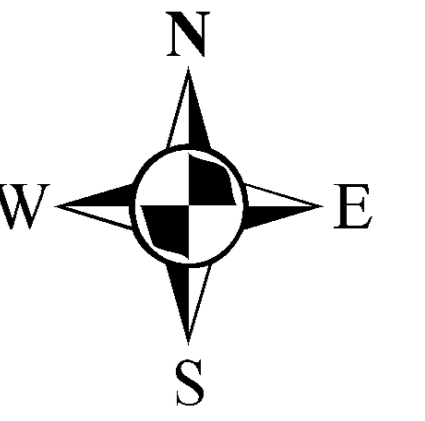


Appendix D Sewer Plans



Dŵr Cymru
Welsh Water

Cardiff and Vale College Barry CF62 8AG



LEGEND(Representative of most common features)

	Foul chamber		Outfall
	Surface water chamber		Lamp hole
	Combined chamber		Storm Overflow
	Combined sewer overflow		Rising main
	Special purpose chamber		Gravity sewer
	Treatment works		Private sewer
	Pumping station		Private sewer subject to Sect. 124 adoption agreement
	Private sewer subject to Sect. 124 adoption agreement		Private Sewer Transfer
	Private Sewer Transfer		Lateral Drain
	Lateral Drain		Inspection Chamber
	Inspection Chamber		

NB: Sewer symbol colour indicates the type:
 RED - Combined
 GREEN - Surface Water
 BROWN - Foul
 Purple - Former S24 sewers (for indicative purposes only)

Notes:

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 (PF)) 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 Cymdeithas (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 is warranted as to its correctness in these respects in the event of excavations or other works made in the vicinity of the Company's apparatus. The user of this information before carrying out any excavations reads entirely on his own. The information which is supplied by the Company is 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 water, main, service pipe, sewer, lateral drain or disposal main and any associated apparatus laid before 1 September 1989, or, if they do, the particulars thereof including their position, and the user 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: 309449,169064
Map scale: 1:1250
Printed by: Zara Howells
Printed on: 17 Aug 2023



Appendix E Surface Water Calculations

Calculated by: Hamza El-Adnany

Site name: Weycock Cross

Site location: Barry

Site Details

Latitude: 51.41327° N

Longitude: 3.30553° W

Reference: 741893381

Date: Aug 03 2023 11:29

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Runoff estimation approach

FEH Statistical

Site characteristics

Total site area (ha): 1

Methodology

Q_{MED} estimation method: Calculate from BFI and SAAR

BFI and SPR method: Specify BFI manually

HOST class: N/A

BFI / BFIHOST: 0.372

Q_{MED} (l/s):

Q_{BAR} / Q_{MED} factor: 1.08

Hydrological characteristics

	Default	Edited
SAAR (mm):	980	980
Hydrological region:	9	9
Growth curve factor 1 year:	0.88	0.88
Growth curve factor 30 years:	1.78	1.78
Growth curve factor 100 years:	2.18	2.18
Growth curve factor 200 years:	2.46	2.46

Notes

(1) Is $Q_{BAR} < 2.0$ l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is $SPR/SPRHOST \leq 0.3$?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.


Greenfield runoff rates

Default

Edited

Q _{BAR} (l/s):		9.56
1 in 1 year (l/s):		8.41
1 in 30 years (l/s):		17.01
1 in 100 year (l/s):		20.84
1 in 200 years (l/s):		23.51


This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement , which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

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Innovyze	Source Control 2019.1	

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m ³)	Status
15 min Summer	99.229	0.729	2.3	69.4	O K
30 min Summer	99.364	0.864	2.3	93.1	O K
60 min Summer	99.483	0.983	2.3	117.4	O K
120 min Summer	99.552	1.052	2.3	133.2	O K
180 min Summer	99.585	1.085	2.4	141.4	O K
240 min Summer	99.603	1.103	2.4	145.8	O K
360 min Summer	99.614	1.114	2.4	148.6	O K
480 min Summer	99.607	1.107	2.4	146.8	O K
600 min Summer	99.594	1.094	2.4	143.5	O K
720 min Summer	99.580	1.080	2.4	140.0	O K
960 min Summer	99.551	1.051	2.3	133.2	O K
1440 min Summer	99.498	0.998	2.3	120.8	O K
2160 min Summer	99.420	0.920	2.3	104.2	O K
2880 min Summer	99.348	0.848	2.3	90.1	O K
4320 min Summer	99.214	0.714	2.3	67.0	O K
5760 min Summer	99.050	0.550	2.3	43.9	O K
7200 min Summer	98.926	0.426	2.3	29.8	O K
8640 min Summer	98.835	0.335	2.3	21.2	O K
10080 min Summer	98.770	0.270	2.3	15.9	O K
15 min Winter	99.281	0.781	2.3	78.0	O K
30 min Winter	99.423	0.923	2.3	104.8	O K


Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
15 min Summer	144.974	0.0	72.0	26
30 min Summer	98.056	0.0	97.4	41
60 min Summer	63.154	0.0	125.5	70
120 min Summer	37.464	0.0	148.9	128
180 min Summer	27.638	0.0	164.8	186
240 min Summer	22.260	0.0	176.9	244
360 min Summer	16.360	0.0	195.1	362
480 min Summer	13.098	0.0	208.2	474
600 min Summer	10.994	0.0	218.4	522
720 min Summer	9.511	0.0	226.8	584
960 min Summer	7.541	0.0	239.7	710
1440 min Summer	5.406	0.0	257.8	982
2160 min Summer	3.859	0.0	276.1	1388
2880 min Summer	3.049	0.0	290.8	1796
4320 min Summer	2.216	0.0	317.1	2596
5760 min Summer	1.791	0.0	341.7	3288
7200 min Summer	1.541	0.0	367.4	3960
8640 min Summer	1.376	0.0	393.8	4592
10080 min Summer	1.261	0.0	421.0	5256
15 min Winter	144.974	0.0	80.6	26
30 min Winter	98.056	0.0	109.0	40

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Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m ³)	Status
60 min Winter	99.549	1.049	2.3	132.5	O K
120 min Winter	99.625	1.125	2.4	151.3	O K
180 min Winter	99.663	1.163	2.5	161.5	O K
240 min Winter	99.686	1.186	2.5	167.5	O K
360 min Winter	99.704	1.204	2.5	172.6	Flood Risk
480 min Winter	99.703	1.203	2.5	172.5	Flood Risk
600 min Winter	99.693	1.193	2.5	169.5	O K
720 min Winter	99.676	1.176	2.5	164.9	O K
960 min Winter	99.643	1.143	2.4	156.0	O K
1440 min Winter	99.576	1.076	2.4	139.1	O K
2160 min Winter	99.471	0.971	2.3	115.0	O K
2880 min Winter	99.368	0.868	2.3	93.8	O K
4320 min Winter	99.137	0.637	2.3	55.4	O K
5760 min Winter	98.863	0.363	2.3	23.7	O K
7200 min Winter	98.714	0.214	2.3	11.8	O K
8640 min Winter	98.645	0.145	2.1	7.3	O K
10080 min Winter	98.610	0.110	2.0	5.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
60 min Winter	63.154	0.0	140.6	68
120 min Winter	37.464	0.0	166.8	126
180 min Winter	27.638	0.0	184.5	184
240 min Winter	22.260	0.0	198.2	240
360 min Winter	16.360	0.0	218.5	354
480 min Winter	13.098	0.0	233.2	466
600 min Winter	10.994	0.0	244.7	572
720 min Winter	9.511	0.0	254.0	670
960 min Winter	7.541	0.0	268.5	754
1440 min Winter	5.406	0.0	288.7	1060
2160 min Winter	3.859	0.0	309.3	1512
2880 min Winter	3.049	0.0	325.7	1936
4320 min Winter	2.216	0.0	355.2	2776
5760 min Winter	1.791	0.0	382.7	3296
7200 min Winter	1.541	0.0	411.5	3888
8640 min Winter	1.376	0.0	441.0	4496
10080 min Winter	1.261	0.0	471.6	5152

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Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 309390 169095 ST 09390 69095
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.265

Time (mins) Area			Time (mins) Area			Time (mins) Area		
From:	To:	(ha)	From:	To:	(ha)	From:	To:	(ha)
0	4	0.089	4	8	0.088	8	12	0.088

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Model Details

Storage is Online Cover Level (m) 100.000

Tank or Pond Structure

Invert Level (m) 98.500

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	42.1	1.500	370.0

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0072-2500-1200-2500
Design Head (m)	1.200
Design Flow (l/s)	2.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	72
Invert Level (m)	98.500
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.200	2.5
Flush-Flo™	0.318	2.3
Kick-Flo®	0.644	1.9
Mean Flow over Head Range	-	2.1

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	1.9	1.200	2.5	3.000	3.8	7.000	5.7
0.200	2.2	1.400	2.7	3.500	4.1	7.500	5.9
0.300	2.3	1.600	2.8	4.000	4.4	8.000	6.0
0.400	2.3	1.800	3.0	4.500	4.6	8.500	6.2
0.500	2.2	2.000	3.2	5.000	4.8	9.000	6.4
0.600	2.0	2.200	3.3	5.500	5.1	9.500	6.5
0.800	2.1	2.400	3.4	6.000	5.3		
1.000	2.3	2.600	3.6	6.500	5.5		



Appendix F Surface Water Drainage
Plans