

MasterDrain
HY 11.0

TDS Consultancy Limited

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Job No.	23010		
Sheet no.	1		
Date	24/10/23		
By	TDS	Checked	Reviewed

Project **Elmfield House, Petersfinger, Salisbury, SP5 3BZ**

Title **IoH 124 (Qbar(urban))Runoff calcs for SALISBURY**

Hydrological Data:-

FSR Hydrology:-

Location	=	SALISBURY	Grid reference	=	SU1429
M5-60 (mm)	=	19.3	r	=	0.36
Soil runoff	=	0.30	SAAR (mm/yr)	=	840
WRAP	=	2	Area	=	England & Wales
Hydrological area	=	7	Hydrological zone	=	8

Soil classification for WRAP type 2

- i) Very permeable soils with shallow ground water;
- ii) Permeable soils over rock or fragipan, commonly on slopes in western Britain associated with smaller areas of less permeable wet soils; (fragipan - a natural subsurface horizon having a higher bulk density than the solum above. Seemingly cemented when dry but showing moderate to weak brittleness when moist. The layer is low in organic matter, mottled and slowly or very slowly permeable to water. It is found in profiles of either cultivated or virgin soils but not in calcareous material).
- iii) Moderately permeable soils, some with slowly permeable subsoils.

Design data:-

Area = 0.003872 Km² - 0.387 Ha - 3872 m² % Urbanisation = 0.00%

Calculation method:-

Runoff is calculated from:-

$$Q_{BAR(urban)} = Q_{BAR(rural)} (1 + URBAN)^{2NC} [1 + URBAN \{ (21/CIND) - 0.3 \}]$$

where:-

NC varies with the value of SAAR:-

for 500<SAAR<1100 mm then NC = 0.92 - 0.00024SAAR

for 1100<SAAR<3000 mm then NC = 0.74 - 0.000082SAAR

CIND = 102.4SOIL + 0.28(CWI - 125) CWI = Catchment Wetness Index

so

CIND = 20.975

CWI = 90.198

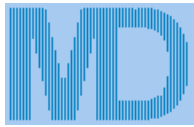
NC = 0.718

For areas less than 50Ha, a modified calculation which multiplies the 50Ha runoff value by the ratio of the site area to 50Ha is used
Reducing factor used for these calculations is 0.008

$$Q_{BAR(rural)} = 0.873 \text{ (l/s)}$$

$$Q_{BAR(urban)} = 0.873 \text{ (l/s)}$$

$Q_{BAR(urban)}$ is then multiplied by a growth factor - GC(T) - for different storm return periods derived from EA publication W5-074/A.



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Calculated data:-

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Project Elmfield House, Petersfinger, Salisbury, SP5 3BZ
Title IoH 124 (Qbar(urban))Runoff calcs for SALISBURY

Mean Annual Peak Flow $Q_{BAR(urban)} = 0.87 \text{ l/s}$

Values for $Q_{BAR(urban)}$

Ret. per.	m ³ /hr	l/s	l/s/ha	Ret. per.	m ³ /hr	l/s	l/s/ha
1yr	2.673	0.742	1.917	100yr+20%	11.886	3.302	8.527
2yr	2.767	0.769	1.985	100yr+30%	12.876	3.577	9.237
5yr	4.025	1.118	2.887	100yr+40%	13.867	3.852	9.948
10yr	5.094	1.415	3.654	200yr	11.634	3.232	8.346
30yr	7.012	1.948	5.030	200yr + 30%	15.124	4.201	10.850
50yr	8.238	2.288	5.910	500yr	14.118	3.922	10.128
100yr	9.905	2.751	7.106	1000yr	16.225	4.507	11.640

Growth factors -

1yr	2yr	5yr	10yr	30yr	50yr	100yr	200yr	500yr	1000yr
0.85	0.88	1.28	1.62	2.23	2.62	3.15	3.70	4.49	5.16

The above is based on the Institute of Hydrology Report 124 to which you are referred for further details (see Sect 7). Note that the 200 year growth curve was taken from W5-074/A.

For WRAP type 1 soils, CIND can become negative for lower values of SAAR. In this case the CIND value is multiplied by -1 to return a positive value (CIND is very small at this point).