

Drainage Design Report



Flow

V8.1

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Project Reference & Site Location	399-18 The Elms Tallarn Green Malpas
File Name	399-18 Surface Water Calculations 04.pfd
Network	Storm Network
Last analysed	10/04/2019 15:17:27
Report produced on	10/04/2019 15:18:31
Flow Control	Soakaway

Revisions

Rainfall Methodology	FSR
Return Period (years)	100
Additional Flow (%)	0
FSR Region	England and Wales
M5-60 (mm)	17.000
Ratio-R	0.300
CV	0.750
Time of Entry (mins)	2.00
Maximum Time of Concentration (mins)	30.00
Maximum Rainfall (mm/hr)	50.0
Minimum Velocity (m/s)	1.00
Connection Type	Level Soffits
Minimum Backdrop Height (m)	0.200
Preferred Cover Depth (m)	1.200
Include Intermediate Ground	✓
Enforce best practice design rules	✓

Name	Area (ha)	T of E (mins)	Add Inflow (l/s)	Cover Level (m)	Node Type	Manhole Type	Diameter (mm)	Depth (m)	Notes
S3	0.011	2.00		50.140	Manhole	Private	450	1.192	
S4				50.000	Manhole	Private	900	1.152	
S5		2.00		51.250	Manhole	Private	450	0.400	
S6				51.250	Junction			0.401	

Flow v8.1 Design Report: Links (Input)

Name	US Node	DS Node	Length (m)	ks (mm) / n	Velocity Equation	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	Link Type	T of C (mins)	Rain (mm/hr)
S3 - S4	S3	S4	7.000	0.600	Colebrook-White	48.948	48.848	0.100	70.0	100	Circular	2.13	50.0
S5 - S6	S5	S6	8.150	0.600	Colebrook-White	50.850	50.849	0.001	8150.0	100	Circular	1.27	0.0

Flow v8.1 Design Report: Links (Results)

Name	US Node	DS Node	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Minimum Depth (m)	Maximum Depth (m)	Σ Area (ha)	Σ Add Inflow (ha)	Pro Depth (mm)	Pro Velocity (m/s)
S3 - S4	S3	S4	0.921	7.2	1.5	1.092	1.052	1.052	1.092	0.011	0.0	31	0.725
S5 - S6	S5	S6	0.077	0.6	0.0	0.300	0.301	0.300	0.301	0.000	0.0	0	0.000

Flow v8.1 Design Report: Pipeline Schedule

Link Name	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)	US Node Name	Dia (mm)	Node Type	MH Type	DS Node Name	Dia (mm)	Node Type	MH Type
S3 - S4	7.000	70.0	100	Circular	50.140	48.948	1.092	50.000	48.848	1.052	S3	450	Manhole	Private	S4	900	Manhole	Private
S5 - S6	8.150	8150.0	100	Circular	51.250	50.850	0.300	51.250	50.849	0.301	S5	450	Manhole	Private	S6		Junction	

Rainfall Methodology	FSR		Return Period (years)	Climate Change (%)
FSR Region	England and Wales		100	35
M5-60 (mm)	17.000			
Ratio-R	0.300			
Summer CV	0.750			
Winter CV	0.840			
Analysis Speed	Detailed			
Skip Steady State	x			
Drain Down Time (mins)	240			
Additional Storage (m³/ha)	0.0			
Storm Durations (mins)	15			
	30			
	60			
	120			
	180			
	240			
	360			
	480			
	600			
	720			
	960			
	1440			

<u>Depth/Flow</u>									
Node	Flap Valve	Online / Offline	Replaces Downstream Link	Loop to Node	Invert Level (m)	Design Depth (m)	Design Flow (l/s)	Depth (m)	Flow (l/s)
S4	x	Offline	x	S5	48.848	0.750	5.0	0.750	5.000

Soakaway										
Node	Base Inf Coefficient (m/hr)	Side Inf Coefficient (m/hr)	Safety Factor	Porosity	Invert Level (m)	Time to half empty (mins)	Pit Width (m)	Pit Length (m)	Inf Depth (m)	Number Required
S5	0.07200	0.07200	2.0	0.10	50.000	67	4.600	4.870	0.850	1
S6	0.07200	0.07200	2.0	0.10	50.000	56	4.600	4.870	0.850	1

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
100 year +35% 15 minute summer	355.680	100.645
100 year +35% 15 minute winter	249.600	100.645
100 year +35% 30 minute summer	245.990	69.607
100 year +35% 30 minute winter	172.625	69.607
100 year +35% 60 minute summer	174.491	46.113
100 year +35% 60 minute winter	115.928	46.113
100 year +35% 120 minute summer	111.942	29.583
100 year +35% 120 minute winter	74.372	29.583
100 year +35% 180 minute summer	87.390	22.488
100 year +35% 180 minute winter	56.806	22.488
100 year +35% 240 minute summer	69.529	18.374
100 year +35% 240 minute winter	46.193	18.374
100 year +35% 360 minute summer	53.204	13.691
100 year +35% 360 minute winter	34.584	13.691
100 year +35% 480 minute summer	42.061	11.115
100 year +35% 480 minute winter	27.944	11.115
100 year +35% 600 minute summer	34.537	9.447
100 year +35% 600 minute winter	23.598	9.447
100 year +35% 720 minute summer	30.841	8.266
100 year +35% 720 minute winter	20.727	8.266
100 year +35% 960 minute summer	25.396	6.687
100 year +35% 960 minute winter	16.823	6.687
100 year +35% 1440 minute summer	18.467	4.949
100 year +35% 1440 minute winter	12.411	4.949

Results for 100 year +35% Critical Storm Duration. Lowest mass balance: 100.00%															
Event	US Node ID	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status	Link ID	DS Node ID	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S3	11	49.394	0.446	6.0	0.0709	0.0000	SURCHARGED	S3 - S4	S4	4.4	0.755	0.603	0.0548	
15 minute winter	S4	11	49.366	0.518	4.4	0.3297	0.0000	OK	Depth/Flow	S5	3.5				2.3
60 minute winter	S5	41	50.917	0.067	2.6	2.0651	0.0000	OK	S5 - S6	S6	1.7	0.394	2.827	0.0353	
									Infiltration		0.4				
120 minute winter	S6	92	50.415	-0.434	1.3	0.9306	0.0000	OK	Infiltration		0.3				