

1 Introduction

LE22743 – EAST GRINSTEAD HOUSE

Job Number: LE22743	Date: 01.03.23	Client: Galliard Homes Limited
Prepared By: MM	Approved By: KL	Ref: EGS-LE-GEN-XX-TN-CE-TN01

LLFA Response Statement

- 1.1 This technical note has been prepared in response to comments raised by Southern Water (SW) in relation to the proposed sewer connections at the site opposite 7 St James's Road in East Grinstead, West Sussex.
- 1.2 A developers enquiry was previously submitted by Link as an application for the acceptance of two wastewater connections into existing SW sewers. These included a storm water connection into an existing surface water sewer and a foul water connection into an existing foul water sewer. This makes up part of a scheme involving the construction of three terraced houses. The latest drainage strategy for the development is included in **Appendix A**.
- 1.3 SW provided initial requests for further information after receiving the Developers Enquiry application in February 2023. These mention planning consent and potential outfall methods and have been addressed below. A copy of the response letter has also been included in **Appendix B** for reference.
- 1.4 The SW comments, included in **Appendix B**, are repeated below for reference along with the corresponding responses prepared by Link.

2 Planning Consent

"Please can you submit: A copy of the planning consent for this development, including details of any conditions that have been imposed by the Planning Authority"

- 2.1 A copy of the planning consent for this development (application reference [08/02793/FUL](#)) has been included in **Appendix C** of this report, subject to 16 conditions. Condition 10 makes reference to the drainage strategy, and is included below.

"The development hereby permitted shall not proceed until details of the proposed surface water and foul drainage and means of disposal have been submitted to and approved by the Local Planning Authority and no building shall be occupied until all drainage works have been carried out in accordance with such details as approved by the Local Planning Authority."

Reason: To ensure that the proposed development is satisfactorily drained and to accord with Policy CS13 of the Mid Sussex Local Plan."

3 Drainage Hierarchy

"A revised drainage layout plan in compliance with Building Regulations Part H3. This is because where surface water is being considered to discharge to our network, your surface water drainage should be disposed off in accordance with the requirements of Building Regulations Part H3.

This states that rainwater shall discharge in order of priority, to:

- a) Reuse*
- b) Infiltration*
- c) Watercourse*
- d) Storm/Surface Water Sewer*
- e) Combined Sewer*

Whilst reuse does not strictly form part of this hierarchy, Southern Water would encourage the consideration of reuse for new developments.

Where a surface water connection to the foul or combined sewer is being considered, this should be agreed by the Lead Local Flood Authority, in consultation with Southern Water."

- 3.1 The Drainage Hierarchy was considered in when designing this network, as required by Building Regulations Part H and paragraph 7-080 in the Planning Policy Guidance of the NPPF. See Table 1 below for an assessment on each potential outfall method.

<i>Outfall Option</i>	<i>Available Option</i>	<i>Comment</i>
Reuse	X	Reuse of surface water runoff is not possible for this site, as there is not enough room for a capable attenuation system.
Infiltration Drainage	X	Drainage via infiltration has not been considered to this site due to the underlying ground conditions, discussed further in Section 4. The lack of permeable soils under the site has led infiltration drainage to be discounted.
Watercourse	X	As shown in Figure 1 overleaf, the site (red line) is approximately 320m to the west of the nearest watercourse (Moat Pond) and approximately 730m from the nearest river (Medway at Weir Wood). Since the route to both of these watercourses crosses many land boundaries and public highways, outfalling to a watercourse has not been considered viable.

Surface Water
Sewer



It is proposed that surface water outfalls to the SW surface water sewer in St James Road along the north border of the site. The close proximity of the existing sewer means this solution is the most economically viable and will cause the least disturbance to the surrounding area. The proposed location for connection can be seen in the Drainage Strategy Drawing included in **Appendix A**.

Combined
Sewer

n/a

Not considered.

Table 1: Outfall Assessment

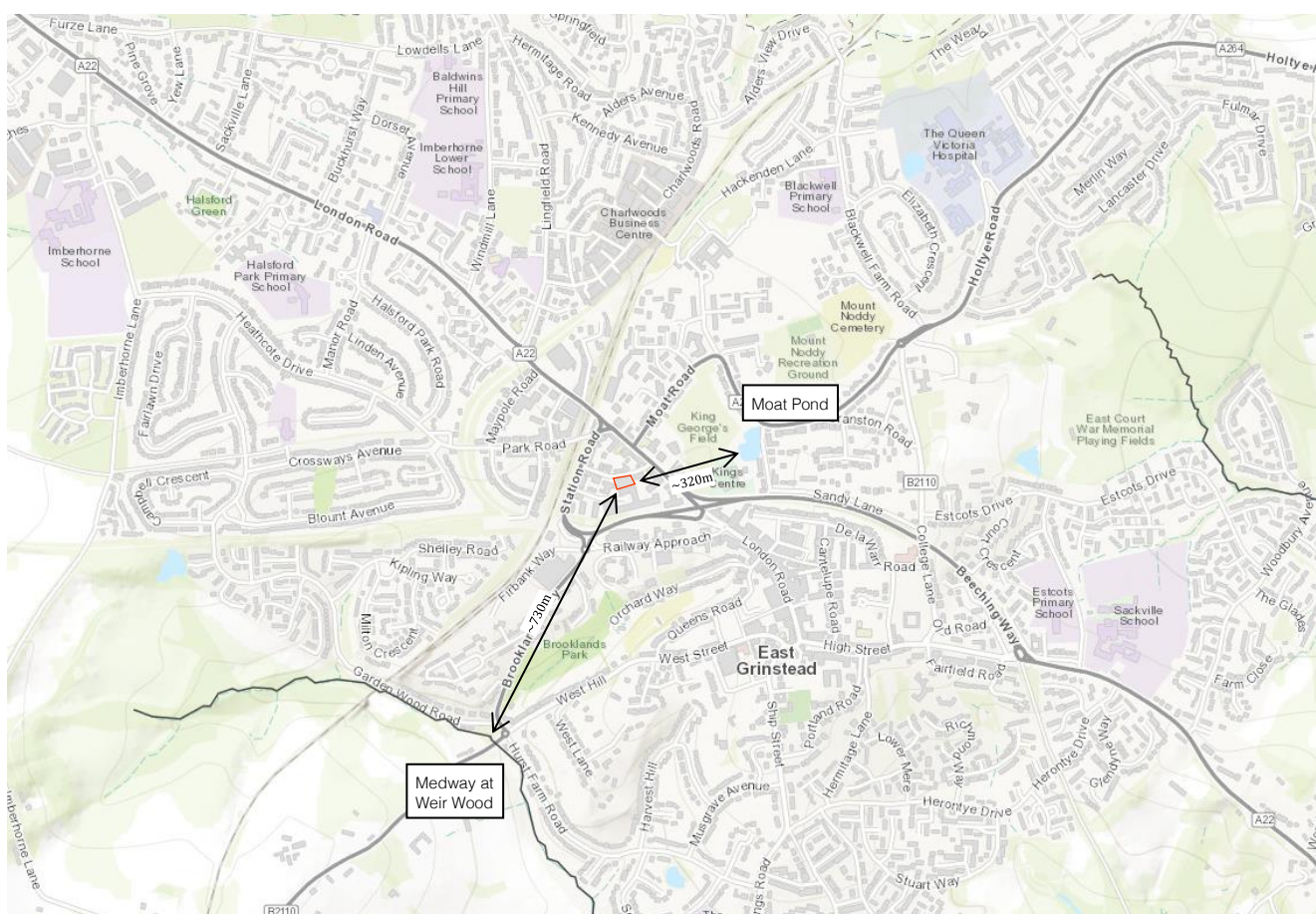


Figure 1: Distance of Rivers from the Site

4 Infiltration Testing

"A letter from Building Regulations and/or percolation test results as evidence to show that soakaways are not a viable drainage method if surface water cannot be disposed off in accordance with Part H3."

- 4.1 A desktop review of the British Geological Survey's geological mapping has been undertaken to determine the likely ground conditions on the site. Geological maps on the British Geological Survey online tools identify the [Grinstead Clay Member](#) as the underlying bedrock geology. The upper boundary of this strata is primarily made of mudstone, siltstone and fine-grained sandstones, capped with a layer of clay. With the exception of sandstone, all the components of this strata are impervious and as such infiltration may not be possible.
- 4.2 Furthermore, two publicly available boreholes in the proximity of the site have been reviewed. The corresponding borehole logs have been included in **Appendix D** of this document. Borehole reference [TQ33NE2](#) indicates that the site will be constructed on a layer of clay to a depth of approximately 2.7m, below ground level (BGL) where the investigation was terminated. Secondly, borehole [TQ33NE9](#) suggests that the development will be constructed over a thick clay layer, which runs to a depth of approximately 21.3mBGL, where the survey was terminated.
- 4.3 The presence of thick clay layers within both borehole logs indicates that a large impervious layer exists underneath the entire site, and as such infiltration is not considered viable. Therefore, percolation and infiltration testing will not be completed for this site.

5 Pre-Planning Application

- 5.1 As required by the Southern Water Wastewater pre-planning enquiry form, a summary statement has been prepared to address the proposed principles of ownership and operational requirements of the system. All other Supporting information has already been provided.

5.2 Proposed principles of ownership

During construction of the development ownership will fall to the developer. Upon completion, the occupier of the development shall be responsible for the operation and maintenance of the drainage system.

5.3 Operational Requirements

Maintenance and management of the main storm sewers and chambers inclusive of pipework from buildings (excluding internal drainage) should be visually inspected and jetted/cleaned as required. As a minimum, this should be carried out once every 5 years. Methods of inspection to give indications of blockages etc. may include:

- Pulling a mandrel through the pipe to identify physical faults (e.g. disjointed pipes).

- Flushing/jetting.
- CCTV.
- Measurement of water depths in pipe entries, catchpits or interceptors along a drain run may identify potentially blocked pipes.

Manhole gratings shall be visually inspected at least once every year and replaced or re-set if damaged or dislodged. Detritus build up in the form of leaves, litter, silt etc. should be removed from the channels and disposed of at a licensed tip. This material should not be tipped in other areas of the development as it may pose a pollution threat to the surrounding drainage system.

Jetting should only be carried out after removal of the silt and debris, as jetting alone will simply wash the debris further downstream without removing the problem.

Information for the Hydro-Brake Optimum provided on the Hydro International Website has been included in **Appendix E** for reference, in relation to the chosen Flow Control device.

6 Conclusion

- 6.1 This Response Statement has been prepared to provide all information requested from SW in reference to the submitted developers enquiry, prior to an S106 agreement for connections into existing storm water and foul water sewers. The S106 agreement will allow the discharge of Condition 10 from the Decision Notice included in **Appendix B**.
- 6.2 As all queries in the response provided by SW have been answered in this report, the wastewater connection application can continue unheeded.

APPENDICES



Appendix A: Drainage Strategy Drawing No. EGS-LE-GEN-XX-DR-CE-500



- GENERAL NOTES
1. THIS DRAWING SHOULD NOT BE REPRODUCED IN WHOLE OR PART WITHOUT THE WRITTEN CONSENT OF LINK ENGINEERING.
 2. DO NOT SCALE FROM THIS DRAWING. UNITS ARE IN METRES UNLESS OTHERWISE SPECIFIED.
 3. THE CONTRACTOR IS TO CHECK ALL INFORMATION PROVIDED PRIOR TO COMMENCING WORKS AND SEEK CLARIFICATION FROM THE ENGINEER IN RESPECT TO ANY AMBIGUITIES FOUND.
 4. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ALL OTHER SCHEME SPECIFIC DRAWINGS.

GENERAL KEY

SITE BOUNDARY

DRAINAGE KEY

- FMH
CL 46.000
IL 45.350
- EXISTING SOUTHERN WATER (SW) ADOPTABLE FOUL MANHOLE
- SMH
CL 46.000
IL 45.350
- EXISTING SW ADOPTABLE FOUL SEWER
- EXISTING SW ADOPTABLE STORM MANHOLE
- EXISTING SW ADOPTABLE STORM SEWER
- PROPOSED PRIVATE FOUL WATER DRAIN (150mm DIA UNLESS OTHERWISE STATED)
- FAF1
CL ---
IL ---
- PROPOSED PRIVATE SHALLOW INSPECTION CHAMBER, 250mm SHAFT DIAMETER, UP TO 600mm MAX DEPTH
- FIC1
CL ---
IL ---
- PROPOSED PRIVATE INSPECTION CHAMBER, 450mm SHAFT DIAMETER, UP TO 1.2m MAX DEPTH
- PROPOSED PRIVATE STORM WATER DRAIN
- SIC1
CL ---
IL ---
- PROPOSED PRIVATE INSPECTION CHAMBER, 450mm SHAFT DIAMETER, UP TO 1.2m DEPTH

OUTFALL RATES

RETURN PERIOD (yrs)	CLIMATE CHANGE COEFFICIENT (%)	OUTFALL RATE (l/s)
1	0	1.6
30	35	2.0
100	40	2.0

A	UPDATED FOR RESTRICTED FLOW RATE	15.02.23	MWM
-	INITIAL ISSUE:	03.01.23	MWM
Rev.	Amendments	Date	By

Revisions

Client

Galliard Homes

Link
ENGINEERING
Find us @ www.linkeng.co.uk

Project

LE22743 - EAST GRINSTEAD HOUSE

Drawing

DRAINAGE STRATEGY

Scale @ A1
1:100

Drawn
MWM

Checked
KL

Rev
A

ECN: E-GEN-XX-DR-CE-500

PRELIMINARY (S1)

APPENDIX B: Southern Water Further Information Request



Mr Rob Gill
Lombard House
145 Great Charles Street
Queensway
Birmingham
West Midlands
B3 3LP

Your ref

Our ref
9366

Date
28 February 2023

Contact

Tel 0330 303 0119

Dear Mr Gill,

Application to Connect to the Public Sewerage System - Section 106

Location: Opposite 7 St James's Road, East Grinstead, West Sussex, RH19 1DL.

Thank you for your application to connect to the public sewerage system at the above location. At this stage, we still require some information from you so that we can further progress your application.

Please can you submit:

1. A copy of the planning consent for this development, including details of any conditions that have been imposed by the Planning Authority.
2. A revised drainage layout plan in compliance with Building Regulations Part H3. This is because where surface water is being considered to discharge to our network, your surface water drainage should be disposed off in accordance with the requirements of Building Regulations Part H3.

This states that rainwater shall discharge in order of priority, to:

- a) Reuse
- b) Infiltration
- c) Watercourse
- d) Storm/Surface Water Sewer
- e) Combined Sewer

Whilst reuse does not strictly form part of this hierarchy, Southern Water would encourage the consideration of reuse for new developments.

Where a surface water connection to the foul or combined sewer is being considered, this should be agreed by the Lead Local Flood Authority, in consultation with Southern Water.

Relevant details on Part H3 can be found in the below weblink:

southernwater.co.uk/media/4867/sewer-connections-detailed-drainage-examples.pdf

3. A letter from Building Regulations and/or percolation test results as evidence to show that soakaways are not a viable drainage method if surface water cannot be disposed off in accordance with Part H3.

Please send this information to us by uploading the relevant files in the Get Connected customer dashboard.

When providing this information, should the files be above 50mb then please only send the information to developerservices@swsbemail.co.uk, which is set up to receive larger files.

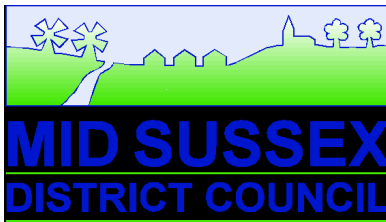
Until we receive the information outlined above, and you are in receipt of our written approval for your works, we would like to inform you that you do not have our permission to carry out any works upon the public sewerage system.

Yours sincerely,



Samantha Jenkins
Interim Head of Developer Services
Developer Services

APPENDIX C: Planning Consent Decision Notice



Oaklands Road
Haywards Heath
West Sussex
RH16 1SS

Switchboard: 01444 458166
Fax: 01444 477461

DX 300320 Haywards Heath 1
www.midsussex.gov.uk

Mr Paul Nash
John Ford
Llewellyn Palmer Hall
Church Road
Lingfield
Surrey
RH7 6AH

08/02793/FUL

TOWN AND COUNTRY PLANNING ACT, 1990

PERMISSION

Description: : Change of use from commercial property to residential to create 3 new dwellings, 3 no. 3 bed town houses. Amended address.

Location: : 21A St James Road East Grinstead West Sussex RH19 1DL

The Council hereby notify you that they **GRANT** planning permission for the above development to be carried out in accordance with the submitted application and plans and subject to compliance with the following conditions:-

1. The development hereby permitted shall be begun before the expiration of 3 years from the date of this permission.

Reason: To comply with Section 91 of the Town and Country Planning Act 1990.

2. No development shall be carried out unless and until samples of materials and finishes to be used for external walls and roofs and windows of the proposed building have been submitted to and approved by the Local Planning Authority.

Reason: To enable the Local Planning Authority to control the development in detail in the interests of amenity by endeavouring to achieve a building of visual quality and to accord with Policy B1 of the Mid Sussex Local Plan and Policy DEV1 of the adopted West Sussex Structure Plan 2001-2016.

3. Details of privacy screens and balconies shall be submitted to and approved by the Local Planning Authority prior to work commencing in respect of this part of the development. The development shall not be carried out otherwise than in accordance with such details.

Reason: To ensure that this aspect of the development is compatible with the design of the building and to accord with Policy B1 of the Mid Sussex Local Plan and Policy DEV1 of the adopted West Sussex Structure Plan 2001- 2016.

4. No development shall take place until there has been submitted to, and approved in writing by, the Local Planning Authority full details of a hard and soft landscaping scheme and these works shall be carried out as approved. The works shall be carried out prior to the occupation of any part of the development or in accordance with the programme agreed by the Local Planning Authority. Any trees or plants which, within a period of five years from the completion of development, die, are removed or become seriously damaged or diseased, shall be replaced in the next planting season with others of similar size and species, unless the Local Planning Authority gives written consent to any variation.

Reason: In the interests of visual amenity and of the environment of the development and to accord with Policy H3 of the Mid Sussex Local Plan and Policy DEV1 of the adopted West Sussex Structure Plan 2001-2016.

5. The planning permission shall not be implemented until all buildings and structures existing on the application site at the date of this permission have been demolished, the debris removed from the site and the site cleared.

Reason: To prevent the overdevelopment of the site and in the interests of the visual amenity of the locality and to accord with Policy H3 of the Mid Sussex Local Plan and Policy DEV1 of the adopted West Sussex Structure Plan 2001-2016.

6. The building(s) shall not be occupied until the parking spaces and turning facilities shown on the submitted plans have been provided and constructed. The areas of land so provided shall not thereafter be used for any purpose other than the parking and turning of vehicles.

Reason: To ensure that adequate and satisfactory provision is made for the accommodation of vehicles clear of the highways and to accord with Policy T6 of the Mid Sussex Local Plan and Policy DEV 4 of the adopted West Sussex Structure Plan 2001-2016.

7. No work for the implementation of the development hereby permitted shall be undertaken on the site on Public Holidays or at any other time except between the hours of 8 a m and 6 pm on Mondays to Fridays and between 8 am and 1 pm Saturdays.

Reason: To safeguard the amenities of nearby residents and to accord with Policy B3 of the Mid Sussex Local Plan.

8. No work shall be carried out on site unless provision is available within the site (or other adjacent land within the applicants control) in accordance with details approved by the Local Planning Authority, for all temporary contractors buildings, plant and stacks of materials associated with the development and such provision shall be retained for these purposes throughout the period of work on the site.

Reason: To avoid undue congestion of the site and consequent obstruction to access and to accord with Policy T4 of the Mid Sussex Local Plan and Policy DEV4 of the adopted West Sussex Structure Plan 2001-2016

9. Notwithstanding the provisions of the Town and Country Planning (General Permitted Development) Order 1995 or as amended in the future, no enlargement, improvement or other alteration of the dwelling house, whether or not consisting of an addition or alteration to its roof, nor any other alteration to its roof, shall be carried out, (nor shall any building or enclosure, swimming or other pool be provided within the curtilage of the dwelling house) without the specific grant of planning permission from the Local Planning Authority.

Reason: To prevent the overdevelopment of the site and to accord with Policy H2 of the Mid Sussex Local Plan.

10. The development hereby permitted shall not proceed until details of the proposed surface water and foul drainage and means of disposal have been submitted to and approved by the Local Planning Authority and no building shall be occupied until all drainage works have been carried out in accordance with such details as approved by the Local Planning Authority.

Reason: To ensure that the proposed development is satisfactorily drained and to accord with Policy CS13 of the Mid Sussex Local Plan.

11. No development shall take place until details of existing and proposed site levels (in particular relating to ground floor slab level have been submitted to and approved by the Local Planning Authority. Development shall not be implemented otherwise than in accordance with such details.

Reason: For the avoidance of doubt and to ensure that the development does not prejudice the amenities of adjacent residents or the appearance of the locality and to accord with Policy H3 of the Mid Sussex Local Plan and Policy DEV1 of the adopted West Sussex Structure Plan 2001- 2016.

12. Notwithstanding the provisions of the Town and Country Planning (General Permitted Development) Order 1995 or as amended in the future no windows or other openings (other than those shown on the plans hereby approved) shall be formed in the northern or southern wall of the building without the prior specific grant of planning permission by the Local Planning Authority.

Reason: To protect the amenities of adjoining residential properties and to accord with Policy B3 of the Mid Sussex Local Plan.

13. An investigation and risk assessment, in addition to any assessment provided with the planning application, must be completed in accordance with a scheme to assess the nature and extent of any contamination on the site, whether or not it originates on the site. The contents of the scheme are subject to the approval in writing of the Local Planning Authority. The investigation and risk assessment must be undertaken by competent persons and a written report of the findings must be produced. The written report is subject to the approval in writing of the Local Planning Authority. The report of the findings must include:

(i) a survey of the extent, scale and nature of contamination;

(ii) an assessment of the potential risks to:

- human health,
- property (existing or proposed) including buildings, crops, livestock, pets, woodland and service lines and pipes,
- adjoining land,

- groundwaters and surface waters,
- ecological systems,
- archeological sites and ancient monuments;

(iii) an appraisal of remedial options, and proposal of the preferred option(s).

This must be conducted in accordance with DEFRA and the Environment Agency's 'Model Procedures for the Management of Land Contamination, CLR 11'.

Reason: To ensure that risks from land contamination to the future users of the land and neighbouring land are minimised, together with those to controlled waters, property and ecological systems, and to ensure that the development can be carried out safely without unacceptable risks to workers, neighbours and other offsite receptors (in accordance with Policy CS20 of the adopted Local Plan 2004).

14. In the event that contamination is found at any time when carrying out the approved development that was not previously identified it must be reported in writing immediately to the Local Planning Authority. An investigation and risk assessment must be undertaken in accordance with the requirements of condition 13, and where remediation is necessary a remediation scheme must be prepared in accordance with the requirements of condition 13, which is subject to the approval in writing of the Local Planning Authority. Following completion of measures identified in the approved remediation scheme a verification report must be prepared, which is subject to the approval in writing of the Local Planning Authority in accordance with condition 13.

Reason: To ensure that risks from land contamination to the future users of the land and neighbouring land are minimised, together with those to controlled waters, property and ecological systems, and to ensure that the development can be carried out safely without unacceptable risks to workers, neighbours and other offsite receptors (in accordance with Policy CS20 of the adopted Local Plan 2004).

15. Before the buildings hereby permitted are occupied a cycle store and dustbin enclosure together with land used for the storage of bins on collection days, shall be provided as part of the development in accordance with detailed drawings to be submitted to and approved in writing by the Local Planning Authority. The land indicated shall therefore not be used for any purpose other than for the storage of bins and cycles.

Reason: To safeguard the appearance of the property and the amenities of the area and to accord with Policy H3 of the Mid Sussex Local Plan and Policy DEV1 of the adopted West Sussex Structure Plan 2001-2016.

16. Prior to works commencing and the dwellings hereby permitted being occupied, details of the ground source heat pumps have been submitted to and approved by the Local Planning Authority and implemented in accordance with the Sustainability Statement submitted on 20 August 2008.

Reason: In the interests of sustainability to accord with PPS1 and Policy B4 of the Mid Sussex Local Plan and Policy DEV1 of the West Sussex Structure Plan.

INFORMATIVES

1. You are advised that the District Council determined this application on the basis of the following drawings:

01/098A submitted 24.10.2008
01/099 submitted 20.08.2008
01/100B submitted 24.10.2008
02/130C submitted 24.10.2008
02/131B submitted 20.08.2008
02/132B submitted 20.08.2008
02/230B submitted 20.08.2008
02/231B submitted 20.08.2008

Reason for Decision

1. The proposal is therefore deemed to be a suitable redevelopment of a commercial site which does not cause undue harm to the amenities of the neighbouring properties, and seeks to preserve the existing street scene and character of the area. It therefore complies with policies B1, B3, B4, B9, H3, E2, T4 and T5 of the Mid Sussex Local Plan and policy DEV1, DEV4 and CH1 of the West Structure Plan.

This information is only intended as a summary of the reasons for grant of planning permission. For further detail on the decision please come and view the planning file at the council offices during normal working hours (9 am – 5 pm Monday – Thursday and 9 am – 4 pm Friday).



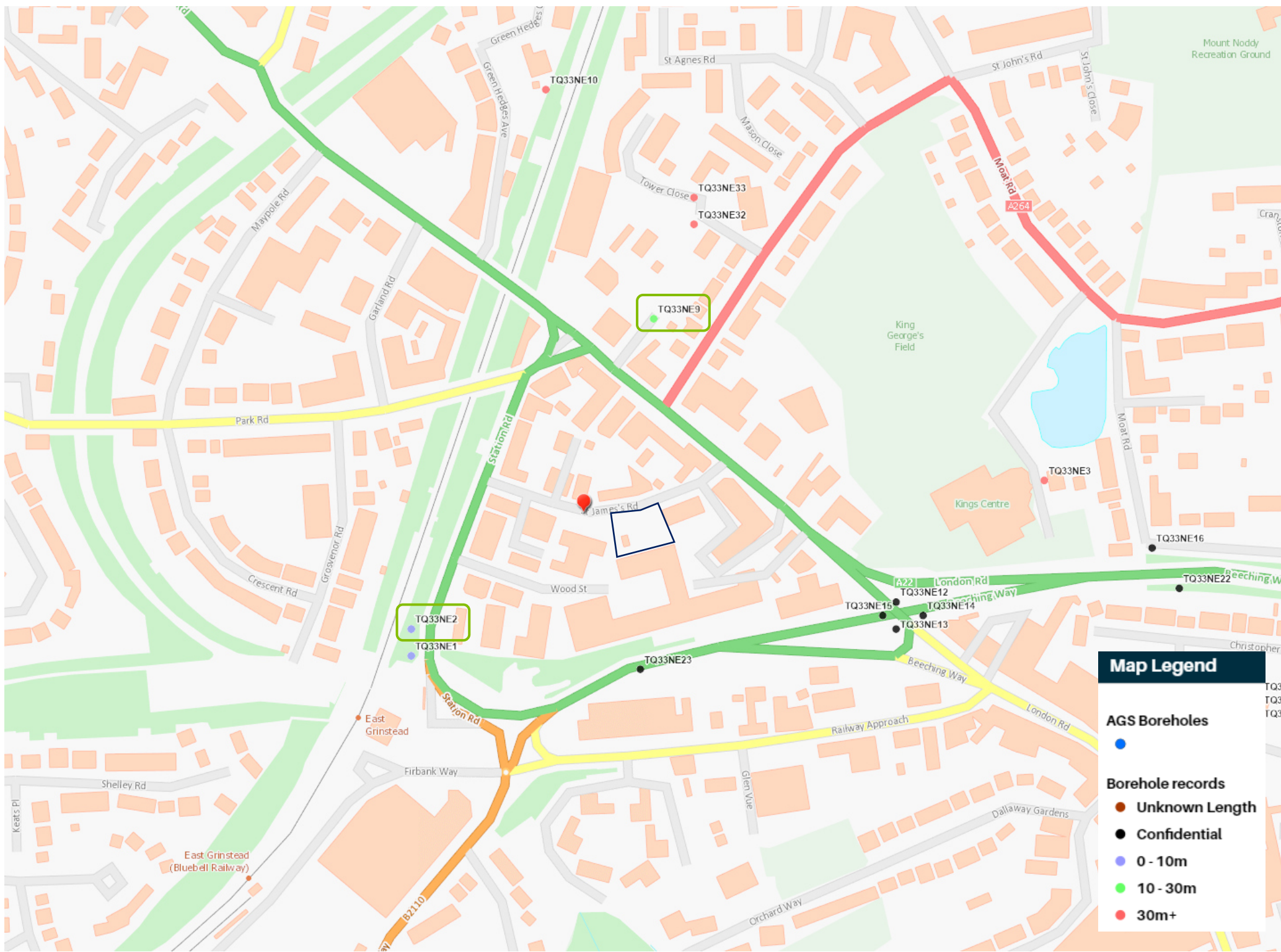
DISTRICT PLANNER

28 OCT 2008

NB: IT IS IMPORTANT THAT YOU SHOULD READ THE NOTES ACCOMPANYING THIS FORM

PEFULZ

APPENDIX D: Borehole Testing Map & Associated Borehole Logs



Map Legend

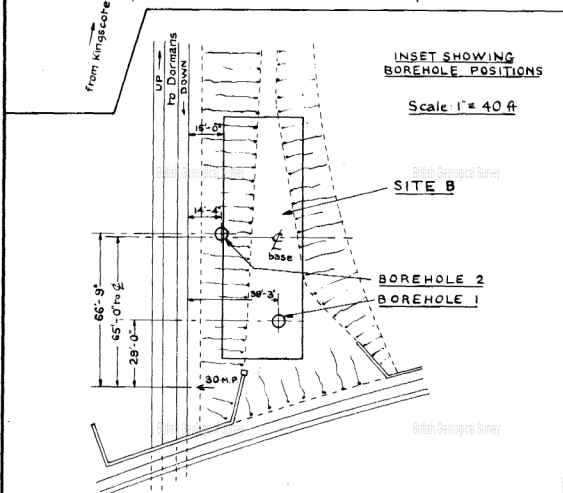
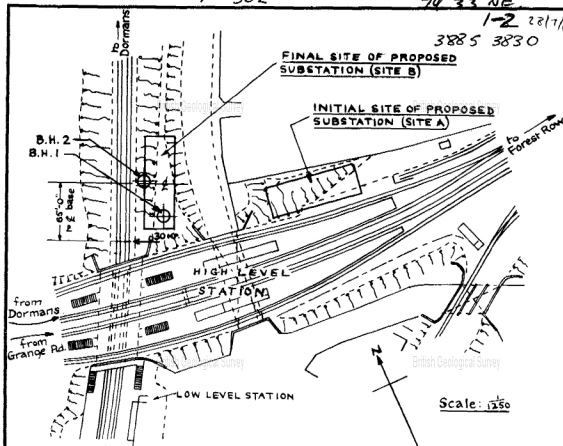
- AGS Boreholes**
 - TQ33NE1
 - TQ33NE2
 - TQ33NE3
 - TQ33NE9
 - TQ33NE10
 - TQ33NE12
 - TQ33NE13
 - TQ33NE14
 - TQ33NE15
 - TQ33NE16
 - TQ33NE22
 - TQ33NE23
 - TQ33NE32
 - TQ33NE33
- Borehole records**
 - Unknown Length
 - Confidential
 - 0 - 10m
 - 10 - 30m
 - 30m+

1" 302

70 33 NE

1-2 22/7/66

3885 3830



BRITISH RAILWAYS
CHIEF CIVIL ENGINEER'S DEPT.

ADDRESS

SOUTHERN REGION
RESEARCH SECTION

CORRES.		EAST GRINSTEAD SUBSTATION				REVISED	
RES/ E434		BOREHOLE SITE PLAN <i>Survey</i>					
DRAWN C.D.	TRACED C.D.	APPROVED 26/2/62	<i>[Signature]</i> RESEARCH ASSISTANT	No.			
CHECKED RGP	DATE 26/3/62	SCALES AS SHOWN	CHIEF CIVIL ENGINEER	C.C.E. No.	10/2250K /R7		

H. 10/66

B R 90615

BOREHOLE No. 2

SHEET No 1

1" 302

TQ/33 NE 2
3885 3830

SITE: EAST GRINSTEAD SUBSTATION

DATUM FOR LEVELS :- GROUND LEVEL

GROUND LEVEL :- 3'-6" above rail level

POSITION :- SEE SITE PLAN: No. 10/2250K/R7

DATE :- 24/8/61

STRATA	THICKNESS	DEPTH	KEY	WATER LEVEL	SAMPLES	REMARKS
Topsoil - brown friable silty clay with some rootlets	0'-6"	0'-6"				Hand Auger
Stiff grey/brown fissured silty CLAY	0'-15m	0'-15m				
END OF BORE	penetrated (1'14m)	3'-9"				No water encountered

3 PENETRATION TEST	N. N. OF BLOWS	FOR	STANDARD	PENETRATION
■ UNDISTURBED CORE	FIELD WORK	RCP	DATE	SCALE
○ DISTURBED SAMPLE	DRAWN	CD	2/2/62	2 FT. TO 1 IN.
△ WATER SAMPLE	CHECKED	1/1/62	C.C.E's No.	10/2250K/R10

RESEARCH SECTION,
SOUTH SIDE OFFICES,
WATERLOO EXT. 2786.

BRITISH RAILWAYS, SOUTHERN REGION,
CHIEF CIVIL ENGINEER'S DEPARTMENT,
WATERLOO STATION, S.E.1.

TQ 33NE9

302/40

302

TQ 33/17

EAST GRINSTEAD

3903

3853

40

138. *ELECTRIC POWER STATION. Formerly BREWERY. Maps
5 N.W., S.W.Grinstead Clay. Blue shale with beds of limestone
(probably calc-grit)... 70 ft.The unusual thickness of this clay may be owing to the local fivers, causing
the bed to be cut obliquely. Well was not used for many years prior to closing
of Brewery.London Road
visited 2.9.00.
Mendenham.

6° 5' N.W. Dimes.

Published in
'Wells & Springs
of Sussex.'

1883 89

302

TQ 33/17

40

EAST GRINSTEAD

TQ 3903 3853

138. *ELECTRIC POWER STATION. Formerly BREWERY. Maps
5 N.W., S.W.Grinstead Clay. Blue shale with beds of limestone
(probably calc-grit)... 70 ft.The unusual thickness of this clay may be owing to the local flexure, causing
the bed to be cut obliquely. Well was not used for many years prior to closing
of Brewery.

London Road

6" S.W. Ditch. - Sided by D.

visited 2.4.40.

J. Jackson.

Now Fire Station. No further knowledge of well.

O.D. + C. 416.

Visited 14.11.57. BN.

Addn info from W.S.Sx I, p. 29:

Ref. W. Topley, "Geology of the Weald", p. 86, 1875.

Seems unusually thick th considering position of site: would have
expected about 50 ft; local flexure mythical. R.G. 3.12.64.Published in
'Wells & Springs
of Sussex. III,

1883 89

APPENDIX E: Hydro-Brake Optimum Design Sheet and Product Brochures

Hydro-Brake® Optimum

Vortex Flow Control

Inspired by nature and engineered to deliver the perfect curve, the Hydro-Brake® Optimum is the most advanced vortex flow control available. There is no equivalent to the Hydro-Brake® Optimum when it comes to delivering the best possible hydraulic performance with a passive flow control.

With a wide range of configurations and options available, the Hydro-Brake® Optimum is able to provide precision flow control to suit the vast majority of applications.



Figure 1 - The Hydro-Brake® Optimum is designed and manufactured to deliver precise, repeatable flow control.

Precision Engineered Vortex Flow Controls

Each Hydro-Brake® Optimum is custom configured to suit the application and is manufactured under strict quality assurance procedures to deliver precise flow control to exacting requirements.

Every unit is backed by significant R&D investment to fine-tune the performance, meaning that the Hydro-Brake® Optimum is the only vortex flow control to have been independently certified by the BBA and WRC.



Benefits

- Manufactured from high grade stainless steel.
- Future proof – adjustable or replaceable inlet plates available to alter flow rates post-installation.
- Configurations available to suit a wide variety of installations.
- Large cross sectional area at all heads.
- Simple installation.
- Self-activating.
- No moving parts or external power requirement.

Versatile and Flexible

At Hydro International, we pride ourselves on providing solutions that meet your requirements, rather than providing a standard solution and asking you to compromise on your project needs.

The Hydro-Brake® Optimum offers designers options to precision-engineer a vortex flow control to:

- Minimise upstream storage volumes.
- Maximise internal (inlet & outlet) cross sectional areas to prevent blockages.
- Build-in a climate change factor to allow for future changes in flow rate.

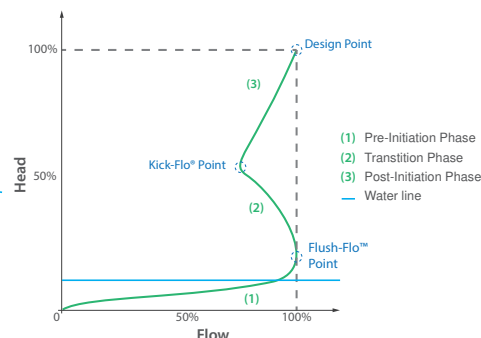
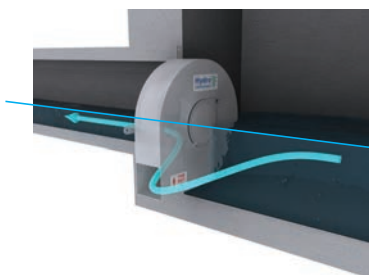
Furthermore, if you need to retrofit a flow control, our dedicated team of engineers can assist with providing a customised Hydro-Brake® Optimum suitable for installation into existing drainage infrastructure.

Operating Principles

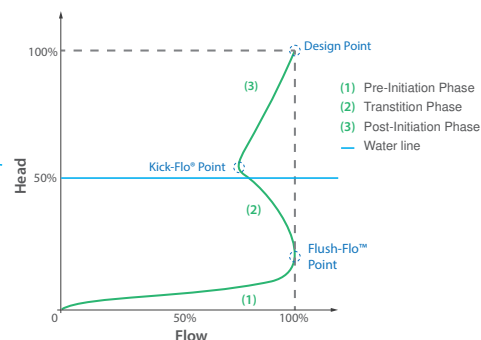
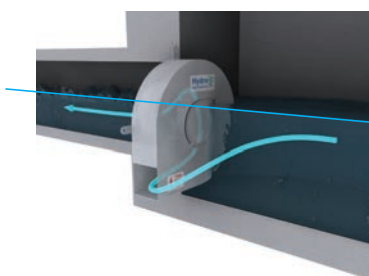
The hydraulic behaviour of the Hydro-Brake® Optimum is described by its hydraulic characteristic curve, which relates the discharge flow from the unit to the hydraulic head acting upon that unit.

The hydraulic characteristic curve consists of three distinct sections, each corresponding to a different governing flow control regime:

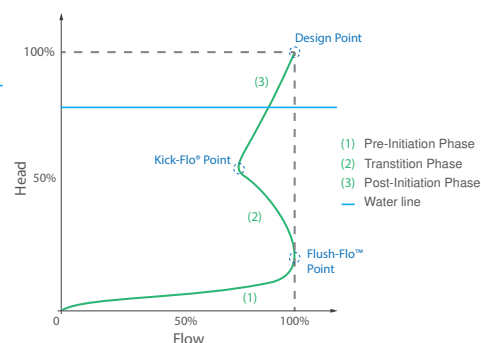
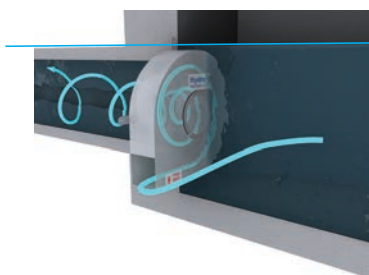
1. The pre-initiation phase – governed by orifice flow and defined on the characteristic curve as the region between the origin and the point at which the vortex begins to have a throttling effect (Flush-Flo™ point). In this region, the depth of water is below the soffit of the outlet orifice of the Hydro-Brake® Optimum.



2. The transition phase – governed by vortex formation and defined on the characteristic curve as the region between the Flush-Flo™ and the point at which the vortex has fully initiated (Kick-Flo® point). In this region the vortex will continually form and collapse. A trapped volume of air inside the Hydro-Brake® Optimum will exert a backpressure and cause the discharge rate to reduce even though the hydraulic head continues to increase.



3. The post-initiation phase – governed by stable vortex flow and defined on the characteristic curve as the region above the Kick-Flo® point. A stable vortex is formed and sustained. An air filled core at the centre of the vortex acts as a pseudo-physical flow restriction by reducing the cross sectional area available for the passage of water.



Design Flexibility

It is possible for the Design Point to be achieved using a number of different flow control configurations, each with a different hydraulic response or characteristic curve.

An in-depth understanding of the flow regimes and interactions at each stage of the hydraulic characteristic curve allows custom configuration of the Hydro-Brake® Optimum to achieve the hydraulic profile best suited to the site requirements.

Design Data

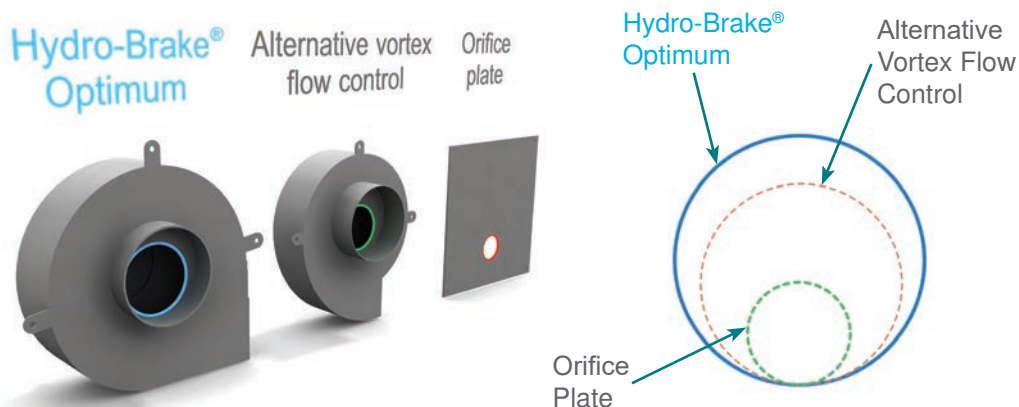
Hydro-Brake® Optimum

Vortex Flow Control

Resilience by Design

Hydro-Brake® Optimum has outlets (clearances) up to 20% larger than competitor products to minimise the risk of blockages. All units are fitted with a pivoting bypass door to enable full access to the internal chamber and the outlet structure in the event that a blockage does occur.

All Hydro-Brake® Optimum units can also be supplied with an adjustable or replaceable inlet to future-proof the device, allowing flows to be altered post-installation, to account for site expansion or climate change.



Expert Design Support Services

Hydro International's professional engineers work with you to provide expert technical and aftersales support to ensure your projects meet exacting design requirements and deliver the very best hydraulic controls for your site.

With over 35 years' experience of flow control knowledge and experience, Hydro International's design support team is available to advise on any aspect of water flow management, including detailed modelling of vortex flow controls and composite outlet structures.

Call the Hydro-Brake® Hotline on: 01275 337937 or email stormwater@hydro-int.com

Online Design Tool

Engineers have the flexibility to try out any number of flow control iterations and explore their impact on hydraulic performance.

Our Online Design Tool allows you to quickly and easily compare a number of different flow control options for your site to develop the most robust and sustainable drainage solution possible.

The new tool now also has the added options to size and design the First Defense® and Downstream Defender® stormwater treatment separators, alongside the existing functionality to size and design Hydro-Brake® Optimum flow controls.

hydro-int.design



Full MicroDrainage® Compatibility

Engineers can carry out sizing and flow rate calculations and conduct hydraulic modelling of drainage networks containing Hydro-Brake® Optimum units using the industry-standard drainage design software, MicroDrainage®.

XPsolutions



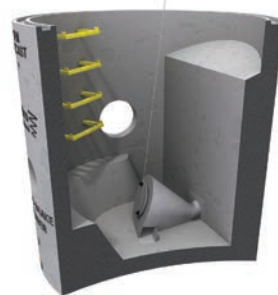
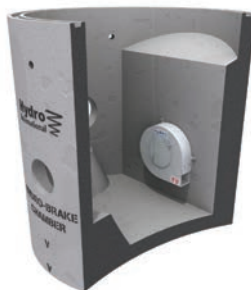
Design Data

Hydro-Brake® Optimum

Vortex Flow Control

Easy to Install

Hydro-Brake® Optimum has a range of mounting options for ease of installation or can be supplied ready fitted into a manhole chamber (with or without a weir wall) for simple plug-and-play installation. There are no set-up or commissioning requirements.



The Hydro-Brake® Flow Control Series

As a brand leader for vortex flow controls for more than 30 years, Hydro International continues to set the standard in flow control management technologies. The Hydro-Brake® Flow Control Series is a comprehensive and versatile toolbox of precision-engineered devices for flow attenuation and control that can help deliver compliant schemes with scalable, precision flow control performance.

Every device in the series is tested and manufactured to exacting standards and wherever possible, independently accredited to provide the reassurance of reliable, repeatable through-life operation.

Hydro-Brake® Orifice



The low-cost option for unconstrained sites (shown with optional screen).

Hydro-Brake® Optimum



The vortex flow control with no equivalent, delivering Nature's Perfect Curve with no moving parts and independently verified by the BBA and WRc.

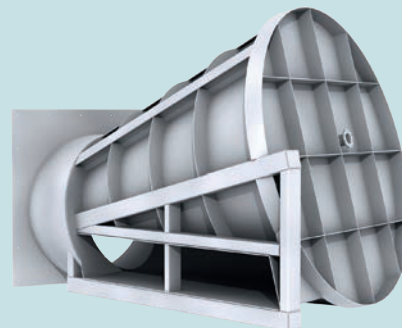
Hydro-Brake® Agile

Precision engineered flow control for highly constrained applications.



Hydro-Brake® Flood Alleviation

The vortex controlled solution to watercourse flooding.



Patent: www.hydro-int.com/patents

Page 4 of 4

Tel: +44 (0)1275 337 937 stormwater@hydro-int.com

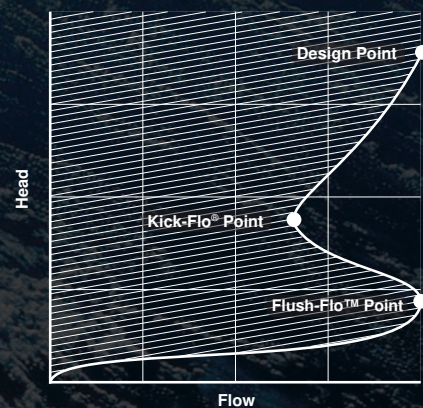
Hydro International
Unit 2, Rivermead Court, Kenn Business Park, Windmill Road, Kenn, Clevedon, BS21 6FT
Hydro-Brake® Optimum Flow Control Design Data Sheet E/0123

hydro-int.com



Nature's Perfect Curve

Hydro-Brake Optimum®. There is no equivalent.



Hydro 
International®



**Inspired by
nature and
engineered
with a perfect
curve.**

Nature's Perfect Curve



There is no equivalent to the Hydro-Brake Optimum® when it comes to getting the best possible hydraulic performance.

Versatile and flexible, it offers designers and specifiers an absolute fit without compromise for every project. That's because Hydro-Brake Optimum® is the only vortex flow control for which the head and discharge relationship can be fine-tuned to optimise your surface water drainage design.

No compromises

Rather than having to choose from pre-determined sizes with fixed head/discharge ratios, designers can size a Hydro-Brake Optimum® to achieve the perfect hydraulic performance curve – and therefore best possible design.

Versatile and Flexible

Only the Hydro-Brake Optimum® offers designers the option to precision-engineer a vortex flow control to:

- **Minimise upstream surface water storage volumes**
- **Make outlet clearances larger to prevent blockages**
- **Build-in a climate change factor to adjust the flow rate post-installation**



Optimum Performance: Optimum Value

Choosing the superior performance of Hydro-Brake Optimum® does not mean building higher cost into your project. On the contrary, you can fine-tune your design to reduce development cost and maximise through-life performance.

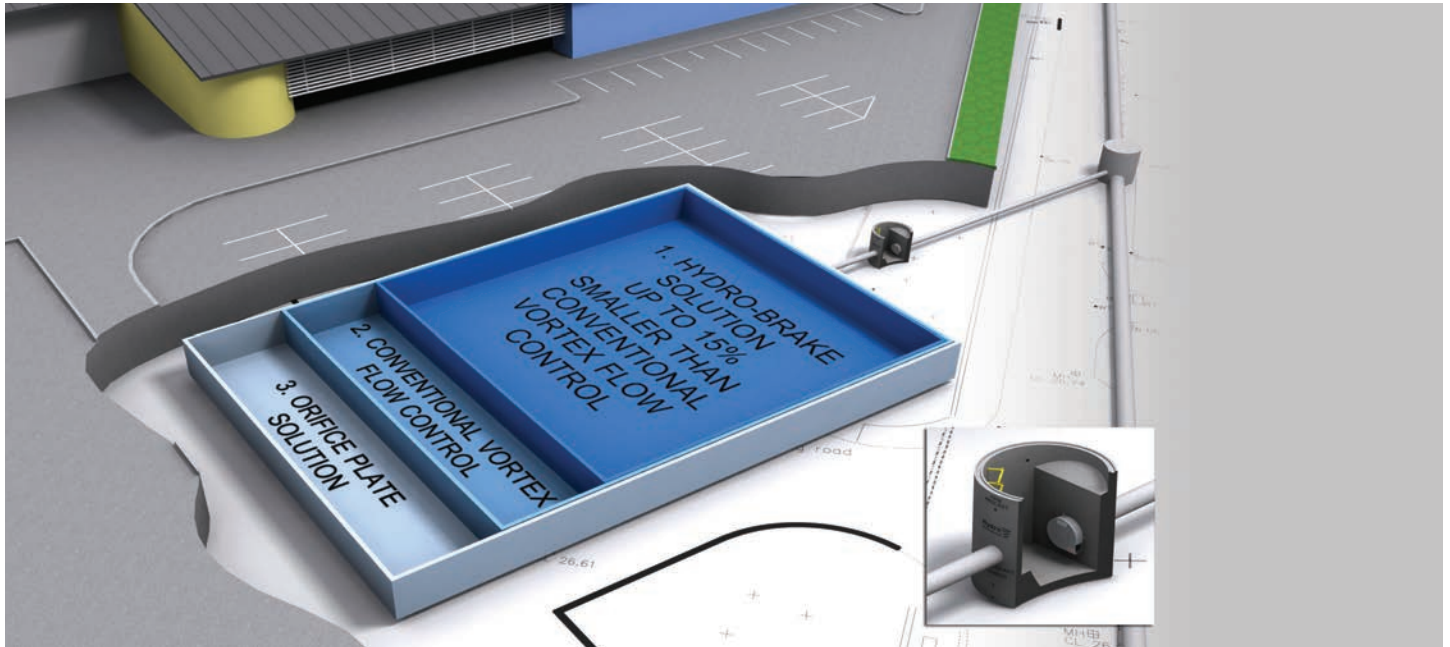
The increased hydraulic efficiency of the Hydro-Brake Optimum® means you can reduce on-site storage requirements by up to 15% more than when using competitor flow controls.

With reduced storage, you can lower construction and excavation costs for your client, as well as saving project time and overall land-use. You can protect your specification against potential switching out to inferior products.

Make SuDS Schemes Feasible

As a passive flow control with no power or moving parts, Hydro-Brake Optimum® can help meet regulatory Sustainable Drainage Systems (SuDS) objectives for a site.

By reducing land take, the “kerb appeal” of natural SuDS features can be exploited with minimal commercial impact for developers.



Reduce on-site storage requirements by an additional 15%



Hydro-Brake Optimum® can enable natural SuDS features

Design Support

Hydro's professional engineers work with you to provide expert technical and aftersales support to ensure your projects meet exacting design requirements and deliver the very best hydraulic efficiency.

Our design support team is available to advise on any aspect of stormwater and wastewater flow management, including vortex flow modelling. Technical manuals and information sheets are also available to assist engineers to develop the very best solutions.



Optimum Software Tools

Hydro has developed a unique flow control software engine so that designers can fully explore and visualise design options for Hydro-Brake Optimum®.

Engineers have the flexibility to try out any number of flow control iterations and explore their impact on hydraulic performance.

Hydro-Brake Optimum® Design Tool

The Hydro-Brake Optimum® Design Tool is available on the Hydro website and free to use for engineers. The Tool makes it quicker and easier to size each Hydro-Brake Optimum®, according to design priorities, then validate and output detailed design drawings.

Using the Tool, engineers have greater flexibility to explore an unlimited range of design choices. The results are calculated in real time, without needing to contact the Hydro design office.



www.hydrobrakeoptimum.com

Full MicroDrainage® Compatibility

Engineers can carry out sizing and flow rate calculations and conduct hydraulic modelling of drainage networks containing Hydro-Brake Optimum® units using the industry-standard MicroDrainage® modelling software.

XPsolutions



Setting the Standard

As a brand leader for more than 30 years, Hydro International continues to set the standard in stormwater management technologies. It's no secret that the Hydro-Brake® has become a name synonymous with vortex flow controls.

At Hydro, we pride ourselves on our engineering excellence and in developing the Hydro-Brake Optimum® we have invested in significant R&D to validate its performance. Hydro-Brake Optimum® is the only vortex flow control to be independently certified by BBA and WRc.

Clearance

Hydro-Brake Optimum® has outlets (clearances) up to 20% larger than competitor products to minimise the risk of blockages. Choosing an alternative flow control with smaller openings and outlets will lead to an increased risk of plugging.

Future-Proofing

All Hydro-Brake Optimum® units can also be supplied with an adjustable inlet to future-proof the device, allowing flows to be altered post-installation, to account for site expansion or climate change.

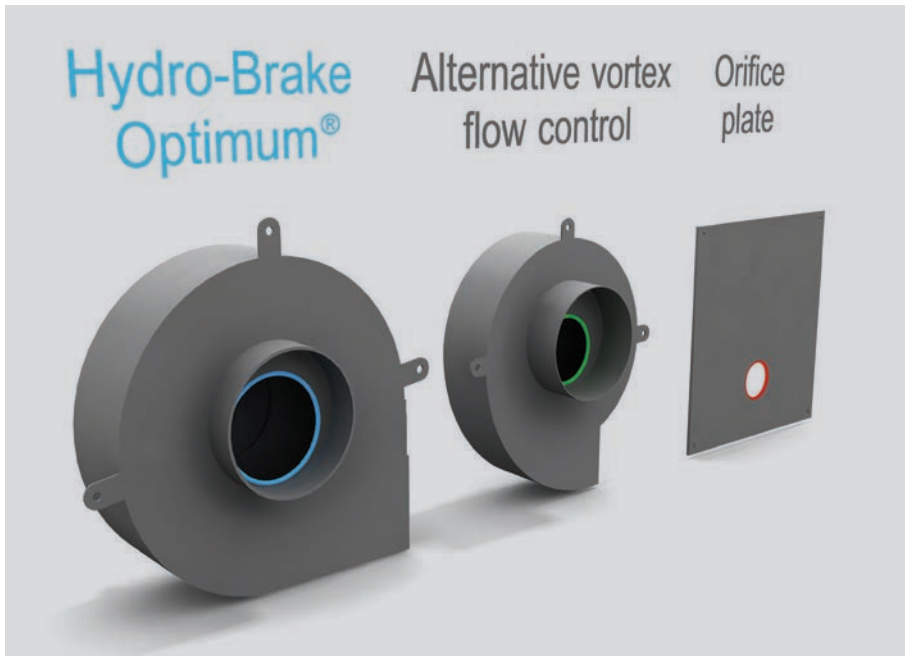
Robust and Easy to Install

Hydro-Brake Optimum® comes with a range of installation options and accessories to make construction and installation as simple as possible for your client.

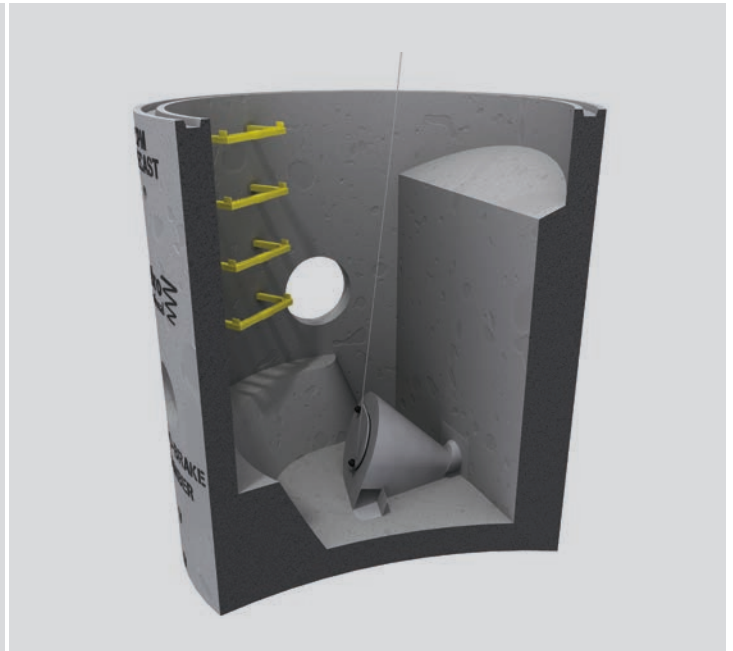
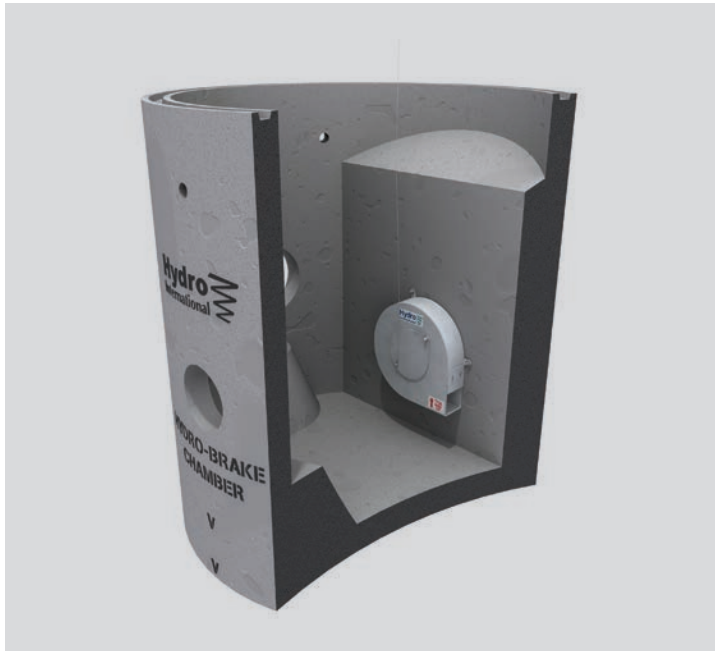
Units can be delivered already pre-fitted within concrete chambers to simplify the construction process. In addition to our ready-to-fit units, we are able to provide custom options integral to the flow control, including high level emergency bypass, rodding pipe and removable units.

Strong

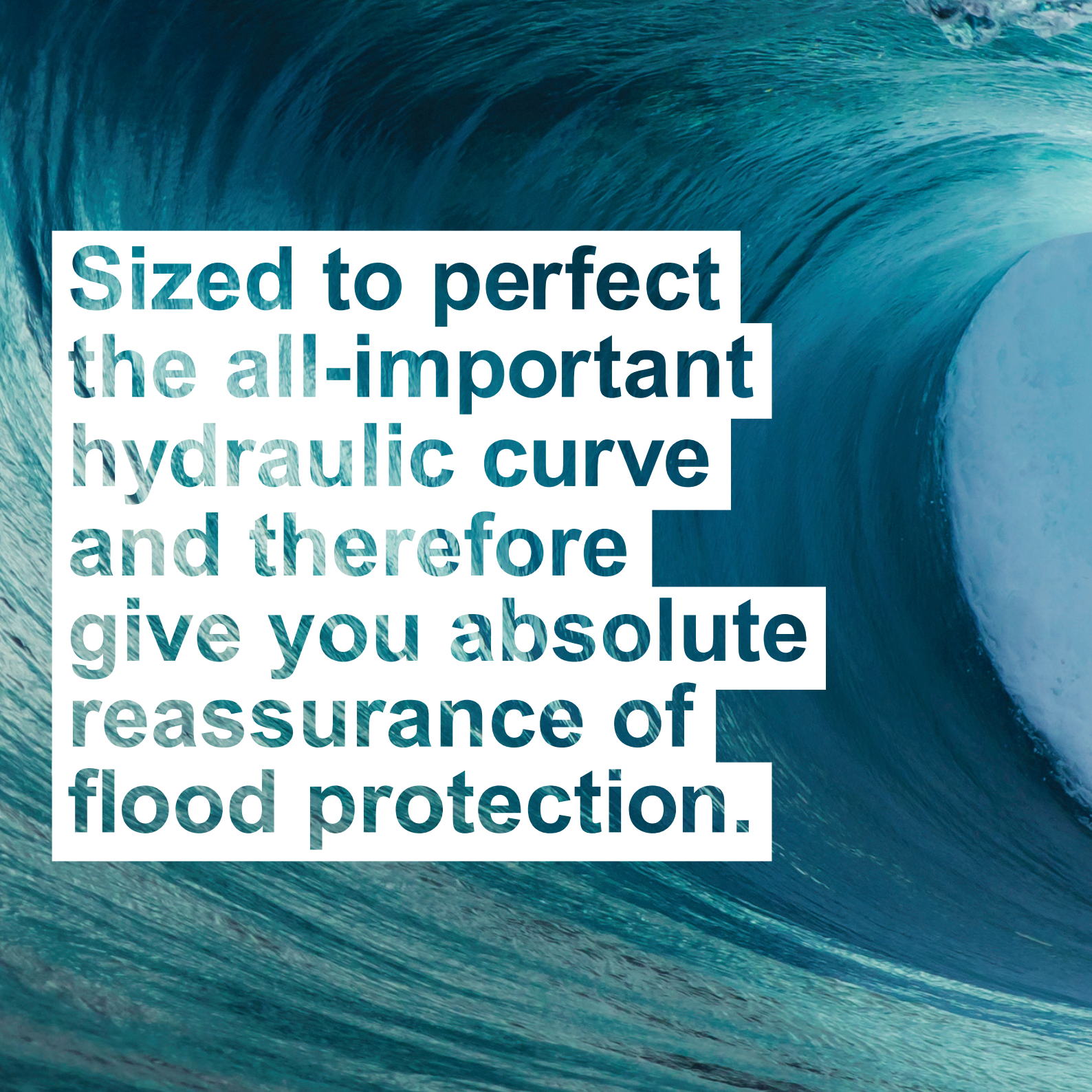
A product required to withstand a deluge in the worst wet weather incidents needs to be robust, and the Hydro-Brake Optimum® is unmatched in its physical strength. Made from high grade stainless steel, the Hydro-Brake Optimum® has been independently verified to ensure it is capable of withstanding the potential high pressures you specify it for.



Greater clearance and adjustable inlet



The Hydro-Brake® Chamber

A large, powerful blue wave crashing, symbolizing flood protection.

**Sized to perfect
the all-important
hydraulic curve
and therefore
give you absolute
reassurance of
flood protection.**





What is HX?

HX is Hydro Experience. It is the essence of Hydro. It's interwoven into every strand of Hydro's story, from our products to our people, our engineering pedigree to our approach to business and problem-solving.

HX is a stamp of quality and a mark of our commitment to optimum process performance. A Hydro solution is tried, tested and proven.

There is no equivalent to HX.

Hydro International

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BS21 6FT

Tel: 01275 878371

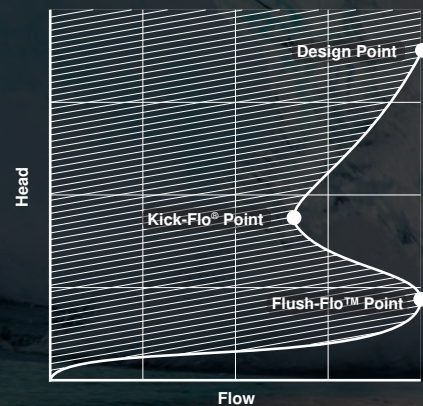
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Turning Water Around...®



Nature's Perfect Curve

Hydro-Brake Optimum®. There is no equivalent.



Hydro 
International®



**Inspired by
nature and
engineered
with a perfect
curve.**

Nature's Perfect Curve



There is no equivalent to the Hydro-Brake Optimum® when it comes to performance, cost-effective installation and through-life maintenance.

At first sight, it may seem like any other vortex flow control. But when a Hydro-Brake Optimum® is specified for your drainage project, it will achieve hydraulic efficiency that cannot be matched by other vortex flow controls.

That's because Hydro-Brake Optimum® is sized to perfect the all-important hydraulic curve and therefore give you absolute reassurance of flood protection.

No compromises

Versatile, future-proofed, BBA and WRc certified, using Hydro-Brake Optimum® offers risk-free assurance that your surface water drainage will perform as it is designed to do.

Each Hydro-Brake Optimum® is sized by fine-tuning the head and discharge relationship to achieve an “absolute fit”. Rather than choosing from a range of pre-determined sizes, each unit is custom-designed to achieve the drainage objectives of your site.



Optimum Value

Relying on the superior performance of Hydro-Brake Optimum® does not mean higher costs for your project. On the contrary, it can help to minimise excavation and development cost.

Reduced stormwater storage

The increased hydraulic efficiency of Hydro-Brake Optimum® can reduce on-site stormwater storage requirements by up to 15% in comparison to other vortex flow controls. A lower storage volume means you can achieve

- **Reduced construction and excavation costs**
- **Project time savings**
- **Reduced land use and opportunity cost savings.**

Make SuDS Schemes Feasible

As a passive flow control with no power or moving parts, Hydro-Brake Optimum® can help meet regulatory Sustainable Drainage Systems (SuDS) objectives for a site.

By reducing land take, the “kerb appeal” of natural SuDS features can be exploited with minimal commercial impact for developers.



Swale under construction at Berewood



Vegetated pond under construction at Berewood

False Economy: Flood Risk

It may be tempting to substitute a Hydro-Brake Optimum® for a cheaper competitor product, but any short-term cost saving is cancelled out by potential long-term problems.

The consequences could be unforeseen maintenance work to rectify poor drainage performance before handover to the adopting authority. Further risks of flooding post-installation could be costly and further damage your company's reputation.

Storage

Switching from a Hydro-Brake Optimum® to an alternative vortex flow control device can lead to inadequate storage capacity on-site, resulting in:

- **Increased flood risk (on-site and downstream)**
- **Premature flooding of the storage facility**
- **Unauthorised over-discharge from the site.**

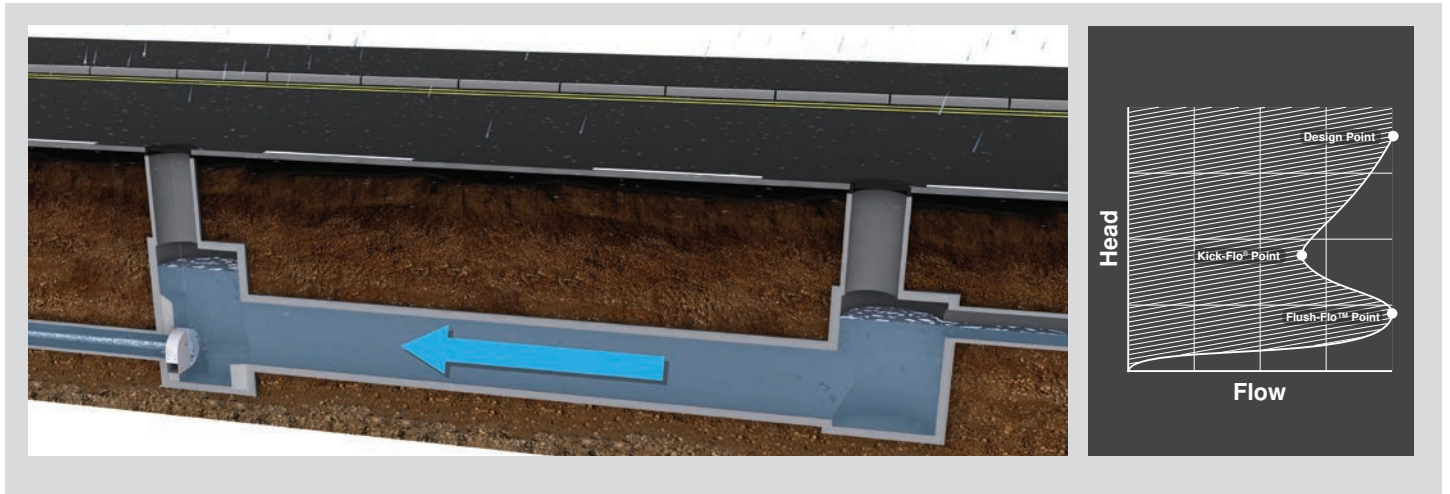
Clearance

Hydro-Brake Optimum® has outlets (clearances) up to 20% larger than competitor products to minimise the risk of blockages. Choosing an alternative flow control with smaller openings and outlets will lead to an increased risk of plugging that could cause flooding.

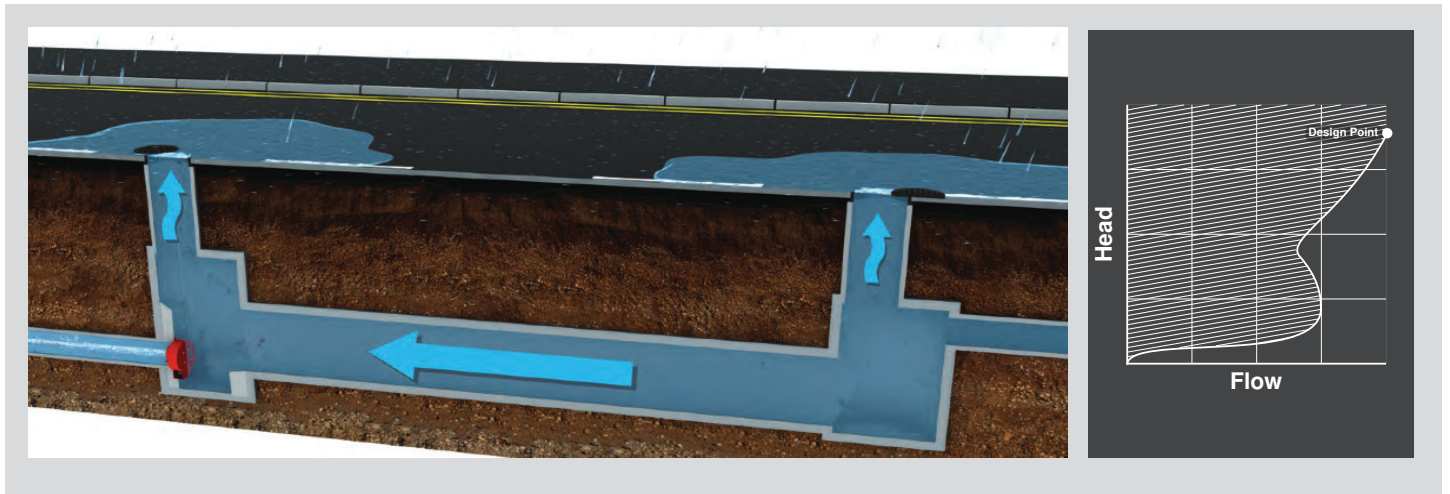
Strength

A product required to withstand a deluge in the worst wet weather incidents needs to be robust, and the Hydro-Brake Optimum® is unmatched in its physical strength.

Made from high grade stainless steel, the Hydro-Brake Optimum® has been independently-verified to ensure it is capable of withstanding the potential high pressures you specify it for. Substituting for the inferior materials used by some suppliers can lead to structural failure.



With Hydro-Brake Optimum®



Substitute for Hydro-Brake Optimum®

Making Life Easier

Hydro-Brake Optimum® comes with a range of installation options and accessories to make construction and installation as simple as possible.

Hydro-Brake® Chamber

If you need a pre-fitted vortex flow control, the Hydro-Brake Optimum® is available ready installed into a purpose built, pre-cast, reinforced concrete chamber base (kite marked to BS EN 1917:2002).

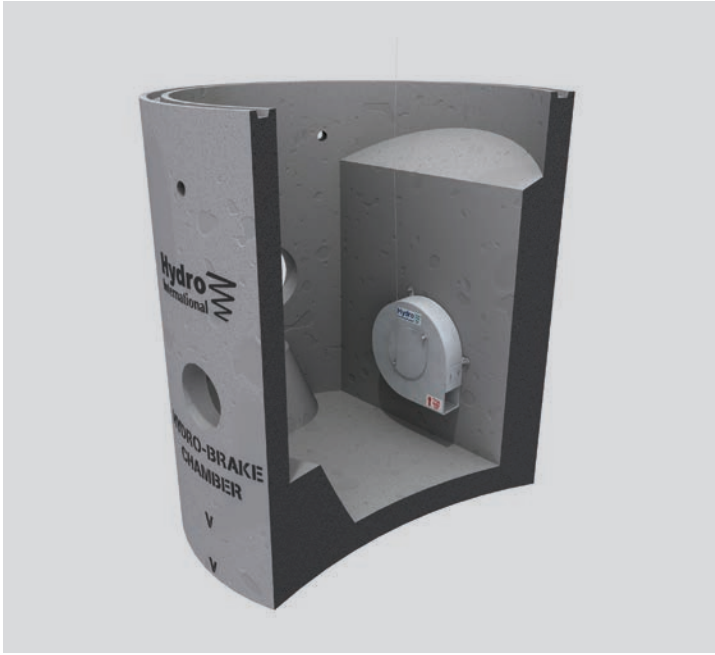
The base comes with preformed benching and headwall, and is ready cored with holes to suit site requirements. Chambers are available in a variety of sizes, with additional features such as weir walls, high levels overflows and penstocks.

Mounting Options

Where units are to be fitted on-site, we provide a variety of mounting options to suit the application:

- **Lugs**
- **Push-fit spigots**
- **Flat or curved mounting plates**
- **Penstock or slide mounts**
- **Removable units.**

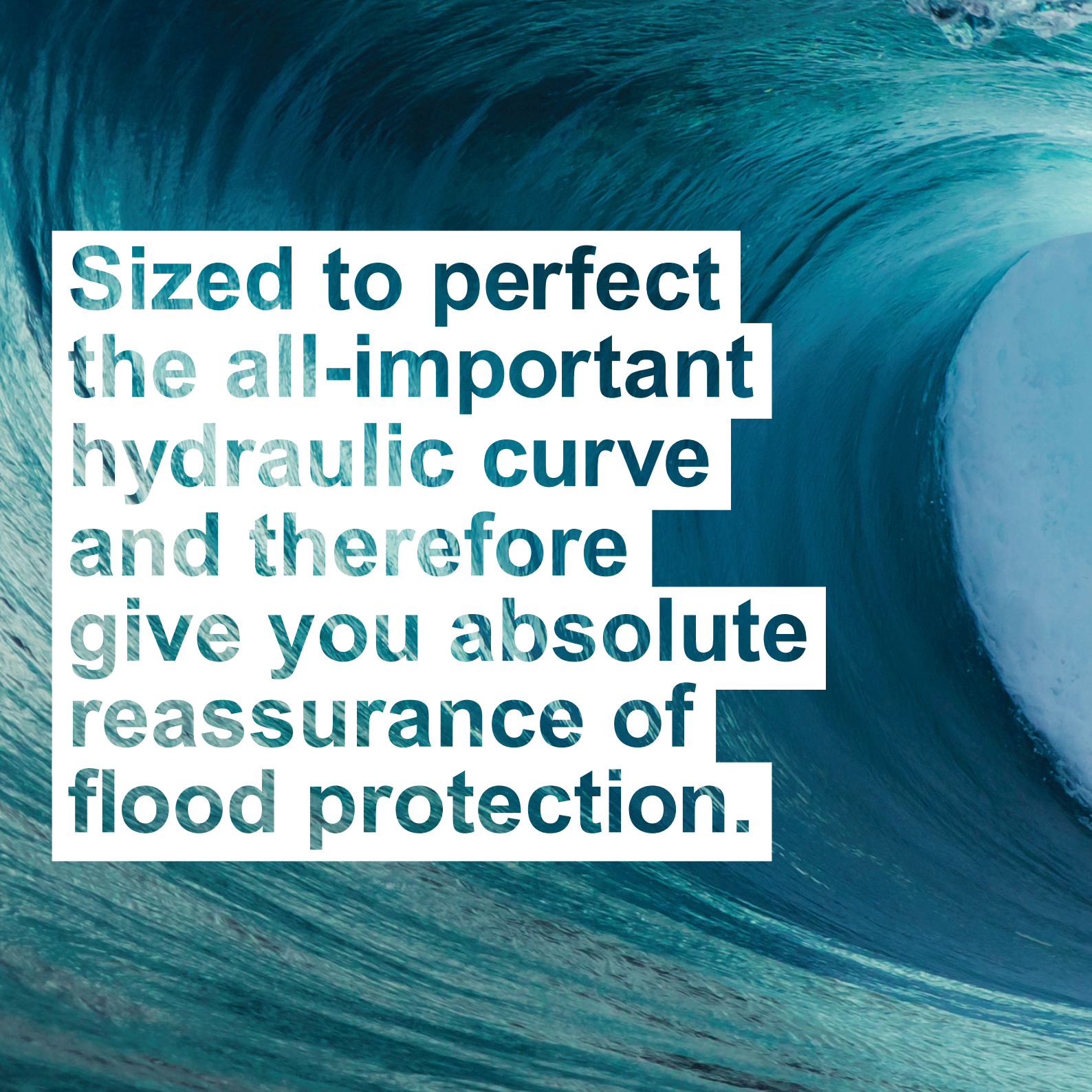
All Hydro-Brake Optimum® units can also be supplied with an adjustable inlet to future-proof the device, allowing flows to be altered post-installation, to account for site expansion or climate change.



The Hydro-Brake Optimum® Chamber



Hydro-Brake Optimum® Mounting Options

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