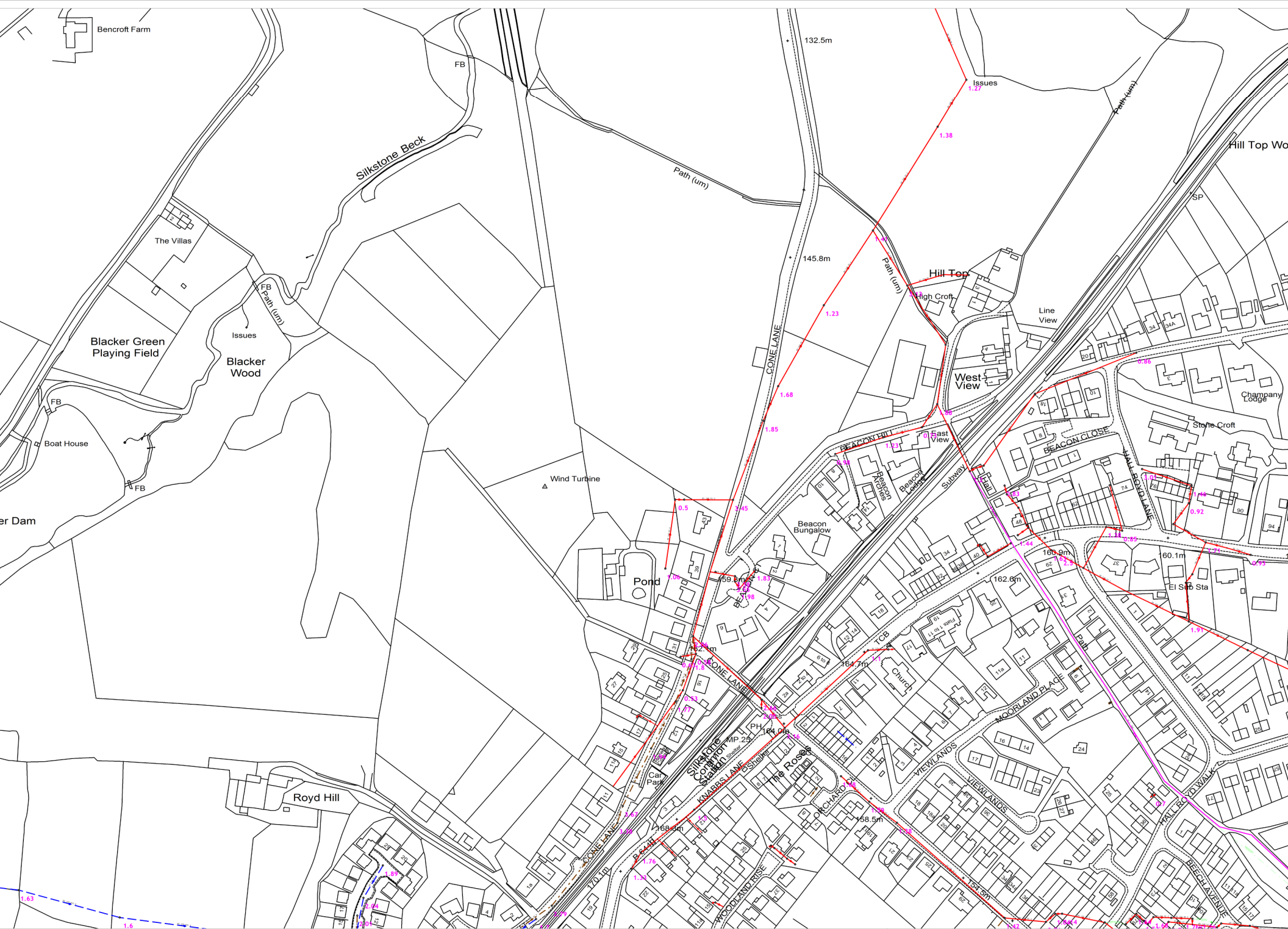




A P P E N D I X E

INDICATIVE SURFACE WATER DRAINAGE CALCULATIONS

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Northwest House Servia Hill Leeds LS6 2QH	Blacker Green Lane, Silkstone, Barnsley	
Date 18/05/2017 File 1640-01 SOURCE CONTROL....	Designed by PSC Checked by WMW	
Elstree Computing Ltd Source Control 2017.1		

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
30 min Winter	8.780	0.780	0.0	5.3	5.3	12.2	O K
60 min Winter	8.785	0.785	0.0	5.3	5.3	12.3	O K
120 min Winter	8.638	0.638	0.0	5.3	5.3	10.0	O K
180 min Winter	8.416	0.416	0.0	5.3	5.3	6.5	O K
240 min Winter	8.248	0.248	0.0	5.3	5.3	3.9	O K
360 min Winter	8.123	0.123	0.0	4.8	4.8	1.9	O K
480 min Winter	8.101	0.101	0.0	3.9	3.9	1.6	O K
600 min Winter	8.088	0.088	0.0	3.3	3.3	1.4	O K
720 min Winter	8.080	0.080	0.0	2.9	2.9	1.3	O K
960 min Winter	8.070	0.070	0.0	2.3	2.3	1.1	O K
1440 min Winter	8.058	0.058	0.0	1.7	1.7	0.9	O K
2160 min Winter	8.049	0.049	0.0	1.2	1.2	0.8	O K
2880 min Winter	8.043	0.043	0.0	1.0	1.0	0.7	O K
4320 min Winter	8.036	0.036	0.0	0.7	0.7	0.6	O K
5760 min Winter	8.032	0.032	0.0	0.6	0.6	0.5	O K
7200 min Winter	8.029	0.029	0.0	0.5	0.5	0.5	O K
8640 min Winter	8.027	0.027	0.0	0.4	0.4	0.4	O K
10080 min Winter	8.026	0.026	0.0	0.4	0.4	0.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	83.086	0.0	19.2	26
60 min Winter	53.779	0.0	24.8	46
120 min Winter	33.599	0.0	31.0	84
180 min Winter	25.120	0.0	34.8	114
240 min Winter	20.279	0.0	37.5	140
360 min Winter	14.978	0.0	41.5	188
480 min Winter	12.069	0.0	44.6	246
600 min Winter	10.199	0.0	47.1	306
720 min Winter	8.883	0.0	49.2	366
960 min Winter	7.135	0.0	52.7	490
1440 min Winter	5.230	0.0	58.0	734
2160 min Winter	3.824	0.0	63.6	1096
2880 min Winter	3.058	0.0	67.8	1456
4320 min Winter	2.227	0.0	74.1	2160
5760 min Winter	1.776	0.0	78.7	2880
7200 min Winter	1.491	0.0	82.7	3592
8640 min Winter	1.293	0.0	86.0	4360
10080 min Winter	1.146	0.0	89.0	5160

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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	0.334	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.055

Time (mins)	Area
From:	To: (ha)

0	4 0.055
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Model Details

Storage is Online Cover Level (m) 10.000

Cellular Storage Structure

Invert Level (m) 8.000 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	16.5	0.0	1.300	0.0	0.0
0.100	16.5	0.0	1.400	0.0	0.0
0.200	16.5	0.0	1.500	0.0	0.0
0.300	16.5	0.0	1.600	0.0	0.0
0.400	16.5	0.0	1.700	0.0	0.0
0.500	16.5	0.0	1.800	0.0	0.0
0.600	16.5	0.0	1.900	0.0	0.0
0.700	16.5	0.0	2.000	0.0	0.0
0.800	16.5	0.0	2.100	0.0	0.0
0.801	0.0	0.0	2.200	0.0	0.0
1.000	0.0	0.0	2.300	0.0	0.0
1.100	0.0	0.0	2.400	0.0	0.0
1.200	0.0	0.0	2.500	0.0	0.0

Hydro-Brake® Optimum Outflow Control

Unit Reference MD-SHE-0112-5300-0800-5300
Design Head (m) 0.800
Design Flow (l/s) 5.3
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 112
Invert Level (m) 8.000
Minimum Outlet Pipe Diameter (mm) 150
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.800	5.3
Flush-Flo™	0.240	5.3
Kick-Flo®	0.537	4.4
Mean Flow over Head Range	-	4.6

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

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Hydro-Brake® Optimum Outflow Control

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.9	1.200	6.4	3.000	9.8	7.000	14.7
0.200	5.3	1.400	6.9	3.500	10.6	7.500	15.2
0.300	5.3	1.600	7.3	4.000	11.3	8.000	15.7
0.400	5.1	1.800	7.7	4.500	11.9	8.500	16.2
0.500	4.7	2.000	8.1	5.000	12.6	9.000	16.6
0.600	4.6	2.200	8.5	5.500	13.1	9.500	17.1
0.800	5.3	2.400	8.9	6.000	13.7		
1.000	5.9	2.600	9.2	6.500	14.2		