

HIGAVATS DRAINAGE

PROVIDE SUFFICIENT ATTENUATION TO ENSURE AN INFLUENCE FROM A 1 IN 30 YEAR EVENT IS STORED BELOW GROUND, WITH 30% MARGIN FOR CLIMATE CHANGE.

CATCHMENT AREA OF ADOPTED ENTRANCE = 510 m^2

$$\sim \quad \sim \quad \sim \quad \text{HOUSING TO SHARE DRAIN} = 970 \sim^7$$

$$\therefore TCTM = \underline{1480 \text{ m}^2}$$

OUTFLOW RESTRICTED TO 14/5.

CALCULATE PPMFM USING VANNOFORD PROCEDURE.

FROM THESE CALCULATIONS

DURATION (MINS)	RAINFALL (MM)	INFLOW (M ³)	OUTFLOW (M ³)	STORAGE (M ³)
5	13.0	19.2	0.3	18.9
10	18.9	28.0	0.6	27.4
15	23.3	34.5	0.9	33.6
30	30.0	44.4	1.8	42.6
60	37.9	56.1	3.6	52.5
120	45.7	67.6	7.2	60.4
240	54.7	80.9	14.4	66.5
360	60.9	90.1	21.6	68.5
600	68.7	102	36.0	66.0

Infra volume = CATAMENTS AREA x IZAMFAM.

EG. FOR 5 MIN DURATION, $I_{HFOV} = 1480 \times 13.0 \times 10^{-3} = 19.2 \text{ m}^3$

For 1 L/s outflow = $1 \times 60 \times 5 \times 10^{-3} = 0.3 \text{ m}^3$

$$\therefore \text{ATTENUATION REQUIRED} = 19.2 - 0.3 = 18.9 \text{ m}^3$$

B7 EXAMINATION PEAK FLOW OCCURS AT 360 MINS

∴ ATTENUATION REQUIRED = 68.5 m^3

ATTENUATION ON-SITE:

PROVIDE 300 mm ϕ PIPES ALONG MAIN ENTRANCE ALONG ADAPTED SECTION.

$$\text{LENGTH OF ROAD} = 57 \text{ m}$$

$$\therefore \text{STORAGE PROVIDED} = 0.15^2 \times \pi \times 57 = 4 \text{ m}^3$$

$$\therefore \text{STORAGE REQUIRED ON SITE} = 68.5 - 4 = 64.5 \text{ m}^3$$

Now FOR DRAINAGE CHANNEL.

$$\text{USING } 1550 \times 1050 \text{ CULVERT CROSS-SECTIONAL VOID} = 0.803 \text{ m}^2$$

$$\therefore \text{LENGTH REQUIRED} = 64.5 / 0.803 = 80.3 \text{ m}$$

$\therefore$ SAY 81 m LENGTH!

AVAILABLE LENGTH $\approx 75 \text{ m}$

$\therefore$ USE PROFILED CULVERT.

$$\text{AVAILABLE CROSS-SECTIONAL VOID} = 0.873 \text{ m}^2$$

$$\therefore \text{LENGTH REQUIRED} = 64.5 / 0.873 = 73.9 \text{ m}$$

$\therefore$ SAY 74 m LENGTH!

SV/3

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	Kingsclere Avenue, Havant			20496		
	Calcs for			Start page no./Revision		
	Proposed Highway SW Drainag			1		
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	KS	08/03/2017				

DESIGN RAINFALL

In accordance with the Wallingford Procedure

Tedds calculation version 2.0.00

Design rainfall intensity

Location of catchment area	Bournemouth
Storm duration	D = 5 min
Return period	Period = 30 yr
Ratio 60 min to 2 day rainfall of 5 yr return period	r = 0.350
5-year return period rainfall of 60 minutes duration	M5_60min = 19.0 mm
Increase of rainfall intensity due to global warming	p _{climate} = 30 %
Factor Z1 (Wallingford procedure)	Z1 = 0.36
Rainfall for 5min storm with 5 year return period	M5_5min _i = Z1 × M5_60min × (1 + p _{climate}) = 8.8 mm
Factor Z2 (Wallingford procedure)	Z2 = 1.47
Rainfall for 5min storm with 30 year return period	M30_5min = Z2 × M5_5min _i = 13.0 mm
Design rainfall intensity	I _{max} = M30_5min / D = 155.9 mm/hr

Maximum surface water runoff

Catchment area	A _{catch} = 1480 m ²
Percentage of area that is impermeable	p = 100 %
Maximum surface water runoff	Q _{max} = A _{catch} × p × I _{max} = 64.1 l/s

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SV/4

DESIGN RAINFALL

In accordance with the Wallingford Procedure

Tedds calculation version 2.0.00

Design rainfall intensity

Location of catchment area	Bournemouth
Storm duration	D = 10 min
Return period	Period = 30 yr
Ratio 60 min to 2 day rainfall of 5 yr return period	r = 0.350
5-year return period rainfall of 60 minutes duration	M5_60min = 19.0 mm
Increase of rainfall intensity due to global warming	p _{climate} = 30 %
Factor Z1 (Wallingford procedure)	Z1 = 0.51
Rainfall for 10min storm with 5 year return period	M5_10min _i = Z1 × M5_60min × (1 + p _{climate}) = 12.5 mm
Factor Z2 (Wallingford procedure)	Z2 = 1.51
Rainfall for 10min storm with 30 year return period	M30_10min = Z2 × M5_10min _i = 18.9 mm
Design rainfall intensity	I _{max} = M30_10min / D = 113.3 mm/hr

Maximum surface water runoff

Catchment area	A _{catch} = 1480 m ²
Percentage of area that is impermeable	p = 100 %
Maximum surface water runoff	Q _{max} = A _{catch} × p × I _{max} = 46.6 l/s

SW/S

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DESIGN RAINFALL

In accordance with the Wallingford Procedure

Tedds calculation version 2.0.00

Design rainfall intensity

Location of catchment area	Bournemouth
Storm duration	D = 15 min
Return period	Period = 30 yr
Ratio 60 min to 2 day rainfall of 5 yr return period	r = 0.350
5-year return period rainfall of 60 minutes duration	M5_60min = 19.0 mm
Increase of rainfall intensity due to global warming	p _{climate} = 30 %
Factor Z1 (Wallingford procedure)	Z1 = 0.62
Rainfall for 15min storm with 5 year return period	M5_15min _i = Z1 × M5_60min × (1 + p _{climate}) = 15.2 mm
Factor Z2 (Wallingford procedure)	Z2 = 1.53
Rainfall for 15min storm with 30 year return period	M30_15min = Z2 × M5_15min _i = 23.3 mm
Design rainfall intensity	I _{max} = M30_15min / D = 93.1 mm/hr

Maximum surface water runoff

Catchment area	A _{catch} = 1480 m²
Percentage of area that is impermeable	p = 100 %
Maximum surface water runoff	Q _{max} = A _{catch} × p × I _{max} = 38.3 l/s

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DESIGN RAINFALL

In accordance with the Wallingford Procedure

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Design rainfall intensity

Location of catchment area	Bournemouth
Storm duration	D = 30 min
Return period	Period = 30 yr
Ratio 60 min to 2 day rainfall of 5 yr return period	r = 0.350
5-year return period rainfall of 60 minutes duration	M5_60min = 19.0 mm
Increase of rainfall intensity due to global warming	p _{climate} = 30 %
Factor Z1 (Wallingford procedure)	Z1 = 0.79
Rainfall for 30min storm with 5 year return period	M5_30min _i = Z1 × M5_60min × (1 + p _{climate}) = 19.4 mm
Factor Z2 (Wallingford procedure)	Z2 = 1.54
Rainfall for 30min storm with 30 year return period	M30_30min = Z2 × M5_30min _i = 30.0 mm
Design rainfall intensity	I _{max} = M30_30min / D = 59.9 mm/hr

Maximum surface water runoff

Catchment area	A _{catch} = 1480 m ²
Percentage of area that is impermeable	p = 100 %
Maximum surface water runoff	Q _{max} = A _{catch} × p × I _{max} = 24.6 l/s

SW/7

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DESIGN RAINFALL

In accordance with the Wallingford Procedure

Tedds calculation version 2.0.00

Design rainfall intensity

Location of catchment area	Bournemouth
Storm duration	D = 1 hr
Return period	Period = 30 yr
Ratio 60 min to 2 day rainfall of 5 yr return period	r = 0.350
5-year return period rainfall of 60 minutes duration	M5_60min = 19.0 mm
Increase of rainfall intensity due to global warming	p _{climate} = 30 %
Factor Z1 (Wallingford procedure)	Z1 = 1.00
Rainfall for 1hr storm with 5 year return period	M5_1hr _i = Z1 × M5_60min × (1 + p _{climate}) = 24.7 mm
Factor Z2 (Wallingford procedure)	Z2 = 1.53
Rainfall for 1hr storm with 30 year return period	M30_1hr = Z2 × M5_1hr _i = 37.9 mm
Design rainfall intensity	I _{max} = M30_1hr / D = 37.9 mm/hr

Maximum surface water runoff

Catchment area	A _{catch} = 1480 m ²
Percentage of area that is impermeable	p = 100 %
Maximum surface water runoff	Q _{max} = A _{catch} × p × I _{max} = 15.6 l/s

SW/8

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DESIGN RAINFALL

In accordance with the Wallingford Procedure

Tedds calculation version 2.0.00

Design rainfall intensity

Location of catchment area	Bournemouth
Storm duration	D = 2 hr
Return period	Period = 30 yr
Ratio 60 min to 2 day rainfall of 5 yr return period	r = 0.350
5-year return period rainfall of 60 minutes duration	M5_60min = 19.0 mm
Increase of rainfall intensity due to global warming	p _{climate} = 30 %
Factor Z1 (Wallingford procedure)	Z1 = 1.22
Rainfall for 2hr storm with 5 year return period	M5_2hr _i = Z1 × M5_60min × (1 + p _{climate}) = 30.2 mm
Factor Z2 (Wallingford procedure)	Z2 = 1.51
Rainfall for 2hr storm with 30 year return period	M30_2hr = Z2 × M5_2hr _i = 45.7 mm
Design rainfall intensity	I _{max} = M30_2hr / D = 22.8 mm/hr

Maximum surface water runoff

Catchment area	A _{catch} = 1480 m ²
Percentage of area that is impermeable	p = 100 %
Maximum surface water runoff	Q _{max} = A _{catch} × p × I _{max} = 9.4 l/s

SW/9

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DESIGN RAINFALL

In accordance with the Wallingford Procedure

Tedds calculation version 2.0.00

Design rainfall intensity

Location of catchment area	Bournemouth
Storm duration	D = 4 hr
Return period	Period = 30 yr
Ratio 60 min to 2 day rainfall of 5 yr return period	r = 0.350
5-year return period rainfall of 60 minutes duration	M5_60min = 19.0 mm
Increase of rainfall intensity due to global warming	p _{climate} = 30 %
Factor Z1 (Wallingford procedure)	Z1 = 1.50
Rainfall for 4hr storm with 5 year return period	M5_4hr _i = Z1 × M5_60min × (1 + p _{climate}) = 37.0 mm
Factor Z2 (Wallingford procedure)	Z2 = 1.48
Rainfall for 4hr storm with 30 year return period	M30_4hr = Z2 × M5_4hr _i = 54.7 mm
Design rainfall intensity	I _{max} = M30_4hr / D = 13.7 mm/hr

Maximum surface water runoff

Catchment area	A _{catch} = 1480 m ²
Percentage of area that is impermeable	p = 100 %
Maximum surface water runoff	Q _{max} = A _{catch} × p × I _{max} = 5.6 l/s

SW/10

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DESIGN RAINFALL

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Design rainfall intensity

Location of catchment area	Bournemouth
Storm duration	D = 6 hr
Return period	Period = 30 yr
Ratio 60 min to 2 day rainfall of 5 yr return period	r = 0.350
5-year return period rainfall of 60 minutes duration	M5_60min = 19.0 mm
Increase of rainfall intensity due to global warming	p _{climate} = 30 %
Factor Z1 (Wallingford procedure)	Z1 = 1.69
Rainfall for 6hr storm with 5 year return period	M5_6hr = Z1 × M5_60min × (1 + p _{climate}) = 41.7 mm
Factor Z2 (Wallingford procedure)	Z2 = 1.46
Rainfall for 6hr storm with 30 year return period	M30_6hr = Z2 × M5_6hr = 60.9 mm
Design rainfall intensity	I _{max} = M30_6hr / D = 10.1 mm/hr

Maximum surface water runoff

Catchment area	A _{catch} = 1480 m ²
Percentage of area that is impermeable	p = 100 %
Maximum surface water runoff	Q _{max} = A _{catch} × p × I _{max} = 4.2 l/s

SW/11

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DESIGN RAINFALL

In accordance with the Wallingford Procedure

Tedds calculation version 2.0.00

Design rainfall intensity

Location of catchment area	Bournemouth
Storm duration	D = 10 hr
Return period	Period = 30 yr
Ratio 60 min to 2 day rainfall of 5 yr return period	r = 0.350
5-year return period rainfall of 60 minutes duration	M5_60min = 19.0 mm
Increase of rainfall intensity due to global warming	p _{climate} = 30 %
Factor Z1 (Wallingford procedure)	Z1 = 1.95
Rainfall for 10hr storm with 5 year return period	M5_10hr _i = Z1 × M5_60min × (1 + p _{climate}) = 48.1 mm
Factor Z2 (Wallingford procedure)	Z2 = 1.43
Rainfall for 10hr storm with 30 year return period	M30_10hr = Z2 × M5_10hr _i = 68.7 mm
Design rainfall intensity	I _{max} = M30_10hr / D = 6.9 mm/hr

Maximum surface water runoff

Catchment area	A _{catch} = 1480 m ²
Percentage of area that is impermeable	p = 100 %
Maximum surface water runoff	Q _{max} = A _{catch} × p × I _{max} = 2.8 l/s

SW/12

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DESIGN RAINFALL

In accordance with the Wallingford Procedure

Tedds calculation version 2.0.00

Design rainfall intensity

Location of catchment area	Bournemouth
Storm duration	D = 24 hr
Return period	Period = 30 yr
Ratio 60 min to 2 day rainfall of 5 yr return period	r = 0.350
5-year return period rainfall of 60 minutes duration	M5_60min = 19.0 mm
Increase of rainfall intensity due to global warming	p _{climate} = 30 %
Factor Z1 (Wallingford procedure)	Z1 = 2.48
Rainfall for 24hr storm with 5 year return period	M5_24hr _i = Z1 × M5_60min × (1 + p _{climate}) = 61.3 mm
Factor Z2 (Wallingford procedure)	Z2 = 1.39
Rainfall for 24hr storm with 30 year return period	M30_24hr = Z2 × M5_24hr _i = 84.9 mm
Design rainfall intensity	I _{max} = M30_24hr / D = 3.5 mm/hr

Maximum surface water runoff

Catchment area	A _{catch} = 1480 m ²
Percentage of area that is impermeable	p = 100 %
Maximum surface water runoff	Q _{max} = A _{catch} × p × I _{max} = 1.5 l/s

DESIGN FOR 1:100 YEAR EVENT

CALCULATE RAINFALL USING LAMINGFORD PROCEDURE AND MAKE FOR 30% CLIMATE CHANGE.

DURATION (MINS)	RAINFALL (mm)	INFLOW (m ³)	OUTFLOW (m ³)	DIFFERENCE (m ³)
5	16.6	24.6	0.3	24.3
10	24.4	36.1	0.6	35.5
15	30.3	44.8	0.9	43.9
30	39.4	58.3	1.8	56.5
60	49.7	73.6	3.6	70.0
120	59.5	88.1	7.2	80.9
240	70.8	105	14.4	90.6
360	78.3	116	21.6	94.4
600	87.8	130	36.0	93.9
1440	106	157	86.4	70.5

FOR CATCHMENT AREA = 1480 m²

BY EXAMINATION PEAK FLOW OCCURS AT 360 MINS.

∴ VOLUME OF WATER = 94.4 m³

STORAGE PROVIDED FOR 1:30 YEAR EVENT = 68.5 m³

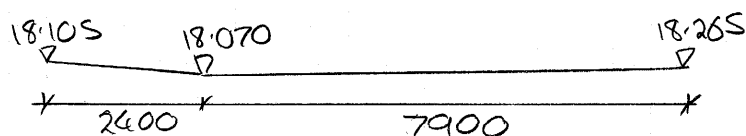
∴ DIFFERENCE = 94.4 - 68.5 = 25.9 m³

RAMP PROVIDED AT ENTRANCE TO SITE TO CONTAIN WATER FROM NON-ADAPTED SECTION

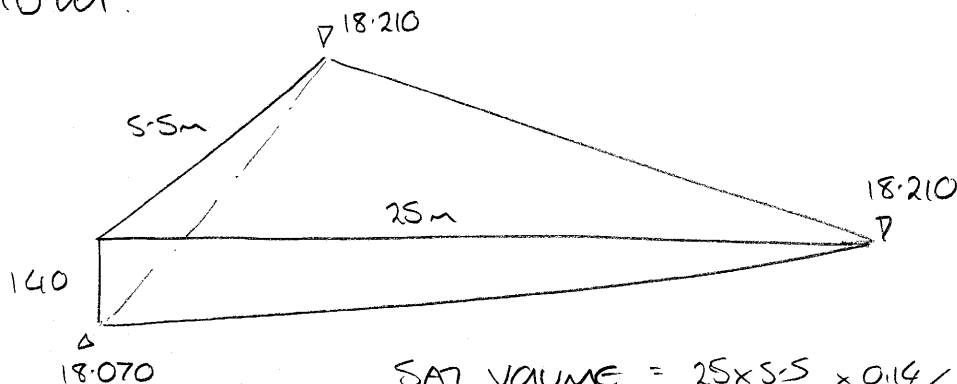
∴ VOLUME RETAINED ON ADAPTED AREA = $25.9 \times 510 / 1480$
= 8.9 m³

LEVEL AT ENTRANCE OFF OF VINGSCREE AVENUE = 18.3

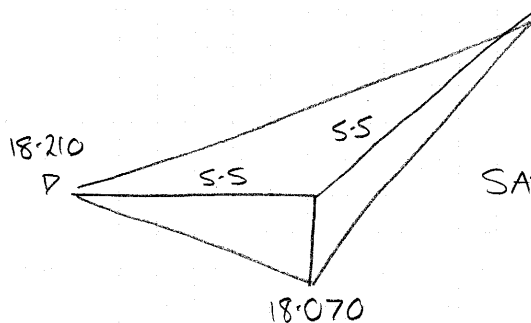
MIN. LEVEL IN PARKING BAT = 18.070



ENTRANCE ROAD HAS CROSS FALL OF 140mm ACROSS 5.5m WIDTH.

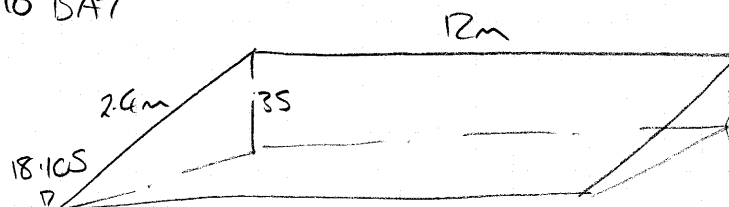


$$\text{SAT VOLUME} = \frac{25 \times 5.5}{2} \times \frac{0.14}{2} = 4.8 \text{ m}^3$$



$$\text{SAT VOLUME} = \frac{5.5 \times 5.5}{2} \times \frac{0.14}{2} = 1.0 \text{ m}^3$$

PARKING BAT



$$\text{VOLUME} = 2.4 \times 12 \times 0.035/2 = 0.5 \text{ m}^3$$

$$\text{TOTAL} = 6.3 \text{ m}^3$$

$$\text{TOTAL AREA} \approx 110 \text{ m}^2$$

$$\therefore \text{ADDIT. DEPTH REQUIRED} = (8.9 - 6.3) / 110 = 0.024 \text{ m}$$

$$\therefore \text{SAT MAX. LEVEL} = 18.234$$

$$\text{MAX. FLOOD DEPTH} = 140 + 24 = 164 \text{ mm.}$$

SW/15

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DESIGN RAINFALL

In accordance with the Wallingford Procedure

Tedds calculation version 2.0.00

Design rainfall intensity

Location of catchment area	Bournemouth
Storm duration	D = 5 min
Return period	Period = 100 yr
Ratio 60 min to 2 day rainfall of 5 yr return period	r = 0.350
5-year return period rainfall of 60 minutes duration	M5_60min = 19.0 mm
Increase of rainfall intensity due to global warming	p _{climate} = 30 %
Factor Z1 (Wallingford procedure)	Z1 = 0.36
Rainfall for 5min storm with 5 year return period	M5_5min _i = Z1 × M5_60min × (1 + p _{climate}) = 8.8 mm
Factor Z2 (Wallingford procedure)	Z2 = 1.88
Rainfall for 5min storm with 100 year return period	M100_5min = Z2 × M5_5min _i = 16.6 mm
Design rainfall intensity	I _{max} = M100_5min / D = 198.9 mm/hr

Maximum surface water runoff

Catchment area	A _{catch} = 510 m ²
Percentage of area that is impermeable	p = 100 %
Maximum surface water runoff	Q _{max} = A _{catch} × p × I _{max} = 28.2 l/s

SW/16

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DESIGN RAINFALL

In accordance with the Wallingford Procedure

Tedds calculation version 2.0.00

Design rainfall intensity

Location of catchment area	Bournemouth
Storm duration	D = 10 min
Return period	Period = 100 yr
Ratio 60 min to 2 day rainfall of 5 yr return period	r = 0.350
5-year return period rainfall of 60 minutes duration	M5_60min = 19.0 mm
Increase of rainfall intensity due to global warming	p _{climate} = 30 %
Factor Z1 (Wallingford procedure)	Z1 = 0.51
Rainfall for 10min storm with 5 year return period	M5_10min _i = Z1 × M5_60min × (1 + p _{climate}) = 12.5 mm
Factor Z2 (Wallingford procedure)	Z2 = 1.95
Rainfall for 10min storm with 100 year return period	M100_10min = Z2 × M5_10min _i = 24.4 mm
Design rainfall intensity	I _{max} = M100_10min / D = 146.4 mm/hr

Maximum surface water runoff

Catchment area	A _{catch} = 510 m ²
Percentage of area that is impermeable	p = 100 %
Maximum surface water runoff	Q _{max} = A _{catch} × p × I _{max} = 20.7 l/s

SW/17

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DESIGN RAINFALL

In accordance with the Wallingford Procedure

Tedds calculation version 2.0.00

Design rainfall intensity

Location of catchment area	Bournemouth
Storm duration	D = 15 min
Return period	Period = 100 yr
Ratio 60 min to 2 day rainfall of 5 yr return period	r = 0.350
5-year return period rainfall of 60 minutes duration	M5_60min = 19.0 mm
Increase of rainfall intensity due to global warming	p _{climate} = 30 %
Factor Z1 (Wallingford procedure)	Z1 = 0.62
Rainfall for 15min storm with 5 year return period	M5_15min _i = Z1 × M5_60min × (1 + p _{climate}) = 15.2 mm
Factor Z2 (Wallingford procedure)	Z2 = 1.99
Rainfall for 15min storm with 100 year return period	M100_15min = Z2 × M5_15min _i = 30.3 mm
Design rainfall intensity	I _{max} = M100_15min / D = 121.4 mm/hr

Maximum surface water runoff

Catchment area	A _{catch} = 510 m ²
Percentage of area that is impermeable	p = 100 %
Maximum surface water runoff	Q _{max} = A _{catch} × p × I _{max} = 17.2 l/s

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DESIGN RAINFALL

In accordance with the Wallingford Procedure

Tedds calculation version 2.0.00

Design rainfall intensity

Location of catchment area Bournemouth
 Storm duration D = 30 min
 Return period Period = 100 yr
 Ratio 60 min to 2 day rainfall of 5 yr return period r = 0.350
 5-year return period rainfall of 60 minutes duration M5_60min = 19.0 mm
 Increase of rainfall intensity due to global warming p_{climate} = 30 %
 Factor Z1 (Wallingford procedure) Z1 = 0.79
 Rainfall for 30min storm with 5 year return period M5_30min_i = Z1 × M5_60min × (1 + p_{climate}) = 19.4 mm
 Factor Z2 (Wallingford procedure) Z2 = 2.03
 Rainfall for 30min storm with 100 year return period M100_30min = Z2 × M5_30min_i = 39.4 mm
 Design rainfall intensity I_{max} = M100_30min / D = 78.7 mm/hr

Maximum surface water runoff

Catchment area A_{catch} = 510 m²
 Percentage of area that is impermeable p = 100 %
 Maximum surface water runoff Q_{max} = A_{catch} × p × I_{max} = 11.2 l/s

SW/19

RJWatkinson Consulting Civil and Structural Engineers 10 High Street, Havant Hampshire PO9 1JG Tel: 01329 840000 Fax: 01329 840001 Email: enquiries@rjwatkinson.co.uk www.rjwatkinson.co.uk	Project Kingsclere Avenue, Havant			Job no. 20496	
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DESIGN RAINFALL

In accordance with the Wallingford Procedure

Tedds calculation version 2.0.00

Design rainfall intensity

Location of catchment area	Bournemouth
Storm duration	D = 1 hr
Return period	Period = 100 yr
Ratio 60 min to 2 day rainfall of 5 yr return period	r = 0.350
5-year return period rainfall of 60 minutes duration	M5_60min = 19.0 mm
Increase of rainfall intensity due to global warming	p _{climate} = 30 %
Factor Z1 (Wallingford procedure)	Z1 = 1.00
Rainfall for 1hr storm with 5 year return period	M5_1hr _i = Z1 × M5_60min × (1 + p _{climate}) = 24.7 mm
Factor Z2 (Wallingford procedure)	Z2 = 2.01
Rainfall for 1hr storm with 100 year return period	M100_1hr = Z2 × M5_1hr _i = 49.7 mm
Design rainfall intensity	I _{max} = M100_1hr / D = 49.7 mm/hr

Maximum surface water runoff

Catchment area	A _{catch} = 510 m ²
Percentage of area that is impermeable	p = 100 %
Maximum surface water runoff	Q _{max} = A _{catch} × p × I _{max} = 7.0 l/s

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DESIGN RAINFALL

In accordance with the Wallingford Procedure

Tedds calculation version 2.0.00

Design rainfall intensity

Location of catchment area	Bournemouth
Storm duration	D = 2 hr
Return period	Period = 100 yr
Ratio 60 min to 2 day rainfall of 5 yr return period	r = 0.350
5-year return period rainfall of 60 minutes duration	M5_60min = 19.0 mm
Increase of rainfall intensity due to global warming	p _{climate} = 30 %
Factor Z1 (Wallingford procedure)	Z1 = 1.22
Rainfall for 2hr storm with 5 year return period	M5_2hr _i = Z1 × M5_60min × (1 + p _{climate}) = 30.2 mm
Factor Z2 (Wallingford procedure)	Z2 = 1.97
Rainfall for 2hr storm with 100 year return period	M100_2hr = Z2 × M5_2hr _i = 59.5 mm
Design rainfall intensity	I _{max} = M100_2hr / D = 29.7 mm/hr

Maximum surface water runoff

Catchment area	A _{catch} = 510 m ²
Percentage of area that is impermeable	p = 100 %
Maximum surface water runoff	Q _{max} = A _{catch} × p × I _{max} = 4.2 l/s

SW/21

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DESIGN RAINFALL

In accordance with the Wallingford Procedure

Tedds calculation version 2.0.00

Design rainfall intensity

Location of catchment area	Bournemouth
Storm duration	D = 4 hr
Return period	Period = 100 yr
Ratio 60 min to 2 day rainfall of 5 yr return period	r = 0.350
5-year return period rainfall of 60 minutes duration	M5_60min = 19.0 mm
Increase of rainfall intensity due to global warming	p _{climate} = 30 %
Factor Z1 (Wallingford procedure)	Z1 = 1.50
Rainfall for 4hr storm with 5 year return period	M5_4hr _r = Z1 × M5_60min × (1 + p _{climate}) = 37.0 mm
Factor Z2 (Wallingford procedure)	Z2 = 1.91
Rainfall for 4hr storm with 100 year return period	M100_4hr = Z2 × M5_4hr _r = 70.8 mm
Design rainfall intensity	I _{max} = M100_4hr / D = 17.7 mm/hr

Maximum surface water runoff

Catchment area	A _{catch} = 510 m ²
Percentage of area that is impermeable	p = 100 %
Maximum surface water runoff	Q _{max} = A _{catch} × p × I _{max} = 2.5 l/s

SL/22

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DESIGN RAINFALL

In accordance with the Wallingford Procedure

Tedds calculation version 2.0.00

Design rainfall intensity

Location of catchment area	Bournemouth
Storm duration	D = 6 hr
Return period	Period = 100 yr
Ratio 60 min to 2 day rainfall of 5 yr return period	r = 0.350
5-year return period rainfall of 60 minutes duration	M5_60min = 19.0 mm
Increase of rainfall intensity due to global warming	p _{climate} = 30 %
Factor Z1 (Wallingford procedure)	Z1 = 1.69
Rainfall for 6hr storm with 5 year return period	M5_6hr = Z1 × M5_60min × (1 + p _{climate}) = 41.7 mm
Factor Z2 (Wallingford procedure)	Z2 = 1.88
Rainfall for 6hr storm with 100 year return period	M100_6hr = Z2 × M5_6hr = 78.3 mm
Design rainfall intensity	I _{max} = M100_6hr / D = 13.1 mm/hr

Maximum surface water runoff

Catchment area	A _{catch} = 510 m ²
Percentage of area that is impermeable	p = 100 %
Maximum surface water runoff	Q _{max} = A _{catch} × p × I _{max} = 1.8 l/s

SW/23

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DESIGN RAINFALL

In accordance with the Wallingford Procedure

Tedds calculation version 2.0.00

Design rainfall intensity

Location of catchment area	Bournemouth
Storm duration	D = 10 hr
Return period	Period = 100 yr
Ratio 60 min to 2 day rainfall of 5 yr return period	r = 0.350
5-year return period rainfall of 60 minutes duration	M5_60min = 19.0 mm
Increase of rainfall intensity due to global warming	p _{climate} = 30 %
Factor Z1 (Wallingford procedure)	Z1 = 1.95
Rainfall for 10hr storm with 5 year return period	M5_10hr = Z1 × M5_60min × (1 + p _{climate}) = 48.1 mm
Factor Z2 (Wallingford procedure)	Z2 = 1.83
Rainfall for 10hr storm with 100 year return period	M100_10hr = Z2 × M5_10hr = 87.8 mm
Design rainfall intensity	I _{max} = M100_10hr / D = 8.8 mm/hr

Maximum surface water runoff

Catchment area	A _{catch} = 510 m ²
Percentage of area that is impermeable	p = 100 %
Maximum surface water runoff	Q _{max} = A _{catch} × p × I _{max} = 1.2 l/s

SW/24

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DESIGN RAINFALL

In accordance with the Wallingford Procedure

Tedds calculation version 2.0.00

Design rainfall intensity

Location of catchment area	Bournemouth
Storm duration	D = 24 hr
Return period	Period = 100 yr
Ratio 60 min to 2 day rainfall of 5 yr return period	r = 0.350
5-year return period rainfall of 60 minutes duration	M5_60min = 19.0 mm
Increase of rainfall intensity due to global warming	p _{climate} = 30 %
Factor Z1 (Wallingford procedure)	Z1 = 2.48
Rainfall for 24hr storm with 5 year return period	M5_24hr = Z1 × M5_60min × (1 + p _{climate}) = 61.3 mm
Factor Z2 (Wallingford procedure)	Z2 = 1.73
Rainfall for 24hr storm with 100 year return period	M100_24hr = Z2 × M5_24hr = 106.2 mm
Design rainfall intensity	I _{max} = M100_24hr / D = 4.4 mm/hr

Maximum surface water runoff

Catchment area	A _{catch} = 510 m ²
Percentage of area that is impermeable	p = 100 %
Maximum surface water runoff	Q _{max} = A _{catch} × p × I _{max} = 0.6 l/s