



Sustainable Drainage Design

6No. dwellings
at
Land r/o King William
1 The Hollow, Earl Shilton
for
Design Studio Architects

Prepared to support discharge of planning condition 9,
Hinckley & Bosworth Borough Council Planning Permission ref
22/00272/FUL

Prepared by
Shaw Savage Ltd
Civil and Environmental Consultants
3rd October 2025
www.shaw-savage.co.uk

Index

1 Summary	Page 3
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2 Surface Water Drainage

- 2.1 Contributing area	Page 4
- 2.2 Surface water outfall	Page 4
- 2.3 Operational lifetime and rainfall allowance	Page 5
- 2.4 SuDS design – flow control and attenuation	Page 5
- 2.5 SuDS design – permeable paving	Page 6
- 2.6 Implementation	Page 6
- 2.7 Management and Maintenance	Page 6

Appendix A

HydroBrake specification

Geocellular specification

Appendix B

Drainage layout 2512-500

Drainage construction details 2512-510

Issue 02

Checked by

William Savage CEng MICE

3rd October 2025



1 Summary

Shaw Savage Ltd have been instructed by Design Studio Architects to prepare a Sustainable Drainage Design to support the erection of 6No. 3 bedroom dwellings at land to the rear of King William, 1 The Hollow, Earl Shilton.

This report has been prepared to support the discharge of planning condition 9 of Hinckley & Bosworth Borough Council Planning Permission ref 22/00272/FUL. The design has been revised to address comments received from HBBC Drainage.

The surface water drainage system has been designed in accordance with the parameters outlined within the Sustainable Drainage Assessment dated February 2022;

- Maximum discharge from site to be restricted to 5 l/s for all storm events up to 1in100 (+40%),
- Hydrobrake flow control with supporting geocellular offline attenuation,
- Utilise existing outfall to surface water sewer,
- SuDS incorporated into the landscape through the use of permeable paving to parking bays, to provide a treatment train at source,

The surface water drainage system will remain privately owned and maintained.

A drainage layout is included within Appendix B including design details for the installation.

2 Surface Water Drainage

2.1 Contributing area

The contributing impermeable area has been calculated for the development as follows;

$$\text{Impermeable area} = 854 \text{ m}^2$$

2.2 Surface water outfall

The existing outfall to surface water sewer has been surveyed on site and is to be maintained to serve the development, as per the Sustainable Drainage Assessment.



Fig 1 – Existing SW chamber

2.3 Operation lifetime and rainfall allowance

The proposed development is residential and is therefore considered to have an operational lifetime of 100 years. An upper end peak rainfall allowance of 40% has been chosen for the 1in100 year storm event, based on output from the Environment Agency's Hydrology Data Explorer as illustrated in figure 2.

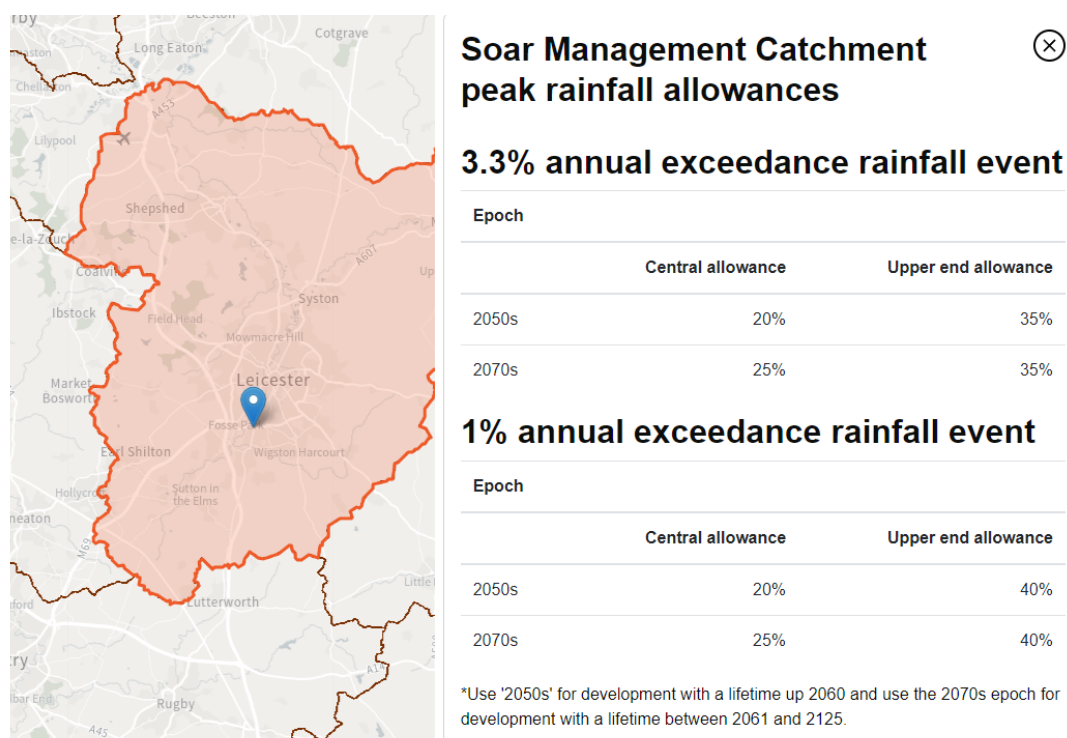


Fig 2 – Peak rainfall allowance

2.4 SuDS design - flow control and attenuation

A HydroBrake has been specified within Appendix A, to restrict discharge to 5 l/s for all storm events up to 1in100 (+40%). Based on a contributing area of 854m², the required attenuation volume has been calculated for a range of storm events within figure 3, as 29.6m³.

An offline geocellular attenuation tank has been specified with the following dimensions;

- 13m long, 6m wide, 0.4m deep, 95% void ration

The available storage is 29.6m³ to meet the requirement.

						M100-D calculation (+40%CC)		
D mins	Z1	M5-D (mm)	Z2 (M100)	M100-D (mm)	40% CC (mm)	Inflow m ³	Outflow m ³	Storage required m ³
15	0.63	12.6	1.93	24.3	34.0	28.9	4.5	24.4
30	0.8	16	1.96	31.4	43.9	37.3	9.0	28.3
60	1	20	2	40.0	56.0	47.6	18.0	29.6
120	1.21	24.2	2.03	49.1	68.8	58.5	36.0	22.5
240	1.46	29.2	2.01	58.7	82.2	69.8	72.0	0.0
360	1.62	32.4	2	64.8	90.7	77.1	108.0	0.0
600	1.82	36.4	1.98	72.1	100.9	85.8	180.0	0.0
1440	2.28	45.6	1.96	89.4	125.1	106.4	432.0	0.0

Fig 3 - Attenuation calculation

2.5 SuDS design – permeable paving

Permeable paving has been chosen for the vehicle parking areas, to provide the following benefits;

- Permeable sub-base material provides additional attenuation, and treatment at source to reduce potential transmission of hydrocarbons,
- First 5mm of rainfall will be absorbed through the wetting of sub-base materials,
- Integrated into landscape design

A 100mm diameter perforated overflow pipe is to be laid within the sub-base to collect excess flows and discharge to the drainage system. A gravity outfall is provided via an indirect connection to the private surface water sewer.

2.6 Implementation

The SuDS measures will be implemented as part of the construction of the building and associated landscape.

2.7 Management and Maintenance

All aspects of the surface water drainage system will be privately owned and maintained. No part of the drainage system is to be adopted. The following maintenance schedule is recommended;

Feature	Weekly	Monthly	Annual	Responsibility
Permeable paving	-	Brushing	Vacuum debris	Private owner
Flow control chamber	-	-	Clean catch pit chambers	Private owner
Yard gullies – general	-	-	Clean silt traps and inspect	Private owner

Appendix A

HydroBrake specification

Geocellular specification

Technical Specification

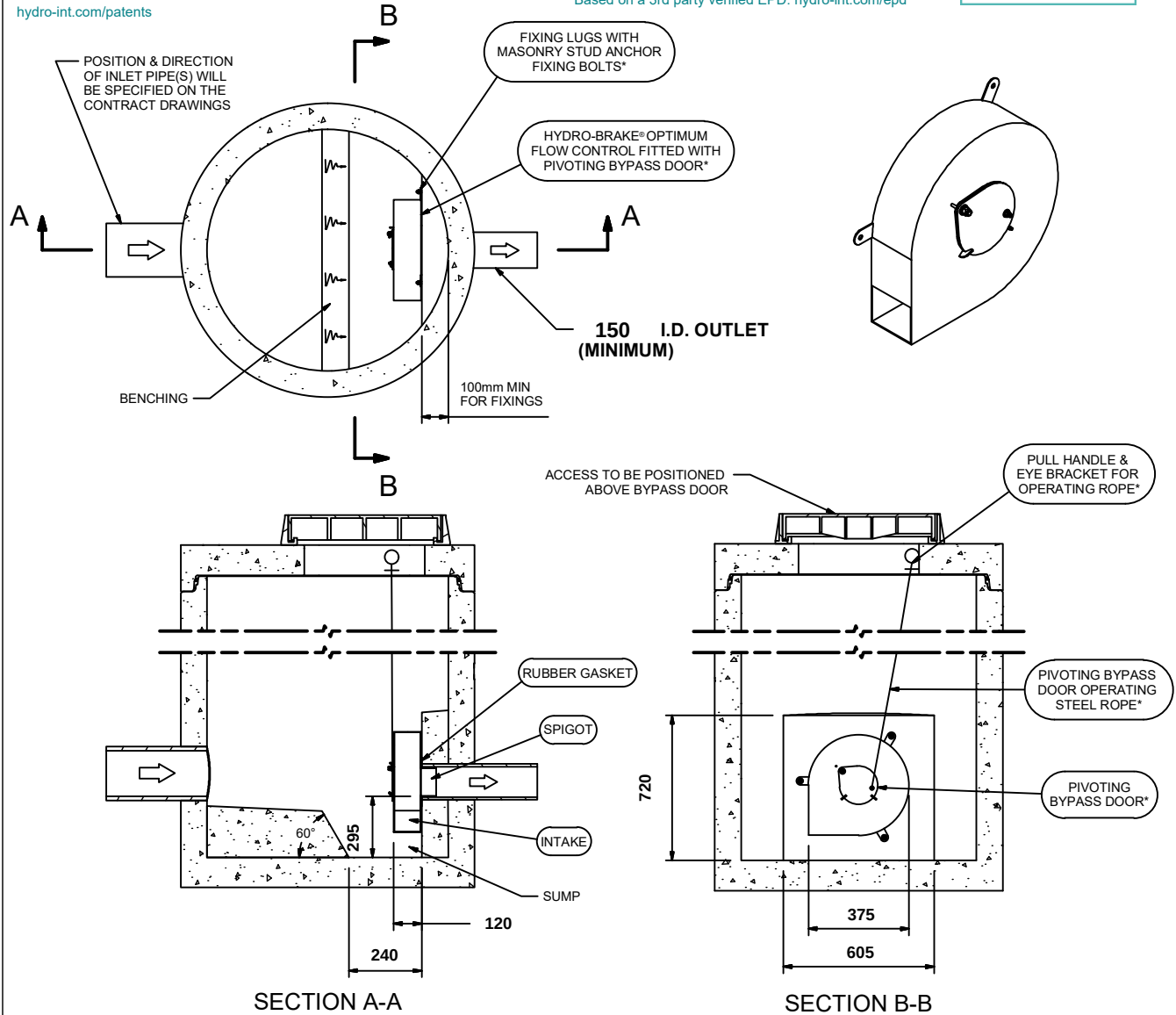
Control Point	Head (m)	Flow (l/s)
Primary Design	0.500	5.000
Flush-Flo™	0.179	4.995
Kick-Flo®	0.372	4.360
Mean Flow		4.126

hydro-int.com/patents

This Hydro-Brake® Optimum includes:

- All in 3 mm Grade 304L stainless steel
- Integral pivoting by-pass door allowing clear line of sight through to outlet, c/w operating rope
- Media blasted for corrosion resistance
- Variable flow rate post installation via adjustable inlet (if necessary)
- Indicative Weight: 10 kg
- Product Carbon Footprint: 36.95 kgCO2e

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



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

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

DESIGN ADVICE



The head/flow characteristics of this SHE-0113-5000-0500-5000 Hydro-Brake® Optimum Flow Control are unique. Dynamic hydraulic modelling evaluates the full head/flow characteristic curve.
The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.

Hydro International
 A CRH COMPANY

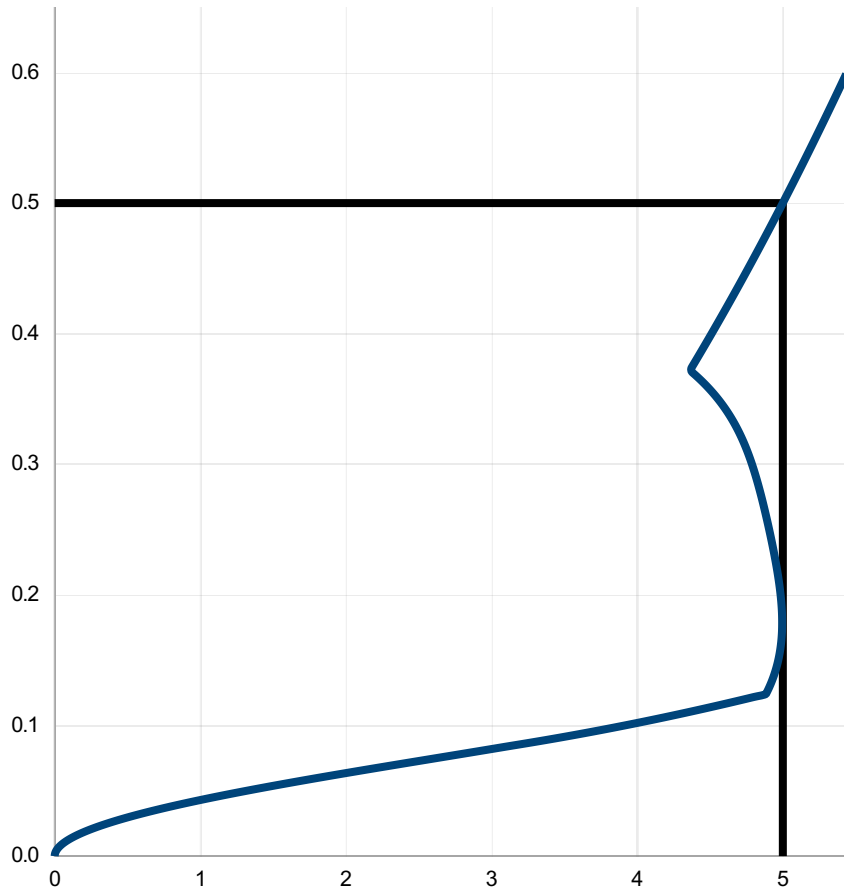
DATE	14/08/2025 07:39	SHE-0113-5000-0500-5000 Hydro-Brake® Optimum
SITE	King William	
DESIGNER	Will Savage	
REF	2512	

Technical Specification

Control Point	Head (m)	Flow (l/s)
Primary Design	0.500	5.000
Flush-Flo™	0.179	4.995
Kick-Flo®	0.372	4.360
Mean Flow		4.126



hydro-int.com/patents



Head (m)	Flow (l/s)
0.000	0.000
0.017	0.176
0.034	0.665
0.052	1.398
0.069	2.289
0.086	3.230
0.103	4.065
0.121	4.758
0.138	4.938
0.155	4.978
0.172	4.994
0.190	4.992
0.207	4.977
0.224	4.953
0.241	4.923
0.259	4.889
0.276	4.851
0.293	4.808
0.310	4.755
0.328	4.685
0.345	4.590
0.362	4.458
0.379	4.402
0.397	4.493
0.414	4.582
0.431	4.669
0.448	4.754
0.466	4.837
0.483	4.919
0.500	5.000

DESIGN ADVICE



The head/flow characteristics of this SHE-0113-5000-0500-5000 Hydro-Brake® Optimum Flow Control are unique. Dynamic hydraulic modelling evaluates the full head/flow characteristic curve.

The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.

Hydro
International
A CRH COMPANY

DATE 14/08/2025 07:39

Site King William

DESIGNER Will Savage

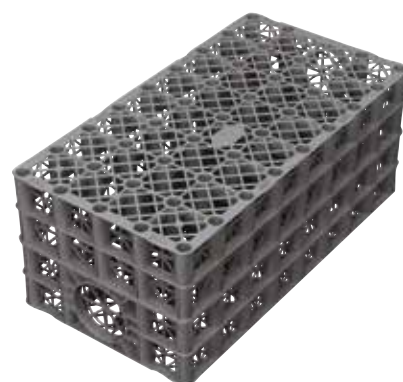
Ref 2512

SHE-0113-5000-0500-5000

Hydro-Brake® Optimum

Product code: PSM1

The Polystorm cell made of virgin material, has a 44 tonnes/m² compressive strength. It is ideally suited for retention, attenuation or infiltration under trafficked or loaded areas at greater depths, such as car parks, housing and commercial developments. An efficient and versatile solution for SuDS compliance, it is hard-wearing, lightweight and provides a 95% void ratio for maximum water capture.



Key Benefits

- Compressive strength of 44 tonnes/m²
- Ideal for retention, attenuation or infiltration applications with a suitable geomembrane or geotextile
- Designed for trafficked and loaded conditions
- BBA approved
- Visual and maintenance access can be achieved when used in conjunction with Polystorm Access & Inspect
- Can be used as part of a value engineered hybrid system with Polystorm Xtra & Polystorm Lite
- Integrated inlet and outlet
- 3D flow throughout the structure
- 95% void ratio
- 100% recyclable
- 50 years creep limited life expectancy

Technical Support

Detailed guidance and assistance is available.

For further information, please contact our Technical Team on **+44 (0) 1509 615100** or email civils@polypipe.com



ELEMENT	VALUE
PHYSICAL PROPERTIES	
Length	1m
Width	0.5m
Depth	0.4m
Total volume	0.2m ³
Unit weight	9kg
Unit storage volume	0.19m ³ (190 litres)
Void ratio	95%
SHORT TERM COMPRESSIVE STRENGTH	
Vertical	Maximum 440kN/m ² **
Lateral	Maximum 63kN/m ² **
SHORT TERM DEFLECTION	
Vertical	83kN/m ² per mm
Lateral	4.2kN/m ² per mm
OTHER PROPERTIES	
Maximum burial depths:	
Light trafficked	3.7m***
Non-trafficked	3.8m***

* Each unit includes 4 Clips and 2 Shear Connectors.

** Compressive strength at yield, maximum recommended value for design purposes.

*** Based on ground conditions being dense sand and gravel with no groundwater present using the calculation methodology detailed within CIRIA C680 (2008). Where ground conditions differ please consult our water management solutions technical department on +44 (0) 1509 615100.

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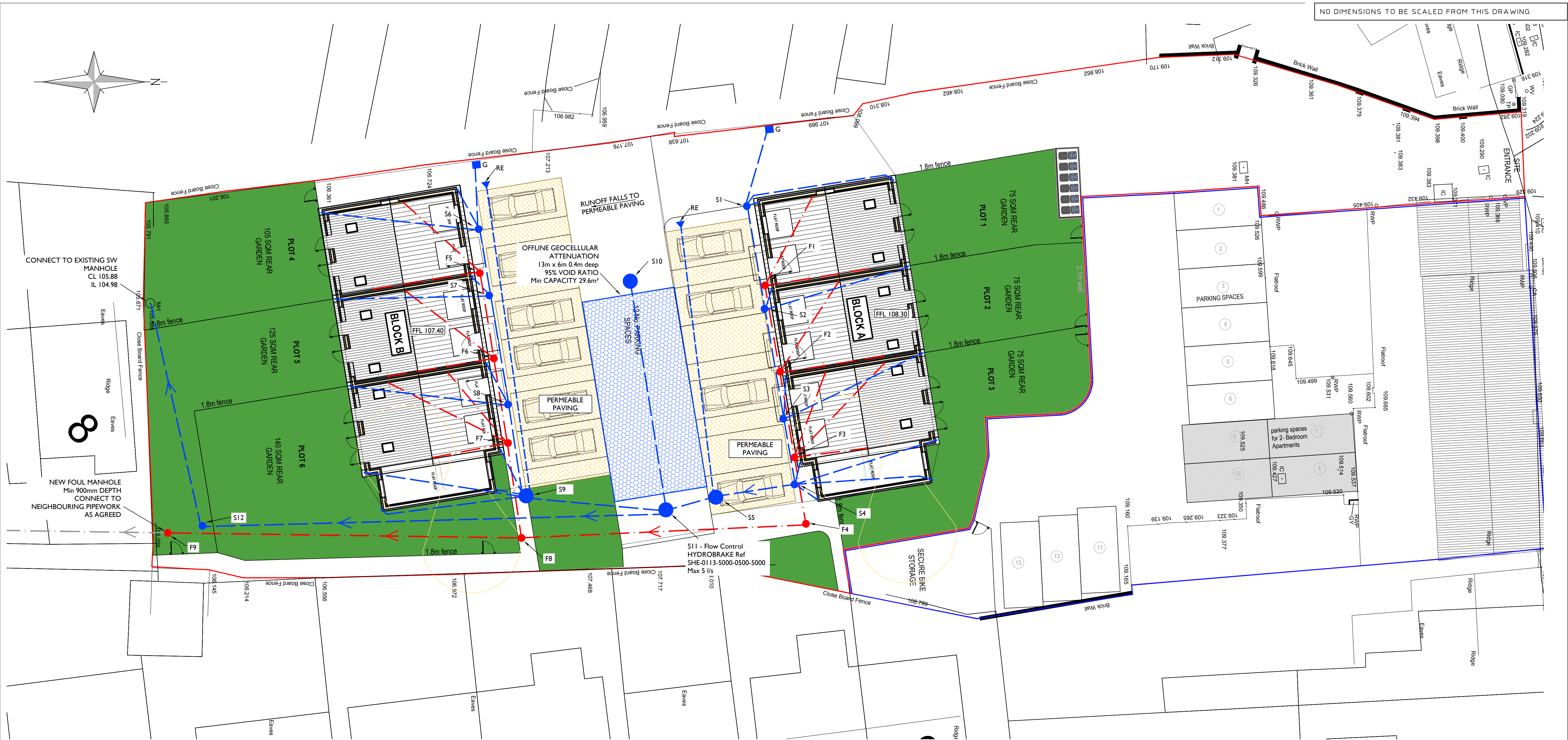
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Appendix B

Drainage layout 2512-500

Drainage construction details 2512-510



U/S MH	D/S MH	U/S MH CL	D/S MH CL	U/S MH IL	D/S MH IL	Dia (mm)	Length (m)	Gradient 1in--
F1	F2	107.85	107.85	107.05	106.90	100	5.6	37
F2	F3	107.85	107.85	106.90	106.75	100	5.5	37
F3	F4	107.85	107.85	106.75	106.60	100	4.2	28
F4	F8	107.85	106.80	106.60	105.70	100	18.3	20
F5	F6	106.95	106.95	106.15	106.00	100	5.5	37
F6	F7	106.95	106.95	106.00	105.85	100	5.6	37
F7	F8	106.95	106.80	105.85	105.70	100	6.2	41
F8	F9	106.80	106.10	105.70	105.20	100	22.8	46

FOUL DRAINAGE SCHEDULE

U/S MH	D/S MH	U/S MH CL	D/S MH CL	U/S MH IL	D/S MH IL	Dia (mm)	Length (m)	Gradient 1in--	Contributing area (m ²)	Flow l/s	Capacity l/s	Utilisation
S1	S2	107.85	107.85	107.25	107.18	100	6.70	96	122	1.7	6.0	28%
S2	S3	107.85	107.85	107.18	107.11	100	6.90	99	244	3.4	6.0	57%
S3	S4	107.85	107.85	107.11	107.03	100	6.00	75	366	5.1	6.8	75%
S4	S5	107.85	107.55	107.03	106.90	100	5.00	38	366	5.1	9.7	53%
S6	S7	106.95	106.95	106.35	106.27	100	6.70	84	162	2.3	6.6	34%
S7	S8	106.95	106.95	106.27	106.20	100	6.90	99	324	4.5	6.0	76%
S8	S9	106.95	106.93	106.20	106.10	100	6.60	66	488	6.8	7.4	92%
S10	S11	107.38	107.38	105.78	105.58	150	14.70	73	850	11.9	20.8	57%
S5	S11	107.55	107.38	106.90	105.58	100	3.60	20	366	5.1	13.6	38%
S9	S11	106.93	107.38	106.10	105.58	100	9.40	20	488	6.8	13.6	50%
S11	S12	107.38	106.20	105.58	105.20	100	29.60	78	n/a	5.0	6.8	74%
S12	outfall	106.20	105.88	105.20	105.00	100	15.40	77	n/a	5.0	6.8	74%

SW DRAINAGE SCHEDULE

- NOTES
- SETTING-OUT OF RWPs AND SVPs TO BE CONFIRMED BY ARCHITECT
 - SURFACE WATER DRAINAGE TO DISCHARGE TO EXISTING SW DRAIN AT Max 5 l/s FOR ALL STORMS UP TO 1in100 (+40%)

- KEY:
- ROAD GULLY
 - RODDING EYE TO PERFORATED SUB-BASE DRAIN
 - SW DRAIN (100/150mmØ as scheduled)
 - FW DRAIN (100mmØ)
 - 450mmØ SW INSPECTION CHAMBER
 - 450mmØ FW INSPECTION CHAMBER
 - 1200mmØ SW MANHOLE

D	Attenuation relocated, external levels coordinated	3/10/25	Checked WSS
C	Gravity foul outfall agreed with neighbour	28/08/25	Checked WSS
B	Discharge of planning condition 9	15/08/25	Checked WSS
A	Draft Issue	1/08/25	Checked WSS

Client
Design Studio Architects

Project
6No. Dwellings, at
Land r/o King William,
The Hollow, Earl Shilton

Drawing
Drainage Layout

Drawing Ref
2512-500 revD

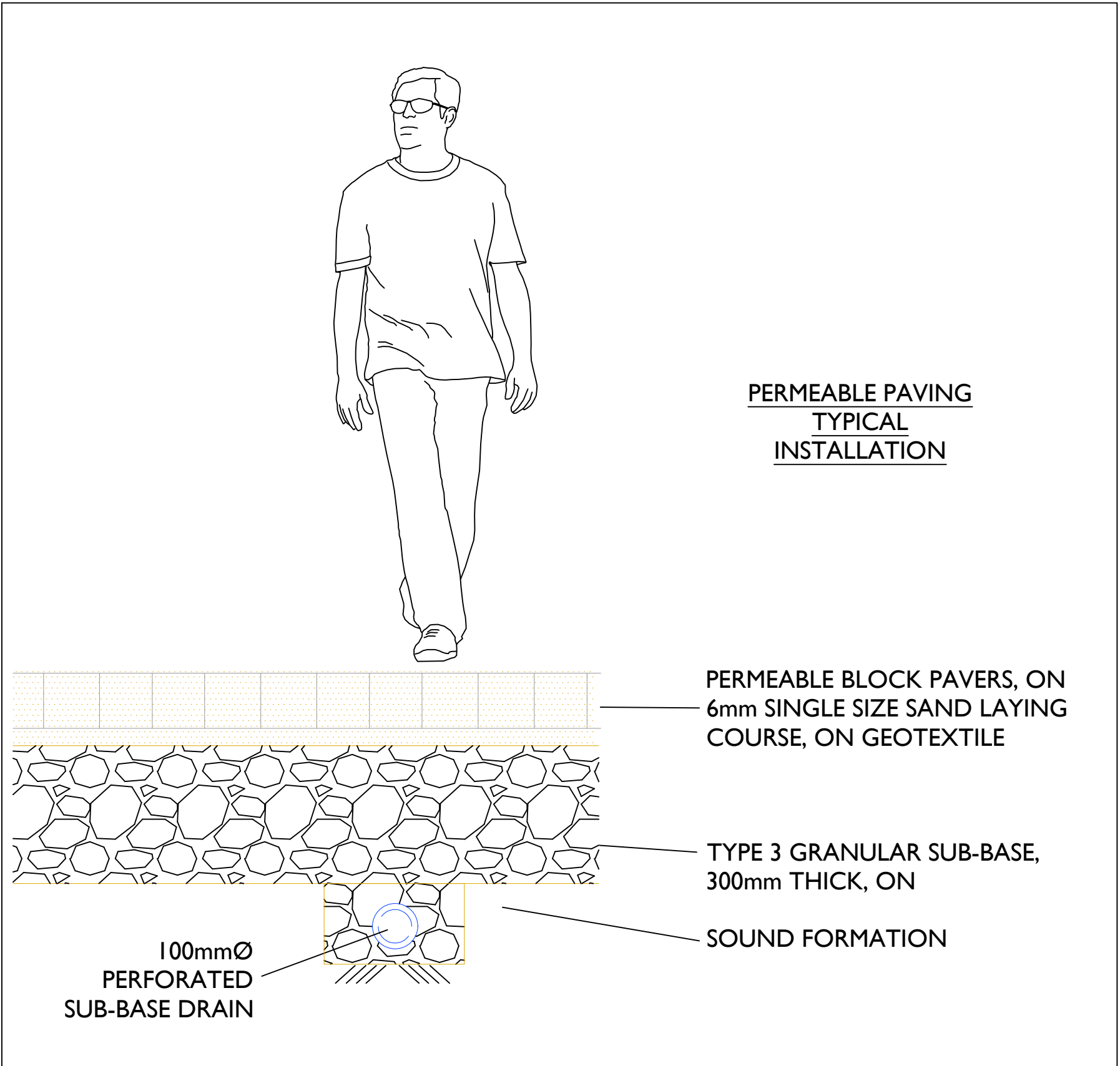
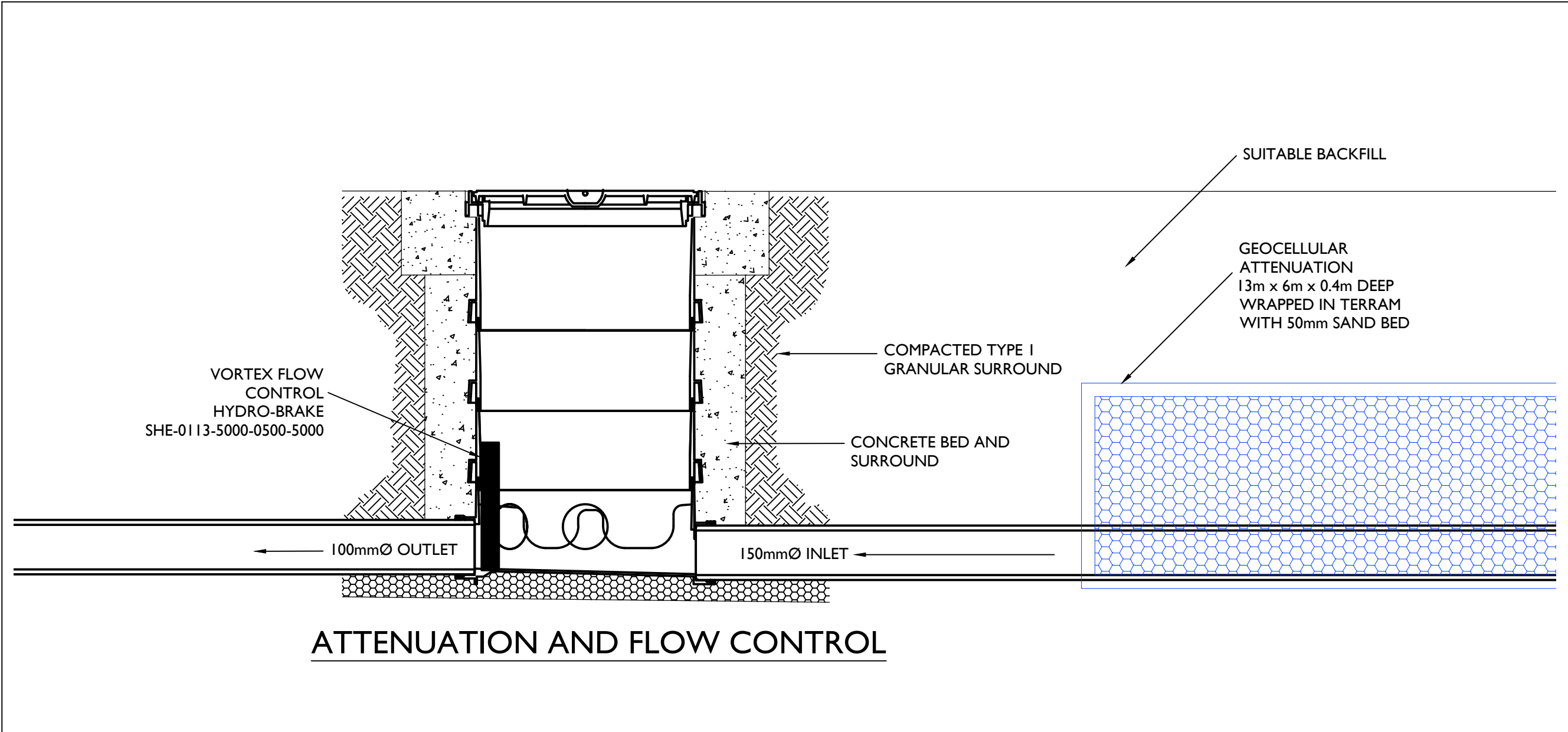
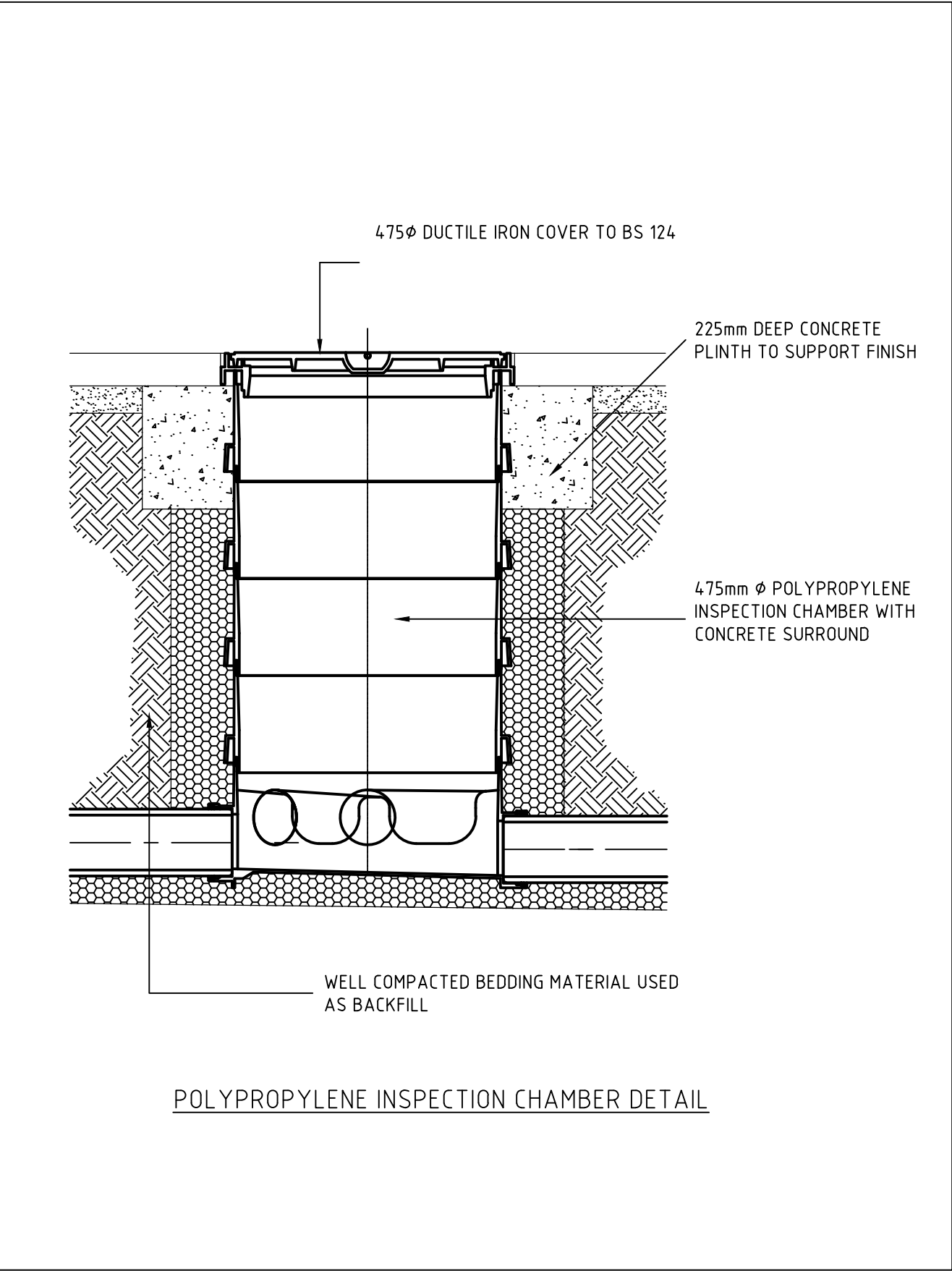
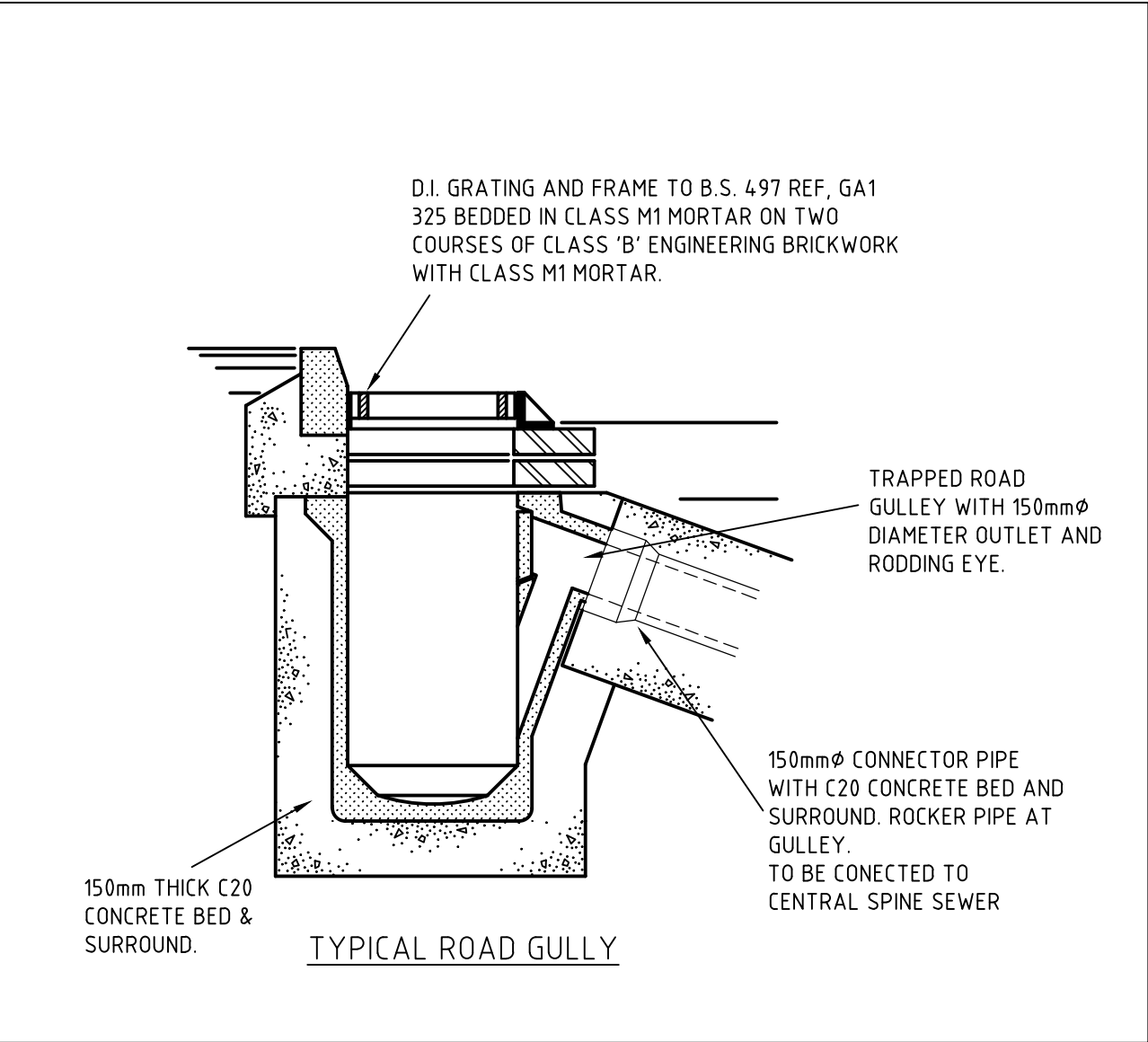
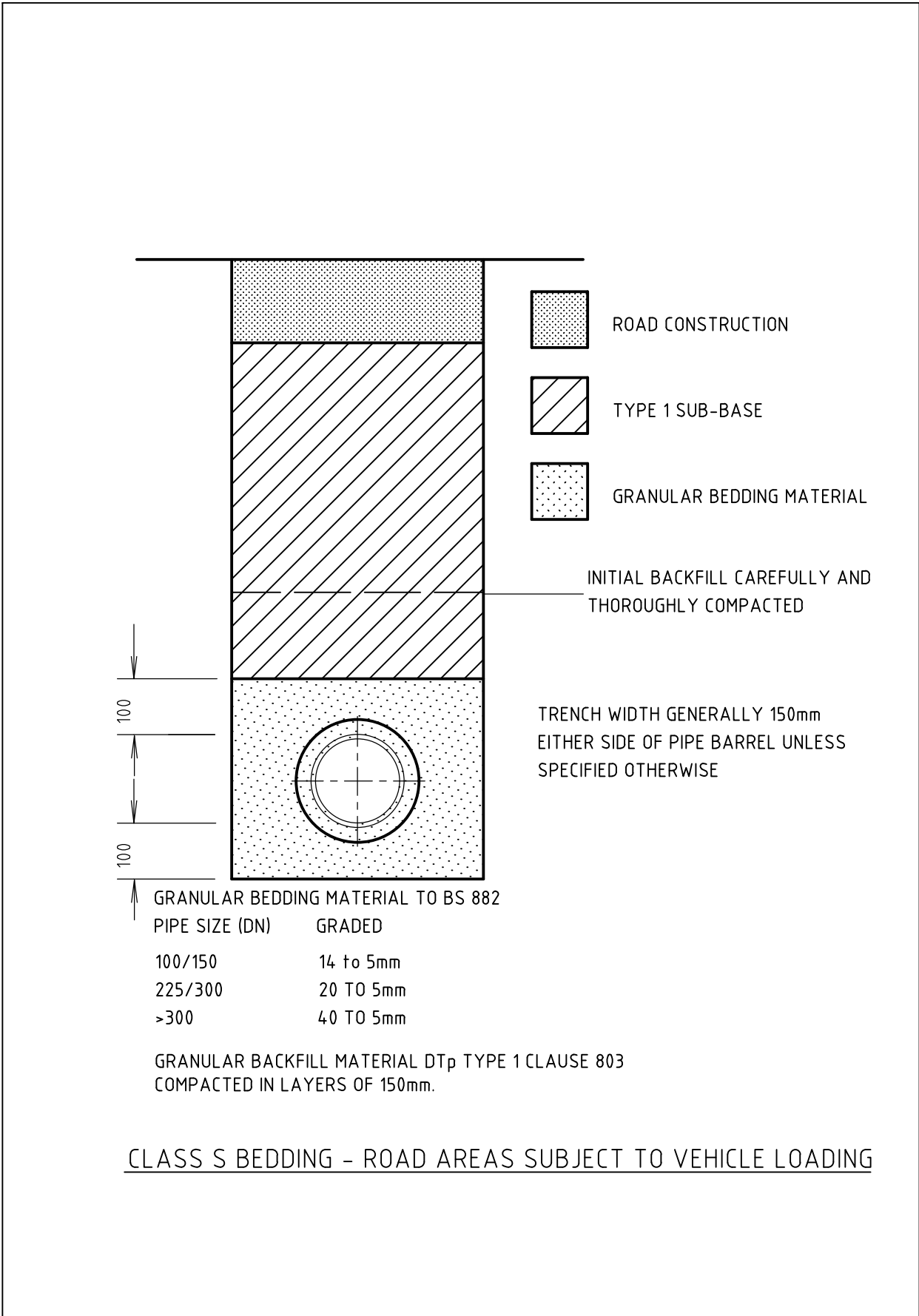
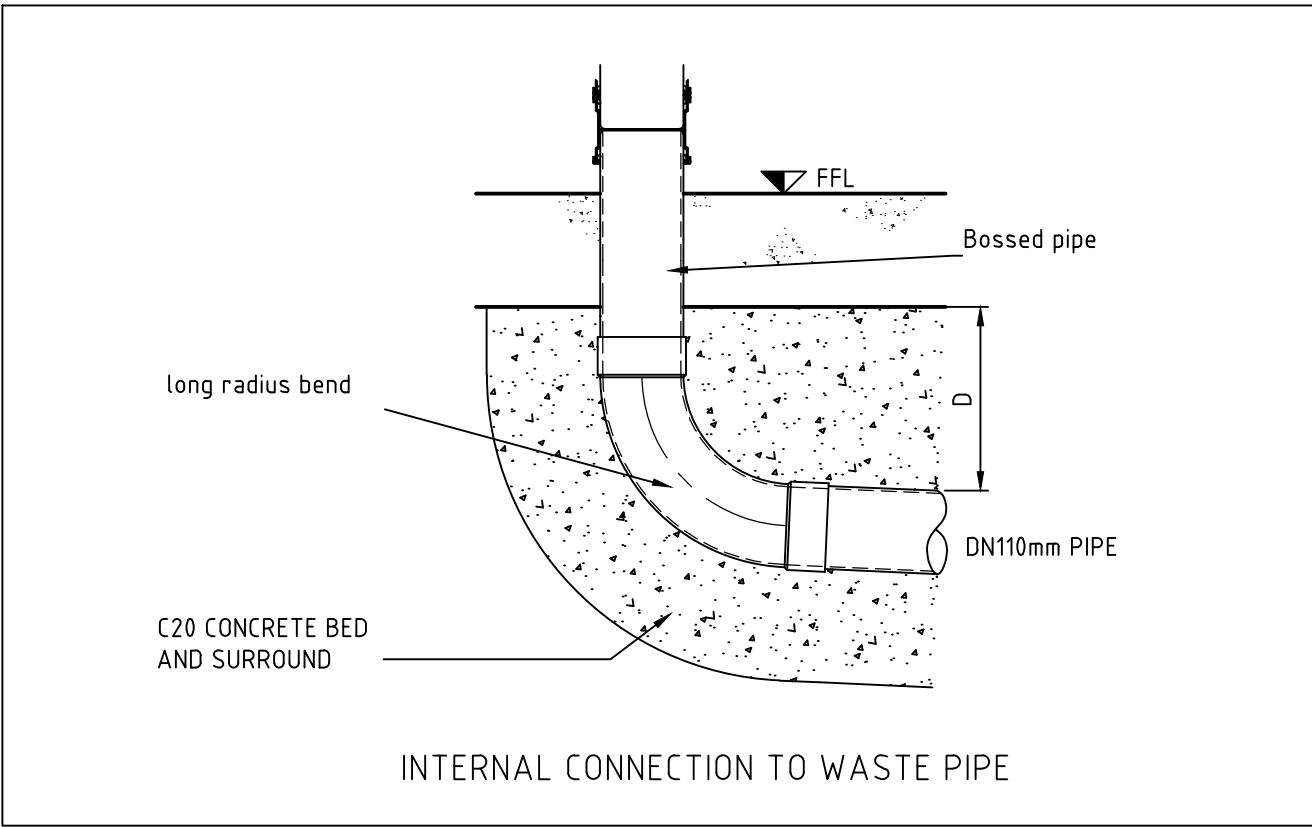


SHAW SAVAGE Ltd

Sulby Hall Farm
Sulby
Northamptonshire
NN6 6EZ

shaw-savage.co.uk

Scale
1:125 at A1



B	Foul pump omitted	28/08/25	Checked WSS
A	Discharge of planning condition 9	15/08/25	Checked WSS

Client
Design Studio Architects

Project
6No. Dwellings, at
Land r/o King William,
The Hollow, Earl Shilton

Drawing
Drainage
Construction details

Drawing Ref
2512-510 revB



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Scale
NTS at A1