

Hemsley Consulting Ltd Unit 18, Park Farm Hundred Acre Lane, Wivelsfield Green West Sussex, RH17 7RU	Project Downs Park Place, Turners Hill Road, Crawley Down				Job no. 6215	
	Calcs for Stormwater Attenuation				Start page no./Revision 1 A	
	Calcs by TJH	Calcs date 18/03/2024	Checked by	Checked date	Approved by	Approved date

ATTENUATION DESIGN

In accordance with CIRIA publication C753 - The SUDS Manual

Tedds calculation version 1.0.04

Allowable discharge method

Site characteristics

Location; Brighton
Hydrological region; 1
Soil type (Wallingford Procedure W.R.A.P map); 4
Standard percentage runoff; SPR = **0.47**
Average annual rainfall; SAAR = **720** mm
5 year return period rainfall of 60 minute duration; M5_60min = **20.0** mm
Ratio 60-minute to 2 day rainfalls of 5 year return; r = **0.35**
Rainfall intensity increase due to global warming; p_{climate} = **45%**

Catchment details

Main House = 260 m²
Outbuildings = 80m²
Total = 340m²

Allowable discharge

Take as Q = 2 l/s

Table equations

Total surface water; $V_w = A_{imp} \times M$
Permitted discharge; $Q_{allow} = Q_r \times D$
Storage volume required; $V_{req} = V_w - Q_{allow}$

Attenuation storage

Duration, D (min)	Growth factor Z1	M5 rainfalls (mm)	Growth factor Z2	100 year rainfall, M100 (mm)	Total surf water (m ³)	Permit dischrge 2l/s (m ³)	Storage vol. reqd (m ³)
5	0.36	10.3	1.91	19.7	6.70	0.60	6.10
10	0.51	14.7	1.97	29	9.86	1.20	8.66
15	0.62	17.9	2.01	36	12.24	1.80	10.44
30	0.79	22.8	2.02	46.1	15.67	3.60	12.07
60	1.00	29.0	1.99	57.7	19.62	7.20	12.42
120	1.22	35.5	1.94	68.9	23.43	14.40	9.03
240	1.48	43.4	1.88	81.6	27.74	28.80	-1.06
360	1.67	49.0	1.84	90.2	30.67	43.20	-12.53
600	1.90	56.5	1.79	101.1	34.37	72.00	-37.63
1440	2.42	71.9	1.70	122.2	41.55	172.80	-131.25

Attenuation storage required

Vol. increase due to head-discharge relationship; p_{hydro} = **1.25**
Maximum attenuation storage required; $V_{req_max} = V_{max} \times p_{hydro} = \mathbf{15.53\ m^3}$
Using Storm Crates with 95% free volume

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$$\text{Storage Required} = 15.53 \times \frac{1}{95/100} = 16.35\text{m}^3$$

Using a Single crate depth of 0.4m

$$\text{Min Storage Area Required} = 16.35 \times \frac{1}{0.4} = 40.88\text{m}^2 = 6.4 \times 6.4\text{m}$$

Outflow Orifice Plate

Limit Outflow to 2.0 l/s = $2 \times 10^{-3} \text{ m}^3/\text{s}$

$$Q = C_d A_o \sqrt{2gh}$$

Coefficient of Discharge $C_d = 0.6$

Head $h = 0.35\text{m}$

$$A_o = \frac{2 \times 10^{-3}}{0.6 \times \sqrt{2} \times 9.81 \times 0.35} = 1.3 \times 10^{-3} \text{m}^2$$

$$d = \sqrt{\frac{1.3 \times 10^{-3}}{\pi}} \times 2 = 0.04\text{m}$$

Conclusion

- Use – Provide min 6.4 x 6.4 x 0.4m deep Stormwater Crates installed to suppliers details.
Crates to discharge to existing ditch through a flow control chamber with 40mm Ø Orifice Plate.
Crates to have a min of 95% free volume.
Overflow pipe to be positioned 0.4m above orifice opening.