

MR C JONES

MONSON

Structural Engineering
Roads & Car Parks
Traffic & Flood Risk Assessments
Water & Drainage Engineering
Technical Audits & Assessments

Hollytree House (2025)
Cuckfield Road
Burgess Hill
RH15 8RE

**Proposed Residential
Redevelopment**

Drainage Design Statement

Issue	A
Date	05 Feb 2025
Author	C. Lama
Verified by	M. Wojcieszak
Job No.	25003



Registered No. FS 37624

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1.00 Introduction

- 1.01 Monson Engineering has been instructed to prepare a detailed drainage design for the proposed redevelopment of Hollytree House on Cuckfield Road, Burgess Hill, West Sussex, RH15 8RE.
- 1.02 The proposal is for the demolition of the existing detached house on the site and the construction of a new detached house together with 4 semi-detached houses with a new access/crossover and onsite parking provided.
- 1.03 The application site is bounded by Cuckfield Road to the west, and by open green areas to the north, east and south (*Figure 1*).

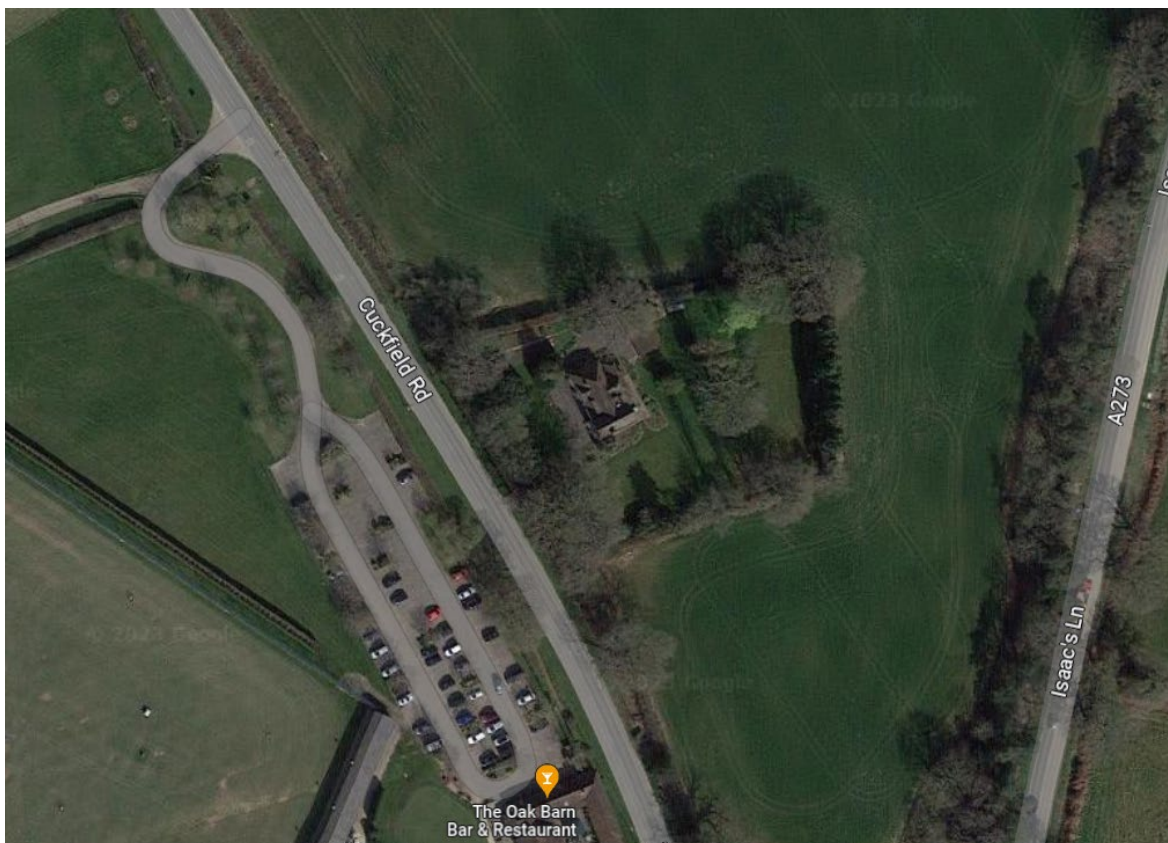


Figure 1: Hollytree House Site

- 1.04 The site is approximately centred at National Grid Reference TQ 30656 20632 (X: 530656, Y: 120632). Development proposals can be found in **Appendix A**.

2.00 Existing Drainage

- 2.01 Topographical survey of the site (**Appendix B**) shows several manhole chambers around the existing house. There is an existing tarmac access leading to the Hollytree house.
- 2.02 This survey also shows the presence of a ditch running along Cuckfield Road. Photos of the ditch can be seen in *Figure 2a* and *Figure 2b*.



Figure 2a: Ditch (looking north on Cuckfield Road)



Figure 2b: Ditch (looking south on Cuckfield Road)

- 2.03 MapInfo GIS sewer records (**Appendix C**) do not show the presence of any surface water or foul water sewers in the vicinity of the site.
- 2.04 The existing 369m² (0.0369ha) access falls to the road without any gullies or channel drains to intercept runoff. Using an average rainfall of 50mm/hr, this area will generate runoff of 5.2 l/s to the public highway and ditch.
- 2.05 A geotechnical assessment was carried out by Ashdown Site Investigation Ltd. Their soakage test findings showed that the site has low infiltration potential (9.72×10^{-8} m/s) with groundwater levels approximately 800mm below existing ground levels. An extract of their report can be found in **Appendix D**.
- 2.06 This suggests that runoff from the undeveloped part of the site would find its way to the public road and the ditch wherever possible and will dissipate via other natural processes such as evaporation where no runoff is generated. Runoff from the access road will discharge uncontrolled to the public highway and ditch as discussed in section 2.04.

3.00 Site Geology

- 3.01 British Geological Survey (BGS) shows that the site is underlain by Weald Clay Formation – Mudstone (*Figure 3*). No superficial deposits are identified.

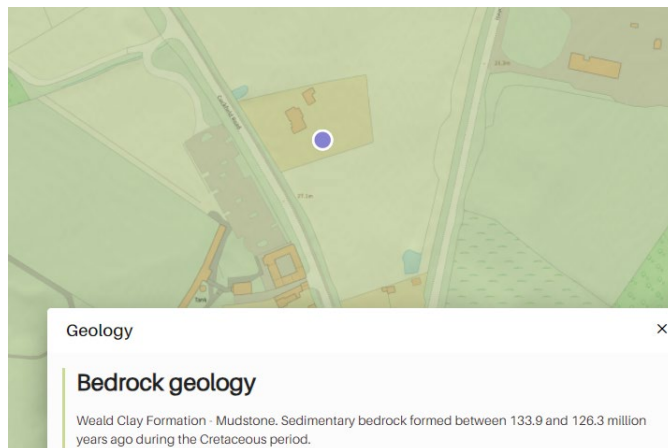


Figure 3: BGS Bedrock Geology

- 3.02 BGS describes the lithology of this bedrock as “*Dark grey thinly bedded mudstones (shales) and mudstones with subordinate siltstones, fine- to medium-grained sandstones, including calcareous sandstone (e.g. Horsham Stone Member), shelly limestones (the so-called “Paludina Limestones”) and clay ironstones*”.
- 3.03 Soilscape map (*Figure 4*) shows that soil has ‘impeded drainage’ and describes the soilscape as “*Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils*”.

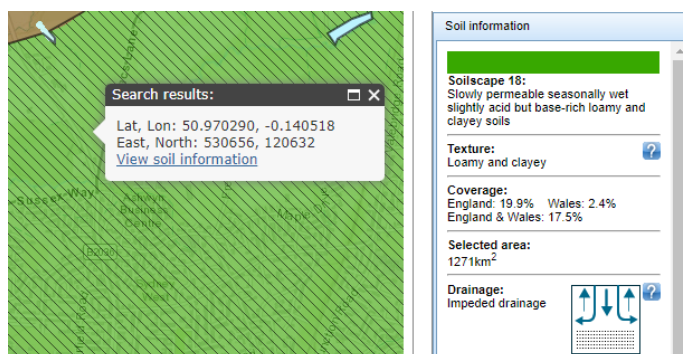


Figure 4: Soilscape Mapping

- 3.04 This geology reinforces the findings of existing drainage. Based on the findings of both the desktop study as well as intrusive geotechnical site investigation, it is unlikely that infiltration will be a sustainable method of surface water disposal from the proposed development.

4.00 Drainage Proposals

Surface Water Drainage

- 4.01 The application site covers approximately 4,901m² (0.490ha). The site is brownfield; however, it is good practice to provide betterment wherever possible, so this design has endeavoured to limit peak discharge rates to as close to greenfield runoff rates as possible to the ditch.
- 4.02 HR Wallingford greenfield runoff rates for the site can be found in **Appendix E**. The areas to drain amount to approximately 1600m² (0.160ha). Proportional greenfield runoff rates are given in *Table 1*.

Table 1: Greenfield Runoff Rates

	Site Area (0.490ha)	Proposed Drained Area (0.160ha)
Q _{bar} (l/s)	2.85	0.93
Q ₁ (l/s)	2.42	0.79
Q ₃₀ (l/s)	6.55	2.14
Q ₁₀₀ (l/s)	9.08	2.96

- 4.03 For future maintenance responsibility and liability, it is proposed to provide each of the two plots with its outfall into the ditch.
- 4.04 Surface water drainage was hydraulically modelled as accurately as possible on Causeway Flow. One of these software limitations is the modelling of a permeable pavement system with multiple gradients. This was the case for the replacement dwelling where the proposed permeable pavement had a flat surface from the rear to the front, from where the pavement surface then fell at a gradient of 1 in 28 towards the entrance. The steeper the gradient, the less available attenuation storage and a permeable pavement (referred to as 'car park' on most hydraulic software) cannot be modelled with two gradients. To solve this problem of software limitation and model the system accurately, calculations attached in **Appendix F** show how a one-system pavement with a gradient of 1 in 89 was designed and hydraulically modelled on Flow.
- 4.05 Causeway Flow modelling and simulation have considered all critical storm events, including 1 in a 30-year storm + 40%CC and 1 in a 100-year storm + 45%CC. Simulation output results show the adequacy of the 600mm deep attenuation storage (30% porosity) to accommodate these storm events without increasing flood risk on or off-site.

**Proposed Residential Redevelopment
Drainage Design Statement**

- 4.06 The proposed access to the replacement building will fall towards the site to prevent runoff from flowing to the public highway. This will be captured by a channel drain and sent back into the sub-base storage.
- 4.07 Perforated collector drains within the sub-base will be placed along a sump trench to collect and direct water to the Hydro Brake chamber and the ditch.
- 4.08 Peak discharge rates achieved for both plots are given in *Table 2*.

Table 2: Achieved Peak Discharge Rates

	Replacement Dwelling (l/s)	Plot 1 (l/s)	Total (l/s)
Q₁	1.1	0.9	2.0
Q_{30+CC}	1.1	1.0	2.1
Q_{100+CC}	1.1	1.0	2.1

- 4.09 Although the equivalent greenfield 1 in 1 is 0.79 l/s, in reality, the access alone discharges in excess of 5 l/s (section 2.04); therefore, these peak discharge rates are a significant improvement to the current situation, providing betterment. In addition, it is proposed to incorporate water conservation measures such as water butts to capture most of the frequent rainfall events where water can be re-used for gardening and similar purposes.

Foul Water Drainage

- 4.10 There are no public foul water sewers in the vicinity of the site. It is proposed to incorporate BioDisc package treatment plants to treat foul water and discharge into the existing ditch. These treatment plants are certified to treat domestic foul water to such a quality that they can discharge into the environment.
- 4.11 BioDisc specifications are based on the population equivalents of the proposed dwellings. Their maximum daily flows are relatively very low compared to surface water peak discharge rates. Installation and maintenance requirements can be found in **Appendix G**. This maintenance should be organised by the homeowner. It is important that these requirements form part of the sale document of the properties to ensure that maintenance is organised as per the manufacturers and thus these assets carry on operating properly.
- 4.12 Proposed surface water and foul water drainage as discussed can be found in **Appendix H**.

5.00 Maintenance of Permeable pavement

- 5.01 The access and hardstanding areas are designed as permeable pavement to provide source control and avoid any runoff from the development. The sub-base will attenuation water by providing storage within its 30% porous void space.
- 5.02 All maintenance operations are to be carried out in accordance with the manufacturer's recommendations and maintenance schedules provided by the manufacturer.
- 5.03 Typical maintenance of permeable paving can be found in *Table 3*.

Table 3: Maintenance Plan for Block Paving (by homeowners)

Maintenance Frequency	Actions Required	Maintenance Frequency	Maintenance effort
Regular (e.g. Monthly)	Litter removal. Also removal of debris from site.	Monthly	1 site visit with 3 men assuming 1 light van,
	Inspect for evidence of poor operation and/or weed growth. If required, take remedial action.	Three times per year, preferably 48 hrs after large storms.	Included in above site visit
	Stabilise and mow adjacent soft landscaping areas.	Three times per year	Included in above site visit. Mower and ancillary equipment.
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually	Included in above site visit
	Surface brushing to remove silt accretion and for aesthetics.	As required	Included in above site visit
	Removal of weeds from gaps in surfacing. Cutting of grass and removal of other ground level overhanging vegetation	Three times per year	Included in above site visit
	Check condition of connected control structures and outlets, rodding eyes and flow control (if present) for debris and silt.	Monthly	Included in above site visit
Occasional Tasks	Brushing and suction sweeping or alternatively jet washing and suction sweeping to remove silt and debris. This is particularly important during autumn with falling leaves. Replacing of lost grit/ material may be required	As required – possibly annually	1 site visit with 3 men assuming 1 light van and appropriate equipment. Once per year
Remedial/Repair (when needed)	Resetting of uneven blocks by lifting block area, removing bedding materials and relaying to match original design.	As required (if infiltration performance is reduced as a result of significant blocking)	-

Other product specific maintenance requirements can be found from the manufacturer. A suitable maintenance regime must be followed to ensure the continued performance of the permeable surface.

6.00 Maintenance of Water Butts

- 6.01 Water butts are the most common means of harvesting rainwater, although they are primarily designed for small-scale use such as in gardens. Therefore, the relative cost, maintenance and performance of water butts when compared to other larger rainwater harvesting systems are significantly less.
- 6.02 Typical water butt maintenance can be found in *Table 3*.

Table 4: Maintenance of Water Butts (By homeowners)

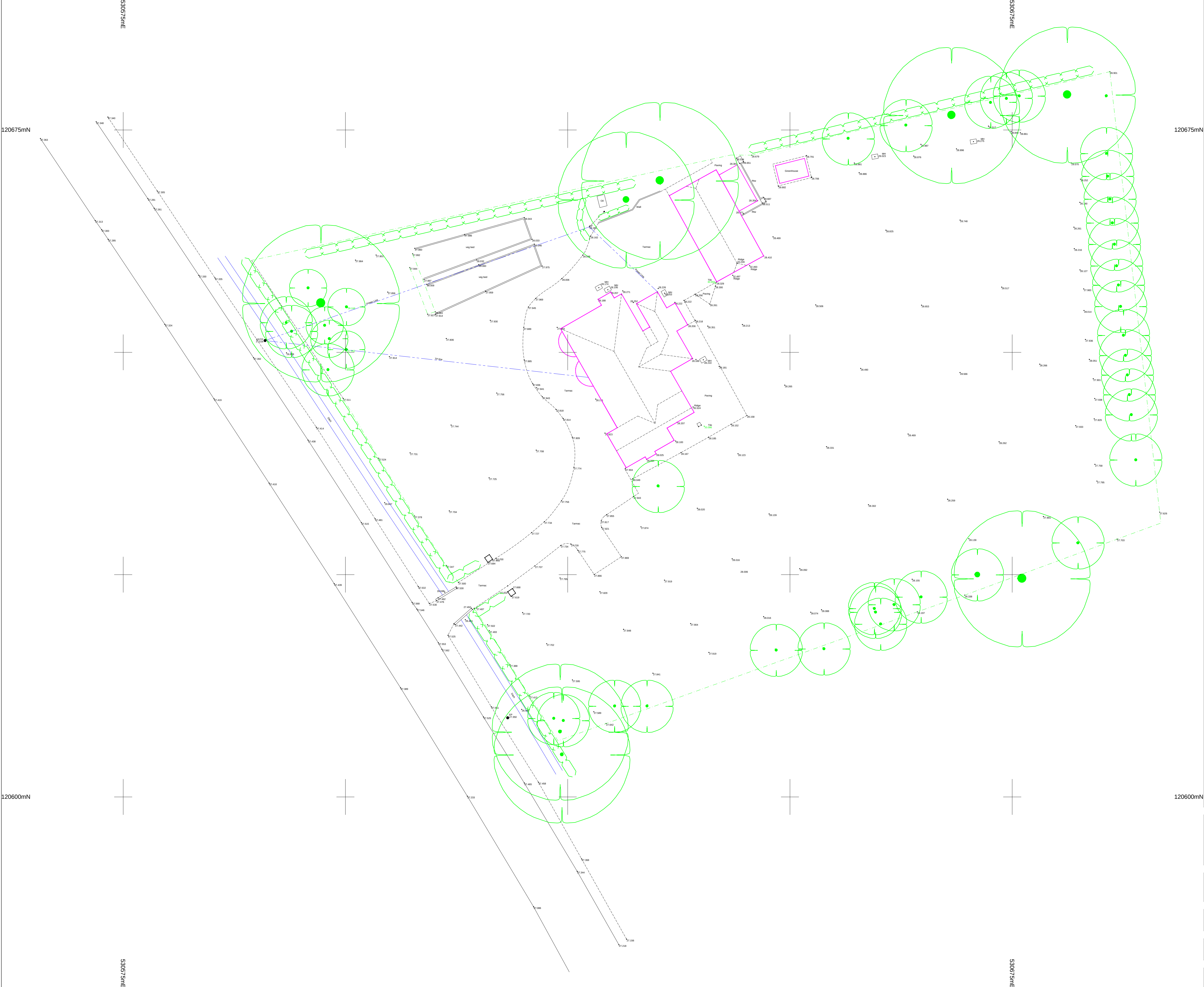
Maintenance Activities	Frequency of Maintenance
Inspection and cleaning of sedimentation at the base of the tank Cleaning out of house guttering Inspection and repair of the inlet and outlet mechanisms Cleaning of the tank, inlets, outlets, filters and removal of debris	Ongoing monitoring and maintenance
Inspection of the tank for debris, leaks, or other damage	Maintenance following storms
Replacement of any filters	Occasional maintenance (when required)

7.00 Maintenance of Bio Disc Treatment Plants

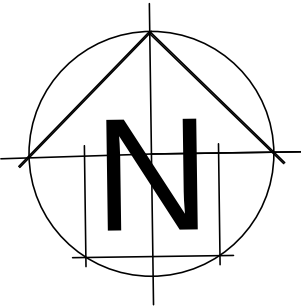
- 7.01 Maintenance and installation requirements can be found in Appendix G.

Appendix A – Development Proposals

Appendix B – Topographical Survey



- Notes
1. The Survey Grid and datum are based on OSTN15&OSGM15
 2. Fences shown are not necessarily legal boundaries.
 3. Dimensions should not be scaled. All dimensions should be checked on site before any fabrication / construction.
 4. Copyright of all data produced by MNA shall remain with MNA unless otherwise specifically agreed.
 5. Information provided should not be altered or modified in any way. It should not be used for any purpose other than for which it was intended and should not be issued to other parties without prior agreement of MNA.
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 7. If the AutoCAD drawing is being read by any system other than AutoCAD it should be checked against a hard copy MNA cannot accept liability for omissions.



Grid 25.00m A1 @1:200

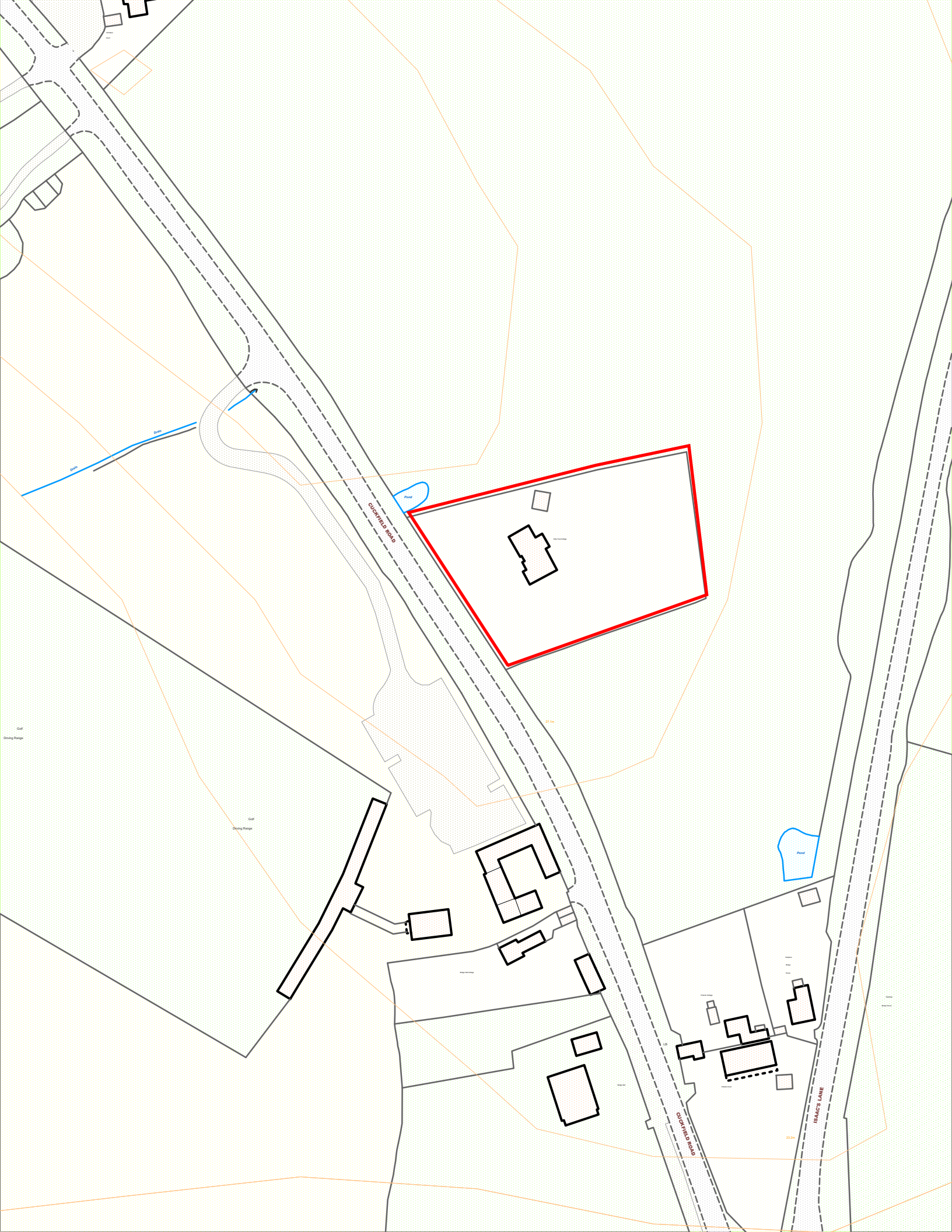


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Email: mnaltd@icloud.com

Site		
Hollytree House Cuckfield Road Burgess Hill		
Drawing Title		
Site plan		
Scale		
1:200		
Surveyed MPN	Drawn MPN	Checked GLN
Project No 006	Drawing No 0123/006/01	Date 01/01/2023

Appendix C – MapInfo GIS Sewer Records



Appendix D – Extract of the Geotechnical Report



**Hollytree House
Cuckfield Road
Burgess Hill
West Sussex**

Geotechnical Assessment Report

Report Beneficiary:

Mr & Mrs Jones
Hollytree House
Cuckfield Road
Burgess Hill
West Sussex
RH15 8RE

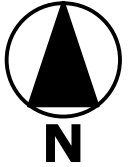
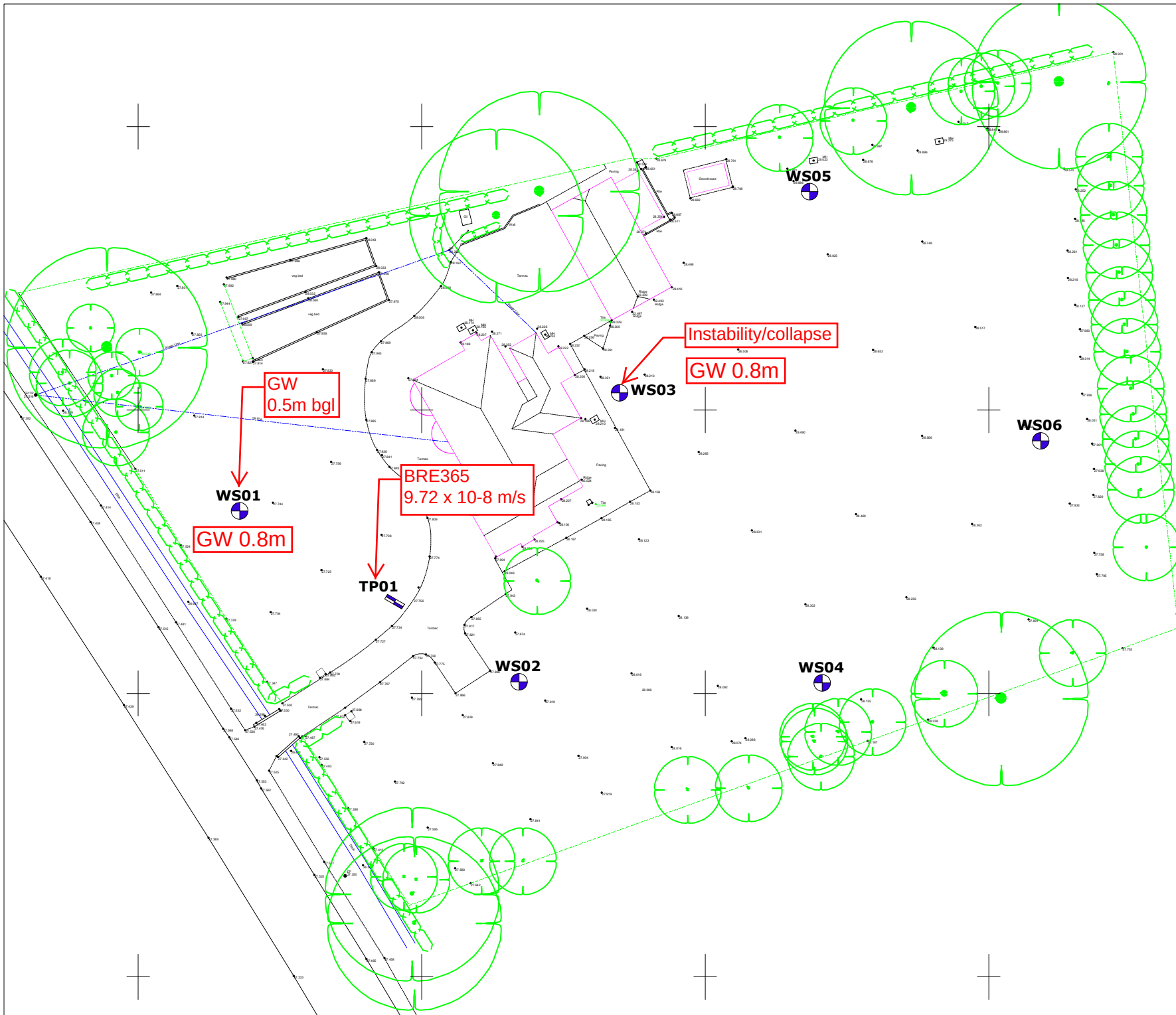
Project Reference: P16089

Report Reference: R15738

Document Control			
Issue No.	Status	Issue Date	Notes
1	Final	25 th May 2023	
Report Section		Prepared By	Approved By
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Site:

Hollytree House
Cuckfield Road
Burgess Hill
West Sussex

Project Ref:

P16089

Figure No.

2

Drawing Title

Site Plan

Scale

NTS

Infiltration Test Results

Test Position TP01
 Test No. 1
 Project No. P16089
 Project Name Hollytree House, Cuckfield Road, Burgess Hill, West Sussex

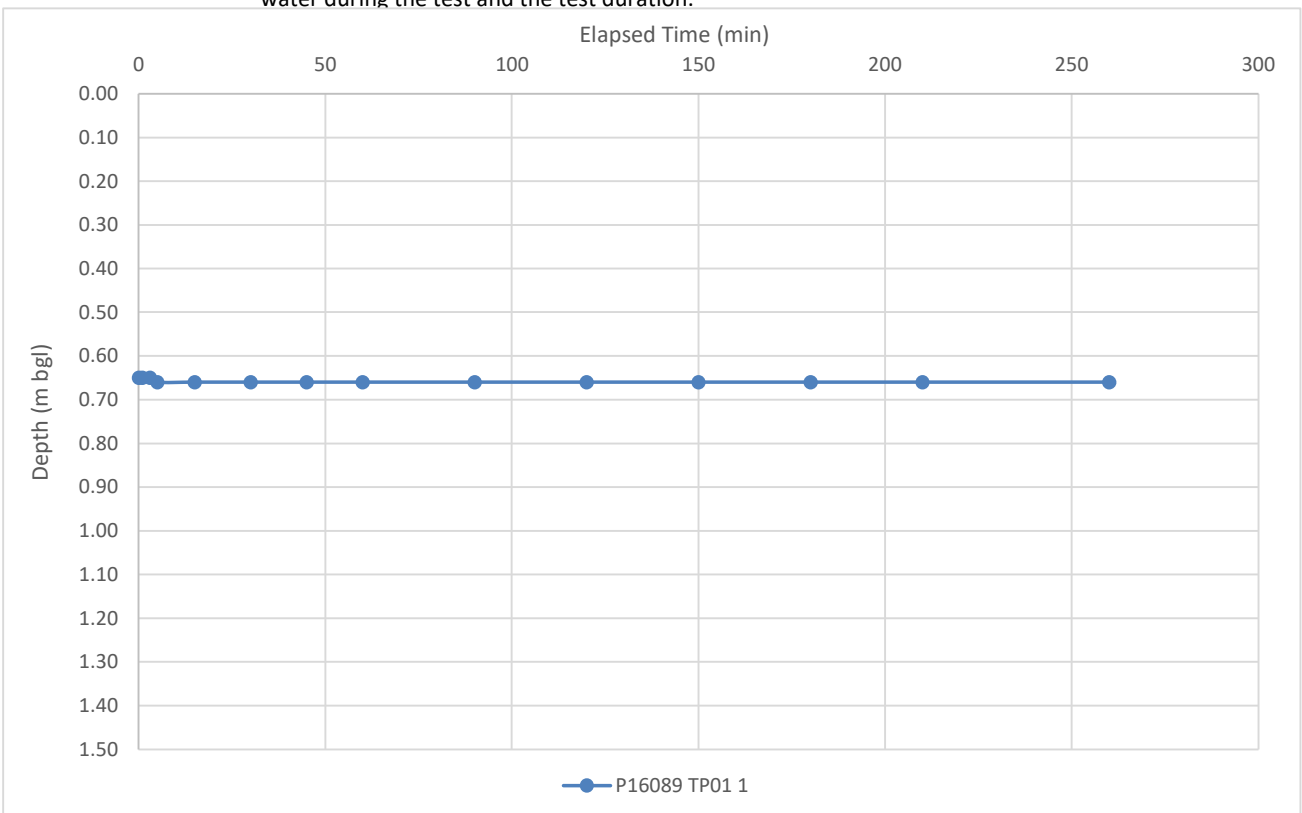
Width of Pit	0.35 m	W
Length of Pit	1.60 m	L
Depth of Pit	1.46 m	D
Pit type	Open	

Volume of water introduced into pit	0.453 m ³	
Initial head of water	0.81 m	h _o
Water level at start of test	0.65 m	
Water level at end of test	0.66 m	
Volume of water discharged from pit	0.006 m ³	
Duration of test	260 min	
Average soaked surface area	3.69 m ²	
Time for water level to fall to 75% of initial head	Not reached min	t _{p75}
Time for water level to fall to 25% of initial head	Not reached min	t _{p25}
Depth to water at 75% of initial head	Not reached m	d ₇₅
Depth to water at 25% of initial head	Not reached m	d ₂₅
Time for the water level to fall from 75% to 25% of initial head	Not reached min	t _{p75-25}
Effective storage volume of water in the soakage trial pit between 75% and 25% of initial head	Not reached m ³	V _{p75-25}
Internal surface area of the soakage trial pit up to 50% of initial head and including the base area	2.14 m ²	a _{s50}

Infiltration rate

9.72E-08 m/sec f

Calculation method: The water level did not fall below 25% of the effective storage depth. 'f' has been calculated by dividing the volume of water lost during the test by the product of the average surface area in contact with water during the test and the test duration.



Groundwater Monitoring Results

Site Name:	Hollytree House, Cuckfield Road, Burgess Hill, West Sussex	
Project Ref:	P16089	
Position	Date	Standing Water Depth (m bgl)
WS01	15/05/2023	0.80
WS03	15/05/2023	0.83

Appendix E – HRWallingford Greenfield Runoff Rates

Calculated by:	Christian Maheshe
Site name:	Hollytree House
Site location:	Cuckfield, Burgess Hill

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:	50.97043° N
Longitude:	0.14075° W
Reference:	3323988002
Date:	Jul 28 2023 16:07

Runoff estimation approach

IH124

Site characteristics

Total site area (ha): 0.4901

Methodology

Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Notes

(1) Is $Q_{BAR} < 2.0$ l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

Soil characteristics

	Default	Edited
SOIL type:	4	4
HOST class:	N/A	N/A
SPR/SPRHOST:	0.47	0.47

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible.

Hydrological

SAAR (mm):	820	820	Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.
Hydrological region:	7	7	
Growth curve factor 1 year:	0.85	0.85	
Growth curve factor 30 years:	2.3	2.3	(3) Is $SPR/SPR_{HOST} \leq 0.3$? Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.
Growth curve factor 100 years:	3.19	3.19	
Growth curve factor 200 years:	3.74	3.74	

Greenfield runoff rates		
	Default	Edited
Q_{BAR} (l/s):	2.85	2.85
1 in 1 year (l/s):	2.42	2.42
1 in 30 years (l/s):	6.55	6.55
1 in 100 year (l/s):	9.08	9.08
1 in 200 years (l/s):	10.65	10.65

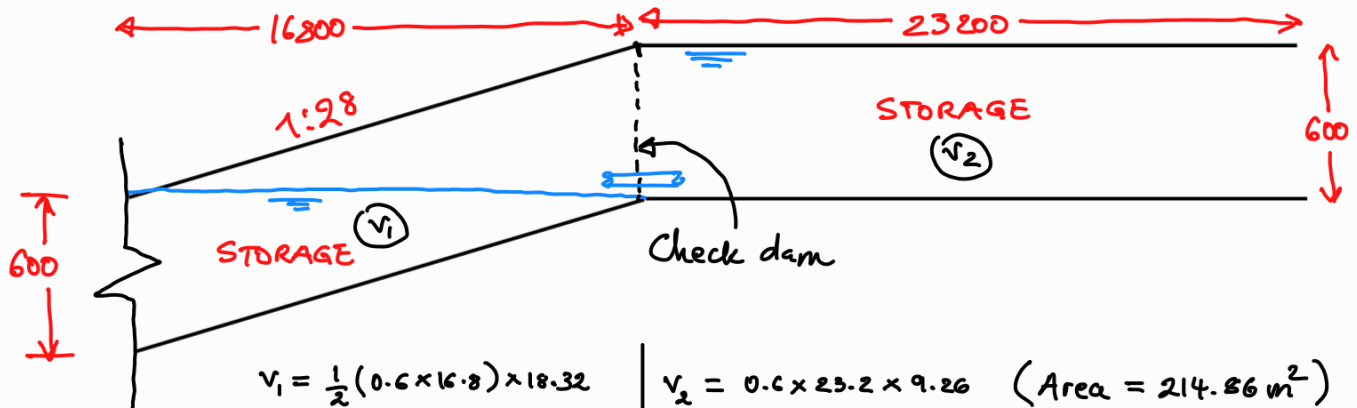
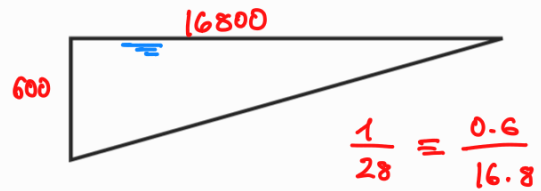
This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement , which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

Appendix F – Hydraulic Modelling of the Pavement (Replacement Dwelling)

Modelling of permeable pavement for the replacement dwelling

- Depth of sub-base = 0.6m
- Gradient of pavement = 1:28.
- This gives the length = 16.8m
- Area of the pavement = 307.8m²

This gives a "width" of 18.3m $\left(\frac{307.8 \text{ m}^2}{16.8 \text{ m}} \right)$



$$V_1 = \frac{1}{2} (0.6 \times 16.8) \times 18.32$$

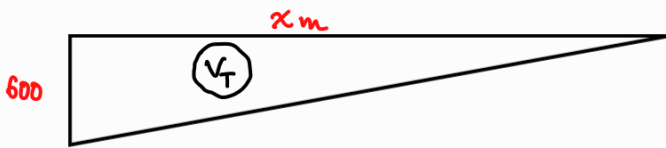
$$= 92.3 \text{ m}^3$$

$$V_2 = 0.6 \times 23.2 \times 9.26 \quad (\text{Area} = 214.86 \text{ m}^2)$$

$$= 128.9 \text{ m}^3$$

* Total volume that can be achieved $V_T = 92.3 \text{ m}^3 + 128.9 \text{ m}^3 = 221.23 \text{ m}^3$

At what gradient must a pavement be laid in order to achieve this volume?



$$\text{Average width} = \frac{18.32 \text{ m} + 9.26 \text{ m}}{2} = 13.79 \text{ m}$$

$$V_T = \frac{1}{2} (0.6x) \times 13.79 = 221.23$$

$$x = 53.7 \text{ m}$$

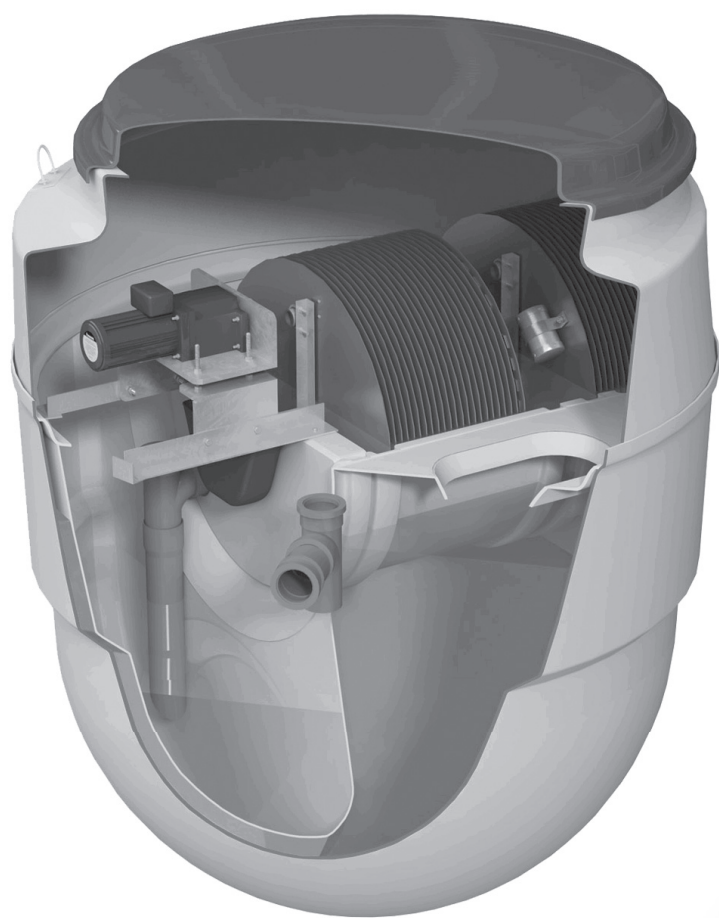
This gives an equivalent gradient of

$$53.7 / 0.6 \approx 1 \text{ in } 89.5$$

Appendix G – BioDisc Installation & Maintenance

BioDisc® BA, BAX, BB, NB

INSTALLATION MANUAL



Important

Once installed, the motor should be left on and running. If there is delayed electrical connection or if there is no power available to operate the unit, then the motor with gearbox must be removed and stored in a dry environment. The motor must not be left non-operational for a period of 7 days or more.

Part Code	Issue	Description	Date
017900	01	Initial Issue	January 2014

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Health and Safety	Page 3
BioDisc® Checklist	Page 4
Installation	Page 5
Capacitor and Control Panel	Page 8
Start up	Page 11



HEALTH AND SAFETY

You must read these warnings carefully before installing or using the equipment. Should the equipment be transferred to a new owner, always ensure that all relevant documents are supplied. Observe all hazard labels and take appropriate action to avoid exposure to the risks indicated. Take care to maintain correct posture, particularly when lifting. Use appropriate lifting equipment when necessary.



- Only experienced contractors should carry out installation, following the guidelines.
- The unit should have a Pre-Service Agreement Inspection by an approved engineer.
- A qualified electrician should carry out electrical work.
- Covers must be kept locked.
- Observe all hazard labels and take appropriate action to avoid exposure to the risks indicated.



CLOTHING

- We recommend the use of a dust mask and gloves when cutting GRP components.
- Any person carrying out maintenance on the equipment should wear suitable protective clothing, including gloves.

WORKING AREA

- Ensure that the working area is adequately lit.
- Ensure that you are familiar with the safe working areas, accesses and that the area is adequately lit.
- Use only the designated access walkways. Do not walk on the cover or deep well safety mesh(es).
- Keep proper footing and balance at all times. Avoid any sharp edges.



MAINTENANCE AND INSPECTION PROCEDURES

- Should you wish to inspect the operation of the equipment, please observe all necessary precautions, including those listed below, which apply to maintenance procedures.
- The power supply to the equipment must be isolated at the control panel(s) before lifting the covers.
- If the equipment has to run with the covers off, all care must be taken to avoid contact with moving parts and electrical components or conductors.
- Drive guards must be replaced and secured if removed during maintenance.
- Once power has been isolated, the control panel must be kept locked shut to avoid accidental re-connection whilst work or inspection is being carried out.

DESLUDGING

- Desludging should be carried out by a licensed waste disposal contractor holding the relevant permits to transport and dispose of sewage sludge.
- The contractor must refer to the desludge instructions in the Operating Handbook, a copy of the instructions is fastened under the covers.



BioDisc® Checklist

BA - BB - BAX BioDisc

Product Code Example - ,BAUAGA104000K'

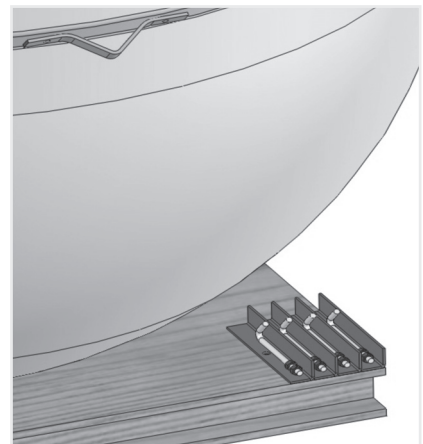
1. The unit will be fitted complete with internal pipework and equipment.
2. Inlet pipework will be fitted.
3. Unit supplied strapped to a standard pallet.
4. Unit Overall Heights are as follows;

- 450mm Inlet Invert	=	2160mm
- 750mm Inlet Invert	=	2460mm
- 1250mm Inlet Invert	=	2960mm



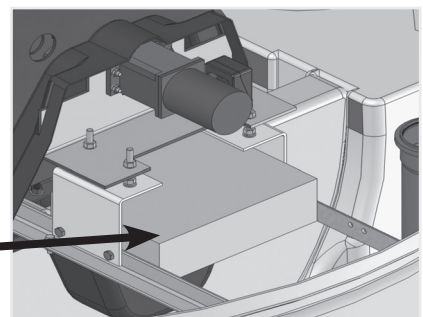
HOLDING DOWN BOLTS

1. The Holding Down Bolts pack will be secured to the pallet as shown in the picture.
2. The Holding Down Bolts need to be fitted to the Holding Down Lugs that are fitted to the Tank - 4 Pos. as detailed in the Installation Manual.



CONTROL PANEL

1. The unit Control Panel will be secured inside the Tank (below the Motor) when delivered.
2. The Control Panel must be removed before the the tank is filled with water during the installation process.

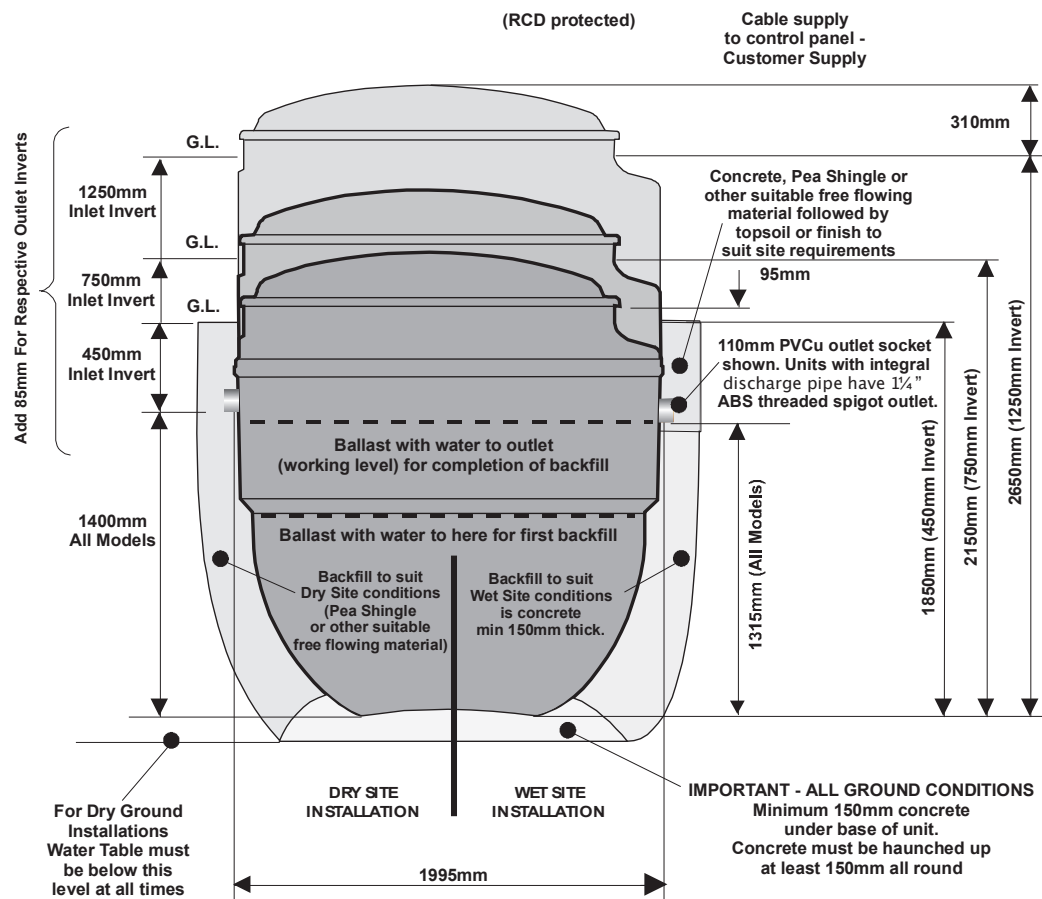


INSTALLATION

1. EXCAVATE A HOLE

Approximate dimensions

Inlet	Depth	Width
450 mm	2000 mm	2145 mm
750 mm	2300 mm	2145 mm
1250 mm	2800 mm	2145 mm



Internal Volumes of Units as an aid to Calculate Materials

① Base to Working Water Level	3.00m ³
② Water Level to Ground Level	
450mm invert	3.00m ³
750mm invert	4.75m ³
1250mm invert	7.50m ³

Approx. Weights: (includes pallet)	BA	BB	NB
450mm invert	310kg	335kg	360kg
750mm invert	325kg	350kg	375kg
1250mm invert	380kg	405kg	430kg

2. LAY CONCRETE BED 150 MM



3. LOWER UNIT ONTO CONCRETE

Should not be lifted with any water inside



4. BACKFILL AND LEVEL

1. Pour water into primary (inlet) and final (outlet) chamber to 200 mm.
2. Backfill.

Wet site: concrete
Dry site: Pea shingle

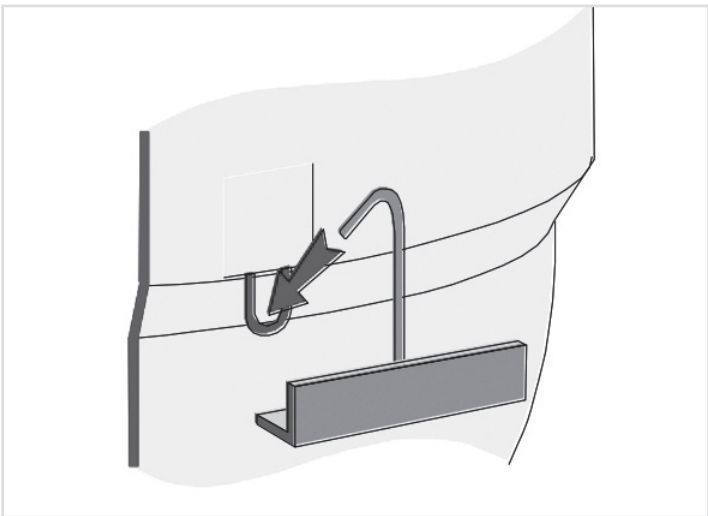
Check that the inlet and outlet orientation is correct and that the unit is level.

The rotor shaft must be level end to end, to within $\pm 3\text{mm}$, measured at the bearing caps or directly on the shaft. The unit must also be level to within $\pm 5\text{mm}$ from side to side, measured at the GRP platform on either side of the rotor.

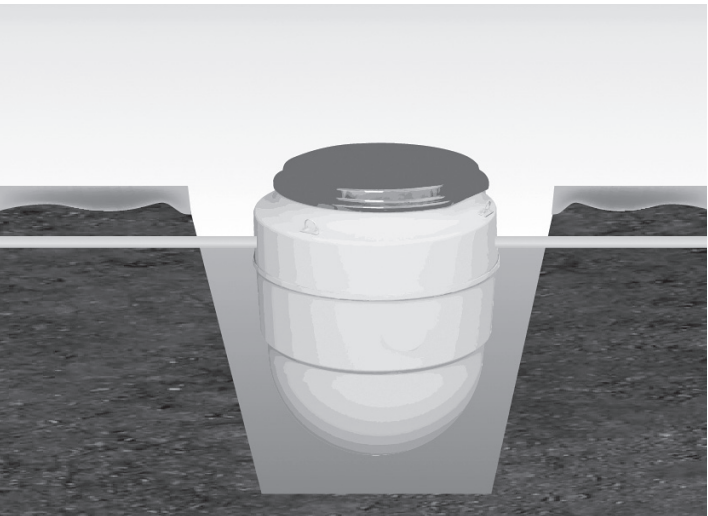


Water levels always in the primary and final chamber 200 mm higher than backfill

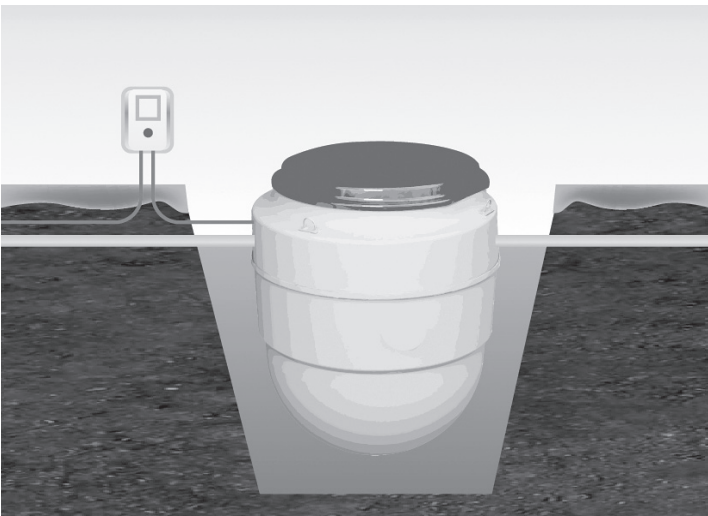
5. WET SITE: ASSEMBLE THE FOUR ANCHOR BARS



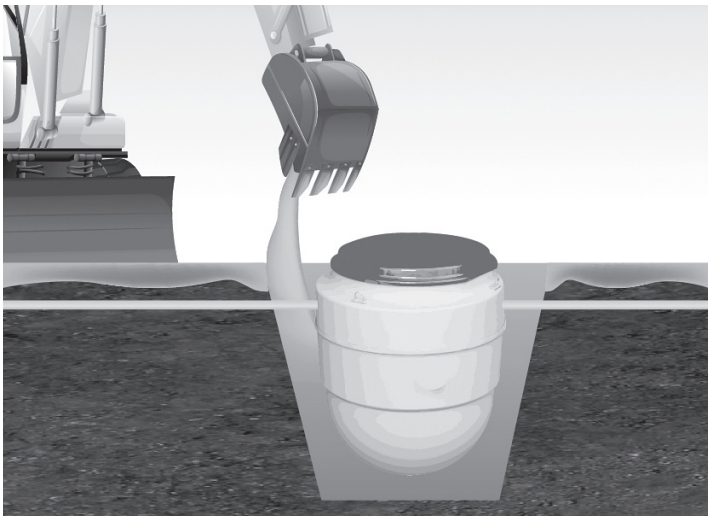
6. CONNECT INLET AND OUTLET PIPEWORK



7. ERECT CONTROL PANEL

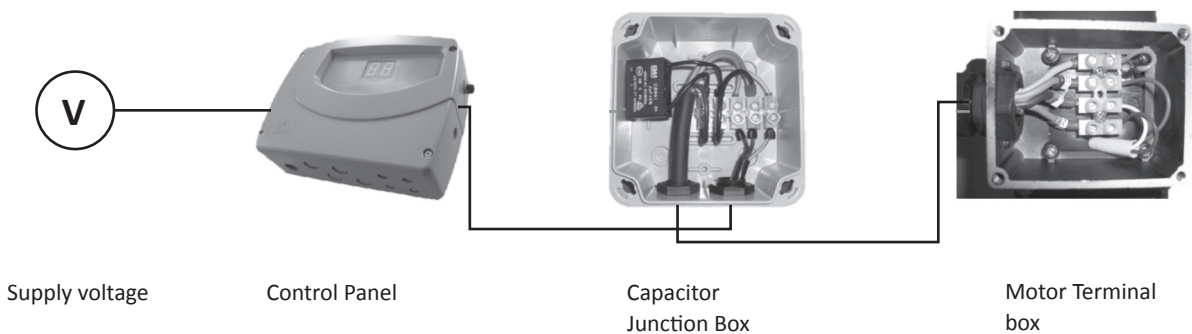


8. CONTINUE TO BACKFILL

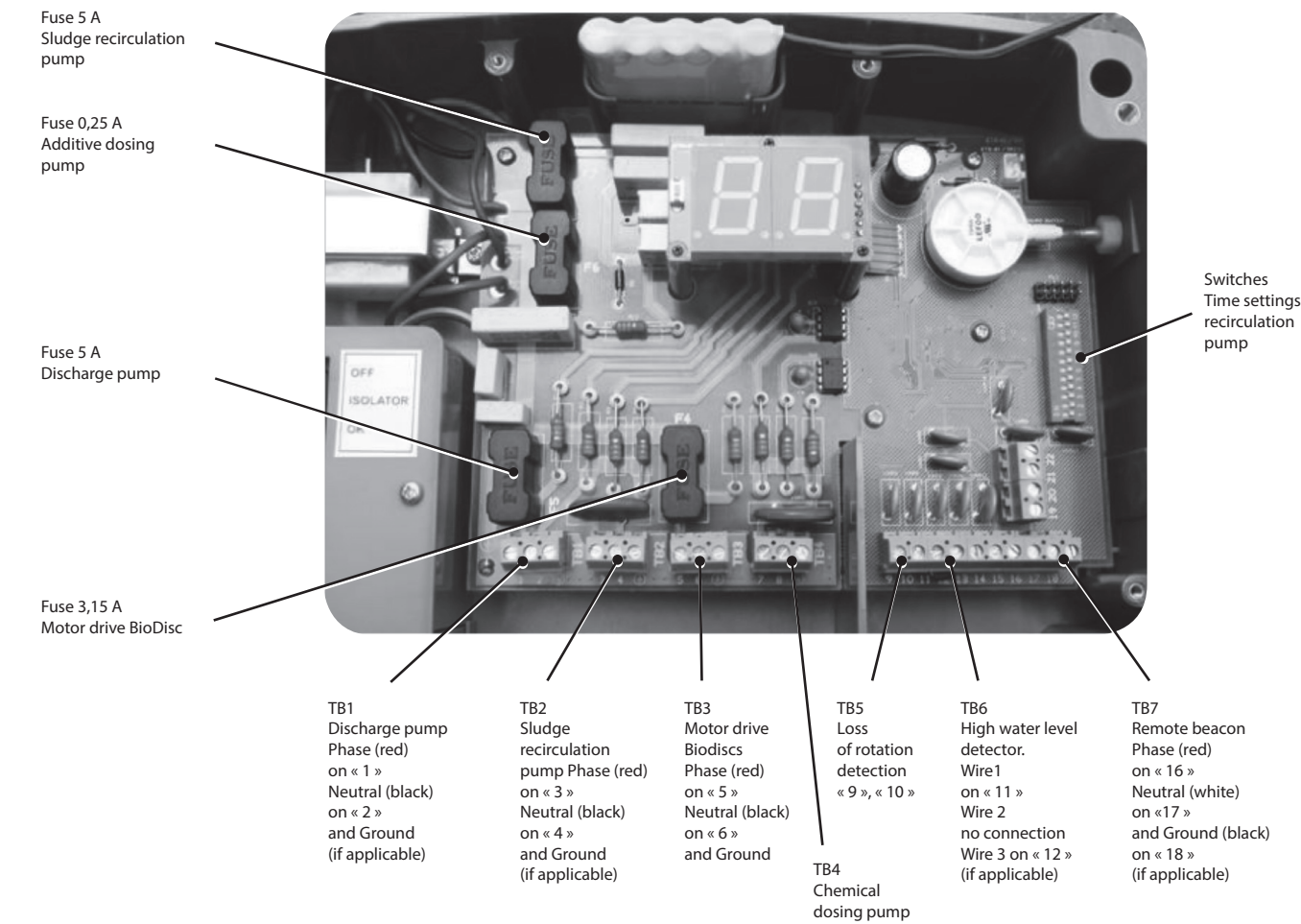


Finished surface 95 mm lower than lid

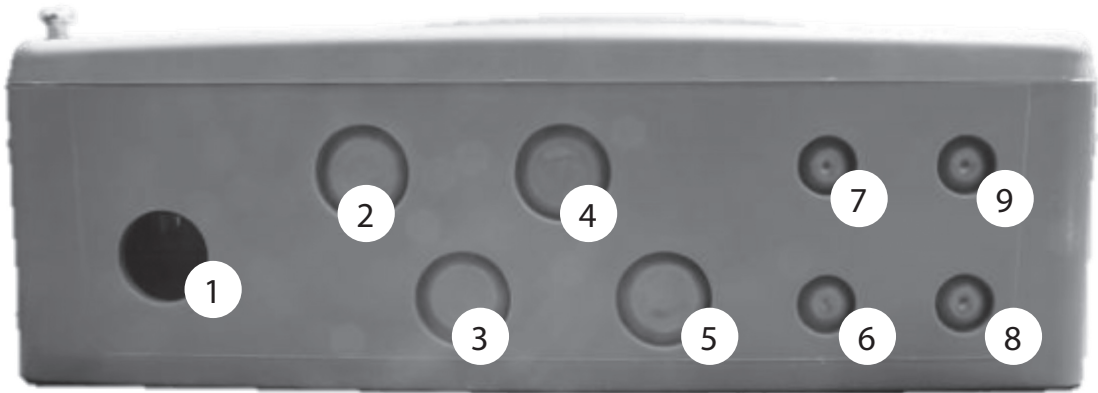
CAPACITOR AND CONTROL PANEL



CONTROL PANEL INSTALLATION



CONTROL PANEL ENTRY POINTS
DEPENDING ON THE EQUIPMENT SUPPLY



Product	Required Gland	Feed through Gland Hole number	Terminate to connection
Mains power supply	M20	1	
Integral discharge pump power cable	M20	2	1&2
Sludge return pump power cable	M20	3	3&4
Motor power supply cable	M20	4	5&6
Chemical dosing pump power cable	M20	5	7&8
Loss of rotation alarm cable	M12	6	9&10
High level alarm cable	M12	7	11&12
Chemical dosing probe cable	M12	8	13, 14&15
Beacon	M12	9	16, 17&18

		Full Load Current (Amps)			
		BA	BAX	BB	NB
Motor	240 volt single phase	0.52	0.52	0.52	0.52
	415 volt three phase	0.22	0.22	0.22	0.22
Integral discharge pump	240 volt single phase only	2.2	2.2	2.2	N/A
Sludge return pump	240 volt single phase only	N/A	N/A	N/A	2.2

FAULT CODES AND FUSES

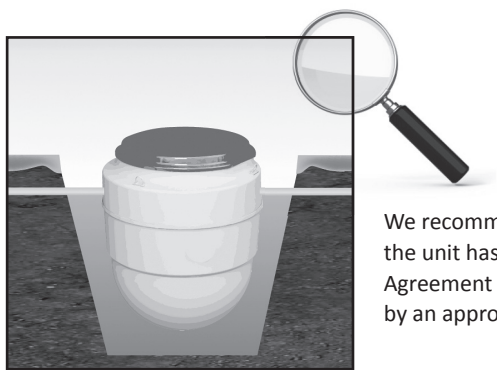
CODE	FAULT CONDITION	FUSE	Amp
F1	No power to the unit	Customer Fuse box	N/A
F2	The blower pressure has failed (not applicable to BioDisc®)	N/A	N/A
F3	The high level alarm has activated (where fitted)	N/A	N/A
F4	The fuse to the motor has failed	F3	3.15
F5	The fuse to the discharge pump has failed (where fitted)	F1	5.0
F6	The fuse to the chemical dosing pump has failed (where fitted)	F4	0.25
F7	The fuse to the recirculation pump has failed (where fitted)	F2	5.0
F8	The loss of rotation alarm has been activated	N/A	N/A
--	The unit has had a fault which has now corrected itself (Flashing left and right - Battery charging Flashing left only - Battery charged)	N/A	N/A

All fuses are Time Lag HBC 20mm type

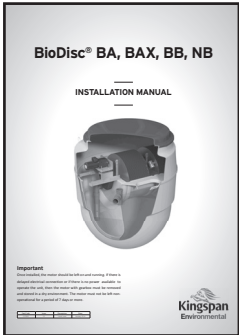
RUN AND PAUSE TIME SETTING

Chemical Dosing Pump Pause Time		
Switch 1	Switch 2	
Off	Off	48 minutes (default BA)
Off	On	24 minutes (default BB)
On	Off	12 minutes
On	On	6 minutes
Chemical Dosing Pump On Time		
Switch 3	Switch 4	
Off	Off	4 seconds
Off	On	3 seconds
On	Off	2 seconds (default)
On	On	1 second
Sludge Return Pump Pause Time		
Switch 5	Switch 6	
Off	Off	12 hours
Off	On	6 hours
On	Off	2 hours(default)
On	On	1 hour
Sludge Return Pump On Time		
Switch 7	Switch 8	
Off	Off	30 seconds
Off	On	20 seconds (default)
On	Off	10 seconds
On	On	5 seconds

START UP



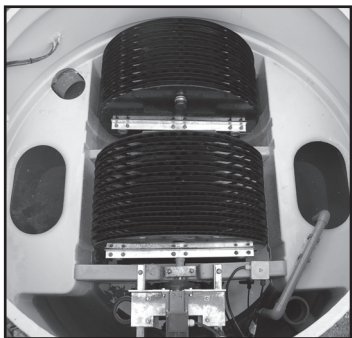
We recommend that the unit has a Pre-Service Agreement Inspection by an approved engineer.



Refer to the Owner's Handbook for details of the Start Up Procedure.



Once the unit has been installed it should be left filled with water.



DO NOT CONNECT UNITS WITH INTEGRAL PUMPS TO A SEWAGE SUPPLY, WITHOUT ENSURING THAT THE ELECTRICITY IS CONNECTED AND THAT THE UNIT IS OPERATIONAL

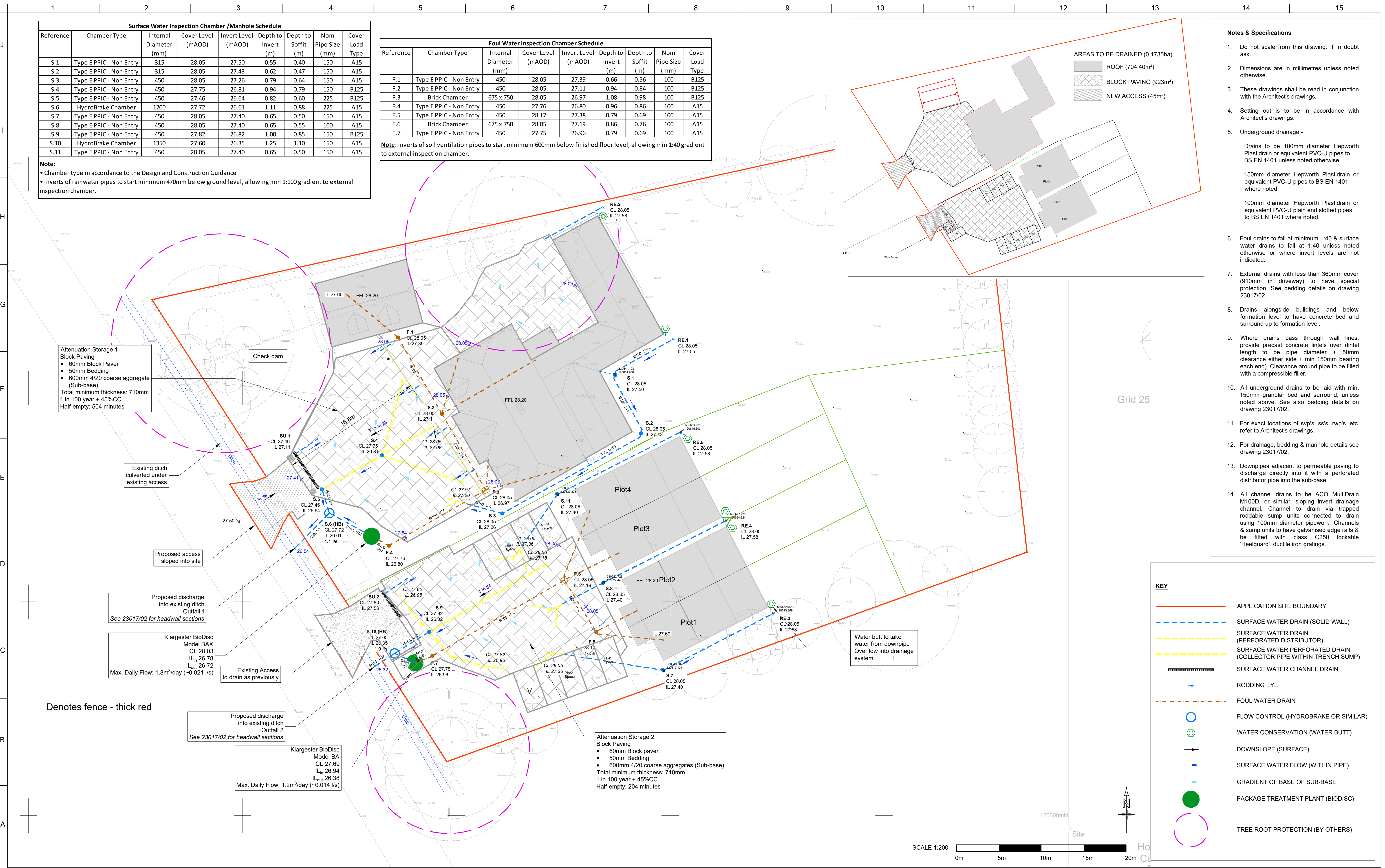


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Appendix H – Proposed Drainage Layout & Flow Simulation Output



Notes & Specifications

- Do not scale from this drawing. If in doubt ask.
- Dimensions are in millimetres unless noted otherwise.
- These drawings shall be read in conjunction with the Architect's drawings.
- Setting out is to be in accordance with Architect's drawings.
- Underground drainage:-

Drains to be 100mm diameter Hepworth Plastidrain or equivalent PVC-U pipes to BS EN 1401 unless noted otherwise.

150mm diameter Hepworth Plastidrain or equivalent PVC-U pipes to BS EN 1401 where noted.

100mm diameter Hepworth Plastidrain or equivalent PVC-U plain end slotted pipes to BS EN 1401 where noted.
- Foul drains to fall at minimum 1:40 & surface water drains to fall at 1:40 unless noted otherwise or where invert levels are not indicated.
- External drains with less than 360mm cover (910mm in driveway) to have special protection. See bedding details on drawing 23017/02.
- Drains alongside buildings and below formation level to have concrete bed and surround up to formation level.
- Where drains pass through wall lines, provide precast concrete lintels over (lintel length to be pipe diameter + 50mm clearance either side + min 150mm bearing each end). Clearance around pipe to be filled with a compressible filler.
- All underground drains to be laid with min. 150mm granular bed and surround, unless noted above. See also bedding details on drawing 23017/02.
- For exact locations of svp's, ss's, rwp's, etc. refer to Architect's drawings.
- For drainage, bedding & manhole details see drawing 23017/02.
- Downpipes adjacent to permeable paving to discharge directly into it with a perforated distributor pipe into the sub-base.
- All channel drains to be ACO MultiDrain M100D, or similar, sloping invert drainage channel. Channel to drain via trapped roddable sump units connected to drain using 100mm diameter pipework. Channels & sump units to have galvanised edge rails & be fitted with class C250 lockable 'Heelguard' ductile iron gratings.

KEY

- APPLICATION SITE BOUNDARY
- SURFACE WATER DRAIN (SOLID WALL)
- SURFACE WATER DRAIN (PERFORATED DISTRIBUTOR)
- SURFACE WATER PERFORATED DRAIN (COLLECTOR PIPE WITHIN TRENCH SUMP)
- SURFACE WATER CHANNEL DRAIN
- RODDING EYE
- FOUL WATER DRAIN
- FLOW CONTROL (HYDROBRAKE OR SIMILAR)
- WATER CONSERVATION (WATER BUTT)
- DOWNSLOPE (SURFACE)
- SURFACE WATER FLOW (WITHIN PIPE)
- GRADIENT OF BASE OF SUB-BASE
- PACKAGE TREATMENT PLANT (BIODISC)
- TREE ROOT PROTECTION (BY OTHERS)

- Notes:
- THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT MONSON DRAWINGS AND SPECIFICATIONS. ANY DISCREPANCIES TO BE REPORTED TO MONSON PRIOR TO ANY FABRICATION OR WORK COMMENCING ON SITE.
 - DO NOT SCALE THIS DRAWING. USE FIGURED DIMENSIONS ONLY.
 - ALL DIMENSIONS IN MILLIMETRES, ALL LEVELS IN METRES.



RISK ASSESSMENT

RESIDUAL RISKS IDENTIFIED

- None identified. 03/02/25.

CONTRACTOR'S GENERAL RISK ITEMS

- (List is not exhaustive but includes commonly raised issues)
- Location of all buried services.
 - Existing drainage:
 - Gases, confined spaces, diseases.
 - Maintain flow in drains during works.
 - Manual lifting of heavy objects:
Manhole covers, drainage pipes, concrete rings, kerbs, etc.
 - Excavation for drainage trenches and manholes.
 - Security:
Keep site secure from members of the public.
Maintain public safety when accessing site

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A CL 03/02/2025 Original Issue

MONSON

Broadway Chambers, High Street, Crowborough, East Sussex TN6 1DF
Tel: (01892) 601370
E-mail: enquiries@monson.co.uk

Project:
Hollytree House (2025)
Cuckfield Road
Burgess Hill
RH15 8RE

Original Drawing: Prepared CM Approved GL
Size A1
Current Issue: Approved GL Date 03/02/2023
Drawing Status: PLANNING

Description:
Proposed Drainage Layout
Surface Water & Foul Water

Scale: 1:200
Dwg No: 25003/01
Issue: A

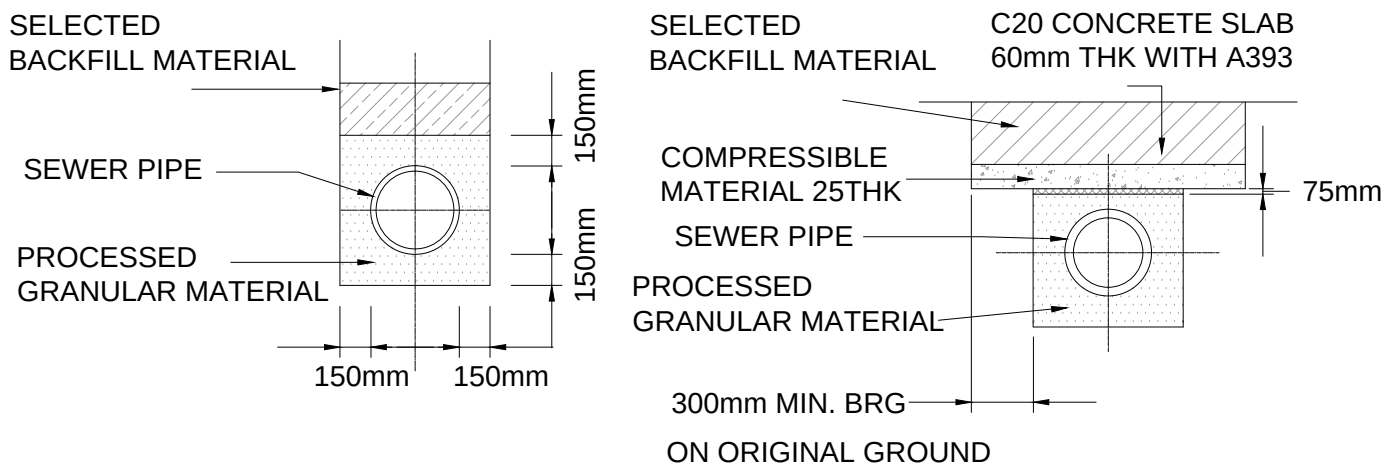
ISSUE SHEET

M01_A4 APPROVED DEC 2010 ISSUE No. 6

NOMINAL SIZE (DN)	PIPE BEDDING REQUIREMENTS (mm)
100 to 150	10 OR 14 NOMINAL SINGLE SIZE OR 14 TO 15 GRADED
225 to 525	10, 14 OR 20 NOMINAL SINGLE SIZE OR 14 TO 5 GRADED OR 20 TO 5 GRADED

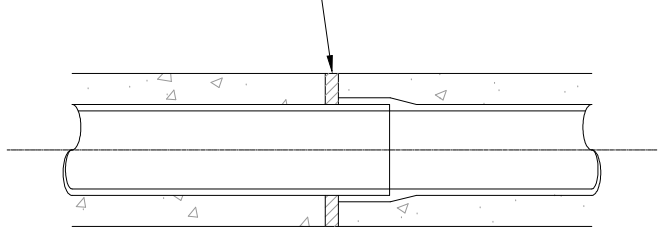
THE MINIMUM DEPTH TO THE CROWN OF GRAVITY PIPES WITHOUT PROTECTION SHOULD BE AS FOLLOWS:

0.35m - DOMESTIC GARDENS AND PATHWAYS WITHOUT ANY POSSIBILITY OF VEHICULAR ACCESS.
0.50m - DOMESTIC DRIVEWAYS, PARKING AREAS AND YARDS WITH HEIGHT RESTRICTIONS TO PREVENT ENTRY BY VEHICLES WITH A GROSS VEHICLE WEIGHT IN EXCESS OF 7.5 TONNES.
0.90m - DOMESTIC DRIVEWAYS, PARKING AREAS AND NARROW STREETS WITHOUT FOOTWAYS (e.g. MEWS DEVELOPMENT) WITH LIMITED ACCESS FOR VEHICLES WITH A GROSS VEHICLE WEIGHT IN EXCESS OF 7.5 TONNES.
0.90m - AGRICULTURAL LAND AND PUBLIC OPEN SPACE.
1.20m - OTHER HIGHWAYS AND PARKING AREAS WITH UNRESTRICTED ACCESS TO VEHICLES WITH A GROSS VEHICLE WEIGHT IN EXCESS OF 7.5 TONNES.



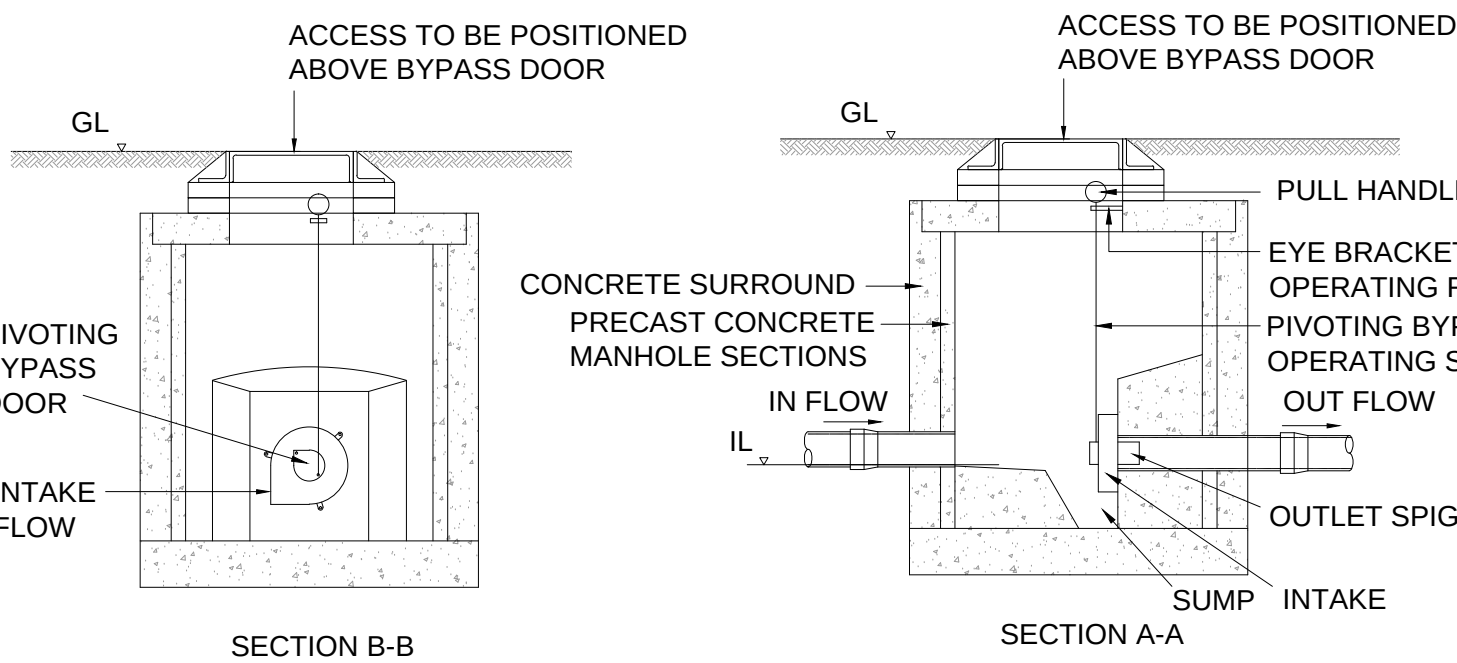
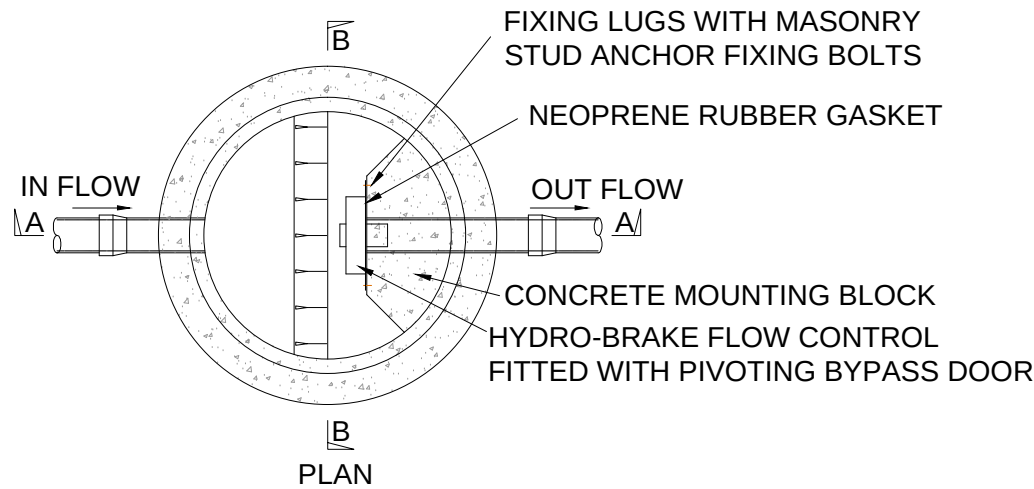
CLASS 'S' BEDDING
360° GRANULAR BED AND SURROUND

150mm MINIMUM CONCRETE SURROUND DIVIDED WITH 25mm THICK COMPRESSIBLE BOARD AT EACH JOINT. PROTECT PIPE FROM INGRESS OF CONCRETE BY WRAPPING JOINT WITH POLYTHENE SHEET AND ADHESIVE TAPE

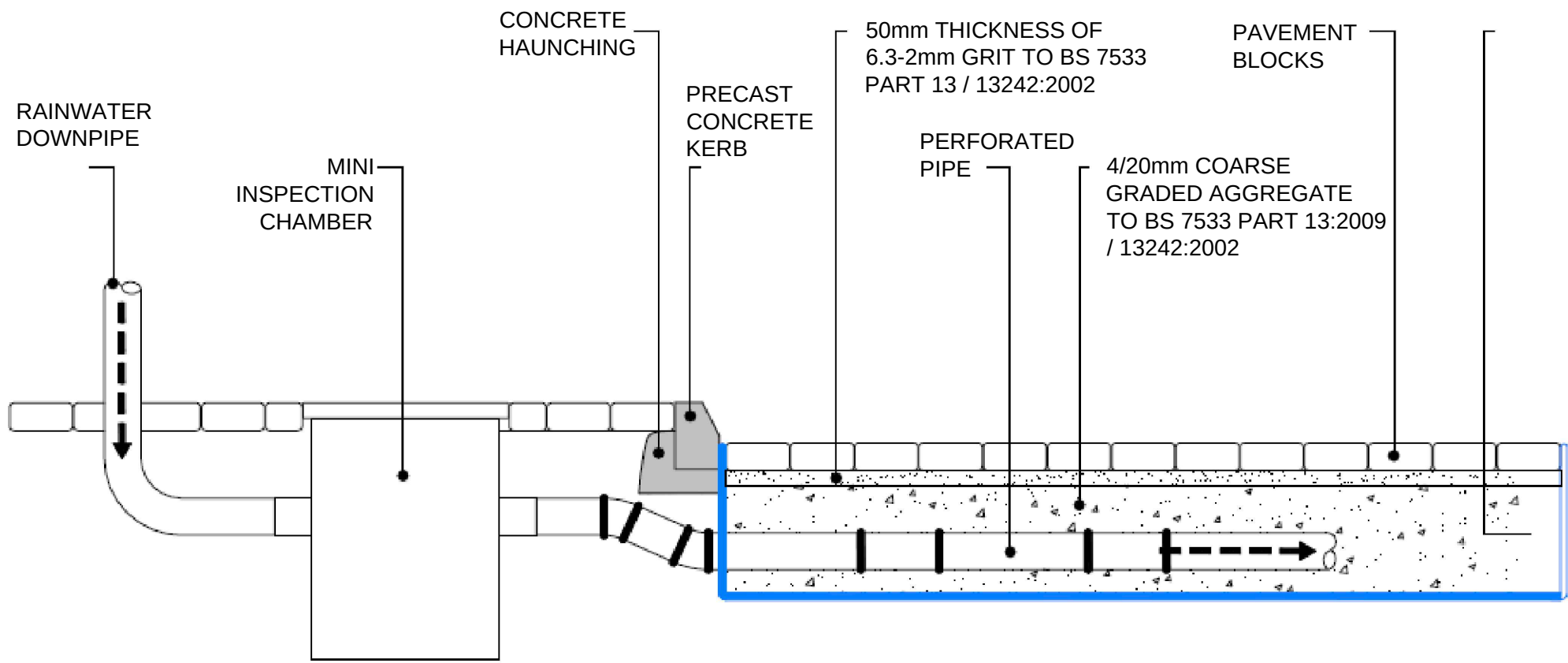


TYPE Z BEDDING

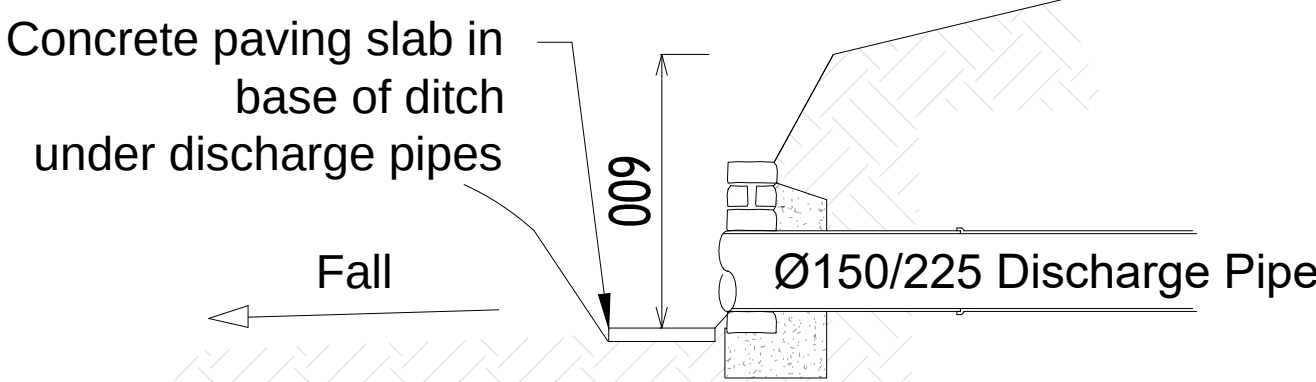
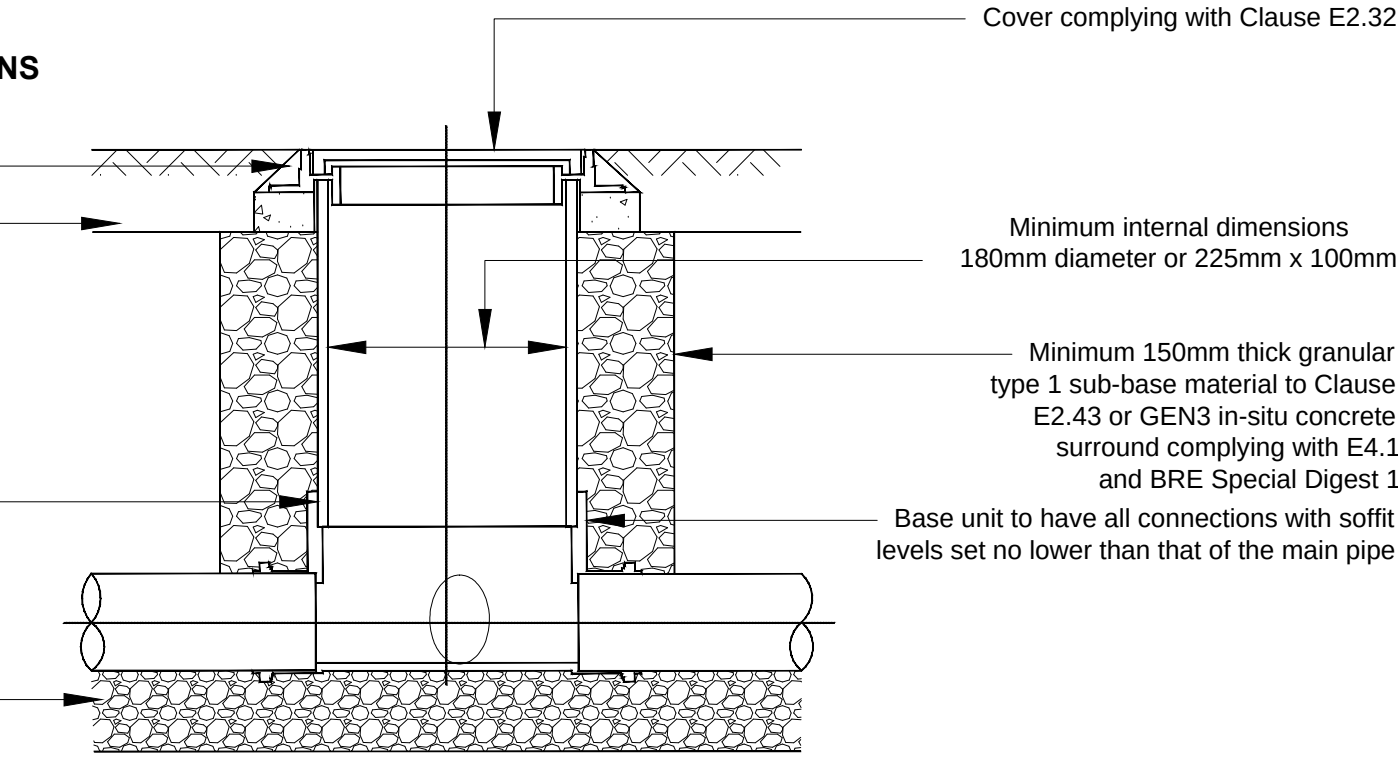
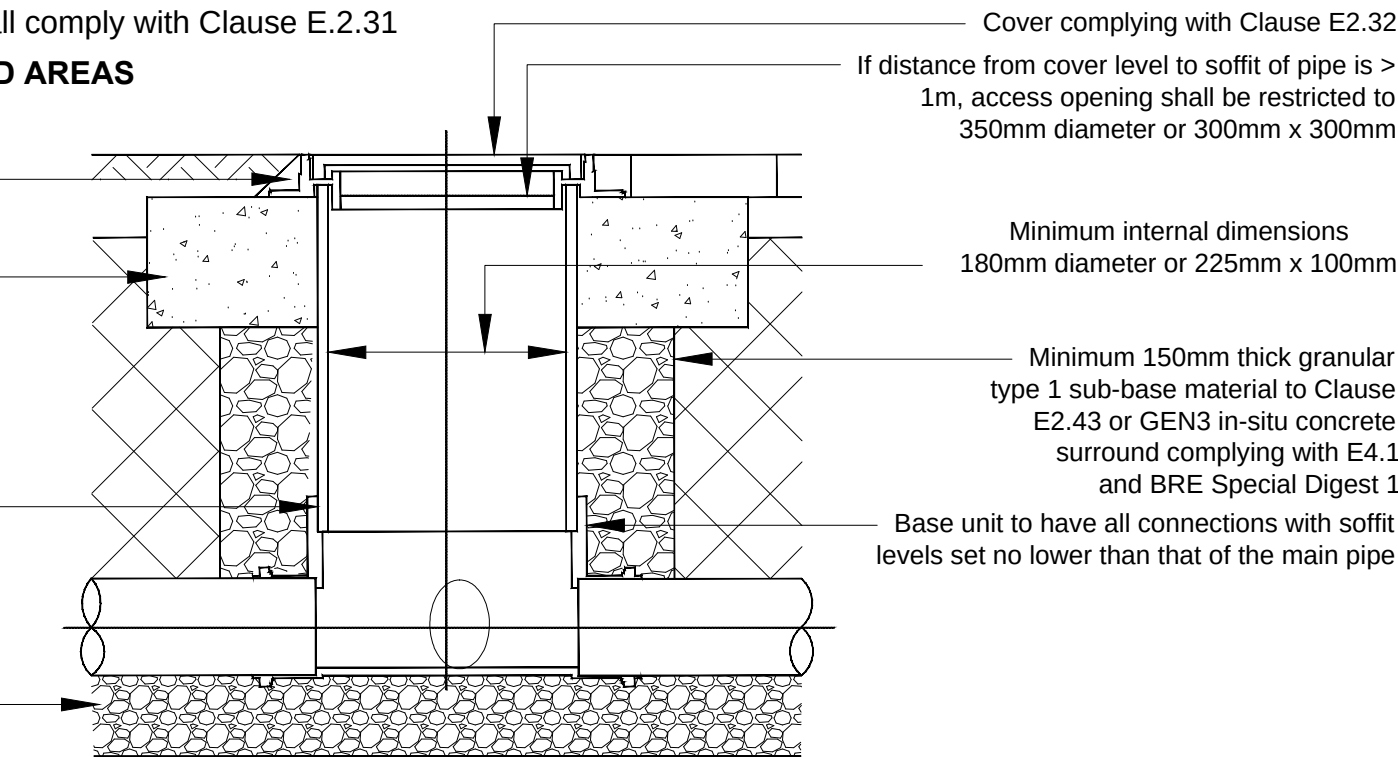
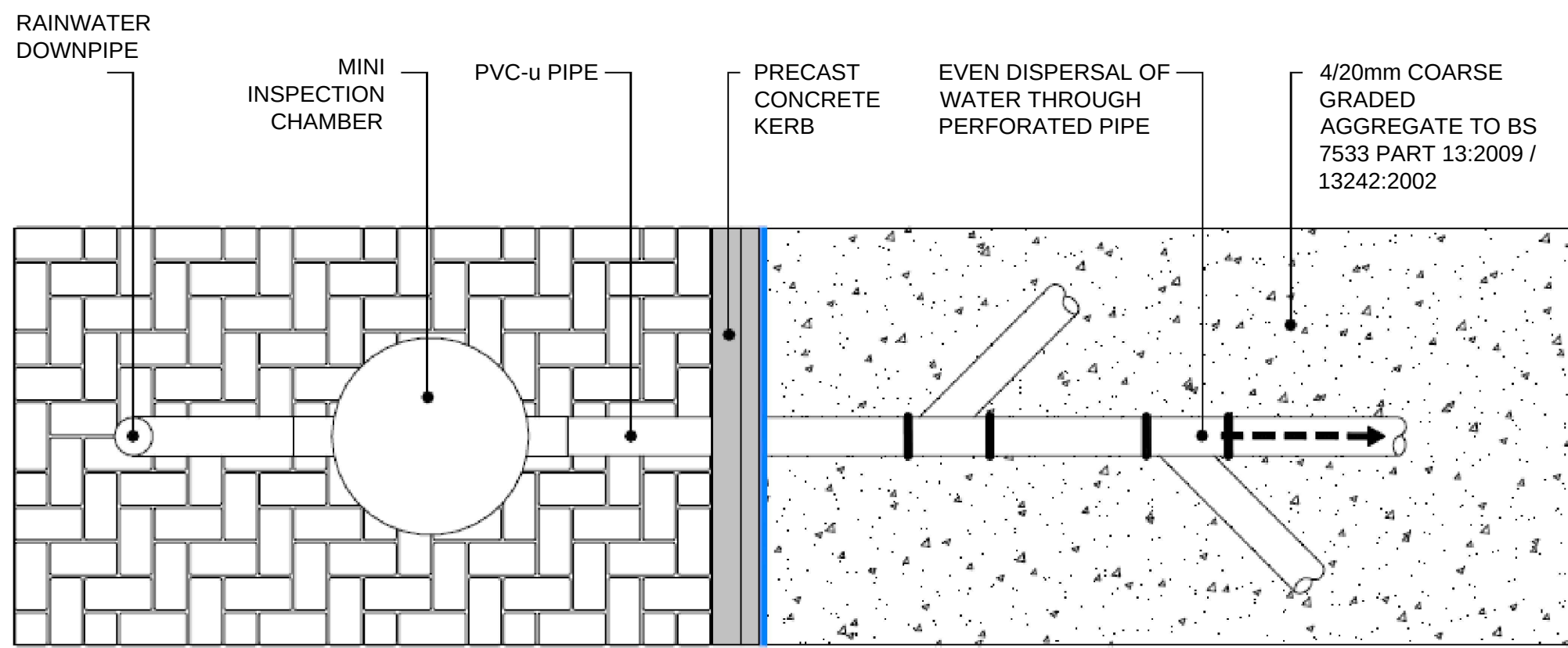
PIPE PROTECTION LAID AT SHALLOW DEPTHS



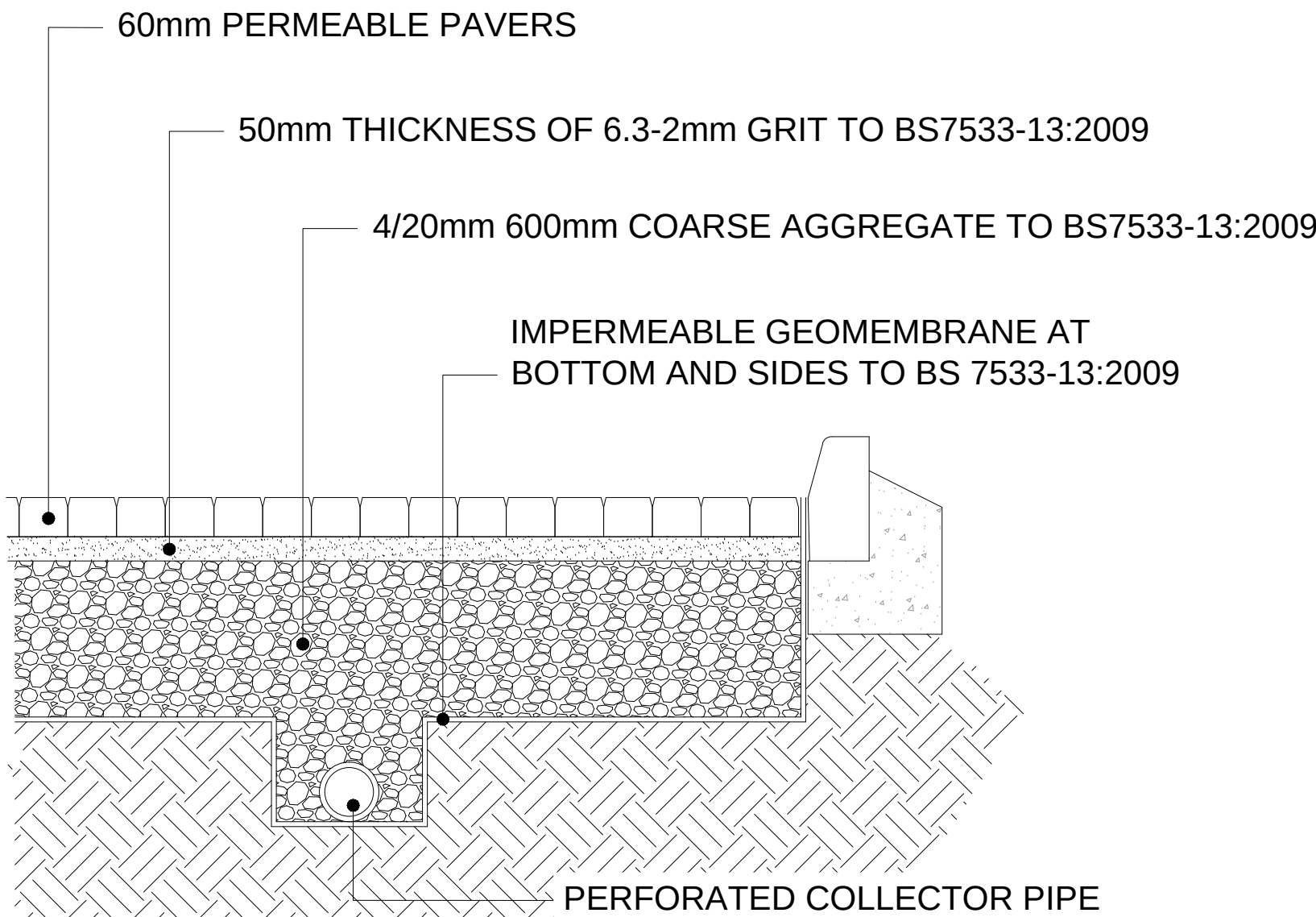
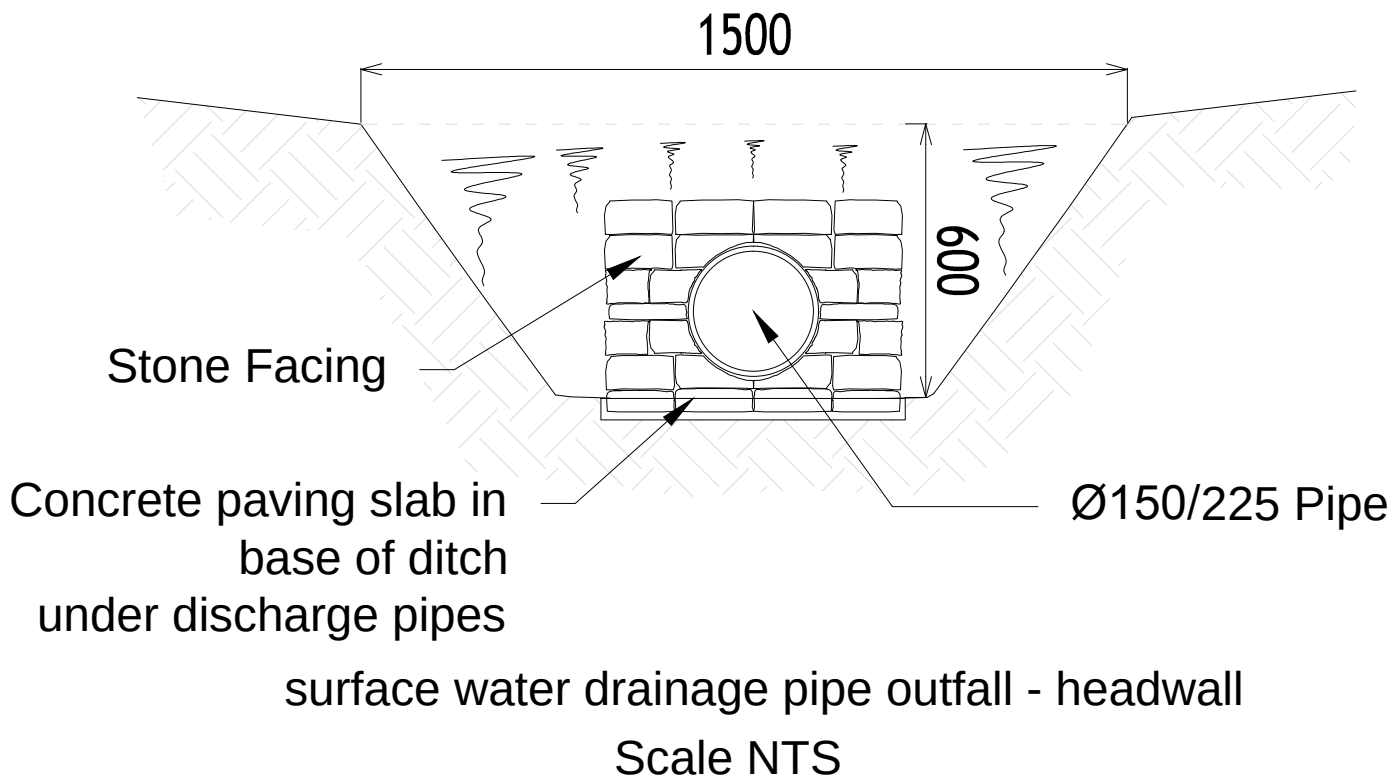
LAYOUT HYDRO-BRAKE
FLOW CONTROL



DOWNPIPE DRAINAGE INTO ATTENUATION SYSTEM



Long section of the discharge pipe into re-established ditch
Scale NTS



Notes:
1. This drawing is to be read in conjunction with all other relevant Monson drawings and specifications, any discrepancies to be reported to Monson prior to any fabrication or work commencing on site.
2. Do not scale this drawing, use figured dimensions only.
3. All dimensions in millimetres, all levels in metres.

A CM 28/07/2023 Original Issue
Issue By Date Amendments

MONSON
Broadway Chambers, High Street, Crowborough, East Sussex TN6 1DF
Tel: (01892) 601370
E-mail: enquiries@monson.co.uk

Project:
Hollytree House
Cuckfield Road
Burgess Hill
RH15 8RE

Description:
Standard Drainage Details

Original Drawing: Prepared CM Approved GL
Origin: Crowborough Size A1
Current Issue: Approved GL Date 28/07/2023
Drawing Status: PLANNING

Scale: NTS Dwg No: 23017/02 Issue: A

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	1	Maximum Rainfall (mm/hr)	200.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	1.200
CV	1.000	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
RE1	0.004	5.00	28.050		530650.642	120655.964	0.500
S1	0.004	5.00	28.050	450	530643.613	120652.070	0.550
S2	0.004	5.00	28.050	450	530647.618	120644.915	0.620
S3	0.005	5.00	28.050	450	530630.824	120635.611	0.790
S5 (AT)	0.089	5.00	27.500	450	530609.597	120638.443	0.860
S6 (HB)			27.720	1200	530610.460	120635.657	1.110
Outfall 1			27.000		530604.454	120630.503	0.460

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	RE1	S1	8.036	0.600	27.550	27.500	0.050	160.7	150	5.17	53.9
1.001	S1	S2	8.200	0.600	27.500	27.430	0.070	117.1	150	5.32	53.2
1.002	S2	S3	19.199	0.600	27.430	27.260	0.170	112.9	150	5.66	51.8
2.001	S5 (AT)	S6 (HB)	2.917	0.600	26.640	26.610	0.030	97.2	225	5.75	51.4
2.002	S6 (HB)	Outfall 1	7.914	0.600	26.610	26.540	0.070	113.1	225	5.86	50.9
1.003	S3	S5 (AT)	4.347	0.600	27.260	27.200	0.060	72.5	150	5.72	51.5

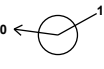
Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	0.790	14.0	0.8	0.350	0.400	0.004	0.0	24	0.426
1.001	0.927	16.4	1.5	0.400	0.470	0.008	0.0	31	0.579
1.002	0.945	16.7	2.2	0.470	0.640	0.012	0.0	37	0.660
2.001	1.326	52.7	19.7	0.635	0.885	0.106	0.0	95	1.233
2.002	1.229	48.8	19.5	0.885	0.235	0.106	0.0	99	1.162
1.003	1.182	20.9	3.2	0.640	0.150	0.017	0.0	40	0.857

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	8.036	160.7	150	Circular	28.050	27.550	0.350	28.050	27.500	0.400
1.001	8.200	117.1	150	Circular	28.050	27.500	0.400	28.050	27.430	0.470
1.002	19.199	112.9	150	Circular	28.050	27.430	0.470	28.050	27.260	0.640
2.001	2.917	97.2	225	Circular	27.500	26.640	0.635	27.720	26.610	0.885
2.002	7.914	113.1	225	Circular	27.720	26.610	0.885	27.000	26.540	0.235
1.003	4.347	72.5	150	Circular	28.050	27.260	0.640	27.500	27.200	0.150

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	RE1		Junction		S1	450	Manhole	Adoptable
1.001	S1	450	Manhole	Adoptable	S2	450	Manhole	Adoptable
1.002	S2	450	Manhole	Adoptable	S3	450	Manhole	Adoptable
2.001	S5 (AT)	450	Manhole	Adoptable	S6 (HB)	1200	Manhole	Adoptable
2.002	S6 (HB)	1200	Manhole	Adoptable	Outfall 1		Junction	
1.003	S3	450	Manhole	Adoptable	S5 (AT)	450	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
RE1	530650.642	120655.964	28.050	0.500					
S1	530643.613	120652.070	28.050	0.550	450		0 1	1.000 1.000	27.550 27.500 150 150
S2	530647.618	120644.915	28.050	0.620	450		0 1	1.001 1.001	27.500 27.430 150 150
S3	530630.824	120635.611	28.050	0.790	450		0 1	1.002 1.002	27.430 27.260 150 150
S5 (AT)	530609.597	120638.443	27.500	0.860	450		0 1	1.003 1.003	27.260 27.200 150 150
S6 (HB)	530610.460	120635.657	27.720	1.110	1200		0 1	2.001 2.001	26.640 26.610 225 225
Outfall 1	530604.454	120630.503	27.000	0.460			1	2.002	26.540 225

**Simulation Settings**

Rainfall Methodology	FSR	Analysis Speed	Detailed
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	20.000	Drain Down Time (mins)	1440
Ratio-R	0.400	Additional Storage (m ³ /ha)	50.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

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

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

Node S6 (HB) Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	26.610	Product Number	CTL-SHE-0052-1100-0800-1100
Design Depth (m)	0.800	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	1.1	Min Node Diameter (mm)	1200

Node S5 (AT) Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	26.750	Slope (1:X)	89.5
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	688	Depth (m)	0.600
Safety Factor	2.0	Width (m)	13.790	Inf Depth (m)	
Porosity	0.30	Length (m)	53.718		

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

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute summer	RE1	18	27.569	0.019	0.5	0.0077	0.0000	OK
30 minute summer	S1	18	27.525	0.025	1.0	0.0131	0.0000	OK
30 minute summer	S2	18	27.460	0.030	1.5	0.0144	0.0000	OK
30 minute summer	S3	18	27.293	0.033	2.0	0.0158	0.0000	OK
60 minute winter	S5 (AT)	60	26.932	0.292	7.8	7.7302	0.0000	SURCHARGED
60 minute winter	S6 (HB)	60	26.932	0.322	3.1	0.3646	0.0000	SURCHARGED
30 minute summer	Outfall 1	1	26.540	0.000	1.1	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	RE1	1.000	S1	0.5	0.306	0.036	0.0131	
30 minute summer	S1	1.001	S2	1.0	0.446	0.060	0.0181	
30 minute summer	S2	1.002	S3	1.4	0.539	0.086	0.0515	
30 minute summer	S3	1.003	S5 (AT)	2.0	0.718	0.095	0.0120	
60 minute winter	S5 (AT)	2.001	S6 (HB)	3.1	0.423	0.058	0.1160	
60 minute winter	S6 (HB)	Hydro-Brake®	Outfall 1	1.1				11.5

Results for 30 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute summer	RE1	18	27.580	0.030	1.2	0.0119	0.0000	OK
30 minute summer	S1	18	27.540	0.040	2.4	0.0210	0.0000	OK
30 minute summer	S2	18	27.477	0.047	3.6	0.0228	0.0000	OK
30 minute summer	S3	18	27.315	0.055	5.1	0.0262	0.0000	OK
180 minute winter	S5 (AT)	176	27.112	0.472	8.4	26.7285	0.0000	SURCHARGED
180 minute winter	S6 (HB)	176	27.112	0.502	3.4	0.5672	0.0000	SURCHARGED
30 minute summer	Outfall 1	1	26.540	0.000	1.1	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	RE1	1.000	S1	1.2	0.387	0.086	0.0251	
30 minute summer	S1	1.001	S2	2.4	0.561	0.146	0.0350	
30 minute summer	S2	1.002	S3	3.6	0.675	0.214	0.1020	
30 minute summer	S3	1.003	S5 (AT)	5.0	0.916	0.241	0.0239	
180 minute winter	S5 (AT)	2.001	S6 (HB)	3.4	0.369	0.064	0.1160	
180 minute winter	S6 (HB)	Hydro-Brake®	Outfall 1	1.1				37.1

Results for 30 year +40% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute summer	RE1	18	27.584	0.034	1.6	0.0137	0.0000	OK
30 minute summer	S1	18	27.547	0.047	3.2	0.0246	0.0000	OK
30 minute summer	S2	18	27.485	0.055	4.8	0.0267	0.0000	OK
30 minute summer	S3	18	27.326	0.066	6.9	0.0313	0.0000	OK
240 minute winter	S5 (AT)	236	27.204	0.564	9.7	41.1167	0.0000	FLOOD RISK
240 minute winter	S6 (HB)	236	27.204	0.594	3.1	0.6714	0.0000	SURCHARGED
30 minute summer	Outfall 1	1	26.540	0.000	1.1	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	RE1	1.000	S1	1.6	0.416	0.115	0.0311	
30 minute summer	S1	1.001	S2	3.2	0.602	0.195	0.0436	
30 minute summer	S2	1.002	S3	4.8	0.718	0.287	0.1281	
30 minute summer	S3	1.003	S5 (AT)	6.9	0.989	0.328	0.0301	
240 minute winter	S5 (AT)	2.001	S6 (HB)	3.1	0.362	0.058	0.1160	
240 minute winter	S6 (HB)	Hydro-Brake®	Outfall 1	1.1				55.2

Results for 100 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute summer	RE1	18	27.583	0.033	1.5	0.0132	0.0000	OK
30 minute summer	S1	18	27.545	0.045	3.0	0.0238	0.0000	OK
30 minute summer	S2	18	27.484	0.054	4.5	0.0258	0.0000	OK
30 minute summer	S3	18	27.323	0.063	6.4	0.0299	0.0000	OK
240 minute winter	S5 (AT)	236	27.182	0.542	8.8	37.4568	0.0000	SURCHARGED
240 minute winter	S6 (HB)	236	27.182	0.572	2.7	0.6469	0.0000	SURCHARGED
30 minute summer	Outfall 1	1	26.540	0.000	1.1	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	RE1	1.000	S1	1.5	0.409	0.107	0.0296	
30 minute summer	S1	1.001	S2	3.0	0.592	0.183	0.0415	
30 minute summer	S2	1.002	S3	4.5	0.710	0.269	0.1214	
30 minute summer	S3	1.003	S5 (AT)	6.4	0.971	0.304	0.0284	
240 minute winter	S5 (AT)	2.001	S6 (HB)	2.7	0.362	0.051	0.1160	
240 minute winter	S6 (HB)	Hydro-Brake®	Outfall 1	1.1				51.4

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute summer	RE1	18	27.590	0.040	2.2	0.0160	0.0000	OK
30 minute summer	S1	18	27.556	0.056	4.4	0.0295	0.0000	OK
30 minute summer	S2	18	27.497	0.067	6.6	0.0321	0.0000	OK
30 minute summer	S3	18	27.339	0.079	9.4	0.0378	0.0000	OK
360 minute winter	S5 (AT)	352	27.301	0.661	9.4	59.7217	0.0000	FLOOD RISK
360 minute winter	S6 (HB)	352	27.301	0.691	3.1	0.7814	0.0000	SURCHARGED
30 minute summer	Outfall 1	1	26.540	0.000	1.1	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	RE1	1.000	S1	2.2	0.450	0.158	0.0394	
30 minute summer	S1	1.001	S2	4.4	0.647	0.268	0.0558	
30 minute summer	S2	1.002	S3	6.6	0.773	0.395	0.1636	
30 minute summer	S3	1.003	S5 (AT)	9.3	1.065	0.447	0.0381	
360 minute winter	S5 (AT)	2.001	S6 (HB)	3.1	0.341	0.059	0.1160	
360 minute winter	S6 (HB)	Hydro-Brake®	Outfall 1	1.1				81.3

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	1	Maximum Rainfall (mm/hr)	200.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	1.200
CV	1.000	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
RE3	0.010	5.00	28.050		530654.986	120622.192	0.470
S7	0.010	5.00	28.050	450	530644.605	120616.174	0.650
S9 (AT)	0.010	5.00	27.820	450	530622.231	120621.673	1.000
S10 (HB)			27.650	1350	530618.149	120619.114	1.300
Outfall 2			26.500		530615.704	120617.514	0.300
RE4	0.010	5.00	28.050		530657.271	120634.824	0.470
S8	0.010	5.00	28.050	450	530642.728	120627.443	0.632
RE5	0.010	5.00	28.050		530651.971	120645.303	0.470
S11	0.013	5.00	28.050	450	530637.317	120637.875	0.633

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)
2.000	RE3	S7	11.913	0.600	27.580	27.400	0.180	66.2	150	5.18	50.0
2.002_1	S9 (AT)	S10 (HB)	4.818	0.600	26.820	26.350	0.470	10.3	150	5.31	50.0
2.003	S10 (HB)	Outfall 2	2.922	0.600	26.350	26.200	0.150	19.5	150	5.36	50.0
2.001_1	S7	S9 (AT)	6.655	0.600	27.400	27.180	0.220	30.3	150	5.28	50.0
3.000	RE4	S8	16.309	0.600	27.580	27.418	0.162	100.7	150	5.27	53.4
3.001	S8	S9 (AT)	21.294	0.600	27.418	27.180	0.238	89.5	150	5.61	52.0
4.000	RE5	S11	16.429	0.600	27.580	27.417	0.163	100.8	150	5.27	53.4
4.001	S11	S9 (AT)	22.138	0.600	27.417	27.180	0.237	93.4	150	5.63	51.9

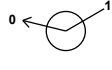
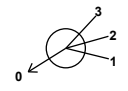
Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
2.000	1.238	21.9	1.8	0.320	0.500	0.010	0.0	29	0.748
2.002_1	3.165	55.9	13.2	0.850	1.150	0.073	0.0	50	2.597
2.003	2.292	40.5	13.2	1.150	0.150	0.073	0.0	59	2.054
2.001_1	1.837	32.5	3.6	0.500	0.490	0.020	0.0	34	1.215
3.000	1.001	17.7	1.9	0.320	0.482	0.010	0.0	34	0.661
3.001	1.063	18.8	3.8	0.482	0.490	0.020	0.0	45	0.831
4.000	1.001	17.7	1.9	0.320	0.483	0.010	0.0	34	0.660
4.001	1.040	18.4	4.3	0.483	0.490	0.023	0.0	50	0.852

Pipeline Schedule

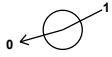
Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
2.000	11.913	66.2	150	Circular	28.050	27.580	0.320	28.050	27.400	0.500
2.002_1	4.818	10.3	150	Circular	27.820	26.820	0.850	27.650	26.350	1.150
2.003	2.922	19.5	150	Circular	27.650	26.350	1.150	26.500	26.200	0.150
2.001_1	6.655	30.3	150	Circular	28.050	27.400	0.500	27.820	27.180	0.490
3.000	16.309	100.7	150	Circular	28.050	27.580	0.320	28.050	27.418	0.482
3.001	21.294	89.5	150	Circular	28.050	27.418	0.482	27.820	27.180	0.490
4.000	16.429	100.8	150	Circular	28.050	27.580	0.320	28.050	27.417	0.483
4.001	22.138	93.4	150	Circular	28.050	27.417	0.483	27.820	27.180	0.490

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
2.000	RE3		Junction		S7	450	Manhole	Adoptable
2.002_1	S9 (AT)	450	Manhole	Adoptable	S10 (HB)	1350	Manhole	Adoptable
2.003	S10 (HB)	1350	Manhole	Adoptable	Outfall 2		Junction	
2.001_1	S7	450	Manhole	Adoptable	S9 (AT)	450	Manhole	Adoptable
3.000	RE4		Junction		S8	450	Manhole	Adoptable
3.001	S8	450	Manhole	Adoptable	S9 (AT)	450	Manhole	Adoptable
4.000	RE5		Junction		S11	450	Manhole	Adoptable
4.001	S11	450	Manhole	Adoptable	S9 (AT)	450	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
RE3	530654.986	120622.192	28.050	0.470					
						0	2.000	27.580	150
S7	530644.605	120616.174	28.050	0.650	450		1	2.000	27.400
						0	2.001_1	27.400	150
S9 (AT)	530622.231	120621.673	27.820	1.000	450		1	2.001_1	27.180
						2	3.001	27.180	150
						3	4.001	27.180	150
						0	2.002_1	26.820	150
S10 (HB)	530618.149	120619.114	27.650	1.300	1350		1	2.002_1	26.350
						0	2.003	26.350	150
Outfall 2	530615.704	120617.514	26.500	0.300			1	2.003	26.200
									150
RE4	530657.271	120634.824	28.050	0.470					
						0	3.000	27.580	150

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S8	530642.728	120627.443	28.050	0.632	450	 1	3.000	27.418	150
						 0	3.001	27.418	150
RE5	530651.971	120645.303	28.050	0.470		 0	4.000	27.580	150
						 1	4.000	27.417	150
S11	530637.317	120637.875	28.050	0.633	450	 0	4.001	27.417	150

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Detailed
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	20.000	Drain Down Time (mins)	1440
Ratio-R	0.400	Additional Storage (m³/ha)	50.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

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

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

Node S10 (HB) Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	26.350	Product Number	CTL-SHE-0045-1000-1200-1000
Design Depth (m)	1.200	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	1.0	Min Node Diameter (mm)	1200

Node S9 (AT) Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	26.820	Slope (1:X)	100.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	160	Depth (m)	
Safety Factor	2.0	Width (m)	10.000	Inf Depth (m)	
Porosity	0.30	Length (m)	41.500		

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

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute summer	RE3	18	27.604	0.024	1.2	0.0254	0.0000	OK
30 minute summer	S7	18	27.429	0.029	2.4	0.0266	0.0000	OK
120 minute winter	S9 (AT)	94	26.988	0.168	3.6	4.3580	0.0000	SURCHARGED
120 minute winter	S10 (HB)	94	26.988	0.638	2.4	0.9128	0.0000	SURCHARGED
30 minute summer	Outfall 2	1	26.200	0.000	0.7	0.0000	0.0000	OK
30 minute summer	RE4	18	27.606	0.026	1.2	0.0281	0.0000	OK
30 minute summer	S8	18	27.454	0.036	2.4	0.0346	0.0000	OK
30 minute summer	RE5	18	27.606	0.026	1.2	0.0281	0.0000	OK
30 minute summer	S11	18	27.457	0.040	2.8	0.0472	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	RE3	2.000	S7	1.2	0.581	0.055	0.0247	
30 minute summer	S7	2.001_1	S9 (AT)	2.4	1.049	0.074	0.0152	
120 minute winter	S9 (AT)	2.002_1	S10 (HB)	2.4	0.588	0.043	0.0848	
120 minute winter	S10 (HB)	Hydro-Brake®	Outfall 2	0.8				10.1
30 minute summer	RE4	3.000	S8	1.2	0.451	0.068	0.0439	
30 minute summer	S8	3.001	S9 (AT)	2.4	0.722	0.125	0.0694	
30 minute summer	RE5	4.000	S11	1.2	0.421	0.068	0.0478	
30 minute summer	S11	4.001	S9 (AT)	2.7	0.742	0.149	0.0817	

Results for 30 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute summer	RE3	18	27.617	0.037	2.9	0.0392	0.0000	OK
30 minute summer	S7	18	27.446	0.046	5.8	0.0425	0.0000	OK
120 minute winter	S9 (AT)	120	27.148	0.328	8.0	16.3643	0.0000	SURCHARGED
120 minute winter	S10 (HB)	120	27.148	0.798	2.0	1.1416	0.0000	SURCHARGED
30 minute summer	Outfall 2	1	26.200	0.000	0.8	0.0000	0.0000	OK
30 minute summer	RE4	18	27.621	0.041	2.9	0.0436	0.0000	OK
30 minute summer	S8	18	27.477	0.059	5.8	0.0556	0.0000	OK
30 minute summer	RE5	18	27.621	0.041	2.9	0.0436	0.0000	OK
30 minute summer	S11	18	27.481	0.064	6.7	0.0762	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	RE3	2.000	S7	2.9	0.736	0.133	0.0471	
30 minute summer	S7	2.001_1	S9 (AT)	5.8	1.333	0.179	0.0290	
120 minute winter	S9 (AT)	2.002_1	S10 (HB)	2.0	0.874	0.036	0.0848	
120 minute winter	S10 (HB)	Hydro-Brake®	Outfall 2	0.8				23.0
30 minute summer	RE4	3.000	S8	2.9	0.572	0.164	0.0837	
30 minute summer	S8	3.001	S9 (AT)	5.8	0.923	0.307	0.1330	
30 minute summer	RE5	4.000	S11	2.9	0.531	0.164	0.0911	
30 minute summer	S11	4.001	S9 (AT)	6.7	0.944	0.362	0.1561	

Results for 30 year +40% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute summer	RE3	18	27.624	0.044	4.1	0.0468	0.0000	OK
30 minute summer	S7	18	27.456	0.056	8.2	0.0516	0.0000	OK
240 minute winter	S9 (AT)	228	27.236	0.416	6.6	26.2631	0.0000	SURCHARGED
240 minute winter	S10 (HB)	228	27.236	0.886	1.5	1.2677	0.0000	SURCHARGED
30 minute summer	Outfall 2	1	26.200	0.000	0.8	0.0000	0.0000	OK
30 minute summer	RE4	18	27.629	0.049	4.1	0.0521	0.0000	OK
30 minute summer	S8	18	27.489	0.071	8.2	0.0679	0.0000	OK
30 minute summer	RE5	18	27.629	0.049	4.1	0.0522	0.0000	OK
30 minute summer	S11	18	27.496	0.079	9.4	0.0931	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	RE3	2.000	S7	4.1	0.804	0.187	0.0609	
30 minute summer	S7	2.001_1	S9 (AT)	8.2	1.456	0.253	0.0375	
240 minute winter	S9 (AT)	2.002_1	S10 (HB)	1.5	0.521	0.027	0.0848	
240 minute winter	S10 (HB)	Hydro-Brake®	Outfall 2	0.9				38.6
30 minute summer	RE4	3.000	S8	4.1	0.624	0.232	0.1082	
30 minute summer	S8	3.001	S9 (AT)	8.2	1.009	0.434	0.1722	
30 minute summer	RE5	4.000	S11	4.1	0.578	0.232	0.1177	
30 minute summer	S11	4.001	S9 (AT)	9.3	1.026	0.509	0.2016	

Results for 100 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute summer	RE3	18	27.622	0.042	3.8	0.0450	0.0000	OK
30 minute summer	S7	18	27.453	0.053	7.6	0.0494	0.0000	OK
180 minute winter	S9 (AT)	176	27.216	0.396	7.4	23.7911	0.0000	SURCHARGED
180 minute winter	S10 (HB)	176	27.216	0.866	1.8	1.2388	0.0000	SURCHARGED
30 minute summer	Outfall 2	1	26.200	0.000	0.8	0.0000	0.0000	OK
30 minute summer	RE4	18	27.627	0.047	3.8	0.0501	0.0000	OK
30 minute summer	S8	18	27.486	0.068	7.6	0.0649	0.0000	OK
30 minute summer	RE5	18	27.627	0.047	3.8	0.0501	0.0000	OK
30 minute summer	S11	18	27.492	0.075	8.8	0.0894	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	RE3	2.000	S7	3.8	0.789	0.174	0.0575	
30 minute summer	S7	2.001_1	S9 (AT)	7.6	1.428	0.234	0.0354	
180 minute winter	S9 (AT)	2.002_1	S10 (HB)	1.8	0.803	0.032	0.0848	
180 minute winter	S10 (HB)	Hydro-Brake®	Outfall 2	0.9				33.5
30 minute summer	RE4	3.000	S8	3.8	0.612	0.215	0.1023	
30 minute summer	S8	3.001	S9 (AT)	7.6	0.990	0.403	0.1627	
30 minute summer	RE5	4.000	S11	3.8	0.567	0.215	0.1117	
30 minute summer	S11	4.001	S9 (AT)	8.7	1.010	0.476	0.1917	

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute summer	RE3	18	27.632	0.052	5.6	0.0550	0.0000	OK
30 minute summer	S7	18	27.467	0.067	11.2	0.0620	0.0000	OK
360 minute winter	S9 (AT)	336	27.332	0.512	6.6	38.2464	0.0000	SURCHARGED
360 minute winter	S10 (HB)	336	27.332	0.982	1.4	1.4047	0.0000	SURCHARGED
30 minute summer	Outfall 2	1	26.200	0.000	0.9	0.0000	0.0000	OK
30 minute summer	RE4	18	27.638	0.058	5.6	0.0615	0.0000	OK
30 minute summer	S8	18	27.505	0.087	11.2	0.0824	0.0000	OK
30 minute summer	RE5	18	27.638	0.058	5.6	0.0615	0.0000	OK
30 minute summer	S11	18	27.514	0.097	12.9	0.1146	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	RE3	2.000	S7	5.6	0.867	0.256	0.0771	
30 minute summer	S7	2.001_1	S9 (AT)	11.2	1.570	0.345	0.0475	
360 minute winter	S9 (AT)	2.002_1	S10 (HB)	1.4	0.368	0.025	0.0848	
360 minute winter	S10 (HB)	Hydro-Brake®	Outfall 2	0.9				57.0
30 minute summer	RE4	3.000	S8	5.6	0.672	0.316	0.1371	
30 minute summer	S8	3.001	S9 (AT)	11.2	1.086	0.594	0.2187	
30 minute summer	RE5	4.000	S11	5.6	0.620	0.317	0.1499	
30 minute summer	S11	4.001	S9 (AT)	12.8	1.101	0.698	0.2581	