

FEBRUARY 12, 2026

ALLISON HOMES EAST MIDLANDS

MAIN STREET, STANTON UNDER BARDON
– LLFA TECHNICAL RESPONSE

24028-BMC-26-XX-TN-C-002

DOCUMENT ISSUE RECORD

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1 INTRODUCTION

This document has been created in response to the Local Lead Flood Authority (LLFA) comments received from Leicestershire County Council in regard to planning applications reference 25/01184/DISCON and 25/01197/DISCON. The comments are dated 16/01.2026 and 14/01.2026.

The LCC response document requests the each of the following, which have been responded to separately.

1.1 Comment A – Planning Reference 25/01184/DISCON

In order to undertake an initial review of the surface water drainage proposals, the applicant should submit the full suite of surface water drainage drawings referenced in the technical approval certificate. This includes the surface water network model, demonstrating the performance of the drainage network in the 1 in 1, 1 in 30 and 1 in 100-year events, making suitable allowances for climate change and urban creep.

The proposed weir within the Hydrobrake chamber is at the modelled peak design level. As a result, the freeboard within the basin cannot be efficiently used during an exceedance event. The LLFA request that the Hydrobrake chamber cover level and weir level be raised to allow for the use of the freeboard volume as much as is reasonably practicable.

While maintenance details have been submitted, these are incomplete as they only detail the SuDS basin. All unadopted shared surface water drainage elements must be included within the maintenance details. These features should be identified on a plan and maintenance requirements details within a schedule along with maintenance frequency and detailing the party responsible for each drainage asset in perpetuity.

Leicestershire County Council as the LLFA advises the LPA that the application documents as submitted are insufficient for the LLFA to provide a substantive response at this stage in relation to Condition 2. In order to provide a substantive response, the following information is required:

- *Surface water network model covering key flood events up to the 1 in 100-year event.*
- *Modification of the flow control arrange to make better use of the proposed freeboard within the basin.*
- *Surface water maintenance details.*

It is noted that sufficient evidence has been provided to discharge Condition 17.

Contained within Appendix B of this technical note are the hydraulic calculations for the proposed S104 adoptable surface water network as requested, which achieve the following requirements. The surface water drainage system is designed to not surcharge in the 1 year storm event, not flood in the 30 year storm event and safely accommodates the retention of surface water onsite for the 100 year plus 40% climate change, including 10% urban creep allowance. The 10% urban creep has also been included in accordance with Local Authority SuDS Officer Organisation's (LASOO) 'Non-statutory technical standards for sustainable drainage – Practice Guidance'.

396mm of freeboard is upheld within the design. We must, however, disagree with the request to amend the weir wall height to further utilise the proposed freeboard for the following reasons:

- The site is discharging at greenfield rate as per the approved Flood Risk Assessment (FRA) and agreement with Leicestershire County Council's LLFA response dated 13.04.2021.
- The site is located within Flood Zone 1, which is at very low risk of flooding.
- The approved FRA explains that the network should protect the site and surrounding areas from surface water flooding for all events up to and including the 1 in 100 year storm event including an allowance for climate change, which it does.
- The hydraulic calculations demonstrate that the pond is suitably sized for the critical event whilst not flooding properties and attenuating a volume beyond this would have an adverse effect on the risk posed to the development.
- Beyond the 1 in 100 year + climate change event, flooding is allowed but must be controlled and planned. It upholds the existing overland routing, which in this instance is towards the watercourse across a landscaped area, which is planned for.
- The purpose of the freeboard is to allow for blockages and wave action whilst reducing the risk of overtopping and erosion, as well as siltation.
- The weir wall is a requirement of the adopting authority and its purpose is accessibility.
- If the weir overtops the outlet pipe size will cause surcharging and force the network to utilise the freeboard as required, however, this would have to be beyond the critical event.

To conclude, there is no requirement to attenuate the volume beyond the 1 in 100 year storm event including allowance for climate change, the design doesn't exceed the greenfield discharge rate, and any exceedance event is managed via overland routing. We therefore conclude that the hydraulic design is sufficient and see no reason to prevent the discharge of conditions.

The proposed SuDS will likely be offered to an appropriate sewerage undertaker or a private maintenance company, which is typically appointed by the developer. The SuDS feature will be maintained in perpetuity, in accordance with the guidance from CIRIA C753 and the tables included in Appendix C.

1.2 Comment B – Planning Reference 25/01197/DISCON

In order to undertake an initial review of the surface water drainage proposals, the applicant should submit the full suite of surface water drainage drawings referenced in the technical approval certificate. This includes the surface water network model, demonstrating the performance of the drainage network in the 1 in 1, 1 in 30 and 1 in 100-year events, making suitable allowances for climate change and urban creep.

The proposed weir within the Hydrobrake chamber is at the modelled peak design level. As a result, the freeboard within the basin cannot be efficiently used during an exceedance event. The LLFA request that the Hydrobrake chamber cover level and weir level be raised to allow for the use of the freeboard volume as much as is reasonably practicable.

Leicestershire County Council as the LLFA advises the LPA that the application documents as submitted are insufficient for the LLFA to provide a substantive response at this stage in relation to Condition 6. In order to provide a substantive response, the following information is required:

- *Surface water network model covering key flood events up to the 1 in 100-year event.*
- *Modification of the flow control arrange to make better use of the proposed freeboard within the basin.*
- *Surface water maintenance details (refer to comments against 25/01184/DISCON).*

The submitted Drainage Strategy is satisfactory in terms of flood risk, but does not appear to incorporate adequate proposals to address issues of water quality in accordance with the CIRIA SuDS Manual (C753) - whilst the requirement is acknowledged within the Strategy, there are insufficient details to assess compliance

The previous response to planning 25/01184/DISCON applies to the comments made under planning 25/01197/DISCON since they are identical. We therefore conclude that there is no reason to prevent discharge of conditions.

SuDS have been considered as part of the surface water drainage strategy. Water treatment will be provided via the attenuation pond, which employs a sediment forebay, berm and permanent pool in accordance with the CIRIA C753 guidance whereby the mitigation indices are greater than the hazard indices and therefore provide the appropriate level of water treatment to the surface water prior to discharge from the site. A summary of the pollutions and treatment indices can be found in the CIRIA tables contained within Appendix D. Further commentary on the suitability of the level of treatment provided is as per the below.

- The outline strategy showed an attenuation basin serving all plots and has a treatment index of 0.5, 0.5, 0.6 respectively.
- The site at Stanton under Bardon utilises a spine road with a gradient of 1:20, which doesn't lend itself to treatment since overland flows are likely to bypass this proposal in a severe storm event. Furthermore, the LLFA mentions that permeable paving promotes infiltration, which reduces the volume of surface water runoff leaving the site, yet the infiltration testing demonstrated that runoff will not soak to ground as described but rather would have to rely on a lined system into the development infrastructure. Long term performance cannot be guaranteed, and this is a significant concern.
- The attenuation basin has therefore been upgraded to an attenuation pond with sediment forebay and permanent pool to uplift the hazard indices from 0.5, 0.5, 0.6 to 0.7, 0.7, 0.5 respectively. When compared with the indices requirements there is then adequate means of treatment whilst being appropriate for the development context when compared to that proposed at outline.

We therefore deem the level of treatment sufficient in terms of water quality as demonstrated.

2 APPENDIX

Appendix A LLFA Comments

Application address Land South Of 295 Main Street, Stanton Under Bardon Leicestershire	Planning ref. 25/01184/DISCON
	Our ref. 2025/1184/04/FDis9,20
Description Application to discharge conditions 9 (Long-term maintenance of the surface water drainage system (SuDS), 20 (Site drainage details) and 24 (Waste and recycling) from planning permission 22/00527/OUT.	Consultation date 17/12/2025
	Response date 16/01/2026
Planning officer Lesley Keal	Reviewing officer Rob Ryan-Matthews
Application type Discharge of Conditions	Extension requested ☐
No concerns ☐	Further consultation required ☒

Lead Local Flood Authority Key Observations

This application seeks to discharge conditions 9 and 20 set as part of the approval of application reference 22/00527/OUT. These conditions read:

9. *No occupation of the development approved by this planning permission shall take place until such time as details in relation to the long-term maintenance of the surface water drainage system (SuDS) within the development have been submitted to and approved in writing by the Local Planning Authority. Details of the SuDS Maintenance Plan shall include responsibilities and schedules for routine maintenance, remedial actions and monitoring of the separate elements of the system and should also include procedures that must be implemented in the event of pollution incidents within the site. The surface water drainage system shall then be maintained in accordance with these approved details in perpetuity.*
20. *No part of the development hereby permitted shall be occupied until such time as site drainage details have been provided to and approved in writing by the Local Planning Authority. The development shall be implemented in accordance with the approved details and thereafter surface water shall not drain into the Public Highway.*

All other conditions sought for discharge under this application do not relate to surface water and as such are not considered as part of this response.

The LLFA is receipt of application 25/01197/DISCON for the surface water drainage network for this development. At present the details submitted against this application are insufficient. The LPA should ensure that the details relating to this application are confirmed, and condition 6 discharged prior to the approval of this application.

This application seeks to discharge the surface water and drainage maintenance conditions associated with the development approved by outline application 22/00527/OUT. The details submitted to date by the applicant do not meet the requirements of the conditions. Please find the LLFA's current position on the application below.

In order to undertake an initial review of the surface water drainage proposals, the applicant should submit the full suite of surface water drainage drawings referenced in the technical approval certificate. This includes the surface water network model, demonstrating the performance of the drainage network in the 1 in 1, 1 in 30 and 1 in 100-year events, making suitable allowances for climate change and urban creep.

The proposed weir within the Hydrobrake chamber is at the modelled peak design level. As a result, the freeboard within the basin cannot be efficiently used during an exceedance event. The LLFA request that the Hydrobrake chamber cover level and weir level be raised to allow for the use of the freeboard volume as much as is reasonably practicable.

While maintenance details have been submitted, these are incomplete as they only detail the SuDS basin. All unadopted shared surface water drainage elements must be included within the maintenance details. These features should be identified on a plan and maintenance requirements details within a schedule along with maintenance frequency and detailing the party responsible for each drainage asset in perpetuity.

Leicestershire County Council as the LLFA advises the LPA that the application documents as submitted are insufficient for the LLFA to provide a substantive response at this stage in relation to Condition 2. In order to provide a substantive response, the following information is required:

- Surface water network model covering key flood events up to the 1 in 100-year event.
- Modification of the flow control arrangement to make better use of the proposed freeboard within the basin.
- Surface water maintenance details.

Note: The LLFA is not a statutory consultee in relation to foul drainage and as such, this response does not consider any foul drainage details submitted.

Standing Advice to the Local Planning Authority

1. Standing Advice – National Planning Policy Framework

When determining planning applications, the local planning authority should ensure flood risk is not increased elsewhere and only consider development appropriate in areas at risk of flooding where informed by a site-specific Flood Risk Assessment (FRA) confirming it will not put the users of the development at risk. Where an FRA is applicable this should be undertaken in accordance with the requirements of the National Planning Policy Framework and accompanying Planning Practice Guidance.

2. Standing Advice – Consent

Where there are any works proposed as part of an application which are likely to affect flows in an ordinary watercourse or ditch, the applicant will require consent under Section 23 of the Land Drainage Act 1991. This is in addition to any planning permission that may be granted. Guidance on this process and a sample application form can be found via the following website: <http://www.leicestershire.gov.uk/flood-risk-management>

Applicants are advised to refer to Leicestershire County Council's culverting policy contained within the Local Flood Risk Management Strategy Appendix document, available at the above

link. No development should take place within 5 metres of any watercourse or ditch without first contacting the County Council for advice.

3. Standing Advice – Maintenance

Note that it is the responsibility of the Local Planning Authority under the DEFRA/DCLG legislation (April 2015) to ensure that a system to facilitate the future maintenance of SuDS features can be managed and maintained in perpetuity before commencement of the works.

Additional information and guidance is available here:

<https://www.leicestershire.gov.uk/environment-and-planning/flooding-and-drainage/>

Note: Response provided by the Lead Local Flood Authority under the delegated authority of the Director of Environment and Transport.

Application address Land South Of 295 Main Street Stanton Under Bardon Leicestershire.	Planning ref. 25/01197/DISCON
	Our ref. 2025/1197/04/FDis6
Description Application to discharge C6 (drainage) C9 (street lighting) C10 (forward visibility) attached to planning permission 24/00828/REM.	Consultation date 22/12/2026
	Response date 14/01/2026
Planning officer Lesley Keal	Reviewing officer Rob Ryan-Matthews
Application type Discharge of Conditions	Extension requested ☐
No concerns ☐	Further consultation required ☒

Lead Local Flood Authority Key Observations

This application seeks to discharge Condition 6 set as part of the approval of application reference 24/00828/REM. This condition reads:

6. No part of the development hereby permitted shall be occupied until such time as site drainage details have been submitted to and approved by the Local Planning Authority. Thereafter surface water shall not drain into the Public Highway and thereafter shall be so maintained.

All other conditions sought for discharge under this application do not relate to surface water and as such are not considered as part of this response.

The LLFA is in receipt of application 25/01184/DISCON relating to the same development, approved by applications 22/00527/OUT and 24/00828/REM. The LLFA should ensure continuity between the document submitted in support of the two DISCON applications.

In order to undertake an initial review of the surface water drainage proposals, the applicant should submit the full suite of surface water drainage drawings referenced in the technical approval certificate. This includes the surface water network model, demonstrating the performance of the drainage network in the 1 in 1, 1 in 30 and 1 in 100-year events, making suitable allowances for climate change and urban creep.

The proposed weir within the Hydrobrake chamber is at the modelled peak design level. As a result, the freeboard within the basin cannot be efficiently used during an exceedance event. The LLFA request that the Hydrobrake chamber cover level and weir level be raised to allow for the use of the freeboard volume as much as is reasonably practicable.

Leicestershire County Council as the LLFA advises the LPA that the application documents as submitted are insufficient for the LLFA to provide a substantive response at this stage in relation to Condition 6. In order to provide a substantive response, the following information is required:

- Surface water network model covering key flood events up to the 1 in 100-year event.
- Modification of the flow control arrangement to make better use of the proposed freeboard within the basin.
- Surface water maintenance details (refer to comments against 25/01184/DISCON).

Note: The LLFA is not a statutory consultee in relation to foul drainage and as such, this response does not consider any foul drainage details submitted.

Standing Advice to the Local Planning Authority

1. Standing Advice – National Planning Policy Framework

When determining planning applications, the local planning authority should ensure flood risk is not increased elsewhere and only consider development appropriate in areas at risk of flooding where informed by a site-specific Flood Risk Assessment (FRA) confirming it will not put the users of the development at risk. Where an FRA is applicable this should be undertaken in accordance with the requirements of the National Planning Policy Framework and accompanying Planning Practice Guidance.

2. Standing Advice – Consent

Where there are any works proposed as part of an application which are likely to affect flows in an ordinary watercourse or ditch, the applicant will require consent under Section 23 of the Land Drainage Act 1991. This is in addition to any planning permission that may be granted.

Guidance on this process and a sample application form can be found via the following website:
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Applicants are advised to refer to Leicestershire County Council's culverting policy contained within the Local Flood Risk Management Strategy Appendix document, available at the above link. No development should take place within 5 metres of any watercourse or ditch without first contacting the County Council for advice.

3. Standing Advice – Maintenance

Note that it is the responsibility of the Local Planning Authority under the DEFRA/DCLG legislation (April 2015) to ensure that a system to facilitate the future maintenance of SuDS features can be managed and maintained in perpetuity before commencement of the works.

Additional information and guidance is available here:

<https://www.leicestershire.gov.uk/environment-and-planning/flooding-and-drainage/>

Note: Response provided by the Lead Local Flood Authority under the delegated authority of the Director of Environment and Transport.

Appendix B Section 104 Adoptable Surface Water Network 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 (%)	40	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)
S1L	0.017	5.00	165.000	450	446567.352	310029.082	1.350
S1	0.030	5.00	164.893	1200	446570.505	310034.186	1.725
S2			165.629	1200	446587.138	310023.913	2.576
S3	0.017	5.00	165.424	1200	446594.767	310009.925	2.465
S4	0.016	5.00	164.763	1200	446593.461	309993.083	1.903
S5	0.016	5.00	164.103	1200	446637.208	309972.578	1.527
S6L	0.105	5.00	164.500	450	446647.415	309964.142	1.650
S6	0.020	5.00	164.103	1200	446641.841	309961.210	1.725
S7L	0.047	5.00	162.950	450	446625.942	309939.776	1.350
S7	0.013	5.00	162.839	1500	446631.442	309937.380	1.725
S8	0.019	5.00	162.357	1200	446633.065	309929.036	1.725
S9L	0.034	5.00	161.950	450	446645.185	309926.758	1.500
S9			161.682	1200	446644.221	309922.363	1.725
S10			161.118	1200	446657.263	309919.500	1.725
S11L	0.102	5.00	160.500	450	446688.505	309927.040	1.400
S11	0.010	5.00	160.413	1500	446677.294	309922.761	1.483
S12	0.041	5.00	160.782	1500	446669.318	309920.398	2.200
HW1			157.975	1200	446676.195	309891.709	1.484
S13L	0.068	5.00	163.250	450	446573.828	309969.225	1.400
S13	0.048	5.00	163.111	1500	446579.305	309966.776	1.425
S14L	0.104	5.00	161.600	600	446560.465	309939.338	1.425
S14	0.039	5.00	161.465	1500	446565.942	309936.889	1.425
S15L	0.055	5.00	161.675	450	446571.136	309933.002	1.700
S15			161.025	1200	446569.092	309928.439	1.700
S16			160.675	1200	446612.735	309904.042	1.800
S17L	0.047	5.00	161.150	450	446615.067	309910.376	1.700
S17			160.675	1200	446623.521	309908.967	2.225
HW2			157.975	1200	446666.215	309888.224	1.484
HW3		5.00	157.975	1200	446691.086	309887.372	1.500
S18 FCU			158.375	2700	446694.580	309880.175	2.275
HW4			155.580	1200	446696.787	309871.760	0.350

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)
S1L	S1L	S1	5.999	0.600	163.650	163.243	0.407	14.7	150	5.04	50.0
1.000	S1	S2	19.550	0.600	163.168	163.053	0.115	170.0	225	5.36	50.0
1.001	S2	S3	15.933	0.600	163.053	162.959	0.094	170.0	225	5.63	50.0
1.002	S3	S4	16.893	0.600	162.959	162.860	0.099	170.0	225	5.91	50.0
1.003	S4	S5	48.314	0.600	162.860	162.576	0.284	170.0	225	6.72	50.0
1.004	S5	S6	12.276	0.600	162.576	162.418	0.158	77.7	225	6.85	50.0
S6L	S6L	S6	6.298	0.600	162.850	162.453	0.397	15.9	150	5.04	50.0
1.005	S6	S7	26.000	0.600	162.378	161.114	1.264	20.6	225	7.00	50.0
S7L	S7L	S7	5.999	0.600	161.600	161.189	0.411	14.6	150	5.04	50.0
1.006	S7	S8	8.500	0.600	161.114	160.632	0.482	17.6	225	7.05	50.0
1.007	S8	S9	12.999	0.600	160.632	159.957	0.675	19.3	225	7.12	50.0
S9L	S9L	S9	4.499	0.600	160.450	160.032	0.418	10.8	150	5.02	50.0
1.008	S9	S10	13.353	0.600	159.957	159.393	0.564	23.7	225	7.20	50.0
1.009	S10	S12	12.088	0.600	159.393	158.657	0.736	16.4	225	7.27	50.0
S11L	S11L	S11	12.000	0.600	159.100	159.005	0.095	126.3	150	5.22	50.0
2.000	S11	S12	8.319	0.600	158.930	158.657	0.273	30.5	225	5.28	50.0
1.010	S12	HW1	29.502	0.600	158.582	156.700	1.882	15.7	300	7.39	50.0
S13L	S13L	S13	6.000	0.600	161.850	161.761	0.089	67.4	150	5.08	50.0
3.000	S13	S14	32.738	0.600	161.686	160.040	1.646	19.9	225	5.27	50.0
S14L	S14L	S14	6.000	0.600	160.175	160.040	0.135	44.4	225	5.05	50.0
3.001	S14	S15	9.018	0.600	160.040	159.400	0.640	14.1	225	5.31	50.0
S15L	S15L	S15	5.000	0.600	159.975	159.475	0.500	10.0	150	5.03	50.0
3.002	S15	S16	49.999	0.600	159.325	158.875	0.450	111.1	300	5.87	50.0
3.003	S16	S17	11.857	0.600	158.875	158.450	0.425	27.9	300	5.93	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)
S1L	2.637	46.6	3.2	1.200	1.500	0.017	0.0	27	1.519
1.000	1.000	39.7	8.9	1.500	2.351	0.047	0.0	73	0.811
1.001	1.000	39.7	8.9	2.351	2.240	0.047	0.0	73	0.811
1.002	1.000	39.7	12.1	2.240	1.678	0.064	0.0	85	0.879
1.003	1.000	39.7	15.2	1.678	1.302	0.080	0.0	96	0.934
1.004	1.485	59.0	18.2	1.302	1.460	0.096	0.0	86	1.312
S6L	2.541	44.9	19.9	1.500	1.500	0.105	0.0	70	2.468
1.005	2.898	115.2	41.9	1.500	1.500	0.221	0.0	94	2.673
S7L	2.650	46.8	8.9	1.200	1.500	0.047	0.0	44	2.047
1.006	3.130	124.5	53.3	1.500	1.500	0.281	0.0	102	3.008
1.007	2.995	119.1	56.9	1.500	1.500	0.300	0.0	109	2.961
S9L	3.088	54.6	6.5	1.350	1.500	0.034	0.0	35	2.087
1.008	2.700	107.4	63.4	1.500	1.500	0.334	0.0	124	2.807
1.009	3.244	129.0	63.4	1.500	1.900	0.334	0.0	111	3.229
S11L	0.892	15.8	19.4	1.250	1.258	0.102	0.0	150	0.909
2.000	2.378	94.6	21.3	1.258	1.900	0.112	0.0	73	1.932
1.010	3.990	282.0	92.4	1.900	0.975	0.487	0.0	118	3.589
S13L	1.226	21.7	12.9	1.250	1.200	0.068	0.0	83	1.279
3.000	2.947	117.2	22.0	1.200	1.200	0.116	0.0	65	2.269
S14L	1.967	78.2	19.7	1.200	1.200	0.104	0.0	77	1.647
3.001	3.504	139.3	49.1	1.200	1.400	0.259	0.0	92	3.204
S15L	3.204	56.6	10.4	1.550	1.400	0.055	0.0	44	2.458
3.002	1.491	105.4	59.6	1.400	1.500	0.314	0.0	161	1.534
3.003	2.988	211.2	59.6	1.500	1.925	0.314	0.0	109	2.581

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)
S17L	S17L	S17	8.571	0.600	159.450	158.600	0.850	10.1	150	5.04	50.0
3.004	S17	HW2	47.466	0.600	158.450	156.700	1.750	27.1	300	6.20	50.0
1.011	HW3	S18 FCU	8.000	0.600	156.475	156.100	0.375	21.3	225	5.05	50.0
1.012	S18 FCU	HW4	8.700	0.600	156.100	155.230	0.870	10.0	225	5.08	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)
S17L	3.191	56.4	8.9	1.550	1.925	0.047	0.0	40	2.337
3.004	3.030	214.2	68.5	1.925	0.975	0.361	0.0	116	2.706
1.011	2.845	113.1	0.0	1.275	2.050	0.000	0.0	0	0.000
1.012	4.161	165.5	0.0	2.050	0.125	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)
S1L	5.999	14.7	150	Circular_Default Sewer Type	165.000	163.650	1.200	164.893	163.243	1.500
1.000	19.550	170.0	225	Circular_Default Sewer Type	164.893	163.168	1.500	165.629	163.053	2.351
1.001	15.933	170.0	225	Circular_Default Sewer Type	165.629	163.053	2.351	165.424	162.959	2.240
1.002	16.893	170.0	225	Circular_Default Sewer Type	165.424	162.959	2.240	164.763	162.860	1.678
1.003	48.314	170.0	225	Circular_Default Sewer Type	164.763	162.860	1.678	164.103	162.576	1.302
1.004	12.276	77.7	225	Circular_Default Sewer Type	164.103	162.576	1.302	164.103	162.418	1.460
S6L	6.298	15.9	150	Circular_Default Sewer Type	164.500	162.850	1.500	164.103	162.453	1.500
1.005	26.000	20.6	225	Circular_Default Sewer Type	164.103	162.378	1.500	162.839	161.114	1.500
S7L	5.999	14.6	150	Circular_Default Sewer Type	162.950	161.600	1.200	162.839	161.189	1.500
1.006	8.500	17.6	225	Circular_Default Sewer Type	162.839	161.114	1.500	162.357	160.632	1.500
1.007	12.999	19.3	225	Circular_Default Sewer Type	162.357	160.632	1.500	161.682	159.957	1.500
S9L	4.499	10.8	150	Circular_Default Sewer Type	161.950	160.450	1.350	161.682	160.032	1.500
1.008	13.353	23.7	225	Circular_Default Sewer Type	161.682	159.957	1.500	161.118	159.393	1.500
1.009	12.088	16.4	225	Circular_Default Sewer Type	161.118	159.393	1.500	160.782	158.657	1.900
S11L	12.000	126.3	150	Circular_Default Sewer Type	160.500	159.100	1.250	160.413	159.005	1.258
2.000	8.319	30.5	225	Circular_Default Sewer Type	160.413	158.930	1.258	160.782	158.657	1.900

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
S1L	S1L	450	Manhole	Adoptable	S1	1200	Manhole	Adoptable
1.000	S1	1200	Manhole	Adoptable	S2	1200	Manhole	Adoptable
1.001	S2	1200	Manhole	Adoptable	S3	1200	Manhole	Adoptable
1.002	S3	1200	Manhole	Adoptable	S4	1200	Manhole	Adoptable
1.003	S4	1200	Manhole	Adoptable	S5	1200	Manhole	Adoptable
1.004	S5	1200	Manhole	Adoptable	S6	1200	Manhole	Adoptable
S6L	S6L	450	Manhole	Adoptable	S6	1200	Manhole	Adoptable
1.005	S6	1200	Manhole	Adoptable	S7	1500	Manhole	Adoptable
S7L	S7L	450	Manhole	Adoptable	S7	1500	Manhole	Adoptable
1.006	S7	1500	Manhole	Adoptable	S8	1200	Manhole	Adoptable
1.007	S8	1200	Manhole	Adoptable	S9	1200	Manhole	Adoptable
S9L	S9L	450	Manhole	Adoptable	S9	1200	Manhole	Adoptable
1.008	S9	1200	Manhole	Adoptable	S10	1200	Manhole	Adoptable
1.009	S10	1200	Manhole	Adoptable	S12	1500	Manhole	Adoptable
S11L	S11L	450	Manhole	Adoptable	S11	1500	Manhole	Adoptable
2.000	S11	1500	Manhole	Adoptable	S12	1500	Manhole	Adoptable

Pipeline Schedule

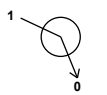
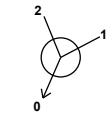
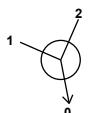
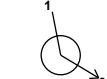
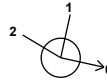
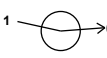
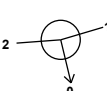
Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.010	29.502	15.7	300	Circular_Default Sewer Type	160.782	158.582	1.900	157.975	156.700	0.975
S13L	6.000	67.4	150	Circular_Default Sewer Type	163.250	161.850	1.250	163.111	161.761	1.200
3.000	32.738	19.9	225	Circular_Default Sewer Type	163.111	161.686	1.200	161.465	160.040	1.200
S14L	6.000	44.4	225	Circular_Default Sewer Type	161.600	160.175	1.200	161.465	160.040	1.200
3.001	9.018	14.1	225	Circular_Default Sewer Type	161.465	160.040	1.200	161.025	159.400	1.400
S15L	5.000	10.0	150	Circular_Default Sewer Type	161.675	159.975	1.550	161.025	159.475	1.400
3.002	49.999	111.1	300	Circular_Default Sewer Type	161.025	159.325	1.400	160.675	158.875	1.500
3.003	11.857	27.9	300	Circular_Default Sewer Type	160.675	158.875	1.500	160.675	158.450	1.925
S17L	8.571	10.1	150	Circular_Default Sewer Type	161.150	159.450	1.550	160.675	158.600	1.925
3.004	47.466	27.1	300	Circular_Default Sewer Type	160.675	158.450	1.925	157.975	156.700	0.975
1.011	8.000	21.3	225	Circular_Default Sewer Type	157.975	156.475	1.275	158.375	156.100	2.050
1.012	8.700	10.0	225	Circular_Default Sewer Type	158.375	156.100	2.050	155.580	155.230	0.125

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.010	S12	1500	Manhole	Adoptable	HW1	1200	Manhole	Adoptable
S13L	S13L	450	Manhole	Adoptable	S13	1500	Manhole	Adoptable
3.000	S13	1500	Manhole	Adoptable	S14	1500	Manhole	Adoptable
S14L	S14L	600	Manhole	Adoptable	S14	1500	Manhole	Adoptable
3.001	S14	1500	Manhole	Adoptable	S15	1200	Manhole	Adoptable
S15L	S15L	450	Manhole	Adoptable	S15	1200	Manhole	Adoptable
3.002	S15	1200	Manhole	Adoptable	S16	1200	Manhole	Adoptable
3.003	S16	1200	Manhole	Adoptable	S17	1200	Manhole	Adoptable
S17L	S17L	450	Manhole	Adoptable	S17	1200	Manhole	Adoptable
3.004	S17	1200	Manhole	Adoptable	HW2	1200	Manhole	Adoptable
1.011	HW3	1200	Manhole	Adoptable	S18 FCU	2700	Manhole	Adoptable
1.012	S18 FCU	2700	Manhole	Adoptable	HW4	1200	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S1L	446567.352	310029.082	165.000	1.350	450				
						0	S1L	163.650	150
S1	446570.505	310034.186	164.893	1.725	1200		1	S1L	163.243
						0	1.000	163.168	225
S2	446587.138	310023.913	165.629	2.576	1200		1	1.000	163.053
						0	1.001	163.053	225
S3	446594.767	310009.925	165.424	2.465	1200		1	1.001	162.959
						0	1.002	162.959	225
S4	446593.461	309993.083	164.763	1.903	1200		1	1.002	162.860
						0	1.003	162.860	225

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
S5	446637.208	309972.578	164.103	1.527	1200		1	1.003	162.576	225
S6L	446647.415	309964.142	164.500	1.650	450		0	1.004	162.576	225
S6	446641.841	309961.210	164.103	1.725	1200		1 2 0	S6L S6L 1.004	162.850 162.453 162.418	150 150 225
S7L	446625.942	309939.776	162.950	1.350	450		0	1.005	162.378	225
S7	446631.442	309937.380	162.839	1.725	1500		1 2 0	S7L S7L 1.005	161.600 161.189 161.114	150 150 225
S8	446633.065	309929.036	162.357	1.725	1200		1 0	1.006 1.007	161.114 160.632	225 225
S9L	446645.185	309926.758	161.950	1.500	450		0	S9L	160.450	150
S9	446644.221	309922.363	161.682	1.725	1200		1 2 0	S9L S9L 1.007	160.032 159.957	150 225
S10	446657.263	309919.500	161.118	1.725	1200		1 0	1.008 1.009	159.957 159.393	225 225
S11L	446688.505	309927.040	160.500	1.400	450		0	S11L	159.100	150
S11	446677.294	309922.761	160.413	1.483	1500		1 0	S11L 2.000	159.005 158.930	150 225
S12	446669.318	309920.398	160.782	2.200	1500		1 2 0	2.000 1.009 1.010	158.657 158.657 158.582	225 225 300
HW1	446676.195	309891.709	157.975	1.484	1200		1	1.010	156.700	300

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
S13L	446573.828	309969.225	163.250	1.400	450		0	S13L	161.850	150
S13	446579.305	309966.776	163.111	1.425	1500		1	S13L	161.761	150
							0	3.000	161.686	225
S14L	446560.465	309939.338	161.600	1.425	600		0	S14L	160.175	225
S14	446565.942	309936.889	161.465	1.425	1500		1	S14L	160.040	225
							2	3.000	160.040	225
							0	3.001	160.040	225
S15L	446571.136	309933.002	161.675	1.700	450		0	S15L	159.975	150
S15	446569.092	309928.439	161.025	1.700	1200		1	S15L	159.475	150
							2	3.001	159.400	225
							0	3.002	159.325	300
S16	446612.735	309904.042	160.675	1.800	1200		1	3.002	158.875	300
							0	3.003	158.875	300
S17L	446615.067	309910.376	161.150	1.700	450		0	S17L	159.450	150
S17	446623.521	309908.967	160.675	2.225	1200		1	S17L	158.600	150
							2	3.003	158.450	300
							0	3.004	158.450	300
HW2	446666.215	309888.224	157.975	1.484	1200		1	3.004	156.700	300
HW3	446691.086	309887.372	157.975	1.500	1200		0	1.011	156.475	225
S18 FCU	446694.580	309880.175	158.375	2.275	2700		1	1.011	156.100	225
							0	1.012	156.100	225
HW4	446696.787	309871.760	155.580	0.350	1200		1	1.012	155.230	225

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Detailed
Rainfall Events	Singular	Skip Steady State	x
FSR Region	England and Wales	Drain Down Time (mins)	240
M5-60 (mm)	20.000	Additional Storage (m³/ha)	0.0
Ratio-R	0.400	Starting Level (m)	
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 %)
1	0	0	0
30	0	0	0
100	40	0	0

Node S18 FCU Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	156.100	Product Number	CTL-SHE-0135-9700-1575-9700
Design Depth (m)	1.575	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	9.7	Min Node Diameter (mm)	0

Node HW1 Online Orifice Control

Flap Valve	x	Invert Level (m)	156.491	Discharge Coefficient	0.600
Replaces Downstream Link	x	Diameter (m)	0.375		

Node HW2 Online Orifice Control

Flap Valve	x	Invert Level (m)	156.491	Discharge Coefficient	0.600
Replaces Downstream Link	x	Diameter (m)	0.450		

Node HW3 Flow through Pond Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Main Channel Length (m)	16.000
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	156.475	Main Channel Slope (1:X)	1000.0
Safety Factor	2.0	Time to half empty (mins)		Main Channel n	0.020

Inlets

HW2 | HW1

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	202.1	0.0	0.400	297.8	0.0	0.800	402.5	0.0	1.200	516.2	0.0
0.100	225.2	0.0	0.500	323.1	0.0	0.900	430.1	0.0	1.300	546.1	0.0
0.200	248.8	0.0	0.600	349.0	0.0	1.000	458.2	0.0	1.400	576.5	0.0
0.300	273.0	0.0	0.700	375.4	0.0	1.100	486.9	0.0	1.500	607.5	0.0

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.90%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S1L	10	163.674	0.024	2.4	0.0038	0.0000	OK
15 minute winter	S1	10	163.231	0.063	6.6	0.0715	0.0000	OK
15 minute winter	S2	11	163.115	0.062	6.5	0.0705	0.0000	OK
15 minute winter	S3	11	163.034	0.075	8.8	0.0845	0.0000	OK
15 minute winter	S4	11	162.942	0.082	11.0	0.0930	0.0000	OK
15 minute winter	S5	11	162.651	0.075	13.0	0.0848	0.0000	OK
15 minute winter	S6L	10	162.916	0.066	14.8	0.0104	0.0000	OK
15 minute winter	S6	11	162.455	0.077	29.3	0.0872	0.0000	OK
15 minute winter	S7L	10	161.641	0.041	6.6	0.0064	0.0000	OK
15 minute winter	S7	11	161.207	0.093	37.3	0.1640	0.0000	OK
15 minute winter	S8	11	160.726	0.093	39.8	0.1057	0.0000	OK
15 minute winter	S9L	10	160.482	0.031	4.8	0.0050	0.0000	OK
15 minute winter	S9	11	160.067	0.110	44.4	0.1248	0.0000	OK
15 minute winter	S10	11	159.493	0.100	44.4	0.1127	0.0000	OK
15 minute winter	S11L	10	159.222	0.122	14.4	0.0194	0.0000	OK
15 minute winter	S11	10	158.997	0.066	15.6	0.1175	0.0000	OK
15 minute winter	S12	11	158.684	0.102	65.1	0.1801	0.0000	OK
15 minute winter	HW1	11	156.746	0.255	65.3	0.2884	0.0000	OK
15 minute winter	S13L	10	161.927	0.077	9.6	0.0123	0.0000	OK
15 minute winter	S13	10	161.742	0.056	16.3	0.0995	0.0000	OK
15 minute winter	S14L	10	160.248	0.073	14.7	0.0206	0.0000	OK
15 minute winter	S14	10	160.126	0.086	36.3	0.1522	0.0000	OK
15 minute winter	S15L	10	160.016	0.041	7.8	0.0065	0.0000	OK
15 minute winter	S15	10	159.467	0.142	43.7	0.1611	0.0000	OK
15 minute winter	S16	11	158.975	0.100	43.2	0.1126	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S1L	S1L	S1	2.4	1.354	0.051	0.0106	
15 minute winter	S1	1.000	S2	6.5	0.724	0.164	0.1760	
15 minute winter	S2	1.001	S3	6.5	0.637	0.163	0.1630	
15 minute winter	S3	1.002	S4	8.9	0.720	0.223	0.2079	
15 minute winter	S4	1.003	S5	10.9	0.883	0.274	0.5960	
15 minute winter	S5	1.004	S6	12.7	1.149	0.216	0.1362	
15 minute winter	S6L	S6L	S6	14.7	2.129	0.328	0.0436	
15 minute winter	S6	1.005	S7	29.3	2.140	0.255	0.3568	
15 minute winter	S7L	S7L	S7	6.6	1.791	0.140	0.0220	
15 minute winter	S7	1.006	S8	37.3	2.406	0.300	0.1318	
15 minute winter	S8	1.007	S9	39.8	2.282	0.335	0.2271	
15 minute winter	S9L	S9L	S9	4.8	1.782	0.088	0.0127	
15 minute winter	S9	1.008	S10	44.4	2.448	0.414	0.2424	
15 minute winter	S10	1.009	S12	44.5	2.789	0.345	0.1929	
15 minute winter	S11L	S11L	S11	14.2	0.969	0.899	0.1756	
15 minute winter	S11	2.000	S12	15.4	1.669	0.163	0.0770	
15 minute winter	S12	1.010	HW1	65.3	3.194	0.232	0.6034	
15 minute winter	HW1	Flow through Pond	HW3	72.8	0.134	0.002	43.2195	
15 minute winter	S13L	S13L	S13	9.5	1.114	0.440	0.0514	
15 minute winter	S13	3.000	S14	16.2	1.503	0.138	0.3554	
15 minute winter	S14L	S14L	S14	14.6	1.171	0.187	0.0751	
15 minute winter	S14	3.001	S15	35.9	2.755	0.258	0.1176	
15 minute winter	S15L	S15L	S15	7.8	2.133	0.137	0.0182	
15 minute winter	S15	3.002	S16	43.2	1.635	0.410	1.3253	
15 minute winter	S16	3.003	S17	43.7	2.122	0.207	0.2440	

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.90%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S17L	10	159.486	0.036	6.6	0.0057	0.0000	OK
15 minute winter	S17	11	158.551	0.101	49.9	0.1140	0.0000	OK
60 minute winter	HW2	61	156.739	0.248	26.4	0.2808	0.0000	OK
60 minute winter	HW3	59	156.739	0.264	46.7	0.2988	0.0000	SURCHARGED
60 minute winter	S18 FCU	60	156.735	0.635	22.3	3.6349	0.0000	SURCHARGED
15 minute summer	HW4	1	155.230	0.000	9.7	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S17L	S17L	S17	6.6	2.076	0.116	0.0271	
15 minute winter	S17	3.004	HW2	50.1	2.461	0.234	0.9661	
60 minute winter	HW2	Flow through Pond	HW3	46.7	0.077	0.001	59.5488	
60 minute winter	HW3	1.011	S18 FCU	22.3	1.159	0.197	0.3182	
60 minute winter	S18 FCU	Hydro-Brake®	HW4	9.7				90.7

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.73%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S1L	10	163.688	0.038	5.9	0.0061	0.0000	OK
15 minute winter	S1	10	163.273	0.105	16.3	0.1182	0.0000	OK
15 minute winter	S2	10	163.157	0.104	16.0	0.1176	0.0000	OK
15 minute winter	S3	11	163.086	0.127	21.6	0.1441	0.0000	OK
15 minute winter	S4	11	163.000	0.140	26.9	0.1578	0.0000	OK
15 minute winter	S5	11	162.705	0.129	32.1	0.1460	0.0000	OK
15 minute winter	S6L	10	162.976	0.126	36.3	0.0201	0.0000	OK
15 minute winter	S6	10	162.507	0.129	72.6	0.1459	0.0000	OK
15 minute winter	S7L	10	161.663	0.063	16.3	0.0100	0.0000	OK
15 minute winter	S7	11	161.309	0.195	92.2	0.3444	0.0000	OK
15 minute winter	S8	11	160.958	0.326	97.3	0.3686	0.0000	SURCHARGED
15 minute winter	S9L	10	160.497	0.047	11.8	0.0075	0.0000	OK
15 minute winter	S9	11	160.351	0.394	106.5	0.4458	0.0000	SURCHARGED
15 minute winter	S10	12	159.580	0.187	105.2	0.2111	0.0000	OK
15 minute winter	S11L	10	159.697	0.597	35.3	0.0950	0.0000	SURCHARGED
15 minute winter	S11	11	159.042	0.112	37.5	0.1976	0.0000	OK
15 minute winter	S12	11	158.740	0.157	155.6	0.2783	0.0000	OK
120 minute winter	HW1	120	157.173	0.681	52.6	0.7707	0.0000	OK
15 minute winter	S13L	10	162.049	0.199	23.5	0.0316	0.0000	SURCHARGED
15 minute winter	S13	10	161.776	0.089	39.7	0.1581	0.0000	OK
15 minute winter	S14L	10	160.306	0.131	36.0	0.0369	0.0000	OK
15 minute winter	S14	10	160.188	0.148	88.8	0.2613	0.0000	OK
15 minute winter	S15L	10	160.036	0.061	19.0	0.0097	0.0000	OK
15 minute winter	S15	11	159.592	0.267	106.9	0.3023	0.0000	OK
15 minute winter	S16	11	159.049	0.173	106.2	0.1962	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S1L	S1L	S1	5.9	1.732	0.126	0.0203	
15 minute winter	S1	1.000	S2	16.0	0.892	0.404	0.3516	
15 minute winter	S2	1.001	S3	15.9	0.773	0.400	0.3274	
15 minute winter	S3	1.002	S4	21.7	0.884	0.545	0.4142	
15 minute winter	S4	1.003	S5	26.9	1.090	0.678	1.1937	
15 minute winter	S5	1.004	S6	31.7	1.432	0.537	0.2719	
15 minute winter	S6L	S6L	S6	36.1	2.512	0.804	0.0900	
15 minute winter	S6	1.005	S7	72.7	2.517	0.631	0.7805	
15 minute winter	S7L	S7L	S7	16.3	2.079	0.347	0.0646	
15 minute winter	S7	1.006	S8	90.9	2.719	0.730	0.3244	
15 minute winter	S8	1.007	S9	95.3	2.542	0.801	0.5170	
15 minute winter	S9L	S9L	S9	11.8	1.795	0.216	0.0503	
15 minute winter	S9	1.008	S10	105.2	2.733	0.980	0.5007	
15 minute winter	S10	1.009	S12	105.6	3.278	0.818	0.3874	
15 minute winter	S11L	S11L	S11	34.0	1.933	2.158	0.2091	
15 minute winter	S11	2.000	S12	37.5	2.070	0.397	0.1508	
15 minute winter	S12	1.010	HW1	155.5	3.548	0.551	1.5912	
120 minute winter	HW1	Flow through Pond	HW3	50.0	0.071	0.001	196.6818	
15 minute winter	S13L	S13L	S13	23.1	1.313	1.066	0.1031	
15 minute winter	S13	3.000	S14	39.4	1.858	0.336	0.6934	
15 minute winter	S14L	S14L	S14	35.9	1.391	0.459	0.1546	
15 minute winter	S14	3.001	S15	88.0	2.913	0.631	0.2870	
15 minute winter	S15L	S15L	S15	19.0	2.458	0.335	0.0533	
15 minute winter	S15	3.002	S16	106.2	1.922	1.008	2.7124	
15 minute winter	S16	3.003	S17	106.6	2.595	0.505	0.4908	

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.73%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S17L	10	159.509	0.059	16.3	0.0094	0.0000	OK
15 minute winter	S17	11	158.618	0.168	122.0	0.1900	0.0000	OK
120 minute winter	HW2	122	157.172	0.681	39.2	0.7705	0.0000	OK
120 minute winter	HW3	122	157.172	0.697	50.0	0.7885	0.0000	SURCHARGED
120 minute winter	S18 FCU	122	157.169	1.069	19.5	6.1220	0.0000	SURCHARGED
15 minute summer	HW4	1	155.230	0.000	9.7	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S17L	S17L	S17	16.2	2.631	0.288	0.0529	
15 minute winter	S17	3.004	HW2	123.4	3.035	0.576	1.9978	
120 minute winter	HW2	Flow through Pond	HW3	50.0	0.071	0.001	196.6818	
120 minute winter	HW3	1.011	S18 FCU	19.5	1.172	0.172	0.3182	
120 minute winter	S18 FCU	Hydro-Brake®	HW4	9.7				174.7

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.31%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S1L	13	164.030	0.380	10.7	0.0605	0.0000	SURCHARGED
15 minute winter	S1	13	164.021	0.853	29.5	0.9644	0.0000	SURCHARGED
15 minute winter	S2	13	163.997	0.944	30.5	1.0678	0.0000	SURCHARGED
15 minute winter	S3	13	163.976	1.017	34.9	1.1500	0.0000	SURCHARGED
15 minute winter	S4	13	163.936	1.076	42.0	1.2165	0.0000	SURCHARGED
15 minute winter	S5	13	163.775	1.199	47.1	1.3557	0.0000	SURCHARGED
15 minute winter	S6L	12	164.497	1.647	65.9	0.2619	0.0000	FLOOD RISK
15 minute winter	S6	13	163.697	1.318	95.2	1.4912	0.0000	SURCHARGED
15 minute winter	S7L	12	162.915	1.315	29.5	0.2091	0.0000	FLOOD RISK
15 minute winter	S7	13	162.806	1.692	118.6	2.9901	0.0000	FLOOD RISK
15 minute winter	S8	13	162.183	1.551	121.9	1.7545	0.0000	FLOOD RISK
15 minute winter	S9L	12	161.258	0.808	21.4	0.1284	0.0000	SURCHARGED
15 minute winter	S9	13	161.217	1.260	135.7	1.4252	0.0000	SURCHARGED
15 minute winter	S10	13	159.990	0.597	134.5	0.6748	0.0000	SURCHARGED
15 minute winter	S11L	10	160.500	1.400	64.0	0.2226	1.0567	FLOOD
15 minute winter	S11	10	159.084	0.154	59.7	0.2722	0.0000	OK
15 minute winter	S12	12	158.806	0.224	212.7	0.3963	0.0000	OK
240 minute winter	HW1	236	157.692	1.201	57.2	1.3587	0.0000	OK
15 minute winter	S13L	10	162.393	0.543	42.7	0.0863	0.0000	SURCHARGED
15 minute winter	S13	12	161.974	0.288	71.8	0.5088	0.0000	SURCHARGED
15 minute winter	S14L	11	161.550	1.375	65.3	0.3891	0.0000	FLOOD RISK
15 minute winter	S14	12	161.421	1.381	150.9	2.4395	0.0000	FLOOD RISK
15 minute winter	S15L	12	160.659	0.683	34.6	0.1087	0.0000	SURCHARGED
15 minute winter	S15	12	160.451	1.126	169.6	1.2735	0.0000	SURCHARGED
15 minute winter	S16	12	159.129	0.254	168.8	0.2872	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S1L	S1L	S1	10.7	1.735	0.229	0.1056	
15 minute winter	S1	1.000	S2	30.5	0.985	0.768	0.7775	
15 minute winter	S2	1.001	S3	24.9	0.822	0.625	0.6337	
15 minute winter	S3	1.002	S4	33.2	0.949	0.836	0.6719	
15 minute winter	S4	1.003	S5	40.8	1.176	1.028	1.9215	
15 minute winter	S5	1.004	S6	49.5	1.563	0.838	0.4882	
15 minute winter	S6L	S6L	S6	58.4	3.318	1.300	0.1109	
15 minute winter	S6	1.005	S7	88.0	2.455	0.763	1.0340	
15 minute winter	S7L	S7L	S7	23.4	2.060	0.499	0.1056	
15 minute winter	S7	1.006	S8	112.7	2.834	0.905	0.3381	
15 minute winter	S8	1.007	S9	120.5	3.031	1.012	0.5170	
15 minute winter	S9L	S9L	S9	17.1	1.896	0.313	0.0792	
15 minute winter	S9	1.008	S10	134.5	3.382	1.253	0.5311	
15 minute winter	S10	1.009	S12	134.7	3.387	1.044	0.4807	
15 minute winter	S11L	S11L	S11	53.4	3.036	3.389	0.2091	
15 minute winter	S11	2.000	S12	59.7	2.272	0.631	0.2331	
15 minute winter	S12	1.010	HW1	211.8	3.455	0.751	1.8721	
240 minute winter	HW1	Flow through Pond	HW3	53.4	0.058	0.001	427.6087	
15 minute winter	S13L	S13L	S13	41.6	2.365	1.921	0.1056	
15 minute winter	S13	3.000	S14	68.2	1.838	0.582	1.3020	
15 minute winter	S14L	S14L	S14	58.3	1.466	0.745	0.2386	
15 minute winter	S14	3.001	S15	139.6	3.510	1.002	0.3587	
15 minute winter	S15L	S15L	S15	30.1	2.443	0.531	0.0880	
15 minute winter	S15	3.002	S16	168.8	2.415	1.602	3.3504	
15 minute winter	S16	3.003	S17	168.8	2.798	0.799	0.7243	

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.31%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S17L	10	159.536	0.086	29.5	0.0136	0.0000	OK
15 minute winter	S17	12	158.682	0.232	192.1	0.2629	0.0000	OK
240 minute winter	HW2	236	157.692	1.201	42.4	1.3583	0.0000	OK
240 minute winter	HW3	236	157.692	1.217	53.4	1.3762	0.0000	FLOOD RISK
240 minute winter	S18 FCU	240	157.687	1.587	14.7	9.0894	0.0000	SURCHARGED
15 minute summer	HW4	1	155.230	0.000	9.7	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S17L	S17L	S17	29.4	3.015	0.521	0.0835	
15 minute winter	S17	3.004	HW2	191.4	3.092	0.894	3.0615	
240 minute winter	HW2	Flow through Pond	HW3	53.4	0.058	0.001	427.6087	
240 minute winter	HW3	1.011	S18 FCU	14.7	1.082	0.130	0.3182	
240 minute winter	S18 FCU	Hydro-Brake®	HW4	9.7				257.4

Appendix C SuDS Maintenance Regime

Operation and Maintenance Requirements based on C753 The SuDS Manual 2015

Inlets, Outlets, Controls and Inspection Chambers	
Regular Maintenance	Frequency
Inlets, outlets and surface control structures Inspect surface structures, removing obstructions and silt as necessary. Check there is no physical damage,	Monthly
Inspection chambers and below-ground control chambers Remove cover and inspect, ensuring that water is flowing freely and that the exit route for water is unobstructed. Remove debris and silt. Undertake inspection after leaf fall in autumn.	Monthly
Occasional Maintenance	
Check topsoil levels are 20mm above edges of baskets and chamber to avoid mower damage.	As necessary
Remedial Work	
Repair physical damage if necessary	As required

Detention Basins, Ponds, Swales and Wetlands	
Regular Maintenance	Frequency
Grass Mow grass access paths and verges surrounding basins, ponds and wetland areas at 35-50mm minimum and 75mm maximum, or as specified; to provide a cared-for appearance and allow pedestrian access.	Monthly or as required
Mow rough grass areas for occasional access or habitat reasons at 100mm minimum and 150mm maximum with cutting removed to wildlife piles.	As required or 4-6 times annually
Grass areas not required for access may be managed for wildlife interest and to reduce costs.	Annually or as required
Wet Woodland Management Manage annually, with cuttings left in-situ or removed to wildlife piles.	Annually or as required
Wetland Vegetation Cut (trim) at 100mm with cuttings removed to wildlife piles September to October. or Maintain as a mosaic to be cut 25-30% in any one year at 100mm in September or October with cuttings removed to wildlife piles.	As necessary

Occasional Tasks	
Where silt accumulates on apron or area in front of inlet or outlet, remove and apply within design profile of SuDS. Where silt accumulates more than 150mm in base of wetland, undertake a phased removal of silt subject to client approval. Confirm whether a liner is present to hold water r prevent pollution of groundwater and protect Remove silt as instructed, but not more than 30% of the pond or wetland area at any one time and to an agreed depth but not the subsoil layer. Retain as much representative existing vegetation as possible to ensure rapid reconciliation of open areas. Stack excavated material adjacent to wetland to allow -de-watering of silt. Undertake silt removal during September – October to minimise damage to protected wildlife and ensure regrowth of aquatic vegetation before winter. Spread excavated material on site above SuDS design profile, e.g. top of banks, in accordance with EA (2010).	Annually or every three years, as required

Appendix D Mitigation Indices

Pollution Hazard Indices for Different Land Use Classifications (Table 26.2 in The SuDS Manual CIRIA C753)

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 (e.g. cul de sacs, home zones and general access roads) and non-residential car parking with infrequent change (e.g. schools, offices) i.e. < 300 traffic movements/day.	Low	0.5	0.4	0.4

Indicative SuDS Mitigation Indices for Discharges to Surface Waters (Table 26.3 in The SuDS Manual CIRIA C753)

Type of SuDS Component	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
Attenuation basin	0.5	0.5	0.6
Pond	0.7	0.7	0.5
Wetland	0.8	0.8	0.8
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		