

Pont Rhyd Y Cyff

Llangynwyd

Drainage Strategy

February 2021



Pont Rhyd Y Cyf Drainage Strategy

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Revision Date

1. Introduction

This drainage strategy has been prepared by Phoenix Design Partnership Limited on behalf of Persimmon Homes West Wales to support their application to submit a parcel of land off Bridgend Road, Llangynwyd into the Bridgend County Borough Councils Local Development Plan (LDP).

The report will provide 'high level' information on the design strategy for the surface and foul water systems that will serve the proposed development.

2. Site Location

The parcel of land is located along the Southern boundary of Llangynwyd. The site is approximately 3km to the South of Maesteg town centre with a National Grid Reference of SS 86749 88542. The site is irregular in shape and approximate area of 7.3Ha.

The site is bounded by agricultural fields and farmhouse to the West, former railway along the Southern boundary, Bridgend Road to the East and residential settlement to the North.

A site location plan can be seen below in figure 1.

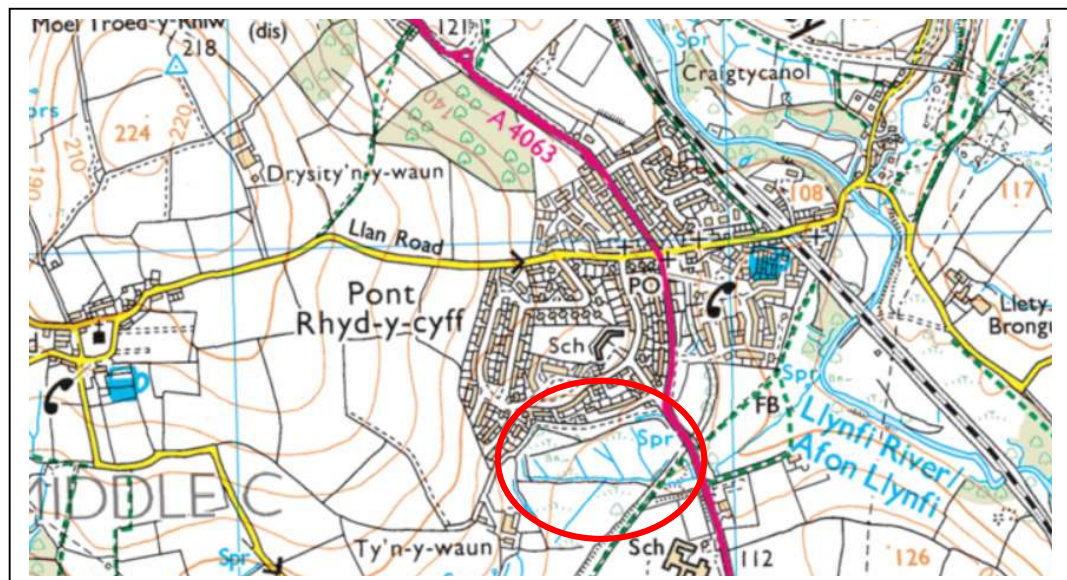


Figure 1 – Site Location

3. Site Topography

The site is divided into two parcels divided by existing hedgerows and trees. The site generally falls from North West to the South East with an approximate level difference of between 130 and 115m AOD, equating to an average gradient of 1:21.

The site is dissected by a series of ditches which convey water from emerging springs and surface water runoff from the North and West.

A small ditch runs along the Eastern boundary which conveys flows from DCWW storm drains from the settlement to the North.

The main conveyance ditch discharges to a culvert that passes East beneath Bridgend Road to the Llynfi River.

6. Existing Drainage

6.1. Surface Water

The Dwr Cymru Welsh Water (DCWW) records indicate that there are storm water sewers within proximity to the site, all of which discharge into Eastern boundary ditch which drains to the South East of the site.

The surface water runoff from the site is drained into the various shallow ditches that dissect the site and run to the South East.

During a site walkover, it was noted that surface water near the site edges run directly to the south into a gorge between the abandoned railway and the site. Water gathered within the gorge discharge via a culvert toward Bridgend Road and onto the Llynfi River.

6.2. Foul Water

The Dwr Cymru Welsh Water (DCWW) records indicate that there are foul water sewers in the vicinity of the site. A 225mm diameter sewer is located immediately to the north of site, however given site levels this will require on site pumping station. An alternative foul sewer is located within Bridgend Road to the South East of the site.

DCWW indicate that there are no capacity issues for the first 60 units, however a hydraulic modelling exercise will be required for additional units.

A copy of the DCWW asset plans can be seen in **Appendix A**

7. Proposed Drainage

The land put forward to the LDP will form an extension to the Llangynwyd settlement to the North. The Flood and Water Management Act 2010, Schedule 3 became legislation in Wales in January 2019, thus the proposed surface water system will need to be designed in accordance with best practice and the Ciria SuDS Manual.

7.1 *Schedule 3 (Flood and Water Management Act 2010) and the Sustainable Drainage Approval Body (SAB)*

Under Schedule 3 all developments in Wales over 100m² now require surface water drainage to be designed in accordance with the statutory standards for sustainable drainage systems produced by Welsh Government. It is the role of each councils SAB team to assess and approve the design proposals which are reviewed against these standards.

The standards aim to mimic the natural drainage characteristics of a site to help control the volume and rate of run off from the proposed development. This is achieved by managing the runoff at or close to the surface and as close to the sources as possible while also providing additional benefits such as biodiversity and amenity.

There are six standards that need to be met as follows:

- S1 – Surface Water runoff destination
- S2 – Surface Water runoff hydraulic control
- S3 – Water Quality
- S4 – Amenity
- S5 – Biodiversity
- S6 – Design of drainage for construction, operation and maintenance

7.2 SAB Compliance

Whilst the surface water design will be considered at detailed design, a summary of how the drainage will adhere to the standards are as follows:

S1 - Surface Water runoff destination

As indicated above, the site falls from North West to the South East with defined sub catchments draining into the existing ditch the dissects the site. The proposal will be to maintain the primary ditch as a green corridor and its main tributaries. Subject to relative depth to the development, the aim should be to drain the development parcels into the tributaries.

Where the ditches are too shallow, the aim will be to respect the overall site catchment of the site and drain to the existing outlet located in the South Eastern corner.

S2 – Surface Water runoff hydraulic control

The existing parcel of land has a 'Qbar' of 75.4/s which has been calculated using Microdrainage and soil characterises of soil 'Type 4'. Given site topography, the proposal is to drain at Qbar to the South Eastern outlet.

Additional features will be incorporated within the design that will aid in the interception and therefore reduce surface water runoff in accordance with 'Table G2.1' of the 2018 Welsh Government Guidance such as rain gardens, ditches, swales, permeable surfacing as well as basins.

Indicative Microdrainage calculations indicate that an impermeable area of 2 hectares (assume 70% of residential development to be hardstanding) will require approximately 1,200 cubic meters of storage to accommodate the 1:100 + 30% climate change. The volume will be split based upon its contributing areas and subsequent proportional discharge rates.

See **Appendix C** for Microdrainage calculations

S3 – Water Quality

Proposed features to be used on site will ensure that water quality complies with S3 of the WG guidance which refers to the Water Quality Management section of the SUDS Manual. The 'Pollution Hazard Level' for each of the surfaces (Roofs, driveways, shared surfaces & Roads) are categorised in Table

26.2 of the SuDS Manual. Once the areas are identified, Table 26.3 of the SuDS Manual is used to identify the pollutants removal along the drainage train.

S4 – Amenity & S5 – Biodiversity

The site will be designed around the SAB features with amenity and biodiversity in mind. Features such as rain gardens, swales, basins can be incorporated within public spaces that enable its residents to interact with the features by means of play & exercise.

Green corridors, rain gardens and basins will be planted with appropriate species and mixes enable local wildlife to thrive whilst tying into existing green corridors and site boundaries.

S6 – Design of drainage for construction, operation and maintenance

The site is to be constructed in line with the guidance set out in Ciria C768. Specific details will be provided in the developers 'SuDS Construction Management Plan'.

Additional operation and maintenance plans will be provided based upon the specific requirements of the site.

7.4 Proposed Foul Drainage

As indicated above, DCWW have confirmed that capacity exists within public sewers to accommodate 60 dwellings. The remaining dwellings are subject to HMA.

Given site topography, the proposed foul system will connect to the public sewers via gravity.

8.0 Conclusions

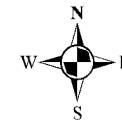
- The proposed development in the main is located with 'Flood Zone A'.
- Surface water will discharge at a Qbar of 75.4l/s into the adjacent field as per the existing scenario.
- Given site topography, the site has several sub catchments which drain to a main outlet located to the South East. Given the extent of green infrastructure proposed it is anticipated that several smaller attenuation basins will be located around the site.
- The development will be SABS compliant.
- Foul Drainage will drain into the public foul sewer that runs along the Eastern boundary.

Appendix A
DCWW Asset Plan



Dwr Cymru
Welsh Water

DCWW Plan



12/10/2020

Scale: 1: 2500



LEGEND

Clean Water

- Sluice Val
- Air Val, SINGLE
- Tap
- Pressure Reducing Valve
- Meter
- BULK Meter
- FH
- Cap
- Existing Main
- NON COMPANY

Sewerage External

- Foul
- Surface Water
- Combined
- Rising Main
- Private
- Treatment Works
- Pumping Station
- Special Purpose
- Unknown End
- Change, Combined Overflow
- Outfall, FOUL
- Lamp Hole, Foul
- Private Sewer Transfer
- Lateral Drain
- Inspection Chamber

286731,188500

Dwr Cymru Cyfyngedig ('the Company') gives this information as to the position of its underground apparatus by way of general guidance only and on the strict 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 and any onus of locating the apparatus before carrying out any excavations rests entirely on you. The information which is supplied hereby by the company, is done so in accordance with statutory requirements of sections 198 and 199 of the water industry Act 1991 based upon 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 drain sewer or disposal main laid before 1 September 1989, or if they do, the particulars thereof including their position underground may not be accurate. It must be understood that the furnishing of this information is entirely without prejudice to the provision of the New Roads and Street Works Act 1991 and the company's right to be compensated for any damage to its apparatus.

EXACT LOCATION OF ALL APPARATUS TO BE DETERMINED ON SITE

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Whilst every reasonable effort has been taken to correctly record the pipe material of DCWW 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

Appendix B
Microdrainage Calculations

Unit 9 Westway Business Centre
Marksbury, Bath
Wiltshire, BA2 9HN



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Innovyze Source Control 2020.1


ICP SUDS Mean Annual Flood

Input

Return Period (years)	100	Soil	0.400
Area (ha)	7.340	Urban	0.000
SAAR (mm)	1800	Region Number	Region 9

Results l/s

QBAR Rural	75.4
QBAR Urban	75.4
Q100 years	164.4
Q1 year	66.4
Q30 years	132.9
Q100 years	164.4

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Unit 9 Westway Business Centre Marksbury, Bath Wiltshire, BA2 9HN		
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Innovyze	Source Control 2020.1	

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m ³)	Status
15 min Summer	8.285	0.285	72.4	340.8	O K
30 min Summer	8.430	0.430	75.2	513.3	O K
60 min Summer	8.604	0.604	75.3	721.5	O K
120 min Summer	8.752	0.752	75.3	898.9	O K
180 min Summer	8.826	0.826	75.3	986.6	O K
240 min Summer	8.864	0.864	75.3	1033.0	O K
360 min Summer	8.896	0.896	75.3	1071.1	O K
480 min Summer	8.897	0.897	75.3	1072.3	O K
600 min Summer	8.883	0.883	75.3	1055.4	O K
720 min Summer	8.865	0.865	75.3	1033.2	O K
960 min Summer	8.816	0.816	75.3	975.1	O K
1440 min Summer	8.695	0.695	75.3	831.0	O K
2160 min Summer	8.550	0.550	75.3	656.8	O K
2880 min Summer	8.447	0.447	75.2	534.1	O K
4320 min Summer	8.315	0.315	73.4	376.6	O K
5760 min Summer	8.263	0.263	68.3	314.8	O K
7200 min Summer	8.237	0.237	61.4	283.1	O K
8640 min Summer	8.218	0.218	55.9	260.3	O K
10080 min Summer	8.203	0.203	51.4	242.9	O K
15 min Winter	8.321	0.321	73.5	383.0	O K
30 min Winter	8.487	0.487	75.3	582.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
15 min Summer	106.095	0.0	397.2	26
30 min Summer	82.153	0.0	615.5	38
60 min Summer	60.593	0.0	908.2	64
120 min Summer	41.711	0.0	1250.7	110
180 min Summer	33.099	0.0	1488.8	146
240 min Summer	27.964	0.0	1677.1	180
360 min Summer	21.912	0.0	1971.3	250
480 min Summer	18.349	0.0	2201.1	322
600 min Summer	15.949	0.0	2391.9	390
720 min Summer	14.245	0.0	2563.4	460
960 min Summer	11.926	0.0	2861.6	598
1440 min Summer	9.325	0.0	3356.4	852
2160 min Summer	7.390	0.0	3990.4	1216
2880 min Summer	6.328	0.0	4556.3	1564
4320 min Summer	5.073	0.0	5479.2	2252
5760 min Summer	4.330	0.0	6234.5	2944
7200 min Summer	3.826	0.0	6886.3	3672
8640 min Summer	3.456	0.0	7464.2	4408
10080 min Summer	3.170	0.0	7987.3	5136
15 min Winter	106.095	0.0	445.0	26
30 min Winter	82.153	0.0	689.5	38

Unit 9 Westway Business Centre
 Marksbury, Bath
 Wiltshire, BA2 9HN



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Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m ³)	Status
60 min Winter	8.690	0.690	75.3	824.0	O K
120 min Winter	8.866	0.866	75.3	1035.1	O K
180 min Winter	8.937	0.937	75.3	1119.9	O K
240 min Winter	8.976	0.976	75.3	1166.8	O K
360 min Winter	8.999	0.999	75.3	1193.8	O K
480 min Winter	8.983	0.983	75.3	1174.9	O K
600 min Winter	8.949	0.949	75.3	1133.7	O K
720 min Winter	8.909	0.909	75.3	1085.8	O K
960 min Winter	8.813	0.813	75.3	971.9	O K
1440 min Winter	8.594	0.594	75.3	710.0	O K
2160 min Winter	8.382	0.382	74.8	456.9	O K
2880 min Winter	8.281	0.281	72.3	335.9	O K
4320 min Winter	8.229	0.229	59.3	273.7	O K
5760 min Winter	8.201	0.201	50.8	240.4	O K
7200 min Winter	8.182	0.182	45.1	217.6	O K
8640 min Winter	8.168	0.168	40.7	200.7	O K
10080 min Winter	8.157	0.157	37.3	187.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
60 min Winter	60.593	0.0	1017.2	64
120 min Winter	41.711	0.0	1400.8	118
180 min Winter	33.099	0.0	1667.4	154
240 min Winter	27.964	0.0	1878.6	192
360 min Winter	21.912	0.0	2208.3	270
480 min Winter	18.349	0.0	2465.4	348
600 min Winter	15.949	0.0	2679.0	422
720 min Winter	14.245	0.0	2871.7	496
960 min Winter	11.926	0.0	3205.8	644
1440 min Winter	9.325	0.0	3759.8	890
2160 min Winter	7.390	0.0	4469.6	1224
2880 min Winter	6.328	0.0	5102.8	1524
4320 min Winter	5.073	0.0	6135.8	2216
5760 min Winter	4.330	0.0	6983.0	2944
7200 min Winter	3.826	0.0	7712.3	3672
8640 min Winter	3.456	0.0	8360.3	4408
10080 min Winter	3.170	0.0	8946.8	5144

Unit 9 Westway Business Centre
 Marksbury, Bath
 Wiltshire, BA2 9HN



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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	23.000	Shortest Storm (mins)	15
Ratio R	0.150	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 2.000

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area	Time (mins)	Area				
From:	To:	From:	To:	From:	To:	From:	To:				
0	4	0.500	4	8	0.500	8	12	0.500	12	16	0.500

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Model Details

Storage is Online Cover Level (m) 10.000

Tank or Pond Structure

Invert Level (m) 8.000

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	1195.0	1.000	1195.0	1.010	0.0

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0350-7540-1050-7540
Design Head (m)	1.050
Design Flow (l/s)	75.4
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	350
Invert Level (m)	7.950
Minimum Outlet Pipe Diameter (mm)	375
Suggested Manhole Diameter (mm)	2100

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.050	75.4
Flush-Flo™	0.512	75.3
Kick-Flo®	0.849	68.0
Mean Flow over Head Range	-	59.3

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	10.1	1.200	80.4	3.000	125.5	7.000	190.0
0.200	35.3	1.400	86.6	3.500	135.3	7.500	196.5
0.300	64.9	1.600	92.4	4.000	144.4	8.000	202.8
0.400	74.2	1.800	97.9	4.500	153.0	8.500	208.9
0.500	75.3	2.000	103.0	5.000	161.1	9.000	214.9
0.600	74.8	2.200	107.9	5.500	168.8	9.500	220.7
0.800	70.3	2.400	112.6	6.000	176.1		
1.000	73.6	2.600	117.1	6.500	183.2		

Appendix C
Indicative Masterplan



- Site Boundary (7.34ha)
- Residential Development (2.93ha)
- Open Space and Amenity
- Existing Vegetation to be Retained/
Ancient Woodland
- Infrastructure (0.44ha)
- Attenuation Pond (0.32ha)
- Watercourse/Stream