Land at G Park,
Kingsdown Road, Swindon

Discharge of Drainage Conditions

for

GLP

Ref: 20052-BGL-XX-XX-RP-C-00001

Version 02
01/03/2024

DOCUMENT CONTROL SHEET

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Project: Land at G Park, Kingsdown Road, Swindon

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Title: Discharge of Drainage Conditions

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01	28/02/2024	First issue
02	01/03/2024	Updated following comments

CONTENTS

1.0 INTRODUCTION

This report has been prepared by Burrows Graham Ltd. on behalf of GLP to support the discharge of conditions related to planning condition no. 15 for the planning application at G Park, Kingsdown Road, Swindon.

The Flood Risk Assessment for the development was submitted and approved by the local authority as part of the outline application. The surface water drainage strategy in this report mimics that of the approved strategy.

2.0 DRAINAGE STRATEGY

The G Park, Kingsdown Road drainage strategy is to direct surface water from the newly formed impermeable areas to an on-plot attenuation pond from where it discharges to an existing highway/land drainage ditch to the northwest boundary of the site. The land drainage ditch ultimately discharges beneath an outfall under Kingsdown Road. The runoff is restricted to Qbar, providing a reduction in the existing runoff rate.

The proposed drainage strategy has been designed in accordance with Sewers for Adoption (SfA) and SuDS guidance (Ciria 753). It is a requirement of these documents and NPPF that drainage systems be designed not to flood any part of the site in a 1 in 30-year storm event (3.33% annual probability). The below ground surface water design may require some areas to flood in events exceeding this storm event, this is generally considered acceptable providing no risk is posed to the building or adjacent areas. Once flood levels recede this water will enter the drainage network freely. All drainage designs will include the appropriate climate change allowance, in this case a 25% increase in rainfall for the 1 in 100-year event.

3.0 DISCHARGE OF CONDITIONS

Below is a formal response to drainage related condition no. 15.

Condition 15, part 1

Evidence that the proposed flows from the site will discharge at or below greenfield runoff rates, or as close as practical for any areas that have been previously developed.

The site drainage strategy has been designed in accordance with the discharge rates as set out within the approved FRA. The maximum runoff rate from the developed site will not exceed the equivalent runoff rate for storms up to the 2.3-year event.

The drainage strategy in Appendix A and the hydraulic calculations provided in Appendix B of this report define the overall surface water drainage strategy.

Condition 15, part 2

Details of how the drainage scheme has incorporated SuDS techniques to manage water quantity and maintain water quality in accordance with best practice guidance including the latest SuDS Manual C753.

Infiltration is not considered suitable at this site and so in accordance with the drainage hierarchy the site will discharge into a land drainage ditch to the northern boundary.

The on-plot drainage strategy incorporates site control measures such as filter drains along the northern and southern boundaries, permeable paving to part of the car park, a below ground attenuation tank and a balancing pond.

Condition 15, part 3

Detailed drainage plan showing the location of the proposed SuDS and drainage network with exceedance flow routes clearly identified.

The detailed drainage strategy can be found in Appendix A of this report. As shown within the calculations in Appendix B there is no exceedance flooding in the 1 in 100 year storm event +25%.

Condition 15, part 4

Details to demonstrate the SuDS Scheme has been designed in accordance with best practice guidance including the latest SuDS Manual C753.

Please see response to part 2. The SuDS scheme has been designed in accordance with best practice guidance including the latest SuDS Manual C753

Condition 15, part 5

General arrangement, which should be coordinated with the landscape proposals and the masterplan.

The detailed drainage strategy can be found in Appendix A of this report.

Condition 15, part 6

Manhole Schedules.

Manhole schedules can be found within the calculations in Appendix B of this report.

Condition 15, part 7

Detailed drainage calculations for all rainfall events up to and including the 1 in 100 year plus climate change to demonstrate that all SuDS features and the drainage network can cater for the critical storm event for its lifetime.

Detailed calculations can be found in Appendix B of this report.

Condition 15, part 8

Details of how the scheme shall be maintained and managed after completion.

The long-term maintenance strategy for the surface water drainage system is outlined in Appendix C of this report.

Condition 15, part 9

Any drainage systems offered for adoption will be designed to Design and Construction Guidance (previously Sewers for Adoption) and/or SBC standards as part of the detailed design and relevant technical approval processes.

Noted. All on plot drainage will be private. Any drainage to be offered for adoption will be designed to SBC standards.

APPENDIX A – DRAINAGE STRATEGY

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

IN ADDITION TO THE HAZARDS/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING

CONSTRUCTION

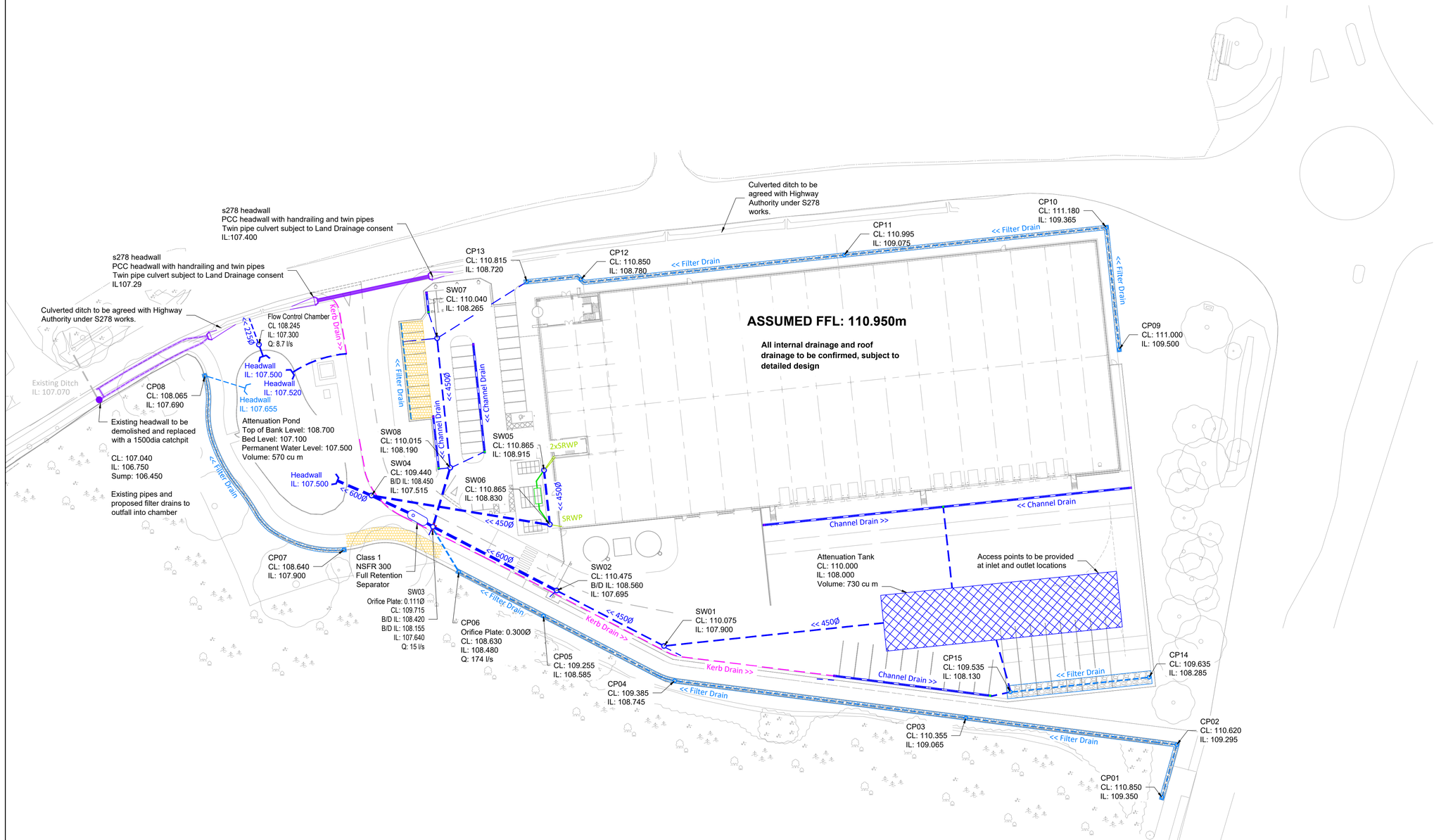
MAINTENANCE

DEMOLITION

IT IS ASSUMED THAT ALL WORKS WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT

GENERAL NOTES:

1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH ALL THE RELEVANT ARCHITECTS, ENGINEERS' AND SERVICE ENGINEERS DRAWINGS & SPECIFICATIONS.



Surface Water Manhole
Surface Water Sewer
Channel Drain
Filter Drain
Kerb Drain
Syphonic Drainage
Access Box
Access Point
Outlet Point
Surface Water Gully
Petrol Interceptor
Attenuation Tank
Permeable Paving
Surface Water Headwall
Rain Water Harvesting Tank
Existing Ditch
S278 Twin Pipe Culvert
S278 Headwall (precast concrete)
S278 Filter Drain
S278 Catchpit

REV	DATE	BY	REVISION	CHK'D

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CLIENT

GLP

PROJECT

LAND AT G PARK
KINGSDOWN ROAD, SWINDON

DRAWING TITLE

DRAINAGE STRATEGY

OUR PROJECT NUMBER	DRAWING STATUS	OFFICE	
20052	PRELIMINARY	NORTH	
SCALE @ A1	DATE	DRAWN BY	CHECKED BY
1:500	09.12.2022	RO	JMW

DRAWING No: 20052-BGL-XX-XX-DR-C-00252

REV: P01

APPENDIX B –HYDRAULIC CALCULATIONS

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	100	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	x

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
CP09	0.049	1.00	111.000	1200	188.352	61.970	1.500
CP10	0.045	5.00	111.180	1200	185.481	89.677	1.815
CP11	0.051	5.00	110.995	1200	126.029	83.271	1.920
CP12	0.014	5.00	110.850	1200	65.769	78.020	2.070
CP13	0.018	5.00	110.815	1200	53.596	77.384	2.095
SW07	0.077	5.00	110.040	1350	33.168	64.392	1.775
SW08	0.102	5.00	110.015	1350	36.204	34.767	1.825
CP01	0.006	5.00	110.850	1200	197.713	-39.747	1.500
CP02	0.005	5.00	110.620	1200	201.006	-28.214	1.325
CP03	0.018	5.00	110.355	1200	155.248	-22.054	1.290
CP04	0.025	5.00	109.385	1200	85.571	-13.266	0.640
CP05	0.012	5.00	109.255	1200	57.016	1.445	0.670
CD02	0.134	5.00	109.650	1200	190.180	30.397	0.500
CD01	0.066	5.00	109.650	1200	107.492	22.164	0.500
CD03	0.066	5.00	109.650	1200	148.007	26.105	0.702
Attenuation Tank			110.000		158.501	3.155	2.000
SW01	0.116	5.00	110.075	1350	85.045	-5.779	2.175
SW05	0.493	5.00	110.865	1350	57.203	34.051	1.950
SW06	0.214	5.00	110.865	1350	58.552	21.881	2.035
SW02	0.015	5.00	110.475	1500	60.018	7.106	2.780
SW03	0.012	5.00	109.840	1800	32.059	21.611	2.200
SW04	0.033	5.00	109.440	1500	18.270	28.592	1.925
CP14	0.050	5.00	109.635	1200	195.425	-13.035	1.350
Pond	0.114	5.00	108.650		-3.883	46.449	1.150
Flow Control Chamber			108.650	1500	-7.285	62.626	1.350
Headwall			108.270	1200	-43.840	50.521	1.200
CP15	0.050	5.00	109.535	1200	163.871	-16.175	1.405
DITCH			107.630	1200	-10.077	69.811	0.460
Kerb Drain	0.046	5.00	108.800	1200	12.309	60.843	1.000
CP06	0.000	5.00	109.500	1200	38.084	11.131	1.020
CP07		5.00	108.640	1200	11.716	15.860	0.740
CP08			108.640	1200	-19.823	55.719	0.950

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	CP09	CP10	28.454	0.600	109.500	109.365	0.135	210.8	300	1.44	50.0
1.001	CP10	CP11	61.143	0.600	109.365	109.075	0.290	210.8	300	5.94	50.0
1.002	CP11	CP12	61.698	0.600	109.075	108.780	0.295	209.1	300	6.89	50.0
1.003	CP12	CP13	12.864	0.600	108.780	108.720	0.060	214.4	300	7.09	50.0
1.004	CP13	SW07	24.626	0.600	108.720	108.415	0.305	80.7	300	7.33	50.0
1.005	SW07	SW08	30.187	0.600	108.265	108.190	0.075	402.5	450	7.83	50.0
1.006	SW08	SW03	14.256	0.600	108.190	108.155	0.035	407.3	450	8.07	50.0
2.000	CP01	CP02	12.686	0.600	109.350	109.295	0.055	230.7	300	5.21	50.0
2.001	CP02	CP03	49.309	0.600	109.295	109.065	0.230	214.4	300	5.97	50.0
2.002	CP03	CP04	68.118	0.600	109.065	108.745	0.320	212.9	300	7.03	50.0
2.003	CP04	CP05	34.024	0.600	108.745	108.585	0.160	212.7	300	7.56	50.0
3.000	CD02	CD03	42.390	0.600	109.150	108.948	0.202	209.9	300	5.65	50.0
4.000	CD01	CD03	40.706	0.600	109.150	108.956	0.194	210.0	300	5.63	50.0
3.001	CD03	Attenuation Tank	25.235	0.600	108.948	108.150	0.798	31.6	300	5.80	50.0
3.002	Attenuation Tank	SW01	51.213	0.600	108.000	107.900	0.100	512.1	450	6.76	50.0
3.003	SW01	SW02	28.039	0.600	107.900	107.845	0.055	509.8	450	7.28	50.0
6.000	SW05	SW06	12.651	0.600	108.915	108.830	0.085	148.8	450	5.13	50.0
6.001	SW06	SW04	42.000	0.600	108.830	108.450	0.380	110.5	450	5.49	50.0
3.004	SW02	SW03	32.288	0.600	107.695	107.640	0.055	587.1	600	7.82	50.0
1.007	SW03	SW04	16.006	0.600	107.640	107.515	0.125	128.0	600	8.21	50.0
1.008	SW04	Pond	8.629	0.600	107.515	107.500	0.015	575.3	600	8.35	50.0
5.000	CP14	CP15	32.349	0.600	108.285	108.130	0.155	208.7	300	5.50	50.0
1.010	Pond	Flow Control Chamber	2.887	0.600	107.500	107.300	0.200	14.4	600	9.55	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.079	76.3	6.6	1.200	1.515	0.049	0.0	59	0.669
1.001	1.079	76.2	12.7	1.515	1.620	0.094	0.0	82	0.804
1.002	1.083	76.6	19.7	1.620	1.770	0.145	0.0	103	0.911
1.003	1.070	75.6	21.5	1.770	1.795	0.159	0.0	109	0.925
1.004	1.751	123.8	24.0	1.795	1.325	0.177	0.0	89	1.367
1.005	1.007	160.1	34.4	1.325	1.375	0.254	0.0	141	0.809
1.006	1.001	159.2	48.2	1.375	1.235	0.356	0.0	169	0.881
2.000	1.031	72.9	0.8	1.200	1.025	0.006	0.0	22	0.341
2.001	1.070	75.6	1.5	1.025	0.990	0.011	0.0	29	0.425
2.002	1.073	75.9	3.9	0.990	0.340	0.029	0.0	46	0.570
2.003	1.074	75.9	7.3	0.340	0.370	0.054	0.0	62	0.685
3.000	1.081	76.4	18.2	0.200	0.402	0.134	0.0	99	0.891
4.000	1.081	76.4	8.9	0.200	0.394	0.066	0.0	69	0.729
3.001	2.805	198.3	36.0	0.402	1.550	0.266	0.0	86	2.145
3.002	0.891	141.8	49.6	1.550	1.725	0.366	0.0	183	0.815
3.003	0.893	142.1	65.3	1.725	2.180	0.482	0.0	214	0.875
6.000	1.664	264.6	66.8	1.500	1.585	0.493	0.0	153	1.396
6.001	1.933	307.4	95.8	1.585	0.540	0.707	0.0	172	1.715
3.004	0.998	282.1	67.4	2.180	1.600	0.497	0.0	198	0.824
1.007	2.150	608.0	126.2	1.600	1.325	0.931	0.0	184	1.714
1.008	1.008	285.0	226.5	1.325	0.550	1.671	0.0	406	1.113
5.000	1.084	76.6	6.8	1.050	1.105	0.050	0.0	60	0.676
1.010	6.430	1818.1	248.1	0.550	0.750	1.831	0.0	148	4.567

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.011	Flow Control Chamber	DITCH	6.442	0.600	107.300	107.170	0.130	49.6	225	9.70	50.0
5.001	CP15	Attenuation Tank	12.522	0.600	108.130	108.000	0.130	96.3	300	5.63	50.0
1.011_1	DITCH	Headwall	39.454	0.600	107.170	107.070	0.100	394.5	225	10.71	50.0
8.000	Kerb Drain	Pond	10.810	0.600	107.800	107.750	0.050	216.2	225	5.20	50.0
2.004	CP05	CP06	22.121	0.600	108.585	108.480	0.105	210.7	300	7.90	50.0
2.005	CP06	SW03	12.087	0.600	108.480	108.420	0.060	201.5	300	8.08	50.0
7.000	CP07	CP08	58.088	0.600	107.900	107.690	0.210	276.6	300	6.03	50.0
7.001	CP08	Pond	9.795	0.600	107.690	107.655	0.035	279.9	300	6.20	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.011	1.862	74.0	248.1	1.125	0.235	1.831	0.0	225	1.897
5.001	1.602	113.2	13.6	1.105	1.700	0.100	0.0	69	1.088
1.011_1	0.652	25.9	248.1	0.235	0.975	1.831	0.0	225	0.664
8.000	0.885	35.2	6.2	0.775	0.675	0.046	0.0	64	0.669
2.004	1.079	76.3	8.9	0.370	0.720	0.066	0.0	69	0.728
2.005	1.104	78.0	8.9	0.720	1.120	0.066	0.0	68	0.741
7.000	0.940	66.5	0.0	0.440	0.650	0.000	0.0	0	0.000
7.001	0.935	66.1	0.0	0.650	0.695	0.000	0.0	0	0.000

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	28.454	210.8	300	Circular	111.000	109.500	1.200	111.180	109.365	1.515
1.001	61.143	210.8	300	Circular	111.180	109.365	1.515	110.995	109.075	1.620
1.002	61.698	209.1	300	Circular	110.995	109.075	1.620	110.850	108.780	1.770
1.003	12.864	214.4	300	Circular	110.850	108.780	1.770	110.815	108.720	1.795
1.004	24.626	80.7	300	Circular	110.815	108.720	1.795	110.040	108.415	1.325
1.005	30.187	402.5	450	Circular	110.040	108.265	1.325	110.015	108.190	1.375
1.006	14.256	407.3	450	Circular	110.015	108.190	1.375	109.840	108.155	1.235
2.000	12.686	230.7	300	Circular	110.850	109.350	1.200	110.620	109.295	1.025
2.001	49.309	214.4	300	Circular	110.620	109.295	1.025	110.355	109.065	0.990
2.002	68.118	212.9	300	Circular	110.355	109.065	0.990	109.385	108.745	0.340
2.003	34.024	212.7	300	Circular	109.385	108.745	0.340	109.255	108.585	0.370

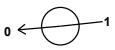
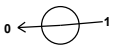
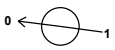
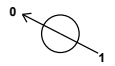
Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	CP09	1200	Manhole	Adoptable	CP10	1200	Manhole	Adoptable
1.001	CP10	1200	Manhole	Adoptable	CP11	1200	Manhole	Adoptable
1.002	CP11	1200	Manhole	Adoptable	CP12	1200	Manhole	Adoptable
1.003	CP12	1200	Manhole	Adoptable	CP13	1200	Manhole	Adoptable
1.004	CP13	1200	Manhole	Adoptable	SW07	1350	Manhole	Adoptable
1.005	SW07	1350	Manhole	Adoptable	SW08	1350	Manhole	Adoptable
1.006	SW08	1350	Manhole	Adoptable	SW03	1800	Manhole	Adoptable
2.000	CP01	1200	Manhole	Adoptable	CP02	1200	Manhole	Adoptable
2.001	CP02	1200	Manhole	Adoptable	CP03	1200	Manhole	Adoptable
2.002	CP03	1200	Manhole	Adoptable	CP04	1200	Manhole	Adoptable
2.003	CP04	1200	Manhole	Adoptable	CP05	1200	Manhole	Adoptable

Pipeline Schedule

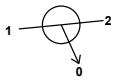
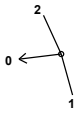
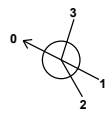
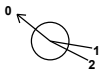
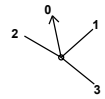
Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
3.000	42.390	209.9	300	Circular	109.650	109.150	0.200	109.650	108.948	0.402
4.000	40.706	210.0	300	Circular	109.650	109.150	0.200	109.650	108.956	0.394
3.001	25.235	31.6	300	Circular	109.650	108.948	0.402	110.000	108.150	1.550
3.002	51.213	512.1	450	Circular	110.000	108.000	1.550	110.075	107.900	1.725
3.003	28.039	509.8	450	Circular	110.075	107.900	1.725	110.475	107.845	2.180
6.000	12.651	148.8	450	Circular	110.865	108.915	1.500	110.865	108.830	1.585
6.001	42.000	110.5	450	Circular	110.865	108.830	1.585	109.440	108.450	0.540
3.004	32.288	587.1	600	Circular	110.475	107.695	2.180	109.840	107.640	1.600
1.007	16.006	128.0	600	Circular	109.840	107.640	1.600	109.440	107.515	1.325
1.008	8.629	575.3	600	Circular	109.440	107.515	1.325	108.650	107.500	0.550
5.000	32.349	208.7	300	Circular	109.635	108.285	1.050	109.535	108.130	1.105
1.010	2.887	14.4	600	Circular	108.650	107.500	0.550	108.650	107.300	0.750
1.011	6.442	49.6	225	Circular	108.650	107.300	1.125	107.630	107.170	0.235
5.001	12.522	96.3	300	Circular	109.535	108.130	1.105	110.000	108.000	1.700
1.011_1	39.454	394.5	225	Circular	107.630	107.170	0.235	108.270	107.070	0.975
8.000	10.810	216.2	225	Circular	108.800	107.800	0.775	108.650	107.750	0.675
2.004	22.121	210.7	300	Circular	109.255	108.585	0.370	109.500	108.480	0.720
2.005	12.087	201.5	300	Circular	109.500	108.480	0.720	109.840	108.420	1.120
7.000	58.088	276.6	300	Circular	108.640	107.900	0.440	108.640	107.690	0.650
7.001	9.795	279.9	300	Circular	108.640	107.690	0.650	108.650	107.655	0.695

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
3.000	CD02	1200	Manhole	Adoptable	CD03	1200	Manhole	Adoptable
4.000	CD01	1200	Manhole	Adoptable	CD03	1200	Manhole	Adoptable
3.001	CD03	1200	Manhole	Adoptable	Attenuation Tank		Junction	
3.002	Attenuation Tank		Junction		SW01	1350	Manhole	Adoptable
3.003	SW01	1350	Manhole	Adoptable	SW02	1500	Manhole	Adoptable
6.000	SW05	1350	Manhole	Adoptable	SW06	1350	Manhole	Adoptable
6.001	SW06	1350	Manhole	Adoptable	SW04	1500	Manhole	Adoptable
3.004	SW02	1500	Manhole	Adoptable	SW03	1800	Manhole	Adoptable
1.007	SW03	1800	Manhole	Adoptable	SW04	1500	Manhole	Adoptable
1.008	SW04	1500	Manhole	Adoptable	Pond		Junction	
5.000	CP14	1200	Manhole	Adoptable	CP15	1200	Manhole	Adoptable
1.010	Pond		Junction		Flow Control Chamber	1500	Manhole	Adoptable
1.011	Flow Control Chamber	1500	Manhole	Adoptable	DITCH	1200	Manhole	Adoptable
5.001	CP15	1200	Manhole	Adoptable	Attenuation Tank		Junction	
1.011_1	DITCH	1200	Manhole	Adoptable	Headwall	1200	Manhole	Adoptable
8.000	Kerb Drain	1200	Manhole	Adoptable	Pond		Junction	
2.004	CP05	1200	Manhole	Adoptable	CP06	1200	Manhole	Adoptable
2.005	CP06	1200	Manhole	Adoptable	SW03	1800	Manhole	Adoptable
7.000	CP07	1200	Manhole	Adoptable	CP08	1200	Manhole	Adoptable
7.001	CP08	1200	Manhole	Adoptable	Pond		Junction	

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
CP09	188.352	61.970	111.000	1.500	1200				
						0	1.000	109.500	300
CP10	185.481	89.677	111.180	1.815	1200	1	1.000	109.365	300
									
						0	1.001	109.365	300
CP11	126.029	83.271	110.995	1.920	1200	1	1.001	109.075	300
									
						0	1.002	109.075	300
CP12	65.769	78.020	110.850	2.070	1200	1	1.002	108.780	300
									
						0	1.003	108.780	300
CP13	53.596	77.384	110.815	2.095	1200	1	1.003	108.720	300
									
						0	1.004	108.720	300
SW07	33.168	64.392	110.040	1.775	1350	1	1.004	108.415	300
									
						0	1.005	108.265	450
SW08	36.204	34.767	110.015	1.825	1350		1.005	108.190	450
						0	1.006	108.190	450
CP01	197.713	-39.747	110.850	1.500	1200				
						0	2.000	109.350	300
CP02	201.006	-28.214	110.620	1.325	1200	1	2.000	109.295	300
									
						0	2.001	109.295	300
CP03	155.248	-22.054	110.355	1.290	1200	1	2.001	109.065	300
									
						0	2.002	109.065	300
CP04	85.571	-13.266	109.385	0.640	1200	1	2.002	108.745	300
									
						0	2.003	108.745	300
CP05	57.016	1.445	109.255	0.670	1200	1	2.003	108.585	300
									
						0	2.004	108.585	300
CD02	190.180	30.397	109.650	0.500	1200				
						0	3.000	109.150	300
CD01	107.492	22.164	109.650	0.500	1200				
						0	4.000	109.150	300

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
CD03	148.007	26.105	109.650	0.702	1200		1	4.000	108.956	300
							2	3.000	108.948	300
							0	3.001	108.948	300
Attenuation Tank	158.501	3.155	110.000	2.000			1	5.001	108.000	300
							2	3.001	108.150	300
							0	3.002	108.000	450
SW01	85.045	-5.779	110.075	2.175	1350		1	3.002	107.900	450
							0	3.003	107.900	450
SW05	57.203	34.051	110.865	1.950	1350		0	6.000	108.915	450
SW06	58.552	21.881	110.865	2.035	1350		1	6.000	108.830	450
							0	6.001	108.830	450
SW02	60.018	7.106	110.475	2.780	1500		1	3.003	107.845	450
							0	3.004	107.695	600
SW03	32.059	21.611	109.840	2.200	1800		1	3.004	107.640	600
							2	2.005	108.420	300
							3	1.006	108.155	450
							0	1.007	107.640	600
SW04	18.270	28.592	109.440	1.925	1500		1	6.001	108.450	450
							2	1.007	107.515	600
							0	1.008	107.515	600
CP14	195.425	-13.035	109.635	1.350	1200		0	5.000	108.285	300
Pond	-3.883	46.449	108.650	1.150			1	8.000	107.750	225
							2	7.001	107.655	300
							3	1.008	107.500	600
							0	1.010	107.500	600
Flow Control Chamber	-7.285	62.626	108.650	1.350	1500		1	1.010	107.300	600
							0	1.011	107.300	225
Headwall	-43.840	50.521	108.270	1.200	1200		1	1.011_1	107.070	225
CP15	163.871	-16.175	109.535	1.405	1200		1	5.000	108.130	300
							0	5.001	108.130	300
DITCH	-10.077	69.811	107.630	0.460	1200		1	1.011	107.170	225
							0	1.011_1	107.170	225

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
Kerb Drain	12.309	60.843	108.800	1.000	1200	 0	8.000	107.800	225
CP06	38.084	11.131	109.500	1.020	1200	 1	2.004	108.480	300
						0	2.005	108.480	300
CP07	11.716	15.860	108.640	0.740	1200	 0	7.000	107.900	300
CP08	-19.823	55.719	108.640	0.950	1200	 1	7.000	107.690	300
						0	7.001	107.690	300

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	20.000	Drain Down Time (mins)	240
Ratio-R	0.400	Additional Storage (m³/ha)	20.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)	Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0	100	25	0	0
30	25	0	0				

Node Flow Control Chamber Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Downstream Link	1.011	Sump Available	✓
Replaces Downstream Link	✓	Product Number	CTL-SHE-0131-8700-1350-8700
Invert Level (m)	107.300	Min Outlet Diameter (m)	0.150
Design Depth (m)	1.350	Min Node Diameter (mm)	1200
Design Flow (l/s)	8.7		

Node SW03 Online Orifice Control

Flap Valve	x	Design Depth (m)	1.400	Discharge Coefficient	0.600
Replaces Downstream Link	x	Design Flow (l/s)	15.0		
Invert Level (m)	107.640	Diameter (m)	0.078		

Node CP06 Online Orifice Control

Flap Valve	✓	Design Depth (m)	1.000	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	174.0		
Invert Level (m)	108.480	Diameter (m)	0.300		

Node Pond Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	107.500
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	268.1	0.0	1.000	615.6	0.0	1.150	700.0	0.0	1.151	0.0	0.0

Node Attenuation Tank Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	108.000
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	960.0	0.0	0.800	960.0	0.0	0.801	0.0	0.0

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
1 year 15 minute summer	109.521	30.991	30 year +25% CC 360 minute summer	39.027	10.043
1 year 15 minute winter	76.857	30.991	30 year +25% CC 360 minute winter	25.368	10.043
1 year 30 minute summer	71.439	20.215	30 year +25% CC 480 minute summer	30.405	8.035
1 year 30 minute winter	50.133	20.215	30 year +25% CC 480 minute winter	20.200	8.035
1 year 60 minute summer	48.435	12.800	30 year +25% CC 600 minute summer	24.695	6.755
1 year 60 minute winter	32.179	12.800	30 year +25% CC 600 minute winter	16.873	6.755
1 year 120 minute summer	30.053	7.942	30 year +25% CC 720 minute summer	21.862	5.859
1 year 120 minute winter	19.966	7.942	30 year +25% CC 720 minute winter	14.693	5.859
1 year 180 minute summer	23.233	5.979	30 year +25% CC 960 minute summer	17.769	4.679
1 year 180 minute winter	15.102	5.979	30 year +25% CC 960 minute winter	11.770	4.679
1 year 240 minute summer	18.475	4.882	30 year +25% CC 1440 minute summer	12.701	3.404
1 year 240 minute winter	12.274	4.882	30 year +25% CC 1440 minute winter	8.536	3.404
1 year 360 minute summer	14.169	3.646	100 year +25% CC 15 minute summer	435.923	123.351
1 year 360 minute winter	9.210	3.646	100 year +25% CC 15 minute winter	305.911	123.351
1 year 480 minute summer	11.185	2.956	100 year +25% CC 30 minute summer	286.207	80.987
1 year 480 minute winter	7.431	2.956	100 year +25% CC 30 minute winter	200.847	80.987
1 year 600 minute summer	9.182	2.511	100 year +25% CC 60 minute summer	191.610	50.637
1 year 600 minute winter	6.274	2.511	100 year +25% CC 60 minute winter	127.301	50.637
1 year 720 minute summer	8.203	2.199	100 year +25% CC 120 minute summer	115.702	30.577
1 year 720 minute winter	5.513	2.199	100 year +25% CC 120 minute winter	76.870	30.577
1 year 960 minute summer	6.768	1.782	100 year +25% CC 180 minute summer	87.258	22.454
1 year 960 minute winter	4.483	1.782	100 year +25% CC 180 minute winter	56.720	22.454
1 year 1440 minute summer	4.949	1.326	100 year +25% CC 240 minute summer	67.836	17.927
1 year 1440 minute winter	3.326	1.326	100 year +25% CC 240 minute winter	45.069	17.927
30 year +25% CC 15 minute summer	335.883	95.043	100 year +25% CC 360 minute summer	50.604	13.022
30 year +25% CC 15 minute winter	235.707	95.043	100 year +25% CC 360 minute winter	32.894	13.022
30 year +25% CC 30 minute summer	218.661	61.874	100 year +25% CC 480 minute summer	39.267	10.377
30 year +25% CC 30 minute winter	153.446	61.874	100 year +25% CC 480 minute winter	26.088	10.377
30 year +25% CC 60 minute summer	145.736	38.514	100 year +25% CC 600 minute summer	31.789	8.695
30 year +25% CC 60 minute winter	96.824	38.514	100 year +25% CC 600 minute winter	21.720	8.695
30 year +25% CC 120 minute summer	88.048	23.268	100 year +25% CC 720 minute summer	28.065	7.522
30 year +25% CC 120 minute winter	58.497	23.268	100 year +25% CC 720 minute winter	18.862	7.522
30 year +25% CC 180 minute summer	66.622	17.144	100 year +25% CC 960 minute summer	22.707	5.979
30 year +25% CC 180 minute winter	43.306	17.144	100 year +25% CC 960 minute winter	15.042	5.979
30 year +25% CC 240 minute summer	52.005	13.743	100 year +25% CC 1440 minute summer	16.120	4.320
30 year +25% CC 240 minute winter	34.551	13.743	100 year +25% CC 1440 minute winter	10.834	4.320

Results for 1 year Critical Storm Duration. Lowest mass balance: 97.81%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	CP09	8	109.576	0.076	11.2	0.1355	0.0000	OK
15 minute summer	CP10	9	109.454	0.089	14.4	0.1445	0.0000	OK
15 minute winter	CP11	10	109.180	0.105	20.5	0.1741	0.0000	OK
15 minute winter	CP12	11	108.894	0.114	21.7	0.1440	0.0000	OK
15 minute winter	CP13	11	108.812	0.092	24.0	0.1204	0.0000	OK
15 minute winter	SW07	11	108.411	0.146	33.9	0.3351	0.0000	OK
15 minute winter	SW08	11	108.360	0.170	46.7	0.4325	0.0000	OK
15 minute winter	CP01	11	109.372	0.022	0.8	0.0268	0.0000	OK
15 minute winter	CP02	11	109.323	0.028	1.5	0.0343	0.0000	OK
15 minute winter	CP03	12	109.109	0.043	3.8	0.0613	0.0000	OK
15 minute winter	CP04	12	108.803	0.058	6.7	0.1112	0.0000	OK
15 minute winter	CP05	12	108.650	0.065	7.7	0.0973	0.0000	OK
15 minute winter	CD02	10	109.253	0.103	18.9	0.6655	0.0000	OK
15 minute winter	CD01	10	109.219	0.069	9.3	0.2607	0.0000	OK
15 minute winter	CD03	11	109.036	0.088	36.4	0.2660	0.0000	OK
180 minute winter	Attenuation Tank	148	108.077	0.077	23.6	70.2240	0.0000	OK
15 minute winter	SW01	14	108.201	0.300	47.4	0.7506	0.0000	OK
15 minute winter	SW05	10	109.094	0.179	69.5	1.1620	0.0000	OK
15 minute winter	SW06	10	109.011	0.181	98.6	0.6390	0.0000	OK
15 minute winter	SW02	14	108.210	0.515	42.1	0.9652	0.0000	OK
15 minute winter	SW03	14	108.209	0.569	54.5	1.5107	0.0000	OK
360 minute winter	SW04	344	107.838	0.323	23.5	0.6815	0.0000	OK
15 minute winter	CP14	10	108.345	0.060	7.1	0.1125	0.0000	OK
360 minute winter	Pond	344	107.838	0.338	31.2	111.0947	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	CP09	1.000	CP10	9.7	0.701	0.128	0.4144	
15 minute summer	CP10	1.001	CP11	14.3	0.789	0.187	1.1470	
15 minute winter	CP11	1.002	CP12	19.8	0.873	0.259	1.4183	
15 minute winter	CP12	1.003	CP13	21.6	1.012	0.286	0.2757	
15 minute winter	CP13	1.004	SW07	23.7	1.331	0.191	0.4388	
15 minute winter	SW07	1.005	SW08	33.2	0.674	0.208	1.4955	
15 minute winter	SW08	1.006	SW03	45.7	0.924	0.287	0.7061	
15 minute winter	CP01	2.000	CP02	0.8	0.302	0.011	0.0360	
15 minute winter	CP02	2.001	CP03	1.4	0.305	0.019	0.2375	
15 minute winter	CP03	2.002	CP04	3.5	0.444	0.046	0.5398	
15 minute winter	CP04	2.003	CP05	6.4	0.610	0.084	0.3549	
15 minute winter	CP05	2.004	CP06	7.6	0.662	0.100	0.2565	
15 minute winter	CD02	3.000	CD03	18.4	0.956	0.240	0.8147	
15 minute winter	CD01	4.000	CD03	9.0	0.670	0.118	0.5557	
15 minute winter	CD03	3.001	Attenuation Tank	36.4	2.139	0.184	0.4299	
180 minute winter	Attenuation Tank	3.002	SW01	-11.1	0.365	-0.079	1.9349	
15 minute winter	SW01	3.003	SW02	-38.0	0.572	-0.268	3.5062	
15 minute winter	SW05	6.000	SW06	68.4	1.157	0.259	0.7482	
15 minute winter	SW06	6.001	SW04	97.2	1.701	0.316	2.4012	
15 minute winter	SW02	3.004	SW03	-40.9	-0.183	-0.145	8.6157	
15 minute winter	SW03	1.007	SW04	11.9	0.321	0.020	1.1240	
360 minute winter	SW04	1.008	Pond	23.1	0.922	0.081	1.3722	
15 minute winter	CP14	5.000	CP15	6.9	0.558	0.090	0.3997	
360 minute winter	Pond	1.010	Flow Control Chamber	18.9	0.318	0.010	0.6220	

Results for 1 year Critical Storm Duration. Lowest mass balance: 97.81%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute winter	Flow Control Chamber	344	107.841	0.541	18.9	0.9566	0.0000	SURCHARGED
720 minute winter	Headwall	390	107.146	0.076	8.7	0.0000	0.0000	OK
15 minute winter	CP15	10	108.209	0.079	14.0	0.1448	0.0000	OK
720 minute winter	DITCH	390	107.263	0.093	8.7	0.1050	0.0000	OK
15 minute winter	Kerb Drain	10	107.866	0.066	6.5	0.1354	0.0000	OK
15 minute winter	CP06	13	108.548	0.068	7.6	0.0772	0.0000	OK
15 minute summer	CP07	1	107.900	0.000	0.0	0.0000	0.0000	OK
360 minute winter	CP08	352	107.838	0.148	0.3	0.1677	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
360 minute winter	Flow Control Chamber	Hydro-Brake®	DITCH	8.7				
15 minute winter	CP15	5.001	Attenuation Tank	13.7	2.150	0.121	0.0966	
720 minute winter	DITCH	1.011_1	Headwall	8.7	0.639	0.334	0.5362	380.7
15 minute winter	Kerb Drain	8.000	Pond	6.3	0.669	0.180	0.1027	
15 minute winter	CP06	Orifice	SW03	7.5				
15 minute summer	CP07	7.000	CP08	0.0	0.000	0.000	0.0000	
360 minute winter	CP08	7.001	Pond	-0.3	-0.070	-0.005	0.3901	

Results for 30 year +25% CC Critical Storm Duration. Lowest mass balance: 97.81%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	CP09	8	109.644	0.144	34.1	0.2564	0.0000	OK
15 minute summer	CP10	9	109.535	0.170	45.5	0.2768	0.0000	OK
15 minute summer	CP11	10	109.286	0.211	67.0	0.3511	0.0000	OK
15 minute winter	CP12	11	109.005	0.225	68.4	0.2852	0.0000	OK
15 minute winter	CP13	11	108.904	0.184	74.5	0.2394	0.0000	OK
15 minute winter	SW07	12	108.679	0.414	105.9	0.9507	0.0000	OK
15 minute winter	SW08	12	108.643	0.453	138.5	1.1544	0.0000	SURCHARGED
15 minute winter	CP01	10	109.388	0.038	2.6	0.0461	0.0000	OK
15 minute winter	CP02	11	109.344	0.049	4.7	0.0595	0.0000	OK
15 minute winter	CP03	11	109.143	0.078	12.1	0.1099	0.0000	OK
15 minute winter	CP04	11	108.855	0.110	21.6	0.2099	0.0000	OK
15 minute winter	CP05	11	108.706	0.121	25.7	0.1806	0.0000	OK
15 minute winter	CD02	10	109.348	0.198	57.9	1.2863	0.0000	OK
15 minute winter	CD01	10	109.275	0.125	28.5	0.4711	0.0000	OK
15 minute winter	CD03	11	109.115	0.167	112.7	0.5030	0.0000	OK
480 minute winter	Attenuation Tank	480	108.395	0.395	44.8	359.8474	0.0000	OK
15 minute winter	SW01	11	108.475	0.575	206.4	1.4355	0.0000	SURCHARGED
15 minute winter	SW05	10	109.320	0.405	213.1	2.6292	0.0000	OK
15 minute winter	SW06	11	109.221	0.391	301.5	1.3819	0.0000	OK
15 minute winter	SW02	11	108.575	0.880	165.1	1.6496	0.0000	SURCHARGED
15 minute winter	SW03	12	108.599	0.959	169.2	2.5459	0.0000	SURCHARGED
480 minute winter	SW04	464	108.359	0.844	39.5	1.7813	0.0000	SURCHARGED
480 minute winter	CP14	480	108.395	0.110	2.4	0.2051	0.0000	OK
480 minute winter	Pond	464	108.359	0.859	46.3	360.0609	0.0000	FLOOD RISK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	CP09	1.000	CP10	31.1	0.905	0.407	0.9774	
15 minute summer	CP10	1.001	CP11	47.0	1.030	0.617	2.7865	
15 minute summer	CP11	1.002	CP12	62.7	1.154	0.820	3.3556	
15 minute winter	CP12	1.003	CP13	67.2	1.332	0.889	0.6560	
15 minute winter	CP13	1.004	SW07	74.7	1.636	0.603	1.3147	
15 minute winter	SW07	1.005	SW08	101.7	0.804	0.635	4.6917	
15 minute winter	SW08	1.006	SW03	139.2	1.096	0.874	2.2557	
15 minute winter	CP01	2.000	CP02	2.5	0.409	0.035	0.0798	
15 minute winter	CP02	2.001	CP03	4.5	0.418	0.060	0.5436	
15 minute winter	CP03	2.002	CP04	11.4	0.608	0.151	1.2883	
15 minute winter	CP04	2.003	CP05	20.9	0.839	0.275	0.8507	
15 minute winter	CP05	2.004	CP06	25.5	0.765	0.334	0.8131	
15 minute winter	CD02	3.000	CD03	56.2	1.262	0.735	1.8915	
15 minute winter	CD01	4.000	CD03	28.0	0.859	0.366	1.3278	
15 minute winter	CD03	3.001	Attenuation Tank	112.2	2.859	0.566	0.9901	
480 minute winter	Attenuation Tank	3.002	SW01	-20.4	-0.293	-0.144	7.8296	
15 minute winter	SW01	3.003	SW02	-166.0	-1.048	-1.168	4.4426	
15 minute winter	SW05	6.000	SW06	209.0	1.410	0.790	1.8756	
15 minute winter	SW06	6.001	SW04	297.1	2.146	0.966	5.8077	
15 minute winter	SW02	3.004	SW03	-160.0	-0.568	-0.567	9.0948	
15 minute winter	SW03	1.007	SW04	22.6	0.147	0.037	3.1171	
480 minute winter	SW04	1.008	Pond	38.8	1.048	0.136	2.4306	
480 minute winter	CP14	5.000	CP15	2.4	0.448	0.031	1.4402	
480 minute winter	Pond	1.010	Flow Control Chamber	27.2	0.410	0.015	0.8132	

Results for 30 year +25% CC Critical Storm Duration. Lowest mass balance: 97.81%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute winter	Flow Control Chamber	464	108.355	1.054	27.2	1.8633	0.0000	FLOOD RISK
1440 minute winter	Headwall	570	107.146	0.076	8.7	0.0000	0.0000	OK
480 minute winter	CP15	480	108.395	0.265	8.6	0.4876	0.0000	OK
1440 minute winter	DITCH	570	107.263	0.093	8.7	0.1050	0.0000	OK
480 minute winter	Kerb Drain	464	108.359	0.559	2.2	1.1459	0.0000	SURCHARGED
15 minute winter	CP06	12	108.669	0.189	25.5	0.2141	0.0000	OK
480 minute winter	CP07	464	108.359	0.459	0.9	0.5191	0.0000	FLOOD RISK
480 minute winter	CP08	464	108.359	0.669	1.6	0.7564	0.0000	FLOOD RISK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
480 minute winter	Flow Control Chamber	Hydro-Brake®	DITCH	8.7				
480 minute winter	CP15	5.001	Attenuation Tank	13.3	0.872	0.118	0.8527	
1440 minute winter	DITCH	1.011_1	Headwall	8.7	0.639	0.334	0.5362	696.7
480 minute winter	Kerb Drain	8.000	Pond	2.0	0.437	0.058	0.4299	
15 minute winter	CP06	Orifice	SW03	25.9				
480 minute winter	CP07	7.000	CP08	-0.9	-0.027	-0.013	4.0905	
480 minute winter	CP08	7.001	Pond	-1.6	-0.067	-0.025	0.6898	

Results for 100 year +25% CC Critical Storm Duration. Lowest mass balance: 97.81%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	CP09	8	109.670	0.169	44.3	0.3023	0.0000	OK
15 minute summer	CP10	9	109.567	0.202	59.3	0.3292	0.0000	OK
15 minute winter	CP11	12	109.400	0.325	82.9	0.5401	0.0000	SURCHARGED
15 minute winter	CP12	12	109.174	0.393	86.6	0.4981	0.0000	SURCHARGED
15 minute winter	CP13	12	109.094	0.374	89.1	0.4868	0.0000	SURCHARGED
15 minute winter	SW07	11	108.932	0.666	122.6	1.5322	0.0000	SURCHARGED
15 minute winter	SW08	11	108.882	0.692	171.7	1.7646	0.0000	SURCHARGED
15 minute winter	CP01	10	109.393	0.043	3.4	0.0525	0.0000	OK
15 minute winter	CP02	11	109.351	0.056	6.1	0.0679	0.0000	OK
15 minute winter	CP03	11	109.155	0.090	15.8	0.1264	0.0000	OK
15 minute winter	CP04	12	108.880	0.135	28.3	0.2583	0.0000	OK
15 minute winter	CP05	12	108.859	0.274	34.5	0.4082	0.0000	OK
15 minute winter	CD02	10	109.394	0.244	75.2	1.5812	0.0000	OK
15 minute winter	CD01	10	109.295	0.145	37.0	0.5481	0.0000	OK
15 minute winter	CD03	11	109.147	0.199	145.4	0.5997	0.0000	OK
720 minute winter	Attenuation Tank	720	108.578	0.578	35.2	527.5186	0.0000	SURCHARGED
15 minute winter	SW01	11	108.631	0.731	250.5	1.8263	0.0000	SURCHARGED
15 minute winter	SW05	11	109.735	0.820	276.6	5.3221	0.0000	SURCHARGED
15 minute winter	SW06	11	109.578	0.748	378.0	2.6452	0.0000	SURCHARGED
15 minute winter	SW02	11	108.776	1.081	197.7	2.0260	0.0000	SURCHARGED
15 minute winter	SW03	11	108.815	1.175	200.1	3.1188	0.0000	SURCHARGED
480 minute winter	SW04	464	108.541	1.026	48.3	2.1639	0.0000	SURCHARGED
720 minute winter	CP14	720	108.578	0.293	2.2	0.5493	0.0000	OK
480 minute winter	Pond	464	108.541	1.041	57.5	469.6396	0.0000	FLOOD RISK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	CP09	1.000	CP10	40.5	0.954	0.531	1.2074	
15 minute summer	CP10	1.001	CP11	61.1	1.077	0.802	3.4503	
15 minute winter	CP11	1.002	CP12	78.7	1.180	1.028	4.3447	
15 minute winter	CP12	1.003	CP13	79.0	1.383	1.045	0.9059	
15 minute winter	CP13	1.004	SW07	83.6	1.663	0.675	1.7341	
15 minute winter	SW07	1.005	SW08	117.8	0.786	0.736	4.7829	
15 minute winter	SW08	1.006	SW03	170.7	1.154	1.072	2.2588	
15 minute winter	CP01	2.000	CP02	3.3	0.443	0.046	0.0968	
15 minute winter	CP02	2.001	CP03	5.9	0.452	0.078	0.6602	
15 minute winter	CP03	2.002	CP04	15.1	0.666	0.199	1.6333	
15 minute winter	CP04	2.003	CP05	28.2	0.864	0.372	1.6718	
15 minute winter	CP05	2.004	CP06	41.4	0.767	0.543	1.5255	
15 minute winter	CD02	3.000	CD03	72.9	1.313	0.954	2.3466	
15 minute winter	CD01	4.000	CD03	36.4	0.903	0.476	1.6382	
15 minute winter	CD03	3.001	Attenuation Tank	145.3	3.017	0.733	1.2149	
720 minute winter	Attenuation Tank	3.002	SW01	-20.6	-0.221	-0.146	8.1144	
15 minute winter	SW01	3.003	SW02	-199.4	-1.258	-1.403	4.4426	
15 minute winter	SW05	6.000	SW06	265.0	1.672	1.001	2.0045	
15 minute winter	SW06	6.001	SW04	380.2	2.400	1.237	6.5331	
15 minute winter	SW02	3.004	SW03	-191.1	-0.678	-0.677	9.0948	
15 minute winter	SW03	1.007	SW04	21.9	0.106	0.036	3.9885	
480 minute winter	SW04	1.008	Pond	48.0	1.112	0.168	2.4306	
720 minute winter	CP14	5.000	CP15	2.2	0.423	0.029	2.2716	
480 minute winter	Pond	1.010	Flow Control Chamber	35.7	0.567	0.020	0.8132	

Results for 100 year +25% CC Critical Storm Duration. Lowest mass balance: 97.81%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute winter	Flow Control Chamber	464	108.537	1.237	35.7	2.1849	0.0000	FLOOD RISK
1440 minute summer	Headwall	600	107.146	0.076	8.7	0.0000	0.0000	OK
720 minute winter	CP15	720	108.578	0.448	6.3	0.8264	0.0000	SURCHARGED
1440 minute summer	DITCH	600	107.263	0.093	8.7	0.1050	0.0000	OK
480 minute winter	Kerb Drain	464	108.541	0.741	2.8	1.5197	0.0000	FLOOD RISK
15 minute winter	CP06	12	108.838	0.358	41.4	0.4048	0.0000	SURCHARGED
480 minute winter	CP07	464	108.541	0.641	1.0	0.7251	0.0000	FLOOD RISK
480 minute winter	CP08	464	108.541	0.851	1.4	0.9623	0.0000	FLOOD RISK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
480 minute winter	Flow Control Chamber	Hydro-Brake®	DITCH	8.7				
720 minute winter	CP15	5.001	Attenuation Tank	4.6	0.784	0.041	0.8818	
1440 minute summer	DITCH	1.011_1	Headwall	8.7	0.639	0.334	0.5362	719.9
480 minute winter	Kerb Drain	8.000	Pond	2.6	0.424	0.074	0.4299	
15 minute winter	CP06	Orifice	SW03	43.8				
480 minute winter	CP07	7.000	CP08	-1.0	-0.016	-0.014	4.0905	
480 minute winter	CP08	7.001	Pond	-1.4	-0.066	-0.021	0.6898	

APPENDIX C – MAINTENANCE STRATEGY

Maintenance Schedule	Required Action	Typical Frequency
Below Ground Drainage Pipes, Manholes, Outfall headwalls, ditches, trash screens etc		
Regular Maintenance	Lift covers and inspect manholes for evidence of debris and silt deposits and evidence of blockages (standing water). Carry out CCTV survey if required Inspect ditches, trash screens, headwalls etc. and clear debris and silt deposits to avoid restriction to flow	Quarterly or following significant rainfall events.
Remedial Actions	High pressure jetting and/or remove minor blockages and silt build up	As required – 20% loss of pipe cross-section
	Replace broken access covers, remove major blockages, repair structurally defective pipework	As required
Flow control chamber		
Regular Maintenance	Lift covers and inspect chamber fore evidence of debris and silt deposits and evidence of blockages. Test bypass door operating correctly.	Quarterly or following significant rainfall events.
Remedial Actions	High pressure jetting and or remove minor blockages and silt build up	As required
	Replace broken access covers, remove major blockages, repair/replace defective flow control devices	As required
Linear channel drains and gullies		
Regular Maintenance	Lift access covers and inspect for silt/debris accumulation	Quarterly or following significant rainfall events.
Remedial Actions	Replace broken access covers, gratings	Annually
	High pressure jetting and/or remove minor blockages and silt build up	As required
Rainwater pipes		
Regular Maintenance	Inspect rainwater goods for evidence of leaking pipework	Monthly (or as required)
Occasional Maintenance	Remove rodding eyes and carry out high pressure jetting to remove any debris	Quarterly
Remedial Actions	Replace cracked / leaking pipework	As required
Ponds		
Regular Maintenance	Remove litter and debris	Monthly (or as required)
	Cut the grass – public areas	Monthly (during growing season)

Maintenance Schedule	Required Action	Typical Frequency
	Cut the meadow grass	Half yearly (spring, before nesting season, and autumn)
	Inspect marginal and bankside vegetation and remove nuisance plants (for first 3 years)	Monthly (at the start, then as required)
	Inspect inlets, outlets, banksides, structures, pipework etc for evidence of blockage and/or physical damage	Monthly
	Inspect water body for signs of poor water quality	Monthly (May – October)
	Inspect silt accumulation rates in any forebay and in main body of the pond and establish appropriate removal frequencies; undertake contamination testing once some build-up has occurred, to inform management and disposal options	Half yearly
	Check any mechanical devices, e.g. penstocks	Half yearly
	Hand cut submerged and emergent aquatic plants (at minimum of 0.1m above pond base; include max 25% of pond surface)	Annually
	Remove 25% of bank vegetation from water's edge to a minimum of 1m above water level	Annually
	Tidy all dead growth (scrub clearance) before start of growing season (Note: tree maintenance is usually part of overall landscape management contract)	Annually
	Remove sediment from any forebay.	Every 1 to 5 years, or as required
	Remove sediment and planting from one quadrant of the main body of ponds without sediment forebays.	Every 5 years, or as required
Occasional Maintenance	Remove sediment from the main body of big ponds when pool volume is reduced by 20%	With effective pre-treatment, this will only be required rarely, eg every 25–50 years
Remedial actions	Repair erosion or other damage	As required
	Replant, where necessary	As required
	Aerate pond when signs of eutrophication are detected	As required

Maintenance Schedule	Required Action	Typical Frequency
	Realign rip-rap or repair other damage	As required
	Repair / rehabilitate inlets, outlets and overflows	As required
Attenuation Tank (Maintenance activities recommended by the manufacturer should be added to this schedule where not included)		
Regular maintenance	Remove litter and debris and inspect for sediment, oil and grease accumulation.	Six monthly
	Change the filter media	As recommended by manufacturer
Remedial actions	Replace malfunctioning parts or structures	As required
Monitoring	Inspect for evidence of poor performance	Six monthly
	Inspect sediment accumulation rates and filter media, and establish appropriate replacement frequencies.	Monthly during first half of the year, then every six months
Pumps (Maintenance activities recommended by the manufacturer should be added to this schedule where not included)		
Regular Maintenance	Ensure sumps and Floats are clean	Quarterly
	Assess the condition of the pipework for wear or damage	Quarterly
	Lift covers and inspect manholes for evidence of debris and silt deposits and evidence of blockages - quarterly	Quarterly
	Examine the condition of pump including impeller, seals, valves and pipework (as recommended by the manufacturer)	Quarterly
Remedial Actions	Consult pump specialist	As Required
	Service and replace and elements of the system	Six Monthly