

12 Appendices

Appendix A.1 – Drawings

Appendix A.2 – Environment Agency Response

Appendix A.3 – Southern Water Asset Location Data

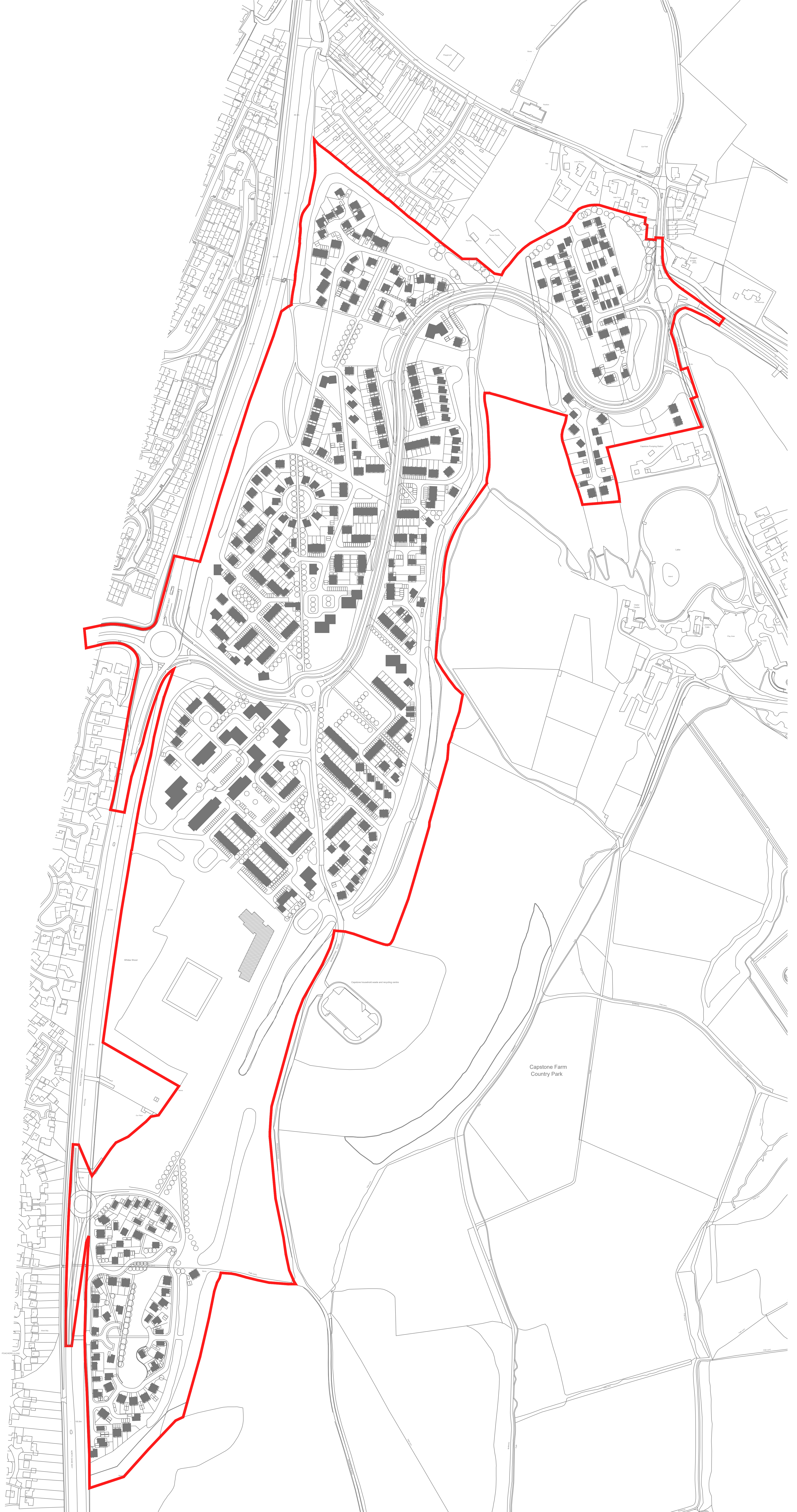
Appendix A.4 – Surface Water Management Calculations

Appendix A.5 – Indicative Drainage Layout

Appendix A.6 – Maintenance Schedules

Appendix A.7 – Southern Water Feasibility Study

Appendix A.1 – Drawings



Appendix A.2 – Environment Agency Response

Anne Winkel

Subject: FW: KSL 94665 LB FW: Product 4
Attachments: 2149_Location Plan.jpg

From: KSL Enquiries <KSLE@environment-agency.gov.uk>
Sent: 01 August 2018 11:50
To: Ben Beckett <Ben@herringtonconsulting.co.uk>
Subject: KSL 94665 LB FW: Product 4

Dear Ben

KSL 94665 LB FW: Product 4

Thank you for your request for information that was received on 31 July 2018.

This site is located in an area of Flood Zones 1, 2 and 3 where we do not have modelled flood levels. This area is covered by national generalised modelling which is only suitable for Flood Zone extent visualisation, not levels or depths data.

In 2004 we completed national generalised modelling to produce catchment scale Flood Zones (using JFLOW modelling techniques), the calculation process produced water depths as a by-product. Since the modelling methods used were developed, tested and reviewed to produce Flood Zone extents only, we currently have no information on the accuracy of the depth data.

Please be aware that you can access our flood map(s) for free here.

We can confirm that we have no record of flooding from rivers and/or sea for this location. You may wish to check with the Lead Local Flood Authority for this area, Kent County Council, who hold detailed records for surface water flooding.

You may be interested in the following guidance / information publically available:

- 'Planning Practice Guidance' - provides information about planning considerations in areas at risk of flooding. <http://planningguidance.planningportal.gov.uk/>
- 'Planning applications: assessing flood risk' - information about completing Flood Risk Assessments. <https://www.gov.uk/planning-applications-assessing-flood-risk>
- 'Site specific flood risk assessment: Checklist' – a checklist to help ensure you have considered all the relevant factors in your flood risk assessment. <http://planningguidance.planningportal.gov.uk/blog/guidance/flood-risk-and-coastal-change/site-specific-flood-risk-assessment-checklist/>

We recommend that you discuss your proposals with the Local Planning Council at the earliest opportunity. They will be able to advise you on a wide range of planning matters in addition to flood risk.

<http://www.environment-agency.gov.uk/research/planning/82584.aspx>

You can find further information about flooding and our flood maps on our website:

<http://www.environment-agency.gov.uk/homeandleisure/floods/default.aspx>

<http://www.environment-agency.gov.uk/homeandleisure/floods/31650.aspx>

I trust this information is of use. If you have any further questions, please contact us and we will be happy to help.

If you have any further queries or if you'd like us to review the information we have provided under the Freedom of Information Act 2000 and Environmental Information Regulations 2004 please contact us within two months and we will happily do this for you.

We would be really grateful if you could spare five minutes to help us improve our service. Please click on the link below and fill in our survey – we use every piece of feedback we receive: <http://www.smartsurvey.co.uk/s/EnvironmentAgencyCustomerSurvey/?a=KSL>

Kind regards
Laura

Laura Buschini
Customers & Engagement Officer
Kent South London & East Sussex

Environment Agency | 0208 4749353 | Jabber 49353 | Orchard House | Endeavour Park | London Road | West Malling | Kent | ME19 5SH


DO YOU KNOW WHAT TO DO?



Appendix A.3 – Southern Water Asset Location Data



Appendix A.4 – Surface Water Management Calculations


Herrington Consulting Ltd		Page 1
Unit 6 - Barham Business Park Elham Valley Road Barham CT4 6DQ	East Hill North Dane Way Bioretention Swale A	
Date 08/03/2019 File BIORETENTION SWALE A 10...	Designed by LA Checked by SB	
Micro Drainage	Source Control 2017.1	

Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 93 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m ³)	Status
15 min Summer	91.113	0.213	48.1	344.1	Flood Risk
30 min Summer	91.151	0.251	53.8	426.8	Flood Risk
60 min Summer	91.174	0.274	57.2	479.0	Flood Risk
120 min Summer	91.178	0.278	57.8	488.4	Flood Risk
180 min Summer	91.177	0.277	57.7	485.9	Flood Risk
240 min Summer	91.174	0.274	57.2	479.2	Flood Risk
360 min Summer	91.168	0.268	56.3	464.4	Flood Risk
480 min Summer	91.159	0.259	55.0	445.3	Flood Risk
600 min Summer	91.149	0.249	53.5	422.8	Flood Risk
720 min Summer	91.139	0.239	52.0	398.8	Flood Risk
960 min Summer	91.115	0.215	48.5	349.2	Flood Risk
1440 min Summer	91.079	0.179	43.2	275.9	O K
2160 min Summer	91.036	0.136	37.1	197.6	O K
2880 min Summer	91.003	0.103	32.5	143.6	O K
4320 min Summer	90.960	0.060	26.7	79.2	O K
5760 min Summer	90.946	0.046	22.9	58.6	O K
7200 min Summer	90.900	0.000	0.0	0.0	O K
8640 min Summer	90.900	0.000	0.0	0.0	O K
10080 min Summer	90.900	0.000	0.0	0.0	O K
15 min Winter	91.113	0.213	48.1	344.4	Flood Risk


Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Time-Peak (mins)
15 min Summer	144.424	0.0	18
30 min Summer	94.472	0.0	32
60 min Summer	58.926	0.0	60
120 min Summer	35.245	0.0	90
180 min Summer	26.213	0.0	124
240 min Summer	21.357	0.0	158
360 min Summer	16.217	0.0	228
480 min Summer	13.363	0.0	296
600 min Summer	11.453	0.0	362
720 min Summer	10.061	0.0	426
960 min Summer	8.097	0.0	556
1440 min Summer	6.002	0.0	806
2160 min Summer	4.415	0.0	1168
2880 min Summer	3.530	0.0	1528
4320 min Summer	2.548	0.0	2208
5760 min Summer	2.025	0.0	2936
7200 min Summer	-0.012	0.0	0
8640 min Summer	-0.010	0.0	0
10080 min Summer	-0.008	0.0	0
15 min Winter	144.424	0.0	17

Herrington Consulting Ltd		Page 2
Unit 6 - Barham Business Park Elham Valley Road Barham CT4 6DQ	East Hill North Dane Way Bioretention Swale A	
Date 08/03/2019 File BIORETENTION SWALE A 10...	Designed by LA Checked by SB	
Micro Drainage	Source Control 2017.1	

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m ³)	Status
30 min Winter	91.152	0.252	53.9	428.3	Flood Risk
60 min Winter	91.175	0.275	57.5	482.4	Flood Risk
120 min Winter	91.177	0.277	57.8	486.8	Flood Risk
180 min Winter	91.173	0.273	57.2	477.3	Flood Risk
240 min Winter	91.167	0.267	56.2	462.7	Flood Risk
360 min Winter	91.154	0.254	54.2	432.8	Flood Risk
480 min Winter	91.139	0.239	52.1	400.4	Flood Risk
600 min Winter	91.124	0.224	49.8	367.0	Flood Risk
720 min Winter	91.108	0.208	47.5	334.5	Flood Risk
960 min Winter	91.077	0.177	43.0	273.2	O K
1440 min Winter	91.030	0.130	36.3	188.7	O K
2160 min Winter	90.981	0.081	29.5	109.4	O K
2880 min Winter	90.951	0.051	25.4	65.8	O K
4320 min Winter	90.938	0.038	18.7	48.3	O K
5760 min Winter	90.931	0.031	14.9	39.1	O K
7200 min Winter	90.900	0.000	0.0	0.0	O K
8640 min Winter	90.900	0.000	0.0	0.0	O K
10080 min Winter	90.900	0.000	0.0	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Time-Peak (mins)
30 min Winter	94.472	0.0	31
60 min Winter	58.926	0.0	58
120 min Winter	35.245	0.0	94
180 min Winter	26.213	0.0	132
240 min Winter	21.357	0.0	170
360 min Winter	16.217	0.0	244
480 min Winter	13.363	0.0	314
600 min Winter	11.453	0.0	382
720 min Winter	10.061	0.0	448
960 min Winter	8.097	0.0	578
1440 min Winter	6.002	0.0	824
2160 min Winter	4.415	0.0	1188
2880 min Winter	3.530	0.0	1496
4320 min Winter	2.548	0.0	2192
5760 min Winter	2.025	0.0	2936
7200 min Winter	-0.012	0.0	0
8640 min Winter	-0.010	0.0	0
10080 min Winter	-0.008	0.0	0

Herrington Consulting Ltd		Page 3
Unit 6 - Barham Business Park Elham Valley Road Barham CT4 6DQ	East Hill North Dane Way Bioretention Swale A	
Date 08/03/2019 File BIORETENTION SWALE A 10...	Designed by LA Checked by SB	
Micro Drainage	Source Control 2017.1	


Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 577452 165243 TQ 77452 65243
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	1.000
Cv (Winter)	1.000
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 1.041

Time (mins)		Area
From:	To:	(ha)
0	4	1.041

Herrington Consulting Ltd		Page 4
Unit 6 - Barham Business Park Elham Valley Road Barham CT4 6DQ	East Hill North Dane Way Bioretention Swale A	
Date 08/03/2019 File BIORETENTION SWALE A 10...	Designed by LA Checked by SB	
Micro Drainage	Source Control 2017.1	


Model Details

Storage is Online Cover Level (m) 91.400

Infiltration Basin Structure

Invert Level (m) 90.900 Safety Factor 5.0
 Infiltration Coefficient Base (m/hr) 0.28000 Porosity 1.00
 Infiltration Coefficient Side (m/hr) 0.28000

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	1203.0	0.500	3610.0

Herrington Consulting Ltd		Page 1
Unit 6 - Barham Business Park Elham Valley Road Barham CT4 6DQ	East Hill North Dane Way Bioretention Swale A	
Date 08/03/2019 File	Designed by LA Checked by SB	
Micro Drainage		Source Control 2017.1.2


Cascade Summary of Results for Bioretention Swale A 100yr30%.SRCX

Upstream Structures	Outflow To	Overflow To
Bioretention Swale D100yr30%.SRCX	(None)	(None)
Bioretention Swale F 100yr30%.SRCX		

Half Drain Time : 92 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	91.102	0.202	46.5	321.5	O K
30 min Summer	91.143	0.243	52.6	407.7	O K
60 min Summer	91.176	0.276	57.5	483.4	O K
120 min Summer	91.191	0.291	59.9	521.3	O K
180 min Summer	91.195	0.295	60.5	530.5	O K
240 min Summer	91.197	0.297	60.7	534.6	O K
360 min Summer	91.204	0.304	61.8	551.6	O K
480 min Summer	91.207	0.307	62.4	560.9	O K
600 min Summer	91.206	0.306	62.2	558.2	O K
720 min Summer	91.202	0.302	61.5	546.9	O K
960 min Summer	91.182	0.282	58.5	499.3	O K
1440 min Summer	91.150	0.250	53.7	425.0	O K
2160 min Summer	91.100	0.200	46.2	317.3	O K
2880 min Summer	91.048	0.148	38.8	219.4	O K
4320 min Summer	90.969	0.069	27.8	91.1	O K
5760 min Summer	90.943	0.043	21.4	55.2	O K
7200 min Summer	90.900	0.000	0.0	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	134.108	0.0	18
30 min Summer	87.724	0.0	33
60 min Summer	54.717	0.0	62
120 min Summer	32.728	0.0	120
180 min Summer	24.340	0.0	176
240 min Summer	19.832	0.0	212
360 min Summer	15.058	0.0	290
480 min Summer	12.409	0.0	364
600 min Summer	10.635	0.0	436
720 min Summer	9.343	0.0	506
960 min Summer	7.519	0.0	640
1440 min Summer	5.573	0.0	908
2160 min Summer	4.100	0.0	1284
2880 min Summer	3.278	0.0	1648
4320 min Summer	2.366	0.0	2336
5760 min Summer	1.880	0.0	2936
7200 min Summer	-0.011	0.0	0

Herrington Consulting Ltd		Page 2
Unit 6 - Barham Business Park Elham Valley Road Barham CT4 6DQ	East Hill North Dane Way Bioretention Swale A	
Date 08/03/2019 File	Designed by LA Checked by SB	
Micro Drainage	Source Control 2017.1.2	

Cascade Summary of Results for Bioretention Swale A 100yr30%.SRCX

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m ³)	Status
8640 min Summer	90.900	0.000	0.0	0.0	O K
10080 min Summer	90.900	0.000	0.0	0.0	O K
15 min Winter	91.102	0.202	46.5	321.5	O K
30 min Winter	91.143	0.243	52.6	408.2	O K
60 min Winter	91.175	0.275	57.5	482.8	O K
120 min Winter	91.191	0.291	59.8	520.2	O K
180 min Winter	91.194	0.294	60.4	528.1	O K
240 min Winter	91.194	0.294	60.3	527.4	O K
360 min Winter	91.194	0.294	60.3	527.8	O K
480 min Winter	91.192	0.292	60.1	523.8	O K
600 min Winter	91.185	0.285	59.0	506.8	O K
720 min Winter	91.174	0.274	57.3	480.7	O K
960 min Winter	91.145	0.245	52.9	412.7	O K
1440 min Winter	91.091	0.191	45.0	300.6	O K
2160 min Winter	91.015	0.115	34.2	163.1	O K
2880 min Winter	90.958	0.058	26.3	75.5	O K
4320 min Winter	90.936	0.036	17.3	45.0	O K
5760 min Winter	90.929	0.029	13.9	36.4	O K
7200 min Winter	90.900	0.000	0.0	0.0	O K
8640 min Winter	90.900	0.000	0.0	0.0	O K
10080 min Winter	90.900	0.000	0.0	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Time-Peak (mins)
8640 min Summer	-0.009	0.0	0
10080 min Summer	-0.008	0.0	0
15 min Winter	134.108	0.0	18
30 min Winter	87.724	0.0	32
60 min Winter	54.717	0.0	60
120 min Winter	32.728	0.0	118
180 min Winter	24.340	0.0	174
240 min Winter	19.832	0.0	228
360 min Winter	15.058	0.0	300
480 min Winter	12.409	0.0	380
600 min Winter	10.635	0.0	456
720 min Winter	9.343	0.0	534
960 min Winter	7.519	0.0	676
1440 min Winter	5.573	0.0	950
2160 min Winter	4.100	0.0	1324
2880 min Winter	3.278	0.0	1672
4320 min Winter	2.366	0.0	2220
5760 min Winter	1.880	0.0	2936
7200 min Winter	-0.011	0.0	0
8640 min Winter	-0.009	0.0	0
10080 min Winter	-0.008	0.0	0

Unit 6 - Barham Business Park Elham Valley Road Barham CT4 6DQ	East Hill North Dane Way Bioretention Swale A
--	---



Date 08/03/2019	Designed by LA
File	Checked by SB

Micro Drainage	Source Control 2017.1.2
----------------	-------------------------

Cascade Rainfall Details for Bioretention Swale A 100yr30%.SRCX

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 577452 165243 TQ 77452 65243
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	1.000
Cv (Winter)	1.000
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+30

Time Area Diagram

Total Area (ha) 1.041

Time (mins)	Area
From:	To: (ha)

0	4	1.041
---	---	-------

Unit 6 - Barham Business Park Elham Valley Road Barham CT4 6DQ	East Hill North Dane Way Bioretention Swale A
--	---



Date 08/03/2019 File	Designed by LA Checked by SB
-------------------------	---------------------------------

Micro Drainage	Source Control 2017.1.2
----------------	-------------------------


Cascade Model Details for Bioretention Swale A 100yr30%.SRCX

Storage is Online Cover Level (m) 91.400

Infiltration Basin Structure

Invert Level (m) 90.900 Safety Factor 5.0
 Infiltration Coefficient Base (m/hr) 0.28000 Porosity 1.00
 Infiltration Coefficient Side (m/hr) 0.28000

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	1203.0	0.500	3610.0


Herrington Consulting Ltd		Page 1
Unit 6 - Barham Business Park Elham Valley Road Barham CT4 6DQ	East Hill North Dane Way Bioretention Swale B	
Date 08/03/2019 File BIORETENTION SWALE B 10...	Designed by LA Checked by SB	
Micro Drainage	Source Control 2017.1	

Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 5201 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m ³)	Status
15 min Summer	90.871	0.271	1.2	333.1	O K
30 min Summer	90.936	0.336	1.4	435.2	O K
60 min Summer	90.997	0.397	1.5	541.3	O K
120 min Summer	91.052	0.452	1.7	644.0	O K
180 min Summer	91.088	0.488	1.8	714.8	O K
240 min Summer	91.116	0.516	1.9	772.8	Flood Risk
360 min Summer	91.162	0.562	2.0	872.3	Flood Risk
480 min Summer	91.197	0.597	2.1	950.2	Flood Risk
600 min Summer	91.222	0.622	2.2	1009.6	Flood Risk
720 min Summer	91.241	0.641	2.2	1055.6	Flood Risk
960 min Summer	91.265	0.665	2.3	1114.3	Flood Risk
1440 min Summer	91.298	0.698	2.4	1200.6	Flood Risk
2160 min Summer	91.323	0.723	2.5	1265.4	Flood Risk
2880 min Summer	91.332	0.732	2.5	1289.1	Flood Risk
4320 min Summer	91.329	0.729	2.5	1281.3	Flood Risk
5760 min Summer	91.325	0.725	2.5	1270.4	Flood Risk
7200 min Summer	90.600	0.000	0.0	0.0	O K
8640 min Summer	90.600	0.000	0.0	0.0	O K
10080 min Summer	90.600	0.000	0.0	0.0	O K
15 min Winter	90.871	0.271	1.2	333.1	O K


Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Time-Peak (mins)
15 min Summer	144.424	0.0	19
30 min Summer	94.472	0.0	34
60 min Summer	58.926	0.0	64
120 min Summer	35.245	0.0	124
180 min Summer	26.213	0.0	184
240 min Summer	21.357	0.0	244
360 min Summer	16.217	0.0	364
480 min Summer	13.363	0.0	484
600 min Summer	11.453	0.0	604
720 min Summer	10.061	0.0	722
960 min Summer	8.097	0.0	962
1440 min Summer	6.002	0.0	1442
2160 min Summer	4.415	0.0	2160
2880 min Summer	3.530	0.0	2880
4320 min Summer	2.548	0.0	3844
5760 min Summer	2.025	0.0	4552
7200 min Summer	-0.012	0.0	0
8640 min Summer	-0.010	0.0	0
10080 min Summer	-0.008	0.0	0
15 min Winter	144.424	0.0	19

Herrington Consulting Ltd		Page 2
Unit 6 - Barham Business Park Elham Valley Road Barham CT4 6DQ	East Hill North Dane Way Bioretention Swale B	
Date 08/03/2019 File BIORETENTION SWALE B 10...	Designed by LA Checked by SB	
Micro Drainage	Source Control 2017.1	

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m ³)	Status
30 min Winter	90.936	0.336	1.4	435.2	O K
60 min Winter	90.997	0.397	1.5	541.3	O K
120 min Winter	91.052	0.452	1.7	644.1	O K
180 min Winter	91.088	0.488	1.8	715.0	O K
240 min Winter	91.116	0.516	1.9	773.0	Flood Risk
360 min Winter	91.162	0.562	2.0	872.7	Flood Risk
480 min Winter	91.197	0.597	2.1	950.8	Flood Risk
600 min Winter	91.222	0.622	2.2	1010.4	Flood Risk
720 min Winter	91.241	0.641	2.2	1056.5	Flood Risk
960 min Winter	91.265	0.665	2.3	1115.6	Flood Risk
1440 min Winter	91.299	0.699	2.4	1203.0	Flood Risk
2160 min Winter	91.325	0.725	2.5	1270.2	Flood Risk
2880 min Winter	91.335	0.735	2.5	1297.0	Flood Risk
4320 min Winter	91.333	0.733	2.5	1292.4	Flood Risk
5760 min Winter	91.325	0.725	2.5	1271.9	Flood Risk
7200 min Winter	90.600	0.000	0.0	0.0	O K
8640 min Winter	90.600	0.000	0.0	0.0	O K
10080 min Winter	90.600	0.000	0.0	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Time-Peak (mins)
30 min Winter	94.472	0.0	34
60 min Winter	58.926	0.0	64
120 min Winter	35.245	0.0	122
180 min Winter	26.213	0.0	182
240 min Winter	21.357	0.0	242
360 min Winter	16.217	0.0	360
480 min Winter	13.363	0.0	478
600 min Winter	11.453	0.0	596
720 min Winter	10.061	0.0	714
960 min Winter	8.097	0.0	950
1440 min Winter	6.002	0.0	1414
2160 min Winter	4.415	0.0	2100
2880 min Winter	3.530	0.0	2772
4320 min Winter	2.548	0.0	4064
5760 min Winter	2.025	0.0	4616
7200 min Winter	-0.012	0.0	0
8640 min Winter	-0.010	0.0	0
10080 min Winter	-0.008	0.0	0

Herrington Consulting Ltd		Page 3
Unit 6 - Barham Business Park Elham Valley Road Barham CT4 6DQ	East Hill North Dane Way Bioretention Swale B	
Date 08/03/2019 File BIORETENTION SWALE B 10...	Designed by LA Checked by SB	
Micro Drainage	Source Control 2017.1	

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 577452 165243 TQ 77452 65243
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	1.000
Cv (Winter)	1.000
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram


Total Area (ha) 0.000

Time (mins)		Area
From:	To:	(ha)
0	4	0.000

Time Area Diagram

Total Area (ha) 0.925

Time (mins)		Area
From:	To:	(ha)
0	4	0.925

Herrington Consulting Ltd		Page 4
Unit 6 - Barham Business Park Elham Valley Road Barham CT4 6DQ	East Hill North Dane Way Bioretention Swale B	
Date 08/03/2019 File BIORETENTION SWALE B 10...	Designed by LA Checked by SB	
Micro Drainage	Source Control 2017.1	


Model Details

Storage is Online Cover Level (m) 91.400

Infiltration Basin Structure

Invert Level (m) 90.600 Safety Factor 5.0
 Infiltration Coefficient Base (m/hr) 0.01000 Porosity 1.00
 Infiltration Coefficient Side (m/hr) 0.01000

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	968.0	0.800	2905.0


Herrington Consulting Ltd		Page 1
Unit 6 - Barham Business Park Elham Valley Road Barham CT4 6DQ	East Hill North Dane Way Bioretention Swale B	
Date 08/03/2019 File BIORETENTION SWALE B 10...	Designed by LA Checked by SB	
Micro Drainage	Source Control 2017.1	

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 5006 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m ³)	Status
15 min Summer	90.855	0.255	1.2	309.3	O K
30 min Summer	90.917	0.317	1.3	404.0	O K
60 min Summer	90.975	0.375	1.5	502.5	O K
120 min Summer	91.028	0.428	1.6	597.7	O K
180 min Summer	91.062	0.462	1.7	663.3	O K
240 min Summer	91.089	0.489	1.8	717.0	O K
360 min Summer	91.133	0.533	1.9	809.1	Flood Risk
480 min Summer	91.166	0.566	2.0	881.1	Flood Risk
600 min Summer	91.190	0.590	2.1	935.9	Flood Risk
720 min Summer	91.209	0.609	2.1	978.2	Flood Risk
960 min Summer	91.231	0.631	2.2	1032.0	Flood Risk
1440 min Summer	91.263	0.663	2.3	1110.7	Flood Risk
2160 min Summer	91.286	0.686	2.4	1168.8	Flood Risk
2880 min Summer	91.294	0.694	2.4	1188.8	Flood Risk
4320 min Summer	91.290	0.690	2.4	1179.7	Flood Risk
5760 min Summer	91.286	0.686	2.4	1168.5	Flood Risk
7200 min Summer	90.600	0.000	0.0	0.0	O K
8640 min Summer	90.600	0.000	0.0	0.0	O K
10080 min Summer	90.600	0.000	0.0	0.0	O K
15 min Winter	90.855	0.255	1.2	309.3	O K


Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Time-Peak (mins)
15 min Summer	134.108	0.0	19
30 min Summer	87.724	0.0	34
60 min Summer	54.717	0.0	64
120 min Summer	32.728	0.0	124
180 min Summer	24.340	0.0	184
240 min Summer	19.832	0.0	244
360 min Summer	15.058	0.0	364
480 min Summer	12.409	0.0	484
600 min Summer	10.635	0.0	604
720 min Summer	9.343	0.0	722
960 min Summer	7.519	0.0	962
1440 min Summer	5.573	0.0	1442
2160 min Summer	4.100	0.0	2160
2880 min Summer	3.278	0.0	2880
4320 min Summer	2.366	0.0	3756
5760 min Summer	1.880	0.0	4496
7200 min Summer	-0.011	0.0	0
8640 min Summer	-0.009	0.0	0
10080 min Summer	-0.008	0.0	0
15 min Winter	134.108	0.0	19

Herrington Consulting Ltd		Page 2
Unit 6 - Barham Business Park Elham Valley Road Barham CT4 6DQ	East Hill North Dane Way Bioretention Swale B	
Date 08/03/2019 File BIORETENTION SWALE B 10...	Designed by LA Checked by SB	
Micro Drainage	Source Control 2017.1	

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m ³)	Status
30 min Winter	90.917	0.317	1.3	404.0	O K
60 min Winter	90.975	0.375	1.5	502.5	O K
120 min Winter	91.028	0.428	1.6	597.8	O K
180 min Winter	91.062	0.462	1.7	663.5	O K
240 min Winter	91.089	0.489	1.8	717.2	O K
360 min Winter	91.133	0.533	1.9	809.5	Flood Risk
480 min Winter	91.166	0.566	2.0	881.6	Flood Risk
600 min Winter	91.191	0.591	2.1	936.6	Flood Risk
720 min Winter	91.209	0.609	2.1	979.1	Flood Risk
960 min Winter	91.232	0.632	2.2	1033.3	Flood Risk
1440 min Winter	91.264	0.664	2.3	1113.1	Flood Risk
2160 min Winter	91.288	0.688	2.4	1173.5	Flood Risk
2880 min Winter	91.297	0.697	2.4	1196.5	Flood Risk
4320 min Winter	91.294	0.694	2.4	1189.0	Flood Risk
5760 min Winter	91.287	0.687	2.4	1169.7	Flood Risk
7200 min Winter	90.600	0.000	0.0	0.0	O K
8640 min Winter	90.600	0.000	0.0	0.0	O K
10080 min Winter	90.600	0.000	0.0	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Time-Peak (mins)
30 min Winter	87.724	0.0	34
60 min Winter	54.717	0.0	64
120 min Winter	32.728	0.0	122
180 min Winter	24.340	0.0	182
240 min Winter	19.832	0.0	242
360 min Winter	15.058	0.0	360
480 min Winter	12.409	0.0	478
600 min Winter	10.635	0.0	596
720 min Winter	9.343	0.0	714
960 min Winter	7.519	0.0	950
1440 min Winter	5.573	0.0	1414
2160 min Winter	4.100	0.0	2100
2880 min Winter	3.278	0.0	2768
4320 min Winter	2.366	0.0	4060
5760 min Winter	1.880	0.0	4608
7200 min Winter	-0.011	0.0	0
8640 min Winter	-0.009	0.0	0
10080 min Winter	-0.008	0.0	0

Herrington Consulting Ltd		Page 3
Unit 6 - Barham Business Park Elham Valley Road Barham CT4 6DQ	East Hill North Dane Way Bioretention Swale B	
Date 08/03/2019 File BIORETENTION SWALE B 10...	Designed by LA Checked by SB	
Micro Drainage	Source Control 2017.1	

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 577452 165243 TQ 77452 65243
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	1.000
Cv (Winter)	1.000
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.000

Time (mins) Area
From: To: (ha)


0 4 0.000

Time Area Diagram

Total Area (ha) 0.925

Time (mins) Area
From: To: (ha)

0 4 0.925

Herrington Consulting Ltd		Page 4
Unit 6 - Barham Business Park Elham Valley Road Barham CT4 6DQ	East Hill North Dane Way Bioretention Swale B	
Date 08/03/2019 File BIORETENTION SWALE B 10...	Designed by LA Checked by SB	
Micro Drainage	Source Control 2017.1	


Model Details

Storage is Online Cover Level (m) 91.400

Infiltration Basin Structure

Invert Level (m) 90.600 Safety Factor 5.0
 Infiltration Coefficient Base (m/hr) 0.01000 Porosity 1.00
 Infiltration Coefficient Side (m/hr) 0.01000

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	968.0	0.800	2905.0


Herrington Consulting Ltd		Page 1
Unit 6 - Barham Business Park Elham Valley Road Barham CT4 6DQ	East Hill North Dane Way Bioretention Swale C	
Date 08/03/2019 File BIORETENTION SWALE C 10...	Designed by LA Checked by SB	
Micro Drainage	Source Control 2017.1	

Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 229 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m ³)	Status
15 min Summer	91.073	0.573	65.1	1116.4	O K
30 min Summer	91.181	0.681	74.7	1426.9	Flood Risk
60 min Summer	91.266	0.766	82.5	1700.2	Flood Risk
120 min Summer	91.313	0.813	86.8	1860.5	Flood Risk
180 min Summer	91.328	0.828	88.2	1912.6	Flood Risk
240 min Summer	91.339	0.839	89.3	1950.8	Flood Risk
360 min Summer	91.356	0.856	90.9	2015.5	Flood Risk
480 min Summer	91.364	0.864	91.7	2043.7	Flood Risk
600 min Summer	91.362	0.862	91.5	2037.4	Flood Risk
720 min Summer	91.355	0.855	90.8	2009.9	Flood Risk
960 min Summer	91.327	0.827	88.1	1908.2	Flood Risk
1440 min Summer	91.275	0.775	83.3	1729.7	Flood Risk
2160 min Summer	91.200	0.700	76.4	1487.5	Flood Risk
2880 min Summer	91.133	0.633	70.4	1283.9	Flood Risk
4320 min Summer	91.019	0.519	60.4	973.1	O K
5760 min Summer	90.933	0.433	53.0	763.4	O K
7200 min Summer	90.500	0.000	0.0	0.0	O K
8640 min Summer	90.500	0.000	0.0	0.0	O K
10080 min Summer	90.500	0.000	0.0	0.0	O K
15 min Winter	91.073	0.573	65.1	1117.4	O K


Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Time-Peak (mins)
15 min Summer	144.424	0.0	18
30 min Summer	94.472	0.0	33
60 min Summer	58.926	0.0	62
120 min Summer	35.245	0.0	120
180 min Summer	26.213	0.0	162
240 min Summer	21.357	0.0	192
360 min Summer	16.217	0.0	258
480 min Summer	13.363	0.0	328
600 min Summer	11.453	0.0	396
720 min Summer	10.061	0.0	464
960 min Summer	8.097	0.0	604
1440 min Summer	6.002	0.0	868
2160 min Summer	4.415	0.0	1256
2880 min Summer	3.530	0.0	1640
4320 min Summer	2.548	0.0	2376
5760 min Summer	2.025	0.0	3112
7200 min Summer	-0.012	0.0	0
8640 min Summer	-0.010	0.0	0
10080 min Summer	-0.008	0.0	0
15 min Winter	144.424	0.0	18

Herrington Consulting Ltd		Page 2
Unit 6 - Barham Business Park Elham Valley Road Barham CT4 6DQ	East Hill North Dane Way Bioretention Swale C	
Date 08/03/2019 File BIORETENTION SWALE C 10...	Designed by LA Checked by SB	
Micro Drainage	Source Control 2017.1	

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m ³)	Status
30 min Winter	91.181	0.681	74.7	1428.9	Flood Risk
60 min Winter	91.267	0.767	82.6	1704.0	Flood Risk
120 min Winter	91.317	0.817	87.2	1872.9	Flood Risk
180 min Winter	91.332	0.832	88.6	1929.2	Flood Risk
240 min Winter	91.339	0.839	89.3	1953.5	Flood Risk
360 min Winter	91.353	0.853	90.6	2004.2	Flood Risk
480 min Winter	91.355	0.855	90.8	2010.0	Flood Risk
600 min Winter	91.347	0.847	90.0	1979.6	Flood Risk
720 min Winter	91.332	0.832	88.6	1928.1	Flood Risk
960 min Winter	91.291	0.791	84.8	1783.2	Flood Risk
1440 min Winter	91.215	0.715	77.8	1534.8	Flood Risk
2160 min Winter	91.114	0.614	68.7	1229.4	Flood Risk
2880 min Winter	91.027	0.527	61.0	993.3	O K
4320 min Winter	90.889	0.389	49.4	665.2	O K
5760 min Winter	90.793	0.293	41.5	466.3	O K
7200 min Winter	90.500	0.000	0.0	0.0	O K
8640 min Winter	90.500	0.000	0.0	0.0	O K
10080 min Winter	90.500	0.000	0.0	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Time-Peak (mins)
30 min Winter	94.472	0.0	32
60 min Winter	58.926	0.0	60
120 min Winter	35.245	0.0	118
180 min Winter	26.213	0.0	170
240 min Winter	21.357	0.0	196
360 min Winter	16.217	0.0	272
480 min Winter	13.363	0.0	350
600 min Winter	11.453	0.0	426
720 min Winter	10.061	0.0	500
960 min Winter	8.097	0.0	644
1440 min Winter	6.002	0.0	922
2160 min Winter	4.415	0.0	1320
2880 min Winter	3.530	0.0	1700
4320 min Winter	2.548	0.0	2424
5760 min Winter	2.025	0.0	3168
7200 min Winter	-0.012	0.0	0
8640 min Winter	-0.010	0.0	0
10080 min Winter	-0.008	0.0	0

Herrington Consulting Ltd		Page 3
Unit 6 - Barham Business Park Elham Valley Road Barham CT4 6DQ	East Hill North Dane Way Bioretention Swale C	
Date 08/03/2019 File BIORETENTION SWALE C 10...	Designed by LA Checked by SB	
Micro Drainage	Source Control 2017.1	

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 577452 165243 TQ 77452 65243
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	1.000
Cv (Winter)	1.000
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.000

Time (mins)	Area
From: To:	(ha)
0	4 0.000

Time Area Diagram


Total Area (ha) 3.218

Time (mins)	Area
From: To:	(ha)
0	4 3.218

Time Area Diagram

Total Area (ha) 0.000

Time (mins)	Area
From: To:	(ha)
0	4 0.000

Herrington Consulting Ltd		Page 4
Unit 6 - Barham Business Park Elham Valley Road Barham CT4 6DQ	East Hill North Dane Way Bioretention Swale C	
Date 08/03/2019 File BIORETENTION SWALE C 10...	Designed by LA Checked by SB	
Micro Drainage	Source Control 2017.1	


Model Details

Storage is Online Cover Level (m) 91.400

Infiltration Basin Structure

Invert Level (m) 90.500 Safety Factor 5.0
 Infiltration Coefficient Base (m/hr) 0.27000 Porosity 1.00
 Infiltration Coefficient Side (m/hr) 0.27000

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	1266.0	0.900	3800.0


Herrington Consulting Ltd		Page 1
Unit 6 - Barham Business Park Elham Valley Road Barham CT4 6DQ	East Hill North Dane Way Bioretention Swale C	
Date 08/03/2019 File BIORETENTION SWALE C 10...	Designed by LA Checked by SB	
Micro Drainage	Source Control 2017.1	

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 221 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m ³)	Status
15 min Summer	91.043	0.543	62.4	1035.2	O K
30 min Summer	91.146	0.646	71.5	1322.0	Flood Risk
60 min Summer	91.227	0.727	78.9	1572.8	Flood Risk
120 min Summer	91.271	0.771	82.9	1715.6	Flood Risk
180 min Summer	91.284	0.784	84.2	1760.9	Flood Risk
240 min Summer	91.294	0.794	85.0	1794.5	Flood Risk
360 min Summer	91.310	0.810	86.6	1850.7	Flood Risk
480 min Summer	91.317	0.817	87.2	1873.0	Flood Risk
600 min Summer	91.314	0.814	86.9	1864.0	Flood Risk
720 min Summer	91.306	0.806	86.2	1835.9	Flood Risk
960 min Summer	91.277	0.777	83.5	1737.8	Flood Risk
1440 min Summer	91.226	0.726	78.8	1569.5	Flood Risk
2160 min Summer	91.153	0.653	72.1	1343.4	Flood Risk
2880 min Summer	91.087	0.587	66.3	1153.7	O K
4320 min Summer	90.976	0.476	56.7	866.7	O K
5760 min Summer	90.893	0.393	49.7	673.7	O K
7200 min Summer	90.500	0.000	0.0	0.0	O K
8640 min Summer	90.500	0.000	0.0	0.0	O K
10080 min Summer	90.500	0.000	0.0	0.0	O K
15 min Winter	91.043	0.543	62.5	1036.2	O K


Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Time-Peak (mins)
15 min Summer	134.108	0.0	18
30 min Summer	87.724	0.0	33
60 min Summer	54.717	0.0	62
120 min Summer	32.728	0.0	120
180 min Summer	24.340	0.0	158
240 min Summer	19.832	0.0	190
360 min Summer	15.058	0.0	256
480 min Summer	12.409	0.0	326
600 min Summer	10.635	0.0	394
720 min Summer	9.343	0.0	464
960 min Summer	7.519	0.0	600
1440 min Summer	5.573	0.0	866
2160 min Summer	4.100	0.0	1256
2880 min Summer	3.278	0.0	1640
4320 min Summer	2.366	0.0	2376
5760 min Summer	1.880	0.0	3112
7200 min Summer	-0.011	0.0	0
8640 min Summer	-0.009	0.0	0
10080 min Summer	-0.008	0.0	0
15 min Winter	134.108	0.0	18

Herrington Consulting Ltd		Page 2
Unit 6 - Barham Business Park Elham Valley Road Barham CT4 6DQ	East Hill North Dane Way Bioretention Swale C	
Date 08/03/2019 File BIORETENTION SWALE C 10...	Designed by LA Checked by SB	
Micro Drainage	Source Control 2017.1	

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m ³)	Status
30 min Winter	91.146	0.646	71.6	1324.1	Flood Risk
60 min Winter	91.228	0.728	79.0	1576.6	Flood Risk
120 min Winter	91.274	0.774	83.2	1727.6	Flood Risk
180 min Winter	91.288	0.788	84.5	1775.0	Flood Risk
240 min Winter	91.295	0.795	85.1	1796.6	Flood Risk
360 min Winter	91.307	0.807	86.2	1838.5	Flood Risk
480 min Winter	91.307	0.807	86.2	1839.3	Flood Risk
600 min Winter	91.298	0.798	85.4	1807.3	Flood Risk
720 min Winter	91.283	0.783	84.0	1756.4	Flood Risk
960 min Winter	91.241	0.741	80.2	1617.9	Flood Risk
1440 min Winter	91.166	0.666	73.4	1384.2	Flood Risk
2160 min Winter	91.067	0.567	64.6	1100.7	O K
2880 min Winter	90.983	0.483	57.3	882.6	O K
4320 min Winter	90.850	0.350	46.2	582.0	O K
5760 min Winter	90.758	0.258	38.7	400.5	O K
7200 min Winter	90.500	0.000	0.0	0.0	O K
8640 min Winter	90.500	0.000	0.0	0.0	O K
10080 min Winter	90.500	0.000	0.0	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Time-Peak (mins)
30 min Winter	87.724	0.0	32
60 min Winter	54.717	0.0	60
120 min Winter	32.728	0.0	118
180 min Winter	24.340	0.0	170
240 min Winter	19.832	0.0	194
360 min Winter	15.058	0.0	270
480 min Winter	12.409	0.0	348
600 min Winter	10.635	0.0	424
720 min Winter	9.343	0.0	498
960 min Winter	7.519	0.0	642
1440 min Winter	5.573	0.0	922
2160 min Winter	4.100	0.0	1316
2880 min Winter	3.278	0.0	1700
4320 min Winter	2.366	0.0	2424
5760 min Winter	1.880	0.0	3168
7200 min Winter	-0.011	0.0	0
8640 min Winter	-0.009	0.0	0
10080 min Winter	-0.008	0.0	0

Herrington Consulting Ltd		Page 3
Unit 6 - Barham Business Park Elham Valley Road Barham CT4 6DQ	East Hill North Dane Way Bioretention Swale C	
Date 08/03/2019 File BIORETENTION SWALE C 10...	Designed by LA Checked by SB	
Micro Drainage	Source Control 2017.1	

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 577452 165243 TQ 77452 65243
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	1.000
Cv (Winter)	1.000
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.000

Time (mins)	Area
From: To:	(ha)
0	4 0.000

Time Area Diagram


Total Area (ha) 3.218

Time (mins)	Area
From: To:	(ha)
0	4 3.218

Time Area Diagram

Total Area (ha) 0.000

Time (mins)	Area
From: To:	(ha)
0	4 0.000

Herrington Consulting Ltd		Page 4
Unit 6 - Barham Business Park Elham Valley Road Barham CT4 6DQ	East Hill North Dane Way Bioretention Swale C	
Date 08/03/2019 File BIORETENTION SWALE C 10...	Designed by LA Checked by SB	
Micro Drainage	Source Control 2017.1	


Model Details

Storage is Online Cover Level (m) 91.400

Infiltration Basin Structure

Invert Level (m) 90.500 Safety Factor 5.0
 Infiltration Coefficient Base (m/hr) 0.27000 Porosity 1.00
 Infiltration Coefficient Side (m/hr) 0.27000

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	1266.0	0.900	3800.0

Herrington Consulting Ltd		Page 1
Unit 6 - Barham Business Park Elham Valley Road Barham CT4 6DQ	East Hill North Dane Way Bioretention Swale D	
Date 08/03/2019 File F-D cascade.CASX	Designed by LA Checked by SB	
Micro Drainage		Source Control 2017.1

Cascade Summary of Results for Bioretention Swale D100yr30%.SRCX

Upstream Structures	Outflow To	Overflow To
Bioretention Swale F 100yr30%.SRCX	(None)	Bioretention Swale A 100yr30%.SRCX
Half Drain Time : 120 minutes.		


Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Overflow (l/s)	Max Outflow (l/s)	Max Volume (m ³)	Status
15 min Summer	91.095	0.295	79.5	9.1	88.6	756.7	O K
30 min Summer	91.146	0.346	89.5	21.4	110.9	940.4	Flood Risk
60 min Summer	91.181	0.381	96.3	32.3	128.5	1073.3	Flood Risk
120 min Summer	91.194	0.394	99.0	36.5	135.5	1128.6	Flood Risk
180 min Summer	91.202	0.402	100.6	39.0	139.6	1162.1	Flood Risk
240 min Summer	91.209	0.409	102.0	41.6	143.5	1190.2	Flood Risk
360 min Summer	91.220	0.420	104.2	47.5	151.7	1237.4	Flood Risk
480 min Summer	91.227	0.427	105.5	51.0	156.5	1265.5	Flood Risk
600 min Summer	91.229	0.429	106.0	52.3	158.4	1274.7	Flood Risk
720 min Summer	91.228	0.428	105.8	51.8	157.6	1271.4	Flood Risk
960 min Summer	91.220	0.420	104.1	47.2	151.3	1234.5	Flood Risk
1440 min Summer	91.203	0.403	100.7	39.2	139.9	1163.5	Flood Risk
2160 min Summer	91.172	0.372	94.6	29.6	124.2	1040.7	Flood Risk
2880 min Summer	91.143	0.343	88.9	20.5	109.3	929.7	Flood Risk
4320 min Summer	91.090	0.290	78.6	8.3	87.0	741.7	O K
5760 min Summer	91.047	0.247	70.4	2.7	73.1	600.1	O K
7200 min Summer	90.800	0.000	0.0	0.0	0.0	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Overflow Volume (m ³)	Time-Peak (mins)
15 min Summer	134.108	0.0	15.6	18
30 min Summer	87.724	0.0	55.5	32
60 min Summer	54.717	0.0	132.1	60
120 min Summer	32.728	0.0	229.5	104
180 min Summer	24.340	0.0	303.5	144
240 min Summer	19.832	0.0	364.6	180
360 min Summer	15.058	0.0	471.6	250
480 min Summer	12.409	0.0	545.2	322
600 min Summer	10.635	0.0	585.4	390
720 min Summer	9.343	0.0	601.5	458
960 min Summer	7.519	0.0	579.7	592
1440 min Summer	5.573	0.0	541.5	852
2160 min Summer	4.100	0.0	449.0	1228
2880 min Summer	3.278	0.0	337.2	1588
4320 min Summer	2.366	0.0	145.6	2336
5760 min Summer	1.880	0.0	38.9	3064
7200 min Summer	-0.011	0.0	0.0	0

Cascade Summary of Results for Bioretention Swale D100yr30%.SRCX

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Overflow (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
8640 min Summer	90.800	0.000	0.0	0.0	0.0	0.0	O K
10080 min Summer	90.800	0.000	0.0	0.0	0.0	0.0	O K
15 min Winter	91.095	0.295	79.6	9.1	88.7	757.4	O K
30 min Winter	91.147	0.347	89.7	21.7	111.4	944.0	Flood Risk
60 min Winter	91.183	0.383	96.7	32.9	129.6	1081.2	Flood Risk
120 min Winter	91.197	0.397	99.5	37.3	136.8	1139.0	Flood Risk
180 min Winter	91.203	0.403	100.7	39.2	139.9	1162.6	Flood Risk
240 min Winter	91.208	0.408	101.8	41.0	142.8	1185.6	Flood Risk
360 min Winter	91.217	0.417	103.5	45.6	149.1	1221.3	Flood Risk
480 min Winter	91.220	0.420	104.1	47.2	151.3	1234.3	Flood Risk
600 min Winter	91.218	0.418	103.7	46.1	149.8	1226.9	Flood Risk
720 min Winter	91.213	0.413	102.8	43.7	146.5	1206.7	Flood Risk
960 min Winter	91.196	0.396	99.4	37.2	136.5	1136.7	Flood Risk
1440 min Winter	91.165	0.365	93.2	27.4	120.6	1013.0	Flood Risk
2160 min Winter	91.121	0.321	84.6	15.0	99.6	849.3	Flood Risk
2880 min Winter	91.082	0.282	77.1	7.0	84.2	714.2	O K
4320 min Winter	91.014	0.214	64.3	0.2	64.5	500.2	O K
5760 min Winter	90.955	0.155	53.6	0.0	53.6	337.0	O K
7200 min Winter	90.800	0.000	0.0	0.0	0.0	0.0	O K
8640 min Winter	90.800	0.000	0.0	0.0	0.0	0.0	O K
10080 min Winter	90.800	0.000	0.0	0.0	0.0	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Overflow Volume (m³)	Time-Peak (mins)
8640 min Summer	-0.009	0.0	0.0	0
10080 min Summer	-0.008	0.0	0.0	0
15 min Winter	134.108	0.0	15.5	18
30 min Winter	87.724	0.0	55.2	31
60 min Winter	54.717	0.0	130.8	60
120 min Winter	32.728	0.0	226.2	114
180 min Winter	24.340	0.0	297.5	150
240 min Winter	19.832	0.0	355.2	190
360 min Winter	15.058	0.0	454.3	268
480 min Winter	12.409	0.0	519.2	344
600 min Winter	10.635	0.0	549.5	418
720 min Winter	9.343	0.0	555.1	490
960 min Winter	7.519	0.0	513.4	628
1440 min Winter	5.573	0.0	424.7	894
2160 min Winter	4.100	0.0	269.6	1280
2880 min Winter	3.278	0.0	134.6	1672
4320 min Winter	2.366	0.0	2.6	2420
5760 min Winter	1.880	0.0	0.0	3120
7200 min Winter	-0.011	0.0	0.0	0
8640 min Winter	-0.009	0.0	0.0	0
10080 min Winter	-0.008	0.0	0.0	0

Herrington Consulting Ltd		Page 3
Unit 6 - Barham Business Park Elham Valley Road Barham CT4 6DQ	East Hill North Dane Way Bioretention Swale D	
Date 08/03/2019 File F-D cascade.CASX	Designed by LA Checked by SB	
Micro Drainage	Source Control 2017.1	

Cascade Rainfall Details for Bioretention Swale D100yr30%.SRCX

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 577452 165243 TQ 77452 65243
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	1.000
Cv (Winter)	1.000
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.000

Time (mins)	Area
From: To:	(ha)
0	4 0.000

Time Area Diagram


Total Area (ha) 2.425

Time (mins)	Area
From: To:	(ha)
0	4 2.425

Time Area Diagram

Total Area (ha) 0.000

Time (mins)	Area
From: To:	(ha)
0	4 0.000

Herrington Consulting Ltd		Page 4
Unit 6 - Barham Business Park Elham Valley Road Barham CT4 6DQ	East Hill North Dane Way Bioretention Swale D	
Date 08/03/2019 File F-D cascade.CASX	Designed by LA Checked by SB	
Micro Drainage	Source Control 2017.1	

Cascade Model Details for Bioretention Swale D100yr30%.SRCX

Storage is Online Cover Level (m) 91.400


Infiltration Basin Structure

Invert Level (m) 90.800 Safety Factor 5.0
 Infiltration Coefficient Base (m/hr) 0.27000 Porosity 1.00
 Infiltration Coefficient Side (m/hr) 0.27000

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	1800.0	0.600	5632.0

Pipe Overflow Control

Diameter (m) 0.450 Entry Loss Coefficient 0.500
 Slope (1:X) 100.0 Coefficient of Contraction 0.600
 Length (m) 100.000 Upstream Invert Level (m) 91.000
 Roughness k (mm) 0.060


Herrington Consulting Ltd		Page 1
Unit 6 - Barham Business Park Elham Valley Road Barham CT4 6DQ	East Hill North Dane Way Bioretention Swale E	
Date 08/03/2019 File BIORETENTION SWALE E 10...	Designed by LA Checked by SB	
Micro Drainage	Source Control 2017.1	

Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 96 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m ³)	Status
15 min Summer	91.121	0.221	18.2	147.0	Flood Risk
30 min Summer	91.164	0.264	20.2	183.4	Flood Risk
60 min Summer	91.191	0.291	21.5	208.2	Flood Risk
120 min Summer	91.196	0.296	21.8	213.3	Flood Risk
180 min Summer	91.197	0.297	21.8	213.4	Flood Risk
240 min Summer	91.195	0.295	21.7	211.7	Flood Risk
360 min Summer	91.190	0.290	21.5	207.3	Flood Risk
480 min Summer	91.183	0.283	21.2	200.4	Flood Risk
600 min Summer	91.173	0.273	20.7	191.7	Flood Risk
720 min Summer	91.162	0.262	20.1	182.1	Flood Risk
960 min Summer	91.138	0.238	19.0	161.2	Flood Risk
1440 min Summer	91.099	0.199	17.1	129.3	O K
2160 min Summer	91.052	0.152	14.9	93.7	O K
2880 min Summer	91.015	0.115	13.2	68.5	O K
4320 min Summer	90.966	0.066	11.0	37.3	O K
5760 min Summer	90.947	0.047	9.6	25.9	O K
7200 min Summer	90.900	0.000	0.0	0.0	O K
8640 min Summer	90.900	0.000	0.0	0.0	O K
10080 min Summer	90.900	0.000	0.0	0.0	O K
15 min Winter	91.121	0.221	18.2	147.1	Flood Risk


Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Time-Peak (mins)
15 min Summer	144.424	0.0	18
30 min Summer	94.472	0.0	32
60 min Summer	58.926	0.0	60
120 min Summer	35.245	0.0	94
180 min Summer	26.213	0.0	128
240 min Summer	21.357	0.0	162
360 min Summer	16.217	0.0	232
480 min Summer	13.363	0.0	300
600 min Summer	11.453	0.0	368
720 min Summer	10.061	0.0	434
960 min Summer	8.097	0.0	560
1440 min Summer	6.002	0.0	810
2160 min Summer	4.415	0.0	1172
2880 min Summer	3.530	0.0	1532
4320 min Summer	2.548	0.0	2244
5760 min Summer	2.025	0.0	2936
7200 min Summer	-0.012	0.0	0
8640 min Summer	-0.010	0.0	0
10080 min Summer	-0.008	0.0	0
15 min Winter	144.424	0.0	18

Herrington Consulting Ltd		Page 2
Unit 6 - Barham Business Park Elham Valley Road Barham CT4 6DQ	East Hill North Dane Way Bioretention Swale E	
Date 08/03/2019 File BIORETENTION SWALE E 10...	Designed by LA Checked by SB	
Micro Drainage	Source Control 2017.1	

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m ³)	Status
30 min Winter	91.164	0.264	20.2	183.9	Flood Risk
60 min Winter	91.192	0.292	21.6	209.5	Flood Risk
120 min Winter	91.196	0.296	21.8	213.2	Flood Risk
180 min Winter	91.194	0.294	21.7	211.1	Flood Risk
240 min Winter	91.189	0.289	21.5	206.4	Flood Risk
360 min Winter	91.178	0.278	20.9	195.9	Flood Risk
480 min Winter	91.164	0.264	20.2	183.6	Flood Risk
600 min Winter	91.148	0.248	19.5	169.9	Flood Risk
720 min Winter	91.132	0.232	18.7	156.3	Flood Risk
960 min Winter	91.099	0.199	17.1	129.5	O K
1440 min Winter	91.048	0.148	14.7	91.1	O K
2160 min Winter	90.992	0.092	12.2	53.2	O K
2880 min Winter	90.956	0.056	10.5	30.8	O K
4320 min Winter	90.939	0.039	7.9	21.3	O K
5760 min Winter	90.932	0.032	6.2	17.2	O K
7200 min Winter	90.900	0.000	0.0	0.0	O K
8640 min Winter	90.900	0.000	0.0	0.0	O K
10080 min Winter	90.900	0.000	0.0	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Time-Peak (mins)
30 min Winter	94.472	0.0	31
60 min Winter	58.926	0.0	60
120 min Winter	35.245	0.0	96
180 min Winter	26.213	0.0	136
240 min Winter	21.357	0.0	174
360 min Winter	16.217	0.0	248
480 min Winter	13.363	0.0	320
600 min Winter	11.453	0.0	388
720 min Winter	10.061	0.0	456
960 min Winter	8.097	0.0	588
1440 min Winter	6.002	0.0	838
2160 min Winter	4.415	0.0	1192
2880 min Winter	3.530	0.0	1528
4320 min Winter	2.548	0.0	2204
5760 min Winter	2.025	0.0	2944
7200 min Winter	-0.012	0.0	0
8640 min Winter	-0.010	0.0	0
10080 min Winter	-0.008	0.0	0

Herrington Consulting Ltd		Page 3
Unit 6 - Barham Business Park Elham Valley Road Barham CT4 6DQ	East Hill North Dane Way Bioretention Swale E	
Date 08/03/2019 File BIORETENTION SWALE E 10...	Designed by LA Checked by SB	
Micro Drainage	Source Control 2017.1	

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 577452 165243 TQ 77452 65243
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	1.000
Cv (Winter)	1.000
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.000

Time (mins)	Area
From: To:	(ha)
0	4 0.000

Time Area Diagram


Total Area (ha) 0.441

Time (mins)	Area
From: To:	(ha)
0	4 0.441

Time Area Diagram

Total Area (ha) 0.000

Time (mins)	Area
From: To:	(ha)
0	4 0.000

Herrington Consulting Ltd		Page 4
Unit 6 - Barham Business Park Elham Valley Road Barham CT4 6DQ	East Hill North Dane Way Bioretention Swale E	
Date 08/03/2019 File BIORETENTION SWALE E 10...	Designed by LA Checked by SB	
Micro Drainage	Source Control 2017.1	


Model Details

Storage is Online Cover Level (m) 91.400

Infiltration Basin Structure

Invert Level (m) 90.900 Safety Factor 5.0
 Infiltration Coefficient Base (m/hr) 0.28000 Porosity 1.00
 Infiltration Coefficient Side (m/hr) 0.28000

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	520.0	0.500	1300.0


Herrington Consulting Ltd		Page 1
Unit 6 - Barham Business Park Elham Valley Road Barham CT4 6DQ	East Hill North Dane Way Bioretention Swale E	
Date 08/03/2019 File BIORETENTION SWALE E 10...	Designed by LA Checked by SB	
Micro Drainage	Source Control 2017.1	

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 103 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m ³)	Status
15 min Summer	91.108	0.208	17.5	136.1	Flood Risk
30 min Summer	91.148	0.248	19.4	169.5	Flood Risk
60 min Summer	91.173	0.273	20.7	191.8	Flood Risk
120 min Summer	91.178	0.278	20.9	196.0	Flood Risk
180 min Summer	91.177	0.277	20.9	195.7	Flood Risk
240 min Summer	91.175	0.275	20.8	193.7	Flood Risk
360 min Summer	91.170	0.270	20.5	189.0	Flood Risk
480 min Summer	91.162	0.262	20.1	182.1	Flood Risk
600 min Summer	91.153	0.253	19.7	173.6	Flood Risk
720 min Summer	91.142	0.242	19.2	164.4	Flood Risk
960 min Summer	91.118	0.218	18.0	144.7	Flood Risk
1440 min Summer	91.080	0.180	16.2	114.7	O K
2160 min Summer	91.035	0.135	14.1	81.7	O K
2880 min Summer	91.001	0.101	12.5	58.7	O K
4320 min Summer	90.957	0.057	10.6	31.6	O K
5760 min Summer	90.944	0.044	9.0	24.2	O K
7200 min Summer	90.900	0.000	0.0	0.0	O K
8640 min Summer	90.900	0.000	0.0	0.0	O K
10080 min Summer	90.900	0.000	0.0	0.0	O K
15 min Winter	91.108	0.208	17.5	136.2	Flood Risk


Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Time-Peak (mins)
15 min Summer	134.108	0.0	18
30 min Summer	87.724	0.0	32
60 min Summer	54.717	0.0	60
120 min Summer	32.728	0.0	92
180 min Summer	24.340	0.0	126
240 min Summer	19.832	0.0	160
360 min Summer	15.058	0.0	230
480 min Summer	12.409	0.0	298
600 min Summer	10.635	0.0	366
720 min Summer	9.343	0.0	432
960 min Summer	7.519	0.0	560
1440 min Summer	5.573	0.0	808
2160 min Summer	4.100	0.0	1172
2880 min Summer	3.278	0.0	1528
4320 min Summer	2.366	0.0	2208
5760 min Summer	1.880	0.0	2936
7200 min Summer	-0.011	0.0	0
8640 min Summer	-0.009	0.0	0
10080 min Summer	-0.008	0.0	0
15 min Winter	134.108	0.0	18

Herrington Consulting Ltd		Page 2
Unit 6 - Barham Business Park Elham Valley Road Barham CT4 6DQ	East Hill North Dane Way Bioretention Swale E	
Date 08/03/2019 File BIORETENTION SWALE E 10...	Designed by LA Checked by SB	
Micro Drainage	Source Control 2017.1	

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m ³)	Status
30 min Winter	91.148	0.248	19.5	170.0	Flood Risk
60 min Winter	91.174	0.274	20.7	192.9	Flood Risk
120 min Winter	91.177	0.277	20.9	195.8	Flood Risk
180 min Winter	91.175	0.275	20.8	193.2	Flood Risk
240 min Winter	91.169	0.269	20.5	188.3	Flood Risk
360 min Winter	91.157	0.257	19.9	177.7	Flood Risk
480 min Winter	91.143	0.243	19.2	165.6	Flood Risk
600 min Winter	91.128	0.228	18.5	152.5	Flood Risk
720 min Winter	91.112	0.212	17.7	139.5	Flood Risk
960 min Winter	91.080	0.180	16.2	114.3	O K
1440 min Winter	91.030	0.130	13.9	78.6	O K
2160 min Winter	90.978	0.078	11.5	44.1	O K
2880 min Winter	90.949	0.049	10.1	27.0	O K
4320 min Winter	90.937	0.037	7.3	19.9	O K
5760 min Winter	90.930	0.030	5.8	15.9	O K
7200 min Winter	90.900	0.000	0.0	0.0	O K
8640 min Winter	90.900	0.000	0.0	0.0	O K
10080 min Winter	90.900	0.000	0.0	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Time-Peak (mins)
30 min Winter	87.724	0.0	31
60 min Winter	54.717	0.0	60
120 min Winter	32.728	0.0	96
180 min Winter	24.340	0.0	134
240 min Winter	19.832	0.0	172
360 min Winter	15.058	0.0	246
480 min Winter	12.409	0.0	318
600 min Winter	10.635	0.0	386
720 min Winter	9.343	0.0	454
960 min Winter	7.519	0.0	586
1440 min Winter	5.573	0.0	836
2160 min Winter	4.100	0.0	1188
2880 min Winter	3.278	0.0	1468
4320 min Winter	2.366	0.0	2204
5760 min Winter	1.880	0.0	2936
7200 min Winter	-0.011	0.0	0
8640 min Winter	-0.009	0.0	0
10080 min Winter	-0.008	0.0	0

Herrington Consulting Ltd		Page 3
Unit 6 - Barham Business Park Elham Valley Road Barham CT4 6DQ	East Hill North Dane Way Bioretention Swale E	
Date 08/03/2019 File BIORETENTION SWALE E 10...	Designed by LA Checked by SB	
Micro Drainage	Source Control 2017.1	

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 577452 165243 TQ 77452 65243
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	1.000
Cv (Winter)	1.000
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.000

Time (mins)	Area
From: To:	(ha)
0	4 0.000

Time Area Diagram


Total Area (ha) 0.441

Time (mins)	Area
From: To:	(ha)
0	4 0.441

Time Area Diagram

Total Area (ha) 0.000

Time (mins)	Area
From: To:	(ha)
0	4 0.000

Herrington Consulting Ltd		Page 4
Unit 6 - Barham Business Park Elham Valley Road Barham CT4 6DQ	East Hill North Dane Way Bioretention Swale E	
Date 08/03/2019 File BIORETENTION SWALE E 10...	Designed by LA Checked by SB	
Micro Drainage	Source Control 2017.1	


Model Details

Storage is Online Cover Level (m) 91.400

Infiltration Basin Structure

Invert Level (m) 90.900 Safety Factor 5.0
 Infiltration Coefficient Base (m/hr) 0.28000 Porosity 1.00
 Infiltration Coefficient Side (m/hr) 0.28000

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	520.0	0.500	1300.0

Herrington Consulting Ltd		Page 1
Unit 6 - Barham Business Park Elham Valley Road Barham CT4 6DQ	East Hill North Dane Way Bioretention Swale F	
Date 08/03/2019 File F-D cascade.CASX	Designed by LA Checked by SB	
Micro Drainage		Source Control 2017.1

Cascade Summary of Results for Bioretention Swale F 100yr30%.SRCX

Upstream Structures (None)
Outflow To (None)
Overflow To Bioretention Swale D100yr30%.SRCX

Half Drain Time : 7997 minutes.


Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Overflow (l/s)	Max Σ Outflow (l/s)	Max Volume (m ³)	Status
15 min Summer	91.105	0.705	1.2	0.0	1.2	679.4	O K
30 min Summer	91.245	0.845	1.4	2.5	4.0	887.5	O K
60 min Summer	91.363	0.963	1.6	26.6	28.2	1081.8	Flood Risk
120 min Summer	91.428	1.028	1.7	51.5	53.2	1198.3	Flood Risk
180 min Summer	91.446	1.046	1.7	61.5	63.2	1231.4	Flood Risk
240 min Summer	91.465	1.065	1.7	71.4	73.1	1264.9	Flood Risk
360 min Summer	91.497	1.097	1.7	84.6	86.3	1323.3	Flood Risk
480 min Summer	91.515	1.115	1.7	92.0	93.7	1356.0	Flood Risk
600 min Summer	91.523	1.123	1.7	95.0	96.7	1369.5	Flood Risk
720 min Summer	91.524	1.124	1.7	95.4	97.1	1371.4	Flood Risk
960 min Summer	91.515	1.115	1.7	92.0	93.7	1356.0	Flood Risk
1440 min Summer	91.497	1.097	1.7	84.4	86.1	1322.7	Flood Risk
2160 min Summer	91.469	1.069	1.7	73.2	74.9	1273.0	Flood Risk
2880 min Summer	91.449	1.049	1.7	62.9	64.5	1236.3	Flood Risk
4320 min Summer	91.420	1.020	1.7	47.2	48.9	1184.3	Flood Risk
5760 min Summer	91.398	0.998	1.7	37.6	39.3	1143.9	Flood Risk
7200 min Summer	90.400	0.000	0.0	0.0	0.0	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Overflow Volume (m ³)	Time-Peak (mins)
15 min Summer	134.108	0.0	0.0	19
30 min Summer	87.724	0.0	22.0	34
60 min Summer	54.717	0.0	211.6	62
120 min Summer	32.728	0.0	420.3	120
180 min Summer	24.340	0.0	569.1	146
240 min Summer	19.832	0.0	693.2	170
360 min Summer	15.058	0.0	909.5	234
480 min Summer	12.409	0.0	1083.2	298
600 min Summer	10.635	0.0	1219.8	362
720 min Summer	9.343	0.0	1329.4	426
960 min Summer	7.519	0.0	1480.9	548
1440 min Summer	5.573	0.0	1723.1	782
2160 min Summer	4.100	0.0	1956.3	1144
2880 min Summer	3.278	0.0	2105.2	1496
4320 min Summer	2.366	0.0	2273.4	2208
5760 min Summer	1.880	0.0	2382.7	2944
7200 min Summer	-0.011	0.0	0.0	0

Cascade Summary of Results for Bioretention Swale F 100yr30%.SRCX

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Overflow (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
8640 min Summer	90.400	0.000	0.0	0.0	0.0	0.0	O K
10080 min Summer	90.400	0.000	0.0	0.0	0.0	0.0	O K
15 min Winter	91.105	0.705	1.2	0.0	1.2	679.4	O K
30 min Winter	91.245	0.845	1.4	2.5	4.0	887.5	O K
60 min Winter	91.364	0.964	1.6	26.9	28.5	1083.8	Flood Risk
120 min Winter	91.433	1.033	1.7	54.2	55.9	1207.7	Flood Risk
180 min Winter	91.452	1.052	1.7	64.7	66.4	1242.7	Flood Risk
240 min Winter	91.471	1.071	1.7	74.0	75.7	1277.0	Flood Risk
360 min Winter	91.495	1.095	1.7	83.8	85.5	1320.4	Flood Risk
480 min Winter	91.504	1.104	1.7	87.3	89.0	1335.8	Flood Risk
600 min Winter	91.503	1.103	1.7	87.1	88.8	1334.8	Flood Risk
720 min Winter	91.498	1.098	1.7	85.0	86.7	1325.7	Flood Risk
960 min Winter	91.482	1.082	1.7	78.3	80.0	1296.0	Flood Risk
1440 min Winter	91.457	1.057	1.7	67.2	68.8	1250.2	Flood Risk
2160 min Winter	91.430	1.030	1.7	52.9	54.6	1202.6	Flood Risk
2880 min Winter	91.412	1.012	1.7	42.9	44.6	1169.1	Flood Risk
4320 min Winter	91.378	0.978	1.6	31.3	33.0	1108.3	Flood Risk
5760 min Winter	91.357	0.957	1.6	24.9	26.5	1072.4	Flood Risk
7200 min Winter	90.400	0.000	0.0	0.0	0.0	0.0	O K
8640 min Winter	90.400	0.000	0.0	0.0	0.0	0.0	O K
10080 min Winter	90.400	0.000	0.0	0.0	0.0	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Overflow Volume (m³)	Time-Peak (mins)
8640 min Summer	-0.009	0.0	0.0	0
10080 min Summer	-0.008	0.0	0.0	0
15 min Winter	134.108	0.0	0.0	19
30 min Winter	87.724	0.0	22.1	34
60 min Winter	54.717	0.0	211.6	62
120 min Winter	32.728	0.0	420.3	116
180 min Winter	24.340	0.0	569.1	146
240 min Winter	19.832	0.0	693.1	180
360 min Winter	15.058	0.0	909.3	250
480 min Winter	12.409	0.0	1083.0	318
600 min Winter	10.635	0.0	1219.6	384
720 min Winter	9.343	0.0	1329.3	448
960 min Winter	7.519	0.0	1480.8	570
1440 min Winter	5.573	0.0	1723.2	808
2160 min Winter	4.100	0.0	1956.7	1168
2880 min Winter	3.278	0.0	2106.3	1532
4320 min Winter	2.366	0.0	2276.0	2248
5760 min Winter	1.880	0.0	2387.3	2944
7200 min Winter	-0.011	0.0	0.0	0
8640 min Winter	-0.009	0.0	0.0	0
10080 min Winter	-0.008	0.0	0.0	0

Herrington Consulting Ltd		Page 3
Unit 6 - Barham Business Park Elham Valley Road Barham CT4 6DQ	East Hill North Dane Way Bioretention Swale F	
Date 08/03/2019 File F-D cascade.CASX	Designed by LA Checked by SB	
Micro Drainage	Source Control 2017.1	

Cascade Rainfall Details for Bioretention Swale F 100yr30%.SRCX

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 577452 165243 TQ 77452 65243
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	1.000
Cv (Winter)	1.000
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.000

Time (mins)	Area
From: To: (ha)	
0 4	0.000

Time Area Diagram


Total Area (ha) 2.029

Time (mins)	Area
From: To: (ha)	
0 4	2.029

Time Area Diagram

Total Area (ha) 0.000

Time (mins)	Area
From: To: (ha)	
0 4	0.000

Herrington Consulting Ltd		Page 4
Unit 6 - Barham Business Park Elham Valley Road Barham CT4 6DQ	East Hill North Dane Way Bioretention Swale F	
Date 08/03/2019 File F-D cascade.CASX	Designed by LA Checked by SB	
Micro Drainage	Source Control 2017.1	

Cascade Model Details for Bioretention Swale F 100yr30%.SRCX

Storage is Online Cover Level (m) 91.600


Infiltration Basin Structure

Invert Level (m) 90.400 Safety Factor 5.0
 Infiltration Coefficient Base (m/hr) 0.01000 Porosity 1.00
 Infiltration Coefficient Side (m/hr) 0.01000

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	601.0	1.000	1803.0

Pipe Overflow Control

Diameter (m) 0.450 Entry Loss Coefficient 0.500
 Slope (1:X) 100.0 Coefficient of Contraction 0.600
 Length (m) 150.000 Upstream Invert Level (m) 91.200
 Roughness k (mm) 0.060


Herrington Consulting Ltd		Page 1
Unit 6 - Barham Business Park Elham Valley Road Barham CT4 6DQ	East Hill North Dane Way Bioretention Swale G	
Date 08/03/2019 File BIORETENTION SWALE G 10...	Designed by LA Checked by SB	
Micro Drainage	Source Control 2017.1	

Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 176 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m ³)	Status
15 min Summer	91.172	0.272	33.3	457.7	Flood Risk
30 min Summer	91.224	0.324	38.0	581.7	Flood Risk
60 min Summer	91.263	0.363	41.6	685.8	Flood Risk
120 min Summer	91.281	0.381	43.3	734.8	Flood Risk
180 min Summer	91.287	0.387	43.8	750.6	Flood Risk
240 min Summer	91.291	0.391	44.2	761.8	Flood Risk
360 min Summer	91.296	0.396	44.7	778.1	Flood Risk
480 min Summer	91.297	0.397	44.8	779.7	Flood Risk
600 min Summer	91.293	0.393	44.5	769.2	Flood Risk
720 min Summer	91.287	0.387	43.8	751.4	Flood Risk
960 min Summer	91.269	0.369	42.2	701.8	Flood Risk
1440 min Summer	91.239	0.339	39.4	620.2	Flood Risk
2160 min Summer	91.197	0.297	35.6	515.5	Flood Risk
2880 min Summer	91.160	0.260	32.3	431.2	Flood Risk
4320 min Summer	91.101	0.201	27.2	308.6	Flood Risk
5760 min Summer	91.058	0.158	23.6	229.3	O K
7200 min Summer	90.900	0.000	0.0	0.0	O K
8640 min Summer	90.900	0.000	0.0	0.0	O K
10080 min Summer	90.900	0.000	0.0	0.0	O K
15 min Winter	91.172	0.272	33.4	458.1	Flood Risk


Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Time-Peak (mins)
15 min Summer	144.424	0.0	18
30 min Summer	94.472	0.0	33
60 min Summer	58.926	0.0	62
120 min Summer	35.245	0.0	118
180 min Summer	26.213	0.0	146
240 min Summer	21.357	0.0	178
360 min Summer	16.217	0.0	248
480 min Summer	13.363	0.0	316
600 min Summer	11.453	0.0	386
720 min Summer	10.061	0.0	456
960 min Summer	8.097	0.0	588
1440 min Summer	6.002	0.0	852
2160 min Summer	4.415	0.0	1232
2880 min Summer	3.530	0.0	1612
4320 min Summer	2.548	0.0	2336
5760 min Summer	2.025	0.0	3056
7200 min Summer	-0.012	0.0	0
8640 min Summer	-0.010	0.0	0
10080 min Summer	-0.008	0.0	0
15 min Winter	144.424	0.0	18

Herrington Consulting Ltd		Page 2
Unit 6 - Barham Business Park Elham Valley Road Barham CT4 6DQ	East Hill North Dane Way Bioretention Swale G	
Date 08/03/2019 File BIORETENTION SWALE G 10...	Designed by LA Checked by SB	
Micro Drainage	Source Control 2017.1	

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m ³)	Status
30 min Winter	91.224	0.324	38.1	582.9	Flood Risk
60 min Winter	91.264	0.364	41.7	688.1	Flood Risk
120 min Winter	91.283	0.383	43.5	741.2	Flood Risk
180 min Winter	91.287	0.387	43.9	751.5	Flood Risk
240 min Winter	91.290	0.390	44.1	760.0	Flood Risk
360 min Winter	91.292	0.392	44.4	766.1	Flood Risk
480 min Winter	91.289	0.389	44.0	755.8	Flood Risk
600 min Winter	91.281	0.381	43.3	733.3	Flood Risk
720 min Winter	91.270	0.370	42.3	704.5	Flood Risk
960 min Winter	91.245	0.345	39.9	636.2	Flood Risk
1440 min Winter	91.202	0.302	36.0	527.0	Flood Risk
2160 min Winter	91.146	0.246	31.0	400.0	Flood Risk
2880 min Winter	91.100	0.200	27.1	307.2	Flood Risk
4320 min Winter	91.033	0.133	21.5	185.9	O K
5760 min Winter	90.988	0.088	17.8	115.9	O K
7200 min Winter	90.900	0.000	0.0	0.0	O K
8640 min Winter	90.900	0.000	0.0	0.0	O K
10080 min Winter	90.900	0.000	0.0	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Time-Peak (mins)
30 min Winter	94.472	0.0	32
60 min Winter	58.926	0.0	60
120 min Winter	35.245	0.0	116
180 min Winter	26.213	0.0	150
240 min Winter	21.357	0.0	186
360 min Winter	16.217	0.0	264
480 min Winter	13.363	0.0	340
600 min Winter	11.453	0.0	414
720 min Winter	10.061	0.0	486
960 min Winter	8.097	0.0	626
1440 min Winter	6.002	0.0	896
2160 min Winter	4.415	0.0	1280
2880 min Winter	3.530	0.0	1648
4320 min Winter	2.548	0.0	2380
5760 min Winter	2.025	0.0	3104
7200 min Winter	-0.012	0.0	0
8640 min Winter	-0.010	0.0	0
10080 min Winter	-0.008	0.0	0

Herrington Consulting Ltd		Page 3
Unit 6 - Barham Business Park Elham Valley Road Barham CT4 6DQ	East Hill North Dane Way Bioretention Swale G	
Date 08/03/2019 File BIORETENTION SWALE G 10...	Designed by LA Checked by SB	
Micro Drainage	Source Control 2017.1	

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 577452 165243 TQ 77452 65243
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	1.000
Cv (Winter)	1.000
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.000

Time (mins)	Area
From: To:	(ha)
0	4 0.000

Time Area Diagram


Total Area (ha) 1.330

Time (mins)	Area
From: To:	(ha)
0	4 1.330

Time Area Diagram

Total Area (ha) 0.000

Time (mins)	Area
From: To:	(ha)
0	4 0.000

Herrington Consulting Ltd		Page 4
Unit 6 - Barham Business Park Elham Valley Road Barham CT4 6DQ	East Hill North Dane Way Bioretention Swale G	
Date 08/03/2019 File BIORETENTION SWALE G 10...	Designed by LA Checked by SB	
Micro Drainage	Source Control 2017.1	


Model Details

Storage is Online Cover Level (m) 91.400

Infiltration Basin Structure

Invert Level (m) 90.900 Safety Factor 5.0
 Infiltration Coefficient Base (m/hr) 0.17000 Porosity 1.00
 Infiltration Coefficient Side (m/hr) 0.17000

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	1160.0	0.500	3481.0


Herrington Consulting Ltd		Page 1
Unit 6 - Barham Business Park Elham Valley Road Barham CT4 6DQ	East Hill North Dane Way Bioretention Swale G	
Date 08/03/2019 File BIORETENTION SWALE G 10...	Designed by LA Checked by SB	
Micro Drainage	Source Control 2017.1	

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 166 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m ³)	Status
15 min Summer	91.157	0.257	32.0	424.4	Flood Risk
30 min Summer	91.206	0.306	36.4	538.7	Flood Risk
60 min Summer	91.244	0.344	39.9	634.0	Flood Risk
120 min Summer	91.260	0.360	41.4	676.8	Flood Risk
180 min Summer	91.265	0.365	41.8	690.8	Flood Risk
240 min Summer	91.269	0.369	42.2	700.4	Flood Risk
360 min Summer	91.274	0.374	42.6	713.8	Flood Risk
480 min Summer	91.274	0.374	42.6	713.7	Flood Risk
600 min Summer	91.270	0.370	42.3	702.7	Flood Risk
720 min Summer	91.263	0.363	41.6	685.3	Flood Risk
960 min Summer	91.246	0.346	40.0	638.4	Flood Risk
1440 min Summer	91.216	0.316	37.3	561.4	Flood Risk
2160 min Summer	91.174	0.274	33.6	463.4	Flood Risk
2880 min Summer	91.139	0.239	30.4	385.0	Flood Risk
4320 min Summer	91.082	0.182	25.5	271.9	O K
5760 min Summer	91.041	0.141	22.1	199.2	O K
7200 min Summer	90.900	0.000	0.0	0.0	O K
8640 min Summer	90.900	0.000	0.0	0.0	O K
10080 min Summer	90.900	0.000	0.0	0.0	O K
15 min Winter	91.157	0.257	32.1	424.7	Flood Risk


Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Time-Peak (mins)
15 min Summer	134.108	0.0	18
30 min Summer	87.724	0.0	33
60 min Summer	54.717	0.0	62
120 min Summer	32.728	0.0	116
180 min Summer	24.340	0.0	144
240 min Summer	19.832	0.0	176
360 min Summer	15.058	0.0	246
480 min Summer	12.409	0.0	316
600 min Summer	10.635	0.0	384
720 min Summer	9.343	0.0	454
960 min Summer	7.519	0.0	588
1440 min Summer	5.573	0.0	852
2160 min Summer	4.100	0.0	1232
2880 min Summer	3.278	0.0	1588
4320 min Summer	2.366	0.0	2332
5760 min Summer	1.880	0.0	3056
7200 min Summer	-0.011	0.0	0
8640 min Summer	-0.009	0.0	0
10080 min Summer	-0.008	0.0	0
15 min Winter	134.108	0.0	18

Herrington Consulting Ltd		Page 2
Unit 6 - Barham Business Park Elham Valley Road Barham CT4 6DQ	East Hill North Dane Way Bioretention Swale G	
Date 08/03/2019 File BIORETENTION SWALE G 10...	Designed by LA Checked by SB	
Micro Drainage	Source Control 2017.1	

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m ³)	Status
30 min Winter	91.207	0.307	36.5	539.9	Flood Risk
60 min Winter	91.245	0.345	39.9	636.2	Flood Risk
120 min Winter	91.262	0.362	41.6	682.9	Flood Risk
180 min Winter	91.266	0.366	41.9	691.5	Flood Risk
240 min Winter	91.268	0.368	42.1	698.2	Flood Risk
360 min Winter	91.269	0.369	42.2	701.5	Flood Risk
480 min Winter	91.265	0.365	41.8	690.1	Flood Risk
600 min Winter	91.257	0.357	41.0	667.8	Flood Risk
720 min Winter	91.246	0.346	40.1	640.1	Flood Risk
960 min Winter	91.221	0.321	37.8	575.5	Flood Risk
1440 min Winter	91.179	0.279	34.0	473.0	Flood Risk
2160 min Winter	91.124	0.224	29.2	355.0	Flood Risk
2880 min Winter	91.080	0.180	25.4	269.5	O K
4320 min Winter	91.016	0.116	20.1	158.5	O K
5760 min Winter	90.974	0.074	16.7	95.3	O K
7200 min Winter	90.900	0.000	0.0	0.0	O K
8640 min Winter	90.900	0.000	0.0	0.0	O K
10080 min Winter	90.900	0.000	0.0	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Time-Peak (mins)
30 min Winter	87.724	0.0	32
60 min Winter	54.717	0.0	60
120 min Winter	32.728	0.0	116
180 min Winter	24.340	0.0	148
240 min Winter	19.832	0.0	186
360 min Winter	15.058	0.0	262
480 min Winter	12.409	0.0	338
600 min Winter	10.635	0.0	412
720 min Winter	9.343	0.0	484
960 min Winter	7.519	0.0	626
1440 min Winter	5.573	0.0	894
2160 min Winter	4.100	0.0	1276
2880 min Winter	3.278	0.0	1644
4320 min Winter	2.366	0.0	2376
5760 min Winter	1.880	0.0	3064
7200 min Winter	-0.011	0.0	0
8640 min Winter	-0.009	0.0	0
10080 min Winter	-0.008	0.0	0

Herrington Consulting Ltd		Page 3
Unit 6 - Barham Business Park Elham Valley Road Barham CT4 6DQ	East Hill North Dane Way Bioretention Swale G	
Date 08/03/2019 File BIORETENTION SWALE G 10...	Designed by LA Checked by SB	
Micro Drainage	Source Control 2017.1	

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 577452 165243 TQ 77452 65243
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	1.000
Cv (Winter)	1.000
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.000

Time (mins)	Area
From: To:	(ha)
0	4 0.000

Time Area Diagram


Total Area (ha) 1.330

Time (mins)	Area
From: To:	(ha)
0	4 1.330

Time Area Diagram

Total Area (ha) 0.000

Time (mins)	Area
From: To:	(ha)
0	4 0.000

Herrington Consulting Ltd		Page 4
Unit 6 - Barham Business Park Elham Valley Road Barham CT4 6DQ	East Hill North Dane Way Bioretention Swale G	
Date 08/03/2019 File BIORETENTION SWALE G 10...	Designed by LA Checked by SB	
Micro Drainage	Source Control 2017.1	


Model Details

Storage is Online Cover Level (m) 91.400

Infiltration Basin Structure

Invert Level (m) 90.900 Safety Factor 5.0
 Infiltration Coefficient Base (m/hr) 0.17000 Porosity 1.00
 Infiltration Coefficient Side (m/hr) 0.17000

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	1160.0	0.500	3481.0


Herrington Consulting Ltd		Page 1
Unit 6 - Barham Business Park Elham Valley Road Barham CT4 6DQ	East Hill North Dane Way Bioretention Swale H	
Date 08/03/2019 File BIORETENTION SWALE H 10...	Designed by LA Checked by SB	
Micro Drainage	Source Control 2017.1	

Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 63 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m ³)	Status
15 min Summer	91.001	0.101	8.7	45.0	O K
30 min Summer	91.022	0.122	9.3	55.2	O K
60 min Summer	91.033	0.133	9.5	60.7	O K
120 min Summer	91.034	0.134	9.5	60.9	O K
180 min Summer	91.030	0.130	9.5	59.4	O K
240 min Summer	91.026	0.126	9.4	57.4	O K
360 min Summer	91.019	0.119	9.2	53.5	O K
480 min Summer	91.010	0.110	9.0	49.4	O K
600 min Summer	91.001	0.101	8.7	45.1	O K
720 min Summer	90.993	0.093	8.5	40.9	O K
960 min Summer	90.976	0.076	8.1	33.2	O K
1440 min Summer	90.955	0.055	7.6	23.4	O K
2160 min Summer	90.942	0.042	6.2	17.8	O K
2880 min Summer	90.935	0.035	5.1	14.8	O K
4320 min Summer	90.927	0.027	3.8	11.1	O K
5760 min Summer	90.922	0.022	3.1	9.0	O K
7200 min Summer	90.900	0.000	0.0	0.0	O K
8640 min Summer	90.900	0.000	0.0	0.0	O K
10080 min Summer	90.900	0.000	0.0	0.0	O K
15 min Winter	91.001	0.101	8.7	45.0	O K


Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Time-Peak (mins)
15 min Summer	144.424	0.0	17
30 min Summer	94.472	0.0	31
60 min Summer	58.926	0.0	52
120 min Summer	35.245	0.0	86
180 min Summer	26.213	0.0	120
240 min Summer	21.357	0.0	154
360 min Summer	16.217	0.0	222
480 min Summer	13.363	0.0	288
600 min Summer	11.453	0.0	350
720 min Summer	10.061	0.0	412
960 min Summer	8.097	0.0	530
1440 min Summer	6.002	0.0	764
2160 min Summer	4.415	0.0	1108
2880 min Summer	3.530	0.0	1472
4320 min Summer	2.548	0.0	2204
5760 min Summer	2.025	0.0	2936
7200 min Summer	-0.012	0.0	0
8640 min Summer	-0.010	0.0	0
10080 min Summer	-0.008	0.0	0
15 min Winter	144.424	0.0	17

Herrington Consulting Ltd		Page 2
Unit 6 - Barham Business Park Elham Valley Road Barham CT4 6DQ	East Hill North Dane Way Bioretention Swale H	
Date 08/03/2019 File BIORETENTION SWALE H 10...	Designed by LA Checked by SB	
Micro Drainage	Source Control 2017.1	

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m ³)	Status
30 min Winter	91.022	0.122	9.3	55.3	O K
60 min Winter	91.033	0.133	9.5	60.7	O K
120 min Winter	91.031	0.131	9.5	59.6	O K
180 min Winter	91.025	0.125	9.3	56.5	O K
240 min Winter	91.017	0.117	9.1	52.8	O K
360 min Winter	91.004	0.104	8.8	46.2	O K
480 min Winter	90.990	0.090	8.5	39.9	O K
600 min Winter	90.978	0.078	8.1	33.9	O K
720 min Winter	90.966	0.066	7.9	28.7	O K
960 min Winter	90.950	0.050	7.4	21.3	O K
1440 min Winter	90.939	0.039	5.7	16.5	O K
2160 min Winter	90.930	0.030	4.3	12.4	O K
2880 min Winter	90.924	0.024	3.4	10.1	O K
4320 min Winter	90.918	0.018	2.5	7.4	O K
5760 min Winter	90.914	0.014	2.0	5.9	O K
7200 min Winter	90.900	0.000	0.0	0.0	O K
8640 min Winter	90.900	0.000	0.0	0.0	O K
10080 min Winter	90.900	0.000	0.0	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Time-Peak (mins)
30 min Winter	94.472	0.0	31
60 min Winter	58.926	0.0	56
120 min Winter	35.245	0.0	90
180 min Winter	26.213	0.0	128
240 min Winter	21.357	0.0	164
360 min Winter	16.217	0.0	234
480 min Winter	13.363	0.0	300
600 min Winter	11.453	0.0	362
720 min Winter	10.061	0.0	420
960 min Winter	8.097	0.0	520
1440 min Winter	6.002	0.0	764
2160 min Winter	4.415	0.0	1124
2880 min Winter	3.530	0.0	1472
4320 min Winter	2.548	0.0	2204
5760 min Winter	2.025	0.0	2936
7200 min Winter	-0.012	0.0	0
8640 min Winter	-0.010	0.0	0
10080 min Winter	-0.008	0.0	0

Herrington Consulting Ltd		Page 3
Unit 6 - Barham Business Park Elham Valley Road Barham CT4 6DQ	East Hill North Dane Way Bioretention Swale H	
Date 08/03/2019 File BIORETENTION SWALE H 10...	Designed by LA Checked by SB	
Micro Drainage	Source Control 2017.1	

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 577452 165243 TQ 77452 65243
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	1.000
Cv (Winter)	1.000
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.000

Time (mins)	Area
From: To:	(ha)
0	4 0.000

Time Area Diagram


Total Area (ha) 0.140

Time (mins)	Area
From: To:	(ha)
0	4 0.140

Time Area Diagram

Total Area (ha) 0.000

Time (mins)	Area
From: To:	(ha)
0	4 0.000

Herrington Consulting Ltd		Page 4
Unit 6 - Barham Business Park Elham Valley Road Barham CT4 6DQ	East Hill North Dane Way Bioretention Swale H	
Date 08/03/2019 File BIORETENTION SWALE H 10...	Designed by LA Checked by SB	
Micro Drainage	Source Control 2017.1	


Model Details

Storage is Online Cover Level (m) 91.400

Infiltration Basin Structure

Invert Level (m) 90.900 Safety Factor 5.0
 Infiltration Coefficient Base (m/hr) 0.27400 Porosity 1.00
 Infiltration Coefficient Side (m/hr) 0.27400

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	410.0	0.900	1232.0


Herrington Consulting Ltd		Page 1
Unit 6 - Barham Business Park Elham Valley Road Barham CT4 6DQ	East Hill North Dane Way Bioretention Swale H	
Date 08/03/2019 File BIORETENTION SWALE H 10...	Designed by LA Checked by SB	
Micro Drainage	Source Control 2017.1	

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 60 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m ³)	Status
15 min Summer	90.994	0.094	8.6	41.6	O K
30 min Summer	91.013	0.113	9.0	50.8	O K
60 min Summer	91.023	0.123	9.3	55.7	O K
120 min Summer	91.023	0.123	9.3	55.8	O K
180 min Summer	91.020	0.120	9.2	54.2	O K
240 min Summer	91.016	0.116	9.1	52.2	O K
360 min Summer	91.008	0.108	8.9	48.3	O K
480 min Summer	91.000	0.100	8.7	44.3	O K
600 min Summer	90.991	0.091	8.5	40.2	O K
720 min Summer	90.983	0.083	8.3	36.3	O K
960 min Summer	90.968	0.068	7.9	29.3	O K
1440 min Summer	90.950	0.050	7.4	21.2	O K
2160 min Summer	90.939	0.039	5.7	16.6	O K
2880 min Summer	90.933	0.033	4.7	13.8	O K
4320 min Summer	90.925	0.025	3.5	10.4	O K
5760 min Summer	90.920	0.020	2.9	8.4	O K
7200 min Summer	90.900	0.000	0.0	0.0	O K
8640 min Summer	90.900	0.000	0.0	0.0	O K
10080 min Summer	90.900	0.000	0.0	0.0	O K
15 min Winter	90.994	0.094	8.6	41.6	O K


Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Time-Peak (mins)
15 min Summer	134.108	0.0	17
30 min Summer	87.724	0.0	31
60 min Summer	54.717	0.0	52
120 min Summer	32.728	0.0	84
180 min Summer	24.340	0.0	118
240 min Summer	19.832	0.0	154
360 min Summer	15.058	0.0	220
480 min Summer	12.409	0.0	284
600 min Summer	10.635	0.0	348
720 min Summer	9.343	0.0	410
960 min Summer	7.519	0.0	528
1440 min Summer	5.573	0.0	750
2160 min Summer	4.100	0.0	1108
2880 min Summer	3.278	0.0	1472
4320 min Summer	2.366	0.0	2204
5760 min Summer	1.880	0.0	2936
7200 min Summer	-0.011	0.0	0
8640 min Summer	-0.009	0.0	0
10080 min Summer	-0.008	0.0	0
15 min Winter	134.108	0.0	17

Herrington Consulting Ltd		Page 2
Unit 6 - Barham Business Park Elham Valley Road Barham CT4 6DQ	East Hill North Dane Way Bioretention Swale H	
Date 08/03/2019 File BIORETENTION SWALE H 10...	Designed by LA Checked by SB	
Micro Drainage	Source Control 2017.1	

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m ³)	Status
30 min Winter	91.013	0.113	9.0	50.9	O K
60 min Winter	91.023	0.123	9.3	55.6	O K
120 min Winter	91.020	0.120	9.2	54.4	O K
180 min Winter	91.014	0.114	9.0	51.1	O K
240 min Winter	91.007	0.107	8.9	47.6	O K
360 min Winter	90.993	0.093	8.5	41.1	O K
480 min Winter	90.980	0.080	8.2	35.1	O K
600 min Winter	90.968	0.068	7.9	29.7	O K
720 min Winter	90.958	0.058	7.7	25.0	O K
960 min Winter	90.947	0.047	6.9	19.8	O K
1440 min Winter	90.936	0.036	5.3	15.3	O K
2160 min Winter	90.928	0.028	4.0	11.6	O K
2880 min Winter	90.923	0.023	3.2	9.4	O K
4320 min Winter	90.917	0.017	2.3	6.9	O K
5760 min Winter	90.913	0.013	1.8	5.5	O K
7200 min Winter	90.900	0.000	0.0	0.0	O K
8640 min Winter	90.900	0.000	0.0	0.0	O K
10080 min Winter	90.900	0.000	0.0	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Time-Peak (mins)
30 min Winter	87.724	0.0	31
60 min Winter	54.717	0.0	56
120 min Winter	32.728	0.0	90
180 min Winter	24.340	0.0	128
240 min Winter	19.832	0.0	162
360 min Winter	15.058	0.0	232
480 min Winter	12.409	0.0	296
600 min Winter	10.635	0.0	356
720 min Winter	9.343	0.0	412
960 min Winter	7.519	0.0	520
1440 min Winter	5.573	0.0	764
2160 min Winter	4.100	0.0	1124
2880 min Winter	3.278	0.0	1468
4320 min Winter	2.366	0.0	2168
5760 min Winter	1.880	0.0	2936
7200 min Winter	-0.011	0.0	0
8640 min Winter	-0.009	0.0	0
10080 min Winter	-0.008	0.0	0

Herrington Consulting Ltd		Page 3
Unit 6 - Barham Business Park Elham Valley Road Barham CT4 6DQ	East Hill North Dane Way Bioretention Swale H	
Date 08/03/2019 File BIORETENTION SWALE H 10...	Designed by LA Checked by SB	
Micro Drainage	Source Control 2017.1	

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 577452 165243 TQ 77452 65243
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	1.000
Cv (Winter)	1.000
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.000

Time (mins)	Area
From: To:	(ha)
0	4 0.000

Time Area Diagram


Total Area (ha) 0.140

Time (mins)	Area
From: To:	(ha)
0	4 0.140

Time Area Diagram

Total Area (ha) 0.000

Time (mins)	Area
From: To:	(ha)
0	4 0.000

Herrington Consulting Ltd		Page 4
Unit 6 - Barham Business Park Elham Valley Road Barham CT4 6DQ	East Hill North Dane Way Bioretention Swale H	
Date 08/03/2019 File BIORETENTION SWALE H 10...	Designed by LA Checked by SB	
Micro Drainage	Source Control 2017.1	

Model Details

Storage is Online Cover Level (m) 91.400

Infiltration Basin Structure

Invert Level (m) 90.900 Safety Factor 5.0
 Infiltration Coefficient Base (m/hr) 0.27400 Porosity 1.00
 Infiltration Coefficient Side (m/hr) 0.27400

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	410.0	0.900	1232.0