

Network Details

Manhole Schedule

Manhole	Catchment Area (ha)	Size (mm)	Type	CL (m)	IL (m)	Depth To Soffit (m)	Easting (m)	Northing (m)
S4-01	0.102	1200	Type B	44.580	42.350	1.930	385968.059	156749.385
S4-02	0.140	1200	Type B	43.600	41.400	1.900	386014.872	156786.809
TD-S01	0.211	1200	Type E	45.207	43.275	1.782	385992.707	156823.396
TD-S02	0.000	1800	Type E	44.905	43.210	1.545	386002.051	156822.816
TD-SW03	0.000	450	Type E	44.500	43.150	1.200	386009.057	156818.028
S4-10	0.005	1350	Type C	43.650	42.300	1.200	386024.334	156799.518
S4-03	0.059	1200	Type B	43.340	41.100	1.940	386027.212	156783.903
S4-04	0.241	1350	Type B	42.190	39.775	1.965	386052.424	156734.019
S4-05	0.203	1350	Type B	41.125	38.916	1.759	386078.518	156682.738
S4-06	0.000	1500	Type C	39.585	37.745	1.240	386111.841	156616.942
S4-07	0.046	1500	Type B	39.850	37.510	1.740	386101.039	156611.261
S4-HW1	0.081	---	Unknown	39.200	37.480	1.120	386104.948	156602.796
S4-HW2	0.000	---	Unknown	39.200	37.480	1.270	386129.657	156555.805
S4-08	0.037	1350	Type B	39.400	37.430	1.520	386133.837	156538.256
S4-12	0.124	1200	Type B	40.179	38.200	1.679	386103.385	156462.908
S4-13	0.081	1200	Type B	39.823	38.000	1.523	386126.287	156496.927
S4-09	0.000	1350	Type B	39.465	37.400	1.915	386141.432	156530.232
S4-HW3	0.000	---	Type C	36.900	37.300	-0.550	386157.774	156522.945

Pipe Schedule

Pipe Number	US Manhole	US IL (m)	DS Manhole	DS IL (m)	Shape	Dimension (mm)	Length (m)	Gradient (1:x)	Roughness (mm)	US Depth To Soffit (m)	DS Depth To Soffit (m)
1.000	S4-01	42.350	S4-02	41.400	Circ	300	59.933	63.1	0.600	1.930	1.900
1.001	S4-02	41.400	S4-03	41.100	Circ	300	12.678	42.3	0.600	1.900	1.940
2.000	TD-S01	43.275	TD-S02	43.210	Circ	150	9.362	144.0	0.600	1.782	1.545
2.001	TD-S02	43.210	TD-SW03	43.150	Circ	150	8.487	141.5	0.600	1.545	1.200
2.002	TD-SW03	43.150	S4-10	42.300	Circ	150	24.000	28.2	0.600	1.200	1.200
2.003	S4-10	42.300	S4-03	41.250	Circ	150	15.877	15.1	0.600	1.200	1.940
1.002	S4-03	41.100	S4-04	39.925	Circ	300	55.894	47.6	0.600	1.940	1.965
1.003	S4-04	39.775	S4-05	38.916	Circ	450	57.537	67.0	0.600	1.965	1.759
1.004	S4-05	38.916	S4-06	37.895	Circ	450	73.753	72.2	0.600	1.759	1.240
1.005	S4-06	37.745	S4-07	37.510	Circ	600	12.205	51.9	0.600	1.240	1.740
1.006	S4-07	37.510	S4-HW1	37.480	Circ	600	9.324	310.8	0.600	1.740	1.120
1.007	S4-HW1	37.480	S4-HW2	37.480	Circ	1050	53.091	Flat	0.600	0.670	0.670
1.008	S4-HW2	37.480	S4-08	37.430	Circ	450	18.040	360.8	0.600	1.270	1.520
1.009	S4-08	37.430	S4-09	37.400	Circ	450	11.048	368.3	0.600	1.520	1.615
3.000	S4-12	38.200	S4-13	38.000	Circ	300	41.009	205.0	0.600	1.679	1.523
3.001	S4-13	38.000	S4-09	37.550	Circ	300	36.587	81.3	0.600	1.523	1.615
1.010	S4-09	37.400	S4-HW3	37.300	Circ	150	17.894	178.9	0.600	1.915	-0.550

Outfall Details

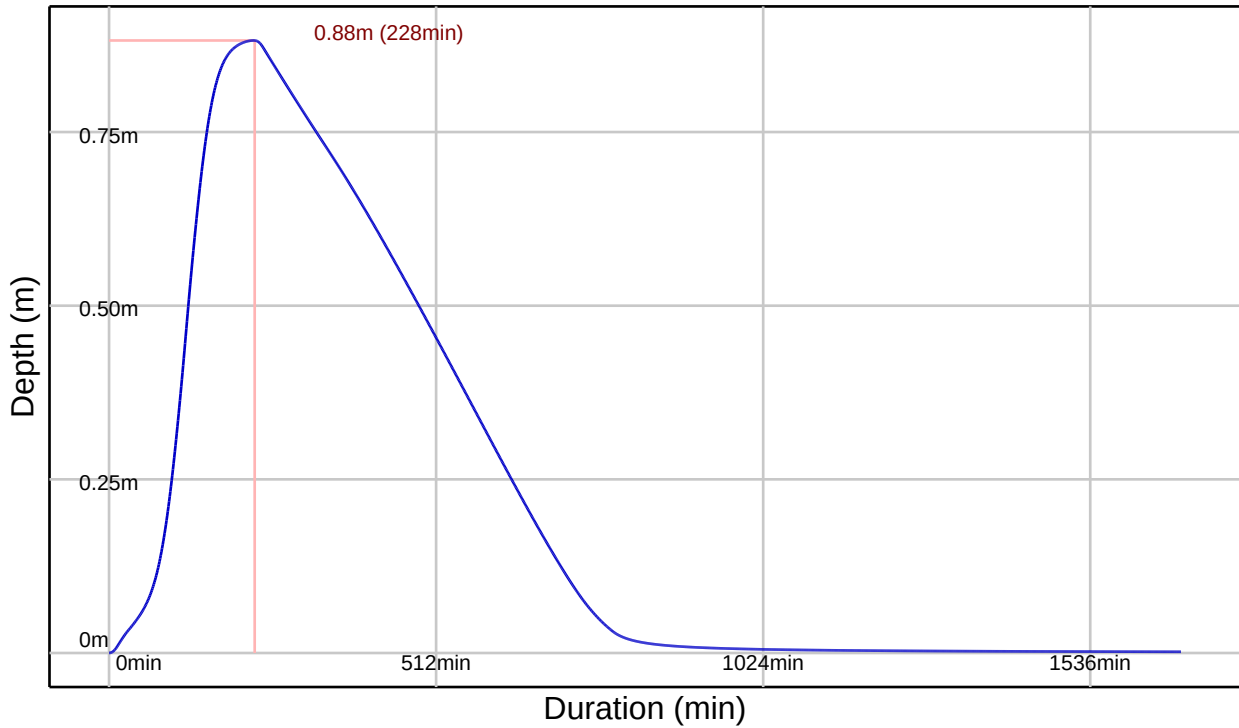
Outfall Manhole S4-HW3 : Free Discharge

Flow Control Details

Tank Structure at Manhole TD-S01

Tank Invert (m)	Tank Height (m)	Porosity Ratio (%)	Area (m2)	Effective Area (m2) Area x Porosity Ratio	Max Storage (m3) Effective Area x Height	Infil Base (m/hr)	Infil Side (m/hr)	Safety Factor
43.275	1.000	95.00	135.000	128.250	128.250	0.00000000	0.00000000	2.00

Tank 1 at TD-S01 (100Yr+40% 240Min Winter)

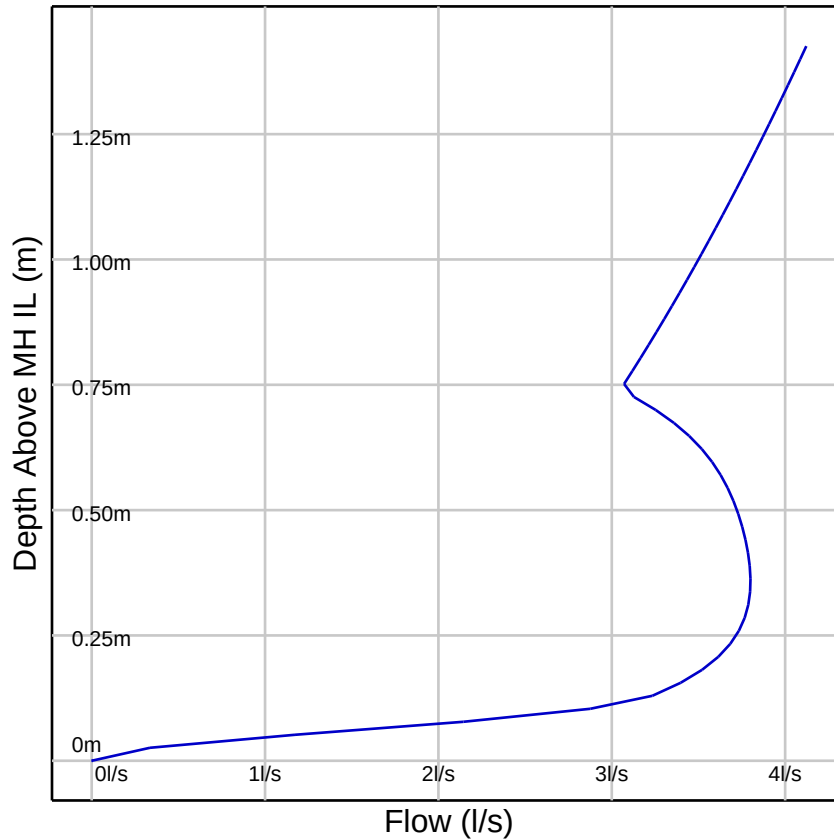


Controls within Manhole TD-S02

Hydro-Brake® Optimum Control

Model Ref	Design Depth (m)	Design Flow (l/s)	Invert Offset (m)	FF Head (m)	FF Flow (l/s)	KF Head (m)	KF Flow (l/s)
SHE-0090-3800-1200-3800	1.200	3.800	0.000	0.358	3.800	0.739	3.048

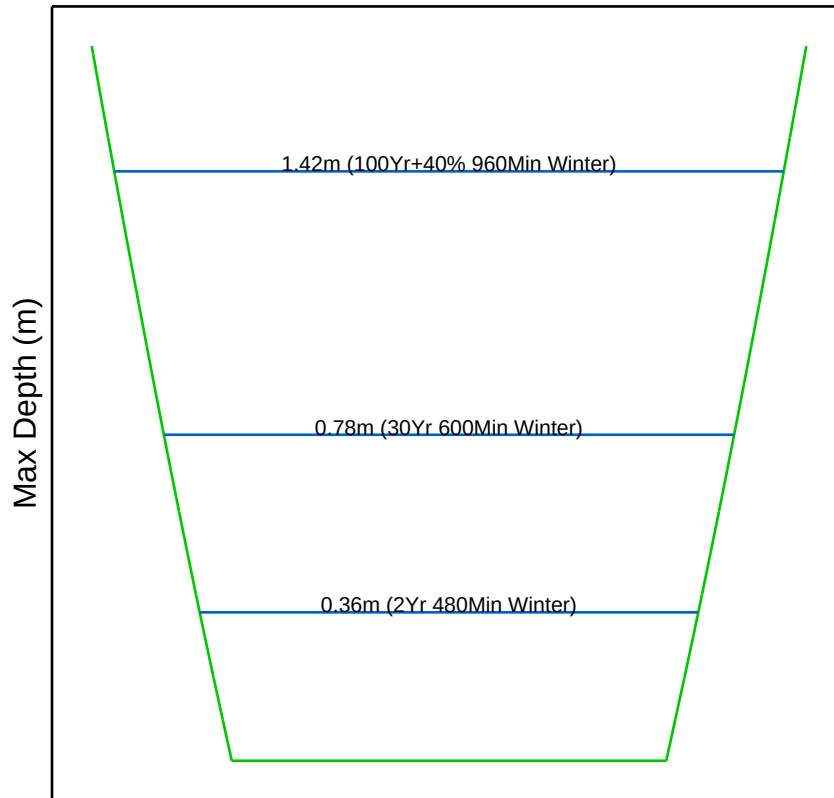
Hydro-Brake® Optimum Control from TD-S02 to TD-SW03



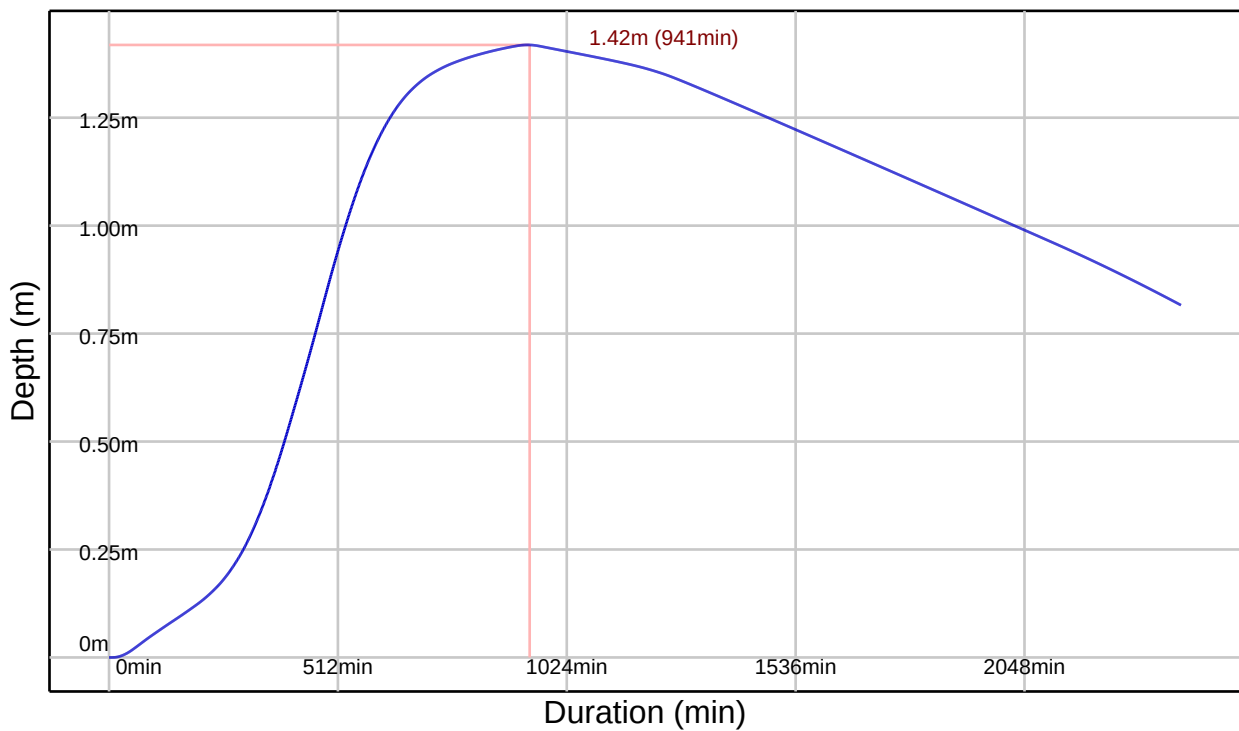
Pond Structure at Manhole S4-HW1

Pond Invert (m)	Max Depth (m)	Volume To Water Level (m3)	Water Level (m)	Freeboard (m)	Infil Base (m/hr)	Infil Side (m/hr)	Safety Factor
37.480	1.720	879.999	38.900	0.300	0.00000000	0.00000000	2.00

Pond Depth/Area Diagram at S4-HW1



Earthwork 4 at S4-HW1 (100Yr+40% 960Min Winter)

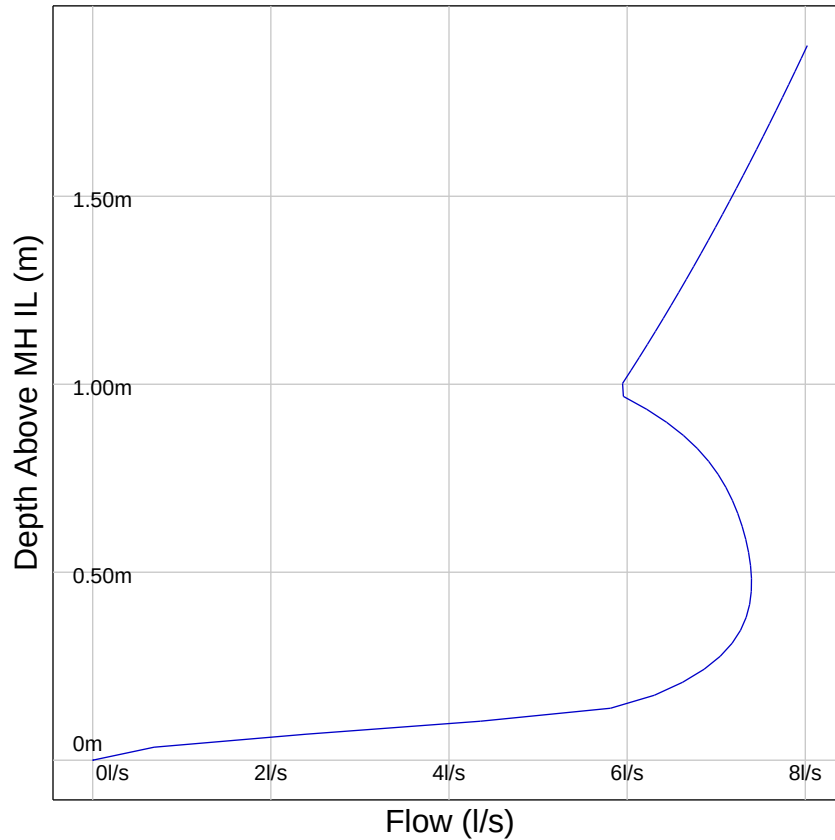


Controls within Manhole S4-09

Hydro-Brake® Optimum Control

Model Ref	Design Depth (m)	Design Flow (l/s)	Invert Offset (m)	FF Head (m)	FF Flow (l/s)	KF Head (m)	KF Flow (l/s)
SHE-0118-7400-1600-7400	1.600	7.400	0.000	0.471	7.397	0.976	5.876

Hydro-Brake® Optimum Control from S4-09 to S4-HW3



Simulation Settings

FEH2013 (point): Filename=FEH_Point_Descriptors_386055_156308.xml

Summer (Cv: 0.75), Winter (Cv: 0.84)

Global Time of Entry: 5.0 mins

Durations (mins): 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440

Return Periods (yrs) + Climate Change: (2, +0%), (30, +0%), (100, +40%)

Manhole Flood Risk Freeboard: 0.300m

Simulated Rainfall Events

Storm	Average Intensity (mm/hr)	Runoff Continuity %	Flow Continuity %	Storm	Average Intensity (mm/hr)	Runoff Continuity %	Flow Continuity %
2Yr 15Min Winter	29.538	0.00	-0.07	30Yr 360Min Summer	8.987	0.00	-0.05
2Yr 15Min Summer	29.538	0.00	-0.07	30Yr 360Min Winter	8.987	0.00	-0.05
2Yr 30Min Winter	18.969	0.00	-0.07	30Yr 480Min Summer	7.224	0.00	-0.04
2Yr 30Min Summer	18.969	0.00	-0.07	30Yr 480Min Winter	7.224	0.00	-0.04
2Yr 60Min Winter	11.785	0.00	-0.06	30Yr 600Min Summer	6.076	0.00	-0.03
2Yr 60Min Summer	11.785	0.00	-0.06	30Yr 600Min Winter	6.076	0.00	-0.04
2Yr 120Min Summer	8.325	0.00	-0.05	30Yr 720Min Summer	5.260	0.00	-0.03
2Yr 120Min Winter	8.325	0.00	-0.04	30Yr 720Min Winter	5.260	0.00	-0.04
2Yr 180Min Winter	6.684	0.00	-0.03	30Yr 960Min Summer	4.178	0.00	-0.04
2Yr 180Min Summer	6.684	0.00	-0.04	30Yr 960Min Winter	4.178	0.00	-0.01
2Yr 240Min Winter	5.505	0.00	-0.03	30Yr 1440Min Summer	2.994	0.00	-0.01
2Yr 240Min Summer	5.505	0.00	-0.04	30Yr 1440Min Winter	2.994	0.00	-0.02
2Yr 360Min Winter	4.214	0.00	-0.02	100Yr+40% 15Min Summer	143.806	0.00	-0.02
2Yr 360Min Summer	4.214	0.00	-0.03	100Yr+40% 15Min Winter	143.806	0.00	-0.09
2Yr 480Min Summer	3.469	0.00	-0.02	100Yr+40% 30Min Summer	95.380	0.00	-0.14
2Yr 480Min Winter	3.469	0.00	-0.02	100Yr+40% 30Min Winter	95.380	0.00	-0.15
2Yr 600Min Winter	2.951	0.00	-0.02	100Yr+40% 60Min Summer	60.339	0.00	-0.11
2Yr 600Min Summer	2.951	0.00	-0.02	100Yr+40% 60Min Winter	60.339	0.00	-0.13
2Yr 720Min Summer	2.572	0.00	-0.02	100Yr+40% 120Min Summer	36.510	0.00	-0.10
2Yr 720Min Winter	2.572	0.00	-0.01	100Yr+40% 120Min Winter	36.510	0.00	-0.09
2Yr 960Min Summer	2.072	0.00	-0.01	100Yr+40% 180Min Summer	27.150	0.00	-0.09
2Yr 960Min Winter	2.072	0.00	-0.01	100Yr+40% 180Min Winter	27.150	0.00	0.02
2Yr 1440Min Winter	1.524	0.00	-0.01	100Yr+40% 240Min Summer	22.108	0.00	-0.04
2Yr 1440Min Summer	1.524	0.00	-0.01	100Yr+40% 240Min Winter	22.108	0.00	0.10
30Yr 15Min Winter	79.881	0.00	-0.12	100Yr+40% 360Min Summer	16.467	0.00	0.04
30Yr 15Min Summer	79.881	0.00	-0.11	100Yr+40% 360Min Winter	16.467	0.00	0.20
30Yr 30Min Summer	52.294	0.00	-0.10	100Yr+40% 480Min Summer	13.320	0.00	0.09
30Yr 30Min Winter	52.294	0.00	-0.16	100Yr+40% 480Min Winter	13.320	0.00	0.25
30Yr 60Min Summer	32.782	0.00	-0.12	100Yr+40% 600Min Summer	11.265	0.00	0.11
30Yr 60Min Winter	32.782	0.00	-0.08	100Yr+40% 600Min Winter	11.265	0.00	0.28
30Yr 120Min Summer	20.016	0.00	-0.07	100Yr+40% 720Min Summer	9.791	0.00	0.12
30Yr 120Min Winter	20.016	0.00	-0.07	100Yr+40% 720Min Winter	9.791	0.00	0.28
30Yr 180Min Winter	14.968	0.00	-0.07	100Yr+40% 960Min Summer	7.799	0.00	0.10
30Yr 180Min Summer	14.968	0.00	-0.06	100Yr+40% 960Min Winter	7.799	0.00	0.26
30Yr 240Min Summer	12.150	0.00	-0.06	100Yr+40% 1440Min Winter	5.580	0.00	0.17
30Yr 240Min Winter	12.150	0.00	-0.07	100Yr+40% 1440Min Summer	5.580	0.00	0.04

Simulation Results

Return Period (yrs) + Climate Change (%):

2yr+0%

Manholes

Manhole	Critical Storm	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Flood (m3)	Status
S4-01	15 min Winter	8	42.412	0.062	13.877		OK
S4-02	15 min Winter	8	41.488	0.088	32.652		OK
TD-S01	180 min Winter	125	43.411	0.136	3.386		OK
TD-S02	180 min Winter	125	43.408	0.198	3.366		Surcharged
TD-SW03	180 min Winter	127	43.183	0.033	3.365		OK
S4-10	180 min Winter	117	42.328	0.028	3.454		OK
S4-03	15 min Winter	9	41.203	0.103	41.365		OK
S4-04	15 min Winter	9	39.902	0.127	72.505		OK
S4-05	15 min Winter	9	39.072	0.156	98.838		OK
S4-06	15 min Winter	9	37.884	0.139	98.574		OK
S4-07	480 min Winter	332	37.862	0.352	10.933		OK
S4-HW1	480 min Winter	381	37.837	0.357	0.332		OK
S4-HW2	480 min Winter	373	37.837	0.357	6.372		OK
S4-08	480 min Winter	376	37.837	0.407	6.145		OK
S4-12	15 min Winter	8	38.294	0.094	16.865		OK
S4-13	15 min Winter	9	38.096	0.096	26.739		OK
S4-09	480 min Winter	377	37.837	0.437	7.161		Surcharged
S4-HW3	480 min Winter	376	37.378	0.078	7.294		Outfall

Conduits

Pipe No.	Critical Storm	Peak (mins)	US Manhole	DS Manhole	Flow Depth (m)	Max Velocity (m/s)	Max Flow (l/s)	Flow / Capacity	Status
1.000	15 min Winter	8	S4-01	S4-02	0.075	0.980	13.588	0.097	OK
1.001	15 min Winter	9	S4-02	S4-03	0.095	1.676	32.089	0.187	OK
2.000	180 min Winter	125	TD-S01	TD-S02	0.143	0.282	3.379	0.229	OK
2.001	180 min Winter	126	TD-S02	TD-SW03	0.040	0.880	3.365	0.226	OK
2.002	180 min Winter	126	TD-SW03	S4-10	0.030	1.331	3.365	0.100	OK
2.003	180 min Winter	118	S4-10	S4-03	0.027	1.569	3.454	0.075	OK
1.002	15 min Winter	9	S4-03	S4-04	0.103	1.942	41.487	0.257	OK
1.003	15 min Winter	9	S4-04	S4-05	0.141	1.712	72.777	0.184	OK
1.004	15 min Winter	9	S4-05	S4-06	0.154	2.050	98.574	0.259	OK
1.005	15 min Winter	9	S4-06	S4-07	0.229	1.491	98.604	0.103	OK
1.006	480 min Winter	349	S4-07	S4-HW1	0.351	0.718	38.428	0.099	OK
1.007	480 min Winter	484	S4-HW1	S4-HW2	0.357	0.162	6.740		OK
1.008	480 min Winter	491	S4-HW2	S4-08	0.382	0.246	7.056	0.042	OK
1.009	480 min Winter	491	S4-08	S4-09	0.422	0.104	7.120	0.043	OK
3.000	15 min Winter	8	S4-12	S4-13	0.094	0.870	16.558	0.214	OK
3.001	480 min Winter	355	S4-13	S4-09	0.153	0.722	4.146	0.034	OK
1.010	480 min Winter	376	S4-09	S4-HW3	0.079	0.773	7.294	0.553	OK

Return Period (yrs) + Climate Change (%):

30yr+0%

Manholes

Manhole	Critical Storm	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Flood (m3)	Status
S4-01	15 min Winter	8	42.453	0.103	37.551		OK
S4-02	15 min Winter	8	41.561	0.161	88.587		OK
TD-S01	180 min Winter	143	43.670	0.395	3.760		Surcharged
TD-S02	180 min Winter	143	43.666	0.456	3.789		Surcharged
TD-SW03	60 min Winter	68	43.185	0.035	3.800		OK
S4-10	15 min Winter	10	42.333	0.033	4.914		OK
S4-03	15 min Winter	9	41.286	0.186	111.425		OK
S4-04	15 min Winter	8	39.999	0.224	199.935		OK
S4-05	15 min Winter	9	39.200	0.284	269.474		OK
S4-06	600 min Winter	579	38.265	0.520	5.815		OK
S4-07	600 min Winter	579	38.265	0.755	5.956		Surcharged
S4-HW1	600 min Winter	579	38.265	0.785	6.205		OK
S4-HW2	600 min Winter	579	38.265	0.785	6.196		OK
S4-08	600 min Winter	579	38.265	0.835	6.307		Surcharged
S4-12	15 min Winter	8	38.366	0.166	45.637		OK
S4-13	600 min Winter	579	38.264	0.264	0.627		OK
S4-09	600 min Winter	579	38.264	0.864	6.939		Surcharged
S4-HW3	360 min Winter	872	37.379	0.079	7.396		Outfall

Conduits

Pipe No.	Critical Storm	Peak (mins)	US Manhole	DS Manhole	Flow Depth (m)	Max Velocity (m/s)	Max Flow (l/s)	Flow / Capacity	Status
1.000	15 min Winter	8	S4-01	S4-02	0.132	1.234	36.996	0.264	OK
1.001	15 min Winter	8	S4-02	S4-03	0.173	2.064	87.215	0.509	OK
2.000	15 min Summer	10	TD-S01	TD-S02	0.150	0.613	5.776	0.392	Surcharged
2.001	120 min Winter	139	TD-S02	TD-SW03	0.043	0.915	3.800	0.256	OK
2.002	30 min Winter	33	TD-SW03	S4-10	0.033	1.383	3.791	0.113	OK
2.003	15 min Winter	9	S4-10	S4-03	0.035	1.739	5.038	0.110	OK
1.002	15 min Winter	9	S4-03	S4-04	0.184	2.499	113.441	0.703	OK
1.003	15 min Winter	9	S4-04	S4-05	0.252	2.176	199.030	0.503	OK
1.004	15 min Winter	9	S4-05	S4-06	0.278	2.641	272.881	0.717	OK
1.005	600 min Winter	579	S4-06	S4-07	0.560	0.687	57.580	0.060	OK
1.006	720 min Winter	431	S4-07	S4-HW1	0.600	0.776	92.392	0.238	Surcharged
1.007	600 min Winter	1098	S4-HW1	S4-HW2	0.785	0.162	6.937		OK
1.008	60 min Winter	66	S4-HW2	S4-08	0.450	0.246	8.054	0.048	OK
1.009	60 min Winter	66	S4-08	S4-09	0.450	0.159	7.983	0.048	OK
3.000	15 min Winter	8	S4-12	S4-13	0.167	1.111	44.937	0.582	OK
3.001	600 min Winter	579	S4-13	S4-09	0.282	0.673	7.262	0.059	OK
1.010	720 min Winter	1189	S4-09	S4-HW3	0.080	0.776	7.396	0.561	OK

Return Period (yrs) + Climate Change (%):

100yr+40%

Manholes

Manhole	Critical Storm	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Flood (m3)	Status
S4-01	15 min Winter	8	42.493	0.143	67.614		OK
S4-02	15 min Winter	10	41.846	0.446	128.446		Surcharged
TD-S01	240 min Winter	227	44.157	0.882	3.315		Surcharged
TD-S02	240 min Winter	227	44.154	0.944	3.328		Surcharged
TD-SW03	360 min Summer	597	43.185	0.035	3.800		OK
S4-10	15 min Winter	9	42.338	0.038	6.696		OK
S4-03	15 min Winter	10	41.630	0.530	173.089		Surcharged
S4-04	15 min Winter	9	40.126	0.351	324.996		OK
S4-05	15 min Winter	10	39.566	0.650	414.287		Surcharged
S4-06	960 min Winter	936	38.899	1.154	5.992		Surcharged
S4-07	960 min Winter	936	38.899	1.389	6.120		Surcharged
S4-HW1	960 min Winter	936	38.899	1.419	6.347		OK
S4-HW2	960 min Winter	936	38.899	1.419	6.319		Surcharged
S4-08	960 min Winter	936	38.899	1.469	6.423		Surcharged
S4-12	960 min Winter	936	38.898	0.698	0.346		Surcharged
S4-13	960 min Winter	936	38.898	0.898	0.574		Surcharged
S4-09	960 min Winter	936	38.898	1.498	6.998		Surcharged
S4-HW3	15 min Summer	223	37.379	0.079	7.396		Outfall

Conduits

Pipe No.	Critical Storm	Peak (mins)	US Manhole	DS Manhole	Flow Depth (m)	Max Velocity (m/s)	Max Flow (l/s)	Flow / Capacity	Status
1.000	15 min Winter	8	S4-01	S4-02	0.222	1.321	66.808	0.477	OK
1.001	15 min Winter	9	S4-02	S4-03	0.300	2.193	142.483	0.832	Surcharged
2.000	15 min Winter	7	TD-S01	TD-S02	0.150	0.697	7.453	0.506	Surcharged
2.001	360 min Winter	680	TD-S02	TD-SW03	0.043	0.916	3.800	0.256	OK
2.002	15 min Winter	79	TD-SW03	S4-10	0.036	1.384	3.800	0.113	OK
2.003	15 min Winter	9	S4-10	S4-03	0.094	1.713	6.715	0.146	OK
1.002	15 min Winter	10	S4-03	S4-04	0.300	2.711	176.652	1.094	Surcharged
1.003	15 min Winter	9	S4-04	S4-05	0.400	2.321	322.065	0.815	OK
1.004	15 min Winter	10	S4-05	S4-06	0.437	2.847	428.393	1.126	OK
1.005	120 min Summer	87	S4-06	S4-07	0.600	1.177	212.458	0.222	Surcharged
1.006	30 min Winter	20	S4-07	S4-HW1	0.600	2.180	399.496	1.028	Surcharged
1.007	240 min Summer	1620	S4-HW1	S4-HW2	1.050	0.035	6.937		OK
1.008	15 min Winter	18	S4-HW2	S4-08	0.450	0.246	10.521	0.062	OK
1.009	15 min Winter	18	S4-08	S4-09	0.450	0.268	12.024	0.072	OK
3.000	180 min Summer	172	S4-12	S4-13	0.300	0.995	26.698	0.346	Surcharged
3.001	15 min Winter	9	S4-13	S4-09	0.300	1.767	124.872	1.013	Surcharged
1.010	15 min Summer	223	S4-09	S4-HW3	0.080	0.776	7.396	0.561	OK