622	
12.001	S109	1500		383129.211	397980.327	
1.008	S6	1800		383124.579	397981.986	
13.000	S114	1200		383070.986	398001.195	
14.000	S115	600		383066.658	397994.098	
1.009	S7	1800		383066.153	397999.592	
15.000	Factory MH	1350		383045.353	397971.577	
16.000	EX Bonded MH	1200		383052.668	397970.956	

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Setting Out Information - Site Coordinates (Storm)

PN	USMH Name	Dia/Len (mm)	Width (mm)	US Easting (m)	US Northing (m)	Layout (North)
17.000	S116	600		383060.535	397977.478	
17.001	S117	600		383057.029	397978.997	
15.001	S8	1800		383053.558	397980.377	
1.010	S9	1800		383059.883	398001.488	
1.011	S10	1800		383033.477	398016.231	
18.000	S118	1200		383030.785	398019.063	
18.001	S119	1200		383036.102	398026.054	
1.012	JUNCTION 5			383042.421	398027.862	
19.000	S120	600		383048.699	398027.762	
1.013	JUNCTION 6			383046.141	398032.519	
20.000	S121	600		383048.870	398028.351	
1.014	JUNCTION 7			383046.429	398032.879	
21.000	U-SLUNG 1			383143.448	398154.226	
21.001	U-SLUNG 2			383092.316	398092.676	
21.002	U-SLUNG 3			383080.204	398053.353	
21.003	U-SLUNG 4			383063.587	398058.067	

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Setting Out Information - Site Coordinates (Storm)

PN	USMH Name	Dia/Len (mm)	Width (mm)	US Easting (m)	US Northing (m)	Layout (North)
21.004	U-SLUNG 5			383060.226	398053.777	
21.005	U-SLUNG 6	1800		383057.494	398044.980	
22.000	S122	1500		383055.818	398051.558	
21.006	S11	1500		383054.079	398045.762	
1.015	S12	2400		383048.127	398035.006	

PN	DSMH Name	Dia/Len (mm)	Width (mm)	DS Easting (m)	DS Northing (m)	Layout (North)
1.015		0		383031.056	398048.641	

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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	0.157	0.157	0.157
2.000	-	-	100	0.000	0.000	0.000
1.001	-	-	100	0.044	0.044	0.044
3.000	-	-	100	0.000	0.000	0.000
1.002	-	-	100	0.000	0.000	0.000
4.000	-	-	100	0.000	0.000	0.000
1.003	-	-	100	0.000	0.000	0.000
5.000	-	-	100	0.000	0.000	0.000
5.001	-	-	100	0.000	0.000	0.000
1.004	-	-	100	0.325	0.325	0.325
6.000	-	-	100	0.000	0.000	0.000
1.005	-	-	100	0.000	0.000	0.000
7.000	-	-	100	0.000	0.000	0.000
7.001	-	-	100	0.000	0.000	0.000
1.006	-	-	100	0.212	0.212	0.212
8.000	-	-	100	0.000	0.000	0.000
1.007	-	-	100	0.000	0.000	0.000
9.000	-	-	100	0.000	0.000	0.000
9.001	-	-	100	0.948	0.948	0.948
10.000	-	-	100	0.000	0.000	0.000
10.001	-	-	100	0.000	0.000	0.000
9.002	-	-	100	0.000	0.000	0.000
11.000	-	-	100	0.017	0.017	0.017
9.003	-	-	100	0.226	0.226	0.226
12.000	-	-	100	0.000	0.000	0.000
12.001	-	-	100	0.000	0.000	0.000
1.008	-	-	100	0.167	0.167	0.167
13.000	-	-	100	0.130	0.130	0.130
14.000	-	-	100	0.000	0.000	0.000
1.009	-	-	100	0.092	0.092	0.092
15.000	-	-	100	0.577	0.577	0.577
16.000	-	-	100	0.546	0.546	0.546
17.000	-	-	100	0.000	0.000	0.000
17.001	-	-	100	0.000	0.000	0.000
15.001	-	-	100	0.093	0.093	0.093
1.010	-	-	100	0.000	0.000	0.000
1.011	-	-	100	0.208	0.208	0.208
18.000	-	-	100	0.000	0.000	0.000
18.001	-	-	100	0.000	0.000	0.000
1.012	-	-	100	0.000	0.000	0.000
19.000	-	-	100	0.000	0.000	0.000
1.013	-	-	100	0.000	0.000	0.000
20.000	-	-	100	0.000	0.000	0.000
1.014	-	-	100	0.000	0.000	0.000
21.000	-	-	100	0.402	0.402	0.402
21.001	-	-	100	0.110	0.110	0.110
21.002	-	-	100	0.041	0.041	0.041
21.003	-	-	100	0.000	0.000	0.000
21.004	-	-	100	0.000	0.000	0.000
21.005	-	-	100	0.000	0.000	0.000
22.000	-	-	100	0.046	0.046	0.046

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
21.006	-	-	100	0.000	0.000	0.000
1.015	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				4.341	4.341	4.341

Surcharged Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.015		23.600	22.089	0.000	0	0

Datum (m) 22.089 Offset (mins) 0

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
1000	4.511	3000	4.511	5000	4.511	7000	4.511	9000	4.511	11000	4.511
2000	4.511	4000	4.511	6000	4.511	8000	4.511	10000	4.511		

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	2.000
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 Storage Structures	0
Number of Online Controls	3	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Storm Duration (mins)	30
Ratio R	0.358		

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Online Controls for Storm

Non Return Valve Manhole: S104, DS/PN: 5.001, Volume (m^3): 0.6

Non Return Valve Manhole: S106, DS/PN: 7.001, Volume (m^3): 0.6

Non Return Valve Manhole: S109, DS/PN: 12.001, Volume (m^3): 3.7

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Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Manhole Headloss Coeff (Global)	0.500	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Foul Sewage per hectare (l/s)	0.000	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Additional Flow - % of Total Flow	0.000	Flow per Person per Day (l/per/day)	0.000

Number of Input Hydrographs 0 Number of Online Controls 3 Number of Offline Controls 0 Number of Storage Structures 0 Number of Time/Area Diagrams 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm)	18.000	Cv (Summer)	0.750
Region	England and Wales	Ratio R	0.358	Cv (Winter)	0.840

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

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S100	15 Winter	1	+0%					24.474	-0.193	0.000	0.27		18.9	OK	
2.000	S101	60 Winter	1	+0%					24.700	-0.225	0.000	0.00		0.0	OK	
1.001	S1	15 Winter	1	+0%					24.048	-0.544	0.000	0.08		22.5	OK	
3.000	S102	60 Winter	1	+0%					24.700	-0.225	0.000	0.00		0.0	OK	
1.002	JUNCTION 1	15 Winter	1	+0%					24.032	-0.524	0.000	0.03		20.6	OK*	
4.000	S103	60 Winter	1	+0%					24.700	-0.225	0.000	0.00		0.0	OK	
1.003	JUNCTION 2	15 Winter	1	+0%					24.032	-0.516	0.000	0.03		20.3	OK*	
5.000	PLOT01	60 Winter	1	+0%					24.500	-0.225	0.000	0.00		0.0	OK	
5.001	S104	60 Winter	1	+0%					24.450	-0.225	0.000	0.00		0.0	OK	
1.004	S2	15 Winter	1	+0%					24.031	-0.514	0.000	0.14		49.4	OK	
6.000	S105	60 Winter	1	+0%					24.700	-0.225	0.000	0.00		0.0	OK	
1.005	JUNCTION 3	15 Winter	1	+0%					24.023	-0.514	0.000	0.13		48.6	OK*	
7.000	PLOT02	60 Winter	1	+0%					24.426	-0.225	0.000	0.00		0.0	OK	
7.001	S106	60 Winter	1	+0%					24.376	-0.225	0.000	0.00		0.0	OK	

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Summary of Critical Results by Maximum Level (Rank 1) for Storm

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)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.006	S3	15 Winter	1	+0%					23.991	-0.510	0.000	0.21		66.2	OK	
8.000	S107	60 Winter	1	+0%					24.700	-0.225	0.000	0.00		0.0	OK	
1.007	JUNCTION 4	15 Winter	1	+0%					23.972	-0.520	0.000	0.21		66.3	OK*	
9.000	S110	60 Winter	1	+0%					29.250	-0.150	0.000	0.00		0.0	OK	
9.001	S4	15 Winter	1	+0%					27.357	-0.469	0.000	0.27		106.7	OK	
10.000	S111	60 Winter	1	+0%					27.645	-0.300	0.000	0.00		0.0	OK	
10.001	S112	60 Winter	1	+0%					27.545	-0.300	0.000	0.00		0.0	OK	
9.002	JUNCTION 5	15 Winter	1	+0%					27.202	-0.540	0.000	0.17		105.5	OK*	
11.000	S113	15 Winter	1	+0%					27.643	-0.267	0.000	0.03		2.0	OK	
9.003	S5	15 Winter	1	+0%					22.898	-0.242	0.000	0.54		125.4	OK	
12.000	S108	60 Winter	1	+0%					24.900	-0.450	0.000	0.00		0.0	OK	
12.001	S109	60 Winter	1	+0%					24.800	-0.450	0.000	0.00		0.0	OK	
1.008	S6	15 Winter	1	+0%					22.872	-0.241	0.000	0.50		190.6	OK	
13.000	S114	15 Winter	1	+0%					24.703	-0.197	0.000	0.25		15.6	OK	
14.000	S115	60 Winter	1	+0%					24.000	-0.225	0.000	0.00		0.0	OK	
1.009	S7	15 Winter	1	+0%					22.803	-0.232	0.000	0.64		205.5	OK	
15.000	Factory MH	15 Winter	1	+0%					23.613	-0.262	0.000	0.19		69.3	OK	
16.000	EX Bonded MH	15 Winter	1	+0%					24.232	-0.204	0.000	0.22		65.7	OK	
17.000	S116	60 Winter	1	+0%					26.000	-0.225	0.000	0.00		0.0	OK	
17.001	S117	60 Winter	1	+0%					25.900	-0.225	0.000	0.00		0.0	OK	
15.001	S8	15 Winter	1	+0%					22.799	-0.254	0.000	0.45		140.4	OK	
1.010	S9	15 Winter	1	+0%					22.791	-0.233	0.000	0.60		279.7	OK	
1.011	S10	15 Winter	1	+0%					22.739	-0.212	0.000	0.86		290.9	OK	
18.000	S118	60 Winter	1	+0%					24.700	-0.300	0.000	0.00		0.0	OK	
18.001	S119	60 Winter	1	+0%					24.600	-0.300	0.000	0.00		0.0	OK	
1.012	JUNCTION 5	15 Winter	1	+0%					22.561	-0.354	0.000	0.48		289.9	OK*	
19.000	S120	60 Winter	1	+0%					24.700	-0.225	0.000	0.00		0.0	OK	
1.013	JUNCTION 6	15 Winter	1	+0%					22.546	-0.355	0.000	0.48		289.0	OK*	
20.000	S121	60 Winter	1	+0%					24.700	-0.225	0.000	0.00		0.0	OK	
1.014	JUNCTION 7	15 Winter	1	+0%					22.544	-0.356	0.000	0.48		288.3	OK*	
21.000	U-SLUNG 1	15 Winter	1	+0%					23.826	-0.149	0.000	0.41		41.4	OK*	
21.001	U-SLUNG 2	15 Winter	1	+0%					23.809	-0.166	0.000	0.44		39.8	OK*	
21.002	U-SLUNG 3	15 Winter	1	+0%					23.777	-0.198	0.000	0.59		40.7	OK*	
21.003	U-SLUNG 4	15 Winter	1	+0%					23.723	-0.252	0.000	0.24		40.3	OK*	
21.004	U-SLUNG 5	15 Winter	1	+0%					23.716	-0.259	0.000	0.33		40.0	OK*	
21.005	U-SLUNG 6	15 Winter	1	+0%					23.692	-0.283	0.000	0.30		40.2	OK	

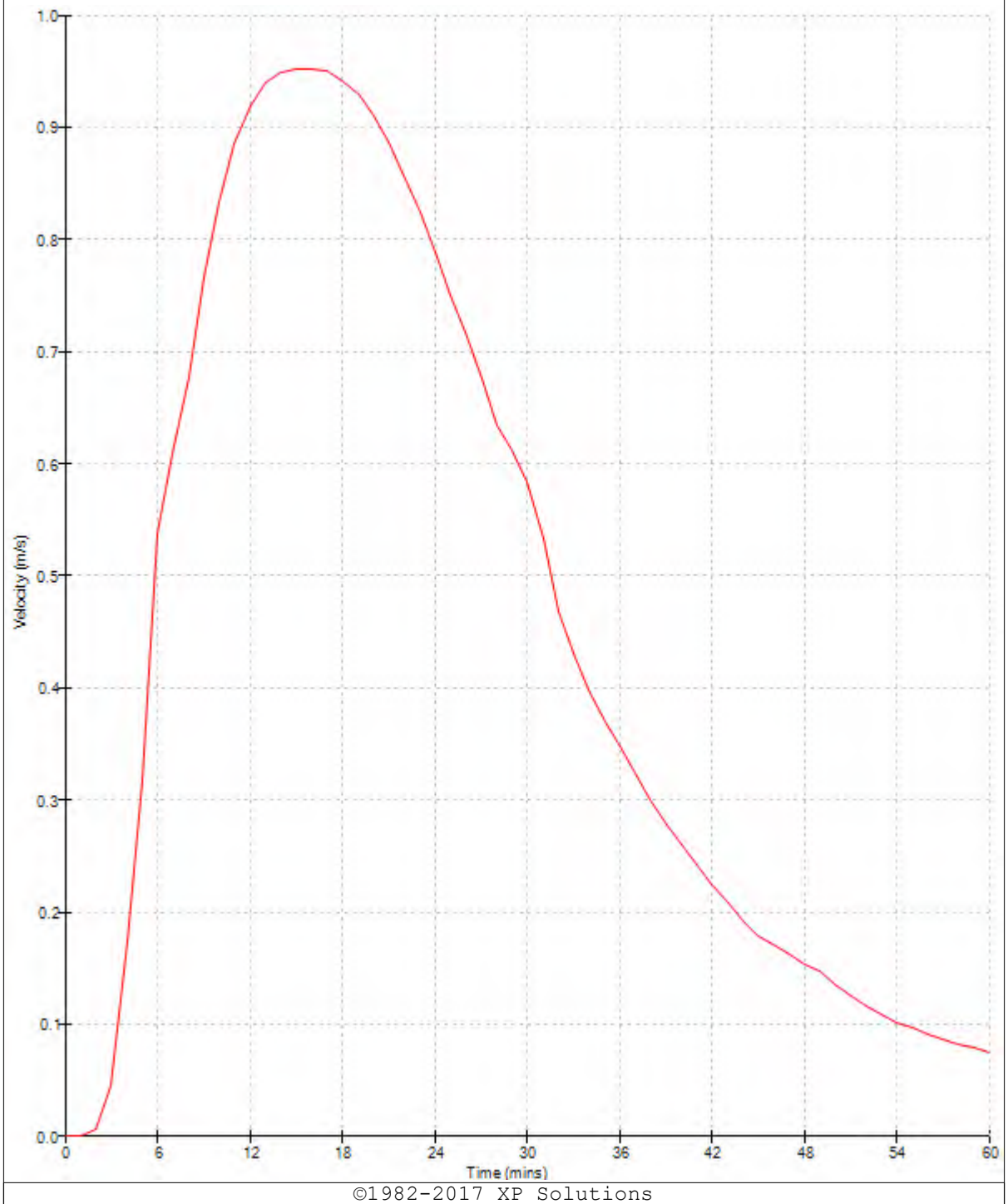
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Summary of Critical Results by Maximum Level (Rank 1) for Storm

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)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
22.000	S122	15 Winter	1	+0%					24.753	-0.397	0.000	0.03		5.5	OK	
21.006	S11	15 Winter	1	+0%					23.640	-0.310	0.000	0.21		41.7	OK	
1.015	S12	15 Winter	1	+0%					22.537	-0.132	0.000	0.86		329.6	OK	

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Graphs for Pipe 1.015 US/MH S12 (Storm)
15 minute 1 year Winter I+0%
Status: OK



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Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Manhole Headloss Coeff (Global)	0.500	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Foul Sewage per hectare (l/s)	0.000	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Additional Flow - % of Total Flow	0.000	Flow per Person per Day (l/per/day)	0.000

Number of Input Hydrographs 0 Number of Online Controls 3 Number of Offline Controls 0 Number of Storage Structures 0 Number of Time/Area Diagrams 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm)	18.000	Cv (Summer)	0.750
Region	England and Wales	Ratio R	0.358	Cv (Winter)	0.840

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

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S100	1440 Winter	1	+0%	1/960 Summer				26.605	1.938	0.000	0.02		1.1	FLOOD RISK	
2.000	S101	1440 Winter	1	+0%	1/960 Summer				26.605	1.680	0.000	0.00		0.0	FLOOD RISK	
1.001	S1	1440 Winter	1	+0%	1/960 Summer				26.605	2.013	0.000	0.00		1.2	FLOOD RISK	
3.000	S102	1440 Winter	1	+0%	1/960 Summer				26.605	1.680	0.000	0.00		0.0	FLOOD RISK	
1.002	JUNCTION 1	960 Summer	1	+0%					24.556	0.000	0.000	0.00		1.1	SURCHARGED*	
4.000	S103	1440 Winter	1	+0%	1/960 Summer				26.605	1.680	0.000	0.00		0.0	FLOOD RISK	
1.003	JUNCTION 2	960 Summer	1	+0%					24.548	0.000	0.000	0.00		0.9	SURCHARGED*	
5.000	PLOT01	60 Winter	1	+0%					24.500	-0.225	0.000	0.00		0.0	OK	
5.001	S104	60 Winter	1	+0%					24.450	-0.225	0.000	0.00		0.0	OK	
1.004	S2	1440 Winter	1	+0%	1/960 Summer				26.605	2.060	0.000	0.01		3.1	FLOOD RISK	
6.000	S105	1440 Winter	1	+0%	1/960 Summer				26.605	1.680	0.000	0.00		0.0	FLOOD RISK	
1.005	JUNCTION 3	960 Summer	1	+0%					24.537	0.000	0.000	0.01		4.3	SURCHARGED*	
7.000	PLOT02	60 Winter	1	+0%					24.426	-0.225	0.000	0.00		0.0	OK	
7.001	S106	60 Winter	1	+0%					24.376	-0.225	0.000	0.00		0.0	OK	

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Summary of Critical Results by Maximum Level (Rank 1) for Storm

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)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.006	S3	1440 Winter	1	+0%	1/960 Summer				26.605	2.104	0.000	0.01		4.3	FLOOD RISK	
8.000	S107	1440 Winter	1	+0%	1/960 Summer				26.605	1.680	0.000	0.00		0.0	FLOOD RISK	
1.007	JUNCTION 4	960 Summer	1	+0%					24.492	0.000	0.000	0.02		5.2	SURCHARGED*	
9.000	S110	60 Winter	1	+0%					29.250	-0.150	0.000	0.00		0.0	OK	
9.001	S4	15 Winter	1	+0%					27.357	-0.469	0.000	0.27		106.7	OK	
10.000	S111	60 Winter	1	+0%					27.645	-0.300	0.000	0.00		0.0	OK	
10.001	S112	60 Winter	1	+0%					27.545	-0.300	0.000	0.00		0.0	OK	
9.002	JUNCTION 5	15 Winter	1	+0%					27.202	-0.540	0.000	0.17		105.5	OK*	
11.000	S113	15 Winter	1	+0%					27.643	-0.267	0.000	0.03		2.0	OK	
9.003	S5	1440 Winter	1	+0%	1/240 Summer				26.605	3.465	0.000	0.04		8.9	SURCHARGED	
12.000	S108	60 Winter	1	+0%					24.900	-0.450	0.000	0.00		0.0	OK	
12.001	S109	60 Winter	1	+0%					24.800	-0.450	0.000	0.00		0.0	OK	
1.008	S6	1440 Winter	1	+0%	1/240 Summer				26.605	3.492	0.000	0.04		14.1	FLOOD RISK	
13.000	S114	1440 Winter	1	+0%	1/960 Summer				26.605	1.705	0.000	0.01		0.8	FLOOD RISK	
14.000	S115	1440 Winter	1	+0%	1/960 Summer				26.605	2.380	0.000	0.00		0.0	FLOOD RISK	
1.009	S7	1440 Winter	1	+0%	1/240 Summer				26.605	3.570	0.000	0.11		36.1	FLOOD RISK	
15.000	Factory MH	1440 Winter	1	+0%	1/480 Summer				26.605	2.730	0.000	0.01		4.0	FLOOD RISK	
16.000	EX Bonded MH	1440 Winter	1	+0%	1/960 Summer				26.606	2.170	0.000	0.01		3.8	SURCHARGED	
17.000	S116	1440 Winter	1	+0%	1/960 Summer				26.604	0.379	0.000	0.00		0.0	SURCHARGED	
17.001	S117	1440 Winter	1	+0%	1/960 Summer				26.605	0.480	0.000	0.00		0.0	SURCHARGED	
15.001	S8	1440 Winter	1	+0%	1/240 Summer				26.605	3.552	0.000	0.03		8.3	SURCHARGED	
1.010	S9	1440 Winter	1	+0%	1/240 Summer				26.605	3.581	0.000	0.06		26.3	SURCHARGED	
1.011	S10	1440 Winter	1	+0%	1/240 Summer				26.603	3.652	0.000	0.07		24.9	SURCHARGED	
18.000	S118	1440 Winter	1	+0%	1/960 Summer				26.602	1.602	0.000	0.00		0.0	FLOOD RISK	
18.001	S119	1440 Winter	1	+0%	1/960 Summer				26.602	1.702	0.000	0.00		0.0	FLOOD RISK	
1.012	JUNCTION 5	240 Winter	1	+0%					22.915	0.000	0.000	0.15		91.9	SURCHARGED*	
19.000	S120	1440 Winter	1	+0%	1/960 Summer				26.602	1.677	0.000	0.00		0.0	FLOOD RISK	
1.013	JUNCTION 6	240 Winter	1	+0%					22.901	0.000	0.000	0.15		91.4	SURCHARGED*	
20.000	S121	1440 Winter	1	+0%	1/960 Summer				26.602	1.677	0.000	0.00		0.0	FLOOD RISK	
1.014	JUNCTION 7	240 Winter	1	+0%					22.900	0.000	0.000	0.15		91.0	SURCHARGED*	
21.000	U-SLUNG 1	960 Summer	1	+0%					23.975	0.000	0.000	0.05		5.4	SURCHARGED*	
21.001	U-SLUNG 2	960 Summer	1	+0%					23.975	0.000	0.000	0.07		6.8	SURCHARGED*	
21.002	U-SLUNG 3	960 Summer	1	+0%					23.975	0.000	0.000	0.11		7.3	SURCHARGED*	
21.003	U-SLUNG 4	960 Summer	1	+0%					23.975	0.000	0.000	0.04		7.2	SURCHARGED*	
21.004	U-SLUNG 5	960 Summer	1	+0%					23.975	0.000	0.000	0.06		7.1	SURCHARGED*	
21.005	U-SLUNG 6	1440 Winter	1	+0%	1/480 Summer				26.602	2.627	0.000	0.03		3.4	FLOOD RISK	

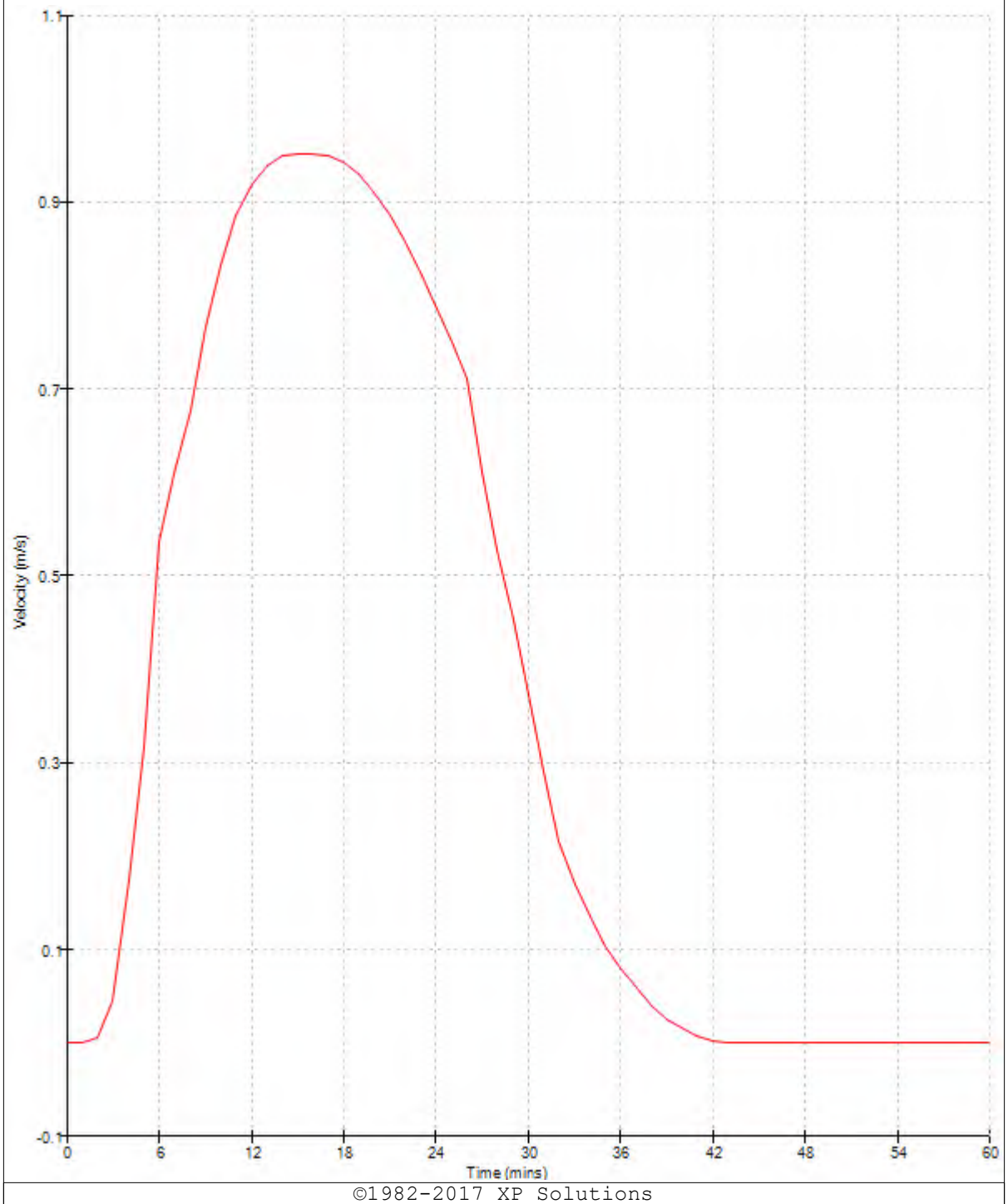
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Summary of Critical Results by Maximum Level (Rank 1) for Storm

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)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
22.000	S122	1440 Winter	1	+0%	1/960 Summer				26.602	1.452	0.000	0.00		0.2	FLOOD RISK	
21.006	S11	1440 Winter	1	+0%	1/480 Summer				26.602	2.652	0.000	0.02		3.4	FLOOD RISK	
1.015	S12	1440 Winter	1	+0%	1/120 Summer				26.602	3.933	0.000	0.07		27.8	FLOOD RISK	

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Graphs for Pipe 1.015 US/MH S12 (Storm)
15 minute 1 year Winter I+0%
Status: OK



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Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Manhole Headloss Coeff (Global)	0.500	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Foul Sewage per hectare (l/s)	0.000	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Additional Flow - % of Total Flow	0.000	Flow per Person per Day (l/per/day)	0.000

Number of Input Hydrographs 0 Number of Online Controls 3 Number of Offline Controls 0 Number of Storage Structures 0 Number of Time/Area Diagrams 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm)	18.000	Cv (Summer)	0.750
Region	England and Wales	Ratio R	0.358	Cv (Winter)	0.840

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

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S100	15 Winter	30	+0%					24.549	-0.118	0.000	0.67		46.2	OK	
2.000	S101	60 Winter	30	+0%					24.700	-0.225	0.000	0.00		0.0	OK	
1.001	S1	15 Winter	30	+0%					24.232	-0.360	0.000	0.20		57.4	OK	
3.000	S102	60 Winter	30	+0%					24.700	-0.225	0.000	0.00		0.0	OK	
1.002	JUNCTION 1	15 Winter	30	+0%					24.222	-0.334	0.000	0.09		54.1	OK*	
4.000	S103	60 Winter	30	+0%					24.700	-0.225	0.000	0.00		0.0	OK	
1.003	JUNCTION 2	15 Winter	30	+0%					24.222	-0.326	0.000	0.09		54.5	OK*	
5.000	PLOT01	60 Winter	30	+0%					24.500	-0.225	0.000	0.00		0.0	OK	
5.001	S104	60 Winter	30	+0%					24.450	-0.225	0.000	0.00		0.0	OK	
1.004	S2	15 Winter	30	+0%					24.221	-0.324	0.000	0.41		138.9	OK	
6.000	S105	60 Winter	30	+0%					24.700	-0.225	0.000	0.00		0.0	OK	
1.005	JUNCTION 3	15 Winter	30	+0%					24.216	-0.321	0.000	0.35		135.1	OK*	
7.000	PLOT02	60 Winter	30	+0%					24.426	-0.225	0.000	0.00		0.0	OK	
7.001	S106	60 Winter	30	+0%					24.376	-0.225	0.000	0.00		0.0	OK	

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Summary of Critical Results by Maximum Level (Rank 1) for Storm

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)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.006	S3	15 Winter	30	+0%					24.199	-0.302	0.000	0.59		187.2	OK	
8.000	S107	60 Winter	30	+0%					24.700	-0.225	0.000	0.00		0.0	OK	
1.007	JUNCTION 4	15 Winter	30	+0%					24.190	-0.302	0.000	0.56		180.0	OK*	
9.000	S110	60 Winter	30	+0%					29.250	-0.150	0.000	0.00		0.0	OK	
9.001	S4	15 Winter	30	+0%					27.551	-0.275	0.000	0.67		262.7	OK	
10.000	S111	60 Winter	30	+0%					27.645	-0.300	0.000	0.00		0.0	OK	
10.001	S112	60 Winter	30	+0%					27.545	-0.300	0.000	0.00		0.0	OK	
9.002	JUNCTION 5	15 Winter	30	+0%					27.336	-0.406	0.000	0.43		260.1	OK*	
11.000	S113	15 Winter	30	+0%					27.661	-0.249	0.000	0.07		5.0	OK	
9.003	S5	15 Winter	30	+0%	30/15 Summer				24.191	1.051	0.000	1.26		291.5	SURCHARGED	
12.000	S108	60 Winter	30	+0%					24.900	-0.450	0.000	0.00		0.0	OK	
12.001	S109	60 Winter	30	+0%					24.800	-0.450	0.000	0.00		0.0	OK	
1.008	S6	15 Winter	30	+0%	30/15 Summer				24.159	1.046	0.000	1.18		448.0	SURCHARGED	
13.000	S114	15 Winter	30	+0%					24.773	-0.127	0.000	0.62		38.1	OK	
14.000	S115	15 Winter	30	+0%					24.055	-0.170	0.000	0.00		0.3	OK	
1.009	S7	15 Winter	30	+0%	30/15 Summer				24.055	1.020	0.000	1.49		481.2	SURCHARGED	
15.000	Factory MH	15 Winter	30	+0%	30/15 Summer				24.138	0.263	0.000	0.48		169.8	SURCHARGED	
16.000	EX Bonded MH	15 Winter	30	+0%					24.296	-0.140	0.000	0.55		160.8	OK	
17.000	S116	60 Winter	30	+0%					26.000	-0.225	0.000	0.00		0.0	OK	
17.001	S117	60 Winter	30	+0%					25.900	-0.225	0.000	0.00		0.0	OK	
15.001	S8	15 Winter	30	+0%	30/15 Summer				24.037	0.984	0.000	1.06		333.7	SURCHARGED	
1.010	S9	15 Winter	30	+0%	30/15 Summer				24.013	0.989	0.000	1.54		723.3	SURCHARGED	
1.011	S10	15 Winter	30	+0%	30/15 Summer				23.816	0.865	0.000	2.19		745.7	SURCHARGED	
18.000	S118	60 Winter	30	+0%					24.700	-0.300	0.000	0.00		0.0	OK	
18.001	S119	60 Winter	30	+0%					24.600	-0.300	0.000	0.00		0.0	OK	
1.012	JUNCTION 5	30 Winter	30	+0%					22.915	0.000	0.000	1.16		703.5	SURCHARGED*	
19.000	S120	60 Winter	30	+0%					24.700	-0.225	0.000	0.00		0.0	OK	
1.013	JUNCTION 6	30 Winter	30	+0%					22.901	0.000	0.000	1.16		701.2	SURCHARGED*	
20.000	S121	60 Winter	30	+0%					24.700	-0.225	0.000	0.00		0.0	OK	
1.014	JUNCTION 7	15 Winter	30	+0%					22.900	0.000	0.000	1.23		743.6	SURCHARGED*	
21.000	U-SLUNG 1	60 Winter	30	+0%					23.975	0.000	0.000	0.60		60.8	SURCHARGED*	
21.001	U-SLUNG 2	60 Winter	30	+0%					23.975	0.000	0.000	0.77		70.2	SURCHARGED*	
21.002	U-SLUNG 3	30 Winter	30	+0%					23.975	0.000	0.000	1.60		110.2	SURCHARGED*	
21.003	U-SLUNG 4	15 Winter	30	+0%					23.895	-0.080	0.000	0.69		116.4	OK*	
21.004	U-SLUNG 5	15 Winter	30	+0%					23.883	-0.092	0.000	0.97		117.6	OK*	
21.005	U-SLUNG 6	15 Winter	30	+0%					23.852	-0.123	0.000	0.87		118.1	OK	

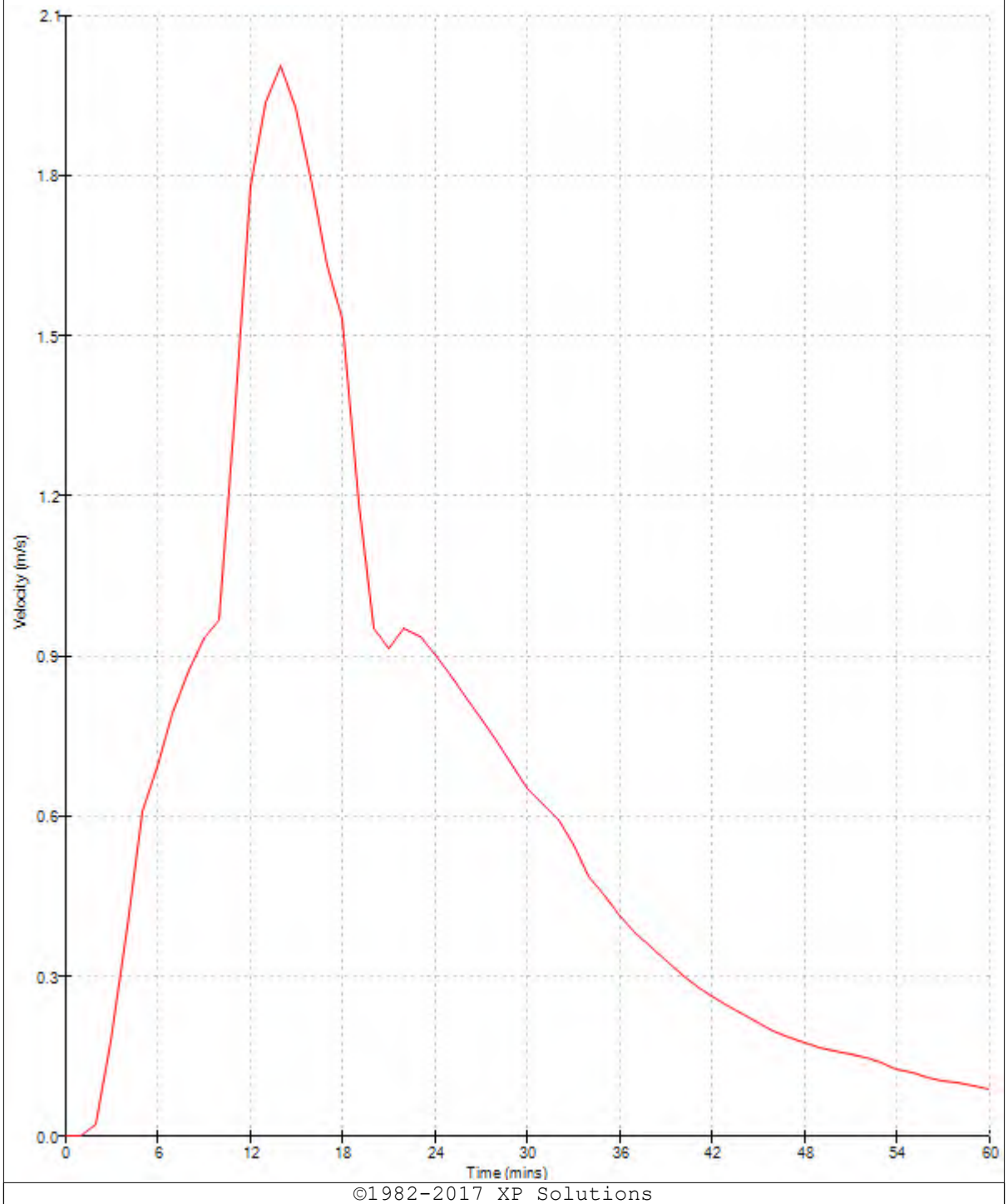
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Summary of Critical Results by Maximum Level (Rank 1) for Storm

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)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
22.000	S122	15 Winter	30	+0%					24.785	-0.365	0.000	0.08		13.5	OK	
21.006	S11	15 Winter	30	+0%					23.758	-0.192	0.000	0.63		123.7	OK	
1.015	S12	15 Winter	30	+0%	30/15 Summer				22.904	0.235	0.000	2.24		860.8	SURCHARGED	

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Graphs for Pipe 1.015 US/MH S12 (Storm)
15 minute 30 year Winter I+0%
Status: SURCHARGED



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Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Manhole Headloss Coeff (Global)	0.500	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Foul Sewage per hectare (l/s)	0.000	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Additional Flow - % of Total Flow	0.000	Flow per Person per Day (l/per/day)	0.000

Number of Input Hydrographs 0 Number of Online Controls 3 Number of Offline Controls 0 Number of Storage Structures 0 Number of Time/Area Diagrams 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm)	18.000	Cv (Summer)	0.750
Region	England and Wales	Ratio R	0.358	Cv (Winter)	0.840

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

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S100	1440 Winter	30	+0%	30/960 Summer				26.613	1.946	0.000	0.03		2.3	FLOOD RISK	
2.000	S101	1440 Winter	30	+0%	30/960 Summer				26.613	1.688	0.000	0.00		0.0	FLOOD RISK	
1.001	S1	1440 Winter	30	+0%	30/960 Summer				26.613	2.021	0.000	0.01		2.8	FLOOD RISK	
3.000	S102	1440 Winter	30	+0%	30/960 Summer				26.613	1.688	0.000	0.00		0.0	FLOOD RISK	
1.002	JUNCTION 1	960 Summer	30	+0%					24.556	0.000	0.000	0.01		4.2	SURCHARGED*	
4.000	S103	1440 Winter	30	+0%	30/960 Summer				26.613	1.688	0.000	0.00		0.0	FLOOD RISK	
1.003	JUNCTION 2	960 Summer	30	+0%					24.548	0.000	0.000	0.01		3.9	SURCHARGED*	
5.000	PLOT01	60 Winter	30	+0%					24.500	-0.225	0.000	0.00		0.0	OK	
5.001	S104	60 Winter	30	+0%					24.450	-0.225	0.000	0.00		0.0	OK	
1.004	S2	1440 Winter	30	+0%	30/960 Summer				26.613	2.068	0.000	0.02		7.4	FLOOD RISK	
6.000	S105	1440 Winter	30	+0%	30/960 Summer				26.613	1.688	0.000	0.00		0.0	FLOOD RISK	
1.005	JUNCTION 3	960 Summer	30	+0%					24.537	0.000	0.000	0.03		12.5	SURCHARGED*	
7.000	PLOT02	60 Winter	30	+0%					24.426	-0.225	0.000	0.00		0.0	OK	
7.001	S106	60 Winter	30	+0%					24.376	-0.225	0.000	0.00		0.0	OK	

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Summary of Critical Results by Maximum Level (Rank 1) for Storm

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)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.006	S3	1440 Winter	30	+0%	30/960 Summer				26.613	2.112	0.000	0.03		10.3	FLOOD RISK	
8.000	S107	1440 Winter	30	+0%	30/960 Summer				26.612	1.687	0.000	0.00		0.0	FLOOD RISK	
1.007	JUNCTION 4	960 Summer	30	+0%					24.492	0.000	0.000	0.05		16.9	SURCHARGED*	
9.000	S110	60 Winter	30	+0%					29.250	-0.150	0.000	0.00		0.0	OK	
9.001	S4	15 Winter	30	+0%					27.551	-0.275	0.000	0.67		262.7	OK	
10.000	S111	60 Winter	30	+0%					27.645	-0.300	0.000	0.00		0.0	OK	
10.001	S112	60 Winter	30	+0%					27.545	-0.300	0.000	0.00		0.0	OK	
9.002	JUNCTION 5	15 Winter	30	+0%					27.336	-0.406	0.000	0.43		260.1	OK*	
11.000	S113	15 Winter	30	+0%					27.661	-0.249	0.000	0.07		5.0	OK	
9.003	S5	1440 Winter	30	+0%	30/15 Summer				26.613	3.473	0.000	0.08		18.6	SURCHARGED	
12.000	S108	60 Winter	30	+0%					24.900	-0.450	0.000	0.00		0.0	OK	
12.001	S109	60 Winter	30	+0%					24.800	-0.450	0.000	0.00		0.0	OK	
1.008	S6	1440 Winter	30	+0%	30/15 Summer				26.612	3.499	0.000	0.08		31.3	FLOOD RISK	
13.000	S114	1440 Winter	30	+0%	30/960 Summer				26.611	1.711	0.000	0.03		1.9	FLOOD RISK	
14.000	S115	1440 Winter	30	+0%	30/480 Summer				26.610	2.385	0.000	0.00		0.0	FLOOD RISK	
1.009	S7	1440 Winter	30	+0%	30/15 Summer				26.610	3.575	0.000	0.11		34.3	FLOOD RISK	
15.000	Factory MH	1440 Winter	30	+0%	30/15 Summer				26.612	2.737	0.000	0.02		8.7	FLOOD RISK	
16.000	EX Bonded MH	1440 Winter	30	+0%	30/960 Summer				26.612	2.176	0.000	0.03		8.3	SURCHARGED	
17.000	S116	1440 Winter	30	+0%	30/960 Summer				26.610	0.385	0.000	0.00		0.0	SURCHARGED	
17.001	S117	1440 Winter	30	+0%	30/960 Summer				26.610	0.485	0.000	0.00		0.0	SURCHARGED	
15.001	S8	1440 Winter	30	+0%	30/15 Summer				26.610	3.557	0.000	0.06		18.2	SURCHARGED	
1.010	S9	1440 Winter	30	+0%	30/15 Summer				26.610	3.586	0.000	0.11		52.4	SURCHARGED	
1.011	S10	1440 Winter	30	+0%	30/15 Summer				26.607	3.656	0.000	0.16		55.5	SURCHARGED	
18.000	S118	1440 Winter	30	+0%	30/960 Summer				26.604	1.604	0.000	0.00		0.0	FLOOD RISK	
18.001	S119	1440 Winter	30	+0%	30/960 Summer				26.604	1.704	0.000	0.00		0.0	FLOOD RISK	
1.012	JUNCTION 5	30 Winter	30	+0%					22.915	0.000	0.000	1.16		703.5	SURCHARGED*	
19.000	S120	1440 Winter	30	+0%	30/960 Summer				26.604	1.679	0.000	0.00		0.0	FLOOD RISK	
1.013	JUNCTION 6	30 Winter	30	+0%					22.901	0.000	0.000	1.16		701.2	SURCHARGED*	
20.000	S121	1440 Winter	30	+0%	30/960 Summer				26.604	1.679	0.000	0.00		0.0	FLOOD RISK	
1.014	JUNCTION 7	30 Winter	30	+0%					22.900	0.000	0.000	1.16		702.2	SURCHARGED*	
21.000	U-SLUNG 1	30 Winter	30	+0%					23.975	0.000	0.000	0.85		85.9	SURCHARGED*	
21.001	U-SLUNG 2	30 Winter	30	+0%					23.975	0.000	0.000	1.13		103.2	SURCHARGED*	
21.002	U-SLUNG 3	15 Winter	30	+0%					23.975	0.000	0.000	1.76		121.2	SURCHARGED*	
21.003	U-SLUNG 4	960 Summer	30	+0%					23.975	0.000	0.000	0.09		15.9	SURCHARGED*	
21.004	U-SLUNG 5	960 Summer	30	+0%					23.975	0.000	0.000	0.13		15.8	SURCHARGED*	
21.005	U-SLUNG 6	1440 Winter	30	+0%	30/480 Summer				26.605	2.630	0.000	0.06		7.9	FLOOD RISK	

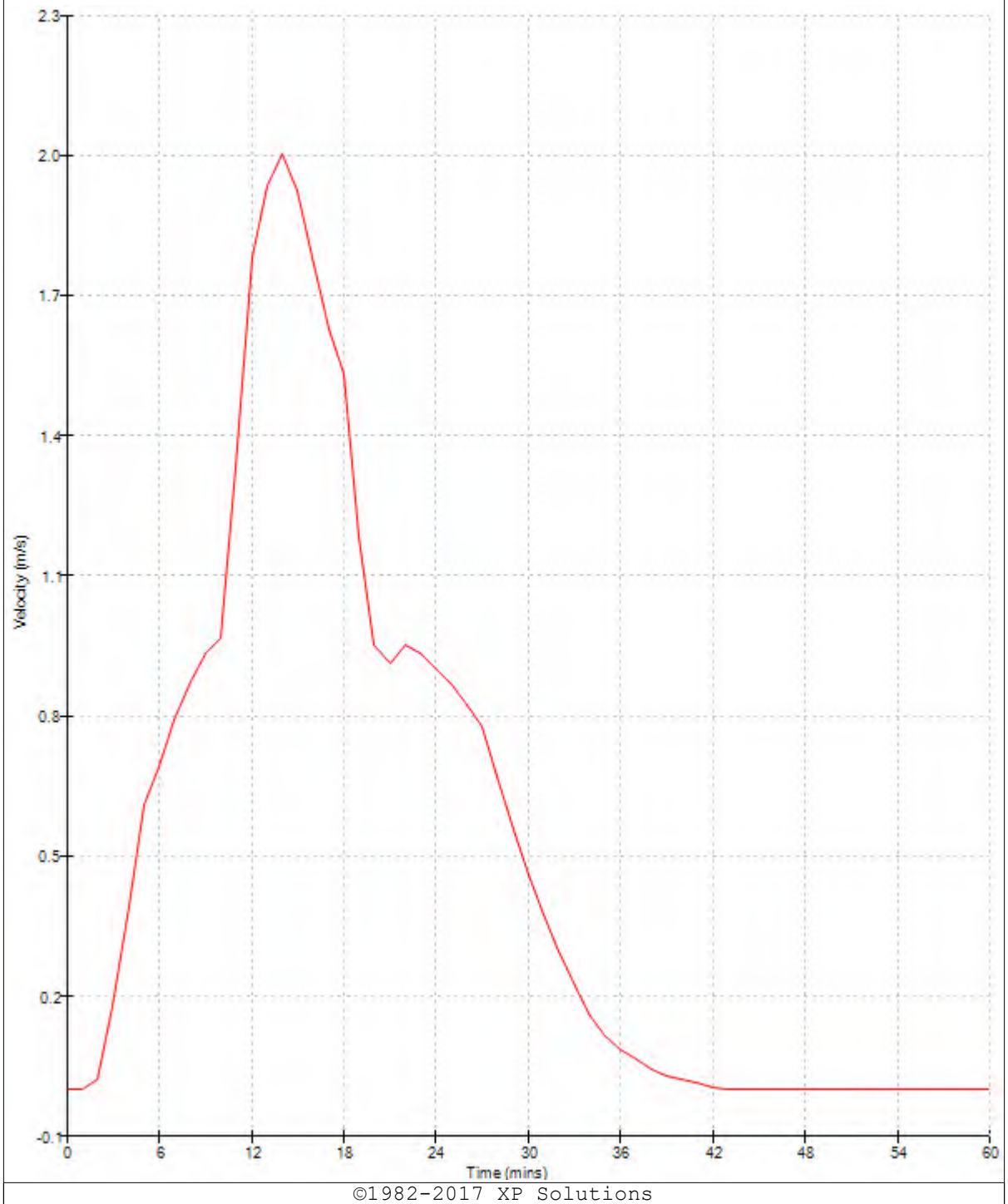
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Summary of Critical Results by Maximum Level (Rank 1) for Storm

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)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
22.000	S122	1440 Winter	30	+0%	30/960 Summer				26.605	1.455	0.000	0.00		0.6	FLOOD RISK	
21.006	S11	1440 Winter	30	+0%	30/480 Summer				26.605	2.655	0.000	0.04		8.3	FLOOD RISK	
1.015	S12	1440 Winter	30	+0%	30/15 Summer				26.604	3.935	0.000	0.16		63.2	FLOOD RISK	

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Graphs for Pipe 1.015 US/MH S12 (Storm)
15 minute 30 year Winter I+0%
Status: SURCHARGED



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Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Manhole Headloss Coeff (Global)	0.500	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Foul Sewage per hectare (l/s)	0.000	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Additional Flow - % of Total Flow	0.000	Flow per Person per Day (l/per/day)	0.000

Number of Input Hydrographs 0 Number of Online Controls 3 Number of Offline Controls 0 Number of Storage Structures 0 Number of Time/Area Diagrams 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm)	18.000	Cv (Summer)	0.750
Region	England and Wales	Ratio R	0.358	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	30

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)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S100	15 Winter	100	+30%	100/15 Summer				26.192	1.525	0.000	1.01		69.5	SURCHARGED	
2.000	S101	15 Winter	100	+30%	100/15 Summer				26.165	1.240	0.000	0.03		2.4	SURCHARGED	
1.001	S1	15 Winter	100	+30%	100/15 Summer				26.165	1.573	0.000	0.28		79.7	SURCHARGED	
3.000	S102	15 Winter	100	+30%	100/15 Summer				26.158	1.233	0.000	0.03		2.4	SURCHARGED	
1.002	JUNCTION 1	60 Winter	100	+30%					24.556	0.000	0.000	0.12		70.7	SURCHARGED*	
4.000	S103	15 Winter	100	+30%	100/15 Summer				26.156	1.231	0.000	0.03		2.4	SURCHARGED	
1.003	JUNCTION 2	60 Winter	100	+30%					24.548	0.000	0.000	0.13		77.1	SURCHARGED*	
5.000	PLOT01	60 Winter	100	+30%					24.500	-0.225	0.000	0.00		0.0	OK	
5.001	S104	60 Winter	100	+30%					24.450	-0.225	0.000	0.00		0.0	OK	
1.004	S2	15 Winter	100	+30%	100/15 Summer				26.155	1.610	0.000	0.57		194.6	SURCHARGED	
6.000	S105	15 Winter	100	+30%	100/15 Summer				26.148	1.223	0.000	0.03		2.4	SURCHARGED	
1.005	JUNCTION 3	60 Winter	100	+30%					24.537	0.000	0.000	0.37		139.9	SURCHARGED*	
7.000	PLOT02	60 Winter	100	+30%					24.426	-0.225	0.000	0.00		0.0	OK	
7.001	S106	60 Winter	100	+30%					24.376	-0.225	0.000	0.00		0.0	OK	

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Summary of Critical Results by Maximum Level (Rank 1) for Storm

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)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.006	S3	15 Winter	100	+30%	100/15 Summer				26.136	1.635	0.000	0.75		237.7	SURCHARGED	
8.000	S107	15 Winter	100	+30%	100/15 Summer				26.126	1.201	0.000	0.03		2.3	SURCHARGED	
1.007	JUNCTION 4	60 Winter	100	+30%					24.492	0.000	0.000	0.64		207.9	SURCHARGED*	
9.000	S110	60 Winter	100	+30%					29.250	-0.150	0.000	0.00		0.0	OK	
9.001	S4	15 Winter	100	+30%	100/15 Winter				27.829	0.003	0.000	1.13		438.3	SURCHARGED	
10.000	S111	60 Winter	100	+30%					27.645	-0.300	0.000	0.00		0.0	OK	
10.001	S112	60 Winter	100	+30%					27.545	-0.300	0.000	0.00		0.0	OK	
9.002	JUNCTION 5	15 Winter	100	+30%					27.447	-0.295	0.000	0.72		435.7	OK*	
11.000	S113	15 Winter	100	+30%					27.678	-0.232	0.000	0.11		8.4	OK	
9.003	S5	15 Winter	100	+30%	100/15 Summer				26.163	3.023	0.000	2.15		495.9	SURCHARGED	
12.000	S108	60 Winter	100	+30%					24.900	-0.450	0.000	0.00		0.0	OK	
12.001	S109	60 Winter	100	+30%					24.800	-0.450	0.000	0.00		0.0	OK	
1.008	S6	15 Winter	100	+30%	100/15 Summer				26.113	3.000	0.000	1.64		623.6	SURCHARGED	
13.000	S114	15 Winter	100	+30%	100/15 Summer				25.916	1.016	0.000	1.01		62.2	SURCHARGED	
14.000	S115	15 Winter	100	+30%	100/15 Summer				25.900	1.675	0.000	0.02		2.3	SURCHARGED	
1.009	S7	15 Winter	100	+30%	100/15 Summer				25.900	2.865	0.000	2.11		680.4	SURCHARGED	
15.000	Factory MH	15 Winter	100	+30%	100/15 Summer				25.931	2.056	0.000	0.65		231.6	SURCHARGED	
16.000	EX Bonded MH	15 Winter	100	+30%	100/15 Summer				26.241	1.805	0.000	0.77		224.7	SURCHARGED	
17.000	S116	60 Winter	100	+30%					26.000	-0.225	0.000	0.00		0.0	OK	
17.001	S117	60 Winter	100	+30%					25.900	-0.225	0.000	0.00		0.0	OK	
15.001	S8	15 Winter	100	+30%	100/15 Summer				25.746	2.693	0.000	1.43		448.5	SURCHARGED	
1.010	S9	15 Winter	100	+30%	100/15 Summer				25.707	2.683	0.000	2.25		1054.7	SURCHARGED	
1.011	S10	15 Winter	100	+30%	100/15 Summer				25.267	2.316	0.000	3.22		1092.9	SURCHARGED	
18.000	S118	15 Winter	100	+30%					24.728	-0.272	0.000	0.01		0.4	OK	
18.001	S119	15 Winter	100	+30%					24.735	-0.165	0.000	0.01		4.8	OK	
1.012	JUNCTION 5	120 Winter	100	+30%					22.915	0.000	0.000	1.00		607.2	SURCHARGED*	
19.000	S120	60 Winter	100	+30%					24.700	-0.225	0.000	0.00		0.0	OK	
1.013	JUNCTION 6	60 Winter	100	+30%					22.901	0.000	0.000	1.39		845.7	SURCHARGED*	
20.000	S121	60 Winter	100	+30%					24.700	-0.225	0.000	0.00		0.0	OK	
1.014	JUNCTION 7	60 Winter	100	+30%					22.900	0.000	0.000	1.40		846.0	SURCHARGED*	
21.000	U-SLUNG 1	120 Winter	100	+30%					23.975	0.000	0.000	0.67		68.0	SURCHARGED*	
21.001	U-SLUNG 2	120 Winter	100	+30%					23.975	0.000	0.000	0.94		86.3	SURCHARGED*	
21.002	U-SLUNG 3	120 Winter	100	+30%					23.975	0.000	0.000	1.35		93.1	SURCHARGED*	
21.003	U-SLUNG 4	60 Winter	100	+30%					23.975	0.000	0.000	0.84		141.3	SURCHARGED*	
21.004	U-SLUNG 5	60 Winter	100	+30%					23.975	0.000	0.000	1.17		141.2	SURCHARGED*	
21.005	U-SLUNG 6	15 Winter	100	+30%	100/15 Summer				24.106	0.131	0.000	1.55		209.3	SURCHARGED	

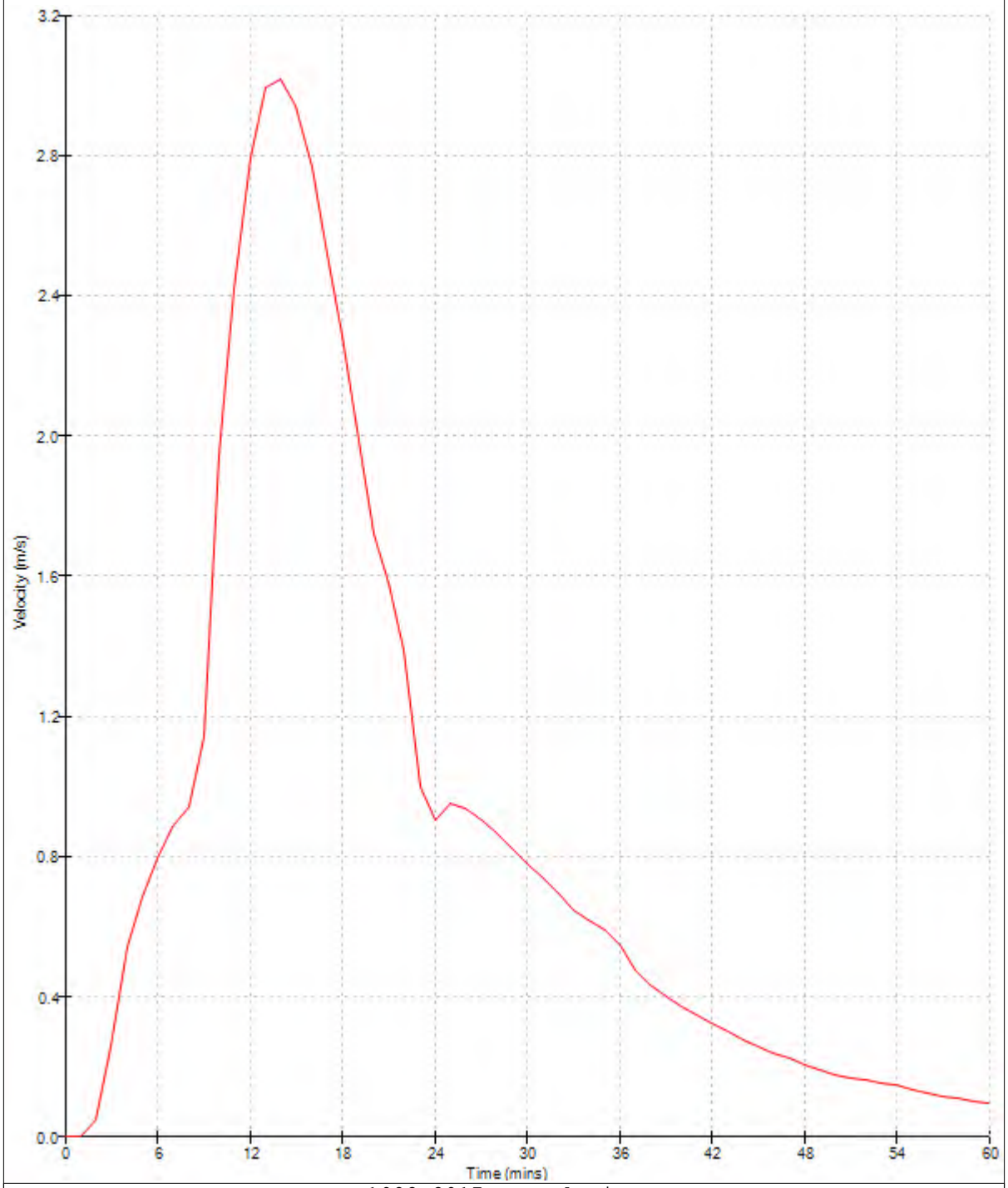
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Summary of Critical Results by Maximum Level (Rank 1) for Storm

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)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
22.000	S122	15 Winter	100	+30%					24.810	-0.340	0.000	0.13		22.7	OK	
21.006	S11	15 Winter	100	+30%	100/15 Summer				23.968	0.018	0.000	1.13		224.3	SURCHARGED	
1.015	S12	15 Winter	100	+30%	100/15 Summer				23.316	0.647	0.000	3.40		1305.7	SURCHARGED	

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Graphs for Pipe 1.015 US/MH S12 (Storm)
15 minute 100 year Winter I+30%
Status: SURCHARGED



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Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Manhole Headloss Coeff (Global)	0.500	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Foul Sewage per hectare (l/s)	0.000	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Additional Flow - % of Total Flow	0.000	Flow per Person per Day (l/per/day)	0.000

Number of Input Hydrographs 0 Number of Online Controls 3 Number of Offline Controls 0 Number of Storage Structures 0 Number of Time/Area Diagrams 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm)	18.000	Cv (Summer)	0.750
Region	England and Wales	Ratio R	0.358	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	30

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)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S100	1440 Winter	100	+30%	100/15 Summer				26.623	1.956	0.000	0.06		4.0	FLOOD RISK	
2.000	S101	1440 Winter	100	+30%	100/15 Summer				26.622	1.697	0.000	0.00		0.0	FLOOD RISK	
1.001	S1	1440 Winter	100	+30%	100/15 Summer				26.622	2.030	0.000	0.02		4.9	FLOOD RISK	
3.000	S102	1440 Winter	100	+30%	100/15 Summer				26.622	1.697	0.000	0.00		0.0	FLOOD RISK	
1.002	JUNCTION 1	15 Winter	100	+30%					24.556	0.000	0.000	0.18		108.2	SURCHARGED*	
4.000	S103	1440 Winter	100	+30%	100/15 Summer				26.622	1.697	0.000	0.00		0.0	FLOOD RISK	
1.003	JUNCTION 2	15 Winter	100	+30%					24.548	0.000	0.000	0.19		118.1	SURCHARGED*	
5.000	PLOT01	60 Winter	100	+30%					24.500	-0.225	0.000	0.00		0.0	OK	
5.001	S104	60 Winter	100	+30%					24.450	-0.225	0.000	0.00		0.0	OK	
1.004	S2	1440 Winter	100	+30%	100/15 Summer				26.622	2.077	0.000	0.04		12.8	FLOOD RISK	
6.000	S105	1440 Winter	100	+30%	100/15 Summer				26.622	1.697	0.000	0.00		0.0	FLOOD RISK	
1.005	JUNCTION 3	15 Winter	100	+30%					24.537	0.000	0.000	0.45		172.1	SURCHARGED*	
7.000	PLOT02	60 Winter	100	+30%					24.426	-0.225	0.000	0.00		0.0	OK	
7.001	S106	60 Winter	100	+30%					24.376	-0.225	0.000	0.00		0.0	OK	

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Summary of Critical Results by Maximum Level (Rank 1) for Storm

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)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.006	S3	1440 Winter	100	+30%	100/15 Summer				26.622	2.121	0.000	0.06		17.9	FLOOD RISK	
8.000	S107	1440 Winter	100	+30%	100/15 Summer				26.621	1.696	0.000	0.00		0.0	FLOOD RISK	
1.007	JUNCTION 4	15 Winter	100	+30%					24.492	0.000	0.000	0.80		257.8	SURCHARGED*	
9.000	S110	60 Winter	100	+30%					29.250	-0.150	0.000	0.00		0.0	OK	
9.001	S4	15 Winter	100	+30%	100/15 Winter				27.829	0.003	0.000	1.13		438.3	SURCHARGED	
10.000	S111	60 Winter	100	+30%					27.645	-0.300	0.000	0.00		0.0	OK	
10.001	S112	60 Winter	100	+30%					27.545	-0.300	0.000	0.00		0.0	OK	
9.002	JUNCTION 5	15 Winter	100	+30%					27.447	-0.295	0.000	0.72		435.7	OK*	
11.000	S113	15 Winter	100	+30%					27.678	-0.232	0.000	0.11		8.4	OK	
9.003	S5	1440 Winter	100	+30%	100/15 Summer				26.622	3.482	0.000	0.13		31.0	SURCHARGED	
12.000	S108	60 Winter	100	+30%					24.900	-0.450	0.000	0.00		0.0	OK	
12.001	S109	60 Winter	100	+30%					24.800	-0.450	0.000	0.00		0.0	OK	
1.008	S6	1440 Winter	100	+30%	100/15 Summer				26.621	3.508	0.000	0.14		52.9	FLOOD RISK	
13.000	S114	1440 Winter	100	+30%	100/15 Summer				26.618	1.718	0.000	0.05		3.2	FLOOD RISK	
14.000	S115	1440 Winter	100	+30%	100/15 Summer				26.617	2.392	0.000	0.00		0.0	FLOOD RISK	
1.009	S7	1440 Winter	100	+30%	100/15 Summer				26.617	3.582	0.000	0.18		58.3	FLOOD RISK	
15.000	Factory MH	1440 Winter	100	+30%	100/15 Summer				26.620	2.745	0.000	0.04		14.7	FLOOD RISK	
16.000	EX Bonded MH	1440 Winter	100	+30%	100/15 Summer				26.621	2.185	0.000	0.05		13.9	SURCHARGED	
17.000	S116	1440 Winter	100	+30%	100/960 Summer				26.617	0.392	0.000	0.00		0.0	SURCHARGED	
17.001	S117	1440 Winter	100	+30%	100/960 Summer				26.617	0.492	0.000	0.00		0.0	SURCHARGED	
15.001	S8	1440 Winter	100	+30%	100/15 Summer				26.617	3.564	0.000	0.10		30.8	SURCHARGED	
1.010	S9	1440 Winter	100	+30%	100/15 Summer				26.616	3.592	0.000	0.19		88.9	SURCHARGED	
1.011	S10	1440 Winter	100	+30%	100/15 Summer				26.611	3.660	0.000	0.28		94.2	SURCHARGED	
18.000	S118	1440 Winter	100	+30%	100/960 Summer				26.607	1.607	0.000	0.00		0.0	FLOOD RISK	
18.001	S119	1440 Winter	100	+30%	100/960 Summer				26.607	1.707	0.000	0.00		0.0	FLOOD RISK	
1.012	JUNCTION 5	60 Winter	100	+30%					22.915	0.000	0.000	1.39		845.1	SURCHARGED*	
19.000	S120	1440 Winter	100	+30%	100/960 Summer				26.606	1.681	0.000	0.00		0.0	FLOOD RISK	
1.013	JUNCTION 6	60 Winter	100	+30%					22.901	0.000	0.000	1.39		845.7	SURCHARGED*	
20.000	S121	1440 Winter	100	+30%	100/960 Summer				26.606	1.681	0.000	0.00		0.0	FLOOD RISK	
1.014	JUNCTION 7	60 Winter	100	+30%					22.900	0.000	0.000	1.40		846.0	SURCHARGED*	
21.000	U-SLUNG 1	30 Winter	100	+30%					23.975	0.000	0.000	1.41		141.8	SURCHARGED*	
21.001	U-SLUNG 2	30 Winter	100	+30%					23.975	0.000	0.000	1.93		176.8	SURCHARGED*	
21.002	U-SLUNG 3	30 Winter	100	+30%					23.975	0.000	0.000	2.75		189.2	SURCHARGED*	
21.003	U-SLUNG 4	30 Winter	100	+30%					23.975	0.000	0.000	1.12		188.6	SURCHARGED*	
21.004	U-SLUNG 5	30 Winter	100	+30%					23.975	0.000	0.000	1.55		188.0	SURCHARGED*	
21.005	U-SLUNG 6	1440 Winter	100	+30%	100/15 Summer				26.608	2.633	0.000	0.10		13.6	FLOOD RISK	

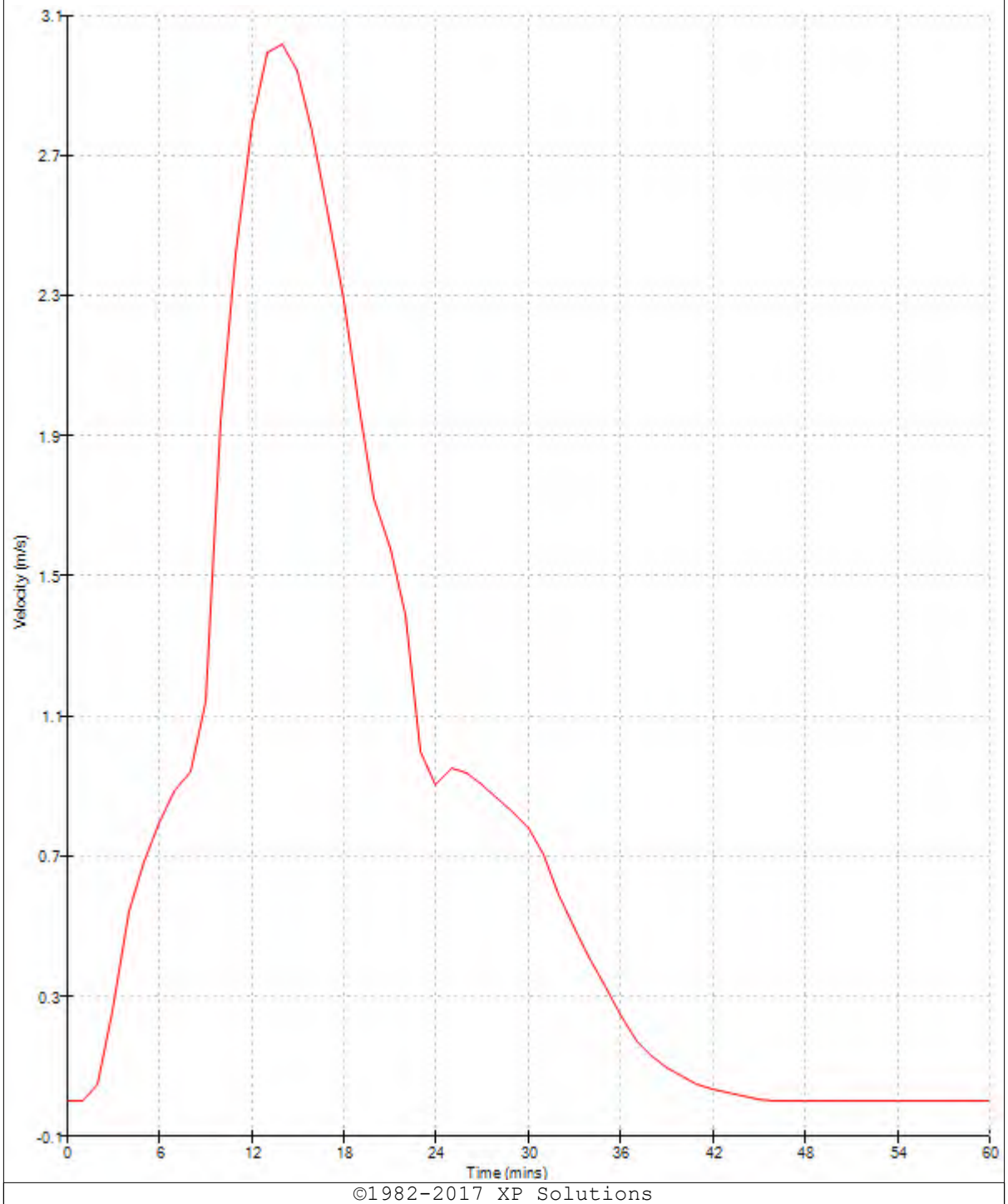
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Summary of Critical Results by Maximum Level (Rank 1) for Storm

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)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
22.000	S122	1440 Winter	100	+30%	100/960 Summer				26.608	1.458	0.000	0.01		1.0	FLOOD RISK	
21.006	S11	1440 Winter	100	+30%	100/15 Summer				26.608	2.658	0.000	0.07		14.5	FLOOD RISK	
1.015	S12	1440 Winter	100	+30%	100/15 Summer				26.606	3.937	0.000	0.28		108.1	FLOOD RISK	

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Graphs for Pipe 1.015 US/MH S12 (Storm)
15 minute 100 year Winter I+30%
Status: SURCHARGED



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Flood Risk Assessment & Surface Water Drainage Statement

On

St John's & Trinity Island

For

Manchester Quays Limited

July 2015

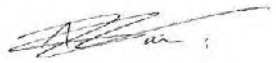
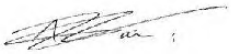
FLOOD RISK ASSESSMENT & SURFACE WATER DRAINAGE STATEMENT

ON

ST JOHN'S & TRINITY ISLAND

FOR

MANCHESTER QUAYS LIMITED

TITLE	NAME	SIGNATURE	DATE
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MANAGING DIRECTOR	RORY O'CONNOR		*21.07.15*
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1.0 INTRODUCTION

RºC Consulting has been commissioned by Manchester Quays Limited to provide a Flood Risk Assessment and Surface Water Drainage Statement (FRA&DS) for the St John's and Trinity Islands development sites. Within the St John's development site there are a number of sub-development plots which are as follows and all have been assessed within the context of this FRA:

- St John's Place
- Central Village
- Bonded Warehouse
- Granada House
- Riverside
- South Village
- Energy Centre

Although these sites are separate developments, due to their proximity, similarities in development types and the fact that they share a single drainage strategy, a single FRA&DS has been commissioned covering both. The FRA&DS will be written in accordance with the requirement of the National Planning Policy Framework (NPPF) and the associated Planning Policy Guidance (PPG). This document will review the following:

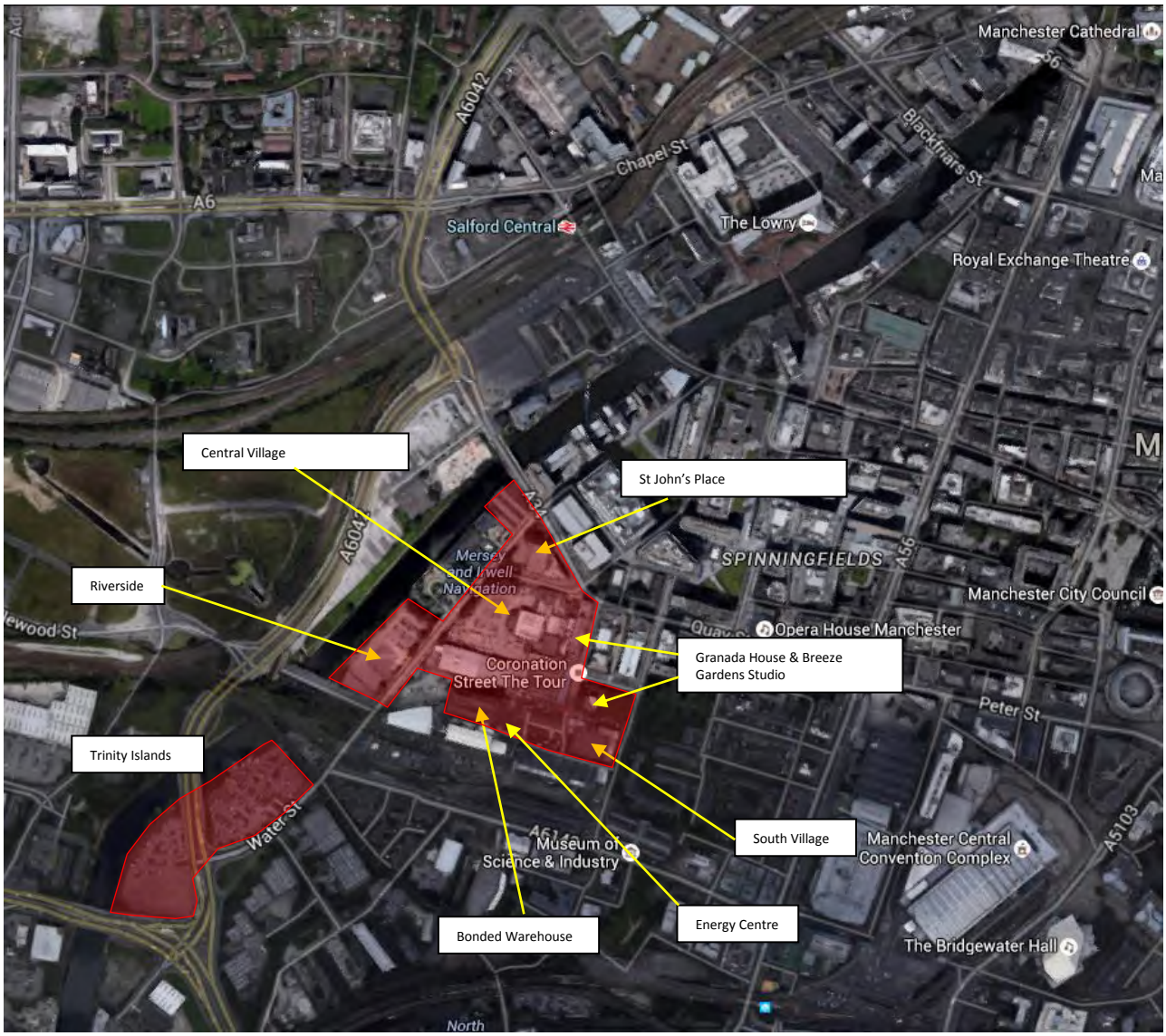
- Applicable policy
- The operation of the existing sites
- The proposed development and associated drainage strategy
- Flood risk to the site from various sources, and
- Residual flood risk and flood management including the ability to use SUD's

As part of the development of this FRA&DS, an approach has been made to United Utilities (UU) and the Manchester Ship Canal and a review carried out of the online Environment Agency mapping information.

The flooding information used within this report has been obtained from the Environment Agency online flood maps and as applicable the detailed information provided within the Manchester City, Salford City and Trafford Councils Level 2 Hybrid SFRA.

A general location plan is provided below:

Figure 1.0 – General Location Plan



2.0 POLICY AND GUIDANCE

2.1 National Planning Policy Frameworks

The National Planning Policy Framework (NPPF) was published in England in March 2012. As a result all previous Planning Policy Guidance (PPG) and Planning Policy Statements (PPS) were superseded. This included PPS25: Development and Flood Risk.

One of the key aims of the NPPF is to ensure that a flood risk is taken into account at all stages of the planning process to avoid inappropriate development in areas at risk of flooding and directing development away from areas of high risk.

It advises that where development is necessary in areas of higher 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.

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

These documents supersede the original technical guidance in March 2014 and expand on the content of the NPPF. This guidance borrows heavily from the NPPF technical guidance document with regard to:

- Usage classification
- Flood zone categories
- Flood zone / usage compatibility
- The sequential test
- The exception test

As part of the requirements noted within these guidance documents is how climate change should be assessed and accounted for within the context of the development. This was updated in February 2016 and is a function of;

- River Basin District
- Allowance Category: A factor dependent upon the usage of the development
- The likely development life span

2.3 Manchester City, Salford City and Trafford Councils Level 2 Hybrid (SFRA)

Local Planning Authorities are required to produce Local Development Frameworks, which are a portfolio of Local Development documents that collectively deliver the spatial planning strategy.

The Manchester City, Salford City and Trafford Councils Level 2 Hybrid SFRA is one of these documents and it assesses the risks associated with all types of flooding and is used to identify the amount and types of suitable developments permitted in an area.

The Manchester City, Salford City and Trafford Councils Level 2 Hybrid SFRA is a combined Level 1 and Level 2 SFRA providing both comments on the wider flooding issues and detailed review of specific development plots.

The above document was prepared by JBA Consulting on behalf of Manchester City, Salford City and Trafford Councils with the final version of the report issued in March 2011.

Within the SFRA the proposed site is not designated for redevelopment and is therefore not considered specifically within the SFRA Level 2 analysis.

2.4 CIRIA Guidance

2.4.1 C624 Development and Flood Risk

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

- Level 1 – Screening Study
- Level 2 – Scoping Study
- Level 3 – Detailed Study

For this proposed development, a Level 2 Scoping Study Flood Risk Assessment (FRA) combined with an overarching drainage statement is considered appropriate because of the size of the development, the proximity of the River Irwell and the fact basements for car parking are proposed.

2.4.2 C697 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 while enhancing the site wide Masterplan proposals.

On this site where the ground conditions have been reviewed, it has been ascertained that the use of infiltration as a method of disposal of surface water is not appropriate. As such two drainage strategies are in development, the first disposing to the River Irwell which flows within close proximity to the development site and the second discharging to the adopted sewer network which surrounds and crosses the development sites. A combined approach based on C697 using SuDS as a way of conveying the surface water around the site and providing the required attenuation volume will form the basis of the drainage strategy.

Currently no physical testing has been completed at the site and the statement above is based on the conclusion of desktop studies and third party borehole information obtained from the British Geological Society (BGS). Phase 2 intrusive investigations are required for each development plot and infiltration testing will be included. A review of the ability to include SUD's within the drainage strategy upon receipt of the result of said testing.

2.4.3 Sustainable Drainage Systems, Non-Statutory Technical Standards for Sustainable Drainage Systems

Within this document it is defined how the surface water discharge from the development should be derived and provides desirable discharge rates based on storm events. Peak flow rates and volume controls are discussed and consideration needs to be given within the design of the surface water system to ensure that both peak flows and volumes do not exceed that of the pre-development case.

3.0 EXISTING SITE

The sites for which this FRA&DS has been commissioned are located on the east side of Manchester City Centre.

The St John's site is centred around NGR: 383118E, 397965N.

The Trinity Islands is slightly further east of the City Centre and is centred around NGR: 382746E, 397811N.

General location plans showing the various development sites are provided in Appendix A.

Site Context – St. John's Place, Central and Southern Village, Riverside, Energy Centre, Bonded Warehouse and Granada House

The Site comprises developed land located entirely within the Castlefield Conservation area and within the former ITV Quay Street Estate in Manchester City Centre. The Site forms part of a wider Masterplan and Strategic Regeneration Framework for the area, which is to become known as St. John's.

The Site lies to the south of the Spinningfields commercial district of Manchester City Centre, an exemplar of City Centre economic regeneration and the largest City Centre office scheme in the UK.

To the south of the Site is Castlefield, an established residential district, set within the City's legacy industrial infrastructure and buildings and infused with leisure, retail and heritage attractions.

To the east of the Site is the St. John's Street district, a mixed-use district characterised by Georgian buildings used as residences and space for professional businesses including legal, accountancy and medical professions.

Immediately beyond the St. John's Street district is the south Deansgate area, which comprises retail facilities, leisure attractions and the City Centre's conference facilities.

To the west of the site there is a Grade II Listed Victoria and Albert Hotel and the River Irwell beyond, with hotels and office uses located on the other side of the river. There are a number of current mixed-use regeneration initiatives underway on the Salford side of the River Irwell, including Salford Central and Middlewood Locks (both mixed use schemes including office, retail and residential).

The wider Site is currently accessed by vehicles and pedestrians from Water Street and New Quay Street.

Area – St John's (The St John's Development is split into a number of application Sites)	**St John's Place** Area schedule: • St. John's Place – 1.3 hectares • South Village – 0.9 hectares • Central Village – 1.3 hectares • Riverside Tower 1 – 0.28 hectares • St. John's Energy Centre – 0.33 hectares • Bonded Warehouse - 0.71 hectares • Granada House - 2.42 hectares All of the proposed development sites as detail above lie within a Critical Drainage Area (CDA) as defined within the Manchester City Councils SFRA and noted by United Utilities.
Existing Surfacing and Current Use	**St. John's Place** The Site comprises previously developed land, with a site area of approximately 1.3 hectares. It is bounded by Quay Street and Manchester College to the north, Gartside Street and Quay Street to the east, Granada House and Studios (the subject of a live application for conversion into a hotel and associated event space – Manchester Grande), the proposed Central Village site / the Victoria and Albert Marriott Hotel to the south and Water Street and the River Irwell to the west. The Site comprises buildings and land associated with the former ITV Quay Street estate, including the two storeys Globe and Simpson building to the north. To the north and west, the Site includes Albert's Shed Warehouse, an early 20th Century warehouse that is semi-derelict and an area of surface car parking. Water Street (B5225), Quay Street and New Quay Street run through part of the Site. The Site is located within the Castlefield Conservation Area, but does not contain any Listed Buildings or Structures. The Site lies adjacent to, or in close proximity to a number of Listed Structures and non-designated heritage assets, including the Grade II Listed Victoria and Albert Hotel. The Site lies adjacent to a number of natural assets, including riverside frontages along the River Irwell.

	South Village The site comprises approximately 9,017 sqm (0.9ha) of developed land. It is bounded by Grape Street to the north, Lower Byrom Street to the east, the great western warehouse (Museum of Science and Industry – MOSI) and railway tracks to the south, with the A6134 (Liverpool Road) beyond and other buildings associated with Granada Studios (Bonded Warehouse and studio 2) to the west. The site currently comprises a number of existing buildings associated with the activities of the former Granada Studios including; offices, studios, performance space and the set of Coronation Street. Classified as a Grade II listed structure the Manchester and Salford junction canal runs below Grape Street, which forms the northern boundary of the development site within the vicinity of this development. The canal tunnel remains open and access is available into the tunnel via the adjacent Granada Studios HQ (Grande) building. Also located within the footprint of the South Village is the accumulator tower. **Central Village** The Site comprises previously developed land, with a site area of approximately 1.3 hectares. It is bounded by Quay Street and the Globe & Simpson Building and the proposed St John's Place development site to the north; Granada House and Studios (Proposed Manchester Grande development) to the east; the Bonded Warehouse (which has Planning Permission for conversion into workspace with retail and restaurant and café uses), Starlight Theatre and the Grade II Listed Colonnaded Railway Viaduct to the south; Water Street to the west. The site currently accommodates buildings and workshops associated with former use by ITV that are proposed to be demolished as part of the Manchester Grande proposals outlined above, including the Administration Block, Security Lodge, Workshop and Staff Welfare Building.

	The Site also incorporates an area surface car parking, which will be utilised on a temporary basis for the Manchester Grande in advance of the current proposals coming forward. The Site contains one listed structure, the Grade II Listed Manchester and Salford Junction Canal tunnel, which is located underground beneath part of the existing surface car park. The canal itself is largely filled in. The Site lies adjacent to, or in close proximity to a number of Listed structures and non-designated heritage assets, including the Grade I Listed Liverpool Road Station and Goods Warehouse, Grade II Listed Colonnaded Railway Viaduct, Grade II Listed Zig Zag Viaduct, Grade II Listed Victoria and Albert Hotel and the Bonded Warehouse. **Riverside** The Site comprises previously developed land, with a site area of approximately 0.28 hectares. It is bounded by the arm of the Manchester and Salford Junction Canal and car parking associated with the Victoria and Albert Marriott Hotel to the north; Water Street and the site of the proposed Central Village development to the east; surface car parking to the south and the River Irwell to the west. The Site also incorporates surface car parking that is currently in operation as a public pay and display car park. The Site lies adjacent to, or in close proximity to a number of Listed structures, including the Grade II Listed Victoria and Albert Hotel. The Site contains and lies adjacent to a number of natural assets, including riverside frontages. **St. John's Energy Centre** The Site comprises the existing Stage 2 building and associated annexes, which was purpose-built by ITV for filming use in the 1990s. The building is a two storey structure, which sits above the Grade II Listed Colonnaded Railway Viaduct and attached brick viaduct.

		The Site is located to the north of the Museum of Science and Industry complex; to the south of the Bonded Warehouse (which has Planning Permission for conversion into workspace with retail and restaurant and café uses); to the east of the Starlight Theatre; and to the west of the former Coronation Street set (which has Planning Permission for comprehensive redevelopment of the Central Village, a residential-led mixed use scheme) and MOSI's Great Western Warehouse. **Bonded Warehouse** The Site comprises of the existing building with a site area of 0.71 hectares. Located within the southern half of the wider St John's masterplan site, this existing building was constructed as part of the operational needs for the adjacent railway infrastructure. The railway is no longer operational in the context of the movement of goods and the Bonded Warehouse is now used as a film set. **Granada House** The Site covers an area of 2.72 hectares and consists of Granada House and its associated studios, temporary car park and breeze studio occupies the central and eastern areas of the wider Street John's masterplan footprint. The site is bounded by Quay Street to the north, Atkinson Street to the east, Grape Street to the south and a staff car park with Water Street beyond the west.
Boundaries	North / Northeast	St John's Place – New Quay Street Core Site – Quay Street
	South / Southeast	St John's Place – Quay Street and the Victoria and Albert Marriot Hotel Core Site – The South Village, The Bonded Warehouse and the Museum of Science and Industry
	East	Core Site – The Grande Hotel
	West	St John's Place – River Irwell Core Site – River Irwell
Access	Vehicles	Access for vehicles is restricted to the to specific entrance point which is controlled.
	Pedestrians	St John's Place – There is limited access from the western bank of the River Irwell and from Water Quay. Core Site – As the site is still operating albeit at a much reduced occupancy pedestrian access is controlled on to site specific locations.

More detailed site plans for aforementioned development plots are provided within Appendix B.

With reference to flood mapping obtained from the Environmental Agency online flood mapping the St John's development site is identified as being located in both flood zone 1 and 2. Flood zone 1 is defined within the NPPF as a site having less than a 1 in 1000 (<0.1%) probability of river or coastal flooding in any one year. This is considered as a low probability. Flood zone 2 is defined within the NPPF as a site having between a 1 in 100 and 1 in 1000 (1% - 0.1%) probability of river or coastal flooding in any one year. This is considered as a medium probability.

An extract from the Environmental Agency online flood maps is contained in Appendix C.

Site Characteristics and Land Use: Trinity Islands

The Site is located entirely within the Castlefield Conservation Area and within the former ITV Estate and Landholdings in Manchester City Centre. The Site forms part of a wider Masterplan and Strategic Regeneration Framework for the area and is located to the west of the core St. John's Masterplan site – divided by the A6042.

The north of the site is bordered by the River Irwell, beyond which a number of regeneration initiatives are currently underway, including Salford Central and Middlewood Locks (both mixed use schemes including office, retail and residential). Immediately to the west of the River Irwell is a current development site, Wilburn Street, which comprises a mixed-use residential-led scheme of circa 490 apartments including a tall building of up to 21 storeys.

Bordering the Site to the north east is a railway viaduct, which the new Ordsall Chord rail link (under construction) will connect into. Beyond this lies the main area of the former ITV Quay Street estate and buildings and structures associated with the Museum of Science and Industry.

To the east of the Site is Castlefield, an established residential district with leisure, retail and heritage attractions including Grade I and II Listed Buildings and Structures associated with the Liverpool Road Station and railway. Beyond this lies the Civic Quarter, the city centre's principal conferencing district which is also an emerging commercial centre.

To the south lies industrial land uses as part of the Castlefield / Water Street Industrial Estate. Beyond this lies the Bridgewater Canal and Deansgate Castlefield Metrolink stop, providing access to the wider Metrolink network, and Deansgate train station which allows access to local train services. The west of the Site is also bordered by the River Irwell, beyond which lies a budget hotel, the Regent Road Retail Park (including a Sainsburys and various other large format retail units), Ordsall, and Salford Quays.

Area		The gross area of the site is 1.79ha. In accordance with the St. John's Masterplan, the proposals involve comprehensive redevelopment of the site to provide a new residential-led, mixed-use neighbourhood, comprising residential, restaurant, retail, bar, public realm, landscaping and other amenity uses. The proposals will come forward as a separate planning application in 2016. The existing site is located within a Critical Drainage Area (CDA).
Existing Surfacing and Current Use		When reviewing the existing development site using aerial photographs, online historic maps and also having walked the majority of the site. The site was previously fully developed. The buildings have now been demolished but the area is now used as a car park. The sites are currently temporarily in use by Network Rail as compounds associated with the delivery of the Ordsall Chord. The car park has an impermeable surface and there is no notable soft landscaping, other than a strip which runs along the boundary with the River Irwell.
Boundaries	North	Railway Viaduct which serves the Museum of Science and Industry
	South	The road bridge which carries the A57 up and over the River Irwell
	East	Water Street
	West	River Irwell
Access	Vehicles	Access for vehicles is restricted to 1 single point of access from Water Street
	Pedestrians	The site is fully secured with pedestrians using the same controlled access as for vehicles.

A more detailed site plan for Trinity Islands is provided within Appendix D.

With reference to flood mapping obtained from the Environmental Agency online flood mapping, the Trinity Islands site is identified as being located in both Flood Zone 2. Flood zone 2 is defined within the NPPF as a site having between a 1 in 100 and 1 in 1000 (1% - 0.1%) probability of river or coastal flooding in any one year. This is considered as a medium probability.

The nearest watercourse to the development is the River Irwell which flows along the western boundary of both the St John's and Trinity Field developments. The classification of this River is Tertiary and it is owned by the Navigation Authority in this case the Manchester Ship Canal Company (MSCC). All agreements in terms of discharge allowances and consents will be negotiated and agreed with the MSCC.

Topography - St John's

The site in general falls from east to west towards the River Irwell and also from south east to northwest. The highest part of the site is set at a level of approximately 29.5m and the lowest identified point adjacent to the River Irwell is at a level of 25.0m.

Topography - Trinity Islands

Generally flat, this site falls by 1.5m from east to west which is diagonally across the development footprint. The highest part of the site is adjacent to Water Street at a level of 26.4. The lowest part of the site is adjacent to the River Irwell at a level of 24.2m.

A copy of the topographical survey for both sites is contained within Appendix E.

A site wide phase 1 desk study has been completed and an intrusive investigation completed for the Southern Village site. The results of which have confirmed the site is underlain by relatively shallow fluvio glacial sand and gravels underlain by the Principal Sandstone bedrock aquifer. The site is not said to be located within any Environment Agency groundwater source protection zones, although the River Irwell water course is present along the sites western boundary.

Theoretically the use of soakaway drainage methods could be applied to the site (subject to completion of the infiltration test). However, from the intrusive investigation completed for the South Village groundwater was encountered at a depth of 7.0m below ground level. Based on the typical hydraulic gradient of the site this depth will only reduce as you approach the River Irwell. This is likely to constrain infiltration potential, water storage and drain down times which are crucial in the operation of soakaways when they are required to address the run-off associated multiple storms occurring in a truncated timescale. In addition, the site has a long standing industrial heritage and the use of infiltration techniques has the potential to mobilise sources of contamination within site soils which could, in turn, have an impact on surface water quality with the adjacent River Irwell.

When reviewing the underlying ground conditions with regard to both Ground Vulnerability and Aquifers the site classification is split:

- Bedrock Aquifer: The whole site is defined as a principal aquifer
- Superficial Aquifer: The site is classed as a secondary aquifer
- Groundwater Vulnerability: The site is classified as a major aquifer with variable permeability
- Groundwater Source Protection: The site is not located within any groundwater source protection zones

As advised in the site description section above, both the St John's and Trinity Islands are either developed or have been developed previously and are therefore defined as being "Brownfield" Sites.

The existing discharge limits for Brownfield sites can be determined in two ways, the first through the development of a hydraulic model for the existing network which can then be interrogated. The alternative where the existing drainage network is not available is to use calculated rainfall intensity. In both cases the 1 in 30 year storm event is used to derive the flow rates.

Sewer records for the development site has been obtained from United Utilities and these identify a number of combined sewers of varying sizes running both around the periphery of the development and also crossing the development. The sewer records also identify three Combined Sewer Overflows. These connect onto the main trunk sewers with a run within Water Street and across the St John's riverside development site before discharging to the River Irwell.

A copy of the United Utilities sewer records is provided in Appendix F.

The local planning authority (LPA) for this development is Manchester City Council, who is also the Lead Local Flood Authority.

4.0 DEVELOPMENT PROPOSALS

When reviewing the proposed Masterplans for the developments contained within Appendix B and D, it identifies the sites as having the following usages:

Proposed St. John's Place

The proposed development involves the demolition of the existing buildings on site, including the Globe and Simpson Building and Albert Shed, in advance of the comprehensive redevelopment of the site for new residential and hotel use, with associated public realm and car parking.

The scheme comprises four zones or elements, which in summary can be described as follows:

Zone 1: a tall building of up to 52 storeys (approximately 195m above ordnance datum), with basement car parking and plan areas. The building will incorporate circa 12 levels of hotel use (providing approximately 180 bedrooms) and circa 35 levels of residential use (providing approximately 287 units). Residential units will provide a range of 1, 2 and 3 bedrooms, with some over duplex levels, and 4 penthouses.

Zone 2: is a serviced apart-hotel of up to ground plus 7 storeys, with a restaurant use at ground and mezzanine floor.

Zones 3 and 4: comprise apartment units in two buildings of up to ground plus 17 and ground plus four storeys. Approximately 100 residential units will be provided, with the mix ranging from 1 to 3 bedrooms. Retail floor space (Use Classes A1, A2, A3 or A4) will be provided at ground and mezzanine floors.

Proposals – Southern Village

The proposals for South Village include the delivery of a low-rise, intimate, mixed-use "Village" of 4 to 7storey building forms, which reintroduces the 'tight knit' urban grain that was historically prevalent in this area.

The Village incorporates a vertical layering of uses including workspace and retail at the lower levels, together with residential uses and terraced gardens above. This mix of uses will, provide activity 24 hours, 7 days a week, and create a vibrant new City Centre neighbourhood.

The workspace will be aimed at Manchester's emerging economic growth sectors, including creative industries and TMT. The retail space has been designed around small units, with shopfronts of no more than 10 feet in width, which will be supported by flexible and affordable rents.

Proposals - Central Village

Whilst the site currently incorporates a number of existing buildings associated with its former use as the ITV television studios, it is anticipated that these will be demolished as part of an earlier phase of development (known as Manchester Grande). Therefore, the Proposed Development is likely to involve only a minimal amount of demolition, potentially including the perimeter wall to the site and the former Granada Studios entrance.

The proposals incorporate a tall building for residential use of up to 34 storeys, together with a lower rise 6-8 storey element that will incorporate a mix of retail, workspace and residential use. New public realm, car and cycle parking will also be provided.

The tower will provide 264 residential units, ranging from 1 to 3 bedrooms, with a number of duplex units and penthouses. A restaurant and café use and resident amenity space will be included at lower levels.

The lower rise element of Central Village will comprise six separate building forms, ranging from 7 to 9 storeys in height. Similarly to the proposals for South Village, this element of the scheme includes a layering of uses with retail at ground floor, office and workspace uses in the middle and residential above. A seventh building of 6 storeys, located opposite to the Bonded Warehouse, will provide retail and workspace uses only. In total, the following approximate amounts of floor space will be provided across this element of the scheme:

- Retail: 3,715 sq.m. (GIA)
- Workspace: 15,950 sq.m. (GIA)
- Residential: 60 units

Basement car parking will be provided underneath the area of lower rise element of Central Village, with approximately 600 spaces that will serve this and wider parts of the St. John's Masterplan, including Bonded Warehouse and Manchester Grande.

Cycle parking will be provided for each element of the scheme, within the basement areas.

Proposals – Riverside

The Riverside proposals incorporates a tall building for residential use of up to 40 storeys, together with cycle parking at ground floor and the first phase of a new public riverside park and amenity space.

Riverside Tower 1 will provide 320 residential units, ranging from 1 to 3 bedrooms, with a number of duplex and triplex units and penthouses. A restaurant and café use and resident amenity space will be included at lower levels.

Proposals – St. John's Energy Centre

The Energy Centre comprises a gas-powered combined heat and power facility, which will sit largely within the existing Stage 2 Building and will provide heat and power for the development across the St John's Masterplan. The proposal includes for a number of new external features to the building, including a 30 metre flue that will sit to the south east corner and a new glazed entrance vestibule to the north elevation. In addition, the south elevation (facing MOSI) will incorporate architectural features including pockets of glazing to enable views into the energy centre.

Proposal – Bonded Warehouse

The Bonded Warehouse and adjoining outbuildings are currently vacant and have most recently been used by ITV as offices and studios prior to their relocation to Media City.

It is proposed to deliver a series of works to facilitate its re-use, retaining the office use on the upper floors in fully refurbished accommodation and targeting to introduce an appropriate combination of retail, restaurant, bar uses and potentially further office uses on the lower floors. The office element will provide highly flexible workspace with a number of options to sub-divide the space to suit modern occupiers.

It is proposed that by diversifying the uses within the Bonded Warehouse, a mixed-use development will be created which will be aligned with the wider ambition for St John's as a sustainable City Centre neighbourhood.

Proposal – Granada House

The proposals will deliver a 150-bed hotel ran by a high-profile operator alongside associated facilities. A private-membres club with associated food and beverage facilities will occupy space within the building and a new eight-storey office building geared towards co-working and start-ups will be erected on site. The proposals also include the revitalisation of the existing Studios as commercial spaces and the renovation of the existing 'M1' service corridor. In addition, the scheme includes improvement works for the existing Breeze Studio and Gardens on Great John Street.

Proposals – Trinity Islands

The proposals involve comprehensive redevelopment of the site to provide a new residential-led, mixed-use neighbourhood comprising residential, restaurant, retail, bar, public realm; landscaping and other amenity uses (the 'Proposed Development').

The Proposed Development will comprise five residential blocks, seen as a family of buildings, which sit on two park-topped podiums. The buildings vary in height: the two buildings on Site C, named V & W for reference, are 30 & 39 storeys respectively; whilst on Site D the three buildings, X, Y & Z, are 39, 30 & 24 storeys in height.

The podium levels will incorporate a mix of retail, gym, restaurant, café and bar uses at ground floor together with two levels of residential car parking above. At the top of each podium a selection of residential amenity and commercial uses are accommodated, including retail, restaurant, bar, amenity and social uses to support the residential community above. In addition, on both sites podium-level parks are proposed, with trees, landscaping and water features, linked by a pedestrian bridge over Trinity Way.

The five towers are proposed to accommodate residential uses, consisting of 1 and 2 bedroom apartments.

The approximate mix of uses is set out below:

- Residential – 1,233 units
- Retail and community – 6,300 sq m
- Educational facility – 2,650 sq m
- Public realm and landscaping – 10,730 sq m. (including podium level)
- Car parking – circa 600 residential spaces

Under the PPG "Table 2 – Flood Risk Vulnerability Classification" which accompanies the NPPF the usages noted above are defined as follows:

Commercial, Retail and Car Parking – "Less Vulnerable"

Residential (including hotels) – "More Vulnerable"

As identified previously the worst case flood zone classification for both development sites is Flood Zone 2.

Through the PPG Table 3 "Flood risk vulnerability and flood zone 'compatibility' these types of usage classification in this level of flood zone is considered appropriate. A copy of Table 3 has been provided below, which confirms compatibility.

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

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

The table below provides a plot specific flood compatibility review comparing specific usages against flood zone classification for each of the development plats:

Sub Development Plot	Flood Zone	Usage	Compatibility
St Johns Place	2	More Vulnerable*	✓
Central Village	2	More Vulnerable*	✓
Granada HQ	1	More Vulnerable*	✓
Southern Village	1	More Vulnerable*	✓
Bonded Warehouse	1	Less Vulnerable*	✓
Riverside	2	More Vulnerable*	✓
Trinity Islands	2	More Vulnerable*	✓

*In all cases the usage has been defined based on the worst case scenario usage included within the development proposals. In all cases however the More vulnerable usages are confined to the upper floors within the development. Less Vulnerable usages are proposed at Ground Floor.

The fact that the site is considered appropriate means that the sequential test has been passed and as such there is no requirement to apply the second stage of the assessment, the exception test.

At the time of writing this FRA&DS a preliminary site level strategy has been determined but only in consideration of the setting of preliminary building levels and how they will respond to the following;

- Tie into the existing adopted highway which in general forms the boundaries of the development site
- In the case of the St John's development, address the 5m change in the level that occurs across the development site
- Where considerable changes are proposed to the existing ground levels continue to provide the necessary cover above the adopted sewers which run across the development site

As touched on previously in section 3.0 Topographic Description, there are a series of adopted highways which form the boundaries of the wider development footprint. These adopted highways will remain at their current levels and the proposed development will tie into the back of pavement levels.

The setting of development ground floor levels will therefore have to account for the points of tie-in with the adopted footways and the requirements to provide DDA compliant access. This will limit in certain locations the ability to raise the buildings ground floor level to a point which sits above the available flood level information as supplied by the Environment Agency. This strategy in setting the building levels has been discussed and agreed with the Lead Flood Authority – Manchester City Council.

The preliminary ground floor levels for the individual development plots are as follows;

Sub Development Plot	Level	Constraint
St Johns Place – East of Water Street	26.9m	Sits at or above the predicted 1 in 100 yr plus climate change flood level.
St Johns Place – West of Water Street	Awaited	Subject to scheme sign-off
Central Village	26.9m	There are some areas within the development which sit below this level due to the requirement to provide a level access out to external areas which are at a lower level. The effected areas are defined as "less vulnerable use" commercial units and there will be flood resilience built into the design and servicing of these units.
Granada House	Awaited	Subject to scheme sign-off
Southern Village	Awaited	Subject to scheme sign-off

Bonded Warehouse	Awaited	Subject to scheme sign-off
Riverside	Awaited	Subject to scheme sign-off
Trinity Islands – Site C	25.7m	Sits below the advised flood level by some 1.2m. The constraint is the requirement to tie into Water Street and maintain DDA access compliance. The effected areas are defined as "less vulnerable use" commercial units and there will be flood resilience built into the design and servicing of these units.
Trinity Islands – Site D	25.2	Sits below the advised flood level by some 1.7m. The constraint is the requirement to tie into Water Street and maintain DDA access compliance. The effected areas are defined as "less vulnerable use" commercial units and there will be flood resilience built into the design and servicing of these units.

These are the ground floor levels that can be achieved while maintaining a DDA compliant access onto the existing highway infrastructure which is to be retained and which serves the various development plots.

5.0 PROPOSED SURFACE WATER STRATEGY

This FRA&DS will be submitted as one of two. This FRA covers the following areas;

- St John's Place
- Trinity Islands
- Southern Village
- Central Village
- The Riverside
- Energy Centre
- Bonded Warehouse
- The Manchester Grande

The second FRA will cover the Factory development. Although separate in terms of planning application the drainage strategy will cover the entire site.

When reviewing the strategy for the disposal of surface water, due cognisance needs to be taken of the hierarchy for discharge as defined in the PPG paragraph 80.

Preferred Discharge Location – To Ground

As defined previously the ground conditions prohibit the use of infiltration as a method of disposal for any surface water run-off generated by the development.

As noted in the previous section 3.0 the potentially high water table can limit the performance of infiltration methods of surface water disposal. When teamed with the potential for ground contamination, the provision of significant areas of basement (namely to; St John's Place, Central Village, Riverside and Trinity Islands) and the associated leachate issues the use of soakaways has been precluded.

Second Discharge Option – To Watercourse

The nearest watercourse is the River Irwell, which runs along the western development boundary of both developments.

Last Option – To Sewer (1st Option to Surface Water Network, if Available. 2nd Option to Combined Sewer)

Running around both developments and in the case of the St John's development running through the development are a number of United Utilities adopted sewers. These sewers are combined and are various sizes, ranging from 225mm to in excess of 1.0m.

Based on the hierarchy above there are two surface water drainage strategies which are currently under investigation to determine if they are achievable.

The preferred option would be to discharge all the surface water from the development sites in to the River Irwell. This would require the installation of a dedicated private surface water network which would pick up the generated flows and discharge them through the creation of a number of new outfalls into the River Irwell. Through initial discussions with the navigation authority (Manchester Ship Canal Company – MSCC) it is likely that there would be no requirement to limit the peak flows but there would be a requirement to limit the discharged velocity. In order to prevent the outfall interfering with craft using the River Irwell the flow velocity cannot exceed 3m/s.

The possibility of using an un-restricted outfall in to the River Irwell has also been discussed with the Lead Flood Authority, Manchester City Council. They have advised that they would have no objection to the proposed. This agreement however did carry the following caveats;

1. Formal Agreement – Peel / Manchester Ship Canal
2. Confirmation that the proposed outfall will not have a detrimental effect on the existing spur of the Manchester and Salford junction canal which still connects to the River Irwell

In order to achieve the above the following would need to be determined:

1. The ability to provide a network with the necessary falls whilst complying with the level constraints dictated by the River Irwell and the requirement to locate the outfall 300mm above the normal water level
2. Water Street which is an adopted highway crosses the St John's Development. In order to outfall into the River Irwell there would be a need to lay the outfall pipes through this highway. The installation of this private sewer within the adopted highway would require entering into a licence agreement with Manchester City Council's highways department
3. Noted previously is the fact that the development sites have adopted sewers running around the periphery and in the case of St John's through the development. These adopted sewers create a level constraint which would need to be overcome through the design of the private sewer network

In accordance with the requirements of DEFRA's - SuD's Non-statutory technical standards for SuD's, section S1 the stretch of the River Irwell which passes to the west of the development site is hydraulically modelled and the associated out of channel flood risk is defined by the Manchester Ship Canal Company (MSC). The ability to provide a free discharge is subject to a final agreement that the River Irwell (Body of Water) can accept un-restricted flows from the proposed development without an increase in flood risk.

Based on the above, the resultant surface water from the development sites drain as follows:

Sub Development Plot	Surface Water Discharge Regime
St Johns Place – East of Water Street	Via a New northern outfall which crosses Water Street and runs through the basement of the St John's Place (west of Water Street) development footprint.
St Johns Place – West of Water Street	Connects into the northern outfall as it passes through the basement.
Central Village	All surface water flows will run south and connect into the southern outfall which runs within Grape Street, crosses Water Street and discharges in the existing spur of the Manchester and Salford Junction Canal just upstream of its confluence with the River Irwell.
Granada House	This is an existing building which is to remain, albeit that the western side of its footprint is to be demolished and re-constructed. As such the remaining eastern section will continue to drain as per the current case which is assumed to be into Atherton Street. The eastern areas as part of the re-construction will have a new outfall which will head south and connect into the proposed southern outfall running within Grape Street.
Southern Village	This will connect in its entirety into the proposed southern outfall which runs within Grape Street.
Bonded Warehouse	This existing building is to remain and will undergo some changes internally. It is hoped that the existing surface water outfalls can be intercepted and connected into the proposed southern outfall within Grape Street. If this turns out not to be the case, then the sites discharge will remain as per the current scenario.
Riverside	This site has a direct adjacency to the River Irwell along its western boundary. This site will have a separate dedicated outfall into the River Irwell. It will be constrained in terms of discharge velocity as per the main outfalls.
Trinity Islands – Site C	This site has a direct adjacency to the River Irwell along its western boundary. This site will have a separate dedicated outfall into the River Irwell. It will be constrained in terms of discharge velocity as per the main outfalls.
Trinity Islands – Site D	This site has a direct adjacency to the River Irwell along its western boundary. This site will have a separate dedicated outfall into the River

	Irwell. It will be constrained in terms of discharge velocity as per the main outfalls.
Wider Development Plots	**Surface Water Discharge Regime**
The Factory	This will connect in its entirety into the proposed southern outfall which runs within Grape Street.

If the above constraints cannot be overcome then the alternative option would be to create a hybrid solution utilising outfalls into the River Irwell where the sites have direct boarders, in general this applies to sites which are river side of Water Street, and outfalls into the adopted sewer network for the remaining sites.

Should this strategy be implemented the following will have to be accounted for:

1) The St John's development is located within a critical drainage area (CDA) referenced as Conurbation Core within the SFRA

2) In order to comply with the requirements of the CDA there is a requirement to reduce the proposed peak discharge rates to 50% of the existing / current discharge rate. The reduction in flow means there is a requirement to provide both vortex flow controls to manage the peak discharge rates and attenuation to provide the necessary storage to prevent flooding. This flooding can occur during the higher order storm events which create flows in excess of the reduced discharge rates.

3) Those sites which abut the River Irwell will discharge direct to the River and as such 100% of their peak discharge is removed from the adopted sewer network. This applies to:
   - ½ of the St John's Place
   - All of the Riverside section of the Core Development, and
   - All of the Trinity Islands Development

4) Of the site listed at the start of this drainage strategy there are a number which cannot accommodate attenuation. In general, this is because the building occupies the entire footprint of the site or the proposed development only comprises a refurbishment of an existing building. In these cases, the sites will have a free discharge in to the adopted sewer network. The remaining sites namely the South Village, Breeze Studio and the central section of the core development site will be restricted to in excess of 50% of their current discharge rates to compensate.

Through the combination of the above the development site will holistically achieve the overall requirements of the Manchester SFRA.

Drainage Strategy schematics and also the basis of the calculations in terms of flow limitation assuming the second options is adopted are contained in Appendix G.

The use of SUD's within this development has not be precluded, however the options to use infiltration as a method of surface water disposal currently appears limited if at all possible. Please refer to section 7.1 for SUD's options.

6.0 SOURCES OF FLOOD RISK

6.1 Fluvial Flood Risk

Information relating to flood risk at the site has been obtained from the Environment Agency online flood maps and from within the Manchester SFRA which confirms that the site is located within both flood zone 1 and 2. In general the area designated as flood zone 2 is located adjacent to the River Irwell or in the low spot as determined by the topographic survey on the opposite of Water Street.

The development proposal (more and less vulnerable uses) is compatible with the flood zone within which it is located.

Through the strategic use of basement car parking and maintaining less vulnerable uses at ground level the more vulnerable uses are kept at a level in excess of that determined for the 1 in 100 yr plus climate change through the Environment Agency hydraulic model. The Environment Agency detailed hydraulic model for the River Irwell predicts a 1 in 100yr plus climate change water level of 26.6m AOD.

In accordance with the requirement of BE EN 8533:2011 "Assessing and Managing The Flood Risk in Development – Code of Practice" we can where applicable apply a freeboard to this level to account for modelling anomalies of 300mm rather than the 600mm as proposed by the Environment Agency because of the confidence in the modelling predictions. As such the preferred ground floor levels for any new buildings is 26.9m AOD. Where less vulnerable uses are located below the identified flooding level, flood resilient measures with regard to construction and material choices will be implemented. These include:

- Locating the critical infrastructure above the flood levels
- Running local infrastructure within the ceiling and then cabling and piping down from the ceiling to raised connection points
- Material choices that can be washed down or easily replaced
- Horizontal installation of boarding

Where basement car parking is proposed the access arrangement into these will be protected via one of the following;

Basement to St John's Place

This proposed basement sits on the boundary between flood zone 1 and flood zone 2 and the access into the ramp is located within flood zone 1 . As such it is likely that the general level of the ramp is above or can be increased locally to provide a physical barrier. The level to which the ramp access would be increased accounts for the predicted levels as supplied by the Environment Agency and includes the necessary freeboard as advised above.

Basements; Central Village, Riverside and Trinity Islands

These development plots either sit fully within the extent of the flood zone 2 boundary (Riverside and Trinity Islands) or partly within flood zone 2 (Central Island) and are fully constrained in terms of access due to the levels of Water Street, the ability to physically increase the access level of the ramp above the flood level cannot practically be achieved. This is because the level of the highway off which the ramp would extend is significantly below the advised flood level plus freeboard.

In these cases we have reach agreement with the Lead Flood Authority, Manchester City Council to the introduction of a mechanical method of flood prevention. Typically this would take the form of a hydraulic barrier located across the ramp entrance, when activated this barrier would seal the ramp to a level in excess of the 100 yr plus climate change level advised by the Environment Agency plus freeboard.

The risk of flooding from rivers or seas is therefore considered **medium**, but is mitigated to low by positioning the more vulnerable uses higher up in the buildings and the introduction of mechanical barriers to basement access.

6.2 Pluvial Flood Risk

Pluvial flooding is defined as flooding resulting from rainfall-generated overland flows before they enter any watercourse or sewer. Surface water flooding is identified within the Manchester SFRA within the location of these proposed developments; however, the areas affected are smaller and generally abut Water Street. Any issues with this type of flooding will be addressed as part of the detailed levels strategy for the development as noted in the following paragraph.

When reviewing the topography of the site in general it falls from the south east diagonally across the development to west / northwest. Although the level strategy for the development site has yet to be confirmed it will be developed such that all landscaped areas are profiled such that they convey water away from the building and basement car park entrance and into lower lying areas served by the site surface water drainage network. As such the risk from Pluvial flooding is considered **low.**

6.3 Sewer Flood Risk

As noted previously within this FRA&DS there are a number of large diameter adopted United Utility trunk sewers running both around and across the development site. Within the SFRA this area is also defined as being part of the critical drainage area (CDA) referenced as Conurbation Core. This would suggest that there are significant issues with regard to the capacity of the adopted sewer network within this area.

A copy of the Critical Drainage Area map is provided as part of the Manchester SFRA which is contained within Appendix H.

It is with this in mind that there are currently two surface water drainage strategies under development, the preferred being to remove all of the surface water generated by this development area out of the sewer network and into the River Irwell. The fall-back position being that over the entire development a 50% reduction in peak flow to the sewer is achieved. Each of these strategies not only benefits this development, but it also aids in reducing the flood risk to the wider catchment area.

In addition to the above, the sewer records indicate two Combined Sewer Overflows (CSO's) which run from the trunk sewers in Water Street and outfall into the River Irwell. The purpose of these overflows is to protect the sewer network from surface flooding. A weir structure within the associated manhole allows the surcharging in the sewers to be dissipated by release excess surface water direct in the river.

On site, the proposed surface water drainage system will be designed such that there is no flooding up to the 1 in 30 year storm event and that any surface water flooding associated with the 1 in 100 year plus an allowance for climate change will be controlled. The term controlled means that the flooding will be contained within the site boundary and will not inundate buildings. As part of the design for the 1 in 30 year event and 1 in 100 year event we will also include a surcharge to the outfall pipe.

Reviewing the above suggests that the risk of sewer flooding is Medium, However through the development of a beneficial drainage strategy, considered on site drainage design and the protection offered by the CSO's the risk is mitigated to Low.

Based on the above, the risk of flooding from sewers is therefore considered **low.**

6.4 Groundwater Flood Risk

In general terms groundwater flooding can occur from three main sources, raised water table, seepage, percolation and groundwater recovery or rebound.

Within the SFRA issues with Groundwater Flooding for the whole catchment area is identified. This area is not considered to be at risk of flooding from Ground Water.

A copy of the groundwater flooding map is provided within the Manchester SFRA which is provided within Appendix I.

The risk of flooding due to groundwater is considered **low**.

6.5 Flooding From Other Sources

Non-natural or artificial sources of flooding can include reservoirs, lakes and canals based on a breach scenario.

The risk of flooding from artificial sources (canal breach and reservoirs) has been reviewed considering the online information available from the Environment Agency, the results are as follows:

- The site does sit within an area which is affected by a breach occurring to one of the reservoirs located upstream of the development site. This is confirmed by the mapping available online from the Environment Agency website
- The site is not at risk of flooding due to a breach occurring to one of the adjacent canals

The extent of the resultant flooding is commensurate with the extent of the flood zone 2 boundaries. As such the issues associated with this type of flooding are already mitigated through the strategy which has been developed to account for the flood zone designation.

A copy of the online Environment Agency flooding map resulting from a reservoir breach and the SFRA map detailing the predicted area which would be affected through a breach on the canal networks are contained in Appendix J.

The risk of flooding from other sources is considered **low**.

6.6 Historical and Anecdotal Flooding

Historic flooding information is detailed within table 2.5 in section 2.8 of the SFRA. The detailed information notes a number of flooding events, none of which however affect the proposed development sites.

6.7 Flood Risk and Vulnerability

Source	Likelihood and Compatibility
Fluvial	Risk: medium Development Types: More and Less Vulnerable Flood Zone 2 **Development Appropriate**
Coastal Sea and Estuarine	Not Applicable
Pluvial / Surface Water	Risk: Low
Sewers	Risk: Low
Groundwater	Risk: Low
Other Sources	Risk: Low
Historic Flooding	No Events Reported or Logged

7.0 RESIDUAL RISK AND IMPACT

7.1 Flood Risk Management Measures

As defined in Section 5.0 the control/restriction and attenuation of surface water flows from the development site will be dependent upon the chosen surface water drainage strategy. In general the available area within the development which can be set aside to accommodate SUD's is limited, which is typical for an inner-city development of this type. The following types of SUD's are therefore precluded from use within this development:

- Ponds
- Swales
- Filter Strips

The use of the following SUD's however will be considered and again are dependent upon the drainage strategy which is implemented:

- Pervious Pavements with 30% void sub-base and permeable paving – Could be implemented with either drainage options to slow down the mitigation of surface water. A further advantage would be the attenuation volume that is provided within the foundation of the pavement, if the option to discharge to the sewer network is adopted.
- Oversized pipes – More likely to be used when discharging to the sewer network as the oversizing of the pipes provides attenuation. These may however be needed to form the outfall into the River Irwell if this option is adopted in order to reduce the velocity of the surface water.
- Proprietary below ground attenuation tanks – This would only be used when discharging to the sewer network as the crates provide a cost effective attenuation solution.
- Green Roofs – Could be implemented with either drainage solutions and provide high level attenuation but more importantly act to slow down the conveyance of surface water from the building at source.

The permeable paved surface will require regular maintenance and cleaning to ensure its effectiveness.

The profile of the hard standing which surrounds the proposed building will be designed to convey water away from the buildings.

When reviewing the flood velocity and depth maps provided within the Manchester SFRA, the only area which is shown as being affected is the Riverside section of the Core development area. The flood depth in this area is less than 0.5m and it does not extend across Water Street. Water Street will therefore provide a safe access and egress during flooding, up to and including the 1 in 100 yr storm event.

A copy of the SFRA flood depth map is contained within Appendix K.

7.2 Off Site Impacts

The regime for the discharge of surface water from the development is currently under development. As detailed in section 5.0, two strategies are being investigated, the preferred option being to discharge to the River Irwell, the second "Fall-Back" solution being to discharge into surrounding adopted sewer network albeit at a restricted rate. As the development site is currently fully developed and positively drained any reduction in flows will positively impact on the wider area. In this case, the fact that the area is defined as a critical drainage area and we are providing a 50% reduction in flows will have a significant beneficial impact removing in excess of 600l/s of surface water from the network during the higher order storm events. The ability to accept the foul and surface water flows from the development has been reviewed with United Utilities and confirmation received that the sewer network within the location of the development has the available capacity.

A copy of the correspondence with United Utilities is provided in Appendix L.

7.3 Residual Risk

The development and its drainage system will be designed to cope with intense storm events up to and including the 1 in 100 year return period rainfall event, which includes an allowance for climate change. If an extreme rainfall event occurs which exceeds this event, then it is likely that there will be an increase in overland flows due to the additional rainwater being unable to enter the drainage network. It is therefore important that these potential overland flows are catered for within the design of the external areas.

Any overland flows generated by the proposed development must be directed away from any properties and towards the highway network and soft landscaped areas, where it can be stored until the peak of the storm has passed and capacity becomes available within the onsite drainage network.

As with any drainage system, blockages within the network have the potential to cause flooding and disruption. It is important that any drainage system not offered for adoption has appropriate trash screens and a maintenance regime included within the operation and maintenance (O & M) manuals for the development.

8.0 SUMMARY

Information has been sourced from the Environment Agency online information, United Utilities Asset Management and the Manchester SFRA.

This FRA&DS has been written in accordance with the following:

- National Planning Policy Framework (NPPF)
- Planning Practise Guidance (PPG)
- Manchester City, Salford City and Trafford Councils, Level 2 Hybrid Strategic Flood Risk Assessment (SFRA)
- CIRIA Guidance
- The SUD's Manual

The underlying geology for the development site and its proximity to the River Irwell is likely to prevent the use of SUD's infiltration techniques.

The total site area is 5.79ha, the usages of the proposed development is classed as both more and less vulnerable and the site is located in both flood zones 1 and 2. The development classifications will be assigned such that they are compatible with the flood zone.

There are two drainage strategies currently under development for the proposed development:

Option 001 – Discharge to River Irwell (Preferred Option)

Discharge into the River Irwell via a separate private surface water network – The peak discharge will not be limited and there will be limited requirements for attenuation. The outflow will be limited to 3.0m/s. – Removal of the vast majority of the existing drainage catchment area from the existing adopted sewer network.

Option 002 – Discharge to Adopted Sewer Network

This is currently how the existing sites operate, however the area is defined as a Critical Drainage Area (CDA) and therefore any regeneration of the area needs to include for a 50% reduction in peak flows when discharging to sewers only. To achieve this reduction various discharges options are required which includes the riverside developments connecting directly to the River Irwell. Flow control through the introduction of vortex flow controls and attenuation will be required.

Flood risk:

- Fluvial – low
- Pluvial/Surface Water – low
- Sewers – low
- Groundwater – low
- Other (Reservoirs & Canals) – low

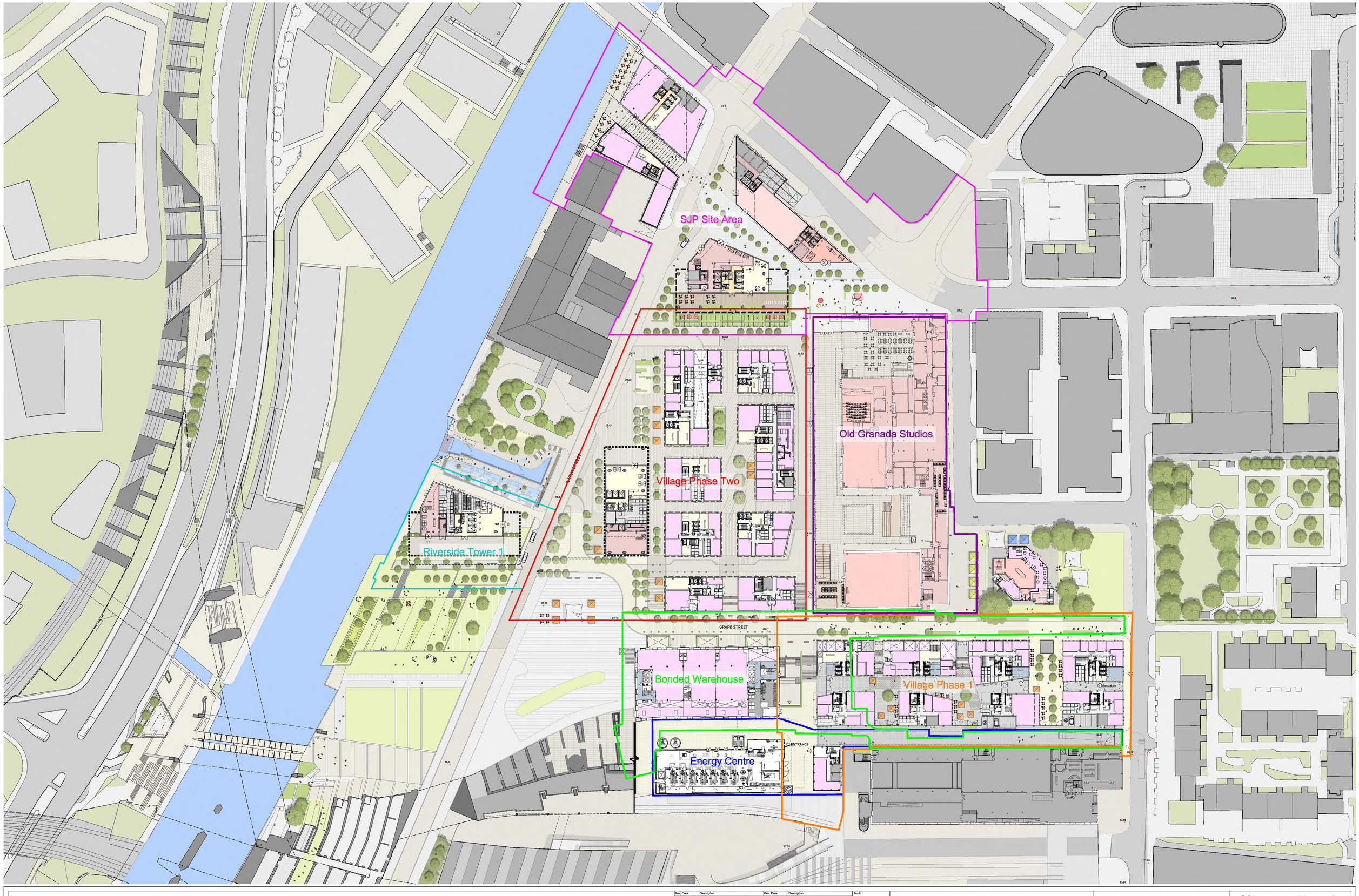
Table 2.5 contained within section 2.8 of the Manchester SFRA contains a review of the known historic flood events, none of which has affected this development site.

If it is the case that the drainage strategy chosen includes connecting back to the existing adopted sewer network then attenuation can be provided. This can take various forms which includes SUD's suitable to this type of inner city regeneration. The attenuation details can also be interconnected to provide pollution control.

The levels strategy for the development site will mitigate the flood risk associated with higher order storms in excess of the 1 in 100 years plus climate change events. These mitigation measures will direct the increased surface water run-off away from buildings and towards soft landscaped areas. The soft landscaped areas will provide additional storage until capacity becomes available in the onsite drainage network allowing the additional surface water to be conveyed away from the development.

Private sewer networks and SUD's systems should be subject to a regular maintenance strategy, to prevent reductions in performance and blockages due to debris.

APPENDIX A – GENERAL LOCATION PLANS



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Rev	Date	Description
A	08-12-2015	First Issue
B	01-06-2016	General Updates

Rev	Date	Description

North

Revision B

St John's - Manchester	7329-A-G100-P-00-002-BOUNDARY	
Masterplan - Ground Level	May 2015	
Ground Floor - Boundary	7329	1:500 @ A0

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1 GROUND FLOOR PLAN
1 : 500

N

0m 10m 20m 30m 40m 50m

SCALE BAR 1:500 @ A1
SCALE BAR 1:1000 @ A3

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NOTES

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Key

- A1
- A3
- Circulation
- Electrical
- Gym
- Lobby
- Parking/Vehicle circulation
- Plant
- Riser
- Servicing
- Storage
- Vertical Circulation

Rev	Date	By	Description

Revision Schedule

key plan



AlliedLondon

project
Trinity Islands
Manchester

title
GROUND FLOOR PLAN

drawing status
PLANNING

contract no.	scale
-	1 : 500 @ A1
client ref.	date
Allied London	JULY 15
drawn by	checked by
SU	DM

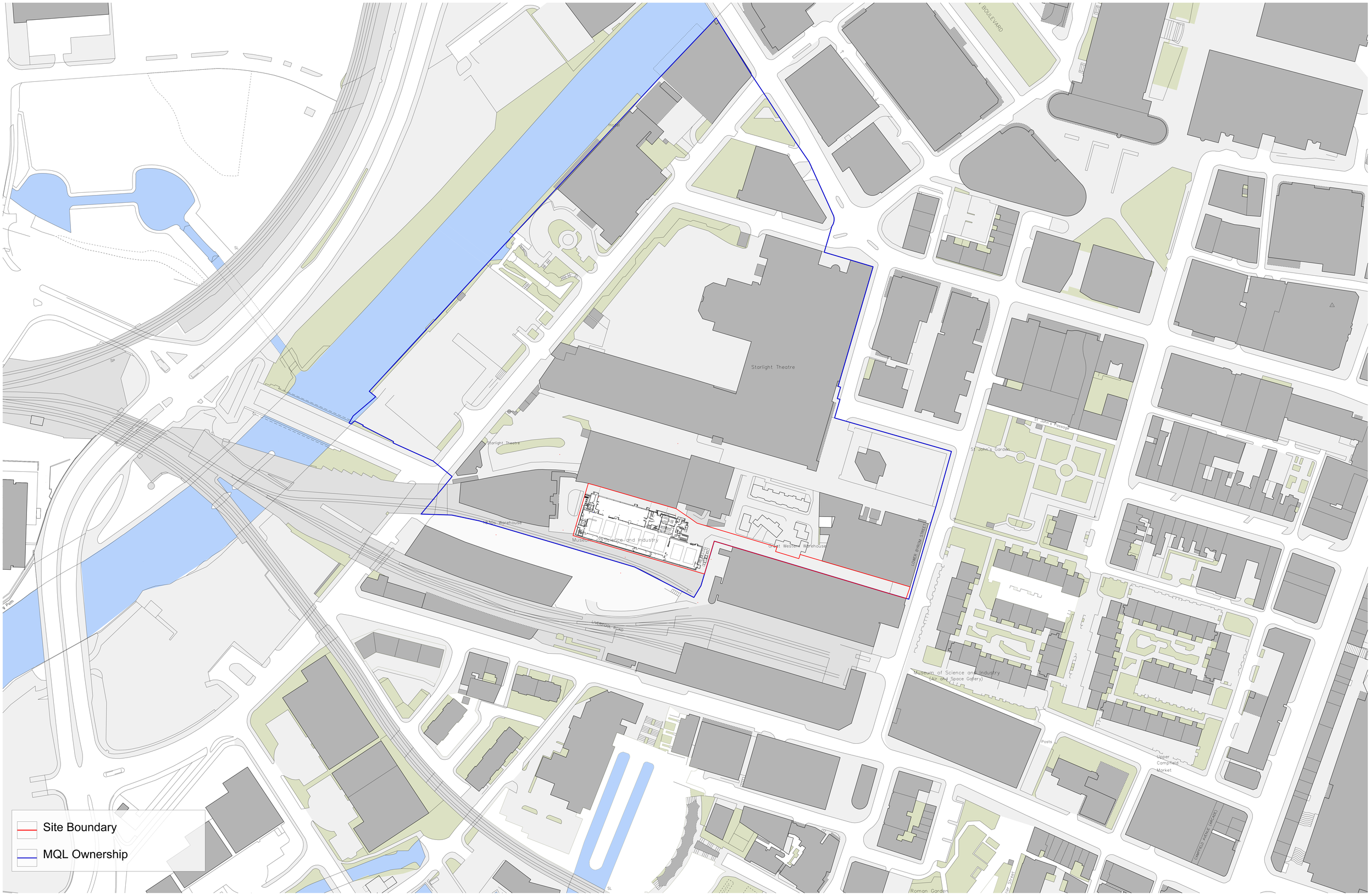
project no.	drawing number	revision
P15-069	23(00)P002	

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APPENDIX B1 – BONDED WAREHOUSE PLANS



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0 10 20 50 100m

Rev	Date	Description
001	16/12/2015	Proposed Penetration
002	22/12/2015	General Update
003	04/03/2016	Site Boundary Updated
004	27/05/2016	General Update
005	01/06/2016	General Update

North

Project Title
St.John's Energy Centre
Manchester

Drawing Title
Location Plan- Existing

Status
FOR PLANNING

Scale
1:1000@A1 / 1:2000@A3

Date
December 2015

Job No
10070

Drawing No
10070-A-G000-XP-00-001

Revision
005

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APPENDIX B2 – CENTRAL VILLAGE PLANS

Drawing Original Size
A1

Notes

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Drawing Revisions

Date:	Rev:	Note:	Check:
08.07.16	A	Cores and structure updated	RO
14.07.16	B	R-grid columns moved and facade amended	RO
20.07.16	C	Block 4 grid updated	RO
20.07.16	D	Scheme updated to reflect plot setting out	RO
27.07.16	E	Block 4 grid updated	RO
09.08.16	F	Block 4 grid updated, Cores ammended.	RO

CARTWRIGHT PICKARD

Client
ALLIED LONDON

Project
779 ST JOHN'S QUARTER

Building Name
CENTRAL VILLAGE

Drawing Title
PLANS - GROUND FLOOR

Scale
1:200 @ A1

Drawing Created
03/08/16

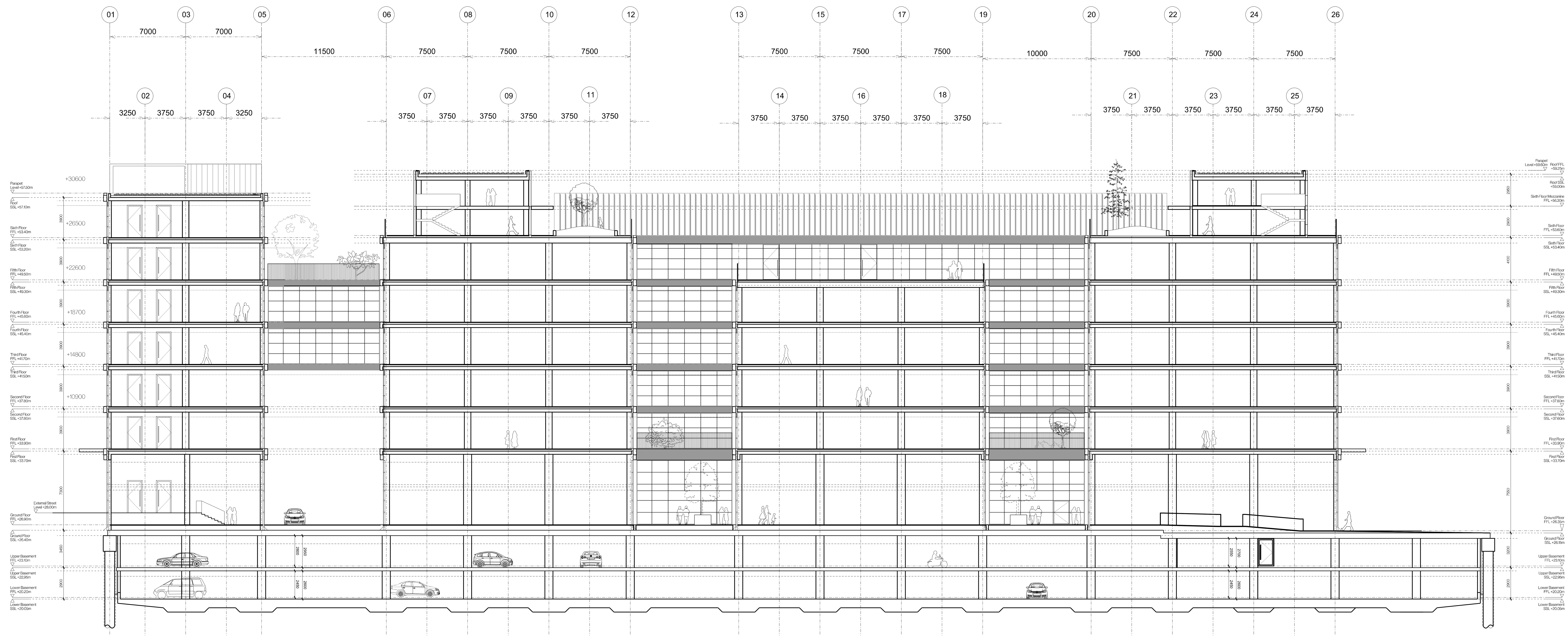
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Revision
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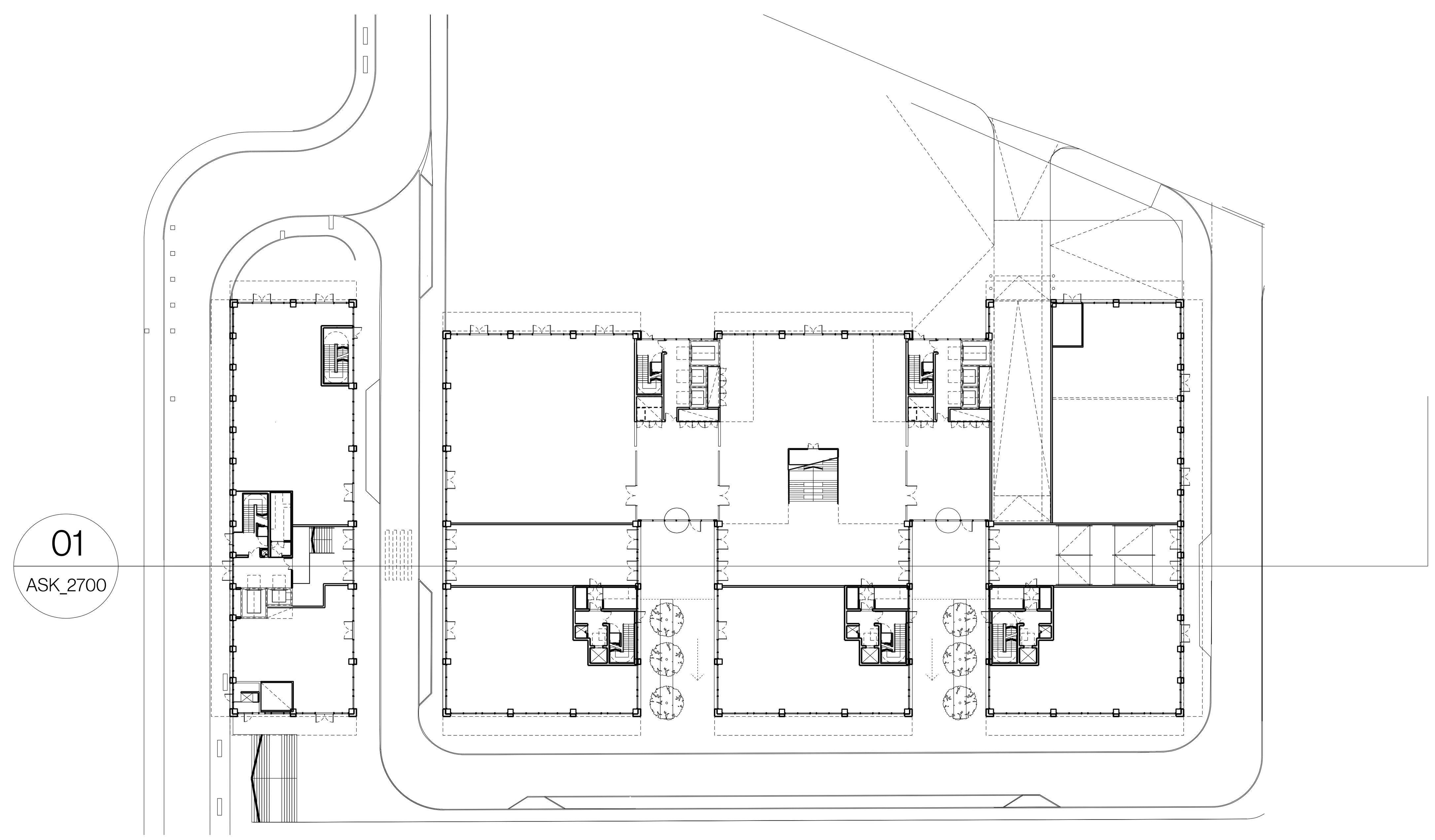
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01

Section 01

1:200@ A1



Drawing Original Size
A1

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Drawing Revisions

Date:	Rev:	Note:	Check:
05.07.16	A	Columns, external envelope and floor slabs amended. Garden deck on block 2 moved to 4th floor.	RO
20.07.16	B	Block 4 width reduced. Grid lines 01-05 amended. Distance between blocks 3 and 4 increased. Slab thicknesses at level 5 + 6 increased. B2, B1, Ground, 5th, 6th and 6M levels amended.	RO
27.07.16	C	Block 4 width increased. Grid lines 01-05 amended. Distance between blocks 3 and 4 decreased. Slab thicknesses at Ground increased. B2, B1 and Ground levels amended.	RO
09.08.16	D	Block 4 width decreased. Grid lines amended. Building envelope amended and external canopies added at first floor level.	RO

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ALLIED LONDON

Project
779 ST JOHN'S QUARTER

Building Name
CENTRAL VILLAGE

Drawing Title
Section 01

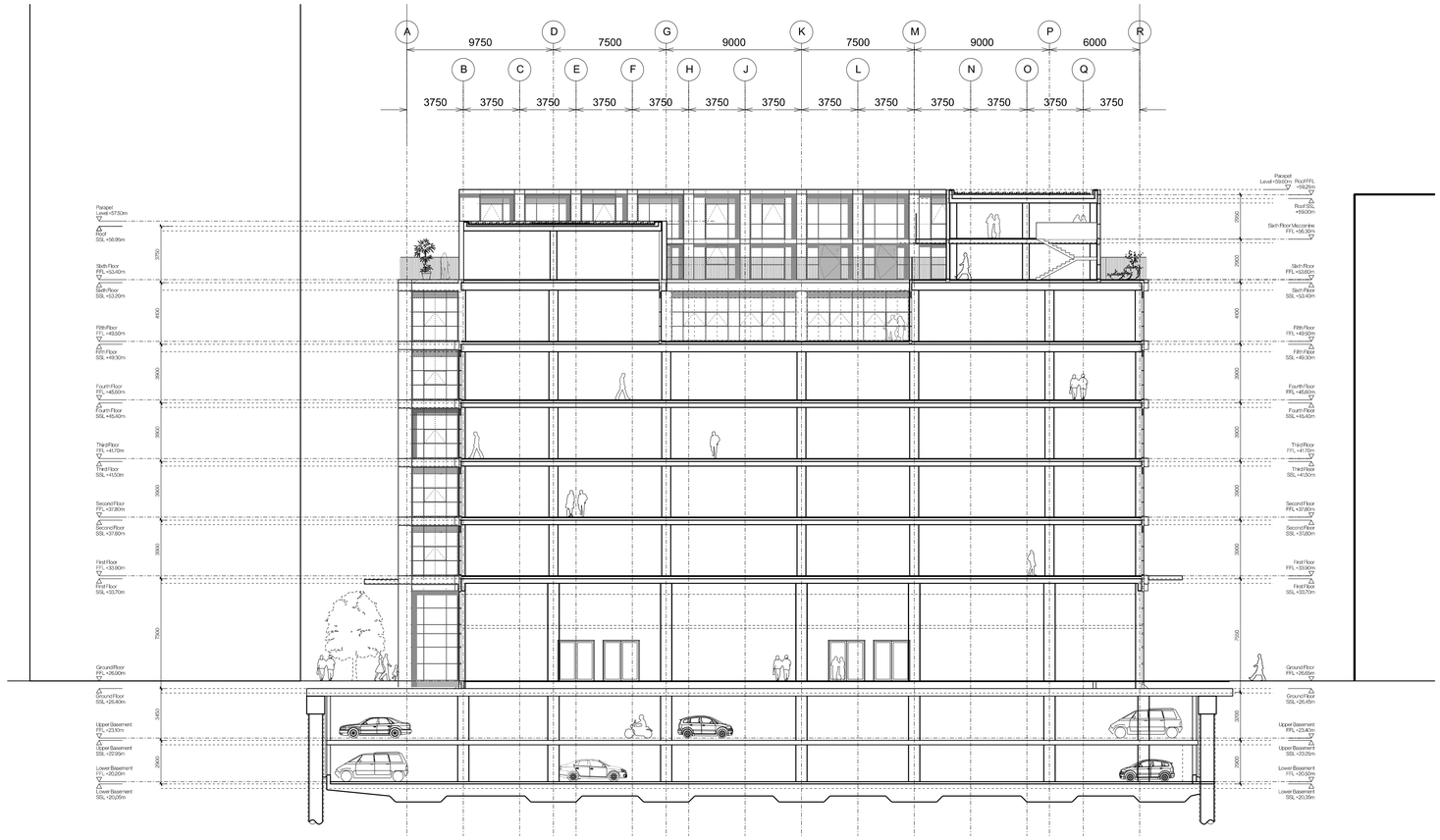
Scale	Drawing Created
1:200 @ A1	21/06/16

Drawing Status	Revision
Preliminary	D

Drawing No.
779-CPA-XX-ZZ-DR-A-2700

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Tel 0161 914 7444

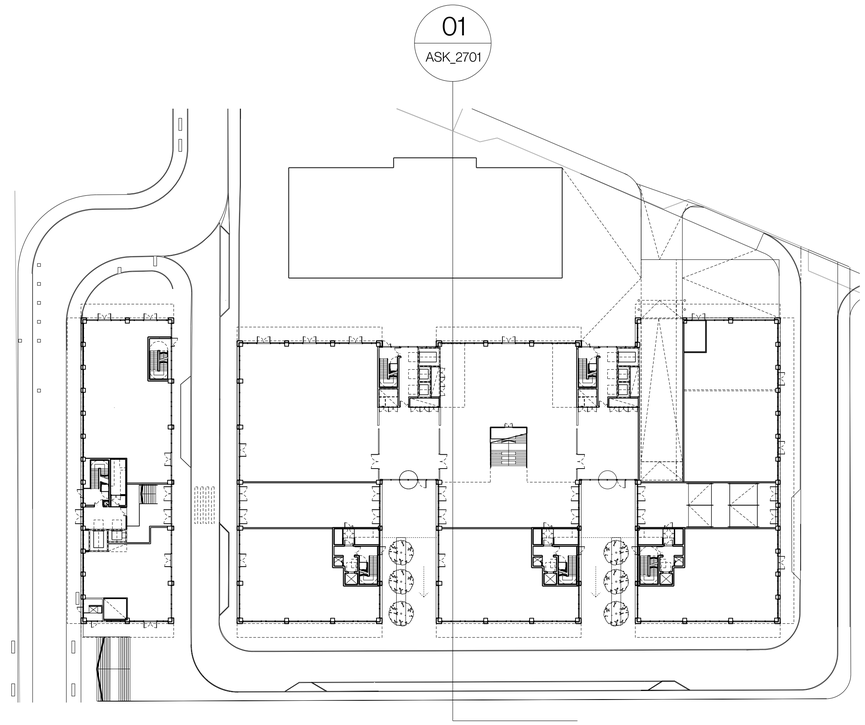
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01

Section 02

1:500 @ A3



Drawing Original Size
A1

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Drawing Revisions

Date:	Rev:	Note:	Check:
08.07.16	A	Columns, external envelope and floor slabs amended. Garden deck on block 2 moved to 4th floor.	RO
20.07.16	B	Slab thicknesses at level 5 + 6 increased. B2, B1, Ground, 5th, 6th and 6M levels amended.	RO
27.07.16	C	Slab thicknesses at level 5 + 6 increased. B2, B1, Ground, 5th, 6th and 6M levels amended.	RO
08.08.16	D	Building envelope amended and external canopies added at first floor level.	RO

CARTWRIGHT PICKARD

Client
ALLIED LONDON

Project
779 ST JOHN'S QUARTER

Building Name
CENTRAL VILLAGE

Drawing Title
SECTION 02

Scale
1:200 @ A1

Drawing Created
21/06/16

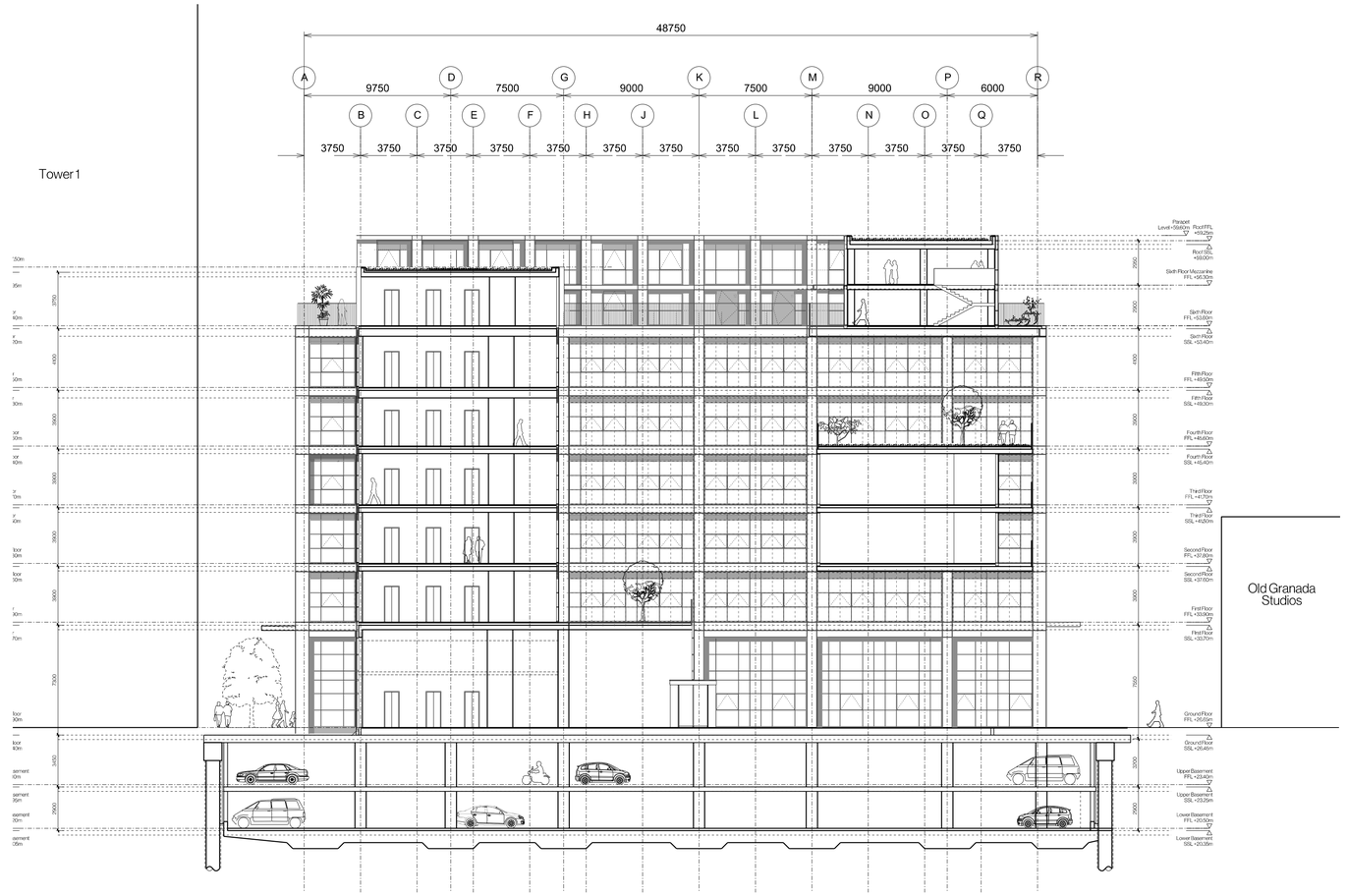
Drawing Status
Preliminary

Revision
D

Drawing No.
779-CPA-XX-ZZ-DR-A-2701

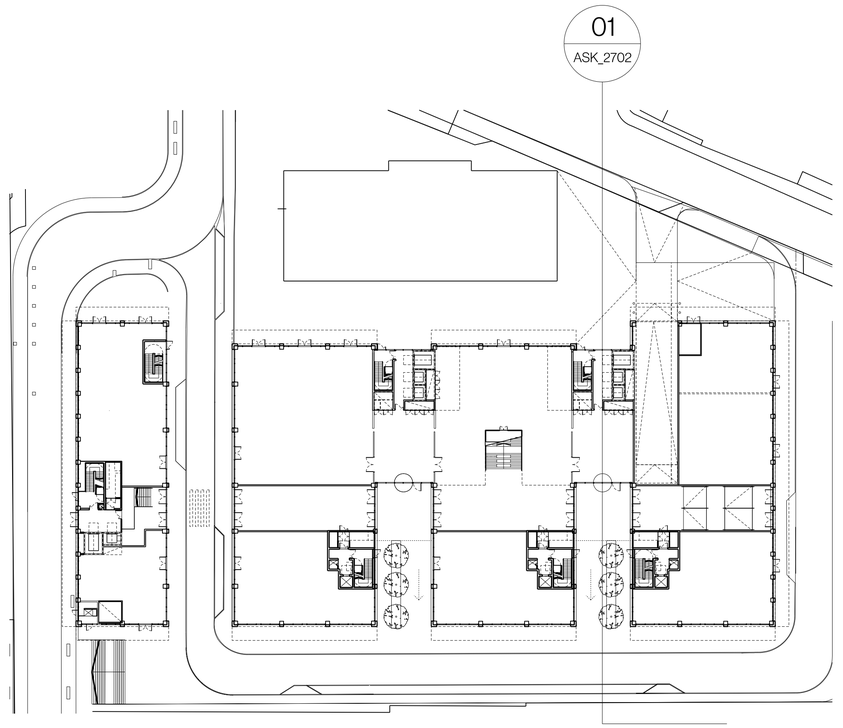
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01

Section 03
1:500 @ A3



Drawing Original Size
A1

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Drawing Revisions

Date:	Rev:	Note:	Check:
20.07.16	A	Slab thicknesses at level 5 + 6 increased. B2, B1, Ground, 5th, 6th and 6M levels amended.	RO
27.07.16	B	Slab thicknesses at level 5 + 6 increased. B2, B1, Ground, 5th, 6th and 6M levels amended.	RO
09.08.16	C	Building envelope amended and external canopies added at first floor level.	RO

CARTWRIGHT PICKARD

Client
ALLIED LONDON

Project
779 ST JOHN'S QUARTER

Building Name
CENTRAL VILLAGE

Drawing Title
SECTION 03

Scale
1:200 @ A1

Drawing Created
24/06/16

Drawing Status
Preliminary

Revision
C

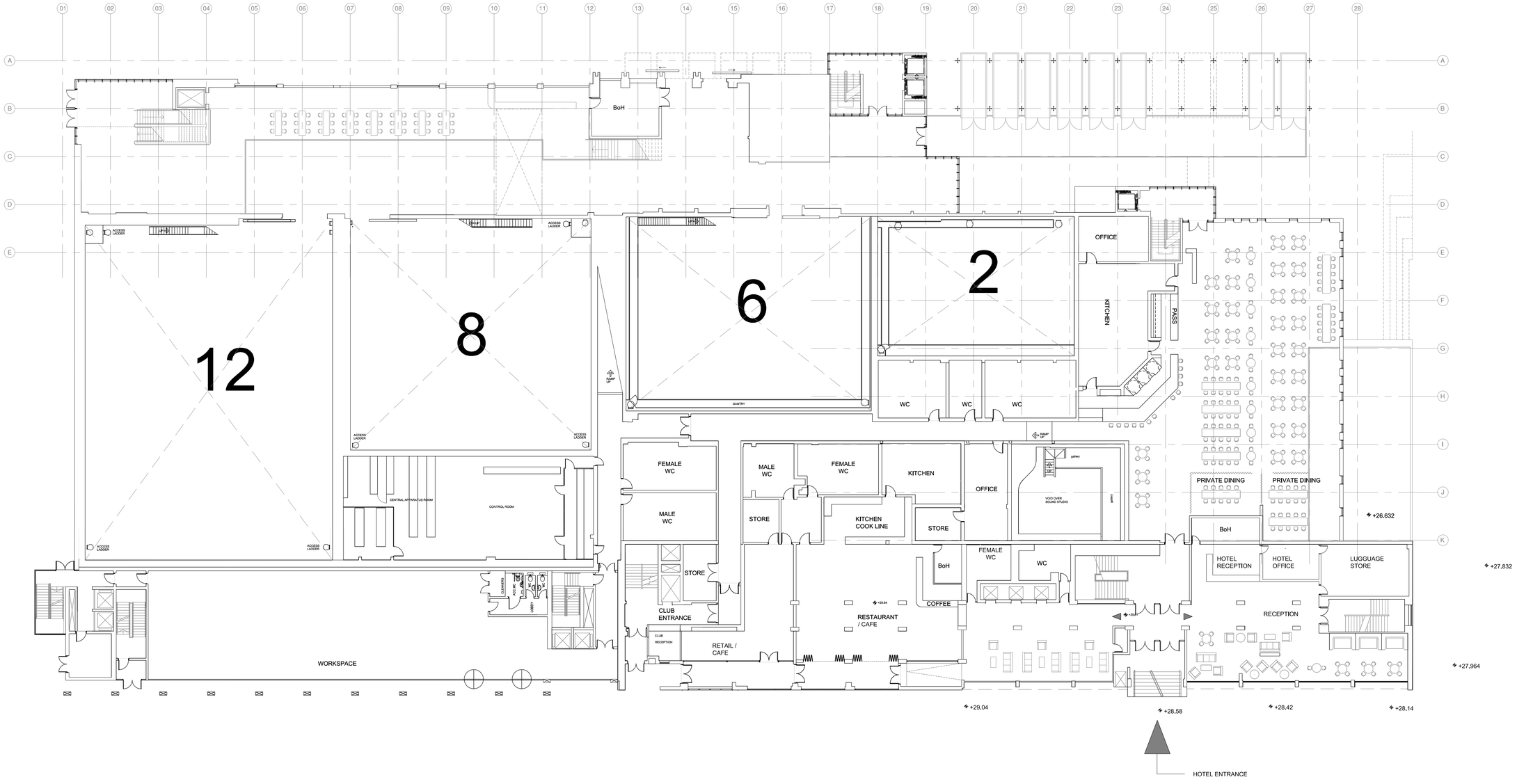
Drawing No.
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APPENDIX B3 – ENERGY CENTRE PLANS (AWAITED)

APPENDIX B4 – GRANADA HOUSE PLANS



N

0 2m 4m 6m 8m 10m

standard notes

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2. All dimensions must be checked on site and any discrepancies verified with the architect.
3. Unless shown otherwise, all dimensions are to structural surfaces.

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drawing notes

revisions

P1	01.04.2016	first issue
P2	05.04.2016	second issue

OGS

date 05.04.2016

client Manchester Quays Ltd

scale 1:200@A1

drawing PROPOSED GROUND FLOOR

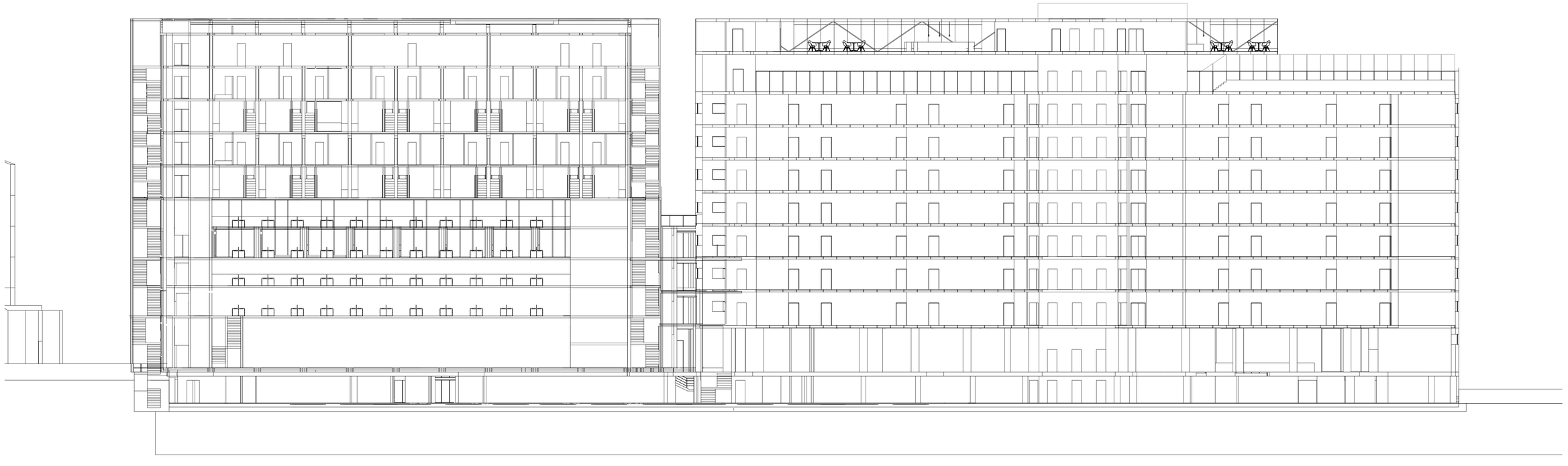
drawn AK **checked** MK **drawing number** 3360_D_110 **rev** P2

File.location

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Levitt Bernstein



0 10m
2m 4m 6m 8m

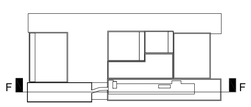
standard notes

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drawing notes

KEY PLAN



revisions

P1	21.01.15	first issue
P2	18.06.15	issued for planning
P3	18.06.15	Issued for planning

MANCHESTER GRANDE

date 18.06.2015

client Manchester Quays Ltd

scale 1:200@A1

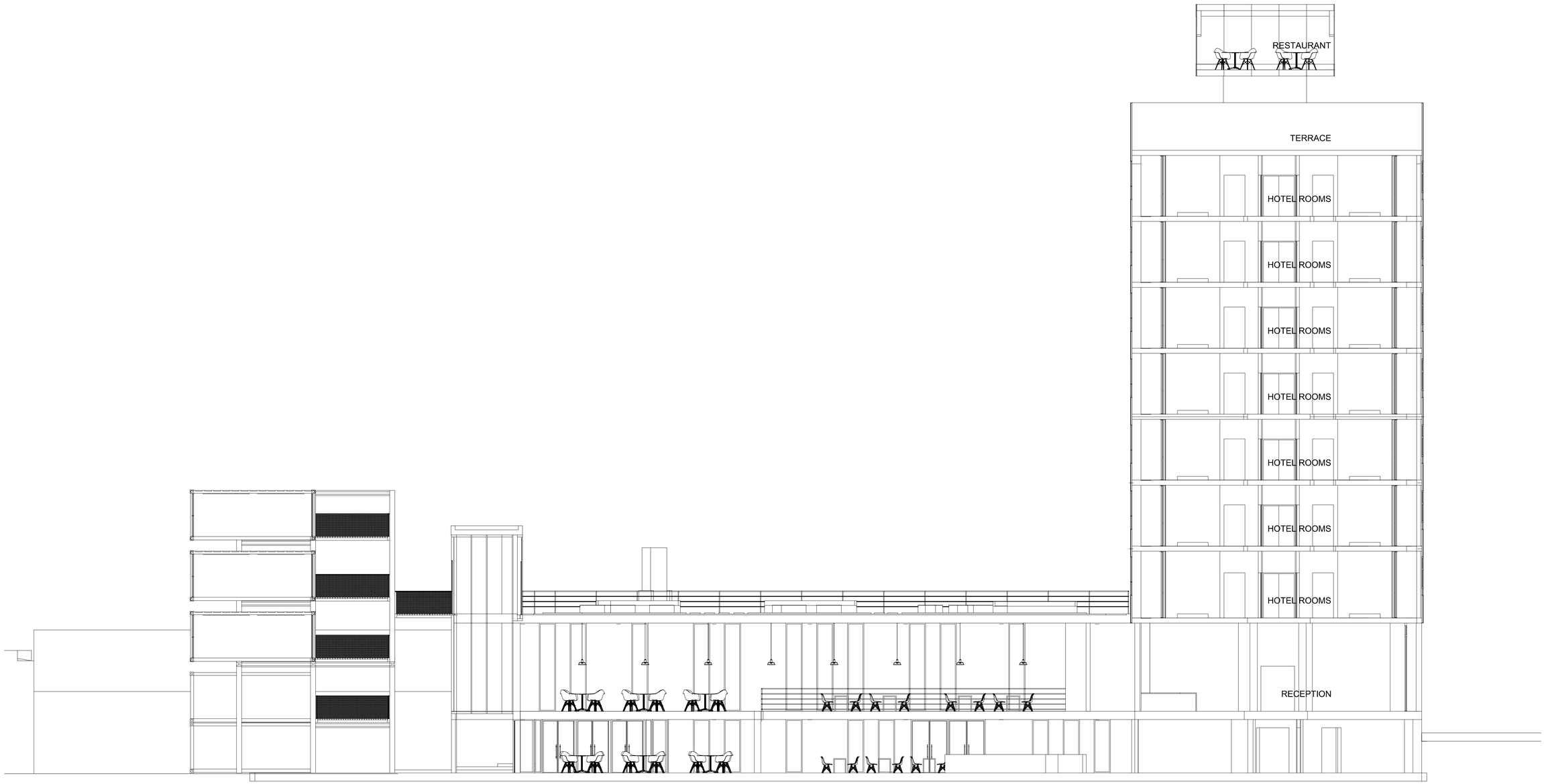
drawing PROPOSED SECTION FF

drawn AK **checked** MK **drawing number** 3156_D_205 **rev** P3

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0 1m 2m 3m 4m 5m

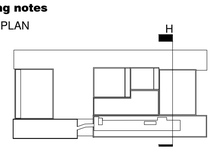
standard notes

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3. Unless shown otherwise, all dimensions are to structural surfaces.

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drawing notes

KEY PLAN



revisions

MANCHESTER GRANDE

date 14.04.2016

client Manchester Quays Ltd

scale 1:100@A1

drawing PROPOSED SECTION HH

drawn AK **checked** MK **drawing number** 3360_D_207 **rev** P1

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APPENDIX B5 – RIVERSIDE PLANS



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	-	08/07/2015	First Issue								Drawing Title: Ground Floor Plan - General Arrangement
	A	24/07/2015	Substation and switchroom added								
	B	01/12/2015	Planning Issue								

Status			
For Planning			
Scale		Date	
1:200 @ A3	1:100 @ A1	30th JUNE 2015	
Job No	Drawing No		Revision
7340	7340-R1-A-G200-P-00-001		B

SimpsonHaugh AND PARTNERS

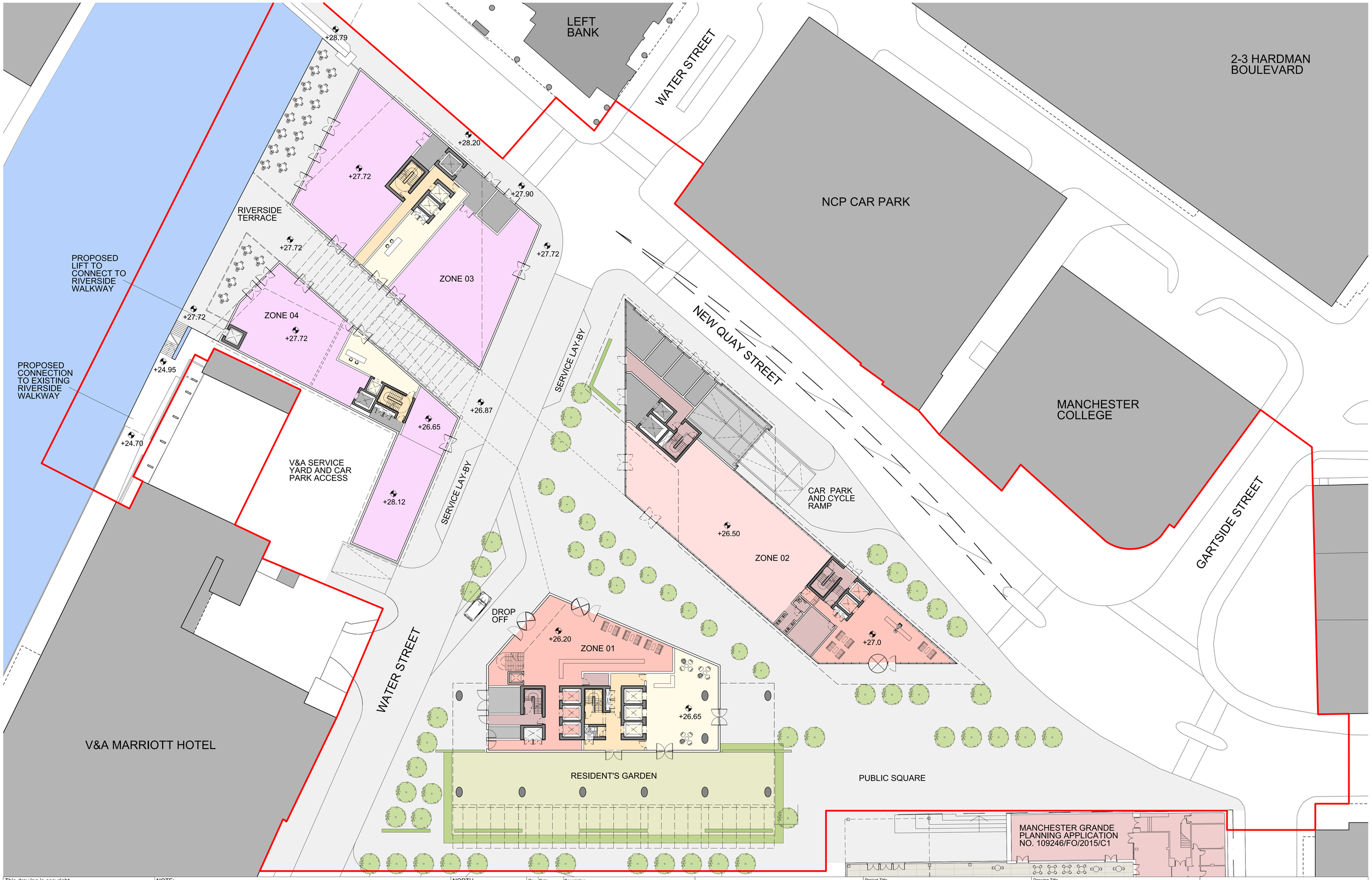
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+44 (0)161 835 2345
www.simpsonhaugh.com

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London EC1R 0BB
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mail@simpsonhaugh.com

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APPENDIX B6 – SOUTHERN VILLAGE PLANS (AWAITED)

APPENDIX B7 – ST. JOHN'S PLACE PLANS



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NOTE:
ILLUSTRATIVE LANDSCAPE PROPOSALS

NORTH

Rev	Date	Description
01	25.11.2015	Issued for Planning
02	08.12.2015	Issued for Planning
03	24.05.2016	Planning Issue

Project Title
ST. JOHN'S PLACE
MANCHESTER

Drawing Title
MASTERPLAN GROUND LEVEL

Job No: 7326
Scale: 1:250 @A1
Date: 06/07/2015
Status: PLANNING
Drawing No: 7326-A-MP-G100-P-00-099
Revision: 03

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APPENDIX C – EA & SFRA FLOOD MAPS

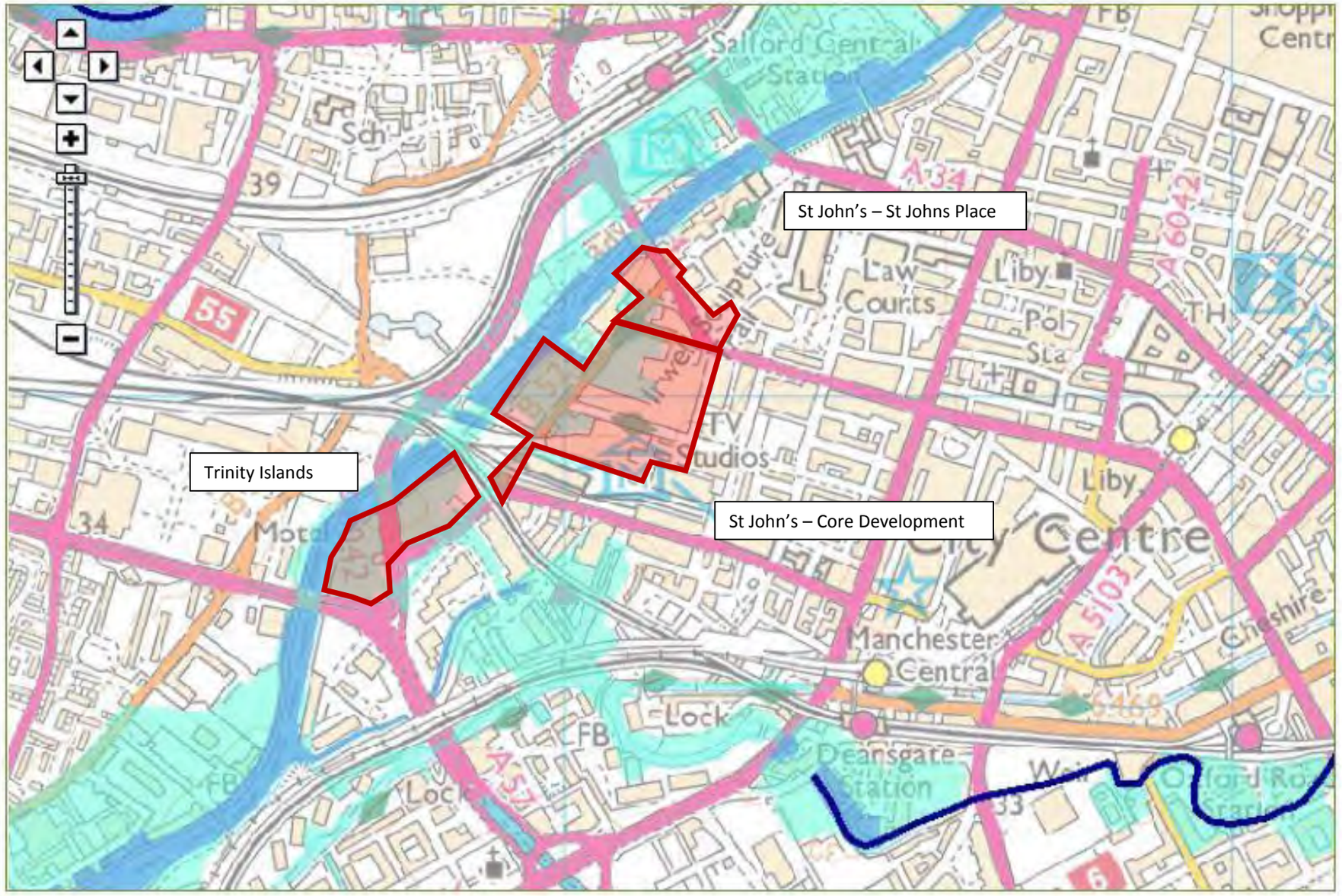
Map legend

Click on the map to see what Flood Zone (National Planning Policy Guidance definitions) the proposed development is in.

- [x] Flood Map for Planning (Rivers and Sea)
  - Flood Zone 3
  - Flood Zone 2
  - Flood defences (Not all may be shown*)
  - Areas benefiting from flood defences (Not all may be shown*)
- [x] Main Rivers
  - Main Rivers
- [x] Other national environmental organisations
  - Natural Resources Wales Area of responsibility
  - Scottish Environment Protection Agency Area of responsibility

X: 383,162;Y: 397,922 at scale 1:10,000

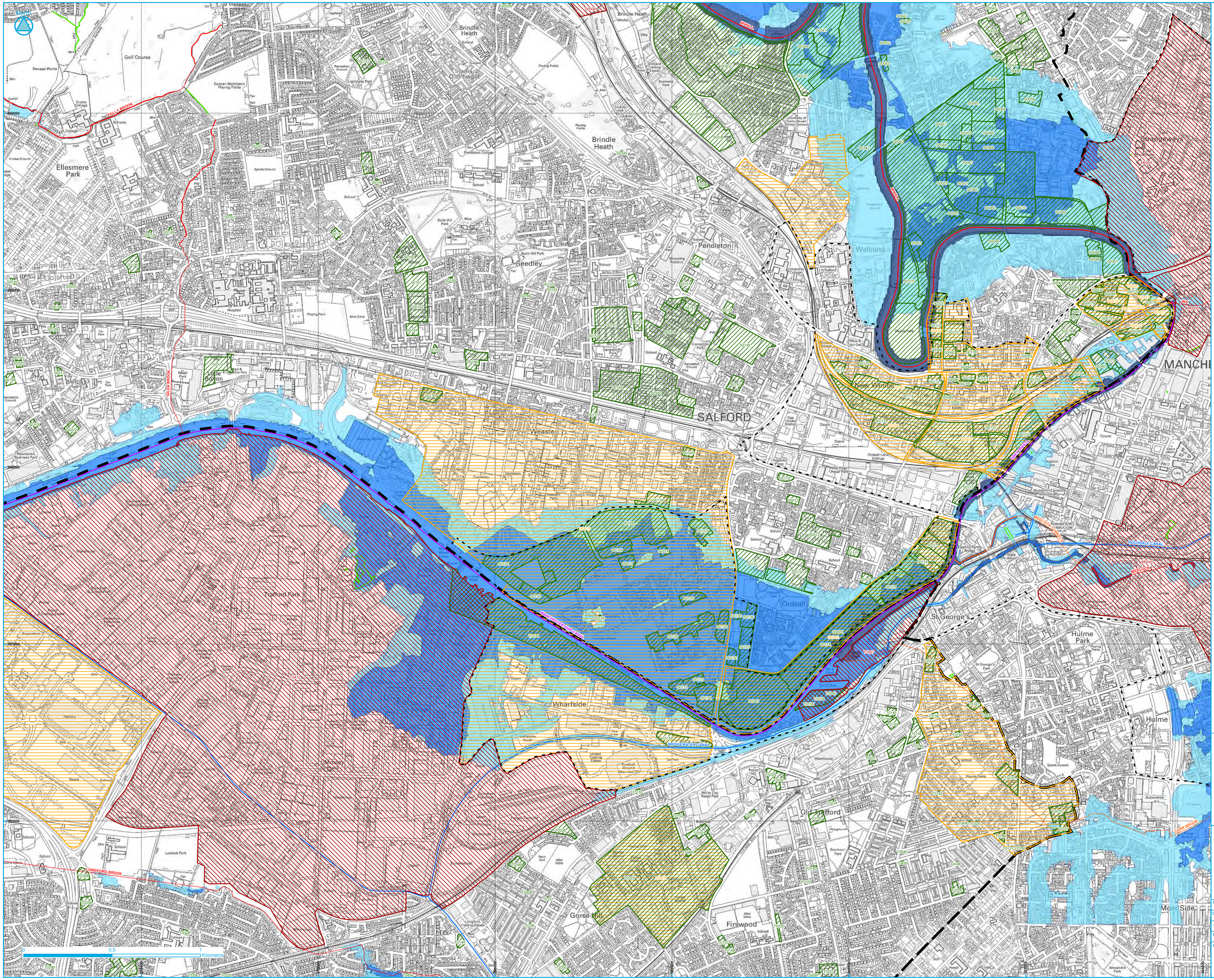
Other maps · Data search · Text only version

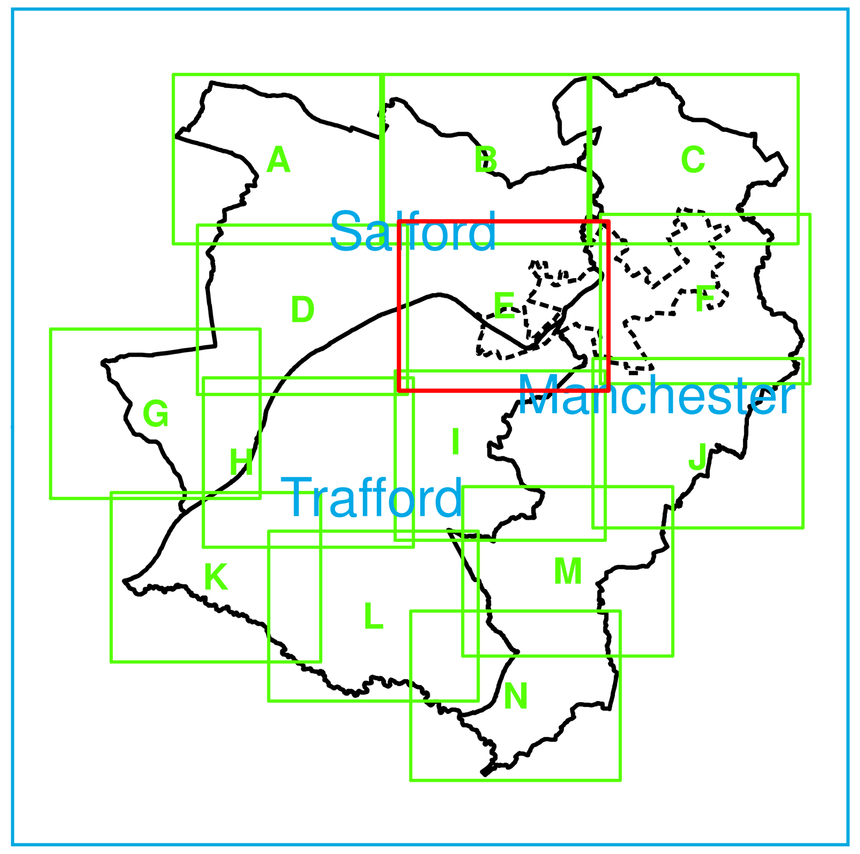


CIVIL ENGINEERING SKETCH

INFORMATION

Job No:	3233
Project Title:	St John & Trinity Islands FRA
Sketch No:	FRA001
Sketch Title	EA Online Flood Maps
Drawn by:	AR – 14/7/2015





Council Boundary

Flood Zones

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

Potential Development Sites / Locations

- Employment
- Housing
- Mixed Use
- Other
- Regional Centre Boundary

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

Main Rivers (V8.0)

- Culverted
- Open

Digitised River Lines

- Culverted
- Open

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

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

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

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

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

The River 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.

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

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e info@jbaconsulting.co.uk

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United Kingdom

Other offices at Atherstone, Doncaster, Edinburgh, Haywards Heath, Limerick, Newcastle upon Tyne, Newport, Northallerton, Saltaire, Skipton, Tadcaster & Wallingford

for

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

PPS25 Flood Zones

Drawn by: J Cheetham	Date: 16/11/2010
Checked by: J Dimelow	Date: 22/11/2010
Approved by: H O'Callaghan	Date: 22/11/2010

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

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

Original @ A1

APPENDIX D – TRINITY ISLANDS DEVELOPMENT PROPOSALS PLAN

SITE C FLOOD MITIGATION STRATEGY

A3/A4
66 m²
711.8 SF

WC
15 m²
162.3 SF

Teaching Space
87 m²
940.6 SF

Teaching Space
63 m²
683.4 SF

Head's Office
12 m²
130.4 SF

Staff WC
13 m²
137.2 SF

General Office
28 m²
297.3 SF

Meeting Room
12 m²
131.4 SF

Interview Room
9 m²
97.0 SF

Sick Bay
6 m²
68.8 SF

Hygiene Room (Shower/WC)
8 m²
85.6 SF

Reprographics
13 m²
135.4 SF

Staff Room
74 m²
796.7 SF

Residential Entrance
39 m²
422.9 SF

Male Changing
66 m²
707.2 SF

Fem Changing
53 m²
565.8 SF

WC
38 m²
404.9 SF

Circulation - 00
128 m²
1362.4 SF

G/565 Room
6 m²
64.5 SF

Storage (Off Hall)
33 m²
356.9 SF

Storage (Off Hall)
42 m²
446.9 SF

Performance Hall
303 m²
3264.5 SF

A3
183 m²
1972.7 SF

A3/A4
168 m²
1807.0 SF

Central Courtyard
977 m²
10516.7 SF

A1
151 m²
1625.3 SF

A3/A4
242 m²
2606.3 SF

Bar

Kitchen

Bicycle Store - Ct
295 m²
3179.7 SF

100 Bike Store Units

Substation
26 m²
275.3 SF

A1
157 m²
1690.9 SF

Corridor
21 m²
223.8 SF

Greengrocer

Residential Entrance
49 m²
531.9 SF

Kitchen

Counter

A3/A4
131 m²
1406.0 SF

Butcher

Bulk Items
(Rice, grains, flours, pasta, beans, nuts and seeds

Food Market
1377 m²
14821.1 SF

Fishmonger

Loading / Service Dock
313 m²
3368.9 SF

A3/A4
119 m²
1283.6 SF

Baker

Deli

Vintner

Cheesemonger

Lift Refuse
55 m²
586.7 SF

Refuse Truck

NOTES

-Do not scale from this drawing, except for planning purposes.
-Check all dimensions on site.
-Subject to survey.
-Subject to site inspection.
-Site boundary lines are indicative only.

Legend

- Ancillary
- Commercial - A1
- Commercial - A3/A4
- Corridor
- Public
- Residential - Communal
- School
- Vertical Circulation

Key

- Proposed Permanent 1.2m High Wall
- Proposed Flood Barrier Locations

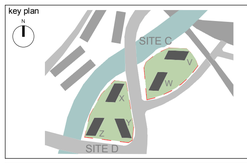
N.B.

All Doors at Ground Level to be Fitted with Flood Seals.

Rev	Date	By	Description
-	29.07.2016		PLANNING

Revision Schedule

key plan



ALLIED LONDON

project
TRINITY ISLANDS
TRINITY WAY, MANCHESTER

title
SITE C - PROPOSED GROUND FLOOR

drawing status
PLANNING

contract no.	scale
-	1 : 200 @ A1
client ref.	date
ALLIED LONDON	MAY 16
drawn by	checked by
TP	GJ

project no.	drawing number	revision
P15-069	CGL-Z1-00-DR-A-16C00 (originator -zone -level -type -role -number)	-

1 00 - Ground Floor - Site C - GA
1 : 200

N

0m 4m 8m 12m 16m 20m

SCALE BAR 1:200 @ A1
SCALE BAR 1:400 @ A3

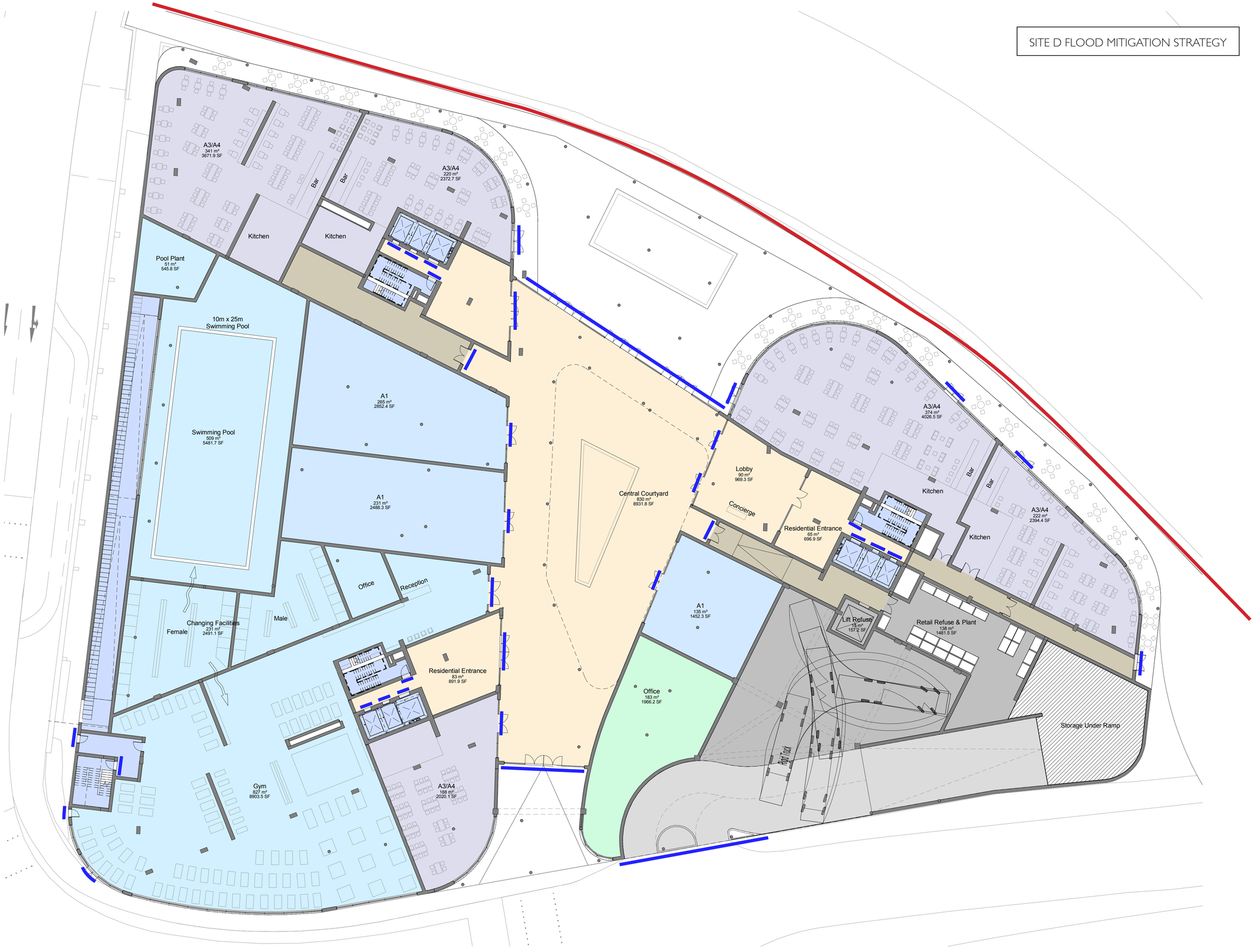
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SITE D FLOOD MITIGATION STRATEGY



1 00 - Ground Floor - Site D - GA
1 : 200

NOTES

-Do not scale from this drawing, except for planning purposes.
-Check all dimensions on site.
-Subject to survey.
-Subject to site inspection.
-Site boundary lines are indicative only.

Legend

- Ancillary
- Commercial - A1
- Commercial - A3/A4
- Corridor
- D2 - Gym
- Office - B1
- Public
- Residential - Communal
- Vertical Circulation

Key

- Proposed Permanent 1.2m High Wall
- Proposed Flood Barrier Locations

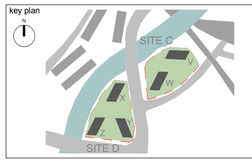
N.B.

All Doors at Ground Level to be Fitted with Flood Seals.

Rev	Date	By	Description
-	29.07.2016		PLANNING

Revision Schedule

key plan



ALLIED LONDON

project
TRINITY ISLANDS
TRINITY WAY, MANCHESTER

title
SITE D - PROPOSED GROUND FLOOR

drawing status
PLANNING

contract no.	scale
-	1 : 200 @ A1
client ref.	date
ALLIED LONDON	MAY 16
drawn by	checked by
TP	GJ

project no.	drawing number	revision
P15-069	CGL-Z2-00-DR-A-16D00	-
	originator -zone -level -type -role -number	

0m 4m 8m 12m 16m 20m

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SCALE BAR 1:400 @ A3

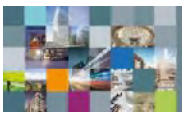
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APPENDIX E – TOPOGRAPHIC SURVEY



STANDARD REFERENCE & ABBREVIATIONS

(AM)..... Assumed Mode
AB..... Air Brick
AV..... Air Valve
B/W..... Barbed Wire
BAR..... Barrier
BE..... Bellshe Beacon
BH..... Borehole
BL..... Bed Level
BOL..... Bollard
BS..... Bus Stop
BT Box..... British Telecom Box
BT..... British Telecom It
BRTR..... Brick Retaining Wall
BW..... Brick Wall
C/B..... Close Boarded
C/I..... Corrugated Iron
C/P..... Chestnut Paling
CB..... Control Box
CBW..... Concrete Block Wall
CCTV..... Closed Circuit TV
CD..... Cable Duct
CEL..... Ceiler Light
CH/L..... Chain Link
CHY..... Chimney
CL..... Cover Level
CM..... Cable Marker
COL..... Column
CONC..... Concrete
CP..... Catch Pit
CRTW..... Concrete Retaining Wall
CTV..... Cable Television
CUL..... Culvert
CW..... Concrete Block Wall
DC..... Drainage Channel
DPC..... Damp Proof Course
DR..... Drain
DSW..... Dry Stone Wall
EDP..... Electricity Cable Pit
EIC..... Electricity Inspection Cover
EJ..... Expansion Joint
EJB..... Electricity Junction Box
EL SUB 07m..Electricity Sub Station
EL..... Eaves Level
ELB..... Electricity Box
EP..... Electricity Pole
ER..... Earth Rod
ETL..... Electricity Transmission Line
FB..... Flower Bed
FH..... Fire Hydrant
FL..... Floor Level
FP..... Flagpole
GT..... Girth (of tree)
G..... Gulley
GAB..... Gabion
GIP..... Gas Inlet Pipe
GMKR..... Gas Marker
GOT..... Gas Stop Tap (Domestic)
GSV..... Gas Stop Valve (Mains)
HSE..... Housing
HT..... Height
HV..... High Voltage
I/R..... Iron Railing
IC..... Inspection Cover
IL..... Invert Level
IP..... Inlet Pipe
KO..... Kerb Outlet
LB..... Letter Box
LP..... Lamp Post
MS..... Multi-Girth
MH..... Manhole
MNR..... Marker
MP..... Mooring Point
NP..... Street Name Plate
O/H..... Overhead
O/P..... Open Paling
OE..... Overhead Electric Wire
OP..... Outfall Pipe
OSBM..... Ordnance Survey Bench Mark
OT..... Overhead Telecom Wire
P/G..... Post & Chain
P/R..... Post & Rail
P/W..... Post & Wire
PAV..... Paving
PB..... Pillar Box
PC..... Pedestrian Crossing
PP..... Petrol Pump
PT..... Post or Pillar
RE..... Rodding Eye
RS..... Road Sign
RTW..... Retaining Wall
RWP..... Rain Water Pipe
SAP..... Sapling
SL..... Sump Level
SOL..... Soffit Level
SP..... Sign Post
SPL..... Springing Level
SRTW..... Stone Retaining Wall
SV..... Stop Valve (unspecified)
SVP..... Soil Vent Pipe
SW..... Stone Wall
TAC..... Tactile Paving
TB..... Traffic Bollard
TBM..... Temporary Bench Mark
TCB..... Telephone Call Box
TFR..... Taken From Records
TIE..... Anchor Point (Guys/Pulley)
TL..... Traffic Light
TLB..... Traffic Light Control Box
TM..... Ticket Machine
TRE..... Tarmac
TP..... Telecommunications Pole
TRT..... Trial Pit
TS..... Trash Screen
U/C..... Under Construction
U/G..... Underground
UTL..... Unable to Lift (BM,SI etc)
UTS..... Unable To Survey
VDP..... Vehicle Detector Pad
VP..... Vent Pipe
W/M..... Wire Mesh
WL..... Water Level
WM..... Water Meter
WO..... Wash Out
WP..... Waste Pipe
WSP..... Water Stop Tap (domestic)
WSV..... Water Stop Valve (mains)

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Note:

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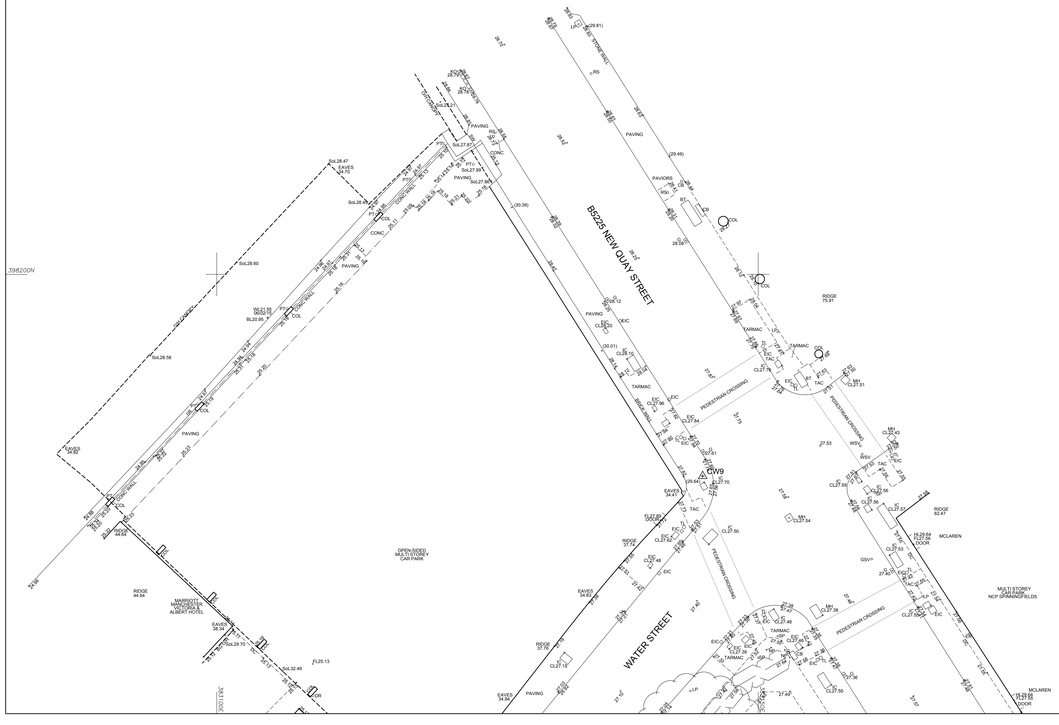
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Survey Control Markers established for Mapping purposes only and should not be used for Construction without the written approval of Survey Operations Ltd.

Levels in parenthesis indicate top of walls

SURVEY STATIONS

Name	Eastings	Northings	Height
CW1	383263.80	397956.37	31.61
CW2	383237.69	397869.12	33.07
CW3	383177.83	397823.53	32.55
CW4	383102.86	397823.53	32.55
CW5	383001.12	397843.51	28.03
CW6	382863.27	397877.75	26.22
CW7	382971.13	397971.46	26.25
CW8	383069.09	398069.93	26.21
CW9	383144.89	398181.38	27.75
SO10	383284.98	398405.86	29.37
SO12	383288.98	398545.86	29.37
SO15	383302.96	398093.10	28.97
CW11	383228.56	398079.33	28.32



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

Client
ROC Consulting

Drawing Title
Topographical Survey of Land at:
St Johns Development,
Manchester.

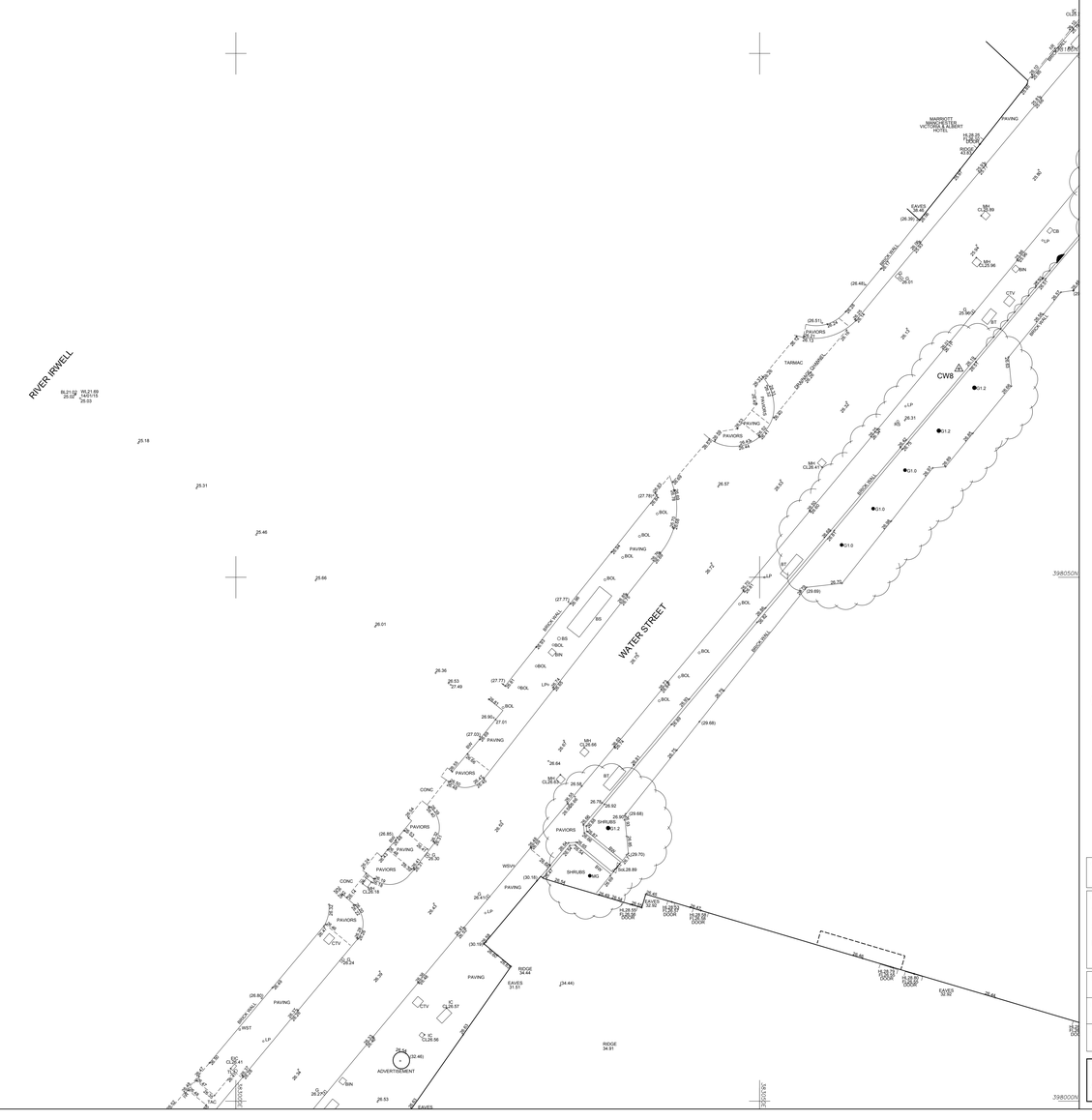
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Date	Jan 15	Drawn	AW
Job Number	14J171	Checked	MG

Sheet Size & Drg Number & Revision
A0 14J171/001

STANDARD REFERENCE & ABBREVIATIONS

(AM).....Assumed Route
AB.....Air Brick
AV.....Air Valve
B/W.....Barbed Wire
BAR.....Barrier
BB.....Bellshe Beacon
BH.....Borehole
BL.....Bed Level
BOL.....Bollard
BS.....Bus Stop
BT Box.....British Telecom Box
BT.....British Telecom IC
BRTW.....Brick Retaining Wall
BW.....Brick Wall
C/B.....Close Boarded
C/I.....Corrugated Iron
C/P.....Chestnut Paling
CB.....Control Box
CBW.....Concrete Block Wall
CCTV.....Closed Circuit TV
CD.....Cable Duct
CEL.....Cellar Light
CH/L.....Chain Link
CHY.....Chimney
CL.....Cover Level
CM.....Cable Marker
COL.....Column
CONC.....Concrete
CP.....Catch Pit
CRTW.....Concrete Retaining Wall
CTV.....Cable Television
CUL.....Culvert
CW.....Concrete Block Wall
DC.....Drainage Channel
DPC.....Damp Proof Course
DR.....Drain
DSW.....Dry Stone Wall
ECP.....Electricity Cable Pit
EIC.....Electricity Inspection Cover
EJ.....Expansion Joint
EJB.....Electricity Junction Box
EL SUB STN..Electricity Sub Station
EL.....Eaves Level
ELB.....Electricity Box
EP.....Electricity Pole
ER.....Earth Rod
ETL.....Electricity Transmission Line
FB.....Flower Bed
FH.....Fire Hydrant
FL.....Floor Level
FP.....Flagpole
GY.*.....Gully (of tree)
G.....Gulley
GRB.....Gabion
GIP.....Gas Inlet Pipe
GMKR.....Gas Marker
GST.....Gas Stop Tap (Domestic)
GSV.....Gas Stop Valve (Mains)
HDG.....Hoarding
HT.....Height
HV.....High Voltage
I/R.....Iron Railing
IC.....Inspection Cover
IL.....Invert Level
IP.....Inlet Pipe
KO.....Kerb Outlet
LB.....Letter Box
LP.....Lamp Post
M(1).....Multi-Girth
MH.....Manhole
M.....Marker
MP.....Mooring Point
NP.....Street Name Plate
O/H.....Overhead
O/P.....Open Paling
OE.....Overhead Electric Wire
OP.....Outfall Pipe
OSBM.....Ordnance Survey Bench Mark
OT.....Overhead Telecom Wire
P/G.....Post & Chain
P/R.....Post & Rail
P/W.....Post & Wire
PAV.....Paving
PB.....Pillar Box
PC.....Pedestrian Crossing
PF.....Petrol Pump
PT.....Post or Pillar
RE.....Rodding Eye
RS.....Road Sign
RTW.....Retaining Wall
RWP.....Rain Water Pipe
SAP.....Sapling
SL.....Sump Level
SOF.....Soffit Level
SP.....Sign Post
SPL.....Springing Level
SRTW.....Stone Retaining Wall
SV.....Stop Valve (unspecified)
SVP.....Soil Vent Pipe
SW.....Stone Wall
TAC.....Tactile Paving
TB.....Traffic Bollard
TBM.....Temporary Bench Mark
TCB.....Telephone Call Box
TFR.....Taken From Records
TIE.....Another Point (Masts/Poles)
TL.....Traffic Light
TLB.....Traffic Light Control Box
TM.....Ticket Machine
TWE.....Tarmac
TP.....Telecommunications Pole
TPIT.....Trial Pit
TS.....Trash Screen
U/G.....Under Construction
U/G.....Underground
UTL.....Unable to Lift (BM,IC etc)
UTS.....Unable to Survey
VDP.....Vehicle Detector Pad
VP.....Vent Pipe
W/M.....Wire Mesh
WL.....Water Level
WM.....Water Meter
WO.....Wash Out
WP.....Waste Pipe
WSP.....Water Stop Tap (domestic)
WSV.....Water Stop Valve (mains)

398150N
398100N
398050N
398000N
385250E
385300E
385350E



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Levels in parenthesis indicate top of walls

SURVEY STATIONS

Name	Eastings	Northings	Height
CW1	383263.80	397956.37	31.61
CW2	383237.69	397869.12	33.07
CW3	383197.86	397837.53	32.55
CW4	383102.86	397823.53	32.35
CW5	383001.12	397843.51	28.03
CW6	382863.27	397877.75	26.22
CW7	382971.13	397971.46	26.25
CW8	383069.09	398069.93	26.21
CW9	383144.89	398181.38	27.75
CW10	383221.58	398299.86	29.97
SO12	383288.98	398345.86	29.37
SO13	383302.96	398093.10	28.97
CW11	383228.56	398079.33	28.32

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4	5	
	6	

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Tel: 01695 725662 Fax: 01695 51816
Email: mail@survops.co.uk — www.survops.co.uk

Client: ROC Consulting

Drawing Title: Topographical Survey of Land at: St Johns Development, Manchester.

Scale(s)	1:200	Surveyor	CW
Date	Jan 15	Drawn	AW
Job Number	14J171	Checked	MG

Sheet Size & Org Number & Revision: A0 14J171/002



STANDARD REFERENCE & ABBREVIATIONS

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

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Levels in parenthesis indicate top of walls

SURVEY STATIONS

Name	Eastings	Northings	Height
CW1	383263.80	397956.37	31.61
CW2	383237.69	397869.12	33.07
CW3	383167.86	397863.53	32.55
CW4	383102.86	397823.53	30.35
CW5	383001.12	397843.51	28.03
CW6	382863.27	397877.75	26.22
CW7	382971.13	397971.46	26.25
CW8	383069.09	398069.93	26.21
CW9	383144.89	398181.38	27.75
CW10	383230.58	398289.06	29.37
SO12	383288.98	398345.86	29.37
SO13	383302.96	398093.10	28.97
CW11	383228.54	398079.33	28.32

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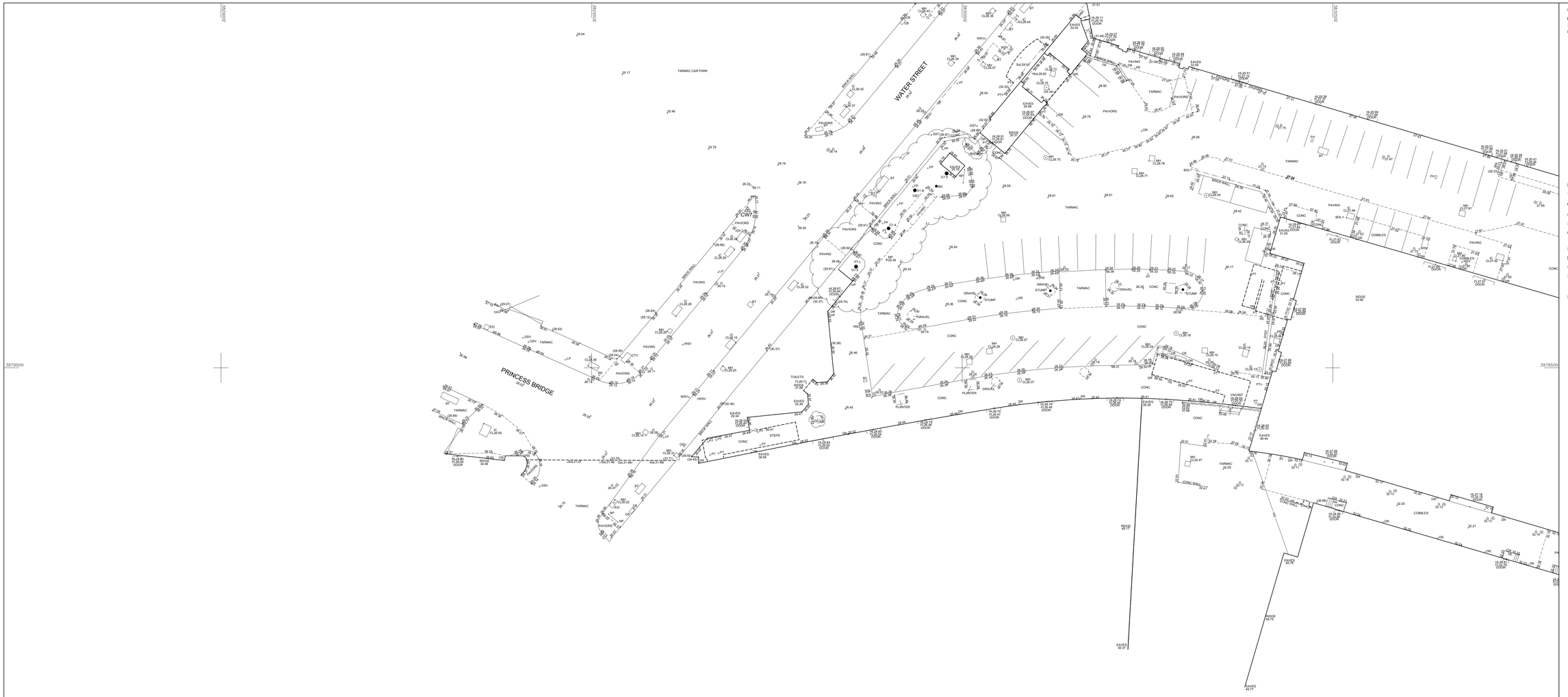
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CW3	383102.86	397863.53	32.55
CW4	383102.86	397923.53	32.55
CW5	383001.12	397843.51	28.03
CW6	382893.27	397877.75	26.22
CW7	382971.13	397971.46	26.25
CW8	383069.09	398069.93	26.21
CW9	383144.89	398181.38	27.75
SO11	383286.98	398045.86	29.37
SO12	383286.98	398045.86	29.37
SO13	383302.96	398093.10	28.97
CW11	383228.56	398079.33	28.32

STANDARD REFERENCE & ABBREVIATIONS

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

1 | 2 3 | 4 5 | 6

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STANDARD REFERENCE & ABBREVIATIONS

(AM).....Assumed Mode
AB.....Air Brick
AV.....Air Valve
B/W.....Barbed Wire
BAR.....Barrier
BB.....Bellshe Beacon
BH.....Borehole
BL.....Bed Level
BOL.....Bollard
BS.....Bus Stop
BT Box.....British Telecom Box
BT.....British Telecom It
BRTR.....Brick Retaining Wall
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ETL.....Electricity Transmission Line
F.....Flower Bed
FH.....Fire Hydrant
FL.....Floor Level
FLAG.....Flagpole
GRAVEL.....Gravel (of Trees)
GUL.....Gulley
GWB.....Guard Rail
GIP.....Gas Inlet Pipe
GWM.....Gas Marker
GOT.....Gas Stop Tap (Domestic)
GSV.....Gas Stop Valve (Mains)
HSE.....Housing
HT.....Height
HV.....High Voltage
I/R.....Iron Railing
IC.....Inspection Cover
IL.....Invert Level
IP.....Inlet Pipe
KO.....Kerb Outlet
LB.....Letter Box
LP.....Lamp Post
MS.....Multi-Girth
MH.....Manhole
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O/H.....Overhead
O/P.....Open Paling
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OSBM.....Ordnance Survey Bench Mark
OT.....Overhead Telecom Wire
P/C.....Post & Chain
P/R.....Post & Rail
P/W.....Post & Wire
PAV.....Paving
PB.....Pillar Box
PC.....Pedestrian Crossing
PP.....Petrol Pump
PT.....Post or Pillar
RB.....Rodding Eye
RS.....Road Sign
RTN.....Retaining Wall
RWP.....Rain Water Pipe
SAP.....Sapling
SL.....Lamp Level
SLL.....Soffit Level
SP.....Sign Post
SPL.....Springing Level
SWTN.....Stone Retaining Wall
SV.....Stop Valve (unspecified)
SVP.....Soil Vent Pipe
SW.....Stone Wall
TAC.....Tactile Paving
TB.....Traffic Bollard
TBM.....Temporary Bench Mark
TCB.....Telephone Call Box
TFR.....Taken From Records
TIE.....Anchor Point (Back=Pulley)
TL.....Traffic Light
TLB.....Traffic Light Control Box
TR.....Toilet Machine
TWC.....Tarmac
TP.....Telecommunications Pole
TVCT.....Trial Pit
TS.....Trash Screen
U/C.....Under Construction
U/G.....Underground
UTL.....Unable to Lift (MH,IC etc)
UTS.....Unable To Survey
VDP.....Vehicle Detector Pad
VP.....Vent Pipe
W/B.....Wire Mesh
WL.....Water Level
WM.....Water Meter
WO.....Wash Out
WP.....Waste Pipe
WSP.....Water Stop Tap (domestic)
WSV.....Water Stop Valve (mains)

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Note:

The survey is plotted on a plane local Grid. Orientation to National Grid.

All levels relate to Ordnance Datum, achieved using the OS National GPS Network.

Survey Control Markers established for Mapping purposes only and should not be used for Construction without the written approval of Survey Operations Ltd.

Levels in parenthesis indicate top of walls

SURVEY STATIONS			
Name	Easting	Northing	Height
CW1	383263.80	397956.37	31.61
CW2	383237.69	397869.12	33.07
CW3	383102.86	397863.53	32.55
CW4	383102.86	397823.53	32.55
CW5	383001.12	397843.51	28.03
CW6	382863.27	397877.75	26.22
CW7	382971.13	397971.46	26.25
CW8	383069.09	398069.91	26.21
CW9	383144.89	398181.38	27.75
SO11	383286.98	398540.86	29.37
SO12	383286.98	398540.86	29.37
SO13	383302.96	398093.10	28.97
CW11	383228.56	398079.33	28.32

	1	
2	3	
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	6	

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

Client: ROC Consulting

Drawing Title: Topographical Survey of Land at: St Johns Development, Manchester.

Scale(s)	1:200	Surveyor	CW
Date	Jan 15	Drawn	AW
Job Number	14J171	Checked	MG

Sheet Size & Drg Number & Revision: A0 14J171/005

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STANDARD REFERENCE & ABBREVIATIONS

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

Note:

The survey is plotted on a plane local Grid. Orientation to National Grid.

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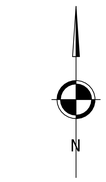
Levels in parenthesis indicate top of walls

SURVEY STATIONS

Name	Eastings	Northings	Height
CW1	383263.80	397956.37	31.61
CW2	383237.69	397869.12	33.07
CW3	383144.89	397831.38	32.55
CW4	383102.86	397923.53	30.35
CW5	383001.12	397843.51	28.03
CW6	382863.27	397877.75	26.22
CW7	382971.13	397971.46	26.25
CW8	383069.09	398069.91	26.21
CW9	383144.89	398181.38	27.75
SO11	383286.98	398540.86	29.37
SO12	383286.98	398540.86	29.37
SO13	383302.96	398093.10	28.97
CW11	383228.56	398079.33	28.32







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4	5	
	6	

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

Client: ROC Consulting

Drawing Title: Topographical Survey of Land at:
St Johns Development,
Manchester.

Scale(s)	1:200	Surveyor	CW
Date	Jan 15	Drawn	AW
Job Number	14J171	Checked	MG

Sheet Size & Drg Number & Revision: A0 14J171/006

APPENDIX F – SEWER RECORDS



OS Sheet No: SJ8397NW

Scale 1:1250 Date: 25-Jul-2013

Printed by: Lea Robertson

Refno	Cover	Func	Type	Invert	Size.x	Size.y	Shape	Matl	Grad	Length
0701	25.6	S	M	24.47	225		C	VC		17.03
0702	25.59	S	M	24.74	225		C	VC		8.94
0703	25.81	O	M	22.76	2300	3080	U	BR		19.03
0704	26.25	C	M	23.77	225		C	VC	81	23.64
0705		O	G		2300	3080	U	BR		20.25
0706		O	G		2300	3080	U	BR		22.2
0707		O	G		2300	3080	U	BR		16.65
0708		O	Q		840	540	U	BR		21.1
0865	29.54	C	M	22.25	620	920	E	BR		76.66
0890		C	J		620	920	E	BR		75.43
0901	26.69	S	M	23.4	400		C	VC	26	5
0902		C	L	23.63	300		C	VC	488	73.25
0903		C	V	24.76	910	580	F	BR	52	45.24
0903		C	V	25.45	225		C	VC	12	22.25
0904		C	V	23.47	300		C	VC	-1022	10.22
0904		C	V		530	640	E	BR		26.07
0905		S	Q	23.21	500	700	U	BR	27	5.11
0906		C	Q	23.30	560	630	U	BR	52	45.54
0907		C	Q	24.9	640	570	F	BR	98	9.79
1601	33.23	C	M							
1602		C	G		400	300	U			43.27
1603		C	J		400	300	U			5.66
1604		C	G		400	300	U			6
1605		C	J		400	300	U			13.04
1700		C	J		1500		C	CO		3.16
1701		C	V	23.41	300		C	VC		35.66
1701		C	V		630	930	F	BR		21.18
1702		C	G		450		C	CO		12.37
1703	31.59	C	M	22.21	620	920	E	BR		62.64
1704		C	G		300		U			33.12
1705		C	G		400	300	U			29.73
1706		C	L	27.23	300	375	E	BR		6.08
1707		C	J		620	920	E	BR		3.16
1708	32.67	C	M	28.15	650	600	U	CO		56.75
1709	31.39	C	M	22.87	1500		C	CO		8.28
1790		C	J		620	920	E	BR		12.37
1791	29.37	C	M	24.12	550	950	F	BR	100	30.95
1792		C	J		1500		C	CO		33.24
1801	28.95	C	M	25	750	490	F	BR	85	8.54
1802		C	G		500	750	U			8.42
1803		C	J		500	720	U			4.14
1804		C	Q	27.09	730	550	F	BR	37	77.49
1805		C	Q		720	510	F	BR		2.56
1806		C	M	25.83	375		C	VC	81	39.1
2501	31.09	C	M	24.85	300		C	VC	399	63.82
2502	29.53	C	M	24.7	300		C	VC	-1253	12.53
2503	37.16	C	M	24.89	300		C	VC	-8	37.01
2601	33.75	C	M	26.77	1500		C	CO		48.26
2602		C	G							39
2603		C	G							15.62
2604		C	J		400	300	U			82.8
2605		C	Q							2.24
2606		C	Q							2
2701	33.05	C	M	28.12	1520		U	BR	-4	10.2
2702	33.12	C	M	25.87	1500		C	CO		14.55
2703	33.04	C	M	25.9	1500		C	CO		10.44
2704	33.44	C	M	30.30	710	460	F	BR		19.65
2705		C	G		500	375	U			34.93
2706	32.91	C	M	29.87	675	600	C	CO	-18	23.77
2707	33.5	C	M	22.19	600	900	E	BR	1263	63.10
2708		C	G		500	375	U	BR		25.4
2709		C	J		620	920	E	BR		43.97
2710		C	G		225		U			39.22
2711		C	G		450		C	CO		11.4
2712		C	J		1500		C	CO		4.12
2713		C	Q	30.62	1500		C	CO		11.18
2714		C	Q		400	700	U	BR		20.86
2715		C	Q	31.22	550	600	U	CO		24.04
2790		C	J		1500		C	CO		63.89
2791		C	J		1500		C	CO		43.66
2800		C	Q		600	400	U			12.28
2801	33.17	C	M	30.87	375		F	BR	54	20.85
2802		C	J							
2803		C	C							
2804		C	G							
2806	33.42	C	M	31.38	225		C	VC		32.7
2807		C	Q		500	400	U			23.22
2808		C	M	30.28	375		C	CO	54	21.18
2809		C	J		500	400	U			15.07
2890		C	J		500	400	U			6.77
2891		C	M		225		C	VC		9.54
2902		C	M							66.76
2903	32.21	C	M	29.16	690	520	F	BR	37	77.79
2904		C	G		500	720	U			32.35
2905		C	Q							
2906		C	M		225		C	VC		38.34

Refno	Cover	Func	Type	Invert	Size.x	Size.y	Shape	Matl	Grad	Length
3100		C	Q		150		C	VC		38.81
3501	32.11	C	M	26.33	300		C	VC	4	37.34
3502		C	G		830	550	U			0
3503	32.24	C	M	26.49	300		C	VC		77.25
3504	31.9	C	M	30	300	400	E	VC	15	30.07
3505		C	G		830	550	U			5.63
3506		C	G		300		U			80.75
3507		C	Q	27.83	225		C	VC	15	30.07
3600		C	Q		150		C	VC		3.78
3601	34.38	C	M	26.9	375		C	VC	-9	28.65
3602		C	J		500	750	U	BR		6.71
3603		C	M		560	760	U	BR		5.39
3604		C	G		560	760	U			31.62
3605		C	G		750	500	U			7.62
3606		C	J		1500		C	CO		44.20
3607		C	Q	30.15	300		C	VC		28.65
3608		C	Q		300		C	VC		7.28
3609		C	Q		150		C	VC		10.61
3610		C	J							
3690	34.2	C	M	27.14	1500		C	CO		4.47
3691	33.4	C	M		300		C	VC		31.80
3692	33.74	C	M		600	750	U	BR		41.16
3701	34.12	C	M	22.12	630	900	E	BR	3585	35.66
3702	34.7	C	M	22.03	900	600	E	BR		23.77
3703	34.32	C	M							
3704		C	G		750	500	U			59.46
3705		C	Q	22.11	900	600	E	BR	3625	36.28
3706		C	Q		600	375	U			52.30
3707	34.62	C	M	30.84	600	375	C	VC		52.8
3708		C	Q		600	375	C	VC		22.47
3709		C	Z		225		C	VC		17.33
3710		C	M		225		C			12.82
3711		C	Z		225		C	BR		5.35
3712		C	Q		225		C	BR		5.58
3713		C	Q							
3801		C	Q	30.95	570	430	F	BR	83	44.64
3804	34.07	C	M	33.04	225		C	VC	17	33.53
3805	33.63	C	M	31.01	225		C	VC	33	8.22
3806	33.49	C	M	30.45	550	440	F	BR	-1253	12.53
3807	33.44	C	M	30.27	375		C	VC		46
3901	33.26	C	M	29.58	650	540	F	BR		45.27
3902		C	J		650	540	F	BR		10.44
3903		C	J							
3905		C	G		670	500	E	BR		10.2
4501	33.52	C	M	28.52	375		C	VC	-1260	38.01
4502		C	R	37.31	225		C	VC	37	25.08
4801		C	G		2300		C	BR		6.71
4802		C	G		1050	600	U	BR		5
4803		C	G		830	550	U			64.56
4804		C	O		800	900	E	BR		22.85
4805		C	O		1050	600	U	BR		48.38
4806		C	Z		150		C	VC		3.95
4807		C	J							
4868		C	M		2400		C	BR		27.9
4869		C	M		2400		C	BR		19.89
4890		C	J		2300		C	BR		40.49
4891		C	J		2400		C	BR		36.69
4892		C	J		500	750	U	BR		10.38
4701		C	V	31.33	630	550	U	BR		24.72
4701		C	V	31.95	300		C	VC	-426	8.52
4702		C	J		2300		C	BR		17.09
4703		C	G		500	375	U			22.47
4704	35.36	C	M	21.81	2300		C	BR		39.68
4705		C	G		530	630	U	BR		23.77
4790		C	J		2300		C	BR		46.87
4791		C	J		500	750	U	BR		67.07
4792		C	G		550	750	U	BR		46.82
4800		C	J							
4801	34.39	C	M	31.94	300		C	VC	104	17.72
4802	34.21	C	M	31.75	300		C	VC	202	42.35
4803	34.44	C	M	31.43	460	630	U	BR	92	43.07
4804	35.23	C	M							
4805	35.27	C	M	21.7	2300		C	BR		66.48
4806		C	G		600	450	U			38.8
4807		C	G		450	650	U	BR		8.54
4808	35.15	C	M	31.85	450	650	U	BR		25
4809		C	M				C			8.15
4810		C	J							
4901		C	G		600	450	U			54.08
4902		C	G		600	450	U			102.88
4903		C	J		450	660	U	BR		102.44
4904		C	G		375		C			20.86
4905		C	G		900	610	E	BR		26.25
6400		C	J		1500		C	CO		4.52
6400		C	J		1500		C	CO		2.28
9028		C	Q		750	600	U			16.81

WASTE WATER SYMBOLOGY

FOUL SURFACE COMBINED DUAL MANHOLE

SIDE ENTRY MANHOLE

FOUL SURFACE COMBINED

- PUBLIC MAIN
- PRIVATE MAIN
- SECTION 104
- PUMPING MAIN
- HIGHWAY DRAIN
- SLUDGE MAIN
- ABANDONED

SITE TERMINATION
T-JUNCTION (SADDLE)
AIR VALVE
LAMP HOLE
CASCADE
OIL INTERCEPTOR
CONTROL KIOSK
PENSTOCK
CONTROL VALVE
PUMP
EXTENT OF SURVEY
RODDING EYE
FLOW METER
SEA OUTFALL
GULLEY
SOAKAWAY
HATCHBOX
SUMMIT NODE
HEAD OF SYSTEM
TUMBLING BAY
HEADWALL
UNSPECIFIED
HYDROBRAKE
VALVE
INLET
VALVE CHAMBER
INSPECTION CHAMBER
WASHOUT
GHOST NODE (inc. GN - Rising Main & DN - Dual Function)
EXPEDIENCY NODE (CHANGE OF CHARACTERISTIC)
BIFURCATION
DROPSHAFT
CATCHPIT
FLOW CONTROL
CHAMBER
SCREEN CHAMBER POWERED
CONTAMINATED SURFACE WATER
SCREEN CHAMBER STATIC
PUMPING STATION
WASTE WATER TREATMENT WORKS
EJECTOR STATION
SEPTIC TANK
SLUDGE PUMPING STATION
TANK
SHEET EDGE
VENT COLUMN
SEWER OVERFLOW
DISCHARGE POINT (OUTFALL)

Note - ALL flow direction arrows are BLUE - colour not significant

NODE TABLE ABBREVIATIONS

MANHOLE FUNCTION

F Foul	T Transition
S Surface	O Overflow
C Combined	U Unspecified

MANHOLE / NODE TYPE

M Manhole	Z Ghost in Rising Main
J Junction	C Cascade
L Lamphole	Y Gulley
H Hatchbox	E Ejector
R Rodding Eye	O Oil Injector
F Outfall	I Inlet
V Combined Sewer Overflow	B Hydrobrake
	T Vent Column
P Pumping Station	X Valve
S Soakaway	U Unspecified
D Dual Function Manhole	Q Expediency Node
W Treatment Works	G Ghost (to allow pipe bends)

SEWER SHAPE

C Circular	T Trapezoidal
E Egg	A Arch
O Oval	B Barrel
F Flat Top	H Horseshoe
R Rectangular	U Unspecified
S Square	

SEWER MATERIAL

AC Asbestos Cement
BR Brick
CI Cast Iron
SI Spun (Grey) Iron
CO Concrete
CS Concrete Segments (Bolted)
CS Concrete Segments (Unbolted)
CC Concrete Box Culvert
DI Ductile Iron
CR Glass Reinforced Concrete
GR Glass Reinforced Plastic
PS Plastic / Steel Composite
PV Polyvinyl Chloride
PE Polyethylene
RP Reinforced Plastic Matrix
ST Steel
VC Vitrified Clay (All Clayware)
PP Polypropylene
PF Pitch Fibre
MA Masonry - In Regular Courses
MA Masonry - Randomly Coursed
U Unspecified

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OS Sheet No: SJ8397NW
Scale 1:1250 Date: 25-Jul-2013
172 Nodes
Sheet 1 of 1

United Utilities
SEWER RECORDS



Refno	Cover	Func	Type	Invert	Size.x	Size.y	Shape	Matl	Grad	Length
0001	26.17	S	M	23.61	225		C	VC		7.21
0002	26.65	C	M	23.66	300		C	VC	258	50.87
0003	25.85	C	M	23.9	375		C	CO	226	40.81
0004		S	J							
0101	25.65	C	M	23.67	375		C	CO	250	58.02
0102		O	F							
0200		C	J	24.33	600		C	BR		3.81
0201	27.49	C	M		2100					8.71
0202		C	M		2240	2110	E	BR		138.22
0203		C	J		600			BR		5.83
0301		C	M		1350		C	CO		99.48
0400	29.16	C	M	20.53	1350		C	CO		52.46
0401	29.25	C	M	25.1	300		C	VC	100	61.29
0402		C	G		900	660	E	BR		21.02
0403		C	M		900	660	E	BR		17.03
0404		C	M		600		C	BR		154.69
0405		C	G		700	590	E	BR		46.65
0406		C	M		1350		C	CO		43.91
0407		C	M		1350		C	CO		24.08
0408		C	M		1350		C	CO		7.81
0409		C	M		730	500	E	BR		49.04
0410		C	Q	26.42	1000	450	F	BR	-179	12.53
1001	26.7	C	M	23.4	875		C	CO		66.41
1002		C	L							
1101		C	R	23.73	225		C	VC	136	40.46
1102	26.43	C	M	23.41	225		C	VC		38.95
1103		C	L	24.18	225		C	VC	52	38.83
1104	27.31	C	M	23.02	810	680	E	BR		7.21
1105		C	V	22.65	900	610	E	BR		4.42
1105		C	V		1220	670	R	BR		10.06
1106	27.66	C	M	22.62	900	610	R	BR		57.98
1108		S	M		1200	650	U			43.6
1109		S	J		630	1220	R	BR		5.1
1111		C	Q		950	620	R	BR		9.45
1112		C	Q		1260	640	R	BR		12.21
1113		O	Q		1200	650	U	BR		10.85
1190		C	J		900	610	E	BR		65.57
1201		C	Q		820	820	E	BR		13.6
1202		C	G		500	500	S	BR		4.12
1203		C	G		500	500	S	BR		2.83
1290		C	J		820	820	E	BR		11.4
1301	27.47	C	M		2100		C	CO		60.22
1302		C	Q		2100	2100	S			61.04
1400	29.28	C	M	25.29	300		C	VC	118	22.47
1401		C	G		900	550	E	BR		12.37
1402		C	G		900	550	E	BR		83.24
2001	27.9	C	M							6.12
2002	28.04	C	M	22.74	900	610	E	BR	1402	84.12
2003	29.3	C	M	25.97	675		C	CO		34.48
2004	29.35	C	M	22.66	900	610	E	BR		66.48
2005	28.13	C	M	23.27	375		C	CO		13.67
2006	28.56	C	M	26.22	150		C	VC		4
2007		C	M		900	610	E	BR		5
2008		C	J		700	460	E	BR		25
2009		C	G		450	300	U			40.82
2010		C	J		675		C	CO		7.24
2011		C	J		900	610	E	BR		5
2012		C	Q		675			CO		14.58
2013		C	J		675		C	CO		11.4
2014		C	J		675		C	CO		4.12
2015		C	J		450	300	U	VC		1
2016		C	Q	25.45	375		C	CO	76	36.41
2017		C	Q		700	460	U	BR		8.54
2018		C	Q		450	300	E	VC		1.41
2090		C	J		675		C	CO		26.94
2102	26.41	C	M	25.48	730	460	E	BR		8.25
2104		C	Q		500	500	S	BR		70.83
2190		C	G		500	500	S	BR		53.01
2201	27.65	C	M	23.59	960	820	E	BR	69	44.09
2202	27.41	C	M	23.07	960	820	E	BR		74.03
2203	26.62	C	M	22.95	960	820	E	BR		12.21
2206		C	J		960	820	E	BR		5.66
2300	27.47	C	M	16.82	2100		C	CO		56.04
2301		S	M							51.22
2302		S	M							20.81
2303		S	F							
2304		C	Q	18.64	2100		C	CO	3000	30
2400	28.37	C	M	18.64	2280			BR		30
2401	26.33	C	M	22.83	600		C	CO	-131	2.83
2402	26.08	C	M	23.24	600		C	CO	97	30.66
2403	26.1	C	M	23.34	1000	450	O	GRP	130	13.38
2404	28.16	C	M	23.69	1000	450	O	GRP		25
2405		C	J		1000	450	O	GRP		9.43
2406		C	J		1000			GRP		20.4
2407		C	J		1000			GRP		33.11
2408		C	Q	22.85	600		C	DI	-320	3.2

Refno	Cover	Func	Type	Invert	Size.x	Size.y	Shape	Matl	Grad	Length
2512		C	G		950			BR		18.84
2513		C	G		1000			GRP		4.24
3001		C	G		400	300	U			2.24
3003	29	C	M	23.4	750	500	U	VC		41.98
3004	30.09	C	M		300		C	VC		77.88
3005	30.09	C	M	28.08	225		C	VC		2
3006	30.86	C	M	27.63	300		C	VC	161	37.11
3007	30.93	C	M	27.38	300		C	VC	17	8.06
3008	30.99	C	M	22.46	900	610	E	BR		15.3
3009	30.93	C	M	23.25	450		C	VC		11.7
3010		C	G		400	300	U			35.44
3011	30.95	C	M	27.55	675		C	CO		3.16
3012	31.73	C	M		400	300	U			14.32
3013		C	G		400	300	U			5
3014		C	J		675		C	CO		2.24
3015		C	G		400	300	U			16.77
3016		C	G				U			10.3
3017		C	G		300			VC		10.06
3018		C	J		450		C	VC		16.62
3019		C	J		900	610	E	BR		26
3020		C	J		450		C	VC		6.08
3021		C	J		675		C	CO		38.5
3022		C	Q		400	300	C			3.16
3090		C	J		900	610	R	BR		4.12
3091	30.2	C	M	27.02	675		C	CO		45.36
3301	30.16	C	M	24.27	525		C	CO		9.51
3302	29.16	C	M	23.35	730	820	R	BR	606	18.17
3303	29.28	C	M	23.33	850	900	R	BR	-135	17.49
3304		C	L	24.43	225		C	VC	40	22.86
3305		C	V	23.95	300		C	VC		11.92
3305		C	V		870	630	E	BR		37.93
3306	29.93	C	M	24.14	300		C	VC		16.34
3306	29.93	C	M		610	860	R	BR		39.13
3307		C	F							
3308		C	G		300		C	VC		9.29
3309		C	F							
3311		C	Q	23.32	830	800	E	BR	852	13.04
3312		C	Q	23.46	960	620	E	BR	-145	18.87
3401		C	M		375		C	VC		17.84
3402		C	M		375		C	VC		2.13
3403		C	M		375		C			7.36
3404	22.27	C	M		375		C	CO		8.78
4001		C	Q		220	300	E	BR		35.13
4002		C	Q		500	700	E	BR		37.34
4003	30.83	C	M	26.11	450		C	VC		8.06
4004		C	Q	28.42	300		C	VC	21	19.42
4005		C	Q		225		C	VC		15.52
4013		C	M		375		C	CO		89.74
4014		C	J		300		C	VC		10.05
4015		C	G		300		C	VC		14.32
4016		C	J		220	350	E	BR		23.09
4017		C	J		900	810	E	BR		14.58
4018		C	J		900	810	E	BR		19.42
4019		C	J		900	810	E	BR		8.25
4020		C	J		900	810	E	BR		30.38
4021		C	M		450		C	VC		8.00
4022		C	J		450		C	VC		4
4023		C	J		220	350	E	BR		2
4090		C	G		300		C	VC		35.44
4091		C	J		220	350	E	BR		12.04
4092		C	G		300		C	CO		18.68
4101		C	R	29.16			U			60.41
4102	33.97	C	M	27.42	770	550	E	BR		7.26
4103	31.14	C	M	26.84	525		C	CO		39.46
4104		C	Q		590	770	U	BR		8.08
4110		C	M		1500		C	CO		5
4111		C	R	30.23			U			15
4113		C	G		300			VC		65.25
4115		C	J		220	300	E	BR		10
4122		C	J		525		C	CO		39.61
4123		C	J		500	770	U	BR		10.2
4190	37.98	C	M	28.27	600		C	CO	69	74.43
4201	33.53	C	M	26.74	600		C	CO	217	65
4205		C	J		600	330	E	BR		32.25
4206		C	J		525		C	CO		24.33
4207		C	J		600	330	E	VC		21.21
4301	33.01	C	M	27.17	525		C	CO	167	26.68
4302	32.79	C	M	26.96	525		C	CO	254	109.38
4303	33.01	C	M	25.94	780	460	E	CO		1.41
4304	31.03	C	M	25.29	850	510	E	BR	59	39.79
4305		C	J		530	820	E	BR		20.62
4306		C	Q		460	770	E	BR		2.24
4307		C	Q	24.62	1010	820	E	BR	61	40.55
4308		C	Q		840	540	E	BR		20.4
4401		C	M		225		C	VC		10.3
4402		C	M		225		C	VC		56.84

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Scale 1:1250 Date: 25-Jul-2013

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WASTE WATER SYMBOLOGY



Note - ALL flow direction arrows are BLUE - colour not significant

NODE TABLE ABBREVIATIONS

MANHOLE FUNCTION

F Foul	T Transition
S Surface	O Overflow
C Combined	U Unspecified

MANHOLE / NODE TYPE

M Manhole	Z Ghost in Rising Main
J Junction	C Cascade
L Lamphole	Y Gulley
H Hatchbox	E Ejector
R Rodding Eye	O Oil Injector
F Outfall	I Inlet
V Combined Sewer Overflow	B Hydrobrake
P Pumping Station	T Vent Column
S Soakaway	X Valve
D Dual Function Manhole	U Unspecified
W Treatment Works	Q Expediency Node
	G Ghost (to allow pipe bends)

SEWER SHAPE

C Circular	T Trapezoidal
E Egg	A Arch
O Oval	B Barrel
F Flat Top	H Horseshoe
R Rectangular	U Unspecified
S Square	

SEWER MATERIAL

- AC Asbestos Cement
- BR Brick
- CI Cast Iron
- SI Spun (Grey) Iron
- CO Concrete
- CS Concrete Segments (Bolted)
- CS Concrete Segments (Unbolted)
- CC Concrete Box Culvert
- DI Ductile Iron
- GR Glass Reinforced Concrete
- CR Glass Reinforced Plastic
- PS Plastic / Steel Composite
- PV Polyvinyl Chloride
- PE Polyethylene
- RP Reinforced Plastic Matrix
- ST Steel
- VC Vitrified Clay (All Clayware)
- PP Polypropylene
- PF Pitch Fibre
- MA Masonry - In Regular Courses
- MA Masonry - Randomly Coursed
- U Unspecified

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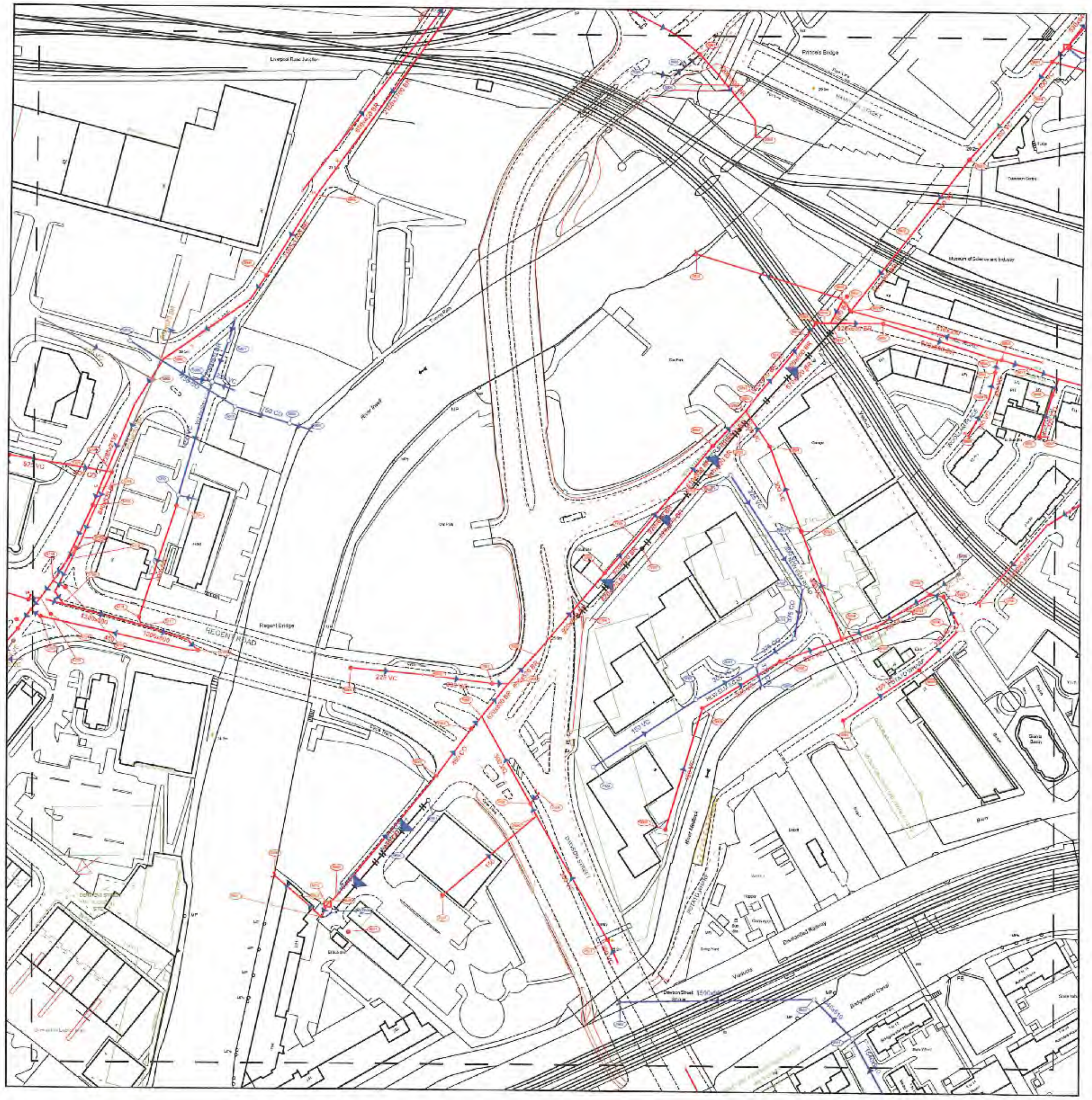
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172 Nodes

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United Utilities

SEWER RECORDS



Refno	Cover	Func	Type	Invert	Size.x	Size.y	Shape	Matl	Grad	Length
5700	28.88	S	M	25.1	750	600	R	BR		5.1
5701		C	Q	27.84	690		C	CO	25	25.32
5702	30.06	C	M	19.73	150			VC		30.87
5703		C	L		2286					8.54
5704	30.74	C	M	26.5	840	620	E	BR		24.17
5705		C	M		450		C			4
5706		C	M		890	680	E			56.92
5707		C	M		450			BR		5.83
5708		C	M		150			VC		6.71
5709		C	M		150		C	VC		8.8
5710		S	G		150		C	VC		9.22
5711		C	J		1200	800	B			24.04
5712		C	G		1200	800	B			7.07
5713		C	G		450		C			74.73
5714		C	M		1200	800	E			4.12
5715		C	G		1200	800	E			8.26
5716		C	G							7.21
5717		C	J							17.89
5718		C	J		150			VC		10
5719		C	Q		1000	880	E			11.18
5720		C	G		840	620	F	BR		10.77
5722		C	G		150			VC		10.83
5723		C	J		700			BR		7.81
5724		C	M							
5725		C	J		1200	800	E			39.29
5800	29.06	S	M	25.86	450		C	VC	83	57.28
5801	29.21	S	M		750	600	R	BR		21.54
5802		C	L		2150			BR		26.05
5803	30.93	F	M	27.03	800	620	E	BR	115	49.24
5804		S	G		225		C	VC		9.22
5805		S	G		225		C	VC		11.7
5806		F	G		800	620	E	BR		49.98
5807		C	G		2285	2135	E			44.38
5808		S	G		750	600	R	BR		11.4
5809		F	G		300		C	VC		63.53
5810	30.67	S	M		750		C	CO		60.57
5811	29	S	M		750		C	CO		28
6501	25.1	C	M							
6502		C	V	23.19	470	430	R	BR		2.79
6502		C	V		300		C	VC		8.81
6503		C	Q		450		C	CO		2.83
6504	25	S	M	21.55	610	1550	H	BR		5
6505		C	J		450		C	CO		76.89
6506		S	G		610	1550	H	BR		2
6507		O	Q		610	1550	H	BR		16.62
6590		O	F							
6591		O	J		610	1550	E	BR		14.87
6601	25.51	S	M							
6602	25.54	C	M	22.86	450		C	CO	1430	28.6
6603	27.8	C	M	24	225		C	VC	110	35.13
6604		S	Q							
6606		C	Q	23.68	300		C	VC	107	34.23
6800	28.65	C	M		2150	1700	A	BR		14.42
6801		C	G		2150			BR		61.04
6802		S	F							
6803	25.78	S	M		750		C	CO		10.21
6900		C	L		2150	1700	A	BR		45.79
6901		C	G		650	450	E	BR		95.6
6911		C	G		650	450	E	BR		30
7501	26.1	C	M	23.41	300		C	VC	888	80.46
7502		S	F							
7503		C	G		300		C	VC		12.08
7504		C	M		150		U			80.31
7601	26.07	C	M	23.34	300		C	VC		8
7604		C	R	23.71	225		C	VC	91	8.4
7605	26.65	C	M	23.08	300		C	VC		48.37
7606		C	L	23.33	300		C	VC	31	6.71
7607	26.21	C	M	22.82	600	800	E	BR		7.31
7608		C	J		920	600	E	BR		52.5
7609	26.52	S	M	23.71	150		C	VC	-102	50.01

Refno	Cover	Func	Type	Invert	Size.x	Size.y	Shape	Matl	Grad	Length
7690		C	J		620	800	E	BR		20.82
7691		C	J		800	520	E	BR		19.1
7702	25.89	C	M							
7703	25.81	C	M	22.83	920	600	E	BR		22.07
7704	25.94	C	M							
7795		C	J		920	600	E	BR		29.83
8501		S	M		1500	900	U			85.02
8600		C	M		150			VC		44.49
8601	26.41	S	M	23.12	375		C	CO		10.44
8603		S	F							
8606	26.45	C	M	24.07	225		C	VC	178	44.42
8607	26.44	S	M	24.38	300		C	VC	29	33.62
8608	26.42	C	M	23.8	225		C	VC	97	31.95
8609		C	M		150		C	VC		61.68
8701	26.44	S	M	23.44	375		C	CO	77	23.02
8702	26.47	S	M	23.83	375		C	CO	68	25.32
8703	26.25	C	M	23.33	300		C	VC	330	44.01
8704	26.52	C	M	23.45	300		C	VC	667	55.71
8705	26.12	S	M	24.73	225		C	VC	74	32.45
8706		C	Q							
8707		S	Q	24.29	300		C	VC	74	32.46
8708		C	Q		610	920	E	BR		28.43
8801	25.83	C	M	22.55	610	920	E	BR		23.36
8802		C	Q	22.48	1000		C	BR	19	2.83
8803	26.04	C	M							
8804	27.08	C	M	23.16	300		C	VC		20.81
8805		C	Q		920	600	E	BR		5
8808	26.07	C	M	22.52	920	600	E	BR		4
8809	26.17	C	M	22.84	510	380	E	VC	24	3.61
8810	26.1	C	M	22.32	1060		C	BR		12.55
8810	26.1	C	M		1060			BR		1.41
8811		C	J		920	600	E	BR		16.44
8812		C	J		920	600	E	BR		19.21
8813		C	J		920	600	E	BR		7.21
8814		C	J		920	600	E	BR		3
8815		O	F							
8816		O	G		1000			BR		74.04
8817		C	J		920	600	E	BR		25
8890		C	J		600	920	E	BR		5
8901		O	M		1200	900	E	BR		40.53
8902		C	F							
8903		S	M							9.13
8904		S	M							8.43
8905		S	O							8.79
9501		S	M		1540	910	U			28.75
9600		C	M		150			VC		28.35
9700		C	P		150			VC		17.33
9701		C	Q	21.34	300		C	VC	-7	15.28
9702	25.88	C	M	21.58	300		C	VC	164	18.03
9703	25.88	C	M	19.09	250		C	VC	-7	15.26
9704		C	M		150			VC		6.72
9705	25.83	F	M	23.86	225		C	VC	4	17.2
9707		O	G		2300	3080	U	BR		59.33
9790		O	F							
9801		C	R	24.46	150		C	VC	5	4
9802	27.01	C	M	23.15	375		C	CO	60	20.88
9803		C	R	25.5	150		C	VC	9	20.59
9804		C	R	23.32	300		C	VC	46	13.34
9805	27.41	C	M	23.01	300		C	VC		6.08
9806	27.43	C	M	22.79	375		C	CO		8.54
9807	25.57	C	M	22.49	920	600	E	BR		58.52
9808	27.58	C	M	22.37	920	600	E	BR		14.55
9809		C	J		920	600	E	BR		2
9810		C	G		610	390	U			87.02
9811		C	Q		860	920	E	BR		14.87
9901	26.17	C	M	23.18	300		C	VC	170	46.4
9902		C	Q	22.93	510	390	E	BR	191	47.01
9903	26.37	C	M	23.46	300		C	VC		18.8
9904		C	J		300		C	VC		43.93

WASTE WATER SYMBOLOGY

FOUL SURFACE COMBINED DUAL — MANHOLE
SIDE ENTRY MANHOLE

FOUL SURFACE COMBINED
- PUBLIC MAIN
- PRIVATE MAIN
- SECTION 104
- PUMPING MAIN
- HIGHWAY DRAIN
- SLUDGE MAIN
- ABANDONED

SITE TERMINATION — T-JUNCTION (SADDLE)
AIRVALVE — LAMP HOLE
CASCADE — OIL INTERCEPTOR
CONTROL KIOSK — PENSTOCK
CONTROL VALVE — PUMP
EXTENT OF SURVEY — RODDING EYE
FLOW METER — SEA OUTFALL
GULLEY — SOAKAWAY
HATCHBOX — SUMMIT NODE
HEAD OF SYSTEM — TUMBLING BAY
HEADWALL — UNSPECIFIED
HYDROBRAKE — VALVE
INLET — VALVE CHAMBER
INSPECTION CHAMBER — WASHOUT
GHOST NODE (inc. GN - Rising Main & GN - Dual Function)
EXPEDIENCY NODE (CHANGE OF CHARACTERISTIC)
BIFURCATION — DROPSHAFT
CATCHPIT — FLOW CONTROL
CHAMBER — SCREEN CHAMBER POWERED
CONTAMINATED SURFACE WATER — SCREEN CHAMBER STATIC
PUMPING STATION — WASTE WATER TREATMENT WORKS
EJECTOR STATION — SEPTIC TANK
SLUDGE PUMPING STATION — TANK
SHEET EDGE — VENT COLUMN
SEWER OVERFLOW — DISCHARGE POINT (OUTFALL)

Note - ALL flow direction arrows are BLUE - colour not significant

NODE TABLE ABBREVIATIONS

MANHOLE FUNCTION

F Foul	I Transition
S Surface	O Overflow
C Combined	U Unspecified

MANHOLE / NODE TYPE

M Manhole	Z Ghost in Rising Main
J Junction	C Cascade
L Lamphole	Y Gulley
H Hatchbox	E Ejector
R Rodding Eye	O Oil Injector
F Outfall	I Inlet
V Combined Sewer Overflow	B Hydrobrake
	T Vent Column
P Pumping Station	X Valve
S Soakaway	U Unspecified
D Dual Function Manhole	Q Expediency Node
	G Ghost
W Treatment Works	(to allow pipe bends)

SEWER SHAPE

C Circular	T Trapezoidal
E Egg	A Arch
O Oval	B Barrel
F Flat Top	H Horseshoe
R Rectangular	U Unspecified
S Square	

SEWER MATERIAL

AC Asbestos Cement
BR Brick
CI Cast Iron
SI Spun (Grey) Iron
CO Concrete
CS Concrete Segments (Bolted)
CR Concrete Segments (Unbolted)
CC Concrete Box Culvert
DI Ductile Iron
GR Glass Reinforced Concrete
GR Glass Reinforced Plastic
PS Plastic / Steel Composite
PV Polyvinyl Chloride
PE Polyethylene
RP Reinforced Plastic Matrix
ST Steel
VC Vitrified Clay (All Clayware)
PP Polypropylene
PF Pitch Fibre
MA Masonry - In Regular Courses
MA Masonry - Randomly Coursed
U Unspecified

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OS Sheet No: SJ8297NE

Scale 1:1250 Date: 25-Jul-2013

139 Nodes

Sheet 1 of 1

United Utilities

SEWER RECORDS

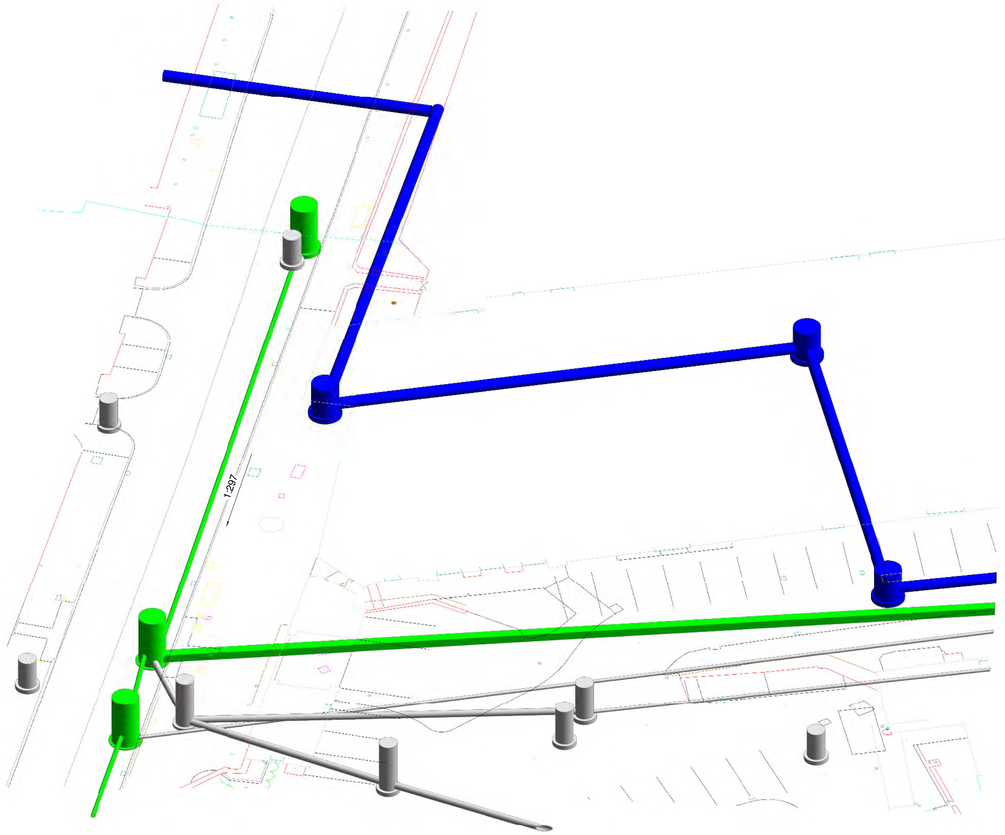
OS Sheet No: SJ8297NE

Scale 1:1250 Date: 25-Jul-2013

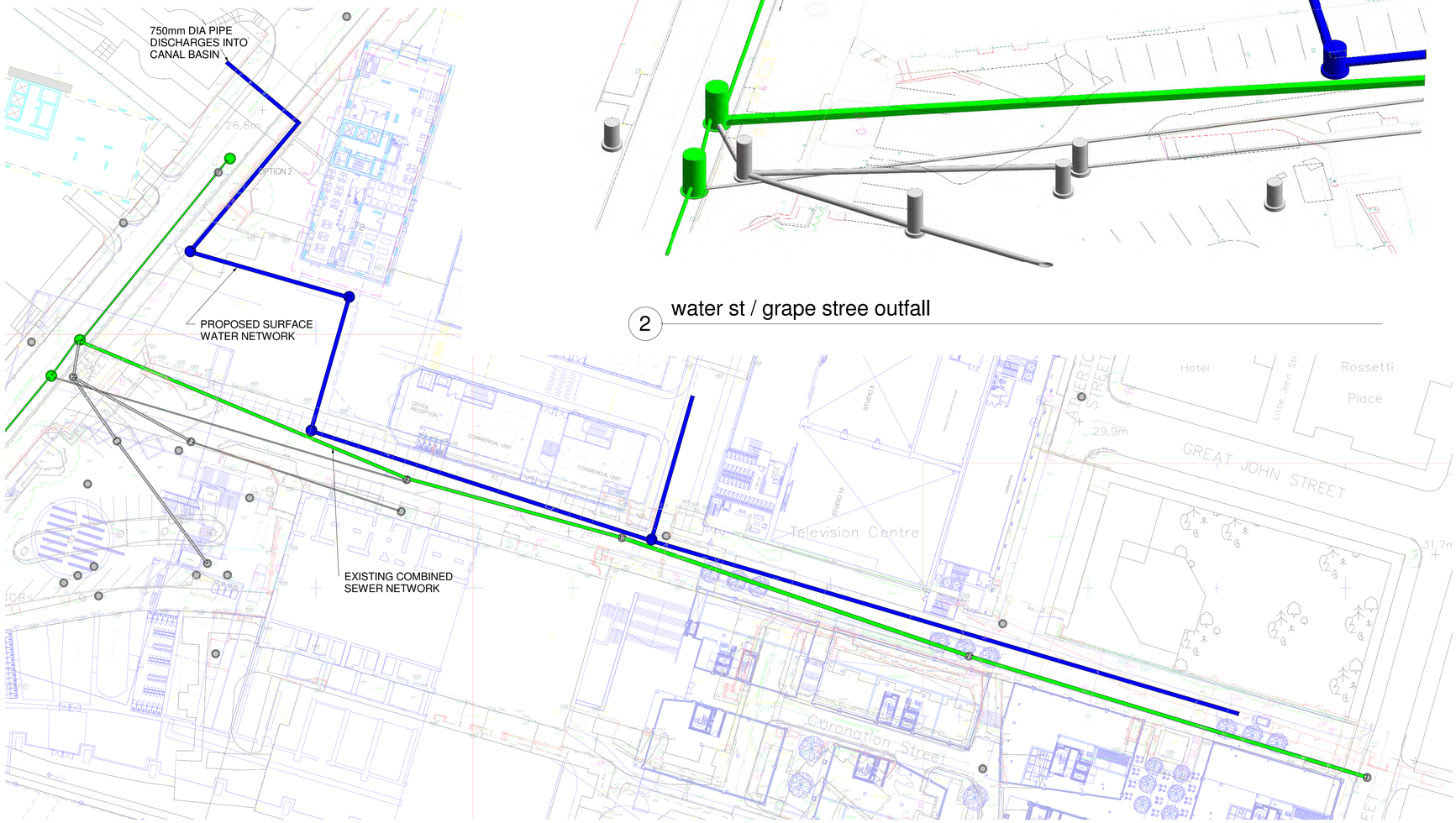
Printed by: Lea Robertson

APPENDIX G – DRAINAGE STRATEGY AND CALCULATIONS

THIS DRAFT PROPOSAL HAS BEEN PRODUCED ON THE BASIS THAT FURTHER SURVEY INFORMATION IS REQUIRED TO INCREASE LEVELS OF CERTAINTY REGARDING FEASABILITY.



2 water st / grape stree outfall



1 water street / grape street outfall
1 : 500

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WORK IN PROGRESS (Tender)

The information on this drawing is an optimised solution based upon external information . It may be subject to change through external influences such as client brief and scope changes, services BWIC, sub-contractor requirements etc. Therefore a suitable contingent approach must be applied where the information is used for strategic decision making, procurement or construction in advance of final design requirements from other designers and sub-contractors.

NOTES

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3. It is the responsibility of the lead consultant (architect) to check the setting out provided on these drawings and the co-ordination of the frame with the evnvelope & other elements of the building.

4. All dimensions are in millimetres unless noted otherwise.

5. All levels are in metres above Ordnance Datum unless noted otherwise.

6. This drawing is to be read in conjunction with General Notes Drawing. No 001

REV	DETAILS	DATE	DRN	CHK

DRAWING STATUS
STAGE 3

RoC CONSULTING
Civil & Structural Engineers
6 Commercial Street, Manchester, M15 4PZ
Tel: 0161 214 5390

DRAWN	DATE	SCALES
SJB	03.16	1 : 500
CHECKED	DATE	THE ABOVE SCALES APPLY WHEN PLOTTED AT A1 SIZE
AR	03.16	
APPRVD	DATE	EMAIL FOR DRAWINGS:
-	03.16	drawings@rocconsulting.com

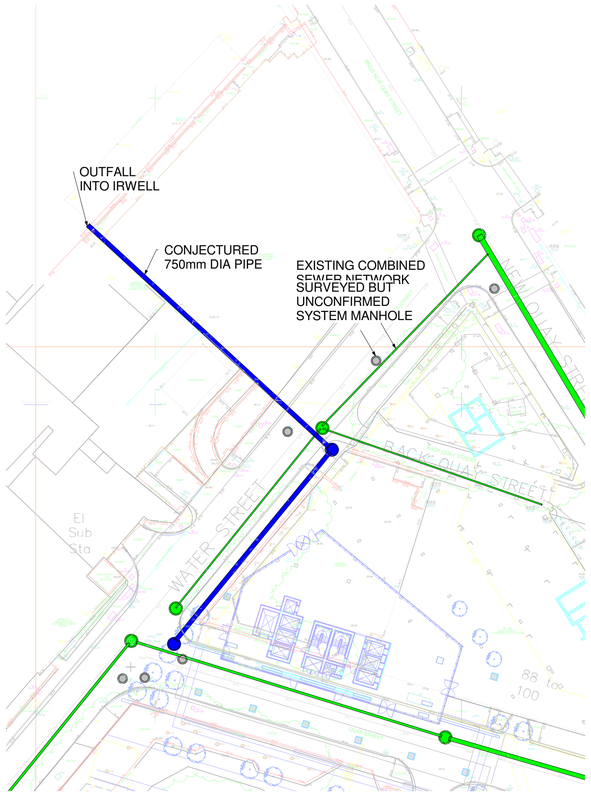
CLIENT
Allied London

PROJECT TITLE
MANCHESTER AND SALFORD JUNCTION CANAL TUNNEL

DRAWING TITLE
OUTFALL - GRAPE ST / WATER ST

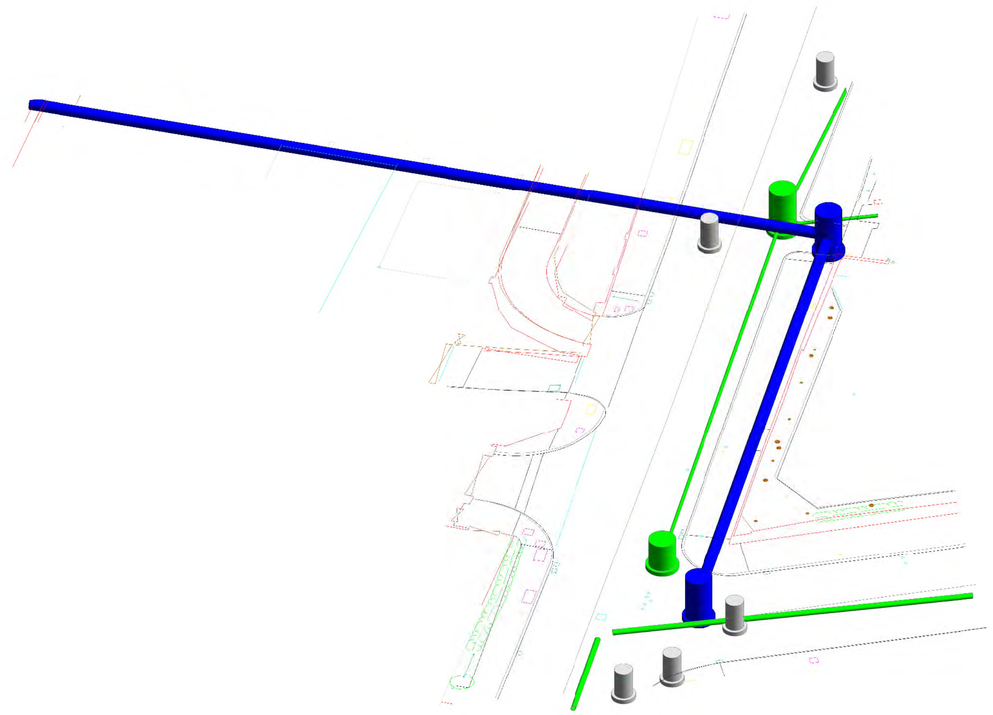
PROJECT No.	DRAWING No.	REV.
3518	OF-01	

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Consulting



1 water street / back quay street outfall

1 : 500



2 water st / back quay outfall

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WORK IN PROGRESS (Tender)

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NOTES

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4. All dimensions are in millimetres unless noted otherwise.

5. All levels are in metres above Ordnance Datum unless noted otherwise.

6. This drawing is to be read in conjunction with General Notes Drawing. No 001

REV	DETAILS	DATE	DRN	CHK

DRAWING STATUS

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CHECKED	DATE	THE ABOVE SCALES APPLY WHEN PLOTTED AT A1 SIZE
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APPRVD	DATE	EMAIL FOR DRAWINGS:
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CLIENT

Allied London

PROJECT TITLE

MANCHESTER AND SALFORD JUNCTION CANAL TUNNEL

DRAWING TITLE

OUTFALL - WATER ST / BACK QUAY ST

PROJECT No.	DRAWING No.	REV.
3518	OF-02	

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KEY

- EXISTING UU SEWERS
- EXISTING UU SEWER – ABANDONED
- EXISTING UU SEWER – BUILDOVER
- EXISTING UU SEWER – BUILDOVER OR DIVERSION
- PROPOSED PRIVATE SURFACE WATER NETWORK, DISCHARGING TO THE RIVER
- PROPOSED FOUL WATER CONNECTIONS/ NETWORK – DISCHARGING INTO ADOPTED SEWER NETWORK

RoC CONSULTING

EXCELLENCE IN ENGINEERING
CONSULTANT OF CHOICE
ADDING VALUE

TRINITY ISLANDS – DRAINAGE STRATEGY

St Johns Masterplan

Drainage Strategy

Plot Reference	Catchment Area (m^2)	Catchment Area (ha)	Proposed Discharge Locations	Rainfall Instensity 1 in 30yr Storm Event				Rainfall Instensity 1 in 100yr Storm Event (Only used to detemine total discahrge)		Critical - For the Derivation of Discharge Limits (Up to 30yr)	$Q_{existing}$ l/s	Cirtical for Total Flow to prevent surface water flooding	$Q_{existing}$ l/s
				15mins - Summer	30mins - Summer	15mins - Winter	30mins - Winter	15mins	30min				
Zone1 - Alberts Wharf	2980.00	0.298	Irwell	65.5	43.5	65.5	43.5	110	74	65.5	54.26		
	5100.00	0.51	Sewer	65.5	43.5	65.5	43.5	110	74	65.5	92.87	110	155.96
Zone 2 - Grande Hotel	9100.00	0.91	Sewer	65.5	43.5	65.5	43.5	110	74	65.5	165.70	110	278.28
Zone 3 - Annex	3675.00	0.3675	Sewer	65.5	43.5	65.5	43.5	110	74	65.5	66.92	N/A	
Zone 4 - Village Phase 1	6335.00												
	660.00												
	6995.00	0.6995	Sewer	65.5	43.5	65.5	43.5	110	74	65.5	127.37	N/A	
Zone 5 - Bonded Warehouse	4125.00	0.4125	Sewer	65.5	43.5	65.5	43.5	110	74	65.5	75.11	110	126.14
Zone 6 - Village Phase 2	10250.00	1.025	Sewer	65.5	43.5	65.5	43.5	110	74	65.5	186.64	N/A	
Zone 7 - Village Phase 3	6885.00	0.6885	Irwel	65.5	43.5	65.5	43.5	110	74	65.5	125.37	N/A	
Zone 8	9600.00	0.96	Irwell	65.5	43.5	65.5	43.5	110	74	65.5	174.81	N/A	
Zone 9	9405.00	0.9405	Irwell	65.5	43.5	65.5	43.5	110	74	65.5	171.26	N/A	
										Total (Development) - L/s	1240.31		560.38

Note:
In the proposed design a number of the site will drain to the River Irwell, these sites are as follows

Plot Reference	Catchment Area (ha)	Qexisting l/s
Zone1 - Alberts Wharf	0.30	54.26
Zone 7 - Village Phase 3	0.69	125.37
Zone 8	0.96	174.81
Zone 9	0.94	171.26
	Total	525.69

The total reduction in flow from the proposed development based on the requirements of the SFRA (50% betterment) is

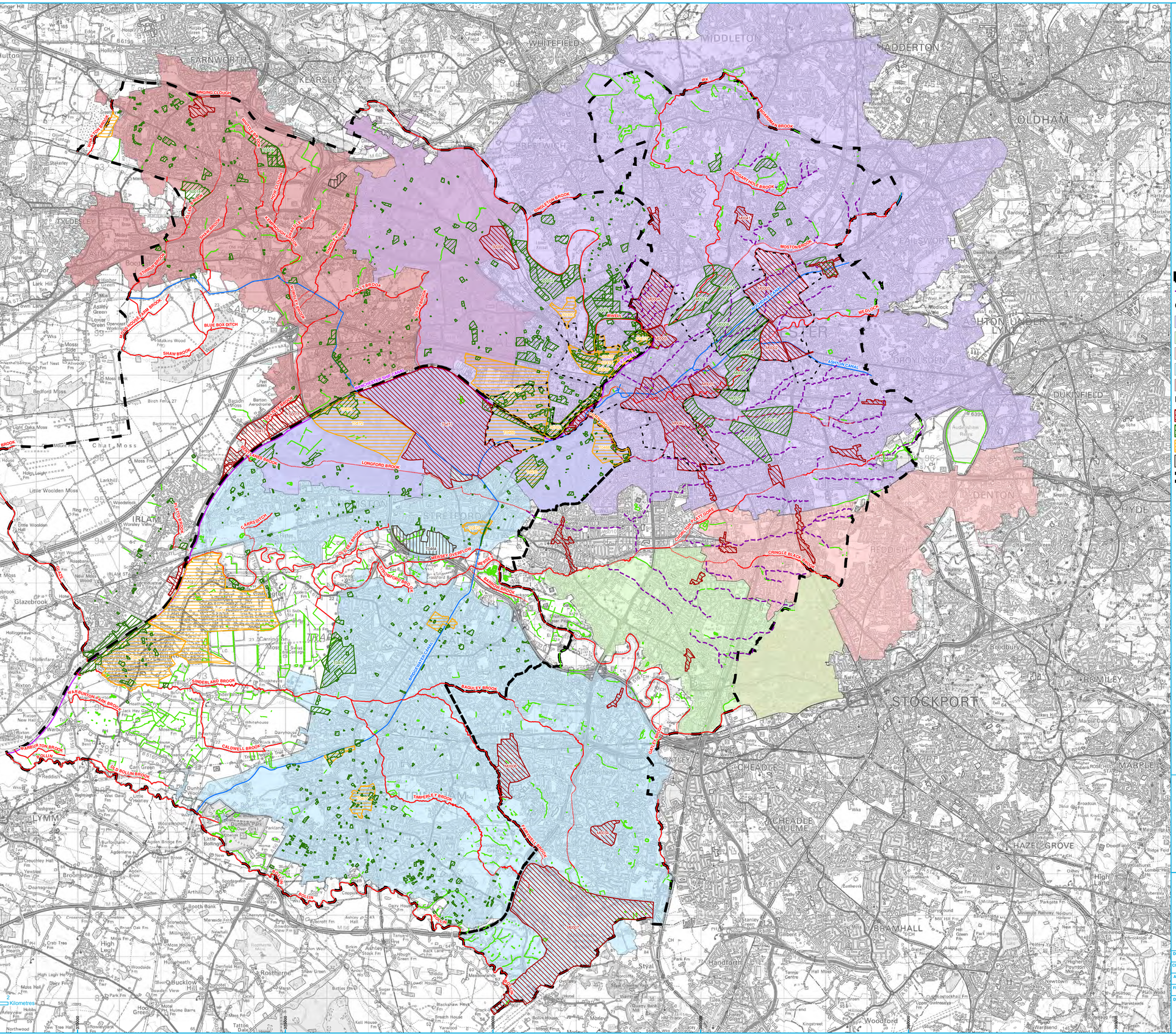
Total (Development) - L/s	1240.31 l/s
Betterment - L/s	620.15 l/s

Re-Alignment of the diacharge allowance to account for the fact that particular zones cannot provide attenuatior

Plot Reference	Catchment Area (m^2)	Discharge Location	Discharge Limit l/s	Attenuation Requirements - 1:100yr +30% Climate Change	
				Lower Limit	Upper Limit
Zone1 - Alberts Wharf	2980.00	Irwell	Unlimited		
	5100.00	Sewer	155.96 (Unlimited)		
Zone 2 - Grande Hotel*	9100.00	Sewer	278.28 (Unlimited)		
Zone 3 - Annex	3675.00	Sewer	10.50	108	171
Zone 4 - Village Phase 1	6335.00				
	660.00				
	6995.00	Sewer	19.99	207	326
Zone 5 - Bonded Warehouse*	4125.00	Sewer	126.14 (Unlimited)		
Zone 6 - Village Phase 2	10250.00	Sewer	29.29	305	480
Zone 7 - Village Phase 3	6885.00	Irwell	Unlimied		
Zone 8	9600.00	Irwell	Unlimited		
Zone 9	9405.00	Irwell	Unlimited		
					977

Total Unrestricted Flow (1:100yr + Climate Change)	560.38 l/s
Flow Remaining to Distribute Between the Three Restricted Site	59.77 l/s
Total Area to Drain	20920.00 m^2
Flow / m^2	0.002857219 l/s

APPENDIX H – CRITICAL DRAINAGE AREA MAP



- Council Boundary
- Lost Watercourses

Critical Drainage Areas

- Conurbation Core
- Didsbury
- Levenshulme and Fallowfield
- Manchester and Trafford South
- Salford North West

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

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

Certain locations are particularly sensitive to an increase in the rate of surface water runoff and/or volume from new development. There are generally known local flooding problems associated with these areas. These areas have been defined as Critical Drainage Areas in the SFRA. Specific drainage requirements are required in these areas to help reduce local flood risk.

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

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

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

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for

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

Critical Drainage Areas

Drawn by:	J Cheetham	Date:	16/03/2011
Checked by:	J Dimelow	Date:	01/02/2011
Approved by:	J Cooper	Date:	01/02/2011

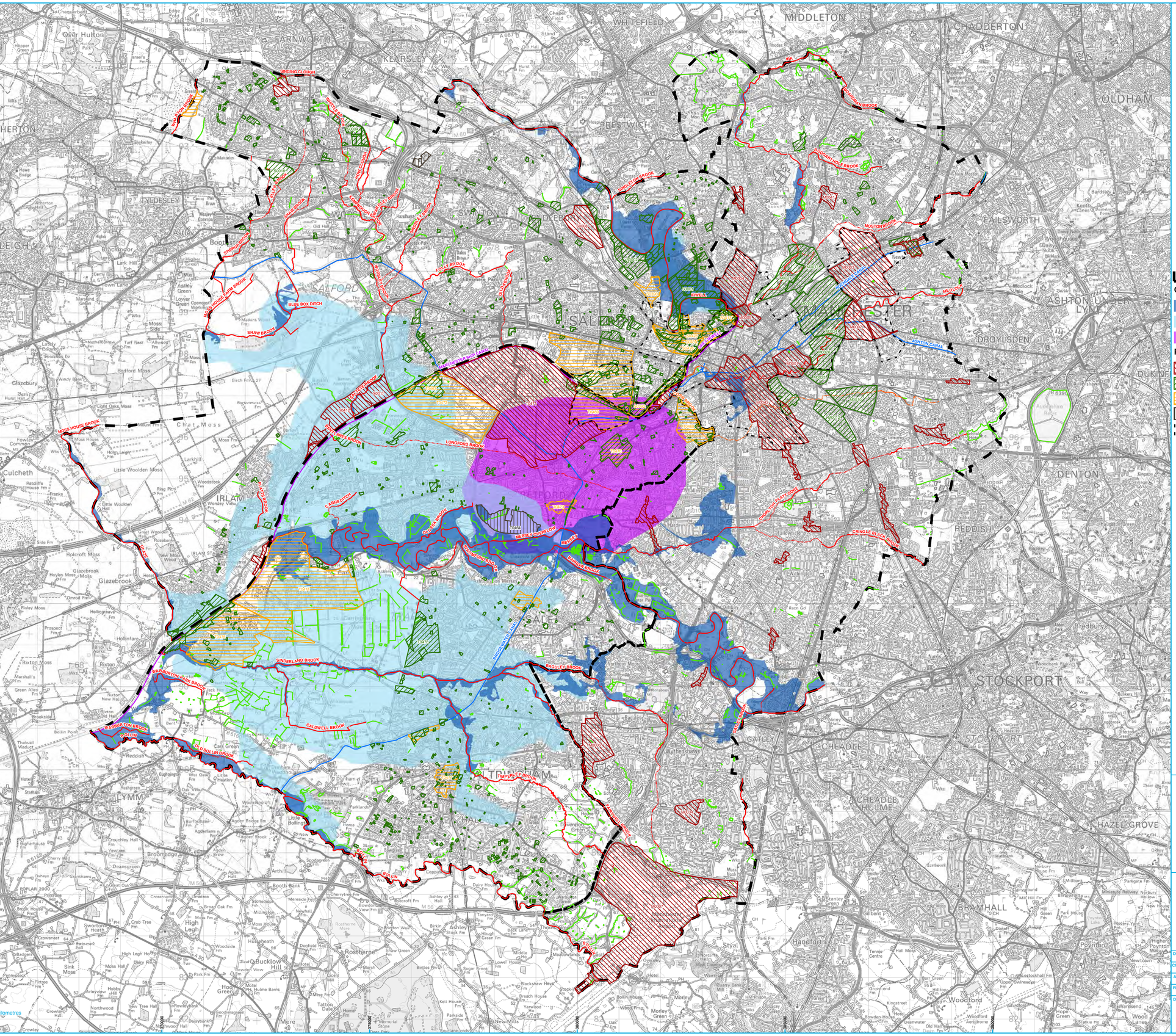
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Drawing Number:	Status:	Scale:
SS_4.5	FINAL	1:45,000

Original @ A1

APPENDIX I – GROUND WATER FLOODING MAP



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 upon Ordnance Survey 1:10,000 mapping and should be confirmed for more detailed studies such as site specific Flood Risk Assessment. The canals layer does not necessarily cover all the canal arms, but the modelled overtopping/breaching and hydraulic interactions with rivers and other waterbodies is complete and accurate as appropriate for a Strategic Flood Risk Assessment.

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

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

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for

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

Groundwater Flooding

Drawn by:	J Cheetham	Date:	08/03/2011
Checked by:	J Dimelow	Date:	01/02/2011
Approved by:	J Cooper	Date:	01/02/2011

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Drawing Number:	Status:	Scale:
GW_2.1	FINAL	1:45,000

Original @ A1

APPENDIX J – RESERVOIR AND CANAL BREACH FLOOD MAP

Map legend

- [x] Risk of Flooding from Reservoirs
- Maximum extent of flooding
- [x] Other national environmental organisations
- Natural Resources Wales Area of responsibility
- Scottish Environment Protection Agency Area of responsibility

Map of X: 383,115; Y: 397,886 at scale 1:10,000

Data search

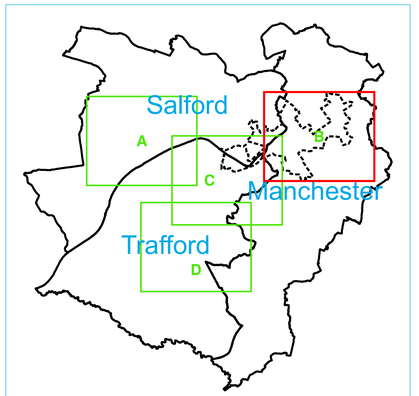


ROC CONSULTING

CIVIL ENGINEERING SKETCH

INFORMATION

Job No:	3233
Project Title:	St John & Trinity Islands FRA
Sketch No:	FRA002
Sketch Title	EA Online Reservoir Breach Maps
Drawn by:	AR – 14/7/2015



Council Boundary

Canal Overtop Hazard Zone

Canal Overtop Hazard Zone

Canal Breach Hazard Zone

Canal Breach Zone A

Canal Breach Zone B

Oldham SFRA Canal Hazard Zone

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

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

Two indicative "Canal Hazard Zones" have been created for the Bridgewater, Ashton and Rochdale Canals. These have been generated using broadscale 2D modelling to show areas that could potentially be affected by flooding in the event of
•Canal Overtop Hazard Zone
•Canal Breach Hazard Zone.

The potential breach locations / areas were sub-divided into two Canal Breach Zones:
•Canal Breach Zone A. A walkover survey of the canal was undertaken to identify the embankments more likely to breach, based on their height and width. This zone shows those areas that would be affected by a breach of one of these embankments. In this zone a detailed examination of canal breach flood risks is required in a site specific FRA.
•Canal Breach Zone B. Less likely breach locations, such as at wide, low or very low embankments, were identified by a walkover survey of the canal. At such locations it is more likely that this source of risk could be scoped out within any site specific FRA.

It should be noted that these outlines are based on broadscale modelling techniques and should only be taken as an indication of areas that might be at risk and inform Flood Risk Assessments. There are a number of uncertainties associated with the simulation of flooding from canals in either overtopping or breach conditions. The assumptions behind the modelling should be considered when using and reviewing the hazard zones that have been produced. Full details of the methodology used to derive Canal Hazard Zones is provided in Chapter 3 of the Level 2 SFRA and guidance on the use of the Canal Hazard Zones is provided in Chapter 3 of the SFRA User Guide.

The Canal Hazard Zone resulting in a breach from the Rochdale Canal in Oldham has also been included on the map and has been taken from the Oldham SFRA (2010). This was based on a similar broadscale methodology.

Interactions between the Bridgewater Canal and the River Medlock in Castlefield may result in overtopping of the Canal during severe weather events, as shown elsewhere in the SFRA.

For further information please see the Level 2 SFRA Chapter 3.

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

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

The map should be considered when applying the Sequential Test and used to scope the inclusion of canal flood risk within a site specific FRA.

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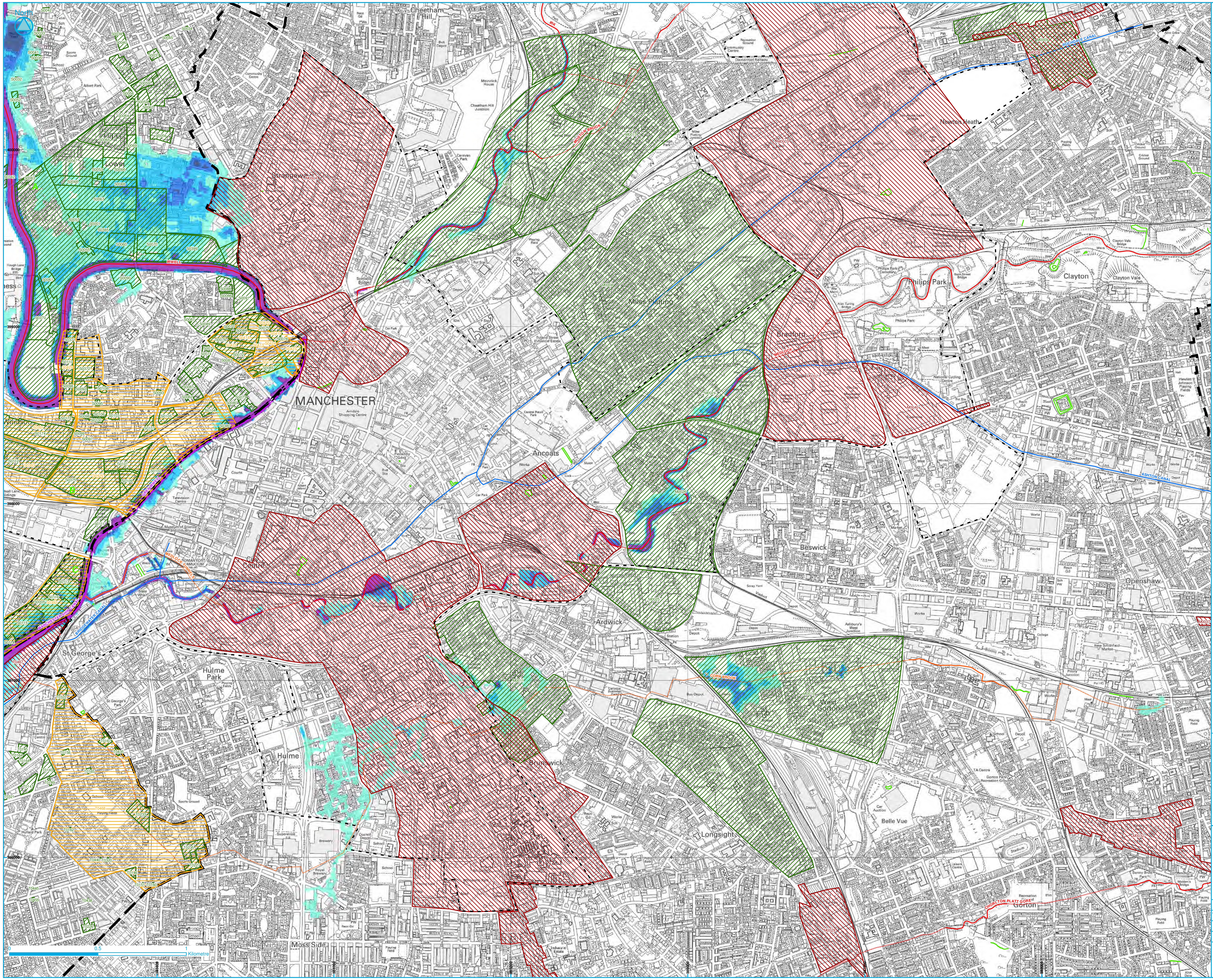
Manchester City, Salford City and Trafford Councils Level 2 Hybrid SFRA

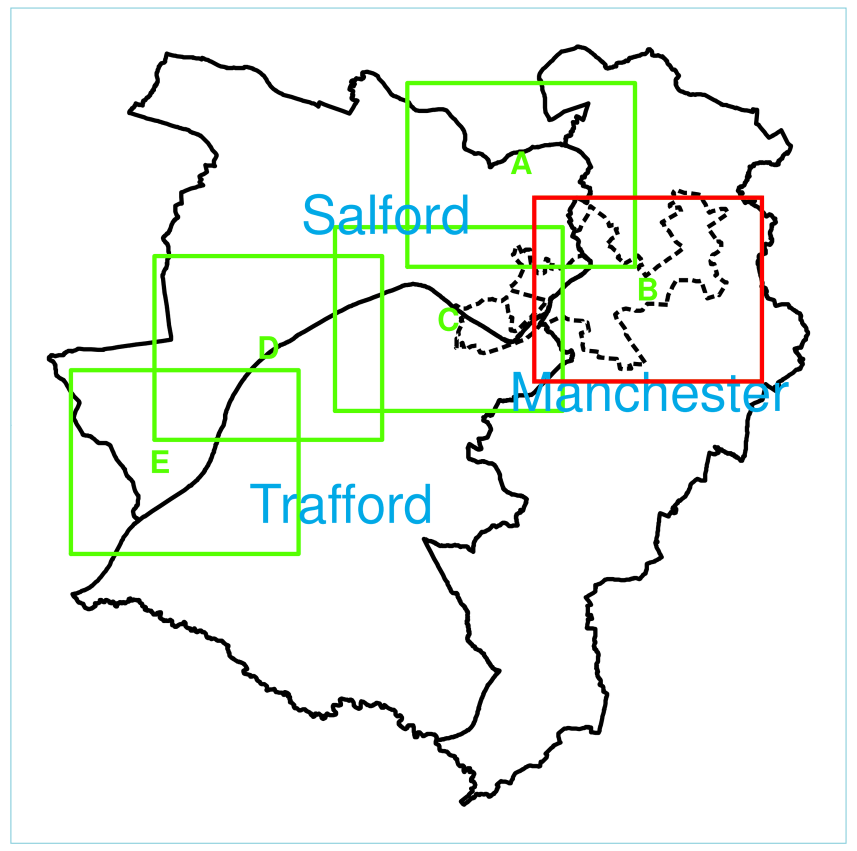
Canal Hazard Zones

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Checked by: J Dimelow	Date: 01/02/2011		
Approved by: J Cooper	Date: 01/02/2011		
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Drawing Number: MM_3.2B	Status: FINAL	Scale: 1:10,000	

Original @ A1

APPENDIX K – FLOOD DEPTH MAP





Council Boundary

Maximum Flood Depth (m)

- <0.5
- 0.5 - 1
- 1 - 1.5
- 1.5 - 2
- >2

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

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

The map identifies the estimated flood depths using the modelling outputs produced for this SFRA. The SFRA modelled reaches are shown on Figure 1.1 of the Maps Index. This map can used to identify those areas sensitive to increases in flood depth in the future.

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

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

The map should be used to apply the Sequential Test and Exception Test.

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

Fluvial 1 in 100 Year With Climate Change Flood Depth

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Checked by:	J Dimelow	Date:	07/01/2011	
Approved by:	J Cooper	Date:	13/01/2011	

File Name: ...ArcView\Mapping\Level2\MST_Fluvial_Q100_CC_Depth_V1.2.mxd

Drawing Number:	Status:	Scale:
FL_1.7B	FINAL	1:10,000

Original @ A1

APPENDIX L – CORRESPONDENCE

From: Andy Rain
To: O'Brien, Neil
Cc: DocumentController
Subject: RE: Meeting with UU - Various Projects
Date: 17 February 2015 12:50:00
Attachments: image003.jpg
image004.png
image005.jpg
image006.png

Neil,

You're not being a pain we would always complete the developer enquire forms, just wanted to make sure I don't go off at a complete tangent to your requirements before submission.

I will carry out some further investigation on the Airports preferred operation when it comes to their drainage network.

Kind regards

Andy Rain **BEng(Hons) CEng MICE**
Civil Engineering Director
On behalf of R²C Consulting
07947 434 859
www.rocconsulting.com

New Year Signature 2015

Click for more information:

cid:image004.png@01D00E33.49046490

From: O'Brien, Neil [mailto:Neil.O'Brien@uuplc.co.uk]
Sent: 13 February 2015 09:40
To: Andy Rain
Cc: DocumentController
Subject: RE: Meeting with UU - Various Projects

Andy,

Sorry, to be a pain but could you complete a pre-development enquiry form for each of the sites below and send it to wastewaterdeveloperservices@uuplc.co.uk. That way you will receive a form response and a DE reference number. Also a file will be set up and the information stored on a central server for further reference.

One of the issues on Manchester Airport was that the airport did not know whether they wanted to put the on-site drainage forward for adoption. My understand is that Manchester Airport acts like a mini water company and charges the properties within the airport site water and sewerage fees. Clearly if the sewers are adopted by UU then the charges will go to UU.

The previous proposal included a large foul pumping station with a deep wet, which was location close to a building. This was not acceptable to UU.

Regards

Neil

From: Andy Rain [mailto:andy.rain@rocconsulting.com]
Sent: 12 February 2015 09:16
To: O'Brien, Neil
Cc: Perry, Graham; DocumentController
Subject: Meeting with UU - Various Projects

Neil,

Thank-you for meeting with me yesterday and apologies for being late.

Just to confirm our discussion ahead of the submission of the developer agreement:

1No Spinningfields:

- Free discharge, no requirement for flow restrictions and therefore attenuation
- Connection direct to the surrounding UU adopted network. Currently the preferred connection location are in Byrom Street and Gartside Street.

Whitworth:

- Free discharge, no requirement for flow restrictions and therefore attenuation
- Connection direct to the surrounding UU adopted network. Proposed connection into Whitworth Street.

St Johns:

-
There are currently two proposals, the first discharging all the surface water into the River Irwell and the second into the surrounding adopted network with a 50% reduction in flow. The issue with the first option is that the majority of the site sits behind Water Street which is an adopted highway and creates a legislative barrier preventing private drainage networks crossing it.

We understand UU's preferred option would be for the discharge of all surface water to the River Irwell, which we will continue to develop, however as a falls back provided we demonstrate the 50% reduction in flows UU would not object to connection of the surface water networks into the surround adopted sewer network.

In all the above cases the foul flows can discharge feely into the adopted sewer network.

Airport City North:

-
This scheme has been previously reviewed by UU for a different consultant. I will supply under the cover of separate email the current scheme details.

As an aside to the above could you please advise on the connection requirements into the UU sewer. Our preferred method would be to provide a separate surface and foul water drainage network within the footprint of the development site and then combine these at the most downstream manhole on the network (after any surface water restrictions). From this manhole we would then make a single combined connection onto the combined adopted sewer.

By return could you please confirm the content of this email and advise on the connection requirement. Should you require any further clarification on the information above, please do not hesitate to contact me.

Kind regards

Andy Rain BEng(Hons) CEng MICE
Civil Engineering Director
On behalf of R⁰C Consulting
07947 434 859
www.rocconsulting.com

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EMGateway3.uuplc.co.uk made the following annotations

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Andy Rain

From: Neil Adair <nadair@peel.co.uk>
Sent: 18 April 2016 16:34
To: Andy Rain
Subject: RE: 3233, St Johns Development - Salford and Junction Canal

Categories: Filed by Newforma

Andy,

Thanks for the e-mail.
Please see below my response to your questions.
I'm happy to come over and meet up to discuss further if necessary.

Kind regards

Neil

Neil Adair
Senior Asset Manager

Peel Utilities Holdings Limited
Peel Dome, intu Trafford Centre, TRAFFORD**CITY**,Manchester M17 8PL

Telephone: 0161 629 8353
Mobile: 07825 513 990
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From: Andy Rain [mailto:andy.rain@rocconsulting.com]
Sent: 18 April 2016 07:52
To: Neil Adair
Subject: 3233, St Johns Development - Salford and Junction Canal

Neil,

When reviewing the details for the St John's development and particular the route for the Surface Water Outfall into the River Irwell, there is the potential that the path of least constraint would be to discharge into the Spur of the Manchester and Salford Junction Canal before it connects to the River Irwell. This is located just to the South of the Victoria and Albert Hotel drop off. Could you please provide any details that you make have in relation to the following:

1) Land Ownership – This land is not owned by the MSCC
2) Navigation Authority – MSCC are the navigational authority for this part of the River Irwell, so a licence will be required for this discharge via the disused lock into the river
3) Limits on Discharge (Will this remain as if we were connecting direct to the Irwell). I will need to check with the engineers on this point, but I do not believe any restriction would be needed. I would need to understand further the way the discharge from the lock to the river will occur – is this an open link between the two, or are the lock gates closed off and the discharge via an opening / outfall from the old lock into the River? The main potential issue will be the velocity of the discharge into the canal.
4) Any further issues associated with the existing lock infrastructure that remains within the Channel of the Canal. The lock infrastructure is not within the ownership of MSCC, so we are not able to advise on this.

I am in Portsmouth today but please do not hesitate to give me call should you require any clarification on my request above.

Regards and thanks,

Andy Rain **BEng(Hons) CEng MICE**
Civil Engineering Director
On behalf of RºC Consulting

07947 434 859
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MEETING MINUTES

JOB REFERENCE	CONTRACT	SUBJECT
3233	St John's	Flood Risk Mitigation Strategy
MEETING	**DATE**	**VENUE**
NO. 01	15 June 2016	MCC – Town Hall Extension
PRESENT	Esther Goodship - MCC (EG) Andy Rain – RoC Consulting (AR)	

		ACTION
1.0	**FLOOD WARNING SYSTEM**	
	When reviewing the general masterplan, the development plots most affected by flooding are The Factory and Zone 7 (Riverside). These plots are within flood zone 2 and Zone 7 is not afforded a dry excess / egress, because of the levels of Water Street.	
	EG enquired as to the option of tapping into the existing Environment Agency flood warning system. AR advised that the Environment Agency's control of the River Irwell terminates some distance upstream of the St John's redevelopment location. This had been discussed with the Environment Agency previously but was feasible (as defined by the Environment Agency). EG is going to speak with the Environment Agency further on this as it will not only apply to St John's, but also future developments within the general Manchester region.	
	AR will review the available proprietary flood warning systems available.	
2.0	**FLOODING & BUILDING LEVELS**	
	AR noted the response from the Environment Agency in respect of the proposed flooding levels for the River Irwell and the inclusion of various levels (percentages) of climate change. EG noted the response and was comfortable with the following strategy;	
	• Within the development proposal there is no intention to locate residential (steeping accommodation) at ground level or below within a basement. As such only commercial uses would be affected / at risk of flooding.	
	• Building levels should be set as high as is physically possible accounting for the surround constraints (Water Street) and the requirement to provide DDA compliant access. Individual plot therefore need to be assessed separately and MCC advise of the floor levels that can be achieved rather than stipulated a floor level across the entire development.	
	• The ramp provided into the central village should maintain its current proposal level which is set above the 1 in 100 yr plus climate changing flood level.	

	• Where it is likely that the ground floor level of the building will be below the 1 in 100 yr and climate change flood level. Flood resilient measures should be included, these include; a) Wiring to run from ceiling down b) Connections points from IT, electric etc should be located above the flood level c) Key infrastructure, power, services etc should be located above the flood level d) Plaster board should be laid horizontal e) Floor and wall coverings should be easily cleaned or replaced f) Potential connection points for flood barriers should be provided which allow temporary flood barrier to be installed quickly if necessary g) Non return valves on drainage (F/W and S/W) h) Plastic and stainless steel materials instead of wood i) Detail of elevation treatments to include for the resistance of water penetration j) Seals around doors to be specified such that they aid in water exclusion	
3.0	**DISCHARGE**	
	AR advised of the two options which had been developed for the disposal of S/W from the St John's development; a) Option A – to sewers b) Option B – to private outfall into the River Irwell	
	AR advised that option B was preferred but could be cost prohibitive and was space prohibitive in terms of any requirements for attenuation. As such would Manchester City Council accept an un-restricted discharge into the River Irwell subject to approval by Peel. EG advised that in this case that would be accepted based on the following; a) Acceptance of flows, discharge rates, volumes and velocities by Peel b) Confirmation of the impact (if any) on the existing canal spur c) The connection point into the River Irwell is close enough to the confluence with the Manchester Ship Canal that Manchester City Council will accept MSC / Peel discussion over the discharge of S/W	
4.0	**GENERAL SUDS WITHIN THE DEVELOPMENT**	
	Options to include; a) Green Roofs b) Rainwater Harvesting – potentially suitable within the public realm for irrigation and cleaning c) Permeable Paving d) Water Gardens – options to be reviewed in and around the pits	

5.0	MAINTENANCE	
	As the network will be private and will include a licence from Manchester City Council to cross Water Street, it will be maintained by ALP and their internal property management team.	

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