



Project
Old Mead House - Site 2

Job Ref.
J19-046

Section
Water and Environment

Sheet No.
1

By

Chk'd By

Date

Estimation of Post Development Runoff

Rainfall calculated using HR Wallingford Modified Rational Method

1.0 Rainfall Data

1.1 Please select the relevant geographic location opposite.

Geographic Location: * England and Wales ☐ Scotland and N. Ireland

1.2 Enter Agroclimatic region number from here.

Agroclimatic Region: **40**

Standard Average Rainfall: SAAR= **939**

5yr 60min. Rainfall: M5-60 = **17** mm

M5-60min/M5-2day: r = **0.3** %

Catchment Area: A = **600** m²

Storm Return Period: T = **30** Yrs

1.3 Using the charts provided below, enter values for 5 year 60 minute rainfall and ratio r (M5-60/M5-2 day). Enter the rainfall catchment area and storm return period to be considered.

[M5-60min for Cornwall](#)

[Ratio M5-60/M5-2day \(r\)](#)

2.0 Time of Concentration

2.1 The time of concentration is calculated using the Kerby-Hathaway Formula. Enter values for overland flow length, Manning's value for the flow path and fall for the flow path. Manning's 'n' values can be found at the link below.

Overland Flow Length: L = **295** m

Manning's Roughness Coefficient: n = **0.03**

Fall over flow length: F = **1.8** m

Time of Concentration: Tc = **13.18** Mins

[Table of Manning's 'n' Values](#)

3.0 Volumetric Runoff

3.1 The program assumes that the runoff considered is for impervious areas only. If runoff is to be considered for the total catchment area (pervious & impervious), tick the box opposite.

☒ Consider Total Catchment Area

3.2 Enter soil class percentage, SOIL from from FSR Figure I.4.18 or see extract for Cornwall below.

[Soil water acceptance values for Cornwall](#)

[Soil Key](#)

Percentage of catcment covered by impervious surfaces:

PIMP = **75.00** %

S1 **0.0%**
S2 **100.0%**
S3 **0.0%**
S4 **0.0%**
S5 **0.0%**

SOIL = **0.30**

UCWI = **95.00**

3.3 Using the standard average annual rainfall for the area, determine the urban catchment wetness index using the chart attached.

[Urban Catchment Wetness Index based on SAAR](#)

Enter climate change factor (%):

CLI = **40%**

Percentage Runoff: PR = **56.39** %

3.4 The modified rational method considers the volumetric runoff for a storm of duration equivalent to the time of concentration. These values are shown opposite. Other values are provided in the table below.

Volumetric Runoff: Qvol = **7.52** l/s
inc. Climate change: Qvolcli = **10.52** l/s
Runoff Volume: V = **5.9** m³
inc. Climate change: Vclcli = **8.324748** m³

Table of Characteristic Rainfall and Runoff Volumes

Storm Duration	M5-D	MT-D	Point	MT-D	Volumetric Runoff		Runoff	Runoff including climate change		
	Rainfalls	Rainfalls	Rainfall, P	Intensity, i	m ² /hr	l/s	Volume	m ³ /hr	l/s	m ³
	mm	mm	mm	m/hr			m ³			
5 min.	5.4	7.8	7.72	0.093	40.743	11.32	3.4	57.040	15.8	4.8
10 min.	8.0	11.7	11.67	0.070	30.797	8.55	5.1	43.115	12.0	7.2
15 min.	9.8	14.5	14.44	0.058	25.403	7.06	6.4	35.564	9.9	8.9
30 min.	13.1	19.8	19.76	0.040	17.383	4.83	8.7	24.337	6.8	12.2
1 hr	17.0	26.1	25.99	0.026	11.429	3.17	11.4	16.001	4.4	16.0
2 hr	21.6	33.3	33.24	0.017	7.310	2.03	14.6	10.235	2.8	20.5
4 hr	27.2	41.6	41.52	0.010	4.565	1.27	18.3	6.391	1.8	25.6
6 hr	31.0	46.8	46.78	0.008	3.429	0.95	20.6	4.800	1.3	28.8
12 hr	38.7	57.3	57.24	0.005	2.098	0.58	25.2	2.937	0.8	35.2
24 hr	48.2	69.7	69.63	0.003	1.276	0.35	30.6	1.786	0.5	42.9
48 hr	60.1	84.3	84.26	0.002	0.772	0.21	37.1	1.081	0.3	51.9



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Civil, Water and Environment

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Calc. By
AN

20/04/2015

Chk'd By
DH

Date

Estimation of Attenuation Basin Size

Permissible Storage Depth: m Planar Base Width: m

Side slope, 1 in:

Permitted Greenfield runoff: l/s Factor of Safety:

Storm Duration D	Dev. Runoff	Greenfield Runoff	Storage Rqd.
	m ²	m ²	m ²
5 min.	4.8	0.6	8.1
10 min.	7.2	1.2	11.7
15 min.	8.9	1.8	13.8
30 min.	12.2	3.6	16.7
1 hr	16.0	7.2	17.2
2 hr	20.5	14.4	11.8
4 hr	25.6	28.8	
6 hr	28.8	43.2	
12 hr	35.2	86.4	
24 hr	42.9	172.8	
48 hr	51.9	345.6	

Storage Requirement: 33.5 m³

Basin Dimensions

Base Width 7.0 m
Base Length 19.1 m
Top Width 11.0 m
Top Length 23.1 m
Depth 1.0 m