

Project: New Development at 30 Commercial Street, Ystalyfera				Document Number 1333-CAL-001		HCE LTD							
Date By Checked		Dec-19 J Angelone I Howells		Job no. 1333		Section C&S		Sheet no.		Rev C01		Canolfan Gorseion Centre Millers Drive Gorseionon SA4 4QN	
Rev		Date		Details								Tel: 01792 805010	
Part													
Calculation Front Cover													
REF		Drainage Calculations For New Development At 30 Commercial Stree, Ystalyfera										OUTPUT	

Project: New Development at 30 Commercial Street, Ystalyfera				Document Number 1333-CAL-001		HCE LTD Canolfan Gorseion Centre Millers Drive Gorseinon SA4 4QN Tel: 01792 805010
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By	J Angelone					
Checked	I Howells					
Rev	Date	Details				

Part	Calculation Index
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REF		Page	OUTPUT
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	Foul Water	FW/01 - 03	
	Storm Water	SW/01 - 07	
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Rev	Date	Details						Tel: 01792 805010	
Part									Design Summary
REF	BS Codes		BSEN 752						OUTPUT
	Building Regulations		Part H, Building Regulations 2015						
	CIRIA		CIRIA C756 SUDS Design Manual						
	Roof Drainage Rainfall Intensity		Roof Drainage 0.014 l/s/m ²						
	Paved Area Rainfall Intensity		Paved Area M5-60 = 20 mm Return period 1 in 100 years 0.2 % for climate change 30%						
	Foul Drainage Design Rate		Foul Water Single Dwelling 2.5 l/s						

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By J Angelone				Rev C01			
Checked I Howells							
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Part SuDS Considerations							
REF	<u>Standard S1 -Surface water runoff destination</u> <u>Priority Level 1</u> The use of rainwater harvesting is not a viable/cost effective part of the solution for managing surface water runoff on the site. The benefits have been taken into account however the cost against effectiveness is heavily outweighed. <u>Priority Level 2</u> Infiltration testing on site proves that a shallow soakaway is not a viable option for managing surface water runoff. <u>Priority Level 3</u> Due to the location of the site, discharging directly into a watercourse/a network that discharges into a is not a viable option as there is no watercourse within a reasonable distance to the site. <u>Priority Level 4</u> After assessing the DCWW maps, no surface water sewers are located near the site to connect to, including highway surface water sewers. <u>Priority Level 5</u> Although the provided DCWW sewer maps show that only a foul line runs through the site, this line has been surveyed and proven to be combined. The storm water will be discharged into said combined sewer at a restricted discharge rate to Qbar for 100-year return period (4.28 l/s total for site) and a design attenuation for 100-year event with 30% climatic change. <u>Standard S2 - Surface water runoff hydraulic control</u> The surface water runoff from the roofed areas will discharge either into a rainwater planter or directly into the surrounding permeable paving sub-base. All hardstanding areas for each plot will be permeable paving. The storm water collected by each plot will be discharged at a controlled rate into the combined sewer and attenuated within the permeable paving sub-base. By initially discharging into a rainwater planter, the total volume of water leaving the site via the combined sewer will be reduced due to the evapotranspiration that will occur. The surface water runoff generated by the new highway will be managed in two different ways. The car park and the turning head will be permeable tarmac, where the water will be attenuated in the sub-base prior to being discharged at a controlled rate into the combined sewer. The remaining sections of the highway will discharge into 3 separate rainwater gardens where the water will be attenuated in the sub-base prior to being discharged at a controlled rate into the combined sewer. By initially discharging into rainwater gardens, the total volume of water leaving the site via the combined sewer will be reduced due to the evapotranspiration that will occur.						OUTPUT

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SuDS Considerations							
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	<u>Standard S3 - Water Quality</u> Surface water runoff from roofs require removal of gross solids/sediments only. This is achieved by discharging the runoff from the roof into either a rainwater planter into the sub-base of the permeable paving which surrounds the proposed dwellings. The surface water runoff from the proposed highway will require removal of pollutants also. This is achieved by the bioremediation process that will occur within the sub-base of either the permeable paving or the rainwater gardens. <u>Standard S4 - Amenity</u> By incorporating a rainwater planter to the storm water drainage design for each property and including rainwater gardens for the highway will improve the visual aesthetics of the site, thus improving amenity. As two of the rainwater gardens are designed to be build-outs, this will provide a traffic calming measure, further increasing the amenity of the site. <u>Standard S5 - Biodiversity</u> To increase the biodiversity of the site 2 no. rainwater gardens and 4 no. rainwater planters have been included in the scheme. These will provide a more diverse habitat on site and help promote population growth of local wildlife. <u>Standard S6 - Design of drainage for Construction, Operation and Maintenance and Structural Integrity</u> To ensure ease of construction, most of the drainage system is designed to be within 1m of the ground. This provides an easier method of construction and reduces the risk of injury. The SuDS scheme allows ease of access to maintain or adapt the design if the current design does not meet future requirements. The scheme is designed to ensure structural integrity of all elements under anticipated loading conditions over the design life of the development site, considering the requirement for reasonable levels of maintenance.						

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Part

Foul Water Design

REF

OUTPUT

H1 Cl. 2.32

2.32 Appliances are seldom in use simultaneously and the minimum drain sizes in normal use are capable of carrying the flow from quite large numbers of appliances. Table 5 shows approximate flow rates resulting from the typical household group of 1 WC, 1 bath, 1 or 2 washbasins, 1 sink and 1 washing machine used for design purposes in BS EN 12056.

2.33 A drain carrying foul water should have an internal diameter of at least 75mm. A drain carrying effluent from a WC or trade effluent should have an internal diameter of at least 100mm.

No. of dwellings = 5

(Actual number of dwellings = 4, taken as 5 for simplicity)

H1, Diag. 9

T.5 & T.6

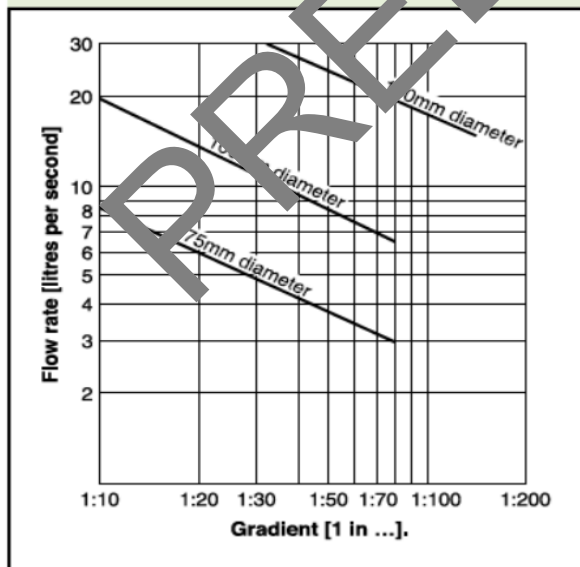
From Clause 2.32 provide 1 No. 100mm diameter foul drainage pipe for connection from bathroom. Lay pipe at minimum 1:80 gradient. Max Capacity = 6.3 l/s > 3.5 l/s for five dwellings therefore ok.

H1, Diag. 9

Connections from non-effluent sources can be 100mm diameter pipe.
T.6 Maximum flow can be 3.5 l/s therefore Lay pipe at 1:80 ==> Capacity = 6.3 l/s ==> O.K.

Table 5 Flow rates from dwellings

Number of dwellings	Flow rate (litres/sec)
1	2.5
5	3.5
10	4.1
15	4.6
20	5.1
25	5.4
30	5.8

Diagram 9 Discharge capacities of foul drains running 0.75 proportional depth

Table 6 Recommended minimum gradients for foul drains

Peak flow (litres/sec)	Pipe size (mm)	Minimum gradient (1 in ...)	Maximum capacity (litres/sec)
< 1	75	1:40	4.1
	100	1:40	9.2
> 1	75	1:80	2.8
	100	1:80*	6.3
	150	1:150†	15.0

Notes:

* Minimum of 1 WC

† Minimum of 5 WCs

Lateral Drain

To comply with Sewers for Adoption 7th Edition, use 100mm dia. Pipe at minimum 1:80 gradient for lateral drain to achieve self cleansing velocity.

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Part

Foul Water Design

REF

OUTPUT

Diagram 7 Pipes penetrating walls

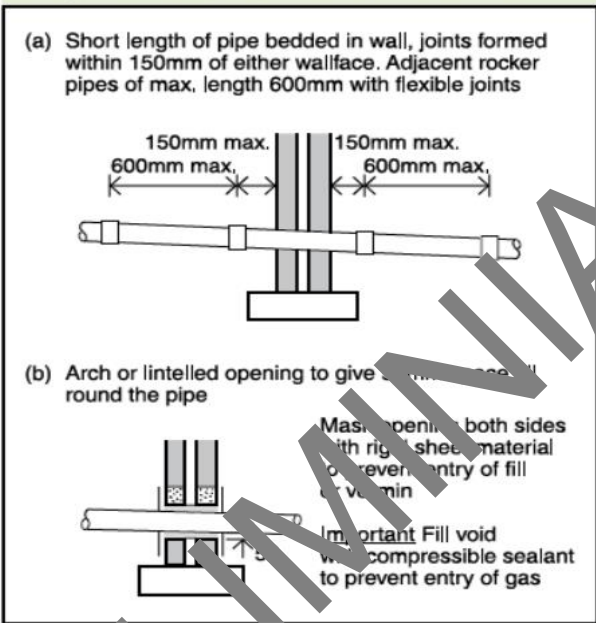
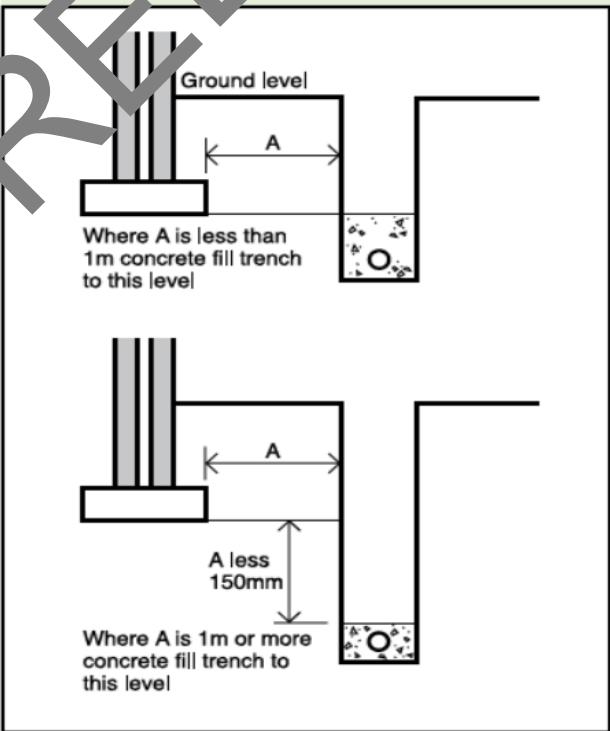


Diagram 8 Pipes runs near buildings



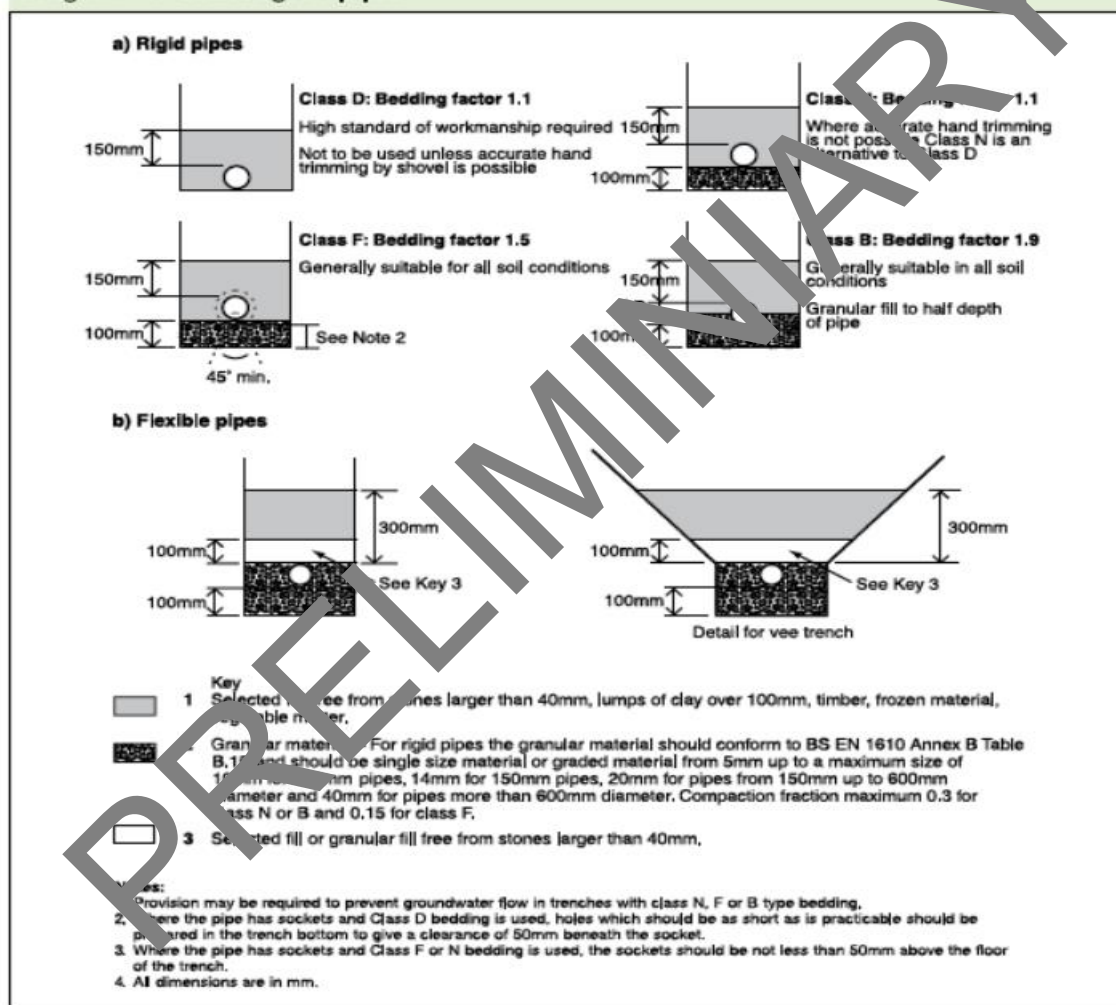
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Part

Foul Water Design

REF H1 Pipe Bedding Material as per recommendation H1 clause 2.41 - 2.45 OUTPUT

Diagram 10 Bedding for pipes



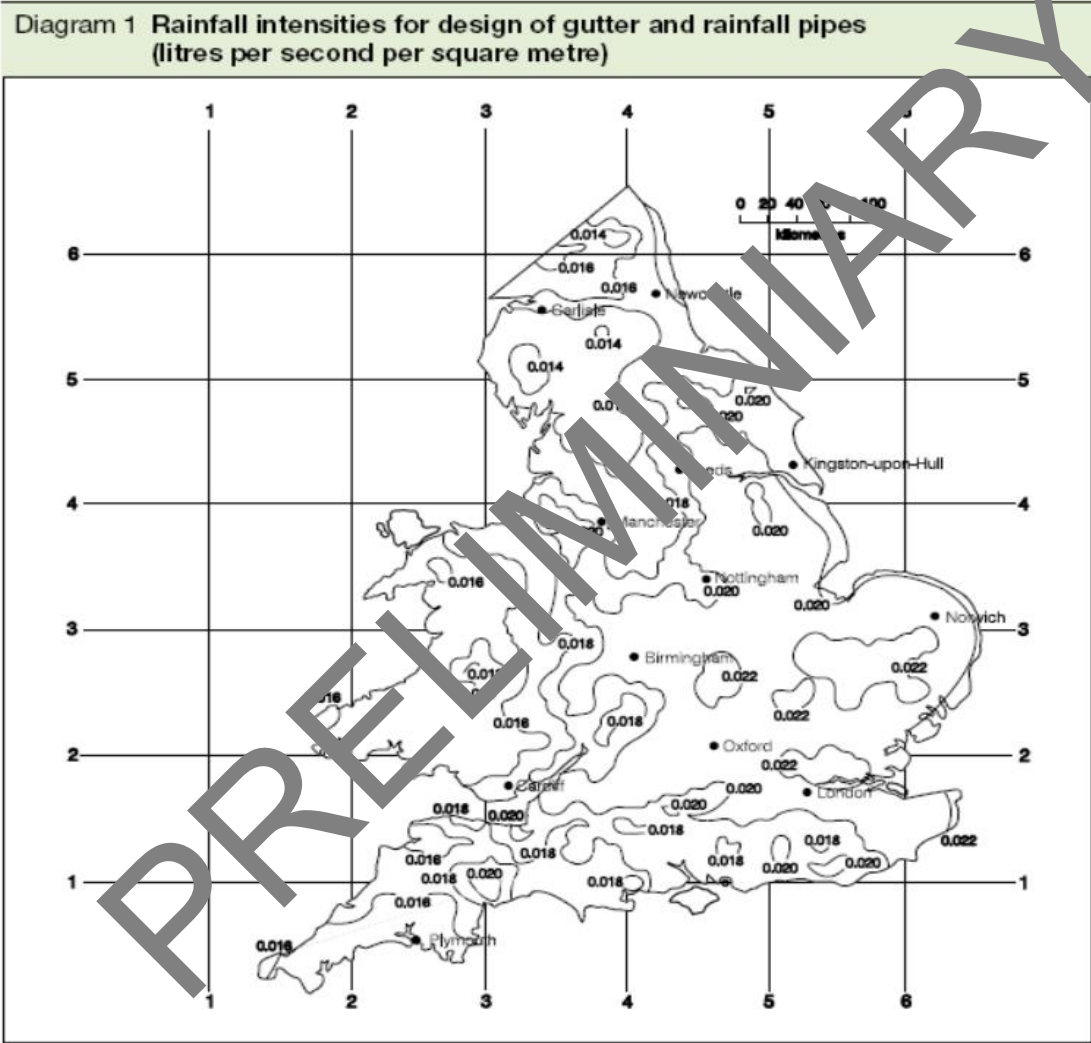
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Part	Storm Water - Roof Drainage
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REF	OUTPUT
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Part H3 Rainfal Intensity = 0.014 l/s/m²

Diagram 1



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Part

Storm Water - Main Roof Drainage

REF		OUTPUT
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H3 Cl. 1.3 **Gutter Design**

Roof Area (Per Dwelling) = 70 m²

Roof Pitch = 30 Degrees

Effective Area Factor = 1.29

Effective Roof Area = 90.3 m²

T1. Part H3

Table 1 Calculation of drained area		
Type of surface	Effective design area	
1 Flat roof	plan area of relevant portion	
2 Pitched roof at 30°	plan area of portion x 1.29	
Pitched roof at 45°	plan area of portion x 1.50	
Pitched roof at 60°	plan area of portion x 1.87	
3 Pitched roof over 70° or any wall	elevational area x 0.5	

Table 2 Gutter sizes and outlet sizes			
Max. effective roof area (m ²)	Gutter size (mm diam.)	Outlet size (mm diam.)	Flow capacity (lres/sec)
6.0	-	-	-
18.0	75	50	0.38
37.0	100	63	0.78
53.0	115	75	1.11
65.0	125	89	1.37
103.0	150	-	2.16

Note: Refers to nominal half round eaves gutters laid level with outlets at one end and edged round eaves outlets allow smaller downpipe sizes

Option: Alternative

From Table 2 above provide:

Gutter Size = 115

No. RWPs = 2

Maximum effective area served by x1 gutter & RWP = 45.15 m²

Max allowable effective area = 53 m² > 45.15 m² **OK**

H3 Cl.1.10 Provide minimum 115 mm gutters with 63 mm diameter downpipes.

Total Roof Discharge Flow Rate per dwelling = 1.2642 l/s

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Storm Water - Main Roof Drainage

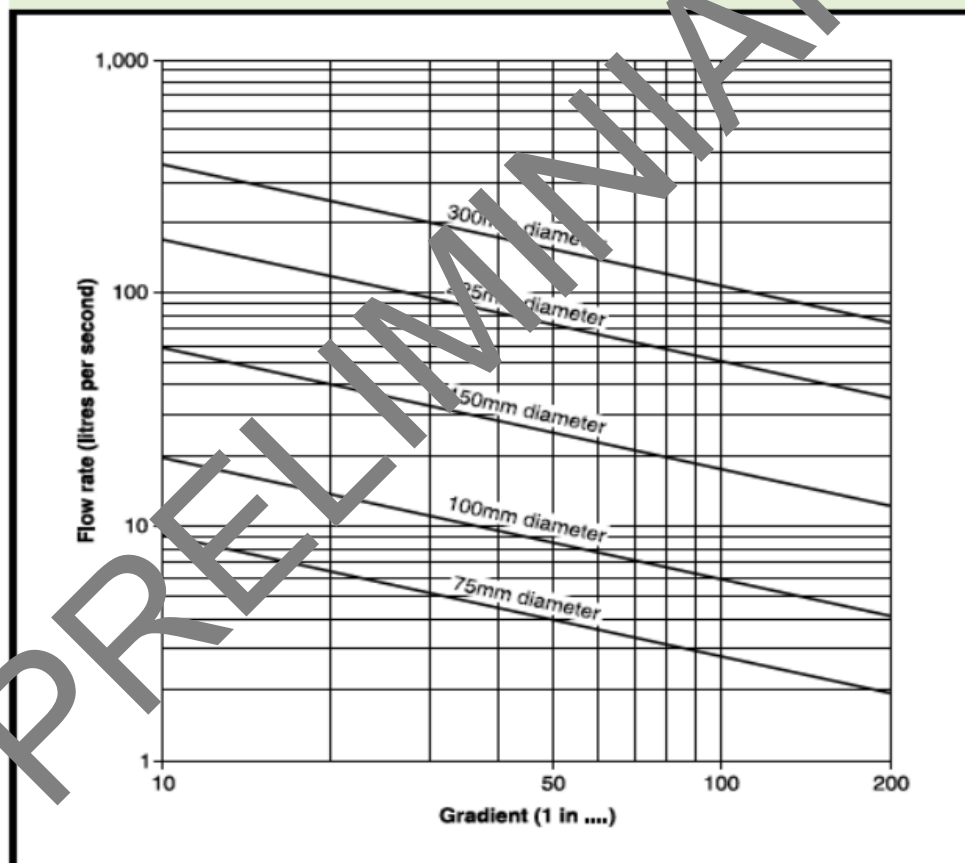
REF

OUTPUT

Design minimum gradient = 1:150

Minimum pipe diameter = 75 mm

Diagram 3 Discharge capacities of rainwater drains running full



H3 Diag. 3 Capacity of 75 mm diameter pipe at 1:150 gradient = 2.4 l/s > 1.264 l/s **O.K.**
Minimum pipe diameter to be used = 100mm for connection requirements

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Part

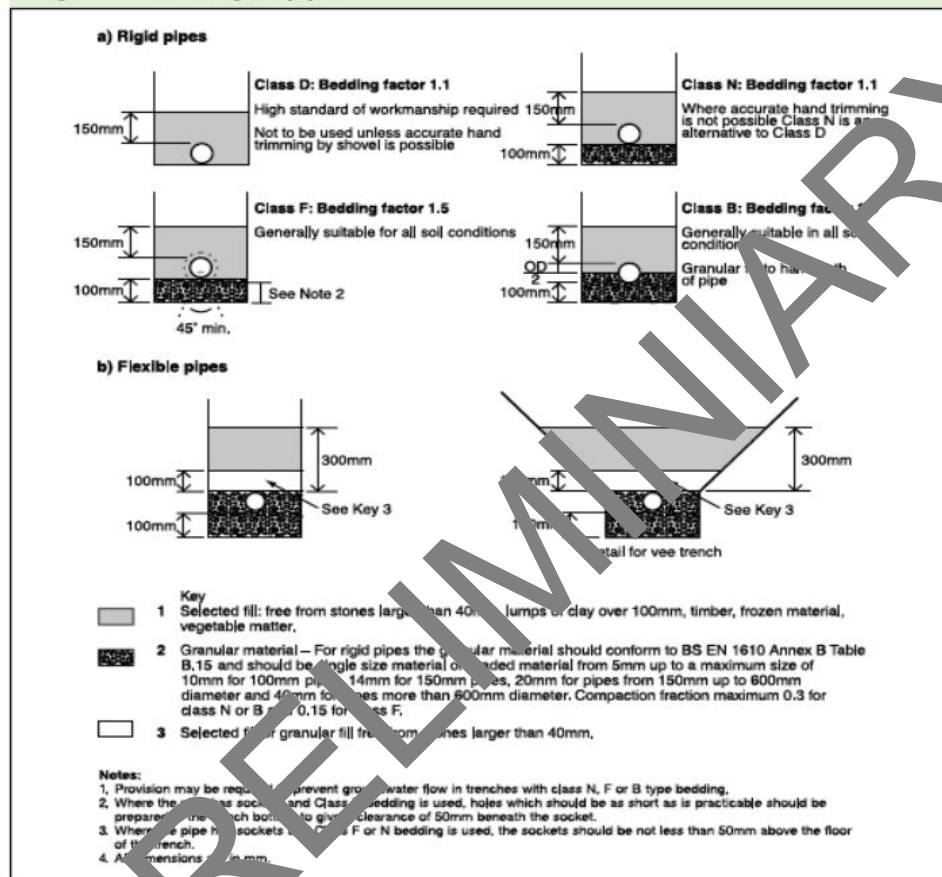
Storm Water - Roof Drainage

REF
H1

Pipe Bedding Material as per recommendation H1 clause 2.41 - 2.45

OUTPUT

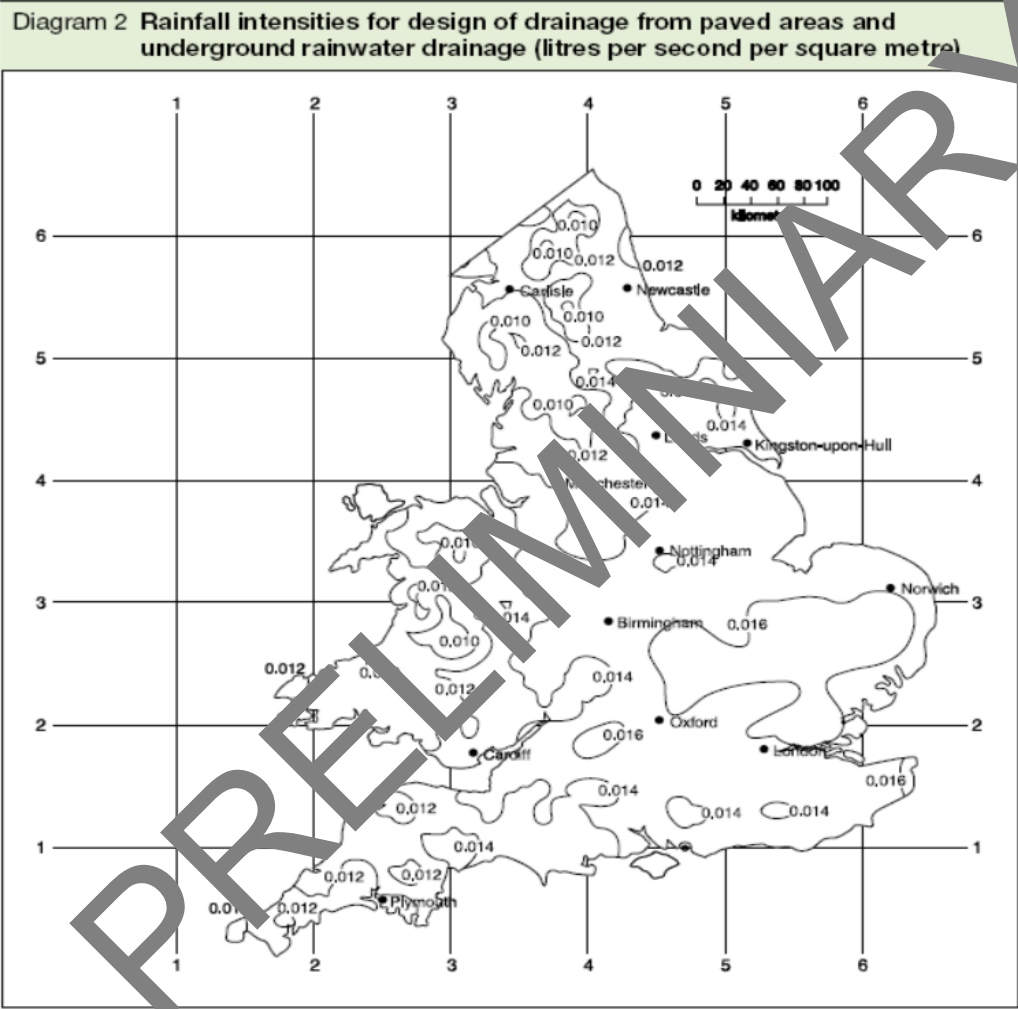
Diagram 10 Bedding for pipes



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Part	Storm Water - Paved Areas
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REF				OUTPUT
Part H3	Rainfal Intensity	=	0.012 l/s/m ²	
Diagram 2				



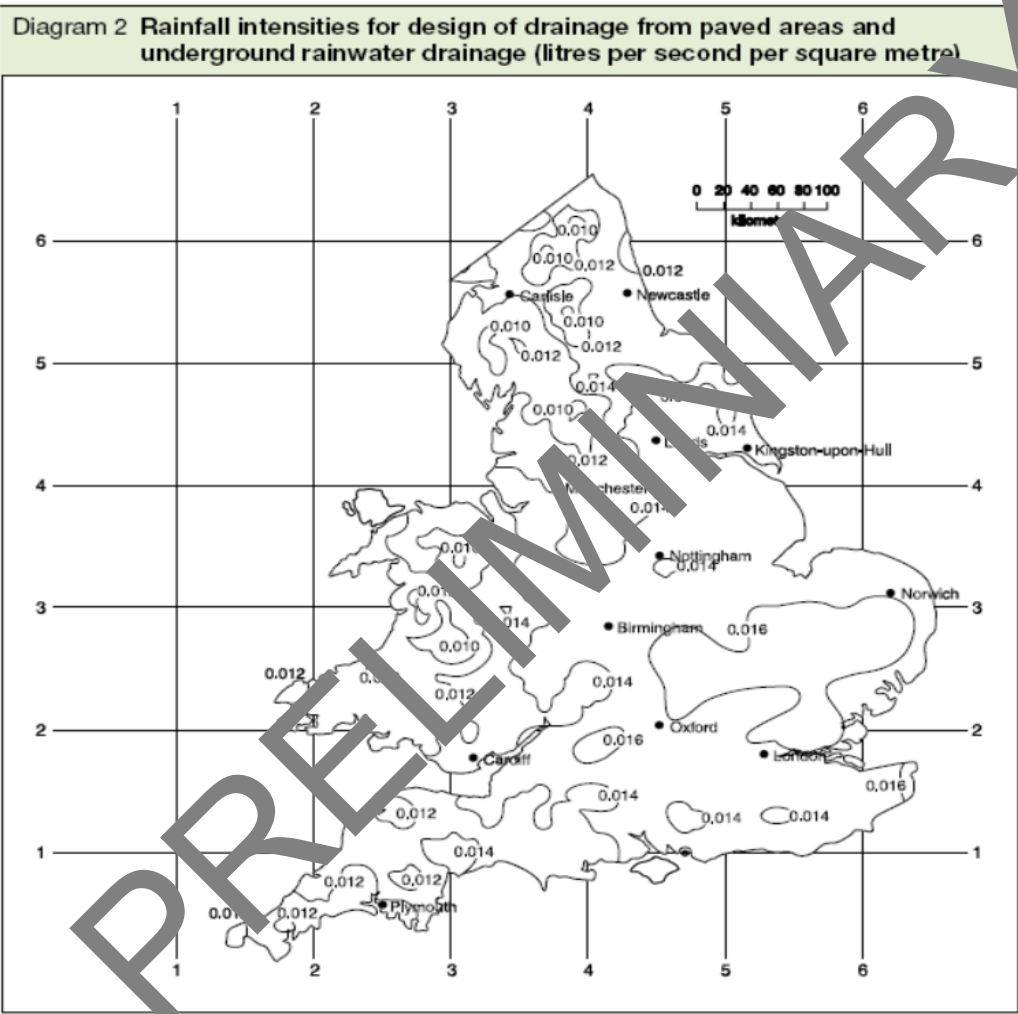
	Total Patio	=	m2
	Total Driveway	=	98 m2
H3	Total Hardstanding Area	=	98 m ²

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Part WAVIN Aquacell Attenuation Sizing Calculations																							
REF <u>U.K. Rainfall Intensity Data - HR Wallingford Map</u> OUTPUT Rainfall Data  <table border="1" style="margin: 20px auto;"> <thead> <tr> <th></th> <th>20mm</th> <th>17mm</th> <th>14mm</th> </tr> </thead> <tbody> <tr> <th>0.4</th> <td style="background-color: red; color: white;">1</td> <td style="background-color: orange;">4</td> <td style="background-color: yellow;">3</td> </tr> <tr> <th>0.3</th> <td style="background-color: red;">2</td> <td style="background-color: yellow;">5</td> <td style="background-color: lightblue;">7</td> </tr> <tr> <th>0.2</th> <td style="background-color: black;">3</td> <td style="background-color: green;">6</td> <td style="background-color: purple;">8</td> </tr> </tbody> </table> FSR M 60 + "r" parameters Reproduced with permission from H.R. Wallingford Area no. = 3									20mm	17mm	14mm	0.4	1	4	3	0.3	2	5	7	0.2	3	6	8
	20mm	17mm	14mm																				
0.4	1	4	3																				
0.3	2	5	7																				
0.2	3	6	8																				

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Part	Storm Water - Highway
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REF		OUTPUT
Part H3	Rainfal Intensity = 0.012 l/s/m ²	
Diagram 2		



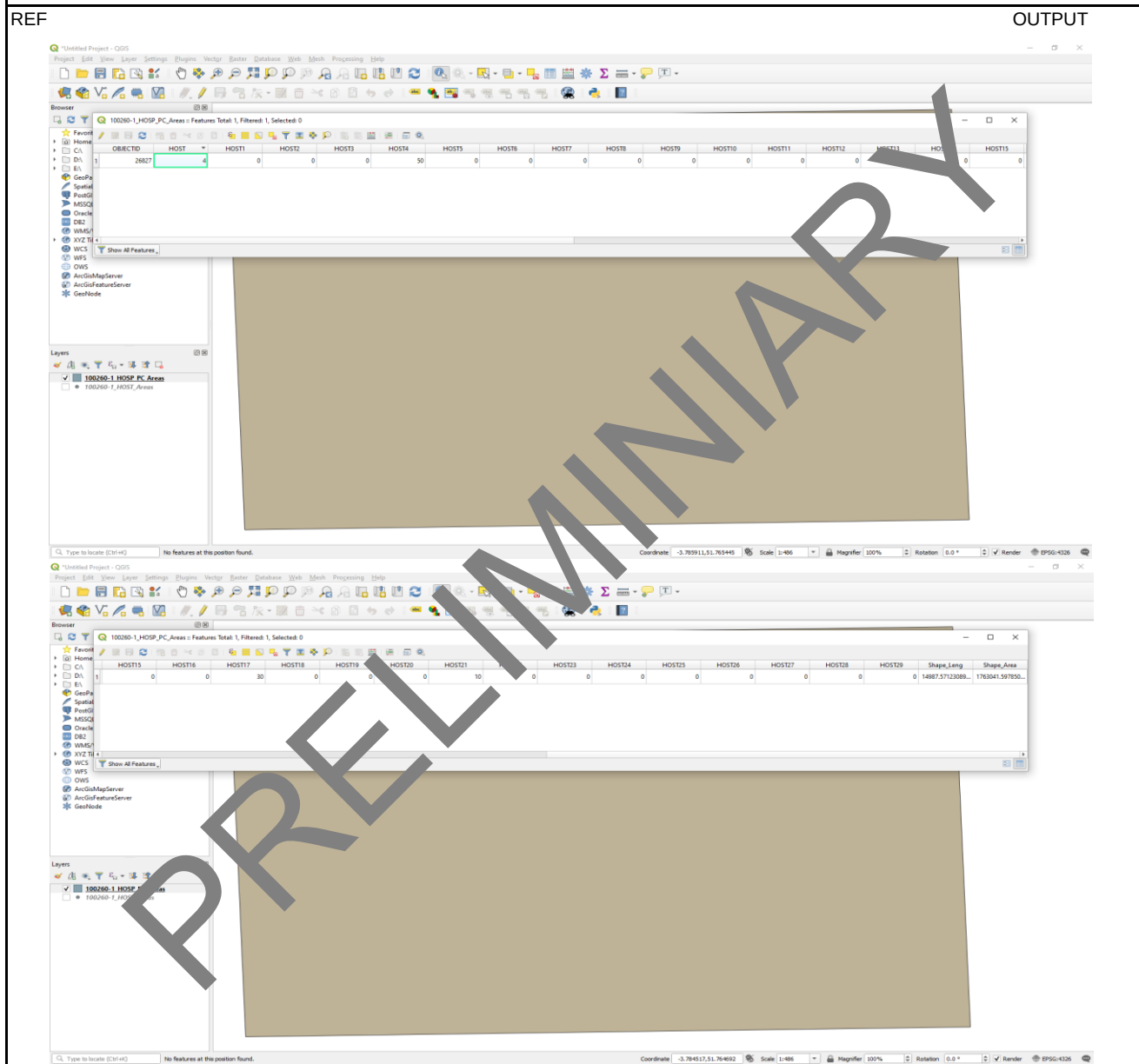
Part 1 (Car Park - Permeable)	=	243	m2	Part 3 (Entrance - Impermeable)	=	225	m2
Part 2 (Turning Head - Permeable)	=	147	m2	Part 4 (Middle - Impermeable)	=	108	m2
Part 5 (Top - Impermeable)	=	129.8	m2				
Total Hardstanding Area	=	852.8	m ²				

H3

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Part

HR Wallingford Greenfield Run-Off Estimate



Dominant HOST = 4 However, does not represent the site accurately

Soil types for site in the ratio of:
 Host 4 : Host 17 : Host 21 = 5 : 3 : 1

Therefore BFI = 0.68

Host	BFI
4	0.79
17	0.61
21	0.34

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HR Wallingford Greenfield Run-Off Estimate

REF

OUTPUT



Calculated by:

Joseph Angelone

Site name:

Site location:

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.

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Site Details

Latitude:

51.7652° N

Longitude:

3.7865° W

Reference:

3994439070

Date:

Feb 05 2020 12:06

Runoff estimation approach

FEH Statistical

Site characteristics

Total site area (ha):

0.3

Methodology

Q_{MED} estimation method:

Calculate from BFI and SAAR

BFI and SPR method:

Specify BFI manually

HOST class:

17

BFI / BFIHOST:

0.68

Q_{MED} (l/s):

2.99

Q_{BAR} / Q_{MED} factor:

1.0

Hydrological characteristics

	Default	Edited
SAAR (mm):	1740	1740
Hydrological region:	9	9
Growth curve factor 1 year:	0.88	0.88
Growth curve factor 10 years:	1.78	1.78
Growth curve factor 100 years:	2.18	2.18
Growth curve factor 200 years:	2.46	2.46

Greenfield runoff rates

	Default	Edited
Q _{BAR} (l/s):	3.22	2.44
1 in 1 year (l/s):	2.83	2.14
1 in 30 years (l/s):	5.73	4.34
1 in 100 year (l/s):	7.02	5.31
1 in 200 years (l/s):	7.92	5.99

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Attenuation Tank Sizing Calculations

REF
OUTPUT

Site & Environmental Data	
Catchment Type	Roof & Hardstanding
Run off Area m ²	188.3
Area Reduction Factor	0.9
Base Infiltration	10%
Soil Type	Clay
Climate Change	30%
Effective Area m ²	220
Factor of Safety	1
Type of Traffic	LIGHT
Rainfall Data	
R Value	0.2
M5-60	20
Storm Return Period	1 in 100 years
Attenuation Type	Gravel

Duration	M5-60	M5-60	M100-60	M100-60	M100-60
Time	Z1 Value	y mm	Z2 Value	p mm	Inflow
5min	0.29	5.72	1.79	10.23	2.25
10min	0.43	8.56	1.86	15.01	3.51
15min	0.53	10.58	1.91	20.23	4.45
30min	0.72	14.48	1.97	26.66	6.09
1hr	1	20	1.99	30.0	8.77
2hr	1.34	26.79	2.03	54.38	11.98
4hr	1.81	36.17	2.06	72.71	16.02
6hr	2.16	43.41	1.97	84.92	18.71
10hr	2.69	53.87	1.87	106.13	23.38
24hr	3.88	77.56	1.81	140.39	30.93
48hr	5.13	102.62	1.81	185.75	40.92

Attenuation Tank Sizing							
Effec	Vol	Discharge	Discharge	Paving Area	Depth	S Volume	S prov
Vol	Vol	Rate (l/s)	Volume			Required	
0.4	5	0.25	0.08	98	0.4	2.18	15.7
0.4	10	0.25	0.15	98	0.4	3.36	15.7
0.4	15	0.25	0.23	98	0.4	4.23	15.7
0.4	30	0.25	0.45	98	0.4	5.64	15.7
0.4	60	0.25	0.90	98	0.4	7.87	15.7
0.4	120	0.25	1.80	98	0.4	10.18	15.7
0.4	240	0.25	3.60	98	0.4	12.42	15.7
0.4	360	0.25	5.40	98	0.4	13.31	15.7
0.4	600	0.25	9.00	98	0.4	14.38	15.7
0.4	1440	0.25	21.60	98	0.4	9.33	15.7
0.4	2880	0.25	43.20	98	0.4	-2.28	15.7

RESULTS	
Critical storm duration	10hr
Storage Req'd m3	14.38
Storage Prov. m3	15.68
No. Of Aquacell Units	N/A
Cover Depth	0.3
Installation Depth	0.3

Hard Emptied Time	
Ts 50	Sx0.5
DR	
Ts 50	= 7.99 hrs

Note

Discharge to adjacent watercourse via PCC chamber with Vortex Flow Control Meter.

Discharge Rate = 0.25 litres/sec. Soakaway: No

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Attenuation Tank Highway Part 1

REF
OUTPUT

Site & Environmental Data	
Catchment Type	Hardstanding
Run off Area m ²	243.3
Area Reduction Factor	0.9
Base Infiltration	10%
Soil Type	Clay
Climate Change	30%
Effective Area m ²	285
Factor of Safety	1
Type of Traffic	LIGHT
Rainfall Data	
R Value	0.2
M5-60	20
Storm Return Period	1 in 100 years
Attenuation Type	Gravel

Duration	M5-60	M5-60	M100-60	M100-60	M100-60
Time	Z1 Value	y mm	Z2 Value	p mm	Inflow
5min	0.29	5.72	1.79	10.23	91
10min	0.43	8.56	1.86	15.01	4.53
15min	0.53	10.58	1.91	20.21	5.75
30min	0.72	14.48	1.99	26.66	7.87
1hr	1	20	1.99	30.0	11.33
2hr	1.34	26.79	2.03	54.38	15.48
4hr	1.81	36.17	2.06	72.71	20.70
6hr	2.16	43.41	1.97	84.92	24.17
10hr	2.69	53.81	1.87	106.13	30.21
24hr	3.88	77.56	1.81	140.39	39.96
48hr	5.13	102.62	1.81	185.75	52.88

Permeable Paving Sub-Base Sizing							
Effec	Vol	Discharge	Discharge	Paving Area	Depth	S Volume	S prov
Rate (l/s)	Rate (l/s)	Volume	Volume	Area	Depth	Required	Volume
0.4	5	0.1	0.03	243.3	0.4	2.88	38.9
0.4	10	0.1	0.06	243.3	0.4	4.47	38.9
0.4	15	0.1	0.09	243.3	0.4	5.66	38.9
0.4	30	0.1	0.18	243.3	0.4	7.69	38.9
0.4	60	0.1	0.36	243.3	0.4	10.97	38.9
0.4	120	0.1	0.72	243.3	0.4	14.76	38.9
0.4	240	0.1	1.44	243.3	0.4	19.26	38.9
0.4	360	0.1	2.16	243.3	0.4	22.01	38.9
0.4	600	0.1	3.60	243.3	0.4	26.61	38.9
0.4	1440	0.1	8.64	243.3	0.4	31.32	38.9
0.4	2880	0.1	17.28	243.3	0.4	35.60	38.9

RESULTS	
Critical storm duration	48hr
Storage Req'd m3	35.60
Storage Prov. m3	38.928
No. Of Aquacell Units	N/A
Cover Depth	0.3
Installation Depth	0.3

Hardstanding Time	
Ts 50	Sx0.5
DR	
Ts 50	= 49.44 hrs

Note

Discharge to adjacent watercourse via PCC chamber with Hydorbrake Flow Control Meter.

Discharge Rate = 0.1 litres/sec. Soakaway: No

Project: New Development at 30 Commercial Street, Ystalyfera				Document Number 1333-CAL-001		HCE LTD Canolfan Gorseion Centre Millers Drive Gorseionon SA4 4QN Tel: 01792 805010	
Date Dec-19 By J Angelone Checked I Howells		Job no. 1333	Section C&S	Sheet no. AT / 1	Rev C01		
Rev	Date	Details					

Part

Attenuation Tank Highway Part 2

REF
OUTPUT

Site & Environmental Data	
Catchment Type	Hardstanding
Run off Area m ²	146.7
Area Reduction Factor	0.9
Base Infiltration	10%
Soil Type	Clay
Climate Change	30%
Effective Area m ²	172
Factor of Safety	1
Type of Traffic	LIGHT
Rainfall Data	
R Value	0.2
M5-60	20
Storm Return Period	1 in 100 years
Attenuation Type	Gravel

RESULTS	
Critical storm duration	24hr
Storage Req'd m3	15.46
Storage Prov. m3	17.604
No. Of Aquacell Units	N/A
Cover Depth	0.3
Installation Depth	0.3

Emptying Time	
Ts 50	Sx0.5
DR	
Ts 100	21.47 hrs

Duration	M5-60 Time	M5-60 Z1 Value	M5-60 y mm	M100-60 Z2 Value	M100-60 p mm	M100-60 Inflow
5min	0.29	5.72	1.79	10.2	1.76	
10min	0.43	8.56	1.86	15.91	2.73	
15min	0.53	10.58	1.91	20.81	3.47	
30min	0.72	14.48	1.91	27.66	4.75	
1hr	1.00	20	1.91	33.80	6.83	
2hr	1.34	26.79	2.03	50.8	9.33	
4hr	1.81	36.17	2.01	72.71	12.48	
6hr	2.16	43.11	1.9	84.92	14.58	
10hr	2.69	53.07	1.97	106.13	18.22	
24hr	3.88	77.56	1.82	140.39	24.10	
48hr	5.13	102.62	1.81	185.75	31.88	

Permeable Paving-Sub Base Sizing							
Effec	D(mm)	Discharge	Discharge	Paving Area	Depth	S Volume	S prov
0.4	75	0.1	0.03	146.7	0.3	1.73	17.6
0.4	90		0.06	146.7	0.3	2.67	17.6
0.4	115	0.1	0.09	146.7	0.3	3.38	17.6
0.4	130	0.1	0.18	146.7	0.3	4.57	17.6
0.4	160	0.1	0.36	146.7	0.3	6.47	17.6
0.4	120	0.1	0.72	146.7	0.3	8.61	17.6
0.4	240	0.1	1.44	146.7	0.3	11.04	17.6
0.4	360	0.1	2.16	146.7	0.3	12.42	17.6
0.4	600	0.1	3.60	146.7	0.3	14.62	17.6
0.4	1440	0.1	8.64	146.7	0.3	15.46	17.6
0.4	2880	0.1	17.28	146.7	0.3	14.60	17.6

Note

Discharge to adjacent watercourse via PCC chamber with Hydorbrake Flow Control Meter.

Discharge Rate = 0.1 litres/sec. Soakaway: No

Project: New Development at 30 Commercial Street, Ystalyfera				Document Number 0		HCE LTD Canolfan Gorseion Centre Millers Drive Gorseionon SA4 4QN Tel: 01792 805010	
Date Dec-19		Job no. 1333		Section C&S		Sheet no. AT / 1	
By J Angelone				Rev C01			
Checked I Howells							
Rev		Date		Details			

Part
Attenuation Tank Highway Part 3

REF
OUTPUT

Site & Environmental Data	
Catchment Type	Hardstanding
Run off Area m ²	354.6
Area Reduction Factor	0.9
Base Infiltration	10%
Soil Type	Clay
Climate Change	30%
Effective Area m ²	415
Factor of Safety	1
Type of Traffic	LIGHT
Rainfall Data	
R Value	0.2
M5-60	20
Storm Return Period	1 in 100 years
Attenuation Type	Gravel

Duration	M5-60	M5-60	M100-60	M100-60	M100-60
Time	Z1 Value	y mm	Z2 Value	p mm	Inflow
5min	0.29	5.72	1.79	10.23	2.24
10min	0.43	8.56	1.86	15.91	6.60
15min	0.53	10.58	1.91	20.26	8.38
30min	0.72	14.48	1.97	26.66	11.48
1hr	1.00	20	1.99	33.00	16.51
2hr	1.34	26.79	2.03	54.38	22.56
4hr	1.81	36.17	2.07	72.71	30.17
6hr	2.16	43.11	1.97	84.92	35.23
10hr	2.69	53.86	1.97	106.13	44.03
24hr	3.88	77.56	1.81	140.39	58.24
48hr	5.13	102.62	1.81	185.75	77.06

Rainwater Garden Sub-base Sizing								
Effec	D (mm)	Discharge	Discharge	Length	Depth	Width	S Volume	S prov
0.4	5	2.6	0.78	14	0.65	2	3.46	7.28
0.4	10	2.6	1.56	14	0.65	2	5.04	7.28
0.4	15	2.6	2.34	14	0.65	2	6.04	7.28
0.4	30	2.6	4.68	14	0.65	2	6.80	7.28
0.4	60	2.6	9.36	14	0.65	2	7.15	7.28
0.4	120	2.6	18.72	14	0.65	2	3.84	7.28
0.4	240	2.6	37.44	14	0.65	2	-7.27	7.28
0.4	360	2.6	56.16	14	0.65	2	-20.93	7.28
0.4	600	2.6	93.60	14	0.65	2	-49.57	7.28
0.4	1440	2.6	224.64	14	0.65	2	-166.40	7.28
0.4	2880	2.6	449.28	14	0.65	2	-372.22	7.28

RESULTS	
(hrs)	1hr
Storage Req'd m3	7.15
Storage Prov. m3	7.28
No. Of Aquacell Units	N/A
Cover Depth	0.3
Installation Depth	-0.95

Hardstanding Time	
Ts 50	Sx0.5
DR	
Ts 50	= 0.382 hrs

Note

Discharge to adjacent watercourse via PCC chamber with Hydorbrake Flow Control Meter.

Discharge Rate = 2.6 litres/sec.

Soakaway: No

Project: New Development at 30 Commercial Street, Ystalyfera				Document Number 0		HCE LTD Canolfan Gorseion Centre Millers Drive Gorseionon SA4 4QN Tel: 01792 805010	
Date Dec-19		Job no. 1333		Section C&S		Sheet no. AT / 1	
By J Angelone				Rev C01			
Checked I Howells							
Rev		Date		Details			

Part
Attenuation Tank Highway Part 4

REF
OUTPUT

Site & Environmental Data	
Catchment Type	Hardstanding
Run off Area m ²	108.2
Area Reduction Factor	0.9
Base Infiltration	10%
Soil Type	Clay
Climate Change	30%
Effective Area m ²	127
Factor of Safety	1
Type of Traffic	LIGHT
Rainfall Data	
R Value	0.2
M5-60	20
Storm Return Period	1 in 100 years
Attenuation Type	Gravel

Duration	M5-60	M5-60	M100-60	M100-60	M100-60
Time	Z1 Value	y mm	Z2 Value	p mm	Inflow
5min	0.29	5.72	1.79	10.23	1.30
10min	0.43	8.56	1.86	11.91	2.01
15min	0.53	10.58	1.91	10.24	2.56
30min	0.72	14.48	1.97	21.66	3.50
1hr	1.00	20	1.99	50.00	5.04
2hr	1.34	26.79	2.03	54.38	6.88
4hr	1.81	36.17	2.07	72.71	9.20
6hr	2.16	43.11	1.97	84.92	10.75
10hr	2.69	53.86	1.97	106.13	13.44
24hr	3.88	77.56	1.81	140.39	17.77
48hr	5.13	102.62	1.81	185.75	23.51

Rainwater Garden Sub-base Sizing								
Effec	D (min)	Discharge	Discharge	Length	Depth	Width	S Volume	S prov
0.4	5	0.59	0.18	7	0.55	2	1.12	3.08
0.4	10	0.59	0.35	7	0.55	2	1.66	3.08
0.4	15	0.59	0.53	7	0.55	2	2.03	3.08
0.4	30	0.59	1.06	7	0.55	2	2.44	3.08
0.4	60	0.59	2.12	7	0.55	2	2.91	3.08
0.4	120	0.59	4.25	7	0.55	2	2.64	3.08
0.4	240	0.59	8.50	7	0.55	2	0.71	3.08
0.4	360	0.59	12.74	7	0.55	2	-1.99	3.08
0.4	600	0.59	21.24	7	0.55	2	-7.80	3.08
0.4	1440	0.59	50.98	7	0.55	2	-33.20	3.08
0.4	2880	0.59	101.95	7	0.55	2	-78.44	3.08

RESULTS	
(hrs)	1hr
Storage Req'd m3	2.91
Storage Prov. m3	3.08
No. Of Aquacell Units	N/A
Cover Depth	0.3
Installation Depth	-0.85

Hardstanding Time	
Ts 50	Sx0.5
DR	
Ts 50	= 0.686 hrs

Note
 Discharge to adjacent watercourse via PCC chamber with Hydorbrake Flow Control Meter.
 Discharge Rate = 0.59 litres/sec. Soakaway: No