

**SURFACE WATER
DRAINAGE SCHEME**

for

ELKER DEVELOPMENTS LIMITED

PROPOSED CONTINUING CARE RETIREMENT DWELLINGS

on

**LAND OFF ELKER LANE
BILLINGTON**

AUGUST 2023

REFORD

Consulting Engineers Limited

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1. INTRODUCTION

1.1 This surface water drainage scheme has been produced on behalf of Elker Developments Limited to discharge Condition 6 of the reserved matters approval for a proposed continuing care retirement community on land off Elker Lane, Billington. A location plan is included within Appendix A.

1.2 Condition 6 of the reserved matters approval from Ribble Valley Borough Council, reference 3/2021/0373, states the following:

No development shall commence until a final, detailed surface water sustainable drainage scheme has been submitted to, and approved in writing by, the local planning authority.

The sustainable drainage scheme shall be based upon the submitted flood risk assessment and sustainable drainage principles set out in the National Planning Policy Framework, Planning Practice Guidance and Defra Technical Standards for Sustainable Drainage Systems. No surface water shall be allowed to discharge to the public foul sewer(s), either directly or indirectly. The detailed sustainable drainage scheme shall include, as a minimum:

- a) Final sustainable drainage plans, appropriately labelled to include:*
 - i. A final surface water drainage layout plan showing all pipe and structure references, dimensions and design levels.*
 - ii. A plan identifying the areas contributing to the surface water drainage network, including surface water flows from outside the curtilage as necessary.*
 - iii. Details of all sustainable drainage components, including landscape drawings showing topography and slope gradient as appropriate.*
 - iv. Flood water exceedance routes in accordance with Defra Technical Standards for Sustainable Drainage Systems.*
 - v. Finished Floor Levels (FFL) in AOD with adjacent ground levels for all sides of each building.*

- vi. Details of proposals to collect and mitigate surface water runoff from the development boundary.*
- vii. Measures taken to manage the quality of the surface water runoff to prevent pollution, protect groundwater and surface waters, and deliver suitably clean water to sustainable drainage components.*
- b) A full set of sustainable drainage flow calculations for the surface water drainage network. The calculations must show the full network design criteria, pipeline schedules and simulation outputs for the 1 in 1 year, 1 in 30 year and 1 in 100 year return period, plus an additional allowance for climate change. Surface water run-off must not exceed the pre development green field run off rate.*
 - i. The scheme shall be implemented in accordance with the approved details prior to first occupation of any of the approved dwellings.*

1.3 This surface water drainage scheme has been produced to discharge Condition 6 of the reserved matters approval. It describes the existing site conditions and proposed development. It assesses the potential impact of proposals on existing drainage and includes a proposed design for the provision of new surface water drainage to serve the proposed development.

2. BASE INFORMATION

Existing site

- 2.1 The proposal relates to land (approx. 2.54 hectares) that is situated on the edge of the settlement of Billington.
- 2.2 The existing site is currently in use for grazing. There are no existing features on the site of any note.
- 2.3 There is an elderly person apartment block to the immediate east of the site.
- 2.4 A watercourse lies along the site's north western boundary and another lies along the site north eastern boundary.
- 2.5 A topographical survey has been carried out. The site has a fall to the north towards the watercourses that lie along the site's northern boundary.
- 2.6 Access to the site is available from Whalley Road and Elker Lane.

Proposed development

- 2.7 The proposed development will comprise the erection of a continuing care retirement community comprising a 50 bed care home, 60 no. assisted living units, access, infrastructure, landscaping and ancillary works.

Site geology

- 2.8 The online Soilsmap viewer has identified that the geology encountered will be slowly permeable seasonally wet acid loamy and clayey soils with impeded drainage. The ground is, therefore, not likely to be conducive to infiltration of surface water.
- 2.9 This is supported by the flood risk assessment that was submitted in support of the planning application that stated:

Percolation tests were carried out at the site, however, the results show that the soil infiltration rate is very slow. Therefore, infiltration measures such as ground soakaways are not considered feasible at the site.

Understanding of existing drainage local to the site

- 2.10 A watercourse lies along the site's north western boundary and another lies along the site north eastern boundary. The watercourses flow to the north to discharge into the Bushburn Brook and the River Calder.
- 2.11 United Utilities sewer records show a public combined sewer lying along Whalley Road that collects discharges from the cottages that are located on Elker Lane near to its junction with Whalley Road. A public surface water sewer takes surface water runoff from development along Elker Lane and discharges into the watercourse that lies along the development site's north eastern boundary. The sewer records are within Appendix B.

3. PROPOSED SURFACE WATER DRAINAGE STRATEGY

3.1 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).

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

3.3 The nature of the geology of the site means that infiltration back into the ground is not feasible. This is supported by the flood risk assessment that was submitted in support of the planning application that stated:

Percolation tests were carried out at the site, however, the results show that the soil infiltration rate is very slow. Therefore, infiltration measures such as ground soakaways are not considered feasible at the site.

3.4 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 lies along the site's north eastern boundary.

3.5 Surface water from the development will be controlled to the existing pre-development Greenfield runoff rate, Q_{bar} , allowing surface water runoff generated by all rainfall events up to the 100 year critical rain storm plus 50% on stored volumes to discharge into the watercourse that lies along the site's north eastern boundary. The additional 50% is to allow for climate change and has been included in the surface water volume.

- 3.6 The pre-development Greenfield runoff rate, Qbar, has been calculated using the 'Causeway Flow' programme. The calculation is based upon the developed area of the site of 2.1ha, having removed the areas of public open space measured at 0.44ha and the calculation is shown below.

Pre-development discharge

Site Makeup	Greenfield ▼
Greenfield Method	IH124 ▼
Positively Drained Area (ha)	2.100
SAAR (mm)	1140
Soil Index	4 ▼
SPR	0.47
Region	10 ▼
Betterment (%)	0
	Calc
QBar (l/s)	17.9

Return Period (years)	Growth Factor	Q (l/s)
1	0.87	15.6
30	1.70	30.5
100	2.08	37.3

- 3.7 A surface water drainage design has been carried out for the proposed site development for all events up to the 100 year critical rain storm plus 50% on stored volumes. Attenuation will be provided within the development site using underground storage within the car parking area in the northeast corner of the development site.
- 3.8 The surface water drainage design, including a site plan showing floor levels, all onsite surface water catchment areas that will contribute to the proposed surface water drainage network and flood water exceedance routes, is included within Appendix C. Detailed surface water drainage layout drawings have been produced separately by Reid Jones Partnership and should be referred to when reading this report.

- 3.9 Surface water within any non-drained areas of the site such as public open spaces will be allowed to infiltrate into the upper strata and be stored and will be either taken up by plants or evaporated.
- 3.10 Water quality controls are to be built into the surface water drainage system with the use of trapped gullies and manholes. Attenuation of surface water runoff from the developed site will prevent flooding of the receiving watercourse.

4. SUMMARY AND CONCLUSIONS

- 4.1 This surface water drainage scheme has been produced on behalf of Elker Developments Limited to discharge Condition 6 of the reserved matters approval for a proposed continuing care retirement community on land off Elker Lane, Billington.
- 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 from the development will be controlled to the existing pre-development Greenfield runoff rate, Q_{bar} , allowing surface water runoff generated by all rainfall events up to the 100 year critical rain storm plus 50% on stored volumes to discharge into the watercourse that lies along the site's north eastern boundary. Attenuation will be provided within the development site using underground storage within the car parking area in the northeast corner of the development site.

APPENDIX A



LOCATION PLAN

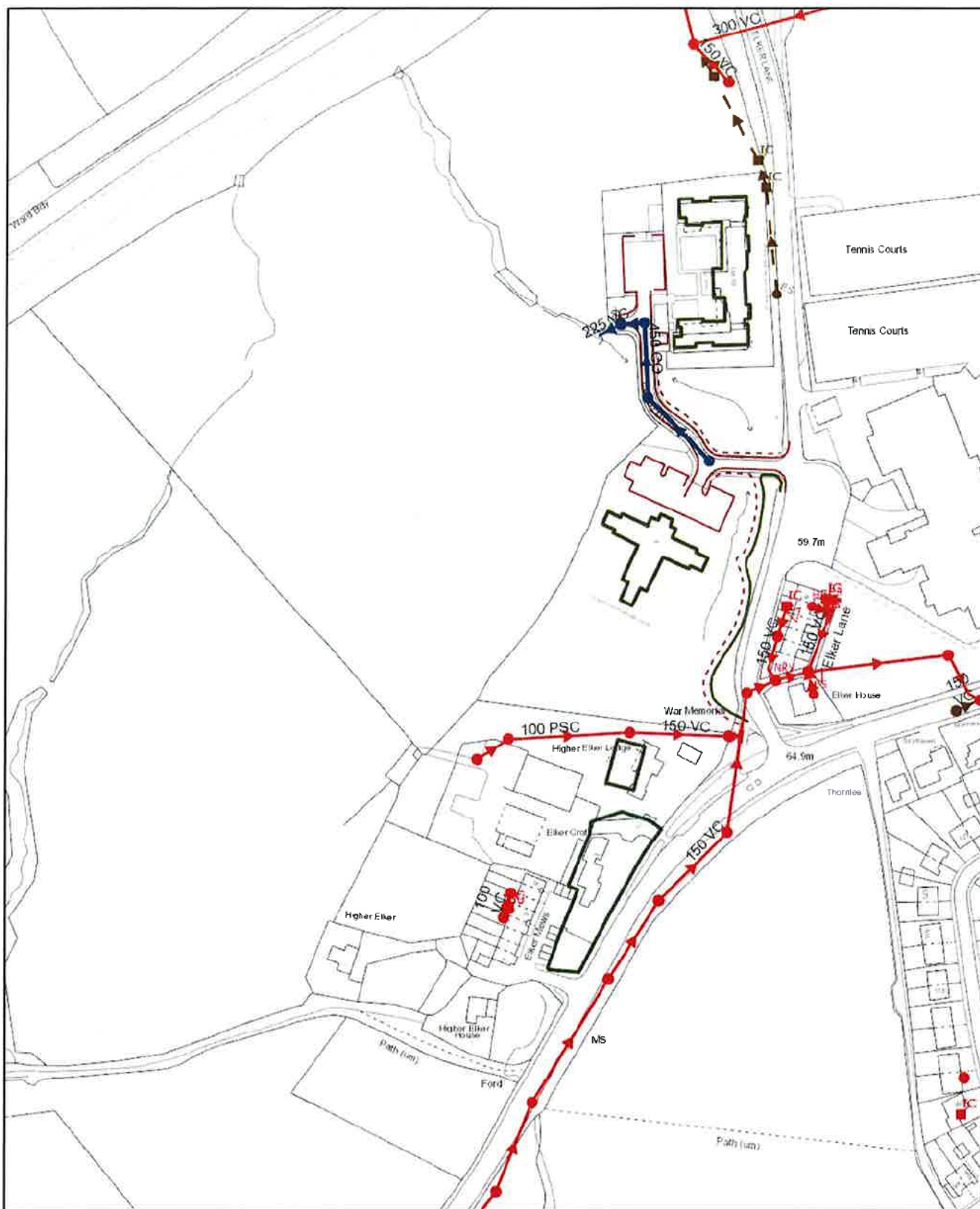
APPENDIX B

Wastewater Symbolology

Abandoned	Foul	Surface Water	Combined	
				Public Sewer
				Private Sewer
				Section 104
				Rising Main
				Sludge Main
				Overflow
				Water Course
				Highway Drain

All point assets follow the standard colour convention: **red** – combined **brown** - foul
blue – surface water **purple** - overflow

Manhole	Side Entry Manhole
Head of System	Outfall
Extent of Survey	Screen Chamber
Rodding Eye	Inspection Chamber
Inlet	Bifurcation Chamber
Discharge Point	Lamp Hole
Vortex	T Junction / Saddle
Penstock	Catchpit
Washout Chamber	Valve Chamber
Valve	Vent Column
Air Valve	Vortex Chamber
Non Return Valve	Penstock Chamber
Soakaway	Network Storage Tank
Gully	Sewer Overflow
Cascade	Ww Treatment Works
Flow Meter	Ww Pumping Station
Hatch Box	Septic Tank
Oil Interceptor	Control Kiosk
Summit	
Drop Shaft	Change of Characteristic
Orifice Plate	



Scale: 1:2392
Date: 25/02/2021

SEWER RECORDS



Address or Site Reference: elker lane
Printed by: Property Searches

The position of the underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. United Utilities Water will not accept liability for any loss or damage caused by the actual position being different from those shown.

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APPENDIX C



Item	Issued for Approval	Reviewed by	Reviewed on	Reviewed by
1. ISSUED FOR CONSTRUCTION	10/10/2010	10/10/2010	10/10/2010	10/10/2010
2. ISSUED FOR APPROVAL	10/10/2010	10/10/2010	10/10/2010	10/10/2010

NEW DEVELOPMENT ON
THE LAND OFF ELKER
LANE BILLINGTON

CONTRIBUTING
SURFACE WATER AREA
AND EXCEEDANCE FLOWS

CONSTRUCTION

[illegible]

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	2	Maximum Rainfall (mm/hr)	75.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	19.000	Minimum Backdrop Height (m)	4.000
Ratio-R	0.300	Preferred Cover Depth (m)	0.500
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Depth (m)
1	0.009	5.00	56.800	450	0.600
2	0.009	5.00	56.800	450	1.105
3	0.009	5.00	57.920	450	0.600
4	0.009	5.00	57.920	450	1.105
5			57.300	1200	1.899
6	0.009	5.00	56.800	450	0.600
7	0.009	5.00	56.800	450	1.105
8	0.015	5.00	56.980	450	0.600
9	0.009	5.00	57.920	450	2.045
10	0.027	5.00	56.670	1200	2.015
11	0.009	5.00	55.530	450	0.600
12	0.009	5.00	55.530	450	1.105
13	0.015	5.00	55.270	450	0.600
14	0.009	5.00	55.270	450	1.155
15			55.830	1200	1.890
16	0.003	5.00	55.530	450	0.600
17	0.003	5.00	55.530	450	0.853
18	0.004	5.00	55.530	450	0.600
19	0.003	5.00	55.530	450	1.055
20	0.009	5.00	55.530	450	1.156
21	0.009	5.00	55.530	450	1.661

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Depth (m)
22	0.009	5.00	55.270	450	0.600
23	0.009	5.00	55.270	450	1.105
24	0.040	5.00	55.000	1200	1.800
25	0.006	5.00	56.980	450	0.600
26	0.009	5.00	55.710	450	0.600
27	0.004	5.00	55.710	450	0.836
28	0.003	5.00	55.710	450	0.600
29	0.035	5.00	55.710	1200	1.197
30	0.068	5.00	54.500	1200	1.425
31	0.026	5.00	54.500	1200	1.818
32	0.049	5.00	52.920	1200	1.425
33	0.041	5.00	54.500	1200	3.303
34	0.022	5.00	56.000	1200	1.425
35	0.011	5.00	56.800	1200	1.425
36	0.009	5.00	55.750	1200	1.425
37	0.006	5.00	57.010	450	0.600
38	0.006	5.00	57.010	450	1.004
39	0.006	5.00	57.010	450	0.600
40	0.006	5.00	57.010	450	1.257
41	0.027	5.00	55.400	1200	1.425
42	0.013	5.00	54.700	1200	3.608
43	0.034	5.00	53.500	1200	2.452
44	0.006	5.00	54.830	450	0.600
45	0.010	5.00	53.550	450	0.600
46	0.006	5.00	53.190	450	1.350
47	0.004	5.00	52.830	450	1.272
48	0.009	5.00	52.830	450	1.190
49	0.009	5.00	52.830	450	1.463
50	0.006	5.00	54.830	450	0.600
51	0.009	5.00	53.550	450	0.600
52	0.006	5.00	52.830	450	1.040
53	0.003	5.00	52.830	450	1.706

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Depth (m)
54	0.024	5.00	54.000	1200	1.425
55	0.030	5.00	52.830	1200	1.765
56	0.012	5.00	52.830	450	1.190
57	0.012	5.00	53.700	1200	2.730
58	0.006	5.00	53.950	450	0.600
59	0.006	5.00	53.950	1200	3.016
60	0.004	5.00	52.830	450	0.600
61	0.003	5.00	53.950	450	3.081
62	0.006	5.00	53.950	450	0.600
63	0.006	5.00	53.950	1200	3.117
64	0.006	5.00	54.390	450	0.600
65	0.006	5.00	54.390	450	1.004
66	0.006	5.00	54.390	450	0.600
67	0.006	5.00	54.390	450	1.240
68			53.950	450	0.868
69	0.022	5.00	54.100	1200	1.425
70			53.400	1200	1.425
71	0.024	5.00	53.020	450	0.650
72	0.014	5.00	53.020	450	0.948
73	0.014	5.00	53.020	450	1.127
74	0.012	5.00	53.020	1200	1.381
75	0.014	5.00	53.020	1200	2.333
76			53.020	1200	2.432
77	0.016	5.00	53.020	1200	2.498
78	0.022	5.00	53.020	450	0.600
79	0.016	5.00	53.020	1200	2.539
80	0.024	5.00	53.020	450	0.600
81	0.014	5.00	53.020	1200	2.638
82	0.014	5.00	53.020	1200	2.712
83	0.024	5.00	53.020	450	0.650
84	0.014	5.00	53.020	450	0.948
85	0.014	5.00	53.020	450	1.147

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Depth (m)
86	0.014	5.00	53.020	450	1.405
87	0.014	5.00	53.020	1200	2.819
88	0.042	5.00	52.750	1800	2.590
89			51.200	1200	1.200

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
18.000	1	2	30.000	0.600	56.200	55.695	0.505	59.4	100	5.50	55.5
18.001	2	5	10.000	0.600	55.695	55.526	0.169	59.2	100	5.67	54.8
19.000	3	4	30.000	0.600	57.320	56.815	0.505	59.4	100	5.50	55.5
19.001	4	5	10.000	0.600	56.815	55.526	1.289	7.8	100	5.56	55.2
18.002	5	10	18.000	0.600	55.401	54.555	0.746	24.1	225	5.78	54.4
20.000	6	7	30.000	0.600	56.200	55.695	0.505	59.4	100	5.50	55.5
20.001	7	10	10.000	0.600	55.695	54.780	0.915	10.9	100	5.57	55.2
21.000	8	9	30.000	0.600	56.380	55.875	0.505	59.4	100	5.50	55.5
21.001	9	10	10.000	0.600	55.875	54.780	1.095	9.1	100	5.56	55.2

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
18.000	1.001	7.9	1.4	0.500	1.005	0.009	0.0
18.001	1.003	7.9	2.7	1.005	1.674	0.018	0.0
19.000	1.001	7.9	1.4	0.500	1.005	0.009	0.0
19.001	2.792	21.9	2.7	1.005	1.674	0.018	0.0
18.002	2.674	106.3	5.3	1.674	1.790	0.036	0.0
20.000	1.001	7.9	1.4	0.500	1.005	0.009	0.0
20.001	2.351	18.5	2.7	1.005	1.790	0.018	0.0
21.000	1.001	7.9	2.3	0.500	1.945	0.015	0.0
21.001	2.573	20.2	3.6	1.945	1.790	0.024	0.0

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
18.003	10	15	18.000	0.600	54.655	53.940	0.715	25.2	225	5.89	53.9
22.000	11	12	30.000	0.600	54.930	54.425	0.505	59.4	100	5.50	55.5
22.001	12	15	10.000	0.600	54.425	54.065	0.360	27.8	100	5.61	55.0
23.000	13	14	30.000	0.600	54.670	54.165	0.505	59.4	100	5.50	55.5
23.001	14	15	10.000	0.600	54.115	54.015	0.100	100.0	150	5.67	54.8
18.004	15	24	18.000	0.600	53.940	53.200	0.740	24.3	225	6.01	53.5
24.000	16	17	15.000	0.600	54.930	54.677	0.253	59.3	100	5.25	56.5
24.001	17	19	12.000	0.600	54.677	54.475	0.202	59.4	100	5.45	55.7
25.000	18	19	15.000	0.600	54.930	54.475	0.455	33.0	100	5.19	56.8
24.002	19	20	6.000	0.600	54.475	54.374	0.101	59.4	100	5.55	55.3
24.003	20	21	30.000	0.600	54.374	53.869	0.505	59.4	100	6.05	53.4
24.004	21	24	10.000	0.600	53.869	53.325	0.544	18.4	100	6.14	53.0
26.000	22	23	30.000	0.600	54.670	54.165	0.505	59.4	100	5.50	55.5
26.001	23	24	10.000	0.600	54.165	53.325	0.840	11.9	100	5.57	55.2

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
18.003	2.618	104.1	15.4	1.790	1.665	0.105	0.0
22.000	1.001	7.9	1.4	0.500	1.005	0.009	0.0
22.001	1.470	11.5	2.7	1.005	1.665	0.018	0.0
23.000	1.001	7.9	2.3	0.500	1.005	0.015	0.0
23.001	1.005	17.8	3.6	1.005	1.665	0.024	0.0
18.004	2.664	105.9	21.3	1.665	1.575	0.147	0.0
24.000	1.002	7.9	0.5	0.500	0.753	0.003	0.0
24.001	1.001	7.9	0.9	0.753	0.955	0.006	0.0
25.000	1.348	10.6	0.6	0.500	0.955	0.004	0.0
24.002	1.001	7.9	1.9	0.955	1.056	0.013	0.0
24.003	1.001	7.9	3.2	1.056	1.561	0.022	0.0
24.004	1.810	14.2	4.5	1.561	1.575	0.031	0.0
26.000	1.001	7.9	1.4	0.500	1.005	0.009	0.0
26.001	2.252	17.7	2.7	1.005	1.575	0.018	0.0



Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
18.005	24	31	10.000	0.600	53.200	52.757	0.443	22.6	225	6.20	52.8
16.000	25	26	22.000	0.600	56.380	55.110	1.270	17.3	100	5.20	56.7
16.001	26	27	14.000	0.600	55.110	54.874	0.236	59.3	100	5.43	55.7
16.002	27	29	14.000	0.600	54.874	54.638	0.236	59.3	100	5.66	54.8
17.000	28	29	14.000	0.600	55.110	54.638	0.472	29.7	100	5.16	56.8
16.003	29	30	20.000	0.600	54.513	53.075	1.438	13.9	225	5.76	54.5
16.004	30	31	54.000	0.600	53.075	52.757	0.318	169.8	225	6.66	51.3
16.005	31	33	28.000	0.600	52.682	51.272	1.410	19.9	300	6.79	50.8
27.000	32	33	25.000	0.600	51.495	51.347	0.148	168.9	225	5.42	55.8
16.006	33	42	34.000	0.600	51.197	51.092	0.105	323.8	375	7.35	49.1
31.000	34	36	12.000	0.600	54.575	54.325	0.250	48.0	225	5.11	57.1
30.000	35	36	14.000	0.600	55.375	54.325	1.050	13.3	225	5.06	57.3
30.001	36	41	10.000	0.600	54.325	53.975	0.350	28.6	225	5.17	56.8
28.000	37	38	24.000	0.600	56.410	56.006	0.404	59.4	100	5.40	55.9

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
18.005	2.765	110.0	33.8	1.575	1.518	0.236	0.0
16.000	1.864	14.6	0.9	0.500	0.500	0.006	0.0
16.001	1.002	7.9	2.3	0.500	0.736	0.015	0.0
16.002	1.002	7.9	2.8	0.736	0.972	0.019	0.0
17.000	1.422	11.2	0.5	0.500	0.972	0.003	0.0
16.003	3.527	140.2	8.4	0.972	1.200	0.057	0.0
16.004	1.000	39.8	17.4	1.200	1.518	0.125	0.0
16.005	3.544	250.5	53.3	1.518	2.928	0.387	0.0
27.000	1.003	39.9	7.4	1.200	2.928	0.049	0.0
16.006	1.001	110.6	63.5	2.928	3.233	0.477	0.0
31.000	1.892	75.2	3.4	1.200	1.200	0.022	0.0
30.000	3.602	143.2	1.7	1.200	1.200	0.011	0.0
30.001	2.457	97.7	6.5	1.200	1.200	0.042	0.0
28.000	1.001	7.9	0.9	0.500	0.904	0.006	0.0



Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
28.001	38	40	15.000	0.600	56.006	55.753	0.253	59.3	100	5.65	54.9
29.000	39	40	24.000	0.600	56.410	55.753	0.657	36.5	100	5.31	56.2
28.002	40	41	8.000	0.600	55.753	54.100	1.653	4.8	100	5.69	54.7
28.003	41	42	30.000	0.600	53.975	51.242	2.733	11.0	225	5.81	54.2
16.007	42	43	14.000	0.600	51.092	51.048	0.044	318.2	375	7.59	48.4
16.008	43	88	48.000	0.600	51.048	50.160	0.888	54.1	375	7.91	47.5
1.000	44	45	24.000	0.600	54.230	52.950	1.280	18.8	100	5.22	56.6
1.001	45	46	16.000	0.600	52.950	51.840	1.110	14.4	100	5.35	56.1
1.002	46	47	16.000	0.600	51.840	51.558	0.282	56.7	100	5.61	55.0
1.003	47	49	8.000	0.600	51.558	51.417	0.141	56.7	100	5.74	54.5
2.000	48	49	14.000	0.600	51.640	51.417	0.223	62.8	100	5.24	56.5
1.004	49	53	6.000	0.600	51.367	51.199	0.168	35.7	150	5.80	54.3
3.000	50	51	24.000	0.600	54.230	52.950	1.280	18.8	100	5.22	56.6
3.001	51	52	16.000	0.600	52.950	51.840	1.110	14.4	100	5.35	56.1

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
28.001	1.002	7.9	1.8	0.904	1.157	0.012	0.0
29.000	1.280	10.1	0.9	0.500	1.157	0.006	0.0
28.002	3.539	27.8	3.6	1.157	1.200	0.024	0.0
28.003	3.971	157.9	13.7	1.200	3.233	0.093	0.0
16.007	1.010	111.6	76.5	3.233	2.077	0.583	0.0
16.008	2.469	272.7	79.4	2.077	2.215	0.617	0.0
1.000	1.792	14.1	0.9	0.500	0.500	0.006	0.0
1.001	2.045	16.1	2.4	0.500	1.250	0.016	0.0
1.002	1.025	8.0	3.3	1.250	1.172	0.022	0.0
1.003	1.025	8.0	3.8	1.172	1.313	0.026	0.0
2.000	0.973	7.6	1.4	1.090	1.313	0.009	0.0
1.004	1.689	29.9	6.5	1.313	1.481	0.044	0.0
3.000	1.792	14.1	0.9	0.500	0.500	0.006	0.0
3.001	2.045	16.1	2.3	0.500	0.890	0.015	0.0



Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
3.002	52	53	16.000	0.600	51.790	51.199	0.591	27.1	150	5.49	55.5
1.005	53	55	10.000	0.600	51.124	51.065	0.059	169.5	225	5.97	53.7
4.000	54	55	25.000	0.600	52.575	51.065	1.510	16.6	225	5.13	57.0
1.006	55	57	16.000	0.600	51.065	50.970	0.095	168.4	225	6.24	52.7
5.000	56	57	16.000	0.600	51.640	51.095	0.545	29.4	100	5.19	56.7
1.007	57	59	6.000	0.600	50.970	50.934	0.036	166.7	225	6.33	52.4
6.000	58	59	24.000	0.600	53.350	51.059	2.291	10.5	100	5.17	56.8
1.008	59	61	11.000	0.600	50.934	50.869	0.065	169.2	225	6.52	51.7
7.000	60	61	16.000	0.600	52.230	50.994	1.236	12.9	100	5.12	57.0
1.009	61	63	6.000	0.600	50.869	50.833	0.036	166.7	225	6.62	51.4
8.000	62	63	24.000	0.600	53.350	50.958	2.392	10.0	100	5.16	56.8
1.010	63	75	12.000	0.600	50.833	50.762	0.071	169.0	225	6.82	50.7
10.000	64	65	24.000	0.600	53.790	53.386	0.404	59.4	100	5.40	55.9
10.001	65	67	14.000	0.600	53.386	53.150	0.236	59.3	100	5.63	54.9

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
3.002	1.942	34.3	3.2	0.890	1.481	0.021	0.0
1.005	1.001	39.8	9.9	1.481	1.540	0.068	0.0
4.000	3.231	128.5	3.7	1.200	1.540	0.024	0.0
1.006	1.004	39.9	17.4	1.540	2.505	0.122	0.0
5.000	1.429	11.2	1.8	1.090	2.505	0.012	0.0
1.007	1.010	40.1	20.7	2.505	2.791	0.146	0.0
6.000	2.401	18.9	0.9	0.500	2.791	0.006	0.0
1.008	1.002	39.8	22.2	2.791	2.856	0.158	0.0
7.000	2.159	17.0	0.6	0.500	2.856	0.004	0.0
1.009	1.010	40.1	23.0	2.856	2.892	0.165	0.0
8.000	2.454	19.3	0.9	0.500	2.892	0.006	0.0
1.010	1.003	39.9	24.3	2.892	2.033	0.177	0.0
10.000	1.001	7.9	0.9	0.500	0.904	0.006	0.0
10.001	1.002	7.9	1.8	0.904	1.140	0.012	0.0



Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
11.000	66	67	24.000	0.600	53.790	53.150	0.640	37.5	100	5.32	56.2
10.002	67	68	4.000	0.600	53.150	53.082	0.068	58.8	100	5.70	54.7
10.003	68	70	8.000	0.600	53.082	52.100	0.982	8.1	100	5.75	54.5
12.000	69	70	12.000	0.600	52.675	51.975	0.700	17.1	225	5.06	57.3
10.004	70	74	8.000	0.600	51.975	51.639	0.336	23.8	225	5.80	54.3
9.000	71	72	30.000	0.600	52.370	52.072	0.298	100.7	150	5.50	55.5
9.001	72	73	18.000	0.600	52.072	51.893	0.179	100.6	150	5.80	54.3
9.002	73	74	18.000	0.600	51.893	51.714	0.179	100.6	150	6.10	53.2
9.003	74	75	26.000	0.600	51.639	50.762	0.877	29.6	225	6.28	52.5
1.011	75	76	24.000	0.600	50.687	50.588	0.099	242.4	300	7.21	49.5
1.012	76	77	16.000	0.600	50.588	50.522	0.066	242.4	300	7.48	48.7
1.013	77	79	10.000	0.600	50.522	50.481	0.041	243.9	300	7.65	48.2
13.000	78	79	30.000	0.600	52.420	50.681	1.739	17.3	100	5.27	56.4
1.014	79	81	24.000	0.600	50.481	50.382	0.099	242.4	300	8.04	47.1

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
11.000	1.263	9.9	0.9	0.500	1.140	0.006	0.0
10.002	1.006	7.9	3.6	1.140	0.768	0.024	0.0
10.003	2.725	21.4	3.5	0.768	1.200	0.024	0.0
12.000	3.175	126.3	3.4	1.200	1.200	0.022	0.0
10.004	2.692	107.0	6.8	1.200	1.156	0.046	0.0
9.000	1.001	17.7	3.6	0.500	0.798	0.024	0.0
9.001	1.002	17.7	5.6	0.798	0.977	0.038	0.0
9.002	1.002	17.7	7.5	0.977	1.156	0.052	0.0
9.003	2.411	95.9	15.7	1.156	2.033	0.110	0.0
1.011	1.005	71.0	40.4	2.033	2.132	0.301	0.0
1.012	1.005	71.0	39.7	2.132	2.198	0.301	0.0
1.013	1.002	70.8	41.4	2.198	2.239	0.317	0.0
13.000	1.868	14.7	3.4	0.500	2.239	0.022	0.0
1.014	1.005	71.0	45.4	2.239	2.338	0.355	0.0

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (mm)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
14.000	80	81	30.000	0.600	52.420	50.582	1.838	16.3	100	5.26	56.4
1.015	81	82	18.000	0.600	50.382	50.308	0.074	243.2	300	8.34	46.4
1.016	82	87	26.000	0.600	50.308	50.201	0.107	243.0	300	8.77	45.3
15.000	83	84	30.000	0.600	52.370	52.072	0.298	100.7	150	5.50	55.5
15.001	84	85	20.000	0.600	52.072	51.873	0.199	100.5	150	5.83	54.2
15.002	85	86	26.000	0.600	51.873	51.615	0.258	100.8	150	6.27	52.6
15.003	86	87	26.000	0.600	51.615	50.351	1.264	20.6	150	6.46	51.9
1.017	87	88	10.000	0.600	50.201	50.160	0.041	243.9	300	8.94	44.9
1.018	88	89	20.000	0.600	50.160	50.000	0.160	125.0	225	9.23	44.2

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
14.000	1.921	15.1	3.7	0.500	2.338	0.024	0.0
1.015	1.003	70.9	49.4	2.338	2.412	0.393	0.0
1.016	1.004	71.0	49.9	2.412	2.519	0.407	0.0
15.000	1.001	17.7	3.6	0.500	0.798	0.024	0.0
15.001	1.002	17.7	5.6	0.798	0.997	0.038	0.0
15.002	1.001	17.7	7.4	0.997	1.255	0.052	0.0
15.003	2.230	39.4	9.3	1.255	2.519	0.066	0.0
1.017	1.002	70.8	59.2	2.519	2.290	0.487	0.0
1.018	1.168	46.4	137.3	2.365	0.975	1.146	0.0

Simulation Settings

Rainfall Methodology	FSR	Summer CV	0.750	Drain Down Time (mins)	240
FSR Region	England and Wales	Winter CV	0.840	Additional Storage (m³/ha)	20.0
M5-60 (mm)	19,000	Analysis Speed	Normal	Check Discharge Rate(s)	x
Ratio-R	0.300	Skip Steady State	x	Check Discharge Volume	x

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440
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Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)	Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0	100	0	0	0
30	0	0	0	100	50	0	0

Node 88 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	50.160	Product Number	CTL-SHE-0168-1790-2450-1790
Design Depth (m)	2.450	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	17.9	Min Node Diameter (mm)	1800

Node 88 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	50.160
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	344.0	0.0	1.800	344.0	0.0
			1.801	0.0	0.0


Results for 1 year Critical Storm Duration. Lowest mass balance: 99.01%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	10	56.225	0.025	1.1	0.0114	0.0000	OK
15 minute winter	2	11	55.731	0.036	2.2	0.0117	0.0000	OK
15 minute winter	3	10	57.346	0.026	1.1	0.0118	0.0000	OK
15 minute winter	4	10	56.836	0.021	2.1	0.0069	0.0000	OK
15 minute winter	5	11	55.431	0.030	4.2	0.0344	0.0000	OK
15 minute winter	6	10	56.225	0.025	1.1	0.0116	0.0000	OK
15 minute winter	7	10	55.718	0.023	2.2	0.0075	0.0000	OK
15 minute winter	8	10	56.414	0.034	1.8	0.0223	0.0000	OK
15 minute winter	9	10	55.901	0.026	2.9	0.0064	0.0000	OK
15 minute winter	10	11	54.707	0.052	12.2	0.0727	0.0000	OK
15 minute winter	11	10	54.955	0.025	1.1	0.0114	0.0000	OK
15 minute winter	12	11	54.455	0.030	2.2	0.0095	0.0000	OK
15 minute winter	13	11	54.702	0.032	1.8	0.0213	0.0000	OK
15 minute winter	14	11	54.156	0.041	2.8	0.0131	0.0000	OK
15 minute winter	15	11	54.001	0.061	17.1	0.0691	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1	18.000	2	1.1	0.526	0.134	0.0608	
15 minute winter	2	18.001	5	2.1	0.832	0.265	0.0251	
15 minute winter	3	19.000	4	1.1	0.749	0.134	0.0422	
15 minute winter	4	19.001	5	2.1	1.737	0.096	0.0121	
15 minute winter	5	18.002	10	4.2	0.845	0.039	0.0910	
15 minute winter	6	20.000	7	1.1	0.717	0.134	0.0441	
15 minute winter	7	20.001	10	2.1	1.533	0.113	0.0136	
15 minute winter	8	21.000	9	1.8	0.896	0.223	0.0591	
15 minute winter	9	21.001	10	2.8	1.775	0.138	0.0157	
15 minute winter	10	18.003	15	12.3	1.573	0.118	0.1405	
15 minute winter	11	22.000	12	1.1	0.613	0.134	0.0516	
15 minute winter	12	22.001	15	2.1	1.096	0.181	0.0190	
15 minute winter	13	23.000	14	1.7	0.801	0.221	0.0651	
15 minute winter	14	23.001	15	2.8	0.718	0.156	0.0386	
15 minute winter	15	18.004	24	17.2	1.564	0.162	0.1989	

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.01%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	16	10	54.945	0.015	0.4	0.0038	0.0000	OK
15 minute winter	17	11	54.697	0.020	0.8	0.0046	0.0000	OK
15 minute winter	18	11	54.945	0.015	0.5	0.0043	0.0000	OK
15 minute winter	19	11	54.505	0.030	1.6	0.0065	0.0000	OK
15 minute winter	20	11	54.415	0.041	2.5	0.0128	0.0000	OK
15 minute winter	21	11	53.904	0.035	3.6	0.0095	0.0000	OK
15 minute winter	22	10	54.695	0.025	1.1	0.0116	0.0000	OK
15 minute winter	23	10	54.189	0.024	2.2	0.0077	0.0000	OK
15 minute winter	24	11	53.284	0.084	27.5	0.1316	0.0000	OK
15 minute winter	25	11	56.395	0.015	0.7	0.0054	0.0000	OK
15 minute winter	26	10	55.142	0.032	1.8	0.0147	0.0000	OK
15 minute winter	27	11	54.912	0.038	2.2	0.0096	0.0000	OK
15 minute winter	28	10	55.122	0.012	0.4	0.0032	0.0000	OK
15 minute winter	29	10	54.546	0.033	6.8	0.0575	0.0000	OK
15 minute winter	30	11	53.170	0.095	15.0	0.1972	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	16	24.000	17	0.4	0.397	0.045	0.0135	
15 minute winter	17	24.001	19	0.7	0.449	0.088	0.0186	
15 minute winter	18	25.000	19	0.5	0.456	0.047	0.0204	
15 minute winter	19	24.002	20	1.5	0.619	0.195	0.0149	
15 minute winter	20	24.003	21	2.6	0.939	0.326	0.0819	
15 minute winter	21	24.004	24	3.6	1.471	0.251	0.0243	
15 minute winter	22	26.000	23	1.1	0.709	0.134	0.0446	
15 minute winter	23	26.001	24	2.1	1.487	0.118	0.0141	
15 minute winter	24	18.005	31	27.6	2.182	0.251	0.1265	
15 minute winter	25	16.000	26	0.7	0.506	0.048	0.0318	
15 minute winter	26	16.001	27	1.7	0.732	0.222	0.0338	
15 minute winter	27	16.002	29	2.2	0.852	0.285	0.0369	
15 minute winter	28	17.000	29	0.4	0.641	0.032	0.0077	
15 minute winter	29	16.003	30	6.7	0.762	0.048	0.1946	
15 minute winter	30	16.004	31	14.3	0.918	0.360	0.8415	

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.01%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	31	11	52.767	0.085	44.9	0.1210	0.0000	OK
15 minute winter	32	10	51.554	0.059	6.0	0.1070	0.0000	OK
15 minute winter	33	11	51.395	0.198	55.4	0.2734	0.0000	OK
15 minute winter	34	10	54.604	0.029	2.7	0.0416	0.0000	OK
15 minute winter	35	11	55.390	0.015	1.3	0.0197	0.0000	OK
15 minute winter	36	10	54.360	0.035	5.1	0.0436	0.0000	OK
15 minute winter	37	11	56.430	0.020	0.7	0.0072	0.0000	OK
15 minute winter	38	11	56.036	0.030	1.4	0.0085	0.0000	OK
15 minute winter	39	11	56.428	0.018	0.7	0.0064	0.0000	OK
15 minute winter	40	11	55.775	0.022	2.8	0.0056	0.0000	OK
15 minute winter	41	10	54.015	0.040	11.0	0.0609	0.0000	OK
15 minute winter	42	11	51.294	0.202	67.5	0.2436	0.0000	OK
15 minute winter	43	11	51.201	0.153	70.9	0.2155	0.0000	OK
15 minute winter	44	11	54.245	0.015	0.7	0.0055	0.0000	OK
15 minute winter	45	10	52.973	0.023	1.9	0.0114	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	31	16.005	33	44.9	2.219	0.179	0.6125	
15 minute winter	32	27.000	33	5.8	0.713	0.145	0.2025	
15 minute winter	33	16.006	42	55.2	0.921	0.499	2.0363	
15 minute winter	34	31.000	36	2.7	0.780	0.035	0.0410	
15 minute winter	35	30.000	36	1.3	0.551	0.009	0.0351	
15 minute winter	36	30.001	41	5.0	1.150	0.051	0.0433	
15 minute winter	37	28.000	38	0.7	0.454	0.089	0.0375	
15 minute winter	38	28.001	40	1.4	0.855	0.177	0.0246	
15 minute winter	39	29.000	40	0.7	0.633	0.070	0.0267	
15 minute winter	40	28.002	41	2.8	2.228	0.100	0.0100	
15 minute winter	41	28.003	42	11.1	2.179	0.070	0.1762	
15 minute winter	42	16.007	43	67.0	1.352	0.600	0.7204	
15 minute winter	43	16.008	88	72.1	2.892	0.265	1.3918	
15 minute winter	44	1.000	45	0.7	0.675	0.050	0.0254	
15 minute winter	45	1.001	46	1.9	0.912	0.116	0.0331	

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.01%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	46	11	51.879	0.039	2.6	0.0096	0.0000	OK
15 minute winter	47	11	51.603	0.045	3.0	0.0100	0.0000	OK
15 minute winter	48	10	51.666	0.026	1.1	0.0079	0.0000	OK
15 minute winter	49	11	51.412	0.045	5.1	0.0127	0.0000	OK
15 minute winter	50	11	54.245	0.015	0.7	0.0055	0.0000	OK
15 minute winter	51	10	52.973	0.023	1.8	0.0104	0.0000	OK
15 minute winter	52	11	51.818	0.028	2.5	0.0076	0.0000	OK
15 minute winter	53	11	51.195	0.071	7.9	0.0138	0.0000	OK
15 minute winter	54	10	52.598	0.023	2.9	0.0341	0.0000	OK
15 minute winter	55	11	51.162	0.097	14.1	0.1423	0.0000	OK
15 minute winter	56	10	51.665	0.025	1.5	0.0090	0.0000	OK
15 minute winter	57	11	51.089	0.119	17.0	0.1456	0.0000	OK
15 minute winter	58	11	53.363	0.013	0.7	0.0048	0.0000	OK
15 minute winter	59	11	51.053	0.119	18.3	0.1392	0.0000	OK
15 minute winter	60	11	52.242	0.012	0.5	0.0035	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	46	1.002	47	2.6	0.832	0.317	0.0491	
15 minute winter	47	1.003	49	3.1	0.926	0.379	0.0264	
15 minute winter	48	2.000	49	1.1	0.677	0.138	0.0218	
15 minute winter	49	1.004	53	5.1	1.209	0.171	0.0254	
15 minute winter	50	3.000	51	0.7	0.684	0.050	0.0250	
15 minute winter	51	3.001	52	1.8	1.328	0.109	0.0211	
15 minute winter	52	3.002	53	2.4	1.116	0.071	0.0351	
15 minute winter	53	1.005	55	7.9	0.587	0.199	0.1351	
15 minute winter	54	4.000	55	2.9	0.372	0.022	0.2299	
15 minute winter	55	1.006	57	14.2	0.752	0.355	0.3015	
15 minute winter	56	5.000	57	1.5	0.977	0.130	0.0240	
15 minute winter	57	1.007	59	16.9	0.794	0.422	0.1280	
15 minute winter	58	6.000	59	0.7	1.140	0.037	0.0147	
15 minute winter	59	1.008	61	18.2	0.826	0.457	0.2425	
15 minute winter	60	7.000	61	0.5	0.954	0.029	0.0084	



Results for 1 year Critical Storm Duration. Lowest mass balance: 99.01%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	61	11	50.995	0.126	19.0	0.0225	0.0000	OK
15 minute winter	62	11	53.363	0.013	0.7	0.0047	0.0000	OK
15 minute winter	63	12	50.954	0.121	20.2	0.1418	0.0000	OK
15 minute winter	64	11	53.810	0.020	0.7	0.0072	0.0000	OK
15 minute winter	65	11	53.415	0.029	1.4	0.0080	0.0000	OK
15 minute winter	66	11	53.808	0.018	0.7	0.0065	0.0000	OK
15 minute winter	67	11	53.196	0.046	2.8	0.0118	0.0000	OK
15 minute winter	68	11	53.107	0.025	2.8	0.0040	0.0000	OK
15 minute winter	69	10	52.698	0.023	2.7	0.0327	0.0000	OK
15 minute winter	70	11	52.009	0.034	5.3	0.0385	0.0000	OK
15 minute winter	71	10	52.410	0.040	2.9	0.0363	0.0000	OK
15 minute winter	72	11	52.123	0.051	4.5	0.0233	0.0000	OK
15 minute winter	73	11	51.956	0.063	6.1	0.0255	0.0000	OK
15 minute winter	74	11	51.694	0.055	12.8	0.0722	0.0000	OK
15 minute winter	75	11	50.842	0.155	34.2	0.1943	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	61	1.009	63	18.8	0.846	0.469	0.1336	
15 minute winter	62	8.000	63	0.7	1.157	0.036	0.0145	
15 minute winter	63	1.010	75	20.3	0.973	0.508	0.2498	
15 minute winter	64	10.000	65	0.7	0.477	0.089	0.0356	
15 minute winter	65	10.001	67	1.4	0.524	0.177	0.0375	
15 minute winter	66	11.000	67	0.7	0.338	0.071	0.0538	
15 minute winter	67	10.002	68	2.8	1.112	0.351	0.0101	
15 minute winter	68	10.003	70	2.8	1.838	0.129	0.0120	
15 minute winter	69	12.000	70	2.7	0.932	0.021	0.0348	
15 minute winter	70	10.004	74	5.3	0.961	0.050	0.0453	
15 minute winter	71	9.000	72	2.8	0.621	0.160	0.1368	
15 minute winter	72	9.001	73	4.5	0.726	0.252	0.1106	
15 minute winter	73	9.002	74	6.1	0.894	0.343	0.1224	
15 minute winter	74	9.003	75	12.8	1.527	0.134	0.2635	
15 minute winter	75	1.011	76	34.1	0.904	0.480	0.9124	

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.01%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	76	12	50.752	0.164	34.1	0.1850	0.0000	OK
15 minute winter	77	12	50.696	0.174	35.7	0.2191	0.0000	OK
15 minute winter	78	10	52.449	0.029	2.7	0.0259	0.0000	OK
15 minute winter	79	12	50.652	0.171	39.3	0.2151	0.0000	OK
15 minute winter	80	10	52.450	0.030	2.9	0.0286	0.0000	OK
15 minute winter	81	12	50.565	0.183	42.8	0.2268	0.0000	OK
15 minute winter	82	13	50.489	0.181	43.4	0.2236	0.0000	OK
15 minute winter	83	10	52.410	0.040	2.9	0.0363	0.0000	OK
15 minute winter	84	11	52.123	0.051	4.5	0.0232	0.0000	OK
15 minute winter	85	11	51.937	0.064	6.0	0.0260	0.0000	OK
15 minute winter	86	11	51.661	0.046	7.7	0.0164	0.0000	OK
240 minute winter	87	172	50.481	0.280	14.9	0.3442	0.0000	OK
240 minute winter	88	172	50.480	0.320	34.7	105.6130	0.0000	SURCHARGED
240 minute winter	89	172	50.086	0.086	14.6	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	76	1.012	77	34.2	0.838	0.481	0.6533	
15 minute winter	77	1.013	79	35.6	0.848	0.502	0.4195	
15 minute winter	78	13.000	79	2.6	1.403	0.179	0.0562	
15 minute winter	79	1.014	81	39.1	0.902	0.550	1.0396	
15 minute winter	80	14.000	81	2.8	1.461	0.187	0.0581	
15 minute winter	81	1.015	82	42.1	0.944	0.594	0.8032	
15 minute winter	82	1.016	87	43.7	0.994	0.616	1.1426	
15 minute winter	83	15.000	84	2.8	0.626	0.160	0.1357	
15 minute winter	84	15.001	85	4.4	0.711	0.251	0.1251	
15 minute winter	85	15.002	86	6.1	1.038	0.344	0.1529	
15 minute winter	86	15.003	87	7.7	1.710	0.194	0.1165	
240 minute winter	87	1.017	88	14.4	0.790	0.203	0.6941	
240 minute winter	88	1.018	89	14.6	1.015	0.314	0.2876	170.7



Results for 30 year Critical Storm Duration. Lowest mass balance: 99.01%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	10	56.240	0.040	2.7	0.0183	0.0000	OK
15 minute winter	2	11	55.758	0.063	5.3	0.0202	0.0000	OK
15 minute winter	3	10	57.362	0.042	2.7	0.0191	0.0000	OK
15 minute winter	4	10	56.850	0.035	5.3	0.0111	0.0000	OK
15 minute winter	5	11	55.448	0.047	10.3	0.0535	0.0000	OK
15 minute winter	6	10	56.241	0.041	2.7	0.0188	0.0000	OK
15 minute winter	7	10	55.733	0.038	5.3	0.0122	0.0000	OK
15 minute winter	8	10	56.437	0.057	4.5	0.0376	0.0000	OK
15 minute winter	9	10	55.918	0.043	7.1	0.0105	0.0000	OK
15 minute winter	10	10	54.740	0.085	30.4	0.1187	0.0000	OK
15 minute winter	11	10	54.970	0.040	2.7	0.0183	0.0000	OK
15 minute winter	12	10	54.474	0.049	5.3	0.0159	0.0000	OK
15 minute winter	13	10	54.724	0.054	4.5	0.0357	0.0000	OK
15 minute winter	14	10	54.184	0.069	7.0	0.0217	0.0000	OK
15 minute winter	15	11	54.039	0.099	42.3	0.1115	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 winter	1	18.000	2	2.6	0.653	0.334	0.1206	
15 minute winter	2	18.001	5	5.2	1.037	0.658	0.0500	
15 minute winter	3	19.000	4	2.6	0.960	0.334	0.0821	
15 minute winter	4	19.001	5	5.2	2.236	0.239	0.0234	
15 minute winter	5	18.002	10	10.4	1.073	0.098	0.1771	
15 minute winter	6	20.000	7	2.6	0.917	0.334	0.0860	
15 minute winter	7	20.001	10	5.2	1.969	0.283	0.0266	
15 minute winter	8	21.000	9	4.4	1.131	0.559	0.1167	
15 minute winter	9	21.001	10	7.0	2.268	0.346	0.0308	
15 minute winter	10	18.003	15	30.3	1.995	0.291	0.2731	
15 minute winter	11	22.000	12	2.6	0.777	0.334	0.1015	
15 minute winter	12	22.001	15	5.2	1.387	0.448	0.0374	
15 minute winter	13	23.000	14	4.3	1.017	0.550	0.1279	
15 minute winter	14	23.001	15	6.9	0.913	0.389	0.0758	
15 minute winter	15	18.004	24	42.5	1.898	0.402	0.4023	

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.01%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	16	10	54.952	0.022	0.9	0.0058	0.0000	OK
15 minute winter	17	10	54.709	0.032	1.8	0.0072	0.0000	OK
15 minute winter	18	10	54.953	0.023	1.2	0.0066	0.0000	OK
15 minute winter	19	11	54.527	0.052	3.8	0.0112	0.0000	OK
15 minute winter	20	11	54.445	0.071	6.3	0.0223	0.0000	OK
15 minute winter	21	11	53.930	0.061	8.8	0.0163	0.0000	OK
15 minute winter	22	10	54.711	0.041	2.7	0.0187	0.0000	OK
15 minute winter	23	10	54.204	0.039	5.3	0.0125	0.0000	OK
15 minute winter	24	11	53.349	0.149	67.7	0.2352	0.0000	OK
15 minute winter	25	10	56.404	0.024	1.8	0.0085	0.0000	OK
15 minute winter	26	10	55.164	0.054	4.5	0.0249	0.0000	OK
15 minute winter	27	11	54.939	0.065	5.6	0.0165	0.0000	OK
15 minute winter	28	10	55.129	0.019	0.9	0.0049	0.0000	OK
15 minute winter	29	10	54.565	0.052	16.6	0.0891	0.0000	OK
15 minute winter	30	11	53.245	0.170	36.7	0.3547	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	16	24.000	17	0.9	0.508	0.110	0.0257	
15 minute winter	17	24.001	19	1.7	0.555	0.215	0.0371	
15 minute winter	18	25.000	19	1.2	0.452	0.111	0.0402	
15 minute winter	19	24.002	20	3.7	0.736	0.470	0.0300	
15 minute winter	20	24.003	21	6.3	1.149	0.797	0.1635	
15 minute winter	21	24.004	24	8.8	1.833	0.620	0.0481	
15 minute winter	22	26.000	23	2.6	0.906	0.334	0.0870	
15 minute winter	23	26.001	24	5.2	1.908	0.295	0.0274	
15 minute winter	24	18.005	31	68.1	2.662	0.620	0.2557	
15 minute winter	25	16.000	26	1.8	0.631	0.121	0.0631	
15 minute winter	26	16.001	27	4.4	0.911	0.555	0.0672	
15 minute winter	27	16.002	29	5.5	1.059	0.701	0.0730	
15 minute winter	28	17.000	29	0.9	0.835	0.077	0.0144	
15 minute winter	29	16.003	30	16.5	0.904	0.117	0.3905	
15 minute winter	30	16.004	31	35.1	1.136	0.884	1.6694	

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.01%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	31	11	52.820	0.138	110.6	0.1960	0.0000	OK
15 minute winter	32	11	51.651	0.156	14.6	0.2830	0.0000	OK
15 minute winter	33	11	51.627	0.430	132.7	0.5926	0.0000	SURCHARGED
15 minute winter	34	10	54.620	0.045	6.5	0.0642	0.0000	OK
15 minute winter	35	10	55.399	0.024	3.3	0.0302	0.0000	OK
15 minute winter	36	10	54.381	0.056	12.4	0.0699	0.0000	OK
15 minute winter	37	10	56.442	0.032	1.8	0.0116	0.0000	OK
15 minute winter	38	11	56.056	0.050	3.6	0.0140	0.0000	OK
15 minute winter	39	10	56.438	0.028	1.8	0.0102	0.0000	OK
15 minute winter	40	11	55.789	0.036	7.0	0.0091	0.0000	OK
15 minute winter	41	10	54.038	0.063	27.2	0.0948	0.0000	OK
15 minute winter	42	11	51.444	0.352	161.1	0.4232	0.0000	OK
15 minute winter	43	11	51.286	0.238	171.3	0.3354	0.0000	OK
15 minute winter	44	10	54.254	0.024	1.8	0.0087	0.0000	OK
15 minute winter	45	10	52.987	0.037	4.8	0.0183	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	31	16.005	33	110.7	2.282	0.442	1.4300	
15 minute winter	32	27.000	33	15.1	0.735	0.378	0.8632	
15 minute winter	33	16.006	42	131.2	1.190	1.187	3.7013	
15 minute winter	34	31.000	36	6.5	0.984	0.086	0.0790	
15 minute winter	35	30.000	36	3.3	0.700	0.023	0.0686	
15 minute winter	36	30.001	41	12.3	1.479	0.126	0.0833	
15 minute winter	37	28.000	38	1.8	0.583	0.224	0.0729	
15 minute winter	38	28.001	40	3.5	1.087	0.443	0.0482	
15 minute winter	39	29.000	40	1.8	0.817	0.176	0.0521	
15 minute winter	40	28.002	41	7.0	2.859	0.250	0.0195	
15 minute winter	41	28.003	42	27.0	2.157	0.171	0.6977	
15 minute winter	42	16.007	43	161.8	1.798	1.450	1.2688	
15 minute winter	43	16.008	88	172.9	3.206	0.634	3.4722	
15 minute winter	44	1.000	45	1.8	0.873	0.126	0.0493	
15 minute winter	45	1.001	46	4.7	1.117	0.293	0.0672	

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.01%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	46	10	51.909	0.069	6.5	0.0171	0.0000	OK
15 minute winter	47	11	51.644	0.086	7.6	0.0192	0.0000	OK
15 minute winter	48	10	51.682	0.042	2.7	0.0129	0.0000	OK
15 minute winter	49	13	51.476	0.109	12.6	0.0308	0.0000	OK
15 minute winter	50	10	54.254	0.024	1.8	0.0087	0.0000	OK
15 minute winter	51	10	52.987	0.037	4.5	0.0168	0.0000	OK
15 minute winter	52	10	51.833	0.043	6.2	0.0118	0.0000	OK
15 minute winter	53	13	51.461	0.337	19.9	0.0654	0.0000	SURCHARGED
15 minute winter	54	10	52.611	0.036	7.1	0.0524	0.0000	OK
15 minute winter	55	13	51.450	0.385	34.1	0.5668	0.0000	SURCHARGED
15 minute winter	56	10	51.679	0.039	3.6	0.0140	0.0000	OK
15 minute winter	57	13	51.407	0.437	35.9	0.5325	0.0000	SURCHARGED
15 minute winter	58	10	53.371	0.021	1.8	0.0075	0.0000	OK
15 minute winter	59	13	51.376	0.442	37.6	0.5177	0.0000	SURCHARGED
15 minute winter	60	10	52.248	0.018	1.2	0.0052	0.0000	OK

Link Event (Upstream Depth)	US Node	Link DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	46	1.002 47	6.4	1.000	0.796	0.1032	
15 minute winter	47	1.003 49	7.6	1.105	0.939	0.0546	
15 minute winter	48	2.000 49	2.6	0.868	0.344	0.0486	
15 minute winter	49	1.004 53	13.1	1.499	0.437	0.0940	
15 minute winter	50	3.000 51	1.8	0.884	0.126	0.0486	
15 minute winter	51	3.001 52	4.4	1.713	0.273	0.0410	
15 minute winter	52	3.002 53	6.1	1.359	0.179	0.1725	
15 minute winter	53	1.005 55	18.2	0.630	0.456	0.3977	
15 minute winter	54	4.000 55	7.0	0.511	0.055	0.5461	
15 minute winter	55	1.006 57	28.8	0.832	0.720	0.6363	
15 minute winter	56	5.000 57	3.6	1.139	0.318	0.0851	
15 minute winter	57	1.007 59	34.0	0.885	0.847	0.2386	
15 minute winter	58	6.000 59	1.8	1.222	0.094	0.1080	
15 minute winter	59	1.008 61	35.8	0.920	0.898	0.4375	
15 minute winter	60	7.000 61	1.2	1.020	0.070	0.0702	

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.01%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	61	13	51.322	0.453	37.8	0.0812	0.0000	SURCHARGED
15 minute winter	62	10	53.371	0.021	1.8	0.0074	0.0000	OK
15 minute winter	63	13	51.283	0.450	40.6	0.5258	0.0000	SURCHARGED
15 minute winter	64	10	53.822	0.032	1.8	0.0116	0.0000	OK
15 minute winter	65	11	53.433	0.047	3.6	0.0130	0.0000	OK
15 minute winter	66	10	53.819	0.029	1.8	0.0103	0.0000	OK
15 minute winter	67	11	53.234	0.084	7.0	0.0215	0.0000	OK
15 minute winter	68	11	53.124	0.041	7.0	0.0066	0.0000	OK
15 minute winter	69	10	52.710	0.035	6.5	0.0498	0.0000	OK
15 minute winter	70	11	52.028	0.053	13.2	0.0602	0.0000	OK
15 minute winter	71	10	52.435	0.065	7.1	0.0586	0.0000	OK
15 minute winter	72	10	52.160	0.088	11.2	0.0401	0.0000	OK
15 minute winter	73	11	52.006	0.113	15.1	0.0460	0.0000	OK
15 minute winter	74	11	51.728	0.089	31.7	0.1157	0.0000	OK
15 minute winter	75	13	51.209	0.522	73.4	0.6531	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	61	1.009	63	37.0	0.942	0.921	0.2386	
15 minute winter	62	8.000	63	1.8	1.377	0.092	0.1075	
15 minute winter	63	1.010	75	38.6	1.059	0.968	0.4773	
15 minute winter	64	10.000	65	1.8	0.616	0.224	0.0689	
15 minute winter	65	10.001	67	3.5	0.653	0.443	0.0741	
15 minute winter	66	11.000	67	1.8	0.409	0.178	0.1060	
15 minute winter	67	10.002	68	7.0	1.350	0.883	0.0202	
15 minute winter	68	10.003	70	7.0	2.353	0.326	0.0237	
15 minute winter	69	12.000	70	6.5	1.211	0.051	0.0656	
15 minute winter	70	10.004	74	13.2	1.241	0.124	0.0867	
15 minute winter	71	9.000	72	7.0	0.769	0.395	0.2724	
15 minute winter	72	9.001	73	11.0	0.882	0.620	0.2243	
15 minute winter	73	9.002	74	15.0	1.094	0.850	0.2475	
15 minute winter	74	9.003	75	31.7	1.551	0.331	0.7057	
15 minute winter	75	1.011	76	66.4	0.997	0.935	1.6901	



Results for 30 year Critical Storm Duration. Lowest mass balance: 99.01%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	76	13	51.114	0.526	66.4	0.5953	0.0000	SURCHARGED
15 minute winter	77	13	51.044	0.522	65.0	0.6567	0.0000	SURCHARGED
15 minute winter	78	10	52.467	0.047	6.5	0.0415	0.0000	OK
15 minute winter	79	13	50.987	0.506	72.9	0.6358	0.0000	SURCHARGED
15 minute winter	80	10	52.468	0.048	7.1	0.0462	0.0000	OK
240 minute winter	81	188	50.980	0.598	24.4	0.7397	0.0000	SURCHARGED
240 minute winter	82	188	50.979	0.671	24.3	0.8283	0.0000	SURCHARGED
15 minute winter	83	10	52.435	0.065	7.1	0.0586	0.0000	OK
15 minute winter	84	10	52.159	0.087	11.2	0.0396	0.0000	OK
15 minute winter	85	11	51.988	0.115	15.1	0.0463	0.0000	OK
15 minute winter	86	11	51.689	0.073	19.0	0.0263	0.0000	OK
240 minute winter	87	188	50.978	0.777	29.3	0.9560	0.0000	SURCHARGED
240 minute winter	88	188	50.977	0.817	73.1	269.4916	0.0000	SURCHARGED
240 minute winter	89	188	50.096	0.096	17.9	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	76	1.012	77	61.6	0.887	0.867	1.1267	
15 minute winter	77	1.013	79	64.6	0.917	0.912	0.7042	
15 minute winter	78	13.000	79	6.5	1.741	0.440	0.1709	
15 minute winter	79	1.014	81	71.7	1.018	1.009	1.6901	
15 minute winter	80	14.000	81	7.0	1.817	0.466	0.1733	
240 minute winter	81	1.015	82	23.4	0.764	0.330	1.2675	
240 minute winter	82	1.016	87	24.1	0.548	0.339	1.8309	
15 minute winter	83	15.000	84	7.0	0.777	0.395	0.2696	
15 minute winter	84	15.001	85	11.0	0.876	0.619	0.2498	
15 minute winter	85	15.002	86	15.1	1.293	0.852	0.2998	
15 minute winter	86	15.003	87	19.0	1.943	0.483	0.3341	
240 minute winter	87	1.017	88	28.9	1.010	0.408	0.7042	
240 minute winter	88	1.018	89	17.9	1.069	0.385	0.3349	383.0



Results for 100 year Critical Storm Duration. Lowest mass balance: 99.01%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	10	56.246	0.046	3.5	0.0212	0.0000	OK
15 minute winter	2	11	55.772	0.077	6.9	0.0249	0.0000	OK
15 minute winter	3	10	57.368	0.048	3.5	0.0222	0.0000	OK
15 minute winter	4	10	56.855	0.040	6.9	0.0129	0.0000	OK
15 minute winter	5	11	55.455	0.054	13.5	0.0612	0.0000	OK
15 minute winter	6	10	56.247	0.047	3.5	0.0218	0.0000	OK
15 minute winter	7	10	55.739	0.044	6.9	0.0142	0.0000	OK
15 minute winter	8	10	56.447	0.067	5.8	0.0444	0.0000	OK
15 minute winter	9	10	55.925	0.050	9.2	0.0122	0.0000	OK
15 minute winter	10	10	54.754	0.099	39.7	0.1383	0.0000	OK
15 minute winter	11	10	54.976	0.046	3.5	0.0212	0.0000	OK
15 minute winter	12	10	54.484	0.059	6.9	0.0189	0.0000	OK
15 minute winter	13	10	54.734	0.064	5.8	0.0421	0.0000	OK
15 minute winter	14	10	54.196	0.081	9.1	0.0254	0.0000	OK
15 minute winter	15	11	54.055	0.115	55.0	0.1305	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1	18.000	2	3.4	0.685	0.437	0.1496	
15 minute winter	2	18.001	5	6.8	1.085	0.860	0.0624	
15 minute winter	3	19.000	4	3.4	1.027	0.436	0.1002	
15 minute winter	4	19.001	5	6.8	2.399	0.312	0.0285	
15 minute winter	5	18.002	10	13.6	1.147	0.128	0.2163	
15 minute winter	6	20.000	7	3.4	0.980	0.436	0.1050	
15 minute winter	7	20.001	10	6.8	2.109	0.370	0.0324	
15 minute winter	8	21.000	9	5.7	1.190	0.720	0.1423	
15 minute winter	9	21.001	10	9.0	2.416	0.447	0.0374	
15 minute winter	10	18.003	15	39.3	2.116	0.377	0.3346	
15 minute winter	11	22.000	12	3.4	0.826	0.436	0.1246	
15 minute winter	12	22.001	15	6.8	1.475	0.587	0.0460	
15 minute winter	13	23.000	14	5.6	1.075	0.708	0.1559	
15 minute winter	14	23.001	15	9.0	0.971	0.505	0.0923	
15 minute winter	15	18.004	24	55.3	1.951	0.522	0.5017	

Results for 100 year Critical Storm Duration. Lowest mass balance: 99.01%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	16	10	54.956	0.026	1.2	0.0068	0.0000	OK
15 minute winter	17	10	54.714	0.037	2.4	0.0085	0.0000	OK
15 minute winter	18	10	54.955	0.025	1.5	0.0074	0.0000	OK
15 minute winter	19	10	54.536	0.061	5.0	0.0132	0.0000	OK
15 minute winter	20	12	54.485	0.111	8.3	0.0351	0.0000	SURCHARGED
15 minute winter	21	11	53.942	0.073	11.3	0.0194	0.0000	OK
15 minute winter	22	10	54.717	0.047	3.5	0.0218	0.0000	OK
15 minute winter	23	10	54.208	0.043	6.9	0.0140	0.0000	OK
15 minute winter	24	11	53.387	0.187	87.8	0.2944	0.0000	OK
15 minute winter	25	10	56.407	0.027	2.3	0.0096	0.0000	OK
15 minute winter	26	10	55.175	0.065	5.8	0.0297	0.0000	OK
15 minute winter	27	11	54.953	0.079	7.2	0.0202	0.0000	OK
15 minute winter	28	10	55.132	0.022	1.2	0.0058	0.0000	OK
15 minute winter	29	10	54.572	0.059	21.4	0.1014	0.0000	OK
15 minute winter	30	11	53.315	0.240	47.4	0.4996	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	16	24.000	17	1.2	0.552	0.148	0.0319	
15 minute winter	17	24.001	19	2.3	0.604	0.292	0.0460	
15 minute winter	18	25.000	19	1.5	0.463	0.139	0.0493	
15 minute winter	19	24.002	20	5.0	0.764	0.638	0.0383	
15 minute winter	20	24.003	21	7.8	1.195	0.996	0.2086	
15 minute winter	21	24.004	24	11.2	1.917	0.787	0.0583	
15 minute winter	22	26.000	23	3.4	0.988	0.434	0.1038	
15 minute winter	23	26.001	24	6.9	1.983	0.388	0.0415	
15 minute winter	24	18.005	31	88.4	2.759	0.804	0.3185	
15 minute winter	25	16.000	26	2.3	0.659	0.156	0.0774	
15 minute winter	26	16.001	27	5.7	0.952	0.719	0.0836	
15 minute winter	27	16.002	29	7.1	1.100	0.903	0.0904	
15 minute winter	28	17.000	29	1.2	0.912	0.104	0.0179	
15 minute winter	29	16.003	30	21.3	0.939	0.152	0.4796	
15 minute winter	30	16.004	31	43.1	1.179	1.084	1.9622	

Results for 100 year Critical Storm Duration. Lowest mass balance: 99.01%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	31	11	52.857	0.175	140.9	0.2484	0.0000	OK
15 minute winter	32	11	51.968	0.473	18.8	0.8599	0.0000	SURCHARGED
15 minute winter	33	11	51.934	0.737	172.7	1.0165	0.0000	SURCHARGED
15 minute winter	34	10	54.626	0.051	8.4	0.0733	0.0000	OK
15 minute winter	35	10	55.401	0.026	4.2	0.0339	0.0000	OK
15 minute winter	36	10	54.389	0.064	16.0	0.0802	0.0000	OK
15 minute winter	37	10	56.447	0.037	2.3	0.0132	0.0000	OK
15 minute winter	38	11	56.064	0.058	4.6	0.0163	0.0000	OK
15 minute winter	39	10	56.442	0.032	2.3	0.0116	0.0000	OK
15 minute winter	40	11	55.794	0.041	9.0	0.0105	0.0000	OK
15 minute winter	41	10	54.047	0.072	35.2	0.1082	0.0000	OK
15 minute winter	42	11	51.613	0.521	211.0	0.6263	0.0000	SURCHARGED
15 minute winter	43	11	51.333	0.285	222.9	0.4020	0.0000	OK
15 minute winter	44	10	54.257	0.027	2.3	0.0098	0.0000	OK
15 minute winter	45	10	52.993	0.043	6.1	0.0209	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	31	16.005	33	140.8	2.224	0.562	1.5844	
15 minute winter	32	27.000	33	18.1	0.720	0.453	0.9943	
15 minute winter	33	16.006	42	171.9	1.559	1.555	3.7501	
15 minute winter	34	31.000	36	8.3	1.047	0.111	0.0958	
15 minute winter	35	30.000	36	4.2	0.739	0.029	0.0829	
15 minute winter	36	30.001	41	15.9	1.578	0.162	0.1005	
15 minute winter	37	28.000	38	2.3	0.618	0.288	0.0881	
15 minute winter	38	28.001	40	4.5	1.152	0.570	0.0584	
15 minute winter	39	29.000	40	2.3	0.869	0.226	0.0629	
15 minute winter	40	28.002	41	9.0	3.051	0.322	0.0235	
15 minute winter	41	28.003	42	35.0	2.294	0.221	0.7596	
15 minute winter	42	16.007	43	210.6	1.969	1.888	1.4023	
15 minute winter	43	16.008	88	223.7	3.236	0.821	4.2239	
15 minute winter	44	1.000	45	2.3	0.936	0.162	0.0589	
15 minute winter	45	1.001	46	6.0	1.151	0.375	0.0875	

Results for 100 year Critical Storm Duration. Lowest mass balance: 99.01%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	46	13	52.059	0.219	8.3	0.0543	0.0000	SURCHARGED
15 minute winter	47	14	51.920	0.362	8.7	0.0804	0.0000	SURCHARGED
15 minute winter	48	14	51.844	0.204	3.5	0.0633	0.0000	SURCHARGED
15 minute winter	49	14	51.829	0.462	15.4	0.1303	0.0000	SURCHARGED
15 minute winter	50	10	54.257	0.027	2.3	0.0098	0.0000	OK
15 minute winter	51	10	52.992	0.042	5.8	0.0195	0.0000	OK
15 minute winter	52	10	51.839	0.049	8.0	0.0135	0.0000	OK
15 minute winter	53	13	51.806	0.682	22.3	0.1323	0.0000	SURCHARGED
15 minute winter	54	10	52.616	0.041	9.2	0.0595	0.0000	OK
15 minute winter	55	13	51.795	0.730	37.5	1.0740	0.0000	SURCHARGED
15 minute winter	56	14	51.772	0.132	4.6	0.0476	0.0000	SURCHARGED
15 minute winter	57	13	51.747	0.777	37.5	0.9467	0.0000	SURCHARGED
15 minute winter	58	10	53.374	0.024	2.3	0.0085	0.0000	OK
15 minute winter	59	13	51.714	0.780	38.8	0.9130	0.0000	SURCHARGED
15 minute winter	60	10	52.250	0.020	1.5	0.0059	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	46	1.002	47	7.2	1.020	0.900	0.1252	
15 minute winter	47	1.003	49	8.4	1.074	1.043	0.0626	
15 minute winter	48	2.000	49	3.5	0.902	0.459	0.1095	
15 minute winter	49	1.004	53	14.0	1.445	0.469	0.1056	
15 minute winter	50	3.000	51	2.3	0.938	0.162	0.0587	
15 minute winter	51	3.001	52	5.7	1.834	0.354	0.0497	
15 minute winter	52	3.002	53	7.9	1.370	0.231	0.1809	
15 minute winter	53	1.005	55	18.2	0.634	0.457	0.3977	
15 minute winter	54	4.000	55	9.1	0.480	0.071	0.5577	
15 minute winter	55	1.006	57	28.3	0.835	0.709	0.6363	
15 minute winter	56	5.000	57	4.6	1.112	0.406	0.1252	
15 minute winter	57	1.007	59	34.5	0.896	0.859	0.2386	
15 minute winter	58	6.000	59	2.3	1.322	0.121	0.1108	
15 minute winter	59	1.008	61	36.8	0.925	0.923	0.4375	
15 minute winter	60	7.000	61	1.5	1.088	0.087	0.0715	



Results for 100 year Critical Storm Duration. Lowest mass balance: 99.01%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	61	13	51.657	0.788	39.2	0.1411	0.0000	SURCHARGED
15 minute winter	62	10	53.373	0.023	2.3	0.0084	0.0000	OK
15 minute winter	63	13	51.617	0.784	41.7	0.9165	0.0000	SURCHARGED
15 minute winter	64	10	53.827	0.037	2.3	0.0132	0.0000	OK
15 minute winter	65	11	53.440	0.054	4.6	0.0151	0.0000	OK
15 minute winter	66	10	53.823	0.033	2.3	0.0117	0.0000	OK
15 minute winter	67	11	53.285	0.135	9.0	0.0345	0.0000	SURCHARGED
15 minute winter	68	11	53.129	0.047	8.7	0.0075	0.0000	OK
15 minute winter	69	10	52.714	0.039	8.4	0.0564	0.0000	OK
15 minute winter	70	11	52.035	0.060	16.6	0.0675	0.0000	OK
15 minute winter	71	10	52.446	0.076	9.2	0.0681	0.0000	OK
15 minute winter	72	10	52.177	0.105	14.5	0.0475	0.0000	OK
15 minute winter	73	11	52.068	0.175	19.7	0.0713	0.0000	SURCHARGED
15 minute winter	74	12	51.748	0.109	39.9	0.1423	0.0000	OK
15 minute winter	75	13	51.543	0.856	78.0	1.0703	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	61	1.009	63	38.5	0.968	0.959	0.2386	
15 minute winter	62	8.000	63	2.3	1.343	0.118	0.1105	
15 minute winter	63	1.010	75	42.7	1.074	1.071	0.4773	
15 minute winter	64	10.000	65	2.3	0.656	0.288	0.0831	
15 minute winter	65	10.001	67	4.5	0.678	0.569	0.0850	
15 minute winter	66	11.000	67	2.3	0.422	0.229	0.1205	
15 minute winter	67	10.002	68	8.7	1.360	1.098	0.0229	
15 minute winter	68	10.003	70	8.6	2.479	0.404	0.0279	
15 minute winter	69	12.000	70	8.4	1.307	0.066	0.0775	
15 minute winter	70	10.004	74	16.6	1.305	0.155	0.1082	
15 minute winter	71	9.000	72	9.1	0.819	0.512	0.3306	
15 minute winter	72	9.001	73	14.3	0.910	0.806	0.2758	
15 minute winter	73	9.002	74	19.0	1.116	1.072	0.3010	
15 minute winter	74	9.003	75	39.1	1.561	0.408	0.7649	
15 minute winter	75	1.011	76	70.7	1.003	0.994	1.6901	

Results for 100 year Critical Storm Duration. Lowest mass balance: 99.01%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	76	13	51.416	0.828	70.7	0.9361	0.0000	SURCHARGED
15 minute winter	77	13	51.322	0.800	74.1	1.0075	0.0000	SURCHARGED
15 minute winter	78	10	52.474	0.054	8.4	0.0483	0.0000	OK
180 minute winter	79	176	51.282	0.801	33.6	1.0072	0.0000	SURCHARGED
15 minute winter	80	10	52.476	0.056	9.2	0.0540	0.0000	OK
180 minute winter	81	176	51.282	0.900	37.2	1.1129	0.0000	SURCHARGED
180 minute winter	82	176	51.281	0.973	38.1	1.2008	0.0000	SURCHARGED
15 minute winter	83	10	52.446	0.076	9.2	0.0681	0.0000	OK
15 minute winter	84	11	52.176	0.104	14.5	0.0474	0.0000	OK
15 minute winter	85	11	52.066	0.193	19.7	0.0778	0.0000	SURCHARGED
15 minute winter	86	10	51.698	0.083	23.3	0.0297	0.0000	OK
180 minute winter	87	176	51.280	1.079	46.4	1.3275	0.0000	SURCHARGED
180 minute winter	88	176	51.280	1.120	116.5	369.1016	0.0000	SURCHARGED
120 minute winter	89	208	50.096	0.096	17.9	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	76	1.012	77	70.6	1.003	0.994	1.1267	
15 minute winter	77	1.013	79	74.1	1.052	1.046	0.7042	
15 minute winter	78	13.000	79	8.3	1.754	0.567	0.1822	
180 minute winter	79	1.014	81	33.1	0.796	0.465	1.6901	
15 minute winter	80	14.000	81	9.1	1.833	0.605	0.1855	
180 minute winter	81	1.015	82	36.6	0.814	0.516	1.2675	
180 minute winter	82	1.016	87	37.8	0.616	0.532	1.8309	
15 minute winter	83	15.000	84	9.1	0.830	0.512	0.3276	
15 minute winter	84	15.001	85	14.3	0.907	0.808	0.3070	
15 minute winter	85	15.002	86	18.1	1.329	1.025	0.3584	
15 minute winter	86	15.003	87	23.2	2.000	0.590	0.3586	
180 minute winter	87	1.017	88	45.7	1.150	0.646	0.7042	
180 minute winter	88	1.018	89	17.9	1.069	0.385	0.3349	379.9

Results for 100 year +50% CC Critical Storm Duration. Lowest mass balance: 99.01%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	10	56.259	0.059	5.2	0.0270	0.0000	OK
15 minute winter	2	11	55.904	0.209	10.3	0.0674	0.0000	SURCHARGED
15 minute winter	3	10	57.382	0.062	5.2	0.0283	0.0000	OK
15 minute winter	4	10	56.866	0.051	10.3	0.0163	0.0000	OK
15 minute winter	5	11	55.466	0.065	19.4	0.0733	0.0000	OK
15 minute winter	6	10	56.261	0.061	5.2	0.0278	0.0000	OK
15 minute winter	7	10	55.751	0.056	10.3	0.0182	0.0000	OK
15 minute winter	8	11	56.526	0.146	8.6	0.0962	0.0000	SURCHARGED
15 minute summer	9	10	55.936	0.061	12.7	0.0152	0.0000	OK
15 minute winter	10	12	54.783	0.128	57.1	0.1790	0.0000	OK
15 minute winter	11	10	54.989	0.059	5.2	0.0270	0.0000	OK
15 minute winter	12	12	54.578	0.153	10.3	0.0492	0.0000	SURCHARGED
15 minute winter	13	12	54.831	0.161	8.6	0.1060	0.0000	SURCHARGED
15 minute winter	14	12	54.443	0.328	13.3	0.1033	0.0000	SURCHARGED
15 minute winter	15	12	54.399	0.459	80.2	0.5188	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1	18.000	2	5.1	0.725	0.650	0.1891	
15 minute winter	2	18.001	5	9.4	1.198	1.190	0.0771	
15 minute winter	3	19.000	4	5.1	1.125	0.648	0.1358	
15 minute winter	4	19.001	5	10.2	2.646	0.464	0.0385	
15 minute winter	5	18.002	10	19.4	1.232	0.182	0.2907	
15 minute winter	6	20.000	7	5.1	1.072	0.649	0.1427	
15 minute winter	7	20.001	10	10.2	2.316	0.551	0.0439	
15 minute winter	8	21.000	9	7.6	1.282	0.962	0.1929	
15 minute summer	9	21.001	10	12.6	2.603	0.625	0.0485	
15 minute winter	10	18.003	15	57.1	2.174	0.548	0.5676	
15 minute winter	11	22.000	12	5.1	0.885	0.649	0.1818	
15 minute winter	12	22.001	15	10.0	1.574	0.868	0.0782	
15 minute winter	13	23.000	14	8.1	1.113	1.031	0.2347	
15 minute winter	14	23.001	15	13.5	1.121	0.758	0.1760	
15 minute winter	15	18.004	24	75.5	1.938	0.713	0.7159	

Results for 100 year +50% CC Critical Storm Duration. Lowest mass balance: 99.01%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	16	10	54.961	0.031	1.7	0.0081	0.0000	OK
15 minute winter	17	13	54.839	0.162	3.4	0.0370	0.0000	SURCHARGED
15 minute winter	18	10	54.962	0.032	2.3	0.0092	0.0000	OK
15 minute winter	19	13	54.825	0.350	7.3	0.0757	0.0000	SURCHARGED
15 minute winter	20	13	54.790	0.416	9.6	0.1310	0.0000	SURCHARGED
15 minute winter	21	12	54.334	0.465	13.0	0.1243	0.0000	SURCHARGED
15 minute winter	22	10	54.731	0.061	5.2	0.0278	0.0000	OK
15 minute winter	23	12	54.239	0.074	10.3	0.0239	0.0000	OK
15 minute winter	24	12	53.997	0.797	118.1	1.2551	0.0000	SURCHARGED
15 minute winter	25	10	56.413	0.033	3.5	0.0119	0.0000	OK
15 minute winter	26	12	55.318	0.208	8.7	0.0953	0.0000	SURCHARGED
15 minute winter	27	12	55.083	0.209	9.7	0.0534	0.0000	SURCHARGED
15 minute winter	28	10	55.137	0.027	1.7	0.0069	0.0000	OK
15 minute winter	29	10	54.584	0.071	30.2	0.1211	0.0000	OK
15 minute winter	30	12	54.106	1.031	69.2	2.1505	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	16	24.000	17	1.7	0.606	0.212	0.0724	
15 minute winter	17	24.001	19	3.3	0.598	0.420	0.0939	
15 minute winter	18	25.000	19	2.3	0.517	0.215	0.0746	
15 minute winter	19	24.002	20	5.9	0.765	0.744	0.0469	
15 minute winter	20	24.003	21	8.5	1.196	1.086	0.2347	
15 minute winter	21	24.004	24	13.2	1.894	0.930	0.0782	
15 minute winter	22	26.000	23	5.1	1.059	0.655	0.1596	
15 minute winter	23	26.001	24	9.6	1.905	0.546	0.0702	
15 minute winter	24	18.005	31	106.7	2.726	0.970	0.3977	
15 minute winter	25	16.000	26	3.5	0.692	0.237	0.1111	
15 minute winter	26	16.001	27	7.5	0.973	0.956	0.1095	
15 minute winter	27	16.002	29	9.0	1.153	1.146	0.1077	
15 minute winter	28	17.000	29	1.7	1.009	0.149	0.0231	
15 minute winter	29	16.003	30	30.1	1.002	0.215	0.5040	
15 minute winter	30	16.004	31	56.1	1.411	1.411	2.1476	



File: elker lane new levels plots lifted qbar.pfd
Network: Storm Network
Bob Ford
14/08/2023

Results for 100 year +50% CC Critical Storm Duration. Lowest mass balance: 99.01%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	31	12	53.393	0.711	172.6	1.0080	0.0000	SURCHARGED
360 minute winter	32	336	52.713	1.218	4.8	2.2162	0.0000	FLOOD RISK
360 minute winter	33	336	52.713	1.516	47.2	2.0911	0.0000	SURCHARGED
15 minute winter	34	10	54.639	0.064	12.7	0.0916	0.0000	OK
15 minute winter	35	10	55.407	0.032	6.3	0.0412	0.0000	OK
15 minute winter	36	10	54.405	0.080	24.1	0.1010	0.0000	OK
15 minute winter	37	10	56.456	0.046	3.5	0.0166	0.0000	OK
15 minute winter	38	11	56.085	0.079	6.9	0.0220	0.0000	OK
15 minute winter	39	10	56.451	0.041	3.5	0.0145	0.0000	OK
15 minute winter	40	10	55.806	0.053	13.7	0.0135	0.0000	OK
15 minute winter	41	10	54.064	0.089	52.8	0.1343	0.0000	OK
360 minute winter	42	336	52.713	1.621	57.7	1.9500	0.0000	SURCHARGED
360 minute winter	43	336	52.713	1.665	59.5	2.3436	0.0000	SURCHARGED
15 minute winter	44	10	54.264	0.034	3.5	0.0122	0.0000	OK
15 minute winter	45	12	53.015	0.065	9.3	0.0320	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	31	16.005	33	172.8	2.454	0.690	1.9717	
360 minute winter	32	27.000	33	4.8	0.676	0.120	0.9943	
360 minute winter	33	16.006	42	47.2	0.896	0.426	3.7501	
15 minute winter	34	31.000	36	12.6	1.153	0.167	0.1315	
15 minute winter	35	30.000	36	6.3	0.811	0.044	0.1131	
15 minute winter	36	30.001	41	23.8	1.747	0.244	0.1365	
15 minute winter	37	28.000	38	3.4	0.671	0.438	0.1216	
15 minute winter	38	28.001	40	6.8	1.240	0.861	0.0811	
15 minute winter	39	29.000	40	3.5	0.963	0.343	0.0861	
15 minute winter	40	28.002	41	13.5	3.367	0.486	0.0321	
15 minute winter	41	28.003	42	52.6	2.289	0.333	0.8154	
360 minute winter	42	16.007	43	56.1	1.389	0.503	1.5442	
360 minute winter	43	16.008	88	59.0	1.650	0.217	5.2943	
15 minute winter	44	1.000	45	3.5	1.030	0.246	0.0889	
15 minute winter	45	1.001	46	8.9	1.289	0.554	0.1058	

Results for 100 year +50% CC Critical Storm Duration. Lowest mass balance: 99.01%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute winter	46	23	52.857	1.017	10.2	0.2523	0.0000	SURCHARGED
360 minute winter	47	336	52.719	1.161	2.6	0.2577	0.0000	FLOOD RISK
360 minute winter	48	336	52.718	1.078	0.9	0.3343	0.0000	FLOOD RISK
360 minute winter	49	336	52.718	1.351	4.4	0.3810	0.0000	FLOOD RISK
15 minute winter	50	10	54.264	0.034	3.5	0.0122	0.0000	OK
15 minute winter	51	10	53.004	0.054	8.7	0.0248	0.0000	OK
360 minute winter	52	336	52.718	0.928	2.1	0.2543	0.0000	FLOOD RISK
360 minute winter	53	336	52.718	1.594	6.8	0.3093	0.0000	FLOOD RISK
360 minute winter	54	336	52.718	0.143	2.4	0.2101	0.0000	OK
360 minute winter	55	336	52.718	1.653	11.6	2.4317	0.0000	FLOOD RISK
360 minute winter	56	336	52.718	1.078	1.2	0.3892	0.0000	FLOOD RISK
360 minute winter	57	336	52.718	1.748	13.2	2.1306	0.0000	SURCHARGED
15 minute winter	58	10	53.379	0.029	3.5	0.0105	0.0000	OK
360 minute winter	59	336	52.718	1.784	13.9	2.0886	0.0000	SURCHARGED
360 minute winter	60	336	52.717	0.487	0.4	0.1423	0.0000	FLOOD RISK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
30 minute winter	46	1.002	47	7.7	1.010	0.952	0.1252	
360 minute winter	47	1.003	49	2.6	0.889	0.323	0.0626	
360 minute winter	48	2.000	49	0.9	0.648	0.118	0.1095	
360 minute winter	49	1.004	53	4.4	1.158	0.147	0.1056	
15 minute winter	50	3.000	51	3.5	1.062	0.246	0.0798	
15 minute winter	51	3.001	52	8.5	2.026	0.531	0.0949	
360 minute winter	52	3.002	53	2.1	1.024	0.062	0.2817	
360 minute winter	53	1.005	55	6.2	0.567	0.157	0.3977	
360 minute winter	54	4.000	55	2.4	0.335	0.019	0.8300	
360 minute winter	55	1.006	57	10.9	0.706	0.272	0.6363	
360 minute winter	56	5.000	57	1.2	0.901	0.107	0.1252	
360 minute winter	57	1.007	59	12.7	0.746	0.315	0.2386	
15 minute winter	58	6.000	59	3.5	1.344	0.184	0.1167	
360 minute winter	59	1.008	61	13.3	0.760	0.335	0.4375	
360 minute winter	60	7.000	61	0.4	0.819	0.024	0.1252	

Results for 100 year +50% CC Critical Storm Duration. Lowest mass balance: 99.01%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute winter	61	336	52.717	1.848	14.0	0.3308	0.0000	SURCHARGED
15 minute winter	62	10	53.379	0.029	3.5	0.0104	0.0000	OK
360 minute winter	63	336	52.717	1.884	14.9	2.2024	0.0000	SURCHARGED
15 minute winter	64	10	53.836	0.046	3.5	0.0166	0.0000	OK
15 minute winter	65	12	53.563	0.177	6.9	0.0494	0.0000	SURCHARGED
15 minute winter	66	10	53.831	0.041	3.5	0.0147	0.0000	OK
15 minute winter	67	12	53.405	0.255	12.3	0.0652	0.0000	SURCHARGED
15 minute winter	68	11	53.139	0.057	11.8	0.0091	0.0000	OK
15 minute winter	69	10	52.723	0.048	12.7	0.0690	0.0000	OK
360 minute winter	70	336	52.717	0.742	4.6	0.8392	0.0000	SURCHARGED
15 minute winter	71	12	52.758	0.388	13.8	0.3482	0.0000	FLOOD RISK
360 minute winter	72	336	52.718	0.646	3.8	0.2931	0.0000	SURCHARGED
360 minute winter	73	336	52.717	0.824	5.2	0.3355	0.0000	SURCHARGED
360 minute winter	74	336	52.717	1.078	11.0	1.4067	0.0000	SURCHARGED
360 minute winter	75	336	52.717	2.030	26.6	2.5390	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
360 minute winter	61	1.009	63	13.7	0.769	0.340	0.2386	
15 minute winter	62	8.000	63	3.5	1.365	0.180	0.1163	
360 minute winter	63	1.010	75	14.5	0.876	0.363	0.4773	
15 minute winter	64	10.000	65	3.4	0.698	0.438	0.1365	
15 minute winter	65	10.001	67	5.9	0.779	0.748	0.1095	
15 minute winter	66	11.000	67	3.5	0.545	0.348	0.1299	
15 minute winter	67	10.002	68	11.8	1.721	1.495	0.0249	
15 minute winter	68	10.003	70	11.8	2.659	0.551	0.0482	
15 minute winter	69	12.000	70	12.6	1.485	0.100	0.2701	
360 minute winter	70	10.004	74	4.6	0.918	0.043	0.3182	
15 minute winter	71	9.000	72	12.5	0.851	0.705	0.5281	
360 minute winter	72	9.001	73	3.8	0.696	0.214	0.3169	
360 minute winter	73	9.002	74	5.2	0.857	0.292	0.3169	
360 minute winter	74	9.003	75	11.0	1.412	0.114	1.0340	
360 minute winter	75	1.011	76	25.8	0.783	0.364	1.6901	



Results for 100 year +50% CC Critical Storm Duration. Lowest mass balance: 99.01%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute winter	76	336	52.716	2.128	25.8	2.4067	0.0000	SURCHARGED
360 minute winter	77	336	52.716	2.194	27.1	2.7616	0.0000	SURCHARGED
360 minute winter	78	336	52.717	0.297	2.2	0.2646	0.0000	SURCHARGED
360 minute winter	79	336	52.715	2.234	30.5	2.8083	0.0000	SURCHARGED
360 minute winter	80	336	52.716	0.296	2.4	0.2837	0.0000	SURCHARGED
360 minute winter	81	336	52.714	2.332	33.8	2.8850	0.0000	SURCHARGED
360 minute winter	82	336	52.713	2.405	34.6	2.9683	0.0000	SURCHARGED
360 minute winter	83	336	52.714	0.344	2.4	0.3093	0.0000	SURCHARGED
360 minute winter	84	336	52.714	0.642	3.8	0.2916	0.0000	SURCHARGED
360 minute winter	85	336	52.714	0.841	5.2	0.3389	0.0000	SURCHARGED
360 minute winter	86	336	52.713	1.098	6.6	0.3932	0.0000	SURCHARGED
360 minute winter	87	336	52.712	2.511	42.3	3.0888	0.0000	SURCHARGED
360 minute winter	88	336	52.711	2.551	101.8	595.7233	0.0000	FLOOD RISK
360 minute winter	89	336	50.096	0.096	17.9	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
360 minute winter	76	1.012	77	25.5	0.713	0.359	1.1267	
360 minute winter	77	1.013	79	26.7	0.740	0.378	0.7042	
360 minute winter	78	13.000	79	2.2	1.145	0.150	0.2347	
360 minute winter	79	1.014	81	30.0	0.712	0.422	1.6901	
360 minute winter	80	14.000	81	2.4	1.140	0.159	0.2347	
360 minute winter	81	1.015	82	33.2	0.658	0.469	1.2675	
360 minute winter	82	1.016	87	34.3	0.588	0.483	1.8309	
360 minute winter	83	15.000	84	2.4	0.592	0.135	0.5281	
360 minute winter	84	15.001	85	3.8	0.680	0.214	0.3521	
360 minute winter	85	15.002	86	5.2	1.000	0.292	0.4577	
360 minute winter	86	15.003	87	6.6	1.047	0.166	0.4577	
360 minute winter	87	1.017	88	41.7	1.048	0.589	0.7042	
360 minute winter	88	1.018	89	17.9	1.069	0.385	0.3350	498.4

Technical Specification

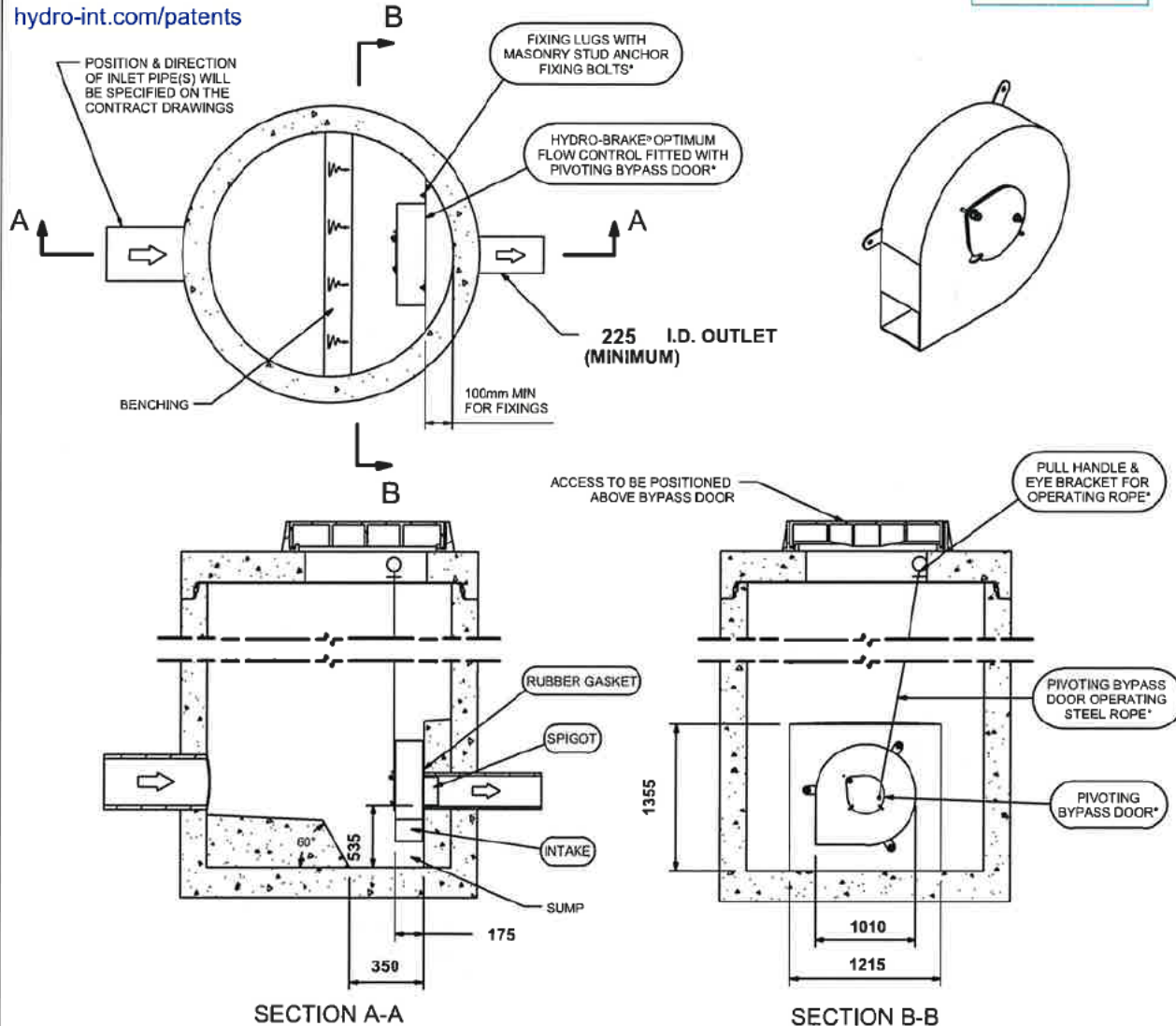
Control Point	Head (m)	Flow (l/s)
Primary Design	2.450	17.900
Flush-Flo™	0.727	17.894
Kick-Flo®	1.489	14.105
Mean Flow		15.688

Hydro-Brake® Optimum Flow Control including:

- 5 mm grade 304L stainless steel
- Integral stainless steel pivoting by-pass door allowing clear line of sight through to outlet, c/w stainless steel operating rope
- Beed blasted finish to maximise corrosion resistance
- Stainless steel fixings
- Rubber gasket to seal outlet
- Indicative Weight: 90 kg



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IMPORTANT: LIMIT OF HYDRO INTERNATIONAL SUPPLY
 THE DEVICE WILL BE HANDED TO SUIT SITE CONDITIONS
 FOR SITE SPECIFIC DETAILS AND MINIMUM CHAMBER SIZE REFER TO HYDRO INTERNATIONAL
 ALL CIVIL AND INSTALLATION WORK BY OTHERS
 * WHERE SUPPLIED
 HYDRO-BRAKE® FLOW CONTROL & HYDRO-BRAKE® OPTIMUM FLOW CONTROL ARE REGISTERED TRADEMARKS FOR FLOW
 CONTROLS DESIGNED AND MANUFACTURED EXCLUSIVELY BY HYDRO INTERNATIONAL

THIS DESIGN LAYOUT IS FOR ILLUSTRATIVE PURPOSES ONLY. NOT TO SCALE.

DESIGN ADVICE



The head/flow characteristics of this SHE-0168-1790-2450-1790 Hydro-Brake® Optimum Flow Control are unique. Dynamic hydraulic modelling evaluates the full head/flow characteristic curve.
The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.

Hydro
International

DATE 14/08/2023 11:42

SITE Elker Lane

DESIGNER Robert Ford

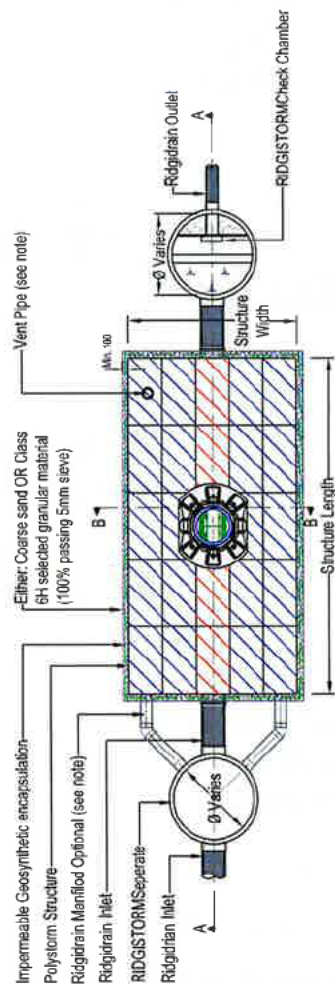
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SHE-0168-1790-2450-1790

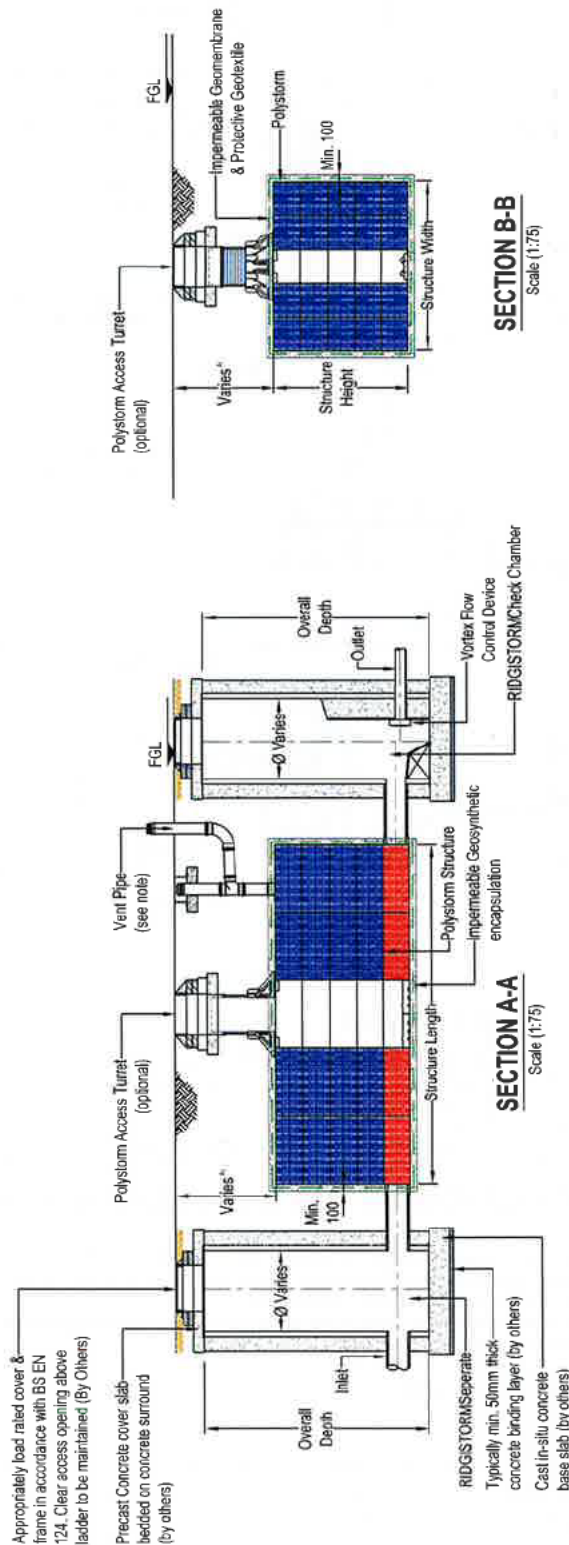
Hydro-Brake® Optimum

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(Scale 1:75)



SECTION 8-B
Scale (1:75)

KEY:

- POLYSTORM (PSM1, 1A & 2 CELL)

POLYSTORM ACCESS NOTES

1. Refer to Polypipe drawing No. PSM_SD_PSM_004 for typical integration into Polystorm structure.

VENTILATION NOTE

For information on Ventilation Options please refer to drawing ref: PSM SD PSM 002

MANIFOLD NOTE

Where single pipe hydraulic capacity is exceeded manifold detail may be required. For information on Manifold connections please refer to drawing ref: PSM_SD_008

NOTE A

For information on tank cover depths please refer to drawing ref: PSM_SD_PSM_005 or alternatively contact the Technical Team:- 01509 61500

NOTES

1. All dimensions in millimetres, unless otherwise stated.
2. All dimensions are nominal and may vary within manufacturing or construction tolerances.
3. All site temporary and enabling works by others.
4. Polypropylene products to be installed in accordance with Polypropylene club's recommendations (refer to Polypropylene technical guidance for further information), giving due consideration to the requirements of the organisation who will be taking ultimate owner ship of the installation.
5. This drawing is intended for guidance only.
Confirmation of the information contained within this document should be sought from the consulting engineers before final design or construction activities commence.

 Polypipe Polypipe Civils Charnwood Business Park, North Road, Loughborough, Leicestershire, LE11 1LE Tel: 01509 515100 Fax: 01509 515215 www.polypipe.com/contracts www.polypipe.com/na	PROJECT	POLYSTORM STANDARD DETAILS		STATUS	FOR INFORMATION		
	TITLE	POLYSTORM ATTENUATION DETAIL		DATE	17/03/16	DRAWN BY	JL
				ORIGINAL SIZE	A3	SCALE	AS SHOWN
				DRAWING NO.	PSM_SD_PSM_001	REV.	

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