RoC CONSULTING

Drainage Technical Note

Plot 10B,
First Street,
Manchester

For

House of Social 1 Ltd



05/06/2023

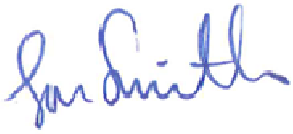
COMPLEX CHALLENGES ...
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Plot 10B, First Street, Manchester

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House of Social 1 Ltd

TITLE	NAME	SIGNATURE	DATE
Report Author	PAUL GRAVENEY		**05/06/23**
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REVISIONS ONLY	DESCRIPTION	SIGNATURE	DATE

COMPLEX CHALLENGES ...
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COMPLEX CHALLENGES ...
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1.0 Introduction

1.1 Summary

RoC Consulting has been appointed by House of Social 1 Ltd to provide civil and structural engineering design advice in connection with their proposed development known as Plot 10B, First Street, Manchester.

In 2023 a planning application was submitted to Manchester City Council for a Development comprising the erection of 14-storey building comprising purpose-built student accommodation (PBSA) (Sui Generis) and ground floor Food Hall (Sui Generis Use), and other associated works including external amenity spaces, public realm, secure cycle parking, access and servicing arrangements (Plot 10B).

Planning approval was granted (ref: 136170/FO/2023) in June 2023 subject to a number of planning conditions including two relating to the drainage of the development, numbers 10 & 42.

This report has been prepared to discuss the overall drainage strategy for the site and it is intended to be submitted for the discharge of these planning conditions.

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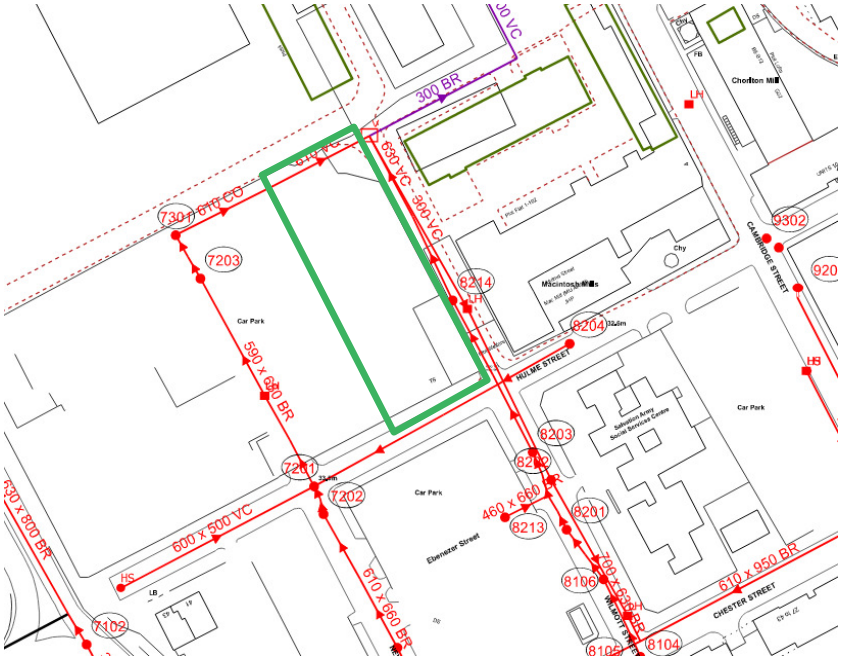
COMPLEX CHALLENGES ...
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2.0 Drainage Strategy

2.1 Existing Drainage Layout

The United Utilities (UU) sewer records have been reviewed. Passing in a north easterly direction through the northern boundary of the site is a 610mm diameter combined water sewer. At the junction with Wilmott Street the sewer then turns south running outside the eastern boundary.

United Utilities Sewer Records



A GPR survey was undertaken by Survey Systems in February 2020 and supplied to RoC for review. This indicates that the site was served by separate foul and surface water drainage networks which are understood to discharge to the public sewer network surrounding the site.

Notwithstanding the above, the GPR survey is limited and only identifies small sections of these networks so is not possible to determine exactly how much of the site these private sewers drained.

2.2 Geology

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

Drift Geology: Glaciofluvial Sheet Deposits – Sand and Gravel
Solid Geology: Chester Formation – Sandstone

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

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

BHID	Direction	Distance	Made Ground	Clay	Sand	Clay
SJ89NW102	Southeast	100m	1.07m	2.59m	13.11m	9.45m
SJ89NW1229	North	65m	1.40m	4.0m	-	-

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

2.3 Hydrological Assessment

A review of the topographical survey, OS Maps and Environment Agency maps would indicate the closest surface water feature to be the River Medlock, which is located circa 100m to the north of the site and is culverted.

2.4 Sustainable Drainage Strategy

When reviewing the strategy for the disposal of surface water, due cognisance needs to be taken of the hierarchy for discharge as defined current NPPF PPG 080. These are summarised below with the option of draining to the existing watercourse to the south of the site to be taken forward.

Discharge via Infiltration to Ground

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

An intrusive investigation for this and the adjacent development site has previously been undertaken by TerraConsult on behalf of ASK Real Estate and provided to RoC for review. In addition, RoC Consulting have undertaken a Phase 1 Desk Study for the site which also provides information on expected ground conditions.

These indicate Made Ground up to depths of around 1.30m, underlain by clays for a further 5-7m. Sandstone bedrock was encountered in one borehole at over 8m.

Variable head permeability testing was undertaken as part of the TerraConsult intrusive investigation. These indicate infiltration rates between $1.06E^{-08}$ m/s to $9.35E^{-09}$ m/s.

Taking this into consideration, plus the fact there are limited external areas to achieve the required 5m offset from foundations, infiltration is not considered to be a feasible method of surface water disposal for the development.

Discharge to a Surface Water Body

As indicated earlier in this report, the nearest watercourse to the site is the River Medlock which is located circa 100m to the northeast of the site and is culverted.

No other water features are present in the vicinity.

To obtain a connection to this feature would require a significant off-site connection through third party land and therefore this method of surface water disposal is not considered to be practicable and has not been considered further.

Discharge to a Surface Water Sewer

Assessing the United Utilities sewer records it is evident that no surface water sewers are located in close proximity.

Discharge to a Combined Sewer

The only public sewerage infrastructure in the vicinity of the site are all combined sewers. On the basis that infiltration is not considered to be viable then connection to the combined sewer is considered the only viable solution. It is therefore proposed that the development will mimic the existing drainage regime and discharge surface water to the combined sewer network.

To facilitate the development, an existing combined sewer will need to be diverted out of the site boundary and into River Street to the north. This will be designed by others and subject to a S185 sewer diversion application. As part of this proposal a stub connection will be provided to facilitate a connection.

A pre-development enquiry was submitted to United Utilities who have acknowledged that infiltration and discharge to watercourse are both not feasible methods of disposal. UU will therefore accept a maximum discharge rate of 5.0 l/s to the combined sewer in River Street

This rate also matches the calculated pre development 1 year runoff rate with a 50% reduction applied (4.9l/s) to satisfy MCC policy requirements. This will ensure that the proposed development will not increase flood risk elsewhere.

2.5 Proposed Surface Water Drainage Strategy

The general principal of the surface water drainage strategy is to collect the runoff from the roof area of the new building, and direct it to a number of new RWPs that will drop down to a new below ground surface water network. The network will pass beneath the building and outfall to the stub connection constructed as part of the S185 sewer diversion in River Street at a peak restricted rate of 4.9l/s. Due to this restricted rate an offline geocellular crate attenuation tank will be constructed beneath the landscaping area to the south east.

A climate change allowance of 40% in additional rainfall for the 100-year return period storm event has been applied.

No exceedance flooding for the 100-year return period storm of Critical duration with a 40% allowance has been identified in the hydraulic modelling.

The proposed private drainage layout for the new development building will be designed in accordance with BS EN 752: 2017 and Building Regulations Part H guidance. This is to indicate no surcharge for the 2-year storm event and no flooding for up to the 30-year storm event.

The proposed surface water drainage layout is indicated on current RoC Drainage GA drawings in Appendix A and accompanying surface water hydraulic calculations in Appendix B.

2.6 Proposed Foul Water Drainage Strategy

Foul water drainage will run in parallel with the surface water and outfall via a combined connection to the UU combined sewer in River Street. UU have confirmed this as acceptable.

The proposed foul water drainage layout is indicated on current RoC Drainage GA plans in Appendix A.

3.0 Drainage Related Planning Condition & RoC Responses

3.1 Planning Conditions

Detailed below are the two drainage conditions (numbers 10 & 42) in *Italics* with RoC response in Blue beneath to answer each of the sub queries.

10) Notwithstanding the details as set out within condition 2 (n) no development shall take place until a scheme for the surface water drainage works in accordance with Non-Statutory Technical Standards for Sustainable Drainage Systems (March 2015) or any subsequent replacements and national standards and details has been submitted to and approved in writing by the Local Planning Authority. This shall include:

i) A finalised drainage layout showing all components, outfalls, levels and connectivity, limiting surface water discharge to a maximum 5l/s;
Refer to the ROC surface water drainage layout drawing in Appendix A. This provides all details and indicates a flow control at the outlet rated at 4.9l/s.

ii) Maximised integration of green SuDS components (utilising infiltration or attenuation) if practicable;
Ground conditions and close proximity of new foundations would negate infiltration. Rain gardens included in the external works layout.

iii) 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 45% climate change in any part of a building;
Hydraulic model has been simulated in the Microdrainage design software and confirms no flooding for the 1 in 100 year plus 45% allowance for climate change.

iv) 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 building is raised above all external levels which fall into the adjoining highways. Refer to ROC drawing in Appendix A which defines this further.

v) *Property threshold levels must be set a minimum of 30.925m AOD, in line with the proposed Flood Risk Assessments (FRA). Providing the Environment Agency agree, given the main risk of flooding at this location is associated to River Medlock (statutory main river).*
The minimum finished floor level with be set at 30.925m AOD.

vi) *Progression through the drainage hierarchy shall be evidence based and supported by site investigation. Results of ground investigation carried out under Building Research Establishment Digest 365. Site investigations should be undertaken in locations and at proposed depths of the proposed infiltration devices. Proposal of the attenuation that is achieving half emptying time within 24 hours. If no ground investigations are possible or infiltration is not feasible on site, evidence of alternative surface water disposal routes (as follows) is required.*
As discussed in Section 2.4, infiltration has been discounted due to the cohesive underlying ground conditions and the minimum 5m offset to foundations and adopted highway being unable to be achieved.

vii) *Where surface water is connected to the public sewer, agreement in principle from United Utilities is required that there is adequate spare capacity in the existing system taking future development requirements into account. An email of acceptance of proposed flows and/or new connection will suffice.*
UU have confirmed via the pre development enquiry in Appendix C that if infiltration is discounted then they will connection to the combined sewer at a rate not exceeding 5L/S.

viii) *Evidence of an agreement in principle to divert the existing United Utilities sewer within the site boundary.*
Consultants Ramboll have submitted the S185 application to UU on behalf of the current landowner ASK Real Estate. This is currently awaiting technical approval.

ix) *Hydraulic calculation of the proposed drainage system;*
Refer to Appendix B for details of the hydraulic calculations.

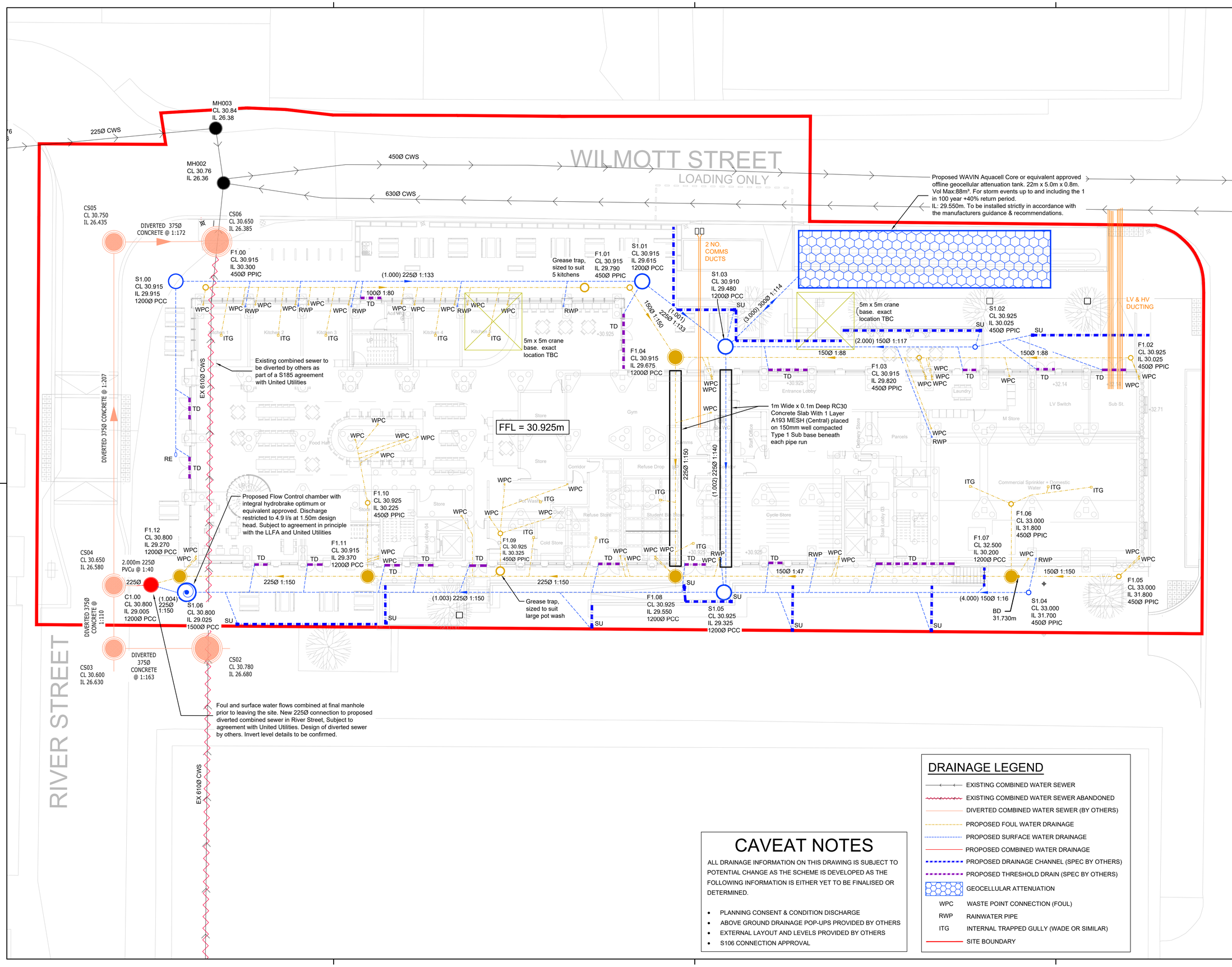
x) *Construction details of flow control and SuDS elements*
Refer to Appendix A for construction details.

42) Before development commences a scheme for dealing with the discharge of surface water and which demonstrates that the site will be drained on a separate system, shall be submitted to and approved in writing by the City Council as Local Planning Authority. The approved scheme shall be implemented in full before use of the use first commences.

Refer to the ROC drainage GA drawing in Appendix A which indicates the drainage will be constructed on separate systems up to the last point of connection to the combined sewer.

COMPLEX CHALLENGES ...
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APPENDIX A – RoC DRAINAGE DRAWINGS



CAVEAT NOTES

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

- PLANNING CONSENT & CONDITION DISCHARGE
- ABOVE GROUND DRAINAGE POP-UPS PROVIDED BY OTHERS
- EXTERNAL LAYOUT AND LEVELS PROVIDED BY OTHERS
- S106 CONNECTION APPROVAL

DRAINAGE LEGEND

- EXISTING COMBINED WATER SEWER
- EXISTING COMBINED WATER SEWER ABANDONED
- DIVERTED COMBINED WATER SEWER (BY OTHERS)
- PROPOSED FOUL WATER DRAINAGE
- PROPOSED SURFACE WATER DRAINAGE
- PROPOSED COMBINED WATER DRAINAGE
- PROPOSED DRAINAGE CHANNEL (SPEC BY OTHERS)
- PROPOSED THRESHOLD DRAIN (SPEC BY OTHERS)
- GEOCELLULAR ATTENUATION
- WPC WASTE POINT CONNECTION (FOUL)
- RWP RAINWATER PIPE
- ITG INTERNAL TRAPPED GULLY (WADE OR SIMILAR)
- SITE BOUNDARY

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3. ANY DISCREPANCIES SHOULD BE REPORTED TO THE ENGINEER IMMEDIATELY SO THAT CLARIFICATION CAN BE SOUGHT PRIOR TO THE COMMENCEMENT OF WORK.
4. BEFORE STARTING ANY WORKS, CONTRACTOR TO CHECK INVERT LEVELS AND POSITIONS OF EXISTING DRAINS, SEWERS, INSPECTIONS CHAMBERS AND MANHOLES AGAINST INFORMATION SHOWN ON THIS DRAWING.
5. ROCKER PIPES ARE TO BE PROVIDED AT ALL CONCRETE CASED INTERFACES.
6. CLASS Z CONCRETE SURROUND TO BE PROVIDED FOR PIPES WITH COVER LESS THAN 1.2m ABOVE THE CROWN OF THE PIPE FOR ROADS AND 0.6m FOR SOFT AND PEDESTRIAN AREAS ONLY AND UNDER ALL FOUNDATIONS AND WHERE PIPES LAID WITHIN 1m OF FOUNDATIONS.
7. CONNECTIONS TO EXISTING PUBLIC SEWERS IN ACCORDANCE WITH UNITED UTILITIES REQUIREMENTS, TO BE APPROVED / AGREED WITH THE WATER AUTHORITY.
8. PROPOSED COVER LEVELS ARE APPROXIMATE AND SHALL BE CHECKED BY THE CONTRACTOR ON SITE TO SUIT THE EXACT FINISHED LEVEL AND GRADIENT.
9. ALL DRAINAGE WORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH THE REQUIREMENTS OF THE LOCAL AUTHORITY AND IN CONJUNCTION WITH ALL RELEVANT BRITISH STANDARDS, CODES OF PRACTICE AND 'SEWERS FOR ADOPTION' 7th EDITION.
10. ACCESS COVERS AND FRAMES SHALL COMPLY WITH THE LOADINGS SPECIFIED AND TO BS EN 124 AND KITEMARKED OR IF RECESSED COVERS ARE SPECIFIED THEN IN ACCORDANCE WITH FACTA ASSOCIATION EQUIVALENT. ALLOW FOR RECESS MANHOLE COVERS TO ACCEPT LANDSCAPE ARCHITECT FINISHES TO ALL NON-ASPHALT EXTERNAL AREAS.
11. THE PROPOSED BUILDING LAYOUTS SHOWN ON THIS DRAWING ARE FOR INFORMATION ONLY. REFER TO ARCHITECTS PLANS FOR PRECISE LOCATION SETTING OUT INFORMATION AND DETAILS
12. FOR SETTING OUT DIMENSIONS OF SSS, SVPS, RWPS, FLOOR GULLY'S & OTHER DRAINAGE 'POP UP' LOCATIONS, REFER TO ARCHITECTS OR MECHANICAL & ELECTRICAL ENGINEERS DRAWINGS.
13. ALL DRAINAGE PIPEWORK SHOWN SHALL BE 100mm DIAMETER FOR FOUL AND 150mm FOR SURFACE WATER UNLESS NOTED OTHERWISE. ALL DRAINAGE PIPEWORK SHALL BE LAID SOFFIT TO SOFFIT UNLESS OTHERWISE STATED.
14. ALL UNDERSLAB DRAINAGE SHALL BE LAID AT GRADIENTS OF 1:80 MIN. FOR FOUL PIPEWORK AND 1:100 MIN. FOR SURFACE WATER UNLESS NOTED OTHERWISE. ALL UNDERSLAB DRAINAGE SHALL BE CLEAR OF FOUNDATIONS UNLESS SHOWN OTHERWISE. USE OF SHORT LONG RADIUS BENDS IS ACCEPTABLE PROVIDED THEY ARE KEPT TO A MINIMUM AND USED WHERE UNAVOIDABLE.
15. AT LEAST ONE SOIL PIPE AT THE HEAD OF EACH FOUL RUN SHALL BE VENTED TO THE ATMOSPHERE. ALL RAINWATER PIPES SHALL HAVE ABOVE GROUND RODDING ACCESS.
16. ALL PRIVATE DRAINAGE PIPEWORK FOR FOUL AND SURFACE WATER SYSTEMS HAVE BEEN DESIGNED ON THE BASIS OF UPVC TO BS EN 1401-1, UNLESS NOTED OTHERWISE. SURFACE WATER CAN ALSO BE CONSTRUCTED WITH POLYPIPE TWINWALL PIPES.
17. CONCRETE ENCASEMENT OF THE PIPEWORK SHALL BE REQUIRED WHERE THE VERTICAL CLEARANCE BETWEEN TWO PIPES CROSSING IS LESS THAN 300MM.
18. WHERE NEW DRAINAGE IS SITUATED WITHIN 5 METRES OF NEW OR EXISTING TREES THE PIPEWORK SHALL BE ENCASED IN CONCRETE TO REDUCE THE RISK OF ROOT INGRESS.
19. ALL NEW DRAINAGE INSTALLATIONS TOGETHER WITH ANY EXISTING DRAINAGE RETAINED SHALL BE JETTED AND CCTV SURVEYED UPON COMPLETION. CONTRACTOR TO ENSURE THAT THE DRAINAGE SYSTEM IS FULLY OPERATIONAL, FREE OF EXCESS DEBRIS/SILT AND ALL IDENTIFIED FAULTS RECTIFIED.
20. ATTENUATION STORAGE CALCULATIONS INCLUDE CLIMATE CHANGE ALLOWANCE OF 40% IN ACCORDANCE WITH CURRENT ENVIRONMENT AGENCY GUIDELINES.

REV	DATE	DETAILS	DRN	CHK
P03	23.05.23	DROPS ADDED, LAYOUT AMENDED	PG	JAS
P02	11.04.23	STAGE 3 ISSUE	PG	JAS
P01	11.10.22	FIRST ISSUE	ARJ	JAS

DRAWING STATUS
PRELIMINARY

RIBA STAGE
RIBA STAGE 4

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

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ARJ	OCT 22	1:150
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JAS	OCT 22	
APPRVD.	DATE	EMAIL FOR DRAWINGS
JAS	OCT 22	info@rocconsulting.com

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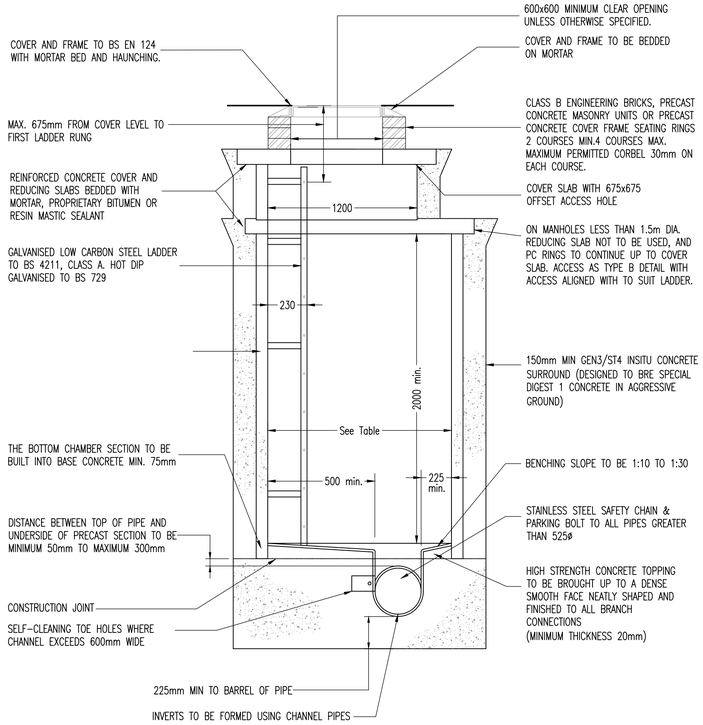
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PLOT 10B
FIRST STREET

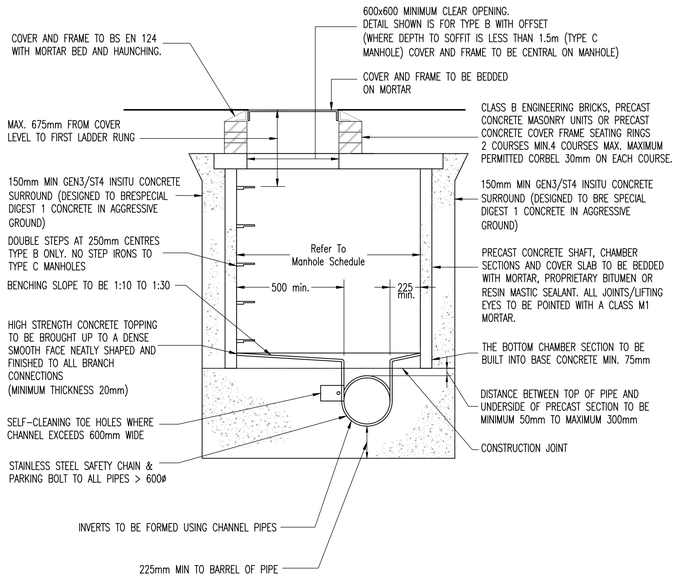
DRAWING TITLE
FOUL & SURFACE DRAINAGE
GENERAL ARRANGEMENT

DRAWING No.	REV.
Z1-ROC-G580-PL-XX-DR01	P03

4513

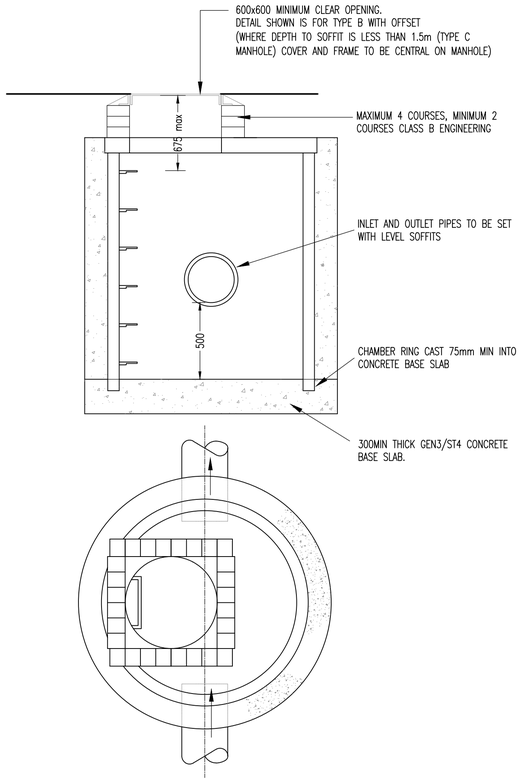
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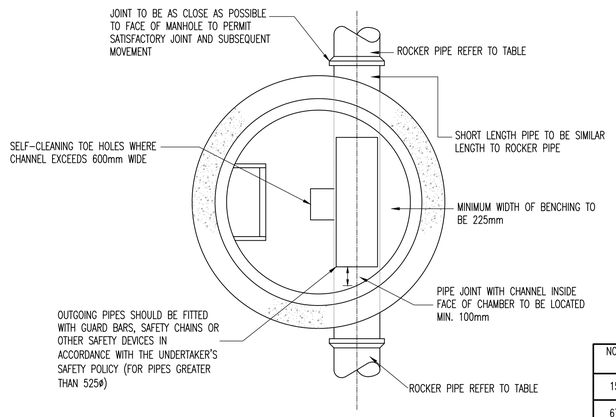
DIAMETER OF LARGEST PIPE IN MANHOLE (mm)	INTERNAL DIAMETER OF MANHOLE (mm)
LESS THAN 375mm	1200
375 – 450	1350
500 – 700	1500
750 – 900	1800

MINIMUM MANHOLE CHAMBER SIZES



CATCHPIT MANHOLE

CHAMBER CONSTRUCTION AS FOR PCC MANHOLES



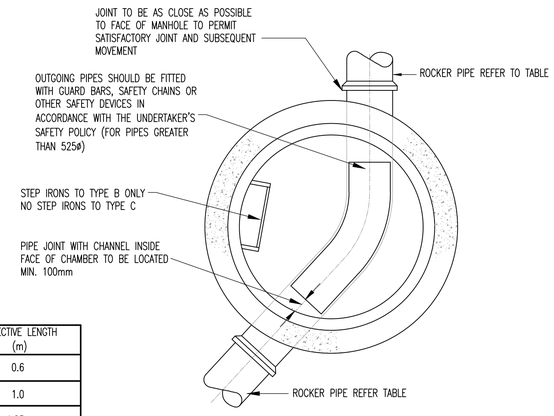
TYPICAL MANHOLE DETAIL TYPE A

DEPTH FROM GROUND LEVEL TO SOFFIT OF PIPE 3m TO 6m
FOR CHAMBERS LESS THAN 1500ø A TYPE B MANHOLE SHALL BE USED

NOTE:
WIDE WALL P.C.C CHAMBER RINGS MAY BE USED FOR MANHOLES IN AREAS NOT AT RISK FROM FLOATION DUE TO A POTENTIAL HIGH WATER TABLE. THE RINGS SHALL BE INSTALLED AND SEALED IN ACCORDANCE WITH THE MANUFACTURERS INSTRUCTIONS. NO CONCRETE SURROUND WILL BE REQUIRED TO THE P.C.C RINGS.

NOMINAL DIA. (mm)	EFFECTIVE LENGTH (m)
150 to 600	0.6
675 to 750	1.0
825 & over	1.25

ROCKER PIPE TABLE

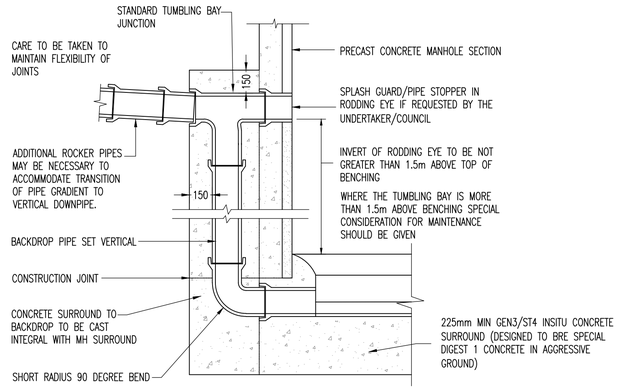


TYPICAL MANHOLE DETAIL TYPE B
DEPTH TO SOFFIT OF PIPE 1.5m* TO 3.0m

TYPICAL MANHOLE DETAIL TYPE C
DEPTH TO SOFFIT OF PIPE LESS THAN 1.5m

P.C.C CHAMBER RINGS USED FOR MANHOLES LESS THAN 1500 TO SOFFIT SHALL BE 600X600 CLEAR OPENING. ALL MAINTENANCE SHALL BE CARRIED OUT FROM THE SURFACE. NO STEP RUNGS SHALL BE PROVIDED. THE COVER OPENING SHALL BE LOCATED OVER THE OUTGOING PIPE.

FOR MAINTENANCE, ANY MANHOLE CONSTRUCTED WITHOUT DOUBLE STEPS OR A LADDER SHALL BE ACCESSED BY WINCH ONLY.



SEWER DIAMETER (mm)	DROP SHAFT DIAMETER (mm)
225-300	225
375	300
450	375
525-600	450
675	525
750-900	600

THE CONNECTION AT THE BOTTOM OF THE BACKDROP IS TO BE MADE AT SOFFIT LEVEL IN MANHOLES MAX. PIPE SIZE 825mm AND AT SPRINGING LEVEL IN MANHOLES PIPE SIZE 900 TO 1500mm VERTICAL RODDING EYE MAY BE REQUIRED IN SITUATIONS WHERE BLOCKAGES ARE HIGH RISK.
THE TUMBLING BAY SHALL BE BUILT INTO THE MANHOLE CHAMBER BELOW ANY REUCING SLAB

MINIMUM DIMENSIONS REQUIRED TO CONSTRUCT BACKDROP	
PIPE DIA. (mm)	MIN DIMENSION (mm)
100	530
150	630
225	915
300	1170

TYPICAL VERTICAL BACKDROP DETAIL

NOTE : WHERE THE DROP IS NOT EXCESSIVE A 45° DROP PIPE MAY BE USED

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REV	DATE	DETAILS	DRN	CHK
P01	23.05.23	FIRST ISSUE	PG	JAS

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Commercial Wharf
6 Commercial Street
Manchester M15 4PZ
T 0161 214 5390
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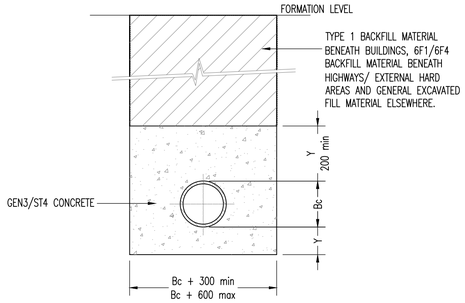
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DRAWING TITLE
TYPICAL DRAINAGE DETAILS
SHEET 1

DRAWING No. Z1-ROC-G580-PL-XX-DR02
REV. P01

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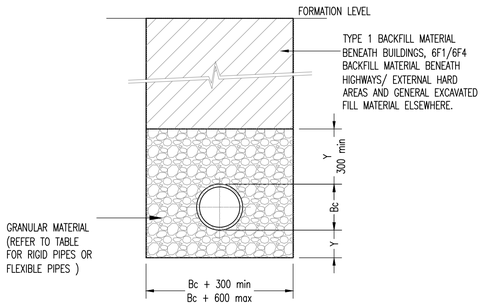
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TO BE USED WHERE COVER TO PIPE IS:
1. LESS THAN 1.2m IN TRAFFICKED AREAS
2. LESS THAN 0.90m IN FIELDS
3. LESS THAN 0.6m IN LANDSCAPED AREAS
4. LESS THAN 0.3m BENEATH BUILDING SLABS

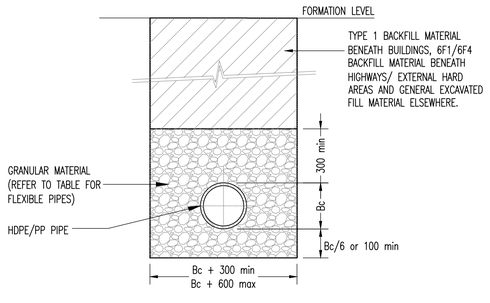
CLASS Z BEDDING DETAIL

Y VALUE:
HARD SPOTS/IRREGULAR TRENCH BOTTOM BC/4 (200mm MIN)
EVEN TRENCH BOTTOM BC/6 (100mm MIN)
BC = OUTSIDE PIPE DIAMETER



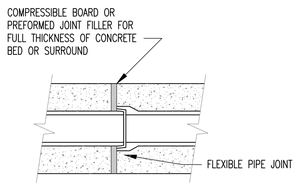
CLASS S BEDDING DETAIL

Y VALUE:
HARD SPOTS/IRREGULAR TRENCH BOTTOM BC/4 (200mm MIN)
EVEN TRENCH BOTTOM BC/6 (100mm MIN)
BC = OUTSIDE PIPE DIAMETER



CLASS P/T/W BEDDING DETAIL

CLASS P 0.6m – 2.0m
CLASS T >2.0m
CLASS W BENEATH BUILDINGS
(FLEXIBLE PIPE CONSTRUCTION)



JOINTS FOR CONCRETE SURROUND TO PIPES

(AT EACH PIPE JOINT)

BS EN 1610:1998 ANNEX B TABLE B.15 COARSE AGGREGATE – PIPE BEDDING							
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	10
50.0	100	-----	-----	100	-----	-----	-----
37.5	90 – 100	100	-----	85 – 100	100	-----	-----
20.0	35 – 70	90 – 100	100	0 – 25	85 – 100	100	-----
14.0	-----	-----	90 – 100	-----	-----	85 – 100	100
10.0	10 – 40	30 – 60	50 – 85	0 – 5	0 – 25	0 – 50	85 – 100
5.0	0 – 5	0 – 10	0 – 10	-----	0 – 5	0 – 10	0 – 25
2.36	-----	-----	-----	-----	-----	-----	0 – 5

RIGID PIPES BEDDING GRADING

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 600mm PIPES

TRENCH WIDTHS	
PIPE I.D	OVERALL TRENCH WIDTH
100	550
150	600
225	700
300	850
375	1050
450	1150
525	1200
600	1350
675	1450
750	1500
825	1600
900	1900
1050	2100
1200	2300
1350	2500
1500	2700
1800	3100

PIPE ø	JOINT THICKNESS
< 450	18mm
450 – 1200	36mm
>1200	54mm

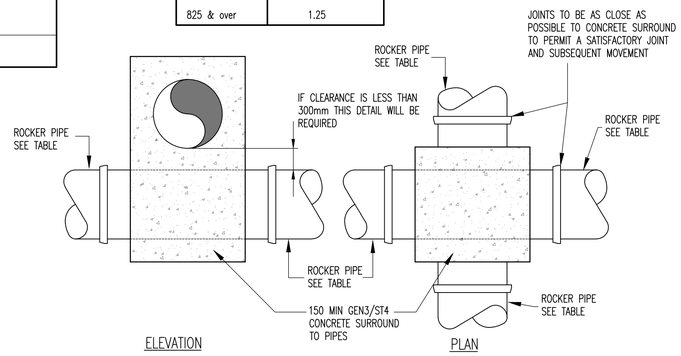
COMPRESSIBLE FILLER TABLE

(BITUMEN IMPREGNATED INSULATING BOARD TO BS EN 622–1 AND BS EN 622–4)

BS EN 13242, COARSE AGGREGATE (CLAUSE 4.3.2)		
CATEGORY FOR GENERAL GRADING REQUIREMENTS	Gc80–20	
CATEGORY FOR TOLERANCES AT MID–SIZE SIEVES	GTnr (NO REQUIREMENTS)	
CATEGORY PF MAXIMUM VALUES OF FINES CONTENTS	GRAVEL – F1.5 CRUSHED ROCK, RECYCLED AGGREGATE – F4	
NOMINAL PIPE DIAMETER, mm	AGGREGATE SIZE, mm	
	GRADED	SINGLE SIZED
NOT EXCEEDING 140	–	4/10
EXCEEDING 140 BUT NOT EXCEEDING 400	2/14 or 4/20	4/10, 6/14 or 10/20
EXCEEDING 400	2/14, 4/20 or 4/40	4/10, 6/14, 10/20 or 20/40

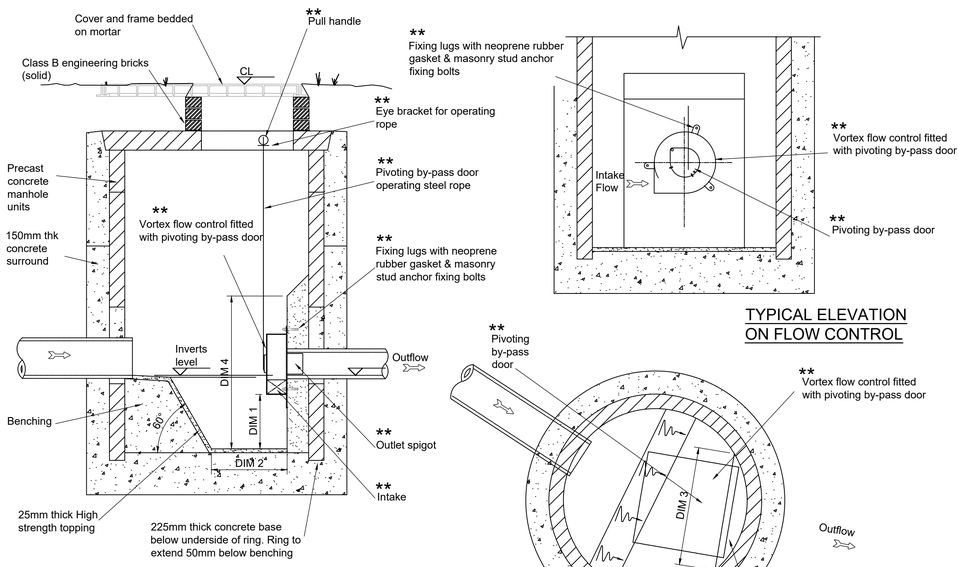
FLEXIBLE PIPE BEDDING, HAUNCHING AND SURROUND MATERIAL

NOMINAL DIA. (mm)	EFFECTIVE LENGTH (m)
150 to 600	0.6
675 to 750	1.0
825 & over	1.25



SPECIAL PIPE CROSSOVER DETAIL

REQUIRED IF CLEARANCE BETWEEN PIPES CROSSING EACH OTHER IS LESS THAN 300mm



TYPICAL SECTION THRU MANHOLE

** By Vortex Flow Control supplier

TYPICAL ELEVATION ON FLOW CONTROL

TYPICAL PLAN

MH Ref	Invert Level	Design Head	Design Flow	Hydrobrake Ref	Dim 1	Dim 2	Dim 3	Dim 4	Min. MH Size
S1.06	29.025	1.5m	4.9 l/s	SHE-0097-4900-1500-4900	TBCmm	TBCmm	TBCmm	TBCmm	1500mm Ø

TYPICAL VORTEX FLOW CONTROL MANHOLE

NOT TO SCALE

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DRAWING STATUS
PRELIMINARY

RIBA STAGE
RIBA STAGE 4

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

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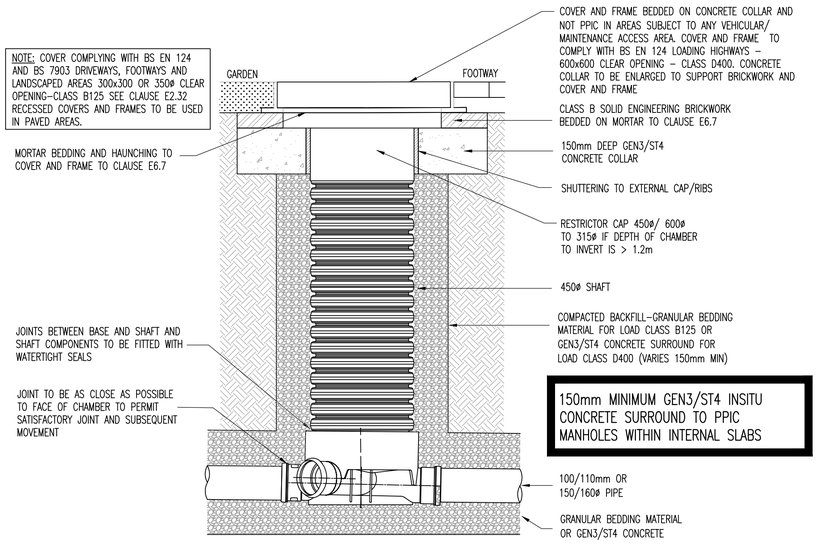
CLIENT
VITA GROUP

PROJECT TITLE
PLOT 10B
FIRST STREET

DRAWING TITLE
TYPICAL DRAINAGE DETAILS
SHEET 2

DRAWING No.	REV.
Z1-ROC-G580-PL-XX-DR03	P01

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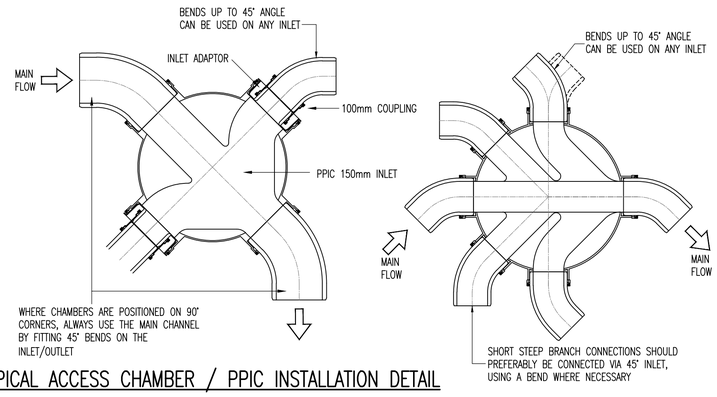


150mm MINIMUM GEN3/ST4 INSITU CONCRETE SURROUND TO PPIC MANHOLES WITHIN INTERNAL SLABS

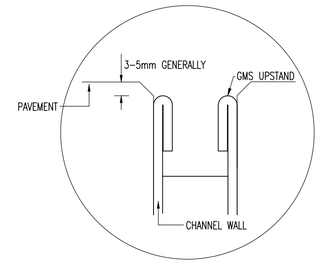
150mm MINIMUM GEN3/ST4 INSITU CONCRETE BED TO PPIC MANHOLES WITHIN INTERNAL SLABS

TYPICAL INSPECTION CHAMBER SfA–7 TYPE D (BASED ON WAVIN RANGE 450/600 CHAMBER)

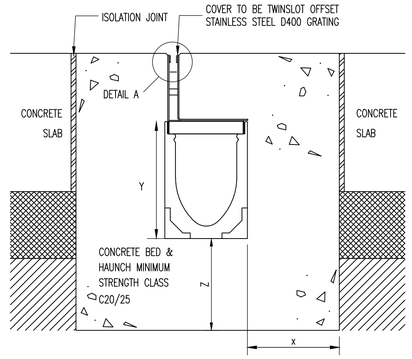
MAXIMUM DEPTH FROM COVER LEVEL TO SOFFIT OF PIPE 3m NON–ENTRY



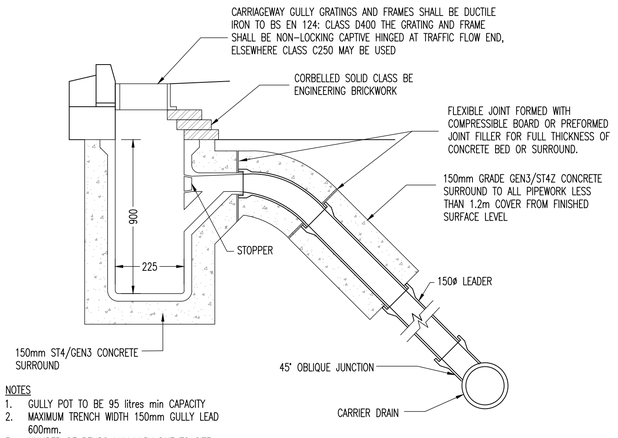
TYPICAL ACCESS CHAMBER / PPIC INSTALLATION DETAIL



DETAIL A



CONCRETE PAVEMENT



NOTES
1. GULLY POT TO BE 95 litres min CAPACITY
2. MAXIMUM TRENCH WIDTH 150mm GULLY LEAD 600mm.
3. NUMBER OF BENDS MAY VARY DUE TO SITE DIFFERENCES.
4. CONCRETE SURROUND OF PIPES SHALL ALWAYS FINISH AT A JOINT.

TYPICAL ROAD GULLY DETAIL

1.0 GROUND CONDITIONS: THE CUSTOMER SHOULD ENSURE THAT THE MINIMUM DIMENSIONS SHOWN ARE SUITABLE FOR THE EXISTING GROUND CONDITIONS. ENGINEERING ADVICE MAY BE NECESSARY.

2.0 BLOCK PAVEMENTS: THE CHANNEL MUST BE SUPPORTED LATERALLY AND THEREFORE BLOCKS MUST BE RESTRAINED FROM MOVEMENT BY BEDDING SECURELY. E.G. BY USING AN EPOXY OR POLYMER MODIFIED MORTAR FOR BED AND PERPENDICULAR JOINTS. (FOR EXAMPLE RONAFIX MORTAR MIX C OR SIMILAR: FROM RONACRETE TEL 01279 638700). ENGINEERING ADVICE MAY BE REQUIRED.

3.0 SURFACE CRACKS: ALTERNATE CRACK CONTROL AND MOVEMENT JOINTS TRANSVERSELY WITHIN BED AND HAUNCH MAY REDUCE UNSIGHTLY SURFACE CRACKING. ENGINEERING ADVICE MAY BE REQUIRED.

4.0 JOINT SEALANT: WHERE ACO DRAIN CHANNEL JOINTS AND FITTINGS ARE TO BE SEALED (WHERE USED IN FOUL WATER APPLICATIONS OR WHERE IMPERMEABILITY IS REQUIRED, FOR EXAMPLE) CONTACT A SEALANT SPECIALIST FOR GUIDANCE ON THE MOST APPROPRIATE SEALING COMPOUND TO USE.

5.0 SURFACE PROTECTION: IN ASPHALT PAVEMENTS AVOID CONTACT BETWEEN COMPACTION EQUIPMENT AND CHANNEL/GRATING. THIS MAY BE ACHIEVED BY ENSURING THAT THE FINISHED SURFACE LEVEL LIES ABOVE THE GRATING LEVEL (BY AT LEAST 3MM). STONES SHOULD BE REMOVED FROM GRATING PRIOR TO LAYING/ROLLING WEARING COURSE.

6.0 GENERAL INSTALLATION NOTES: SEE DRAWING FOR GENERAL NOTES ON INSTALLATION.

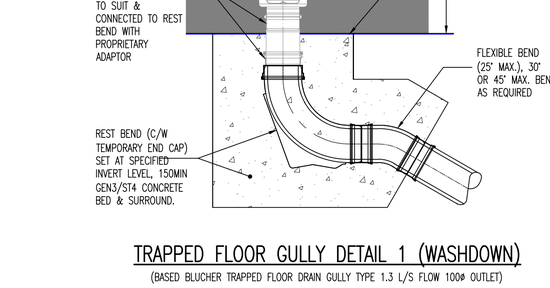
7.0 MINIMUM DIMENSIONS OF CONCRETE SURROUND

LOAD CLASS		A15	B125	C250	D400*
MINIMUM DIMENSIONS (mm)	X	100	150	150	200
	Y	Full Channel Height (Less Y2 where necessary)			
	Z	100	150	150	200
MAXIMUM DIMENSIONS (mm)	Y2+	35	35	35	35
	Y3	100	60	60	60

* E.G. PARKING AREAS FOR ALL TYPES OF ROAD VEHICLE NOT SUITABLE FOR CARRIAGEWAY OF ROADS OR INDUSTRIAL AREAS.
\+ NOTE DASHED LINE PRINTED ON EDGE RAILS 35mm BELOW TOP.

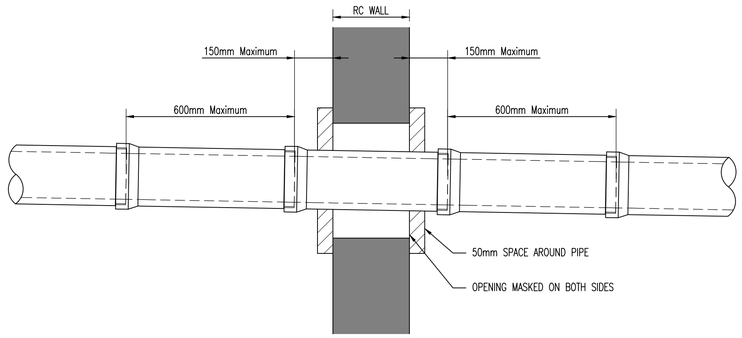
8.0 GRATING SECURITY LOCKS
ALL THE GRATINGS ARE HELD IN THE CHANNEL UNITS BY THE DRAINLOCK ™ FIXING. IN ADDITION, GRATINGS TYPE 23405, 23161 & 23221 (CAST IRON) AND 12680/12682 (COMPOSITE) CAN BE LOCKED IN PLACE WITH AN OPTIONAL SECURITY LOCKING KIT. SEE INSTALLATION NOTES.

INSTALLATION DETAILS FOR ACO MULTIDRAIN M100D DRAINAGE CHANNEL

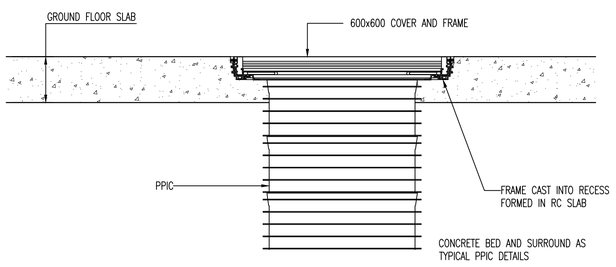


TYPICAL BELOW GROUND WASTE PIPE CONNECTION DETAIL

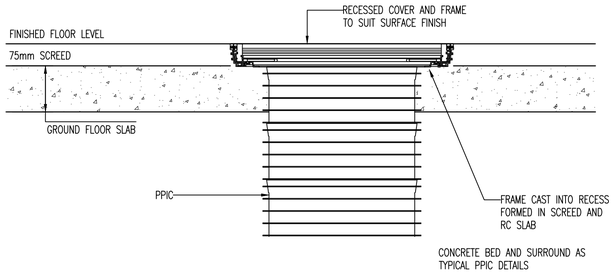
(INVERT LEVEL FOR 100ø AND 150ø ALL TO BE SET AT MAXIMUM OF 1m BELOW SSL & uPVC PIPE LENGTH TO BE ADJUSTED AS REQUIRED)



PIPE PASSING THROUGH OPENING IN WALL



COVER/FRAME TO INTERNAL MANHOLE ON CONCRETE SLAB



COVER/FRAME TO INTERNAL MANHOLE ON SCREED OVEDR CONCRETE SLAB

TRAPPED FLOOR GULLY DETAIL 1 (WASHDOWN)

(BASED BLUCHER TRAPPED FLOOR DRAIN GULLY TYPE 1.3 L/S FLOW 100ø OUTLET)

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DRAWING STATUS
PRELIMINARY

RIBA STAGE
RIBA STAGE 4

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

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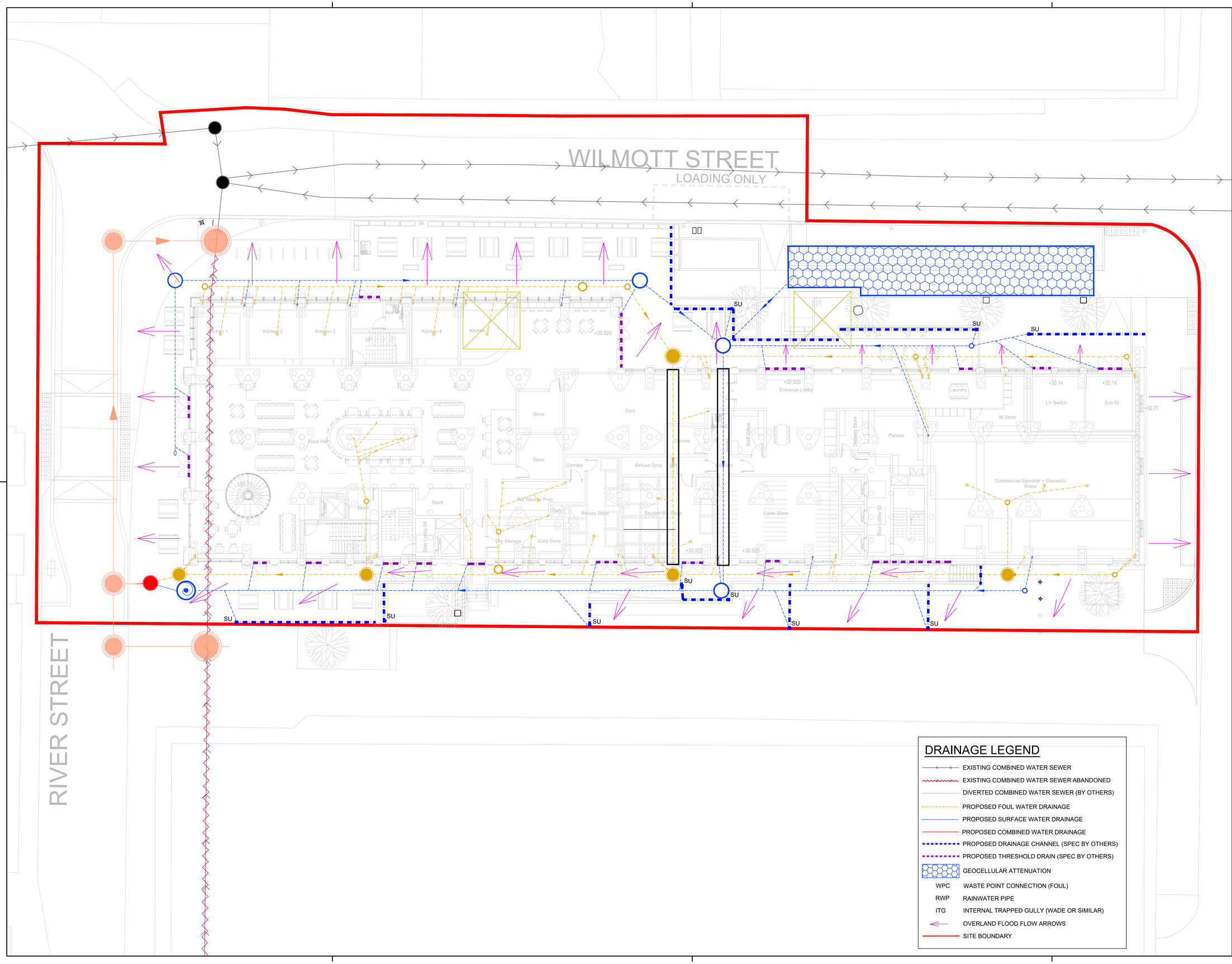
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DRAINAGE LEGEND

- EXISTING COMBINED WATER SEWER
- EXISTING COMBINED WATER SEWER ABANDONED
- DIVERTED COMBINED WATER SEWER (BY OTHERS)
- PROPOSED FOUL WATER DRAINAGE
- PROPOSED SURFACE WATER DRAINAGE
- PROPOSED COMBINED WATER DRAINAGE
- PROPOSED DRAINAGE CHANNEL (SPEC BY OTHERS)
- PROPOSED THRESHOLD DRAIN (SPEC BY OTHERS)
- GEOCELLULAR ATTENUATION
- WPC WASTE POINT CONNECTION (FOUL)
- RWP RAINWATER PIPE
- ITG INTERNAL TRAPPED GULLY (WADE OR SIMILAR)
- OVERLAND FLOOD FLOW ARROWS
- SITE BOUNDARY

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4. BEFORE STARTING ANY WORKS, CONTRACTOR TO CHECK INVERT LEVELS AND POSITIONS OF EXISTING DRAINS, SEWERS, INSPECTIONS CHAMBERS AND MANHOLES AGAINST INFORMATION SHOWN ON THIS DRAWING.
5. ROCKER PIPES ARE TO BE PROVIDED AT ALL CONCRETE CASED INTERFACES.
6. CLASS Z CONCRETE SURROUND TO BE PROVIDED FOR PIPES WITH COVER LESS THAN 1.2m ABOVE THE CROWN OF THE PIPE FOR ROADS AND 0.6m FOR SOFT AND PEDESTRIAN AREAS ONLY AND UNDER ALL FOUNDATIONS AND WHERE PIPES LAID WITHIN 1m OF FOUNDATIONS.
7. CONNECTIONS TO EXISTING PUBLIC SEWERS IN ACCORDANCE WITH UNITED UTILITIES REQUIREMENTS, TO BE APPROVED / AGREED WITH THE WATER AUTHORITY.
8. PROPOSED COVER LEVELS ARE APPROXIMATE AND SHALL BE CHECKED BY THE CONTRACTOR ON SITE TO SUIT THE EXACT FINISHED LEVEL AND GRADIENT.
9. ALL DRAINAGE WORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH THE REQUIREMENTS OF THE LOCAL AUTHORITY AND IN CONJUNCTION WITH ALL RELEVANT BRITISH STANDARDS, CODES OF PRACTICE AND 'SEWERS FOR ADOPTION' 7th EDITION.
10. ACCESS COVERS AND FRAMES SHALL COMPLY WITH THE LOADINGS SPECIFIED AND TO BS EN 124 AND KITEMARKED OR IF RECESSED COVERS ARE SPECIFIED THEN IN ACCORDANCE WITH FACTA ASSOCIATION EQUIVALENT. ALLOW FOR RECESS MANHOLE COVERS TO ACCEPT LANDSCAPE ARCHITECT FINISHES TO ALL NON-ASPHALT EXTERNAL AREAS.
11. THE PROPOSED BUILDING LAYOUTS SHOWN ON THIS DRAWING ARE FOR INFORMATION ONLY. REFER TO ARCHITECTS PLANS FOR PRECISE LOCATION SETTING OUT INFORMATION AND DETAILS
12. FOR SETTING OUT DIMENSIONS OF SSS, SVPS, RWPS, FLOOR GULLY'S & OTHER DRAINAGE 'POP UP' LOCATIONS, REFER TO ARCHITECTS OR MECHANICAL & ELECTRICAL ENGINEERS DRAWINGS.
13. ALL DRAINAGE PIPEWORK SHOWN SHALL BE 100mm DIAMETER FOR FOUL AND 150mm FOR SURFACE WATER UNLESS NOTED OTHERWISE. ALL DRAINAGE PIPEWORK SHALL BE LAID SOFFIT TO SOFFIT UNLESS OTHERWISE STATED.
14. ALL UNDERSLAB DRAINAGE SHALL BE LAID AT GRADIENTS OF 1:80 MIN. FOR FOUL PIPEWORK AND 1:100 MIN. FOR SURFACE WATER UNLESS NOTED OTHERWISE. ALL UNDERSLAB DRAINAGE SHALL BE CLEAR OF FOUNDATIONS UNLESS SHOWN OTHERWISE. USE OF SHORT LONG RADIUS BENDS IS ACCEPTABLE PROVIDED THEY ARE KEPT TO A MINIMUM AND USED WHERE UNAVOIDABLE.
15. AT LEAST ONE SOIL PIPE AT THE HEAD OF EACH FOUL RUN SHALL BE VENTED TO THE ATMOSPHERE. ALL RAINWATER PIPES SHALL HAVE ABOVE GROUND RODDING ACCESS.
16. ALL PRIVATE DRAINAGE PIPEWORK FOR FOUL AND SURFACE WATER SYSTEMS HAVE BEEN DESIGNED ON THE BASIS OF UPVC TO BS EN 1401-1, UNLESS NOTED OTHERWISE. SURFACE WATER CAN ALSO BE CONSTRUCTED WITH POLYPIPE TWINWALL PIPES.
17. CONCRETE ENCASEMENT OF THE PIPEWORK SHALL BE REQUIRED WHERE THE VERTICAL CLEARANCE BETWEEN TWO PIPES CROSSING IS LESS THAN 300MM.
18. WHERE NEW DRAINAGE IS SITUATED WITHIN 5 METRES OF NEW OR EXISTING TREES THE PIPEWORK SHALL BE ENCASED IN CONCRETE TO REDUCE THE RISK OF ROOT INGRESS.
19. ALL NEW DRAINAGE INSTALLATIONS TOGETHER WITH ANY EXISTING DRAINAGE RETAINED SHALL BE JETTED AND CCTV SURVEYED UPON COMPLETION. CONTRACTOR TO ENSURE THAT THE DRAINAGE SYSTEM IS FULLY OPERATIONAL, FREE OF EXCESS DEBRIS/SILT AND ALL IDENTIFIED FAULTS RECTIFIED.
20. ATTENUATION STORAGE CALCULATIONS INCLUDE CLIMATE CHANGE ALLOWANCE OF 40% IN ACCORDANCE WITH CURRENT ENVIRONMENT AGENCY GUIDELINES.

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DRAWING STATUS
PRELIMINARY

RIBA STAGE
RIBA STAGE 4

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

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PROJECT TITLE
PLOT 10B
FIRST STREET

DRAWING TITLE
OVERLAND FLOOD
FLOW ROUTING

DRAWING No.	REV.
Z1-ROC-G580-PL-XX-DR05	P01

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COMPLEX CHALLENGES ...
MADE SIMPLE

APPENDIX B – HYDRAULIC CALCULATIONS

	Plot 10b First Street Surface Water Network V2 24.05.23	
Date 24/05/2023 File First Street - Plot 10b...	Designed by paulg Checked by	
Innovyze	Network 2017.1.2	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	2	PIMP (%)	100
M5-60 (mm)	18.000	Add Flow / Climate Change (%)	0
Ratio R	0.364	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	3.000
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.145	4-8	0.083

Total Area Contributing (ha) = 0.228

Total Pipe Volume (m³) = 6.490

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	40.000	0.300	133.3	0.104	4.00	0.0	0.600	o	225	Pipe/Conduit	
1.001	8.000	0.060	133.3	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
2.000	35.000	0.300	116.7	0.041	4.00	0.0	0.600	o	150	Pipe/Conduit	
3.000	8.000	0.070	114.3	0.000	4.00	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	4.59	29.915	0.104	0.0	0.0	0.0	1.13	45.0	14.1
1.001	50.00	4.71	29.615	0.104	0.0	0.0	0.0	1.13	45.0	14.1
2.000	50.00	4.63	30.025	0.041	0.0	0.0	0.0	0.93	16.4	5.6
3.000	50.00	4.09	29.550	0.000	0.0	0.0	0.0	1.47	103.9	0.0

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	Plot 10b First Street Surface Water Network V2 24.05.23	
Date 24/05/2023 File First Street - Plot 10b...	Designed by paulg Checked by	
Innovyze	Network 2017.1.2	

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.002	21.000	0.150	140.0	0.005	0.00	0.0	0.600	o	225	Pipe/Conduit	
4.000	37.000	2.300	16.1	0.050	4.00	0.0	0.600	o	150	Pipe/Conduit	
1.003	45.000	0.300	150.0	0.028	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.004	3.000	0.020	150.0	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)
1.002	50.00	5.02	29.480	0.150	0.0	0.0	0.0	1.10	43.9	20.3
4.000	50.00	4.24	31.700	0.050	0.0	0.0	0.0	2.52	44.6	6.8
1.003	50.00	5.73	29.325	0.228	0.0	0.0	0.0	1.07	42.4	30.9
1.004	50.00	5.78	29.025	0.228	0.0	0.0	0.0	1.07	42.4	30.9

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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	225	S1.00	30.915	29.915	0.775	Open Manhole	450
1.001	o	225	S1.01	30.915	29.615	1.075	Open Manhole	450
2.000	o	150	S1.02	30.925	30.025	0.750	Open Manhole	450
3.000	o	300	TANK	31.350	29.550	1.500	Open Manhole	1200
1.002	o	225	S1.03	30.910	29.480	1.205	Open Manhole	1200
4.000	o	150	S1.04	33.000	31.700	1.150	Open Manhole	450
1.003	o	225	S1.05	30.925	29.325	1.375	Open Manhole	1200
1.004	o	225	S1.06	30.800	29.025	1.550	Open Manhole	1200

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	40.000	133.3	S1.01	30.915	29.615	1.075	Open Manhole	450
1.001	8.000	133.3	S1.03	30.910	29.555	1.130	Open Manhole	1200
2.000	35.000	116.7	S1.03	30.910	29.725	1.035	Open Manhole	1200
3.000	8.000	114.3	S1.03	30.910	29.480	1.130	Open Manhole	1200
1.002	21.000	140.0	S1.05	30.925	29.330	1.370	Open Manhole	1200
4.000	37.000	16.1	S1.05	30.925	29.400	1.375	Open Manhole	1200
1.003	45.000	150.0	S1.06	30.800	29.025	1.550	Open Manhole	1200
1.004	3.000	150.0	sewer	30.700	29.005	1.470	Open Manhole	0

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.004	sewer	30.700	29.005	27.500	0	0

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Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Storm Duration (mins)	30
Ratio R	0.364		

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Online Controls for Storm

Hydro-Brake® Optimum Manhole: S1.06, DS/PN: 1.004, Volume (m³): 3.7

Unit Reference	MD-SHE-0097-4900-1500-4900
Design Head (m)	1.500
Design Flow (l/s)	4.9
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	97
Invert Level (m)	29.025
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.500	4.9
Flush-Flo™	0.424	4.8
Kick-Flo®	0.867	3.8
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)
0.100	3.2	1.200	4.4	3.000	6.8	7.000	10.1
0.200	4.3	1.400	4.7	3.500	7.3	7.500	10.5
0.300	4.7	1.600	5.0	4.000	7.8	8.000	10.8
0.400	4.8	1.800	5.3	4.500	8.2	8.500	11.1
0.500	4.7	2.000	5.6	5.000	8.6	9.000	11.4
0.600	4.7	2.200	5.9	5.500	9.0	9.500	11.7
0.800	4.2	2.400	6.1	6.000	9.4		
1.000	4.1	2.600	6.3	6.500	9.8		

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	Plot 10b First Street Surface Water Network V2 24.05.23	
Date 24/05/2023 File First Street - Plot 10b...	Designed by paulg Checked by	
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Storage Structures for Storm

Cellular Storage Manhole: TANK, DS/PN: 3.000

Invert Level (m) 29.550 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	110.0	110.0	5.200	0.0	143.6
0.400	110.0	126.8	5.600	0.0	143.6
0.800	110.0	143.6	6.000	0.0	143.6
0.801	0.0	143.6	6.400	0.0	143.6
1.600	0.0	143.6	6.800	0.0	143.6
2.000	0.0	143.6	7.200	0.0	143.6
2.400	0.0	143.6	7.600	0.0	143.6
2.800	0.0	143.6	8.000	0.0	143.6
3.200	0.0	143.6	8.400	0.0	143.6
3.600	0.0	143.6	8.800	0.0	143.6
4.000	0.0	143.6	9.200	0.0	143.6
4.400	0.0	143.6	9.600	0.0	143.6
4.800	0.0	143.6	10.000	0.0	143.6

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	Plot 10b First Street Surface Water Network V2 24.05.23	Micro Drainage
Date 24/05/2023 File First Street - Plot 10b...	Designed by paulg Checked by	
Innovyze	Network 2017.1.2	

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

Simulation Criteria

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

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

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.364
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.000	Cv (Winter)	0.840

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
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 45

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S1.00	15 Winter	1	+0%	30/15 Summer				30.001
1.001	S1.01	15 Winter	1	+0%	1/15 Winter				29.841
2.000	S1.02	15 Winter	1	+0%	100/15 Summer				30.085
3.000	TANK	30 Winter	1	+0%	30/60 Winter				29.608
1.002	S1.03	15 Winter	1	+0%	1/15 Summer				29.833
4.000	S1.04	15 Winter	1	+0%					31.739
1.003	S1.05	15 Winter	1	+0%	1/15 Summer				29.840
1.004	S1.06	15 Winter	1	+0%	1/15 Summer				29.826

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S1.00	-0.139	0.000	0.31		13.2	OK	
1.001	S1.01	0.001	0.000	0.38		13.0	SURCHARGED	
2.000	S1.02	-0.090	0.000	0.33		5.3	OK	
3.000	TANK	-0.242	0.000	0.06		3.8	OK	

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.002	S1.03	0.128	0.000	0.37		14.7	SURCHARGED	
4.000	S1.04	-0.111	0.000	0.15		6.5	OK	
1.003	S1.05	0.290	0.000	0.45		18.1	SURCHARGED	
1.004	S1.06	0.576	0.000	0.18		4.8	SURCHARGED	

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	Plot 10b First Street Surface Water Network V2 24.05.23	Micro Drainage
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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

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

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.364
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.000	Cv (Winter)	0.840

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
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 45

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S1.00	15 Summer	30	+0%	30/15 Summer				30.198
1.001	S1.01	15 Summer	30	+0%	1/15 Winter				30.038
2.000	S1.02	15 Summer	30	+0%	100/15 Summer				30.131
3.000	TANK	60 Winter	30	+0%	30/60 Winter				29.853
1.002	S1.03	15 Summer	30	+0%	1/15 Summer				29.934
4.000	S1.04	15 Winter	30	+0%					31.763
1.003	S1.05	15 Summer	30	+0%	1/15 Summer				30.064
1.004	S1.06	15 Summer	30	+0%	1/15 Summer				30.086

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S1.00	0.058	0.000	0.74		31.4	SURCHARGED	
1.001	S1.01	0.198	0.000	0.97		33.4	SURCHARGED	
2.000	S1.02	-0.044	0.000	0.80		12.7	OK	
3.000	TANK	0.003	0.000	0.20		13.4	SURCHARGED	

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.002	S1.03	0.229	0.000	0.35		14.0	SURCHARGED	
4.000	S1.04	-0.087	0.000	0.37		15.8	OK	
1.003	S1.05	0.514	0.000	0.43		17.5	SURCHARGED	
1.004	S1.06	0.836	0.000	0.18		4.8	SURCHARGED	

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

Simulation Criteria

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

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.364
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.000	Cv (Winter)	0.840

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
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 45

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S1.00	15 Winter	100	+45%	30/15 Summer				30.784
1.001	S1.01	180 Winter	100	+45%	1/15 Winter				30.353
2.000	S1.02	15 Winter	100	+45%	100/15 Summer				30.685
3.000	TANK	120 Winter	100	+45%	30/60 Winter				30.331
1.002	S1.03	180 Winter	100	+45%	1/15 Summer				30.351
4.000	S1.04	15 Winter	100	+45%					31.792
1.003	S1.05	180 Winter	100	+45%	1/15 Summer				30.406
1.004	S1.06	180 Winter	100	+45%	1/15 Summer				30.429

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S1.00	0.644	0.000	1.31		55.9	FLOOD RISK	
1.001	S1.01	0.513	0.000	0.40		13.7	SURCHARGED	
2.000	S1.02	0.510	0.000	1.38		21.8	FLOOD RISK	
3.000	TANK	0.481	0.000	0.24		15.7	SURCHARGED	

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.002	S1.03	0.646	0.000	0.38		15.3	SURCHARGED	
4.000	S1.04	-0.058	0.000	0.69		29.7	OK	
1.003	S1.05	0.856	0.000	0.22		8.7	SURCHARGED	
1.004	S1.06	1.179	0.000	0.18		4.8	SURCHARGED	

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COMPLEX CHALLENGES ...
MADE SIMPLE

APPENDIX C – UU PRE-DEVELOPMENT RESPONSE

Andy James

From: wastewaterdeveloperservices@uuplc.co.uk
Sent: 01 November 2022 15:52
To: Andy James
Subject: PDE for: Plot 10b, First Street UU Ref : 02985624

Categories: Filed by Newforma

Good afternoon Andy

Pre Development Enquiry for: Plot 10b, First Street UU Reference Number : 02985624

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 6723 723 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.

Our preferred point of discharge would be to the 610mm diameter public combined sewer within River Street located to the North of your proposed development at an unrestricted rate.

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.

Please ensure all proposed manhole chambers cover levels and finished floor levels are higher than the receiving public sewer.

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

According to the provided document ref: 4302R001-3, dated 01/2020, prepared by Terra Consult, we are satisfied that infiltration is not feasible, we accept the provided sufficient evidence to discount infiltration.

Waterbody

United Utilities acknowledge that the nearest watercourse is a significant distance off-site.

Highway Drainage

If an evidence based assessment has been carried out and confirms that infiltration is not feasible, we recommend that you investigate the possibility of draining surface water to the highway drain where this ultimately discharges to a watercourse, by contacting the relevant Highway Authority.

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 to the 610mm diameter public combined sewer within River Street located North of the proposed site 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.

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 pubic sewerage network under any circumstances

Existing Wastewater Assets Crossing the Site

According to our public sewer records there are public sewers located within your site boundary. We will require unrestricted access to the sewer for maintenance purposes, we would ask that you maintain a minimum clearance of 6m which is measured 3m from the centre line of the pipe unless there happens to be a formal easement agreement in place, in which case the specified easement width would apply. If you cannot achieve this then you may wish to consider diverting and or abandoning the public sewer.

Please be aware that any proposed diversion may require modelling. This process may take up to 6 months in order to reach an acceptable design. Please submit your S185 as soon as possible to avoid delaying your planning application.

Please refer to the link below to obtain full details of the processes involved with sewer diversions:

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

Please refer to the link below to obtain full details of the processes involved with sewer closure:

https://www.unitedutilities.com/builders-developers/wastewater-services/close-a-sewer/sewer-closures/

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/wastewater-services/sewer-connections/sewer-connection/

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.

Many thanks and kind regards,

Mohammed Aljafarawi (He/Him)
Developer Engineer
Developer Services & Metering
Customer Services
M: 07950474499
unitedutilities.com

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RoCP Ltd
(Trading as RoC Consulting)
Commercial Wharf
6 Commercial Street
MANCHESTER
M15 4PZ

T | 0161 214 5390
W | www.rocconsulting.com