



MasterDrain
HY 11.0

Muir Associates (UK) Limited www.muir-associates.co.uk		Job No. Sheet no. 1 Date 27/10/22		
		Trinity Chambers, 18 Ivy Street, Birkenhead CH41 5EF Tel: 0151 650 1200 Mob: 07813 7770514 email: design@muir-associates.co.uk		
		Project Knowsley East Hub Title IoH 124 Runoff Calculation		
		By	Checked	Reviewed

Hydrological Data:-

FSR Hydrology:-

Location = LIVERPOOL
M5-60 (mm) = 19
Soil runoff = 0.45
WRAP = 4
Hydrological area = 9

Grid reference = SJ9766
r = 0.40
SAAR (mm/yr) = 800
Area = England & Wales
Hydrological zone = 8

Soil classification for WRAP type 4

Clayey, or loamy over clayey soils with an impermeable layer at shallow depth.

Design data:-

Area = 0.009377 Km² - 0.938 Ha - 9377 m²

Calculation method:-

Runoff is calculated from:-

$$Q_{\text{BAR(rural)}} = 0.00108 \text{ AREA}^{0.89} \cdot \text{SAAR}^{1.17} \cdot \text{SOIL}^{2.17}$$

where

AREA = Site area in Km²
SAAR = Standard Average Annual Rainfall (mm/yr)
SOIL = Soil value derived from Winter Rainfall Acceptance Potential
 $Q_{\text{BAR(rural)}}$ = Runoff (cumecs)

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

Calculated data:-

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 0.019

Mean Annual Peak Flow $Q_{\text{BAR(rural)}}$ = 4.82 l/s



MasterDrain
HY 11.0

Muir Associates (UK) Limited

www.muir-associates.co.uk

Trinity Chambers,
18 Ivy Street,
Birkenhead CH41 5EF
Tel: 0151 650 1200 Mob: 07813 7770514
email: design@muir-associates.co.uk

Job No.

Sheet no.

2

Date

27/10/22

Project

Knowsley East Hub

Title

IoH 124 Runoff Calculation

By

Checked

Reviewed

Values for $Q_{\text{BAR(rural)}}$

Ret. per. 1yr	m ³ /hr 14.737	l/s 4.094	l/s/ha 4.366	Ret. per. 100yr+20%	m ³ /hr 45.355	l/s 12.599	l/s/ha 13.436
2yr	16.124	4.479	4.776	100yr+30%	49.135	13.649	14.555
5yr	21.152	5.876	6.266	100yr+40%	52.914	14.698	15.675
10yr	24.619	6.839	7.293	200yr	43.344	12.040	12.840
30yr	30.341	8.428	8.988	200yr + 30%	56.347	15.652	16.692
50yr	33.635	9.343	9.964	500yr	49.586	13.774	14.689
100yr	37.796	10.499	11.196	1000yr	55.307	15.363	16.384

Growth factors -

1yr	2yr	5yr	10yr	30yr	50yr	100yr	200yr	500yr	1000yr
0.85	0.93	1.22	1.42	1.75	1.94	2.18	2.50	2.86	3.19

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 and above year growth curves were taken from W5-074.