

DETERMINATION OF GREENFIELD RUN-OFF RATE

For a development less than 25 hectares in area, the permissible outflow is calculated using the estimation method contained in the Institute of Hydrology Report No. 124:

$$QBAR = 0.00108 \times (AREA)^{0.89} (SAAR)^{1.17} (SOIL)^{2.17}$$

where QBAR (m³/s) is the mean annual peak flow.

$$AREA = \text{Area of Catchment} = 840 \text{ m}^2 = 840 \times 10^6 \text{ km}^2$$

$$SAAR = \text{Annual Average Rainfall} = 941 \text{ mm for the Rathvilly Area}$$

$$SOIL = \text{Soil Index with values in the range 0.15 (very low runoff) - 0.5 (very high runoff).}$$

Gsi geotechnical records indicate a clayey or loamy soil type in the Rathvilly area and thus a value of 0.4 (moderately permeable) was taken for subsoil ref. Transport Infrastructure Ireland: Drainage of runoff from Natural Catchments (including Amendments No.1 dated June 2015)

Using the values above in the QBAR formula, **QBAR rural = 0.0008 m³/s (or 1 lt/sec)**

The above formula should not strictly be applied to area less than 50 Ha, however under the GDDSDS guidelines, this constraint can be avoided by calculating QBAR for 50 Ha and lineally interpolation flow rates for the smaller area.

The permissible outflow from the developed site will be set at 1 litres/second. The Surface Water Drainage Attenuation System will be designed based on this outflow rate.

PROPOSED ATTENUATION REQUIREMENTS

Area (Site) (sqm) 840
 Actual Impermeable Area (sqm) 658
 Storm Return Period 1 in 100 Year
 Allowable outflow from site: 1 litres/second

The greenfield run-off rate from the total site was calculated to be 1 litres/second, see QBAR formula on sheet

Storm Duration (mins)	Total Rainfall during storm (100 yr RP)	+10% Total Rainfall for climate change	Impermeable Contributing Area (m ²)	Total run-off from site during storm (m ³)	Discharge allowed from site during storm (m ³)	Required Storage (m ³)
5	12.80	14.08	658	11.78	0.30	11.5
10	17.90	19.69	658	12.96	0.60	12.4
15	21.10	23.21	658	15.27	0.90	14.4
30	26.00	28.60	658	18.82	1.80	17.0
60	32.20	35.42	658	23.31	3.60	19.7
120	39.80	43.78	658	28.81	7.20	21.6
240	49.20	54.12	658	35.61	14.40	21.2
360	55.70	61.27	658	40.32	21.60	18.7
720	68.90	75.79	658	49.87	43.20	6.7
1440	85.20	93.72	658	61.67	86.40	-24.7
2880	98.10	107.91	658	71.00	172.80	-101.8

Critical Attenuation Vol.

Results: Min. required Attenuation Storage Volume > 21.6 m³ , actual Attenuation Storage Volume provided = 22.5 m³

Surface Water Sewer Network Design in accordance with B.S. EN 752:2008 Drain & Sewer Systems outside Buildings																Project No.	22P1544								
2yr Design Return Period																Frequency Factor	1				Effective Roughness for Surface Water Flow	KS 0.60 mm			
	US MH CL	US MH IL	DS MH IL	Length [m]	Grad. [1 in...]	Pipe Diameter [mm]	Cover to US Soffit [m]	Vel. [m/s]	Time of Flow [min]	Time of Conc. [min]	Rate of Rainfall [mm/hr]	% Imperv.	Imperv. Area [m2]	Cumul. Imperv. Area [m2]	Actual Rate of Flow [m3/s]	Allow. Rate of Flow [m3/s]	Prop. Capacity	Prop. Velocity	Partial Velocity						
Saj1-Saj2	118.570	118.200	118.147	5.310	100	100	0.270	0.766	0.115	4.115	74.91	100	170	170	0.004	0.006	0.59	1.020	0.78						
Saj2-Saj3	118.450	118.147	118.046	11.083	110	150	0.153	0.957	0.193	4.309	72.88	100	39	209	0.004	0.017	0.25	0.850	0.81						
Saj3-Saj4	118.450	118.046	118.003	5.166	120	150	0.254	0.914	0.094	4.403	71.94	100	9	218	0.004	0.016	0.27	0.880	0.80						
Saj4-Saj5	118.450	118.003	117.930	8.720	119	150	0.297	0.917	0.159	4.561	70.43	100	50	268	0.005	0.016	0.32	0.900	0.82						
Saj5-Saj6	118.550	117.930	117.882	5.704	119	150	0.470	0.919	0.103	4.665	69.49	100	12	280	0.005	0.016	0.33	0.900	0.83						
Saj6-S1.0	118.450	117.882	117.626	24.662	96	150	0.418	1.022	0.402	5.067	66.12	100	296	637	0.012	0.018	0.65	1.050	1.07						
Saj7-S1.0	118.570	118.000	117.626	7.416	20	100	0.470	1.740	0.071	4.071	75.40	100	61	61	0.001	0.014	0.09	0.700	1.22						
NOTE: Storm pipe from manhole ref. S1.0 connected to attenuation tank. Flow control device is fitted within manhole ref. S2.0. This restrict the discharge flow from the site to 1 l/sec.																									
S2.0-S2.1	118.370	116.836	116.785	2.550	50	150	1.384	1.424	0.030	4.030	75.86	100	0	0	0.001	0.025	0.04	0.440	0.63						
S2.1-S2.2	118.350	116.785	116.435	33.362	95	225	1.340	1.338	0.416	4.446	71.52	100	0	0	0.001	0.053	0.02	0.300	0.40						
S2.2-Ex.S1	118.110	116.435	116.330	10.015	95	225	1.450	1.337	0.125	4.570	70.34	100	0	0	0.001	0.053	0.02	0.300	0.40						
Ex.S1	117.140	116.330					0.810																		

Surface Water Sewer Network Design in accordance with B.S. EN 752:2008 Drain & Sewer Systems outside Buildings																	Project No.	22P1544								
30yr Design Return Period																	Frequency Factor	1	Effective Roughness for Surface Water Flow	KS	0.60	mm	Drawing Ref.	P02	Calc By.	IB
	US MH CL	US MH IL	DS MH IL	Length [m]	Grad. [1 in...]	Pipe Diameter [mm]	Cover to US Soffit [m]	Vel. [m/s]	Time of Flow [min]	Time of Conc. [min]	Rate of Rainfall [mm/hr]	% Imperv.	Imperv. Area [m2]	Cumul. Imperv. Area [m2]	Actual Rate of Flow [m3/s]	Allow. Rate of Flow [m3/s]	Prop. Capacity	Prop. Velocity	Partial Velocity							
Saj1-Saj2	118.570	118.200	118.147	5.310	100	100	0.270	0.766	0.115	4.115	128.75	100	170	170	0.006	0.006	1.01	1.130	0.87							
Saj2-Saj3	118.450	118.147	118.046	11.083	110	150	0.153	0.957	0.193	4.309	125.26	100	39	209	0.007	0.017	0.43	0.950	0.91							
Saj3-Saj4	118.450	118.046	118.003	5.166	120	150	0.254	0.914	0.094	4.403	123.64	100	9	218	0.007	0.016	0.46	0.960	0.88							
Saj4-Saj5	118.450	118.003	117.930	8.720	119	150	0.297	0.917	0.159	4.561	121.05	100	50	268	0.009	0.016	0.56	1.000	0.92							
Saj5-Saj6	118.550	117.930	117.882	5.704	119	150	0.470	0.919	0.103	4.665	119.43	100	12	280	0.009	0.016	0.57	1.000	0.92							
Saj6-S1.0	118.450	117.882	117.626	24.662	96	150	0.418	1.022	0.402	5.067	113.65	100	296	576	0.018	0.018	1.01	1.130	1.16							
Saj7-S1.0	118.570	118.000	117.626	7.416	20	100	0.470	1.740	0.071	4.071	129.59	100	61	61	0.002	0.014	0.16	0.720	1.25							
NOTE: Storm pipe from manhole ref. S1.0 connected to attenuation tank. Flow control device is fitted within manhole ref. S2.0. This restrict the discharge flow from the site to 1 l/sec.																										
S2.0-S2.1	118.370	116.836	116.785	2.550	50	150	1.384	1.424	0.030	4.030	130.39	100	0	0	0.001	0.025	0.04	0.960	1.37							
S2.1-S2.2	118.350	116.785	116.435	33.362	95	225	1.340	1.338	0.416	4.446	122.93	100	0	0	0.001	0.053	0.02	0.960	1.28							
S2.2-Ex.S1	118.110	116.435	116.330	10.015	95	225	1.450	1.337	0.125	4.570	120.90	100	0	0	0.001	0.053	0.02	1.960	2.62							
Ex.S1	117.140	116.330					0.810																			

