

**Surface Water Attenuation Calculations**

**Calculation of QBAR<sub>rural</sub>**

Client Paul A. Glynn Limited  
 Project 127sqm extension to existing approved facility  
 Location Unit F6, South City Business Park, Tallaght, Dublin 24

As the site is small, we will calculate the QBAR for a notional 50ha site and then interpolate this value for our site.  
 QBAR<sub>rural</sub> = 0.00108 AREA<sup>0.89</sup> SAAR<sup>1.17</sup> SOIL<sup>2.17</sup>

AREA = Catchment Area  
 SAAR = Standard Average Annual Rainfall  
 SOIL = Soil Index, Intermediate Soil (Sandy)

Example for 50ha site	
km <sup>2</sup>	ha
0.5	50
733	mm
0.37	

Actual Site Area	
m <sup>2</sup>	ha
223	0.0223

QBAR<sub>rural</sub>  
 QBAR<sub>rural</sub>  
 QBAR<sub>rural</sub>/ha

0.1516	m <sup>3</sup> /sec
152	l/sec
3.03	l/sec/ha

Greenfield Limiting Discharge Rates:					
Year Event	Growth Curve Factor	QBAR <sub>rural</sub> /ha	l/s/ha	l/s	
1	0.85	3.03	2.6	0.06	
30	2.1	3.03	6.4	0.14	
100	2.61	3.03	7.9	0.18	

Extreme Rainfall Return Periods from Met Eireann									
Location:		Tallaght, Dublin 24							
Average Annual Rainfall:		733 mm							
Maximum rainfall (mm) of indicated duration expected in the indicated return period.									
Duration	Return Period (years)								
	1	2	5	10	20	30	50	75	100
5 mins		4.0	5.7	7.0	8.5	9.4	10.8	12.0	12.9
10 mins		5.6	7.9	9.8	11.8	13.1	15.0	16.7	18.0
15 mins	5.7	6.6	9.3	11.5	13.9	15.5	17.7	19.6	21.1
30 mins	7.5	8.5	11.8	14.4	17.2	19.0	21.5	23.8	25.5
1 hours	10.0	11.0	15.0	18.0	21.3	23.4	26.2	28.8	30.7
2 hours	13.1	14.3	19.1	22.5	26.3	28.7	32.0	34.8	37.0
4 hours	17.7	18.6	24.2	28.2	32.5	35.3	39.0	42.2	44.6
6 hours	21.3	21.6	27.8	32.2	36.9	39.8	43.8	47.2	49.7
12 hours	26.0	28.0	35.3	40.3	45.6	48.9	53.3	57.1	59.9
24 hours	34.0	36.9	45.4	51.2	57.2	61.0	65.9	70.1	73.2
48 hours	42.0	45.3	54.7	61.0	67.5	71.5	76.7	81.1	84.4

Notes: Larger margins of error for 1, 2, 5 and 10 minute values and for 100 year return periods  
 M560: 15.0 M52d: 54.7 M560/M52d: 0.27

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$Q = A_p \times i \times C_r \times C_v \times 2.78$

Q	Flow	ha	m <sup>2</sup>	km <sup>2</sup>	Impermeability Factors
	Total Site Area	0.022	223	0.00022	
	Roof Area	0.013	127	0.00013	1.00
	Roads and Yards	0.000	0	0.00000	0.90
	Car Parks	0.000	0	0.00000	0.90
	Other Areas - planting, meadow grass	0.010	96	0.00010	0.20
	A <sub>p</sub> Proposed Impermeable Area				0.0146
I	Rainfall Intensity mm/hr	From Met Eireann Data below			
Cr	Routing Co-efficient 1.3	1.3			
Cv	Volumetric Run Off Co-efficient 0.9	0.9			
	Event Period	l/sec	l/s/ha		
QBAR <sub>rural</sub>	100 years	7.91	0.18		See QBAR Calculation on attached sheet
	30 years	6.37	0.14		See QBAR Calculation on attached sheet
	1 years	2.58	0.06		See QBAR Calculation on attached sheet

Duration (Mins)	Rainfall Intensity i, mm/hr	Q l/s	Volume of Water collected during storm m <sup>3</sup>	Qbar Allowable Volume to be discharged m <sup>3</sup>	Volume to be retained m <sup>3</sup>	Max Volume to be retained
<b>Return period = 100 years</b>						
15	84.40	4.013	3.6	0.2	3.5	
30	51.00	2.425	4.4	0.3	4.0	
60	30.70	1.460	5.3	0.6	4.6	
120	18.50	0.880	6.3	1.3	5.1	
240	11.15	0.530	7.6	2.5	5.1	
360	8.28	0.394	8.5	3.8	4.7	
720	4.99	0.237	10.3	7.6	2.6	
1440	3.05	0.145	12.5	15.2	-2.7	5.1 m <sup>3</sup>
<b>Return period = 30 years</b>						
15	62.00	2.948	2.7	0.1	2.5	
30	38.00	1.807	3.3	0.3	3.0	
60	23.40	1.113	4.0	0.5	3.5	
120	14.35	0.682	4.9	1.0	3.9	
240	8.83	0.420	6.0	2.0	4.0	
360	6.63	0.315	6.8	3.1	3.7	
720	4.08	0.194	8.4	6.1	2.2	
1440	2.54	0.121	10.4	12.3	-1.8	4.0 m <sup>3</sup>
<b>Return Period = 1 Year</b>						
15	22.80	1.084	1.0	0.1	0.9	
30	15.00	0.713	1.3	0.1	1.2	
60	10.00	0.476	1.7	0.2	1.5	
120	6.55	0.311	2.2	0.4	1.8	
240	4.43	0.210	3.0	0.8	2.2	
360	3.55	0.169	3.6	1.2	2.4	
720	2.17	0.103	4.5	2.5	2.0	
1440	1.42	0.067	5.8	5.0	0.9	2.4 m <sup>3</sup>

Based on the above figures we can see that for a 30 year storm event, there will be a requirement to store 4.0 m<sup>3</sup> of surface water run-off. There is additional capacity to storage capacity within the site pipework and manholes. The attenuation tanks will be sized to store 6.0 m<sup>3</sup>. 50% oversized is 25% larger than required for a 1 in 100 year storm. For the 100 year storm event, the additional overflow capacity is provided in the proposed attenuation with 25% additional capacity