



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
A	24.08.26	Inception section revised

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 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 current 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 as required under Standard 2, swales have been installed with raised outlets to hold the first rainfall. The vegetated area for being provided will be 94m², calculations can be found in [Appendix D](#).
- 4.3.2 The permeable paving complies under Standard 2 as no additional impermeable area is being applied to the pavement.
- 4.3.3 An above ground storage tank will accommodate 1000 litres (1m³) in addition to the swales for reuse as part of the business operation.

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 to consider the groundwater impact. 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 Should the watercourse water level be high and surcharge the outfall, a surcharged level of 10.41m has been modelled. The EA mapping shows the site not to flood from the watercourse and therefore the highest possible water would be the lowest embankment level along the site boundary. The calculations can be found in [Appendix E](#).
- 4.4.9 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 will be directed to swales, with the permeable paving filtering through pavement and to the pond, with a filter at the outfall of the basin.
- 4.5.2 The control chamber will have a filter device to reduce the risk of blockages.
- 4.5.3 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 pond will support the landscaping in this area.

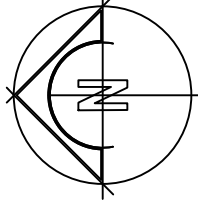
4.7 *Standard 6: - Biodiversity*

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

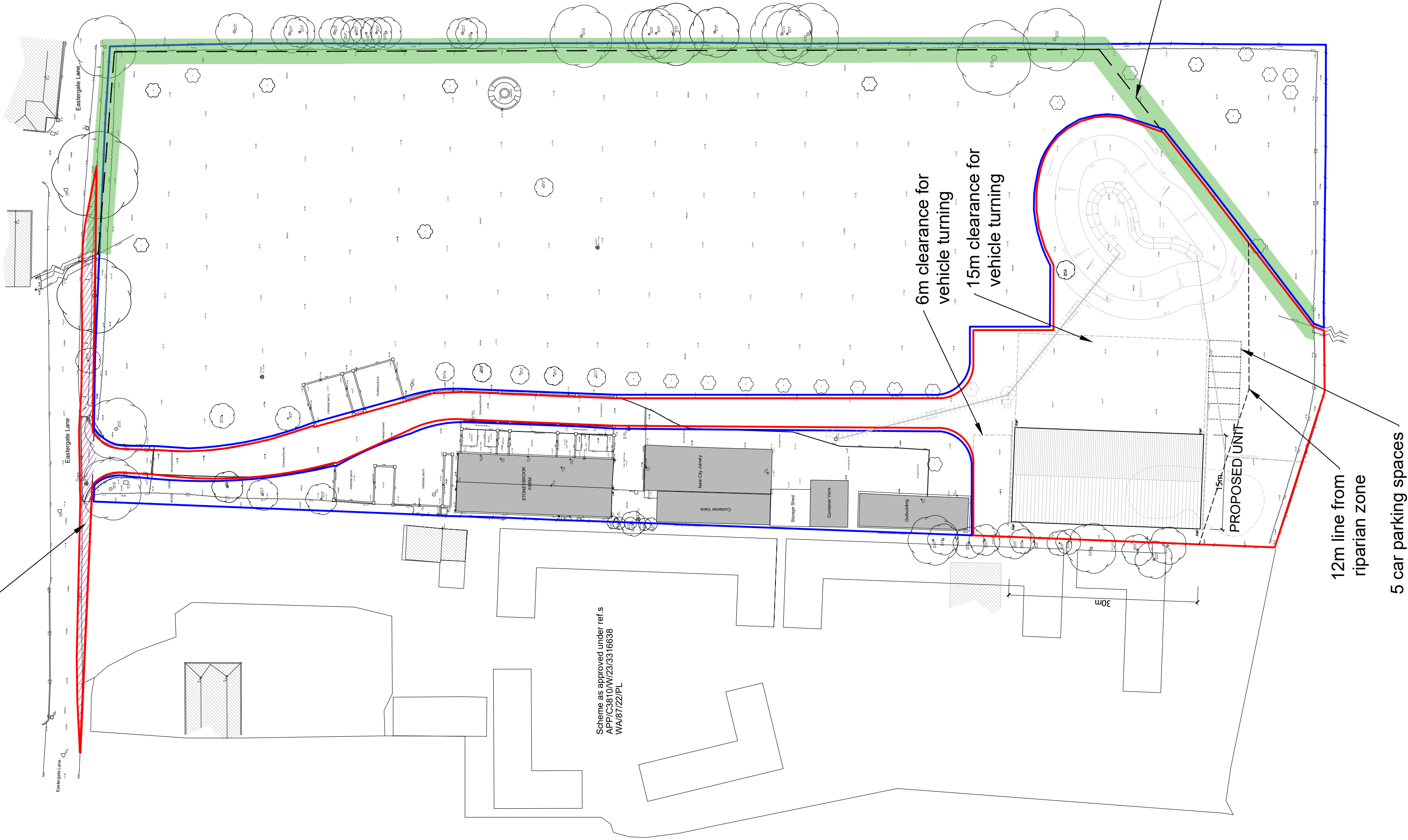
4.8 *Standard 7: Design of drainage and Maintenance*

- 4.8.1 The proposed drainage layout can be found in [Appendix G](#). The pond will be lined and at risk of floatation issues from the rising groundwater. The pond will require a minimum of 200mm topsoil over the liner, as set out in the floatation calculations in [Appendix H](#).
- 4.8.2 The maintenance of the drainage systems is vital to ensure their continued operation and efficiencies. The Maintenance Plan is a standalone document for the site to cover the maintenance for the life-time of the drainage features. This Plan can be found in [Appendix J](#).

Appendix A – Site Proposal



Visibility splays 2.4m x 47m



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

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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

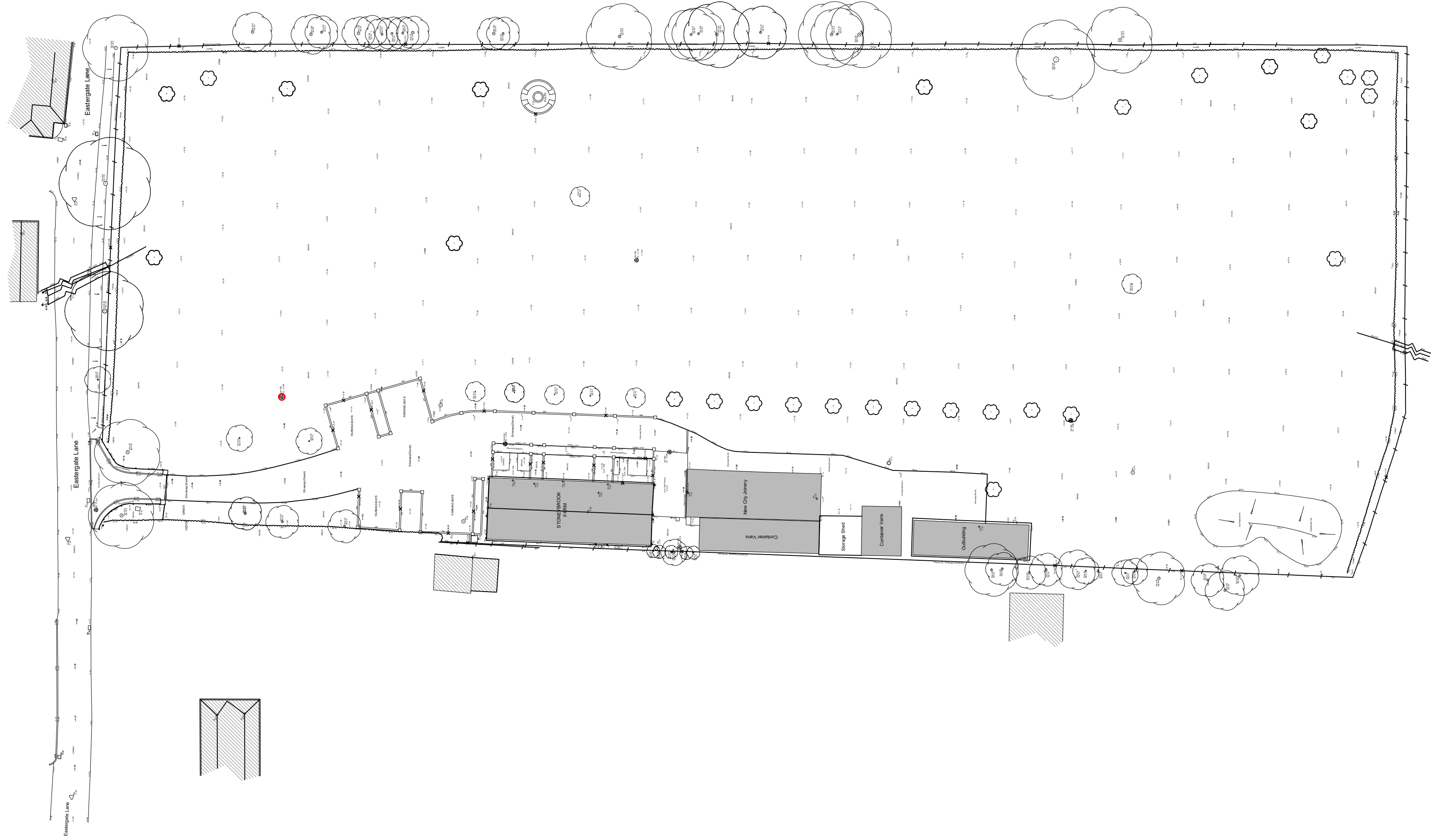
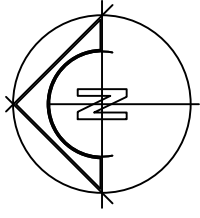
Drawing Rev

G



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 – Inception Calculation

Project Title STONEY BROOK FARM

Project Reference A001 - 013

Calculation Title INCEPTION VOLUME



ENGINEERING GROUP

PAVED AREA TO BE PERMEABLE PAVING,
(NO ADDITIONAL AREA)

ROOF AREA = 450m^2

IF 100m^2 ROOF AREA = 20m^2 VEGETATED AREA

THEN 450m^2 WILL REQUIRE 90m^2

SWALE 1.004-1 = 17.7m LONG
2.5m BASE

$17.7 \times 2.5 = 44.25\text{m}^2$
SIDE SLOPE UPTO 0.150 HIGH. @ 1 in 3.

$$(0.15^2 + 0.45^2) = \sqrt{0.225} = 0.474\text{m}$$

$$17.7 \times 0.474 \times 2 = 16.78\text{m}^2$$

SWALE 5.001-1 = 11.8m LONG.
 22.1m^2 BASE AREA.

$$\text{SIDE SLOPE} = 0.474 \times 11.8 \times 2 = 11.19\text{m}^2$$

$$\begin{array}{r} \text{TOTAL} = 44.25\text{m}^2 \\ 16.78\text{m}^2 \\ 22.10\text{m}^2 \\ 11.19\text{m}^2 \\ \hline 94.32\text{m}^2 \end{array}$$

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	0.000		5.00	11.150	600	1873685.160	-216009.957	1.054	10.096
5				11.300		1873715.268	-216037.046	1.403	9.897
20				11.300		1873713.507	-216050.271	1.349	9.951
IC07				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				10.750		1873707.036	-216010.085	0.727	10.023
RE02	0.023	10	5.00	11.150	1200	1873671.366	-216050.112	0.200	10.950
IC06	0.024		5.00	10.750	600	1873701.164	-216050.801	0.600	10.150
RE01	0.023	10	5.00	11.150	150	1873672.015	-216019.405	0.774	10.376
1	0.024		5.00	10.750	450	1873701.477	-216014.753	0.735	10.015
2	0.024		5.00	10.750	600	1873701.764	-216036.529	0.808	9.942
3				11.150		1873687.525	-216053.019	0.323	10.827
4				10.750		1873707.435	-216027.846	0.760	9.990
21				11.150		1873675.946	-216051.038	0.300	10.850

Links (Input)

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	17.921	0.600	10.156	10.096	0.060	300.0	300	6.59	48.2
1.003	IC04	IC05	21.876	0.600	10.096	10.023	0.073	300.0	300	6.99	46.8
1.007	6	7	2.223	0.012	9.945	9.944	0.001	2223.2	300	7.54	45.0
1.008	7	8	2.223	0.012	9.944	9.943	0.001	2223.4	300	7.66	44.7
1.004	5	6	3.297	0.012	9.947	9.945	0.002	1648.5	300	7.41	40.8
1.010	11	12	3.669	0.012	9.960	9.956	0.004	917.3	300	7.96	43.7
1.019	20	IC07	32.187	0.012	10.383	9.840	0.543	59.3	225	8.93	37.7
1.009	8	9	1.791	0.012	9.943	9.942	0.001	1790.6	300	7.75	44.4
1.010_1	9	10	1.000	0.012	9.942	9.942	0.000	0.0	300	7.77	44.3
1.011	10	11	1.400	0.012	9.942	9.941	0.001	1400.1	300	7.83	44.2
1.022	IC07	22	12.759	0.012	9.840	9.716	0.124	102.9	100	9.23	40.5
1.013	12	13	2.792	0.012	9.956	9.955	0.001	2792.2	300	8.13	43.3
1.014	13	14	2.793	0.012	9.955	9.954	0.001	2792.6	300	8.30	42.8
1.015	14	15	2.192	0.012	9.954	9.953	0.001	2192.2	300	8.42	42.5
1.016	15	16	1.632	0.012	9.953	9.952	0.001	1632.0	300	8.50	42.3
1.017	16	17	1.000	0.012	9.952	9.952	0.000	0.0	300	8.52	42.2
1.018	17	18	1.024	0.012	9.952	9.951	0.001	1024.0	300	8.55	42.1
1.019_1	18	19	1.000	0.012	9.951	9.951	0.000	0.0	300	8.57	42.1
1.020	19	20	1.000	0.012	9.951	9.951	0.000	0.0	300	8.59	42.0
1.004_1	IC05	4	17.765	0.045	10.026	9.990	0.036	500.0	2500	7.11	46.4

Links (Input)

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)
5.000	RE02	21	4.673	0.600	10.950	10.919	0.031	150.0	150	5.10	50.0
4.000	IC06	2	14.285	0.600	10.150	10.017	0.133	107.4	225	5.19	50.0
2.000	RE01	IC04	16.188	0.600	10.376	10.214	0.162	100.0	150	5.27	50.0
3.000	1	2	21.778	0.600	10.015	9.942	0.073	300.0	300	5.40	50.0
3.001	2	5	13.514	0.600	9.942	9.897	0.045	300.0	300	5.65	50.0
5.001	3	IC07	4.984	0.600	10.900	9.840	1.060	4.7	100	5.23	50.0
1.005	4	5	14.211	0.600	10.100	9.947	0.153	92.9	300	7.26	45.7
5.001_1	21	3	11.747	0.045	10.850	10.827	0.023	500.0	3000	5.21	50.0

SuDS CarriersTime to
Half Empty (mins)

1

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)	10.410		

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 %)	Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0	30	40	0	0
10	40	0	0	100	45	0	0

Node IC07 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-0032-5000-1000-5000
Design Depth (m)	1.000	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	0.5	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)	3720

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	14.9	14.9	1.250	32.7	42.6

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)	3720

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	14.9	14.9	1.250	32.7	42.6

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)	3720

Depth	Area	Inf Area	Depth	Area	Inf Area
(m)	(m ²)	(m ²)	(m)	(m ²)	(m ²)
0.000	14.9	14.9	1.250	32.7	42.6

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)	3720

Depth	Area	Inf Area	Depth	Area	Inf Area
(m)	(m ²)	(m ²)	(m)	(m ²)	(m ²)
0.000	14.9	14.9	1.250	32.7	42.6

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)	3720

Depth	Area	Inf Area	Depth	Area	Inf Area
(m)	(m ²)	(m ²)	(m)	(m ²)	(m ²)
0.000	14.9	14.9	1.250	32.7	42.6

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)	3720

Depth	Area	Inf Area	Depth	Area	Inf Area
(m)	(m ²)	(m ²)	(m)	(m ²)	(m ²)
0.000	14.9	14.9	1.250	32.7	42.6

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)	3720

Depth	Area	Inf Area	Depth	Area	Inf Area
(m)	(m ²)	(m ²)	(m)	(m ²)	(m ²)
0.000	14.9	14.9	1.250	32.7	42.6

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)	3720

Depth	Area	Inf Area	Depth	Area	Inf Area
(m)	(m ²)	(m ²)	(m)	(m ²)	(m ²)
0.000	14.9	14.9	1.250	32.7	42.6

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)	3720

Depth	Area	Inf Area	Depth	Area	Inf Area
(m)	(m ²)	(m ²)	(m)	(m ²)	(m ²)
0.000	14.9	14.9	1.250	32.7	42.6

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)	3720

Depth	Area	Inf Area	Depth	Area	Inf Area
(m)	(m ²)	(m ²)	(m)	(m ²)	(m ²)
0.000	14.9	14.9	1.250	32.7	42.6

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)	3720

Depth	Area	Inf Area	Depth	Area	Inf Area
(m)	(m ²)	(m ²)	(m)	(m ²)	(m ²)
0.000	14.9	14.9	1.250	32.7	42.6

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)	3720

Depth	Area	Inf Area	Depth	Area	Inf Area
(m)	(m ²)	(m ²)	(m)	(m ²)	(m ²)
0.000	14.9	14.9	1.250	32.7	42.6

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)	3720

Depth	Area	Inf Area	Depth	Area	Inf Area
(m)	(m ²)	(m ²)	(m)	(m ²)	(m ²)
0.000	14.9	14.9	1.250	32.7	42.6

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)	3720

Depth	Area	Inf Area	Depth	Area	Inf Area
(m)	(m ²)	(m ²)	(m)	(m ²)	(m ²)
0.000	14.9	14.9	1.250	32.7	42.6

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)	3720

Depth	Area	Inf Area	Depth	Area	Inf Area
(m)	(m ²)	(m ²)	(m)	(m ²)	(m ²)
0.000	14.9	14.9	1.250	32.7	42.6

Node 2 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	10.315	Slope (1:X)	1000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	9120	Depth (m)	
Safety Factor	2.0	Width (m)	14.800	Inf Depth (m)	0.305
Porosity	0.30	Length (m)	50.000		

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.30%

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	10.570	0.057	4.6	0.0162	0.0000	OK
720 minute summer	EX.IC03	690	10.462	0.306	0.8	0.0867	0.0000	SURCHARGED
720 minute summer	IC04	690	10.462	0.366	1.4	0.1037	0.0000	SURCHARGED
720 minute summer	5	690	10.462	0.565	0.9	0.0000	0.0000	SURCHARGED
720 minute summer	20	690	10.462	0.511	0.5	7.3628	0.0000	OK
720 minute summer	IC07	690	10.462	0.622	0.6	0.7039	0.0000	SURCHARGED
15 minute summer	22	1	9.794	0.078	5.7	0.0000	0.0000	OK
720 minute summer	6	690	10.462	0.517	1.8	7.3629	0.0000	SURCHARGED
720 minute summer	7	690	10.462	0.518	1.7	7.3629	0.0000	SURCHARGED
720 minute summer	8	690	10.462	0.519	1.6	7.3628	0.0000	SURCHARGED
720 minute summer	9	690	10.462	0.520	1.4	7.3628	0.0000	SURCHARGED
720 minute summer	10	690	10.462	0.520	1.3	7.3628	0.0000	SURCHARGED
720 minute summer	11	690	10.462	0.521	1.2	7.3628	0.0000	SURCHARGED
720 minute summer	12	690	10.462	0.506	1.1	7.3628	0.0000	SURCHARGED
720 minute summer	13	690	10.462	0.507	1.0	7.3628	0.0000	SURCHARGED
720 minute summer	14	690	10.462	0.508	0.9	7.3628	0.0000	SURCHARGED
720 minute summer	15	690	10.462	0.509	0.8	7.3628	0.0000	SURCHARGED
720 minute summer	16	690	10.462	0.510	0.7	7.3628	0.0000	SURCHARGED
720 minute summer	17	690	10.462	0.510	0.7	7.3628	0.0000	SURCHARGED
720 minute summer	18	690	10.462	0.511	0.6	7.3628	0.0000	SURCHARGED
720 minute summer	19	690	10.462	0.511	0.5	7.3628	0.0000	SURCHARGED
720 minute summer	IC05	690	10.462	0.439	1.4	0.0000	0.0000	OK
15 minute summer	RE02	10	10.999	0.049	3.2	0.0557	0.0000	OK
720 minute summer	IC06	690	10.462	0.312	0.5	0.0884	0.0000	FLOOD RISK
600 minute summer	RE01	615	10.462	0.086	0.6	0.0016	0.0000	OK
720 minute summer	1	675	10.462	0.447	0.5	0.0711	0.0000	FLOOD RISK
720 minute summer	2	690	10.462	0.520	1.5	27.3207	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	2.7	0.656	0.442	0.1169	
15 minute summer	EX IC02	1.001	EX.IC03	4.5	0.432	0.310	0.3186	
720 minute summer	EX.IC03	1.002	IC04	0.8	0.011	0.012	1.2620	
720 minute summer	IC04	1.003	IC05	1.4	0.019	0.021	1.5405	
720 minute summer	5	1.004	6	0.9	0.008	0.056	0.4688	
720 minute summer	20	1.019	IC07	0.5	0.065	0.008	0.8413	
720 minute summer	IC07	1.022	22	0.4	0.408	0.073	0.0126	69.2
720 minute summer	6	1.007	7	1.7	0.013	0.117	0.3179	
720 minute summer	7	1.008	8	1.6	0.012	0.108	0.3191	
720 minute summer	8	1.009	9	1.4	0.011	0.089	0.2583	
720 minute summer	9	1.010_1	10	1.3	0.010	0.027	0.1445	
720 minute summer	10	1.011	11	1.2	0.009	0.065	0.2027	
720 minute summer	11	1.010	12	1.1	0.009	0.047	0.4980	
720 minute summer	12	1.013	13	1.0	0.008	0.076	0.3827	
720 minute summer	13	1.014	14	0.9	0.008	0.070	0.3844	
720 minute summer	14	1.015	15	0.8	0.007	0.056	0.3028	
720 minute summer	15	1.016	16	0.7	0.006	0.044	0.2263	
720 minute summer	16	1.017	17	0.7	0.006	0.014	0.1390	
720 minute summer	17	1.018	18	0.6	0.005	0.028	0.1426	
720 minute summer	18	1.019_1	19	0.5	0.005	0.011	0.1395	
720 minute summer	19	1.020	20	0.5	0.004	0.010	0.1395	
720 minute summer	IC05	1.004_1	4	1.1	0.001	0.000	31.2050	
15 minute summer	RE02	5.000	21	3.1	0.642	0.218	0.0229	
720 minute summer	IC06	4.000	2	0.5	0.012	0.010	0.5681	
600 minute summer	RE01	2.000	IC04	0.6	0.043	0.033	0.2275	
720 minute summer	1	3.000	2	0.5	0.007	0.008	1.5336	
720 minute summer	2	3.001	5	0.4	0.006	0.007	0.9516	

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.30%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute summer	3	256	10.911	0.084	0.8	0.0000	0.0000	OK
720 minute summer	4	690	10.462	0.472	1.1	0.0000	0.0000	FLOOD RISK
480 minute summer	21	256	10.911	0.061	0.8	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 summer	3	5.001	IC07	0.7	0.149	0.026	0.0207	
720 minute summer	4	1.005	5	0.8	0.011	0.007	1.0007	
480 minute summer	21	5.001_1	3	0.8	0.009	0.000	2.7540	

Results for 10 year +40% CC 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
15 minute summer	EX IC01	12	11.499	0.699	11.3	0.1979	0.0000	FLOOD RISK
15 minute summer	EX IC02	11	10.757	0.244	16.3	0.0689	0.0000	SURCHARGED
2160 minute summer	EX.IC03	2160	10.607	0.451	0.9	0.1277	0.0000	SURCHARGED
2160 minute summer	IC04	2160	10.607	0.511	1.5	0.1446	0.0000	SURCHARGED
2160 minute summer	5	2160	10.607	0.710	1.1	0.0000	0.0000	SURCHARGED
2160 minute summer	20	2160	10.607	0.656	0.5	10.5179	0.0000	OK
2160 minute summer	IC07	2160	10.607	0.767	0.6	0.8676	0.0000	SURCHARGED
15 minute summer	22	1	9.794	0.078	5.7	0.0000	0.0000	OK
2160 minute summer	6	2160	10.607	0.662	2.1	10.5179	0.0000	SURCHARGED
2160 minute summer	7	2160	10.607	0.663	2.0	10.5179	0.0000	SURCHARGED
2160 minute summer	8	2160	10.607	0.664	1.8	10.5179	0.0000	SURCHARGED
2160 minute summer	9	2160	10.607	0.665	1.7	10.5179	0.0000	SURCHARGED
2160 minute summer	10	2160	10.607	0.665	1.5	10.5179	0.0000	SURCHARGED
2160 minute summer	11	2160	10.607	0.666	1.4	10.5179	0.0000	SURCHARGED
2160 minute summer	12	2160	10.607	0.651	1.2	10.5179	0.0000	SURCHARGED
2160 minute summer	13	2160	10.607	0.652	1.1	10.5179	0.0000	SURCHARGED
2160 minute summer	14	2160	10.607	0.653	0.9	10.5179	0.0000	SURCHARGED
2160 minute summer	15	2160	10.607	0.654	0.7	10.5179	0.0000	SURCHARGED
2160 minute summer	16	2160	10.607	0.655	0.6	10.5179	0.0000	SURCHARGED
2160 minute summer	17	2160	10.607	0.655	0.5	10.5179	0.0000	SURCHARGED
2160 minute summer	18	2160	10.607	0.656	0.5	10.5179	0.0000	SURCHARGED
2160 minute summer	19	2160	10.607	0.656	0.5	10.5179	0.0000	SURCHARGED
2160 minute summer	IC05	2160	10.607	0.584	1.5	0.0000	0.0000	OK
15 minute summer	RE02	10	11.065	0.115	13.0	0.1305	0.0000	OK
2160 minute summer	IC06	2160	10.607	0.457	0.6	0.1294	0.0000	FLOOD RISK
2160 minute summer	RE01	2160	10.607	0.231	0.6	0.0042	0.0000	SURCHARGED
2160 minute summer	1	2160	10.607	0.592	0.6	0.0941	0.0000	FLOOD RISK
2160 minute summer	2	2160	10.607	0.665	1.8	59.4863	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	9.1	1.169	1.516	0.2248	
15 minute summer	EX IC02	1.001	EX.IC03	15.8	0.895	1.090	0.5477	
2160 minute summer	EX.IC03	1.002	IC04	0.9	0.013	0.014	1.2620	
2160 minute summer	IC04	1.003	IC05	1.5	0.021	0.023	1.5405	
2160 minute summer	5	1.004	6	1.1	0.007	0.067	0.7684	
2160 minute summer	20	1.019	IC07	0.4	0.065	0.007	1.2794	
2160 minute summer	IC07	1.022	22	0.4	0.420	0.080	0.0135	204.9
2160 minute summer	6	1.007	7	2.0	0.012	0.136	0.5204	
2160 minute summer	7	1.008	8	1.8	0.011	0.125	0.5220	
2160 minute summer	8	1.009	9	1.7	0.010	0.103	0.4221	
2160 minute summer	9	1.010_1	10	1.5	0.009	0.032	0.2360	
2160 minute summer	10	1.011	11	1.4	0.008	0.075	0.3309	
2160 minute summer	11	1.010	12	1.2	0.008	0.054	0.8248	
2160 minute summer	12	1.013	13	1.1	0.007	0.082	0.6324	
2160 minute summer	13	1.014	14	0.9	0.006	0.070	0.6346	
2160 minute summer	14	1.015	15	0.7	0.005	0.051	0.4995	
2160 minute summer	15	1.016	16	0.6	0.005	0.035	0.3730	
2160 minute summer	16	1.017	17	0.5	0.005	0.011	0.2289	
2160 minute summer	17	1.018	18	0.5	0.005	0.024	0.2348	
2160 minute summer	18	1.019_1	19	0.5	0.004	0.010	0.2296	
2160 minute summer	19	1.020	20	0.5	0.004	0.010	0.2296	
2160 minute summer	IC05	1.004_1	4	1.2	0.001	0.000	45.7581	
15 minute summer	RE02	5.000	21	12.9	0.928	0.891	0.0649	
2160 minute summer	IC06	4.000	2	0.6	0.015	0.012	0.5681	
2160 minute summer	RE01	2.000	IC04	0.6	0.034	0.033	0.2850	
2160 minute summer	1	3.000	2	0.6	0.008	0.009	1.5336	
2160 minute summer	2	3.001	5	0.3	0.005	0.005	0.9516	

Results for 10 year +40% CC 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
30 minute summer	3	20	10.940	0.113	10.6	0.0000	0.0000	OK
2160 minute summer	4	2160	10.607	0.617	1.2	0.0000	0.0000	FLOOD RISK
30 minute summer	21	21	10.939	0.089	11.8	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)
30 minute summer	3	5.001	IC07	8.7	1.376	0.308	0.0268	
2160 minute summer	4	1.005	5	0.8	0.012	0.007	1.0007	
30 minute summer	21	5.001_1	3	10.6	0.089	0.005	3.9284	

Results for 30 year +40% CC Critical Storm Duration. Lowest mass balance: 99.46%

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	0.8721	FLOOD
15 minute summer	EX IC02	11	10.861	0.348	18.6	0.0986	0.0000	SURCHARGED
2880 minute summer	EX.IC03	2880	10.652	0.496	0.9	0.1405	0.0000	SURCHARGED
2880 minute summer	IC04	2880	10.652	0.556	1.5	0.1574	0.0000	SURCHARGED
2880 minute summer	5	2880	10.652	0.755	1.1	0.0000	0.0000	SURCHARGED
2880 minute summer	20	2880	10.652	0.701	0.5	11.5654	0.0000	SURCHARGED
2880 minute summer	IC07	2880	10.652	0.812	0.6	0.9187	0.0000	SURCHARGED
15 minute summer	22	1	9.794	0.078	5.7	0.0000	0.0000	OK
2880 minute summer	6	2880	10.652	0.707	2.1	11.5654	0.0000	SURCHARGED
2880 minute summer	7	2880	10.652	0.708	2.0	11.5654	0.0000	SURCHARGED
2880 minute summer	8	2880	10.652	0.709	1.8	11.5654	0.0000	SURCHARGED
2880 minute summer	9	2880	10.652	0.710	1.7	11.5654	0.0000	SURCHARGED
2880 minute summer	10	2880	10.652	0.710	1.5	11.5654	0.0000	SURCHARGED
2880 minute summer	11	2880	10.652	0.711	1.4	11.5654	0.0000	SURCHARGED
2880 minute summer	12	2880	10.652	0.696	1.2	11.5654	0.0000	SURCHARGED
2880 minute summer	13	2880	10.652	0.697	1.1	11.5654	0.0000	SURCHARGED
2880 minute summer	14	2880	10.652	0.698	0.9	11.5654	0.0000	SURCHARGED
2880 minute summer	15	2880	10.652	0.699	0.8	11.5654	0.0000	SURCHARGED
2880 minute summer	16	2880	10.652	0.700	0.6	11.5654	0.0000	SURCHARGED
2880 minute summer	17	2880	10.652	0.700	0.5	11.5654	0.0000	SURCHARGED
2880 minute summer	18	2880	10.652	0.701	0.5	11.5654	0.0000	SURCHARGED
2880 minute summer	19	2880	10.652	0.701	0.5	11.5654	0.0000	SURCHARGED
2880 minute summer	IC05	2880	10.652	0.629	1.5	0.0000	0.0000	FLOOD RISK
15 minute summer	RE02	10	11.094	0.144	16.9	0.1630	0.0000	OK
2880 minute summer	IC06	2880	10.652	0.502	0.6	0.1422	0.0000	FLOOD RISK
2880 minute summer	RE01	2880	10.652	0.276	0.6	0.0050	0.0000	SURCHARGED
2880 minute summer	1	2880	10.652	0.637	0.6	0.1013	0.0000	FLOOD RISK
2880 minute summer	2	2880	10.652	0.710	1.8	69.5415	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	9.0	1.151	1.492	0.2248	
15 minute summer	EX IC02	1.001	EX.IC03	18.0	1.023	1.246	0.5477	
2880 minute summer	EX.IC03	1.002	IC04	0.9	0.013	0.014	1.2620	
2880 minute summer	IC04	1.003	IC05	1.5	0.021	0.023	1.5405	
2880 minute summer	5	1.004	6	1.1	0.006	0.067	0.8772	
2880 minute summer	20	1.019	IC07	0.5	0.064	0.007	1.2801	
2880 minute summer	IC07	1.022	22	0.5	0.423	0.082	0.0137	255.9
2880 minute summer	6	1.007	7	2.0	0.011	0.136	0.5939	
2880 minute summer	7	1.008	8	1.8	0.010	0.126	0.5956	
2880 minute summer	8	1.009	9	1.7	0.009	0.103	0.4815	
2880 minute summer	9	1.010_1	10	1.5	0.008	0.032	0.2692	
2880 minute summer	10	1.011	11	1.4	0.008	0.075	0.3774	
2880 minute summer	11	1.010	12	1.2	0.007	0.054	0.9437	
2880 minute summer	12	1.013	13	1.1	0.006	0.082	0.7233	
2880 minute summer	13	1.014	14	0.9	0.006	0.070	0.7256	
2880 minute summer	14	1.015	15	0.8	0.005	0.052	0.5711	
2880 minute summer	15	1.016	16	0.6	0.005	0.036	0.4264	
2880 minute summer	16	1.017	17	0.5	0.005	0.011	0.2616	
2880 minute summer	17	1.018	18	0.5	0.005	0.024	0.2683	
2880 minute summer	18	1.019_1	19	0.5	0.004	0.010	0.2624	
2880 minute summer	19	1.020	20	0.5	0.004	0.010	0.2624	
2880 minute summer	IC05	1.004_1	4	1.1	0.001	0.000	50.7655	
15 minute summer	RE02	5.000	21	16.7	1.018	1.155	0.0758	
2880 minute summer	IC06	4.000	2	0.6	0.015	0.012	0.5681	
2880 minute summer	RE01	2.000	IC04	0.6	0.034	0.033	0.2850	
2880 minute summer	1	3.000	2	0.6	0.008	0.009	1.5336	
2880 minute summer	2	3.001	5	0.3	0.005	0.005	0.9516	

Results for 30 year +40% CC Critical Storm Duration. Lowest mass balance: 99.46%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute summer	3	20	10.953	0.126	15.6	0.0000	0.0000	OK
2880 minute summer	4	2880	10.652	0.662	1.1	0.0000	0.0000	FLOOD RISK
30 minute summer	21	20	10.952	0.102	15.4	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)
30 minute summer	3	5.001	IC07	11.9	1.740	0.422	0.0301	
2880 minute summer	4	1.005	5	0.8	0.012	0.007	1.0007	
30 minute summer	21	5.001_1	3	15.6	0.123	0.008	4.4890	

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.50%

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	2.3891	FLOOD
15 minute summer	EX IC02	11	10.980	0.467	20.8	0.1320	0.0000	SURCHARGED
4320 minute summer	EX.IC03	4140	10.732	0.576	0.9	0.1629	0.0000	SURCHARGED
4320 minute summer	IC04	4140	10.732	0.636	1.5	0.1799	0.0000	SURCHARGED
4320 minute summer	5	4140	10.732	0.835	1.1	0.0000	0.0000	SURCHARGED
4320 minute summer	20	4140	10.732	0.781	0.5	13.4756	0.0000	SURCHARGED
4320 minute summer	IC07	4140	10.732	0.892	0.6	1.0086	0.0000	FLOOD RISK
15 minute summer	22	1	9.794	0.078	5.7	0.0000	0.0000	OK
4320 minute summer	6	4140	10.732	0.787	2.1	13.4756	0.0000	SURCHARGED
4320 minute summer	7	4140	10.732	0.788	2.0	13.4756	0.0000	SURCHARGED
4320 minute summer	8	4140	10.732	0.789	1.8	13.4756	0.0000	SURCHARGED
4320 minute summer	9	4140	10.732	0.790	1.7	13.4756	0.0000	SURCHARGED
4320 minute summer	10	4140	10.732	0.790	1.5	13.4756	0.0000	SURCHARGED
4320 minute summer	11	4140	10.732	0.791	1.4	13.4756	0.0000	SURCHARGED
4320 minute summer	12	4140	10.732	0.776	1.2	13.4756	0.0000	SURCHARGED
4320 minute summer	13	4140	10.732	0.777	1.1	13.4756	0.0000	SURCHARGED
4320 minute summer	14	4140	10.732	0.778	0.9	13.4756	0.0000	SURCHARGED
4320 minute summer	15	4140	10.732	0.779	0.8	13.4756	0.0000	SURCHARGED
4320 minute summer	16	4140	10.732	0.780	0.6	13.4756	0.0000	SURCHARGED
4320 minute summer	17	4140	10.732	0.780	0.5	13.4756	0.0000	SURCHARGED
4320 minute summer	18	4140	10.732	0.781	0.5	13.4756	0.0000	SURCHARGED
4320 minute summer	19	4140	10.732	0.781	0.5	13.4756	0.0000	SURCHARGED
4320 minute summer	IC05	4140	10.732	0.709	1.5	0.0000	0.0000	FLOOD RISK
15 minute summer	RE02	10	11.146	0.196	21.9	0.2218	0.0000	FLOOD RISK
4320 minute summer	IC06	4140	10.732	0.582	0.6	0.1646	0.0000	FLOOD RISK
15 minute summer	RE01	11	10.791	0.415	21.9	0.0075	0.0000	SURCHARGED
4320 minute summer	1	4140	10.732	0.717	0.6	0.1140	0.0000	FLOOD RISK
4320 minute summer	2	4140	10.732	0.790	1.8	87.2026	0.0000	FLOOD RISK

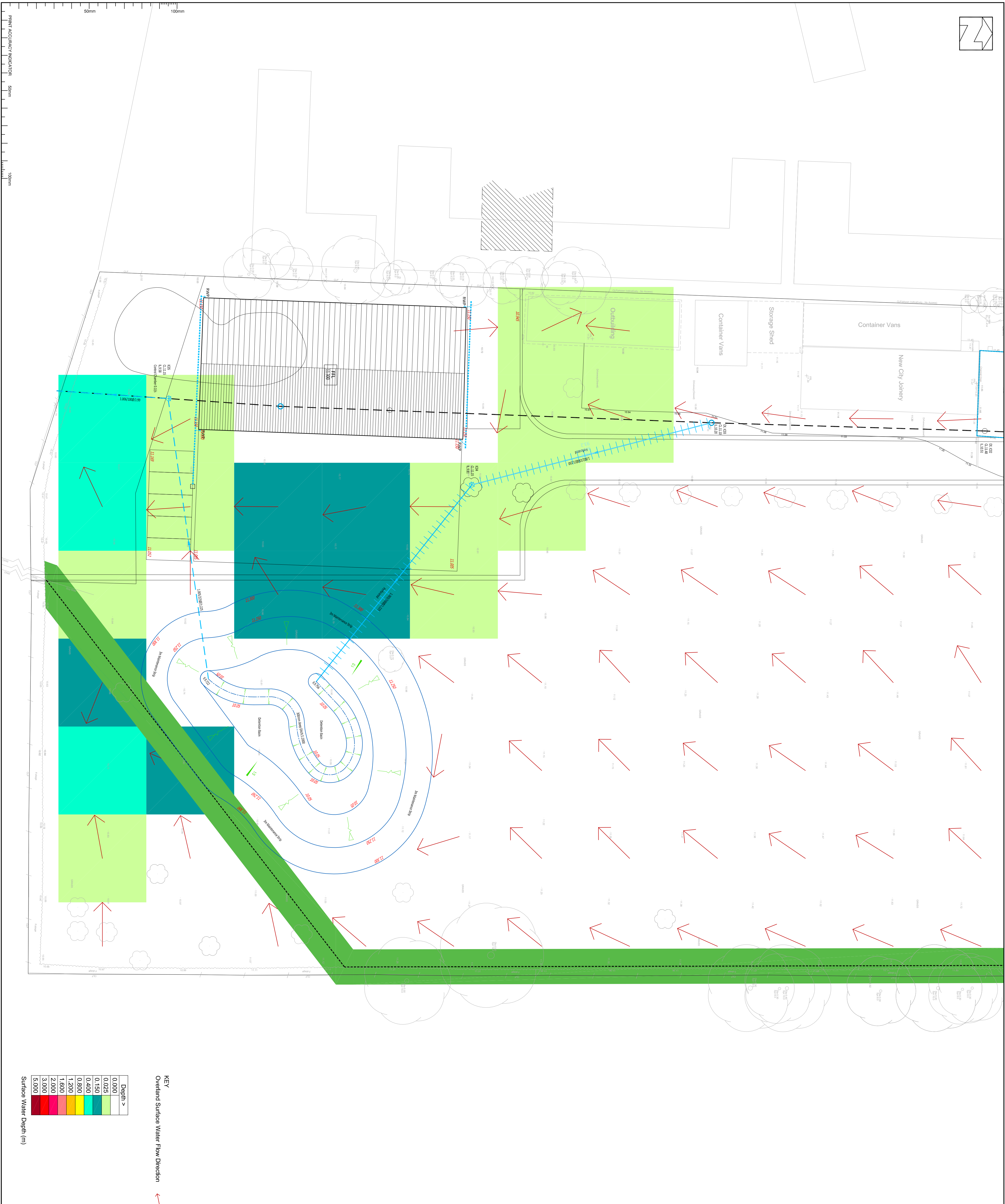
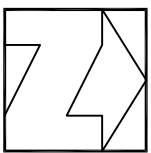
Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
30 minute summer	EX IC01	1.000	EX IC02	8.8	1.120	1.452	0.2248	
15 minute summer	EX IC02	1.001	EX.IC03	20.1	1.143	1.392	0.5477	
4320 minute summer	EX.IC03	1.002	IC04	0.9	0.012	0.014	1.2620	
4320 minute summer	IC04	1.003	IC05	1.5	0.021	0.023	1.5405	
4320 minute summer	5	1.004	6	1.1	0.006	0.068	1.0856	
4320 minute summer	20	1.019	IC07	0.5	0.065	0.007	1.2801	
4320 minute summer	IC07	1.022	22	0.5	0.428	0.086	0.0141	349.1
4320 minute summer	6	1.007	7	2.0	0.010	0.137	0.7347	
4320 minute summer	7	1.008	8	1.8	0.009	0.126	0.7366	
4320 minute summer	8	1.009	9	1.7	0.008	0.104	0.5953	
4320 minute summer	9	1.010_1	10	1.5	0.007	0.032	0.3328	
4320 minute summer	10	1.011	11	1.4	0.007	0.076	0.4665	
4320 minute summer	11	1.010	12	1.2	0.006	0.054	1.1721	
4320 minute summer	12	1.013	13	1.1	0.005	0.083	0.8976	
4320 minute summer	13	1.014	14	0.9	0.005	0.071	0.9002	
4320 minute summer	14	1.015	15	0.8	0.005	0.052	0.7083	
4320 minute summer	15	1.016	16	0.6	0.005	0.036	0.5287	
4320 minute summer	16	1.017	17	0.5	0.005	0.010	0.3244	
4320 minute summer	17	1.018	18	0.5	0.004	0.023	0.3326	
4320 minute summer	18	1.019_1	19	0.5	0.004	0.010	0.3252	
4320 minute summer	19	1.020	20	0.5	0.004	0.010	0.3252	
4320 minute summer	IC05	1.004_1	4	1.1	0.000	0.000	60.0885	
15 minute summer	RE02	5.000	21	21.7	1.233	1.500	0.0797	
4320 minute summer	IC06	4.000	2	0.6	0.015	0.012	0.5681	
15 minute summer	RE01	2.000	IC04	21.1	1.200	1.190	0.2850	
4320 minute summer	1	3.000	2	0.6	0.008	0.009	1.5336	
4320 minute summer	2	3.001	5	0.4	0.005	0.006	0.9516	

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.50%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute summer	3	20	10.971	0.144	19.6	0.0000	0.0000	OK
4320 minute summer	4	4140	10.732	0.742	1.1	0.0000	0.0000	FLOOD RISK
30 minute summer	21	20	10.970	0.120	20.1	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)
30 minute summer	3	5.001	IC07	15.5	2.086	0.551	0.0343	
4320 minute summer	4	1.005	5	0.8	0.011	0.007	1.0007	
30 minute summer	21	5.001_1	3	19.6	0.117	0.009	5.2642	

Appendix F – Flood Exceedance



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 work 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 the 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 during 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 (100 and 150mm diameter) (surface) made in vitrified clay connecting soft to soft.

Status	Details				
	Rev#	Date	Description	Drawn	CHK'd

The logo for MJ Engineering Group features the letters 'MJ' in a bold, black, sans-serif font, centered within a blue hexagonal border. The hexagon has a double-line effect, with a lighter blue inner border and a darker blue outer border.

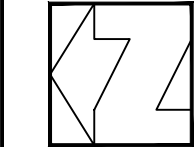
New City Joinery

Land at Stoney Brook Farm,
Walberton

Proposed Surface Water Drainage Exceedance Routes

Form	Checked	Approved	Date
MJ	MJ	MJ	10/24
Scale of Art	Drawing no.		Revision
1:200	A001-013/201		-

Appendix G: - 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

- General Notes:
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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.

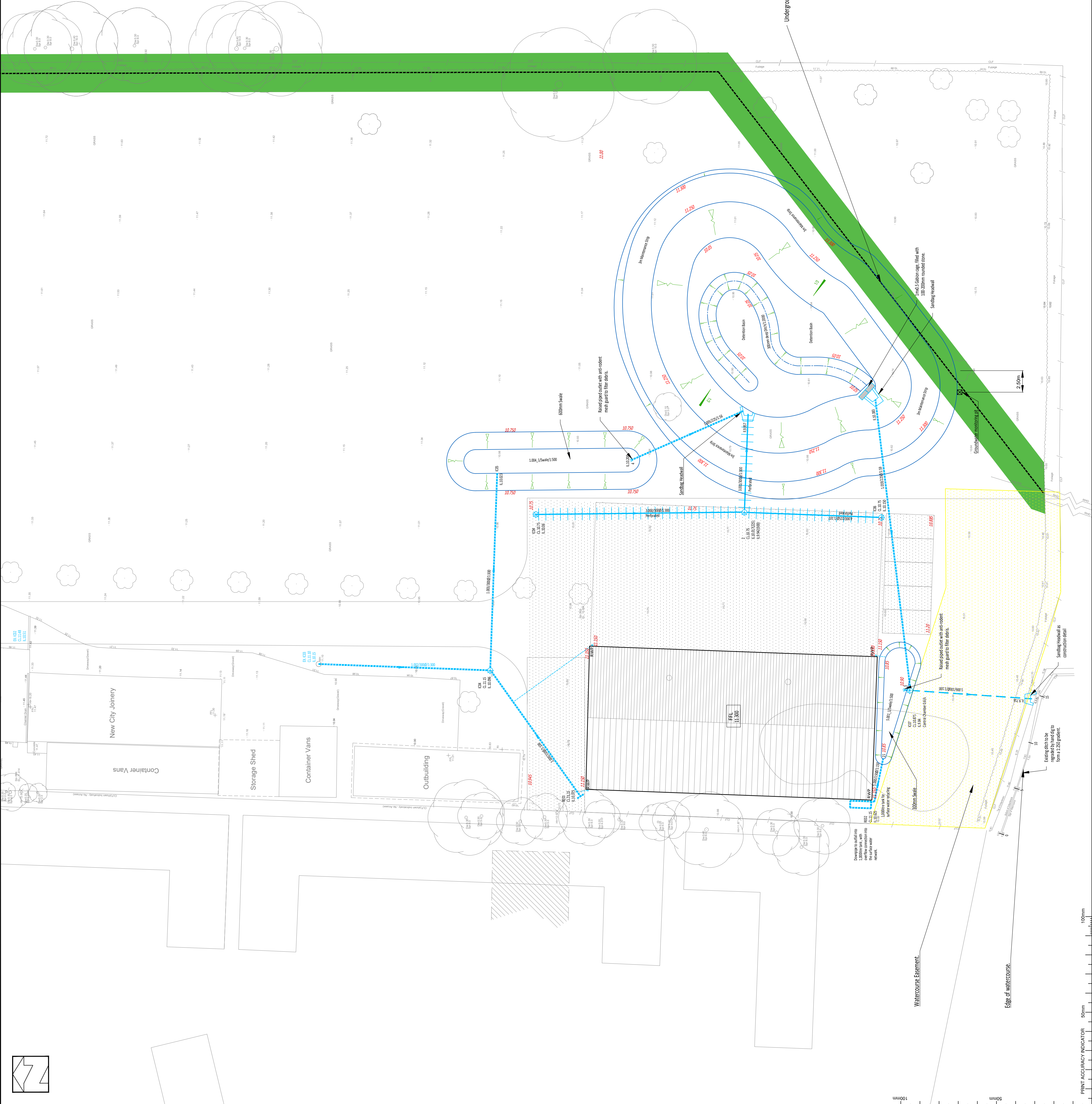
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8. During construction works on site, all roads and footpaths are to be swept and kept clear of obstructions, this is to include existing highways as appropriate to ensure safe passage of all road users.

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.



Rev	Date	Description	Drawn	Check	App'd
H	23.08.26	Swales added	MJ	MJ	MJ
G	03.06.26	Tank added	MJ	MJ	MJ
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

ENGINEERING GROUP

Client

New City Joinery

Project

Land at Stoney Brook Farm, Walberton

Drawing title

Proposed Surface Water Drainage

Drawn

MJ

Checked

MJ

Approved

MJ

Date

10/24

Scale at A1

1:200

Drawing No.

A001-013/101

Revision

H

General Notes:

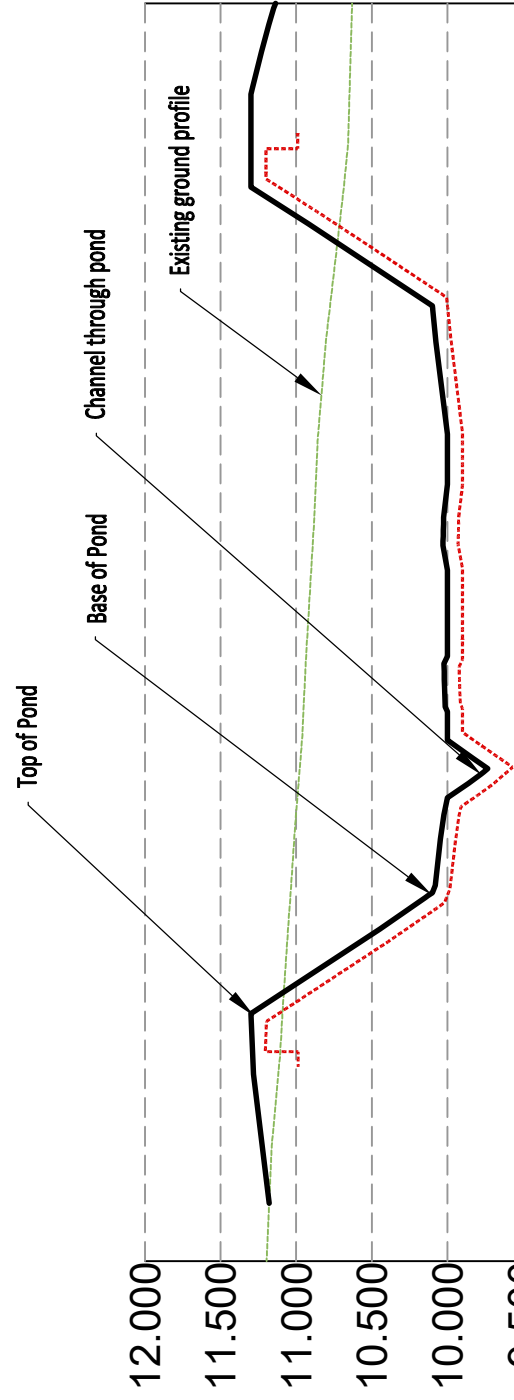
1. Do not scale this drawing. All dimensions are in metres unless otherwise noted. Any discrepancies are to be recorded and reported to the engineers immediately.
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11. All private connections to adoptable sewers should be a minimum of 100mm diameter (600 and 150mm diameter (surface) made in vitrified clay connecting soffit to soffit.

Filter Medium Topsoil		
Soil Type	Sieve Size (mm)	% Passing
Clay and Silt	0.06	less than 5
Fine Sand	0.063 - 0.2	less than 20
Medium Sand	0.2 - 0.6	35-45
Coarse Sand	0.6 - 2.0	50-60
Fine Gravel	2.0 - 6.0	less than 10

In addition to the sieve size, the filter material shall comply as below:

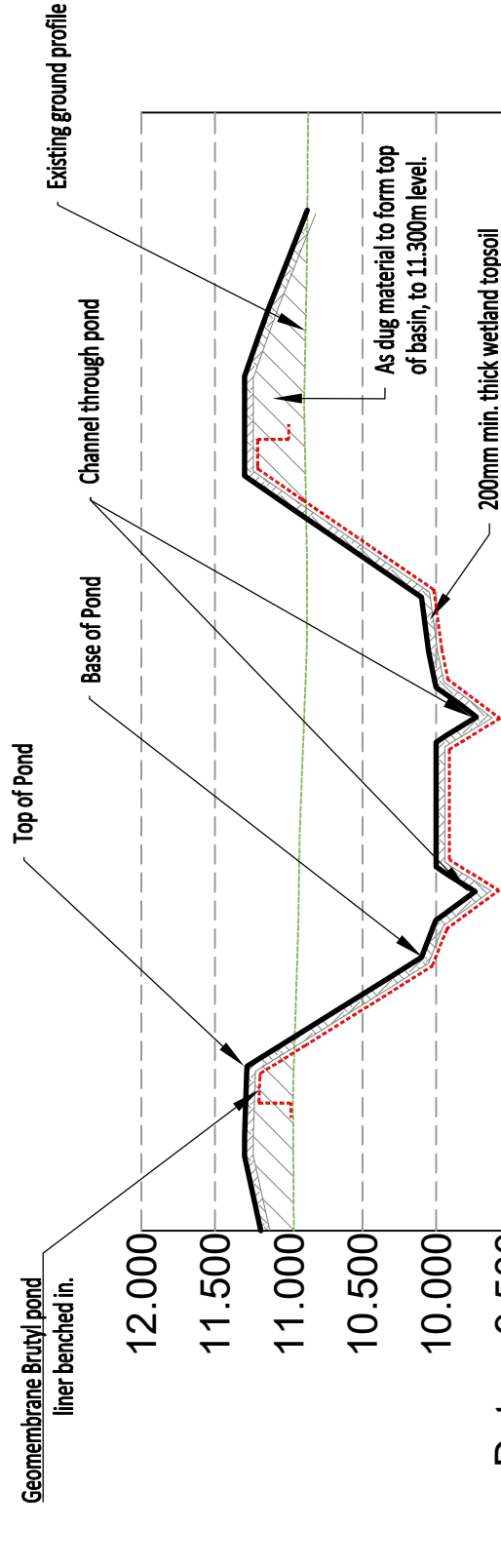
- The filter medium should well-graded and its composition contain limited particle size range.
- The organic matter content shall be 3-5% (w/w), plus and plus 5.5 to 12.5 (w/w) (water extract).
- Total chlorides should be 0.10 to 0.30%.
- Extractable phosphorus should be 15-100mg/l.
- Extractable potassium should be 120-400mg/l.

(Methods of analysis in accordance with BS 3982:2015, unless otherwise stated)



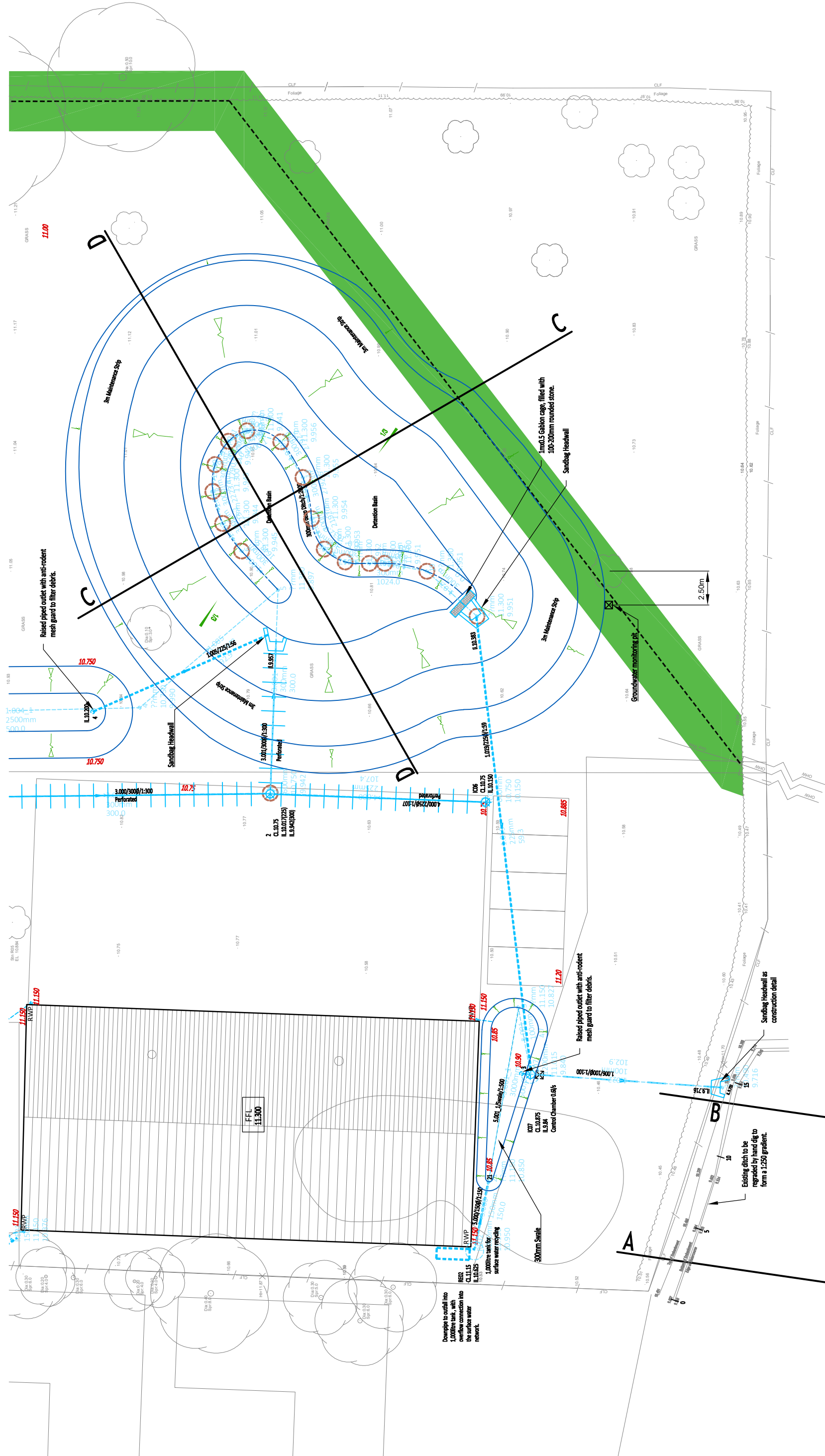
Chainage	11.265	11.196	11.178	11.158	11.121	11.093	11.067	11.039	11.012	10.981	10.953	10.935	10.911	10.887	10.868	10.844	10.810	10.766	10.720	10.675	10.651	10.630	10.639	11.137
Existing	11.265	11.196	11.178	11.158	11.121	11.093	11.067	11.039	11.012	10.981	10.953	10.935	10.911	10.887	10.868	10.844	10.810	10.766	10.720	10.675	10.651	10.630	10.639	11.137
Proposed	11.265	11.196	11.178	11.158	11.121	11.093	11.067	11.039	11.012	10.981	10.953	10.935	10.911	10.887	10.868	10.844	10.810	10.766	10.720	10.675	10.651	10.630	10.639	11.137

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

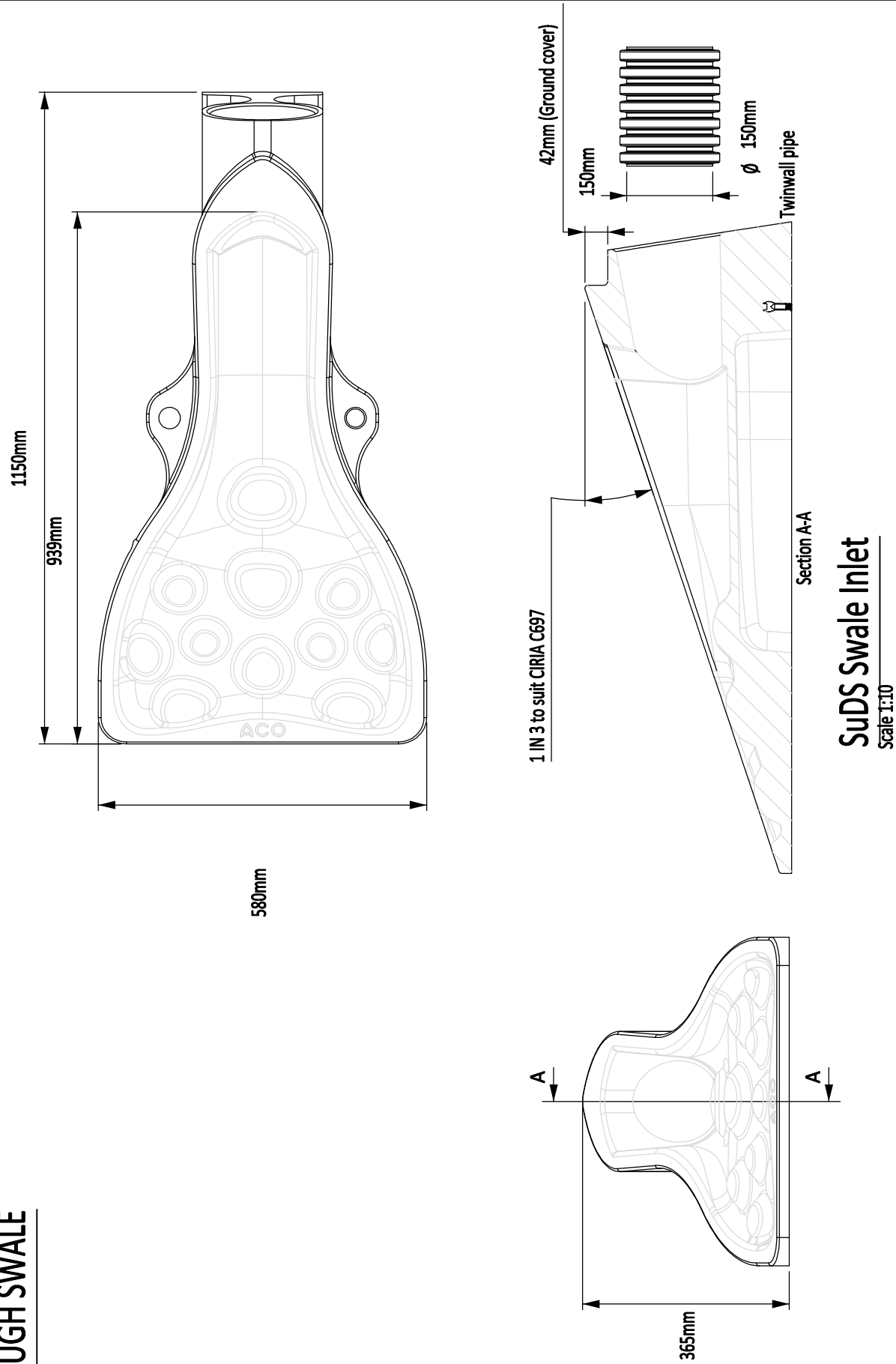


Chainage	11.188	10.965	10.971	10.968	10.971	10.950	10.937	10.930	10.921	10.906	10.891	10.876	10.877	10.880	10.888	10.895	10.887	10.879	10.874	10.872	10.868	10.868	37.916
Existing	11.188	10.965	10.971	10.968	10.971	10.950	10.937	10.930	10.921	10.906	10.891	10.876	10.877	10.880	10.888	10.895	10.887	10.879	10.874	10.872	10.868	10.868	37.916
Proposed	11.188	10.965	10.971	10.968	10.971	10.950	10.937	10.930	10.921	10.906	10.891	10.876	10.877	10.880	10.888	10.895	10.887	10.879	10.874	10.872	10.868	10.868	37.916

Section C-C & Typical Pond Detail
Scale H 1:250
V 1:50



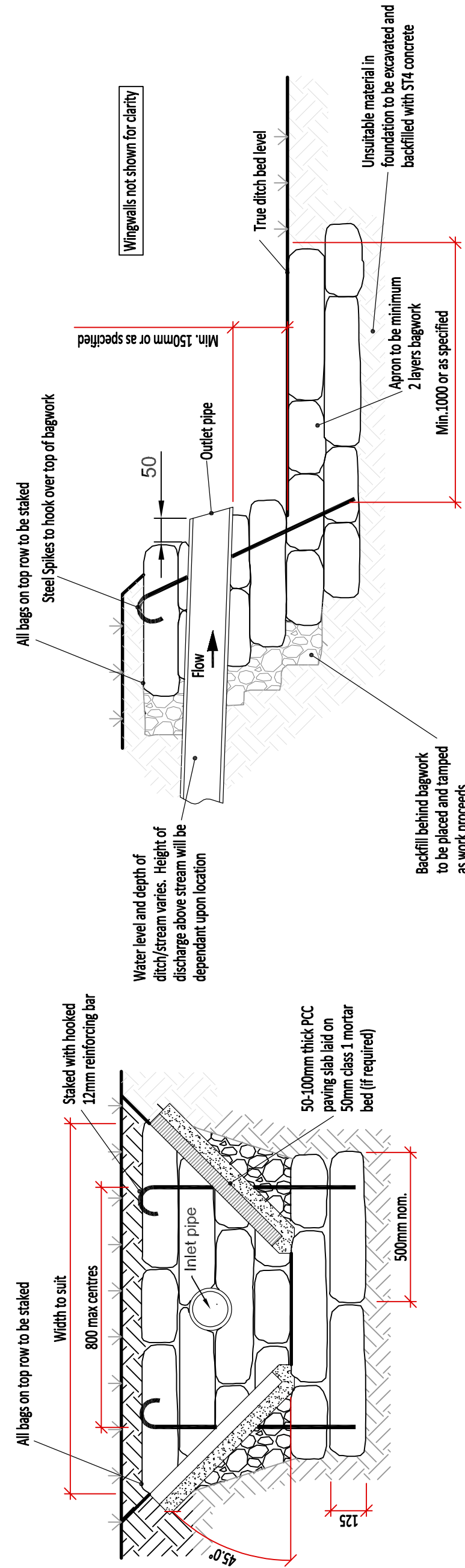
CROSS SECTION THROUGH SWALE
Scale 1:20



suDS Swale Inlet
Scale 1:10

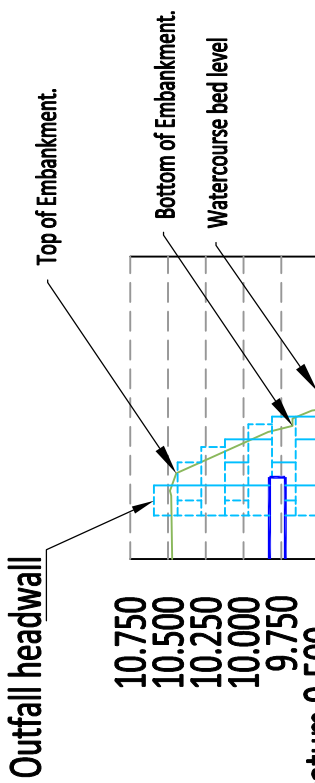
Rev	Date	Description	Drawn	Checkd	As Shown
C	21.08.26	Headwall and long section detail added	MJ	MJ	MJ
B	02.06.26	Swale details added	MJ	MJ	MJ
A	10.04.26	Notes added to section C-C	MJ	MJ	MJ
A	10.04.26	Basin location revised	MJ	MJ	MJ

Ditch Long Section
Scale H 1:250
V 1:50



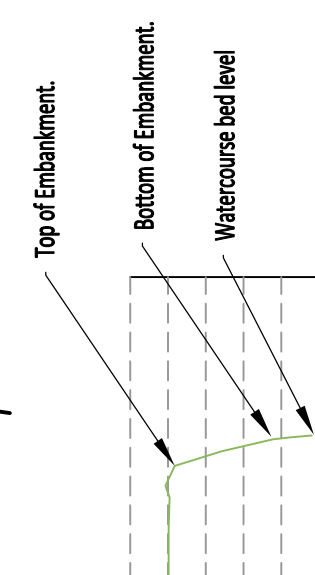
Elevation of Headwall Outfall
Scale 1:20

Headwall Section
Scale 1:20



Chainage	10.473	10.478	9.924	8.000	10.000
Existing	10.473	10.478	9.924	8.000	10.000

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



Chainage	10.497	10.494	10.302	8.000	10.000
Existing	10.497	10.494	10.302	8.000	10.000

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



ENGINEERING GROUP

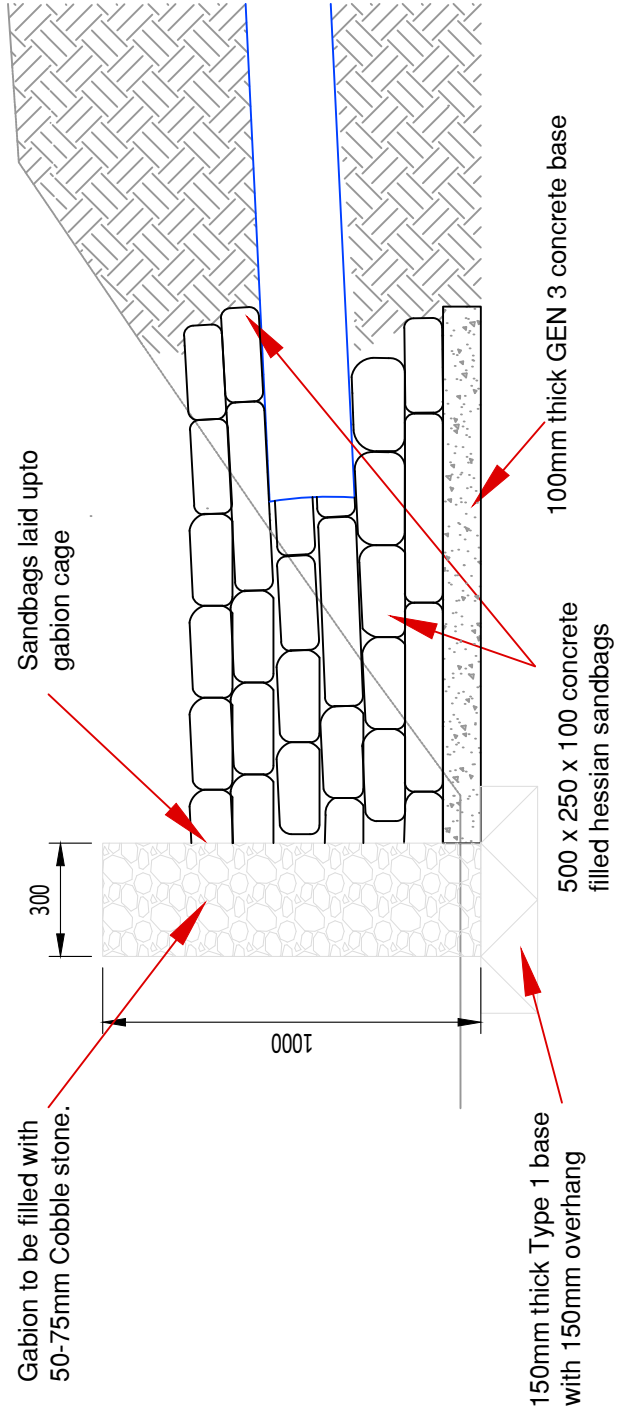
New City Joinery

Land at Stoney Brook Farm,
Walberton

Proposed Surface Water Drainage
Watercourse and Pond Sections

Drawn	Checkd	Approved	Date	Revision
MJ	MJ	MJ	07/25	C

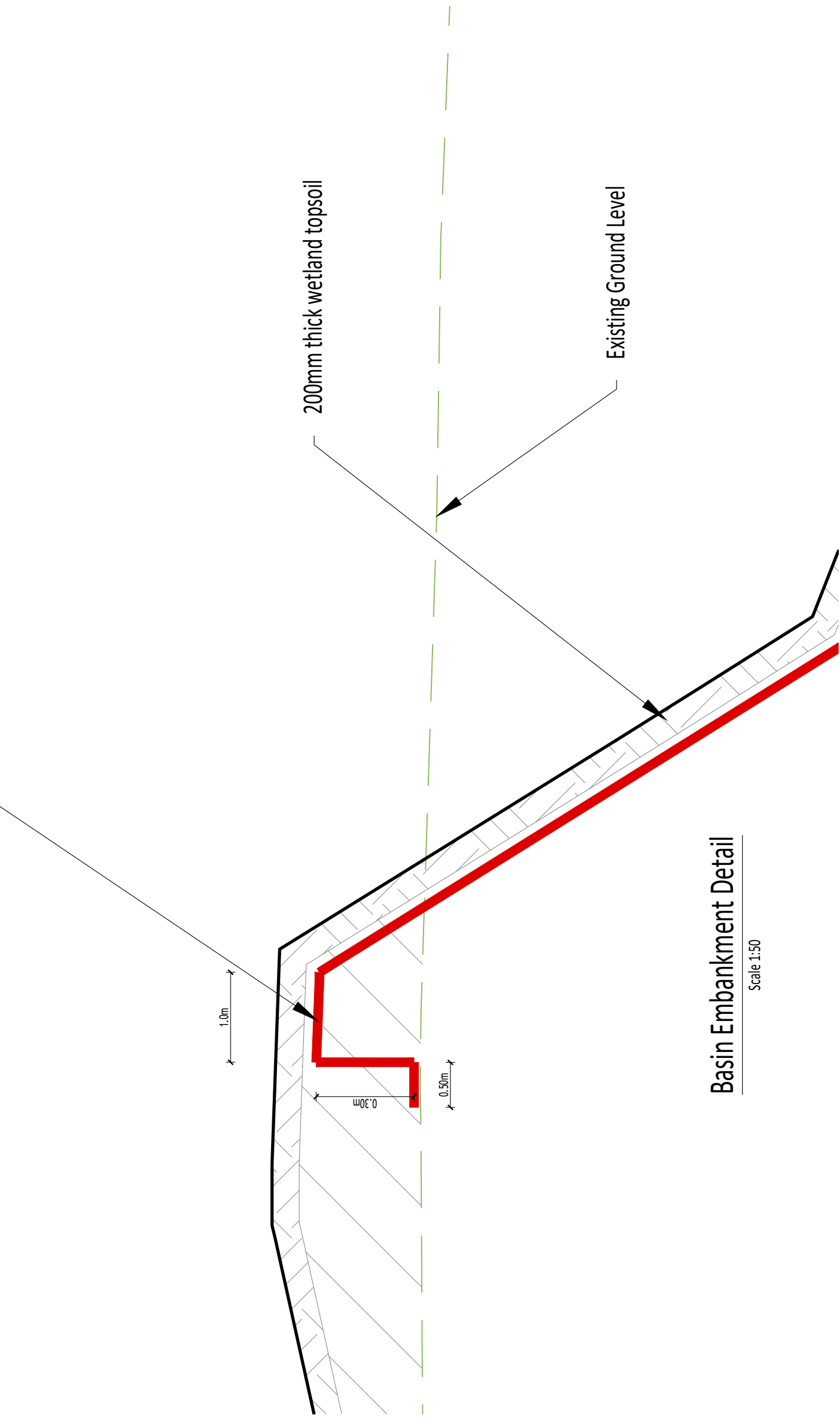
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Section - Headwall Gabion Cage Filter (Outlet)

Scale 1:20

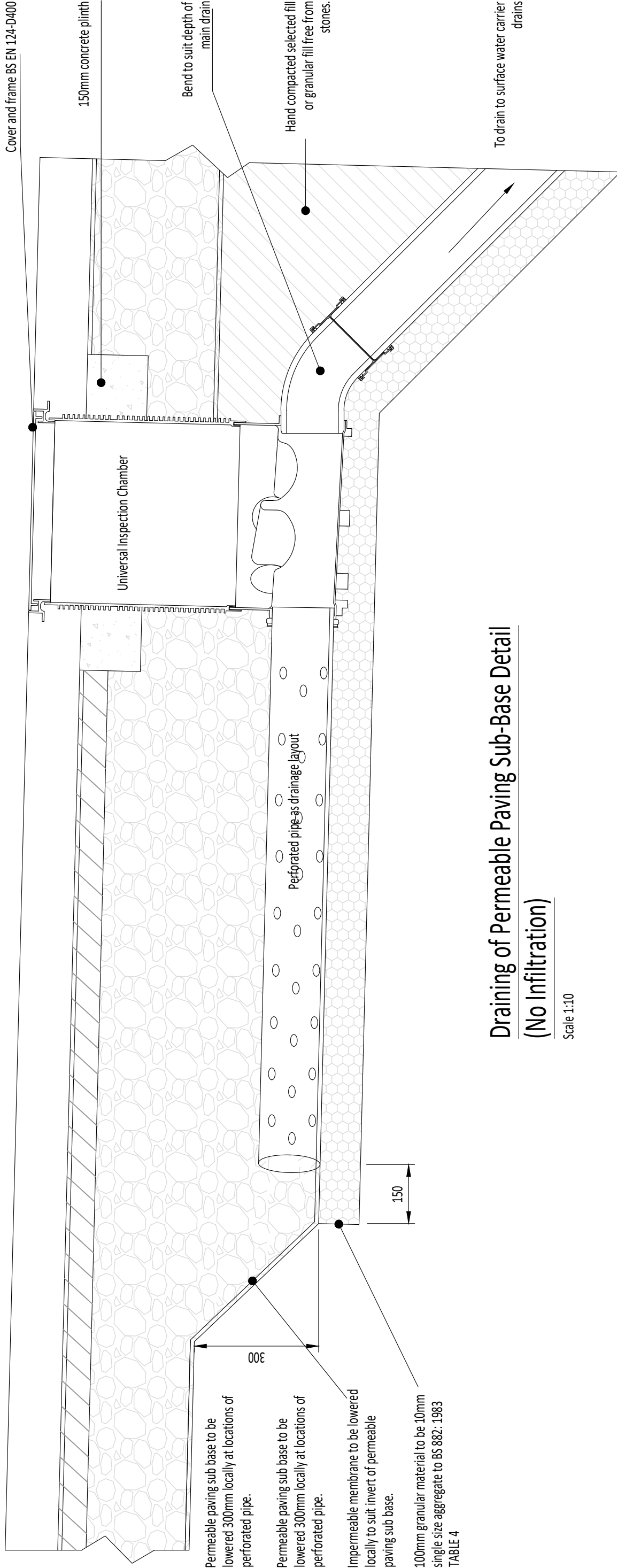
Geomembrane Bruty/
pond liner benched in.



Basin Embankment Detail

Scale 1:50

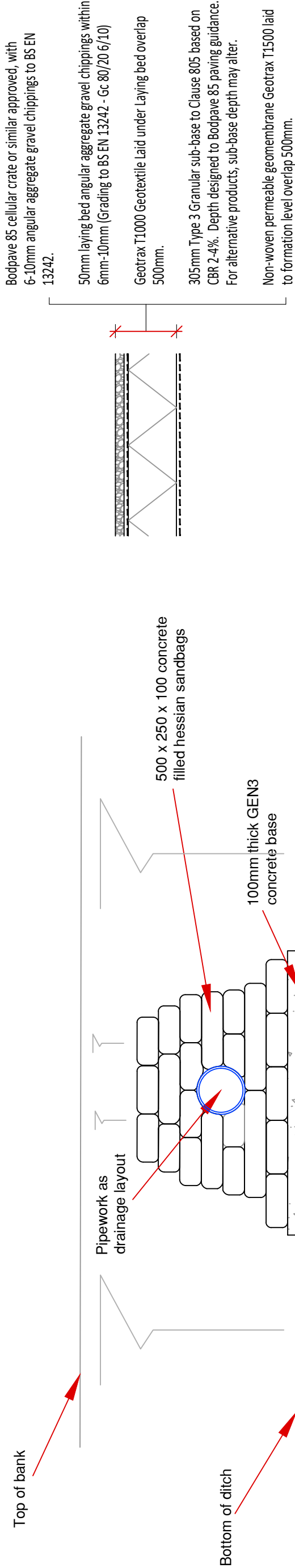
- 80mm Permeable block paving laid on 50mm laying bed angular aggregate within 4mm-15mm (BS EN 13242).
- Geotrax T51000 Geotextile laid under laying bed.
- 60mm Thick Binder Course (AC2 Dense Bm 100/150) to BS EN 13108-1
- 305mm Type 3 Granular sub-base to Clause 805 based on water storage volume, to be increased to suit CBR percentage.
- Non-woven permeable geomembrane Geotrax T51000 laid to formation level



Draining of Permeable Paving Sub-Base Detail

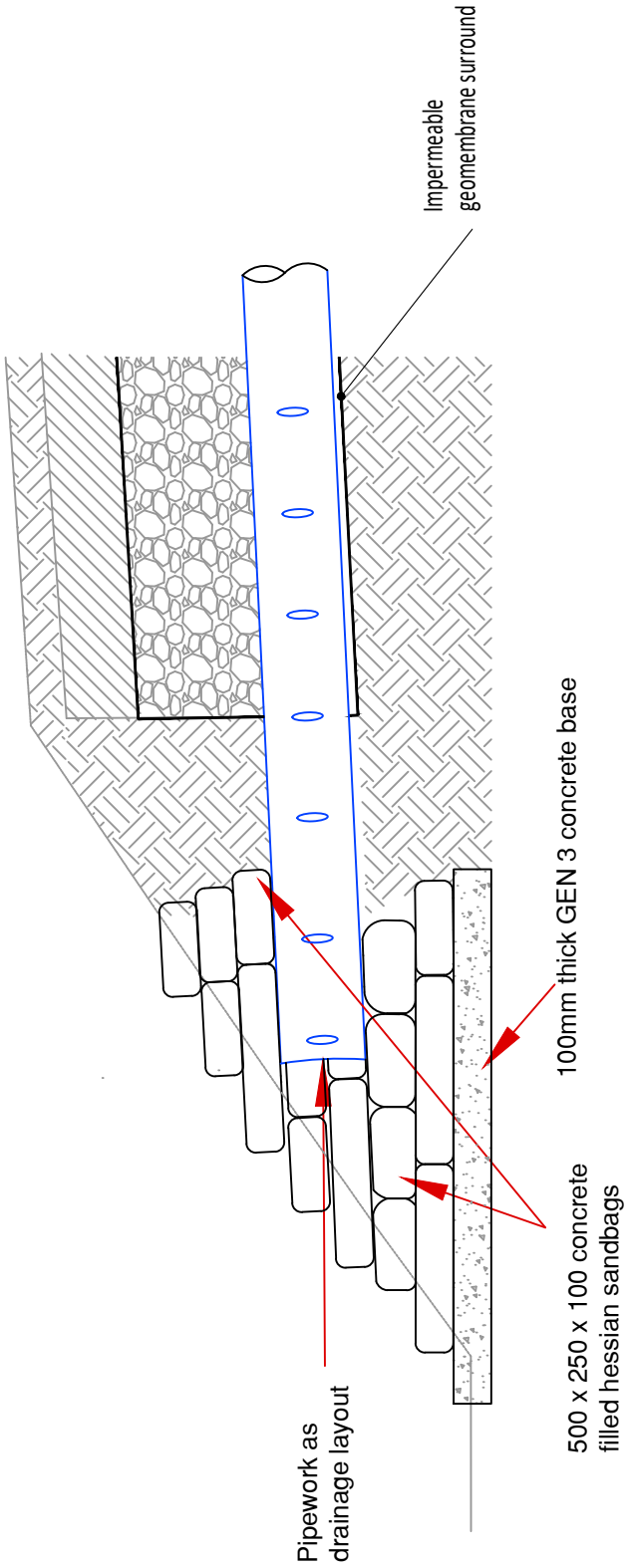
(No Infiltration)

Scale 1:10



Front Elevation - Basin Headwalls

Scale 1:20

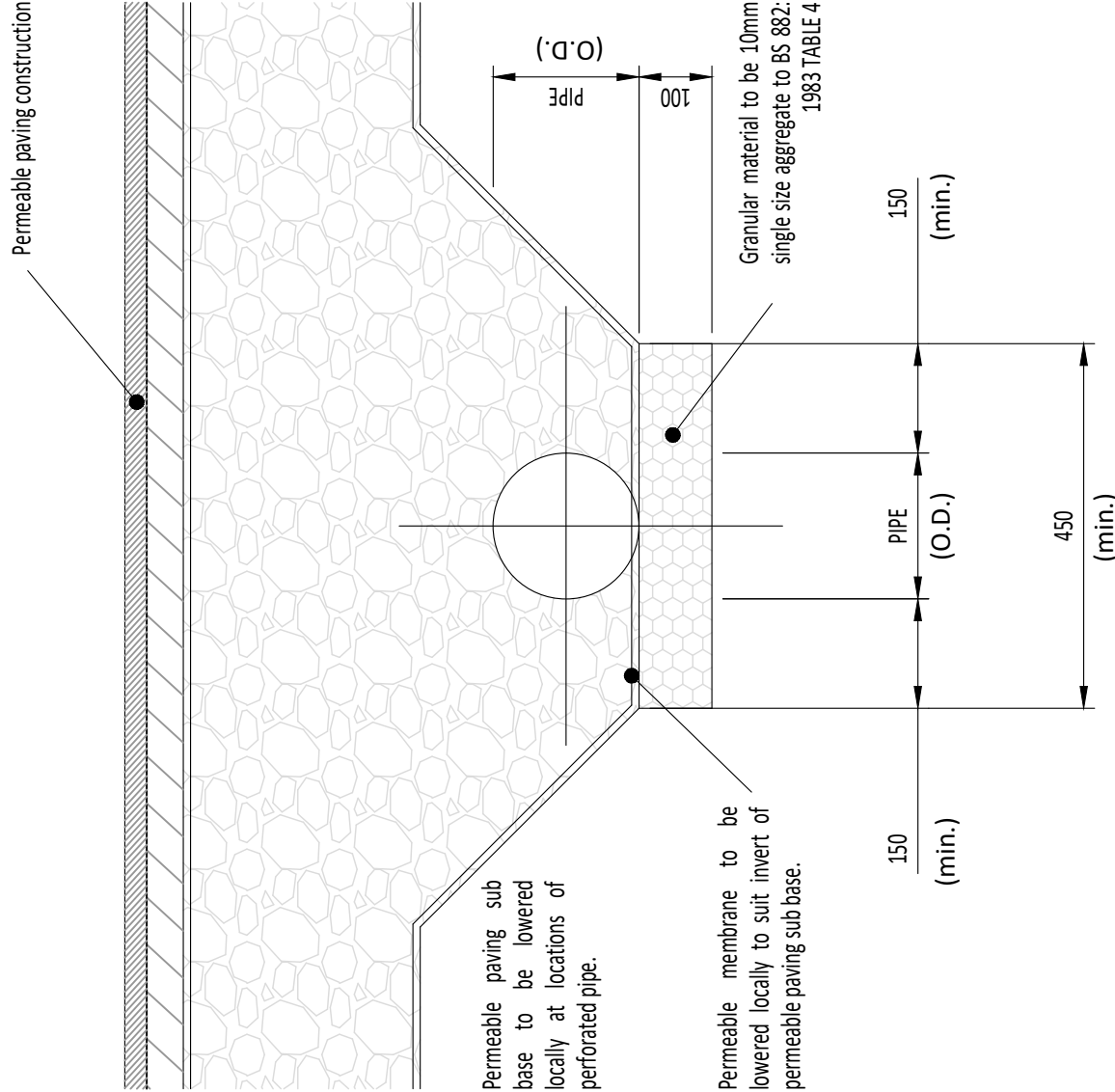
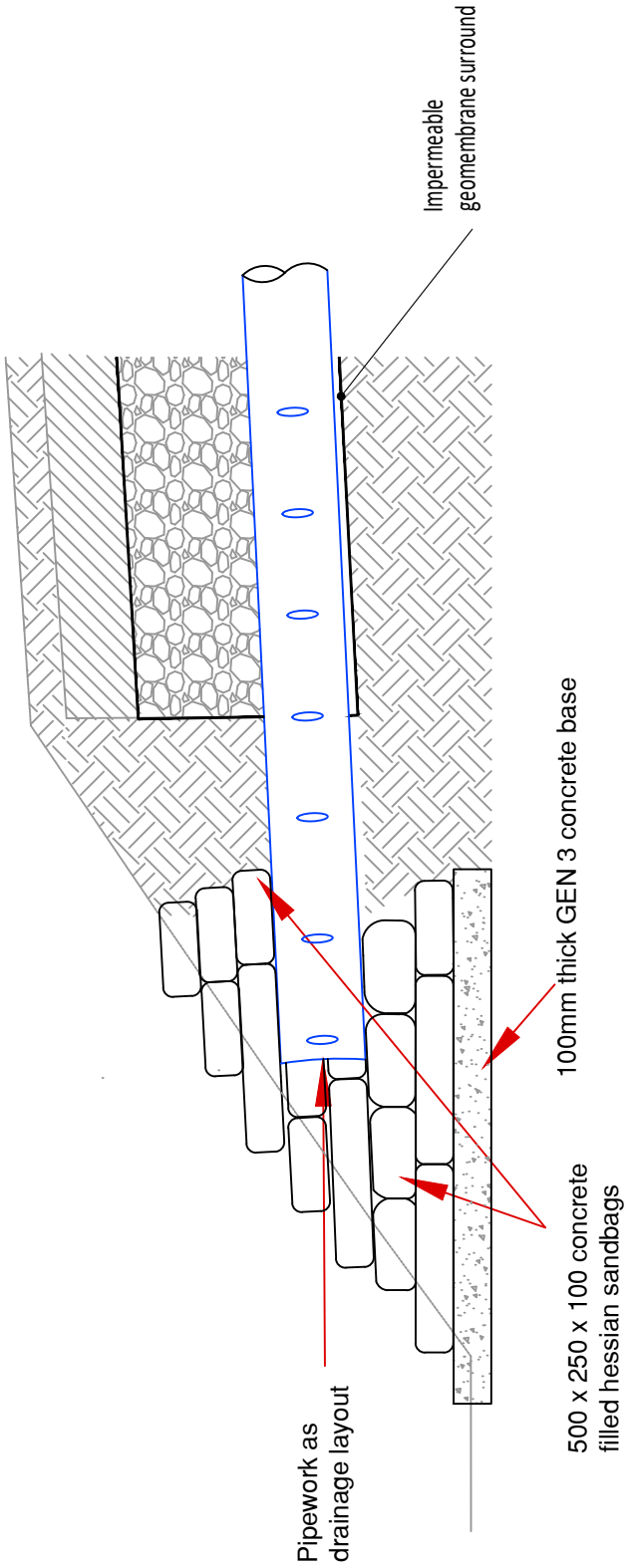
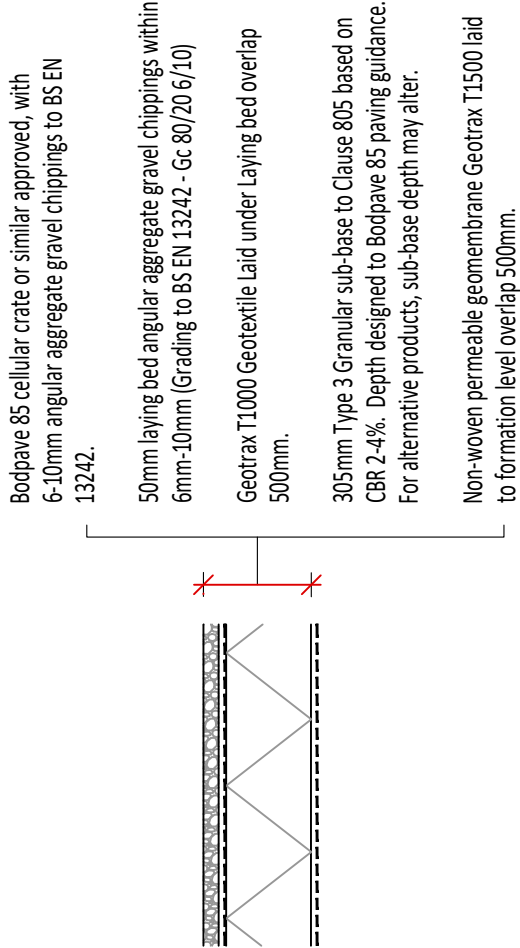


Section - Headwall 1 & 2

Scale 1:20

Car Park Construction

Scale 1:20



Perforated Pipe Bedding

Scale 1:10

Appendix H: - Floatation Calculations

Project Title STONEY BROOK FARM.

Project Reference A001-013

Calculation Title FLOATATION CALC.



WATER DISPLACEMENT.
POND VOLUME =

BASE AREA = 223m^2 @ 10.05m .
GROUNDWATER
@ 10.333 .

PLAN OF POND @ 10.333m = 274m^2

$$\therefore \frac{274 + 223}{2} \times (10.333 - 10.05) = 70.32\text{m}^2$$

VOLUME $\times$ WATER WEIGHT

$$70.32 \times 1,000 \text{ kg} = \underline{70,320 \text{ kg}}$$

WEIGHT OF SOIL

BASE 223m^2
SIDES = LENGTH. $60\text{m} \times 0.283 = 16.98\text{m}^2$

TOTAL TOPSOIL AREA = 239m^2 .

WEIGHT TOPSOIL = ~~1,600~~ $1,600 \text{ kg/m}^3$.

$$\therefore 70,320 / 1,600 = 43.95\text{m}^3 \text{ REQUIRED}$$

$$43.95\text{m}^3 / 239\text{m}^2 = 0.184 \text{ m topsoil thickness required.}$$

MIM. 200mm topsoil proposed.

Appendix J: - Drainage Maintenance Plan



ENGINEERING GROUP

Stoney Brook Farm, Walberton

SURFACE WATER MANAGEMENT PLAN

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Revisions and Additional Material

Document History and Status

Revision	Date	Purpose/Status
-	03.06.2026	First Issue
A	24.08.26	Pond added

Document Details

Project Director	Mark Jones
Report Author	Mark Jones
Project Number	A001-013
Project Name	Stoney Brook Farm, Walberton

1 Introduction and Limitation

1.1 Introduction

- 1.1.1 MJ Engineering Group (MJEG) has been appointed to prepare a Surface Water Management Plan (SWMP) for Land at Stoney Brook Farm, Walberton, BN18 0BA.

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

- 2.1.1 The site is located off Eastergate Lane in the village of Walberton at grid reference SU960060.
- 2.1.2 The ground conditions according to the British Geological Society across the site reports Head deposits comprising of Gravel, Sand, Silt and Clay, over a bedrock of London Clay.
- 2.1.3 The immediate neighbouring site has been subject of a planning application that reported Clay to be present across the site, with a groundwater level at 0.69m below existing ground level.
- 2.1.4 Groundwater monitoring has been carried out between November 2025 to February 2026 in the area of the proposed basin. The monitoring recorded groundwater at 0.347m below existing ground level making the use of infiltration as the primary means of discharging surface water not viable.
- 2.1.5 The surface water drainage will outfall to the existing watercourse, using the existing outfall pipe.
- 2.1.6 Sustainable Drainage Systems (SuDS) features will manage rainfall to deal with Surface Water. The SuDS features will control the flow rate to greenfield run-off rate and volume of water leaving the development area. The drainage system will also provide provision for collecting and reusing surface water on the site and allow for surface water to infiltrate/feed the landscape areas from the basin.

3 Roles and Responsibilities

- 3.1.1 This section identifies the key roles and responsibilities for the drainage features.

SuDS Features	Company Responsible
Above ground storage tank	Landowner
Catchpit chambers	Landowner
Surface Water pipework	Landowner
Control Chamber	Landowner
Basin Headwalls	Landowner
Outfall Headwall	Landowner
Surface Water pond	Landowner
Permeable Paving	Landowner
Landscape areas	Landowner

4 Managing SuDS

- 4.1.1 With all drainage systems, SuDS components require regular inspection and maintenance to ensure the operational efficiency and reduce the risk of failure. The level of inspection and maintenance will vary depending on the type of SuDS component. The maintenance schedules set out in **Appendix A** reflects the guidance set out in The SuDS Manual (CIRIA publication C753).
- 4.1.2 The SuDS Maintenance Schedules, as set out in The SuDS Manual, are designed for easy maintenance comprising of:
- Regular daily – Litter collection and clearing inlets and outlets.
 - Occasional tasks – removing silt that builds up, clearing excessive vegetation, etc.
 - Remedial Work – Repairing damage to the features as required.

5 Appendices

Appendix A – Management, Maintenance and Remediation Schedule

Operation and Maintenance requirements for Control Chamber

Responsible for Maintenance	Highway Authority	
Maintenance Schedule	Required Action	Typical Frequency
Routine maintenance	Inspection of chamber and removal of debris when necessary	Quarterly or as required following monitoring
Remedial actions	Check for blockages in manholes and pipes. Rodding and jetting of pipes to be carried out. CCTV survey can be carried out to inspect condition of pipework.	Quarterly or as required following monitoring
Monitoring	Inspect outfall pipework for consistency in flow. Inspect manholes and catchpits for debris and litter. Remove where necessary to prevent blockages in the system.	Monthly or after periods of heavy rainfall

Operation and Maintenance requirements for Pervious Pavements

Responsible for Maintenance	Management Company/Household	
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 50mm 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 hrs after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

Operation and Maintenance requirements for SW Pipes and Chambers		
Responsible for Maintenance	Water Authority/Household	
Maintenance Schedule	Required Action	Typical Frequency
Routine maintenance	Remove litter and debris and inspect for sediment, oil and grease accumulation	Six monthly
	Remove sediment, oil, grease and floatables	As necessary – indicated by system inspections or immediately following significant spill
Remedial actions	Replace damaged guttering, and pipework	As required
	Cleanout guttering of debris	Annually or as required
Monitoring	Inspect for guttering and pipework for debris and blockages	Six monthly

Operation and Maintenance requirements for Ponds and Wetlands

Responsible for Maintenance	Landowner	
Maintenance Schedule	Required Action	Typical Frequency
Regular maintenance	Remove litter and debris	Monthly
	Cut the grass	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 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 e.g. penstocks	Half yearly
	Hand cut submerged and emergent aquatic plants (at minimum of 0.1m above pond base: include max 25% of pond surface)	Annually
	Remove 25% of bank vegetation from water's edge to a minimum of 1m 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 1-5years, 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, 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

Operation and Maintenance requirements for Storage Tanks

Responsible for Maintenance	Farm Owner	
Maintenance Schedule	Required Action	Typical Frequency
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial actions	Monthly for 3 months, then annually
	Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
Remedial Actions	Repair/rehabilitate inlets, outlets and overflows	As required
Monitoring	Inspect/check all inlets, outlets and overflows to ensure that they are in good condition and operating as designed	Annually
	Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required by manufacturers specification

Operation and Maintenance requirements for Swales

Responsible for Maintenance	Landowner	
Maintenance Schedule	Required Action	Typical Frequency
Regular maintenance	Remove litter and debris	Monthly, or as required
	Cut grass - retain grass height within specified design range	Monthly (during growing season), or as required
	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 infiltration surfaces for ponding, compaction, silt accumulation, record areas where water is ponding for .48hrs	Monthly, or when required
	Inspect inlets and facility surface for silt accumulation, establish appropriate silt removal frequencies	Half yearly
Occasional maintenance	Reseed areas of poor vegetation growth, after plant types to better suit conditions, if required.	As required or if bare soil is exposed over 10% or more of the swale treatment area
Remedial Actions	Repair erosion or other damage by re-turfing or reseeding	As required
	Relevel uneven surfaces and reinstate design levels	As required
	Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface	As required
	Remove build-up of sediment on upstream gravel trench, flow spreader or at top of filter strip	As required
	Remove and dispose of oils or petrol residues using safe standard practices	As required

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