

Avie Consulting Ltd		Page 1
6 Killingbeck Court Killingbeck Drive Leeds LS14 6FD	DBS 3 Pump station storage P3129 1 in 100 year Plus 30%CC	
Date 18/01/2023 09:19 File P3129 DAVID BROWN MARIN...	Designed by TC Checked by SAB	
Micro Drainage		Source Control 2020.1

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

Half Drain Time : 1 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m ³)	Status
15 min Summer	123.135	0.115	0.0	79.9	79.9	5.5	O K
30 min Summer	123.101	0.081	0.0	79.9	79.9	3.8	O K
60 min Summer	123.020	0.000	0.0	77.2	77.2	0.0	O K
120 min Summer	123.020	0.000	0.0	51.2	51.2	0.0	O K
180 min Summer	123.020	0.000	0.0	39.2	39.2	0.0	O K
240 min Summer	123.020	0.000	0.0	31.9	31.9	0.0	O K
360 min Summer	123.020	0.000	0.0	23.4	23.4	0.0	O K
480 min Summer	123.020	0.000	0.0	18.8	18.8	0.0	O K
600 min Summer	123.020	0.000	0.0	15.9	15.9	0.0	O K
720 min Summer	123.020	0.000	0.0	13.8	13.8	0.0	O K
960 min Summer	123.020	0.000	0.0	11.1	11.1	0.0	O K
1440 min Summer	123.020	0.000	0.0	8.1	8.1	0.0	O K
2160 min Summer	123.020	0.000	0.0	5.9	5.9	0.0	O K
2880 min Summer	123.020	0.000	0.0	4.7	4.7	0.0	O K
4320 min Summer	123.020	0.000	0.0	3.4	3.4	0.0	O K
5760 min Summer	123.020	0.000	0.0	2.7	2.7	0.0	O K
7200 min Summer	123.020	0.000	0.0	2.3	2.3	0.0	O K
8640 min Summer	123.020	0.000	0.0	2.0	2.0	0.0	O K
10080 min Summer	123.020	0.000	0.0	1.7	1.7	0.0	O K
15 min Winter	123.161	0.141	0.0	79.9	79.9	6.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
15 min Summer	115.731	0.0	46.3	11
30 min Summer	77.804	0.0	60.9	19
60 min Summer	49.937	0.0	78.7	0
120 min Summer	30.956	0.0	97.5	0
180 min Summer	23.058	0.0	109.0	0
240 min Summer	18.577	0.0	117.0	0
360 min Summer	13.656	0.0	129.0	0
480 min Summer	10.974	0.0	138.3	0
600 min Summer	9.254	0.0	145.7	0
720 min Summer	8.046	0.0	152.1	0
960 min Summer	6.447	0.0	162.5	0
1440 min Summer	4.709	0.0	178.0	0
2160 min Summer	3.432	0.0	194.6	0
2880 min Summer	2.739	0.0	207.0	0
4320 min Summer	1.989	0.0	225.5	0
5760 min Summer	1.583	0.0	239.3	0
7200 min Summer	1.325	0.0	250.4	0
8640 min Summer	1.147	0.0	260.1	0
10080 min Summer	1.015	0.0	268.6	0
15 min Winter	115.731	0.0	52.5	12

Avie Consulting Ltd		Page 2
6 Killingbeck Court Killingbeck Drive Leeds LS14 6FD	DBS 3 Pump station storage P3129 1 in 100 year Plus 30%CC	
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Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (1/s)	Max Control (1/s)	Max Σ Outflow (1/s)	Max Volume (m³)	Status
30 min Winter	123.056	0.036	0.0	79.8	79.8	1.7	O K
60 min Winter	123.020	0.000	0.0	60.7	60.7	0.0	O K
120 min Winter	123.020	0.000	0.0	38.2	38.2	0.0	O K
180 min Winter	123.020	0.000	0.0	28.5	28.5	0.0	O K
240 min Winter	123.020	0.000	0.0	23.0	23.0	0.0	O K
360 min Winter	123.020	0.000	0.0	16.9	16.9	0.0	O K
480 min Winter	123.020	0.000	0.0	13.6	13.6	0.0	O K
600 min Winter	123.020	0.000	0.0	11.5	11.5	0.0	O K
720 min Winter	123.020	0.000	0.0	10.0	10.0	0.0	O K
960 min Winter	123.020	0.000	0.0	8.0	8.0	0.0	O K
1440 min Winter	123.020	0.000	0.0	5.8	5.8	0.0	O K
2160 min Winter	123.020	0.000	0.0	4.3	4.3	0.0	O K
2880 min Winter	123.020	0.000	0.0	3.4	3.4	0.0	O K
4320 min Winter	123.020	0.000	0.0	2.5	2.5	0.0	O K
5760 min Winter	123.020	0.000	0.0	2.0	2.0	0.0	O K
7200 min Winter	123.020	0.000	0.0	1.6	1.6	0.0	O K
8640 min Winter	123.020	0.000	0.0	1.4	1.4	0.0	O K
10080 min Winter	123.020	0.000	0.0	1.3	1.3	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	77.804	0.0	68.8	19
60 min Winter	49.937	0.0	88.1	0
120 min Winter	30.956	0.0	109.2	0
180 min Winter	23.058	0.0	122.0	0
240 min Winter	18.577	0.0	131.1	0
360 min Winter	13.656	0.0	144.5	0
480 min Winter	10.974	0.0	154.9	0
600 min Winter	9.254	0.0	163.2	0
720 min Winter	8.046	0.0	170.3	0
960 min Winter	6.447	0.0	182.0	0
1440 min Winter	4.709	0.0	199.4	0
2160 min Winter	3.432	0.0	218.0	0
2880 min Winter	2.739	0.0	231.9	0
4320 min Winter	1.989	0.0	252.6	0
5760 min Winter	1.583	0.0	268.0	0
7200 min Winter	1.325	0.0	280.5	0
8640 min Winter	1.147	0.0	291.3	0
10080 min Winter	1.015	0.0	300.9	0

Avie Consulting Ltd		Page 3
6 Killingbeck Court Killingbeck Drive Leeds LS14 6FD	DBS 3 Pump station storage P3129 1 in 100 year Plus 30%CC	
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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	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.210

Time (mins)		Area
From:	To:	(ha)
0	4	0.210

Avie Consulting Ltd		Page 4
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Model Details

Storage is Online Cover Level (m) 124.720

Cellular Storage Structure

Invert Level (m) 123.020 Safety Factor 2.0
 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
 Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	50.0	0.0	0.500	50.0	0.0
0.100	50.0	0.0	0.600	50.0	0.0
0.200	50.0	0.0	0.800	50.0	0.0
0.300	50.0	0.0	0.801	0.0	0.0
0.400	50.0	0.0			

Hydro-Brake® Optimum Outflow Control

Unit Reference MD-SHE-0362-8000-0800-8000
 Design Head (m) 0.800
 Design Flow (l/s) 80.0
 Flush-Flo™ Calculated
 Objective Minimise upstream storage
 Application Surface
 Sump Available Yes
 Diameter (mm) 362
 Invert Level (m) 122.600
 Minimum Outlet Pipe Diameter (mm) 375
 Suggested Manhole Diameter (mm) 2100

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.800	80.0
Flush-Flo™	0.487	79.9
Kick-Flo®	0.704	75.2
Mean Flow over Head Range	-	58.6

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)						
0.100	10.4	1.200	97.4	3.000	152.2	7.000	230.5
0.200	36.4	1.400	104.9	3.500	164.1	7.500	238.4
0.300	68.0	1.600	112.0	4.000	175.2	8.000	246.1
0.400	79.0	1.800	118.6	4.500	185.6	8.500	251.0
0.500	79.9	2.000	124.8	5.000	195.4	9.000	258.4
0.600	78.6	2.200	130.8	5.500	204.7	9.500	265.7
0.800	80.0	2.400	136.5	6.000	213.7		
1.000	89.1	2.600	141.9	6.500	222.2		