

Penally Training Camp Brownfield Runoff Calculations to Modified Rational Method (MRM)

$$Q = 2.78C_v CR i A$$

Where:

CV = Volumetric Runoff Coefficient

CR = 1.3 (Routing Coefficient)

i = Average Rainfall Intensity (mm/h)

A = Area (ha)

2.78 = Coefficient which accounts for the differences in units used for the inputs and outputs of the equation

Entire Site (all impermeable areas):

CV = 0.84

CR = 1.3

i = 30.90 mm/hr (1y 15min winter storm)

A = 1.51ha

$$Q1 = 2.78(0.84)(1.3)(30.90)(1.51)$$

$$\therefore Q1 = \mathbf{140.65 \text{ l/s}}$$

$$50\% \text{ betterment} = \mathbf{70.82 \text{ l/s}}$$

See overleaf for SW – FW breakdown

To SW network

$$CV = 0.84$$

$$CR = 1.3$$

$$i = 30.90 \text{ mm/hr (1y 15min winter storm)}$$

$$A = 0.93\text{ha}$$

$$Q2 = 2.78(0.84)(1.3)(30.90)(0.93)$$

$$\therefore Q2 = \mathbf{90.05 \text{ l/s}}$$

$$50\% \text{ betterment} = \mathbf{45.03 \text{ l/s}}$$

To FW network

$$CV = 0.84$$

$$CR = 1.3$$

$$i = 30.90 \text{ mm/hr (1y 15min winter storm)}$$

$$A = 0.58\text{ha}$$

$$Q3 = 2.78(0.84)(1.3)(30.90)(0.58)$$

$$\therefore Q3 = \mathbf{51.59 \text{ l/s}}$$

$$50\% \text{ betterment} = \mathbf{25.80 \text{ l/s}}$$

Appendix F

Greenfield Runoff Calculations

Calculated by:

Site name:

Site location:

Karl Griffiths

Penally Training Camp

Pembrokeshire

Site Details

Latitude:

Longitude:

Reference:

Date:

51.65719° N

4.73455° W

1426481521

Aug 30 2024 14:08

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Runoff estimation approach

IH124

Site characteristics

Total site area (ha):

5.5

Methodology

Q_{BAR} estimation method:

Calculate from SPR and SAAR

SPR estimation method:

Calculate from SOIL type

Notes

(1) Is $Q_{\text{BAR}} < 2.0 \text{ l/s/ha}$?

When Q_{BAR} is $< 2.0 \text{ l/s/ha}$ then limiting discharge rates are set at 2.0 l/s/ha .

Soil characteristics

	Default	Edited
SOIL type:	1	1
HOST class:	N/A	N/A
SPR/SPRHOST:	0.1	0.1

(2) Are flow rates $< 5.0 \text{ l/s}$?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

Hydrological characteristics

	Default	Edited
SAAR (mm):	999	999
Hydrological region:	9	9
Growth curve factor 1 year:	0.88	0.88
Growth curve factor 30 years:	1.78	1.78
Growth curve factor 100 years:	2.18	2.18
Growth curve factor 200 years:	2.46	2.46

(3) Is $\text{SPR/SPRHOST} \leq 0.3$?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates	Default	Edited
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Q _{BAR} (l/s):	1.4	1.4
1 in 1 year (l/s):	1.23	1.23
1 in 30 years (l/s):	2.49	2.49
1 in 100 year (l/s):	3.05	3.05
1 in 200 years (l/s):	3.45	3.45

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement , which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

Q _{BAR} (l/s):	1.01	1.01
1 in 1 year (l/s):	0.89	0.89
1 in 30 years (l/s):	1.8	1.8
1 in 100 year (l/s):	2.2	2.2
1 in 200 years (l/s):	2.49	2.49

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Appendix G

Estimated Foul Flow Calculations

Foul Sewer Design Flow

Method taken from "The Surveyor" 30th January 1992

DRY WEATHER FLOW RATES

Location	Rate (l/day)	Unit	Number	Unit	Total Rate
General Housing	600	per property	215	properties	129000
School	80	per pupil	0	pupils	0
Assembly Hall	10	per seat	0	seats	0
Cinema	10	per seat	0	seats	0
Theatre	10	per seat	0	seats	0
Sports Hall	50	per person	0	persons	0
Hotel	550	per room	0	rooms	0
Guest House	200	per room	0	rooms	0
Motel	300	per room	0	rooms	0
Hotel Apartment	150	per person	0	persons	0
Leisure Park	220	per person	0	persons	0
Caravan Park Standard	250	per space	0	spaces	0
Caravan Park Serviced	450	per space	0	spaces	0
Camping Site Standard	200	per space	0	spaces	0
Camping Site Serviced	350	per space	0	spaces	0
Public House	150	per seat	0	seats	0
Restaurant	270	per seat	0	seats	0
Drive-in restaurant	380	per seat	0	seats	0
Hospital	750	per bed	0	beds	0
Nursing Home	375	per bed	0	beds	0
Offices	750	per 100m^2	0	m^2	0
Shopping Centre	400	per 100m^2	0	m^2	0
Warehouse	150	per 100m^2	0	m^2	0
Commercial Premises	300	per 100m^2	0	m^2	0
Manufacturing Unit	550	per 100m^2	0	m^2	0
Commercial Premises	250	per 100m^2	0	m^2	0
Church	50	per person	0	persons	0
Apartment / Flat	250	per 1.5 person	0	units	0
Café	15	per person	0	persons	0

DRY WEATHER FLOW		
DWF	129000	l/day
DWF	1.493056	l/s
PEAK FLOW = DWF x 6		
DWF x 6	8.958333	l/s
+ 10% Inf.	9.854167	l/s
PEAK	9.854167	l/s

Complete green values
Results shown in red

Foul Sewer Design Flow

Method taken from "The Surveyor" 30th January 1992

DRY WEATHER FLOW RATES

Location	Rate (l/day)	Unit	Number	Unit	Total Rate
General Housing	600	per property	60	properties	36000
School	80	per pupil	0	pupils	0
Assembly Hall	10	per seat	0	seats	0
Cinema	10	per seat	0	seats	0
Theatre	10	per seat	0	seats	0
Sports Hall	50	per person	0	persons	0
Hotel	550	per room	0	rooms	0
Guest House	200	per room	0	rooms	0
Motel	300	per room	0	rooms	0
Hotel Apartment	150	per person	0	persons	0
Leisure Park	220	per person	0	persons	0
Caravan Park Standard	250	per space	0	spaces	0
Caravan Park Serviced	450	per space	0	spaces	0
Camping Site Standard	200	per space	0	spaces	0
Camping Site Serviced	350	per space	0	spaces	0
Public House	150	per seat	0	seats	0
Restaurant	270	per seat	0	seats	0
Drive-in restaurant	380	per seat	0	seats	0
Hospital	750	per bed	0	beds	0
Nursing Home	375	per bed	0	beds	0
Offices	750	per 100m^2	0	m^2	0
Shopping Centre	400	per 100m^2	0	m^2	0
Warehouse	150	per 100m^2	0	m^2	0
Commercial Premises	300	per 100m^2	0	m^2	0
Manufacturing Unit	550	per 100m^2	0	m^2	0
Commercial Premises	250	per 100m^2	0	m^2	0
Church	50	per person	0	persons	0
Apartment / Flat	250	per 1.5 person	0	units	0
Café	15	per person	0	persons	0

DRY WEATHER FLOW		
DWF	36000	l/day
DWF	0.416667	l/s
PEAK FLOW = DWF x 6		
DWF x 6	2.5	l/s
+ 10% Inf.	2.75	l/s
PEAK	2.75	l/s

Complete green values
Results shown in red