

SW Addendum report

For the Approved development at
**Old Blacksmiths Yard, Water
Lane, Angmering**

Prepared by

Dr Robin Saunders CEng
Innervision Design Ltd

March 2020



All rights reserved. No part of this report may be reproduced, stored in a retrieval system or transmitted in any form or by any means – electronic, mechanical, photocopying, recording or otherwise – without the prior written permission of Innervision Design.

Contents

Contents	i
List of Figures	ii
1 Introduction	1
1.1 Conditions to Approved application, A/62/19/PL	1
1.1.1 Condition 8	1
1.1.2 Condition 9	1
1.2 Additional	2
2 Updates	2
2.1 On Condition 8	2
2.1.1 Updates required	2
2.1.2 Site investigation	2
2.2 On Condition 9	3
2.2.1 Outfall rate	3
2.2.2 Headwall details	3
2.2.3 Land drainage consent	3
2.3 Checklist	3
2.3.1 Checklist items - notes	3
3 Summary	4

Appendix

A GIR	6
B Headwall	16
C Diffuser unit	17
D Arun's Checklist	18
E Detailed drainage layout	22
F Fin drain	23
G Hydrobrake details	26

List of Figures

1	Proposed impermeable areas	4
---	--------------------------------------	---

Disclaimer

This document has been prepared solely as an addendum to an existing surface water drainage report prepared on behalf of the client by CEP. Innervision Design Ltd maintains that all reasonable care and skill have been used in the compilation of this addendum report. However, Innervision Design Ltd shall not be under any liability for loss or damage (including consequential loss) whatsoever or howsoever arising as a result of the use of this report by the client or his agents. If any un-authorised third party comes into possession of this report they rely on it at their own risk and Innervision Design Ltd owes them no duty, care or skill whatsoever.

1 Introduction

This report is an Addendum to an existing and valid drainage statement prepared by The Civil Engineering Practice (will be referred to within as CEP) for the client, submitted in support of a previously Approved planning application to Arun Council, A/62/19/PL

This addendum report is to be read in conjunction with the CEP report (as already submitted).

1.1 Conditions to Approved application, A/62/19/PL

1.1.1 Condition 8

Development shall not commence, other than works of site survey and investigation, until full details of the proposed surface water drainage scheme have been submitted to and approved in writing by the Local Planning Authority. The design should follow the hierarchy of preference for different types of surface water drainage disposal systems as set out in Approved Document H of the Building Regulations, and the recommendations of the SuDS Manual produced by CIRIA. Winter groundwater monitoring to establish highest annual ground water levels and winter Percolation testing to BRE 365, or similar approved, will be required to support the design of any Infiltration drainage. No building / No part of the extended building shall be occupied until the complete surface water drainage system serving the property has been implemented in accordance with the agreed details and the details so agreed shall be maintained in good working order in perpetuity.

1.1.2 Condition 9

The development shall not proceed until details have been submitted to and approved in writing by the Local Planning Authority for any proposals: to discharge flows to watercourses; or for the culverting, diversion, infilling or obstruction of any watercourse on or adjacent to the site. Any discharge to a watercourse must be at a rate no greater than the pre development run-off values. No construction is permitted, which will restrict current and future land owners from undertaking their riparian maintenance responsibilities in respect to any watercourse or culvert on or adjacent to the site.

1.2 Additional

While not part of any formal Condition the planning permission makes reference to a Surface water Drainage Proposal Checklist to be submitted with a Discharge of Conditions Application.

2 Updates

2.1 On Condition 8

2.1.1 Updates required

Further to the details already provided in the CEP report the following are required to complete the evidence required by this Condition.

- Winter ground water monitoring
- Infiltration testing to BRE 365 or similar

2.1.2 Site investigation

Refer to GIR report at Appendix A.

A series of four trial holes have been carried out on site.

From this report it can be concluded that the geology on the site is not suitable for infiltration devices.

- Groundwater was encountered at circa 0.9m below the surface (staff length 2m) - Report page 8
- Water in the infiltration test pits did not drop more than 150mm over a 21hr period.

This confirms CEP Sections 3.5.3, 4.2.4 & 5.2

Hence the strategy proposed by CEP is shown to follow the drainage hierarchy as presented in Part H of the Building Regulations and hence meets Condition 8.

The CEP report details the Strategy in full.

2.2 On Condition 9

Further to the details already provided in the CEP report the following are required to complete the evidence required by this Condition.

- Details of outfall rate.
- Details of headwall (assumed) to demonstrate that *“No construction is permitted, which will restrict current and future land owners from undertaking their riparian maintenance responsibilities in respect to any watercourse or culvert on or adjacent to the site”* as required by this Condition.

2.2.1 Outfall rate

The CEP report proposes a controlled out fall rate of 2ls^{-1} using a commercial vortex device. The CEP report provides all calculations in support of this device.

2.2.2 Headwall details

Refer to the “side of ditch” head wall detail provided by Arun as at Appendix B.

2.2.3 Land drainage consent

Applications to be submitted under separate cover.

2.3 Checklist

Refer to Appendix D.

2.3.1 Checklist items - notes

Unlined sub-base. The CEP report indicates the use of a lined sub-base for attenuation at 4.2.13.

This Addendum changes this to an un-lined 350mm DoT type 3 sub-base. This provides a circa 30% void ratio and will also allow limited infiltration if any available. Given the close proximity of the stream, natural flow paths will be maintained and mimicked.

Rainwater from the roof areas will drain directly to the sub-base via commercial diffuser units as Appendix C.

Exceedence flow route plan

Foot note12 applies. Not required for less than 5 residential units.

Impermeable area plan

Figure 1 provides this.

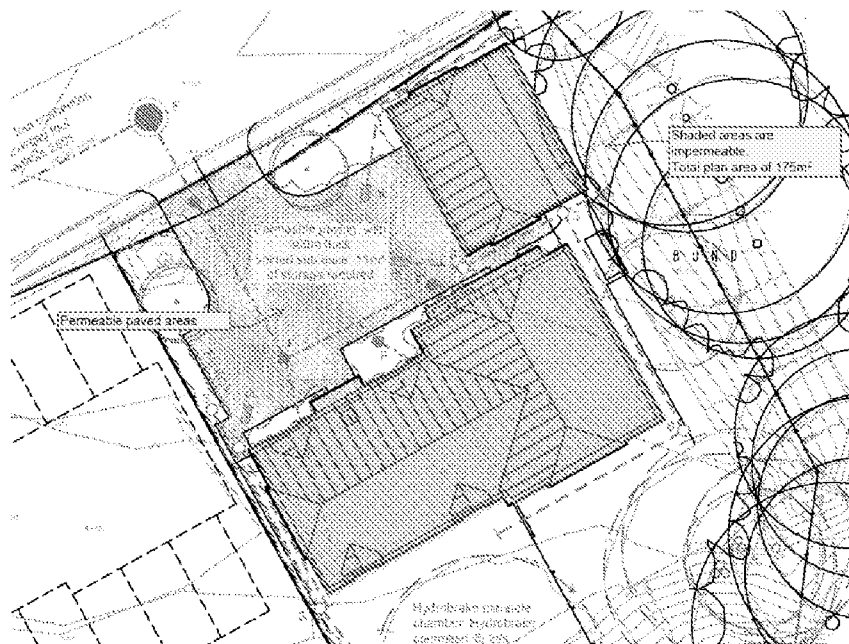


Figure 1: Proposed impermeable areas

Detailed drainage layout

Refer to Appendix E with Fin drain details at Appendix F and flow control unit details at Appendix G.

3 Summary

Condition 8 calls for site testing. This has now been undertaken and evidence provided. Condition 9 calls for further information regarding the outfall. This is now provided. Land drainage consents will be submitted under separate cover.

The Checklist requires a detailed drainage plan with details of drainage elements to allow construction- this is now provided.

Signed:



Dr Robin Saunders CEng, C. Build E, MCABE, BEng(Hons), PhD

Date: 28th April, 2020

A GIR



TL Homes

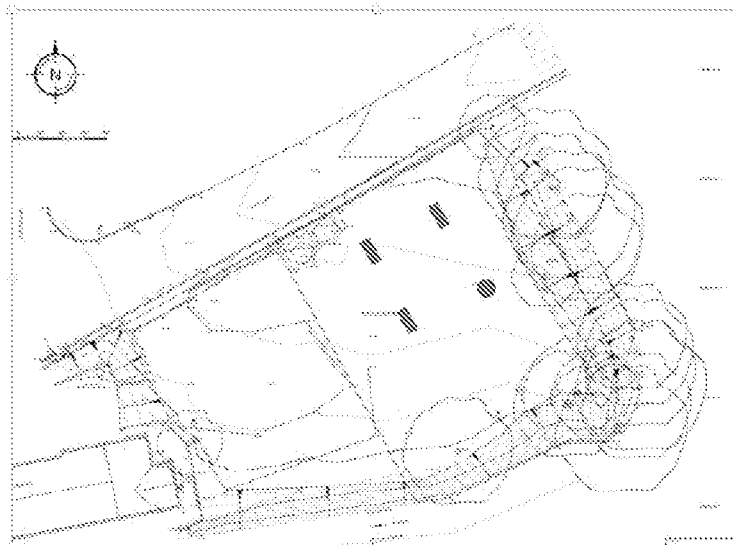
Vat reg 262 568 779

Company reg :

10169099

Water lane

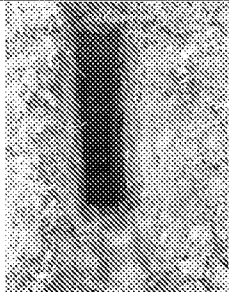
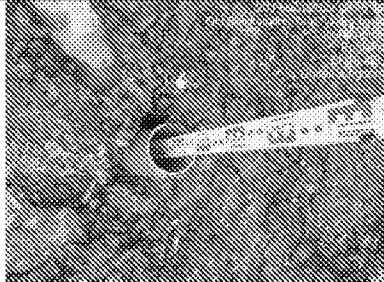
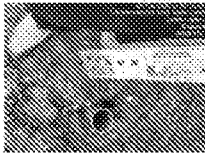
Test holes info



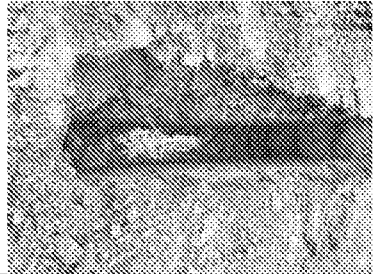
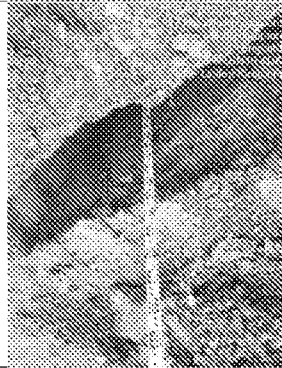
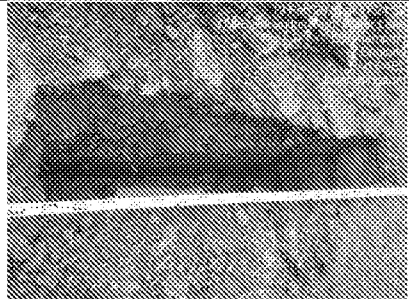
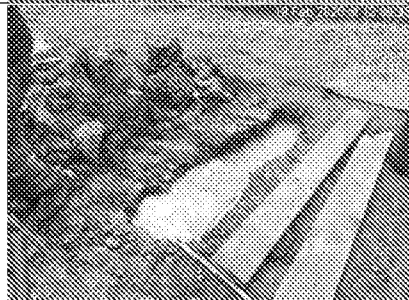
4 test holes were dug North East South and West on the plan above spaced out just over 5 meters from the road and each other. For BRE 365 testing. During excavation it was noted a high level of clay mixed with stone. Once filled the North and west holes which are located where the driveway and drainage pits would be placed didn't drain more than 20cm in 24h period. The south hole closer to the river and where the house would be located a much lower clay content was found during the excavations and this pit did drain however it being under the house structure therefore of little help on its own testing was not continued.

Water table Bore hole Round circle on plan	2.5m deep
--	-----------

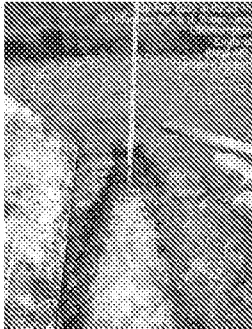
TL homes registered address: 36 Crescent road / Worthing / BN11 1RL

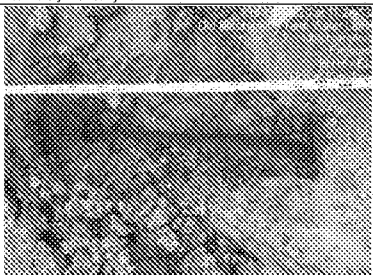
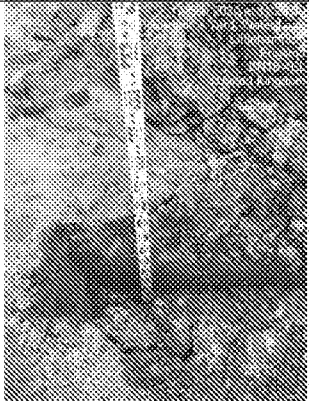
	
	February 20th showing water table at 1.1m 
	Feb 22nd water table at 1.1m 
North pit on plan	

TI homes registered address: 36 Crescent road / Worthing / BN11 1RL

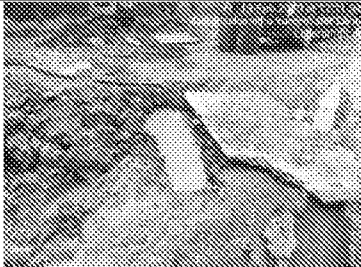
	Water started seeping into the hole within minutes of it being excavated.
	Showing depth of 1.3m
	Length of 2m with 35cm width
	19 th Feb 12.06pm Showing pit full of water

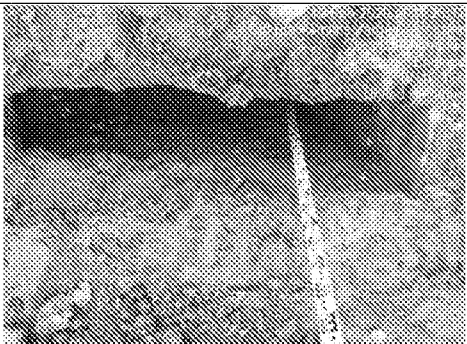
TI homes registered address: 36 Crescent road / Worthing / BN11 1RL B

	Feb 20 th 9.28am less than 20cm drop over 21H
---	--

West pit on plan	2m x 70cm x 30cm
	Showing length of 2m
	Showing depth

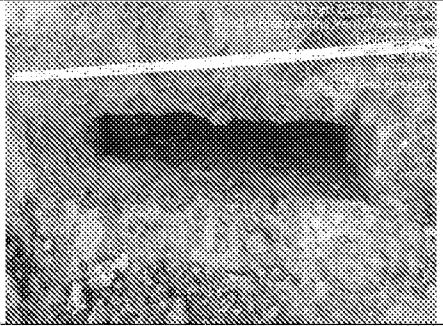
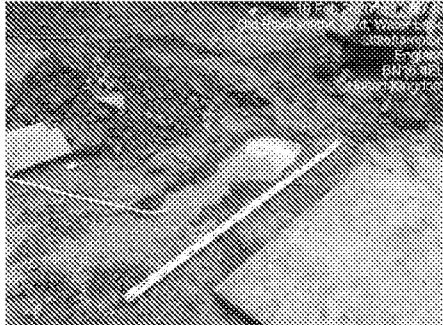
TI homes registered address: 36 Crescent road / Worthing / BN11 1RL 8

	19 th Feb 12.11 water filled to the top of the pit for pre testing soak.
	20 th Feb 9.27am water levels had not moved more than 15cm over 21 hours

South Pit	
	Showing depth of 1.3M

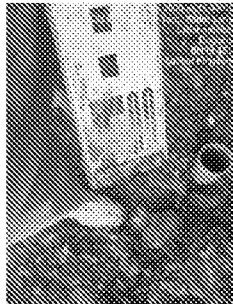
Tf homes registered address: 36 Crescent road / Worthing / BN11 1RL



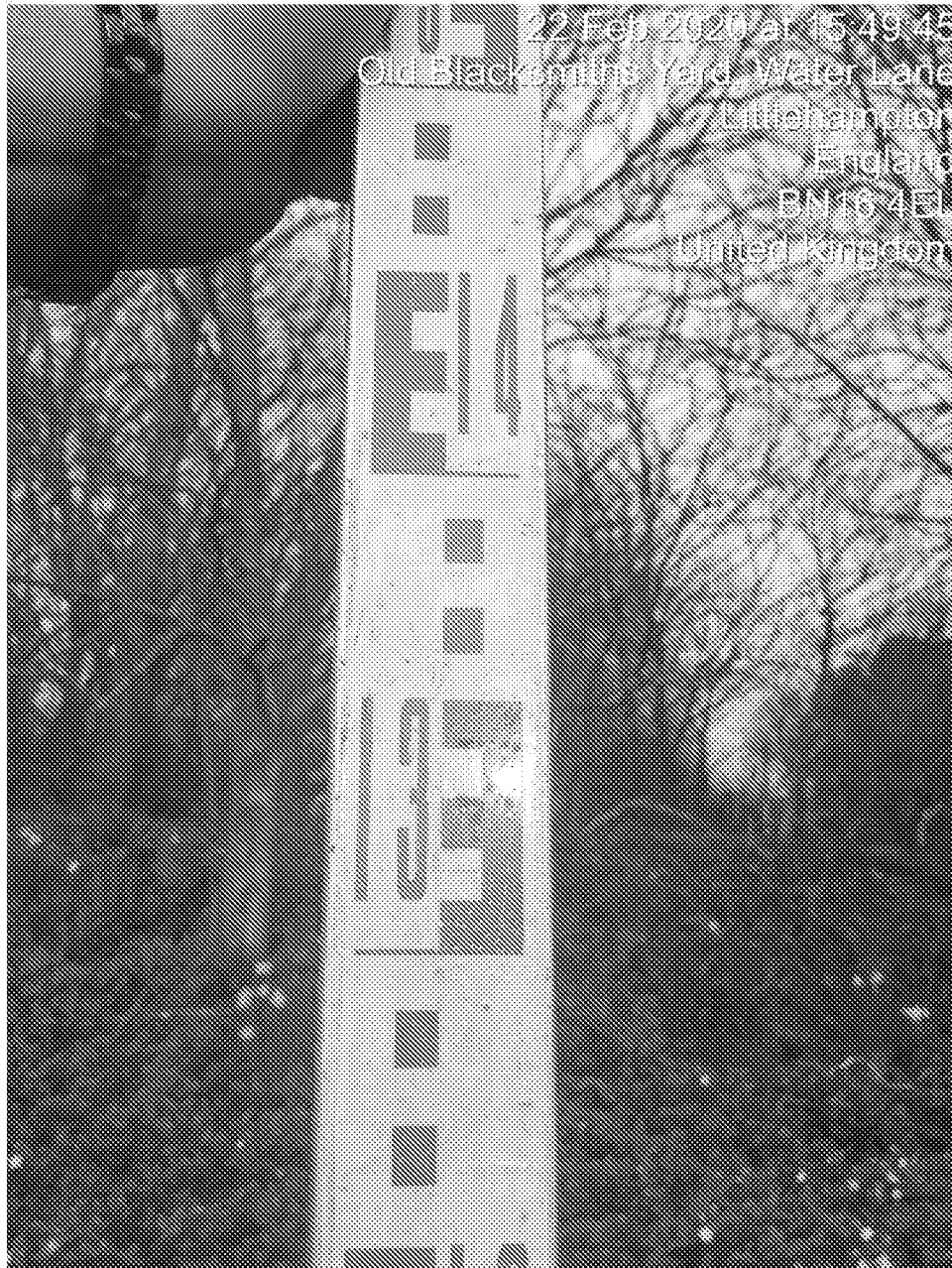
	Showing length of 1.8m
	19th Feb 12.09pm Water filled to top of pits 24h before testing starts

T1 homes registered address: 36 Crescent road / Worthing / BN11 1RL





Yf homes registered address: 36 Crescent road / Worthing / BN11 1RL Ba



Thomes registered address: 36 Crescent road / Worthing / BN11 1RL Bank



Thomes registered address: 36 Crescent road / Worthing / BN11 1RL Bank





Thomas registered address: 36 Crescent road / Worthing / BN11 1BL



B Headwall

Notes	1. Head design shall be as shown and shall be at least 50mm size to provide wall thickness of 500mm. 2. Concrete bagwork shall be as shown S-10 and be three parts or filled with 25mm slump S74 concrete immediately prior to placing with the end stem. 3. The bags shall be placed in a modified stepped fashion from the surface and be lapped into position to form a rectangular block. 4. Extent of outlet protection to be the greater of 1500mm or pipe diameter + 100mm spanning the entire pipe. 5. Headwall design may need to be adjusted to suit site conditions following approval from ADC Engineer. 6. Ditch to be regraded as requested. 7. All exposed pipework to be certified UV resistant. 8. Pipe details to be as specified on supporting drawings.
Project:	ADC Technical Standards
Size:	D1000
Scale:	1:25
Drawn by:	LG
Checked by:	PC
Date:	10/01/19
Scale:	1:25
Drawing Title:	Concrete bagwork headwall and retaining wall standard details
ARUN	Arun District Council Arun Civic Centre The Quadrant Lissington West Sussex BN17 5LF Tel: 01603 795500 Email: arundistrict@arun.gov.uk
Original Sheet Size:	A2
Drawing Number:	80000102
Rev:	

C Diffuser unit

Permavoid Rainwater Diffuser Unit

Data Sheet

PRODUCT INFORMATION

P1

15/01/17 10/01/2016

Run-off from building roofs is collected into downpipe and flows into a back inlet gully incorporating an internal filter or catchpit inspection chambers. The back inlet gully or chamber discharges the filtered stormwater into the permeable sub-base via Permavoid Rainwater Diffuser Unit encapsulated in a 2mm mesh fabric. The run-off will then diffuse out of the Permavoid Rainwater Diffuser Unit and into the modified granular sub-base layer. The Permavoid unit is a 150mm deep modular interlocking plastic unit storage system designed for use as a combined drainage component and sub-base replacement system, ideal for shallow infiltration/attenuation.



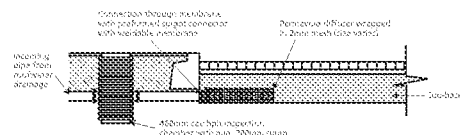
Permavoid Rainwater Diffuser Unit - Configuration Options

	Width				
	254mm	762mm	1062mm	1415mm	2124mm
Length	762mm	✓	✓	✓	✓
	1062mm	✓	✓	✓	✓
	1415mm	✓	✓	✓	✓
	2124mm	✓	✓	✓	✓

Depth available are either 150mm or 200mm.
Connections available are either Ø110mm or Ø150mm

Catchpit: 460mm diameter catchpit with 160mm inlet - PSMT 160
460mm diameter catchpit with 110mm inlet - PSMT 110

Typical Layout - Rainwater downpipe drainage into sub-base reservoir



Technical Support

Detailed guidance and assistance is available.
For further information, please contact our Technical Team on: 444 (0) 1509 615 100 or email: civils@polypipe.com

All notes, plans and illustrations in this publication are intended for guidance only and shall not constitute a liability for any error. All dimensions given are nominal and Polypipe may modify and change the information, products and specifications from time to time for a variety of reasons without prior notice. The information in this publication is provided "as is" as of January 2016. Upstream liability is not assumed. This information is not intended to have any legal effect, whether by way of action, representation or warranty (express or implied) in any jurisdiction. Liability is limited to the extent permitted by law. If you place any reliance on this publication, you must do so at your own risk. All rights reserved. Copyright in this publication belongs to Polypipe and all other copyright may not be used, reproduced or reproduced in whole or part in any manner in any media to any person without prior consent of Polypipe. Polypipe is a registered trademark of Polypipe. All Polypipe products are covered by Design Right under UKPA 1988. Copyright © 2016 Polypipe. All rights reserved.

ELEMENT	UNIT
PHYSICAL PROPERTIES	
Weight per unit	3kg
Length	768mm
Width	854mm
Depth	150mm
SHORT TERM COMPRESSIVE STRENGTH	
Vertical	2150 N/mm
Lateral	1550 N/mm
SHORT TERM DEFLECTION	
Vertical	1mm per 1200N/mm
Lateral	1mm per 1300N/mm
TENSILE STRENGTH	
Of a single joint	82.8kN/mm
Of a single joint at 15% secant modulus	18.8kN/mm
Bending resistance of unit	0.21kNm
Bending resistance of single joint	0.18kNm
Volumetric void ratio	85%
Average effective perforated surface area	52%
OTHER PROPERTIES	
Intrinsic permeability (R)	Minimum 1.0 x 10 ⁻¹⁰
Auxiliary	Permavoid Permeable
	Permavoid Linear Connector
Material	Polypropylene (PP)

HYDRAULIC PERFORMANCE	
2 units wide, 1 unit deep (1.06m x 0.15m)	
FREE DISCHARGE	
Gradient (%)	0 1 2 3 4 5
Flow rate (l/s)	0 13 16 17 18 21

Polypipe Civils
Charnwood Business Park, Loughborough, Leicestershire LE11 3LE
Tel: +44 (0) 1509 615100 Fax: +44 (0) 1509 610215 Email: civils@polypipe.com
www.polypipe.com/wms



D Arun's Checklist



Size of Area to be Drained	Factor of Safety Table					
	Consequences of failure					
	No damage or inconvenience		Minor inconvenience, e.g. surface water on car park		Damage to buildings or structures or roads.	
	Cv=1.0	Cv=0.75	Cv=1.0	Cv=0.75	Cv=1.0	Cv=0.75
<100 m ²	1.5	2	2	3	10	13
100m ² to 1000m ²	1.5	2	3	4	10	13
>1000m ²	1.5	2	5	6.5	10	13

8. Ordinary Watercourse/Land Drainage Consent will need to be sought, ideally in parallel with planning permission, if you propose discharging into, culverting or altering a watercourse.
9. Modelling is required to ensure that problems, such as surcharged outfalls, are addressed.

Plans/Drawings/Diagrams			
Required	Provided?		
Plan detailing the location of groundwater monitoring and infiltration testing	Yes	No	
Detailed drainage layout plan ^{Note 10}	Yes	No	
Construction detail plans ^{Note 11}	Yes	No	
Exceedance flow route plans ^{Note 12}	Yes	No	
Impermeable area plan	Yes	No	
If ground levels are being raised $\geq 300\text{mm}$ above existing levels and is unavoidable, have fully detailed plans been provided, together with drainage proposals, to address any potential drainage related issues.	Yes	N/A	No

Guidance Notes

10. Drainage layout plans should include:
 - All surface water drainage pipes labelled with; diameters, pipe materials, falls and invert levels.
 - All infiltrating and attenuating structures (including permeable paving) labelled with; dimensions, invert and cover levels.
 - All manholes labelled with; cover levels, invert levels, cover types detailed.
 - All silt traps clearly labelled with sump depths.
 - Control structures with outflow rates and invert levels.
 - Proposed/existing levels of any areas subject to ground raising, together with suitable measures/detailed drawings for the associated management of surface water runoff. Please note that ground raising should be avoided unless there are exceptional circumstances.
11. Site specific construction detail plans should be supplied if your proposed drainage scheme includes any of the following elements: pipe bed and surround; infiltrating structures; attenuating structures; manholes; catch-pits/silt traps; control devices; permeable paving; headwalls.
12. Unless specifically requested by the council's drainage engineers 'Exceedance Flow Route Plans' are only required for developments of more than 5 residential properties or more than 0.5ha of commercial development.

Version 3.0 (20.11.2019)

Drainage Design: Supporting Calculations			
Calculations Required		Calculations Provided?	
Infiltration Structures	Half-drain time for 10 year event (plus climate change allowance)	Yes ☐	No ☐
		Hours	
	Half-drain time for 100 year event (plus climate change allowance)	Yes ☐	No ☐
		Hours	
	Calculations demonstrating that the 1 in 100 year event, plus climate change allowance can be accommodated on-site. Note 7	Yes ☐	No ☐
Attenuation and Subsequent Restricted Discharge	Lowest base level of infiltration structure	mAOD mBGL	
	Has the design sought to provide treatment of potential contaminants? E.g. hydrocarbons.	Yes ☐	No ☐
	Pre-development run-off rate calculations	Yes ☐	No ☐
	Proposed discharge rate Note 6	0.3	l/s
	Calculations demonstrating that the 1 in 100 year event, plus climate change allowance can be accommodated on-site. Note 7	Yes ☐	No ☐
	Has the design sought to provide treatment of potential contaminants? E.g. hydrocarbons.	Yes ☐	No ☐
	If your proposed scheme incorporates any impermeable lined attenuation features we require calculations to demonstrate that appropriate resistance to floatation (due to groundwater levels) is catered for in the design	Yes ☐	No ☐
Attenuation and Subsequent Restricted Discharge	If you propose discharging into or altering an ordinary watercourse; have you sought Ordinary Watercourse/Land Drainage Consent? Note 8	Yes ☐	in process ☐
	If discharging to a watercourse, piped system or the sea, has the proposed drainage network been modelled against predicted top water levels for the 1 in 100 year storm event plus climate change allowance, within the existing system? Note 9	Yes ☐	No ☐

Guidance Notes

- Any proposed discharge rate must be less than, or equal to, the pre-development rate. Greenfield sites must use the mean flow rate (Q_{bar}) and be based upon the area occupied by the development, ignoring significant open spaces. Please note that the minimum acceptable discharge rate is 2l/s when using formal flow control devices, unless otherwise agreed. Additionally, if you are developing a brownfield site, we expect you to provide fully detailed plans of the existing surface water drainage arrangements on site, including impermeable areas, gullies, outfalls, pipes & diameters, manholes, etc. We generally seek 50% betterment in terms of run off from brownfield sites.
- The appropriate factor of safety from the table below must be applied to your calculations to ensure your design is fully in accordance with CIRIA R156/ CIRIA C753.

Version 3.0 (20.11.2019)



Surface Water Drainage Proposal Checklist

Ground Investigation Results			
Results Required	Results Provided?		
Winter groundwater monitoring results (Please refer to guidance note 1 below)	Yes	No	
Period of winter groundwater monitoring Note 1	From	20.02.2022	
	To	20.02.2022	
Maximum recorded groundwater level		0.7 mADD mBGL	
Winter infiltration test results Note 2	Yes	No	
Date of winter infiltration testing		20.02.2022	
Details of the location and depth of the infiltration testing Note 3	Yes	No	
Minimum infiltration rate Note 4	Test failed		m/s

Guidance Notes

1. A full winters groundwater monitoring should be undertaken, (October to March inclusive) to enable the peak annual groundwater levels to be established. The extent of winter monitoring for developments of less than 5 properties should be discussed with the council's Engineers.
2. Infiltration testing should be undertaken during the wet winter months (typically January) and in line with BRE365, or a similar approved method. Tests should be repeated 3x, to replicate saturated ground conditions. Please note that infiltration testing is to be carried out at a time and depth agreed with the Councils engineers.
3. Infiltration testing should be undertaken at the location and depth of any proposed infiltration structures. This must be above the maximum recorded groundwater level in that vicinity.
4. The minimum infiltration rate obtained at the location and depth of the proposed infiltration structures should be used to inform the design of the structures.

Proposed Method of Surface Water Disposal			
Infiltration	Yes	No	
On-site, via soak-away structures			
If on-site infiltration is not to be used, has justification for this been provided? Note 5	Yes	No	
Attenuation (on-site) with a restricted discharge to a watercourse on, or adjacent to, the site	Yes	No	
Attenuation (on-site) with a restricted discharge to a surface water sewer on, or adjacent to, the site	Yes	No	
Attenuation (on-site) with a restricted discharge to a foul water sewer on, or adjacent to, the site	Yes	No	

Guidance Notes

5. If on-site infiltration is not being used to drain the site you will need to provide evidence that demonstrates on-site infiltration is unviable.

Version 3.0 (20.11.2019)



Surface Water Drainage Proposal Checklist

This 'Surface Water Drainage Proposals Checklist' has been designed to clearly define Arun District Council's and Chichester District Council's expectations and requirements for any surface water drainage proposals, submitted for appraisal by the council's Engineers, during the planning process.

Please be aware that it is in your interest to provide all of the requested information, as this will allow the council's Engineers to quickly and efficiently review your proposals. The omission of any requested information may lead to delays in the planning process.

This document will be of help to any applicant, or drainage consultant, preparing to submit a 'Discharge of Conditions Application' relating to surface water drainage conditions. Alternatively, it can also be used earlier in the planning process, if the applicant wishes to avoid pre-commencement conditions relating to surface water drainage. The Town and Country Planning Regulations now require pre-commencement conditions to have the prior agreement of the applicant regarding their wording and use. Therefore, if you wish to avoid pre-commencement conditions, in relation to surface water drainage, you will need to submit proposals that provide the information requested in this checklist and also align with the requirements of the following documents:

[West Sussex Policy for the Management of Surface Water \(WSCC\)](#)

['Supplementary Requirements for Surface Water Drainage Proposals'](#). (Arun DC)

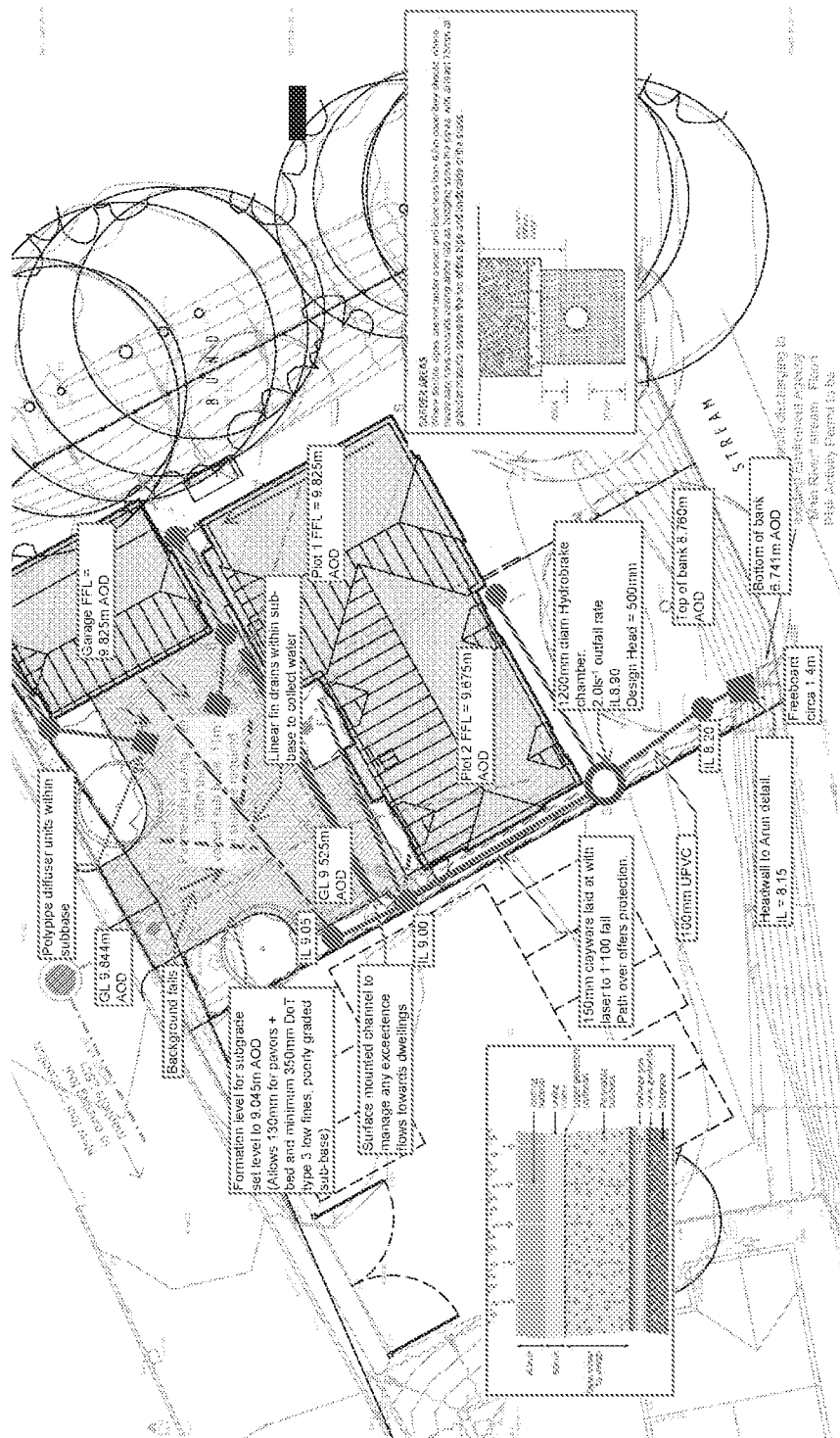
['Supplementary Requirements for Surface Water Drainage Proposals'](#). (Chichester DC)

By submitting all of the information requested by this checklist you will enable the council's Engineers to determine whether your proposals follow the hierarchy for sustainable drainage and will adequately drain the site.

Please be aware that it will be difficult for the council's Engineers to undertake a timely assessment of your application if you fail to provide any of the information requested.

Version 3.0 (20.11.2019)

E Detailed drainage layout



F Fin drain

HAPAS

ABG Ltd

E7 Meltham Mills Road
Meltham
Holmfirth
West Yorkshire HD9 4DS



HAPAS Certificate
14/H220
Product Sheet 1

ABG GEOCOMPOSITE HIGHWAY DRAINAGE SYSTEMS

ABG FILDRAIN TYPE 5, 6, 7 AND 10 SYSTEMS

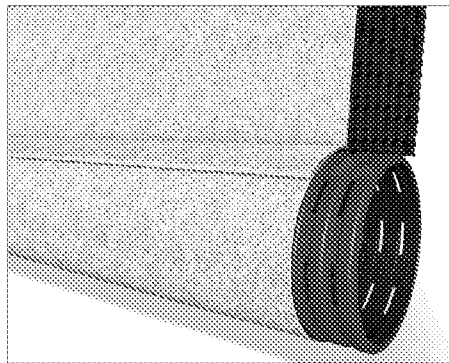
This HAPAS Certificate Product Sheet⁽¹⁾ is issued by the British Board of Agrément (BBA), supported by the Highways Agency (HA) (acting on behalf of the Overseeing Organisations of the Department for Transport; Transport Scotland; the Welsh Assembly Government and the Department for Regional Development, Northern Ireland), the Association of Directors of Environment, Economy, Planning and Transport (ADEPT), the Local Government Technical Advisers' Group and industry bodies. HAPAS Certificate Product Sheets are normally each subject to a review every three years.

(1) Hereinafter referred to as 'Certificate'.

This Certificate relates to ABG Filldrain Type 5, 6, 7 and 10 Systems, a range of geocomposite Systems for the collection and/or disposal of sub-surface water from road foundations. The Systems comprise an outer geotextile material and a cusped high density polyethylene core for use vertically as edge-of-pavement drainage (Types 5 to 7) and horizontally as under channel drainage (Type 10).

CERTIFICATION INCLUDES:

- factors relating to compliance with HAPAS requirements
- factors relating to compliance with Regulations where applicable
- independently verified technical specification
- assessment criteria and technical investigations
- design considerations
- installation guidance
- regular surveillance of production
- formal three-yearly review.



KEY FACTORS ASSESSED

Geotextile properties — the geotextile component meets the requirements of Manual of Contract Documents for Highway Works (MCHW) Volume 1, sub-clause 514.4 (see section 6).

Geocomposite — the geocomposite provides suitable flow characteristics provided the Systems are correctly installed in accordance with MCHW Volume 1, clause 514.5 (see section 7).

Durability — under normal soil conditions and temperatures, the Systems will have a service life in excess of 50 years (see section 10).

The BBA has awarded this Certificate to the company named above for the Systems described herein. These Systems have been assessed by the BBA as being fit for their intended use provided they are installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément



Date of First issue: 15 January 2015

Brian Chamberlain
Head of Approvals — Engineering

Claire Curtis-Thomas
Chief Executive

The BBA is a UKAS accredited certification body — Number 113. The schedule of the current scope of accreditation for product certification is available in pdf format via the UKAS link on the BBA website at www.bbacerts.co.uk

Readers are advised to check the validity and latest issue number of this Agrément Certificate by either referring to the BBA website or contacting the BBA direct.

HAPAS

ABG Ltd

E7 Meltham Mills Road
Meltham
Holmfirth
West Yorkshire HD9 4DS
Tel: 01484 852096 Fax: 01484 851562
e-mail: geo@abgltd.com
website: www.abgltd.com



HAPAS Certificate
14/H220
Product Sheet 1

ABG GEOCOMPOSITE HIGHWAY DRAINAGE SYSTEMS

ABG FILDRAIN TYPE 5, 6, 7 AND 10 SYSTEMS

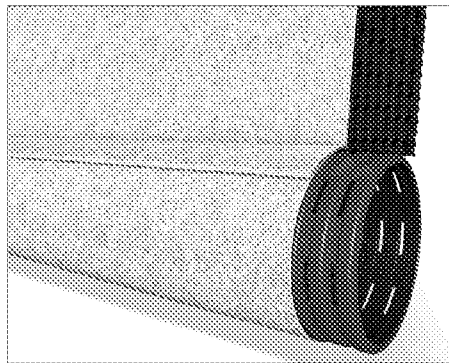
This HAPAS Certificate Product Sheet⁽¹⁾ is issued by the British Board of Agrément (BBA), supported by the Highways Agency (HA) (acting on behalf of the Overseeing Organisations of the Department for Transport; Transport Scotland; the Welsh Assembly Government and the Department for Regional Development, Northern Ireland), the Association of Directors of Environment, Economy, Planning and Transport (ADEPT), the Local Government Technical Advisers' Group and industry bodies. HAPAS Certificate Product Sheets are normally each subject to a review every three years.

(1) Hereinafter referred to as 'Certificate'.

This Certificate relates to ABG Fildrain Type 5, 6, 7 and 10 Systems, a range of geocomposite Systems for the collection and/or disposal of sub-surface water from road foundations. The Systems comprise an outer geotextile material and a cusped high density polyethylene core for use vertically as edge-of-pavement drainage (Types 5 to 7) and horizontally as under channel drainage (Type 10).

CERTIFICATION INCLUDES:

- factors relating to compliance with HAPAS requirements
- factors relating to compliance with Regulations where applicable
- independently verified technical specification
- assessment criteria and technical investigations
- design considerations
- installation guidance
- regular surveillance of production
- formal three-yearly review.



KEY FACTORS ASSESSED

Geotextile properties — the geotextile component meets the requirements of Manual of Contract Documents for Highway Works (MCHW) Volume 1, sub-clause 514.4 (see section 6).

Geocomposite — the geocomposite provides suitable flow characteristics provided the Systems are correctly installed in accordance with MCHW Volume 1, clause 514.5 (see section 7).

Durability — under normal soil conditions and temperatures, the Systems will have a service life in excess of 50 years (see section 10).

The BBA has awarded this Certificate to the company named above for the Systems described herein. These Systems have been assessed by the BBA as being fit for their intended use provided they are installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément



Date of First issue: 15 January 2015

Brian Chamberlain

Claire Curtis-Thomas

Head of Approvals — Engineering

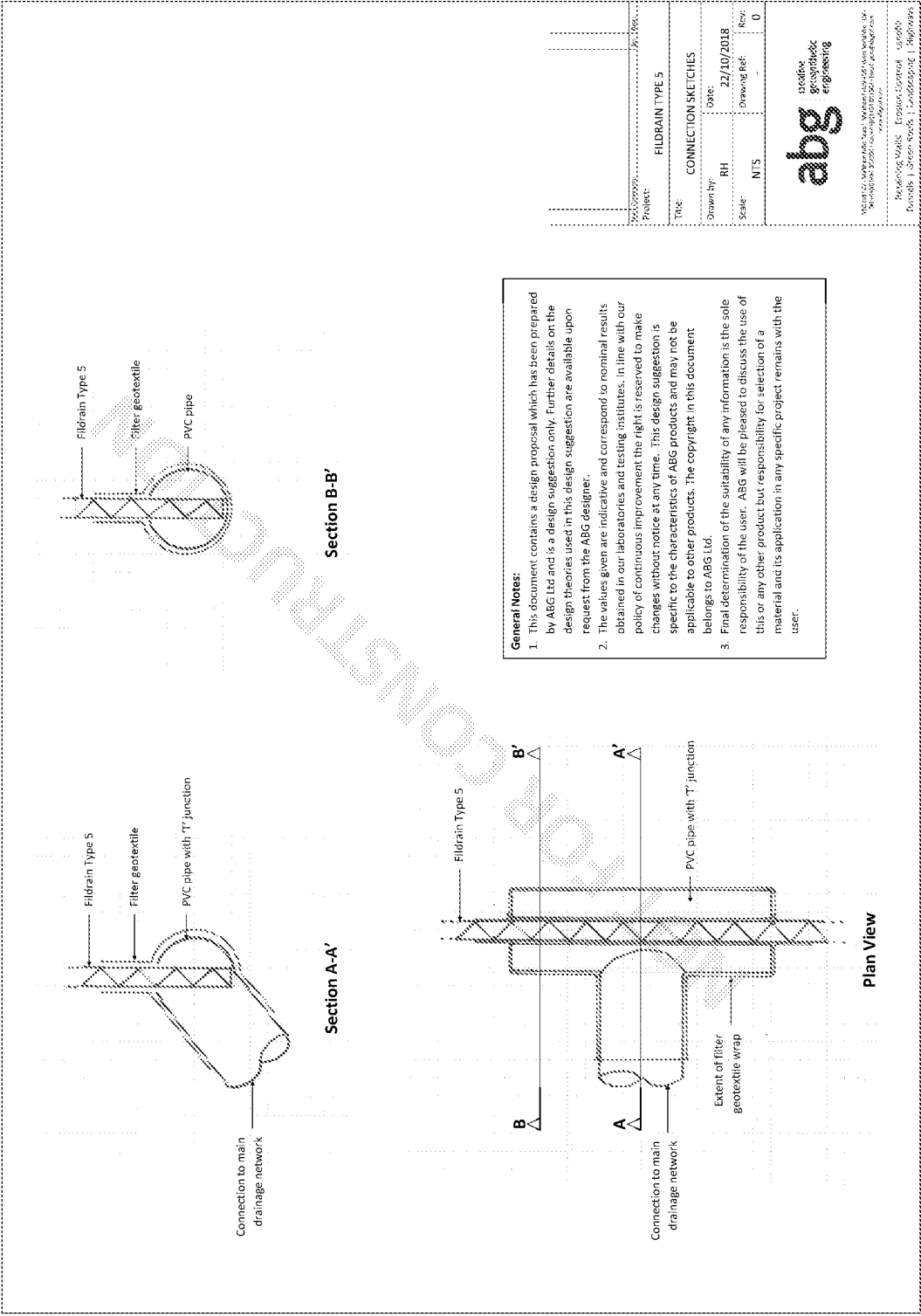
Chief Executive

The BBA is a UKAS accredited certification body — Number 113. The schedule of the current scope of accreditation for product certification is available in pdf format via the UKAS link on the BBA website at www.bbacerts.co.uk

Readers are advised to check the validity and latest issue number of this Agrément Certificate by either referring to the BBA website or contacting the BBA direct.

Page 1 of 10

Page 1 of 10

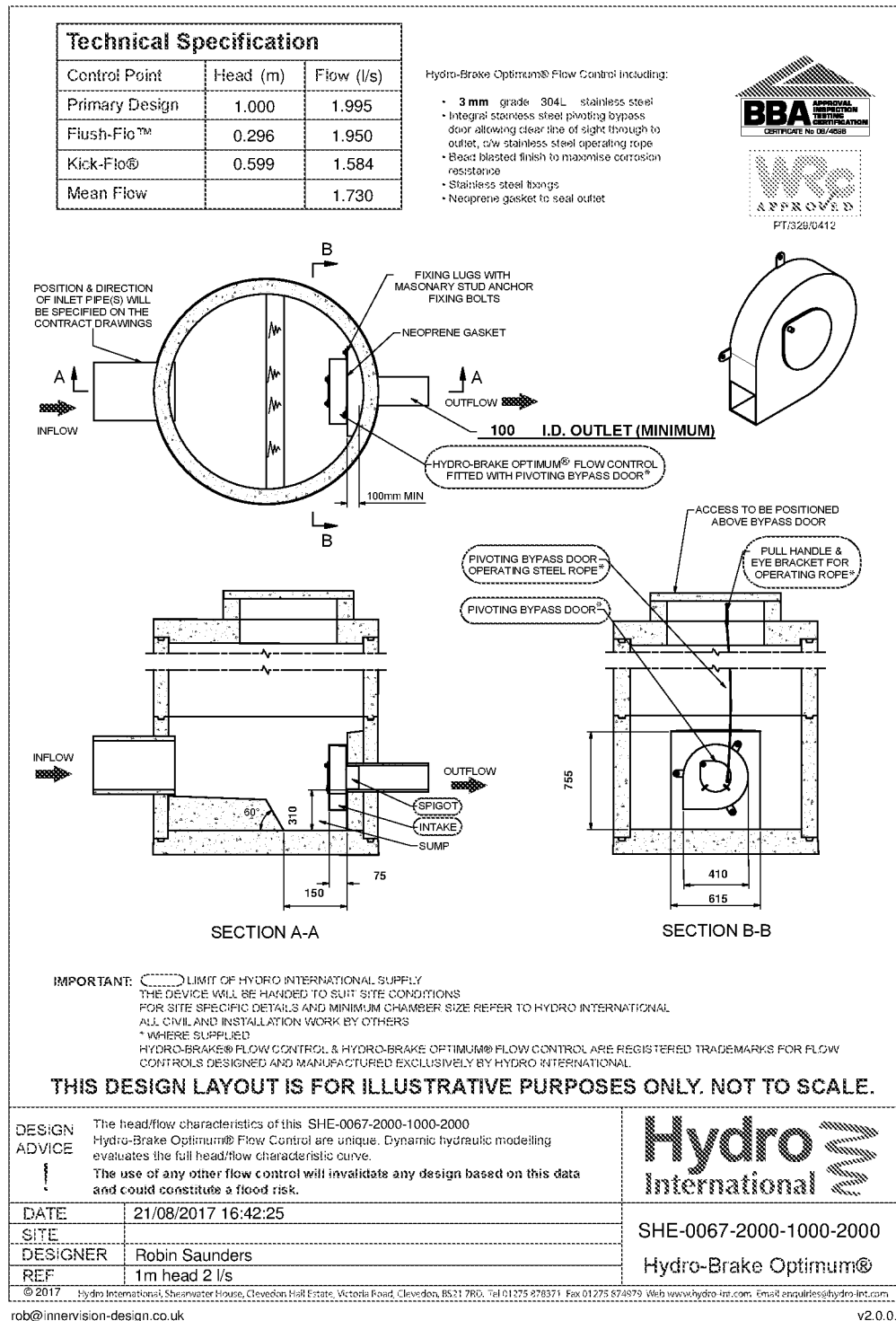


Project:	Fildrain Type 5		
Title:	CONNECTION SKETCHES		
Drawn by:	BH	Date:	22/10/2018
Scale:	NTS	Drawing Ref:	Rev: 0

abg creative geosynthetic engineering

ABG Ltd, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000

G Hydrobrake details

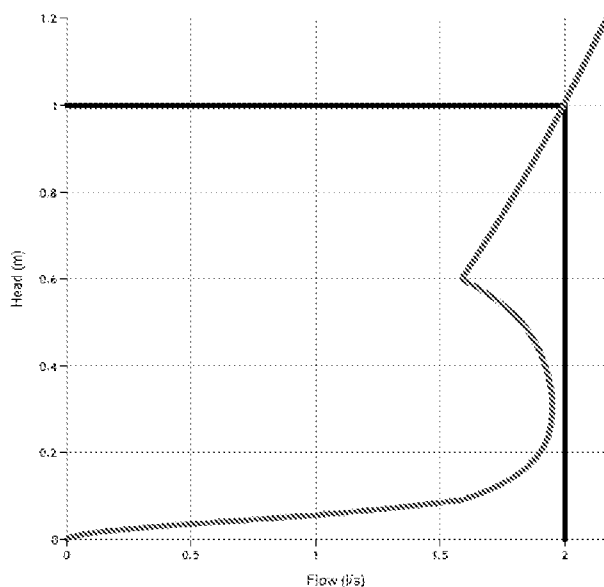


Technical Specification

Control Point	Head (m)	Flow (l/s)
Primary Design	1.000	1.995
Flush-Flo™	0.296	1.950
Kick-Flo®	0.599	1.584
Mean Flow		1.730



PT/329/0412



Head (m)	Flow (l/s)
0.000	0.000
0.034	0.462
0.069	1.240
0.103	1.646
0.138	1.775
0.172	1.858
0.207	1.909
0.241	1.936
0.276	1.948
0.310	1.949
0.345	1.942
0.379	1.929
0.414	1.911
0.448	1.884
0.483	1.848
0.517	1.797
0.552	1.726
0.586	1.631
0.621	1.609
0.655	1.649
0.690	1.687
0.724	1.725
0.759	1.761
0.793	1.797
0.828	1.832
0.862	1.866
0.897	1.899
0.931	1.932
0.966	1.964
1.000	1.995

DESIGN ADVICE

The head/flow characteristics of this SHE-0067-2000-1000-2000 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.



DATE	21/08/2017 16:42:24
SITE	
DESIGNER	Robin Saunders
REF	1m head 2 l/s

SHE-0067-2000-1000-2000
Hydro-Brake Optimum®

© 2017 Hydro International, Shearwater House, Clevedon Hall Estate, Victoria Road, Clevedon, BS21 7RD, Tel 01275 878371 Fax 01275 874879 Web www.hydro-int.com Email enquiries@hydro-int.com

rob@innvision-design.co.uk

v2.0.0.0