

Appendix F – Hertfordshire County Council LLFA Meeting Minutes

MEETING AGENDA

DATE AND TIME: 16:00 – 17:00 Wednesday 21st May 2025

SUBJECT: Hertfordshire County Council (HCC) LLFA /
Ardent Consulting Engineers - Catch up

VENUE: Video Call (Microsoft Teams)

REF: 2025-05-21_HCC-ACE

THOSE PRESENT: Emma Bullen (EB) – Herts County Council (LLFA);
David Uncle (DU) – Herts County Council (LLFA);
Alex Jones (AJ) – WSP (Support HCC LLFA);
Jake Silverton (JS) - WSP (Support HCC LLFA);
Colin Dear (CD) – Barratt David Wilson (North Thames);
Ben Brooks (BB) – Ardent Consulting Engineers;
Edward Fambley (EF) – Ardent Consulting Engineers;
Thomas Rayment (TR) – Ardent Consulting Engineers.

1.0 Welcome and Introductions

2.0 Project Discussions

2.1 2502330 – Land at Talbot Way, Letchworth (BB/TR)

ITEM	NOTES	ACTION
1.00	Welcome and Introductions	
1.10	BB introduces himself and outlines the requirements of this meeting. The proposal is to outline Ardent's drainage strategies are acceptable and the changes made are necessary due to the unfeasibility of the original statement.	
2.00	Project Discussions	
2.10	Land at Talbot Way, Letchworth (21/00504/OP)	
		
2.11	BB describes the previous drainage strategy and its unfeasibility. Infiltration rates shown at outline are unsatisfactory and the next stage on the hierarchy should be sought. It was noted that the current Ciria guidance is to use the lowest infiltration rate achieved on the site, unless there is a distinct change in geology which in this case there is not as all testing was undertaken within the chalk. See Appendix A for infiltration rates and details of the testing undertaken.	TR

ITEM	NOTES	ACTION
2.12	Ardent to re-consult with Anglian Water to reconfirm the 8 l/s discharge at a later stage.	TR
2.13	BB notes deep sewers (4.5–5.0m) are typical in the area, with existing ones around 4.0m. DCG/SSG allows upto 6m for typical manhole construction.	
2.14	BB outlines a second option which will also provide a gravity connection through the commercial development just north of Blackhorse road.	
2.15	AJ agrees infiltration shouldn't be pursued if unviable and supports gravity-fed solutions.	
2.16	AJ says the drainage statement must explain why infiltration isn't viable and follow the drainage design hierarchy	
2.17	AJ suggests the basin can retain infiltration properties, but drainage modelling should assume none, to keep the design robust.	
2.18	BB agrees the basin can be unlined to allow infiltration but should not factor into calculations.	
2.19	BB outlines the drainage proposal, including buried storage and CIRIA treatment compliance, see Appendix B .	TR
2.20	BB notes Ardent would include more SuDS, but site constraints (landscaping/tree buffers/ecology) limit this.	
2.21	TR clarifies the distinction between the bioretention and dry swale elements on site, emphasizing that the dry swale provides multi-stage treatment for the entire development via an underdrain and filter medium.	
2.22	AJ finds the proposed strategy acceptable, emphasizing that clear justification is essential for the changes from Outline to Reserved Matters.	
2.23	DU states that Condition 3 allows connection to Anglian Water's existing asset—limited to 8 l/s—provided it can be clearly demonstrated that infiltration is not viable.	
2.24	BB re-iterates the site has shown poor infiltration; therefore it would not be necessary for more BRE 365 infiltration rates to be undertaken. Better infiltration rates would not supersede the previous testing, and these rates prove that infiltration is unviable. <i>In particular the conditions do not state for additional testing to be done, rather to</i>	

ITEM	NOTES	ACTION
	<i>prove infiltration is unfavourable.</i>	
2.25	DU mentions additional source control measures and the desire for them where possible. BB adds that the proposed drainage strategy remains compliant with CIRIA SuDS treatment indices, which addresses the requirements set out within the planning condition, see Appendix C.	
2.26	BB inquires about the runoff coefficient. DU confirms HCC's preferred value is 1.0. BB and DU agree to proceed with the default value, as set out in the outline strategy. Drainage calculations will also use $C_v = 1.0$ to as a sensitivity test to assess the impact on modelling and determine flood mitigation measures if necessary.	

Appendix G – SUDS Maintenance Plan

SuDS Management & Maintenance Strategy

Maintenance and Management

The attenuation basins, swales, connecting pipework, chambers, and flow controls would be maintained by a management company set up by the developer. As construction has not yet commenced, the process of finalising the management company contract has not yet commenced. The developer will ensure that the measures as outlined below form part of the management company contract details, for the ongoing maintenance of all SuDS features on site.

The indicative maintenance requirements for each proposed SuDS component is given below. Taken from CIRIA report C753 "The SuDS Manual".

Drainage Pipes

Maintenance schedule	Required action	Typical frequency
Regular Maintenance	Remove sediment and debris from inspection chambers and flow control chambers	Annually
	Cleaning of gutters and any filters on downpipes	Annually
	Remove any root ingress	As required
Occasional Maintenance	CCTV survey of drains to check alignment, cracking and joint displacement	10 year intervals

SuDS Management & Maintenance Strategy**Attenuation Basins**

Maintenance schedule	Maintenance Task	Frequency
Regular Maintenance	Remove litter and debris	Monthly (or as required)
	Cut the grass – for spillways and access routes	Monthly (during growing season), or as required
	Cut grass - meadow grass in and around basin	Half yearly (spring, before nesting season, and autumn)
	Manage other vegetation and remove nuisance plants	Monthly (at start, then as required)
	Inspect inlets, outlets, and overflows for blockages, and clear is required	Monthly
	Inspect banksides, structures, pipework etc. for evidence of physical damage	Monthly
	Inspect inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies	Monthly (for first year), then annually or as required
	Check any penstocks and other mechanical devices	Annually
	Tidy all dead growth before start of growing season	Annually
	Remove sediment from inlets, outlets and forebays	Annually (or as required)
	Manage wetland plants in outlet pool- where provided	Annually

SuDS Management & Maintenance Strategy

Occasional Maintenance	Reseed areas of poor vegetation growth	As required
	Prune and trim any trees and remove cuttings	Every 2 years, or as required
	Remove sediment from inlets, outlets, forebay and main basin when required	Every 5 years, or as required (likely to be minimal requirements where effective upstream source control is provided)
Remedial Actions	Repair erosion or other damage by reseedling or returfing	As required
	Realignment of rip-rap	As required
	Repair/rehabilitation of inlets, outlets and overflows	As required
	Relevel uneven levels and reinstate design levels	As required

Swales

Maintenance schedule	Maintenance Task	Frequency
Regular Maintenance	Remove litter and debris	Monthly, or as required
	Cut the grass – to retain grass height within specified design range	Monthly (during growing season) or as required
	Manage other vegetation and remove nuisance plants	Monthly at start, then as required
	Inspect inlets, outlets and overflows for blockages, and clear if required	Monthly

SuDS Management & Maintenance Strategy

	Inspect infiltration surfaces for ponding, compaction, silt accumulation, record areas where water is ponding for > 48 hours	Monthly, or when required
	Inspect vegetation coverage	Monthly for 6 months, quarterly for 2 years, then half yearly
	Inspect inlets and facility surface for silt accumulation, establish appropriate silt removal frequencies	Half yearly
Occasional Maintenance	Reseed areas of poor vegetation growth; alter plant types to better suit conditions, if required	As required or if bare soil is exposed over > 10% of the filter strip area
Remedial Actions	Repair erosion or other damage by re-turfing or reseed	As required
	Relevel uneven surfaces and reinstate design levels	As required
	Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface	As required
	Remove build-up of sediment on upstream gravel trench, flow spreader or at top of filter strip	As required
	Remove and dispose of oils or petrol residues using safe standard practices	As required

SuDS Management & Maintenance Strategy**Bio-retention Systems**

Maintenance schedule	Maintenance Task	Frequency
Regular Maintenance	Inspect infiltration surfaces for silting and ponding, record de-watering time of the facility and assess standing water levels in underdrain (if appropriate) to determine if maintenance is necessary	Quarterly
	Check operation of underdrains by inspection of flows after rain	Annually
	Assess plants for disease infection, poor growth, invasive species etc. and replace as necessary	Quarterly
	Inspect inlets and outlets for blockages.	Quarterly
	Remove litter and surface debris and weeds	Quarterly (or more frequently for tidiness or aesthetic reasons)
	Replace any plants, to maintain planting density	As required
	Remove sediment, litter and debris build-up from around inlets or from forebays	Quarterly to biannually
Occasional Maintenance	Infill any holes or scour in the filter medium, improve erosion protection if required	As required
	Repair minor accumulations of silt by raking away surface mulch, scarifying surface of medium and replacing mulch	As required

SuDS Management & Maintenance Strategy

Remedial Actions	Remove and replace filter medium and vegetation above	As required but likely to be > 20 years
	Remove and replace filter medium and vegetation above	As required but likely to be > 20 years

Attenuation Tank

Maintenance Period	Maintenance Task	Frequency
Maintenance Work	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then annually
	Remove debris from the catchment surface (where it may cause risk to performance)	Monthly
	Remove sediment from pre-treatment structures and/or internal forebays.	Annually, or as required
Remedial Work	Repair/rehabilitate inlets, outlets, overflows and vents	As required.
Monitoring	Inspect/check all inlets, outlets, vents, and overflows to ensure that they are in good condition and operating as designed	Annually.
	Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required.

Appendix H – SUDS Treatment Plan

Pollution hazard indices for different land use classifications (land use shaded applicable for the development)

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydrocarbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, home zones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (e.g. hospitals, retail), all roads except low traffic roads and trunk roads/motorways	Medium	0.7	0.6	0.7
Sites with heavy pollution (e.g. haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial	High	0.8	0.8	0.9

sites; trunk roads and motorways				
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Indicative SuDS mitigation indices for discharges to surface waters
(SuDS components shaded applicable to this development)

SuDS component	Pollution Hazard Mitigation indices		
	TSS	Metals	Hydrocarbons
Filter strip	0.4	0.4	0.5
Filter drain	0.4	0.4	0.4
Swale	0.5	0.6	0.6
Bio retention system	0.8	0.8	0.8
Permeable pavement	0.7	0.6	0.7
Detention basin	0.5	0.5	0.6
Pond	0.7	0.7	0.5
Wetland	0.8	0.8	0.8
Hydrodynamic Vortex Separator	0.5	0.4	0.5
Proprietary treatment systems	These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period event, for inflow concentrations relevant to the contributing drainage area.		

Indicative SuDS mitigation indices for discharges to surface water outfalls

<u>Northern Catchment</u>			
For surface water discharge from all roads except low traffic roads and trunks/motorways			
Source	Required mitigation indices		
	TSS	Metals	Hydrocarbons
Medium	0.7	0.6	0.7
Drainage Network			
Detention Basin (mitigation index ₁)	0.5	0.5	0.6
Swales (mitigation index ₂)	0.5	0.6	0.6
Detention Basin (mitigation index ₃)	0.5	0.5	0.6
Total	1.0	1.05	1.2
Check	+0.3	+0.45	+0.5

Total SuDS mitigation index = mitigation index₁ + (0.5 x mitigation index₂)

<u>Central Catchment</u>			
For surface water discharge from all roads except low traffic roads and trunks/motorways			
Source	Required mitigation indices		
	TSS	Metals	Hydrocarbons
Medium	0.7	0.6	0.7
Drainage Network			
Swales (mitigation index ₁)	0.5	0.6	0.6
Bioretention System (mitigation index ₂)	0.8	0.8	0.8
Total	0.9	1.0	1.0
Check	+0.2	+0.4	+0.3

Total SuDS mitigation index = mitigation index₁ + (0.5 x mitigation index₂)

<u>Southern Catchment</u>			
For surface water discharge from all roads except low traffic roads and trunks/motorways			
Source	Required mitigation indices		
	TSS	Metals	Hydrocarbons
Medium	0.7	0.6	0.7
Drainage Network			
Detention Basin (mitigation index ₁)	0.5	0.5	0.6
Swales (mitigation index ₂)	0.5	0.6	0.6
Bioretention System (mitigation index ₃)	0.8	0.8	0.8
Total	1.15	1.2	1.3
Check	+0.45	+0.6	+0.6

Total SuDS mitigation index = mitigation index₁ + (0.5 x mitigation index₂)

Appendix I – Proposed Drainage Calculations

Network Details

Manhole Schedule

Manhole	Catchment Area (ha)	Diameter (m)	Type	CL (m)	IL (m)	Depth To Soffit (m)	Easting (m)	Northing (m)
S1	0.110	1.200	Type B	88.941	87.120	1.446	523165.209	234151.045
S2	0.110	1.200	Type B	88.841	86.900	1.566	523196.724	234158.348
S3	0.110	1.350	Type B	88.778	86.840	1.563	523187.020	234168.308
S4	0.110	1.350	Type C	88.324	86.625	1.324	523166.921	234194.702
S5	0.110	1.350	Type C	88.080	86.550	1.155	523184.471	234207.102
POND 01	0.000	1.350	Type C	87.989	86.500	1.114	523185.552	234232.735
S7	0.000	1.350	Type C	88.000	86.470	1.230	523204.890	234228.980
S8	0.000	1.350	Type C	87.600	86.320	0.980	523232.930	234206.208
S9	0.000	1.350	Type C	87.610	86.245	1.065	523249.020	234192.930
S10	0.050	1.200	Type B	88.705	86.900	1.505	523227.174	234152.272
S11	0.050	1.350	Type C	88.374	86.651	1.424	523238.065	234166.667
S12	0.000	1.350	Type C	88.061	86.300	1.461	523247.059	234177.389
S13	0.050	1.200	Unknown	87.984	86.202	1.482	523251.771	234177.479
S14	0.050	1.350	Type C	87.620	86.095	1.225	523273.257	234163.873
S15	0.050	1.350	Type B	86.894	85.005	1.514	523293.325	234149.296
S16	0.050	1.350	Type B	86.038	83.975	1.688	523307.567	234139.712
S17	0.050	1.200	Type B	88.758	86.950	1.508	523198.718	234100.741
S18	0.050	1.200	Type B	88.830	86.450	2.080	523211.913	234110.339
S19	0.050	1.350	Type C	88.723	86.950	1.473	523216.833	234139.077
S20	0.050	1.200	Type B	88.492	86.340	1.852	523228.331	234130.535
S21	0.050	1.200	Type B	87.453	85.644	1.509	523258.683	234109.577
S22	0.050	1.200	Unknown	87.161	85.370	1.491	523233.894	234051.272
S23	0.050	1.200	Unknown	86.814	85.020	1.494	523254.506	234068.187
S24	0.000	1.200	Type B	86.353	84.440	1.613	523278.198	234093.152
S25	0.050	1.350	Type B	85.809	83.925	1.584	523286.679	234085.271
S26	0.050	1.350	Type B	85.761	83.635	1.751	523301.845	234099.311
S27	0.050	1.350	Type B	85.154	82.815	1.964	523320.127	234127.274
S28	0.050	1.350	Type C	84.077	82.130	1.497	523336.167	234117.547
S29	0.050	1.350	Type C	82.468	80.530	1.488	523354.161	234101.044
S30	0.050	1.350	Type B	81.387	79.240	1.697	523367.170	234091.811
S31	0.050	1.350	Type B	79.906	77.950	1.506	523387.457	234082.512
S32	0.050	1.350	Type C	79.511	77.670	1.391	523391.397	234076.737
POND 02	0.000	1.350	Type C	78.500	77.200	0.850	523402.451	234051.044
S34	0.000	1.350	Type C	78.500	77.000	1.125	523395.823	234032.339
S35	0.000	1.350	Type C	78.708	76.952	1.380	523385.643	234021.044
S36	0.000	1.350	Type B	79.526	76.896	2.254	523367.747	234019.697
S37	0.070	1.200	Unknown	85.018	83.518	1.200	523296.928	234070.524
S38	0.070	1.350	Type C	84.503	83.003	1.200	523303.001	234061.196
S39	0.070	1.350	Type C	83.487	81.987	1.200	523309.723	234039.387
S40	0.070	1.350	Type C	83.473	81.973	1.200	523285.943	234004.353
TANK 01	0.000	1.350	Type A	82.069	76.880	4.889	523327.078	234027.913
S42	0.070	1.350	Type A	82.169	76.728	5.081	523314.740	234010.461
S43	0.070	1.350	Type A	81.444	76.588	4.406	523318.933	233989.884
S44	0.070	1.350	Type A	81.055	76.509	4.096	523327.676	233959.783
S45	0.070	1.500	Type A	80.704	76.461	3.868	523335.724	233942.263
Ex S3951	0.000	1.350	Type A	80.130	76.420	3.335	523343.015	233941.174

Pipe Schedule

Pipe Number	US Manhole	US IL (m)	DS Manhole	DS IL (m)	Shape	Dimension (m)	Length (m)	Gradient (1:x)	Roughness (mm)	US Depth To Soffit (m)	DS Depth To Soffit (m)
1.000	S1	87.120	S3	86.840	Circ	0.375mØ	27.816	99.3	0.600	1.446	1.563
2.000	S2	86.900	S3	86.840	Circ	0.375mØ	13.905	231.8	0.600	1.566	1.563
1.001	S3	86.840	S4	86.625	Circ	0.375mØ	33.175	154.3	0.600	1.563	1.324
1.002	S4	86.625	S5	86.550	Circ	0.375mØ	21.488	286.5	0.600	1.324	1.155
1.003	S5	86.550	POND 01	86.500	Circ	0.375mØ	25.656	513.1	0.600	1.155	1.114
1.004	POND 01	86.500	S7	86.470	Circ	0.375mØ	19.700	656.7	0.600	1.114	1.155
1.005	S7	86.470	S8	86.320	Circ	0.3mØ	36.122	240.8	0.600	1.230	0.980
1.006	S8	86.320	S9	86.245	Circ	0.3mØ	20.861	278.1	0.600	0.980	1.065
1.007	S9	86.245	S13	86.202	Circ	0.3mØ	15.694	365.0	0.600	1.065	1.482
3.000	S10	86.900	S11	86.651	Circ	0.3mØ	18.050	72.4	0.600	1.505	1.424
3.001	S11	86.651	S12	86.450	Circ	0.3mØ	13.995	69.8	0.600	1.424	1.311

Pipe Schedule

Pipe Number	US Manhole	US IL (m)	DS Manhole	DS IL (m)	Shape	Dimension (m)	Length (m)	Gradient (1:x)	Roughness (mm)	US Depth To Soffit (m)	DS Depth To Soffit (m)
3.002	S12	86.300	S13	86.202	Circ	0.3mØ	4.713	48.1	0.600	1.461	1.482
1.008	S13	86.202	S14	86.095	Circ	0.3mØ	25.431	237.7	0.600	1.482	1.225
1.009	S14	86.095	S15	85.080	Circ	0.3mØ	24.803	24.4	0.600	1.225	1.514
1.010	S15	85.005	S16	83.975	Circ	0.375mØ	17.167	16.7	0.600	1.514	1.688
1.011	S16	83.975	S27	83.040	Circ	0.375mØ	17.676	18.9	0.600	1.688	1.739
4.000	S17	86.950	S18	86.450	Circ	0.3mØ	16.317	32.6	0.600	1.508	2.080
4.001	S18	86.600	S20	86.340	Circ	0.3mØ	26.028	100.1	0.600	1.930	1.852
5.000	S19	86.950	S20	86.340	Circ	0.3mØ	14.323	23.5	0.600	1.473	1.852
4.002	S20	86.340	S21	85.644	Circ	0.3mØ	36.885	53.0	0.600	1.852	1.509
4.003	S21	85.644	S24	84.440	Circ	0.3mØ	25.507	21.2	0.600	1.509	1.613
6.000	S22	85.370	S23	85.020	Circ	0.3mØ	26.664	76.2	0.600	1.491	1.494
6.001	S23	85.020	S24	84.440	Circ	0.3mØ	34.417	59.3	0.600	1.494	1.613
4.004	S24	84.440	S25	83.925	Circ	0.3mØ	11.577	22.5	0.600	1.613	1.584
4.005	S25	83.925	S26	83.860	Circ	0.375mØ	20.667	318.0	0.600	1.509	1.526
4.006	S26	83.635	S27	82.815	Circ	0.375mØ	33.409	40.7	0.600	1.751	1.964
1.012	S27	83.040	S28	82.130	Circ	0.45mØ	18.759	20.6	0.600	1.664	1.497
1.013	S28	82.130	S29	80.530	Circ	0.45mØ	24.416	15.3	0.600	1.497	1.488
1.014	S29	80.530	S30	79.240	Circ	0.45mØ	15.953	12.4	0.600	1.488	1.697
1.015	S30	79.240	S31	77.950	Circ	0.45mØ	22.316	17.3	0.600	1.697	1.506
1.016	S31	77.950	S32	77.670	Circ	0.45mØ	6.991	25.0	0.600	1.506	1.391
1.017	S32	77.670	POND 02	77.200	Circ	0.45mØ	27.971	59.5	0.600	1.391	0.850
1.018	POND 02	77.200	S34	77.000	Circ	0.45mØ	19.844	99.2	0.600	0.850	1.050
1.019	S34	77.000	S35	76.952	Circ	0.375mØ	15.206	320.0	0.600	1.125	1.380
1.020	S35	76.952	S36	76.896	Circ	0.375mØ	17.947	320.0	0.600	1.380	2.254
1.021	S36	76.896	S42	76.728	Circ	0.375mØ	53.805	320.0	0.600	2.254	5.066
7.000	S37	83.518	S38	83.003	Circ	0.3mØ	11.131	21.6	0.600	1.200	1.200
7.001	S38	83.153	S39	82.137	Circ	0.3mØ	22.821	22.5	0.600	1.050	1.050
7.002	S39	81.987	S42	76.788	Circ	0.3mØ	29.358	5.6	0.600	1.200	5.081
8.000	S40	81.973	S42	76.788	Circ	0.3mØ	29.437	5.7	0.600	1.200	5.081
9.000	TANK 01	76.880	S42	76.788	Circ	0.3mØ	21.373	231.6	0.600	4.889	5.081
1.022	S42	76.728	S43	76.663	Circ	0.375mØ	20.999	320.0	0.600	5.066	4.406
1.023	S43	76.588	S44	76.509	Circ	0.45mØ	31.345	400.0	0.600	4.406	4.096
1.024	S44	76.509	S45	76.461	Circ	0.45mØ	19.280	400.0	0.600	4.096	3.793
1.025	S45	76.461	Ex S3951	76.420	Circ	0.375mØ	7.372	179.4	0.600	3.868	3.335

Outfall Details

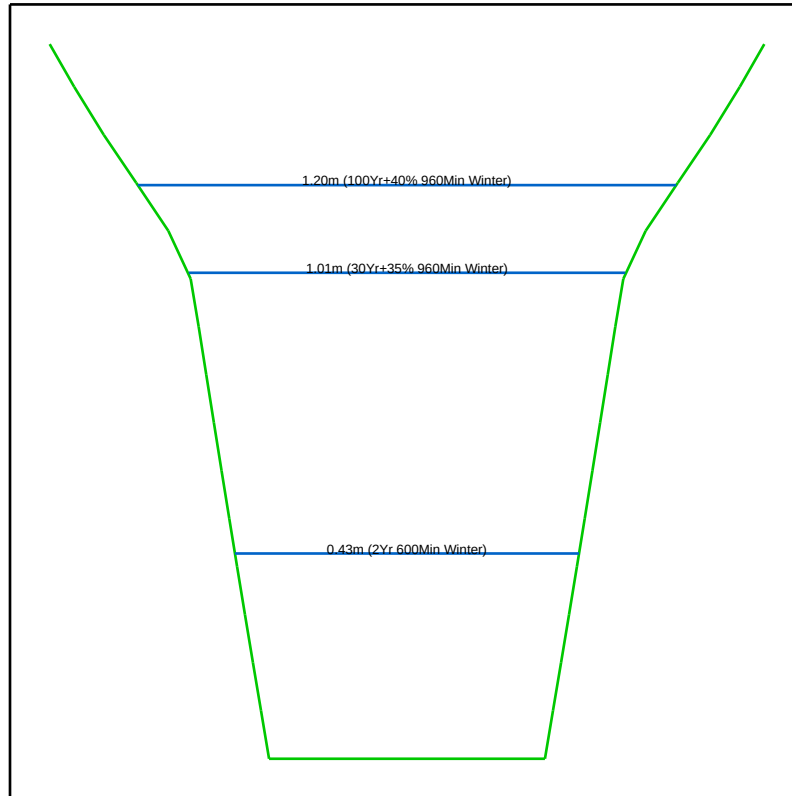
Outfall Manhole Ex S3951 : Free Discharge

Flow Control Details

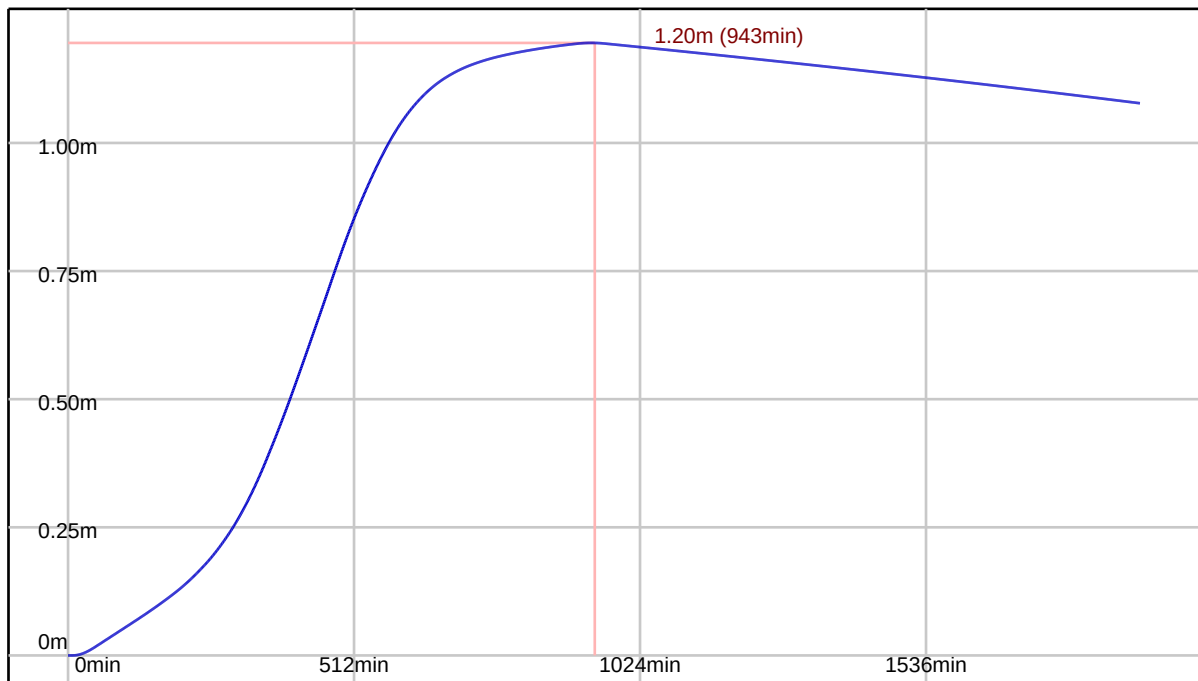
Pond Structure at Manhole POND 01

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
86.500	1.489	375.538	87.689	0.300	0.00000000	0.00000000	2.00

Pond Depth/Area Diagram at POND 01



Pond at POND 01 (100Yr+40% 960Min Winter)

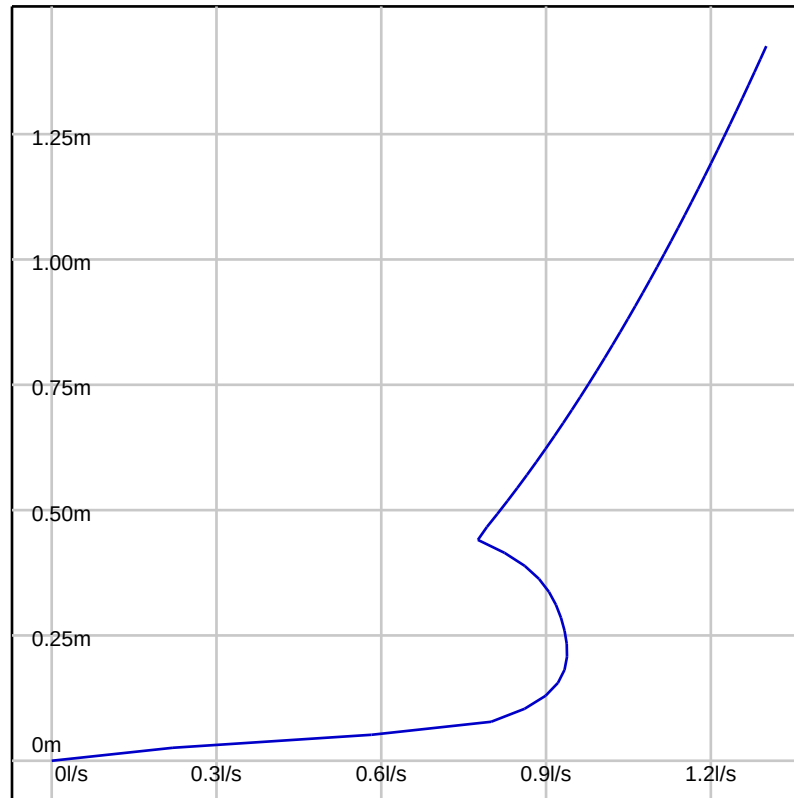


Controls within Manhole S7

Hydro-Brake® Optimum Control at Manhole S7

Model Ref	Design Depth (m)	Design Flow (l/s)	Depth Above Invert (m)	FF Head (m)	FF Flow (l/s)	KF Head (m)	KF Flow (l/s)
SHE-0049-1200-1200-1200	1.200	1.200	0.000	0.217	0.938	0.440	0.773

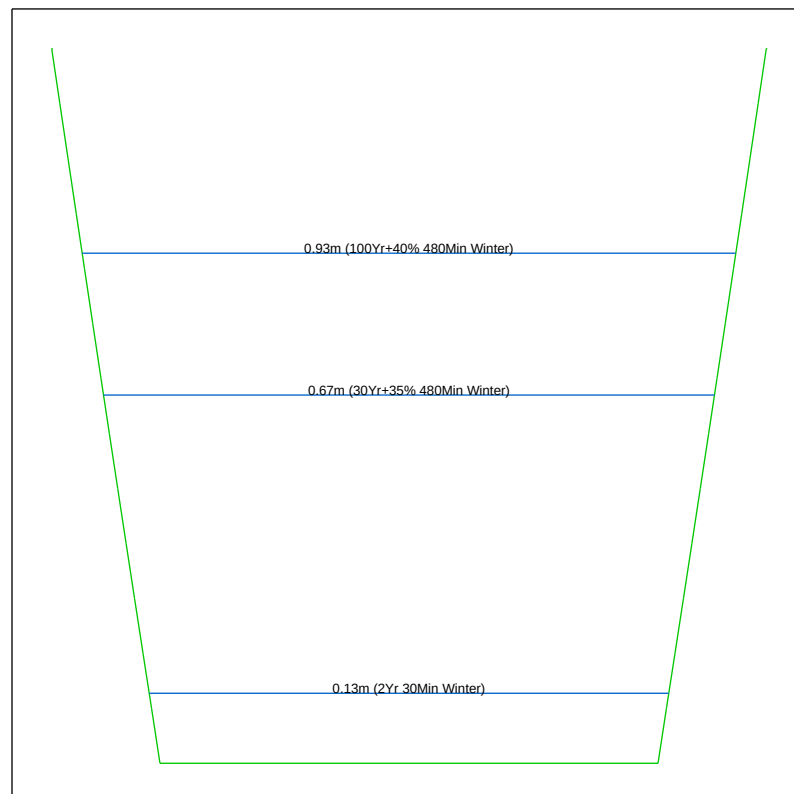
Hydro-Brake® Optimum Control at S7



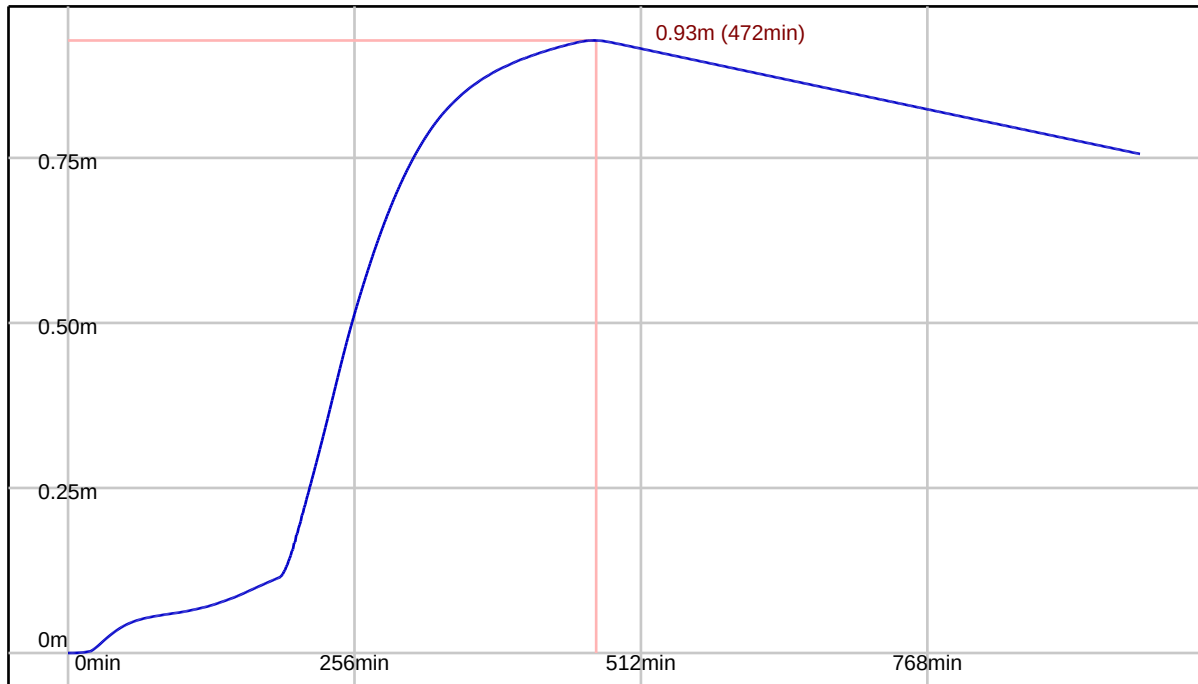
Pond Structure at Manhole POND 02

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
77.200	1.300	410.547	78.200	0.300	0.00000000	0.00000000	2.00

Pond Depth/Area Diagram at POND 02



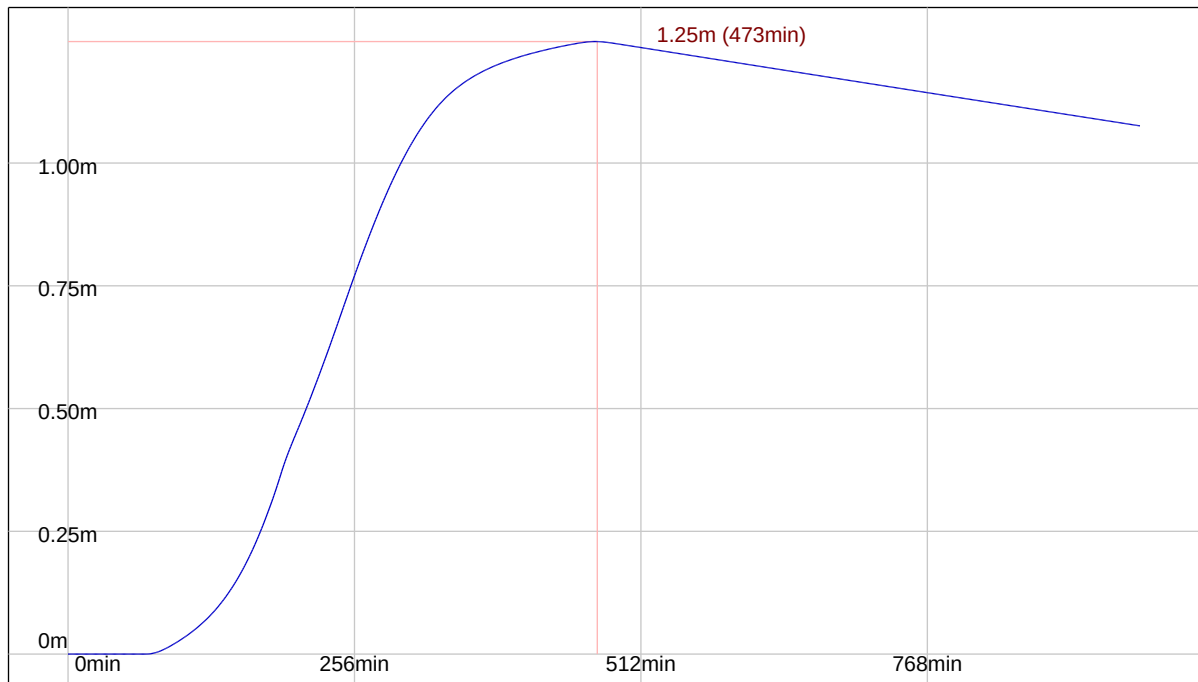
Pond at POND 02 (100Yr+40% 480Min Winter)



Tank Structure at Manhole TANK 01

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
76.880	1.600	95.00	526.735	500.398	800.637	0.00000000	0.00000000	2.00

Tank at TANK 01 (100Yr+40% 480Min Winter)

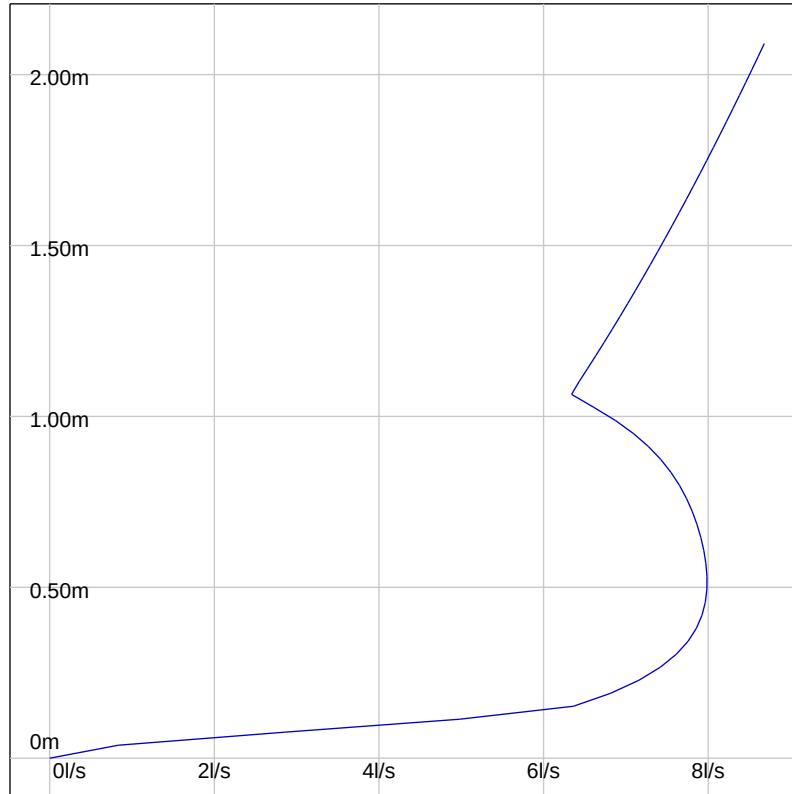


Controls within Manhole S45

Hydro-Brake® Optimum Control at Manhole S45

Model Ref	Design Depth (m)	Design Flow (l/s)	Depth Above Invert (m)	FF Head (m)	FF Flow (l/s)	KF Head (m)	KF Flow (l/s)
SHE-0120-8000-1760-8000	1.760	8.000	0.000	0.516	7.986	1.061	6.320

Hydro-Brake® Optimum Control at S45



Simulation Settings

FEH2022 (point): Filename=FEH_Point_Descriptors_523219_234129_v5_0_1.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, 2160, 2880, 4320, 5760, 7200, 8640, 10080

Return Periods (yrs) + Climate Change: (2, +0%), (30, +35%), (100, +40%)

Simulated Rainfall Events

Storm	Average Intensity (mm/hr)	Runoff Continuity %	Flow Continuity %	Storm	Average Intensity (mm/hr)	Runoff Continuity %	Flow Continuity %
2Yr 15Min Winter	28.729	0.00	-0.37	30Yr+35% 720Min Winter	6.434	0.00	1.71
2Yr 15Min Summer	28.729	0.00	-0.45	30Yr+35% 960Min Summer	5.008	0.00	0.93
2Yr 30Min Winter	18.000	0.00	-0.13	30Yr+35% 960Min Winter	5.008	0.00	1.28
2Yr 30Min Summer	18.000	0.00	-0.28	30Yr+35% 1440Min Summer	3.525	0.00	0.23
2Yr 60Min Winter	11.000	0.00	0.03	30Yr+35% 1440Min Winter	3.525	0.00	0.41
2Yr 60Min Summer	11.000	0.00	-0.10	30Yr+35% 2160Min Summer	2.491	0.00	0.08
2Yr 120Min Winter	8.159	0.00	0.22	30Yr+35% 2160Min Winter	2.491	0.00	0.15
2Yr 120Min Summer	8.159	0.00	0.06	30Yr+35% 2880Min Summer	1.956	0.00	-0.01
2Yr 180Min Summer	6.648	0.00	0.04	30Yr+35% 2880Min Winter	1.956	0.00	0.03
2Yr 180Min Winter	6.648	0.00	0.21	30Yr+35% 4320Min Summer	1.411	0.00	-0.01
2Yr 240Min Summer	5.404	0.00	-0.06	30Yr+35% 4320Min Winter	1.411	0.00	-0.02
2Yr 240Min Winter	5.404	0.00	0.05	30Yr+35% 5760Min Summer	1.133	0.00	-0.01
2Yr 360Min Summer	4.070	0.00	-0.09	30Yr+35% 5760Min Winter	1.133	0.00	-0.01
2Yr 360Min Winter	4.070	0.00	-0.11	30Yr+35% 7200Min Summer	0.965	0.00	-0.01
2Yr 480Min Summer	3.303	0.00	-0.08	30Yr+35% 7200Min Winter	0.965	0.00	-0.01
2Yr 480Min Winter	3.303	0.00	-0.07	30Yr+35% 8640Min Summer	0.851	0.00	-0.01
2Yr 600Min Summer	2.767	0.00	-0.07	30Yr+35% 8640Min Winter	0.851	0.00	-0.01
2Yr 600Min Winter	2.767	0.00	-0.07	30Yr+35% 10080Min Summer	0.769	0.00	-0.01
2Yr 720Min Summer	2.376	0.00	-0.07	30Yr+35% 10080Min Winter	0.769	0.00	-0.01
2Yr 720Min Winter	2.376	0.00	-0.06	100Yr+40% 15Min Summer	141.549	0.00	2.32
2Yr 960Min Summer	1.877	0.00	-0.06	100Yr+40% 15Min Winter	141.549	0.00	2.44
2Yr 960Min Winter	1.877	0.00	-0.06	100Yr+40% 30Min Summer	91.215	0.00	2.54
2Yr 1440Min Winter	1.353	0.00	-0.04	100Yr+40% 30Min Winter	91.215	0.00	2.67
2Yr 1440Min Summer	1.353	0.00	-0.04	100Yr+40% 60Min Summer	55.877	0.00	2.78
2Yr 2160Min Winter	0.980	0.00	-0.03	100Yr+40% 60Min Winter	55.877	0.00	2.96
2Yr 2160Min Summer	0.980	0.00	-0.04	100Yr+40% 120Min Summer	34.601	0.00	2.89
2Yr 2880Min Summer	0.785	0.00	-0.03	100Yr+40% 120Min Winter	34.601	0.00	3.02
2Yr 2880Min Winter	0.785	0.00	-0.03	100Yr+40% 180Min Summer	25.819	0.00	2.85
2Yr 4320Min Summer	0.585	0.00	-0.03	100Yr+40% 180Min Winter	25.819	0.00	2.98
2Yr 4320Min Winter	0.585	0.00	-0.03	100Yr+40% 240Min Summer	20.560	0.00	2.77
2Yr 5760Min Summer	0.484	0.00	-0.05	100Yr+40% 240Min Winter	20.560	0.00	2.86
2Yr 5760Min Winter	0.484	0.00	-0.05	100Yr+40% 360Min Summer	14.837	0.00	2.58
2Yr 7200Min Summer	0.422	0.00	-0.04	100Yr+40% 360Min Winter	14.837	0.00	2.62
2Yr 7200Min Winter	0.422	0.00	-0.04	100Yr+40% 480Min Summer	11.707	0.00	2.38
2Yr 8640Min Summer	0.380	0.00	-0.04	100Yr+40% 480Min Winter	11.707	0.00	2.44
2Yr 8640Min Winter	0.380	0.00	-0.04	100Yr+40% 600Min Summer	9.674	0.00	2.17
2Yr 10080Min Winter	0.350	0.00	-0.04	100Yr+40% 600Min Winter	9.674	0.00	2.26
2Yr 10080Min Summer	0.350	0.00	-0.04	100Yr+40% 720Min Summer	8.247	0.00	1.96
30Yr+35% 15Min Summer	107.652	0.00	1.75	100Yr+40% 720Min Winter	8.247	0.00	2.08
30Yr+35% 15Min Winter	107.652	0.00	1.91	100Yr+40% 960Min Summer	6.412	0.00	1.55
30Yr+35% 30Min Summer	69.031	0.00	2.10	100Yr+40% 960Min Winter	6.412	0.00	1.70
30Yr+35% 30Min Winter	69.031	0.00	2.28	100Yr+40% 1440Min Summer	4.490	0.00	0.82
30Yr+35% 60Min Summer	41.932	0.00	2.37	100Yr+40% 1440Min Winter	4.490	0.00	1.14
30Yr+35% 60Min Winter	41.932	0.00	2.53	100Yr+40% 2160Min Summer	3.147	0.00	0.23
30Yr+35% 120Min Summer	26.609	0.00	2.48	100Yr+40% 2160Min Winter	3.147	0.00	0.32
30Yr+35% 120Min Winter	26.609	0.00	2.67	100Yr+40% 2880Min Summer	2.452	0.00	0.10
30Yr+35% 180Min Summer	20.071	0.00	2.47	100Yr+40% 2880Min Winter	2.452	0.00	0.17
30Yr+35% 180Min Winter	20.071	0.00	2.67	100Yr+40% 4320Min Summer	1.745	0.00	-0.01
30Yr+35% 240Min Summer	15.983	0.00	2.38	100Yr+40% 4320Min Winter	1.745	0.00	-0.01
30Yr+35% 240Min Winter	15.983	0.00	2.58	100Yr+40% 5760Min Summer	1.385	0.00	-0.01
30Yr+35% 360Min Summer	11.570	0.00	2.16	100Yr+40% 5760Min Winter	1.385	0.00	-0.01
30Yr+35% 360Min Winter	11.570	0.00	2.38	100Yr+40% 7200Min Summer	1.168	0.00	-0.01
30Yr+35% 480Min Summer	9.145	0.00	1.94	100Yr+40% 7200Min Winter	1.168	0.00	-0.03
30Yr+35% 480Min Winter	9.145	0.00	2.16	100Yr+40% 8640Min Summer	1.021	0.00	-0.02
30Yr+35% 600Min Summer	7.554	0.00	1.70	100Yr+40% 8640Min Winter	1.021	0.00	-0.01

Simulated Rainfall Events

Storm	Average Intensity (mm/hr)	Runoff Continuity %	Flow Continuity %	Storm	Average Intensity (mm/hr)	Runoff Continuity %	Flow Continuity %
30Yr+35% 600Min Winter	7.554	0.00	1.93	100Yr+40% 10080Min Winter	0.917	0.00	-0.01
30Yr+35% 720Min Summer	6.434	0.00	1.44	100Yr+40% 10080Min Summer	0.917	0.00	-0.01

Simulation Results

Return Period Yrs: 2.0

Climate Change %: 0

Manholes

Manhole	Critical Storm	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Flood (m3)	Status
S1	15 min Winter	8	87.187	0.067	14.598		OK
S2	15 min Winter	8	86.983	0.083	14.598		OK
S3	15 min Winter	9	86.969	0.129	41.564		OK
S4	600 min Winter	579	86.928	0.303	0.623		OK
S5	600 min Winter	579	86.928	0.378	0.829		Surcharged
POND 01	600 min Winter	580	86.928	0.428	0.646		Surcharged
S7	600 min Winter	580	86.928	0.458	0.783		Surcharged
S8	8640 min Summer	5062	86.345	0.025	0.938		OK
S9	15 min Winter	9	86.307	0.062	0.070		OK
S10	15 min Winter	8	86.945	0.045	6.636		OK
S11	15 min Winter	8	86.713	0.063	13.201		OK
S12	15 min Winter	8	86.359	0.059	12.971		OK
S13	15 min Winter	9	86.307	0.105	19.225		OK
S14	15 min Winter	9	86.162	0.067	25.540		OK
S15	15 min Winter	9	85.069	0.064	31.837		OK
S16	15 min Winter	9	84.047	0.072	38.106		OK
S17	15 min Winter	8	86.987	0.037	6.636		OK
S18	15 min Winter	8	86.668	0.218	13.215		OK
S19	15 min Winter	8	86.984	0.034	6.636		OK
S20	15 min Winter	8	86.424	0.084	26.173		OK
S21	15 min Winter	9	85.717	0.073	32.016		OK
S22	15 min Winter	8	85.416	0.046	6.636		OK
S23	15 min Winter	8	85.080	0.060	13.177		OK
S24	15 min Winter	9	84.528	0.088	45.061		OK
S25	15 min Winter	9	84.097	0.172	51.562		OK
S26	15 min Winter	9	83.743	0.108	58.189		OK
S27	15 min Winter	9	83.154	0.339	102.564		OK
S28	15 min Winter	9	82.239	0.109	108.832		OK
S29	15 min Winter	9	80.635	0.105	115.056		OK
S30	15 min Winter	9	79.358	0.118	121.224		OK
S31	15 min Winter	9	78.083	0.133	127.358		OK
S32	15 min Winter	9	77.855	0.185	133.485		OK
POND 02	30 min Winter	22	77.327	0.127	56.434		OK
S34	360 min Winter	310	77.209	0.209	5.869		OK
S35	360 min Winter	311	77.209	0.256	5.812		OK
S36	360 min Winter	311	77.209	0.312	5.813		OK
S37	15 min Winter	8	83.557	0.040	9.290		OK
S38	15 min Winter	8	83.209	0.206	18.531		OK
S39	15 min Winter	8	82.036	0.049	27.579		OK
S40	15 min Winter	8	82.002	0.029	9.290		OK
TANK 01	360 min Winter	311	77.208	0.328	0.019		Surcharged
S42	360 min Winter	312	77.208	0.480	7.083		Surcharged
S43	360 min Winter	312	77.208	0.620	7.341		Surcharged
S44	360 min Winter	312	77.208	0.699	7.598		Surcharged
S45	360 min Winter	312	77.208	0.747	7.855		Surcharged
Ex S3951	30 min Winter	16	76.478	0.058	7.986		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	S1	S3	0.098	0.628	14.412	0.072	OK
2.000	15 min Winter	8	S2	S3	0.106	0.566	14.456	0.111	OK
1.001	600 min Winter	579	S3	S4	0.195	0.527	5.325	0.033	OK
1.002	600 min Winter	579	S4	S5	0.339	0.421	6.766	0.058	OK
1.003	600 min Winter	538	S5	POND 01	0.375	0.535	8.222	0.094	Surcharged
1.004	480 min Summer	441	POND 01	S7	0.375	0.129	1.224	0.016	Surcharged

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
1.005	8640 min Summer	5062	S7	S8	0.024	0.351	0.938	0.013	OK
1.006	15 min Winter	21	S8	S9	0.037	0.324	0.927	0.014	OK
1.007	15 min Winter	12	S9	S13	0.083	0.315	1.653	0.029	OK
3.000	15 min Winter	8	S10	S11	0.054	0.761	6.566	0.050	OK
3.001	15 min Winter	8	S11	S12	0.063	1.215	12.971	0.097	OK
3.002	15 min Winter	9	S12	S13	0.082	0.846	12.879	0.080	OK
1.008	15 min Winter	9	S13	S14	0.086	1.152	19.292	0.269	OK
1.009	15 min Winter	9	S14	S15	0.067	2.152	25.590	0.113	OK
1.010	15 min Winter	9	S15	S16	0.068	2.345	31.858	0.065	OK
1.011	15 min Winter	9	S16	S27	0.093	1.790	38.153	0.083	OK
4.000	15 min Winter	8	S17	S18	0.128	0.286	6.579	0.034	OK
4.001	15 min Winter	8	S18	S20	0.076	0.917	12.952	0.117	OK
5.000	15 min Winter	8	S19	S20	0.059	0.724	6.586	0.029	OK
4.002	15 min Winter	9	S20	S21	0.078	1.751	25.768	0.169	OK
4.003	15 min Winter	9	S21	S24	0.081	2.110	32.254	0.133	OK
6.000	15 min Winter	8	S22	S23	0.053	0.782	6.541	0.051	OK
6.001	15 min Winter	9	S23	S24	0.074	0.962	12.868	0.089	OK
4.004	15 min Winter	9	S24	S25	0.130	1.538	45.314	0.193	OK
4.005	15 min Winter	9	S25	S26	0.169	1.078	51.941	0.466	OK
4.006	15 min Winter	9	S26	S27	0.223	0.849	58.163	0.185	OK
1.012	15 min Winter	9	S27	S28	0.111	3.350	102.584	0.144	OK
1.013	15 min Winter	9	S28	S29	0.107	3.759	108.809	0.131	OK
1.014	15 min Winter	9	S29	S30	0.111	3.744	114.976	0.125	OK
1.015	15 min Winter	9	S30	S31	0.125	3.355	121.110	0.155	OK
1.016	15 min Winter	9	S31	S32	0.159	2.550	127.237	0.196	OK
1.017	15 min Winter	10	S32	POND 02	0.135	3.787	133.920	0.319	OK
1.018	30 min Winter	23	POND 02	S34	0.163	1.099	56.384	0.174	OK
1.019	360 min Winter	311	S34	S35	0.232	0.796	25.185	0.227	OK
1.020	360 min Winter	311	S35	S36	0.284	0.704	25.101	0.226	OK
1.021	360 min Winter	311	S36	S42	0.344	0.516	24.741	0.223	OK
7.000	15 min Winter	8	S37	S38	0.123	0.385	9.241	0.039	OK
7.001	15 min Winter	8	S38	S39	0.056	2.007	18.290	0.078	OK
7.002	30 min Winter	19	S39	S42	0.169	2.660	20.159	0.043	OK
8.000	30 min Winter	19	S40	S42	0.161	1.759	6.720	0.014	OK
9.000	480 min Winter	760	TANK 01	S42	0.300	0.518	6.425	0.088	Surcharged
1.022	30 min Winter	20	S42	S43	0.375	0.752	24.094	0.217	Surcharged
1.023	15 min Summer	11	S43	S44	0.450	0.482	22.127	0.138	OK
1.024	15 min Summer	13	S44	S45	0.450	0.248	11.894	0.074	OK
1.025	30 min Summer	27	S45	Ex S3951	0.058	0.736	7.986	0.054	OK

Return Period Yrs: 30.0

Climate Change %: 35

Manholes

Manhole	Critical Storm	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Flood (m3)	Status
S1	960 min Winter	933	87.513	0.393	0.222		Surcharged
S2	960 min Winter	933	87.513	0.613	0.222		Surcharged
S3	960 min Winter	933	87.513	0.673	0.667		Surcharged
S4	960 min Winter	933	87.513	0.888	0.891		Surcharged
S5	960 min Winter	933	87.513	0.963	1.114		Surcharged
POND 01	960 min Winter	933	87.513	1.013	1.114		Surcharged
S7	960 min Winter	933	87.513	1.043	1.118		Surcharged
S8	15 min Summer	9	86.422	0.102	0.932		OK
S9	15 min Winter	9	86.417	0.172	1.409		OK
S10	15 min Winter	8	86.987	0.087	24.877		OK
S11	15 min Winter	8	86.775	0.125	49.588		OK
S12	15 min Winter	8	86.440	0.140	49.003		OK
S13	15 min Winter	9	86.414	0.212	73.233		OK
S14	15 min Winter	9	86.230	0.135	96.219		OK
S15	15 min Winter	9	85.129	0.124	119.449		OK
S16	15 min Winter	9	84.116	0.141	142.854		OK
S17	15 min Winter	8	87.021	0.071	24.877		OK
S18	15 min Winter	8	86.738	0.288	49.632		OK
S19	15 min Winter	8	87.016	0.066	24.877		OK
S20	15 min Winter	8	86.515	0.175	98.687		OK
S21	15 min Winter	8	85.792	0.148	122.289		OK
S22	15 min Winter	8	85.458	0.088	24.877		OK
S23	15 min Winter	8	85.139	0.119	49.528		OK
S24	15 min Winter	9	84.656	0.216	167.909		OK
S25	15 min Winter	9	84.368	0.443	193.658		Surcharged
S26	15 min Winter	9	83.863	0.228	218.574		OK
S27	15 min Winter	9	83.272	0.457	385.611		OK
S28	15 min Winter	9	82.350	0.220	409.425		OK
S29	15 min Winter	9	80.742	0.212	433.199		OK
S30	15 min Winter	9	79.482	0.242	456.761		OK
S31	15 min Winter	9	78.318	0.368	480.313		OK
S32	15 min Winter	9	78.188	0.518	498.419		Surcharged
POND 02	480 min Winter	469	77.870	0.670	5.025		Surcharged
S34	480 min Winter	468	77.870	0.870	5.799		Surcharged
S35	480 min Winter	468	77.870	0.917	5.801		Surcharged
S36	480 min Winter	468	77.870	0.973	5.709		Surcharged
S37	15 min Winter	8	83.594	0.076	34.828		OK
S38	15 min Winter	8	83.263	0.260	69.554		OK
S39	15 min Winter	8	82.082	0.094	103.800		OK
S40	15 min Winter	8	82.027	0.054	34.828		OK
TANK 01	480 min Winter	469	77.869	0.989	0.062		Surcharged
S42	480 min Winter	471	77.869	1.141	6.636		Surcharged
S43	480 min Winter	470	77.869	1.281	7.007		Surcharged
S44	480 min Winter	469	77.869	1.360	6.820		Surcharged
S45	480 min Winter	469	77.869	1.408	7.062		Surcharged
Ex S3951	7200 min Summer	4677	76.478	0.058	7.985		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	600 min Winter	533	S1	S3	0.375	0.428	4.847	0.024	Surcharged
2.000	15 min Winter	8	S2	S3	0.375	0.657	52.120	0.398	Surcharged
1.001	15 min Winter	9	S3	S4	0.375	1.260	139.177	0.866	Surcharged
1.002	15 min Winter	10	S4	S5	0.375	1.668	184.194	1.568	Surcharged
1.003	15 min Winter	11	S5	POND 01	0.375	2.564	227.852	2.607	Surcharged
1.004	15 min Winter	11	POND 01	S7	0.375	0.424	10.702	0.139	Surcharged
1.005	15 min Summer	9	S7	S8	0.063	0.398	0.932	0.013	OK
1.006	15 min Winter	12	S8	S9	0.137	0.313	4.490	0.068	OK
1.007	15 min Winter	12	S9	S13	0.192	0.303	6.967	0.121	OK
3.000	15 min Winter	8	S10	S11	0.106	1.106	24.711	0.189	OK

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
3.001	15 min Winter	8	S11	S12	0.124	1.767	49.003	0.368	OK
3.002	15 min Winter	9	S12	S13	0.174	1.167	48.833	0.304	OK
1.008	15 min Winter	9	S13	S14	0.174	1.718	72.822	1.016	OK
1.009	15 min Winter	9	S14	S15	0.135	3.113	96.051	0.426	OK
1.010	15 min Winter	9	S15	S16	0.132	3.425	119.456	0.243	OK
1.011	15 min Winter	9	S16	S27	0.186	2.607	142.947	0.309	OK
4.000	15 min Winter	8	S17	S18	0.180	0.560	24.755	0.127	OK
4.001	15 min Winter	8	S18	S20	0.157	1.314	49.044	0.442	OK
5.000	15 min Winter	8	S19	S20	0.121	0.933	24.766	0.108	OK
4.002	15 min Winter	8	S20	S21	0.162	2.508	97.412	0.637	OK
4.003	15 min Winter	9	S21	S24	0.182	2.858	121.379	0.501	OK
6.000	15 min Winter	8	S22	S23	0.103	1.140	24.651	0.194	OK
6.001	15 min Winter	9	S23	S24	0.166	1.304	48.827	0.338	OK
4.004	15 min Winter	9	S24	S25	0.258	2.634	170.260	0.724	OK
4.005	15 min Winter	9	S25	S26	0.348	1.826	195.176	1.751	OK
4.006	15 min Winter	9	S26	S27	0.301	2.305	219.266	0.698	OK
1.012	15 min Winter	9	S27	S28	0.226	4.831	386.027	0.540	OK
1.013	15 min Winter	9	S28	S29	0.216	5.429	409.802	0.493	OK
1.014	15 min Winter	9	S29	S30	0.227	5.382	433.363	0.469	OK
1.015	15 min Winter	9	S30	S31	0.305	4.360	456.915	0.586	OK
1.016	15 min Winter	9	S31	S32	0.409	3.355	475.022	0.732	OK
1.017	15 min Winter	10	S32	POND 02	0.430	4.510	493.604	1.177	OK
1.018	15 min Winter	19	POND 02	S34	0.450	1.099	128.013	0.395	OK
1.019	15 min Winter	19	S34	S35	0.375	1.169	129.133	1.162	Surcharged
1.020	15 min Winter	19	S35	S36	0.375	1.178	130.134	1.171	Surcharged
1.021	15 min Winter	19	S36	S42	0.375	1.194	131.887	1.187	Surcharged
7.000	15 min Winter	8	S37	S38	0.168	0.851	34.726	0.145	OK
7.001	15 min Winter	8	S38	S39	0.110	2.933	68.972	0.293	OK
7.002	15 min Winter	8	S39	S42	0.197	2.951	103.529	0.220	OK
8.000	15 min Winter	8	S40	S42	0.177	1.995	34.688	0.074	OK
9.000	15 min Winter	58	TANK 01	S42	0.300	0.174	12.331	0.170	Surcharged
1.022	15 min Winter	6	S42	S43	0.375	0.954	44.319	0.399	Surcharged
1.023	15 min Winter	5	S43	S44	0.450	0.582	28.097	0.175	OK
1.024	15 min Winter	5	S44	S45	0.450	0.257	15.775	0.098	OK
1.025	30 min Summer	10	S45	Ex S3951	0.058	0.736	7.985	0.054	OK

Return Period Yrs: 100.0

Climate Change %: 40

Manholes

Manhole	Critical Storm	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Flood (m3)	Status
S1	15 min Winter	10	87.965	0.845	56.586		Surcharged
S2	15 min Winter	10	87.957	1.057	56.586		Surcharged
S3	15 min Winter	10	87.947	1.107	175.384		Surcharged
S4	15 min Winter	10	87.699	1.074	236.549		Surcharged
S5	960 min Winter	937	87.695	1.145	1.222		Surcharged
POND 01	960 min Winter	938	87.695	1.195	1.190		Flood Risk
S7	960 min Winter	938	87.695	1.225	1.203		Surcharged
S8	15 min Winter	9	86.465	0.145	0.919		OK
S9	15 min Winter	9	86.461	0.216	1.221		OK
S10	15 min Winter	8	87.001	0.101	32.699		OK
S11	15 min Winter	8	86.796	0.146	65.200		OK
S12	15 min Winter	8	86.466	0.166	64.459		OK
S13	15 min Winter	9	86.459	0.257	95.262		OK
S14	15 min Winter	9	86.253	0.158	126.248		OK
S15	15 min Winter	9	85.148	0.143	157.073		OK
S16	15 min Winter	9	84.139	0.164	187.897		OK
S17	15 min Winter	8	87.032	0.082	32.699		OK
S18	15 min Winter	8	86.764	0.314	65.257		OK
S19	15 min Winter	8	87.025	0.075	32.699		OK
S20	15 min Winter	8	86.551	0.211	129.729		OK
S21	15 min Winter	8	85.819	0.175	160.687		OK
S22	15 min Winter	8	85.472	0.102	32.699		OK
S23	15 min Winter	8	85.158	0.138	65.127		OK
S24	15 min Winter	9	84.936	0.496	221.081		Surcharged
S25	15 min Winter	9	84.505	0.580	250.425		Surcharged
S26	15 min Winter	9	83.925	0.290	280.555		OK
S27	15 min Winter	9	83.312	0.497	498.947		OK
S28	15 min Winter	9	82.387	0.257	529.586		OK
S29	15 min Winter	9	80.777	0.247	560.210		OK
S30	15 min Winter	9	79.577	0.337	590.878		OK
S31	15 min Winter	10	78.886	0.936	586.983		Surcharged
S32	15 min Winter	10	78.672	1.002	617.819		Surcharged
POND 02	480 min Winter	469	78.128	0.928	8.446		Surcharged
S34	480 min Winter	468	78.128	1.128	6.182		Surcharged
S35	480 min Winter	468	78.128	1.175	6.171		Surcharged
S36	480 min Winter	468	78.128	1.232	6.166		Surcharged
S37	15 min Winter	8	83.605	0.088	45.778		OK
S38	15 min Winter	8	83.281	0.278	91.439		OK
S39	15 min Winter	8	82.096	0.109	136.502		OK
S40	15 min Winter	8	82.035	0.062	45.778		OK
TANK 01	480 min Winter	471	78.127	1.247	0.000		Surcharged
S42	480 min Winter	473	78.127	1.399	7.105		Surcharged
S43	480 min Winter	472	78.127	1.539	7.321		Surcharged
S44	480 min Winter	472	78.127	1.618	7.526		Surcharged
S45	480 min Winter	472	78.127	1.666	7.700		Surcharged
Ex S3951	30 min Summer	9	76.478	0.058	7.986		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	9	S1	S3	0.375	0.823	64.497	0.321	Surcharged
2.000	15 min Winter	7	S2	S3	0.375	0.661	64.969	0.497	Surcharged
1.001	15 min Winter	10	S3	S4	0.375	1.629	179.963	1.120	Surcharged
1.002	15 min Winter	10	S4	S5	0.375	2.146	237.071	2.018	Surcharged
1.003	15 min Winter	10	S5	POND 01	0.375	2.732	296.366	3.390	Surcharged
1.004	15 min Winter	10	POND 01	S7	0.375	0.441	20.563	0.267	Surcharged
1.005	15 min Winter	9	S7	S8	0.084	0.346	0.925	0.013	OK
1.006	15 min Winter	11	S8	S9	0.181	0.321	6.032	0.091	OK
1.007	15 min Winter	11	S9	S13	0.236	0.312	8.693	0.151	OK
3.000	15 min Winter	8	S10	S11	0.123	1.189	32.501	0.249	OK

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
3.001	15 min Winter	8	S11	S12	0.145	1.898	64.459	0.484	OK
3.002	15 min Winter	9	S12	S13	0.210	1.244	64.214	0.400	OK
1.008	15 min Winter	9	S13	S14	0.208	1.842	95.468	1.332	OK
1.009	15 min Winter	9	S14	S15	0.158	3.336	126.292	0.560	OK
1.010	15 min Winter	9	S15	S16	0.154	3.689	157.117	0.319	OK
1.011	15 min Winter	9	S16	S27	0.218	2.833	188.069	0.407	OK
4.000	15 min Winter	8	S17	S18	0.191	0.686	32.558	0.167	OK
4.001	15 min Winter	8	S18	S20	0.188	1.385	64.459	0.581	OK
5.000	15 min Winter	8	S19	S20	0.143	0.981	32.570	0.141	OK
4.002	15 min Winter	8	S20	S21	0.193	2.672	127.988	0.837	OK
4.003	15 min Winter	8	S21	S24	0.238	2.884	159.594	0.658	OK
6.000	15 min Winter	8	S22	S23	0.120	1.227	32.428	0.255	OK
6.001	15 min Winter	8	S23	S24	0.219	1.333	64.298	0.445	OK
4.004	15 min Winter	9	S24	S25	0.300	3.107	219.645	0.933	Surcharged
4.005	15 min Winter	9	S25	S26	0.361	2.289	249.775	2.241	OK
4.006	15 min Winter	9	S26	S27	0.333	2.705	280.098	0.892	OK
1.012	15 min Winter	9	S27	S28	0.264	5.132	498.805	0.698	OK
1.013	15 min Winter	9	S28	S29	0.252	5.777	529.430	0.637	OK
1.014	15 min Winter	9	S29	S30	0.292	5.497	560.098	0.607	OK
1.015	15 min Winter	9	S30	S31	0.393	4.296	587.047	0.752	OK
1.016	15 min Winter	9	S31	S32	0.450	3.832	609.536	0.939	OK
1.017	15 min Winter	10	S32	POND 02	0.450	4.593	633.058	1.509	OK
1.018	15 min Winter	19	POND 02	S34	0.450	1.089	143.668	0.443	OK
1.019	15 min Winter	19	S34	S35	0.375	1.311	144.797	1.303	Surcharged
1.020	15 min Winter	19	S35	S36	0.375	1.320	145.830	1.313	Surcharged
1.021	15 min Winter	19	S36	S42	0.375	1.337	147.638	1.329	Surcharged
7.000	15 min Winter	8	S37	S38	0.183	1.012	45.661	0.190	OK
7.001	15 min Winter	8	S38	S39	0.128	3.157	90.724	0.386	OK
7.002	15 min Winter	8	S39	S42	0.204	3.131	136.185	0.289	OK
8.000	15 min Winter	8	S40	S42	0.181	2.056	45.616	0.097	OK
9.000	15 min Winter	64	TANK 01	S42	0.300	0.147	10.376	0.143	Surcharged
1.022	15 min Winter	5	S42	S43	0.375	0.923	56.561	0.509	Surcharged
1.023	15 min Winter	5	S43	S44	0.450	0.602	36.945	0.230	OK
1.024	1440 min Winter	652	S44	S45	0.450	0.129	15.215	0.095	OK
1.025	30 min Summer	9	S45	Ex S3951	0.058	0.736	7.986	0.054	OK

Network Details

Manhole Schedule

Manhole	Catchment Area (ha)	Diameter (m)	Type	CL (m)	IL (m)	Depth To Soffit (m)	Easting (m)	Northing (m)
S1	0.110	1.200	Type B	88.941	87.120	1.446	523165.209	234151.045
S2	0.110	1.200	Type B	88.841	86.900	1.566	523196.724	234158.348
S3	0.110	1.350	Type B	88.778	86.840	1.563	523187.020	234168.308
S4	0.110	1.350	Type C	88.324	86.625	1.324	523166.921	234194.702
S5	0.110	1.350	Type C	88.080	86.550	1.155	523184.471	234207.102
POND 01	0.000	1.350	Type C	87.989	86.500	1.114	523185.552	234232.735
S7	0.000	1.350	Type C	88.000	86.470	1.230	523204.890	234228.980
S8	0.000	1.350	Type C	87.600	86.320	0.980	523232.930	234206.208
S9	0.000	1.350	Type C	87.610	86.245	1.065	523249.020	234192.930
S10	0.050	1.200	Type B	88.705	86.900	1.505	523227.174	234152.272
S11	0.050	1.350	Type C	88.374	86.651	1.424	523238.065	234166.667
S12	0.000	1.350	Type C	88.061	86.300	1.461	523247.059	234177.389
S13	0.050	1.200	Unknown	87.984	86.202	1.482	523251.771	234177.479
S14	0.050	1.350	Type C	87.620	86.095	1.225	523273.257	234163.873
S15	0.050	1.350	Type B	86.894	85.005	1.514	523293.325	234149.296
S16	0.050	1.350	Type B	86.038	83.975	1.688	523307.567	234139.712
S17	0.050	1.200	Type B	88.758	86.950	1.508	523198.718	234100.741
S18	0.050	1.200	Type B	88.830	86.450	2.080	523211.913	234110.339
S19	0.050	1.350	Type C	88.723	86.950	1.473	523216.833	234139.077
S20	0.050	1.200	Type B	88.492	86.340	1.852	523228.331	234130.535
S21	0.050	1.200	Type B	87.453	85.644	1.509	523258.683	234109.577
S22	0.050	1.200	Unknown	87.161	85.370	1.491	523233.894	234051.272
S23	0.050	1.200	Unknown	86.814	85.020	1.494	523254.506	234068.187
S24	0.000	1.200	Type B	86.353	84.440	1.613	523278.198	234093.152
S25	0.050	1.350	Type B	85.809	83.925	1.584	523286.679	234085.271
S26	0.050	1.350	Type B	85.761	83.635	1.751	523301.845	234099.311
S27	0.050	1.350	Type B	85.154	82.815	1.964	523320.127	234127.274
S28	0.050	1.350	Type C	84.077	82.130	1.497	523336.167	234117.547
S29	0.050	1.350	Type C	82.468	80.530	1.488	523354.161	234101.044
S30	0.050	1.350	Type B	81.387	79.240	1.697	523367.170	234091.811
S31	0.050	1.350	Type B	79.906	77.950	1.506	523387.457	234082.512
S32	0.050	1.350	Type C	79.511	77.670	1.391	523391.397	234076.737
POND 02	0.000	1.350	Type C	78.500	77.200	0.850	523402.451	234051.044
S34	0.000	1.350	Type C	78.500	77.000	1.125	523395.823	234032.339
S35	0.000	1.350	Type C	78.708	76.952	1.380	523385.643	234021.044
S36	0.000	1.350	Type B	79.526	76.896	2.254	523367.747	234019.697
S37	0.070	1.200	Unknown	85.018	83.518	1.200	523296.928	234070.524
S38	0.070	1.350	Type C	84.503	83.003	1.200	523303.001	234061.196
S39	0.070	1.350	Type C	83.487	81.987	1.200	523309.723	234039.387
S40	0.070	1.350	Type C	83.473	81.973	1.200	523285.943	234004.353
TANK 01	0.000	1.350	Type A	82.069	76.880	4.889	523327.078	234027.913
S42	0.070	1.350	Type A	82.169	76.728	5.081	523314.740	234010.461
S43	0.070	1.350	Type A	81.444	76.588	4.406	523318.933	233989.884
S44	0.070	1.350	Type A	81.055	76.509	4.096	523327.676	233959.783
S45	0.070	1.500	Type A	80.704	76.461	3.868	523335.724	233942.263
Ex S3951	0.000	1.350	Type A	80.130	76.420	3.335	523343.015	233941.174

Pipe Schedule

Pipe Number	US Manhole	US IL (m)	DS Manhole	DS IL (m)	Shape	Dimension (m)	Length (m)	Gradient (1:x)	Roughness (mm)	US Depth To Soffit (m)	DS Depth To Soffit (m)
1.000	S1	87.120	S3	86.840	Circ	0.375mØ	27.816	99.3	0.600	1.446	1.563
2.000	S2	86.900	S3	86.840	Circ	0.375mØ	13.905	231.8	0.600	1.566	1.563
1.001	S3	86.840	S4	86.625	Circ	0.375mØ	33.175	154.3	0.600	1.563	1.324
1.002	S4	86.625	S5	86.550	Circ	0.375mØ	21.488	286.5	0.600	1.324	1.155
1.003	S5	86.550	POND 01	86.500	Circ	0.375mØ	25.656	513.1	0.600	1.155	1.114
1.004	POND 01	86.500	S7	86.470	Circ	0.375mØ	19.700	656.7	0.600	1.114	1.155
1.005	S7	86.470	S8	86.320	Circ	0.3mØ	36.122	240.8	0.600	1.230	0.980
1.006	S8	86.320	S9	86.245	Circ	0.3mØ	20.861	278.1	0.600	0.980	1.065
1.007	S9	86.245	S13	86.202	Circ	0.3mØ	15.694	365.0	0.600	1.065	1.482
3.000	S10	86.900	S11	86.651	Circ	0.3mØ	18.050	72.4	0.600	1.505	1.424
3.001	S11	86.651	S12	86.450	Circ	0.3mØ	13.995	69.8	0.600	1.424	1.311

Pipe Schedule

Pipe Number	US Manhole	US IL (m)	DS Manhole	DS IL (m)	Shape	Dimension (m)	Length (m)	Gradient (1:x)	Roughness (mm)	US Depth To Soffit (m)	DS Depth To Soffit (m)
3.002	S12	86.300	S13	86.202	Circ	0.3mØ	4.713	48.1	0.600	1.461	1.482
1.008	S13	86.202	S14	86.095	Circ	0.3mØ	25.431	237.7	0.600	1.482	1.225
1.009	S14	86.095	S15	85.080	Circ	0.3mØ	24.803	24.4	0.600	1.225	1.514
1.010	S15	85.005	S16	83.975	Circ	0.375mØ	17.167	16.7	0.600	1.514	1.688
1.011	S16	83.975	S27	83.040	Circ	0.375mØ	17.676	18.9	0.600	1.688	1.739
4.000	S17	86.950	S18	86.450	Circ	0.3mØ	16.317	32.6	0.600	1.508	2.080
4.001	S18	86.600	S20	86.340	Circ	0.3mØ	26.028	100.1	0.600	1.930	1.852
5.000	S19	86.950	S20	86.340	Circ	0.3mØ	14.323	23.5	0.600	1.473	1.852
4.002	S20	86.340	S21	85.644	Circ	0.3mØ	36.885	53.0	0.600	1.852	1.509
4.003	S21	85.644	S24	84.440	Circ	0.3mØ	25.507	21.2	0.600	1.509	1.613
6.000	S22	85.370	S23	85.020	Circ	0.3mØ	26.664	76.2	0.600	1.491	1.494
6.001	S23	85.020	S24	84.440	Circ	0.3mØ	34.417	59.3	0.600	1.494	1.613
4.004	S24	84.440	S25	83.925	Circ	0.3mØ	11.577	22.5	0.600	1.613	1.584
4.005	S25	83.925	S26	83.860	Circ	0.375mØ	20.667	318.0	0.600	1.509	1.526
4.006	S26	83.635	S27	82.815	Circ	0.375mØ	33.409	40.7	0.600	1.751	1.964
1.012	S27	83.040	S28	82.130	Circ	0.45mØ	18.759	20.6	0.600	1.664	1.497
1.013	S28	82.130	S29	80.530	Circ	0.45mØ	24.416	15.3	0.600	1.497	1.488
1.014	S29	80.530	S30	79.240	Circ	0.45mØ	15.953	12.4	0.600	1.488	1.697
1.015	S30	79.240	S31	77.950	Circ	0.45mØ	22.316	17.3	0.600	1.697	1.506
1.016	S31	77.950	S32	77.670	Circ	0.45mØ	6.991	25.0	0.600	1.506	1.391
1.017	S32	77.670	POND 02	77.200	Circ	0.45mØ	27.971	59.5	0.600	1.391	0.850
1.018	POND 02	77.200	S34	77.000	Circ	0.45mØ	19.844	99.2	0.600	0.850	1.050
1.019	S34	77.000	S35	76.952	Circ	0.375mØ	15.206	320.0	0.600	1.125	1.380
1.020	S35	76.952	S36	76.896	Circ	0.375mØ	17.947	320.0	0.600	1.380	2.254
1.021	S36	76.896	S42	76.728	Circ	0.375mØ	53.805	320.0	0.600	2.254	5.066
7.000	S37	83.518	S38	83.003	Circ	0.3mØ	11.131	21.6	0.600	1.200	1.200
7.001	S38	83.153	S39	82.137	Circ	0.3mØ	22.821	22.5	0.600	1.050	1.050
7.002	S39	81.987	S42	76.788	Circ	0.3mØ	29.358	5.6	0.600	1.200	5.081
8.000	S40	81.973	S42	76.788	Circ	0.3mØ	29.437	5.7	0.600	1.200	5.081
9.000	TANK 01	76.880	S42	76.788	Circ	0.3mØ	21.373	231.6	0.600	4.889	5.081
1.022	S42	76.728	S43	76.663	Circ	0.375mØ	20.999	320.0	0.600	5.066	4.406
1.023	S43	76.588	S44	76.509	Circ	0.45mØ	31.345	400.0	0.600	4.406	4.096
1.024	S44	76.509	S45	76.461	Circ	0.45mØ	19.280	400.0	0.600	4.096	3.793
1.025	S45	76.461	Ex S3951	76.420	Circ	0.375mØ	7.372	179.4	0.600	3.868	3.335

Outfall Details

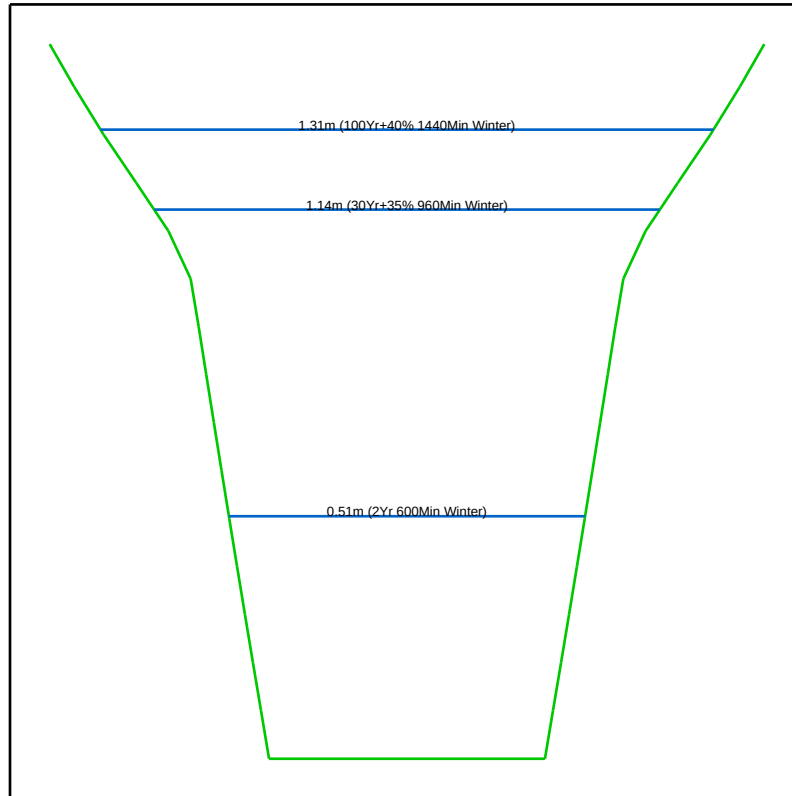
Outfall Manhole Ex S3951 : Free Discharge

Flow Control Details

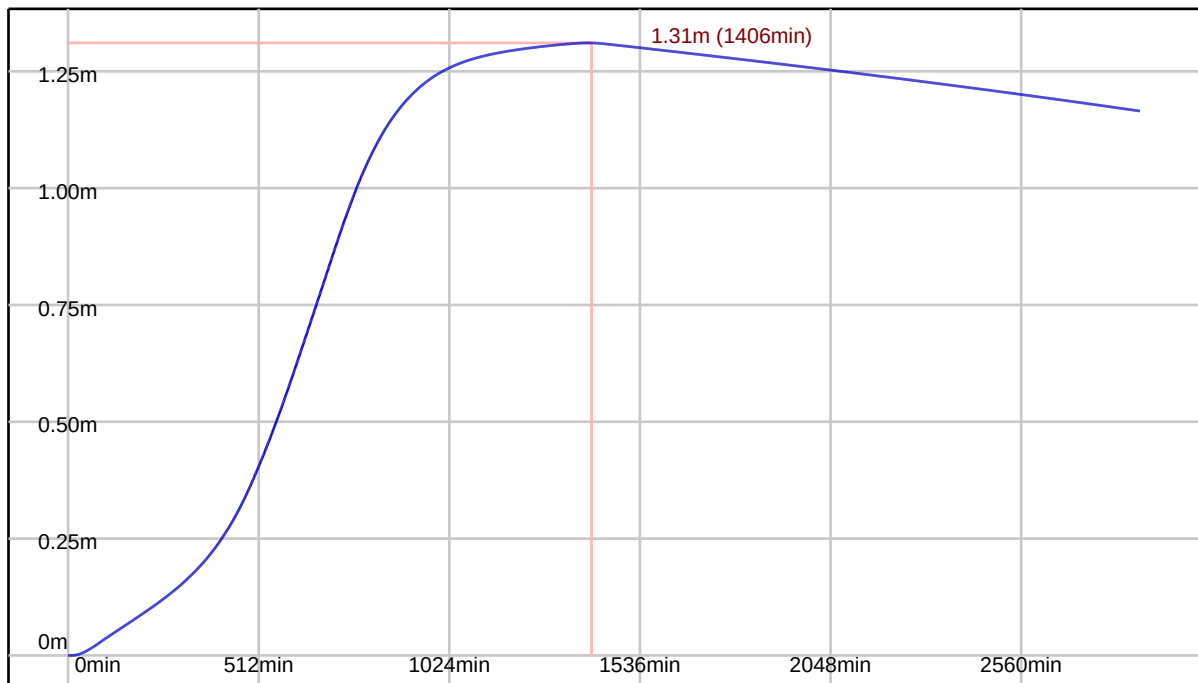
Pond Structure at Manhole POND 01

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
86.500	1.489	375.538	87.689	0.300	0.00000000	0.00000000	2.00

Pond Depth/Area Diagram at POND 01



Pond at POND 01 (100Yr+40% 1440Min Winter)

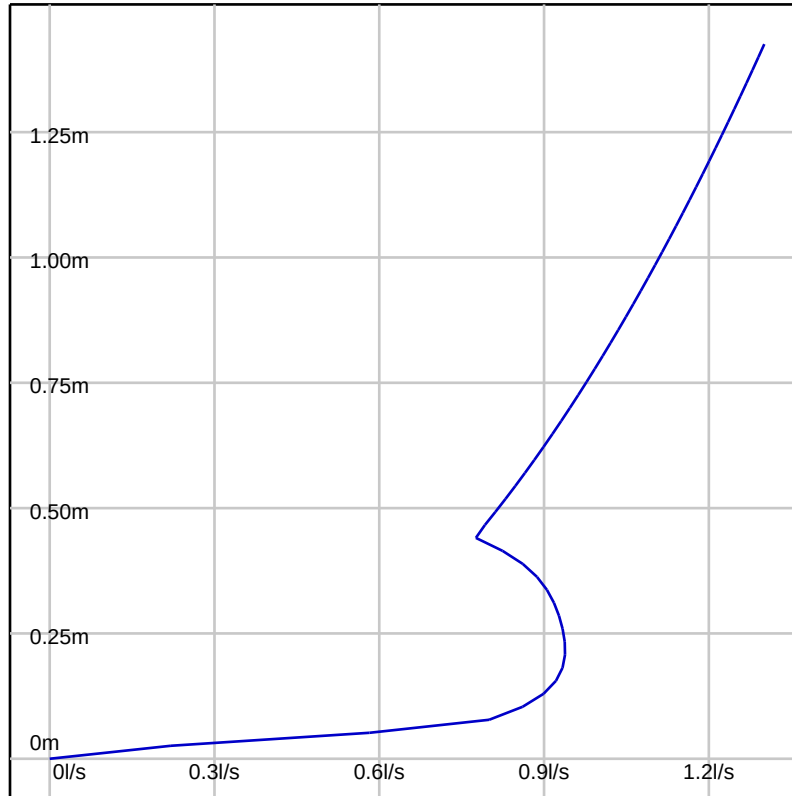


Controls within Manhole S7

Hydro-Brake® Optimum Control at Manhole S7

Model Ref	Design Depth (m)	Design Flow (l/s)	Depth Above Invert (m)	FF Head (m)	FF Flow (l/s)	KF Head (m)	KF Flow (l/s)
SHE-0049-1200-1200-1200	1.200	1.200	0.000	0.217	0.938	0.440	0.773

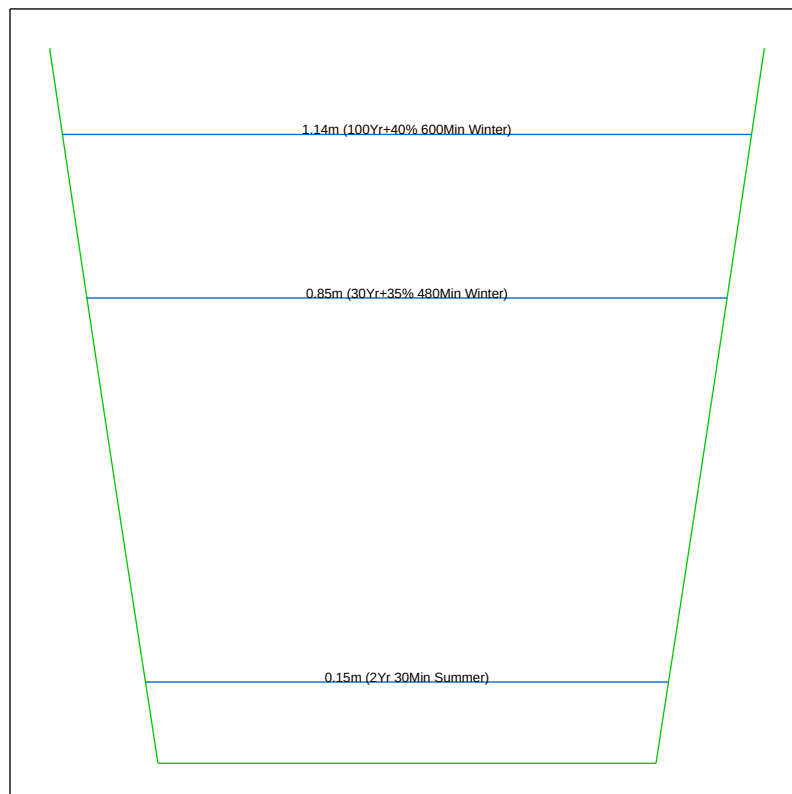
Hydro-Brake® Optimum Control at S7



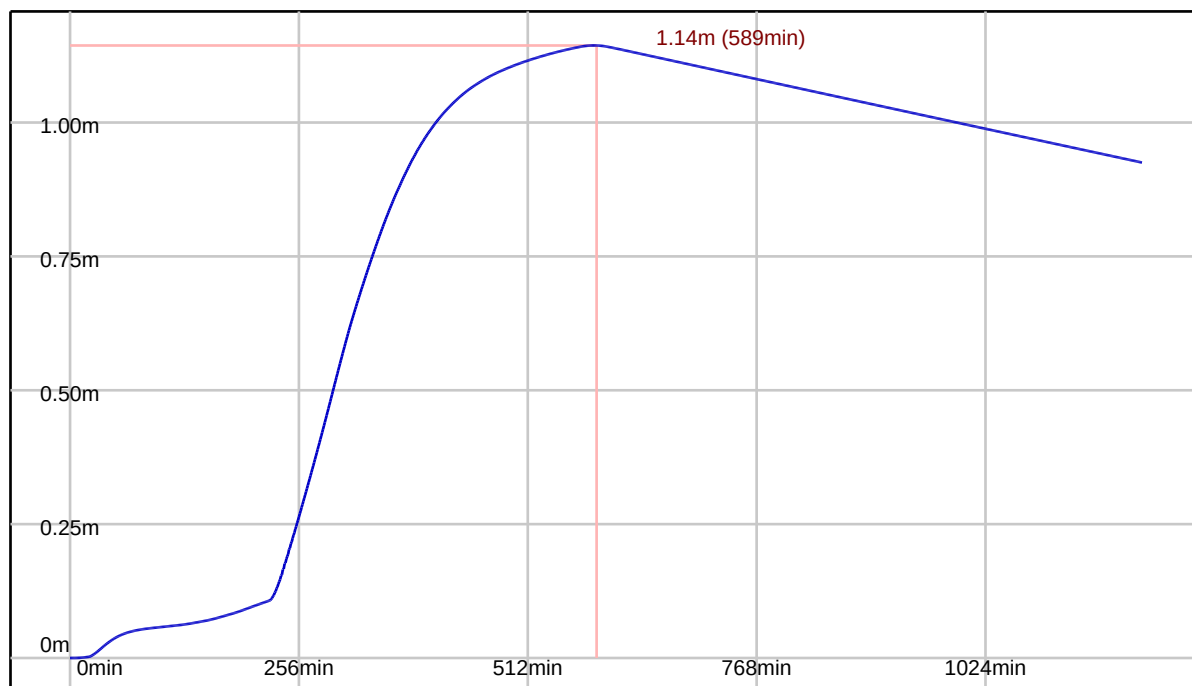
Pond Structure at Manhole POND 02

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
77.200	1.300	410.547	78.200	0.300	0.00000000	0.00000000	2.00

Pond Depth/Area Diagram at POND 02



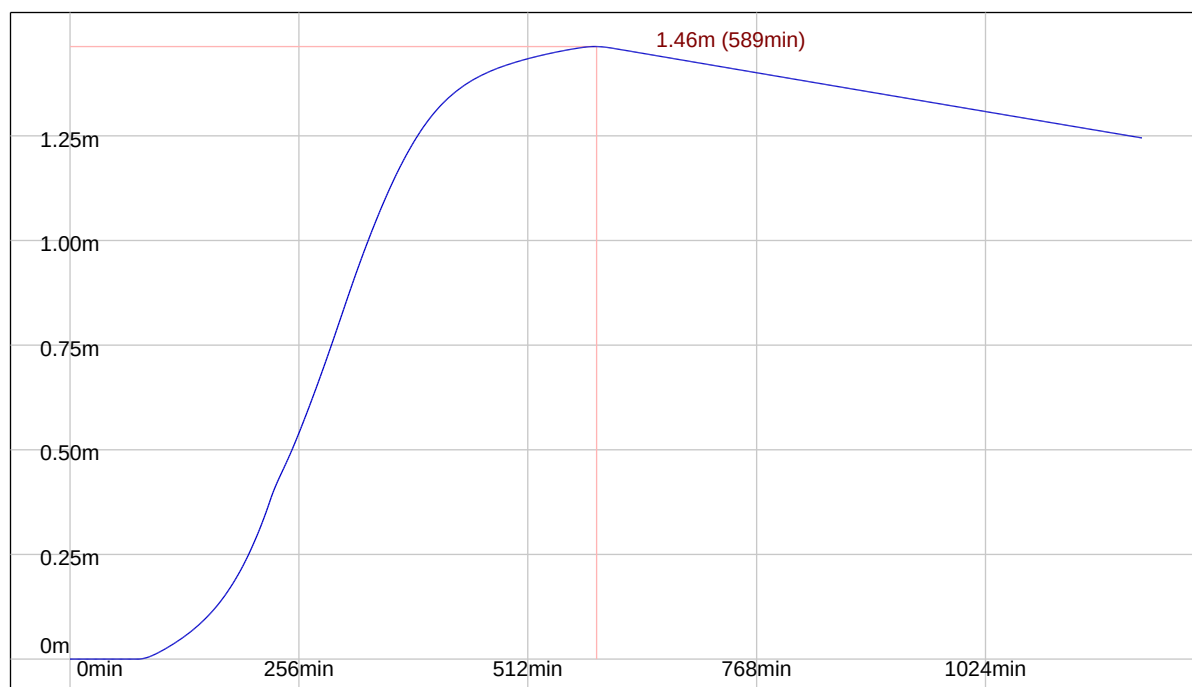
Pond at POND 02 (100Yr+40% 600Min Winter)



Tank Structure at Manhole TANK 01

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
76.880	1.600	95.00	526.735	500.398	800.637	0.00000000	0.00000000	2.00

Tank at TANK 01 (100Yr+40% 600Min Winter)

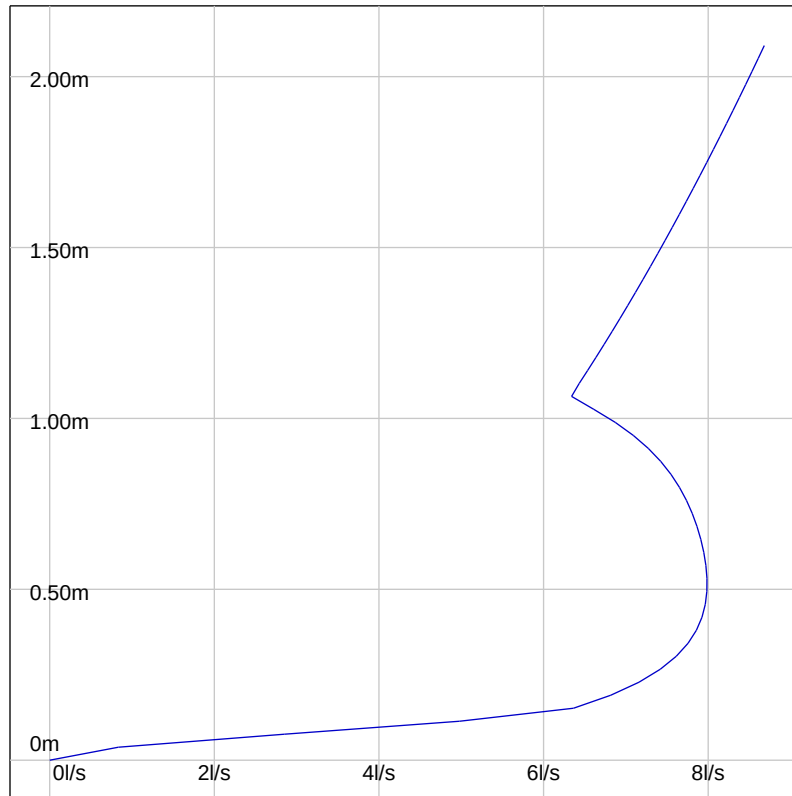


Controls within Manhole S45

Hydro-Brake® Optimum Control at Manhole S45

Model Ref	Design Depth (m)	Design Flow (l/s)	Depth Above Invert (m)	FF Head (m)	FF Flow (l/s)	KF Head (m)	KF Flow (l/s)
SHE-0120-8000-1760-8000	1.760	8.000	0.000	0.516	7.986	1.061	6.320

Hydro-Brake® Optimum Control at S45



Simulation Settings

FEH2022 (point): Filename=FEH_Point_Descriptors_523219_234129_v5_0_1.xml

Summer (Cv: 1.00), Winter (Cv: 1.00)

Global Time of Entry: 5.0 mins

Durations (mins): 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080

Return Periods (yrs) + Climate Change: (2, +0%), (30, +35%), (100, +40%)

Simulated Rainfall Events

Storm	Average Intensity (mm/hr)	Runoff Continuity %	Flow Continuity %	Storm	Average Intensity (mm/hr)	Runoff Continuity %	Flow Continuity %
2Yr 15Min Winter	28.729	0.00	-0.16	30Yr+35% 720Min Winter	6.434	0.00	2.04
2Yr 15Min Summer	28.729	0.00	-0.16	30Yr+35% 960Min Summer	5.008	0.00	1.63
2Yr 30Min Winter	18.000	0.00	0.06	30Yr+35% 960Min Winter	5.008	0.00	1.65
2Yr 30Min Summer	18.000	0.00	0.04	30Yr+35% 1440Min Summer	3.525	0.00	0.94
2Yr 60Min Winter	11.000	0.00	0.28	30Yr+35% 1440Min Winter	3.525	0.00	0.97
2Yr 60Min Summer	11.000	0.00	0.29	30Yr+35% 2160Min Summer	2.491	0.00	0.27
2Yr 120Min Winter	8.159	0.00	0.64	30Yr+35% 2160Min Winter	2.491	0.00	0.27
2Yr 120Min Summer	8.159	0.00	0.66	30Yr+35% 2880Min Summer	1.956	0.00	0.13
2Yr 180Min Summer	6.648	0.00	0.69	30Yr+35% 2880Min Winter	1.956	0.00	0.14
2Yr 180Min Winter	6.648	0.00	0.69	30Yr+35% 4320Min Summer	1.411	0.00	-0.01
2Yr 240Min Summer	5.404	0.00	0.47	30Yr+35% 4320Min Winter	1.411	0.00	-0.01
2Yr 240Min Winter	5.404	0.00	0.47	30Yr+35% 5760Min Summer	1.133	0.00	-0.01
2Yr 360Min Summer	4.070	0.00	0.13	30Yr+35% 5760Min Winter	1.133	0.00	-0.01
2Yr 360Min Winter	4.070	0.00	0.13	30Yr+35% 7200Min Summer	0.965	0.00	-0.01
2Yr 480Min Summer	3.303	0.00	-0.02	30Yr+35% 7200Min Winter	0.965	0.00	-0.02
2Yr 480Min Winter	3.303	0.00	-0.02	30Yr+35% 8640Min Summer	0.851	0.00	-0.01
2Yr 600Min Summer	2.767	0.00	-0.01	30Yr+35% 8640Min Winter	0.851	0.00	-0.01
2Yr 600Min Winter	2.767	0.00	-0.01	30Yr+35% 10080Min Summer	0.769	0.00	-0.01
2Yr 720Min Summer	2.376	0.00	-0.03	30Yr+35% 10080Min Winter	0.769	0.00	-0.01
2Yr 720Min Winter	2.376	0.00	-0.03	100Yr+40% 15Min Summer	141.549	0.00	2.72
2Yr 960Min Summer	1.877	0.00	-0.05	100Yr+40% 15Min Winter	141.549	0.00	2.68
2Yr 960Min Winter	1.877	0.00	-0.05	100Yr+40% 30Min Summer	91.215	0.00	2.96
2Yr 1440Min Winter	1.353	0.00	-0.04	100Yr+40% 30Min Winter	91.215	0.00	2.96
2Yr 1440Min Summer	1.353	0.00	-0.04	100Yr+40% 60Min Summer	55.877	0.00	3.08
2Yr 2160Min Winter	0.980	0.00	-0.03	100Yr+40% 60Min Winter	55.877	0.00	3.10
2Yr 2160Min Summer	0.980	0.00	-0.03	100Yr+40% 120Min Summer	34.601	0.00	3.05
2Yr 2880Min Summer	0.785	0.00	-0.03	100Yr+40% 120Min Winter	34.601	0.00	3.09
2Yr 2880Min Winter	0.785	0.00	-0.03	100Yr+40% 180Min Summer	25.819	0.00	3.06
2Yr 4320Min Summer	0.585	0.00	-0.02	100Yr+40% 180Min Winter	25.819	0.00	3.09
2Yr 4320Min Winter	0.585	0.00	-0.02	100Yr+40% 240Min Summer	20.560	0.00	2.98
2Yr 5760Min Summer	0.484	0.00	-0.03	100Yr+40% 240Min Winter	20.560	0.00	3.00
2Yr 5760Min Winter	0.484	0.00	-0.04	100Yr+40% 360Min Summer	14.837	0.00	2.80
2Yr 7200Min Summer	0.422	0.00	-0.03	100Yr+40% 360Min Winter	14.837	0.00	2.82
2Yr 7200Min Winter	0.422	0.00	-0.04	100Yr+40% 480Min Summer	11.707	0.00	2.63
2Yr 8640Min Summer	0.380	0.00	-0.03	100Yr+40% 480Min Winter	11.707	0.00	2.64
2Yr 8640Min Winter	0.380	0.00	-0.04	100Yr+40% 600Min Summer	9.674	0.00	2.45
2Yr 10080Min Winter	0.350	0.00	-0.03	100Yr+40% 600Min Winter	9.674	0.00	2.47
2Yr 10080Min Summer	0.350	0.00	-0.03	100Yr+40% 720Min Summer	8.247	0.00	2.29
30Yr+35% 15Min Summer	107.652	0.00	2.34	100Yr+40% 720Min Winter	8.247	0.00	2.31
30Yr+35% 15Min Winter	107.652	0.00	2.26	100Yr+40% 960Min Summer	6.412	0.00	1.97
30Yr+35% 30Min Summer	69.031	0.00	2.55	100Yr+40% 960Min Winter	6.412	0.00	1.99
30Yr+35% 30Min Winter	69.031	0.00	2.52	100Yr+40% 1440Min Summer	4.490	0.00	1.39
30Yr+35% 60Min Summer	41.932	0.00	2.78	100Yr+40% 1440Min Winter	4.490	0.00	1.41
30Yr+35% 60Min Winter	41.932	0.00	2.79	100Yr+40% 2160Min Summer	3.147	0.00	0.61
30Yr+35% 120Min Summer	26.609	0.00	2.92	100Yr+40% 2160Min Winter	3.147	0.00	0.64
30Yr+35% 120Min Winter	26.609	0.00	2.93	100Yr+40% 2880Min Summer	2.452	0.00	0.26
30Yr+35% 180Min Summer	20.071	0.00	2.89	100Yr+40% 2880Min Winter	2.452	0.00	0.19
30Yr+35% 180Min Winter	20.071	0.00	2.90	100Yr+40% 4320Min Summer	1.745	0.00	0.07
30Yr+35% 240Min Summer	15.983	0.00	2.81	100Yr+40% 4320Min Winter	1.745	0.00	0.08
30Yr+35% 240Min Winter	15.983	0.00	2.82	100Yr+40% 5760Min Summer	1.385	0.00	-0.01
30Yr+35% 360Min Summer	11.570	0.00	2.63	100Yr+40% 5760Min Winter	1.385	0.00	-0.01
30Yr+35% 360Min Winter	11.570	0.00	2.64	100Yr+40% 7200Min Summer	1.168	0.00	-0.01
30Yr+35% 480Min Summer	9.145	0.00	2.42	100Yr+40% 7200Min Winter	1.168	0.00	-0.01
30Yr+35% 480Min Winter	9.145	0.00	2.43	100Yr+40% 8640Min Summer	1.021	0.00	-0.01
30Yr+35% 600Min Summer	7.554	0.00	2.23	100Yr+40% 8640Min Winter	1.021	0.00	-0.01

Simulated Rainfall Events

Storm	Average Intensity (mm/hr)	Runoff Continuity %	Flow Continuity %	Storm	Average Intensity (mm/hr)	Runoff Continuity %	Flow Continuity %
30Yr+35% 600Min Winter	7.554	0.00	2.23	100Yr+40% 10080Min Winter	0.917	0.00	-0.02
30Yr+35% 720Min Summer	6.434	0.00	2.03	100Yr+40% 10080Min Summer	0.917	0.00	-0.01

Simulation Results

Return Period Yrs: 2.0

Climate Change %: 0

Manholes

Manhole	Critical Storm	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Flood (m3)	Status
S1	15 min Summer	8	87.196	0.076	18.691		OK
S2	600 min Winter	580	87.005	0.105	0.174		OK
S3	600 min Winter	582	87.005	0.165	0.471		OK
S4	600 min Winter	581	87.005	0.380	0.674		Surcharged
S5	600 min Winter	581	87.005	0.455	0.839		Surcharged
POND 01	600 min Winter	581	87.005	0.505	0.838		Surcharged
S7	600 min Winter	581	87.005	0.535	0.826		Surcharged
S8	10080 min Winter	6857	86.345	0.025	0.938		OK
S9	15 min Summer	9	86.322	0.077	0.191		OK
S10	15 min Summer	8	86.951	0.051	8.495		OK
S11	15 min Summer	8	86.722	0.071	16.933		OK
S12	15 min Summer	9	86.369	0.069	16.538		OK
S13	15 min Summer	9	86.322	0.120	24.739		OK
S14	15 min Summer	9	86.172	0.077	32.989		OK
S15	15 min Summer	9	85.077	0.072	41.256		OK
S16	15 min Summer	9	84.057	0.082	49.433		OK
S17	15 min Summer	8	86.992	0.042	8.495		OK
S18	15 min Summer	8	86.678	0.228	16.945		OK
S19	15 min Summer	8	86.989	0.039	8.495		OK
S20	15 min Summer	8	86.436	0.096	33.675		OK
S21	15 min Summer	9	85.727	0.083	41.398		OK
S22	15 min Summer	8	85.422	0.052	8.495		OK
S23	15 min Summer	8	85.088	0.068	16.912		OK
S24	15 min Summer	9	84.541	0.101	58.178		OK
S25	15 min Summer	9	84.124	0.199	66.576		OK
S26	15 min Summer	9	83.758	0.123	75.189		OK
S27	15 min Summer	9	83.170	0.355	132.854		OK
S28	15 min Summer	9	82.254	0.124	141.091		OK
S29	15 min Summer	9	80.650	0.120	149.273		OK
S30	15 min Summer	9	79.375	0.135	157.378		OK
S31	15 min Summer	9	78.102	0.152	165.444		OK
S32	15 min Summer	9	77.881	0.211	173.514		OK
POND 02	30 min Summer	20	77.348	0.148	87.736		OK
S34	30 min Summer	22	77.356	0.356	75.395		OK
S35	30 min Summer	22	77.339	0.386	76.230		Surcharged
S36	360 min Winter	298	77.334	0.437	7.787		Surcharged
S37	15 min Summer	8	83.562	0.045	11.894		OK
S38	15 min Summer	8	83.216	0.213	23.750		OK
S39	15 min Summer	8	82.042	0.055	35.445		OK
S40	15 min Summer	8	82.005	0.032	11.894		OK
TANK 01	360 min Winter	316	77.287	0.407	2.120		Surcharged
S42	360 min Winter	322	77.291	0.563	21.225		Surcharged
S43	360 min Winter	314	77.297	0.709	9.310		Surcharged
S44	360 min Winter	314	77.309	0.799	9.381		Surcharged
S45	360 min Winter	329	77.312	0.851	7.710		Surcharged
Ex S3951	15 min Winter	9	76.478	0.058	7.988		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 Summer	8	S1	S3	0.112	0.671	18.540	0.092	OK
2.000	600 min Winter	580	S2	S3	0.135	0.318	2.113	0.016	OK
1.001	600 min Winter	582	S3	S4	0.270	0.541	6.339	0.039	OK
1.002	720 min Summer	679	S4	S5	0.375	0.367	10.809	0.092	Surcharged
1.003	240 min Summer	190	S5	POND 01	0.375	0.820	29.545	0.338	Surcharged
1.004	240 min Summer	147	POND 01	S7	0.375	0.162	1.530	0.020	Surcharged

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
1.005	10080 min Winter	6857	S7	S8	0.024	0.351	0.938	0.013	OK
1.006	15 min Summer	25	S8	S9	0.046	0.325	0.936	0.014	OK
1.007	15 min Summer	12	S9	S13	0.099	0.316	2.348	0.041	OK
3.000	15 min Summer	8	S10	S11	0.061	0.818	8.437	0.065	OK
3.001	15 min Summer	8	S11	S12	0.071	1.309	16.744	0.126	OK
3.002	15 min Summer	9	S12	S13	0.094	0.917	16.635	0.104	OK
1.008	15 min Summer	9	S13	S14	0.098	1.234	24.845	0.347	OK
1.009	15 min Summer	9	S14	S15	0.077	2.318	33.112	0.147	OK
1.010	15 min Summer	9	S15	S16	0.077	2.528	41.289	0.084	OK
1.011	15 min Summer	9	S16	S27	0.106	1.933	49.488	0.107	OK
4.000	15 min Summer	8	S17	S18	0.135	0.312	8.450	0.043	OK
4.001	15 min Summer	8	S18	S20	0.087	0.986	16.725	0.151	OK
5.000	15 min Summer	8	S19	S20	0.067	0.715	8.455	0.037	OK
4.002	15 min Summer	9	S20	S21	0.089	1.883	33.254	0.217	OK
4.003	15 min Summer	9	S21	S24	0.092	2.271	41.622	0.172	OK
6.000	15 min Summer	8	S22	S23	0.060	0.841	8.416	0.066	OK
6.001	15 min Summer	9	S23	S24	0.084	1.031	16.645	0.115	OK
4.004	15 min Summer	9	S24	S25	0.150	1.659	58.432	0.248	OK
4.005	15 min Summer	9	S25	S26	0.193	1.167	67.044	0.602	OK
4.006	15 min Summer	9	S26	S27	0.239	1.013	75.222	0.239	OK
1.012	15 min Summer	9	S27	S28	0.127	3.610	132.946	0.186	OK
1.013	15 min Summer	9	S28	S29	0.122	4.050	141.129	0.170	OK
1.014	15 min Summer	9	S29	S30	0.127	4.035	149.233	0.162	OK
1.015	15 min Summer	9	S30	S31	0.143	3.611	157.300	0.202	OK
1.016	15 min Summer	9	S31	S32	0.181	2.764	165.370	0.255	OK
1.017	15 min Summer	10	S32	POND 02	0.157	3.981	174.148	0.415	OK
1.018	30 min Summer	22	POND 02	S34	0.250	1.084	78.658	0.242	OK
1.019	30 min Summer	22	S34	S35	0.366	0.888	76.807	0.691	OK
1.020	30 min Summer	22	S35	S36	0.375	0.775	76.406	0.688	Surcharged
1.021	30 min Summer	22	S36	S42	0.375	0.700	77.348	0.696	Surcharged
7.000	15 min Summer	8	S37	S38	0.129	0.407	11.856	0.049	OK
7.001	15 min Summer	8	S38	S39	0.063	2.161	23.551	0.100	OK
7.002	15 min Summer	10	S39	S42	0.175	2.846	35.346	0.075	OK
8.000	15 min Summer	10	S40	S42	0.165	1.889	11.841	0.025	OK
9.000	180 min Summer	193	TANK 01	S42	0.300	0.170	12.027	0.166	Surcharged
1.022	15 min Summer	10	S42	S43	0.375	0.865	43.000	0.387	Surcharged
1.023	15 min Summer	9	S43	S44	0.450	0.491	27.166	0.169	OK
1.024	360 min Winter	335	S44	S45	0.450	0.153	11.675	0.073	OK
1.025	15 min Winter	9	S45	Ex S3951	0.058	0.736	7.988	0.054	OK

Return Period Yrs: 30.0

Climate Change %: 35

Manholes

Manhole	Critical Storm	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Flood (m3)	Status
S1	15 min Summer	10	87.924	0.804	55.899		Surcharged
S2	15 min Summer	10	87.907	1.007	55.899		Surcharged
S3	15 min Summer	10	87.897	1.057	172.981		Surcharged
S4	15 min Summer	10	87.654	1.029	233.169		Surcharged
S5	960 min Winter	936	87.644	1.094	1.178		Surcharged
POND 01	960 min Winter	936	87.644	1.144	1.179		Surcharged
S7	960 min Winter	936	87.644	1.174	1.180		Surcharged
S8	15 min Summer	9	86.460	0.140	0.926		OK
S9	15 min Summer	9	86.458	0.213	1.431		OK
S10	15 min Summer	8	86.999	0.099	31.836		OK
S11	15 min Summer	8	86.794	0.144	63.534		OK
S12	15 min Summer	8	86.464	0.164	63.022		OK
S13	15 min Summer	9	86.457	0.255	94.394		OK
S14	15 min Summer	9	86.252	0.157	124.723		OK
S15	15 min Summer	9	85.147	0.142	154.821		OK
S16	15 min Summer	9	84.137	0.162	185.253		OK
S17	15 min Summer	8	87.031	0.081	31.836		OK
S18	15 min Summer	8	86.762	0.312	63.574		OK
S19	15 min Summer	8	87.024	0.074	31.836		OK
S20	15 min Summer	8	86.548	0.208	126.607		OK
S21	15 min Summer	8	85.817	0.173	157.374		OK
S22	15 min Summer	8	85.471	0.101	31.836		OK
S23	15 min Summer	8	85.157	0.137	63.484		OK
S24	15 min Summer	9	84.908	0.468	217.456		Surcharged
S25	15 min Summer	9	84.494	0.569	246.032		Surcharged
S26	15 min Summer	9	83.920	0.285	275.809		OK
S27	15 min Summer	9	83.309	0.494	490.953		OK
S28	15 min Summer	9	82.384	0.254	521.071		OK
S29	15 min Summer	9	80.775	0.245	551.176		OK
S30	15 min Summer	9	79.561	0.321	581.372		OK
S31	15 min Summer	10	78.824	0.874	578.971		Surcharged
S32	15 min Summer	10	78.617	0.947	610.494		Surcharged
POND 02	480 min Winter	470	78.046	0.846	5.609		Surcharged
S34	480 min Winter	472	78.046	1.046	5.576		Surcharged
S35	480 min Winter	472	78.046	1.094	5.562		Surcharged
S36	480 min Winter	471	78.046	1.150	5.715		Surcharged
S37	15 min Summer	8	83.604	0.087	44.570		OK
S38	15 min Summer	8	83.279	0.276	89.059		OK
S39	15 min Summer	8	82.095	0.108	133.146		OK
S40	15 min Summer	8	82.034	0.062	44.570		OK
TANK 01	480 min Winter	471	78.046	1.166	0.000		Surcharged
S42	480 min Winter	471	78.046	1.318	6.860		Surcharged
S43	480 min Winter	471	78.046	1.458	7.074		Surcharged
S44	480 min Winter	471	78.045	1.536	7.284		Surcharged
S45	480 min Winter	471	78.045	1.584	7.494		Surcharged
Ex S3951	30 min Winter	9	76.478	0.058	7.987		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	30 min Summer	16	S1	S3	0.375	0.832	57.456	0.286	Surcharged
2.000	15 min Winter	9	S2	S3	0.375	0.659	59.554	0.455	Surcharged
1.001	15 min Winter	10	S3	S4	0.375	1.493	164.883	1.026	Surcharged
1.002	15 min Winter	10	S4	S5	0.375	1.989	219.720	1.870	Surcharged
1.003	15 min Winter	10	S5	POND 01	0.375	2.623	270.216	3.091	Surcharged
1.004	15 min Winter	10	POND 01	S7	0.375	0.439	16.468	0.214	Surcharged
1.005	15 min Summer	9	S7	S8	0.082	0.398	0.929	0.013	OK
1.006	15 min Summer	11	S8	S9	0.177	0.319	6.389	0.097	OK
1.007	15 min Summer	11	S9	S13	0.234	0.309	10.668	0.185	OK
3.000	15 min Summer	8	S10	S11	0.121	1.181	31.698	0.243	OK

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
3.001	15 min Summer	8	S11	S12	0.143	1.889	63.022	0.473	OK
3.002	15 min Summer	9	S12	S13	0.208	1.247	62.871	0.392	OK
1.008	15 min Summer	9	S13	S14	0.206	1.835	94.206	1.314	OK
1.009	15 min Summer	9	S14	S15	0.157	3.320	124.303	0.551	OK
1.010	15 min Summer	9	S15	S16	0.152	3.674	154.736	0.314	OK
1.011	15 min Summer	9	S16	S27	0.216	2.812	185.142	0.401	OK
4.000	15 min Summer	8	S17	S18	0.190	0.671	31.738	0.163	OK
4.001	15 min Summer	8	S18	S20	0.185	1.381	63.025	0.568	OK
5.000	15 min Summer	8	S19	S20	0.141	0.979	31.747	0.138	OK
4.002	15 min Summer	8	S20	S21	0.190	2.660	125.538	0.821	OK
4.003	15 min Summer	8	S21	S24	0.237	2.915	156.655	0.646	OK
6.000	15 min Summer	8	S22	S23	0.119	1.218	31.648	0.249	OK
6.001	15 min Summer	8	S23	S24	0.218	1.385	62.903	0.436	OK
4.004	15 min Winter	9	S24	S25	0.300	2.805	198.248	0.842	Surcharged
4.005	15 min Summer	9	S25	S26	0.361	2.249	245.292	2.201	OK
4.006	15 min Summer	9	S26	S27	0.330	2.676	275.293	0.876	OK
1.012	15 min Summer	9	S27	S28	0.262	5.111	490.553	0.687	OK
1.013	15 min Summer	9	S28	S29	0.249	5.752	520.658	0.627	OK
1.014	15 min Summer	9	S29	S30	0.283	5.465	550.854	0.597	OK
1.015	15 min Summer	9	S30	S31	0.386	4.207	577.771	0.741	OK
1.016	15 min Winter	9	S31	S32	0.450	3.504	557.328	0.859	OK
1.017	15 min Winter	10	S32	POND 02	0.450	4.549	583.090	1.390	OK
1.018	15 min Winter	19	POND 02	S34	0.450	1.175	138.020	0.425	OK
1.019	15 min Winter	19	S34	S35	0.375	1.260	139.202	1.253	Surcharged
1.020	15 min Winter	19	S35	S36	0.375	1.270	140.238	1.262	Surcharged
1.021	15 min Winter	19	S36	S42	0.375	1.286	141.983	1.278	Surcharged
7.000	15 min Summer	8	S37	S38	0.181	0.996	44.489	0.185	OK
7.001	15 min Summer	8	S38	S39	0.126	3.139	88.576	0.376	OK
7.002	15 min Summer	8	S39	S42	0.204	2.905	132.929	0.282	OK
8.000	15 min Summer	8	S40	S42	0.181	2.098	44.458	0.095	OK
9.000	15 min Winter	62	TANK 01	S42	0.300	0.156	11.018	0.152	Surcharged
1.022	15 min Winter	6	S42	S43	0.375	0.892	53.492	0.482	Surcharged
1.023	15 min Winter	5	S43	S44	0.450	0.590	34.251	0.213	OK
1.024	1440 min Winter	670	S44	S45	0.450	0.130	15.255	0.095	OK
1.025	30 min Winter	9	S45	Ex S3951	0.058	0.736	7.987	0.054	OK

Return Period Yrs: 100.0

Climate Change %: 40

Manholes

Manhole	Critical Storm	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Flood (m3)	Status
S1	15 min Summer	10	88.632	1.512	73.421		Surcharged
S2	15 min Summer	10	88.611	1.711	73.421		Flood Risk
S3	15 min Summer	10	88.596	1.756	221.701		Flood Risk
S4	15 min Summer	10	88.212	1.587	296.241		Flood Risk
S5	1440 min Winter	1397	87.811	1.261	1.239		Flood Risk
POND 01	1440 min Winter	1396	87.811	1.311	1.256		Flood Risk
S7	1440 min Winter	1396	87.811	1.341	1.254		Flood Risk
S8	15 min Summer	10	86.570	0.250	4.656		OK
S9	15 min Summer	10	86.559	0.314	6.889		Surcharged
S10	15 min Summer	8	87.015	0.115	41.866		OK
S11	15 min Summer	8	86.820	0.169	83.566		OK
S12	15 min Summer	9	86.557	0.257	81.034		OK
S13	15 min Summer	10	86.552	0.350	110.589		Surcharged
S14	15 min Summer	9	86.271	0.176	149.818		OK
S15	15 min Summer	9	85.164	0.159	190.135		OK
S16	15 min Summer	9	84.159	0.184	230.338		OK
S17	15 min Summer	8	87.043	0.093	41.866		OK
S18	15 min Summer	8	86.796	0.346	83.617		OK
S19	15 min Summer	8	87.036	0.086	41.866		OK
S20	15 min Summer	8	86.605	0.265	166.724		OK
S21	15 min Summer	10	85.977	0.333	179.965		Surcharged
S22	15 min Summer	8	85.486	0.116	41.866		OK
S23	15 min Summer	10	85.419	0.399	67.628		Surcharged
S24	15 min Summer	10	85.285	0.845	260.668		Surcharged
S25	15 min Summer	9	84.667	0.742	300.016		Surcharged
S26	15 min Summer	9	84.230	0.595	337.425		Surcharged
S27	15 min Summer	9	83.351	0.536	605.331		OK
S28	15 min Summer	9	82.421	0.291	645.429		OK
S29	15 min Summer	10	80.962	0.432	653.182		OK
S30	15 min Summer	10	80.441	1.201	688.207		Surcharged
S31	15 min Summer	10	79.512	1.562	720.925		Surcharged
S32	15 min Summer	10	79.194	1.524	751.141		Surcharged
POND 02	600 min Winter	586	78.344	1.144	6.092		Flood Risk
S34	600 min Winter	586	78.344	1.344	6.047		Flood Risk
S35	600 min Winter	586	78.344	1.391	6.047		Surcharged
S36	600 min Winter	587	78.344	1.447	5.971		Surcharged
S37	15 min Summer	8	83.617	0.100	58.613		OK
S38	15 min Summer	8	83.300	0.298	117.131		OK
S39	15 min Summer	8	82.112	0.125	175.155		OK
S40	15 min Summer	8	82.043	0.071	58.613		OK
TANK 01	600 min Winter	587	78.343	1.463	0.000		Surcharged
S42	15 min Summer	10	78.354	1.625	375.184		Surcharged
S43	15 min Summer	10	78.449	1.861	134.614		Surcharged
S44	15 min Summer	10	78.472	1.963	87.924		Surcharged
S45	15 min Summer	10	78.476	2.014	46.722		Surcharged
Ex S3951	15 min Summer	10	76.479	0.059	8.420		Outfall

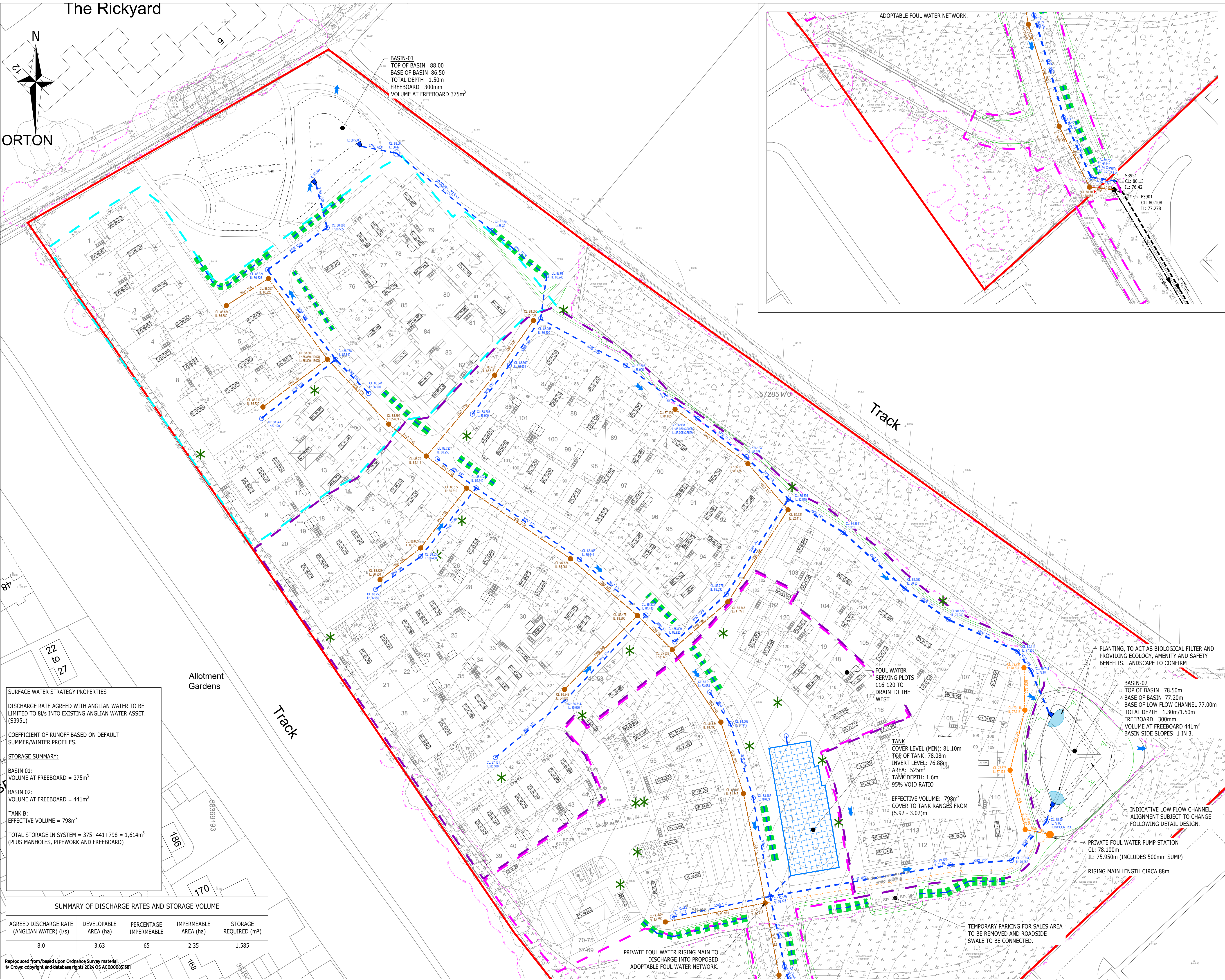
Conduits

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	9	S1	S3	0.375	0.843	69.757	0.348	Surcharged
2.000	15 min Winter	8	S2	S3	0.375	0.694	76.604	0.586	Surcharged
1.001	15 min Winter	10	S3	S4	0.375	1.886	208.315	1.297	Surcharged
1.002	15 min Winter	10	S4	S5	0.375	2.503	276.459	2.353	Surcharged
1.003	15 min Winter	9	S5	POND 01	0.375	3.111	343.650	3.931	Surcharged
1.004	15 min Winter	10	POND 01	S7	0.375	0.437	19.449	0.252	Surcharged
1.005	15 min Summer	10	S7	S8	0.178	0.353	4.656	0.065	OK
1.006	15 min Summer	12	S8	S9	0.275	0.537	17.088	0.258	OK
1.007	15 min Summer	12	S9	S13	0.300	0.482	23.348	0.405	Surcharged
3.000	15 min Summer	8	S10	S11	0.142	1.265	41.699	0.319	OK

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
3.001	15 min Summer	8	S11	S12	0.169	2.020	82.903	0.623	OK
3.002	15 min Summer	9	S12	S13	0.278	1.347	80.735	0.503	OK
1.008	15 min Summer	10	S13	S14	0.238	1.856	110.761	1.545	OK
1.009	15 min Summer	9	S14	S15	0.176	3.474	150.016	0.665	OK
1.010	15 min Summer	9	S15	S16	0.172	3.861	190.220	0.387	OK
1.011	15 min Summer	9	S16	S27	0.248	3.052	230.559	0.499	OK
4.000	15 min Summer	8	S17	S18	0.197	0.851	41.750	0.214	OK
4.001	15 min Summer	8	S18	S20	0.231	1.426	83.096	0.749	OK
5.000	15 min Summer	8	S19	S20	0.175	1.025	41.761	0.181	OK
4.002	15 min Summer	9	S20	S21	0.280	2.697	164.760	1.078	OK
4.003	15 min Summer	9	S21	S24	0.300	2.952	200.244	0.826	Surcharged
6.000	15 min Summer	9	S22	S23	0.207	1.287	41.638	0.327	OK
6.001	15 min Summer	9	S23	S24	0.300	1.362	73.524	0.509	Surcharged
4.004	15 min Winter	9	S24	S25	0.300	3.551	251.028	1.067	Surcharged
4.005	15 min Summer	10	S25	S26	0.375	2.708	299.042	2.683	Surcharged
4.006	15 min Winter	10	S26	S27	0.375	2.891	319.261	1.016	Surcharged
1.012	15 min Summer	9	S27	S28	0.301	5.356	605.311	0.847	OK
1.013	15 min Summer	10	S28	S29	0.357	5.791	645.424	0.777	OK
1.014	15 min Summer	10	S29	S30	0.441	5.346	673.422	0.729	OK
1.015	15 min Winter	9	S30	S31	0.450	4.330	651.211	0.835	OK
1.016	15 min Winter	9	S31	S32	0.450	4.274	679.773	1.047	OK
1.017	15 min Winter	9	S32	POND 02	0.450	4.658	706.749	1.685	OK
1.018	15 min Winter	19	POND 02	S34	0.450	1.097	152.436	0.470	OK
1.019	15 min Winter	19	S34	S35	0.375	1.390	153.533	1.382	Surcharged
1.020	15 min Winter	19	S35	S36	0.375	1.397	154.304	1.389	Surcharged
1.021	15 min Winter	19	S36	S42	0.375	1.408	155.469	1.399	Surcharged
7.000	15 min Summer	8	S37	S38	0.199	1.178	58.517	0.244	OK
7.001	15 min Summer	8	S38	S39	0.147	3.371	116.541	0.495	OK
7.002	15 min Summer	8	S39	S42	0.212	3.269	174.892	0.372	OK
8.000	15 min Summer	8	S40	S42	0.185	2.226	58.480	0.125	OK
9.000	15 min Winter	69	TANK 01	S42	0.300	0.137	9.688	0.133	Surcharged
1.022	15 min Winter	5	S42	S43	0.375	0.980	42.758	0.385	Surcharged
1.023	15 min Winter	4	S43	S44	0.450	0.618	35.034	0.218	OK
1.024	60 min Summer	12	S44	S45	0.450	0.261	16.542	0.103	OK
1.025	15 min Summer	10	S45	Ex S3951	0.059	0.748	8.420	0.057	OK

Appendix J – Proposed Drainage Strategy



NOTES:

- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE RELEVANT SPECIFICATION, INC. RISK ASSESSMENTS AND ALL OTHER RELATED DRAWINGS ISSUED BY THE ENGINEER.
- DO NOT SCALE FROM THIS DRAWING. WORK FROM FIGURED DIMENSIONS ONLY.
- ALL DIMENSIONS SHOWN ON THIS DRAWING ARE IN METRES UNLESS OTHERWISE STATED.
- ALL DIMENSIONS, LEVELS AND SURVEY GRID CO-ORDINATES ARE TO BE CHECKED ON SITE AND THE ENGINEER NOTIFIED IMMEDIATELY OF ANY DISCREPANCIES PRIOR TO THE COMMENCEMENT OF THE WORKS.
- NO DEVIATION FROM THE DETAILS SHOWN ON THIS DRAWING IS PERMITTED WITHOUT PRIOR PERMISSION FROM THE ENGINEER.
- ANY WORKS OUTSIDE RED SITE BOUNDARY ARE FOR INFORMATION PURPOSES ONLY. UNLESS SPECIFICALLY NOTED, ALL WORKS OUTSIDE THE SITE BOUNDARY WILL BE UNDERTAKEN BY OTHERS UNDER A SEPARATE CONTRACT.

KEY

	SITE BOUNDARY
	NORTHERN CATCHMENT
	CENTRAL CATCHMENT
	SOUTHERN CATCHMENT
	INDICATIVE SURFACE WATER SEWER
	PROPOSED FOUL WATER SEWER
	PROPOSED PRIVATE FOUL WATER SEWER
	PROPOSED PRIVATE PUMPING STATION AND RISING MAIN
	EXISTING SURFACE WATER SEWER
	EXISTING SURFACE WATER SEWER
	INDICATIVE UNDERDRAIN SWALE
	INDICATIVE BIO-RETENTION/RAINWATER HARVESTING
	ROOT PROTECTION AREA
	PROPOSED BASIN
	BASIN PLANTING/AMENITY
	PROPOSED TANKS
	PROPOSED BANKING (1:3)
	FINISHED FLOOR LEVEL
	GARAGE FLOOD LEVEL
	FLOOD EXCEEDANCE ROUTE

0m 5m 25m

Scale: 1:500 @ A0

C	SITE LAYOUT UPDATED	MAC	TR	BB	26/11/25
B	PLANNING SUBMISSION	KC	TR	BB	31/10/25
A	PRELIMINARY ISSUE	DC	TR	BB	08/09/25
Rev	Description	Drn	Chk	App	Date
Purpose:	FOR PLANNING	Status:	NOT YET APPROVED		

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Client: **BARRATT DAVID WILSON HOMES NORTH THAMES**

Project Title: **LAND AT TALBOT WAY, LETCHFORD**

Drawing Title: **DRAINAGE STRATEGY**

Drawn by DC	Checked by TR	Approved by BB	Revision C
Scale 1:500@A0	Date SEPT 2025		
Drawing Number 2502330-ACE-XX-00-DR-C-0151			