

Pontrhydyfen RFC



Sport Facility Development

rainage Strategy & Flood Consequence Assessment

April 2026



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CARDIFF, CF11 9AG

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DOCUMENT CONTROL

Project Number	2769
Project Title	Pontrhydyfen RFC
Client	Pontrhydyfen RFC
Document Title	Drainage Strategy & FCA

Prepared by	Checked by	Verified by	Approved by
Steve Davis Director	Tom Pugh Associate Director	Tony Owens-Redwood Director	Tony Owens-Redwood Director

Issue History

Issue	Revision date	Details
P01	27/04/2026	First Issue

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1. Introduction

PHG Consulting Engineers have been commissioned to undertake a Drainage Strategy and Flood Consequence Assessment to support a Planning and SAB Application.

The site is a new clubhouse and changing facility for Pontrhydyfen RFC, Neath Port Talbot.

The purpose of this report is to ensure that surface and foul water drainage can be discharged without affecting the downstream catchments detrimentally. Also a note on Flood Risk.

Existing Site

The existing site is partially greenfield and brownfield from some previous use. The development area covers an area of approximately 0.1 Ha (0.25 Acres). The site is bound by the Oakwood Avenue residential area to the north, with the village centre further north. To the east, south, and west is general woodland. The site is adjacent to and will serve the rugby ground, Oakwood Playing Fields, to the south of Pontrhydyfen. The site is located at National Grid reference SS794937 and is shown in Figure 1 below, and Appendix A.



Figure 1. Site Layout

Topography

The site is generally flat with a level of 73.30m AOD. An access path does fall towards the site from Oakwood Avenue being at an elevated level of 78.00m AOD.

Geology and Hydrogeology

The site and general local area are underlain by sandy / gravelly clay soils and made ground, subject to a full site investigation, due to the historical use for the site. This included railways sidings. Following an initial intrusive site investigation and falling head soakaway testing, see Appendix E, the area to the north of the clubhouse was identified to have potential for infiltration within the sandy / gravelly clay. The area to the south of the clubhouse was identified as being made ground. Detailed design will be subject to soakaway testing to BRE365 and to be carried out during a full Tier 2 Site Investigation.

Development Proposals

The development will consist of a new clubhouse and changing facility to serve the local rugby club.

Existing Drainage Features

The site is adjacent to the existing rugby ground, Oakwood Playing Field, to the south of Pontrhydyfen. The site has a history of previous use so classed as brownfield. Surface water run-off from the development currently discharges to ground naturally or via installed filter drains. There are no local watercourses serving the immediate area.

Foul Drainage

There is an adopted combined sewer within Oakwood Avenue to the north of the site, serving the local area. Welsh Water has been approached for pre-Planning advice (Ref: PPA0009943) and advised that the local system has capacity to accept foul drainage from the proposed development.

A point of connection from the site shall be via an adopted foul manhole within Oakwood Avenue to the north of the site, Ref: SS79934803.

There are no hydraulic or capacity issues within the local network, nor at the Wastewater Treatment Works at Afan New Works WwTW.

Confirmation and correspondence with Welsh Water is shown within Appendix D.

Due to topography a private package foul pumping station will be required from site to discharge to the adopted sewer within Oakwood Avenue.

All foul drainage within the site will be designed in accordance with Sewers for Adoption (7th Edition) and Welsh Government regulations. Any drainage system crossing third party land will be submitted for adoption by Dŵr Cymru Welsh Water (DCWW) under a Section 104 Agreement.

Surface Water Drainage

The site is in an area where Neath Port Talbot County Borough Council are the Lead Local Flood Authority (LLFA) and SuDS Approval Body (SAB).

The development will adhere to the National Standards for Sustainable Drainage Systems (SuDS) in Wales.

Key Components of the Drainage Strategy:

1. Surface Water Runoff Destination (Standard S1):

- Priority Hierarchy: Direct runoff to the most sustainable destinations, such as infiltration to the ground, before considering alternatives like discharge to surface water bodies or existing drainage systems.
- Site wide rainwater harvesting is not considered appropriate at the masterplan stage and does not provide a suitable means for managing surface water within this development.
- The underlying soils seem to allow sufficient infiltration to manage runoff generated by the development.
- No watercourses are near the site.

2. Hydraulic Control (Standard S2):

- Post-development runoff rates will be carefully regulated to ensure they remain within the agreed limits, minimising flood risk.
- Based on available information a design infiltration rate of 2.89×10^{-6} m/s / 0.0102 m/hr has been used as an estimated design for proposed infrastructure, see Appendix F.
- Volume Control: Discharge via infiltration and evapotranspiration where possible.
- Interception Storage: Not applicable due to discharge to ground.
- Attenuation: Via volumes within the raingarden and below any associated porous paving.
- Hydraulic Assessment: FEH data will be utilised for site-specific hydraulic calculations during detailed design.
- Runoff Coefficients: A runoff coefficient of 0.95 is applied in hydraulic calculations.

- Urban Creep Allowance: A 10% increase is applied to residential roof areas to account for future urban creep.
- Climate Change Allowance: Rainfall intensities will be increased by 40% to accommodate projected climate change impacts.

3. Water Quality (Standard S3):

- Pollution Prevention: Implement treatment stages within the SuDS design to remove contaminants from runoff, protecting downstream water quality. To ensure there is no detrimental effect on water quality of the receiving water course, runoff from the development will pass through SuDS features. Any pollutants or suspended solids will be treated within the development boundary.

4. Amenity (Standard S4) and Biodiversity (Standard S5):

- Multi-functional Spaces: Design SuDS features that enhance public spaces, providing recreational and aesthetic benefits.
- Ecological Enhancement: Incorporate native vegetation and create habitats to support local wildlife.

5. Design for Maintenance and Structural Integrity (Standard S6):

- Accessibility: Ensure SuDS components are accessible for regular inspection and maintenance.
- Durability: Select materials and designs that ensure long-term functionality and resilience.

Site-Specific Considerations:

- Topography and Soil Permeability: The main site is relatively flat and gives some opportunities for infiltration.

Approval Process:

A Pre-SAB application will be submitted to Neath Port Talbot County Borough Council and run parallel with the Planning Application.

Prior to construction, a Full-SAB application will be submitted to the local SuDS Approval Body (SAB) for review and approval. This process ensures compliance with national standards and facilitates the adoption and maintenance of SuDS features. This shall be undertaken during the detailed design stage.

Copy of the preliminary Engineering Layout drawing and supporting calculations are attached in Appendix B.

Flood Risk

The site lies within an area not at risk from flooding from the sea, rivers, nor surface water run-off. Therefore, the site is within Flood Zone 1.

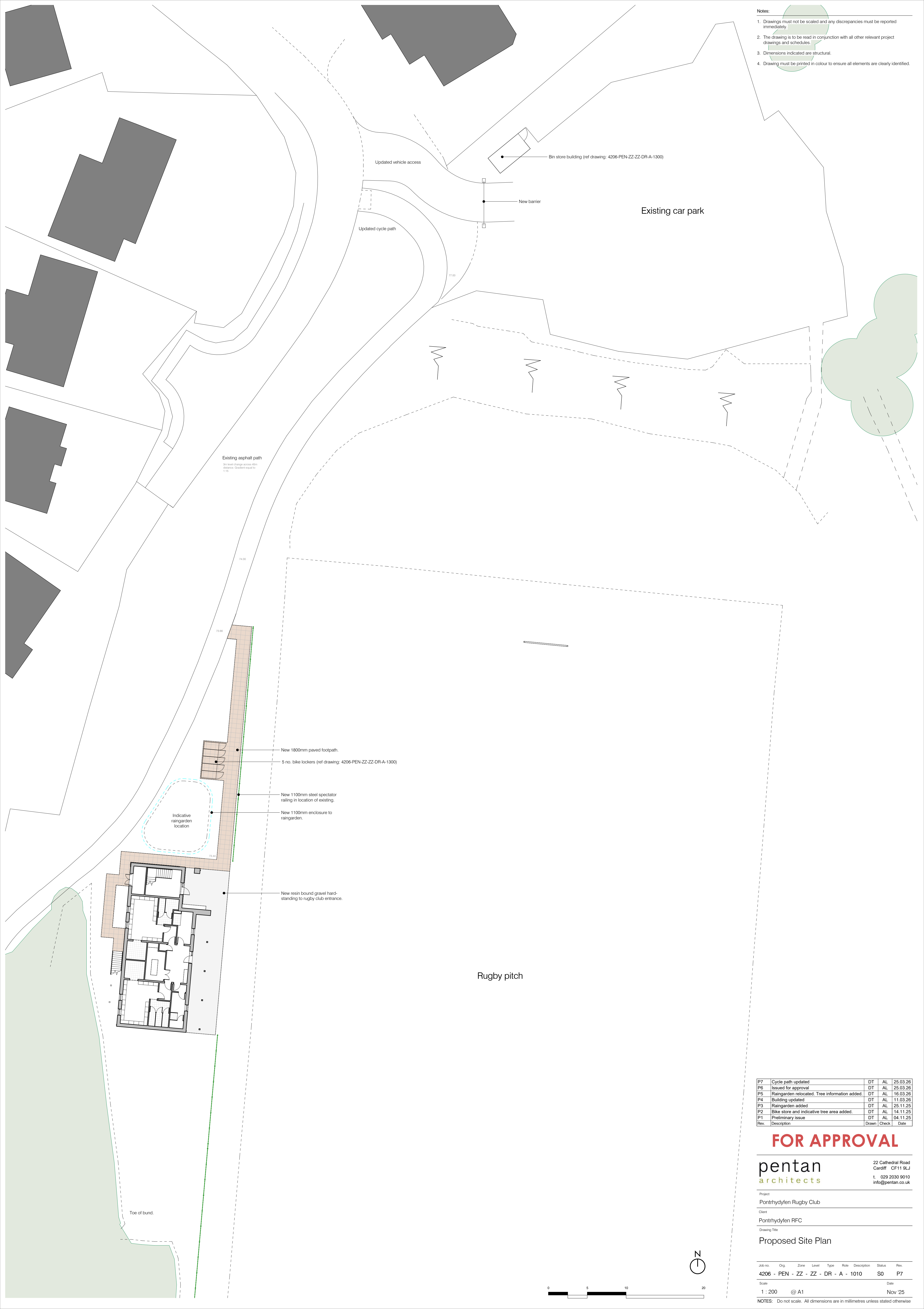
The latest NRW Flood Risk Map is shown within Appendix C.

Conclusions

- The development is in Flood Zone 1 from Rivers and Sea (FMfP).
- Foul water will discharge into the existing public sewer to the north of the development.
- Surface water runoff rate from site will discharge to ground via infiltration at an initial design rate of 2.89×10^{-06} m/s. Further soakaway testing is required during the full Tier 2 Site Investigation.
- The surface water drainage system will be designed to accommodate storm events up to and including the 1 in 100-year event with a 40% allowance for an increase in rainfall intensity due to climate change.
- A Pre-SAB application will be submitted to NPTCBC SAB and feedback will be incorporated within the final detailed design.
- A Full SAB application will be submitted during the detailed design stage and approved prior to commencing construction.
- The development will not result in increase of flood risk downstream.

Appendix A – Site Layout

- Notes:
1. Drawings must not be scaled and any discrepancies must be reported immediately.
 2. The drawing is to be read in conjunction with all other relevant project drawings and schedules.
 3. Dimensions indicated are structural.
 4. Drawing must be printed in colour to ensure all elements are clearly identified.



P7	Cycle path updated	DT	AL	25.03.26
P6	Issued for approval	DT	AL	25.03.26
P5	Raingarden relocated. Tree information added.	DT	AL	16.03.26
P4	Building updated	DT	AL	11.03.26
P3	Raingarden added	DT	AL	25.11.25
P2	Bike store and indicative tree area added.	DT	AL	14.11.25
P1	Preliminary issue	DT	AL	04.11.25
Rev.	Description	Drawn	Check	Date

FOR APPROVAL

pentan
architects

22 Cathedral Road
Cardiff CF11 9LJ
t. 029 2030 9010
info@pentan.co.uk

Project
Pontrhydyfen Rugby Club

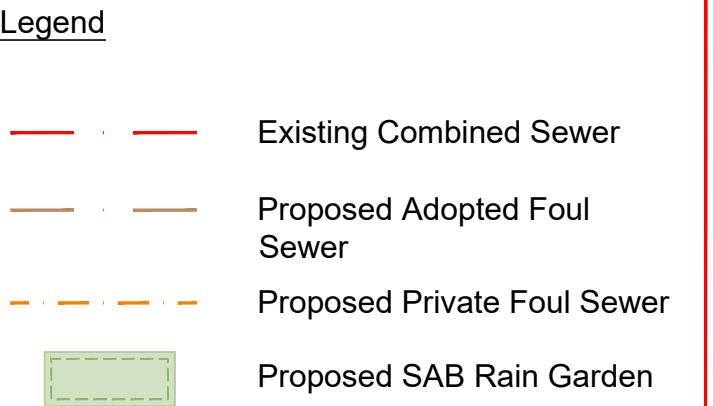
Client
Pontrhydyfen RFC

Drawing Title
Proposed Site Plan

Job no.	Org.	Zone	Level	Type	Role	Description	Status	Rev.
4206	-	PEN	-	ZZ	-	DR	-	A - 1010
SO								P7
Scale		Date						
1 : 200		@ A1		Nov '25				

NOTES: Do not scale. All dimensions are in millimetres unless stated otherwise

Appendix B – Engineering Layout



/	27.04.26	Initial issue	SID TOR
REV	DATE	DETAILS	BY CHK
AMENDMENTS			



PHG CONSULTING ENGINEERS
PHG CONSULTING LTD
62A ALBANY ROAD
CARDIFF CF24 3RR
T: +44(0)29 2030 2521
E: enquiries@phg-consulting.co.uk
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 @PHG_consulting
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phg-consulting-engineers

PROJECT: **V15 Consulting
Ponrhydyfen RFC**

Engineering Layout

RAWN:	CHC:	STATUS:	SCALE:
SJD	TOR	Information	1:500 @ A1
DATE:	JOB NO.	DRG. NO.	REV.
April '26	2769	100	

Appendix C – NRW Flood Map



Flood Map for Planning - Basic
Enter title (max 35 characters)

Legend

TAN15 Defended Zones

- Rivers
- Sea
- Rivers and Sea

Rivers and Sea

- Flood Zone 3
- Flood Zone 2

Surface Water and Small Watercourses

- Flood Zone 3
- Flood Zone 2

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Scale at A3: 1:2,500

Date: 30/04/2025

0.1 0.05 0 0.1
km
British National Grid

Disclaimer
<https://naturalresources.wales/flooding/disclaimer-for-our-flood-and-coastal-erosion-risk-maps/?lang=en>

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Appendix D – Welsh Water Correspondence

Mr Stephen Davis
PHG Consulting Engineers
107 Cowbridge Road East
Cardiff
CF11 9AG

Date: 03/03/2026
Our Ref: PPA0009943

Dear Mr Davis,

Grid Ref: 279420 193801

Site Address: Pontrhydyfen RFC, Oakwood Avenue, Pontrhydyfen

Development: Sports Facility

I refer to your pre-planning enquiry received relating to the above site, seeking our views on the capacity of our network of assets and infrastructure to accommodate your proposed development. Having reviewed the details submitted I can provide the following comments which should be taken into account within any future planning application for the development.

APPRAISAL

Firstly, we note that the proposal relates to a Sports Facility at Pontrhydyfen RFC, Oakwood Avenue, Pontrhydyfen, Neath Port Talbot and acknowledge that the site comprises of a potential windfall development with no allocated status in the Local Development Plan (LDP). Accordingly, whilst it does not appear an assessment has been previously undertaken of the public sewerage and watermains systems, we offer the following comments as part of our appraisal of this development.

PUBLIC SEWERAGE NETWORK

The proposed development site is located in the immediate vicinity of a combined public sewerage system which drains to Afan New Works Wastewater Treatment Works (WwTW).

You are also advised that some public sewers and lateral drains may not be recorded on our maps of public sewers because they were originally privately owned and were transferred into public ownership by nature of the Water Industry (Schemes for Adoption of Private Sewers) Regulations 2011. The presence of such assets may affect the proposal. In order to assist you may contact Dwr Cymru Welsh Water on 0800 085 3968 to establish the location and status of the apparatus in and around your site. Please be mindful that under the Water Industry Act 1991 Dwr Cymru Welsh Water has rights of access to its apparatus at all times.

SURFACE WATER DRAINAGE

As of 7th January 2019, this proposed development is subject to Schedule 3 of the Flood and Water Management Act 2010. The development therefore requires approval of Sustainable Drainage Systems (SuDS) features, in accordance with the 'Statutory standards for sustainable drainage systems – designing, constructing, operating and maintaining surface water drainage systems'. As highlighted in these standards, the developer is required to explore and fully exhaust all surface water drainage options in accordance with a hierarchy preferring infiltration (PL2) and, where infiltration is not possible, disposal to a surface water body (PL3), in liaison with the Lead Local Flood Authority and/or Natural Resources Wales, or surface water sewer or highway drain (PL4) in liaison with the riparian owner and/or Local Highways Authority.

Please note, DCWW is a statutory consultee to the SAB application process and will provide comments to any SuDS proposals by response to SAB consultation. Please refer to further detailed advice relating to surface water management included in our attached Advice & Guidance note and our Developer Services website at <https://developers.dwrcymru.com/en/help-advice/regulation-to-be-aware-of/sustainable-drainage-systems>.

In the absence of an accompanying surface water drainage strategy, it is recommended that the developer engage in consultation with Bridgend County Borough Council, as the determining SuDS Approval Body (SAB), in relation to their proposals for SuDS features. Please be advised that due to capacity constraints with the downstream public sewerage network, under no circumstances would we allow surface water highway run-off from the proposed development to communicate directly or indirectly with the public combined sewerage system. In addition, please note, no amount of land drainage run-off is permitted to discharge directly or indirectly into the public sewerage system.



Welsh Water is owned by Glas Cymru – a 'not-for-profit' company.
Mae Dŵr Cymru yn eiddo i Glas Cymru – cwmni 'nid-er-elw'.

We welcome correspondence in
Welsh and English

Dŵr Cymru Cyf, a limited company registered in
Wales no 2366777. Registered office: Pentwyn Road,
Nelson, Treharris, Mid Glamorgan CF46 6LY

Rydym yn croesawu gohebiaeth yn y
Gymraeg neu yn Saesneg

Dŵr Cymru Cyf, cwmni cyfyngedig wedi'i gofrestru yng
Nghymru rhif 2366777. Swyddfa gofrestredig: Heol Pentwyn
Nelson, Treharris, Morgannwg Ganol CF46 6LY.

Furthermore, Planning Policy Wales (PPW) acknowledges that discharge of surface water to foul sewers is prohibited and highlights that any additional surface water from new developments should not be discharged to combined systems because of the risk of pollution when combined systems overflow (Para 6.6.3). Moreover, PPW recognises the challenges faced from rainfall intensity causing surface water flooding and diffuse pollution (Para 6.6.14) along with the importance of well-maintained sewerage networks (Para 6.6.15), particularly as a result of run-off from built surfaces and the sewage discharges from overloaded sewers (Para 6.6.16).

FOUL WATER DRAINAGE – SEWERAGE NETWORK

We have considered the impact of foul flows generated by the proposed development and concluded that flows can be accommodated within the public sewerage system. We advise that the flows should be connected to the combined sewer at manhole SS79934805 located in the road to the north.

Should a planning application be submitted for this development we will seek to control this point of communication via appropriate planning conditions and therefore recommend that any drainage layout or strategy submitted as part of your application takes this into account. However, should you wish for an alternative connection point to be considered please provide further information to us in the form of a drainage strategy, preferably in advance of a planning application being submitted.

You may need to apply to Dwr Cymru Welsh Water for any connection to the public sewer under Section 106 of the Water industry Act 1991. However, if the connection to the public sewer network is either via a lateral drain (i.e. a drain which extends beyond the connecting property boundary) or via a new sewer (i.e. serves more than one property), it is now a mandatory requirement to first enter into a Section 104 Adoption Agreement (Water Industry Act 1991). The design of the sewers and lateral drains must also conform to the Welsh Ministers Standards for Foul Sewers and Lateral Drains, and conform with the publication "Sewers for Adoption"- 7th Edition. Further information can be obtained via the Developer Services pages of www.dwrcymru.com.

FOUL WATER DRAINAGE – SEWAGE TREATMENT

No problems are envisaged with the Waste Water Treatment Works for the treatment of domestic discharges from this site.



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Rydym yn croesawu gohebiaeth yn y
Gymraeg neu yn Saesneg

Dŵr Cymru Cyf, cwmni cyfyngedig wedi'i gofrestru yng
Nghymru rhif 2366777. Swyddfa gofrestredig: Heol Pentwyn
Nelson, Treharris, Morgannwg Ganol CF46 6LY.

POTABLE WATER SUPPLY

A water supply can be made available to service this proposed development. Initial indications are that a connection can be made from the 4" diameter UPVC watermain in 279412, 193843 location. The cost of providing new on-site watermain can be calculated upon the receipt of detailed site layout plans which should be sent to the above address.

Dwr Cymru Welsh Water is not responsible for fire protection or for providing suitable fire flows. Providing fire flows and fire protection are the responsibility of the appropriate regional Fire Services. We refer you to the 3rd Edition of the National Guidance Document on the Provision of Water for Fire Fighting published by the Local Government Association and Water UK.

FURTHER CONTACT

If you have any questions about the above response, please contact Amy Marshall who is the Development Planning Officer for Bridgend at developer.services@dwrcymru.com or on 0800 917 2652. They will be happy to assist you further.

I trust the above information is helpful and will assist you in forming water and drainage strategies that should accompany any future planning application. I also attach copies of our water and sewer extract plans for the area, and a copy of our Planning Guidance Note which provides further information on our approach to the planning process, making connections to our systems and ensuring any existing public assets or infrastructure located within new development sites are protected.

Please note that our response is based on the information provided in your enquiry and should the information change we reserve the right to make a new representation. Should you have any queries or wish to discuss any aspect of our response please do not hesitate to contact our dedicated team of planning officers, either on 0800 917 2652 or via email at developer.services@dwrcymru.com

Please quote our reference number in all communications and correspondence.

Yours faithfully,

Matthew Lord
Planning Liaison Manager
Developer Services

Please Note that demands upon the water and sewerage systems change continually; consequently the information given above should be regarded as reliable for a maximum period of 12 months from the date of this letter.



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We welcome correspondence in
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Rydym yn croesawu gohebiaeth yn y
Gymraeg neu yn Saesneg

Dŵr Cymru Cyf, cwmni cyfyngedig wedi'i gofrestru yng
Nghymru rhif 2366777. Swyddfa gofrestredig: Heol Pentwyn
Nelson, Treharris, Morgannwg Ganol CF46 6LY.



PPA0009943



LEGEND(Representative of most common features)

Waste network:	Manhole	Outfall
Manhole	Manhole	Manhole
Surface water chamber	Storm Overflow	Rising main
Combined chamber	Gravity sewer	Private sewer
Combined sewer overflow	Private sewer subject to Sect. 13A adoption agreement	Lateral Drain
Special purpose chamber	Inspection Chamber	
Treatment works		
Pumping station		
SE: Sewer symbol colour indicates the type.		
RED - Combined		
GREEN - Surface Water		
BROWN - Foul		
Purple - Private (for adoption purposes only)		

Notes:

Whilst every reasonable effort has been taken to correctly record the pipe material of DCNW assets, there is a possibility that in some cases pipe material (other than Asbestos Cement or Pitch Fibre) may be found to be asbestos cement (AC) or Pitch Fibre (PF). It is therefore advisable that the possible presence of AC or PF pipes be anticipated and considered as part of any risk assessment prior to excavation.

Dŵr Cymru Cŷnngedig (the Company) gives this information as to the position of its underground apparatus by way of general guidance only and on the understanding that it is based on the best information available and no warranty as to its correctness is relied upon in the event of excavations or other works made in the vicinity of the company's apparatus. The user of this information is advised to carry out any excavations made entirely on their own. The information which is supplied by the Company is done so in accordance with statutory requirements of sections 105 and 109 of the Water Industry Act 1991 which in turn gives the best information available and, in particular, but without prejudice to the generality of the foregoing, it should be noted that the records that are available to the Company may not disclose the existence of a water main, service pipe, sewer, lateral drain or downpipe and any associated apparatus and before 1 September 1992, or if they do, the particular detail including the position underground may not be accurate. It must be understood that the furnishing of this information is entirely without prejudice to the provisions of the New Roads and Street Works Act 1991 and the Company's right to be compensated for any damage to its apparatus.

Service pipes are not generally shown but their presence should be anticipated.

EXACT LOCATIONS OF ALL APPARATUS
TO BE DETERMINED ON SITE.

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Map Ref: 279446,193815
Map scale: 1:1000
Printed by: Hannah Lewis
Printed on: 03 Mar 2026

Appendix E – Soakaway Testing Report

Our Ref: BW/TF-25-587-CA/Soakaway Letter

Your Ref:

Contact: Ben Walder

27th April 2026

PHG Consulting
107 Cowbridge Road East
Cardiff
CF11 9AG

For the attn. of Mr Stephen Davis

Dear Sir,

FALLING HEAD TESTING: Pontrhydyfen RFC, Pontrhydyfen

1.0 Introduction

PHG Consulting (The Client) commissioned Terra Firma to undertake falling head testing at the rugby club in Pontrhydyfen.

1.1 Limitations and Exceptions of Investigation

The investigation was conducted, and this report has been prepared for the sole internal reliance of the Client and their design and construction team. This report shall not be relied upon or transferred to any other parties without the express written authorisation of Terra Firma (Wales) Limited. If an unauthorised third party comes into possession of this report, they rely on it at their peril and the authors owe them no duty of care and skill. The report represents the findings and opinions of experienced geoenvironmental and geotechnical consultants. TFW Group Ltd (Terra Firma) does not provide legal advice and the advice of lawyers may be required.

The subsurface geological profiles, any contamination and other plots are generalised by necessity and have been based on the information found at the locations of the exploratory holes and depths sampled and tested.

2.0 Site Works

A ground investigation comprising three window sample boreholes, including three falling head tests, was undertaken on the 10th of March 2026.

The fieldwork was supervised by TFW Group Limited, who logged the exploratory holes to the requirements of BS 5930:2015+A1:2020. The proposed locations of the exploratory holes were determined by the clients' design team and positioned on site by TFW Group in general accordance with BS 10175:2011+A2:2017 in order to assess the findings of the preliminary conceptual site model.

The boreholes referenced FH1 to FH3 were formed using a Archway Dart rig. Dynamic sampling techniques were employed from surface.

Standard penetration tests (SPT) were carried out at regular intervals in general accordance with BS1377: Part 9:1990:3.3. SPT results summarised as N values are presented on the borehole log. Boreholes were monitored for groundwater ingress as drilling proceeded. Representative disturbed samples were taken and retained in airtight containers for environmental and geotechnical testing.

The borehole logs are presented in **Annex A**

Falling head tests were carried out in FH1 to FH3 in general accordance with BS5930:2015. Rising head tests were carried out by lowering the water level in the borehole. Falling head tests were carried out by adding water to the borehole. Coefficients of permeability were calculated using the general approach/time lag method and the results are presented in **Annex B**.

On completion, boreholes were backfilled with arisings and left mounded to accommodate any future settlement that may occur.

Exploratory hole locations are shown on **Drawing 01**.

2.1 Summary of Ground Conditions

Table 2.1: Summary of Typical Ground Conditions

Depth (m)			Thickness (m)	Stratum
FH1				
0.0	-	0.40	0.40	Grass over topsoil of soft dark brown slightly sandy CLAY .
0.40	-	1.50	-	Soft to very stiff dark brown slightly sandy gravelly CLAY . Gravel is angular to subrounded fine to coarse sandstone.
FH2				
0.0	-	0.30	0.30	Grass over very soft to soft slightly sandy gravelly silty CLAY . Gravel is angular to subrounded fine and medium sandstone.
0.30	-	0.90	0.60	Dense light orangish brown very sandy clayey angular to subangular fine to coarse sandstone GRAVEL .
0.90	-	2.00	-	Very dense yellowish brown slightly clayey fine to coarse SAND .
FH3				
0.0	-	1.30	1.30	MADE GROUND . Black mottled brown sandy clayey angular to subrounded fine to coarse asphalt, brick, slag and ash GRAVEL .
1.30	-	1.50	-	Medium dense yellowish brown sandy angular to subrounded fine to coarse sandstone GRAVEL .

The borehole logs can be found within **Annex A** and their locations are shown in **Drawing 01**.

2.2 Stability and Obstructions

Boreholes encountered some instability and typically collapsed slightly at the base during falling head tests.

No significant obstructions were encountered.

2.3 Groundwater

Groundwater was not encountered within the boreholes.

3.0 Soakaway Testing

During the site investigation three borehole falling head tests were undertaken in FH01, FH02 and FH03 and carried out in accordance with BRE DG 365:2016. The soakaway test results are summarised below.

Table 2.1 Summary of Falling Head Results

Borehole	Depth Range of Test (m)	Infiltration Rate (ms^{-1})
FH01	0.11 - 1.50	8.19×10^{-7}
FH02	0.30 - 1.40	2.89×10^{-6}
FH02	0.25 – 1.40	3.18×10^{-6}
FH03	0.30 – 1.05	2.59×10^{-5}
FH03	0.30 – 1.05	1.72×10^{-5}

The falling head test calculation sheets can be found in **Annex B**.

We trust that the above is to your satisfaction, however, if you have any queries or require any further information, please do not hesitate to contact us.

For TFW Group Ltd;



Mr Ben Walder

BSC (Hons), PGd, FGS

**Annex A
Borehole Logs**



Terra Firma

TFW Group Ltd, 5 Deryn Court, Wharfedale Road, Cardiff, CF23 7

Phone: 02920 735354

Geotechnical Log - WS

FH01

UTM	: 30U	Drill Rig	: Archway Dart	Job Number	: 25-587
Latitude	: 51.63023	Driller Supplier	: Terra Firma	Client	: Pontrhydyfen RFC
Longitude	: -3.74341	Logged By	: BW	Project	: Pontrhydyfen RFC
Ground Elevation	: 74.19 (m)	Reviewed By	: TM	Location	: 4 Oakwood Ave, Pontrhydyfen, Port Talbot SA12 9SD, UK
Total Depth	: 1.5 m BGL	Date	: 10/03/2026	Loc Comment	:

Test Results	Depth (m)	Legend	Stratum Description	Depth Scale
6-15-13-9-14-14 N = 50	0.4		Grass over soft dark brown slightly sandy CLAY.	1.0
			Soft to very stiff dark brown slightly sandy gravelly CLAY. Gravel is angular to subrounded fine to coarse sandstone.	
			FH01 Refusal at 1.5 m	



Terra Firma

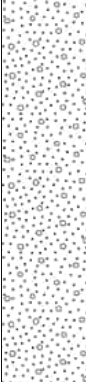
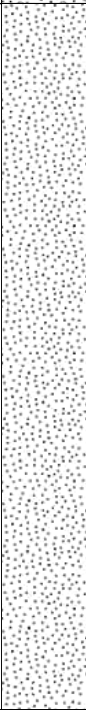
TFW Group Ltd, 5 Deryn Court, Wharfedale Road, Cardiff, CF23 7

Phone: 02920 735354

Geotechnical Log - WS

FH02

UTM	: 30U	Drill Rig	: Archway Dart	Job Number	: 25-587
Latitude	: 51.62992	Driller Supplier	: Terra Firma	Client	: Pontrhydyfen RFC
Longitude	: -3.74364	Logged By	: BW	Project	: Pontrhydyfen RFC
Ground Elevation	: 73.59 (m)	Reviewed By	: TM	Location	: 4 Oakwood Ave, Pontrhydyfen, Port Talbot SA12 9SD, UK
Total Depth	: 2 m BGL	Date	: 10/03/2026	Loc Comment	

Test Results	Depth (m)	Legend	Stratum Description	Depth Scale
5-5-6-7-8-14 N = 35	0.3		Grass over very soft to soft slightly sandy gravelly and silty CLAY. Gravel is fine to medium sandstone.	1.0
			Dense light orangish brown very sandy clayey GRAVEL. Gravel is angular to subangular fine to coarse sandstone. Sand is fine to coarse.	
	0.9		Very dense yellowish brown slightly clayey fine to coarse SAND.	
17-8-16-17-15-2 N = 50				
			FH02 Terminated at 2 m	



Terra Firma

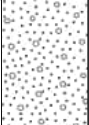
TFW Group Ltd, 5 Deryn Court, Wharfedale Road, Cardiff, CF23 7

Phone: 02920 735354

Geotechnical Log - WS

FH03

UTM	: 30U	Drill Rig	: Archway Dart	Job Number	: 25-587
Latitude	: 51.62971	Driller Supplier	: Terra Firma	Client	: Pontrhydyfen RFC
Longitude	: -3.74364	Logged By	: BW	Project	: Pontrhydyfen RFC
Ground Elevation	: 73.12 (m)	Reviewed By	: TM	Location	: 4 Oakwood Ave, Pontrhydyfen, Port Talbot SA12 9SD, UK
Total Depth	: 1.5 m BGL	Date	: 10/03/2026	Loc Comment	:

Test Results	Depth (m)	Legend	Stratum Description	Depth Scale
6-15-13-9-14-14 N = 21	1.3		MADE GROUND. Black mottled brown sandy clayey angular to subrounded fine to coarse GRAVEL of asphal, brick, slag and ash.	1.0
			Medium dense yellowish brown sandy angular to subrounded fine to coarse GRAVEL of sandstone.	
			FH03 Refusal at 1.5 m	

Annex B
Falling Head Calculation
Sheets

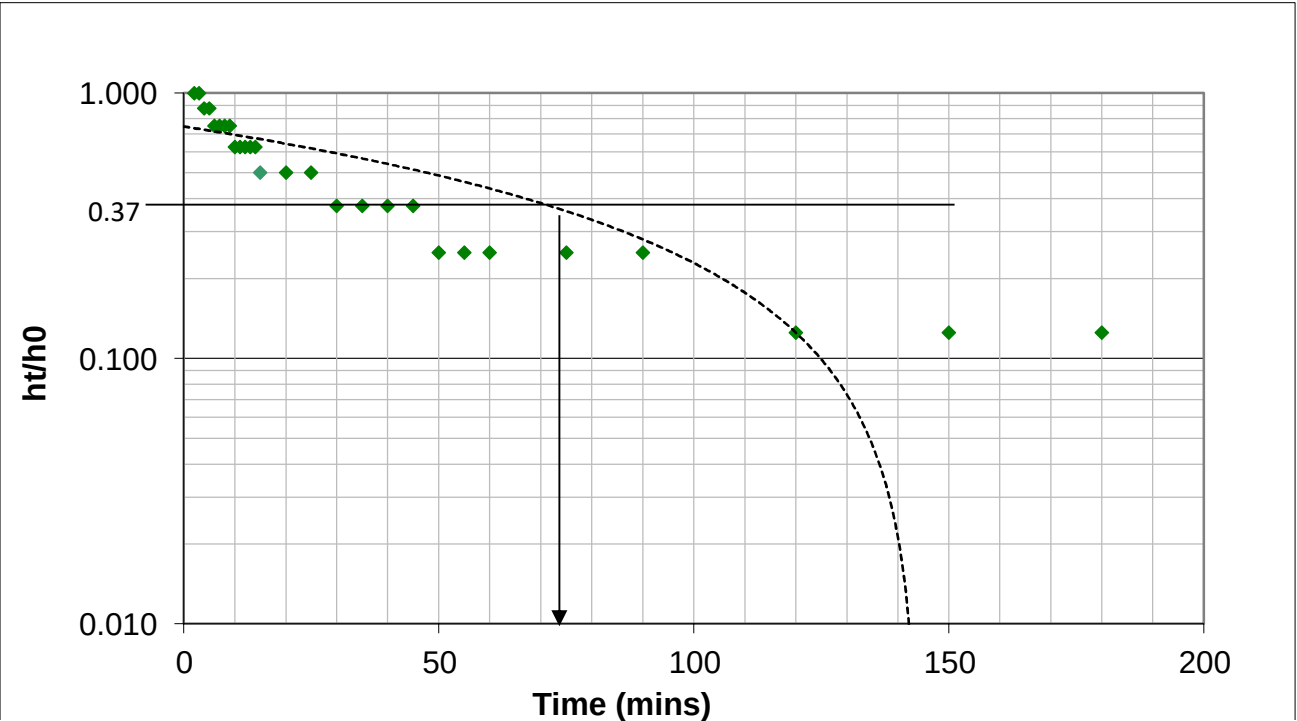
Site Name: Pontrhydyfen RFC
Position: FH01
Date Undertaken: 10.03.2026

Initial Measurement (m)	Time Elapsed (mins)	dt	Depth of Water bgl (m)	ht **	ht/h0
	0		0.11	0.090	1.125
	1		0.11	0.090	1.125
	2		0.12	0.080	1.000
	3		0.12	0.080	1.000
	4		0.13	0.070	0.875
	5		0.13	0.070	0.875
	6		0.14	0.060	0.750
	7		0.14	0.060	0.750
	8		0.14	0.060	0.750
	9		0.14	0.060	0.750
	10		0.15	0.050	0.625
	11		0.15	0.050	0.625
	12		0.15	0.050	0.625
	13		0.15	0.050	0.625
	14		0.15	0.050	0.625
	15		0.16	0.040	0.500
	20		0.16	0.040	0.500
	25		0.16	0.040	0.500
	30		0.17	0.030	0.375
	35		0.17	0.030	0.375
	40		0.17	0.030	0.375
	45		0.17	0.030	0.375
	50		0.18	0.020	0.250
	55		0.18	0.020	0.250
	60		0.18	0.020	0.250
	75		0.18	0.020	0.250
	90		0.18	0.020	0.250
	120		0.19	0.010	0.125
Last Measurement (m)	150		0.19	0.010	0.125
	180		0.19	0.010	0.125

Depth of Borehole (m)	1.50
Depth of Casing (m)	0.00
L Testing depth - casing depth (m)	1.5
D Diameter of Borehole (m)	0.115
Ground Water Level (m) at end of test	0.20
h0 Depth of water at end - depth of water at start (m)	0.080

F Intake Factor **	
2 π L	9.420
L/D	13.04
√(1+ L / D)²	14.04
logₑ [(L/D) + √(1+ L / D)²]	3.299
F	2.855

K Soil Infiltration Rate **	
A Cross-sectional Area (m2)	0.0104
F	2.86
T (read off graph at 0.37 ht/h0)	74.00



Soil infiltration rate (m/min)	4.91328E-05
Soil infiltration rate (m/sec)	0.000000819

Soil Infiltration Worksheet: This worksheet has been produced in combination with the document 'BS 5930:1999+A2:2010, Section 25.4'
This worksheet can be used to determine soil infiltration rates from borehole field measurements
Worksheet options are identified by a green background

** $F = \frac{2 \pi L}{\log_e [(L/D) + \sqrt{(1+ (L /D)^2)}]}$

** $K = \frac{A}{FT}$

** $h_t = \text{Level of water at end of test} - dt$

Site Name: Pontrhydyfen RFC
Position: FH02
Date Undertaken: 10.03.2026

	Time Elapsed (mins)	dt	Depth of Water bgl (m)	ht **	ht/h0
Initial Measurement (m)	0		0.3	0.500	1.020
	1		0.38	0.420	0.857
	2		0.44	0.360	0.735
	3		0.5	0.300	0.612
	4		0.52	0.280	0.571
	5		0.55	0.250	0.510
	6		0.57	0.230	0.469
	7		0.59	0.210	0.429
	8		0.61	0.190	0.388
	9		0.63	0.170	0.347
	10		0.64	0.160	0.327
	11		0.65	0.150	0.306
	12		0.65	0.150	0.306
	13		0.66	0.140	0.286
	14		0.67	0.130	0.265
	15		0.68	0.120	0.245
	20		0.69	0.110	0.224
	25		0.7	0.100	0.204
	30		0.71	0.090	0.184
	35		0.72	0.080	0.163
Last Measurement (m)	40		0.73	0.070	0.143
	45		0.74	0.060	0.122
	50		0.74	0.060	0.122
	55		0.75	0.050	0.102
	60		0.76	0.040	0.082
	90		0.77	0.030	0.061
	100		0.78	0.020	0.041
	120		0.79	0.010	0.020

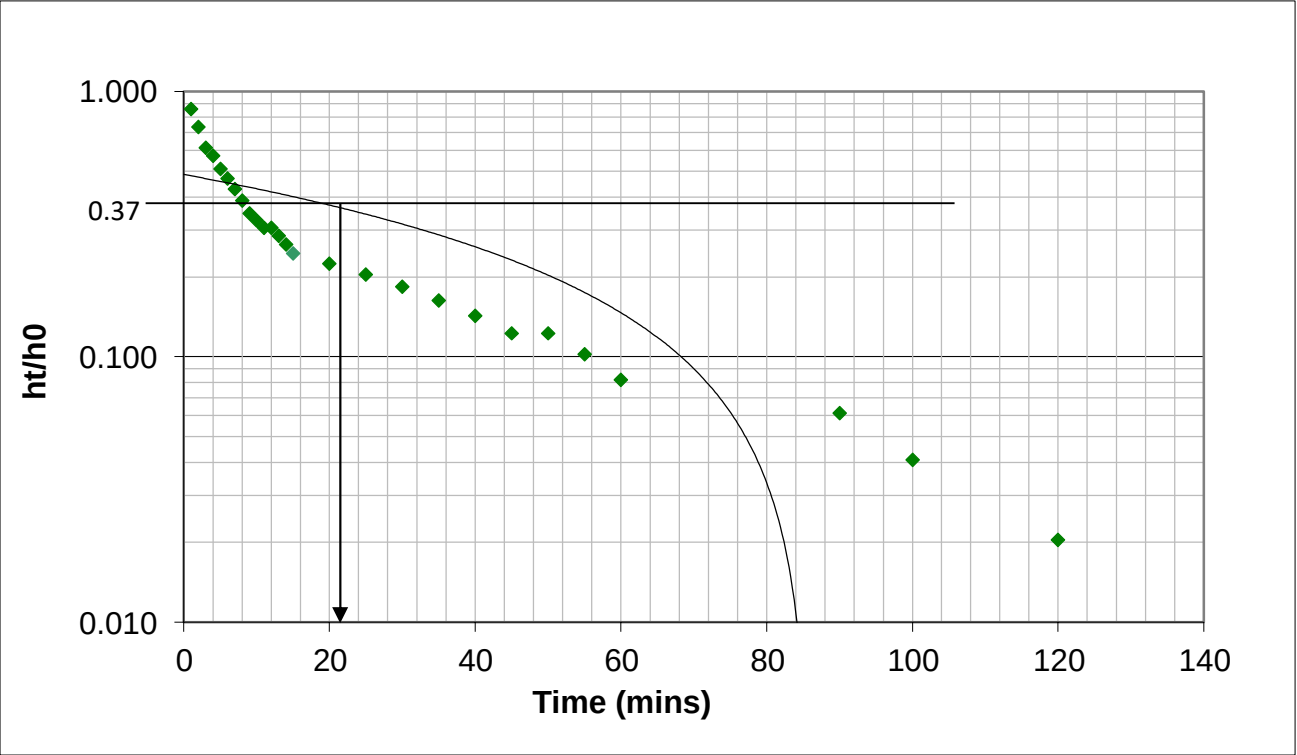
Depth of Borehole (m)	1.40
Depth of Casing (m)	0.00
L Testing depth - casing depth (m)	1.4
D Diameter of Borehole (m)	0.115
Ground Water Level (m) at end of test	0.80
h0 Depth of water at end - depth of water at start (m)	0.490

F Intake Factor **	
2 π L	8.792
L/D	12.17
√(1+ L / D) ²	13.17
log _e [(L/D) + √(1+ L / D) ²]	3.233
F	2.720

K Soil Infiltration Rate **	
A Cross-sectional Area (m2)	0.0104
F	2.72
T (read off graph at 0.37 ht/h0)	22.00

Soil infiltration rate (m/min)	0.000173508
Soil infiltration rate (m/sec)	0.000002892

Soil Infiltration Worksheet: This worksheet has been produced in combination with the document 'BS 5930:1999+A2:2010, Section 25.4'
This worksheet can be used to determine soil infiltration rates from borehole field measurements
Worksheet options are identified by a green background



Site Name: Pontrhydyfen RFC
Position: FH02
Date Undertaken: 10.03.2026

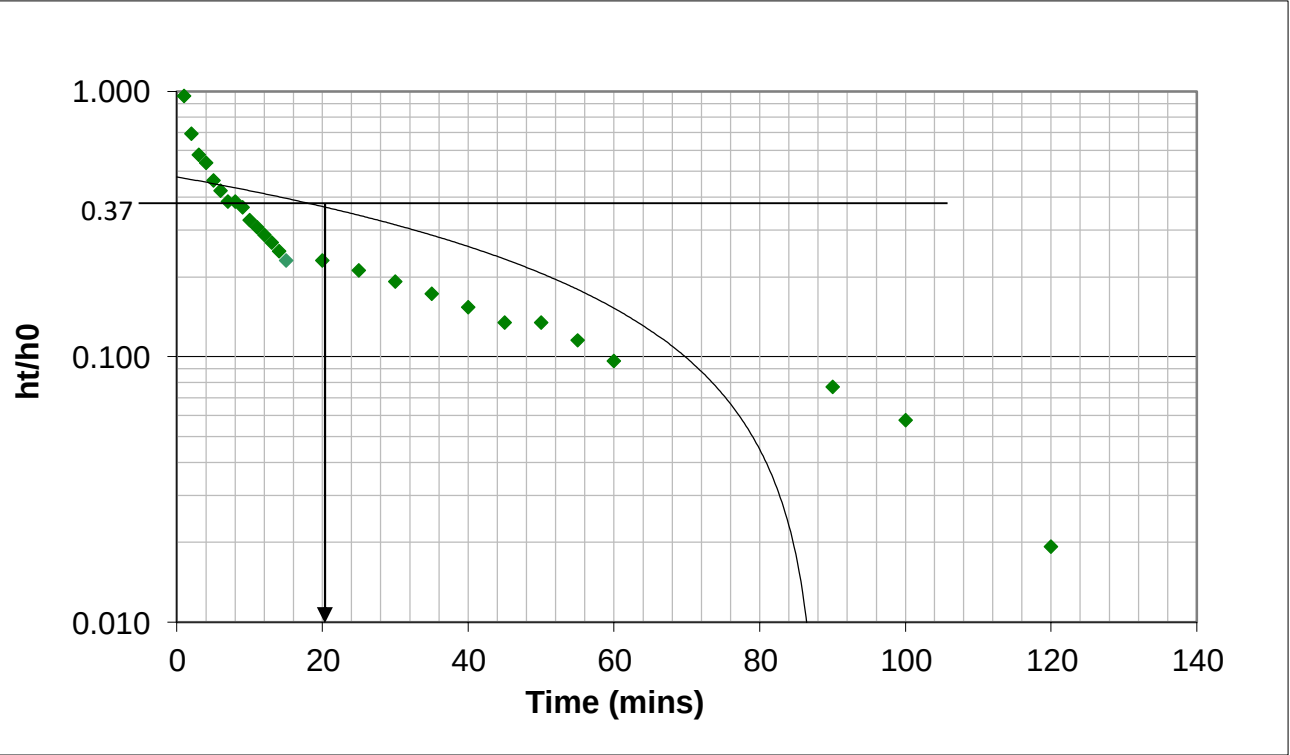
	Time Elapsed (mins)	dt	Depth of Water bgl (m)	ht **	ht/h0
Initial Measurement (m)	0		0.25	0.530	1.019
	1		0.28	0.500	0.962
	2		0.42	0.360	0.692
	3		0.48	0.300	0.577
	4		0.5	0.280	0.538
	5		0.54	0.240	0.462
	6		0.56	0.220	0.423
	7		0.58	0.200	0.385
	8		0.58	0.200	0.385
	9		0.59	0.190	0.365
	10		0.61	0.170	0.327
	11		0.62	0.160	0.308
	12		0.63	0.150	0.288
	13		0.64	0.140	0.269
	14		0.65	0.130	0.250
	15		0.66	0.120	0.231
	20		0.66	0.120	0.231
	25		0.67	0.110	0.212
	30		0.68	0.100	0.192
	35		0.69	0.090	0.173
Last Measurement (m)	40		0.7	0.080	0.154
	45		0.71	0.070	0.135
	50		0.71	0.070	0.135
	55		0.72	0.060	0.115
	60		0.73	0.050	0.096
	90		0.74	0.040	0.077
	100		0.75	0.030	0.058
	120		0.77	0.010	0.019

Depth of Borehole (m)	1.40
Depth of Casing (m)	0.00
L Testing depth - casing depth (m)	1.4
D Diameter of Borehole (m)	0.115
Ground Water Level (m) at end of test	0.78
h0 Depth of water at end - depth of water at start (m)	0.520

F Intake Factor **	
2 π L	8.792
L/D	12.17
√(1+ L / D) ²	13.17
log _e [(L/D) + √(1+ L / D) ²]	3.233
F	2.720

K Soil Infiltration Rate **	
A Cross-sectional Area (m2)	0.0104
F	2.72
T (read off graph at 0.37 ht/h0)	20.00

Soil infiltration rate (m/min)	0.000190859
Soil infiltration rate (m/sec)	0.000003181



Soil Infiltration Worksheet: This worksheet has been produced in combination with the document 'BS 5930:1999+A2:2010, Section 25.4'
This worksheet can be used to determine soil infiltration rates from borehole field measurements
Worksheet options are identified by a green background

Site Name: Pontrhydyfen RFC
Position: FH03
Date Undertaken: 10.03.2026

	Time Elapsed (mins)	dt	Depth of Water bgl (m)	ht **	ht/h0
Initial Measurement (m)	0		0.3	0.750	1.000
	1		0.55	0.500	0.667
	2		0.7	0.350	0.467
	3		0.8	0.250	0.333
	4		0.83	0.220	0.293
	5		0.85	0.200	0.267
	6		0.86	0.190	0.253
	7		0.86	0.190	0.253
	8		0.88	0.170	0.227
	9		0.89	0.160	0.213
	10		0.92	0.130	0.173
	11		0.94	0.110	0.147
	12		0.95	0.100	0.133
	13		0.97	0.080	0.107
	14		0.99	0.060	0.080
Last Measurement (m)	15		1	0.050	0.067
	20		1.05	0.000	0.000
	25		1.05	0.000	0.000
	30		1.05	0.000	0.000
	35		1.05	0.000	0.000
	40		1.05	0.000	0.000
	45		1.05	0.000	0.000
	50		1.05	0.000	0.000
	55		1.05	0.000	0.000
	60		1.05	0.000	0.000

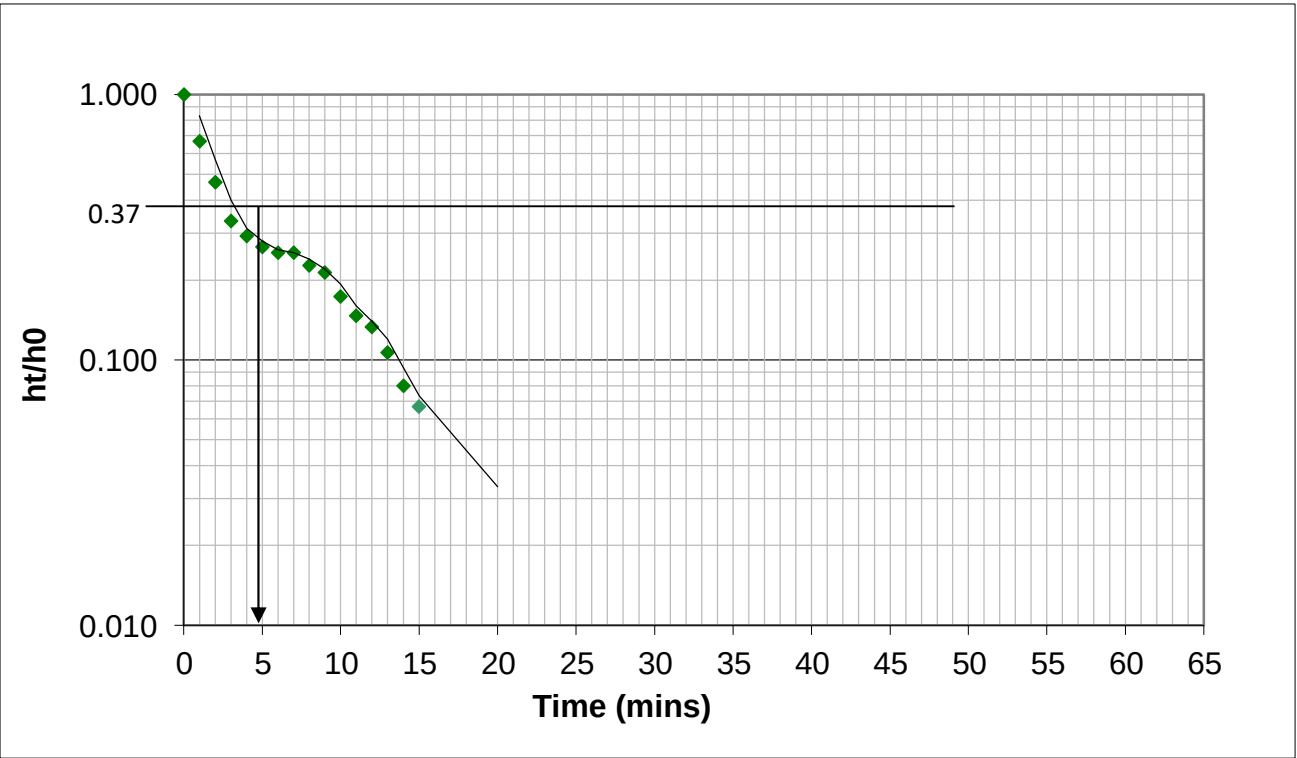
Depth of Borehole (m)	1.05
Depth of Casing (m)	0.00
L Testing depth - casing depth (m)	1.05
D Diameter of Borehole (m)	0.115
Ground Water Level (m) at end of test	1.05
h0 Depth of water at end - depth of water at start (m)	0.750

F Intake Factor **	
2 π L	6.594
L/D	9.13
√(1+ L / D)²	10.13
logₑ [(L/D) + √(1+ L / D)²]	2.958
F	2.229

K Soil Infiltration Rate **	
A Cross-sectional Area (m2)	0.0104
F	2.23
T (read off graph at 0.37 ht/h0)	3.00

Soil infiltration rate (m/min)	0.001552403
Soil infiltration rate (m/sec)	0.000025873

Soil Infiltration Worksheet: This worksheet has been produced in combination with the document 'BS 5930:1999+A2:2010, Section 25.4'
This worksheet can be used to determine soil infiltration rates from borehole field measurements
Worksheet options are identified by a green background



Site Name: Pontrhydyfen RFC
Position: FH03
Date Undertaken: 10.03.2026

	Time Elapsed (mins)	dt	Depth of Water bgl (m)	ht **	ht/h0
Initial Measurement (m)	0		0.3	0.750	1.000
	1		0.5	0.550	0.733
	2		0.65	0.400	0.533
	3		0.73	0.320	0.427
	4		0.78	0.270	0.360
	5		0.8	0.250	0.333
	6		0.82	0.230	0.307
	7		0.84	0.210	0.280
	8		0.86	0.190	0.253
	9		0.88	0.170	0.227
	10		0.9	0.150	0.200
	11		0.92	0.130	0.173
	12		0.93	0.120	0.160
	13		0.95	0.100	0.133
	14		0.96	0.090	0.120
	15		0.98	0.070	0.093
	20		1.01	0.040	0.053
	25		1.05	0.000	0.000
	30		1.05	0.000	0.000
	35		1.05	0.000	0.000
	40		1.05	0.000	0.000
	45		1.05	0.000	0.000
	50		1.05	0.000	0.000
	55		1.05	0.000	0.000
	60		1.05	0.000	0.000
Last Measurement (m)					

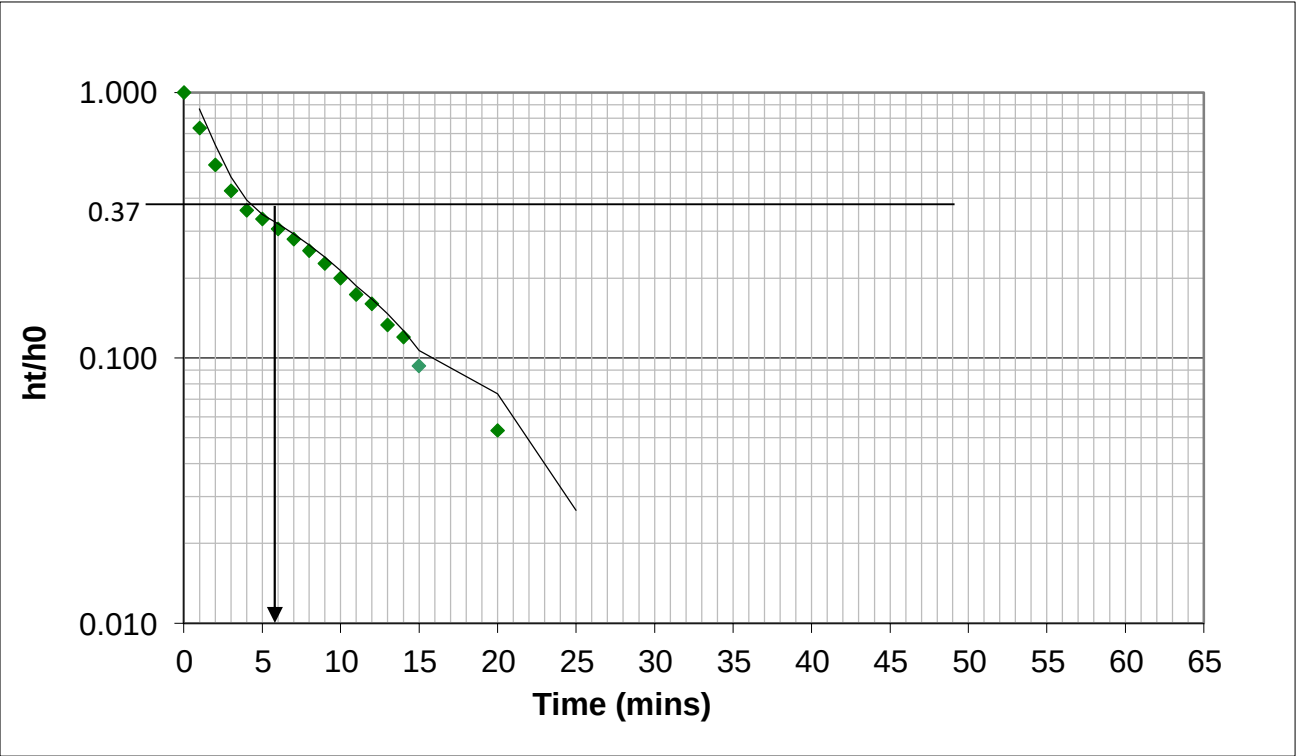
Depth of Borehole (m)	1.05
Depth of Casing (m)	0.00
L Testing depth - casing depth (m)	1.05
D Diameter of Borehole (m)	0.115
Ground Water Level (m) at end of test	1.05
h0 Depth of water at end - depth of water at start (m)	0.750

F Intake Factor **	
2 π L	6.594
L/D	9.13
√(1+ L / D)²	10.13
logₑ [(L/D) + √(1+ L / D)²]	2.958
F	2.229

K Soil Infiltration Rate **	
A Cross-sectional Area (m2)	0.0104
F	2.23
T (read off graph at 0.37 ht/h0)	4.50

Soil infiltration rate (m/min)	0.001034935
Soil infiltration rate (m/sec)	0.000017249

Soil Infiltration Worksheet: This worksheet has been produced in combination with the document 'BS 5930:1999+A2:2010, Section 25.4'
This worksheet can be used to determine soil infiltration rates from borehole field measurements
Worksheet options are identified by a green background



Drawing



Legend

 FH Locations

PROJECT:

25-587 - Pontrhydyfen RFC

DRAWING 01:

Falling Head Test Locations

TFW Group Ltd
5 Deryn Court, Wharfedale Road, Cardiff,
CF23 7HA
Tel: 029 2073 5354
Email: cardiff@tfwgroup.co.uk

Appendix F – Hydraulic Calculations

PHG Consulting Engineers				Page 1	
107 Cowbridge Road East Cardiff Wales, CF11 9AG		Pontrhydyfen RFC RG 100yr+40%cc			
Date 29/04/2026 09:46 File 2769 - RG Estimate.SRCX		Designed by SJD Checked by			
Innovyze		Source Control 2020.1			
<u>Summary of Results for 100 year Return Period (+40%)</u> Half Drain Time : 2904 minutes. Outflow is too low. Design is unsatisfactory.					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	72.632	0.132	0.1	7.7	O K
30 min Summer	72.681	0.181	0.1	11.4	O K
60 min Summer	72.741	0.241	0.1	16.1	O K
120 min Summer	72.810	0.310	0.1	21.5	O K
180 min Summer	72.849	0.349	0.1	24.8	O K
240 min Summer	72.879	0.379	0.1	27.3	O K
360 min Summer	72.923	0.423	0.1	31.0	O K
480 min Summer	72.953	0.453	0.1	33.7	O K
600 min Summer	72.977	0.477	0.1	35.7	O K
720 min Summer	72.995	0.495	0.1	37.3	O K
960 min Summer	73.022	0.522	0.1	39.8	O K
1440 min Summer	73.054	0.554	0.1	42.6	O K
2160 min Summer	73.076	0.576	0.1	44.7	O K
2880 min Summer	73.086	0.586	0.1	45.6	O K
4320 min Summer	73.098	0.598	0.2	46.7	O K
5760 min Summer	73.106	0.606	0.2	47.4	O K
7200 min Summer	73.113	0.613	0.2	48.1	O K
8640 min Summer	73.118	0.618	0.2	48.5	O K
10080 min Summer	73.120	0.620	0.2	48.7	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
15 min Summer	102.842	0.0	27		
30 min Summer	76.166	0.0	41		
60 min Summer	54.074	0.0	72		
120 min Summer	36.694	0.0	130		
180 min Summer	28.475	0.0	190		
240 min Summer	23.751	0.0	250		
360 min Summer	18.312	0.0	368		
480 min Summer	15.179	0.0	488		
600 min Summer	13.099	0.0	608		
720 min Summer	11.600	0.0	726		
960 min Summer	9.556	0.0	966		
1440 min Summer	7.242	0.0	1444		
2160 min Summer	5.503	0.0	2160		
2880 min Summer	4.534	0.0	2504		
4320 min Summer	3.467	0.0	3292		
5760 min Summer	2.885	0.0	4096		
7200 min Summer	2.516	0.0	4968		
8640 min Summer	2.251	0.0	5800		
10080 min Summer	2.048	0.0	6656		
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PHG Consulting Engineers				Page 2	
107 Cowbridge Road East Cardiff Wales, CF11 9AG		Pontrhydyfen RFC RG 100yr+40%cc			
Date 29/04/2026 09:46 File 2769 - RG Estimate.SRCX		Designed by SJD Checked by			
Innovyze		Source Control 2020.1			
<u>Summary of Results for 100 year Return Period (+40%)</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Winter	72.632	0.132	0.1	7.7	O K
30 min Winter	72.681	0.181	0.1	11.4	O K
60 min Winter	72.741	0.241	0.1	16.1	O K
120 min Winter	72.810	0.310	0.1	21.6	O K
180 min Winter	72.850	0.350	0.1	24.8	O K
240 min Winter	72.880	0.380	0.1	27.3	O K
360 min Winter	72.923	0.423	0.1	31.1	O K
480 min Winter	72.954	0.454	0.1	33.7	O K
600 min Winter	72.978	0.478	0.1	35.8	O K
720 min Winter	72.997	0.497	0.1	37.5	O K
960 min Winter	73.024	0.524	0.1	39.9	O K
1440 min Winter	73.057	0.557	0.1	42.9	O K
2160 min Winter	73.082	0.582	0.1	45.2	O K
2880 min Winter	73.092	0.592	0.1	46.2	O K
4320 min Winter	73.100	0.600	0.2	46.9	O K
5760 min Winter	73.103	0.603	0.2	47.2	O K
7200 min Winter	73.105	0.605	0.2	47.4	O K
8640 min Winter	73.104	0.604	0.2	47.2	O K
10080 min Winter	73.099	0.599	0.2	46.8	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
15 min Winter	102.842	0.0	26		
30 min Winter	76.166	0.0	41		
60 min Winter	54.074	0.0	70		
120 min Winter	36.694	0.0	128		
180 min Winter	28.475	0.0	186		
240 min Winter	23.751	0.0	246		
360 min Winter	18.312	0.0	362		
480 min Winter	15.179	0.0	480		
600 min Winter	13.099	0.0	596		
720 min Winter	11.600	0.0	714		
960 min Winter	9.556	0.0	946		
1440 min Winter	7.242	0.0	1402		
2160 min Winter	5.503	0.0	2072		
2880 min Winter	4.534	0.0	2708		
4320 min Winter	3.467	0.0	3380		
5760 min Winter	2.885	0.0	4328		
7200 min Winter	2.516	0.0	5264		
8640 min Winter	2.251	0.0	6224		
10080 min Winter	2.048	0.0	7160		
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PHG Consulting Engineers		Page 3
107 Cowbridge Road East Cardiff Wales, CF11 9AG	Pontrhydyfen RFC RG 100yr+40%cc	
Date 29/04/2026 09:46 File 2769 - RG Estimate.SRCX	Designed by SJD Checked by	
Innovyze Source Control 2020.1		

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.950
Region	England and Wales	Cv (Winter)	0.950
M5-60 (mm)	19.100	Shortest Storm (mins)	15
Ratio R	0.200	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.032

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From:	To:	From:	To:	From:	To:
0	4 0.011	4	8 0.011	8	12 0.011

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PHG Consulting Engineers		Page 4
107 Cowbridge Road East Cardiff Wales, CF11 9AG	Pontrhydyfen RFC RG 100yr+40%cc	
Date 29/04/2026 09:46 File 2769 - RG Estimate.SRCX	Designed by SJD Checked by	
Innovyze Source Control 2020.1		

Model Details

Storage is Online Cover Level (m) 73.400

Swale Structure

Infiltration Coefficient Base (m/hr)	0.01030	Length (m)	10.0
Infiltration Coefficient Side (m/hr)	0.01030	Side Slope (1:X)	2.0
Safety Factor	2.0	Slope (1:X)	200.0
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	72.500	Cap Infiltration Depth (m)	0.000
Base Width (m)	7.0		

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