

### Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	2	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)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	1.200
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)	Depth (m)
SA37	0.004	4.00	80.000	450	1.500
Dum37	0.000		80.000	450	1.600
SA77	0.007	4.00	79.000	450	1.500
Dum77	0.000		79.000	450	1.600
SA62	0.006	4.00	76.000	450	1.500
Dum62	0.000		76.000	450	1.600
SA415	0.042	4.00	71.000	450	2.000
Dum415	0.000		71.000	450	2.100
SA169	0.017	4.00	68.500	450	1.500
Dum169	0.000		68.500	450	1.600

### Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	SA37	Dum37	2.000	0.600	78.500	78.400	0.100	20.0	100	4.02	50.0
2.000	SA77	Dum77	2.000	0.600	77.500	77.400	0.100	20.0	100	4.02	50.0
3.000	SA62	Dum62	2.000	0.600	74.500	74.400	0.100	20.0	100	4.02	50.0
4.000	SA415	Dum415	2.000	0.600	69.000	68.900	0.100	20.0	100	4.02	50.0
5.000	SA169	Dum169	2.000	0.600	67.000	66.900	0.100	20.0	100	4.02	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.734	13.6	0.5	1.400	1.500	0.004	0.0	14	0.836
2.000	1.734	13.6	0.9	1.400	1.500	0.007	0.0	18	0.982
3.000	1.734	13.6	0.8	1.400	1.500	0.006	0.0	17	0.954
4.000	1.734	13.6	5.7	1.900	2.000	0.042	0.0	45	1.654
5.000	1.734	13.6	2.3	1.400	1.500	0.017	0.0	28	1.288

### Pipeline Schedule

Link	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)
1.000	2.000	20.0	100	1 STANDARD	80.000	78.500	1.400	80.000	78.400	1.500
2.000	2.000	20.0	100	1 STANDARD	79.000	77.500	1.400	79.000	77.400	1.500
3.000	2.000	20.0	100	1 STANDARD	76.000	74.500	1.400	76.000	74.400	1.500
4.000	2.000	20.0	100	1 STANDARD	71.000	69.000	1.900	71.000	68.900	2.000
5.000	2.000	20.0	100	1 STANDARD	68.500	67.000	1.400	68.500	66.900	1.500

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	SA37	450	Manhole	1 STANDARD	Dum37	450	Manhole	1 STANDARD
2.000	SA77	450	Manhole	1 STANDARD	Dum77	450	Manhole	1 STANDARD
3.000	SA62	450	Manhole	1 STANDARD	Dum62	450	Manhole	1 STANDARD
4.000	SA415	450	Manhole	1 STANDARD	Dum415	450	Manhole	1 STANDARD
5.000	SA169	450	Manhole	1 STANDARD	Dum169	450	Manhole	1 STANDARD

### Manhole Schedule

Node	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
SA37	80.000	1.500	450	○			
					0	1.000	78.500
Dum37	80.000	1.600	450	○			
					1	1.000	78.400
SA77	79.000	1.500	450	○			
					0	2.000	77.500
Dum77	79.000	1.600	450	○			
					1	2.000	77.400
SA62	76.000	1.500	450	○			
					0	3.000	74.500
Dum62	76.000	1.600	450	○			
					1	3.000	74.400
SA415	71.000	2.000	450	○			
					0	4.000	69.000
Dum415	71.000	2.100	450	○			
					1	4.000	68.900

### Manhole Schedule

Node	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
SA169	68.500	1.500	450	○			
				0	5.000	67.000	100
Dum169	68.500	1.600	450	○			
				1	5.000	66.900	100

### Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	20.000	Drain Down Time (mins)	1440
Ratio-R	0.400	Additional Storage (m <sup>3</sup> /ha)	20.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

### Storm Durations

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

<b>Return Period</b> (years)	<b>Climate Change</b> (CC %)	<b>Additional Area</b> (A %)	<b>Additional Flow</b> (Q %)
100	40	0	0

### Node SA37 Online Pump Control

Flap Valve	x	Invert Level (m)	78.500	Switch off depth (m)	0.400
Replaces Downstream Link	✓	Switch on depth (m)	0.500		

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.001	0.000	1.000	0.000	2.000	0.000

### Node SA77 Online Pump Control

Flap Valve	x	Invert Level (m)	77.500	Switch off depth (m)	0.400
Replaces Downstream Link	✓	Switch on depth (m)	0.500		

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.001	0.000	1.000	0.000	2.000	0.000

### Node SA62 Online Pump Control

Flap Valve	x	Invert Level (m)	74.500	Switch off depth (m)	0.400
Replaces Downstream Link	✓	Switch on depth (m)	0.500		

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.001	0.000	1.000	0.000	2.000	0.000

### Node SA415 Online Pump Control

Flap Valve	x	Invert Level (m)	69.000	Switch off depth (m)	0.400
Replaces Downstream Link	✓	Switch on depth (m)	0.500		

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.001	0.000	1.000	0.000	2.000	0.000

### Node SA169 Online Pump Control

Flap Valve	x	Invert Level (m)	67.000	Switch off depth (m)	0.400
Replaces Downstream Link	✓	Switch on depth (m)	0.500		

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.001	0.000	1.000	0.000	2.000	0.000

### Node SA37 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.02500	Safety Factor	2.0	Invert Level (m)	78.500
Side Inf Coefficient (m/hr)	0.02500	Porosity	1.00	Time to half empty (mins)	616

Depth (m)	Area (m <sup>2</sup> )	Inf Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf Area (m <sup>2</sup> )
0.000	3.0	3.0	1.000	3.0	11.0	1.001	0.0	11.0

### Node SA77 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.02500	Safety Factor	2.0	Invert Level (m)	77.500
Side Inf Coefficient (m/hr)	0.02500	Porosity	1.00	Time to half empty (mins)	855

Depth (m)	Area (m <sup>2</sup> )	Inf Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf Area (m <sup>2</sup> )
0.000	5.0	5.0	1.000	5.0	17.0	1.001	0.0	17.0

### Node SA62 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.02500	Safety Factor	2.0	Invert Level (m)	74.500
Side Inf Coefficient (m/hr)	0.02500	Porosity	1.00	Time to half empty (mins)	1020

Depth (m)	Area (m <sup>2</sup> )	Inf Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf Area (m <sup>2</sup> )
0.000	4.0	4.0	1.000	4.0	14.0	1.001	0.0	14.0

### Node SA415 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.02500	Safety Factor	2.0	Invert Level (m)	69.000
Side Inf Coefficient (m/hr)	0.02500	Porosity	1.00	Time to half empty (mins)	1425

Depth (m)	Area (m <sup>2</sup> )	Inf Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf Area (m <sup>2</sup> )
0.000	19.2	19.2	1.000	19.2	48.0	1.500	19.2	70.8	1.501	0.0	70.8

**Node SA169 Depth/Area Storage Structure**

Base Inf Coefficient (m/hr)	0.02500	Safety Factor	2.0	Invert Level (m)	67.000
Side Inf Coefficient (m/hr)	0.02500	Porosity	1.00	Time to half empty (mins)	1035

Depth (m)	Area (m <sup>2</sup> )	Inf Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf Area (m <sup>2</sup> )
0.000	11.0	11.0	1.000	11.0	35.0	1.010	0.0	35.0

**Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
360 minute winter	SA37	344	79.318	0.818	0.3	2.6289	0.0000	SURCHARGED
15 minute summer	Dum37	1	78.400	0.000	0.0	0.0000	0.0000	OK
720 minute winter	SA77	675	78.434	0.934	0.3	4.9047	0.0000	SURCHARGED
15 minute summer	Dum77	1	77.400	0.000	0.0	0.0000	0.0000	OK
720 minute winter	SA62	675	75.660	1.160	0.3	4.2792	0.0000	SURCHARGED
15 minute summer	Dum62	1	74.400	0.000	0.0	0.0000	0.0000	OK
720 minute winter	SA415	705	70.747	1.747	2.1	29.8212	0.0000	FLOOD RISK
15 minute summer	Dum415	1	68.900	0.000	0.0	0.0000	0.0000	OK
600 minute winter	SA169	570	68.119	1.119	1.0	11.4871	0.0000	SURCHARGED
15 minute summer	Dum169	1	66.900	0.000	0.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Discharge Vol (m <sup>3</sup> )
360 minute winter	SA37	Pump	Dum37	0.0	0.0
360 minute winter	SA37	Infiltration		0.0	
720 minute winter	SA77	Pump	Dum77	0.0	0.0
720 minute winter	SA77	Infiltration		0.1	
720 minute winter	SA62	Pump	Dum62	0.0	0.0
720 minute winter	SA62	Infiltration		0.0	
720 minute winter	SA415	Pump	Dum415	0.0	0.0
720 minute winter	SA415	Infiltration		0.2	
600 minute winter	SA169	Pump	Dum169	0.0	0.0
600 minute winter	SA169	Infiltration		0.1	