

Project Title: Proposed Lidl Store at Wrexham

Project No: 09 – 124 CALC02

Client: Lidl UK GmbH

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Prepared by:	Date:	Checked by:	Date:	Approved by:	Date:
KA	June 2020	KGP	June 2020	KGP	June 2020

Revisions

Ref	Date	Description	Checked	Approved
A	29-01-2021	Soakaway 2 infiltration rate amended	KGP	KGP

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DESIGN PHILOSOPHY

A) DESCRIPTION

This site has planning approval for under the previous planning application ref: P/2018/0675. This was for a Lidl store and Drive Thru.

EXISTING SITE AND PROPOSED WORKS

The existing site is currently developed as a Wrexham Police Station with associated access roads and car parking. The existing drainage is separate systems for surface water and foul, the foul discharging from site into the local drainage system while the surface water discharge via soakaways.

A Flood Consequence Assessment with Drainage Strategy has been undertaken by Beam Consulting, references 09-124-DOC-001 Rev 2 dated 15-01-2019, confirming the foul and surface water discharges from the site will remain as existing.

SURFACE WATER DRAINAGE

Based on the Flood Consequence Assessment report and discussions with the LLFA, the overall proposed impermeable area for the site area is 7028m².

It is proposed that the surface water discharge from the site will be discharged via two soakaways, one for the Lidl Store roof area and one for the Lidl Store Hardstanding.

Soakaway testing has been undertaken in accordance with BRE Digest 365 by Remada Ltd. The Remada letter report, reference 525.04.01 dated 12th May 2020, indicates that the infiltration rates vary from 2.09×10^{-4} m/s and 1.65×10^{-5} m/s this gives an average infiltration rate of 8.20×10^{-5} m/s. As this is a good infiltration rate it is proposed to use soakaways for the surface water system instead of discharging into the existing sewer system, as the existing site. This is a preferred method in the SuDS drainage Hierarchy.

The drainage system will be designed for a 1 in 100 year storm event plus 30% allowance for climate change with the soakaways being designed for a 1 in 10 year storm event plus 30% allowance for climate change.

The system is to be designed as Private with pipe cover of 600mm in footpaths/grassed areas and 900mm in roads.

FOUL WATER DRAINAGE

The drainage system is designed as a gravity system collecting foul water. The existing foul water drainage system on site will be removed except for the last manhole on the site, this and the existing connection into the existing sewer system will remain. The proposed foul water drainage from the proposed Lidl store will connect into the existing foul manhole on site.

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B) DESIGN CODES

- The Wallingford Procedure - Design and Analysis of Urban Drainage. Volume 1 Principles, Methods and Practice. Volume 4 - Modified Rational Method.
- BS EN 12056-2:2000 Gravity drainage systems inside buildings – Part 2: Sanitary pipework, layout and calculation.

C) CDM

- Construction method statement to be provided by contractor prior to construction
- Designers Risk Assessment has been prepared.

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	100	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	100	Minimum Velocity (m/s)	0.75
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	18.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.350	Preferred Cover Depth (m)	0.900
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	1.00	Enforce best practice design rules	✓

Nodes

Name	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
F1	1.00	84.700	1200	333718.881	350719.921	1.050
F2		84.700	1200	333736.768	350710.481	1.199
F3		84.700	1200	333740.015	350708.767	1.226
F4		84.700	1200	333749.717	350703.646	1.307
F5		84.700	1200	333758.231	350699.169	1.378
F6		84.700	1200	333780.834	350687.224	1.566
F7		84.720	1200	333765.696	350658.184	1.827
F8		84.720	1200	333765.035	350656.931	1.838
F9	1.00	84.800	1200	333697.038	350703.501	1.050
F10		84.800	1200	333690.618	350691.338	1.152
F11		84.800	1200	333706.357	350683.030	1.283
F12		84.800	1200	333726.821	350672.228	1.454
F13		84.720	1200	333763.022	350653.119	1.870
EXG F1		84.110	1200	333758.222	350646.138	1.323

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	F1	F2	20.225	1.500	83.650	83.501	0.149	135.7	150	1.45	50.0
1.001	F2	F3	3.672	1.500	83.501	83.474	0.027	136.0	150	1.53	50.0
1.002	F3	F4	10.971	1.500	83.474	83.393	0.081	135.4	150	1.77	50.0
1.003	F4	F5	9.619	1.500	83.393	83.322	0.071	135.5	150	1.99	50.0
1.004	F5	F6	25.565	1.500	83.322	83.134	0.188	136.0	150	2.55	50.0
1.005	F6	F7	32.749	1.500	83.134	82.893	0.241	135.9	150	3.28	50.0
1.006	F7	F8	1.417	1.500	82.893	82.882	0.011	128.8	150	3.31	50.0
1.007	F8	F13	4.311	1.500	82.882	82.850	0.032	134.7	150	3.41	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	0.751	13.3	0.0	0.900	1.049	0.000	0.0	0	0.000
1.001	0.750	13.3	0.0	1.049	1.076	0.000	0.0	0	0.000
1.002	0.752	13.3	0.0	1.076	1.157	0.000	0.0	0	0.000
1.003	0.752	13.3	0.0	1.157	1.228	0.000	0.0	0	0.000
1.004	0.750	13.3	0.0	1.228	1.416	0.000	0.0	0	0.000
1.005	0.750	13.3	0.0	1.416	1.677	0.000	0.0	0	0.000
1.006	0.771	13.6	0.0	1.677	1.688	0.000	0.0	0	0.000
1.007	0.754	13.3	0.0	1.688	1.720	0.000	0.0	0	0.000

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)
2.000	F9	F10	13.753	1.500	83.750	83.648	0.102	134.8	150	1.30	50.0
2.001	F10	F11	17.797	1.500	83.648	83.517	0.131	135.9	150	1.70	50.0
2.002	F11	F12	23.140	1.500	83.517	83.346	0.171	135.3	150	2.21	50.0
2.003	F12	F13	40.935	1.500	83.346	82.850	0.496	82.5	150	2.92	50.0
1.008	F13	EXG F1	8.472	1.500	82.850	82.787	0.063	134.5	150	3.60	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)
2.000	0.753	13.3	0.0	0.900	1.002	0.000	0.0	0	0.000
2.001	0.751	13.3	0.0	1.002	1.133	0.000	0.0	0	0.000
2.002	0.752	13.3	0.0	1.133	1.304	0.000	0.0	0	0.000
2.003	0.964	17.0	0.0	1.304	1.720	0.000	0.0	0	0.000
1.008	0.754	13.3	0.0	1.720	1.173	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	20.225	135.7	150	Circular	84.700	83.650	0.900	84.700	83.501	1.049
1.001	3.672	136.0	150	Circular	84.700	83.501	1.049	84.700	83.474	1.076
1.002	10.971	135.4	150	Circular	84.700	83.474	1.076	84.700	83.393	1.157
1.003	9.619	135.5	150	Circular	84.700	83.393	1.157	84.700	83.322	1.228
1.004	25.565	136.0	150	Circular	84.700	83.322	1.228	84.700	83.134	1.416
1.005	32.749	135.9	150	Circular	84.700	83.134	1.416	84.720	82.893	1.677
1.006	1.417	128.8	150	Circular	84.720	82.893	1.677	84.720	82.882	1.688
1.007	4.311	134.7	150	Circular	84.720	82.882	1.688	84.720	82.850	1.720
2.000	13.753	134.8	150	Circular	84.800	83.750	0.900	84.800	83.648	1.002
2.001	17.797	135.9	150	Circular	84.800	83.648	1.002	84.800	83.517	1.133
2.002	23.140	135.3	150	Circular	84.800	83.517	1.133	84.800	83.346	1.304
2.003	40.935	82.5	150	Circular	84.800	83.346	1.304	84.720	82.850	1.720

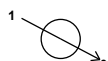
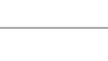
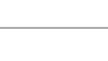
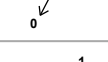
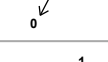
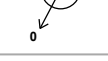
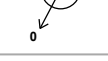
Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	F1	1200	Manhole	Adoptable	F2	1200	Manhole	Adoptable
1.001	F2	1200	Manhole	Adoptable	F3	1200	Manhole	Adoptable
1.002	F3	1200	Manhole	Adoptable	F4	1200	Manhole	Adoptable
1.003	F4	1200	Manhole	Adoptable	F5	1200	Manhole	Adoptable
1.004	F5	1200	Manhole	Adoptable	F6	1200	Manhole	Adoptable
1.005	F6	1200	Manhole	Adoptable	F7	1200	Manhole	Adoptable
1.006	F7	1200	Manhole	Adoptable	F8	1200	Manhole	Adoptable
1.007	F8	1200	Manhole	Adoptable	F13	1200	Manhole	Adoptable
2.000	F9	1200	Manhole	Adoptable	F10	1200	Manhole	Adoptable
2.001	F10	1200	Manhole	Adoptable	F11	1200	Manhole	Adoptable
2.002	F11	1200	Manhole	Adoptable	F12	1200	Manhole	Adoptable
2.003	F12	1200	Manhole	Adoptable	F13	1200	Manhole	Adoptable

Pipeline Schedule

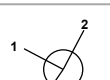
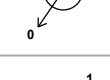
Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.008	8.472	134.5	150	Circular	84.720	82.850	1.720	84.110	82.787	1.173

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.008	F13	1200	Manhole	Adoptable	EXG F1	1200	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
F1	333718.881	350719.921	84.700	1.050	1200	 0	1.000	83.650	150
F2	333736.768	350710.481	84.700	1.199	1200	 1	1.000	83.501	150
F3	333740.015	350708.767	84.700	1.226	1200	 0	1.001	83.501	150
						 1	1.001	83.474	150
F4	333749.717	350703.646	84.700	1.307	1200	 0	1.002	83.474	150
						 1	1.002	83.393	150
F5	333758.231	350699.169	84.700	1.378	1200	 0	1.003	83.393	150
						 1	1.003	83.322	150
F6	333780.834	350687.224	84.700	1.566	1200	 0	1.004	83.322	150
						 1	1.004	83.134	150
F7	333765.696	350658.184	84.720	1.827	1200	 0	1.005	83.134	150
						 1	1.005	82.893	150
F8	333765.035	350656.931	84.720	1.838	1200	 0	1.006	82.893	150
						 1	1.006	82.882	150
F9	333697.038	350703.501	84.800	1.050	1200	 0	2.000	83.750	150
						 1	2.000	83.648	150
F10	333690.618	350691.338	84.800	1.152	1200	 0	2.001	83.648	150
						 1	2.001	83.648	150

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
F11	333706.357	350683.030	84.800	1.283	1200		1	2.001	83.517	150
							0	2.002	83.517	150
F12	333726.821	350672.228	84.800	1.454	1200		1	2.002	83.346	150
							0	2.003	83.346	150
F13	333763.022	350653.119	84.720	1.870	1200		1	2.003	82.850	150
							2	1.007	82.850	150
							0	1.008	82.850	150
EXG F1	333758.222	350646.138	84.110	1.323	1200		1	1.008	82.787	150

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	18.000	Drain Down Time (mins)	240
Ratio-R	0.350	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

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

Project Title: Lidl Wrexham

Project No: 09-124

Prepared By: KA

Date: May 2020

Checked By: KGP

Date: May 2020

SOAKAWAY FOR 10 YEAR RAINFALL RETURN PERIOD - LIDL ROOF

DESIGN DATA

Site location =	Wrexham
M5-60 rainfall ratio (mm) =	18
60min rainfall ratio to 2 day rainfalls of 5 year return period, r =	0.35
Impermeable Roof Area (m ²) =	2104
Allowance for Climate Change (%) =	30
Soil Infiltration Rate based on average from site test results 13-6-2011 (m/s) =	0.0000165
Soakaway Type	Polystorm
Soakaway voids - Polystorm unit (%) =	0.95
Restricted discharge, Qe (l/s)	0

CALCULATIONS RESULTS

Soakaway Length (m) =	20.78
Soakaway Depth (m) =	2.00
Soakaway Width (m) =	5.00
Soakaway to be made of Polystorm units	

DETAILED CALCULATIONS

Soakaway Width (m)	5.00								
Soakaway Depth (m)	2.00								
Duration, D	15	30	60	120	240	360	600	1440	2880
Z1	0.64	0.79	1.00	1.20	1.44	1.63	1.85	2.35	2.81
M5-D	11.52	14.22	18	21.6	25.92	29.34	33.3	42.3	50.58
Z2	1.23	1.24	1.24	1.24	1.22	1.21	1.19	1.17	1.16
M10-D	14.17	17.63	22.32	26.78	31.62	35.50	39.63	49.49	58.67
i (mm/hr)	56.68	35.27	22.32	13.39	7.91	5.92	3.96	2.06	1.22
i + Climate Change %	73.68	45.85	29.02	17.41	10.28	7.69	5.15	2.68	1.59
Area (m ²)	2104	2104	2104	2104	2104	2104	2104	2104	2104
Qp (l/s)	43.10	26.82	16.97	10.18	6.01	4.50	3.01	1.57	0.93
Qe (l/s)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Balancing Q	43.10	26.82	16.97	10.18	6.01	4.50	3.01	1.57	0.93
In flow volume (m ³)	77.6	96.5	122.2	146.6	173.1	194.4	216.9	271.0	321.2
Soakaway Length (m)	8.12	10.07	12.64	14.94	17.12	18.68	19.74	20.78	19.25

DESIGN NOTES

1. Soakaway design is in accordance with BRE Digest 350
2. Design rainfall return period is 10 years based on Building Regulations Part H
2. Factor of Safety of 2.0 is adopted as per CIRIA C753 SUDS Manual guidance

Project Title: Lidl Wrexham

Project No: 09-124

Prepared By: KA

Date: May 2020

Checked By: KGP

Date: May 2020

SOAKAWAY FOR 10 YEAR RAINFALL RETURN PERIOD - LIDL HARDSTANDING

DESIGN DATA

Site location =	Wrexham
M5-60 rainfall ratio (mm) =	18
60min rainfall ratio to 2 day rainfalls of 5 year return period, r =	0.35
Impermeable Roof Area (m ²) =	4924
Allowance for Climate Change (%) =	30
Soil Infiltration Rate based on average from site test results 13-6-2011 (m/s) =	0.000082
Soakaway Type	Polystorm
Soakaway voids - Polystorm unit (%) =	0.95
Restricted discharge, Qe (l/s)	0

CALCULATIONS RESULTS

Soakaway Length (m) =	33.52
Soakaway Depth (m) =	2.00
Soakaway Width (m) =	5.00
Soakaway to be made of Polystorm units	

DETAILED CALCULATIONS

Soakaway Width (m)	5.00								
Soakaway Depth (m)	2.00								
Duration, D	15	30	60	120	240	360	600	1440	2880
Z1	0.64	0.79	1.00	1.20	1.44	1.63	1.85	2.35	2.81
M5-D	11.52	14.22	18	21.6	25.92	29.34	33.3	42.3	50.58
Z2	1.23	1.24	1.24	1.24	1.22	1.21	1.19	1.17	1.16
M10-D	14.17	17.63	22.32	26.78	31.62	35.50	39.63	49.49	58.67
i (mm/hr)	56.68	35.27	22.32	13.39	7.91	5.92	3.96	2.06	1.22
i + Climate Change %	73.68	45.85	29.02	17.41	10.28	7.69	5.15	2.68	1.59
Area (m ²)	4924	4924	4924	4924	4924	4924	4924	4924	4924
Qp (l/s)	100.86	62.76	39.72	23.83	14.07	10.53	7.05	3.67	2.18
Qe (l/s)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Balancing Q	100.86	62.76	39.72	23.83	14.07	10.53	7.05	3.67	2.18
In flow volume (m ³)	181.6	225.9	286.0	343.2	405.2	454.9	507.7	634.1	751.8
Soakaway Length (m)	18.74	22.91	28.05	31.58	33.16	33.52	31.04	23.80	16.12

DESIGN NOTES

1. Soakaway design is in accordance with BRE Digest 350
2. Design rainfall return period is 10 years based on Building Regulations Part H
2. Factor of Safety of 2.0 is adopted as per CIRIA C753 SUDS Manual guidance

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	100	Maximum Rainfall (mm/hr)	116.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	18.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.350	Preferred Cover Depth (m)	0.900
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	1.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
S1	0.020	1.00	84.800	1200	333708.530	350727.808	1.200
S2	0.078	1.00	84.675	1200	333734.620	350724.773	1.200
S3	0.067	1.00	84.300	1200	333785.171	350645.173	1.200
S4	0.091	1.00	84.300	1500	333792.677	350659.304	1.341
S5	0.027	1.00	84.330	1500	333789.343	350675.614	1.498
S6	0.136	1.00	84.400	1500	333781.528	350689.281	1.607
S7	0.072	1.00	84.575	1500	333753.319	350714.880	1.876
Soakaway 1			84.550	1500	333757.852	350723.461	1.875
S8	0.140	1.00	84.800	1500	333702.543	350686.518	1.275
S9	0.070	1.00	84.800	1500	333735.560	350669.092	1.391
S10			84.350	1500	333768.499	350651.519	1.275
Soakaway 2			84.500	1500	333801.490	350634.106	1.540

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
3.000	S1	S2	26.266	0.600	83.600	83.475	0.125	210.1	300	1.41	116.0
3.001	S2	S7	21.155	0.600	83.475	83.375	0.100	211.5	300	1.73	116.0
2.000	S3	S4	16.001	0.600	83.100	83.034	0.066	242.4	300	1.27	116.0
2.001	S4	S5	16.647	0.600	82.959	82.907	0.052	320.1	375	1.54	116.0
2.002	S5	S6	15.744	0.600	82.832	82.793	0.039	403.7	450	1.80	116.0
2.003	S6	S7	38.093	0.600	82.793	82.699	0.094	405.2	450	2.43	116.0
2.004	S7	Soakaway 1	9.705	0.600	82.699	82.675	0.024	404.4	450	2.60	116.0

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)
3.000	1.081	76.4	6.3	0.900	0.900	0.020	0.0	58	0.658
3.001	1.077	76.1	30.8	0.900	0.900	0.098	0.0	133	1.022
2.000	1.005	71.0	21.1	0.900	0.966	0.067	0.0	112	0.879
2.001	1.007	111.2	49.7	0.966	1.048	0.158	0.0	175	0.979
2.002	1.005	159.9	58.2	1.048	1.157	0.185	0.0	188	0.929
2.003	1.003	159.6	100.9	1.157	1.426	0.321	0.0	260	1.059
2.004	1.005	159.8	154.4	1.426	1.425	0.491	0.0	358	1.137

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	S8	S9	37.333	0.600	83.525	83.409	0.116	321.8	375	1.62	116.0
1.001	S9	S10	37.333	0.600	83.409	83.075	0.334	111.8	375	1.98	116.0
1.002	S10	Soakaway 2	37.304	0.600	83.075	82.960	0.115	324.4	375	2.60	116.0

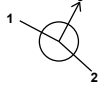
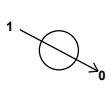
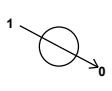
Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.004	110.9	44.0	0.900	1.016	0.140	0.0	164	0.947
1.001	1.713	189.2	66.0	1.016	0.900	0.210	0.0	153	1.566
1.002	1.000	110.5	66.0	0.900	1.165	0.210	0.0	209	1.043

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	26.266	210.1	300	Circular	84.800	83.600	0.900	84.675	83.475	0.900
3.001	21.155	211.5	300	Circular	84.675	83.475	0.900	84.575	83.375	0.900
2.000	16.001	242.4	300	Circular	84.300	83.100	0.900	84.300	83.034	0.966
2.001	16.647	320.1	375	Circular	84.300	82.959	0.966	84.330	82.907	1.048
2.002	15.744	403.7	450	Circular	84.330	82.832	1.048	84.400	82.793	1.157
2.003	38.093	405.2	450	Circular	84.400	82.793	1.157	84.575	82.699	1.426
2.004	9.705	404.4	450	Circular	84.575	82.699	1.426	84.550	82.675	1.425
1.000	37.333	321.8	375	Circular	84.800	83.525	0.900	84.800	83.409	1.016
1.001	37.333	111.8	375	Circular	84.800	83.409	1.016	84.350	83.075	0.900
1.002	37.304	324.4	375	Circular	84.350	83.075	0.900	84.500	82.960	1.165

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
3.000	S1	1200	Manhole	Adoptable	S2	1200	Manhole	Adoptable
3.001	S2	1200	Manhole	Adoptable	S7	1500	Manhole	Adoptable
2.000	S3	1200	Manhole	Adoptable	S4	1500	Manhole	Adoptable
2.001	S4	1500	Manhole	Adoptable	S5	1500	Manhole	Adoptable
2.002	S5	1500	Manhole	Adoptable	S6	1500	Manhole	Adoptable
2.003	S6	1500	Manhole	Adoptable	S7	1500	Manhole	Adoptable
2.004	S7	1500	Manhole	Adoptable	Soakaway 1	1500	Manhole	Adoptable
1.000	S8	1500	Manhole	Adoptable	S9	1500	Manhole	Adoptable
1.001	S9	1500	Manhole	Adoptable	S10	1500	Manhole	Adoptable
1.002	S10	1500	Manhole	Adoptable	Soakaway 2	1500	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S1	333708.530	350727.808	84.800	1.200	1200				
						0	3.000	83.600	300
S2	333734.620	350724.773	84.675	1.200	1200				
						0	3.001	83.475	300
S3	333785.171	350645.173	84.300	1.200	1200				
						0	2.000	83.100	300
S4	333792.677	350659.304	84.300	1.341	1500				
						0	2.001	82.959	375
S5	333789.343	350675.614	84.330	1.498	1500				
						0	2.002	82.832	450
S6	333781.528	350689.281	84.400	1.607	1500				
						0	2.003	82.793	450
S7	333753.319	350714.880	84.575	1.876	1500				
						1	3.001	83.375	300
						2	2.003	82.699	450
						0	2.004	82.699	450
Soakaway 1	333757.852	350723.461	84.550	1.875	1500				
						1	2.004	82.675	450
S8	333702.543	350686.518	84.800	1.275	1500				
						0	1.000	83.525	375
S9	333735.560	350669.092	84.800	1.391	1500				
						0	1.001	83.409	375
S10	333768.499	350651.519	84.350	1.275	1500				
						1	1.001	83.075	375
						0	1.002	83.075	375
Soakaway 2	333801.490	350634.106	84.500	1.540	1500				
						1	1.002	82.960	375

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	18.000	Drain Down Time (mins)	240
Ratio-R	0.350	Additional Storage (m ³ /ha)	0.0
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 %)
2	30	0	0
10	30	0	0
30	30	0	0
100	30	0	0

Node Soakaway 1 Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.29520	Invert Level (m)	82.000	Depth (m)	2.000
Side Inf Coefficient (m/hr)	0.29520	Time to half empty (mins)	279	Inf Depth (m)	
Safety Factor	2.0	Pit Width (m)	5.000	Number Required	1
Porosity	1.00	Pit Length (m)	35.000		

Node Soakaway 2 Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.05940	Invert Level (m)	82.000	Depth (m)	2.000
Side Inf Coefficient (m/hr)	0.05940	Time to half empty (mins)	1351	Inf Depth (m)	
Safety Factor	2.0	Pit Width (m)	5.000	Number Required	1
Porosity	1.00	Pit Length (m)	21.000		

Results for 30 year +30% CC Critical Storm Duration. Lowest mass balance: 99.95%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S1	8	83.677	0.077	12.3	0.0870	0.0000	OK
15 minute summer	S2	8	83.670	0.195	59.4	0.2209	0.0000	OK
15 minute summer	S3	9	83.334	0.234	41.5	0.2650	0.0000	OK
15 minute summer	S4	9	83.288	0.329	94.8	0.5816	0.0000	OK
15 minute summer	S5	9	83.257	0.425	99.4	0.7508	0.0000	OK
15 minute summer	S6	9	83.245	0.452	162.4	0.7988	0.0000	SURCHARGED
15 minute summer	S7	9	83.145	0.446	226.6	0.7878	0.0000	OK
120 minute winter	Soakaway 1	116	82.741	0.066	64.1	129.8083	0.0000	OK
15 minute summer	S8	8	83.778	0.253	86.7	0.4475	0.0000	OK
15 minute summer	S9	8	83.631	0.222	121.3	0.3923	0.0000	OK
15 minute summer	S10	9	83.387	0.312	113.4	0.5521	0.0000	OK
480 minute winter	Soakaway 2	464	82.830	-0.130	10.0	87.1141	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
15 minute summer	S1	3.000	S2	11.2	0.359	0.146	0.8250
15 minute summer	S2	3.001	S7	49.5	1.140	0.651	0.9549
15 minute summer	S3	2.000	S4	38.5	0.838	0.542	0.9813
15 minute summer	S4	2.001	S5	82.7	0.973	0.744	1.7446
15 minute summer	S5	2.002	S6	90.0	0.574	0.563	2.4671
15 minute summer	S6	2.003	S7	148.1	0.936	0.928	6.0300
15 minute summer	S7	2.004	Soakaway 1	229.2	1.565	1.435	1.3876
120 minute winter	Soakaway 1	Infiltration		9.6			
15 minute summer	S8	1.000	S9	77.9	1.059	0.703	2.7462
15 minute summer	S9	1.001	S10	113.4	1.468	0.600	3.0234
15 minute summer	S10	1.002	Soakaway 2	108.7	1.251	0.984	3.2385
480 minute winter	Soakaway 2	Infiltration		1.2			

Results for 100 year +30% CC Critical Storm Duration. Lowest mass balance: 99.95%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S1	9	83.709	0.109	16.1	0.1231	0.0000	OK
15 minute summer	S2	8	83.707	0.232	73.2	0.2627	0.0000	OK
15 minute summer	S3	9	83.568	0.468	53.8	0.5298	0.0000	SURCHARGED
15 minute summer	S4	9	83.541	0.582	92.9	1.0280	0.0000	SURCHARGED
15 minute summer	S5	9	83.480	0.648	117.1	1.1459	0.0000	SURCHARGED
15 minute summer	S6	9	83.446	0.653	199.5	1.1534	0.0000	SURCHARGED
15 minute summer	S7	9	83.269	0.570	307.9	1.0076	0.0000	SURCHARGED
180 minute winter	Soakaway 1	168	83.013	0.338	63.0	177.8338	0.0000	OK
15 minute summer	S8	8	83.831	0.306	112.3	0.5411	0.0000	OK
15 minute summer	S9	8	83.678	0.269	156.8	0.4755	0.0000	OK
15 minute summer	S10	9	83.491	0.416	142.1	0.7343	0.0000	SURCHARGED
600 minute winter	Soakaway 2	585	83.117	0.157	10.8	117.5924	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
15 minute summer	S1	3.000	S2	16.2	0.411	0.212	1.0297
15 minute summer	S2	3.001	S7	63.3	1.212	0.832	1.1348
15 minute summer	S3	2.000	S4	45.8	0.840	0.645	1.1268
15 minute summer	S4	2.001	S5	103.1	0.972	0.927	1.8361
15 minute summer	S5	2.002	S6	129.0	0.815	0.807	2.4945
15 minute summer	S6	2.003	S7	207.7	1.311	1.301	6.0356
15 minute summer	S7	2.004	Soakaway 1	313.7	1.989	1.964	1.4749
180 minute winter	Soakaway 1	Infiltration		10.5			
15 minute summer	S8	1.000	S9	100.6	1.109	0.907	3.3789
15 minute summer	S9	1.001	S10	142.1	1.536	0.751	3.5050
15 minute summer	S10	1.002	Soakaway 2	143.5	1.349	1.299	3.7020
600 minute winter	Soakaway 2	Infiltration		1.3			