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Unit 10, Penstraze Business ... Truro Cornwall	E-462 Coombe Farm	
Date 04/08/2020 File ATTENUATION POND CALCS....	Designed by Joshua Munyard Checked by	
Innovyze	Source Control 2018.1.1	

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

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Overflow (l/s)	Max Σ Outflow (l/s)	Max Volume (m ³)	Status
15 min Summer	99.472	0.472	1.0	0.0	1.0	4.5	O K
30 min Summer	99.526	0.526	1.0	0.0	1.0	5.5	O K
60 min Summer	99.549	0.549	1.0	0.0	1.0	6.0	O K
120 min Summer	99.545	0.545	1.0	0.0	1.0	5.9	O K
180 min Summer	99.530	0.530	1.0	0.0	1.0	5.6	O K
240 min Summer	99.511	0.511	1.0	0.0	1.0	5.2	O K
360 min Summer	99.466	0.466	1.0	0.0	1.0	4.4	O K
480 min Summer	99.418	0.418	1.0	0.0	1.0	3.6	O K
600 min Summer	99.354	0.354	1.0	0.0	1.0	2.6	O K
720 min Summer	99.293	0.293	1.0	0.0	1.0	1.9	O K
960 min Summer	99.190	0.190	1.0	0.0	1.0	1.0	O K
1440 min Summer	99.084	0.084	0.9	0.0	0.9	0.3	O K
2160 min Summer	99.055	0.055	0.7	0.0	0.7	0.2	O K
2880 min Summer	99.045	0.045	0.5	0.0	0.5	0.2	O K
4320 min Summer	99.036	0.036	0.4	0.0	0.4	0.1	O K
5760 min Summer	99.031	0.031	0.3	0.0	0.3	0.1	O K
7200 min Summer	99.028	0.028	0.3	0.0	0.3	0.1	O K
8640 min Summer	99.026	0.026	0.2	0.0	0.2	0.1	O K
10080 min Summer	99.024	0.024	0.2	0.0	0.2	0.1	O K
15 min Winter	99.506	0.506	1.0	0.0	1.0	5.1	O K
30 min Winter	99.566	0.566	1.0	0.0	1.0	6.3	O K


Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Overflow Volume (m ³)	Time-Peak (mins)
15 min Summer	122.482	0.0	5.3	0.0	17
30 min Summer	82.129	0.0	7.1	0.0	31
60 min Summer	52.595	0.0	9.1	0.0	54
120 min Summer	32.562	0.0	11.2	0.0	88
180 min Summer	24.256	0.0	12.6	0.0	122
240 min Summer	19.552	0.0	13.5	0.0	156
360 min Summer	14.344	0.0	14.8	0.0	226
480 min Summer	11.518	0.0	15.9	0.0	292
600 min Summer	9.707	0.0	16.7	0.0	350
720 min Summer	8.436	0.0	17.5	0.0	406
960 min Summer	6.755	0.0	18.6	0.0	512
1440 min Summer	4.929	0.0	20.4	0.0	736
2160 min Summer	3.590	0.0	22.3	0.0	1100
2880 min Summer	2.863	0.0	23.7	0.0	1460
4320 min Summer	2.077	0.0	25.8	0.0	2192
5760 min Summer	1.653	0.0	27.4	0.0	2856
7200 min Summer	1.383	0.0	28.6	0.0	3672
8640 min Summer	1.195	0.0	29.7	0.0	4328
10080 min Summer	1.057	0.0	30.6	0.0	5064
15 min Winter	122.482	0.0	5.9	0.0	17
30 min Winter	82.129	0.0	7.9	0.0	31

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Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Overflow (l/s)	Max Outflow (l/s)	Max Volume (m ³)	Status
60 min Winter	99.596	0.596	1.0	0.0	1.0	7.0	O K
120 min Winter	99.589	0.589	1.0	0.0	1.0	6.9	O K
180 min Winter	99.567	0.567	1.0	0.0	1.0	6.4	O K
240 min Winter	99.539	0.539	1.0	0.0	1.0	5.8	O K
360 min Winter	99.471	0.471	1.0	0.0	1.0	4.4	O K
480 min Winter	99.387	0.387	1.0	0.0	1.0	3.1	O K
600 min Winter	99.276	0.276	1.0	0.0	1.0	1.7	O K
720 min Winter	99.183	0.183	1.0	0.0	1.0	0.9	O K
960 min Winter	99.084	0.084	0.9	0.0	0.9	0.3	O K
1440 min Winter	99.055	0.055	0.7	0.0	0.7	0.2	O K
2160 min Winter	99.042	0.042	0.5	0.0	0.5	0.1	O K
2880 min Winter	99.036	0.036	0.4	0.0	0.4	0.1	O K
4320 min Winter	99.029	0.029	0.3	0.0	0.3	0.1	O K
5760 min Winter	99.026	0.026	0.2	0.0	0.2	0.1	O K
7200 min Winter	99.023	0.023	0.2	0.0	0.2	0.1	O K
8640 min Winter	99.021	0.021	0.2	0.0	0.2	0.1	O K
10080 min Winter	99.020	0.020	0.1	0.0	0.1	0.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Overflow Volume (m ³)	Time-Peak (mins)
60 min Winter	52.595	0.0	10.2	0.0	58
120 min Winter	32.562	0.0	12.6	0.0	94
180 min Winter	24.256	0.0	14.1	0.0	132
240 min Winter	19.552	0.0	15.1	0.0	170
360 min Winter	14.344	0.0	16.6	0.0	242
480 min Winter	11.518	0.0	17.8	0.0	314
600 min Winter	9.707	0.0	18.8	0.0	360
720 min Winter	8.436	0.0	19.6	0.0	406
960 min Winter	6.755	0.0	20.9	0.0	500
1440 min Winter	4.929	0.0	22.9	0.0	728
2160 min Winter	3.590	0.0	25.0	0.0	1092
2880 min Winter	2.863	0.0	26.5	0.0	1432
4320 min Winter	2.077	0.0	28.9	0.0	2152
5760 min Winter	1.653	0.0	30.7	0.0	2960
7200 min Winter	1.383	0.0	32.1	0.0	3592
8640 min Winter	1.195	0.0	33.2	0.0	4408
10080 min Winter	1.057	0.0	34.3	0.0	5120

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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)	18.600	Shortest Storm (mins)	15
Ratio R	0.356	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.023

Time (mins)		Area
From:	To:	(ha)
0	4	0.023

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Model Details

Storage is Online Cover Level (m) 100.000

Tank or Pond Structure

Invert Level (m) 99.000

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	3.0	1.000	49.7

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0052-1000-0600-1000
Design Head (m)	0.600
Design Flow (l/s)	1.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	52
Invert Level (m)	99.000
Minimum Outlet Pipe Diameter (mm)	75
Suggested Manhole Diameter (mm)	1200


Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.600	1.0
Flush-Flo™	0.186	1.0
Kick-Flo®	0.389	0.8
Mean Flow over Head Range	-	0.9

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)
0.100	0.9	1.200	1.4	3.000	2.1	7.000	3.1
0.200	1.0	1.400	1.5	3.500	2.2	7.500	3.2
0.300	1.0	1.600	1.5	4.000	2.4	8.000	3.3
0.400	0.8	1.800	1.6	4.500	2.5	8.500	3.4
0.500	0.9	2.000	1.7	5.000	2.6	9.000	3.5
0.600	1.0	2.200	1.8	5.500	2.7	9.500	3.6
0.800	1.1	2.400	1.9	6.000	2.8		
1.000	1.3	2.600	1.9	6.500	3.0		

Pipe Overflow Control

Diameter (m)	0.100	Roughness k (mm)	0.600
Slope (1:X)	10.0	Entry Loss Coefficient	0.500
Length (m)	10.000	Coefficient of Contraction	0.600

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Pipe Overflow Control

Upstream Invert Level (m) 99.600