

Your Environment

SURFACE WATER DRAINAGE – SUPPLEMENTARY REPORT LAND TO THE REAR OF SUNNYSIDE BARN AND FLINT BARN, BARNHAM

For Manorwood Ltd

Your Environment
Head Office, Unit 2, Woodhorn Business Centre, Oving,
Chichester, Sussex, PO20 2BX

Report Number: YE4281, Date: May 2020

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	Name	Position	Signature	Date
Prepared by:	Paul Timmins	Drainage Consultant		May 2020
Reviewed by:	Mat Griffith	Geo Environmental Consultant		May 2020
Approved:	Colin Hiscock	Director		May 2020
For and on behalf of YourEnvironment				

Issue	Date	Description	Prepared	Reviewed	Approved
01	18/05/2020	For Issue to Arun DC	PT	MG	CH
02	10/06/2020	Incorporating comments from Arun DC	PT	MG	CH

1.0 Executive Summary

YourEnvironment (YE) was instructed by Manorwood Ltd to provide a Surface Water Drainage Report to describe the proposed drainage strategy for the proposed development within land to the rear of Sunnyside Barn and Flint Barn, Barnham. The strategy was deemed acceptable to the local planning authority, however more detailed design information is necessary in order to avoid the need for a pre commencement planning condition.

The purpose of this report is to provide the detailed drainage design information for the development to enable the application to be approved without the need for a pre commencement condition.

We trust this is sufficient for your requirements and should you have any questions please do not hesitate to contact the undersigned.

For YourEnvironment

Colin Hiscock

Director

2.0 Introduction

This report is to be read in conjunction with the Surface Water Drainage Report submitted in January 2020 as part of the planning application at the site.

This report seeks to provide detailed design information for the SuDS components proposed and also to provide further information relating to the drainage design, for example in relation to the groundwater identified at the site.

The consultation response from Sarah Burrows (Engineering Assistant at Arun DC Drainage team) during the planning stage is provided in Appendix A of this report. Within her email of the 18th March, Ms Burrows raises a number of issues which require clarification and recommends the wording for two planning conditions to be appended to the planning permission.

The applicant wishes to provide this detail prior to determination to avoid the need for a pre commencement condition.

The issues which require further information relate to the following and shall be assessed in turn below.

1. Further explanation regarding the groundwater levels encountered within the site.
2. The size of the orifices used to control runoff from the site.
3. Confirmation that the contributing area to the swale includes the area of the swale
4. Confirmation that all structures are 3m away from the pipe entering the existing watercourse passing through the site.
5. Confirmation that all buildings and fences are 3m away from the ditch bank
6. Improvements to the downstream headwall, pipe and culvert which drain runoff from the site currently.

The recommended conditions appended to the permission are as follows:

"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. 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."

"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. "

3.0 Issue 1 - Groundwater levels

An investigation of the groundwater levels at the site was undertaken on 21st March 2018. A screen shot of the data presented previously is provided below:

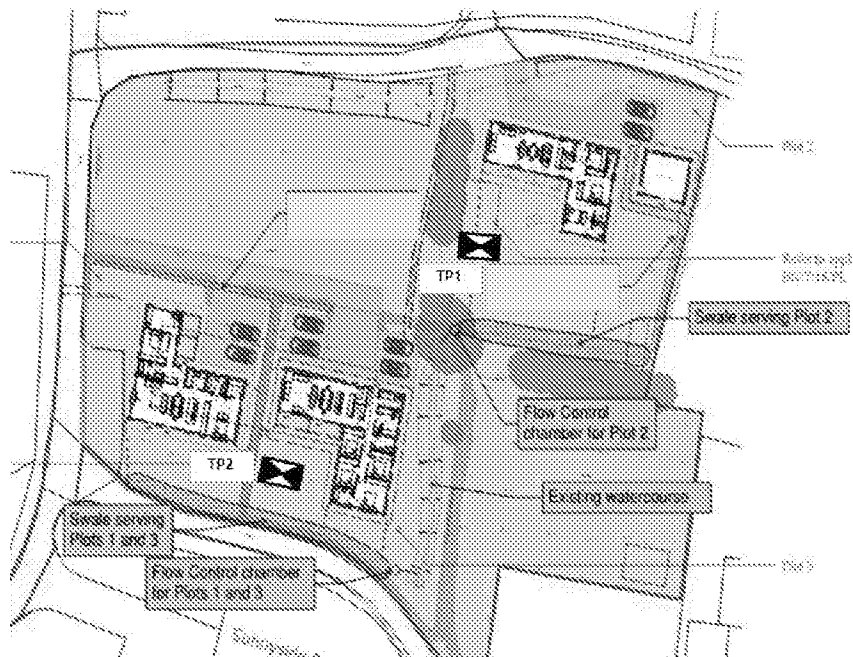
Trial Pit Information												
Pit ID	Pit Type	Start Date	End Date	Backfill Date	Observation	Trial Pit Length	Trial Pit Width	Trigger	Shoring/Support Used	Stability	Ground Remarks on Tests	Trial Pit Water Conditions
TP1	TP	21.03.2018	21.03.2018	21.03.2018		1.25	0.50				Water levels rose at 0.90 - filled 60cm within 20 minutes	
TP2	TP	21.03.2018	21.03.2018	21.03.2018		1.25	0.50				Water levels rose at 0.70 - filled 60cm within 20 minutes	

Arun DC made the following comment:

- The groundwater level identified as part of the infiltration testing is unclear. The results state that each pit "filled 60cm within 20mins" from a starting point of 0.9mbgl and 0.7mbgl. On this basis we have read the results as peaking at 0.1mbgl in TP2. (Rather than both pits stabilising at 0.6mbgl). If this is the case the swales will require impermeable liners to avoid groundwater ingress, this will require the design to account for buoyancy. If the groundwater is in fact at 0.6mbgl then the applicant is advised to approach this department to discuss any further required monitoring and/or design options.

It is agreed that the data as presented could have been made more clear. During the excavation of the trial pit water ingress was noted at 0.9m bgl and was reported (verbally) to be perched groundwater which did not prevent the excavation from continuing to the target depth of 2.0m bgl. Once the excavation was complete water filled the excavation by 60cm (to 1.4mbgl) within 20mins. It is our contention that the design groundwater level is at 1.4m bgl (at TP1 and at TP2).

The Trial Pits were excavated in the positions shown below (not provided in the previous report). The ground levels at these locations are approx. 9.3m AOD for TP1 and approx. 9.1m AOD for TP2. Therefore, it may be stated that the groundwater level in TP1 has been measured at approx. 7.9m AOD at TP1 and at 7.7m AOD at TP2.



This would make sense as the watercourse which passes through the site has a bed level at between 8.2m AOD and 7.95m AOD. The lowest level being at the culvert which drains the site southwards. It would make sense that this watercourse prevents the groundwater from rising to the ground levels found across the site.

An email from the team that carried out the testing is provided in Appendix G.

4.0 Issue 2 - Minimum orifice sizes for flow control devices

Arun DC commented as follows:

We do not accept orifices of less than 50mm as control devices due to the risk of blockage causing flooding upstream. On this basis the calculations will likely change with the inclusion of alternative flow control devices.

As an alternative, hydrobrakes have been incorporated into the detailed design which provide the necessary control to the discharge rates whilst maintaining an orifice size of at least 50mm.

5.0 Issue 3 - Contributing areas to the swales

Arun DC queried whether the contributing areas draining to the swales included the areas of the swales themselves. They did not.

The plan and table below identify the total areas draining to the swales which has been used in the updated hydraulic modelling (see Section 9).



Drained Area	Area (m ²)
Plot 1 - Access Road	67
Plot 1 - Parking area	91
Plot 1 - House	165
Plot 3 - Access Road	54
Plot 3 - Parking area	143
Plot 3 - House	179
Plot 1 + 3 Swale	175
Total Area draining to Plot 1 + 3 Swale	874
Plot 2 - Parking area	124
Plot 2 - House	145
Plot 2 - Garage	36
Plot 2 Swale	102
Total Area draining to Plot 2 Swale	407

6.0 Issue 4 - Contributing areas to the swales

4. A pipe is believed to enter the watercourse at the north end of it, all structures must be kept further than 3m from this.

The 3m offset from the north-end of the watercourse has been indicated on the latest layout plan. An extract of that plan is provided below and in full within Appendix B. The pipe that enters the north end of the watercourse is redundant and not connected to anything, it is approximately 6ft long and laid in the ground.

Nevertheless, all structures and fences are a minimum of 3m from the top of the ditch and swales

7.0 Issue 5 - Offset to top of bank to ditch

5. All buildings and fences must be minimum 3m from the top of the ditch bank.

The plan layout of the development has been adjusted in order to achieve this constraint. As above all structures and fences are a minimum of 3m from the top of the ditch and swales

8.0 Issue 6 - Downstream culvert

6. The downstream culvert (which the watercourse leads to) has known issues. The applicant will likely need to undertake offsite improvements to this to ensure it is fit for purpose. The same is likely to be applicable for the headwall and ditch onsite.

The Client shall undertake to clear debris from the watercourse and at the trash screen as it flows into a pipe at the south end of the site.

A CCTV survey has identified a blockage at the north end of the pipe which shall be cleared as part of the development to allow water to pass freely

9.0 Detailed Drainage Design information

Drainage Layout

A Drainage Layout for the development is provided in Appendix B. An extract of that drawing is provided below:



Plot 1 and 3 Swale

This swale comprises the following technical details, which have been used for the hydraulic modelling.

Bed Length	32 m
Bed width	0.7m
Bed level at outlet	8.5m AOD
Min. top of slope level	9.3m AOD
Height to top of slope	0.8m
Side Slopes	1 in 3
Overall width	5.0m
Overall length	36.2m
Longitudinal gradient	1 in 200

Detailed Design drawings for this swale are provided in Appendix C. A trash screen is to be included on the outlet of the swale. Silt traps are to be provided prior to discharging into the swale.

Plot 1 and 3 Flow Control

The flow control device proposed to limit flows from the Plot 1 & Plot 3 swale is a Hydrobrake with a Design Flow of 1.1 l/s at a Design Head of 0.8m (it is noted that the specified Hydrobrake has a 52mm orifice, it had been recommended that orifices no smaller than 50mm are suitable).

The hydrobrake shall be installed within a 1200mm diameter concrete chamber and have its invert level set at 8.4m AOD (see Appendix C). Details of the specified hydrobrake are provided within Appendix D.

Plot 2 swale

This swale comprises the following technical details, which have been used for the hydraulic modelling.

Bed Length	22 m
Bed width	0.5m
Bed level at outlet	8.6m AOD
Min. top of slope level	9.2m AOD
Height to top of slope	0.6m
Side Slopes	1 in 3
Overall width	4.1m
Overall length	25.6m
Longitudinal gradient	1 in 200

Detailed Design drawings for this swale are provided in Appendix C. A trash screen is to be included on the outlet of the swale. Silt traps are to be provided prior to discharging into the swale.

Plot 2 Flow Control

The flow control device proposed to limit flows from the Plot 2 swale is a Hydrobrake with a Design Flow of 1.0 l/s at a Design Head of 0.7m (it is noted that the specified Hydrobrake has a 51mm orifice, it had been recommended that orifices no smaller than 50mm are suitable).

The hydrobrake shall be installed within a 1200mm diameter concrete chamber and have its invert level set at 8.5m AOD (see Appendix C). Details of the specified hydrobrake are provided within Appendix D.

Headwalls

A headwall detail for incoming pipes into the swale and the outgoing pipes is provided in Appendix E. This detail is reproduced from the West Sussex CC suite of highways drawings.

Hydraulic Performance

Microdrainage outputs for both swales are provided in Appendix F.

Both fully contain the 1 in 100 year return period event of critical duration and discharge at no more than 1.1 l/s.

10.0 Limitations

YE have prepared this report with all reasonable skill, care and diligence. The work undertaken to provide the basis of this report comprised a study of available documented information from a variety of sources.

The opinions given in this report have been dictated by the finite data on which are they based and are relevant only to the purpose for which the report was commissioned.

Information reviewed should not be considered exhaustive and has accepted in good faith as providing true and representative data with respect to site conditions. Should additional information become available which may influence the opinion expressed in this report, YE reserves the right to review such information and, if warranted, to alter the opinions accordingly.

It should be noted that any risks identified in this report are perceived risks based on the information reviewed.

The recommendations contained in this report represent our professional opinions. These opinions were arrived at in accordance with currently accepted industry practices at this time and as such are not a guarantee that the study site is free of hazardous conditions.

This report has been prepared solely for the use of the named client, and may not be relied upon by other parties without written consent from YE. YE disclaim any responsibility to the client and others in respect of any matters outside the agreed scope of the work

Appendix A - Arun DC e-mail dated 18th March 2020



Amanda Scholes | Receptionist, Department, [Arun District Council](#) | Location: Ground Floor, Arun Civic Centre, Maltravers Road, Littlehampton, BN17 5LF

Internal: 37736 | External: +44 (0) 1903 737500 ext 37736 | E-mail: amanda.scholes@arun.gov.uk



Visit Arun's web site at [Error! Hyperlink reference not valid.](#)



Save the environment - think before you print.

From: Sarah Burrow <Sarah.Burrow@arun.gov.uk>

Sent: 18 March 2020 12:39

To: Planning.Responses <Planning.Responses@arun.gov.uk>

Cc: Maria Tomalova <Maria.Tomalova@arun.gov.uk>

Subject: RE: Planning Consultation on: BN/5/20/PL

Engineers Comments Regarding Surface Water Drainage

The application is within the Lidsey Treatment Catchment, therefore surface water drainage design should be carefully considered.

The applicant has supplied a Surface Water Drainage Strategy as part of the application. The principle of the strategy; of attenuating surface water and discharging to the existing watercourse on the site is acceptable, however, this department will require further detail of the proposed scheme. We require a scaled drainage layout, including invert and cover levels and falls, control structures should be labelled with outflow rates, invert levels and design heads. In addition, the applicant should supply construction detail drawings of the proposed swales, conveyance channels, control structures, catch pits/silt traps and the outlets to the watercourse.

The following points have also been identified that require consideration:

1. The groundwater level identified as part of the infiltration testing is unclear. The results state that each pit "filled 60cm within 20mins" from a starting point of 0.9m bgl and 0.7m bgl. On this basis we have read the results as peaking at 0.1m bgl in TP2. (Rather than both pits stabilising at 0.6m bgl). If this is the case the swales will require impermeable liners to avoid groundwater ingress, this will require the design to account for buoyancy. If the groundwater is in fact at 0.6m bgl then the applicant is advised to approach this department to discuss any further required monitoring and/or design options.
2. We do not accept orifices of less than 50mm as control devices due to the risk of blockage causing flooding upstream. On this basis the calculations will likely change with the inclusion of alternative flow control devices.

3. It is not mentioned within the discussion of the impermeable areas, but please ensure that the design accounts for rainwater falling directly onto the swales themselves (and runoff from surrounding areas).
4. A pipe is believed to enter the watercourse at the north end of it, all structures must be kept further than 3m from this.
5. All buildings and fences must be minimum 3m from the top of the ditch bank.
6. The downstream culvert (which the watercourse leads to) has known issues. The applicant will likely need to undertake offsite improvements to this to ensure it is fit for purpose. The same is likely to be applicable for the headwall and ditch onsite.

If you are minded to approve the scheme please apply the following conditions:

PCENG D2 (Modified to remove requirement for groundwater monitoring and infiltration testing – already completed)

“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. 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.”

Reason: To ensure that the proposed development is satisfactorily drained in accordance with policies W SP1, W DM1, W DM2 and W DM3 of the Arun Local Plan. This is required to be a pre-commencement condition because it is necessary to implement the surface water drainage system prior to commencing any building works.

PCENG D3

“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. “

Reason: To ensure that the proposed development is satisfactorily drained in accordance with policies W DM1, W DM2 and W DM3 of the Arun Local Plan. And to ensure that the duties and responsibilities, as required under the Land Drainage Act 1991, and amended by the Flood and Water Management Act 2010, can be fulfilled without additional impediment following the development completion. It is considered necessary for this to be a pre-commencement condition to protect existing watercourses prior to the construction commencing.

And the accompanying informative(s):

“Under Section 23 of the Land Drainage Act 1991 Land Drainage Consent must be sought from the Lead Local Flood Authority (West Sussex County Council), or its agent (Arun District Council land.drainage@arun.gov.uk), prior to starting any works (temporary or permanent) that affect the flow of water in an ordinary watercourse. Such works may include culverting, channel diversion, discharge of flows, connections, headwalls and the installation of trash screens.

The development layout must take account of any existing watercourses (open or culverted) to ensure that future access for maintenance is not restricted. No development is permitted within 3m of the bank of an ordinary watercourse, or 3m of a culverted ordinary watercourse.”

“Supplementary guidance notes regarding surface water drainage are located here <https://www.arun.gov.uk/surfacewater> on Arun District Councils website. A surface water drainage checklist is available on Arun District Councils website, this should be submitted with a Discharge of Conditions Application.”

Kind Regards

Sarah Burrow
Engineering Assistant

From: Planning.Responses <Planning.Responses@arun.gov.uk>
Sent: 31 January 2020 14:34
To: Land Drainage [REDACTED]
Subject: Planning Consultation on: BN/5/20/PL

To: **Engineers (Drainage)**

**NOTIFICATION FROM ARUN DISTRICT COUNCIL
Town & Country Planning Act 1990 (as amended)
Town and Country Planning (Development Management Procedure) (England) Order 2015
Planning Permission**

APPLICATION NO: BN/5/20/PL

Registered: 30th January
2020

Site Address: Land north of Sunnyside Cottages Yapton Road Barnham PO22 0AZ

Grid Reference: 496475 104086

Description of Works: Removal of existing buildings and erection of three new build dwellings.
(Alternatives to BN/7/18/PL and BN/48/18/PL). This application is a Departure from the Development Plan

The Council have received the above application. I shall be pleased to receive any observations you may wish to make.

[Click here to view the application details](#)

Should you have any comments to make, these should be sent by replying to this email by 05-MAR-20.

You can also monitor the progress of this application through the Council web site:
www.arun.gov.uk/planning

Please be aware that any comments you may make will be available on our website so please do not insert personal details or signatures on your reply.

In the absence of a reply within the period stated, I shall assume that you have no observations to make.

The application will be determined having regard to the development plan policies (if any are relevant) and other material considerations. The development plan can be accessed via the website as can the leaflet which deals with material planning considerations.

Should the application go to appeal the Planning Inspectorate will publish any comments made to the Council on their website: www.planningportal.gov.uk/planning/appeals/ but they will protect personal details.

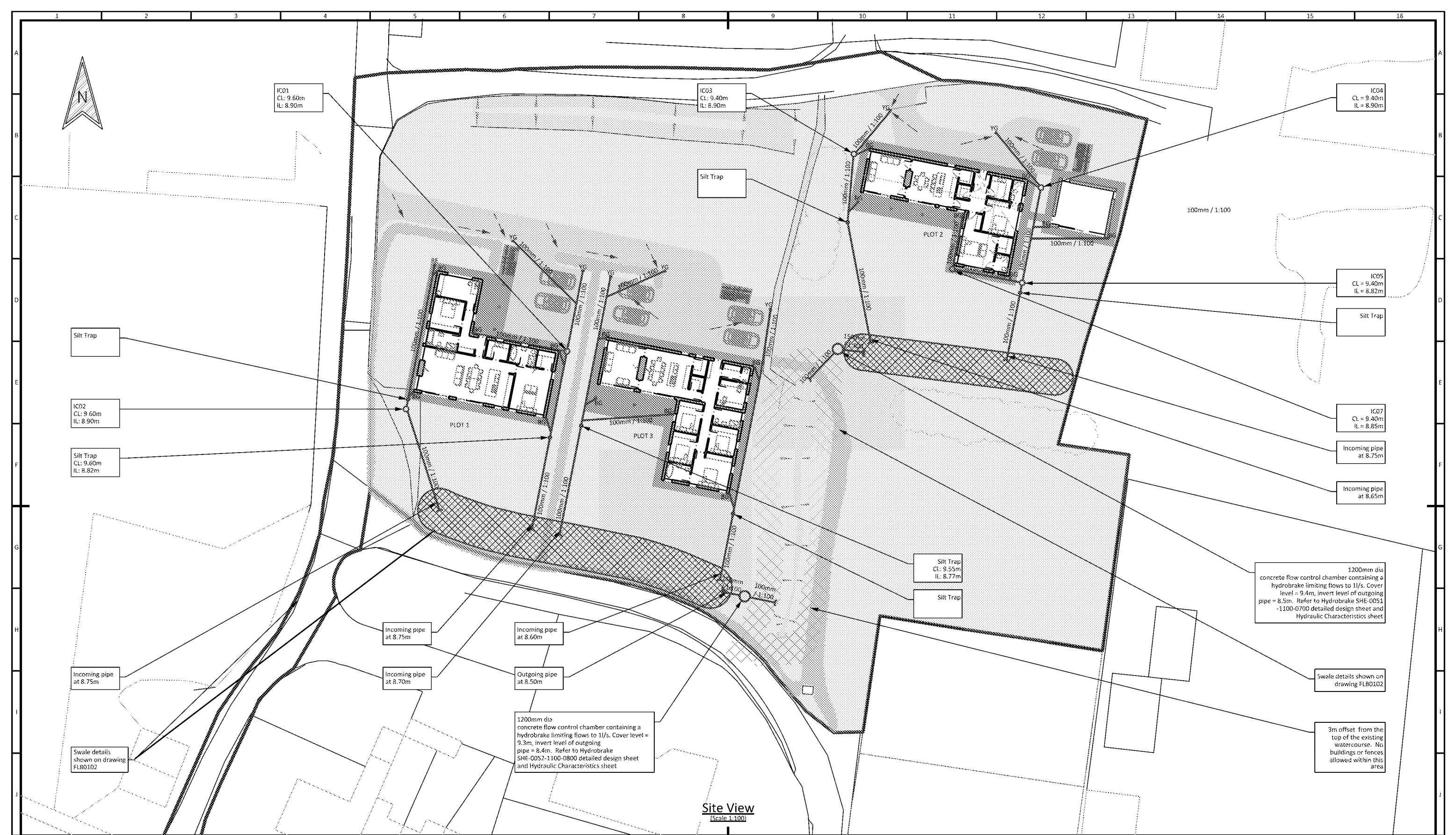
The officer dealing with this application is Maria Tomalova who can be contacted on telephone number 01903 737510.

Regards
Planning Officer

consultee_email

Appendix B - Drainage layout plan





NOTES:

- This drawing is to be read in conjunction with all other relevant drawings.
- All chamber and pipeline construction to be in accordance with the relevant provisions of the Building Regulations Part H, BS EN 752 and the manufacturers' recommendations.
- Concrete grades to be to BS8500: Grade S74 unless specified otherwise.
- Pipework to comprise: 100mm Osma Twin Wall pipe for surface water flows or similar approved.
- Class 2 Concrete bed and surround to be provided as follows: 100mm Dia. with less than 0.30m cover. Flexcell or similar required at each pipe joint NB: concrete bed and surround also required for pipelines beneath vehicular areas and adoptable carriageways with less than 1.20m cover from finished levels. Class 5 Granular bed and surround to be provided where pipes are located beneath surfaced areas with cover depths greater than above.
- N.B. The above information relates to pipeline protection at depths from finished levels and additional protective measures may be necessary to protect pipes from construction operations. Type 1 Granular backfill required to heddings Z & S.
- For full notes on clay pipes: Refer to CPDA pamphlet 'Technical Notes For Vitrified Clay Pipes'.
- Alternative pipes and fitting in plastics in PVC-U structured wall or plain wall may be used in accordance with WIS 04-35-01 and BS EN 1401-01 with flexible joints and manufacturers recommendations.
- All existing levels of drains, manholes & connection points to be checked before work commences.
- All existing statutory authorities and private services, water mains etc to be carefully located and exposed before work commences.
- Precise setting out of new drains to be checked on site after notes 8 & 9 are complete.
- Long radius bends to be used at base of BG's/SVP's etc.
- Manhole cover load classes to BS EN 124.
- Foul drain pipes are generally laid at 1:80, unless otherwise stated.
- Surface water drain pipes are generally 100mm diameter unless otherwise stated and laid at not less than 1:100 gradient.

KEY:

- Surface Water Pipe
- Rodding Eye
- Yard Gully
- Bottle Gully to Rain Water Pipe
- Type 3 Inspection Chamber
- Swale
- Fall in surfacing
- Silt Trap
- Headwall
- Trash Screen

CONSTRUCTION RISKS	MAINTENANCE/CLEANING RISKS	REMEDIAL/ADAPTATION RISKS
IN ADDITION TO THE HAZARD/RISKS NORMALLY ASSOCIATED WITH THE TYPE OF WORKS DETAILED ON THIS DRAWING TAKE NOTE OF THE ABOVE. IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.		

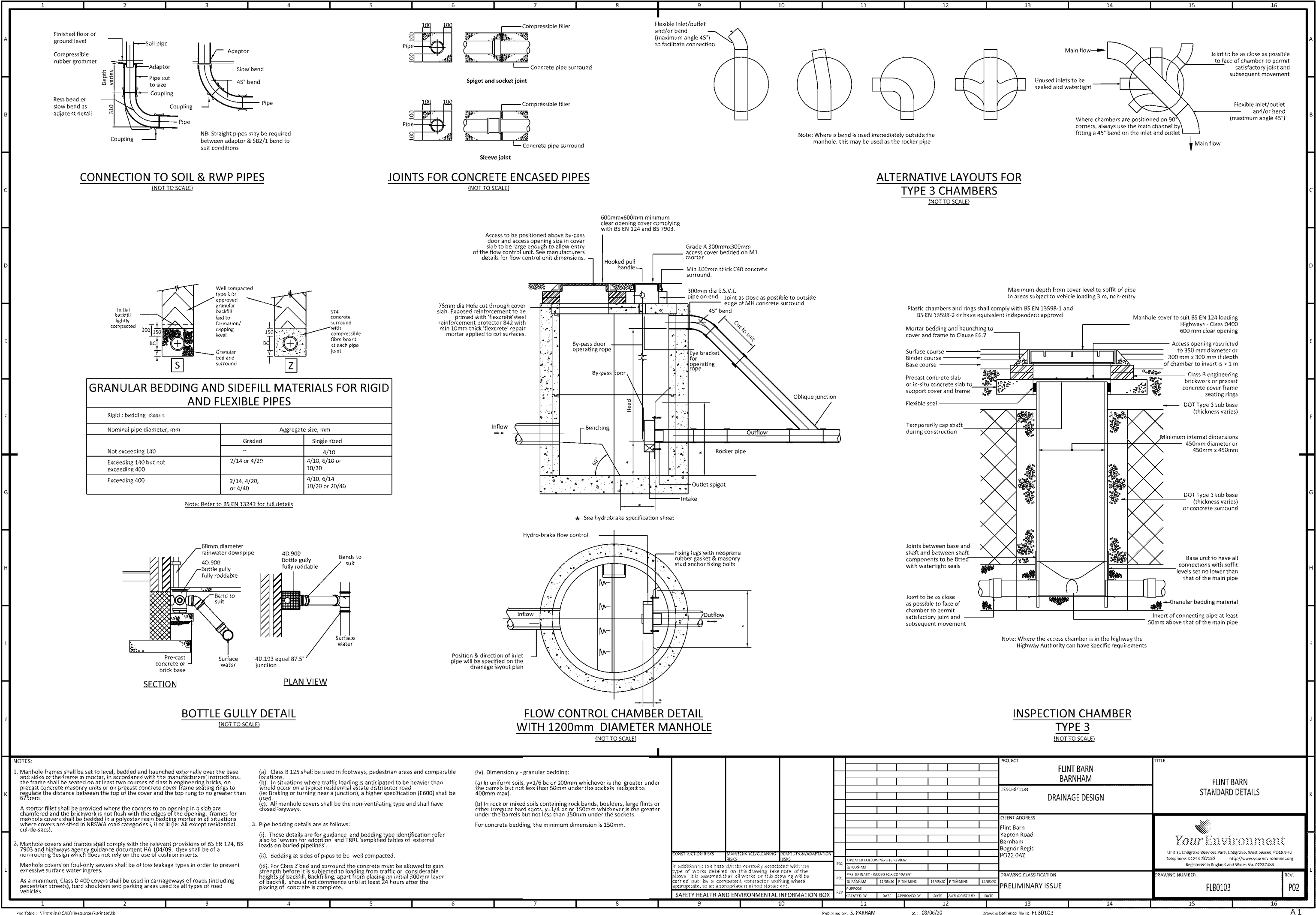
SAFETY HEALTH AND ENVIRONMENTAL INFORMATION BOX

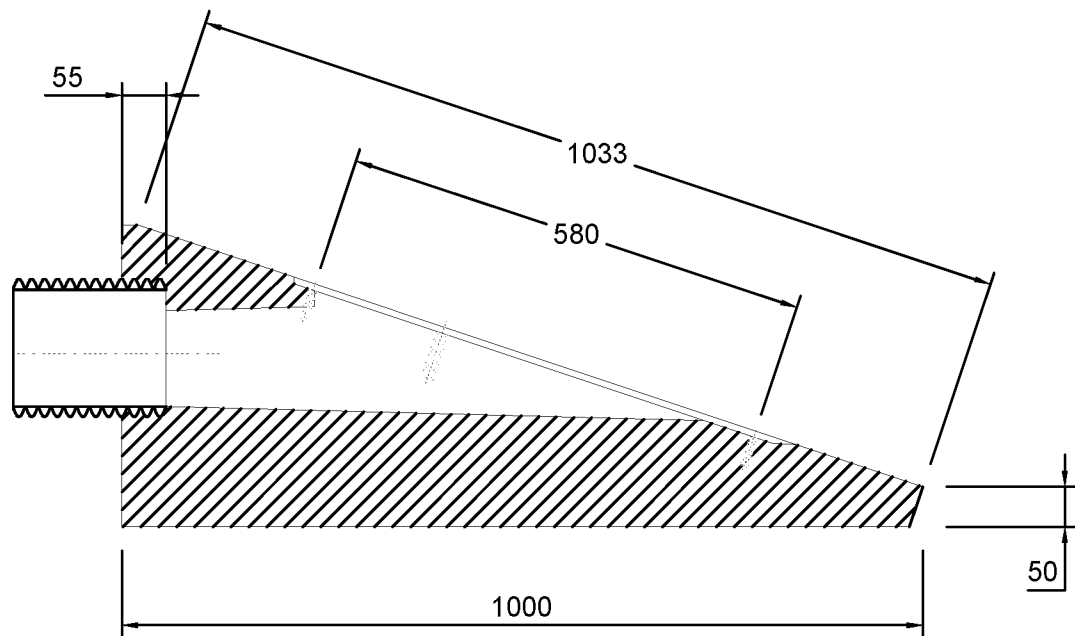
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001	ISSUED FOR COMMENT	12/05/20	SJ PARHAM	14/05/20	SJ PARHAM	14/05/20
002	SWALE DETAILS INCORPORATED	26/04/20	SJ PARHAM	25/04/20	SJ PARHAM	13/05/20
003	UPDATED FOLLOWING SITE REVIEW	09/06/20	SJ PARHAM	09/06/20	SJ PARHAM	09/06/20

PROJECT FLINT BARN BARNHAM	TITLE FLINT BARN DRAINAGE DESIGN
DESCRIPTION DRAINAGE DESIGN	
CLIENT ADDRESS Flint Barn Yapton Road Barnham Bognor Regis PO22 0AZ	DRAWING CLASSIFICATION PRELIMINARY ISSUE
DRAWING NUMBER FLB0101	REV. P03

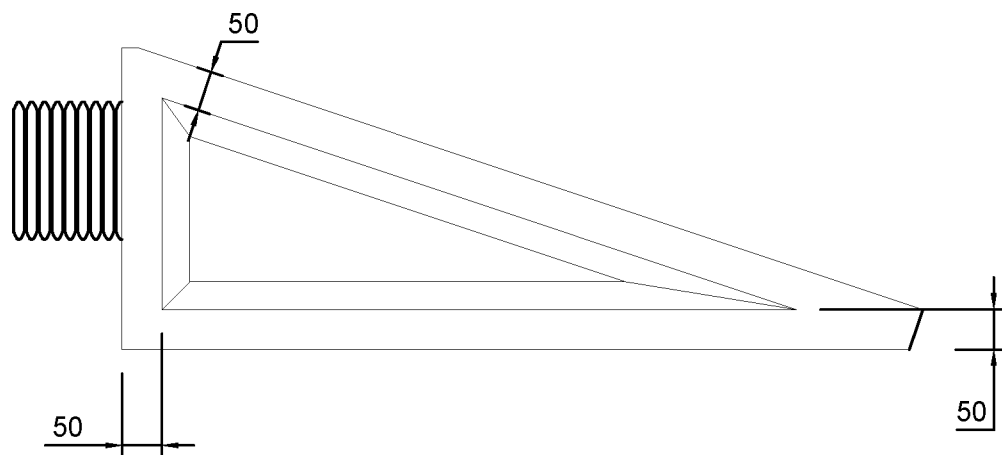
Appendix C - Detailed Design drawings



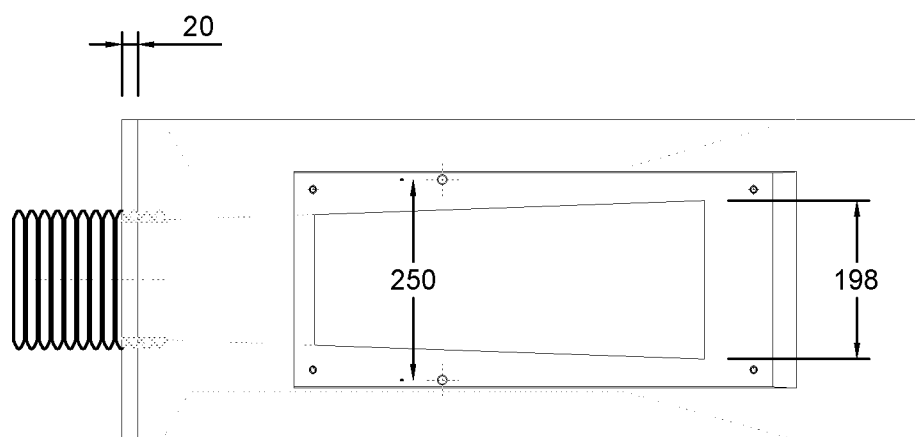




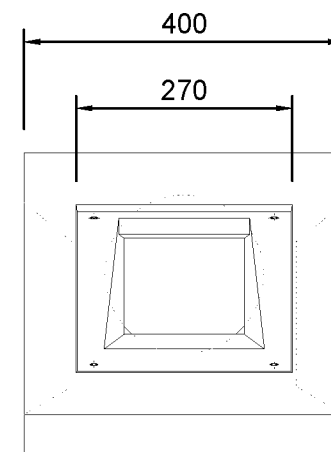
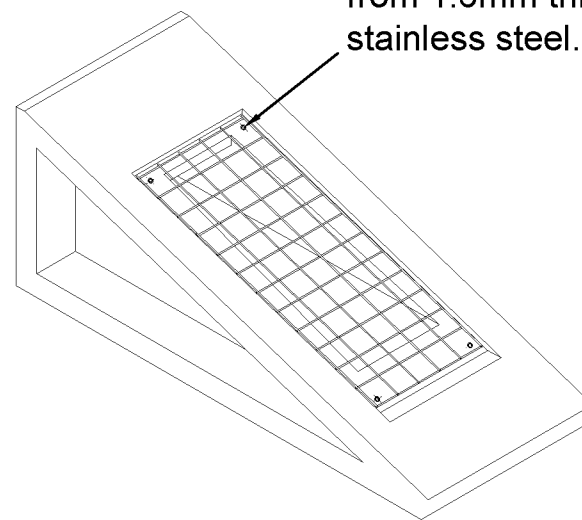
Section XX



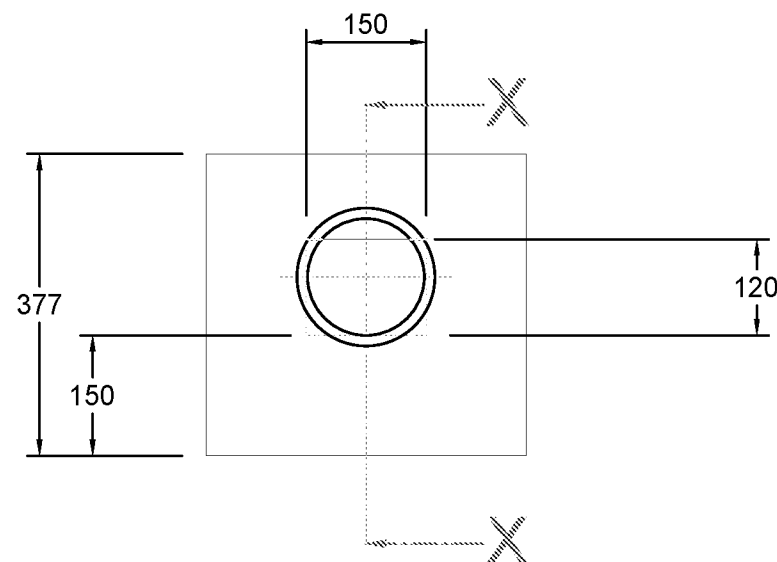
Side elevation.



Plan View.



Front elevation.



Rear elevation.

NOTES:

- All dimensions in mm
- All measurements ± 1 mm

Specification Information

- 150mm ID Twin Wall Pipe Connection Stub cast into unit during manufacture

Headwall Installation

Units should be bedded on minimum 100mm well compacted type 6 graded granular fill

Handling

- Weight of concrete is based on 2.4 tonne/m³+5% is recommended for sizing lifting equipment.
- All lifting points shall be used as specified below - Anchor points & loops - Total Qty: 2
- Unit to be lifted as per lifting diagram

Concrete

- Mix ref: Self-compacting DC2/DS2 Mix
- Lifting strength based on 2 cubes = 20N/mm²
- Characteristic 28 day cube strength = 50N/mm²
- Concrete provides Design Chemical Class 2 (DC2) to special Digest 1, Table F2.

Reinforcement

- Durus S500 48mm Macro / Embossed Monofilament Modified PP

Manufacture

- Manufacture to BS EN 15258:2008 precast concrete products - Retaining wall elements, Factory Production Control certificate number: 0086-CPR-650448 & BS EN 13369

- Tolerances to BS EN 13369 clause 4.3.1.1

- Finishing:

Class	Top	Sides	Base	Rear of back wall
	A	A	A	Self-Levelled

- Marking: Units shall be indelibly marked to show:

- Mould reference code
- De-mould date
- Job reference number & unique product number
- Unit weight (kg)

Design

- Concrete design to EC2
- Althon have designed the concrete units only, the site conditions should be assessed for suitability by the scheme designer
- Design Life: >50 years

Min Cover	Cover Block Size (mm)	Min Cover Size (mm)	Max Cover Size (mm)
All Faces	33	28	33

Exposure Classification	Exposure induced by Carbonation	Corrosion induced by Chloride	Freeze/thaw attack	Chemical attack
All Faces	XC3/4	XD2	XF3	XA2

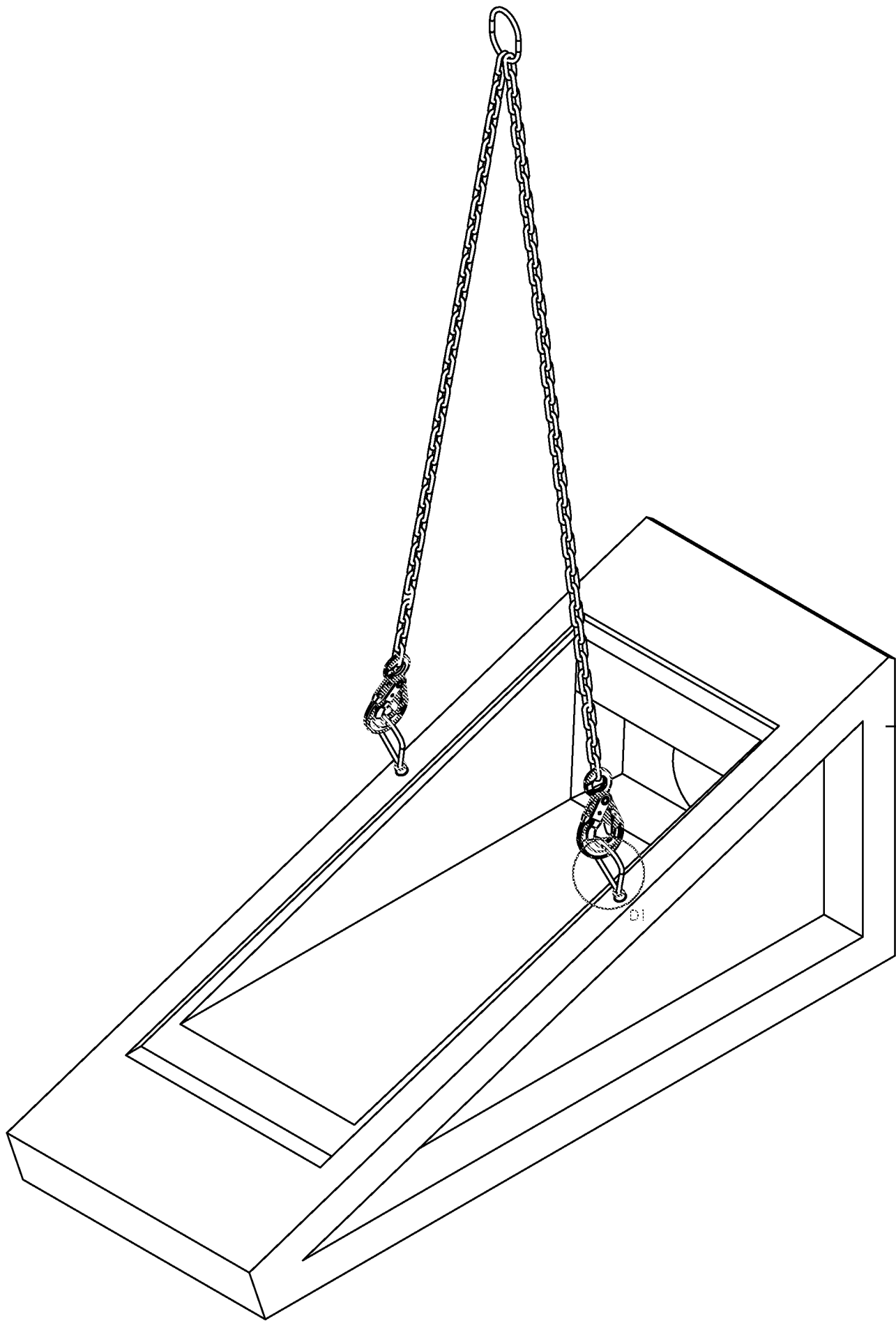
Fabrication Specification

- Manufacture IAW EN 1090-2 EXC CLASS 1
- Grade 304 Stainless Steel 1.6mm thick 40 x 40mm Mesh

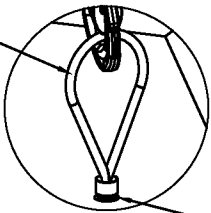
REV NO	DATE	DESCRIPTION
		
ADDRESS: ALTHON LIMITED VULCAN ROAD SOUTH NORWICH NR6 6AF		
TEL: 01603 488700 FAX: 01603 488558 EMAIL: sales@althon.co.uk WEBSITE: www.althon.co.uk		
PROPRIETARY & CONFIDENTIAL		
The information contained in this drawing is the sole property of Althon Limited. Any reproduction in part or as a whole without the written permission of Althon Limited is strictly prohibited.		
DRAWING TITLE / PROJECT:		
150mm Swale Inlet Mesh Grating		
CLIENT:		
SCALE:	PAPER:	SHEET NO:
NTS	A3	01 OF 02
DATE:	14 - 02 - 19	
HEADWALL WEIGHT:	TOE WEIGHT:	
165kg	N/A	
PRODUCT NAME:		
150mm Swale Inlet		
DRAWING No:		
FLB0104/01		



DO NOT SCALE DRAWING



M12 LIFTING LOOP



M12 CAST-IN LIFTING SOCKET

RD12 Threaded Lifting Loop
Safe Working Load: 500kg each

Manufactured from zinc plated steel wire rope with a precision bright steel threaded portion. Threaded lifting loops are ideally suited to axial lifting procedures but can be used up to and including angled lifts of 30 degrees.

Use and Operation

The threaded lifting loop must be fully threaded into the lifting socket prior to commencing a lifting operation. It is imperative that the two mating surfaces are parallel to each other.

DO NOT SCALE DRAWING



NOTES:

- All dimensions in mm
- All measurements ± 1 mm

Specification Information

- 150mm ID Twin Wall Pipe Connection Stub cast into unit during manufacture

Headwall Installation

Units should be bedded on minimum 100mm well compacted type 6 graded granular fill

Handling

- A. Weight of concrete is based on 2.4 tonne/m³+5% is recommended for sizing lifting equipment.
- B. All lifting points shall be used as specified below - Anchor points & loops - Total Qty: 2
- C. Unit to be lifted as per lifting diagram

Concrete

- A. Mix ref: Self-compacting DC2/DS2 Mix
- B. Lifting strength based on 2 cubes = 20N/mm²
- C. Characteristic 28 day cube strength = 50N/mm²
- D. Concrete provides Design Chemical Class 2 (DC2) to special Digest 1, Table F2.

Reinforcement

- A. Durus S500 48mm Macro / Embossed Monofilament Modified PP

Manufacture

- A. Manufacture to BS EN 15258:2008 precast concrete products - Retaining wall elements, Factory Production Control certificate number: 0086-CPR-650448 & BS EN 13369
- B. Tolerances to BS EN 13369 clause 4.3.1.1
- C. Finishing:

Class	Top	Sides	Base	Rear of back wall
	A	A	A	Self-Levelled

- D. Marking: Units shall be indelibly marked to show:

- Mould reference code
- De-mould date
- Job reference number & unique product number
- Unit weight (kg)

Design

- A. Concrete design to EC2
- B. Althon have designed the concrete units only, the site conditions should be assessed for suitability by the scheme designer
- C. Design Life: >50 years

Min Cover	Cover Block Size (mm)	Min Cover Size (mm)	Max Cover Size (mm)
All Faces	33	28	33

Exposure Classification	Exposure induced by Carbonation	Corrosion induced by Chloride	Freeze/thaw attack	Chemical attack
All Faces	XC3/4	XD2	XF3	XA2

Fabrication Specification

- A. Manufacture IAW EN 1090-2 EXC CLASS 1
- B. Grade 304 Stainless Steel 1.6mm thick 40 x 40mm Mesh

REV NO	DATE	DESCRIPTION
ADDRESS: ALTHON LIMITED VULCAN ROAD SOUTH NORWICH NR6 6AF TEL: 01603 488700 FAX: 01603 488558 EMAIL: sales@althon.co.uk WEBSITE: www.althon.co.uk PROPRIETARY & CONFIDENTIAL The information contained in this drawing is the sole property of Althon Limited. Any reproduction in part or as a whole without the written permission of Althon Limited is strictly prohibited.		
DRAWING TITLE / PROJECT:		
150mm Swale Inlet Lifting Diagram		
CLIENT:		
SCALE:	PAPER:	SHEET NO:
NTS	A3	02 OF 02
DATE:	14 - 02 - 19	
HEADWALL WEIGHT:		TOE WEIGHT:
165kg		N/A
PRODUCT NAME:		
150mm Swale Inlet		
DRAWING No:		
FLB0104/02		

Appendix D - Hydrobrake details



Technical Specification

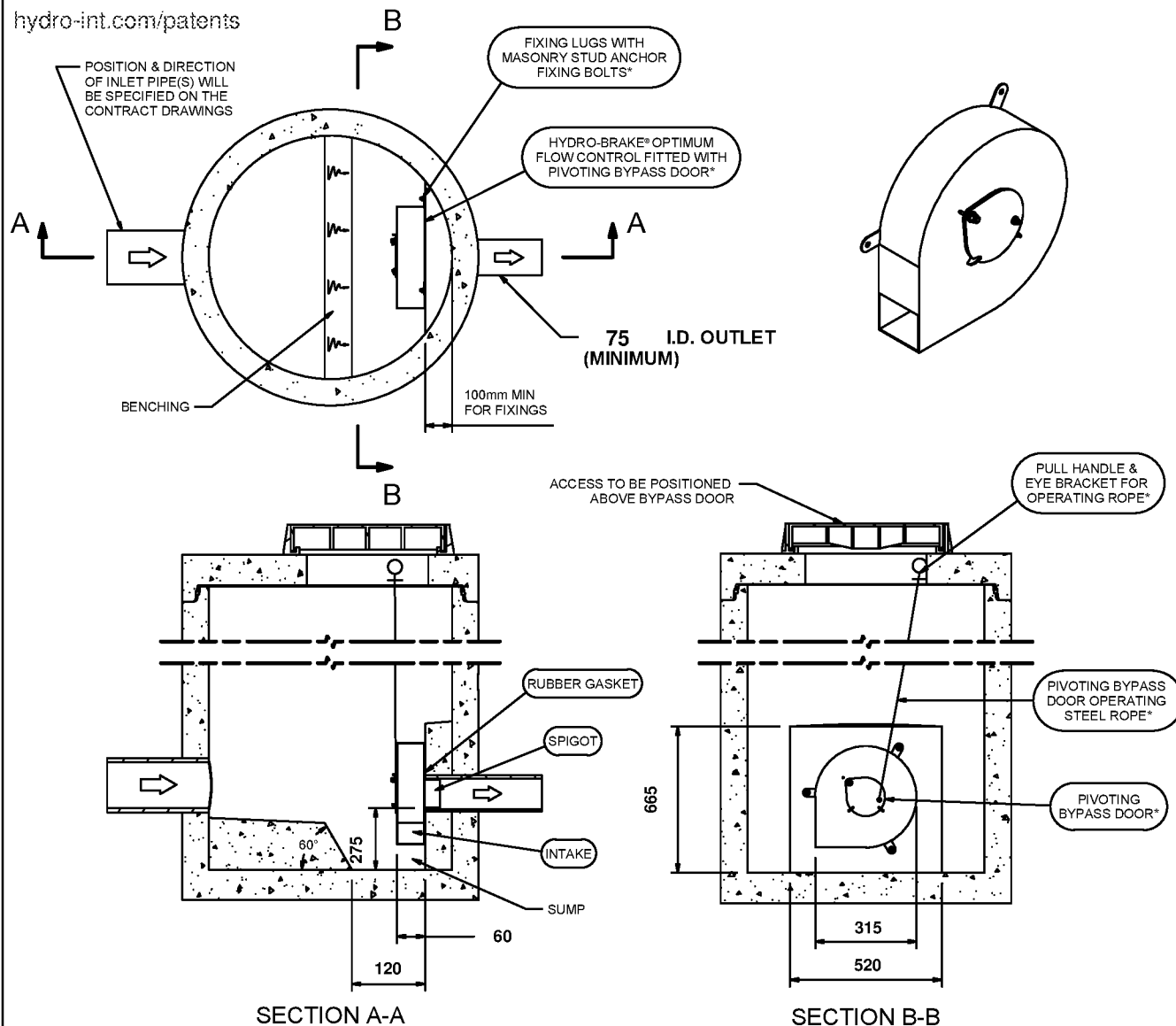
Control Point	Head (m)	Flow (l/s)
Primary Design	0.800	1.100
Flush-Flo™	0.229	1.046
Kick-Flo®	0.462	0.862
Mean Flow		0.939

Hydro-Brake® Optimum Flow Control including:

- 3 mm grade 304L stainless steel
- Integral stainless steel pivoting by-pass door allowing clear line of sight through to outlet, c/w stainless steel operating rope
- Beed blasted finish to maximise corrosion resistance
- Stainless steel fixings
- Rubber gasket to seal outlet



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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® FLOW CONTROL & HYDRO-BRAKE® OPTIMUM FLOW CONTROL ARE REGISTERED TRADEMARKS 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-0052-1100-0800-1100 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

DATE 5/13/2020 1:12 PM

SITE Flint Barn

DESIGNER Paul Timmins

REF Plot 1 & 3

SHE-0052-1100-0800-1100

Hydro-Brake® Optimum

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paul@timminsconsulting.co.uk

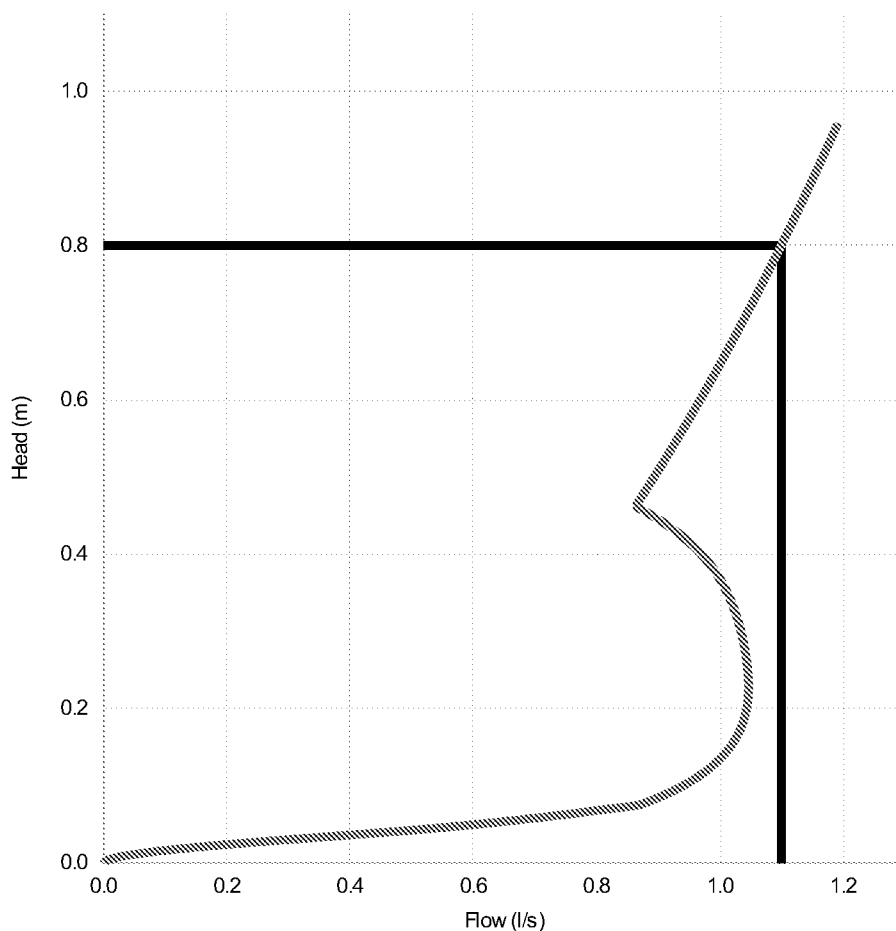
Technical Specification

Control Point	Head (m)	Flow (l/s)
Primary Design	0.800	1.100
Flush-Flo	0.229	1.046
Kick-Flo®	0.462	0.862
Mean Flow		0.939



PT/329/0412

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Head (m)	Flow (l/s)
0.000	0.000
0.028	0.255
0.055	0.666
0.083	0.894
0.110	0.962
0.138	1.004
0.166	1.029
0.193	1.041
0.221	1.046
0.248	1.045
0.276	1.041
0.303	1.033
0.331	1.022
0.359	1.007
0.386	0.984
0.414	0.953
0.441	0.908
0.469	0.868
0.497	0.890
0.524	0.912
0.552	0.933
0.579	0.953
0.607	0.973
0.634	0.992
0.662	1.011
0.690	1.029
0.717	1.047
0.745	1.065
0.772	1.082
0.800	1.099

DESIGN ADVICE



The head/flow characteristics of this SHE-0052-1100-0800-1100 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.

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International

DATE 13/05/2020 13:12

Site Flint Barn

DESIGNER Paul Timmins

Ref Plot 1 & 3

SHE-0052-1100-0800-1100

Hydro-Brake Optimum®

Technical Specification

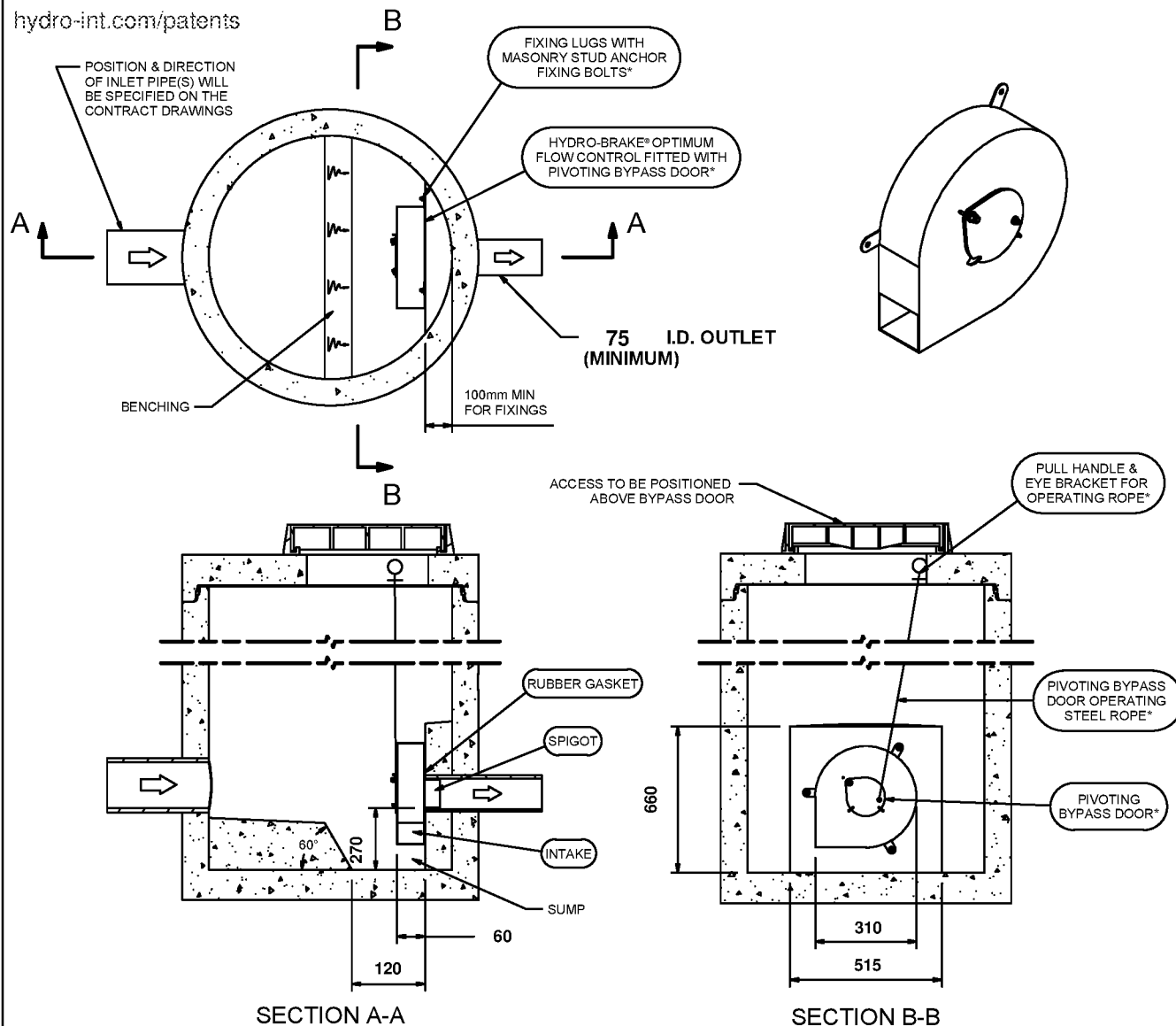
Control Point	Head (m)	Flow (l/s)
Primary Design	0.700	1.000
Flush-Flo™	0.222	0.996
Kick-Flo®	0.449	0.822
Mean Flow		0.880

Hydro-Brake® Optimum Flow Control including:

- 3 mm grade 304L stainless steel
- Integral stainless steel pivoting by-pass door allowing clear line of sight through to outlet, c/w stainless steel operating rope
- Beed blasted finish to maximise corrosion resistance
- Stainless steel fixings
- Rubber gasket to seal outlet



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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
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 * WHERE SUPPLIED
 HYDRO-BRAKE® FLOW CONTROL & HYDRO-BRAKE® OPTIMUM FLOW CONTROL ARE REGISTERED TRADEMARKS FOR FLOW
 CONTROLS DESIGNED AND MANUFACTURED EXCLUSIVELY BY HYDRO INTERNATIONAL

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DESIGN ADVICE



The head/flow characteristics of this SHE-0051-1000-0700-1000 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.

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DATE 5/13/2020 12:59 PM

SITE Flint Barn

DESIGNER Paul Timmins

REF Plot 2

SHE-0051-1000-0700-1000

Hydro-Brake® Optimum

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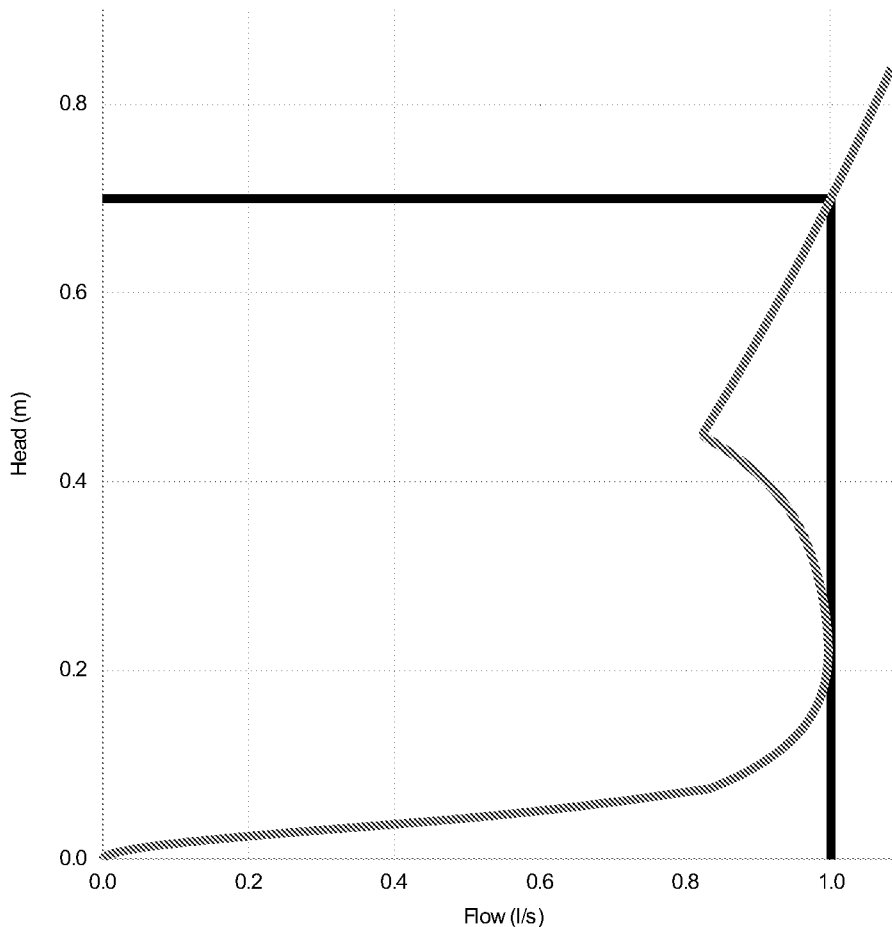
paul@timminsconsulting.co.uk

Technical Specification

Control Point	Head (m)	Flow (l/s)
Primary Design	0.700	1.000
Flush-Flo	0.222	0.996
Kick-Flo®	0.449	0.822
Mean Flow		0.880



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Head (m)	Flow (l/s)
0.000	0.000
0.024	0.199
0.048	0.565
0.072	0.814
0.097	0.894
0.121	0.939
0.145	0.967
0.169	0.984
0.193	0.993
0.217	0.996
0.241	0.995
0.266	0.991
0.290	0.985
0.314	0.977
0.338	0.965
0.362	0.949
0.386	0.927
0.410	0.896
0.434	0.854
0.459	0.830
0.483	0.849
0.507	0.867
0.531	0.885
0.555	0.902
0.579	0.920
0.603	0.936
0.628	0.953
0.652	0.969
0.676	0.984
0.700	1.000

DESIGN ADVICE



The head/flow characteristics of this SHE-0051-1000-0700-1000 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
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DATE 13/05/2020 12:59

Site Flint Barn

DESIGNER Paul Timmins

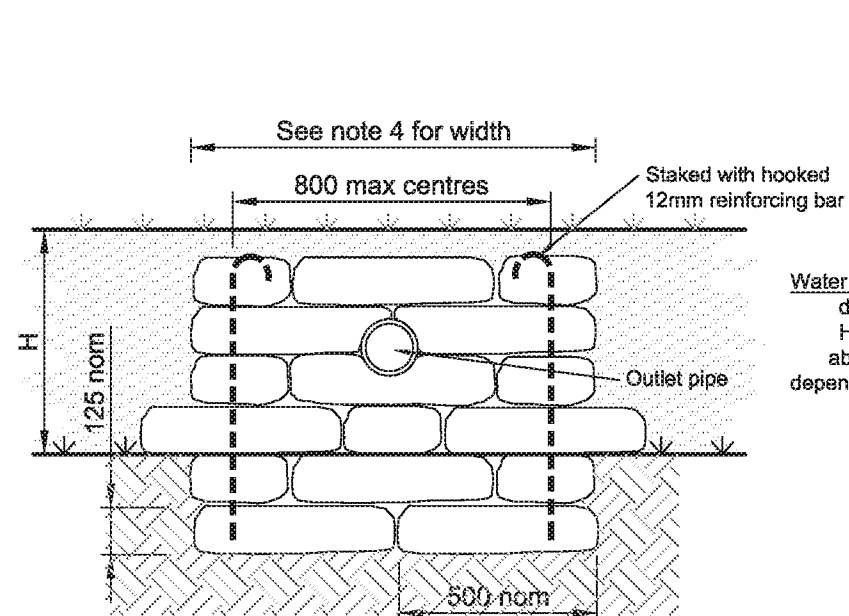
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SHE-0051-1000-0700-1000

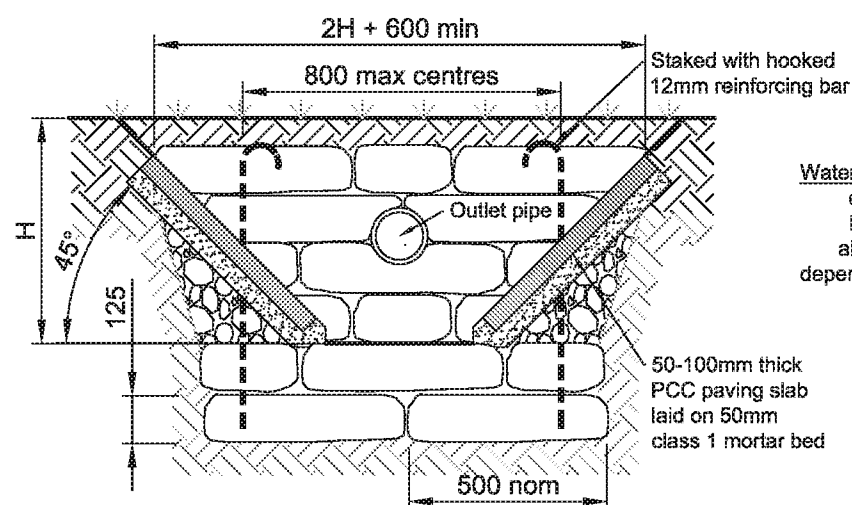
Hydro-Brake Optimum®

Appendix E - Headwall details

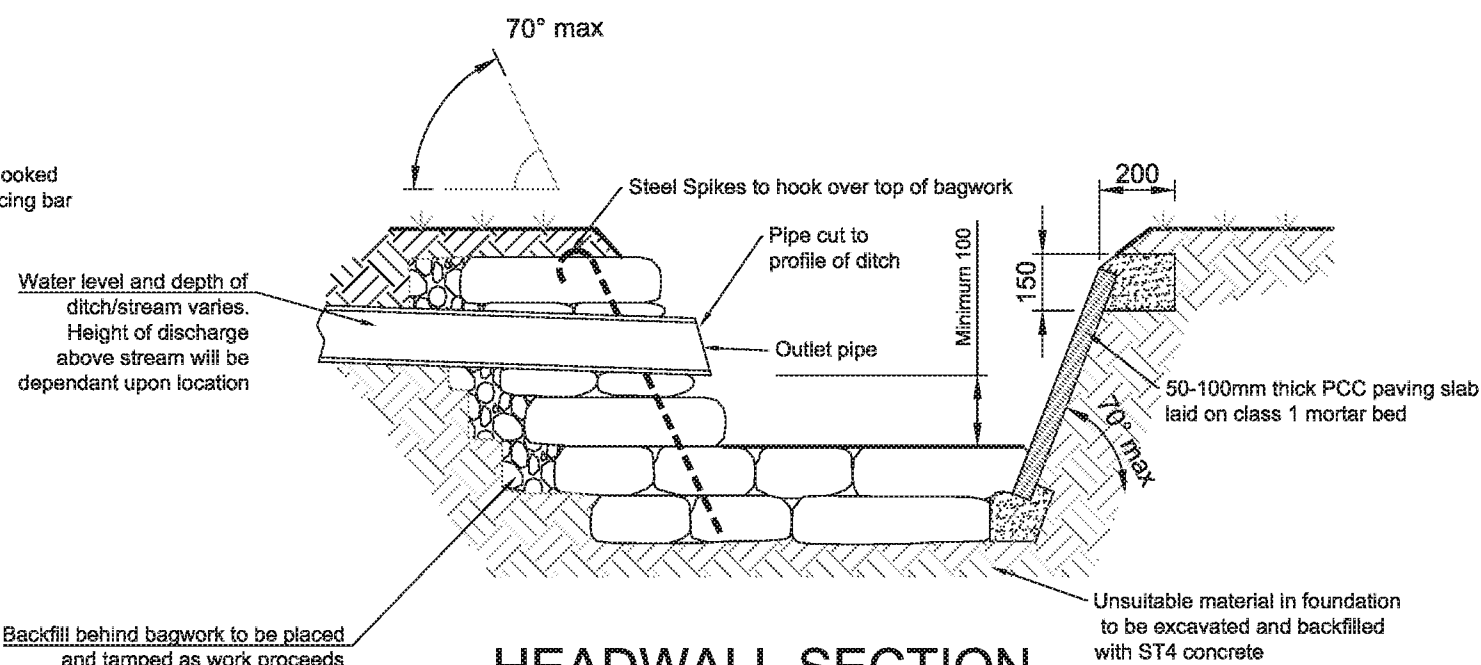




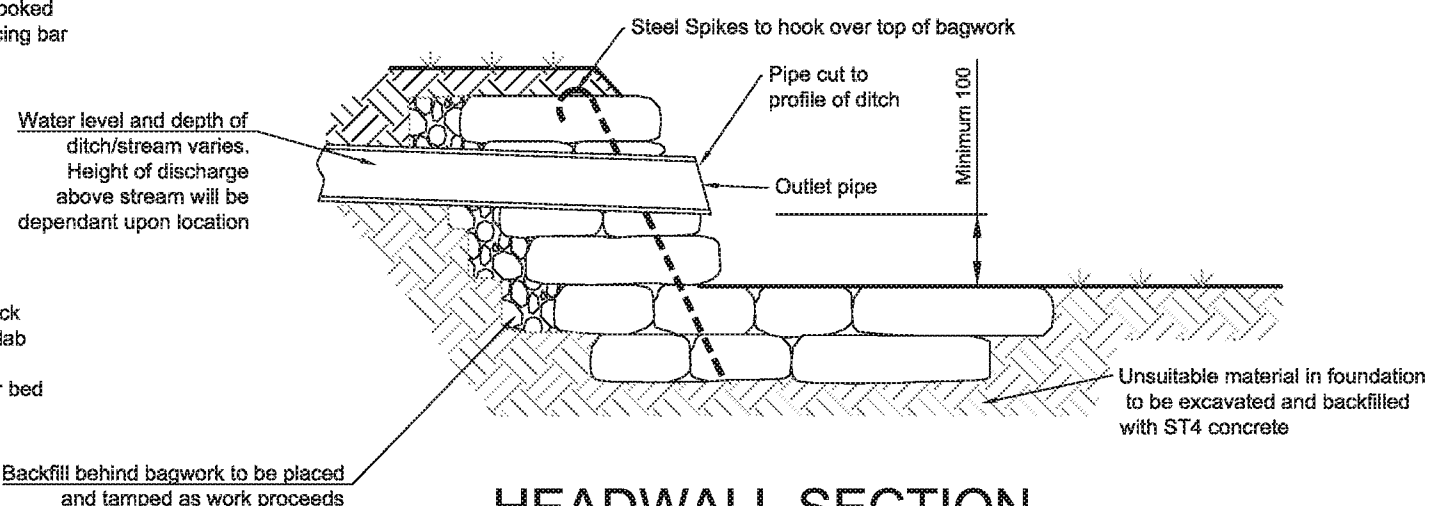
**ELEVATION OF HEADWALL
OUTFALL TO POND / SIDE OF DITCH**



**ELEVATION OF HEADWALL
OUTFALL TO END OF DITCH**



**HEADWALL SECTION
OUTFALL TO SIDE OF DITCH**



**HEADWALL SECTION
OUTFALL TO POND / END OF DITCH**

NOTES

1. Bags shall be of Hessian or Canvas and shall be of a size to provide a wall thickness of 500mm
2. Concrete bagwork shall be to Clause 519 and be three quarter filled with 25mm slump ST4 concrete immediately prior to placing with the ends sewn.
3. The bags shall be placed in a modified Flemish bond so as to 'break joint' with the mouths away from the surface and be tamped into position to form a rectangular block
4. Extent of outlet protection to be the greater of 1500mm or pipe diameter + 1200mm spanning the outlet pipe.
5. Headwall design may need to be adjusted to on site conditions following approval from WSCC Inspector
6. For vehicular crossings of ditches pipes shall be min 450mm diam and be set to invert of ditch. Ditch to be regraded to achieve satisfactory falls.
7. For $H > 600$ appropriate vehicular or pedestrian containment shall be installed.
8. The nearest edge of any carriageway shall be set back at least H from the base of the ditch
9. All exposed pipework to be certified UV stable.

A	Note 9 added	DL	HM	25.04.17
Rev	Revision details	Chkd	Appd	Date
Drawn:	DJL		For comment	
Chkd:	GM		For tender	
Appd:	AH	X	For construction	
Date:	SEPT 2013		As constructed	
File ref:				
IWP Ref:				

West Sussex County Council
Infrastructure Group
County Hall,
West Street
Chichester
West Sussex
PO19 1RH
(01243) 642105



Project Name

Section 278/38 Highway Agreement
Standard Details

Drawing Title

Headwall Detail for pipe sizes up to 600 diam
Concrete Bagwork



Original Drawing Size : A3

Scale : 1:20

Dimensions : mm

Drawing No.

S278/38/23

Rev

A

Appendix F - Microdrainage Outputs



KPT Properties			Page 1				
19 Lonsdale Avenue Hutton Essex CM13 1NH			Land to the rear of Sunnyside Barn and Flint Barn Barnham				
Date 19/05/2020 09:23 File PLOT1AND3_SWALE_HB_1%+40%_50MM ORIFIC...			Designed by Paul Checked by				
XP Solutions			Source Control 2020.1				
Summary of Results for 100 year Return Period (+40%)							
Half Drain Time : 407 minutes.							
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max E Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	8.947	0.447	0.0	1.0	1.0	21.4	O K
30 min Summer	9.017	0.517	0.0	1.0	1.0	28.4	Flood Risk
60 min Summer	9.081	0.581	0.0	1.0	1.0	35.5	Flood Risk
120 min Summer	9.112	0.612	0.0	1.0	1.0	39.3	Flood Risk
180 min Summer	9.122	0.622	0.0	1.1	1.1	40.6	Flood Risk
240 min Summer	9.121	0.621	0.0	1.0	1.0	40.4	Flood Risk
360 min Summer	9.104	0.604	0.0	1.0	1.0	38.3	Flood Risk
480 min Summer	9.087	0.587	0.0	1.0	1.0	36.3	Flood Risk
600 min Summer	9.073	0.573	0.0	1.0	1.0	34.6	Flood Risk
720 min Summer	9.060	0.560	0.0	1.0	1.0	33.1	Flood Risk
960 min Summer	9.035	0.535	0.0	1.0	1.0	30.2	Flood Risk
1440 min Summer	8.987	0.487	0.0	1.0	1.0	25.3	O K
2160 min Summer	8.921	0.421	0.0	1.0	1.0	19.0	O K
2880 min Summer	8.848	0.348	0.0	1.0	1.0	13.1	O K
4320 min Summer	8.712	0.212	0.0	1.0	1.0	4.8	O K
5760 min Summer	8.615	0.115	0.0	1.0	1.0	1.2	O K
7200 min Summer	8.538	0.038	0.0	1.0	1.0	0.1	O K
8640 min Summer	8.500	0.000	0.0	0.9	0.9	0.0	O K
10080 min Summer	8.500	0.000	0.0	0.8	0.8	0.0	O K
15 min Winter	8.976	0.476	0.0	1.0	1.0	24.1	O K
30 min Winter	9.051	0.551	0.0	1.0	1.0	32.1	Flood Risk
60 min Winter	9.120	0.620	0.0	1.0	1.0	40.3	Flood Risk
120 min Winter	9.158	0.658	0.0	1.1	1.1	45.2	Flood Risk
180 min Winter	9.172	0.672	0.0	1.1	1.1	47.1	Flood Risk
240 min Winter	9.174	0.674	0.0	1.1	1.1	47.4	Flood Risk
360 min Winter	9.162	0.662	0.0	1.1	1.1	45.8	Flood Risk
480 min Winter	9.142	0.642	0.0	1.1	1.1	43.1	Flood Risk
600 min Winter	9.124	0.624	0.0	1.1	1.1	40.8	Flood Risk
720 min Winter	9.108	0.608	0.0	1.0	1.0	38.8	Flood Risk
960 min Winter	9.075	0.575	0.0	1.0	1.0	34.8	Flood Risk
1440 min Winter	9.009	0.509	0.0	1.0	1.0	27.5	Flood Risk
2160 min Winter	8.909	0.409	0.0	1.0	1.0	17.9	O K
2880 min Winter	8.775	0.275	0.0	1.0	1.0	8.2	O K
4320 min Winter	8.557	0.057	0.0	1.0	1.0	0.3	O K
5760 min Winter	8.500	0.000	0.0	0.8	0.8	0.0	O K
7200 min Winter	8.500	0.000	0.0	0.7	0.7	0.0	O K
8640 min Winter	8.500	0.000	0.0	0.6	0.6	0.0	O K
10080 min Winter	8.500	0.000	0.0	0.6	0.6	0.0	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)			
15 min Summer	141.327	0.0	23.1	29			
30 min Summer	94.752	0.0	30.9	43			
60 min Summer	60.960	0.0	39.8	72			
120 min Summer	36.131	0.0	47.1	128			
180 min Summer	26.513	0.0	51.9	186			
240 min Summer	21.191	0.0	55.3	242			
360 min Summer	15.297	0.0	59.8	328			
480 min Summer	12.091	0.0	63.1	388			
600 min Summer	10.057	0.0	65.7	450			
720 min Summer	8.643	0.0	67.7	516			
960 min Summer	6.791	0.0	70.9	652			
1440 min Summer	4.841	0.0	75.8	924			
2160 min Summer	3.471	0.0	81.5	1324			
2880 min Summer	2.758	0.0	86.4	1708			
4320 min Summer	2.027	0.0	95.2	2344			
5760 min Summer	1.649	0.0	103.3	3000			
7200 min Summer	1.419	0.0	111.2	3672			
8640 min Summer	1.264	0.0	118.8	0			
10080 min Summer	1.152	0.0	126.3	0			
15 min Winter	141.327	0.0	25.8	29			
30 min Winter	94.752	0.0	34.6	43			
60 min Winter	60.960	0.0	44.6	72			
120 min Winter	36.131	0.0	52.8	126			
180 min Winter	26.513	0.0	58.2	184			
240 min Winter	21.191	0.0	61.3	240			
360 min Winter	15.297	0.0	67.0	348			
480 min Winter	12.091	0.0	70.7	444			
600 min Winter	10.057	0.0	73.4	478			
720 min Winter	8.643	0.0	75.8	554			
960 min Winter	6.791	0.0	79.4	706			
1440 min Winter	4.841	0.0	84.9	1002			
2160 min Winter	3.471	0.0	91.2	1428			
2880 min Winter	2.758	0.0	96.7	1756			
4320 min Winter	2.027	0.0	106.6	2248			
5760 min Winter	1.649	0.0	115.7	0			
7200 min Winter	1.419	0.0	124.5	0			
8640 min Winter	1.264	0.0	133.1	0			
10080 min Winter	1.152	0.0	141.5	0			
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KPT Properties		Page 2
19 Lonsdale Avenue Hutton Essex CM13 1NH	Land to the rear of Sunnyside Barn and Flint Barn Barnham	
Date 19/05/2020 09:23 File PLOT1AND3_SWALE_HB_1%+40%_50MM ORIFIC...	Designed by Paul Checked by	
XP Solutions	Source Control 2020.1	
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KPT Properties		Page 3																																																																																										
19 Lonsdale Avenue Hutton Essex CM13 1NH	Land to the rear of Sunnyside Barn and Flint Barn Barnham																																																																																											
Date 19/05/2020 09:23 File PLOT1AND3_SWALE_HB_1%+40%_50MM ORIFIC...	Designed by Paul Checked by																																																																																											
XP Solutions	Source Control 2020.1																																																																																											
Model Details Storage is Online Cover Level (m) 9.300 Swale Structure Infiltration Coefficient Base (m/hr) 0.00000Length (m) 32.0 Infiltration Coefficient Side (m/hr) 0.00000Side Slope (1:X) 3.0 Safety Factor 2.0Slope (1:X) 200.0 Porosity 1.00Cap Volume Depth (m) 0.000 Invert Level (m) 8.500Cap Infiltration Depth (m) 0.000 Base Width (m) 0.7 Hydro-Brake® Optimum Outflow Control Unit Reference MD-SHE-0052-1100-0800-1100Sump Available Yes Design Head (m) 0.800Diameter (mm) 52 Design Flow (l/s) 1.1Invert Level (m) 8.400 Flush-Flo™Calculated Minimum Outlet Pipe Diameter (mm) 75 Objective Minimise upstream storageSuggested Manhole Diameter (mm) 1200 Application Surface <table><tr><th>Control Points</th><th>Head (m)</th><th>Flow (l/s)</th><th>Control Points</th><th>Head (m)</th><th>Flow (l/s)</th></tr><tr><td>Design Point (Calculated)</td><td>0.800</td><td>1.1</td><td>Kick-Flo®</td><td>0.462</td><td>0.9</td></tr><tr><td>Flush-Flo™</td><td>0.229</td><td>1.0</td><td>Mean Flow over Head Range</td><td>-</td><td>0.9</td></tr></table> The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated <table><tr><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th></tr><tr><td>0.100</td><td>0.9</td><td>0.600</td><td>1.0</td><td>1.600</td><td>1.5</td><td>2.600</td><td>1.9</td><td>5.000</td><td>2.5</td><td>7.500</td><td>3.1</td></tr><tr><td>0.200</td><td>1.0</td><td>0.800</td><td>1.1</td><td>1.800</td><td>1.6</td><td>3.000</td><td>2.0</td><td>5.500</td><td>2.6</td><td>8.000</td><td>3.2</td></tr><tr><td>0.300</td><td>1.0</td><td>1.000</td><td>1.2</td><td>2.000</td><td>1.7</td><td>3.500</td><td>2.1</td><td>6.000</td><td>2.8</td><td>8.500</td><td>3.2</td></tr><tr><td>0.400</td><td>1.0</td><td>1.200</td><td>1.3</td><td>2.200</td><td>1.7</td><td>4.000</td><td>2.3</td><td>6.500</td><td>2.9</td><td>9.000</td><td>3.3</td></tr><tr><td>0.500</td><td>0.9</td><td>1.400</td><td>1.4</td><td>2.400</td><td>1.8</td><td>4.500</td><td>2.4</td><td>7.000</td><td>3.0</td><td>9.500</td><td>3.4</td></tr></table>			Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)	Design Point (Calculated)	0.800	1.1	Kick-Flo®	0.462	0.9	Flush-Flo™	0.229	1.0	Mean Flow over Head Range	-	0.9	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	0.100	0.9	0.600	1.0	1.600	1.5	2.600	1.9	5.000	2.5	7.500	3.1	0.200	1.0	0.800	1.1	1.800	1.6	3.000	2.0	5.500	2.6	8.000	3.2	0.300	1.0	1.000	1.2	2.000	1.7	3.500	2.1	6.000	2.8	8.500	3.2	0.400	1.0	1.200	1.3	2.200	1.7	4.000	2.3	6.500	2.9	9.000	3.3	0.500	0.9	1.400	1.4	2.400	1.8	4.500	2.4	7.000	3.0	9.500	3.4
Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)																																																																																							
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0.200	1.0	0.800	1.1	1.800	1.6	3.000	2.0	5.500	2.6	8.000	3.2																																																																																	
0.300	1.0	1.000	1.2	2.000	1.7	3.500	2.1	6.000	2.8	8.500	3.2																																																																																	
0.400	1.0	1.200	1.3	2.200	1.7	4.000	2.3	6.500	2.9	9.000	3.3																																																																																	
0.500	0.9	1.400	1.4	2.400	1.8	4.500	2.4	7.000	3.0	9.500	3.4																																																																																	
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KPT Properties			Page 1				
19 Lonsdale Avenue Hutton Essex CM13 1NH			Land to the rear of Sunnyside Barn and Flint Barn Barnham				
Date 19/05/2020 10:15 File PLOT2_SWALE_HB_1%+40%_50MM ORIFICE.SRCX			Designed by Paul Checked by				
XP Solutions			Source Control 2020.1				
Summary of Results for 100 year Return Period (+40%)							
Half Drain Time : 169 minutes.							
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max E Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	8.956	0.356	0.0	1.0	1.0	9.3	Flood Risk
30 min Summer	9.010	0.410	0.0	1.0	1.0	12.3	Flood Risk
60 min Summer	9.054	0.454	0.0	1.0	1.0	15.0	Flood Risk
120 min Summer	9.061	0.461	0.0	1.0	1.0	15.4	Flood Risk
180 min Summer	9.052	0.452	0.0	1.0	1.0	14.8	Flood Risk
240 min Summer	9.042	0.442	0.0	1.0	1.0	14.2	Flood Risk
360 min Summer	9.022	0.422	0.0	1.0	1.0	13.0	Flood Risk
480 min Summer	9.001	0.401	0.0	1.0	1.0	11.8	Flood Risk
600 min Summer	8.980	0.380	0.0	1.0	1.0	10.6	Flood Risk
720 min Summer	8.958	0.358	0.0	1.0	1.0	9.4	Flood Risk
960 min Summer	8.906	0.306	0.0	1.0	1.0	7.0	Flood Risk
1440 min Summer	8.811	0.211	0.0	1.0	1.0	3.4	O K
2160 min Summer	8.700	0.100	0.0	1.0	1.0	0.7	O K
2880 min Summer	8.611	0.011	0.0	0.9	0.9	0.0	O K
4320 min Summer	8.600	0.000	0.0	0.7	0.7	0.0	O K
5760 min Summer	8.600	0.000	0.0	0.6	0.6	0.0	O K
7200 min Summer	8.600	0.000	0.0	0.5	0.5	0.0	O K
8640 min Summer	8.600	0.000	0.0	0.4	0.4	0.0	O K
10080 min Summer	8.600	0.000	0.0	0.4	0.4	0.0	O K
15 min Winter	8.980	0.380	0.0	1.0	1.0	10.6	Flood Risk
30 min Winter	9.040	0.440	0.0	1.0	1.0	14.1	Flood Risk
60 min Winter	9.089	0.489	0.0	1.0	1.0	17.3	Flood Risk
120 min Winter	9.102	0.502	0.0	1.0	1.0	18.2	Flood Risk
180 min Winter	9.096	0.496	0.0	1.0	1.0	17.7	Flood Risk
240 min Winter	9.082	0.482	0.0	1.0	1.0	16.8	Flood Risk
360 min Winter	9.057	0.457	0.0	1.0	1.0	15.2	Flood Risk
480 min Winter	9.030	0.430	0.0	1.0	1.0	13.4	Flood Risk
600 min Winter	9.000	0.400	0.0	1.0	1.0	11.7	Flood Risk
720 min Winter	8.967	0.367	0.0	1.0	1.0	9.9	Flood Risk
960 min Winter	8.886	0.286	0.0	1.0	1.0	6.1	O K
1440 min Winter	8.734	0.134	0.0	1.0	1.0	1.4	O K
2160 min Winter	8.600	0.000	0.0	0.8	0.8	0.0	O K
2880 min Winter	8.600	0.000	0.0	0.7	0.7	0.0	O K
4320 min Winter	8.600	0.000	0.0	0.5	0.5	0.0	O K
5760 min Winter	8.600	0.000	0.0	0.4	0.4	0.0	O K
7200 min Winter	8.600	0.000	0.0	0.3	0.3	0.0	O K
8640 min Winter	8.600	0.000	0.0	0.3	0.3	0.0	O K
10080 min Winter	8.600	0.000	0.0	0.3	0.3	0.0	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)			
15 min Summer	141.327	0.0	10.9	28			
30 min Summer	94.752	0.0	14.6	41			
60 min Summer	60.960	0.0	18.8	68			
120 min Summer	36.131	0.0	22.3	122			
180 min Summer	26.513	0.0	24.4	164			
240 min Summer	21.191	0.0	26.0	194			
360 min Summer	15.297	0.0	28.2	260			
480 min Summer	12.091	0.0	29.8	328			
600 min Summer	10.057	0.0	30.9	396			
720 min Summer	8.643	0.0	31.8	464			
960 min Summer	6.791	0.0	33.4	588			
1440 min Summer	4.841	0.0	35.7	816			
2160 min Summer	3.471	0.0	38.4	1136			
2880 min Summer	2.758	0.0	40.7	1468			
4320 min Summer	2.027	0.0	44.9	0			
5760 min Summer	1.649	0.0	48.7	0			
7200 min Summer	1.419	0.0	52.4	0			
8640 min Summer	1.264	0.0	56.0	0			
10080 min Summer	1.152	0.0	59.5	0			
15 min Winter	141.327	0.0	12.2	28			
30 min Winter	94.752	0.0	16.3	42			
60 min Winter	60.960	0.0	20.9	68			
120 min Winter	36.131	0.0	24.9	122			
180 min Winter	26.513	0.0	27.4	176			
240 min Winter	21.191	0.0	29.2	208			
360 min Winter	15.297	0.0	31.6	280			
480 min Winter	12.091	0.0	33.4	356			
600 min Winter	10.057	0.0	34.7	430			
720 min Winter	8.643	0.0	35.7	504			
960 min Winter	6.791	0.0	37.4	624			
1440 min Winter	4.841	0.0	40.0	822			
2160 min Winter	3.471	0.0	43.0	0			
2880 min Winter	2.758	0.0	45.6	0			
4320 min Winter	2.027	0.0	50.3	0			
5760 min Winter	1.649	0.0	54.5	0			
7200 min Winter	1.419	0.0	58.7	0			
8640 min Winter	1.264	0.0	62.7	0			
10080 min Winter	1.152	0.0	66.7	0			
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KPT Properties		Page 2																								
19 Lonsdale Avenue Hutton Essex CM13 1NH	Land to the rear of Sunnyside Barn and Flint Barn Barnham																									
Date 19/05/2020 10:15 File PLOT2_SWALE_HB_1%+40%_50MM ORIFICE.SRCX	Designed by Paul Checked by																									
XP Solutions	Source Control 2020.1																									
Rainfall Details Rainfall Model FEH Data Type Point Cv (Winter) 0.840 Return Period (years) 100 Summer Storms Yes Shortest Storm (mins) 15 FEH Rainfall Version 2013 Winter Storms Yes Longest Storm (mins) 10080 Site Location GB 496538 104129 Cv (Summer) 0.750 Climate Change % +40 Time Area Diagram Total Area (ha) 0.041 <table><tr><th>Time (mins)</th><th>Area</th><th>Time (mins)</th><th>Area</th><th>Time (mins)</th><th>Area</th><th>Time (mins)</th><th>Area</th></tr><tr><th>From: To: (ha)</th><th></th><th>From: To: (ha)</th><th></th><th>From: To: (ha)</th><th></th><th>From: To: (ha)</th><th></th></tr><tr><td>0 4 0.010</td><td></td><td>4 8 0.010</td><td></td><td>8 12 0.010</td><td></td><td>12 16 0.011</td><td></td></tr></table>			Time (mins)	Area	Time (mins)	Area	Time (mins)	Area	Time (mins)	Area	From: To: (ha)		From: To: (ha)		From: To: (ha)		From: To: (ha)		0 4 0.010		4 8 0.010		8 12 0.010		12 16 0.011	
Time (mins)	Area	Time (mins)	Area	Time (mins)	Area	Time (mins)	Area																			
From: To: (ha)		From: To: (ha)		From: To: (ha)		From: To: (ha)																				
0 4 0.010		4 8 0.010		8 12 0.010		12 16 0.011																				
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KPT Properties

19 Lonsdale Avenue
Hutton
Essex CM13 1NH

Date 19/05/2020 10:15
File PLOT2_SWALE_HB_1%+40%_50MM ORIFICE.SRCX
XP Solutions

Land to the rear of Sunnyside
Barn and Flint Barn
Barnham

Designed by Paul
Checked by
Source Control 2020.1

Page 3



Model Details

Storage is Online Cover Level (m) 9.200

Swale Structure

Infiltration Coefficient Base (m/hr) 0.00000Length (m) 22.0

Infiltration Coefficient Side (m/hr) 0.00000Side Slope (1:X) 3.0

Safety Factor 2.0Slope (1:X) 200.0

Porosity 1.00Cap Volume Depth (m) 0.000

Invert Level (m) 8.600Cap Infiltration Depth (m) 0.000

Base Width (m) 0.5

Hydro-Brake® Optimum Outflow Control

Unit Reference MD-SHE-0051-1000-0700-1000Sump Available Yes

Design Head (m) 0.700Diameter (mm) 51

Design Flow (l/s) 1.0Invert Level (m) 8.500

Flush-Flo™Calculated Minimum Outlet Pipe Diameter (mm) 75

Objective Minimise upstream storageSuggested Manhole Diameter (mm) 1200

Application Surface

Control PointsHead (m) Flow (l/s)

Design Point (Calculated)0.7001.0

Flush-Flo™0.2221.0

Control PointsHead (m) Flow (l/s)

Kick-Flo®0.4490.8

Mean Flow over Head Range-0.9

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified.
Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	0.9	0.600	0.9	1.600	1.4	2.600	1.8	5.000	2.4	7.500	2.9
0.200	1.0	0.800	1.1	1.800	1.5	3.000	1.9	5.500	2.6	8.000	3.0
0.300	1.0	1.000	1.2	2.000	1.6	3.500	2.1	6.000	2.7	8.500	3.1
0.400	0.9	1.200	1.3	2.200	1.7	4.000	2.2	6.500	2.8	9.000	3.2
0.500	0.9	1.400	1.4	2.400	1.7	4.500	2.3	7.000	2.9	9.500	3.3

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Appendix G - Confirmation email for Soakaway testing



Paul

From: Colin Hiscock
Sent: 08 June 2020 13:21
To: Paul
Subject: Flint Barn Tril pits

Paul,

YourEnvironment engineer, Nick Hammond attended a site at Flint Barn, Barnham on 21st March 2018 to perform soakaway testing. During the excavation of the trial pit, water ingress was noted at 0.9m bgl. This appeared to be perched and had very low flow which did not prevent the excavation from continuing to the target depth of 2.0m bgl.

Once the excavation was complete, he observed that water filled the excavation by 60cm (to 1.4mbgl) within 20mins. Therefore, we conclude that the groundwater level is at 1.4m bgl (at TP1 and at TP2).

Should you have any further questions, please do contact me.

Regards

Colin Hiscock
Managing Director
[REDACTED]

During the Covid-19 pandemic, YourEnvironment office staff are all working from home in line with Government guidelines. Our site teams are fully operational and working on site and maintaining social distancing.



www.yourenvironment.org
[REDACTED]

Unit 2
Woodhorn Business Centre
Oving
Chichester
West Sussex
PO20 2BX



Your Environmental Company Ltd, trading as Your Environment, registered in England and Wales
No: 07717486. Registered address: Unit 2, Woodhorn Business Centre, Oving, Chichester, PO20 2BX. This message is private and confidential. If you have received this message in error, please notify us and remove it from your system. Your Environment Ltd may monitor email traffic data and also the content of email for the purposes of security and staff training