Appendix C . Drainage calculations

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BACTON LOW RISE

Drainage Calculations
Using Wallingford Procedure

Existing Impermeable Area 0.8 ha

Storm Frequency 1 in 1 Year M5-60 = 20mm r = 0.4

Climate Change Allowance 0 %

Duration Min	Z1	Rainfall Intensity mm/hr	Impermeable Area ha	Peak Discharge l/s	Volume Run Off cu m
5	0.36	53.6	0.8	119.1	35.7
10	0.51	37.3	0.8	83.0	49.8
15	0.62	30.8	0.8	68.4	61.6
30	0.79	19.6	0.8	43.6	78.4
60	1.00	12.8	0.8	28.5	102.5
120	1.22	8.1	0.8	17.9	128.9
240	1.53	5.2	0.8	11.6	166.6
360	1.67	3.8	0.8	8.5	184.5

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BACTON LOW RISE

Drainage Calculations
Using Wallingford Procedure

Proposed Impermeable Area 0.7 ha

Storm Frequency 1 in 1 Year M5-60 = 20mm r = 0.4

Climate Change Allowance 30 %

Duration Min	Z1	Rainfall Intensity mm/hr	Impermeable Area ha	Peak * Discharge l/s	Volume * Run Off cu m
5	0.36	53.6	0.7	135.5	40.7
10	0.51	37.3	0.7	94.4	56.7
15	0.62	30.8	0.7	77.8	70.0
30	0.79	19.6	0.7	49.6	89.2
60	1.00	12.8	0.7	32.4	116.6
120	1.22	8.1	0.7	20.4	146.7
240	1.53	5.2	0.7	13.2	189.5
360	1.67	3.8	0.7	9.7	209.9

* Includes Climate Change Allowance

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BACTON LOW RISE

Drainage Calculations
Using Wallingford Procedure

Existing Impermeable Area 0.8 ha

Storm Frequency 1 in 100 Year M5-60 = 20mm r = 0.4

Climate Change Allowance 0 %

Duration Min	Z1	Rainfall Intensity mm/hr	Impermeable Area ha	Peak Discharge l/s	Volume Run Off cu m
5	0.36	159.0	0.8	353.6	106.1
10	0.51	117.5	0.8	261.3	156.8
15	0.62	96.7	0.8	215.1	193.6
30	0.79	62.9	0.8	139.9	251.7
60	1.00	40.6	0.8	90.3	325.1
120	1.22	24.5	0.8	54.5	392.7
240	1.53	15.1	0.8	33.5	482.6
360	1.67	10.8	0.8	24.0	518.8

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Drainage Calculations
Using Wallingford Procedure

Proposed Impermeable Area 0.7 ha

Storm Frequency 1 in 100 Year M5-60 = 20mm r = 0.4

Climate Change Allowance 30 %

Duration Min	Z1	Rainfall Intensity mm/hr	Impermeable Area ha	Peak * Discharge l/s	Volume * Run Off cu m
5	0.36	159.0	0.7	402.2	120.7
10	0.51	117.5	0.7	297.3	178.4
15	0.62	96.7	0.7	244.7	220.2
30	0.79	62.9	0.7	159.1	286.4
60	1.00	40.6	0.7	102.7	369.8
120	1.22	24.5	0.7	62.0	446.7
240	1.53	15.1	0.7	38.1	549.0
360	1.67	10.8	0.7	27.3	590.1

* Includes Climate Change Allowance

HR Wallingford
Working with water

Greenfield runoff estimation for sites

Site name:	Bacton Low Rise
Site location:	Wellesley Road

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 CIRIA SUDS Manual (2007). It is not to be used for detailed design of drainage systems. It is recommended that every drainage scheme uses hydraulic modelling software to finalise volume requirements and design details before drawings are produced.

Site coordinates

Latitude:	51.55171° N
Longitude:	0.15403° W

Reference:	gcpvk2xy6z6b / 1
Date:	8 Aug 2016

Site characteristics

Total site area	1	ha
Significant public open space	0.2	ha
Area positively drained	0.8	ha

Methodology

Greenfield runoff method	IH124

Qbar estimation method	Calculate from SPR and SAAR
SPR estimation method	Calculate from SOIL type
SOIL type	4
HOST class	N/A
SPR	0.47

Hydrological characteristics

	Default	Edited	
SAAR	641	641	mm
M5-60 Rainfall Depth	20	20	mm
'r' Ratio M5-60/M5-2 day	0.4	0.4	
FEH/FSR conversion factor	0.75	0.75	
Hydrological region	6	6	
Growth curve factor: 1 year	0.85	0.85	
Growth curve factor: 10 year	1.62	1.62	
Growth curve factor: 30 year	2.3	2.3	
Growth curve factor: 100 year	3.19	3.19	

Greenfield runoff rates

	Default	Edited	
Qbar	3.48	3.48	l/s
1 in 1 year	2.96	2.96	l/s
1 in 30 years	8.01	8.01	l/s
1 in 100 years	11.11	11.11	l/s

Please note that a minimum flow of 5 l/s applies to any site

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BACTON LOW RISE

Storage Calculations
Using Wallingford Procedure

Proposed Impermeable Area = 0.7 ha

Allowable Run Off = 11.11 l/s (Greenfield Run Off)

Storm Frequency 1 in 100 Years + 30% M5-60 = 20mm r = 0.4 Z2 = 2.03

Duration Min	Z1	Rainfall Intensity mm/hr	Impermeable area ha	Inflow l/s	Outflow l/s	Difference l/s	Storage Cu m
5	0.36	206.70	0.7	402.2	11.11	391.1	117.3
10	0.51	152.75	0.7	297.3	11.11	286.1	171.7
15	0.62	125.71	0.7	244.6	11.11	233.5	210.2
30	0.79	81.77	0.7	159.1	11.11	148.0	266.4
60	1.00	52.78	0.7	102.7	11.11	91.6	329.8
120	1.22	31.85	0.7	62.0	11.11	50.9	366.3
240	1.53	19.63	0.7	38.2	11.11	27.1	390.1
360	1.67	14.04	0.7	27.3	11.11	16.2	350.2
600	1.90	9.10	0.7	17.7	11.11	6.6	237.5
1440	2.42	4.68	0.7	9.1	11.11	-2.0	-173.0

Total Storage Required = 390 cu m

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BACTON LOW RISE

Storage Calculations
Using Wallingford Procedure

Proposed Impermeable Area = 0.7 ha

Allowable Run Off = 40 l/s

Storm Frequency 1 in 100 Years + 30% M5-60 = 20mm r = 0.4 Z2 = 2.03

Duration Min	Z1	Rainfall Intensity mm/hr	Impermeable area ha	Inflow l/s	Outflow l/s	Difference l/s	Storage Cu m
5	0.36	206.70	0.7	402.2	40	362.2	108.7
10	0.51	152.75	0.7	297.3	40	257.3	154.4
15	0.62	125.71	0.7	244.6	40	204.6	184.2
30	0.79	81.77	0.7	159.1	40	119.1	214.4
60	1.00	52.78	0.7	102.7	40	62.7	225.8
120	1.22	31.85	0.7	62.0	40	22.0	158.3
240	1.53	19.63	0.7	38.2	40	-1.8	-25.9
360	1.67	14.04	0.7	27.3	40	-12.7	-273.8
600	1.90	9.10	0.7	17.7	40	-22.3	-802.5
1440	2.42	4.68	0.7	9.1	40	-30.9	-2669.1

Total Storage Required = 226 cu m