



# technical note

Grasmere Gardens,  
Chestfield, Kent

CCE/S102/PL/TN/0002

10.06.21

For Kent County Council

## Document Review Sheet

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<b>Reference</b>	<b>Date</b>	<b>Author</b>	<b>Checked</b>
CCE/S102/PL/TN/002	10.06.21	RW	JM

This technical note provides the formal response to comments received from Kent County Council on the 15.04.21 (**Appendix A**) by their Sustainable Drainage Team. It should be noted that informal responses were provided by Cannon Consulting Engineers on 13.05.21, and these are re-included below for complete clarity.

**Comment A** - The submission includes plan drawings, modelled drainage results and a drainage schematic. The node and link/pipe numbering are not fully consistent which leads to some difficulty in cross-referencing connectivity and network representation to confirm that the plan drawings represent the network model in the report. It would be recommended that the schematic be annotated with the plan drawing pipe numbers for easier cross-referencing. A portion of the schematic is also not visible (page 50).

The site layouts with pipe numbers have been provided within the following drawings within report *CCE-S102-PL-RP-01-P06*:

S102-PL-DR-200-P03 Surface Water Layout Sheet 1 of 3

S102-PL-DR-201-P03 Surface Water Layout Sheet 2 of 3

S102-PL-DR-202-P03 Surface Water Layout Sheet 3 of 3

**Comment B** - From initial assessment it appears that the operation of the system as shown within the modelled results is appropriate, though the drainage is modified from the originally submitted scheme but is consistent with the overall approach. However, as results are shown for the critical storm duration for each node, without the full network model it is difficult to understand the overall network operation. It would be beneficial if the network simulation solely for the 15-minute summer storm could be provided for the 1 in 30 year and 1 in 100 year plus 20% climate change events.

The 15min summer simulation results are provided within **Appendix B** of this technical note.

**Comment C** - The drainage system has been designed to criteria agreed with KCC Flood and Water Management team. The current modelled results show that a staged 2 discharge from the site controls surface water for the 1 in 2 year rainfall event to 11.5 l/s, for the 1 in 30 year to 30.1 l/s and for the 1 in 100 year plus 20% climate change to 45/1 l/s. These rates are within the 4 l/s/ha rate as required by Canterbury City Council but it also provides greater control for the more frequent rainfall events and manages potential impacts on Swalecliffe Brook.

Noted.

**Comment D** - We would enquire as to the purpose for pipe 49.003 as it parallels the system in the highway (pipe no. 10.014, 10.015, 10.016, Surface Water Layout Sheet 2) and would appear to have relative invert levels which would enable discharge to 10.014. There is a lack of clarity as to the connectivity of Link 30.001 (Pipe 49.003) which connects to Node 202 and basin node 89. Node 202

**has both an online and offline orifice control. We would recommend that detail of this connection is provided.**

Pipe label 49.003 has been updated correctly on plan to 30.001.

The area around nodes 200 and 203 are located in the low spot of the site. Attenuation provided at nodes 200 and 203 was insufficient to contain all flood water and as such, it was necessary to convey water from this area to a larger attenuation facility. In this case, additional attenuation was provided in the main basin (Node 89). The use of the pipe linking node 201 to 202 (pipe 30.001 formerly 49.003) was therefore required to convey water to the basin. Connection of an outfall to the closer manholes 33 or 34 was not possible as it connected the wider network to the low spot and therefore created significant flooding.

In an attempt to remove the need for pipe 30.001, we have maximised the size of the main basin (node 89) to provide additional storage. To remove the extended length of pipe 49.003 we have also connected nodes 200 and 203 etc. to node 34. This was only possible at invert to invert. We have also modified orifice controls and provided an additional 100mm height to the basin top level.

It should be noted that the use of offline orifices is a particular function of the software which allows flows to ignore storage provided by the downstream pipes.

**Comment E - The public have raised concerns in relation to the flood levels in the Swalecliffe Brook and the proposed developments impact on these levels and vice versa. The network model utilises a surcharged outfall water level of 9.14m which is very conservative, over the life time of the development. The modelled results demonstrate that the drainage system will retain the development generated surface water with limited overflow for the 1 in 100 year plus 40% climate change event. Given that the surcharge is maintained for the full modelled event, the likelihood of the overflow occurring is lower than presented.**

Noted.

**Comment F - The designer has utilised orifice controls throughout the drainage system to retain water within the system and make use of its full volume. There are a number of orifices which are extremely small, less than 5 cm in diameter, which are usually located below geocellular systems but in some instances may be downstream of open attenuation (e.g. Node 16). It is usual that we would recommend a larger minimum diameter; however, in this instance if the orifices are below structures which will control debris and other material from blocking the orifice then the risk may be mitigated. We would recommend that the applicant reviews the locations of orifices less than or equal to 5 cm to ensure that blockage will not present a problem.**

We have upsized all orifices serving open attenuation features to a minimum of 75mm. On running the amended model we have the following results at the main basin (Node 89):

- 1 in 100 year plus 20% climate change – Water Level 9.60 (500mm Freeboard)
- 1 in 100 year plus 40% climate change - Water Level 9.95 (100mm Freeboard)

**Comment G** - It should be noted that the network model accounts for the 12.32 ha of catchment areas as defined in section 2.1.1 of the Surface Water Technical Note. The node contributing areas were added to confirm that all areas have been included in the analysis.

Noted.

**Comment H** - No general arrangements or details have been provided for any of the structures. It would be beneficial if cross section of the pond with geo-cellular crates including the location of inlets and outfalls and freeboard. The cross-sections should be provided on both axis and include an extent beyond the basin area to include adjacent ground levels. The details for other drainage measures should also be provided. We would recommend detail is provided to demonstrate how the above storage and below ground attenuation will operate.

Basin cross-sections are provided in drawing S102-PL-DR-700-P01, Typical Basins and Tank Sections, within report *CCE-S102-PL-RP-01-P06*.

**Comment I** - The requirements of Condition 17 also include information in relation to the ordinary watercourses adjacent to the site. We would recommend that information on the proposed changes to the watercourses is also submitted for this application.

The proposed changes are provided in the following drawings within report *CCE-S102-PL-RP-01-P06*:

S102-DA-DR-001-A02 Site Access Ditch Sections  
S102-DA-DR-002-A02 Site Access Ditch Sections  
S102-DA-DR-003-A02 Location Plan  
S102-DA-DR-004-A02 Site Access Ditch Plan  
S102-DA-DR-005-A02 Site Access Ditch Construction Detail

## **Appendix A – Kent County Council Comments**



**Joanna Dymowska**  
**Canterbury City Council**  
Planning Department  
Military Road,  
Canterbury  
CT1 1YW

**Flood and Water Management**  
Invicta House  
Maidstone  
Kent  
ME14 1XX

**Website:** [www.kent.gov.uk/flooding](http://www.kent.gov.uk/flooding)  
**Email:** [suds@kent.gov.uk](mailto:suds@kent.gov.uk)  
**Tel:** 03000 41 41 41  
**Our Ref:** CCC/2021/083370  
**Date:** 15 April 2021

**Application No:** CA/21/00486

**Location:** Grasmere Gardens, Land South Of The Ridgeway, Chestfield

**Proposal:** Details submitted pursuant to condition 17 (surface water drainage) of planning permission CA/17/00469/OUT

Thank you for your consultation on the above referenced planning application.

This planning application is supported by Surface Water Technical Note prepared by Cannon Consulting (February 2021). The report includes a drainage network model which assesses the operation of the drainage system under normal conditions and with a surcharged outfall in Swalecliffe Brook. A flood level of 9.14m has been used in the surcharged scenario.

Kent County Council as Lead Local Flood Authority have the following comments:

- a) The submission includes plan drawings, modelled drainage results and a drainage schematic. The node and link/pipe numbering are not fully consistent which leads to some difficulty in cross-referencing connectivity and network representation to confirm that the plan drawings represent the network model in the report. It would be recommended that the schematic be annotated with the plan drawing pipe numbers for easier cross-referencing. A portion of the schematic is also not visible (page 50).
- b) From initial assessment it appears that the operation of the system as shown within the modelled results is appropriate, though the drainage is modified from the originally submitted scheme but is consistent with the overall approach. However, as results are shown for the critical storm duration for each node, without the full network model it is difficult to understand the overall network operation. It would be beneficial if the network simulation solely for the 15-minute summer storm could be provided for the 1 in 30 year and 1 in 100 year plus 20% climate change events.
- c) The drainage system has been designed to criteria agreed with KCC Flood and Water Management team. The current modelled results show that a staged

discharge from the site controls surface water for the 1 in 2 year rainfall event to 11.5 l/s, for the 1 in 30 year to 30.1 l/s and for the 1 in 100 year plus 20% climate change to 45/1 l/s. These rates are within the 4 l/s/ha rate as required by Canterbury City Council but it also provides greater control for the more frequent rainfall events and manages potential impacts on Swalecliffe Brook.

- d) We would enquire as to the purpose for pipe 49.003 as it parallels the system in the highway (pipe no. 10.014, 10.015, 10.016, Surface Water Layout Sheet 2) and would appear to have relative invert levels which would enable discharge to 10.014. There is a lack of clarity as to the connectivity of Link 30.001 (Pipe 49.003) which connects to Node 202 and basin node 89. Node 202 has both an online and offline orifice control. We would recommend that detail of this connection is provided.
- e) The public have raised concerns in relation to the flood levels in the Swalecliffe Brook and the proposed developments impact on these levels and vice versa. The network model utilises a surcharged outfall water level of 9.14m which is very conservative, over the life time of the development. The modelled results demonstrate that the drainage system will retain the development generated surface water with limited overflow for the 1 in 100 year plus 40% climate change event. Given that the surcharge is maintained for the full modelled event, the likelihood of the overflow occurring is lower than presented.
- f) The designer has utilised orifice controls throughout the drainage system to retain water within the system and make use of its full volume. There are a number of orifices which are extremely small, less than 5 cm in diameter, which are usually located below geocellular systems but in some instances may be downstream of open attenuation (e.g. Node 16). It is usual that we would recommend a larger minimum diameter; however, in this instance if the orifices are below structures which will control debris and other material from blocking the orifice then the risk may be mitigated. We would recommend that the applicant reviews the locations of orifices less than or equal to 5 cm to ensure that blockage will not present a problem.
- g) It should be noted that the network model accounts for the 12.32 ha of catchment areas as defined in section 2.1.1 of the Surface Water Technical Note. The node contributing areas were added to confirm that all areas have been included in the analysis.
- h) No general arrangements or details have been provided for any of the structures. It would be beneficial if cross section of the pond with geocellular crates including the location of inlets and outfalls and freeboard. The cross-sections should be provided on both axis and include an extent beyond the basin area to include adjacent ground levels. The details for other drainage measures should also be provided. We would recommend detail is provided to demonstrate how the above storage and below ground attenuation will operate.



- i) The requirements of Condition 17 also include information in relation to the ordinary watercourses adjacent to the site. We would recommend that information on the proposed changes to the watercourses is also submitted for this application.

We would recommend that further information is provided to respond to the comments above before the condition is approved.

The comments above represent an initial review of the submission. Given the drainage scheme complexity and the information requested other matters may arise upon further review.

This response has been provided using the best knowledge and information submitted as part of the planning application at the time of responding and is reliant on the accuracy of that information.

Yours faithfully,

**Bronwyn Buntine**

Sustainable Drainage Team Leader  
Flood and Water Management

## **Appendix B – 15min Simulation Results**

**Design Settings**

Rainfall Methodology	FEH-13	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	40	Minimum Backdrop Height (m)	0.200
CV	0.950	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	x
Maximum Rainfall (mm/hr)	50.0		

**Simulation Settings**

Rainfall Methodology	FEH-13	Drain Down Time (mins)	60	5 year (l/s)	5.0
Summer CV	0.800	Additional Storage (m <sup>3</sup> /ha)	20.0	Check Discharge Volume	x
Analysis Speed	Detailed	Check Discharge Rate(s)	✓		
Skip Steady State	✓	2 year (l/s)	3.4		

**Storm Durations**

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Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
30	0	0	0
100	20	0	0

**Pre-development Discharge Rate**

Site Makeup	Greenfield	Growth Factor 2 year	0.88
Greenfield Method	IH124	Growth Factor 5 year	1.28
Positively Drained Area (ha)	1.000	Betterment (%)	0
SAAR (mm)	585	QBar	3.9
Soil Index	4	Q 2 year (l/s)	3.4
SPR	0.47	Q 5 year (l/s)	5.0
Region	7		

**Results for 30 year 15 minute summer. 75 minute analysis at 1 minute timestep. Mass balance: 99.84%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	13	16.639	0.989	27.3	5.1313	0.0000	SURCHARGED
15 minute summer	2	10	15.916	0.092	41.3	0.2622	0.0000	OK
15 minute summer	3	10	15.138	0.214	59.7	0.2869	0.0000	OK
15 minute summer	4	10	16.108	0.073	23.0	0.1524	0.0000	OK
15 minute summer	5	10	15.288	0.115	39.4	0.2007	0.0000	OK
15 minute summer	6	10	14.959	0.171	112.3	0.2815	0.0000	OK
15 minute summer	7	10	14.523	0.111	33.1	0.2757	0.0000	OK
15 minute summer	8	10	14.392	0.315	171.2	0.7191	0.0000	OK
15 minute summer	9	15	15.647	1.115	33.4	9.6784	0.0000	SURCHARGED
15 minute summer	10	11	14.218	0.213	184.3	0.3646	0.0000	OK
15 minute summer	11	10	13.829	0.078	9.3	0.1194	0.0000	OK
15 minute summer	12	11	13.471	0.238	200.9	0.3985	0.0000	OK
15 minute summer	13	14	14.254	0.977	33.4	7.3749	0.0000	SURCHARGED
15 minute summer	14	11	12.749	0.254	246.8	0.6823	0.0000	OK
15 minute summer	15	10	12.354	0.058	8.3	0.0873	0.0000	OK
15 minute summer	16	19	12.997	0.047	3.4	1.2558	0.0000	OK
15 minute summer	17	11	11.772	0.322	290.9	0.7980	0.0000	OK
15 minute summer	18	14	12.991	1.069	33.1	7.0222	0.0000	SURCHARGED
15 minute summer	19	11	11.314	0.273	313.5	0.4933	0.0000	OK
15 minute summer	20	10	11.776	0.045	7.2	0.1040	0.0000	OK
15 minute summer	21	13	11.550	0.050	4.3	1.0365	0.0000	OK
15 minute summer	22	11	10.563	0.309	333.4	0.5697	0.0000	OK
15 minute summer	23	20	10.520	0.070	120.4	51.9158	0.0000	OK
15 minute summer	24	12	9.977	0.188	6.8	0.2695	0.0000	OK
15 minute summer	25	12	9.971	0.255	334.6	0.3648	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	3	11.4	1.611	0.117	0.3061	
15 minute summer	2	2.000	3	41.1	2.171	0.357	0.3486	
15 minute summer	3	1.001	6	59.1	1.249	0.833	1.5738	
15 minute summer	4	3.000	5	22.9	1.457	0.231	0.3794	
15 minute summer	5	3.001	6	39.0	2.071	0.422	0.1867	
15 minute summer	6	1.002	8	111.7	2.209	0.563	1.0210	
15 minute summer	7	4.000	8	32.8	0.857	0.295	1.0898	
15 minute summer	8	1.003	10	170.4	2.059	1.000	0.8090	
15 minute summer	9	5.000	10	6.5	0.978	0.110	0.2268	
15 minute summer	10	1.004	12	185.0	2.674	0.556	1.9391	
15 minute summer	11	6.000	12	9.1	0.997	0.513	0.2686	
15 minute summer	12	1.005	14	202.0	2.639	0.653	2.3756	
15 minute summer	13	7.000	14	11.2	1.330	0.459	0.2507	
15 minute summer	14	1.006	17	247.7	3.353	0.679	2.0025	
15 minute summer	15	8.000	17	8.2	1.324	0.301	0.1452	
15 minute summer	16	9.000	17	1.1	1.409	0.002	0.0091	
15 minute summer	17	1.007	19	291.4	2.621	0.724	2.9400	
15 minute summer	18	10.000	19	11.7	1.396	0.458	0.2368	
15 minute summer	19	1.008	22	313.7	2.904	0.594	3.2132	
15 minute summer	20	11.000	22	7.1	1.594	0.192	0.1229	
15 minute summer	21	12.000	22	1.2	0.838	0.002	0.4026	
15 minute summer	22	1.009	25	334.6	3.400	0.637	2.0703	
15 minute summer	23	13.000	24	0.2	0.631	0.001	0.0176	
15 minute summer	24	13.001	25	-6.7	0.284	-0.060	0.5988	
15 minute summer	25	1.010	27	324.0	4.334	0.322	1.0963	

**Results for 30 year 15 minute summer. 75 minute analysis at 1 minute timestep. Mass balance: 99.84%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	26	15	11.392	0.570	33.4	8.5270	0.0000	FLOOD RISK
15 minute summer	27	12	9.586	0.861	367.4	2.2452	0.0000	SURCHARGED
15 minute summer	28	10	9.455	0.055	10.4	0.0856	0.0000	OK
15 minute summer	29	19	8.832	0.032	64.6	24.1268	0.0000	OK
15 minute summer	30	12	9.269	0.534	34.3	0.6043	0.0000	SURCHARGED
15 minute summer	31	12	9.340	1.123	375.1	3.1844	0.0000	SURCHARGED
15 minute summer	32	12	9.293	1.346	355.5	4.1027	0.0000	SURCHARGED
15 minute summer	33	12	8.326	0.406	374.1	1.2716	0.0000	OK
15 minute summer	34	12	8.273	0.467	402.7	1.6144	0.0000	OK
15 minute summer	35	12	8.174	0.577	446.7	2.2012	0.0000	OK
15 minute summer	36	75	10.187	1.537	120.2	102.5476	0.0000	SURCHARGED
15 minute summer	37	13	8.104	0.553	485.7	1.8468	0.0000	OK
15 minute summer	38	13	7.983	0.482	512.5	1.5901	0.0000	OK
15 minute summer	39	13	7.884	0.456	530.2	1.3477	0.0000	OK
15 minute summer	40	13	7.761	0.363	532.8	0.9245	0.0000	OK
15 minute summer	41	10	11.541	0.150	88.1	0.6060	0.0000	OK
15 minute summer	42	10	10.398	0.104	24.4	0.2065	0.0000	OK
15 minute summer	43	11	10.155	0.415	156.5	1.2271	0.0000	OK
15 minute summer	44	10	10.109	0.456	280.9	2.3186	0.0000	OK
15 minute summer	45	9	9.970	1.448	334.0	3.1932	0.0000	SURCHARGED
15 minute summer	46	15	11.590	0.152	40.6	13.9066	0.0000	OK
15 minute summer	47	18	11.164	0.181	62.7	23.7901	0.0000	OK
15 minute summer	48	36	10.996	0.158	39.3	17.0121	0.0000	OK
15 minute summer	49	53	8.809	0.209	424.5	121.2894	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	26	14.000	27	8.5	2.211	0.157	0.2001	
15 minute summer	27	1.011	31	357.9	2.105	0.704	7.0468	
15 minute summer	28	15.000	31	10.3	1.079	0.289	0.3038	
15 minute summer	29	16.000	30	-35.7	-1.414	-0.894	0.2343	
15 minute summer	30	16.001	31	-34.3	-0.863	-0.862	0.4581	
15 minute summer	31	1.012	32	339.7	1.180	0.749	6.8022	
15 minute summer	32	1.013	33	353.8	1.173	0.547	7.5987	
15 minute summer	33	1.014	34	368.5	1.220	0.262	6.9320	
15 minute summer	34	1.015	35	398.0	1.460	0.558	4.8169	
15 minute summer	35	1.016	37	437.3	1.046	0.681	18.2191	
15 minute summer	36	17.000	37	24.7	1.048	0.622	0.4369	
15 minute summer	37	1.017	38	483.5	1.282	0.753	17.8888	
15 minute summer	38	1.018	39	515.4	1.544	0.395	5.6517	
15 minute summer	39	1.019	40	532.8	1.899	0.604	4.2544	
15 minute summer	40	1.020	89	291.7	1.345	0.329	2.4965	
15 minute summer	40	Orifice	89	242.4				231.8
15 minute summer	41	18.000	43	86.7	2.532	0.471	2.0927	
15 minute summer	42	19.000	43	24.1	1.411	0.391	0.3373	
15 minute summer	43	18.001	44	174.6	1.310	0.804	7.7333	
15 minute summer	44	18.002	45	318.5	1.715	0.488	12.6679	
15 minute summer	45	18.003	50	391.9	1.814	0.511	2.7883	
15 minute summer	46	20.000	47	7.9	1.084	0.123	0.1461	
15 minute summer	47	20.001	48	11.3	0.454	0.098	1.2814	
15 minute summer	48	20.002	49	9.4	1.583	0.022	0.1769	
15 minute summer	49	20.003	50	-419.4	-2.801	-0.403	1.2917	

**Results for 30 year 15 minute summer. 75 minute analysis at 1 minute timestep. Mass balance: 99.84%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	50	9	9.949	1.749	411.1	3.9646	0.0000	SURCHARGED
15 minute summer	51	10	9.307	0.095	12.6	0.1564	0.0000	OK
15 minute summer	52	10	8.205	0.071	26.7	0.1252	0.0000	OK
15 minute summer	53	10	10.163	0.107	18.0	0.1716	0.0000	OK
15 minute summer	54	10	9.781	0.088	30.0	0.1264	0.0000	OK
15 minute summer	55	75	8.889	0.489	247.5	182.9245	0.0000	SURCHARGED
15 minute summer	56	11	7.980	0.114	64.7	0.2966	0.0000	OK
15 minute summer	57	10	16.503	0.112	39.2	0.2968	0.0000	OK
15 minute summer	58	10	16.307	0.130	57.3	0.2334	0.0000	OK
15 minute summer	59	10	16.023	0.147	92.5	0.3614	0.0000	OK
15 minute summer	60	11	15.386	0.351	130.8	0.9593	0.0000	OK
15 minute summer	61	17	16.524	0.874	48.2	16.8258	0.0000	SURCHARGED
15 minute summer	62	11	15.093	0.293	132.2	0.4195	0.0000	OK
15 minute summer	63	18	16.086	0.513	82.0	30.1524	0.0000	SURCHARGED
15 minute summer	64	12	14.537	0.195	137.2	0.3451	0.0000	OK
15 minute summer	65	10	16.891	0.238	70.5	0.9227	0.0000	OK
15 minute summer	66	15	18.406	1.020	51.4	13.9634	0.0000	SURCHARGED
15 minute summer	67	11	16.645	0.163	80.3	0.2331	0.0000	OK
15 minute summer	68	10	16.427	0.209	129.6	0.5502	0.0000	OK
15 minute summer	69	10	15.711	0.078	11.1	0.1498	0.0000	OK
15 minute summer	70	11	15.551	0.271	162.5	0.6331	0.0000	OK
15 minute summer	71	26	14.443	0.343	300.4	127.6515	0.0000	SURCHARGED
15 minute summer	72	11	14.001	0.101	42.5	0.1989	0.0000	OK
15 minute summer	73	10	13.397	0.125	53.2	0.4001	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	50	18.004	52	15.0	0.826	0.044	0.2422	
15 minute summer	51	21.000	52	12.3	1.068	0.693	0.3590	
15 minute summer	52	18.005	56	26.8	1.073	0.040	0.3597	
15 minute summer	53	22.000	54	17.8	1.463	0.781	0.2690	
15 minute summer	54	22.001	56	29.7	2.857	0.593	0.1927	
15 minute summer	55	23.000	56	7.8	1.410	0.084	0.0403	
15 minute summer	56	18.006	89	22.5	0.641	0.051	0.9961	
15 minute summer	56	Orifice	89	42.4				64.5
15 minute summer	57	24.000	58	39.0	1.471	0.248	0.2856	
15 minute summer	58	24.001	59	56.9	1.790	0.329	0.3975	
15 minute summer	59	24.002	60	92.0	2.049	0.490	1.3691	
15 minute summer	60	24.003	62	127.6	1.320	1.109	4.5480	
15 minute summer	61	25.000	62	4.8	1.054	0.058	0.0136	
15 minute summer	62	24.004	64	131.4	1.309	0.708	3.4846	
15 minute summer	63	26.000	64	6.1	2.625	0.075	0.0112	
15 minute summer	64	24.005	71	136.8	3.166	0.457	0.7737	
15 minute summer	65	27.000	67	69.2	1.390	0.978	2.0612	
15 minute summer	66	28.000	67	11.5	1.274	0.166	0.2071	
15 minute summer	67	27.001	68	80.5	1.782	0.434	0.4363	
15 minute summer	68	27.002	70	129.5	2.145	0.809	2.7071	
15 minute summer	69	29.000	70	11.0	0.804	0.538	0.2752	
15 minute summer	70	27.003	71	163.6	1.993	0.818	1.6827	
15 minute summer	71	24.006	72	24.3	2.097	0.205	0.0489	
15 minute summer	72	24.007	121	41.5	2.435	0.404	0.5733	
15 minute summer	73	31.000	74	52.2	1.939	0.342	1.2278	

**Results for 30 year 15 minute summer. 75 minute analysis at 1 minute timestep. Mass balance: 99.84%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	74	11	12.486	0.220	85.3	0.6248	0.0000	OK
15 minute summer	75	20	12.644	0.115	115.0	48.7370	0.0000	OK
15 minute summer	76	11	12.248	0.218	85.9	0.3116	0.0000	OK
15 minute summer	77	20	12.163	0.098	76.2	32.2942	0.0000	OK
15 minute summer	78	11	12.049	0.176	86.9	0.2522	0.0000	OK
15 minute summer	79	10	14.620	0.120	57.5	0.3626	0.0000	OK
15 minute summer	80	11	13.975	0.366	91.3	0.8538	0.0000	SURCHARGED
15 minute summer	81	19	14.132	0.123	69.4	28.9986	0.0000	OK
15 minute summer	82	11	13.640	0.219	89.5	0.2477	0.0000	OK
15 minute summer	83	20	13.334	0.093	79.4	33.9948	0.0000	OK
15 minute summer	84	12	13.106	0.145	88.7	0.1639	0.0000	OK
15 minute summer	85	10	17.175	0.175	47.1	0.4821	0.0000	OK
15 minute summer	86	10	16.985	0.144	100.4	0.4445	0.0000	OK
15 minute summer	87	11	16.214	0.364	169.3	1.1900	0.0000	OK
15 minute summer	88	11	15.952	0.352	165.9	0.5033	0.0000	OK
15 minute summer	89	75	7.408	0.258	612.1	441.4951	0.0000	OK
15 minute summer	90	75	7.398	0.290	41.2	0.7371	0.0000	OK
15 minute summer	91_OUT	1	6.828	0.000	41.2	0.0000	0.0000	OK
15 minute summer	92	19	15.637	0.919	142.0	54.8954	0.0000	SURCHARGED
15 minute summer	93	18	14.941	0.727	54.6	20.6741	0.0000	SURCHARGED
15 minute summer	94	18	15.264	0.714	176.3	71.9388	0.0000	SURCHARGED
15 minute summer	95	17	13.973	0.076	30.8	0.1395	0.0000	OK
15 minute summer	96	10	13.192	0.113	45.7	0.3684	0.0000	OK

  

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	74	31.001	76	84.8	1.163	0.458	3.5403	
15 minute summer	75	32.000	76	1.6	1.187	0.011	0.0045	
15 minute summer	76	31.002	78	86.1	1.291	0.463	3.1354	
15 minute summer	77	33.000	78	1.1	0.564	0.018	0.0099	
15 minute summer	78	31.003	55	86.2	3.309	0.107	0.6160	
15 minute summer	79	34.000	80	57.1	1.149	0.343	1.9287	
15 minute summer	80	34.001	82	88.3	1.307	1.247	2.8786	
15 minute summer	81	35.000	82	1.6	0.910	0.017	0.0093	
15 minute summer	82	34.002	84	88.4	1.988	0.795	2.0365	
15 minute summer	83	36.000	84	0.5	0.739	0.004	0.0221	
15 minute summer	84	34.003	121	89.0	2.783	0.415	0.3125	
15 minute summer	85	37.000	86	46.5	1.224	0.613	1.2898	
15 minute summer	86	37.001	87	99.7	2.135	0.472	1.3106	
15 minute summer	87	37.002	88	165.9	1.535	0.987	3.8295	
15 minute summer	88	37.003	94	166.1	1.634	1.177	1.0087	
15 minute summer	89	38.000	90	41.2	0.533	0.372	1.1661	
15 minute summer	90	Hydro-Brake®	91_OUT	41.2				145.3
15 minute summer	92	39.000	95	7.0	0.989	0.051	0.5613	
15 minute summer	93	40.000	95	3.5	0.705	0.073	0.1408	
15 minute summer	94	41.000	95	20.1	2.087	0.543	0.1131	
15 minute summer	94	Weir	115	0.0				0.0
15 minute summer	95	39.001	115	30.8	1.128	0.133	0.2945	
15 minute summer	96	42.000	98	45.2	1.844	0.512	1.2186	

**Results for 30 year 15 minute summer. 75 minute analysis at 1 minute timestep. Mass balance: 99.84%**

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
15 minute summer	97	10	12.228	0.059	7.2	0.0936	0.0000	OK
15 minute summer	98	10	11.940	0.250	69.3	0.4335	0.0000	OK
15 minute summer	99	19	11.741	0.442	99.2	39.7651	0.0000	SURCHARGED
15 minute summer	100	18	12.396	0.640	106.4	40.7630	0.0000	SURCHARGED
15 minute summer	101	75	12.220	0.791	55.3	29.3314	0.0000	SURCHARGED
15 minute summer	102	75	11.151	0.101	37.4	0.2638	0.0000	OK
15 minute summer	103	10	11.687	0.121	46.7	0.3590	0.0000	OK
15 minute summer	104	10	10.807	0.070	7.5	0.0995	0.0000	OK
15 minute summer	105	10	10.596	0.146	69.9	0.2303	0.0000	OK
15 minute summer	106	10	14.603	0.108	42.1	0.2952	0.0000	OK
15 minute summer	107	10	13.410	0.091	11.5	0.1480	0.0000	OK
15 minute summer	108	10	13.176	0.139	68.5	0.2264	0.0000	OK
15 minute summer	109	75	10.181	0.220	106.4	22.7322	0.0000	OK
15 minute summer	110	18	11.142	0.869	105.7	37.9894	0.0000	SURCHARGED
15 minute summer	111	75	10.420	0.520	60.7	15.3203	0.0000	SURCHARGED
15 minute summer	112	75	10.187	0.507	102.8	0.9311	0.0000	OK
15 minute summer	113	19	13.910	0.953	122.6	48.3523	0.0000	SURCHARGED
15 minute summer	114	19	13.441	0.784	84.5	33.2694	0.0000	FLOOD RISK
15 minute summer	115	65	13.186	0.406	66.5	38.1809	0.0000	SURCHARGED
15 minute summer	116	64	12.530	0.101	30.9	0.2645	0.0000	OK
15 minute summer	117	20	13.363	0.076	108.9	46.4889	0.0000	OK
15 minute summer	118	21	13.148	0.025	1.0	0.0281	0.0000	OK
Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
15 minute summer	97	43.000	98	7.1	0.966	0.325	0.2046	
15 minute summer	98	42.001	123	68.2	1.198	1.181	0.8301	
15 minute summer	99	44.000	102	3.3	0.533	0.045	0.2630	
15 minute summer	100	45.000	102	5.8	1.079	0.082	0.1847	
15 minute summer	101	46.000	102	28.6	1.624	1.553	0.2693	
15 minute summer	101	Weir	111	0.0				0.0
15 minute summer	102	44.001	111	37.3	0.805	0.152	0.6141	
15 minute summer	103	53.000	105	46.3	1.889	0.568	1.1184	
15 minute summer	104	54.000	105	7.4	0.921	0.420	0.1722	
15 minute summer	105	53.001	55	69.1	2.680	0.662	0.2256	
15 minute summer	106	55.000	108	41.4	2.247	0.444	0.7985	
15 minute summer	107	56.000	108	11.3	1.040	0.636	0.2258	
15 minute summer	108	55.001	121	68.2	2.771	0.628	0.2488	
15 minute summer	109	47.000	112	60.4	1.070	0.546	3.7296	
15 minute summer	110	48.000	112	8.7	0.990	0.073	1.2182	
15 minute summer	111	49.000	112	35.9	0.953	0.289	1.8071	
15 minute summer	111	Weir	36	0.0				0.0
15 minute summer	112	47.001	36	102.9	1.168	0.447	2.8277	
15 minute summer	113	50.000	116	5.0	0.823	0.043	0.2536	
15 minute summer	114	51.000	116	3.6	0.540	0.051	0.2515	
15 minute summer	115	52.000	116	22.4	1.332	1.061	0.2444	
15 minute summer	115	Weir	101	0.0				0.0
15 minute summer	116	50.001	101	30.9	0.710	0.167	0.5791	
15 minute summer	117	57.000	118	1.0	0.439	0.008	0.0352	
15 minute summer	118	57.001	16	1.0	0.380	0.014	0.0296	



**Results for 30 year 15 minute summer. 75 minute analysis at 1 minute timestep. Mass balance: 99.84%**

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
15 minute summer	119	20	11.842	0.059	129.1	55.5388	0.0000	OK
15 minute summer	120	41	11.534	0.463	1.4	0.6629	0.0000	OK
15 minute summer	121	75	12.393	0.779	196.5	117.3632	0.0000	SURCHARGED
15 minute summer	122	11	11.737	0.182	68.8	0.5280	0.0000	OK
15 minute summer	123	18	10.587	0.437	136.8	47.7883	0.0000	SURCHARGED
15 minute summer	200	25	8.148	0.148	17.1	7.9342	0.0000	OK
15 minute summer	201	24	8.145	0.245	4.7	0.2768	0.0000	SURCHARGED
15 minute summer	203	18	8.337	0.237	53.0	19.8918	0.0000	SURCHARGED
15 minute summer	204	10	8.664	0.098	31.3	0.2875	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
15 minute summer	119	59.000	120	0.4	0.390	0.003	0.2837	
15 minute summer	120	59.001	21	-1.1	0.223	-0.010	0.0317	
15 minute summer	121	60.000	122	17.3	1.024	0.190	0.3137	
15 minute summer	122	60.001	123	68.7	1.610	0.618	0.4045	
15 minute summer	123	61.000	55	27.9	2.064	0.301	0.1922	
15 minute summer	200	30.000	201	4.7	0.470	0.330	0.0431	
15 minute summer	201	30.001	34	-5.7	0.558	-0.691	0.7351	
15 minute summer	203	58.000	200	4.9	0.536	0.391	0.2462	
15 minute summer	204	62.000	203	31.2	2.425	0.657	0.0979	

**Results for 100 year +20% CC 15 minute summer. 75 minute analysis at 1 minute timestep. Mass balance: 99.74%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	14	16.695	1.045	42.0	10.0723	0.0000	SURCHARGED
15 minute summer	2	11	15.945	0.121	63.5	0.3424	0.0000	OK
15 minute summer	3	11	15.356	0.432	86.2	0.5806	0.0000	SURCHARGED
15 minute summer	4	10	16.127	0.092	35.4	0.1920	0.0000	OK
15 minute summer	5	11	15.332	0.159	60.6	0.2781	0.0000	OK
15 minute summer	6	11	15.139	0.351	164.5	0.5780	0.0000	SURCHARGED
15 minute summer	7	11	14.629	0.217	50.8	0.5413	0.0000	OK
15 minute summer	8	11	14.587	0.510	246.0	1.1664	0.0000	SURCHARGED
15 minute summer	9	17	15.719	1.187	51.4	16.7410	0.0000	SURCHARGED
15 minute summer	10	12	14.305	0.300	264.1	0.5127	0.0000	OK
15 minute summer	11	12	13.863	0.112	14.4	0.1705	0.0000	OK
15 minute summer	12	12	13.795	0.562	286.4	0.9412	0.0000	SURCHARGED
15 minute summer	13	15	14.311	1.034	51.4	13.7791	0.0000	FLOOD RISK
15 minute summer	14	12	13.089	0.594	345.1	1.5962	0.0000	SURCHARGED
15 minute summer	15	10	12.368	0.072	12.7	0.1080	0.0000	OK
15 minute summer	16	17	13.013	0.063	5.4	1.8435	0.0000	OK
15 minute summer	17	12	12.186	0.736	406.6	1.8245	0.0000	SURCHARGED
15 minute summer	18	15	13.047	1.125	50.8	13.2857	0.0000	FLOOD RISK
15 minute summer	19	12	11.703	0.662	409.6	1.1962	0.0000	SURCHARGED
15 minute summer	20	10	11.787	0.056	11.1	0.1285	0.0000	OK
15 minute summer	21	13	11.564	0.064	6.6	1.4544	0.0000	OK
15 minute summer	22	12	11.113	0.859	442.4	1.5834	0.0000	SURCHARGED
15 minute summer	23	20	10.558	0.108	185.1	79.8991	0.0000	OK
15 minute summer	24	12	10.610	0.822	30.8	1.1759	0.0000	SURCHARGED
15 minute summer	25	12	10.609	0.893	427.4	1.2775	0.0000	SURCHARGED

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	3	11.7	1.624	0.121	0.4412	
15 minute summer	2	2.000	3	63.2	2.162	0.549	0.5224	
15 minute summer	3	1.001	6	82.5	1.329	1.163	2.3302	
15 minute summer	4	3.000	5	35.2	1.587	0.356	0.5399	
15 minute summer	5	3.001	6	59.9	2.088	0.649	0.3456	
15 minute summer	6	1.002	8	160.8	2.286	0.810	1.4130	
15 minute summer	7	4.000	8	49.0	0.853	0.441	1.6243	
15 minute summer	8	1.003	10	245.9	2.306	1.444	1.0146	
15 minute summer	9	5.000	10	6.7	0.986	0.114	0.5051	
15 minute summer	10	1.004	12	261.7	2.738	0.786	2.8706	
15 minute summer	11	6.000	12	14.2	1.088	0.806	0.4678	
15 minute summer	12	1.005	14	279.2	2.686	0.903	3.4249	
15 minute summer	13	7.000	14	11.5	1.340	0.473	0.3885	
15 minute summer	14	1.006	17	337.4	3.398	0.926	2.9928	
15 minute summer	15	8.000	17	12.6	1.335	0.464	0.3052	
15 minute summer	16	9.000	17	1.7	1.602	0.003	0.2314	
15 minute summer	17	1.007	19	380.8	2.635	0.947	4.1978	
15 minute summer	18	10.000	19	12.0	1.405	0.471	0.3667	
15 minute summer	19	1.008	22	411.4	2.951	0.779	4.7005	
15 minute summer	20	11.000	22	11.0	1.743	0.298	0.3248	
15 minute summer	21	12.000	22	1.7	0.996	0.003	0.6141	
15 minute summer	22	1.009	25	427.4	3.483	0.813	3.2399	
15 minute summer	23	13.000	24	-4.8	0.680	-0.035	0.2589	
15 minute summer	24	13.001	25	32.5	0.295	0.292	1.0980	
15 minute summer	25	1.010	27	415.2	4.242	0.412	1.3838	

**Results for 100 year +20% CC 15 minute summer. 75 minute analysis at 1 minute timestep. Mass balance: 99.74%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	26	16	11.451	0.629	51.4	15.2651	0.0000	FLOOD RISK
15 minute summer	27	12	10.304	1.579	456.3	4.1200	0.0000	SURCHARGED
15 minute summer	28	12	10.036	0.636	16.0	0.9845	0.0000	SURCHARGED
15 minute summer	29	17	8.867	0.067	111.1	49.8987	0.0000	OK
15 minute summer	30	12	9.655	0.920	66.4	1.0400	0.0000	SURCHARGED
15 minute summer	31	12	9.903	1.686	478.4	4.7808	0.0000	SURCHARGED
15 minute summer	32	12	9.832	1.885	437.3	5.7468	0.0000	SURCHARGED
15 minute summer	33	12	8.432	0.512	465.0	1.6035	0.0000	OK
15 minute summer	34	12	8.396	0.590	514.0	2.0399	0.0000	OK
15 minute summer	35	12	8.305	0.708	586.9	2.7022	0.0000	OK
15 minute summer	36	75	10.251	1.601	160.1	106.8605	0.0000	SURCHARGED
15 minute summer	37	12	8.231	0.680	655.0	2.2679	0.0000	OK
15 minute summer	38	12	8.099	0.598	715.0	1.9737	0.0000	OK
15 minute summer	39	12	7.984	0.556	749.9	1.6436	0.0000	OK
15 minute summer	40	12	7.841	0.443	748.9	1.1282	0.0000	OK
15 minute summer	41	10	11.618	0.227	135.4	0.9186	0.0000	OK
15 minute summer	42	10	10.941	0.647	37.6	1.2904	0.0000	SURCHARGED
15 minute summer	43	10	10.831	1.091	244.6	3.2248	0.0000	SURCHARGED
15 minute summer	44	10	10.733	1.080	430.7	5.4949	0.0000	SURCHARGED
15 minute summer	45	10	10.194	1.672	485.2	3.6865	0.0000	SURCHARGED
15 minute summer	46	16	11.674	0.236	62.4	21.5871	0.0000	SURCHARGED
15 minute summer	47	18	11.261	0.278	97.9	36.5588	0.0000	OK
15 minute summer	48	40	11.075	0.237	62.3	25.6072	0.0000	OK
15 minute summer	49	75	8.938	0.338	549.2	196.2878	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	26	14.000	27	9.0	2.242	0.166	0.2015	
15 minute summer	27	1.011	31	456.5	2.113	0.899	7.0468	
15 minute summer	28	15.000	31	14.2	1.160	0.397	0.4553	
15 minute summer	29	16.000	30	-68.8	-2.508	-1.723	0.2696	
15 minute summer	30	16.001	31	-66.4	-1.669	-1.667	0.4581	
15 minute summer	31	1.012	32	413.2	1.178	0.911	6.8022	
15 minute summer	32	1.013	33	435.2	1.195	0.672	9.8113	
15 minute summer	33	1.014	34	463.6	1.241	0.329	9.2428	
15 minute summer	34	1.015	35	512.1	1.488	0.718	6.3680	
15 minute summer	35	1.016	37	585.4	1.116	0.911	22.8535	
15 minute summer	36	17.000	37	25.3	1.053	0.636	0.4442	
15 minute summer	37	1.017	38	651.9	1.366	1.016	22.7895	
15 minute summer	38	1.018	39	713.1	1.666	0.546	7.2671	
15 minute summer	39	1.019	40	748.9	2.073	0.849	5.4684	
15 minute summer	40	1.020	89	420.3	1.496	0.474	3.2309	
15 minute summer	40	Orifice	89	326.8				291.3
15 minute summer	41	18.000	43	134.6	2.528	0.732	3.3465	
15 minute summer	42	19.000	43	48.1	1.423	0.780	0.7184	
15 minute summer	43	18.001	44	271.5	1.447	1.249	9.2313	
15 minute summer	44	18.002	45	456.2	2.112	0.700	13.1849	
15 minute summer	45	18.003	50	498.3	2.307	0.649	2.7883	
15 minute summer	46	20.000	47	10.5	1.094	0.165	0.3222	
15 minute summer	47	20.001	48	15.3	0.428	0.133	2.0857	
15 minute summer	48	20.002	49	12.7	1.729	0.030	0.2183	
15 minute summer	49	20.003	50	-541.6	-3.531	-0.520	1.5836	

**Results for 100 year +20% CC 15 minute summer. 75 minute analysis at 1 minute timestep. Mass balance: 99.74%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	50	9	10.053	1.853	534.1	4.2009	0.0000	SURCHARGED
15 minute summer	51	11	9.360	0.148	19.3	0.2439	0.0000	OK
15 minute summer	52	10	8.214	0.080	33.7	0.1415	0.0000	OK
15 minute summer	53	11	10.378	0.322	27.6	0.5150	0.0000	SURCHARGED
15 minute summer	54	11	9.813	0.120	43.8	0.1712	0.0000	OK
15 minute summer	55	75	9.118	0.718	388.8	268.5547	0.0000	SURCHARGED
15 minute summer	56	11	8.002	0.136	88.5	0.3563	0.0000	OK
15 minute summer	57	10	16.538	0.147	60.2	0.3916	0.0000	OK
15 minute summer	58	10	16.353	0.177	88.0	0.3174	0.0000	OK
15 minute summer	59	11	16.146	0.270	141.9	0.6625	0.0000	OK
15 minute summer	60	11	15.695	0.660	197.5	1.8046	0.0000	SURCHARGED
15 minute summer	61	18	16.616	0.966	74.0	27.5393	0.0000	SURCHARGED
15 minute summer	62	11	15.201	0.401	199.7	0.5737	0.0000	OK
15 minute summer	63	18	16.158	0.585	126.0	48.5761	0.0000	SURCHARGED
15 minute summer	64	12	14.610	0.269	205.2	0.4747	0.0000	OK
15 minute summer	65	12	17.438	0.785	108.3	3.0482	0.0000	SURCHARGED
15 minute summer	66	16	18.479	1.093	79.0	24.5922	0.0000	FLOOD RISK
15 minute summer	67	12	17.105	0.623	105.6	0.8909	0.0000	SURCHARGED
15 minute summer	68	12	16.952	0.734	173.6	1.9322	0.0000	SURCHARGED
15 minute summer	69	11	15.862	0.229	17.1	0.4392	0.0000	SURCHARGED
15 minute summer	70	11	15.694	0.414	217.9	0.9678	0.0000	SURCHARGED
15 minute summer	71	22	14.609	0.509	420.2	189.4307	0.0000	SURCHARGED
15 minute summer	72	11	14.029	0.129	62.8	0.2537	0.0000	OK
15 minute summer	73	10	13.433	0.161	81.8	0.5179	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	50	18.004	52	15.6	0.852	0.046	0.2724	
15 minute summer	51	21.000	52	18.2	1.122	1.030	0.5184	
15 minute summer	52	18.005	56	33.6	1.066	0.050	0.4513	
15 minute summer	53	22.000	54	25.9	1.593	1.139	0.3623	
15 minute summer	54	22.001	56	43.9	3.051	0.877	0.2664	
15 minute summer	55	23.000	56	9.6	1.493	0.102	0.0467	
15 minute summer	56	18.006	89	33.2	0.716	0.075	1.3172	
15 minute summer	56	Orifice	89	55.8				78.2
15 minute summer	57	24.000	58	59.8	1.547	0.381	0.4172	
15 minute summer	58	24.001	59	87.2	1.786	0.504	0.6858	
15 minute summer	59	24.002	60	137.8	2.026	0.734	1.8528	
15 minute summer	60	24.003	62	194.9	1.773	1.693	5.0733	
15 minute summer	61	25.000	62	5.0	1.069	0.061	0.0141	
15 minute summer	62	24.004	64	199.0	1.474	1.072	4.6267	
15 minute summer	63	26.000	64	6.6	2.676	0.080	0.0157	
15 minute summer	64	24.005	71	204.2	3.194	0.682	1.0532	
15 minute summer	65	27.000	67	93.7	1.372	1.324	2.9413	
15 minute summer	66	28.000	67	11.9	1.287	0.172	0.3594	
15 minute summer	67	27.001	68	107.2	1.823	0.578	0.6720	
15 minute summer	68	27.002	70	170.7	2.424	1.066	3.1963	
15 minute summer	69	29.000	70	15.0	0.854	0.733	0.3605	
15 minute summer	70	27.003	71	216.0	2.035	1.080	2.1938	
15 minute summer	71	24.006	72	30.6	2.213	0.258	0.0636	
15 minute summer	72	24.007	121	62.5	2.690	0.608	0.7794	
15 minute summer	73	31.000	74	80.5	2.155	0.527	1.7022	

**Results for 100 year +20% CC 15 minute summer. 75 minute analysis at 1 minute timestep. Mass balance: 99.74%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	74	11	12.554	0.288	131.3	0.8179	0.0000	OK
15 minute summer	75	20	12.706	0.177	176.8	75.0833	0.0000	OK
15 minute summer	76	11	12.308	0.278	132.0	0.3975	0.0000	OK
15 minute summer	77	20	12.216	0.151	117.1	49.7457	0.0000	OK
15 minute summer	78	11	12.075	0.202	133.6	0.2890	0.0000	OK
15 minute summer	79	11	14.710	0.210	88.4	0.6358	0.0000	OK
15 minute summer	80	12	14.532	0.923	135.6	2.1554	0.0000	SURCHARGED
15 minute summer	81	19	14.198	0.189	106.6	44.7484	0.0000	OK
15 minute summer	82	12	13.894	0.473	124.4	0.5353	0.0000	SURCHARGED
15 minute summer	83	20	13.384	0.143	122.1	52.3544	0.0000	OK
15 minute summer	84	12	13.140	0.179	123.8	0.2028	0.0000	OK
15 minute summer	85	11	17.445	0.445	72.4	1.2217	0.0000	SURCHARGED
15 minute summer	86	11	17.301	0.460	147.4	1.4228	0.0000	SURCHARGED
15 minute summer	87	11	16.762	0.912	243.6	2.9806	0.0000	SURCHARGED
15 minute summer	88	11	16.112	0.512	241.2	0.7322	0.0000	SURCHARGED
15 minute summer	89	75	7.535	0.385	884.5	660.5043	0.0000	SURCHARGED
15 minute summer	90	75	7.524	0.416	45.3	1.0591	0.0000	SURCHARGED
15 minute summer	91_OUT	1	6.828	0.000	45.3	0.0000	0.0000	OK
15 minute summer	92	19	15.696	0.978	218.2	88.1290	0.0000	SURCHARGED
15 minute summer	93	19	14.985	0.771	84.0	33.0498	0.0000	FLOOD RISK
15 minute summer	94	18	15.658	1.108	259.0	113.5988	0.0000	SURCHARGED
15 minute summer	95	17	13.980	0.083	36.6	0.1527	0.0000	OK
15 minute summer	96	10	13.228	0.149	70.2	0.4848	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	74	31.001	76	130.5	1.312	0.704	4.8271	
15 minute summer	75	32.000	76	2.0	1.284	0.014	0.0142	
15 minute summer	76	31.002	78	132.5	1.543	0.712	4.0303	
15 minute summer	77	33.000	78	1.4	0.606	0.023	0.0192	
15 minute summer	78	31.003	55	133.1	3.730	0.166	0.8437	
15 minute summer	79	34.000	80	83.1	1.366	0.499	2.4571	
15 minute summer	80	34.001	82	122.8	1.744	1.734	3.2294	
15 minute summer	81	35.000	82	2.1	0.979	0.022	0.0311	
15 minute summer	82	34.002	84	123.3	2.077	1.110	2.6278	
15 minute summer	83	36.000	84	0.7	0.793	0.006	0.0372	
15 minute summer	84	34.003	121	123.7	2.992	0.577	0.4040	
15 minute summer	85	37.000	86	66.4	1.195	0.876	2.3866	
15 minute summer	86	37.001	87	141.6	2.136	0.671	1.8012	
15 minute summer	87	37.002	88	241.2	2.187	1.435	3.8969	
15 minute summer	88	37.003	94	240.8	2.184	1.707	1.0819	
15 minute summer	89	38.000	90	45.3	0.555	0.409	1.4951	
15 minute summer	90	Hydro-Brake®	91_OUT	45.3				167.9
15 minute summer	92	39.000	95	7.3	0.999	0.053	0.6169	
15 minute summer	93	40.000	95	3.6	0.711	0.075	0.1439	
15 minute summer	94	41.000	95	25.4	2.195	0.688	0.1362	
15 minute summer	94	Weir	115	0.0				0.0
15 minute summer	95	39.001	115	36.6	1.184	0.158	0.3340	
15 minute summer	96	42.000	98	69.6	1.875	0.788	1.5527	

**Results for 100 year +20% CC 15 minute summer. 75 minute analysis at 1 minute timestep. Mass balance: 99.74%**

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
15 minute summer	97	10	12.244	0.075	11.1	0.1194	0.0000	OK
15 minute summer	98	10	12.066	0.376	106.6	0.6519	0.0000	SURCHARGED
15 minute summer	99	19	11.789	0.490	152.5	62.6478	0.0000	SURCHARGED
15 minute summer	100	19	12.460	0.704	163.5	64.9515	0.0000	SURCHARGED
15 minute summer	101	75	12.408	0.979	82.3	36.3022	0.0000	SURCHARGED
15 minute summer	102	75	11.156	0.106	41.0	0.2768	0.0000	OK
15 minute summer	103	10	11.728	0.162	71.8	0.4815	0.0000	OK
15 minute summer	104	11	10.826	0.089	11.6	0.1267	0.0000	OK
15 minute summer	105	11	10.755	0.305	107.9	0.4821	0.0000	SURCHARGED
15 minute summer	106	10	14.637	0.142	64.6	0.3882	0.0000	OK
15 minute summer	107	10	13.450	0.131	17.7	0.2131	0.0000	OK
15 minute summer	108	10	13.240	0.203	105.3	0.3297	0.0000	OK
15 minute summer	109	75	10.246	0.285	163.5	62.4460	0.0000	OK
15 minute summer	110	18	11.225	0.952	162.4	62.0606	0.0000	SURCHARGED
15 minute summer	111	75	10.532	0.632	90.9	18.6239	0.0000	SURCHARGED
15 minute summer	112	75	10.251	0.571	124.6	1.0482	0.0000	SURCHARGED
15 minute summer	113	19	13.963	1.006	188.4	76.4883	0.0000	SURCHARGED
15 minute summer	114	19	13.486	0.829	129.8	52.6340	0.0000	FLOOD RISK
15 minute summer	115	75	13.370	0.590	96.8	55.5252	0.0000	SURCHARGED
15 minute summer	116	75	12.536	0.107	34.8	0.2805	0.0000	OK
15 minute summer	117	20	13.403	0.116	167.4	71.5628	0.0000	OK
15 minute summer	118	21	13.151	0.028	1.3	0.0320	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
15 minute summer	97	43.000	98	11.0	0.952	0.501	0.2866	
15 minute summer	98	42.001	123	105.1	1.506	1.820	0.9740	
15 minute summer	99	44.000	102	3.5	0.542	0.048	0.2735	
15 minute summer	100	45.000	102	6.1	1.095	0.086	0.1913	
15 minute summer	101	46.000	102	31.7	1.802	1.723	0.2693	
15 minute summer	101	Weir	111	0.0				0.0
15 minute summer	102	44.001	111	40.9	0.826	0.167	0.6564	
15 minute summer	103	53.000	105	71.5	2.000	0.877	1.6089	
15 minute summer	104	54.000	105	11.5	0.927	0.648	0.3027	
15 minute summer	105	53.001	55	102.2	2.795	0.979	0.3478	
15 minute summer	106	55.000	108	63.7	2.477	0.683	1.1130	
15 minute summer	107	56.000	108	17.3	1.108	0.977	0.3362	
15 minute summer	108	55.001	121	104.2	2.939	0.959	0.3580	
15 minute summer	109	47.000	112	72.2	1.125	0.654	4.2509	
15 minute summer	110	48.000	112	9.3	1.004	0.078	1.2514	
15 minute summer	111	49.000	112	41.8	1.014	0.337	1.9744	
15 minute summer	111	Weir	36	0.0				0.0
15 minute summer	112	47.001	36	124.6	1.238	0.542	2.8423	
15 minute summer	113	50.000	116	5.1	0.830	0.044	0.2587	
15 minute summer	114	51.000	116	3.7	0.545	0.053	0.2569	
15 minute summer	115	52.000	116	26.1	1.480	1.234	0.2476	
15 minute summer	115	Weir	101	0.0				0.0
15 minute summer	116	50.001	101	34.8	0.735	0.188	0.6300	
15 minute summer	117	57.000	118	1.3	0.468	0.011	0.0428	
15 minute summer	118	57.001	16	1.3	0.404	0.018	0.0370	

**Results for 100 year +20% CC 15 minute summer. 75 minute analysis at 1 minute timestep. Mass balance: 99.74%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	119	20	11.874	0.091	198.3	85.3958	0.0000	OK
15 minute summer	120	20	11.548	0.478	2.6	0.6835	0.0000	OK
15 minute summer	121	75	12.707	1.093	285.6	174.5060	0.0000	SURCHARGED
15 minute summer	122	11	11.802	0.247	104.2	0.7169	0.0000	OK
15 minute summer	123	18	10.837	0.687	207.9	75.0298	0.0000	SURCHARGED
15 minute summer	200	28	8.201	0.201	24.7	11.7294	0.0000	SURCHARGED
15 minute summer	201	28	8.196	0.296	5.3	0.3350	0.0000	SURCHARGED
15 minute summer	203	18	8.433	0.333	76.0	31.4879	0.0000	SURCHARGED
15 minute summer	204	11	8.929	0.363	48.1	1.0643	0.0000	SURCHARGED

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	119	59.000	120	0.5	0.254	0.004	0.2845	
15 minute summer	120	59.001	21	-2.2	-0.261	-0.019	0.0475	
15 minute summer	121	60.000	122	20.8	1.074	0.228	0.4737	
15 minute summer	122	60.001	123	103.5	1.742	0.930	0.5622	
15 minute summer	123	61.000	55	36.1	2.211	0.388	0.2319	
15 minute summer	200	30.000	201	5.3	0.465	0.372	0.0431	
15 minute summer	201	30.001	34	-6.9	0.541	-0.829	0.7351	
15 minute summer	203	58.000	200	5.4	0.531	0.436	0.3218	
15 minute summer	204	62.000	203	43.7	2.491	0.923	0.1169	