



ENGINEERING GROUP

Proposed Commercial Unit, Stoney Brook Farm, Easterbrook Lane, Walberton, BN18 0BA.

SUDS REPORT

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Revisions and Additional Material

Document History and Status

Revision	Date	Purpose/Status
-	09.04.2026	First Issue

Document Details

Project Director	Mark Jones
Report Author	Mark Jones
Project Number	A001-013
Project Name	Stoney Brook Farm Commercial Unit

1 Introduction and Limitation

1.1 Introduction

1.1.1 MJ Engineering Group (MJEG) has been commissioned by New City Joinery Ltd to provide a detailed drainage design for discharging Condition 3 of the planning approval WA/108/24/PL. The proposed development layout can be found in [Appendix A](#).

1.1.2 The Planning **Condition 3** as written will require the following to be provided:

3 Prior to the commencement of development, full details of the proposed surface water drainage scheme must be submitted and approved in writing by the Local Planning Authority.

The Full details submitted for approval shall include:

I. winter groundwater monitoring,

II. winter infiltration testing strictly in accordance with BRE DG 365 or similar approved,

III. details of the proposed method and location of surface water disposal, in accordance with the SuDS hierarchy,

IV. impermeable area plan,

V. calculations modelling the surface water drainage network for the following storm events:

a. 100% Annual Exceedance Probability

b. 10% AEP + climate change allowance

c. 3.3% AEP + climate change allowance

d. 1% AEP + climate change allowance

All storm events must include an allowance for urban creep and surcharged outfalls where appropriate,

VI. detailed drainage plans conforming to local planning authority guidance,

VII. specifications for all surface water drainage components and associated infrastructure or flow control mechanisms,

VIII. any relevant permissions relating to the discharge location, works to watercourses or adoption of the SuDS scheme.

The scheme shall then be constructed as per the approved plans prior to occupation of the building. The surface water drainage scheme shall remain for the lifetime of the development unless agreed in writing by the Local Planning Authority.

1.1.3 This SuDS Report supports the drainage design, setting out the principles and calculations to which the drainage design has been based.

1.2 Limitation

- 1.2.1 This Report has been prepared by MJ Engineering Group Ltd (MJEG) for the sole use of the “client”. This Report is confidential and may not be disclosed by the client nor relied upon by any other party without the prior and express written agreement of MJEG.
- 1.2.2 The conclusions and recommendations contained in this Report are based upon information provided by others and upon the assumption that all relevant information has been provided by those parties from whom it has been requested and that such information is accurate. Information obtained by MJEG has not been independently verified unless otherwise stated in this Report.
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2 Site Description

2.1 Site Location and Existing Condition

- 2.1.1 The site is located in the village of Walberton to the south of the County of West Sussex, within the district of Arun, as shown in [Figure 1](#) below.



Figure 1: Wider Site Location

- 2.1.2 The site comprises of existing residential dwellings and a commercial workshop, with associated access and parking. The area to which the application relates to, is grassland covering an area of circa 0.35ha and centred at Ordnance Survey grid reference SU960060.
- 2.1.3 The topographical survey established the natural fall of the land to be north to south and towards the existing watercourse partly along the southern boundary. The Survey can be found in [Appendix B](#).
- 2.1.4 The existing development on the site currently outfalls to the watercourse at an unrestricted discharge rate which has been calculated at 4.0l/s using the SuDS Manual Eq. 24.5, increasing to 8.6l/s during the 1% AEP storm event as modelled using the latest Flow+ software.

3 Proposed Site Use

- 3.1.1 The proposal as approved is to provide a new commercial unit which consists of a 450m² workshop with associated access road and parking provision, as shown in [Appendix A](#).

4 Surface Water Principles

4.1 *National Planning Policy*

- 4.1.1 In accordance with the latest National Standards for Sustainable Drainage Systems (SuDS), the surface water drainage design considers the principles and standards set out as below.

4.2 *Standard 1: Runoff Destination*

- 4.2.1 As required consideration has been given to the surface water hierarchy;
- Priority 1: It is proposed to install a water butt onto a downpipe for collecting and storing rainfall for reuse.
 - Priority 2: Following winter groundwater monitoring, it has been established the groundwater will be within 1m of the existing and proposed ground levels. As such, a 1m clear zone below any infiltration feature would not be achieved, making infiltration as the main means of discharging surface water not viable. The monitoring records can be found in [Appendix C](#).
 - Priority 3: Currently the existing surface water discharges to an above ground water body. The existing ground falls towards the watercourse discharging at greenfield runoff rate. As such to mimic the existing drainage provision for the site and the existing development it is proposed to outfall to the watercourse at a controlled at 0.1l/s which sets the orifice diameter at 25mm.
- 4.2.2 Having worked through the hierarchy in order where Priority 3 is currently and can deliver the runoff destination, the remaining options have been discarded.

- 4.2.3 The point of discharge to the watercourse is shown on the drainage layout. The design requires a headwall that will be within the application site and not encroach on the channel. In accordance with West Sussex Watercourse Consent criteria, consent is not required.

4.3 *Standard 2: Management of everyday rainfall (interception)*

- 4.3.1 To manage the first 5mm of rainfall the proposal will collect rainwater for reuse and the detention basin will hold surface water for the benefit of the landscaping of the pond. This equates to 7.3m³ of surface water from the new development as the catchment for the building and new access with parking totals 1460m², as the catchment plan in [Appendix D](#).
- 4.3.2 The storage tank will accommodate 1000 litres (1m³), the pond has a lower area of 224m² at a level of 10.05m. Given the groundwater level from the monitoring was recorded at 10.333m it is proposed the outfall pipe is set 50mm above this level. This will allow 11.2m³ of surface water to remain within the basin.
- 4.3.3 This will provide a volume of 3.9m³ additional surface water storage minimum as required to manage the first 5mm of a storm event.

4.4 *Standard 3: Management of extreme rainfall and flooding*

- 4.4.1 The drainage layout has been modelled for the following storm probabilities;
- 100% Annual Exceedance Probability
 - 10% AEP + climate change allowance
 - 3.3% AEP + climate change allowance
 - 1% AEP + climate change allowance
- 4.4.2 The proposed drainage system will pick up the existing surface water drainage and divert into the storage basin reducing the discharge rate to the watercourse.
- 4.4.3 The greenfield runoff rate from the site would be 0.03l/s for 100% AEP storm event rising to 0.11l/s for the 1% AEP storm event. These low discharge rates give concern to the risk of blockages at the control device and increase the risk of flooding.
- 4.4.4 It was agreed in the drainage strategy that the control device will have an orifice diameter no less than 25mm which will control the rate to 0.1l/s for storms up to the 1% AEP plus climate change. The drainage design has filters at key points to reduce the risk of potential blockages of the control device.
- 4.4.5 For the climate change allowance, the initial modelling was taken from the Government Department for Environment Food & Rural Affairs website for the Arun and Western Streams Management Catchment. The website returns for an Upper End Allowance 40% for 3.3% AEP

and 45% for the 1% AEP. Whilst an allowance is not provided for the 10% AEP, 40% has been applied.

- 4.4.6 For urban creep, an allowance of 10% has been added to the building area for future growth. It should be noted, any extension to the north or east would be replacing car park area which is modelled as part of this drainage provision. The hydraulic modelling includes the pond area within the catchment allowance also.
- 4.4.7 As established through groundwater monitoring, the groundwater will rise to approximately 10.333m around the proposed basin. As such, hydraulic modelling has considered a surcharged system with a start water level of 10.333m. The modelling results can be found in [Appendix E](#). The basin will provide 300mm freeboard during the 1% AEP including climate change.
- 4.4.8 The flood exceedance routing will flow as currently towards the watercourse. The proposal will not impact on this routing. The Flood Exceedance plan can be found in [Appendix F](#).

4.5 *Standard 4: Water Quality*

- 4.5.1 As required, the drainage design provides surface water treatment through routing surface water from the building roof through the Type C (No infiltration) permeable paving and the detention basin, with a filter at the outfall of the basin.
- 4.5.2 The pollution risk is considered low which the SuDS features will mitigate.

4.6 *Standard 5: Amenity*

- 4.6.1 The drainage design works with the detention basin and supports the landscaping within the basin.

4.7 *Standard 6: - Biodiversity*

- 4.7.1 The basin through the landscaping area will encourage flora and fauna.

4.8 *Standard 7: Design of drainage and Maintenance*

- 4.8.1 The proposed drainage layout can be found in [Appendix F](#). The maintenance of the drainage systems is vital to ensure their continued operation and efficiencies. The following tables set out the maintenance requirements for each drainage feature. Maintenance for periods of high groundwater is considered under table 23.1.

TABLE 20.15 Operation and maintenance requirements for pervious pavements

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50 mm of the level of the paving	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three-monthly, 48 h after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

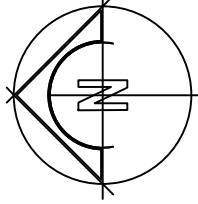
TABLE 22.1 Operation and maintenance requirements for detention basins

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter and debris	Monthly
	Cut grass – for spillways and access routes	Monthly (during growing season), or as required
	Cut grass – meadow grass in and around basin	Half yearly (spring – before nesting season, and autumn)
	Manage other vegetation and remove nuisance plants	Monthly (at start, then as required)
	Inspect inlets, outlets and overflows for blockages, and clear if required.	Monthly
	Inspect banksides, structures, pipework etc for evidence of physical damage	Monthly
	Inspect inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies.	Monthly (for first year), then annually or as required
	Check any penstocks and other mechanical devices	Annually
	Tidy all dead growth before start of growing season	Annually
	Remove sediment from inlets, outlet and forebay	Annually (or as required)
	Manage wetland plants in outlet pool – where provided	Annually (as set out in Chapter 23)
Occasional maintenance	Reseed areas of poor vegetation growth	As required
	Prune and trim any trees and remove cuttings	Every 2 years, or as required
	Remove sediment from inlets, outlets, forebay and main basin when required	Every 5 years, or as required (likely to be minimal requirements where effective upstream source control is provided)
Remedial actions	Repair erosion or other damage by reseedling or re-turfing	As required
	Realignment of rip-rap	As required
	Repair/rehabilitation of inlets, outlets and overflows	As required
	Relevel uneven surfaces and reinstate design levels	As required

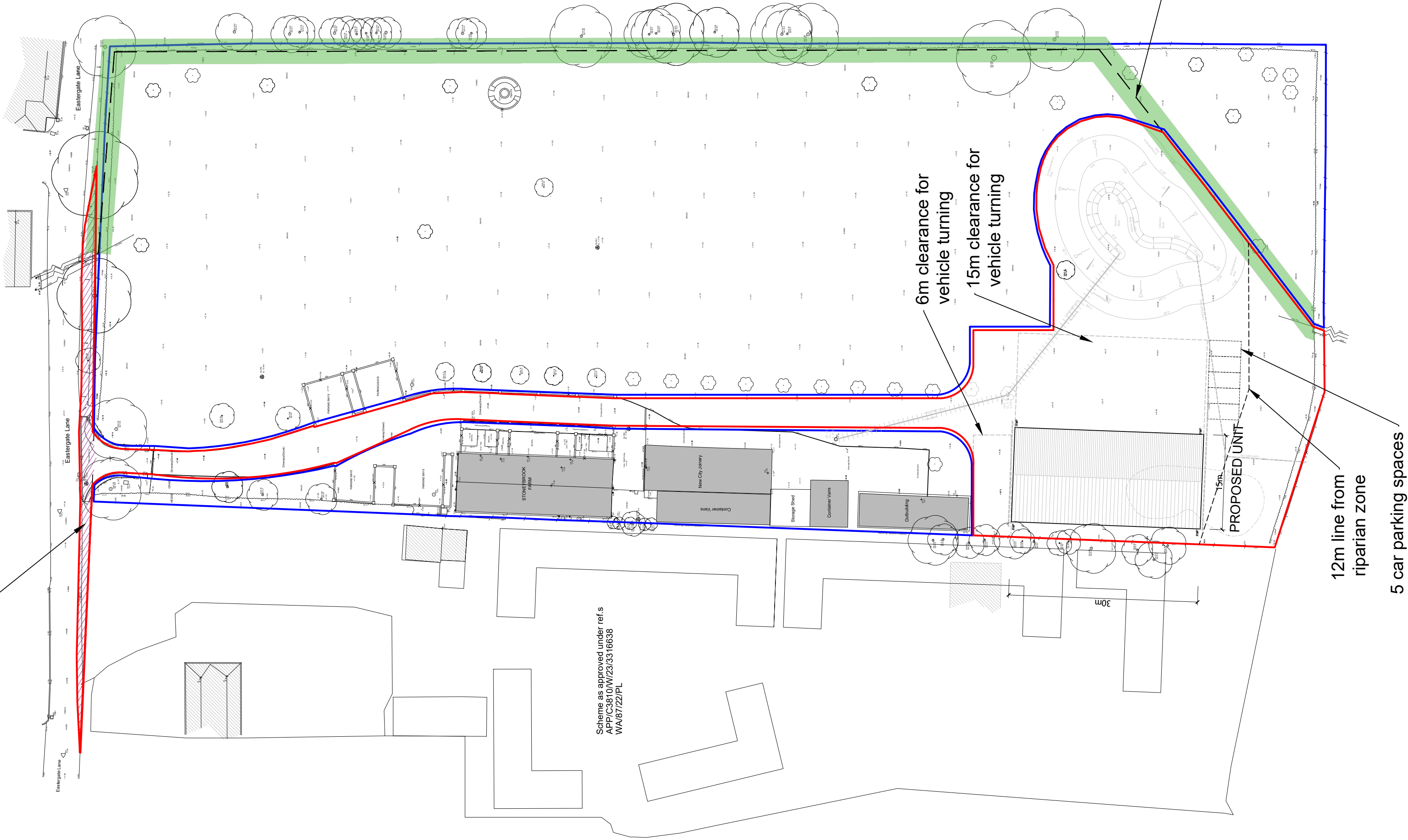
TABLE 23.1 Operation and maintenance requirements for ponds and wetlands

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter and debris	Monthly (or as required)
	Cut the grass – public areas	Monthly (during growing season)
	Cut the meadow grass	Half yearly (spring, before nesting season, and autumn)
	Inspect marginal and bankside vegetation and remove nuisance plants (for first 3 years)	Monthly (at start, then as required)
	Inspect inlets, outlets, banksides, structures, pipework etc for evidence of blockage and/or physical damage	Monthly
	Inspect water body for signs of poor water quality	Monthly (May – October)
	Inspect silt accumulation rates in any forebay and in main body of the pond and establish appropriate removal frequencies; undertake contamination testing once some build-up has occurred, to inform management and disposal options	Half yearly
	Check any mechanical devices, eg penstocks	Half yearly
	Hand cut submerged and emergent aquatic plants (at minimum of 0.1 m above pond base; include max 25% of pond surface)	Annually
	Remove 25% of bank vegetation from water's edge to a minimum of 1 m above water level	Annually
	Tidy all dead growth (scrub clearance) before start of growing season (Note: tree maintenance is usually part of overall landscape management contract)	Annually
	Remove sediment from any forebay	Every 1–5 years, or as required
	Remove sediment and planting from one quadrant of the main body of ponds without sediment forebays	Every 5 years, or as required
Occasional maintenance	Remove sediment from the main body of big ponds when pool volume is reduced by 20%	With effective pre-treatment, this will only be required rarely, eg every 25–50 years
Remedial actions	Repair erosion or other damage	As required
	Replant, where necessary	As required
	Aerate pond when signs of eutrophication are detected	As required
	Realign rip-rap or repair other damage	As required
	Repair / rehabilitate inlets, outlets and overflows	As required

Appendix A – Site Proposal



Visibility splays 2.4m x 47m



Scheme as approved under ref.s
W/23/016538
W/23/016538

Site area - 0.36ha

13.11.24	G	Basin & red line amended	JK
29.10.24	F	Basin added & red line amended	JK
17.04.24	E	Driveway & red line amended	JK
17.04.24	D	Building position amended & parking added	JK
21.03.24	C	Amended to consultant comments	JK
11.01.24	B	Amended to consultant comments	JK
10.01.24	A	Amended to consultant comments	JK
DATE	REV	DESCRIPTION	DRAWN

PatrickAllen&Associates
Architects

2 Grange Business Centre
Tommy Powers Drive
Grange Park
Kesgrave, Ipswich
Suffolk, IP5 2BY

Project

Proposed Commercial Unit at:
Storey Brook Farm, Eastergate Lane
Arundel, BN18 0BA

Client

March Developments Ltd.

Drawing Title

Proposed Block Plan

Drawing Status

Preliminary

Scale

1:500

Paper Size

A1

Date

Dec 2023

Drawn

/

Drawing Number

4494-02

Drawing Rev

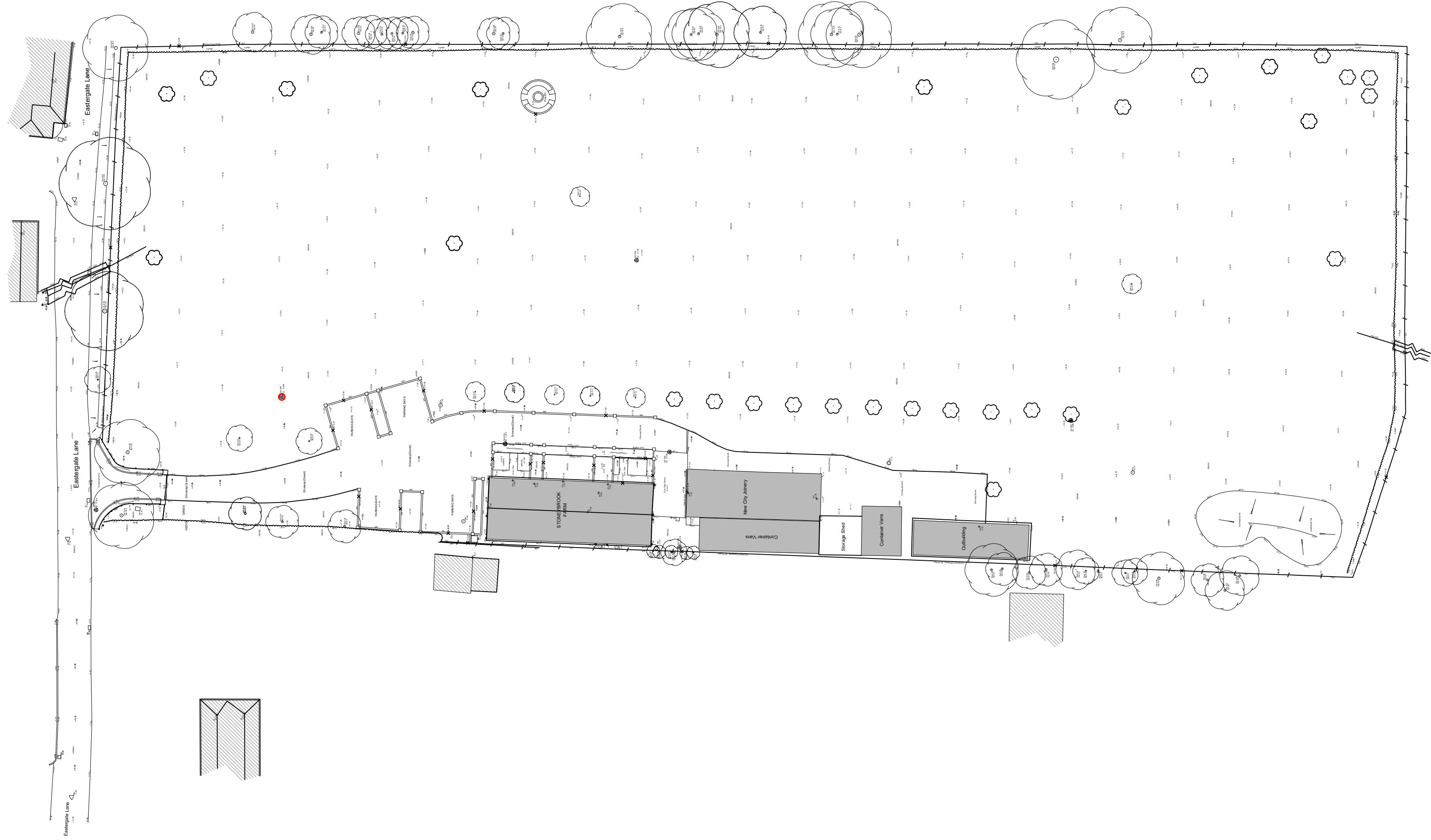
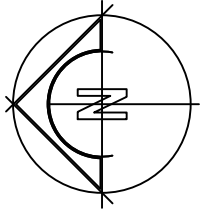
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1:500 0 10 20 30 40 50m

Appendix B – Topographical Survey

Do not scale from this drawing. Use only figured dimensions. If in doubt, ask. All dimensions are to be checked on site. Any discrepancies should be reported immediately to the Architect.

[illegible]

Appendix C – Groundwater Monitoring Records

Groundwater Monitoring

Hole Size

L (m): 0.5

W (m): 0.5

D (m): 1

Existing Ground Level – 10.68m

Monitoring Record

Date	Depth to Water (mm)	Comments/Water level
17/11/2025	602	Date hole dug./ 10.078m
24/11/2025	408	10.272
01/12/2025	448	10.232
08/12/2025	509	10.171
15/12/2025	415	10.264
22/12/2025	356	10.324
29/12/2025	363	10.317
05/01/2026	357	10.323
12/01/2026	423	10.257
19/01/2026	478	10.202
26/01/2026	447	10.233
02/02/2026	347	10.333
09/02/2026	416	10.264
16/02/2026	555	10.125
23/02/2026	598	10.082
02/03/2026		
09/03/2026		
16/03/2026		
23/03/2026		
30/03/2026		
06/04/2026		
13/04/2026		
20/04/2026		
27/04/2026		

Appendix D – Catchment Plan



- General Notes:
1. Do not scale this drawing. All dimensions are in metres unless otherwise noted. Any discrepancies are to be recorded and reported to the engineers immediately.
 2. This drawing is to be read in conjunction with all other engineers and architects drawings, and the specification.
 3. All works are to be carried out in accordance with the specification for the works. The specification for the works refers to "Volume 1 of the Manual for Contract Documents for Highway Works" for highway works and the "Civil Engineering Specification for the Water Industry" is applicable for the drainage works.
 4. All workmanship and materials are to be to current British Standards.
 5. The contractor is responsible for and must take all necessary precautions to ensure the stability of the works at all times during construction.
 6. All services are to be located and protected as necessary by the contractor prior to the commencement of the works.
 7. Any existing details which are shown on this drawing are for guidance only and are to be checked on site by the contractor. Any variations are to be recorded and reported to the engineer immediately.
 8. During construction works on site, all roads and footpaths are to be swept and kept clear of obstructions, this is to include existing highways as appropriate to ensure safe passage of all road users.
 9. Provision shall be made for the installation of all mains services including ducting prior to the laying of the road base-course.
 10. All road markings and signs are to be in accordance with 'the traffic signs regulations and directions' 2016.
 11. All private connections to adoptable sewers should be a minimum of 100mm diameter (600 and 150mm diameter (surface) made in vitrified clay connecting soft to soft.

A	11.11.24	Electric Cable added, Basin location revised	MJ	MJ	MJ
Drawn	Date	Description	Drawn	Checkd	App'd



ENGINEERING GROUP

Client

New City Joinery

Project

Land at Stoney Brook Farm,
Walberton

Drawing file

Proposed Surface Water
Impermeable Catchment Plan

Drawn	MJ	Checked	MJ	Approved	MJ	Date	10/24
Scale at A1							Revision
1:200							A

Appendix E – Hydraulic Modelling

**Nodes**

Name	Area (ha)	Add Area (%)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)	Invert Level (m)
EX IC01	0.022		5.00	11.500	600	1873687.952	-215932.244	0.700	10.800
EX IC02	0.015		5.00	11.480	600	1873686.779	-215960.954	0.967	10.513
EX.IC03				11.100	600	1873685.842	-215992.049	0.944	10.156
IC04	0.022		5.00	11.150	600	1873688.606	-216020.080	1.088	10.062
5				11.300		1873715.268	-216037.046	1.353	9.947
20				11.300		1873713.507	-216050.271	1.349	9.951
21				11.015	1200	1873683.089	-216053.829	1.175	9.840
22				10.490		1873682.205	-216066.557	0.774	9.716
6	0.042		5.00	11.300		1873717.843	-216034.627	1.355	9.945
7				11.300		1873719.676	-216033.369	1.356	9.944
8				11.300		1873721.802	-216032.718	1.357	9.943
9				11.300		1873723.587	-216032.860	1.358	9.942
10				11.300		1873725.136	-216033.759	1.358	9.942
11				11.300		1873725.830	-216034.975	1.359	9.941
12				11.300		1873725.101	-216037.230	1.344	9.956
13				11.300		1873722.729	-216038.703	1.345	9.955
14				11.300		1873719.996	-216039.277	1.346	9.954
15				11.300		1873717.972	-216040.119	1.347	9.953
16				11.300		1873717.120	-216041.511	1.348	9.952
17				11.300		1873717.019	-216043.112	1.348	9.952
18				11.300		1873717.027	-216044.136	1.349	9.951
19				11.300		1873716.501	-216046.937	1.349	9.951
IC05	0.025		5.00	11.005	600	1873701.705	-216036.529	1.013	9.992
RE02	0.023	10	5.00	11.150	150	1873671.366	-216050.112	0.525	10.625
2	0.029		5.00	11.005	600	1873701.142	-216051.093	0.753	10.252
RE01	0.023	10	5.00	11.150	150	1873672.015	-216019.405	0.774	10.376

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	EX IC01	EX IC02	28.734	0.600	10.800	10.513	0.287	100.1	100	5.62	50.0
1.001	EX IC02	EX.IC03	31.109	0.600	10.513	10.306	0.207	150.0	150	6.26	49.4
1.002	EX.IC03	IC04	28.167	0.600	10.156	10.062	0.094	300.0	300	6.78	47.5
1.003	IC04	IC05	21.027	0.600	10.062	9.992	0.070	300.0	300	7.17	46.2
1.006	6	7	2.223	0.012	9.945	9.944	0.001	2223.2	300	7.70	44.5
1.007	7	8	2.223	0.012	9.944	9.943	0.001	2223.4	300	7.82	44.2
1.004	5	6	3.297	0.012	9.947	9.945	0.002	1648.5	300	7.57	40.8
1.010	11	12	3.669	0.012	9.960	9.956	0.004	917.3	300	8.12	43.7

US Depth (m)	DS Depth (m)	Σ Area (ha)
0.600	0.867	0.022
0.817	0.644	0.037
0.644	0.788	0.037
0.788	0.713	0.084
1.055	1.056	0.206
1.056	1.057	0.206
1.053	1.055	0.164
1.040	1.044	0.206

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)
1.019	20	21	32.187	0.012	10.386	9.840	0.546	59.0	225	9.08	37.7
1.008	8	9	1.791	0.012	9.943	9.942	0.001	1790.6	300	7.91	43.9
1.009	9	10	1.000	0.012	9.942	9.942	0.000	0.0	300	7.92	43.9
1.010_1	10	11	1.400	0.012	9.942	9.941	0.001	1400.1	300	7.99	43.7
1.021	21	22	12.759	0.012	9.840	9.716	0.124	102.9	100	9.39	40.1
1.012	12	13	2.792	0.012	9.956	9.955	0.001	2792.2	300	8.29	42.8
1.013	13	14	2.793	0.012	9.955	9.954	0.001	2792.6	300	8.46	42.4
1.014	14	15	2.192	0.012	9.954	9.953	0.001	2192.2	300	8.58	42.1
1.015	15	16	1.632	0.012	9.953	9.952	0.001	1632.0	300	8.66	41.9
1.016	16	17	1.000	0.012	9.952	9.952	0.000	0.0	300	8.68	41.8
1.017	17	18	1.024	0.012	9.952	9.951	0.001	1024.0	300	8.71	41.7
1.018	18	19	1.000	0.012	9.951	9.951	0.000	0.0	300	8.73	41.7
1.019_1	19	20	1.000	0.012	9.951	9.951	0.000	0.0	300	8.75	41.6
1.004_1	IC05	5	13.573	0.600	9.992	9.947	0.045	300.0	300	7.42	45.4
3.000	RE02	2	29.792	0.600	10.625	10.252	0.373	79.9	225	5.34	50.0
3.001	2	IC05	14.575	0.600	10.252	10.067	0.185	78.8	225	5.50	50.0
2.000	RE01	IC04	16.605	0.600	10.376	10.210	0.166	100.0	150	5.28	50.0

US Depth (m)	DS Depth (m)	Σ Area (ha)
0.689	0.950	0.206
1.057	1.058	0.206
1.058	1.058	0.206
1.058	1.059	0.206
1.075	0.674	0.206
1.044	1.045	0.206
1.045	1.046	0.206
1.046	1.047	0.206
1.047	1.048	0.206
1.048	1.048	0.206
1.048	1.049	0.206
1.049	1.049	0.206
1.049	1.049	0.206
0.713	1.053	0.164
0.300	0.528	0.025
0.528	0.713	0.054
0.624	0.790	0.025

Simulation Settings

Rainfall Methodology	FEH-22	Skip Steady State	✓	Check Discharge Rate(s)	x
Rainfall Events	Singular	Drain Down Time (mins)	10080	Check Discharge Volume	x
Summer CV	1.000	Additional Storage (m³/ha)	0.0		
Analysis Speed	Detailed	Starting Level (m)	10.333		

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	0	0
10	40	0	0
30	40	0	0
100	45	0	0

Node 21 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	9.840	Product Number	CTL-SHE-0026-3000-0800-3000
Design Depth (m)	0.800	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	0.3	Min Node Diameter (mm)	1200

Node 6 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	10.050
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	9540

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	25.4	0.0	1.250	55.8	0.0

Node 7 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	10.050
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	9540

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	17.1	0.0	1.250	37.6	0.0

Node 8 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	10.050
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	9540

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	17.1	0.0	1.250	37.6	0.0

Node 9 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	10.050
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	9540

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	13.8	0.0	1.250	30.3	0.0

Node 10 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	10.050
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	9540



Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	7.7	0.0	1.250	16.9	0.0

Node 11 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	10.050
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	9540

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	10.8	0.0	1.250	23.7	0.0

Node 12 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	10.050
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	9540

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	28.3	0.0	1.250	62.0	0.0

Node 13 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	10.050
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	9540

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	21.5	0.0	1.250	47.2	0.0

Node 14 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	10.050
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	9540

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	21.5	0.0	1.250	47.2	0.0

Node 15 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	10.050
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	9540

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	16.9	0.0	1.250	37.1	0.0

Node 16 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	10.050
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	9540



Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	12.6	0.0	1.250	27.6	0.0

Node 17 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	10.050
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	9540

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	7.7	0.0	1.250	16.9	0.0

Node 18 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	10.050
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	9540

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	7.9	0.0	1.250	17.3	0.0

Node 19 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	10.050
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	9540

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	7.7	0.0	1.250	16.9	0.0

Node IC04 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	10.695	Slope (1:X)	1000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	4740	Depth (m)	0.305
Safety Factor	1.5	Width (m)	14.800	Inf Depth (m)	
Porosity	0.30	Length (m)	50.000		

Node 20 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	10.050
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	9540

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	7.7	0.0	1.250	16.9	0.0

**Results for 1 year 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
15 minute summer	EX IC01	10	10.846	0.046	2.7	0.0132	0.0000	OK
15 minute summer	EX IC02	11	10.571	0.058	4.6	0.0164	0.0000	OK
10080 minute summer	EX.IC03	6000	10.515	0.359	0.2	0.1015	0.0000	SURCHARGED
10080 minute summer	IC04	6000	10.514	0.452	0.4	0.1280	0.0000	SURCHARGED
10080 minute summer	5	6000	10.514	0.567	0.7	0.0000	0.0000	SURCHARGED
10080 minute summer	20	6000	10.514	0.563	0.5	4.3743	0.0000	OK
10080 minute summer	21	6000	10.515	0.675	0.5	0.7629	0.0000	SURCHARGED
15 minute summer	22	1	9.767	0.051	2.9	0.0000	0.0000	OK
10080 minute summer	6	6000	10.515	0.569	0.9	14.4346	0.0000	SURCHARGED
10080 minute summer	7	6000	10.515	0.571	0.9	9.7208	0.0000	SURCHARGED
10080 minute summer	8	6000	10.514	0.571	0.8	9.7206	0.0000	SURCHARGED
10080 minute summer	9	6000	10.514	0.572	0.8	7.8409	0.0000	SURCHARGED
10080 minute summer	10	6000	10.514	0.572	0.8	4.3744	0.0000	SURCHARGED
10080 minute summer	11	6000	10.514	0.573	0.8	6.1352	0.0000	SURCHARGED
10080 minute summer	12	6000	10.514	0.558	0.8	16.0674	0.0000	SURCHARGED
10080 minute summer	13	6000	10.514	0.559	0.7	12.2149	0.0000	SURCHARGED
10080 minute summer	14	6000	10.514	0.560	0.7	12.2148	0.0000	SURCHARGED
10080 minute summer	15	6000	10.514	0.561	0.6	9.6013	0.0000	SURCHARGED
10080 minute summer	16	6000	10.514	0.562	0.5	7.1531	0.0000	SURCHARGED
10080 minute summer	17	6000	10.514	0.562	0.5	4.3742	0.0000	SURCHARGED
10080 minute summer	18	6000	10.514	0.563	0.5	4.4845	0.0000	SURCHARGED
10080 minute summer	19	6000	10.514	0.563	0.5	4.3743	0.0000	SURCHARGED
10080 minute summer	IC05	6000	10.514	0.522	0.7	0.1478	0.0000	SURCHARGED
15 minute summer	RE02	10	10.660	0.035	3.2	0.0006	0.0000	OK
10080 minute summer	2	6000	10.514	0.262	0.2	0.0743	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	EX IC01	1.000	EX IC02	2.7	0.653	0.442	0.1183	
15 minute summer	EX IC02	1.001	EX.IC03	4.5	0.718	0.308	0.1933	
10080 minute summer	EX.IC03	1.002	IC04	0.2	0.003	0.003	1.9835	
10080 minute summer	IC04	1.003	IC05	0.4	0.006	0.006	1.4807	
10080 minute summer	5	1.004	6	0.7	0.007	0.042	0.5682	
10080 minute summer	20	1.019	21	0.5	0.100	0.008	1.0169	
10080 minute summer	21	1.021	22	0.3	0.365	0.050	0.0097	72.1
10080 minute summer	6	1.006	7	0.9	0.007	0.059	0.3851	
10080 minute summer	7	1.007	8	0.8	0.007	0.058	0.3865	
10080 minute summer	8	1.008	9	0.8	0.007	0.051	0.3127	
10080 minute summer	9	1.009	10	0.8	0.007	0.017	0.1749	
10080 minute summer	10	1.010_1	11	0.8	0.007	0.042	0.2452	
10080 minute summer	11	1.010	12	0.8	0.007	0.034	0.6062	
10080 minute summer	12	1.012	13	0.7	0.007	0.056	0.4654	
10080 minute summer	13	1.013	14	0.7	0.006	0.051	0.4672	
10080 minute summer	14	1.014	15	0.6	0.005	0.040	0.3680	
10080 minute summer	15	1.015	16	0.5	0.005	0.031	0.2749	
10080 minute summer	16	1.016	17	0.5	0.005	0.011	0.1688	
10080 minute summer	17	1.017	18	0.5	0.005	0.024	0.1731	
10080 minute summer	18	1.018	19	0.5	0.005	0.011	0.1694	
10080 minute summer	19	1.019_1	20	0.5	0.005	0.010	0.1694	
10080 minute summer	IC05	1.004_1	5	0.7	0.010	0.011	0.9558	
15 minute summer	RE02	3.000	2	3.1	0.297	0.054	0.3384	
10080 minute summer	2	3.001	IC05	0.2	0.006	0.004	0.5797	

**Results for 1 year Critical Storm Duration. Lowest mass balance: 99.19%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
10080 minute summer	RE01	6000	10.514	0.138	0.1	0.0025	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
10080 minute summer	RE01	2.000	IC04	0.1	0.012	0.006	0.2872	

**Results for 10 year +40% CC Critical Storm Duration. Lowest mass balance: 99.43%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	EX IC01	11	11.500	0.700	11.3	0.1981	0.1391	FLOOD
15 minute summer	EX IC02	11	10.829	0.316	16.1	0.0895	0.0000	SURCHARGED
10080 minute summer	EX.IC03	6780	10.770	0.614	0.3	0.1737	0.0000	SURCHARGED
10080 minute summer	IC04	6780	10.770	0.708	0.7	11.2601	0.0000	SURCHARGED
10080 minute summer	5	6780	10.770	0.823	1.4	0.0000	0.0000	SURCHARGED
10080 minute summer	20	6780	10.770	0.819	0.5	7.4530	0.0000	SURCHARGED
10080 minute summer	21	6780	10.770	0.930	0.5	1.0516	0.0000	FLOOD RISK
15 minute summer	22	1	9.767	0.051	2.9	0.0000	0.0000	OK
10080 minute summer	6	6780	10.770	0.825	1.8	24.5961	0.0000	SURCHARGED
10080 minute summer	7	6780	10.770	0.826	1.6	16.5658	0.0000	SURCHARGED
10080 minute summer	8	6780	10.770	0.827	1.5	16.5658	0.0000	SURCHARGED
10080 minute summer	9	6780	10.770	0.828	1.4	13.3598	0.0000	SURCHARGED
10080 minute summer	10	6780	10.770	0.828	1.3	7.4530	0.0000	SURCHARGED
10080 minute summer	11	6780	10.770	0.829	1.2	10.4528	0.0000	SURCHARGED
10080 minute summer	12	6780	10.770	0.814	1.2	27.3689	0.0000	SURCHARGED
10080 minute summer	13	6780	10.770	0.815	1.0	20.8129	0.0000	SURCHARGED
10080 minute summer	14	6780	10.770	0.816	0.8	20.8128	0.0000	SURCHARGED
10080 minute summer	15	6780	10.770	0.817	0.7	16.3596	0.0000	SURCHARGED
10080 minute summer	16	6780	10.770	0.818	0.6	12.1846	0.0000	SURCHARGED
10080 minute summer	17	6780	10.770	0.818	0.5	7.4530	0.0000	SURCHARGED
10080 minute summer	18	6780	10.770	0.819	0.5	7.6385	0.0000	SURCHARGED
10080 minute summer	19	6780	10.770	0.819	0.5	7.4530	0.0000	SURCHARGED
10080 minute summer	IC05	6780	10.770	0.778	1.4	0.2201	0.0000	FLOOD RISK
10080 minute summer	RE02	6780	10.770	0.145	0.2	0.0026	0.0000	OK
10080 minute summer	2	6780	10.770	0.518	0.5	0.1465	0.0000	FLOOD RISK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	EX IC01	1.000	EX IC02	8.8	1.118	1.450	0.2248	
15 minute summer	EX IC02	1.001	EX.IC03	15.6	0.884	1.076	0.5477	
10080 minute summer	EX.IC03	1.002	IC04	0.3	0.004	0.005	1.9835	
10080 minute summer	IC04	1.003	IC05	0.7	0.010	0.011	1.4807	
10080 minute summer	5	1.004	6	1.4	0.007	0.081	1.1932	
10080 minute summer	20	1.019	21	0.5	0.115	0.007	1.2801	
10080 minute summer	21	1.021	22	0.3	0.380	0.058	0.0107	217.6
10080 minute summer	6	1.006	7	1.6	0.008	0.110	0.8074	
10080 minute summer	7	1.007	8	1.5	0.008	0.102	0.8093	
10080 minute summer	8	1.008	9	1.4	0.007	0.085	0.6541	
10080 minute summer	9	1.009	10	1.3	0.007	0.027	0.3656	
10080 minute summer	10	1.010_1	11	1.2	0.006	0.067	0.5125	
10080 minute summer	11	1.010	12	1.2	0.006	0.051	1.2901	
10080 minute summer	12	1.012	13	1.0	0.005	0.075	0.9877	
10080 minute summer	13	1.013	14	0.8	0.005	0.064	0.9905	
10080 minute summer	14	1.014	15	0.7	0.005	0.048	0.7792	
10080 minute summer	15	1.015	16	0.6	0.005	0.035	0.5815	
10080 minute summer	16	1.016	17	0.5	0.005	0.010	0.3568	
10080 minute summer	17	1.017	18	0.5	0.005	0.023	0.3658	
10080 minute summer	18	1.018	19	0.5	0.005	0.010	0.3576	
10080 minute summer	19	1.019_1	20	0.5	0.004	0.010	0.3576	
10080 minute summer	IC05	1.004_1	5	1.4	0.019	0.021	0.9558	
10080 minute summer	RE02	3.000	2	0.2	0.012	0.003	0.9946	
10080 minute summer	2	3.001	IC05	0.5	0.012	0.008	0.5797	

**Results for 10 year +40% CC Critical Storm Duration. Lowest mass balance: 99.43%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
10080 minute summer	RE01	6780	10.770	0.394	0.2	0.0071	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
10080 minute summer	RE01	2.000	IC04	0.2	0.012	0.011	0.2923	

**Results for 30 year +40% CC Critical Storm Duration. Lowest mass balance: 99.48%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	EX IC01	10	11.500	0.700	14.7	0.1981	1.0110	FLOOD
15 minute summer	EX IC02	11	10.982	0.469	17.9	0.1326	0.0000	SURCHARGED
10080 minute summer	EX.IC03	7020	10.833	0.677	0.4	0.1915	0.0000	FLOOD RISK
10080 minute summer	IC04	7020	10.833	0.771	0.9	25.1960	0.0000	SURCHARGED
10080 minute summer	5	7020	10.833	0.886	1.8	0.0000	0.0000	SURCHARGED
10080 minute summer	20	7020	10.833	0.882	0.5	8.2825	0.0000	SURCHARGED
10080 minute summer	21	7020	10.832	0.992	0.5	1.1225	0.0000	FLOOD RISK
15 minute summer	22	1	9.767	0.051	2.9	0.0000	0.0000	OK
10080 minute summer	6	7020	10.833	0.888	2.2	27.3341	0.0000	SURCHARGED
10080 minute summer	7	7020	10.833	0.889	2.0	18.4104	0.0000	SURCHARGED
10080 minute summer	8	7020	10.833	0.890	1.9	18.4104	0.0000	SURCHARGED
10080 minute summer	9	7020	10.833	0.891	1.7	14.8468	0.0000	SURCHARGED
10080 minute summer	10	7020	10.833	0.891	1.6	8.2825	0.0000	SURCHARGED
10080 minute summer	11	7020	10.833	0.892	1.5	11.6160	0.0000	SURCHARGED
10080 minute summer	12	7020	10.833	0.877	1.5	30.4131	0.0000	SURCHARGED
10080 minute summer	13	7020	10.833	0.878	1.2	23.1293	0.0000	SURCHARGED
10080 minute summer	14	7020	10.833	0.879	1.0	23.1293	0.0000	SURCHARGED
10080 minute summer	15	7020	10.833	0.880	0.8	18.1804	0.0000	SURCHARGED
10080 minute summer	16	7020	10.833	0.881	0.7	13.5398	0.0000	SURCHARGED
10080 minute summer	17	7020	10.833	0.881	0.6	8.2825	0.0000	SURCHARGED
10080 minute summer	18	7020	10.833	0.882	0.6	8.4881	0.0000	SURCHARGED
10080 minute summer	19	7020	10.833	0.882	0.5	8.2825	0.0000	SURCHARGED
10080 minute summer	IC05	7020	10.832	0.840	1.8	0.2379	0.0000	FLOOD RISK
10080 minute summer	RE02	7020	10.832	0.207	0.3	0.0037	0.0000	OK
10080 minute summer	2	7020	10.832	0.580	0.6	0.1643	0.0000	FLOOD RISK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	EX IC01	1.000	EX IC02	8.5	1.089	1.413	0.2248	
15 minute summer	EX IC02	1.001	EX.IC03	17.1	0.970	1.182	0.5477	
10080 minute summer	EX.IC03	1.002	IC04	0.4	0.006	0.006	1.9835	
10080 minute summer	IC04	1.003	IC05	0.9	0.012	0.014	1.4807	
10080 minute summer	5	1.004	6	1.7	0.007	0.104	1.3817	
10080 minute summer	20	1.019	21	0.5	0.086	0.008	1.2801	
10080 minute summer	21	1.021	22	0.3	0.384	0.059	0.0109	269.1
10080 minute summer	6	1.006	7	2.0	0.008	0.140	0.9348	
10080 minute summer	7	1.007	8	1.9	0.008	0.130	0.9368	
10080 minute summer	8	1.008	9	1.7	0.007	0.107	0.7570	
10080 minute summer	9	1.009	10	1.6	0.007	0.034	0.4231	
10080 minute summer	10	1.010_1	11	1.5	0.007	0.085	0.5930	
10080 minute summer	11	1.010	12	1.5	0.008	0.064	1.4971	
10080 minute summer	12	1.012	13	1.2	0.007	0.094	1.1457	
10080 minute summer	13	1.013	14	1.0	0.007	0.079	1.1487	
10080 minute summer	14	1.014	15	0.8	0.006	0.057	0.9035	
10080 minute summer	15	1.015	16	0.7	0.005	0.041	0.6742	
10080 minute summer	16	1.016	17	0.6	0.005	0.012	0.4136	
10080 minute summer	17	1.017	18	0.6	0.005	0.026	0.4240	
10080 minute summer	18	1.018	19	0.5	0.005	0.011	0.4145	
10080 minute summer	19	1.019_1	20	0.5	0.005	0.011	0.4145	
10080 minute summer	IC05	1.004_1	5	1.8	0.025	0.028	0.9558	
10080 minute summer	RE02	3.000	2	0.3	0.013	0.005	1.1630	
10080 minute summer	2	3.001	IC05	0.6	0.015	0.010	0.5797	

**Results for 30 year +40% CC Critical Storm Duration. Lowest mass balance: 99.48%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
10080 minute summer	RE01	7020	10.833	0.457	0.3	0.0082	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
10080 minute summer	RE01	2.000	IC04	0.3	0.017	0.017	0.2923	

**Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.52%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute summer	EX IC01	16	11.500	0.700	17.5	0.1981	2.7535	FLOOD
15 minute summer	EX IC02	11	11.132	0.619	19.9	0.1752	0.0000	SURCHARGED
4320 minute summer	EX.IC03	4260	10.927	0.771	0.9	0.2182	0.0000	FLOOD RISK
4320 minute summer	IC04	4320	10.927	0.865	2.0	46.2482	0.0000	FLOOD RISK
4320 minute summer	5	4320	10.927	0.980	3.3	0.0000	0.0000	SURCHARGED
4320 minute summer	20	4320	10.927	0.976	0.5	9.5900	0.0000	SURCHARGED
4320 minute summer	21	4320	10.927	1.087	0.5	1.2296	0.0000	FLOOD RISK
15 minute summer	22	1	9.767	0.051	2.9	0.0000	0.0000	OK
4320 minute summer	6	4320	10.927	0.982	4.2	31.6508	0.0000	SURCHARGED
4320 minute summer	7	4320	10.927	0.983	3.7	21.3187	0.0000	SURCHARGED
4320 minute summer	8	4320	10.927	0.984	3.4	21.3187	0.0000	SURCHARGED
4320 minute summer	9	4320	10.927	0.985	3.2	17.1910	0.0000	SURCHARGED
4320 minute summer	10	4320	10.927	0.985	2.9	9.5901	0.0000	SURCHARGED
4320 minute summer	11	4320	10.927	0.986	2.8	13.4498	0.0000	SURCHARGED
4320 minute summer	12	4320	10.927	0.971	2.6	35.2118	0.0000	SURCHARGED
4320 minute summer	13	4320	10.927	0.972	2.1	26.7810	0.0000	SURCHARGED
4320 minute summer	14	4320	10.927	0.973	1.7	26.7810	0.0000	SURCHARGED
4320 minute summer	15	4320	10.927	0.974	1.4	21.0507	0.0000	SURCHARGED
4320 minute summer	16	4320	10.927	0.975	1.1	15.6760	0.0000	SURCHARGED
4320 minute summer	17	4320	10.927	0.975	0.8	9.5900	0.0000	SURCHARGED
4320 minute summer	18	4320	10.927	0.976	0.7	9.8271	0.0000	SURCHARGED
4320 minute summer	19	4320	10.927	0.976	0.6	9.5900	0.0000	SURCHARGED
4320 minute summer	IC05	4320	10.927	0.935	3.3	0.2647	0.0000	FLOOD RISK
4320 minute summer	RE02	4260	10.927	0.302	0.6	0.0054	0.0000	FLOOD RISK
4320 minute summer	2	4260	10.927	0.675	1.3	0.1911	0.0000	FLOOD RISK

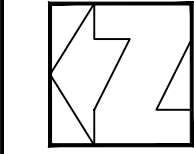
Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
30 minute summer	EX IC01	1.000	EX IC02	8.0	1.021	1.324	0.2248	
15 minute summer	EX IC02	1.001	EX.IC03	18.9	1.074	1.308	0.5477	
4320 minute summer	EX.IC03	1.002	IC04	0.9	0.013	0.014	1.9835	
4320 minute summer	IC04	1.003	IC05	1.8	0.025	0.028	1.4807	
4320 minute summer	5	1.004	6	3.3	0.012	0.195	1.6927	
4320 minute summer	20	1.019	21	0.5	0.086	0.008	1.2801	
4320 minute summer	21	1.021	22	0.3	0.388	0.062	0.0112	260.2
4320 minute summer	6	1.006	7	3.7	0.013	0.259	1.1448	
4320 minute summer	7	1.007	8	3.4	0.012	0.238	1.1470	
4320 minute summer	8	1.008	9	3.2	0.011	0.195	0.9266	
4320 minute summer	9	1.009	10	2.9	0.010	0.061	0.5179	
4320 minute summer	10	1.010_1	11	2.8	0.010	0.152	0.7258	
4320 minute summer	11	1.010	12	2.6	0.009	0.115	1.8389	
4320 minute summer	12	1.012	13	2.1	0.008	0.162	1.4065	
4320 minute summer	13	1.013	14	1.7	0.007	0.134	1.4098	
4320 minute summer	14	1.014	15	1.4	0.006	0.093	1.1087	
4320 minute summer	15	1.015	16	1.1	0.005	0.063	0.8271	
4320 minute summer	16	1.016	17	0.8	0.005	0.018	0.5073	
4320 minute summer	17	1.017	18	0.7	0.005	0.034	0.5200	
4320 minute summer	18	1.018	19	0.6	0.005	0.012	0.5083	
4320 minute summer	19	1.019_1	20	0.5	0.005	0.011	0.5083	
4320 minute summer	IC05	1.004_1	5	3.3	0.047	0.052	0.9558	
4320 minute summer	RE02	3.000	2	0.6	0.019	0.010	1.1849	
4320 minute summer	2	3.001	IC05	1.3	0.032	0.022	0.5797	

**Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.52%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
15 minute summer	RE01	11	11.002	0.626	21.9	0.0113	0.0000	FLOOD RISK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
15 minute summer	RE01	2.000	IC04	21.1	1.200	1.189	0.2923	

Appendix F – Drainage Layout and Construction Details



Private Surface Water ditch

Private Surface Water perforated pipe

Private Surface Water pipe

Private 600mm Inspection Chamber (Surface Water)

Private Rodding Eye (Surface Water)

Sandbag Headwall

Gabion Cage

Proposed Paved Levels

Permeable Paving - Gravel Finished

Drainage Easement

KEY

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4. All workmanship and materials are to be to current British Standards.

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6. All services are to be located and protected as necessary by the contractor prior to the commencement of the works.

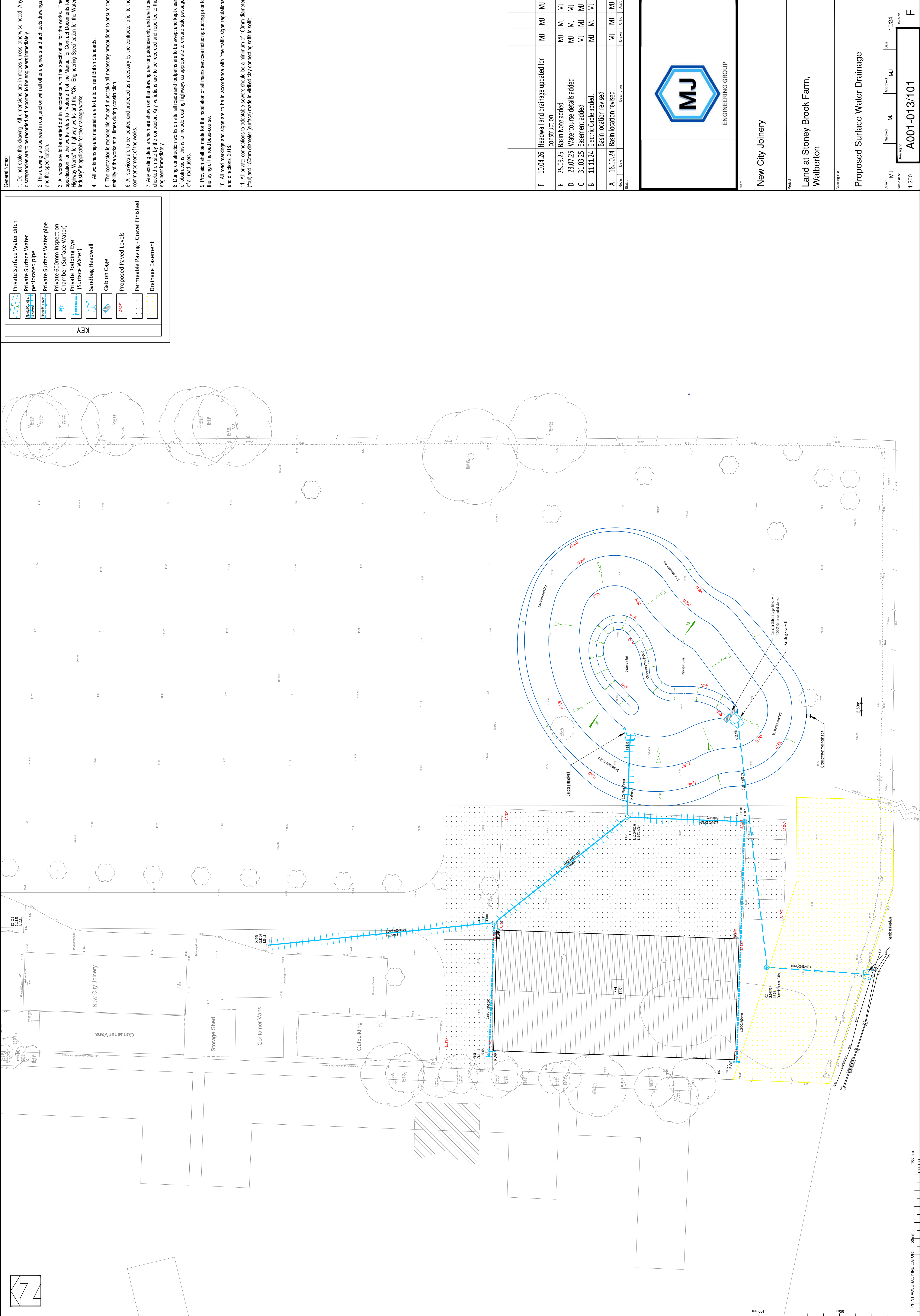
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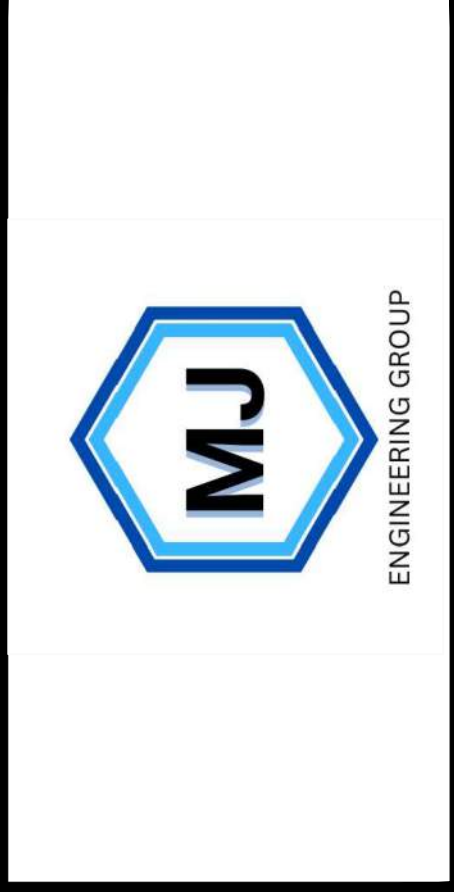
9. Provision shall be made for the installation of all mains services including ducting prior to the laying of the road base-course.

10. All road markings and signs are to be in accordance with 'the traffic signs regulations and directions' 2016.

11. All private connections to adoptable sewers should be a minimum of 100mm diameter (foot) and 150mm diameter (surface) made in vitrified clay connecting soffit to soffit.



F	10.04.26	Headwall and drainage updated for construction	MJ	MJ	MJ
E	25.09.25	Basin Note added	MJ	MJ	MJ
D	23.07.25	Watercourse details added	MJ	MJ	MJ
C	31.03.25	Easement added	MJ	MJ	MJ
B	11.11.24	Electric Cable added, Basin location revised	MJ	MJ	MJ
A	18.10.24	Basin location revised	MJ	MJ	MJ
Drawn	Version	Date	Description	Drawn	Revis



Client

New City Joinery

Project

Land at Stoney Brook Farm, Walberton

Drawing file

Proposed Surface Water Drainage

Drawn

MJ

Checked

MJ

Approved

MJ

Date

10/24

Scale at A1

1:200

Drawing No.

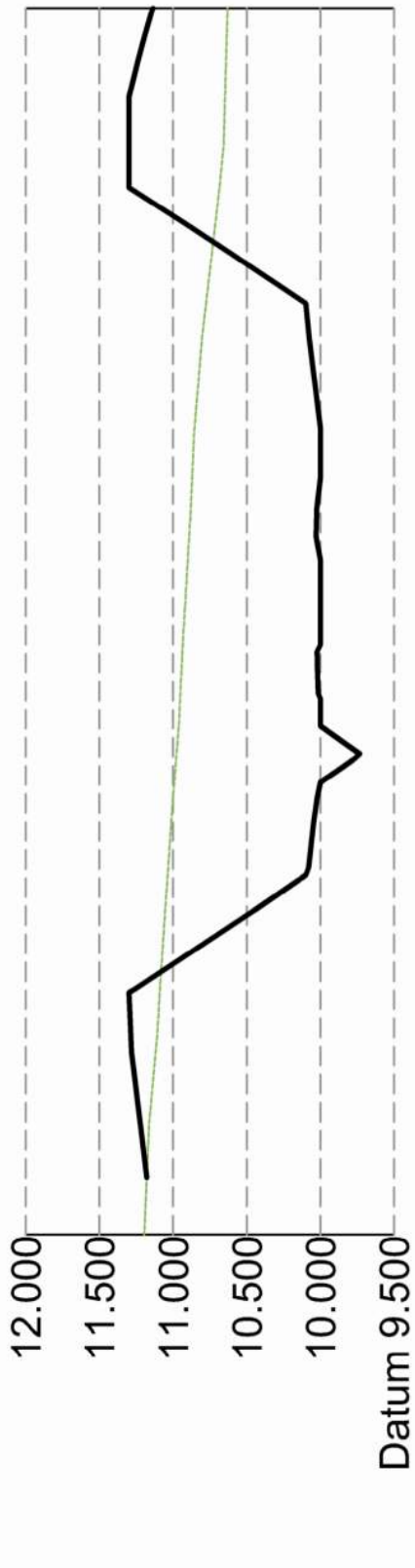
A001-013/101

Revision

F

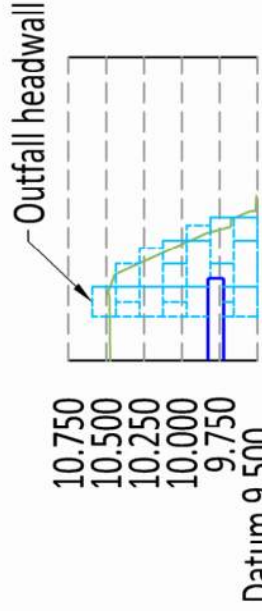
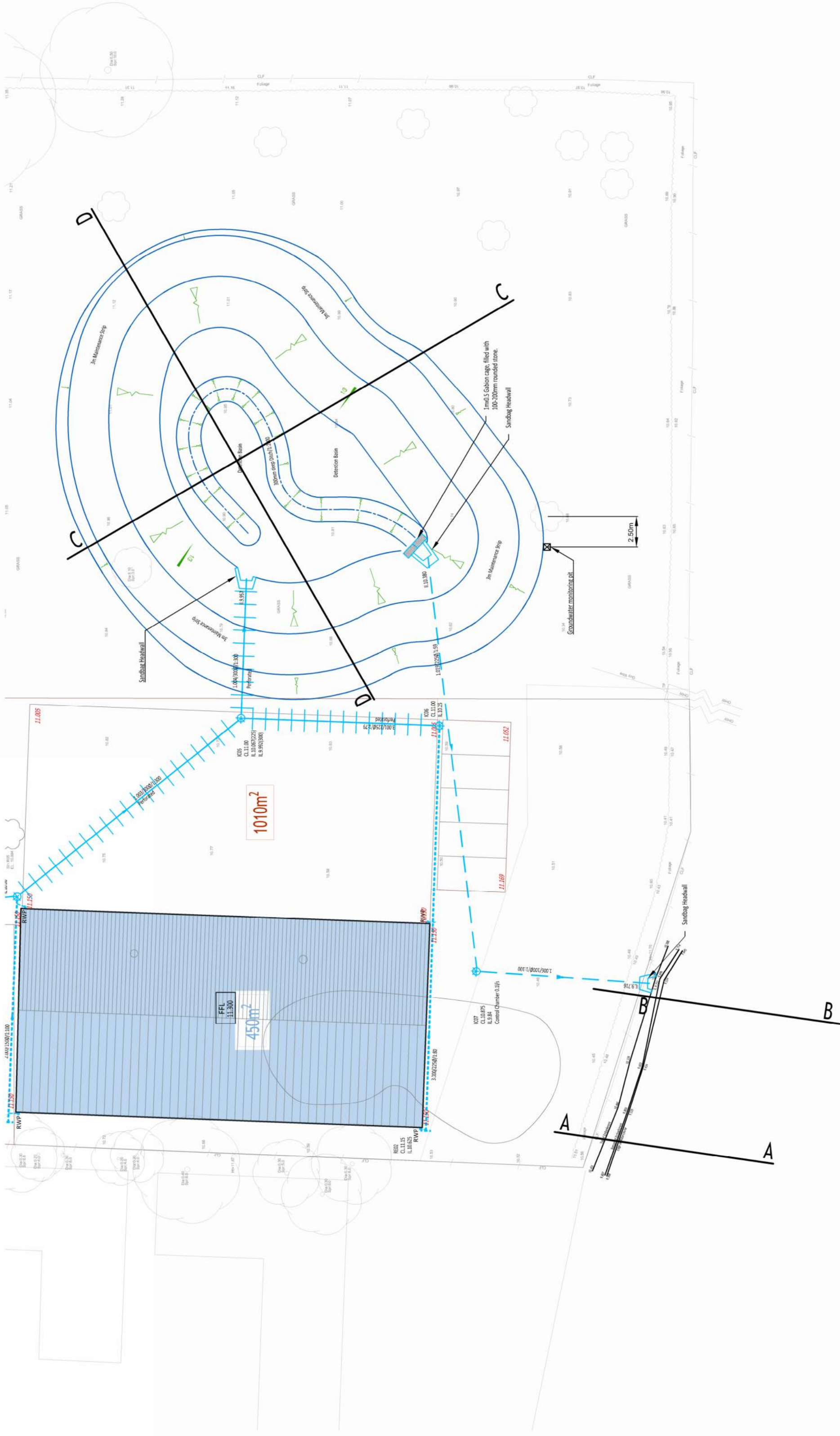
General Notes:

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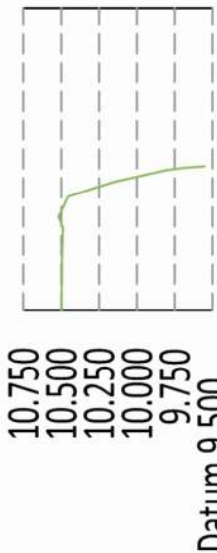
Chainage	Existing	11.265	11.196	11.275	11.178	11.290	11.158	11.284	11.121	11.093	11.298	11.093	8.000	10.745	11.067	11.039	11.045	9.804	10.000	10.953	18.000	20.000	10.000	10.911	22.000	10.027	10.887	24.000	10.000	10.868	26.000	10.016	10.844	28.000	10.066	10.810	30.000	10.226	10.766	32.000	10.831	10.720	34.000	11.300	10.675	36.000	10.651	38.000	10.639	40.000	10.630	41.587																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
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Section D-D
Scale H 1:250
V 1:50



Chainage	0.000	2.000	4.000	6.000	8.000	10.000
Existing	10.473	10.478	9.924	10.478	10.478	10.478

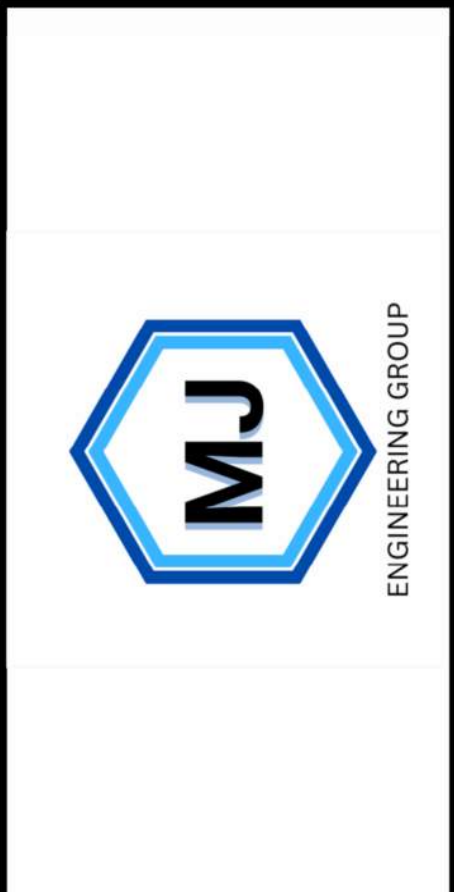
Section B-B
Scale H 1:250
V 1:50



Chainage	0.000	2.000	4.000	6.000	8.000	10.000
Existing	10.497	10.494	10.302	10.494	10.494	10.494

Section A-A
Scale H 1:250
V 1:50

Revision	Date	Description	Drawn	Check	App'd
A	10.04.26	Basin location revised	MJ	MJ	MJ



Client
New City Joinery

Project
**Land at Stoney Brook Farm,
Walberton**

Drawing title
**Proposed Surface Water Drainage
Watercourse and Pond Sections**

Drawn	Checked	Approved	Date	Revision
MJ	MJ	MJ	07/25	A

General Notes:

1. FORMATION OF TRENCH BEDS AND INSPECTION CHAMBERS

- i) Excavate immediately before laying beds and pipes or base slabs for inspection chambers.
- ii) Remove all mud, rock projections, boulders and hard spots and replace with well compacted selected fill, localised soft spots are to be hardened by tamping in granular bedding material.
- iii) If oil contamination is found adjacent to trench, the trench profile is to be cut back by 150mm from the face of bedding material and replaced with crushed concrete.

2. CONCRETE AND MORTAR

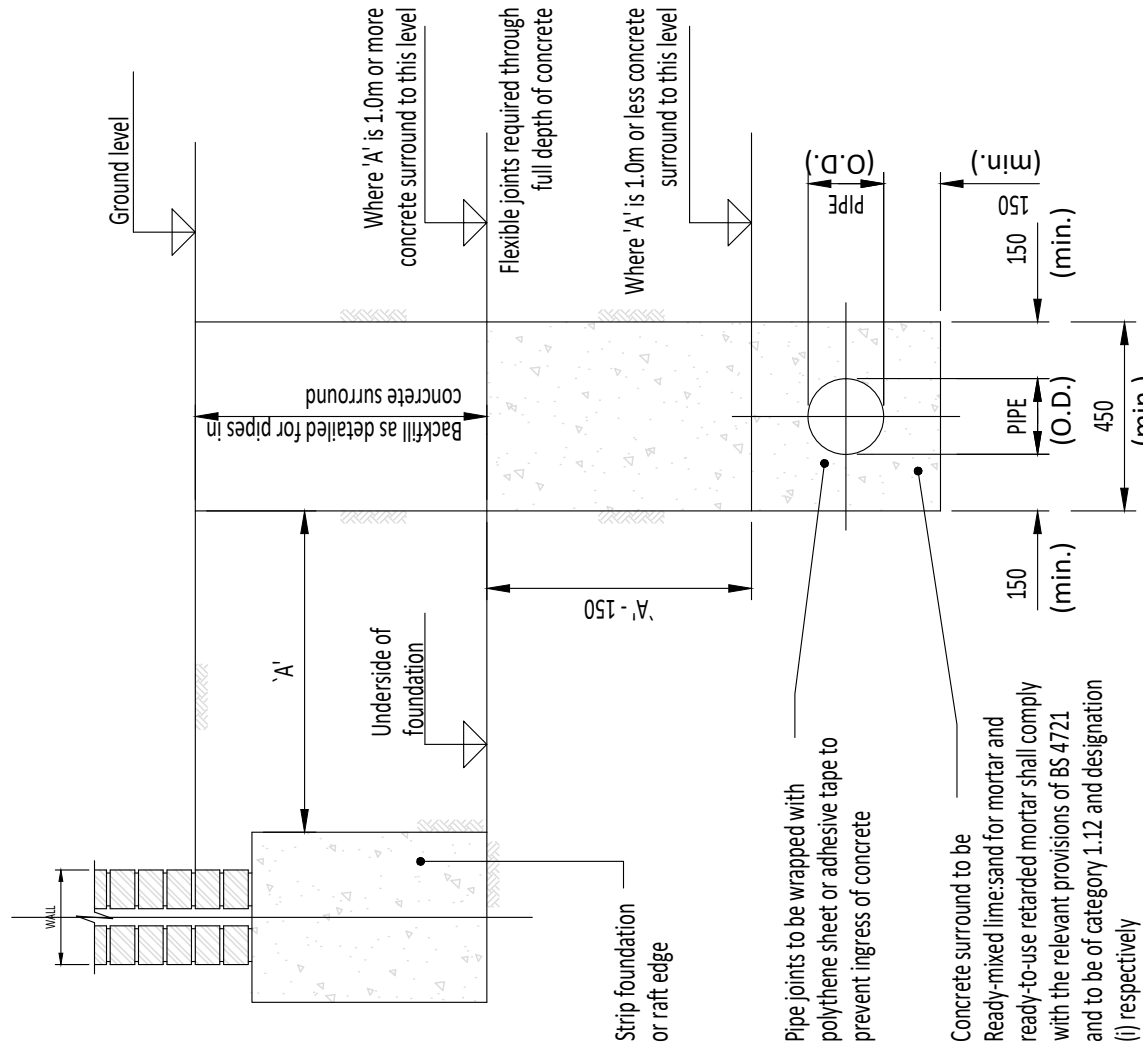
- i) The concrete used to surround pipes and in the construction of gullies and inspection chambers is to be Grade C20P (unless noted otherwise) and mixed using SPCC unless directed otherwise by the engineer or local authority. Sulphate resisting cement is to be used for in-situ or precast concrete and mortars to foul drains.

3. COVERS AND FRAMES

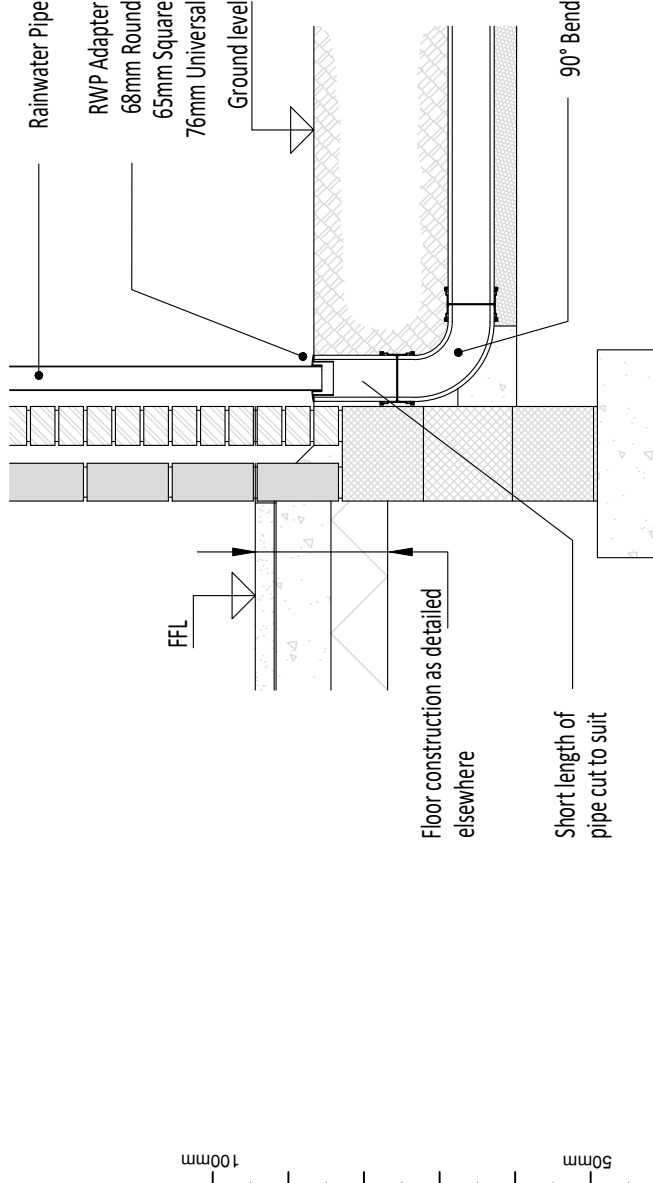
All inspection chamber cover and frames are to be laid to have the top surface in alignment with both the longitudinal and transverse gradients of adjacent roads, drives, footways and verges. They are otherwise to be laid level. All cover levels as shown on the drainage layout (elevation) are approximate. Actual cover levels are to be determined on site from the position in the road, drive, footpath or otherwise.

4. PIPES

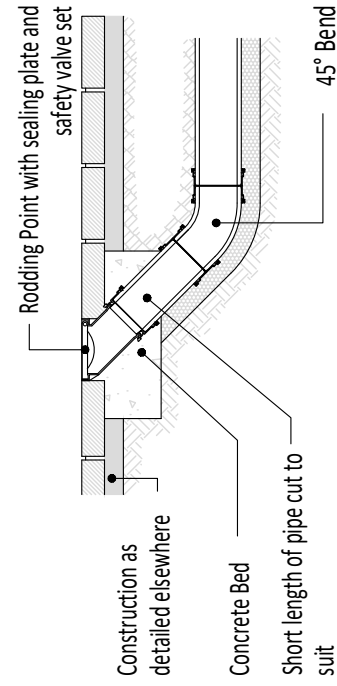
PIPE DIA. (mm)	TYPE	REMARK
100 INTERNAL (110 NOM. dia.)	uPVC	BS EN 1401
150 INTERNAL (160 NOM. dia.)	uPVC	BS EN 1401
225 INTERNAL (235 NOM. dia.)	uPVC	BS EN 1401



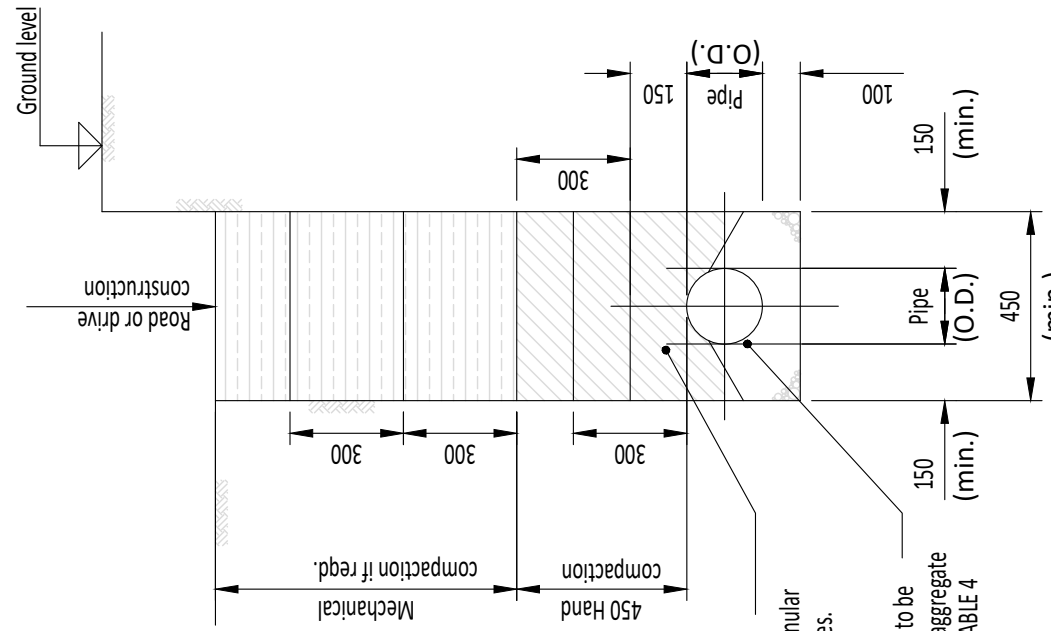
Pipe Runs Near Buildings
Scale 1:20



External RWP Connection
Scale 1:20

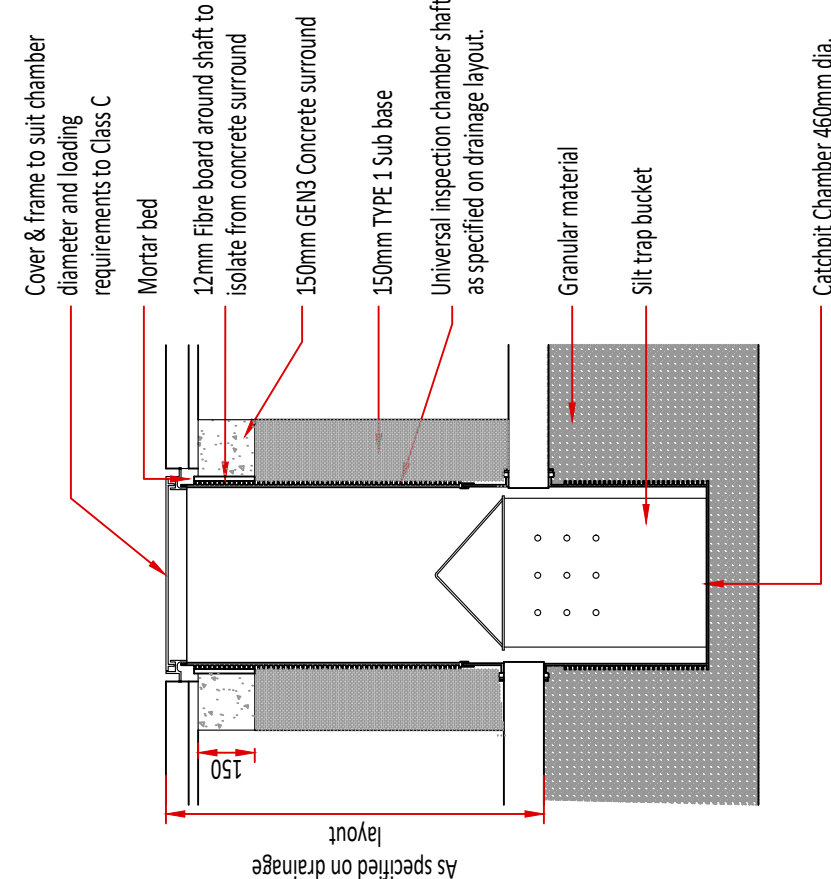


Rodding Point
Scale 1:20

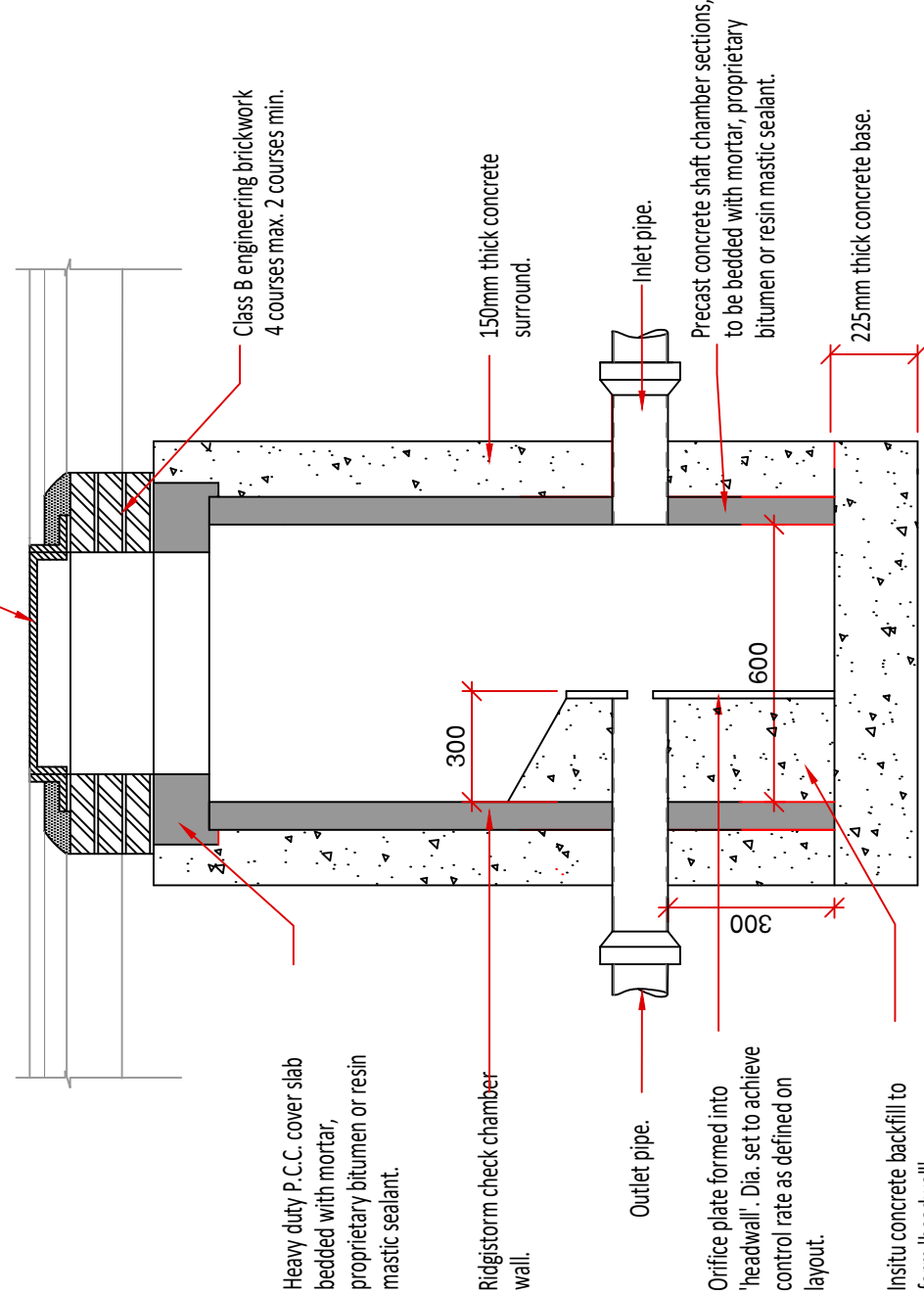


NORMAL BEDDING
Scale 1:20

Note:
Pipe protection is required by one of the three methods shown where cover is <500mm in un-trafficked areas and <300mm elsewhere.



Surface Water Catchpit Chamber
Scale 1:20



Ridgiform Check Control Chamber
Scale 1:20

- 5. MORTARS
Mortar shall be mixed only as and when required, the relevant proportions indicated in the following table, until its colour and consistency are uniform. The constituent materials shall be accurately gauged, allowance being made for bulking of sand.

NOMINAL MIXES BY VOLUME			
Cement:Lime:Sand	Cement:Sand	Cement:Sand with plasticiser	
1 : 1/4 : 3	1 : 3	1 : 2 1/2 : 3	

- i) Ready-mixed lime sand for mortar and ready-to-use retarded mortar shall comply with the relevant provisions of BS 4771 and to be of category 1.1.2 and designation (I) respectively.
- ii) All mortar shall be conveyed fresh to the works as required for use. Mortar which has begun to set or which has been set-mixed for a period of more than 1 hour shall not be used. Plasticising and set-retarding mortar admixtures shall comply with BS 4887: Part 1 and 2, respectively and shall be supplied with instructions for use.
- iii) Crushed natural stone and shall comply in all respects with BS 1200.

6. GENERAL

- i) The contractor/developer is to ensure that all of the works comply with the following:

- A) BS 8301: 1985 (Code of Practice for building drainage)
- B) The Building Regulations: Approved Document H
- C) NHBC Technical requirements
- D) BRE Digest no. 333

- ii) The storage and installation of all proprietary drainage items used are to be strictly in accordance with the manufacturers instructions.

- iii) All uPVC items as specified on this drawing are to comply with BS EN 1401.

7. GENERAL FILL MATERIAL

May be of selected locally excavated material or imported. It shall be uniform readily compacted material free from stones larger than 40mm dia. lumps of clay over 100mm, timber, frozen material, vegetable matter, tree roots and building rubbish. The material shall be placed and compacted in layers not exceeding 300mm loose depth. Mechanical compaction equipment shall not be used until there is a minimum of 450mm of compacted material above the crown of the pipe.

8. SELECTED FILL MATERIAL

To be free from stones larger than 40mm dia. lumps of clay over 100mm, timber, frozen material, vegetable matter, tree roots and building rubbish. The material shall be placed uniformly on each side of the pipe in layers not exceeding 100mm, each layer being compacted by hand tamping, care to be taken not to displace the pipe from its correct line and level.

Material	British Standard
1. Inspection chambers and manholes. Clay brick & blocks Vitrified clay Concrete-precast Concrete-in situ Plastics	BS 3921 BS EN 295, BS 65 BS 5911 BS 8110 BS 7158
2. Bedding eyes and access fittings (excludes covers and frames). As pipes refer to materials for below ground drainage	

Materials For Access Points

Material	British Standard
1. Rigid pipes Vitrified clay Concrete Grey iron Ductile iron	BS 65, BS EN 295 BS 5911 BS 437 BS EN 598
2. Flexible pipes UPVC PP Structure wall Plastic pipes	BS EN 1401* BS EN 1352* BS EN 13476

*Application see code, at should normally be specified.
Note:
Some of these materials may not be suitable for competing trade effluent.

Materials For Below Ground Drainage

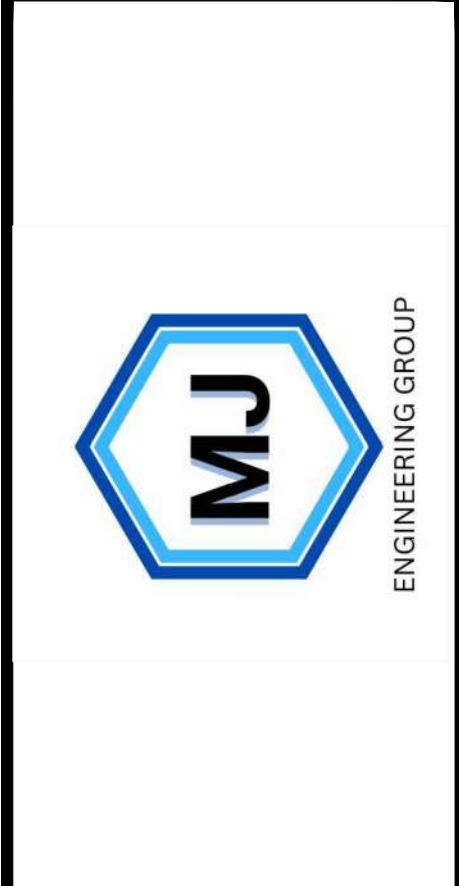
Pipe Diameter (mm)	Single Steel Aggregate (mm) to BS582
Less than 150	10
Including 150 up to 300	10 or 14
Including 300 up to 525	14 or 20
Including 525 and Above	10, 20 or 40

Table 7/1

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Drawn	Date	Description	Drawn	Checked	App'd



New City Joinery

Project
Land at Soney Brook Farm,
Walberton

Drawing title
Typical Construction Details
Sheet 1 of 2

Drawn	MJ	Checked	MJ	Approved	MJ	Date	07/25
Scale at A1							
AS							
Shown							

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6. All services are to be located and protected as necessary by the contractor prior to the commencement of the works.

7. Any existing details which are shown on this drawing are for guidance only and are to be checked on site by the contractor. Any variations are to be recorded and reported to the engineer immediately.

8. During construction works on site, all roads and footpaths are to be swept and kept clear of obstructions, this is to include existing highways as appropriate to ensure safe passage of all road users.

9. Provision shall be made for the installation of all mains services including ducting prior to the laying of the road base-course.

10. All road markings and signs are to be in accordance with "the traffic signs regulations and directions" 2016.

11. All private connections to adoptable sewers should be a minimum of 100mm diameter (foot) and 150mm diameter (surface) made in vitrified clay connecting soffit to soffit.

MJ

ENGINEERING GROUP

Client

New City Joinery

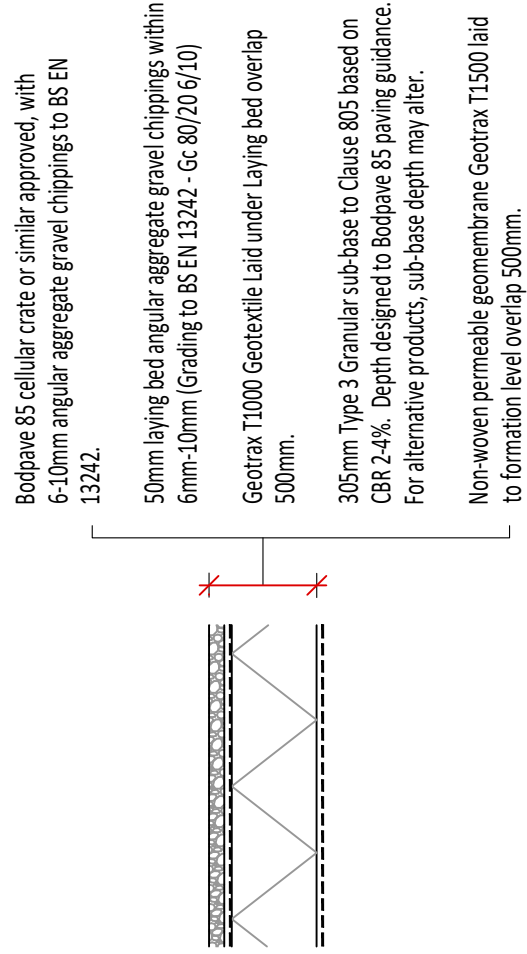
Project

Land at Stoney Brook Farm,
Walberton

Drawing title

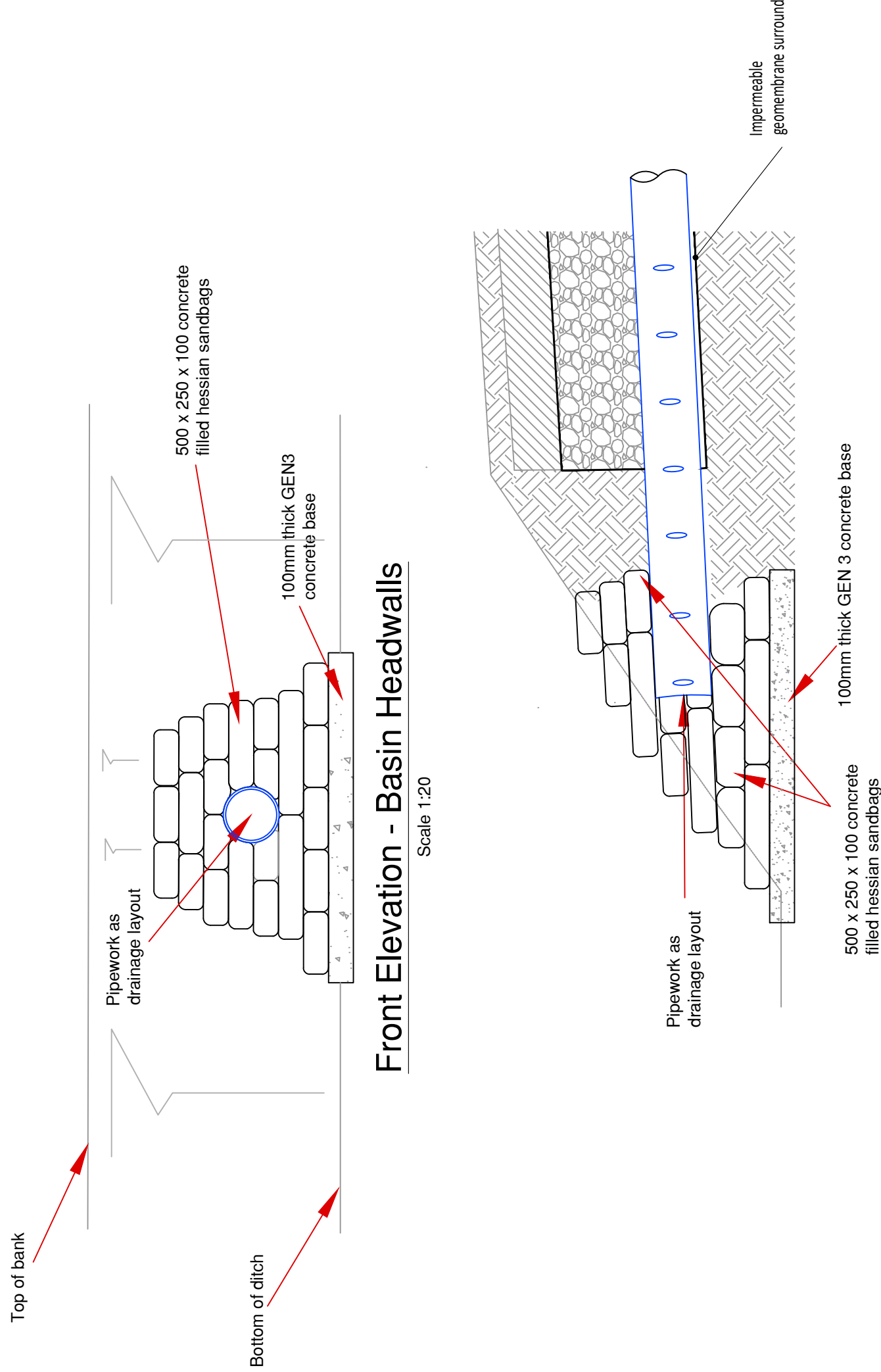
Typical Construction Details
Sheet 2 of 2

Drawn	MJ	Checked	MJ	Approved	MJ	Date	07/25	Revision	
As Shown	As	Drawing no.		A001-013/303		-			



Car Park Construction

Scale 1:20

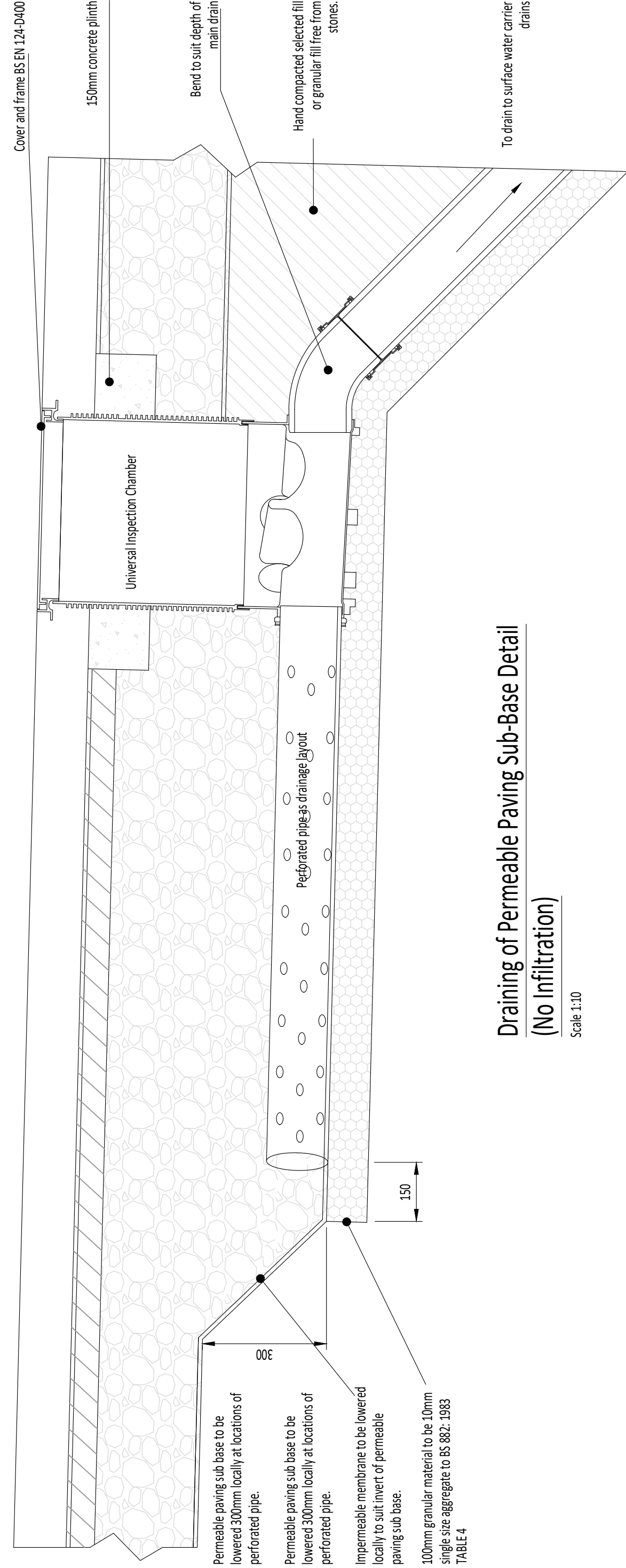
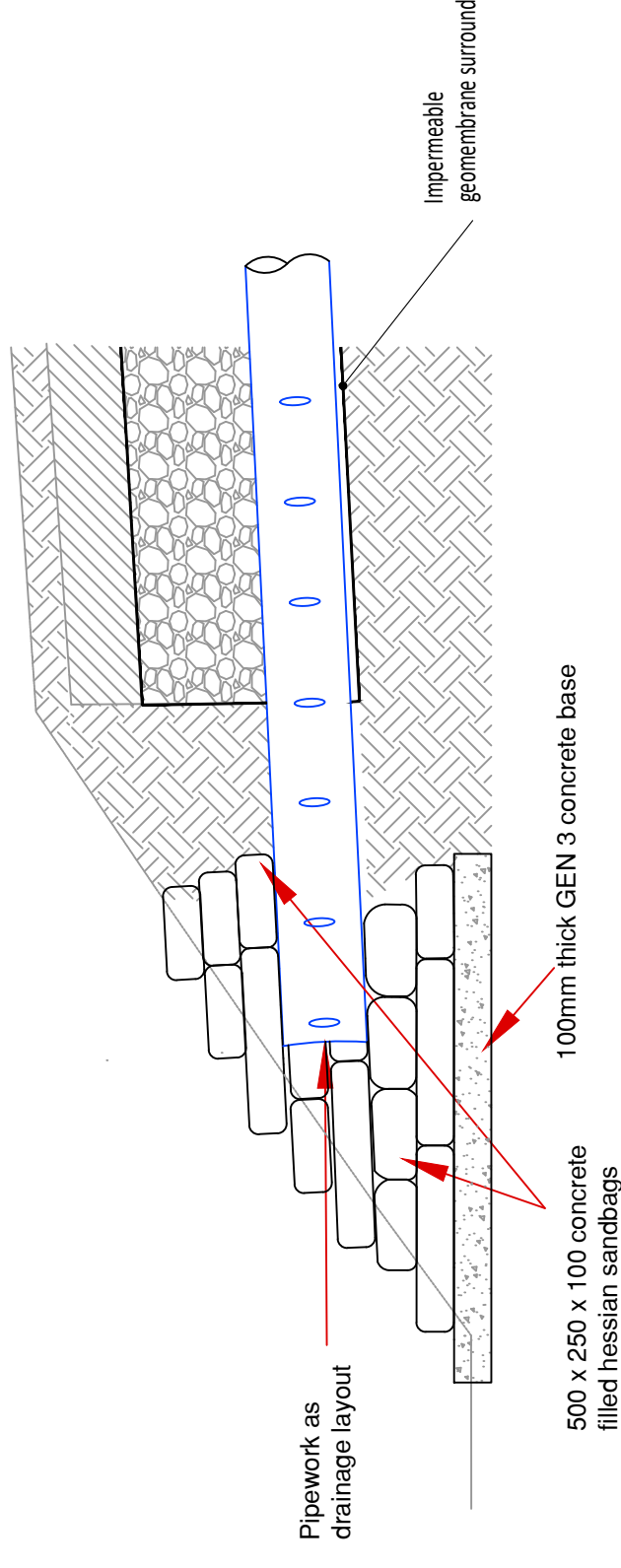


Front Elevation - Basin Headwalls

Scale 1:20

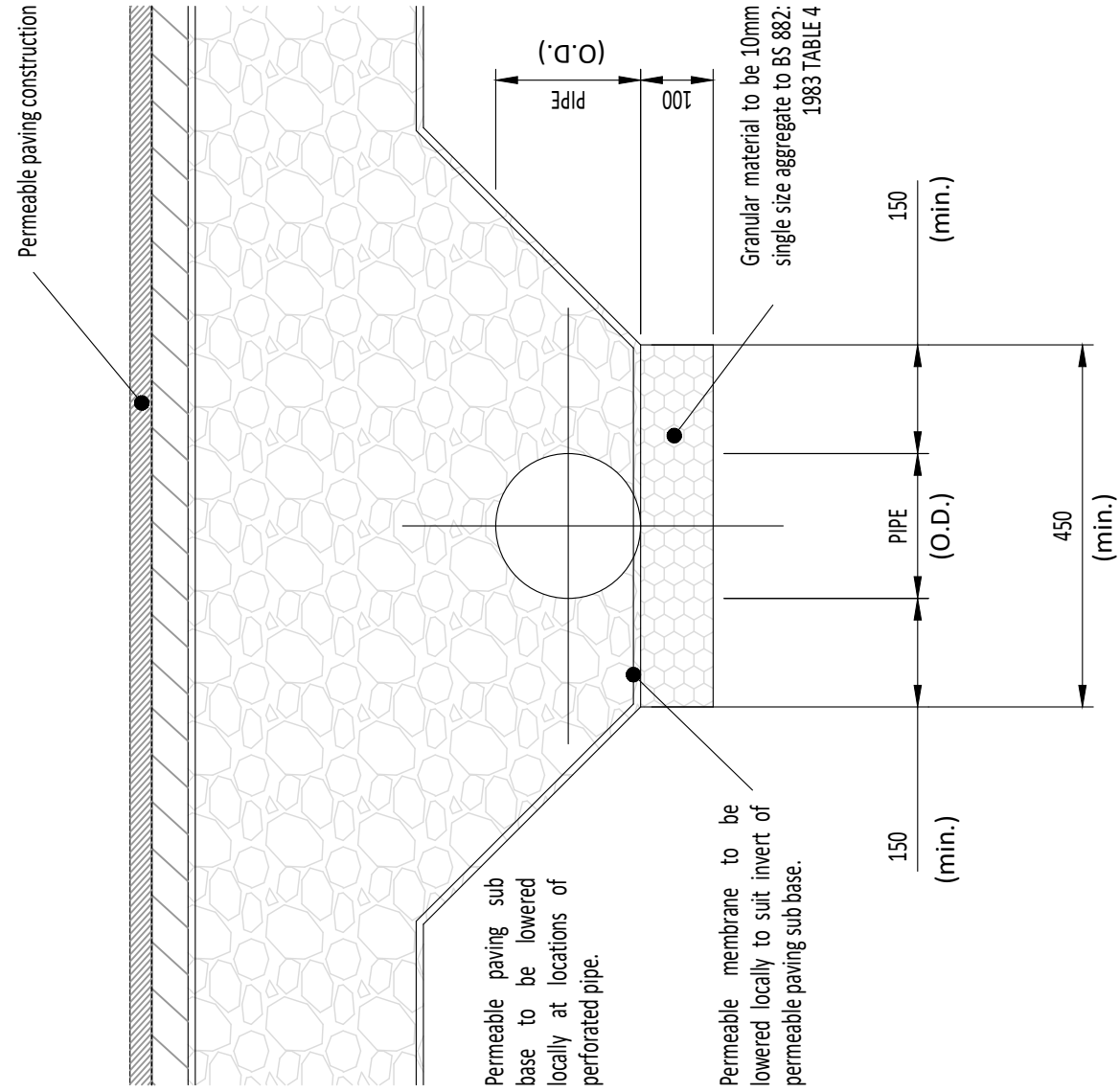
Section - Headwall 1 & 2

Scale 1:20



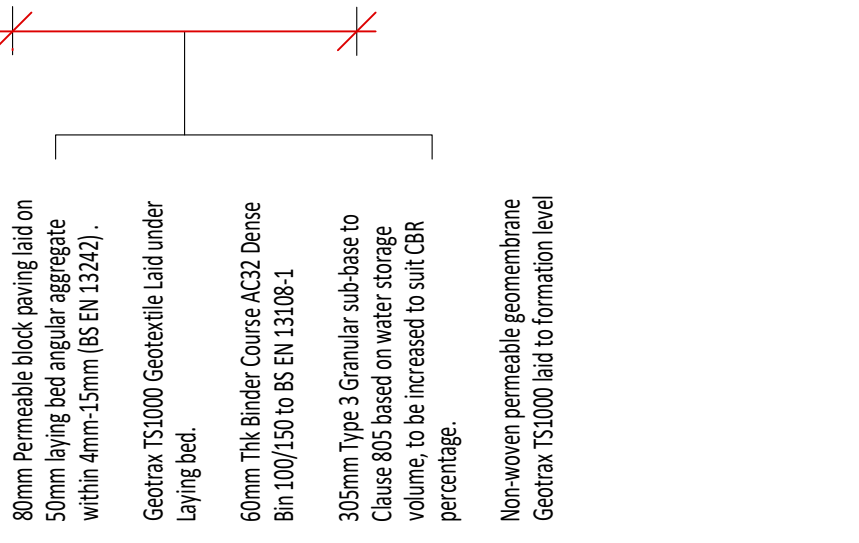
Draining of Permeable Paving Sub-Base Detail (No Infiltration)

Scale 1:10



Perforated Pipe Bedding

Scale 1:10



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