

MasterDrain  
HY 11.0

## TDS Consultancy Limited

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|           |          |         |          |
|-----------|----------|---------|----------|
| Job No.   | 23010    |         |          |
| Sheet no. | 1        |         |          |
| Date      | 28/11/23 |         |          |
| By        | TDS      | Checked | Reviewed |

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

Title **IoH 124 (Qbar(urban))Runoff calcs for CATCHMENT 1**

### 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 = 0.00642 Km<sup>2</sup> - 0.642 Ha - 6420 m<sup>2</sup> % 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

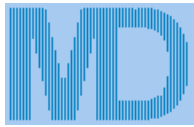
NC = 0.718

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 0.013

$$Q_{BAR(rural)} = 1.448 \text{ (l/s)}$$

$$Q_{BAR(urban)} = 1.448 \text{ (l/s)}$$

$Q_{BAR(urban)}$  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 Road, Salisbury SP5 3BZ**

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

Mean Annual Peak Flow  $Q_{BAR(urban)} = 1.45 \text{ l/s}$

Values for  $Q_{BAR(urban)}$

| Ret. per. | m <sup>3</sup> /hr | l/s   | l/s/ha | Ret. per.   | m <sup>3</sup> /hr | l/s   | l/s/ha |
|-----------|--------------------|-------|--------|-------------|--------------------|-------|--------|
| 1yr       | 4.432              | 1.231 | 1.917  | 100yr+20%   | 19.707             | 5.474 | 8.527  |
| 2yr       | 4.588              | 1.274 | 1.985  | 100yr+30%   | 21.350             | 5.930 | 9.237  |
| 5yr       | 6.673              | 1.854 | 2.887  | 100yr+40%   | 22.992             | 6.387 | 9.948  |
| 10yr      | 8.446              | 2.346 | 3.654  | 200yr       | 19.290             | 5.358 | 8.346  |
| 30yr      | 11.626             | 3.230 | 5.030  | 200yr + 30% | 25.077             | 6.966 | 10.850 |
| 50yr      | 13.660             | 3.794 | 5.910  | 500yr       | 23.409             | 6.502 | 10.128 |
| 100yr     | 16.423             | 4.562 | 7.106  | 1000yr      | 26.902             | 7.473 | 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).