Intended for
Manchester City Council

Project no.
1620003165

Date
01 August 2019



OUR TOWN HALL, MANCHESTER

Drainage Planning Condition Sign Off – Early Works Package

Document ref: OTH-RAM-XX-XX-RPT-C-0019

Revision History

Revision	Date	Purpose / Status	Comments
P01	01/08/2019	Planning Submission / S3	For Approval

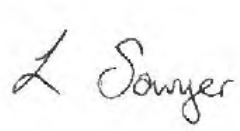
Prepared By		Reviewed By		Approved By
				
Lisa Sawyer		**Gary Willis**		**Greig Kirker**
Director		Director		Director

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1. INTRODUCTION

Flood Risk Management Team via the Manchester Planning Authority has recommended the following draft planning condition. The information included within this document is proposed to remove the need for the condition or discharge the condition.

Installation of the drainage works shall not commence until a surface water drainage scheme for the site has been submitted to and approved in writing by the local planning authority. The development shall be constructed and completed in accordance with the approved details. The scheme shall also include:

1.Surface water drainage layout including discharge points and proposed overland flow routes for extreme events (up to a 1 in 100 year including 40% climate change allowance).

2.Hydraulic calculations to support the drainage proposal.

3.Agreement in principle from United Utilities to assess whether there is adequate spare capacity in the existing system taking climate change requirements into account.

4. Details of how the scheme shall be maintained and managed after completion.

2. DESIGN PHILOSOPHY

<table>
<tr><td>Site constraints which affect drainage design</td><td>The site is located within the Manchester Conurbation Core Critical Drainage Area. Therefore, in accordance with Manchester City Council guidelines, a minimum 50% reduction on existing surface water flow rates / volumes should be applied and agreement was made with the Lead Local Flood Authority that due to space restrictions within the courtyard of the building the restriction would be limited to the capacity of the existing discharge pipework and where new drainage was being installed the drainage will be designed for 40% climate change.

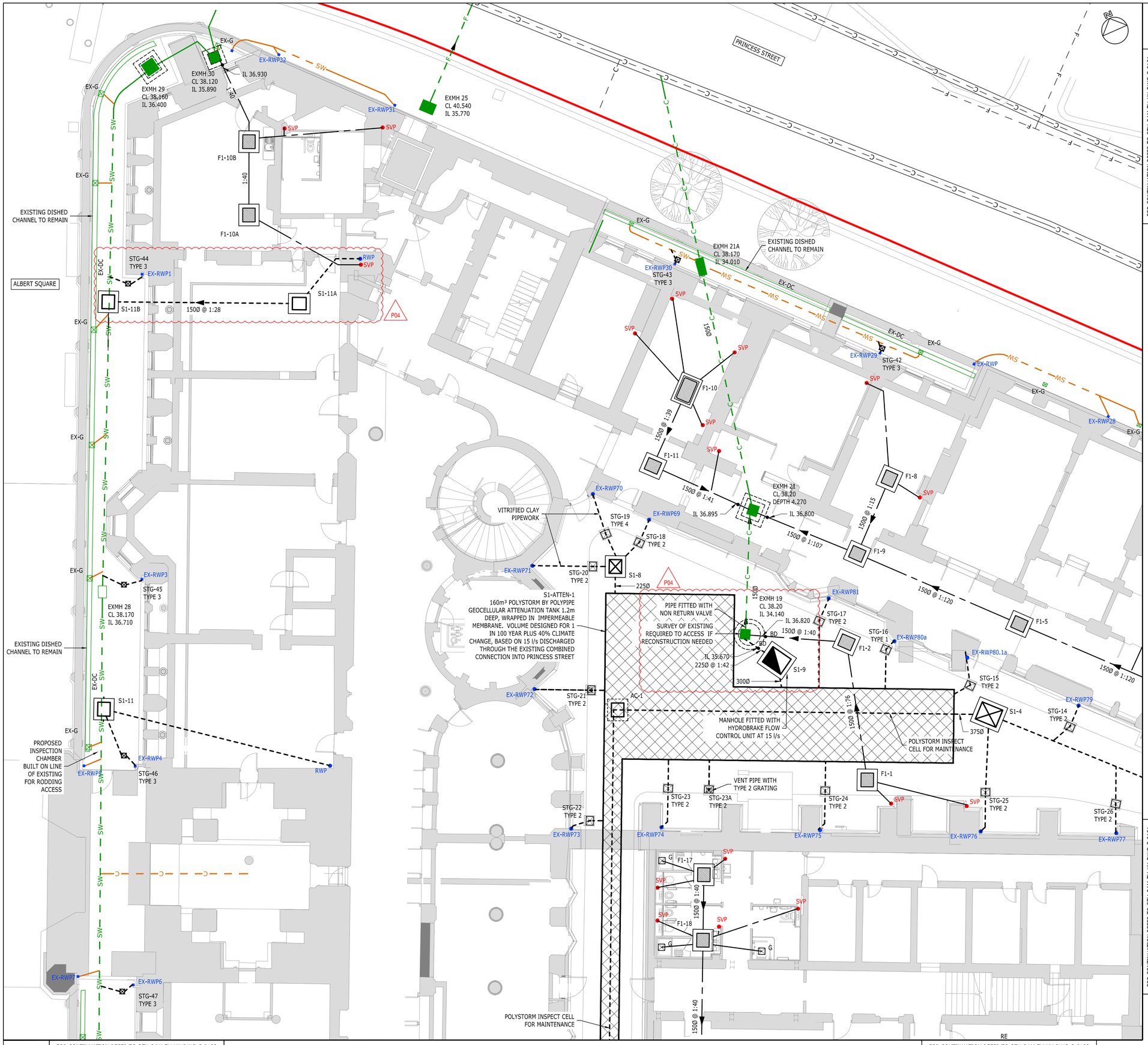
Some existing drainage within the moats will remain within the scheme.</td></tr>
<tr><td>Relevant building regulations, design codes and design guides used</td><td>BS EN 752:2017 — Drain and Sewer Systems Outside Buildings
BS EN 12056-2:2000 — Gravity Drainage Systems Inside Buildings – Part 2 Sanitary Drainage
BS EN 12056-3:2000 — Gravity Drainage Systems Inside Buildings – Part 3 Roof Drainage
Building Regulations 2015 — Approved Document H – Drainage and Waste Disposal
Ciria C753 — The SuDS Manual
HR Wallingford — Wallingford Procedure for Design and Aanalysis of Urban Storm Drainage
PPG3 — Environment Agency Pollution Prevention Guidelines 3 (Withdrawn but remains best practice)
BS EN 16933-2:2017 — Drain and Sewer Systems Outside Buildings – Part 2: Design
SFA7 — Sewers for Adoption 7th Edition
BW COP 4 — British Water Flows and Loads 4</td></tr>
<tr><td>Design Software Utilised</td><td>• AutoCAD 2016/2018
• Civil 3D 2018
• Microdrainage 2017/2018
• NBS Building</td></tr>
<tr><td>Drawings and Specifications</td><td>This drainage philosophy is to be read in conjunction with the following Ramboll below ground drainage drawings and specification:

<table>
<tr><td>OTH-RAM-TH-XX-DWG-C-5100</td><td>Enabling Works Drainage Sheet 1 of 4</td></tr>
<tr><td>OTH-RAM-TH-XX-DWG-C-5101</td><td>Enabling Works Drainage Sheet 2 of 4</td></tr>
<tr><td>OTH-RAM-TH-XX-DWG-C-5102</td><td>Enabling Works Drainage Sheet 3 of 4</td></tr>
<tr><td>OTH-RAM-TH-XX-DWG-C-5103</td><td>Enabling Works Drainage Sheet 4 of 4</td></tr>
<tr><td></td><td></td></tr>
<tr><td>OTH-RAM-TH-XX-DWG-C-5200</td><td>Enabling Works Schedules Sheet 1</td></tr>
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	OTH-RAM-TH-XX-DWG-C-5401 — Enabling Works Details Sheet 2 OTH-RAM-TH-XX-DWG-C-5402 — Enabling Works Details Sheet 3
Foul Water General	The existing site discharges foul water via a number of connections into the public sewer systems which are adjacent to the site. The development proposals for the site are to reuse the existing drainage within the courtyard for foul drainage collection re-using the existing 150mm connection into the public sewer within Lloyd Street. The source of foul drainage is expected to be domestic in nature.
Foul Water Discharge Agreement	United Utilities have confirmed via Developer Enquiry (Ref: 4200019060) dated 26th July 2019 that foul water from the site will be allowed to drain to the public combined sewer network at an unrestricted rate continuing to drain the existing building and associated courtyard via the existing connections. A S106 Agreement will not be required to be submitted to United Utilities
Surface Water General	The agreed surface water discharge rate from the courtyard is 15 l/s which is the capacity of the existing outfall pipework. External rainwater pipes which connect directly to sewer can continue to do so. The majority of the roof discharges via rainwater pipes into the courtyard which will be collected via silt trap gullies at each rainwater pipe location which discharge into a below ground attenuation tank before discharge at 15l/s.
Surface Water Discharge Agreement	United Utilities have confirmed via Developer Enquiry (Ref: 4200019060 dated 26th July 2019) that surface water from the site will be allowed to drain to the public combined sewer network via the existing connections from the building. A S106 Agreement will not be required to be submitted to United Utilities. Manchester City Council LLFA have confirmed that surface water runoff from the site should be restricted to a maximum of 15 l/s which represents the remaining capacity of the existing connection into the Princess Street sewer.
Exceedance	The courtyard is located at basement level and therefore there are no flow routes out of the building for flood water when the drainage system is at capacity. The below ground system has been designed to store water below ground for the 1 in 100-year storm event plus 40% for climate change therefore a check has been undertaken on the amount of water which can be stored within the surfacing before entering the building. The outcome of this is indicated on Sketch OTH-RAM-XX-XX-SKE-C-0044. Flooding at manhole S1-5 will hold the flooding up to the 1in600 year storm event.

	Flooding at S1-1, S1-2 & Ex MH 10 will hold the flooding up the 1in500 year storm event.
Drainage materials	Foul Water Drains (generally) – vitrified clay pipework – DN100, DN150, DN225 Surface Water Drains (generally) – HDPE Structured Wall – DN150, DN225, DN300, DN375 Foul Water Drains (cast into structure / exposed) – Ductile Cast Iron – DN100, DN150 Surface Water Drains (cast into structure / exposed) – Ductile Cast Iron – DN150. Internal Surface Water Manholes – Brick (covers to be recessed, sealable and lockable) Internal Foul Manholes – Brick (covers to be recessed, sealable and lockable) Surface Water Attenuation – Polystorm by Polypipe
SuDs / Attenuation	Where possible attenuation has been incorporated into the scheme. Green/above ground SuDs were not possible on the part of the site due to space restrictions and heritage nature of the building. Geocellular tanks are to be utilised as these can be easily changed shape (to suit underground obstructions) and man-handled into the courtyard.
Grease separation	Grease provision has been incorporated into the foul below ground drainage system. The system proposed will have a suction line incorporated so that it is easily maintained from the external elevation of the building as the courtyard has restricted access for large vehicles.
Oil separation	No required within the courtyard area as limited vehicles will use this area
Anti-flood valves	Non-return valves to be fitted on the existing outlets to avoid flooding within the site and backing up the public sewer networks
External drainage collection	The courtyard and moats will be collected via silt trap gullies at every rainwater pipe location. Those in the courtyard are located at the low spots in the proposed surfacing. The area of courtyard surfacing being drained by each gully is not more than 20m2 therefore redundancy in the system has been designed for if gullies are blocked.

APPENDIX 1
PROPOSED BELOW GROUND DRAINAGE DRAWINGS



5. THIS DRAWING HAS BEEN CREATED USING THE FOLLOWING INFORMATION:

- UTILITIES SURVEY BY POWERS AND TILTMAN DATED FEBRUARY/MARCH 2018
- CCTV DRAINAGE SURVEY BY POWERS AND TILTMAN DATED 14/11/18
- PROPOSED LANDSCAPE PLAN BY PLAN IT, DRAWING NUMBER OTH-PLA-EE-ES-CAD-L-1000 REV 10
- PROPOSED LOWER GROUND FLOOR PLAN BY PURCELL, EXPORTED 20.06.19
- PROPOSED SERVICES PLAN BY ARUP

6. ANY DISCREPANCIES IN DIMENSIONS OR DETAILS ON OR BETWEEN DRAWINGS SHOULD BE DRAWN TO THE ATTENTION OF THE ENGINEER FOR CLARIFICATION.

7. THIS DRAWING HAS BEEN DEVELOPED USING INFORMATION PROVIDED TO RAMBOLL BY A NUMBER OF THIRD PARTIES. RAMBOLL CAN ACCEPT NO RESPONSIBILITY FOR THE ACCURACY OF THE THIRD PARTY INFORMATION SHOWN.

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9. FOR DRAINAGE DETAILS REFER TO DRAWING SERIES OTH-RAM-XX-XX-DWG-C-0400

10. ALL DRAINAGE WORKS CARRIED OUT IN ACCORDANCE WITH SEWERS FOR ADOPTION 7TH EDITION, BS EN 752 (2008), BUILDING REGULATIONS PART H, RELEVANT WATER AUTHORITY STANDARDS, LOCAL COUNCIL STANDARDS AND HEALTH AND SAFETY POLICIES.

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14. ALL SURFACE WATER PIPES (UP TO 600mm DIA) TO BE STRUCTURED WALL HDPE TO BS EN 13476-1 AND -3, KITEMARKED, AGREMENT CERTIFIED OR CE MARKED U.N.O.

15. ALL FOUL WATER PIPES TO BE VITRIFIED CLAY TO BS EN 295-1:1991/BS 65 AS APPROPRIATE , KITEMARKED, AGREMENT CERTIFIED OR CE MARKED U.N.O.

16. ANY PIPEWORK WHICH IS CAST INTO FOUNDATIONS OR THROUGH GROUND BEAMS TO BE CAST IRON.

17. BRICK MANHOLES TO BE CONSTRUCTED USING CLASS B ENGINEERING BRICK IN ACCORDANCE WITH BS EN 771-1:2011, BS 5628-1:2005, AND PD 6697:2010.

18. POLYPROPYLENE INSPECTION CHAMBER TO BE IN ACCORDANCE WITH B57158 OR BSEN13598-1 OR AGREEMENT CERTIFIED MINIMUM INTERNAL DIAMETER 450mm UNO.

19. ALL FOUL BRANCH CONNECTIONS TO BE DN100 AT 1:40 MINIMUM GRADIENT U.N.O. HEAD OF BRANCH IL=37.450 U.N.O.

20. ALL SURFACE WATER BRANCHES FROM RAIN WATER DOWN PIPES , INTO SILT TRAP TO BE DN150 AT 1:60 MINIMUM GRADIENT. ALL OTHER SURFACE WATER BRANCHES TO BE DN150 AT 1:80 UNO.

21. FOR PIPES WITH MORE THAN 1200mm COVER BELOW EXTERNAL GROUND LEVEL OR GREATER THAN 300mm BELOW BUILDING SLAB TO HAVE CLASS S SURROUND U.N.O IN ACCORDANCE WITH BUILDING REGULATIONS DOCUMENT H.

22. ALL DRAINAGE WITH LESS THAN 300mm COVER BELOW BUILDING SLAB TO HAVE CLASS Y CONCRETE SURROUND

23. CONNECTION TO EXISTING DRAINAGE IS SUBJECT TO AGREEMENT IN PRINCIPLE. A SECTION 106 AGREEMENT IS REQUIRED TO BE SUBMITTED BY THE CONTRACTOR FOR FORMAL CONNECTION.

24. SURFACE WATER DISCHARGE HAS BEEN RESTRICTED TO 15 L/S. FOUL WATER DISCHARGE IS UNRESTRICTED.

25. LOCATION OF FOUL STACKS AND GULLYS THROUGH THE SLAB ARE CURRENTLY ASSUMED. SETTING OUT TO BE PROVIDED BY PURCELL.

26. THIS DRAWING IS THE COPYRIGHT OF RAMBOLL UK.

Scale Bars to be used as guidance only - refer to sheet size below

1:100	mm	4000	6000	8000	10000	12000	
1:200	mm	2000	4000	6000	8000	10000	
1:500	m	5	10	15	25	35	
1:1250	m	10	30	50	70	90	

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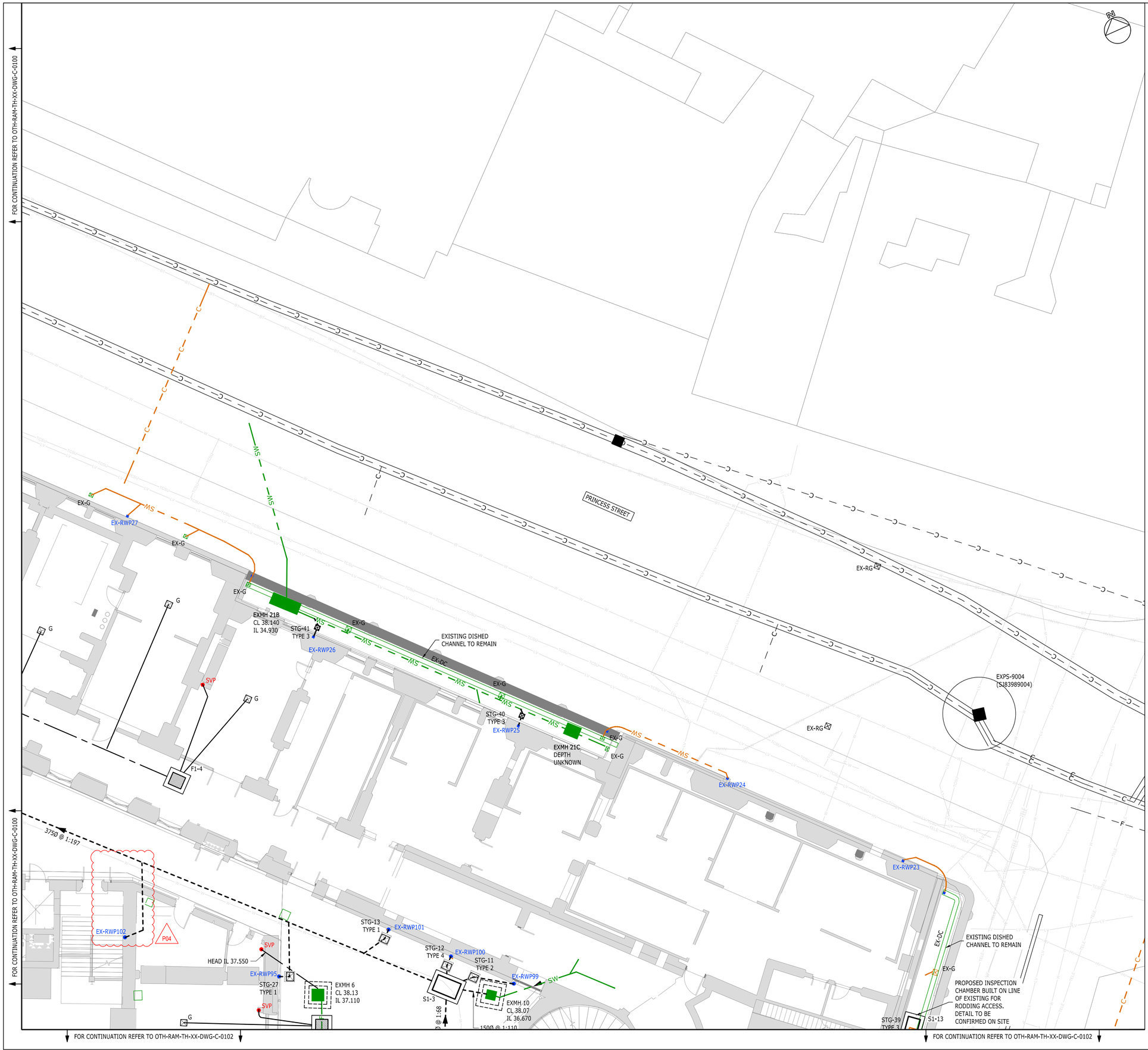
OUR TOWN HALL PROJECT

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PROJECT STATUS	STAGE 4
CLIENT	MANCHESTER CITY COUNCIL
PROJECT	OUR TOWN HALL PROJECT
DRAWING TITLE	TOWN HALL PROPOSED DRAINAGE SHEET 1 OF 4
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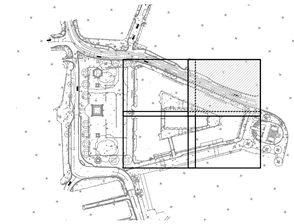
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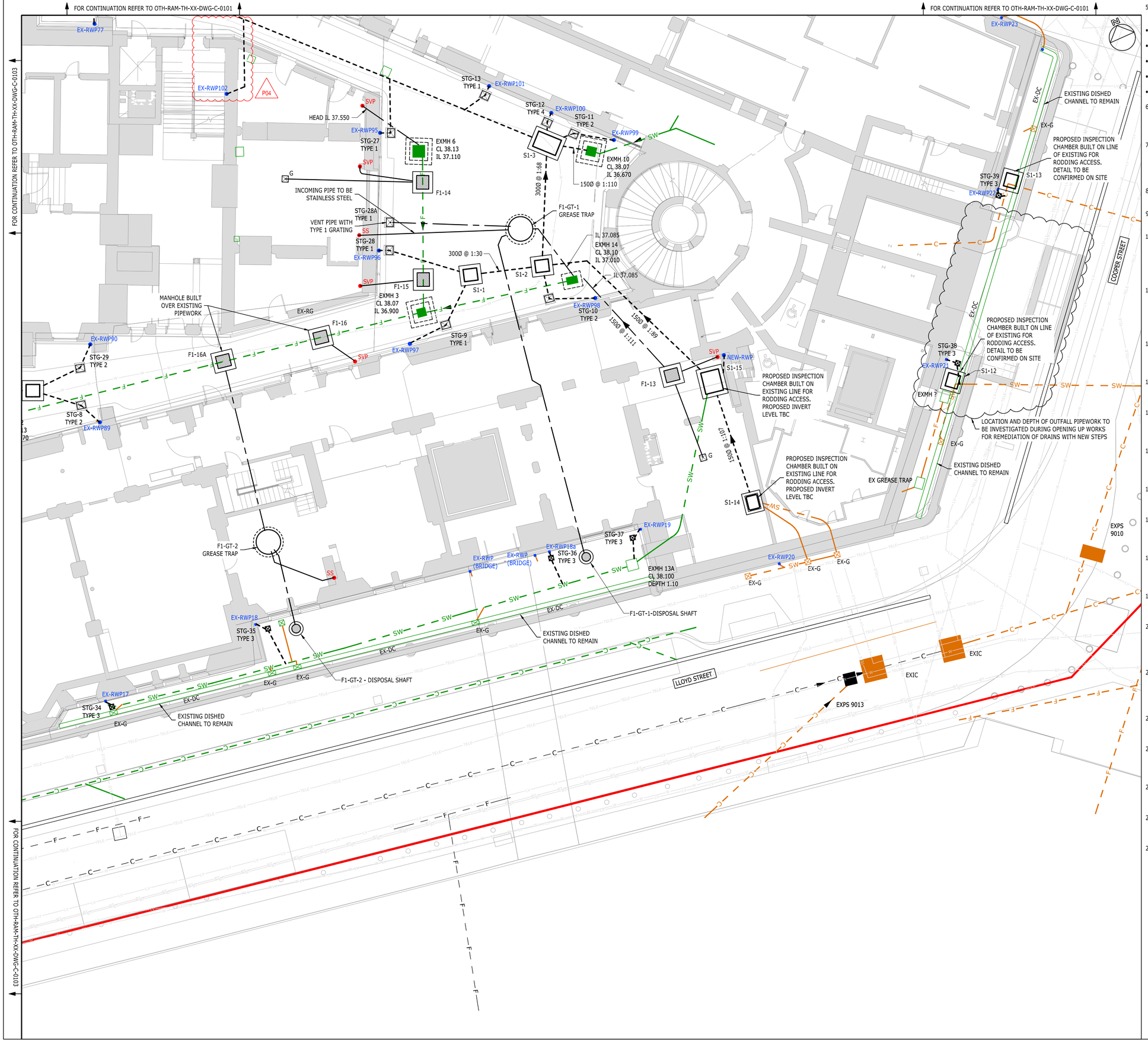
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17 July 2019 15:43:54



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24. SURFACE WATER DISCHARGE HAS BEEN RESTRICTED TO 15 L/S. FOUL WATER DISCHARGE IS UNRESTRICTED.

25. LOCATION OF FOUL STACKS AND GULLYS THROUGH THE SLAB ARE CURRENTLY ASSUMED. SETTING OUT TO BE PROVIDED BY PURCELL.

26. THIS DRAWING IS THE COPYRIGHT OF RAMBOLL UK.

Scale Bars to be used as guidance only - refer to sheet size below

1:100	mm	1000	3000	5000	7000		
1:200	mm	2000	4000	6000	8000	10000	12000
1:500	m	5	15	25	35		
1:1250	m	10	30	50	70	90	

1. DO NOT SCALE FROM THIS DRAWING
2. ALL DIMENSIONS ARE MILLIMETERS U.N.O
3. ALL LEVELS ARE IN METERS ABOVE ORDNANCE DATUM U.N.O
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECT AND ENGINEERS DRAWINGS AND SPECIFICATIONS

IF ANY INFORMATION WITHIN THESE DRAWINGS CHANGES THE BELOW GROUND DRAINAGE IS ALSO SUBJECT TO CHANGE

KEY

- EXISTING PUBLIC COMBINED DRAIN/ MANHOLE — C —
- EXISTING PUBLIC FOUL DRAIN/ MANHOLE — F —
- EXISTING PRIVATE SURFACE WATER DRAIN/MANHOLE — SW —
- EXISTING PRIVATE COMBINED DRAIN/ MANHOLE — C —
- EXISTING PRIVATE FOUL DRAIN/ MANHOLE — F —
- EXISTING ASSUMED DRAIN — — C —
- EXISTING ROAD GULLY EX-RG
- EXISTING GULLY EX-G
- EXISTING RWP TO REMAIN EX-RWP
- PROPOSED NEW SOIL PIPE SVP
- PROPOSED NEW RWP RWP
- PROPOSED SILT TRAP GULLY (REFER TO DETAIL FOR 'TYPE') STG-XX TYPE X
- PROPOSED FOUL WATER MANHOLE
- PROPOSED FOUL WATER DRAIN
- PROPOSED SURFACE WATER MANHOLE
- PROPOSED SURFACE WATER DRAIN
- PROPOSED BACKDROP BD
- PROPOSED ATTENUATION

ISSUE	DATE	APPROVED	DRAWN	DESCRIPTION
P04	19/07/2019	LS	SG	STAGE 4 ISSUE SEE REVISION CLOUDS
P03	28/06/2019	LS	SG	STAGE 4 ISSUE DRAINAGE AMENDED TO SUIT ABOVE GROUND DRAINAGE LAYOUT
P02	30/11/2018	LS	SG	STAGE 3 ISSUE ADDITIONAL NOTES, NEW INSPECTION CHAMBERS AND GREASE TRAP ADDED
P01	16/11/2018	LS	SG	DRAFT STAGE 3 ISSUE

OUR TOWN HALL PROJECT

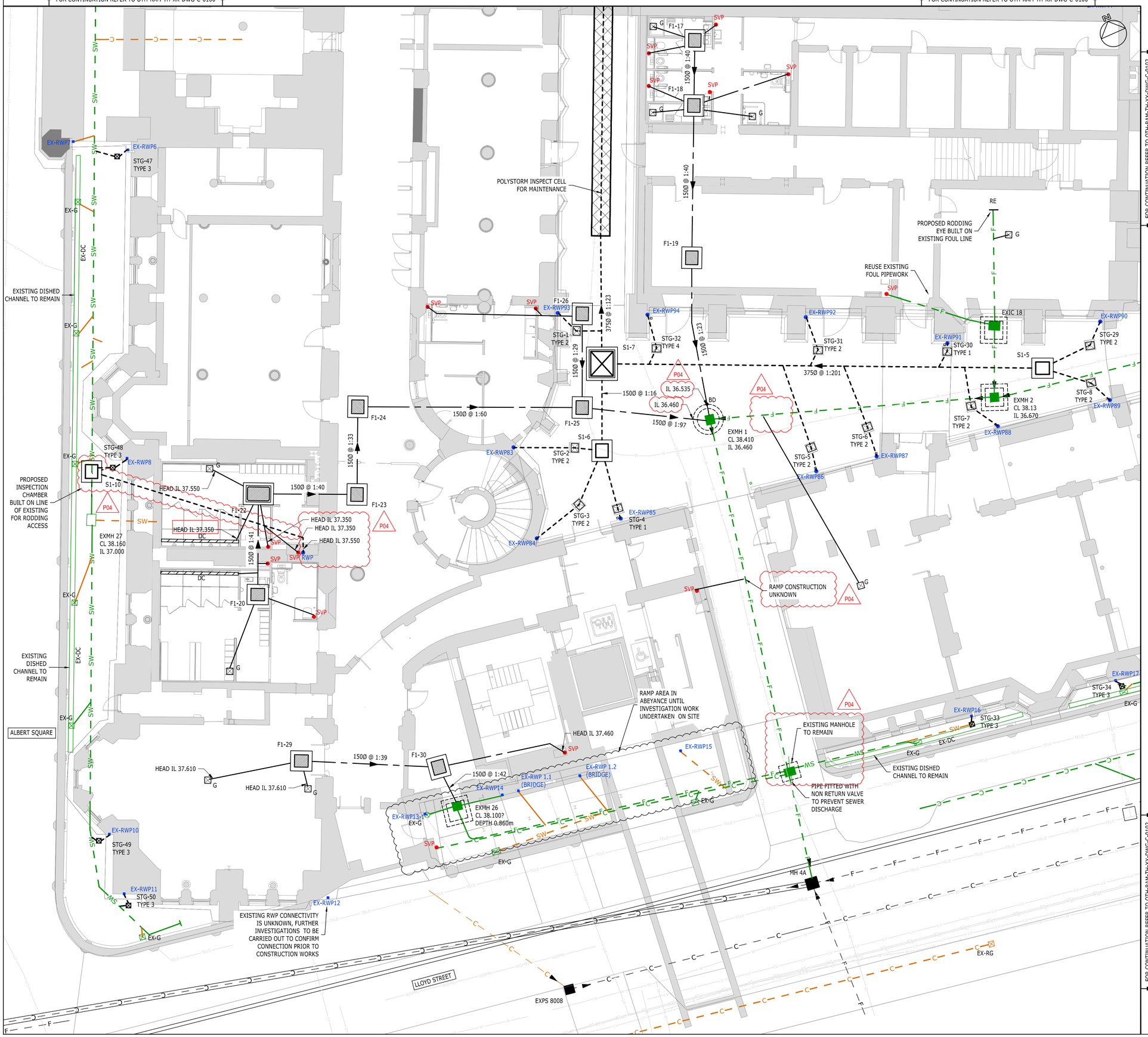
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PROJECT STATUS	STAGE 4
CLIENT	MANCHESTER CITY COUNCIL
PROJECT	OUR TOWN HALL PROJECT
DRAWING TITLE	TOWN HALL PROPOSED DRAINAGE SHEET 3 OF 4
SIZE & SCALE	A1: 1:100
DRAWING STATUS	D2 - FOR TENDER
JOB NUMBER	1620003165
DRAWING NO.	OTH-RAM-TH-XX-DWG-C-0102
REV	P04

17 July 2019 15:44:15



5. THIS DRAWING HAS BEEN CREATED USING THE FOLLOWING INFORMATION:
   - UTILITIES SURVEY BY POWERS AND TILTMAN DATED FEBRUARY/MARCH 2018
   - CCTV DRAINAGE SURVEY BY POWERS AND TILTMAN DATED 14/11/18
   - PROPOSED LANDSCAPE PLAN BY PLAN IT, DRAWING NUMBER OTH-PLA-EE-ES-CAD-L-1000 REV 10
   - PROPOSED LOWER GROUND FLOOR PLAN BY PURCELL, EXPORTED 20.06.19
   - PROPOSED SERVICES PLAN BY ARUP
6. ANY DISCREPANCIES IN DIMENSIONS OR DETAILS ON OR BETWEEN DRAWINGS SHOULD BE DRAWN TO THE ATTENTION OF THE ENGINEER FOR CLARIFICATION.
7. THIS DRAWING HAS BEEN DEVELOPED USING INFORMATION PROVIDED TO RAMBOLL BY A NUMBER OF THIRD PARTIES. RAMBOLL CAN ACCEPT NO RESPONSIBILITY FOR THE ACCURACY OF THE THIRD PARTY INFORMATION SHOWN.
8. FOR DRAINAGE SCHEDULE REFER TO DRAWING OTH-RAM-XX-XX-DWG-C-0200
9. FOR DRAINAGE DETAILS REFER TO DRAWING SERIES OTH-RAM-XX-XX-DWG-C-0400
10. ALL DRAINAGE WORKS CARRIED OUT IN ACCORDANCE WITH SEWERS FOR ADOPTION 7TH EDITION, BS EN 752 (2008), BUILDING REGULATIONS PART H, RELEVANT WATER AUTHORITY STANDARDS, LOCAL COUNCIL STANDARDS AND HEALTH AND SAFETY POLICIES.
11. PIPES ARE NOT DESIGNED FOR CONSTRUCTION TRAFFIC, CONTRACTOR WILL TAKE NECESSARY PRECAUTIONS TO PROTECT PIPES DURING CONSTRUCTION. EXISTING DRAINAGE WHICH IS TO REMAIN IN THE PROPOSED WORKS TO BE PROTECTED AT ALL TIMES.
12. IT IS ASSUMED THAT ALL ABOVE GROUND DRAINAGE CONNECTIONS ARE RODDABLE AND VENTED FROM ABOVE GROUND. PUBLIC HEALTH ENGINEER TO CONFIRM ABOVE GROUND VENTING.
13. CONCRETE FOR GENERAL DRAINAGE WORKS DESIGNATED MIX GEN 3 TO BS 8500 - 1:2006, BS EN 206 - 1:2013 AND ENGINEERS SPECIFICATION.
14. ALL SURFACE WATER PIPES (UP TO 600mm DIA) TO BE STRUCTURED WALL HDPE TO BS EN 13476-1 AND -3, KITEMARKED, AGREMENT CERTIFIED OR CE MARKED U.N.O.
15. ALL FOUL WATER PIPES TO BE VITRIFIED CLAY TO BS EN 295-1:1991/BS 65 AS APPROPRIATE , KITEMARKED, AGREMENT CERTIFIED OR CE MARKED U.N.O.
16. ANY PIPEWORK WHICH IS CAST INTO FOUNDATIONS OR THROUGH GROUND BEAMS TO BE CAST IRON.
17. BRICK MANHOLES TO BE CONSTRUCTED USING CLASS B ENGINEERING BRICK IN ACCORDANCE WITH BS EN 771-1:2011, BS 5628-1:2005, AND PD 6697:2010.
18. POLYPROPYLENE INSPECTION CHAMBER TO BE IN ACCORDANCE WITH B57158 OR BSEN13598-1 OR AGREEMENT CERTIFIED MINIMUM INTERNAL DIAMETER 450mm UNO.
19. ALL FOUL BRANCH CONNECTIONS TO BE DN100 AT 1:40 MINIMUM GRADIENT U.N.O. HEAD OF BRANCH IL=37.450 U.N.O.
20. ALL SURFACE WATER BRANCHES FROM RAIN WATER DOWN PIPES , INTO SILT TRAP TO BE DN150 AT 1:60 MINIMUM GRADIENT. ALL OTHER SURFACE WATER BRANCHES TO BE DN150 AT 1:80 UNO.
21. FOR PIPES WITH MORE THAN 1200mm COVER BELOW EXTERNAL GROUND LEVEL OR GREATER THAN 300mm BELOW BUILDING SLAB TO HAVE CLASS S SURROUND U.N.O IN ACCORDANCE WITH BUILDING REGULATIONS DOCUMENT H.
22. ALL DRAINAGE WITH LESS THAN 300mm COVER BELOW BUILDING SLAB TO HAVE CLASS Y CONCRETE SURROUND
23. CONNECTION TO EXISTING DRAINAGE IS SUBJECT TO AGREEMENT IN PRINCIPLE. A SECTION 106 AGREEMENT IS REQUIRED TO BE SUBMITTED BY THE CONTRACTOR FOR FORMAL CONNECTION.
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FOR CONTINUATION REFER TO OTH-RAM-TH-XX-DWG-C-0102

Scale Bars to be used as guidance only - refer to sheet size below

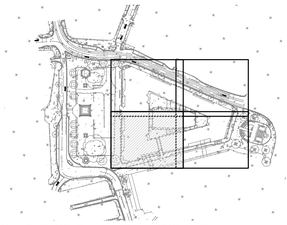
1:100	mm	1000	3000	5000	7000	
1:200	mm	2000	4000	6000	8000	10000
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KEY

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- EXISTING PUBLIC FOUL DRAIN/ MANHOLE — F
- EXISTING PRIVATE SURFACE WATER DRAIN/MANHOLE — SW
- EXISTING PRIVATE COMBINED DRAIN/ MANHOLE — C
- EXISTING PRIVATE FOUL DRAIN/ MANHOLE — F
- EXISTING ASSUMED DRAIN — C
- EXISTING ROAD GULLY — EX-RG
- EXISTING GULLY — EX-G
- EXISTING RWP TO REMAIN — EX-RWP
- PROPOSED NEW SOIL PIPE — SVP
- PROPOSED NEW RWP — RWP
- PROPOSED SILT TRAP GULLY (REFER TO DETAIL FOR 'TYPE') — STG-XX TYPE X
- PROPOSED FOUL WATER MANHOLE
- PROPOSED FOUL WATER DRAIN
- PROPOSED SURFACE WATER MANHOLE
- PROPOSED SURFACE WATER DRAIN
- PROPOSED BACKDROP — BD
- PROPOSED ATTENUATION



ISSUE	DATE	APPROVED	DRAWN	DESCRIPTION
P04	19/07/2019	LS	SG	STAGE 4 ISSUE SEE REVISION CLOUDS
P03	28/06/2019	LS	SG	DRAFT STAGE 4 ISSUE DRAINAGE AMENDED TO SUIT ABOVE GROUND DRAINAGE LAYOUT
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PROJECT STATUS	STAGE 4
CLIENT	MANCHESTER CITY COUNCIL
PROJECT	OUR TOWN HALL PROJECT
DRAWING TITLE	TOWN HALL PROPOSED DRAINAGE SHEET 4 OF 4
SIZE & SCALE	A1: 1:100
DRAWING STATUS	D2 - FOR TENDER
JOB NUMBER	1620003165
DRAWING NO.	OTH-RAM-TH-XX-DWG-C-0103
REV	P04

18 July 2019 10:40:40

FOUL WATER MANHOLE SCHEDULE

Manhole No.	Cover Level (m) #	Invert Level (m)	Depth to Invert (m)	Main Channel (mm)	Branches	Manhole Type	Chamber Size (mm)	Cover Size (mm)	Cover Loading	Comment	Special Requirements	Co-ordinates (mm) Easting Northing
F1-1	REFER TO ENABLING WORKS DRAINAGE SCHEDULES OTH-RAM-TH-XX-C-5200											
F1-2	REFER TO ENABLING WORKS DRAINAGE SCHEDULES OTH-RAM-TH-XX-C-5200											
F1-3	NO LONGER IN USE											
F1-4	38.200	37.075	1.125	150Ø	100Ø @ IL 37.150 In 100Ø @ IL 37.150 In 150Ø @ IL 37.075 Out	Brick	675X750	600X600	AAA	Recessed, Double Sealed and Lockable	Sealing Plate Warning Sign	383917800,398078954
F1-5	38.200	36.935	1.265	150Ø	150Ø @ IL 36.935 In 150Ø @ IL 36.935 Out	Brick	675X750	600X600	AAA	Recessed, Double Sealed and Lockable	Sealing Plate Warning Sign	383906429,398091270
F1-6	NO LONGER IN USE											
F1-7	NO LONGER IN USE											
F1-8	38.200	37.150	1.050	150Ø	100Ø @ IL 37.225 In 100Ø @ IL 37.225 In 150Ø @ IL 37.150 Out	Brick	675X750	600X600	AAA	Recessed, Double Sealed and Lockable	Sealing Plate Warning Sign	383903179,398101363
F1-9	38.200	36.855	1.345	150Ø	150Ø @ IL 36.855 In 150Ø @ IL 36.855 In 150Ø @ IL 36.855 Out	Brick	675X750	600X600	AAA	Recessed, Double Sealed and Lockable	Sealing Plate Warning Sign	383899920,398098332
F1-10	38.200	37.150	1.050	150Ø	100Ø @ IL 37.225 In 100Ø @ IL 37.225 In 100Ø @ IL 37.225 In 100Ø @ IL 37.225 In 150Ø @ IL 37.150 Out	Brick	750x1200	600X600	AAA	Recessed, Double Sealed and Lockable	Sealing Plate Warning Sign	383895059,398110229
F1-10A	38.200	37.150	1.050	150Ø	100Ø @ IL 37.150 In 150Ø @ IL 37.150 Out	Brick	675x750	600X600	AAA	Recessed, Double Sealed and Lockable	Sealing Plate Warning Sign	383877165,398128601
F1-10B	38.200	37.050	1.150	150Ø	150Ø @ IL 37.050 In 100Ø @ IL 37.125 In 150Ø @ IL 37.050 Out	Brick	675x750	600X600	AAA	Recessed, Double Sealed and Lockable	Sealing Plate Warning Sign	383878785,398132243
F1-11	38.200	37.035	1.165	150Ø	150Ø @ IL 37.035 In 150Ø @ IL 37.035 Out	Brick	675X750	600X600	AAA	Recessed, Double Sealed and Lockable	Sealing Plate Warning Sign	383891707,398107214
F1-13	38.200	37.150	1.050	150Ø	100Ø @ IL 37.225 In 100Ø @ IL 37.225 In 150Ø @ IL 37.150 Out	Brick	675X750	600X600	AAA	Recessed, Double Sealed and Lockable	Sealing Plate Warning Sign	383927826,398048147
F1-14	REFER TO ENABLING WORKS DRAINAGE SCHEDULES OTH-RAM-TH-XX-C-5200											
F1-15	REFER TO ENABLING WORKS DRAINAGE SCHEDULES OTH-RAM-TH-XX-C-5200											
F1-16	REFER TO ENABLING WORKS DRAINAGE SCHEDULES OTH-RAM-TH-XX-C-5200											
F1-16A	REFER TO ENABLING WORKS DRAINAGE SCHEDULES OTH-RAM-TH-XX-C-5200											
F1-17	38.200	37.150	1.050	150Ø	100Ø @ IL 37.225 In 100Ø @ IL 37.225 In 100Ø @ IL 37.225 In 150Ø @ IL 37.150 Out	Brick	675X750	600X600	AAA	Recessed, Double Sealed and Lockable	Sealing Plate Warning Sign	383885215,398085772
F1-18	38.200	37.050	1.150	150Ø	150Ø @ IL 37.060 In 100Ø @ IL 37.135 In 100Ø @ IL 37.135 In 100Ø @ IL 37.135 In 100Ø @ IL 37.135 In 150Ø @ IL 37.060 Out	Brick	675X750	600X600	AAA	Recessed, Double Sealed and Lockable	Sealing Plate Warning Sign	383883723,398082535
F1-19	38.200	36.850	1.350	150Ø	150Ø @ IL 36.850 In 150Ø @ IL 36.850 Out	Brick	675x750	600X600	AAA	Recessed, Double Sealed and Lockable	Sealing Plate Warning Sign	383880235,398074965
F1-20	38.200	37.150	1.050	150Ø	100Ø @ IL 37.225 In 100Ø @ IL 37.225 In 150Ø @ IL 37.150 Out	Brick	675X750	600X600	AAA	Recessed, Double Sealed and Lockable	Sealing Plate Warning Sign	383851036,398067759
F1-21	NO LONGER IN USE											
F1-22	38.200	37.015	1.185	150Ø	100Ø @ IL 37.090 In 100Ø @ IL 37.090 In 150Ø @ IL 37.015 In 100Ø @ IL 37.090 In 150Ø @ IL 37.015 Out	Brick	750x1200	600X600	AAA	Recessed, Double Sealed and Lockable	Sealing Plate Warning Sign	383853306,398072783
F1-23	38.200	36.880	1.320	150Ø	150Ø @ IL 36.880 In 150Ø @ IL 36.880 Out	Brick	675X750	600X600	AAA	Recessed, Double Sealed and Lockable	Sealing Plate Warning Sign	383858227,398070562
F1-24	38.200	36.760	1.440	150Ø	150Ø @ IL 36.735 In 150Ø @ IL 36.735 Out	Brick	675X750	600X600	AAA	Recessed, Double Sealed and Lockable	Sealing Plate Warning Sign	383860213,398074930
F1-25	REFER TO ENABLING WORKS DRAINAGE SCHEDULES OTH-RAM-TH-XX-C-5200											
F1-26	REFER TO ENABLING WORKS DRAINAGE SCHEDULES OTH-RAM-TH-XX-C-5200											
F1-27	NO LONGER IN USE											
F1-28	NO LONGER IN USE											
F1-29	38.200	37.485	0.715	150Ø	100Ø @ IL 37.485 In 100Ø @ IL 37.485 In 150Ø @ IL 37.485 Out	Brick	675X750	600X600	AAA	Recessed, Double Sealed and Lockable	Sealing Plate Warning Sign	383849519,398058468
F1-30	38.200	37.290	0.910	150Ø	150Ø @ IL 37.290 In 150Ø @ IL 37.290 In 150Ø @ IL 37.290 Out	Brick	675X750	600X600	AAA	Recessed, Double Sealed and Lockable	Sealing Plate Warning Sign	383856252,398055100

SURFACE WATER MANHOLE SCHEDULE

Manhole No.	Cover Level (m) #	Invert Level (m)	Depth to Invert (m)	Main Channel (mm)	Branches	Manhole Type	Chamber Size (mm)	Cover Size (mm)	Cover Loading	Comment	Special Requirements	Co-ordinates (mm) EastingNorthing
S1-1	REFER TO ENABLING WORKS DRAINAGE SCHEDULES OTH-RAM-TH-XX-C-5200											
S1-2	REFER TO ENABLING WORKS DRAINAGE SCHEDULES OTH-RAM-TH-XX-C-5200											
S1-3	REFER TO ENABLING WORKS DRAINAGE SCHEDULES OTH-RAM-TH-XX-C-5200											
S1-4	REFER TO ENABLING WORKS DRAINAGE SCHEDULES OTH-RAM-TH-XX-C-5200											
S1-5	REFER TO ENABLING WORKS DRAINAGE SCHEDULES OTH-RAM-TH-XX-C-5200											
S1-6	REFER TO ENABLING WORKS DRAINAGE SCHEDULES OTH-RAM-TH-XX-C-5200											
S1-7	REFER TO ENABLING WORKS DRAINAGE SCHEDULES OTH-RAM-TH-XX-C-5200											
S1-8	REFER TO ENABLING WORKS DRAINAGE SCHEDULES OTH-RAM-TH-XX-C-5200											
S1-9	REFER TO ENABLING WORKS DRAINAGE SCHEDULES OTH-RAM-TH-XX-C-5200											
S1-10	38.110	36.990 *	1.120	225Ø	150Ø @ IL 37.065 In 225Ø @ IL 36.990 In 150Ø @ IL 37.065 In 225Ø @ IL 36.990 Out	Brick	675x750	600X600	D400	Recessed Cover	Derogation Sealing Plate Warning Sign	383845454,398077607
S1-11	REFER TO ENABLING WORKS DRAINAGE SCHEDULES OTH-RAM-TH-XX-C-5200											
S1-11A	38.200	37.000	1.200	150Ø	150Ø @ IL 37.075 In 150Ø @ IL 37.000 Out	Brick	675x750	600X600	AAA	Recessed, Double Sealed and Lockable	Sealing Plate Warning Sign	383877712,398123088
S1-11B	38.020	36.560 *	1.460	225Ø	150Ø @ IL 36.635 In 225Ø @ IL 36.560 In 225Ø @ IL 36.560 Out	Brick	675x750	600X600	D400	Recessed Cover	Derogation Sealing Plate Warning Sign	383868260,398127390
S1-12	38.150	36.850 *	tbc	tbc	As existing tbc	Brick	675x750	600X600	D400	Recessed Cover	Derogation Sealing Plate Warning Sign	383941840,398041585
S1-13	38.110	36.910 *	tbc	tbc	As existing tbc	Brick	675x750	600X600	D400	Recessed Cover		383949241,398050356
S1-14	38.200	tbc *	tbc	150Ø	As existing tbc In x2 150Ø @ IL 36.925 Out	Brick	600x750	600X600	AAA	Recessed, Double Sealed and Lockable	Sealing Plate Warning Sign	383929067,398039938
S1-15	38.200	tbc *	tbc	150Ø	As existing tbc In 150Ø @ IL 36.860 In 150Ø @ IL 36.860 Out	Brick	1350x900	600X600	AAA	Recessed, Double Sealed and Lockable	Sealing Plate Warning Sign	383929708,398046928

ALL EXISTING MANHOLE COVERS TO BE RETAINED AND RESET IN CONJUNCTION WITH PROPOSED LEVELS BY PLANIT. EXISTING MANHOLES NOT INDICATED IN THE SCHEDULES. REFER TO EXISTING DRAINAGE GENERAL ARRANGEMENT DRAWING FOR FURTHER DETAILS

GREASE SEPARATOR SCHEDULE

REF.	MANUFACTURER & TYPE	DESIGNATION	INLET INVERT/ DIA (m/ mm)	OUTLET INVERT/ DIA (m/ mm)	COVER SIZE (mm)	COVER LOADING	COMMENTS
F1-GT-1	REFER TO ENABLING WORKS DRAINAGE SCHEDULES OTH-RAM-TH-XX-C-5200						
F1-GT-2	LIPUMAX P-DA BY ACO	NS3	37.800 STAINLESS STEEL PIPE	37.730	AS PER MANUFACTURERS DETAILS	D400	RECESSED COVER TO SUIT ARCHITECTS FINISHES AND SPECIFICATION

GREASE TRAP TO BE INSTALLED IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS.
ALARM LINKED TO BMS AS REQUIRED. DN100 VENT PIPE TO ABOVE GROUND TO BE INSTALLED AND TERMINATED IN A LOCATION AGREED BY THE ARCHITECT.
NOTE IT IS ASSUMED THAT ANY DOSING REQUIREMENTS SHALL BE PROVIDED ABOVE GROUND UPSTREAM OF THE BELOW GROUND UNIT. CLEANING LINE TO BE PROVIDED TO LLOYD STREET ELEVATION FOR MAINTENANCE OF GREASE TRAPS

Scale Bars to be used as guidance only - refer to sheet size below

1:100 mm 1000 2000 3000 4000
1:200 mm 4000 6000 8000 10000
1:500 m 5 15 25 35
1:1250 m 10 30 50 70 90

1. ALL INTERNAL RECESSED COVER TO ARCHITECTS DETAILS
2. ALL EXTERNAL RECESSED COVERS TO LANDSCAPES ARCHITECTS DETAILS
3. ALL COVERS TO BE CAST IRON UNO
4. BRANCH CONNECTIONS OF DN150 OR LESS TO DISCHARGE INTO MAIN CHANNEL AT HALF PIPE LEVEL
5. CO-ORDINATES GIVEN ARE CENTRE OF MANHOLE

NOTE:

* PROPOSED MANHOLE BUILT OVER EXISTING LINE - LEVELS TO BE CONFIRMED ON SITE DURING WORKS

\# ALL COVER LEVELS AND SHOULD BE TAKEN FROM FINAL PROPOSED LEVELS HAVE BEEN CONFIRMED BY PLANIT (EXTERNAL) AND/OR PURCELL (INTERNAL)

ISSUE	DATE	APPROVED	DRAWN	DESCRIPTION
P03	19/07/2019	LS	SG	STAGE 4 ISSUE SEE REVISION CLOUDS
P02	28/06/2019	LS	SG	DRAFT STAGE 4 ISSUE DRAINAGE AMENDED TO SUIT ABOVE GROUND DRAINAGE LAYOUT
P01	30/11/2018	LS	SG	STAGE 3 ISSUE

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PROJECT STATUS	STAGE 4
CLIENT	MANCHESTER CITY COUNCIL
PROJECT	OUR TOWN HALL PROJECT
DRAWING TITLE	TOWN HALL MANHOLE SCHEDULES SHEET 1
SIZE & SCALE	A1: NTS
DRAWING STATUS	D2 - FOR TENDER
JOB NUMBER	1620003165
DRAWING NO.	OTH-RAM-TH-XX-DWG-C-0200
REV	P03

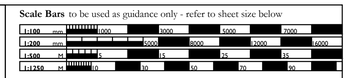
APPENDIX 2
PROPOSED MICRODRAINAGE CALCULATIONS

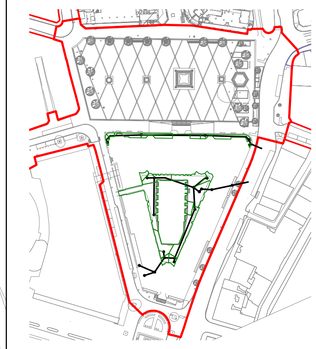
N

Public Sewer
E-1.009
BEND5
BEND4
E-1.008
MH29
E-1.006
MH30
E-1.005
BEND3
E-1.004
MH28
E-1.003
MH27
E-1.002
BEND2
E-1.001
PIPE B
BEND1

S-Ex Outfall
S4.007
S-ExMH 21a
S4.006
S-ExMH 21
S1-8
S6.000
S4.005
S-Tank-ND3
S-ExMH 19
S4.004
S1-9
S6.001
S4.003
S-Tank-ND1
S7.003
S1-4
S7.004
S-Tank
S7.002
S4.002
S-Tank-ND4
S4.001
S1-7
S5.000
S1-5
S4.000
S1-6
S1-3
S6.002
S-ExMH 10
S7.001
S7.000
S1-2
S1-1
S8.001
S1-15
S9.000
S8.000
S11
S-ExMH 13a

Scale Bars to be used as guidance only - refer to sheet size below





ISSUE	DATE	APPROVED	DRAWN	DESCRIPTION
P01	01/08/2019	LS	CO	SKETCH

OUR TOWN HALL PROJECT

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PROJECT STATUS	SKETCH
CLIENT	MANCHESTER CITY COUNCIL
PROJECT	OUR TOWN HALL PROJECT
DRAWING TITLE	TOWN HALL COURTYARD MICRODRAINAGE MODEL AREAS
SIZE & SCALE	A1: 1:150
DRAWING STATUS	-
JOB NUMBER	1620003165
DRAWING NO.	OTH-RAM-XX-XX-SKE-0045
REV	P01

01 August 2019 16:12:31

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	Foul Sewage (l/s/ha)	0.000	Maximum Backdrop Height (m)	0.000
M5-60 (mm)	18.000	Volumetric Runoff Coeff.	0.840	Min Design Depth for Optimisation (m)	0.000
Ratio R	0.357	PIMP (%)	100	Min Vel for Auto Design only (m/s)	1.00
Maximum Rainfall (mm/hr)	550	Add Flow / Climate Change (%)	0	Min Slope for Optimisation (1:X)	500
Maximum Time of Concentration (mins)	30	Minimum Backdrop Height (m)	0.000		

Designed with Level Inverts

Network Design Table for Storm

« - 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
S4.000	4.760	0.270	17.6	0.002	5.00	0.0	0.600	o	150	Pipe/Conduit	
S5.000	24.120	0.120	201.0	0.025	5.00	0.0	0.600	o	375	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)
S4.000	59.48	5.03	37.200	0.002	0.0	0.0	0.0	2.41	42.6	0.4
S5.000	58.15	5.32	36.825	0.025	0.0	0.0	0.0	1.27	140.7	4.4

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Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S4.001	7.002	0.240	29.2	0.008	0.00	0.0	0.600	o	375	Pipe/Conduit	
S4.002	19.753	0.725	27.2	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
S6.000	1.460	0.485	3.0	0.038	5.00	0.0	0.600	o	225	Pipe/Conduit	
S6.001	9.484	0.800	11.9	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S7.000	3.965	0.110	36.0	0.028	5.00	0.0	0.600	o	300	Pipe/Conduit	
S8.000	11.003	0.140	78.6	0.025	5.00	0.0	0.600	o	150	Pipe/Conduit	
S9.000	7.019	0.065	108.0	0.005	5.00	0.0	0.600	o	150	Pipe/Conduit	
S8.001	11.325	0.110	103.0	0.032	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)
S4.001	57.99	5.35	36.705	0.036	0.0	0.0	0.0	3.37	371.7	6.3
S4.002	57.57	5.44	36.465	0.036	0.0	0.0	0.0	3.48	384.7	6.3
S6.000	59.62	5.00	37.025	0.038	0.0	0.0	0.0	7.60	302.1	6.9
S6.001	59.42	5.04	36.540	0.038	0.0	0.0	0.0	3.82	151.9	6.9
S7.000	59.51	5.03	36.880	0.028	0.0	0.0	0.0	2.63	185.7	5.1
S8.000	58.86	5.16	37.000	0.025	0.0	0.0	0.0	1.14	20.1	4.5
S9.000	59.05	5.12	36.925	0.005	0.0	0.0	0.0	0.97	17.1	0.9
S8.001	57.98	5.35	36.860	0.062	0.0	0.0	0.0	0.99	17.5	10.9

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Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S7.001	6.759	0.100	67.6	0.014	0.00	0.0	0.600	o	300	Pipe/Conduit	
S10.000	2.475	0.020	123.8	0.000	5.00	0.0	0.600	o	150	Pipe/Conduit	
S7.002	34.398	0.175	196.6	0.092	0.00	0.0	0.600	o	375	Pipe/Conduit	
S7.003	1.914	0.010	191.4	0.014	0.00	0.0	0.600	o	375	Pipe/Conduit	
S7.004	12.390	0.725	17.1	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
S4.003	4.566	0.050	91.3	0.095	0.00	0.0	0.600	oo	300	Double Pipe	
S4.004	2.237	1.550	1.4	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S4.005	6.758	0.173	39.1	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S4.006	13.550	0.346	39.2	0.012	0.00	0.0	0.600	o	150	Pipe/Conduit	
S4.007	10.613	0.271	39.2	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)
S7.001	57.72	5.41	36.750	0.104	0.0	0.0	0.0	1.92	135.4	18.2
S10.000	59.41	5.05	36.670	0.000	0.0	0.0	0.0	0.90	15.9	0.0
S7.002	55.80	5.86	36.650	0.196	0.0	0.0	0.0	1.29	142.3	33.2
S7.003	55.70	5.88	36.475	0.210	0.0	0.0	0.0	1.31	144.3	35.5
S7.004	55.51	5.93	36.465	0.210	0.0	0.0	0.0	4.40	486.1	35.5
S4.003	55.32	5.97	35.740	0.379	0.0	0.0	0.0	1.65	232.7	63.5
S4.004	55.31	5.98	35.690	0.379	0.0	0.0	0.0	13.18	931.8	63.5
S4.005	55.03	6.05	34.140	0.379	0.0	0.0	0.0	1.62	28.5«	63.5
S4.006	54.48	6.19	33.967	0.391	0.0	0.0	0.0	1.61	28.5«	64.5
S4.007	54.05	6.30	33.621	0.391	0.0	0.0	0.0	1.61	28.5«	64.5

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Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S1-6	38.250	1.050	Open Manhole	1200	S4.000	37.200	150				
S1-5	38.100	1.275	Open Manhole	1350	S5.000	36.825	375				
S1-7	38.200	1.495	Open Manhole	1350	S4.001	36.705	375	S4.000	36.930	150	
								S5.000	36.705	375	
S-Tank-ND4	38.150	1.685	Junction		S4.002	36.465	375	S4.001	36.465	375	
S1-8	38.150	1.125	Open Manhole	1200	S6.000	37.025	225				
S-Tank-ND3	38.150	1.610	Junction		S6.001	36.540	225	S6.000	36.540	225	
S1-1	38.080	1.200	Open Manhole	1200	S7.000	36.880	300				
S-ExMH 13a	38.100	1.100	Open Manhole	1200	S8.000	37.000	150				
S11	38.200	1.275	Open Manhole	1200	S9.000	36.925	150				
S1-15	38.100	1.240	Open Manhole	1200	S8.001	36.860	150	S8.000	36.860	150	
								S9.000	36.860	150	
S1-2	38.100	1.350	Open Manhole	1200	S7.001	36.750	300	S7.000	36.770	300	20
								S8.001	36.750	150	
S-ExMH 10	38.070	1.400	Open Manhole	1200	S10.000	36.670	150				
S1-3	38.195	1.545	Open Manhole	1350	S7.002	36.650	375	S7.001	36.650	300	
								S10.000	36.650	150	
S1-4	38.110	1.635	Open Manhole	1350	S7.003	36.475	375	S7.002	36.475	375	
S-Tank-ND1	38.150	1.685	Junction		S7.004	36.465	375	S7.003	36.465	375	
S-Tank	38.150	2.410	Open Manhole	1500	S4.003	35.740	300	S4.002	35.740	375	
								S6.001	35.740	225	
								S7.004	35.740	375	
S1-9	38.200	2.510	Open Manhole	1500	S4.004	35.690	300	S4.003	35.690	300	
S-ExMH 19	38.200	4.060	Open Manhole	1200	S4.005	34.140	150	S4.004	34.140	300	
S-ExMH 21	38.200	4.233	Open Manhole	1200	S4.006	33.967	150	S4.005	33.967	150	

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Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S-ExMH 21a	38.200	4.579	Open Manhole	1200	S4.007	33.621	150	S4.006	33.621	150	
S-Ex Outfall	40.540	7.190	Open Manhole	0		OUTFALL		S4.007	33.350	150	

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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)
S4.000	o	150	S1-6	38.250	37.200	0.900	Open Manhole	1200
S5.000	o	375	S1-5	38.100	36.825	0.900	Open Manhole	1350
S4.001	o	375	S1-7	38.200	36.705	1.120	Open Manhole	1350
S4.002	o	375	S-Tank-ND4	38.150	36.465	1.310	Junction	
S6.000	o	225	S1-8	38.150	37.025	0.900	Open Manhole	1200
S6.001	o	225	S-Tank-ND3	38.150	36.540	1.385	Junction	
S7.000	o	300	S1-1	38.080	36.880	0.900	Open Manhole	1200
S8.000	o	150	S-ExMH 13a	38.100	37.000	0.950	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)
S4.000	4.760	17.6	S1-7	38.200	36.930	1.120	Open Manhole	1350
S5.000	24.120	201.0	S1-7	38.200	36.705	1.120	Open Manhole	1350
S4.001	7.002	29.2	S-Tank-ND4	38.150	36.465	1.310	Junction	
S4.002	19.753	27.2	S-Tank	38.150	35.740	2.035	Open Manhole	1500
S6.000	1.460	3.0	S-Tank-ND3	38.150	36.540	1.385	Junction	
S6.001	9.484	11.9	S-Tank	38.150	35.740	2.185	Open Manhole	1500
S7.000	3.965	36.0	S1-2	38.100	36.770	1.030	Open Manhole	1200
S8.000	11.003	78.6	S1-15	38.100	36.860	1.090	Open Manhole	1200

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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)
S9.000	o	150	S11	38.200	36.925	1.125	Open Manhole	1200
S8.001	o	150	S1-15	38.100	36.860	1.090	Open Manhole	1200
S7.001	o	300	S1-2	38.100	36.750	1.050	Open Manhole	1200
S10.000	o	150	S-ExMH 10	38.070	36.670	1.250	Open Manhole	1200
S7.002	o	375	S1-3	38.195	36.650	1.170	Open Manhole	1350
S7.003	o	375	S1-4	38.110	36.475	1.260	Open Manhole	1350
S7.004	o	375	S-Tank-ND1	38.150	36.465	1.310	Junction	

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S9.000	7.019	108.0	S1-15	38.100	36.860	1.090	Open Manhole	1200
S8.001	11.325	103.0	S1-2	38.100	36.750	1.200	Open Manhole	1200
S7.001	6.759	67.6	S1-3	38.195	36.650	1.245	Open Manhole	1350
S10.000	2.475	123.8	S1-3	38.195	36.650	1.395	Open Manhole	1350
S7.002	34.398	196.6	S1-4	38.110	36.475	1.260	Open Manhole	1350
S7.003	1.914	191.4	S-Tank-ND1	38.150	36.465	1.310	Junction	
S7.004	12.390	17.1	S-Tank	38.150	35.740	2.035	Open Manhole	1500

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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)
S4.003	oo	300	S-Tank	38.150	35.740	2.110	Open Manhole	1500
S4.004	o	300	S1-9	38.200	35.690	2.210	Open Manhole	1500
S4.005	o	150	S-ExMH 19	38.200	34.140	3.910	Open Manhole	1200
S4.006	o	150	S-ExMH 21	38.200	33.967	4.083	Open Manhole	1200
S4.007	o	150	S-ExMH 21a	38.200	33.621	4.429	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)
S4.003	4.566	91.3	S1-9	38.200	35.690	2.210	Open Manhole	1500
S4.004	2.237	1.4	S-ExMH 19	38.200	34.140	3.760	Open Manhole	1200
S4.005	6.758	39.1	S-ExMH 21	38.200	33.967	4.083	Open Manhole	1200
S4.006	13.550	39.2	S-ExMH 21a	38.200	33.621	4.429	Open Manhole	1200
S4.007	10.613	39.2	S-Ex Outfall	40.540	33.350	7.040	Open Manhole	0

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
4.000	User	-	100	0.002	0.002	0.002
5.000	User	-	100	0.025	0.025	0.025
4.001	User	-	100	0.008	0.008	0.008
4.002	-	-	100	0.000	0.000	0.000
6.000	-	-	100	0.038	0.038	0.038
6.001	-	-	100	0.000	0.000	0.000
7.000	-	-	100	0.028	0.028	0.028
8.000	-	-	100	0.025	0.025	0.025
9.000	-	-	100	0.005	0.005	0.005
8.001	-	-	100	0.032	0.032	0.032
7.001	-	-	100	0.014	0.014	0.014
10.000	-	-	100	0.000	0.000	0.000
7.002	-	-	100	0.092	0.092	0.092
7.003	-	-	100	0.014	0.014	0.014
7.004	-	-	100	0.000	0.000	0.000
4.003	-	-	100	0.095	0.095	0.095
4.004	-	-	100	0.000	0.000	0.000
4.005	-	-	100	0.000	0.000	0.000
4.006	-	-	100	0.012	0.012	0.012
4.007	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.391	0.391	0.391

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)
S4.007	S-Ex Outfall	40.540	33.350	0.000	0	0

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Simulation Criteria for Storm

Volumetric Runoff Coeff	0.840	Manhole Headloss Coeff (Global)	0.500	Inlet Coeffiecient	0.800
Areal Reduction Factor	1.000	Foul Sewage per hectare (l/s)	0.000	Flow per Person per Day (l/per/day)	0.000
Hot Start (mins)	0	Additional Flow - % of Total Flow	0.000	Run Time (mins)	1200
Hot Start Level (mm)	0	MADD Factor * 10m³/ha Storage	2.000	Output Interval (mins)	10

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)	0.840
Return Period (years)	2	Ratio R	0.357	Cv (Winter)	0.840
Region	England and Wales	Profile Type	Winter	Storm Duration (mins)	600

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Online Controls for Storm

Hydro-Brake® Optimum Manhole: S1-9, DS/PN: S4.004, Volume (m³): 4.9

Unit Reference	MD-SHE-0160-1500-2000-1500	Sump Available	Yes
Design Head (m)	2.000	Diameter (mm)	160
Design Flow (l/s)	15.0	Invert Level (m)	35.690
Flush-Flo™	Calculated	Minimum Outlet Pipe Diameter (mm)	225
Objective	Minimise upstream storage	Suggested Manhole Diameter (mm)	1500
Application	Surface		

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.000	15.0	Kick-Flo®	1.216	11.9
Flush-Flo™	0.582	15.0	Mean Flow over Head Range	-	13.1

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)	Depth (m)	Flow (l/s)
0.100	5.7	0.600	15.0	1.600	13.5	2.600	17.0	5.000	23.2	7.500	28.2
0.200	12.5	0.800	14.7	1.800	14.3	3.000	18.2	5.500	24.3	8.000	29.1
0.300	13.9	1.000	13.9	2.000	15.0	3.500	19.6	6.000	25.3	8.500	30.0
0.400	14.6	1.200	12.1	2.200	15.7	4.000	20.9	6.500	26.3	9.000	30.8
0.500	14.9	1.400	12.7	2.400	16.4	4.500	22.1	7.000	27.3	9.500	31.6

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Storage Structures for Storm

Cellular Storage Manhole: S-Tank, DS/PN: S4.003

Invert Level (m) 35.690 Infiltration Coefficient Side (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Base (m/hr) 0.00000 Safety Factor 2.0

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	128.0	0.0	1.200	128.0	0.0	1.201	0.0	0.0

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of 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 0.361 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 2, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S4.000	S1-6	15 Winter	2	+0%					37.207	-0.143	0.000	0.01		0.3	OK	
S5.000	S1-5	15 Winter	2	+0%					36.869	-0.331	0.000	0.03		3.8	OK	
S4.001	S1-7	15 Winter	2	+0%					36.746	-0.334	0.000	0.03		5.3	OK	
S4.002	S-Tank-ND4	15 Winter	2	+0%					36.494	-0.346	0.000	0.02		5.3	OK*	
S6.000	S1-8	15 Winter	2	+0%					37.061	-0.189	0.000	0.06		5.9	OK	
S6.001	S-Tank-ND3	15 Winter	2	+0%					36.571	-0.194	0.000	0.05		5.9	OK*	
S7.000	S1-1	15 Winter	2	+0%					36.924	-0.256	0.000	0.05		4.4	OK	
S8.000	S-ExMH 13a	15 Winter	2	+0%	100/15 Summer				37.047	-0.103	0.000	0.22		3.9	OK	
S9.000	S11	15 Winter	2	+0%	100/15 Summer				36.953	-0.122	0.000	0.05		0.8	OK	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S8.001	S1-15	15 Winter	2	+0%	30/15 Summer				36.941	-0.069	0.000	0.56		8.9	OK	
S7.001	S1-2	15 Winter	2	+0%	100/15 Winter				36.839	-0.211	0.000	0.19		15.1	OK	
S10.000	S-ExMH 10	15 Winter	2	+0%	30/15 Summer				36.767	-0.053	0.000	0.02		0.3	OK	
S7.002	S1-3	15 Winter	2	+0%					36.767	-0.258	0.000	0.21		26.9	OK	
S7.003	S1-4	15 Winter	2	+0%	100/15 Summer				36.622	-0.228	0.000	0.33		28.5	OK	
S7.004	S-Tank-ND1	15 Winter	2	+0%					36.539	-0.301	0.000	0.09		28.5	OK*	
S4.003	S-Tank	60 Winter	2	+0%	30/30 Summer				35.901	-0.139	0.000	0.10		12.8	OK	
S4.004	S1-9	60 Winter	2	+0%	30/15 Winter				35.899	-0.091	0.000	0.04		12.7	OK	
S4.005	S-ExMH 19	60 Winter	2	+0%					34.217	-0.073	0.000	0.52		12.7	OK	
S4.006	S-ExMH 21	60 Winter	2	+0%					34.042	-0.075	0.000	0.50		13.1	OK	
S4.007	S-ExMH 21a	60 Winter	2	+0%					33.697	-0.074	0.000	0.51		13.1	OK	

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

Number of Input Hydrographs 0 Number of 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 0.361 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 2, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S4.000	S1-6	15 Winter	30	+0%					37.214	-0.136	0.000	0.02		0.6	OK	
S5.000	S1-5	15 Winter	30	+0%					36.885	-0.315	0.000	0.06		7.2	OK	
S4.001	S1-7	15 Winter	30	+0%					36.762	-0.318	0.000	0.05		10.4	OK	
S4.002	S-Tank-ND4	15 Winter	30	+0%					36.509	-0.331	0.000	0.03		10.5	OK*	
S6.000	S1-8	15 Winter	30	+0%					37.076	-0.174	0.000	0.11		11.2	OK	
S6.001	S-Tank-ND3	15 Winter	30	+0%					36.585	-0.180	0.000	0.09		11.1	OK*	
S7.000	S1-1	15 Winter	30	+0%					36.943	-0.237	0.000	0.10		8.3	OK	
S8.000	S-ExMH 13a	15 Winter	30	+0%	100/15 Summer				37.067	-0.083	0.000	0.41		7.3	OK	
S9.000	S11	15 Winter	30	+0%	100/15 Summer				37.040	-0.035	0.000	0.13		1.9	OK	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S8.001	S1-15	15 Winter	30	+0%	30/15 Summer				37.036	0.026	0.000	1.12		17.7	SURCHARGED	
S7.001	S1-2	15 Winter	30	+0%	100/15 Winter				36.878	-0.172	0.000	0.38		29.7	OK	
S10.000	S-ExMH 10	15 Winter	30	+0%	30/15 Summer				36.828	0.008	0.000	0.04		0.5	SURCHARGED	
S7.002	S1-3	15 Winter	30	+0%					36.828	-0.197	0.000	0.44		56.4	OK	
S7.003	S1-4	15 Winter	30	+0%	100/15 Summer				36.705	-0.145	0.000	0.69		60.5	OK	
S7.004	S-Tank-ND1	15 Winter	30	+0%					36.572	-0.268	0.000	0.18		60.2	OK*	
S4.003	S-Tank	60 Winter	30	+0%	30/30 Summer				36.135	0.095	0.000	0.13		15.9	SURCHARGED	
S4.004	S1-9	60 Winter	30	+0%	30/15 Winter				36.135	0.145	0.000	0.05		14.8	SURCHARGED	
S4.005	S-ExMH 19	60 Winter	30	+0%					34.225	-0.065	0.000	0.61		14.8	OK	
S4.006	S-ExMH 21	30 Winter	30	+0%					34.052	-0.065	0.000	0.61		15.9	OK	
S4.007	S-ExMH 21a	30 Winter	30	+0%					33.707	-0.064	0.000	0.62		15.9	OK	

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

Number of Input Hydrographs 0 Number of 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 0.361 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 2, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S4.000	S1-6	15 Winter	100	+40%					37.218	-0.132	0.000	0.03		1.1	OK	
S5.000	S1-5	15 Winter	100	+40%					36.908	-0.292	0.000	0.11		13.1	OK	
S4.001	S1-7	15 Winter	100	+40%					36.785	-0.295	0.000	0.10		18.9	OK	
S4.002	S-Tank-ND4	120 Winter	100	+40%					36.650	-0.190	0.000	0.02		6.5	OK*	
S6.000	S1-8	15 Winter	100	+40%					37.094	-0.156	0.000	0.21		20.3	OK	
S6.001	S-Tank-ND3	120 Winter	100	+40%					36.651	-0.114	0.000	0.06		7.0	OK*	
S7.000	S1-1	15 Winter	100	+40%					37.067	-0.113	0.000	0.17		14.5	OK	
S8.000	S-ExMH 13a	15 Winter	100	+40%	100/15 Summer				37.424	0.274	0.000	0.63		11.4	SURCHARGED	
S9.000	S11	15 Winter	100	+40%	100/15 Summer				37.375	0.300	0.000	0.28		4.1	SURCHARGED	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S8.001	S1-15	15 Winter	100	+40%	30/15 Summer				37.371	0.361	0.000	1.73		27.3	SURCHARGED	
S7.001	S1-2	15 Winter	100	+40%	100/15 Winter				37.062	0.012	0.000	0.59		46.4	SURCHARGED	
S10.000	S-ExMH 10	15 Winter	100	+40%	30/15 Summer				36.957	0.137	0.000	0.12		1.3	SURCHARGED	
S7.002	S1-3	15 Winter	100	+40%					36.958	-0.067	0.000	0.74		93.8	OK	
S7.003	S1-4	15 Winter	100	+40%	100/15 Summer				36.876	0.026	0.000	1.08		94.7	SURCHARGED	
S7.004	S-Tank-ND1	120 Winter	100	+40%					36.652	-0.188	0.000	0.12		38.6	OK*	
S4.003	S-Tank	120 Winter	100	+40%	30/30 Summer				36.650	0.610	0.000	0.14		16.8	SURCHARGED	
S4.004	S1-9	120 Winter	100	+40%	30/15 Winter				36.651	0.661	0.000	0.05		15.0	SURCHARGED	
S4.005	S-ExMH 19	180 Winter	100	+40%					34.225	-0.065	0.000	0.62		15.0	OK	
S4.006	S-ExMH 21	15 Winter	100	+40%					34.068	-0.049	0.000	0.76		19.9	OK	
S4.007	S-ExMH 21a	15 Winter	100	+40%					33.722	-0.049	0.000	0.78		20.0	OK	

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Existing Network Details for Existing

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
E-1.000	1.784	0.018	99.1	0.001	5.00	0.0	0.600	o	225	Pipe/Conduit
E-1.001	3.770	0.038	99.2	0.008	0.00	0.0	0.600	o	225	Pipe/Conduit
E-1.002	20.111	0.201	100.1	0.005	0.00	0.0	0.600	o	225	Pipe/Conduit
E-1.003	41.642	0.290	143.6	0.090	0.00	0.0	0.600	o	225	Pipe/Conduit
E-1.004	26.927	0.283	95.1	0.036	0.00	0.0	0.600	o	225	Pipe/Conduit
E-1.005	2.511	0.025	100.4	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit
E-1.006	2.835	0.358	7.9	0.000	0.00	0.0	0.600	o	100	Pipe/Conduit
E-1.007	1.205	0.152	7.9	0.000	0.00	0.0	0.600	o	100	Pipe/Conduit
E-1.008	1.581	0.016	98.8	0.011	0.00	0.0	0.600	o	150	Pipe/Conduit
E-1.009	6.772	0.068	99.6	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit

Network Results Table

PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)
E-1.000	37.257	0.001	0.0	1.31	52.2
E-1.001	37.239	0.009	0.0	1.31	52.2
E-1.002	37.201	0.014	0.0	1.31	52.0
E-1.003	37.000	0.104	0.0	1.09	43.3
E-1.004	36.710	0.140	0.0	1.34	53.3
E-1.005	36.425	0.140	0.0	1.30	51.9
E-1.006	36.400	0.140	0.0	2.76	21.7
E-1.007	36.042	0.140	0.0	2.76	21.7
E-1.008	35.890	0.151	0.0	1.01	17.9
E-1.009	35.874	0.151	0.0	1.01	17.8

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Manhole Schedules for Existing

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
PIPE B	38.100	0.843	Sealed Manhole	1200	E-1.000	37.257	225				
BEND1	38.160	0.921	Junction		E-1.001	37.239	225	E-1.000	37.239	225	
BEND2	38.160	0.959	Junction		E-1.002	37.201	225	E-1.001	37.201	225	
MH27	38.160	1.160	Open Manhole	1200	E-1.003	37.000	225	E-1.002	37.000	225	
MH28	38.170	1.460	Open Manhole	1200	E-1.004	36.710	225	E-1.003	36.710	225	
BEND3	38.160	1.735	Junction		E-1.005	36.425	225	E-1.004	36.427	225	2
MH29	38.160	1.760	Open Manhole	1200	E-1.006	36.400	100	E-1.005	36.400	225	
BEND4	38.120	2.078	Junction		E-1.007	36.042	100	E-1.006	36.042	100	
MH30	38.120	2.230	Open Manhole	1200	E-1.008	35.890	150	E-1.007	35.890	100	
BEND5	40.380	4.506	Junction		E-1.009	35.874	150	E-1.008	35.874	150	
Public Sewer	40.380	4.574	Open Manhole	0		OUTFALL		E-1.009	35.806	150	

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PIPELINE SCHEDULES for Existing

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)
E-1.000	o	225	PIPE B	38.100	37.257	0.618	Sealed Manhole	1200
E-1.001	o	225	BEND1	38.160	37.239	0.696	Junction	
E-1.002	o	225	BEND2	38.160	37.201	0.734	Junction	
E-1.003	o	225	MH27	38.160	37.000	0.935	Open Manhole	1200
E-1.004	o	225	MH28	38.170	36.710	1.235	Open Manhole	1200
E-1.005	o	225	BEND3	38.160	36.425	1.510	Junction	
E-1.006	o	100	MH29	38.160	36.400	1.660	Open Manhole	1200
E-1.007	o	100	BEND4	38.120	36.042	1.978	Junction	
E-1.008	o	150	MH30	38.120	35.890	2.080	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)
E-1.000	1.784	99.1	BEND1	38.160	37.239	0.696	Junction	
E-1.001	3.770	99.2	BEND2	38.160	37.201	0.734	Junction	
E-1.002	20.111	100.1	MH27	38.160	37.000	0.935	Open Manhole	1200
E-1.003	41.642	143.6	MH28	38.170	36.710	1.235	Open Manhole	1200
E-1.004	26.927	95.1	BEND3	38.160	36.427	1.508	Junction	
E-1.005	2.511	100.4	MH29	38.160	36.400	1.535	Open Manhole	1200
E-1.006	2.835	7.9	BEND4	38.120	36.042	1.978	Junction	
E-1.007	1.205	7.9	MH30	38.120	35.890	2.130	Open Manhole	1200
E-1.008	1.581	98.8	BEND5	40.380	35.874	4.356	Junction	

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PIPELINE SCHEDULES for Existing

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)
E-1.009	o	150	BEND5	40.380	35.874	4.356	Junction	

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
E-1.009	6.772	99.6	Public Sewer	40.380	35.806	4.424	Open Manhole	0

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Area Summary for Existing

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	User	-	100	0.001	0.001	0.001
1.001	-	-	100	0.008	0.008	0.008
1.002	-	-	100	0.005	0.005	0.005
1.003	-	-	100	0.090	0.090	0.090
1.004	-	-	100	0.036	0.036	0.036
1.005	-	-	100	0.000	0.000	0.000
1.006	-	-	100	0.000	0.000	0.000
1.007	-	-	100	0.000	0.000	0.000
1.008	-	-	100	0.011	0.011	0.011
1.009	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.151	0.151	0.151

Free Flowing Outfall Details for Existing

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
E-1.009	Public Sewer	40.380	35.806	0.000	0	0

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Simulation Criteria for Existing

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

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

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm)	18.000	Cv (Summer)	0.750
Return Period (years)	2	Ratio R	0.358	Cv (Winter)	0.840
Region	England and Wales	Profile Type	Summer	Storm Duration (mins)	30

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

Simulation Criteria

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

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

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.000 Cv (Summer) 0.750
Region England and Wales Ratio R 0.359 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DTS Status ON Inertia Status OFF
Analysis Timestep Fine DVD 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) 2, 30, 100
Climate Change (%) 0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
E-1.000	PIPE B	15 Winter	2	+0%	100/15 Summer				37.270	-0.212	0.000	0.01		0.2	OK
E-1.001	BEND1	15 Winter	2	+0%					37.268	-0.196	0.000	0.04		1.2	OK*

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

PN	US/MH Name	Level Exceeded
E-1.000	PIPE B	
E-1.001	BEND1	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)
E-1.002	BEND2	15 Winter	2	+0%					37.229	-0.197	0.000	0.04		1.9
E-1.003	MH27	15 Winter	2	+0%	30/15 Summer				37.090	-0.135	0.000	0.33		13.5
E-1.004	MH28	15 Winter	2	+0%	30/15 Summer				36.804	-0.131	0.000	0.36		18.0
E-1.005	BEND3	15 Winter	2	+0%	2/15 Winter				36.652	0.002	0.000	0.52		15.5
E-1.006	MH29	15 Winter	2	+0%	2/15 Summer				36.649	0.149	0.000	0.89		14.9
E-1.007	BEND4	60 Winter	2	+0%					36.142	0.000	0.000	1.03		11.2
E-1.008	MH30	15 Winter	2	+0%	2/15 Summer				36.080	0.040	0.000	1.45		15.8
E-1.009	BEND5	15 Winter	2	+0%					35.991	-0.033	0.000	0.96		15.8

PN	US/MH Name	Status	Level Exceeded
E-1.002	BEND2	OK*	
E-1.003	MH27	OK	
E-1.004	MH28	OK	
E-1.005	BEND3	SURCHARGED*	
E-1.006	MH29	SURCHARGED	
E-1.007	BEND4	SURCHARGED*	
E-1.008	MH30	SURCHARGED	
E-1.009	BEND5	OK*	

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

Simulation Criteria

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

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

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.000 Cv (Summer) 0.750
Region England and Wales Ratio R 0.359 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DTS Status ON Inertia Status OFF
Analysis Timestep Fine DVD 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) 2, 30, 100
Climate Change (%) 0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
E-1.000	PIPE B	15 Winter	30	+0%	100/15 Summer				37.325	-0.157	0.000	0.02		0.7	OK
E-1.001	BEND1	15 Winter	30	+0%					37.330	-0.134	0.000	0.10		2.8	OK*

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

PN	US/MH Name	Level Exceeded
E-1.000	PIPE B	
E-1.001	BEND1	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)
E-1.002	BEND2	15 Winter	30	+0%					37.330	-0.096	0.000	0.08		4.4
E-1.003	MH27	15 Winter	30	+0%	30/15 Summer				37.332	0.107	0.000	0.74		30.5
E-1.004	MH28	15 Winter	30	+0%	30/15 Summer				37.289	0.354	0.000	0.63		30.9
E-1.005	BEND3	30 Winter	30	+0%	2/15 Winter				36.652	0.002	0.000	0.69		20.6
E-1.006	MH29	15 Winter	30	+0%	2/15 Summer				37.233	0.733	0.000	1.23		20.5
E-1.007	BEND4	180 Winter	30	+0%					36.142	0.000	0.000	0.96		10.4
E-1.008	MH30	15 Winter	30	+0%	2/15 Summer				36.184	0.144	0.000	1.97		21.4
E-1.009	BEND5	30 Winter	30	+0%					36.024	0.000	0.000	1.28		20.9

PN	US/MH Name	Status	Level Exceeded
E-1.002	BEND2	OK*	
E-1.003	MH27	SURCHARGED	
E-1.004	MH28	SURCHARGED	
E-1.005	BEND3	SURCHARGED*	
E-1.006	MH29	SURCHARGED	
E-1.007	BEND4	SURCHARGED*	
E-1.008	MH30	SURCHARGED	
E-1.009	BEND5	SURCHARGED*	

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

Simulation Criteria

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

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

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.000 Cv (Summer) 0.750
Region England and Wales Ratio R 0.359 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DTS Status ON Inertia Status OFF
Analysis Timestep Fine DVD 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)	2, 30, 100
Climate Change (%)	0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)
E-1.000	PIPE B 15	Winter	100	+0%	100/15 Summer				37.662	0.180	0.000	0.06		1.7
E-1.001	BEND1 30	Winter	100	+0%					37.464	0.000	0.000	0.10		3.1

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

PN	US/MH Name	Status	Level Exceeded
E-1.000	PIPE B	SURCHARGED*	
E-1.001	BEND1	SURCHARGED*	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)
E-1.002	BEND2	30 Winter	100	+0%					37.426	0.000	0.000	0.10		5.1
E-1.003	MH27	15 Winter	100	+0%	30/15 Summer				37.657	0.432	0.000	0.80		33.2
E-1.004	MH28	15 Winter	100	+0%	30/15 Summer				37.608	0.673	0.000	0.64		31.4
E-1.005	BEND3	120 Winter	100	+0%	2/15 Winter				36.652	0.002	0.000	0.57		17.0
E-1.006	MH29	15 Winter	100	+0%	2/15 Summer				37.543	1.043	0.000	1.37		22.7
E-1.007	BEND4	180 Winter	100	+0%					36.142	0.000	0.000	1.25		13.5
E-1.008	MH30	15 Winter	100	+0%	2/15 Summer				36.244	0.204	0.000	2.21		24.0
E-1.009	BEND5	120 Winter	100	+0%					36.024	0.000	0.000	1.08		17.7

PN	US/MH Name	Status	Level Exceeded
E-1.002	BEND2	SURCHARGED*	
E-1.003	MH27	SURCHARGED	
E-1.004	MH28	SURCHARGED	
E-1.005	BEND3	SURCHARGED*	
E-1.006	MH29	SURCHARGED	
E-1.007	BEND4	SURCHARGED*	
E-1.008	MH30	SURCHARGED	
E-1.009	BEND5	SURCHARGED*	

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APPENDIX 3
UNITED UTILITIES CORRESPONDANCE

Lisa Sawyer

From: O'Brien, Neil <Neil.O'Brien@uuplc.co.uk>
Sent: 26 July 2019 09:44
To: Lisa Sawyer; Wastewater Developer Services
Subject: RE: REPEAT 2: Manchester Town Hall and Albert Square Redevelopment - 4200019060

Dear Customer

Thank you for your email of 12/7/19 in relation to United Utilities' initial Pre Development Enquiry response.

United Utilities have no objection to you continuing to exercise your rights under the Water Industry Act and continue draining your existing building and associated court yard to the public sewer.

You only need to apply for a S106 Sewer Connection if the you are building a new premises (a part 1) or actually working on the public sewer itself (a part 2). As the work is to a private drain for an existing building there is no need for a s106 application

If you require any further guidance please follow http://www.unitedutilities.com/builders-developers.aspx

If you need a make further enquiry relating to this matter please send your enquiry to WastewaterDeveloperServices@uuplc.co.uk Please quote your reference number

Please Note:- enquiries sent to any other United Utilities e-mail address will be deleted

Please note, should you intend to enter into an adoption agreement with UU and although your proposal may comply with the principal strategy set out in the advice above, we do reserve the right to request changes to any future design proposals put forward for adoption, as we need to be sure that the proposals meet the requirements of Sewers for Adoption and UU Asset Standards. Any design proposals should take in to consideration long term operability whilst also offering cost effectiveness for the life of the assets. Where a developer would like to progress a Section 104 Agreement, it must be emphasised that any works commenced on site on the basis of the Pre-Development Enquiry Advice without an approved S104 technical assessment will be at the Designers/ Developers own risk and may be subject to change. Please be aware that on site drainage must be designed in accordance with Building Regulations, National Planning Policy, Planning Conditions and local flood authority guidelines, we would recommend that you laise and make suitable agreements with the relevant statutory bodies.

Regards,

Developer Services

From: Lisa Sawyer [mailto:Lisa.Sawyer@ramboll.co.uk]
Sent: 12 July 2019 17:55
To: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>; O'Brien, Neil <Neil.O'Brien@uuplc.co.uk>
Subject: FW: REPEAT 1: Manchester Town Hall and Albert Square Redevelopment - 4200019060

Neil
Conscious that the response below was over 6 months ago please can you confirm that your advice below still stands.

The project is now being split in regards to planning approval with an enabling works package to install the drainage beneath the courtyard of the Town Hall first. I have therefore attached the latest design information for the enabling works package (which is currently in for planning) indicating the existing outfall locations which we propose to utilise. Surface water is to discharge into the Princess Street sewer via the existing 150mm connection from the courtyard drainage and foul water into the Lloyd Street sewer. The LLFA are requiring from us your response in order to discharge the planning condition.

Can you please confirm if we are required to complete an S106 agreement for this. Assuming we get planning the works are hoping to start in the next few months.

Kind regards

Lisa Sawyer
Director, Team Leader Highways North

D +44 7896227086
lisa.sawyer@ramboll.co.uk

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Registered office: 240 Blackfriars Road, London SE1 8NW

From: O'Brien, Neil
Sent: 15 October 2018 10:51
To: Lisa Sawyer <Lisa.Sawyer@ramboll.co.uk>; Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>
Subject: REPEAT 1: Manchester Town Hall and Albert Square Redevelopment - 4200019060

Dear Customer

Thank you for your email of 1/10/18 in relation to my initial Pre Development Enquiry response.

You will only need to enter into a build over agreement if the structure to be constructed is subject to part H4 of the Building Regulations.

UU would not object to the existing hardstanding areas and the existing building continuing to drain to the public sewer

If you require any further guidance please follow http://www.unitedutilities.com/builders-developers.aspx

If you need a make further enquiry relating to this matter please send your enquiry to WastewaterDeveloperServices@uuplc.co.uk Please quote your reference number

Please Note:- enquiries sent to any other United Utilities e-mail address will be deleted

Please note, should you intend to enter into an adoption agreement with UU and although your proposal may comply with the principal strategy set out in the advice above, we do reserve the right to request changes to any future design proposals put forward for adoption, as we need to be sure that the proposals meet the requirements of Sewers for Adoption and UU Asset Standards. Any design proposals should take in to consideration long term operability whilst also offering cost effectiveness for the life of the assets. Where a developer would like to progress a Section 104 Agreement, it must be emphasised that any works commenced on site on the basis of the Pre-Development Enquiry Advice without an approved S104 technical assessment will be at the Designers/ Developers own risk and may be subject to change. Please be aware that on site drainage must be designed in accordance with Building Regulations, National Planning Policy, Planning Conditions and local flood authority guidelines, we would recommend that you laise and make suitable agreements with the relevant statutory bodies.

Regards,

Developer Services

From: Lisa Sawyer [mailto:Lisa.Sawyer@ramboll.co.uk]
Sent: 01 October 2018 09:50
To: O'Brien, Neil ; Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>
Subject: RE: Manchester Town Hall and Albert Square Redevelopment - 4200019060

Hi Neil

This scheme is developing and we are now at a position to confirm our likely discharge points to the public sewer network and design of the proposed scheme in Albert Square

As the programme of works is quite long and it may be some time before a S106 agreements are issued I wanted to ensure I kept United Utilities updated with our proposals in case you had any comments.

Attached are sketches which indicate the existing drainage systems for both the building, Albert Square and surrounding highways within the redline boundary. It is proposed to reuse the existing connections to the public sewer and the locations are indicated on these sketches. Some surface water attenuation will be provided but it is not possible to all areas within the redline boundary and this strategy has been agreed with the LLFA.

Please confirm if you have any queries at this time in regards to the strategy indicated on the attached.

I have also attached a part completed "Building over a public sewer" enquiry form to enable a discussion to be had on building over existing public sewers. It is not proposed to construct major structural works but there are new ramps, steps, anti-terrorism retractable bollards with potential large foundations and landscaping with large trees proposed on top of the public sewers or within the easement of the sewers therefore I need advice at this stage if the current scheme is acceptable to United Utilities or what would need to be amended to make the scheme work. There are also sketches attached to indicate the locations of these over the existing public sewers.

Your earliest response would be appreciated and if you require additional information please advise.

Kind regards
Lisa Sawyer
Associate, Infrastructure & Highways

D +44 7896227086
lisa.sawyer@ramboll.co.uk

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Registered office: 240 Blackfriars Road, London SE1 8NW

From: O'Brien, Neil
Sent: 07 December 2017 10:24
To: Lisa Sawyer <Lisa.Sawyer@ramboll.co.uk>; Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>
Subject: RE: Manchester Town Hall and Albert Square Redevelopment - 4200019060

Dear Customer

We have carried out an assessment of your application which is based on the information provided; this pre development advice will be valid for 12 months

Foul will be allowed to drain to the public combined sewer network at an unrestricted rate. The connection(s) to the public sewer can be at a point(s) convenient to yourself

Surface water from the building and associated land can drain to the public sewer network at an unrestricted rate. The connection(s) to the public sewer can be at a point(s) convenient to yourself

United Utilities are not obliged to accept run-off from highways (highway drainage) to the public sewer network. Please drain any new sections of highway without recourse to the public sewer network.

If you require any further guidance please follow http://www.unitedutilities.com/builders-developers.aspx

If you need a make further enquiry relating to this matter please send your enquiry to WastewaterDeveloperServices@uuplc.co.uk Please quote your DEXXXX/42XXXXXXX?GEXXXX reference number

Please Note:- enquiries sent to any other United Utilities e-mail address will be deleted.

Connection Application

Although we may discuss and agree discharge points & 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 ultimatley 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

http://www.unitedutilities.com/connecting-public-sewer.aspx

Please be aware that on site drainage must be designed in accordance with Building Regulations, National Planning Policy, Planning Conditions and local flood authority guidelines, we would recommend that you laise and make suitable agreements with the relevant statutory bodies.

Regards

Neil O'Brien

Developer Engineer
Developer Services and Planning

From: Lisa Sawyer [mailto:Lisa.Sawyer@ramboll.co.uk]
Sent: 22 November 2017 15:00
To: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>
Subject: Manchester Town Hall and Albert Square Redevelopment

To whom it may concern

Please find attached a completed predevelopment enquiry which we have submitted to begin engagement on drainage discharge for the works being undertaken on the Manchester Town Hall refurbishment and works within Albert Square.

It is believed that the vast majority of the foul drainage and surface water roof drainage from Manchester Town Hall drains into the existing 640x480 combined sewer within Princess Street with a drainage connection also connecting into the combined sewer within Lloyd Street.

We believe that as part of the Metrolink Second City Crossing works two 375mm stubs were proposed to be provided and internal lining works undertaken to mitigate any future problems with the sewers located directly underneath tram tracks in preparation for the proposed works to the Town Hall and Albert Square. We are struggling however to obtain any information on this and we believe these works may not have been actually undertaken? I have a pdf copy (although it is unreadable) of a United Utilities drawing reference MISC/80030937/03/11/2300, see attached. Do you have any information on this to help inform a decision on proposed outfall locations?

It is not exactly clear yet what changes will be made within the Town Hall although it is expected that the majority of the building will be kept as offices (albeit it increased number of personnel) with increased kitchen and toilet facilities. The total proposed foul flow could be in the region of 20l/s.

It is unlikely that we will propose any new foul connections into the 1500mm diameter sewer in Albert Square due to the existing lightwells located between the Town Hall and the existing sewer. If possible the existing infrastructure will be utilised however the size of the connections (believed to be 150mm and 100mm) may not be adequate for the increased flows so either an upgrade of these will be required (tunnel bored under the tram line) or additional connection locations will be required.

In regards to surface water it is believed that this is also collected and discharged into the combined public sewers surrounding the site. It is believed that there are direct connections from the perimeter rainwater downpipes from the building and collection of the internal rainwater pipes which discharge into Princess Street. It is also believed the northern section of Albert Square discharges into the combined sewer in Princess Street but further connectivity surveys are required to identify where the remainder of the area ends up. Highway drainage is also assumed to discharge into the public sewer.

We will be in discussion with the Lead Local Flood Authority also who are likely to put restrictions on discharge of surface water from the site, however it would be useful to understand the sewers which are most vulnerable and where your preference would be on discharge for both Albert Square and the town hall building (foul and surface water). I have attached a sketch indicating the current thoughts on surface area split between that which can be attended and that which is likely to have to stay unattenuated.

A below ground CCTV survey is due in January/February to provide us with the connectivity/capacity confirmation we require to move the design forward. However we are required to give some initial advice to our client and design team on your thoughts regarding discharge and advise on the public sewer capacities within the vicinity of the site before Christmas if possible.

Yours sincerely
Lisa Sawyer

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Associate
Infrastructure & Highways

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Lisa.Sawyer@ramboll.co.uk

_____

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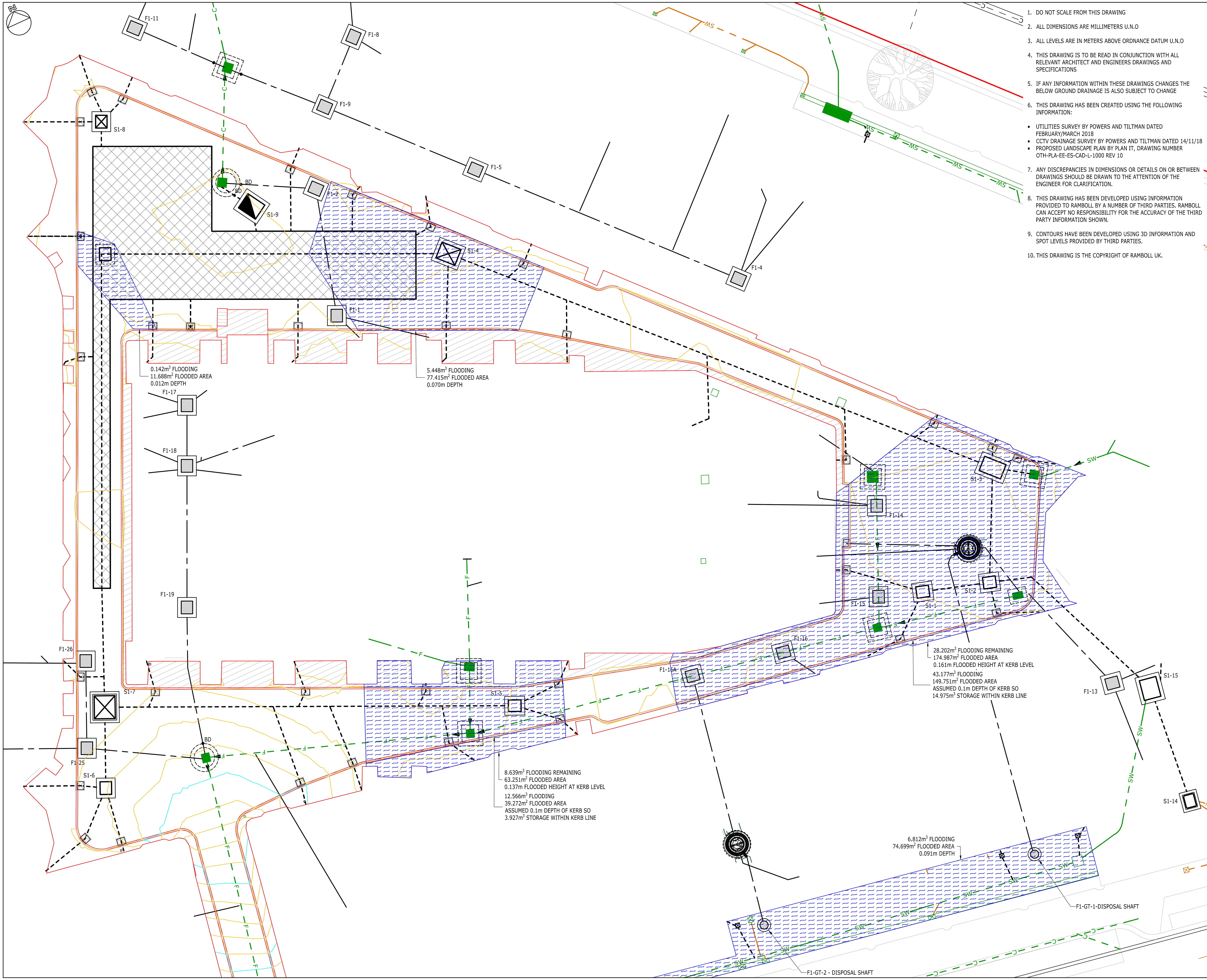
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APPENDIX 4
EXCEEDENCE DRAWING



1. DO NOT SCALE FROM THIS DRAWING
2. ALL DIMENSIONS ARE MILLIMETERS U.N.O
3. ALL LEVELS ARE IN METERS ABOVE ORDNANCE DATUM U.N.O
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECT AND ENGINEERS DRAWINGS AND SPECIFICATIONS
5. IF ANY INFORMATION WITHIN THESE DRAWINGS CHANGES THE BELOW GROUND DRAINAGE IS ALSO SUBJECT TO CHANGE
6. THIS DRAWING HAS BEEN CREATED USING THE FOLLOWING INFORMATION:

- UTILITIES SURVEY BY POWERS AND TILTMAN DATED FEBRUARY/MARCH 2018
- CCTV DRAINAGE SURVEY BY POWERS AND TILTMAN DATED 14/11/18
- PROPOSED LANDSCAPE PLAN BY PLAN IT, DRAWING NUMBER OTH-PLA-EE-ES-CAD-L-1000 REV 10

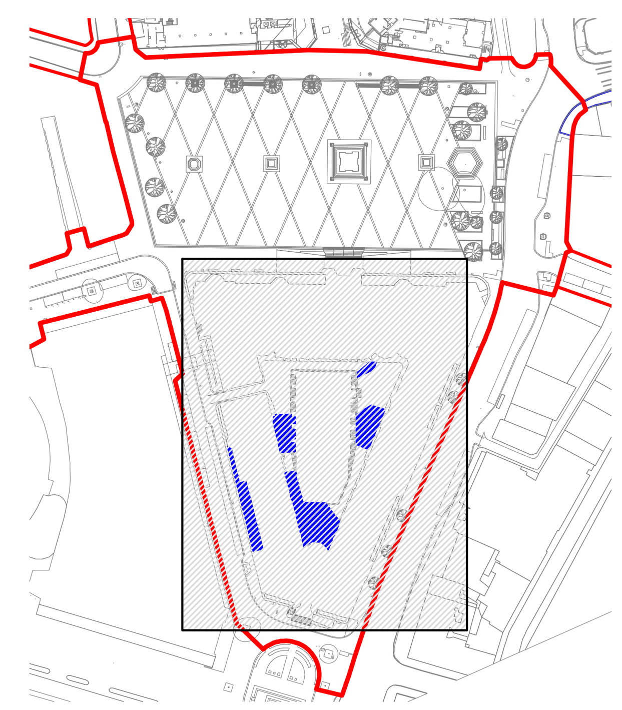
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Scale Bars to be used as guidance only - refer to sheet size below

Scale	Unit					
1:100	mm	1000	3000	5000	7000	
1:200	mm	5000	8000	12000	16000	
1:500	M	5	15	25	35	
1:1250	M	10	30	50	70	90

KEY

- EXISTING PUBLIC COMBINED DRAIN/ MANHOLE — C —
- EXISTING PUBLIC FOUL DRAIN/ MANHOLE — F —
- EXISTING PRIVATE SURFACE WATER DRAIN/MANHOLE — SW—
- EXISTING PRIVATE COMBINED DRAIN/ MANHOLE — C—
- EXISTING PRIVATE FOUL DRAIN/ MANHOLE — F —
- EXISTING ASSUMED DRAIN — C—
- PROPOSED FOUL WATER MANHOLE
- PROPOSED FOUL WATER DRAIN
- PROPOSED SURFACE WATER MANHOLE
- PROPOSED SURFACE WATER DRAIN
- PROPOSED ATTENUATION
- POTENTIAL FLOODING AREAS



ISSUE	DATE	APPROVED	DRAWN	DESCRIPTION
P01	WIP/2019	LS	CO	SKETCH

OUR TOWN HALL PROJECT

RAMBOLL

www.ramboll.co.uk

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+44 (0) 161 827 1890
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PROJECT STATUS	SKETCH
CLIENT	MANCHESTER CITY COUNCIL
PROJECT	OUR TOWN HALL PROJECT
DRAWING TITLE	TOWN HALL COURTYARD PROPOSED EXCEEDANCE FLOODING AREAS
SIZE & SCALE	A1: 1:100
DRAWING STATUS	-
JOB NUMBER	1620003165
DRAWING NO.	OTH-RAM-XX-XX-SKE-0044
REV	P01

01 August 2019 15:52:24