

WE LISTEN, WE PLAN, WE DELIVER

Geotechnical Engineering and Environmental Services across the UK

TECHNICAL NOTE – DRAINAGE STRATEGY

Station Road, Warnham, RH12 3SR

Report Title: Drainage Technical Note: Station Road, Warnham, RH12 3SR

Job No: P6420J3142

Date: July 2026

Control: Revisions

Version	Date	Issued By
V1.0	14/07/2026	A Wallace

Prepared by: JOMAS ASSOCIATES LTD **For:** Weinerberger Ltd

TECHNICAL NOTE: DRAINAGE AND SUDS ASSESSMENT

Project: Station Road, Warnham

Response to: Lead Local Flood Authority (LLFA) Reconsultation Comments (Dated 07 July 2026)

Date: 14 July 2026

1.0 Introduction

This technical note has been prepared to respond directly to the LLFA consultation response received on 7 July 2026 regarding the revised surface water drainage strategy.

2.0 Outfall Routing and Tree Protection

- **Detailed Design Phase:** The specific outfall routing, tree protection measures, and above-ground SuDS details will be investigated further and finalised as part of the detailed design process.
- **Arborist Approval:** The proposed outfall routing through the wooded area will be strictly subject to Arborist approval and will consist of a piped outfall or shallow swale to suit conditions.
- **Excavation Methodology:** To safeguard existing root systems, all excavation works within any designated Root Protection Areas (RPAs) will be hand-dug.
- **Root Protection:** Robust pipe material and protective sleeve measures will be deployed where necessary to prevent future root intrusion and structural damage.

3.0 Above-Ground SuDS and Surface Water Conveyance

- **Shallow Swale Consideration:** In line with SuDS Principle 3, the applicant is investigating the feasibility of utilising a shallow, vegetated swale for the outfall to meander through the trees rather than a closed culvert/pipe.
- **Survey Dependent:** This feature is subject to a detailed topographic and tree survey to ensure it fits the natural landscape without damaging existing root networks.
- **Permeable Surfacing:** All external site surfacing will consist of permeable paving, providing extensive source-control SuDS measures across the entire site footprint.
- **Rain Gardens:** Rain Gardens will be included to some rainwater pipes to increase Source Control SUDS through the development.
- **Rainwater Harvesting:** Individual water butts will be provided to each dwelling to manage runoff close to its source, fulfilling SuDS Principles 1–6.
- **Further above ground SUDS options** have been reviewed as part of the on-site drainage strategy but have discounted for this scheme due to site size constraints and the alternative SuDS measures being implemented. While ponds and swales are recognised as a valuable SuDS mechanism, the proposed strategy already incorporates a comprehensive range of other features. The opportunities to accommodate anything further is heavily constrained by the limited space available on the site.

4.0 Drainage Calculations and Attenuation

- **Climate Change & CV Values:** The Drainage calculations have been fully updated to incorporate a 45% climate change allowance (Arun and Western Streams Catchment) alongside CV values set to 1.0 for both summer and winter.
- **Layout Consistency:** The revised calculations confirm that the overall drainage layout remains entirely unchanged.

- Tank Footprint: The additional attenuation volume required by the change in Cv values and climate change parameters will be successfully stored within the exact footprint of the previously proposed attenuation tank.

Enc

Drainage Plan - C01

Drainage Details 1 - C02

Drainage Details 2 - C03

Drainage Calculations

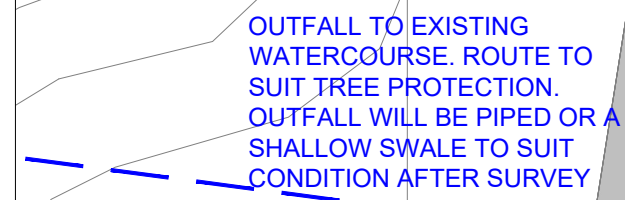
	Stormwater Pipe - Diameter and fall
	Rising Main
	Perforated Pipe - Diameter and fall
	Manhole type - SMH Surface Water Diameter Cover Level Invert Level
	Surface Water Polypropylene Inspection Chamber (PPIC)
	Rain Water Pipe
	Foul Pipe - Diameter and fall
	Manhole type - FMH Foul Water Diameter Cover Level Invert Level
	Foul Polypropylene Inspection Chamber (PPIC)
	Sewer Vent Pipe/Sub Stack/Foul Outlet
	Attenuation Tank

18.30+ Proposed Level

FFL Finished Floor Level

FOR
CONTINUATION
SEE BELOW

ALL DIMENSIONS TO BE CHECKED BY CONTRACTOR
NOTE: CONTRACTOR TO NOTE THE LIKELY PRESENCE OF MULTIPLE EXISTING SERVICES.
ALL SERVICES TO BE CONFIRMED PRIOR TO CONSTRUCTION AND DIVERTED AS NECESSARY



FOR
CONTINUATION
SEE BELOW

PERMEABLE PAVED
ATTENUATION SYSTEM
GROUND LEVEL = 48.80
TOP OF STORAGE = 48.80
BASE OF STORAGE = 48.80

Job. No.	P6420J3172	Rev
----------	------------	-----

DRAINAGE NOTES

1. THIS DRAWING IS FOR PLANNING ONLY AND IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT SERIES DESIGN DRAWINGS, SPECIFICATIONS AND DOCUMENTATION.
2. CONSTRUCTION TO BE IN ACCORDANCE WITH ALL BRITISH AND EUROPEAN STANDARDS AND BUILDING REGULATIONS.
3. ALL DIMENSIONS ARE IN MILLIMETRES AND LEVELS IN METRES ABOVE LOCAL DATUM.
4. ANY DISCREPANCIES IN THE DETAILS SHOWN ARE TO BE REPORTED TO THE EMPLOYER'S REPRESENTATIVE/ENGINEER PRIOR TO CONSTRUCTION.
5. ALL EXISTING SERVICES ARE TO BE LOCATED PRIOR TO THE COMMENCEMENT OF ANY WORKS. THE CONTRACTOR MUST NOTIFY THE ENGINEER IMMEDIATELY OF ANY CONFLICT WITH THE PROPOSED WORKS.
6. THE GENERAL SPECIFICATION OF MATERIALS AND WORKMANSHIPS FOR THE CONSTRUCTION OF THE ACCESS ROAD, FOOTPATHS AND OTHER AREAS OF HANDSTANDING SHALL BE THE MANUAL OF CONTRACT DOCUMENTS FOR HIGHWAY WORKS, VOLUME 1. SPECIFICATION OF HIGHWAY WORKS (SHW) PUBLISHED BY THE STATIONARY OFFICE.
7. ALL LEVELS SHOWN ARE ASSUMED ONLY AND SUBJECT TO SURVEY AND DETAILED DESIGN.
8. ALL BUILDING DRAINAGE SHOWN IS INDICATIVE ONLY AND SUBJECT TO APPROVAL AND SETTING OUT BY THE ARCHITECT PRIOR TO DETAILED DESIGN.
9. NODE NUMBERS REFER TO DRAINAGE MODEL
10. UNLESS NOTED OTHERWISE, PIPES TO BE:
FOUL PIPES UNDER BUILDING @1500MM Ø40,
FOUL PIPES EXTERNAL @1500MM Ø80,
SURFACE WATER PIPES @1500MM Ø100

Copyright of this plan is held by Jomas Associates Ltd.
No responsibility is taken for amendments by others.
Do not scale from copies or PDF's.

Key dimensions to be checked by engineer before major structural works commence on site.

1. This survey has been computed and drawn about O S National Grid.
2. All levels are in metres and relate to O S National Datum by GPS instruments.
3. This survey was measured for a scale of 1:100, any subsequent enlargements should be verified on site.

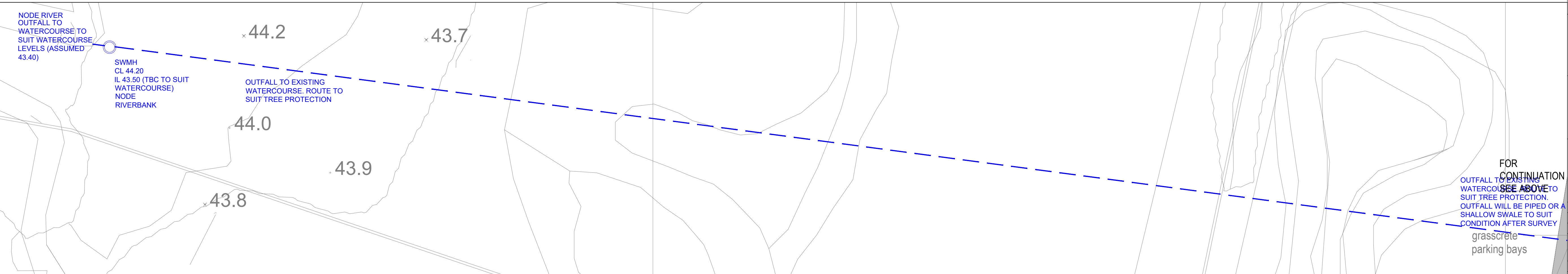
Rev	Date		By	Chkd
A	10.06.26	REVISED OUTFALL	AW	AW
B	06.07.26	REVISED FOUL	AW	AW
C	14.07.26	REVISED SUDS	AW	AW

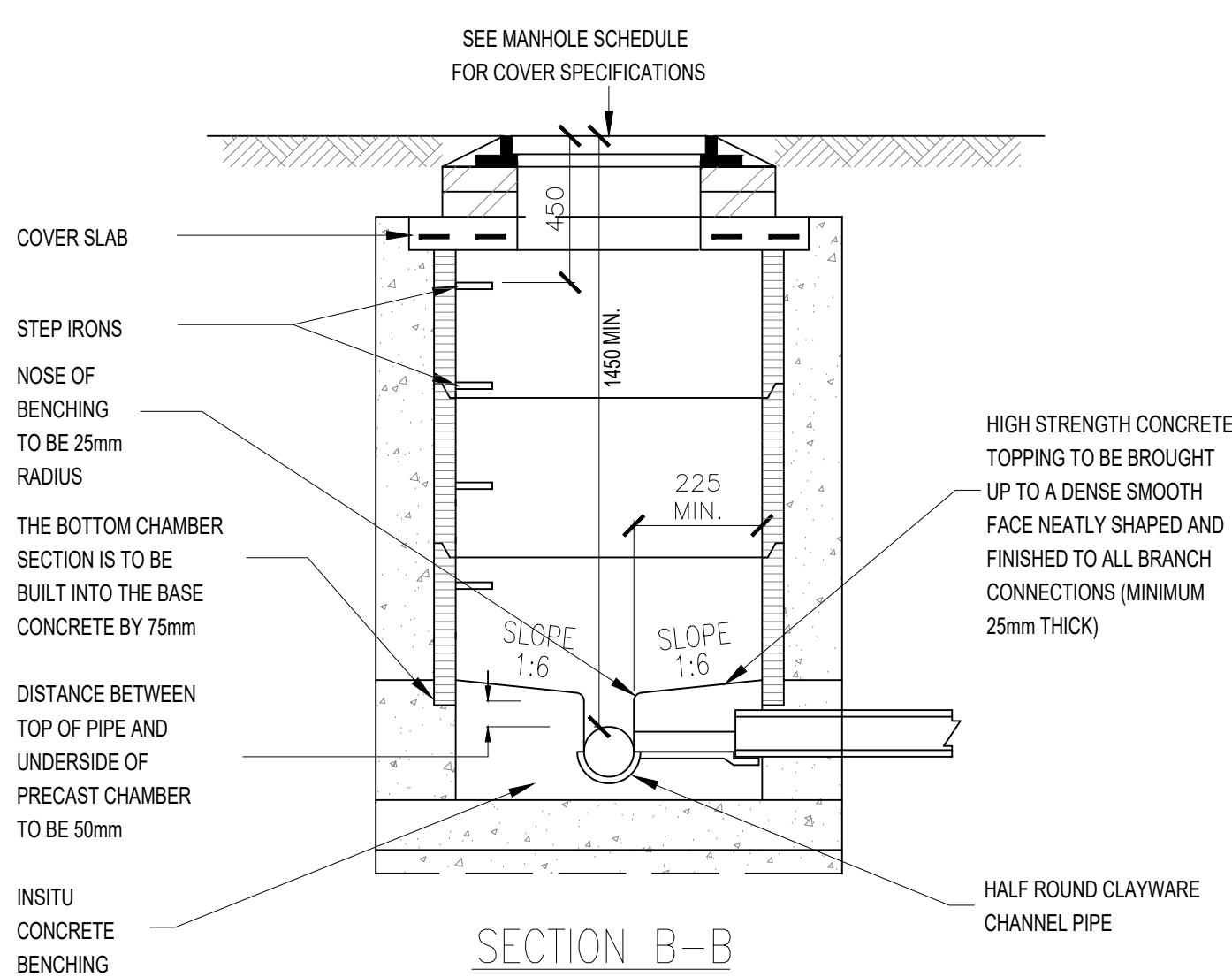
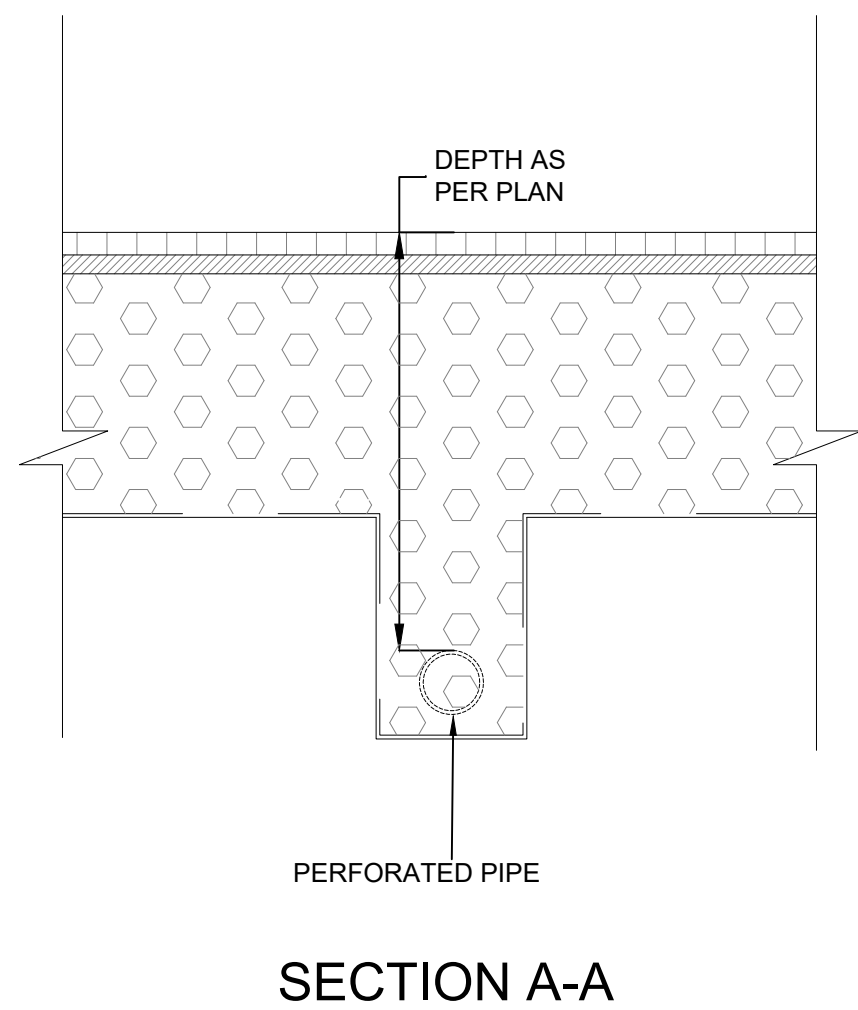
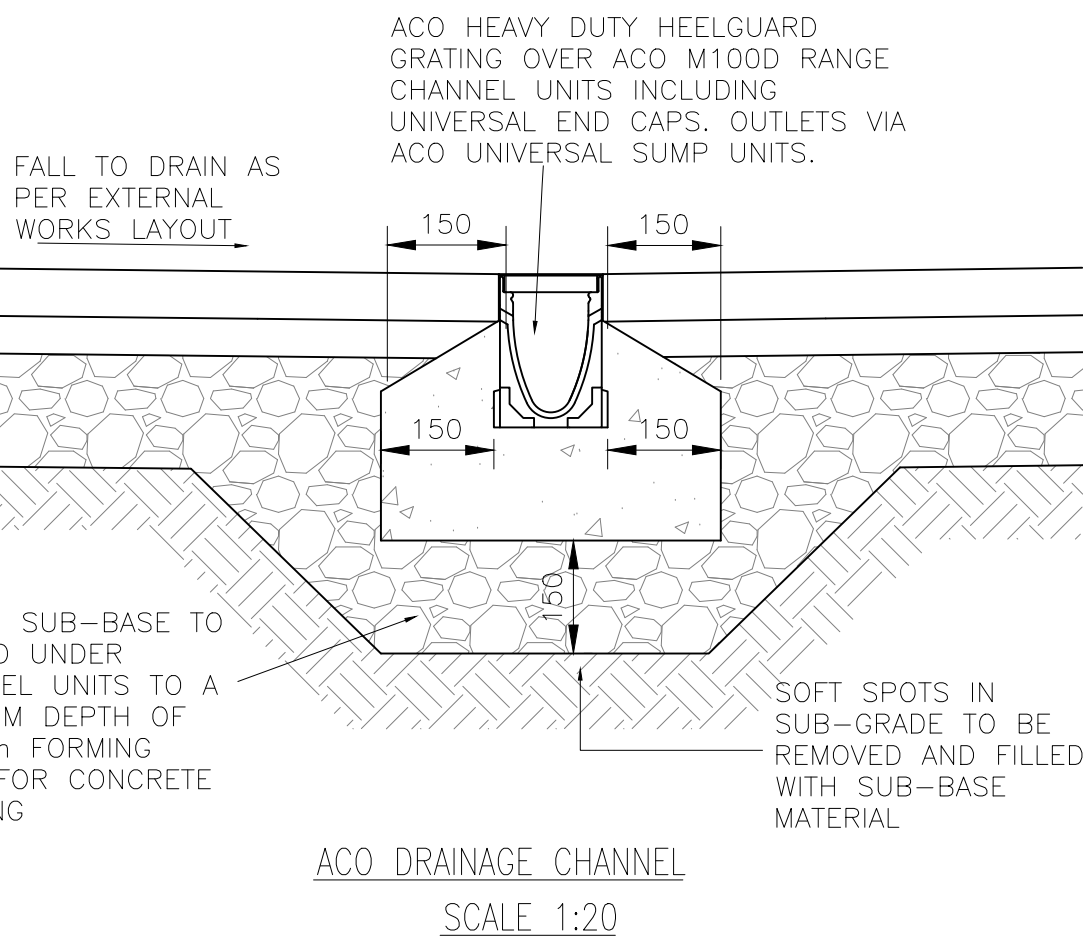
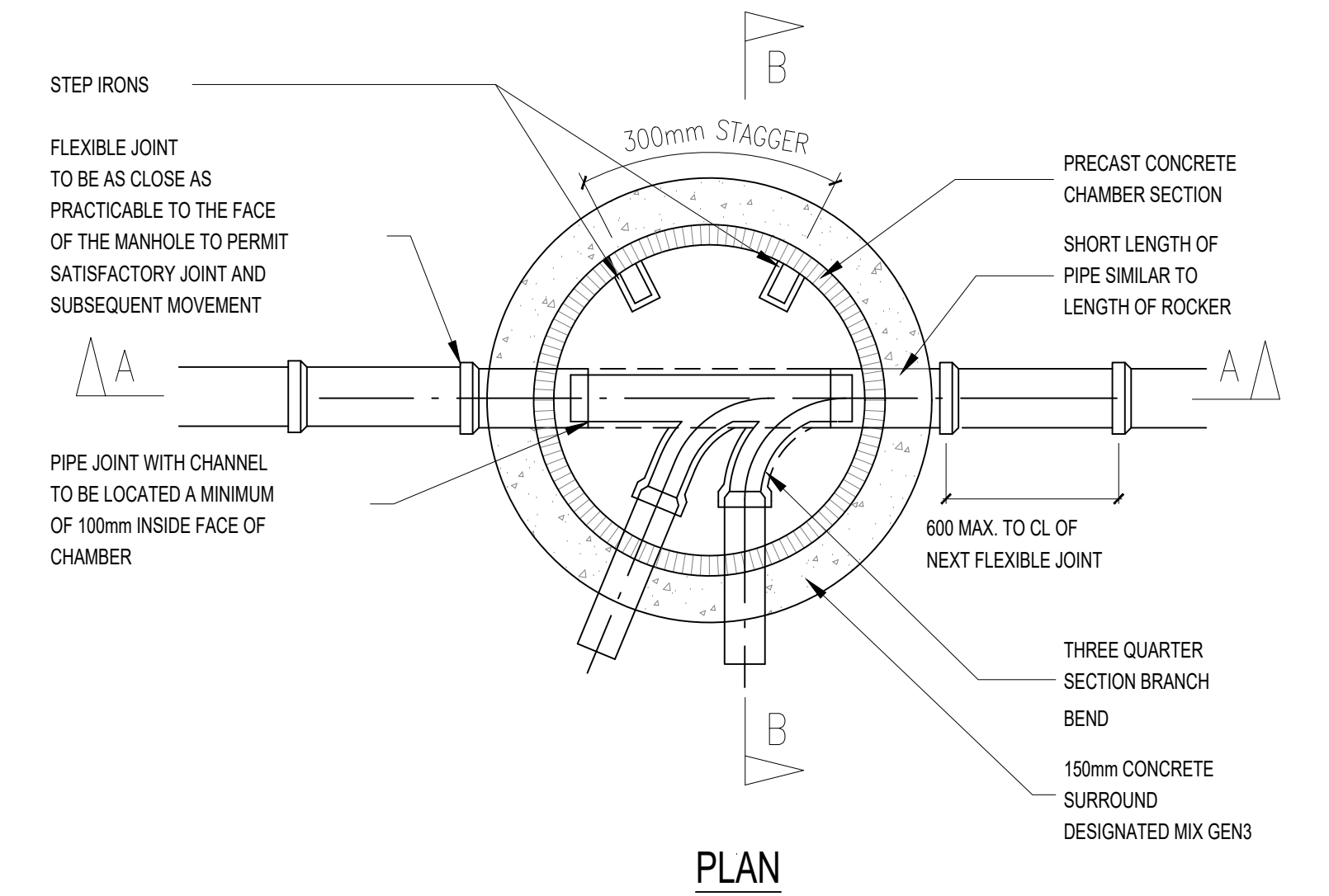
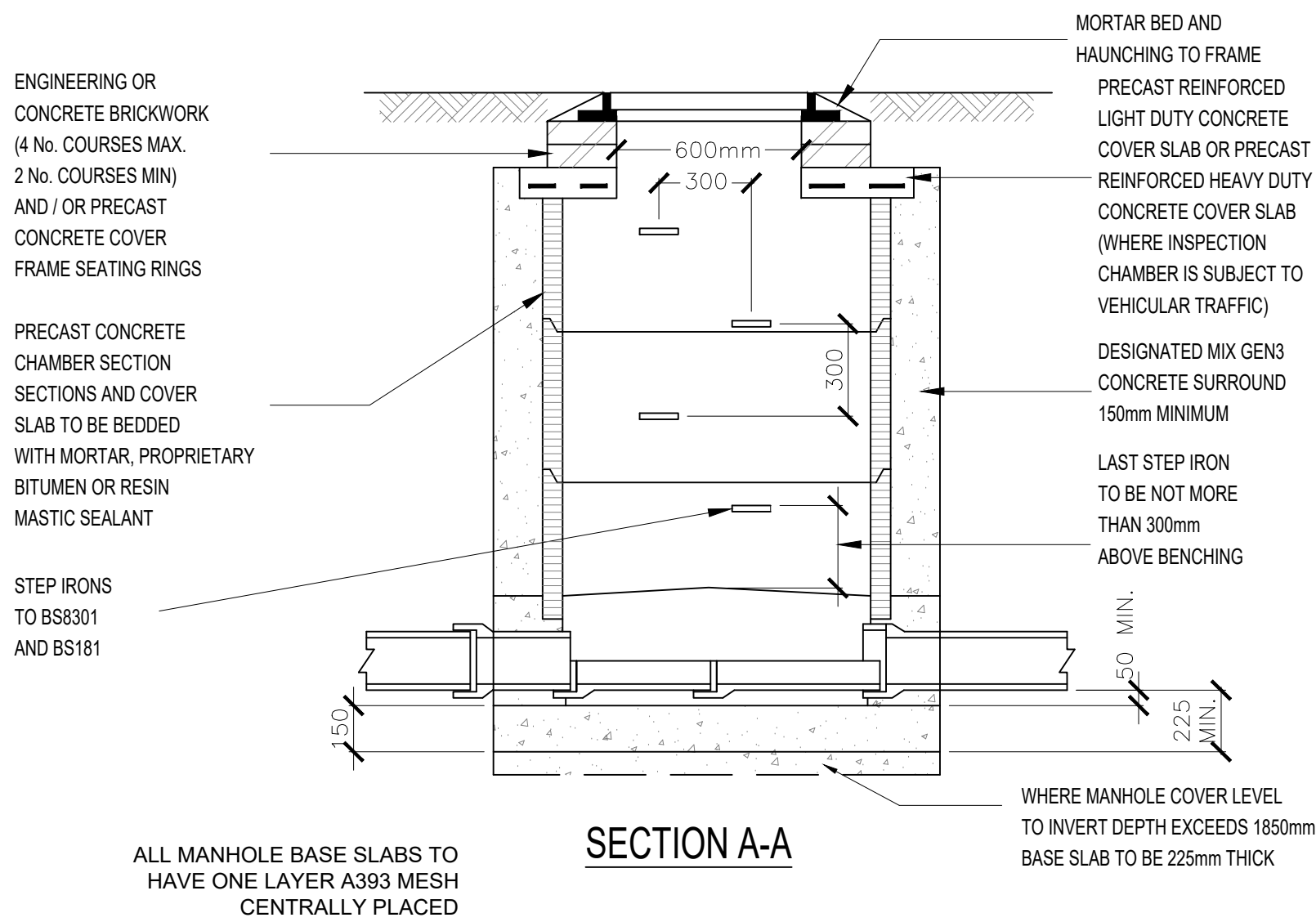
Jomas Associates Ltd.
Unit 24 Sarum Complex,
Salisbury Road,
Uxbridge, UB8 2RZ

Project
Station Rd, Warnham

Proposed Drainage Plan

Wing no C01		Checked AW		Surveyor NA	
Date 11.02.26		Scale		1:250 @ A1	
Job No. P6420J3172					Rev. C
Grid	Contours	Level Datum			



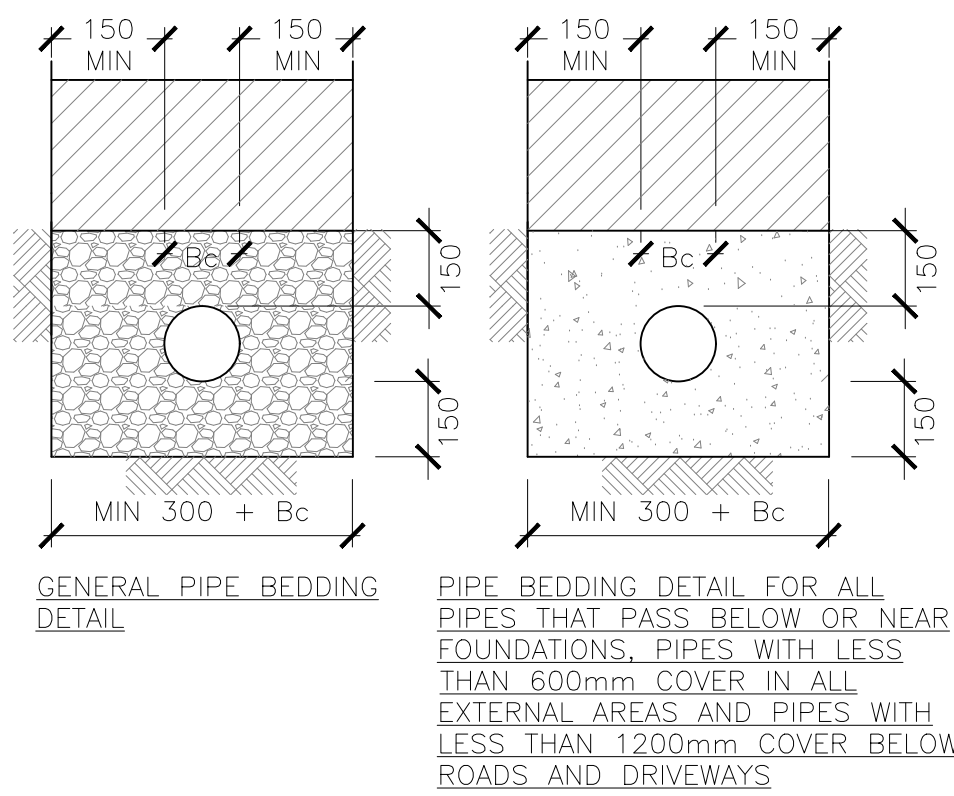
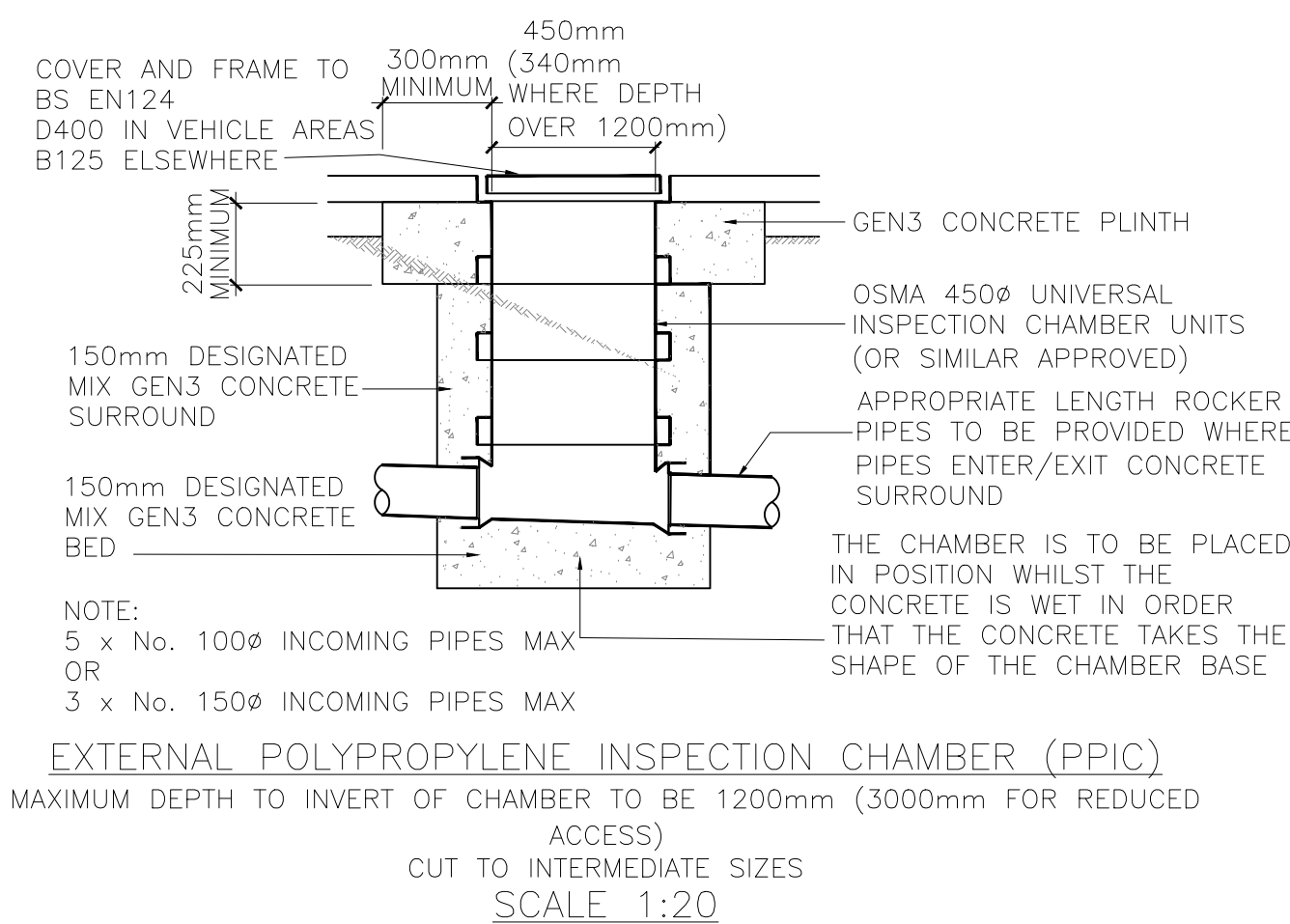


SCALE 1:20

PIPE DIAMETER	ROCKER PIPE* LENGTH
150mm-450mm	500mm-750mm
475mm-750mm	750mm-1000mm
OVER 750mm	1200mm

* OR LINTEL AND COMPRESSIBLE SEALANT IN ACCORDANCE WITH CLAUSE 689 OF THE SPECIFICATION.

NOTES:
CHAMBERS WITH OUTGOING PIPES GREATER THAN 500mm DIAMETER SHALL BE FITTED WITH GUARD BARS, SAFETY CHAINS OR OTHER SAFETY DEVICES. TOE HOLES TO BE PROVIDED IN BENCHING OF SEWERS GREATER THAN 450mm DIAMETER FOR ACCESS TO INVERT. WHERE INTERNAL HEIGHT EXCEEDS 1800mm MANHOLE MAY BE PROVIDED WITH REDUCING COVER AND SHAFT. SHAFT DIAMETER TO BE 600mm DIAMETER OR 900mm DIAMETER IF LONGER THAN 900mm.



SELECTED FILL: FREE FROM STONES LARGER THAN 40mm, LUMPS OF CLAY OVER 100mm, TIMBER, FROZEN MATERIAL, VEGETABLE MATTER.

GRANULAR MATERIAL: TO CONFORM TO BS EN 1810 ANNEX B TABLE B.15 AND SHOULD BE SINGLE SIZE MATERIAL OR GRADED MATERIAL FROM 5mm UP TO A MAXIMUM SIZE OF 10mm FOR 100mm PIPES, 14mm FOR 150mm PIPES, 20mm FOR PIPES FROM 150mm UP TO 600mm DIAMETER AND 40mm FOR PIPES MORE THAN 600mm DIAMETER.

GEN1 CONCRETE IN ACCORDANCE WITH BS 8500-1:2002.

NOTE:
PIPES LESS THAN 1200mm BELOW ROADS AND LESS THAN 600mm BELOW OTHER EXTERNAL AREAS SHALL HAVE A 150mm GEN1 CONCRETE SURROUND. OTHER THAN PIPES CAST WITHIN PILECAPS ALL PIPES BELOW SUSPENDED SLAB SHALL HAVE GRANULAR SURROUND AS SHOWN.

PIPE BEDDING DETAIL
SCALE 1:10

Job. No.	P6420J3172	Rev.
NOTES		
1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT SERIES DESIGN DRAWINGS, SPECIFICATIONS AND DOCUMENTATION.		
2. CONSTRUCTION TO BE IN ACCORDANCE WITH ALL BRITISH AND EUROPEAN STANDARDS AND BUILDING REGULATIONS.		
3. ANY DISCREPANCIES IN THE DETAILS SHOWN ARE TO BE REPORTED TO THE EMPLOYER'S REPRESENTATIVE/ENGINEER PRIOR TO CONSTRUCTION		
4. ALL EXISTING SERVICES ARE TO BE LOCATED PRIOR TO THE COMMENCEMENT OF ANY WORKS. THE CONTRACTOR MUST NOTIFY THE ENGINEER IMMEDIATELY OF ANY CONFLICT WITH THE PROPOSED WORKS.		
5. FOR GRAVITY SEWERS, ALL DRAINAGE AND FITTINGS ARE TO BE FLEXIBLY JOINTED UPVC TO BS EN 1401-1 OR CLAYWARE TO BS EN295 OR CONCRETE TO BS5911 PART 100		
6. CHAMBER WALLS 225 THICK TO BE CONSTRUCTED IN CLASS B ENGINEERING BRICKS TO SHW SERIES 2400 IN DESIGNATION (I) MORTAR OR IN-SITU STRENGTH CLASS C16/20 CONCRETE TO CLAUSE 2602		
7. CHAMBER WALLS AND COVER SLAB TO BE CONSTRUCTED IN PRECAST CONCRETE TO BS EN 1917 AND BS 5911-3.		
8. CONCRETE MIXES INDICATED ON THIS DRAWING ARE DESIGNATED MIXES IN ACCORDANCE WITH BS8500-1:2006. ALL CONCRETE TO BE SULPHATE RESISTANT		
9. BACKFILL TO ALL TRENCHES UNDER CARRIAGEWAYS TO BE TYPE 1 SUB-BASE MATERIAL, ELSEWHERE BACKFILL TO BE IN ACCORDANCE WITH THE SPECIFICATION, FREE DRAINING READILY COMPACTIBLE MATERIAL, FREE FROM RUBBISH AND ORGANIC MATTER, FROZEN SOIL, CLAY LUMPS AND LARGE STONES. TO BE COMPACTED IN LAYERS NOT EXCEEDING 150mm THICK.		
10. A FLEXIBLE JOINT SHALL BE PROVIDED AS CLOSE AS IS FEASIBLE TO OUTSIDE FACE OF ANY STRUCTURE INTO WHICH A PIPE IS BUILT, IN ACCORDANCE WITH THE DETAIL.		
11. THE GENERAL SPECIFICATION OF MATERIALS AND WORKMANSHIPS FOR THE CONSTRUCTION OF THE ACCESS ROAD, FOOTPATHS AND OTHER AREAS OF HARDSTANDING SHALL BE THE MANUAL OF CONTRACT DOCUMENTS FOR HIGHWAY WORKS, VOLUME 1, SPECIFICATION OF HIGHWAY WORKS (SHW) PUBLISHED BY THE STATIONARY OFFICE.		
12. ALL PIPES TO BE LAID SOFFIT TO SOFFIT UNLESS NOTED OTHERWISE.		
13. MANHOLE COVERS AND FRAMES SHALL COMPLY WITH BS EN124 AND SHALL BE OF A NON-ROCKING DESIGN WHICH DOES NOT RELY ON THE USE OF CUSHION INSERTS. CLASS D COVERS SHALL BE USED IN CARRIAGEWAYS, HARD SHOULDERS AND PARKING AREAS USED BY ALL TYPE OF ROAD VEHICLES. CLASS C SHALL BE USED IN FOOTWAYS, PEDESTRIAN AREAS AND ALL COMPARABLE LOCATIONS.		
Notes.		

Copyright of this plan is held by Jomas Associates Ltd. No responsibility is taken for amendments by others. Do not scale from copies or PDF's.

Key dimensions to be checked by engineer before major structural works commence on site.

- This survey has been computed and drawn about O S National Grid.
- All levels are in metres and relate to O S National Datum by GPS instruments.
- This survey was measured for a scale of 1:100, any subsequent enlargements should be verified on site.

Amendments

Rev	Date		By	Chkd
A	14.07.26	REVISED SUDS	AW	AW

JOMAS
ENGINEERING
ENVIRONMENTAL

Jomas Associates Ltd.
Unit 24 Sarum Complex,
Salisbury Road,
Uxbridge, UB8 2RZ

Client
Weinerberger Limited

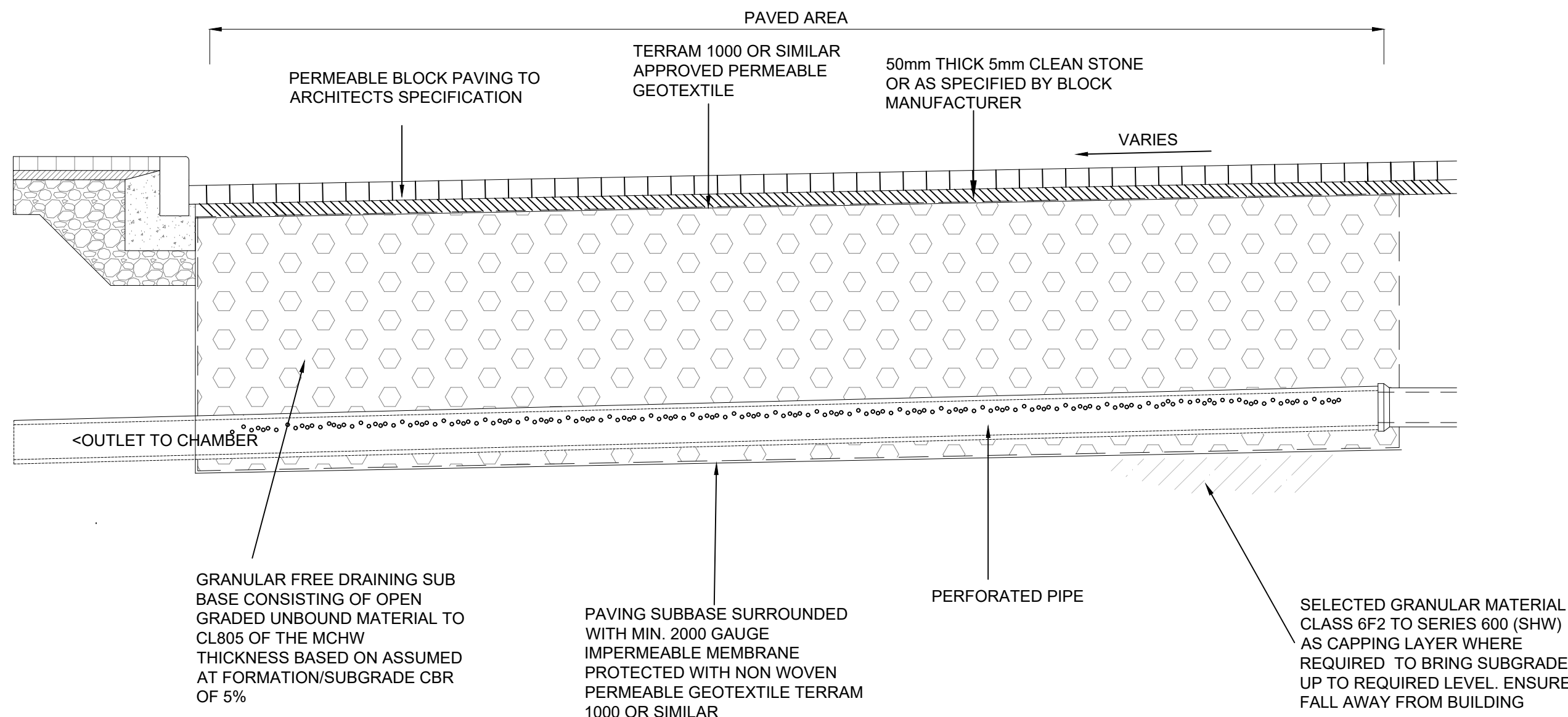
Project
Station Rd, Warnham

Drawing
Proposed Drainage Details

Dwg no	Checked	Surveyor
C02	AW	NA
Date	11.02.26	Scale
Job No.	P6420J3172	Rev.
Grid	Contours	Level Datum

TANKED PERMEABLE PAVING DETAIL

SCALE 1:20



Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	10	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	1.000	Preferred Cover Depth (m)	0.600
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	x
Maximum Rainfall (mm/hr)	50.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
1			48.900	1200	95.000	145.000	2.950
2	0.095	2.00	47.700	1200	100.000	105.000	1.200
3	0.100	2.00	48.900	1200	110.000	150.000	1.900
4	0.095	2.00	49.300	1200	120.000	160.000	2.150
5	0.095	2.00	49.800	1200	170.000	135.000	1.300
6	0.030	2.00	46.000	1200	94.000	80.000	1.000
7	0.035	2.00	48.500	1200	112.000	124.000	1.500
8	0.035	2.00	49.000	1200	197.000	111.000	1.500
OUT			48.000	1200	75.000	145.000	2.200
RIVERBANK			44.200	1200	-100.000	170.000	0.700
RIVER			44.200	1200	-105.000	170.000	0.800

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)
3.001	2	1	40.311	0.600	46.500	45.950	0.550	73.3	300	30.00	32.8
2.002	3	1	15.811	0.600	47.000	45.950	1.050	15.1	450	2.46	50.0
2.001	4	3	14.142	0.600	47.150	47.000	0.150	94.3	450	2.41	50.0
2.000	5	4	55.902	0.600	48.500	47.150	1.350	41.4	450	2.29	50.0
3.000	6	2	25.710	0.600	45.000	46.500	-1.500	-17.1	150	30.00	32.8
1.001	7	1	27.019	0.600	47.000	46.300	0.700	38.6	225	3.66	50.0
1.000	8	7	85.988	0.600	47.500	47.000	0.500	172.0	225	3.44	50.0
1.002	1	OUT	20.000	0.600	45.950	45.800	0.150	133.3	150	30.00	32.8
1.003	OUT	RIVERBANK	176.777	0.600	45.800	43.500	2.300	76.9	150	30.00	32.8
1.004	RIVERBANK	RIVER	5.000	0.600	43.500	43.400	0.100	50.0	150	30.00	32.8

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)
3.001	1.838	129.9	14.8	0.900	2.650	0.125	0.0	68	1.237
2.002	5.259	836.4	52.4	1.450	2.500	0.290	0.0	75	2.983
2.001	2.094	333.0	34.3	1.700	1.450	0.190	0.0	96	1.367
2.000	3.166	503.5	17.2	0.850	1.700	0.095	0.0	56	1.500
3.000	0.007	0.1	3.6	0.850	1.050	0.030	0.0	150	0.000
1.001	2.112	84.0	12.6	1.275	2.375	0.070	0.0	58	1.527
1.000	0.994	39.5	6.3	1.275	1.275	0.035	0.0	61	0.735
1.002	0.868	15.3	57.6	2.800	2.050	0.485	0.0	150	0.885
1.003	1.148	20.3	57.6	2.050	0.550	0.485	0.0	150	1.169
1.004	1.426	25.2	57.6	0.550	0.650	0.485	0.0	150	1.453

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Starting Level (m)	
Rainfall Events	Singular	Skip Steady State	x	Check Discharge Rate(s)	x
Summer CV	1.000	Drain Down Time (mins)	240	Check Discharge Volume	x
Winter CV	1.000	Additional Storage (m³/ha)	0.0		

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	10	0
30	0	10	0
100	0	10	0
100	45	10	0

Node 1 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	45.950	Product Number	CTL-SHE-0069-2700-1700-2700
Design Depth (m)	1.700	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	2.7	Min Node Diameter (mm)	1200

Node 6 Online Depth/Flow Control

Flap Valve	x	Replaces Downstream Link	✓	Invert Level (m)	45.000
------------	---	--------------------------	---	------------------	--------

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	25.000	2.000	25.000

Node 1 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	46.000
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	300.0	0.0	1.200	300.0	0.0	1.201	0.1	0.0

Node 4 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	47.200
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	45

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	220.0	0.0	0.800	220.0	0.0	0.801	0.1	0.0

Node 3 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	48.000
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	400.0	400.0	0.700	400.0	449.6	0.701	0.1	449.6

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
1 year +10% A 15 minute summer	64.487	18.248
1 year +10% A 15 minute winter	45.254	18.248
1 year +10% A 30 minute summer	41.108	11.632
1 year +10% A 30 minute winter	28.848	11.632
1 year +10% A 60 minute summer	27.306	7.216
1 year +10% A 60 minute winter	18.141	7.216
1 year +10% A 120 minute summer	21.645	5.720
1 year +10% A 120 minute winter	14.380	5.720
1 year +10% A 180 minute summer	18.098	4.657
1 year +10% A 180 minute winter	11.764	4.657
1 year +10% A 240 minute summer	14.875	3.931
1 year +10% A 240 minute winter	9.883	3.931
1 year +10% A 360 minute summer	11.674	3.004
1 year +10% A 360 minute winter	7.588	3.004
1 year +10% A 480 minute summer	9.218	2.436
1 year +10% A 480 minute winter	6.124	2.436
1 year +10% A 600 minute summer	7.522	2.057
1 year +10% A 600 minute winter	5.139	2.057
1 year +10% A 720 minute summer	6.666	1.787
1 year +10% A 720 minute winter	4.480	1.787
1 year +10% A 960 minute summer	5.414	1.426
1 year +10% A 960 minute winter	3.586	1.426
1 year +10% A 1440 minute summer	3.859	1.034
1 year +10% A 1440 minute winter	2.594	1.034
1 year +10% A 2160 minute summer	2.739	0.757
1 year +10% A 2160 minute winter	1.888	0.757
1 year +10% A 2880 minute summer	2.286	0.613
1 year +10% A 2880 minute winter	1.536	0.613
1 year +10% A 4320 minute summer	1.778	0.465
1 year +10% A 4320 minute winter	1.171	0.465
1 year +10% A 5760 minute summer	1.518	0.389
1 year +10% A 5760 minute winter	0.983	0.389
1 year +10% A 7200 minute summer	1.342	0.342
1 year +10% A 7200 minute winter	0.866	0.342
1 year +10% A 8640 minute summer	1.219	0.311
1 year +10% A 8640 minute winter	0.787	0.311
1 year +10% A 10080 minute summer	1.132	0.289
1 year +10% A 10080 minute winter	0.731	0.289
30 year +10% A 15 minute summer	253.641	71.772
30 year +10% A 15 minute winter	177.994	71.772
30 year +10% A 30 minute summer	165.360	46.791
30 year +10% A 30 minute winter	116.042	46.791
30 year +10% A 60 minute summer	110.300	29.149
30 year +10% A 60 minute winter	73.280	29.149
30 year +10% A 120 minute summer	69.870	18.464
30 year +10% A 120 minute winter	46.420	18.464
30 year +10% A 180 minute summer	53.663	13.809
30 year +10% A 180 minute winter	34.883	13.809

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
30 year +10% A 240 minute summer	42.092	11.124
30 year +10% A 240 minute winter	27.965	11.124
30 year +10% A 360 minute summer	31.407	8.082
30 year +10% A 360 minute winter	20.415	8.082
30 year +10% A 480 minute summer	24.147	6.381
30 year +10% A 480 minute winter	16.043	6.381
30 year +10% A 600 minute summer	19.344	5.291
30 year +10% A 600 minute winter	13.217	5.291
30 year +10% A 720 minute summer	16.902	4.530
30 year +10% A 720 minute winter	11.359	4.530
30 year +10% A 960 minute summer	13.413	3.532
30 year +10% A 960 minute winter	8.885	3.532
30 year +10% A 1440 minute summer	9.280	2.487
30 year +10% A 1440 minute winter	6.237	2.487
30 year +10% A 2160 minute summer	6.356	1.756
30 year +10% A 2160 minute winter	4.379	1.756
30 year +10% A 2880 minute summer	5.148	1.380
30 year +10% A 2880 minute winter	3.459	1.380
30 year +10% A 4320 minute summer	3.814	0.997
30 year +10% A 4320 minute winter	2.511	0.997
30 year +10% A 5760 minute summer	3.131	0.801
30 year +10% A 5760 minute winter	2.026	0.801
30 year +10% A 7200 minute summer	2.676	0.683
30 year +10% A 7200 minute winter	1.727	0.683
30 year +10% A 8640 minute summer	2.363	0.603
30 year +10% A 8640 minute winter	1.525	0.603
30 year +10% A 10080 minute summer	2.137	0.545
30 year +10% A 10080 minute winter	1.379	0.545
100 year +10% A 15 minute summer	320.546	90.703
100 year +10% A 15 minute winter	224.945	90.703
100 year +10% A 30 minute summer	211.163	59.752
100 year +10% A 30 minute winter	148.184	59.752
100 year +10% A 60 minute summer	141.717	37.452
100 year +10% A 60 minute winter	94.154	37.452
100 year +10% A 120 minute summer	88.806	23.469
100 year +10% A 120 minute winter	59.001	23.469
100 year +10% A 180 minute summer	68.256	17.565
100 year +10% A 180 minute winter	44.368	17.565
100 year +10% A 240 minute summer	53.687	14.188
100 year +10% A 240 minute winter	35.668	14.188
100 year +10% A 360 minute summer	40.309	10.373
100 year +10% A 360 minute winter	26.202	10.373
100 year +10% A 480 minute summer	31.170	8.237
100 year +10% A 480 minute winter	20.709	8.237
100 year +10% A 600 minute summer	25.067	6.856
100 year +10% A 600 minute winter	17.127	6.856
100 year +10% A 720 minute summer	21.959	5.885
100 year +10% A 720 minute winter	14.758	5.885
100 year +10% A 960 minute summer	17.468	4.600
100 year +10% A 960 minute winter	11.571	4.600
100 year +10% A 1440 minute summer	12.058	3.232
100 year +10% A 1440 minute winter	8.104	3.232

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
100 year +10% A 2160 minute summer	8.185	2.262
100 year +10% A 2160 minute winter	5.640	2.262
100 year +10% A 2880 minute summer	6.564	1.759
100 year +10% A 2880 minute winter	4.411	1.759
100 year +10% A 4320 minute summer	4.758	1.244
100 year +10% A 4320 minute winter	3.133	1.244
100 year +10% A 5760 minute summer	3.830	0.981
100 year +10% A 5760 minute winter	2.479	0.981
100 year +10% A 7200 minute summer	3.224	0.823
100 year +10% A 7200 minute winter	2.081	0.823
100 year +10% A 8640 minute summer	2.810	0.717
100 year +10% A 8640 minute winter	1.814	0.717
100 year +10% A 10080 minute summer	2.514	0.641
100 year +10% A 10080 minute winter	1.622	0.641
100 year +45% CC +10% A 15 minute summer	464.792	131.520
100 year +45% CC +10% A 15 minute winter	326.170	131.520
100 year +45% CC +10% A 30 minute summer	306.186	86.640
100 year +45% CC +10% A 30 minute winter	214.867	86.640
100 year +45% CC +10% A 60 minute summer	205.490	54.305
100 year +45% CC +10% A 60 minute winter	136.523	54.305
100 year +45% CC +10% A 120 minute summer	128.769	34.030
100 year +45% CC +10% A 120 minute winter	85.551	34.030
100 year +45% CC +10% A 180 minute summer	98.971	25.469
100 year +45% CC +10% A 180 minute winter	64.334	25.469
100 year +45% CC +10% A 240 minute summer	77.846	20.572
100 year +45% CC +10% A 240 minute winter	51.719	20.572
100 year +45% CC +10% A 360 minute summer	58.448	15.041
100 year +45% CC +10% A 360 minute winter	37.993	15.041
100 year +45% CC +10% A 480 minute summer	45.197	11.944
100 year +45% CC +10% A 480 minute winter	30.028	11.944
100 year +45% CC +10% A 600 minute summer	36.347	9.942
100 year +45% CC +10% A 600 minute winter	24.834	9.942
100 year +45% CC +10% A 720 minute summer	31.840	8.533
100 year +45% CC +10% A 720 minute winter	21.398	8.533
100 year +45% CC +10% A 960 minute summer	25.328	6.670
100 year +45% CC +10% A 960 minute winter	16.778	6.670
100 year +45% CC +10% A 1440 minute summer	17.485	4.686
100 year +45% CC +10% A 1440 minute winter	11.751	4.686
100 year +45% CC +10% A 2160 minute summer	11.868	3.280
100 year +45% CC +10% A 2160 minute winter	8.178	3.280
100 year +45% CC +10% A 2880 minute summer	9.518	2.551
100 year +45% CC +10% A 2880 minute winter	6.397	2.551
100 year +45% CC +10% A 4320 minute summer	6.899	1.804
100 year +45% CC +10% A 4320 minute winter	4.543	1.804
100 year +45% CC +10% A 5760 minute summer	5.554	1.422
100 year +45% CC +10% A 5760 minute winter	3.595	1.422
100 year +45% CC +10% A 7200 minute summer	4.675	1.193
100 year +45% CC +10% A 7200 minute winter	3.018	1.193
100 year +45% CC +10% A 8640 minute summer	4.074	1.039
100 year +45% CC +10% A 8640 minute winter	2.630	1.039
100 year +45% CC +10% A 10080 minute summer	3.645	0.930
100 year +45% CC +10% A 10080 minute winter	2.352	0.930

Results for 1 year +10% A Critical Storm Duration. Lowest mass balance: 99.42%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute summer	1	288	46.208	0.258	17.1	59.6898	0.0000	SURCHARGED
15 minute summer	2	9	46.582	0.082	20.3	0.0928	0.0000	OK
15 minute summer	3	9	47.055	0.055	27.7	0.0626	0.0000	OK
15 minute summer	4	11	47.214	0.064	30.8	3.1463	0.0000	OK
15 minute summer	5	9	48.553	0.053	15.4	0.0604	0.0000	OK
15 minute summer	6	9	45.020	0.020	4.9	0.0222	0.0000	OK
15 minute summer	7	9	47.052	0.052	10.8	0.0588	0.0000	OK
15 minute summer	8	9	47.556	0.056	5.7	0.0629	0.0000	OK
360 minute summer	OUT	288	45.833	0.033	2.1	0.0374	0.0000	OK
360 minute summer	RIVERBANK	288	43.531	0.031	2.1	0.0349	0.0000	OK
360 minute summer	RIVER	288	43.429	0.029	2.1	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
360 minute summer	1	Hydro-Brake®	OUT	2.1				
15 minute summer	2	3.001	1	20.5	1.345	0.158	0.6157	
15 minute summer	3	2.002	1	27.5	1.925	0.033	0.3146	
15 minute summer	4	2.001	3	12.9	1.191	0.039	0.1661	
15 minute summer	5	2.000	4	15.4	1.343	0.031	0.6405	
15 minute summer	6	Depth/Flow	2	4.9				
15 minute summer	7	1.001	1	9.6	1.401	0.114	0.1848	
15 minute summer	8	1.000	7	5.1	0.700	0.129	0.6246	
360 minute summer	OUT	1.003	RIVERBANK	2.1	0.769	0.104	0.4845	
360 minute summer	RIVERBANK	1.004	RIVER	2.1	0.838	0.084	0.0126	64.3

Results for 30 year +10% A Critical Storm Duration. Lowest mass balance: 99.29%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute winter	1	472	46.749	0.799	23.6	214.6327	0.0000	SURCHARGED
480 minute winter	2	472	46.749	0.249	6.2	0.2821	0.0000	OK
15 minute summer	3	9	47.105	0.105	102.4	0.1190	0.0000	OK
15 minute summer	4	11	47.281	0.131	121.9	17.1877	0.0000	OK
15 minute summer	5	9	48.606	0.106	60.5	0.1196	0.0000	OK
15 minute summer	6	9	45.076	0.076	19.1	0.0864	0.0000	OK
15 minute summer	7	9	47.118	0.118	44.0	0.1332	0.0000	OK
15 minute summer	8	9	47.621	0.121	22.3	0.1371	0.0000	OK
15 minute summer	OUT	13	45.833	0.033	2.1	0.0377	0.0000	OK
15 minute summer	RIVERBANK	157	43.531	0.031	2.1	0.0350	0.0000	OK
15 minute summer	RIVER	157	43.429	0.029	2.1	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
480 minute winter	1	Hydro-Brake®	OUT	2.1				
480 minute winter	2	3.001	1	6.2	0.184	0.048	2.6810	
15 minute summer	3	2.002	1	101.9	2.739	0.122	1.1082	
15 minute summer	4	2.001	3	52.1	1.754	0.156	0.4443	
15 minute summer	5	2.000	4	61.4	2.163	0.122	1.6654	
15 minute summer	6	Depth/Flow	2	19.1				
15 minute summer	7	1.001	1	41.2	2.039	0.490	0.5456	
15 minute summer	8	1.000	7	21.7	1.014	0.549	1.8403	
15 minute summer	OUT	1.003	RIVERBANK	2.1	0.797	0.105	0.4862	
15 minute summer	RIVERBANK	1.004	RIVER	2.1	0.839	0.084	0.0126	31.2

Results for 100 year +10% A Critical Storm Duration. Lowest mass balance: 99.19%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute winter	1	472	47.012	1.062	30.4	289.6581	0.0000	SURCHARGED
480 minute winter	2	472	47.012	0.512	7.9	0.5787	0.0000	SURCHARGED
15 minute summer	3	9	47.121	0.121	131.7	0.1363	0.0000	OK
15 minute summer	4	11	47.303	0.153	154.1	21.7264	0.0000	OK
15 minute summer	5	8	48.619	0.119	76.5	0.1349	0.0000	OK
15 minute summer	6	9	45.097	0.097	24.2	0.1095	0.0000	OK
15 minute summer	7	9	47.138	0.138	55.8	0.1560	0.0000	OK
15 minute summer	8	9	47.641	0.141	28.2	0.1598	0.0000	OK
480 minute winter	OUT	480	45.834	0.034	2.2	0.0380	0.0000	OK
480 minute winter	RIVERBANK	480	43.531	0.031	2.2	0.0356	0.0000	OK
480 minute winter	RIVER	480	43.430	0.030	2.2	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
480 minute winter	1	Hydro-Brake®	OUT	2.2				
480 minute winter	2	3.001	1	7.9	0.217	0.061	2.8387	
15 minute summer	3	2.002	1	131.0	2.854	0.157	1.2956	
15 minute summer	4	2.001	3	69.2	1.893	0.208	0.5465	
15 minute summer	5	2.000	4	77.6	2.294	0.154	2.0163	
15 minute summer	6	Depth/Flow	2	24.2				
15 minute summer	7	1.001	1	52.5	2.151	0.625	0.6590	
15 minute summer	8	1.000	7	27.6	1.066	0.698	2.2242	
480 minute winter	OUT	1.003	RIVERBANK	2.2	0.777	0.108	0.4966	
480 minute winter	RIVERBANK	1.004	RIVER	2.2	0.846	0.087	0.0129	83.9

Results for 100 year +45% CC +10% A Critical Storm Duration. Lowest mass balance: 97.92%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
720 minute winter	1	705	47.614	1.664	31.5	344.2066	0.0000	SURCHARGED
720 minute winter	2	705	47.614	1.114	8.2	1.2602	0.0000	FLOOD RISK
720 minute winter	3	705	47.614	0.614	18.8	0.6948	0.0000	SURCHARGED
720 minute winter	4	705	47.614	0.464	17.3	87.2170	0.0000	SURCHARGED
15 minute summer	5	8	48.645	0.145	110.9	0.1641	0.0000	OK
15 minute summer	6	10	45.976	0.976	35.0	1.1039	0.0000	FLOOD RISK
720 minute winter	7	705	47.614	0.614	4.6	0.6948	0.0000	SURCHARGED
15 minute summer	8	9	47.690	0.190	40.9	0.2150	0.0000	OK
720 minute winter	OUT	705	45.837	0.037	2.7	0.0421	0.0000	OK
720 minute winter	RIVERBANK	705	43.535	0.035	2.7	0.0396	0.0000	OK
720 minute winter	RIVER	705	43.433	0.033	2.7	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
720 minute winter	1	Hydro-Brake®	OUT	2.7				
720 minute winter	2	3.001	1	8.1	0.212	0.062	2.8387	
720 minute winter	3	2.002	1	18.8	0.395	0.023	2.5051	
720 minute winter	4	2.001	3	12.3	1.137	0.037	2.2407	
15 minute summer	5	2.000	4	112.3	2.479	0.223	2.7645	
15 minute summer	6	Depth/Flow	2	25.0				
720 minute winter	7	1.001	1	4.6	0.952	0.055	1.0746	
15 minute summer	8	1.000	7	39.5	1.117	1.000	3.0422	
720 minute winter	OUT	1.003	RIVERBANK	2.7	0.822	0.132	0.5766	
720 minute winter	RIVERBANK	1.004	RIVER	2.7	0.894	0.106	0.0150	128.0