



Date	11/07/19 23:40
File	Catchment 1A.SRCX

Designed by Andy James
Checked by

XP Solutions

Source Control 2018.1.1

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

Half Drain Time : 16 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	53.107	0.507		0.0	18.6	18.6	23.1	OK
	30 min Summer	53.225	0.625		0.0	18.6	18.6	28.5	OK
	60 min Summer	53.233	0.633		0.0	18.6	18.6	28.9	OK
	120 min Summer	53.126	0.526		0.0	18.6	18.6	24.0	OK
	180 min Summer	53.009	0.409		0.0	18.6	18.6	18.6	OK
	240 min Summer	52.917	0.317		0.0	18.2	18.2	14.4	OK
	360 min Summer	52.809	0.209		0.0	16.9	16.9	9.5	OK
	480 min Summer	52.774	0.174		0.0	14.6	14.6	7.9	OK
	600 min Summer	52.753	0.153		0.0	12.6	12.6	7.0	OK
	720 min Summer	52.740	0.140		0.0	11.1	11.1	6.4	OK
	960 min Summer	52.722	0.122		0.0	9.0	9.0	5.6	OK
	1440 min Summer	52.701	0.101		0.0	6.6	6.6	4.6	OK
	2160 min Summer	52.685	0.085		0.0	4.9	4.9	3.9	OK
	2880 min Summer	52.675	0.075		0.0	3.9	3.9	3.4	OK
	4320 min Summer	52.663	0.063		0.0	2.8	2.8	2.9	OK
	5760 min Summer	52.656	0.056		0.0	2.3	2.3	2.5	OK
	7200 min Summer	52.651	0.051		0.0	1.9	1.9	2.3	OK
	8640 min Summer	52.647	0.047		0.0	1.6	1.6	2.1	OK
10080	min Summer	52.644	0.044		0.0	1.5	1.5	2.0	OK
	15 min Winter	53.187	0.587		0.0	18.6	18.6	26.8	OK

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
15 min Summer	118.498	0.0	38.0	20
30 min Summer	79.373	0.0	50.9	29
60 min Summer	50.812	0.0	65.1	46
120 min Summer	31.483	0.0	80.7	78
180 min Summer	23.483	0.0	90.3	108
240 min Summer	18.956	0.0	97.2	138
360 min Summer	13.897	0.0	106.9	194
480 min Summer	11.157	0.0	114.4	252
600 min Summer	9.402	0.0	120.6	312
720 min Summer	8.170	0.0	125.7	372
960 min Summer	6.541	0.0	134.2	492
1440 min Summer	4.773	0.0	146.9	734
2160 min Summer	3.476	0.0	160.4	1100
2880 min Summer	2.772	0.0	170.6	1460
4320 min Summer	2.011	0.0	185.7	2148
5760 min Summer	1.600	0.0	197.0	2880
7200 min Summer	1.339	0.0	206.1	3664
8640 min Summer	1.157	0.0	213.7	4336
10080 min Summer	1.023	0.0	220.3	5088
15 min Winter	118.498	0.0	42.5	21

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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 Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	53.323	0.723	0.0	18.6	18.6	33.0	OK
60 min Winter	53.305	0.705	0.0	18.6	18.6	32.2	OK
120 min Winter	53.111	0.511	0.0	18.6	18.6	23.3	OK
180 min Winter	52.936	0.336	0.0	18.3	18.3	15.3	OK
240 min Winter	52.829	0.229	0.0	17.3	17.3	10.4	OK
360 min Winter	52.765	0.165	0.0	13.7	13.7	7.5	OK
480 min Winter	52.740	0.140	0.0	11.1	11.1	6.4	OK
600 min Winter	52.726	0.126	0.0	9.4	9.4	5.7	OK
720 min Winter	52.715	0.115	0.0	8.2	8.2	5.2	OK
960 min Winter	52.701	0.101	0.0	6.6	6.6	4.6	OK
1440 min Winter	52.684	0.084	0.0	4.8	4.8	3.8	OK
2160 min Winter	52.671	0.071	0.0	3.5	3.5	3.2	OK
2880 min Winter	52.663	0.063	0.0	2.8	2.8	2.9	OK
4320 min Winter	52.653	0.053	0.0	2.0	2.0	2.4	OK
5760 min Winter	52.647	0.047	0.0	1.6	1.6	2.1	OK
7200 min Winter	52.643	0.043	0.0	1.4	1.4	1.9	OK
8640 min Winter	52.640	0.040	0.0	1.2	1.2	1.8	OK
10080 min Winter	52.637	0.037	0.0	1.0	1.0	1.7	OK

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
30 min Winter	79.373	0.0	57.0	31
60 min Winter	50.812	0.0	73.0	50
120 min Winter	31.483	0.0	90.4	82
180 min Winter	23.483	0.0	101.2	112
240 min Winter	18.956	0.0	108.9	138
360 min Winter	13.897	0.0	119.8	192
480 min Winter	11.157	0.0	128.2	252
600 min Winter	9.402	0.0	135.0	312
720 min Winter	8.170	0.0	140.8	372
960 min Winter	6.541	0.0	150.3	494
1440 min Winter	4.773	0.0	164.5	736
2160 min Winter	3.476	0.0	179.7	1076
2880 min Winter	2.772	0.0	191.1	1440
4320 min Winter	2.011	0.0	208.0	2168
5760 min Winter	1.600	0.0	220.6	2904
7200 min Winter	1.339	0.0	230.8	3640
8640 min Winter	1.157	0.0	239.4	4352
10080 min Winter	1.023	0.0	246.8	5048

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XP Solutions Source Control 2018.1.1		

Model Details

Storage is Online Cover Level (m) 55.400

Cellular Storage Structure

Invert Level (m) 52.600 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	48.0	0.0	0.801	0.0	0.0
0.800	48.0	0.0			

Hydro-Brake® Optimum Outflow Control

Unit Reference MD-SHE-0185-1860-1500-1860
Design Head (m) 1.500
Design Flow (l/s) 18.6
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 185
Invert Level (m) 52.600
Minimum Outlet Pipe Diameter (mm) 225
Suggested Manhole Diameter (mm) 1500

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.500	18.6
Flush-Flo™	0.449	18.6
Kick-Flo®	0.977	15.2
Mean Flow over Head Range	-	16.1

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	6.5	1.200	16.7	3.000	25.9	7.000	38.9
0.200	16.7	1.400	18.0	3.500	27.9	7.500	40.3
0.300	18.1	1.600	19.2	4.000	29.7	8.000	41.5
0.400	18.6	1.800	20.3	4.500	31.5	8.500	42.8
0.500	18.6	2.000	21.3	5.000	33.1	9.000	44.0
0.600	18.4	2.200	22.3	5.500	34.7	9.500	45.2
0.800	17.5	2.400	23.3	6.000	36.2		
1.000	15.3	2.600	24.2	6.500	37.6		

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Date 11/07/19 23:43
File Catchment 1B.SRCX

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Source Control 2018.1.1

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

Half Drain Time : 18 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		56.989	0.489	0.0	34.1	34.1	46.4	OK
	30 min Summer		57.104	0.604	0.0	34.1	34.1	57.4	OK
	60 min Summer		57.129	0.629	0.0	34.1	34.1	59.7	OK
	120 min Summer		57.042	0.542	0.0	34.1	34.1	51.5	OK
	180 min Summer		56.938	0.438	0.0	34.0	34.0	41.6	OK
	240 min Summer		56.853	0.353	0.0	33.6	33.6	33.5	OK
	360 min Summer		56.751	0.251	0.0	31.9	31.9	23.9	OK
	480 min Summer		56.715	0.215	0.0	27.1	27.1	20.4	OK
	600 min Summer		56.692	0.192	0.0	23.6	23.6	18.2	OK
	720 min Summer		56.676	0.176	0.0	20.8	20.8	16.7	OK
	960 min Summer		56.654	0.154	0.0	16.9	16.9	14.7	OK
	1440 min Summer		56.629	0.129	0.0	12.6	12.6	12.3	OK
	2160 min Summer		56.608	0.108	0.0	9.2	9.2	10.3	OK
	2880 min Summer		56.596	0.096	0.0	7.4	7.4	9.1	OK
	4320 min Summer		56.580	0.080	0.0	5.3	5.3	7.6	OK
	5760 min Summer		56.571	0.071	0.0	4.3	4.3	6.8	OK
	7200 min Summer		56.565	0.065	0.0	3.6	3.6	6.1	OK
	8640 min Summer		56.560	0.060	0.0	3.1	3.1	5.7	OK
10080	min Summer		56.556	0.056	0.0	2.7	2.7	5.3	OK
	15 min Winter		57.062	0.562	0.0	34.1	34.1	53.4	OK

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
15 min Summer	118.498	0.0	72.1	20
30 min Summer	79.373	0.0	96.6	30
60 min Summer	50.812	0.0	123.8	46
120 min Summer	31.483	0.0	153.4	78
180 min Summer	23.483	0.0	171.7	110
240 min Summer	18.956	0.0	184.8	138
360 min Summer	13.897	0.0	203.2	194
480 min Summer	11.157	0.0	217.5	254
600 min Summer	9.402	0.0	229.1	314
720 min Summer	8.170	0.0	238.9	374
960 min Summer	6.541	0.0	255.1	494
1440 min Summer	4.773	0.0	279.1	736
2160 min Summer	3.476	0.0	304.9	1100
2880 min Summer	2.772	0.0	324.2	1464
4320 min Summer	2.011	0.0	352.9	2200
5760 min Summer	1.600	0.0	374.4	2928
7200 min Summer	1.339	0.0	391.7	3656
8640 min Summer	1.157	0.0	406.2	4368
10080 min Summer	1.023	0.0	418.7	5136
15 min Winter	118.498	0.0	80.8	21



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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 Outflow (l/s)	Max Volume (m³)	Status
	30 min Winter	57.194	0.694	0.0	34.1	34.1	66.0	OK
	60 min Winter	57.197	0.697	0.0	34.1	34.1	66.2	OK
	120 min Winter	57.036	0.536	0.0	34.1	34.1	50.9	OK
	180 min Winter	56.877	0.377	0.0	33.8	33.8	35.8	OK
	240 min Winter	56.772	0.272	0.0	32.4	32.4	25.9	OK
	360 min Winter	56.706	0.206	0.0	25.8	25.8	19.6	OK
	480 min Winter	56.678	0.178	0.0	21.0	21.0	16.9	OK
	600 min Winter	56.660	0.160	0.0	17.8	17.8	15.2	OK
	720 min Winter	56.647	0.147	0.0	15.6	15.6	13.9	OK
	960 min Winter	56.629	0.129	0.0	12.5	12.5	12.2	OK
	1440 min Winter	56.608	0.108	0.0	9.1	9.1	10.2	OK
	2160 min Winter	56.591	0.091	0.0	6.7	6.7	8.6	OK
	2880 min Winter	56.580	0.080	0.0	5.3	5.3	7.6	OK
	4320 min Winter	56.568	0.068	0.0	3.9	3.9	6.4	OK
	5760 min Winter	56.560	0.060	0.0	3.1	3.1	5.7	OK
	7200 min Winter	56.555	0.055	0.0	2.6	2.6	5.2	OK
	8640 min Winter	56.551	0.051	0.0	2.2	2.2	4.8	OK
	10080 min Winter	56.548	0.048	0.0	2.0	2.0	4.5	OK

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	79.373	0.0	108.2	31
60 min Winter	50.812	0.0	138.7	50
120 min Winter	31.483	0.0	171.9	84
180 min Winter	23.483	0.0	192.3	112
240 min Winter	18.956	0.0	207.0	138
360 min Winter	13.897	0.0	227.6	194
480 min Winter	11.157	0.0	243.6	254
600 min Winter	9.402	0.0	256.6	314
720 min Winter	8.170	0.0	267.6	374
960 min Winter	6.541	0.0	285.7	494
1440 min Winter	4.773	0.0	312.6	738
2160 min Winter	3.476	0.0	341.5	1096
2880 min Winter	2.772	0.0	363.2	1460
4320 min Winter	2.011	0.0	395.3	2156
5760 min Winter	1.600	0.0	419.3	2880
7200 min Winter	1.339	0.0	438.7	3576
8640 min Winter	1.157	0.0	454.9	4408
10080 min Winter	1.023	0.0	469.0	5096

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Model Details

Storage is Online Cover Level (m) 58.650

Cellular Storage Structure

Invert Level (m) 56.500 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	100.0	0.0	0.801	0.0	0.0
0.800	100.0	0.0			

Hydro-Brake® Optimum Outflow Control

Unit Reference MD-SHE-0244-3420-1500-3420
Design Head (m) 1.500
Design Flow (l/s) 34.2
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 244
Invert Level (m) 56.500
Minimum Outlet Pipe Diameter (mm) 300
Suggested Manhole Diameter (mm) 1800

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.500	34.1
Flush-Flo™	0.474	34.1
Kick-Flo®	1.031	28.5
Mean Flow over Head Range	-	29.1

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	8.0	1.200	30.7	3.000	47.6	7.000	71.8
0.200	24.8	1.400	33.0	3.500	51.3	7.500	74.3
0.300	32.9	1.600	35.2	4.000	54.8	8.000	76.7
0.400	33.9	1.800	37.2	4.500	58.0	8.500	79.0
0.500	34.0	2.000	39.2	5.000	61.0	9.000	81.2
0.600	33.8	2.200	41.0	5.500	63.9	9.500	83.3
0.800	32.6	2.400	42.8	6.000	66.6		
1.000	29.5	2.600	44.5	6.500	69.3		

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Date 11/07/19 23:44
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Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 48 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		54.888	0.038	0.0	37.0	37.0	94.2	OK
	30 min Summer		54.907	0.057	0.0	37.0	37.0	139.9	OK
	60 min Summer		54.920	0.070	0.0	37.0	37.0	173.1	OK
	120 min Summer		54.920	0.070	0.0	37.0	37.0	173.7	OK
	180 min Summer		54.915	0.065	0.0	37.0	37.0	160.4	OK
	240 min Summer		54.908	0.058	0.0	37.0	37.0	144.4	OK
	360 min Summer		54.895	0.045	0.0	37.0	37.0	110.6	OK
	480 min Summer		54.883	0.033	0.0	37.0	37.0	80.8	OK
	600 min Summer		54.872	0.022	0.0	37.0	37.0	55.5	OK
	720 min Summer		54.864	0.014	0.0	37.0	37.0	35.2	OK
	960 min Summer		54.854	0.004	0.0	37.0	37.0	8.7	OK
	1440 min Summer		54.850	0.000	0.0	31.4	31.4	0.0	OK
	2160 min Summer		54.850	0.000	0.0	22.8	22.8	0.0	OK
	2880 min Summer		54.850	0.000	0.0	18.1	18.1	0.0	OK
	4320 min Summer		54.850	0.000	0.0	13.1	13.1	0.0	OK
	5760 min Summer		54.850	0.000	0.0	10.3	10.3	0.0	OK
	7200 min Summer		54.850	0.000	0.0	8.6	8.6	0.0	OK
	8640 min Summer		54.850	0.000	0.0	7.4	7.4	0.0	OK
	10080 min Summer		54.850	0.000	0.0	6.5	6.5	0.0	OK
	15 min Winter		54.897	0.047	0.0	37.0	37.0	115.7	OK

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
15 min Summer	118.498	0.0	137.4	29
30 min Summer	79.373	0.0	199.2	39
60 min Summer	50.812	0.0	266.1	60
120 min Summer	31.483	0.0	338.5	96
180 min Summer	23.483	0.0	385.3	130
240 min Summer	18.956	0.0	413.8	162
360 min Summer	13.897	0.0	457.7	228
480 min Summer	11.157	0.0	492.6	288
600 min Summer	9.402	0.0	519.8	348
720 min Summer	8.170	0.0	544.0	404
960 min Summer	6.541	0.0	578.0	512
1440 min Summer	4.773	0.0	631.3	0
2160 min Summer	3.476	0.0	683.4	0
2880 min Summer	2.772	0.0	719.3	0
4320 min Summer	2.011	0.0	766.3	0
5760 min Summer	1.600	0.0	795.2	0
7200 min Summer	1.339	0.0	813.6	0
8640 min Summer	1.157	0.0	825.2	0
10080 min Summer	1.023	0.0	831.8	0
15 min Winter	118.498	0.0	159.7	30

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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 Outflow (l/s)	Max Volume (m³)	Status
	30 min Winter	54.918	0.068	0.0	37.0	37.0	167.7	OK
	60 min Winter	54.933	0.083	0.0	37.0	37.0	204.4	OK
	120 min Winter	54.932	0.082	0.0	37.0	37.0	204.1	OK
	180 min Winter	54.924	0.074	0.0	37.0	37.0	182.7	OK
	240 min Winter	54.913	0.063	0.0	37.0	37.0	156.8	OK
	360 min Winter	54.892	0.042	0.0	37.0	37.0	103.5	OK
	480 min Winter	54.874	0.024	0.0	37.0	37.0	58.6	OK
	600 min Winter	54.860	0.010	0.0	37.0	37.0	24.1	OK
	720 min Winter	54.851	0.001	0.0	37.0	37.0	2.9	OK
	960 min Winter	54.850	0.000	0.0	31.0	31.0	0.0	OK
	1440 min Winter	54.850	0.000	0.0	22.6	22.6	0.0	OK
	2160 min Winter	54.850	0.000	0.0	16.4	16.4	0.0	OK
	2880 min Winter	54.850	0.000	0.0	13.0	13.0	0.0	OK
	4320 min Winter	54.850	0.000	0.0	9.4	9.4	0.0	OK
	5760 min Winter	54.850	0.000	0.0	7.4	7.4	0.0	OK
	7200 min Winter	54.850	0.000	0.0	6.1	6.1	0.0	OK
	8640 min Winter	54.850	0.000	0.0	5.3	5.3	0.0	OK
	10080 min Winter	54.850	0.000	0.0	4.6	4.6	0.0	OK

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	79.373	0.0	227.9	40
60 min Winter	50.812	0.0	301.0	62
120 min Winter	31.483	0.0	385.8	102
180 min Winter	23.483	0.0	435.0	140
240 min Winter	18.956	0.0	470.6	174
360 min Winter	13.897	0.0	518.9	242
480 min Winter	11.157	0.0	557.4	302
600 min Winter	9.402	0.0	588.4	354
720 min Winter	8.170	0.0	614.8	392
960 min Winter	6.541	0.0	656.0	0
1440 min Winter	4.773	0.0	715.3	0
2160 min Winter	3.476	0.0	775.2	0
2880 min Winter	2.772	0.0	817.1	0
4320 min Winter	2.011	0.0	873.1	0
5760 min Winter	1.600	0.0	908.9	0
7200 min Winter	1.339	0.0	933.0	0
8640 min Winter	1.157	0.0	949.4	0
10080 min Winter	1.023	0.0	960.7	0

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Model Details

Storage is Online Cover Level (m) 55.400

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	75.0
Membrane Percolation (mm/hr)	1000	Length (m)	110.0
Max Percolation (l/s)	2291.7	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	54.850	Cap Volume Depth (m)	0.300

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0259-3710-1000-3710
Design Head (m)	1.000
Design Flow (l/s)	37.1
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	259
Invert Level (m)	54.400
Minimum Outlet Pipe Diameter (mm)	300
Suggested Manhole Diameter (mm)	1800

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	37.1
Flush-Flo™	0.407	37.1
Kick-Flo®	0.762	32.6
Mean Flow over Head Range	-	30.3

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	8.3	1.200	40.5	3.000	63.0	7.000	95.2
0.200	26.6	1.400	43.6	3.500	67.9	7.500	98.4
0.300	36.5	1.600	46.5	4.000	72.5	8.000	101.6
0.400	37.1	1.800	49.2	4.500	76.7	8.500	104.6
0.500	36.8	2.000	51.8	5.000	80.8	9.000	107.6
0.600	36.0	2.200	54.2	5.500	84.6	9.500	110.5
0.800	33.3	2.400	56.6	6.000	88.3		
1.000	37.1	2.600	58.8	6.500	91.8		

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

Half Drain Time : 10 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		52.720	0.470	0.0	29.9	29.9	24.1	OK
	30 min Summer		52.823	0.573	0.0	29.9	29.9	29.4	OK
	60 min Summer		52.804	0.554	0.0	29.9	29.9	28.4	OK
	120 min Summer		52.661	0.411	0.0	29.9	29.9	21.1	OK
	180 min Summer		52.544	0.294	0.0	29.6	29.6	15.1	OK
	240 min Summer		52.482	0.232	0.0	28.3	28.3	11.9	OK
	360 min Summer		52.439	0.189	0.0	22.2	22.2	9.7	OK
	480 min Summer		52.415	0.165	0.0	18.3	18.3	8.5	OK
	600 min Summer		52.400	0.150	0.0	15.6	15.6	7.7	OK
	720 min Summer		52.388	0.138	0.0	13.7	13.7	7.1	OK
	960 min Summer		52.372	0.122	0.0	11.1	11.1	6.3	OK
	1440 min Summer		52.353	0.103	0.0	8.2	8.2	5.3	OK
	2160 min Summer		52.336	0.086	0.0	6.0	6.0	4.4	OK
	2880 min Summer		52.326	0.076	0.0	4.7	4.7	3.9	OK
	4320 min Summer		52.314	0.064	0.0	3.4	3.4	3.3	OK
	5760 min Summer		52.307	0.057	0.0	2.8	2.8	2.9	OK
	7200 min Summer		52.302	0.052	0.0	2.3	2.3	2.7	OK
	8640 min Summer		52.298	0.048	0.0	2.0	2.0	2.5	OK
	10080 min Summer		52.295	0.045	0.0	1.8	1.8	2.3	OK
	15 min Winter		52.801	0.551	0.0	29.9	29.9	28.3	OK

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
15 min Summer	118.498	0.0	46.6	20
30 min Summer	79.373	0.0	62.5	28
60 min Summer	50.812	0.0	80.0	44
120 min Summer	31.483	0.0	99.1	74
180 min Summer	23.483	0.0	111.0	104
240 min Summer	18.956	0.0	119.4	130
360 min Summer	13.897	0.0	131.3	190
480 min Summer	11.157	0.0	140.6	250
600 min Summer	9.402	0.0	148.0	310
720 min Summer	8.170	0.0	154.4	370
960 min Summer	6.541	0.0	164.8	492
1440 min Summer	4.773	0.0	180.4	734
2160 min Summer	3.476	0.0	197.0	1100
2880 min Summer	2.772	0.0	209.5	1468
4320 min Summer	2.011	0.0	228.1	2200
5760 min Summer	1.600	0.0	241.9	2896
7200 min Summer	1.339	0.0	253.1	3632
8640 min Summer	1.157	0.0	262.5	4360
10080 min Summer	1.023	0.0	270.6	5104
15 min Winter	118.498	0.0	52.2	20



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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 Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	52.916	0.666	0.0	29.9	29.9	34.1	OK
60 min Winter	52.842	0.592	0.0	29.9	29.9	30.4	OK
120 min Winter	52.596	0.346	0.0	29.9	29.9	17.8	OK
180 min Winter	52.477	0.227	0.0	27.6	27.6	11.6	OK
240 min Winter	52.443	0.193	0.0	22.8	22.8	9.9	OK
360 min Winter	52.408	0.158	0.0	17.0	17.0	8.1	OK
480 min Winter	52.388	0.138	0.0	13.7	13.7	7.1	OK
600 min Winter	52.375	0.125	0.0	11.6	11.6	6.4	OK
720 min Winter	52.366	0.116	0.0	10.1	10.1	5.9	OK
960 min Winter	52.352	0.102	0.0	8.1	8.1	5.2	OK
1440 min Winter	52.336	0.086	0.0	5.9	5.9	4.4	OK
2160 min Winter	52.323	0.073	0.0	4.3	4.3	3.7	OK
2880 min Winter	52.314	0.064	0.0	3.4	3.4	3.3	OK
4320 min Winter	52.304	0.054	0.0	2.5	2.5	2.8	OK
5760 min Winter	52.298	0.048	0.0	2.0	2.0	2.5	OK
7200 min Winter	52.294	0.044	0.0	1.7	1.7	2.3	OK
8640 min Winter	52.291	0.041	0.0	1.4	1.4	2.1	OK
10080 min Winter	52.288	0.038	0.0	1.3	1.3	2.0	OK

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
30 min Winter	79.373	0.0	70.0	30
60 min Winter	50.812	0.0	89.6	46
120 min Winter	31.483	0.0	111.0	76
180 min Winter	23.483	0.0	124.2	102
240 min Winter	18.956	0.0	133.7	130
360 min Winter	13.897	0.0	147.1	190
480 min Winter	11.157	0.0	157.4	250
600 min Winter	9.402	0.0	165.8	314
720 min Winter	8.170	0.0	172.9	370
960 min Winter	6.541	0.0	184.6	492
1440 min Winter	4.773	0.0	202.0	736
2160 min Winter	3.476	0.0	220.7	1088
2880 min Winter	2.772	0.0	234.7	1444
4320 min Winter	2.011	0.0	255.4	2208
5760 min Winter	1.600	0.0	271.0	2928
7200 min Winter	1.339	0.0	283.5	3600
8640 min Winter	1.157	0.0	294.0	4368
10080 min Winter	1.023	0.0	303.1	5008

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Model Details

Storage is Online Cover Level (m) 54.750

Cellular Storage Structure

Invert Level (m) 52.250 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)
0.000	54.0	0.0	0.801	0.0	0.0
0.800	54.0	0.0			

Hydro-Brake® Optimum Outflow Control

Unit Reference MD-SHE-0237-3000-1000-3000
Design Head (m) 1.000
Design Flow (l/s) 30.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 237
Invert Level (m) 52.250
Minimum Outlet Pipe Diameter (mm) 300
Suggested Manhole Diameter (mm) 1500

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	30.0
Flush-Flo™	0.383	29.9
Kick-Flo®	0.748	26.1
Mean Flow over Head Range	-	24.8

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)
0.100	7.8	1.200	32.7	3.000	50.9	7.000	76.8
0.200	23.9	1.400	35.2	3.500	54.8	7.500	79.4
0.300	29.6	1.600	37.6	4.000	58.5	8.000	81.9
0.400	29.9	1.800	39.8	4.500	61.9	8.500	84.4
0.500	29.6	2.000	41.8	5.000	65.2	9.000	86.8
0.600	28.8	2.200	43.8	5.500	68.3	9.500	89.1
0.800	27.0	2.400	45.7	6.000	71.2		
1.000	30.0	2.600	47.5	6.500	74.0		

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