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Hawthorn Medical Centre

Drainage Planning Condition Discharge Report

Curtins Ref: HMCNMC-CUR-XX-XX-T-C-92001

Revision: P02

Issue Date: 05 June 2026

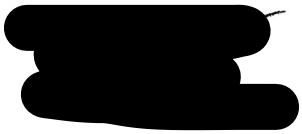
Client Name: NHS Property 99 Gresham Street London EC2V 7NG

Site Address: Land on Molesey Road, Fallowfield Manchester , M14 6PE

Control Sheet

Rev	Description	Checked	Issued	Date
P01	Issue to discharge condition	MW	MW	20.02.26
P02	Updated Connection Detail Added	IK	ATL	05.06.26

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

Author	Signature	Date
Andrew Losty MEng (Hons) Project Engineer		05 June 2026

Reviewed	Signature	Date
Marta Wolska MEng (Hons) Senior Civil Engineer		05 June 2026

Contents

1.0 Planning Condition Discharge 4
1.1 Introduction 4
1.2 Condition 20 4
1.3 Surface Water Drainage Design 4
Appendix 6

Appendices

Appendix A

Proposed Drainage Layout

Appendix B

Proposed catchment and easements

Appendix C

Proposed Drainage Calculations

Appendix D

Flow Exceedance Plan

Appendix E

Drainage Details

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1.0 Planning Condition Discharge

1.1 Introduction

Curtins has been appointed by NHS Property to provide a report to facilitate the discharge of Planning Condition for the proposed development located at Land on Molesey Road, Fallowfield Manchester , M14 6PE . Planning Approval Ref **144426/FO/2025**.

The Planning Condition to be discharged is Condition 20, which relates to the proposed surface water drainage design for the scheme.

1.2 Condition 20

The wording of Condition 20 is as follows:

Condition 20: Notwithstanding the drainage information referenced in condition no.2 prior to commencement of development, a surface water drainage scheme in accordance with Non-Statutory Technical Standards for Sustainable Drainage Systems (March 2015) or any subsequent replacement national standards, shall be submitted for approval in writing by the City Council, as Local Planning Authority. The development shall be constructed and completed in accordance with the approved details, prior to the first occupation/use of the development.

1.3 Surface Water Drainage Design

The Surface Water Drainage has been designed and progressed following the principles of the FRA & Drainage Strategy 087546-CUR-XX-XX-T-C-92000-V03

In-situ infiltration testing was undertaken by Structural Soils LTD on the 27th of August 2025. 5 no. in-situ CBR tests in accordance with BS1377:Part 9:1990, Clause 4.3 and 2 no. soakaway testing to BRE Digest 365. Based on test results it is evident that the infiltration properties of the soil are very poor. Drainage design to account for poor infiltration properties of the soil. Therefore based on ground conditions infiltration systems are not considered suitable for this site.

The culverted watercourse, Fallowfield Brook, is located a short distance north of the site boundary. It is proposed that surface water from the site will be discharged to this watercourse,

The existing site is greenfield site. The existing greenfield rates are lower than 5 l/s, it is proposed to increase to 5 l/s for all storm events to reduce the risk of blockage of flow control device. The restriction of 5 l/s has been accepted by the LLFA.

The belowground drainage has been designed not to flood for 1 in 100 +45 Climate Change

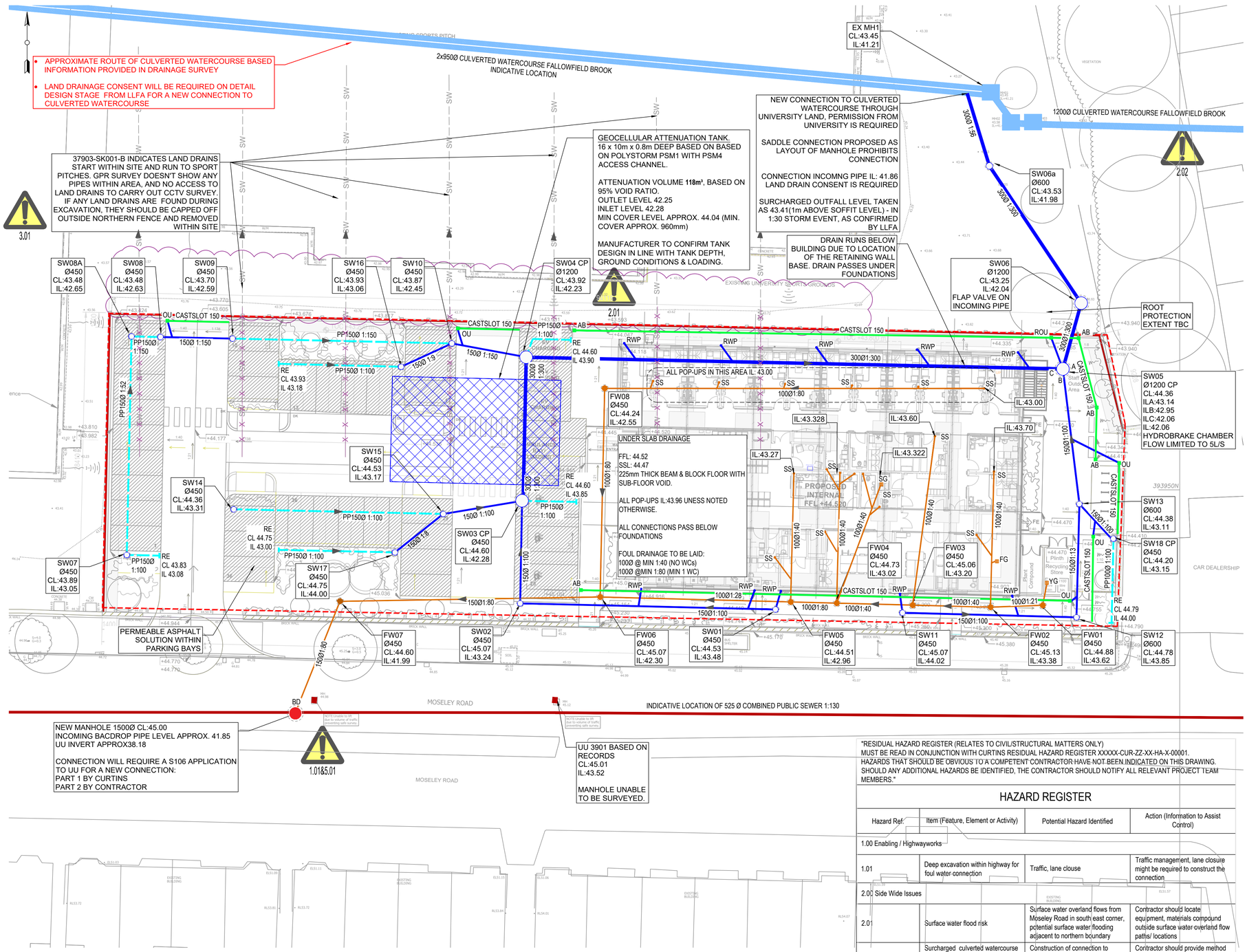
A cellular attenuation tank is proposed to provide 118m^3 attenuation storage. Further attenuation is provided by the permeable asphalt sub-base; however, the permeable asphalt is primarily utilised as a pollution control measure.

The area of the car park and access road is 1040 m^2 (40 parking bays). The risk of pollution is low. It is proposed that the access road will be graded to slope toward the parking bays, which are designed with a permeable asphalt surface and subbase to provide pollution treatment.

Appendix

Appendix A

Proposed Drainage Layout -



GENERAL NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.
2. ALL ADOPTABLE DRAINAGE WORKS INCLUDING WORKS TO EXISTING PUBLIC SEWERS TO BE UNDERTAKEN IN ACCORDANCE WITH "DESIGN AND CONSTRUCTION GUIDANCE FOR FOUL AND SURFACE WATER SEWERS OFFERED FOR ADOPTION - LATEST EDITION" AND "CIVIL ENGINEERING SPECIFICATION FOR THE WATER INDUSTRY 7th EDITION" AND CONSTRUCTED TO THE RELEVANT STATUTORY UNDERTAKERS DETAILS.
3. ALL PRIVATE DRAINAGE WORKS TO BE IN ACCORDANCE WITH CURTINS DRAINAGE SPECIFICATION, "CIVIL ENGINEERING SPECIFICATION FOR THE WATER INDUSTRY 7th EDITION", BS EN 752 2017 'DRAIN AND SEWER SYSTEMS OUTSIDE BUILDINGS' AND THE BUILDING REGULATIONS APPROVED 'DOCUMENT H'.
4. DO NOT SCALE THIS DRAWING. ANY AMBIGUITIES, OMISSIONS AND ERRORS ON DRAWINGS SHALL BE BROUGHT TO THE ENGINEERS ATTENTION IMMEDIATELY. ALL DIMENSIONS MUST BE CHECKED / VERIFIED ON SITE.
5. DESIGN BASED ON TOPOGRAPHICAL SURVEY INFORMATION AVAILABLE AT THE TIME OF THE DESIGN.
6. ALL EXISTING SERVICES TO BE LOCATED PRIOR TO COMMENCEMENT OF ANY DRAINAGE WORKS, AND WHERE NECESSARY PROTECTION OR DIVERSIONS TO BE UNDERTAKEN TO AVOID CONFLICT WITH THE PROPOSED WORK.
7. OUTFALL CONNECTION(S) SUBJECT TO AGREEMENT WITH THE APPROVING AUTHORITY.
8. ALL DIMENSIONS ARE IN METRES AND LEVELS IN METRES ABOVE ORDNANCE DATUM UNLESS OTHERWISE NOTED.
9. COVER LEVELS, GULLY POSITIONS, AND BUILDINGS LOCATION ARE APPROXIMATE AND SHALL BE CONFIRMED BY ARCHITECT/ LANDSCAPE ARCHITECT. CONTRACTOR TO ALLOW FOR ADJUSTMENT TO SUIT AGREED POSITIONS AND FINISHED LEVELS, AND CONFIRM ALL COVER LEVELS ON SITE.
10. ALL INTERNAL DRAINAGE CONNECTIONS ARE PROVIDED TO THE PENETRATION POSITIONS SHOWN ON ARCHITECT AND M&E DRAWINGS. REFER TO DIMENSIONED LOCATIONS AND DIAMETERS ON ARCHITECT'S GROUND FLOOR SETTING-OUT PLANS.
11. ALL UNDERGROUND FOUL DRAINAGE SHOULD BE SUITABLY VENTED AT OR NEAR TO THE HEAD OF RUNS.
12. ALL ACCESS FITTINGS, STACKS, RWP'S AND GULLIES TO BE RODDABLE. ALL TO HAVE LOW LEVEL RODDING ACCESS PLATES UNLESS AN ALTERNATIVE MEANS OF ACCESS IS AGREED. ACCESS POINT TO BE ABOVE ANY GROUND FLOOR CONNECTED APPLIANCE SPILL LEVEL.
13. LARGE ACCESS FITTING REQUIRED ABOVE GROUND WHERE GREATER THAN 12M UP TO 22M TO A JUNCTION. SMALL ACCESS FITTING REQUIRED UP TO 12M TO A JUNCTION.
14. ALL GULLY AND CHANNEL DRAIN OUTLETS AND TERMINATION POINTS TO BE TRAPPED AND RODDABLE. INTERNAL GULLIES AND CHANNEL DRAINS TO BE SPECIFIED BY OTHERS.
15. WHERE NO WC'S ARE CONNECTED UPSTREAM, UNDERSLAB FW DRAINAGE TO BE LAID AT 1:40 MIN. AFTER THE CONNECTION OF AT LEAST 1NO WC, A MIN. FALL OF 1:80 APPLIES.
16. ALL CONNECTIONS FROM POP-UPS TO BE LAID AT A CONSTANT GRADIENT TO JUNCTION/ INSPECTION CHAMBER/ MANHOLE UNLESS NOTED OTHERWISE. ANY ISSUES RELATING TO CLASHES WITH FOUNDATIONS ARE TO BE FORWARDED TO THE ENGINEER, ALLOWING SUFFICIENT TIME FOR AN ALTERNATIVE SOLUTION TO BE PROPOSED.
17. INVERT LEVELS AT MANHOLES/ INSPECTION CHAMBERS TO BE USED TO SET OUT PIPEWORK. PIPE GRADIENTS ARE SHOWN INDICATIVELY ONLY.
18. ALL PIPE DIAMETERS GIVEN ARE NOMINAL INTERNAL PIPE DIAMETERS.
19. ALL SEWERS, UNLESS AGREED OTHERWISE STATED, SHALL BE:
    - 100mm to 300mm DIA TO BE VITRIFIED CLAY.
    - 375mm DIA AND GREATER TO BE CLASS 120 CONCRETE PIPES.
19. AS AN ALTERNATIVE THE CONTRACTOR MAY USE AN APPROVED UNPLASTICISED POLYVINYL CHLORIDE (PVCU) WITH APPROVAL FROM THE ENGINEER.

GENERAL NOTES:

20. SEWER PIPES TO BE LAID IN MAXIMUM 3 METRE LENGTHS UNLESS THERE IS A SPECIFIC OPERATIONAL NEED TO LAY LONGER LENGTHS.
21. THE FIRST PIPE OUT OF MANHOLES TO BE AS SHORT AS PRACTICABLE SO AS TO PROVIDE A FLEXIBLE JOINT AS CLOSE AS POSSIBLE TO THE OUTSIDE FACE OF THE CONCRETE SURROUND AND CONNECTED TO A LENGTH OF ROCKER PIPE.
22. ALL NEW CONNECTIONS INTO EXISTING MANHOLES (OR INTO EXISTING SEWERS) TO BE 'SOFFITS LEVEL' UNLESS OTHERWISE NOTED.
23. ALL PRIVATE DRAINAGE PIPES WITH A COVER OF LESS THAN 600mm IN NON-TRAFFICKED AREAS AND LESS THAN 1200mm IN TRAFFICKED AREAS TO BE BEDDED AND SURROUNDED IN CONCRETE (CLASS Z). COMPRESSIBLE MATERIAL SHALL BE PROVIDED AT EVERY PIPE JOINT. WHERE COVER EXCEEDS THIS DEPTH, PIPES ARE TYPICALLY BEDDED AND SURROUNDED IN CLASS S. REFER TO PIPE EMBEDMENT DETAILS DRAWING FOR SPECIFIC TYPES.
24. WHERE DRAINAGE PIPES ARE LESS THAN 300mm BELOW THE UNDERSIDE OF THE GROUND FLOOR SLAB, CONCRETE ENCASEMENT IS REQUIRED (CLASS Z). COMPRESSIBLE JOINTS ARE TO BE PROVIDED AT EVERY PIPE JOINT WITHIN THE CONCRETE.
25. WHERE PIPES ARE MORE THAN 300mm BELOW THE UNDERSIDE OF THE SLAB, CLASS S BEDDING IS ACCEPTABLE.
26. SULPHATE RESISTANT CEMENT (C20-DC2) AND PRECAST CONCRETE PRODUCTS MUST BE USED OR A LABORATORY REPORT PROVIDED TO PROVE THAT SUCH PRECAUTIONS ARE NOT REQUIRED.
27. WHERE FOUL SEWERS RUN ABOVE SURFACE SEWERS, CONCRETE PROTECTION MAY BE REQUIRED AT CROSSOVERS TO PREVENT ANY POTENTIAL CONTAMINATION.
28. ALL CONNECTIONS PASSING THROUGH BASES OR EDGE BEAMS TO BE IN SEALED SLEEVES. ALTERNATIVELY CONNECTIONS MAY BE CAST-IN WITH FLEXIBLE JOINTS NOT GREATER THAN 150MM FROM FACE OF CONCRETE.
29. THE CHAMBER SIZE OF MANHOLES WITH MORE THAN ONE CONNECTION MAY NEED TO BE INCREASED TO ACCOMMODATE THE CONNECTIONS AND BENDS.
30. ALL MANHOLE COVERS IN BLOCK/SLAB AND EXTERNAL PAVING AREAS TO HAVE RECESSED COVERS OF THE APPROPRIATE GRADE TO ACCEPT ARCHITECT'S PAVING PROPOSAL.
31. UNLESS NOTED OTHERWISE IN THE MANHOLE SCHEDULE, ALL MANHOLE, GULLY AND CHANNEL COVERS (IRONWORK) SHOULD BE THE FOLLOWING SPECIFICATION:
    - B125 LOAD CLASS IN PEDESTRIAN AREAS
    - D400 LOAD CLASS IN VEHICULAR AREAS.
35. WHERE LAND DRAINAGE PERFORATED PIPES ARE SPECIFIED, TH E PIPES SHOULD BE FULLY PERFORATED AND IN ACCORDANCE WITH BS EN 295.
36. PERFORATED PIPES SHOULD BE WRAPPED IN A GEOTEXTILE MEMBRANE UNLESS NOTED OTHERWISE.
37. ALL PROPRIETARY PRODUCTS TO BE INSTALLED IN STRICT ACCORDANCE WITH THE MANUFACTURERS REQUIREMENTS, INSTRUCTIONS AND RECOMMENDATIONS.
38. THE DESIGN IS BASED ON A GRAVITY RAINWATER SYSTEM.

Rev:	Description:	Date:	By:	Chkd:
P06	OUTFALL UPDATED	29/05/26	IK	ATL
P05	ISSUED TO DISCHARGE PLANNING CONDITION 20	19/02/26	MW	MW
P04	UPDATED WITH WATERCOURSE SURVEY INFORMATION	15.10.25	MW	MW
P03	STAGE 4 UPDATE. DRAWING RENUMBERED FOR BEP	22/08/25	RO	GD
P02	STAGE 3 UPDATE	19/06/25	ATL	MW
P01	ISSUED FOR COMMENTS	01/05/25	MW	MW

DESIGN PHOSOPHY

SURFACE WATER DESIGN
THE DESIGN PROVIDES CAPACITY UP TO THE 100 YEAR + 45% IMATE CHANGE EVENT.
SW FLOW RATE: 5 l/s (FLOW CALCULATED BASED ON GREENFIELD RUNOFF RATE, INCREASED TO ACHIEVE MINIMUM ORIFICE SIZE TO PREVENT BLOCKAGES)

ATTENUATION
APPROXIMATE STORAGE REQUIREMENT:118m³ PROVIDED WITHIN CELLULAR STORAGE.
ADDITIONAL STORAGE PROVIDED WITHIN PERMEABLE PAVING AREAS

OUTFALL:
SITE DISCHARGES TO THE EXISTING WATERCOURSE IN THE UNIVERSITY GROUNDS.

LAND DRAINAGE CONSENT IS REQUIRED FROM THE LLFA FOR THE CONNECTION TO THE WATERCOURSE

SURCHARGED OUTFALL LEVEL TAKEN AS 43.43(1M ABOVE SOFFIT LEVEL) - IN 1:30 STORM EVENT, AS CONFIRMED BY LLFA

PERMISSION REQUIRED FROM UNIVERSITY FOR THE CONNECTION TO THE WATERCOURSE

POLLUTION TREATMENT/ SUSTAINABLE DRAINAGE:
THE CAR PARK DRAINAGE IS SERVED BY PERMEABLE PAVING AREAS.
INFTRATION IS NOT CONSIDERED APPROPRIATE FOR THIS SCHEME.

FOUL WATER DESIGN

THE PEAK FLOW RATE HAS BEEN CALCULATED AS 1.7 l/s, BASED ON AN ESTIMATED TOTAL OF 12.2 DISCHARGE UNITS. FINAL DISCHARGE UINIT LOADING TBC BY MEP ENGINEER.

OUTFALL:
SITE DISCHARGES TO THE EXISTING 525 MM COMBINED SEWER IN MOSELEY ROAD

A S106 AGREEMENT IS REQUIRED WITH UNITED UTITIES:
PART 1 BY CURTINS
PART 2 ASSUMED NOT REQUIRED AS CONNECTION IS INDIRECT.

LEVELS INDICATE THAT PUMPING WL NOT BE REQUIRED.

DRAWING BASED ON:

TOPOGRAPHICAL SURVEY
74193MCUG-01 TOPOGRAPHICAL & GPR SURVEY DATED MARCH 2025
LAYER SURVEY TOPOGRAPHICAL SURVEY JULY 25

CCTV SURVEY
- S26205 CCTV SURVEY BY SEP DATED MAY/ AUGUST 25

ARCHITECT'S PLANS
- MCNMC-GDA-V1-S1-DR-A-1002 P07 PROPOSED SITE PLAN
- HMCNMC-GDA-V1-00-DR-A-1010 P07 PROPOSED GROUND FLOOR PLAN

STRUCTURAL PLANS
- 087546-CUR-XX-FN-D-S-16001 P02 FOUNDATION GA
- 087546-CUR-XX-FN-D-S-16100 P02 SITE RETAINING WALL GA

SITE INVESTIGATION
- 087546-CUR-XX-XX-T-GE-00002 P01 PHASE 1 PRELIMINARY RISK ASSESSMENT.

"RESIDUAL HAZARD REGISTER (RELATES TO CIVIL/STRUCTURAL MATTERS ONLY)
MUST BE READ IN CONJUNCTION WITH CURTINS RESIDUAL HAZARD REGISTER XXXXX-CUR-ZZ-XX-HA-X-00001.
HAZARDS THAT SHOULD BE OBVIOUS TO A COMPETENT CONTRACTOR HAVE NOT BEEN INDICATED ON THIS DRAWING.
SHOULD ANY ADDITIONAL HAZARDS BE IDENTIFIED, THE CONTRACTOR SHOULD NOTIFY ALL RELEVANT PROJECT TEAM MEMBERS."

HAZARD REGISTER

Hazard Ref:	Item (Feature, Element or Activity)	Potential Hazard Identified	Action (Information to Assist Control)
1.00 Enabling / Highwayworks			
1.01	Deep excavation within highway for foul water connection	Traffic, lane clouse	Traffic management, lane closure might be required to construct the connection
2.00 Side Wide Issues			
2.01	Surface water flood risk	Surface water overland flows from Moseley Road in south east corner, pctential surface water flooding adjacent to northern boundary	Contractor should locate equipment, materials compound outside surface water overland flow paths/ locations
2.02	Surcharged culverted watercourse	Construction of connection to watercourse might be limited, obstructed by high water level in culverted watercourse	Coritractor should provide melhod statement of construction connection to LLFA.
3.00 Existing Buried & Overhead Services			
3.01	Buried land drains	Buried land drains, unknown location as not detected under GPR	Land drains should be removed from site and capped of outside northern fence line
5.00 Excavations and Foundations			
5.01	Deep excavation within highway for foul water connection	Potential collapse of deep excavation	Contractor should provide method statement of deep connection construction to United Utilities

KEY
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- PROPOSED UNDERGROUND ATTENUATION STORAGE
- PROPOSED PERMEABLE ASPHALT
- FG PROPOSED FOUL WATER GULLY
- SH PROPOSED SHOWER GULLY
- SS/SVP PROPOSED SOIL VENT PIPE/ STUBSTACK
- RWP PROPOSED RAINWATER PIPE
- RE PROPOSED RODDING EYE
- BD PROPOSED BACKDROP
- FV FLAP VALVE
- OU OUTLET BOX
- AB ACCESS BOX
- HB HYDROBRAKE
- CP CATCHPIT
- PROPOSED FOUNDATION - TOC 43.90
- PROPOSED FOUNDATION - TOC 43.45
- PROPOSED RW BASE - TOC 43.20
- PROPOSED RW BASE - TOC 43.80

1:200 0 5m 10m 15m 20m
1:1 0 10 20 30 40 50 60 70 80 90 100

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Status: SUITABLE FOR AUTHORIZATION S4

Project: HAWTHORN MEDICAL CENTRE

Drg Title: PROPOSED DRAINAGE PLAN

Drawn By	Designed By	Checked By
IK	ATL	ATL
	Date: 29/05/26	Scales @ A1: 1:200

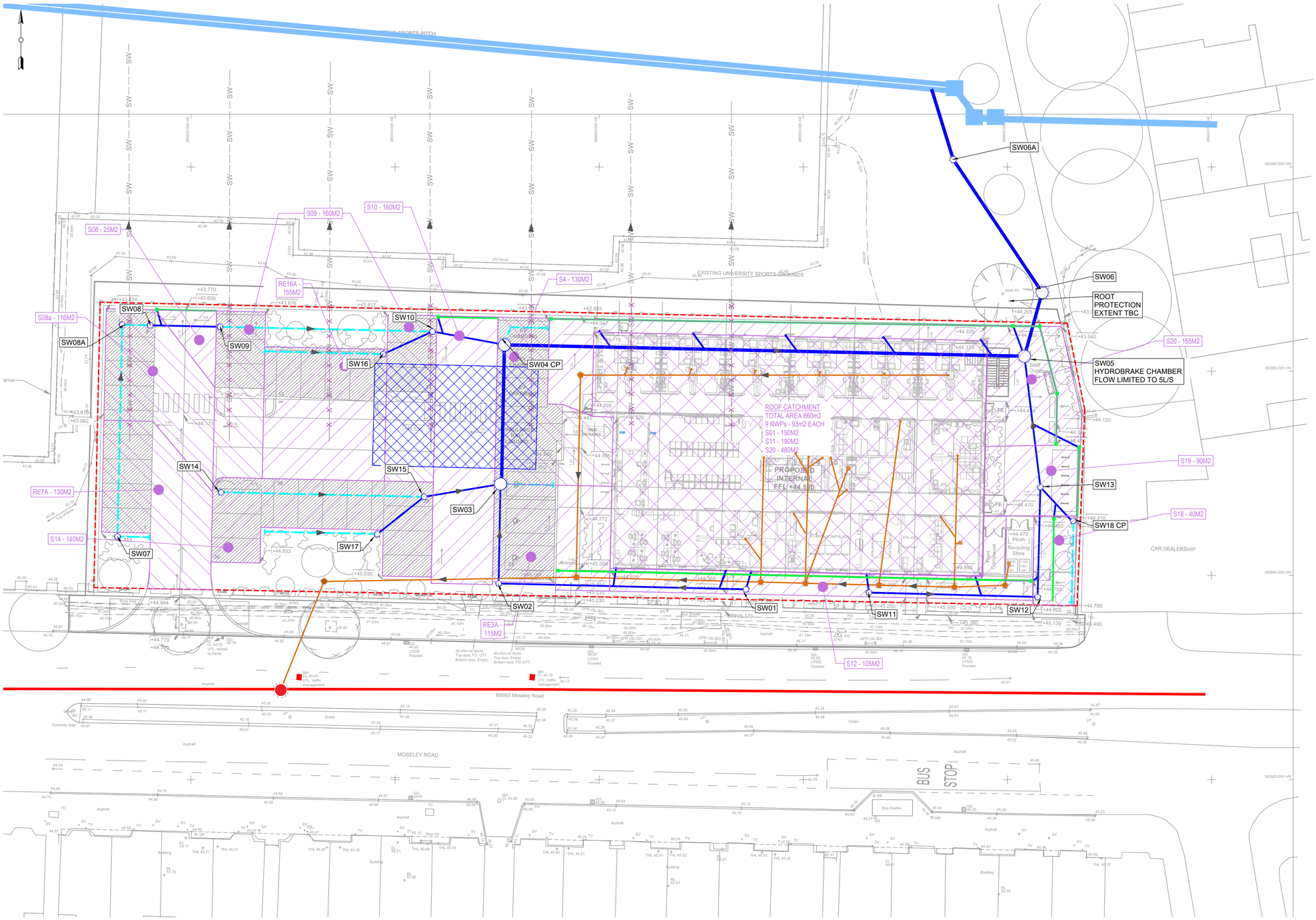
Project No - Originator - Function - Spatial - Form - Discipline - Number: HMCNMC - CUR - ZZ - 00 - DR- C - 92500

Revision: P06

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Appendix B

Proposed Catchment Plan and easment



GENERAL NOTES:

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CATCHMENTS

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ATTENUATION
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OUTFALL:
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1:200 scale: 0, 5m, 10m, 15m, 20m
1:1 scale: 0, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100

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P03	SW CONNECTION TO CULVERT UPDATED	04/06/26	IK	ATL
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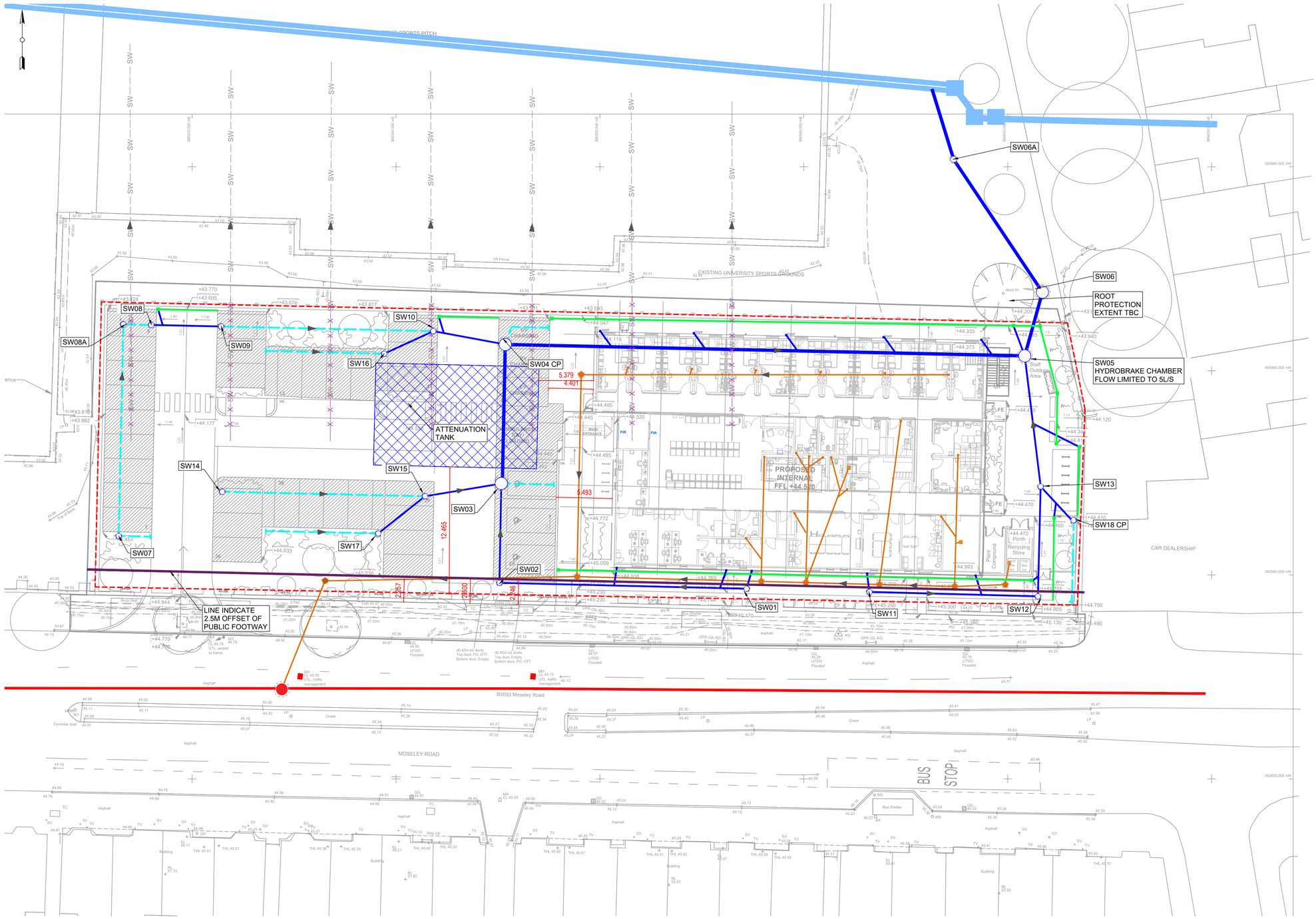
Project: HAWTHORN MEDICAL CENTRE

Drg Title: PROPOSED CATCHMENTS PLAN

Drawn By	Designed By	Checked By
MW	MW	MW
	Date: 28/04/25	Scales @ A1: 1:200

Project No - Originator - Function - Spatial - Form - Discipline - Number: HMCNMC - CUR - ZZ - 00 - DR- C - 92502
Revision: P03

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LAYER SURVEY TOPOGRAPHICAL SURVEY JULY 25

CCTV SURVEY
- S26205 CCTV SURVEY BY SEP DATED MAY/ AUGUST 25

ARCHITECT'S PLANS
- MCNMC-GDA-V1-S1-DR-A-1002 P07 PROPOSED SITE PLAN
- HMCNMC-GDA-V1-00-DR-A-1010 P07 PROPOSED GROUND FLOOR PLAN

STRUCTURAL PLANS
- 087546-CUR-XX-FN-D-S-16001 P02 FOUNDATION GA
- 087546-CUR-XX-FN-D-S-16100 P02 SITE RETAINING WALL GA

SITE INVESTIGATION
- 087546-CUR-XX-XX-T-GE-00002 P01 PHASE 1 PRELIMINARY RISK ASSESSMENT.

1:200 scale: 0, 5m, 10m, 15m, 20m
1:1 scale: 0, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100

Rev:	Description:	Date:	By:	Chkd:
P03	SW CONNECTION TO CULVERT UPDATED	04/06/26	IK	ATL
P02	ISSUED TO DISCHARGE PLANNING CONDITION 20	19/02/26	MW	MW
P01	ISSUED FOR INFORMATION	15/10/25	MW	MW

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Status: SUITABLE FOR AUTHORIZATION **S4**

Project: HAWTHORN MEDICAL CENTRE

Drg Title: EASEMENTS

Drawn By	Designed By	Checked By
MW	MW	MW
	Date: 28/04/25	Scales @ A1: 1:200

Project No - Originator - Function - Spatial - Form - Discipline - Number: HMCNMC - CUR - ZZ - 00 - DR- C - 92503

Revision: P03

\\ms-fs-1\Projects\087001 - 085000\087546 - Hawthorn Medical Centre\04-Production\44-Models-Drawings\C\CAD\92\

Appendix C

Proposed Drainage Calculations

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)	Invert Level (m)
RE7A	0.003	5.00	43.830	150	386315.900	393943.751	0.750	43.080
S07	0.013	5.00	43.830	450	386312.800	393943.817	0.781	43.049
S08A	0.012	5.00	43.480	450	386313.255	393964.562	0.830	42.650
S08	0.002	5.00	43.480	450	386316.001	393964.501	0.848	42.632
S09	0.016	5.00	43.700	450	386322.845	393964.351	1.114	42.586
RE16A	0.016	5.00	43.930	150	386327.225	393961.958	0.750	43.180
S16			43.930	450	386338.845	393961.679	0.866	43.064
S10	0.016	5.00	43.870	450	386343.660	393963.893	1.424	42.446
S01	0.019	5.00	44.530	450	386374.394	393938.897	1.050	43.480
S02			45.070	1200	386350.147	393939.221	1.832	43.238
S14	0.014	5.00	44.360	450	386322.954	393948.148	1.050	43.310
RE17A	0.008	5.00	44.750	150	386327.236	393944.301	0.750	44.000
S17			44.750	450	386338.259	393944.058	0.860	43.890
S15			44.530	450	386342.851	393947.707	1.419	43.111
RE3A	0.012	5.00	44.600	150	386355.476	393948.855	0.750	43.850
S03			44.600	1200	386350.317	393948.962	2.320	42.280
TANK			44.120		386350.520	393959.467	1.875	42.245
RE4A	0.013	5.00	43.900	150	386354.950	393964.232	0.750	43.150
S04			43.920	1500	386350.621	393962.691	1.686	42.234
S11	0.019	5.00	45.070	450	386386.283	393938.636	1.050	44.020
S12			44.780	450	386403.016	393938.309	0.927	43.853
S18	0.004	5.00	44.200	450	386406.457	393945.362	1.050	43.150
S13	0.009	5.00	44.380	450	386403.218	393948.083	1.272	43.108
S05			44.360	1200	386401.672	393961.569	2.296	42.064
S06			43.900	1200	386399.065	393966.111	1.853	42.047
S6a			43.530	600	386394.692	393980.738	1.550	41.980
OUTFALL			43.450	1200	386394.700	393987.516	1.591	41.859

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	RE7A	S07	3.101	0.600	43.080	43.049	0.031	100.0	150	5.05	50.0
1.001	S07	S08A	20.750	0.600	43.049	42.650	0.399	52.0	150	5.30	50.0
1.002	S08A	S08	2.747	0.600	42.650	42.632	0.018	150.0	150	5.35	50.0
1.003	S08	S09	6.846	0.600	42.632	42.586	0.046	150.0	150	5.49	50.0
1.004	S09	S10	20.820	0.600	42.586	42.447	0.139	150.0	150	5.92	49.4
2.000	RE16A	S16	11.623	0.600	43.180	43.064	0.116	100.0	150	5.19	50.0
2.001	S16	S10	5.300	0.600	43.064	42.446	0.618	8.6	150	5.22	50.0
1.005	S10	S04	7.064	0.600	42.446	42.399	0.047	150.0	150	6.06	48.8

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.005	17.8	0.4	0.600	0.631	0.003	0.0	16	0.407
1.001	1.398	24.7	2.2	0.631	0.680	0.016	0.0	30	0.865
1.002	0.818	14.5	3.8	0.680	0.698	0.028	0.0	52	0.690
1.003	0.818	14.5	4.1	0.698	0.964	0.030	0.0	54	0.702
1.004	0.818	14.5	6.2	0.964	1.273	0.046	0.0	68	0.785
2.000	1.005	17.8	2.2	0.600	0.716	0.016	0.0	35	0.683
2.001	3.461	61.2	2.2	0.716	1.274	0.016	0.0	19	1.618
1.005	0.818	14.5	10.3	1.274	1.371	0.078	0.0	94	0.888

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Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
3.000	S01	S02	24.249	0.600	43.480	43.238	0.242	100.0	150	5.40	50.0
3.001	S02	S03	9.742	0.600	43.238	43.141	0.097	100.0	150	5.56	50.0
4.000	S14	S15	19.902	0.600	43.310	43.111	0.199	100.0	150	5.33	50.0
5.000	RE17A	S17	11.026	0.600	44.000	43.890	0.110	100.0	150	5.18	50.0
5.001	S17	S15	5.865	0.600	43.890	43.111	0.779	7.5	150	5.21	50.0
4.001	S15	S03	7.571	0.600	43.111	43.035	0.076	100.0	150	5.46	50.0
6.000	RE3A	S03	5.160	0.600	43.850	43.798	0.052	100.0	150	5.09	50.0
3.002	S03	TANK	10.507	0.600	42.280	42.245	0.035	300.0	300	5.76	50.0
3.003	TANK	S04	3.226	0.600	42.245	42.234	0.011	300.0	300	5.82	49.8
7.000	RE4A	S04	4.595	0.600	43.150	43.104	0.046	100.0	150	5.08	50.0
1.006	S04	S05	51.063	0.600	42.234	42.064	0.170	300.0	300	7.01	45.4
8.000	S11	S12	16.736	0.600	44.020	43.853	0.167	100.0	150	5.28	50.0
8.001	S12	S13	9.776	0.600	43.853	43.108	0.745	13.1	150	5.34	50.0
9.000	S18	S13	4.230	0.600	43.150	43.108	0.042	100.0	150	5.07	50.0
8.002	S13	S05	13.574	0.600	43.108	42.972	0.136	100.0	150	5.56	50.0
1.007	S05	S06	5.237	0.600	42.064	42.047	0.017	300.0	300	7.10	45.1
1.008	S06	S6a	15.267	0.600	42.047	41.980	0.067	227.9	300	7.35	44.3
1.009	S6a	OUTFALL	6.778	0.600	41.980	41.859	0.121	56.0	300	7.40	44.2

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
3.000	1.005	17.8	2.6	0.900	1.682	0.019	0.0	38	0.715
3.001	1.005	17.8	2.6	1.682	1.309	0.019	0.0	38	0.715
4.000	1.005	17.8	1.9	0.900	1.269	0.014	0.0	33	0.656
5.000	1.005	17.8	1.1	0.600	0.710	0.008	0.0	25	0.552
5.001	3.695	65.3	1.1	0.710	1.269	0.008	0.0	13	1.360
4.001	1.005	17.8	3.0	1.269	1.415	0.022	0.0	41	0.746
6.000	1.005	17.8	1.6	0.600	0.652	0.012	0.0	31	0.628
3.002	0.902	63.8	7.2	2.020	1.575	0.053	0.0	68	0.602
3.003	0.902	63.8	7.1	1.575	1.386	0.053	0.0	68	0.602
7.000	1.005	17.8	1.8	0.600	0.666	0.013	0.0	32	0.642
1.006	0.902	63.8	17.7	1.386	1.996	0.144	0.0	108	0.776
8.000	1.005	17.8	2.6	0.900	0.777	0.019	0.0	38	0.715
8.001	2.796	49.4	2.6	0.777	1.122	0.019	0.0	23	1.476
9.000	1.005	17.8	0.5	0.900	1.122	0.004	0.0	18	0.446
8.002	1.005	17.8	4.3	1.122	1.238	0.032	0.0	51	0.833
1.007	0.902	63.8	21.5	1.996	1.553	0.176	0.0	120	0.816
1.008	1.037	73.3	21.2	1.553	1.250	0.176	0.0	110	0.900
1.009	2.105	148.8	21.1	1.250	1.291	0.176	0.0	76	1.504

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Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	3.101	100.0	150	Circular	43.830	43.080	0.600	43.830	43.049	0.631
1.001	20.750	52.0	150	Circular	43.830	43.049	0.631	43.480	42.650	0.680
1.002	2.747	150.0	150	Circular	43.480	42.650	0.680	43.480	42.632	0.698
1.003	6.846	150.0	150	Circular	43.480	42.632	0.698	43.700	42.586	0.964
1.004	20.820	150.0	150	Circular	43.700	42.586	0.964	43.870	42.447	1.273
2.000	11.623	100.0	150	Circular	43.930	43.180	0.600	43.930	43.064	0.716
2.001	5.300	8.6	150	Circular	43.930	43.064	0.716	43.870	42.446	1.274
1.005	7.064	150.0	150	Circular	43.870	42.446	1.274	43.920	42.399	1.371
3.000	24.249	100.0	150	Circular	44.530	43.480	0.900	45.070	43.238	1.682
3.001	9.742	100.0	150	Circular	45.070	43.238	1.682	44.600	43.141	1.309
4.000	19.902	100.0	150	Circular	44.360	43.310	0.900	44.530	43.111	1.269
5.000	11.026	100.0	150	Circular	44.750	44.000	0.600	44.750	43.890	0.710
5.001	5.865	7.5	150	Circular	44.750	43.890	0.710	44.530	43.111	1.269
4.001	7.571	100.0	150	Circular	44.530	43.111	1.269	44.600	43.035	1.415
6.000	5.160	100.0	150	Circular	44.600	43.850	0.600	44.600	43.798	0.652
3.002	10.507	300.0	300	Circular	44.600	42.280	2.020	44.120	42.245	1.575
3.003	3.226	300.0	300	Circular	44.120	42.245	1.575	43.920	42.234	1.386
7.000	4.595	100.0	150	Circular	43.900	43.150	0.600	43.920	43.104	0.666
1.006	51.063	300.0	300	Circular	43.920	42.234	1.386	44.360	42.064	1.996
8.000	16.736	100.0	150	Circular	45.070	44.020	0.900	44.780	43.853	0.777
8.001	9.776	13.1	150	Circular	44.780	43.853	0.777	44.380	43.108	1.122
9.000	4.230	100.0	150	Circular	44.200	43.150	0.900	44.380	43.108	1.122
8.002	13.574	100.0	150	Circular	44.380	43.108	1.122	44.360	42.972	1.238
1.007	5.237	300.0	300	Circular	44.360	42.064	1.996	43.900	42.047	1.553
1.008	15.267	227.9	300	Circular	43.900	42.047	1.553	43.530	41.980	1.250

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	RE7A	150	Manhole	Adoptable	S07	450	Manhole	Adoptable
1.001	S07	450	Manhole	Adoptable	S08A	450	Manhole	Adoptable
1.002	S08A	450	Manhole	Adoptable	S08	450	Manhole	Adoptable
1.003	S08	450	Manhole	Adoptable	S09	450	Manhole	Adoptable
1.004	S09	450	Manhole	Adoptable	S10	450	Manhole	Adoptable
2.000	RE16A	150	Manhole	Adoptable	S16	450	Manhole	Adoptable
2.001	S16	450	Manhole	Adoptable	S10	450	Manhole	Adoptable
1.005	S10	450	Manhole	Adoptable	S04	1500	Manhole	Adoptable
3.000	S01	450	Manhole	Adoptable	S02	1200	Manhole	Adoptable
3.001	S02	1200	Manhole	Adoptable	S03	1200	Manhole	Adoptable
4.000	S14	450	Manhole	Adoptable	S15	450	Manhole	Adoptable
5.000	RE17A	150	Manhole	Adoptable	S17	450	Manhole	Adoptable
5.001	S17	450	Manhole	Adoptable	S15	450	Manhole	Adoptable
4.001	S15	450	Manhole	Adoptable	S03	1200	Manhole	Adoptable
6.000	RE3A	150	Manhole	Adoptable	S03	1200	Manhole	Adoptable
3.002	S03	1200	Manhole	Adoptable	TANK		Junction	
3.003	TANK		Junction		S04	1500	Manhole	Adoptable
7.000	RE4A	150	Manhole	Adoptable	S04	1500	Manhole	Adoptable
1.006	S04	1500	Manhole	Adoptable	S05	1200	Manhole	Adoptable
8.000	S11	450	Manhole	Adoptable	S12	450	Manhole	Adoptable
8.001	S12	450	Manhole	Adoptable	S13	450	Manhole	Adoptable
9.000	S18	450	Manhole	Adoptable	S13	450	Manhole	Adoptable
8.002	S13	450	Manhole	Adoptable	S05	1200	Manhole	Adoptable
1.007	S05	1200	Manhole	Adoptable	S06	1200	Manhole	Adoptable
1.008	S06	1200	Manhole	Adoptable	S6a	600	Manhole	Adoptable

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Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.009	6.778	56.0	300	Circular	43.530	41.980	1.250	43.450	41.859	1.291

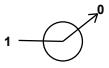
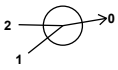
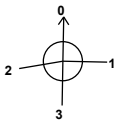
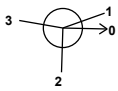
Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.009	S6a	600	Manhole	Adoptable	OUTFALL	1200	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
RE7A	386315.900	393943.751	43.830	0.750	150				
						0	1.000	43.080	150
S07	386312.800	393943.817	43.830	0.781	450				
						1	1.000	43.049	150
						0	1.001	43.049	150
S08A	386313.255	393964.562	43.480	0.830	450				
						1	1.001	42.650	150
						0	1.002	42.650	150
S08	386316.001	393964.501	43.480	0.848	450				
						1	1.002	42.632	150
						0	1.003	42.632	150
S09	386322.845	393964.351	43.700	1.114	450				
						1	1.003	42.586	150
						0	1.004	42.586	150
RE16A	386327.225	393961.958	43.930	0.750	150				
						0	2.000	43.180	150
S16	386338.845	393961.679	43.930	0.866	450				
						1	2.000	43.064	150
						0	2.001	43.064	150
S10	386343.660	393963.893	43.870	1.424	450				
						1	2.001	42.446	150
						2	1.004	42.447	150
						0	1.005	42.446	150
S01	386374.394	393938.897	44.530	1.050	450				
						0	3.000	43.480	150
S02	386350.147	393939.221	45.070	1.832	1200				
						1	3.000	43.238	150
						0	3.001	43.238	150

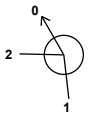
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Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S14	386322.954	393948.148	44.360	1.050	450		0	4.000	43.310	150
RE17A	386327.236	393944.301	44.750	0.750	150		0	5.000	44.000	150
S17	386338.259	393944.058	44.750	0.860	450		1	5.000	43.890	150
							0	5.001	43.890	150
S15	386342.851	393947.707	44.530	1.419	450		1	5.001	43.111	150
							2	4.000	43.111	150
							0	4.001	43.111	150
RE3A	386355.476	393948.855	44.600	0.750	150		0	6.000	43.850	150
S03	386350.317	393948.962	44.600	2.320	1200		1	6.000	43.798	150
							2	4.001	43.035	150
							3	3.001	43.141	150
							0	3.002	42.280	300
TANK	386350.520	393959.467	44.120	1.875			1	3.002	42.245	300
							0	3.003	42.245	300
RE4A	386354.950	393964.232	43.900	0.750	150		0	7.000	43.150	150
S04	386350.621	393962.691	43.920	1.686	1500		1	7.000	43.104	150
							2	3.003	42.234	300
							3	1.005	42.399	150
							0	1.006	42.234	300
S11	386386.283	393938.636	45.070	1.050	450		0	8.000	44.020	150
S12	386403.016	393938.309	44.780	0.927	450		1	8.000	43.853	150
							0	8.001	43.853	150
S18	386406.457	393945.362	44.200	1.050	450		0	9.000	43.150	150
S13	386403.218	393948.083	44.380	1.272	450		1	9.000	43.108	150
							2	8.001	43.108	150
							0	8.002	43.108	150

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Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S05	386401.672	393961.569	44.360	2.296	1200		1	8.002	42.972	150
							2	1.006	42.064	300
							0	1.007	42.064	300
S06	386399.065	393966.111	43.900	1.853	1200		1	1.007	42.047	300
							0	1.008	42.047	300
S6a	386394.692	393980.738	43.530	1.550	600		1	1.008	41.980	300
							0	1.009	41.980	300

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
Rainfall Events	Singular	Skip Steady State	x
FSR Region	England and Wales	Drain Down Time (mins)	240
M5-60 (mm)	19.000	Additional Storage (m³/ha)	20.0
Ratio-R	0.420	Starting Level (m)	
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
30	0	0	0
100	45	0	0
500	45	0	0

Node OUTFALL Surcharged Outfall

Overrides Design Area	x	Depression Storage Area (m²)	0	Evapo-transpiration (mm/day)	0
Overrides Design Additional Inflow	x	Depression Storage Depth (mm)	0		

Applies to 30yr, 100yr+45% CC 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440 minute storms

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
0	1.290	300	1.290	600	1.290	900	1.426	1200	1.290
60	1.290	360	1.290	660	1.290	960	1.290	1260	1.290
120	1.290	420	1.290	720	1.290	1020	1.290	1320	1.290
180	1.290	480	1.290	780	1.290	1080	1.290	1380	1.290
240	1.290	540	1.290	840	1.290	1140	1.290	1440	1.290

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Node S05 Online Hydro-Brake® Control

Flap Valve	✓	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	42.064	Product Number	CTL-SHE-0100-5000-1400-5000
Design Depth (m)	1.400	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	5.0	Min Node Diameter (mm)	1200

Node TANK Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	42.245
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	155.0	155.0	0.400	155.0	172.7	0.800	155.0	190.3
0.200	155.0	163.8	0.600	155.0	181.5	0.801	0.0	190.3

Node S08A Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	43.030	Slope (1:X)	21.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	4	Depth (m)	0.300
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.30	Length (m)	23.000		

Node S04 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	43.400	Slope (1:X)	21.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.300
Safety Factor	2.0	Width (m)	5.000	Inf Depth (m)	
Porosity	0.30	Length (m)	16.000		

Node S09 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	43.250	Slope (1:X)	21.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	3	Depth (m)	0.300
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.30	Length (m)	7.000		

Node S10 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	43.420	Slope (1:X)	21.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.300
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.30	Length (m)	7.000		

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Results for 1 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	RE7A	11	43.096	0.016	0.4	0.0015	0.0000	OK
15 minute winter	S07	10	43.079	0.030	2.2	0.0148	0.0000	OK
15 minute winter	S08A	10	42.709	0.059	3.8	0.0266	0.0000	OK
15 minute winter	S08	11	42.690	0.058	4.0	0.0119	0.0000	OK
15 minute winter	S09	11	42.653	0.067	6.1	0.0301	0.0000	OK
15 minute winter	RE16A	10	43.219	0.039	2.2	0.0173	0.0000	OK
15 minute winter	S16	10	43.083	0.019	2.2	0.0031	0.0000	OK
15 minute winter	S10	11	42.548	0.102	10.3	0.0393	0.0000	OK
15 minute winter	S01	10	43.519	0.039	2.6	0.0203	0.0000	OK
15 minute winter	S02	11	43.278	0.039	2.5	0.0447	0.0000	OK
15 minute winter	S14	10	43.343	0.033	1.9	0.0140	0.0000	OK
15 minute winter	RE17A	10	44.028	0.028	1.1	0.0064	0.0000	OK
15 minute winter	S17	10	43.903	0.013	1.1	0.0021	0.0000	OK
15 minute winter	S15	11	43.154	0.043	2.9	0.0068	0.0000	OK
15 minute winter	RE3A	10	43.882	0.032	1.6	0.0107	0.0000	OK
15 minute winter	S03	11	42.344	0.064	7.0	0.0728	0.0000	OK
30 minute winter	TANK	27	42.292	0.047	13.1	6.8612	0.0000	OK
15 minute winter	RE4A	10	43.184	0.034	1.8	0.0123	0.0000	OK
15 minute winter	S04	13	42.322	0.088	12.0	0.1564	0.0000	OK
15 minute winter	S11	10	44.062	0.042	2.6	0.0219	0.0000	OK
15 minute winter	S12	10	43.876	0.023	2.5	0.0037	0.0000	OK
15 minute summer	S18	11	43.167	0.017	0.5	0.0041	0.0000	OK
15 minute winter	S13	11	43.159	0.051	4.2	0.0155	0.0000	OK
15 minute winter	S05	12	42.330	0.266	11.4	0.3006	0.0000	OK
15 minute winter	S06	12	42.099	0.052	4.6	0.0593	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	RE7A	1.000	S07	0.4	0.240	0.023	0.0054	
15 minute winter	S07	1.001	S08A	2.2	0.494	0.088	0.0933	
15 minute winter	S08A	1.002	S08	3.7	0.580	0.255	0.0175	
15 minute winter	S08	1.003	S09	4.0	0.575	0.277	0.0476	
15 minute winter	S09	1.004	S10	6.1	0.598	0.420	0.2119	
15 minute winter	RE16A	2.000	S16	2.2	0.899	0.122	0.0288	
15 minute winter	S16	2.001	S10	2.1	0.342	0.035	0.0374	
15 minute winter	S10	1.005	S04	10.3	0.846	0.711	0.0858	
15 minute winter	S01	3.000	S02	2.5	0.705	0.143	0.0876	
15 minute winter	S02	3.001	S03	2.5	0.698	0.142	0.0352	
15 minute winter	S14	4.000	S15	1.9	0.542	0.105	0.0692	
15 minute winter	RE17A	5.000	S17	1.1	0.742	0.061	0.0166	
15 minute winter	S17	5.001	S15	1.1	0.471	0.016	0.0144	
15 minute winter	S15	4.001	S03	2.9	0.724	0.164	0.0305	
15 minute winter	RE3A	6.000	S03	1.6	0.606	0.089	0.0135	
15 minute winter	S03	3.002	TANK	7.0	1.331	0.110	0.0654	
15 minute winter	TANK	3.003	S04	-10.6	-1.119	-0.166	0.0330	
15 minute winter	RE4A	7.000	S04	1.8	0.623	0.100	0.0132	
15 minute winter	S04	1.006	S05	7.2	0.371	0.112	2.0641	
15 minute winter	S11	8.000	S12	2.5	0.906	0.144	0.0481	
15 minute winter	S12	8.001	S13	2.5	0.746	0.051	0.0344	
15 minute summer	S18	9.000	S13	0.5	0.174	0.028	0.0133	
15 minute winter	S13	8.002	S05	4.2	0.811	0.238	0.0708	
15 minute winter	S05	1.007	S06	4.6	0.521	0.072	0.0464	
15 minute winter	S06	1.008	S6a	4.6	0.693	0.063	0.1019	

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Results for 1 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S6a	13	42.018	0.038	4.6	0.0107	0.0000	OK
15 minute summer	OUTFALL	13	41.895	0.036	4.6	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	S6a	1.009	OUTFALL	4.6	0.928	0.031	0.0335	8.7

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Results for 30 year Critical Storm Duration. Lowest mass balance: 98.42%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	RE7A	10	43.104	0.024	1.0	0.0023	0.0000	OK
15 minute winter	S07	10	43.096	0.047	5.3	0.0230	0.0000	OK
15 minute winter	S08A	12	42.870	0.220	9.2	0.0986	0.0000	SURCHARGED
15 minute winter	S08	12	42.859	0.227	8.9	0.0468	0.0000	SURCHARGED
15 minute winter	S09	12	42.834	0.248	13.4	0.1107	0.0000	SURCHARGED
15 minute winter	RE16A	10	43.242	0.062	5.3	0.0275	0.0000	OK
15 minute winter	S16	10	43.094	0.030	5.3	0.0047	0.0000	OK
960 minute winter	S10	1080	42.707	0.261	1.5	0.1002	0.0000	SURCHARGED
15 minute winter	S01	10	43.543	0.063	6.3	0.0327	0.0000	OK
15 minute winter	S02	11	43.303	0.065	6.2	0.0730	0.0000	OK
15 minute winter	S14	10	43.362	0.052	4.7	0.0222	0.0000	OK
15 minute winter	RE17A	10	44.044	0.044	2.7	0.0101	0.0000	OK
15 minute winter	S17	10	43.911	0.021	2.7	0.0033	0.0000	OK
15 minute winter	S15	10	43.182	0.071	7.3	0.0113	0.0000	OK
15 minute winter	RE3A	10	43.902	0.052	4.0	0.0175	0.0000	OK
960 minute winter	S03	1005	42.707	0.427	1.1	0.4829	0.0000	SURCHARGED
960 minute winter	TANK	1005	42.707	0.462	3.2	68.0101	0.0000	SURCHARGED
15 minute winter	RE4A	10	43.204	0.054	4.3	0.0198	0.0000	OK
960 minute winter	S04	1155	42.707	0.473	2.4	0.8356	0.0000	SURCHARGED
15 minute winter	S11	10	44.087	0.067	6.3	0.0351	0.0000	OK
15 minute winter	S12	10	43.889	0.036	6.2	0.0057	0.0000	OK
15 minute winter	S18	10	43.195	0.045	1.3	0.0106	0.0000	OK
15 minute winter	S13	11	43.195	0.087	10.6	0.0262	0.0000	OK
960 minute winter	S05	1125	42.707	0.643	0.7	0.7273	0.0000	SURCHARGED
960 minute winter	S06	1155	42.708	0.661	0.4	0.7476	0.0000	SURCHARGED

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	RE7A	1.000	S07	1.0	0.309	0.055	0.0101	
15 minute winter	S07	1.001	S08A	5.2	0.567	0.212	0.2313	
15 minute winter	S08A	1.002	S08	8.3	0.645	0.573	0.0484	
15 minute winter	S08	1.003	S09	8.9	0.632	0.613	0.1205	
15 minute winter	S09	1.004	S10	13.5	0.765	0.932	0.3665	
15 minute winter	RE16A	2.000	S16	5.3	1.155	0.296	0.0542	
15 minute winter	S16	2.001	S10	5.2	0.433	0.086	0.0532	
15 minute winter	S10	1.005	S04	22.8	1.298	1.580	0.1212	
15 minute winter	S01	3.000	S02	6.2	0.881	0.351	0.1716	
15 minute winter	S02	3.001	S03	6.2	0.885	0.348	0.0680	
15 minute winter	S14	4.000	S15	4.6	0.679	0.261	0.1363	
15 minute winter	RE17A	5.000	S17	2.7	0.967	0.150	0.0315	
15 minute winter	S17	5.001	S15	2.7	0.581	0.041	0.0285	
15 minute winter	S15	4.001	S03	7.1	0.913	0.403	0.0593	
15 minute winter	RE3A	6.000	S03	4.0	0.775	0.224	0.0264	
15 minute winter	S03	3.002	TANK	17.6	1.589	0.276	0.2849	
15 minute winter	TANK	3.003	S04	-32.7	-1.820	-0.513	0.1093	
15 minute winter	RE4A	7.000	S04	4.3	0.785	0.241	0.0250	
15 minute summer	S04	1.006	S05	10.7	0.391	0.168	2.6418	
15 minute winter	S11	8.000	S12	6.2	1.161	0.352	0.0914	
15 minute winter	S12	8.001	S13	6.2	0.917	0.126	0.0675	
15 minute winter	S18	9.000	S13	1.3	0.209	0.076	0.0318	
15 minute winter	S13	8.002	S05	10.4	1.015	0.585	0.1390	
15 minute summer	S05	1.007	S06	4.5	0.542	0.071	0.3688	
15 minute winter	S06	1.008	S6a	4.4	0.450	0.060	1.0751	

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Results for 30 year Critical Storm Duration. Lowest mass balance: 98.42%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute winter	S6a	1200	42.708	0.728	0.1	0.2060	0.0000	SURCHARGED
960 minute summer	OUTFALL	900	43.285	1.426	0.0	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	S6a	1.009	OUTFALL	0.0	0.000	0.000	0.4773	0.0

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Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 97.79%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	RE7A	12	43.396	0.316	2.5	0.0310	0.0000	SURCHARGED
15 minute winter	S07	12	43.394	0.345	9.3	0.1696	0.0000	SURCHARGED
15 minute winter	S08A	12	43.355	0.705	14.7	0.7815	0.0000	FLOOD RISK
15 minute winter	S08	12	43.331	0.699	14.1	0.1440	0.0000	FLOOD RISK
960 minute winter	S09	915	43.311	0.725	1.8	0.3801	0.0000	SURCHARGED
960 minute winter	RE16A	915	43.312	0.132	0.6	0.0587	0.0000	OK
960 minute winter	S16	915	43.310	0.246	0.6	0.0392	0.0000	SURCHARGED
960 minute winter	S10	915	43.311	0.865	2.9	0.3320	0.0000	SURCHARGED
15 minute winter	S01	10	43.573	0.093	11.9	0.0482	0.0000	OK
15 minute winter	S02	11	43.334	0.096	11.8	0.1081	0.0000	OK
15 minute winter	S14	10	43.384	0.074	8.8	0.0315	0.0000	OK
15 minute winter	RE17A	10	44.060	0.060	5.0	0.0139	0.0000	OK
15 minute winter	S17	10	43.918	0.028	5.0	0.0044	0.0000	OK
960 minute winter	S15	900	43.312	0.201	0.8	0.0319	0.0000	SURCHARGED
15 minute winter	RE3A	10	43.925	0.075	7.5	0.0252	0.0000	OK
960 minute winter	S03	915	43.311	1.031	2.0	1.1659	0.0000	SURCHARGED
960 minute winter	TANK	900	43.314	1.069	6.2	117.8736	0.0000	SURCHARGED
960 minute winter	RE4A	900	43.312	0.162	0.5	0.0588	0.0000	SURCHARGED
960 minute winter	S04	915	43.310	1.076	4.3	1.9016	0.0000	SURCHARGED
15 minute winter	S11	10	44.119	0.099	11.9	0.0514	0.0000	OK
15 minute winter	S12	10	43.903	0.050	11.8	0.0079	0.0000	OK
960 minute winter	S18	915	43.310	0.160	0.2	0.0376	0.0000	SURCHARGED
960 minute winter	S13	915	43.310	0.202	1.2	0.0609	0.0000	SURCHARGED
960 minute winter	S05	915	43.310	1.246	1.7	1.4093	0.0000	SURCHARGED
960 minute winter	S06	900	43.287	1.240	3.0	1.4021	0.0000	SURCHARGED

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	RE7A	1.000	S07	2.6	0.402	0.147	0.0546	
15 minute summer	S07	1.001	S08A	8.8	0.614	0.355	0.3653	
15 minute winter	S08A	1.002	S08	13.6	0.774	0.943	0.0484	
15 minute winter	S08	1.003	S09	15.5	0.882	1.075	0.1205	
15 minute winter	S09	1.004	S10	21.0	1.196	1.456	0.3665	
15 minute winter	RE16A	2.000	S16	9.9	1.359	0.559	0.0858	
15 minute winter	S16	2.001	S10	9.9	0.768	0.162	0.0569	
15 minute winter	S10	1.005	S04	37.1	2.109	2.569	0.1231	
15 minute winter	S01	3.000	S02	11.8	1.013	0.662	0.2813	
15 minute winter	S02	3.001	S03	11.6	1.026	0.653	0.1101	
15 minute winter	S14	4.000	S15	8.7	0.780	0.490	0.2208	
15 minute winter	RE17A	5.000	S17	5.0	1.150	0.280	0.0489	
15 minute winter	S17	5.001	S15	4.9	0.647	0.076	0.0464	
15 minute winter	S15	4.001	S03	13.4	1.048	0.752	0.0967	
15 minute winter	RE3A	6.000	S03	7.4	0.908	0.420	0.0424	
15 minute winter	S03	3.002	TANK	32.2	1.645	0.504	0.6871	
15 minute winter	TANK	3.003	S04	-56.7	-1.968	-0.888	0.2237	
15 minute winter	RE4A	7.000	S04	8.1	0.919	0.454	0.0403	
30 minute summer	S04	1.006	S05	-14.6	0.373	-0.230	3.5958	
15 minute winter	S11	8.000	S12	11.8	1.356	0.664	0.1455	
15 minute winter	S12	8.001	S13	11.7	1.000	0.237	0.1110	
15 minute winter	S18	9.000	S13	2.7	0.211	0.152	0.0730	
15 minute winter	S13	8.002	S05	19.3	1.103	1.086	0.2276	
15 minute winter	S05	1.007	S06	5.1	0.550	0.080	0.3688	
15 minute winter	S06	1.008	S6a	4.4	0.457	0.059	1.0751	

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Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 97.79%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute winter	S6a	900	43.285	1.305	1.9	0.3694	0.0000	FLOOD RISK
960 minute winter	OUTFALL	900	43.285	1.426	2.0	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
960 minute winter	S6a	1.009	OUTFALL	2.0	0.029	0.014	0.4773	17.4

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Results for 500 year +45% CC Critical Storm Duration. Lowest mass balance: 99.77%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	RE7A	11	43.609	0.529	2.7	0.0519	0.0000	FLOOD RISK
15 minute winter	S07	11	43.608	0.559	12.6	0.2751	0.0000	FLOOD RISK
15 minute winter	S08A	11	43.480	0.830	22.6	1.2465	2.3068	FLOOD
15 minute winter	S08	12	43.474	0.842	15.0	0.1735	0.0000	FLOOD RISK
15 minute winter	S09	12	43.458	0.872	24.9	0.9910	0.0000	FLOOD RISK
15 minute winter	RE16A	10	43.289	0.109	14.2	0.0486	0.0000	OK
15 minute winter	S16	11	43.221	0.157	14.0	0.0249	0.0000	SURCHARGED
15 minute winter	S10	11	43.177	0.731	45.1	0.2806	0.0000	SURCHARGED
15 minute winter	S01	10	43.602	0.122	16.8	0.0637	0.0000	OK
15 minute winter	S02	11	43.365	0.127	16.6	0.1437	0.0000	OK
15 minute winter	S14	10	43.402	0.091	12.4	0.0390	0.0000	OK
15 minute winter	RE17A	10	44.073	0.073	7.1	0.0169	0.0000	OK
15 minute winter	S17	10	43.923	0.033	7.1	0.0053	0.0000	OK
15 minute winter	S15	10	43.281	0.170	19.3	0.0271	0.0000	SURCHARGED
15 minute winter	RE3A	10	43.943	0.093	10.6	0.0314	0.0000	OK
180 minute winter	S03	176	42.948	0.668	10.9	0.7551	0.0000	SURCHARGED
180 minute winter	TANK	176	42.948	0.703	29.4	103.4590	0.0000	SURCHARGED
15 minute winter	RE4A	10	43.249	0.099	11.5	0.0360	0.0000	OK
180 minute winter	S04	176	42.948	0.714	19.3	1.2609	0.0000	SURCHARGED
15 minute winter	S11	10	44.148	0.128	16.8	0.0668	0.0000	OK
15 minute winter	S12	11	43.913	0.060	16.6	0.0096	0.0000	OK
15 minute winter	S18	11	43.494	0.344	3.5	0.0809	0.0000	SURCHARGED
15 minute winter	S13	11	43.492	0.384	26.9	0.1155	0.0000	SURCHARGED
180 minute winter	S05	176	42.947	0.883	6.5	0.9987	0.0000	SURCHARGED
15 minute winter	S06	67	42.102	0.055	5.0	0.0618	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	RE7A	1.000	S07	-3.2	0.338	-0.181	0.0546	
15 minute winter	S07	1.001	S08A	12.6	0.714	0.509	0.3653	
15 minute summer	S08A	1.002	S08	15.3	0.869	1.058	0.0484	
15 minute summer	S08	1.003	S09	17.6	1.002	1.220	0.1205	
15 minute summer	S09	1.004	S10	23.8	1.352	1.646	0.3665	
15 minute winter	RE16A	2.000	S16	14.0	1.375	0.788	0.1800	
15 minute winter	S16	2.001	S10	13.0	0.868	0.213	0.0933	
15 minute winter	S10	1.005	S04	44.9	2.549	3.103	0.1244	
15 minute winter	S01	3.000	S02	16.6	1.069	0.932	0.3758	
15 minute winter	S02	3.001	S03	16.4	1.083	0.923	0.1470	
15 minute winter	S14	4.000	S15	12.3	0.820	0.693	0.2871	
15 minute winter	RE17A	5.000	S17	7.1	1.262	0.397	0.0630	
15 minute winter	S17	5.001	S15	7.0	0.667	0.108	0.0601	
15 minute winter	S15	4.001	S03	18.9	1.083	1.065	0.1265	
15 minute winter	RE3A	6.000	S03	10.5	0.984	0.593	0.0552	
15 minute winter	S03	3.002	TANK	45.1	1.717	0.707	0.7399	
15 minute winter	TANK	3.003	S04	-72.9	-2.062	-1.143	0.2272	
15 minute winter	RE4A	7.000	S04	11.4	0.995	0.643	0.0527	
15 minute winter	S04	1.006	S05	-20.7	0.477	-0.325	3.5958	
15 minute winter	S11	8.000	S12	16.6	1.429	0.935	0.1889	
15 minute winter	S12	8.001	S13	16.5	1.166	0.334	0.1184	
15 minute summer	S18	9.000	S13	4.4	0.251	0.249	0.0745	
15 minute winter	S13	8.002	S05	26.9	1.527	1.514	0.2360	
120 minute summer	S05	1.007	S06	5.0	0.532	0.078	0.0492	
180 minute summer	S06	1.008	S6a	5.0	0.710	0.068	0.1083	

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Results for 500 year +45% CC Critical Storm Duration. Lowest mass balance: 99.77%

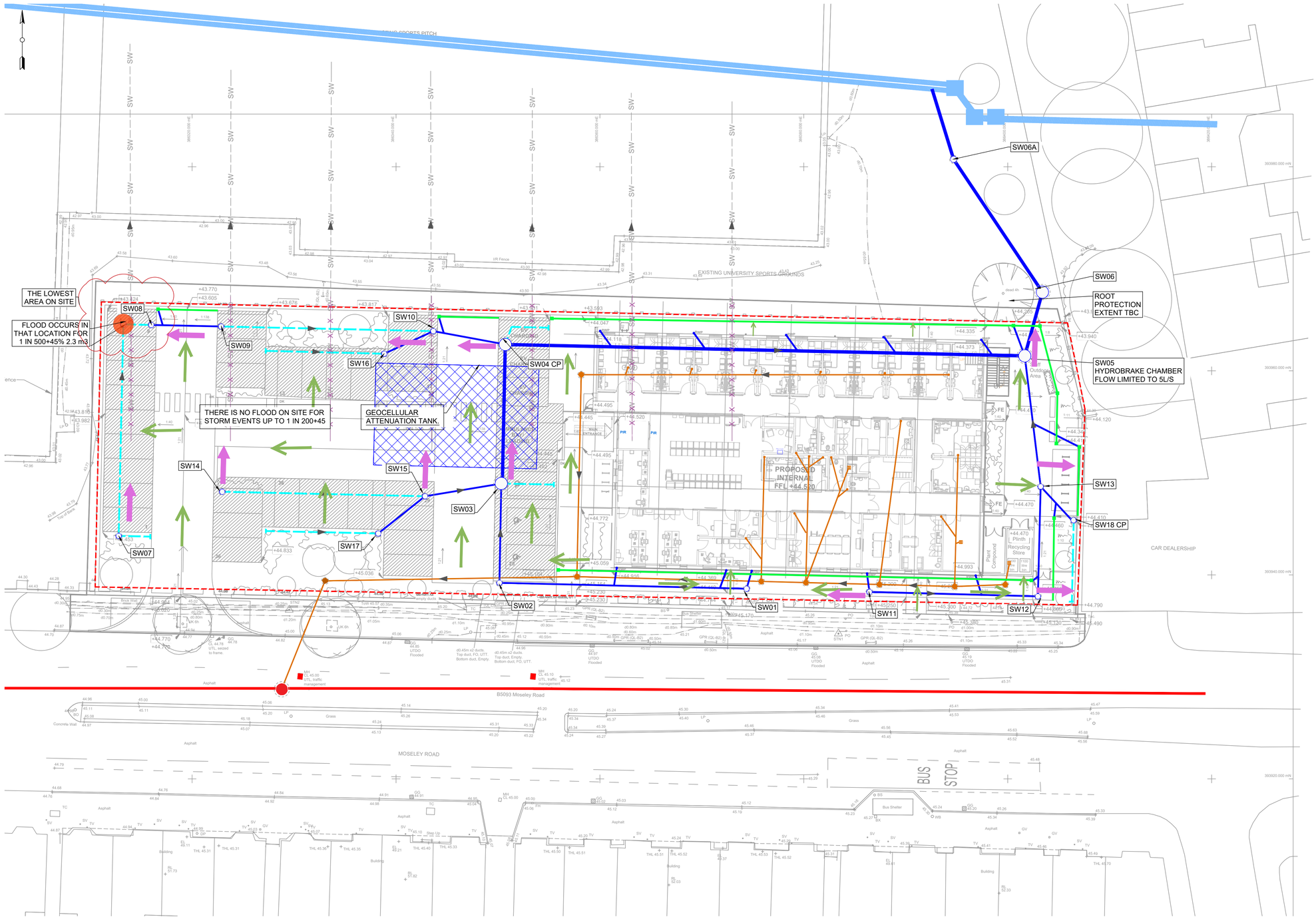
Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
180 minute summer	S6a	336	42.020	0.040	5.0	0.0112	0.0000	OK
60 minute winter	OUTFALL	244	41.896	0.037	5.0	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute winter	S6a	1.009	OUTFALL	5.0	0.951	0.034	0.0356	84.5

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Appendix D

Flow Exceedance Plan



GENERAL NOTES:

GENERAL NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.
2. DESIGN BASED ON TOPOGRAPHICAL SURVEY AND CCTV SURVEY INFORMATION AVAABLE AT THE TIME OF DESIGN.
3. DO NOT SCALE THIS DRAWING. ALL DETAS AND DIMENSIONS ARE TO BE CHECKED BY THE CONTRACTOR. ANY DISCREPANCIES TO BE REPORTED TO THE ENGINEER.
4. ALL DIMENSIONS ARE IN METRES AND LEVELS IN METRES ABOVE ORDNANCE DATUM UNLESS OTHERWISE NOTED.

KEY

- SITE BOUNDARY
- EXISTING COMBINED PUBLIC SEWER
- EXISTING CULVERTED WATERCOURSE
- PROPOSED FOUL DRAINAGE
- PROPOSED SURFACE WATER DRAINAGE
- PROPOSED PERFORATED PIPE
- PROPOSED CHANNEL DRAIN
- INDICATIVE LOCATION OF EXISTING LAND DRAINS BASED ON DRAWING PROVIDE BY UNIVERSITY
- PROPOSED UNDERGROUND ATTENUATION STORAGE
- PROPOSED PERMEABLE ASPHALT
- LOCATION OF FLOODING WITHIN DRAINAGE NETWORK
- ROUTE OF OVERLAND FLOW FROM FLOOD POINT
- GENERAL FALLS

Rev:	Description:	Date:	By:	Chkd:
P03	SW CONNECTION TO CULVERT UPDATED	04/06/26	IK	ATL
P02	ISSUED TO DISCHARGE PLANNING CONDITION 20	19/02/26	MW	MW
P01	ISSUED FOR INFORMATION	15/10/25	MW	MW

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Status: SUITABLE FOR AUTHORIZATION **S4**

Project: HAWTHORN MEDICAL CENTRE

Drg Title: FLOW EXEEDANCE PLAN

Drawn By	Designed By	Checked By
MW	MW	MW
	Date: 28/04/25	Scales @ A1: 1:200

Project No - Originator - Function - Spatial - Form - Discipline - Number: HMCNMC - CUR - ZZ - 00 - DR- C - 92501

Revision: P03

\\ms-fs-1\Projects\087001 - 085000\087545 - Hawthorn Medical Centre\04-Production\A4-Models-Drawings\C\CAD\92\

DESIGN PHOSOPHY

SURFACE WATER DESIGN
THE DESIGN PROVIDES CAPACITY UP TO THE 100 YEAR + 45% IMATE CHANGE EVENT.
SW FLOW RATE: 5 l/s (FLOW CALCULATED BASED ON GREENFIELD RUNOFF RATE, INCREASED TO ACHIEVE MINIMUM ORIFICE SIZE TO PREVENT BLOCKAGES)

ATTENUATION
APPROXIMATE STORAGE REQUIREMENT:118m³ PROVIDED WITHIN CELLULAR STORAGE.
ADDITIONAL STORAGE PROVIDED WITHIN PERMEABLE PAVING AREAS

OUTFALL:
SITE DISCHARGES TO THE EXISTING WATERCOURSE IN THE UNIVERSITY GROUNDS.

LAND DRAINAGE CONSENT IS REQUIRED FROM THE LLFA FOR THE CONNECTION TO THE WATERCOURSE

SURCHARGED OUTFALL LEVEL TAKEN AS 43.43(1M ABOVE SOFFIT LEVEL) - IN 1:30 STORM EVENT, AS CONFIRMED BY LLFA

PERMISSION REQUIRED FROM UNIVERSITY FOR THE CONNECTION TO THE WATERCOURSE

POLLUTION TREATMENT/ SUSTAINABLE DRAINAGE:
THE CAR PARK DRAINAGE IS SERVED BY PERMEABLE PAVING AREAS.
INFTRATION IS NOT CONSIDERED APPROPRIATE FOR THIS SCHEME.

FOUL WATER DESIGN

THE PEAK FLOW RATE HAS BEEN CALCULATED AS 1.7 l/s, BASED ON AN ESTIMATED TOTAL OF 12.2 DISCHARGE UNITS. FINAL DISCHARGE UINIT LOADING TBC BY MEP ENGINEER.

OUTFALL:
SITE DISCHARGES TO THE EXISTING 525 MM COMBINED SEWER IN MOSELEY ROAD

A S106 AGREEMENT IS REQUIRED WITH UNITED UTITIES:
PART 1 BY CURTINS
PART 2 ASSUMED NOT REQUIRED AS CONNECTION IS INDIRECT.

LEVELS INDICATE THAT PUMPING WL NOT BE REQUIRED.

DRAWING BASED ON:

TOPOGRAPHICAL SURVEY
74193MCUG-01 TOPOGRAPHICAL & GPR SURVEY DATED MARCH 2025
LAYER SURVEY TOPOGRAPHICAL SURVEY JULY 25

CCTV SURVEY
- S26205 CCTV SURVEY BY SEP DATED MAY/ AUGUST 25

ARCHITECT'S PLANS
- MCNMC-GDA-V1-S1-DR-A-1002 P07 PROPOSED SITE PLAN
- HMCNMC-GDA-V1-00-DR-A-1010 P07 PROPOSED GROUND FLOOR PLAN

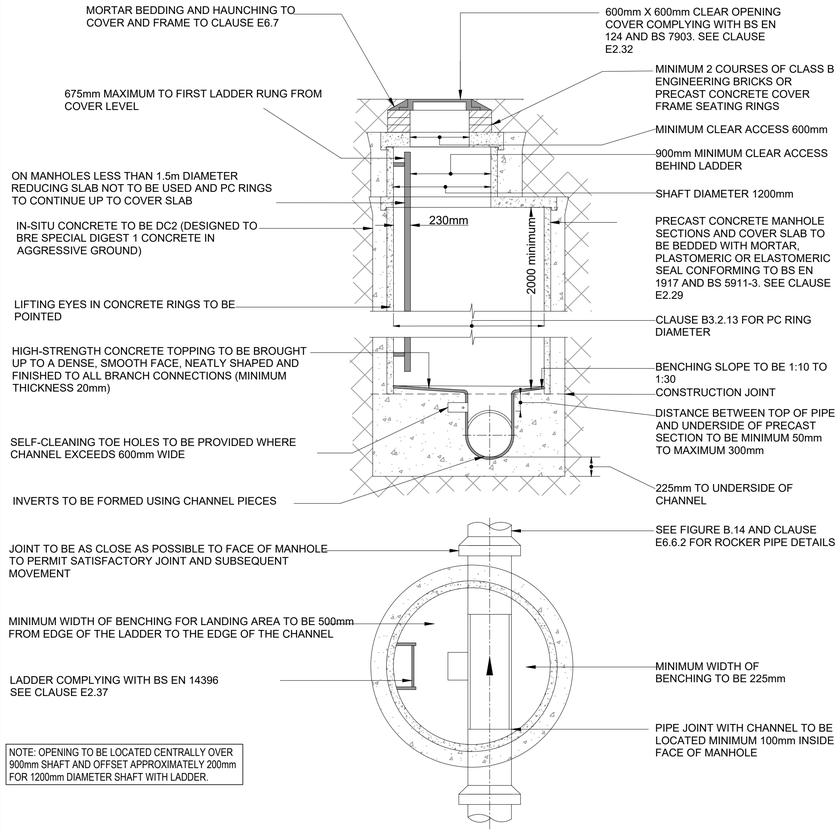
STRUCTURAL PLANS
- 087546-CUR-XX-FN-D-S-16001 P02 FOUNDATION GA
- 087546-CUR-XX-FN-D-S-16100 P02 SITE RETAINING WALL GA

SITE INVESTIGATION
- 087546-CUR-XX-XX-T-GE-00002 P01 PHASE 1 PRELIMINARY RISK ASSESSMENT.

1:200 0 5m 10m 15m 20m
1:1 0 10 20 30 40 50 60 70 80 90 100

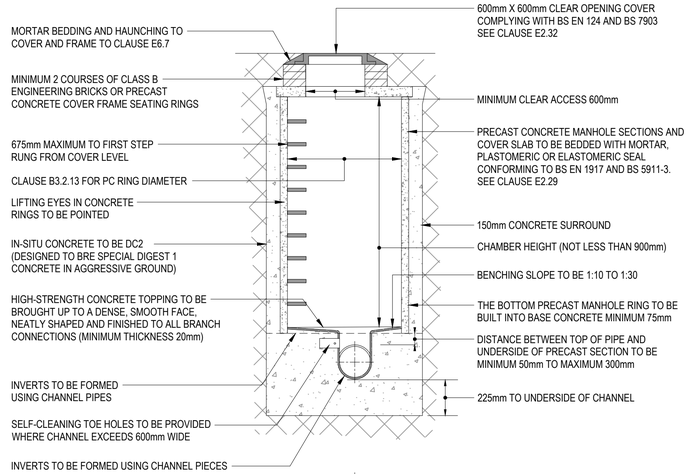
Appendix E

Drainage Details



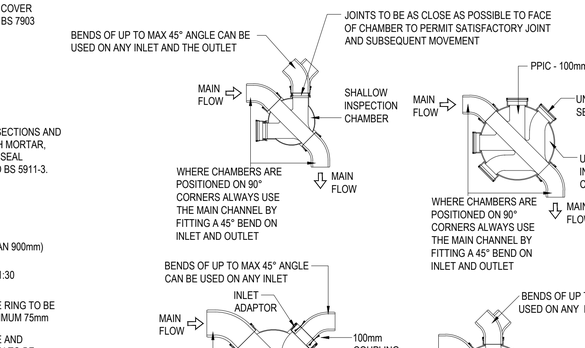
NOTE: OPENING TO BE LOCATED CENTRALLY OVER 900mm SHAFT AND OFFSET APPROXIMATELY 200mm FOR 1200mm DIAMETER SHAFT WITH LADDER.

TYPICAL MANHOLE DETAIL - TYPE A1
(DEPTH FROM COVER TO SOFFIT OF PIPE 3m TO 6m)



MANHOLE COVERS WITHIN TRAFFICKED PAVED AREAS TO BE D400 RECESSED COVERS.

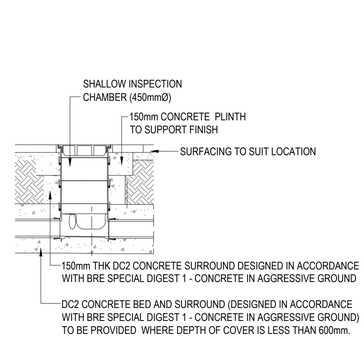
TYPICAL MANHOLE DETAIL - TYPE B
(MAXIMUM DEPTH FROM COVER TO SOFFIT OF PIPE 3.0 m)



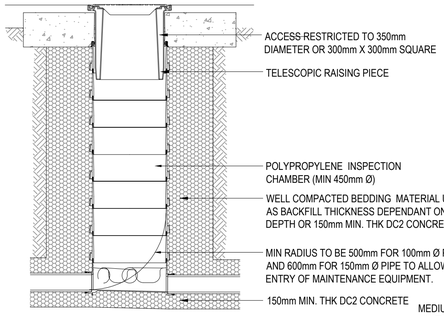
INSPECTION CHAMBER BASE DETAILS

GENERAL NOTES:

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

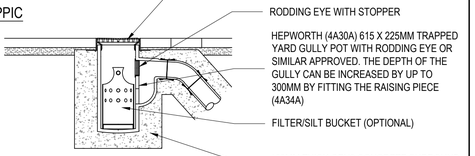


SHALLOW INSPECTION CHAMBER
MAX DEPTH 0.6m

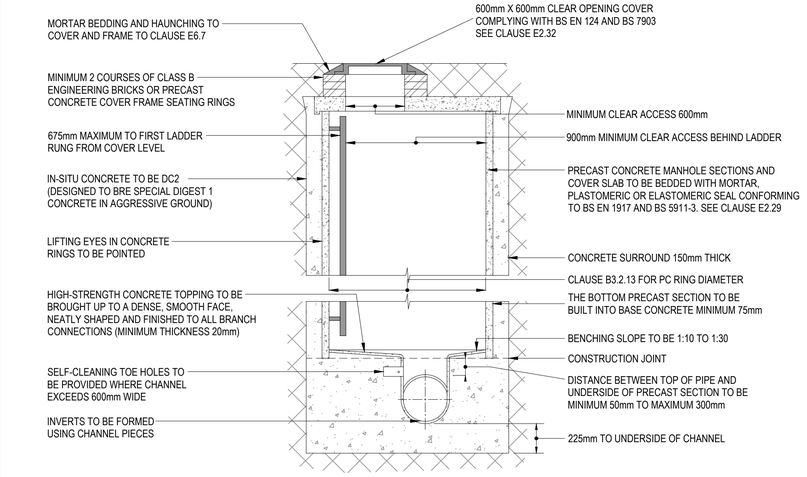


DEEP INSPECTION CHAMBER
DEPTHS BETWEEN 1.2m AND 3.0m

TYPICAL INSPECTION CHAMBER DETAILS - PPIC

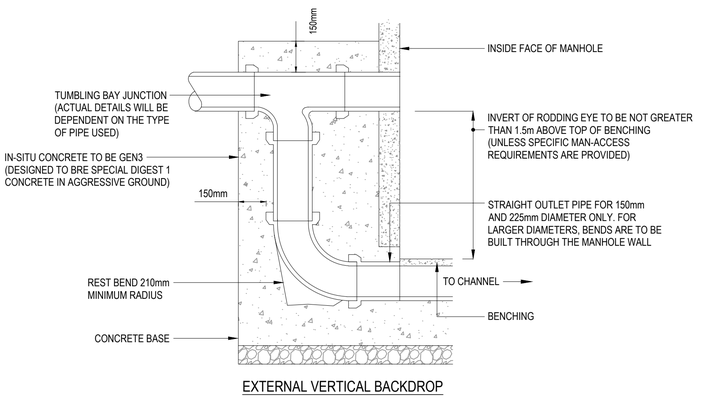


TYPICAL YARD GULLY

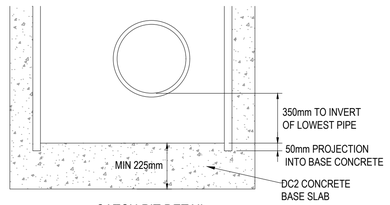


NOTE: OPENING TO BE LOCATED CENTRALLY OVER 900mm SHAFT AND OFFSET APPROXIMATELY 200mm FOR 1200mm DIAMETER SHAFT WITH LADDER.

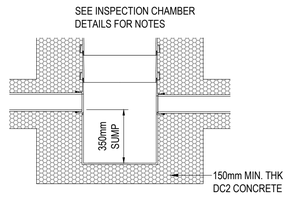
TYPICAL MANHOLE DETAIL - TYPE A2
(DEPTH FROM COVER TO SOFFIT OF PIPE 3m TO 6m)



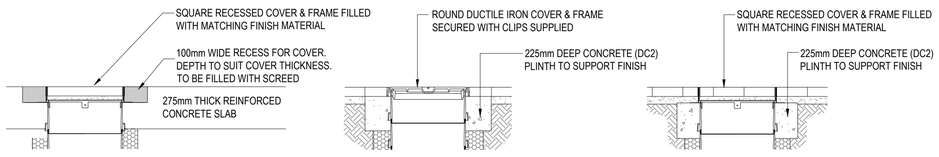
EXTERNAL VERTICAL BACKDROP



CATCH PIT DETAIL



PPIC CATCHPIT BASE DETAIL



INTERNAL MANHOLE WITH RECESSED COVER

SITED IN HARD LANDSCAPED AREAS WITH STANDARD ROUND COVER

SITED IN HARD LANDSCAPED AREAS WITH RECESSED COVER

TYPICAL INSPECTION CHAMBER COVER DETAILS

Rev:	Description:	Date:	By:	Chkd:
P04	ISSUED TO DISCHARGE PLANNING CONDITION 20	18/02/26	MW	MW
P03	STAGE 4 ISSUE. DRAWING RENUMBERED FOR BEP	26/08/25	GD	GD
P02	STAGE 3 ISSUE	19/06/25	ATL	MW
P01	ISSUED FOR COMMENT	01/05/25	KS	MW

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Status: SUITABLE FOR AUTHORIZATION — S4

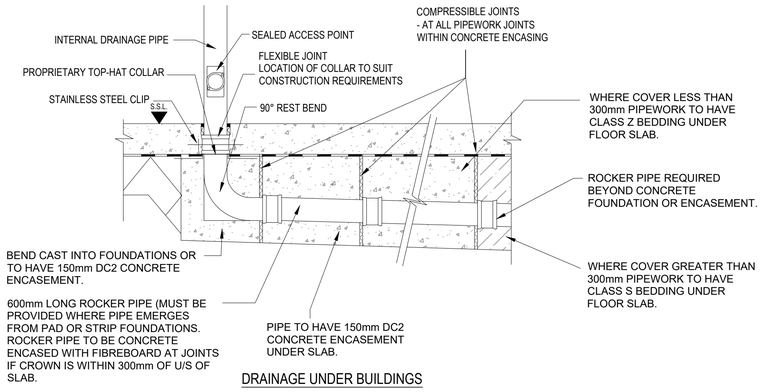
Project: HAWTHORN MEDICAL CENTRE

Drg Title: DRAINAGE DETAILS SHEET 1

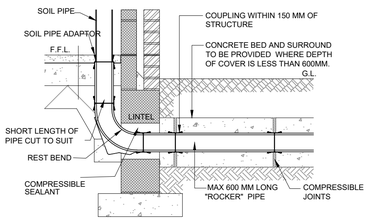
Drawn By	Designed By	Checked By
KS	MW	MW
	Date: 01/05/2025	Scales @ A1: 1:20

Project No - Originator - Function - Spatial - Form - Discipline - Number	Revision
HMCNMC - CUR - ZZ - 00 - DR- C - 92520	P04

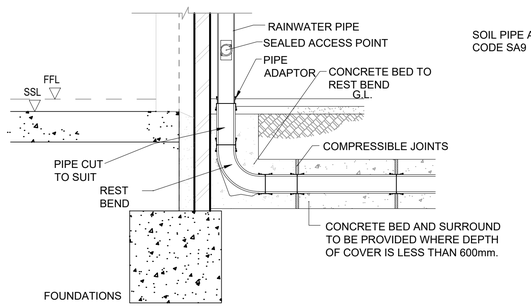
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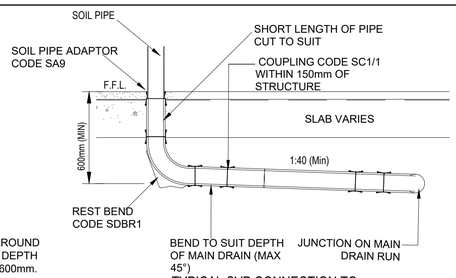
DRAINAGE UNDER BUILDINGS



SOIL & VENT PIPE / STUB STACK /
W.C. CONNECTION DETAIL



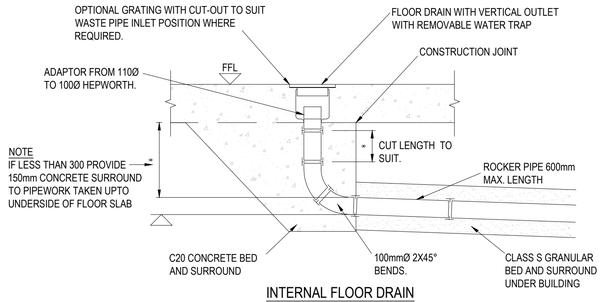
RWP CONNECTION DETAIL



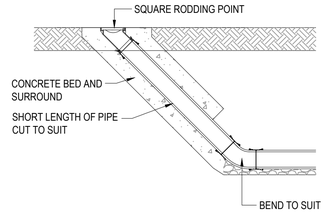
TYPICAL SVP CONNECTION TO
MAIN RUN

GENERAL NOTES:

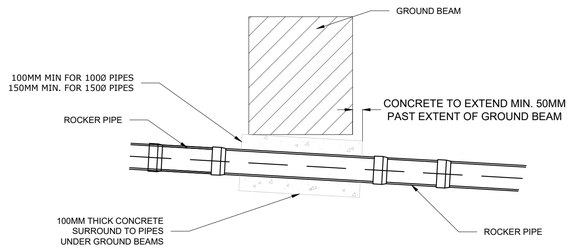
1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.
2. DO NOT SCALE THIS DRAWING. ANY AMBIGUITIES, OMISSIONS AND ERRORS ON DRAWINGS SHALL BE BROUGHT TO THE ENGINEERS ATTENTION IMMEDIATELY. ALL DIMENSIONS MUST BE CHECKED / VERIFIED ON SITE.
3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
4. SULPHATE RESISTANT CEMENT AND PRECAST CONCRETE PRODUCTS MUST BE USED WHERE SULPHATE FOUND, OR WHERE NO SULPHATES THEN C20- GEN 3



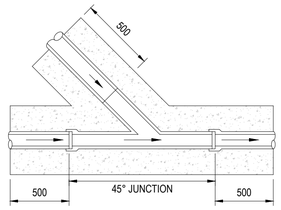
INTERNAL FLOOR DRAIN



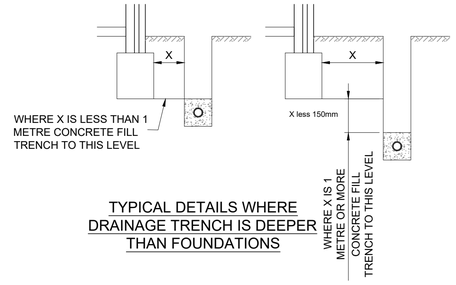
RODDING POINT DETAIL (RE)



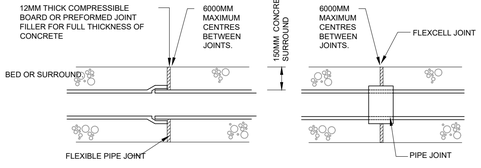
TYPICAL PIPE DETAIL UNDER
GROUND BEAMS
(SCALE 1:20)



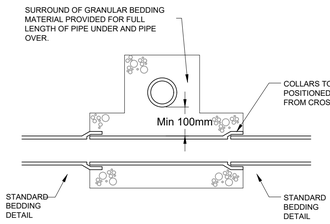
TYPICAL SADDLE CONNECTION



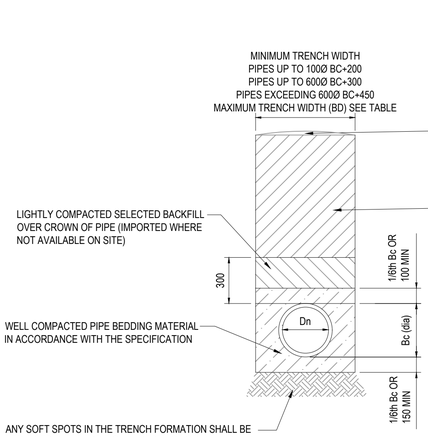
TYPICAL DETAILS WHERE
DRAINAGE TRENCH IS DEEPER
THAN FOUNDATIONS



EXPANSION JOINT
FOR CONCRETE BED AND
SURROUND



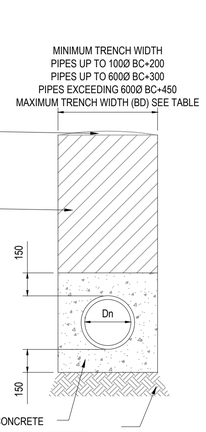
PIPE CROSSINGS DETAIL



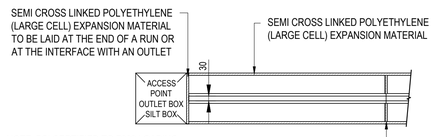
CLASS S - 360° GRANULAR SURROUND PIPE BEDDING DETAIL

Dn	Bd
150	0.6
225	0.7
300	0.85
375	1.05
450	1.15
525	1.25
600	1.35
675	1.45
750	1.50

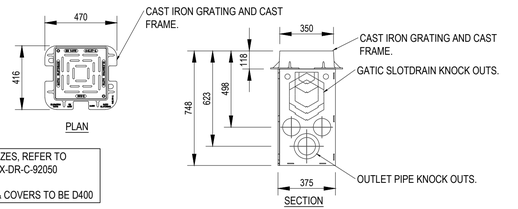
MAXIMUM TRENCH WIDTH



CLASS Z - CONCRETE BED AND
SURROUND PIPE BEDDING DETAIL
COVER < 900mm IN VEHICULAR LOADING AND OPEN FIELD.
COVER <600mm ELSEWHERE EXCEPT UNDER BUILDINGS.



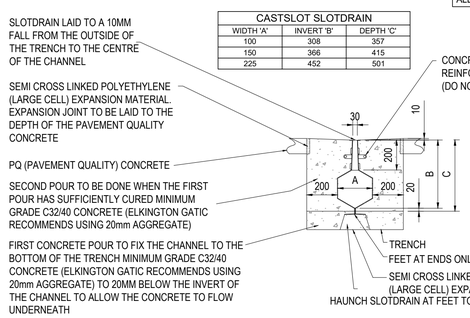
GATIC PLAN DETAIL



FOR CHANNEL SIZES, REFER TO
WCHS-CUR-XX-XX-DR-C-92050

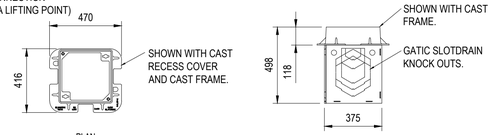
ALL CHANNELS & COVERS TO BE D400

GATIC SLOTDRAIN 350mm OUTLET UNIT
SECTION AND PLAN DETAILS

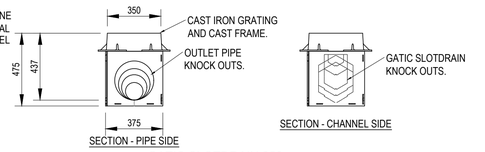


CASTSLOT SLOTDRAIN		
WIDTH 'A'	INVERT 'B'	DEPTH 'C'
100	308	357
150	366	415
225	452	501

GATIC SLOTDRAIN CASTSLOT
TREADSAFE CONCRETE INSTALLATION



350 ACCESS BOX
SECTION AND PLAN DETAILS



GATIC SLOTDRAIN 350mm
REDUCED DEPTH OUTLET UNIT
SECTION AND PLAN DETAILS

Rev:	Description:	Date:	By:	Chkd:
P04	ISSUED TO DISCHARGE PLANNING CONDITION 20	18/02/26	MW	MW
P03	STAGE 4 ISSUE. DRAWING RENUMBERED FOR BEP	26/08/25	GD	GD
P02	REDUCED DEPTH GATIC DRAIN OUTLET ADDED	19/06/25	ATL	MW
P01	ISSUED FOR COMMENT	01/05/25	KS	MW

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Status: SUITABLE FOR AUTHORIZATION **S4**

Project: HAWTHORN MEDICAL CENTRE

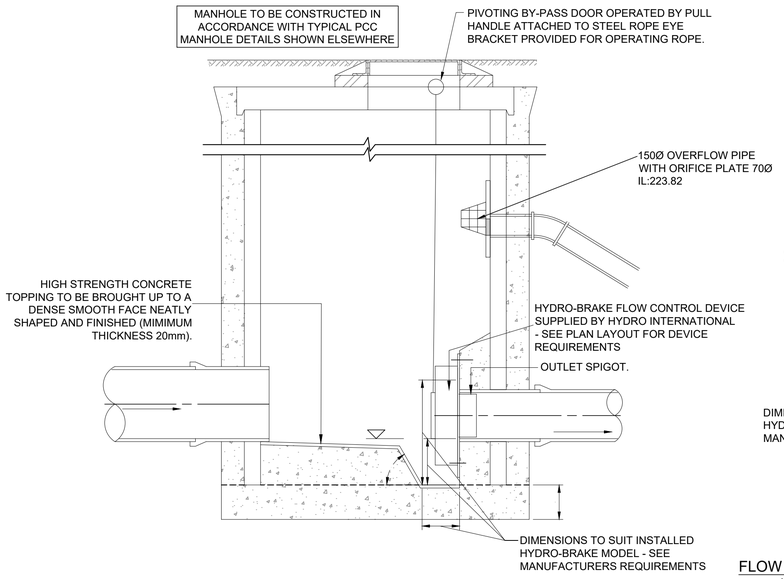
Drg Title: DRAINAGE DETAILS SHEET 2

Drawn By	Designed By	Checked By
KS	MW	MW
	Date: 01/05/2025	Scales @ A1: 1:20

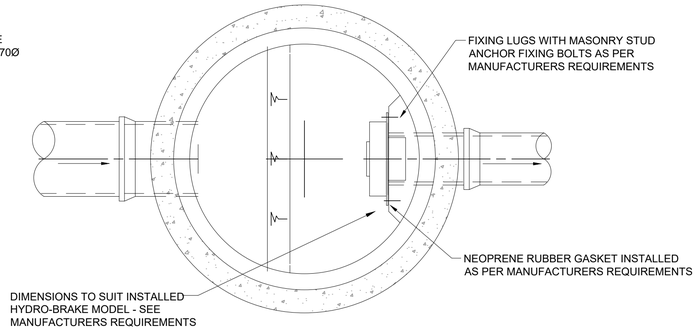
Project No - Originator - Function - Spatial - Form - Discipline - Number: HMCNMC - CUR - ZZ - 00 - DR- C - 92521

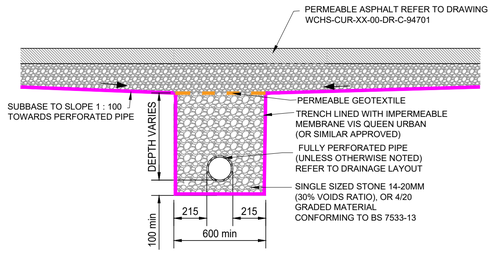
Revision: P04

\\ma-fs-1\Projects\097001 - 098000\097546 - Hawthorn Medical Centre\Q4-Production\4A-Models-Drawings\CC-AD\92521

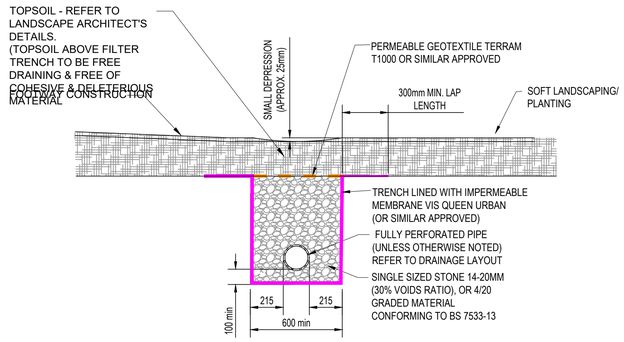


FLOW CONTROL MANHOLE (HYDRO-BRAKE)





PERMEABLE ASPHALT AND PERFORATED PIPE DETAIL



PERFORATED PIPE/ FILTER DRAIN IN SOFT LANDSCAPING (ADJACENT TO HARD LANDSCAPE)

GENERAL NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.
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3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
4. REFER TO DRAINAGE LAYOUT 087546-CUR-XX-00-DR-C-92500 PROPOSED DRAINAGE LAYOUT FOR THE LOCATIONS OF FLOW CONTROL MANHOLES.
5. FLOW CONTROL TO BE INSTALLED IN STRICT ACCORDANCE WITH THE MANUFACTURERS REQUIREMENTS, INSTRUCTIONS AND RECOMMENDATIONS.
6. WHERE ALTERNATIVE FLOW CONTROL DEVICE IS PREFERRED, IT WILL BE SUBJECT TO REDESIGN TO CONFIRM WHETHER THERE IS ANY IMPACT ON THE UPSTREAM CAPACITY
7. SURFACE WATER DRAINAGE CONNECTION SUBJECT TO S106 AGREEMENT WITH SEVERN TRENT WATER

Technical Specification

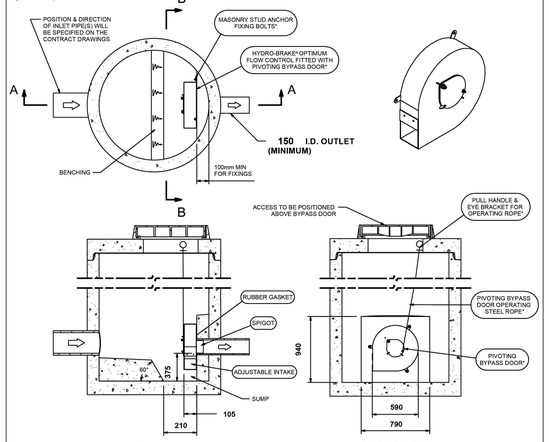
Control Point	Head (m)	Flow (l/s)
Primary Design	1.400	5.000
Flush-Flo™	0.416	4.991
Kick-Flo®	0.855	3.980
Mean Flow		4.382

This Hydro-Brake® Optimum includes:

- All in 3 mm Grade 304L stainless steel
- Integral pivoting by-pass door allowing clear line of sight through to outlet, c/w operating rope
- Media blasted for corrosion resistance
- Variable flow rate post installation via adjustable inlet (if necessary)
- Indicative Weight: 20 kg
- Product Carbon Footprint: 80.61 kgCO2e

Based on a 3rd party verified EPD: hydro-int.com/epd

hydro-int.com/patents



IMPORTANT: ⬭ LIMIT OF HYDRO INTERNATIONAL SUPPLY
THE DEVICE WILL BE HANDED TO SUIT SITE CONDITIONS
FOR SITE SPECIFIC DETAILS AND MINIMUM CHAMBER SIZE REFER TO HYDRO INTERNATIONAL
ALL CIVIL AND INSTALLATION WORK BY OTHERS
* WHERE SUPPLIED
HYDRO-BRAKE® IS A REGISTERED TRADEMARK FOR FLOW CONTROLS DESIGNED AND MANUFACTURED EXCLUSIVELY BY HYDRO INTERNATIONAL

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

DESIGN ADVICE !	The head/flow characteristics of this SHE-0100-5000-1400-5000 Hydro-Brake® Optimum Flow Control are unique. Dynamic hydraulic modelling evaluates the full head/flow characteristic curve. **The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.**
DATE	19/06/2025 09:00
SITE	Hawthorn Medical Centre
DESIGNER	Andrew Losty
REF	087546

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SHE-0100-5000-1400-5000
Hydro-Brake® Optimum

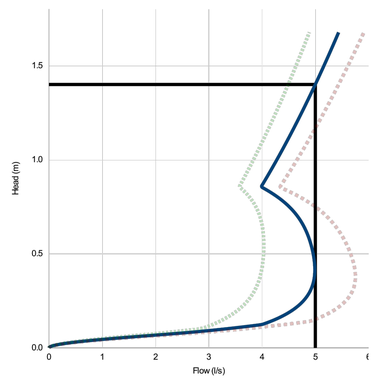
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andy.losty@curtins.com

Technical Specification

	Original Setting		Minimum Setting		Maximum Setting	
Control Point	Head (m)	Flow (l/s)	Head (m)	Flow (l/s)	Head (m)	Flow (l/s)
Primary Design	1.400	5.000	1.400	4.491	1.400	5.438
Flush-Flo™	0.416	4.991	0.544	4.032	0.378	5.752
Kick-Flo®	0.855	3.980	0.855	3.570	0.853	4.330
Mean Flow		4.382		3.723		4.898

hydro-int.com/patents



Head (m)	Flow (l/s)
0.000	0.000
0.048	1.130
0.097	3.168
0.145	4.196
0.193	4.532
0.241	4.747
0.290	4.880
0.338	4.954
0.386	4.986
0.434	4.989
0.483	4.971
0.531	4.936
0.579	4.885
0.628	4.817
0.676	4.723
0.724	4.597
0.772	4.424
0.821	4.194
0.869	4.010
0.917	4.111
0.966	4.209
1.014	4.305
1.062	4.399
1.110	4.490
1.159	4.579
1.207	4.667
1.255	4.752
1.303	4.836
1.352	4.918
1.400	4.999

DESIGN ADVICE !	The head/flow characteristics of this SHE-0100-5000-1400-5000 Hydro-Brake® Optimum Flow Control are unique. Dynamic hydraulic modelling evaluates the full head/flow characteristic curve. **The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.**
DATE	19/06/2025 09:00
Site	Hawthorn Medical Centre
DESIGNER	Andrew Losty
Ref	087546

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SHE-0100-5000-1400-5000
Hydro-Brake® Optimum

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Rev:	Description:	Date:	By:	Chkd:
P04	ISSUED TO DISCHARGE PLANNING CONDITION 20	18/02/25	MW	MW
P03	STAGE 4 ISSUE. DRAWING RENUMBERED FOR BEP	26/08/25	GD	GD
P02	STAGE 3 ISSUE	19/05/25	ATL	MW
P01	ISSUED FOR COMMENT	01/05/25	KS	MW

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Status: SUITABLE FOR AUTHORIZATION — S4

Project: HAWTHORN MEDICAL CENTRE

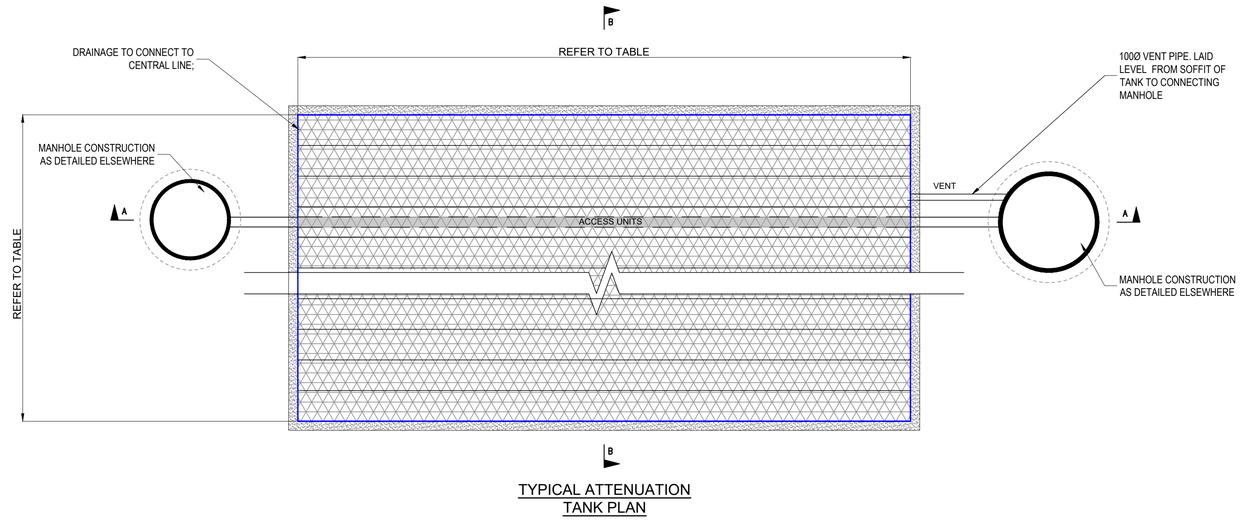
Drg Title: DRAINAGE DETAILS SHEET 3

Drawn By	Designed By	Checked By
KS	MW	MW
	Date: 01/05/2025	Scales @ A1: 1:20

Project No - Originator - Function - Spatial - Form - Discipline - Number: HMCNMC - CUR - ZZ - 00 - DR- C - 92522

Revision: P04

\\ms-fs-1\Projects\087001 - 088000\087546 - Hawthorn Medical Centre\04-Production\44-Models-Drawings\C\CAD\92\



TYPICAL ATTENUATION TANK PLAN

CURRENT DESIGN ASSUMPTIONS

DESIGN BASED ON POLYPIPE PSM1a 1000LX500WX400D

TANK IS LOCATED IN A CAR PARK AREA.

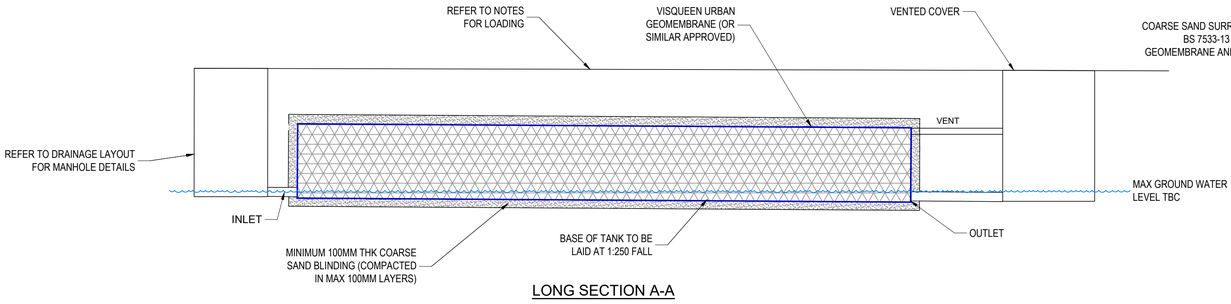
THE MANUFACTURER WILL NEED TO CONFIRM THAT THE TANK HAS SUFFICIENT STRENGTH FOR THIS LOCATION IN ACCORDANCE WITH CIRIA C680.

MAX GROUND LEVEL IS APPROX. 44.49
MIN GROUND LEVEL IS APPROX. 43.93

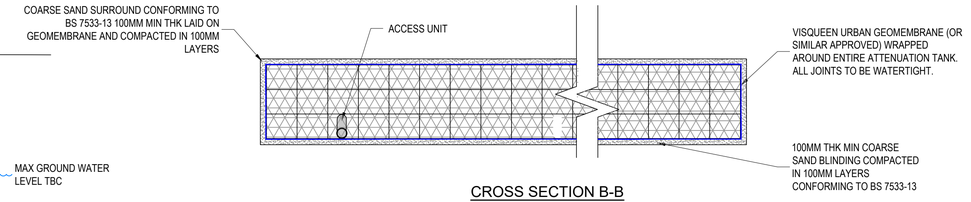
TANK BASE TO BE LAID AT 1:300 FALL
INVERT LEVEL OF INLET PIPES - 42.28
INVERT LEVEL OF OUTLET PIPE - 42.25

DIMENSIONS OF TOTAL UNIT:
16 x 10 x 0.8m DEEP.
ATTENUATION VOLUME, BASED ON 95% VOID RATIO IS 118m³

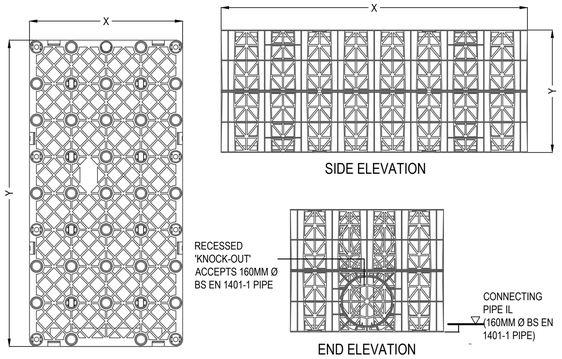
IMPERMEABLE MEMBRANE, BED AND SURROUND TO BE CONFIRMED WITH THE MANUFACTURER.



LONG SECTION A-A



CROSS SECTION B-B



PLAN

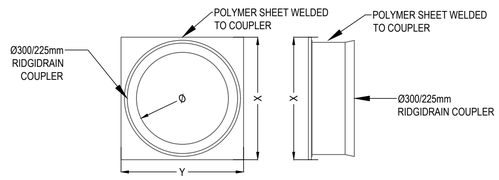
SIDE ELEVATION

END ELEVATION

POLYPIPE POLYSTORM PSM1 ONE UNIT TYPICAL DETAILS

POLYSTORM FLANGE ADAPTER TABLE			
FLANGE CODE	Ø (mm)	X (mm)	Y (mm)
PSMFA300	375	385	450

* FLANGE ADAPTERS ARE COMPATIBLE WITH THE PSM1, PSM1A,PSM2, PSM5 CELLS.
* CONSIDERATION TO HYDRAULIC PERFORMANCE SHOULD BE TAKEN WHEN USING A FLANGE ADAPTER



POLYSTORM FLANGE ADAPTER DETAIL

GENERAL NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.
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3. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
4. REFER TO DRAINAGE LAYOUT 087546-CUR-XX-00-DR-C-92500 FOR THE LOCATION OF THE ATTENUATION TANK.
5. ATTENUATION TANK TO BE INSTALLED STRICTLY IN ACCORDANCE WITH THE MANUFACTURER'S REQUIREMENTS.
6. WHERE AN ALTERNATIVE ATTENUATION TANK DEVICE IS PREFERRED, IT WILL BE SUBJECT TO REDESIGN TO CONFIRM WHETHER THE SYSTEM HAS CAPACITY.
7. THE DESIGN OF THE TANK SHOULD BE PROVIDED BY THE MANUFACTURER OR SUPPLIER TO ENSURE THE TANK IS SUFFICIENT FOR THE SITE SPECIFIC CRITERIA.
8. THE TANK DESIGN SHOULD INCORPORATE:
   - CRATES SUBJECT TO OCCASIONAL VEHICLE LOADING,
   - SUITABLE MAINTENANCE ACCESS; AND
   - VENTING TO PREVENT TRAPPED AIR POCKETS.
9. THE STRENGTH OF THE TANK SHOULD COMPLY WITH CIRIA C680 STRUCTURAL DESIGN OF MODULAR GEOCELLULAR DRAINAGE TANKS.
10. ACCESS FOR MAINTENANCE SHOULD BE IN ACCORDANCE WITH CIRIA GUIDANCE.
11. VENTING TO THE TANK SHOULD BE CONFIRMED BY THE TANK MANUFACTURER. VENTING SHOULD BE LOCATED WITHIN LANDSCAPED AREAS, OR ROUTED BACK TO THE NEAREST MANHOLE ABOVE THE DESIGN WATER LEVEL.
12. CONSTRUCTION AND INSTALLATION OF THE TANK SHOULD BE STRICTLY IN ACCORDANCE WITH THE MANUFACTURER'S INSTALLATION REQUIREMENTS.
13. THE CURRENT DESIGN OF THE TANK IS BASED ON USE OF ESS POLIPIPE CUBE MODULES, TO ALLOW AN ASSUMPTION OF UNIT SIZES WITHIN THE OVERALL DESIGN. HOWEVER, WHERE AN ALTERNATIVE SYSTEM IS PROPOSED, THE DIMENSIONS OF THE UNITS WILL NEED TO BE CHECKED WITHIN THE DESIGN AND MAY RESULT IN A REDESIGN.
14. THE CONTRACTOR SHALL PROHIBIT THE MOVEMENT OF CONSTRUCTION PLANT ACROSS THE STORAGE TANK AND WHERE NECESSARY PROVIDE ADDITIONAL SUPPORT AND PROTECTION TO THE STRUCTURE. PARTICULARLY POST CONSTRUCTION. TEMPORARY FENCING CAN BE USED TO PROHIBIT TRADE STOCKS, PILLING MATERIALS, HEAVY PLANTS ETC.
15. FINAL DESIGN IS SUBJECT TO CONTRACTOR'S DESIGN PORTION

Rev:	Description:	Date:	By:	Chkd:
P04	ISSUED TO DISCHARGE PLANNING CONDITION 20	18/02/26	MW	MW
P03	STAGE 4 ISSUE. DRAWING RENUMBERED FOR BEP	26/08/25	GD	GD
P02	STAGE 3 ISSUE	19/06/25	ATL	MW
P01	ISSUED FOR COMMENT	01/05/25	KS	MW

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Status: SUITABLE FOR AUTHORIZATION — S4

Project: HAWTHORN MEDICAL CENTRE

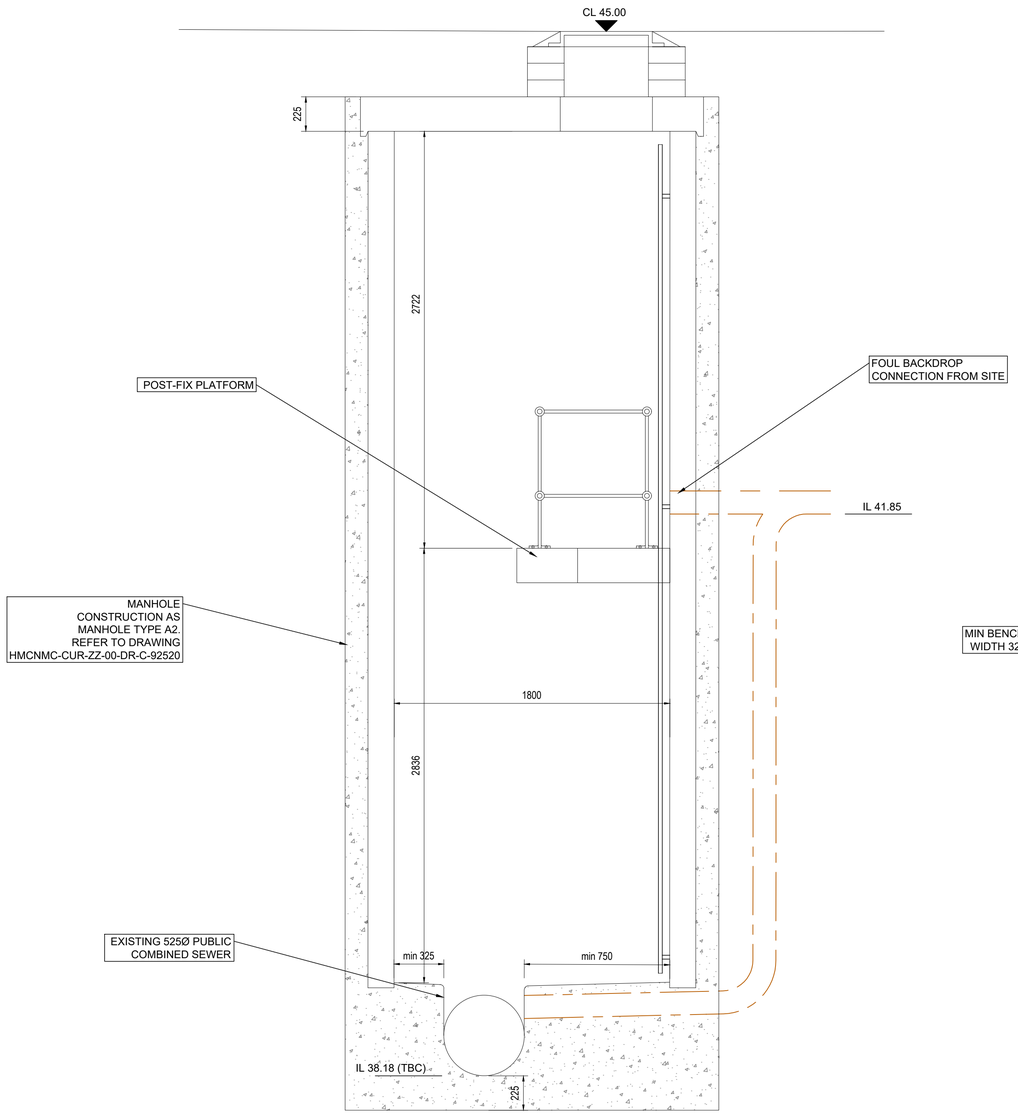
Drg Title: DRAINAGE DETAILS SHEET 4

Drawn By	Designed By	Checked By
KS	MW	MW
	Date: 01/05/2025	Scales @ A1: 1:20

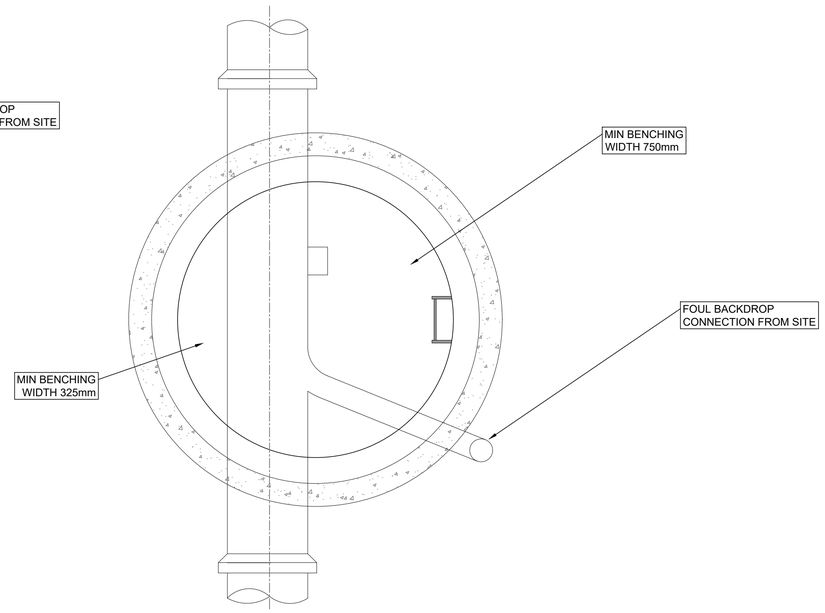
Project No - Originator - Function - Spatial - Form - Discipline - Number: HMCNMC - CUR - ZZ - 00 - DR- C - 92523

Revision: P04

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S106 CONNECTION MANHOLE
SECTION VIEW



S106 CONNECTION MANHOLE
PLAN VIEW

GENERAL NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.
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3. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
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7. THE DESIGN OF THE TANK SHOULD BE PROVIDED BY THE MANUFACTURER OR SUPPLIER TO ENSURE THE TANK IS SUFFICIENT FOR THE SITE SPECIFIC CRITERIA.
8. THE TANK DESIGN SHOULD INCORPORATE:
   - CRATES SUBJECT TO OCCASIONAL VEHICLE LOADING,
   - SUITABLE MAINTENANCE ACCESS; AND
   - VENTING TO PREVENT TRAPPED AIR POCKETS.
9. THE STRENGTH OF THE TANK SHOULD COMPLY WITH CIRIA C680 STRUCTURAL DESIGN OF MODULAR GEOCELLULAR DRAINAGE TANKS.
10. ACCESS FOR MAINTENANCE SHOULD BE IN ACCORDANCE WITH CIRIA GUIDANCE.
11. VENTING TO THE TANK SHOULD BE CONFIRMED BY THE TANK MANUFACTURER. VENTING SHOULD BE LOCATED WITHIN LANDSCAPED AREAS, OR ROUTED BACK TO THE NEAREST MANHOLE ABOVE THE DESIGN WATER LEVEL.
12. CONSTRUCTION AND INSTALLATION OF THE TANK SHOULD BE STRICTLY IN ACCORDANCE WITH THE MANUFACTURER'S INSTALLATION REQUIREMENTS.
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14. THE CONTRACTOR SHALL PROHIBIT THE MOVEMENT OF CONSTRUCTION PLANT ACROSS THE STORAGE TANK AND WHERE NECESSARY PROVIDE ADDITIONAL SUPPORT AND PROTECTION TO THE STRUCTURE. PARTICULARLY POST CONSTRUCTION. TEMPORARY FENCING CAN BE USED TO PROHIBIT TRADE STOCKS, PILLING MATERIALS, HEAVY PLANTS ETC.
15. FINAL DESIGN IS SUBJECT TO CONTRACTOR'S DESIGN PORTION

Rev:	Description:	Date:	By:	Chkd:
P02	COVER LEVEL CORRECTED	22/05/26	ATL	ATL
P01	ISSUED FOR COMMENT	14/05/26	ATL	ATL

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Status: SUITABLE FOR AUTHORIZATION S4

Project: HAWTHORN MEDICAL CENTRE

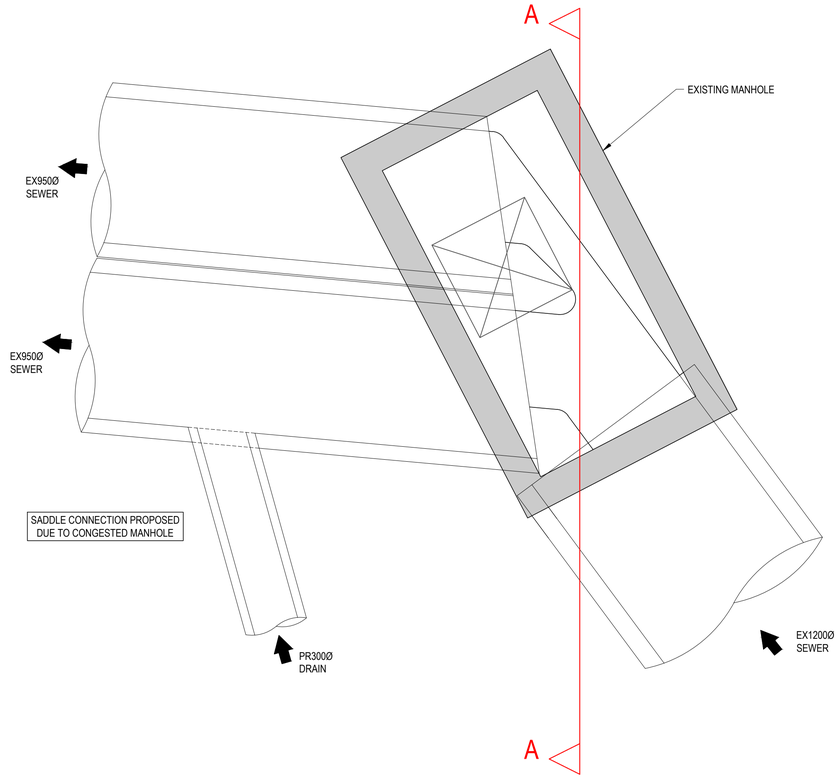
Drg Title: DRAINAGE DETAILS SHEET 5

Drawn By	Designed By	Checked By
KS	ATL	ATL
	Date: 14/05/2026	Scales @ A1: 1:20

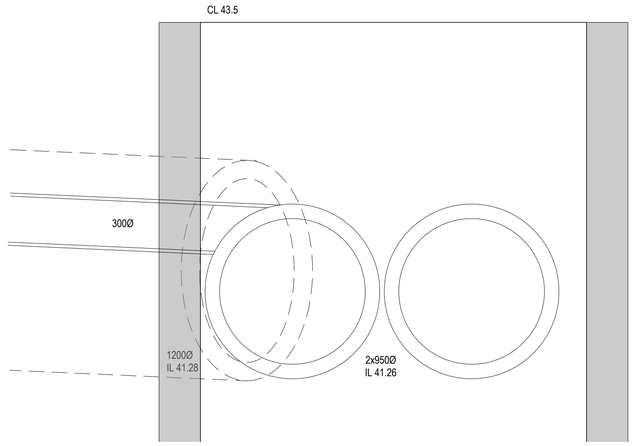
Project No - Originator - Function - Spatial - Form - Discipline - Number: HMCNMC - CUR - ZZ - 00 - DR- C - 92524

Revision: P02

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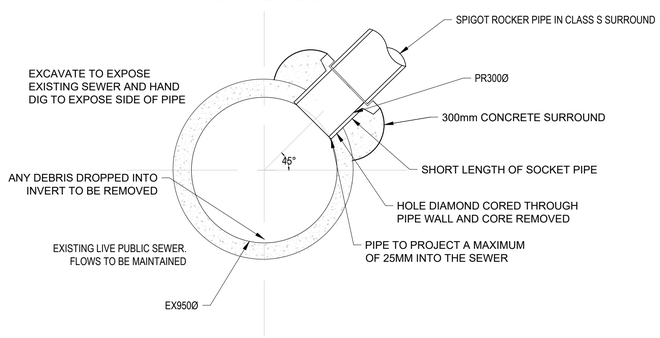


EXISTING CULVERTED WATERCOURSE
CONNECTION DETAIL
PLAN VIEW



EXISTING CULVERTED WATERCOURSE
CONNECTION DETAIL
SECTION VIEW
A - A

THE DRAINAGE AUTHORITY SHALL BE CONTACTED TO:
- BE ALLOWED THE OPTION TO UNDERTAKE THE WORKS USING THEIR OWN CONTRACTOR
- OR ALTERNATIVELY BE GIVEN THE OPPORTUNITY TO INSPECT THE WORKS PRIOR TO OPENING UP THE SEWER.
- TO INFORM THE REGIONAL OFFICER FOR SEWER SAFETY OF THE IMMANENT SEWER ENTRY



SADDLE TO EXISTING 950mm CIRCULAR SEWER.
CONNECTION DETAIL TO BE APPROVED BY UNITED UTILITIES AND
CONSTRUCTED TO THE ADOPTING AUTHORITIES SPEC.

GENERAL NOTES:

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

Rev:	Description:	Date:	By:	Chkd:
P01	ISSUED FOR COMMENTS	29/05/26	IK	ATL

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Status:
SUITABLE FOR AUTHORIZATION — S4

Project:
HAWTHORN MEDICAL CENTRE

Drg Title:
EXISTING CULVERT
CONNECTION DETAIL

Drawn By	Designed By	Checked By
IK	IK	ATL
	Date: 29/05/26	Scales @ A1: 1:20

Project No - Originator - Function - Spatial - Form - Discipline - Number: HMCNMC - CUR - ZZ - 00 - DR- C - 92516
Revision: P01

1:20 0 0.5m 1m 1.5m 2m
1:1 0 10 20 30 40 50 60 70 80 90 100

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