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PRINCESS STREET SURFACE WATER DRAINAGE - ATTENUATION ANALYSIS

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CONTENTS

1.	**INTRODUCTION**	**1**
2.	**SURFACE WATER ATTENUATION ANALYSIS**	**1**
2.1	Design Parameters	1
2.2	Analysis Results	2
3.	**CONCLUSION**	**2**

APPENDICES

Appendix A
Site Wide Drainage Strategy – Below Ground

Appendix B
Analysis Results

1. INTRODUCTION

1.1.1 The drainage attenuation analysis for the Princess Street development has been undertaken in accordance with the planning requirements of Manchester City Council (MCC) and the statutory undertaker United Utilities.

1.1.2 This document outlines the key requirements for the surface water drainage attenuation at the Princess Street site.

1.1.3 The proposed site is located at the junction of Whitworth Street and Princess Street within the Whitworth Street/Princess Street Conservation Area.

1.1.4 The total site area to be drained is approximately 0.45ha. This catchment area is defined by the site boundary and is considered to be conservative.

1.1.5 The vast majority of the site will be hard standing and as such the site is considered to be 100% impermeable for the purposes of the attenuation analysis.

2. SURFACE WATER ATTENUATION ANALYSIS

2.1 Design Parameters

2.1.1 It is proposed that the on-site surface water drainage is discharged via a single 300 dia. pipe laid at a gradient of 1 in 140. The pipe will connect into the existing 3.0m dia. United Utilities manhole within Princess Street. No restriction on flow has been imposed other than the pipe size and gradient must remain as previously described (300 dia. at 1 in140). The system must also discharge freely with no surcharging or flooding. The final outfall connection is shown on drawing 'BX-DR-01, Site Wide Drainage Strategy Below Ground' within Appendix A.

2.1.2 The following parameters will be used for the attenuation analysis:

- Rainfall profile for Manchester, r = 0.358, M5-60 = 18mm
- 1 in 100 year return period, as per MCC requirements
- Storage tank if required at 29.85m invert level (Equivalent to basement 3 ground level)
- Outfall invert level of 28.270 from the development
- Catchment area, 0.45ha, 100% impermeable
- Assumed public sewer is free flowing and not surcharged

2.1.3 The site will be assessed via Microdrainage storm simulation software using the aforementioned design parameters.

2.2 Analysis Results

2.2.1 Using the design parameters and an initial attenuation sizing of 50m³ the full range of storm scenarios for the 1 in 100 year return period was applied to the system to simulate for surcharging and flooding.

2.2.2 The simulation results showed no surcharging or flooding within the network and therefore complies with the requirements. The results also showed that the storage was not being utilised and the system was therefore over attenuated.

2.2.3 The second simulation used the same parameters with 0m³ of storage provided. The results for this simulation were the same as for the 50m³ storage scenario. This indicates the outfall rate achieved via the 300 dia. pipe is sufficient to discharge the 1 in 100 year storm without the need for attenuation.

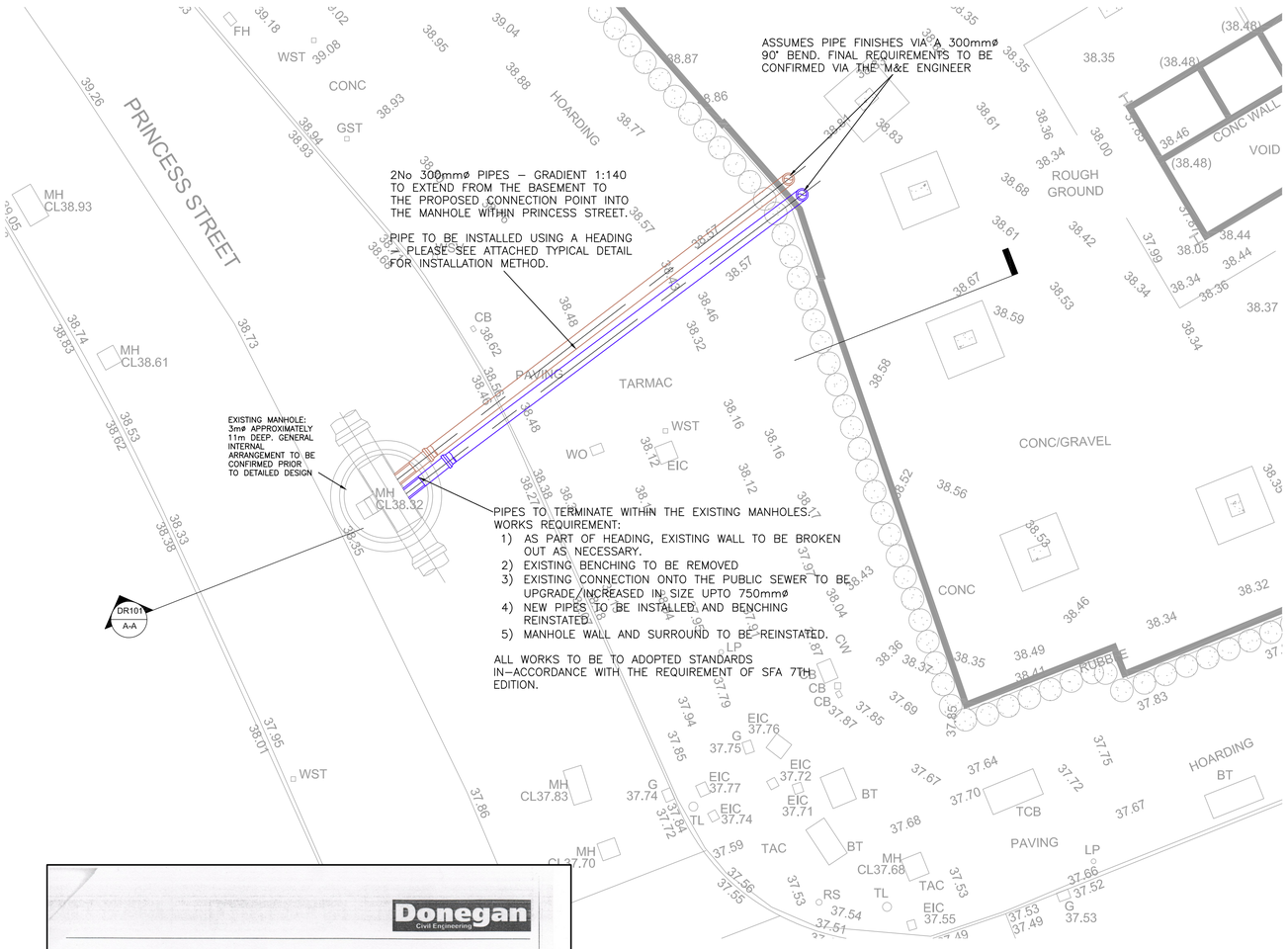
2.2.4 The peak flow rate shown is for the 15 minute storm at 135.1l/s. The results show the pipe is discharging under pressure head at this rate and is not surcharged at any point. There is also no flooding experienced.

2.2.5 Refer to Appendix B for the detailed simulation results.

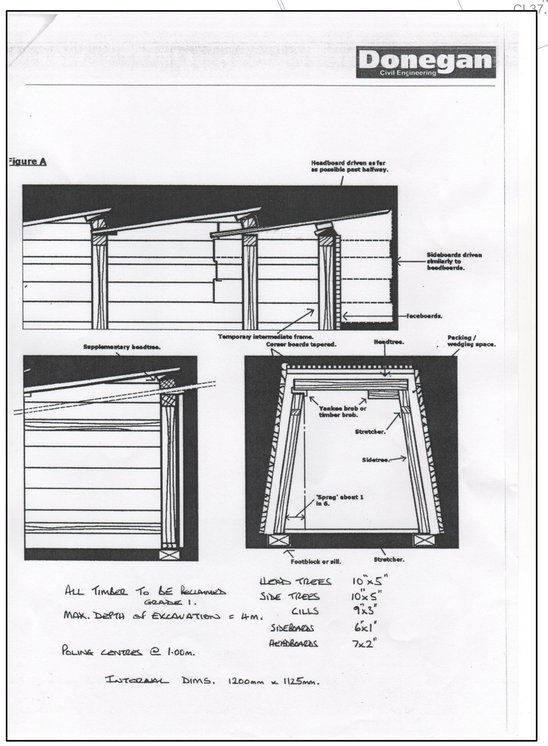
3. CONCLUSION

3.1.1 It is apparent from the simulation that the proposed flow restriction of the 300 dia. pipe does not result in attenuation storage being required for the 1 in 100 year storm. Therefore there is no requirement for storage to be installed to prevent flooding on the site.

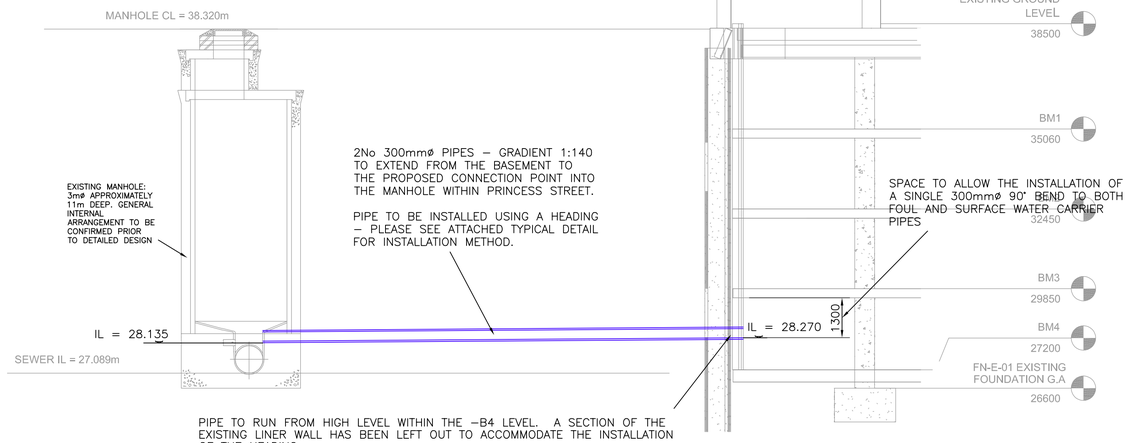
APPENDIX A
SITE WIDE DRAINAGE STRATEGY – BELOW GROUND



PLAN
SCALE 1:100



TYPICAL HEADING DETAIL
SCALE NTS



PIPE TO RUN FROM HIGH LEVEL WITHIN THE –B4 LEVEL. A SECTION OF THE EXISTING LINER WALL HAS BEEN LEFT OUT TO ACCOMMODATE THE INSTALLATION OF THE HEADING.

WORKS REQUIRED:
1)EXISTING REINFORCEMENT WITHIN THE LINER WALL TO BE CUT
2)BREAKING OUT OF THE EXISTING PILES
3)INSTALLATION OF THE TIMBER HEADING AND COMMENCEMENT OF THE HEADING PROCESS.
4)INSTALLATION OF THE 2No 300mmø PIPES.
5)BACKFILL AND REMOVAL OF THE HEADING
6)FINAL PRESSURE GROUTING OF THE PIPES TO REMOVE ANY FINAL VOIDS
7)REINSTATEMENT OF THE REINFORCEMENT TO THE LINER WALL
8)CONCRETE AND FINISH OF THE LINER WALL.

WORKS METHOD AND RISKS AS ADVISED BY DONEGAN'S

SECTION A–A
SCALE 1:100

NOTES CONT:

ALL BRANCH DRAINS, OR CONNECTIONS, ARE TO DISCHARGE TO THE COLLECTORS OBLIQUELY, AND IN THE DIRECTION OF THE MAIN FLOW.

THE CONTRACTOR IS TO EXERCISE PARTICULAR CARE WHEN WORKING AT INTERFACES WITH EXISTING RETAINED CONSTRUCTION. EXISTING DRAINS IDENTIFIED ARE TO BE EXPLORED AND, WHERE NOT ALREADY IDENTIFIED ON THE DRAWINGS, ARE TO BE BROUGHT TO THE ATTENTION OF ROC CONSULTING.

ALL BEDDING AND BACKFILL TO DRAINS BELOW THE PLANE OF INFLUENCE OF ADJACENT BUILDING FOUNDATIONS TO BE CONCRETE.

IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY ALL INFORMATION GIVEN WITH REGARD TO EXISTING SERVICES AND DRAINAGE CONNECTIONS ETC. THIS MUST BE CARRIED OUT PRIOR TO COMMENCING ANY WORKS ON SITE.

CONNECTION TO EXISTING PUBLIC SEWER MANHOLES TO BE AGREED WITH LOCAL AUTHORITY.

ALL EXISTING DRAINAGE PROPOSED FOR ABANDONMENT IS TO BE GRUBBED OUT DURING EXCAVATIONS FOR THE WORKS OR GROUT–FILLED WHERE LEFT INSITU.

ALL EXTERNAL NEW MANHOLES TO BE CIRCULAR PRECAST CONCRETE 1050ø UNLESS NOTED OTHERWISE AS TYPICAL DETAILS WHERE LOCAL CONDITIONS PERMIT. WHERE LOCAL CONDITIONS ARE SUCH THAT CIRCULAR PRECAST MANHOLES AS SPECIFIED CANNOT BE ACCOMMODATED, RECTANGULAR BRICKWORK MANHOLES SHOULD BE CONSTRUCTED IN ACCORDANCE WITH BUILDING REGULATIONS APPROVED DOCUMENT H1: TABLE 12.

ALL LINEAR SLOT DRAINS DENOTED "DRAINAGE CHANNELS"ON THE DRAWING ARE TO BE ACO M150D 0.0 WITH D400 GRATES – TYPE TO BE ADVISED BY ARCHITECT, UNLESS OTHERWISE NOTED. ALL ASSOCIATED SUMP UNITS DENOTED "SO" ON THE DRAWING TO BE THE ACO M150D UNIVERSAL SUMP.

THIS DRAWING IS THE PROPERTY OF RgCp. COPYRIGHT IS RESERVED BY THEM AND THE DRAWING IS ISSUED ON THE CONDITION THAT IT IS NOT COPIED, REPRODUCED, RETAINED OR DISCLOSED TO ANY UNAUTHORISED PERSON EITHER WHOLLY OR IN PART WITHOUT THE WRITTEN CONSENT OF RgCp

NOTES

THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECT'S, ENGINEER'S AND OTHER SPECIALISTS' DRAWINGS.

THE CONTRACTOR IS RESPONSIBLE FOR CHECKING DIMENSIONS AND LEVELS AND FOR CONFIRMING THE GIVEN LEVEL OF EXISTING DRAINAGE, OUTFALL INTO PUBLIC SEWER, WATERCOURSE OR OTHER OUTFALL.

ALL WORKS TO BE IN ACCORDANCE WITH BS EN 752: BRITISH STANDARD FOR DRAIN AND SEWER SYSTEMS OUTSIDE BUILDINGS AND THE BUILDING REGULATIONS, ALL WHERE RELEVANT.

ALL 100–300mm DIA PIPES TO BE CLAY PIPEWORK. FITTINGS TO BE PLAIN END VITRIFIED CLAY WITH FLEXIBLE POLYPROPYLENE COUPLINGS AS HEPWORTH SUPERSLEEVE OR NAYLOR DENSLEEVE.

ALL CHAMBER AND MANHOLE COVERS AND FRAMES IN ROADS AND ACCESSWAYS TO BE TO BS 7903 OR BS EN 124 CLASS D400. IN FOOTWAYS AND LANDSCAPED AREAS TO BE TO CLASS B125.

ALL PIPES BENEATH BUILDINGS AND FROM SVPS, GULLIES AND WC CONNECTIONS TO ACCESS CHAMBERS TO BE 100mm AT A MINIMUM GRADIENT OF 1 IN 40 UNLESS NOTED OTHERWISE. MINIMUM GRADIENT OF 150mm PIPE BETWEEN ACCESS CHAMBERS OUTSIDE BUILDING TO BE 1 IN 80 UNO.

WORKMANSHIP GENERALLY TO BE TO SEWERS FOR ADOPTION 6TH EDITION WHERE NOT OTHERWISE COVERED IN BS EN 752.

ALL RWP's AND FOUL WATER APPLIANCES TO HAVE ACCESS POINT FOR RODDING ABOVE GRD LEVEL / FLOOR LEVEL

WHERE PIPES PASS UNDER BUILDINGS, UNLESS BEAM & BLOCK FLOORS ARE USED, THEY ARE TO BE SURROUNDED IN 100mm CONCRETE AS BUILDING REGULATIONS APPROVED DOCUMENT H1: DIAGRAM 12. THE CONCRETE SURROUND IS TO HAVE 18mm WIDE MOVEMENT JOINTS OF THICK COMPRESSIBLE BOARD AT EACH PIPE POINT POSITION AND AT A MAXIMUM OF 5m CENTRES ALONG THE LENGTH OF THE PIPE.

PIPE SURROUND REQUIREMENTS:
HIGHWAYS/AREAS SUBJECT TO VEHICLE OVERRUN:
COVER GREATER THAN 1.2m = TYPE S
COVER LESS THAN 1.2m = TYPE Z
AREAS NOT SUBJECT TO VEHICLE OVERRUN:
COVER GREATER THAN 0.6m = TYPE S
COVER LESS THAN 0.6m = TYPE Z

ALL CONCRETE TO BE FND4Z UNLESS OTHERWISE NOTED.

DRAINAGE REQUIREMENTS WITHIN THE BASEMENT:
A) NON–RETURN VALVES TO BE INCLUDED ON BOTH OUTGOING PIPES – VALVES LOCATED WITHIN THE BASEMENT FOR EASE OF MAINTENANCE. SPECIFICATION BY M&E
B) ANY REQUIREMENT FOR DRAINAGE WITHIN THE BASEMENT INCLUDING BUT NOT LIMITED TO; GULLIES TO CAR PARKING, LIFT PITS, FIRE FIGHTING REQUIREMENTS AND PLANT TESTING AND MAINTENANCE SHOULD BE PUMPED AND CONNECTED BACK TO THE OUTGOING PIPES AT HIGH LEVEL. CONNECTION SHOULD BE UPSTREAM OF ANY NON–RETURN VALVE TO PREVENT ISSUES WITH SURCHARGING FROM THE ADOPTED SEWER NETWORK. SPECIFICATION BY M&E

REV.	DATE	DETAILS	DRN.	CHK.

DRAWING STATUS
STAGE 3

RgC CONSULTING
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6 Commercial Street, Manchester, M15 4PZ
Tel: 0161 214 5390

DRAWN	DATE	SCALES
ARR	DEC15	AS SHOWN
CHECKED	DATE	THE ABOVE SCALES APPLY WHEN PLOTTED AT A1 SIZE
APPRVD.	DATE	EMAIL FOR DRAWINGS drawings@rocconsulting.com

CLIENT
URBAN AND CIVIC

PROJECT TITLE
PRINCESS STREET

DRAWING TITLE
SITE WIDE DRAINAGE STRATEGY BELOW GROUND

PROJECT No.	DRAWING No.	REV.
3251	BX-DR-01	-

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APPENDIX B
ANALYSIS RESULTS

Summary of Results for 100 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Winter	29.850	0.000	135.1	0.0	O K
30 min Winter	29.850	0.000	125.1	0.0	O K
60 min Winter	29.850	0.000	90.7	0.0	O K
120 min Winter	29.850	0.000	58.6	0.0	O K
180 min Winter	29.850	0.000	44.2	0.0	O K
240 min Winter	29.850	0.000	35.8	0.0	O K
360 min Winter	29.850	0.000	26.4	0.0	O K
480 min Winter	29.850	0.000	21.2	0.0	O K
600 min Winter	29.850	0.000	17.9	0.0	O K
720 min Winter	29.850	0.000	15.5	0.0	O K
960 min Winter	29.850	0.000	12.4	0.0	O K
1440 min Winter	29.850	0.000	9.1	0.0	O K
2160 min Winter	29.850	0.000	6.6	0.0	O K
2880 min Winter	29.850	0.000	5.3	0.0	O K
4320 min Winter	29.850	0.000	3.8	0.0	O K
5760 min Winter	29.850	0.000	3.0	0.0	O K
7200 min Winter	29.850	0.000	2.5	0.0	O K
8640 min Winter	29.850	0.000	2.2	0.0	O K
10080 min Winter	29.850	0.000	1.9	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Winter	84.558	0.0	79.9	0
30 min Winter	56.667	0.0	107.1	0
60 min Winter	36.294	0.0	137.2	0
120 min Winter	22.499	0.0	170.1	0
180 min Winter	16.785	0.0	190.3	0
240 min Winter	13.552	0.0	204.9	0
360 min Winter	9.938	0.0	225.4	0
480 min Winter	7.979	0.0	241.3	0
600 min Winter	6.725	0.0	254.2	0
720 min Winter	5.845	0.0	265.1	0
960 min Winter	4.680	0.0	283.1	0
1440 min Winter	3.416	0.0	309.9	0
2160 min Winter	2.488	0.0	338.5	0
2880 min Winter	1.984	0.0	360.0	0
4320 min Winter	1.440	0.0	392.0	0
5760 min Winter	1.146	0.0	415.8	0
7200 min Winter	0.959	0.0	435.0	0
8640 min Winter	0.829	0.0	451.2	0
10080 min Winter	0.732	0.0	465.2	0

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