

Appendix E Greenfield Run-Off Rates



Calculated by: Jacob Cronin
Site name: Sibford Ferris
Site location: Sibford Ferris

Site coordinates
Latitude: 52.03081° N
Longitude: 1.48458° W

This is an estimation of the greenfield runoff rate limits that are needed to meet normal best practice criteria in line with Environment Agency guidance "Preliminary rainfall runoff management for developments", W5-074/A/TR1/1 rev. E (2012) and the SuDS Manual, C753 (Ciria, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Reference: 6413154
Date: 2018-07-31T12:59:17

Methodology

FEH Statistical

Site characteristics

Total site area (ha)	1
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Methodology

Qmed estimation method	Calculate from BFI and SAAR
BFI and SPR estimation method	Calculate from dominant HOST
HOST class	13
BFI / BFIHOST	0.98
Qmed (l/s)	0.29
Qbar / Qmed Conversion Factor	1.12

Hydrological characteristics

	Default	Edited
SAAR (mm)	668	668
Hydrological region	4	4
Growth curve factor: 1 year	0.83	0.83
Growth curve factor: 30 year	2	2
Growth curve factor: 100 year	2.57	2.57

Notes:

(1) Is $Q_{BAR} < 2.0$ l/s/ha?
Normally limiting discharge rates which are less than 2.0 l/s/ha are set at 2.0 l/s/ha.
(2) Are flow rates < 5.0 l/s?
Where flow rates are less than 5.0 l/s consents are usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set in which case blockage work must be addressed by using appropriate drainage elements
(3) Is $SPR/SPRHOST \leq 0.3$?

Greenfield runoff rates

	Default	Edited
Qbar (l/s)	0.33	0.33
1 in 1 year (l/s)	0.27	0.27
1 in 30 years (l/s)	0.65	0.65
1 in 100 years (l/s)	0.84	0.84

Appendix F: Soakage Testing Calculations



JNP Group			Page 1																																																																																																																																																																																																																			
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Summer</td><td>171.075</td><td>0.075</td><td>2.4</td><td>0.3</td><td>O K</td></tr><tr><td>600 min Summer</td><td>171.047</td><td>0.047</td><td>2.2</td><td>0.2</td><td>O K</td></tr><tr><td>720 min Summer</td><td>171.041</td><td>0.041</td><td>1.9</td><td>0.2</td><td>O K</td></tr><tr><td>960 min Summer</td><td>171.032</td><td>0.032</td><td>1.5</td><td>0.1</td><td>O K</td></tr><tr><td>1440 min Summer</td><td>171.023</td><td>0.023</td><td>1.0</td><td>0.1</td><td>O K</td></tr><tr><td>2160 min Summer</td><td>171.016</td><td>0.016</td><td>0.7</td><td>0.1</td><td>O K</td></tr><tr><td>2880 min Summer</td><td>171.013</td><td>0.013</td><td>0.6</td><td>0.1</td><td>O K</td></tr><tr><td>4320 min Summer</td><td>171.009</td><td>0.009</td><td>0.4</td><td>0.0</td><td>O K</td></tr><tr><td>5760 min Summer</td><td>171.007</td><td>0.007</td><td>0.3</td><td>0.0</td><td>O K</td></tr><tr><td>7200 min Summer</td><td>171.006</td><td>0.006</td><td>0.3</td><td>0.0</td><td>O K</td></tr><tr><td>8640 min 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Summer</td><td>10.490</td><td>0.0</td><td>306</td></tr><tr><td>720 min Summer</td><td>9.042</td><td>0.0</td><td>366</td></tr><tr><td>960 min Summer</td><td>7.115</td><td>0.0</td><td>482</td></tr><tr><td>1440 min Summer</td><td>5.028</td><td>0.0</td><td>714</td></tr><tr><td>2160 min Summer</td><td>3.527</td><td>0.0</td><td>1076</td></tr><tr><td>2880 min Summer</td><td>2.747</td><td>0.0</td><td>1428</td></tr><tr><td>4320 min Summer</td><td>1.958</td><td>0.0</td><td>2172</td></tr><tr><td>5760 min Summer</td><td>1.557</td><td>0.0</td><td>2880</td></tr><tr><td>7200 min Summer</td><td>1.322</td><td>0.0</td><td>3648</td></tr><tr><td>8640 min Summer</td><td>1.167</td><td>0.0</td><td>4304</td></tr><tr><td>10080 min Summer</td><td>1.058</td><td>0.0</td><td>4856</td></tr><tr><td>15 min Winter</td><td>145.040</td><td>0.0</td><td>13</td></tr></table>					Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status	15 min Summer	171.876	0.876	6.7	3.5	O K	30 min Summer	171.961	0.961	6.7	3.6	O K	60 min Summer	171.708	0.708	6.2	3.0	O K	120 min Summer	171.497	0.497	4.9	2.1	O K	180 min Summer	171.361	0.361	4.1	1.5	O K	240 min Summer	171.268	0.268	3.6	1.1	O K	360 min Summer	171.147	0.147	2.9	0.6	O K	480 min Summer	171.075	0.075	2.4	0.3	O K	600 min Summer	171.047	0.047	2.2	0.2	O K	720 min Summer	171.041	0.041	1.9	0.2	O K	960 min Summer	171.032	0.032	1.5	0.1	O K	1440 min Summer	171.023	0.023	1.0	0.1	O K	2160 min Summer	171.016	0.016	0.7	0.1	O K	2880 min Summer	171.013	0.013	0.6	0.1	O K	4320 min Summer	171.009	0.009	0.4	0.0	O K	5760 min Summer	171.007	0.007	0.3	0.0	O K	7200 min Summer	171.006	0.006	0.3	0.0	O K	8640 min Summer	171.006	0.006	0.3	0.0	O K	10080 min Summer	171.005	0.005	0.2	0.0	O K	15 min Winter	172.354	1.354	6.7	4.0	Flood Risk	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)	15 min Summer	145.040	0.0	13	30 min Summer	95.760	0.0	21	60 min Summer	59.780	0.0	36	120 min Summer	35.700	0.0	68	180 min Summer	26.449	0.0	98	240 min 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Link House St Marys Way Chesham HP5 1HR	Hook Norton Road Sibford Ferris	
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XP Solutions		
Source Control 2018.1		

Source Control 2018.1

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

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m ³)	Status
30 min Winter	172.258	1.258	6.7	3.9	Flood Risk
60 min Winter	171.697	0.697	6.1	3.0	O K
120 min Winter	171.416	0.416	4.4	1.8	O K
180 min Winter	171.262	0.262	3.5	1.1	O K
240 min Winter	171.165	0.165	3.0	0.7	O K
360 min Winter	171.053	0.053	2.3	0.2	O K
480 min Winter	171.041	0.041	1.9	0.2	O K
600 min Winter	171.034	0.034	1.6	0.1	O K
720 min Winter	171.030	0.030	1.4	0.1	O K
960 min Winter	171.023	0.023	1.1	0.1	O K
1440 min Winter	171.017	0.017	0.8	0.1	O K
2160 min Winter	171.012	0.012	0.5	0.1	O K
2880 min Winter	171.009	0.009	0.4	0.0	O K
4320 min Winter	171.007	0.007	0.3	0.0	O K
5760 min Winter	171.005	0.005	0.2	0.0	O K
7200 min Winter	171.005	0.005	0.2	0.0	O K
8640 min Winter	171.004	0.004	0.2	0.0	O K
10080 min Winter	171.004	0.004	0.2	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Time-Peak (mins)
30 min Winter	95.760	0.0	22
60 min Winter	59.780	0.0	38
120 min Winter	35.700	0.0	70
180 min Winter	26.449	0.0	100
240 min Winter	21.350	0.0	130
360 min Winter	15.703	0.0	186
480 min Winter	12.542	0.0	244
600 min Winter	10.490	0.0	306
720 min Winter	9.042	0.0	364
960 min Winter	7.115	0.0	484
1440 min Winter	5.028	0.0	724
2160 min Winter	3.527	0.0	1108
2880 min Winter	2.748	0.0	1492
4320 min Winter	1.958	0.0	2168
5760 min Winter	1.558	0.0	2840
7200 min Winter	1.322	0.0	3504
8640 min Winter	1.167	0.0	4248
10080 min Winter	1.058	0.0	4872

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XP Solutions		Source Control 2018.1

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 435200 237350 SP 35200 37350
Data Type	Catchment
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.025

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

0	4 0.025
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XP Solutions	Source Control 2018.1	

Model Details

Storage is Online Cover Level (m) 172.450

Cellular Storage Structure

Invert Level (m) 171.000 Safety Factor 5.0
Infiltration Coefficient Base (m/hr) 7.92000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 7.92000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	4.5	4.5	0.801	0.0	15.3
0.800	4.5	15.3			

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Summer</td><td>178.049</td><td>0.049</td><td>3.6</td><td>0.3</td><td>O K</td></tr><tr><td>600 min Summer</td><td>178.041</td><td>0.041</td><td>3.0</td><td>0.3</td><td>O K</td></tr><tr><td>720 min Summer</td><td>178.035</td><td>0.035</td><td>2.6</td><td>0.2</td><td>O K</td></tr><tr><td>960 min Summer</td><td>178.028</td><td>0.028</td><td>2.0</td><td>0.2</td><td>O K</td></tr><tr><td>1440 min Summer</td><td>178.020</td><td>0.020</td><td>1.4</td><td>0.1</td><td>O K</td></tr><tr><td>2160 min Summer</td><td>178.014</td><td>0.014</td><td>1.0</td><td>0.1</td><td>O K</td></tr><tr><td>2880 min Summer</td><td>178.011</td><td>0.011</td><td>0.8</td><td>0.1</td><td>O K</td></tr><tr><td>4320 min Summer</td><td>178.008</td><td>0.008</td><td>0.6</td><td>0.1</td><td>O K</td></tr><tr><td>5760 min Summer</td><td>178.006</td><td>0.006</td><td>0.5</td><td>0.0</td><td>O K</td></tr><tr><td>7200 min Summer</td><td>178.006</td><td>0.006</td><td>0.4</td><td>0.0</td><td>O K</td></tr><tr><td>8640 min 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Summer</td><td>10.490</td><td>0.0</td><td>304</td></tr><tr><td>720 min Summer</td><td>9.042</td><td>0.0</td><td>366</td></tr><tr><td>960 min Summer</td><td>7.115</td><td>0.0</td><td>488</td></tr><tr><td>1440 min Summer</td><td>5.028</td><td>0.0</td><td>724</td></tr><tr><td>2160 min Summer</td><td>3.527</td><td>0.0</td><td>1100</td></tr><tr><td>2880 min Summer</td><td>2.747</td><td>0.0</td><td>1464</td></tr><tr><td>4320 min Summer</td><td>1.958</td><td>0.0</td><td>2148</td></tr><tr><td>5760 min Summer</td><td>1.557</td><td>0.0</td><td>2840</td></tr><tr><td>7200 min Summer</td><td>1.322</td><td>0.0</td><td>3624</td></tr><tr><td>8640 min Summer</td><td>1.167</td><td>0.0</td><td>4392</td></tr><tr><td>10080 min Summer</td><td>1.058</td><td>0.0</td><td>5120</td></tr><tr><td>15 min Winter</td><td>145.040</td><td>0.0</td><td>13</td></tr></table>					Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status	15 min Summer	178.743	0.743	8.7	5.0	O K	30 min Summer	178.763	0.763	8.8	5.2	O K	60 min Summer	178.654	0.654	8.0	4.4	O K	120 min Summer	178.447	0.447	6.5	3.0	O K	180 min Summer	178.313	0.313	5.6	2.1	O K	240 min Summer	178.220	0.220	4.9	1.5	O K	360 min Summer	178.101	0.101	4.0	0.7	O K	480 min Summer	178.049	0.049	3.6	0.3	O K	600 min Summer	178.041	0.041	3.0	0.3	O K	720 min Summer	178.035	0.035	2.6	0.2	O K	960 min Summer	178.028	0.028	2.0	0.2	O K	1440 min Summer	178.020	0.020	1.4	0.1	O K	2160 min Summer	178.014	0.014	1.0	0.1	O K	2880 min Summer	178.011	0.011	0.8	0.1	O K	4320 min Summer	178.008	0.008	0.6	0.1	O K	5760 min Summer	178.006	0.006	0.5	0.0	O K	7200 min Summer	178.006	0.006	0.4	0.0	O K	8640 min Summer	178.005	0.005	0.3	0.0	O K	10080 min Summer	178.005	0.005	0.3	0.0	O K	15 min Winter	179.076	1.076	9.1	5.7	O K	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)	15 min Summer	145.040	0.0	13	30 min Summer	95.760	0.0	21	60 min Summer	59.780	0.0	38	120 min Summer	35.700	0.0	68	180 min Summer	26.449	0.0	100	240 min Summer	21.350	0.0	130	360 min Summer	15.703	0.0	188	480 min Summer	12.542	0.0	242	600 min Summer	10.490	0.0	304	720 min Summer	9.042	0.0	366	960 min Summer	7.115	0.0	488	1440 min Summer	5.028	0.0	724	2160 min Summer	3.527	0.0	1100	2880 min Summer	2.747	0.0	1464	4320 min Summer	1.958	0.0	2148	5760 min Summer	1.557	0.0	2840	7200 min Summer	1.322	0.0	3624	8640 min Summer	1.167	0.0	4392	10080 min Summer	1.058	0.0	5120	15 min Winter	145.040	0.0	13
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JNP Group			Page 2		
Link House St Marys Way Chesham HP5 1HR		Hook Norton Road Sibford Ferris			
Date 05/09/2018 13:02 File SOAKAWAY 0.030HA.SRCX		Designed by JC Checked by MV			
XP Solutions		Source Control 2018.1			
<u>Summary of Results for 100 year Return Period (+40%)</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	178.995	0.995	9.1	5.6	O K
60 min Winter	178.649	0.649	8.0	4.4	O K
120 min Winter	178.373	0.373	6.0	2.5	O K
180 min Winter	178.216	0.216	4.9	1.5	O K
240 min Winter	178.114	0.114	4.1	0.8	O K
360 min Winter	178.044	0.044	3.2	0.3	O K
480 min Winter	178.035	0.035	2.6	0.2	O K
600 min Winter	178.030	0.030	2.2	0.2	O K
720 min Winter	178.026	0.026	1.9	0.2	O K
960 min Winter	178.020	0.020	1.5	0.1	O K
1440 min Winter	178.014	0.014	1.0	0.1	O K
2160 min Winter	178.010	0.010	0.8	0.1	O K
2880 min Winter	178.008	0.008	0.6	0.1	O K
4320 min Winter	178.006	0.006	0.4	0.0	O K
5760 min Winter	178.005	0.005	0.3	0.0	O K
7200 min Winter	178.004	0.004	0.3	0.0	O K
8640 min Winter	178.004	0.004	0.3	0.0	O K
10080 min Winter	178.003	0.003	0.2	0.0	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
30 min Winter	95.760	0.0	22		
60 min Winter	59.780	0.0	40		
120 min Winter	35.700	0.0	72		
180 min Winter	26.449	0.0	102		
240 min Winter	21.350	0.0	132		
360 min Winter	15.703	0.0	186		
480 min Winter	12.542	0.0	246		
600 min Winter	10.490	0.0	302		
720 min Winter	9.042	0.0	366		
960 min Winter	7.115	0.0	488		
1440 min Winter	5.028	0.0	718		
2160 min Winter	3.527	0.0	1080		
2880 min Winter	2.748	0.0	1416		
4320 min Winter	1.958	0.0	2156		
5760 min Winter	1.558	0.0	3104		
7200 min Winter	1.322	0.0	3408		
8640 min Winter	1.167	0.0	4416		
10080 min Winter	1.058	0.0	4840		
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Link House St Marys Way Chesham HP5 1HR	Hook Norton Road Sibford Ferris	
Date 05/09/2018 13:02 File SOAKAWAY 0.030HA.SRCX	Designed by JC Checked by MV	
XP Solutions		Source Control 2018.1

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 435200 237350 SP 35200 37350
Data Type	Catchment
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.035

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

0	4 0.035
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JNP Group		Page 4
Link House St Marys Way Chesham HP5 1HR	Hook Norton Road Sibford Ferris	
Date 05/09/2018 13:02 File SOAKAWAY 0.030HA.SRCX	Designed by JC Checked by MV	
XP Solutions	Source Control 2018.1	

Model Details

Storage is Online Cover Level (m) 179.750

Cellular Storage Structure

Invert Level (m) 178.000 Safety Factor 5.0
Infiltration Coefficient Base (m/hr) 7.92000 Porosity 0.90
Infiltration Coefficient Side (m/hr) 7.92000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	7.5	7.5	0.801	0.0	20.7
0.800	7.5	20.7			

JNP Group		Page 1																																																																																																																																																																																																																		
Link House St Marys Way Chesham HP5 1HR	Hook Norton Road Sibford Ferris																																																																																																																																																																																																																			
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Summer</td><td>95.048</td><td>0.048</td><td>11.3</td><td>1.1</td><td>O K</td></tr><tr><td>600 min Summer</td><td>95.041</td><td>0.041</td><td>9.5</td><td>1.0</td><td>O K</td></tr><tr><td>720 min Summer</td><td>95.035</td><td>0.035</td><td>8.1</td><td>0.8</td><td>O K</td></tr><tr><td>960 min Summer</td><td>95.028</td><td>0.028</td><td>6.5</td><td>0.7</td><td>O K</td></tr><tr><td>1440 min Summer</td><td>95.020</td><td>0.020</td><td>4.6</td><td>0.5</td><td>O K</td></tr><tr><td>2160 min Summer</td><td>95.014</td><td>0.014</td><td>3.2</td><td>0.3</td><td>O K</td></tr><tr><td>2880 min Summer</td><td>95.011</td><td>0.011</td><td>2.5</td><td>0.3</td><td>O K</td></tr><tr><td>4320 min Summer</td><td>95.008</td><td>0.008</td><td>1.8</td><td>0.2</td><td>O K</td></tr><tr><td>5760 min Summer</td><td>95.006</td><td>0.006</td><td>1.5</td><td>0.1</td><td>O K</td></tr><tr><td>7200 min Summer</td><td>95.005</td><td>0.005</td><td>1.2</td><td>0.1</td><td>O K</td></tr><tr><td>8640 min Summer</td><td>95.005</td><td>0.005</td><td>1.1</td><td>0.1</td><td>O K</td></tr><tr><td>10080 min Summer</td><td>95.004</td><td>0.004</td><td>1.0</td><td>0.1</td><td>O K</td></tr><tr><td>15 min Winter</td><td>96.917</td><td>1.917</td><td>21.6</td><td>20.1</td><td>O K</td></tr></table> <table><tr><th>Storm Event</th><th>Rain (mm/hr)</th><th>Flooded Volume (m³)</th><th>Time-Peak (mins)</th></tr><tr><td>15 min Summer</td><td>145.040</td><td>0.0</td><td>13</td></tr><tr><td>30 min Summer</td><td>95.760</td><td>0.0</td><td>22</td></tr><tr><td>60 min Summer</td><td>59.780</td><td>0.0</td><td>38</td></tr><tr><td>120 min Summer</td><td>35.700</td><td>0.0</td><td>70</td></tr><tr><td>180 min Summer</td><td>26.449</td><td>0.0</td><td>102</td></tr><tr><td>240 min Summer</td><td>21.350</td><td>0.0</td><td>132</td></tr><tr><td>360 min Summer</td><td>15.703</td><td>0.0</td><td>190</td></tr><tr><td>480 min Summer</td><td>12.542</td><td>0.0</td><td>244</td></tr><tr><td>600 min Summer</td><td>10.490</td><td>0.0</td><td>304</td></tr><tr><td>720 min Summer</td><td>9.042</td><td>0.0</td><td>366</td></tr><tr><td>960 min Summer</td><td>7.115</td><td>0.0</td><td>488</td></tr><tr><td>1440 min Summer</td><td>5.028</td><td>0.0</td><td>720</td></tr><tr><td>2160 min Summer</td><td>3.527</td><td>0.0</td><td>1076</td></tr><tr><td>2880 min Summer</td><td>2.747</td><td>0.0</td><td>1464</td></tr><tr><td>4320 min Summer</td><td>1.958</td><td>0.0</td><td>2144</td></tr><tr><td>5760 min Summer</td><td>1.557</td><td>0.0</td><td>2952</td></tr><tr><td>7200 min Summer</td><td>1.322</td><td>0.0</td><td>3656</td></tr><tr><td>8640 min Summer</td><td>1.167</td><td>0.0</td><td>4432</td></tr><tr><td>10080 min Summer</td><td>1.058</td><td>0.0</td><td>5056</td></tr><tr><td>15 min Winter</td><td>145.040</td><td>0.0</td><td>14</td></tr></table>			Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status	15 min Summer	95.736	0.736	20.7	17.5	O K	30 min Summer	95.775	0.775	21.2	18.4	O K	60 min Summer	95.693	0.693	20.1	16.5	O K	120 min Summer	95.491	0.491	17.5	11.7	O K	180 min Summer	95.346	0.346	15.6	8.2	O K	240 min Summer	95.239	0.239	14.2	5.7	O K	360 min Summer	95.101	0.101	12.3	2.4	O K	480 min Summer	95.048	0.048	11.3	1.1	O K	600 min Summer	95.041	0.041	9.5	1.0	O K	720 min Summer	95.035	0.035	8.1	0.8	O K	960 min Summer	95.028	0.028	6.5	0.7	O K	1440 min Summer	95.020	0.020	4.6	0.5	O K	2160 min Summer	95.014	0.014	3.2	0.3	O K	2880 min Summer	95.011	0.011	2.5	0.3	O K	4320 min Summer	95.008	0.008	1.8	0.2	O K	5760 min Summer	95.006	0.006	1.5	0.1	O K	7200 min Summer	95.005	0.005	1.2	0.1	O K	8640 min Summer	95.005	0.005	1.1	0.1	O K	10080 min Summer	95.004	0.004	1.0	0.1	O K	15 min Winter	96.917	1.917	21.6	20.1	O K	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)	15 min Summer	145.040	0.0	13	30 min Summer	95.760	0.0	22	60 min Summer	59.780	0.0	38	120 min Summer	35.700	0.0	70	180 min Summer	26.449	0.0	102	240 min Summer	21.350	0.0	132	360 min Summer	15.703	0.0	190	480 min Summer	12.542	0.0	244	600 min Summer	10.490	0.0	304	720 min Summer	9.042	0.0	366	960 min Summer	7.115	0.0	488	1440 min Summer	5.028	0.0	720	2160 min Summer	3.527	0.0	1076	2880 min Summer	2.747	0.0	1464	4320 min Summer	1.958	0.0	2144	5760 min Summer	1.557	0.0	2952	7200 min Summer	1.322	0.0	3656	8640 min Summer	1.167	0.0	4432	10080 min Summer	1.058	0.0	5056	15 min Winter	145.040	0.0	14
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JNP Group		Page 2			
Link House St Marys Way Chesham HP5 1HR	Hook Norton Road Sibford Ferris				
Date 05/09/2018 14:28 File SOAKAWAY LAP.SRCX	Designed by JC Checked by MV				
XP SolutionsSource Control 2018.1					
Summary of Results for 100 year Return Period (+40%)					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	97.528	2.528	21.6	20.7	O K
60 min Winter	95.724	0.724	20.6	17.2	O K
120 min Winter	95.437	0.437	16.8	10.4	O K
180 min Winter	95.247	0.247	14.3	5.9	O K
240 min Winter	95.121	0.121	12.6	2.9	O K
360 min Winter	95.044	0.044	10.2	1.0	O K
480 min Winter	95.035	0.035	8.2	0.8	O K
600 min Winter	95.029	0.029	6.8	0.7	O K
720 min Winter	95.025	0.025	5.9	0.6	O K
960 min Winter	95.020	0.020	4.6	0.5	O K
1440 min Winter	95.014	0.014	3.3	0.3	O K
2160 min Winter	95.010	0.010	2.4	0.2	O K
2880 min Winter	95.008	0.008	1.8	0.2	O K
4320 min Winter	95.006	0.006	1.3	0.1	O K
5760 min Winter	95.005	0.005	1.1	0.1	O K
7200 min Winter	95.004	0.004	1.0	0.1	O K
8640 min Winter	95.004	0.004	0.9	0.1	O K
10080 min Winter	95.003	0.003	0.8	0.1	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
30 min Winter	95.760	0.0	23		
60 min Winter	59.780	0.0	42		
120 min Winter	35.700	0.0	74		
180 min Winter	26.449	0.0	104		
240 min Winter	21.350	0.0	134		
360 min Winter	15.703	0.0	182		
480 min Winter	12.542	0.0	244		
600 min Winter	10.490	0.0	300		
720 min Winter	9.042	0.0	368		
960 min Winter	7.115	0.0	490		
1440 min Winter	5.028	0.0	742		
2160 min Winter	3.527	0.0	1068		
2880 min Winter	2.748	0.0	1432		
4320 min Winter	1.958	0.0	2068		
5760 min Winter	1.558	0.0	2928		
7200 min Winter	1.322	0.0	3712		
8640 min Winter	1.167	0.0	4176		
10080 min Winter	1.058	0.0	5400		
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JNP Group		Page 3
Link House St Marys Way Chesham HP5 1HR	Hook Norton Road Sibford Ferris	
Date 05/09/2018 14:28 File SOAKAWAY LAP.SRCX	Designed by JC Checked by MV	
XP Solutions Source Control 2018.1		

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 435200 237350 SP 35200 37350
Data Type	Catchment
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.110

	Time (mins)	Area
From:	To:	(ha)
	0	4 0.110

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JNP Group		Page 4
Link House St Marys Way Chesham HP5 1HR	Hook Norton Road Sibford Ferris	
Date 05/09/2018 14:28 File SOAKAWAY LAP.SRCX	Designed by JC Checked by MV	
XP Solutions Source Control 2018.1		

Model Details

Storage is Online Cover Level (m) 100.000

Cellular Storage Structure

Invert Level (m) 95.000 Safety Factor 5.0
Infiltration Coefficient Base (m/hr) 7.92000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 7.92000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	25.0	25.0	0.801	0.0	49.0
0.800	25.0	49.0			

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JNP Group		Page 1																																																																																																																																																																																																																		
Link House St Marys Way Chesham HP5 1HR	Hook Norton Road Sibford Ferris																																																																																																																																																																																																																			
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Summary of Results for 100 year Return Period (+40%) Half Drain Time : 10 minutes. <table><thead><tr><th>Storm Event</th><th>Max Level (m)</th><th>Max Depth (m)</th><th>Max Infiltration (l/s)</th><th>Max Volume (m³)</th><th>Status</th></tr></thead><tbody><tr><td>15 min Summer</td><td>98.565</td><td>3.565</td><td>8.5</td><td>8.4</td><td>O K</td></tr><tr><td>30 min Summer</td><td>98.959</td><td>3.959</td><td>8.5</td><td>9.1</td><td>O K</td></tr><tr><td>60 min Summer</td><td>98.459</td><td>3.459</td><td>8.5</td><td>8.2</td><td>O K</td></tr><tr><td>120 min Summer</td><td>97.130</td><td>2.130</td><td>8.5</td><td>5.6</td><td>O K</td></tr><tr><td>180 min Summer</td><td>96.424</td><td>1.424</td><td>8.2</td><td>4.2</td><td>O K</td></tr><tr><td>240 min Summer</td><td>96.174</td><td>1.174</td><td>7.1</td><td>3.5</td><td>O K</td></tr><tr><td>360 min Summer</td><td>95.845</td><td>0.845</td><td>5.6</td><td>2.5</td><td>O K</td></tr><tr><td>480 min Summer</td><td>95.633</td><td>0.633</td><td>4.7</td><td>1.9</td><td>O K</td></tr><tr><td>600 min Summer</td><td>95.484</td><td>0.484</td><td>4.0</td><td>1.4</td><td>O K</td></tr><tr><td>720 min Summer</td><td>95.373</td><td>0.373</td><td>3.5</td><td>1.1</td><td>O K</td></tr><tr><td>960 min Summer</td><td>95.219</td><td>0.219</td><td>2.8</td><td>0.6</td><td>O K</td></tr><tr><td>1440 min Summer</td><td>95.050</td><td>0.050</td><td>2.1</td><td>0.1</td><td>O K</td></tr><tr><td>2160 min Summer</td><td>95.035</td><td>0.035</td><td>1.5</td><td>0.1</td><td>O K</td></tr><tr><td>2880 min Summer</td><td>95.027</td><td>0.027</td><td>1.1</td><td>0.1</td><td>O K</td></tr><tr><td>4320 min Summer</td><td>95.020</td><td>0.020</td><td>0.8</td><td>0.1</td><td>O K</td></tr><tr><td>5760 min Summer</td><td>95.016</td><td>0.016</td><td>0.7</td><td>0.0</td><td>O K</td></tr><tr><td>7200 min Summer</td><td>95.013</td><td>0.013</td><td>0.5</td><td>0.0</td><td>O K</td></tr><tr><td>8640 min Summer</td><td>95.012</td><td>0.012</td><td>0.5</td><td>0.0</td><td>O K</td></tr><tr><td>10080 min Summer</td><td>95.011</td><td>0.011</td><td>0.4</td><td>0.0</td><td>O K</td></tr><tr><td>15 min Winter</td><td>99.245</td><td>4.245</td><td>8.5</td><td>9.7</td><td>O K</td></tr></tbody></table> <table><thead><tr><th>Storm Event</th><th>Rain (mm/hr)</th><th>Flooded Volume (m³)</th><th>Time-Peak (mins)</th></tr></thead><tbody><tr><td>15 min Summer</td><td>145.040</td><td>0.0</td><td>14</td></tr><tr><td>30 min Summer</td><td>95.760</td><td>0.0</td><td>22</td></tr><tr><td>60 min Summer</td><td>59.780</td><td>0.0</td><td>40</td></tr><tr><td>120 min Summer</td><td>35.700</td><td>0.0</td><td>70</td></tr><tr><td>180 min Summer</td><td>26.449</td><td>0.0</td><td>98</td></tr><tr><td>240 min Summer</td><td>21.350</td><td>0.0</td><td>128</td></tr><tr><td>360 min Summer</td><td>15.703</td><td>0.0</td><td>190</td></tr><tr><td>480 min Summer</td><td>12.542</td><td>0.0</td><td>250</td></tr><tr><td>600 min Summer</td><td>10.490</td><td>0.0</td><td>310</td></tr><tr><td>720 min Summer</td><td>9.042</td><td>0.0</td><td>370</td></tr><tr><td>960 min Summer</td><td>7.115</td><td>0.0</td><td>490</td></tr><tr><td>1440 min Summer</td><td>5.028</td><td>0.0</td><td>724</td></tr><tr><td>2160 min Summer</td><td>3.527</td><td>0.0</td><td>1084</td></tr><tr><td>2880 min Summer</td><td>2.747</td><td>0.0</td><td>1436</td></tr><tr><td>4320 min Summer</td><td>1.958</td><td>0.0</td><td>2192</td></tr><tr><td>5760 min Summer</td><td>1.557</td><td>0.0</td><td>2880</td></tr><tr><td>7200 min Summer</td><td>1.322</td><td>0.0</td><td>3632</td></tr><tr><td>8640 min Summer</td><td>1.167</td><td>0.0</td><td>4368</td></tr><tr><td>10080 min Summer</td><td>1.058</td><td>0.0</td><td>5032</td></tr><tr><td>15 min Winter</td><td>145.040</td><td>0.0</td><td>15</td></tr></tbody></table>			Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status	15 min Summer	98.565	3.565	8.5	8.4	O K	30 min Summer	98.959	3.959	8.5	9.1	O K	60 min Summer	98.459	3.459	8.5	8.2	O K	120 min Summer	97.130	2.130	8.5	5.6	O K	180 min Summer	96.424	1.424	8.2	4.2	O K	240 min Summer	96.174	1.174	7.1	3.5	O K	360 min Summer	95.845	0.845	5.6	2.5	O K	480 min Summer	95.633	0.633	4.7	1.9	O K	600 min Summer	95.484	0.484	4.0	1.4	O K	720 min Summer	95.373	0.373	3.5	1.1	O K	960 min Summer	95.219	0.219	2.8	0.6	O K	1440 min Summer	95.050	0.050	2.1	0.1	O K	2160 min Summer	95.035	0.035	1.5	0.1	O K	2880 min Summer	95.027	0.027	1.1	0.1	O K	4320 min Summer	95.020	0.020	0.8	0.1	O K	5760 min Summer	95.016	0.016	0.7	0.0	O K	7200 min Summer	95.013	0.013	0.5	0.0	O K	8640 min Summer	95.012	0.012	0.5	0.0	O K	10080 min Summer	95.011	0.011	0.4	0.0	O K	15 min Winter	99.245	4.245	8.5	9.7	O K	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)	15 min Summer	145.040	0.0	14	30 min Summer	95.760	0.0	22	60 min Summer	59.780	0.0	40	120 min Summer	35.700	0.0	70	180 min Summer	26.449	0.0	98	240 min Summer	21.350	0.0	128	360 min Summer	15.703	0.0	190	480 min Summer	12.542	0.0	250	600 min Summer	10.490	0.0	310	720 min Summer	9.042	0.0	370	960 min Summer	7.115	0.0	490	1440 min Summer	5.028	0.0	724	2160 min Summer	3.527	0.0	1084	2880 min Summer	2.747	0.0	1436	4320 min Summer	1.958	0.0	2192	5760 min Summer	1.557	0.0	2880	7200 min Summer	1.322	0.0	3632	8640 min Summer	1.167	0.0	4368	10080 min Summer	1.058	0.0	5032	15 min Winter	145.040	0.0	15
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JNP Group		Page 2			
Link House St Marys Way Chesham HP5 1HR	Hook Norton Road Sibford Ferris				
Date 05/09/2018 14:26 File RING SOAKAWAY- Roads.SRCX	Designed by JC Checked by MV				
XP SolutionsSource Control 2018.1					
Summary of Results for 100 year Return Period (+40%)					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	99.588	4.588	8.5	10.3	O K
60 min Winter	98.683	3.683	8.5	8.6	O K
120 min Winter	96.672	1.672	8.5	4.8	O K
180 min Winter	96.170	1.170	7.1	3.5	O K
240 min Winter	95.908	0.908	5.9	2.7	O K
360 min Winter	95.588	0.588	4.5	1.7	O K
480 min Winter	95.398	0.398	3.6	1.2	O K
600 min Winter	95.270	0.270	3.0	0.8	O K
720 min Winter	95.178	0.178	2.6	0.5	O K
960 min Winter	95.056	0.056	2.1	0.2	O K
1440 min Winter	95.036	0.036	1.5	0.1	O K
2160 min Winter	95.026	0.026	1.1	0.1	O K
2880 min Winter	95.020	0.020	0.8	0.1	O K
4320 min Winter	95.014	0.014	0.6	0.0	O K
5760 min Winter	95.012	0.012	0.5	0.0	O K
7200 min Winter	95.010	0.010	0.4	0.0	O K
8640 min Winter	95.009	0.009	0.4	0.0	O K
10080 min Winter	95.008	0.008	0.3	0.0	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
30 min Winter	95.760	0.0	24		
60 min Winter	59.780	0.0	42		
120 min Winter	35.700	0.0	72		
180 min Winter	26.449	0.0	100		
240 min Winter	21.350	0.0	132		
360 min Winter	15.703	0.0	192		
480 min Winter	12.542	0.0	252		
600 min Winter	10.490	0.0	312		
720 min Winter	9.042	0.0	370		
960 min Winter	7.115	0.0	490		
1440 min Winter	5.028	0.0	724		
2160 min Winter	3.527	0.0	1076		
2880 min Winter	2.748	0.0	1464		
4320 min Winter	1.958	0.0	2224		
5760 min Winter	1.558	0.0	2880		
7200 min Winter	1.322	0.0	3672		
8640 min Winter	1.167	0.0	4344		
10080 min Winter	1.058	0.0	5008		
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JNP Group		Page 3
Link House St Marys Way Chesham HP5 1HR	Hook Norton Road Sibford Ferris	
Date 05/09/2018 14:26	Designed by JC	
File RING SOAKAWAY- Roads.SRCX	Checked by MV	
XP Solutions		Source Control 2018.1

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 435200 237350 SP 35200 37350
Data Type	Catchment
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.050

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

0	4 0.050
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JNP Group		Page 4										
Link House St Marys Way Chesham HP5 1HR	Hook Norton Road Sibford Ferris											
Date 05/09/2018 14:26 File RING SOAKAWAY- Roads.SRCX	Designed by JC Checked by MV											
XP Solutions Source Control 2018.1												
<u>Model Details</u> Storage is Online Cover Level (m) 100.000 <u>Lined Soakaway Structure</u> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%;">Infiltration Coefficient Base (m/hr) 7.92000</td> <td style="width: 50%;">Ring Diameter (m) 1.10</td> </tr> <tr> <td>Infiltration Coefficient Side (m/hr) 7.92000</td> <td>Pit Multiplier 1.5</td> </tr> <tr> <td>Safety Factor 6.5</td> <td>Number Required 2</td> </tr> <tr> <td>Porosity 0.30</td> <td>Cap Volume Depth (m) 0.000</td> </tr> <tr> <td>Invert Level (m) 95.000</td> <td>Cap Infiltration Depth (m) 1.500</td> </tr> </table>			Infiltration Coefficient Base (m/hr) 7.92000	Ring Diameter (m) 1.10	Infiltration Coefficient Side (m/hr) 7.92000	Pit Multiplier 1.5	Safety Factor 6.5	Number Required 2	Porosity 0.30	Cap Volume Depth (m) 0.000	Invert Level (m) 95.000	Cap Infiltration Depth (m) 1.500
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Porosity 0.30	Cap Volume Depth (m) 0.000											
Invert Level (m) 95.000	Cap Infiltration Depth (m) 1.500											
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Appendix G: Drainage Schematic



Notes:-

- Where this drawing has been issued in electronic .dwg format it has been done so in good faith. jnpgroup do not take any responsibility for any inaccuracies in the electronic data, which should be checked against the paper (or .pdf) drawing issue. Any apparent discrepancies should be immediately reported to jnpgroup. The electronic .dwg file should not be assumed to be to scale and should not be used for 'overlying', setting out or checking of any third party information. All dimensions should be taken from the paper (or .pdf) version of the drawing. Electronic drawings may contain third party information, jnpgroup take no responsibility for this information, which should be checked against the originators paper drawing(s).
- All working dimensions to be checked on site.
- Do not scale.
- Any discrepancies between drawings of different scales, and between drawings and specification where appropriate to be notified to The Engineer for decision.
- Copyright reserved. This drawing may only be used for The Client and location specified in the title block. It may not be copied or disclosed to any third party without the prior written consent of jnpgroup.
- This drawing should only be used for construction if the drawing status is "Construction". jnpgroup take no responsibility for construction works undertaken to drawings which are not marked with this status.

Health and Safety Note:
The details on this drawing have been prepared on the assumption that a competent contractor will be carrying out the works. If the contractor(s) considers that there is insufficient Health and Safety information on this drawing, this should immediately be brought to the attention of the designer.

Drawing References

- The proposed site layout has been provided by BHP Hardwood Architects. Date: July 2018. Reference: 3361.101
- Topographic Survey data was provided by greenhatch group on May 2017. Reference: 27085_T

Key

- Geocellular Soakaways
- Concrete Ring Soakaways
- Pipes
- Manholes
- Private Permeable Paving
- Shared Permeable Paving
- Petrol Interceptors

Rev.	Date	Amendment	By	Chk.
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Status Preliminary

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Client Land & Partners

Job Hook Norton Road, Sibford Ferris

Title Drainage Schematic

Scale 1:500 @ A1 Date September 2018

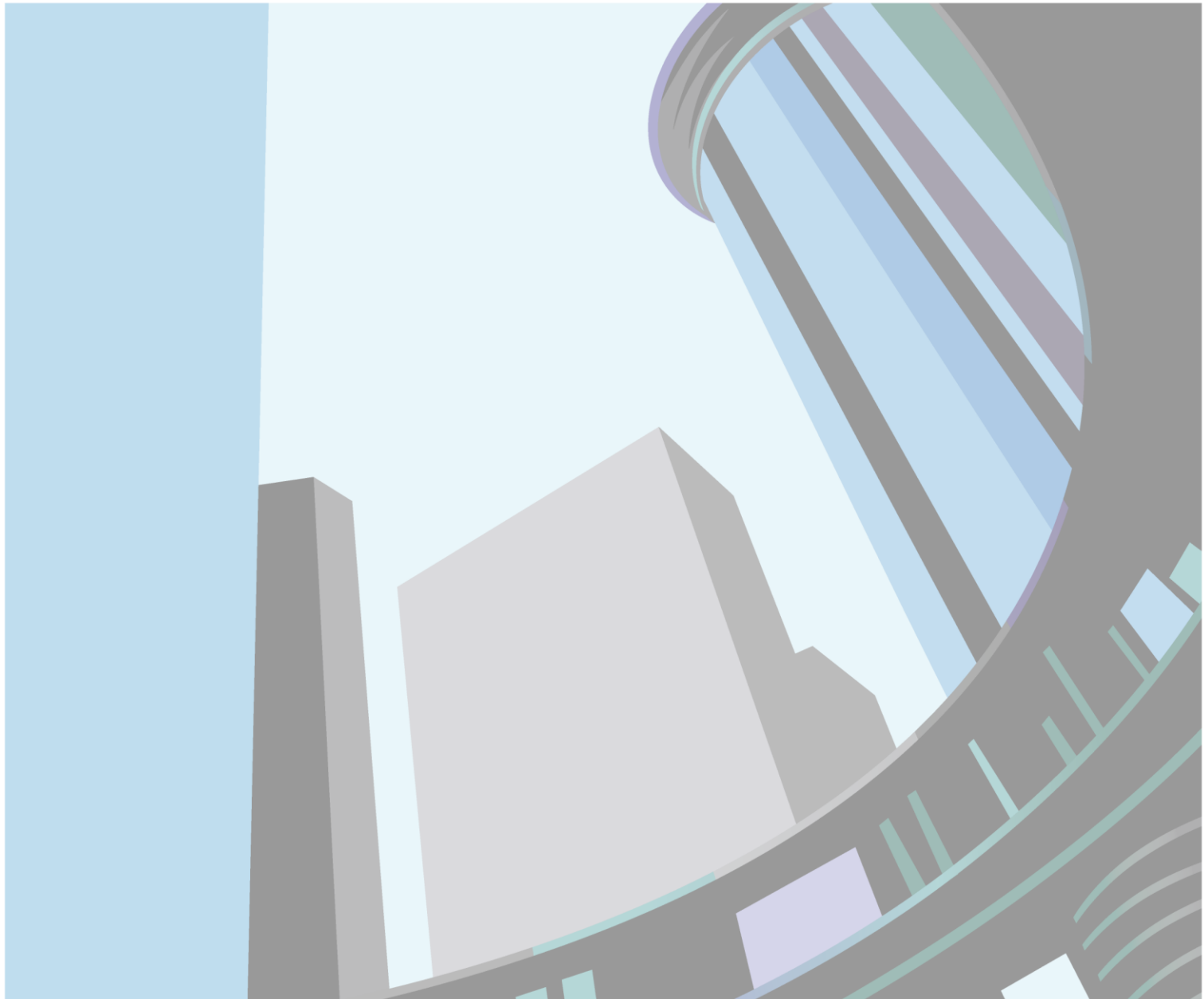
Drawn by JC Checked by MV Approved by MV



Drawing No. C85855-SK-001 Rev. -

Notes

- All soakaways have been sized to accommodate all storm events up to and including the 1in100+40% Climate Change.
- The soakage rate of 1.3x10-3 was applied to all soakaway calculations. This rate was calculated from the results of 1 day soakage testing in the north-eastern area of the site.
- The soakage rates across the site will need to be confirmed via full BRE 365 soakage testing.
- Flood Estimation Handbook (FEH) Statistical method rainfall data was used to size all soakaways.
- The permeable paving has been designed to drain its own area only.
- Cover Levels (CL) and Invert Levels (IL) shown are indicative and will be adjusted following a levels strategy for the site. However, the current IL for the soakaways should not be exceeded as this may result in the soakaway being within the impermeable Whibby Mudstone.



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