

Appendix H Hydraulic Calculations

Only a limited useful representative set of the individual plot calculations is included within this report to avoid repeating multiple similar calculation outputs. Summary tables of all the results of plot calculations are provided in this appendix.

Title
Development Plot, Areas, Flows and Attenuation Summary Table
Pre-development greenfield runoff calculations. All Plots
Sample attenuation calculations. Plot Chapman
Sample attenuation calculations. Plot Dimple 1
Sample attenuation calculations. Plot Nero
Sample attenuation calculations. Plot Steam 1
Sample attenuation calculations. Plot Zenith 1

DORSET INNOVATION PARK DRAINAGE STRATEGY
APPENDIX H - SUMMARY OF AREAS, FLOWS AND ATTENUATION REQUIREMENTS

DEVELOPMENT PLOT REF.	PROPOSED DEVELOPMENT PLOT AREA*	EXISTING IMPERMEABLE AREA	EXISTING SURFACE WATER RUNOFF (QBAR)	PROPOSED PLOT IMPERMEABLE AREA	ALLOWABLE SW DISCHARGE RATE DURING Q100+40%	ON-PLOT SURFACE WATER STORAGE VOLUME REQUIRED	INDICATIVE ATTENUATION TANK AREA (AT 1m DEEP)	DEVELOPMENT PLOT ANTICIPATED FOUL FLOW
	Ha	Ha	l/s	Ha	l/s [Q100+40%]	m ³	m ²	l/s
ZENITH 1	1.89	0	1.9	0.9	1.9	925	974	0.59
ZENITH 2	1.56	0.18	2	0.75	2	720	758	0.43
CHAPMAN	0.86	0.36	1.9	0.33	1.9	251	264	0.4
STEAM 1	1.55	0.28	2.3	0.96	2.3	842	886	0.43
STEAM 2	1.49	0.31	2.3	0.99	2.3	900	947	0.33
NESTOR	1.61	0	1.6	0.88	1.6	888	935	0.78
HECTOR	1.27	0	1.3	0.72	1.3	775	816	2.75
NUCLEUS	0.92	0	0.9	0.57	0.9	642	676	3.75
DRAGON	1.45	0	1.5	1	1.5	1026	1080	2.43
NERO	1.74	0.58	3.3	1.43	3.3	1311	1380	0.96
ZEBRA 1	0.91	0.29	1.7	0.5	1.7	447	471	1.78
ZEBRA 2	1.11	0.25	1.8	0.71	1.8	630	663	0.59
DIMPLE 1	1.27	EXISTING PLOT	EXISTING PLOT	EXISTING PLOT	EXISTING PLOT	EXISTING PLOT	EXISTING PLOT	EXISTING PLOT
DIMPLE 2	1.21	0.12	1.5	0.76	1.5	731	769	1.42
JUNO	1.38	0.82	3.9	0.94	3.9	743	782	0.64
PAV	0.13							1.18
TOTALS	20.4	3.2	27.9	11.4	27.9	10831	11401	18.5

* excludes estate roads and open space outside of the individual plots

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.	Dorset Innovation Park	
.	Drainage Strategy	
.	Chapman Pre-Dev QBAR Runoff	
Date 05/07/2018 16:59	Designed by Hydrock	
File	Checked by	
XP Solutions	Source Control 2016.1	
<u>ICP SUDS Mean Annual Flood</u> Input Return Period (years) 100 Soil 0.200 Area (ha) 0.860 Urban 0.418 SAAR (mm) 900 Region Number Region 7 Results l/s QBAR Rural 0.9 QBAR Urban 1.9 Q100 years 4.5 Q1 year 1.6 Q30 years 3.7 Q100 years 4.5		
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.	Dorset Innovation Park	
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.	Dimple 1 Pre-Dev QBAR Runoff	
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XP Solutions	Source Control 2016.1	
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Area (ha)	1.270	Urban 0.700
SAAR (mm)	900	Region Number Region 7
Results 1/s		
QBAR Rural 1.3		
QBAR Urban 4.2		
Q100 years 8.6		
Q1 year 3.6		
Q30 years 7.4		
Q100 years 8.6		
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.	Dorset Innovation Park													
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.	Dimple 2 Pre-Dev QBAR Runoff													
Date 05/07/2018 17:12	Designed by Hydrock													
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XP Solutions	Source Control 2016.1													
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Return Period (years)	100	Soil	0.200											
Area (ha)	1.210	Urban	0.099											
SAAR (mm)	900	Region Number	Region 7											
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.	Dorset Innovation Park	
.	Drainage Strategy	
.	Dragon Pre-Dev QBAR Runoff	
Date 05/07/2018 17:06	Designed by Hydrock	
File	Checked by	
XP Solutions	Source Control 2016.1	
<u>ICP SUDS Mean Annual Flood</u>		
Input		
Return Period (years)	100	Soil 0.200
Area (ha)	1.450	Urban 0.000
SAAR (mm)	900	Region Number Region 7
Results l/s		
QBAR Rural 1.5		
QBAR Urban 1.5		
Q100 years 4.7		
Q1 year 1.3		
Q30 years 3.3		
Q100 years 4.7		
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.	Dorset Innovation Park	
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XP Solutions	Source Control 2016.1	
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.	Dorset Innovation Park	
.	Drainage Strategy	
.	Juno Pre-Dev QBAR Runoff	
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XP Solutions	Source Control 2016.1	
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Input		
Return Period (years)	100	Soil 0.200
Area (ha)	1.380	Urban 0.594
SAAR (mm)	900	Region Number Region 7
Results 1/s		
QBAR Rural 1.4		
QBAR Urban 3.9		
Q100 years 8.6		
Q1 year 3.3		
Q30 years 7.2		
Q100 years 8.6		
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.	Dorset Innovation Park	
.	Drainage Strategy	
.	Nero Pre-Dev QBAR Runoff	
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XP Solutions	Source Control 2016.1	
<u>ICP SUDS Mean Annual Flood</u>		
Input		
Return Period (years)	100	Soil 0.200
Area (ha)	1.740	Urban 0.333
SAAR (mm)	900	Region Number Region 7
Results 1/s		
QBAR Rural 1.8		
QBAR Urban 3.3		
Q100 years 8.3		
Q1 year 2.8		
Q30 years 6.6		
Q100 years 8.3		
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.	Dorset Innovation Park	
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.	Nestor Pre-Dev QBAR Runoff	
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XP Solutions	Source Control 2016.1	
<u>ICP SUDS Mean Annual Flood</u>		
Input		
Return Period (years)	100	Soil 0.200
Area (ha)	1.610	Urban 0.000
SAAR (mm)	900	Region Number Region 7
Results 1/s		
QBAR Rural 1.6		
QBAR Urban 1.6		
Q100 years 5.2		
Q1 year 1.4		
Q30 years 3.7		
Q100 years 5.2		
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Return Period (years)	100	Soil	0.200																							
Area (ha)	0.920	Urban	0.000																							
SAAR (mm)	900	Region Number	Region 7																							
QBAR Rural	0.9																									
QBAR Urban	0.9																									
Q100 years	3.0																									
Q1 year	0.8																									
Q30 years	2.1																									
Q100 years	3.0																									
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<u>ICP SUDS Mean Annual Flood</u> Input Return Period (years) 100 Soil 0.200 Area (ha) 1.550 Urban 0.180 SAAR (mm) 900 Region Number Region 7 Results 1/s QBAR Rural 1.6 QBAR Urban 2.3 Q100 years 6.3 Q1 year 1.9 Q30 years 4.8 Q100 years 6.3		
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Return Period (years)	100	Soil	0.200																							
Area (ha)	1.490	Urban	0.208																							
SAAR (mm)	900	Region Number	Region 7																							
QBAR Rural	1.5																									
QBAR Urban	2.3																									
Q100 years	6.2																									
Q1 year	1.9																									
Q30 years	4.8																									
Q100 years	6.2																									
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<u>ICP SUDS Mean Annual Flood</u> Input Return Period (years) 100 Soil 0.200 Area (ha) 0.910 Urban 0.318 SAAR (mm) 900 Region Number Region 7 Results 1/s QBAR Rural 0.9 QBAR Urban 1.7 Q100 years 4.3 Q1 year 1.4 Q30 years 3.4 Q100 years 4.3		
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Return Period (years)	100	Soil	0.200											
Area (ha)	1.110	Urban	0.225											
SAAR (mm)	900	Region Number	Region 7											
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.	Drainage Strategy	
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XP Solutions	Source Control 2016.1	
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Input		
Return Period (years)	100	Soil 0.200
Area (ha)	1.890	Urban 0.000
SAAR (mm)	900	Region Number Region 7
Results 1/s		
QBAR Rural 1.9		
QBAR Urban 1.9		
Q100 years 6.1		
Q1 year 1.6		
Q30 years 4.3		
Q100 years 6.1		
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XP Solutions	Source Control 2016.1	
<u>ICP SUDS Mean Annual Flood</u>		
Input		
Return Period (years)	100	Soil 0.200
Area (ha)	1.560	Urban 0.115
SAAR (mm)	900	Region Number Region 7
Results 1/s		
QBAR Rural 1.6		
QBAR Urban 2.0		
Q100 years 5.9		
Q1 year 1.7		
Q30 years 4.3		
Q100 years 5.9		
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.	Chapman Storage Calculations
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Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 1175 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	20.543	0.293	0.0	1.8	1.8	77.9	O K
30 min Summer	20.646	0.396	0.0	1.8	1.8	105.4	O K
60 min Summer	20.758	0.508	0.0	1.8	1.8	135.2	O K
120 min Summer	20.873	0.623	0.0	1.8	1.8	165.7	O K
180 min Summer	20.933	0.683	0.0	1.8	1.8	181.7	O K
240 min Summer	20.971	0.721	0.0	1.8	1.8	191.8	O K
360 min Summer	21.020	0.770	0.0	1.8	1.8	204.9	O K
480 min Summer	21.048	0.798	0.0	1.8	1.8	212.2	O K
600 min Summer	21.062	0.812	0.0	1.8	1.8	216.1	O K
720 min Summer	21.069	0.819	0.0	1.8	1.8	217.9	O K
960 min Summer	21.068	0.818	0.0	1.8	1.8	217.5	O K
1440 min Summer	21.049	0.799	0.0	1.8	1.8	212.6	O K
2160 min Summer	21.013	0.763	0.0	1.8	1.8	203.1	O K
2880 min Summer	20.975	0.725	0.0	1.8	1.8	192.9	O K
4320 min Summer	20.896	0.646	0.0	1.8	1.8	171.9	O K
5760 min Summer	20.810	0.560	0.0	1.8	1.8	149.0	O K
7200 min Summer	20.726	0.476	0.0	1.8	1.8	126.6	O K
8640 min Summer	20.656	0.406	0.0	1.8	1.8	107.9	O K
10080 min Summer	20.596	0.346	0.0	1.8	1.8	92.1	O K
15 min Winter	20.579	0.329	0.0	1.8	1.8	87.4	O K
30 min Winter	20.695	0.445	0.0	1.8	1.8	118.4	O K
60 min Winter	20.822	0.572	0.0	1.8	1.8	152.2	O K
120 min Winter	20.951	0.701	0.0	1.8	1.8	186.6	O K
180 min Winter	21.020	0.770	0.0	1.8	1.8	204.9	O K
240 min Winter	21.064	0.814	0.0	1.8	1.8	216.6	O K
360 min Winter	21.123	0.873	0.0	1.8	1.8	232.3	O K
480 min Winter	21.158	0.908	0.0	1.8	1.8	241.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	128.475	0.0	76.5	27
30 min Summer	87.398	0.0	103.9	41
60 min Summer	56.713	0.0	138.9	70
120 min Summer	35.427	0.0	173.4	130
180 min Summer	26.430	0.0	193.9	190
240 min Summer	21.352	0.0	208.7	250
360 min Summer	15.813	0.0	231.2	368
480 min Summer	12.755	0.0	247.7	488
600 min Summer	10.786	0.0	260.2	606
720 min Summer	9.400	0.0	269.4	726
960 min Summer	7.557	0.0	276.2	940
1440 min Summer	5.544	0.0	266.7	1164
2160 min Summer	4.057	0.0	360.2	1560
2880 min Summer	3.246	0.0	384.0	1968
4320 min Summer	2.366	0.0	418.1	2816
5760 min Summer	1.892	0.0	449.0	3632
7200 min Summer	1.591	0.0	472.0	4328
8640 min Summer	1.382	0.0	491.6	5032
10080 min Summer	1.226	0.0	508.4	5752
15 min Winter	128.475	0.0	85.7	26
30 min Winter	87.398	0.0	116.0	41
60 min Winter	56.713	0.0	155.5	70
120 min Winter	35.427	0.0	194.1	128
180 min Winter	26.430	0.0	216.9	186
240 min Winter	21.352	0.0	233.1	246
360 min Winter	15.813	0.0	257.5	362
480 min Winter	12.755	0.0	273.8	478

. Dorset Innovation Park
 . Drainage Strategy
 . Chapman Storage Calculations

Date 06/07/2018 14:22

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

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
600 min Winter	21.178	0.928	0.0	1.8	1.8	246.8	O K
720 min Winter	21.189	0.939	0.0	1.8	1.8	249.9	O K
960 min Winter	21.195	0.945	0.0	1.9	1.9	251.5	O K
1440 min Winter	21.172	0.922	0.0	1.8	1.8	245.4	O K
2160 min Winter	21.127	0.877	0.0	1.8	1.8	233.2	O K
2880 min Winter	21.073	0.823	0.0	1.8	1.8	218.8	O K
4320 min Winter	20.957	0.707	0.0	1.8	1.8	188.0	O K
5760 min Winter	20.830	0.580	0.0	1.8	1.8	154.4	O K
7200 min Winter	20.694	0.444	0.0	1.8	1.8	118.2	O K
8640 min Winter	20.593	0.343	0.0	1.8	1.8	91.2	O K
10080 min Winter	20.514	0.264	0.0	1.8	1.8	70.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
600 min Winter	10.786	0.0	282.9	592
720 min Winter	9.400	0.0	284.9	704
960 min Winter	7.557	0.0	282.2	926
1440 min Winter	5.544	0.0	272.1	1328
2160 min Winter	4.057	0.0	403.3	1652
2880 min Winter	3.246	0.0	429.8	2132
4320 min Winter	2.366	0.0	466.0	3036
5760 min Winter	1.892	0.0	503.0	3968
7200 min Winter	1.591	0.0	528.7	4616
8640 min Winter	1.382	0.0	550.7	5280
10080 min Winter	1.226	0.0	569.7	5952

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Model Details

Storage is Online Cover Level (m) 22.000

Cellular Storage Structure

Invert Level (m) 20.250 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)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	280.0	0.0	1.800	0.0	0.0	3.600	0.0	0.0
0.200	280.0	0.0	2.000	0.0	0.0	3.800	0.0	0.0
0.400	280.0	0.0	2.200	0.0	0.0	4.000	0.0	0.0
0.600	280.0	0.0	2.400	0.0	0.0	4.200	0.0	0.0
0.800	280.0	0.0	2.600	0.0	0.0	4.400	0.0	0.0
1.000	280.0	0.0	2.800	0.0	0.0	4.600	0.0	0.0
1.001	0.0	0.0	3.000	0.0	0.0	4.800	0.0	0.0
1.400	0.0	0.0	3.200	0.0	0.0	5.000	0.0	0.0
1.600	0.0	0.0	3.400	0.0	0.0			

Hydro-Brake Optimum® Outflow Control

Unit Reference MD-SHE-0065-1900-1000-1900
Design Head (m) 1.000
Design Flow (l/s) 1.9
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 65
Invert Level (m) 20.250
Minimum Outlet Pipe Diameter (mm) 100
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	1.9	Kick-Flo®	0.582	1.5
Flush-Flo™	0.286	1.8	Mean Flow over Head Range	-	1.6

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)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.5	0.800	1.7	2.000	2.6	4.000	3.6	7.000	4.7
0.200	1.8	1.000	1.9	2.200	2.7	4.500	3.8	7.500	4.8
0.300	1.8	1.200	2.1	2.400	2.8	5.000	4.0	8.000	5.0
0.400	1.8	1.400	2.2	2.600	2.9	5.500	4.2	8.500	5.1
0.500	1.7	1.600	2.4	3.000	3.1	6.000	4.3	9.000	5.3
0.600	1.5	1.800	2.5	3.500	3.4	6.500	4.5	9.500	5.4

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

Half Drain Time : 1132 minutes.

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
15 min Summer	20.552	0.302	0.0	4.2	4.2	172.3	O K
30 min Summer	20.659	0.409	0.0	4.2	4.2	233.2	O K
60 min Summer	20.775	0.525	0.0	4.2	4.2	299.1	O K
120 min Summer	20.893	0.643	0.0	4.2	4.2	366.5	O K
180 min Summer	20.956	0.706	0.0	4.2	4.2	402.3	O K
240 min Summer	20.995	0.745	0.0	4.2	4.2	424.8	O K
360 min Summer	21.046	0.796	0.0	4.2	4.2	454.0	O K
480 min Summer	21.075	0.825	0.0	4.2	4.2	470.2	O K
600 min Summer	21.090	0.840	0.0	4.2	4.2	479.1	O K
720 min Summer	21.098	0.848	0.0	4.2	4.2	483.1	O K
960 min Summer	21.096	0.846	0.0	4.2	4.2	482.3	O K
1440 min Summer	21.078	0.828	0.0	4.2	4.2	472.0	O K
2160 min Summer	21.041	0.791	0.0	4.2	4.2	451.0	O K
2880 min Summer	21.001	0.751	0.0	4.2	4.2	427.9	O K
4320 min Summer	20.914	0.664	0.0	4.2	4.2	378.8	O K
5760 min Summer	20.817	0.567	0.0	4.2	4.2	323.4	O K
7200 min Summer	20.734	0.484	0.0	4.2	4.2	275.8	O K
8640 min Summer	20.662	0.412	0.0	4.2	4.2	234.9	O K
10080 min Summer	20.601	0.351	0.0	4.2	4.2	200.0	O K
15 min Winter	20.589	0.339	0.0	4.2	4.2	193.3	O K
30 min Winter	20.709	0.459	0.0	4.2	4.2	261.8	O K
60 min Winter	20.840	0.590	0.0	4.2	4.2	336.5	O K
120 min Winter	20.974	0.724	0.0	4.2	4.2	412.9	O K
180 min Winter	21.045	0.795	0.0	4.2	4.2	453.4	O K
240 min Winter	21.091	0.841	0.0	4.2	4.2	479.5	O K
360 min Winter	21.152	0.902	0.0	4.2	4.2	514.2	O K
480 min Winter	21.188	0.938	0.0	4.2	4.2	534.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	128.475	0.0	166.1	26
30 min Summer	87.398	0.0	226.2	41
60 min Summer	56.713	0.0	305.3	70
120 min Summer	35.427	0.0	381.5	130
180 min Summer	26.430	0.0	426.5	190
240 min Summer	21.352	0.0	458.9	250
360 min Summer	15.813	0.0	508.3	368
480 min Summer	12.755	0.0	544.5	488
600 min Summer	10.786	0.0	572.5	606
720 min Summer	9.400	0.0	594.0	726
960 min Summer	7.557	0.0	618.2	938
1440 min Summer	5.544	0.0	600.5	1160
2160 min Summer	4.057	0.0	795.2	1556
2880 min Summer	3.246	0.0	847.4	1968
4320 min Summer	2.366	0.0	922.2	2816
5760 min Summer	1.892	0.0	992.7	3576
7200 min Summer	1.591	0.0	1043.3	4320
8640 min Summer	1.382	0.0	1086.3	5024
10080 min Summer	1.226	0.0	1122.7	5752
15 min Winter	128.475	0.0	186.3	26
30 min Winter	87.398	0.0	252.6	41
60 min Winter	56.713	0.0	342.1	70
120 min Winter	35.427	0.0	426.9	128
180 min Winter	26.430	0.0	476.9	186
240 min Winter	21.352	0.0	512.7	246
360 min Winter	15.813	0.0	566.3	362
480 min Winter	12.755	0.0	603.7	478

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

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
600 min Winter	21.209	0.959	0.0	4.2	4.2	546.5	O K
720 min Winter	21.220	0.970	0.0	4.2	4.2	553.2	O K
960 min Winter	21.226	0.976	0.0	4.2	4.2	556.6	O K
1440 min Winter	21.202	0.952	0.0	4.2	4.2	542.9	O K
2160 min Winter	21.155	0.905	0.0	4.2	4.2	515.9	O K
2880 min Winter	21.098	0.848	0.0	4.2	4.2	483.3	O K
4320 min Winter	20.972	0.722	0.0	4.2	4.2	411.6	O K
5760 min Winter	20.823	0.573	0.0	4.2	4.2	326.8	O K
7200 min Winter	20.693	0.443	0.0	4.2	4.2	252.5	O K
8640 min Winter	20.590	0.340	0.0	4.2	4.2	193.8	O K
10080 min Winter	20.512	0.262	0.0	4.2	4.2	149.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
600 min Winter	10.786	0.0	628.8	592
720 min Winter	9.400	0.0	641.0	704
960 min Winter	7.557	0.0	637.1	924
1440 min Winter	5.544	0.0	612.1	1318
2160 min Winter	4.057	0.0	890.4	1652
2880 min Winter	3.246	0.0	948.5	2116
4320 min Winter	2.366	0.0	1028.5	3036
5760 min Winter	1.892	0.0	1112.0	3864
7200 min Winter	1.591	0.0	1168.8	4552
8640 min Winter	1.382	0.0	1217.1	5272
10080 min Winter	1.226	0.0	1258.4	5856

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Model Details

Storage is Online Cover Level (m) 22.000

Cellular Storage Structure

Invert Level (m) 20.250 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)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	600.0	0.0	1.800	0.0	0.0	3.600	0.0	0.0
0.200	600.0	0.0	2.000	0.0	0.0	3.800	0.0	0.0
0.400	600.0	0.0	2.200	0.0	0.0	4.000	0.0	0.0
0.600	600.0	0.0	2.400	0.0	0.0	4.200	0.0	0.0
0.800	600.0	0.0	2.600	0.0	0.0	4.400	0.0	0.0
1.000	600.0	0.0	2.800	0.0	0.0	4.600	0.0	0.0
1.001	0.0	0.0	3.000	0.0	0.0	4.800	0.0	0.0
1.400	0.0	0.0	3.200	0.0	0.0	5.000	0.0	0.0
1.600	0.0	0.0	3.400	0.0	0.0			

Hydro-Brake Optimum® Outflow Control

Unit Reference MD-SHE-0097-4200-1000-4200
Design Head (m) 1.000
Design Flow (l/s) 4.2
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 97
Invert Level (m) 20.250
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)	1.000	4.2	Kick-Flo®	0.635	3.4
Flush-Flo™	0.299	4.2	Mean Flow over Head Range	-	3.7

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	3.2	0.800	3.8	2.000	5.8	4.000	8.0	7.000	10.4
0.200	4.1	1.000	4.2	2.200	6.0	4.500	8.5	7.500	10.8
0.300	4.2	1.200	4.6	2.400	6.3	5.000	8.9	8.000	11.1
0.400	4.1	1.400	4.9	2.600	6.5	5.500	9.3	8.500	11.5
0.500	4.0	1.600	5.2	3.000	7.0	6.000	9.7	9.000	11.8
0.600	3.6	1.800	5.5	3.500	7.5	6.500	10.1	9.500	12.1

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

Half Drain Time : 2168 minutes.

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
15 min Summer	20.516	0.266	0.0	3.3	3.3	341.7	O K
30 min Summer	20.612	0.362	0.0	3.3	3.3	463.9	O K
60 min Summer	20.717	0.467	0.0	3.3	3.3	599.3	O K
120 min Summer	20.829	0.579	0.0	3.3	3.3	742.6	O K
180 min Summer	20.893	0.643	0.0	3.3	3.3	825.1	O K
240 min Summer	20.938	0.688	0.0	3.3	3.3	882.5	O K
360 min Summer	21.004	0.754	0.0	3.3	3.3	966.5	O K
480 min Summer	21.049	0.799	0.0	3.3	3.3	1025.1	O K
600 min Summer	21.084	0.834	0.0	3.3	3.3	1069.0	O K
720 min Summer	21.110	0.860	0.0	3.3	3.3	1103.1	O K
960 min Summer	21.148	0.898	0.0	3.3	3.3	1152.1	O K
1440 min Summer	21.190	0.940	0.0	3.3	3.3	1205.7	O K
2160 min Summer	21.209	0.959	0.0	3.3	3.3	1230.2	O K
2880 min Summer	21.203	0.953	0.0	3.3	3.3	1222.2	O K
4320 min Summer	21.176	0.926	0.0	3.3	3.3	1187.3	O K
5760 min Summer	21.148	0.898	0.0	3.3	3.3	1151.3	O K
7200 min Summer	21.120	0.870	0.0	3.3	3.3	1115.3	O K
8640 min Summer	21.092	0.842	0.0	3.3	3.3	1079.3	O K
10080 min Summer	21.064	0.814	0.0	3.3	3.3	1043.7	O K
15 min Winter	20.549	0.299	0.0	3.3	3.3	383.0	O K
30 min Winter	20.655	0.405	0.0	3.3	3.3	520.0	O K
60 min Winter	20.774	0.524	0.0	3.3	3.3	672.1	O K
120 min Winter	20.900	0.650	0.0	3.3	3.3	834.0	O K
180 min Winter	20.973	0.723	0.0	3.3	3.3	926.8	O K
240 min Winter	21.023	0.773	0.0	3.3	3.3	991.5	O K
360 min Winter	21.097	0.847	0.0	3.3	3.3	1086.9	O K
480 min Winter	21.150	0.900	0.0	3.3	3.3	1154.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	128.475	0.0	252.3	27
30 min Summer	87.398	0.0	276.9	42
60 min Summer	56.713	0.0	524.2	72
120 min Summer	35.427	0.0	543.6	132
180 min Summer	26.430	0.0	525.7	192
240 min Summer	21.352	0.0	510.6	250
360 min Summer	15.813	0.0	492.0	370
480 min Summer	12.755	0.0	482.0	490
600 min Summer	10.786	0.0	476.9	610
720 min Summer	9.400	0.0	475.1	730
960 min Summer	7.557	0.0	478.7	968
1440 min Summer	5.544	0.0	482.3	1448
2160 min Summer	4.057	0.0	973.7	2164
2880 min Summer	3.246	0.0	953.4	2804
4320 min Summer	2.366	0.0	922.9	3468
5760 min Summer	1.892	0.0	1880.2	4264
7200 min Summer	1.591	0.0	1851.0	5048
8640 min Summer	1.382	0.0	1761.4	5888
10080 min Summer	1.226	0.0	1662.4	6760
15 min Winter	128.475	0.0	266.7	27
30 min Winter	87.398	0.0	279.3	41
60 min Winter	56.713	0.0	546.1	72
120 min Winter	35.427	0.0	527.7	130
180 min Winter	26.430	0.0	507.3	188
240 min Winter	21.352	0.0	496.3	248
360 min Winter	15.813	0.0	486.4	366
480 min Winter	12.755	0.0	486.0	484

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

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
600 min Winter	21.189	0.939	0.0	3.3	3.3	1204.9	O K
720 min Winter	21.221	0.971	0.0	3.3	3.3	1244.8	O K
960 min Winter	25.257	5.007	0.0	7.0	7.0	1290.3	FLOOD
1440 min Winter	25.274	5.024	0.0	7.0	7.0	1306.9	FLOOD
2160 min Winter	25.278	5.028	0.0	7.0	7.0	1311.4	FLOOD
2880 min Winter	25.278	5.028	0.0	7.0	7.0	1311.0	FLOOD
4320 min Winter	25.259	5.009	0.0	7.0	7.0	1292.2	FLOOD
5760 min Winter	25.250	5.000	0.0	7.0	7.0	1283.3	FLOOD
7200 min Winter	21.245	0.995	0.0	3.3	3.3	1276.2	O K
8640 min Winter	21.205	0.955	0.0	3.3	3.3	1224.5	O K
10080 min Winter	21.164	0.914	0.0	3.3	3.3	1172.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
600 min Winter	10.786	0.0	491.6	602
720 min Winter	9.400	0.0	498.2	718
960 min Winter	7.557	7.4	521.9	932
1440 min Winter	5.544	24.0	580.7	1362
2160 min Winter	4.057	28.5	1117.1	1696
2880 min Winter	3.246	28.0	1109.2	2164
4320 min Winter	2.366	9.2	1054.5	3036
5760 min Winter	1.892	0.4	2017.7	3968
7200 min Winter	1.591	0.0	1913.1	5408
8640 min Winter	1.382	0.0	1833.9	6328
10080 min Winter	1.226	0.0	1756.3	7272

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Model Details

Storage is Online Cover Level (m) 22.000

Cellular Storage Structure

Invert Level (m) 20.250 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)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	1350.0	0.0	1.800	0.0	0.0	3.600	0.0	0.0
0.200	1350.0	0.0	2.000	0.0	0.0	3.800	0.0	0.0
0.400	1350.0	0.0	2.200	0.0	0.0	4.000	0.0	0.0
0.600	1350.0	0.0	2.400	0.0	0.0	4.200	0.0	0.0
0.800	1350.0	0.0	2.600	0.0	0.0	4.400	0.0	0.0
1.000	1350.0	0.0	2.800	0.0	0.0	4.600	0.0	0.0
1.001	0.0	0.0	3.000	0.0	0.0	4.800	0.0	0.0
1.400	0.0	0.0	3.200	0.0	0.0	5.000	0.0	0.0
1.600	0.0	0.0	3.400	0.0	0.0			

Hydro-Brake Optimum® Outflow Control

Unit Reference MD-SHE-0086-3300-1000-3300
Design Head (m) 1.000
Design Flow (l/s) 3.3
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 86
Invert Level (m) 20.250
Minimum Outlet Pipe Diameter (mm) 100
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	3.3	Kick-Flo®	0.624	2.7
Flush-Flo™	0.296	3.3	Mean Flow over Head Range	-	2.9

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	2.6	0.800	3.0	2.000	4.5	4.000	6.3	7.000	8.2
0.200	3.2	1.000	3.3	2.200	4.8	4.500	6.6	7.500	8.5
0.300	3.3	1.200	3.6	2.400	4.9	5.000	7.0	8.000	8.7
0.400	3.2	1.400	3.9	2.600	5.1	5.500	7.3	8.500	9.0
0.500	3.1	1.600	4.1	3.000	5.5	6.000	7.6	9.000	9.2
0.600	2.8	1.800	4.3	3.500	5.9	6.500	7.9	9.500	9.5

Dorset Innovation Park
Drainage Strategy
Steam 1 Storage Calculations



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

Half Drain Time : 2032 minutes.

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
15 min Summer	20.552	0.302	0.0	2.3	2.3	229.3	O K
30 min Summer	20.659	0.409	0.0	2.3	2.3	311.2	O K
60 min Summer	20.779	0.529	0.0	2.3	2.3	401.9	O K
120 min Summer	20.905	0.655	0.0	2.3	2.3	498.0	O K
180 min Summer	20.977	0.727	0.0	2.3	2.3	552.7	O K
240 min Summer	21.027	0.777	0.0	2.3	2.3	590.4	O K
360 min Summer	21.099	0.849	0.0	2.3	2.3	645.4	O K
480 min Summer	21.149	0.899	0.0	2.3	2.3	683.5	O K
600 min Summer	21.186	0.936	0.0	2.3	2.3	711.7	O K
720 min Summer	21.215	0.965	0.0	2.3	2.3	733.4	O K
960 min Summer	25.250	5.000	0.0	4.8	4.8	760.4	FLOOD
1440 min Summer	25.251	5.001	0.0	4.8	4.8	760.8	FLOOD
2160 min Summer	25.251	5.001	0.0	4.8	4.8	761.0	FLOOD
2880 min Summer	25.250	5.000	0.0	4.8	4.8	760.4	FLOOD
4320 min Summer	23.761	3.511	0.0	4.1	4.1	760.3	FLOOD
5760 min Summer	21.228	0.978	0.0	2.3	2.3	743.5	O K
7200 min Summer	21.195	0.945	0.0	2.3	2.3	717.9	O K
8640 min Summer	21.162	0.912	0.0	2.3	2.3	692.9	O K
10080 min Summer	21.129	0.879	0.0	2.3	2.3	668.4	O K
15 min Winter	20.588	0.338	0.0	2.3	2.3	257.0	O K
30 min Winter	20.709	0.459	0.0	2.3	2.3	348.9	O K
60 min Winter	20.843	0.593	0.0	2.3	2.3	450.9	O K
120 min Winter	20.986	0.736	0.0	2.3	2.3	559.1	O K
180 min Winter	21.067	0.817	0.0	2.3	2.3	620.7	O K
240 min Winter	21.123	0.873	0.0	2.3	2.3	663.5	O K
360 min Winter	21.206	0.956	0.0	2.3	2.3	726.3	O K
480 min Winter	25.256	5.006	0.0	4.8	4.8	766.3	FLOOD

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	128.475	0.0	179.2	27
30 min Summer	87.398	0.0	193.3	42
60 min Summer	56.713	0.0	364.6	72
120 min Summer	35.427	0.0	369.9	132
180 min Summer	26.430	0.0	359.1	192
240 min Summer	21.352	0.0	352.2	250
360 min Summer	15.813	0.0	344.5	370
480 min Summer	12.755	0.0	341.6	490
600 min Summer	10.786	0.0	341.7	610
720 min Summer	9.400	0.0	344.1	728
960 min Summer	7.557	0.1	353.0	962
1440 min Summer	5.544	0.6	383.6	1188
2160 min Summer	4.057	0.8	742.8	1564
2880 min Summer	3.246	0.1	719.0	1968
4320 min Summer	2.366	0.0	675.6	3360
5760 min Summer	1.892	0.0	1287.6	4152
7200 min Summer	1.591	0.0	1308.4	4976
8640 min Summer	1.382	0.0	1252.2	5800
10080 min Summer	1.226	0.0	1180.9	6656
15 min Winter	128.475	0.0	187.5	27
30 min Winter	87.398	0.0	194.2	41
60 min Winter	56.713	0.0	376.3	72
120 min Winter	35.427	0.0	360.7	130
180 min Winter	26.430	0.0	351.7	188
240 min Winter	21.352	0.0	347.7	248
360 min Winter	15.813	0.0	346.8	366
480 min Winter	12.755	6.0	358.4	478

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

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
600 min Winter	25.278	5.028	0.0	4.9	4.9	788.3	FLOOD
720 min Winter	25.294	5.044	0.0	4.9	4.9	803.9	FLOOD
960 min Winter	25.315	5.065	0.0	4.9	4.9	825.1	FLOOD
1440 min Winter	25.330	5.080	0.0	4.9	4.9	840.2	FLOOD
2160 min Winter	25.332	5.082	0.0	4.9	4.9	841.9	FLOOD
2880 min Winter	25.325	5.075	0.0	4.9	4.9	834.8	FLOOD
4320 min Winter	25.296	5.046	0.0	4.9	4.9	806.1	FLOOD
5760 min Winter	25.268	5.018	0.0	4.9	4.9	778.3	FLOOD
7200 min Winter	25.251	5.001	0.0	4.8	4.8	761.6	FLOOD
8640 min Winter	23.738	3.488	0.0	4.1	4.1	760.3	FLOOD
10080 min Winter	21.233	0.983	0.0	2.3	2.3	747.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
600 min Winter	10.786	28.1	383.4	594
720 min Winter	9.400	43.6	403.9	708
960 min Winter	7.557	64.9	433.7	932
1440 min Winter	5.544	80.0	469.7	1352
2160 min Winter	4.057	81.6	849.1	1676
2880 min Winter	3.246	74.5	855.8	2140
4320 min Winter	2.366	45.9	815.5	3032
5760 min Winter	1.892	18.1	1439.1	3872
7200 min Winter	1.591	1.4	1416.4	4688
8640 min Winter	1.382	0.0	1328.0	6288
10080 min Winter	1.226	0.0	1248.9	7168

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Model Details

Storage is Online Cover Level (m) 22.000

Cellular Storage Structure

Invert Level (m) 20.250 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)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	800.0	0.0	1.800	0.0	0.0	3.600	0.0	0.0
0.200	800.0	0.0	2.000	0.0	0.0	3.800	0.0	0.0
0.400	800.0	0.0	2.200	0.0	0.0	4.000	0.0	0.0
0.600	800.0	0.0	2.400	0.0	0.0	4.200	0.0	0.0
0.800	800.0	0.0	2.600	0.0	0.0	4.400	0.0	0.0
1.000	800.0	0.0	2.800	0.0	0.0	4.600	0.0	0.0
1.001	0.0	0.0	3.000	0.0	0.0	4.800	0.0	0.0
1.400	0.0	0.0	3.200	0.0	0.0	5.000	0.0	0.0
1.600	0.0	0.0	3.400	0.0	0.0			

Hydro-Brake Optimum® Outflow Control

Unit Reference MD-SHE-0072-2300-1000-2300
Design Head (m) 1.000
Design Flow (l/s) 2.3
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 72
Invert Level (m) 20.250
Minimum Outlet Pipe Diameter (mm) 100
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	2.3	Kick-Flo®	0.625	1.9
Flush-Flo™	0.307	2.3	Mean Flow over Head Range	-	2.0

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	1.9	0.800	2.1	2.000	3.2	4.000	4.4	7.000	5.7
0.200	2.2	1.000	2.3	2.200	3.3	4.500	4.6	7.500	5.9
0.300	2.3	1.200	2.5	2.400	3.4	5.000	4.8	8.000	6.0
0.400	2.3	1.400	2.7	2.600	3.6	5.500	5.1	8.500	6.2
0.500	2.2	1.600	2.9	3.000	3.8	6.000	5.3	9.000	6.4
0.600	2.0	1.800	3.0	3.500	4.1	6.500	5.5	9.500	6.6

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

Half Drain Time : 4303 minutes.

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
15 min Summer	20.473	0.223	0.0	1.8	1.8	215.3	O K
30 min Summer	20.553	0.303	0.0	1.8	1.8	292.3	O K
60 min Summer	20.642	0.392	0.0	1.8	1.8	377.8	O K
120 min Summer	20.736	0.486	0.0	1.8	1.8	468.4	O K
180 min Summer	20.790	0.540	0.0	1.8	1.8	520.6	O K
240 min Summer	20.828	0.578	0.0	1.8	1.8	557.4	O K
360 min Summer	20.885	0.635	0.0	1.8	1.8	612.0	O K
480 min Summer	20.925	0.675	0.0	1.8	1.8	650.6	O K
600 min Summer	20.955	0.705	0.0	1.8	1.8	679.9	O K
720 min Summer	20.979	0.729	0.0	1.8	1.8	702.9	O K
960 min Summer	21.014	0.764	0.0	1.8	1.8	737.0	O K
1440 min Summer	21.056	0.806	0.0	1.8	1.8	777.1	O K
2160 min Summer	21.081	0.831	0.0	1.8	1.8	801.6	O K
2880 min Summer	21.085	0.835	0.0	1.8	1.8	804.9	O K
4320 min Summer	21.066	0.816	0.0	1.8	1.8	787.0	O K
5760 min Summer	21.046	0.796	0.0	1.8	1.8	767.4	O K
7200 min Summer	21.025	0.775	0.0	1.8	1.8	747.1	O K
8640 min Summer	21.004	0.754	0.0	1.8	1.8	726.9	O K
10080 min Summer	20.983	0.733	0.0	1.8	1.8	706.7	O K
15 min Winter	20.500	0.250	0.0	1.8	1.8	241.3	O K
30 min Winter	20.590	0.340	0.0	1.8	1.8	327.6	O K
60 min Winter	20.689	0.439	0.0	1.8	1.8	423.6	O K
120 min Winter	20.795	0.545	0.0	1.8	1.8	525.8	O K
180 min Winter	20.857	0.607	0.0	1.8	1.8	585.0	O K
240 min Winter	20.900	0.650	0.0	1.8	1.8	626.6	O K
360 min Winter	20.964	0.714	0.0	1.8	1.8	688.2	O K
480 min Winter	21.009	0.759	0.0	1.8	1.8	732.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	128.475	0.0	143.0	27
30 min Summer	87.398	0.0	153.7	42
60 min Summer	56.713	0.0	301.8	72
120 min Summer	35.427	0.0	307.1	132
180 min Summer	26.430	0.0	301.2	192
240 min Summer	21.352	0.0	292.9	252
360 min Summer	15.813	0.0	277.9	370
480 min Summer	12.755	0.0	269.3	490
600 min Summer	10.786	0.0	264.2	610
720 min Summer	9.400	0.0	261.4	730
960 min Summer	7.557	0.0	260.7	970
1440 min Summer	5.544	0.0	262.7	1448
2160 min Summer	4.057	0.0	534.3	2168
2880 min Summer	3.246	0.0	524.7	2884
4320 min Summer	2.366	0.0	510.6	3728
5760 min Summer	1.892	0.0	1071.5	4504
7200 min Summer	1.591	0.0	1029.4	5264
8640 min Summer	1.382	0.0	981.6	6064
10080 min Summer	1.226	0.0	932.7	6952
15 min Winter	128.475	0.0	148.4	27
30 min Winter	87.398	0.0	155.6	41
60 min Winter	56.713	0.0	307.8	72
120 min Winter	35.427	0.0	302.5	130
180 min Winter	26.430	0.0	288.8	190
240 min Winter	21.352	0.0	279.5	248
360 min Winter	15.813	0.0	269.7	366
480 min Winter	12.755	0.0	266.6	484

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

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
600 min Winter	21.044	0.794	0.0	1.8	1.8	765.7	O K
720 min Winter	21.072	0.822	0.0	1.8	1.8	792.4	O K
960 min Winter	21.113	0.863	0.0	1.8	1.8	832.5	O K
1440 min Winter	21.164	0.914	0.0	1.8	1.8	881.3	O K
2160 min Winter	21.199	0.949	0.0	1.9	1.9	915.1	O K
2880 min Winter	21.210	0.960	0.0	1.9	1.9	925.2	O K
4320 min Winter	21.196	0.946	0.0	1.9	1.9	912.1	O K
5760 min Winter	21.167	0.917	0.0	1.8	1.8	884.2	O K
7200 min Winter	21.141	0.891	0.0	1.8	1.8	859.4	O K
8640 min Winter	21.113	0.863	0.0	1.8	1.8	832.1	O K
10080 min Winter	21.083	0.833	0.0	1.8	1.8	803.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
600 min Winter	10.786	0.0	267.6	602
720 min Winter	9.400	0.0	270.8	720
960 min Winter	7.557	0.0	274.9	956
1440 min Winter	5.544	0.0	276.5	1420
2160 min Winter	4.057	0.0	551.9	2108
2880 min Winter	3.246	0.0	553.3	2780
4320 min Winter	2.366	0.0	539.4	4072
5760 min Winter	1.892	0.0	1095.1	4720
7200 min Winter	1.591	0.0	1058.4	5560
8640 min Winter	1.382	0.0	1021.5	6496
10080 min Winter	1.226	0.0	989.5	7464

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Model Details

Storage is Online Cover Level (m) 22.000

Cellular Storage Structure

Invert Level (m) 20.250 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)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	1015.0	0.0	1.800	0.0	0.0	3.600	0.0	0.0
0.200	1015.0	0.0	2.000	0.0	0.0	3.800	0.0	0.0
0.400	1015.0	0.0	2.200	0.0	0.0	4.000	0.0	0.0
0.600	1015.0	0.0	2.400	0.0	0.0	4.200	0.0	0.0
0.800	1015.0	0.0	2.600	0.0	0.0	4.400	0.0	0.0
1.000	1015.0	0.0	2.800	0.0	0.0	4.600	0.0	0.0
1.001	0.0	0.0	3.000	0.0	0.0	4.800	0.0	0.0
1.400	0.0	0.0	3.200	0.0	0.0	5.000	0.0	0.0
1.600	0.0	0.0	3.400	0.0	0.0			

Hydro-Brake Optimum® Outflow Control

Unit Reference MD-SHE-0065-1900-1000-1900
Design Head (m) 1.000
Design Flow (l/s) 1.9
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 65
Invert Level (m) 20.250
Minimum Outlet Pipe Diameter (mm) 100
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	1.9	Kick-Flo®	0.582	1.5
Flush-Flo™	0.286	1.8	Mean Flow over Head Range	-	1.6

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)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.5	0.800	1.7	2.000	2.6	4.000	3.6	7.000	4.7
0.200	1.8	1.000	1.9	2.200	2.7	4.500	3.8	7.500	4.8
0.300	1.8	1.200	2.1	2.400	2.8	5.000	4.0	8.000	5.0
0.400	1.8	1.400	2.2	2.600	2.9	5.500	4.2	8.500	5.1
0.500	1.7	1.600	2.4	3.000	3.1	6.000	4.3	9.000	5.3
0.600	1.5	1.800	2.5	3.500	3.4	6.500	4.5	9.500	5.4