

Proposed Development

The proposed development comprises a new building, rear playground, and additional permeable paved car parking within the existing Connell Co-op College grounds. The surface water run-off from the existing college building and external areas drain off-site to the public sewers located in Wilson Street to the south of the site and the foul drainage drains into the public foul sewer to the west. The general site levels fall towards the south and east.

Existing Surface Water Network

A model of the existing surface water network has been produced in the Causeway Flow software to determine the current hydraulic behaviour of the surface water network, along with the existing discharge rates over a range of events and return periods.

Due to the standard nomenclature used for drainage networks the pipe numbering in the existing and proposed modelling is different, but the chamber references have been retained in the models for comparison of the systems.

The modelling predicts that there is flooding present within the existing network during the lower return events. The effects of 40% climate change have also been included in the modelling to compare the predicted volumes of flooding under the same conditions as the proposed network.

The summary of the existing discharge rates are as follows:

Return Period (1 in x years)	Discharge Rate (l/s)
1	37.9
30	80.8
100	95.9
100 + 40%	105.8

Table 1: Existing Discharge Rates

The modelling indicates that the existing discharge rates are largely limited by the capacity of the existing pipework with some flooding shown at EXSW01a and EXSW03a (the two head of runs) with volumes of 3.97m³ and 6.74m³ respectively for 1 in 100-year future events. As these are existing areas of potential flooding the proposed development will not remove this flooding but should not increase the volume or regularity of the flooding to comply with the requirements of the NPPF.

Proposed Surface Water Network

Following the accepted discharge hierarchy, infiltration to the impermeable ground will not be suitable for the development, as indicated by the existing college discharge to off-site sewers. The second receptor to be considered is a discharge to a watercourse, but none are present within 100m of the development site. Therefore, a connection may be made to the existing surface water network on site, provided this does not increase the risk of flooding within and/or from the existing site and within the downstream network.

The location of the new building is over the line of the existing surface water drain and therefore this will be routed around the proposed development and the existing flows allowed to pass forward.

There are RWPs on both sides of the proposed building and therefore the flow control will need to sit over the existing outfall pipe. The car parking will also be permeable to provide attenuation and water quality benefits.

The existing linear surface channel between the existing and proposed buildings will be diverted into the new system as it locally needs to be routed to the north due to the diversion.

The new connections are designed to balance the flows across the full network. This will ensure that the net flow from the new development is effectively zero when considered against the existing conditions and will avoid exacerbating flood risk issues that are present in the existing network.

Based on this modelling a 48m² x 1.5m deep geo-cellular attenuation tank with a 188mm orifice plate flow control, together with the additional permeable car parking areas and turning area are shown to limit the proposed discharge rates from the total site to less than the existing discharge rates.

The proposed discharge rates from the whole site in comparison to the existing are as follows:

Return Period (1 in x years)	Existing Discharge Rate (l/s)	Proposed Discharge Rate (l/s)
1	37.9	37.3
30	80.8	61.1
100	95.9	72.1
100 + 40%	105.8	87.5

Table 2: Comparison of Discharge Rates

The results demonstrate that the drainage proposals will limit the discharge to less than the existing discharge rate across a range of events up to the 1 in 100-year event (plus climate change) for each equivalent return period.

Comparing the existing against the proposed areas of flooding, the volumes of 3.97m³ and 6.74m³ are reduced to 0m³ and 6.46m³ respectively and thus the development proposals will reduce the extents of flooding that are present in the existing network.

The design will contribute to the water quality of the discharge through the use of permeable paving for the car parks to provide filtration as the surface water passes through the filter stone and membrane construction, and by the inclusion of a catchpit and a filter drain to laterally connect in to the geocellular attenuation tank.

Potential Risk of Pollution

In accordance with the CIRIA SuDS Manual 2015, Table 26.2, the proposed development should be classified as having a potentially "low" pollution level. In order to manage this level of potential pollution it is proposed to include the following measures:

1. Catch-pit and filter drain to prevent solid particles entering the attenuation tank
2. Filtration of the surface water run-off through the permeable filter stone and membrane
3. Impermeable membrane surround to prevent ingress of water to the substrate

This combination of pollution protection measures as proposed will satisfy the requirements of the NPPF and local and national SuDS guidance and will be sufficient to manage the potential low pollution risk at the site.

Conclusion

The existing drainage network has been modelled to determine the existing flow rate from the site, which is being throttled by the existing pipework. The development proposals have been designed to not increase the discharge rate from the existing network across the full range of return periods which means the effective net additional flow rate from the development proposals will be zero.

The development proposals will also reduce the extents of flooding within the existing network, whilst fully accommodating the 1 in 100 year plus 40% event below ground in the proposed system.

The discharge water quality will be enhanced by the inclusion of permeable paving for the car parks, and the use of a catchpit and filter drain to laterally connect in to the geocellular attenuation tank.

Future Maintenance

The future maintenance of the surface water drainage system will comprise regular inspections of the permeable paving, attenuation tank, surface channels, inspection chambers, catchpit and control manhole, and cleaning as necessary in response to the inspections. The units will be cleaned out during dry weather conditions when the sumps are no more than half-full, and the frequency of emptying will be determined by the regular maintenance inspection schedule.

Initially, after pre-handover inspection and cleaning of all surface water drainage systems, the following inspection and maintenance is recommended:

- 3-monthly inspection of the attenuation tank, catchpit, and flow control manhole
- 6-monthly inspection of channels, pipes, and inspection chambers
- Any blockage and/or silt removal as required by the inspections
- 6-monthly hard brush and suction cleaning of the permeable paved surfaces
- Records to be kept of inspection and maintenance
- Any malfunctioning parts or structures to be replaced as required

The surface water drainage systems will be maintained directly by the college or an appointed management company and the maintenance required for the new drainage system will be undertaken as part of the wider ongoing routine building maintenance programme.

Assessment Calculations

Existing SW Network: calculations for rainfall events up to 100-year + 40% climate change

Proposed SW Network: calculations for rainfall events 100-year + 40% climate change

Design Drawings

20-315-DR-001 Preliminary Drainage Layout

20-315-DR-002 Existing Drainage Layout

20-315-DR-003 Preliminary Drainage Details 1

20-315-DR-004 Preliminary Drainage Details 2

**Design Settings**

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	1	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)	17.000	Minimum Backdrop Height (m)	1.000
Ratio-R	0.400	Preferred Cover Depth (m)	1.200
CV	1.000	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Circular Link Type

Shape	Circular	Auto Increment (mm)	75
Barrels	1	Follow Ground	x

Available Diameters (mm)

100 | 150

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
EXSW01a	0.089	5.00	58.400	1200	387299.853	397926.771	1.000
EXSW01			59.060	1200	387328.362	397967.410	2.340
EXSW02	0.053	5.00	59.070	1200	387341.548	397969.577	2.440
EXSW03a	0.098	5.00	58.580	1200	387352.644	397918.667	1.780
EXSW03	0.021	5.00	58.540	1200	387373.149	397941.971	2.170
EXSW04	0.055	5.00	58.340	1200	387354.196	397895.911	1.380
EXSW05	0.055	5.00	59.080	1200	387402.556	397914.291	2.850
EXSW06			59.670	1200	387433.115	397925.977	3.750

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	EXSW01a	EXSW01	49.642	0.600	57.400	56.720	0.680	73.0	225	5.70	44.0
1.001	EXSW01	EXSW02	13.363	0.600	56.720	56.630	0.090	148.5	225	5.92	43.2
1.002	EXSW02	EXSW03	41.961	0.600	56.630	56.445	0.185	226.8	225	6.62	41.0
2.000	EXSW03a	EXSW03	31.041	0.600	56.800	56.520	0.280	110.9	150	5.29	45.5
1.003	EXSW03	EXSW05	40.385	0.600	56.370	56.230	0.140	288.5	300	7.23	39.2
3.000	EXSW04	EXSW05	51.735	0.600	56.960	56.230	0.730	70.9	300	5.72	43.9
1.004	EXSW05	EXSW06	32.717	0.600	56.230	55.920	0.310	105.5	300	7.78	37.8

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	1.532	60.9	14.1	0.775	2.115	0.089	0.0	73	1.252
1.001	1.071	42.6	13.9	2.115	2.215	0.089	0.0	88	0.960
1.002	0.864	34.3	21.0	2.215	1.870	0.142	0.0	127	0.905
2.000	0.954	16.8	16.2	1.630	1.870	0.098	0.0	118	1.083
1.003	0.920	65.1	37.1	1.870	2.550	0.262	0.0	163	0.950
3.000	1.870	132.2	8.7	1.080	2.550	0.055	0.0	52	1.072
1.004	1.530	108.1	50.7	2.550	3.450	0.371	0.0	144	1.506

**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	49.642	73.0	225	Circular	58.400	57.400	0.775	59.060	56.720	2.115
1.001	13.363	148.5	225	Circular	59.060	56.720	2.115	59.070	56.630	2.215
1.002	41.961	226.8	225	Circular	59.070	56.630	2.215	58.540	56.445	1.870
2.000	31.041	110.9	150	Circular	58.580	56.800	1.630	58.540	56.520	1.870
1.003	40.385	288.5	300	Circular	58.540	56.370	1.870	59.080	56.230	2.550
3.000	51.735	70.9	300	Circular	58.340	56.960	1.080	59.080	56.230	2.550
1.004	32.717	105.5	300	Circular	59.080	56.230	2.550	59.670	55.920	3.450

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	EXSW01a	1200	Manhole	Adoptable	EXSW01	1200	Manhole	Adoptable
1.001	EXSW01	1200	Manhole	Adoptable	EXSW02	1200	Manhole	Adoptable
1.002	EXSW02	1200	Manhole	Adoptable	EXSW03	1200	Manhole	Adoptable
2.000	EXSW03a	1200	Manhole	Adoptable	EXSW03	1200	Manhole	Adoptable
1.003	EXSW03	1200	Manhole	Adoptable	EXSW05	1200	Manhole	Adoptable
3.000	EXSW04	1200	Manhole	Adoptable	EXSW05	1200	Manhole	Adoptable
1.004	EXSW05	1200	Manhole	Adoptable	EXSW06	1200	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
EXSW01a	387299.853	397926.771	58.400	1.000	1200				
						0	1.000	57.400	225
EXSW01	387328.362	397967.410	59.060	2.340	1200		1	1.000	56.720
						0	1.001	56.720	225
EXSW02	387341.548	397969.577	59.070	2.440	1200		1	1.001	56.630
						0	1.002	56.630	225
EXSW03a	387352.644	397918.667	58.580	1.780	1200				
						0	2.000	56.800	150
EXSW03	387373.149	397941.971	58.540	2.170	1200		1	2.000	56.520
						2	1.002	56.445	225
						0	1.003	56.370	300
EXSW04	387354.196	397895.911	58.340	1.380	1200				
						0	3.000	56.960	300
EXSW05	387402.556	397914.291	59.080	2.850	1200		1	3.000	56.230
						2	1.003	56.230	300
						0	1.004	56.230	300



Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
EXSW06	387433.115	397925.977	59.670	3.750	1200	1 	1.004	55.920	300

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Detailed
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	17.000	Drain Down Time (mins)	240
Ratio-R	0.400	Additional Storage (m³/ha)	0.0
Summer CV	1.000	Check Discharge Rate(s)	x
Winter CV	1.000	Check Discharge Volume	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	0	0	0
2	0	0	0
5	0	0	0
10	0	0	0
30	0	0	0
100	0	0	0
100	40	0	0

Approval Settings

Node Size	✓	Minimum Full Bore Velocity (m/s)	
Node Losses	✓	Maximum Full Bore Velocity (m/s)	3.000
Link Size	✓	Proportional Velocity	✓
Minimum Diameter (mm)	150	Return Period (years)	
Link Length	✓	Minimum Proportional Velocity (m/s)	0.750
Maximum Length (m)	100.000	Maximum Proportional Velocity (m/s)	3.000
Coordinates	✓	Surcharged Depth	✓
Accuracy (m)	1.000	Return Period (years)	
Crossings	✓	Maximum Surcharged Depth (m)	0.100
Cover Depth	✓	Flooding	✓
Minimum Cover Depth (m)		Return Period (years)	30
Maximum Cover Depth (m)	3.000	Time to Half Empty	x
Backdrops	✓	Discharge Rates	✓
Minimum Backdrop Height (m)		Discharge Volume	✓
Maximum Backdrop Height (m)	1.500	100 year 360 minute (m³)	
Full Bore Velocity	✓		



Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
1 year 15 minute summer	92.521	26.180	5 year 60 minute summer	66.258	17.510
1 year 15 minute winter	64.927	26.180	5 year 60 minute winter	44.020	17.510
1 year 30 minute summer	60.022	16.984	5 year 120 minute summer	40.063	10.587
1 year 30 minute winter	42.121	16.984	5 year 120 minute winter	26.617	10.587
1 year 60 minute summer	40.398	10.676	5 year 180 minute summer	30.473	7.842
1 year 60 minute winter	26.839	10.676	5 year 180 minute winter	19.808	7.842
1 year 120 minute summer	24.980	6.602	5 year 240 minute summer	23.940	6.327
1 year 120 minute winter	16.596	6.602	5 year 240 minute winter	15.905	6.327
1 year 180 minute summer	19.271	4.959	5 year 360 minute summer	18.136	4.667
1 year 180 minute winter	12.527	4.959	5 year 360 minute winter	11.789	4.667
1 year 240 minute summer	15.301	4.043	5 year 480 minute summer	14.219	3.758
1 year 240 minute winter	10.165	4.043	5 year 480 minute winter	9.447	3.758
1 year 360 minute summer	11.775	3.030	5 year 600 minute summer	11.603	3.174
1 year 360 minute winter	7.654	3.030	5 year 600 minute winter	7.928	3.174
1 year 480 minute summer	9.342	2.469	5 year 720 minute summer	10.310	2.763
1 year 480 minute winter	6.207	2.469	5 year 720 minute winter	6.929	2.763
1 year 600 minute summer	7.682	2.101	5 year 960 minute summer	8.430	2.220
1 year 600 minute winter	5.249	2.101	5 year 960 minute winter	5.584	2.220
1 year 720 minute summer	6.859	1.838	5 year 1440 minute summer	6.081	1.630
1 year 720 minute winter	4.609	1.838	5 year 1440 minute winter	4.087	1.630
1 year 960 minute summer	5.653	1.489	10 year 15 minute summer	179.310	50.739
1 year 960 minute winter	3.745	1.489	10 year 15 minute winter	125.832	50.739
1 year 1440 minute summer	4.127	1.106	10 year 30 minute summer	115.897	32.795
1 year 1440 minute winter	2.773	1.106	10 year 30 minute winter	81.331	32.795
2 year 15 minute summer	119.760	33.888	10 year 60 minute summer	77.042	20.360
2 year 15 minute winter	84.042	33.888	10 year 60 minute winter	51.185	20.360
2 year 30 minute summer	77.518	21.935	10 year 120 minute summer	46.688	12.338
2 year 30 minute winter	54.399	21.935	10 year 120 minute winter	31.019	12.338
2 year 60 minute summer	51.720	13.668	10 year 180 minute summer	35.513	9.139
2 year 60 minute winter	34.361	13.668	10 year 180 minute winter	23.084	9.139
2 year 120 minute summer	31.549	8.338	10 year 240 minute summer	27.879	7.368
2 year 120 minute winter	20.961	8.338	10 year 240 minute winter	18.522	7.368
2 year 180 minute summer	24.133	6.210	10 year 360 minute summer	21.070	5.422
2 year 180 minute winter	15.687	6.210	10 year 360 minute winter	13.696	5.422
2 year 240 minute summer	19.039	5.032	10 year 480 minute summer	16.473	4.353
2 year 240 minute winter	12.649	5.032	10 year 480 minute winter	10.944	4.353
2 year 360 minute summer	14.516	3.735	10 year 600 minute summer	13.418	3.670
2 year 360 minute winter	9.436	3.735	10 year 600 minute winter	9.168	3.670
2 year 480 minute summer	11.436	3.022	10 year 720 minute summer	11.912	3.193
2 year 480 minute winter	7.598	3.022	10 year 720 minute winter	8.006	3.193
2 year 600 minute summer	9.363	2.561	10 year 960 minute summer	9.726	2.561
2 year 600 minute winter	6.398	2.561	10 year 960 minute winter	6.442	2.561
2 year 720 minute summer	8.339	2.235	10 year 1440 minute summer	6.999	1.876
2 year 720 minute winter	5.605	2.235	10 year 1440 minute winter	4.704	1.876
2 year 960 minute summer	6.846	1.803	30 year 15 minute summer	226.195	64.005
2 year 960 minute winter	4.535	1.803	30 year 15 minute winter	158.733	64.005
2 year 1440 minute summer	4.967	1.331	30 year 30 minute summer	147.452	41.724
2 year 1440 minute winter	3.338	1.331	30 year 30 minute winter	103.475	41.724
5 year 15 minute summer	155.864	44.104	30 year 60 minute summer	98.615	26.061
5 year 15 minute winter	109.378	44.104	30 year 60 minute winter	65.517	26.061
5 year 30 minute summer	100.117	28.330	30 year 120 minute summer	59.946	15.842
5 year 30 minute winter	70.257	28.330	30 year 120 minute winter	39.827	15.842

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
30 year 180 minute summer	45.598	11.734	100 year 600 minute summer	22.137	6.055
30 year 180 minute winter	29.640	11.734	100 year 600 minute winter	15.126	6.055
30 year 240 minute summer	35.759	9.450	100 year 720 minute summer	19.562	5.243
30 year 240 minute winter	23.758	9.450	100 year 720 minute winter	13.147	5.243
30 year 360 minute summer	26.939	6.932	100 year 960 minute summer	15.851	4.174
30 year 360 minute winter	17.511	6.932	100 year 960 minute winter	10.500	4.174
30 year 480 minute summer	20.981	5.545	100 year 1440 minute summer	11.278	3.023
30 year 480 minute winter	13.940	5.545	100 year 1440 minute winter	7.579	3.023
30 year 600 minute summer	17.039	4.661	100 year +40% CC 15 minute summer	408.473	115.584
30 year 600 minute winter	11.642	4.661	100 year +40% CC 15 minute winter	286.647	115.584
30 year 720 minute summer	15.093	4.045	100 year +40% CC 30 minute summer	268.775	76.054
30 year 720 minute winter	10.143	4.045	100 year +40% CC 30 minute winter	188.614	76.054
30 year 960 minute summer	12.278	3.233	100 year +40% CC 60 minute summer	180.954	47.821
30 year 960 minute winter	8.133	3.233	100 year +40% CC 60 minute winter	120.222	47.821
30 year 1440 minute summer	8.788	2.355	100 year +40% CC 120 minute summer	110.370	29.168
30 year 1440 minute winter	5.906	2.355	100 year +40% CC 120 minute winter	73.327	29.168
100 year 15 minute summer	291.766	82.560	100 year +40% CC 180 minute summer	83.953	21.604
100 year 15 minute winter	204.748	82.560	100 year +40% CC 180 minute winter	54.572	21.604
100 year 30 minute summer	191.982	54.324	100 year +40% CC 240 minute summer	65.765	17.380
100 year 30 minute winter	134.724	54.324	100 year +40% CC 240 minute winter	43.693	17.380
100 year 60 minute summer	129.253	34.158	100 year +40% CC 360 minute summer	49.370	12.705
100 year 60 minute winter	85.873	34.158	100 year +40% CC 360 minute winter	32.092	12.705
100 year 120 minute summer	78.836	20.834	100 year +40% CC 480 minute summer	38.291	10.119
100 year 120 minute winter	52.377	20.834	100 year +40% CC 480 minute winter	25.439	10.119
100 year 180 minute summer	59.966	15.431	100 year +40% CC 600 minute summer	30.992	8.477
100 year 180 minute winter	38.980	15.431	100 year +40% CC 600 minute winter	21.176	8.477
100 year 240 minute summer	46.975	12.414	100 year +40% CC 720 minute summer	27.387	7.340
100 year 240 minute winter	31.209	12.414	100 year +40% CC 720 minute winter	18.406	7.340
100 year 360 minute summer	35.264	9.075	100 year +40% CC 960 minute summer	22.191	5.844
100 year 360 minute winter	22.923	9.075	100 year +40% CC 960 minute winter	14.700	5.844
100 year 480 minute summer	27.350	7.228	100 year +40% CC 1440 minute summer	15.789	4.232
100 year 480 minute winter	18.171	7.228	100 year +40% CC 1440 minute winter	10.611	4.232



Results for 1 year Critical Storm Duration. Lowest mass balance: 99.62%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	EXSW01a	10	57.471	0.071	13.4	0.0800	0.0000	OK
15 minute summer	EXSW01	11	56.808	0.088	13.2	0.1000	0.0000	OK
15 minute summer	EXSW02	11	56.758	0.128	20.8	0.1453	0.0000	OK
15 minute summer	EXSW03a	10	56.912	0.112	14.9	0.1262	0.0000	OK
15 minute summer	EXSW03	11	56.540	0.170	37.9	0.1926	0.0000	OK
15 minute summer	EXSW04	10	57.010	0.050	8.2	0.0564	0.0000	OK
15 minute summer	EXSW05	11	56.384	0.154	53.6	0.1743	0.0000	OK
15 minute summer	EXSW06	12	56.065	0.145	52.4	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	EXSW01a	1.000	EXSW01	13.2	1.073	0.217	0.6202	
15 minute summer	EXSW01	1.001	EXSW02	13.2	0.703	0.310	0.2531	
15 minute summer	EXSW02	1.002	EXSW03	20.3	0.915	0.591	0.9344	
15 minute summer	EXSW03a	2.000	EXSW03	14.5	1.058	0.861	0.4253	
15 minute summer	EXSW03	1.003	EXSW05	37.6	0.969	0.578	1.5689	
15 minute summer	EXSW04	3.000	EXSW05	8.1	0.457	0.061	1.1399	
15 minute summer	EXSW05	1.004	EXSW06	52.4	1.494	0.484	1.1471	24.3

**Results for 2 year Critical Storm Duration. Lowest mass balance: 99.62%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	EXSW01a	10	57.481	0.081	17.4	0.0918	0.0000	OK
15 minute summer	EXSW01	11	56.825	0.105	17.2	0.1186	0.0000	OK
15 minute summer	EXSW02	11	56.784	0.154	26.9	0.1739	0.0000	OK
15 minute summer	EXSW03a	11	56.978	0.178	19.2	0.2010	0.0000	SURCHARGED
15 minute summer	EXSW03	11	56.571	0.201	48.6	0.2273	0.0000	OK
15 minute summer	EXSW04	10	57.017	0.057	10.7	0.0642	0.0000	OK
15 minute summer	EXSW05	11	56.411	0.181	68.6	0.2045	0.0000	OK
15 minute summer	EXSW06	12	56.089	0.169	67.4	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	EXSW01a	1.000	EXSW01	17.2	1.137	0.282	0.7648	
15 minute summer	EXSW01	1.001	EXSW02	17.0	0.733	0.400	0.3143	
15 minute summer	EXSW02	1.002	EXSW03	26.4	0.981	0.768	1.1304	
15 minute summer	EXSW03a	2.000	EXSW03	18.2	1.066	1.080	0.5152	
15 minute summer	EXSW03	1.003	EXSW05	48.0	1.020	0.737	1.9090	
15 minute summer	EXSW04	3.000	EXSW05	10.5	0.481	0.079	1.3843	
15 minute summer	EXSW05	1.004	EXSW06	67.4	1.580	0.623	1.3948	31.4

**Results for 5 year Critical Storm Duration. Lowest mass balance: 99.62%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	EXSW01a	10	57.494	0.094	22.6	0.1059	0.0000	OK
15 minute summer	EXSW01	11	56.851	0.131	22.3	0.1479	0.0000	OK
15 minute summer	EXSW02	11	56.824	0.194	34.6	0.2189	0.0000	OK
15 minute summer	EXSW03a	11	57.230	0.430	25.0	0.4863	0.0000	SURCHARGED
15 minute summer	EXSW03	11	56.615	0.245	62.8	0.2767	0.0000	OK
15 minute summer	EXSW04	10	57.025	0.065	13.9	0.0731	0.0000	OK
15 minute summer	EXSW05	12	56.447	0.217	87.9	0.2449	0.0000	OK
15 minute summer	EXSW06	12	56.120	0.200	86.5	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	EXSW01a	1.000	EXSW01	22.3	1.200	0.367	0.9750	
15 minute summer	EXSW01	1.001	EXSW02	21.6	0.757	0.508	0.4027	
15 minute summer	EXSW02	1.002	EXSW03	34.3	1.005	0.998	1.4367	
15 minute summer	EXSW03a	2.000	EXSW03	23.3	1.327	1.385	0.5340	
15 minute summer	EXSW03	1.003	EXSW05	61.6	1.062	0.946	2.3369	
15 minute summer	EXSW04	3.000	EXSW05	13.7	0.504	0.103	1.6858	
15 minute summer	EXSW05	1.004	EXSW06	86.5	1.658	0.800	1.7069	40.7

**Results for 10 year Critical Storm Duration. Lowest mass balance: 99.62%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	EXSW01a	10	57.501	0.101	26.0	0.1145	0.0000	OK
15 minute summer	EXSW01	11	56.881	0.161	25.7	0.1818	0.0000	OK
15 minute summer	EXSW02	11	56.858	0.228	38.4	0.2575	0.0000	SURCHARGED
15 minute summer	EXSW03a	11	57.450	0.650	28.8	0.7354	0.0000	SURCHARGED
15 minute summer	EXSW03	11	56.649	0.279	70.4	0.3160	0.0000	OK
15 minute summer	EXSW04	10	57.029	0.069	16.0	0.0784	0.0000	OK
15 minute summer	EXSW05	12	56.471	0.241	100.1	0.2724	0.0000	OK
15 minute summer	EXSW06	12	56.140	0.220	97.9	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	EXSW01a	1.000	EXSW01	25.7	1.230	0.422	1.1752	
15 minute summer	EXSW01	1.001	EXSW02	23.9	0.770	0.560	0.4685	
15 minute summer	EXSW02	1.002	EXSW03	37.5	1.002	1.090	1.6298	
15 minute summer	EXSW03a	2.000	EXSW03	27.0	1.533	1.601	0.5397	
15 minute summer	EXSW03	1.003	EXSW05	69.3	1.076	1.065	2.6036	
15 minute summer	EXSW04	3.000	EXSW05	15.7	0.518	0.119	1.8812	
15 minute summer	EXSW05	1.004	EXSW06	97.9	1.686	0.905	1.8964	46.8



14/12/2020

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.62%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	EXSW01a	10	57.516	0.116	32.8	0.1311	0.0000	OK
15 minute summer	EXSW01	12	57.210	0.490	32.5	0.5538	0.0000	SURCHARGED
15 minute summer	EXSW02	12	57.159	0.529	43.6	0.5980	0.0000	SURCHARGED
15 minute summer	EXSW03a	11	57.979	1.179	36.3	1.3329	0.0000	SURCHARGED
15 minute summer	EXSW03	12	56.833	0.463	80.8	0.5241	0.0000	SURCHARGED
15 minute summer	EXSW04	10	57.038	0.078	20.1	0.0881	0.0000	OK
15 minute summer	EXSW05	12	56.578	0.348	117.4	0.3939	0.0000	SURCHARGED
15 minute summer	EXSW06	12	56.180	0.260	114.8	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	EXSW01a	1.000	EXSW01	32.5	1.271	0.533	1.4987	
15 minute summer	EXSW01	1.001	EXSW02	29.4	0.753	0.691	0.5315	
15 minute summer	EXSW02	1.002	EXSW03	42.5	1.069	1.238	1.6688	
15 minute summer	EXSW03a	2.000	EXSW03	32.2	1.829	1.911	0.5465	
15 minute summer	EXSW03	1.003	EXSW05	80.6	1.145	1.239	2.8439	
15 minute summer	EXSW04	3.000	EXSW05	19.8	0.546	0.150	2.1912	
15 minute summer	EXSW05	1.004	EXSW06	114.8	1.704	1.062	2.2125	59.2

**Results for 100 year Critical Storm Duration. Lowest mass balance: 99.62%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	EXSW01a	12	57.976	0.576	42.4	0.6517	0.0000	SURCHARGED
15 minute summer	EXSW01	12	57.747	1.027	38.9	1.1617	0.0000	SURCHARGED
15 minute summer	EXSW02	12	57.671	1.041	52.9	1.1778	0.0000	SURCHARGED
15 minute summer	EXSW03a	11	58.580	1.780	46.9	2.0132	0.6212	FLOOD
15 minute summer	EXSW03	12	57.172	0.802	95.9	0.9065	0.0000	SURCHARGED
15 minute summer	EXSW04	10	57.049	0.089	26.0	0.1005	0.0000	OK
15 minute summer	EXSW05	12	56.808	0.578	141.4	0.6539	0.0000	SURCHARGED
15 minute summer	EXSW06	12	56.197	0.277	139.1	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	EXSW01a	1.000	EXSW01	38.9	1.329	0.639	1.9743	
15 minute summer	EXSW01	1.001	EXSW02	37.6	0.944	0.882	0.5315	
15 minute summer	EXSW02	1.002	EXSW03	52.7	1.326	1.535	1.6688	
15 minute summer	EXSW03a	2.000	EXSW03	36.7	2.083	2.177	0.5465	
15 minute summer	EXSW03	1.003	EXSW05	96.0	1.363	1.475	2.8439	
15 minute summer	EXSW04	3.000	EXSW05	25.7	0.575	0.194	2.2729	
15 minute summer	EXSW05	1.004	EXSW06	139.1	1.975	1.286	2.2638	76.0

**Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.62%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	EXSW01a	10	58.400	1.000	59.3	1.1310	3.9713	FLOOD
15 minute summer	EXSW01	11	58.248	1.528	44.1	1.7282	0.0000	SURCHARGED
15 minute summer	EXSW02	11	58.197	1.567	67.4	1.7721	0.0000	SURCHARGED
15 minute summer	EXSW03a	9	58.580	1.780	65.6	2.0132	6.7358	FLOOD
15 minute summer	EXSW03	11	57.522	1.152	105.8	1.3025	0.0000	SURCHARGED
15 minute summer	EXSW04	12	57.120	0.160	36.4	0.1807	0.0000	OK
15 minute summer	EXSW05	11	57.082	0.852	173.6	0.9637	0.0000	SURCHARGED
15 minute summer	EXSW06	11	56.204	0.284	166.8	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	EXSW01a	1.000	EXSW01	44.1	1.291	0.724	1.9743	
15 minute summer	EXSW01	1.001	EXSW02	38.2	0.961	0.897	0.5315	
15 minute summer	EXSW02	1.002	EXSW03	61.4	1.545	1.789	1.6688	
15 minute summer	EXSW03a	2.000	EXSW03	36.4	2.070	2.163	0.5465	
15 minute summer	EXSW03	1.003	EXSW05	105.8	1.502	1.626	2.8439	
15 minute summer	EXSW04	3.000	EXSW05	36.0	0.657	0.273	2.8081	
15 minute summer	EXSW05	1.004	EXSW06	166.8	2.369	1.543	2.2806	97.4



14/12/2020

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	1	Maximum Rainfall (mm/hr)	1.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Inverts
M5-60 (mm)	17.000	Minimum Backdrop Height (m)	0.000
Ratio-R	0.400	Preferred Cover Depth (m)	0.900
CV	1.000	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Circular Link Type

Shape	Circular	Auto Increment (mm)	75
Barrels	1	Follow Ground	x

Available Diameters (mm)

100 | 150

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
EXSW01a	0.089	5.00	58.400	1200	387299.853	397926.771	1.000
EXSW01			59.060	1200	387328.362	397967.410	2.340
EXSW02	0.030	5.00	59.070	1200	387341.548	397969.577	2.440
SW01	0.040	5.00	58.450	450	387369.489	397944.891	1.050
SW02			58.840	450	387355.690	397956.723	1.667
SW03	0.012	5.00	58.430	450	387346.529	397964.577	1.408
SW04jct			59.500		387346.021	397970.902	2.886
SW05	0.027	5.00	59.000	1200	387358.410	397974.572	2.429
SW06	0.089	5.00	58.850	1200	387376.015	397959.706	2.390
SW07a	0.020	8.00	59.750	1200	387432.939	397933.328	1.650
SW07	0.021	8.00	59.300	1200	387405.917	397934.070	2.971
EXSW03a	0.098	5.00	58.580	1200	387352.644	397918.667	1.780
SW08	0.075	8.00	58.700	1200	387364.368	397932.009	2.135
SW09			58.800	1200	387382.571	397916.403	2.451
SW10			59.270	1500	387394.896	397921.215	2.997
EXSW04	0.055	5.00	58.340	1200	387354.196	397895.911	1.380
EXSW05	0.055	5.00	59.080	1200	387402.556	397914.291	2.850
EXSW06			59.670	1200	387433.115	397925.977	3.750

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	EXSW01a	EXSW01	49.642	0.600	57.400	56.720	0.680	73.0	225	5.70	44.0
1.001	EXSW01	EXSW02	13.363	0.600	56.720	56.630	0.090	148.5	225	5.92	43.2
1.002	EXSW02	SW04jct	4.665	0.600	56.630	56.614	0.016	291.6	300	6.00	1.0
2.000	SW01	SW02	18.177	0.600	57.400	57.173	0.227	80.1	150	5.27	1.0
2.001	SW02	SW03	12.067	0.600	57.173	57.022	0.151	79.9	150	5.45	1.0
2.002	SW03	SW04jct	6.345	0.600	57.022	56.614	0.408	15.6	150	5.49	1.0
1.003	SW04jct	SW05	12.921	0.600	56.614	56.571	0.043	300.5	300	6.24	1.0
1.004	SW05	SW06	23.042	0.600	56.571	56.460	0.111	207.6	300	6.60	1.0
1.005	SW06	SW07	39.387	0.600	56.460	56.329	0.131	300.7	300	7.33	1.0
3.000	SW07a	SW07	27.032	0.600	58.100	56.479	1.621	16.7	100	8.24	1.0
1.006	SW07	SW10	16.933	0.600	56.329	56.273	0.056	302.4	300	8.55	1.0
4.000	EXSW03a	SW08	17.761	0.600	56.800	56.640	0.160	111.0	150	5.31	1.0
4.001	SW08	SW09	23.977	0.600	56.565	56.424	0.141	170.0	225	8.40	1.0
4.002	SW09	SW10	13.231	0.600	56.349	56.273	0.076	174.1	300	5.94	1.0
1.007	SW10	EXSW05	10.326	0.600	56.273	56.230	0.043	240.1	300	7.83	1.0
5.000	EXSW04	EXSW05	51.735	0.600	56.960	56.230	0.730	70.9	300	5.72	43.9
1.008	EXSW05	EXSW06	32.717	0.600	56.230	55.920	0.310	105.5	300	7.78	37.8

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	1.532	60.9	14.1	0.775	2.115	0.089	0.0	73	1.252
1.001	1.071	42.6	13.9	2.115	2.215	0.089	0.0	88	0.960
1.002	0.915	64.7	0.4	2.140	2.586	0.119	0.0	17	0.256
2.000	1.124	19.9	0.1	0.900	1.517	0.040	0.0	9	0.316
2.001	1.125	19.9	0.1	1.517	1.258	0.040	0.0	9	0.316
2.002	2.567	45.4	0.2	1.258	2.736	0.052	0.0	7	0.630
1.003	0.902	63.7	0.6	2.586	2.129	0.171	0.0	21	0.286
1.004	1.087	76.9	0.7	2.129	2.090	0.198	0.0	20	0.340
1.005	0.901	63.7	1.0	2.090	2.671	0.286	0.0	27	0.338
3.000	1.900	14.9	0.1	1.550	2.721	0.020	0.0	5	0.464
1.006	0.899	63.5	1.2	2.671	2.697	0.328	0.0	28	0.351
4.000	0.953	16.8	0.4	1.630	1.910	0.098	0.0	15	0.376
4.001	1.000	39.7	0.6	1.910	2.151	0.173	0.0	20	0.369
4.002	1.188	84.0	0.6	2.151	2.697	0.173	0.0	18	0.350
1.007	1.010	71.4	1.8	2.697	2.550	0.501	0.0	33	0.431
5.000	1.870	132.2	8.7	1.080	2.550	0.055	0.0	52	1.072
1.008	1.530	108.1	83.5	2.550	3.450	0.611	0.0	198	1.682

**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	49.642	73.0	225	Circular	58.400	57.400	0.775	59.060	56.720	2.115
1.001	13.363	148.5	225	Circular	59.060	56.720	2.115	59.070	56.630	2.215
1.002	4.665	291.6	300	Circular	59.070	56.630	2.140	59.500	56.614	2.586
2.000	18.177	80.1	150	Circular	58.450	57.400	0.900	58.840	57.173	1.517
2.001	12.067	79.9	150	Circular	58.840	57.173	1.517	58.430	57.022	1.258
2.002	6.345	15.6	150	Circular	58.430	57.022	1.258	59.500	56.614	2.736
1.003	12.921	300.5	300	Circular	59.500	56.614	2.586	59.000	56.571	2.129
1.004	23.042	207.6	300	Circular	59.000	56.571	2.129	58.850	56.460	2.090
1.005	39.387	300.7	300	Circular	58.850	56.460	2.090	59.300	56.329	2.671
3.000	27.032	16.7	100	Circular	59.750	58.100	1.550	59.300	56.479	2.721
1.006	16.933	302.4	300	Circular	59.300	56.329	2.671	59.270	56.273	2.697
4.000	17.761	111.0	150	Circular	58.580	56.800	1.630	58.700	56.640	1.910
4.001	23.977	170.0	225	Circular	58.700	56.565	1.910	58.800	56.424	2.151
4.002	13.231	174.1	300	Circular	58.800	56.349	2.151	59.270	56.273	2.697
1.007	10.326	240.1	300	Circular	59.270	56.273	2.697	59.080	56.230	2.550
5.000	51.735	70.9	300	Circular	58.340	56.960	1.080	59.080	56.230	2.550
1.008	32.717	105.5	300	Circular	59.080	56.230	2.550	59.670	55.920	3.450

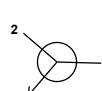
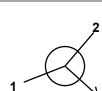
Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	EXSW01a	1200	Manhole	Adoptable	EXSW01	1200	Manhole	Adoptable
1.001	EXSW01	1200	Manhole	Adoptable	EXSW02	1200	Manhole	Adoptable
1.002	EXSW02	1200	Manhole	Adoptable	SW04jct		Junction	
2.000	SW01	450	Manhole	Adoptable	SW02	450	Manhole	Adoptable
2.001	SW02	450	Manhole	Adoptable	SW03	450	Manhole	Adoptable
2.002	SW03	450	Manhole	Adoptable	SW04jct		Junction	
1.003	SW04jct		Junction		SW05	1200	Manhole	Adoptable
1.004	SW05	1200	Manhole	Adoptable	SW06	1200	Manhole	Adoptable
1.005	SW06	1200	Manhole	Adoptable	SW07	1200	Manhole	Adoptable
3.000	SW07a	1200	Manhole	Adoptable	SW07	1200	Manhole	Adoptable
1.006	SW07	1200	Manhole	Adoptable	SW10	1500	Manhole	Adoptable
4.000	EXSW03a	1200	Manhole	Adoptable	SW08	1200	Manhole	Adoptable
4.001	SW08	1200	Manhole	Adoptable	SW09	1200	Manhole	Adoptable
4.002	SW09	1200	Manhole	Adoptable	SW10	1500	Manhole	Adoptable
1.007	SW10	1500	Manhole	Adoptable	EXSW05	1200	Manhole	Adoptable
5.000	EXSW04	1200	Manhole	Adoptable	EXSW05	1200	Manhole	Adoptable
1.008	EXSW05	1200	Manhole	Adoptable	EXSW06	1200	Manhole	Adoptable

Manhole Schedule

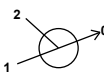
Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
EXSW01a	387299.853	397926.771	58.400	1.000	1200				
						0	1.000	57.400	225
EXSW01	387328.362	397967.410	59.060	2.340	1200		1	1.000	56.720
						0	1.001	56.720	225



Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
EXSW02	387341.548	397969.577	59.070	2.440	1200		1	1.001	56.630	225
							0	1.002	56.630	300
SW01	387369.489	397944.891	58.450	1.050	450					
							0	2.000	57.400	150
SW02	387355.690	397956.723	58.840	1.667	450		1	2.000	57.173	150
							0	2.001	57.173	150
SW03	387346.529	397964.577	58.430	1.408	450		1	2.001	57.022	150
							0	2.002	57.022	150
SW04jct	387346.021	397970.902	59.500	2.886			1	2.002	56.614	150
							2	1.002	56.614	300
							0	1.003	56.614	300
SW05	387358.410	397974.572	59.000	2.429	1200		1	1.003	56.571	300
							0	1.004	56.571	300
SW06	387376.015	397959.706	58.850	2.390	1200		1	1.004	56.460	300
							0	1.005	56.460	300
SW07a	387432.939	397933.328	59.750	1.650	1200					
							0	3.000	58.100	100
SW07	387405.917	397934.070	59.300	2.971	1200		1	3.000	56.479	100
							2	1.005	56.329	300
							0	1.006	56.329	300
EXSW03a	387352.644	397918.667	58.580	1.780	1200					
							0	4.000	56.800	150
SW08	387364.368	397932.009	58.700	2.135	1200		1	4.000	56.640	150
							0	4.001	56.565	225
SW09	387382.571	397916.403	58.800	2.451	1200		1	4.001	56.424	225
							0	4.002	56.349	300
SW10	387394.896	397921.215	59.270	2.997	1500		1	4.002	56.273	300
							2	1.006	56.273	300
							0	1.007	56.273	300

**Manhole Schedule**

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
EXSW04	387354.196	397895.911	58.340	1.380	1200					
						0	5.000	56.960	300	
EXSW05	387402.556	397914.291	59.080	2.850	1200		1	5.000	56.230	300
						2	1.007	56.230	300	
						0	1.008	56.230	300	
EXSW06	387433.115	397925.977	59.670	3.750	1200		1	1.008	55.920	300

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Detailed
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	17.000	Drain Down Time (mins)	240
Ratio-R	0.400	Additional Storage (m³/ha)	0.0
Summer CV	1.000	Check Discharge Rate(s)	x
Winter CV	1.000	Check Discharge Volume	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	0	0	0
2	0	0	0
5	0	0	0
10	0	0	0
30	0	0	0
100	0	0	0
100	40	0	0

Node SW10 Online Orifice Control

Flap Valve	x	Design Depth (m)	1.750	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	93.9		
Invert Level (m)	56.273	Diameter (m)	0.188		

Node SW10 Online Orifice Control

Flap Valve	x	Invert Level (m)	58.000	Discharge Coefficient	0.500
Replaces Downstream Link	✓	Diameter (m)	0.225		

Node SW06 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	56.460
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	18



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Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	48.0	0.0	1.500	48.0	0.0	1.501	0.0	0.0

Node SW09 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	57.900	Slope (1:X)	36.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	0	Depth (m)	0.300
Safety Factor	2.0	Width (m)	20.100	Inf Depth (m)	
Porosity	0.30	Length (m)	10.800		

Node SW07 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	58.800	Slope (1:X)	40.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	0	Depth (m)	0.300
Safety Factor	2.0	Width (m)	10.800	Inf Depth (m)	
Porosity	0.30	Length (m)	12.000		

Node SW07a Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	58.660	Slope (1:X)	65.6
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	0	Depth (m)	0.350
Safety Factor	2.0	Width (m)	2.400	Inf Depth (m)	
Porosity	0.30	Length (m)	42.000		

Approval Settings

Node Size	✓	Minimum Full Bore Velocity (m/s)	
Node Losses	✓	Maximum Full Bore Velocity (m/s)	3.000
Link Size	✓	Proportional Velocity	✓
Minimum Diameter (mm)	150	Return Period (years)	
Link Length	✓	Minimum Proportional Velocity (m/s)	0.750
Maximum Length (m)	100.000	Maximum Proportional Velocity (m/s)	3.000
Coordinates	✓	Surcharged Depth	✓
Accuracy (m)	1.000	Return Period (years)	
Crossings	✓	Maximum Surcharged Depth (m)	0.100
Cover Depth	✓	Flooding	✓
Minimum Cover Depth (m)		Return Period (years)	30
Maximum Cover Depth (m)	3.000	Time to Half Empty	x
Backdrops	✓	Discharge Rates	✓
Minimum Backdrop Height (m)		Discharge Volume	✓
Maximum Backdrop Height (m)	1.500	100 year 360 minute (m ³)	
Full Bore Velocity	✓		

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
1 year 15 minute summer	92.521	26.180	1 year 180 minute summer	19.271	4.959
1 year 15 minute winter	64.927	26.180	1 year 180 minute winter	12.527	4.959
1 year 30 minute summer	60.022	16.984	1 year 240 minute summer	15.301	4.043
1 year 30 minute winter	42.121	16.984	1 year 240 minute winter	10.165	4.043
1 year 60 minute summer	40.398	10.676	1 year 360 minute summer	11.775	3.030
1 year 60 minute winter	26.839	10.676	1 year 360 minute winter	7.654	3.030
1 year 120 minute summer	24.980	6.602	1 year 480 minute summer	9.342	2.469
1 year 120 minute winter	16.596	6.602	1 year 480 minute winter	6.207	2.469



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Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
1 year 600 minute summer	7.682	2.101	5 year 960 minute summer	8.430	2.220
1 year 600 minute winter	5.249	2.101	5 year 960 minute winter	5.584	2.220
1 year 720 minute summer	6.859	1.838	5 year 1440 minute summer	6.081	1.630
1 year 720 minute winter	4.609	1.838	5 year 1440 minute winter	4.087	1.630
1 year 960 minute summer	5.653	1.489	10 year 15 minute summer	179.310	50.739
1 year 960 minute winter	3.745	1.489	10 year 15 minute winter	125.832	50.739
1 year 1440 minute summer	4.127	1.106	10 year 30 minute summer	115.897	32.795
1 year 1440 minute winter	2.773	1.106	10 year 30 minute winter	81.331	32.795
2 year 15 minute summer	119.760	33.888	10 year 60 minute summer	77.042	20.360
2 year 15 minute winter	84.042	33.888	10 year 60 minute winter	51.185	20.360
2 year 30 minute summer	77.518	21.935	10 year 120 minute summer	46.688	12.338
2 year 30 minute winter	54.399	21.935	10 year 120 minute winter	31.019	12.338
2 year 60 minute summer	51.720	13.668	10 year 180 minute summer	35.513	9.139
2 year 60 minute winter	34.361	13.668	10 year 180 minute winter	23.084	9.139
2 year 120 minute summer	31.549	8.338	10 year 240 minute summer	27.879	7.368
2 year 120 minute winter	20.961	8.338	10 year 240 minute winter	18.522	7.368
2 year 180 minute summer	24.133	6.210	10 year 360 minute summer	21.070	5.422
2 year 180 minute winter	15.687	6.210	10 year 360 minute winter	13.696	5.422
2 year 240 minute summer	19.039	5.032	10 year 480 minute summer	16.473	4.353
2 year 240 minute winter	12.649	5.032	10 year 480 minute winter	10.944	4.353
2 year 360 minute summer	14.516	3.735	10 year 600 minute summer	13.418	3.670
2 year 360 minute winter	9.436	3.735	10 year 600 minute winter	9.168	3.670
2 year 480 minute summer	11.436	3.022	10 year 720 minute summer	11.912	3.193
2 year 480 minute winter	7.598	3.022	10 year 720 minute winter	8.006	3.193
2 year 600 minute summer	9.363	2.561	10 year 960 minute summer	9.726	2.561
2 year 600 minute winter	6.398	2.561	10 year 960 minute winter	6.442	2.561
2 year 720 minute summer	8.339	2.235	10 year 1440 minute summer	6.999	1.876
2 year 720 minute winter	5.605	2.235	10 year 1440 minute winter	4.704	1.876
2 year 960 minute summer	6.846	1.803	30 year 15 minute summer	226.195	64.005
2 year 960 minute winter	4.535	1.803	30 year 15 minute winter	158.733	64.005
2 year 1440 minute summer	4.967	1.331	30 year 30 minute summer	147.452	41.724
2 year 1440 minute winter	3.338	1.331	30 year 30 minute winter	103.475	41.724
5 year 15 minute summer	155.864	44.104	30 year 60 minute summer	98.615	26.061
5 year 15 minute winter	109.378	44.104	30 year 60 minute winter	65.517	26.061
5 year 30 minute summer	100.117	28.330	30 year 120 minute summer	59.946	15.842
5 year 30 minute winter	70.257	28.330	30 year 120 minute winter	39.827	15.842
5 year 60 minute summer	66.258	17.510	30 year 180 minute summer	45.598	11.734
5 year 60 minute winter	44.020	17.510	30 year 180 minute winter	29.640	11.734
5 year 120 minute summer	40.063	10.587	30 year 240 minute summer	35.759	9.450
5 year 120 minute winter	26.617	10.587	30 year 240 minute winter	23.758	9.450
5 year 180 minute summer	30.473	7.842	30 year 360 minute summer	26.939	6.932
5 year 180 minute winter	19.808	7.842	30 year 360 minute winter	17.511	6.932
5 year 240 minute summer	23.940	6.327	30 year 480 minute summer	20.981	5.545
5 year 240 minute winter	15.905	6.327	30 year 480 minute winter	13.940	5.545
5 year 360 minute summer	18.136	4.667	30 year 600 minute summer	17.039	4.661
5 year 360 minute winter	11.789	4.667	30 year 600 minute winter	11.642	4.661
5 year 480 minute summer	14.219	3.758	30 year 720 minute summer	15.093	4.045
5 year 480 minute winter	9.447	3.758	30 year 720 minute winter	10.143	4.045
5 year 600 minute summer	11.603	3.174	30 year 960 minute summer	12.278	3.233
5 year 600 minute winter	7.928	3.174	30 year 960 minute winter	8.133	3.233
5 year 720 minute summer	10.310	2.763	30 year 1440 minute summer	8.788	2.355
5 year 720 minute winter	6.929	2.763	30 year 1440 minute winter	5.906	2.355

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
100 year 15 minute summer	291.766	82.560	100 year +40% CC 15 minute summer	408.473	115.584
100 year 15 minute winter	204.748	82.560	100 year +40% CC 15 minute winter	286.647	115.584
100 year 30 minute summer	191.982	54.324	100 year +40% CC 30 minute summer	268.775	76.054
100 year 30 minute winter	134.724	54.324	100 year +40% CC 30 minute winter	188.614	76.054
100 year 60 minute summer	129.253	34.158	100 year +40% CC 60 minute summer	180.954	47.821
100 year 60 minute winter	85.873	34.158	100 year +40% CC 60 minute winter	120.222	47.821
100 year 120 minute summer	78.836	20.834	100 year +40% CC 120 minute summer	110.370	29.168
100 year 120 minute winter	52.377	20.834	100 year +40% CC 120 minute winter	73.327	29.168
100 year 180 minute summer	59.966	15.431	100 year +40% CC 180 minute summer	83.953	21.604
100 year 180 minute winter	38.980	15.431	100 year +40% CC 180 minute winter	54.572	21.604
100 year 240 minute summer	46.975	12.414	100 year +40% CC 240 minute summer	65.765	17.380
100 year 240 minute winter	31.209	12.414	100 year +40% CC 240 minute winter	43.693	17.380
100 year 360 minute summer	35.264	9.075	100 year +40% CC 360 minute summer	49.370	12.705
100 year 360 minute winter	22.923	9.075	100 year +40% CC 360 minute winter	32.092	12.705
100 year 480 minute summer	27.350	7.228	100 year +40% CC 480 minute summer	38.291	10.119
100 year 480 minute winter	18.171	7.228	100 year +40% CC 480 minute winter	25.439	10.119
100 year 600 minute summer	22.137	6.055	100 year +40% CC 600 minute summer	30.992	8.477
100 year 600 minute winter	15.126	6.055	100 year +40% CC 600 minute winter	21.176	8.477
100 year 720 minute summer	19.562	5.243	100 year +40% CC 720 minute summer	27.387	7.340
100 year 720 minute winter	13.147	5.243	100 year +40% CC 720 minute winter	18.406	7.340
100 year 960 minute summer	15.851	4.174	100 year +40% CC 960 minute summer	22.191	5.844
100 year 960 minute winter	10.500	4.174	100 year +40% CC 960 minute winter	14.700	5.844
100 year 1440 minute summer	11.278	3.023	100 year +40% CC 1440 minute summer	15.789	4.232
100 year 1440 minute winter	7.579	3.023	100 year +40% CC 1440 minute winter	10.611	4.232

**Results for 1 year Critical Storm Duration. Lowest mass balance: 99.08%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	EXSW01a	10	57.471	0.071	13.4	0.0800	0.0000	OK
15 minute summer	EXSW01	11	56.808	0.088	13.2	0.0994	0.0000	OK
15 minute summer	EXSW02	11	56.759	0.129	17.4	0.1459	0.0000	OK
15 minute summer	SW01	10	57.458	0.058	6.0	0.0092	0.0000	OK
15 minute summer	SW02	10	57.233	0.060	5.9	0.0096	0.0000	OK
15 minute summer	SW03	10	57.064	0.042	7.6	0.0066	0.0000	OK
15 minute summer	SW04jct	11	56.750	0.136	25.0	0.0000	0.0000	OK
15 minute summer	SW05	11	56.704	0.133	28.9	0.1500	0.0000	OK
30 minute summer	SW06	22	56.645	0.185	37.3	8.6291	0.0000	OK
15 minute summer	SW07a	12	58.127	0.027	2.3	0.0301	0.0000	OK
30 minute summer	SW07	22	56.635	0.306	27.8	0.3463	0.0000	SURCHARGED
15 minute summer	EXSW03a	10	56.915	0.115	14.9	0.1306	0.0000	OK
15 minute summer	SW08	11	56.693	0.128	22.9	0.1449	0.0000	OK
30 minute summer	SW09	22	56.627	0.278	21.2	0.3150	0.0000	OK
30 minute summer	SW10	22	56.625	0.352	37.3	0.6216	0.0000	SURCHARGED
15 minute summer	EXSW04	10	57.010	0.050	8.2	0.0564	0.0000	OK
15 minute summer	EXSW05	12	56.377	0.147	49.1	0.1666	0.0000	OK
30 minute summer	EXSW06	20	56.059	0.139	48.4	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	EXSW01a	1.000	EXSW01	13.2	1.092	0.217	0.6175	
15 minute summer	EXSW01	1.001	EXSW02	13.1	0.691	0.307	0.2532	
15 minute summer	EXSW02	1.002	SW04jct	17.4	0.582	0.269	0.1396	
15 minute summer	SW01	2.000	SW02	5.9	0.927	0.299	0.1165	
15 minute summer	SW02	2.001	SW03	5.9	1.117	0.294	0.0638	
15 minute summer	SW03	2.002	SW04jct	7.6	0.719	0.167	0.0657	
15 minute summer	SW04jct	1.003	SW05	25.0	0.822	0.393	0.3935	
15 minute summer	SW05	1.004	SW06	28.7	1.117	0.374	0.7423	
30 minute summer	SW06	1.005	SW07	23.3	0.549	0.365	2.2827	
15 minute summer	SW07a	3.000	SW07	2.3	1.342	0.154	0.1283	
30 minute summer	SW07	1.006	SW10	26.7	0.398	0.420	1.1924	
15 minute summer	EXSW03a	4.000	SW08	14.6	1.044	0.868	0.2491	
15 minute summer	SW08	4.001	SW09	23.0	1.005	0.578	0.6873	
30 minute summer	SW09	4.002	SW10	21.1	0.551	0.251	0.9171	
30 minute summer	SW10	Orifice	EXSW05	37.3				
30 minute summer	SW10	Orifice	EXSW05	0.0				
15 minute summer	EXSW04	5.000	EXSW05	8.1	0.509	0.061	1.0697	
15 minute summer	EXSW05	1.008	EXSW06	48.3	1.461	0.447	1.0845	39.8

**Results for 2 year Critical Storm Duration. Lowest mass balance: 99.08%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	EXSW01a	10	57.481	0.081	17.4	0.0918	0.0000	OK
15 minute summer	EXSW01	11	56.825	0.105	17.2	0.1185	0.0000	OK
15 minute summer	EXSW02	11	56.782	0.152	22.6	0.1725	0.0000	OK
15 minute summer	SW01	10	57.467	0.067	7.8	0.0106	0.0000	OK
15 minute summer	SW02	10	57.243	0.070	7.7	0.0111	0.0000	OK
15 minute summer	SW03	10	57.070	0.048	10.0	0.0076	0.0000	OK
15 minute summer	SW04jct	11	56.773	0.159	32.4	0.0000	0.0000	OK
30 minute summer	SW05	23	56.734	0.163	33.6	0.1840	0.0000	OK
30 minute summer	SW06	22	56.734	0.274	48.5	12.8142	0.0000	OK
15 minute summer	SW07a	12	58.131	0.031	3.0	0.0345	0.0000	OK
30 minute summer	SW07	22	56.718	0.389	30.1	0.4396	0.0000	SURCHARGED
15 minute summer	EXSW03a	11	56.981	0.181	19.2	0.2049	0.0000	SURCHARGED
30 minute summer	SW08	21	56.740	0.175	27.6	0.1981	0.0000	OK
30 minute summer	SW09	21	56.710	0.361	28.5	0.4087	0.0000	SURCHARGED
30 minute summer	SW10	22	56.705	0.432	41.9	0.7626	0.0000	SURCHARGED
15 minute summer	EXSW04	10	57.017	0.057	10.7	0.0642	0.0000	OK
15 minute summer	EXSW05	11	56.392	0.162	59.1	0.1836	0.0000	OK
15 minute summer	EXSW06	12	56.072	0.152	56.5	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	EXSW01a	1.000	EXSW01	17.2	1.154	0.282	0.7645	
15 minute summer	EXSW01	1.001	EXSW02	17.0	0.723	0.399	0.3124	
15 minute summer	EXSW02	1.002	SW04jct	22.6	0.612	0.349	0.1721	
15 minute summer	SW01	2.000	SW02	7.7	0.989	0.389	0.1419	
15 minute summer	SW02	2.001	SW03	7.6	1.196	0.383	0.0775	
15 minute summer	SW03	2.002	SW04jct	9.9	0.787	0.219	0.0712	
15 minute summer	SW04jct	1.003	SW05	32.4	0.867	0.509	0.4837	
30 minute summer	SW05	1.004	SW06	33.9	0.977	0.440	1.2260	
30 minute summer	SW06	1.005	SW07	28.2	0.550	0.443	2.7163	
15 minute summer	SW07a	3.000	SW07	3.0	1.401	0.201	0.1331	
30 minute summer	SW07	1.006	SW10	31.0	0.440	0.488	1.1924	
15 minute summer	EXSW03a	4.000	SW08	18.6	1.067	1.105	0.2961	
30 minute summer	SW08	4.001	SW09	28.5	0.987	0.717	0.8745	
30 minute summer	SW09	4.002	SW10	27.4	0.584	0.327	0.9317	
30 minute summer	SW10	Orifice	EXSW05	42.0				
30 minute summer	SW10	Orifice	EXSW05	0.0				
15 minute summer	EXSW04	5.000	EXSW05	10.5	0.536	0.079	1.2431	
15 minute summer	EXSW05	1.008	EXSW06	56.5	1.523	0.522	1.2179	51.5

**Results for 5 year Critical Storm Duration. Lowest mass balance: 99.08%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	EXSW01a	10	57.494	0.094	22.6	0.1059	0.0000	OK
30 minute summer	EXSW01	23	56.863	0.143	19.9	0.1620	0.0000	OK
30 minute summer	EXSW02	23	56.863	0.233	26.2	0.2632	0.0000	OK
15 minute summer	SW01	10	57.478	0.078	10.1	0.0124	0.0000	OK
15 minute summer	SW02	10	57.254	0.081	10.0	0.0129	0.0000	OK
15 minute summer	SW03	10	57.077	0.055	13.0	0.0087	0.0000	OK
30 minute summer	SW04jct	23	56.862	0.248	37.6	0.0000	0.0000	OK
30 minute summer	SW05	23	56.860	0.289	43.3	0.3271	0.0000	OK
30 minute summer	SW06	23	56.854	0.394	62.2	18.4195	0.0000	SURCHARGED
15 minute summer	SW07a	12	58.135	0.035	3.8	0.0391	0.0000	OK
30 minute summer	SW07	22	56.833	0.504	34.2	0.5697	0.0000	SURCHARGED
15 minute summer	EXSW03a	11	57.235	0.435	25.0	0.4925	0.0000	SURCHARGED
30 minute summer	SW08	20	56.908	0.343	34.8	0.3878	0.0000	SURCHARGED
30 minute summer	SW09	21	56.827	0.478	33.6	0.5411	0.0000	SURCHARGED
30 minute summer	SW10	22	56.818	0.545	47.9	0.9632	0.0000	SURCHARGED
15 minute summer	EXSW04	10	57.025	0.065	13.9	0.0731	0.0000	OK
15 minute summer	EXSW05	12	56.409	0.179	67.0	0.2027	0.0000	OK
15 minute summer	EXSW06	12	56.087	0.167	66.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	EXSW01a	1.000	EXSW01	22.3	1.209	0.367	0.9642	
30 minute summer	EXSW01	1.001	EXSW02	19.5	0.734	0.458	0.4438	
30 minute summer	EXSW02	1.002	SW04jct	26.0	0.623	0.401	0.2822	
15 minute summer	SW01	2.000	SW02	10.0	1.051	0.504	0.1730	
15 minute summer	SW02	2.001	SW03	9.9	1.276	0.497	0.0940	
15 minute summer	SW03	2.002	SW04jct	12.9	0.934	0.285	0.0743	
30 minute summer	SW04jct	1.003	SW05	37.3	0.882	0.585	0.8527	
30 minute summer	SW05	1.004	SW06	42.3	0.991	0.550	1.6136	
30 minute summer	SW06	1.005	SW07	32.1	0.548	0.504	2.7736	
15 minute summer	SW07a	3.000	SW07	3.8	1.397	0.255	0.1381	
30 minute summer	SW07	1.006	SW10	34.7	0.493	0.547	1.1924	
15 minute summer	EXSW03a	4.000	SW08	23.6	1.343	1.404	0.3127	
30 minute summer	SW08	4.001	SW09	33.6	0.990	0.847	0.9536	
30 minute summer	SW09	4.002	SW10	32.2	0.624	0.384	0.9317	
30 minute summer	SW10	Orifice	EXSW05	47.9				
30 minute summer	SW10	Orifice	EXSW05	0.0				
15 minute summer	EXSW04	5.000	EXSW05	13.7	0.564	0.103	1.4084	
15 minute summer	EXSW05	1.008	EXSW06	66.0	1.572	0.610	1.3782	67.0



Results for 10 year Critical Storm Duration. Lowest mass balance: 99.08%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	EXSW01a	10	57.501	0.101	26.0	0.1145	0.0000	OK
30 minute summer	EXSW01	23	56.966	0.246	23.1	0.2780	0.0000	SURCHARGED
30 minute summer	EXSW02	23	56.962	0.332	30.3	0.3754	0.0000	SURCHARGED
15 minute summer	SW01	10	57.486	0.086	11.6	0.0136	0.0000	OK
15 minute summer	SW02	10	57.262	0.089	11.5	0.0141	0.0000	OK
15 minute summer	SW03	10	57.081	0.059	14.9	0.0094	0.0000	OK
30 minute summer	SW04jct	23	56.961	0.347	43.2	0.0000	0.0000	SURCHARGED
30 minute summer	SW05	23	56.959	0.388	49.5	0.4390	0.0000	SURCHARGED
30 minute summer	SW06	23	56.953	0.493	71.7	23.0414	0.0000	SURCHARGED
15 minute summer	SW07a	12	58.137	0.037	4.4	0.0422	0.0000	OK
30 minute summer	SW07	22	56.927	0.598	37.4	0.6769	0.0000	SURCHARGED
15 minute summer	EXSW03a	11	57.435	0.635	28.8	0.7177	0.0000	SURCHARGED
15 minute summer	SW08	12	57.028	0.463	43.2	0.5240	0.0000	SURCHARGED
30 minute summer	SW09	22	56.920	0.571	38.2	0.6459	0.0000	SURCHARGED
30 minute summer	SW10	22	56.911	0.638	52.5	1.1276	0.0000	SURCHARGED
15 minute summer	EXSW04	10	57.029	0.069	16.0	0.0784	0.0000	OK
15 minute summer	EXSW05	12	56.423	0.193	73.5	0.2181	0.0000	OK
15 minute summer	EXSW06	12	56.099	0.179	73.6	0.0000	0.0000	OK
Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	EXSW01a	1.000	EXSW01	25.7	1.233	0.422	1.1757	
30 minute summer	EXSW01	1.001	EXSW02	22.5	0.744	0.528	0.5315	
30 minute summer	EXSW02	1.002	SW04jct	29.8	0.629	0.461	0.3285	
15 minute summer	SW01	2.000	SW02	11.5	1.084	0.579	0.1929	
15 minute summer	SW02	2.001	SW03	11.4	1.319	0.572	0.1043	
15 minute summer	SW03	2.002	SW04jct	14.8	1.051	0.327	0.0763	
30 minute summer	SW04jct	1.003	SW05	42.5	0.891	0.667	0.9099	
30 minute summer	SW05	1.004	SW06	45.1	0.999	0.587	1.6226	
30 minute summer	SW06	1.005	SW07	35.4	0.547	0.556	2.7736	
15 minute summer	SW07a	3.000	SW07	4.4	1.453	0.295	0.1417	
30 minute summer	SW07	1.006	SW10	38.1	0.541	0.600	1.1924	
15 minute summer	EXSW03a	4.000	SW08	27.0	1.533	1.603	0.3127	
15 minute summer	SW08	4.001	SW09	41.8	1.098	1.052	0.9536	
30 minute summer	SW09	4.002	SW10	37.2	0.625	0.443	0.9317	
30 minute summer	SW10	Orifice	EXSW05	52.4				
30 minute summer	SW10	Orifice	EXSW05	0.0				
15 minute summer	EXSW04	5.000	EXSW05	15.7	0.579	0.119	1.5200	
15 minute summer	EXSW05	1.008	EXSW06	73.6	1.605	0.681	1.5004	77.2



Results for 30 year Critical Storm Duration. Lowest mass balance: 99.08%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	EXSW01a	10	57.516	0.116	32.8	0.1311	0.0000	OK
30 minute summer	EXSW01	23	57.185	0.465	29.4	0.5255	0.0000	SURCHARGED
30 minute summer	EXSW02	23	57.179	0.549	35.7	0.6213	0.0000	SURCHARGED
15 minute summer	SW01	10	57.501	0.101	14.7	0.0160	0.0000	OK
15 minute summer	SW02	10	57.276	0.103	14.6	0.0164	0.0000	OK
30 minute summer	SW03	23	57.186	0.164	17.2	0.0261	0.0000	SURCHARGED
30 minute summer	SW04jct	23	57.179	0.565	50.7	0.0000	0.0000	SURCHARGED
30 minute summer	SW05	23	57.175	0.604	57.8	0.6833	0.0000	SURCHARGED
30 minute summer	SW06	23	57.167	0.707	81.0	33.0219	0.0000	SURCHARGED
15 minute summer	SW07a	12	58.143	0.043	5.6	0.0482	0.0000	OK
30 minute summer	SW07	23	57.133	0.804	43.4	0.9096	0.0000	SURCHARGED
15 minute summer	EXSW03a	11	57.904	1.104	36.3	1.2486	0.0000	SURCHARGED
30 minute summer	SW08	20	57.297	0.732	49.7	0.8274	0.0000	SURCHARGED
30 minute summer	SW09	22	57.130	0.781	48.2	0.8832	0.0000	SURCHARGED
30 minute summer	SW10	22	57.114	0.841	61.3	1.4860	0.0000	SURCHARGED
15 minute summer	EXSW04	10	57.038	0.078	20.1	0.0881	0.0000	OK
15 minute summer	EXSW05	12	56.447	0.217	87.0	0.2450	0.0000	OK
15 minute summer	EXSW06	12	56.120	0.200	86.4	0.0000	0.0000	OK
Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	EXSW01a	1.000	EXSW01	32.4	1.280	0.533	1.4885	
30 minute summer	EXSW01	1.001	EXSW02	25.8	0.746	0.606	0.5315	
30 minute summer	EXSW02	1.002	SW04jct	34.4	0.637	0.532	0.3285	
15 minute summer	SW01	2.000	SW02	14.6	1.140	0.733	0.2322	
15 minute summer	SW02	2.001	SW03	14.4	1.344	0.724	0.1397	
30 minute summer	SW03	2.002	SW04jct	16.7	1.131	0.369	0.1117	
30 minute summer	SW04jct	1.003	SW05	48.9	0.897	0.767	0.9099	
30 minute summer	SW05	1.004	SW06	50.8	1.008	0.661	1.6226	
30 minute summer	SW06	1.005	SW07	40.9	0.582	0.643	2.7736	
15 minute summer	SW07a	3.000	SW07	5.6	1.405	0.375	0.1487	
30 minute summer	SW07	1.006	SW10	44.2	0.628	0.696	1.1924	
15 minute summer	EXSW03a	4.000	SW08	32.5	1.845	1.929	0.3127	
30 minute summer	SW08	4.001	SW09	48.2	1.211	1.212	0.9536	
30 minute summer	SW09	4.002	SW10	46.4	0.659	0.552	0.9317	
30 minute summer	SW10	Orifice	EXSW05	61.1				
30 minute summer	SW10	Orifice	EXSW05	0.0				
15 minute summer	EXSW04	5.000	EXSW05	19.8	0.612	0.150	1.7633	
15 minute summer	EXSW05	1.008	EXSW06	86.4	1.656	0.799	1.7063	97.5

**Results for 100 year Critical Storm Duration. Lowest mass balance: 99.08%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute summer	EXSW01a	20	57.548	0.148	38.2	0.1671	0.0000	OK
30 minute summer	EXSW01	23	57.497	0.777	37.5	0.8783	0.0000	SURCHARGED
30 minute summer	EXSW02	24	57.489	0.859	42.9	0.9716	0.0000	SURCHARGED
30 minute summer	SW01	20	57.604	0.204	17.1	0.0324	0.0000	SURCHARGED
30 minute summer	SW02	21	57.524	0.351	17.4	0.0558	0.0000	SURCHARGED
30 minute summer	SW03	23	57.500	0.478	21.5	0.0760	0.0000	SURCHARGED
30 minute summer	SW04jct	24	57.488	0.874	57.1	0.0000	0.0000	SURCHARGED
30 minute summer	SW05	24	57.484	0.913	66.9	1.0325	0.0000	SURCHARGED
30 minute summer	SW06	24	57.473	1.013	110.8	47.3606	0.0000	SURCHARGED
30 minute summer	SW07a	21	58.151	0.051	7.3	0.0581	0.0000	OK
30 minute summer	SW07	23	57.435	1.106	51.5	1.2507	0.0000	SURCHARGED
15 minute summer	EXSW03a	11	58.580	1.780	46.9	2.0132	0.3229	FLOOD
30 minute summer	SW08	20	57.719	1.154	63.7	1.3048	0.0000	SURCHARGED
30 minute summer	SW09	22	57.434	1.085	61.6	1.2272	0.0000	SURCHARGED
30 minute summer	SW10	23	57.406	1.133	72.3	2.0028	0.0000	SURCHARGED
15 minute summer	EXSW04	10	57.049	0.089	26.0	0.1005	0.0000	OK
30 minute summer	EXSW05	19	56.488	0.258	104.5	0.2913	0.0000	OK
30 minute summer	EXSW06	19	56.151	0.231	103.5	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
30 minute summer	EXSW01a	1.000	EXSW01	37.5	1.266	0.615	1.6728	
30 minute summer	EXSW01	1.001	EXSW02	30.0	0.754	0.704	0.5315	
30 minute summer	EXSW02	1.002	SW04jct	40.6	0.640	0.627	0.3285	
30 minute summer	SW01	2.000	SW02	17.4	1.172	0.875	0.3200	
30 minute summer	SW02	2.001	SW03	16.3	1.337	0.821	0.2124	
30 minute summer	SW03	2.002	SW04jct	19.9	1.226	0.438	0.1117	
30 minute summer	SW04jct	1.003	SW05	55.3	0.892	0.867	0.9099	
30 minute summer	SW05	1.004	SW06	64.6	1.062	0.841	1.6226	
30 minute summer	SW06	1.005	SW07	48.8	0.693	0.766	2.7736	
30 minute summer	SW07a	3.000	SW07	7.2	1.250	0.482	0.1605	
30 minute summer	SW07	1.006	SW10	52.4	0.744	0.825	1.1924	
15 minute summer	EXSW03a	4.000	SW08	39.3	2.232	2.334	0.3127	
30 minute summer	SW08	4.001	SW09	61.6	1.548	1.549	0.9536	
30 minute summer	SW09	4.002	SW10	59.3	0.842	0.706	0.9317	
30 minute summer	SW10	Orifice	EXSW05	72.1				
30 minute summer	SW10	Orifice	EXSW05	0.0				
15 minute summer	EXSW04	5.000	EXSW05	25.7	0.663	0.194	2.0894	
30 minute summer	EXSW05	1.008	EXSW06	103.5	1.692	0.957	2.0042	166.3

**Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.08%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute summer	EXSW01a	19	58.394	0.994	53.5	1.1243	0.0000	FLOOD RISK
30 minute summer	EXSW01	24	58.048	1.328	48.6	1.5021	0.0000	SURCHARGED
30 minute summer	EXSW02	24	58.046	1.416	62.2	1.6015	0.0000	SURCHARGED
30 minute summer	SW01	20	58.347	0.947	23.9	0.1505	0.0000	FLOOD RISK
30 minute summer	SW02	21	58.155	0.982	20.1	0.1562	0.0000	SURCHARGED
30 minute summer	SW03	24	58.062	1.040	22.9	0.1654	0.0000	SURCHARGED
30 minute summer	SW04jct	24	58.047	1.433	77.9	0.0000	0.0000	SURCHARGED
30 minute summer	SW05	24	58.045	1.474	89.9	1.6672	0.0000	SURCHARGED
30 minute summer	SW06	24	58.022	1.562	150.0	70.1897	0.0000	SURCHARGED
30 minute summer	SW07a	22	58.382	0.282	10.2	0.3187	0.0000	SURCHARGED
30 minute summer	SW07	24	57.965	1.636	61.8	1.8500	0.0000	SURCHARGED
15 minute summer	EXSW03a	9	58.580	1.780	65.6	2.0132	6.4561	FLOOD
30 minute summer	SW08	22	58.212	1.647	70.1	1.8631	0.0000	SURCHARGED
30 minute summer	SW09	24	57.936	1.587	66.9	1.9419	0.0000	SURCHARGED
30 minute summer	SW10	24	57.916	1.643	88.8	2.9040	0.0000	SURCHARGED
15 minute summer	EXSW04	10	57.066	0.106	36.4	0.1199	0.0000	OK
30 minute summer	EXSW05	19	56.681	0.451	128.0	0.5103	0.0000	SURCHARGED
30 minute summer	EXSW06	19	56.189	0.269	126.4	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
30 minute summer	EXSW01a	1.000	EXSW01	48.6	1.267	0.798	1.9743	
30 minute summer	EXSW01	1.001	EXSW02	44.4	1.117	1.044	0.5315	
30 minute summer	EXSW02	1.002	SW04jct	58.1	0.824	0.897	0.3285	
30 minute summer	SW01	2.000	SW02	20.1	1.175	1.012	0.3200	
30 minute summer	SW02	2.001	SW03	16.3	1.324	0.820	0.2124	
30 minute summer	SW03	2.002	SW04jct	20.3	1.261	0.446	0.1117	
30 minute summer	SW04jct	1.003	SW05	75.1	1.067	1.179	0.9099	
30 minute summer	SW05	1.004	SW06	86.8	1.232	1.129	1.6226	
30 minute summer	SW06	1.005	SW07	60.4	0.859	0.949	2.7736	
30 minute summer	SW07a	3.000	SW07	9.7	1.294	0.653	0.2115	
30 minute summer	SW07	1.006	SW10	63.6	0.903	1.001	1.1924	
15 minute summer	EXSW03a	4.000	SW08	40.3	2.288	2.392	0.3127	
30 minute summer	SW08	4.001	SW09	66.9	1.683	1.684	0.9536	
30 minute summer	SW09	4.002	SW10	63.7	0.905	0.758	0.9317	
30 minute summer	SW10	Orifice	EXSW05	87.5				
30 minute summer	SW10	Orifice	EXSW05	0.0				
15 minute summer	EXSW04	5.000	EXSW05	36.0	0.737	0.273	2.3972	
30 minute summer	EXSW05	1.008	EXSW06	126.4	1.797	1.169	2.2405	227.1