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)	100	PIMP (%)	95
M5-60 (mm)	17.000	Add Flow / Climate Change (%)	20
Ratio R	0.300	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	2.000
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Inverts

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	3.000	0.015	200.0	0.004	5.00	0.0	0.600	o	150	Pipe/Conduit	
S1.001	15.286	0.076	200.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S2.000	10.406	0.083	125.0	0.026	5.00	0.0	0.600	o	150	Pipe/Conduit	
S1.002	12.578	0.070	179.7	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S1.003	11.854	0.059	200.9	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S3.000	8.273	0.041	201.8	0.026	5.00	0.0	0.600	o	150	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)
S1.000	50.00	5.07	85.700	0.004	0.0	0.0	0.1	0.71	12.5	0.6
S1.001	50.00	5.43	85.685	0.004	0.0	0.0	0.1	0.71	12.5	0.6
S2.000	50.00	5.19	85.700	0.026	0.0	0.0	0.7	0.90	15.9	4.1
S1.002	50.00	5.71	85.609	0.029	0.0	0.0	0.8	0.75	13.2	4.8
S1.003	50.00	5.99	85.539	0.029	0.0	0.0	0.8	0.71	12.5	4.8
S3.000	50.00	5.20	85.650	0.026	0.0	0.0	0.7	0.70	12.4	4.1

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
S1.004	13.855	0.069	200.8	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S1.005	14.670	0.073	201.0	0.013	0.00	0.0	0.600	o	150	Pipe/Conduit	
S1.006	7.269	0.036	201.9	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S1.007	10.818	0.072	150.3	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S4.000	10.535	0.053	198.8	0.008	5.00	0.0	0.600	o	225	Pipe/Conduit	
S1.008	36.411	0.182	200.0	0.038	0.00	0.0	0.600	o	225	Pipe/Conduit	
S5.000	11.439	0.057	200.7	0.006	5.00	0.0	0.600	o	225	Pipe/Conduit	
S1.009	26.223	0.175	149.8	0.028	0.00	0.0	0.600	o	225	Pipe/Conduit	
S6.000	5.919	0.039	150.0	0.013	5.00	0.0	0.600	o	150	Pipe/Conduit	
S1.010	47.348	0.316	149.8	0.066	0.00	0.0	0.600	o	225	Pipe/Conduit	
S7.000	5.407	0.054	100.1	0.023	5.00	0.0	0.600	o	150	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)
S1.004	50.00	6.32	85.480	0.055	0.0	0.0	1.5	0.71	12.5	8.9
S1.005	50.00	6.67	85.411	0.068	0.0	0.0	1.8	0.71	12.5	11.1
S1.006	50.00	6.84	85.338	0.068	0.0	0.0	1.8	0.70	12.4	11.1
S1.007	50.00	7.06	85.302	0.068	0.0	0.0	1.8	0.82	14.4	11.1
S4.000	50.00	5.19	85.300	0.008	0.0	0.0	0.2	0.92	36.7	1.3
S1.008	50.00	7.72	85.230	0.115	0.0	0.0	3.1	0.92	36.6	18.7
S5.000	50.00	5.21	85.200	0.006	0.0	0.0	0.2	0.92	36.6	1.0
S1.009	50.00	8.13	85.048	0.149	0.0	0.0	4.0	1.07	42.4	24.2
S6.000	50.00	5.12	85.000	0.013	0.0	0.0	0.4	0.82	14.5	2.2
S1.010	50.00	8.87	84.873	0.229	0.0	0.0	6.2	1.07	42.4	37.2
S7.000	50.00	5.09	85.000	0.023	0.0	0.0	0.6	1.00	17.7	3.8

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
S1.011	20.570	0.137	150.1	0.006	0.00	0.0	0.600	o	225	Pipe/Conduit	
S8.000	9.187	0.061	150.0	0.005	5.00	0.0	0.600	o	100	Pipe/Conduit	
S8.001	10.523	0.070	150.3	0.000	0.00	0.0	0.600	o	100	Pipe/Conduit	
S9.000	5.151	0.026	200.0	0.009	5.00	0.0	0.600	o	150	Pipe/Conduit	
S8.002	10.750	0.072	149.3	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S8.003	8.146	0.054	150.9	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S10.000	3.006	0.030	100.0	0.013	5.00	0.0	0.600	o	150	Pipe/Conduit	
S8.004	9.853	0.066	149.3	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S1.012	3.326	0.022	151.2	0.000	0.00	0.0	0.600	o	150	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)
S1.011	50.00	9.19	84.557	0.258	0.0	0.0	7.0	1.06	42.3	41.9
S8.000	50.00	5.24	85.650	0.005	0.0	0.0	0.1	0.63	4.9	0.8
S8.001	50.00	5.53	85.604	0.005	0.0	0.0	0.1	0.62	4.9	0.8
S9.000	50.00	5.12	85.650	0.009	0.0	0.0	0.3	0.71	12.5	1.5
S8.002	50.00	5.74	85.534	0.014	0.0	0.0	0.4	0.82	14.5	2.3
S8.003	50.00	5.91	85.462	0.014	0.0	0.0	0.4	0.82	14.4	2.3
S10.000	50.00	5.05	85.650	0.013	0.0	0.0	0.4	1.00	17.8	2.1
S8.004	50.00	6.11	85.408	0.028	0.0	0.0	0.7	0.82	14.5	4.5
S1.012	50.00	9.26	84.420	0.285	0.0	0.0	7.7	0.81	14.4«	46.4

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S1	86.000	0.300	Open Manhole	1200	S1.000	85.700	150				
S1	86.000	0.315	Open Manhole	1200	S1.001	85.685	150	S1.000	85.685	150	
S4	86.000	0.300	Open Manhole	1200	S2.000	85.700	150				
S2	86.000	0.391	Open Manhole	1200	S1.002	85.609	150	S1.001	85.609	150	
								S2.000	85.617	150	8
S3	86.000	0.461	Open Manhole	1200	S1.003	85.539	150	S1.002	85.539	150	
S6	86.000	0.350	Open Manhole	1200	S3.000	85.650	150				
S4	86.000	0.520	Open Manhole	1200	S1.004	85.480	150	S1.003	85.480	150	
								S3.000	85.609	150	129
S5	86.000	0.589	Open Manhole	1200	S1.005	85.411	150	S1.004	85.411	150	
S10	86.000	0.662	Open Manhole	1200	S1.006	85.338	150	S1.005	85.338	150	
S6	86.000	0.698	Open Manhole	1200	S1.007	85.302	150	S1.006	85.302	150	
S10	86.000	0.700	Open Manhole	1200	S4.000	85.300	225				
S7	86.000	0.770	Open Manhole	1200	S1.008	85.230	225	S1.007	85.230	150	
								S4.000	85.247	225	17
S12	86.000	0.800	Open Manhole	1200	S5.000	85.200	225				
S8	86.000	0.952	Open Manhole	1200	S1.009	85.048	225	S1.008	85.048	225	
								S5.000	85.143	225	95
S14	86.000	1.000	Open Manhole	1200	S6.000	85.000	150				
S9	86.000	1.127	Open Manhole	1200	S1.010	84.873	225	S1.009	84.873	225	
								S6.000	84.961	150	13
S16	86.000	1.000	Open Manhole	1200	S7.000	85.000	150				
S10	86.000	1.443	Open Manhole	1200	S1.011	84.557	225	S1.010	84.557	225	
								S7.000	84.946	150	314
S18	86.000	0.350	Open Manhole	1200	S8.000	85.650	100				
S18	86.000	0.411	Open Manhole	1200	S8.001	85.604	100	S8.000	85.589	100	
S20	86.000	0.350	Open Manhole	1200	S9.000	85.650	150				
S19	86.000	0.466	Open Manhole	1200	S8.002	85.534	150	S8.001	85.534	100	
								S9.000	85.624	150	90
S23	86.000	0.538	Open Manhole	1200	S8.003	85.462	150	S8.002	85.462	150	
S22	86.000	0.350	Open Manhole	1200	S10.000	85.650	150				
S20	86.000	0.592	Open Manhole	1200	S8.004	85.408	150	S8.003	85.408	150	
								S10.000	85.620	150	212
S11	86.000	1.580	Open Manhole	1200	S1.012	84.420	150	S1.011	84.420	225	

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
								S8.004	85.342	150	922
S	86.000	1.602	Open Manhole	0		OUTFALL		S1.012	84.398	150	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S1	712249.794	726749.208	712249.794	726749.208	Required	
S1	712252.595	726750.284	712252.595	726750.284	Required	
S4	712254.871	726726.334	712254.871	726726.334	Required	
S2	712258.375	726736.133	712258.375	726736.133	Required	
S3	712270.844	726737.782	712270.844	726737.782	Required	
S6	712285.303	726732.859	712285.303	726732.859	Required	
S4	712282.361	726740.591	712282.361	726740.591	Required	
S5	712285.458	726754.095	712285.458	726754.095	Required	
S10	712300.094	726755.088	712300.094	726755.088	Required	
S6	712307.233	726756.461	712307.233	726756.461	Required	
S10	712309.856	726749.104	712309.856	726749.104	Required	

Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S7	712318.027	726755.754	712318.027	726755.754	Required	
S12	712309.484	726729.654	712309.484	726729.654	Required	
S8	712314.737	726719.492	712314.737	726719.492	Required	
S14	712289.561	726717.583	712289.561	726717.583	Required	
S9	712289.710	726711.666	712289.710	726711.666	Required	
S16	712246.226	726702.541	712246.226	726702.541	Required	
S10	712244.563	726697.395	712244.563	726697.395	Required	
S18	712236.278	726744.471	712236.278	726744.471	Required	
S18	712234.309	726735.498	712234.309	726735.498	Required	
S20	712236.127	726728.440	712236.127	726728.440	Required	
S19	712232.118	726725.206	712232.118	726725.206	Required	
S23	712229.537	726714.770	712229.537	726714.770	Required	
S22	712232.403	726706.512	712232.403	726706.512	Required	
S20	712229.399	726706.626	712229.399	726706.626	Required	

Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S11	712224.017	726698.374	712224.017	726698.374	Required	
S	712220.714	726697.985			No Entry	

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	o	150	S1	86.000	85.700	0.150	Open Manhole	1200
S1.001	o	150	S1	86.000	85.685	0.165	Open Manhole	1200
S2.000	o	150	S4	86.000	85.700	0.150	Open Manhole	1200
S1.002	o	150	S2	86.000	85.609	0.241	Open Manhole	1200
S1.003	o	150	S3	86.000	85.539	0.311	Open Manhole	1200
S3.000	o	150	S6	86.000	85.650	0.200	Open Manhole	1200
S1.004	o	150	S4	86.000	85.480	0.370	Open Manhole	1200
S1.005	o	150	S5	86.000	85.411	0.439	Open Manhole	1200
S1.006	o	150	S10	86.000	85.338	0.512	Open Manhole	1200
S1.007	o	150	S6	86.000	85.302	0.548	Open Manhole	1200
S4.000	o	225	S10	86.000	85.300	0.475	Open Manhole	1200
S1.008	o	225	S7	86.000	85.230	0.545	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	3.000	200.0	S1	86.000	85.685	0.165	Open Manhole	1200
S1.001	15.286	200.0	S2	86.000	85.609	0.241	Open Manhole	1200
S2.000	10.406	125.0	S2	86.000	85.617	0.233	Open Manhole	1200
S1.002	12.578	179.7	S3	86.000	85.539	0.311	Open Manhole	1200
S1.003	11.854	200.9	S4	86.000	85.480	0.370	Open Manhole	1200
S3.000	8.273	201.8	S4	86.000	85.609	0.241	Open Manhole	1200
S1.004	13.855	200.8	S5	86.000	85.411	0.439	Open Manhole	1200
S1.005	14.670	201.0	S10	86.000	85.338	0.512	Open Manhole	1200
S1.006	7.269	201.9	S6	86.000	85.302	0.548	Open Manhole	1200
S1.007	10.818	150.3	S7	86.000	85.230	0.620	Open Manhole	1200
S4.000	10.535	198.8	S7	86.000	85.247	0.528	Open Manhole	1200
S1.008	36.411	200.0	S8	86.000	85.048	0.727	Open Manhole	1200

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S5.000	o	225	S12	86.000	85.200	0.575	Open Manhole	1200
S1.009	o	225	S8	86.000	85.048	0.727	Open Manhole	1200
S6.000	o	150	S14	86.000	85.000	0.850	Open Manhole	1200
S1.010	o	225	S9	86.000	84.873	0.902	Open Manhole	1200
S7.000	o	150	S16	86.000	85.000	0.850	Open Manhole	1200
S1.011	o	225	S10	86.000	84.557	1.218	Open Manhole	1200
S8.000	o	100	S18	86.000	85.650	0.250	Open Manhole	1200
S8.001	o	100	S18	86.000	85.604	0.296	Open Manhole	1200
S9.000	o	150	S20	86.000	85.650	0.200	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S5.000	11.439	200.7	S8	86.000	85.143	0.632	Open Manhole	1200
S1.009	26.223	149.8	S9	86.000	84.873	0.902	Open Manhole	1200
S6.000	5.919	150.0	S9	86.000	84.961	0.889	Open Manhole	1200
S1.010	47.348	149.8	S10	86.000	84.557	1.218	Open Manhole	1200
S7.000	5.407	100.1	S10	86.000	84.946	0.904	Open Manhole	1200
S1.011	20.570	150.1	S11	86.000	84.420	1.355	Open Manhole	1200
S8.000	9.187	150.0	S18	86.000	85.589	0.311	Open Manhole	1200
S8.001	10.523	150.3	S19	86.000	85.534	0.366	Open Manhole	1200
S9.000	5.151	200.0	S19	86.000	85.624	0.226	Open Manhole	1200

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S8.002	o	150	S19	86.000	85.534	0.316	Open Manhole	1200
S8.003	o	150	S23	86.000	85.462	0.388	Open Manhole	1200
S10.000	o	150	S22	86.000	85.650	0.200	Open Manhole	1200
S8.004	o	150	S20	86.000	85.408	0.442	Open Manhole	1200
S1.012	o	150	S11	86.000	84.420	1.430	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S8.002	10.750	149.3	S23	86.000	85.462	0.388	Open Manhole	1200
S8.003	8.146	150.9	S20	86.000	85.408	0.442	Open Manhole	1200
S10.000	3.006	100.0	S20	86.000	85.620	0.230	Open Manhole	1200
S8.004	9.853	149.3	S11	86.000	85.342	0.508	Open Manhole	1200
S1.012	3.326	151.2	S	86.000	84.398	1.452	Open Manhole	0

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	Classification	Green Roof	70	0.006	0.004	0.004
1.001	-	-	95	0.000	0.000	0.000
2.000	Classification	Green Roof	70	0.036	0.026	0.026
1.002	-	-	95	0.000	0.000	0.000
1.003	-	-	95	0.000	0.000	0.000
3.000	Classification	Green Roof	70	0.036	0.026	0.026
1.004	-	-	95	0.000	0.000	0.000
1.005	Classification	Permeable Pavement	95	0.014	0.013	0.013
1.006	-	-	95	0.000	0.000	0.000
1.007	-	-	95	0.000	0.000	0.000
4.000	Classification	Green Roof	70	0.012	0.008	0.008
1.008	Classification	Permeable Pavement	95	0.040	0.038	0.038
5.000	Classification	Green Roof	70	0.009	0.006	0.006
1.009	Classification	Permeable Pavement	95	0.029	0.028	0.028
6.000	Classification	Green Roof	70	0.019	0.013	0.013
1.010	Classification	Permeable Pavement	95	0.070	0.066	0.066
7.000	Classification	Green Roof	70	0.033	0.023	0.023
1.011	Classification	Permeable Pavement	95	0.006	0.006	0.006
8.000	Classification	Green Roof	70	0.007	0.005	0.005
8.001	-	-	95	0.000	0.000	0.000
9.000	Classification	Green Roof	70	0.013	0.009	0.009
8.002	-	-	95	0.000	0.000	0.000
8.003	-	-	95	0.000	0.000	0.000
10.000	Classification	Green Roof	70	0.019	0.013	0.013
8.004	-	-	95	0.000	0.000	0.000
1.012	-	-	95	0.000	0.000	0.000
				Total	Total	Total
				0.351	0.285	0.285

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	20.000
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 5 Number of Storage Structures 9 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Return Period (years) 100

Synthetic Rainfall Details

Region	Scotland and Ireland	Cv (Summer)	0.750
M5-60 (mm)	17.000	Cv (Winter)	0.840
Ratio R	0.300	Storm Duration (mins)	30
Profile Type	Summer		

Online Controls for Storm

Orifice Manhole: S3, DS/PN: S1.003, Volume (m³): 0.7

Diameter (m) 0.035 Discharge Coefficient 0.600 Invert Level (m) 85.539

Orifice Manhole: S10, DS/PN: S1.006, Volume (m³): 1.0

Diameter (m) 0.025 Discharge Coefficient 0.600 Invert Level (m) 85.338

Orifice Manhole: S19, DS/PN: S8.002, Volume (m³): 0.7

Diameter (m) 0.029 Discharge Coefficient 0.600 Invert Level (m) 85.534

Orifice Manhole: S20, DS/PN: S8.004, Volume (m³): 0.8

Diameter (m) 0.021 Discharge Coefficient 0.600 Invert Level (m) 85.408

Hydro-Brake® Optimum Manhole: S11, DS/PN: S1.012, Volume (m³): 2.7

Unit Reference	MD-SHE-0064-2000-1200-2000
Design Head (m)	1.200
Design Flow (l/s)	2.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	64
Invert Level (m)	84.420
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)	1.200	2.0	Kick-Flo®	0.573	1.4
Flush-Flo™	0.282	1.8	Mean Flow over Head Range	-	1.6

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)
0.100	1.5	0.500	1.6	1.200	2.0	2.000	2.5
0.200	1.7	0.600	1.5	1.400	2.1	2.200	2.6
0.300	1.8	0.800	1.7	1.600	2.3	2.400	2.7
0.400	1.7	1.000	1.8	1.800	2.4	2.600	2.8

Hydro-Brake® Optimum Manhole: S11, DS/PN: S1.012, Volume (m³): 2.7

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
3.000	3.0	5.000	3.9	7.000	4.5	9.000	5.1
3.500	3.3	5.500	4.0	7.500	4.7	9.500	5.2
4.000	3.5	6.000	4.2	8.000	4.8		
4.500	3.7	6.500	4.4	8.500	5.0		

Storage Structures for Storm

Infiltration Basin Manhole: S3, DS/PN: S1.003

Invert Level (m) 85.660 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 1.00
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	6.5	0.340	36.0

Infiltration Basin Manhole: S10, DS/PN: S1.006

Invert Level (m) 85.500 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 1.00
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	80.0	0.500	156.0

Porous Car Park Manhole: S7, DS/PN: S1.008

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	3.0
Membrane Percolation (mm/hr)	1000	Length (m)	2.0
Max Percolation (l/s)	1.7	Slope (1:X)	1250.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	85.230	Cap Volume Depth (m)	0.300

Porous Car Park Manhole: S10, DS/PN: S1.011

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	8.0
Membrane Percolation (mm/hr)	1000	Length (m)	130.0
Max Percolation (l/s)	288.9	Slope (1:X)	1100.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	85.300	Cap Volume Depth (m)	0.300

Swale Manhole: S18, DS/PN: S8.000

Warning:- Volume should always be included unless the upstream pipe is being used for storage and/or as a carrier

Infiltration Coefficient Base (m/hr) 0.00000 Safety Factor 2.0
Infiltration Coefficient Side (m/hr) 0.00000 Porosity 1.00

Swale Manhole: S18, DS/PN: S8.000

Invert Level (m)	85.650	Slope (1:X)	150.0
Base Width (m)	1.0	Cap Volume Depth (m)	0.300
Length (m)	8.0	Cap Infiltration Depth (m)	0.000
Side Slope (1:X)	3.0	Include Swale Volume	Yes

Swale Manhole: S18, DS/PN: S8.001

Warning:- Volume should always be included unless the upstream pipe is being used for storage and/or as a carrier

Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	8.0
Infiltration Coefficient Side (m/hr)	0.00000	Side Slope (1:X)	3.0
Safety Factor	2.0	Slope (1:X)	150.0
Porosity	1.00	Cap Volume Depth (m)	0.300
Invert Level (m)	85.604	Cap Infiltration Depth (m)	0.000
Base Width (m)	1.0	Include Swale Volume	Yes

Swale Manhole: S19, DS/PN: S8.002

Warning:- Volume should always be included unless the upstream pipe is being used for storage and/or as a carrier

Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	8.0
Infiltration Coefficient Side (m/hr)	0.00000	Side Slope (1:X)	3.0
Safety Factor	2.0	Slope (1:X)	150.0
Porosity	1.00	Cap Volume Depth (m)	0.300
Invert Level (m)	85.534	Cap Infiltration Depth (m)	0.000
Base Width (m)	1.0	Include Swale Volume	Yes

Swale Manhole: S23, DS/PN: S8.003

Warning:- Volume should always be included unless the upstream pipe is being used for storage and/or as a carrier

Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	8.0
Infiltration Coefficient Side (m/hr)	0.00000	Side Slope (1:X)	3.0
Safety Factor	2.0	Slope (1:X)	150.0
Porosity	1.00	Cap Volume Depth (m)	0.300
Invert Level (m)	85.462	Cap Infiltration Depth (m)	0.000
Base Width (m)	1.0	Include Swale Volume	Yes

Swale Manhole: S20, DS/PN: S8.004

Warning:- Volume should always be included unless the upstream pipe is being used for storage and/or as a carrier

Swale Manhole: S20, DS/PN: S8.004

Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	5.0
Infiltration Coefficient Side (m/hr)	0.00000	Side Slope (1:X)	3.0
Safety Factor	2.0	Slope (1:X)	150.0
Porosity	1.00	Cap Volume Depth (m)	0.300
Invert Level (m)	85.408	Cap Infiltration Depth (m)	0.000
Base Width (m)	1.0	Include Swale Volume	Yes

Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	20.000
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 5 Number of Storage Structures 9 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.300
Region	Scotland and Ireland	Cv (Summer)	0.750
M5-60 (mm)	17.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	75.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	20

WARNING: Half Drain Time has not been calculated as the structure is too full.

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.000	S1	120 Winter	100	+20%	100/15 Summer				85.973
S1.001	S1	120 Winter	100	+20%	100/15 Summer				85.973
S2.000	S4	120 Winter	100	+20%	100/15 Summer				85.977
S1.002	S2	120 Winter	100	+20%	100/15 Summer				85.972
S1.003	S3	120 Winter	100	+20%	100/15 Summer				85.967
S3.000	S6	600 Winter	100	+20%	100/15 Summer				85.818
S1.004	S4	600 Winter	100	+20%	100/15 Summer				85.818
S1.005	S5	600 Winter	100	+20%	100/15 Summer				85.816
S1.006	S10	600 Winter	100	+20%	100/15 Summer				85.814
S1.007	S6	30 Winter	100	+20%	100/15 Summer				85.976
S4.000	S10	30 Summer	100	+20%	100/15 Summer				85.990
S1.008	S7	30 Summer	100	+20%	100/15 Summer				85.987

Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S5.000	S12	30 Summer	100	+20%	100/15 Summer				85.953
S1.009	S8	30 Summer	100	+20%	100/15 Summer				85.950
S6.000	S14	30 Summer	100	+20%	100/15 Summer				85.886
S1.010	S9	30 Summer	100	+20%	100/15 Summer				85.875
S7.000	S16	600 Winter	100	+20%	100/15 Summer				85.657
S1.011	S10	600 Winter	100	+20%	100/15 Summer				85.656
S8.000	S18	480 Winter	100	+20%	100/120 Winter				85.769
S8.001	S18	480 Winter	100	+20%	100/30 Summer				85.769
S9.000	S20	480 Winter	100	+20%					85.769
S8.002	S19	480 Winter	100	+20%	100/15 Summer				85.768
S8.003	S23	480 Winter	100	+20%	100/30 Summer				85.747
S10.000	S22	600 Winter	100	+20%					85.748
S8.004	S20	480 Winter	100	+20%	100/15 Summer				85.748
S1.012	S11	600 Winter	100	+20%	100/15 Summer				85.765

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S5.000	S12	0.528	0.000	0.09			2.9	FLOOD RISK	
S1.009	S8	0.677	0.000	0.62			24.4	FLOOD RISK	
S6.000	S14	0.736	0.000	0.44			5.3	SURCHARGED	
S1.010	S9	0.777	0.000	1.20			48.6	SURCHARGED	
S7.000	S16	0.507	0.000	0.09			1.3	SURCHARGED	
S1.011	S10	0.874	0.000	0.11			4.2	SURCHARGED	
S8.000	S18	0.019	0.000	0.06		273	0.3	SURCHARGED	
S8.001	S18	0.065	0.000	0.04		378	0.2	SURCHARGED	
S9.000	S20	-0.031	0.000	0.06			0.6	OK	
S8.002	S19	0.084	0.000	0.03		497	0.3	SURCHARGED	
S8.003	S23	0.135	0.000	0.02			0.2	SURCHARGED	
S10.000	S22	-0.052	0.000	0.07			0.7	OK	
S8.004	S20	0.190	0.000	0.02			0.3	SURCHARGED	
S1.012	S11	1.195	0.000	0.19			2.0	SURCHARGED	

Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	0.123	0.000	0.05			0.5	FLOOD RISK	
S1.001	S1	0.138	0.000	0.03			0.4	FLOOD RISK	
S2.000	S4	0.127	0.000	0.28			4.0	FLOOD RISK	
S1.002	S2	0.213	0.000	0.35			4.2	FLOOD RISK	
S1.003	S3	0.278	0.000	0.11		87	1.3	FLOOD RISK	
S3.000	S6	0.018	0.000	0.13			1.4	SURCHARGED	
S1.004	S4	0.188	0.000	0.19			2.2	SURCHARGED	
S1.005	S5	0.255	0.000	0.25			2.9	SURCHARGED	
S1.006	S10	0.326	0.000	0.05			0.5	SURCHARGED	
S1.007	S6	0.524	0.000	0.07			0.9	FLOOD RISK	
S4.000	S10	0.465	0.000	0.12			3.6	FLOOD RISK	
S1.008	S7	0.532	0.000	0.40			14.0	FLOOD RISK	

Magda Bednarczyk

1st Floor
30 O' Connell Street
Co. Limerick

Uisce Éireann
Bosca OP 448
Oifig Sheachadta na
Cathrach Theas
Cathair Chorcaí

Irish Water
PO Box 448,
South City
Delivery Office
Cork City.

www.water.ie

20 September 2021

Re: CDS21005773 pre-connection enquiry - Subject to contract | Contract denied

Connection for Multi/Mixed Use Development of 101 unit(s) at Scholarstown House, Scholarstown Road, Dublin 16, Co. Dublin

Dear Sir/Madam,

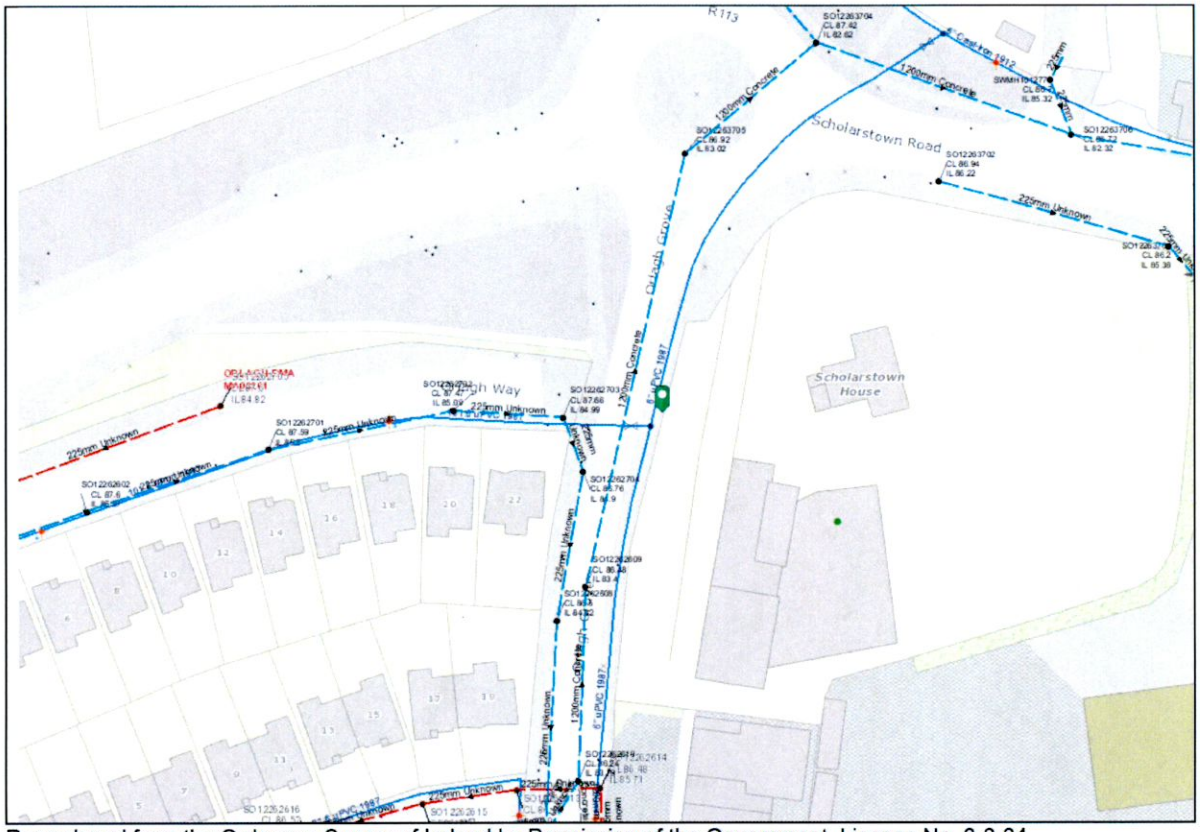
Irish Water has reviewed your pre-connection enquiry in relation to a Water & Wastewater connection at Scholarstown House, Scholarstown Road, Dublin 16, Co. Dublin (the **Premises**). Based upon the details you have provided with your pre-connection enquiry and on our desk top analysis of the capacity currently available in the Irish Water network(s) as assessed by Irish Water, we wish to advise you that your proposed connection to the Irish Water network(s) can be facilitated at this moment in time.

SERVICE	**OUTCOME OF PRE-CONNECTION ENQUIRY** **THIS IS NOT A CONNECTION OFFER. YOU MUST APPLY FOR A CONNECTION(S) TO THE IRISH WATER NETWORK(S) IF YOU WISH TO PROCEED.**
Water Connection	Feasible without infrastructure upgrade by Irish Water
Wastewater Connection	Feasible subject to upgrades
SITE SPECIFIC COMMENTS	
Water Connection	N/A
Wastewater Connection	In order to accommodate the proposed connection to Irish Water wastewater network at the Premises, upgrade works are required to extend the length of the network by approximately 70m. Irish Water currently does not have any plans to extend its network in this area. Should you wish to progress with the connection you will be required to fund this network extension.
Strategic Housing Development	Irish Water notes that the scale of this development dictates that it is subject to the Strategic Housing Development planning process. Therefore: in advance of submitting your full application to An Bord Pleanala for assessment, you must have reviewed this development with Irish Water and

	received a Statement of Design Acceptance in relation to the layout of water and wastewater services.

The design and construction of the Water & Wastewater pipes and related infrastructure to be installed in this development shall comply with the Irish Water Connections and Developer Services Standard Details and Codes of Practice that are available on the Irish Water website. Irish Water reserves the right to supplement these requirements with Codes of Practice and these will be issued with the connection agreement.

The map included below outlines the current Irish Water infrastructure adjacent to your site:



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Whilst every care has been taken in its compilation Irish Water gives this information as to the position of its underground network as a general guide only on the strict understanding that it is based on the best available information provided by each Local Authority in Ireland to Irish Water. Irish Water can assume no responsibility for and give no guarantees, undertakings or warranties concerning the accuracy, completeness or up to date nature of the information provided and does not accept any liability whatsoever arising from any errors or omissions. This information should not be relied upon in the event of excavations or any other works being carried out in the vicinity of the Irish Water underground network. The onus is on the parties carrying out excavations or any other works to ensure the exact location of the Irish Water underground network is identified prior to excavations or any other works being carried out. Service connection pipes are not generally shown but their presence should be anticipated.

General Notes:

1) The initial assessment referred to above is carried out taking into account water demand and wastewater discharge volumes and infrastructure details on the date of the assessment. **The availability of capacity may change at any date after this assessment.**
2) This feedback does not constitute a contract in whole or in part to provide a connection to any Irish Water infrastructure. All feasibility assessments are subject to the constraints of the Irish Water Capital Investment Plan.
3) The feedback provided is subject to a Connection Agreement/contract being signed at a later date.
4) A Connection Agreement will be required to commencing the connection works associated with the enquiry this can be applied for at https://www.water.ie/connections/get-connected/
5) A Connection Agreement cannot be issued until all statutory approvals are successfully in place.
6) Irish Water Connection Policy/ Charges can be found at https://www.water.ie/connections/information/connection-charges/
7) Please note the Confirmation of Feasibility does not extend to your fire flow requirements.
8) Irish Water is not responsible for the management or disposal of storm water or ground waters. You are advised to contact the relevant Local Authority to discuss the management or disposal of proposed storm water or ground water discharges
9) To access Irish Water Maps email datarequests@water.ie
10) All works to the Irish Water infrastructure, including works in the Public Space, shall have to be carried out by Irish Water.

If you have any further questions, please contact Dario Alvarez from the design team on + 353 2254621 or email dalvarez@water.ie For further information, visit **www.water.ie/connections.**

Yours sincerely,

Yvonne Harris

Yvonne Harris

Head of Customer Operations