

Invoice



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Port Talbot

SA13 2PU

For the attention of Mr. Carl Price

By e-mail only

Telephone Number: 01267 290769

Mobile Number: 07769 226695

Invoice No: **792**

Invoice Date: **05 October 2020**

Due Date: **19 October 2020**

Job No: 2020-567

Site: Plot 24, Clos Dewi Sant, Bryn, Port Talbot

Details of work undertaken:-

Item * Professional Fees	Description	Hours	Rate	Net Amount	VAT Amount
Prepare attenuation tank calculations	Director	3.5	£80.00	£280.00	£56.00
Total Professional Fees		3.5		£280.00	£56.00

Item * Disbursements	Mileage	Quantity	Rate	Net Amount	VAT Amount
Total Disbursements				£0.00	£0.00

Total Net Fees: £ 280.00 £ 56.00

Pre-payment:

Balance: £ 280.00

VAT at 20.0% £ 56.00

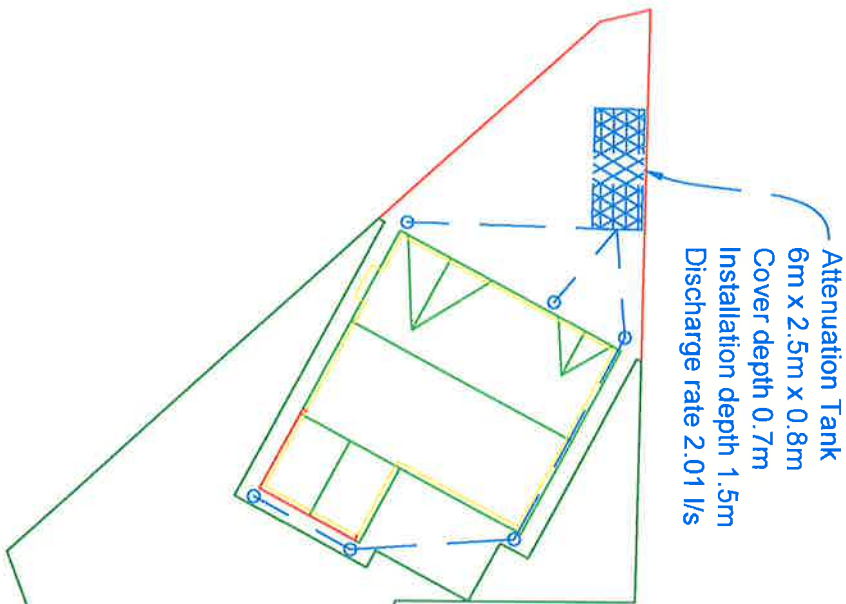
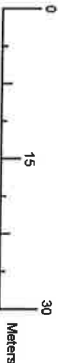
Total: £ 336.00

Payment by Bank Transfer would be preferred if at all possible using account name LvW Highways Ltd, sort code 40-44-04, account number 41892916 and quoting INV No 792 as reference.

If paying by cheque please make payable to LvW Highways Ltd and forward to address above:

TRADING TERMS - Strictly 14 days from invoice date.

Accounts outstanding after **14 days** may incur interest calculated at 8% over Bank of England published rate on a Daily Balance Basis from the Payment Due Date to the last day of the month.



Attenuation Tank
6m x 2.5m x 0.8m
Cover depth 0.7m
Installation depth 1.5m
Discharge rate 2.01 l/s

Areas

Site Area =	734.540
Plan Roof Area =	153.556
Pitched roof angle =	30
Roof Area =	198.087
Patio Area =	56.297
Driveway Area =	125.268
Grass Area =	399.419

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2. DO NOT SCALE THIS DRAWING. USE FIGURED DIMENSIONS ONLY.
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A	For Discussion	11.10.20
No.	Revisions/Issues	Date



Plot 24,
Close Dewi Sant,
Bryn, Port Talbot.
Surface Water Drainage
Attenuation Tank

2020-567	100
26.08.2020	
1:250 @ A3L	

Calculated by: Karl von Weber

Site name: Clos Dewi Sant

Site location: Varteg Row, Bryn, SA13 2RF

Site Details

Latitude: 51.61474° N

Longitude: 3.71424° W

Reference: 1909141686

Date: Sep 18 2020 14:36

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

IH124

Site characteristics

Total site area (ha): 0.1

Methodology

Q_{BAR} estimation method: Calculate from SPR and SAAR

SPR estimation method: Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	3	3

	Default	Edited
HOST class:	N/A	N/A

	Default	Edited
SPR/SPRHOST:	0.37	0.37

Hydrological characteristics

	Default	Edited
SAAR (mm):	1711	1711

	Default	Edited
Hydrological region:	9	9

	Default	Edited
Growth curve factor 1 year:	0.88	0.88

	Default	Edited
Growth curve factor 30 years:	1.78	1.78

	Default	Edited
Growth curve factor 100 years:	2.18	2.18

	Default	Edited
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 ≤ 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):	0.82	0.82
1 in 1 year (l/s):	0.72	0.72
1 in 30 years (l/s):	1.45	1.45
1 in 100 year (l/s):	1.78	1.78
1 in 200 years (l/s):	2.01	2.01

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.

ATTENUATION TANK CALCULATION 2020-567 - Verteg Way, Bryn, Port Talbot

Impermeable surface area

	Plot 1				Total			
Area to be drained								
Plan Roof Space					153.56			153.56 m ²
Pitched roof angle					30.00			
Roof Space Area					198.09			198.09 m ²
Patio Area					56.30			56.30 m ²
Driveway Area					125.27			125.27 m ²
Grassed area								0.00 m ²
Pathways Area								0.00 m ²
Total	380.00	0.00	0.00					380.00 m ²
Access Road								0.00 m ²
Footway								0.00 m ²
Total	380.00	0.00	0.00	0.00	0.00	0.00	0.00	380.00 m ²
Total Site Area	734.54							0.073 hectares

Design rainfall intensity

Location of catchment area;	= England and Wales
Impermeable area drained to the system;	A = 380 m ²
Return period;	Period = M100-D years
Ratio 60 min to 2 day rainfall of 5 yr return period;	r = 0.27
5-year return period rainfall of 60 minutes duration;	M5_60min = 18 mm
Increase of rainfall intensity due to global warming;	pclimate = 40%
Area reduction factor;	0.9
Effective area drained to the system;	A = 478.80

Greenfield runoff rates from ukuds

Proposed discharge rate 'v1' 1 in 30 years;	litres per second	1.45 l/s
Proposed discharge rate 'v2' 1 in 100 years;	litres per second	2.01 l/s

Table equations

Inflow;	I = M100 × A
Outflow;	O = a ₅₀ × f × D
Storage;	S = I - O

Duration, D (min)	Growth factor Z1	M5 rainfalls (mm)	Z2	M10-D rainfall, (mm)	Inflow (m ³)	Z2	M20-D rainfall, (mm)	Inflow (m ³)	Z2	M30-D rainfall, (mm)	Inflow (m ³)	Outflow from attenuation tank (m ³)	Storage required (m ³)
5	0.33	5.94	1.20	7.10	3.40	1.37	8.13	3.89	1.44	8.55	4.09	0.44	3.65
10	0.48	8.64	1.21	10.47	5.01	1.40	12.06	5.78	1.47	12.72	6.09	0.87	5.22
15	0.58	10.44	1.22	12.76	6.11	1.41	14.75	7.06	1.49	15.59	7.46	1.31	6.15
30	0.76	13.68	1.23	16.89	8.09	1.43	19.59	9.38	1.52	20.75	9.94	2.61	7.33
60	1.00	18.00	1.24	22.32	10.69	1.45	26.03	12.46	1.54	27.66	13.24	5.22	8.02
120	1.27	22.86	1.24	28.35	13.57	1.44	33.02	15.81	1.54	35.15	16.83	10.44	6.39
240	1.64	29.52	1.22	36.07	17.27	1.42	41.98	20.10	1.52	44.73	21.42	20.88	0.54
360	1.88	33.84	1.21	40.89	19.58	1.40	47.53	22.76	1.50	50.60	24.23	31.32	0.00
600	2.24	40.32	1.19	47.95	22.96	1.38	55.59	26.62	1.47	59.08	28.29	52.20	0.00
1440	3.10	55.80	1.16	64.90	31.07	1.33	74.00	35.43	1.40	78.24	37.46	125.28	0.00

Duration, D (min)	Growth factor Z1	M5 rainfalls (mm)	Z2	M10-D rainfall, (mm)	Inflow (m ³)	Z2	M50-D rainfall, (mm)	Inflow (m ³)	Z2	M100-D rainfall, (mm)	Inflow (m ³)	Outflow from attenuation tank (m ³)	Storage required (m ³)
5	0.33	5.94	1.20	7.10	3.40	1.58	9.37	4.48	1.81	10.77	5.16	0.60	4.56
10	0.48	8.64	1.21	10.47	5.01	1.63	14.04	6.72	1.88	16.22	7.77	1.21	6.56
15	0.58	10.44	1.22	12.76	6.11	1.65	17.27	8.27	1.92	20.01	9.58	1.81	7.77
30	0.76	13.68	1.23	16.89	8.09	1.69	23.08	11.05	1.97	26.93	12.90	3.62	9.28
60	1.00	18.00	1.24	22.32	10.69	1.72	30.92	14.81	2.01	36.25	17.36	7.24	10.12
120	1.27	22.86	1.24	28.35	13.57	1.72	39.42	18.87	2.02	46.14	22.09	14.47	7.62
240	1.64	29.52	1.22	36.07	17.27	1.70	50.24	24.06	1.97	58.27	27.90	28.94	0.00
360	1.88	33.84	1.21	40.89	19.58	1.68	56.75	27.17	1.94	65.63	31.42	43.42	0.00
600	2.24	40.32	1.19	47.95	22.96	1.64	66.05	31.62	1.89	76.10	36.44	72.36	0.00
1440	3.10	55.80	1.16	64.90	31.07	1.55	86.74	41.53	1.77	98.80	47.30	173.66	0.00

Attenuation Tank details

Attenuation Tank type;	Rectangular Crates (l x w x d) 1m x 0.5m x 0.4m
Length of tank;	l = 6.00 m
Width of tank;	w = 2.50 m
Depth of tank;	d = 0.80 m
Area;	a = 15 m ²
Void Ratio, Percentage free volume;	V _{free} = 95.0%
Number of Crates;	60
Cover depth;	0.7 m
Installation depth;	1.5 m
Wetted area of tank 50% full;	a ₅₀ = l × d + w × d = 6.80 m ²

Summary of Results

Required attenuation tank volume;	M30-D	S _{req} =	8.02 m ³	
Attenuation tank storage volume;		S _{act} = l × d × w × V _{free} =	11.40 m ³	70% storage volume
			PASS	Attenuation storage volume okay
Required attenuation tank volume;	M100-D	S _{req} =	10.12 m ³	
Attenuation tank storage volume;		S _{act} = l × d × w × V _{free} =	11.40 m ³	89% storage volume
			PASS	Attenuation storage volume okay