



RIDGE

**SILK STREET,
GORTON**

**REPORT TO DISCHARGE DRAINAGE
RELATED PLANNING CONDITIONS**

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1.0 Introduction

In June 2021 a planning application was submitted to Manchester City Council for a residential development comprising of 69 dwellings and associated infrastructure. Planning permission was granted in October 2021 with a drainage related planning condition attached. This report has been prepared to discharge this condition, specifically for the full planning application.

2.0 Drainage Strategy

2.1 Surface Water Strategy

The proposed residential development is situated on series of hardstanding areas currently used for car parking, with access roads linking these together. Therefore, the site is classified as brownfield.

According to Phase 2 Geo-Environmental Investigations undertaken, the site is underlain by a variable thickness of Made Ground. Beneath this lies sandy clay/silty, sandy gravelly clay to depths of approximately 8mbgl. Shallow groundwater was also present at depths of between 0.5-2.0mbgl. Based on the presence of cohesive underlying clay and shallow groundwater, soakaways are not viable for use on this site.

The Rochdale Canal is to the north of the site. However, it is classified as a site of biological importance, as such the Council Ecology Department have requested that no drainage be discharged into the Canal. There are existing sewers both on site and in the surrounding highways. United Utilities have confirmed that surface water from the development can outfall into the surrounding sewers at three outfall points.

Based on the above, surface water from the development site will discharge into the existing combined sewer and surface water networks respectively. It has been agreed with United Utilities that each SW system is to have a maximum discharge rate of 5 l/s. Surface water will be attenuated within below ground geo-cellular storage crates, permeable paving or oversized pipes prior to controlled release.

In the case of his development, all surface water flows up to the 1 in 100 year event including an allowance for climate change will be retained below ground.

The proposed drainage layout for the new development site will be designed in accordance with Building Regulations Part H guidance, i.e. up to the 30-year storm return period criterion and tested for the extreme 100-year event to confirm no flood risk to the building.

2.2 Foul Water Strategy

A new foul water drainage network will collect foul flows from the new development and outfall into the combined sewer network.

The proposed private drainage layout for the new development site has been designed in accordance with BS EN 752: 2008 and Building Regulations Part H guidance.

3.0 Drainage Related Planning Condition

3.1 Proposed Planning Condition 6

Notwithstanding the Flood Risk and drainage strategy prepared by Ridge stamped as received by the City Council, as Local Planning Authority, 1 June 2021, (a) the development shall not commence until a scheme for the drainage of surface water for the development has been submitted for approval in writing by the City Council as the Local Planning Authority. This shall include:

- A finalised drainage layout with all components labelled, levels, connectivity, inlets and discharge points shown. The design shall avoid the location within private plot allocations of attenuation and flow control components which are designed to serve multiple properties;*
- Maximised integration of green SuDS components (utilising infiltration or attenuation) if practicable. Appraisal demonstrating maximum integration has been achieved is to be presented.*
- Details of surface water attenuation that offers a reduction in surface water runoff rate in line with the Manchester Trafford and Salford Strategic Flood Risk Assessment, i.e. at least a 50% reduction in runoff rate compared to the existing rates, as the site is located within Conurbation Core Critical Drainage Area;*
- An existing and proposed impermeable areas drawing to accompany all discharge rate calculations;*
- Runoff volume in the 1 in 100 year, 6 hours rainfall shall be constrained to a value as close as is reasonable practicable to the greenfield runoff volume for the same event, but never to exceed the runoff volume from the development site prior to redevelopment;*
- Evidence that the drainage system has been designed (unless an area is designated to hold and/or convey water as part of the design) so that flooding does not occur during a 1 in 100 year rainfall event with allowance for 40% climate change in any part of a building;*
- Assessment of overland flow routes for extreme events that is diverted away from buildings (including basements). Overland flow routes need to be designed to convey the flood water in a safe manner in the event of a blockage or exceedance of the proposed drainage system capacity including inlet structures. A layout with overland flow routes needs to be presented with appreciation of these overland flow routes with regards to the properties on site and adjacent properties off site;*
- The FRA shall evidence that historic flooding and breach modelling data relevant to the site has been requested from the appropriate organisation and considered in the FRA;*
- Progression down Drainage Hierarchy shall be evidence based. Evidence that permission to discharge into the canal has been requested from the appropriate organisation must be presented. Where discharge is feasible, agreement in principle is required that there is adequate spare capacity in the existing system taking future development requirements into account. An email of acceptance of proposed flows and/or new connection will suffice;*

- Where surface water is connected to the public sewer, agreement in principle from United Utilities is required that there is adequate spare capacity in the existing system 130586/VO/2021 Page 6 of 18 taking future development requirements into account. An email of acceptance of proposed flows and/or new connection will suffice;

- For sites where proposed development would cause unusual pollution risk to surface water, evidence of pollution control measures (preferably through SuDS) is required;

- Maximised use of permeable surfacing where feasible. Front driveway hard surfacing >5m² shall be permeable where feasible in line with Government Guidance;

- Hydraulic calculation of the proposed drainage system;

- Construction details of flow control and SuDS elements;

(b) The development shall then be constructed in accordance with the approved details, within an agreed timescale.

Reason - To promote sustainable development, secure proper drainage and to manage the risk of flooding and pollution pursuant to policies SP1, EN14 and DM1 of the Manchester Core Strategy (2012).

4.0 Discharge of Proposed Planning Condition

4.1 Surface Water Drainage

- 4.1.5 *A finalised drainage layout with all components labelled, levels, connectivity, inlets and discharge points shown. The design shall avoid the location within private plot allocations of attenuation and flow control components which are designed to serve multiple properties –*

See the 'Proposed Drainage Plan' for the finalised drainage layout. Attenuation for Plots 1 – 48 has been provided via a Geo cellular Storage Tank, this is within the private car park, along with the flow control serving this Area A. Attenuation for Plots 49 – 69 has been provided via permeable paving within the car parking areas. The flow control serving this Area B, is not located within a private area (located within a communal bin storage area) and can be accessed for maintenance. Attenuation for Plots 59 – 63 has been provided via oversized pipes. The flow control for this Area C, is not located within a private area (located within a communal bin storage area) and can be accessed for maintenance. Due to limited space and the existing infrastructure within the existing highways, attenuation was located within the private areas.

- 4.1.6 *Maximised integration of green SuDS components (utilising infiltration or attenuation) if practicable. Appraisal demonstrating maximum integration has been achieved is to be presented –*

According to Phase 2 Geo-Environmental Investigations undertaken, the site is underlain by a variable thickness of Made Ground. Beneath this lies sandy clay/silty, sandy gravelly clay to depths of approximately 8mbgl. Shallow groundwater was also present at depths of between 0.5-2.0mbgl. The infiltration test results indicates that partial infiltration systems maybe possible with permeability less than 10^{-8} m/s but the infiltration of water for storage design would not be appropriate. Therefore, based on the infiltration results, the presence of cohesive underlying clay and shallow groundwater, soakaways are not viable for use on this site. Results from this investigation can be seen within the Appendix A.

BH	Response Zone (mbgl) and Strata	Test No.	Initial water level (mbgl)	Basic Time Lag (where $H/H_o=0.37$)	Permeability (k) m/sec
WS104	2.0-4.0 (C)	1	2.36	180 mins	2.14×10^{-7}
		2		1840 mins*	2.90×10^{-8}
		3		2760 mins*	1.39×10^{-8}
WS107	1.5-5.0 (C)	1	1.71	9600 mins*	8.20×10^{-10}
WS108	1.0-4.0 (C)	1	1.32	66 mins	4.32×10^{-7}
		2		91 mins	3.12×10^{-7}
		3		1920 mins*	1.48×10^{-8}

Figure 1 – Infiltration Tests Data

As mentioned above, the car parking areas are to be utilised with permeable paving. The subbase for the car parking areas is to have a minimum of 450mm permeable subbase, with filter drains diverting the flows into the main SW network.

- 4.1.7 *Details of surface water attenuation that offers a reduction in surface water runoff rate in line with the Manchester Trafford and Salford Strategic Flood Risk Assessment, i.e. at least a 50% reduction*

in runoff rate compared to the existing rates, as the site is located within Conurbation Core Critical Drainage Area –

Proposed discharge rates for each parcel have been limited to 5l/s, this is significant reduction in the existing run off rates highlighted within the 'Existing Impermeable Areas' plan, attached in Appendix A. The discharge rates for proposed development are shown in the table below. Parcel A and Parcel C are gravel areas and the existing levels for these areas suggest that the land falls towards the existing highways. As it is currently gravelly areas, it is anticipated that approximately 75% of these areas discharges into the existing highway drainage. This assessment has been considered when calculating the existing discharge rate for the Parcel A and Parcel C.

Table 1 - Discharge Rate Calculations

	Impermeable Area (m ²)	Existing Discharge Rate - (Imp Area x 50mm/hr) ÷ 3600	Allowable Discharge Rate (50% Reduction from Existing)	Proposed Discharge Rate
Parcel A	1061	14.7 l/s	7.4 l/s	5 l/s
Parcel B	774	10.8 l/s	5.4l/s	5 l/s
Parcel C	1923	26.7 l/s	13.4l/s	5 l/s

4.1.8 *An existing and proposed impermeable areas drawing to accompany all discharge rate calculations –*

'Existing Impermeable Area' and 'Proposed Impermeable Area' Plans are attached within the Appendix A.

4.1.9 *Runoff volume in the 1 in 100 year, 6 hours rainfall shall be constrained to a value as close as is reasonable practicable to the greenfield runoff volume for the same event, but never to exceed the runoff volume from the development site prior to redevelopment –*

Due to ground conditions, infiltration has been discounted. Therefore, there is no scope to use infiltration SuDS to reduce volumes. The existing site is brownfield and in the redevelopment scenario there is a 50% reduction on existing flow rates, see Table 1 for the proposed discharge rates. Therefore, it is not achievable to reduce the volume of runoff any further.

4.1.10 *Evidence that the drainage system has been designed (unless an area is designated to hold and/or convey water as part of the design) so that flooding does not occur during a 1 in 100 year rainfall event with allowance for 40% climate change in any part of a building –*

SW results has been attached in Appendix B. Flooding does not occur in all three systems up to and including the 1 in 100 year plus 40% climate change events. The proposed drainage layout has been designed in accordance with BS EN 752: 2008 and Building Regulations Part H guidance, i.e. up to

the 30-year storm return period criterion and tested for the extreme 100-year event to confirm no flood risk to the properties.

- 4.1.11 *Assessment of overland flow routes for extreme events that is diverted away from buildings (including basements). Overland flow routes need to be designed to convey the flood water in a safe manner in the event of a blockage or exceedance of the proposed drainage system capacity including inlet structures. A layout with overland flow routes needs to be presented with appreciation of these overland flow routes with regards to the properties on site and adjacent properties off site –*

‘Flood Exceedance Flood Route Plan’ attached within the Appendix A. In the case of this development, flood events up to the 1 in 100-year event (including a 40% increase to allow for climate change) will be contained below ground. Any exceedance flooding for storms in excess of the 1 in 100-year event (including a 40% increase to allow for climate change) will be directed away from the properties and contained within the existing highways areas, with flows directed back into the surface water drainage network as water levels in the drainage network recede. No habitable areas of the proposed developments will be impacted. Furthermore, the development will reduce the off-site flooding by providing a drainage system within the currently undrained areas (areas drain to off-site highways at present). The on-site drainage system will in turn reduce the off-site flood risk.

- 4.1.12 *The FRA shall evidence that historic flooding and breach modelling data relevant to the site has been requested from the appropriate organisation and considered in the FRA;*

It has been confirmed by the Canal and River Trust that ‘there are no recorded events of overtopping or any canal breaches in the immediate vicinity of the Silk Street Development.’ See the email correspondence attached in Appendix C.

- 4.1.13 *Progression down Drainage Hierarchy shall be evidence based. Evidence that permission to discharge into the canal has been requested from the appropriate organisation must be presented. Where discharge is feasible, agreement in principle is required that there is adequate spare capacity in the existing system taking future development requirements into account. An email of acceptance of proposed flows and/or new connection will suffice –*

Results from the infiltration investigation (Figure 1) can be seen within the Appendix A. Based on the presence of cohesive underlying clay and shallow groundwater, soakaways are not viable for use on this site. The Rochdale Canal is to the north of the site. However, it is classified as a site of biological importance, as such the Council Ecology Department have requested that no drainage be discharged into the Canal. Canal Trust and River Trust highlighted due to lack of available outputs and flood risk issues (canal is at capacity), as such discharging into the canal had been discounted. See the email correspondence with the Ecology Department attached in Appendix C. Based on the SuDS Hierarchical Approach, surface water from the properties of the development site will discharge into the combined sewer and the surface water sewer, with a total of three connection

points. The drainage strategy for the site is to collect runoff from the roof and all external areas and direct it to new below ground surface water drainage networks prior to outfall. Each surface water system will be restricted to 5l/s, giving a total rate of 15l/s. Geo-cellular attenuation, permeable paving areas and oversized pipes has been provided to attenuate flows. The existing adopted highway on site will continue with the current regime and discharge into the combined water sewers via series of gullies.

- 4.1.14 *Where surface water is connected to the public sewer, agreement in principle from United Utilities is required that there is adequate spare capacity in the existing system 130586/VO/2021 Page 6 of 18 taking future development requirements into account. An email of acceptance of proposed flows and/or new connection will suffice –*

See the email correspondence with United Utilities attached in Appendix C. United Utilities have confirmed all three proposed connections into the public sewers are now acceptable.

- 4.1.15 *For sites where proposed development would cause unusual pollution risk to surface water, evidence of pollution control measures (preferably through SuDS) is required –*

Silt is to be prevented from entering the drainage system using trapped gullies and channels with silt traps. No unusual pollution risks exist at the site.

- 4.1.16 - *Maximised use of permeable surfacing where feasible. Front driveway hard surfacing >5m² shall be permeable where feasible in line with Government Guidance –*

Permeable paving has been proposed within the car parking areas. 'Proposed Drainage Plan' attached in Appendix A indicates areas which are going to utilise a filter drain within the permeable sub base (maximum 600mm deep).

- 4.1.17 *Hydraulic calculation of the proposed drainage system –*

See the SW results attached within the Appendix B. Plot 46 – 69 network now include the permeable paving approach and therefore the oversized pipes size have been reduced.

- 4.1.18 *Construction details of flow control and SuDS elements –*

'Proposed Drainage Details' drawing attached within Appendix A. Additional details for the hydrobrakes (, this includes the manufacture specifications) and permeable paving have been added to the drawing.

- 4.1.19 The regular management and maintenance of surface water and foul water drainage systems is essential to ensure that the system always operates at its maximum efficiency. The maintenance schedules below taken from CIRIA document C753 outlines the required programme of maintenance for the geocellular storage, filter drains and the general maintenance of pipe and manholes.

TABLE 21.3 Operation and maintenance requirements for attenuation storage tanks

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action	Monthly for 3 months, then annually
	Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
	For systems where rainfall infiltrates into the tank from above, check surface of filter for blockage by sediment, algae or other matter; remove and replace surface infiltration medium as necessary.	Annually
	Remove sediment from pre-treatment structures and/or internal forebays	Annually, or as required
Remedial actions	Repair/rehabilitate inlets, outlet, overflows and vents	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually
	Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required

Figure 2 - Geo Cellular Operation and Maintenance

TABLE 16.1 Operation and maintenance requirements for filter drains

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter (including leaf litter) and debris from filter drain surface, access chambers and pre-treatment devices	Monthly (or as required)
	Inspect filter drain surface, inlet/outlet pipework and control systems for blockages, clogging, standing water and structural damage	Monthly
	Inspect pre-treatment systems, inlets and perforated pipework for silt accumulation, and establish appropriate silt removal frequencies	Six monthly
	Remove sediment from pre-treatment devices	Six monthly, or as required
Occasional maintenance	Remove or control tree roots where they are encroaching the sides of the filter drain, using recommended methods (eg NJUG, 2007 or BS 3998:2010)	As required
	At locations with high pollution loads, remove surface geotextile and replace, and wash or replace overlying filter medium	Five yearly, or as required
	Clear perforated pipework of blockages	As required

Figure 3 - - Filter Drains Operation and Maintenance

TABLE 32.1 Typical key SuDS components operation and maintenance activities (for full specifications, see Chapters 11–23)

Operation and maintenance activity	SuDS component											
	Pond	Wetland	Detention basin	Infiltration basin	Soakaway	Infiltration trench	Filter drain	Modular storage	Pervious pavement	Swale/bioretention/ trees	Filter strip	Green roofs
Regular maintenance												
Inspection	■	■	■	■	■	■	■	■	■	■	■	■
Litter and debris removal	■	■	■	■	□	■	■	□	■	■	■	□
Grass cutting	■	■	■	■	□	■	■	□	□	■	■	
Weed and invasive plant control	□	□	□	□		□	□		□		□	■
Shrub management (including pruning)	□	□	□	□					□	□	□	
Shoreline vegetation management	■	■	□									
Aquatic vegetation management	■	■	□									
Occasional maintenance												
Sediment management ¹	■	■	■	■	■	■	■	■	■	■	■	■
Vegetation replacement	□	□	□	□						□	□	■
Vacuum sweeping and brushing									■			
Remedial maintenance												
Structure rehabilitation /repair	□	□	□	□	□	□	□	□	□	□	□	
Infiltration surface reconditioning				□	□	□	□		□	□	□	

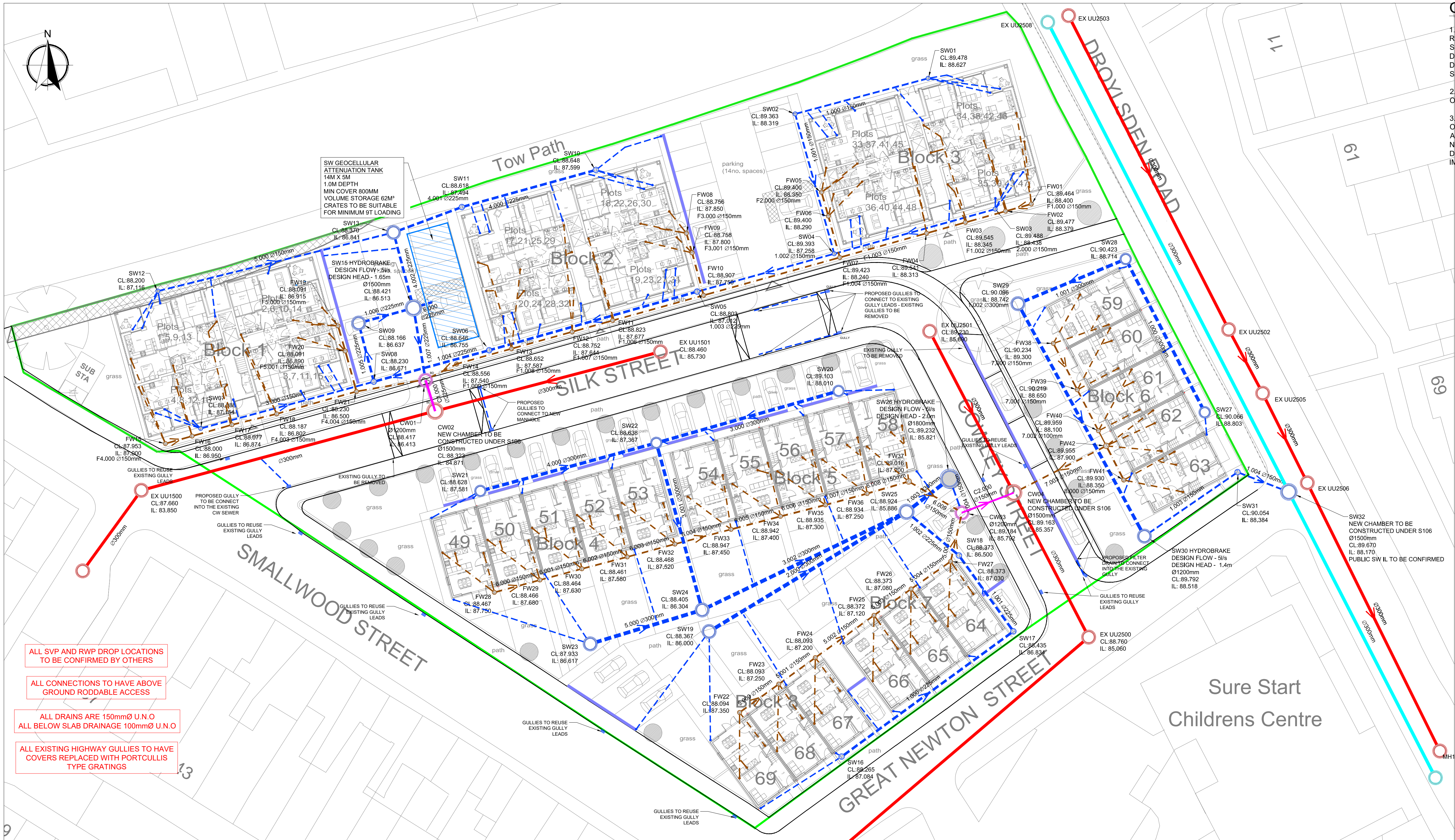
4.1.20 The long-term maintenance of the drainage infrastructure will be the responsibility of a Management Company for the apartments (to be appointed at build completion) and the maintenance responsibility for the houses will be Manchester City Council. To further future proof the drainage networks from potential build overs, pipes and manholes within the rear gardens have been aligned towards (close as possible) the rear entrance footpaths

4.1.21 See the email correspondence attached in Appendix C.

4.3.3 The Management Company will need to carry out annual inspections and undertake clearing of private drainage channels. There will be a site management health and safety document prepared in respect of the final development. This will include the required maintenance regime for the on-site private drains and drainage facilities such as the channels, pipes, chambers, permeable paving and the geocellular storage tank.

Appendix A – Ridge Design Drawings

CONTENTS	
Identifier	Name
SSG-RDG-XX-ZZ-DR-C-0001	Proposed Drainage Plan
SSG-RDG-XX-ZZ-DR-C-0002	Existing Impermeable Areas
SSG-RDG-XX-ZZ-DR-C-0003	Proposed Impermeable Areas
SSG-RDG-XX-ZZ-DR-C-0004	Flood Exceedance Route Plan
SSG-RDG-XX-ZZ-DR-C-0006	Drainage Manhole Schedule
SSG-RDG-XX-ZZ-DR-C-0007	Proposed Drainage Details
SSG-RDG-XX-ZZ-DR-C-0008	Proposed Drainage Details



- ALL SVP AND RWP DROP LOCATIONS TO BE CONFIRMED BY OTHERS
- ALL CONNECTIONS TO HAVE ABOVE GROUND RODDABLE ACCESS
- ALL DRAINS ARE 150mmØ U.N.O
ALL BELOW SLAB DRAINAGE 100mmØ U.N.O
- ALL EXISTING HIGHWAY GULLIES TO HAVE COVERS REPLACED WITH PORTCULLIS TYPE GRATINGS

DRAINAGE NOTES

- THE CONTRACTOR SHALL ALLOW FOR THE PROTECTION, TEMPORARY AND PERMANENT SUPPORT AND DIVERSION WORKS AS NECESSARY, TO ALL EXISTING SERVICES TO THE SATISFACTION OF THE PUBLIC UTILITIES.
- THE CONTRACTOR SHALL ALLOW FOR DEALING WITH SURFACE WATER RUN-OFF INTO EXCAVATIONS AND FROM GROUNDWATER BY MEANS OF SUMPS, PUMPING AND DE-WATERING AS APPROPRIATE. IN ORDER TO KEEP THE EXCAVATION AS REASONABLY DRY AS POSSIBLE DURING THE CONSTRUCTION OF THE WORKS.
- ALL PRIVATE DRAINAGE WITHIN THE SITE IS TO COMPLY WITH THE REQUIREMENTS OF BSEN752 AND BUILDING REGULATIONS PART H. WHERE APPROPRIATE, ALL ADOPTED DRAINAGE SHALL BE DESIGN AND CONSTRUCTED IN ACCORDANCE WITH SEWERS FOR ADOPTION 6th EDITION AND THE ADOPTING AUTHORITIES STANDARD REQUIREMENTS.
- ALL PRIVATE DRAINAGE PIPES TO BE LAID IN TRENCHES BEDDED CLASS 'B' ON SINGLE SIZED AGGREGATE AND BACKFILLED WITH APPROVED SELECTED FILL (40mm DOWN) REUSED FROM EXCAVATED MATERIAL. UNDER BUILDINGS AND WHERE COVER TO INVERT IS LESS THAN 1200mm UNDER TRAFFICKED AREAS PIPES TO BE CAST IN CONCRETE (CLASS Z BEDDING). CLASS 'S' BED AND SURROUND MAY BE REQUIRED FOR SEWERS TO BE ADOPTED. REFER TO SPECIFIC DRAWINGS FOR FURTHER INFORMATION.
- SELECTED BACKFILL MATERIAL SHALL CONSIST OF UNIFORM EXCAVATED MATERIAL, FREE FROM STONES LARGER THAN 40mm, CLAY LUMPS LARGER THAN 75mm, TREE ROOTS, CONTAMINATED MATERIAL. SELECTED BACKFILL MATERIAL IS TO BE PLACED IN LAYERS NOT EXCEEDING 150mm THICKNESS. THE MATERIAL SHALL BE COMPACTED TO

- ACHIEVE NOT LESS THAN 95% OF THE MAXIMUM DRY DENSITY AS DETERMINED IN LABORATORY COMPACTION TESTS. SUFFICIENT TESTING SHALL BE CARRIED OUT, BY THE CONTRACTOR, TO DEMONSTRATE THIS IS ACHIEVED (NUMBER 12). WHERE THE MOISTURE CONTENT OF THE MATERIAL PROHIBITS COMPLIANCE WITH THE ABOVE 6F1 OR SIMILAR IMPORTED MATERIAL SHALL BE USED.
- CONCRETE PROTECTION TO PIPEWORK IS TO BE PROVIDED AS FOLLOWS:
 - ALL PIPEWORK WITHIN PEDESTRIAN/SOFT AREAS WITH LESS THAN 600mm COVER.
 - ALL PIPEWORK SUBJECT TO VEHICULAR OVERRUN WITH LESS THAN 1.2m COVER.
 - ALL PIPEWORK WITHIN MANHOLES ARE TO BE LAID SOFFIT TO SOFFIT (U.N.O). ALL CHAMBER INVERT LEVELS ARE FOR THE OUTGOING PIPE LEVELS. BACKDROP PIPEWORK SHALL BE CONNECTED AT SOFFIT TO SOFFIT WITH THE RODDING ACCESS LEVEL SPECIFIED.
 - ALL DRAINS TO BE LAID ACCURATELY TO LINE AND LEVEL IN STRICT ACCORDANCE WITH THE MANUFACTURERS RECOMMENDATIONS.
 - ANY GRADIENTS OF DRAINS INDICATED ARE INDICATIVE ONLY AND THE CONTRACTOR SHALL INSTALL THE DRAINS TO THE SPECIFIED LEVELS SHOWN FOR EACH MANHOLE (U.N.O). CATCHPIT INVERT LEVELS ARE FOR THE OUTGOING PIPE WITH THE SUMP LEVEL SPECIFIED SEPARATELY.
 - CO-ORDINATE SETTING OUT INFORMATION FOR MANHOLES IS TO THE INTERSECTION THE DRAINS AND NOT THE CENTRE OF THE MANHOLE.
 - COVER LEVELS OF THE MANHOLES ARE PROVISIONAL AND SUBJECT TO ADJUSTMENT ON SITE TO SUIT THE FINISHED

- GROUND LEVELS. ALL EXTERNAL WORKS CONSTRUCTION AREAS TO BE AS LOCATED BY THE ARCHITECT.
- MANHOLE COVERS AND FRAMES ARE TO BE IN ACCORDANCE WITH BSEN124 AND THE FOLLOWING:
 - VEHICULAR AREAS: CLASS D400 (E600 IN VULNERABLE SE RVICE YARD LOCATIONS), DOUBLE TRIANGULAR, 150mm DEEP DUCTILE IRON COVER AND FRAME WITH THREE POINT COVER SEATING, BADGED FW OR SW FOR FOUL OR SURFACE WATER DRAINAGE.
 - PEDESTRIAN AREAS: CLASS B125, 100mm DEEP, BADGED FW OR SW FOR FOUL OR SURFACE WATER DRAINAGE.
 - POSITIONS AND SIZES OF ABOVE GROUND FOUL AND SURFACE WATER DRAINAGE CONNECTIONS ARE TO BE CONFIRMED PRIOR TO CONSTRUCTION WITH THE ARCHITECT & M&E ENGINEER.
 - GULLY GRATINGS AND STEEL CHANNEL COVERS ARE TO BE IN ACCORDANCE WITH BSEN124 AS FOLLOWS:
 - AREAS SUBJECT TO VEHICULAR OVERRUN: CLASS D400 MINIMUM.
 - AREAS NOT SUBJECT TO REGULAR VEHICLE OVERRUN (ADJACENT TO KERBS ETC): CLASS C250.
 - GULLY GRATES ADJACENT TO KERBS SHALL BE HINGED ON THE SIDE OF THE TRAFFIC DIRECTION (LEFT HAND SIDE).
 - ALL BRICKWORK IN CONNECTION WITH DRAINAGE IS TO BE SOLID CLASS B ENGINEERING BRICK TO BS3921.
 - ALL PRECAST CONCRETE PIPES, CHAMBER PRODUCTS AND ROAD GULLIES SHALL BE TO BS5911 AND BE KITEMARKED.
 - ALL DRAINAGE INSITU CONCRETE SHALL BE GEN3 (U.N.O).
 - ALL INSITU AND CONCRETE PRODUCTS SHALL COMPLY WITH THE REQUIREMENTS FOR SULPHATE EXPOSURE IN ACCORDANCE WITH BRE SPECIAL DIGEST 1, CONCRETE IN

- AGGRESSIVE GROUND (2001) PART 1: TABLE 2.
- UPON COMPLETION OF THE WORKS THE CONTRACTOR SHALL CLEAN ALL DRAINAGE BY JETTING, REMOVING ALL DEBRIS FROM SITE. NO DEBRIS SHALL BE PERMITTED TO ENTER THE EXISTING DRAINAGE SYSTEM.
 - CONSTRUCTION JOINTS IN CONCRETE SURROUND MUST NOT BE WITHIN 150MM OF CHAMBER/SHAFT RING JOINTS.
 - ROCKER PIPES TO BE SURROUNDED WITH CONCRETE LOCATED 150mm MINIMUM 200mm MAXIMUM FROM THE FIRST FLEXIBLE JOINT TO THE MANHOLE WALL.
 - SOFT SPOTS IN THE TRENCH FORMATION SHALL BE REMOVED AND REPLACED WITH GRANULAR BEDDING UNLESS INSTRUCTED OTHERWISE.
 - LATERAL CONNECTIONS IN BETWEEN MANHOLE RUNS SHALL BE FORMED BY USING PURPOSE MADE JUNCTION FITTINGS. BEND FITTINGS SHALL BE PROVIDED WHERE APPROPRIATE TO DIRECT THE FLOW INTO MAIN RUNS.
 - IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO LIAISE WITH BUILDING CONTROL FOR APPROVALS, INTERIM INSPECTION, SNAGGING AND FINAL INSPECTIONS OF THEIR WORK.
 - THE CONTRACTOR SHALL CONFIRM THE LOCATION OF ALL EXISTING STATUTORY UNDERTAKERS APPARATUS AND SERVICE CONNECTIONS ADJACENT TO AND CROSSING THE WORKS BY TRIAL PITS PRIOR TO COMMENCING MACHINE DIG.
 - AT THE CONCLUSION OF THE WORKS THE CONTRACTOR SHALL PROVIDE A MARKED UP DRAWING TO RECORD ANY AS BUILT VARIATIONS NOT SHOWN ON THE DRAWINGS.
 - THE DRAINAGE SYSTEM IS NOT DESIGNED TO ACCEPT

- UNTREATED EFFLUENT FROM A COMMERCIAL KITCHEN CONTAINING GREASE AND OILS. REMOVAL OF GREASE AND OIL SHOULD BE MADE AT SOURCE USING A FLOOR MOUNTED ABOVE GROUND GREASE REMOVAL SYSTEM. IT IS RECOMMENDED THAT A MECHANICAL GREASE REMOVAL SYSTEM BE EMPLOYED FOR THIS PURPOSE NOT A PASSIVE SYSTEM.
- PIPEWORK TO BE OF THE FOLLOWING MANUFACTURER: 100 / 150 / 225MM DIAMETER HEPWORTH SUPERSLEEVE VITRIFIED CLAY PIPES (40kN/mm CRUSHING STRENGTH), 300mm + TO BE CONCRETE CLASS M. ALTERNATIVELY 'POLYSEWER' UPVC DRAINAGE SYSTEM BY POLYPIPE WHEN INSTALLED IN LINE WITH THE MANUFACTURERS RECOMMENDATIONS. FILTER DRAINAGE TO BE PERFORATED HDPE.
 - ALL RWP, WPC & GULLY CONNECTIONS TO BE 100mm DIA UNO & ARE RODDABLE AT LOCATIONS ABOVE GROUND LEVEL.
 - ALL INSPECTION CHAMBERS WITH A DEPTH GREATER THAN 1.2m TO HAVE A 350mm DIAMETER REDUCING PLATE LOCATED BENEATH COVER AND FRAME TO PREVENT ACCESS.

- KEY
- EXISTING SW SEWER
 - EXISTING CW SEWER
 - PROPOSED FILTER DRAIN WITHIN PERMEABLE SUB BASE - 600mm DEEP
 - PROPOSED SW IC
 - PROPOSED SW SEWER
 - PROPOSED FW IC
 - PROPOSED FW MH
 - PROPOSED CW SEWER
 - PROPOSED CW MH

GENERAL NOTES

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P3	20.01.22	AM	PB	PLOT 49 - 69 DRAINAGE UPDATED
P2	08.10.21	AM	PB	ISSUED FOR INFORMATION
P1	02.07.21	PB	PB	PRELIMINARY ISSUE
No	DATE	DRAWN	REV'D ENG.	AMENDMENT

STATUS	PURPOSE OF ISSUE
S2	FOR INFORMATION

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RIDGE

CLIENT
ROWLINSON CONSTRUCTION

PROJECT
SILK STREET, GORTON

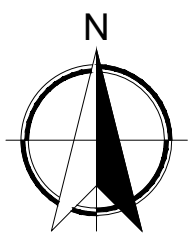
DRAFTER
PB

ENGINEER
PB

TITLE
PROPOSED DRAINAGE LAYOUT

PROJECT REFERENCE:

SCALE 1-250	SHEET A1	DRAWING No SSG-RDG-00-ZZ-DR-C-0001	REV P3
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KEY

- EXISTING SW SEWER & MANHOLE
- EXISTING SW SEWER & HIGHWAY GULLY
- EXISTING CW SEWER & MANHOLE
- EXISTING IMPERMEABLE AREA

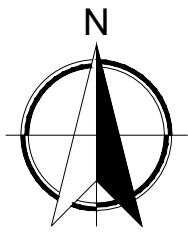
P2	20.10.21	AM	PB	UPDATED EXISTING IMPERMEABLE AREAS
P1	28.04.21	JJ	PB	PRELIMINARY ISSUE
No	DATE	DRAWN	REV'D ENG.	AMENDMENT

STATUS	PURPOSE OF ISSUE
S2	FOR INFORMATION

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CLIENT	ROWLINSON CONSTRUCTION		
PROJECT	SILK STREET, GORTON		
DRAFTER	JJ	ENGINEER	PB
TITLE	EXISTING IMPERMEABLE AREA		
SCALE	1-250	SHEET	A1
DRAWING No	SSG-RDG-00-ZZ-DR-C-0002	REV	P1



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Impermeable Areas:

PLOTS	AREA (ha)
1 - 48	0.200
49 - 69	0.127
59 - 63	0.049
Total	0.376

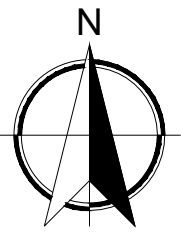
P3	20.01.22	AM	PB	UPDATED TO SUIT THE LATEST MASTERPLAN
P2	10.08.21	AM	PB	UPDATED TO SUIT THE LATEST MASTERPLAN
P1	28.04.21	JJ	PB	PRELIMINARY ISSUE
No	DATE	DRAWN	REV'D ENG.	AMENDMENT

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CLIENT	ROWLINSON CONSTRUCTION		
PROJECT	SILK STREET, GORTON		
DRAFTER	JJ	ENGINEER	PB
TITLE	PROJECT REFERENCE: PROPOSED IMPERMEABLE AREAS		
SCALE	SHEET	DRAWING No.	REV
1-250	A1	SSG-RDG-00-ZZ-DR-C-0003	P3



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KEY

- EXISTING SW SEWER
- EXISTING CW SEWER
- PROPOSED FILTER DRAIN WITHIN PERMEABLE SUB BASE - 600mm DEEP
- PROPOSED SW IC
- PROPOSED SW SEWER
- PROPOSED FW IC
- PROPOSED FW MH
- PROPOSED CW SEWER
- PROPOSED CW MH
- OUT OF CHAMBER EXCEEDANCE FLOW ROUTES IN EXCESS OF 100 YEAR + 40%
- EXCEEDANCE FLOODING AREAS

P2	20.01.22	AM	PB	UPDATED TO SUIT THE LATEST MASTERPLAN
P1	08.10.21	AM	PB	ISSUED FOR INFORMATION
No	DATE	DRAWN	REV'D ENG.	AMENDMENT

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CLIENT	ROWLINSON CONSTRUCTION		
PROJECT	SILK STREET, GORTON		
DRAFTER	AM	ENGINEER	AM
TITLE	EXCEEDANCE FLOOD ROUTE PLAN		
SCALE	1-250	SHEET	A1
DRAWING No	SSG-RDG-00-ZZ-DR-C-0004	REV	P2

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MANHOLE SCHEDULE									
MANHOLE NO.	MANHOLE CO-ORDINATES	COVER LEVEL (m)	DEPTH TO INVERT (m)	MANHOLE SIZE	MANHOLE TYPE	PIPE IN NAME, INVERT LEVEL (m) & DIA	PIPE OUT NAME, INVERT LEVEL (m) & DIA	COVER SIZE (mm) & GRADE	COMMENTS
SW09	E:388140.947 N:400555.831	88.166	1.529	1,200	TYPE C	From SW08, IL=86.629, 225mmØ	To SW15, IL=86.629, 225mmØ	750 x 750 D400	
SW13	E:388145.086 N:400566.604	88.370	1.479	1,200	TYPE C	From SW11, IL=86.841, 225mmØ From SW12, IL=86.916, 150mmØ	To SW15, IL=86.841, 225mmØ	750 x 750 D400	
SW15	E:388147.465 N:400557.637	88.421	1.908	1,500	Hydrobrake Chamber	From ATTNJ, IL=86.425, 225mmØ From SW09, IL=86.425, 225mmØ From SW13, IL=86.425, 225mmØ	To CW01, IL=86.425, 225mmØ	600x600 D400	FLOW CONTROL CHAMBER HYDROBRAKE FLOW - 5l/s HEAD - 1.65m
SW19	E:388182.590 N:400519.177	88.367	2.367	1,200	TYPE B	From ACO02, IL=86.150, 100mmØ From RWP23, IL=86.150, 100mmØ	To SW25, IL=86.000, 300mmØ	600x600 D400	
SW20	E:388197.970 N:400547.766	89.103	1.093	900	TYPE C	From ACO03, IL=88.160, 100mmØ From RWP27, IL=88.160, 100mmØ	To SW22, IL=88.010, 300mmØ	600x600 D400	
SW21	E:388155.413 N:400535.883	88.628	1.047	900	TYPE C	From ACO04, IL=87.731, 100mmØ From RWP30, IL=87.731, 100mmØ	To SW22, IL=87.581, 300mmØ	600x600 D400	
SW22	E:388176.316 N:400541.595	88.638	1.271	900	TYPE C	From SW21, IL=87.367, 300mmØ From SW20, IL=87.367, 300mmØ	To SW24, IL=87.367, 300mmØ	600x600 D400	
SW23	E:388168.460 N:400517.711	87.933	1.316	1,200	TYPE C	From RWP33, IL=86.767, 100mmØ From RWP34, IL=86.767, 100mmØ	To SW24, IL=86.617, 300mmØ	600x600 D400	
SW24	E:388181.760 N:400521.742	88.405	2.101	1,200	TYPE B	From SW23, IL=86.304, 300mmØ From SW22, IL=86.304, 300mmØ	To SW25, IL=86.304, 300mmØ	600x600 D400	
SW25	E:388206.044 N:400533.401	88.924	3.038	1,350	TYPE B	From SW24, IL=85.886, 300mmØ From SW19, IL=85.886, 300mmØ From SW18, IL=85.961, 225mmØ	To SW26, IL=85.886, 300mmØ	600x600 D400	
SW26	E:388211.169 N:400537.332	89.232	3.411	1,800	Hydrobrake Chamber	From SW25, IL=85.821, 300mmØ	To CW03, IL=85.821, 150mmØ	600x600 D400	FLOW CONTROL CHAMBER HYDROBRAKE FLOW - 5l/s HEAD - 1.9m
SW27	E:388241.473 N:400545.232	90.066	1.263	900	TYPE C	From RWP42, IL=88.803, 100mmØ	To SW28, IL=88.803, 300mmØ	600x600 D400	
SW28	E:388232.088 N:400563.445	90.423	1.709	900	TYPE C	From SW27, IL=88.714, 300mmØ	To SW29, IL=88.714, 300mmØ	600x600 D400	
SW29	E:388219.282 N:400558.138	90.096	1.354	1,200	TYPE C	From SW28, IL=88.655, 300mmØ	To SW30, IL=88.655, 300mmØ	600 x 600 D400	
SW30	E:388234.306 N:400530.513	89.792	1.274	1,200	Hydrobrake Chamber	From SW29, IL=88.518, 300mmØ	To SW31, IL=88.518, 150mmØ	600x600 D400	FLOW CONTROL CHAMBER FLOW - 5l/s HEAD - 1.4m
SW32	E:388251.465 N:400535.768	89.670	1.500	1,500	TYPE C	From EX UU2508, IL=88.170, 300mmØ From SW31, IL=88.170, 150mmØ	To MH13, IL=88.170, 300mmØ	1200 x 675 D400	New Chamber to be Constructed Under S106 IL TBC

MANHOLE SCHEDULE									
MANHOLE NO.	MANHOLE CO-ORDINATES	COVER LEVEL (m)	DEPTH TO INVERT (m)	MANHOLE SIZE	MANHOLE TYPE	PIPE IN NAME, INVERT LEVEL (m) & DIA	PIPE OUT NAME, INVERT LEVEL (m) & DIA	COVER SIZE (mm) & GRADE	COMMENTS
CW01	E:388148.895 N:400549.041	88.417	2.004	1,200	TYPE B	From SW15, IL=86.373, 225mmØ	To , IL=86.373, 225mmØ	600x600 D400	
CW02	E:388150.025 N:400545.379	88.323	3.368	1,500	Type-A	From EX UU1501, IL=84.871, 300mmØ From , IL=86.000, 225mmØ	To EX UU1500, IL=84.871, 300mmØ	600x600 D400	NEW CHAMBER TO BE CONSTRUCTED UNDER S106
CW03	E:388212.630 N:400533.283	89.184	3.392	1,200	Type-A	From SW26, IL=85.792, 150mmØ	To , IL=85.792, 150mmØ	600x600 D400	
CW04	E:388218.773 N:400535.663	89.163	3.750	1,500	Type-A	From EX UU2501, IL=85.357, 300mmØ From , IL=85.507, 150mmØ From FW42, IL=86.857, 150mmØ	To EX UU2500, IL=85.357, 300mmØ	600x600 D400	NEW CHAMBER TO BE CONSTRUCTED UNDER S106

P2	20.01.22	AM	PB	UPDATED TO SUIT THE DRAINAGE LAYOUT	
P1	28.09.21	AM	PB	ISSUED FOR INFORMATION	
No	DATE	DRAWN	REV'D ENG.	AMENDMENT	

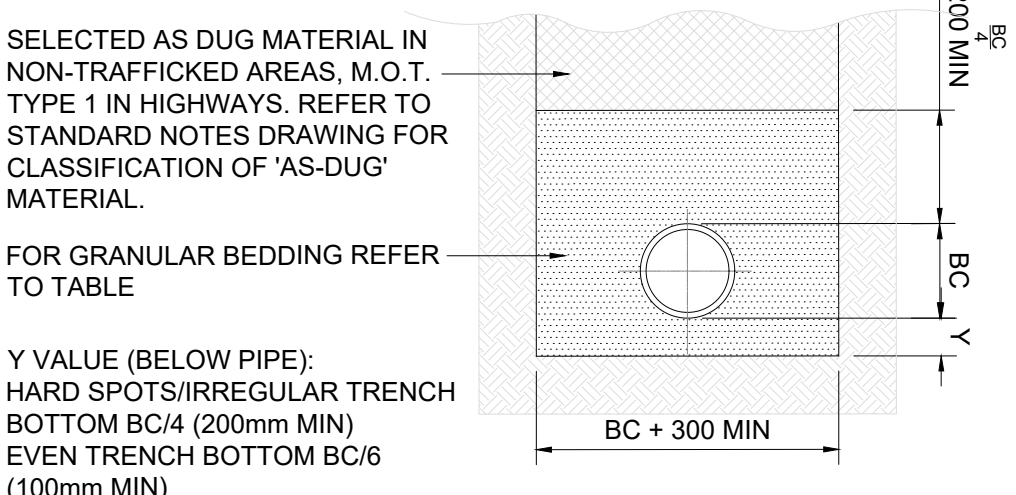
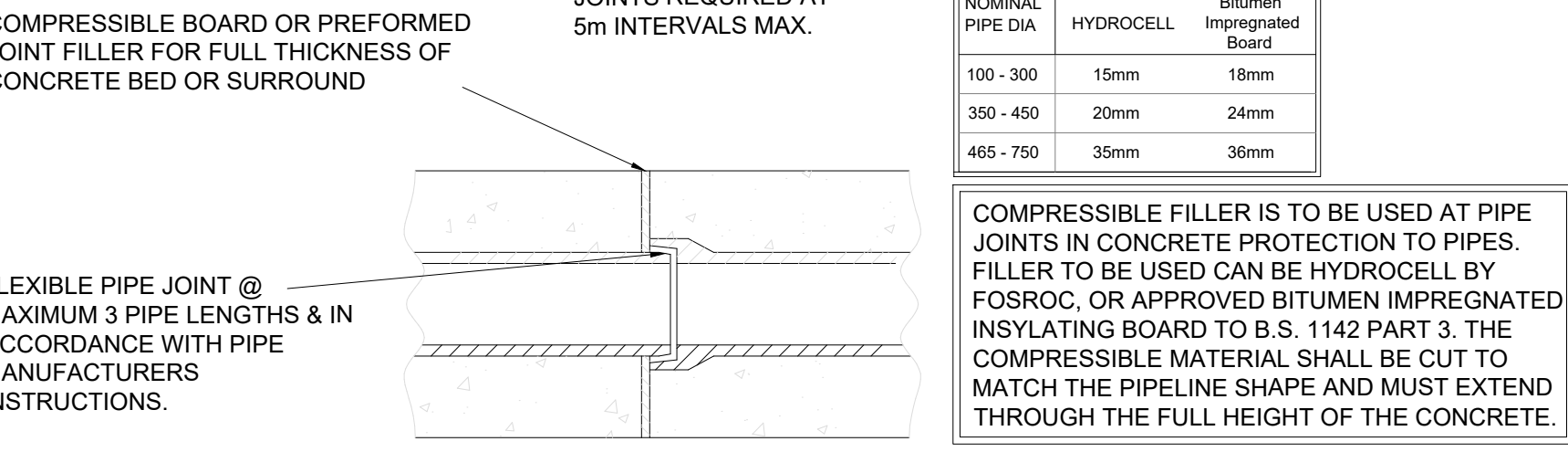
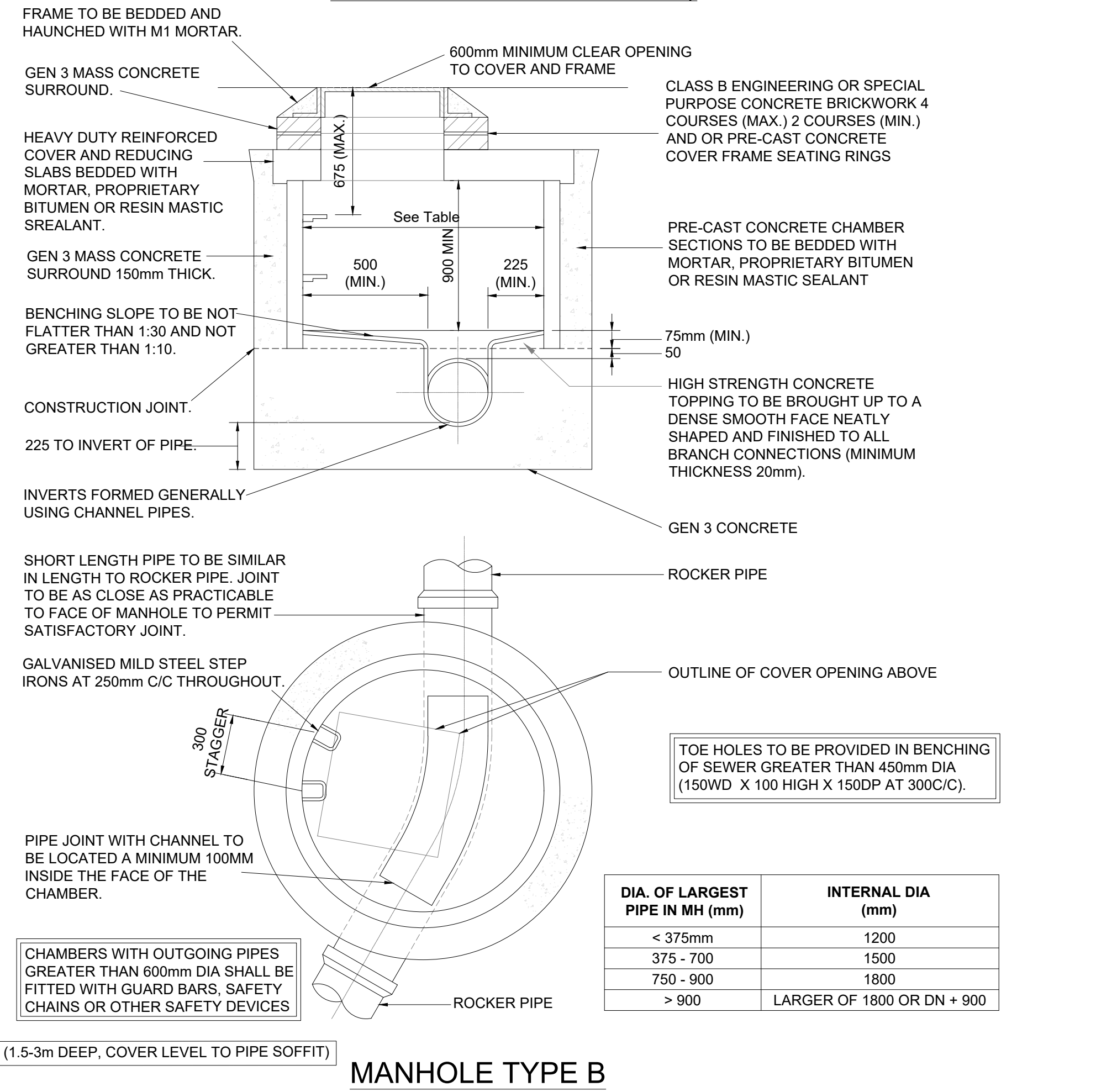
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S2	FOR INFORMATION

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CLIENT	ROWLINSON CONSTRUCTION		
PROJECT	SILK STREET, GORTON		
DRAFTER	AM	ENGINEER	AM
TITLE	PROJECT REFERENCE:		
DRAINAGE MANHOLE SCHEDULE			
SCALE	SHEET	DRAWING No	REV
NTS	A1	SSG-RDG-00-ZZ-DR-C-0006	P2

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Sieve Size (mm)	Percentage by mass passing BS sieves for nominal sizes					
	Graded Aggregate (mm)		Single-sized Aggregate (mm)			
	40 to 5	20 to 5	14 to 5	40	20	14
50.0	100	-----	-----	100	-----	-----
75.0	90 - 100	100	-----	85 - 100	100	-----
20.0	35 - 70	90 - 100	100	0 - 25	85 - 100	-----
14.0	-----	-----	90 - 100	-----	-----	85 - 100
10.0	10 - 40	30 - 60	50 - 85	0 - 5	0 - 25	0 - 50
5.0	0 - 5	0 - 10	0 - 10	-----	0 - 5	0 - 10
2.36	-----	-----	-----	-----	-----	0 - 5

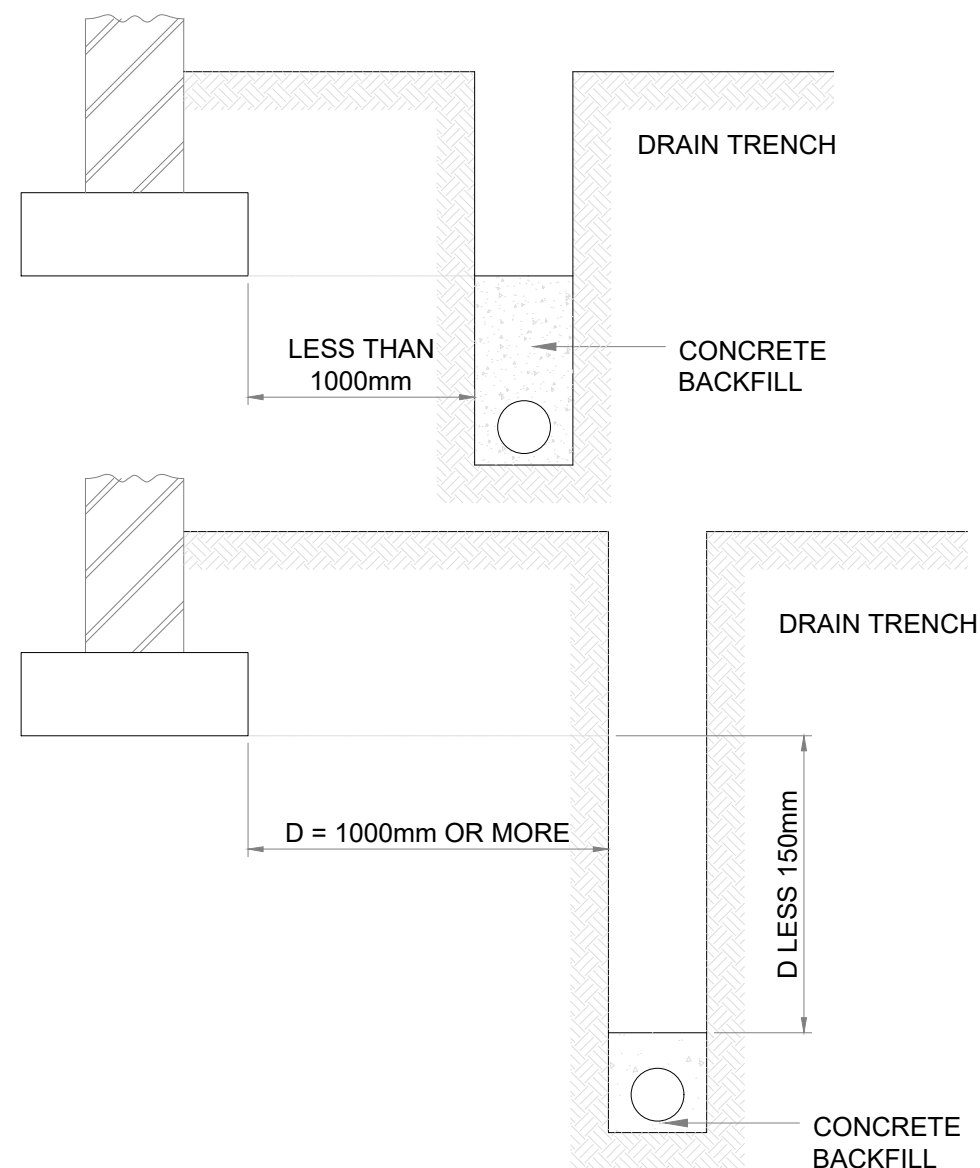
BASED ON BS EN 1610 : 1997 TABLE B.15
FOR RIGID PIPES THE BEDDING SHOULD BE SINGLE SIZE MATERIAL
OR GRADED MATERIAL FROM 5MM UP TO A MAX SIZE OF 10MM FOR
100MM PIPES; 14MM FOR 150MM PIPES; 20MM FOR 225MM TO 600MM
PIPES; 40MM FOR OVER 675MM PIPES



STATUS	PURPOSE OF ISSUE
S2	FOR INFORMATION

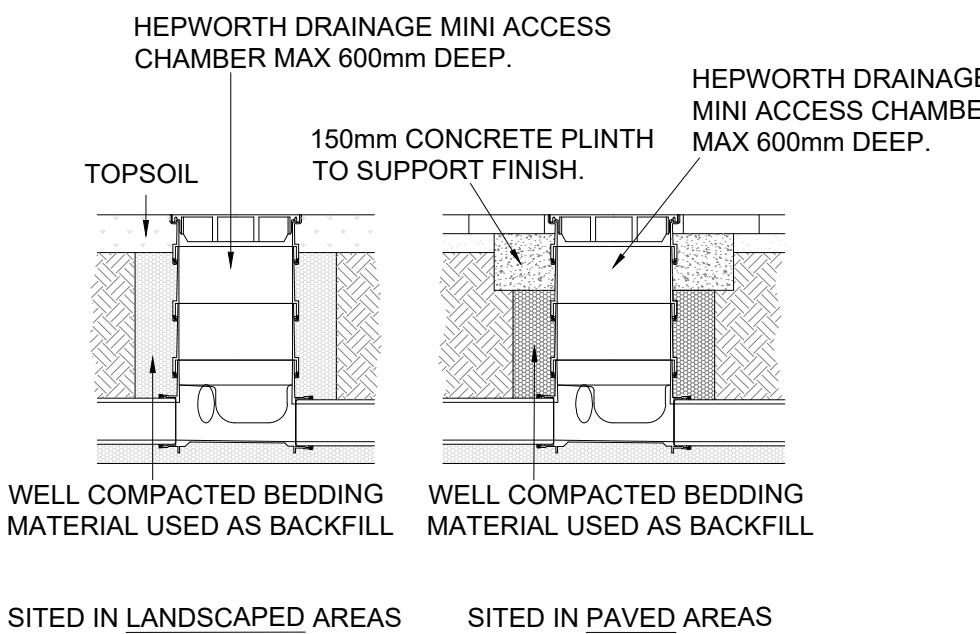
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CLIENT				ROWLINSON CONSTRUCTION			
PROJECT				SILK STREET, GORTON			
DRAFTER		AM		ENGINEER		AM	
TITLE		PROJECT REFERENCE:					
DRAINAGE DETAILS SHEET 1							
SCALE	SHEET	DRAWING No				REV	
1:20	A1	SSG-RDG-00-ZZ-DR-C-0007				P2	

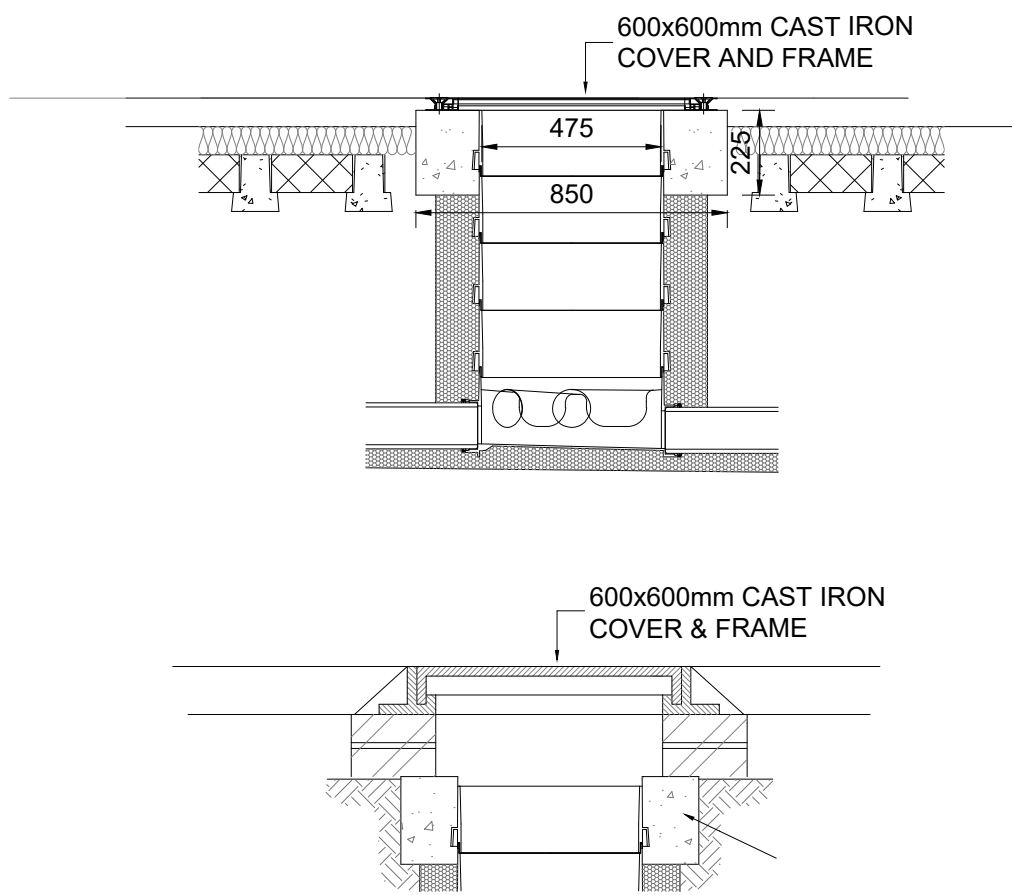


- NOTES
1. CONCRETE TO BE GRADE GEN 3
 2. JOINTS TO BE PROVIDED IN CONCRETE SURROUND AT NOT GREATER THAN 5.0m CENTRES. BUILDING REGULATIONS PART H1 PARA A11
 3. WHERE THE TRENCH IS WITHIN 1m OF THE BUILDING THE TRENCH SHALL BE FILLED WITH CONCRETE UP TO THE LOWEST LEVEL OF THE FOUNDATIONS. WHERE THE TRENCH IS FURTHER THAN 1000mm FROM THE BUILDING, THE TRENCH SHALL BE FILLED WITH CONCRETE UP TO A LEVEL, BELOW THE LOWEST LEVEL OF THE FOUNDATION, EQUAL TO THE DISTANCE FROM THE BUILDING LESS 150mm.

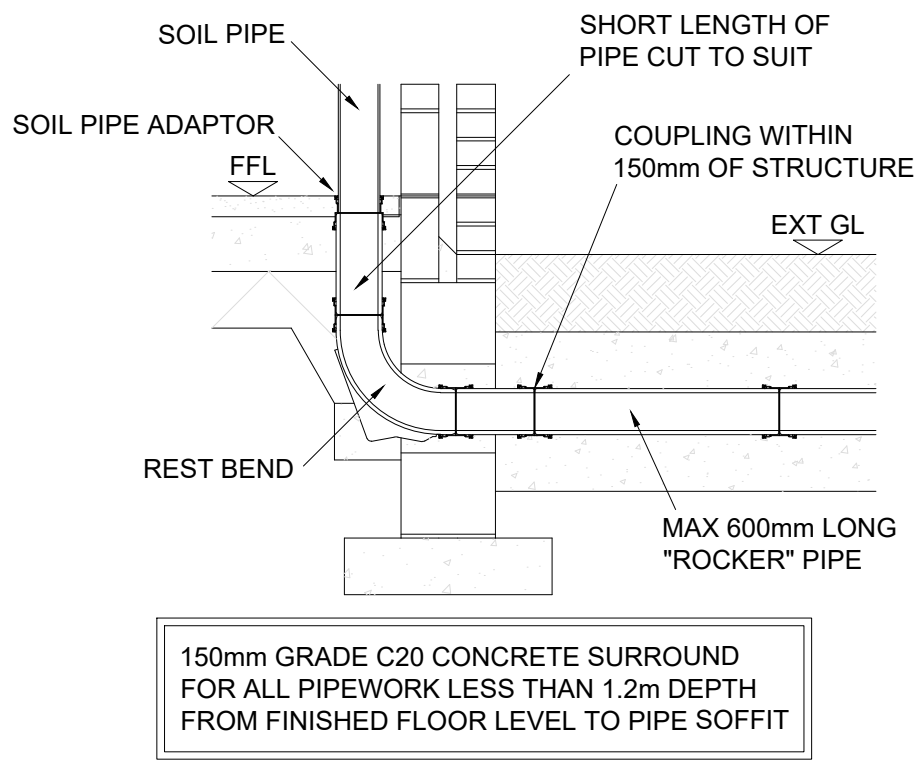
PIPE RUNS ADJACENT TO BUILDING



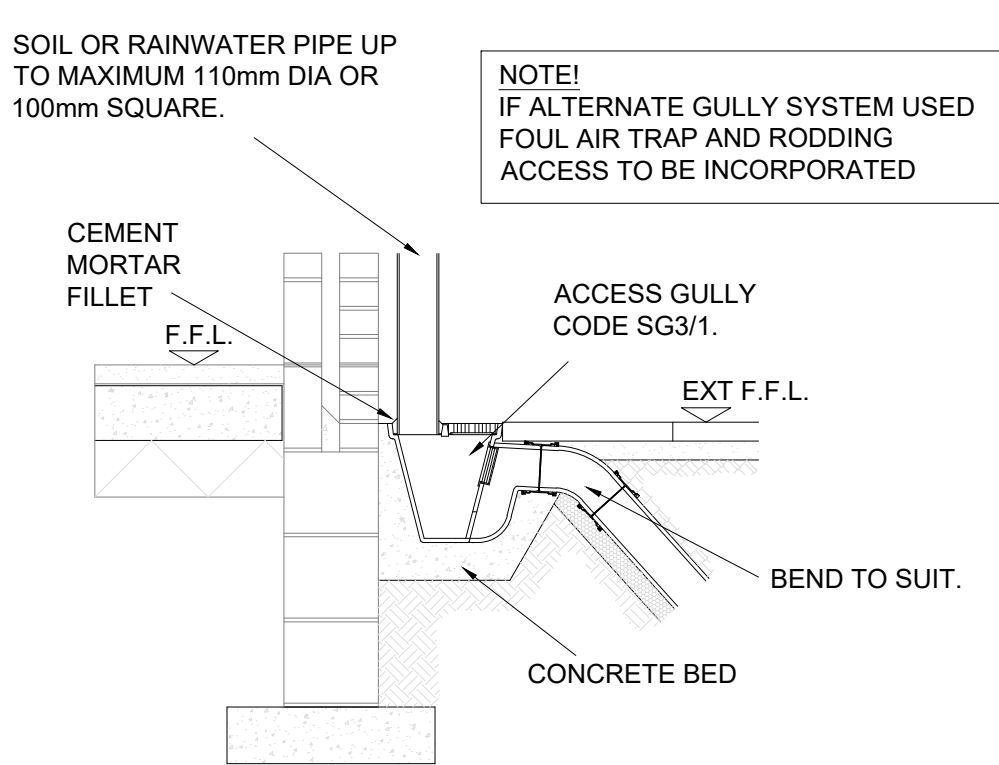
MINI ACCESS CHAMBERS (600mm DEEP)



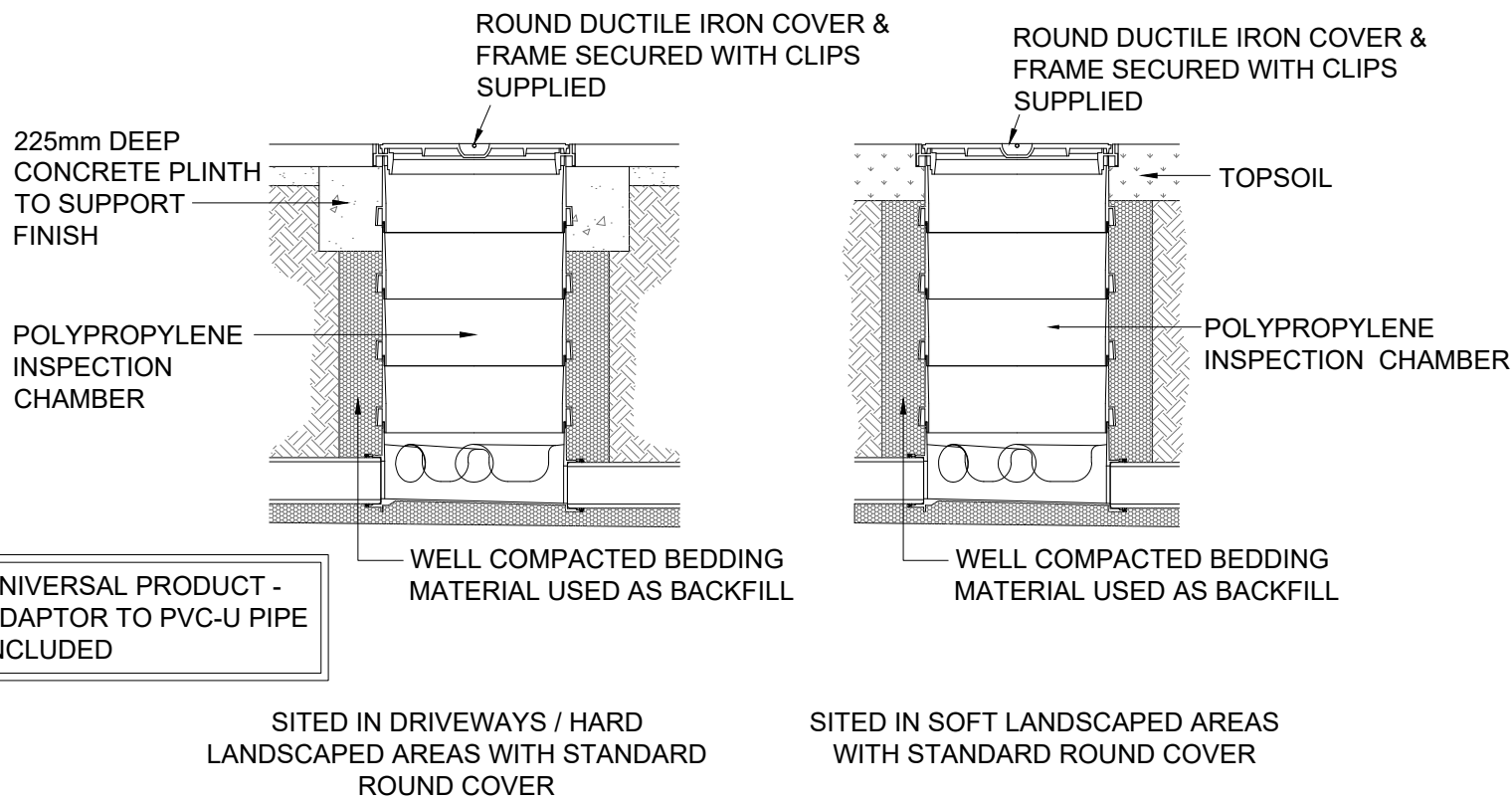
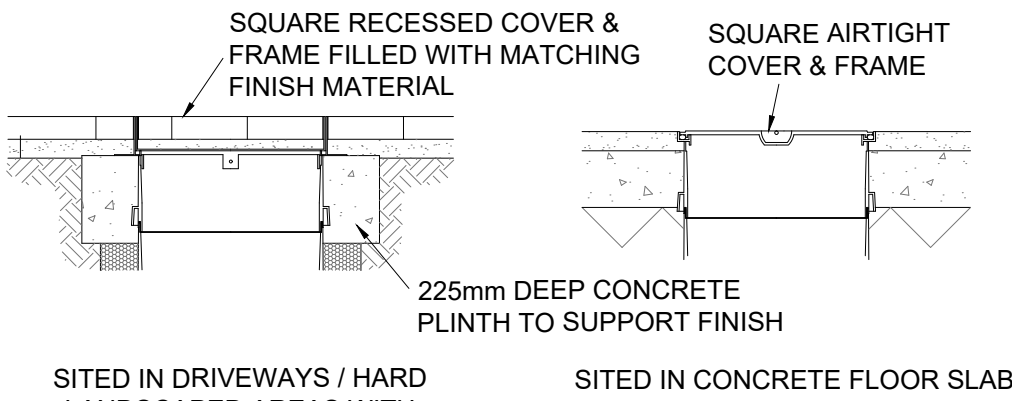
SITED IN EXTERNAL HARD STANDING AREAS WITH 600x600 CAST IRON COVER



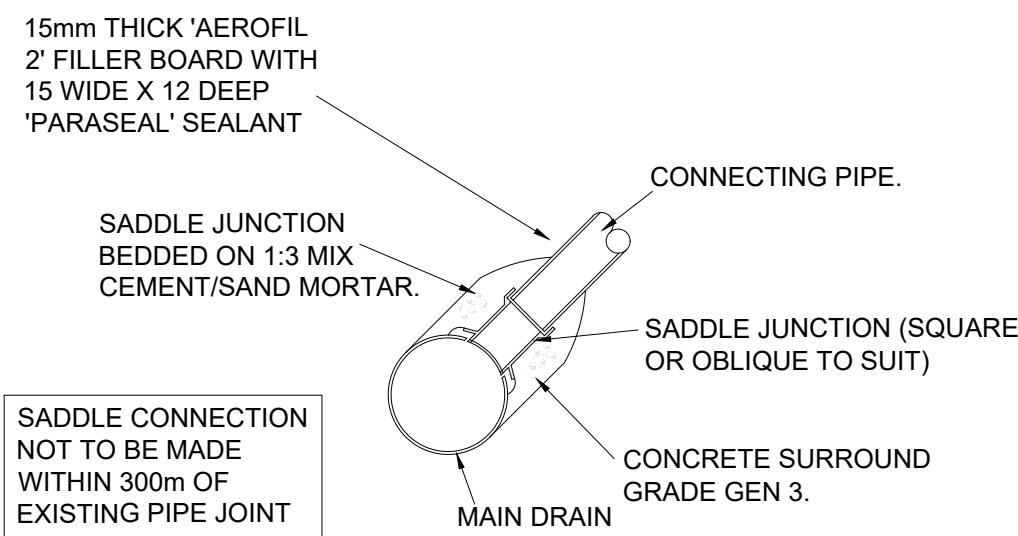
SOIL AND VENT PIPE CONNECTION



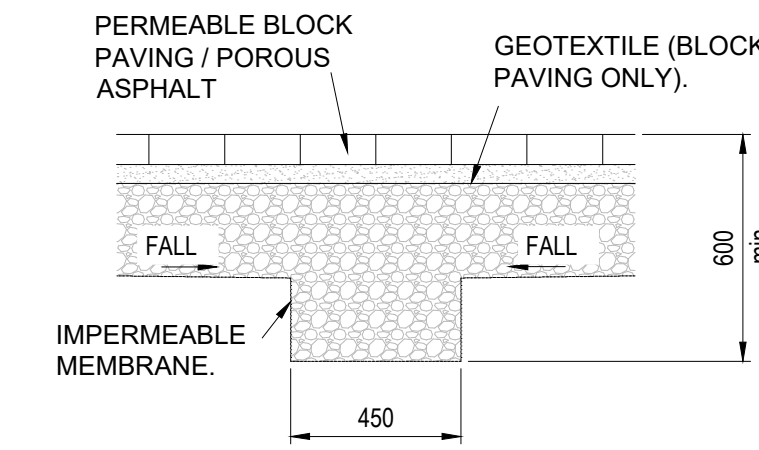
EXTERNAL RWP CONNECTION AND GULLY (SHOWN AS HEPWORTH BUT SIMILAR CAN BE USED)



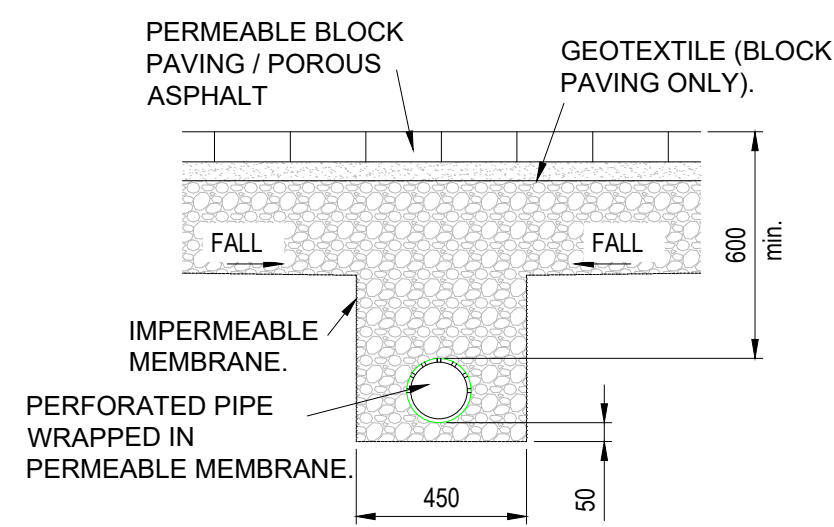
POLYPROPYLENE INSPECTION CHAMBER INSTALLATION DETAIL



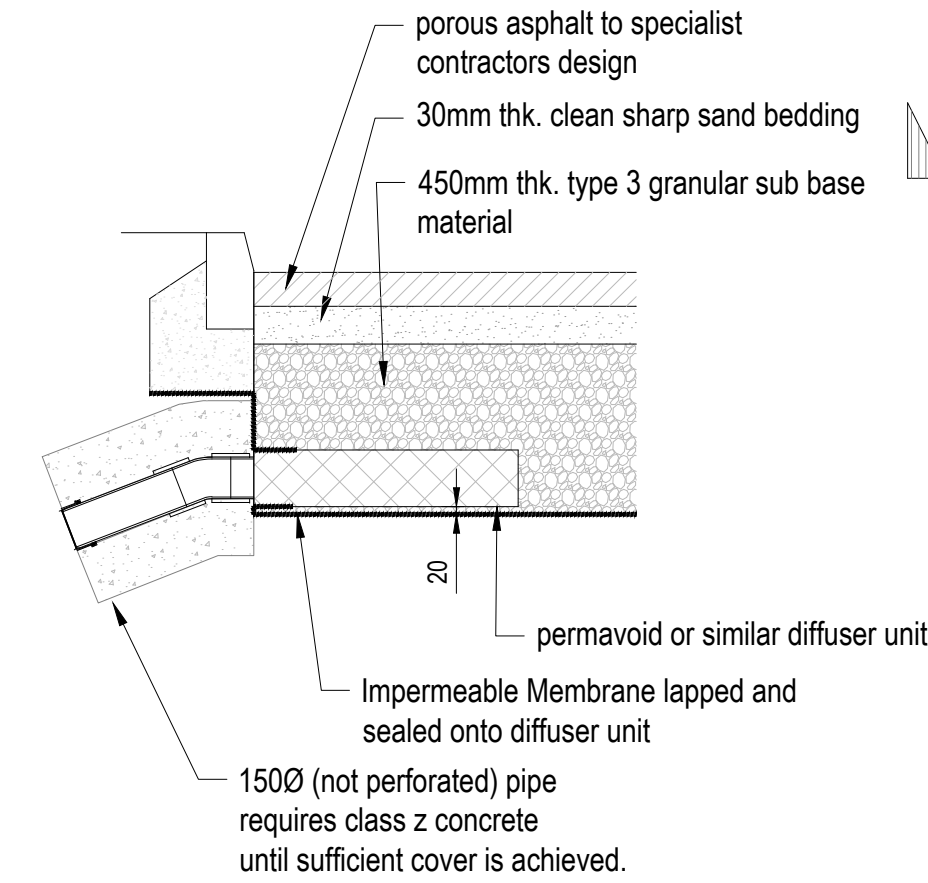
SADDLE CONNECTION DETAIL (DIAMETER OF MAIN DRAIN TO BE A MINIMUM OF DOUBLE THE SIZE OF THE CONNECTING PIPE. IN ALL OTHER CASES A PRE-FORMED JUNCTION IS TO BE USED.)



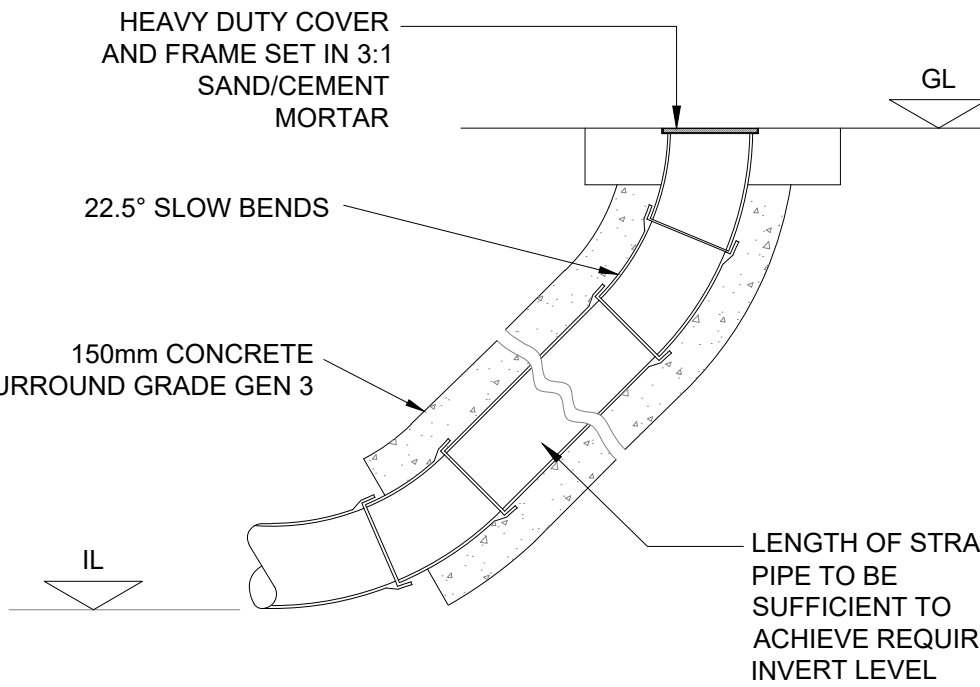
TYPICAL CONVEYANCE TRENCH DETAIL



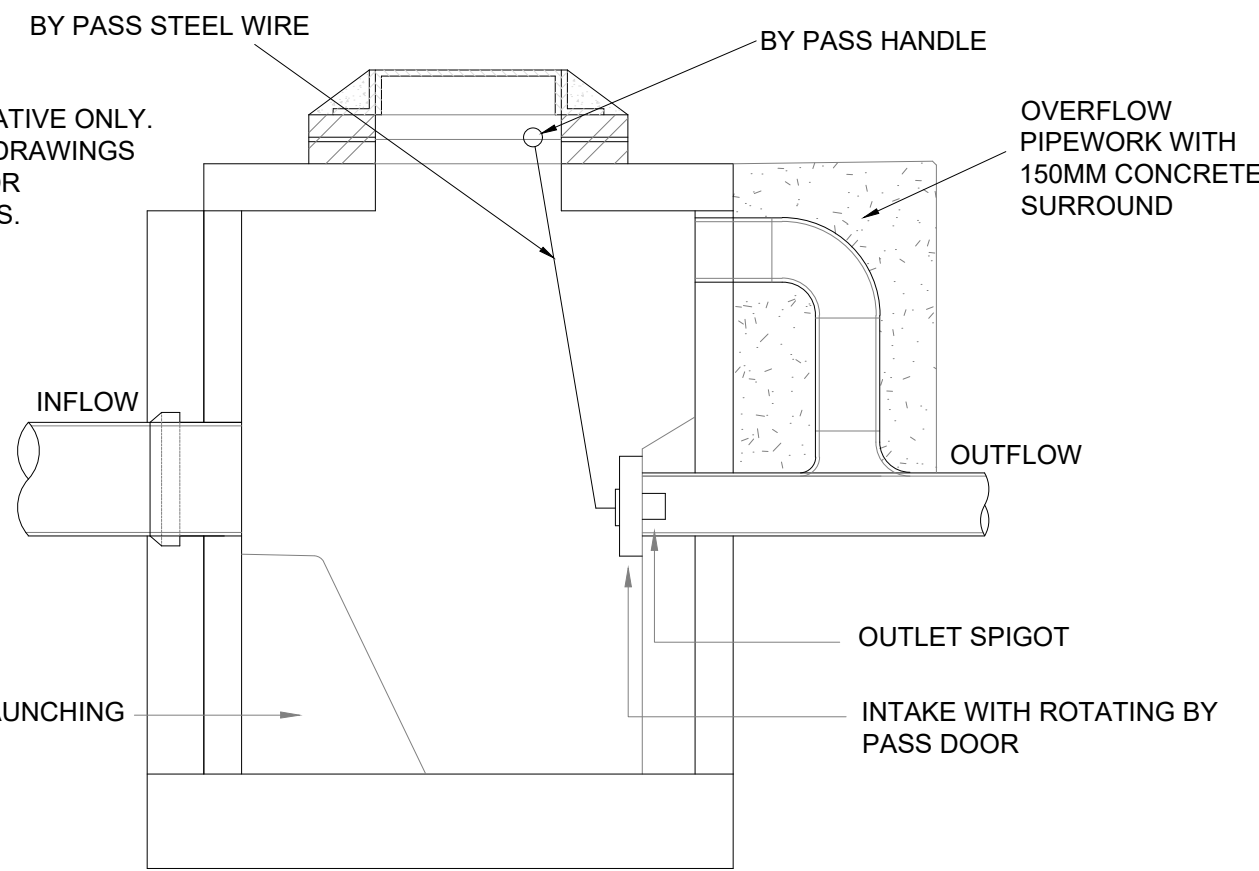
PERFORATED PIPE DETAIL



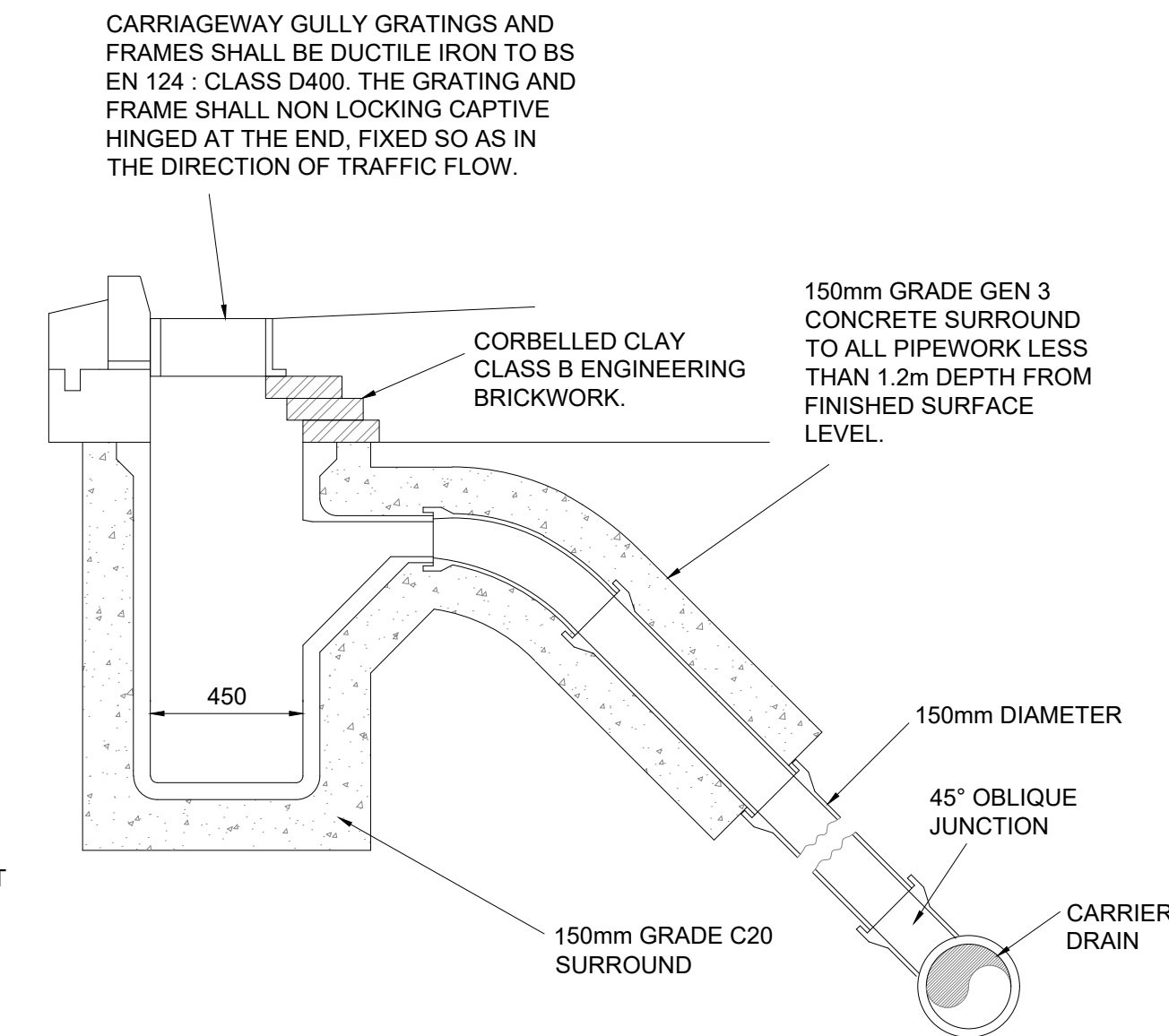
DIFFUSER OUTLET DETAIL



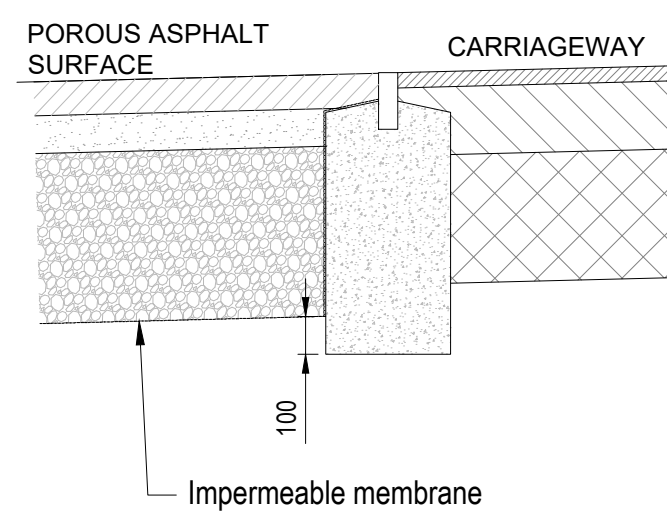
RODDING EYE DETAIL



VORTEX CONTROL CHAMBER



ROAD GULLY DETAIL



TYPICAL TRANSITION FROM PERMEABLE BAYS TO CARRAIGEWAY

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P2	20.01.22	AM	PB	HYDROBRAKE DETAIL ADDED
P1	28.09.21	AM	PB	ISSUED FOR INFORMATION
No	DATE	DRAWN	REV'D ENG.	AMENDMENT

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CLIENT ROWLINSON CONSTRUCTION			
PROJECT SILK STREET, GORTON			
DRAFTER AM		ENGINEER AM	
TITLE		PROJECT REFERENCE:	
DRAINAGE DETAILS SHEET 1			
SCALE	SHEET	DRAWING No	REV
1:20	A1	SSG-RDG-00-ZZ-DR-C-0008	P2

Technical Specification

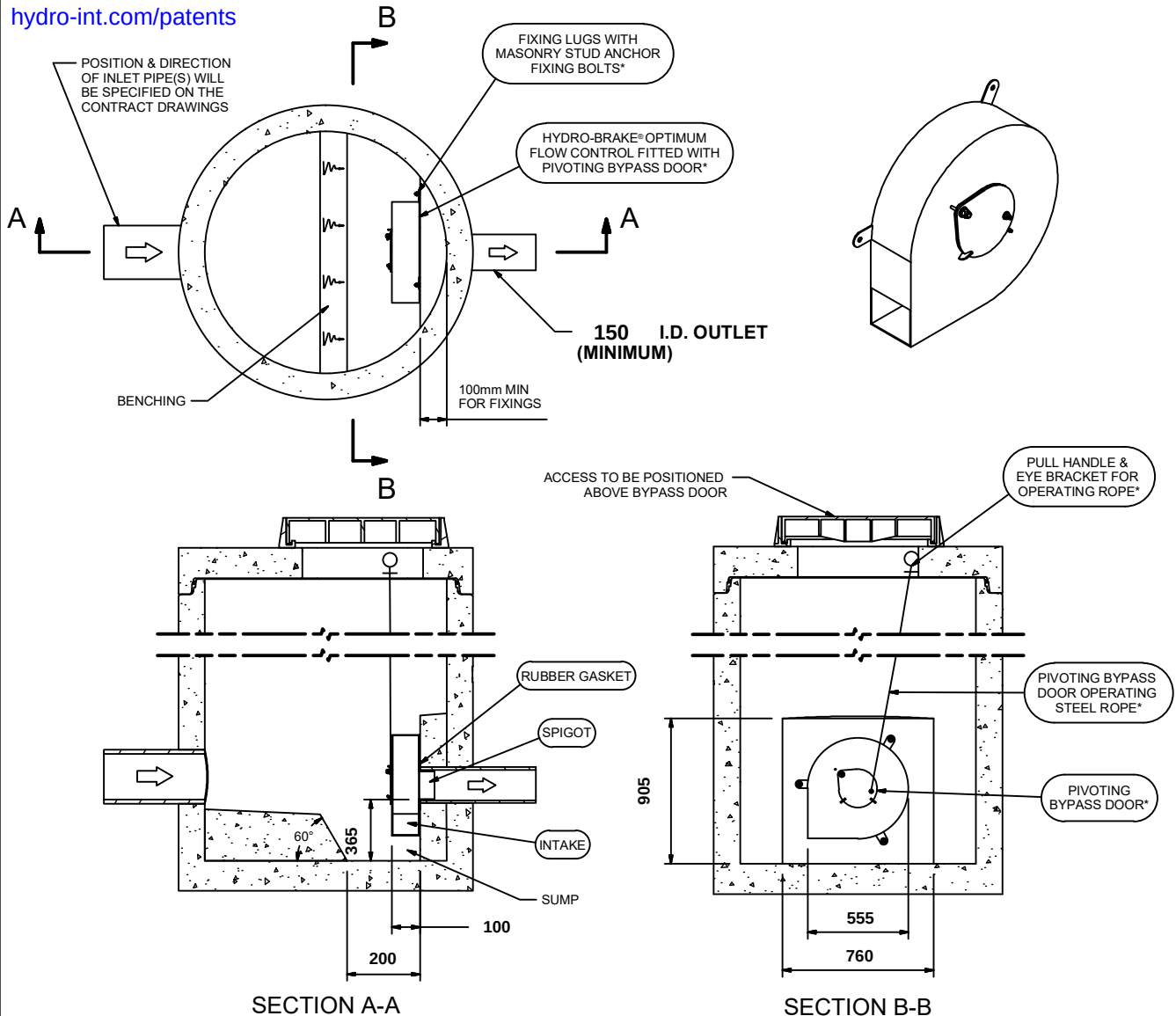
Control Point	Head (m)	Flow (l/s)
Primary Design	2.000	5.000
Flush-Flo™	0.398	4.133
Kick-Flo®	0.816	3.300
Mean Flow		3.950

Hydro-Brake® Optimum Flow Control including:

- 3 mm grade 304L stainless steel
- Integral stainless steel pivoting by-pass door allowing clear line of sight through to outlet, c/w stainless steel operating rope
- Beed blasted finish to maximise corrosion resistance
- Stainless steel fixings
- Rubber gasket to seal outlet



hydro-int.com/patents



IMPORTANT:

○ LIMIT OF HYDRO INTERNATIONAL SUPPLY

THE DEVICE WILL BE HANDED TO SUIT SITE CONDITIONS
FOR SITE SPECIFIC DETAILS AND MINIMUM CHAMBER SIZE REFER TO HYDRO INTERNATIONAL
ALL CIVIL AND INSTALLATION WORK BY OTHERS

* WHERE SUPPLIED

HYDRO-BRAKE® FLOW CONTROL & HYDRO-BRAKE® OPTIMUM FLOW CONTROL ARE REGISTERED TRADEMARKS FOR FLOW CONTROLS DESIGNED AND MANUFACTURED EXCLUSIVELY BY HYDRO INTERNATIONAL

THIS DESIGN LAYOUT IS FOR ILLUSTRATIVE PURPOSES ONLY. NOT TO SCALE.

**DESIGN
ADVICE**



The head/flow characteristics of this SHE-0092-5000-2000-5000 Hydro-Brake® Optimum Flow Control are unique. Dynamic hydraulic modelling evaluates the full head/flow characteristic curve.
The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.

**Hydro
International**

DATE	1/20/2022 3:29 PM
SITE	Silk Street
DESIGNER	Adam Matadar
REF	SW26 - Hydrobrake / 21_21_6200

SHE-0092-5000-2000-5000
Hydro-Brake® Optimum

Technical Specification

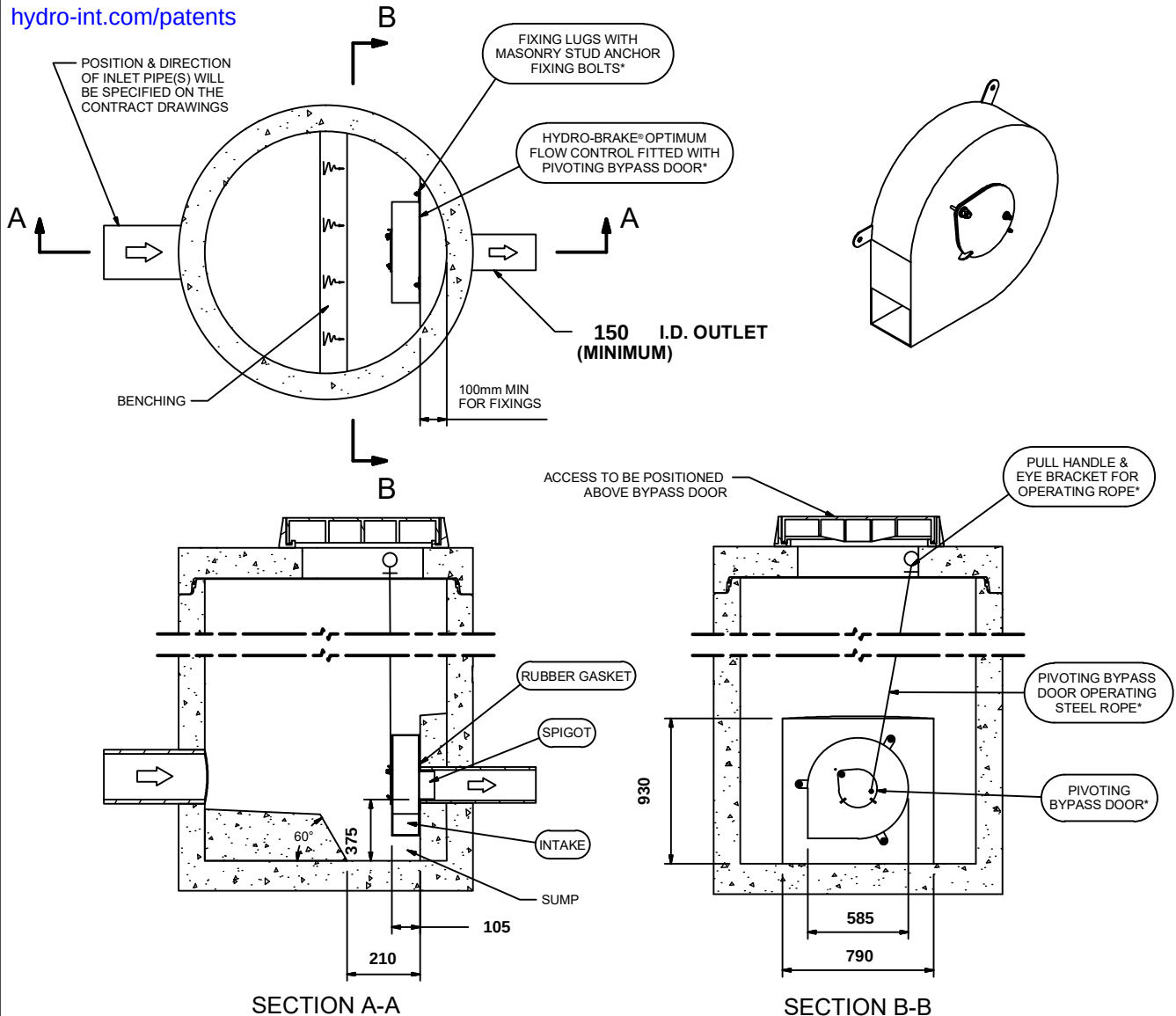
Control Point	Head (m)	Flow (l/s)
Primary Design	1.650	5.000
Flush-Flo™	0.419	4.619
Kick-Flo®	0.856	3.690
Mean Flow		4.177

Hydro-Brake® Optimum Flow Control including:

- 3 mm grade 304L stainless steel
- Integral stainless steel pivoting by-pass door allowing clear line of sight through to outlet, c/w stainless steel operating rope
- Beed blasted finish to maximise corrosion resistance
- Stainless steel fixings
- Rubber gasket to seal outlet



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IMPORTANT:

○ LIMIT OF HYDRO INTERNATIONAL SUPPLY

THE DEVICE WILL BE HANDED TO SUIT SITE CONDITIONS
FOR SITE SPECIFIC DETAILS AND MINIMUM CHAMBER SIZE REFER TO HYDRO INTERNATIONAL
ALL CIVIL AND INSTALLATION WORK BY OTHERS

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HYDRO-BRAKE® FLOW CONTROL & HYDRO-BRAKE® OPTIMUM FLOW CONTROL ARE REGISTERED TRADEMARKS FOR FLOW CONTROLS DESIGNED AND MANUFACTURED EXCLUSIVELY BY HYDRO INTERNATIONAL

THIS DESIGN LAYOUT IS FOR ILLUSTRATIVE PURPOSES ONLY. NOT TO SCALE.

**DESIGN
ADVICE**



The head/flow characteristics of this SHE-0096-5000-1650-5000 Hydro-Brake® Optimum Flow Control are unique. Dynamic hydraulic modelling evaluates the full head/flow characteristic curve.
The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.

**Hydro
International**

DATE 10/20/2021 12:41 PM

SITE Silk Street, Gorton

DESIGNER Adam Matadar

REF SW15 - Hydrobrake

SHE-0096-5000-1650-5000

Hydro-Brake® Optimum

Technical Specification

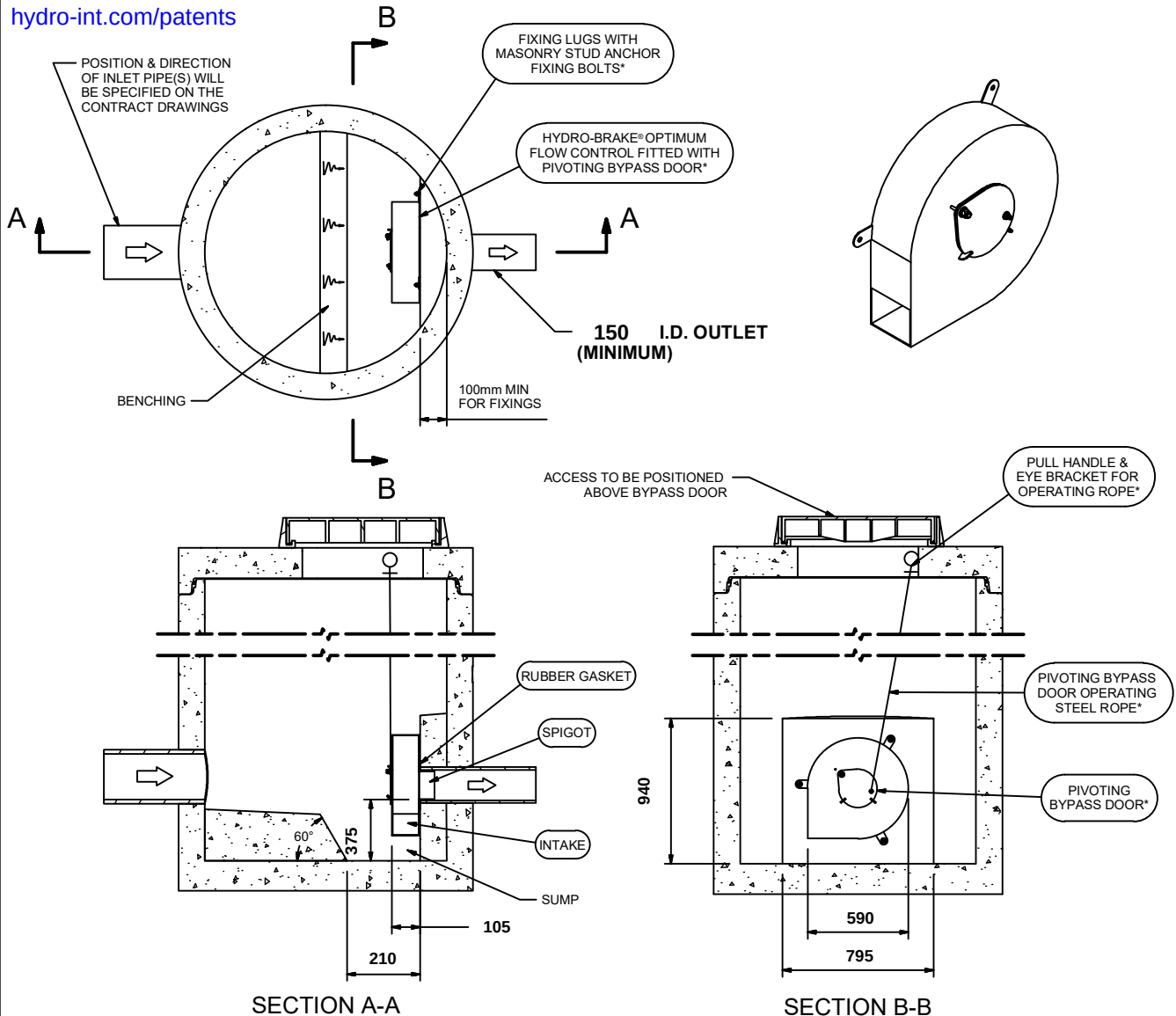
Control Point	Head (m)	Flow (l/s)
Primary Design	1.400	5.000
Flush-Flo™	0.416	4.991
Kick-Flo®	0.855	3.980
Mean Flow		4.382

Hydro-Brake® Optimum Flow Control including:

- 3 mm grade 304L stainless steel
- Integral stainless steel pivoting by-pass door allowing clear line of sight through to outlet, c/w stainless steel operating rope
- Beed blasted finish to maximise corrosion resistance
- Stainless steel fixings
- Rubber gasket to seal outlet



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IMPORTANT:

○ LIMIT OF HYDRO INTERNATIONAL SUPPLY

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FOR SITE SPECIFIC DETAILS AND MINIMUM CHAMBER SIZE REFER TO HYDRO INTERNATIONAL
ALL CIVIL AND INSTALLATION WORK BY OTHERS

* WHERE SUPPLIED

HYDRO-BRAKE® FLOW CONTROL & HYDRO-BRAKE® OPTIMUM FLOW CONTROL ARE REGISTERED TRADEMARKS FOR FLOW CONTROLS DESIGNED AND MANUFACTURED EXCLUSIVELY BY HYDRO INTERNATIONAL

THIS DESIGN LAYOUT IS FOR ILLUSTRATIVE PURPOSES ONLY. NOT TO SCALE.

**DESIGN
ADVICE**



The head/flow characteristics of this SHE-0100-5000-1400-5000 Hydro-Brake® Optimum Flow Control are unique. Dynamic hydraulic modelling evaluates the full head/flow characteristic curve.
The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.

**Hydro
International**

DATE 10/20/2021 12:45 PM

SITE Silk Street, Gorton

DESIGNER Adam Matadar

REF SW27 - Hydrobrake

SHE-0100-5000-1400-5000

Hydro-Brake® Optimum

Appendix B – Hydraulic Calculations

Outputs from the Microdrainage software for the surface water drainage networks serving the development are provided. Pipe references from the hydraulic models can be located on the drainage layout plan.

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The Flint Glass Works 64 Jersey Street Manchester M4 6JW	SILK STREET, GORTON SW RESULT PLOTS 1 - 48	
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File Apartment Plots 1-48_P2.MDX	Checked by PB	
Micro Drainage	Network 2018.1	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for SW3 (Apts)

Pipe Sizes Pipe Manhole Sizes Manhole

FSR Rainfall Model - England and Wales

Return Period (years)	1	PIMP (%)	100
M5-60 (mm)	18.000	Add Flow / Climate Change (%)	0
Ratio R	0.354	Minimum Backdrop Height (m)	0.600
Maximum Rainfall (mm/hr)	80	Maximum Backdrop Height (m)	0.000
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	0.900
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.850	Min Slope for Optimisation (1:X)	300

Designed with Level Soffits

Network Design Table for SW3 (Apts)

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	11.520	0.308	37.4	0.021	10.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	17.244	1.061	16.2	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
2.000	19.705	1.180	16.7	0.025	10.00	0.0	0.600	o	150	Pipe/Conduit	
1.002	17.042	0.171	99.7	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.003	25.671	0.257	99.9	0.025	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.004	14.210	0.084	169.2	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
3.000	13.369	0.408	32.8	0.025	10.00	0.0	0.600	o	150	Pipe/Conduit	
1.005	7.188	0.042	171.1	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.006	5.739	0.204	28.1	0.030	0.00	0.0	0.600	o	225	Pipe/Conduit	
4.000	10.590	0.105	100.9	0.053	10.00	0.0	0.600	o	225	Pipe/Conduit	
4.001	9.390	0.653	14.4	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	33.12	10.12	88.627	0.021	0.0	0.0	0.0	1.65	29.2	2.1
1.001	32.92	10.23	88.319	0.021	0.0	0.0	0.0	2.51	44.4	2.1
2.000	33.09	10.13	88.438	0.025	0.0	0.0	0.0	2.48	43.8	2.5
1.002	32.44	10.51	87.258	0.046	0.0	0.0	0.0	1.01	17.8	4.6
1.003	31.91	10.84	87.012	0.071	0.0	0.0	0.0	1.31	52.0	7.0
1.004	31.53	11.08	86.755	0.071	0.0	0.0	0.0	1.00	39.9	7.0
3.000	33.11	10.13	87.154	0.025	0.0	0.0	0.0	1.76	31.2	2.5
1.005	31.34	11.20	86.671	0.096	0.0	0.0	0.0	1.00	39.6	9.2
1.006	31.28	11.24	86.629	0.126	0.0	0.0	0.0	2.48	98.5	12.1
4.000	33.09	10.14	87.599	0.053	0.0	0.0	0.0	1.30	51.8	5.4
4.001	33.01	10.18	87.494	0.053	0.0	0.0	0.0	3.47	137.9	5.4

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The Flint Glass Works 64 Jersey Street Manchester M4 6JW	SILK STREET, GORTON SW RESULT PLOTS 1 - 48	
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Micro Drainage		Network 2018.1

Network Design Table for SW3 (Apts)

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
5.000	20.199	0.200	101.0	0.021	10.00	0.0	0.600	o	150	Pipe/Conduit	
4.002	9.111	0.416	21.9	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
6.000	3.347	0.050	66.9	0.000	10.00	0.0	0.600	o	225	Pipe/Conduit	
1.007	8.640	0.051	168.4	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
5.000	32.74	10.34	87.116	0.021	0.0	0.0	0.0	1.00	17.7	2.1
4.002	32.65	10.39	86.841	0.074	0.0	0.0	0.0	2.81	111.7	7.4
6.000	33.27	10.03	86.475	0.000	0.0	0.0	0.0	1.60	63.6	0.0
1.007	31.07	11.38	86.425	0.200	0.0	0.0	0.0	1.00	39.9	19.1

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Manhole Schedules for SW3 (Apts)

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	Pipe Out PN	Invert Level (m)	Diameter (mm)	Pipes In PN	Invert Level (m)	Diameter (mm)	Backdrop (mm)
SW01	89.677	1.050	Open Manhole	450	1.000	88.627	150				
SW02	89.369	1.050	Open Manhole	450	1.001	88.319	150	1.000	88.319	150	
SW03	89.488	1.050	Open Manhole	450	2.000	88.438	150				
SW04	89.370	2.112	Open Manhole	450	1.002	87.258	150	1.001	87.258	150	
								2.000	87.258	150	
SW05	88.782	1.770	Open Manhole	600	1.003	87.012	225	1.002	87.087	150	
SW06	88.626	1.871	Open Manhole	600	1.004	86.755	225	1.003	86.755	225	
SW07	88.204	1.050	Open Manhole	450	3.000	87.154	150				
SW08	88.198	1.527	Open Manhole	600	1.005	86.671	225	1.004	86.671	225	
								3.000	86.746	150	
SW09	88.158	1.529	Open Manhole	1200	1.006	86.629	225	1.005	86.629	225	
SW10	88.649	1.050	Open Manhole	600	4.000	87.599	225				
SW11	88.618	1.124	Open Manhole	600	4.001	87.494	225	4.000	87.494	225	
SW12	88.166	1.050	Open Manhole	450	5.000	87.116	150				
SW13	88.341	1.500	Open Manhole	600	4.002	86.841	225	4.001	86.841	225	
								5.000	86.916	150	
SW TANK	88.345	1.870	Junction		6.000	86.475	225				
SW15	88.315	1.890	Open Manhole	1500	1.007	86.425	225	1.006	86.425	225	
								4.002	86.425	225	
								6.000	86.425	225	
SW03	88.387	2.014	Open Manhole	1200		OUTFALL		1.007	86.373	225	

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PIPELINE SCHEDULES for SW3 (Apts)

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	150	SW01	89.677	88.627	0.900	Open Manhole	450
1.001	o	150	SW02	89.369	88.319	0.900	Open Manhole	450
2.000	o	150	SW03	89.488	88.438	0.900	Open Manhole	450
1.002	o	150	SW04	89.370	87.258	1.962	Open Manhole	450
1.003	o	225	SW05	88.782	87.012	1.545	Open Manhole	600
1.004	o	225	SW06	88.626	86.755	1.646	Open Manhole	600
3.000	o	150	SW07	88.204	87.154	0.900	Open Manhole	450
1.005	o	225	SW08	88.198	86.671	1.302	Open Manhole	600
1.006	o	225	SW09	88.158	86.629	1.304	Open Manhole	1200
4.000	o	225	SW10	88.649	87.599	0.825	Open Manhole	600
4.001	o	225	SW11	88.618	87.494	0.899	Open Manhole	600
5.000	o	150	SW12	88.166	87.116	0.900	Open Manhole	450
4.002	o	225	SW13	88.341	86.841	1.275	Open Manhole	600
6.000	o	225	SW TANK	88.345	86.475	1.645	Junction	
1.007	o	225	SW15	88.315	86.425	1.665	Open Manhole	1500

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	11.520	37.4	SW02	89.369	88.319	0.900	Open Manhole	450
1.001	17.244	16.2	SW04	89.370	87.258	1.962	Open Manhole	450
2.000	19.705	16.7	SW04	89.370	87.258	1.962	Open Manhole	450
1.002	17.042	99.7	SW05	88.782	87.087	1.545	Open Manhole	600
1.003	25.671	99.9	SW06	88.626	86.755	1.646	Open Manhole	600
1.004	14.210	169.2	SW08	88.198	86.671	1.302	Open Manhole	600
3.000	13.369	32.8	SW08	88.198	86.746	1.302	Open Manhole	600
1.005	7.188	171.1	SW09	88.158	86.629	1.304	Open Manhole	1200
1.006	5.739	28.1	SW15	88.315	86.425	1.665	Open Manhole	1500
4.000	10.590	100.9	SW11	88.618	87.494	0.899	Open Manhole	600
4.001	9.390	14.4	SW13	88.341	86.841	1.275	Open Manhole	600
5.000	20.199	101.0	SW13	88.341	86.916	1.275	Open Manhole	600
4.002	9.111	21.9	SW15	88.315	86.425	1.665	Open Manhole	1500
6.000	3.347	66.9	SW15	88.315	86.425	1.665	Open Manhole	1500
1.007	8.640	168.4	SW03	88.387	86.373	1.789	Open Manhole	1200

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Free Flowing Outfall Details for SW3 (Apts)

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

1.007	SW03	88.387	86.373	0.000	1200	0
-------	------	--------	--------	-------	------	---

Simulation Criteria for SW3 (Apts)

Volumetric Runoff Coeff	0.850	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha	Storage 2.000
Hot Start (mins)	0	Inlet Coefficient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	1	Cv (Summer)	0.850
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Storm Duration (mins)	30
Ratio R	0.354		

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Micro Drainage		Network 2018.1

Online Controls for SW3 (Apts)

Hydro-Brake® Optimum Manhole: SW15, DS/PN: 1.007, Volume (m³): 3.9

Unit Reference	MD-SHE-0096-5000-1650-5000
Design Head (m)	1.650
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	96
Invert Level (m)	86.425
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.650	5.0	Kick-Flo®	0.856	3.7
Flush-Flo™	0.419	4.6	Mean Flow over Head Range	-	4.2

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.1	0.800	4.0	2.000	5.5	4.000	7.6	7.000	9.9
0.200	4.2	1.000	4.0	2.200	5.7	4.500	8.0	7.500	10.2
0.300	4.5	1.200	4.3	2.400	6.0	5.000	8.4	8.000	10.5
0.400	4.6	1.400	4.6	2.600	6.2	5.500	8.8	8.500	10.8
0.500	4.6	1.600	4.9	3.000	6.6	6.000	9.2	9.000	11.1
0.600	4.5	1.800	5.2	3.500	7.1	6.500	9.5	9.500	11.4

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Storage Structures for SW3 (Apts)

Cellular Storage Manhole: SW TANK, DS/PN: 6.000

Invert Level (m) 86.475 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	65.0	0.0	1.000	65.0	0.0	1.001	0.0	0.0

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Micro Drainage		Network 2018.1

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SW3 (Apts)

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 1 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 0.359 Cv (Winter) 0.850

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

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960,
 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
 Return Period(s) (years) 1, 30, 100
 Climate Change (%) 0, 0, 40

PN	US/MH		Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Surcharged	
	Name	Storm							Level (m)	Depth (m)
1.000	SW01	15 Winter	1	+0%					88.652	-0.125
1.001	SW02	15 Winter	1	+0%					88.339	-0.130
2.000	SW03	15 Winter	1	+0%					88.460	-0.128
1.002	SW04	15 Winter	1	+0%	100/15 Winter				87.306	-0.101
1.003	SW05	15 Winter	1	+0%	100/15 Summer				87.066	-0.171
1.004	SW06	15 Winter	1	+0%	100/15 Summer				86.818	-0.161
3.000	SW07	15 Winter	1	+0%	100/30 Winter				87.181	-0.123
1.005	SW08	15 Winter	1	+0%	30/60 Winter				86.751	-0.145
1.006	SW09	15 Winter	1	+0%	30/30 Winter				86.693	-0.161
4.000	SW10	15 Winter	1	+0%	100/120 Winter				87.647	-0.177
4.001	SW11	15 Winter	1	+0%	100/120 Winter				87.522	-0.197
5.000	SW12	15 Winter	1	+0%	100/30 Winter				87.148	-0.118
4.002	SW13	15 Winter	1	+0%	100/15 Winter				86.879	-0.187
6.000	SW TANK	30 Winter	1	+0%	30/15 Summer				86.600	-0.100
1.007	SW15	15 Winter	1	+0%	1/15 Summer				86.676	0.026

PN	US/MH Name	Flooded		Pipe		Status	Level Exceeded
		Volume (m ³)	Flow / Cap. (l/s)	Flow (l/s)	Overflow		
1.000	SW01	0.000	0.07	1.8		OK	
1.001	SW02	0.000	0.04	1.8		OK	
2.000	SW03	0.000	0.05	2.1		OK	
1.002	SW04	0.000	0.23	3.8		OK	
1.003	SW05	0.000	0.13	6.2		OK	
1.004	SW06	0.000	0.18	6.2		OK	
3.000	SW07	0.000	0.07	2.1		OK	
1.005	SW08	0.000	0.28	8.3		OK	
1.006	SW09	0.000	0.17	11.0		OK	

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Micro Drainage	Network 2018.1	

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SW3 (Apts)

PN	US/MH Name	Flooded		Pipe	Status	Level Exceeded
		Volume (m³)	Flow / Cap.	Overflow (l/s)		
4.000	SW10	0.000	0.10			OK
4.001	SW11	0.000	0.04			OK
5.000	SW12	0.000	0.11			OK
4.002	SW13	0.000	0.07			OK
6.000	SW TANK	0.000	0.12			OK*
1.007	SW15	0.000	0.14			SURCHARGED

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Micro Drainage		Network 2018.1

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SW3 (Apts)

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 1 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 0.359 Cv (Winter) 0.850

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

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960,
 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
 Return Period(s) (years) 1, 30, 100
 Climate Change (%) 0, 0, 40

PN	US/MH		Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level	Surcharged Depth
	Name	Storm							(m)	(m)
1.000	SW01	15 Winter	30	+0%					88.667	-0.110
1.001	SW02	15 Winter	30	+0%					88.351	-0.118
2.000	SW03	15 Winter	30	+0%					88.473	-0.115
1.002	SW04	15 Winter	30	+0%	100/15 Winter				87.339	-0.069
1.003	SW05	15 Winter	30	+0%	100/15 Summer				87.103	-0.133
1.004	SW06	60 Winter	30	+0%	100/15 Summer				86.944	-0.036
3.000	SW07	15 Winter	30	+0%	100/30 Winter				87.197	-0.107
1.005	SW08	60 Winter	30	+0%	30/60 Winter				86.940	0.044
1.006	SW09	60 Winter	30	+0%	30/30 Winter				86.938	0.084
4.000	SW10	15 Winter	30	+0%	100/120 Winter				87.675	-0.149
4.001	SW11	15 Winter	30	+0%	100/120 Winter				87.540	-0.179
5.000	SW12	15 Winter	30	+0%	100/30 Winter				87.168	-0.098
4.002	SW13	60 Winter	30	+0%	100/15 Winter				86.937	-0.129
6.000	SW TANK	60 Winter	30	+0%	30/15 Summer				86.935	0.235
1.007	SW15	60 Winter	30	+0%	1/15 Summer				86.935	0.285

PN	US/MH Name	Flooded		Pipe		Status	Level Exceeded
		Volume (m ³)	Flow / Cap. (l/s)	Flow (l/s)	Overflow (l/s)		
1.000	SW01	0.000	0.16	4.3		OK	
1.001	SW02	0.000	0.10	4.3		OK	
2.000	SW03	0.000	0.12	5.1		OK	
1.002	SW04	0.000	0.57	9.4		OK	
1.003	SW05	0.000	0.33	16.0		OK	
1.004	SW06	0.000	0.31	10.7		OK	
3.000	SW07	0.000	0.18	5.1		OK	
1.005	SW08	0.000	0.48	14.3		SURCHARGED	
1.006	SW09	0.000	0.29	18.6		SURCHARGED	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SW3 (Apts)

PN	US/MH Name	Flooded		Pipe	Status	Level Exceeded
		Volume (m³)	Flow / Overflow Cap. (l/s)	Flow (l/s)		
4.000	SW10	0.000	0.25	10.8	OK	
4.001	SW11	0.000	0.10	10.8	OK	
5.000	SW12	0.000	0.26	4.3	OK	
4.002	SW13	0.000	0.12	11.2	OK	
6.000	SW TANK	0.000	0.13	4.1	SURCHARGED*	
1.007	SW15	0.000	0.14	4.6	SURCHARGED	

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Micro Drainage		Network 2018.1

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SW3 (Apts)

Simulation Criteria

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

 Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 1 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 0.359 Cv (Winter) 0.850

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

 Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960,
 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
 Return Period(s) (years) 1, 30, 100
 Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level	Surcharged Depth
									(m)	(m)
1.000	SW01	15 Winter	100	+40%					88.682	-0.095
1.001	SW02	15 Winter	100	+40%					88.363	-0.106
2.000	SW03	15 Winter	100	+40%					88.486	-0.102
1.002	SW04	120 Winter	100	+40%	100/15 Winter				88.099	0.692
1.003	SW05	120 Winter	100	+40%	100/15 Summer				88.094	0.857
1.004	SW06	120 Winter	100	+40%	100/15 Summer				88.090	1.110
3.000	SW07	120 Winter	100	+40%	100/30 Winter				88.089	0.785
1.005	SW08	120 Winter	100	+40%	30/60 Winter				88.086	1.191
1.006	SW09	120 Winter	100	+40%	30/30 Winter				88.084	1.230
4.000	SW10	120 Winter	100	+40%	100/120 Winter				88.087	0.263
4.001	SW11	120 Winter	100	+40%	100/120 Winter				88.085	0.366
5.000	SW12	120 Winter	100	+40%	100/30 Winter				88.086	0.820
4.002	SW13	120 Winter	100	+40%	100/15 Winter				88.084	1.018
6.000	SW TANK	180 Winter	100	+40%	30/15 Summer				87.476	0.776
1.007	SW15	120 Winter	100	+40%	1/15 Summer				88.081	1.432

PN	US/MH Name	Flooded Volume (m ³)	Flow / Cap. (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	SW01	0.000	0.29	7.8	OK	
1.001	SW02	0.000	0.19	7.8	OK	
2.000	SW03	0.000	0.22	9.2	OK	
1.002	SW04	0.000	0.51	8.4	SURCHARGED	
1.003	SW05	0.000	0.27	12.8	SURCHARGED	
1.004	SW06	0.000	0.33	11.6	SURCHARGED	
3.000	SW07	0.000	0.16	4.6	FLOOD RISK	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SW3 (Apts)

PN	US/MH Name	Flooded		Pipe	Status	Level Exceeded
		Volume (m³)	Flow / Overflow Cap. (l/s)	Flow (l/s)		
1.005	SW08	0.000	0.53	15.7	FLOOD RISK	
1.006	SW09	0.000	0.32	20.4	FLOOD RISK	
4.000	SW10	0.000	0.22	9.7	SURCHARGED	
4.001	SW11	0.000	0.09	9.7	SURCHARGED	
5.000	SW12	0.000	0.23	3.8	FLOOD RISK	
4.002	SW13	0.000	0.14	12.6	FLOOD RISK	
6.000	SW TANK	0.000	0.13	4.0	SURCHARGED*	
1.007	SW15	0.000	0.16	5.0	FLOOD RISK	

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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for SW Plots 46-69

Pipe Sizes Pipes Manhole Sizes Manholes

FSR Rainfall Model - England and Wales

Return Period (years)	2	PIMP (%)	100
M5-60 (mm)	18.100	Add Flow / Climate Change (%)	0
Ratio R	0.348	Minimum Backdrop Height (m)	0.600
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	400

Designed with Level Soffits

Network Design Table for SW Plots 46-69

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	25.257	0.250	101.0	0.019	5.00	0.0	0.600	o	225	Pipe/Conduit	
1.001	11.090	0.334	33.2	0.002	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.002	8.107	0.539	15.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
2.000	27.430	0.114	240.6	0.026	5.00	0.0	0.600	o	300	Pipe/Conduit	
3.000	22.688	0.643	35.3	0.020	5.00	0.0	0.600	o	300	Pipe/Conduit	
4.000	21.669	0.214	101.3	0.020	5.00	0.0	0.600	o	300	Pipe/Conduit	
3.001	20.587	1.063	19.4	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
5.000	13.897	0.313	44.4	0.020	5.00	0.0	0.600	o	300	Pipe/Conduit	
3.002	26.938	0.418	64.4	0.020	0.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.32	87.084	0.019	0.0	0.0	0.0	1.30	51.7	2.6
1.001	50.00	5.40	86.834	0.021	0.0	0.0	0.0	2.28	90.6	2.8
1.002	50.00	5.44	86.500	0.021	0.0	0.0	0.0	3.39	134.8	2.8
2.000	50.00	5.45	86.000	0.026	0.0	0.0	0.0	1.01	71.3	3.5
3.000	50.00	5.14	88.010	0.020	0.0	0.0	0.0	2.66	187.7	2.7
4.000	50.00	5.23	87.581	0.020	0.0	0.0	0.0	1.56	110.4	2.7
3.001	50.00	5.33	87.367	0.040	0.0	0.0	0.0	3.59	253.7	5.4
5.000	50.00	5.10	86.617	0.020	0.0	0.0	0.0	2.37	167.2	2.7
3.002	50.00	5.56	86.304	0.080	0.0	0.0	0.0	1.96	138.7	10.8

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Micro Drainage		Network 2018.1

Network Design Table for SW Plots 46-69

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.003	6.460	0.065	99.4	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.004	4.304	0.029	150.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.003	50.00	5.62	85.886	0.127	0.0	0.0	0.0	1.58	111.5	17.2
1.004	50.00	5.71	85.821	0.127	0.0	0.0	0.0	0.82	14.5«	17.2

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Manhole Schedules for SW Plots 46-69

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	Pipe Out PN	Invert Level (m)	Diameter (mm)	Pipes In PN	Invert Level (m)	Diameter (mm)	Backdrop (mm)
SW16	88.265	1.181	Open Manhole	600	1.000	87.084	225				
SW17	88.435	1.601	Open Manhole	600	1.001	86.834	225	1.000	86.834	225	
SW18	88.373	1.873	Open Manhole	600	1.002	86.500	225	1.001	86.500	225	
SW19	88.367	2.367	Open Manhole	1200	2.000	86.000	300				
SW20	89.101	1.091	Open Manhole	900	3.000	88.010	300				
SW21	88.628	1.047	Open Manhole	900	4.000	87.581	300				
SW22	88.638	1.271	Open Manhole	900	3.001	87.367	300	3.000	87.367	300	
								4.000	87.367	300	
SW23	87.933	1.316	Open Manhole	1200	5.000	86.617	300				
SW24	88.405	2.101	Open Manhole	1200	3.002	86.304	300	3.001	86.304	300	
								5.000	86.304	300	
SW25	88.924	3.038	Open Manhole	1350	1.003	85.886	300	1.002	85.961	225	
								2.000	85.886	300	
								3.002	85.886	300	
SW26	89.232	3.411	Open Manhole	1800	1.004	85.821	150	1.003	85.821	300	
CW03	89.184	3.391	Open Manhole	1200		OUTFALL		1.004	85.792	150	

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PIPELINE SCHEDULES for SW Plots 46-69

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	225	SW16	88.265	87.084	0.956	Open Manhole	600
1.001	o	225	SW17	88.435	86.834	1.376	Open Manhole	600
1.002	o	225	SW18	88.373	86.500	1.648	Open Manhole	600
2.000	o	300	SW19	88.367	86.000	2.067	Open Manhole	1200
3.000	o	300	SW20	89.101	88.010	0.791	Open Manhole	900
4.000	o	300	SW21	88.628	87.581	0.747	Open Manhole	900
3.001	o	300	SW22	88.638	87.367	0.971	Open Manhole	900
5.000	o	300	SW23	87.933	86.617	1.016	Open Manhole	1200
3.002	o	300	SW24	88.405	86.304	1.801	Open Manhole	1200
1.003	o	300	SW25	88.924	85.886	2.738	Open Manhole	1350
1.004	o	150	SW26	89.232	85.821	3.261	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)
1.000	25.257	101.0	SW17	88.435	86.834	1.376	Open Manhole	600
1.001	11.090	33.2	SW18	88.373	86.500	1.648	Open Manhole	600
1.002	8.107	15.0	SW25	88.924	85.961	2.738	Open Manhole	1350
2.000	27.430	240.6	SW25	88.924	85.886	2.738	Open Manhole	1350
3.000	22.688	35.3	SW22	88.638	87.367	0.971	Open Manhole	900
4.000	21.669	101.3	SW22	88.638	87.367	0.971	Open Manhole	900
3.001	20.587	19.4	SW24	88.405	86.304	1.801	Open Manhole	1200
5.000	13.897	44.4	SW24	88.405	86.304	1.801	Open Manhole	1200
3.002	26.938	64.4	SW25	88.924	85.886	2.738	Open Manhole	1350
1.003	6.460	99.4	SW26	89.232	85.821	3.111	Open Manhole	1800
1.004	4.304	150.0	CW03	89.184	85.792	3.241	Open Manhole	1200

Free Flowing Outfall Details for SW Plots 46-69

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.004	CW03	89.184	85.792	0.000	1200	0

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Simulation Criteria for SW Plots 46-69

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start (mins)	0	Inlet Coefficient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1
Number of Input Hydrographs	0	Number of Offline Controls	0
Number of Online Controls	1	Number of Storage Structures	6
		Number of Time/Area Diagrams	0
		Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.100	Storm Duration (mins)	30
Ratio R	0.348		

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Online Controls for SW Plots 46-69

Hydro-Brake® Optimum Manhole: SW26, DS/PN: 1.004, Volume (m³): 9.0

Unit Reference	MD-SHE-0092-5000-2000-5000
Design Head (m)	2.000
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	92
Invert Level (m)	85.821
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.000	5.0	Kick-Flo®	0.816	3.3
Flush-Flo™	0.398	4.1	Mean Flow over Head Range	-	3.9

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.9	0.800	3.4	2.000	5.0	4.000	6.9	7.000	9.0
0.200	3.8	1.000	3.6	2.200	5.2	4.500	7.3	7.500	9.3
0.300	4.1	1.200	3.9	2.400	5.4	5.000	7.7	8.000	9.6
0.400	4.1	1.400	4.2	2.600	5.6	5.500	8.0	8.500	9.9
0.500	4.1	1.600	4.5	3.000	6.0	6.000	8.4	9.000	10.2
0.600	4.0	1.800	4.8	3.500	6.5	6.500	8.7	9.500	10.4

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Storage Structures for SW Plots 46-69

Porous Car Park Manhole: SW16, DS/PN: 1.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	6.6
Membrane Percolation (mm/hr)	1000	Length (m)	2.7
Max Percolation (l/s)	5.0	Slope (1:X)	17.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	87.500	Cap Volume Depth (m)	0.450

Porous Car Park Manhole: SW17, DS/PN: 1.001

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	3.8
Membrane Percolation (mm/hr)	1000	Length (m)	6.2
Max Percolation (l/s)	6.5	Slope (1:X)	13.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	87.800	Cap Volume Depth (m)	0.450

Porous Car Park Manhole: SW18, DS/PN: 1.002

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	3.0
Membrane Percolation (mm/hr)	1000	Length (m)	5.5
Max Percolation (l/s)	4.6	Slope (1:X)	21.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	87.800	Cap Volume Depth (m)	0.300

Porous Car Park Manhole: SW19, DS/PN: 2.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	8.0
Membrane Percolation (mm/hr)	1000	Length (m)	9.6
Max Percolation (l/s)	21.3	Slope (1:X)	27.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	87.000	Cap Volume Depth (m)	0.600

Porous Car Park Manhole: SW20, DS/PN: 3.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	19.0
Max Percolation (l/s)	26.4	Slope (1:X)	15.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	88.300	Cap Volume Depth (m)	0.450

Porous Car Park Manhole: SW21, DS/PN: 4.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	19.0
Max Percolation (l/s)	26.4	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	87.850	Cap Volume Depth (m)	0.450

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SW Plots 46-69

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 6 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.100 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.348 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
 Return Period(s) (years) 1, 30, 100
 Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level	Surcharged Depth	Flooded Volume
									(m)	(m)	(m ³)
1.000	SW16	15 Winter	1	+0%	100/15 Summer				87.116	-0.193	0.000
1.001	SW17	15 Winter	1	+0%	30/30 Winter				86.859	-0.200	0.000
1.002	SW18	15 Winter	1	+0%	30/15 Summer				86.523	-0.202	0.000
2.000	SW19	30 Winter	1	+0%	30/15 Summer				86.160	-0.140	0.000
3.000	SW20	15 Summer	1	+0%					88.032	-0.278	0.000
4.000	SW21	15 Summer	1	+0%					87.613	-0.268	0.000
3.001	SW22	15 Winter	1	+0%	100/60 Winter				87.398	-0.269	0.000
5.000	SW23	15 Winter	1	+0%	30/30 Summer				86.642	-0.275	0.000
3.002	SW24	15 Winter	1	+0%	30/15 Summer				86.359	-0.245	0.000
1.003	SW25	30 Winter	1	+0%	30/15 Summer				86.159	-0.027	0.000
1.004	SW26	30 Winter	1	+0%	1/15 Summer				86.157	0.186	0.000

PN	US/MH Name	Pipe Flow / Overflow		Flow (l/s)	Status	Level Exceeded
		Cap.	(l/s)			
1.000	SW16	0.05		2.3	OK	
1.001	SW17	0.03		2.2	OK	
1.002	SW18	0.02		2.3	OK	
2.000	SW19	0.04		2.3	OK	
3.000	SW20	0.01		2.3	OK	
4.000	SW21	0.02		2.2	OK	
3.001	SW22	0.02		4.8	OK	
5.000	SW23	0.02		2.4	OK	
3.002	SW24	0.07		9.2	OK	
1.003	SW25	0.09		6.0	OK	
1.004	SW26	0.38		4.1	SURCHARGED	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SW Plots 46-69

Simulation Criteria

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

 Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 6 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.100 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.348 Cv (Winter) 0.840

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

 Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960,
 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
 Return Period(s) (years) 1, 30, 100
 Climate Change (%) 0, 0, 40

PN	US/MH		Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level	Surcharged Depth	Flooded Volume
	Name	Storm							(m)	(m)	(m ³)
1.000	SW16	60 Winter	30	+0%	100/15 Summer				87.157	-0.152	0.000
1.001	SW17	60 Winter	30	+0%	30/30 Winter				87.156	0.097	0.000
1.002	SW18	60 Winter	30	+0%	30/15 Summer				87.154	0.429	0.000
2.000	SW19	60 Winter	30	+0%	30/15 Summer				87.155	0.855	0.000
3.000	SW20	15 Winter	30	+0%					88.047	-0.263	0.000
4.000	SW21	15 Winter	30	+0%					87.629	-0.252	0.000
3.001	SW22	15 Winter	30	+0%	100/60 Winter				87.411	-0.256	0.000
5.000	SW23	60 Winter	30	+0%	30/30 Summer				87.158	0.241	0.000
3.002	SW24	60 Winter	30	+0%	30/15 Summer				87.157	0.553	0.000
1.003	SW25	60 Winter	30	+0%	30/15 Summer				87.153	0.967	0.000
1.004	SW26	60 Winter	30	+0%	1/15 Summer				87.151	1.180	0.000

PN	US/MH Name	Pipe Flow / Overflow		Flow (l/s)	Status	Level Exceeded
		Cap.	(l/s)			
1.000	SW16	0.06		3.0	OK	
1.001	SW17	0.04		3.3	SURCHARGED	
1.002	SW18	0.03		3.2	SURCHARGED	
2.000	SW19	0.04		2.3	SURCHARGED	
3.000	SW20	0.04		5.9	OK	
4.000	SW21	0.06		5.9	OK	
3.001	SW22	0.05		11.6	OK	
5.000	SW23	0.02		3.2	SURCHARGED	
3.002	SW24	0.09		11.4	SURCHARGED	
1.003	SW25	0.12		7.6	SURCHARGED	
1.004	SW26	0.38		4.1	SURCHARGED	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SW Plots 46-69

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 6 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.100 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.348 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960,
 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
 Return Period(s) (years) 1, 30, 100
 Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level	Surcharged Depth	Flooded Volume
									(m)	(m)	(m ³)
1.000	SW16	120 Winter	100	+40%	100/15 Summer				87.798	0.489	0.000
1.001	SW17	120 Winter	100	+40%	30/30 Winter				87.798	0.739	0.000
1.002	SW18	120 Winter	100	+40%	30/15 Summer				87.797	1.072	0.000
2.000	SW19	120 Winter	100	+40%	30/15 Summer				87.795	1.495	0.000
3.000	SW20	15 Winter	100	+40%					88.059	-0.251	0.000
4.000	SW21	120 Winter	100	+40%					87.800	-0.081	0.000
3.001	SW22	120 Winter	100	+40%	100/60 Winter				87.800	0.133	0.000
5.000	SW23	120 Winter	100	+40%	30/30 Summer				87.799	0.882	0.000
3.002	SW24	120 Winter	100	+40%	30/15 Summer				87.799	1.195	0.000
1.003	SW25	120 Winter	100	+40%	30/15 Summer				87.797	1.611	0.000
1.004	SW26	120 Winter	100	+40%	1/15 Summer				87.795	1.824	0.000

PN	US/MH Name	Pipe Flow / Overflow		Flow (l/s)	Status	Level Exceeded
		Cap.	(l/s)			
1.000	SW16	0.07		3.2	SURCHARGED	
1.001	SW17	0.04		3.3	SURCHARGED	
1.002	SW18	0.03		3.2	SURCHARGED	
2.000	SW19	0.05		3.2	SURCHARGED	
3.000	SW20	0.06		10.6	OK	
4.000	SW21	0.04		3.7	OK	
3.001	SW22	0.03		7.4	SURCHARGED	
5.000	SW23	0.02		2.9	FLOOD RISK	
3.002	SW24	0.10		12.3	SURCHARGED	
1.003	SW25	0.11		7.3	SURCHARGED	
1.004	SW26	0.46		5.0	SURCHARGED	

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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for SW Plots 59-63

Pipe Sizes Pipes Manhole Sizes Manholes

FSR Rainfall Model - England and Wales

Return Period (years)	1	PIMP (%)	100
M5-60 (mm)	18.200	Add Flow / Climate Change (%)	0
Ratio R	0.341	Minimum Backdrop Height (m)	0.600
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	400

Designed with Level Soffits

Network Design Table for SW Plots 59-63

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	20.489	0.089	230.2	0.020	5.00	0.0	0.600	o	300	Pipe/Conduit	
1.001	13.556	0.059	230.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.002	31.429	0.137	230.0	0.020	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.003	13.431	0.134	100.2	0.009	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.004	6.524	0.064	101.9	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	44.82	5.33	88.803	0.020	0.0	0.0	0.0	1.03	72.9	2.4
1.001	44.06	5.55	88.714	0.020	0.0	0.0	0.0	1.03	73.0	2.4
1.002	42.40	6.06	88.655	0.040	0.0	0.0	0.0	1.03	73.0	4.6
1.003	41.72	6.28	88.518	0.049	0.0	0.0	0.0	1.00	17.7	5.5
1.004	41.40	6.39	88.384	0.049	0.0	0.0	0.0	1.00	17.6	5.5

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Manhole Schedules for SW Plots 59-63

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	Pipe Out PN Invert Level (m)	Diameter (mm)	Pipes In PN Invert Level (m)	Diameter (mm)	Backdrop (mm)
SW27	90.066	1.263	Open Manhole	1200	1.000	88.803	300		
SW28	90.423	1.709	Open Manhole	900	1.001	88.714	300	1.000 88.714	300
SW29	90.029	1.374	Open Manhole	1200	1.002	88.655	300	1.001 88.655	300
SW30	89.792	1.274	Open Manhole	1200	1.003	88.518	150	1.002 88.518	300
SW31	90.054	1.670	Open Manhole	600	1.004	88.384	150	1.003 88.384	150
SW33	89.670	1.350	Open Manhole	1500		OUTFALL		1.004 88.320	150

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PIPELINE SCHEDULES for SW Plots 59-63

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	SW27	90.066	88.803	0.963	Open Manhole	1200
1.001	o	300	SW28	90.423	88.714	1.409	Open Manhole	900
1.002	o	300	SW29	90.029	88.655	1.074	Open Manhole	1200
1.003	o	150	SW30	89.792	88.518	1.124	Open Manhole	1200
1.004	o	150	SW31	90.054	88.384	1.520	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	20.489	230.2	SW28	90.423	88.714	1.409	Open Manhole	900
1.001	13.556	230.0	SW29	90.029	88.655	1.074	Open Manhole	1200
1.002	31.429	230.0	SW30	89.792	88.518	0.974	Open Manhole	1200
1.003	13.431	100.2	SW31	90.054	88.384	1.520	Open Manhole	600
1.004	6.524	101.9	SW33	89.670	88.320	1.200	Open Manhole	1500

Free Flowing Outfall Details for SW Plots 59-63

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
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1.004	SW33	89.670	88.320	0.000	1500	0
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Simulation Criteria for SW Plots 59-63

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 Coefficient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 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)	18.200	Storm Duration (mins)	30
Ratio R	0.341		

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Online Controls for SW Plots 59-63

Hydro-Brake® Optimum Manhole: SW30, DS/PN: 1.003, Volume (m³): 3.6

Unit Reference	MD-SHE-0100-5000-1400-5000
Design Head (m)	1.400
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	100
Invert Level (m)	88.518
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.400	5.0	Kick-Flo®	0.855	4.0
Flush-Flo™	0.416	5.0	Mean Flow over Head Range	-	4.4

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.3	0.800	4.3	2.000	5.9	4.000	8.2	7.000	10.7
0.200	4.6	1.000	4.3	2.200	6.2	4.500	8.6	7.500	11.0
0.300	4.9	1.200	4.7	2.400	6.4	5.000	9.1	8.000	11.4
0.400	5.0	1.400	5.0	2.600	6.7	5.500	9.5	8.500	11.7
0.500	5.0	1.600	5.3	3.000	7.1	6.000	9.9	9.000	12.0
0.600	4.9	1.800	5.6	3.500	7.7	6.500	10.3	9.500	12.3

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SW Plots 59-63

Simulation Criteria

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

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

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.200 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.341 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960,
 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
 Return Period(s) (years) 1, 30, 100
 Climate Change (%) 0, 0, 40

									Water	Surcharged	Flooded	
	US/MH			Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume
PN	Name	Storm	Period		Change	Surcharge	Flood	Overflow	Act.	(m)	(m)	(m³)
1.000	SW27	15 Winter		1	+0%	100/15 Summer				88.841	-0.262	0.000
1.001	SW28	15 Winter		1	+0%	100/15 Summer				88.752	-0.262	0.000
1.002	SW29	15 Winter		1	+0%	100/15 Summer				88.705	-0.250	0.000
1.003	SW30	15 Winter		1	+0%	30/15 Summer				88.649	-0.019	0.000
1.004	SW31	15 Winter		1	+0%					88.437	-0.097	0.000

		Pipe		Level	
		US/MH	Flow / Overflow	Flow	Status
PN	Name	Cap.	(l/s)	(l/s)	Exceeded
1.000	SW27	0.04		2.4	OK
1.001	SW28	0.04		2.4	OK
1.002	SW29	0.06		4.2	OK
1.003	SW30	0.25		4.1	OK
1.004	SW31	0.27		4.1	OK

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The Flint Glass Works 64 Jersey Street Manchester M4 6JW	SILK STREET, GORTON	
	SW RESULTS PLOTS 59-63	
Date 19/10/2021	Designed by AM	
File Plots 59-63_P3.MDX	Checked by PB	
Micro Drainage	Network 2018.1	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SW Plots 59-63

Simulation Criteria

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

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

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.200 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.341 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
 Return Period(s) (years) 1, 30, 100
 Climate Change (%) 0, 0, 40

									Water	Surcharged	Flooded	
	US/MH			Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume
PN	Name	Storm	Period	Change		Surcharge	Flood	Overflow	Act.	(m)	(m)	(m³)
1.000	SW27	15	Winter	30	+0%	100/15	Summer			88.867	-0.236	0.000
1.001	SW28	30	Winter	30	+0%	100/15	Summer			88.854	-0.160	0.000
1.002	SW29	30	Winter	30	+0%	100/15	Summer			88.852	-0.103	0.000
1.003	SW30	30	Winter	30	+0%	30/15	Summer			88.847	0.179	0.000
1.004	SW31	30	Winter	30	+0%					88.443	-0.091	0.000

		Pipe			Level	
PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Flow (l/s)	Status	Exceeded
1.000	SW27	0.09		5.7	OK	
1.001	SW28	0.07		4.1	OK	
1.002	SW29	0.12		7.7	OK	
1.003	SW30	0.30		4.9	SURCHARGED	
1.004	SW31	0.33		4.9	OK	

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The Flint Glass Works 64 Jersey Street Manchester M4 6JW	SILK STREET, GORTON	
	SW RESULTS PLOTS 59-63	
Date 19/10/2021	Designed by AM	
File Plots 59-63_P3.MDX	Checked by PB	
Micro Drainage		Network 2018.1

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SW Plots 59-63

Simulation Criteria

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

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

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.200 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.341 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
 Return Period(s) (years) 1, 30, 100
 Climate Change (%) 0, 0, 40

US/MH		Return Climate		First (X)		First (Y)		First (Z)		Water
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.	Level	Surcharged
									(m)	Flooded
										Volume
										(m ³)
1.000	SW27 30	Winter	100	+40%	100/15	Summer			89.724	0.621
1.001	SW28 30	Winter	100	+40%	100/15	Summer			89.722	0.708
1.002	SW29 30	Winter	100	+40%	100/15	Summer			89.720	0.765
1.003	SW30 30	Winter	100	+40%	30/15	Summer			89.715	1.047
1.004	SW31 15	Winter	100	+40%					88.444	-0.090

		Pipe				Level	
US/MH		Flow / Overflow		Flow		Exceeded	
PN	Name	Cap.	(l/s)	(l/s)	Status		
1.000	SW27	0.11		7.2	SURCHARGED		
1.001	SW28	0.08		4.8	SURCHARGED		
1.002	SW29	0.13		8.8	SURCHARGED		
1.003	SW30	0.31		5.0	FLOOD RISK		
1.004	SW31	0.34		5.0	OK		

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The Flint Glass Works 64 Jersey Street Manchester M4 6JW	SILK STREET, GORTON SW RESULT PLOTS 1 - 48	
Date 19/10/2021	Designed by AM	
File Apartment Plots 1-48_P2.MDX	Checked by PB	
Micro Drainage		Network 2018.1

200 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SW3 (Apts)

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 1 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 0.359 Cv (Winter) 0.850

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

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960,
 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
 Return Period(s) (years) 200
 Climate Change (%) 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Surcharged	
									Level (m)	Depth (m)
1.000	SW01	15 Winter	200	+40%					88.687	-0.090
1.001	SW02	15 Winter	200	+40%					88.366	-0.103
2.000	SW03	15 Winter	200	+40%					88.490	-0.098
1.002	SW04	120 Winter	200	+40%	200/15 Summer				88.235	0.827
1.003	SW05	120 Winter	200	+40%	200/15 Summer				88.208	0.971
1.004	SW06	120 Winter	200	+40%	200/15 Summer				88.188	1.208
3.000	SW07	120 Winter	200	+40%	200/15 Winter				88.187	0.883
1.005	SW08	120 Winter	200	+40%	200/15 Summer				88.174	1.278
1.006	SW09	120 Winter	200	+40%	200/15 Summer	200/60 Winter			88.170	1.317
4.000	SW10	120 Winter	200	+40%	200/60 Winter				88.196	0.372
4.001	SW11	120 Winter	200	+40%	200/60 Winter				88.183	0.464
5.000	SW12	180 Winter	200	+40%	200/15 Winter	200/60 Winter			88.170	0.904
4.002	SW13	120 Winter	200	+40%	200/15 Summer				88.170	1.104
6.000	SW TANK	600 Winter	200	+40%	200/15 Summer				87.476	0.776
1.007	SW15	120 Winter	200	+40%	200/15 Summer				88.168	1.518

PN	US/MH Name	Flooded		Pipe		Status	Level Exceeded
		Volume (m ³)	Flow / Cap. (l/s)	Flow (l/s)	Overflow (l/s)		
1.000	SW01	0.000	0.34	9.0		OK	
1.001	SW02	0.000	0.22	9.0		OK	
2.000	SW03	0.000	0.26	10.7		OK	
1.002	SW04	0.000	0.58	9.7		SURCHARGED	
1.003	SW05	0.000	0.29	14.0		SURCHARGED	
1.004	SW06	0.000	0.40	13.8		SURCHARGED	
3.000	SW07	0.000	0.18	5.2		FLOOD RISK	

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The Flint Glass Works 64 Jersey Street Manchester M4 6JW	SILK STREET, GORTON SW RESULT PLOTS 1 - 48	
Date 19/10/2021	Designed by AM	
File Apartment Plots 1-48_P2.MDX	Checked by PB	
Micro Drainage	Network 2018.1	

200 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SW3 (Apts)

PN	US/MH Name	Flooded		Pipe	Status	Level Exceeded
		Volume (m³)	Flow / Overflow Cap. (l/s)	Flow (l/s)		
1.005	SW08	0.000	0.62	18.6	FLOOD RISK	8
1.006	SW09	12.381	0.37	23.9	FLOOD	
4.000	SW10	0.000	0.26	11.3	SURCHARGED	
4.001	SW11	0.000	0.10	11.3	SURCHARGED	5
5.000	SW12	3.816	0.20	3.3	FLOOD	
4.002	SW13	0.000	0.16	14.9	FLOOD RISK	
6.000	SW TANK	0.000	0.13	4.1	SURCHARGED*	
1.007	SW15	0.000	0.16	5.1	FLOOD RISK	

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The Flint Glass Works 64 Jersey Street Manchester M4 6JW	SILK STREET, GORTON SW RESULT PLOTS 1 - 48	
Date 19/10/2021	Designed by AM	
File Apartment Plots 1-48_P2.MDX	Checked by PB	
Micro Drainage		Network 2018.1

200 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SW3 (Apts)

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 1 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 0.359 Cv (Winter) 0.850

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

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960,
 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
 Return Period(s) (years) 200
 Climate Change (%) 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Surcharged	
									Level (m)	Depth (m)
1.000	SW01	15 Winter	200	+40%					88.687	-0.090
1.001	SW02	15 Winter	200	+40%					88.366	-0.103
2.000	SW03	15 Winter	200	+40%					88.490	-0.098
1.002	SW04	120 Winter	200	+40%	200/15 Summer				88.235	0.827
1.003	SW05	120 Winter	200	+40%	200/15 Summer				88.208	0.971
1.004	SW06	120 Winter	200	+40%	200/15 Summer				88.188	1.208
3.000	SW07	120 Winter	200	+40%	200/15 Winter				88.187	0.883
1.005	SW08	120 Winter	200	+40%	200/15 Summer				88.174	1.278
1.006	SW09	120 Winter	200	+40%	200/15 Summer	200/60 Winter			88.170	1.317
4.000	SW10	120 Winter	200	+40%	200/60 Winter				88.196	0.372
4.001	SW11	120 Winter	200	+40%	200/60 Winter				88.183	0.464
5.000	SW12	180 Winter	200	+40%	200/15 Winter	200/60 Winter			88.170	0.904
4.002	SW13	120 Winter	200	+40%	200/15 Summer				88.170	1.104
6.000	SW TANK	600 Winter	200	+40%	200/15 Summer				87.476	0.776
1.007	SW15	120 Winter	200	+40%	200/15 Summer				88.168	1.518

PN	US/MH Name	Flooded		Pipe		Status	Level Exceeded
		Volume (m ³)	Flow / Cap. (l/s)	Flow (l/s)	Overflow (l/s)		
1.000	SW01	0.000	0.34	9.0		OK	
1.001	SW02	0.000	0.22	9.0		OK	
2.000	SW03	0.000	0.26	10.7		OK	
1.002	SW04	0.000	0.58	9.7		SURCHARGED	
1.003	SW05	0.000	0.29	14.0		SURCHARGED	
1.004	SW06	0.000	0.40	13.8		SURCHARGED	
3.000	SW07	0.000	0.18	5.2		FLOOD RISK	

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The Flint Glass Works 64 Jersey Street Manchester M4 6JW	SILK STREET, GORTON SW RESULT PLOTS 1 - 48	
Date 19/10/2021	Designed by AM	
File Apartment Plots 1-48_P2.MDX	Checked by PB	
Micro Drainage		Network 2018.1

200 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SW3 (Apts)

PN	US/MH Name	Flooded		Pipe	Status	Level Exceeded
		Volume (m³)	Flow / Overflow Cap. (l/s)	Flow (l/s)		
1.005	SW08	0.000	0.62	18.6	FLOOD RISK	8
1.006	SW09	12.381	0.37	23.9	FLOOD	
4.000	SW10	0.000	0.26	11.3	SURCHARGED	
4.001	SW11	0.000	0.10	11.3	SURCHARGED	5
5.000	SW12	3.816	0.20	3.3	FLOOD	
4.002	SW13	0.000	0.16	14.9	FLOOD RISK	
6.000	SW TANK	0.000	0.13	4.1	SURCHARGED*	
1.007	SW15	0.000	0.16	5.1	FLOOD RISK	

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The Flint Glass Works 64 Jersey Street Manchester M4 6JW	SILK STREET, GORTON SW RESULTS PLOT 49 - 69	
Date 20/01/2022 17:14	Designed by AM	
File Plots 49-69_P5 - Permeable	Checked by PB	
Micro Drainage	Network 2018.1	

200 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SW Plots 46-69

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 6 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.100 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.348 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960,
 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
 Return Period(s) (years) 200
 Climate Change (%) 40

US/MH		Return Climate		First (X)		First (Y)		First (Z)		Water	Surcharged
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.	Level	Depth	
1.000	SW16	120 Winter	200	+40%	200/15 Summer				87.947	0.638	
1.001	SW17	120 Winter	200	+40%	200/15 Summer				87.943	0.884	
1.002	SW18	120 Winter	200	+40%	200/15 Summer				87.940	1.215	
2.000	SW19	120 Winter	200	+40%	200/15 Summer				87.941	1.641	
3.000	SW20	15 Winter	200	+40%					88.064	-0.246	
4.000	SW21	120 Winter	200	+40%	200/60 Winter				87.945	0.064	
3.001	SW22	120 Winter	200	+40%	200/30 Summer				87.943	0.276	
5.000	SW23	120 Winter	200	+40%	200/15 Summer	200/60 Winter			87.936	1.019	
3.002	SW24	120 Winter	200	+40%	200/15 Summer				87.940	1.336	
1.003	SW25	120 Winter	200	+40%	200/15 Summer				87.938	1.752	
1.004	SW26	120 Winter	200	+40%	200/15 Summer				87.936	1.965	

Flooded		Pipe		Level	
PN	US/MH Name	Volume (m ³)	Flow / Overflow Cap. (l/s)	Flow (l/s)	Status
1.000	SW16	0.000	0.08	3.7	SURCHARGED
1.001	SW17	0.000	0.05	4.0	SURCHARGED
1.002	SW18	0.000	0.04	3.8	SURCHARGED
2.000	SW19	0.000	0.05	3.2	SURCHARGED
3.000	SW20	0.000	0.07	12.3	OK
4.000	SW21	0.000	0.04	4.4	SURCHARGED
3.001	SW22	0.000	0.04	8.3	SURCHARGED
5.000	SW23	2.909	0.03	4.7	FLOOD
3.002	SW24	0.000	0.11	13.9	SURCHARGED
1.003	SW25	0.000	0.12	7.5	SURCHARGED
1.004	SW26	0.000	0.47	5.1	SURCHARGED

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The Flint Glass Works 64 Jersey Street Manchester M4 6JW	SILK STREET, GORTON SW RESULTS PLOTS 59-63	
Date 19/10/2021 File Plots 59-63_P3.MDX	Designed by AM Checked by PB	
Micro Drainage	Network 2018.1	

200 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SW Plots 59-63

Simulation Criteria

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

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

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.200 Cv (Summer) 0.750
Region England and Wales Ratio R 0.341 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960,
1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 200
Climate Change (%) 40

US/MH		Return Climate		First (X)		First (Y)		First (Z)		Water	Surcharged
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.	Level	Depth	
1.000	SW27 30	Winter	200	+40%	200/15	Summer			89.821	0.718	
1.001	SW28 30	Winter	200	+40%	200/15	Summer			89.814	0.800	
1.002	SW29 30	Winter	200	+40%	200/15	Summer			89.808	0.853	
1.003	SW30 60	Winter	200	+40%	200/15	Summer	200/15	Winter	89.794	1.126	
1.004	SW31 30	Summer	200	+40%					88.444	-0.090	

Flooded		Pipe		Level	
US/MH	Volume	Flow /	Overflow	Flow	Level
PN	Name	(m ³)	Cap.	(l/s)	Exceeded
1.000	SW27	0.000	0.12	7.8	FLOOD RISK
1.001	SW28	0.000	0.10	6.3	SURCHARGED
1.002	SW29	0.000	0.16	10.6	FLOOD RISK
1.003	SW30	1.840	0.31	5.0	FLOOD 5
1.004	SW31	0.000	0.34	5.0	OK

Appendix C – Statutory Responses

Jason Jones

From: Perry, Graham <Graham.Perry@uuplc.co.uk>
Sent: 05 May 2021 17:24
To: Jason Jones
Cc: Wastewater Developer Services
Subject: Pre Development Enquiry for : Silk Street, Gorton Manchester UU Reference Number: 4200039340

Hello Jason

Pre Development Enquiry for: Silk Street, Gorton Manchester UU Reference Number: 4200039340

We have carried out an assessment of your application which is based on the information provided. This pre-development advice on your drainage strategy will be valid for 12 months. Your drainage strategy will need to be reviewed by other competent authorities as part of the planning process, and we advise that you carry out the necessary site investigations to confirm the viability of your proposals.

If your investigations require access to our public sewer network, we ask that you contact our network engineers with a request for an access certificate via our main contact telephone number 0345 3723223 or refer to the link below:

<https://www.unitedutilities.com/builders-developers/working-near-our-assets/>

Foul Water

Foul flow from this site will be allowed to drain into the public foul water/combined sewer system from each parcel:

1. Our preferred point of discharge for the northern parcel would be to the 300mm diameter public combined sewer within Silk Street located to the south of the parcel at an unrestricted rate.
2. Our preferred point of discharge for the eastern parcel would be to the 300mm diameter public combined sewer within Cowley Street located to the west of the parcel at an unrestricted rate.
3. Our preferred point of discharge for the western parcel would be to the 300mm diameter public combined sewer within either silk Street or Gt Newton Street located to the north or south of your proposed development at an unrestricted rate. I have noted that you have proposed a connection onto a sewer on Smallwood Street in your drawing but this does not appear on our records. If you are able to prove connectivity and confirm that the pipe is in good order then we would allow the connection to be made at this point

If you are able to identify an alternative, more suitable point of discharge, we request that you contact us at your earliest convenience so that we can assess suitability.

Surface Water

All surface water flow from the proposed development should drain in-line with the drainage hierarchy, as outlined in Paragraph 80, (Reference ID: 7-080-20150323), of the National Planning Practice Guidance. We also recommend you

prioritise the use of multi-functional sustainable drainage systems for the management of surface water in accordance with national planning policy.

Generally, the aim should be to discharge surface run off as high up the following hierarchy of drainage options as reasonably practicable.

This is outlined as follows, in order of priority:

- 1. into the ground (infiltration);**
- 2. to a surface waterbody;**
- 3. to a surface water sewer or highway drain;**
- 4. to a combined sewer.**

For guidance, The North West SuDS Pro-Forma provides information on the appropriate evidence required at each stage of the hierarchy, to demonstrate how each level has been discounted.

The Lead Local Flood Authority has responsibility for all surface water drainage concerns and their input to your proposal is critical. You should also consider whether it is necessary to discuss your proposal with the Environment Agency, or Internal Drainage Board (if operating in your area).

The Local Planning Authority are the determining authority for any application for planning permission and the appropriate authority for determining cost viability of a proposed drainage scheme, such assessments are outside of the jurisdiction of United Utilities.

Infiltration

Surface water runoff generated from this development should discharge to the ground via infiltration system where feasible.

A detailed evidence based feasibility assessment must be carried out in line with Chapter 25 of the CIRIA SuDS Manual 2015 to determine whether infiltration is a suitable method of surface water disposal.

Particular attention must be paid to Ground Water Source Protection Zones to ensure that the risk of pollution to these valuable resources is not compromised. Details can be obtained from the government website:

<https://www.gov.uk/guidance/groundwater-source-protection-zones-spzs#find-groundwater-spzs>

If your site is in a Groundwater Source Protection Zone, you should have regard to the Environment Agency's approach to Groundwater Protection. Information on this is available via the link below:

<https://www.gov.uk/government/publications/groundwater-protection-position-statements>

Please note that such a location could have implications for the principle of your development and the need for additional mitigating measures to protect the groundwater environment and public water supply in the detailed design of your site.

Canal

If infiltration is not feasible we would ask that you carry out investigations to see if a connection to the Rochdale canal is a viable option. We would ask that you speak to the owner of the canal for advice

Public Sewer

In accordance with the hierarchy of drainage options within the National Planning Practice Guidance, both discharge to ground via infiltration and discharge to a waterbody should be discounted prior to consideration of discharging surface

water to the public sewer system. Evidence should be provided to demonstrate how these have been discounted, as outlined in the North West SuDS pro-forma.

Once evidence is provided as outlined above, United Utilities will consider a connection from each parcel to:

1. A gravity connection to the 300mm diameter public combined sewer within Silk Street located south of the proposed northern parcel at a pass forward flow to be agreed by the Lead Local Flood Authority. United Utilities request that any agreed rate does not exceed 5l/s.
2. A gravity connection to the 300mm diameter public combined sewer within Cowley Street located west of the proposed eastern parcel at a pass forward flow to be agreed by the Lead Local Flood Authority. United Utilities request that any agreed rate does not exceed 5l/s.
3. A gravity connection to the 300mm diameter public surface water sewer within Old Church Street located south west of the proposed western parcel at a pass forward flow to be agreed by the Lead Local Flood Authority. United Utilities request that any agreed rate does not exceed 5l/s. I have noted that you are looking to install a pumped surface water solution that drains to the 375mm sw sewer on Droylsden Rd to serve western parcel but I feel a gravity solution would prove more economical and more sustainable in this instance so I have had to discount it for now

As a Water Company, we have no obligation to accept highway drainage into our public sewer network. However, should your proposals include runoff from highways, we would request that consideration is given to SuDS components that deliver source control are incorporated within the design of the scheme to reduce the volume and frequency of discharges of these flows to the public sewer.

Levels

For low-lying sites, (where the ground level of the site or the level of a basement is below the ground level at the point where the drainage connects to the public sewer), care should be taken to ensure that the property is not at increased risk of flooding. If these circumstances exist, we recommend that you contact us to discuss further. It could affect the detailed design of your site and result in the need to incorporate appropriate mitigating measures in your drainage scheme.

Land drainage / Overland flows / track drainage

United Utilities have no obligation, and furthermore we do not accept land drainage, overland flows or track drainage into the public sewerage network under any circumstances

Existing Wastewater Assets Crossing the Site (Delete section as appropriate,

It would appear that there are a number of sewers within the boundary of the site but appear to be unaffected by the development because they are in the public highway which I believe will be retained.

Please refer to the link below to obtain full details of the processes involved with sewer diversions if you come across any uncharted public sewers while carrying out works:

<https://www.unitedutilities.com/builders-developers/larger-developments/wastewater/sewer-diversions/>

Existing Water Assets Crossing the Site

It is the developer responsibility to identify utilities on-site. Where clean water assets are shown on our records, we recommend that you contact our Water Pre-Development Team, via the following email address:

DeveloperServicesWater@uuplc.co.uk. Further information for this service can be found on our website via the link below:

<https://www.unitedutilities.com/builders-developers/larger-developments/pre-development/water-pre-dev/>

Connection Application

Although we may discuss and agree discharge points and rates in principle, please be aware that you will have to apply for a formal sewer connection. This is so that we can assess the method of construction, Health & Safety requirements and to ultimately inspect the connection when it is made. Details of the application process and the form itself can be obtained from our website by following the link below:

<https://www.unitedutilities.com/builders-developers/larger-developments/wastewater/sewer-connections/>

We recommend that the detailed design should confirm the locations of all utilities in the area and ensure that any proposed drainage solution considers routing and clash checks where required.

If we can be of any further assistance please don't hesitate to contact us further.

Kind regards,

Graham Perry



Graham Perry
Development Engineer
Developer Services
M: 07557 577548
T: 01925 679405
unitedutilities.com

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Adam Matadar

From: Perry, Graham <Graham.Perry@uuplc.co.uk>
Sent: 20 December 2021 14:27
To: Adam Matadar
Cc: Wastewater Developer Services
Subject: FW: Pre Development Enquiry for : Silk Street, Gorton Manchester UU Reference Number: 4200039340
Attachments: PDE.pdf; SSG-RDG-00-ZZ-DR-C-0001_P2 - Proposed Drainage.pdf

Hello Adam

I can confirm that the revised proposals are acceptable.

I believe I have recently seen the scheme in the planning system and think I have already agreed to discharge the associated drainage conditions

Thanks

Graham Perry

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Visit: unitedutilities.com/wow

From: Adam Matadar [mailto:adammatadar@ridge.co.uk]
Sent: 07 December 2021 09:39
To: Perry, Graham <Graham.Perry@uuplc.co.uk>
Cc: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>
Subject: Pre Development Enquiry for : Silk Street, Gorton Manchester UU Reference Number: 4200039340

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Good Morning Graham,

Further to your previous response on the proposed SW discharge points & Discharge Rates for the proposed development.

In the previous response it was advised that for the western / Eastern parcel, the discharge points would be the 300mm dia Combined sewer within Cowley Street and Old Church Street respectively.

However due to proposed site levels and with an existing SW sewer located nearby within Droylsden Road, we are proposing to discharge the SW from the Eastern network into the existing SW sewer within Droylsden Road at 5l/s. For the Western network we are proposing to discharge into the existing 300mm Combined water sewer within Cowley Road at 5l/s.

Please can you advise if this is acceptable.

I have provided a drawing of the proposed SW outfalls.

If you require any further information please let me know.

Kind regards,

Adam Matadar
Civil Engineer
For Ridge and Partners LLP
Office: 0161 833 9579 Mobile: 07469 378701
Offices adammatadar@ridge.co.uk www.ridge.co.uk [email disclaimer](#)



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Paul Slater
Senior Estimator

Rowlinson Constructions Limited
Gardale House, 118b Gatley Road, Gatley, Cheadle SK8 4AU
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Web: www.rowlinsonconstruction.co.uk



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From: Deborah McCormick <Deborah.McCormick@canalrivertrust.org.uk>
Sent: 21 June 2021 12:08
To: Paul Slater <paul.slater@rowcon.co.uk>
Cc: Gareth Taylor <Gareth.Taylor@canalrivertrust.org.uk>
Subject: RE: Silk Street Development - Surface Water Discharge into canal

Hi Paul,

Thank you for your enquiry in relation to the site at Silk Street and I apologise for the delay in responding to you.

To confirm, we cannot provide pre application advice in relation to Surface Water Discharge as each application has to be assessed individually on a case by case basis via our Code of Practice.

I can however confirm that the canal at the location of your development is currently at capacity and at this point in time we are struggling to accept any new applications for surface water given the flood risk and lack of available outputs. In order to overcome this issue, we have commissioned a flood study and modelling survey for a section of the Rochdale and Ashton Canal, the results of which will be presented to us imminently.

This survey will provide us with mitigation options to reduce flood risk in this area along with the ability to accept a number of future SWD applications.

Therefore, as of next week any SWD applications on the Rochdale and Ashton Canals will be asked to sign onto our Code of Practice and follow the mandatory process, however, given your timescales for this development, I can confirm that at this point in time, **we are currently unable to accept new surface water applications at this location.**

If you need anything further, please let me know.

Kind regards

Deborah McCormick
Utilities Surveyor BSc (Hons)
Canal & River Trust, North West Region
M 07768 447444
My working days are Monday to Thursday



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From: Paul Slater <paul.slater@rowcon.co.uk>

Sent: 17 June 2021 12:45

To: Deborah McCormick <Deborah.McCormick@canalrivertrust.org.uk>

Subject: Silk Street Development - Surface Water Discharge into canal

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Hi Deborah,

Thanks for your time earlier.

As discussed we are developing the above scheme and would request your response as to the whether or not discharge into the canal would be acceptable.

I understand from our conversation that currently the Rochdale Canal is at capacity and may not be able to currently accept this discharge.

Your earliest attention to this would be appreciated, please give me a call if you would like to discuss further.

Regards

Paul 07900 991138

Paul Slater
Senior Estimator

Rowlinson Constructions Limited
Gardale House, 118b Gatley Road, Gatley, Cheadle SK8 4AU
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From: Deborah McCormick <Deborah.McCormick@canalrivertrust.org.uk>

Sent: 17 June 2021 11:42

To: Potter, Andrew J (F&G) <Andrew.Potter@fgould.com>

Cc: Paul Slater <paul.slater@rowcon.co.uk>; Paul Waite <paul.waite@manchester.gov.uk>; Regina Khanum <regina.khanum@manchester.gov.uk>; Gareth Taylor <Gareth.Taylor@canalrivertrust.org.uk>

Subject: RE: Silk Street Development - Surface Water Discharge

Adam Matadar

From: Mark Heath <Mark.Heath@canalrivertrust.org.uk>
Sent: 05 January 2022 11:02
To: Adam Matadar
Cc: Gareth Taylor
Subject: RE: 5015017 - Silk Street Development, Newton Heath, Rochdale Canal
Attachments: Appendix A.PDF

Dear Adam,

RE:- Historical Canal Flooding: Silk Street Development, Newton Heath, Rochdale Canal

Further to your enquiry Canal & River Trust can confirm the following:-

The Trust are aware of 1 overtopping event in the vicinity.

- 1) Below (downstream) of Lock 74, June 2013 – approximately 1.2km downstream from the above site, recorded as an act of vandalism.

The Trust are not aware of any breach events in the vicinity.

Further, please note that the canal pound (lock to lock) adjacent to the site identified is approximately 0.7km in length, with an average width of 15m.

Please be aware that we are unable to comment on the flood risk to individual properties or developments and interpretation of the information provided in this e-mail is your responsibility.

For further advice on flood risk from canals we have included some generic guidance, please refer to Appendix A attached.

Kind regards

Mark

Mark Heath

Water Engineer, Water Management Team

(North West, Yorkshire & the North East, East Midlands Regions)

T 03030 404040

Canal & River Trust | **Red Bull Yard** | Congleton Road South | **Church Lawton** | Stoke-on-Trent | **ST7 3AP**

From: Adam Matadar <adammatadar@ridge.co.uk>
Sent: 17 December 2021 14:27
To: Mark Heath <Mark.Heath@canalrivertrust.org.uk>
Subject: FW: 5015017 - Silk Street Development

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Good Afternoon Mark,

I am currently working on a proposed residential scheme in Manchester.

The Rochdale Canal is adjacent to the proposed development (located north of the site)

We have been asked by the LLFA (Manchester City Council) if there would be any breach modelling data for the watercourse in question and if you have any historic flooding information for this area.

I have provided a site location plan.

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

Kind regards,

Adam Matadar

Civil Engineer

For Ridge and Partners LLP

Office: 0161 833 9579 Mobile: 07469 378701

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From: Gareth Taylor <Gareth.Taylor@canalrivertrust.org.uk>

Sent: 17 December 2021 14:03

To: Adam Matadar <> adammatadar@ridge.co.uk

Subject: RE: 5015017 - Silk Street Development

Adam

The Northwest Water Engineer is Mark Heath – detail below.

Mark Heath

Email: mark.heath@canalrivertrust.org.uk

Mobile: 07717178332

Regards

Gareth Taylor (BSc)

Infrastructure Services, Works Engineer (Northwest)

Northwest Region: Lancaster canal, Leeds Liverpool canal (west of Foulridge tunnel).

Manchester, Bury & Bolton Canal, Rochdale Canal & Ashton Canal.



Canal & River Trust | NW Waterway | Canal Cottage | Lowerhouse Lane | Rosegrove | Burnley | BB12 6HU | Mob: 07484 913064 |

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<https://canalrivertrust.org.uk/business-and-trade/undertaking-works-on-our-property-and-our-code-of-practice>

From: Adam Matadar <adammatadar@ridge.co.uk>
Sent: 15 December 2021 10:06
To: Gareth Taylor <Gareth.Taylor@canalrivertrust.org.uk>
Subject: RE: 5015017 - Silk Street Development

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Good Morning Gareth,

Thank you very much for your response.

Please are you able to provide a contact within the Water Management team.

Kind regards,

Adam Matadar
Civil Engineer
For Ridge and Partners LLP
Office: 0161 833 9579 Mobile: 07469 378701
Offices adammatadar@ridge.co.uk www.ridge.co.uk [email disclaimer](#)



From: Gareth Taylor <Gareth.Taylor@canalrivertrust.org.uk>
Sent: 15 December 2021 09:59
To: Adam Matadar <adammatadar@ridge.co.uk>
Subject: RE: 5015017 - Silk Street Development

Adam

I have just reviewed our GIS System, and can confirm that there are no recorded events of overtopping or any canal breaches in the immediate vicinity of the Silk Street Development.

Not sure if this fulfils your requirement, the only other option is to contact our Water Management Team to see if there is anything else.

Regards

Gareth Taylor (BSc)

Infrastructure Services, Works Engineer (Northwest)

Northwest Region: Lancaster canal, Leeds Liverpool canal (west of Foulridge tunnel).
Manchester, Bury & Bolton Canal, Rochdale Canal & Ashton Canal.



For further information and a copy of the 3rd Party Code of Practice please follow the link below.

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From: Adam Matadar <adammatadar@ridge.co.uk>

Sent: 07 December 2021 10:24

To: Gareth Taylor <Gareth.Taylor@canalrivertrust.org.uk>

Subject: 5015017 - Silk Street Development

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Good Morning Gareth,

I am currently working on a proposed residential scheme in Manchester.

The Rochdale Canal is adjacent to the proposed development (located north of the site)

We have been asked by the LLFA (Manchester City Council) if there would be any breach modelling data for the watercourse in question and if you have any historic flooding information for this area.

I have provided a site location plan.

If you require any further information please let me know.

Kind regards,

Adam Matadar

Civil Engineer

For Ridge and Partners LLP

Office: 0161 833 9579 Mobile: 07469 378701

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Mae Glandŵr Cymru yn gwmni cyfyngedig drwy warant a gofrestrwyd yng Nghymru a Lloegr gyda rhif cwmni 7807276 a rhif elusen gofrestredig 1146792. Swyddfa gofrestredig: National Waterways Museum Ellesmere Port, South Pier Road, Ellesmere Port, Cheshire CH65 4FW.

Adam Matadar

From: Laura Peacock <Laura.Peacock@manchester.gov.uk>
Sent: 10 January 2022 10:21
To: Adam Matadar
Subject: RE: CDN/21/0812

Good morning Adam,

Thank you for speaking to UU and coming back to me.

We will therefore proceed with MCC as responsible party for maintenance.

We look forward to receiving the revised drainage strategy and supporting documents. Please include the latest layout & calcs & project response the two bullet points from call summary:

- You have proposed some changes including storage in the front gardens that will allow you to downsize the pipes in the back gardens.
- We discussed moving the pipes to the lowest possible risk of build-over, and improving maintenance access by aligning the pipes with footpaths where possible and moving manholes to the footpaths where possible.

Many Thanks,
Laura

From: Adam Matadar <adammatadar@ridge.co.uk>
Sent: 10 January 2022 08:55
To: Laura Peacock <Laura.Peacock@manchester.gov.uk>
Subject: RE: CDN/21/0812

Good morning Laura,

Thank you very much for your time last weeks with regards to discussing the proposed Drainage Strategy and the outstanding issues with this scheme.

United Utilities will not look into adopting the proposed drainage network that serves a single property curtilage (as all properties will be owned by MCC, this is not something UU will look to adopt).

Therefore, as suggested it would be more appropriate that MCC takes over the maintenance for the drainage infrastructure. This is to be highlighted within the revised Drainage Strategy and the Updated Discharge Conditions Report.

Kind regards,

Adam Matadar
Civil Engineer
For Ridge and Partners LLP
Office: 0161 833 9579 Mobile: 07469 378701
Offices adammatadar@ridge.co.uk www.ridge.co.uk [email disclaimer](#)



From: Flood Risk Management <floodriskmanagement@manchester.gov.uk>
Sent: 06 January 2022 16:32
To: Adam Matadar <adammatadar@ridge.co.uk>
Subject: FW: CDN/21/0812

Adam,

Further to my email below, my Planning colleague advised that she would support MCC taking maintenance responsibility for the pipes. However, she has emphasised a possible consequence that "if the properties are sold under right to buy, then there will need to be arrangements about whether MCC will continue to maintain the pipes on private land. That ultimately is a decision for the city as landowner."

Please could you look into offering the pipes for UU adoption as a preferred option to remove the above risk, and if this is not possible we will look to the above option which has Planning support.

Kind Regards,
Laura

From: Laura Peacock
Sent: 06 January 2022 12:43
To: Adam Matadar <adammatadar@ridge.co.uk>
Subject: CDN/21/0812

Adam,

Thank you for your time on our call discussing CDN/21/0812.

Just a brief summary of points discussed –

- You have proposed some changes including storage in the front gardens that will allow you to downsize the pipes in the back gardens.
- We discussed moving the pipes to the lowest possible risk of build-over, and improving maintenance access by aligning the pipes with footpaths where possible and moving manholes to the footpaths where possible.
- We discussed first preference would be for UU to adopt these pipes, which you have said you will investigate.
- I have contacted the MCC planner regarding the option to have a maintenance company overseeing these pipes, which would be our second preference if UU adoption could not be achieved.

I hope this is an accurate summary however if you have any concerns/amendments please let me know.

Laura Peacock MESci(Geol) MCIWEM
Flood Risk Engineer – LLFA
Mobile: 07814 082198
Email: laura.peacock@manchester.gov.uk

Highways Service,
Growth and Neighbourhoods Directorate
Manchester City Council
PO Box 532
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