SURFACE WATER AND FOUL WATER

DRAINAGE STRATEGY

for

OAKMERE HOMES

PROPOSED RESIDENTIAL DEVELOPMENT

on

LAND AT CHATBURN ROAD

CLITHEROE

FEBRUARY 2018

CTC Infrastructure Limited

7 Hall Road, Fulwood, Preston, PR2 9QD

Mobile: 07970 265334 **Email: r.e.ford@virginmedia.com**

Company number: 9620365 VAT Reg. 215 5638 12

CONTENTS

1. INTRODUCTION

1.1 This drainage strategy is in support of a planning application for a residential development comprising 30 dwellings to be sited on land adjacent Chatburn Road, Clitheroe.

1.2 The site has an Outline Planning Permission, reference 3/2013/0981, which has been granted by Ribble Valley Borough Council.

1.3 A further planning application has been made, reference 3/2017/0653, for the erection of 28 dwellings.

1.4 Comments have been received from the Lead Local Flood Authority with regards the current application and this drainage strategy incorporates the comments made.

2. BASE INFORMATION

Existing site

2.1 The site comprises a green field to the north of Chatburn Road, Clitheroe. The development area is 1.47 hectares.

2.2 The site has a fall to the north towards the watercourse that runs within the site and parallel to its northern boundary.

Proposed development

2.3 The proposed development will comprise 30 residential dwellings.

Site geology

2.4 The online Soilscapes Viewer has identified the site lies in a region characterised by *slowly permeable seasonally wet slightly acid loamy and clayey soils with impeded drainage.*

2.5 The nature of the geology of the site means that infiltration back into the ground is not feasible. This has been confirmed by a site investigation that has been carried out on the site.

Understanding of existing drainage local to the site

2.6 Within the site and parallel to its northern boundary runs a watercourse that flows to the west.

2.7 The watercourse ultimately discharges into the River Ribble. The watercourse takes surface water runoff from the local area including the application site.

2.8 United Utilities sewer records show a public foul sewer within Chatburn Road that lies along the site's southern boundary.

3. PROPOSED DRAINAGE STRATEGY

3.1 The proposed surface and foul water drainage layout is included within Appendix A.

Surface Water Drainage

3.2 In accordance with the National Standards for Sustainable Drainage, the drainage strategy should incorporate the use of Sustainable Drainage (SUDS) where possible. The approach promotes the use infiltration features in the first instance. If drainage cannot be achieved solely through infiltration due to site conditions or contamination risks, the preferred options are (in order of preference):

(i) a controlled discharge to a local waterbody or watercourse, or

(ii) a controlled discharge into the public sewer network (depending on availability and capacity).

3.3 The rate and volume of discharge should be restricted to the pre-development values as far as practicable.

Surface water drainage discharges from the developed site

3.4 The nature of the geology of the site means that infiltration back into the ground is not feasible. This has been confirmed by a site investigation that has been carried out on the site.

3.5 In line with common practice, surface water runoff from the proposed development should mimic those from the existing site. It is therefore intended that surface water runoff from the developed site will be attenuated and discharge into the watercourse that flows parallel to the northern boundary of the site.

3.6 The flow from the development will be controlled to pre-development runoff rates allowing surface water runoff generated by all rainfall events up to the 100 year critical rain storm plus 30% on stored volumes to discharge into the watercourse. The additional 30% is to allow for climate change and has been included in the surface water volume.

3.7 Greenfield runoff rates have been calculated using the Causeway Flow programme for the development area of 1.47 hectares. The figures are as follows:

- Qbar – 13.9 l/s
- Q1 – 12.1 l/s
- Q100 – 28.9 l/s

3.8 The following design criteria have been applied to the surface water drainage design:

- An additional 10% has been added to the areas when designing the pipe network to allow for development creep;
- The surface water drainage network has been designed such that the peak surface water runoff for the 1 in 1 and the 1 in 100 year rainfall event will not exceed the pre-development Greenfield runoff rate for the same event.
- No flooding from sewers for 1 in 30 year.
- No risk of flooding to the site or downstream from the site between 1 in 1 year and up to 1 in 100 year plus 30% for climate change.
- The FSR method has been used as the site is a small catchment, rather that the FEH method, which is used for large catchments.
- A PIMP value of 100% has been used.

3.9 A preliminary surface water drainage design has been carried out for the proposed development. Attenuation will be provide within the development site using oversized pipes.

3.10 The existing and proposed runoff volumes for the 1 in 1 year and 1 in 100 year rainfall events are as follows.

Existing		Proposed	
1 year 6 hour	215 m^3	1 year	110 m^3
100 year 6 hour	638 m^3	100 year	275 m^3
		100 year plus 30%	413 m^3

3.11 The surface water drainage design is included within Appendix B.

Foul Water Drainage

3.12 Foul water discharges from the site will be to an onsite foul pumping station located at the end of the access spine road and the foul water pumped to the public foul sewer that runs within Chatburn Road.

4. SUMMARY AND CONCLUSIONS

4.1 This drainage strategy is in support of a planning application for a residential development comprising 30 dwellings to be sited on land adjacent Chatburn Road, Clitheroe.

4.2 The nature of the local geology means that infiltration of surface water runoff back into the ground is not feasible on this site.

4.3 Surface water runoff from the developed site will be attenuated and discharge into the watercourse that flows parallel to the northern boundary of the site. Attenuation will be provided by oversized pipes.

4.4 The surface water drainage network has been designed such that the peak surface water runoff for the 1 in 1 and the 1 in 100 year rainfall event will not exceed the pre-development Greenfield runoff rate for the same event.

4.5 Foul water discharges from the site will be to an onsite foul pumping station located at the end of the access spine road and the foul water pumped to the public foul sewer that runs within Chatburn Road.

APPENDIX A

NOTES

1. DRAWINGS ARE IN METRES UNLESS OTHERWISE STATED.
2. ALL DIMENSIONS ARE TO BE CHECKED BEFORE COMMENCEMENT OF WORK ON SITE.
3. FOR STANDARD DRAINAGE DETAILS REFER TO DRAWING 18376-530.

KEY

- PROPOSED SURFACE WATER DRAIN
- S1 — SURFACE WATER NODE
- R — RAIN WATER PIPE
- G — PROPOSED GULLY
- PROPOSED FOUL WATER DRAIN
- F1 — FOUL WATER NODE
- S — SOIL STACK

Rev	Date	Description	Drn	Chk	App
0	21/02/18	First Issue	JJ	BF	BF

CTC Infrastructure Ltd
7 Hall Road, Fulwood, Preston, PR2 9QD
Mobile: 07970 265334
Email: r.e.ford@virginmedia.com
Company number: 9620365
VAT Reg. 215 5638 12

CHATBURN ROAD, CLITHEROE

GENERAL ARRANGEMENT

SCALE: 1:500 @ A3

18376-500 | REV 0

APPENDIX B

CAUSEWAY

Drainage Design Report

Flow

v6.0

Network	Storm Network
Filename	C:\Users\Bob\Documents\ctc\chatburn road\drainage design\new layout\chatburn road new layout with houses.pfd
Username	Bob-TOSH\Bob
Last analysed	25-Feb-18 5:25:22 PM
Report produced on	25-Feb-18 5:42:48 PM

Causeway Sales

Tel:	+44(0) 1628 552000
Fax:	+44(0) 1628 552001
Email:	marketing@causeway.com
Web:	www.causeway.com

Technical support web portal:

http://support.causeway.com

Rainfall Methodology	FSR
Return Period (years)	2
Additional Flow (%)	0
FSR Region	England and Wales
M5-60 (mm)	20.000
Ratio-R	0.200
CV	0.750
Time of Entry (mins)	5.00
Maximum Time of Concentration (mins)	30.00
Maximum Rainfall (mm/hr)	75.0
Minimum Velocity (m/s)	1.00
Connection Type	Level Soffits
Minimum Backdrop Height (m)	3.000
Preferred Cover Depth (m)	0.600
Enforce best practice design rules	

Name	Area (ha)	T of E (mins)	Add Inflow (l/s)	Cover Level (m)	Node Type	Diameter (mm)	Depth (m)
1	0.012	5.00		91.700	Manhole	1200	1.150
2	0.012	5.00		90.700	Manhole	1200	1.150
3	0.002	5.00		90.550	Manhole	100	0.700
4	0.002	5.00		90.550	Manhole	450	0.885
5	0.004	5.00		90.550	Manhole	100	0.700
6	0.008	5.00		90.550	Manhole	450	1.054
7	0.004	5.00		90.450	Manhole	100	0.700
8	0.009	5.00		90.450	Manhole	450	1.123
9	0.004	5.00		90.150	Manhole	100	0.700
10	0.010	5.00		90.150	Manhole	450	0.958
11	0.018	5.00		89.100	Manhole	1200	1.050
12	0.004	5.00		89.350	Manhole	100	0.700
13	0.009	5.00		89.350	Manhole	450	0.902
14	0.004	5.00		88.550	Manhole	100	0.700
15	0.009	5.00		88.550	Manhole	450	0.902
16	0.005	5.00		87.650	Manhole	100	0.641
17	0.008	5.00		87.650	Manhole	450	0.893
18	0.014	5.00		88.000	Manhole	1200	1.343
19	0.006	5.00		87.650	Manhole	100	0.700
20	0.005	5.00		86.550	Manhole	100	0.700
21	0.010	5.00		86.550	Manhole	450	0.902
22	0.005	5.00		86.100	Manhole	1200	1.050
23	0.026	5.00		86.300	Manhole	1200	1.399
24	0.024	5.00		86.800	Manhole	1200	2.153
25	0.004	5.00		89.850	Manhole	100	0.700
26	0.014	5.00		89.850	Manhole	450	0.936
27	0.006	5.00		89.600	Manhole	100	0.700
28	0.007	5.00		89.600	Manhole	450	1.006
29	0.003	5.00		89.350	Manhole	100	0.700

30	0.007	5.00	89.350 Manhole	450	0.902
31	0.005	5.00	89.350 Manhole	100	0.700
32	0.016	5.00	89.350 Manhole	450	1.171
33	0.009	5.00	90.000 Manhole	1200	1.050
34	0.038	5.00	89.000 Manhole	1200	1.050
35	0.007	5.00	88.350 Manhole	100	0.700
36	0.008	5.00	88.150 Manhole	450	0.700
37	0.002	5.00	88.350 Manhole	100	0.700
38	0.009	5.00	88.150 Manhole	450	0.902
39	0.008	5.00	87.850 Manhole	100	0.700
40	0.008	5.00	87.850 Manhole	450	0.902
41	0.004	5.00	87.850 Manhole	450	1.104
42	0.009	5.00	87.850 Manhole	450	1.491
43	0.008	5.00	88.250 Manhole	100	0.700
44	0.005	5.00	88.250 Manhole	450	2.115
45	0.010	5.00	88.550 Manhole	100	0.700
46	0.005	5.00	88.550 Manhole	450	2.486
47	0.004	5.00	88.150 Manhole	100	0.700
48	0.006	5.00	88.150 Manhole	450	2.157
49	0.012	5.00	85.300 Manhole	3000	2.847
50	0.007	5.00	85.450 Manhole	100	0.700
51	0.008	5.00	85.350 Manhole	450	0.785
52	0.003	5.00	85.450 Manhole	100	0.700
53	0.006	5.00	85.350 Manhole	450	0.987
54	0.010	5.00	85.350 Manhole	100	0.700
55	0.005	5.00	85.350 Manhole	450	1.172
56	0.010	5.00	85.250 Manhole	100	0.700
57	0.005	5.00	85.250 Manhole	450	1.274
58	0.002	5.00	85.250 Manhole	100	0.700
59	0.003	5.00	85.250 Manhole	450	1.476
60		5.00	84.600 Manhole	3000	2.109
61	0.015	5.00	84.500 Manhole	3000	2.069

62	0.003	5.00	85.050	Manhole	100	0.700
63	0.003	5.00	85.050	Manhole	450	0.902
64	0.005	5.00	84.450	Manhole	100	0.542
65	0.012	5.00	84.450	Manhole	450	0.744
66	0.003	5.00	84.450	Manhole	100	0.667
67	0.003	5.00	84.450	Manhole	100	0.642
68			84.450	Manhole	450	0.811
69	0.010	5.00	84.450	Manhole	450	1.047
70	0.003	5.00	84.450	Manhole	100	0.700
71	0.003	5.00	84.450	Manhole	450	0.902
72	0.005	5.00	84.450	Manhole	100	0.700
73	0.013	5.00	84.450	Manhole	450	1.434
74	0.035	5.00	84.000	Manhole	3000	1.637
75			82.900	Manhole	1200	0.580

Name	US Node	DS Node	Length (m)	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	Link Type	T of C (mins)	Rain (mm/hr)	Min DS IL (m)
16.000	1	2	15.000	90.550	89.550	1.000	15.0	150	Circular	5.10	48.0	
16.001	2	11	24.000	89.550	88.050	1.500	16.0	150	Circular	5.25	48.4	
12.000	3	4	11.000	89.850	89.665	0.185	59.5	100	Circular	5.18	48.6	
12.001	4	6	10.000	89.665	89.496	0.169	59.2	100	Circular	5.35	48.1	
13.000	5	6	12.000	89.850	89.496	0.354	33.9	100	Circular	5.15	48.7	
12.002	6	8	10.000	89.496	89.327	0.169	59.2	100	Circular	5.52	47.6	
14.000	7	8	12.000	89.750	89.327	0.423	28.4	100	Circular	5.14	48.7	
12.003	8	10	8.000	89.327	89.192	0.135	59.3	100	Circular	5.65	47.2	
15.000	9	10	12.000	89.450	89.192	0.258	46.5	100	Circular	5.18	48.6	
12.004	10	11	14.000	89.192	88.100	1.092	12.8	100	Circular	5.76	46.9	
12.005	11	18	18.000	88.050	86.657	1.393	12.9	150	Circular	5.86	46.6	
17.000	12	13	12.000	88.650	88.448	0.202	59.4	100	Circular	5.20	48.5	
17.001	13	15	10.000	88.448	87.648	0.800	12.5	100	Circular	5.28	48.3	
18.000	14	15	12.000	87.850	87.648	0.202	59.4	100	Circular	5.20	48.5	
17.002	15	17	10.000	87.648	86.807	0.841	11.9	100	Circular	5.35	48.1	
19.000	16	17	12.000	87.009	86.807	0.202	59.4	100	Circular	5.20	48.5	
17.003	17	18	10.000	86.757	86.657	0.100	100.0	150	Circular	5.52	47.6	
12.006	18	24	20.000	86.657	84.722	1.935	10.3	150	Circular	5.97	46.3	
21.000	19	21	6.000	86.950	85.648	1.302	4.6	100	Circular	5.03	49.1	
20.000	20	21	12.000	85.850	85.648	0.202	59.4	100	Circular	5.20	48.5	
20.001	21	23	15.000	85.648	84.951	0.697	21.5	100	Circular	5.35	48.1	
22.000	22	23	15.000	85.050	84.901	0.149	100.7	150	Circular	5.25	48.4	
20.002	23	24	18.000	84.901	84.722	0.179	100.6	150	Circular	5.65	47.2	
12.007	24	49	24.000	84.647	83.128	1.519	15.8	225	Circular	5.08	46.0	
1.000	25	26	14.000	89.150	88.914	0.236	59.3	100	Circular	5.23	48.4	
1.001	26	28	19.000	88.914	88.594	0.320	59.4	100	Circular	5.55	47.5	
2.000	27	28	14.000	88.900	88.594	0.306	45.8	100	Circular	5.20	48.5	
1.002	28	32	12.000	88.594	88.179	0.415	28.9	100	Circular	5.69	47.1	
3.000	29	30	12.000	88.650	88.448	0.202	59.4	100	Circular	5.20	48.5	

3.001	30	32	16.000	88.448	88.179	0.269	59.5	100Circular	5.47	47.7
4.000	31	32	12.000	88.650	88.179	0.471	25.5	100Circular	5.13	48.8
1.003	32	34	10.000	88.179	88.000	0.179	55.9	100Circular	5.65	48.7
5.000	33	34	28.000	88.950	87.950	1.000	28.0	150Circular	5.24	48.4
1.004	34	42	24.000	87.950	86.359	1.591	15.1	150Circular	6.00	46.2
8.000	35	36	8.000	87.650	87.450	0.200	40.0	100Circular	5.11	48.8
8.001	36	38	12.000	87.450	87.248	0.202	59.4	100Circular	5.31	48.2
10.000	37	38	10.000	87.650	87.248	0.402	24.9	100Circular	5.11	48.8
9.002	38	48	12.000	87.248	86.118	1.130	10.6	100Circular	5.59	48.0
6.000	39	40	12.000	87.150	86.948	0.202	59.4	100Circular	5.20	48.5
6.001	40	41	12.000	86.948	86.746	0.202	59.4	100Circular	5.40	47.9
8.000	41	42	20.000	86.746	86.409	0.337	59.3	100Circular	5.73	47.0
1.005	42	44	15.000	86.359	85.210	0.149	100.7	150Circular	6.25	45.6
7.000	43	44	12.000	87.550	86.260	1.290	9.3	100Circular	5.08	48.9
1.006	44	46	12.000	86.135	86.064	0.071	169.0	225Circular	6.40	45.1
8.000	45	46	12.000	87.850	86.189	1.661	7.2	100Circular	5.07	48.9
1.007	46	48	12.000	86.064	85.993	0.071	169.0	225Circular	6.85	44.8
11.000	47	48	12.000	87.450	86.118	1.332	9.0	100Circular	5.08	48.9
1.008	48	49	28.000	85.993	83.128	2.865	9.8	225Circular	6.76	44.3
1.009	49	61	20.000	82.453	82.431	0.022	909.1	900double	7.09	43.5
23.000	50	51	11.000	84.750	84.565	0.185	59.5	100Circular	5.18	48.6
23.001	51	53	12.000	84.565	84.363	0.202	59.4	100Circular	5.36	48.0
24.000	52	53	11.000	84.750	84.363	0.387	28.4	100Circular	5.13	48.8
25.002	53	55	11.000	84.363	84.178	0.185	59.5	100Circular	5.67	47.1
26.000	54	55	12.000	84.650	84.178	0.472	25.4	100Circular	5.13	48.8
23.003	55	57	12.000	84.178	83.976	0.202	59.4	100Circular	5.77	46.9
26.000	56	57	12.000	84.550	83.976	0.574	20.9	100Circular	5.12	48.9
23.004	57	59	12.000	83.976	83.774	0.202	59.4	100Circular	5.97	46.3
27.000	58	59	11.000	84.550	83.774	0.776	14.2	100Circular	5.09	48.9
23.005	59	61	8.000	83.774	83.231	0.543	14.7	100Circular	6.03	45.2
28.000	60	61	57.000	82.491	82.431	0.060	950.0	900double	5.94	45.4
1.010	61	74	65.000	82.431	82.353	0.078	955.9	900double	6.16	41.3

29.000	62	63	12.000	84.350	84.148	0.202	59.4	100 Circular	5.20	48.5	
29.001	63	65	12.000	84.148	83.706	0.442	27.1	100 Circular	5.33	48.1	
30.000	64	65	12.000	83.908	83.706	0.202	59.4	100 Circular	5.20	48.5	
29.002	65	69	18.000	83.706	83.403	0.303	59.4	100 Circular	5.63	47.3	
32.000	66	68	8.000	83.783	83.639	0.144	55.6	100 Circular	5.13	48.8	
31.000	67	68	10.000	83.808	83.639	0.169	59.2	100 Circular	5.17	48.6	
31.001	68	69	12.000	83.639	83.403	0.236	50.8	100 Circular	5.35	48.1	
29.003	69	73	20.000	83.403	83.066	0.337	59.3	100 Circular	5.97	46.3	
33.000	70	71	12.000	83.750	83.548	0.202	59.4	100 Circular	5.20	48.5	
33.001	71	73	20.000	83.548	83.066	0.482	41.5	100 Circular	5.48	47.7	
34.000	72	73	12.000	83.750	83.066	0.684	17.5	100 Circular	5.11	48.8	
29.004	73	74	12.000	83.016	82.513	0.503	23.9	150 Circular	5.06	46.1	
1.011	74	75	10.000	82.363	82.320	0.043	232.6	300 Circular	8.33	41.0	82.320

Rainfall Methodology	FSR	Return Period (years)	Climate Change (%)
FSR Region	England and Wales	1	0
M5-60 (mm)	20.000	30	0
Ratio-R	0.200	100	0
Summer CV	0.750	100	30
Winter CV	0.840		
Analysis Speed	Normal		
Drain Down Time (mins)	240		
Additional Storage (m³/ha)	20.0		
Storm Durations (mins)	15		
	30		
	60		
	120		
	180		
	240		
	360		
	480		
	600		
	720		
	960		
	1440		
Check Discharge Rate(s)	x		
1 year (l/s)	12.1		
30 year (l/s)	23.6		
100 year (l/s)	28.9		
Check Discharge Volume	x		
100 year 360 minute (m³)	638		

Hydro-Brake®

Node	Flap Valve	Online / Offline	Replaces Downstream Link	Loop to Node	Invert Level (m)	Design Depth (m)	Design Flow (l/s)	Objective	Sump Available	Product Number	Min Outlet Diameter (m)	Min Node Diameter (mm)
74	x	Online	x		82.363	1.630	13.2	(HE) Minimise upstream storage		CTL-SHE-0156-1320-1630-1320	0.225	1500
74	x	Online	x		82.681	1.312	15.6	(HE) Minimise upstream storage		CTL-SHE-0174-1560-1312-1560	0.225	1500

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.74%

Event	US Node ID	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status	Link ID	DS Node ID	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1	11	90.567	0.017	1.3	0.0233	0.0000	OK	16.000	2	1.3	0.871	0.028	0.0226	
15 minute winter	2	11	89.575	0.025	2.6	0.0330	0.0000	OK	16.001	11	2.6	0.878	0.058	0.0730	
30 minute summer	3	20	89.861	0.011	0.2	0.0007	0.0000	OK	12.000	4	0.2	0.331	0.025	0.0068	
30 minute summer	4	20	89.680	0.015	0.4	0.0031	0.0000	OK	12.001	6	0.4	0.311	0.051	0.0139	
15 minute winter	5	11	89.863	0.013	0.4	0.0016	0.0000	OK	13.000	6	0.4	0.344	0.038	0.0161	
15 minute winter	6	10	89.527	0.031	1.7	0.0096	0.0000	OK	12.002	8	1.6	0.595	0.207	0.0276	
15 minute winter	7	11	89.763	0.013	0.4	0.0016	0.0000	OK	14.000	8	0.4	0.243	0.035	0.0244	
30 minute summer	8	18	89.373	0.046	3.0	0.0146	0.0000	OK	12.003	10	3.0	0.992	0.379	0.0241	
15 minute winter	9	11	89.464	0.014	0.4	0.0018	0.0000	OK	15.000	10	0.4	0.291	0.045	0.0194	
15 minute winter	10	11	89.228	0.036	4.5	0.0133	0.0000	OK	12.004	11	4.5	1.798	0.264	0.0350	
15 minute winter	11	11	88.093	0.043	9.0	0.0638	0.0000	OK	12.005	18	9.0	1.818	0.181	0.0894	
15 minute winter	12	11	88.665	0.015	0.4	0.0019	0.0000	OK	17.000	13	0.4	0.465	0.051	0.0109	
30 minute summer	13	18	88.467	0.019	1.4	0.0069	0.0000	OK	17.001	15	1.4	0.999	0.081	0.0141	
15 minute winter	14	11	87.865	0.015	0.4	0.0019	0.0000	OK	18.000	15	0.4	0.343	0.051	0.0150	
30 minute summer	15	18	87.676	0.028	2.8	0.0099	0.0000	OK	17.002	17	2.8	1.614	0.158	0.0173	
15 minute winter	16	10	87.027	0.018	0.6	0.0030	0.0000	OK	19.000	17	0.5	0.570	0.069	0.0115	
15 minute winter	17	10	86.808	0.051	4.2	0.0173	0.0000	OK	17.003	18	4.1	0.747	0.230	0.0548	
15 minute winter	18	11	86.711	0.054	14.6	0.0726	0.0000	OK	12.006	24	14.7	2.611	0.263	0.1124	
15 minute winter	19	10	86.961	0.011	0.7	0.0019	0.0000	OK	21.000	21	0.7	0.626	0.024	0.0069	
15 minute winter	20	10	85.868	0.018	0.6	0.0027	0.0000	OK	20.000	21	0.6	0.401	0.071	0.0170	
15 minute winter	21	11	85.677	0.029	2.3	0.0110	0.0000	OK	20.001	23	2.3	1.242	0.175	0.0278	
15 minute winter	22	10	85.068	0.018	0.6	0.0222	0.0000	OK	22.000	23	0.5	0.152	0.031	0.0581	
15 minute winter	23	11	84.961	0.060	5.7	0.0900	0.0000	OK	20.002	24	5.6	0.878	0.318	0.1156	
15 minute winter	24	11	84.712	0.065	22.8	0.0885	0.0000	OK	12.007	49	22.9	2.450	0.174	0.2243	
15 minute winter	25	12	89.165	0.015	0.4	0.0019	0.0000	OK	1.000	26	0.4	0.285	0.051	0.0218	
15 minute winter	26	10	88.948	0.034	2.0	0.0156	0.0000	OK	1.001	28	2.0	0.783	0.249	0.0476	
15 minute winter	27	10	88.919	0.018	0.7	0.0033	0.0000	OK	2.000	28	0.7	0.374	0.074	0.0255	
15 minute winter	28	11	88.631	0.037	3.4	0.0111	0.0000	OK	1.002	32	3.3	0.764	0.295	0.0534	
15 minute summer	29	12	88.663	0.013	0.3	0.0013	0.0000	OK	3.000	30	0.3	0.304	0.038	0.0124	
15 minute winter	30	10	88.473	0.025	1.1	0.0078	0.0000	OK	3.001	32	1.0	0.286	0.134	0.0619	
15 minute winter	31	10	88.665	0.015	0.6	0.0022	0.0000	OK	4.000	32	0.6	0.200	0.047	0.0416	
15 minute winter	32	11	88.253	0.074	6.7	0.0321	0.0000	OK	1.003	34	6.7	1.109	0.822	0.0601	
30 minute summer	33	18	88.968	0.018	1.0	0.0232	0.0000	OK	5.000	34	1.0	0.333	0.030	0.0890	
15 minute winter	34	11	88.002	0.051	11.6	0.0955	0.0000	OK	1.004	42	11.7	1.231	0.253	0.2316	
15 minute winter	35	10	87.669	0.019	0.8	0.0040	0.0000	OK	9.000	36	0.8	0.485	0.081	0.0129	
15 minute winter	36	10	87.482	0.032	1.7	0.0125	0.0000	OK	9.001	38	1.6	0.837	0.204	0.0230	
60 minute summer	37	34	87.659	0.009	0.2	0.0006	0.0000	OK	10.000	38	0.2	0.243	0.016	0.0090	

15 minute winter	38	11	87.274	0.026	2.8	0.0095	0.0000 OK	9.002	48	2.7	1.678	0.146	0.0196	
15 minute winter	39	10	87.172	0.022	0.9	0.0053	0.0000 OK	6.000	40	0.9	0.504	0.110	0.0206	
15 minute summer	40	10	86.980	0.032	1.8	0.0107	0.0000 OK	6.001	41	1.7	0.745	0.218	0.0276	
15 minute summer	41	11	86.781	0.035	2.1	0.0082	0.0000 OK	6.002	42	2.1	0.725	0.269	0.0713	
15 minute winter	42	11	86.470	0.111	14.7	0.0310	0.0000 OK	1.005	44	14.5	1.080	0.818	0.2010	
15 minute summer	43	10	87.565	0.014	0.9	0.0034	0.0000 OK	7.000	44	0.9	1.266	0.044	0.0083	
15 minute winter	44	11	86.242	0.107	15.8	0.0219	0.0000 OK	1.006	46	15.7	0.843	0.394	0.2238	
15 minute winter	45	11	87.865	0.015	1.1	0.0045	0.0000 OK	8.000	46	1.1	1.482	0.048	0.0089	
15 minute winter	46	11	86.172	0.108	17.3	0.0215	0.0000 OK	1.007	48	17.2	1.335	0.431	0.1575	
15 minute winter	47	11	87.460	0.010	0.4	0.0012	0.0000 OK	11.000	48	0.4	1.012	0.020	0.0047	
15 minute winter	48	11	86.048	0.055	20.9	0.0118	0.0000 OK	1.008	49	20.8	2.845	0.124	0.2047	
180 minute winter	49	128	82.678	0.225	18.3	1.6128	0.0000 OK	1.009	61	17.0	0.249	0.013	5.3102	
15 minute winter	50	10	84.771	0.021	0.8	0.0044	0.0000 OK	23.000	51	0.8	0.477	0.098	0.0178	
15 minute winter	51	10	84.596	0.031	1.7	0.0111	0.0000 OK	23.001	53	1.6	0.663	0.203	0.0291	
15 minute summer	52	11	84.761	0.011	0.3	0.0011	0.0000 OK	24.000	53	0.3	0.231	0.026	0.0178	
15 minute winter	53	11	84.402	0.039	2.6	0.0110	0.0000 OK	23.002	55	2.5	0.729	0.323	0.0384	
15 minute winter	54	11	84.670	0.020	1.1	0.0060	0.0000 OK	25.000	55	1.1	0.505	0.091	0.0318	
15 minute winter	55	11	84.230	0.052	4.2	0.0128	0.0000 OK	23.003	57	4.2	0.833	0.533	0.0601	
15 minute winter	56	11	84.570	0.020	1.1	0.0057	0.0000 OK	26.000	57	1.1	0.537	0.083	0.0417	
15 minute winter	57	11	84.046	0.070	5.8	0.0167	0.0000 OK	23.004	59	5.8	1.224	0.738	0.0565	
60 minute summer	58	34	84.558	0.008	0.2	0.0005	0.0000 OK	27.000	59	0.2	0.144	0.012	0.0188	
15 minute winter	59	11	83.820	0.046	6.3	0.0093	0.0000 OK	23.005	61	6.3	1.832	0.395	0.0274	
180 minute winter	60	128	82.678	0.187	2.7	1.3250	0.0000 OK	28.000	61	-2.7	-0.051	-0.002	13.5014	
180 minute winter	61	128	82.678	0.247	20.0	1.7851	0.0000 OK	1.010	74	11.0	0.153	0.009	22.0588	
15 minute summer	62	12	84.363	0.013	0.3	0.0013	0.0000 OK	29.000	63	0.3	0.432	0.038	0.0083	
15 minute summer	63	12	84.163	0.015	0.6	0.0035	0.0000 OK	29.001	65	0.6	0.380	0.051	0.0206	
15 minute winter	64	10	83.926	0.018	0.6	0.0035	0.0000 OK	30.000	65	0.6	0.312	0.071	0.0221	
15 minute winter	65	11	83.744	0.038	2.5	0.0185	0.0000 OK	29.002	69	2.4	0.712	0.312	0.0625	
15 minute summer	66	12	83.796	0.013	0.3	0.0013	0.0000 OK	32.000	68	0.3	0.428	0.037	0.0063	
15 minute summer	67	12	83.821	0.013	0.3	0.0014	0.0000 OK	31.000	68	0.3	0.411	0.038	0.0079	
15 minute summer	68	12	83.657	0.018	0.6	0.0029	0.0000 OK	31.001	69	0.6	0.264	0.071	0.0301	
15 minute winter	69	11	83.456	0.053	4.1	0.0184	0.0000 OK	29.003	73	4.1	0.997	0.521	0.0822	
15 minute summer	70	12	83.763	0.013	0.3	0.0013	0.0000 OK	33.000	71	0.3	0.408	0.038	0.0091	
15 minute summer	71	12	83.565	0.017	0.6	0.0039	0.0000 OK	33.001	73	0.6	0.669	0.064	0.0179	
15 minute winter	72	10	83.764	0.014	0.6	0.0021	0.0000 OK	34.000	73	0.6	0.888	0.039	0.0076	
15 minute winter	73	11	83.061	0.045	6.6	0.0153	0.0000 OK	29.004	74	6.6	1.536	0.181	0.0591	
180 minute winter	74	128	82.678	0.315	14.9	2.3640	0.0000	1.011	75	12.1	0.741	0.166	0.1630	109.3
180 minute winter	75	128	82.402	0.082	12.1	0.0000	0.0000 OK							

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.74%

Event	US Node ID	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status	Link ID	DS Node ID	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1	10	90.577	0.027	3.3	0.0363	0.0000	OK	16.000	2	3.3	1.146	0.071	0.0432	
15 minute winter	2	10	89.589	0.039	6.6	0.0519	0.0000	OK	16.001	11	6.5	1.126	0.145	0.1401	
30 minute summer	3	19	89.867	0.017	0.5	0.0011	0.0000	OK	12.000	4	0.5	0.431	0.064	0.0129	
30 minute summer	4	19	89.689	0.024	1.0	0.0049	0.0000	OK	12.001	6	1.0	0.381	0.127	0.0274	
15 minute winter	5	10	89.872	0.022	1.1	0.0027	0.0000	OK	13.000	6	1.1	0.412	0.103	0.0320	
15 minute winter	6	10	89.548	0.052	4.3	0.0161	0.0000	OK	12.002	8	4.2	0.718	0.530	0.0574	
15 minute winter	7	10	89.771	0.021	1.1	0.0025	0.0000	OK	14.000	8	1.1	0.272	0.094	0.0512	
15 minute winter	8	11	89.417	0.090	7.7	0.0286	0.0000	OK	12.003	10	7.6	1.196	0.967	0.0502	
15 minute winter	9	10	89.474	0.024	1.1	0.0029	0.0000	OK	15.000	10	1.1	0.340	0.120	0.0391	
15 minute winter	10	11	89.255	0.063	11.2	0.0231	0.0000	OK	12.004	11	11.3	2.249	0.663	0.0703	
15 minute winter	11	11	88.120	0.070	22.4	0.1038	0.0000	OK	12.005	18	22.3	2.265	0.448	0.1776	
15 minute winter	12	10	88.675	0.025	1.1	0.0030	0.0000	OK	17.000	13	1.1	0.601	0.136	0.0214	
15 minute winter	13	10	88.479	0.031	3.5	0.0111	0.0000	OK	17.001	15	3.5	1.276	0.204	0.0278	
15 minute winter	14	10	87.875	0.025	1.1	0.0030	0.0000	OK	18.000	15	1.1	0.431	0.136	0.0302	
15 minute winter	15	10	87.694	0.046	7.1	0.0165	0.0000	OK	17.002	17	7.0	2.053	0.394	0.0340	
15 minute winter	16	10	87.037	0.028	1.4	0.0046	0.0000	OK	19.000	17	1.4	0.670	0.175	0.0283	
15 minute winter	17	10	86.847	0.090	10.5	0.0304	0.0000	OK	17.003	18	10.4	0.922	0.585	0.1129	
15 minute winter	18	11	86.751	0.094	36.3	0.1259	0.0000	OK	12.006	24	36.6	3.255	0.656	0.2246	
30 minute summer	19	18	86.966	0.016	1.6	0.0029	0.0000	OK	21.000	21	1.6	0.786	0.056	0.0128	
15 minute winter	20	10	85.878	0.028	1.4	0.0043	0.0000	OK	20.000	21	1.4	0.520	0.175	0.0319	
15 minute winter	21	10	85.694	0.046	5.7	0.0175	0.0000	OK	20.001	23	5.6	1.502	0.428	0.0590	
15 minute winter	22	10	85.078	0.028	1.4	0.0345	0.0000	OK	22.000	23	1.4	0.181	0.077	0.1158	
15 minute winter	23	11	85.006	0.105	14.1	0.1581	0.0000	OK	20.002	24	13.8	1.079	0.779	0.2300	
15 minute winter	24	11	84.756	0.109	56.5	0.1474	0.0000	OK	12.007	49	56.6	3.098	0.432	0.4401	
15 minute winter	25	10	89.175	0.025	1.1	0.0030	0.0000	OK	1.000	26	1.1	0.358	0.136	0.0424	
15 minute winter	26	10	88.970	0.056	4.9	0.0258	0.0000	OK	1.001	28	4.8	0.925	0.607	0.1169	
30 minute summer	27	18	88.929	0.029	1.6	0.0051	0.0000	OK	2.000	28	1.6	0.442	0.178	0.0676	
15 minute winter	28	12	88.777	0.183	8.2	0.0547	0.0000	[illegible]	1.002	32	6.9	0.924	0.610	0.0939	
15 minute winter	29	11	88.672	0.022	0.8	0.0020	0.0000	OK	3.000	30	0.8	0.384	0.102	0.0544	
15 minute winter	30	12	88.627	0.179	3.2	0.0561	0.0000	[illegible]	3.001	32	2.4	0.382	0.306	0.1252	
15 minute winter	31	10	88.673	0.023	1.4	0.0035	0.0000	OK	4.000	32	1.4	0.250	0.114	0.0551	
15 minute winter	32	12	88.609	0.430	14.3	0.1856	0.0000	[illegible]	1.003	34	12.6	1.610	1.553	0.0775	
15 minute winter	33	10	88.977	0.027	2.5	0.0357	0.0000	OK	5.000	34	2.4	0.447	0.072	0.1587	
15 minute winter	34	11	88.028	0.078	24.4	0.1439	0.0000	OK	1.004	42	24.4	1.597	0.529	0.3216	
15 minute winter	35	10	87.680	0.030	1.9	0.0063	0.0000	OK	9.000	36	1.9	0.602	0.196	0.0252	
15 minute winter	36	10	87.504	0.054	4.1	0.0210	0.0000	OK	9.001	38	4.0	1.057	0.512	0.0457	
30 minute summer	37	18	87.664	0.014	0.5	0.0009	0.0000	OK	10.000	38	0.5	0.286	0.041	0.0194	

15 minute winter	38	10	87.292	0.044	7.0	0.0158	0.0000 OK	9.002	48	6.9	2.150	0.370	0.0367	
15 minute winter	39	10	87.186	0.036	2.2	0.0085	0.0000 OK	6.000	40	2.2	0.640	0.277	0.0409	
15 minute winter	40	10	87.002	0.054	4.4	0.0160	0.0000 OK	6.001	41	4.4	0.914	0.558	0.0725	
15 minute winter	41	12	86.965	0.219	5.5	0.0507	0.0000 SURCHARGE	6.002	42	4.7	0.736	0.599	0.1565	
15 minute winter	42	12	86.850	0.491	30.3	0.1375	0.0000 SURCHARGE	1.005	44	29.6	1.681	1.672	0.2614	
15 minute winter	43	10	87.572	0.022	2.2	0.0053	0.0000 OK	7.000	44	2.2	1.583	0.109	0.0309	
15 minute winter	44	12	86.310	0.175	32.5	0.0361	0.0000 OK	1.006	46	32.6	1.010	0.818	0.3876	
15 minute winter	45	10	87.873	0.023	2.7	0.0069	0.0000 OK	8.000	46	2.7	1.882	0.118	0.0262	
15 minute winter	46	11	86.230	0.166	36.1	0.0330	0.0000 OK	1.007	48	36.1	1.611	0.905	0.2676	
15 minute winter	47	10	87.466	0.016	1.1	0.0019	0.0000 OK	11.000	48	1.1	1.361	0.053	0.0095	
15 minute winter	48	11	86.076	0.083	45.3	0.0178	0.0000 OK	1.008	49	45.2	3.517	0.270	0.3603	
120 minute winter	49	88	82.923	0.470	51.9	3.3620	0.0000 OK	1.009	61	47.2	0.426	0.036	13.7895	
15 minute winter	50	10	84.783	0.033	1.9	0.0069	0.0000 OK	23.000	51	1.9	0.601	0.239	0.0345	
15 minute winter	51	13	84.617	0.052	4.1	0.0189	0.0000 OK	23.001	53	4.0	0.815	0.512	0.0717	
15 minute winter	52	11	84.768	0.018	0.8	0.0017	0.0000 OK	24.000	53	0.8	0.256	0.070	0.0483	
15 minute winter	53	13	84.594	0.231	6.4	0.0648	0.0000 SURCHARGE	23.002	55	5.5	0.807	0.701	0.0861	
15 minute winter	54	10	84.682	0.032	2.7	0.0095	0.0000 OK	25.000	55	2.7	0.574	0.222	0.0600	
15 minute winter	55	13	84.517	0.339	9.3	0.0826	0.0000 SURCHARGE	23.003	57	7.4	0.950	0.946	0.0939	
15 minute winter	56	10	84.581	0.031	2.7	0.0090	0.0000 OK	26.000	57	2.7	0.622	0.202	0.0591	
15 minute winter	57	12	84.299	0.323	11.0	0.0769	0.0000 SURCHARGE	23.004	59	10.3	1.403	1.316	0.0814	
30 minute summer	58	18	84.562	0.012	0.5	0.0008	0.0000 OK	27.000	59	0.5	0.193	0.031	0.0343	
15 minute winter	59	12	83.843	0.069	11.4	0.0138	0.0000 OK	23.005	61	11.4	2.084	0.717	0.0437	
120 minute winter	60	88	82.923	0.432	11.0	3.0537	0.0000 OK	28.000	61	-11.0	-0.075	-0.009	37.3537	
120 minute winter	61	88	82.923	0.492	56.1	3.5494	0.0000 OK	1.010	74	25.2	0.212	0.020	49.9973	
15 minute winter	62	11	84.372	0.022	0.8	0.0020	0.0000 OK	29.000	63	0.8	0.578	0.102	0.0166	
15 minute winter	63	11	84.173	0.025	1.6	0.0057	0.0000 OK	29.001	65	1.6	0.457	0.137	0.0443	
15 minute winter	64	10	83.936	0.028	1.4	0.0054	0.0000 OK	30.000	65	1.4	0.377	0.175	0.0457	
15 minute winter	65	12	83.776	0.070	6.3	0.0339	0.0000 OK	29.002	69	6.1	0.851	0.775	0.1233	
15 minute winter	66	11	83.804	0.021	0.8	0.0021	0.0000 OK	32.000	68	0.8	0.525	0.098	0.0125	
15 minute winter	67	11	83.830	0.022	0.8	0.0022	0.0000 OK	31.000	68	0.8	0.518	0.102	0.0158	
15 minute winter	68	11	83.668	0.029	1.6	0.0047	0.0000 OK	31.001	69	1.6	0.282	0.188	0.0585	
15 minute winter	69	12	83.636	0.233	10.4	0.0815	0.0000 SURCHARGE	29.003	73	8.9	1.141	1.135	0.1538	
15 minute winter	70	11	83.772	0.022	0.8	0.0020	0.0000 OK	33.000	71	0.8	0.530	0.102	0.0183	
15 minute winter	71	11	83.576	0.028	1.6	0.0064	0.0000 OK	33.001	73	1.6	0.887	0.169	0.0359	
15 minute winter	72	10	83.771	0.021	1.4	0.0032	0.0000 OK	34.000	73	1.4	1.152	0.094	0.0143	
15 minute summer	73	10	83.064	0.068	14.4	0.0232	0.0000 OK	29.004	74	14.4	1.800	0.393	0.1410	
120 minute winter	74	88	82.923	0.560	35.4	4.1973	0.0000 SURCHARGE	1.011	75	28.1	0.922	0.387	0.3050	209.9
120 minute winter	75	88	82.448	0.128	28.1	0.0000	0.0000 OK							

Results for 100 year Critical Storm Duration. Lowest mass balance: 99.74%

Event	US Node ID	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status	Link ID	DS Node ID	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1	10	90.581	0.031	4.2	0.0409	0.0000	OK	16.000	2	4.2	1.229	0.090	0.0513	
15 minute winter	2	10	89.594	0.044	8.4	0.0588	0.0000	OK	16.001	11	8.3	1.213	0.186	0.1657	
15 minute winter	3	11	89.870	0.020	0.7	0.0013	0.0000	OK	12.000	4	0.7	0.476	0.089	0.0163	
15 minute winter	4	11	89.694	0.029	1.4	0.0058	0.0000	OK	12.001	6	1.4	0.405	0.178	0.0413	
30 minute summer	5	18	89.875	0.025	1.4	0.0030	0.0000	OK	13.000	6	1.4	0.438	0.134	0.0469	
15 minute winter	6	12	89.573	0.077	5.6	0.0238	0.0000	OK	12.002	8	5.1	0.723	0.645	0.0713	
30 minute summer	7	18	89.774	0.024	1.4	0.0029	0.0000	OK	14.000	8	1.4	0.267	0.123	0.0555	
15 minute winter	8	11	89.508	0.181	9.6	0.0579	0.0000	SURCHARGED	12.003	10	9.1	1.245	1.154	0.0557	
30 minute summer	9	18	89.477	0.027	1.4	0.0033	0.0000	OK	15.000	10	1.4	0.372	0.157	0.0464	
15 minute winter	10	11	89.265	0.073	13.7	0.0267	0.0000	OK	12.004	11	13.7	2.327	0.805	0.0825	
15 minute winter	11	11	88.130	0.080	27.8	0.1184	0.0000	OK	12.005	18	27.9	2.334	0.560	0.2141	
30 minute summer	12	18	88.679	0.029	1.4	0.0035	0.0000	OK	17.000	13	1.4	0.655	0.178	0.0257	
15 minute winter	13	10	88.483	0.035	4.6	0.0126	0.0000	OK	17.001	15	4.5	1.381	0.263	0.0329	
30 minute summer	14	18	87.879	0.029	1.4	0.0035	0.0000	OK	18.000	15	1.4	0.474	0.178	0.0357	
15 minute winter	15	10	87.700	0.052	9.1	0.0187	0.0000	OK	17.002	17	9.0	2.096	0.511	0.0444	
15 minute winter	16	10	87.041	0.032	1.8	0.0053	0.0000	OK	19.000	17	1.8	0.649	0.226	0.0417	
15 minute winter	17	10	86.865	0.108	13.6	0.0367	0.0000	OK	17.003	18	13.4	0.968	0.755	0.1390	
15 minute winter	18	11	86.770	0.113	45.9	0.1509	0.0000	OK	12.006	24	46.2	3.385	0.829	0.2726	
15 minute winter	19	10	86.968	0.018	2.1	0.0033	0.0000	OK	21.000	21	2.1	0.830	0.073	0.0157	
15 minute winter	20	10	85.882	0.032	1.8	0.0049	0.0000	OK	20.000	21	1.8	0.554	0.226	0.0387	
15 minute winter	21	10	85.701	0.053	7.4	0.0204	0.0000	OK	20.001	23	7.3	1.519	0.555	0.0853	
15 minute winter	22	10	85.082	0.032	1.8	0.0392	0.0000	OK	22.000	23	1.8	0.186	0.100	0.1465	
15 minute winter	23	11	85.038	0.137	18.2	0.2053	0.0000	OK	20.002	24	17.7	1.111	0.999	0.2902	
15 minute winter	24	11	84.773	0.126	71.8	0.1713	0.0000	OK	12.007	49	72.0	3.270	0.548	0.5288	
30 minute summer	25	18	89.179	0.029	1.4	0.0035	0.0000	OK	1.000	26	1.4	0.377	0.178	0.0667	
30 minute summer	26	20	89.082	0.168	6.2	0.0770	0.0000	SURCHARGED	1.001	28	5.9	0.934	0.744	0.1487	
30 minute summer	27	20	88.960	0.060	2.0	0.0108	0.0000	OK	2.000	28	2.0	0.464	0.223	0.0891	
30 minute summer	28	20	88.954	0.360	10.2	0.1074	0.0000	SURCHARGED	1.002	32	7.4	0.944	0.653	0.0939	
15 minute winter	29	13	88.765	0.115	1.7	0.0109	0.0000	SURCHARGED	3.000	30	1.4	0.381	0.180	0.0939	
30 minute summer	30	20	88.765	0.317	3.4	0.0995	0.0000	SURCHARGED	3.001	32	3.5	0.516	0.446	0.1252	
30 minute summer	31	20	88.745	0.095	1.7	0.0144	0.0000	OK	4.000	32	1.7	0.295	0.138	0.0931	
30 minute summer	32	20	88.742	0.563	15.6	0.2433	0.0000	SURCHARGED	1.003	34	14.1	1.807	1.744	0.0775	
15 minute winter	33	10	88.981	0.031	3.2	0.0404	0.0000	OK	5.000	34	3.1	0.481	0.093	0.1990	
15 minute winter	34	11	88.044	0.094	29.6	0.1749	0.0000	OK	1.004	42	29.3	1.810	0.636	0.3511	
15 minute winter	35	10	87.685	0.035	2.5	0.0072	0.0000	OK	9.000	36	2.5	0.645	0.257	0.0306	
15 minute winter	36	10	87.514	0.064	5.3	0.0247	0.0000	OK	9.001	38	5.2	1.114	0.659	0.0558	
15 minute winter	37	11	87.666	0.016	0.7	0.0011	0.0000	OK	10.000	38	0.7	0.311	0.057	0.0243	

15 minute winter	38	10	87.299	0.051	9.1	0.0184	0.0000 OK	9.002	48	9.0	2.289	0.479	0.0471
30 minute summer	39	20	87.208	0.058	2.7	0.0137	0.0000 OK	6.000	40	2.7	0.654	0.343	0.0752
30 minute summer	40	20	87.199	0.251	5.4	0.0843	0.0000 SU	6.001	41	4.6	0.896	0.589	0.0939
30 minute summer	41	20	87.152	0.406	5.9	0.0942	0.0000 SU	6.002	42	5.8	0.747	0.743	0.1565
15 minute winter	42	12	87.037	0.678	35.5	0.1898	0.0000 SU	1.005	44	34.7	1.970	1.960	0.2614
15 minute winter	43	10	87.575	0.025	2.8	0.0060	0.0000 OK	7.000	44	2.8	1.629	0.139	0.0501
15 minute winter	44	12	86.342	0.207	38.5	0.0427	0.0000 OK	1.006	46	38.5	1.042	0.967	0.4425
15 minute winter	45	10	87.877	0.027	3.5	0.0078	0.0000 OK	8.000	46	3.5	1.913	0.153	0.0409
30 minute summer	46	19	86.252	0.188	43.1	0.0375	0.0000 OK	1.007	48	43.0	1.664	1.079	0.3044
30 minute summer	47	18	87.468	0.018	1.4	0.0022	0.0000 OK	11.000	48	1.4	1.468	0.069	0.0114
15 minute winter	48	11	86.085	0.092	55.1	0.0198	0.0000 OK	1.008	49	54.9	3.697	0.328	0.4162
120 minute winter	49	92	83.095	0.642	67.3	4.5906	0.0000 OK	1.009	61	61.3	0.406	0.047	19.7016
30 minute winter	50	21	84.815	0.065	2.2	0.0135	0.0000 OK	23.000	51	2.2	0.610	0.280	0.0725
30 minute winter	51	21	84.809	0.244	4.7	0.0886	0.0000 SURCHARGED	23.001	53	4.2	0.791	0.528	0.0939
30 minute summer	52	21	84.773	0.023	1.0	0.0022	0.0000 OK	24.000	53	1.0	0.237	0.088	0.0506
30 minute summer	53	21	84.771	0.408	7.4	0.1147	0.0000 SURCHARGED	23.002	55	5.4	0.806	0.682	0.0861
15 minute winter	54	13	84.700	0.050	3.5	0.0147	0.0000 OK	25.000	55	3.5	0.564	0.288	0.0705
30 minute summer	55	20	84.686	0.508	9.6	0.1240	0.0000 SURCHARGED	23.003	57	8.4	1.072	1.067	0.0939
15 minute winter	56	10	84.585	0.035	3.5	0.0103	0.0000 OK	26.000	57	3.5	0.622	0.261	0.0616
30 minute summer	57	20	84.429	0.453	12.7	0.1077	0.0000 SURCHARGED	23.004	59	11.9	1.554	1.508	0.0861
15 minute winter	58	11	84.564	0.014	0.7	0.0009	0.0000 OK	27.000	59	0.7	0.228	0.043	0.0397
15 minute winter	59	12	83.852	0.078	13.3	0.0157	0.0000 OK	23.005	61	13.3	2.127	0.835	0.0498
120 minute winter	60	92	83.095	0.604	13.5	4.2688	0.0000 OK	28.000	61	-13.5	-0.099	-0.011	54.3583
120 minute winter	61	92	83.095	0.664	72.8	4.7887	0.0000 OK	1.010	74	28.2	0.222	0.022	68.4845
15 minute winter	62	10	84.375	0.025	1.1	0.0023	0.0000 OK	29.000	63	1.1	0.630	0.136	0.0204
15 minute winter	63	10	84.177	0.029	2.2	0.0065	0.0000 OK	29.001	65	2.1	0.464	0.181	0.0582
15 minute winter	64	12	83.953	0.045	1.8	0.0086	0.0000 OK	30.000	65	1.8	0.392	0.226	0.0675
15 minute winter	65	12	83.948	0.240	8.1	0.1155	0.0000 SURCHARGED	29.002	69	6.5	0.870	0.833	0.1408
15 minute winter	66	10	83.808	0.025	1.1	0.0024	0.0000 OK	32.000	68	1.1	0.561	0.132	0.0361
15 minute winter	67	10	83.833	0.025	1.1	0.0025	0.0000 OK	31.000	68	1.1	0.555	0.136	0.0452
15 minute winter	68	13	83.742	0.103	2.1	0.0164	0.0000 SURCHARGED	31.001	69	2.4	0.365	0.283	0.0939
15 minute winter	69	13	83.732	0.329	11.6	0.1152	0.0000 SURCHARGED	29.003	73	9.8	1.248	1.241	0.1545
15 minute winter	70	10	83.775	0.025	1.1	0.0023	0.0000 OK	33.000	71	1.1	0.578	0.136	0.0223
15 minute winter	71	11	83.581	0.033	2.2	0.0073	0.0000 OK	33.001	73	2.1	0.957	0.222	0.0437
15 minute winter	72	10	83.774	0.024	1.8	0.0036	0.0000 OK	34.000	73	1.8	1.239	0.122	0.0172
120 minute winter	73	90	83.097	0.081	10.2	0.0276	0.0000 OK	29.004	74	10.2	1.106	0.279	0.1641
120 minute winter	74	92	83.095	0.732	43.0	5.4862	0.0000 SURCHARGED	1.011	75	28.7	0.927	0.396	0.3098
120 minute winter	75	114	82.449	0.129	28.7	0.0000	0.0000 OK						

Results for 100 year +30% Critical Storm Duration. Lowest mass balance: 99.74%

Event	US Node ID	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status	Link ID	DS Node ID	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1	10	90.585	0.035	5.5	0.0468	0.0000	OK	16.000	2	5.5	1.326	0.118	0.0623	
15 minute winter	2	10	89.600	0.050	11.0	0.0676	0.0000	OK	16.001	11	10.9	1.314	0.243	0.1990	
15 minute winter	3	11	89.873	0.023	0.9	0.0015	0.0000	OK	12.000	4	0.9	0.510	0.115	0.0288	
15 minute winter	4	12	89.716	0.051	1.8	0.0105	0.0000	OK	12.001	6	2.0	0.382	0.249	0.0593	
30 minute summer	5	18	89.878	0.028	1.8	0.0034	0.0000	OK	13.000	6	1.8	0.441	0.172	0.0578	
15 minute winter	6	12	89.711	0.215	7.3	0.0668	0.0000	[illegible]	12.002	8	5.9	0.760	0.755	0.0782	
30 minute summer	7	18	89.777	0.027	1.8	0.0033	0.0000	OK	14.000	8	1.8	0.315	0.158	0.0571	
30 minute summer	8	19	89.599	0.272	11.4	0.0868	0.0000	[illegible]	12.003	10	10.8	1.390	1.370	0.0600	
30 minute summer	9	18	89.481	0.031	1.8	0.0037	0.0000	OK	15.000	10	1.8	0.392	0.202	0.0552	
30 minute summer	10	18	89.278	0.086	16.7	0.0317	0.0000	OK	12.004	11	16.9	2.358	0.989	0.1050	
30 minute summer	11	18	88.143	0.093	35.4	0.1373	0.0000	OK	12.005	18	35.2	2.364	0.707	0.2619	
30 minute summer	12	18	88.683	0.033	1.8	0.0040	0.0000	OK	17.000	13	1.8	0.701	0.229	0.0308	
15 minute winter	13	10	88.488	0.040	5.9	0.0144	0.0000	OK	17.001	15	5.8	1.499	0.338	0.0389	
30 minute summer	14	18	87.883	0.033	1.8	0.0040	0.0000	OK	18.000	15	1.8	0.513	0.229	0.0422	
15 minute winter	15	10	87.707	0.059	11.7	0.0213	0.0000	OK	17.002	17	11.6	2.102	0.657	0.0629	
15 minute winter	16	12	87.069	0.060	2.3	0.0099	0.0000	OK	19.000	17	2.3	0.652	0.290	0.0765	
15 minute winter	17	12	87.058	0.301	17.6	0.1019	0.0000	[illegible]	17.003	18	16.7	0.982	0.940	0.1760	
15 minute winter	18	12	86.976	0.319	57.9	0.4268	0.0000	[illegible]	12.006	24	54.4	3.394	0.977	0.3518	
15 minute winter	19	10	86.971	0.021	2.7	0.0037	0.0000	OK	21.000	21	2.7	0.878	0.095	0.0192	
15 minute winter	20	10	85.887	0.037	2.3	0.0056	0.0000	OK	20.000	21	2.3	0.581	0.290	0.0470	
15 minute winter	21	10	85.711	0.063	9.6	0.0241	0.0000	OK	20.001	23	9.5	1.507	0.722	0.0978	
15 minute winter	22	11	85.143	0.093	2.8	0.1137	0.0000	OK	22.000	23	3.4	0.260	0.192	0.2178	
15 minute winter	23	11	85.144	0.243	21.9	0.3650	0.0000	[illegible]	20.002	24	21.4	1.217	1.208	0.3067	
15 minute winter	24	10	84.791	0.144	85.7	0.1943	0.0000	OK	12.007	49	86.8	3.398	0.660	0.6127	
30 minute winter	25	22	89.327	0.177	1.6	0.0216	0.0000	[illegible]	1.000	26	1.8	0.383	0.223	0.1095	
30 minute winter	26	22	89.320	0.400	7.2	0.1861	0.0000	[illegible]	1.001	28	5.8	0.928	0.733	0.1487	
30 minute winter	27	22	89.200	0.300	2.4	0.0538	0.0000	[illegible]	2.000	28	2.2	0.436	0.249	0.1095	
30 minute winter	28	22	89.190	0.596	10.1	0.1775	0.0000	[illegible]	1.002	32	8.0	1.028	0.711	0.0939	
30 minute summer	29	21	88.986	0.336	3.1	0.0316	0.0000	[illegible]	3.000	30	-1.8	0.372	-0.225	0.0939	
30 minute summer	30	21	88.982	0.534	3.9	0.1676	0.0000	[illegible]	3.001	32	3.1	0.403	0.401	0.1252	
30 minute summer	31	21	88.959	0.309	3.1	0.0466	0.0000	[illegible]	4.000	32	1.9	0.337	0.160	0.0939	
30 minute summer	32	21	88.949	0.770	16.7	0.3326	0.0000	SURCHARGED	1.003	34	15.9	2.037	1.965	0.0782	
15 minute winter	33	10	88.985	0.035	4.1	0.0458	0.0000	OK	5.000	34	4.1	0.495	0.120	0.2895	
30 minute summer	34	20	88.156	0.206	35.7	0.3812	0.0000	[illegible]	1.004	42	34.0	1.951	0.738	0.4225	
15 minute winter	35	10	87.690	0.040	3.2	0.0082	0.0000	OK	9.000	36	3.2	0.667	0.330	0.0376	
15 minute winter	36	10	87.528	0.078	6.9	0.0301	0.0000	OK	9.001	38	6.7	1.165	0.853	0.0687	
15 minute winter	37	11	87.668	0.018	0.9	0.0012	0.0000	OK	10.000	38	0.9	0.321	0.074	0.0296	

15 minute winter	38	10	87.308	0.060	11.7	0.0217	0.0000	OK	9.002	48	11.6	2.423	0.618	0.0573
30 minute winter	39	22	87.521	0.371	3.2	0.0875	0.0000		6.000	40	2.9	0.670	0.374	0.0939
30 minute winter	40	22	87.504	0.556	5.9	0.1867	0.0000		6.001	41	5.0	0.886	0.634	0.0939
30 minute winter	41	21	87.440	0.694	6.1	0.1611	0.0000		6.002	42	6.9	0.883	0.878	0.1565
30 minute winter	42	20	87.305	0.946	39.7	0.2648	0.0000		1.005	44	39.2	2.226	2.214	0.2641
15 minute winter	43	10	87.579	0.029	3.7	0.0069	0.0000	OK	7.000	44	3.7	1.605	0.183	0.0583
15 minute winter	44	11	86.398	0.263	43.6	0.0542	0.0000		1.006	46	43.5	1.094	1.091	0.4754
15 minute winter	45	10	87.881	0.031	4.6	0.0090	0.0000	OK	8.000	46	4.6	1.871	0.201	0.0575
15 minute winter	46	11	86.283	0.219	50.0	0.0436	0.0000	OK	1.007	48	49.7	1.697	1.247	0.3417
30 minute summer	47	18	87.471	0.021	1.8	0.0025	0.0000	OK	11.000	48	1.8	1.580	0.088	0.0137
15 minute winter	48	11	86.095	0.102	65.5	0.0219	0.0000	OK	1.008	49	65.5	3.863	0.391	0.4745
180 minute winter	49	136	83.997	1.544	67.9	11.0459	0.0000		1.009	61	61.9	0.352	0.047	25.3510
30 minute winter	50	22	85.060	0.310	2.8	0.0644	0.0000		23.000	51	2.6	0.635	0.326	0.0861
30 minute winter	51	22	85.050	0.485	5.6	0.1762	0.0000		23.001	53	4.5	0.793	0.572	0.0939
30 minute winter	52	22	85.006	0.256	1.3	0.0241	0.0000		24.000	53	1.4	0.250	0.119	0.0861
30 minute winter	53	22	85.004	0.641	7.5	0.1802	0.0000		23.002	55	5.9	0.796	0.755	0.0861
30 minute winter	54	22	84.924	0.274	4.0	0.0806	0.0000		25.000	55	3.7	0.601	0.310	0.0939
30 minute winter	55	22	84.900	0.722	9.8	0.1762	0.0000		23.003	57	9.4	1.201	1.195	0.0939
30 minute summer	56	20	84.603	0.053	4.4	0.0155	0.0000	OK	26.000	57	4.4	0.693	0.327	0.0721
30 minute winter	57	21	84.579	0.603	13.9	0.1436	0.0000		23.004	59	13.3	1.696	1.688	0.0939
15 minute winter	58	11	84.566	0.016	0.9	0.0010	0.0000	OK	27.000	59	0.9	0.249	0.056	0.0469
180 minute winter	59	136	84.019	0.245	9.3	0.0491	0.0000		23.005	61	9.3	2.003	0.584	0.0626
180 minute winter	60	136	83.997	1.506	14.2	10.6477	0.0000		28.000	61	-14.2	-0.082	-0.011	72.2502
180 minute winter	61	136	83.997	1.566	73.5	11.2988	0.0000		1.010	74	28.2	0.212	0.022	82.3906
15 minute winter	62	10	84.378	0.028	1.4	0.0027	0.0000	OK	29.000	63	1.4	0.675	0.175	0.0244
15 minute winter	63	10	84.181	0.033	2.8	0.0075	0.0000	OK	29.001	65	2.7	0.483	0.233	0.0604
15 minute winter	64	13	84.164	0.256	3.2	0.0491	0.0000		30.000	65	2.2	0.397	0.277	0.0939
30 minute summer	65	20	84.155	0.449	9.2	0.2163	0.0000		29.002	69	7.1	0.908	0.904	0.1408
180 minute winter	66	136	84.016	0.233	0.5	0.0228	0.0000		32.000	68	0.5	0.451	0.061	0.0626
180 minute winter	67	136	84.016	0.208	0.8	0.0210	0.0000		31.000	68	-0.6	0.446	-0.076	0.0782
180 minute winter	68	136	84.016	0.377	1.5	0.0599	0.0000		31.001	69	-1.5	0.284	-0.171	0.0939
180 minute winter	69	136	84.016	0.613	6.3	0.2144	0.0000		29.003	73	6.3	1.092	0.801	0.1565
180 minute winter	70	136	84.001	0.251	0.8	0.0236	0.0000		33.000	71	-0.6	0.463	-0.077	0.0939
180 minute winter	71	136	84.001	0.453	1.3	0.1023	0.0000		33.001	73	-1.1	0.777	-0.116	0.1565
180 minute winter	72	136	84.001	0.251	0.8	0.0378	0.0000		34.000	73	0.8	0.985	0.055	0.0939
180 minute winter	73	136	84.000	0.984	10.2	0.3347	0.0000		29.004	74	10.2	1.065	0.278	0.2113
180 minute winter	74	136	83.997	1.634	43.5	12.2500	0.0000		1.011	75	28.7	0.927	0.396	0.3098
240 minute winter	75	264	82.449	0.129	28.7	0.0000	0.0000	OK						