Drainage Design Report

Flow

v8.0

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Network	Storm Network 1
Filename	X:\1362 - Joyce\5. Design\5.3 Flow\S104 DRAINAGE DESIGN .PFD
Username	Office2-PC\George
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Rainfall Methodology	FSR
Return Period (years)	1
Additional Flow (%)	0
FSR Region	England and Wales
M5-60 (mm)	20.000
Ratio-R	0.400
CV	0.750
Time of Entry (mins)	5.00
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)	2.000
Preferred Cover Depth (m)	0.600
Include Intermediate Ground	
Enforce best practice design rules	

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	Name	Area (ha)	T of E (mins)	Add Inflow (l/s)	Cover Level (m)	Node Type	Manhole Type	Diameter (mm)	Width (mm)	Easting (m)	Northing (m)	Depth (m)	Notes
	208	0.253	5.00		1.910	Manhole	Adoptable	2400		523704.626	309473.599	1.455	
	209	0.000			2.088	Manhole	Adoptable	2400		523697.809	309451.917	1.769	
	210	0.000			1.927	Junction				523696.947	309449.212	1.717	Auto-design is off

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	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)	Con Offset (m)	Min DS IL (m)	Lateral Area (ha)	Lateral Ins Point (%)	Lateral T of E (mins)
?	50.005	208	209	22.728	0.600	Colebrook-White	0.455	0.369	0.086	264.3	300	3 x 300	5.39	50.0					
?	50.006	209	210	2.839	0.600	Colebrook-White	0.319	0.210	0.109	26.0	225	Circular_Default Sewer Type	5.41	50.0					

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	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)	Notes
?	50.005	208	209	0.962	204.0	34.3	1.155	1.419	1.155	1.419	0.253	0.0	83	0.720	Velocity is less than the specified minimum | Downstream Depth is more than twice the specified minimum
?	50.006	209	210	2.574	102.3	34.3	1.544	1.492	1.492	1.544	0.253	0.0	89	2.320	Upstream Depth is more than twice the specified minimum | Downstream Depth is more than twice the specified minimum

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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)	Width (mm)	Node Type	MH Type	DS Node Name	Dia (mm)	Width (mm)	Node Type	MH Type
50.005	22.728	264.3	300	3 x 300	1.910	0.455	1.155	2.088	0.369	1.419	208	2400		Manhole	Adoptable	209	2400		Manhole	Adoptable
50.006	2.839	26.0	225	Circular_Default Sewer Type	2.088	0.319	1.544	1.927	0.210	1.492	209	2400		Manhole	Adoptable	210			Junction	

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Node Name	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Width (mm)	Node Type	MH Type		Link ID	IL (m)	Dia (mm)	Link Type
208	523704.626	309473.599	1.910	1.455	2400		Manhole	Adoptable					
									0	50.005	0.455	300	3 x 300
209	523697.809	309451.917	2.088	1.769	2400		Manhole	Adoptable	1	50.005	0.369	300	3 x 300
									0	50.006	0.319	225	Circular_Default Sewer Type
210	523696.947	309449.212	1.927	1.717			Junction		1	50.006	0.210	225	Circular_Default Sewer Type

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Rainfall Methodology	FSR		Return Period (years)	Climate Change (%)
FSR Region	England and Wales		1	0
M5-60 (mm)	20.000		2	0
Ratio-R	0.400		30	0
Summer CV	0.750			
Winter CV	0.840			
Analysis Speed	Normal			
Skip Steady State				
Drain Down Time (mins)	240			
Additional Storage (m³/ha)	20.0			
Storm Durations (mins)	15			
	30			
	60			
	120			
	180			
	240			
	360			
	480			
	600			
	720			
	960			
	1440			
	2160			
	2880			
	4320			
	5760			
	7200			
	8640			
	10080			
Check Discharge Rate(s)				
1 year (l/s)				
30 year (l/s)				

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100 year (l/s)				
Check Discharge Volume				
100 year 360 minute (m³)				

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Site Makeup	Greenfield
Greenfield Method	IH124
Positively Drained Area (ha)	
SAAR (mm)	
Soil Index	1
SPR	0.10
Region	1
Growth Factor 1 year	0.85
Growth Factor 30 years	1.95
Growth Factor 100 years	2.48
Betterment (%)	0
QBar	
Q 1 year (l/s)	
Q 30 year (l/s)	
Q 100 year (l/s)	

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Site Makeup	Greenfield
Greenfield Method	FSR/FEH
Positively Drained Area (ha)	
Soil Index	1
SPR	0.10
CWI	
Return Period (years)	100
Climate Change (%)	0
Storm Duration (mins)	360
Betterment (%)	0
PR	
Runoff Volume (m3)	

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Hydro-Brake®

Node	Flap Valve	Online / Offline	Replaces Downstream Link	Loop to Node	Invert Level (m)	Design Depth (m)	Design Flow (l/s)	Objective	Sump Available	Product Number	Min Outlet Diameter (m)	Min Node Diameter (mm)
209	x	Online			0.319	1.600	25.0	(HE) Minimise upstream storage		CTL-SHE-0211-2500-1600-2500	0.225	1800

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Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
1 year 15 minute summer	109.521	30.991
1 year 15 minute winter	76.857	30.991
1 year 30 minute summer	71.439	20.215
1 year 30 minute winter	50.133	20.215
1 year 60 minute summer	48.435	12.800
1 year 60 minute winter	32.179	12.800
1 year 120 minute summer	30.053	7.942
1 year 120 minute winter	19.966	7.942
1 year 180 minute summer	23.233	5.979
1 year 180 minute winter	15.102	5.979
1 year 240 minute summer	18.475	4.882
1 year 240 minute winter	12.274	4.882
1 year 360 minute summer	14.169	3.646
1 year 360 minute winter	9.210	3.646
1 year 480 minute summer	11.185	2.956
1 year 480 minute winter	7.431	2.956
1 year 600 minute summer	9.182	2.511
1 year 600 minute winter	6.274	2.511
1 year 720 minute summer	8.203	2.199
1 year 720 minute winter	5.513	2.199
1 year 960 minute summer	6.768	1.782
1 year 960 minute winter	4.483	1.782
1 year 1440 minute summer	4.949	1.326
1 year 1440 minute winter	3.326	1.326
1 year 2160 minute summer	3.574	0.988
1 year 2160 minute winter	2.462	0.988
1 year 2880 minute summer	2.986	0.800
1 year 2880 minute winter	2.007	0.800
1 year 4320 minute summer	2.276	0.595

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1 year 4320 minute winter	1.499	0.595
1 year 5760 minute summer	1.885	0.483
1 year 5760 minute winter	1.220	0.483
1 year 7200 minute summer	1.609	0.410
1 year 7200 minute winter	1.038	0.410
1 year 8640 minute summer	1.409	0.359
1 year 8640 minute winter	0.910	0.359
1 year 10080 minute summer	1.260	0.322
1 year 10080 minute winter	0.813	0.322
2 year 15 minute summer	141.566	40.058
2 year 15 minute winter	99.345	40.058
2 year 30 minute summer	91.753	25.963
2 year 30 minute winter	64.388	25.963
2 year 60 minute summer	61.301	16.200
2 year 60 minute winter	40.727	16.200
2 year 120 minute summer	37.449	9.897
2 year 120 minute winter	24.880	9.897
2 year 180 minute summer	28.672	7.378
2 year 180 minute winter	18.637	7.378
2 year 240 minute summer	22.636	5.982
2 year 240 minute winter	15.039	5.982
2 year 360 minute summer	17.235	4.435
2 year 360 minute winter	11.203	4.435
2 year 480 minute summer	13.550	3.581
2 year 480 minute winter	9.003	3.581
2 year 600 minute summer	11.088	3.033
2 year 600 minute winter	7.576	3.033
2 year 720 minute summer	9.878	2.647
2 year 720 minute winter	6.639	2.647
2 year 960 minute summer	8.113	2.136
2 year 960 minute winter	5.374	2.136
2 year 1440 minute summer	5.891	1.579

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2 year 1440 minute winter	3.959	1.579
2 year 2160 minute summer	4.223	1.167
2 year 2160 minute winter	2.909	1.167
2 year 2880 minute summer	3.512	0.941
2 year 2880 minute winter	2.360	0.941
2 year 4320 minute summer	2.659	0.695
2 year 4320 minute winter	1.751	0.695
2 year 5760 minute summer	2.191	0.561
2 year 5760 minute winter	1.418	0.561
2 year 7200 minute summer	1.861	0.475
2 year 7200 minute winter	1.201	0.475
2 year 8640 minute summer	1.625	0.414
2 year 8640 minute winter	1.049	0.414
2 year 10080 minute summer	1.449	0.370
2 year 10080 minute winter	0.935	0.370
30 year 15 minute summer	268.706	76.035
30 year 15 minute winter	188.566	76.035
30 year 30 minute summer	174.929	49.499
30 year 30 minute winter	122.757	49.499
30 year 60 minute summer	116.589	30.811
30 year 60 minute winter	77.459	30.811
30 year 120 minute summer	70.438	18.615
30 year 120 minute winter	46.797	18.615
30 year 180 minute summer	53.298	13.715
30 year 180 minute winter	34.645	13.715
30 year 240 minute summer	41.604	10.995
30 year 240 minute winter	27.641	10.995
30 year 360 minute summer	31.221	8.034
30 year 360 minute winter	20.295	8.034
30 year 480 minute summer	24.324	6.428
30 year 480 minute winter	16.160	6.428
30 year 600 minute summer	19.756	5.404

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30 year 600 minute winter	13.498	5.404
30 year 720 minute summer	17.490	4.687
30 year 720 minute winter	11.754	4.687
30 year 960 minute summer	14.215	3.743
30 year 960 minute winter	9.416	3.743
30 year 1440 minute summer	10.161	2.723
30 year 1440 minute winter	6.829	2.723
30 year 2160 minute summer	7.160	1.979
30 year 2160 minute winter	4.933	1.979
30 year 2880 minute summer	5.883	1.577
30 year 2880 minute winter	3.953	1.577
30 year 4320 minute summer	4.374	1.143
30 year 4320 minute winter	2.880	1.143
30 year 5760 minute summer	3.554	0.910
30 year 5760 minute winter	2.301	0.910
30 year 7200 minute summer	2.987	0.762
30 year 7200 minute winter	1.928	0.762
30 year 8640 minute summer	2.583	0.659
30 year 8640 minute winter	1.667	0.659
30 year 10080 minute summer	2.284	0.583
30 year 10080 minute winter	1.474	0.583

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Results for 1 year Critical Storm Duration. Lowest mass balance: 98.42%

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	208	13	0.588	0.133	35.7	1.0642	0.0000	OK	50.005	209	31.5	0.496	0.154	2.9165	
15 minute winter	209	13	0.589	0.270	31.5	1.2222	0.0000	SURCHARGED	Hydro-Brake®	210	23.6				16.5
15 minute summer	210	1	0.210	0.000	23.4	0.0000	0.0000	OK							

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Results for 2 year Critical Storm Duration. Lowest mass balance: 98.42%

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	208	13	0.689	0.234	46.1	1.8742	0.0000	OK	50.005	209	36.2	0.516	0.177	4.4127	
15 minute winter	209	13	0.693	0.374	36.2	1.6907	0.0000	SURCHARGED	Hydro-Brake®	210	24.7				21.3
15 minute summer	210	1	0.210	0.000	24.5	0.0000	0.0000	OK							

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Results for 30 year Critical Storm Duration. Lowest mass balance: 98.42%

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	208	15	1.895	1.440	87.5	11.5261	0.0000	FLOOD RISK	50.005	209	49.3	0.538	0.241	4.8015	
15 minute winter	209	15	1.894	1.575	49.3	7.1275	0.0000	FLOOD RISK	Hydro-Brake®	210	25.0				40.4
15 minute summer	210	1	0.210	0.000	25.0	0.0000	0.0000	OK							

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