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Job No. : **19895**
Sheet : **S1**
Made by : **GWP**
Date : **15-Mar-18**
Checked :
Revision : -

Ref:	CALCULATIONS	Output.
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**FRONT END EXTENSION
PUFFIN PROCUDE**

Client: PUFFIN PRODUCE

RCA Brief: Drianage Design

- Design Data:**
- 1 Percolation Test Results.
 - 2 BRE 365.
 - 3 Building Regulations Approved Document Part H.
 - 4 Sewers for Adoption 7th Edition.
 - 5 Site Location Co-Ordinates:
E 196306
N 218966
 - 6 Site Grid Reference: SM963189
 - 7 Time of Entry = 4 minutes.
 - 8 Welsh Ministers Standards.

Information

Provided: Architectural Site Plan.
Percolation Test Result.
Land Survey.

Drainage

Design By: Micro Drainage Network - Version 2017.1.2
Micro Drainage Source Control - Version 2017.1.2
Micro Drainage Simulation- Version 2017.1.2

Revisions:

Revision Version:	Description:	Date:

Calculations Prepared By:	Calculations Checked By:
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Gavin Phillips

Signed:	Date:	Signed:	Date:
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Gavin Phillips

15/03/2018

Template Issue Date:

21/03/2016



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

Half Drain Time : 126 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max E (l/s)	Max Outflow (l/s)	Max Volume (m ³)	Status
15 min Summer	9.086	0.686	0.0	4.7	4.7	4.7	28.7	O K
30 min Summer	9.355	0.955	0.0	4.7	4.7	4.7	39.9	O K
60 min Summer	9.599	1.199	0.0	4.7	4.7	4.7	50.1	O K
120 min Summer	9.746	1.346	0.0	4.7	4.7	4.7	56.3	O K
180 min Summer	9.772	1.372	0.0	4.7	4.7	4.7	57.3	O K
240 min Summer	9.758	1.358	0.0	4.7	4.7	4.7	56.8	O K
360 min Summer	9.713	1.313	0.0	4.7	4.7	4.7	54.9	O K
480 min Summer	9.653	1.253	0.0	4.7	4.7	4.7	52.4	O K
600 min Summer	9.586	1.186	0.0	4.7	4.7	4.7	49.6	O K
720 min Summer	9.515	1.115	0.0	4.7	4.7	4.7	46.6	O K
960 min Summer	9.365	0.965	0.0	4.7	4.7	4.7	40.3	O K
1440 min Summer	9.009	0.609	0.0	4.7	4.7	4.7	25.5	O K
2160 min Summer	8.726	0.326	0.0	4.6	4.6	4.6	13.6	O K
2880 min Summer	8.599	0.199	0.0	4.3	4.3	4.3	8.3	O K
4320 min Summer	8.513	0.113	0.0	3.5	3.5	3.5	4.7	O K
5760 min Summer	8.491	0.091	0.0	2.9	2.9	2.9	3.8	O K
7200 min Summer	8.479	0.079	0.0	2.4	2.4	2.4	3.3	O K
8640 min Summer	8.472	0.072	0.0	2.1	2.1	2.1	3.0	O K
10080 min Summer	8.467	0.067	0.0	1.9	1.9	1.9	2.8	O K
15 min Winter	9.182	0.782	0.0	4.7	4.7	4.7	32.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
15 min Summer	98.544	0.0	33.4	23
30 min Summer	69.433	0.0	47.1	37
60 min Summer	46.906	0.0	63.7	64
120 min Summer	30.580	0.0	83.0	110
180 min Summer	23.377	0.0	95.2	142
240 min Summer	19.122	0.0	103.8	176
360 min Summer	14.422	0.0	117.5	246
480 min Summer	11.780	0.0	127.9	316
600 min Summer	10.057	0.0	136.5	384
720 min Summer	8.831	0.0	143.8	454
960 min Summer	7.183	0.0	156.0	590
1440 min Summer	5.354	0.0	174.4	822
2160 min Summer	3.977	0.0	194.3	1152
2880 min Summer	3.214	0.0	209.4	1500
4320 min Summer	2.381	0.0	232.7	2204
5760 min Summer	1.927	0.0	251.1	2928
7200 min Summer	1.636	0.0	266.6	3672
8640 min Summer	1.433	0.0	280.0	4360
10080 min Summer	1.281	0.0	292.1	5112
15 min Winter	98.544	0.0	37.4	24



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

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ (l/s)	Max Outflow (l/s)	Max Volume (m ³)	Status
30 min Winter	9.486	1.086	0.0	4.7	4.7	4.7	45.4	O K
60 min Winter	9.772	1.372	0.0	4.7	4.7	4.7	57.3	O K
120 min Winter	9.960	1.560	0.0	4.9	4.9	4.9	65.2	O K
180 min Winter	9.985	1.585	0.0	5.0	5.0	5.0	66.2	O K
240 min Winter	9.961	1.561	0.0	4.9	4.9	4.9	65.3	O K
360 min Winter	9.881	1.481	0.0	4.8	4.8	4.8	61.9	O K
480 min Winter	9.777	1.377	0.0	4.7	4.7	4.7	57.6	O K
600 min Winter	9.665	1.265	0.0	4.7	4.7	4.7	52.9	O K
720 min Winter	9.550	1.150	0.0	4.7	4.7	4.7	48.1	O K
960 min Winter	9.290	0.890	0.0	4.7	4.7	4.7	37.2	O K
1440 min Winter	8.800	0.400	0.0	4.7	4.7	4.7	16.7	O K
2160 min Winter	8.567	0.167	0.0	4.1	4.1	4.1	7.0	O K
2880 min Winter	8.510	0.110	0.0	3.4	3.4	3.4	4.6	O K
4320 min Winter	8.483	0.083	0.0	2.6	2.6	2.6	3.5	O K
5760 min Winter	8.471	0.071	0.0	2.1	2.1	2.1	3.0	O K
7200 min Winter	8.464	0.064	0.0	1.8	1.8	1.8	2.7	O K
8640 min Winter	8.459	0.059	0.0	1.5	1.5	1.5	2.4	O K
10080 min Winter	8.455	0.055	0.0	1.4	1.4	1.4	2.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
30 min Winter	69.433	0.0	52.8	37
60 min Winter	46.906	0.0	71.3	64
120 min Winter	30.580	0.0	93.0	118
180 min Winter	23.377	0.0	106.6	148
240 min Winter	19.122	0.0	116.3	188
360 min Winter	14.422	0.0	131.6	264
480 min Winter	11.780	0.0	143.3	340
600 min Winter	10.057	0.0	152.9	416
720 min Winter	8.831	0.0	161.1	490
960 min Winter	7.183	0.0	174.7	638
1440 min Winter	5.354	0.0	195.3	832
2160 min Winter	3.977	0.0	217.6	1148
2880 min Winter	3.214	0.0	234.5	1472
4320 min Winter	2.381	0.0	260.7	2196
5760 min Winter	1.927	0.0	281.3	2856
7200 min Winter	1.636	0.0	298.5	3592
8640 min Winter	1.433	0.0	313.6	4320
10080 min Winter	1.281	0.0	327.1	5080

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Puffin Extension
 Aquacell Design



Date 15/03/2018 16:51
 File 1-100+30% - AC.SRCX

Designed by GWP
 Checked by PWJL

Micro Drainage	Source Control 2017.1.2
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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)	17.900	Shortest Storm (mins)	15
Ratio R	0.267	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.181

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From:	To:	From:	To:	From:	To:
0	4	0.060	4	8	0.060
				8	12
					0.061

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Date 15/03/2018 16:51 File 1-100+30% - AC.SRCX	Designed by GWP Checked by PWJL	
Micro Drainage	Source Control 2017.1.2	

Model Details

Storage is Online Cover Level (m) 10.000

Cellular Storage Structure

Invert Level (m) 8.400 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	44.0	44.0	1.601	0.0	92.0
1.600	44.0	92.0			

Hydro-Brake® Optimum Outflow Control

Unit Reference MD-SHE-0097-5000-1600-5000
 Design Head (m) 1.600
 Design Flow (l/s) 5.0
 Flush-Flo™ Calculated
 Objective Minimise upstream storage
 Application Surface
 Sump Available Yes
 Diameter (mm) 97
 Invert Level (m) 8.400
 Minimum Outlet Pipe Diameter (mm) 150
 Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.600	5.0
Flush-Flo™	0.425	4.7
Kick-Flo®	0.865	3.8
Mean Flow over Head Range	-	4.2

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	3.1	1.200	4.4	3.000	6.7	7.000	10.0
0.200	4.3	1.400	4.7	3.500	7.2	7.500	10.3
0.300	4.6	1.600	5.0	4.000	7.7	8.000	10.7
0.400	4.7	1.800	5.3	4.500	8.1	8.500	11.0
0.500	4.7	2.000	5.5	5.000	8.5	9.000	11.3
0.600	4.6	2.200	5.8	5.500	8.9	9.500	11.6
0.800	4.1	2.400	6.0	6.000	9.3		
1.000	4.0	2.600	6.3	6.500	9.7		