

Mucklow & Harris Ltd				Page 1	
Studio 313 Scott House The Custard Factory, Gibb St... Birmingham, B9 4AA		Fole Dairy Storm Area B			
Date 09/09/2021 File AREA B.SRCX		Designed by RAA Checked by AM			
Innovyze		Source Control 2019.1			
<u>Summary of Results for 100 year Return Period (+40%)</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	110.583	0.583	15.0	20.4	O K
30 min Summer	110.661	0.661	15.0	23.2	O K
60 min Summer	110.647	0.647	15.0	22.6	O K
120 min Summer	110.500	0.500	15.0	17.5	O K
180 min Summer	110.358	0.358	15.0	12.5	O K
240 min Summer	110.259	0.259	15.0	9.1	O K
360 min Summer	110.174	0.174	13.7	6.1	O K
480 min Summer	110.148	0.148	11.4	5.2	O K
600 min Summer	110.132	0.132	9.7	4.6	O K
720 min Summer	110.121	0.121	8.5	4.2	O K
960 min Summer	110.106	0.106	6.9	3.7	O K
1440 min Summer	110.088	0.088	5.0	3.1	O K
2160 min Summer	110.074	0.074	3.7	2.6	O K
2880 min Summer	110.065	0.065	2.9	2.3	O K
4320 min Summer	110.055	0.055	2.1	1.9	O K
5760 min Summer	110.049	0.049	1.7	1.7	O K
7200 min Summer	110.044	0.044	1.4	1.5	O K
8640 min Summer	110.041	0.041	1.2	1.4	O K
10080 min Summer	110.038	0.038	1.1	1.3	O K
15 min Winter	110.670	0.670	15.0	23.4	O K
30 min Winter	110.748	0.748	15.0	26.2	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
15 min Summer	126.113	0.0	29.3	15	
30 min Summer	84.299	0.0	39.2	24	
60 min Summer	53.779	0.0	50.0	42	
120 min Summer	33.149	0.0	61.6	74	
180 min Summer	24.624	0.0	68.7	104	
240 min Summer	19.809	0.0	73.7	132	
360 min Summer	14.513	0.0	81.0	186	
480 min Summer	11.640	0.0	86.6	246	
600 min Summer	9.801	0.0	91.1	308	
720 min Summer	8.511	0.0	95.0	368	
960 min Summer	6.807	0.0	101.3	488	
1440 min Summer	4.960	0.0	110.7	734	
2160 min Summer	3.606	0.0	120.7	1100	
2880 min Summer	2.873	0.0	128.2	1460	
4320 min Summer	2.082	0.0	139.4	2196	
5760 min Summer	1.655	0.0	147.7	2904	
7200 min Summer	1.384	0.0	154.4	3672	
8640 min Summer	1.195	0.0	160.0	4280	
10080 min Summer	1.057	0.0	165.1	5016	
15 min Winter	126.113	0.0	32.8	15	
30 min Winter	84.299	0.0	43.9	25	
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Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	110.705	0.705	15.0	24.7	O K
120 min Winter	110.459	0.459	15.0	16.1	O K
180 min Winter	110.261	0.261	15.0	9.1	O K
240 min Winter	110.178	0.178	14.0	6.2	O K
360 min Winter	110.139	0.139	10.5	4.9	O K
480 min Winter	110.120	0.120	8.5	4.2	O K
600 min Winter	110.108	0.108	7.1	3.8	O K
720 min Winter	110.100	0.100	6.2	3.5	O K
960 min Winter	110.088	0.088	5.0	3.1	O K
1440 min Winter	110.073	0.073	3.6	2.6	O K
2160 min Winter	110.062	0.062	2.7	2.2	O K
2880 min Winter	110.055	0.055	2.1	1.9	O K
4320 min Winter	110.046	0.046	1.5	1.6	O K
5760 min Winter	110.041	0.041	1.2	1.4	O K
7200 min Winter	110.037	0.037	1.0	1.3	O K
8640 min Winter	110.035	0.035	0.9	1.2	O K
10080 min Winter	110.032	0.032	0.8	1.1	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
60 min Winter	53.779	0.0	56.0	44	
120 min Winter	33.149	0.0	69.1	78	
180 min Winter	24.624	0.0	76.9	104	
240 min Winter	19.809	0.0	82.5	128	
360 min Winter	14.513	0.0	90.7	186	
480 min Winter	11.640	0.0	97.0	248	
600 min Winter	9.801	0.0	102.1	308	
720 min Winter	8.511	0.0	106.4	368	
960 min Winter	6.807	0.0	113.4	488	
1440 min Winter	4.960	0.0	124.0	734	
2160 min Winter	3.606	0.0	135.2	1096	
2880 min Winter	2.873	0.0	143.6	1428	
4320 min Winter	2.082	0.0	156.1	2200	
5760 min Winter	1.655	0.0	165.4	2896	
7200 min Winter	1.384	0.0	172.9	3600	
8640 min Winter	1.195	0.0	179.2	4384	
10080 min Winter	1.057	0.0	184.9	5136	
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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Shortest Storm (mins)	15
Ratio R	0.362	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.124

Time (mins)		Area
From:	To:	(ha)
0	4	0.124

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Model Details

Storage is Online Cover Level (m) 112.100

Tank or Pond Structure

Invert Level (m) 110.000

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	35.0	0.700	35.0	1.400	0.0	2.100	0.0
0.100	35.0	0.800	35.0	1.500	0.0	2.200	0.0
0.200	35.0	0.801	0.0	1.600	0.0	2.300	0.0
0.300	35.0	1.000	0.0	1.700	0.0	2.400	0.0
0.400	35.0	1.100	0.0	1.800	0.0	2.500	0.0
0.500	35.0	1.200	0.0	1.900	0.0		
0.600	35.0	1.300	0.0	2.000	0.0		

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0177-1500-0800-1500
Design Head (m)	0.800
Design Flow (l/s)	15.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	177
Invert Level (m)	110.000
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.800	15.0
Flush-Flo™	0.288	15.0
Kick-Flo®	0.590	13.0
Mean Flow over Head Range	-	12.5

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)
0.100	6.3	1.200	18.2	3.000	28.2	7.000	42.4
0.200	14.7	1.400	19.6	3.500	30.4	7.500	43.9
0.300	15.0	1.600	20.9	4.000	32.4	8.000	45.3
0.400	14.7	1.800	22.1	4.500	34.3	8.500	46.4
0.500	14.2	2.000	23.2	5.000	36.1	9.000	47.8
0.600	13.1	2.200	24.3	5.500	37.8	9.500	49.1
0.800	15.0	2.400	25.3	6.000	39.4		
1.000	16.7	2.600	26.3	6.500	40.9		

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