

Calculated by: Michael Uruski

Site name: Gwrhyd Quarry

Site location: Northern Catchment 1

Site coordinates

Latitude: 51.76528° N

Longitude: 3.83138° W

This is an estimation of the greenfield runoff rate limits that are needed to meet normal best practice criteria in line with Environment Agency guidance "Preliminary rainfall runoff management for developments", W5-074/A/TR1/1 rev. E (2012) and the SuDS Manual, C753 (Ciria, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Reference: 6000944

Date: 2017-07-17T14:32:33

Methodology	IH124
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Site characteristics

Total site area (ha)	2.197
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Methodology

Qbar estimation method	Calculate from SPR and SAAR
SPR estimation method	Calculate from SOIL type

	Default	Edited
SOIL type	5	5
HOST class	---	---
SPR/SPRHOST	0.53	0.53

Hydrological characteristics

	Default	Edited
SAAR (mm)	1704	1704
Hydrological region	9	9
Growth curve factor: 1 year	0.88	0.88
Growth curve factor: 30 year	1.78	1.78
Growth curve factor: 100 year	2.18	2.18

Notes:

(1) Is $Q_{BAR} < 2.0$ l/s/ha?
(2) Are flow rates < 5.0 l/s?
(3) Is $SPR/SPRHOST \leq 0.3$?

Greenfield runoff rates

	Default	Edited
Qbar (l/s)	38.98	38.98
1 in 1 year (l/s)	34.3	34.3
1 in 30 years (l/s)	69.39	69.39
1 in 100 years (l/s)	84.98	84.98

Catchment 1 Channel 1 - Gradient 1:73

Qbar = 0.039m³/s

Parameter		Units	Value	Source
Manning's coefficient	n		0.050	estimated
Flow depth	d	m	0.130	
Channel base width	b	m	0.50	field
Side slope, 1/x	x		1.00	field
Channel cross-sectional area	A	m ²	0.08	calculated
Wetted perimeter	P	m	0.87	calculated
Hydraulic radius	R	m	0.094	calculated
Mean channel slope	So		0.0137	field
Froude Number (subcritical)	F		0.43	calculated
Velocity	V	m/s	0.49	calculated
Flow	Q	cumecs	0.040	calculated

Q30 = 0.069m³/s

Parameter		Units	Value	Source
Manning's coefficient	n		0.050	estimated
Flow depth	d	m	0.180	field
Channel base width	b	m	0.50	field
Side slope, 1/x	x		1.00	field
Channel cross-sectional area	A	m ²	0.12	calculated
Wetted perimeter	P	m	1.01	calculated
Hydraulic radius	R	m	0.121	calculated
Mean channel slope	So		0.0137	field
Froude Number (subcritical)	F		0.43	calculated
Velocity	V	m/s	0.57	calculated
Flow	Q	cumecs	0.070	calculated

Q100 = 0.085m³/s

Parameter		Units	Value	Source
Manning's coefficient	n		0.050	estimated
Flow depth	d	m	0.200	field
Channel base width	b	m	0.50	field
Side slope, 1/x	x		1.00	field
Channel cross-sectional area	A	m ²	0.14	calculated
Wetted perimeter	P	m	1.07	calculated
Hydraulic radius	R	m	0.131	calculated
Mean channel slope	So		0.0137	field
Froude Number (subcritical)	F		0.43	calculated
Velocity	V	m/s	0.60	calculated
Flow	Q	cumecs	0.085	calculated

Q100+30% = 0.111m³/s

Parameter for Stone Size		Units	Value	Source
Manning's coefficient	n		0.050	estimated
Flow depth	d	m	0.235	field
Channel base width	b	m	0.50	field
Side slope, 1/x	x		1.00	field
Channel cross-sectional area	A	m ²	0.17	calculated
Wetted perimeter	P	m	1.16	calculated
Hydraulic radius	R	m	0.148	calculated
Mean channel slope	So		0.0137	field
Froude Number (subcritical)	F		0.43	calculated
Velocity	V	m/s	0.66	calculated
Flow	Q	cumecs	0.113	calculated

Characteristic Stone Sizing for Q100+30% flow at maximum channel gradient

Escarameia equation $D_{50} = k(U^2/(s-1))$ from Environment Agency Fluvial Design Guide Ch. 8

Average velocity (squared) $U=V$	U^2		0.43	calculated
Coefficient for continuous revetments	k		0.05	EAFDG
Stone density	s	t/m ³	2.5	EAFDG
Characteristic stone size	D_{50}	m	0.01	calculated
Volume of spherical stone (based on D_{50})		m ³	0.000002	calculated
D_{50} weight (based on 2.5t/m ³)		tonnes	0.000004	calculated

Calculated by: Michael Uruski

Site name: Gwrhyd Quarry

Site location: Northern Catchment 3

Site coordinates

Latitude: 51.76528° N

Longitude: 3.83138° W

This is an estimation of the greenfield runoff rate limits that are needed to meet normal best practice criteria in line with Environment Agency guidance "Preliminary rainfall runoff management for developments", W5-074/A/TR1/1 rev. E (2012) and the SuDS Manual, C753 (Ciria, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Reference: 6000944

Date: 2017-07-18T17:31:12

Methodology

IH124

Site characteristics

Total site area (ha)	0.9099
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Methodology

Qbar estimation method	Calculate from SPR and SAAR
SPR estimation method	Calculate from SOIL type

	Default	Edited
SOIL type	5	5
HOST class	---	---
SPR/SPRHOST	0.53	0.53

Hydrological characteristics

	Default	Edited
SAAR (mm)	1704	1704
Hydrological region	9	9
Growth curve factor: 1 year	0.88	0.88
Growth curve factor: 30 year	1.78	1.78
Growth curve factor: 100 year	2.18	2.18

Notes:

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

(2) Are flow rates < 5.0 l/s?

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

Greenfield runoff rates

	Default	Edited
Qbar (l/s)	16.14	16.14
1 in 1 year (l/s)	14.21	14.21
1 in 30 years (l/s)	28.74	28.74
1 in 100 years (l/s)	35.2	35.2

Catchment 3 Channel 2 - Gradient 1:153

Qbar = 0.016m³/s

Parameter	Units	Value	Source
Manning's coefficient	n	0.050	estimated
Flow depth	d	0.095	
Channel base width	b	0.50	field
Side slope, 1/x	x	1.00	field
Channel cross-sectional area	A	0.06	calculated
Wetted perimeter	P	0.77	calculated
Hydraulic radius	R	0.074	calculated
Mean channel slope	So	0.0065	field
Froude Number (subcritical)	F	0.29	calculated
Velocity	V	0.28	calculated
Flow	Q	0.016	calculated

Q30 = 0.029m³/s

Parameter	Units	Value	Source
Manning's coefficient	n	0.050	estimated
Flow depth	d	0.135	field
Channel base width	b	0.50	field
Side slope, 1/x	x	1.00	field
Channel cross-sectional area	A	0.09	calculated
Wetted perimeter	P	0.88	calculated
Hydraulic radius	R	0.097	calculated
Mean channel slope	So	0.0065	field
Froude Number (subcritical)	F	0.30	calculated
Velocity	V	0.34	calculated
Flow	Q	0.029	calculated

Q100 = 0.035m³/s

Parameter	Units	Value	Source
Manning's coefficient	n	0.050	estimated
Flow depth	d	0.150	field
Channel base width	b	0.50	field
Side slope, 1/x	x	1.00	field
Channel cross-sectional area	A	0.10	calculated
Wetted perimeter	P	0.92	calculated
Hydraulic radius	R	0.105	calculated
Mean channel slope	So	0.0065	field
Froude Number (subcritical)	F	0.30	calculated
Velocity	V	0.36	calculated
Flow	Q	0.035	calculated

Q100+30% = 0.046m³/s

Parameter for Stone Size	Units	Value	Source
Manning's coefficient	n	0.050	estimated
Flow depth	d	0.175	field
Channel base width	b	0.50	field
Side slope, 1/x	x	1.00	field
Channel cross-sectional area	A	0.12	calculated
Wetted perimeter	P	0.99	calculated
Hydraulic radius	R	0.119	calculated
Mean channel slope	So	0.0065	field
Froude Number (subcritical)	F	0.30	calculated
Velocity	V	0.39	calculated
Flow	Q	0.046	calculated

Characteristic Stone Sizing for Q100+30% flow at maximum channel gradient

Escarameia equation $D_{50} = k(U^2/(s-1))$ from Environment Agency Fluvial Design Guide Ch. 8

Average velocity (squared) $U=V$	U^2	0.15	calculated
Coefficient for continuous revetments	k	0.05	EAFDG
Stone density	s	2.5	EAFDG
Characteristic stone size	D_{50}	0.01	calculated
Volume of spherical stone (based on D_{50})	m ³	0.000000	calculated
D_{50} weight (based on 2.5t/m ³)	tonnes	0.000000	calculated

Calculated by: Michael Uruski

Site name: Gwrhyd Quarry

Site location: Northern Catchment 2 (including 1 and 3)

Site coordinates

Latitude: 51.76528° N

Longitude: 3.83138° W

This is an estimation of the greenfield runoff rate limits that are needed to meet normal best practice criteria in line with Environment Agency guidance "Preliminary rainfall runoff management for developments", W5-074/A/TR1/1 rev. E (2012) and the SuDS Manual, C753 (Ciria, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Reference: 6000944

Date: 2017-07-18T17:35:52

Methodology

IH124

Site characteristics

Total site area (ha) 4.5365

Methodology

Qbar estimation method Calculate from SPR and SAAR

SPR estimation method Calculate from SOIL type

	Default	Edited
SOIL type	5	5
HOST class	---	---
SPR/SPRHOST	0.53	0.53

Hydrological characteristics

	Default	Edited
SAAR (mm)	1704	1704
Hydrological region	9	9
Growth curve factor: 1 year	0.88	0.88
Growth curve factor: 30 year	1.78	1.78
Growth curve factor: 100 year	2.18	2.18

Notes:

(1) Is $Q_{BAR} < 2.0$ l/s/ha?
(2) Are flow rates < 5.0 l/s?
(3) Is $SPR/SPRHOST \leq 0.3$?

Greenfield runoff rates

	Default	Edited
Qbar (l/s)	80.49	80.49
1 in 1 year (l/s)	70.83	70.83
1 in 30 years (l/s)	143.28	143.28
1 in 100 years (l/s)	175.47	175.47

Calculated by: Michael Uruski

Site name: Gwrhyd Quarry

Site location: Western Catchment 4

Site coordinates

Latitude: 51.76528° N

Longitude: 3.83138° W

This is an estimation of the greenfield runoff rate limits that are needed to meet normal best practice criteria in line with Environment Agency guidance "Preliminary rainfall runoff management for developments", W5-074/A/TR1/1 rev. E (2012) and the SuDS Manual, C753 (Ciria, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Reference: 6000944

Date: 2017-07-17T14:48:07

Methodology

IH124

Site characteristics

Total site area (ha)	0.2364
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Methodology

Qbar estimation method	Calculate from SPR and SAAR
SPR estimation method	Specify SPR manually

	Default	Edited
SOIL type	5	5
HOST class	---	---
SPR/SPRHOST	0.53	0.80

Hydrological characteristics

	Default	Edited
SAAR (mm)	1704	1704
Hydrological region	9	9
Growth curve factor: 1 year	0.88	0.88
Growth curve factor: 30 year	1.78	1.78
Growth curve factor: 100 year	2.18	2.18

Notes:

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

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consents are usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set in which case blockage work must be addressed by using appropriate drainage elements

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

Greenfield runoff rates

	Default	Edited
Qbar (l/s)	4.19	10.25
1 in 1 year (l/s)	3.69	9.02
1 in 30 years (l/s)	7.47	18.24
1 in 100 years (l/s)	9.14	22.34

Calculated by: Michael Uruski
Site name: Gwrhyd Quarry
Site location: Western Catchment 5

Site coordinates
Latitude: 51.76528° N
Longitude: 3.83138° W

This is an estimation of the greenfield runoff rate limits that are needed to meet normal best practice criteria in line with Environment Agency guidance "Preliminary rainfall runoff management for developments", W5-074/A/TR1/1 rev. E (2012) and the SuDS Manual, C753 (Ciria, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Reference: 6000944
Date: 2017-07-17T14:51:54

Methodology

IH124

Site characteristics

Total site area (ha)	0.5692
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Methodology

Qbar estimation method	Calculate from SPR and SAAR
SPR estimation method	Calculate from SOIL type

	Default	Edited
SOIL type	5	5
HOST class	---	---
SPR/SPRHOST	0.53	0.53

Hydrological characteristics

	Default	Edited
SAAR (mm)	1704	1704
Hydrological region	9	9
Growth curve factor: 1 year	0.88	0.88
Growth curve factor: 30 year	1.78	1.78
Growth curve factor: 100 year	2.18	2.18

Notes:

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

(2) Are flow rates < 5.0 l/s?

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

Greenfield runoff rates

	Default	Edited
Qbar (l/s)	10.1	10.1
1 in 1 year (l/s)	8.89	8.89
1 in 30 years (l/s)	17.98	17.98
1 in 100 years (l/s)	22.02	22.02

Catchment 5 Channel 3 - Gradient 1:15

Qbar = 0.020m³/s

Parameter		Units	Value	Source
Manning's coefficient	n		0.050	estimated
Flow depth	d	m	0.055	
Channel base width	b	m	0.50	field
Side slope, 1/x	x		1.00	field
Channel cross-sectional area	A	m ²	0.03	calculated
Wetted perimeter	P	m	0.66	calculated
Hydraulic radius	R	m	0.047	calculated
Mean channel slope	So		0.0650	field
Froude Number (subcritical)	F		0.90	calculated
Velocity	V	m/s	0.66	calculated
Flow	Q	cumeecs	0.020	calculated

Q30 = 0.036m³/s

Parameter		Units	Value	Source
Manning's coefficient	n		0.050	estimated
Flow depth	d	m	0.080	field
Channel base width	b	m	0.50	field
Side slope, 1/x	x		1.00	field
Channel cross-sectional area	A	m ²	0.05	calculated
Wetted perimeter	P	m	0.73	calculated
Hydraulic radius	R	m	0.064	calculated
Mean channel slope	So		0.0650	field
Froude Number (subcritical)	F		0.92	calculated
Velocity	V	m/s	0.81	calculated
Flow	Q	cumeecs	0.038	calculated

Q100 = 0.044m³/s

Parameter		Units	Value	Source
Manning's coefficient	n		0.050	estimated
Flow depth	d	m	0.090	field
Channel base width	b	m	0.50	field
Side slope, 1/x	x		1.00	field
Channel cross-sectional area	A	m ²	0.05	calculated
Wetted perimeter	P	m	0.75	calculated
Hydraulic radius	R	m	0.070	calculated
Mean channel slope	So		0.0650	field
Froude Number (subcritical)	F		0.92	calculated
Velocity	V	m/s	0.87	calculated
Flow	Q	cumeecs	0.046	calculated

Q100+30% = 0.057m³/s

Parameter for Stone Size		Units	Value	Source
Manning's coefficient	n		0.050	estimated
Flow depth	d	m	0.105	field
Channel base width	b	m	0.50	field
Side slope, 1/x	x		1.00	field
Channel cross-sectional area	A	m ²	0.06	calculated
Wetted perimeter	P	m	0.80	calculated
Hydraulic radius	R	m	0.080	calculated
Mean channel slope	So		0.0650	field
Froude Number (subcritical)	F		0.93	calculated
Velocity	V	m/s	0.94	calculated
Flow	Q	cumeecs	0.060	calculated

Characteristic Stone Sizing for Q100+30% flow at maximum channel gradient

Escarameia equation $D_{50} = k(U^2/(s-1))$ from Environment Agency Fluvial Design Guide Ch. 8

Average velocity (squared) U=V	U ²		0.89	calculated
Coefficient for continuous revetments	k		0.05	EAFDG
Stone density	s	t/m ³	2.5	EAFDG
Characteristic stone size	D ₅₀	m	0.03	calculated
Volume of spherical stone (based on D ₅₀)		m ³	0.000014	calculated
D ₅₀ weight (based on 2.5t/m ³)		tonnes	0.000034	calculated

Calculated by: Michael Uruski
Site name: Gwrhyd Quarry
Site location: Western Site Catchment 6

Site coordinates
Latitude: 51.76528° N
Longitude: 3.83138° W

This is an estimation of the greenfield runoff rate limits that are needed to meet normal best practice criteria in line with Environment Agency guidance "Preliminary rainfall runoff management for developments", W5-074/A/TR1/1 rev. E (2012) and the SuDS Manual, C753 (Ciria, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Reference: 6000944
Date: 2017-07-17T15:15:38

Methodology IH124

Site characteristics

Total site area (ha)	0.2957
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Methodology

Qbar estimation method	Calculate from SPR and SAAR
SPR estimation method	Specify SPR manually

	Default	Edited
SOIL type	5	5
HOST class	---	---
SPR/SPRHOST	0.53	0.80

Hydrological characteristics

	Default	Edited
SAAR (mm)	1704	1704
Hydrological region	9	9
Growth curve factor: 1 year	0.88	0.88
Growth curve factor: 30 year	1.78	1.78
Growth curve factor: 100 year	2.18	2.18

Notes:

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

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consents are usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set in which case blockage work must be addressed by using appropriate drainage elements

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

Greenfield runoff rates

	Default	Edited
Qbar (l/s)	5.25	12.82
1 in 1 year (l/s)	4.62	11.28
1 in 30 years (l/s)	9.34	22.82
1 in 100 years (l/s)	11.44	27.95