



ENGINEERING INFRASTRUCTURE TECHNICAL NOTE FOR AMENDMENT APPLICATION TO NEIGHBOURHOOD CENTRE at Kilternan Village Development, Kilternan, Dublin 18. Reg.Ref.LRD24A/0597



PROJECT: KV NEIGHBOORHOOD CTR AMENDMENT-2104
CLIENT: LISCOVE LTD
DATE: JULY 2026
ISSUE NO: PLANNING AMENDMENT
ISSUED BY: ROGER MULLARKEY

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1.0 Introduction

- 1.1 This document relates to the Amendment application to the Neighbourhood Centre cell and addition of a MUGA area within the permitted LRD Ref. LRD24A/0597 on lands at Wayside, Enniskerry Road, Kiltarnan, Dublin 18. Specifically, this report deals with the Drainage & Water Infrastructure design.
- 1.3 The main permission under LRD24A/0597 contained all of the technical detail relating to the drainage and water infrastructural elements, including the Site Specific Flood Risk Assessment, Stormwater Impact Assessment and SuDS Audit.
- 1.4 Please refer to Thornton O'Connor Planning Consultants for a full development description.

2.0 Drainage & Water Proposed Modifications

- 2.1 The cell containing the permitted Neighbourhood Centre and 30No.duplex units is proposed to be amended to an increased retail/commercial unit with undercroft parking and a 1No. apartment block with 31No.apartments. There is also a DLR requested MUGA area included in the amendment application.
- 2.2 The proposed roof area for the retail/commercial unit is c.3,513m² and 850m² for the apartment block. As the proposed net green roof for the retail commercial block is 2065m², the percentage coverage is 59% and an intensive green roof is proposed here. The apartment block net green roof area is 603m² which results in a percentage coverage of 71% and an extensive green roof is proposed here. It is proposed that the provision of the green roofs is compliant with the DLR policy.
- 2.3 The access road is to be drained by sheet flow to the 5No. adjacent tree pits, bio-retention area and the permeable car parking areas. All impermeable paved surfaces are drained via a SuDS element. A below ground S/W piped system is to be installed to collect excess run-off from the drained SuDS features before outfalling into a below ground void arched attenuation system similar to that previously permitted. The attenuated outflow rate is restricted to 2 l/s as was previously approved as part of the overall LRD scheme.
- 2.4 Downstream of the attenuation area/hydrobrake manhole (SMh58B Hb), it is proposed to connect into the Kiltarnan Village Phase 1 (D23A/0616) existing constructed S/W network at the existing manhole SMh58.

- 2.5 As the amended NC drained area and attenuated outfall rate are similar to that already approved under the LRD scheme, there is a negligible impact on the overall LRD S/W scheme designed and constructed under the current Ph1(D23A/0616). MicroDrainage model calculations were prepared (annotated in appendix) for the amended configuration and included 20% Climate Change. The resulting attenuation volume of **274m³** was increased by 10% to allow for the Urban Creep factor as required by DLR, resulting in an overall required volume of **302m³**. The void arched attenuation storage system proposed has a design capacity of **312m³**. Therefore, it is proposed that there is more than the required storage volume proposed for this amendment application. Summary calculations for the amended NC attenuation storage are included in the appendix of this report.
- 2.6 As part of the assessment for blockages in the system, the MicroDrainage design model was run on the basis that there was a near 100% blockage of the outfall vortex control devices for a 120 minute period. Therefore, the model was run with a reduction in the outfall rate in the Hydrobrake down to 0.1 l/s for a 120min duration in the Q100 + 20% event. These resulting volumes and top water level are contained beneath the ground level in the storage area. Refer to Appendix 4.1 for these calculation results.
- 2.7 The undercroft parking area includes a sub-ground drainage piped network collecting the run-off from the roof of the retail/commercial block that in turn outfalls to the attenuation system. Furthermore, a secondary below ground drainage system has been included in the application and is intended to capture any residual water that may enter the undercroft area via snow covered car roofs or through ventilation grills. This secondary drainage network passes through a Class 1 Bypass interceptor before connection to the foul drainage network. Refer to Dwg.No.2104NC/03 for layout of the drainage of the undercroft parking area.
- 2.8 The foul drainage serving the retail/commercial block is collected in the below ground pipework under the undercroft parking area before outfalling to the existing overall developments constructed drainage system. The 31No.unit apartment block foul drainage is collected in a piped network and connected to the existing overall developments drainage network. Refer to Dwg.No.2104NC/02 for the proposed layout. As the overall foul drainage network serving the Kiltarnan Village Phase 1 scheme (Reg.Ref D23A/0616) has been substantially completed, there is 1No.additional manhole (FMh68A) to be installed on the existing pipeline to accommodate this proposed amended alignment.

- 2.9 The proposed amendment to the permitted watermain network is minimal and a GA drawing of same is prepared and be viewed on Dwg.No.2140NC/01.
- 2.10 The proposed MUGA area is located above the existing attenuation Storage 1 area. The surface of the MUGA is proposed to be a permeable surface material which allows the local rainfall to infiltrate vertically downwards into the existing void arched attenuation tank. The system manufacturers have been consulted and it has been confirmed that there is no loading concerns in placing the MUGA above the storage system. A minimum of c.2.4m cover is maintained above the void arches. In fact, as the proposed MUGA finished surface level of 133.15mOD is c.>1.5m lower than the previously designed surface level and therefore there is less vertical loading applied to the void arches.
- 2.11 Refer to the following drawings submitted with the amendment application;
- Dwg.No.2104NC/01 –Levels & Watermain GA
 - Dwg.No.2104NC/02 –Drainage GA
 - Dwg.No.2104NC/03 –Undercroft Drainage GA
 - Dwg.No.2104NC/04 –SuDS Details
 - Dwg.No.2104NC/05 –Watermain Hydrant Circles

3.0 Summary

- 3.1 The amendment application includes Green Roofs in compliance with the DLR policy, permeable paved car parking areas, 5No.tree pits and 1No.Bio-retention area.
- 3.2 Localised changes to the recently constructed Ph1 (D23A/0616) drainage and water network are minimal.

Appendices

- 4.1 *MicroDrainage Drainage Calculations*
- 4.2 *Attenuation Storage System & Calculations & Details*
- 4.3 *Bypass Separator Data*
- 4.4 *Green Roof Information*

Appendix 4.1

Micro Drainage Calculations



Roger Mullarkey & Associates		Page 1
Duncreevan Kilcock Co. Kildare, Ireland	Kilternan LRD Stage 3 June'24 Post S/W Audit	
Date 10/07/2026 17:30	Designed by R.M.	
File Kilternan Master LRD ALTERNATE N...	Checked by	
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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - Scotland and Ireland

Return Period (years)	2	PIMP (%)	100
M5-60 (mm)	16.500	Add Flow / Climate Change (%)	0
Ratio R	0.277	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	90	Maximum Backdrop Height (m)	3.000
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.500
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	1.000	Min Slope for Optimisation (1:X)	180

Designed with Level Soffits

Time Area Diagram for Storm at outfall SExisting Mh (pipe S1.022)

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.710	4-8	4.454	8-12	1.013	12-16	0.008

Total Area Contributing (ha) = 6.185

Total Pipe Volume (m³) = 263.550

Time Area Diagram at outfall SGlenamuck Rd (pipe S22.004)

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.118	4-8	0.024

Total Area Contributing (ha) = 0.142

Total Pipe Volume (m³) = 4.750

Time Area Diagram at outfall S (pipe S23.007)

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.314	4-8	0.094

Total Area Contributing (ha) = 0.408

Total Pipe Volume (m³) = 9.044

Time Area Diagram at outfall S (pipe S24.009)

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.384	4-8	0.693

Total Area Contributing (ha) = 1.076

Total Pipe Volume (m³) = 47.974

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Duncreevan	Kilternan LRD Stage 3	
Kilcock	June'24	
Co. Kildare, Ireland	Post S/W Audit	
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Network Design Table for Storm

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	33.812	0.339	99.7	0.129	6.00	0.0	0.600	o	300	Pipe/Conduit	
S1.001	26.400	0.299	88.3	0.055	0.00	0.0	0.600	o	300	Pipe/Conduit	
S2.000	38.370	0.389	98.5	0.104	6.00	0.0	0.600	o	225	Pipe/Conduit	
S1.002	17.656	0.234	75.5	0.065	0.00	0.0	0.600	o	375	Pipe/Conduit	
S1.003	38.882	0.972	40.0	0.061	0.00	0.0	0.600	o	375	Pipe/Conduit	
S1.004	9.096	0.227	40.0	0.017	0.00	0.0	0.600	o	375	Pipe/Conduit	
S3.000	30.075	0.376	80.0	0.171	6.00	0.0	0.600	o	300	Pipe/Conduit	
S3.001	9.985	0.125	79.9	0.024	0.00	0.0	0.600	o	300	Pipe/Conduit	
S3.002	38.334	0.475	80.7	0.094	0.00	0.0	0.600	o	300	Pipe/Conduit	
S3.003	11.243	0.147	76.5	0.068	0.00	0.0	0.600	o	300	Pipe/Conduit	
S4.000	24.743	0.287	86.2	0.080	6.00	0.0	0.600	o	225	Pipe/Conduit	
S4.001	12.820	0.110	116.5	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S3.004	62.605	0.965	64.9	0.117	0.00	0.0	0.600	o	450	Pipe/Conduit	
S5.000	43.356	0.701	61.8	0.025	4.00	0.0	0.600	o	225	Pipe/Conduit	
S3.005	30.193	0.315	95.9	0.118	0.00	0.0	0.600	o	450	Pipe/Conduit	
S3.006	32.421	0.531	61.1	0.092	0.00	0.0	0.600	o	450	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	E I.Area (ha)	E Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	45.35	6.36	140.810	0.129	0.0	0.0	0.0	1.57	111.3	21.2
S1.001	44.60	6.62	140.450	0.184	0.0	0.0	0.0	1.67	118.3	29.7
S2.000	44.98	6.49	140.540	0.104	0.0	0.0	0.0	1.32	52.4	16.9
S1.002	44.21	6.76	140.050	0.354	0.0	0.0	0.0	2.09	230.6	56.5
S1.003	43.61	6.99	139.472	0.415	0.0	0.0	0.0	2.87	317.2	65.3
S1.004	43.47	7.04	138.500	0.431	0.0	0.0	0.0	2.87	317.2	67.7
S3.000	45.57	6.28	141.520	0.171	0.0	0.0	0.0	1.76	124.4	28.1
S3.001	45.29	6.38	141.144	0.195	0.0	0.0	0.0	1.76	124.5	31.8
S3.002	44.26	6.74	141.020	0.289	0.0	0.0	0.0	1.75	123.8	46.1
S3.003	43.98	6.85	140.540	0.356	0.0	0.0	0.0	1.80	127.2	56.6
S4.000	45.54	6.29	141.430	0.080	0.0	0.0	0.0	1.41	56.0	13.2
S4.001	45.03	6.47	141.140	0.080	0.0	0.0	0.0	1.21	48.1	13.2
S3.004	42.90	7.26	140.270	0.554	0.0	0.0	0.0	2.53	402.0	85.8
S5.000	51.98	4.43	140.640	0.025	0.0	0.0	0.0	1.67	66.3	4.7
S3.005	42.30	7.50	139.300	0.697	0.0	0.0	0.0	2.08	330.3	106.5
S3.006	41.80	7.71	138.985	0.789	0.0	0.0	0.0	2.61	414.4	119.2

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Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.005	3.256	0.048	67.8	0.033	0.00	0.0	0.600	o	600	Pipe/Conduit	
S1.006	11.579	0.045	257.3	0.011	0.00	0.0	0.600	o	600	Pipe/Conduit	
S1.007	14.180	0.095	149.3	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S6.000	49.472	0.883	56.0	0.096	6.00	0.0	0.600	o	225	Pipe/Conduit	
S6.001	27.422	0.946	29.0	0.092	0.00	0.0	0.600	o	300	Pipe/Conduit	
S6.002	42.378	0.314	135.0	0.099	0.00	0.0	0.600	o	300	Pipe/Conduit	
S6.003	13.410	0.447	30.0	0.028	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.008	18.824	0.157	119.9	0.009	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.009	52.833	0.440	120.1	0.116	0.00	0.0	0.600	o	375	Pipe/Conduit	
S7.000	24.973	0.250	99.9	0.046	6.00	0.0	0.600	o	300	Pipe/Conduit	
S7.001	20.101	0.201	100.0	0.090	0.00	0.0	0.600	o	300	Pipe/Conduit	
S7.002	30.568	0.255	119.9	0.094	0.00	0.0	0.600	o	300	Pipe/Conduit	
S7.003	13.481	0.112	120.4	0.038	0.00	0.0	0.600	o	300	Pipe/Conduit	
S7.004	28.441	0.237	120.0	0.040	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.010	47.284	0.394	120.0	0.090	0.00	0.0	0.600	o	450	Pipe/Conduit	
S1.011	28.492	0.570	50.0	0.135	0.00	0.0	0.600	o	450	Pipe/Conduit	
S1.012	25.325	0.122	207.6	0.017	0.00	0.0	0.600	o	600	Pipe/Conduit	
S8.000	24.985	0.999	25.0	0.078	4.00	0.0	0.600	o	225	Pipe/Conduit	
S8.001	20.163	0.672	30.0	0.045	0.00	0.0	0.600	o	225	Pipe/Conduit	
S8.002	12.595	0.210	60.0	0.057	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.005	41.76	7.73	138.200	1.254	0.0	0.0	0.0	2.96	836.9	189.1
S1.006	41.46	7.86	136.750	1.266	0.0	0.0	0.0	1.51	427.9	189.5
S1.007	53.03	4.18	136.650	0.000	30.0	0.0	0.0	1.28	90.8	30.0
S6.000	45.03	6.47	139.210	0.096	0.0	0.0	0.0	1.75	69.6	15.6
S6.001	44.59	6.63	138.260	0.188	0.0	0.0	0.0	2.93	207.2	30.3
S6.002	43.19	7.15	137.310	0.286	0.0	0.0	0.0	1.35	95.5	44.7
S6.003	42.99	7.23	136.996	0.314	0.0	0.0	0.0	2.88	203.7	48.8
S1.008	42.44	7.45	135.350	0.323	30.0	0.0	0.0	1.43	101.4	79.5
S1.009	41.18	7.98	135.120	0.439	30.0	0.0	0.0	1.65	182.5	95.2
S7.000	45.63	6.26	135.220	0.046	0.0	0.0	0.0	1.57	111.2	7.6
S7.001	45.01	6.48	134.980	0.136	0.0	0.0	0.0	1.57	111.1	22.1
S7.002	44.02	6.83	134.780	0.230	0.0	0.0	0.0	1.43	101.4	36.5
S7.003	43.60	6.99	134.520	0.268	0.0	0.0	0.0	1.43	101.2	42.1
S7.004	42.75	7.32	134.410	0.307	0.0	0.0	0.0	1.43	101.4	47.4
S1.010	40.24	8.40	133.980	0.836	30.0	0.0	0.0	1.85	295.0	151.5
S1.011	39.88	8.57	133.300	0.970	30.0	0.0	0.0	2.88	458.2	169.8
S1.012	39.37	8.82	131.500	0.987	30.0	0.0	0.0	1.69	476.8	170.3
S8.000	53.14	4.16	138.510	0.078	0.0	0.0	0.0	2.63	104.5	14.9
S8.001	52.54	4.30	137.510	0.123	0.0	0.0	0.0	2.40	95.3	23.3
S8.002	52.03	4.42	136.830	0.179	0.0	0.0	0.0	1.69	67.3	33.7

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S8.003	55.339	0.922	60.0	0.059	0.00	0.0	0.600	o	300	Pipe/Conduit	
S8.004	20.225	0.337	60.0	0.089	0.00	0.0	0.600	o	300	Pipe/Conduit	
S9.000	28.233	0.387	73.0	0.038	4.00	0.0	0.600	o	225	Pipe/Conduit	
S8.005	8.527	0.426	20.0	0.041	0.00	0.0	0.600	o	300	Pipe/Conduit	
S8.006	20.255	1.013	20.0	0.014	0.00	0.0	0.600	o	600	Pipe/Conduit	
S1.013	45.182	0.400	113.0	0.055	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.014	8.407	0.191	44.0	0.066	0.00	0.0	0.600	o	450	Pipe/Conduit	
S1.015	17.953	0.211	85.1	0.011	0.00	0.0	0.600	o	600	Pipe/Conduit	
S10.000	37.341	0.467	80.0	0.062	8.00	0.0	0.600	o	300	Pipe/Conduit	
S11.000	33.089	0.276	120.0	0.098	4.00	0.0	0.600	o	300	Pipe/Conduit	
S11.001	15.353	0.128	120.0	0.066	0.00	0.0	0.600	o	300	Pipe/Conduit	
S10.001	16.798	0.210	80.0	0.040	0.00	0.0	0.600	o	375	Pipe/Conduit	
S12.000	25.931	0.259	100.1	0.122	6.00	0.0	0.600	o	300	Pipe/Conduit	
S12.001	32.766	0.327	100.2	0.033	0.00	0.0	0.600	o	300	Pipe/Conduit	
S10.002	24.348	0.298	81.7	0.024	0.00	0.0	0.600	o	375	Pipe/Conduit	
S10.003	39.509	0.263	150.0	0.046	0.00	0.0	0.600	o	375	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S8.003	50.25	4.88	136.490	0.239	0.0	0.0	0.0	2.03	143.7	43.3
S8.004	49.63	5.04	135.570	0.327	0.0	0.0	0.0	2.03	143.7	58.7
S9.000	52.51	4.31	135.800	0.038	0.0	0.0	0.0	1.53	60.9	7.1
S8.005	49.49	5.08	135.200	0.406	0.0	0.0	0.0	3.53	249.6	72.5
S8.006	49.27	5.14	132.500	0.420	0.0	0.0	0.0	5.46	1544.3	74.6
S1.013	51.68	4.51	131.350	0.000	50.0	0.0	0.0	1.48	104.5	50.0
S1.014	51.49	4.55	130.659	0.066	50.0	0.0	0.0	3.07	488.4	62.3
S1.015	51.05	4.67	129.500	0.078	50.0	0.0	0.0	2.64	746.8	64.3
S10.000	40.34	8.35	140.800	0.062	0.0	0.0	0.0	1.76	124.4	9.0
S11.000	52.19	4.38	140.900	0.098	0.0	0.0	0.0	1.43	101.4	18.4
S11.001	51.46	4.56	140.620	0.163	0.0	0.0	0.0	1.43	101.4	30.3
S10.001	40.05	8.49	140.300	0.265	0.0	0.0	0.0	2.03	223.9	38.3
S12.000	45.59	6.28	141.000	0.122	0.0	0.0	0.0	1.57	111.1	20.1
S12.001	44.60	6.62	140.741	0.156	0.0	0.0	0.0	1.57	111.0	25.1
S10.002	39.62	8.69	140.090	0.445	0.0	0.0	0.0	2.01	221.5	63.7
S10.003	38.72	9.14	139.660	0.491	0.0	0.0	0.0	1.48	163.1	68.7

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Innovyze	Network 2020.1.3	

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S13.000	28.774	0.429	67.1	0.236	4.00	0.0	0.600	o	300	Pipe/Conduit	
S14.000	24.146	0.241	100.2	0.093	4.00	0.0	0.600	o	300	Pipe/Conduit	
S13.001	7.121	0.059	120.7	0.040	0.00	0.0	0.600	o	300	Pipe/Conduit	
S13.002	18.699	0.093	200.0	0.021	0.00	0.0	0.600	o	450	Pipe/Conduit	
S13.003	9.908	0.083	119.4	0.015	0.00	0.0	0.600	o	225	Pipe/Conduit	
S13.004	5.344	0.045	120.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S10.004	40.749	0.272	149.8	0.078	0.00	0.0	0.600	o	375	Pipe/Conduit	
S10.005	4.422	0.029	152.5	0.021	0.00	0.0	0.600	o	375	Pipe/Conduit	
S10.006	36.693	0.155	236.7	0.026	0.00	0.0	0.600	o	600	Pipe/Conduit	
S10.007	7.609	0.044	172.9	0.056	0.00	0.0	0.600	o	225	Pipe/Conduit	
S10.008	25.517	0.172	148.4	0.058	0.00	0.0	0.600	o	225	Pipe/Conduit	
S10.009	52.902	1.079	49.0	0.117	0.00	0.0	0.600	o	300	Pipe/Conduit	
S10.010	26.211	1.006	26.1	0.053	0.00	0.0	0.600	o	300	Pipe/Conduit	
S10.011	6.682	0.327	20.5	0.010	0.00	0.0	0.600	o	300	Pipe/Conduit	
S15.000	21.354	0.267	80.0	0.137	4.00	0.0	0.600	o	375	Pipe/Conduit	
S16.000	25.721	0.322	80.0	0.097	4.00	0.0	0.600	o	225	Pipe/Conduit	
S15.001	28.157	0.282	99.8	0.002	0.00	0.0	0.600	o	375	Pipe/Conduit	
S15.002	25.423	0.254	100.1	0.070	0.00	0.0	0.600	o	375	Pipe/Conduit	
S15.003	12.459	0.125	99.7	0.023	0.00	0.0	0.600	o	375	Pipe/Conduit	

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Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S13.000	52.75	4.25	141.200	0.236	0.0	0.0	0.0	1.92	135.9	44.9
S14.000	52.72	4.26	141.000	0.093	0.0	0.0	0.0	1.57	111.0	17.7
S13.001	52.38	4.34	140.000	0.369	0.0	0.0	0.0	1.43	101.1	69.7
S13.002	51.49	4.56	139.700	0.390	0.0	0.0	0.0	1.43	228.1	72.5
S13.003	50.94	4.69	139.620	0.405	0.0	0.0	0.0	1.20	47.5	74.5
S13.004	50.65	4.77	139.520	0.405	0.0	0.0	0.0	1.19	47.4	74.5
S10.004	37.85	9.60	139.400	0.974	0.0	0.0	0.0	1.48	163.2	133.1
S10.005	37.76	9.65	139.130	0.995	0.0	0.0	0.0	1.46	161.8	135.7
S10.006	37.06	10.04	139.110	1.022	0.0	0.0	0.0	1.58	446.3	136.7
S10.007	53.28	4.13	138.950	0.000	10.0	0.0	0.0	0.99	39.4	10.0
S10.008	51.61	4.52	138.900	0.058	10.0	0.0	0.0	1.07	42.6	20.0
S10.009	50.10	4.92	138.680	0.176	10.0	0.0	0.0	2.25	159.1	41.0
S10.010	49.58	5.06	137.600	0.228	10.0	0.0	0.0	3.09	218.6	50.9
S10.011	49.46	5.09	136.560	0.239	10.0	0.0	0.0	3.49	246.8	52.6
S15.000	53.07	4.18	139.850	0.137	0.0	0.0	0.0	2.03	223.9	26.2
S16.000	52.57	4.29	140.950	0.097	0.0	0.0	0.0	1.46	58.2	18.5
S15.001	51.51	4.55	139.550	0.237	0.0	0.0	0.0	1.81	200.3	44.0
S15.002	50.59	4.79	139.260	0.306	0.0	0.0	0.0	1.81	200.0	56.0
S15.003	50.16	4.90	139.000	0.330	0.0	0.0	0.0	1.81	200.5	59.7

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Roger Mullarkey & Associates		Page 6
Duncreevan	Kilternan LRD Stage 3	
Kilcock	June'24	
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Date 10/07/2026 17:30	Designed by R.M.	
File Kilternan Master LRD ALTERNATE N...	Checked by	
Innovyze	Network 2020.1.3	

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S17.000	56.062	0.820	68.4	0.138	6.00	0.0	0.600	o	300	Pipe/Conduit	
S15.004	21.046	0.210	100.2	0.078	0.00	0.0	0.600	o	375	Pipe/Conduit	
S15.005	35.877	0.422	85.0	0.080	0.00	0.0	0.600	o	375	Pipe/Conduit	
S15.006	34.315	0.429	80.0	0.129	0.00	0.0	0.600	o	375	Pipe/Conduit	
S18.000	9.277	0.093	100.0	0.034	4.00	0.0	0.600	o	225	Pipe/Conduit	
S18.001	47.815	0.912	52.4	0.113	0.00	0.0	0.600	o	225	Pipe/Conduit	
S18.002	42.670	1.255	34.0	0.182	0.00	0.0	0.600	o	300	Pipe/Conduit	
S15.007	65.208	1.124	58.0	0.193	0.00	0.0	0.600	o	450	Pipe/Conduit	
S15.008	8.108	0.111	73.0	0.123	0.00	0.0	0.600	o	450	Pipe/Conduit	
S15.009	20.506	0.101	203.0	0.024	0.00	0.0	0.600	o	450	Pipe/Conduit	
S15.010	34.067	0.236	144.4	0.015	0.00	0.0	0.600	o	225	Pipe/Conduit	
S19.000	30.201	1.041	29.0	0.070	4.00	0.0	0.600	o	225	Pipe/Conduit	
S19.001	12.633	0.431	29.3	0.018	0.00	0.0	0.600	o	225	Pipe/Conduit	
S19.002	23.946	0.368	65.1	0.034	0.00	0.0	0.600	o	225	Pipe/Conduit	
S19.003	14.637	0.225	65.0	0.039	0.00	0.0	0.600	o	225	Pipe/Conduit	
S19.004	10.511	0.133	79.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S19.005	34.068	1.136	30.0	0.054	0.00	0.0	0.600	o	225	Pipe/Conduit	
S15.011	41.041	0.354	115.9	0.143	0.00	0.0	0.600	o	300	Pipe/Conduit	
S15.012	40.961	0.116	354.4	0.038	0.00	0.0	0.600	o	600	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S17.000	44.97	6.49	141.000	0.138	0.0	0.0	0.0	1.90	134.6	22.3
S15.004	44.43	6.68	138.850	0.545	0.0	0.0	0.0	1.81	199.9	87.5
S15.005	43.61	6.99	138.640	0.625	0.0	0.0	0.0	1.97	217.2	98.4
S15.006	42.88	7.27	138.220	0.754	0.0	0.0	0.0	2.03	223.9	116.7
S18.000	53.32	4.12	141.170	0.034	0.0	0.0	0.0	1.31	52.0	6.5
S18.001	51.48	4.56	141.050	0.146	0.0	0.0	0.0	1.81	72.0	27.2
S18.002	50.46	4.82	140.030	0.329	0.0	0.0	0.0	2.71	191.2	59.9
S15.007	41.88	7.68	137.700	1.276	0.0	0.0	0.0	2.67	425.2	192.9
S15.008	41.75	7.73	136.580	1.399	0.0	0.0	0.0	2.38	378.7	210.9
S15.009	41.19	7.97	135.920	1.423	0.0	0.0	0.0	1.42	226.3	211.7
S15.010	51.62	4.52	135.700	0.000	6.0	0.0	0.0	1.09	43.2	6.0
S19.000	52.94	4.21	140.200	0.070	0.0	0.0	0.0	2.44	97.0	13.5
S19.001	52.57	4.29	139.159	0.088	0.0	0.0	0.0	2.43	96.4	16.8
S19.002	51.56	4.54	138.728	0.123	0.0	0.0	0.0	1.62	64.6	22.9
S19.003	50.96	4.69	138.360	0.162	0.0	0.0	0.0	1.62	64.6	29.8
S19.004	50.51	4.81	138.130	0.162	0.0	0.0	0.0	1.47	58.5	29.8
S19.005	49.62	5.04	137.500	0.216	0.0	0.0	0.0	2.40	95.3	38.7
S15.011	47.99	5.51	135.380	0.359	6.0	0.0	0.0	1.46	103.2	68.2
S15.012	46.29	6.04	135.020	0.397	6.0	0.0	0.0	1.29	364.1	72.3

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Duncreevan	Kilternan LRD Stage 3	
Kilcock	June'24	
Co. Kildare, Ireland	Post S/W Audit	
Date 10/07/2026 17:30	Designed by R.M.	
File Kilternan Master LRD ALTERNATE N...	Checked by	
Innovyze	Network 2020.1.3	

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S20.000	13.317	0.166	80.0	0.027	4.00	0.0	0.600	o	225	Pipe/Conduit	
S20.001	22.075	0.110	200.0	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
S15.013	22.284	0.186	119.8	0.048	0.00	0.0	0.600	o	225	Pipe/Conduit	
S10.012	12.180	0.122	100.0	0.024	0.00	0.0	0.600	o	300	Pipe/Conduit	
S10.013	28.539	0.285	100.0	0.024	0.00	0.0	0.600	o	300	Pipe/Conduit	
S10.014	29.525	0.984	30.0	0.033	0.00	0.0	0.600	o	300	Pipe/Conduit	
S10.015	28.903	0.500	57.8	0.041	0.00	0.0	0.600	o	600	Pipe/Conduit	
S1.016	37.394	0.831	45.0	0.031	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.017	35.441	1.772	20.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.018	38.753	1.938	20.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.019	34.116	0.853	40.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.020	13.590	0.412	33.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S21.000	15.759	0.050	315.2	0.000	4.00	2.0	0.600	o	450	Pipe/Conduit	
S1.021	10.662	0.089	120.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.022	8.163	0.068	120.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S22.000	29.214	0.487	60.0	0.096	4.00	0.0	0.600	o	300	Pipe/Conduit	
S22.001	4.899	0.024	204.1	0.014	0.00	0.0	0.600	o	450	Pipe/Conduit	
S22.002	8.910	0.074	120.4	0.008	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S20.000	53.17	4.15	137.500	0.027	0.0	0.0	0.0	1.46	58.2	5.3
S20.001	52.09	4.41	135.000	0.027	0.0	0.0	0.0	1.43	228.1	5.3
S15.013	52.49	4.31	134.890	0.000	5.0	0.0	0.0	1.19	47.5	5.0
S10.012	49.00	5.22	134.630	0.263	15.0	0.0	0.0	1.57	111.1	61.6
S10.013	47.96	5.52	134.620	0.287	15.0	0.0	0.0	1.57	111.1	64.7
S10.014	47.40	5.69	132.800	0.320	15.0	0.0	0.0	2.88	203.7	69.8
S10.015	46.92	5.84	129.800	0.361	15.0	0.0	0.0	3.21	906.8	76.1
S1.016	52.69	4.27	129.200	0.000	42.0	0.0	0.0	2.35	166.1	42.0
S1.017	51.99	4.43	128.370	0.000	42.0	0.0	0.0	3.53	249.6	42.0
S1.018	51.25	4.62	126.600	0.000	42.0	0.0	0.0	3.53	249.7	42.0
S1.019	50.37	4.84	124.660	0.000	42.0	0.0	0.0	2.49	176.2	42.0
S1.020	50.06	4.93	123.750	0.000	42.0	0.0	0.0	2.75	194.1	42.0
S21.000	52.83	4.23	123.430	0.000	2.0	0.0	0.0	1.14	181.3	2.0
S1.021	49.61	5.05	122.060	0.000	44.0	0.0	0.0	1.43	101.4	44.0
S1.022	49.26	5.14	121.970	0.000	44.0	0.0	0.0	1.43	101.4	44.0
S22.000	52.80	4.24	134.620	0.096	0.0	0.0	0.0	2.03	143.7	18.2
S22.001	52.55	4.30	134.000	0.110	0.0	0.0	0.0	1.42	225.7	20.8
S22.002	53.29	4.12	133.870	0.000	1.5	0.0	0.0	1.19	47.3	1.5

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S22.003	24.719	0.206	120.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S22.004	14.303	0.715	20.0	0.025	0.00	0.0	0.600	o	225	Pipe/Conduit	
S23.000	20.582	0.257	80.1	0.033	4.00	0.0	0.600	o	300	Pipe/Conduit	
S23.001	31.531	0.394	80.0	0.050	0.00	0.0	0.600	o	300	Pipe/Conduit	
S23.002	33.707	0.421	80.0	0.109	0.00	0.0	0.600	o	300	Pipe/Conduit	
S23.003	8.329	0.139	60.0	0.122	0.00	0.0	0.600	o	300	Pipe/Conduit	
S23.004	17.817	0.073	244.1	0.036	0.00	0.0	0.600	o	300	Pipe/Conduit	
S23.005	9.399	0.085	110.6	0.059	0.00	0.0	0.600	o	225	Pipe/Conduit	
S23.006	12.146	0.101	120.3	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S23.007	6.866	0.057	120.5	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S24.000	22.728	1.136	20.0	0.069	4.00	0.0	0.600	o	225	Pipe/Conduit	
S24.001	52.087	1.736	30.0	0.124	0.00	0.0	0.600	o	225	Pipe/Conduit	
S25.000	20.287	0.203	100.0	0.059	4.00	0.0	0.600	o	225	Pipe/Conduit	
S24.002	51.014	0.855	59.7	0.121	0.00	0.0	0.600	o	375	Pipe/Conduit	
S24.003	20.698	0.342	60.5	0.064	0.00	0.0	0.600	o	375	Pipe/Conduit	
S24.004	43.564	0.726	60.0	0.059	0.00	0.0	0.600	o	375	Pipe/Conduit	
S24.005	32.234	0.161	200.0	0.049	0.00	0.0	0.600	o	600	Pipe/Conduit	
S26.000	37.265	0.373	100.0	0.072	4.00	0.0	0.600	o	225	Pipe/Conduit	
S26.001	43.747	0.437	100.1	0.069	0.00	0.0	0.600	o	225	Pipe/Conduit	
S26.002	11.219	0.187	60.0	0.054	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S22.003	51.84	4.47	133.800	0.000	1.5	0.0	0.0	1.19	47.4	1.5
S22.004	51.51	4.55	133.594	0.025	1.5	0.0	0.0	2.94	116.9	6.1
S23.000	52.99	4.20	138.340	0.033	0.0	0.0	0.0	1.76	124.3	6.3
S23.001	51.74	4.49	138.080	0.083	0.0	0.0	0.0	1.76	124.4	15.5
S23.002	50.49	4.81	137.690	0.192	0.0	0.0	0.0	1.76	124.4	34.9
S23.003	50.23	4.88	137.270	0.313	0.0	0.0	0.0	2.03	143.7	56.8
S23.004	49.15	5.18	137.070	0.349	0.0	0.0	0.0	1.00	70.8	62.0
S23.005	53.28	4.13	136.970	0.000	1.5	0.0	0.0	1.24	49.4	1.5
S23.006	52.56	4.30	136.850	0.000	1.5	0.0	0.0	1.19	47.4	1.5
S23.007	52.16	4.39	136.750	0.000	1.5	0.0	0.0	1.19	47.3	1.5
S24.000	53.27	4.13	134.450	0.069	0.0	0.0	0.0	2.94	116.9	13.3
S24.001	51.75	4.49	133.000	0.193	0.0	0.0	0.0	2.40	95.3	36.1
S25.000	52.71	4.26	129.500	0.059	0.0	0.0	0.0	1.31	52.0	11.3
S24.002	50.34	4.85	129.000	0.374	0.0	0.0	0.0	2.35	259.5	68.0
S24.003	49.79	5.00	128.150	0.438	0.0	0.0	0.0	2.33	257.6	78.7
S24.004	48.68	5.31	127.810	0.497	0.0	0.0	0.0	2.34	258.8	87.3
S24.005	47.62	5.62	127.000	0.546	0.0	0.0	0.0	1.72	485.8	93.8
S26.000	51.82	4.48	132.300	0.072	0.0	0.0	0.0	1.31	52.0	13.5
S26.001	49.67	5.03	131.920	0.141	0.0	0.0	0.0	1.31	52.0	25.4
S26.002	49.27	5.14	131.480	0.196	0.0	0.0	0.0	1.69	67.3	34.8

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Duncreevan Kilcock Co. Kildare, Ireland	Kilternan LRD Stage 3 June'24 Post S/W Audit	
Date 10/07/2026 17:30	Designed by R.M.	
File Kilternan Master LRD ALTERNATE N...	Checked by	
Innovyze	Network 2020.1.3	

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S27.000	41.246	0.412	100.0	0.066	4.00	0.0	0.600	o	225	Pipe/Conduit	
S27.001	42.022	0.408	103.0	0.039	0.00	0.0	0.600	o	225	Pipe/Conduit	
S26.003	6.815	0.170	40.1	0.021	0.00	0.0	0.600	o	300	Pipe/Conduit	
S26.004	9.194	0.383	24.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S28.000	23.452	0.235	100.0	0.103	4.00	0.0	0.600	o	225	Pipe/Conduit	
S28.001	31.798	0.318	100.0	0.030	0.00	0.0	0.600	o	225	Pipe/Conduit	
S28.002	13.068	0.131	100.0	0.022	0.00	0.0	0.600	o	225	Pipe/Conduit	
S26.005	18.970	0.632	30.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S26.006	16.897	0.068	250.0	0.053	0.00	0.0	0.600	o	600	Pipe/Conduit	
S24.006	8.488	0.141	60.2	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S24.007	59.502	0.593	100.4	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S24.008	56.744	1.183	47.9	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S24.009	11.151	0.074	150.7	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S27.000	51.61	4.53	131.700	0.066	0.0	0.0	0.0	1.31	52.0	12.4
S27.001	49.53	5.07	131.300	0.106	0.0	0.0	0.0	1.29	51.2	18.9
S26.003	49.11	5.19	130.800	0.323	0.0	0.0	0.0	2.49	176.1	57.3
S26.004	48.94	5.24	130.600	0.323	0.0	0.0	0.0	3.22	227.8	57.3
S28.000	52.54	4.30	131.100	0.103	0.0	0.0	0.0	1.31	52.0	19.5
S28.001	50.91	4.70	130.850	0.133	0.0	0.0	0.0	1.31	52.0	24.4
S28.002	50.27	4.87	130.540	0.155	0.0	0.0	0.0	1.31	52.0	28.1
S26.005	48.56	5.35	130.000	0.478	0.0	0.0	0.0	2.88	203.7	83.8
S26.006	47.93	5.53	127.100	0.531	0.0	0.0	0.0	1.54	434.2	91.9
S24.006	53.47	4.08	126.750	0.000	4.0	0.0	0.0	1.69	67.1	4.0
S24.007	50.37	4.84	126.500	0.000	4.0	0.0	0.0	1.30	51.9	4.0
S24.008	48.57	5.34	125.910	0.000	4.0	0.0	0.0	1.89	75.3	4.0
S24.009	47.97	5.52	124.740	0.000	4.0	0.0	0.0	1.06	42.3	4.0

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	User	-	71	0.022	0.016	0.016
	User	-	37	0.000	0.000	0.016
	User	-	37	0.022	0.008	0.024
	User	-	37	0.001	0.000	0.024
	User	-	37	0.001	0.000	0.025
	User	-	60	0.013	0.008	0.032
	User	-	100	0.022	0.022	0.054
	User	-	70	0.021	0.015	0.069
	User	-	100	0.012	0.012	0.081
	User	-	70	0.031	0.021	0.102
	User	-	37	0.019	0.007	0.109
	User	-	37	0.001	0.000	0.110
	User	-	37	0.001	0.000	0.110
	User	-	37	0.002	0.001	0.111
	User	-	37	0.002	0.001	0.111
	User	-	37	0.004	0.002	0.113
	User	-	37	0.005	0.002	0.115
	User	-	60	0.017	0.010	0.125
	User	-	95	0.001	0.001	0.125
	User	-	71	0.001	0.001	0.126
	User	-	71	0.001	0.001	0.127
	User	-	71	0.001	0.001	0.128
	User	-	71	0.001	0.000	0.128
1.001	User	-	37	0.003	0.001	0.129
	User	-	71	0.017	0.012	0.012
	User	-	37	0.001	0.000	0.012
	User	-	37	0.021	0.008	0.020
	User	-	37	0.001	0.000	0.020
	User	-	60	0.007	0.004	0.025
	User	-	95	0.003	0.003	0.027
	User	-	37	0.002	0.001	0.028
	User	-	37	0.001	0.000	0.028
	User	-	60	0.009	0.005	0.034
	User	-	71	0.012	0.009	0.042
	User	-	37	0.035	0.013	0.055
2.000	User	-	37	0.001	0.000	0.000
	User	-	37	0.000	0.000	0.000
	User	-	37	0.005	0.002	0.002
	User	-	37	0.004	0.002	0.004
	User	-	37	0.000	0.000	0.004
	User	-	37	0.000	0.000	0.004
	User	-	37	0.002	0.001	0.005
	User	-	60	0.013	0.008	0.012
	User	-	70	0.018	0.012	0.025
	User	-	100	0.011	0.011	0.036
	User	-	71	0.004	0.003	0.039
	User	-	37	0.024	0.009	0.048
	User	-	37	0.030	0.011	0.059
	User	-	70	0.018	0.013	0.071
	User	-	70	0.047	0.033	0.104
1.002	User	-	71	0.049	0.034	0.034
	User	-	37	0.001	0.000	0.035
	User	-	37	0.023	0.009	0.043
	User	-	37	0.002	0.001	0.044
	User	-	60	0.011	0.007	0.051
	User	-	71	0.002	0.001	0.052
	User	-	71	0.000	0.000	0.052

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.003	User	-	100	0.013	0.013	0.065
	User	-	71	0.029	0.020	0.020
	User	-	37	0.023	0.008	0.029
	User	-	37	0.003	0.001	0.030
	User	-	37	0.001	0.001	0.031
	User	-	70	0.011	0.008	0.038
	User	-	100	0.007	0.007	0.045
	User	-	95	0.001	0.001	0.046
	User	-	95	0.002	0.002	0.048
	User	-	37	0.034	0.013	0.061
1.004	User	-	37	0.012	0.005	0.005
	User	-	70	0.015	0.010	0.015
	User	-	95	0.002	0.002	0.017
3.000	User	-	95	0.023	0.021	0.021
	User	-	37	0.001	0.000	0.022
	User	-	37	0.009	0.003	0.025
	User	-	37	0.002	0.001	0.026
	User	-	37	0.002	0.001	0.027
	User	-	37	0.009	0.003	0.030
	User	-	60	0.005	0.003	0.033
	User	-	60	0.005	0.003	0.036
	User	-	60	0.003	0.002	0.038
	User	-	60	0.006	0.004	0.041
	User	-	70	0.011	0.007	0.049
	User	-	70	0.021	0.015	0.064
	User	-	100	0.008	0.008	0.072
	User	-	100	0.027	0.027	0.098
	User	-	95	0.001	0.001	0.100
	User	-	95	0.001	0.001	0.101
	User	-	95	0.001	0.001	0.102
	User	-	95	0.002	0.002	0.103
	User	-	37	0.034	0.013	0.116
	User	-	37	0.002	0.001	0.117
	User	-	70	0.023	0.016	0.133
	User	-	100	0.010	0.010	0.143
	User	-	37	0.037	0.014	0.156
	User	-	37	0.002	0.001	0.157
	User	-	37	0.005	0.002	0.159
	User	-	37	0.003	0.001	0.160
	User	-	37	0.002	0.001	0.161
	User	-	37	0.000	0.000	0.161
	User	-	37	0.000	0.000	0.161
	User	-	37	0.001	0.000	0.162
	User	-	37	0.001	0.000	0.162
	User	-	71	0.004	0.003	0.165
	User	-	71	0.001	0.001	0.166
	User	-	71	0.003	0.002	0.167
	User	-	71	0.005	0.004	0.171
3.001	User	-	37	0.000	0.000	0.000
	User	-	60	0.012	0.007	0.007
	User	-	60	0.006	0.004	0.011
3.002	User	-	71	0.018	0.013	0.024
	User	-	37	0.001	0.000	0.000
	User	-	70	0.021	0.014	0.015
	User	-	95	0.001	0.001	0.015
	User	-	37	0.021	0.008	0.023
	User	-	37	0.034	0.013	0.036

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
	User	-	37	0.001	0.001	0.036
	User	-	37	0.001	0.001	0.037
	User	-	37	0.002	0.001	0.038
	User	-	37	0.001	0.001	0.038
	User	-	60	0.022	0.013	0.051
	User	-	37	0.013	0.005	0.056
	User	-	37	0.002	0.001	0.056
	User	-	60	0.005	0.003	0.059
	User	-	60	0.006	0.003	0.063
	User	-	60	0.008	0.005	0.067
	User	-	71	0.037	0.026	0.094
3.003	User	-	37	0.025	0.009	0.009
	User	-	37	0.005	0.002	0.011
	User	-	100	0.034	0.034	0.045
	User	-	37	0.003	0.001	0.046
	User	-	37	0.017	0.006	0.053
	User	-	71	0.020	0.014	0.067
	User	-	71	0.001	0.001	0.068
4.000	User	-	37	0.004	0.001	0.001
	User	-	37	0.001	0.000	0.002
	User	-	37	0.001	0.000	0.002
	User	-	37	0.001	0.000	0.002
	User	-	37	0.001	0.000	0.003
	User	-	37	0.000	0.000	0.003
	User	-	37	0.011	0.004	0.007
	User	-	37	0.000	0.000	0.007
	User	-	60	0.013	0.008	0.015
	User	-	70	0.009	0.007	0.022
	User	-	70	0.014	0.010	0.031
	User	-	92	0.006	0.006	0.037
	User	-	95	0.028	0.027	0.064
	User	-	37	0.045	0.017	0.080
4.001	-	-	100	0.000	0.000	0.000
3.004	User	-	37	0.002	0.001	0.001
	User	-	37	0.003	0.001	0.002
	User	-	60	0.004	0.003	0.005
	User	-	37	0.001	0.000	0.005
	User	-	37	0.001	0.000	0.005
	User	-	37	0.001	0.000	0.006
	User	-	60	0.012	0.007	0.013
	User	-	70	0.015	0.010	0.023
	User	-	100	0.005	0.005	0.028
	User	-	100	0.010	0.010	0.039
	User	-	100	0.012	0.012	0.051
	User	-	100	0.009	0.009	0.060
	User	-	70	0.022	0.015	0.075
	User	-	70	0.014	0.010	0.085
	User	-	100	0.009	0.009	0.094
	User	-	71	0.027	0.019	0.113
	User	-	71	0.006	0.005	0.117
5.000	User	-	37	0.011	0.004	0.004
	User	-	71	0.026	0.018	0.023
	User	-	37	0.001	0.000	0.023
	User	-	37	0.003	0.001	0.024
	User	-	37	0.001	0.000	0.024
	User	-	37	0.003	0.001	0.025
3.005	User	-	71	0.003	0.002	0.002

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
	User	-	37	0.001	0.001	0.003
	User	-	37	0.001	0.000	0.003
	User	-	37	0.001	0.000	0.003
	User	-	37	0.005	0.002	0.005
	User	-	60	0.008	0.005	0.010
	User	-	60	0.013	0.008	0.018
	User	-	60	0.007	0.004	0.022
	User	-	70	0.015	0.010	0.032
	User	-	70	0.031	0.022	0.054
	User	-	100	0.031	0.031	0.085
	User	-	95	0.002	0.002	0.087
	User	-	71	0.002	0.002	0.089
	User	-	37	0.021	0.008	0.096
	User	-	60	0.004	0.003	0.099
	User	-	71	0.016	0.011	0.110
	User	-	71	0.012	0.008	0.118
3.006	User	-	71	0.017	0.012	0.012
	User	-	37	0.003	0.001	0.013
	User	-	37	0.001	0.000	0.013
	User	-	37	0.001	0.000	0.013
	User	-	37	0.003	0.001	0.014
	User	-	37	0.001	0.000	0.015
	User	-	60	0.007	0.004	0.019
	User	-	60	0.007	0.004	0.023
	User	-	70	0.031	0.022	0.045
	User	-	100	0.018	0.018	0.063
	User	-	100	0.018	0.018	0.082
	User	-	95	0.002	0.002	0.083
	User	-	37	0.024	0.009	0.092
1.005	User	-	71	0.035	0.025	0.025
	User	-	37	0.003	0.001	0.026
	User	-	37	0.002	0.001	0.027
	User	-	37	0.001	0.000	0.027
	User	-	60	0.007	0.004	0.031
	User	-	95	0.002	0.002	0.033
1.006	User	-	37	0.031	0.011	0.011
1.007	-	-	100	0.000	0.000	0.000
6.000	User	-	37	0.119	0.044	0.044
	User	-	37	0.018	0.007	0.051
	User	-	37	0.004	0.002	0.052
	User	-	37	0.000	0.000	0.052
	User	-	37	0.000	0.000	0.053
	User	-	37	0.002	0.001	0.053
	User	-	37	0.000	0.000	0.053
	User	-	37	0.000	0.000	0.054
	User	-	37	0.001	0.000	0.054
	User	-	60	0.011	0.007	0.061
	User	-	71	0.032	0.023	0.083
	User	-	100	0.012	0.012	0.095
	User	-	71	0.001	0.001	0.096
6.001	User	-	37	0.082	0.030	0.030
	User	-	37	0.017	0.006	0.036
	User	-	37	0.010	0.004	0.040
	User	-	37	0.001	0.000	0.040
	User	-	60	0.022	0.013	0.053
	User	-	71	0.024	0.017	0.070
	User	-	100	0.022	0.022	0.092

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
6.002	User	-	37	0.087	0.032	0.032
	User	-	71	0.031	0.022	0.054
	User	-	60	0.002	0.001	0.055
	User	-	60	0.004	0.002	0.058
	User	-	60	0.003	0.002	0.060
	User	-	60	0.013	0.008	0.068
	User	-	37	0.002	0.001	0.068
	User	-	37	0.002	0.001	0.069
	User	-	37	0.000	0.000	0.069
	User	-	37	0.001	0.000	0.070
	User	-	37	0.002	0.001	0.070
	User	-	100	0.023	0.023	0.093
	User	-	71	0.001	0.000	0.093
	User	-	37	0.014	0.005	0.099
6.003	User	-	71	0.011	0.008	0.008
	User	-	60	0.007	0.004	0.012
	User	-	37	0.002	0.001	0.013
	User	-	100	0.011	0.011	0.023
	User	-	71	0.000	0.000	0.024
	User	-	71	0.000	0.000	0.024
	User	-	37	0.010	0.004	0.028
1.008	User	-	37	0.009	0.003	0.003
	User	-	37	0.007	0.002	0.006
	User	-	71	0.004	0.003	0.009
1.009	User	-	60	0.007	0.004	0.004
	User	-	60	0.015	0.009	0.013
	User	-	60	0.016	0.009	0.022
	User	-	71	0.027	0.019	0.042
	User	-	37	0.004	0.001	0.043
	User	-	37	0.001	0.000	0.043
	User	-	37	0.000	0.000	0.043
	User	-	37	0.001	0.000	0.044
	User	-	37	0.004	0.002	0.045
	User	-	37	0.014	0.005	0.051
	User	-	70	0.016	0.011	0.062
	User	-	100	0.019	0.019	0.081
	User	-	71	0.002	0.001	0.082
	User	-	95	0.030	0.029	0.111
	User	-	37	0.014	0.005	0.116
7.000	User	-	37	0.008	0.003	0.003
	User	-	37	0.003	0.001	0.004
	User	-	71	0.025	0.018	0.022
	User	-	95	0.025	0.024	0.046
7.001	User	-	37	0.004	0.001	0.001
	User	-	37	0.006	0.002	0.004
	User	-	37	0.037	0.014	0.018
	User	-	37	0.009	0.003	0.021
	User	-	60	0.013	0.008	0.028
	User	-	95	0.056	0.053	0.082
	User	-	95	0.004	0.003	0.085
	User	-	95	0.001	0.001	0.087
	User	-	100	0.002	0.002	0.088
	User	-	37	0.003	0.001	0.090
7.002	User	-	37	0.012	0.004	0.004
	User	-	37	0.010	0.004	0.008
	User	-	37	0.001	0.000	0.008
	User	-	37	0.001	0.000	0.009

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
	User	-	37	0.003	0.001	0.010
	User	-	37	0.012	0.004	0.014
	User	-	37	0.003	0.001	0.015
	User	-	60	0.011	0.007	0.022
	User	-	60	0.009	0.005	0.028
	User	-	71	0.037	0.026	0.054
	User	-	71	0.001	0.000	0.054
	User	-	70	0.034	0.024	0.078
	User	-	100	0.016	0.016	0.094
7.003	User	-	37	0.004	0.001	0.001
	User	-	37	0.013	0.005	0.006
	User	-	60	0.009	0.005	0.011
	User	-	60	0.007	0.004	0.016
	User	-	71	0.005	0.003	0.019
	User	-	70	0.003	0.002	0.021
	User	-	37	0.004	0.002	0.023
	User	-	71	0.014	0.010	0.033
	User	-	71	0.007	0.005	0.038
7.004	User	-	37	0.007	0.003	0.003
	User	-	70	0.045	0.031	0.034
	User	-	71	0.001	0.001	0.035
	User	-	71	0.006	0.005	0.040
1.010	User	-	71	0.034	0.024	0.024
	User	-	37	0.027	0.010	0.034
	User	-	70	0.029	0.020	0.054
	User	-	60	0.008	0.005	0.059
	User	-	37	0.008	0.003	0.062
	User	-	71	0.012	0.009	0.070
	User	-	95	0.013	0.012	0.082
	User	-	71	0.004	0.003	0.085
	User	-	37	0.012	0.005	0.090
	User	-	71	0.001	0.000	0.090
1.011	User	-	71	0.020	0.014	0.014
	User	-	37	0.038	0.014	0.028
	User	-	37	0.025	0.009	0.037
	User	-	70	0.036	0.025	0.063
	User	-	70	0.027	0.019	0.082
	User	-	70	0.012	0.008	0.090
	User	-	100	0.023	0.023	0.113
	User	-	60	0.012	0.007	0.120
	User	-	60	0.011	0.007	0.127
	User	-	37	0.002	0.001	0.128
	User	-	37	0.001	0.000	0.128
	User	-	37	0.002	0.001	0.128
	User	-	37	0.009	0.003	0.132
	User	-	37	0.008	0.003	0.135
1.012	User	-	37	0.046	0.017	0.017
8.000	User	-	37	0.010	0.004	0.004
	User	-	70	0.015	0.010	0.014
	User	-	100	0.008	0.008	0.022
	User	-	71	0.002	0.001	0.023
	User	-	60	0.003	0.002	0.025
	User	-	60	0.003	0.002	0.027
	User	-	71	0.027	0.019	0.046
	User	-	37	0.004	0.002	0.048
	User	-	37	0.003	0.001	0.049
	User	-	37	0.003	0.001	0.050

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
8.001	User	-	37	0.074	0.028	0.078
	User	-	60	0.009	0.006	0.006
	User	-	71	0.019	0.013	0.019
	User	-	37	0.004	0.002	0.020
	User	-	37	0.006	0.002	0.023
8.002	User	-	37	0.060	0.022	0.045
	User	-	37	0.016	0.006	0.006
	User	-	70	0.024	0.017	0.023
	User	-	71	0.021	0.015	0.038
	User	-	37	0.003	0.001	0.039
8.003	User	-	71	0.025	0.018	0.057
	User	-	60	0.007	0.004	0.004
	User	-	37	0.015	0.005	0.010
	User	-	70	0.018	0.013	0.022
	User	-	100	0.013	0.013	0.036
8.004	User	-	71	0.020	0.014	0.050
	User	-	71	0.004	0.003	0.053
	User	-	71	0.005	0.004	0.056
	User	-	37	0.001	0.000	0.056
	User	-	60	0.005	0.003	0.059
8.005	User	-	60	0.015	0.009	0.009
	User	-	37	0.020	0.007	0.016
	User	-	37	0.016	0.006	0.022
	User	-	70	0.036	0.025	0.047
	User	-	70	0.024	0.017	0.064
8.006	User	-	100	0.013	0.013	0.077
	User	-	71	0.009	0.006	0.083
	User	-	71	0.006	0.005	0.088
	User	-	37	0.002	0.001	0.089
	User	-	37	0.001	0.000	0.089
9.000	User	-	37	0.102	0.038	0.038
1.013	User	-	60	0.007	0.004	0.004
	User	-	37	0.021	0.008	0.012
	User	-	70	0.013	0.009	0.022
	User	-	100	0.007	0.007	0.029
	User	-	71	0.017	0.012	0.041
1.014	User	-	37	0.020	0.007	0.007
	User	-	71	0.009	0.006	0.014
	User	-	37	0.045	0.017	0.017
	User	-	37	0.008	0.003	0.019
	User	-	70	0.051	0.036	0.055
1.015	User	-	71	0.004	0.003	0.003
	User	-	60	0.009	0.005	0.008
	User	-	60	0.004	0.002	0.011
	User	-	100	0.047	0.047	0.057
	User	-	71	0.013	0.009	0.066
10.000	User	-	71	0.013	0.010	0.010
	User	-	37	0.005	0.002	0.011
	User	-	71	0.019	0.013	0.013
	User	-	95	0.009	0.009	0.022
	User	-	37	0.001	0.000	0.022
	User	-	37	0.000	0.000	0.022
	User	-	37	0.001	0.000	0.023
	User	-	37	0.018	0.007	0.029
	User	-	60	0.019	0.011	0.041
	User	-	95	0.002	0.002	0.043
	User	-	37	0.003	0.001	0.044

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
	User	-	71	0.001	0.001	0.045
	User	-	71	0.005	0.004	0.049
	User	-	60	0.021	0.013	0.062
11.000	User	-	37	0.020	0.008	0.008
	User	-	71	0.017	0.012	0.020
	User	-	37	0.173	0.064	0.083
	User	-	71	0.017	0.012	0.095
	User	-	37	0.006	0.002	0.098
11.001	User	-	71	0.004	0.003	0.003
	User	-	92	0.068	0.062	0.066
10.001	User	-	37	0.002	0.001	0.001
	User	-	95	0.031	0.030	0.030
	User	-	60	0.016	0.010	0.040
	User	-	37	0.001	0.000	0.040
12.000	User	-	71	0.016	0.011	0.011
	User	-	37	0.002	0.001	0.012
	User	-	37	0.001	0.000	0.012
	User	-	37	0.001	0.000	0.012
	User	-	37	0.001	0.000	0.013
	User	-	92	0.045	0.041	0.054
	User	-	100	0.014	0.014	0.068
	User	-	95	0.020	0.019	0.087
	User	-	95	0.009	0.009	0.096
	User	-	60	0.014	0.009	0.105
	User	-	95	0.011	0.010	0.115
	User	-	60	0.013	0.008	0.122
12.001	User	-	71	0.023	0.017	0.017
	User	-	37	0.001	0.000	0.017
	User	-	37	0.001	0.000	0.017
	User	-	37	0.003	0.001	0.018
	User	-	71	0.001	0.000	0.019
	User	-	60	0.013	0.008	0.027
	User	-	71	0.001	0.001	0.028
	User	-	37	0.015	0.005	0.033
10.002	User	-	37	0.005	0.002	0.002
	User	-	37	0.000	0.000	0.002
	User	-	37	0.000	0.000	0.002
	User	-	95	0.005	0.005	0.007
	User	-	95	0.002	0.002	0.009
	User	-	37	0.005	0.002	0.010
	User	-	71	0.017	0.012	0.022
	User	-	71	0.003	0.002	0.024
10.003	User	-	71	0.013	0.009	0.009
	User	-	71	0.012	0.009	0.018
	User	-	37	0.004	0.001	0.020
	User	-	60	0.006	0.004	0.023
	User	-	60	0.005	0.003	0.026
	User	-	100	0.010	0.010	0.037
	User	-	71	0.001	0.001	0.038
	User	-	60	0.014	0.008	0.046
	User	-	37	0.001	0.000	0.046
13.000	User	-	37	0.005	0.002	0.002
	User	-	95	0.012	0.012	0.014
	User	-	92	0.106	0.098	0.111
	User	-	92	0.008	0.007	0.119
	User	-	70	0.007	0.005	0.123
	User	-	92	0.013	0.012	0.135

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
	User	-	71	0.005	0.003	0.138
	User	-	71	0.027	0.019	0.157
	User	-	37	0.002	0.001	0.158
	User	-	92	0.083	0.076	0.234
	User	-	37	0.006	0.002	0.236
14.000	User	-	92	0.092	0.085	0.085
	User	-	71	0.011	0.008	0.093
13.001	User	-	60	0.016	0.010	0.010
	User	-	37	0.002	0.001	0.011
	User	-	37	0.005	0.002	0.012
	User	-	71	0.010	0.007	0.020
	User	-	71	0.017	0.012	0.032
	User	-	60	0.013	0.008	0.040
13.002	User	-	37	0.035	0.013	0.013
	User	-	71	0.011	0.008	0.021
13.003	User	-	92	0.017	0.015	0.015
13.004	-	-	100	0.000	0.000	0.000

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
	User	-	37	0.011	0.004	0.040
	User	-	37	0.004	0.001	0.041
	User	-	100	0.007	0.007	0.048
	User	-	37	0.001	0.000	0.048
	User	-	37	0.004	0.002	0.050
	User	-	37	0.003	0.001	0.051
	User	-	71	0.007	0.005	0.056
	User	-	71	0.003	0.002	0.058
	User	-	37	0.001	0.001	0.058
10.009	User	-	71	0.030	0.021	0.021
	User	-	37	0.010	0.004	0.025
	User	-	37	0.078	0.029	0.054
	User	-	37	0.001	0.000	0.054
	User	-	37	0.001	0.001	0.054
	User	-	37	0.001	0.000	0.055
	User	-	37	0.001	0.000	0.055
	User	-	37	0.001	0.000	0.055
	User	-	37	0.003	0.001	0.056
	User	-	37	0.004	0.001	0.058
	User	-	60	0.030	0.018	0.076
	User	-	37	0.003	0.001	0.077
	User	-	37	0.004	0.002	0.078
	User	-	37	0.003	0.001	0.079
	User	-	37	0.004	0.001	0.081
	User	-	37	0.003	0.001	0.082
	User	-	95	0.014	0.013	0.095
	User	-	100	0.014	0.014	0.109
	User	-	71	0.003	0.002	0.111
	User	-	71	0.002	0.001	0.112
	User	-	71	0.002	0.002	0.113
	User	-	71	0.001	0.001	0.114
	User	-	71	0.003	0.002	0.116
	User	-	71	0.001	0.001	0.117
10.010	User	-	37	0.004	0.002	0.002
	User	-	60	0.014	0.009	0.010
	User	-	37	0.014	0.005	0.015
	User	-	37	0.009	0.003	0.019
	User	-	37	0.005	0.002	0.021
	User	-	70	0.007	0.005	0.026
	User	-	92	0.008	0.007	0.033
	User	-	71	0.001	0.001	0.034
	User	-	71	0.001	0.001	0.035
	User	-	71	0.002	0.002	0.036
	User	-	37	0.003	0.001	0.037
	User	-	60	0.008	0.005	0.042
	User	-	71	0.015	0.011	0.053
10.011	User	-	71	0.014	0.010	0.010
15.000	User	-	71	0.049	0.035	0.035
	User	-	92	0.016	0.015	0.049
	User	-	92	0.021	0.020	0.069
	User	-	60	0.004	0.002	0.071
	User	-	60	0.002	0.001	0.073
	User	-	37	0.002	0.001	0.073
	User	-	37	0.005	0.002	0.075
	User	-	37	0.007	0.002	0.077
	User	-	37	0.008	0.003	0.080
	User	-	70	0.010	0.007	0.087

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
	User	-	70	0.010	0.007	0.094
	User	-	71	0.042	0.030	0.124
	User	-	92	0.015	0.013	0.137
16.000	User	-	37	0.011	0.004	0.004
	User	-	37	0.003	0.001	0.005
	User	-	70	0.016	0.011	0.017
	User	-	70	0.010	0.007	0.024
	User	-	71	0.007	0.005	0.029
	User	-	71	0.094	0.067	0.096
	User	-	37	0.005	0.002	0.097
15.001	User	-	37	0.006	0.002	0.002
15.002	User	-	71	0.029	0.020	0.020
	User	-	100	0.007	0.007	0.027
	User	-	92	0.014	0.013	0.040
	User	-	60	0.016	0.009	0.049
	User	-	37	0.001	0.001	0.050
	User	-	37	0.003	0.001	0.051
	User	-	71	0.001	0.000	0.051
	User	-	70	0.015	0.011	0.062
	User	-	37	0.002	0.001	0.063
	User	-	71	0.010	0.007	0.070
15.003	User	-	60	0.010	0.006	0.006
	User	-	60	0.010	0.006	0.012
	User	-	37	0.014	0.005	0.017
	User	-	37	0.004	0.002	0.019
	User	-	71	0.006	0.004	0.023
17.000	User	-	71	0.024	0.017	0.017
	User	-	71	0.010	0.007	0.024
	User	-	60	0.009	0.005	0.029
	User	-	60	0.008	0.005	0.033
	User	-	37	0.023	0.008	0.042
	User	-	70	0.014	0.010	0.052
	User	-	70	0.016	0.011	0.063
	User	-	95	0.010	0.009	0.072
	User	-	95	0.008	0.007	0.079
	User	-	37	0.004	0.001	0.081
	User	-	37	0.001	0.000	0.081
	User	-	71	0.000	0.000	0.081
	User	-	60	0.007	0.004	0.085
	User	-	71	0.002	0.001	0.087
	User	-	37	0.002	0.001	0.088
	User	-	37	0.006	0.002	0.090
	User	-	37	0.001	0.001	0.090
	User	-	37	0.012	0.004	0.095
	User	-	71	0.028	0.020	0.114
	User	-	71	0.015	0.010	0.125
	User	-	70	0.014	0.010	0.135
	User	-	37	0.008	0.003	0.138
15.004	User	-	37	0.017	0.006	0.006
	User	-	37	0.001	0.000	0.007
	User	-	37	0.000	0.000	0.007
	User	-	37	0.000	0.000	0.007
	User	-	37	0.002	0.001	0.008
	User	-	70	0.031	0.022	0.030
	User	-	71	0.019	0.013	0.043
	User	-	71	0.001	0.001	0.044
	User	-	71	0.004	0.003	0.047

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
	User	-	60	0.018	0.011	0.057
	User	-	60	0.007	0.004	0.061
	User	-	95	0.017	0.017	0.078
15.005	User	-	37	0.002	0.001	0.001
	User	-	37	0.001	0.000	0.001
	User	-	37	0.001	0.000	0.002
	User	-	37	0.006	0.002	0.004
	User	-	37	0.002	0.001	0.005
	User	-	37	0.017	0.006	0.011
	User	-	70	0.015	0.011	0.021
	User	-	71	0.031	0.022	0.043
	User	-	60	0.006	0.004	0.047
	User	-	60	0.006	0.004	0.051
	User	-	100	0.008	0.008	0.059
	User	-	100	0.019	0.019	0.078
	User	-	71	0.002	0.001	0.079
	User	-	71	0.001	0.001	0.080
15.006	User	-	37	0.025	0.009	0.009
	User	-	37	0.002	0.001	0.010
	User	-	37	0.002	0.001	0.011
	User	-	37	0.001	0.000	0.011
	User	-	37	0.001	0.000	0.012
	User	-	37	0.013	0.005	0.017
	User	-	37	0.013	0.005	0.022
	User	-	37	0.024	0.009	0.031
	User	-	70	0.041	0.029	0.060
	User	-	70	0.024	0.017	0.077
	User	-	71	0.022	0.015	0.092
	User	-	71	0.003	0.002	0.094
	User	-	71	0.001	0.000	0.095
	User	-	60	0.006	0.004	0.098
	User	-	60	0.006	0.003	0.102
	User	-	100	0.018	0.018	0.119
	User	-	100	0.008	0.008	0.127
	User	-	71	0.001	0.001	0.128
	User	-	71	0.001	0.001	0.129
18.000	User	-	37	0.028	0.010	0.010
	User	-	95	0.008	0.008	0.018
	User	-	71	0.020	0.014	0.032
	User	-	71	0.003	0.002	0.034
18.001	User	-	37	0.006	0.002	0.002
	User	-	37	0.007	0.003	0.005
	User	-	37	0.001	0.000	0.005
	User	-	37	0.001	0.000	0.006
	User	-	60	0.009	0.005	0.011
	User	-	60	0.005	0.003	0.014
	User	-	60	0.005	0.003	0.017
	User	-	60	0.009	0.005	0.022
	User	-	70	0.024	0.017	0.039
	User	-	70	0.014	0.010	0.049
	User	-	71	0.032	0.023	0.072
	User	-	37	0.009	0.003	0.075
	User	-	37	0.020	0.007	0.082
	User	-	95	0.013	0.012	0.094
	User	-	71	0.005	0.004	0.098
	User	-	37	0.001	0.000	0.098
	User	-	37	0.004	0.002	0.100

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
	User	-	95	0.013	0.012	0.112
	User	-	71	0.001	0.000	0.113
18.002	User	-	37	0.001	0.000	0.000
	User	-	37	0.001	0.000	0.001
	User	-	37	0.030	0.011	0.012
	User	-	37	0.013	0.005	0.017
	User	-	37	0.008	0.003	0.020
	User	-	60	0.013	0.008	0.027
	User	-	60	0.023	0.014	0.041
	User	-	60	0.012	0.007	0.048
	User	-	60	0.005	0.003	0.051
	User	-	70	0.026	0.018	0.070
	User	-	70	0.031	0.022	0.091
	User	-	70	0.018	0.013	0.104
	User	-	95	0.017	0.016	0.120
	User	-	100	0.020	0.020	0.140
	User	-	100	0.010	0.010	0.150
	User	-	71	0.004	0.003	0.153
	User	-	71	0.000	0.000	0.153
	User	-	37	0.022	0.008	0.162
	User	-	95	0.017	0.016	0.177
	User	-	71	0.001	0.001	0.178
	User	-	71	0.000	0.000	0.179
	User	-	71	0.005	0.004	0.182
15.007	User	-	37	0.006	0.002	0.002
	User	-	37	0.040	0.015	0.017
	User	-	37	0.013	0.005	0.022
	User	-	37	0.008	0.003	0.025
	User	-	37	0.059	0.022	0.047
	User	-	60	0.008	0.005	0.051
	User	-	60	0.007	0.004	0.055
	User	-	60	0.022	0.013	0.069
	User	-	70	0.042	0.029	0.098
	User	-	71	0.035	0.025	0.123
	User	-	71	0.049	0.034	0.157
	User	-	100	0.029	0.029	0.187
	User	-	71	0.001	0.001	0.187
	User	-	71	0.001	0.000	0.188
	User	-	37	0.002	0.001	0.189
	User	-	37	0.012	0.005	0.193
15.008	User	-	70	0.029	0.021	0.021
	User	-	71	0.029	0.020	0.041
	User	-	100	0.061	0.061	0.102
	User	-	100	0.019	0.019	0.121
	User	-	71	0.003	0.002	0.123
15.009	User	-	37	0.066	0.024	0.024
15.010	User	-	37	0.024	0.009	0.009
	User	-	37	0.003	0.001	0.010
	User	-	60	0.007	0.004	0.014
	User	-	71	0.001	0.001	0.015
19.000	User	-	37	0.009	0.003	0.003
	User	-	60	0.005	0.003	0.006
	User	-	71	0.027	0.019	0.025
	User	-	71	0.001	0.001	0.026
	User	-	100	0.008	0.008	0.034
	User	-	37	0.006	0.002	0.037
	User	-	37	0.001	0.000	0.037

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
	User	-	37	0.001	0.000	0.037
	User	-	95	0.028	0.027	0.064
	User	-	92	0.006	0.006	0.070
	User	-	71	0.001	0.001	0.070
19.001	User	-	37	0.001	0.001	0.001
	User	-	37	0.004	0.002	0.002
	User	-	37	0.001	0.000	0.002
	User	-	100	0.014	0.014	0.017
	User	-	71	0.002	0.001	0.018
19.002	User	-	37	0.006	0.002	0.002
	User	-	37	0.013	0.005	0.007
	User	-	37	0.009	0.003	0.011
	User	-	70	0.014	0.010	0.021
	User	-	71	0.019	0.014	0.034
19.003	User	-	37	0.009	0.003	0.003
	User	-	37	0.003	0.001	0.004
	User	-	37	0.018	0.007	0.011
	User	-	60	0.007	0.004	0.015
	User	-	71	0.015	0.011	0.026
	User	-	100	0.013	0.013	0.039
19.004	-	-	100	0.000	0.000	0.000
19.005	User	-	37	0.005	0.002	0.002
	User	-	37	0.002	0.001	0.002
	User	-	37	0.012	0.005	0.007
	User	-	37	0.008	0.003	0.010
	User	-	70	0.021	0.015	0.025
	User	-	71	0.008	0.005	0.030
	User	-	71	0.034	0.024	0.054
15.011	User	-	37	0.007	0.003	0.003
	User	-	37	0.026	0.010	0.012
	User	-	60	0.033	0.020	0.032
	User	-	60	0.007	0.004	0.036
	User	-	60	0.008	0.005	0.041
	User	-	71	0.039	0.028	0.069
	User	-	100	0.073	0.073	0.142
	User	-	37	0.001	0.000	0.142
	User	-	37	0.001	0.000	0.143
	User	-	37	0.001	0.000	0.143
15.012	User	-	37	0.017	0.006	0.006
	User	-	60	0.006	0.004	0.010
	User	-	71	0.015	0.010	0.020
	User	-	71	0.008	0.005	0.025
	User	-	71	0.017	0.012	0.038
20.000	User	-	37	0.001	0.000	0.000
	User	-	37	0.001	0.000	0.000
	User	-	37	0.004	0.001	0.002
	User	-	37	0.002	0.001	0.003
	User	-	70	0.014	0.010	0.013
	User	-	100	0.014	0.014	0.026
	User	-	37	0.002	0.001	0.027
	User	-	71	0.000	0.000	0.027
20.001	-	-	100	0.000	0.000	0.000
15.013	User	-	71	0.004	0.003	0.003
	User	-	60	0.005	0.003	0.006
	User	-	60	0.005	0.003	0.009
	User	-	71	0.027	0.019	0.028
	User	-	71	0.006	0.004	0.033

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
	User	-	37	0.002	0.001	0.033
	User	-	37	0.004	0.001	0.035
	User	-	37	0.037	0.014	0.048
10.012	User	-	71	0.015	0.011	0.011
	User	-	37	0.004	0.002	0.012
	User	-	71	0.007	0.005	0.017
	User	-	37	0.020	0.007	0.024
10.013	User	-	37	0.065	0.024	0.024
10.014	User	-	71	0.029	0.021	0.021
	User	-	60	0.014	0.008	0.029
	User	-	37	0.011	0.004	0.033
10.015	User	-	71	0.009	0.006	0.006
	User	-	60	0.021	0.013	0.019
	User	-	37	0.055	0.020	0.039
	User	-	37	0.004	0.001	0.041
1.016	User	-	37	0.003	0.001	0.001
	User	-	37	0.082	0.030	0.031
1.017	-	-	100	0.000	0.000	0.000
1.018	-	-	100	0.000	0.000	0.000
1.019	-	-	100	0.000	0.000	0.000
1.020	-	-	100	0.000	0.000	0.000
21.000	-	-	100	0.000	0.000	0.000
1.021	-	-	100	0.000	0.000	0.000
1.022	-	-	100	0.000	0.000	0.000
22.000	User	-	37	0.001	0.000	0.000
	User	-	37	0.019	0.007	0.007
	User	-	37	0.005	0.002	0.009
	User	-	37	0.001	0.000	0.010
	User	-	37	0.002	0.001	0.010
	User	-	37	0.003	0.001	0.011
	User	-	71	0.013	0.009	0.021
	User	-	71	0.028	0.020	0.040
	User	-	71	0.024	0.017	0.058
	User	-	71	0.015	0.011	0.069
	User	-	60	0.014	0.009	0.077
	User	-	60	0.018	0.011	0.088
	User	-	71	0.004	0.003	0.090
	User	-	71	0.004	0.003	0.093
	User	-	70	0.003	0.002	0.096
22.001	User	-	37	0.005	0.002	0.002
	User	-	37	0.007	0.003	0.004
	User	-	71	0.011	0.008	0.012
	User	-	71	0.003	0.002	0.014
22.002	User	-	37	0.012	0.004	0.004
	User	-	37	0.010	0.004	0.008
22.003	-	-	100	0.000	0.000	0.000
22.004	User	-	95	0.022	0.021	0.021
	User	-	37	0.003	0.001	0.022
	User	-	37	0.007	0.003	0.025
23.000	User	-	71	0.024	0.017	0.017
	User	-	60	0.013	0.008	0.025
	User	-	60	0.002	0.001	0.026
	User	-	37	0.014	0.005	0.032
	User	-	37	0.004	0.001	0.033
23.001	User	-	71	0.023	0.016	0.016
	User	-	60	0.009	0.005	0.021
	User	-	60	0.013	0.008	0.029

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
	User	-	37	0.006	0.002	0.031
	User	-	37	0.003	0.001	0.032
	User	-	100	0.007	0.007	0.039
	User	-	71	0.001	0.001	0.039
	User	-	70	0.010	0.007	0.046
	User	-	71	0.001	0.001	0.047
	User	-	37	0.008	0.003	0.050
23.002	User	-	71	0.016	0.011	0.011
	User	-	60	0.010	0.006	0.017
	User	-	60	0.011	0.007	0.024
	User	-	37	0.000	0.000	0.024
	User	-	37	0.001	0.000	0.024
	User	-	100	0.044	0.044	0.068
	User	-	100	0.016	0.016	0.084
	User	-	71	0.011	0.007	0.092
	User	-	71	0.000	0.000	0.092
	User	-	70	0.024	0.017	0.109
23.003	User	-	71	0.028	0.020	0.020
	User	-	60	0.008	0.005	0.025
	User	-	60	0.012	0.007	0.032
	User	-	60	0.013	0.008	0.039
	User	-	37	0.004	0.001	0.041
	User	-	37	0.032	0.012	0.052
	User	-	37	0.008	0.003	0.056
	User	-	37	0.003	0.001	0.057
	User	-	100	0.061	0.061	0.118
	User	-	37	0.004	0.002	0.119
	User	-	71	0.003	0.002	0.122
23.004	User	-	100	0.035	0.035	0.035
	User	-	37	0.002	0.001	0.036
23.005	User	-	71	0.017	0.012	0.012
	User	-	60	0.012	0.007	0.020
	User	-	37	0.007	0.003	0.022
	User	-	37	0.012	0.005	0.027
	User	-	37	0.013	0.005	0.031
	User	-	100	0.025	0.025	0.056
	User	-	71	0.004	0.003	0.059
23.006	-	-	100	0.000	0.000	0.000
23.007	-	-	100	0.000	0.000	0.000
24.000	User	-	60	0.003	0.002	0.002
	User	-	15	0.001	0.000	0.002
	User	-	15	0.004	0.001	0.002
	User	-	60	0.004	0.003	0.005
	User	-	70	0.017	0.012	0.017
	User	-	15	0.020	0.003	0.020
	User	-	100	0.011	0.011	0.031
	User	-	15	0.037	0.005	0.036
	User	-	15	0.017	0.003	0.039
	User	-	15	0.032	0.005	0.043
	User	-	71	0.036	0.026	0.069
24.001	User	-	15	0.001	0.000	0.000
	User	-	15	0.002	0.000	0.000
	User	-	15	0.002	0.000	0.001
	User	-	15	0.001	0.000	0.001
	User	-	15	0.002	0.000	0.001
	User	-	15	0.002	0.000	0.001
	User	-	60	0.007	0.004	0.005

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
	User	-	60	0.006	0.003	0.009
	User	-	60	0.009	0.005	0.014
	User	-	15	0.002	0.000	0.014
	User	-	70	0.061	0.042	0.057
	User	-	15	0.048	0.007	0.064
	User	-	100	0.037	0.037	0.101
	User	-	15	0.020	0.003	0.104
	User	-	71	0.029	0.021	0.124
25.000	User	-	15	0.005	0.001	0.001
	User	-	15	0.001	0.000	0.001
	User	-	15	0.001	0.000	0.001
	User	-	37	0.001	0.000	0.001
	User	-	60	0.002	0.001	0.003
	User	-	60	0.003	0.002	0.004
	User	-	70	0.014	0.010	0.014
	User	-	70	0.018	0.012	0.026
	User	-	14	0.008	0.001	0.028
	User	-	100	0.006	0.006	0.034
	User	-	60	0.002	0.001	0.035
	User	-	15	0.005	0.001	0.036
	User	-	15	0.005	0.001	0.036
	User	-	15	0.002	0.000	0.037
	User	-	60	0.003	0.002	0.039
	User	-	60	0.003	0.002	0.040
	User	-	60	0.003	0.002	0.042
	User	-	71	0.014	0.010	0.052
	User	-	70	0.009	0.006	0.058
	User	-	71	0.002	0.001	0.059
24.002	User	-	15	0.001	0.000	0.000
	User	-	15	0.004	0.001	0.001
	User	-	60	0.006	0.003	0.004
	User	-	60	0.007	0.004	0.008
	User	-	60	0.001	0.001	0.009
	User	-	70	0.018	0.012	0.021
	User	-	15	0.012	0.002	0.023
	User	-	100	0.012	0.012	0.035
	User	-	15	0.004	0.001	0.036
	User	-	15	0.015	0.002	0.038
	User	-	15	0.040	0.006	0.044
	User	-	15	0.017	0.003	0.046
	User	-	15	0.001	0.000	0.047
	User	-	15	0.003	0.000	0.047
	User	-	71	0.020	0.014	0.061
	User	-	71	0.017	0.012	0.073
	User	-	71	0.012	0.009	0.081
	User	-	60	0.010	0.006	0.087
	User	-	60	0.010	0.006	0.093
	User	-	71	0.001	0.000	0.094
	User	-	71	0.001	0.001	0.094
	User	-	71	0.023	0.017	0.111
	User	-	15	0.001	0.000	0.111
	User	-	15	0.002	0.000	0.111
	User	-	15	0.009	0.001	0.113
	User	-	15	0.004	0.001	0.113
	User	-	15	0.001	0.000	0.113
	User	-	15	0.015	0.002	0.116
	User	-	71	0.001	0.001	0.117

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
	User	-	71	0.001	0.001	0.118
	User	-	71	0.005	0.004	0.121
24.003	User	-	60	0.010	0.006	0.006
	User	-	60	0.010	0.006	0.012
	User	-	71	0.021	0.015	0.027
	User	-	15	0.003	0.000	0.027
	User	-	71	0.002	0.001	0.028
	User	-	71	0.003	0.002	0.031
	User	-	70	0.038	0.027	0.057
	User	-	70	0.003	0.002	0.060
	User	-	37	0.011	0.004	0.064
24.004	User	-	60	0.008	0.005	0.005
	User	-	60	0.010	0.006	0.011
	User	-	60	0.012	0.007	0.018
	User	-	71	0.029	0.021	0.038
	User	-	15	0.011	0.002	0.040
	User	-	15	0.002	0.000	0.040
	User	-	15	0.001	0.000	0.041
	User	-	15	0.001	0.000	0.041
	User	-	37	0.002	0.001	0.041
	User	-	85	0.011	0.009	0.050
	User	-	60	0.008	0.005	0.055
	User	-	71	0.002	0.002	0.057
	User	-	71	0.001	0.001	0.058
	User	-	71	0.001	0.000	0.058
	User	-	71	0.001	0.000	0.058
	User	-	60	0.001	0.000	0.059
24.005	User	-	15	0.004	0.001	0.001
	User	-	60	0.001	0.001	0.001
	User	-	60	0.001	0.000	0.002
	User	-	71	0.002	0.001	0.003
	User	-	70	0.036	0.025	0.028
	User	-	71	0.005	0.004	0.032
	User	-	37	0.005	0.002	0.034
	User	-	37	0.003	0.001	0.035
	User	-	60	0.023	0.014	0.049
26.000	User	-	15	0.008	0.001	0.001
	User	-	71	0.011	0.008	0.009
	User	-	71	0.016	0.011	0.020
	User	-	85	0.061	0.052	0.072
26.001	User	-	15	0.030	0.005	0.005
	User	-	15	0.010	0.001	0.006
	User	-	15	0.013	0.002	0.008
	User	-	85	0.072	0.061	0.069
26.002	User	-	15	0.008	0.001	0.001
	User	-	15	0.004	0.001	0.002
	User	-	71	0.022	0.015	0.017
	User	-	85	0.044	0.037	0.054
27.000	User	-	85	0.078	0.066	0.066
27.001	User	-	85	0.046	0.039	0.039
26.003	User	-	85	0.025	0.021	0.021
26.004	-	-	100	0.000	0.000	0.000
28.000	User	-	85	0.121	0.103	0.103
28.001	User	-	85	0.035	0.030	0.030
28.002	User	-	85	0.026	0.022	0.022
26.005	-	-	100	0.000	0.000	0.000
26.006	User	-	71	0.001	0.001	0.001

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
	User	-	37	0.009	0.004	0.004
	User	-	37	0.014	0.005	0.009
	User	-	71	0.026	0.018	0.028
	User	-	37	0.067	0.025	0.053
24.006	-	-	100	0.000	0.000	0.000
24.007	-	-	100	0.000	0.000	0.000
24.008	-	-	100	0.000	0.000	0.000
24.009	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				12.563	7.812	7.812

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
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S1.022	SExisting Mh	123.210	121.902	122.180	1200	0
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Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
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S22.004	SGlenamuck Rd	134.330	132.879	132.850	1200	0
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Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
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S23.007	S	137.800	136.693	136.700	1200	0
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Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
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S24.009	S	127.750	124.666	124.700	0	0
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Simulation Criteria for Storm

Volumetric Runoff Coeff	1.000	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha	Storage 2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1
Number of Input Hydrographs	0	Number of Offline Controls	0
Number of Online Controls	10	Number of Storage Structures	10
		Number of Time/Area Diagrams	0
		Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Winter
Return Period (years)	2	Cv (Summer)	1.000
Region	Scotland and Ireland	Cv (Winter)	1.000
M5-60 (mm)	16.500	Storm Duration (mins)	30
Ratio R	0.277		

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Online Controls for Storm

Hydro-Brake® Optimum Manhole: S19, DS/PN: S1.007, Volume (m³): 7.0

Unit Reference MD-SHE-0229-3000-1600-3000
 Design Head (m) 1.600
 Design Flow (l/s) 30.0
 Flush-Flo™ Calculated
 Objective Minimise upstream storage
 Application Surface
 Sump Available Yes
 Diameter (mm) 229
 Invert Level (m) 136.650
 Minimum Outlet Pipe Diameter (mm) 300
 Suggested Manhole Diameter (mm) 1800

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.600	29.9	Kick-Flo®	1.071	24.7
Flush-Flo™	0.490	29.9	Mean Flow over Head Range	-	25.7

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	7.6	0.800	28.8	2.000	33.3	4.000	46.5	7.000	61.0
0.200	22.9	1.000	26.5	2.200	34.9	4.500	49.3	7.500	63.1
0.300	28.7	1.200	26.1	2.400	36.4	5.000	51.8	8.000	65.1
0.400	29.7	1.400	28.1	2.600	37.8	5.500	54.3	8.500	67.1
0.500	29.9	1.600	29.9	3.000	40.5	6.000	56.6	9.000	69.0
0.600	29.7	1.800	31.7	3.500	43.6	6.500	58.9	9.500	70.8

Hydro-Brake® Optimum Manhole: S42, DS/PN: S1.013, Volume (m³): 15.8

Unit Reference MD-SHE-0285-5000-1750-5000
 Design Head (m) 1.750
 Design Flow (l/s) 50.0
 Flush-Flo™ Calculated
 Objective Minimise upstream storage
 Application Surface
 Sump Available Yes
 Diameter (mm) 285
 Invert Level (m) 131.350
 Minimum Outlet Pipe Diameter (mm) 300
 Suggested Manhole Diameter (mm) 2100

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.750	50.0	Kick-Flo®	1.200	41.7
Flush-Flo™	0.550	50.0	Mean Flow over Head Range	-	42.7

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	8.9	0.200	29.4	0.300	47.1	0.400	49.1	0.500	49.9

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Hydro-Brake® Optimum Manhole: S42, DS/PN: S1.013, Volume (m³): 15.8

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.600	49.9	1.600	47.9	2.600	60.5	5.000	83.1	7.500	101.3
0.800	48.9	1.800	50.7	3.000	64.9	5.500	87.1	8.000	104.5
1.000	47.0	2.000	53.3	3.500	69.9	6.000	90.8	8.500	107.6
1.200	41.8	2.200	55.8	4.000	74.6	6.500	94.4	9.000	110.7
1.400	44.9	2.400	58.2	4.500	79.0	7.000	97.9	9.500	113.7

Hydro-Brake® Optimum Manhole: S56, DS/PN: S13.003, Volume (m³): 7.5

Unit Reference MD-SHE-0066-2000-1100-2000
Design Head (m) 1.100
Design Flow (l/s) 2.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 66
Invert Level (m) 139.620
Minimum Outlet Pipe Diameter (mm) 100
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.100	2.0	Kick-Flo®	0.584	1.5
Flush-Flo™	0.289	1.8	Mean Flow over Head Range	-	1.7

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.6	0.800	1.7	2.000	2.6	4.000	3.6	7.000	4.7
0.200	1.8	1.000	1.9	2.200	2.7	4.500	3.8	7.500	4.9
0.300	1.8	1.200	2.1	2.400	2.9	5.000	4.0	8.000	5.0
0.400	1.8	1.400	2.2	2.600	3.0	5.500	4.2	8.500	5.1
0.500	1.7	1.600	2.4	3.000	3.2	6.000	4.4	9.000	5.3
0.600	1.5	1.800	2.5	3.500	3.4	6.500	4.5	9.500	5.4

Hydro-Brake® Optimum Manhole: S61, DS/PN: S10.007, Volume (m³): 15.7

Unit Reference MD-SHE-0138-1000-1500-1000
Design Head (m) 1.500
Design Flow (l/s) 10.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 138
Invert Level (m) 138.950
Minimum Outlet Pipe Diameter (mm) 225
Suggested Manhole Diameter (mm) 1200

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Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.500	10.0	Kick-Flo®	0.933	8.0
Flush-Flo™	0.441	10.0	Mean Flow over Head Range	-	8.7

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as

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Hydro-Brake® Optimum Manhole: S61, DS/PN: S10.007, Volume (m³): 15.7

specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	5.0	0.800	9.1	2.000	11.4	4.000	15.9	7.000	20.8
0.200	9.0	1.000	8.3	2.200	12.0	4.500	16.8	7.500	21.5
0.300	9.7	1.200	9.0	2.400	12.5	5.000	17.7	8.000	22.2
0.400	10.0	1.400	9.7	2.600	13.0	5.500	18.5	8.500	22.8
0.500	10.0	1.600	10.3	3.000	13.9	6.000	19.3	9.000	23.5
0.600	9.8	1.800	10.9	3.500	14.9	6.500	20.1	9.500	24.1

Hydro-Brake® Optimum Manhole: S81, DS/PN: S15.010, Volume (m³): 7.5

Unit Reference	MD-SHE-0108-6000-1500-6000
Design Head (m)	1.500
Design Flow (l/s)	6.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	108
Invert Level (m)	135.700
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.500	6.0	Kick-Flo®	0.918	4.8
Flush-Flo™	0.448	6.0	Mean Flow over Head Range	-	5.3

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.7	0.800	5.4	2.000	6.9	4.000	9.5	7.000	12.4
0.200	5.4	1.000	5.0	2.200	7.2	4.500	10.1	7.500	12.8
0.300	5.8	1.200	5.4	2.400	7.5	5.000	10.6	8.000	13.2
0.400	6.0	1.400	5.8	2.600	7.8	5.500	11.1	8.500	13.6
0.500	6.0	1.600	6.2	3.000	8.3	6.000	11.5	9.000	14.0
0.600	5.9	1.800	6.5	3.500	8.9	6.500	12.0	9.500	14.4

Hydro-Brake® Optimum Manhole: S92, DS/PN: S15.013, Volume (m³): 18.6

Unit Reference	MD-SHE-0092-5000-2000-5000
Design Head (m)	2.000
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	92
Invert Level (m)	134.890
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

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Hydro-Brake® Optimum Manhole: S92, DS/PN: S15.013, Volume (m³): 18.6

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.000	5.0	Kick-Flo®	0.816	3.3
Flush-Flo™	0.398	4.1	Mean Flow over Head Range	-	3.9

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.9	0.800	3.4	2.000	5.0	4.000	6.9	7.000	9.0
0.200	3.8	1.000	3.6	2.200	5.2	4.500	7.3	7.500	9.3
0.300	4.1	1.200	3.9	2.400	5.4	5.000	7.7	8.000	9.6
0.400	4.1	1.400	4.2	2.600	5.6	5.500	8.0	8.500	9.9
0.500	4.1	1.600	4.5	3.000	6.0	6.000	8.4	9.000	10.2
0.600	4.0	1.800	4.8	3.500	6.5	6.500	8.7	9.500	10.4

Hydro-Brake® Optimum Manhole: S97, DS/PN: S1.016, Volume (m³): 16.5

Unit Reference	MD-SHE-0263-4200-1800-4200
Design Head (m)	1.800
Design Flow (l/s)	42.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	263
Invert Level (m)	129.200
Minimum Outlet Pipe Diameter (mm)	300
Suggested Manhole Diameter (mm)	2100

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.800	41.9	Kick-Flo®	1.210	34.6
Flush-Flo™	0.554	41.9	Mean Flow over Head Range	-	36.0

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	8.4	0.800	41.0	2.000	44.0	4.000	61.6	7.000	80.8
0.200	27.0	1.000	39.3	2.200	46.1	4.500	65.2	7.500	83.5
0.300	39.3	1.200	35.0	2.400	48.1	5.000	68.6	8.000	86.2
0.400	41.1	1.400	37.1	2.600	50.0	5.500	71.8	8.500	88.8
0.500	41.8	1.600	39.6	3.000	53.6	6.000	74.9	9.000	91.3
0.600	41.8	1.800	41.9	3.500	57.7	6.500	77.9	9.500	93.7

Hydro-Brake® Optimum Manhole: S107, DS/PN: S22.002, Volume (m³): 3.8

Unit Reference	MD-SHE-0054-1500-1270-1500
Design Head (m)	1.270
Design Flow (l/s)	1.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes

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Hydro-Brake® Optimum Manhole: S107, DS/PN: S22.002, Volume (m³): 3.8

Diameter (mm) 54
Invert Level (m) 133.870
Minimum Outlet Pipe Diameter (mm) 75
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.270	1.5	Kick-Flo®	0.487	1.0
Flush-Flo™	0.241	1.2	Mean Flow over Head Range	-	1.2

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.1	0.800	1.2	2.000	1.8	4.000	2.5	7.000	3.3
0.200	1.2	1.000	1.3	2.200	1.9	4.500	2.7	7.500	3.4
0.300	1.2	1.200	1.5	2.400	2.0	5.000	2.8	8.000	3.5
0.400	1.1	1.400	1.6	2.600	2.1	5.500	2.9	8.500	3.6
0.500	1.0	1.600	1.7	3.000	2.2	6.000	3.1	9.000	3.7
0.600	1.1	1.800	1.8	3.500	2.4	6.500	3.2	9.500	3.8

Hydro-Brake® Optimum Manhole: S115, DS/PN: S23.005, Volume (m³): 3.8

Unit Reference MD-SHE-0052-1500-1600-1500
Design Head (m) 1.600
Design Flow (l/s) 1.5
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 52
Invert Level (m) 136.970
Minimum Outlet Pipe Diameter (mm) 75
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.600	1.5	Kick-Flo®	0.460	0.9
Flush-Flo™	0.228	1.0	Mean Flow over Head Range	-	1.1

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	0.9	0.800	1.1	2.000	1.7	4.000	2.3	7.000	2.9
0.200	1.0	1.000	1.2	2.200	1.7	4.500	2.4	7.500	3.0
0.300	1.0	1.200	1.3	2.400	1.8	5.000	2.5	8.000	3.1
0.400	1.0	1.400	1.4	2.600	1.9	5.500	2.6	8.500	3.2
0.500	0.9	1.600	1.5	3.000	2.0	6.000	2.7	9.000	3.3
0.600	1.0	1.800	1.6	3.500	2.1	6.500	2.8	9.500	3.4

Hydro-Brake® Optimum Manhole: S137, DS/PN: S24.006, Volume (m³): 17.9

Unit Reference MD-SHE-0085-4000-1720-4000
Design Head (m) 1.720

Hydro-Brake® Optimum Manhole: S137, DS/PN: S24.006, Volume (m³): 17.9

Design Flow (l/s)	4.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	85
Invert Level (m)	126.750
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.720	4.0	Kick-Flo®	0.756	2.7
Flush-Flo™	0.372	3.4	Mean Flow over Head Range	-	3.2

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.5	0.800	2.8	2.000	4.3	4.000	5.9	7.000	7.7
0.200	3.2	1.000	3.1	2.200	4.5	4.500	6.3	7.500	8.0
0.300	3.4	1.200	3.4	2.400	4.7	5.000	6.6	8.000	8.2
0.400	3.4	1.400	3.6	2.600	4.8	5.500	6.9	8.500	8.5
0.500	3.3	1.600	3.9	3.000	5.2	6.000	7.2	9.000	8.7
0.600	3.2	1.800	4.1	3.500	5.6	6.500	7.4	9.500	8.9

Storage Structures for Storm

Cellular Storage Manhole: S19, DS/PN: S1.007

Invert Level (m) 136.650 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00006 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00006

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	300.0	300.0	1.850	300.0	300.0	1.851	0.0	300.0

Cellular Storage Manhole: S42, DS/PN: S1.013

Invert Level (m) 131.400 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00005 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00005

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	400.0	400.0	1.850	400.0	400.0	1.851	0.0	400.0

Cellular Storage Manhole: S56, DS/PN: S13.003

Invert Level (m) 139.700 Safety Factor 1.5
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	300.0	0.0	1.400	300.0	0.0	1.410	0.0	0.0

Cellular Storage Manhole: S61, DS/PN: S10.007

Invert Level (m) 139.000 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00006 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00006

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	220.0	220.0	1.850	220.0	220.0	1.851	0.0	220.0

Cellular Storage Manhole: S81, DS/PN: S15.010

Invert Level (m) 135.800 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	700.0	700.0	1.850	700.0	700.0	1.851	0.0	700.0

Cellular Storage Manhole: S92, DS/PN: S15.013

Invert Level (m) 134.900 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00006 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00006

Roger Mullarkey & Associates		Page 37
Duncreevan	Kilternan LRD Stage 3	
Kilcock	June'24	
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File Kilternan Master LRD ALTERNATE N...	Checked by	
Innovyze	Network 2020.1.3	

Cellular Storage Manhole: S92, DS/PN: S15.013

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	500.0	500.0	1.850	500.0	500.0	1.851	0.0	500.0

Cellular Storage Manhole: S97, DS/PN: S1.016

Invert Level (m) 129.250 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00005 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00005

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	950.0	950.0	1.850	950.0	950.0	1.851	0.0	950.0

Cellular Storage Manhole: S107, DS/PN: S22.002

Invert Level (m) 133.950 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00006 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00006

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	50.0	100.0	1.450	50.0	100.0	1.451	0.0	100.0

Cellular Storage Manhole: S115, DS/PN: S23.005

Invert Level (m) 137.000 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00001 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00001

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	200.0	200.0	1.850	200.0	200.0	1.851	0.0	200.0

Cellular Storage Manhole: S137, DS/PN: S24.006

Invert Level (m) 126.750 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00001 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00001

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	550.0	550.0	1.850	550.0	550.0	1.851	0.0	550.0

2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000

Additional Flow - % of Total Flow 0.000

Hot Start (mins) 0

MADD Factor * 10m³/ha Storage 2.000

Hot Start Level (mm) 0

Inlet Coefficient 0.800

Manhole Headloss Coeff (Global) 0.500

Flow per Person per Day (l/per/day) 0.000

Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0

Number of Offline Controls 0

Number of Time/Area Diagrams 0

Number of Online Controls 10

Number of Storage Structures 10

Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model

FSR M5-60 (mm) 16.500 Cv (Summer) 1.000

Region Scotland and Ireland

Ratio R 0.277 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 150.0

DVD Status ON

Analysis Timestep

Fine Inertia Status ON

DTS Status OFF

Profile(s)

Summer and Winter

Duration(s) (mins)

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

Return Period(s) (years)

2, 30, 100

Climate Change (%)

20, 20, 20

								Water	Surcharged	Flooded				Maximum	
US/MH								Level	Depth	Volume	Flow /	Overflow	Maximum	Velocity	
PN	Name	Event						(m)	(m)	(m)	(m³)	Cap.	(l/s)	Vol (m³)	(m/s)
S1.000	S1	15 minute	2 year	Summer	I+20%	142.310	140.908	-0.202	0.000	0.24			0.105	1.2	
S1.001	S2	15 minute	2 year	Summer	I+20%	142.000	140.565	-0.185	0.000	0.31			0.201	1.3	
S2.000	S3	15 minute	2 year	Summer	I+20%	142.040	140.637	-0.128	0.000	0.39			0.105	1.2	
S1.002	S4	15 minute	2 year	Summer	I+20%	141.750	140.200	-0.225	0.000	0.34			0.270	1.5	
S1.003	S5	15 minute	2 year	Summer	I+20%	141.420	139.601	-0.246	0.000	0.26			0.178	2.2	
S1.004	S6	15 minute	2 year	Summer	I+20%	140.100	138.667	-0.208	0.000	0.41			0.368	1.6	
S3.000	S7	15 minute	2 year	Summer	I+20%	142.780	141.628	-0.192	0.000	0.28			0.117	1.4	
S3.001	S8	15 minute	2 year	Summer	I+20%	142.900	141.277	-0.167	0.000	0.40			0.285	1.2	
S3.002	S9	15 minute	2 year	Summer	I+20%	142.840	141.162	-0.158	0.000	0.45			0.298	1.6	
S3.003	S10	15 minute	2 year	Summer	I+20%	142.500	140.718	-0.122	0.000	0.65			0.446	1.4	
S4.000	S11	15 minute	2 year	Summer	I+20%	142.930	141.512	-0.143	0.000	0.29			0.088	1.1	
S4.001	S12	15 minute	2 year	Summer	I+20%	142.670	141.233	-0.132	0.000	0.36			0.148	1.0	
S3.004	S13	15 minute	2 year	Summer	I+20%	142.570	140.426	-0.294	0.000	0.26			0.232	2.0	
S5.000	S14	15 minute	2 year	Summer	I+20%	142.140	140.686	-0.179	0.000	0.09			0.046	1.0	
S3.005	S15	15 minute	2 year	Summer	I+20%	141.390	139.505	-0.245	0.000	0.42			0.630	1.7	
S3.006	S16	15 minute	2 year	Summer	I+20%	140.960	139.177	-0.258	0.000	0.37			0.738	2.1	
S1.005	S17	15 minute	2 year	Summer	I+20%	140.110	138.546	-0.254	0.000	0.62			1.013	1.3	
S1.006	S18	180 minute	2 year	Summer	I+20%	140.000	137.223	-0.127	0.000	0.38			0.828	0.9	
S1.007	S19	180 minute	2 year	Summer	I+20%	139.000	137.199	0.249	0.000	0.40		159.652		1.2	
S6.000	S20	15 minute	2 year	Summer	I+20%	140.710	139.289	-0.146	0.000	0.27			0.083	1.4	
S6.001	S21	15 minute	2 year	Summer	I+20%	139.860	138.347	-0.213	0.000	0.18			0.094	2.0	
S6.002	S22	15 minute	2 year	Summer	I+20%	139.070	137.474	-0.136	0.000	0.56			0.256	1.3	
S6.003	S23	15 minute	2 year	Summer	I+20%	138.870	137.114	-0.182	0.000	0.33			0.298	2.1	
S1.008	S24	30 minute	2 year	Summer	I+20%	138.190	135.577	-0.073	0.000	0.93			0.251	1.4	
S1.009	S25	30 minute	2 year	Summer	I+20%	137.490	135.326	-0.169	0.000	0.58			0.462	1.6	
S7.000	S26	15 minute	2 year	Summer	I+20%	136.470	135.279	-0.241	0.000	0.09			0.061	0.9	
S7.001	S27	15 minute	2 year	Summer	I+20%	137.770	135.082	-0.198	0.000	0.25			0.226	1.2	
S7.002	S28	15 minute	2 year	Summer	I+20%	137.290	134.920	-0.160	0.000	0.44			0.352	1.3	
S7.003	S29	15 minute	2 year	Summer	I+20%	136.510	134.681	-0.139	0.000	0.56			0.483	1.2	

2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	Pipe		Status
	US/MH Name	Flow (l/s)	
S1.000	S1	24.0	OK
S1.001	S2	33.3	OK
S2.000	S3	19.3	OK
S1.002	S4	63.6	OK
S1.003	S5	73.8	OK
S1.004	S6	76.5	OK
S3.000	S7	31.8	OK
S3.001	S8	35.8	OK
S3.002	S9	51.5	OK
S3.003	S10	62.7	OK
S4.000	S11	15.0	OK
S4.001	S12	15.0	OK
S3.004	S13	96.3	OK
S5.000	S14	5.9	OK
S3.005	S15	120.2	OK
S3.006	S16	134.4	OK
S1.005	S17	215.5	OK
S1.006	S18	106.2	OK
S1.007	S19	29.9	SURCHARGED
S6.000	S20	17.8	OK
S6.001	S21	33.4	OK
S6.002	S22	50.2	OK
S6.003	S23	54.7	OK
S1.008	S24	81.2	OK
S1.009	S25	98.1	OK
S7.000	S26	8.6	OK
S7.001	S27	23.9	OK
S7.002	S28	40.2	OK
S7.003	S29	46.8	OK

2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

						Water Surcharged Flooded					
PN	US/MH Name	Event	US/CL (m)	Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Maximum Vol (m³)		
S7.004	S30	15 minute 2 year Summer I+20%	136.000	134.574	-0.136	0.000	0.58			0.471	
S1.010	S31	30 minute 2 year Summer I+20%	136.480	134.234	-0.196	0.000	0.61			0.414	
S1.011	S32	30 minute 2 year Summer I+20%	135.840	133.516	-0.234	0.000	0.46			0.303	
S1.012	S33	360 minute 2 year Summer I+20%	135.000	132.106	0.006	0.000	0.24			1.061	
S8.000	S34	15 minute 2 year Summer I+20%	139.810	138.576	-0.159	0.000	0.19			0.069	
S8.001	S35	15 minute 2 year Summer I+20%	139.050	137.594	-0.141	0.000	0.30			0.103	
S8.002	S36	15 minute 2 year Summer I+20%	138.330	136.959	-0.096	0.000	0.62			0.175	
S8.003	S37	15 minute 2 year Summer I+20%	138.090	136.611	-0.179	0.000	0.34			0.134	
S8.004	S38	15 minute 2 year Summer I+20%	137.240	135.719	-0.151	0.000	0.49			0.313	
S9.000	S39	15 minute 2 year Summer I+20%	137.000	135.859	-0.166	0.000	0.16			0.061	
S8.005	S40	15 minute 2 year Summer I+20%	136.960	135.346	-0.154	0.000	0.47			0.236	
S8.006	S41	15 minute 2 year Summer I+20%	136.000	132.612	-0.488	0.000	0.08			0.189	
S1.013	S42	360 minute 2 year Summer I+20%	133.500	131.995	0.345	0.000	0.51			234.653	
S1.014	S43	60 minute 2 year Summer I+20%	133.480	130.805	-0.304	0.000	0.23			0.201	
S1.015	S44	960 minute 2 year Summer I+20%	134.000	129.972	-0.128	0.000	0.11			0.825	
S10.000	S45	30 minute 2 year Summer I+20%	142.140	140.859	-0.241	0.000	0.09			0.078	
S11.000	S46	15 minute 2 year Summer I+20%	142.100	141.000	-0.200	0.000	0.24			0.108	
S11.001	S47	15 minute 2 year Summer I+20%	142.500	140.752	-0.168	0.000	0.40			0.340	
S10.001	S48	15 minute 2 year Summer I+20%	142.630	140.436	-0.239	0.000	0.28			0.273	
S12.000	S49	15 minute 2 year Summer I+20%	142.750	141.097	-0.203	0.000	0.23			0.104	
S12.001	S50	15 minute 2 year Summer I+20%	142.510	140.849	-0.192	0.000	0.28			0.208	
S10.002	S51	15 minute 2 year Summer I+20%	142.760	140.263	-0.202	0.000	0.43			0.519	
S10.003	S57	15 minute 2 year Summer I+20%	142.970	139.872	-0.163	0.000	0.60			0.340	
S13.000	S53	15 minute 2 year Summer I+20%	142.980	141.340	-0.160	0.000	0.45			0.153	
S14.000	S54	15 minute 2 year Summer I+20%	142.920	141.095	-0.205	0.000	0.22			0.102	
S13.001	S54	15 minute 2 year Summer I+20%	142.780	140.342	0.042	0.000	1.37			0.381	
S13.002	S55	1440 minute 2 year Summer I+20%	142.850	140.033	-0.117	0.000	0.05			0.534	
S13.003	S56	1440 minute 2 year Summer I+20%	142.920	140.032	0.187	0.000	0.05			97.715	
S13.004	S57	15 minute 2 year Summer I+20%	142.920	139.632	-0.113	0.000	0.07			0.182	
S10.004	S58	15 minute 2 year Summer I+20%	142.920	139.631	-0.144	0.000	0.69			1.491	
S10.005	S59	30 minute 2 year Summer I+20%	142.400	139.532	0.027	0.000	1.00			3.701	
S10.006	S60	360 minute 2 year Summer I+20%	142.400	139.488	-0.222	0.000	0.00			0.985	
S10.007	S61	360 minute 2 year Summer I+20%	142.200	139.483	0.308	0.000	0.00			109.671	
S10.008	S62	60 minute 2 year Summer I+20%	142.100	139.003	-0.122					0.179	
S10.009	S63	30 minute 2 year Summer I+20%	141.380	138.778	-0.202					0.125	
S10.010	S64	30 minute 2 year Summer I+20%	139.110	137.696	-0.204					0.139	
S10.011	S65	30 minute 2 year Summer I+20%	138.060	136.676	-0.184	0.000	0.31			0.140	
S15.000	S66	15 minute 2 year Summer I+20%	141.720	139.953	-0.272	0.000	0.17			0.140	
S16.000	S67	15 minute 2 year Summer I+20%	142.150	141.052	-0.123	0.000	0.42			0.110	
S15.001	S68	15 minute 2 year Summer I+20%	141.930	139.694	-0.231	0.000	0.31			0.312	
S15.002	S69	15 minute 2 year Summer I+20%	142.140	139.422	-0.213	0.000	0.38			0.508	
S15.003	S70	15 minute 2 year Summer I+20%	141.860	139.192	-0.183	0.000	0.51			0.670	
S17.000	S71	15 minute 2 year Summer I+20%	142.650	141.091	-0.209	0.000	0.20			0.097	
S15.004	S72	15 minute 2 year Summer I+20%	141.700	139.073	-0.152	0.000	0.65			0.701	
S15.005	S73	15 minute 2 year Summer I+20%	141.500	138.856	-0.159	0.000	0.63			0.922	
S15.006	S74	15 minute 2 year Summer I+20%	141.000	138.457	-0.138	0.000	0.71			1.044	
S18.000	S75	15 minute 2 year Summer I+20%	142.800	141.235	-0.160	0.000	0.19			0.068	
S18.001	S76	15 minute 2 year Summer I+20%	142.680	141.149	-0.126	0.000	0.40			0.134	
S18.002	S77	15 minute 2 year Summer I+20%	141.530	140.150	-0.180	0.000	0.33			0.135	
S15.007	S78	15 minute 2 year Summer I+20%	140.500	137.949	-0.201	0.000	0.58			0.673	
S15.008	S79	15 minute 2 year Summer I+20%	139.000	137.095	0.065	0.000	1.32			3.518	
S15.009	S80	15 minute 2 year Summer I+20%	139.000	136.446	0.076	0.000	1.40			0.749	
S15.010	S81	1440 minute 2 year Summer I+20%	138.250	136.366	0.441	0.000	0.15			380.417	
S19.000	S82	15 minute 2 year Summer I+20%	141.700	140.264	-0.161	0.000	0.18			0.067	
S19.001	S83	15 minute 2 year Summer I+20%	140.640	139.233	-0.151	0.000	0.24			0.092	

RELEVANT TO
AMENDMENT NC
APPLICATION

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Duncreevan Kilcock Co. Kildare, Ireland	Kilternan LRD Stage 3 June'24 Post S/W Audit	
Date 10/07/2026 17:30	Designed by R.M.	
File Kilternan Master LRD ALTERNATE N...	Checked by	
Innovyze	Network 2020.1.3	

2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Maximum Velocity (m/s)	Pipe Flow (l/s)	Status
S7.004	S30	1.3	52.9	OK
S1.010	S31	1.8	162.3	OK
S1.011	S32	2.4	181.7	OK
S1.012	S33	0.9	83.5	SURCHARGED
S8.000	S34	1.9	18.2	OK
S8.001	S35	1.9	26.1	OK
S8.002	S36	1.5	36.1	OK
S8.003	S37	1.7	45.7	OK
S8.004	S38	1.8	61.1	OK
S9.000	S39	1.1	8.8	OK
S8.005	S40	2.3	76.4	OK
S8.006	S41	2.2	79.1	OK
S1.013	S42	1.5	49.9	SURCHARGED
S1.014	S43	1.3	56.1	OK
S1.015	S44	1.1	51.4	OK
S10.000	S45	1.0	9.9	OK
S11.000	S46	1.1	22.6	OK
S11.001	S47	1.1	33.9	OK
S10.001	S48	1.4	50.0	OK
S12.000	S49	1.2	22.8	OK
S12.001	S50	1.2	28.4	OK
S10.002	S51	1.7	82.8	OK
S10.003	S57	1.4	89.2	OK
S13.000	S53	1.7	55.0	OK
S14.000	S54	1.1	21.7	OK
S13.001	S54	1.2	84.0	SURCHARGED
S13.002	S55	0.4	8.9	OK
S13.003	S56	0.6	1.8	SURCHARGED
S13.004	S57	0.4	2.2	OK
S10.004	S58	1.4	101.9	OK
S10.005	S59	1.0	94.7	SURCHARGED
S10.006	S60	0.7	34.1	OK
S10.007	S61	0.8	10.0	SURCHARGED
S10.008	S62	0.9	16.5	OK
S10.009	S63	1.7	34.5	OK
S10.010	S64	2.3	43.3	OK
S10.011	S65	1.8	45.1	OK
S15.000	S66	1.3	32.0	OK
S16.000	S67	1.3	22.7	OK
S15.001	S68	1.4	54.9	OK
S15.002	S69	1.5	66.5	OK
S15.003	S70	1.3	70.9	OK
S17.000	S71	1.4	25.6	OK
S15.004	S72	1.6	110.3	OK
S15.005	S73	1.9	122.1	OK
S15.006	S74	2.0	141.7	OK
S18.000	S75	0.8	7.9	OK
S18.001	S76	1.6	27.5	OK
S18.002	S77	2.3	59.3	OK
S15.007	S78	2.6	226.8	OK
S15.008	S79	1.6	248.1	SURCHARGED
S15.009	S80	1.6	251.0	SURCHARGED
S15.010	S81	0.8	6.0	SURCHARGED
S19.000	S82	1.8	16.4	OK

2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Maximum		Pipe Flow (l/s)	Status
		Velocity (m/s)			
S19.001	S83	1.7	19.6		OK

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Duncreevan	Kilternan LRD Stage 3	
Kilcock	June'24	
Co. Kildare, Ireland	Post S/W Audit	
Date 10/07/2026 17:30	Designed by R.M.	
File Kilternan Master LRD ALTERNATE N...	Checked by	
Innovyze	Network 2020.1.3	

2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Maximum Vol (m³)	
S19.002	S84	15 minute	2 year	Summer I+20%	140.260	138.832	-0.121	0.000	0.43	0.130
S19.003	S85	15 minute	2 year	Summer I+20%	140.000	138.483	-0.102	0.000	0.57	0.208
S19.004	S86	15 minute	2 year	Summer I+20%	139.850	138.265	-0.090	0.000	0.66	0.233
S19.005	S87	15 minute	2 year	Summer I+20%	139.620	137.609	-0.116	0.000	0.47	0.118
S15.011	S88	4320 minute	2 year	Summer I+20%	138.250	135.982	0.302	0.000	0.11	2.349
S15.012	S89	4320 minute	2 year	Summer I+20%	138.250	135.977	0.357	0.000	0.03	4.477
S20.000	S90	15 minute	2 year	Summer I+20%	139.100	137.553	-0.172	0.000	0.13	0.054
S20.001	S91	4320 minute	2 year	Summer I+20%	139.250	135.976	0.526	0.000	0.00	1.389
S15.013	S92	4320 minute	2 year	Summer I+20%	137.250	135.976	0.861	0.000	0.10	527.283
S10.012	S93	30 minute	2 year	Summer I+20%	137.750	134.817	-0.113	0.000	0.58	0.322
S10.013	S94	30 minute	2 year	Summer I+20%	137.500	134.778	-0.142	0.000	0.54	0.846
S10.014	S95	30 minute	2 year	Summer I+20%	136.500	132.918	-0.182	0.000	0.32	0.127
S10.015	S96	960 minute	2 year	Summer I+20%	133.000	129.945	-0.455	0.000	0.03	0.247
S1.016	S97	960 minute	2 year	Summer I+20%	131.500	129.942	0.442	0.000	0.26	634.721
S1.017	S98	960 minute	2 year	Summer I+20%	129.750	128.454	-0.216	0.000	0.17	0.120
S1.018	S99	960 minute	2 year	Summer I+20%	127.750	126.683	-0.217	0.000	0.17	0.104
S1.019	S100	960 minute	2 year	Summer I+20%	126.250	124.761	-0.199	0.000	0.25	0.123
S1.020	S101	960 minute	2 year	Summer I+20%	126.000	123.851	-0.199	0.000	0.25	0.113
S21.000	S102	180 minute	2 year	Summer I+20%	124.750	123.460	-0.420	0.000	0.01	0.036
S1.021	S103	960 minute	2 year	Summer I+20%	125.000	122.221	-0.139	0.000	0.56	0.223
S1.022	S104	960 minute	2 year	Summer I+20%	123.500	122.145	-0.125	0.000	0.64	0.459
S22.000	S105	15 minute	2 year	Summer I+20%	136.200	134.703	-0.217	0.000	0.17	0.088
S22.001	S106	360 minute	2 year	Summer I+20%	136.270	134.306	-0.144	0.000	0.05	0.600
S22.002	S107	360 minute	2 year	Summer I+20%	136.160	134.306	0.211	0.000	0.03	17.885
S22.003	S108	360 minute	2 year	Winter I+20%	136.030	133.824	-0.201	0.000	0.03	0.043
S22.004	S109	15 minute	2 year	Summer I+20%	135.100	133.628	-0.191	0.000	0.05	0.056
S23.000	S110	15 minute	2 year	Summer I+20%	139.460	138.392	-0.248	0.000	0.07	0.053
S23.001	S111	15 minute	2 year	Summer I+20%	139.660	138.156	-0.224	0.000	0.14	0.123
S23.002	S112	15 minute	2 year	Summer I+20%	139.940	137.805	-0.185	0.000	0.31	0.233
S23.003	S113	2880 minute	2 year	Summer I+20%	139.050	137.704	0.134	0.000	0.05	2.006
S23.004	S114	2880 minute	2 year	Summer I+20%	139.100	137.704	0.334	0.000	0.08	1.215
S23.005	S115	2880 minute	2 year	Summer I+20%	139.250	137.703	0.508	0.000	0.03	135.530
S23.006	S116	2880 minute	2 year	Summer I+20%	139.000	136.874	-0.201	0.000	0.03	0.026
S23.007	S117	2880 minute	2 year	Summer I+20%	139.000	136.776	-0.199	0.000	0.03	0.042
S24.000	S118	15 minute	2 year	Summer I+20%	136.450	134.508	-0.167	0.000	0.15	0.060
S24.001	S119	15 minute	2 year	Summer I+20%	134.980	133.101	-0.124	0.000	0.41	0.109
S25.000	S120	15 minute	2 year	Summer I+20%	131.230	129.583	-0.142	0.000	0.29	0.088
S24.002	S121	15 minute	2 year	Summer I+20%	132.400	129.142	-0.233	0.000	0.30	0.195
S24.003	S122	15 minute	2 year	Summer I+20%	131.980	128.312	-0.213	0.000	0.38	0.438
S24.004	S123	15 minute	2 year	Summer I+20%	131.800	127.974	-0.211	0.000	0.39	0.429
S24.005	S124	2160 minute	2 year	Summer I+20%	130.750	127.429	-0.171	0.000	0.02	1.738
S26.000	S125	15 minute	2 year	Summer I+20%	133.500	132.391	-0.134	0.000	0.34	0.097
S26.001	S126	15 minute	2 year	Summer I+20%	133.500	132.044	-0.101	0.000	0.57	0.240
S26.002	S127	15 minute	2 year	Summer I+20%	133.500	131.614	-0.091	0.000	0.66	0.288
S27.000	S128	15 minute	2 year	Summer I+20%	132.900	131.786	-0.139	0.000	0.31	0.092
S27.001	S129	15 minute	2 year	Summer I+20%	132.900	131.407	-0.118	0.000	0.44	0.237
S26.003	S130	15 minute	2 year	Summer I+20%	132.900	130.969	-0.131	0.000	0.61	0.241
S26.004	S131	15 minute	2 year	Summer I+20%	132.500	130.732	-0.168	0.000	0.40	0.179
S28.000	S132	15 minute	2 year	Summer I+20%	132.300	131.213	-0.112	0.000	0.50	0.122
S28.001	S133	15 minute	2 year	Summer I+20%	132.300	130.976	-0.099	0.000	0.58	0.231
S28.002	S134	15 minute	2 year	Summer I+20%	132.300	130.684	-0.081	0.000	0.73	0.361
S26.005	S135	15 minute	2 year	Summer I+20%	132.000	130.157	-0.143	0.000	0.54	0.171
S26.006	S136	2160 minute	2 year	Summer I+20%	131.000	127.429	-0.271	0.000	0.03	0.572
S24.006	S137	2160 minute	2 year	Summer I+20%	129.500	127.429	0.454	0.000	0.06	365.950
S24.007	S138	10080 minute	2 year	Summer I+20%	128.650	126.538	-0.187	0.000	0.07	0.038

Roger Mullarkey & Associates		Page 44
Duncreevan Kilcock Co. Kildare, Ireland	Kilternan LRD Stage 3 June'24 Post S/W Audit	
Date 10/07/2026 17:30	Designed by R.M.	
File Kilternan Master LRD ALTERNATE N...	Checked by	
Innovyze	Network 2020.1.3	

2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Maximum Velocity (m/s)	Pipe Flow (l/s)	Status
S19.002	S84	1.4	25.7	OK
S19.003	S85	1.5	32.3	OK
S19.004	S86	1.3	32.4	OK
S19.005	S87	2.2	41.7	OK
S15.011	S88	0.9	10.1	SURCHARGED
S15.012	S89	0.4	10.4	SURCHARGED
S20.000	S90	0.9	6.4	OK
S20.001	S91	0.0	0.3	SURCHARGED
S15.013	S92	0.7	4.1	SURCHARGED
S10.012	S93	1.1	50.8	OK
S10.013	S94	1.5	54.4	OK
S10.014	S95	2.3	59.5	OK
S10.015	S96	1.3	24.5	OK
S1.016	S97	1.9	39.9	SURCHARGED
S1.017	S98	2.5	39.9	OK
S1.018	S99	2.5	39.9	OK
S1.019	S100	1.9	39.9	OK
S1.020	S101	1.9	39.9	OK
S21.000	S102	0.4	2.0	OK
S1.021	S103	1.1	41.9	OK
S1.022	S104	1.0	41.9	OK
S22.000	S105	1.4	22.3	OK
S22.001	S106	0.4	5.9	OK
S22.002	S107	0.5	1.2	SURCHARGED
S22.003	S108	0.5	1.2	OK
S22.004	S109	1.5	5.5	OK
S23.000	S110	0.9	7.7	OK
S23.001	S111	1.2	16.4	OK
S23.002	S112	1.4	34.9	OK
S23.003	S113	0.7	4.6	SURCHARGED
S23.004	S114	0.4	5.0	SURCHARGED
S23.005	S115	0.5	1.1	SURCHARGED
S23.006	S116	0.5	1.1	OK
S23.007	S117	0.4	1.1	OK
S24.000	S118	2.0	16.1	OK
S24.001	S119	2.2	37.9	OK
S25.000	S120	1.0	13.8	OK
S24.002	S121	1.9	71.8	OK
S24.003	S122	1.8	83.2	OK
S24.004	S123	2.0	93.5	OK
S24.005	S124	0.7	9.7	OK
S26.000	S125	1.1	16.6	OK
S26.001	S126	1.3	28.1	OK
S26.002	S127	1.5	37.5	OK
S27.000	S128	1.1	15.2	OK
S27.001	S129	1.2	21.7	OK
S26.003	S130	1.5	62.7	OK
S26.004	S131	2.1	62.4	OK
S28.000	S132	1.2	23.9	OK
S28.001	S133	1.3	28.4	OK
S28.002	S134	1.2	32.7	OK
S26.005	S135	2.5	94.6	OK
S26.006	S136	0.6	9.5	OK
S24.006	S137	0.9	3.4	SURCHARGED

2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Maximum		Pipe Flow (l/s)	Status
		Velocity (m/s)			
S24.007	S138	0.8	3.4		OK

2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

			Water		Surcharged		Flooded			
PN	US/MH Name	Event	US/CL (m)	Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Maximum Vol (m³)	
S24.008	S139	2880 minute 2 year Summer I+20%	127.750	125.941	-0.194	0.000	0.05		0.053	
S24.009	S140	8640 minute 2 year Summer I+20%	127.730	124.786	-0.179	0.000	0.10		0.081	

		Maximum		Pipe	
PN	US/MH Name	Velocity (m/s)	Flow (l/s)	Status	
S24.008	S139	1.0	3.4	OK	
S24.009	S140	0.6	3.4	OK	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm														
Simulation Criteria														
Areal Reduction Factor			1.000		Additional Flow - % of Total Flow			0.000						
Hot Start (mins)			0		MADD Factor * 10m³/ha Storage			2.000						
Hot Start Level (mm)			0		Inlet Coeffiecient			0.800						
Manhole Headloss Coeff (Global)			0.500		Flow per Person per Day (l/per/day)			0.000						
Foul Sewage per hectare (l/s)			0.000											
Number of Input Hydrographs			0		Number of Offline Controls			0		Number of Time/Area Diagrams			0	
Number of Online Controls			10		Number of Storage Structures			10		Number of Real Time Controls			0	
Synthetic Rainfall Details														
Rainfall Model			FSR M5-60 (mm)		16.500 Cv (Summer)			1.000						
Region Scotland and Ireland			Ratio R		0.277 Cv (Winter)			1.000						
Margin for Flood Risk Warning (mm)			150.0		DVD Status			ON						
Analysis Timestep			Fine Inertia		Status			ON						
DTS Status			OFF											
Profile(s)					Summer and Winter									
Duration(s) (mins)			15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080											
Return Period(s) (years)					2, 30, 100									
Climate Change (%)					20, 20, 20									
				Water		Surcharged		Flooded		Maximum				
				US/CL		Level		Depth		Volume		Maximum		
PN	US/MH	Event		(m)		(m)		(m)		(m³)		Velocity		
	Name									Flow /	Overflow	Maximum		
										Cap.	(l/s)	Vol (m³)	(m/s)	
S1.000	S1	30 minute	30 year Summer I+20%	142.310	140.948	-0.162	0.000	0.43				0.150	1.4	
S1.001	S2	15 minute	30 year Summer I+20%	142.000	140.624	-0.126	0.000	0.61				0.431	1.6	
S2.000	S3	30 minute	30 year Summer I+20%	142.040	140.682	-0.083	0.000	0.71				0.155	1.4	
S1.002	S4	15 minute	30 year Summer I+20%	141.750	140.279	-0.146	0.000	0.67				0.592	1.8	
S1.003	S5	15 minute	30 year Summer I+20%	141.420	139.668	-0.179	0.000	0.52				0.274	2.6	
S1.004	S6	15 minute	30 year Summer I+20%	140.100	139.102	0.227	0.000	0.84				2.600	1.7	
S3.000	S7	30 minute	30 year Summer I+20%	142.780	141.674	-0.146	0.000	0.51				0.168	1.6	
S3.001	S8	15 minute	30 year Summer I+20%	142.900	141.376	-0.068	0.000	0.75				0.721	1.3	
S3.002	S9	15 minute	30 year Summer I+20%	142.840	141.310	-0.010	0.000	0.88				0.809	1.8	
S3.003	S10	15 minute	30 year Summer I+20%	142.500	140.943	0.103	0.000	1.32				1.790	1.8	
S4.000	S11	30 minute	30 year Summer I+20%	142.930	141.547	-0.108	0.000	0.53				0.127	1.3	
S4.001	S12	30 minute	30 year Summer I+20%	142.670	141.274	-0.091	0.000	0.66				0.267	1.1	
S3.004	S13	15 minute	30 year Summer I+20%	142.570	140.508	-0.212	0.000	0.53				0.426	2.4	
S5.000	S14	15 minute	30 year Summer I+20%	142.140	140.702	-0.163	0.000	0.17				0.065	1.2	
S3.005	S15	15 minute	30 year Summer I+20%	141.390	139.632	-0.118	0.000	0.88				1.598	2.0	
S3.006	S16	15 minute	30 year Summer I+20%	140.960	139.289	-0.146	0.000	0.79				1.775	2.5	
S1.005	S17	15 minute	30 year Summer I+20%	140.110	138.925	0.125	0.000	1.29				4.353	1.6	
S1.006	S18	180 minute	30 year Summer I+20%	140.000	137.839	0.489	0.000	0.66				1.916	0.9	
S1.007	S19	180 minute	30 year Summer I+20%	139.000	137.835	0.885	0.000	0.40				342.729	1.2	
S6.000	S20	30 minute	30 year Summer I+20%	140.710	139.322	-0.113	0.000	0.48				0.121	1.7	
S6.001	S21	15 minute	30 year Summer I+20%	139.860	138.389	-0.171	0.000	0.38				0.161	2.5	
S6.002	S22	15 minute	30 year Summer I+20%	139.070	137.773	0.163	0.000	1.21				1.112	1.5	
S6.003	S23	15 minute	30 year Summer I+20%	138.870	137.184	-0.112	0.000	0.71				0.701	2.6	
S1.008	S24	15 minute	30 year Summer I+20%	138.190	136.029	0.379	0.000	1.67				0.762	2.1	
S1.009	S25	15 minute	30 year Summer I+20%	137.490	135.574	0.079	0.000	1.08				1.788	1.7	
S7.000	S26	30 minute	30 year Summer I+20%	136.470	135.300	-0.220	0.000	0.16				0.084	1.1	
S7.001	S27	15 minute	30 year Summer I+20%	137.770	135.192	-0.088	0.000	0.53				0.763	1.4	
S7.002	S28	15 minute	30 year Summer I+20%	137.290	135.140	0.060	0.000	0.90				1.508	1.4	
S7.003	S29	15 minute	30 year Summer I+20%	136.510	134.966	0.146	0.000	1.09				2.386	1.3	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	Pipe		Status
	US/MH Name	Flow (l/s)	
S1.000	S1	43.6	OK
S1.001	S2	65.1	OK
S2.000	S3	35.2	OK
S1.002	S4	126.0	OK
S1.003	S5	149.1	OK
S1.004	S6	156.5	SURCHARGED
S3.000	S7	57.8	OK
S3.001	S8	66.8	OK
S3.002	S9	100.4	OK
S3.003	S10	126.7	SURCHARGED
S4.000	S11	27.2	OK
S4.001	S12	27.3	OK
S3.004	S13	197.1	OK
S5.000	S14	10.8	OK
S3.005	S15	250.5	OK
S3.006	S16	283.3	OK
S1.005	S17	446.7	SURCHARGED
S1.006	S18	186.9	SURCHARGED
S1.007	S19	29.9	SURCHARGED
S6.000	S20	32.2	OK
S6.001	S21	70.4	OK
S6.002	S22	108.1	SURCHARGED
S6.003	S23	118.2	OK
S1.008	S24	146.4	SURCHARGED
S1.009	S25	183.3	SURCHARGED
S7.000	S26	15.6	OK
S7.001	S27	51.4	OK
S7.002	S28	82.9	SURCHARGED
S7.003	S29	90.6	SURCHARGED

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Maximum Vol (m³)
S7.004	S30	15 minute 30 year Summer I+20%	136.000	134.840	0.130	0.000	1.12		1.351
S1.010	S31	15 minute 30 year Summer I+20%	136.480	134.542	0.112	0.000	1.15		2.317
S1.011	S32	15 minute 30 year Summer I+20%	135.840	133.633	-0.117	0.000	0.86		0.518
S1.012	S33	480 minute 30 year Winter I+20%	135.000	132.670	0.570	0.000	0.23		2.059
S8.000	S34	15 minute 30 year Summer I+20%	139.810	138.601	-0.134	0.000	0.35		0.098
S8.001	S35	15 minute 30 year Summer I+20%	139.050	137.637	-0.098	0.000	0.61		0.170
S8.002	S36	15 minute 30 year Summer I+20%	138.330	137.210	0.155	0.000	1.31		0.709
S8.003	S37	15 minute 30 year Summer I+20%	138.090	136.685	-0.105	0.000	0.73		0.230
S8.004	S38	15 minute 30 year Summer I+20%	137.240	135.897	0.027	0.000	1.05		1.088
S9.000	S39	15 minute 30 year Summer I+20%	137.000	135.882	-0.143	0.000	0.29		0.087
S8.005	S40	15 minute 30 year Summer I+20%	136.960	135.437	-0.063	0.000	0.98		0.536
S8.006	S41	480 minute 30 year Winter I+20%	136.000	132.663	-0.437	0.000	0.02		0.280
S1.013	S42	480 minute 30 year Winter I+20%	133.500	132.662	1.012	0.000	0.51		493.181
S1.014	S43	30 minute 30 year Summer I+20%	133.480	130.827	-0.282	0.000	0.30		0.233
S1.015	S44	960 minute 30 year Winter I+20%	134.000	130.682	0.582	0.000	0.11		2.342
S10.000	S45	30 minute 30 year Summer I+20%	142.140	140.880	-0.220	0.000	0.16		0.107
S11.000	S46	15 minute 30 year Summer I+20%	142.100	141.041	-0.159	0.000	0.45		0.154
S11.001	S47	15 minute 30 year Summer I+20%	142.500	140.828	-0.092	0.000	0.81		0.730
S10.001	S48	15 minute 30 year Summer I+20%	142.630	140.546	-0.129	0.000	0.57		0.787
S12.000	S49	30 minute 30 year Summer I+20%	142.750	141.136	-0.164	0.000	0.42		0.148
S12.001	S50	15 minute 30 year Summer I+20%	142.510	140.900	-0.141	0.000	0.54		0.438
S10.002	S51	15 minute 30 year Summer I+20%	142.760	140.498	0.033	0.000	0.84		2.029
S10.003	S57	15 minute 30 year Summer I+20%	142.970	140.345	0.310	0.000	1.05		3.360
S13.000	S53	15 minute 30 year Summer I+20%	142.980	141.408	-0.092	0.000	0.82		0.230
S14.000	S54	15 minute 30 year Summer I+20%	142.920	141.132	-0.168	0.000	0.40		0.144
S13.001	S54	15 minute 30 year Summer I+20%	142.780	140.648	0.348	0.000	2.59		0.727
S13.002	S55	960 minute 30 year Winter I+20%	142.850	140.400	0.250	0.000	0.07		1.408
S13.003	S56	960 minute 30 year Winter I+20%	142.920	140.399	0.554	0.000	0.05		203.244
S13.004	S57	240 minute 30 year Summer I+20%	142.920	140.121	0.376	0.000	0.07		1.017
S10.004	S58	240 minute 30 year Summer I+20%	142.920	140.120	0.345	0.000	0.42		5.405
S10.005	S59	480 minute 30 year Summer I+20%	142.400	140.021	0.516	0.000	0.43		5.623
S10.006	S60	480 minute 30 year Summer I+20%	142.400	140.019	0.309	0.000	0.11		1.945
S10.007	S61	480 minute 30 year Summer I+20%	142.200	140.018	0.843	0.000	0.33		224.491
S10.008	S62	30 minute 30 year Summer I+20%	142.100	139.046					0.283
S10.009	S63	15 minute 30 year Summer I+20%	141.380	138.834					0.310
S10.010	S64	15 minute 30 year Summer I+20%	139.110	137.752					0.285
S10.011	S65	15 minute 30 year Summer I+20%	138.060	136.750					0.272
S15.000	S66	15 minute 30 year Summer I+20%	141.720	140.051	-0.174	0.000	0.31		0.280
S16.000	S67	15 minute 30 year Summer I+20%	142.150	141.100	-0.075	0.000	0.78		0.164
S15.001	S68	15 minute 30 year Summer I+20%	141.930	140.021	0.096	0.000	0.58		2.419
S15.002	S69	15 minute 30 year Summer I+20%	142.140	139.895	0.260	0.000	0.68		3.841
S15.003	S70	15 minute 30 year Summer I+20%	141.860	139.773	0.398	0.000	0.77		3.759
S17.000	S71	30 minute 30 year Summer I+20%	142.650	141.126	-0.174	0.000	0.37		0.137
S15.004	S72	15 minute 30 year Summer I+20%	141.700	139.666	0.441	0.000	1.01		2.388
S15.005	S73	15 minute 30 year Summer I+20%	141.500	139.498	0.483	0.000	0.93		3.675
S15.006	S74	15 minute 30 year Summer I+20%	141.000	139.169	0.574	0.000	1.10		5.468
S18.000	S75	15 minute 30 year Summer I+20%	142.800	141.260	-0.135	0.000	0.34		0.097
S18.001	S76	15 minute 30 year Summer I+20%	142.680	141.218	-0.057	0.000	0.90		0.312
S18.002	S77	15 minute 30 year Summer I+20%	141.530	140.232	-0.098	0.000	0.78		0.252
S15.007	S78	15 minute 30 year Summer I+20%	140.500	138.673	0.523	0.000	0.99		5.334
S15.008	S79	15 minute 30 year Summer I+20%	139.000	137.501	0.471	0.000	2.30		7.902
S15.009	S80	1440 minute 30 year Winter I+20%	139.000	136.958	0.588	0.000	0.19		2.474
S15.010	S81	1440 minute 30 year Winter I+20%	138.250	136.956	1.031	0.000	0.15		774.144
S19.000	S82	15 minute 30 year Summer I+20%	141.700	140.289	-0.136	0.000	0.33		0.095
S19.001	S83	15 minute 30 year Summer I+20%	140.640	139.266	-0.118	0.000	0.46		0.137

RELEVANT TO
AMENDMENT NC
APPLICATION

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Duncreevan Kilcock Co. Kildare, Ireland	Kilternan LRD Stage 3 June'24 Post S/W Audit	
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File Kilternan Master LRD ALTERNATE N...	Checked by	
Innovyze	Network 2020.1.3	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Maximum Pipe		Status
		Velocity (m/s)	Flow (l/s)	
S7.004	S30	1.5	102.3	SURCHARGED
S1.010	S31	1.9	305.5	SURCHARGED
S1.011	S32	2.8	337.2	OK
S1.012	S33	0.8	81.1	SURCHARGED
S8.000	S34	2.2	33.4	OK
S8.001	S35	2.3	52.8	OK
S8.002	S36	1.9	75.9	SURCHARGED
S8.003	S37	2.1	98.7	OK
S8.004	S38	2.0	131.4	SURCHARGED
S9.000	S39	1.2	16.2	OK
S8.005	S40	2.7	160.3	OK
S8.006	S41	1.8	21.8	OK
S1.013	S42	1.5	49.8	SURCHARGED
S1.014	S43	1.4	72.7	OK
S1.015	S44	1.1	52.1	SURCHARGED
S10.000	S45	1.2	18.3	OK
S11.000	S46	1.3	41.6	OK
S11.001	S47	1.3	69.3	OK
S10.001	S48	1.7	102.1	OK
S12.000	S49	1.4	41.5	OK
S12.001	S50	1.5	54.7	OK
S10.002	S51	1.9	160.1	SURCHARGED
S10.003	S57	1.5	155.8	SURCHARGED
S13.000	S53	1.9	101.2	OK
S14.000	S54	1.3	39.9	OK
S13.001	S54	2.2	158.8	SURCHARGED
S13.002	S55	0.4	12.4	SURCHARGED
S13.003	S56	0.6	1.8	SURCHARGED
S13.004	S57	0.4	2.1	SURCHARGED
S10.004	S58	1.3	63.0	SURCHARGED
S10.005	S59	0.7	41.0	SURCHARGED
S10.006	S60	0.6	42.5	SURCHARGED
S10.007	S61	0.8	10.0	SURCHARGED
S10.008	S62	1.1	28.8	OK
S10.009	S63	2.1	76.0	OK
S10.010	S64	2.8	97.7	OK
S10.011	S65	2.2	101.0	OK
S15.000	S66	1.5	58.7	OK
S16.000	S67	1.5	41.8	OK
S15.001	S68	1.6	101.0	SURCHARGED
S15.002	S69	1.7	117.4	SURCHARGED
S15.003	S70	1.3	106.5	SURCHARGED
S17.000	S71	1.7	46.6	OK
S15.004	S72	1.7	170.4	SURCHARGED
S15.005	S73	2.0	182.2	SURCHARGED
S15.006	S74	2.0	221.3	SURCHARGED
S18.000	S75	1.0	14.6	OK
S18.001	S76	2.0	62.1	OK
S18.002	S77	2.8	139.7	OK
S15.007	S78	2.7	392.2	SURCHARGED
S15.008	S79	2.7	431.7	SURCHARGED
S15.009	S80	0.7	34.6	SURCHARGED
S15.010	S81	0.8	6.0	SURCHARGED
S19.000	S82	2.1	30.2	OK

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Maximum		Pipe Flow (l/s)	Status
		Velocity (m/s)			
S19.001	S83	2.0	38.0		OK

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Kilcock	June'24	
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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH		Event			US/CL (m)	Water	Surcharged	Flooded	Flow / Cap.	Overflow (l/s)	Maximum Vol (m³)
	Name						Level (m)	Depth (m)	Volume (m³)			
S19.002	S84	15 minute	30 year	Summer	I+20%	140.260	138.987	0.034	0.000	0.84		0.438
S19.003	S85	15 minute	30 year	Summer	I+20%	140.000	138.723	0.138	0.000	1.13		1.006
S19.004	S86	15 minute	30 year	Summer	I+20%	139.850	138.436	0.081	0.000	1.29		0.757
S19.005	S87	15 minute	30 year	Summer	I+20%	139.620	137.673	-0.052	0.000	0.92		0.190
S15.011	S88	4320 minute	30 year	Winter	I+20%	138.250	136.502	0.822	0.000	0.10		3.339
S15.012	S89	4320 minute	30 year	Winter	I+20%	138.250	136.496	0.876	0.000	0.03		5.395
S20.000	S90	15 minute	30 year	Summer	I+20%	139.100	137.573	-0.152	0.000	0.23		0.077
S20.001	S91	4320 minute	30 year	Winter	I+20%	139.250	136.495	1.045	0.000	0.00		2.133
S15.013	S92	4320 minute	30 year	Winter	I+20%	137.250	136.495	1.380	0.000	0.10		775.091
S10.012	S93	15 minute	30 year	Summer	I+20%	137.750	135.207	0.277	0.000	1.23		1.479
S10.013	S94	15 minute	30 year	Summer	I+20%	137.500	135.013	0.093	0.000	1.16		1.342
S10.014	S95	15 minute	30 year	Summer	I+20%	136.500	132.985	-0.115	0.000	0.69		0.204
S10.015	S96	960 minute	30 year	Winter	I+20%	133.000	130.565	0.165	0.000	0.04		1.343
S1.016	S97	960 minute	30 year	Winter	I+20%	131.500	130.562	1.062	0.000	0.27		1198.759
S1.017	S98	4320 minute	30 year	Summer	I+20%	129.750	128.455	-0.215	0.000	0.18		0.121
S1.018	S99	4320 minute	30 year	Summer	I+20%	127.750	126.684	-0.216	0.000	0.18		0.106
S1.019	S100	240 minute	30 year	Summer	I+20%	126.250	124.762	-0.198	0.000	0.25		0.125
S1.020	S101	240 minute	30 year	Summer	I+20%	126.000	123.852	-0.198	0.000	0.26		0.114
S21.000	S102	180 minute	30 year	Summer	I+20%	124.750	123.460	-0.420	0.000	0.01		0.036
S1.021	S103	240 minute	30 year	Summer	I+20%	125.000	122.223	-0.137	0.000	0.57		0.226
S1.022	S104	240 minute	30 year	Winter	I+20%	123.500	122.148	-0.122	0.000	0.66		0.469
S22.000	S105	15 minute	30 year	Summer	I+20%	136.200	134.735	-0.185	0.000	0.31		0.125
S22.001	S106	360 minute	30 year	Winter	I+20%	136.270	134.710	0.260	0.000	0.05		2.684
S22.002	S107	360 minute	30 year	Winter	I+20%	136.160	134.710	0.615	0.000	0.03		37.865
S22.003	S108	360 minute	30 year	Winter	I+20%	136.030	133.825	-0.200	0.000	0.03		0.044
S22.004	S109	15 minute	30 year	Summer	I+20%	135.100	133.645	-0.174	0.000	0.12		0.089
S23.000	S110	15 minute	30 year	Summer	I+20%	139.460	138.412	-0.228	0.000	0.13		0.075
S23.001	S111	2160 minute	30 year	Winter	I+20%	139.660	138.260	-0.120	0.000	0.01		0.451
S23.002	S112	2160 minute	30 year	Winter	I+20%	139.940	138.260	0.270	0.000	0.03		2.649
S23.003	S113	2160 minute	30 year	Winter	I+20%	139.050	138.259	0.689	0.000	0.06		3.412
S23.004	S114	2160 minute	30 year	Winter	I+20%	139.100	138.258	0.888	0.000	0.10		1.842
S23.005	S115	2160 minute	30 year	Winter	I+20%	139.250	138.257	1.062	0.000	0.03		241.468
S23.006	S116	2160 minute	30 year	Winter	I+20%	139.000	136.877	-0.198	0.000	0.03		0.030
S23.007	S117	2160 minute	30 year	Winter	I+20%	139.000	136.779	-0.196	0.000	0.04		0.048
S24.000	S118	15 minute	30 year	Summer	I+20%	136.450	134.530	-0.145	0.000	0.28		0.085
S24.001	S119	15 minute	30 year	Summer	I+20%	134.980	133.167	-0.058	0.000	0.91		0.184
S25.000	S120	15 minute	30 year	Summer	I+20%	131.230	129.618	-0.107	0.000	0.54		0.127
S24.002	S121	15 minute	30 year	Summer	I+20%	132.400	129.225	-0.150	0.000	0.66		0.314
S24.003	S122	15 minute	30 year	Summer	I+20%	131.980	128.419	-0.106	0.000	0.85		0.997
S24.004	S123	15 minute	30 year	Summer	I+20%	131.800	128.087	-0.098	0.000	0.87		1.006
S24.005	S124	2160 minute	30 year	Winter	I+20%	130.750	127.992	0.392	0.000	0.02		6.094
S26.000	S125	15 minute	30 year	Summer	I+20%	133.500	132.429	-0.096	0.000	0.62		0.141
S26.001	S126	15 minute	30 year	Summer	I+20%	133.500	132.289	0.144	0.000	1.04		1.352
S26.002	S127	15 minute	30 year	Summer	I+20%	133.500	131.802	0.097	0.000	1.25		1.141
S27.000	S128	15 minute	30 year	Summer	I+20%	132.900	131.823	-0.102	0.000	0.57		0.133
S27.001	S129	15 minute	30 year	Summer	I+20%	132.900	131.476	-0.049	0.000	0.88		0.503
S26.003	S130	15 minute	30 year	Summer	I+20%	132.900	131.153	0.053	0.000	1.17		0.967
S26.004	S131	15 minute	30 year	Summer	I+20%	132.500	130.802	-0.098	0.000	0.77		0.319
S28.000	S132	15 minute	30 year	Summer	I+20%	132.300	131.343	0.018	0.000	0.86		0.269
S28.001	S133	15 minute	30 year	Summer	I+20%	132.300	131.173	0.098	0.000	1.02		1.033
S28.002	S134	15 minute	30 year	Summer	I+20%	132.300	130.840	0.075	0.000	1.27		1.071
S26.005	S135	15 minute	30 year	Summer	I+20%	132.000	130.318	0.018	0.000	1.01		0.374
S26.006	S136	2160 minute	30 year	Winter	I+20%	131.000	127.992	0.292	0.000	0.03		1.568
S24.006	S137	2160 minute	30 year	Winter	I+20%	129.500	127.992	1.017	0.000	0.06		664.254
S24.007	S138	2160 minute	30 year	Winter	I+20%	128.650	126.538	-0.187	0.000	0.07		0.038

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Maximum Velocity (m/s)	Pipe Flow (l/s)	Status
S19.002	S84	1.6	49.7	SURCHARGED
S19.003	S85	1.6	63.7	SURCHARGED
S19.004	S86	1.6	63.3	SURCHARGED
S19.005	S87	2.6	82.7	OK
S15.011	S88	0.9	10.0	SURCHARGED
S15.012	S89	0.5	10.4	SURCHARGED
S20.000	S90	1.0	11.8	OK
S20.001	S91	0.0	0.3	SURCHARGED
S15.013	S92	0.8	4.5	SURCHARGED
S10.012	S93	1.5	107.1	SURCHARGED
S10.013	S94	1.6	116.8	SURCHARGED
S10.014	S95	2.8	128.0	OK
S10.015	S96	1.3	25.7	SURCHARGED
S1.016	S97	2.0	40.8	SURCHARGED
S1.017	S98	2.5	40.8	OK
S1.018	S99	2.5	40.8	OK
S1.019	S100	1.9	40.9	OK
S1.020	S101	1.9	40.9	OK
S21.000	S102	0.4	2.0	OK
S1.021	S103	1.1	42.9	OK
S1.022	S104	1.0	42.9	OK
S22.000	S105	1.6	41.0	OK
S22.001	S106	0.4	6.4	SURCHARGED
S22.002	S107	0.5	1.2	SURCHARGED
S22.003	S108	0.5	1.2	OK
S22.004	S109	1.8	11.7	OK
S23.000	S110	1.1	14.2	OK
S23.001	S111	0.8	1.5	OK
S23.002	S112	0.8	3.5	SURCHARGED
S23.003	S113	0.7	5.5	SURCHARGED
S23.004	S114	0.4	6.1	SURCHARGED
S23.005	S115	0.5	1.4	SURCHARGED
S23.006	S116	0.5	1.4	OK
S23.007	S117	0.5	1.4	OK
S24.000	S118	2.3	29.6	OK
S24.001	S119	2.6	83.0	OK
S25.000	S120	1.2	25.4	OK
S24.002	S121	2.3	158.8	OK
S24.003	S122	2.2	183.9	OK
S24.004	S123	2.4	206.4	OK
S24.005	S124	0.6	9.8	SURCHARGED
S26.000	S125	1.3	30.5	OK
S26.001	S126	1.4	51.8	SURCHARGED
S26.002	S127	1.8	70.9	SURCHARGED
S27.000	S128	1.3	28.0	OK
S27.001	S129	1.4	42.9	OK
S26.003	S130	1.7	121.2	SURCHARGED
S26.004	S131	2.4	120.0	OK
S28.000	S132	1.3	41.1	SURCHARGED
S28.001	S133	1.3	49.7	SURCHARGED
S28.002	S134	1.4	57.2	SURCHARGED
S26.005	S135	2.8	178.8	SURCHARGED
S26.006	S136	0.6	9.7	SURCHARGED
S24.006	S137	0.9	3.4	SURCHARGED

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Maximum	Pipe	Status
		Velocity (m/s)	Flow (l/s)	
S24.007	S138	0.8	3.4	OK

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Event	US/CL (m)	Water	Surcharged	Flooded	Flow / Cap.	Overflow (l/s)	Maximum Vol (m³)
				Level (m)	Depth (m)	Volume (m³)			
S24.008	S139	2160 minute 30 year Winter I+20%	127.750	125.941	-0.194	0.000	0.05		0.053
S24.009	S140	2160 minute 30 year Winter I+20%	127.730	124.787	-0.178	0.000	0.10		0.081

PN	US/MH Name	Maximum Pipe		Status
		Velocity (m/s)	Flow (l/s)	
S24.008	S139	1.0	3.4	OK
S24.009	S140	0.6	3.4	OK

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Duncreevan	Kiltiernan LRD Stage 3	
Kilcock	June'24	
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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coefficient 0.800
 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
 Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 10 Number of Storage Structures 10 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 16.500 Cv (Summer) 1.000
 Region Scotland and Ireland Ratio R 0.277 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 150.0 DVD Status ON
 Analysis Timestep Fine Inertia Status ON
 DTS Status OFF

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
 Return Period(s) (years) 2, 30, 100
 Climate Change (%) 20, 20, 20

PN	US/MH Name	Event	US/CL (m)	Water Surcharged Flooded				Flow / Cap.	Overflow (l/s)	Maximum Vol (m ³)
				Level (m)	Depth (m)	Volume (m ³)				
S1.000	S1	30 minute 100 year Summer I+20%	142.310	140.972	-0.138	0.000	0.56			0.178
S1.001	S2	15 minute 100 year Summer I+20%	142.000	140.658	-0.092	0.000	0.80			0.574
S2.000	S3	30 minute 100 year Summer I+20%	142.040	140.712	-0.053	0.000	0.93			0.189
S1.002	S4	15 minute 100 year Summer I+20%	141.750	140.325	-0.100	0.000	0.86			0.917
S1.003	S5	15 minute 100 year Summer I+20%	141.420	139.742	-0.105	0.000	0.68			0.379
S1.004	S6	15 minute 100 year Summer I+20%	140.100	139.277	0.402	0.000	1.08			3.598
S3.000	S7	15 minute 100 year Summer I+20%	142.780	141.845	0.025	0.000	0.66			0.362
S3.001	S8	15 minute 100 year Summer I+20%	142.900	141.689	0.245	0.000	1.01			2.486
S3.002	S9	15 minute 100 year Summer I+20%	142.840	141.570	0.250	0.000	1.03			1.239
S3.003	S10	15 minute 100 year Summer I+20%	142.500	141.035	0.195	0.000	1.54			2.401
S4.000	S11	30 minute 100 year Summer I+20%	142.930	141.569	-0.086	0.000	0.69			0.152
S4.001	S12	30 minute 100 year Summer I+20%	142.670	141.302	-0.063	0.000	0.86			0.361
S3.004	S13	15 minute 100 year Summer I+20%	142.570	140.538	-0.182	0.000	0.64			0.526
S5.000	S14	15 minute 100 year Summer I+20%	142.140	140.712	-0.153	0.000	0.22			0.075
S3.005	S15	15 minute 100 year Summer I+20%	141.390	139.829	0.079	0.000	1.04			3.721
S3.006	S16	15 minute 100 year Summer I+20%	140.960	139.487	0.052	0.000	0.92			4.241
S1.005	S17	15 minute 100 year Summer I+20%	140.110	139.021	0.221	0.000	1.56			5.404
S1.006	S18	240 minute 100 year Summer I+20%	140.000	138.265	0.915	0.000	0.71			2.716
S1.007	S19	240 minute 100 year Summer I+20%	139.000	138.260	1.310	0.000	0.40			464.675
S6.000	S20	30 minute 100 year Summer I+20%	140.710	139.341	-0.094	0.000	0.63			0.143
S6.001	S21	15 minute 100 year Summer I+20%	139.860	138.410	-0.150	0.000	0.49			0.201
S6.002	S22	15 minute 100 year Summer I+20%	139.070	138.086	0.476	0.000	1.56			2.079
S6.003	S23	15 minute 100 year Summer I+20%	138.870	137.219	-0.077	0.000	0.90			0.964
S1.008	S24	15 minute 100 year Summer I+20%	138.190	136.573	0.923	0.000	2.10			1.429
S1.009	S25	15 minute 100 year Summer I+20%	137.490	135.885	0.390	0.000	1.34			2.329
S7.000	S26	15 minute 100 year Summer I+20%	136.470	135.766	0.246	0.000	0.24			0.612
S7.001	S27	15 minute 100 year Summer I+20%	137.770	135.749	0.469	0.000	0.55			2.556
S7.002	S28	15 minute 100 year Summer I+20%	137.290	135.623	0.543	0.000	0.96			2.285
S7.003	S29	15 minute 100 year Summer I+20%	136.510	135.377	0.557	0.000	1.20			3.039

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Maximum Pipe		Status
		Velocity (m/s)	Flow (l/s)	
S1.000	S1	1.5	56.9	OK
S1.001	S2	1.7	84.6	OK
S2.000	S3	1.4	45.9	OK
S1.002	S4	1.9	163.4	OK
S1.003	S5	2.7	194.4	OK
S1.004	S6	1.8	201.9	SURCHARGED
S3.000	S7	1.7	75.1	SURCHARGED
S3.001	S8	1.3	89.1	SURCHARGED
S3.002	S9	1.8	118.2	SURCHARGED
S3.003	S10	2.1	148.3	SURCHARGED
S4.000	S11	1.4	35.5	OK
S4.001	S12	1.2	35.7	OK
S3.004	S13	2.5	239.1	OK
S5.000	S14	1.3	14.0	OK
S3.005	S15	2.0	294.1	SURCHARGED
S3.006	S16	2.5	332.2	SURCHARGED
S1.005	S17	1.9	540.3	SURCHARGED
S1.006	S18	0.8	199.3	SURCHARGED
S1.007	S19	1.2	30.0	SURCHARGED
S6.000	S20	1.8	42.1	OK
S6.001	S21	2.6	91.3	OK
S6.002	S22	2.0	138.7	SURCHARGED
S6.003	S23	2.7	151.0	OK
S1.008	S24	2.6	183.9	SURCHARGED
S1.009	S25	2.1	227.6	SURCHARGED
S7.000	S26	1.1	23.9	SURCHARGED
S7.001	S27	1.4	53.7	SURCHARGED
S7.002	S28	1.4	88.5	SURCHARGED
S7.003	S29	1.4	100.1	SURCHARGED

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap. (l/s)	Overflow Maximum Vol (m³)
S7.004	S30	15 minute 100 year Summer I+20%	136.000	135.203	0.493	0.000	1.26	1.762
S1.010	S31	15 minute 100 year Summer I+20%	136.480	134.817	0.387	0.000	1.40	3.380
S1.011	S32	15 minute 100 year Summer I+20%	135.840	133.821	0.071	0.000	1.06	1.704
S1.012	S33	360 minute 100 year Winter I+20%	135.000	133.107	1.007	0.000	0.31	3.971
S8.000	S34	15 minute 100 year Summer I+20%	139.810	138.616	-0.119	0.000	0.45	0.114
S8.001	S35	15 minute 100 year Summer I+20%	139.050	137.821	0.086	0.000	0.75	0.528
S8.002	S36	15 minute 100 year Summer I+20%	138.330	137.419	0.364	0.000	1.62	1.180
S8.003	S37	15 minute 100 year Summer I+20%	138.090	136.878	0.088	0.000	0.87	0.727
S8.004	S38	15 minute 100 year Summer I+20%	137.240	136.181	0.311	0.000	1.24	2.595
S9.000	S39	15 minute 100 year Summer I+20%	137.000	135.894	-0.131	0.000	0.37	0.101
S8.005	S40	15 minute 100 year Summer I+20%	136.960	135.648	0.148	0.000	1.16	1.824
S8.006	S41	360 minute 100 year Winter I+20%	136.000	133.100	0.000	0.000	0.03	1.052
S1.013	S42	360 minute 100 year Winter I+20%	133.500	133.098	1.448	0.000	0.51	660.425
S1.014	S43	1440 minute 100 year Winter I+20%	133.480	131.232	0.123	0.000	0.21	1.819
S1.015	S44	1440 minute 100 year Winter I+20%	134.000	131.089	0.989	0.000	0.11	3.891
S10.000	S45	30 minute 100 year Summer I+20%	142.140	140.975	-0.125	0.000	0.21	0.243
S11.000	S46	30 minute 100 year Summer I+20%	142.100	141.081	-0.119	0.000	0.52	0.199
S11.001	S47	15 minute 100 year Summer I+20%	142.500	141.045	0.125	0.000	1.00	2.401
S10.001	S48	15 minute 100 year Summer I+20%	142.630	140.948	0.273	0.000	0.62	4.237
S12.000	S49	30 minute 100 year Summer I+20%	142.750	141.159	-0.141	0.000	0.54	0.174
S12.001	S50	15 minute 100 year Summer I+20%	142.510	140.940	-0.101	0.000	0.69	0.619
S10.002	S51	15 minute 100 year Summer I+20%	142.760	140.817	0.352	0.000	0.88	4.372
S10.003	S57	15 minute 100 year Summer I+20%	142.970	140.608	0.573	0.000	1.17	3.890
S13.000	S53	15 minute 100 year Summer I+20%	142.980	141.542	0.042	0.000	1.05	0.381
S14.000	S54	15 minute 100 year Summer I+20%	142.920	141.154	-0.146	0.000	0.52	0.169
S13.001	S54	15 minute 100 year Summer I+20%	142.780	140.887	0.587	0.000	3.24	1.235
S13.002	S55	1440 minute 100 year Winter I+20%	142.850	140.650	0.500	0.000	0.07	1.765
S13.003	S56	1440 minute 100 year Winter I+20%	142.920	140.649	0.804	0.000	0.05	274.703
S13.004	S57	360 minute 100 year Summer I+20%	142.920	140.435	0.690	0.000	0.06	2.373
S10.004	S58	360 minute 100 year Summer I+20%	142.920	140.437	0.662	0.000	0.45	5.859
S10.005	S59	480 minute 100 year Winter I+20%	142.400	140.363	0.858	0.000	0.40	6.112
S10.006	S60	480 minute 100 year Winter I+20%	142.400	140.361	0.651	0.000	0.10	2.548
S10.007	S61	480 minute 100 year Winter I+20%	142.200	140.359	1.184	0.000	0.33	296.399
S10.008	S62	30 minute 100 year Summer I+20%	142.100	139.073	-0.000	0.000	0.39	0.349
S10.009	S63	15 minute 100 year Summer I+20%	141.380	138.860	-0.000	0.000	0.40	0.405
S10.010	S64	15 minute 100 year Summer I+20%	139.110	137.778	-0.000	0.000	0.35	0.358
S10.011	S65	15 minute 100 year Summer I+20%	138.060	136.789	-0.000	0.000	0.36	0.356
S15.000	S66	15 minute 100 year Summer I+20%	141.720	141.117	0.892	0.000	0.39	1.807
S16.000	S67	15 minute 100 year Summer I+20%	142.150	141.144	-0.031	0.000	1.00	0.214
S15.001	S68	15 minute 100 year Summer I+20%	141.930	141.013	1.088	0.000	0.65	5.028
S15.002	S69	15 minute 100 year Summer I+20%	142.140	140.853	1.218	0.000	0.70	5.234
S15.003	S70	15 minute 100 year Summer I+20%	141.860	140.713	1.338	0.000	0.90	5.103
S17.000	S71	30 minute 100 year Summer I+20%	142.650	141.147	-0.153	0.000	0.48	0.161
S15.004	S72	15 minute 100 year Summer I+20%	141.700	140.595	1.370	0.000	1.16	4.946
S15.005	S73	15 minute 100 year Summer I+20%	141.500	140.355	1.340	0.000	1.13	5.189
S15.006	S74	15 minute 100 year Summer I+20%	141.000	139.953	1.358	0.000	1.30	6.855
S18.000	S75	15 minute 100 year Summer I+20%	142.800	141.467	0.072	0.000	0.41	0.330
S18.001	S76	15 minute 100 year Summer I+20%	142.680	141.445	0.170	0.000	1.08	0.761
S18.002	S77	15 minute 100 year Summer I+20%	141.530	140.290	-0.040	0.000	0.96	0.393
S15.007	S78	15 minute 100 year Summer I+20%	140.500	139.379	1.229	0.000	1.16	7.627
S15.008	S79	15 minute 100 year Summer I+20%	139.000	137.849	0.819	0.000	2.65	11.394
S15.009	S80	1440 minute 100 year Winter I+20%	139.000	137.340	0.970	0.000	0.24	3.089
S15.010	S81	1440 minute 100 year Winter I+20%	138.250	137.338	1.413	0.000	0.15	1028.704
S19.000	S82	15 minute 100 year Summer I+20%	141.700	140.303	-0.122	0.000	0.43	0.111
S19.001	S83	15 minute 100 year Summer I+20%	140.640	139.435	0.051	0.000	0.55	0.482

RELEVANT TO
AMENDMENT NC
APPLICATION

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Maximum Pipe		Status
		Velocity (m/s)	Flow (l/s)	
S7.004	S30	1.6	115.2	SURCHARGED
S1.010	S31	2.3	374.0	SURCHARGED
S1.011	S32	2.8	415.5	SURCHARGED
S1.012	S33	0.8	107.3	SURCHARGED
S8.000	S34	2.4	43.3	OK
S8.001	S35	2.3	64.8	SURCHARGED
S8.002	S36	2.4	93.5	SURCHARGED
S8.003	S37	2.1	118.4	SURCHARGED
S8.004	S38	2.2	155.3	SURCHARGED
S9.000	S39	1.3	20.9	OK
S8.005	S40	2.7	189.3	SURCHARGED
S8.006	S41	1.8	33.6	OK
S1.013	S42	1.5	50.0	SURCHARGED
S1.014	S43	1.2	51.6	SURCHARGED
S1.015	S44	1.1	51.8	SURCHARGED
S10.000	S45	1.3	24.7	OK
S11.000	S46	1.3	48.5	OK
S11.001	S47	1.4	85.0	SURCHARGED
S10.001	S48	1.7	112.0	SURCHARGED
S12.000	S49	1.4	54.2	OK
S12.001	S50	1.6	70.3	OK
S10.002	S51	1.8	167.4	SURCHARGED
S10.003	S57	1.6	173.9	SURCHARGED
S13.000	S53	1.9	128.7	SURCHARGED
S14.000	S54	1.4	51.8	OK
S13.001	S54	2.8	198.9	SURCHARGED
S13.002	S55	0.4	11.6	SURCHARGED
S13.003	S56	0.6	1.9	SURCHARGED
S13.004	S57	0.4	1.9	SURCHARGED
S10.004	S58	1.1	66.3	SURCHARGED
S10.005	S59	0.6	37.8	SURCHARGED
S10.006	S60	0.6	39.3	SURCHARGED
S10.007	S61	0.8	10.0	SURCHARGED
S10.008	S62	1.1	36.6	OK
S10.009	S63	2.3	97.8	OK
S10.010	S64	2.9	126.0	OK
S10.011	S65	2.3	130.2	OK
S15.000	S66	1.6	73.3	SURCHARGED
S16.000	S67	1.6	53.8	OK
S15.001	S68	1.7	114.7	SURCHARGED
S15.002	S69	1.7	121.1	SURCHARGED
S15.003	S70	1.3	124.2	SURCHARGED
S17.000	S71	1.8	60.7	OK
S15.004	S72	1.8	195.4	SURCHARGED
S15.005	S73	2.0	221.3	SURCHARGED
S15.006	S74	2.4	261.4	SURCHARGED
S18.000	S75	1.0	17.7	SURCHARGED
S18.001	S76	2.0	74.1	SURCHARGED
S18.002	S77	2.9	171.1	OK
S15.007	S78	2.9	458.3	SURCHARGED
S15.008	S79	3.1	497.9	SURCHARGED
S15.009	S80	0.7	42.4	SURCHARGED
S15.010	S81	0.8	6.0	SURCHARGED
S19.000	S82	2.2	39.1	OK

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Maximum Pipe		Status
		Velocity (m/s)	Flow (l/s)	
S19.001	S83	2.1	46.0	SURCHARGED

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH		Event				US/CL (m)	Water	Surcharged	Flooded	Flow / Cap.	Overflow (l/s)	Maximum Vol (m³)
	Name							Level (m)	Depth (m)	Volume (m³)			
S19.002	S84	15 minute	100 year	Summer	I+20%		140.260	139.310	0.357	0.000	0.99		1.092
S19.003	S85	15 minute	100 year	Summer	I+20%		140.000	138.955	0.370	0.000	1.35		1.568
S19.004	S86	15 minute	100 year	Summer	I+20%		139.850	138.536	0.181	0.000	1.55		0.978
S19.005	S87	15 minute	100 year	Summer	I+20%		139.620	138.007	0.282	0.000	1.09		0.569
S15.011	S88	4320 minute	100 year	Winter	I+20%		138.250	136.907	1.227	0.000	0.11		4.471
S15.012	S89	4320 minute	100 year	Winter	I+20%		138.250	136.900	1.280	0.000	0.04		6.109
S20.000	S90	15 minute	100 year	Summer	I+20%		139.100	137.584	-0.141	0.000	0.30		0.090
S20.001	S91	4320 minute	100 year	Winter	I+20%		139.250	136.899	1.449	0.000	0.00		2.711
S15.013	S92	4320 minute	100 year	Winter	I+20%		137.250	136.899	1.784	0.000	0.12		896.892
S10.012	S93	15 minute	100 year	Summer	I+20%		137.750	135.593	0.663	0.000	1.59		1.916
S10.013	S94	15 minute	100 year	Summer	I+20%		137.500	135.270	0.350	0.000	1.50		1.632
S10.014	S95	15 minute	100 year	Summer	I+20%		136.500	133.023	-0.077	0.000	0.90		0.246
S10.015	S96	1440 minute	100 year	Winter	I+20%		133.000	130.964	0.564	0.000	0.03		2.048
S1.016	S97	1440 minute	100 year	Winter	I+20%		131.500	130.961	1.461	0.000	0.27		1559.335
S1.017	S98	1440 minute	100 year	Winter	I+20%		129.750	128.455	-0.215	0.000	0.18		0.122
S1.018	S99	1440 minute	100 year	Winter	I+20%		127.750	126.685	-0.215	0.000	0.18		0.106
S1.019	S100	1440 minute	100 year	Winter	I+20%		126.250	124.763	-0.197	0.000	0.26		0.126
S1.020	S101	1440 minute	100 year	Winter	I+20%		126.000	123.853	-0.197	0.000	0.26		0.115
S21.000	S102	180 minute	100 year	Summer	I+20%		124.750	123.460	-0.420	0.000	0.01		0.036
S1.021	S103	1440 minute	100 year	Winter	I+20%		125.000	122.224	-0.136	0.000	0.58		0.228
S1.022	S104	1440 minute	100 year	Winter	I+20%		123.500	122.149	-0.121	0.000	0.66		0.474
S22.000	S105	360 minute	100 year	Winter	I+20%		136.200	134.989	0.069	0.000	0.06		0.412
S22.001	S106	360 minute	100 year	Winter	I+20%		136.270	134.988	0.538	0.000	0.06		3.382
S22.002	S107	360 minute	100 year	Winter	I+20%		136.160	134.988	0.893	0.000	0.04		51.454
S22.003	S108	360 minute	100 year	Winter	I+20%		136.030	133.826	-0.199	0.000	0.03		0.047
S22.004	S109	15 minute	100 year	Summer	I+20%		135.100	133.651	-0.168	0.000	0.15		0.101
S23.000	S110	2160 minute	100 year	Winter	I+20%		139.460	138.622	-0.018	0.000	0.01		0.313
S23.001	S111	2160 minute	100 year	Winter	I+20%		139.660	138.622	0.242	0.000	0.02		1.965
S23.002	S112	2160 minute	100 year	Winter	I+20%		139.940	138.622	0.632	0.000	0.04		3.197
S23.003	S113	2160 minute	100 year	Winter	I+20%		139.050	138.621	1.051	0.000	0.07		3.822
S23.004	S114	2160 minute	100 year	Winter	I+20%		139.100	138.620	1.250	0.000	0.12		2.252
S23.005	S115	2160 minute	100 year	Winter	I+20%		139.250	138.619	1.424	0.000	0.04		310.625
S23.006	S116	2160 minute	100 year	Winter	I+20%		139.000	136.878	-0.197	0.000	0.04		0.032
S23.007	S117	2160 minute	100 year	Winter	I+20%		139.000	136.780	-0.195	0.000	0.05		0.051
S24.000	S118	15 minute	100 year	Summer	I+20%		136.450	134.543	-0.132	0.000	0.36		0.100
S24.001	S119	15 minute	100 year	Summer	I+20%		134.980	133.589	0.364	0.000	1.09		0.781
S25.000	S120	15 minute	100 year	Summer	I+20%		131.230	129.639	-0.086	0.000	0.70		0.151
S24.002	S121	15 minute	100 year	Summer	I+20%		132.400	129.262	-0.113	0.000	0.81		0.368
S24.003	S122	15 minute	100 year	Summer	I+20%		131.980	128.578	0.053	0.000	1.02		2.153
S24.004	S123	2160 minute	100 year	Winter	I+20%		131.800	128.357	0.172	0.000	0.05		2.685
S24.005	S124	2160 minute	100 year	Winter	I+20%		130.750	128.356	0.756	0.000	0.03		7.041
S26.000	S125	15 minute	100 year	Summer	I+20%		133.500	132.794	0.269	0.000	0.69		0.553
S26.001	S126	15 minute	100 year	Summer	I+20%		133.500	132.635	0.490	0.000	1.24		2.237
S26.002	S127	15 minute	100 year	Summer	I+20%		133.500	131.933	0.228	0.000	1.47		1.783
S27.000	S128	15 minute	100 year	Summer	I+20%		132.900	131.857	-0.068	0.000	0.73		0.171
S27.001	S129	15 minute	100 year	Summer	I+20%		132.900	131.676	0.151	0.000	1.01		1.480
S26.003	S130	15 minute	100 year	Summer	I+20%		132.900	131.247	0.147	0.000	1.38		1.447
S26.004	S131	15 minute	100 year	Summer	I+20%		132.500	130.872	-0.028	0.000	0.91		0.505
S28.000	S132	15 minute	100 year	Summer	I+20%		132.300	131.672	0.347	0.000	1.00		0.641
S28.001	S133	15 minute	100 year	Summer	I+20%		132.300	131.444	0.369	0.000	1.24		1.551
S28.002	S134	15 minute	100 year	Summer	I+20%		132.300	130.950	0.185	0.000	1.54		1.544
S26.005	S135	15 minute	100 year	Summer	I+20%		132.000	130.556	0.256	0.000	1.19		1.055
S26.006	S136	2160 minute	100 year	Winter	I+20%		131.000	128.356	0.656	0.000	0.04		2.211
S24.006	S137	2160 minute	100 year	Winter	I+20%		129.500	128.356	1.381	0.000	0.07		854.834
S24.007	S138	2160 minute	100 year	Winter	I+20%		128.650	126.541	-0.184	0.000	0.08		0.041

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Maximum Velocity (m/s)	Pipe Flow (l/s)	Status
S19.002	S84	1.6	58.7	SURCHARGED
S19.003	S85	1.9	76.6	SURCHARGED
S19.004	S86	1.9	76.0	SURCHARGED
S19.005	S87	2.6	98.1	SURCHARGED
S15.011	S88	0.9	10.8	SURCHARGED
S15.012	S89	0.5	11.3	SURCHARGED
S20.000	S90	1.1	15.3	OK
S20.001	S91	0.0	0.4	SURCHARGED
S15.013	S92	0.8	5.0	SURCHARGED
S10.012	S93	1.9	138.9	SURCHARGED
S10.013	S94	2.1	151.0	SURCHARGED
S10.014	S95	3.0	165.7	OK
S10.015	S96	1.3	24.4	SURCHARGED
S1.016	S97	2.0	41.4	SURCHARGED
S1.017	S98	2.5	41.4	OK
S1.018	S99	2.5	41.4	OK
S1.019	S100	1.9	41.4	OK
S1.020	S101	1.9	41.4	OK
S21.000	S102	0.4	2.0	OK
S1.021	S103	1.1	43.4	OK
S1.022	S104	1.0	43.4	OK
S22.000	S105	1.1	7.7	SURCHARGED
S22.001	S106	0.4	8.1	SURCHARGED
S22.002	S107	0.5	1.4	SURCHARGED
S22.003	S108	0.5	1.4	OK
S22.004	S109	1.9	14.9	OK
S23.000	S110	0.4	0.7	OK
S23.001	S111	0.8	1.9	SURCHARGED
S23.002	S112	0.8	4.1	SURCHARGED
S23.003	S113	0.7	6.7	SURCHARGED
S23.004	S114	0.4	7.4	SURCHARGED
S23.005	S115	0.6	1.5	SURCHARGED
S23.006	S116	0.5	1.5	OK
S23.007	S117	0.5	1.5	OK
S24.000	S118	2.5	38.4	OK
S24.001	S119	2.6	100.1	SURCHARGED
S25.000	S120	1.3	32.9	OK
S24.002	S121	2.4	195.2	OK
S24.003	S122	2.2	221.3	SURCHARGED
S24.004	S123	1.2	11.2	SURCHARGED
S24.005	S124	0.6	12.1	SURCHARGED
S26.000	S125	1.3	33.9	SURCHARGED
S26.001	S126	1.6	61.2	SURCHARGED
S26.002	S127	2.1	84.0	SURCHARGED
S27.000	S128	1.4	36.2	OK
S27.001	S129	1.3	49.3	SURCHARGED
S26.003	S130	2.0	142.4	SURCHARGED
S26.004	S131	2.5	141.2	OK
S28.000	S132	1.3	47.7	SURCHARGED
S28.001	S133	1.5	60.4	SURCHARGED
S28.002	S134	1.7	69.3	SURCHARGED
S26.005	S135	3.0	208.9	SURCHARGED
S26.006	S136	0.6	11.9	SURCHARGED
S24.006	S137	0.9	3.9	SURCHARGED

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Maximum Pipe		Status
		Velocity (m/s)	Flow (l/s)	
S24.007	S138	0.8	3.9	OK

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Maximum Vol (m³)
S24.008	S139	2160 minute 100 year Winter I+20%	127.750	125.943	-0.192	0.000	0.05		0.057
S24.009	S140	2160 minute 100 year Winter I+20%	127.730	124.789	-0.176	0.000	0.11		0.085

PN	US/MH Name	Maximum Velocity (m/s)	Pipe Flow (l/s)	Status
S24.008	S139	1.1	3.9	OK
S24.009	S140	0.6	3.9	OK

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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - Scotland and Ireland

Return Period (years)	2	PIMP (%)	100
M5-60 (mm)	16.500	Add Flow / Climate Change (%)	0
Ratio R	0.277	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	90	Maximum Backdrop Height (m)	3.000
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.500
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	1.000	Min Slope for Optimisation (1:X)	180

Designed with Level Soffits

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
------------------------	-----------------	-----------------	-----------------	------------------------	-------------	-----------

S1.022	SExisting Mh	123.210	121.902	122.180	1200	0
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Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
------------------------	-----------------	-----------------	-----------------	------------------------	-------------	-----------

S22.004	SGlenamuck Rd	134.330	132.879	132.850	1200	0
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Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
------------------------	-----------------	-----------------	-----------------	------------------------	-------------	-----------

S23.007	S	137.800	136.693	136.700	1200	0
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Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
------------------------	-----------------	-----------------	-----------------	------------------------	-------------	-----------

S24.009	S	127.750	124.666	124.700	0	0
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Simulation Criteria for Storm

Volumetric Runoff Coeff 1.000

Additional Flow - % of Total Flow 0.000

Areal Reduction Factor 1.000

MADD Factor * 10m³/ha Storage 2.000

Hot Start (mins) 0

Inlet Coeffiecient 0.800

Hot Start Level (mm) 0

Flow per Person per Day (l/per/day) 0.000

Manhole Headloss Coeff (Global) 0.500

Run Time (mins) 60

Foul Sewage per hectare (l/s) 0.000

Output Interval (mins) 1

Number of Input Hydrographs 0

Number of Offline Controls 0

Number of Time/Area Diagrams 0

Number of Online Controls 10

Number of Storage Structures 10

Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model

FSR

Profile Type Winter

Return Period (years) 2

Cv (Summer) 1.000

Region Scotland and Ireland

Cv (Winter) 1.000

M5-60 (mm) 16.500

Storm Duration (mins) 30

Ratio R 0.277

Online Controls for Storm

Hydro-Brake® Optimum Manhole: S19, DS/PN: S1.007, Volume (m³): 7.0

Unit Reference	MD-SHE-0229-3000-1600-3000
Design Head (m)	1.600
Design Flow (l/s)	30.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	229
Invert Level (m)	136.650
Minimum Outlet Pipe Diameter (mm)	300
Suggested Manhole Diameter (mm)	1800

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.600	29.9	Kick-Flo®	1.071	24.7
Flush-Flo™	0.490	29.9	Mean Flow over Head Range	-	25.7

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	7.6	0.800	28.8	2.000	33.3	4.000	46.5	7.000	61.0
0.200	22.9	1.000	26.5	2.200	34.9	4.500	49.3	7.500	63.1
0.300	28.7	1.200	26.1	2.400	36.4	5.000	51.8	8.000	65.1
0.400	29.7	1.400	28.1	2.600	37.8	5.500	54.3	8.500	67.1
0.500	29.9	1.600	29.9	3.000	40.5	6.000	56.6	9.000	69.0
0.600	29.7	1.800	31.7	3.500	43.6	6.500	58.9	9.500	70.8

Hydro-Brake® Optimum Manhole: S42, DS/PN: S1.013, Volume (m³): 15.8

Unit Reference	MD-SHE-0285-5000-1750-5000
Design Head (m)	1.750
Design Flow (l/s)	50.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	285
Invert Level (m)	131.350
Minimum Outlet Pipe Diameter (mm)	300
Suggested Manhole Diameter (mm)	2100

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.750	50.0	Kick-Flo®	1.200	41.7
Flush-Flo™	0.550	50.0	Mean Flow over Head Range	-	42.7

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	8.9	0.200	29.4	0.300	47.1	0.400	49.1	0.500	49.9

Hydro-Brake® Optimum Manhole: S42, DS/PN: S1.013, Volume (m³): 15.8

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.600	49.9	1.600	47.9	2.600	60.5	5.000	83.1	7.500	101.3
0.800	48.9	1.800	50.7	3.000	64.9	5.500	87.1	8.000	104.5
1.000	47.0	2.000	53.3	3.500	69.9	6.000	90.8	8.500	107.6
1.200	41.8	2.200	55.8	4.000	74.6	6.500	94.4	9.000	110.7
1.400	44.9	2.400	58.2	4.500	79.0	7.000	97.9	9.500	113.7

Hydro-Brake® Optimum Manhole: S56, DS/PN: S13.003, Volume (m³): 7.5

Unit Reference	MD-SHE-0013-1000-1100-1000
Design Head (m)	1.100
Design Flow (l/s)	0.1
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	13
Invert Level (m)	139.620
Minimum Outlet Pipe Diameter (mm)	75
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.100	0.1	Kick-Flo®	0.118	0.0
Flush-Flo™	0.051	0.0	Mean Flow over Head Range	-	0.1

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	0.0	0.800	0.1	2.000	0.1	4.000	0.2	7.000	0.2
0.200	0.1	1.000	0.1	2.200	0.1	4.500	0.2	7.500	0.2
0.300	0.1	1.200	0.1	2.400	0.1	5.000	0.2	8.000	0.2
0.400	0.1	1.400	0.1	2.600	0.1	5.500	0.2	8.500	0.2
0.500	0.1	1.600	0.1	3.000	0.2	6.000	0.2	9.000	0.2
0.600	0.1	1.800	0.1	3.500	0.2	6.500	0.2	9.500	0.2

Hydro-Brake® Optimum Manhole: S61, DS/PN: S10.007, Volume (m³): 15.7

Unit Reference	MD-SHE-0138-1000-1500-1000
Design Head (m)	1.500
Design Flow (l/s)	10.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	138
Invert Level (m)	138.950
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1200

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Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.500	10.0	Kick-Flo®	0.933	8.0
Flush-Flo™	0.441	10.0	Mean Flow over Head Range	-	8.7

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as

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Hydro-Brake® Optimum Manhole: S61, DS/PN: S10.007, Volume (m³): 15.7

specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	5.0	0.800	9.1	2.000	11.4	4.000	15.9	7.000	20.8
0.200	9.0	1.000	8.3	2.200	12.0	4.500	16.8	7.500	21.5
0.300	9.7	1.200	9.0	2.400	12.5	5.000	17.7	8.000	22.2
0.400	10.0	1.400	9.7	2.600	13.0	5.500	18.5	8.500	22.8
0.500	10.0	1.600	10.3	3.000	13.9	6.000	19.3	9.000	23.5
0.600	9.8	1.800	10.9	3.500	14.9	6.500	20.1	9.500	24.1

Hydro-Brake® Optimum Manhole: S81, DS/PN: S15.010, Volume (m³): 7.5

Unit Reference	MD-SHE-0108-6000-1500-6000
Design Head (m)	1.500
Design Flow (l/s)	6.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	108
Invert Level (m)	135.700
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.500	6.0	Kick-Flo®	0.918	4.8
Flush-Flo™	0.448	6.0	Mean Flow over Head Range	-	5.3

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.7	0.800	5.4	2.000	6.9	4.000	9.5	7.000	12.4
0.200	5.4	1.000	5.0	2.200	7.2	4.500	10.1	7.500	12.8
0.300	5.8	1.200	5.4	2.400	7.5	5.000	10.6	8.000	13.2
0.400	6.0	1.400	5.8	2.600	7.8	5.500	11.1	8.500	13.6
0.500	6.0	1.600	6.2	3.000	8.3	6.000	11.5	9.000	14.0
0.600	5.9	1.800	6.5	3.500	8.9	6.500	12.0	9.500	14.4

Hydro-Brake® Optimum Manhole: S92, DS/PN: S15.013, Volume (m³): 18.6

Unit Reference	MD-SHE-0092-5000-2000-5000
Design Head (m)	2.000
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	92
Invert Level (m)	134.890
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

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Hydro-Brake® Optimum Manhole: S92, DS/PN: S15.013, Volume (m³): 18.6

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.000	5.0	Kick-Flo®	0.816	3.3
Flush-Flo™	0.398	4.1	Mean Flow over Head Range	-	3.9

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.9	0.800	3.4	2.000	5.0	4.000	6.9	7.000	9.0
0.200	3.8	1.000	3.6	2.200	5.2	4.500	7.3	7.500	9.3
0.300	4.1	1.200	3.9	2.400	5.4	5.000	7.7	8.000	9.6
0.400	4.1	1.400	4.2	2.600	5.6	5.500	8.0	8.500	9.9
0.500	4.1	1.600	4.5	3.000	6.0	6.000	8.4	9.000	10.2
0.600	4.0	1.800	4.8	3.500	6.5	6.500	8.7	9.500	10.4

Hydro-Brake® Optimum Manhole: S97, DS/PN: S1.016, Volume (m³): 16.5

Unit Reference	MD-SHE-0263-4200-1800-4200
Design Head (m)	1.800
Design Flow (l/s)	42.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	263
Invert Level (m)	129.200
Minimum Outlet Pipe Diameter (mm)	300
Suggested Manhole Diameter (mm)	2100

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.800	41.9	Kick-Flo®	1.210	34.6
Flush-Flo™	0.554	41.9	Mean Flow over Head Range	-	36.0

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	8.4	0.800	41.0	2.000	44.0	4.000	61.6	7.000	80.8
0.200	27.0	1.000	39.3	2.200	46.1	4.500	65.2	7.500	83.5
0.300	39.3	1.200	35.0	2.400	48.1	5.000	68.6	8.000	86.2
0.400	41.1	1.400	37.1	2.600	50.0	5.500	71.8	8.500	88.8
0.500	41.8	1.600	39.6	3.000	53.6	6.000	74.9	9.000	91.3
0.600	41.8	1.800	41.9	3.500	57.7	6.500	77.9	9.500	93.7

Hydro-Brake® Optimum Manhole: S107, DS/PN: S22.002, Volume (m³): 3.8

Unit Reference	MD-SHE-0054-1500-1270-1500
Design Head (m)	1.270
Design Flow (l/s)	1.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes

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Hydro-Brake® Optimum Manhole: S107, DS/PN: S22.002, Volume (m³): 3.8

Diameter (mm) 54
Invert Level (m) 133.870
Minimum Outlet Pipe Diameter (mm) 75
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.270	1.5	Kick-Flo®	0.487	1.0
Flush-Flo™	0.241	1.2	Mean Flow over Head Range	-	1.2

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.1	0.800	1.2	2.000	1.8	4.000	2.5	7.000	3.3
0.200	1.2	1.000	1.3	2.200	1.9	4.500	2.7	7.500	3.4
0.300	1.2	1.200	1.5	2.400	2.0	5.000	2.8	8.000	3.5
0.400	1.1	1.400	1.6	2.600	2.1	5.500	2.9	8.500	3.6
0.500	1.0	1.600	1.7	3.000	2.2	6.000	3.1	9.000	3.7
0.600	1.1	1.800	1.8	3.500	2.4	6.500	3.2	9.500	3.8

Hydro-Brake® Optimum Manhole: S115, DS/PN: S23.005, Volume (m³): 3.8

Unit Reference MD-SHE-0052-1500-1600-1500
Design Head (m) 1.600
Design Flow (l/s) 1.5
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 52
Invert Level (m) 136.970
Minimum Outlet Pipe Diameter (mm) 75
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.600	1.5	Kick-Flo®	0.460	0.9
Flush-Flo™	0.228	1.0	Mean Flow over Head Range	-	1.1

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	0.9	0.800	1.1	2.000	1.7	4.000	2.3	7.000	2.9
0.200	1.0	1.000	1.2	2.200	1.7	4.500	2.4	7.500	3.0
0.300	1.0	1.200	1.3	2.400	1.8	5.000	2.5	8.000	3.1
0.400	1.0	1.400	1.4	2.600	1.9	5.500	2.6	8.500	3.2
0.500	0.9	1.600	1.5	3.000	2.0	6.000	2.7	9.000	3.3
0.600	1.0	1.800	1.6	3.500	2.1	6.500	2.8	9.500	3.4

Hydro-Brake® Optimum Manhole: S137, DS/PN: S24.006, Volume (m³): 17.9

Unit Reference MD-SHE-0085-4000-1720-4000
Design Head (m) 1.720

Hydro-Brake® Optimum Manhole: S137, DS/PN: S24.006, Volume (m³): 17.9

Design Flow (l/s)	4.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	85
Invert Level (m)	126.750
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.720	4.0	Kick-Flo®	0.756	2.7
Flush-Flo™	0.372	3.4	Mean Flow over Head Range	-	3.2

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.5	0.800	2.8	2.000	4.3	4.000	5.9	7.000	7.7
0.200	3.2	1.000	3.1	2.200	4.5	4.500	6.3	7.500	8.0
0.300	3.4	1.200	3.4	2.400	4.7	5.000	6.6	8.000	8.2
0.400	3.4	1.400	3.6	2.600	4.8	5.500	6.9	8.500	8.5
0.500	3.3	1.600	3.9	3.000	5.2	6.000	7.2	9.000	8.7
0.600	3.2	1.800	4.1	3.500	5.6	6.500	7.4	9.500	8.9

Storage Structures for Storm

Cellular Storage Manhole: S19, DS/PN: S1.007

Invert Level (m) 136.650 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00006 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00006

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	300.0	300.0	1.850	300.0	300.0	1.851	0.0	300.0

Cellular Storage Manhole: S42, DS/PN: S1.013

Invert Level (m) 131.400 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00005 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00005

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	400.0	400.0	1.850	400.0	400.0	1.851	0.0	400.0

Cellular Storage Manhole: S56, DS/PN: S13.003

Invert Level (m) 139.700 Safety Factor 1.5
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	300.0	0.0	1.400	300.0	0.0	1.410	0.0	0.0

Cellular Storage Manhole: S61, DS/PN: S10.007

Invert Level (m) 139.000 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00006 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00006

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	220.0	220.0	1.850	220.0	220.0	1.851	0.0	220.0

Cellular Storage Manhole: S81, DS/PN: S15.010

Invert Level (m) 135.800 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	700.0	700.0	1.850	700.0	700.0	1.851	0.0	700.0

Cellular Storage Manhole: S92, DS/PN: S15.013

Invert Level (m) 134.900 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00006 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00006

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Cellular Storage Manhole: S92, DS/PN: S15.013

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	500.0	500.0	1.850	500.0	500.0	1.851	0.0	500.0

Cellular Storage Manhole: S97, DS/PN: S1.016

Invert Level (m) 129.250 Safety Factor 2.0
 Infiltration Coefficient Base (m/hr) 0.00005 Porosity 0.95
 Infiltration Coefficient Side (m/hr) 0.00005

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	950.0	950.0	1.850	950.0	950.0	1.851	0.0	950.0

Cellular Storage Manhole: S107, DS/PN: S22.002

Invert Level (m) 133.950 Safety Factor 2.0
 Infiltration Coefficient Base (m/hr) 0.00006 Porosity 0.95
 Infiltration Coefficient Side (m/hr) 0.00006

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	50.0	100.0	1.450	50.0	100.0	1.451	0.0	100.0

Cellular Storage Manhole: S115, DS/PN: S23.005

Invert Level (m) 137.000 Safety Factor 2.0
 Infiltration Coefficient Base (m/hr) 0.00001 Porosity 0.95
 Infiltration Coefficient Side (m/hr) 0.00001

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	200.0	200.0	1.850	200.0	200.0	1.851	0.0	200.0

Cellular Storage Manhole: S137, DS/PN: S24.006

Invert Level (m) 126.750 Safety Factor 2.0
 Infiltration Coefficient Base (m/hr) 0.00001 Porosity 0.95
 Infiltration Coefficient Side (m/hr) 0.00001

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	550.0	550.0	1.850	550.0	550.0	1.851	0.0	550.0

2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0 Inlet Coefficient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 10 Number of Storage Structures 10 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 16.500 Cv (Summer) 1.000
Region Scotland and Ireland Ratio R 0.277 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 150.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120
Return Period(s) (years) 2, 30, 100
Climate Change (%) 20, 20, 20

				Water			Surcharged		Flooded				Maximum
PN	US/MH			US/CL	Level	Depth	Volume	Flow /	Overflow	Maximum	Velocity		
	Name	Event		(m)	(m)	(m)	(m³)	Cap.	(l/s)	Vol (m³)	(m/s)		
S1.000	S1	15 minute	2 year Summer I+20%	142.310	140.908	-0.202	0.000	0.24		0.105	1.2		
S1.001	S2	15 minute	2 year Summer I+20%	142.000	140.565	-0.185	0.000	0.31		0.201	1.3		
S2.000	S3	15 minute	2 year Summer I+20%	142.040	140.637	-0.128	0.000	0.39		0.105	1.2		
S1.002	S4	15 minute	2 year Summer I+20%	141.750	140.200	-0.225	0.000	0.34		0.270	1.5		
S1.003	S5	15 minute	2 year Summer I+20%	141.420	139.601	-0.246	0.000	0.26		0.178	2.2		
S1.004	S6	15 minute	2 year Summer I+20%	140.100	138.667	-0.208	0.000	0.41		0.368	1.6		
S3.000	S7	15 minute	2 year Summer I+20%	142.780	141.628	-0.192	0.000	0.28		0.117	1.4		
S3.001	S8	15 minute	2 year Summer I+20%	142.900	141.277	-0.167	0.000	0.40		0.285	1.2		
S3.002	S9	15 minute	2 year Summer I+20%	142.840	141.162	-0.158	0.000	0.45		0.298	1.6		
S3.003	S10	15 minute	2 year Summer I+20%	142.500	140.718	-0.122	0.000	0.65		0.446	1.4		
S4.000	S11	15 minute	2 year Summer I+20%	142.930	141.512	-0.143	0.000	0.29		0.088	1.1		
S4.001	S12	15 minute	2 year Summer I+20%	142.670	141.233	-0.132	0.000	0.36		0.148	1.0		
S3.004	S13	15 minute	2 year Summer I+20%	142.570	140.426	-0.294	0.000	0.26		0.232	2.0		
S5.000	S14	15 minute	2 year Summer I+20%	142.140	140.686	-0.179	0.000	0.09		0.046	1.0		
S3.005	S15	15 minute	2 year Summer I+20%	141.390	139.505	-0.245	0.000	0.42		0.630	1.7		
S3.006	S16	15 minute	2 year Summer I+20%	140.960	139.177	-0.258	0.000	0.37		0.738	2.1		
S1.005	S17	15 minute	2 year Summer I+20%	140.110	138.546	-0.254	0.000	0.62		1.013	1.3		
S1.006	S18	120 minute	2 year Summer I+20%	140.000	137.222	-0.128	0.000	0.45		0.825	1.0		
S1.007	S19	120 minute	2 year Summer I+20%	139.000	137.198	0.248	0.000	0.40		159.310	1.2		
S6.000	S20	15 minute	2 year Summer I+20%	140.710	139.289	-0.146	0.000	0.27		0.083	1.4		
S6.001	S21	15 minute	2 year Summer I+20%	139.860	138.347	-0.213	0.000	0.18		0.094	2.0		
S6.002	S22	15 minute	2 year Summer I+20%	139.070	137.474	-0.136	0.000	0.56		0.256	1.3		
S6.003	S23	15 minute	2 year Summer I+20%	138.870	137.114	-0.182	0.000	0.33		0.298	2.1		
S1.008	S24	30 minute	2 year Summer I+20%	138.190	135.577	-0.073	0.000	0.93		0.251	1.4		
S1.009	S25	30 minute	2 year Summer I+20%	137.490	135.326	-0.169	0.000	0.58		0.462	1.6		
S7.000	S26	15 minute	2 year Summer I+20%	136.470	135.279	-0.241	0.000	0.09		0.061	0.9		
S7.001	S27	15 minute	2 year Summer I+20%	137.770	135.082	-0.198	0.000	0.25		0.226	1.2		
S7.002	S28	15 minute	2 year Summer I+20%	137.290	134.920	-0.160	0.000	0.44		0.352	1.3		
S7.003	S29	15 minute	2 year Summer I+20%	136.510	134.681	-0.139	0.000	0.56		0.483	1.2		
S7.004	S30	15 minute	2 year Summer I+20%	136.000	134.574	-0.136	0.000	0.58		0.471	1.3		

2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	Pipe		Status
	US/MH Name	Flow (l/s)	
S1.000	S1	24.0	OK
S1.001	S2	33.3	OK
S2.000	S3	19.3	OK
S1.002	S4	63.6	OK
S1.003	S5	73.8	OK
S1.004	S6	76.5	OK
S3.000	S7	31.8	OK
S3.001	S8	35.8	OK
S3.002	S9	51.5	OK
S3.003	S10	62.7	OK
S4.000	S11	15.0	OK
S4.001	S12	15.0	OK
S3.004	S13	96.3	OK
S5.000	S14	5.9	OK
S3.005	S15	120.2	OK
S3.006	S16	134.4	OK
S1.005	S17	215.5	OK
S1.006	S18	127.3	OK
S1.007	S19	29.9	SURCHARGED
S6.000	S20	17.8	OK
S6.001	S21	33.4	OK
S6.002	S22	50.2	OK
S6.003	S23	54.7	OK
S1.008	S24	81.2	OK
S1.009	S25	98.1	OK
S7.000	S26	8.6	OK
S7.001	S27	23.9	OK
S7.002	S28	40.2	OK
S7.003	S29	46.8	OK
S7.004	S30	52.9	OK

2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

								Water	Surcharged	Flooded				Maximum	
US/MH								Level	Depth	Volume	Flow /	Overflow	Maximum	Velocity	
PN	Name	Event						(m)	(m)	(m)	(m³)	Cap.	(l/s)	Vol (m³)	(m/s)
S1.010	S31	30 minute	2 year	Summer	I+20%	136.480	134.234	-0.196	0.000	0.61			0.414	1.8	
S1.011	S32	30 minute	2 year	Summer	I+20%	135.840	133.516	-0.234	0.000	0.46			0.303	2.4	
S1.012	S33	120 minute	2 year	Summer	I+20%	135.000	132.012	-0.088	0.000	0.36			0.896	1.1	
S8.000	S34	15 minute	2 year	Summer	I+20%	139.810	138.576	-0.159	0.000	0.19			0.069	1.9	
S8.001	S35	15 minute	2 year	Summer	I+20%	139.050	137.594	-0.141	0.000	0.30			0.103	1.9	
S8.002	S36	15 minute	2 year	Summer	I+20%	138.330	136.959	-0.096	0.000	0.62			0.175	1.5	
S8.003	S37	15 minute	2 year	Summer	I+20%	138.090	136.611	-0.179	0.000	0.34			0.134	1.7	
S8.004	S38	15 minute	2 year	Summer	I+20%	137.240	135.719	-0.151	0.000	0.49			0.313	1.8	
S9.000	S39	15 minute	2 year	Summer	I+20%	137.000	135.859	-0.166	0.000	0.16			0.061	1.1	
S8.005	S40	15 minute	2 year	Summer	I+20%	136.960	135.346	-0.154	0.000	0.47			0.236	2.3	
S8.006	S41	15 minute	2 year	Summer	I+20%	136.000	132.612	-0.488	0.000	0.08			0.189	2.2	
S1.013	S42	120 minute	2 year	Summer	I+20%	133.500	131.947	0.297	0.000	0.51		215.612	1.5		
S1.014	S43	60 minute	2 year	Summer	I+20%	133.480	130.805	-0.304	0.000	0.23			0.201	1.3	
S1.015	S44	120 minute	2 year	Winter	I+20%	134.000	129.681	-0.419	0.000	0.12			0.311	1.1	
S10.000	S45	30 minute	2 year	Summer	I+20%	142.140	140.859	-0.241	0.000	0.09			0.078	1.0	
S11.000	S46	15 minute	2 year	Summer	I+20%	142.100	141.000	-0.200	0.000	0.24			0.108	1.1	
S11.001	S47	15 minute	2 year	Summer	I+20%	142.500	140.752	-0.168	0.000	0.40			0.340	1.1	
S10.001	S48	15 minute	2 year	Summer	I+20%	142.630	140.436	-0.239	0.000	0.28			0.273	1.4	
S12.000	S49	15 minute	2 year	Summer	I+20%	142.750	141.097	-0.203	0.000	0.23			0.104	1.2	
S12.001	S50	15 minute	2 year	Summer	I+20%	142.510	140.849	-0.192	0.000	0.28			0.208	1.2	
S10.002	S51	15 minute	2 year	Summer	I+20%	142.760	140.263	-0.202	0.000	0.43			0.519	1.7	
S10.003	S57	15 minute	2 year	Summer	I+20%	142.970	139.872	-0.163	0.000	0.60			0.340	1.4	
S13.000	S53	15 minute	2 year	Summer	I+20%	142.980	141.340	-0.160	0.000	0.45			0.153	1.7	
S14.000	S54	15 minute	2 year	Summer	I+20%	142.920	141.095	-0.205	0.000	0.22			0.102	1.1	
S13.001	S54	15 minute	2 year	Summer	I+20%	142.780	140.342	0.042	0.000	1.37			0.381	1.2	
S13.002	S55	120 minute	2 year	Winter	I+20%	142.850	139.992	-0.158	0.000	0.17			0.431	0.6	
S13.003	S56	120 minute	2 year	Winter	I+20%	142.920	139.992	0.147	0.000	0.00			85.954	0.1	
S13.004	S57	15 minute	2 year	Summer	I+20%	142.920	139.626	-0.119	0.000	0.02			0.163	0.3	
S10.004	S58	15 minute	2 year	Summer	I+20%	142.920	139.628	-0.147	0.000	0.67			1.451	1.4	
S10.005	S59	15 minute	2 year	Summer	I+20%	142.400	139.498	0.16	0.000	1.00			3.186	1.0	
S10.006	S60	120 minute	2 year	Summer	I+20%	142.400	139.413	0.16	0.000	0.16			0.796	0.9	
S10.007	S61	120 minute	2 year	Summer	I+20%	142.200	139.410	0.33	0.000	0.33		92.887	0.8		
S10.008	S62	60 minute	2 year	Summer	I+20%	142.100	139.002	0.42	0.000	0.42			0.176	0.9	
S10.009	S63	30 minute	2 year	Summer	I+20%	141.380	138.778	-0.202	0.000	0.23			0.124	1.7	
S10.010	S64	30 minute	2 year	Summer	I+20%	139.110	137.696	-0.204	0.000	0.22			0.139	2.2	
S10.011	S65	30 minute	2 year	Summer	I+20%	138.060	136.676	-0.184	0.000	0.31			0.139	1.8	
S15.000	S66	15 minute	2 year	Summer	I+20%	141.720	139.953	-0.272	0.000	0.17			0.140	1.3	
S16.000	S67	15 minute	2 year	Summer	I+20%	142.150	141.052	-0.123	0.000	0.42			0.110	1.3	
S15.001	S68	15 minute	2 year	Summer	I+20%	141.930	139.694	-0.231	0.000	0.31			0.312	1.4	
S15.002	S69	15 minute	2 year	Summer	I+20%	142.140	139.422	-0.213	0.000	0.38			0.508	1.5	
S15.003	S70	15 minute	2 year	Summer	I+20%	141.860	139.192	-0.183	0.000	0.51			0.670	1.3	
S17.000	S71	15 minute	2 year	Summer	I+20%	142.650	141.091	-0.209	0.000	0.20			0.097	1.4	
S15.004	S72	15 minute	2 year	Summer	I+20%	141.700	139.073	-0.152	0.000	0.65			0.701	1.6	
S15.005	S73	15 minute	2 year	Summer	I+20%	141.500	138.856	-0.159	0.000	0.63			0.922	1.9	
S15.006	S74	15 minute	2 year	Summer	I+20%	141.000	138.457	-0.138	0.000	0.71			1.044	2.0	
S18.000	S75	15 minute	2 year	Summer	I+20%	142.800	141.235	-0.160	0.000	0.19			0.068	0.8	
S18.001	S76	15 minute	2 year	Summer	I+20%	142.680	141.149	-0.126	0.000	0.40			0.134	1.6	
S18.002	S77	15 minute	2 year	Summer	I+20%	141.530	140.150	-0.180	0.000	0.33			0.135	2.3	
S15.007	S78	15 minute	2 year	Summer	I+20%	140.500	137.949	-0.201	0.000	0.58			0.673	2.6	
S15.008	S79	15 minute	2 year	Summer	I+20%	139.000	137.095	0.065	0.000	1.32			3.518	1.6	
S15.009	S80	15 minute	2 year	Summer	I+20%	139.000	136.446	0.076	0.000	1.40			0.749	1.6	
S15.010	S81	120 minute	2 year	Winter	I+20%	138.250	136.199	0.274	0.000	0.15		268.794	0.8		
S19.000	S82	15 minute	2 year	Summer	I+20%	141.700	140.264	-0.161	0.000	0.18			0.067	1.8	
S19.001	S83	15 minute	2 year	Summer	I+20%	140.640	139.233	-0.151	0.000	0.24			0.092	1.7	
S19.002	S84	15 minute	2 year	Summer	I+20%	140.260	138.832	-0.121	0.000	0.43			0.130	1.4	

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Roger Mullarkey & Associates		Page 14
Duncreevan Kilcock Co. Kildare, Ireland	KV NC AMENDMENT June'24 BLOCKED OUTFALL	
Date 13/07/2026 14:50 File Kilternan Master LRD ALTERNATE N...	Designed by R.M. Checked by	
Innovyze	Network 2020.1.3	

2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Pipe Flow (l/s)	Status
S1.010	S31	162.3	OK
S1.011	S32	181.7	OK
S1.012	S33	127.0	OK
S8.000	S34	18.2	OK
S8.001	S35	26.1	OK
S8.002	S36	36.1	OK
S8.003	S37	45.7	OK
S8.004	S38	61.1	OK
S9.000	S39	8.8	OK
S8.005	S40	76.4	OK
S8.006	S41	79.1	OK
S1.013	S42	49.9	SURCHARGED
S1.014	S43	56.1	OK
S1.015	S44	54.4	OK
S10.000	S45	9.9	OK
S11.000	S46	22.6	OK
S11.001	S47	33.9	OK
S10.001	S48	50.0	OK
S12.000	S49	22.8	OK
S12.001	S50	28.4	OK
S10.002	S51	82.8	OK
S10.003	S57	89.2	OK
S13.000	S53	55.0	OK
S14.000	S54	21.7	OK
S13.001	S54	84.0	SURCHARGED
S13.002	S55	28.6	OK
S13.003	S56	0.1	SURCHARGED
S13.004	S57	0.6	OK
S10.004	S58	100.0	OK
S10.005	S59	94.7	OK
S10.006	S60	60.8	OK
S10.007	S61	10.0	SURCHARGED
S10.008	S62	16.3	OK
S10.009	S63	34.4	OK
S10.010	S64	43.1	OK
S10.011	S65	44.9	OK
S15.000	S66	32.0	OK
S16.000	S67	22.7	OK
S15.001	S68	54.9	OK
S15.002	S69	66.5	OK
S15.003	S70	70.9	OK
S17.000	S71	25.6	OK
S15.004	S72	110.3	OK
S15.005	S73	122.1	OK
S15.006	S74	141.7	OK
S18.000	S75	7.9	OK
S18.001	S76	27.5	OK
S18.002	S77	59.3	OK
S15.007	S78	226.8	OK
S15.008	S79	248.1	SURCHARGED
S15.009	S80	251.0	SURCHARGED
S15.010	S81	6.0	SURCHARGED
S19.000	S82	16.4	OK
S19.001	S83	19.6	OK

2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Pipe			
US/MH		Flow	Status
PN	Name	(l/s)	
S19.002	S84	25.7	OK

2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm												
US/MH					US/CL		Water Level	Surcharged Depth	Flooded Volume	Flow / Overflow	Maximum	Maximum
PN	Name	Event			(m)	(m)	(m)	(m³)	Cap.	(l/s)	Vol (m³)	Velocity (m/s)
S19.003	S85	15 minute	2 year	Summer I+20%	140.000	138.483	-0.102	0.000	0.57		0.208	1.5
S19.004	S86	15 minute	2 year	Summer I+20%	139.850	138.265	-0.090	0.000	0.66		0.233	1.3
S19.005	S87	15 minute	2 year	Summer I+20%	139.620	137.609	-0.116	0.000	0.47		0.118	2.2
S15.011	S88	15 minute	2 year	Summer I+20%	138.250	135.575	-0.105	0.000	0.73		0.462	1.5
S15.012	S89	15 minute	2 year	Summer I+20%	138.250	135.221	-0.399	0.000	0.25		0.790	0.9
S20.000	S90	15 minute	2 year	Summer I+20%	139.100	137.553	-0.172	0.000	0.13		0.054	0.9
S20.001	S91	120 minute	2 year	Summer I+20%	139.250	135.169	-0.281	0.000	0.02		0.235	0.5
S15.013	S92	120 minute	2 year	Summer I+20%	137.250	135.169	0.054	0.000	0.09		133.139	0.7
S10.012	S93	30 minute	2 year	Summer I+20%	137.750	134.817	-0.113	0.000	0.58		0.321	1.1
S10.013	S94	30 minute	2 year	Summer I+20%	137.500	134.778	-0.142	0.000	0.54		0.845	1.5
S10.014	S95	30 minute	2 year	Summer I+20%	136.500	132.917	-0.183	0.000	0.32		0.127	2.3
S10.015	S96	30 minute	2 year	Summer I+20%	133.000	129.923	-0.477	0.000	0.09		0.209	1.6
S1.016	S97	120 minute	2 year	Winter I+20%	131.500	129.672	0.172	0.000	0.26		384.964	1.9
S1.017	S98	120 minute	2 year	Winter I+20%	129.750	128.453	-0.217	0.000	0.17		0.119	2.5
S1.018	S99	60 minute	2 year	Summer I+20%	127.750	126.683	-0.217	0.000	0.17		0.104	2.5
S1.019	S100	60 minute	2 year	Summer I+20%	126.250	124.760	-0.200	0.000	0.25		0.123	1.9
S1.020	S101	60 minute	2 year	Summer I+20%	126.000	123.851	-0.199	0.000	0.25		0.112	1.9
S21.000	S102	60 minute	2 year	Summer I+20%	124.750	123.460	-0.420	0.000	0.01		0.036	0.4
S1.021	S103	120 minute	2 year	Summer I+20%	125.000	122.220	-0.140	0.000	0.56		0.222	1.1
S1.022	S104	60 minute	2 year	Winter I+20%	123.500	122.144	-0.126	0.000	0.64		0.457	1.0
S22.000	S105	15 minute	2 year	Summer I+20%	136.200	134.703	-0.217	0.000	0.17		0.088	1.4
S22.001	S106	120 minute	2 year	Winter I+20%	136.270	134.291	-0.159	0.000	0.06		0.555	0.5
S22.002	S107	120 minute	2 year	Winter I+20%	136.160	134.291	0.196	0.000	0.03		17.138	0.5
S22.003	S108	120 minute	2 year	Summer I+20%	136.030	133.824	-0.201	0.000	0.03		0.043	0.5
S22.004	S109	15 minute	2 year	Summer I+20%	135.100	133.628	-0.191	0.000	0.05		0.056	1.5
S23.000	S110	15 minute	2 year	Summer I+20%	139.460	138.392	-0.248	0.000	0.07		0.053	0.9
S23.001	S111	15 minute	2 year	Summer I+20%	139.660	138.156	-0.224	0.000	0.14		0.123	1.2
S23.002	S112	15 minute	2 year	Summer I+20%	139.940	137.805	-0.185	0.000	0.31		0.233	1.4
S23.003	S113	15 minute	2 year	Summer I+20%	139.050	137.440	-0.130	0.000	0.60		0.435	1.4
S23.004	S114	120 minute	2 year	Winter I+20%	139.100	137.412	0.042	0.000	0.42		0.734	0.8
S23.005	S115	120 minute	2 year	Winter I+20%	139.250	137.410	0.215	0.000	0.03		79.519	0.5
S23.006	S116	60 minute	2 year	Summer I+20%	139.000	136.874	-0.201	0.000	0.03		0.026	0.5
S23.007	S117	30 minute	2 year	Summer I+20%	139.000	136.776	-0.199	0.000	0.03		0.042	0.4
S24.000	S118	15 minute	2 year	Summer I+20%	136.450	134.508	-0.167	0.000	0.15		0.060	2.0
S24.001	S119	15 minute	2 year	Summer I+20%	134.980	133.101	-0.124	0.000	0.41		0.109	2.2
S25.000	S120	15 minute	2 year	Summer I+20%	131.230	129.583	-0.142	0.000	0.29		0.088	1.0
S24.002	S121	15 minute	2 year	Summer I+20%	132.400	129.142	-0.233	0.000	0.30		0.195	1.9
S24.003	S122	15 minute	2 year	Summer I+20%	131.980	128.312	-0.213	0.000	0.38		0.438	1.8
S24.004	S123	15 minute	2 year	Summer I+20%	131.800	127.974	-0.211	0.000	0.39		0.429	2.0
S24.005	S124	15 minute	2 year	Summer I+20%	130.750	127.204	-0.396	0.000	0.25		0.431	1.2
S26.000	S125	15 minute	2 year	Summer I+20%	133.500	132.391	-0.134	0.000	0.34		0.097	1.1
S26.001	S126	15 minute	2 year	Summer I+20%	133.500	132.044	-0.101	0.000	0.57		0.240	1.3
S26.002	S127	15 minute	2 year	Summer I+20%	133.500	131.614	-0.091	0.000	0.66		0.288	1.5
S27.000	S128	15 minute	2 year	Summer I+20%	132.900	131.786	-0.139	0.000	0.31		0.092	1.1
S27.001	S129	15 minute	2 year	Summer I+20%	132.900	131.407	-0.118	0.000	0.44		0.237	1.2
S26.003	S130	15 minute	2 year	Summer I+20%	132.900	130.969	-0.131	0.000	0.61		0.241	1.5
S26.004	S131	15 minute	2 year	Summer I+20%	132.500	130.732	-0.168	0.000	0.40		0.179	2.1
S28.000	S132	15 minute	2 year	Summer I+20%	132.300	131.213	-0.112	0.000	0.50		0.122	1.2
S28.001	S133	15 minute	2 year	Summer I+20%	132.300	130.976	-0.099	0.000	0.58		0.231	1.3
S28.002	S134	15 minute	2 year	Summer I+20%	132.300	130.684	-0.081	0.000	0.73		0.361	1.2
S26.005	S135	15 minute	2 year	Summer I+20%	132.000	130.157	-0.143	0.000	0.54		0.171	2.5
S26.006	S136	15 minute	2 year	Summer I+20%	131.000	127.337	-0.363	0.000	0.33		0.410	1.0
S24.006	S137	120 minute	2 year	Summer I+20%	129.500	127.151	0.176	0.000	0.06		213.311	0.9
S24.007	S138	120 minute	2 year	Summer I+20%	128.650	126.538	-0.187	0.000	0.07		0.038	0.8
S24.008	S139	120 minute	2 year	Summer I+20%	127.750	125.941	-0.194	0.000	0.05		0.053	1.0

Roger Mullarkey & Associates		Page 17
Duncreevan Kilcock Co. Kildare, Ireland	KV NC AMENDMENT June'24 BLOCKED OUTFALL	
Date 13/07/2026 14:50 File Kilternan Master LRD ALTERNATE N...	Designed by R.M. Checked by	
Innovyze	Network 2020.1.3	

2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Pipe Flow (l/s)	Status
S19.003	S85	32.3	OK
S19.004	S86	32.4	OK
S19.005	S87	41.7	OK
S15.011	S88	70.5	OK
S15.012	S89	76.5	OK
S20.000	S90	6.4	OK
S20.001	S91	2.9	OK
S15.013	S92	4.0	SURCHARGED
S10.012	S93	50.7	OK
S10.013	S94	54.2	OK
S10.014	S95	59.3	OK
S10.015	S96	65.7	OK
S1.016	S97	39.6	SURCHARGED
S1.017	S98	39.6	OK
S1.018	S99	39.7	OK
S1.019	S100	39.7	OK
S1.020	S101	39.7	OK
S21.000	S102	2.0	OK
S1.021	S103	41.6	OK
S1.022	S104	41.7	OK
S22.000	S105	22.3	OK
S22.001	S106	7.8	OK
S22.002	S107	1.2	SURCHARGED
S22.003	S108	1.2	OK
S22.004	S109	5.5	OK
S23.000	S110	7.7	OK
S23.001	S111	16.4	OK
S23.002	S112	34.9	OK
S23.003	S113	56.0	OK
S23.004	S114	25.4	SURCHARGED
S23.005	S115	1.0	SURCHARGED
S23.006	S116	1.0	OK
S23.007	S117	1.0	OK
S24.000	S118	16.1	OK
S24.001	S119	37.9	OK
S25.000	S120	13.8	OK
S24.002	S121	71.8	OK
S24.003	S122	83.2	OK
S24.004	S123	93.5	OK
S24.005	S124	101.1	OK
S26.000	S125	16.6	OK
S26.001	S126	28.1	OK
S26.002	S127	37.5	OK
S27.000	S128	15.2	OK
S27.001	S129	21.7	OK
S26.003	S130	62.7	OK
S26.004	S131	62.4	OK
S28.000	S132	23.9	OK
S28.001	S133	28.4	OK
S28.002	S134	32.7	OK
S26.005	S135	94.6	OK
S26.006	S136	102.6	OK
S24.006	S137	3.4	SURCHARGED
S24.007	S138	3.4	OK

2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Pipe			
US/MH Flow			
PN	Name	(l/s)	Status
S24.008	S139	3.4	OK

2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

				Water	Surcharged	Flooded				Maximum
PN	US/MH		US/CL	Level	Depth	Volume	Flow /	Overflow	Maximum	Velocity
	Name	Event	(m)	(m)	(m)	(m³)	Cap.	(l/s)	Vol (m³)	(m/s)
S24.009	S140	120 minute 2 year Winter I+20%	127.730	124.786	-0.179	0.000	0.10		0.081	0.6

Pipe			
PN	US/MH Name	Flow (l/s)	Status
S24.009	S140	3.4	OK

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0 Inlet Coefficient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 10 Number of Storage Structures 10 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 16.500 Cv (Summer) 1.000
Region Scotland and Ireland Ratio R 0.277 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 150.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120
Return Period(s) (years) 2, 30, 100
Climate Change (%) 20, 20, 20

								Water	Surcharged	Flooded				Maximum	
US/MH								Level	Depth	Volume	Flow /	Overflow	Maximum	Velocity	
PN	Name	Event						(m)	(m)	(m)	(m³)	Cap.	(l/s)	Vol (m³)	(m/s)
S1.000	S1	30 minute	30 year	Summer	I+20%	142.310	140.948	-0.162	0.000	0.43			0.150	1.4	
S1.001	S2	15 minute	30 year	Summer	I+20%	142.000	140.624	-0.126	0.000	0.61			0.431	1.6	
S2.000	S3	30 minute	30 year	Summer	I+20%	142.040	140.682	-0.083	0.000	0.71			0.155	1.4	
S1.002	S4	15 minute	30 year	Summer	I+20%	141.750	140.279	-0.146	0.000	0.67			0.592	1.8	
S1.003	S5	15 minute	30 year	Summer	I+20%	141.420	139.668	-0.179	0.000	0.52			0.274	2.6	
S1.004	S6	15 minute	30 year	Summer	I+20%	140.100	139.102	0.227	0.000	0.84			2.600	1.7	
S3.000	S7	30 minute	30 year	Summer	I+20%	142.780	141.674	-0.146	0.000	0.51			0.168	1.6	
S3.001	S8	15 minute	30 year	Summer	I+20%	142.900	141.376	-0.068	0.000	0.75			0.721	1.3	
S3.002	S9	15 minute	30 year	Summer	I+20%	142.840	141.310	-0.010	0.000	0.88			0.809	1.8	
S3.003	S10	15 minute	30 year	Summer	I+20%	142.500	140.943	0.103	0.000	1.32			1.790	1.8	
S4.000	S11	30 minute	30 year	Summer	I+20%	142.930	141.547	-0.108	0.000	0.53			0.127	1.3	
S4.001	S12	30 minute	30 year	Summer	I+20%	142.670	141.274	-0.091	0.000	0.66			0.267	1.1	
S3.004	S13	15 minute	30 year	Summer	I+20%	142.570	140.508	-0.212	0.000	0.53			0.426	2.4	
S5.000	S14	15 minute	30 year	Summer	I+20%	142.140	140.702	-0.163	0.000	0.17			0.065	1.2	
S3.005	S15	15 minute	30 year	Summer	I+20%	141.390	139.632	-0.118	0.000	0.88			1.598	2.0	
S3.006	S16	15 minute	30 year	Summer	I+20%	140.960	139.289	-0.146	0.000	0.79			1.775	2.5	
S1.005	S17	15 minute	30 year	Summer	I+20%	140.110	138.925	0.125	0.000	1.29			4.353	1.6	
S1.006	S18	120 minute	30 year	Summer	I+20%	140.000	137.814	0.464	0.000	0.82			1.872	1.0	
S1.007	S19	120 minute	30 year	Summer	I+20%	139.000	137.810	0.860	0.000	0.40			335.594	1.2	
S6.000	S20	30 minute	30 year	Summer	I+20%	140.710	139.322	-0.113	0.000	0.48			0.121	1.7	
S6.001	S21	15 minute	30 year	Summer	I+20%	139.860	138.389	-0.171	0.000	0.38			0.161	2.5	
S6.002	S22	15 minute	30 year	Summer	I+20%	139.070	137.773	0.163	0.000	1.21			1.112	1.5	
S6.003	S23	15 minute	30 year	Summer	I+20%	138.870	137.184	-0.112	0.000	0.71			0.701	2.6	
S1.008	S24	15 minute	30 year	Summer	I+20%	138.190	136.029	0.379	0.000	1.67			0.762	2.1	
S1.009	S25	15 minute	30 year	Summer	I+20%	137.490	135.574	0.079	0.000	1.08			1.788	1.7	
S7.000	S26	30 minute	30 year	Summer	I+20%	136.470	135.300	-0.220	0.000	0.16			0.084	1.1	
S7.001	S27	15 minute	30 year	Summer	I+20%	137.770	135.192	-0.088	0.000	0.53			0.763	1.4	
S7.002	S28	15 minute	30 year	Summer	I+20%	137.290	135.140	0.060	0.000	0.90			1.508	1.4	
S7.003	S29	15 minute	30 year	Summer	I+20%	136.510	134.966	0.146	0.000	1.09			2.386	1.3	
S7.004	S30	15 minute	30 year	Summer	I+20%	136.000	134.840	0.130	0.000	1.12			1.351	1.5	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

		Pipe		
		US/MH	Flow	
PN	Name	(l/s)	Status	
S1.000	S1	43.6	OK	
S1.001	S2	65.1	OK	
S2.000	S3	35.2	OK	
S1.002	S4	126.0	OK	
S1.003	S5	149.1	OK	
S1.004	S6	156.5	SURCHARGED	
S3.000	S7	57.8	OK	
S3.001	S8	66.8	OK	
S3.002	S9	100.4	OK	
S3.003	S10	126.7	SURCHARGED	
S4.000	S11	27.2	OK	
S4.001	S12	27.3	OK	
S3.004	S13	197.1	OK	
S5.000	S14	10.8	OK	
S3.005	S15	250.5	OK	
S3.006	S16	283.3	OK	
S1.005	S17	446.7	SURCHARGED	
S1.006	S18	230.1	SURCHARGED	
S1.007	S19	29.9	SURCHARGED	
S6.000	S20	32.2	OK	
S6.001	S21	70.4	OK	
S6.002	S22	108.1	SURCHARGED	
S6.003	S23	118.2	OK	
S1.008	S24	146.4	SURCHARGED	
S1.009	S25	183.3	SURCHARGED	
S7.000	S26	15.6	OK	
S7.001	S27	51.4	OK	
S7.002	S28	82.9	SURCHARGED	
S7.003	S29	90.6	SURCHARGED	
S7.004	S30	102.3	SURCHARGED	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

					Water		Surcharged	Flooded			
PN	US/MH Name	Event			US/CL (m)	Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Maximum Vol (m³)
S1.010	S31	15 minute	30 year	Summer I+20%	136.480	134.542	0.112	0.000	1.15		2.317
S1.011	S32	15 minute	30 year	Summer I+20%	135.840	133.633	-0.117	0.000	0.86		0.518
S1.012	S33	120 minute	30 year	Winter I+20%	135.000	132.549	0.449	0.000	0.45		1.844
S8.000	S34	15 minute	30 year	Summer I+20%	139.810	138.601	-0.134	0.000	0.35		0.098
S8.001	S35	15 minute	30 year	Summer I+20%	139.050	137.637	-0.098	0.000	0.61		0.170
S8.002	S36	15 minute	30 year	Summer I+20%	138.330	137.210	0.155	0.000	1.31		0.709
S8.003	S37	15 minute	30 year	Summer I+20%	138.090	136.685	-0.105	0.000	0.73		0.230
S8.004	S38	15 minute	30 year	Summer I+20%	137.240	135.897	0.027	0.000	1.05		1.088
S9.000	S39	15 minute	30 year	Summer I+20%	137.000	135.882	-0.143	0.000	0.29		0.087
S8.005	S40	15 minute	30 year	Summer I+20%	136.960	135.437	-0.063	0.000	0.98		0.536
S8.006	S41	15 minute	30 year	Summer I+20%	136.000	132.662	-0.438	0.000	0.16		0.277
S1.013	S42	120 minute	30 year	Winter I+20%	133.500	132.541	0.891	0.000	0.51		446.509
S1.014	S43	30 minute	30 year	Summer I+20%	133.480	130.827	-0.282	0.000	0.30		0.233
S1.015	S44	120 minute	30 year	Winter I+20%	134.000	129.803	-0.297	0.000	0.13		0.526
S10.000	S45	30 minute	30 year	Summer I+20%	142.140	140.880	-0.220	0.000	0.16		0.107
S11.000	S46	15 minute	30 year	Summer I+20%	142.100	141.041	-0.159	0.000	0.45		0.154
S11.001	S47	15 minute	30 year	Summer I+20%	142.500	140.828	-0.092	0.000	0.81		0.730
S10.001	S48	15 minute	30 year	Summer I+20%	142.630	140.544	-0.131	0.000	0.57		0.773
S12.000	S49	30 minute	30 year	Summer I+20%	142.750	141.136	-0.164	0.000	0.42		0.148
S12.001	S50	15 minute	30 year	Summer I+20%	142.510	140.900	-0.141	0.000	0.54		0.438
S10.002	S51	15 minute	30 year	Summer I+20%	142.760	140.497	0.032	0.000	0.84		2.020
S10.003	S57	15 minute	30 year	Summer I+20%	142.970	140.345	0.310	0.000	1.05		3.364
S13.000	S53	15 minute	30 year	Summer I+20%	142.980	141.408	-0.092	0.000	0.82		0.230
S14.000	S54	15 minute	30 year	Summer I+20%	142.920	141.132	-0.168	0.000	0.40		0.144
S13.001	S54	15 minute	30 year	Summer I+20%	142.780	140.648	0.348	0.000	2.59		0.727
S13.002	S55	120 minute	30 year	Summer I+20%	142.850	140.223	0.073	0.000	0.42		1.092
S13.003	S56	120 minute	30 year	Winter I+20%	142.920	140.222	0.377	0.000	0.00		152.430
S13.004	S57	15 minute	30 year	Summer I+20%	142.920	140.058	0.313	0.000	0.15		70.946
S10.004	S58	15 minute	30 year	Summer I+20%	142.920	140.059	0.284	0.000	1.16		5.312
S10.005	S59	120 minute	30 year	Winter I+20%	142.400	139.900	0.72		0.72		5.496
S10.006	S60	120 minute	30 year	Winter I+20%	142.400	139.800	0.19		0.19		1.650
S10.007	S61	120 minute	30 year	Winter I+20%	142.200	139.800	0.33		0.33		187.947
S10.008	S62	30 minute	30 year	Summer I+20%	142.100	139.000	0.73		0.73		0.282
S10.009	S63	15 minute	30 year	Summer I+20%	141.380	138.833	-0.147	0.000	0.51		0.309
S10.010	S64	15 minute	30 year	Summer I+20%	139.110	137.752	-0.148	0.000	0.50		0.285
S10.011	S65	15 minute	30 year	Summer I+20%	138.060	136.750	-0.110	0.000	0.70		0.271
S15.000	S66	15 minute	30 year	Summer I+20%	141.720	140.051	-0.174	0.000	0.31		0.280
S16.000	S67	15 minute	30 year	Summer I+20%	142.150	141.100	-0.075	0.000	0.78		0.164
S15.001	S68	15 minute	30 year	Summer I+20%	141.930	140.021	0.096	0.000	0.58		2.419
S15.002	S69	15 minute	30 year	Summer I+20%	142.140	139.895	0.260	0.000	0.68		3.841
S15.003	S70	15 minute	30 year	Summer I+20%	141.860	139.773	0.398	0.000	0.77		3.759
S17.000	S71	30 minute	30 year	Summer I+20%	142.650	141.126	-0.174	0.000	0.37		0.137
S15.004	S72	15 minute	30 year	Summer I+20%	141.700	139.666	0.441	0.000	1.01		2.388
S15.005	S73	15 minute	30 year	Summer I+20%	141.500	139.498	0.483	0.000	0.93		3.675
S15.006	S74	15 minute	30 year	Summer I+20%	141.000	139.169	0.574	0.000	1.10		5.468
S18.000	S75	15 minute	30 year	Summer I+20%	142.800	141.260	-0.135	0.000	0.34		0.097
S18.001	S76	15 minute	30 year	Summer I+20%	142.680	141.218	-0.057	0.000	0.90		0.312
S18.002	S77	15 minute	30 year	Summer I+20%	141.530	140.232	-0.098	0.000	0.78		0.252
S15.007	S78	15 minute	30 year	Summer I+20%	140.500	138.673	0.523	0.000	0.99		5.334
S15.008	S79	15 minute	30 year	Summer I+20%	139.000	137.501	0.471	0.000	2.30		7.902
S15.009	S80	15 minute	30 year	Summer I+20%	139.000	136.852	0.482	0.000	2.44		2.131
S15.010	S81	120 minute	30 year	Winter I+20%	138.250	136.557	0.632	0.000	0.15		508.151
S19.000	S82	15 minute	30 year	Summer I+20%	141.700	140.289	-0.136	0.000	0.33		0.095
S19.001	S83	15 minute	30 year	Summer I+20%	140.640	139.266	-0.118	0.000	0.46		0.137
S19.002	S84	15 minute	30 year	Summer I+20%	140.260	138.987	0.034	0.000	0.84		0.438

RELEVANT TO
 AMENDMENT NC
 APPLICATION

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Duncreevan Kilcock Co. Kildare, Ireland	KV NC AMENDMENT June'24 BLOCKED OUTFALL	
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Innovyze	Network 2020.1.3	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Maximum Velocity (m/s)	Pipe Flow (l/s)	Status
S1.010	S31	1.9	305.5	SURCHARGED
S1.011	S32	2.8	337.2	OK
S1.012	S33	1.1	157.9	SURCHARGED
S8.000	S34	2.2	33.4	OK
S8.001	S35	2.3	52.8	OK
S8.002	S36	1.9	75.9	SURCHARGED
S8.003	S37	2.1	98.7	OK
S8.004	S38	2.0	131.4	SURCHARGED
S9.000	S39	1.2	16.2	OK
S8.005	S40	2.7	160.3	OK
S8.006	S41	2.7	165.1	OK
S1.013	S42	1.5	49.7	SURCHARGED
S1.014	S43	1.4	72.7	OK
S1.015	S44	1.2	59.8	OK
S10.000	S45	1.2	18.3	OK
S11.000	S46	1.3	41.6	OK
S11.001	S47	1.3	69.3	OK
S10.001	S48	1.7	102.1	OK
S12.000	S49	1.4	41.5	OK
S12.001	S50	1.5	54.7	OK
S10.002	S51	1.9	160.4	SURCHARGED
S10.003	S57	1.5	155.1	SURCHARGED
S13.000	S53	1.9	101.2	OK
S14.000	S54	1.3	39.9	OK
S13.001	S54	2.2	158.8	SURCHARGED
S13.002	S55	0.8	72.1	SURCHARGED
S13.003	S56	0.1	0.1	SURCHARGED
S13.004	S57	0.2	4.5	SURCHARGED
S10.004	S58	1.6	172.9	SURCHARGED
S10.005	S59	0.9	68.1	SURCHARGED
S10.006	S60	0.8	70.4	SURCHARGED
S10.007	S61	0.8	10.0	SURCHARGED
S10.008	S62	1.1	28.7	OK
S10.009	S63	2.1	75.9	OK
S10.010	S64	2.8	97.7	OK
S10.011	S65	2.2	100.9	OK
S15.000	S66	1.5	58.7	OK
S16.000	S67	1.5	41.8	OK
S15.001	S68	1.6	101.0	SURCHARGED
S15.002	S69	1.7	117.4	SURCHARGED
S15.003	S70	1.3	106.5	SURCHARGED
S17.000	S71	1.7	46.6	OK
S15.004	S72	1.7	170.4	SURCHARGED
S15.005	S73	2.0	182.2	SURCHARGED
S15.006	S74	2.0	221.3	SURCHARGED
S18.000	S75	1.0	14.6	OK
S18.001	S76	2.0	62.1	OK
S18.002	S77	2.8	139.7	OK
S15.007	S78	2.7	392.2	SURCHARGED
S15.008	S79	2.7	431.7	SURCHARGED
S15.009	S80	2.8	437.2	SURCHARGED
S15.010	S81	0.8	6.0	SURCHARGED
S19.000	S82	2.1	30.2	OK
S19.001	S83	2.0	38.0	OK

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Maximum	Pipe	Status
		Velocity (m/s)	Flow (l/s)	
S19.002	S84	1.6	49.7	SURCHARGED

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Duncreevan	KV NC AMENDMENT	
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File Kilternan Master LRD ALTERNATE N...	Checked by	
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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name		Event			US/CL (m)	Water Surcharged		Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Maximum Vol (m³)
							Level (m)	Depth (m)				
S19.003	S85	15 minute	30 year	Summer	I+20%	140.000	138.723	0.138	0.000	1.13		1.006
S19.004	S86	15 minute	30 year	Summer	I+20%	139.850	138.436	0.081	0.000	1.29		0.757
S19.005	S87	15 minute	30 year	Summer	I+20%	139.620	137.673	-0.052	0.000	0.92		0.190
S15.011	S88	15 minute	30 year	Summer	I+20%	138.250	136.059	0.379	0.000	1.40		2.486
S15.012	S89	15 minute	30 year	Summer	I+20%	138.250	135.310	-0.310	0.000	0.46		1.541
S20.000	S90	15 minute	30 year	Summer	I+20%	139.100	137.573	-0.152	0.000	0.23		0.077
S20.001	S91	120 minute	30 year	Summer	I+20%	139.250	135.304	-0.146	0.000	0.03		0.428
S15.013	S92	120 minute	30 year	Summer	I+20%	137.250	135.304	0.189	0.000	0.10		201.655
S10.012	S93	15 minute	30 year	Summer	I+20%	137.750	135.206	0.276	0.000	1.22		1.479
S10.013	S94	15 minute	30 year	Summer	I+20%	137.500	135.013	0.093	0.000	1.16		1.342
S10.014	S95	15 minute	30 year	Summer	I+20%	136.500	132.985	-0.115	0.000	0.69		0.203
S10.015	S96	15 minute	30 year	Summer	I+20%	133.000	129.983	-0.417	0.000	0.20		0.314
S1.016	S97	120 minute	30 year	Winter	I+20%	131.500	129.774	0.274	0.000	0.26		479.617
S1.017	S98	60 minute	30 year	Summer	I+20%	129.750	128.453	-0.217	0.000	0.17		0.119
S1.018	S99	60 minute	30 year	Summer	I+20%	127.750	126.683	-0.217	0.000	0.17		0.104
S1.019	S100	60 minute	30 year	Summer	I+20%	126.250	124.760	-0.200	0.000	0.25		0.123
S1.020	S101	120 minute	30 year	Summer	I+20%	126.000	123.851	-0.199	0.000	0.25		0.112
S21.000	S102	60 minute	30 year	Summer	I+20%	124.750	123.460	-0.420	0.000	0.01		0.036
S1.021	S103	120 minute	30 year	Summer	I+20%	125.000	122.220	-0.140	0.000	0.56		0.222
S1.022	S104	60 minute	30 year	Winter	I+20%	123.500	122.144	-0.126	0.000	0.64		0.457
S22.000	S105	15 minute	30 year	Summer	I+20%	136.200	134.735	-0.185	0.000	0.31		0.125
S22.001	S106	120 minute	30 year	Winter	I+20%	136.270	134.641	0.191	0.000	0.11		2.331
S22.002	S107	120 minute	30 year	Winter	I+20%	136.160	134.641	0.546	0.000	0.03		34.475
S22.003	S108	120 minute	30 year	Winter	I+20%	136.030	133.825	-0.200	0.000	0.03		0.044
S22.004	S109	15 minute	30 year	Summer	I+20%	135.100	133.645	-0.174	0.000	0.12		0.089
S23.000	S110	15 minute	30 year	Summer	I+20%	139.460	138.412	-0.228	0.000	0.13		0.075
S23.001	S111	15 minute	30 year	Summer	I+20%	139.660	138.195	-0.185	0.000	0.31		0.210
S23.002	S112	15 minute	30 year	Summer	I+20%	139.940	138.017	0.027	0.000	0.64		1.329
S23.003	S113	15 minute	30 year	Summer	I+20%	139.050	137.846	0.276	0.000	1.26		2.750
S23.004	S114	120 minute	30 year	Summer	I+20%	139.100	137.749	0.379	0.000	0.97		1.266
S23.005	S115	120 minute	30 year	Winter	I+20%	139.250	137.744	0.549	0.000	0.03		143.478
S23.006	S116	120 minute	30 year	Winter	I+20%	139.000	136.874	-0.201	0.000	0.03		0.027
S23.007	S117	120 minute	30 year	Winter	I+20%	139.000	136.776	-0.199	0.000	0.03		0.042
S24.000	S118	15 minute	30 year	Summer	I+20%	136.450	134.530	-0.145	0.000	0.28		0.085
S24.001	S119	15 minute	30 year	Summer	I+20%	134.980	133.167	-0.058	0.000	0.91		0.184
S25.000	S120	15 minute	30 year	Summer	I+20%	131.230	129.618	-0.107	0.000	0.54		0.127
S24.002	S121	15 minute	30 year	Summer	I+20%	132.400	129.225	-0.150	0.000	0.66		0.314
S24.003	S122	15 minute	30 year	Summer	I+20%	131.980	128.419	-0.106	0.000	0.85		0.997
S24.004	S123	15 minute	30 year	Summer	I+20%	131.800	128.087	-0.098	0.000	0.87		1.006
S24.005	S124	120 minute	30 year	Summer	I+20%	130.750	127.475	-0.125	0.000	0.25		2.109
S26.000	S125	15 minute	30 year	Summer	I+20%	133.500	132.429	-0.096	0.000	0.62		0.141
S26.001	S126	15 minute	30 year	Summer	I+20%	133.500	132.289	0.144	0.000	1.04		1.352
S26.002	S127	15 minute	30 year	Summer	I+20%	133.500	131.802	0.097	0.000	1.25		1.141
S27.000	S128	15 minute	30 year	Summer	I+20%	132.900	131.823	-0.102	0.000	0.57		0.133
S27.001	S129	15 minute	30 year	Summer	I+20%	132.900	131.476	-0.049	0.000	0.88		0.503
S26.003	S130	15 minute	30 year	Summer	I+20%	132.900	131.153	0.053	0.000	1.17		0.967
S26.004	S131	15 minute	30 year	Summer	I+20%	132.500	130.802	-0.098	0.000	0.77		0.319
S28.000	S132	15 minute	30 year	Summer	I+20%	132.300	131.343	0.018	0.000	0.86		0.269
S28.001	S133	15 minute	30 year	Summer	I+20%	132.300	131.173	0.098	0.000	1.02		1.033
S28.002	S134	15 minute	30 year	Summer	I+20%	132.300	130.840	0.075	0.000	1.27		1.071
S26.005	S135	15 minute	30 year	Summer	I+20%	132.000	130.318	0.018	0.000	1.01		0.374
S26.006	S136	120 minute	30 year	Summer	I+20%	131.000	127.472	-0.228	0.000	0.32		0.648
S24.006	S137	120 minute	30 year	Summer	I+20%	129.500	127.472	0.497	0.000	0.06		389.253
S24.007	S138	30 minute	30 year	Summer	I+20%	128.650	126.538	-0.187	0.000	0.07		0.038
S24.008	S139	60 minute	30 year	Winter	I+20%	127.750	125.941	-0.194	0.000	0.05		0.053

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Duncreevan Kilcock Co. Kildare, Ireland	KV NC AMENDMENT June'24 BLOCKED OUTFALL	
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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Maximum Velocity (m/s)	Pipe Flow (l/s)	Status
S19.003	S85	1.6	63.7	SURCHARGED
S19.004	S86	1.6	63.3	SURCHARGED
S19.005	S87	2.6	82.7	OK
S15.011	S88	1.9	134.6	SURCHARGED
S15.012	S89	1.1	144.5	OK
S20.000	S90	1.0	11.8	OK
S20.001	S91	0.4	4.9	OK
S15.013	S92	0.7	4.1	SURCHARGED
S10.012	S93	1.5	107.1	SURCHARGED
S10.013	S94	1.6	116.8	SURCHARGED
S10.014	S95	2.8	128.0	OK
S10.015	S96	2.0	141.9	OK
S1.016	S97	1.9	39.6	SURCHARGED
S1.017	S98	2.5	39.7	OK
S1.018	S99	2.5	39.7	OK
S1.019	S100	1.9	39.7	OK
S1.020	S101	1.9	39.6	OK
S21.000	S102	0.4	2.0	OK
S1.021	S103	1.1	41.6	OK
S1.022	S104	1.0	41.7	OK
S22.000	S105	1.6	41.0	OK
S22.001	S106	0.4	13.5	SURCHARGED
S22.002	S107	0.5	1.2	SURCHARGED
S22.003	S108	0.5	1.2	OK
S22.004	S109	1.8	11.7	OK
S23.000	S110	1.1	14.2	OK
S23.001	S111	1.4	35.5	OK
S23.002	S112	1.6	72.8	SURCHARGED
S23.003	S113	1.7	117.3	SURCHARGED
S23.004	S114	0.9	59.2	SURCHARGED
S23.005	S115	0.5	1.1	SURCHARGED
S23.006	S116	0.5	1.1	OK
S23.007	S117	0.4	1.1	OK
S24.000	S118	2.3	29.6	OK
S24.001	S119	2.6	83.0	OK
S25.000	S120	1.2	25.4	OK
S24.002	S121	2.3	158.8	OK
S24.003	S122	2.2	183.9	OK
S24.004	S123	2.4	206.4	OK
S24.005	S124	1.2	101.5	OK
S26.000	S125	1.3	30.5	OK
S26.001	S126	1.4	51.8	SURCHARGED
S26.002	S127	1.8	70.9	SURCHARGED
S27.000	S128	1.3	28.0	OK
S27.001	S129	1.4	42.9	OK
S26.003	S130	1.7	121.2	SURCHARGED
S26.004	S131	2.4	120.0	OK
S28.000	S132	1.3	41.1	SURCHARGED
S28.001	S133	1.3	49.7	SURCHARGED
S28.002	S134	1.4	57.2	SURCHARGED
S26.005	S135	2.8	178.8	SURCHARGED
S26.006	S136	1.0	99.2	OK
S24.006	S137	0.9	3.4	SURCHARGED
S24.007	S138	0.8	3.4	OK

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Maximum	Pipe	Status
		Velocity (m/s)	Flow (l/s)	
S24.008	S139	1.0	3.4	OK

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm										
				Water		Surcharged		Flooded		Maximum
PN	US/MH Name	Event	US/CL (m)	Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Maximum Vol (m³)	Velocity (m/s)
S24.009	S140	15 minute 30 year Summer I+20%	127.730	124.786	-0.179	0.000	0.09		0.081	0.6
Pipe										
				US/MH	Flow					
PN	Name				(l/s)	Status				
S24.009	S140				3.4	OK				

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Co. Kildare, Ireland	BLOCKED OUTFALL	
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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coefficient 0.800
 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
 Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 10 Number of Storage Structures 10 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 16.500 Cv (Summer) 1.000
 Region Scotland and Ireland Ratio R 0.277 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 150.0 DVD Status ON
 Analysis Timestep Fine Inertia Status ON
 DTS Status OFF

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120
 Return Period(s) (years) 2, 30, 100
 Climate Change (%) 20, 20, 20

								Water	Surcharged	Flooded				
US/MH								Level	Depth	Volume	Flow /	Overflow	Maximum	
PN	Name	Event						(m)	(m)	(m)	(m³)	Cap.	(l/s)	Vol (m³)
S1.000	S1	30 minute	100 year	Summer	I+20%	142.310	140.972	-0.138	0.000	0.56				0.178
S1.001	S2	15 minute	100 year	Summer	I+20%	142.000	140.658	-0.092	0.000	0.80				0.574
S2.000	S3	30 minute	100 year	Summer	I+20%	142.040	140.712	-0.053	0.000	0.93				0.189
S1.002	S4	15 minute	100 year	Summer	I+20%	141.750	140.325	-0.100	0.000	0.86				0.917
S1.003	S5	15 minute	100 year	Summer	I+20%	141.420	139.742	-0.105	0.000	0.68				0.379
S1.004	S6	15 minute	100 year	Summer	I+20%	140.100	139.277	0.402	0.000	1.08				3.598
S3.000	S7	15 minute	100 year	Summer	I+20%	142.780	141.845	0.025	0.000	0.66				0.362
S3.001	S8	15 minute	100 year	Summer	I+20%	142.900	141.689	0.245	0.000	1.01				2.486
S3.002	S9	15 minute	100 year	Summer	I+20%	142.840	141.570	0.250	0.000	1.03				1.239
S3.003	S10	15 minute	100 year	Summer	I+20%	142.500	141.035	0.195	0.000	1.54				2.401
S4.000	S11	30 minute	100 year	Summer	I+20%	142.930	141.569	-0.086	0.000	0.69				0.152
S4.001	S12	30 minute	100 year	Summer	I+20%	142.670	141.302	-0.063	0.000	0.86				0.361
S3.004	S13	15 minute	100 year	Summer	I+20%	142.570	140.538	-0.182	0.000	0.64				0.526
S5.000	S14	15 minute	100 year	Summer	I+20%	142.140	140.712	-0.153	0.000	0.22				0.075
S3.005	S15	15 minute	100 year	Summer	I+20%	141.390	139.829	0.079	0.000	1.04				3.721
S3.006	S16	15 minute	100 year	Summer	I+20%	140.960	139.487	0.052	0.000	0.92				4.241
S1.005	S17	15 minute	100 year	Summer	I+20%	140.110	139.021	0.221	0.000	1.56				5.404
S1.006	S18	120 minute	100 year	Winter	I+20%	140.000	138.238	0.888	0.000	0.75				2.656
S1.007	S19	120 minute	100 year	Winter	I+20%	139.000	138.233	1.283	0.000	0.40				456.807
S6.000	S20	30 minute	100 year	Summer	I+20%	140.710	139.341	-0.094	0.000	0.63				0.143
S6.001	S21	15 minute	100 year	Summer	I+20%	139.860	138.410	-0.150	0.000	0.49				0.201
S6.002	S22	15 minute	100 year	Summer	I+20%	139.070	138.086	0.476	0.000	1.56				2.079
S6.003	S23	15 minute	100 year	Summer	I+20%	138.870	137.219	-0.077	0.000	0.90				0.964
S1.008	S24	15 minute	100 year	Summer	I+20%	138.190	136.573	0.923	0.000	2.10				1.429
S1.009	S25	15 minute	100 year	Summer	I+20%	137.490	135.885	0.390	0.000	1.34				2.329
S7.000	S26	15 minute	100 year	Summer	I+20%	136.470	135.766	0.246	0.000	0.24				0.612
S7.001	S27	15 minute	100 year	Summer	I+20%	137.770	135.749	0.469	0.000	0.55				2.556
S7.002	S28	15 minute	100 year	Summer	I+20%	137.290	135.623	0.543	0.000	0.96				2.285
S7.003	S29	15 minute	100 year	Summer	I+20%	136.510	135.377	0.557	0.000	1.20				3.039
S7.004	S30	15 minute	100 year	Summer	I+20%	136.000	135.203	0.493	0.000	1.26				1.762

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Maximum Pipe		Status
		Velocity (m/s)	Flow (l/s)	
S1.000	S1	1.5	56.9	OK
S1.001	S2	1.7	84.6	OK
S2.000	S3	1.4	45.9	OK
S1.002	S4	1.9	163.4	OK
S1.003	S5	2.7	194.4	OK
S1.004	S6	1.8	201.9	SURCHARGED
S3.000	S7	1.7	75.1	SURCHARGED
S3.001	S8	1.3	89.1	SURCHARGED
S3.002	S9	1.8	118.2	SURCHARGED
S3.003	S10	2.1	148.3	SURCHARGED
S4.000	S11	1.4	35.5	OK
S4.001	S12	1.2	35.7	OK
S3.004	S13	2.5	239.1	OK
S5.000	S14	1.3	14.0	OK
S3.005	S15	2.0	294.1	SURCHARGED
S3.006	S16	2.5	332.2	SURCHARGED
S1.005	S17	1.9	540.3	SURCHARGED
S1.006	S18	1.0	211.4	SURCHARGED
S1.007	S19	1.2	29.8	SURCHARGED
S6.000	S20	1.8	42.1	OK
S6.001	S21	2.6	91.3	OK
S6.002	S22	2.0	138.7	SURCHARGED
S6.003	S23	2.7	151.0	OK
S1.008	S24	2.6	183.9	SURCHARGED
S1.009	S25	2.1	227.6	SURCHARGED
S7.000	S26	1.1	23.9	SURCHARGED
S7.001	S27	1.4	53.7	SURCHARGED
S7.002	S28	1.4	88.5	SURCHARGED
S7.003	S29	1.4	100.1	SURCHARGED
S7.004	S30	1.6	115.2	SURCHARGED

Roger Mullarkey & Associates		Page 31
Duncreevan	KV NC AMENDMENT	
Kilcock	June'24	
Co. Kildare, Ireland	BLOCKED OUTFALL	
Date 13/07/2026 14:50	Designed by R.M.	
File Kilternan Master LRD ALTERNATE N...	Checked by	
Innovyze	Network 2020.1.3	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH		Event			US/CL (m)	Water	Surcharged	Flooded	Flow / Cap.	Overflow (1/s)	Maximum Vol (m³)
	Name						Level (m)	Depth (m)	Volume (m³)			
S1.010	S31	15 minute	100 year	Summer	I+20%	136.480	134.817	0.387	0.000	1.40		3.380
S1.011	S32	15 minute	100 year	Summer	I+20%	135.840	133.821	0.071	0.000	1.06		1.704
S1.012	S33	120 minute	100 year	Winter	I+20%	135.000	132.957	0.857	0.000	0.56		2.992
S8.000	S34	15 minute	100 year	Summer	I+20%	139.810	138.616	-0.119	0.000	0.45		0.114
S8.001	S35	15 minute	100 year	Summer	I+20%	139.050	137.821	0.086	0.000	0.75		0.528
S8.002	S36	15 minute	100 year	Summer	I+20%	138.330	137.419	0.364	0.000	1.62		1.180
S8.003	S37	15 minute	100 year	Summer	I+20%	138.090	136.878	0.088	0.000	0.87		0.727
S8.004	S38	15 minute	100 year	Summer	I+20%	137.240	136.181	0.311	0.000	1.24		2.595
S9.000	S39	15 minute	100 year	Summer	I+20%	137.000	135.894	-0.131	0.000	0.37		0.101
S8.005	S40	15 minute	100 year	Summer	I+20%	136.960	135.648	0.148	0.000	1.16		1.824
S8.006	S41	120 minute	100 year	Winter	I+20%	136.000	132.949	-0.151	0.000	0.07		0.785
S1.013	S42	120 minute	100 year	Winter	I+20%	133.500	132.948	1.298	0.000	0.51		603.134
S1.014	S43	15 minute	100 year	Summer	I+20%	133.480	130.840	-0.269	0.000	0.32		0.251
S1.015	S44	120 minute	100 year	Summer	I+20%	134.000	129.867	-0.233	0.000	0.15		0.640
S10.000	S45	30 minute	100 year	Summer	I+20%	142.140	140.977	-0.123	0.000	0.21		0.246
S11.000	S46	30 minute	100 year	Summer	I+20%	142.100	141.085	-0.115	0.000	0.52		0.203
S11.001	S47	30 minute	100 year	Summer	I+20%	142.500	141.048	0.128	0.000	0.93		2.413
S10.001	S48	15 minute	100 year	Summer	I+20%	142.630	140.949	0.274	0.000	0.62		4.240
S12.000	S49	30 minute	100 year	Summer	I+20%	142.750	141.159	-0.141	0.000	0.54		0.174
S12.001	S50	15 minute	100 year	Summer	I+20%	142.510	140.941	-0.100	0.000	0.69		0.624
S10.002	S51	15 minute	100 year	Summer	I+20%	142.760	140.820	0.355	0.000	0.88		4.389
S10.003	S57	15 minute	100 year	Summer	I+20%	142.970	140.612	0.577	0.000	1.17		3.895
S13.000	S53	15 minute	100 year	Summer	I+20%	142.980	141.542	0.042	0.000	1.05		0.381
S14.000	S54	15 minute	100 year	Summer	I+20%	142.920	141.154	-0.146	0.000	0.52		0.169
S13.001	S54	15 minute	100 year	Summer	I+20%	142.780	140.887	0.587	0.000	3.24		1.235
S13.002	S55	120 minute	100 year	Summer	I+20%	142.850	140.377	0.227	0.000	0.53		1.375
S13.003	S56	120 minute	100 year	Winter	I+20%	142.920	140.376	0.531	0.000	0.00		196.544
S13.004	S57	120 minute	100 year	Winter	I+20%	142.920	140.356	0.611	0.000	0.01		1.283
S10.004	S58	120 minute	100 year	Winter	I+20%	142.920	140.356	0.581	0.000	0.57		5.742
S10.005	S59	120 minute	100 year	Winter	I+20%	142.400	140.200	0.93	0.000	0.93		5.927
S10.006	S60	120 minute	100 year	Winter	I+20%	142.400	140.100	0.24	0.000	0.24		2.204
S10.007	S61	120 minute	100 year	Winter	I+20%	142.200	140.100	0.33	0.000	0.33		255.386
S10.008	S62	30 minute	100 year	Summer	I+20%	142.100	139.000	0.93	0.000	0.93		0.349
S10.009	S63	15 minute	100 year	Summer	I+20%	141.380	138.860	-0.120	0.000	0.65		0.404
S10.010	S64	15 minute	100 year	Summer	I+20%	139.110	137.778	-0.122	0.000	0.64		0.358
S10.011	S65	15 minute	100 year	Summer	I+20%	138.060	136.789	-0.071	0.000	0.91		0.356
S15.000	S66	15 minute	100 year	Summer	I+20%	141.720	141.117	0.892	0.000	0.39		1.807
S16.000	S67	15 minute	100 year	Summer	I+20%	142.150	141.144	-0.031	0.000	1.00		0.214
S15.001	S68	15 minute	100 year	Summer	I+20%	141.930	141.013	1.088	0.000	0.65		5.028
S15.002	S69	15 minute	100 year	Summer	I+20%	142.140	140.853	1.218	0.000	0.70		5.234
S15.003	S70	15 minute	100 year	Summer	I+20%	141.860	140.713	1.338	0.000	0.90		5.103
S17.000	S71	30 minute	100 year	Summer	I+20%	142.650	141.147	-0.153	0.000	0.48		0.161
S15.004	S72	15 minute	100 year	Summer	I+20%	141.700	140.595	1.370	0.000	1.16		4.946
S15.005	S73	15 minute	100 year	Summer	I+20%	141.500	140.355	1.340	0.000	1.13		5.189
S15.006	S74	15 minute	100 year	Summer	I+20%	141.000	139.953	1.358	0.000	1.30		6.855
S18.000	S75	15 minute	100 year	Summer	I+20%	142.800	141.467	0.072	0.000	0.41		0.330
S18.001	S76	15 minute	100 year	Summer	I+20%	142.680	141.445	0.170	0.000	1.08		0.761
S18.002	S77	15 minute	100 year	Summer	I+20%	141.530	140.290	-0.040	0.000	0.96		0.393
S15.007	S78	15 minute	100 year	Summer	I+20%	140.500	139.379	1.229	0.000	1.16		7.627
S15.008	S79	15 minute	100 year	Summer	I+20%	139.000	137.849	0.819	0.000	2.65		11.394
S15.009	S80	15 minute	100 year	Summer	I+20%	139.000	137.053	0.683	0.000	2.81		2.648
S15.010	S81	120 minute	100 year	Winter	I+20%	138.250	136.792	0.867	0.000	0.15		664.682
S19.000	S82	15 minute	100 year	Summer	I+20%	141.700	140.303	-0.122	0.000	0.43		0.111
S19.001	S83	15 minute	100 year	Summer	I+20%	140.640	139.435	0.051	0.000	0.55		0.482
S19.002	S84	15 minute	100 year	Summer	I+20%	140.260	139.310	0.357	0.000	0.99		1.092

RELEVANT TO
AMENDMENT NC
APPLICATION

Roger Mullarkey & Associates		Page 32
Duncreevan Kilcock Co. Kildare, Ireland	KV NC AMENDMENT June'24 BLOCKED OUTFALL	
Date 13/07/2026 14:50	Designed by R.M.	
File Kilternan Master LRD ALTERNATE N...	Checked by	
Innovyze	Network 2020.1.3	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Maximum Velocity (m/s)	Pipe Flow (l/s)	Status
S1.010	S31	2.3	374.0	SURCHARGED
S1.011	S32	2.8	415.5	SURCHARGED
S1.012	S33	1.1	195.0	SURCHARGED
S8.000	S34	2.4	43.3	OK
S8.001	S35	2.3	64.8	SURCHARGED
S8.002	S36	2.4	93.5	SURCHARGED
S8.003	S37	2.1	118.4	SURCHARGED
S8.004	S38	2.2	155.3	SURCHARGED
S9.000	S39	1.3	20.9	OK
S8.005	S40	2.7	189.3	SURCHARGED
S8.006	S41	2.2	71.0	OK
S1.013	S42	1.5	49.6	SURCHARGED
S1.014	S43	1.4	78.7	OK
S1.015	S44	1.2	67.0	OK
S10.000	S45	1.3	24.7	OK
S11.000	S46	1.3	48.5	OK
S11.001	S47	1.4	79.2	SURCHARGED
S10.001	S48	1.7	112.0	SURCHARGED
S12.000	S49	1.4	54.2	OK
S12.001	S50	1.6	70.3	OK
S10.002	S51	1.8	167.6	SURCHARGED
S10.003	S57	1.6	173.1	SURCHARGED
S13.000	S53	1.9	128.7	SURCHARGED
S14.000	S54	1.4	51.8	OK
S13.001	S54	2.8	198.9	SURCHARGED
S13.002	S55	0.8	92.2	SURCHARGED
S13.003	S56	0.1	0.1	SURCHARGED
S13.004	S57	0.0	0.4	SURCHARGED
S10.004	S58	1.3	85.1	SURCHARGED
S10.005	S59	0.9	87.8	SURCHARGED
S10.006	S60	0.8	91.5	SURCHARGED
S10.007	S61	0.8	10.0	SURCHARGED
S10.008	S62	1.1	36.5	OK
S10.009	S63	2.3	97.7	OK
S10.010	S64	2.9	126.0	OK
S10.011	S65	2.3	130.1	OK
S15.000	S66	1.6	73.3	SURCHARGED
S16.000	S67	1.6	53.8	OK
S15.001	S68	1.7	114.7	SURCHARGED
S15.002	S69	1.7	121.1	SURCHARGED
S15.003	S70	1.3	124.2	SURCHARGED
S17.000	S71	1.8	60.7	OK
S15.004	S72	1.8	195.4	SURCHARGED
S15.005	S73	2.0	221.3	SURCHARGED
S15.006	S74	2.4	261.4	SURCHARGED
S18.000	S75	1.0	17.7	SURCHARGED
S18.001	S76	2.0	74.1	SURCHARGED
S18.002	S77	2.9	171.1	OK
S15.007	S78	2.9	458.3	SURCHARGED
S15.008	S79	3.1	497.9	SURCHARGED
S15.009	S80	3.2	504.0	SURCHARGED
S15.010	S81	0.8	6.0	SURCHARGED
S19.000	S82	2.2	39.1	OK
S19.001	S83	2.1	46.0	SURCHARGED

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Maximum		Pipe Flow (l/s)	Status
		Velocity (m/s)			
S19.002	S84	1.6	58.7		SURCHARGED

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH		Event			US/CL	Water	Surcharged	Flooded	Flow /	Overflow	Maximum
	Name					(m)	Level	Depth	Volume	Cap.	(1/s)	Vol (m³)
S19.003	S85	15 minute	100 year	Summer	I+20%	140.000	138.955	0.370	0.000	1.35		1.568
S19.004	S86	15 minute	100 year	Summer	I+20%	139.850	138.536	0.181	0.000	1.55		0.978
S19.005	S87	15 minute	100 year	Summer	I+20%	139.620	138.007	0.282	0.000	1.09		0.569
S15.011	S88	15 minute	100 year	Summer	I+20%	138.250	136.372	0.692	0.000	1.67		3.040
S15.012	S89	120 minute	100 year	Summer	I+20%	138.250	135.404	-0.216	0.000	0.32		2.425
S20.000	S90	15 minute	100 year	Summer	I+20%	139.100	137.584	-0.141	0.000	0.30		0.090
S20.001	S91	120 minute	100 year	Summer	I+20%	139.250	135.402	-0.048	0.000	0.03		0.569
S15.013	S92	120 minute	100 year	Summer	I+20%	137.250	135.402	0.287	0.000	0.10		251.308
S10.012	S93	15 minute	100 year	Summer	I+20%	137.750	135.592	0.662	0.000	1.59		1.915
S10.013	S94	15 minute	100 year	Summer	I+20%	137.500	135.269	0.349	0.000	1.50		1.632
S10.014	S95	15 minute	100 year	Summer	I+20%	136.500	133.023	-0.077	0.000	0.90		0.246
S10.015	S96	15 minute	100 year	Summer	I+20%	133.000	130.009	-0.391	0.000	0.26		0.360
S1.016	S97	120 minute	100 year	Summer	I+20%	131.500	129.832	0.332	0.000	0.26		533.581
S1.017	S98	60 minute	100 year	Summer	I+20%	129.750	128.453	-0.217	0.000	0.17		0.119
S1.018	S99	60 minute	100 year	Summer	I+20%	127.750	126.683	-0.217	0.000	0.17		0.104
S1.019	S100	60 minute	100 year	Summer	I+20%	126.250	124.760	-0.200	0.000	0.25		0.123
S1.020	S101	60 minute	100 year	Summer	I+20%	126.000	123.851	-0.199	0.000	0.25		0.112
S21.000	S102	60 minute	100 year	Summer	I+20%	124.750	123.460	-0.420	0.000	0.01		0.036
S1.021	S103	60 minute	100 year	Winter	I+20%	125.000	122.220	-0.140	0.000	0.56		0.222
S1.022	S104	60 minute	100 year	Winter	I+20%	123.500	122.144	-0.126	0.000	0.64		0.457
S22.000	S105	120 minute	100 year	Winter	I+20%	136.200	134.868	-0.052	0.000	0.12		0.275
S22.001	S106	120 minute	100 year	Winter	I+20%	136.270	134.865	0.415	0.000	0.13		3.174
S22.002	S107	120 minute	100 year	Winter	I+20%	136.160	134.865	0.770	0.000	0.03		45.432
S22.003	S108	120 minute	100 year	Winter	I+20%	136.030	133.826	-0.199	0.000	0.03		0.046
S22.004	S109	15 minute	100 year	Summer	I+20%	135.100	133.651	-0.168	0.000	0.15		0.101
S23.000	S110	15 minute	100 year	Summer	I+20%	139.460	138.448	-0.192	0.000	0.17		0.117
S23.001	S111	15 minute	100 year	Summer	I+20%	139.660	138.433	0.053	0.000	0.37		1.361
S23.002	S112	15 minute	100 year	Summer	I+20%	139.940	138.340	0.350	0.000	0.76		2.848
S23.003	S113	15 minute	100 year	Summer	I+20%	139.050	138.125	0.555	0.000	1.51		3.260
S23.004	S114	120 minute	100 year	Summer	I+20%	139.100	137.967	0.597	0.000	1.30		1.513
S23.005	S115	120 minute	100 year	Winter	I+20%	139.250	137.962	0.767	0.000	0.03		185.020
S23.006	S116	120 minute	100 year	Winter	I+20%	139.000	136.875	-0.200	0.000	0.03		0.028
S23.007	S117	120 minute	100 year	Winter	I+20%	139.000	136.777	-0.198	0.000	0.04		0.045
S24.000	S118	15 minute	100 year	Summer	I+20%	136.450	134.543	-0.132	0.000	0.36		0.100
S24.001	S119	15 minute	100 year	Summer	I+20%	134.980	133.589	0.364	0.000	1.09		0.781
S25.000	S120	15 minute	100 year	Summer	I+20%	131.230	129.639	-0.086	0.000	0.70		0.151
S24.002	S121	15 minute	100 year	Summer	I+20%	132.400	129.262	-0.113	0.000	0.81		0.368
S24.003	S122	15 minute	100 year	Summer	I+20%	131.980	128.578	0.053	0.000	1.02		2.153
S24.004	S123	15 minute	100 year	Summer	I+20%	131.800	128.235	0.050	0.000	1.03		2.020
S24.005	S124	120 minute	100 year	Summer	I+20%	130.750	127.688	0.088	0.000	0.32		3.846
S26.000	S125	15 minute	100 year	Summer	I+20%	133.500	132.794	0.269	0.000	0.69		0.553
S26.001	S126	15 minute	100 year	Summer	I+20%	133.500	132.635	0.490	0.000	1.24		2.237
S26.002	S127	15 minute	100 year	Summer	I+20%	133.500	131.933	0.228	0.000	1.47		1.783
S27.000	S128	15 minute	100 year	Summer	I+20%	132.900	131.857	-0.068	0.000	0.73		0.171
S27.001	S129	15 minute	100 year	Summer	I+20%	132.900	131.676	0.151	0.000	1.01		1.480
S26.003	S130	15 minute	100 year	Summer	I+20%	132.900	131.247	0.147	0.000	1.38		1.447
S26.004	S131	15 minute	100 year	Summer	I+20%	132.500	130.872	-0.028	0.000	0.91		0.505
S28.000	S132	15 minute	100 year	Summer	I+20%	132.300	131.672	0.347	0.000	1.00		0.641
S28.001	S133	15 minute	100 year	Summer	I+20%	132.300	131.444	0.369	0.000	1.24		1.551
S28.002	S134	15 minute	100 year	Summer	I+20%	132.300	130.950	0.185	0.000	1.54		1.544
S26.005	S135	15 minute	100 year	Summer	I+20%	132.000	130.556	0.256	0.000	1.19		1.055
S26.006	S136	120 minute	100 year	Winter	I+20%	131.000	127.700	0.000	0.000	0.28		1.052
S24.006	S137	120 minute	100 year	Summer	I+20%	129.500	127.688	0.713	0.000	0.06		504.751
S24.007	S138	60 minute	100 year	Winter	I+20%	128.650	126.538	-0.187	0.000	0.07		0.038
S24.008	S139	120 minute	100 year	Winter	I+20%	127.750	125.941	-0.194	0.000	0.05		0.053

Roger Mullarkey & Associates		Page 35
Duncreevan Kilcock Co. Kildare, Ireland	KV NC AMENDMENT June'24 BLOCKED OUTFALL	
Date 13/07/2026 14:50 File Kilternan Master LRD ALTERNATE N...	Designed by R.M. Checked by	
Innovyze	Network 2020.1.3	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Maximum Velocity (m/s)	Pipe Flow (l/s)	Status
S19.003	S85	1.9	76.6	SURCHARGED
S19.004	S86	1.9	76.0	SURCHARGED
S19.005	S87	2.6	98.1	SURCHARGED
S15.011	S88	2.3	160.2	SURCHARGED
S15.012	S89	1.0	100.8	OK
S20.000	S90	1.1	15.3	OK
S20.001	S91	0.4	6.3	OK
S15.013	S92	0.7	4.1	SURCHARGED
S10.012	S93	1.9	138.9	SURCHARGED
S10.013	S94	2.1	150.9	SURCHARGED
S10.014	S95	3.0	165.6	OK
S10.015	S96	2.1	184.0	OK
S1.016	S97	1.9	39.4	SURCHARGED
S1.017	S98	2.5	39.7	OK
S1.018	S99	2.5	39.7	OK
S1.019	S100	1.9	39.7	OK
S1.020	S101	1.9	39.7	OK
S21.000	S102	0.4	2.0	OK
S1.021	S103	1.1	41.7	OK
S1.022	S104	1.0	41.7	OK
S22.000	S105	1.3	16.2	OK
S22.001	S106	0.4	16.9	SURCHARGED
S22.002	S107	0.5	1.3	SURCHARGED
S22.003	S108	0.5	1.3	OK
S22.004	S109	1.9	14.9	OK
S23.000	S110	1.2	18.2	OK
S23.001	S111	1.5	42.3	SURCHARGED
S23.002	S112	1.7	86.6	SURCHARGED
S23.003	S113	2.0	140.7	SURCHARGED
S23.004	S114	1.1	79.3	SURCHARGED
S23.005	S115	0.5	1.2	SURCHARGED
S23.006	S116	0.5	1.2	OK
S23.007	S117	0.4	1.2	OK
S24.000	S118	2.5	38.4	OK
S24.001	S119	2.6	100.1	SURCHARGED
S25.000	S120	1.3	32.9	OK
S24.002	S121	2.4	195.2	OK
S24.003	S122	2.2	221.3	SURCHARGED
S24.004	S123	2.4	244.9	SURCHARGED
S24.005	S124	1.2	129.7	SURCHARGED
S26.000	S125	1.3	33.9	SURCHARGED
S26.001	S126	1.6	61.2	SURCHARGED
S26.002	S127	2.1	84.0	SURCHARGED
S27.000	S128	1.4	36.2	OK
S27.001	S129	1.3	49.3	SURCHARGED
S26.003	S130	2.0	142.4	SURCHARGED
S26.004	S131	2.5	141.2	OK
S28.000	S132	1.3	47.7	SURCHARGED
S28.001	S133	1.5	60.4	SURCHARGED
S28.002	S134	1.7	69.3	SURCHARGED
S26.005	S135	3.0	208.9	SURCHARGED
S26.006	S136	1.0	89.7	OK
S24.006	S137	0.9	3.4	SURCHARGED
S24.007	S138	0.8	3.4	OK

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Maximum	Pipe	Status
		Velocity (m/s)	Flow (l/s)	
S24.008	S139	1.0	3.4	OK

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Event	US/CL (m)	Water	Surcharged	Flooded	Flow / Cap.	Overflow (l/s)	Maximum Vol (m³)
				Level (m)	Depth (m)	Volume (m³)			
S24.009	S140	120 minute 100 year Winter I+20%	127.730	124.786	-0.179	0.000	0.09		0.081

PN	US/MH Name	Maximum	Pipe	Status
		Velocity (m/s)	Flow (l/s)	
S24.009	S140	0.6	3.4	OK

Appendix 4.2

Attenuation Storage



CubicM3 Stormwater Management System Design Tool

Ver: June 2025

PROJECT REF: KVPPh2 - NC Alternate

PROJECT: NC

DATE: 13-Jul-26

CREATED BY: RM

SYSTEM PARAMETERS

Required Total Storage	302 m ³
Attenuation Chamber Model	RT-1140
Filtration Permeable Geo or Impermeable Geo	Filter geo - TS1000
Number of Separator Rows (IR)	1

SITE PARAMETERS

Stone Porosity	45%
Excavation Batter Angle (degrees)	60°
Stone Above Chambers	0.45 m
Stone Below Chambers	0.3 m
In-between Row Spacing	0.15 m
Additional Storage outside Excavation. E.g manholes, Header Pipe	5 m ³

Minimum Requirement

0.15

0.2 if cover <= 2.5m or 0.25 for bigger cover

0.15

HEADER PIPE

Is Header pipe required within excavation	No
Orientation of Header Pipe	Perp to IR
Diameter of Header Pipe	0.6 m
Length of Header Pipe	0 m

CHAMBER SYSTEM DIMENSIONS

	Calculated	Adopted
Number of Rows		3 ea
Number of units per Row		16 ea
System Installed Storage Depth (effective storage depth)	1.890	m
Tank overall installed Width at base	7.15	7.15 m
Tank overall installed Length at Base	32.122	32.5 m
Total Effective System Storage	309.9	312.5 m³

SYSTEM ITEM LIST

Item	Product	Calculated	Adopted	unit	€/unit	Total	Comments
Storage							
Chamber Type	RT-1140	48	48	ea	€ -	€ -	
Endcap Type	RT-1140 ec	6	6	ea	€ -	€ -	



SYSTEM DETAIL

Chamber Model	RT-1140
Unit Width	1.95 m
Unit Length	1.88 m
Unit Height	1.14 m
Min Cover Over System	0.3 m
Max Cover Over Chamber	4 m
Chamber Internal Storage Vol.	2.67 m ³
Header Pipe Internal Storage Vol in Excavation	0.0 m ³

STONE AND EXCAVATION DETAIL

Volume of Dig for System	525 m ³
Width at base	7.15 m
Width at top	9.33 m
Length at base	32.50 m
Length at top	34.68 m
Depth Of System	1.89 m
Area of Dig at Base of System	232 m ²
Area of Dig at Top of System	324 m ²
Void Ratio	59%
Stone Requirement - m3	393 m ³
Stone Requirement - tonne	596 tonne



STORMWATER MANAGEMENT SYSTEMS



PRODUCT BROCHURE



CubicM3, a leader in sustainable stormwater management with over two decades of international expertise, introduces RainSafe, an innovative range of attenuation chambers crafted for sustainable and efficient stormwater management. With thousands of systems installed across three continents, CubicM3 has leveraged its extensive experience to develop RainSafe in collaboration with top-tier global specialists in geotechnical engineering, structural analysis, design for manufacture, and product testing. Utilizing cutting-edge Finite Element modeling, the chambers are optimized for structural efficiency and durability.

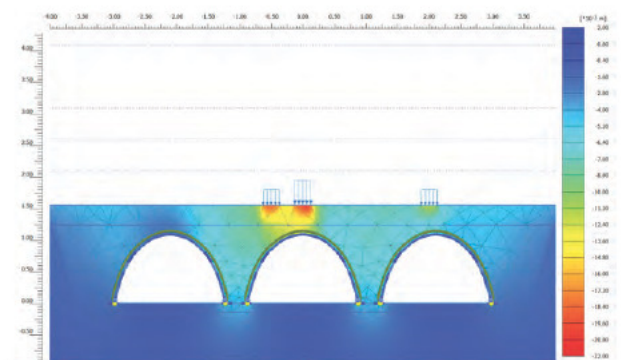
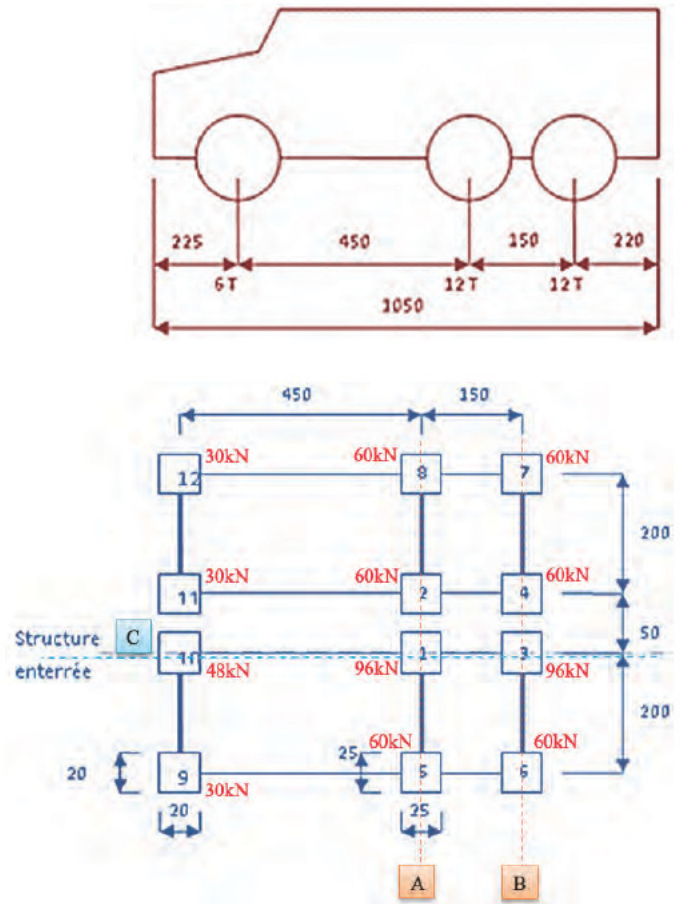
Manufactured in Europe through precision injection molding, RainSafe ensures uniform wall thickness and exceptional quality, meeting or surpassing stringent European and national standards such as Eurocode, ASTM, and CIRIA. The product has undergone exhaustive independent material and performance testing to secure CSTB certification, affirming its reliability.

Rainsafe Chambers Key Features :

- **Industry-leading structural capacity** for both live traffic loads (e.g., heavy vehicles) and long-term dead loads in deep cover scenarios.
- **CSTB certification ensure full compliance with relevant European** and local regulatory codes.
- **Modular design with innovative button-tab features** enables rapid, adaptable assembly on-site, saving time and labor.
- **Environmentally conscious European production** reduces carbon footprint, with optimized sizing for containerized shipping and compact storage.
- **Lightweight design (RT-1140 weighs under 50 kg)** with integrated handles ensures compliance with European health and safety manual handling regulations, allowing safe lifting by two operatives.
- **A dedicated Filtration and Maintenance Row captures suspended solids**, offering easy access for cost-effective maintenance to maintain tank performance and enhance discharge water quality.
- **Built-in vents prevent air entrapment**, ensuring maximum storage capacity is always available.
- **Swift lead times**, with delivery possible within as little as one week from order placement.

Structural Performance:

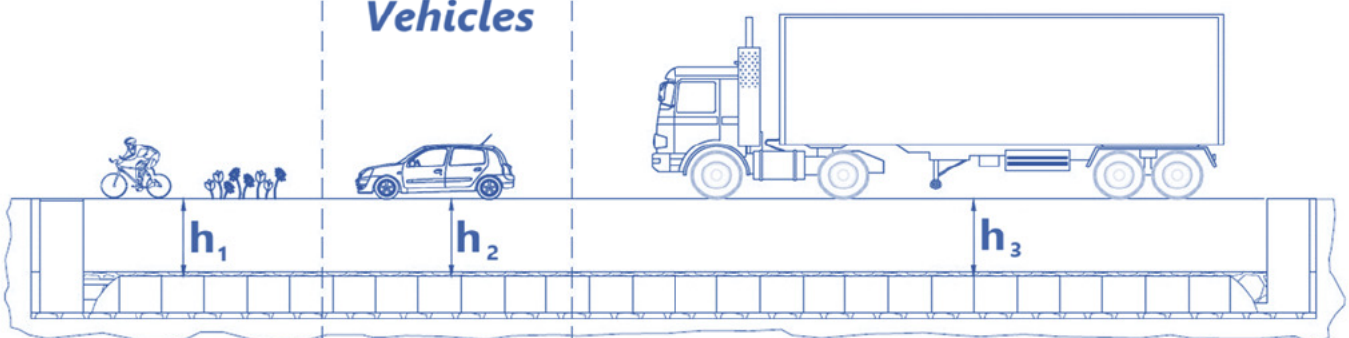
RainSafe is engineered to excel under the most rigorous structural demands, adhering to the strictest interpretation of Eurocode LM1 and LM2 vehicle loading scenarios, as outlined in the French Fascicule F70 Standard. This includes simulations of multiple vehicles exerting simultaneous vertical and horizontal forces, as well as traffic moving in varied directions—factors often overlooked in less comprehensive guidelines like ASTM and CIRIA. These alternative standards typically impose lower surface pressure requirements, yet RainSafe's unique design surpasses them all. Independently evaluated and certified by CSTB, RainSafe significantly exceeds these loading benchmarks, making it an ideal solution for high-traffic areas such as roadways and logistics parks, as well as deep-burial installations.



Green Spaces

Light Vehicles

Heavy Vehicles

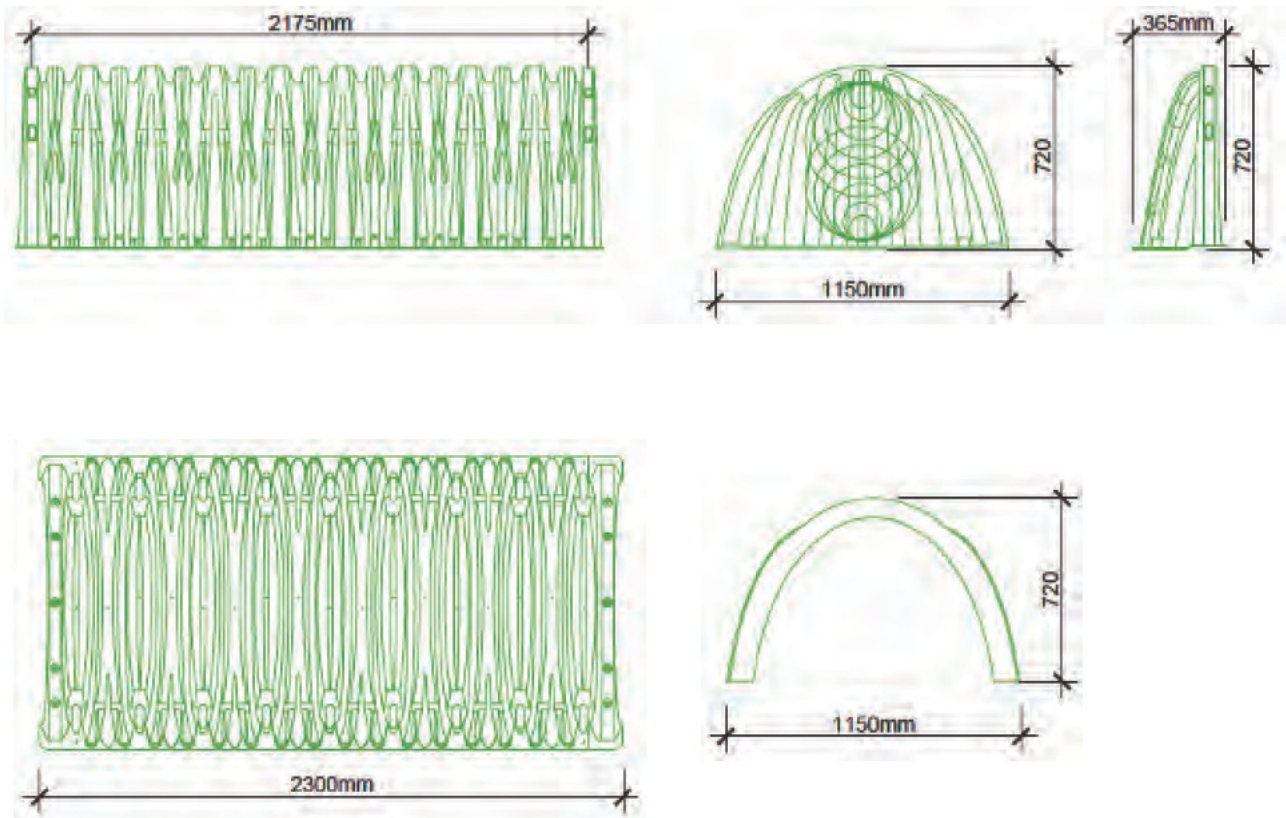


RainSafe RT-720 chambers were developed by CubicM3 to provide the ideal solution for managing stormwater in virtually all scenarios faced by developers, engineers and contractors. Designed to exceed the most demanding European industry standards, RainSafe RT-720 chambers combine market-leading structural performance with cost-efficiency and ease of use. Capability of supporting HGV traffic (LM1 and LM2) and deep cover loads requirements make RainSafe chambers the best in the market.

RainSafe RT-720 Nominal Specifications:

Dimensions(L x W x H)	2175 x 1150 x 720 mm
Chamber Capacity	1.16 m ³
Weight	25.2 kg
Min. Base Stone*	150 - 200 mm
Min. Stone Above	150 mm
Min. Row Spacing	150 mm
Min. Total Cover**	450 mm
Max. Total Cover	4500 mm

*Base stone depth varies with total cover depth
 **Min cover is to support HGV traffic



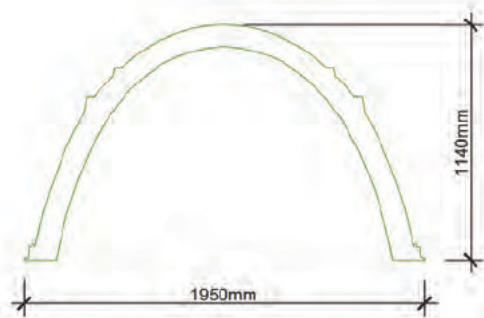
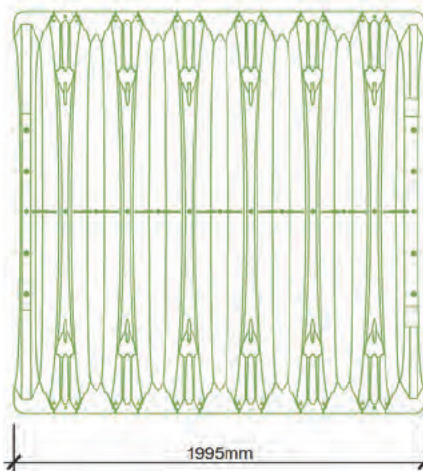
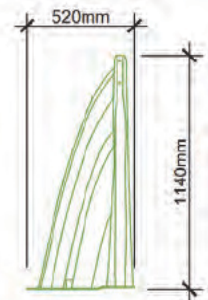
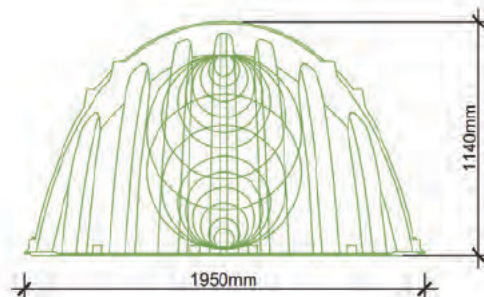
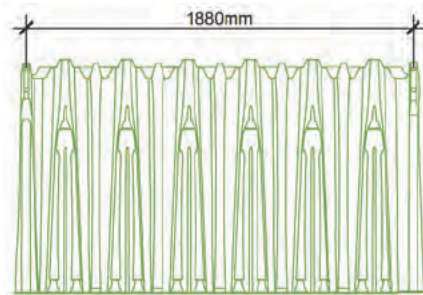
RainSafe RT-1140 chambers were developed by CubicM3 to provide the ideal solution for managing stormwater in virtually all scenarios faced by developers, engineers and contractors. Designed to exceed the most demanding European industry standards, RainSafe RT-720 chambers combine market-leading structural performance with cost-efficiency and ease of use. Capability of supporting HGV traffic (LM1 and LM2) and deep cover loads requirements make RainSafe chambers the best in the market.

RainSafe RT-1140 Nominal Specifications:

Dimensions(L x W x H)	1880 x 1950 x 1140 mm
Chamber Capacity	2.67 m ³
Weight	48.75 kg
Min. Base Stone*	200 - 250 mm
Min. Stone Above	150 mm
Min. Row Spacing	300 mm
Min. Total Cover**	450 mm
Max. Total Cover	4000 mm

*Base stone depth varies with total cover depth

**Min cover is to support HGV traffic



Structural rigidity and maximum allowable construction loads

Rainsafe storm attenuation systems from Cubic M3 are engineered for strength and durability, offering exceptional load-bearing performance in even the most demanding environments. Designed to withstand the weight of heavy machinery and traffic, Rainsafe is ideal for installation beneath car parks, roadways, and commercial yards.

Whether exposed to occasional HGV movements or constant industrial operations, the system's **robust modular structure** ensures long-term stability without compromise. Independent load testing confirms that Rainsafe meets and exceeds relevant structural standards, giving you **peace of mind and flexibility** in project planning.

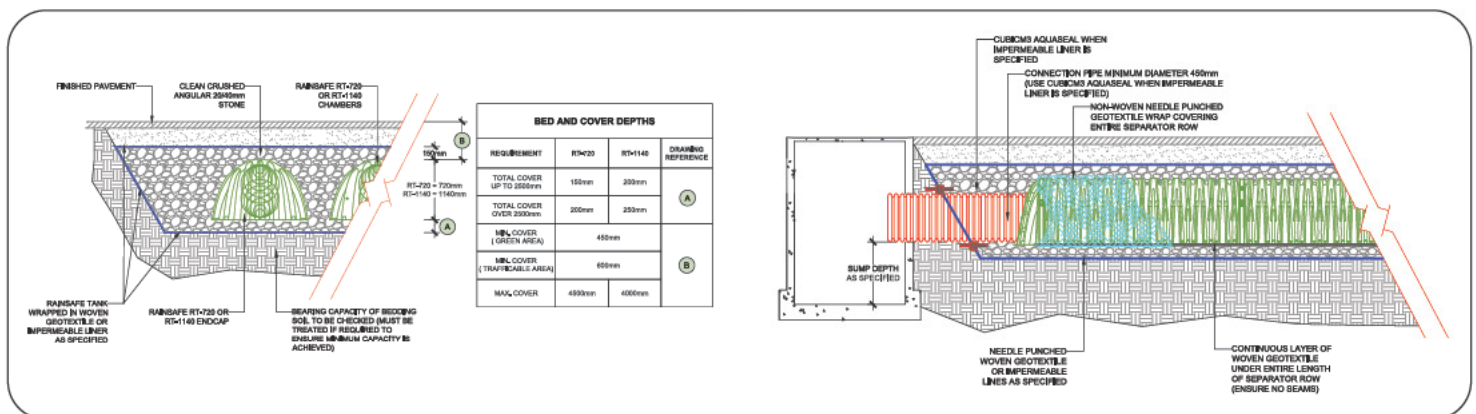
With Rainsafe, there's no need to limit your surface usage—**functionality above ground doesn't come at the expense of performance below.**

Zone	Fill Depth over Chambers	Maximum Allowable Wheel Loads		Maximum Allowable Track Loads		Max Allowable Roller Loads
		Max Axle Load Kg(kN)	Max Wheel Loads	Track Width	Max Ground Pressure (kPa)	Max Drum Weight or Dynamic Force Kg(kPa)
Surround Stone	Upto 150mm	3,500 (35)	Not Allowed	Not Allowed	Not Allowed	Not Allowed
	150mm to 300mm	7,000 (70)	Not Allowed	300 450 600 750	55 35 35 30	Drum weight no to exceed 1,350 kgs Max allowable pressure 55 kPa
Initial Fill Material	300mm to 450mm	15,000 (150)	7,000 (70)	300 450 600 750	100 75 60 55	Drum weight no to exceed 2,500 kgs Max allowable pressure 104 kPa
	450mm to 600mm Loose	15,000 (150)	7,000 (70)	300 450 600 750 900	110 80 65 55 50	Drum weight no to exceed 8,000 kgs Max allowable pressure 182 kPa
	450mm to 600mm Compacted	15,000 (150)	7,000 (70)	300 450 600 750 900	120 85 70 60 55	Drum weight no to exceed 10,000 kgs Max allowable pressure 233 kPa
Final Fill Material	450mm to 900mm Compacted	15,000 (150)	7,000 (70)	300 450 600 750 900	165 115 90 75 65	17,500 (170)

Cubic M3's **Rainsafe system** is designed with **quick, visual inspections and access for maintenance** in mind—allowing users to assess sediment build-up easily without the need for invasive procedures. When maintenance is needed, the **straightforward jetting process** makes cleaning simple, effective, and fast. Using a self-propelling jetting unit, silt and debris are efficiently flushed and removed, ensuring optimal system performance.



Photographic records and maintenance logs help track system condition over time, making it easier to **optimise inspection schedules** and **reduce unnecessary servicing**. With clear guidance and minimal disruption, Rainsafe helps keep your stormwater system operating smoothly and compliantly.



Full Engineering Design Support



RainSafe Technical Notice and FAQs

June 2025

To Whom it May Concern,

CubicM3 is the leading provider of products and solutions in the Stormwater management sector in Ireland. We are very proud to present RainSafe, our own range of attenuation chambers, to the Irish market.

For over 20 years we have been sourcing and promoting leading products from reputable suppliers and over that time we have built up considerable expertise in the sector. This was recognised in 2019 when CubicM3 was asked to review BS 9298 prior to its publication in 2020. In 2022 we decided to develop our own product range with the intent of incorporating various innovations and improvements and providing a superior solution specifically designed for and manufactured in Europe. As you may be aware, earlier this year CubicM3 began offering RainSafe chambers for stormwater management systems.

We developed RainSafe from the outset with several objectives:

- Improve structural efficiency and performance;
- Design in Europe to European codes and standards (in particular the updated application of LM1 and LM2, which is significantly more stringent than the old interpretations);
- Manufacture in Europe for reduced carbon footprint;
- Optimise sizing for transport and handling.

This development process was carried out in the context of the new ISO-4982 and working closely in conjunction with CSTB who from prior experience are the most experienced and stringent national standards authority for stormwater management products. For reference, the CSTB approval was the underpinning approval, under which we marketed Stormtech for years and was the base approval for Stormtech's BBA and DIBt certificates. We also worked closely with Ireland's leading geotechnical firm, Advanced Geotechnics Ltd, to provide finite element modelling and independent analysis of the structural performance of RainSafe chambers.

CSTB's review of RainSafe generally made reference to the testing and performance requirements detailed in ISO-4982, except where their existing requirements were already more stringent and included:

- Raw material testing for both short and long term properties,
- Product testing per ISO-4982,
- Detailed review of structural analyses and modelling,
- Production facilities and quality control measures,
- Installation and Maintenance guidelines.

RainSafe meets or exceeds all the necessary specifications and outperforms other comparable products in all relevant parameters. We are confident the testing and analyses of our products has been more thorough and in compliance with the latest standards than other products on the market today.

We recognise that given RainSafe is a new product, our clients and their consultant engineers will have questions and will need to carry out due diligence to satisfy themselves as to RainSafe suitability for use on their projects. To assist in this, in addition to the standard material we are issuing with our proposals – CSTB cert, Product Brochure, Installation and Maintenance Guidelines, etc we are providing the following answers to some frequently asked questions (FAQs) appended below.

CubicM3 is extremely proud of the RainSafe and if you have a query or concern that is not addressed below, please contact us and we would be happy to address this directly with you.

Yours sincerely,



Justin Elliott,
Managing Director, CubicM3 and RainSafe
CEng, MBA, BA, BAI

Frequently Asked Questions

Is RainSafe able to take Traffic Loading?

RainSafe is the strongest attenuation system in the market and is suitable for use in areas subject to Heavy Goods Vehicle traffic and Emergency Vehicle loading. There are numerous design codes and standards that apply to assessing structural capacities of buried structures. We had RainSafe independently assessed by AGL Consulting who demonstrated compliance with French Bc Convoi Loading (as specified in Fascicules 61 & 70). We selected the French standard because it is more realistic in that it assesses multiple wheel loads simultaneously and in un-balanced configurations, significantly exceeding the loading regimes under the pan-European LM1 and LM2 loading regimes. RainSafe complies with all these standards with significant factors of safety when installed correctly.

What plant can be used above RainSafe tanks during construction?

In general once the specified minimum levels of cover are in place RainSafe can take typical construction traffic loading. However, if construction traffic is expected to transit a RainSafe tank in advance of final surfacing being in place it may be necessary to provide a means to prevent rutting impacting effective cover during wet periods. Similarly, suitable measures may be required for construction plant that use outriggers or generate abnormally concentrated loads. CubicM3 has extensive experience in this area and can provide assistance with for non-standard loading situations.

How deep can you bury RainSafe chambers?

RainSafe was specifically designed to provide market-leading structural performance. RainSafe RT-720s is approved to carry up to 4.5m and up to 4.0m of cover at a minimum chamber spacing of 150mm for RT-1140s.

Are RainSafe chamber walls thinner than some other chambers and is this a problem?

Yes, some other chambers have thicker walls than RainSafe. However, wall thickness is not a relevant engineering consideration in its own right. It is included as a criteria in certain design codes, originally drafted nearly 20 years ago. Since then it has ceased to be relevant under engineering consideration.

Wall thickness is a contributing factor to both structural capacity and impact resistance but is not the only metric that should be taken into consideration. CSTB do not consider wall thickness in isolation in their evaluation of attenuation arches. RainSafe has been determined to meet and exceed the requirements for both structural capacity and impact resistance.

RainSafe's structural performance was independently evaluated by Advanced Geotechnics Ltd (Ireland's leading geotechnical consulting engineers) and verified by CSTB to meet Eurocode 1 traffic loads (LM1 and LM2) meaning it considerably exceeds the structural capacity of other chambers on the market both for live loading and deep burial. AGL used Eurocode 7 in their evaluation which is more onerous than the ASTM code F2787.



Where is RainSafe made?

RainSafe was designed in Ireland and is manufactured by injection moulding in France in one of the most advanced manufacturing facilities of its kind in Europe. Manufacturing in France enables us to serve the European market with a much smaller carbon footprint and a significantly reduced lead-time than competing products in the market being imported from Asia and the US

Is RainSafe manufactured in an ISO certified factory?

ISO QA systems are one of many systems that may be used for controlling and measuring quality in manufacturing. CSTB has assessed the RainSafe quality assurance program that is in place for the manufacture for RainSafe (in exactly the same way they would in an ISO facility) and deemed it to be appropriate and adequate to ensure the necessary quality and performance criteria are maintained. Under CSTB certification this quality plan is subject to regular audit by QB.

If RainSafe is a new product, how can we be sure of its long term capabilities?

Long term deep burial was a requirement when design codes for corrugated arches were originally drafted nearly 20 years ago. Over the years, testing methods have been developed to enable highly accurate prediction of long-term structural performance of polymers. The high-quality virgin polypropylene material qualified for use in RainSafe underwent rigorous testing as required under ISO 4982 (ISO 899-2) the new International Standard governing Arch-shaped, corrugated wall chambers and also under ASTM 6992, a well-established methodology, relied on for years by other leading products in the industry, including Stormtech and recycled polymer pipe products. Again, the results of these tests were evaluated and accepted by CSTB.

Has RainSafe been used before in Ireland?

RainSafe has been approved by consulting engineers and adopted in over 200 projects to date in Ireland and the UK. These include installations for county councils and other public sector clients, on projects multinationals and other mission-critical installations such as at airports and power stations.

What is the Design Life of RainSafe chambers

The standard design is the same as for plastic pipes where the Factor of Safety for RainSafe is verified as sufficient at 50 years. Please contact CubicM3 if your project requires an extended design life.

How easy is it to install RainSafe tanks?

RainSafe chambers were designed for ease of use and handling. Their modular design means tanks can be designed to meet virtually any site layout. The chambers come stacked on pallets for compact storage on site. For installation the chambers fit together to form storage tunnels within the tank. Based on years of experience of installing attenuation tanks we included features to help make installation easier and more accurate such as lifting handles on the larger RT-1140 model, which we also kept under 50kg to allow a safe two-man lift and locating buttons on the overlap joints to ensure a firm connection.



Can RainSafe tanks be used for Soakaways?

Yes, this is a very common application also known as *detention* storage. Simply wrapping a RainSafe tank in a permeable geotextile will allow Stormwater held in the tank to permeate into the surrounding soil. Thanks to RainSafe's Separator Row stormwater can infiltrate through the floor of the tank as well as the walls. This is different to and an improvement over traditional methods where infiltration through the floor is excluded from consideration due to potential silt build-up.

Can RainSafe tanks be made to be impermeable?

RainSafe tanks can be designed for *retention* storage where it is required to prevent stormwater from infiltrating into the surrounding ground. This can be achieved using Geo-synthetic Clay Liners (GCLs) or High-density Polyethylene (HDPE) liners. CubicM3 has extensive experience working with both types of liners but in general our customers have a preference for GCLs due to their ease of use.

How close can RainSafe be installed to buildings and structures?

As with all buried stormwater management systems, due care needs to be taken for installations in close proximity to buildings and structures. For tanks with permeable outer membranes (ie soakaway-type systems), these should be kept a minimum of 5m from the nearest structural elements that are founded in the surrounding soil. It is possible to install closer than this with impermeable membranes with appropriate design consideration.

Do RainSafe Tanks provide any water treatment?

Yes. Our Separator Row provides a means of capturing any remaining water-borne silt or suspended solids that have not been removed by upstream measures, retaining them and preventing them from reducing the hydraulic performance of the tank. The Separator Row enables easy access for inspection and maintenance and removal of any build of material that accumulates over time. CubicM3 previously commissioned the Scottish Environmental Protection Agency to carry out an independent evaluation of a similar system that concluded that over 90% of suspended solids are captured in this way. Please refer to the RainSafe Operation and Maintenance manual for further information.

Is RainSafe CE certified?

There is no CE in place yet for corrugated arch chambers so it is not yet possible to provide a CE mark for RainSafe. In these cases where CE marking is not available, products intended for use in the Irish Construction Industry must be evaluated by a recognized EU national standards authority. Therefore, the CSTB provide the necessary Technical Opinion that RainSafe complies with their requirements and is suitable for use .

Does RainSafe carry BBA Certification?

No. As we developed RainSafe after Brexit had occurred we opted to use CSTB for certification as they provide EU recognized standards and are the most experienced national standards authority at evaluating corrugated arch attenuation systems and carry out the most rigorous evaluations.



Whats the difference between CSTB and NSAI?

Both organisations are national standards authorities. We decided to work with CSTB from the outset for two reasons. First, from our experience of working with CSTB on Stormtech, we knew that CSTB have extensive experience working with corrugated arch attenuation chambers and provide the most stringent assessment requirements for certification and we wanted to use this to demonstrate RainSafe's superior performance. Second, it made sense to work with CSTB as we manufacture RainSafe in France and it is easier for them to carry out quality audits on our manufacturing facilities.

If RainSafe is new, how can we be sure of its long-term performance?

Over the years testing methods have been developed to enable highly accurate prediction of long-term structural performance of polymers. The polypropylene material qualified for use in RainSafe underwent rigorous testing as required under ISO 4982 (ISO 899-2) the new International Standard governing Arch-shaped, corrugated wall chambers and also under ASTM 6992, a well-established methodology, relied on for years by other leading products in the industry, including Stormtech.

Has RainSafe undergone a 10,000 hour test?

This is not required under ISO 4982. By using the methodology prescribed in that standard and others such as ASTM 6992, the certifying national and European standards authorities, such as CSTB, can evaluate long-term structural performance with confidence and without the need for extended sites testing.

What is the Design Life of RainSafe chambers

The standard design life for RainSafe is 50 years. However, it is possible to extend this up to 120 years based on project-specific information. Please contact CubicM3 if your project requires and extended design life.

What is ISO 4982 and why is it important?

ISO 4982 was introduced in 2023 to provide clarity on the requirements for injection moulded corrugated arch-shaped chambers to be used in underground systems for retention, detention, transportation and storage of non-potable water (eg stormwater). While these types of stormwater products have been used for many years there has been a lack of such a unified standard and ISO 4982 is seen as a first step towards being able to introduce a CE mark for this type of product.

Why doesn't RainSafe have a CE mark?

At present CE marking is not available for arch-shaped attenuation systems as there has not been a unified standard in place against which to certify them. With the introduction of ISO-4982 in 2023 we expect that this situation will change in the near future. However, in the absence of a CE mark, CubicM3 developed RainSafe in compliance with all the relevant European and US standards and obtained the French CSTB certification as this is generally accepted as the most stringent assessment available for these types of products.

What warranty does CubicM3 offer for RainSafe installations

We provide a standard limited 10-year warranty on all installations.



Does CubicM3 carry out its own design and does it have Professional Indemnity cover?

We have a dedicated team of qualified and experienced engineers and technicians and over the years we have developed a reputation for value engineering and reliability. This is why over 70% of our business is with repeat customers. We carry our own Professional Indemnity cover of €1.5m.

What are the dimensions and storage capacity of RainSafe chambers?

RainSafe currently offers two chamber types as follows:

- RT-720 L: 2175mm x W: 1150mm x H: 720mm, providing 1.16m³ storage and weighing 26.4kg,
- RT-1140 L: 1880mm x W: 1950mm x H: 1140mm, providing 2.67m³ storage and weighing 48.5kg.

(Please refer to the RainSafe website at www.rainsafe.ie for product literature and further information)

Does CubicM3 do CPDs for RainSafe?

Yes – we are a Registered CPD Training Provider with Engineers Ireland and would be glad to set up a CPD with your team. This can be arranged by contacting sales@cubicm3.com

Appendix 4.3

ByPass Interceptor

Bypass NSB RANGE

APPLICATION

Bypass separators are used when it is considered an acceptable risk not to provide full treatment, for very high flows, and are used, for example, where the risk of a large spillage and heavy rainfall occurring at the same time is small, e.g.

- Surface car parks.
- Roadways.
- Lightly contaminated commercial areas.

PERFORMANCE

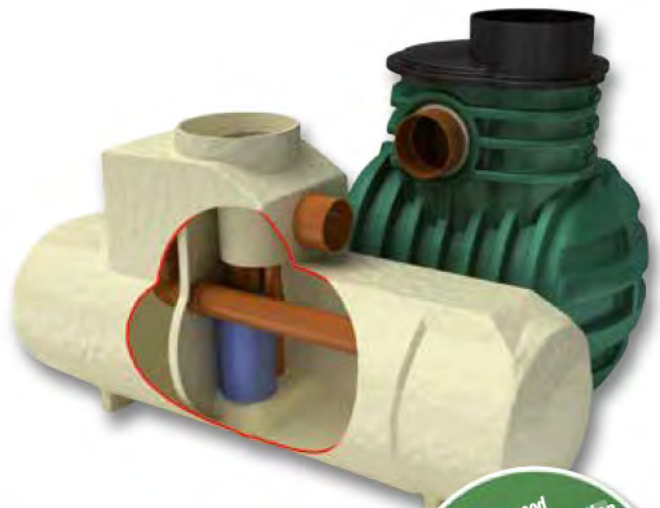
Klargester were one of the first UK manufacturers to have separators tested to EN 858-1. Klargester have now added the NSB bypass range to their portfolio of certified and tested models. The NSB number denotes the maximum flow at which the separator treats liquids. The British Standards Institute (BSI) tested the required range of Kingspan Klargester Bypass separators and certified their performance in relation to their flow and process performance assessing the effluent qualities to the requirements of EN 858-1. Klargester bypass separator designs follow the parameters determined during the testing of the required range of bypass separators.

Each bypass separator design includes the necessary volume requirements for:

- Oil separation capacity.
- Oil storage volume.
- Silt storage capacity.
- Coalescer.

The unit is designed to treat 10% of peak flow. The calculated drainage areas served by each separator are indicated according to the formula given by PPG3 $NSB = 0.0018A(m^2)$. Flows generated by higher rainfall rates will pass through part of the separator and bypass the main separation chamber.

Class I separators are designed to achieve a concentration of 5mg/litre of oil under standard test conditions.



Advanced rotomoulded construction on selected models

- Compact and robust
- Require less backfill
- Tough, lightweight and easy to handle

FEATURES

- Light and easy to install.
- Inclusive of silt storage volume.
- Fitted inlet/outlet connectors.
- Vent points within necks.
- Oil alarm system available (required by EN 858-1 and PPG3).
- Extension access shafts for deep inverts.
- Maintenance from ground level.
- GRP or rotomoulded construction (subject to model).

To specify a nominal size bypass separator, the following information is needed:-

- The calculated flow rate for the drainage area served. Our designs are based on the assumption that any interconnecting pipework fitted elsewhere on site does not impede flow into or out of the separator and that the flow is not pumped.
- The drain invert inlet depth.
- Pipework type, size and orientation.

Tank 5
CPSMh- Q100 Flowrate <30l/s

SIZES AND SPECIFICATIONS

UNIT NOMINAL SIZE	FLOW (l/s)	PEAK FLOW RATE (l/s)	DRAINAGE AREA (m ²)	STORAGE CAPACITY (litres)		UNIT LENGTH (mm)	UNIT DIA. (mm)	ACCESS SHAFT DIA. (mm)	BASE TO INLET INVERT (mm)	BASE TO OUTLET INVERT (mm)	STANDARD FALL ACROSS (mm)	MIN. INLET INVERT (mm)	STANDARD PIPEWORK DIA.
NSBP003	3	30	1670	300	45	1700	1350	600	1420	1320	100	500	160
NSBP004	4.5	45	2500	450	60	1700	1350	600	1420	1320	100	500	160
NSBP006	6	60	3335	600	90	1700	1350	600	1420	1320	100	500	160
NSBE010	10	100	5560	1000	150	2069	1220	750	1450	1350	100	700	315
NSBE015	15	150	8335	1500	225	2947	1220	750	1450	1350	100	700	315
NSBE020	20	200	11111	2000	300	3893	1220	750	1450	1350	100	700	375
NSBE025	25	250	13890	2500	375	3575	1420	750	1680	1580	100	700	375
NSBE030	30	300	16670	3000	450	4265	1420	750	1680	1580	100	700	450
NSBE040	40	400	22222	4000	600	3230	1920	600	2185	2035	150	1000	500
NSBE050	50	500	27778	5000	750	3960	1920	600	2185	2035	150	1000	600
NSBE075	75	750	41667	7500	1125	5841	1920	600	2235	2035	200	950	675
NSBE100	100	1000	55556	10000	1500	7661	1920	600	2235	2035	200	950	750
NSBE125	125	1250	69444	12500	1875	9548	1920	600	2235	2035	200	950	750

■ Rotomoulded chamber construction ■ GRP chamber construction * Some units have more than one access shaft – diameter of largest shown.

Appendix 4.4

Green Roof



MOY TOTAL EXTENSIVE GREEN ROOF SYSTEM.



Intended Use.

The Moy Total Extensive Green Roof System is a robust waterproofing assembly finished with a native Irish Sedum mix species extensive green roof assembly, designed to provide a self-sustaining low maintenance green roof which provides substantial rainwater attenuation benefits and provides habitat for bees and invertebrates. The Moy Extensive Green roof may be installed in "Blue Roof" configuration, whereby drainage of the roof is delayed, or may be installed on roofs where free drainage takes place.

Green Roof Assembly and Key Data.

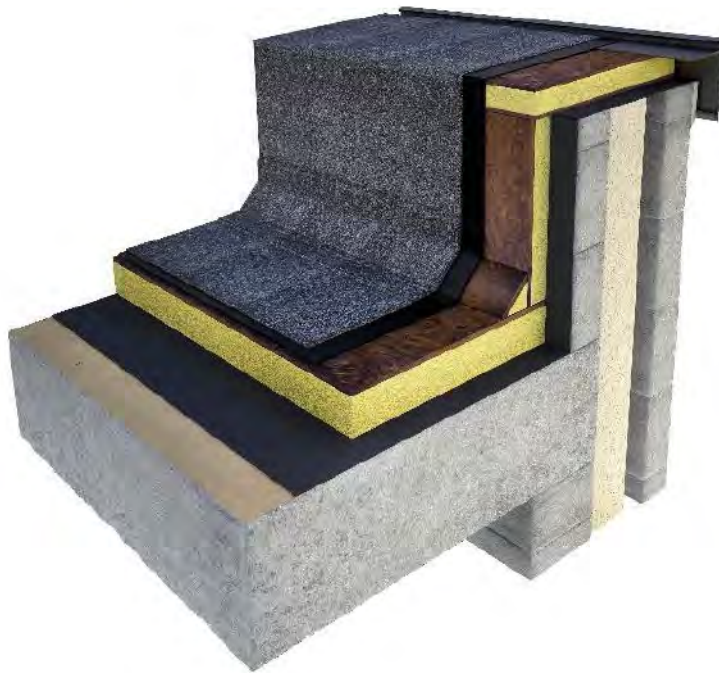
Element	Key Characteristics	Notes
Moy Sedum Mix Blanket	30mm Thickness	Native Irish Species Mix.
Moy Growing Media	50mm Thickness	Recycled Brick & Organic Materials
Filtration Fleece VLF150	1mm Thickness	Recycled fibres.
DE25H Reservoir Layer	25mm Thickness	Recycled Plastics.
Protection Fleece VLU300	2mm Thickness	Recycled fibres.
System PH Value	PH 7.1	-

Weight & Water Attenuation Data.

Total Mass per M2 – Dry Condition.	C. 70 Kg / M2.
Total Mass per M2 – Saturated Condition	C. 125 Kg / M2.
Rainwater Attenuation Capacity	C. 44 litres / M2. (Dynamic Value).

Moy Extensive Green Roofs provide a substantial rainwater attenuation capacity and may be incorporated in site specific SUDs Design.

Moy Warm Roof Waterproofing & Insulation Assembly.



Paralon System Assembly.

1. Vapour Controlling Layer, Parabase modified bitumen.
2. Thermal Insulation, Paratherm T, PIR foam core by Kingspan Insulation, available as a flat or tapered layer. High Efficiency of 0.024 W/mK.
3. Paralon TOP/S polyester reinforced base layer, modified bitumen, torch applied membrane.
4. Paralon NT4 polyester reinforced cap layer, root resistant, modified bitumen, torch applied membrane.

Approvals, Compliance & Certification.

- ❖ BBA Certified Certificate No. 09/4688 (Life Expectancy in Excess of 40 Years).
- ❖ FM Global Insurance Corporation Approved.
- ❖ Compliant with FLL (Germany) and GRO (UK) Green Roof Design Guidelines.

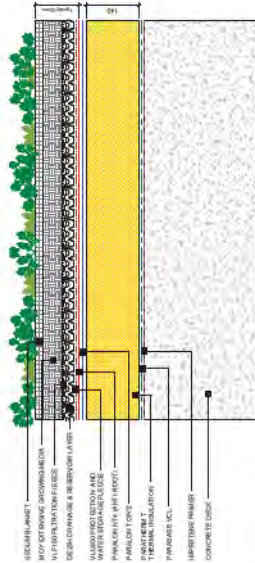
LEED & BREEAM CREDITS.

Moy Extensive Green Roofs are locally sourced where possible, with over 80% of the bulk mass material being produced or grown in Ireland, reducing the carbon footprint and promoting sustainability.

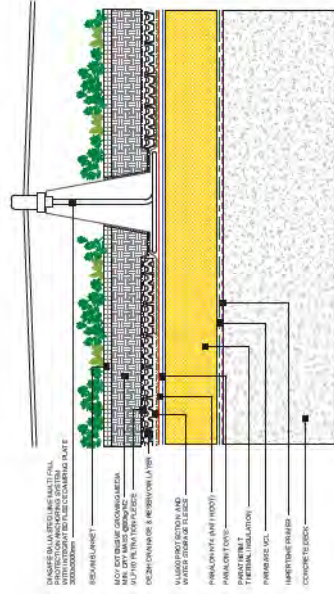
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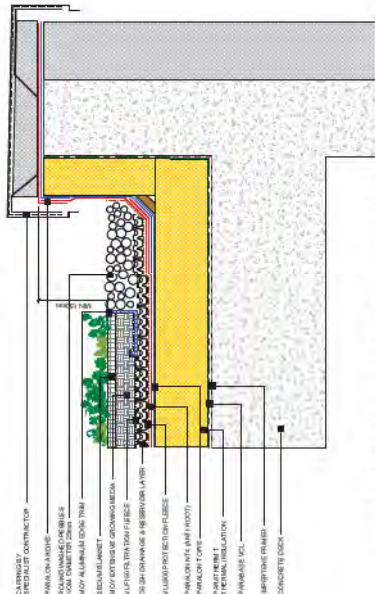
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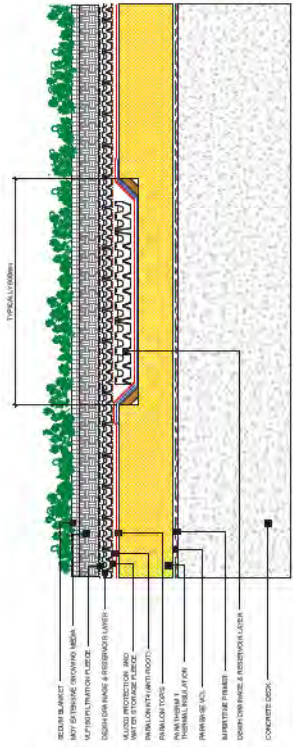
MOY EXTENSIVE GREEN ROOF SYSTEM (CONCRETE DECK)
1 1:5



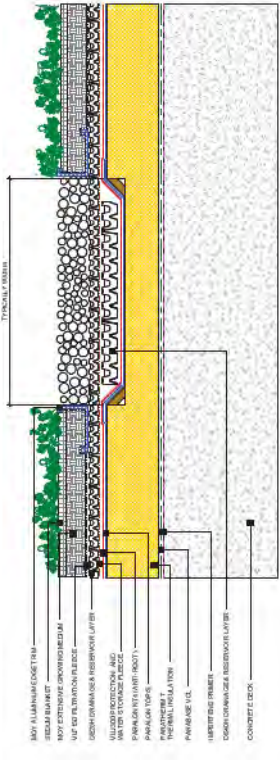
MOY EXTENSIVE GREEN ROOF SYSTEM - PROTECTION ANCHORING SYSTEM DETAIL
2 1:5



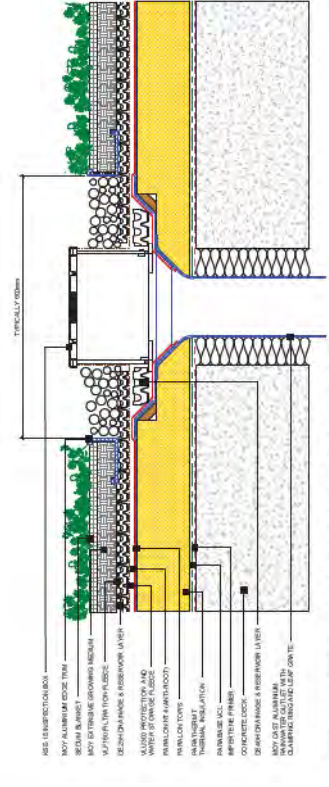
MOY EXTENSIVE GREEN ROOF - PARAPET DETAIL
3 1:5



MOY EXTENSIVE GREEN ROOF SYSTEM - GUTTER CHANNEL WITH SEDUM COVERING DETAIL
4 1:5



MOY EXTENSIVE GREEN ROOF SYSTEM - GUTTER CHANNEL WITH PEBBLES DETAIL
5 1:5



MOY EXTENSIVE GREEN ROOF SYSTEM - RAINWATER OUTLET INSPECTION BOX DETAIL
6 1:5

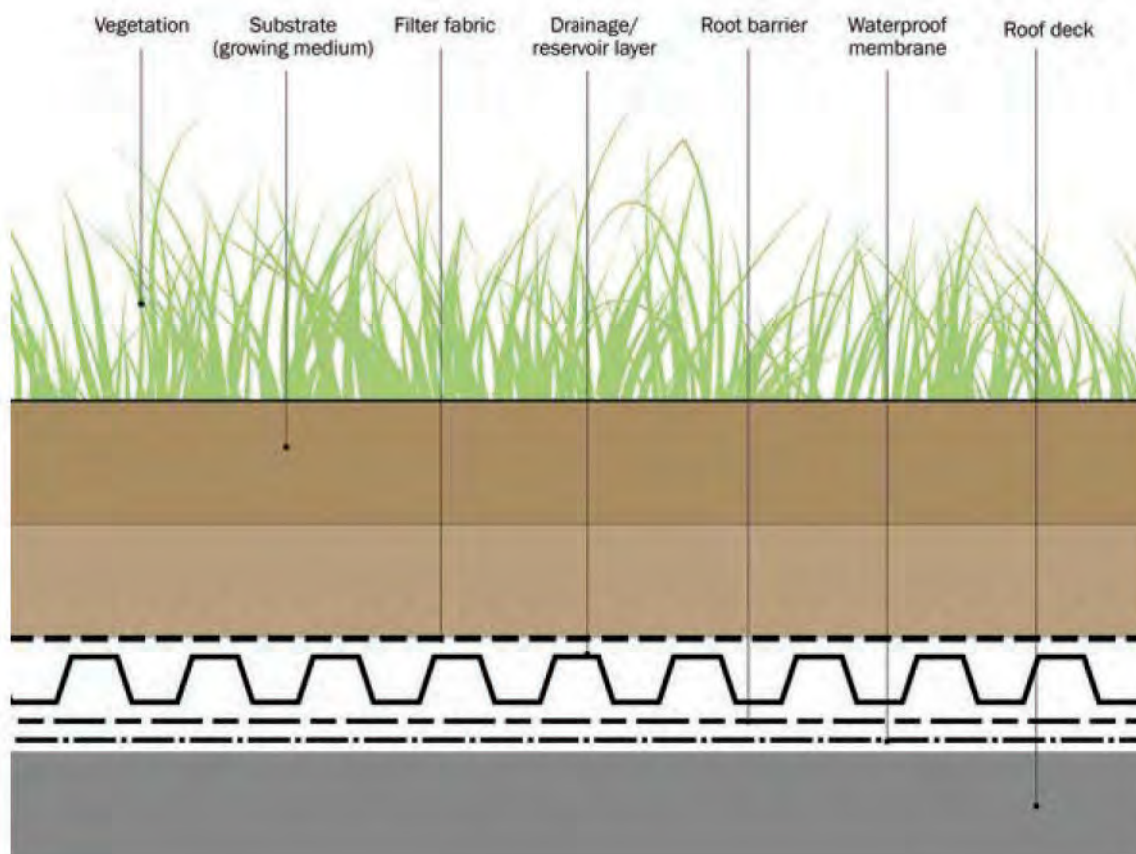


Figure 12.1 Section showing typical extensive green roof components

As mentioned earlier, there are two main types of green roof:

Extensive green roofs – These systems cover the entire roof area with hardy, slow growing, drought tolerant, low maintenance plants (eg mosses, succulents, herbs, grasses) often enhanced with wildflowers. Planting often establishes more slowly, but the long-term biodiversity can be of high value. They are only accessed for maintenance and can be flat or sloping. Extensive green roofs typically comprise a 20–150 mm thick growing medium and can be further divided into “single-layer” systems (which consist of a single medium designed to be free-draining and support plant growth), and “multi-layer” systems that include both a growing medium layer and a separate underlying drainage layer. They are lightweight and low cost to maintain, and can be used in a wide variety of locations with minimal intervention. They are often suitable for retrofit on existing structures due to their light weight. Biodiverse extensive green roofs are often planted with a mix of species supported by a range of soil depths.

Intensive green roofs (or roof gardens) – These are designed to sustain more complex landscaped environments that can provide high amenity or biodiversity benefits. They are planted with a range of plants including grasses, shrubs and/or trees, either as ground cover or within planters, and may also include water features and storage of rainwater for irrigation (ie blue roof elements). They are usually easily accessible, as they normally require a fairly high level of regular maintenance, and in some cases they are made accessible to the public. Intensive roofs have a deeper substrate, with >150 mm growing medium, and therefore impose greater loads on the roof structure.

Green roofs with substrate depths of 100–200 mm tend to be semi-intensive roofs, and can include characteristics of both extensive and intensive roofs, with plants that include shrubs and woody plants. Irrigation and maintenance requirements of this type of roof will be dependent upon the plant species chosen for the roof. There are also various combinations of green roof that combine both types in a single roof system.

A comparison of the main differences between extensive and intensive green roof systems is given in [Table 12.1](#).

Extensive Green Roof

Blackdown extensive green roofs provide a lightweight, drought tolerant and low maintenance planting solution. They are suitable for lightweight roof decks, inaccessible roofs, flat or sloping roofs. Ongoing maintenance will keep extensive green roofs looking healthy and attractive

Vegetation

Extensive green roofs rely on hardy, drought tolerant sedum plants to form the majority of the planting. The sedums that Blackdown select and grow at the nursery in Somerset represent years of experience and horticultural knowledge.

There are three planting options to choose from – sedum NatureMat®, plugs or hydroplant (sedum cuttings).

Key Features

Substrate

Blackdown extensive substrates are made from carefully selected organic and inorganic materials. These materials are then blended to very specific proportions which enables plant material to establish as quickly as possible.

Waterproofing

Typical waterproofing options include suitable root-resistant bituminous membranes from the Derbigum and Eurorof ranges along with standing seam metal roofing.

Warranty

Warranties are available for the Alumasc waterproofing system used in the green roof build-up.



Build-up height	100mm
Drainage layer	25mm
Saturated weight	95-100 kg per m ²
Plant coverage at installation	<5 to 90%
Maximum pitch	45 degrees
Irrigation requirements	Not required once plant material is established
Maintenance requirements	Twice a year