

Technical Note

Microdrainage Simulation Results

Pond 17

10yr+30%CC

AECOM		Page 1
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 17 - 10yr+30%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Summary of Results for Arborfield Hazebrouke SuDS - Pond 17 10yr +30%CC FEH v2.srcx

Upstream Structures

Outflow To

Overflow To

(None) Arborfield Hazebrouke SuDS - Pond 16 10yr +30%CC FEH v3.srcx

(None)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	55.128	0.393	11.0	201.4	O K
30 min Summer	55.167	0.432	11.0	226.4	O K
60 min Summer	55.200	0.465	11.0	248.4	O K
120 min Summer	55.219	0.484	11.0	261.0	O K
180 min Summer	55.217	0.482	11.0	259.2	O K
240 min Summer	55.208	0.473	11.0	253.4	O K
360 min Summer	55.190	0.455	11.0	241.4	O K
480 min Summer	55.171	0.436	11.0	229.1	O K
600 min Summer	55.152	0.417	11.0	216.7	O K
720 min Summer	55.133	0.398	11.0	204.6	O K
960 min Summer	55.095	0.360	11.0	181.2	O K
1440 min Summer	55.028	0.293	11.0	141.1	O K
2160 min Summer	54.948	0.213	10.8	97.3	O K
2880 min Summer	54.894	0.159	10.4	69.7	O K
4320 min Summer	54.849	0.114	9.2	48.3	O K
5760 min Summer	54.828	0.093	7.8	39.0	O K
7200 min Summer	54.815	0.080	6.7	33.3	O K
8640 min Summer	54.806	0.071	6.0	29.3	O K
10080 min Summer	54.799	0.064	5.4	26.2	O K
15 min Winter	55.168	0.433	11.0	226.9	O K
30 min Winter	55.211	0.476	11.0	255.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	109.733	0.0	213.4	25
30 min Summer	62.937	0.0	244.8	39
60 min Summer	36.098	0.0	280.9	68
120 min Summer	20.704	0.0	322.2	124
180 min Summer	14.956	0.0	349.1	180
240 min Summer	11.875	0.0	369.5	208
360 min Summer	8.578	0.0	400.5	268
480 min Summer	6.811	0.0	424.0	334
600 min Summer	5.695	0.0	443.2	402
720 min Summer	4.920	0.0	459.4	468
960 min Summer	3.900	0.0	485.6	602
1440 min Summer	2.810	0.0	524.8	854
2160 min Summer	2.025	0.0	567.4	1212
2880 min Summer	1.605	0.0	599.5	1540
4320 min Summer	1.191	0.0	667.4	2248
5760 min Summer	0.964	0.0	720.0	2944
7200 min Summer	0.818	0.0	763.7	3680
8640 min Summer	0.715	0.0	801.4	4408
10080 min Summer	0.638	0.0	834.7	5136
15 min Winter	109.733	0.0	239.0	25
30 min Winter	62.937	0.0	274.2	39

AECOM		Page 2
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 17 - 10yr+30%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Summary of Results for Arborfield Hazebrouke SuDS - Pond 17 10yr +30%CC FEH v2.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	55.249	0.514	11.0	281.8	O K
120 min Winter	55.274	0.539	11.0	299.4	O K
180 min Winter	55.276	0.541	11.0	300.6	O K
240 min Winter	55.268	0.533	11.0	294.9	O K
360 min Winter	55.244	0.509	11.0	277.8	O K
480 min Winter	55.219	0.484	11.0	260.9	O K
600 min Winter	55.192	0.457	11.0	243.0	O K
720 min Winter	55.165	0.430	11.0	224.9	O K
960 min Winter	55.109	0.374	11.0	189.4	O K
1440 min Winter	55.008	0.273	10.9	129.7	O K
2160 min Winter	54.900	0.165	10.5	72.5	O K
2880 min Winter	54.852	0.117	9.4	49.8	O K
4320 min Winter	54.821	0.086	7.2	35.5	O K
5760 min Winter	54.805	0.070	5.8	28.7	O K
7200 min Winter	54.795	0.060	5.0	24.4	O K
8640 min Winter	54.788	0.053	4.4	21.3	O K
10080 min Winter	54.782	0.047	3.9	18.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
60 min Winter	36.098	0.0	314.6	66
120 min Winter	20.704	0.0	360.8	122
180 min Winter	14.956	0.0	391.0	178
240 min Winter	11.875	0.0	414.0	232
360 min Winter	8.578	0.0	448.5	290
480 min Winter	6.811	0.0	474.9	364
600 min Winter	5.695	0.0	496.3	438
720 min Winter	4.920	0.0	514.6	512
960 min Winter	3.900	0.0	543.8	650
1440 min Winter	2.810	0.0	587.8	902
2160 min Winter	2.025	0.0	635.5	1232
2880 min Winter	1.605	0.0	671.5	1536
4320 min Winter	1.191	0.0	747.4	2248
5760 min Winter	0.964	0.0	806.5	2952
7200 min Winter	0.818	0.0	855.4	3680
8640 min Winter	0.715	0.0	897.6	4408
10080 min Winter	0.638	0.0	934.9	5144

AECOM		Page 3
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 17 - 10yr+30%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Rainfall Details for Arborfield Hazebrouke SuDS - Pond 17 10yr +30%CC FEH v2.srcx

Rainfall Model	FEH	F (1km)	2.642
Return Period (years)	10	Summer Storms	Yes
FEH Rainfall Version	1999	Winter Storms	Yes
Site Location	GB 476950 165250 SU 76950 65250	Cv (Summer)	0.750
C (1km)	-0.028	Cv (Winter)	0.840
D1 (1km)	0.261	Shortest Storm (mins)	15
D2 (1km)	0.255	Longest Storm (mins)	10080
D3 (1km)	0.327	Climate Change %	+30
E (1km)	0.303		

Time Area Diagram

Total Area (ha) 1.038

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
From:	To:	From:	To:	From:	To:
0	4	0.350	4	8	0.350
				8	12
					0.338

Time Area Diagram

Total Area (ha) 0.000

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

AECOM		Page 4
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 17 - 10yr+30%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Model Details for Arborfield Hazebrouke SuDS - Pond 17 10yr +30%CC FEH v2.srcx

Storage is Online Cover Level (m) 56.100

Tank or Pond Structure

Invert Level (m) 54.735

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	390.0	0.300	580.0	0.600	740.0	0.900	890.0	1.200	1040.0
0.100	450.0	0.400	630.0	0.700	790.0	1.000	940.0	1.300	1070.0
0.200	520.0	0.500	690.0	0.800	840.0	1.100	990.0	1.301	0.0

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0151-1100-1100-1100
Design Head (m)	1.100
Design Flow (l/s)	11.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	151
Invert Level (m)	54.700
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.100	11.0	Kick-Flo®	0.732	9.1
Flush-Flo™	0.334	11.0	Mean Flow over Head Range	-	9.5

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	5.4	0.800	9.5	2.000	14.6	4.000	20.3	7.000	26.6
0.200	10.5	1.000	10.5	2.200	15.3	4.500	21.5	7.500	27.5
0.300	10.9	1.200	11.5	2.400	15.9	5.000	22.6	8.000	28.4
0.400	10.9	1.400	12.3	2.600	16.5	5.500	23.7	8.500	29.2
0.500	10.7	1.600	13.1	3.000	17.7	6.000	24.7	9.000	30.0
0.600	10.3	1.800	13.9	3.500	19.1	6.500	25.7	9.500	30.8

Technical Note

Microdrainage Simulation Results

Pond 16

10yr+30%CC

AECOM		Page 1
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 16 - 10yr+30%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Summary of Results for Arborfield Hazebrouke SuDS - Pond 16 10yr +30%CC FEH v3.srcx

**Upstream
Structures**

Outflow To

Arborfield Hazebrouke SuDS - Pond 17 10yr +30%CC FEH v2.srcx Arborfield Hazebrouke SuDS - Pond 19c1 10yr +30%CC FEH

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	54.337	0.537	34.8	361.7	O K
30 min Summer	54.395	0.595	34.8	405.1	O K
60 min Summer	54.444	0.644	34.8	441.9	O K
120 min Summer	54.465	0.665	34.8	458.1	O K
180 min Summer	54.454	0.654	34.8	450.2	O K
240 min Summer	54.441	0.641	34.8	439.8	O K
360 min Summer	54.411	0.611	34.8	416.7	O K
480 min Summer	54.377	0.577	34.8	391.8	O K
600 min Summer	54.344	0.544	34.8	367.0	O K
720 min Summer	54.311	0.511	34.8	343.0	O K
960 min Summer	54.250	0.450	34.8	298.0	O K
1440 min Summer	54.149	0.349	34.5	225.7	O K
2160 min Summer	54.047	0.247	33.3	155.9	O K
2880 min Summer	53.993	0.193	31.8	120.3	O K
4320 min Summer	53.951	0.151	25.9	93.2	O K
5760 min Summer	53.927	0.127	21.9	77.9	O K
7200 min Summer	53.910	0.110	18.9	67.4	O K
8640 min Summer	53.898	0.098	16.7	59.7	O K
10080 min Summer	53.888	0.088	15.0	53.7	O K
15 min Winter	54.399	0.599	34.8	407.7	O K
30 min Winter	54.464	0.664	34.8	457.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	109.733	0.0	599.7	25
30 min Summer	62.937	0.0	688.0	39
60 min Summer	36.098	0.0	789.2	66
120 min Summer	20.704	0.0	905.3	122
180 min Summer	14.956	0.0	980.9	160
240 min Summer	11.875	0.0	1038.5	190
360 min Summer	8.578	0.0	1125.5	254
480 min Summer	6.811	0.0	1191.4	322
600 min Summer	5.695	0.0	1245.4	388
720 min Summer	4.920	0.0	1291.2	456
960 min Summer	3.900	0.0	1364.5	584
1440 min Summer	2.810	0.0	1475.0	830
2160 min Summer	2.025	0.0	1594.5	1172
2880 min Summer	1.605	0.0	1684.8	1504
4320 min Summer	1.191	0.0	1875.4	2216
5760 min Summer	0.964	0.0	2023.5	2944
7200 min Summer	0.818	0.0	2146.2	3680
8640 min Summer	0.715	0.0	2252.1	4408
10080 min Summer	0.638	0.0	2345.7	5144
15 min Winter	109.733	0.0	671.7	25
30 min Winter	62.937	0.0	770.5	39

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Midpoint Alencon Link Basingstoke, RG21 7PP	Arborfield - Hazebrouke SuDS Attenuation Assessment Pond 16 - 10yr+30%CC	
Date 23/08/2022 File Hazebrouck Cascade - V2E Tan...	Designed by AB Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Summary of Results for Arborfield Hazebrouke SuDS - Pond 16 10yr +30%CC FEH v3.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	54.520	0.720	34.8	501.9	O K
120 min Winter	54.550	0.750	34.8	526.3	O K
180 min Winter	54.543	0.743	34.8	521.1	O K
240 min Winter	54.523	0.723	34.8	504.5	O K
360 min Winter	54.483	0.683	34.8	472.8	O K
480 min Winter	54.437	0.637	34.8	436.5	O K
600 min Winter	54.387	0.587	34.8	399.1	O K
720 min Winter	54.338	0.538	34.8	362.7	O K
960 min Winter	54.246	0.446	34.8	295.1	O K
1440 min Winter	54.102	0.302	34.1	193.5	O K
2160 min Winter	53.991	0.191	31.5	119.0	O K
2880 min Winter	53.955	0.155	26.4	95.4	O K
4320 min Winter	53.918	0.118	20.2	71.8	O K
5760 min Winter	53.896	0.096	16.4	58.6	O K
7200 min Winter	53.883	0.083	14.0	50.0	O K
8640 min Winter	53.872	0.072	12.3	43.6	O K
10080 min Winter	53.864	0.064	10.9	38.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
60 min Winter	36.098	0.0	884.0	66
120 min Winter	20.704	0.0	1014.2	122
180 min Winter	14.956	0.0	1098.9	176
240 min Winter	11.875	0.0	1163.4	210
360 min Winter	8.578	0.0	1260.5	276
480 min Winter	6.811	0.0	1334.5	352
600 min Winter	5.695	0.0	1394.9	424
720 min Winter	4.920	0.0	1446.2	492
960 min Winter	3.900	0.0	1528.4	624
1440 min Winter	2.810	0.0	1652.4	862
2160 min Winter	2.025	0.0	1786.0	1168
2880 min Winter	1.605	0.0	1887.1	1532
4320 min Winter	1.191	0.0	2100.5	2248
5760 min Winter	0.964	0.0	2266.3	2952
7200 min Winter	0.818	0.0	2403.9	3672
8640 min Winter	0.715	0.0	2522.4	4408
10080 min Winter	0.638	0.0	2627.2	5144

AECOM		Page 3
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 16 - 10yr+30%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Rainfall Details for Arborfield Hazebrouke SuDS - Pond 16 10yr +30%CC FEH v3.srcx

Rainfall Model	FEH	F (1km)	2.642
Return Period (years)	10	Summer Storms	Yes
FEH Rainfall Version	1999	Winter Storms	Yes
Site Location	GB 476950 165250 SU 76950 65250	Cv (Summer)	0.750
C (1km)	-0.028	Cv (Winter)	0.840
D1 (1km)	0.261	Shortest Storm (mins)	15
D2 (1km)	0.255	Longest Storm (mins)	10080
D3 (1km)	0.327	Climate Change %	+30
E (1km)	0.303		

Time Area Diagram

Total Area (ha) 1.879

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
From:	To:	From:	To:	From:	To:
0	4	0.627	4	8	0.626
				8	12
					0.626

Time Area Diagram

Total Area (ha) 0.000

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

AECOM		Page 4
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 16 - 10yr+30%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Model Details for Arborfield Hazebrouke SuDS - Pond 16 10yr +30%CC FEH v3.srcx

Storage is Online Cover Level (m) 55.650

Tank or Pond Structure

Invert Level (m) 53.800

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	593.6	0.600	748.0	1.200	994.7	1.800	1225.9
0.200	654.9	0.800	851.9	1.400	1069.5	1.900	1225.9
0.400	718.3	1.000	922.2	1.600	1146.6	1.901	0.0

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0245-3480-1605-3480
Design Head (m)	1.605
Design Flow (l/s)	34.8
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	245
Invert Level (m)	53.745
Minimum Outlet Pipe Diameter (mm)	300
Suggested Manhole Diameter (mm)	1800

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.605	34.8	Kick-Flo®	1.088	28.9
Flush-Flo™	0.497	34.8	Mean Flow over Head Range	-	29.8

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	8.0	0.800	33.6	2.000	38.7	4.000	54.0	7.000	70.9
0.200	24.9	1.000	31.2	2.200	40.5	4.500	57.2	7.500	73.3
0.300	33.3	1.200	30.3	2.400	42.2	5.000	60.2	8.000	75.6
0.400	34.5	1.400	32.6	2.600	43.9	5.500	63.0	8.500	77.9
0.500	34.8	1.600	34.7	3.000	47.0	6.000	65.8	9.000	80.1
0.600	34.6	1.800	36.8	3.500	50.6	6.500	68.4	9.500	82.2

Technical Note

Microdrainage Simulation Results

Pond 19a

10yr+30%CC

AECOM		Page 1
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19a - 10yr+30%CC	
Date 13/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Summary of Results for Arborfield Hazebrouke SuDS - Pond 19a 10yr +30%CC FEH v3.srcx

**Upstream
Structures**

Outflow To

Overflow To

(None) Arborfield Hazebrouke SuDS - Pond 19c1 10yr +30%CC FEH v3.srcx

(None)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	53.668	0.453	4.4	49.6	O K
30 min Summer	53.702	0.487	4.4	54.9	O K
60 min Summer	53.722	0.507	4.4	58.2	O K
120 min Summer	53.715	0.500	4.4	57.0	O K
180 min Summer	53.697	0.482	4.4	54.2	O K
240 min Summer	53.680	0.465	4.4	51.4	O K
360 min Summer	53.646	0.431	4.4	46.3	O K
480 min Summer	53.614	0.399	4.4	41.6	O K
600 min Summer	53.583	0.368	4.4	37.3	O K
720 min Summer	53.554	0.339	4.3	33.4	O K
960 min Summer	53.499	0.284	4.3	26.5	O K
1440 min Summer	53.411	0.196	4.1	16.7	O K
2160 min Summer	53.330	0.115	3.7	8.9	O K
2880 min Summer	53.292	0.077	3.3	5.7	O K
4320 min Summer	53.266	0.051	2.5	3.7	O K
5760 min Summer	53.253	0.038	2.1	2.7	O K
7200 min Summer	53.246	0.031	1.8	2.1	O K
8640 min Summer	53.240	0.025	1.6	1.7	O K
10080 min Summer	53.236	0.021	1.4	1.5	O K
15 min Winter	53.709	0.494	4.4	56.1	O K
30 min Winter	53.747	0.532	4.4	62.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	109.733	0.0	54.7	25
30 min Summer	62.937	0.0	62.7	38
60 min Summer	36.098	0.0	72.0	64
120 min Summer	20.704	0.0	82.6	114
180 min Summer	14.956	0.0	89.5	142
240 min Summer	11.875	0.0	94.7	174
360 min Summer	8.578	0.0	102.6	242
480 min Summer	6.811	0.0	108.7	308
600 min Summer	5.695	0.0	113.6	374
720 min Summer	4.920	0.0	117.8	438
960 min Summer	3.900	0.0	124.4	562
1440 min Summer	2.810	0.0	134.5	796
2160 min Summer	2.025	0.0	145.4	1136
2880 min Summer	1.605	0.0	153.7	1476
4320 min Summer	1.191	0.0	171.0	2204
5760 min Summer	0.964	0.0	184.5	2928
7200 min Summer	0.818	0.0	195.7	3672
8640 min Summer	0.715	0.0	205.4	4352
10080 min Summer	0.638	0.0	213.9	5136
15 min Winter	109.733	0.0	61.3	25
30 min Winter	62.937	0.0	70.3	38

AECOM		Page 2
Midpoint Alencon Link Basingstoke, RG21 7PP	Arborfield - Hazebrouke SuDS Attenuation Assessment Pond 19a - 10yr+30%CC	
Date 13/08/2022 File Hazebrouck Cascade - V2E Tan...	Designed by AB Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Summary of Results for Arborfield Hazebrouke SuDS - Pond 19a 10yr +30%CC FEH
v3.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	53.773	0.558	4.4	66.8	O K
120 min Winter	53.772	0.557	4.4	66.8	O K
180 min Winter	53.751	0.536	4.4	63.1	O K
240 min Winter	53.730	0.515	4.4	59.6	O K
360 min Winter	53.685	0.470	4.4	52.2	O K
480 min Winter	53.638	0.423	4.4	45.1	O K
600 min Winter	53.592	0.377	4.4	38.5	O K
720 min Winter	53.548	0.333	4.3	32.7	O K
960 min Winter	53.468	0.253	4.3	22.9	O K
1440 min Winter	53.354	0.139	3.9	11.0	O K
2160 min Winter	53.285	0.070	3.1	5.2	O K
2880 min Winter	53.264	0.049	2.5	3.5	O K
4320 min Winter	53.248	0.033	1.9	2.3	O K
5760 min Winter	53.239	0.024	1.5	1.7	O K
7200 min Winter	53.234	0.019	1.3	1.3	O K
8640 min Winter	53.230	0.015	1.1	1.0	O K
10080 min Winter	53.226	0.011	1.0	0.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
60 min Winter	36.098	0.0	80.6	64
120 min Winter	20.704	0.0	92.5	120
180 min Winter	14.956	0.0	100.2	154
240 min Winter	11.875	0.0	106.1	190
360 min Winter	8.578	0.0	115.0	264
480 min Winter	6.811	0.0	121.7	336
600 min Winter	5.695	0.0	127.2	402
720 min Winter	4.920	0.0	131.9	468
960 min Winter	3.900	0.0	139.4	588
1440 min Winter	2.810	0.0	150.7	810
2160 min Winter	2.025	0.0	162.9	1128
2880 min Winter	1.605	0.0	172.1	1476
4320 min Winter	1.191	0.0	191.6	2200
5760 min Winter	0.964	0.0	206.7	2904
7200 min Winter	0.818	0.0	219.2	3672
8640 min Winter	0.715	0.0	230.0	4392
10080 min Winter	0.638	0.0	239.6	5144

AECOM		Page 3
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19a - 10yr+30%CC	
Date 13/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Rainfall Details for Arborfield Hazebrouke SuDS - Pond 19a 10yr +30%CC FEH v3.srcx

Rainfall Model	FEH	F (1km)	2.642
Return Period (years)	10	Summer Storms	Yes
FEH Rainfall Version	1999	Winter Storms	Yes
Site Location	GB 476950 165250 SU 76950 65250	Cv (Summer)	0.750
C (1km)	-0.028	Cv (Winter)	0.840
D1 (1km)	0.261	Shortest Storm (mins)	15
D2 (1km)	0.255	Longest Storm (mins)	10080
D3 (1km)	0.327	Climate Change %	+30
E (1km)	0.303		

Time Area Diagram

Total Area (ha) 0.266

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From: To: (ha)		From: To: (ha)		From: To: (ha)	
0 4 0.089		4 8 0.089		8 12 0.088	

Time Area Diagram

Total Area (ha) 0.000

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

AECOM		Page 4
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19a - 10yr+30%CC	
Date 13/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Model Details for Arborfield Hazebrouke SuDS - Pond 19a 10yr +30%CC FEH v3.srcx

Storage is Online Cover Level (m) 55.300

Tank or Pond Structure

Invert Level (m) 53.215

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	67.8	0.600	184.5	1.200	322.6	1.800	482.1	2.051	0.0
0.200	104.3	0.800	228.2	1.400	373.4	2.000	540.0		
0.400	143.2	1.000	274.2	1.600	426.6	2.050	555.2		

Hydro-Brake® Optimum Outflow Control

Unit Reference MD-SHE-0094-5000-1820-5000
Design Head (m) 1.820
Design Flow (l/s) 5.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 94
Invert Level (m) 53.180
Minimum Outlet Pipe Diameter (mm) 150
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.820	5.0	Kick-Flo®	0.839	3.5
Flush-Flo™	0.414	4.4	Mean Flow over Head Range	-	4.0

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.0	0.800	3.7	2.000	5.2	4.000	7.2	7.000	9.4
0.200	4.0	1.000	3.8	2.200	5.5	4.500	7.6	7.500	9.7
0.300	4.3	1.200	4.1	2.400	5.7	5.000	8.0	8.000	10.0
0.400	4.4	1.400	4.4	2.600	5.9	5.500	8.4	8.500	10.3
0.500	4.3	1.600	4.7	3.000	6.3	6.000	8.7	9.000	10.6
0.600	4.2	1.800	5.0	3.500	6.8	6.500	9.1	9.500	10.9

Technical Note

Microdrainage Simulation Results

Pond 19c1

10yr+30%CC

AECOM		Page 1
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19c1 - 10yr+30%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Summary of Results for Arborfield Hazebrouke SuDS - Pond 19c1 10yr +30%CC FEH v3.srcx

Upstream Structures

Outflow To

Arborfield Hazebrouke SuDS - Pond 16 10yr +30%CC FEH v3.srcx Arborfield Hazebrouke SuDS - Pond 19c3 with V2E Tanks
Arborfield Hazebrouke SuDS - Pond 17 10yr +30%CC FEH v2.srcx
Arborfield Hazebrouke SuDS - Pond 19a 10yr +30%CC FEH v3.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	52.079	0.979	56.0	305.1	O K
30 min Summer	52.157	1.057	56.0	342.4	O K
60 min Summer	52.216	1.116	56.0	372.5	O K
120 min Summer	52.245	1.145	56.0	387.4	O K
180 min Summer	52.238	1.138	56.0	383.7	O K
240 min Summer	52.216	1.116	56.0	372.2	O K
360 min Summer	52.164	1.064	56.0	346.0	O K
480 min Summer	52.117	1.017	56.0	323.3	O K
600 min Summer	52.071	0.971	56.0	301.6	O K
720 min Summer	52.024	0.924	56.0	280.5	O K
960 min Summer	51.929	0.829	56.0	239.1	O K
1440 min Summer	51.739	0.639	56.0	166.3	O K
2160 min Summer	51.514	0.414	55.3	94.1	O K
2880 min Summer	51.377	0.277	52.6	57.7	O K
4320 min Summer	51.305	0.205	43.2	40.7	O K
5760 min Summer	51.273	0.173	36.1	33.6	O K
7200 min Summer	51.252	0.152	31.1	29.0	O K
8640 min Summer	51.237	0.137	27.4	25.7	O K
10080 min Summer	51.225	0.125	24.6	23.3	O K
15 min Winter	52.160	1.060	56.0	344.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	109.733	0.0	978.4	26
30 min Summer	62.937	0.0	1122.4	41
60 min Summer	36.098	0.0	1287.6	70
120 min Summer	20.704	0.0	1477.1	128
180 min Summer	14.956	0.0	1600.5	184
240 min Summer	11.875	0.0	1694.0	240
360 min Summer	8.578	0.0	1836.1	288
480 min Summer	6.811	0.0	1943.6	348
600 min Summer	5.695	0.0	2031.7	412
720 min Summer	4.920	0.0	2106.5	478
960 min Summer	3.900	0.0	2225.8	606
1440 min Summer	2.810	0.0	2406.1	850
2160 min Summer	2.025	0.0	2600.9	1180
2880 min Summer	1.605	0.0	2748.4	1508
4320 min Summer	1.191	0.0	3059.0	2212
5760 min Summer	0.964	0.0	3300.3	2944
7200 min Summer	0.818	0.0	3500.7	3672
8640 min Summer	0.715	0.0	3673.7	4400
10080 min Summer	0.638	0.0	3826.3	5128
15 min Winter	109.733	0.0	1096.0	26

AECOM		Page 2
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19c1 - 10yr+30%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Summary of Results for Arborfield Hazebrouke SuDS - Pond 19c1 10yr +30%CC FEH v3.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
30 min Winter	52.246	1.146	56.0	388.0	O K
60 min Winter	52.318	1.218	56.0	426.5	O K
120 min Winter	52.366	1.266	56.0	452.8	O K
180 min Winter	52.372	1.272	56.0	456.5	O K
240 min Winter	52.360	1.260	56.0	449.9	O K
360 min Winter	52.303	1.203	56.0	418.3	O K
480 min Winter	52.228	1.128	56.0	378.2	O K
600 min Winter	52.161	1.061	56.0	344.9	O K
720 min Winter	52.093	0.993	56.0	311.7	O K
960 min Winter	51.945	0.845	56.0	246.0	O K
1440 min Winter	51.645	0.545	56.0	134.0	O K
2160 min Winter	51.364	0.264	52.2	54.3	O K
2880 min Winter	51.306	0.206	43.4	40.9	O K
4320 min Winter	51.260	0.160	33.0	30.7	O K
5760 min Winter	51.234	0.134	26.8	25.3	O K
7200 min Winter	51.217	0.117	22.8	21.8	O K
8640 min Winter	51.205	0.105	20.0	19.3	O K
10080 min Winter	51.195	0.095	17.9	17.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	62.937	0.0	1257.1	40
60 min Winter	36.098	0.0	1442.3	70
120 min Winter	20.704	0.0	1654.6	128
180 min Winter	14.956	0.0	1792.8	184
240 min Winter	11.875	0.0	1897.9	242
360 min Winter	8.578	0.0	2056.4	350
480 min Winter	6.811	0.0	2177.0	388
600 min Winter	5.695	0.0	2275.5	454
720 min Winter	4.920	0.0	2359.2	526
960 min Winter	3.900	0.0	2493.4	656
1440 min Winter	2.810	0.0	2695.4	882
2160 min Winter	2.025	0.0	2913.3	1172
2880 min Winter	1.605	0.0	3078.7	1508
4320 min Winter	1.191	0.0	3426.4	2212
5760 min Winter	0.964	0.0	3696.9	2944
7200 min Winter	0.818	0.0	3921.2	3680
8640 min Winter	0.715	0.0	4114.5	4408
10080 min Winter	0.638	0.0	4285.5	5128

AECOM		Page 3
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19c1 - 10yr+30%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Rainfall Details for Arborfield Hazebrouke SuDS - Pond 19c1 10yr +30%CC FEH v3.srcx

Rainfall Model	FEH	F (1km)	2.642
Return Period (years)	10	Summer Storms	Yes
FEH Rainfall Version	1999	Winter Storms	Yes
Site Location	GB 476950 165250 SU 76950 65250	Cv (Summer)	0.750
C (1km)	-0.028	Cv (Winter)	0.840
D1 (1km)	0.261	Shortest Storm (mins)	15
D2 (1km)	0.255	Longest Storm (mins)	10080
D3 (1km)	0.327	Climate Change %	+30
E (1km)	0.303		

Time Area Diagram

Total Area (ha) 1.575

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
From:	To:	From:	To:	From:	To:
0	4	0.383	4	8	0.192
				8	12
					1.000

Time Area Diagram

Total Area (ha) 0.000

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

AECOM		Page 4
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19c1 - 10yr+30%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Model Details for Arborfield Hazebrouke SuDS - Pond 19c1 10yr +30%CC FEH v3.srcx

Storage is Online Cover Level (m) 53.300

Tank or Pond Structure

Invert Level (m) 51.100

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	170.6	0.600	342.8	1.200	541.2	1.800	763.1	2.400	923.0
0.100	197.3	0.700	374.1	1.300	576.6	1.900	802.2	2.500	923.0
0.200	224.8	0.800	406.2	1.400	612.7	2.000	841.9		
0.300	253.2	0.900	438.9	1.500	649.4	2.100	882.2		
0.400	282.3	1.000	472.3	1.600	686.7	2.200	923.0		
0.500	312.2	1.100	506.5	1.700	724.6	2.300	923.0		

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0297-5600-1950-5600
Design Head (m)	1.950
Design Flow (l/s)	56.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	297
Invert Level (m)	51.050
Minimum Outlet Pipe Diameter (mm)	375
Suggested Manhole Diameter (mm)	2100

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.950	55.9	Kick-Flo®	1.321	46.4
Flush-Flo™	0.604	56.0	Mean Flow over Head Range	-	48.0

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	9.1	0.800	55.3	2.000	56.6	4.000	79.2	7.000	104.0
0.200	30.6	1.000	53.8	2.200	59.3	4.500	83.9	7.500	107.6
0.300	51.7	1.200	50.5	2.400	61.8	5.000	88.3	8.000	111.0
0.400	54.4	1.400	47.7	2.600	64.3	5.500	92.5	8.500	114.3
0.500	55.6	1.600	50.9	3.000	68.9	6.000	96.5	9.000	117.6
0.600	56.0	1.800	53.8	3.500	74.2	6.500	100.3	9.500	120.7

Technical Note

Microdrainage Simulation Results

Pond 19c2

10yr+30%CC

AECOM		Page 1
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19c2 - 10yr+30%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Summary of Results for Arborfield Hazebrouke SuDS - Pond 19c2 10yr +30%CC FEH v3.srcx

Upstream Structures

Outflow To

Overflow To

(None) Arborfield Hazebrouke SuDS - Pond 19c3 with V2E Tanks 10yr +30%CC FEH 24-08-16.srcx

(None)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	51.186	0.386	11.0	49.3	O K
30 min Summer	51.197	0.397	11.0	51.5	O K
60 min Summer	51.183	0.383	11.0	48.9	O K
120 min Summer	51.149	0.349	11.0	42.7	O K
180 min Summer	51.115	0.315	11.0	37.0	O K
240 min Summer	51.083	0.283	10.9	31.9	O K
360 min Summer	51.026	0.226	10.7	23.6	O K
480 min Summer	50.979	0.179	10.4	17.6	O K
600 min Summer	50.944	0.144	10.1	13.4	O K
720 min Summer	50.918	0.118	9.8	10.6	O K
960 min Summer	50.891	0.091	8.4	7.8	O K
1440 min Summer	50.863	0.063	6.4	5.2	O K
2160 min Summer	50.843	0.043	4.7	3.4	O K
2880 min Summer	50.831	0.031	3.8	2.4	O K
4320 min Summer	50.818	0.018	2.8	1.4	O K
5760 min Summer	50.811	0.011	2.3	0.8	O K
7200 min Summer	50.806	0.006	1.9	0.4	O K
8640 min Summer	50.802	0.002	1.7	0.1	O K
10080 min Summer	50.800	0.000	1.5	0.0	O K
15 min Winter	51.222	0.422	11.0	56.1	O K
30 min Winter	51.237	0.437	11.0	59.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	109.733	0.0	59.2	19
30 min Summer	62.937	0.0	67.9	31
60 min Summer	36.098	0.0	77.8	50
120 min Summer	20.704	0.0	89.5	82
180 min Summer	14.956	0.0	96.9	116
240 min Summer	11.875	0.0	102.5	148
360 min Summer	8.578	0.0	111.1	210
480 min Summer	6.811	0.0	117.6	268
600 min Summer	5.695	0.0	123.0	326
720 min Summer	4.920	0.0	127.5	380
960 min Summer	3.900	0.0	134.7	498
1440 min Summer	2.810	0.0	145.6	736
2160 min Summer	2.025	0.0	157.4	1100
2880 min Summer	1.605	0.0	166.4	1468
4320 min Summer	1.191	0.0	185.2	2200
5760 min Summer	0.964	0.0	199.8	2936
7200 min Summer	0.818	0.0	211.9	3624
8640 min Summer	0.715	0.0	222.4	4376
10080 min Summer	0.638	0.0	231.6	0
15 min Winter	109.733	0.0	66.3	19
30 min Winter	62.937	0.0	76.1	32

AECOM		Page 2
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19c2 - 10yr+30%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Summary of Results for Arborfield Hazebrouke SuDS - Pond 19c2 10yr +30%CC FEH v3.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m ³)	Status
60 min Winter	51.224	0.424	11.0	56.7	O K
120 min Winter	51.179	0.379	11.0	48.1	O K
180 min Winter	51.130	0.330	11.0	39.5	O K
240 min Winter	51.082	0.282	10.9	31.8	O K
360 min Winter	50.999	0.199	10.6	20.0	O K
480 min Winter	50.937	0.137	10.0	12.6	O K
600 min Winter	50.904	0.104	9.1	9.1	O K
720 min Winter	50.887	0.087	8.1	7.3	O K
960 min Winter	50.865	0.065	6.5	5.3	O K
1440 min Winter	50.843	0.043	4.7	3.4	O K
2160 min Winter	50.827	0.027	3.4	2.1	O K
2880 min Winter	50.817	0.017	2.7	1.3	O K
4320 min Winter	50.807	0.007	2.0	0.5	O K
5760 min Winter	50.801	0.001	1.7	0.1	O K
7200 min Winter	50.800	0.000	1.4	0.0	O K
8640 min Winter	50.800	0.000	1.2	0.0	O K
10080 min Winter	50.800	0.000	1.1	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
60 min Winter	36.098	0.0	87.3	54
120 min Winter	20.704	0.0	100.1	90
180 min Winter	14.956	0.0	108.5	126
240 min Winter	11.875	0.0	114.8	158
360 min Winter	8.578	0.0	124.5	220
480 min Winter	6.811	0.0	131.8	272
600 min Winter	5.695	0.0	137.7	324
720 min Winter	4.920	0.0	142.8	382
960 min Winter	3.900	0.0	150.9	500
1440 min Winter	2.810	0.0	163.1	738
2160 min Winter	2.025	0.0	176.3	1104
2880 min Winter	1.605	0.0	186.3	1472
4320 min Winter	1.191	0.0	207.4	2204
5760 min Winter	0.964	0.0	223.8	2904
7200 min Winter	0.818	0.0	237.4	0
8640 min Winter	0.715	0.0	249.1	0
10080 min Winter	0.638	0.0	259.4	0

AECOM		Page 3
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19c2 - 10yr+30%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Rainfall Details for Arborfield Hazebrouke SuDS - Pond 19c2 10yr +30%CC FEH v3.srcx

Rainfall Model	FEH	F (1km)	2.642
Return Period (years)	10	Summer Storms	Yes
FEH Rainfall Version	1999	Winter Storms	Yes
Site Location	GB 476950 165250 SU 76950 65250	Cv (Summer)	0.750
C (1km)	-0.028	Cv (Winter)	0.840
D1 (1km)	0.261	Shortest Storm (mins)	15
D2 (1km)	0.255	Longest Storm (mins)	10080
D3 (1km)	0.327	Climate Change %	+30
E (1km)	0.303		

Time Area Diagram

Total Area (ha) 0.288

Time (mins)	Area (ha)	Time (mins)	Area (ha)
From:	To:	From:	To:
0	4 0.192	4	8 0.096

Time Area Diagram

Total Area (ha) 0.000

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

AECOM		Page 4
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19c2 - 10yr+30%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Model Details for Arborfield Hazebrouke SuDS - Pond 19c2 10yr +30%CC FEH v3.srcx

Storage is Online Cover Level (m) 52.400

Tank or Pond Structure

Invert Level (m) 50.800

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	73.0	0.600	250.6	1.200	457.9	1.800	608.5	2.400	608.5
0.100	101.0	0.700	282.3	1.300	496.2	1.900	608.5	2.500	608.5
0.200	129.8	0.800	315.7	1.400	532.9	2.000	608.5		
0.300	159.1	0.900	349.9	1.500	570.9	2.100	608.5		
0.400	189.0	1.000	385.1	1.600	608.5	2.200	608.5		
0.500	219.5	1.100	421.1	1.700	608.5	2.300	608.5		

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0147-1100-1350-1100
Design Head (m)	1.350
Design Flow (l/s)	11.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	147
Invert Level (m)	50.750
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.350	11.0	Kick-Flo®	0.858	8.9
Flush-Flo™	0.397	11.0	Mean Flow over Head Range	-	9.5

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	5.3	0.800	9.6	2.000	13.2	4.000	18.4	7.000	24.1
0.200	10.2	1.000	9.5	2.200	13.9	4.500	19.5	7.500	24.9
0.300	10.8	1.200	10.4	2.400	14.4	5.000	20.5	8.000	25.7
0.400	11.0	1.400	11.2	2.600	15.0	5.500	21.5	8.500	26.5
0.500	10.9	1.600	11.9	3.000	16.1	6.000	22.4	9.000	27.2
0.600	10.7	1.800	12.6	3.500	17.3	6.500	23.2	9.500	27.9

Technical Note

Microdrainage Simulation Results

Pond 19c3 + V2E Tanks

10yr+30%CC

AECOM		Page 1
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19c3	
Date 13/12/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Summary of Results for Arborfield Hazebrouke SuDS - Pond 19c3 with V2E Tanks
10yr +30%CC FEH 24-08-16.srcx

Upstream Structures	Outflow To	Overflow To
Arborfield Hazebrouke SuDS - Pond 19c1 10yr +30%CC FEH v3.srcx	(None)	(None)
Arborfield Hazebrouke SuDS - Pond 16 10yr +30%CC FEH v3.srcx		
Arborfield Hazebrouke SuDS - Pond 17 10yr +30%CC FEH v2.srcx		
Arborfield Hazebrouke SuDS - Pond 19a 10yr +30%CC FEH v3.srcx		
Arborfield Hazebrouke SuDS - Pond 19c2 10yr +30%CC FEH v3.srcx		

Half Drain Time : 56 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	50.484	0.584	0.0	73.4	73.4	309.7	O K
30 min Summer	50.538	0.638	0.0	73.4	73.4	347.0	O K
60 min Summer	50.592	0.692	0.0	73.4	73.4	385.4	O K
120 min Summer	50.634	0.734	0.0	73.4	73.4	416.2	O K
180 min Summer	50.646	0.746	0.0	73.4	73.4	424.5	O K
240 min Summer	50.638	0.738	0.0	73.4	73.4	418.5	O K
360 min Summer	50.612	0.712	0.0	73.4	73.4	399.8	O K
480 min Summer	50.587	0.687	0.0	73.4	73.4	381.4	O K
600 min Summer	50.560	0.660	0.0	73.4	73.4	362.4	O K
720 min Summer	50.533	0.633	0.0	73.4	73.4	343.1	O K
960 min Summer	50.477	0.577	0.0	73.4	73.4	304.7	O K
1440 min Summer	50.372	0.472	0.0	73.4	73.4	235.1	O K
2160 min Summer	50.227	0.327	0.0	72.9	72.9	145.9	O K
2880 min Summer	50.112	0.212	0.0	70.9	70.9	79.4	O K
4320 min Summer	50.022	0.122	0.0	60.1	60.1	31.1	O K
5760 min Summer	49.987	0.087	0.0	50.8	50.8	17.0	O K
7200 min Summer	49.962	0.062	0.0	43.6	43.6	12.2	O K
8640 min Summer	49.944	0.044	0.0	38.4	38.4	8.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	109.733	0.0	1368.6	22
30 min Summer	62.937	0.0	1570.2	37
60 min Summer	36.098	0.0	1800.5	66
120 min Summer	20.704	0.0	2066.6	124
180 min Summer	14.956	0.0	2238.4	182
240 min Summer	11.875	0.0	2369.8	228
360 min Summer	8.578	0.0	2567.9	282
480 min Summer	6.811	0.0	2718.5	342
600 min Summer	5.695	0.0	2841.3	408
720 min Summer	4.920	0.0	2945.8	476
960 min Summer	3.900	0.0	3113.4	610
1440 min Summer	2.810	0.0	3365.5	872
2160 min Summer	2.025	0.0	3638.1	1232
2880 min Summer	1.605	0.0	3844.3	1556
4320 min Summer	1.191	0.0	4278.8	2216
5760 min Summer	0.964	0.0	4616.5	2936
7200 min Summer	0.818	0.0	4896.7	3672
8640 min Summer	0.715	0.0	5138.6	4408

AECOM		Page 2
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19c3	
Date 13/12/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Summary of Results for Arborfield Hazebrouke SuDS - Pond 19c3 with V2E Tanks
10yr +30%CC FEH 24-08-16.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max E Outflow (l/s)	Max Volume (m³)	Status
10080 min Summer	49.931	0.031	0.0	34.5	34.5	5.9	O K
15 min Winter	50.542	0.642	0.0	73.4	73.4	350.1	O K
30 min Winter	50.603	0.703	0.0	73.4	73.4	393.3	O K
60 min Winter	50.664	0.764	0.0	73.4	73.4	438.1	O K
120 min Winter	50.713	0.813	0.0	73.4	73.4	475.2	O K
180 min Winter	50.729	0.829	0.0	73.4	73.4	487.3	O K
240 min Winter	50.729	0.829	0.0	73.4	73.4	487.7	O K
360 min Winter	50.702	0.802	0.0	73.4	73.4	467.0	O K
480 min Winter	50.671	0.771	0.0	73.4	73.4	443.5	O K
600 min Winter	50.635	0.735	0.0	73.4	73.4	416.5	O K
720 min Winter	50.596	0.696	0.0	73.4	73.4	388.5	O K
960 min Winter	50.516	0.616	0.0	73.4	73.4	331.3	O K
1440 min Winter	50.353	0.453	0.0	73.4	73.4	223.0	O K
2160 min Winter	50.115	0.215	0.0	71.0	71.0	81.1	O K
2880 min Winter	50.025	0.125	0.0	60.7	60.7	32.6	O K
4320 min Winter	49.971	0.071	0.0	46.2	46.2	13.9	O K
5760 min Winter	49.942	0.042	0.0	37.6	37.6	8.1	O K
7200 min Winter	49.922	0.022	0.0	32.0	32.0	4.3	O K
8640 min Winter	49.908	0.008	0.0	28.1	28.1	1.5	O K
10080 min Winter	49.900	0.000	0.0	25.1	25.1	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
10080 min Summer	0.638	0.0	5352.0	5136
15 min Winter	109.733	0.0	1533.1	22
30 min Winter	62.937	0.0	1758.1	36
60 min Winter	36.098	0.0	2016.7	64
120 min Winter	20.704	0.0	2314.0	120
180 min Winter	14.956	0.0	2507.4	178
240 min Winter	11.875	0.0	2654.2	232
360 min Winter	8.578	0.0	2876.2	292
480 min Winter	6.811	0.0	3045.1	364
600 min Winter	5.695	0.0	3183.2	442
720 min Winter	4.920	0.0	3299.3	518
960 min Winter	3.900	0.0	3487.5	664
1440 min Winter	2.810	0.0	3770.0	936
2160 min Winter	2.025	0.0	4075.0	1232
2880 min Winter	1.605	0.0	4306.3	1528
4320 min Winter	1.191	0.0	4792.6	2204
5760 min Winter	0.964	0.0	5171.0	2936
7200 min Winter	0.818	0.0	5484.7	3672
8640 min Winter	0.715	0.0	5755.1	4400
10080 min Winter	0.638	0.0	5994.4	0

AECOM		Page 3
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19c3	
Date 13/12/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Rainfall Details for Arborfield Hazebrouke SuDS - Pond 19c3 with V2E Tanks
10yr +30%CC FEH 24-08-16.srcx

Rainfall Model	FEH	F (1km)	2.642
Return Period (years)	10	Summer Storms	Yes
FEH Rainfall Version	1999	Winter Storms	Yes
Site Location	GB 476950 165250 SU 76950 65250	Cv (Summer)	0.750
C (1km)	-0.028	Cv (Winter)	0.840
D1 (1km)	0.261	Shortest Storm (mins)	15
D2 (1km)	0.255	Longest Storm (mins)	10080
D3 (1km)	0.327	Climate Change %	+30
E (1km)	0.303		

Time Area Diagram

Total Area (ha) 1.609

Time (mins)	Area (ha)	Time (mins)	Area (ha)
From:	To:	From:	To:
0	4 1.072	4	8 0.537

Time Area Diagram

Total Area (ha) 0.000

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

AECOM		Page 4
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19c3	
Date 13/12/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Model Details for Arborfield Hazebrouke SuDS - Pond 19c3 with V2E Tanks 10yr +30%CC FEH 24-08-16.srcx

Storage is Online Cover Level (m) 51.800

Complex Structure

Tank or Pond

Invert Level (m) 49.900

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	65.0	1.599	65.0	1.600	0.0

Tank or Pond

Invert Level (m) 49.900

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	130.0	1.599	130.0	1.600	0.0

Tank or Pond

Invert Level (m) 50.000

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	324.0	0.600	528.6	1.200	753.2	1.600	914.1
0.200	389.9	0.800	601.2	1.400	832.5	1.800	997.9
0.400	458.1	1.000	676.1	1.500	873.3		

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0337-7340-1770-7340
Design Head (m)	1.770
Design Flow (l/s)	73.4
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	337
Invert Level (m)	49.730
Minimum Outlet Pipe Diameter (mm)	375
Suggested Manhole Diameter (mm)	Site Specific Design (Contact Hydro International)

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.770	73.4	Kick-Flo®	1.259	62.2
Flush-Flo™	0.597	73.4	Mean Flow over Head Range	-	62.1

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

AECOM		Page 5
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19c3	
Date 13/12/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Hydro-Brake® Optimum Outflow Control

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	9.9	0.800	72.4	2.000	77.8	4.000	109.0	7.000	143.2
0.200	34.3	1.000	70.2	2.200	81.5	4.500	115.4	7.500	148.1
0.300	61.9	1.200	65.1	2.400	85.0	5.000	121.5	8.000	152.9
0.400	71.4	1.400	65.5	2.600	88.4	5.500	127.3	8.500	157.5
0.500	73.0	1.600	69.9	3.000	94.8	6.000	132.8	9.000	162.0
0.600	73.4	1.800	74.0	3.500	102.1	6.500	138.1	9.500	166.3

Technical Note

Microdrainage Simulation Results

Pond 17

30yr+30%CC

AECOM		Page 1
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 17 - 30yr+30%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Summary of Results for Arborfield Hazebrouke SuDS - Pond 17 30yr +30%CC FEH v2.srcx

Upstream Structures

Outflow To

Overflow To

(None) Arborfield Hazebrouke SuDS - Pond 16 30yr +30%CC FEH v3.srcx

(None)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	55.278	0.543	11.0	302.0	O K
30 min Summer	55.322	0.587	11.0	333.7	O K
60 min Summer	55.360	0.625	11.0	362.3	O K
120 min Summer	55.385	0.650	11.0	381.2	O K
180 min Summer	55.387	0.652	11.0	382.6	O K
240 min Summer	55.379	0.644	11.0	376.4	O K
360 min Summer	55.351	0.616	11.0	355.6	O K
480 min Summer	55.326	0.591	11.0	336.8	O K
600 min Summer	55.303	0.568	11.0	319.7	O K
720 min Summer	55.280	0.545	11.0	303.7	O K
960 min Summer	55.237	0.502	11.0	273.2	O K
1440 min Summer	55.157	0.422	11.0	220.2	O K
2160 min Summer	55.055	0.320	11.0	157.1	O K
2880 min Summer	54.976	0.241	10.9	112.0	O K
4320 min Summer	54.888	0.153	10.4	66.6	O K
5760 min Summer	54.851	0.116	9.3	49.4	O K
7200 min Summer	54.833	0.098	8.1	41.1	O K
8640 min Summer	54.821	0.086	7.2	35.5	O K
10080 min Summer	54.812	0.077	6.4	31.6	O K
15 min Winter	55.330	0.595	11.0	339.8	O K
30 min Winter	55.379	0.644	11.0	376.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	161.684	0.0	314.5	26
30 min Summer	90.715	0.0	352.9	40
60 min Summer	50.897	0.0	396.1	68
120 min Summer	28.557	0.0	444.4	126
180 min Summer	20.365	0.0	475.5	184
240 min Summer	16.022	0.0	498.8	242
360 min Summer	11.426	0.0	533.5	312
480 min Summer	8.989	0.0	559.7	368
600 min Summer	7.463	0.0	580.8	430
720 min Summer	6.411	0.0	598.7	496
960 min Summer	5.035	0.0	626.9	626
1440 min Summer	3.582	0.0	669.1	888
2160 min Summer	2.548	0.0	714.0	1260
2880 min Summer	2.001	0.0	747.7	1596
4320 min Summer	1.466	0.0	821.6	2288
5760 min Summer	1.175	0.0	878.3	2952
7200 min Summer	0.990	0.0	925.0	3680
8640 min Summer	0.861	0.0	965.0	4408
10080 min Summer	0.765	0.0	1000.2	5144
15 min Winter	161.684	0.0	352.2	26
30 min Winter	90.715	0.0	395.3	40

AECOM		Page 2
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 17 - 30yr+30%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Summary of Results for Arborfield Hazebrouke SuDS - Pond 17 30yr +30%CC FEH v2.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m ³)	Status
60 min Winter	55.423	0.688	11.0	410.5	O K
120 min Winter	55.455	0.720	11.0	435.9	O K
180 min Winter	55.462	0.727	11.0	441.6	O K
240 min Winter	55.459	0.724	11.0	438.8	O K
360 min Winter	55.436	0.701	11.0	420.9	O K
480 min Winter	55.401	0.666	11.0	393.5	O K
600 min Winter	55.371	0.636	11.0	370.2	O K
720 min Winter	55.341	0.606	11.0	347.7	O K
960 min Winter	55.280	0.545	11.0	303.1	O K
1440 min Winter	55.163	0.428	11.0	223.5	O K
2160 min Winter	55.012	0.277	10.9	132.5	O K
2880 min Winter	54.910	0.175	10.6	77.5	O K
4320 min Winter	54.843	0.108	8.8	45.5	O K
5760 min Winter	54.820	0.085	7.1	35.3	O K
7200 min Winter	54.807	0.072	6.0	29.6	O K
8640 min Winter	54.798	0.063	5.3	25.7	O K
10080 min Winter	54.791	0.056	4.7	22.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
60 min Winter	50.897	0.0	443.6	68
120 min Winter	28.557	0.0	497.8	124
180 min Winter	20.365	0.0	532.5	182
240 min Winter	16.022	0.0	558.6	238
360 min Winter	11.426	0.0	597.6	348
480 min Winter	8.989	0.0	626.8	440
600 min Winter	7.463	0.0	650.5	470
720 min Winter	6.411	0.0	670.6	542
960 min Winter	5.035	0.0	702.2	686
1440 min Winter	3.582	0.0	749.3	956
2160 min Winter	2.548	0.0	799.9	1316
2880 min Winter	2.001	0.0	837.3	1620
4320 min Winter	1.466	0.0	920.1	2252
5760 min Winter	1.175	0.0	983.7	2944
7200 min Winter	0.990	0.0	1036.1	3672
8640 min Winter	0.861	0.0	1080.9	4408
10080 min Winter	0.765	0.0	1120.0	5136

AECOM		Page 3
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 17 - 30yr+30%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Rainfall Details for Arborfield Hazebrouke SuDS - Pond 17 30yr +30%CC FEH v2.srcx

Rainfall Model	FEH	F (1km)	2.642
Return Period (years)	30	Summer Storms	Yes
FEH Rainfall Version	1999	Winter Storms	Yes
Site Location	GB 476950 165250 SU 76950 65250	Cv (Summer)	0.750
C (1km)	-0.028	Cv (Winter)	0.840
D1 (1km)	0.261	Shortest Storm (mins)	15
D2 (1km)	0.255	Longest Storm (mins)	10080
D3 (1km)	0.327	Climate Change %	+30
E (1km)	0.303		

Time Area Diagram

Total Area (ha) 1.038

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
From:	To:	From:	To:	From:	To:
0	4	0.350	4	8	0.350
				8	12
					0.338

Time Area Diagram

Total Area (ha) 0.000

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

AECOM		Page 4
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 17 - 30yr+30%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Model Details for Arborfield Hazebrouke SuDS - Pond 17 30yr +30%CC FEH v2.srcx

Storage is Online Cover Level (m) 56.100

Tank or Pond Structure

Invert Level (m) 54.735

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	390.0	0.300	580.0	0.600	740.0	0.900	890.0	1.200	1040.0
0.100	450.0	0.400	630.0	0.700	790.0	1.000	940.0	1.300	1070.0
0.200	520.0	0.500	690.0	0.800	840.0	1.100	990.0	1.301	0.0

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0151-1100-1100-1100
Design Head (m)	1.100
Design Flow (l/s)	11.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	151
Invert Level (m)	54.700
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.100	11.0	Kick-Flo®	0.732	9.1
Flush-Flo™	0.334	11.0	Mean Flow over Head Range	-	9.5

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	5.4	0.800	9.5	2.000	14.6	4.000	20.3	7.000	26.6
0.200	10.5	1.000	10.5	2.200	15.3	4.500	21.5	7.500	27.5
0.300	10.9	1.200	11.5	2.400	15.9	5.000	22.6	8.000	28.4
0.400	10.9	1.400	12.3	2.600	16.5	5.500	23.7	8.500	29.2
0.500	10.7	1.600	13.1	3.000	17.7	6.000	24.7	9.000	30.0
0.600	10.3	1.800	13.9	3.500	19.1	6.500	25.7	9.500	30.8

Technical Note

Microdrainage Simulation Results

Pond 16

30yr+30%CC

AECOM		Page 1
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 16 - 30yr+30%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Summary of Results for Arborfield Hazebrouke SuDS - Pond 16 30yr +30%CC FEH v3.srcx

**Upstream
Structures**

Outflow To

Arborfield Hazebrouke SuDS - Pond 17 30yr +30%CC FEH v2.srcx Arborfield Hazebrouke SuDS - Pond 19c1 30yr +30%CC FEH

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	54.570	0.770	34.8	543.1	O K
30 min Summer	54.635	0.835	34.8	598.7	O K
60 min Summer	54.690	0.890	34.8	646.9	O K
120 min Summer	54.720	0.920	34.8	673.0	O K
180 min Summer	54.713	0.913	34.8	667.3	O K
240 min Summer	54.692	0.892	34.8	648.2	O K
360 min Summer	54.648	0.848	34.8	610.2	O K
480 min Summer	54.608	0.808	34.8	575.4	O K
600 min Summer	54.569	0.769	34.8	542.2	O K
720 min Summer	54.530	0.730	34.8	510.5	O K
960 min Summer	54.455	0.655	34.8	450.5	O K
1440 min Summer	54.320	0.520	34.8	349.1	O K
2160 min Summer	54.169	0.369	34.6	239.6	O K
2880 min Summer	54.070	0.270	33.7	171.2	O K
4320 min Summer	53.987	0.187	31.0	116.0	O K
5760 min Summer	53.954	0.154	26.4	95.0	O K
7200 min Summer	53.933	0.133	22.8	81.3	O K
8640 min Summer	53.917	0.117	20.1	71.7	O K
10080 min Summer	53.905	0.105	18.0	64.2	O K
15 min Winter	54.650	0.850	34.8	611.4	O K
30 min Winter	54.722	0.922	34.8	675.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	161.684	0.0	883.8	26
30 min Summer	90.715	0.0	991.8	40
60 min Summer	50.897	0.0	1113.2	68
120 min Summer	28.557	0.0	1249.0	124
180 min Summer	20.365	0.0	1336.1	182
240 min Summer	16.022	0.0	1401.6	228
360 min Summer	11.426	0.0	1499.3	282
480 min Summer	8.989	0.0	1572.7	344
600 min Summer	7.463	0.0	1632.2	410
720 min Summer	6.411	0.0	1682.5	476
960 min Summer	5.035	0.0	1761.8	608
1440 min Summer	3.582	0.0	1880.2	862
2160 min Summer	2.548	0.0	2006.4	1216
2880 min Summer	2.001	0.0	2101.3	1560
4320 min Summer	1.466	0.0	2308.8	2216
5760 min Summer	1.175	0.0	2468.3	2944
7200 min Summer	0.990	0.0	2599.6	3680
8640 min Summer	0.861	0.0	2712.0	4408
10080 min Summer	0.765	0.0	2810.9	5144
15 min Winter	161.684	0.0	989.9	26
30 min Winter	90.715	0.0	1110.9	40

AECOM		Page 2
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 16 - 30yr+30%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Summary of Results for Arborfield Hazebrouke SuDS - Pond 16 30yr +30%CC FEH
v3.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	54.786	0.986	34.8	733.3	O K
120 min Winter	54.828	1.028	34.8	771.4	O K
180 min Winter	54.830	1.030	34.8	773.6	O K
240 min Winter	54.814	1.014	34.8	759.2	O K
360 min Winter	54.758	0.958	34.8	707.1	O K
480 min Winter	54.705	0.905	34.8	660.3	O K
600 min Winter	54.653	0.853	34.8	614.0	O K
720 min Winter	54.599	0.799	34.8	568.1	O K
960 min Winter	54.491	0.691	34.8	479.1	O K
1440 min Winter	54.293	0.493	34.8	329.2	O K
2160 min Winter	54.090	0.290	34.0	184.7	O K
2880 min Winter	53.993	0.193	31.8	120.4	O K
4320 min Winter	53.944	0.144	24.7	88.3	O K
5760 min Winter	53.917	0.117	20.0	71.3	O K
7200 min Winter	53.899	0.099	16.9	60.5	O K
8640 min Winter	53.887	0.087	14.8	52.8	O K
10080 min Winter	53.878	0.078	13.2	46.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
60 min Winter	50.897	0.0	1246.6	68
120 min Winter	28.557	0.0	1399.0	124
180 min Winter	20.365	0.0	1496.3	180
240 min Winter	16.022	0.0	1569.9	236
360 min Winter	11.426	0.0	1679.3	332
480 min Winter	8.989	0.0	1761.7	374
600 min Winter	7.463	0.0	1828.1	448
720 min Winter	6.411	0.0	1884.4	520
960 min Winter	5.035	0.0	1973.5	660
1440 min Winter	3.582	0.0	2105.8	914
2160 min Winter	2.548	0.0	2247.9	1252
2880 min Winter	2.001	0.0	2353.3	1532
4320 min Winter	1.466	0.0	2585.8	2248
5760 min Winter	1.175	0.0	2764.4	2952
7200 min Winter	0.990	0.0	2911.6	3680
8640 min Winter	0.861	0.0	3037.4	4408
10080 min Winter	0.765	0.0	3148.0	5120

AECOM		Page 3
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 16 - 30yr+30%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Rainfall Details for Arborfield Hazebrouke SuDS - Pond 16 30yr +30%CC FEH v3.srcx

Rainfall Model	FEH	F (1km)	2.642
Return Period (years)	30	Summer Storms	Yes
FEH Rainfall Version	1999	Winter Storms	Yes
Site Location	GB 476950 165250 SU 76950 65250	Cv (Summer)	0.750
C (1km)	-0.028	Cv (Winter)	0.840
D1 (1km)	0.261	Shortest Storm (mins)	15
D2 (1km)	0.255	Longest Storm (mins)	10080
D3 (1km)	0.327	Climate Change %	+30
E (1km)	0.303		

Time Area Diagram

Total Area (ha) 1.879

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
From:	To:	From:	To:	From:	To:
0	4	0.627	4	8	0.626
				8	12
					0.626

Time Area Diagram

Total Area (ha) 0.000

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

AECOM		Page 4
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 16 - 30yr+30%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Model Details for Arborfield Hazebrouke SuDS - Pond 16 30yr +30%CC FEH v3.srcx

Storage is Online Cover Level (m) 55.650

Tank or Pond Structure

Invert Level (m) 53.800

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	593.6	0.600	748.0	1.200	994.7	1.800	1225.9
0.200	654.9	0.800	851.9	1.400	1069.5	1.900	1225.9
0.400	718.3	1.000	922.2	1.600	1146.6	1.901	0.0

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0245-3480-1605-3480
Design Head (m)	1.605
Design Flow (l/s)	34.8
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	245
Invert Level (m)	53.745
Minimum Outlet Pipe Diameter (mm)	300
Suggested Manhole Diameter (mm)	1800

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.605	34.8	Kick-Flo®	1.088	28.9
Flush-Flo™	0.497	34.8	Mean Flow over Head Range	-	29.8

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	8.0	0.800	33.6	2.000	38.7	4.000	54.0	7.000	70.9
0.200	24.9	1.000	31.2	2.200	40.5	4.500	57.2	7.500	73.3
0.300	33.3	1.200	30.3	2.400	42.2	5.000	60.2	8.000	75.6
0.400	34.5	1.400	32.6	2.600	43.9	5.500	63.0	8.500	77.9
0.500	34.8	1.600	34.7	3.000	47.0	6.000	65.8	9.000	80.1
0.600	34.6	1.800	36.8	3.500	50.6	6.500	68.4	9.500	82.2

Technical Note

Microdrainage Simulation Results

Pond 19a

30yr+30%CC

AECOM		Page 1
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19a - 30yr+30%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Summary of Results for Arborfield Hazebrouke SuDS - Pond 19a 30yr +30%CC FEH v3.srcx

Upstream Structures

Outflow To

Overflow To

(None) Arborfield Hazebrouke SuDS - Pond 19c1 30yr +30%CC FEH v3.srcx

(None)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	53.820	0.605	4.4	75.3	O K
30 min Summer	53.856	0.641	4.4	82.2	O K
60 min Summer	53.881	0.666	4.4	87.1	O K
120 min Summer	53.881	0.666	4.4	87.1	O K
180 min Summer	53.860	0.645	4.4	82.9	O K
240 min Summer	53.838	0.623	4.4	78.6	O K
360 min Summer	53.798	0.583	4.4	71.3	O K
480 min Summer	53.762	0.547	4.4	65.0	O K
600 min Summer	53.729	0.514	4.4	59.3	O K
720 min Summer	53.697	0.482	4.4	54.1	O K
960 min Summer	53.635	0.420	4.4	44.6	O K
1440 min Summer	53.526	0.311	4.3	29.8	O K
2160 min Summer	53.408	0.193	4.1	16.4	O K
2880 min Summer	53.337	0.122	3.8	9.5	O K
4320 min Summer	53.285	0.070	3.1	5.1	O K
5760 min Summer	53.265	0.050	2.5	3.6	O K
7200 min Summer	53.255	0.040	2.2	2.8	O K
8640 min Summer	53.248	0.033	1.9	2.3	O K
10080 min Summer	53.243	0.028	1.7	1.9	O K
15 min Winter	53.870	0.655	4.4	85.0	O K
30 min Winter	53.911	0.696	4.4	93.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	161.684	0.0	80.6	25
30 min Summer	90.715	0.0	90.5	39
60 min Summer	50.897	0.0	101.5	66
120 min Summer	28.557	0.0	113.9	122
180 min Summer	20.365	0.0	121.8	170
240 min Summer	16.022	0.0	127.8	196
360 min Summer	11.426	0.0	136.7	258
480 min Summer	8.989	0.0	143.4	324
600 min Summer	7.463	0.0	148.8	390
720 min Summer	6.411	0.0	153.5	456
960 min Summer	5.035	0.0	160.7	586
1440 min Summer	3.582	0.0	171.5	826
2160 min Summer	2.548	0.0	183.0	1172
2880 min Summer	2.001	0.0	191.6	1504
4320 min Summer	1.466	0.0	210.5	2208
5760 min Summer	1.175	0.0	225.1	2936
7200 min Summer	0.990	0.0	237.1	3632
8640 min Summer	0.861	0.0	247.3	4400
10080 min Summer	0.765	0.0	256.3	5032
15 min Winter	161.684	0.0	90.3	25
30 min Winter	90.715	0.0	101.3	39

AECOM		Page 2
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19a - 30yr+30%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Summary of Results for Arborfield Hazebrouke SuDS - Pond 19a 30yr +30%CC FEH
v3.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	53.942	0.727	4.4	99.6	O K
120 min Winter	53.950	0.735	4.4	101.3	O K
180 min Winter	53.935	0.720	4.4	98.1	O K
240 min Winter	53.910	0.695	4.4	92.9	O K
360 min Winter	53.860	0.645	4.4	83.0	O K
480 min Winter	53.813	0.598	4.4	74.0	O K
600 min Winter	53.766	0.551	4.4	65.6	O K
720 min Winter	53.719	0.504	4.4	57.7	O K
960 min Winter	53.628	0.413	4.4	43.6	O K
1440 min Winter	53.472	0.257	4.3	23.3	O K
2160 min Winter	53.332	0.117	3.7	9.1	O K
2880 min Winter	53.284	0.069	3.1	5.1	O K
4320 min Winter	53.259	0.044	2.3	3.1	O K
5760 min Winter	53.247	0.032	1.8	2.3	O K
7200 min Winter	53.240	0.025	1.6	1.8	O K
8640 min Winter	53.235	0.020	1.4	1.4	O K
10080 min Winter	53.232	0.017	1.2	1.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
60 min Winter	50.897	0.0	113.7	66
120 min Winter	28.557	0.0	127.5	122
180 min Winter	20.365	0.0	136.5	178
240 min Winter	16.022	0.0	143.2	228
360 min Winter	11.426	0.0	153.1	280
480 min Winter	8.989	0.0	160.7	354
600 min Winter	7.463	0.0	166.8	426
720 min Winter	6.411	0.0	171.9	494
960 min Winter	5.035	0.0	179.9	624
1440 min Winter	3.582	0.0	192.0	856
2160 min Winter	2.548	0.0	204.9	1172
2880 min Winter	2.001	0.0	214.6	1480
4320 min Winter	1.466	0.0	235.8	2192
5760 min Winter	1.175	0.0	252.1	2920
7200 min Winter	0.990	0.0	265.5	3592
8640 min Winter	0.861	0.0	277.0	4376
10080 min Winter	0.765	0.0	287.1	5016

AECOM		Page 3
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19a - 30yr+30%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Rainfall Details for Arborfield Hazebrouke SuDS - Pond 19a 30yr +30%CC FEH v3.srcx

Rainfall Model	FEH	F (1km)	2.642
Return Period (years)	30	Summer Storms	Yes
FEH Rainfall Version	1999	Winter Storms	Yes
Site Location	GB 476950 165250 SU 76950 65250	Cv (Summer)	0.750
C (1km)	-0.028	Cv (Winter)	0.840
D1 (1km)	0.261	Shortest Storm (mins)	15
D2 (1km)	0.255	Longest Storm (mins)	10080
D3 (1km)	0.327	Climate Change %	+30
E (1km)	0.303		

Time Area Diagram

Total Area (ha) 0.266

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
From:	To:	From:	To:	From:	To:
0	4	0.089	4	8	0.089
				8	12
					0.088

Time Area Diagram

Total Area (ha) 0.000

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

AECOM		Page 4
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19a - 30yr+30%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Model Details for Arborfield Hazebrouke SuDS - Pond 19a 30yr +30%CC FEH v3.srcx

Storage is Online Cover Level (m) 55.300

Tank or Pond Structure

Invert Level (m) 53.215

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	67.8	0.600	184.5	1.200	322.6	1.800	482.1	2.051	0.0
0.200	104.3	0.800	228.2	1.400	373.4	2.000	540.0		
0.400	143.2	1.000	274.2	1.600	426.6	2.050	555.2		

Hydro-Brake® Optimum Outflow Control

Unit Reference MD-SHE-0094-5000-1820-5000
 Design Head (m) 1.820
 Design Flow (l/s) 5.0
 Flush-Flo™ Calculated
 Objective Minimise upstream storage
 Application Surface
 Sump Available Yes
 Diameter (mm) 94
 Invert Level (m) 53.180
 Minimum Outlet Pipe Diameter (mm) 150
 Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.820	5.0	Kick-Flo®	0.839	3.5
Flush-Flo™	0.414	4.4	Mean Flow over Head Range	-	4.0

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.0	0.800	3.7	2.000	5.2	4.000	7.2	7.000	9.4
0.200	4.0	1.000	3.8	2.200	5.5	4.500	7.6	7.500	9.7
0.300	4.3	1.200	4.1	2.400	5.7	5.000	8.0	8.000	10.0
0.400	4.4	1.400	4.4	2.600	5.9	5.500	8.4	8.500	10.3
0.500	4.3	1.600	4.7	3.000	6.3	6.000	8.7	9.000	10.6
0.600	4.2	1.800	5.0	3.500	6.8	6.500	9.1	9.500	10.9

Technical Note

Microdrainage Simulation Results

Pond 19c1

30yr+30%CC

AECOM		Page 1
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19c1 - 30yr+30%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Summary of Results for Arborfield Hazebrouke SuDS - Pond 19c1 30yr +30%CC FEH v3.srcx

Upstream Structures

Outflow To

Arborfield Hazebrouke SuDS - Pond 16 30yr +30%CC FEH v3.srcx Arborfield Hazebrouke SuDS - Pond 19c3 with V2E Tanks
Arborfield Hazebrouke SuDS - Pond 17 30yr +30%CC FEH v2.srcx
Arborfield Hazebrouke SuDS - Pond 19a 30yr +30%CC FEH v3.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	52.379	1.279	56.0	460.2	O K
30 min Summer	52.462	1.362	56.0	508.9	O K
60 min Summer	52.527	1.427	56.0	548.8	O K
120 min Summer	52.563	1.463	56.0	571.2	O K
180 min Summer	52.563	1.463	56.0	571.4	O K
240 min Summer	52.552	1.452	56.0	564.4	O K
360 min Summer	52.519	1.419	56.0	543.6	O K
480 min Summer	52.481	1.381	56.0	520.4	O K
600 min Summer	52.444	1.344	56.0	498.1	O K
720 min Summer	52.405	1.305	56.0	475.1	O K
960 min Summer	52.274	1.174	56.0	402.5	O K
1440 min Summer	52.071	0.971	56.0	301.6	O K
2160 min Summer	51.790	0.690	56.0	184.8	O K
2880 min Summer	51.565	0.465	55.7	109.0	O K
4320 min Summer	51.353	0.253	51.8	51.9	O K
5760 min Summer	51.307	0.207	43.6	41.2	O K
7200 min Summer	51.279	0.179	37.5	34.9	O K
8640 min Summer	51.260	0.160	33.0	30.7	O K
10080 min Summer	51.245	0.145	29.4	27.5	O K
15 min Winter	52.475	1.375	56.0	516.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	161.684	0.0	1441.8	27
30 min Summer	90.715	0.0	1618.1	41
60 min Summer	50.897	0.0	1815.9	70
120 min Summer	28.557	0.0	2037.4	130
180 min Summer	20.365	0.0	2179.5	188
240 min Summer	16.022	0.0	2286.4	244
360 min Summer	11.426	0.0	2445.8	362
480 min Summer	8.989	0.0	2565.7	458
600 min Summer	7.463	0.0	2662.5	532
720 min Summer	6.411	0.0	2744.6	626
960 min Summer	5.035	0.0	2874.1	674
1440 min Summer	3.582	0.0	3067.1	904
2160 min Summer	2.548	0.0	3273.1	1256
2880 min Summer	2.001	0.0	3427.5	1568
4320 min Summer	1.466	0.0	3766.2	2212
5760 min Summer	1.175	0.0	4026.3	2944
7200 min Summer	0.990	0.0	4240.0	3672
8640 min Summer	0.861	0.0	4424.0	4408
10080 min Summer	0.765	0.0	4585.1	5136
15 min Winter	161.684	0.0	1615.0	26

AECOM		Page 2
Midpoint Alencon Link Basingstoke, RG21 7PP	Arborfield - Hazebrouke SuDS Attenuation Assessment Pond 19c1 - 30yr+30%CC	
Date 23/08/2022 File Hazebrouck Cascade - V2E Tan...	Designed by AB Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Summary of Results for Arborfield Hazebrouke SuDS - Pond 19c1 30yr +30%CC FEH v3.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
30 min Winter	52.564	1.464	56.0	571.9	O K
60 min Winter	52.635	1.535	56.0	618.2	O K
120 min Winter	52.676	1.576	56.0	645.2	O K
180 min Winter	52.677	1.577	56.0	646.2	O K
240 min Winter	52.666	1.566	56.0	638.7	O K
360 min Winter	52.632	1.532	56.0	615.8	O K
480 min Winter	52.593	1.493	56.0	590.5	O K
600 min Winter	52.553	1.453	56.0	564.7	O K
720 min Winter	52.512	1.412	56.0	539.2	O K
960 min Winter	52.415	1.315	56.0	480.8	O K
1440 min Winter	52.070	0.970	56.0	301.1	O K
2160 min Winter	51.618	0.518	56.0	125.4	O K
2880 min Winter	51.371	0.271	52.4	56.1	O K
4320 min Winter	51.292	0.192	40.4	37.7	O K
5760 min Winter	51.259	0.159	32.8	30.5	O K
7200 min Winter	51.238	0.138	27.6	26.0	O K
8640 min Winter	51.223	0.123	24.1	22.9	O K
10080 min Winter	51.211	0.111	21.5	20.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	90.715	0.0	1812.3	41
60 min Winter	50.897	0.0	2033.5	70
120 min Winter	28.557	0.0	2282.0	126
180 min Winter	20.365	0.0	2441.2	182
240 min Winter	16.022	0.0	2560.8	238
360 min Winter	11.426	0.0	2739.4	346
480 min Winter	8.989	0.0	2873.7	452
600 min Winter	7.463	0.0	2982.3	554
720 min Winter	6.411	0.0	3074.2	592
960 min Winter	5.035	0.0	3219.1	794
1440 min Winter	3.582	0.0	3435.3	978
2160 min Winter	2.548	0.0	3666.6	1276
2880 min Winter	2.001	0.0	3838.8	1540
4320 min Winter	1.466	0.0	4217.9	2248
5760 min Winter	1.175	0.0	4509.3	2936
7200 min Winter	0.990	0.0	4749.3	3680
8640 min Winter	0.861	0.0	4954.7	4384
10080 min Winter	0.765	0.0	5135.1	5136

AECOM		Page 3
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19c1 - 30yr+30%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Rainfall Details for Arborfield Hazebrouke SuDS - Pond 19c1 30yr +30%CC FEH v3.srcx

Rainfall Model	FEH	F (1km)	2.642
Return Period (years)	30	Summer Storms	Yes
FEH Rainfall Version	1999	Winter Storms	Yes
Site Location GB 476950 165250 SU 76950 65250		Cv (Summer)	0.750
C (1km)	-0.028	Cv (Winter)	0.840
D1 (1km)	0.261	Shortest Storm (mins)	15
D2 (1km)	0.255	Longest Storm (mins)	10080
D3 (1km)	0.327	Climate Change %	+30
E (1km)	0.303		

Time Area Diagram

Total Area (ha) 1.575

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From: To: (ha)		From: To: (ha)		From: To: (ha)	
0 4 0.383		4 8 0.192		8 12 1.000	

Time Area Diagram

Total Area (ha) 0.000

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

AECOM		Page 4
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19c1 - 30yr+30%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Model Details for Arborfield Hazebrouke SuDS - Pond 19c1 30yr +30%CC FEH v3.srcx

Storage is Online Cover Level (m) 53.300

Tank or Pond Structure

Invert Level (m) 51.100

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	170.6	0.600	342.8	1.200	541.2	1.800	763.1	2.400	923.0
0.100	197.3	0.700	374.1	1.300	576.6	1.900	802.2	2.500	923.0
0.200	224.8	0.800	406.2	1.400	612.7	2.000	841.9		
0.300	253.2	0.900	438.9	1.500	649.4	2.100	882.2		
0.400	282.3	1.000	472.3	1.600	686.7	2.200	923.0		
0.500	312.2	1.100	506.5	1.700	724.6	2.300	923.0		

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0297-5600-1950-5600
Design Head (m)	1.950
Design Flow (l/s)	56.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	297
Invert Level (m)	51.050
Minimum Outlet Pipe Diameter (mm)	375
Suggested Manhole Diameter (mm)	2100

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.950	55.9	Kick-Flo®	1.321	46.4
Flush-Flo™	0.604	56.0	Mean Flow over Head Range	-	48.0

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	9.1	0.800	55.3	2.000	56.6	4.000	79.2	7.000	104.0
0.200	30.6	1.000	53.8	2.200	59.3	4.500	83.9	7.500	107.6
0.300	51.7	1.200	50.5	2.400	61.8	5.000	88.3	8.000	111.0
0.400	54.4	1.400	47.7	2.600	64.3	5.500	92.5	8.500	114.3
0.500	55.6	1.600	50.9	3.000	68.9	6.000	96.5	9.000	117.6
0.600	56.0	1.800	53.8	3.500	74.2	6.500	100.3	9.500	120.7

Technical Note

Microdrainage Simulation Results

Pond 19c2

30yr+30%CC

AECOM		Page 1
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19c2 - 30yr+30%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Summary of Results for Arborfield Hazebrouke SuDS - Pond 19c2 30yr +30%CC FEH v3.srcx

Upstream Structures

Outflow To

Overflow To

(None) Arborfield Hazebrouke SuDS - Pond 19c3 with V2E Tanks 30yr +30%CC FEH 24-08-16.srcx

(None)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	51.319	0.519	11.0	76.5	O K
30 min Summer	51.334	0.534	11.0	80.1	O K
60 min Summer	51.322	0.522	11.0	77.3	O K
120 min Summer	51.280	0.480	11.0	68.0	O K
180 min Summer	51.242	0.442	11.0	60.2	O K
240 min Summer	51.207	0.407	11.0	53.3	O K
360 min Summer	51.142	0.342	11.0	41.5	O K
480 min Summer	51.084	0.284	10.9	32.1	O K
600 min Summer	51.034	0.234	10.8	24.8	O K
720 min Summer	50.993	0.193	10.5	19.2	O K
960 min Summer	50.933	0.133	10.0	12.1	O K
1440 min Summer	50.886	0.086	8.0	7.3	O K
2160 min Summer	50.858	0.058	5.9	4.6	O K
2880 min Summer	50.843	0.043	4.7	3.3	O K
4320 min Summer	50.827	0.027	3.5	2.1	O K
5760 min Summer	50.818	0.018	2.8	1.4	O K
7200 min Summer	50.812	0.012	2.3	0.9	O K
8640 min Summer	50.807	0.007	2.0	0.5	O K
10080 min Summer	50.804	0.004	1.8	0.3	O K
15 min Winter	51.363	0.563	11.0	86.8	O K
30 min Winter	51.383	0.583	11.0	91.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	161.684	0.0	87.3	20
30 min Summer	90.715	0.0	97.9	33
60 min Summer	50.897	0.0	110.0	60
120 min Summer	28.557	0.0	123.4	88
180 min Summer	20.365	0.0	131.9	122
240 min Summer	16.022	0.0	138.4	156
360 min Summer	11.426	0.0	148.0	220
480 min Summer	8.989	0.0	155.2	280
600 min Summer	7.463	0.0	161.2	338
720 min Summer	6.411	0.0	166.1	396
960 min Summer	5.035	0.0	174.0	506
1440 min Summer	3.582	0.0	185.7	738
2160 min Summer	2.548	0.0	198.1	1100
2880 min Summer	2.001	0.0	207.5	1468
4320 min Summer	1.466	0.0	228.0	2196
5760 min Summer	1.175	0.0	243.7	2920
7200 min Summer	0.990	0.0	256.7	3624
8640 min Summer	0.861	0.0	267.8	4368
10080 min Summer	0.765	0.0	277.6	5064
15 min Winter	161.684	0.0	97.8	20
30 min Winter	90.715	0.0	109.7	33

AECOM		Page 2
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19c2 - 30yr+30%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Summary of Results for Arborfield Hazebrouke SuDS - Pond 19c2 30yr +30%CC FEH v3.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m ³)	Status
60 min Winter	51.377	0.577	11.0	90.3	O K
120 min Winter	51.328	0.528	11.0	78.7	O K
180 min Winter	51.279	0.479	11.0	67.9	O K
240 min Winter	51.230	0.430	11.0	57.7	O K
360 min Winter	51.134	0.334	11.0	40.2	O K
480 min Winter	51.050	0.250	10.8	27.0	O K
600 min Winter	50.981	0.181	10.5	17.8	O K
720 min Winter	50.932	0.132	10.0	12.0	O K
960 min Winter	50.891	0.091	8.4	7.8	O K
1440 min Winter	50.859	0.059	6.1	4.8	O K
2160 min Winter	50.838	0.038	4.3	3.0	O K
2880 min Winter	50.826	0.026	3.4	2.0	O K
4320 min Winter	50.814	0.014	2.5	1.1	O K
5760 min Winter	50.807	0.007	2.0	0.5	O K
7200 min Winter	50.802	0.002	1.7	0.1	O K
8640 min Winter	50.800	0.000	1.5	0.0	O K
10080 min Winter	50.800	0.000	1.3	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
60 min Winter	50.897	0.0	123.2	60
120 min Winter	28.557	0.0	138.2	96
180 min Winter	20.365	0.0	147.7	132
240 min Winter	16.022	0.0	155.0	168
360 min Winter	11.426	0.0	165.8	234
480 min Winter	8.989	0.0	174.0	294
600 min Winter	7.463	0.0	180.5	348
720 min Winter	6.411	0.0	186.1	396
960 min Winter	5.035	0.0	194.8	502
1440 min Winter	3.582	0.0	207.9	738
2160 min Winter	2.548	0.0	221.9	1096
2880 min Winter	2.001	0.0	232.4	1472
4320 min Winter	1.466	0.0	255.3	2184
5760 min Winter	1.175	0.0	273.0	2912
7200 min Winter	0.990	0.0	287.5	3600
8640 min Winter	0.861	0.0	299.9	0
10080 min Winter	0.765	0.0	310.9	0

AECOM		Page 3
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19c2 - 30yr+30%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Rainfall Details for Arborfield Hazebrouke SuDS - Pond 19c2 30yr +30%CC FEH v3.srcx

Rainfall Model	FEH	F (1km)	2.642
Return Period (years)	30	Summer Storms	Yes
FEH Rainfall Version	1999	Winter Storms	Yes
Site Location	GB 476950 165250 SU 76950 65250	Cv (Summer)	0.750
C (1km)	-0.028	Cv (Winter)	0.840
D1 (1km)	0.261	Shortest Storm (mins)	15
D2 (1km)	0.255	Longest Storm (mins)	10080
D3 (1km)	0.327	Climate Change %	+30
E (1km)	0.303		

Time Area Diagram

Total Area (ha) 0.288

Time (mins)	Area (ha)	Time (mins)	Area (ha)
From:	To:	From:	To:
0	4 0.192	4	8 0.096

Time Area Diagram

Total Area (ha) 0.000

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

AECOM		Page 4
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19c2 - 30yr+30%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Model Details for Arborfield Hazebrouke SuDS - Pond 19c2 30yr +30%CC FEH v3.srcx

Storage is Online Cover Level (m) 52.400

Tank or Pond Structure

Invert Level (m) 50.800

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	73.0	0.600	250.6	1.200	457.9	1.800	608.5	2.400	608.5
0.100	101.0	0.700	282.3	1.300	496.2	1.900	608.5	2.500	608.5
0.200	129.8	0.800	315.7	1.400	532.9	2.000	608.5		
0.300	159.1	0.900	349.9	1.500	570.9	2.100	608.5		
0.400	189.0	1.000	385.1	1.600	608.5	2.200	608.5		
0.500	219.5	1.100	421.1	1.700	608.5	2.300	608.5		

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0147-1100-1350-1100
Design Head (m)	1.350
Design Flow (l/s)	11.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	147
Invert Level (m)	50.750
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.350	11.0	Kick-Flo®	0.858	8.9
Flush-Flo™	0.397	11.0	Mean Flow over Head Range	-	9.5

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	5.3	0.800	9.6	2.000	13.2	4.000	18.4	7.000	24.1
0.200	10.2	1.000	9.5	2.200	13.9	4.500	19.5	7.500	24.9
0.300	10.8	1.200	10.4	2.400	14.4	5.000	20.5	8.000	25.7
0.400	11.0	1.400	11.2	2.600	15.0	5.500	21.5	8.500	26.5
0.500	10.9	1.600	11.9	3.000	16.1	6.000	22.4	9.000	27.2
0.600	10.7	1.800	12.6	3.500	17.3	6.500	23.2	9.500	27.9

Technical Note

Microdrainage Simulation Results

Pond 19c3 + V2E Tanks

30yr+30%CC

AECOM		Page 1
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19c3 + Tanks - 30yr+30%CC	
Date 16/08/2024	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by DM	
Innovyze	Source Control 2020.1	

Cascade Summary of Results for Arborfield Hazebrouke SuDS - Pond 19c3 with V2E Tanks
30yr +30%CC FEH 24-08-16.srcx

Upstream Structures	Outflow To	Overflow To
Arborfield Hazebrouke SuDS - Pond 19c2 30yr +30%CC FEH v3.srcx	(None)	(None)
Arborfield Hazebrouke SuDS - Pond 19c1 30yr +30%CC FEH v3.srcx		
Arborfield Hazebrouke SuDS - Pond 16 30yr +30%CC FEH v3.srcx		
Arborfield Hazebrouke SuDS - Pond 17 30yr +30%CC FEH v2.srcx		
Arborfield Hazebrouke SuDS - Pond 19a 30yr +30%CC FEH v3.srcx		

Half Drain Time : 78 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	50.645	0.745	0.0	73.4	73.4	423.9	O K
30 min Summer	50.700	0.800	0.0	73.4	73.4	465.0	O K
60 min Summer	50.756	0.856	0.0	73.4	73.4	508.1	O K
120 min Summer	50.802	0.902	0.0	73.4	73.4	544.3	O K
180 min Summer	50.814	0.914	0.0	73.4	73.4	554.4	O K
240 min Summer	50.811	0.911	0.0	73.4	73.4	552.2	O K
360 min Summer	50.772	0.872	0.0	73.4	73.4	520.5	O K
480 min Summer	50.733	0.833	0.0	73.4	73.4	490.7	O K
600 min Summer	50.703	0.803	0.0	73.4	73.4	467.6	O K
720 min Summer	50.678	0.778	0.0	73.4	73.4	448.7	O K
960 min Summer	50.624	0.724	0.0	73.4	73.4	408.8	O K
1440 min Summer	50.516	0.616	0.0	73.4	73.4	331.4	O K
2160 min Summer	50.368	0.468	0.0	73.4	73.4	232.9	O K
2880 min Summer	50.240	0.340	0.0	73.0	73.0	153.7	O K
4320 min Summer	50.075	0.175	0.0	69.8	69.8	59.3	O K
5760 min Summer	50.020	0.120	0.0	59.6	59.6	29.9	O K
7200 min Summer	49.990	0.090	0.0	51.6	51.6	17.6	O K
8640 min Summer	49.968	0.068	0.0	45.1	45.1	13.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	161.684	0.0	1973.4	22
30 min Summer	90.715	0.0	2214.7	36
60 min Summer	50.897	0.0	2485.4	66
120 min Summer	28.557	0.0	2789.5	124
180 min Summer	20.365	0.0	2983.4	184
240 min Summer	16.022	0.0	3129.9	242
360 min Summer	11.426	0.0	3347.7	320
480 min Summer	8.989	0.0	3511.6	364
600 min Summer	7.463	0.0	3644.3	416
720 min Summer	6.411	0.0	3757.4	476
960 min Summer	5.035	0.0	3934.6	614
1440 min Summer	3.582	0.0	4198.5	884
2160 min Summer	2.548	0.0	4480.5	1272
2880 min Summer	2.001	0.0	4691.7	1616
4320 min Summer	1.466	0.0	5155.5	2252
5760 min Summer	1.175	0.0	5511.6	2944
7200 min Summer	0.990	0.0	5804.1	3672
8640 min Summer	0.861	0.0	6055.9	4408

AECOM		Page 2
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19c3 + Tanks - 30yr+30%CC	
Date 16/08/2024	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by DM	
Innovyze	Source Control 2020.1	

Cascade Summary of Results for Arborfield Hazebrouke SuDS - Pond 19c3 with V2E Tanks
30yr +30%CC FEH 24-08-16.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max E Outflow (l/s)	Max Volume (m³)	Status
10080 min Summer	49.951	0.051	0.0	40.4	40.4	10.0	O K
15 min Winter	50.716	0.816	0.0	73.4	73.4	477.7	O K
30 min Winter	50.780	0.880	0.0	73.4	73.4	526.8	O K
60 min Winter	50.846	0.946	0.0	73.4	73.4	579.6	O K
120 min Winter	50.908	1.008	0.0	73.4	73.4	631.5	O K
180 min Winter	50.937	1.037	0.0	73.4	73.4	655.3	O K
240 min Winter	50.948	1.048	0.0	73.4	73.4	665.2	O K
360 min Winter	50.933	1.033	0.0	73.4	73.4	652.1	O K
480 min Winter	50.865	0.965	0.0	73.4	73.4	595.9	O K
600 min Winter	50.812	0.912	0.0	73.4	73.4	552.3	O K
720 min Winter	50.760	0.860	0.0	73.4	73.4	511.5	O K
960 min Winter	50.675	0.775	0.0	73.4	73.4	446.6	O K
1440 min Winter	50.530	0.630	0.0	73.4	73.4	341.4	O K
2160 min Winter	50.307	0.407	0.0	73.3	73.3	194.6	O K
2880 min Winter	50.101	0.201	0.0	70.6	70.6	73.8	O K
4320 min Winter	50.004	0.104	0.0	55.3	55.3	21.3	O K
5760 min Winter	49.967	0.067	0.0	44.9	44.9	13.0	O K
7200 min Winter	49.943	0.043	0.0	37.9	37.9	8.3	O K
8640 min Winter	49.926	0.026	0.0	33.1	33.1	5.0	O K
10080 min Winter	49.912	0.012	0.0	29.3	29.3	2.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
10080 min Summer	0.765	0.0	6276.4	5136
15 min Winter	161.684	0.0	2211.0	22
30 min Winter	90.715	0.0	2480.8	36
60 min Winter	50.897	0.0	2783.6	66
120 min Winter	28.557	0.0	3124.2	124
180 min Winter	20.365	0.0	3342.2	184
240 min Winter	16.022	0.0	3505.4	242
360 min Winter	11.426	0.0	3749.7	352
480 min Winter	8.989	0.0	3933.7	408
600 min Winter	7.463	0.0	4082.0	458
720 min Winter	6.411	0.0	4208.1	522
960 min Winter	5.035	0.0	4406.9	652
1440 min Winter	3.582	0.0	4702.5	952
2160 min Winter	2.548	0.0	5019.0	1340
2880 min Winter	2.001	0.0	5254.8	1596
4320 min Winter	1.466	0.0	5773.8	2220
5760 min Winter	1.175	0.0	6172.6	2944
7200 min Winter	0.990	0.0	6501.3	3656
8640 min Winter	0.861	0.0	6782.6	4408
10080 min Winter	0.765	0.0	7029.5	5144

AECOM		Page 3
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19c3 + Tanks - 30yr+30%CC	
Date 16/08/2024	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by DM	
Innovyze	Source Control 2020.1	

Cascade Rainfall Details for Arborfield Hazebrouke SuDS - Pond 19c3 with V2E Tanks
30yr +30%CC FEH 24-08-16.srcx

Rainfall Model	FEH	F (1km)	2.642
Return Period (years)	30	Summer Storms	Yes
FEH Rainfall Version	1999	Winter Storms	Yes
Site Location	GB 476950 165250 SU 76950 65250	Cv (Summer)	0.750
C (1km)	-0.028	Cv (Winter)	0.840
D1 (1km)	0.261	Shortest Storm (mins)	15
D2 (1km)	0.255	Longest Storm (mins)	10080
D3 (1km)	0.327	Climate Change %	+30
E (1km)	0.303		

Time Area Diagram

Total Area (ha) 1.467

Time (mins)	Area (ha)	Time (mins)	Area (ha)
From:	To:	From:	To:
0	4 0.978	4	8 0.489

Time Area Diagram

Total Area (ha) 0.000

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

AECOM		Page 4
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19c3 + Tanks - 30yr+30%CC	
Date 16/08/2024	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by DM	
Innovyze	Source Control 2020.1	

Cascade Model Details for Arborfield Hazebrouke SuDS - Pond 19c3 with V2E Tanks 30yr +30%CC FEH 24-08-16.srcx

Storage is Online Cover Level (m) 51.800

Complex Structure

Tank or Pond

Invert Level (m) 49.900

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	65.0	1.599	65.0	1.600	0.0

Tank or Pond

Invert Level (m) 49.900

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	130.0	1.599	130.0	1.600	0.0

Tank or Pond

Invert Level (m) 50.000

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	324.0	0.600	528.6	1.200	753.2	1.600	914.1
0.200	389.9	0.800	601.2	1.400	832.5	1.800	997.9
0.400	458.1	1.000	676.1	1.500	873.3		

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0337-7340-1770-7340
Design Head (m)	1.770
Design Flow (l/s)	73.4
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	337
Invert Level (m)	49.730
Minimum Outlet Pipe Diameter (mm)	375
Suggested Manhole Diameter (mm)	Site Specific Design (Contact Hydro International)

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.770	73.4	Kick-Flo®	1.259	62.2
Flush-Flo™	0.597	73.4	Mean Flow over Head Range	-	62.1

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

AECOM		Page 5
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19c3 + Tanks - 30yr+30%CC	
Date 16/08/2024	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by DM	
Innovyze	Source Control 2020.1	

Hydro-Brake® Optimum Outflow Control

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	9.9	0.800	72.4	2.000	77.8	4.000	109.0	7.000	143.2
0.200	34.3	1.000	70.2	2.200	81.5	4.500	115.4	7.500	148.1
0.300	61.9	1.200	65.1	2.400	85.0	5.000	121.5	8.000	152.9
0.400	71.4	1.400	65.5	2.600	88.4	5.500	127.3	8.500	157.5
0.500	73.0	1.600	69.9	3.000	94.8	6.000	132.8	9.000	162.0
0.600	73.4	1.800	74.0	3.500	102.1	6.500	138.1	9.500	166.3

Technical Note

Microdrainage Simulation Results

Pond 17

100yr+30%CC

AECOM		Page 1
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 17 - 100yr+30%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Summary of Results for Arborfield Hazebrouke SuDS - Pond 17 100yr +30%CC FEH v2.srcx

Upstream Structures

Outflow To

Overflow To

(None) Arborfield Hazebrouke SuDS - Pond 16 100yr +30%CC FEH v3.srcx

(None)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	55.490	0.755	11.0	464.2	O K
30 min Summer	55.537	0.802	11.0	502.9	O K
60 min Summer	55.578	0.843	11.0	537.7	O K
120 min Summer	55.605	0.870	11.0	561.3	O K
180 min Summer	55.609	0.874	11.0	564.6	O K
240 min Summer	55.603	0.868	11.0	559.3	O K
360 min Summer	55.577	0.842	11.0	537.1	O K
480 min Summer	55.545	0.810	11.0	509.4	O K
600 min Summer	55.516	0.781	11.0	485.1	O K
720 min Summer	55.489	0.754	11.0	463.1	O K
960 min Summer	55.438	0.703	11.0	422.3	O K
1440 min Summer	55.341	0.606	11.0	348.0	O K
2160 min Summer	55.220	0.485	11.0	261.5	O K
2880 min Summer	55.116	0.381	11.0	193.7	O K
4320 min Summer	54.979	0.244	10.9	113.9	O K
5760 min Summer	54.898	0.163	10.5	71.4	O K
7200 min Summer	54.859	0.124	9.8	53.1	O K
8640 min Summer	54.841	0.106	8.7	44.7	O K
10080 min Summer	54.828	0.093	7.8	38.9	O K
15 min Winter	55.559	0.824	11.0	521.2	O K
30 min Winter	55.610	0.875	11.0	565.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	244.996	0.0	476.6	26
30 min Summer	134.253	0.0	522.4	41
60 min Summer	73.568	0.0	572.5	70
120 min Summer	40.314	0.0	627.5	128
180 min Summer	28.356	0.0	662.1	186
240 min Summer	22.091	0.0	687.7	244
360 min Summer	15.538	0.0	725.6	362
480 min Summer	12.106	0.0	753.7	438
600 min Summer	9.974	0.0	776.3	494
720 min Summer	8.515	0.0	795.2	556
960 min Summer	6.622	0.0	824.7	684
1440 min Summer	4.647	0.0	867.9	932
2160 min Summer	3.260	0.0	913.6	1316
2880 min Summer	2.536	0.0	947.3	1676
4320 min Summer	1.832	0.0	1026.7	2344
5760 min Summer	1.455	0.0	1086.9	3008
7200 min Summer	1.216	0.0	1136.1	3680
8640 min Summer	1.051	0.0	1177.8	4408
10080 min Summer	0.929	0.0	1214.4	5144
15 min Winter	244.996	0.0	533.8	26
30 min Winter	134.253	0.0	585.1	40

AECOM		Page 2
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 17 - 100yr+30%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Summary of Results for Arborfield Hazebrouke SuDS - Pond 17 100yr +30%CC FEH
v2.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	55.655	0.920	11.0	606.1	O K
120 min Winter	55.689	0.954	11.0	636.2	O K
180 min Winter	55.696	0.961	11.0	643.4	O K
240 min Winter	55.694	0.959	11.0	640.8	O K
360 min Winter	55.673	0.938	11.0	621.9	O K
480 min Winter	55.643	0.908	11.0	594.6	O K
600 min Winter	55.609	0.874	11.0	564.4	O K
720 min Winter	55.577	0.842	11.0	536.6	O K
960 min Winter	55.517	0.782	11.0	486.4	O K
1440 min Winter	55.390	0.655	11.0	384.9	O K
2160 min Winter	55.209	0.474	11.0	253.9	O K
2880 min Winter	55.056	0.321	11.0	157.8	O K
4320 min Winter	54.888	0.153	10.4	66.8	O K
5760 min Winter	54.843	0.108	8.8	45.5	O K
7200 min Winter	54.824	0.089	7.4	36.9	O K
8640 min Winter	54.812	0.077	6.4	31.6	O K
10080 min Winter	54.803	0.068	5.7	27.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
60 min Winter	73.568	0.0	641.3	68
120 min Winter	40.314	0.0	702.8	126
180 min Winter	28.356	0.0	741.5	182
240 min Winter	22.091	0.0	770.2	240
360 min Winter	15.538	0.0	812.7	352
480 min Winter	12.106	0.0	844.2	460
600 min Winter	9.974	0.0	869.5	560
720 min Winter	8.515	0.0	890.7	582
960 min Winter	6.622	0.0	923.7	732
1440 min Winter	4.647	0.0	972.1	1026
2160 min Winter	3.260	0.0	1023.2	1408
2880 min Winter	2.536	0.0	1060.9	1740
4320 min Winter	1.832	0.0	1149.9	2340
5760 min Winter	1.455	0.0	1217.3	2992
7200 min Winter	1.216	0.0	1272.3	3680
8640 min Winter	1.051	0.0	1319.2	4408
10080 min Winter	0.929	0.0	1360.1	5144

AECOM		Page 3
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 17 - 100yr+30%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Rainfall Details for Arborfield Hazebrouke SuDS - Pond 17 100yr +30%CC FEH v2.srcx

Rainfall Model	FEH	F (1km)	2.642
Return Period (years)	100	Summer Storms	Yes
FEH Rainfall Version	1999	Winter Storms	Yes
Site Location GB 476950 165250 SU 76950 65250		Cv (Summer)	0.750
C (1km)	-0.028	Cv (Winter)	0.840
D1 (1km)	0.261	Shortest Storm (mins)	15
D2 (1km)	0.255	Longest Storm (mins)	10080
D3 (1km)	0.327	Climate Change %	+30
E (1km)	0.303		

Time Area Diagram

Total Area (ha) 1.038

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From: To: (ha)		From: To: (ha)		From: To: (ha)	
0 4 0.350		4 8 0.350		8 12 0.338	

Time Area Diagram

Total Area (ha) 0.000

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

AECOM		Page 4
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 17 - 100yr+30%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Model Details for Arborfield Hazebrouke SuDS - Pond 17 100yr +30%CC FEH v2.srcx

Storage is Online Cover Level (m) 56.100

Tank or Pond Structure

Invert Level (m) 54.735

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	390.0	0.300	580.0	0.600	740.0	0.900	890.0	1.200	1040.0
0.100	450.0	0.400	630.0	0.700	790.0	1.000	940.0	1.300	1070.0
0.200	520.0	0.500	690.0	0.800	840.0	1.100	990.0	1.301	0.0

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0151-1100-1100-1100
Design Head (m)	1.100
Design Flow (l/s)	11.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	151
Invert Level (m)	54.700
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.100	11.0	Kick-Flo®	0.732	9.1
Flush-Flo™	0.334	11.0	Mean Flow over Head Range	-	9.5

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	5.4	0.800	9.5	2.000	14.6	4.000	20.3	7.000	26.6
0.200	10.5	1.000	10.5	2.200	15.3	4.500	21.5	7.500	27.5
0.300	10.9	1.200	11.5	2.400	15.9	5.000	22.6	8.000	28.4
0.400	10.9	1.400	12.3	2.600	16.5	5.500	23.7	8.500	29.2
0.500	10.7	1.600	13.1	3.000	17.7	6.000	24.7	9.000	30.0
0.600	10.3	1.800	13.9	3.500	19.1	6.500	25.7	9.500	30.8

Technical Note

Microdrainage Simulation Results

Pond 16

100yr+30%CC

AECOM		Page 1
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 16 - 100yr+30%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Summary of Results for Arborfield Hazebrouke SuDS - Pond 16 100yr +30%CC FEH v3.srcx

**Upstream
Structures**

Outflow To

Arborfield Hazebrouke SuDS - Pond 17 100yr +30%CC FEH v2.srcx Arborfield Hazebrouke SuDS - Pond 19c1 100yr +30%CC FEH v3.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	54.897	1.097	34.8	836.7	O K
30 min Summer	54.967	1.167	34.8	905.0	O K
60 min Summer	55.027	1.227	34.8	964.3	O K
120 min Summer	55.061	1.261	34.8	999.1	O K
180 min Summer	55.060	1.260	34.8	997.4	O K
240 min Summer	55.043	1.243	34.8	980.8	O K
360 min Summer	54.990	1.190	34.8	927.8	O K
480 min Summer	54.937	1.137	34.8	875.8	O K
600 min Summer	54.889	1.089	34.8	829.2	O K
720 min Summer	54.842	1.042	34.8	784.7	O K
960 min Summer	54.744	0.944	34.8	695.1	O K
1440 min Summer	54.586	0.786	34.8	557.1	O K
2160 min Summer	54.384	0.584	34.8	396.5	O K
2880 min Summer	54.227	0.427	34.8	281.9	O K
4320 min Summer	54.062	0.262	33.6	165.9	O K
5760 min Summer	53.991	0.191	31.5	118.9	O K
7200 min Summer	53.963	0.163	27.6	100.8	O K
8640 min Summer	53.942	0.142	24.4	87.2	O K
10080 min Summer	53.927	0.127	21.8	77.7	O K
15 min Winter	55.002	1.202	34.8	939.9	O K
30 min Winter	55.080	1.280	34.8	1018.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	244.996	0.0	1339.8	26
30 min Summer	134.253	0.0	1468.4	41
60 min Summer	73.568	0.0	1609.2	70
120 min Summer	40.314	0.0	1763.8	128
180 min Summer	28.356	0.0	1860.8	184
240 min Summer	22.091	0.0	1932.9	242
360 min Summer	15.538	0.0	2039.4	348
480 min Summer	12.106	0.0	2118.3	402
600 min Summer	9.974	0.0	2181.9	462
720 min Summer	8.515	0.0	2235.1	526
960 min Summer	6.622	0.0	2317.5	644
1440 min Summer	4.647	0.0	2439.2	900
2160 min Summer	3.260	0.0	2567.1	1276
2880 min Summer	2.536	0.0	2662.1	1616
4320 min Summer	1.832	0.0	2885.5	2296
5760 min Summer	1.455	0.0	3054.0	2944
7200 min Summer	1.216	0.0	3192.6	3680
8640 min Summer	1.051	0.0	3310.0	4408
10080 min Summer	0.929	0.0	3412.7	5144
15 min Winter	244.996	0.0	1500.6	26
30 min Winter	134.253	0.0	1644.6	40

AECOM		Page 2
Midpoint Alencon Link Basingstoke, RG21 7PP	Arborfield - Hazebrouke SuDS Attenuation Assessment Pond 16 - 100yr+30%CC	
Date 23/08/2022 File Hazebrouck Cascade - V2E Tan...	Designed by AB Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Summary of Results for Arborfield Hazebrouke SuDS - Pond 16 100yr +30%CC FEH
v3.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	55.147	1.347	34.8	1087.5	O K
120 min Winter	55.190	1.390	34.8	1133.3	O K
180 min Winter	55.195	1.395	34.8	1138.1	O K
240 min Winter	55.183	1.383	34.8	1125.3	O K
360 min Winter	55.136	1.336	34.8	1076.5	O K
480 min Winter	55.077	1.277	34.8	1015.2	O K
600 min Winter	55.019	1.219	34.8	956.6	O K
720 min Winter	54.966	1.166	34.8	904.1	O K
960 min Winter	54.853	1.053	34.8	795.4	O K
1440 min Winter	54.612	0.812	34.8	579.1	O K
2160 min Winter	54.317	0.517	34.8	347.1	O K
2880 min Winter	54.118	0.318	34.3	204.2	O K
4320 min Winter	53.981	0.181	30.2	112.5	O K
5760 min Winter	53.944	0.144	24.7	88.3	O K
7200 min Winter	53.921	0.121	20.8	74.1	O K
8640 min Winter	53.906	0.106	18.1	64.3	O K
10080 min Winter	53.894	0.094	15.9	56.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
60 min Winter	73.568	0.0	1802.5	68
120 min Winter	40.314	0.0	1975.4	124
180 min Winter	28.356	0.0	2084.1	182
240 min Winter	22.091	0.0	2164.8	238
360 min Winter	15.538	0.0	2284.1	350
480 min Winter	12.106	0.0	2372.8	452
600 min Winter	9.974	0.0	2443.9	486
720 min Winter	8.515	0.0	2503.4	560
960 min Winter	6.622	0.0	2595.9	716
1440 min Winter	4.647	0.0	2732.0	972
2160 min Winter	3.260	0.0	2875.8	1336
2880 min Winter	2.536	0.0	2982.0	1648
4320 min Winter	1.832	0.0	3231.5	2252
5760 min Winter	1.455	0.0	3421.1	2952
7200 min Winter	1.216	0.0	3575.6	3680
8640 min Winter	1.051	0.0	3707.2	4408
10080 min Winter	0.929	0.0	3822.2	5136

AECOM		Page 3
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 16 - 100yr+30%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Rainfall Details for Arborfield Hazebrouke SuDS - Pond 16 100yr +30%CC FEH v3.srcx

Rainfall Model	FEH	F (1km)	2.642
Return Period (years)	100	Summer Storms	Yes
FEH Rainfall Version	1999	Winter Storms	Yes
Site Location GB 476950 165250 SU 76950 65250		Cv (Summer)	0.750
C (1km)	-0.028	Cv (Winter)	0.840
D1 (1km)	0.261	Shortest Storm (mins)	15
D2 (1km)	0.255	Longest Storm (mins)	10080
D3 (1km)	0.327	Climate Change %	+30
E (1km)	0.303		

Time Area Diagram

Total Area (ha) 1.879

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From: To: (ha)		From: To: (ha)		From: To: (ha)	
0 4 0.627		4 8 0.626		8 12 0.626	

Time Area Diagram

Total Area (ha) 0.000

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

AECOM		Page 4
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 16 - 100yr+30%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Model Details for Arborfield Hazebrouke SuDS - Pond 16 100yr +30%CC FEH v3.srcx

Storage is Online Cover Level (m) 55.650

Tank or Pond Structure

Invert Level (m) 53.800

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	593.6	0.600	748.0	1.200	994.7	1.800	1225.9
0.200	654.9	0.800	851.9	1.400	1069.5	1.900	1225.9
0.400	718.3	1.000	922.2	1.600	1146.6	1.901	0.0

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0245-3480-1605-3480
Design Head (m)	1.605
Design Flow (l/s)	34.8
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	245
Invert Level (m)	53.745
Minimum Outlet Pipe Diameter (mm)	300
Suggested Manhole Diameter (mm)	1800

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.605	34.8	Kick-Flo®	1.088	28.9
Flush-Flo™	0.497	34.8	Mean Flow over Head Range	-	29.8

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	8.0	0.800	33.6	2.000	38.7	4.000	54.0	7.000	70.9
0.200	24.9	1.000	31.2	2.200	40.5	4.500	57.2	7.500	73.3
0.300	33.3	1.200	30.3	2.400	42.2	5.000	60.2	8.000	75.6
0.400	34.5	1.400	32.6	2.600	43.9	5.500	63.0	8.500	77.9
0.500	34.8	1.600	34.7	3.000	47.0	6.000	65.8	9.000	80.1
0.600	34.6	1.800	36.8	3.500	50.6	6.500	68.4	9.500	82.2

Technical Note

Microdrainage Simulation Results

Pond 19a

100yr+30%CC

AECOM		Page 1
Midpoint Alencon Link Basingstoke, RG21 7PP	Arborfield - Hazebrouke SuDS Attenuation Assessment Pond 19a - 100yr+30%CC	
Date 23/08/2022 File Hazebrouck Cascade - V2E Tan...	Designed by AB Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Summary of Results for Arborfield Hazebrouke SuDS - Pond 19a 100yr +30%CC FEH v3.srcx

**Upstream
Structures**

Outflow To

Overflow To

(None) Arborfield Hazebrouke SuDS - Pond 19c1 100yr +30%CC FEH v3.srcx

(None)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	54.021	0.806	4.4	116.9	O K
30 min Summer	54.059	0.844	4.4	125.8	O K
60 min Summer	54.087	0.872	4.4	132.5	O K
120 min Summer	54.094	0.879	4.4	134.2	O K
180 min Summer	54.080	0.865	4.4	130.9	O K
240 min Summer	54.058	0.843	4.4	125.7	O K
360 min Summer	54.006	0.791	4.4	113.6	O K
480 min Summer	53.960	0.745	4.4	103.5	O K
600 min Summer	53.922	0.707	4.4	95.3	O K
720 min Summer	53.886	0.671	4.4	88.0	O K
960 min Summer	53.819	0.604	4.4	75.1	O K
1440 min Summer	53.696	0.481	4.4	54.0	O K
2160 min Summer	53.542	0.327	4.3	31.9	O K
2880 min Summer	53.432	0.217	4.2	18.8	O K
4320 min Summer	53.323	0.108	3.7	8.3	O K
5760 min Summer	53.285	0.070	3.1	5.2	O K
7200 min Summer	53.268	0.053	2.6	3.9	O K
8640 min Summer	53.258	0.043	2.3	3.1	O K
10080 min Summer	53.251	0.036	2.0	2.6	O K
15 min Winter	54.083	0.868	4.4	131.6	O K
30 min Winter	54.124	0.909	4.4	141.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	244.996	0.0	122.2	26
30 min Summer	134.253	0.0	133.9	40
60 min Summer	73.568	0.0	146.8	68
120 min Summer	40.314	0.0	160.8	126
180 min Summer	28.356	0.0	169.7	184
240 min Summer	22.091	0.0	176.3	242
360 min Summer	15.538	0.0	186.0	308
480 min Summer	12.106	0.0	193.2	358
600 min Summer	9.974	0.0	199.0	418
720 min Summer	8.515	0.0	203.8	484
960 min Summer	6.622	0.0	211.4	614
1440 min Summer	4.647	0.0	222.4	866
2160 min Summer	3.260	0.0	234.1	1216
2880 min Summer	2.536	0.0	242.8	1556
4320 min Summer	1.832	0.0	263.1	2216
5760 min Summer	1.455	0.0	278.5	2936
7200 min Summer	1.216	0.0	291.1	3672
8640 min Summer	1.051	0.0	301.9	4376
10080 min Summer	0.929	0.0	311.2	5136
15 min Winter	244.996	0.0	136.8	26
30 min Winter	134.253	0.0	150.0	40

AECOM		Page 2
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19a - 100yr+30%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Summary of Results for Arborfield Hazebrouke SuDS - Pond 19a 100yr +30%CC FEH v3.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	54.157	0.942	4.4	150.2	O K
120 min Winter	54.170	0.955	4.4	153.7	O K
180 min Winter	54.161	0.946	4.4	151.4	O K
240 min Winter	54.143	0.928	4.4	146.8	O K
360 min Winter	54.096	0.881	4.4	134.8	O K
480 min Winter	54.045	0.830	4.4	122.5	O K
600 min Winter	53.996	0.781	4.4	111.3	O K
720 min Winter	53.947	0.732	4.4	100.7	O K
960 min Winter	53.851	0.636	4.4	81.2	O K
1440 min Winter	53.671	0.456	4.4	50.0	O K
2160 min Winter	53.456	0.241	4.2	21.5	O K
2880 min Winter	53.337	0.122	3.8	9.5	O K
4320 min Winter	53.276	0.061	2.9	4.4	O K
5760 min Winter	53.258	0.043	2.3	3.1	O K
7200 min Winter	53.249	0.034	1.9	2.4	O K
8640 min Winter	53.243	0.028	1.7	1.9	O K
10080 min Winter	53.238	0.023	1.5	1.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
60 min Winter	73.568	0.0	164.3	68
120 min Winter	40.314	0.0	180.1	124
180 min Winter	28.356	0.0	190.0	180
240 min Winter	22.091	0.0	197.4	236
360 min Winter	15.538	0.0	208.3	344
480 min Winter	12.106	0.0	216.3	394
600 min Winter	9.974	0.0	222.8	462
720 min Winter	8.515	0.0	228.3	532
960 min Winter	6.622	0.0	236.7	668
1440 min Winter	4.647	0.0	249.1	916
2160 min Winter	3.260	0.0	262.2	1240
2880 min Winter	2.536	0.0	271.9	1556
4320 min Winter	1.832	0.0	294.7	2208
5760 min Winter	1.455	0.0	312.0	2936
7200 min Winter	1.216	0.0	326.1	3656
8640 min Winter	1.051	0.0	338.1	4352
10080 min Winter	0.929	0.0	348.6	5136

AECOM		Page 3
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19a - 100yr+30%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Rainfall Details for Arborfield Hazebrouke SuDS - Pond 19a 100yr +30%CC FEH v3.srcx

Rainfall Model	FEH	F (1km)	2.642
Return Period (years)	100	Summer Storms	Yes
FEH Rainfall Version	1999	Winter Storms	Yes
Site Location GB 476950 165250 SU 76950 65250		Cv (Summer)	0.750
C (1km)	-0.028	Cv (Winter)	0.840
D1 (1km)	0.261	Shortest Storm (mins)	15
D2 (1km)	0.255	Longest Storm (mins)	10080
D3 (1km)	0.327	Climate Change %	+30
E (1km)	0.303		

Time Area Diagram

Total Area (ha) 0.266

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
From:	To:	From:	To:	From:	To:
0	4	0.089	4	8	0.089
				8	12
					0.088

Time Area Diagram

Total Area (ha) 0.000

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

AECOM		Page 4
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19a - 100yr+30%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Model Details for Arborfield Hazebrouke SuDS - Pond 19a 100yr +30%CC FEH v3.srcx

Storage is Online Cover Level (m) 55.300

Tank or Pond Structure

Invert Level (m) 53.215

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	67.8	0.600	184.5	1.200	322.6	1.800	482.1	2.051	0.0
0.200	104.3	0.800	228.2	1.400	373.4	2.000	540.0		
0.400	143.2	1.000	274.2	1.600	426.6	2.050	555.2		

Hydro-Brake® Optimum Outflow Control

Unit Reference MD-SHE-0094-5000-1820-5000
 Design Head (m) 1.820
 Design Flow (l/s) 5.0
 Flush-Flo™ Calculated
 Objective Minimise upstream storage
 Application Surface
 Sump Available Yes
 Diameter (mm) 94
 Invert Level (m) 53.180
 Minimum Outlet Pipe Diameter (mm) 150
 Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.820	5.0	Kick-Flo®	0.839	3.5
Flush-Flo™	0.414	4.4	Mean Flow over Head Range	-	4.0

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.0	0.800	3.7	2.000	5.2	4.000	7.2	7.000	9.4
0.200	4.0	1.000	3.8	2.200	5.5	4.500	7.6	7.500	9.7
0.300	4.3	1.200	4.1	2.400	5.7	5.000	8.0	8.000	10.0
0.400	4.4	1.400	4.4	2.600	5.9	5.500	8.4	8.500	10.3
0.500	4.3	1.600	4.7	3.000	6.3	6.000	8.7	9.000	10.6
0.600	4.2	1.800	5.0	3.500	6.8	6.500	9.1	9.500	10.9

Technical Note

Microdrainage Simulation Results

Pond 19c1

100yr+30%CC

AECOM		Page 1
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19c1 - 100yr+30%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Summary of Results for Arborfield Hazebrouke SuDS - Pond 19c1 100yr +30%CC FEH v3.srcx

Upstream Structures

Outflow To

Arborfield Hazebrouke SuDS - Pond 16 100yr +30%CC FEH v3.srcx Arborfield Hazebrouke SuDS - Pond 19c3 with V2E Tan...
Arborfield Hazebrouke SuDS - Pond 17 100yr +30%CC FEH v2.srcx
Arborfield Hazebrouke SuDS - Pond 19a 100yr +30%CC FEH v3.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	52.757	1.657	56.0	701.5	O K
30 min Summer	52.835	1.735	56.0	758.1	O K
60 min Summer	52.895	1.795	56.0	802.9	O K
120 min Summer	52.922	1.822	56.0	823.6	O K
180 min Summer	52.912	1.812	56.0	815.8	O K
240 min Summer	52.888	1.788	56.0	797.4	O K
360 min Summer	52.825	1.725	56.0	750.8	O K
480 min Summer	52.773	1.673	56.0	712.7	O K
600 min Summer	52.728	1.628	56.0	681.2	O K
720 min Summer	52.691	1.591	56.0	655.6	O K
960 min Summer	52.635	1.535	56.0	618.0	O K
1440 min Summer	52.524	1.424	56.0	546.7	O K
2160 min Summer	52.235	1.135	56.0	382.0	O K
2880 min Summer	51.937	0.837	56.0	242.8	O K
4320 min Summer	51.547	0.447	55.6	103.7	O K
5760 min Summer	51.363	0.263	52.2	54.2	O K
7200 min Summer	51.318	0.218	45.7	43.5	O K
8640 min Summer	51.291	0.191	40.1	37.4	O K
10080 min Summer	51.272	0.172	35.7	33.2	O K
15 min Winter	52.875	1.775	56.0	787.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	244.996	0.0	2185.4	27
30 min Summer	134.253	0.0	2395.2	41
60 min Summer	73.568	0.0	2625.1	70
120 min Summer	40.314	0.0	2876.9	130
180 min Summer	28.356	0.0	3035.3	188
240 min Summer	22.091	0.0	3152.9	244
360 min Summer	15.538	0.0	3326.6	328
480 min Summer	12.106	0.0	3455.3	386
600 min Summer	9.974	0.0	3559.0	446
720 min Summer	8.515	0.0	3645.7	512
960 min Summer	6.622	0.0	3780.5	672
1440 min Summer	4.647	0.0	3978.9	994
2160 min Summer	3.260	0.0	4187.6	1372
2880 min Summer	2.536	0.0	4342.6	1680
4320 min Summer	1.832	0.0	4706.5	2300
5760 min Summer	1.455	0.0	4981.7	2952
7200 min Summer	1.216	0.0	5207.4	3680
8640 min Summer	1.051	0.0	5399.8	4408
10080 min Summer	0.929	0.0	5566.5	5144
15 min Winter	244.996	0.0	2447.6	26

AECOM		Page 2
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19c1 - 100yr+30%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Summary of Results for Arborfield Hazebrouke SuDS - Pond 19c1 100yr +30%CC FEH
v3.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
30 min Winter	52.960	1.860	56.0	853.2	O K
60 min Winter	53.029	1.929	56.3	908.7	Flood Risk
120 min Winter	53.069	1.969	56.9	941.2	Flood Risk
180 min Winter	53.068	1.968	56.9	940.4	Flood Risk
240 min Winter	53.051	1.951	56.6	926.5	Flood Risk
360 min Winter	52.996	1.896	56.0	882.1	O K
480 min Winter	52.931	1.831	56.0	830.8	O K
600 min Winter	52.880	1.780	56.0	791.8	O K
720 min Winter	52.833	1.733	56.0	756.1	O K
960 min Winter	52.743	1.643	56.0	691.7	O K
1440 min Winter	52.613	1.513	56.0	603.4	O K
2160 min Winter	52.190	1.090	56.0	359.1	O K
2880 min Winter	51.698	0.598	56.0	151.8	O K
4320 min Winter	51.340	0.240	49.8	48.8	O K
5760 min Winter	51.292	0.192	40.4	37.7	O K
7200 min Winter	51.264	0.164	33.9	31.6	O K
8640 min Winter	51.245	0.145	29.4	27.5	O K
10080 min Winter	51.231	0.131	26.1	24.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	134.253	0.0	2682.7	41
60 min Winter	73.568	0.0	2940.1	70
120 min Winter	40.314	0.0	3222.2	126
180 min Winter	28.356	0.0	3399.5	184
240 min Winter	22.091	0.0	3531.3	240
360 min Winter	15.538	0.0	3725.8	348
480 min Winter	12.106	0.0	3870.3	438
600 min Winter	9.974	0.0	3986.3	474
720 min Winter	8.515	0.0	4083.4	550
960 min Winter	6.622	0.0	4234.4	700
1440 min Winter	4.647	0.0	4456.6	1056
2160 min Winter	3.260	0.0	4690.9	1468
2880 min Winter	2.536	0.0	4864.2	1704
4320 min Winter	1.832	0.0	5271.2	2248
5760 min Winter	1.455	0.0	5580.4	2936
7200 min Winter	1.216	0.0	5832.3	3680
8640 min Winter	1.051	0.0	6047.1	4408
10080 min Winter	0.929	0.0	6234.7	5112

AECOM		Page 3
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19c1 - 100yr+30%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Rainfall Details for Arborfield Hazebrouke SuDS - Pond 19c1 100yr +30%CC FEH v3.srcx

Rainfall Model	FEH	F (1km)	2.642
Return Period (years)	100	Summer Storms	Yes
FEH Rainfall Version	1999	Winter Storms	Yes
Site Location GB 476950 165250 SU 76950 65250		Cv (Summer)	0.750
C (1km)	-0.028	Cv (Winter)	0.840
D1 (1km)	0.261	Shortest Storm (mins)	15
D2 (1km)	0.255	Longest Storm (mins)	10080
D3 (1km)	0.327	Climate Change %	+30
E (1km)	0.303		

Time Area Diagram

Total Area (ha) 1.575

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From: To: (ha)		From: To: (ha)		From: To: (ha)	
0 4 0.383		4 8 0.192		8 12 1.000	

Time Area Diagram

Total Area (ha) 0.000

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

AECOM		Page 4
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19c1 - 100yr+30%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Model Details for Arborfield Hazebrouke SuDS - Pond 19c1 100yr +30%CC FEH v3.srcx

Storage is Online Cover Level (m) 53.300

Tank or Pond Structure

Invert Level (m) 51.100

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	170.6	0.600	342.8	1.200	541.2	1.800	763.1	2.400	923.0
0.100	197.3	0.700	374.1	1.300	576.6	1.900	802.2	2.500	923.0
0.200	224.8	0.800	406.2	1.400	612.7	2.000	841.9		
0.300	253.2	0.900	438.9	1.500	649.4	2.100	882.2		
0.400	282.3	1.000	472.3	1.600	686.7	2.200	923.0		
0.500	312.2	1.100	506.5	1.700	724.6	2.300	923.0		

Hydro-Brake® Optimum Outflow Control

Unit Reference MD-SHE-0297-5600-1950-5600
Design Head (m) 1.950
Design Flow (l/s) 56.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 297
Invert Level (m) 51.050
Minimum Outlet Pipe Diameter (mm) 375
Suggested Manhole Diameter (mm) 2100

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.950	55.9	Kick-Flo®	1.321	46.4
Flush-Flo™	0.604	56.0	Mean Flow over Head Range	-	48.0

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	9.1	0.800	55.3	2.000	56.6	4.000	79.2	7.000	104.0
0.200	30.6	1.000	53.8	2.200	59.3	4.500	83.9	7.500	107.6
0.300	51.7	1.200	50.5	2.400	61.8	5.000	88.3	8.000	111.0
0.400	54.4	1.400	47.7	2.600	64.3	5.500	92.5	8.500	114.3
0.500	55.6	1.600	50.9	3.000	68.9	6.000	96.5	9.000	117.6
0.600	56.0	1.800	53.8	3.500	74.2	6.500	100.3	9.500	120.7

Technical Note

Microdrainage Simulation Results

Pond 19c2

100yr+30%CC

AECOM		Page 1
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19c2 - 100yr+30%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Summary of Results for Arborfield Hazebrouke SuDS - Pond 19c2 100yr +30%CC FEH v3.srcx

Upstream Structures	Outflow To	Overflow To
(None)	Arborfield Hazebrouke SuDS - Pond 19c3 with V2E Tanks 100yr +30%CC FEH 24-08-19.srcx	(None)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	51.495	0.695	11.0	121.0	O K
30 min Summer	51.513	0.713	11.0	126.2	O K
60 min Summer	51.508	0.708	11.0	124.6	O K
120 min Summer	51.456	0.656	11.0	110.5	O K
180 min Summer	51.411	0.611	11.0	98.8	O K
240 min Summer	51.373	0.573	11.0	89.1	O K
360 min Summer	51.303	0.503	11.0	73.1	O K
480 min Summer	51.239	0.439	11.0	59.6	O K
600 min Summer	51.179	0.379	11.0	48.2	O K
720 min Summer	51.125	0.325	11.0	38.6	O K
960 min Summer	51.034	0.234	10.8	24.7	O K
1440 min Summer	50.925	0.125	9.9	11.3	O K
2160 min Summer	50.878	0.078	7.5	6.6	O K
2880 min Summer	50.858	0.058	5.9	4.7	O K
4320 min Summer	50.838	0.038	4.3	3.0	O K
5760 min Summer	50.827	0.027	3.4	2.0	O K
7200 min Summer	50.819	0.019	2.9	1.4	O K
8640 min Summer	50.814	0.014	2.5	1.0	O K
10080 min Summer	50.810	0.010	2.2	0.7	O K
15 min Winter	51.550	0.750	11.0	136.9	O K
30 min Winter	51.573	0.773	11.0	143.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	244.996	0.0	132.3	21
30 min Summer	134.253	0.0	145.0	34
60 min Summer	73.568	0.0	158.8	62
120 min Summer	40.314	0.0	174.1	104
180 min Summer	28.356	0.0	183.6	132
240 min Summer	22.091	0.0	190.9	164
360 min Summer	15.538	0.0	201.3	230
480 min Summer	12.106	0.0	209.2	294
600 min Summer	9.974	0.0	215.3	356
720 min Summer	8.515	0.0	220.6	414
960 min Summer	6.622	0.0	228.8	528
1440 min Summer	4.647	0.0	240.8	750
2160 min Summer	3.260	0.0	253.5	1104
2880 min Summer	2.536	0.0	262.9	1468
4320 min Summer	1.832	0.0	284.9	2200
5760 min Summer	1.455	0.0	301.6	2896
7200 min Summer	1.216	0.0	315.2	3584
8640 min Summer	1.051	0.0	326.8	4400
10080 min Summer	0.929	0.0	337.0	5048
15 min Winter	244.996	0.0	148.1	21
30 min Winter	134.253	0.0	162.3	34

AECOM		Page 2
Midpoint Alencon Link Basingstoke, RG21 7PP	Arborfield - Hazebrouke SuDS Attenuation Assessment Pond 19c2 - 100yr+30%CC	
Date 23/08/2022 File Hazebrouck Cascade - V2E Tan...	Designed by AB Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Summary of Results for Arborfield Hazebrouke SuDS - Pond 19c2 100yr +30%CC FEH
v3.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m ³)	Status
60 min Winter	51.574	0.774	11.0	144.3	O K
120 min Winter	51.530	0.730	11.0	131.0	O K
180 min Winter	51.474	0.674	11.0	115.3	O K
240 min Winter	51.425	0.625	11.0	102.1	O K
360 min Winter	51.328	0.528	11.0	78.6	O K
480 min Winter	51.235	0.435	11.0	58.7	O K
600 min Winter	51.147	0.347	11.0	42.3	O K
720 min Winter	51.068	0.268	10.9	29.7	O K
960 min Winter	50.953	0.153	10.2	14.4	O K
1440 min Winter	50.883	0.083	7.8	7.0	O K
2160 min Winter	50.853	0.053	5.5	4.2	O K
2880 min Winter	50.838	0.038	4.3	3.0	O K
4320 min Winter	50.823	0.023	3.1	1.7	O K
5760 min Winter	50.814	0.014	2.5	1.0	O K
7200 min Winter	50.808	0.008	2.1	0.6	O K
8640 min Winter	50.804	0.004	1.8	0.3	O K
10080 min Winter	50.800	0.000	1.6	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
60 min Winter	73.568	0.0	177.9	62
120 min Winter	40.314	0.0	195.0	116
180 min Winter	28.356	0.0	205.7	144
240 min Winter	22.091	0.0	213.6	180
360 min Winter	15.538	0.0	225.5	250
480 min Winter	12.106	0.0	234.3	316
600 min Winter	9.974	0.0	241.2	374
720 min Winter	8.515	0.0	247.1	430
960 min Winter	6.622	0.0	256.3	530
1440 min Winter	4.647	0.0	269.7	740
2160 min Winter	3.260	0.0	283.9	1104
2880 min Winter	2.536	0.0	294.4	1468
4320 min Winter	1.832	0.0	319.0	2200
5760 min Winter	1.455	0.0	337.8	2936
7200 min Winter	1.216	0.0	353.0	3672
8640 min Winter	1.051	0.0	366.1	4336
10080 min Winter	0.929	0.0	377.4	0

AECOM		Page 3
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19c2 - 100yr+30%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Rainfall Details for Arborfield Hazebrouke SuDS - Pond 19c2 100yr +30%CC FEH
v3.srcx

Rainfall Model	FEH	F (1km)	2.642
Return Period (years)	100	Summer Storms	Yes
FEH Rainfall Version	1999	Winter Storms	Yes
Site Location	GB 476950 165250 SU 76950 65250	Cv (Summer)	0.750
C (1km)	-0.028	Cv (Winter)	0.840
D1 (1km)	0.261	Shortest Storm (mins)	15
D2 (1km)	0.255	Longest Storm (mins)	10080
D3 (1km)	0.327	Climate Change %	+30
E (1km)	0.303		

Time Area Diagram

Total Area (ha) 0.288

Time (mins)	Area	Time (mins)	Area
From: To: (ha)		From: To: (ha)	
0 4 0.192		4 8 0.096	

Time Area Diagram

Total Area (ha) 0.000

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

AECOM		Page 4
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19c2 - 100yr+30%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Model Details for Arborfield Hazebrouke SuDS - Pond 19c2 100yr +30%CC FEH v3.srcx

Storage is Online Cover Level (m) 52.400

Tank or Pond Structure

Invert Level (m) 50.800

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	73.0	0.600	250.6	1.200	457.9	1.800	608.5	2.400	608.5
0.100	101.0	0.700	282.3	1.300	496.2	1.900	608.5	2.500	608.5
0.200	129.8	0.800	315.7	1.400	532.9	2.000	608.5		
0.300	159.1	0.900	349.9	1.500	570.9	2.100	608.5		
0.400	189.0	1.000	385.1	1.600	608.5	2.200	608.5		
0.500	219.5	1.100	421.1	1.700	608.5	2.300	608.5		

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0147-1100-1350-1100
Design Head (m)	1.350
Design Flow (l/s)	11.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	147
Invert Level (m)	50.750
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.350	11.0	Kick-Flo®	0.858	8.9
Flush-Flo™	0.397	11.0	Mean Flow over Head Range	-	9.5

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	5.3	0.800	9.6	2.000	13.2	4.000	18.4	7.000	24.1
0.200	10.2	1.000	9.5	2.200	13.9	4.500	19.5	7.500	24.9
0.300	10.8	1.200	10.4	2.400	14.4	5.000	20.5	8.000	25.7
0.400	11.0	1.400	11.2	2.600	15.0	5.500	21.5	8.500	26.5
0.500	10.9	1.600	11.9	3.000	16.1	6.000	22.4	9.000	27.2
0.600	10.7	1.800	12.6	3.500	17.3	6.500	23.2	9.500	27.9

Technical Note

Microdrainage Simulation Results

Pond 19c3 + V2E Tanks

100yr+30%CC

AECOM		Page 1
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19c3 + Tanks, 100yr+30%CC	
Date 19/08/2024	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by DM	
Innovyze	Source Control 2020.1	

Cascade Summary of Results for Arborfield Hazebrouke SuDS - Pond 19c3 with V2E Tanks
100yr +30%CC FEH 24-08-19.srcx

Upstream Structures	Outflow To Overflow To	
Arborfield Hazebrouke SuDS - Pond 19c2 100yr +30%CC FEH v3.srcx	(None)	(None)
Arborfield Hazebrouke SuDS - Pond 19c1 100yr +30%CC FEH v3.srcx		
Arborfield Hazebrouke SuDS - Pond 16 100yr +30%CC FEH v3.srcx		
Arborfield Hazebrouke SuDS - Pond 17 100yr +30%CC FEH v2.srcx		
Arborfield Hazebrouke SuDS - Pond 19a 100yr +30%CC FEH v3.srcx		

Half Drain Time : 129 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	51.014	1.114	0.0	73.4	73.4	721.8	O K
30 min Summer	51.083	1.183	0.0	73.4	73.4	783.5	O K
60 min Summer	51.156	1.256	0.0	73.4	73.4	849.8	O K
120 min Summer	51.223	1.323	0.0	73.4	73.4	913.5	O K
180 min Summer	51.253	1.353	0.0	73.4	73.4	942.6	O K
240 min Summer	51.267	1.367	0.0	73.4	73.4	956.0	O K
360 min Summer	51.270	1.370	0.0	73.4	73.4	959.3	O K
480 min Summer	51.240	1.340	0.0	73.4	73.4	929.4	O K
600 min Summer	51.187	1.287	0.0	73.4	73.4	879.4	O K
720 min Summer	51.141	1.241	0.0	73.4	73.4	836.4	O K
960 min Summer	51.057	1.157	0.0	73.4	73.4	760.0	O K
1440 min Summer	50.859	0.959	0.0	73.4	73.4	590.8	O K
2160 min Summer	50.696	0.796	0.0	73.4	73.4	462.2	O K
2880 min Summer	50.548	0.648	0.0	73.4	73.4	353.7	O K
4320 min Summer	50.299	0.399	0.0	73.3	73.3	189.2	O K
5760 min Summer	50.110	0.210	0.0	70.9	70.9	78.3	O K
7200 min Summer	50.038	0.138	0.0	63.7	63.7	39.2	O K
8640 min Summer	50.006	0.106	0.0	56.0	56.0	22.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	244.996	0.0	3055.9	23
30 min Summer	134.253	0.0	3350.0	38
60 min Summer	73.568	0.0	3671.5	68
120 min Summer	40.314	0.0	4024.8	128
180 min Summer	28.356	0.0	4245.6	186
240 min Summer	22.091	0.0	4409.4	246
360 min Summer	15.538	0.0	4652.2	364
480 min Summer	12.106	0.0	4833.2	480
600 min Summer	9.974	0.0	4978.3	536
720 min Summer	8.515	0.0	5099.4	598
960 min Summer	6.622	0.0	5287.8	740
1440 min Summer	4.647	0.0	5565.7	928
2160 min Summer	3.260	0.0	5857.4	1316
2880 min Summer	2.536	0.0	6074.2	1708
4320 min Summer	1.832	0.0	6582.9	2408
5760 min Summer	1.455	0.0	6968.1	3008
7200 min Summer	1.216	0.0	7283.7	3680
8640 min Summer	1.051	0.0	7552.5	4408

AECOM		Page 2
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19c3 + Tanks, 100yr+30%CC	
Date 19/08/2024	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by DM	
Innovyze	Source Control 2020.1	

Cascade Summary of Results for Arborfield Hazebrouke SuDS - Pond 19c3 with V2E Tanks
100yr +30%CC FEH 24-08-19.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max E Outflow (l/s)	Max Volume (m³)	Status
10080 min Summer	49.985	0.085	0.0	50.0	50.0	16.5	O K
15 min Winter	51.114	1.214	0.0	73.4	73.4	811.2	O K
30 min Winter	51.189	1.289	0.0	73.4	73.4	881.2	O K
60 min Winter	51.267	1.367	0.0	73.4	73.4	955.8	O K
120 min Winter	51.342	1.442	0.0	73.4	73.4	1029.9	O K
180 min Winter	51.379	1.479	0.0	73.4	73.4	1067.4	O K
240 min Winter	51.398	1.498	0.0	73.4	73.4	1087.2	O K
360 min Winter	51.410	1.510	0.0	73.4	73.4	1098.9	O K
480 min Winter	51.398	1.498	0.0	73.4	73.4	1086.7	O K
600 min Winter	51.349	1.449	0.0	73.4	73.4	1036.9	O K
720 min Winter	51.295	1.395	0.0	73.4	73.4	983.0	O K
960 min Winter	51.199	1.299	0.0	73.4	73.4	890.5	O K
1440 min Winter	51.000	1.100	0.0	73.4	73.4	709.2	O K
2160 min Winter	50.717	0.817	0.0	73.4	73.4	478.0	O K
2880 min Winter	50.486	0.586	0.0	73.4	73.4	310.7	O K
4320 min Winter	50.067	0.167	0.0	69.5	69.5	55.2	O K
5760 min Winter	50.008	0.108	0.0	56.5	56.5	23.7	O K
7200 min Winter	49.976	0.076	0.0	47.6	47.6	14.8	O K
8640 min Winter	49.954	0.054	0.0	41.3	41.3	10.5	O K
10080 min Winter	49.938	0.038	0.0	36.5	36.5	7.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
10080 min Summer	0.929	0.0	7786.1	5136
15 min Winter	244.996	0.0	3423.1	23
30 min Winter	134.253	0.0	3751.8	38
60 min Winter	73.568	0.0	4112.7	68
120 min Winter	40.314	0.0	4506.6	126
180 min Winter	28.356	0.0	4755.3	184
240 min Winter	22.091	0.0	4939.5	242
360 min Winter	15.538	0.0	5212.2	360
480 min Winter	12.106	0.0	5414.3	470
600 min Winter	9.974	0.0	5575.5	570
720 min Winter	8.515	0.0	5712.3	664
960 min Winter	6.622	0.0	5923.5	760
1440 min Winter	4.647	0.0	6233.1	1098
2160 min Winter	3.260	0.0	6561.1	1428
2880 min Winter	2.536	0.0	6803.6	1836
4320 min Winter	1.832	0.0	7372.8	2272
5760 min Winter	1.455	0.0	7805.4	2944
7200 min Winter	1.216	0.0	8157.9	3672
8640 min Winter	1.051	0.0	8458.4	4400
10080 min Winter	0.929	0.0	8720.6	5128

AECOM		Page 3
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19c3 + Tanks, 100yr+30%CC	
Date 19/08/2024	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by DM	
Innovyze	Source Control 2020.1	

Cascade Rainfall Details for Arborfield Hazebrouke SuDS - Pond 19c3 with V2E Tanks
100yr +30%CC FEH 24-08-19.srcx

Rainfall Model	FEH	F (1km)	2.642
Return Period (years)	100	Summer Storms	Yes
FEH Rainfall Version	1999	Winter Storms	Yes
Site Location	GB 476950 165250 SU 76950 65250	Cv (Summer)	0.750
C (1km)	-0.028	Cv (Winter)	0.840
D1 (1km)	0.261	Shortest Storm (mins)	15
D2 (1km)	0.255	Longest Storm (mins)	10080
D3 (1km)	0.327	Climate Change %	+30
E (1km)	0.303		

Time Area Diagram

Total Area (ha) 1.609

Time (mins)	Area	Time (mins)	Area
From: To: (ha)		From: To: (ha)	
0 4 1.072		4 8 0.537	

Time Area Diagram

Total Area (ha) 0.000

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

AECOM		Page 4
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19c3 + Tanks, 100yr+30%CC	
Date 19/08/2024	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by DM	
Innovyze	Source Control 2020.1	

Cascade Model Details for Arborfield Hazebrouke SuDS - Pond 19c3 with V2E Tanks 100yr +30%CC FEH 24-08-19.srcx

Storage is Online Cover Level (m) 51.800

Complex Structure

Tank or Pond

Invert Level (m) 49.900

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	65.0	1.599	65.0	1.600	0.0

Tank or Pond

Invert Level (m) 49.900

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	130.0	1.599	130.0	1.600	0.0

Tank or Pond

Invert Level (m) 50.000

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	324.0	0.600	528.6	1.200	753.2	1.600	914.1
0.200	389.9	0.800	601.2	1.400	832.5	1.800	997.9
0.400	458.1	1.000	676.1	1.500	873.3		

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0337-7340-1770-7340
Design Head (m)	1.770
Design Flow (l/s)	73.4
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	337
Invert Level (m)	49.730
Minimum Outlet Pipe Diameter (mm)	375
Suggested Manhole Diameter (mm)	Site Specific Design (Contact Hydro International)

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.770	73.4	Kick-Flo®	1.259	62.2
Flush-Flo™	0.597	73.4	Mean Flow over Head Range	-	62.1

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

AECOM		Page 5
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19c3 + Tanks, 100yr+30%CC	
Date 19/08/2024	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by DM	
Innovyze	Source Control 2020.1	

Hydro-Brake® Optimum Outflow Control

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	9.9	0.800	72.4	2.000	77.8	4.000	109.0	7.000	143.2
0.200	34.3	1.000	70.2	2.200	81.5	4.500	115.4	7.500	148.1
0.300	61.9	1.200	65.1	2.400	85.0	5.000	121.5	8.000	152.9
0.400	71.4	1.400	65.5	2.600	88.4	5.500	127.3	8.500	157.5
0.500	73.0	1.600	69.9	3.000	94.8	6.000	132.8	9.000	162.0
0.600	73.4	1.800	74.0	3.500	102.1	6.500	138.1	9.500	166.3

Technical Note

Microdrainage Simulation Results

Pond 17

100yr+40%CC

AECOM		Page 1
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 17 - 100yr+40%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Summary of Results for Arborfield Hazebrouke SuDS - Pond 17 100yr +40%CC FEH v2.srcx

Upstream Structures

Outflow To

Overflow To

(None) Arborfield Hazebrouke SuDS - Pond 16 100yr +40%CC FEH v3.srcx

(None)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	55.534	0.799	11.0	500.7	O K
30 min Summer	55.584	0.849	11.0	542.8	O K
60 min Summer	55.627	0.892	11.0	581.1	O K
120 min Summer	55.658	0.923	11.0	608.2	O K
180 min Summer	55.663	0.928	11.0	613.3	O K
240 min Summer	55.659	0.924	11.0	609.2	O K
360 min Summer	55.635	0.900	11.0	588.1	O K
480 min Summer	55.603	0.868	11.0	559.9	O K
600 min Summer	55.574	0.839	11.0	534.4	O K
720 min Summer	55.547	0.812	11.0	511.8	O K
960 min Summer	55.498	0.763	11.0	470.8	O K
1440 min Summer	55.405	0.670	11.0	396.7	O K
2160 min Summer	55.280	0.545	11.0	303.1	O K
2880 min Summer	55.172	0.437	11.0	229.6	O K
4320 min Summer	55.024	0.289	10.9	138.8	O K
5760 min Summer	54.927	0.192	10.7	86.4	O K
7200 min Summer	54.873	0.138	10.2	59.3	O K
8640 min Summer	54.851	0.116	9.3	49.1	O K
10080 min Summer	54.836	0.101	8.3	42.5	O K
15 min Winter	55.606	0.871	11.0	562.1	O K
30 min Winter	55.660	0.925	11.0	610.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	263.842	0.0	513.3	26
30 min Summer	144.580	0.0	562.6	41
60 min Summer	79.227	0.0	616.6	70
120 min Summer	43.415	0.0	675.8	128
180 min Summer	30.537	0.0	713.0	186
240 min Summer	23.790	0.0	740.6	244
360 min Summer	16.734	0.0	781.4	362
480 min Summer	13.037	0.0	811.7	452
600 min Summer	10.742	0.0	836.0	504
720 min Summer	9.170	0.0	856.4	564
960 min Summer	7.132	0.0	888.1	692
1440 min Summer	5.004	0.0	934.8	956
2160 min Summer	3.511	0.0	983.9	1328
2880 min Summer	2.731	0.0	1020.2	1704
4320 min Summer	1.973	0.0	1105.6	2384
5760 min Summer	1.566	0.0	1170.4	3056
7200 min Summer	1.310	0.0	1223.4	3688
8640 min Summer	1.132	0.0	1268.4	4408
10080 min Summer	1.000	0.0	1307.8	5144
15 min Winter	263.842	0.0	574.9	26
30 min Winter	144.580	0.0	630.1	40

AECOM		Page 2
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 17 - 100yr+40%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Summary of Results for Arborfield Hazebrouke SuDS - Pond 17 100yr +40%CC FEH v2.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	55.709	0.974	11.0	654.7	O K
120 min Winter	55.745	1.010	11.0	689.0	O K
180 min Winter	55.755	1.020	11.0	698.4	O K
240 min Winter	55.754	1.019	11.0	697.3	O K
360 min Winter	55.736	1.001	11.0	680.0	O K
480 min Winter	55.707	0.972	11.0	653.4	O K
600 min Winter	55.674	0.939	11.0	623.2	O K
720 min Winter	55.641	0.906	11.0	593.6	O K
960 min Winter	55.584	0.849	11.0	542.8	O K
1440 min Winter	55.470	0.735	11.0	447.5	O K
2160 min Winter	55.282	0.547	11.0	305.1	O K
2880 min Winter	55.122	0.387	11.0	197.9	O K
4320 min Winter	54.924	0.189	10.7	84.9	O K
5760 min Winter	54.853	0.118	9.4	50.3	O K
7200 min Winter	54.831	0.096	8.0	40.2	O K
8640 min Winter	54.817	0.082	6.9	34.2	O K
10080 min Winter	54.808	0.073	6.1	30.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
60 min Winter	79.227	0.0	690.6	68
120 min Winter	43.415	0.0	756.9	126
180 min Winter	30.537	0.0	798.6	182
240 min Winter	23.790	0.0	829.6	240
360 min Winter	16.734	0.0	875.2	354
480 min Winter	13.037	0.0	909.1	462
600 min Winter	10.742	0.0	936.4	564
720 min Winter	9.170	0.0	959.2	592
960 min Winter	7.132	0.0	994.7	738
1440 min Winter	5.004	0.0	1046.9	1046
2160 min Winter	3.511	0.0	1101.8	1436
2880 min Winter	2.731	0.0	1142.8	1792
4320 min Winter	1.973	0.0	1238.3	2420
5760 min Winter	1.566	0.0	1311.0	3000
7200 min Winter	1.310	0.0	1370.3	3680
8640 min Winter	1.132	0.0	1420.6	4416
10080 min Winter	1.000	0.0	1464.8	5144

AECOM		Page 3
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 17 - 100yr+40%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Rainfall Details for Arborfield Hazebrouke SuDS - Pond 17 100yr +40%CC FEH v2.srcx

Rainfall Model	FEH	F (1km)	2.642
Return Period (years)	100	Summer Storms	Yes
FEH Rainfall Version	1999	Winter Storms	Yes
Site Location	GB 476950 165250 SU 76950 65250	Cv (Summer)	0.750
C (1km)	-0.028	Cv (Winter)	0.840
D1 (1km)	0.261	Shortest Storm (mins)	15
D2 (1km)	0.255	Longest Storm (mins)	10080
D3 (1km)	0.327	Climate Change %	+40
E (1km)	0.303		

Time Area Diagram

Total Area (ha) 1.038

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
From:	To:	From:	To:	From:	To:
0	4	0.350	4	8	0.350
				8	12
					0.338

Time Area Diagram

Total Area (ha) 0.000

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

AECOM		Page 4
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 17 - 100yr+40%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Model Details for Arborfield Hazebrouke SuDS - Pond 17 100yr +40%CC FEH v2.srcx

Storage is Online Cover Level (m) 56.100

Tank or Pond Structure

Invert Level (m) 54.735

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	390.0	0.300	580.0	0.600	740.0	0.900	890.0	1.200	1040.0
0.100	450.0	0.400	630.0	0.700	790.0	1.000	940.0	1.300	1070.0
0.200	520.0	0.500	690.0	0.800	840.0	1.100	990.0	1.301	0.0

Hydro-Brake® Optimum Outflow Control

Unit Reference MD-SHE-0151-1100-1100-1100
Design Head (m) 1.100
Design Flow (l/s) 11.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 151
Invert Level (m) 54.700
Minimum Outlet Pipe Diameter (mm) 225
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.100	11.0	Kick-Flo®	0.732	9.1
Flush-Flo™	0.334	11.0	Mean Flow over Head Range	-	9.5

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	5.4	0.800	9.5	2.000	14.6	4.000	20.3	7.000	26.6
0.200	10.5	1.000	10.5	2.200	15.3	4.500	21.5	7.500	27.5
0.300	10.9	1.200	11.5	2.400	15.9	5.000	22.6	8.000	28.4
0.400	10.9	1.400	12.3	2.600	16.5	5.500	23.7	8.500	29.2
0.500	10.7	1.600	13.1	3.000	17.7	6.000	24.7	9.000	30.0
0.600	10.3	1.800	13.9	3.500	19.1	6.500	25.7	9.500	30.8

Technical Note

Microdrainage Simulation Results

Pond 16

100yr+40%CC

AECOM		Page 1
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 16 - 100yr+40%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Summary of Results for Arborfield Hazebrouke SuDS - Pond 16 100yr +40%CC FEH v3.srcx

**Upstream
Structures**

Outflow To

Arborfield Hazebrouke SuDS - Pond 17 100yr +40%CC FEH v2.srcx Arborfield Hazebrouke SuDS - Pond 19c1 100yr +40%CC FEH v3.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	54.965	1.165	34.8	902.8	O K
30 min Summer	55.039	1.239	34.8	977.1	O K
60 min Summer	55.103	1.303	34.8	1042.4	O K
120 min Summer	55.143	1.343	34.8	1083.1	O K
180 min Summer	55.144	1.344	34.8	1084.4	O K
240 min Summer	55.129	1.329	34.8	1069.4	O K
360 min Summer	55.079	1.279	34.8	1017.3	O K
480 min Summer	55.026	1.226	34.8	963.2	O K
600 min Summer	54.978	1.178	34.8	915.7	O K
720 min Summer	54.934	1.134	34.8	872.4	O K
960 min Summer	54.847	1.047	34.8	789.2	O K
1440 min Summer	54.676	0.876	34.8	634.2	O K
2160 min Summer	54.470	0.670	34.8	461.9	O K
2880 min Summer	54.298	0.498	34.8	333.0	O K
4320 min Summer	54.105	0.305	34.2	195.4	O K
5760 min Summer	54.008	0.208	32.5	130.2	O K
7200 min Summer	53.976	0.176	29.5	109.3	O K
8640 min Summer	53.953	0.153	26.2	94.4	O K
10080 min Summer	53.936	0.136	23.5	83.5	O K
15 min Winter	55.076	1.276	34.8	1013.8	O K
30 min Winter	55.157	1.357	34.8	1098.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	263.842	0.0	1442.8	26
30 min Summer	144.580	0.0	1581.4	41
60 min Summer	79.227	0.0	1733.1	70
120 min Summer	43.415	0.0	1899.3	128
180 min Summer	30.537	0.0	2004.0	186
240 min Summer	23.790	0.0	2081.7	244
360 min Summer	16.734	0.0	2196.2	358
480 min Summer	13.037	0.0	2281.5	408
600 min Summer	10.742	0.0	2349.7	470
720 min Summer	9.170	0.0	2407.1	532
960 min Summer	7.132	0.0	2496.1	668
1440 min Summer	5.004	0.0	2626.9	914
2160 min Summer	3.511	0.0	2765.2	1288
2880 min Summer	2.731	0.0	2866.9	1644
4320 min Summer	1.973	0.0	3107.3	2304
5760 min Summer	1.566	0.0	3289.4	2992
7200 min Summer	1.310	0.0	3438.1	3680
8640 min Summer	1.132	0.0	3564.7	4408
10080 min Summer	1.000	0.0	3675.3	5144
15 min Winter	263.842	0.0	1616.0	26
30 min Winter	144.580	0.0	1771.2	40

AECOM		Page 2
Midpoint Alencon Link Basingstoke, RG21 7PP	Arborfield - Hazebrouke SuDS Attenuation Assessment Pond 16 - 100yr+40%CC	
Date 23/08/2022 File Hazebrouck Cascade - V2E Tan...	Designed by AB Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Summary of Results for Arborfield Hazebrouke SuDS - Pond 16 100yr +40%CC FEH
v3.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m ³)	Status
60 min Winter	55.229	1.429	34.8	1175.3	O K
120 min Winter	55.278	1.478	34.8	1228.0	O K
180 min Winter	55.285	1.485	34.8	1236.5	O K
240 min Winter	55.276	1.476	34.8	1225.9	O K
360 min Winter	55.233	1.433	34.8	1179.4	O K
480 min Winter	55.176	1.376	34.8	1118.4	O K
600 min Winter	55.117	1.317	34.8	1057.0	O K
720 min Winter	55.066	1.266	34.8	1004.4	O K
960 min Winter	54.962	1.162	34.8	899.7	O K
1440 min Winter	54.723	0.923	34.8	675.5	O K
2160 min Winter	54.417	0.617	34.8	421.7	O K
2880 min Winter	54.186	0.386	34.7	251.9	O K
4320 min Winter	53.994	0.194	32.0	121.2	O K
5760 min Winter	53.955	0.155	26.5	95.8	O K
7200 min Winter	53.930	0.130	22.4	79.8	O K
8640 min Winter	53.913	0.113	19.4	69.2	O K
10080 min Winter	53.901	0.101	17.2	61.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
60 min Winter	79.227	0.0	1941.1	68
120 min Winter	43.415	0.0	2127.3	126
180 min Winter	30.537	0.0	2244.5	182
240 min Winter	23.790	0.0	2331.6	238
360 min Winter	16.734	0.0	2459.8	350
480 min Winter	13.037	0.0	2555.2	454
600 min Winter	10.742	0.0	2631.8	492
720 min Winter	9.170	0.0	2696.1	564
960 min Winter	7.132	0.0	2795.8	720
1440 min Winter	5.004	0.0	2942.1	996
2160 min Winter	3.511	0.0	3096.7	1364
2880 min Winter	2.731	0.0	3211.4	1680
4320 min Winter	1.973	0.0	3479.9	2252
5760 min Winter	1.566	0.0	3684.1	2992
7200 min Winter	1.310	0.0	3850.8	3680
8640 min Winter	1.132	0.0	3992.4	4408
10080 min Winter	1.000	0.0	4116.4	5144

AECOM		Page 3
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 16 - 100yr+40%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Rainfall Details for Arborfield Hazebrouke SuDS - Pond 16 100yr +40%CC FEH
v3.srcx

Rainfall Model	FEH	F (1km)	2.642
Return Period (years)	100	Summer Storms	Yes
FEH Rainfall Version	1999	Winter Storms	Yes
Site Location GB 476950 165250 SU 76950 65250		Cv (Summer)	0.750
C (1km)	-0.028	Cv (Winter)	0.840
D1 (1km)	0.261	Shortest Storm (mins)	15
D2 (1km)	0.255	Longest Storm (mins)	10080
D3 (1km)	0.327	Climate Change %	+40
E (1km)	0.303		

Time Area Diagram

Total Area (ha) 1.879

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From: To: (ha)		From: To: (ha)		From: To: (ha)	
0 4 0.627		4 8 0.626		8 12 0.626	

Time Area Diagram

Total Area (ha) 0.000

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

AECOM		Page 4
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 16 - 100yr+40%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Model Details for Arborfield Hazebrouke SuDS - Pond 16 100yr +40%CC FEH v3.srcx

Storage is Online Cover Level (m) 55.650

Tank or Pond Structure

Invert Level (m) 53.800

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	593.6	0.600	748.0	1.200	994.7	1.800	1225.9
0.200	654.9	0.800	851.9	1.400	1069.5	1.900	1225.9
0.400	718.3	1.000	922.2	1.600	1146.6	1.901	0.0

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0245-3480-1605-3480
Design Head (m)	1.605
Design Flow (l/s)	34.8
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	245
Invert Level (m)	53.745
Minimum Outlet Pipe Diameter (mm)	300
Suggested Manhole Diameter (mm)	1800

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.605	34.8	Kick-Flo®	1.088	28.9
Flush-Flo™	0.497	34.8	Mean Flow over Head Range	-	29.8

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	8.0	0.800	33.6	2.000	38.7	4.000	54.0	7.000	70.9
0.200	24.9	1.000	31.2	2.200	40.5	4.500	57.2	7.500	73.3
0.300	33.3	1.200	30.3	2.400	42.2	5.000	60.2	8.000	75.6
0.400	34.5	1.400	32.6	2.600	43.9	5.500	63.0	8.500	77.9
0.500	34.8	1.600	34.7	3.000	47.0	6.000	65.8	9.000	80.1
0.600	34.6	1.800	36.8	3.500	50.6	6.500	68.4	9.500	82.2

Technical Note

Microdrainage Simulation Results

Pond 19a

100yr+40%CC

AECOM		Page 1
Midpoint Alencon Link Basingstoke, RG21 7PP	Arborfield - Hazebrouke SuDS Attenuation Assessment Pond 19a - 100yr+40%CC	
Date 23/08/2022 File Hazebrouck Cascade - V2E Tan...	Designed by AB Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Summary of Results for Arborfield Hazebrouke SuDS - Pond 19a 100yr +40%CC FEH v3.srcx

**Upstream
Structures**

Outflow To

Overflow To

(None) Arborfield Hazebrouke SuDS - Pond 19c1 100yr +40%CC FEH v3.srcx

(None)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	54.061	0.846	4.4	126.3	O K
30 min Summer	54.101	0.886	4.4	136.0	O K
60 min Summer	54.131	0.916	4.4	143.6	O K
120 min Summer	54.142	0.927	4.4	146.3	O K
180 min Summer	54.130	0.915	4.4	143.4	O K
240 min Summer	54.111	0.896	4.4	138.5	O K
360 min Summer	54.063	0.848	4.4	126.8	O K
480 min Summer	54.020	0.805	4.4	116.7	O K
600 min Summer	53.979	0.764	4.4	107.6	O K
720 min Summer	53.943	0.728	4.4	99.8	O K
960 min Summer	53.876	0.661	4.4	86.0	O K
1440 min Summer	53.753	0.538	4.4	63.4	O K
2160 min Summer	53.594	0.379	4.4	38.8	O K
2880 min Summer	53.473	0.258	4.3	23.5	O K
4320 min Summer	53.347	0.132	3.8	10.4	O K
5760 min Summer	53.294	0.079	3.4	5.9	O K
7200 min Summer	53.275	0.060	2.8	4.4	O K
8640 min Summer	53.263	0.048	2.5	3.4	O K
10080 min Summer	53.255	0.040	2.2	2.8	O K
15 min Winter	54.125	0.910	4.4	142.1	O K
30 min Winter	54.169	0.954	4.4	153.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	263.842	0.0	131.6	26
30 min Summer	144.580	0.0	144.2	40
60 min Summer	79.227	0.0	158.0	68
120 min Summer	43.415	0.0	173.2	126
180 min Summer	30.537	0.0	182.7	184
240 min Summer	23.790	0.0	189.8	242
360 min Summer	16.734	0.0	200.3	320
480 min Summer	13.037	0.0	208.0	380
600 min Summer	10.742	0.0	214.2	432
720 min Summer	9.170	0.0	219.5	494
960 min Summer	7.132	0.0	227.6	622
1440 min Summer	5.004	0.0	239.5	874
2160 min Summer	3.511	0.0	252.1	1232
2880 min Summer	2.731	0.0	261.5	1564
4320 min Summer	1.973	0.0	283.3	2248
5760 min Summer	1.566	0.0	300.0	2936
7200 min Summer	1.310	0.0	313.5	3672
8640 min Summer	1.132	0.0	325.1	4400
10080 min Summer	1.000	0.0	335.2	5040
15 min Winter	263.842	0.0	147.3	26
30 min Winter	144.580	0.0	161.5	40

AECOM		Page 2
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19a - 100yr+40%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Summary of Results for Arborfield Hazebrouke SuDS - Pond 19a 100yr +40%CC FEH v3.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	54.204	0.989	4.4	162.7	O K
120 min Winter	54.220	1.005	4.4	167.2	O K
180 min Winter	54.214	0.999	4.4	165.5	O K
240 min Winter	54.198	0.983	4.4	161.2	O K
360 min Winter	54.154	0.939	4.4	149.6	O K
480 min Winter	54.105	0.890	4.4	137.0	O K
600 min Winter	54.062	0.847	4.4	126.6	O K
720 min Winter	54.018	0.803	4.4	116.2	O K
960 min Winter	53.921	0.706	4.4	95.2	O K
1440 min Winter	53.740	0.525	4.4	61.2	O K
2160 min Winter	53.512	0.297	4.3	28.0	O K
2880 min Winter	53.370	0.155	3.9	12.6	O K
4320 min Winter	53.284	0.069	3.1	5.0	O K
5760 min Winter	53.263	0.048	2.5	3.4	O K
7200 min Winter	53.252	0.037	2.1	2.6	O K
8640 min Winter	53.246	0.031	1.8	2.1	O K
10080 min Winter	53.241	0.026	1.6	1.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
60 min Winter	79.227	0.0	177.0	68
120 min Winter	43.415	0.0	194.0	124
180 min Winter	30.537	0.0	204.7	182
240 min Winter	23.790	0.0	212.6	238
360 min Winter	16.734	0.0	224.3	346
480 min Winter	13.037	0.0	233.0	404
600 min Winter	10.742	0.0	240.0	472
720 min Winter	9.170	0.0	245.8	548
960 min Winter	7.132	0.0	255.0	682
1440 min Winter	5.004	0.0	268.3	938
2160 min Winter	3.511	0.0	282.4	1264
2880 min Winter	2.731	0.0	292.8	1568
4320 min Winter	1.973	0.0	317.3	2204
5760 min Winter	1.566	0.0	336.0	2912
7200 min Winter	1.310	0.0	351.2	3672
8640 min Winter	1.132	0.0	364.1	4392
10080 min Winter	1.000	0.0	375.4	5008

AECOM		Page 3
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19a - 100yr+40%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Rainfall Details for Arborfield Hazebrouke SuDS - Pond 19a 100yr +40%CC FEH v3.srcx

Rainfall Model	FEH	F (1km)	2.642
Return Period (years)	100	Summer Storms	Yes
FEH Rainfall Version	1999	Winter Storms	Yes
Site Location GB 476950 165250 SU 76950 65250		Cv (Summer)	0.750
C (1km)	-0.028	Cv (Winter)	0.840
D1 (1km)	0.261	Shortest Storm (mins)	15
D2 (1km)	0.255	Longest Storm (mins)	10080
D3 (1km)	0.327	Climate Change %	+40
E (1km)	0.303		

Time Area Diagram

Total Area (ha) 0.266

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From: To: (ha)		From: To: (ha)		From: To: (ha)	
0 4 0.089		4 8 0.089		8 12 0.088	

Time Area Diagram

Total Area (ha) 0.000

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

AECOM		Page 4
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19a - 100yr+40%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Model Details for Arborfield Hazebrouke SuDS - Pond 19a 100yr +40%CC FEH v3.srcx

Storage is Online Cover Level (m) 55.300

Tank or Pond Structure

Invert Level (m) 53.215

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	67.8	0.600	184.5	1.200	322.6	1.800	482.1	2.051	0.0
0.200	104.3	0.800	228.2	1.400	373.4	2.000	540.0		
0.400	143.2	1.000	274.2	1.600	426.6	2.050	555.2		

Hydro-Brake® Optimum Outflow Control

Unit Reference MD-SHE-0094-5000-1820-5000
Design Head (m) 1.820
Design Flow (l/s) 5.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 94
Invert Level (m) 53.180
Minimum Outlet Pipe Diameter (mm) 150
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.820	5.0	Kick-Flo®	0.839	3.5
Flush-Flo™	0.414	4.4	Mean Flow over Head Range	-	4.0

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.0	0.800	3.7	2.000	5.2	4.000	7.2	7.000	9.4
0.200	4.0	1.000	3.8	2.200	5.5	4.500	7.6	7.500	9.7
0.300	4.3	1.200	4.1	2.400	5.7	5.000	8.0	8.000	10.0
0.400	4.4	1.400	4.4	2.600	5.9	5.500	8.4	8.500	10.3
0.500	4.3	1.600	4.7	3.000	6.3	6.000	8.7	9.000	10.6
0.600	4.2	1.800	5.0	3.500	6.8	6.500	9.1	9.500	10.9

Technical Note

Microdrainage Simulation Results

Pond 19c1

100yr+40%CC

AECOM		Page 1
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19c1 - 100yr+40%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Summary of Results for Arborfield Hazebrouke SuDS - Pond 19c1 100yr +40%CC FEH v3.srcx

Upstream Structures

Outflow To

Arborfield Hazebrouke SuDS - Pond 16 100yr +40%CC FEH v3.srcx Arborfield Hazebrouke SuDS - Pond 19c3 with V2E Tan...
 Arborfield Hazebrouke SuDS - Pond 17 100yr +40%CC FEH v2.srcx
 Arborfield Hazebrouke SuDS - Pond 19a 100yr +40%CC FEH v3.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	52.833	1.733	56.0	756.7	O K
30 min Summer	52.915	1.815	56.0	818.4	O K
60 min Summer	52.980	1.880	56.0	868.8	O K
120 min Summer	53.012	1.912	56.1	895.0	Flood Risk
180 min Summer	53.006	1.906	56.0	889.7	Flood Risk
240 min Summer	52.984	1.884	56.0	872.5	O K
360 min Summer	52.923	1.823	56.0	824.1	O K
480 min Summer	52.866	1.766	56.0	781.3	O K
600 min Summer	52.820	1.720	56.0	746.7	O K
720 min Summer	52.778	1.678	56.0	716.7	O K
960 min Summer	52.707	1.607	56.0	666.2	O K
1440 min Summer	52.609	1.509	56.0	600.7	O K
2160 min Summer	52.440	1.340	56.0	495.4	O K
2880 min Summer	52.093	0.993	56.0	311.7	O K
4320 min Summer	51.654	0.554	56.0	137.2	O K
5760 min Summer	51.423	0.323	53.8	69.2	O K
7200 min Summer	51.335	0.235	48.9	47.5	O K
8640 min Summer	51.305	0.205	43.1	40.5	O K
10080 min Summer	51.283	0.183	38.4	35.7	O K
15 min Winter	52.956	1.856	56.0	849.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	263.842	0.0	2353.6	27
30 min Summer	144.580	0.0	2579.5	41
60 min Summer	79.227	0.0	2827.0	70
120 min Summer	43.415	0.0	3098.2	130
180 min Summer	30.537	0.0	3268.9	188
240 min Summer	23.790	0.0	3395.5	244
360 min Summer	16.734	0.0	3582.4	344
480 min Summer	13.037	0.0	3721.3	394
600 min Summer	10.742	0.0	3832.7	454
720 min Summer	9.170	0.0	3926.2	520
960 min Summer	7.132	0.0	4071.4	654
1440 min Summer	5.004	0.0	4285.0	972
2160 min Summer	3.511	0.0	4510.4	1468
2880 min Summer	2.731	0.0	4676.6	1736
4320 min Summer	1.973	0.0	5068.3	2344
5760 min Summer	1.566	0.0	5366.0	3000
7200 min Summer	1.310	0.0	5608.6	3680
8640 min Summer	1.132	0.0	5814.9	4408
10080 min Summer	1.000	0.0	5994.5	5136
15 min Winter	263.842	0.0	2636.0	26

AECOM		Page 2
Midpoint Alencon Link Basingstoke, RG21 7PP	Arborfield - Hazebrouke SuDS Attenuation Assessment Pond 19c1 - 100yr+40%CC	
Date 23/08/2022 File Hazebrouck Cascade - V2E Tan...	Designed by AB Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Summary of Results for Arborfield Hazebrouke SuDS - Pond 19c1 100yr +40%CC FEH
v3.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
30 min Winter	53.044	1.944	56.6	921.0	Flood Risk
60 min Winter	53.118	2.018	57.6	982.7	Flood Risk
120 min Winter	53.164	2.064	58.2	1021.6	Flood Risk
180 min Winter	53.167	2.067	58.2	1024.3	Flood Risk
240 min Winter	53.153	2.053	58.0	1012.2	Flood Risk
360 min Winter	53.102	2.002	57.3	969.1	Flood Risk
480 min Winter	53.039	1.939	56.5	916.8	Flood Risk
600 min Winter	52.983	1.883	56.0	871.4	O K
720 min Winter	52.934	1.834	56.0	832.8	O K
960 min Winter	52.840	1.740	56.0	761.2	O K
1440 min Winter	52.702	1.602	56.0	663.4	O K
2160 min Winter	52.470	1.370	56.0	513.7	O K
2880 min Winter	51.891	0.791	56.0	223.8	O K
4320 min Winter	51.377	0.277	52.6	57.6	O K
5760 min Winter	51.306	0.206	43.4	40.9	O K
7200 min Winter	51.275	0.175	36.6	34.0	O K
8640 min Winter	51.255	0.155	31.7	29.6	O K
10080 min Winter	51.240	0.140	28.1	26.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	144.580	0.0	2889.1	41
60 min Winter	79.227	0.0	3166.4	70
120 min Winter	43.415	0.0	3469.9	126
180 min Winter	30.537	0.0	3661.2	184
240 min Winter	23.790	0.0	3803.2	240
360 min Winter	16.734	0.0	4012.4	350
480 min Winter	13.037	0.0	4167.9	450
600 min Winter	10.742	0.0	4292.8	480
720 min Winter	9.170	0.0	4397.6	554
960 min Winter	7.132	0.0	4560.3	708
1440 min Winter	5.004	0.0	4799.3	1030
2160 min Winter	3.511	0.0	5051.3	1564
2880 min Winter	2.731	0.0	5238.3	1780
4320 min Winter	1.973	0.0	5676.6	2292
5760 min Winter	1.566	0.0	6009.5	2952
7200 min Winter	1.310	0.0	6281.1	3680
8640 min Winter	1.132	0.0	6512.2	4400
10080 min Winter	1.000	0.0	6714.5	5136

AECOM		Page 3
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19c1 - 100yr+40%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Rainfall Details for Arborfield Hazebrouke SuDS - Pond 19c1 100yr +40%CC FEH v3.srcx

Rainfall Model	FEH	F (1km)	2.642
Return Period (years)	100	Summer Storms	Yes
FEH Rainfall Version	1999	Winter Storms	Yes
Site Location GB 476950 165250 SU 76950 65250		Cv (Summer)	0.750
C (1km)	-0.028	Cv (Winter)	0.840
D1 (1km)	0.261	Shortest Storm (mins)	15
D2 (1km)	0.255	Longest Storm (mins)	10080
D3 (1km)	0.327	Climate Change %	+40
E (1km)	0.303		

Time Area Diagram

Total Area (ha) 1.575

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
From:	To:	From:	To:	From:	To:
0	4	0.383	4	8	0.192
				8	12
					1.000

Time Area Diagram

Total Area (ha) 0.000

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

AECOM		Page 4
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19c1 - 100yr+40%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Model Details for Arborfield Hazebrouke SuDS - Pond 19c1 100yr +40%CC FEH v3.srcx

Storage is Online Cover Level (m) 53.300

Tank or Pond Structure

Invert Level (m) 51.100

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	170.6	0.600	342.8	1.200	541.2	1.800	763.1	2.400	923.0
0.100	197.3	0.700	374.1	1.300	576.6	1.900	802.2	2.500	923.0
0.200	224.8	0.800	406.2	1.400	612.7	2.000	841.9		
0.300	253.2	0.900	438.9	1.500	649.4	2.100	882.2		
0.400	282.3	1.000	472.3	1.600	686.7	2.200	923.0		
0.500	312.2	1.100	506.5	1.700	724.6	2.300	923.0		

Hydro-Brake® Optimum Outflow Control

Unit Reference MD-SHE-0297-5600-1950-5600
Design Head (m) 1.950
Design Flow (l/s) 56.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 297
Invert Level (m) 51.050
Minimum Outlet Pipe Diameter (mm) 375
Suggested Manhole Diameter (mm) 2100

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.950	55.9	Kick-Flo®	1.321	46.4
Flush-Flo™	0.604	56.0	Mean Flow over Head Range	-	48.0

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	9.1	0.800	55.3	2.000	56.6	4.000	79.2	7.000	104.0
0.200	30.6	1.000	53.8	2.200	59.3	4.500	83.9	7.500	107.6
0.300	51.7	1.200	50.5	2.400	61.8	5.000	88.3	8.000	111.0
0.400	54.4	1.400	47.7	2.600	64.3	5.500	92.5	8.500	114.3
0.500	55.6	1.600	50.9	3.000	68.9	6.000	96.5	9.000	117.6
0.600	56.0	1.800	53.8	3.500	74.2	6.500	100.3	9.500	120.7

Technical Note

Microdrainage Simulation Results

Pond 19c2

100yr+40%CC

AECOM		Page 1
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19c2 - 100yr+40%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Summary of Results for Arborfield Hazebrouke SuDS - Pond 19c2 100yr +40%CC FEH v3.srcx

Upstream Structures	Outflow To	Overflow To
(None)	Arborfield Hazebrouke SuDS - Pond 19c3 with V2E Tanks 100yr +40%CC FEH 24-08-19.srcx	(None)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	51.530	0.730	11.0	131.1	O K
30 min Summer	51.551	0.751	11.0	137.3	O K
60 min Summer	51.549	0.749	11.0	136.8	O K
120 min Summer	51.501	0.701	11.0	122.8	O K
180 min Summer	51.455	0.655	11.0	110.1	O K
240 min Summer	51.416	0.616	11.0	100.0	O K
360 min Summer	51.347	0.547	11.0	83.1	O K
480 min Summer	51.284	0.484	11.0	68.9	O K
600 min Summer	51.224	0.424	11.0	56.6	O K
720 min Summer	51.169	0.369	11.0	46.2	O K
960 min Summer	51.072	0.272	10.9	30.2	O K
1440 min Summer	50.947	0.147	10.1	13.7	O K
2160 min Summer	50.887	0.087	8.1	7.3	O K
2880 min Summer	50.863	0.063	6.4	5.2	O K
4320 min Summer	50.842	0.042	4.7	3.3	O K
5760 min Summer	50.830	0.030	3.7	2.3	O K
7200 min Summer	50.822	0.022	3.1	1.7	O K
8640 min Summer	50.817	0.017	2.7	1.2	O K
10080 min Summer	50.812	0.012	2.4	0.9	O K
15 min Winter	51.587	0.787	11.0	148.4	O K
30 min Winter	51.613	0.813	11.0	156.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	263.842	0.0	142.4	21
30 min Summer	144.580	0.0	156.1	34
60 min Summer	79.227	0.0	171.1	62
120 min Summer	43.415	0.0	187.4	108
180 min Summer	30.537	0.0	197.8	136
240 min Summer	23.790	0.0	205.4	168
360 min Summer	16.734	0.0	216.8	234
480 min Summer	13.037	0.0	225.2	298
600 min Summer	10.742	0.0	231.9	360
720 min Summer	9.170	0.0	237.6	420
960 min Summer	7.132	0.0	246.4	534
1440 min Summer	5.004	0.0	259.4	754
2160 min Summer	3.511	0.0	273.0	1104
2880 min Summer	2.731	0.0	283.1	1468
4320 min Summer	1.973	0.0	306.8	2196
5760 min Summer	1.566	0.0	324.8	2928
7200 min Summer	1.310	0.0	339.5	3584
8640 min Summer	1.132	0.0	352.0	4392
10080 min Summer	1.000	0.0	362.9	5016
15 min Winter	263.842	0.0	159.6	21
30 min Winter	144.580	0.0	174.9	35

AECOM		Page 2
Midpoint Alencon Link Basingstoke, RG21 7PP	Arborfield - Hazebrouke SuDS Attenuation Assessment Pond 19c2 - 100yr+40%CC	
Date 23/08/2022 File Hazebrouck Cascade - V2E Tan...	Designed by AB Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Summary of Results for Arborfield Hazebrouke SuDS - Pond 19c2 100yr +40%CC FEH
v3.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	51.619	0.819	11.0	158.3	O K
120 min Winter	51.580	0.780	11.0	146.3	O K
180 min Winter	51.524	0.724	11.0	129.4	O K
240 min Winter	51.475	0.675	11.0	115.6	O K
360 min Winter	51.381	0.581	11.0	91.2	O K
480 min Winter	51.289	0.489	11.0	70.0	O K
600 min Winter	51.201	0.401	11.0	52.1	O K
720 min Winter	51.119	0.319	11.0	37.7	O K
960 min Winter	50.989	0.189	10.5	18.7	O K
1440 min Winter	50.892	0.092	8.4	7.8	O K
2160 min Winter	50.858	0.058	6.0	4.7	O K
2880 min Winter	50.842	0.042	4.7	3.3	O K
4320 min Winter	50.826	0.026	3.3	2.0	O K
5760 min Winter	50.817	0.017	2.7	1.2	O K
7200 min Winter	50.810	0.010	2.2	0.8	O K
8640 min Winter	50.806	0.006	1.9	0.4	O K
10080 min Winter	50.802	0.002	1.7	0.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
60 min Winter	79.227	0.0	191.6	62
120 min Winter	43.415	0.0	210.0	118
180 min Winter	30.537	0.0	221.6	148
240 min Winter	23.790	0.0	230.1	182
360 min Winter	16.734	0.0	242.8	254
480 min Winter	13.037	0.0	252.3	320
600 min Winter	10.742	0.0	259.7	382
720 min Winter	9.170	0.0	266.2	438
960 min Winter	7.132	0.0	276.0	542
1440 min Winter	5.004	0.0	290.5	748
2160 min Winter	3.511	0.0	305.8	1096
2880 min Winter	2.731	0.0	317.0	1472
4320 min Winter	1.973	0.0	343.6	2204
5760 min Winter	1.566	0.0	363.8	2872
7200 min Winter	1.310	0.0	380.2	3656
8640 min Winter	1.132	0.0	394.2	4320
10080 min Winter	1.000	0.0	406.5	5136

AECOM		Page 3
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19c2 - 100yr+40%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Rainfall Details for Arborfield Hazebrouke SuDS - Pond 19c2 100yr +40%CC FEH v3.srcx

Rainfall Model	FEH	F (1km)	2.642
Return Period (years)	100	Summer Storms	Yes
FEH Rainfall Version	1999	Winter Storms	Yes
Site Location	GB 476950 165250 SU 76950 65250	Cv (Summer)	0.750
C (1km)	-0.028	Cv (Winter)	0.840
D1 (1km)	0.261	Shortest Storm (mins)	15
D2 (1km)	0.255	Longest Storm (mins)	10080
D3 (1km)	0.327	Climate Change %	+40
E (1km)	0.303		

Time Area Diagram

Total Area (ha) 0.288

Time (mins)	Area (ha)	Time (mins)	Area (ha)
From:	To:	From:	To:
0	4 0.192	4	8 0.096

Time Area Diagram

Total Area (ha) 0.000

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

AECOM		Page 4
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19c2 - 100yr+40%CC	
Date 23/08/2022	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by AC	
Innovyze	Source Control 2020.1	

Cascade Model Details for Arborfield Hazebrouke SuDS - Pond 19c2 100yr +40%CC FEH v3.srcx

Storage is Online Cover Level (m) 52.400

Tank or Pond Structure

Invert Level (m) 50.800

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	73.0	0.600	250.6	1.200	457.9	1.800	608.5	2.400	608.5
0.100	101.0	0.700	282.3	1.300	496.2	1.900	608.5	2.500	608.5
0.200	129.8	0.800	315.7	1.400	532.9	2.000	608.5		
0.300	159.1	0.900	349.9	1.500	570.9	2.100	608.5		
0.400	189.0	1.000	385.1	1.600	608.5	2.200	608.5		
0.500	219.5	1.100	421.1	1.700	608.5	2.300	608.5		

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0147-1100-1350-1100
Design Head (m)	1.350
Design Flow (l/s)	11.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	147
Invert Level (m)	50.750
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.350	11.0	Kick-Flo®	0.858	8.9
Flush-Flo™	0.397	11.0	Mean Flow over Head Range	-	9.5

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	5.3	0.800	9.6	2.000	13.2	4.000	18.4	7.000	24.1
0.200	10.2	1.000	9.5	2.200	13.9	4.500	19.5	7.500	24.9
0.300	10.8	1.200	10.4	2.400	14.4	5.000	20.5	8.000	25.7
0.400	11.0	1.400	11.2	2.600	15.0	5.500	21.5	8.500	26.5
0.500	10.9	1.600	11.9	3.000	16.1	6.000	22.4	9.000	27.2
0.600	10.7	1.800	12.6	3.500	17.3	6.500	23.2	9.500	27.9

Technical Note

Microdrainage Simulation Results

Pond 19c3 + V2E Tanks

100yr+40%CC

AECOM		Page 1
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19c3 + Tanks, 100yr+40%CC	
Date 19/08/2024	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by DM	
Innovyze	Source Control 2020.1	

Cascade Summary of Results for Arborfield Hazebrouke SuDS - Pond 19c3 with V2E Tanks
100yr +40%CC FEH 24-08-19.srcx

Upstream Structures	Outflow To Overflow To	
Arborfield Hazebrouke SuDS - Pond 19c1 100yr +40%CC FEH v3.srcx	(None)	(None)
Arborfield Hazebrouke SuDS - Pond 16 100yr +40%CC FEH v3.srcx		
Arborfield Hazebrouke SuDS - Pond 17 100yr +40%CC FEH v2.srcx		
Arborfield Hazebrouke SuDS - Pond 19a 100yr +40%CC FEH v3.srcx		
Arborfield Hazebrouke SuDS - Pond 19c2 100yr +40%CC FEH v3.srcx		

Half Drain Time : 144 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	51.079	1.179	0.0	73.4	73.4	779.3	O K
30 min Summer	51.151	1.251	0.0	73.4	73.4	845.8	O K
60 min Summer	51.227	1.327	0.0	73.4	73.4	917.7	O K
120 min Summer	51.299	1.399	0.0	73.4	73.4	987.7	O K
180 min Summer	51.333	1.433	0.0	73.4	73.4	1021.0	O K
240 min Summer	51.349	1.449	0.0	73.4	73.4	1037.2	O K
360 min Summer	51.356	1.456	0.0	73.4	73.4	1044.2	O K
480 min Summer	51.338	1.438	0.0	73.4	73.4	1026.3	O K
600 min Summer	51.287	1.387	0.0	73.4	73.4	975.6	O K
720 min Summer	51.242	1.342	0.0	73.4	73.4	931.2	O K
960 min Summer	51.159	1.259	0.0	73.4	73.4	853.3	O K
1440 min Summer	51.011	1.111	0.0	73.4	73.4	719.6	O K
2160 min Summer	50.771	0.871	0.0	73.4	73.4	519.8	O K
2880 min Summer	50.639	0.739	0.0	73.4	73.4	419.5	O K
4320 min Summer	50.397	0.497	0.0	73.4	73.4	251.8	O K
5760 min Summer	50.177	0.277	0.0	72.3	72.3	116.7	O K
7200 min Summer	50.058	0.158	0.0	68.2	68.2	50.1	O K
8640 min Summer	50.022	0.122	0.0	60.1	60.1	31.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	263.842	0.0	3292.3	23
30 min Summer	144.580	0.0	3607.9	38
60 min Summer	79.227	0.0	3953.3	68
120 min Summer	43.415	0.0	4333.5	128
180 min Summer	30.537	0.0	4572.6	186
240 min Summer	23.790	0.0	4749.1	246
360 min Summer	16.734	0.0	5010.1	364
480 min Summer	13.037	0.0	5205.7	482
600 min Summer	10.742	0.0	5360.9	548
720 min Summer	9.170	0.0	5492.5	604
960 min Summer	7.132	0.0	5694.8	730
1440 min Summer	5.004	0.0	5993.9	1024
2160 min Summer	3.511	0.0	6308.5	1300
2880 min Summer	2.731	0.0	6541.4	1728
4320 min Summer	1.973	0.0	7089.0	2464
5760 min Summer	1.566	0.0	7505.2	3064
7200 min Summer	1.310	0.0	7844.5	3680
8640 min Summer	1.132	0.0	8133.3	4408

AECOM		Page 2
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19c3 + Tanks, 100yr+40%CC	
Date 19/08/2024	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by DM	
Innovyze	Source Control 2020.1	

Cascade Summary of Results for Arborfield Hazebrouke SuDS - Pond 19c3 with V2E Tanks
100yr +40%CC FEH 24-08-19.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max E Outflow (l/s)	Max Volume (m³)	Status
10080 min Summer	49.998	0.098	0.0	53.7	53.7	19.1	O K
15 min Winter	51.182	1.282	0.0	73.4	73.4	874.6	O K
30 min Winter	51.262	1.362	0.0	73.4	73.4	950.6	O K
60 min Winter	51.343	1.443	0.0	73.4	73.4	1031.5	O K
120 min Winter	51.423	1.523	0.0	73.4	73.4	1112.3	O K
180 min Winter	51.463	1.563	0.0	73.4	73.4	1154.4	O K
240 min Winter	51.485	1.585	0.0	73.4	73.4	1177.7	O K
360 min Winter	51.501	1.601	0.0	73.4	73.4	1194.2	Flood Risk
480 min Winter	51.495	1.595	0.0	73.4	73.4	1188.6	O K
600 min Winter	51.457	1.557	0.0	73.4	73.4	1148.6	O K
720 min Winter	51.404	1.504	0.0	73.4	73.4	1093.3	O K
960 min Winter	51.309	1.409	0.0	73.4	73.4	996.8	O K
1440 min Winter	51.139	1.239	0.0	73.4	73.4	834.8	O K
2160 min Winter	50.799	0.899	0.0	73.4	73.4	541.8	O K
2880 min Winter	50.613	0.713	0.0	73.4	73.4	400.4	O K
4320 min Winter	50.153	0.253	0.0	71.9	71.9	102.5	O K
5760 min Winter	50.025	0.125	0.0	60.7	60.7	32.5	O K
7200 min Winter	49.989	0.089	0.0	51.2	51.2	17.3	O K
8640 min Winter	49.965	0.065	0.0	44.4	44.4	12.7	O K
10080 min Winter	49.947	0.047	0.0	39.2	39.2	9.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
10080 min Summer	1.000	0.0	8384.8	5136
15 min Winter	263.842	0.0	3686.4	23
30 min Winter	144.580	0.0	4041.3	37
60 min Winter	79.227	0.0	4428.0	66
120 min Winter	43.415	0.0	4853.5	126
180 min Winter	30.537	0.0	5120.5	184
240 min Winter	23.790	0.0	5318.9	242
360 min Winter	16.734	0.0	5612.8	360
480 min Winter	13.037	0.0	5830.4	476
600 min Winter	10.742	0.0	6004.7	574
720 min Winter	9.170	0.0	6151.5	670
960 min Winter	7.132	0.0	6378.9	762
1440 min Winter	5.004	0.0	6712.3	1082
2160 min Winter	3.511	0.0	7065.5	1384
2880 min Winter	2.731	0.0	7326.9	1876
4320 min Winter	1.973	0.0	7939.8	2380
5760 min Winter	1.566	0.0	8405.6	2984
7200 min Winter	1.310	0.0	8785.5	3672
8640 min Winter	1.132	0.0	9108.7	4392
10080 min Winter	1.000	0.0	9391.7	5120

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Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19c3 + Tanks, 100yr+40%CC	
Date 19/08/2024	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by DM	
Innovyze	Source Control 2020.1	

Cascade Rainfall Details for Arborfield Hazebrouke SuDS - Pond 19c3 with V2E Tanks
100yr +40%CC FEH 24-08-19.srcx

Rainfall Model	FEH	F (1km)	2.642
Return Period (years)	100	Summer Storms	Yes
FEH Rainfall Version	1999	Winter Storms	Yes
Site Location	GB 476950 165250 SU 76950 65250	Cv (Summer)	0.750
C (1km)	-0.028	Cv (Winter)	0.840
D1 (1km)	0.261	Shortest Storm (mins)	15
D2 (1km)	0.255	Longest Storm (mins)	10080
D3 (1km)	0.327	Climate Change %	+40
E (1km)	0.303		

Time Area Diagram

Total Area (ha) 1.609

Time (mins)	Area (ha)	Time (mins)	Area (ha)
From:	To:	From:	To:
0	4 1.072	4	8 0.537

Time Area Diagram

Total Area (ha) 0.000

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

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Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19c3 + Tanks, 100yr+40%CC	
Date 19/08/2024	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by DM	
Innovyze	Source Control 2020.1	

Cascade Model Details for Arborfield Hazebrouke SuDS - Pond 19c3 with V2E Tanks 100yr +40%CC FEH 24-08-19.srcx

Storage is Online Cover Level (m) 51.800

Complex Structure

Tank or Pond

Invert Level (m) 49.900

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	65.0	1.599	65.0	1.600	0.0

Tank or Pond

Invert Level (m) 49.900

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	130.0	1.599	130.0	1.600	0.0

Tank or Pond

Invert Level (m) 50.000

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	324.0	0.600	528.6	1.200	753.2	1.600	914.1
0.200	389.9	0.800	601.2	1.400	832.5	1.800	997.9
0.400	458.1	1.000	676.1	1.500	873.3		

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0337-7340-1770-7340
Design Head (m)	1.770
Design Flow (l/s)	73.4
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	337
Invert Level (m)	49.730
Minimum Outlet Pipe Diameter (mm)	375
Suggested Manhole Diameter (mm)	Site Specific Design (Contact Hydro International)

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.770	73.4	Kick-Flo®	1.259	62.2
Flush-Flo™	0.597	73.4	Mean Flow over Head Range	-	62.1

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

AECOM		Page 5
Midpoint	Arborfield - Hazebrouke SuDS	
Alencon Link	Attenuation Assessment	
Basingstoke, RG21 7PP	Pond 19c3 + Tanks, 100yr+40%CC	
Date 19/08/2024	Designed by AB	
File Hazebrouck Cascade - V2E Tan...	Checked by DM	
Innovyze	Source Control 2020.1	

Hydro-Brake® Optimum Outflow Control

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	9.9	0.800	72.4	2.000	77.8	4.000	109.0	7.000	143.2
0.200	34.3	1.000	70.2	2.200	81.5	4.500	115.4	7.500	148.1
0.300	61.9	1.200	65.1	2.400	85.0	5.000	121.5	8.000	152.9
0.400	71.4	1.400	65.5	2.600	88.4	5.500	127.3	8.500	157.5
0.500	73.0	1.600	69.9	3.000	94.8	6.000	132.8	9.000	162.0
0.600	73.4	1.800	74.0	3.500	102.1	6.500	138.1	9.500	166.3