Appendix

C. Calculations

AMBIENTAL
ENVIRONMENTAL ASSESSMENT
a company of Royal HaskoningDHV

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	100	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	17.700	Minimum Backdrop Height (m)	0.200
Ratio-R	0.388	Preferred Cover Depth (m)	0.400
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	4.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
1	0.710	4.00	11.500		7.941	88.341	0.780
2			11.500	1200	24.065	88.527	1.090

Simulation Settings

Rainfall Methodology	FSR	Drain Down Time (mins)	240
FSR Region	England and Wales	Additional Storage (m³/ha)	20.0
M5-60 (mm)	17.700	Check Discharge Rate(s)	✓
Ratio-R	0.388	1 year (l/s)	2.5
Summer CV	0.750	30 year (l/s)	5.0
Winter CV	0.840	100 year (l/s)	6.0
Analysis Speed	Normal	Check Discharge Volume	x
Skip Steady State	x		

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	40	0	0
30	40	0	0
100	40	0	0

Pre-development Discharge Rate

Site Makeup	Greenfield	Growth Factor 30 year	1.75
Greenfield Method	IH124	Growth Factor 100 year	2.08
Positively Drained Area (ha)	0.710	Betterment (%)	0
SAAR (mm)	600	QBar	2.9
Soil Index	4	Q 1 year (l/s)	2.5
SPR	0.47	Q 30 year (l/s)	5.0
Region	3	Q 100 year (l/s)	6.0
Growth Factor 1 year	0.86		

Node 1 Online Orifice Control

Flap Valve	x	Invert Level (m)	10.500	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Diameter (m)	0.039		

Node 1 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	10.720	Slope (1:X)	9999.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.650
Safety Factor	2.0	Width (m)	20.000	Inf Depth (m)	
Porosity	0.30	Length (m)	119.000		

Results for 1 year +40% CC Critical Storm Duration. Lowest mass balance: 92.23%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute winter	1	464	10.900	0.180	15.3	127.8745	0.0000	OK
15 minute summer	2	1	10.410	0.000	1.7	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Discharge Vol (m³)
480 minute winter	1	Orifice	2	2.0	75.4

Results for 30 year +40% CC Critical Storm Duration. Lowest mass balance: 92.23%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute winter	1	915	11.192	0.472	20.0	341.0362	0.0000	SURCHARGED
15 minute summer	2	1	10.410	0.000	1.9	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Discharge Vol (m³)
960 minute winter	1	Orifice	2	2.6	153.5

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 92.23%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute winter	1	930	11.357	0.637	25.7	462.2953	0.0000	FLOOD RISK
15 minute summer	2	1	10.410	0.000	2.1	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Discharge Vol (m³)
960 minute winter	1	Orifice	2	2.9	167.9