Appendix C

SURFACE WATER CALCULATIONS

Our Ref: IE2181/PMS/4733

Your Ref:

Date: 24th November 2020

IE CONSULTING
WATER-ENVIRONMENTAL-CIVIL

The Planning Officer
Kildare County Council
Devoy Park
Naas
Co Kildare

Dear Sir / Madam

Re: Proposed Strategic Housing Development at Capdoo & Abbeylands, Clane, Co Kildare – Assessment of Potential Residual Pluvial Flood Risk

As illustrated on the Proposed Foul & Surface Water Drainage layout drawing prepared by BCA Consulting Engineers, the stormwater management system to serve the proposed strategic housing development at Capdoo & Abbeylands, Clane has been designed in general consideration of the Kildare County Council drainage policy and the GDSDS guidelines.

In order to access any potential residual pluvial flood risk associated with the stormwater drainage network to serve the proposed strategic housing development the network has been subject to an additional hydraulic simulation analysis utilising the Micro-Drainage software package in order to demonstrate the following:-

- Analysis to demonstrate that the proposed development storm water drainage and management system has been designed not to flood any part of the site in a 1 in 30 year return design storm and to ensure a free-board of 300mm below each manhole cover level & inclusive of climate change allowance and inclusive of allowance for urban creep (GDSDS Level of Service – Site Flooding criteria)
- Analysis to check for exceedence up to the 1 in 100 year return design storm and inclusive of climate change allowance and inclusive of allowance for urban creep (GDSDS Level of Service – Site Flooding criteria)
- Additional simulation analysis in consideration of 1 in 1 year and 1 in 2 year return design storm event (inclusive of climate change allowance).

The output of the Micro-Drainage hydraulic simulation analysis is presented in *Appendix A*.

As presented in the hydraulic simulation analysis output in *Appendix A*, under 'Summary of Critical Results by Maximum Level (Rank 1) for Storm', the simulation criteria for each simulated return period (1 in 1 year, 1 in 2 year, 1 in 30 year & 1 in 100 year) has applied a 'Margin of Flood Risk Warning' of 300m. This criteria has been set in order to ensure that in the event of an extreme rainfall event, and where surcharging of the storm water drainage pipes and manholes is predicted to occur during these events, then a freeboard of 300mm is maintained between each manhole cover level and the surcharged water level in each manhole.

As summarised in the Micro-Drainage hydraulic simulation output analysis presented in *Appendix A*, in consideration of a 1 in 30 year return period design storm, inclusive of climate change, a minimum freeboard of 300mm is maintained within the storm water drainage system (Page 32-35 of Micro-Drainage calculations).

In consideration of a 1 in 100 year return period design storm, inclusive of climate change, maximum water levels within the storm water drainage system would not exceed proposed manhole cover levels and would therefore not present a residual pluvial flood risk to the proposed development site (Page 37-40 of Micro-Drainage calculations).

In summary the storm water drainage and management system to serve the proposed strategic housing development is not predicted to present a residual pluvial flood risk to the development and is considered to comply with the GDSDS Level of Service – Site Flooding Criteria.

Yours Sincerely

Paul McShane

Senior Hydrological Engineer

For IE Consulting

IE CONSULTING
WATER-ENVIRONMENTAL-CIVIL

APPENDIX A

Micro-Drainage

Hydraulic Simulation Summary
Output Calculations

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 (%)	100
M5-60 (mm)	20.000	Add Flow / Climate Change (%)	10
Ratio R	0.200	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
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 Soffits

Time Area Diagram for Storm at outfall S (pipe S1.008)

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.001	4-8	1.603	8-12	0.834

Total Area Contributing (ha) = 2.439

Total Pipe Volume (m^3) = 118.462

Time Area Diagram at outfall S (pipe S10.006)

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.199	4-8	2.006	8-12	0.426

Total Area Contributing (ha) = 2.631

Total Pipe Volume (m^3) = 205.266

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

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
S1.000	47.891	0.479	100.0	0.182	4.00	0.0	0.600	o	300	Pipe/Conduit	
S2.000	44.572	0.371	120.0	0.136	4.00	0.0	0.600	o	300	Pipe/Conduit	
S1.001	27.099	0.165	164.2	0.061	0.00	0.0	0.600	o	300	Pipe/Conduit	
S3.000	36.349	0.481	75.6	0.129	4.00	0.0	0.600	o	225	Pipe/Conduit	
S4.000	45.814	0.306	149.7	0.152	4.00	0.0	0.600	o	300	Pipe/Conduit	
S3.001	46.218	0.206	224.4	0.123	0.00	0.0	0.600	o	375	Pipe/Conduit	
S1.002	67.267	0.117	574.9	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
S5.000	37.726	0.400	94.3	0.118	4.00	0.0	0.600	o	225	Pipe/Conduit	
S5.001	38.653	0.155	249.4	0.042	0.00	0.0	0.600	o	225	Pipe/Conduit	
S5.002	70.035	0.575	121.8	0.118	0.00	0.0	0.600	o	300	Pipe/Conduit	
S6.000	33.520	0.230	145.7	0.108	4.00	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)
S1.000	50.00	4.51	64.904	0.182	0.0	0.0	2.5	1.57	111.1	27.1
S2.000	50.00	4.52	64.425	0.136	0.0	0.0	1.8	1.43	101.4	20.2
S1.001	50.00	4.89	64.053	0.378	0.0	0.0	5.1	1.22	86.5	56.3
S3.000	50.00	4.40	64.575	0.129	0.0	0.0	1.7	1.51	59.9	19.2
S4.000	50.00	4.60	64.400	0.152	0.0	0.0	2.1	1.28	90.7	22.6
S3.001	50.00	5.23	64.019	0.404	0.0	0.0	5.5	1.21	133.1	60.2
S1.002	50.00	6.73	63.813	0.782	0.0	0.0	10.6	0.75	82.7«	116.5
S5.000	50.00	4.47	65.325	0.118	0.0	0.0	1.6	1.35	53.5	17.6
S5.001	50.00	5.25	64.925	0.160	0.0	0.0	2.2	0.82	32.7	23.9
S5.002	50.00	6.07	64.695	0.278	0.0	0.0	3.8	1.42	100.6	41.5
S6.000	50.00	4.52	64.425	0.108	0.0	0.0	1.5	1.08	43.0	16.0

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
S5.003	43.075	0.186	231.6	0.096	0.00	0.0	0.600	o	375	Pipe/Conduit	
S5.004	55.087	0.238	231.5	0.181	0.00	0.0	0.600	o	600	Pipe/Conduit	
S7.000	105.943	0.610	173.7	0.288	4.00	0.0	0.600	o	300	Pipe/Conduit	
S8.000	53.499	0.225	237.8	0.286	4.00	0.0	0.600	o	375	Pipe/Conduit	
S8.001	20.097	0.085	236.4	0.022	0.00	0.0	0.600	o	375	Pipe/Conduit	
S7.001	78.729	0.530	148.5	0.161	0.00	0.0	0.600	o	375	Pipe/Conduit	
S9.000	76.216	1.296	58.8	0.236	4.00	0.0	0.600	o	225	Pipe/Conduit	
S7.002	20.805	0.134	155.3	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
S1.003	5.902	0.024	245.9	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
S1.004	60.709	0.067	906.1	0.000	0.00	0.0	0.600	o	750	Pipe/Conduit	
S1.005	6.764	0.023	300.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.006	39.086	0.130	300.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.007	48.491	0.162	300.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.008	6.236	0.021	300.0	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)
S5.003	50.00	6.67	64.120	0.482	0.0	0.0	6.5	1.19	131.0	71.9
S5.004	50.00	7.25	63.934	0.664	0.0	0.0	9.0	1.60	451.4	98.9
S7.000	50.00	5.48	64.990	0.288	0.0	0.0	3.9	1.19	84.1	42.9
S8.000	50.00	4.76	64.670	0.286	0.0	0.0	3.9	1.17	129.3	42.6
S8.001	50.00	5.05	64.445	0.308	0.0	0.0	4.2	1.17	129.7	45.9
S7.001	50.00	6.37	64.360	0.757	0.0	0.0	10.2	1.48	164.0	112.7
S9.000	50.00	4.74	65.125	0.236	0.0	0.0	3.2	1.71	67.9	35.1
S7.002	50.00	6.58	63.830	0.993	0.0	0.0	13.4	1.63	259.1	147.9
S1.003	50.00	7.31	63.696	2.439	0.0	0.0	33.0	1.55	437.8	363.3
S1.004	50.00	8.41	63.672	2.439	0.0	0.0	33.0	0.92	407.1	363.3
S1.005	50.00	8.56	63.605	2.439	0.0	0.0	33.0	0.75	29.8«	363.3
S1.006	50.00	9.43	63.582	2.439	0.0	0.0	33.0	0.75	29.8«	363.3
S1.007	50.00	10.51	63.452	2.439	0.0	0.0	33.0	0.75	29.8«	363.3
S1.008	50.00	10.65	63.291	2.439	0.0	0.0	33.0	0.75	29.8«	363.3

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
S10.000	47.647	0.210	226.9	0.355	4.00	0.0	0.600	o	300	Pipe/Conduit	
S10.001	76.508	0.340	225.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S11.000	50.741	0.230	220.6	0.095	4.00	0.0	0.600	o	225	Pipe/Conduit	
S12.000	55.287	0.240	230.4	0.183	4.00	0.0	0.600	o	225	Pipe/Conduit	
S11.001	26.083	0.120	217.4	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S13.000	35.184	0.160	219.9	0.052	4.00	0.0	0.600	o	225	Pipe/Conduit	
S13.001	28.457	0.120	237.1	0.098	0.00	0.0	0.600	o	225	Pipe/Conduit	
S13.002	10.027	0.040	250.7	0.032	0.00	0.0	0.600	o	300	Pipe/Conduit	
S13.003	11.539	0.060	192.3	0.011	0.00	0.0	0.600	o	300	Pipe/Conduit	
S13.004	51.717	0.230	224.9	0.054	0.00	0.0	0.600	o	300	Pipe/Conduit	
S14.000	21.348	0.070	305.0	0.049	4.00	0.0	0.600	o	225	Pipe/Conduit	
S13.005	70.828	0.310	228.5	0.264	0.00	0.0	0.600	o	375	Pipe/Conduit	
S13.006	8.146	0.040	203.7	0.017	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)
S10.000	50.00	4.76	64.060	0.355	0.0	0.0	4.8	1.04	73.5	52.8
S10.001	50.00	5.99	63.850	0.355	0.0	0.0	4.8	1.04	73.8	52.8
S11.000	50.00	4.97	64.200	0.095	0.0	0.0	1.3	0.88	34.8	14.1
S12.000	50.00	5.07	64.210	0.183	0.0	0.0	2.5	0.86	34.1	27.2
S11.001	50.00	5.57	63.970	0.278	0.0	0.0	3.8	0.88	35.1«	41.3
S13.000	50.00	4.67	64.810	0.052	0.0	0.0	0.7	0.88	34.9	7.7
S13.001	50.00	5.23	64.650	0.150	0.0	0.0	2.0	0.84	33.6	22.3
S13.002	50.00	5.40	64.530	0.182	0.0	0.0	2.5	0.99	69.9	27.1
S13.003	50.00	5.57	64.490	0.193	0.0	0.0	2.6	1.13	79.9	28.8
S13.004	50.00	6.39	64.430	0.248	0.0	0.0	3.4	1.04	73.8	36.9
S14.000	50.00	4.48	64.270	0.049	0.0	0.0	0.7	0.74	29.6	7.3
S13.005	50.00	7.38	64.200	0.561	0.0	0.0	7.6	1.19	131.9	83.5
S13.006	50.00	7.49	63.890	0.578	0.0	0.0	7.8	1.27	139.8	86.1

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
S11.002	11.294	0.050	225.9	0.016	0.00	0.0	0.600	o	375	Pipe/Conduit	
S11.003	66.102	0.290	227.9	0.252	0.00	0.0	0.600	o	450	Pipe/Conduit	
S10.002	32.104	0.190	169.0	0.068	0.00	0.0	0.600	o	450	Pipe/Conduit	
S15.000	26.075	0.030	869.2	0.039	4.00	0.0	0.600	o	750	Pipe/Conduit	
S15.001	50.212	0.070	717.3	0.135	0.00	0.0	0.600	o	750	Pipe/Conduit	
S16.000	50.617	0.230	220.1	0.136	4.00	0.0	0.600	o	225	Pipe/Conduit	
S16.001	19.635	0.090	218.2	0.029	0.00	0.0	0.600	o	225	Pipe/Conduit	
S16.002	9.341	0.040	233.5	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S17.000	12.814	0.060	213.6	0.027	4.00	0.0	0.600	o	225	Pipe/Conduit	
S16.003	50.011	0.200	250.1	0.049	0.00	0.0	0.600	o	300	Pipe/Conduit	
S15.002	51.920	0.070	741.7	0.131	0.00	0.0	0.600	o	750	Pipe/Conduit	
S18.000	20.049	0.340	59.0	0.039	4.00	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)
S11.002	50.00	7.65	63.850	0.872	0.0	0.0	11.8	1.20	132.7	129.9
S11.003	50.00	8.47	63.800	1.124	0.0	0.0	15.2	1.34	213.5	167.5
S10.002	50.00	8.81	63.510	1.547	0.0	0.0	21.0	1.56	248.3	230.5
S15.000	50.00	4.46	63.670	0.039	0.0	0.0	0.5	0.94	415.7	5.8
S15.001	50.00	5.27	63.640	0.174	0.0	0.0	2.4	1.04	458.2	25.9
S16.000	50.00	4.96	64.640	0.136	0.0	0.0	1.8	0.88	34.9	20.2
S16.001	50.00	5.33	64.410	0.165	0.0	0.0	2.2	0.88	35.0	24.5
S16.002	50.00	5.52	64.320	0.165	0.0	0.0	2.2	0.85	33.8	24.5
S17.000	50.00	4.24	64.340	0.027	0.0	0.0	0.4	0.89	35.4	4.0
S16.003	50.00	6.36	64.280	0.240	0.0	0.0	3.2	0.99	70.0	35.7
S15.002	50.00	7.21	63.570	0.545	0.0	0.0	7.4	1.02	450.5	81.1
S18.000	50.00	4.20	64.300	0.039	0.0	0.0	0.5	1.71	67.8	5.8

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
S15.003	65.202	0.090	724.5	0.000	0.00	0.0	0.600	o	750	Pipe/Conduit	
S19.000	26.689	0.120	222.4	0.043	4.00	0.0	0.600	o	225	Pipe/Conduit	
S20.000	41.030	0.103	398.3	0.058	4.00	0.0	0.600	o	300	Pipe/Conduit	
S19.001	79.656	0.370	215.3	0.209	0.00	0.0	0.600	o	300	Pipe/Conduit	
S15.004	30.318	0.080	379.0	0.125	0.00	0.0	0.600	o	750	Pipe/Conduit	
S15.005	4.016	0.010	401.6	0.066	0.00	0.0	0.600	o	750	Pipe/Conduit	
S10.003	20.653	0.031	666.2	0.000	0.00	0.0	0.600	o	750	Pipe/Conduit	
S10.004	16.333	0.027	604.9	0.000	0.00	0.0	0.600	o	750	Pipe/Conduit	
S10.005	49.089	0.082	598.6	0.000	0.00	0.0	0.600	o	750	Pipe/Conduit	
S10.006	21.382	0.036	598.6	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)
S15.003	50.00	8.26	63.500	0.584	0.0	0.0	7.9	1.03	455.9	86.9
S19.000	50.00	4.51	63.900	0.043	0.0	0.0	0.6	0.87	34.7	6.5
S20.000	50.00	4.87	63.882	0.058	0.0	0.0	0.8	0.78	55.3	8.6
S19.001	50.00	6.12	63.780	0.310	0.0	0.0	4.2	1.07	75.5	46.2
S15.004	50.00	8.61	63.410	1.019	0.0	0.0	13.8	1.43	632.4	151.7
S15.005	50.00	8.66	63.330	1.084	0.0	0.0	14.7	1.39	614.2	161.5
S10.003	50.00	9.13	63.320	2.631	0.0	0.0	35.6	1.08	475.6	391.9
S10.004	50.00	9.37	63.289	2.631	0.0	0.0	35.6	1.13	499.4	391.9
S10.005	50.00	10.09	63.262	2.631	0.0	0.0	35.6	1.14	502.1	391.9
S10.006	50.00	10.77	63.180	2.631	0.0	0.0	35.6	0.53	21.0«	391.9

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
SS110	65.950	1.046	Open Manhole	1200	S1.000	64.904	300				
SS111	65.850	1.425	Open Manhole	1200	S2.000	64.425	300				
SS112	66.100	2.047	Open Manhole	1200	S1.001	64.053	300	S1.000	64.425	300	372
								S2.000	64.054	300	1
SS108	66.000	1.425	Open Manhole	1200	S3.000	64.575	225				
SS107	65.900	1.500	Open Manhole	1200	S4.000	64.400	300				
SS109	65.770	1.751	Open Manhole	1350	S3.001	64.019	375	S3.000	64.094	225	
								S4.000	64.094	300	
SS113	66.300	2.487	Open Manhole	1350	S1.002	63.813	375	S1.001	63.888	300	
								S3.001	63.813	375	
SS101	66.750	1.425	Open Manhole	1200	S5.000	65.325	225				
SS102	66.350	1.425	Open Manhole	1200	S5.001	64.925	225	S5.000	64.925	225	
SS103	66.100	1.405	Open Manhole	1200	S5.002	64.695	300	S5.001	64.770	225	
SS104	65.850	1.425	Open Manhole	1200	S6.000	64.425	225				
SS105	65.740	1.620	Open Manhole	1350	S5.003	64.120	375	S5.002	64.120	300	
								S6.000	64.195	225	
SS106	65.900	1.966	Open Manhole	1500	S5.004	63.934	600	S5.003	63.934	375	
SS116	66.600	1.610	Open Manhole	1200	S7.000	64.990	300				
SS114	66.150	1.480	Open Manhole	1350	S8.000	64.670	375				
SS115	66.600	2.155	Open Manhole	1350	S8.001	64.445	375	S8.000	64.445	375	
SS116	66.650	2.290	Open Manhole	1350	S7.001	64.360	375	S7.000	64.380	300	
								S8.001	64.360	375	
SS118	66.550	1.425	Open Manhole	1200	S9.000	65.125	225				
SS119	66.750	2.921	Open Manhole	1350	S7.002	63.830	450	S7.001	63.830	375	
								S9.000	63.829	225	
SS120	66.200	2.504	Open Manhole	1500	S1.003	63.696	600	S1.002	63.696	375	
								S5.004	63.696	600	
								S7.002	63.696	450	
SS121	66.200	2.528	Open Manhole	1800	S1.004	63.672	750	S1.003	63.672	600	
SS122	66.750	3.145	Open Manhole	1800	S1.005	63.605	225	S1.004	63.605	750	
SS123	66.800	3.218	Open Manhole	1200	S1.006	63.582	225	S1.005	63.582	225	
SS124	66.350	2.898	Open Manhole	1200	S1.007	63.452	225	S1.006	63.452	225	
SS125	66.100	2.810	Open Manhole	1200	S1.008	63.291	225	S1.007	63.290	225	
S	66.100	2.830	Open Manhole	0		OUTFALL		S1.008	63.270	225	

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
SS214	67.100	3.040	Open Manhole	1200	S10.000	64.060	300				
SS215	67.500	3.650	Open Manhole	1200	S10.001	63.850	300	S10.000	63.850	300	
SS210	66.700	2.500	Open Manhole	1200	S11.000	64.200	225				
SS209	66.750	2.540	Open Manhole	1200	S12.000	64.210	225				
SS211	66.800	2.830	Open Manhole	1200	S11.001	63.970	225	S11.000	63.970	225	
								S12.000	63.970	225	
SS201	66.750	1.940	Open Manhole	1200	S13.000	64.810	225				
SS202	66.850	2.200	Open Manhole	1200	S13.001	64.650	225	S13.000	64.650	225	
SS203	66.900	2.370	Open Manhole	1200	S13.002	64.530	300	S13.001	64.530	225	
SS204	66.850	2.360	Open Manhole	1200	S13.003	64.490	300	S13.002	64.490	300	
SS205	66.800	2.370	Open Manhole	1200	S13.004	64.430	300	S13.003	64.430	300	
SS206	66.950	2.680	Open Manhole	1200	S14.000	64.270	225				
SS207	66.700	2.500	Open Manhole	1350	S13.005	64.200	375	S13.004	64.200	300	
								S14.000	64.200	225	
SS208	66.800	2.910	Open Manhole	1350	S13.006	63.890	375	S13.005	63.890	375	
SS212	66.900	3.050	Open Manhole	1350	S11.002	63.850	375	S11.001	63.850	225	
								S13.006	63.850	375	
SS213	67.000	3.200	Open Manhole	1350	S11.003	63.800	450	S11.002	63.800	375	
SS216	67.250	3.740	Open Manhole	1350	S10.002	63.510	450	S10.001	63.510	300	
								S11.003	63.510	450	
SS222	65.900	2.230	Open Manhole	1800	S15.000	63.670	750				
SS223	66.200	2.560	Open Manhole	1800	S15.001	63.640	750	S15.000	63.640	750	
SS217	66.000	1.360	Open Manhole	1200	S16.000	64.640	225				
SS218	66.200	1.790	Open Manhole	1200	S16.001	64.410	225	S16.000	64.410	225	
SS219	66.350	2.030	Open Manhole	1200	S16.002	64.320	225	S16.001	64.320	225	
SS220	66.100	1.760	Open Manhole	1200	S17.000	64.340	225				
SS221	66.150	1.870	Open Manhole	1200	S16.003	64.280	300	S16.002	64.280	225	
								S17.000	64.280	225	
SS224	66.100	2.530	Open Manhole	1800	S15.002	63.570	750	S15.001	63.570	750	
								S16.003	64.080	300	60
SS225	66.000	1.800	Open Manhole	1200	S18.000	64.200	225				
SS220	65.850	2.350	Open Manhole	1800	S15.003	63.500	750	S15.002	63.500	750	
								S18.000	63.860	225	

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
SS229	67.000	3.100	Open Manhole	1200	S19.000	63.900	225				
SS228	66.500	2.618	Open Manhole	1200	S20.000	63.882	300				
SS230	66.500	2.721	Open Manhole	1200	S19.001	63.780	300	S19.000	63.780	225	
								S20.000	63.779	300	
SS227	66.450	3.040	Open Manhole	1800	S15.004	63.410	750	S15.003	63.410	750	
								S19.001	63.410	300	
SS231	66.450	3.120	Open Manhole	1800	S15.005	63.330	750	S15.004	63.330	750	
SS232	66.750	3.430	Open Manhole	1800	S10.003	63.320	750	S10.002	63.320	450	
								S15.005	63.320	750	
SS233	66.000	2.711	Open Manhole	1800	S10.004	63.289	750	S10.003	63.289	750	
SS234	65.500	2.238	Open Manhole	1800	S10.005	63.262	750	S10.004	63.262	750	
SS235	65.350	2.170	Open Manhole	1800	S10.006	63.180	225	S10.005	63.180	750	
S	64.700	1.556	Open Manhole	0		OUTFALL		S10.006	63.144	225	

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	300	SS110	65.950	64.904	0.746	Open Manhole	1200
S2.000	o	300	SS111	65.850	64.425	1.125	Open Manhole	1200
S1.001	o	300	SS112	66.100	64.053	1.747	Open Manhole	1200
S3.000	o	225	SS108	66.000	64.575	1.200	Open Manhole	1200
S4.000	o	300	SS107	65.900	64.400	1.200	Open Manhole	1200
S3.001	o	375	SS109	65.770	64.019	1.376	Open Manhole	1350
S1.002	o	375	SS113	66.300	63.813	2.112	Open Manhole	1350
S5.000	o	225	SS101	66.750	65.325	1.200	Open Manhole	1200
S5.001	o	225	SS102	66.350	64.925	1.200	Open Manhole	1200
S5.002	o	300	SS103	66.100	64.695	1.105	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	47.891	100.0	SS112	66.100	64.425	1.375	Open Manhole	1200
S2.000	44.572	120.0	SS112	66.100	64.054	1.746	Open Manhole	1200
S1.001	27.099	164.2	SS113	66.300	63.888	2.112	Open Manhole	1350
S3.000	36.349	75.6	SS109	65.770	64.094	1.451	Open Manhole	1350
S4.000	45.814	149.7	SS109	65.770	64.094	1.376	Open Manhole	1350
S3.001	46.218	224.4	SS113	66.300	63.813	2.112	Open Manhole	1350
S1.002	67.267	574.9	SS120	66.200	63.696	2.129	Open Manhole	1500
S5.000	37.726	94.3	SS102	66.350	64.925	1.200	Open Manhole	1200
S5.001	38.653	249.4	SS103	66.100	64.770	1.105	Open Manhole	1200
S5.002	70.035	121.8	SS105	65.740	64.120	1.320	Open Manhole	1350

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)
S6.000	o	225	SS104	65.850	64.425	1.200	Open Manhole	1200
S5.003	o	375	SS105	65.740	64.120	1.245	Open Manhole	1350
S5.004	o	600	SS106	65.900	63.934	1.366	Open Manhole	1500
S7.000	o	300	SS116	66.600	64.990	1.310	Open Manhole	1200
S8.000	o	375	SS114	66.150	64.670	1.105	Open Manhole	1350
S8.001	o	375	SS115	66.600	64.445	1.780	Open Manhole	1350
S7.001	o	375	SS116	66.650	64.360	1.915	Open Manhole	1350
S9.000	o	225	SS118	66.550	65.125	1.200	Open Manhole	1200
S7.002	o	450	SS119	66.750	63.830	2.470	Open Manhole	1350
S1.003	o	600	SS120	66.200	63.696	1.904	Open Manhole	1500
S1.004	o	750	SS121	66.200	63.672	1.778	Open Manhole	1800

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)
S6.000	33.520	145.7	SS105	65.740	64.195	1.320	Open Manhole	1350
S5.003	43.075	231.6	SS106	65.900	63.934	1.591	Open Manhole	1500
S5.004	55.087	231.5	SS120	66.200	63.696	1.904	Open Manhole	1500
S7.000	105.943	173.7	SS116	66.650	64.380	1.970	Open Manhole	1350
S8.000	53.499	237.8	SS115	66.600	64.445	1.780	Open Manhole	1350
S8.001	20.097	236.4	SS116	66.650	64.360	1.915	Open Manhole	1350
S7.001	78.729	148.5	SS119	66.750	63.830	2.545	Open Manhole	1350
S9.000	76.216	58.8	SS119	66.750	63.829	2.696	Open Manhole	1350
S7.002	20.805	155.3	SS120	66.200	63.696	2.054	Open Manhole	1500
S1.003	5.902	245.9	SS121	66.200	63.672	1.928	Open Manhole	1800
S1.004	60.709	906.1	SS122	66.750	63.605	2.395	Open Manhole	1800

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)
S1.005	o	225	SS122	66.750	63.605	2.920	Open Manhole	1800
S1.006	o	225	SS123	66.800	63.582	2.993	Open Manhole	1200
S1.007	o	225	SS124	66.350	63.452	2.673	Open Manhole	1200
S1.008	o	225	SS125	66.100	63.291	2.584	Open Manhole	1200
S10.000	o	300	SS214	67.100	64.060	2.740	Open Manhole	1200
S10.001	o	300	SS215	67.500	63.850	3.350	Open Manhole	1200
S11.000	o	225	SS210	66.700	64.200	2.275	Open Manhole	1200
S12.000	o	225	SS209	66.750	64.210	2.315	Open Manhole	1200
S11.001	o	225	SS211	66.800	63.970	2.605	Open Manhole	1200
S13.000	o	225	SS201	66.750	64.810	1.715	Open Manhole	1200
S13.001	o	225	SS202	66.850	64.650	1.975	Open Manhole	1200
S13.002	o	300	SS203	66.900	64.530	2.070	Open Manhole	1200
S13.003	o	300	SS204	66.850	64.490	2.060	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)
S1.005	6.764	300.0	SS123	66.800	63.582	2.993	Open Manhole	1200
S1.006	39.086	300.0	SS124	66.350	63.452	2.673	Open Manhole	1200
S1.007	48.491	300.0	SS125	66.100	63.290	2.585	Open Manhole	1200
S1.008	6.236	300.0	S	66.100	63.270	2.605	Open Manhole	0
S10.000	47.647	226.9	SS215	67.500	63.850	3.350	Open Manhole	1200
S10.001	76.508	225.0	SS216	67.250	63.510	3.440	Open Manhole	1350
S11.000	50.741	220.6	SS211	66.800	63.970	2.605	Open Manhole	1200
S12.000	55.287	230.4	SS211	66.800	63.970	2.605	Open Manhole	1200
S11.001	26.083	217.4	SS212	66.900	63.850	2.825	Open Manhole	1350
S13.000	35.184	219.9	SS202	66.850	64.650	1.975	Open Manhole	1200
S13.001	28.457	237.1	SS203	66.900	64.530	2.145	Open Manhole	1200
S13.002	10.027	250.7	SS204	66.850	64.490	2.060	Open Manhole	1200
S13.003	11.539	192.3	SS205	66.800	64.430	2.070	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)
S13.004	o	300	SS205	66.800	64.430	2.070	Open Manhole	1200
S14.000	o	225	SS206	66.950	64.270	2.455	Open Manhole	1200
S13.005	o	375	SS207	66.700	64.200	2.125	Open Manhole	1350
S13.006	o	375	SS208	66.800	63.890	2.535	Open Manhole	1350
S11.002	o	375	SS212	66.900	63.850	2.675	Open Manhole	1350
S11.003	o	450	SS213	67.000	63.800	2.750	Open Manhole	1350
S10.002	o	450	SS216	67.250	63.510	3.290	Open Manhole	1350
S15.000	o	750	SS222	65.900	63.670	1.480	Open Manhole	1800
S15.001	o	750	SS223	66.200	63.640	1.810	Open Manhole	1800
S16.000	o	225	SS217	66.000	64.640	1.135	Open Manhole	1200
S16.001	o	225	SS218	66.200	64.410	1.565	Open Manhole	1200
S16.002	o	225	SS219	66.350	64.320	1.805	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)
S13.004	51.717	224.9	SS207	66.700	64.200	2.200	Open Manhole	1350
S14.000	21.348	305.0	SS207	66.700	64.200	2.275	Open Manhole	1350
S13.005	70.828	228.5	SS208	66.800	63.890	2.535	Open Manhole	1350
S13.006	8.146	203.7	SS212	66.900	63.850	2.675	Open Manhole	1350
S11.002	11.294	225.9	SS213	67.000	63.800	2.825	Open Manhole	1350
S11.003	66.102	227.9	SS216	67.250	63.510	3.290	Open Manhole	1350
S10.002	32.104	169.0	SS232	66.750	63.320	2.980	Open Manhole	1800
S15.000	26.075	869.2	SS223	66.200	63.640	1.810	Open Manhole	1800
S15.001	50.212	717.3	SS224	66.100	63.570	1.780	Open Manhole	1800
S16.000	50.617	220.1	SS218	66.200	64.410	1.565	Open Manhole	1200
S16.001	19.635	218.2	SS219	66.350	64.320	1.805	Open Manhole	1200
S16.002	9.341	233.5	SS221	66.150	64.280	1.645	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)
S17.000	o	225	SS220	66.100	64.340	1.535	Open Manhole	1200
S16.003	o	300	SS221	66.150	64.280	1.570	Open Manhole	1200
S15.002	o	750	SS224	66.100	63.570	1.780	Open Manhole	1800
S18.000	o	225	SS225	66.000	64.200	1.575	Open Manhole	1200
S15.003	o	750	SS220	65.850	63.500	1.600	Open Manhole	1800
S19.000	o	225	SS229	67.000	63.900	2.875	Open Manhole	1200
S20.000	o	300	SS228	66.500	63.882	2.318	Open Manhole	1200
S19.001	o	300	SS230	66.500	63.780	2.420	Open Manhole	1200
S15.004	o	750	SS227	66.450	63.410	2.290	Open Manhole	1800

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)
S17.000	12.814	213.6	SS221	66.150	64.280	1.645	Open Manhole	1200
S16.003	50.011	250.1	SS224	66.100	64.080	1.720	Open Manhole	1800
S15.002	51.920	741.7	SS220	65.850	63.500	1.600	Open Manhole	1800
S18.000	20.049	59.0	SS220	65.850	63.860	1.765	Open Manhole	1800
S15.003	65.202	724.5	SS227	66.450	63.410	2.290	Open Manhole	1800
S19.000	26.689	222.4	SS230	66.500	63.780	2.495	Open Manhole	1200
S20.000	41.030	398.3	SS230	66.500	63.779	2.421	Open Manhole	1200
S19.001	79.656	215.3	SS227	66.450	63.410	2.740	Open Manhole	1800
S15.004	30.318	379.0	SS231	66.450	63.330	2.370	Open Manhole	1800

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)
S15.005	o	750	SS231	66.450	63.330	2.370	Open Manhole	1800
S10.003	o	750	SS232	66.750	63.320	2.680	Open Manhole	1800
S10.004	o	750	SS233	66.000	63.289	1.961	Open Manhole	1800
S10.005	o	750	SS234	65.500	63.262	1.488	Open Manhole	1800
S10.006	o	225	SS235	65.350	63.180	1.945	Open Manhole	1800

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)
S15.005	4.016	401.6	SS232	66.750	63.320	2.680	Open Manhole	1800
S10.003	20.653	666.2	SS233	66.000	63.289	1.961	Open Manhole	1800
S10.004	16.333	604.9	SS234	65.500	63.262	1.488	Open Manhole	1800
S10.005	49.089	598.6	SS235	65.350	63.180	1.420	Open Manhole	1800
S10.006	21.382	598.6	S	64.700	63.144	1.331	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	User	-	100	0.182	0.182	0.182
2.000	User	-	100	0.136	0.136	0.136
1.001	User	-	100	0.061	0.061	0.061
3.000	User	-	100	0.129	0.129	0.129
4.000	User	-	100	0.152	0.152	0.152
3.001	User	-	100	0.123	0.123	0.123
1.002	-	-	100	0.000	0.000	0.000
5.000	User	-	100	0.118	0.118	0.118
5.001	User	-	100	0.042	0.042	0.042
5.002	User	-	100	0.118	0.118	0.118
6.000	User	-	100	0.108	0.108	0.108
5.003	User	-	100	0.096	0.096	0.096
5.004	User	-	100	0.181	0.181	0.181
7.000	User	-	100	0.288	0.288	0.288
8.000	User	-	100	0.286	0.286	0.286
8.001	User	-	100	0.022	0.022	0.022
7.001	User	-	100	0.161	0.161	0.161
9.000	User	-	100	0.236	0.236	0.236
7.002	-	-	100	0.000	0.000	0.000
1.003	-	-	100	0.000	0.000	0.000
1.004	-	-	100	0.000	0.000	0.000
1.005	-	-	100	0.000	0.000	0.000
1.006	-	-	100	0.000	0.000	0.000
1.007	-	-	100	0.000	0.000	0.000
1.008	-	-	100	0.000	0.000	0.000
10.000	User	-	100	0.355	0.355	0.355
10.001	-	-	100	0.000	0.000	0.000
11.000	User	-	100	0.095	0.095	0.095
12.000	User	-	100	0.183	0.183	0.183
11.001	-	-	100	0.000	0.000	0.000
13.000	User	-	100	0.052	0.052	0.052
13.001	User	-	100	0.098	0.098	0.098
13.002	User	-	100	0.032	0.032	0.032
13.003	User	-	100	0.011	0.011	0.011
13.004	User	-	100	0.054	0.054	0.054
14.000	User	-	100	0.049	0.049	0.049
13.005	User	-	100	0.264	0.264	0.264
13.006	User	-	100	0.017	0.017	0.017
11.002	User	-	100	0.016	0.016	0.016
11.003	User	-	100	0.252	0.252	0.252
10.002	User	-	100	0.068	0.068	0.068
15.000	User	-	100	0.039	0.039	0.039
15.001	User	-	100	0.135	0.135	0.135
16.000	User	-	100	0.136	0.136	0.136
16.001	User	-	100	0.029	0.029	0.029
16.002	-	-	100	0.000	0.000	0.000

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
17.000	User	-	100	0.027	0.027	0.027
16.003	User	-	100	0.049	0.049	0.049
15.002	User	-	100	0.131	0.131	0.131
18.000	User	-	100	0.039	0.039	0.039
15.003	-	-	100	0.000	0.000	0.000
19.000	User	-	100	0.043	0.043	0.043
20.000	User	-	100	0.058	0.058	0.058
19.001	User	-	100	0.209	0.209	0.209
15.004	User	-	100	0.125	0.125	0.125
15.005	User	-	100	0.066	0.066	0.066
10.003	-	-	100	0.000	0.000	0.000
10.004	-	-	100	0.000	0.000	0.000
10.005	-	-	100	0.000	0.000	0.000
10.006	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				5.070	5.070	5.070

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)
S1.008	S	66.100	63.270	0.000	0	0

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)
S10.006	S	64.700	63.144	0.000	0	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	10.000
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 2 Number of Storage Structures 2 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	Scotland and Ireland	Cv (Winter)	0.840
M5-60 (mm)	20.000	Storm Duration (mins)	30
Ratio R	0.200		

Online Controls for Storm

Hydro-Brake® Optimum Manhole: SS121, DS/PN: S1.004, Volume (m³): 7.6

Unit Reference	MD-SHE-0206-2430-1700-2430
Design Head (m)	1.700
Design Flow (l/s)	24.3
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface Sump Available
Yes Diameter (mm)	206
Invert Level (m)	63.672
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1800

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.700	24.3	Kick-Flo®	1.100	19.7
Flush-Flo™	0.506	24.3	Mean Flow over Head Range	-	21.0

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)
0.100	7.1	1.200	20.6	3.000	31.9	7.000	48.0
0.200	19.8	1.400	22.1	3.500	34.3	7.500	49.6
0.300	23.2	1.600	23.6	4.000	36.6	8.000	51.2
0.400	24.1	1.800	25.0	4.500	38.7	8.500	52.7
0.500	24.3	2.000	26.2	5.000	40.8	9.000	54.2
0.600	24.2	2.200	27.5	5.500	42.7	9.500	55.6
0.800	23.4	2.400	28.6	6.000	44.5		
1.000	21.6	2.600	29.8	6.500	46.3		

Hydro-Brake® Optimum Manhole: SS234, DS/PN: S10.005, Volume (m³): 12.1

Unit Reference	MD-SHE-0290-5100-1600-5100
Design Head (m)	1.600
Design Flow (l/s)	51.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface Sump Available
Yes Diameter (mm)	290
Invert Level (m)	63.262
Minimum Outlet Pipe Diameter (mm)	375

Hydro-Brake® Optimum Manhole: SS234, DS/PN: S10.005, Volume (m³): 12.1

Suggested Manhole Diameter (mm) 2100

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.600	51.0	Kick-Flo®	1.119	42.9
Flush-Flo™	0.520	50.9	Mean Flow over Head Range	-	43.2

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)
0.100	9.0	1.200	44.4	3.000	69.1	7.000	104.3
0.200	29.8	1.400	47.8	3.500	74.5	7.500	107.9
0.300	48.4	1.600	51.0	4.000	79.5	8.000	111.4
0.400	50.3	1.800	54.0	4.500	84.1	8.500	114.7
0.500	50.9	2.000	56.8	5.000	88.6	9.000	118.0
0.600	50.8	2.200	59.5	5.500	92.8	9.500	121.1
0.800	49.5	2.400	62.0	6.000	96.8		
1.000	46.8	2.600	64.5	6.500	100.6		

Storage Structures for Storm

Cellular Storage Manhole: SS121, DS/PN: S1.004

Invert Level (m) 63.672 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.60
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	1133.0	0.0	0.400	1133.0	0.0
0.100	1133.0	0.0	0.500	1133.0	0.0
0.200	1133.0	0.0	0.700	1133.0	0.0
0.300	1133.0	0.0	0.885	1133.0	0.0

Cellular Storage Manhole: SS234, DS/PN: S10.005

Invert Level (m) 63.262 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.60
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	871.0	0.0	0.600	871.0	0.0
0.100	871.0	0.0	0.700	871.0	0.0
0.200	871.0	0.0	0.717	871.0	0.0
0.300	871.0	0.0	1.000	871.0	0.0
0.400	871.0	0.0	1.200	871.0	0.0
0.500	871.0	0.0			

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	10.000
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 2 Number of Storage Structures 2 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.200
Region	Scotland and Ireland	Cv (Summer)	0.750
M5-60 (mm)	20.000	Cv (Winter)	0.850

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Coarse Inertia Status OFF
DTS Status ON

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)	1
Climate Change (%)	0

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	SS110	15 Winter	1	+0%					65.006
S2.000	SS111	15 Winter	1	+0%					64.518
S1.001	SS112	30 Winter	1	+0%	1/15 Winter				64.367
S3.000	SS108	15 Winter	1	+0%					64.664
S4.000	SS107	15 Winter	1	+0%					64.504
S3.001	SS109	30 Winter	1	+0%					64.352
S1.002	SS113	30 Winter	1	+0%	1/15 Summer				64.322
S5.000	SS101	15 Winter	1	+0%					65.415
S5.001	SS102	15 Winter	1	+0%					65.068
S5.002	SS103	15 Winter	1	+0%					64.819
S6.000	SS104	15 Winter	1	+0%					64.522
S5.003	SS105	720 Winter	1	+0%					64.316
S5.004	SS106	720 Winter	1	+0%					64.312
S7.000	SS116	15 Winter	1	+0%					65.144
S8.000	SS114	15 Winter	1	+0%					64.823
S8.001	SS115	15 Winter	1	+0%					64.653

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	SS110	-0.198	0.000	0.26		26.7	OK	
S2.000	SS111	-0.207	0.000	0.21		20.0	OK	
S1.001	SS112	0.014	0.000	0.54		42.0	SURCHARGED	
S3.000	SS108	-0.136	0.000	0.34		19.0	OK	
S4.000	SS107	-0.196	0.000	0.26		22.1	OK	
S3.001	SS109	-0.042	0.000	0.34		42.0	OK	
S1.002	SS113	0.134	0.000	0.89		69.7	SURCHARGED	
S5.000	SS101	-0.135	0.000	0.34		17.4	OK	
S5.001	SS102	-0.082	0.000	0.71		22.1	OK	
S5.002	SS103	-0.176	0.000	0.36		34.8	OK	
S6.000	SS104	-0.128	0.000	0.39		15.9	OK	
S5.003	SS105	-0.179	0.000	0.10		11.7	OK	
S5.004	SS106	-0.222	0.000	0.04		15.5	OK	
S7.000	SS116	-0.146	0.000	0.48		39.6	OK	
S8.000	SS114	-0.222	0.000	0.34		41.2	OK	
S8.001	SS115	-0.167	0.000	0.38		41.5	OK	

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)
S7.001	SS116	15 Winter	1	+0%					64.579
S9.000	SS118	15 Winter	1	+0%					65.242
S7.002	SS119	720 Winter	1	+0%	1/480 Winter				64.314
S1.003	SS120	480 Winter	1	+0%	1/480 Winter				64.319
S1.004	SS121	480 Winter	1	+0%					64.330
S1.005	SS122	480 Winter	1	+0%	1/180 Winter				63.884
S1.006	SS123	480 Winter	1	+0%					63.793
S1.007	SS124	480 Winter	1	+0%					63.651
S1.008	SS125	600 Summer	1	+0%					63.516
S10.000	SS214	15 Winter	1	+0%					64.260
S10.001	SS215	15 Winter	1	+0%					64.040
S11.000	SS210	15 Winter	1	+0%					64.310
S12.000	SS209	15 Winter	1	+0%					64.391
S11.001	SS211	15 Winter	1	+0%	1/15 Summer				64.268
S13.000	SS201	15 Winter	1	+0%					64.883
S13.001	SS202	15 Winter	1	+0%					64.776
S13.002	SS203	15 Winter	1	+0%					64.670
S13.003	SS204	15 Winter	1	+0%					64.626
S13.004	SS205	15 Winter	1	+0%					64.565
S14.000	SS206	15 Winter	1	+0%					64.383
S13.005	SS207	15 Winter	1	+0%					64.387
S13.006	SS208	15 Winter	1	+0%					64.212
S11.002	SS212	15 Winter	1	+0%					64.170
S11.003	SS213	30 Winter	1	+0%					64.061
S10.002	SS216	30 Winter	1	+0%	1/30 Winter				63.962
S15.000	SS222	30 Winter	1	+0%					63.891
S15.001	SS223	30 Winter	1	+0%					63.879
S16.000	SS217	15 Winter	1	+0%					64.767
S16.001	SS218	15 Winter	1	+0%					64.554
S16.002	SS219	15 Winter	1	+0%					64.475
S17.000	SS220	15 Winter	1	+0%					64.424
S16.003	SS221	15 Winter	1	+0%					64.423
S15.002	SS224	30 Winter	1	+0%					63.872
S18.000	SS225	15 Winter	1	+0%					64.241
S15.003	SS220	30 Winter	1	+0%					63.857
S19.000	SS229	15 Winter	1	+0%					63.972
S20.000	SS228	15 Winter	1	+0%					63.975
S19.001	SS230	15 Winter	1	+0%					63.935
S15.004	SS227	30 Winter	1	+0%					63.865
S15.005	SS231	360 Winter	1	+0%					63.888
S10.003	SS232	360 Winter	1	+0%					63.889
S10.004	SS233	360 Winter	1	+0%					63.879
S10.005	SS234	360 Winter	1	+0%					63.884
S10.006	SS235	600 Winter	1	+0%	1/30 Summer				63.554

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)	Pipe Flow (l/s)	Status	Level Exceeded
S7.001	SS116	-0.156	0.000	0.61		95.0	OK	
S9.000	SS118	-0.108	0.000	0.52		34.2	OK	
S7.002	SS119	0.034	0.000	0.11		23.4	SURCHARGED	
S1.003	SS120	0.023	0.000	0.31		70.9	SURCHARGED	
S1.004	SS121	-0.092	0.000	0.07		23.9	OK	
S1.005	SS122	0.054	0.000	1.03		23.9	SURCHARGED	
S1.006	SS123	-0.014	0.000	0.84		23.9	OK	
S1.007	SS124	-0.026	0.000	0.84		23.9	OK	
S1.008	SS125	0.000	0.000	1.05		24.0	OK	
S10.000	SS214	-0.100	0.000	0.74		51.3	OK	
S10.001	SS215	-0.110	0.000	0.69		49.0	OK	
S11.000	SS210	-0.115	0.000	0.40		13.3	OK	
S12.000	SS209	-0.044	0.000	0.78		25.5	OK	
S11.001	SS211	0.073	0.000	0.91		29.5	SURCHARGED	
S13.000	SS201	-0.152	0.000	0.23		7.6	OK	
S13.001	SS202	-0.099	0.000	0.60		18.7	OK	
S13.002	SS203	-0.160	0.000	0.40		22.0	OK	
S13.003	SS204	-0.164	0.000	0.38		23.5	OK	
S13.004	SS205	-0.165	0.000	0.41		28.9	OK	
S14.000	SS206	-0.112	0.000	0.26		7.0	OK	
S13.005	SS207	-0.188	0.000	0.48		60.0	OK	
S13.006	SS208	-0.053	0.000	0.61		60.0	OK	
S11.002	SS212	-0.055	0.000	0.87		87.5	OK	
S11.003	SS213	-0.189	0.000	0.54		107.2	OK	
S10.002	SS216	0.002	0.000	0.61		131.0	SURCHARGED	
S15.000	SS222	-0.529	0.000	0.02		4.3	OK	
S15.001	SS223	-0.511	0.000	0.03		13.5	OK	
S16.000	SS217	-0.098	0.000	0.58		19.4	OK	
S16.001	SS218	-0.081	0.000	0.69		22.0	OK	
S16.002	SS219	-0.070	0.000	0.79		22.1	OK	
S17.000	SS220	-0.141	0.000	0.13		3.9	OK	
S16.003	SS221	-0.157	0.000	0.46		30.3	OK	
S15.002	SS224	-0.448	0.000	0.12		45.4	OK	
S18.000	SS225	-0.184	0.000	0.09		5.7	OK	
S15.003	SS220	-0.393	0.000	0.10		38.7	OK	
S19.000	SS229	-0.153	0.000	0.20		6.4	OK	
S20.000	SS228	-0.207	0.000	0.16		8.1	OK	
S19.001	SS230	-0.145	0.000	0.50		36.6	OK	
S15.004	SS227	-0.295	0.000	0.13		65.9	OK	
S15.005	SS231	-0.192	0.000	0.09		33.4	OK	
S10.003	SS232	-0.181	0.000	0.32		86.5	OK	
S10.004	SS233	-0.160	0.000	0.35		85.4	OK	
S10.005	SS234	-0.128	0.000	0.10		43.4	OK	

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)	Pipe Flow (l/s)	Status	Level Exceeded
S10.006	SS235	0.149	0.000	2.69		44.8	SURCHARGED	

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	10.000
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 2 Number of Storage Structures 2 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.200
Region	Scotland and Ireland	Cv (Summer)	0.750
M5-60 (mm)	20.000	Cv (Winter)	0.850

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Coarse Inertia Status OFF
DTS Status ON

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
Climate Change (%)	0

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	SS110	15 Winter	2	+0%					65.017
S2.000	SS111	15 Winter	2	+0%					64.528
S1.001	SS112	30 Winter	2	+0%	2/15 Summer				64.490
S3.000	SS108	15 Winter	2	+0%					64.674
S4.000	SS107	30 Winter	2	+0%					64.530
S3.001	SS109	30 Winter	2	+0%	2/15 Summer				64.477
S1.002	SS113	720 Winter	2	+0%	2/15 Summer				64.460
S5.000	SS101	15 Winter	2	+0%					65.426
S5.001	SS102	15 Winter	2	+0%					65.091
S5.002	SS103	15 Winter	2	+0%					64.834
S6.000	SS104	15 Winter	2	+0%					64.534
S5.003	SS105	720 Winter	2	+0%					64.458
S5.004	SS106	720 Winter	2	+0%					64.454
S7.000	SS116	15 Winter	2	+0%					65.164
S8.000	SS114	15 Winter	2	+0%					64.841
S8.001	SS115	15 Winter	2	+0%					64.674

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)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	SS110	-0.187	0.000	0.31		32.3	OK	
S2.000	SS111	-0.197	0.000	0.25		24.1	OK	
S1.001	SS112	0.137	0.000	0.58		45.3	SURCHARGED	
S3.000	SS108	-0.126	0.000	0.40		22.9	OK	
S4.000	SS107	-0.170	0.000	0.26		22.2	OK	
S3.001	SS109	0.083	0.000	0.39		48.1	SURCHARGED	
S1.002	SS113	0.272	0.000	0.26		20.1	SURCHARGED	
S5.000	SS101	-0.124	0.000	0.41		21.0	OK	
S5.001	SS102	-0.059	0.000	0.85		26.5	OK	
S5.002	SS103	-0.161	0.000	0.43		41.8	OK	
S6.000	SS104	-0.116	0.000	0.47		19.1	OK	
S5.003	SS105	-0.037	0.000	0.11		13.4	OK	
S5.004	SS106	-0.080	0.000	0.04		17.5	OK	
S7.000	SS116	-0.126	0.000	0.58		47.7	OK	
S8.000	SS114	-0.204	0.000	0.41		49.8	OK	
S8.001	SS115	-0.146	0.000	0.46		50.4	OK	

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)
S7.001	SS116	15 Winter	2	+0%					64.613
S9.000	SS118	15 Winter	2	+0%					65.257
S7.002	SS119	720 Winter	2	+0%	2/15 Summer				64.456
S1.003	SS120	480 Winter	2	+0%	2/180 Winter				64.453
S1.004	SS121	480 Winter	2	+0%	2/480 Winter				64.460
S1.005	SS122	480 Winter	2	+0%	2/120 Summer				63.886
S1.006	SS123	480 Winter	2	+0%					63.796
S1.007	SS124	480 Winter	2	+0%					63.652
S1.008	SS125	600 Summer	2	+0%					63.516
S10.000	SS214	15 Winter	2	+0%					64.309
S10.001	SS215	30 Winter	2	+0%					64.103
S11.000	SS210	15 Winter	2	+0%					64.382
S12.000	SS209	15 Winter	2	+0%	2/15 Summer				64.473
S11.001	SS211	15 Winter	2	+0%	2/15 Summer				64.348
S13.000	SS201	15 Winter	2	+0%					64.891
S13.001	SS202	15 Winter	2	+0%					64.793
S13.002	SS203	15 Winter	2	+0%					64.680
S13.003	SS204	15 Winter	2	+0%					64.636
S13.004	SS205	15 Winter	2	+0%					64.581
S14.000	SS206	15 Winter	2	+0%					64.412
S13.005	SS207	15 Winter	2	+0%					64.417
S13.006	SS208	30 Winter	2	+0%	2/15 Winter				64.317
S11.002	SS212	30 Winter	2	+0%	2/30 Winter				64.240
S11.003	SS213	30 Winter	2	+0%					64.143
S10.002	SS216	30 Winter	2	+0%	2/15 Winter				64.021
S15.000	SS222	600 Winter	2	+0%					63.935
S15.001	SS223	30 Winter	2	+0%					63.948
S16.000	SS217	15 Winter	2	+0%					64.784
S16.001	SS218	15 Winter	2	+0%					64.598
S16.002	SS219	15 Winter	2	+0%					64.497
S17.000	SS220	15 Winter	2	+0%					64.429
S16.003	SS221	15 Winter	2	+0%					64.434
S15.002	SS224	30 Winter	2	+0%					63.954
S18.000	SS225	15 Winter	2	+0%					64.246
S15.003	SS220	600 Winter	2	+0%					63.933
S19.000	SS229	15 Winter	2	+0%					63.986
S20.000	SS228	15 Winter	2	+0%					63.993
S19.001	SS230	30 Winter	2	+0%					63.989
S15.004	SS227	360 Winter	2	+0%					63.943
S15.005	SS231	360 Winter	2	+0%					63.966
S10.003	SS232	360 Winter	2	+0%					63.979
S10.004	SS233	360 Winter	2	+0%					63.975
S10.005	SS234	360 Winter	2	+0%					63.975
S10.006	SS235	600 Winter	2	+0%	2/15 Winter				63.592

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)	Pipe Flow (l/s)	Status	Level Exceeded
S7.001	SS116	-0.122	0.000	0.73		113.6	OK	
S9.000	SS118	-0.093	0.000	0.62		41.2	OK	
S7.002	SS119	0.176	0.000	0.13		26.8	SURCHARGED	
S1.003	SS120	0.157	0.000	0.35		80.5	SURCHARGED	
S1.004	SS121	0.038	0.000	0.07		24.0	SURCHARGED	
S1.005	SS122	0.056	0.000	1.03		24.0	SURCHARGED	
S1.006	SS123	-0.011	0.000	0.85		24.0	OK	
S1.007	SS124	-0.025	0.000	0.84		24.0	OK	
S1.008	SS125	0.000	0.000	1.06		24.2	OK	
S10.000	SS214	-0.051	0.000	0.88		61.1	OK	
S10.001	SS215	-0.047	0.000	0.69		48.7	OK	
S11.000	SS210	-0.043	0.000	0.48		15.9	OK	
S12.000	SS209	0.038	0.000	0.91		29.9	SURCHARGED	
S11.001	SS211	0.153	0.000	1.07		34.8	SURCHARGED	
S13.000	SS201	-0.144	0.000	0.28		9.1	OK	
S13.001	SS202	-0.082	0.000	0.72		22.6	OK	
S13.002	SS203	-0.150	0.000	0.49		26.6	OK	
S13.003	SS204	-0.154	0.000	0.46		28.3	OK	
S13.004	SS205	-0.149	0.000	0.50		34.8	OK	
S14.000	SS206	-0.083	0.000	0.31		8.3	OK	
S13.005	SS207	-0.158	0.000	0.57		70.9	OK	
S13.006	SS208	0.052	0.000	0.66		64.9	SURCHARGED	
S11.002	SS212	0.015	0.000	0.97		97.5	SURCHARGED	
S11.003	SS213	-0.107	0.000	0.62		123.6	OK	
S10.002	SS216	0.061	0.000	0.74		158.5	SURCHARGED	
S15.000	SS222	-0.485	0.000	0.00		1.1	OK	
S15.001	SS223	-0.442	0.000	0.05		18.3	OK	
S16.000	SS217	-0.081	0.000	0.69		23.3	OK	
S16.001	SS218	-0.037	0.000	0.77		24.5	OK	
S16.002	SS219	-0.048	0.000	0.89		24.7	OK	
S17.000	SS220	-0.136	0.000	0.15		4.6	OK	
S16.003	SS221	-0.146	0.000	0.52		34.0	OK	
S15.002	SS224	-0.366	0.000	0.14		54.3	OK	
S18.000	SS225	-0.179	0.000	0.11		6.9	OK	
S15.003	SS220	-0.317	0.000	0.04		14.4	OK	
S19.000	SS229	-0.139	0.000	0.23		7.5	OK	
S20.000	SS228	-0.189	0.000	0.19		9.7	OK	
S19.001	SS230	-0.091	0.000	0.54		39.5	OK	
S15.004	SS227	-0.217	0.000	0.07		34.0	OK	
S15.005	SS231	-0.114	0.000	0.10		35.8	OK	
S10.003	SS232	-0.091	0.000	0.36		96.4	OK	
S10.004	SS233	-0.064	0.000	0.39		94.7	OK	
S10.005	SS234	-0.037	0.000	0.11		48.3	OK	

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)	Pipe Flow (l/s)	Status	Level Exceeded
S10.006	SS235	0.187	0.000	2.94		48.9	SURCHARGED	

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	10.000
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 2 Number of Storage Structures 2 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.200
Region Scotland and Ireland Cv (Summer) 0.750
M5-60 (mm) 20.000 Cv (Winter) 0.850

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Coarse Inertia Status OFF
DTS Status ON

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) 30
Climate Change (%) 0

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	SS110	15 Winter	30	+0%	30/15 Winter				65.305
S2.000	SS111	15 Winter	30	+0%	30/15 Summer				65.278
S1.001	SS112	960 Winter	30	+0%	30/15 Summer				65.191
S3.000	SS108	15 Winter	30	+0%	30/15 Summer				65.292
S4.000	SS107	30 Winter	30	+0%	30/15 Summer				65.232
S3.001	SS109	960 Winter	30	+0%	30/15 Summer				65.190
S1.002	SS113	960 Winter	30	+0%	30/15 Summer				65.187
S5.000	SS101	15 Winter	30	+0%	30/15 Winter				65.552
S5.001	SS102	15 Winter	30	+0%	30/15 Summer				65.355
S5.002	SS103	960 Winter	30	+0%	30/15 Winter				65.190
S6.000	SS104	960 Winter	30	+0%	30/15 Summer				65.188
S5.003	SS105	960 Winter	30	+0%	30/15 Summer				65.185
S5.004	SS106	960 Winter	30	+0%	30/15 Winter				65.181
S7.000	SS116	15 Winter	30	+0%	30/15 Summer				65.566
S8.000	SS114	15 Winter	30	+0%	30/15 Summer				65.346
S8.001	SS115	15 Winter	30	+0%	30/15 Summer				65.267

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	SS110	0.101	0.000	0.55		57.6	SURCHARGED	
S2.000	SS111	0.553	0.000	0.36		33.8	SURCHARGED	
S1.001	SS112	0.838	0.000	0.17		12.9	SURCHARGED	
S3.000	SS108	0.492	0.000	0.64		36.2	SURCHARGED	
S4.000	SS107	0.532	0.000	0.39		33.3	SURCHARGED	
S3.001	SS109	0.796	0.000	0.11		13.7	SURCHARGED	
S1.002	SS113	0.999	0.000	0.34		26.4	SURCHARGED	
S5.000	SS101	0.002	0.000	0.71		36.0	SURCHARGED	
S5.001	SS102	0.205	0.000	1.48		45.9	SURCHARGED	
S5.002	SS103	0.195	0.000	0.11		10.3	SURCHARGED	
S6.000	SS104	0.538	0.000	0.10		3.8	SURCHARGED	
S5.003	SS105	0.690	0.000	0.14		16.6	SURCHARGED	
S5.004	SS106	0.647	0.000	0.06		22.8	SURCHARGED	
S7.000	SS116	0.276	0.000	0.96		78.2	SURCHARGED	
S8.000	SS114	0.301	0.000	0.72		86.5	SURCHARGED	
S8.001	SS115	0.447	0.000	0.60		65.5	SURCHARGED	

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)
S7.001	SS116	15 Winter	30	+0%	30/15 Summer				65.239
S9.000	SS118	15 Winter	30	+0%	30/15 Summer				65.725
S7.002	SS119	960 Winter	30	+0%	30/15 Summer				65.183
S1.003	SS120	960 Winter	30	+0%	30/15 Summer				65.179
S1.004	SS121	960 Winter	30	+0%	30/60 Winter				65.177
S1.005	SS122	240 Summer	30	+0%	30/30 Summer				63.886
S1.006	SS123	60 Winter	30	+0%					63.797
S1.007	SS124	240 Summer	30	+0%					63.652
S1.008	SS125	720 Summer	30	+0%					63.516
S10.000	SS214	30 Summer	30	+0%	30/15 Summer				65.148
S10.001	SS215	30 Winter	30	+0%	30/15 Summer				64.871
S11.000	SS210	30 Winter	30	+0%	30/15 Summer				65.398
S12.000	SS209	30 Winter	30	+0%	30/15 Summer				65.595
S11.001	SS211	30 Winter	30	+0%	30/15 Summer				65.296
S13.000	SS201	30 Winter	30	+0%	30/15 Summer				65.563
S13.001	SS202	30 Winter	30	+0%	30/15 Summer				65.521
S13.002	SS203	30 Winter	30	+0%	30/15 Summer				65.423
S13.003	SS204	30 Winter	30	+0%	30/15 Summer				65.393
S13.004	SS205	30 Winter	30	+0%	30/15 Summer				65.362
S14.000	SS206	30 Winter	30	+0%	30/15 Summer				65.285
S13.005	SS207	30 Winter	30	+0%	30/15 Summer				65.266
S13.006	SS208	30 Winter	30	+0%	30/15 Summer				65.061
S11.002	SS212	30 Winter	30	+0%	30/15 Summer				64.960
S11.003	SS213	30 Winter	30	+0%	30/15 Summer				64.771
S10.002	SS216	360 Winter	30	+0%	30/15 Summer				64.550
S15.000	SS222	600 Winter	30	+0%	30/240 Winter				64.520
S15.001	SS223	600 Winter	30	+0%	30/180 Winter				64.520
S16.000	SS217	15 Winter	30	+0%	30/15 Summer				65.129
S16.001	SS218	15 Winter	30	+0%	30/15 Summer				64.866
S16.002	SS219	15 Winter	30	+0%	30/15 Summer				64.671
S17.000	SS220	600 Winter	30	+0%					64.528
S16.003	SS221	600 Winter	30	+0%					64.527
S15.002	SS224	600 Winter	30	+0%	30/180 Winter				64.520
S18.000	SS225	360 Winter	30	+0%	30/240 Winter				64.520
S15.003	SS220	360 Winter	30	+0%	30/120 Winter				64.521
S19.000	SS229	600 Winter	30	+0%	30/15 Summer				64.530
S20.000	SS228	360 Winter	30	+0%	30/15 Summer				64.535
S19.001	SS230	360 Winter	30	+0%	30/15 Summer				64.536
S15.004	SS227	360 Winter	30	+0%	30/60 Winter				64.536
S15.005	SS231	360 Winter	30	+0%	30/15 Winter				64.537
S10.003	SS232	360 Winter	30	+0%	30/15 Winter				64.551
S10.004	SS233	360 Winter	30	+0%	30/60 Summer				64.560
S10.005	SS234	360 Winter	30	+0%	30/60 Summer				64.562
S10.006	SS235	360 Summer	30	+0%	30/15 Summer				63.614

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)	Pipe Flow (l/s)	Status	Level Exceeded
S7.001	SS116	0.504	0.000	1.01		156.7	SURCHARGED	
S9.000	SS118	0.375	0.000	0.94		62.2	SURCHARGED	
S7.002	SS119	0.903	0.000	0.17		34.2	SURCHARGED	
S1.003	SS120	0.883	0.000	0.36		82.6	SURCHARGED	
S1.004	SS121	0.755	0.000	0.07		24.3	SURCHARGED	
S1.005	SS122	0.056	0.000	1.03		24.0	SURCHARGED	
S1.006	SS123	-0.010	0.000	0.83		23.6	OK	
S1.007	SS124	-0.025	0.000	0.84		24.0	OK	
S1.008	SS125	0.000	0.000	1.06		24.3	OK	
S10.000	SS214	0.788	0.000	1.36		94.0	SURCHARGED	
S10.001	SS215	0.721	0.000	1.10		78.0	SURCHARGED	
S11.000	SS210	0.973	0.000	0.54		18.0	SURCHARGED	
S12.000	SS209	1.160	0.000	1.14		37.5	SURCHARGED	
S11.001	SS211	1.101	0.000	1.67		54.1	SURCHARGED	
S13.000	SS201	0.528	0.000	0.37		12.3	SURCHARGED	
S13.001	SS202	0.646	0.000	0.99		30.8	SURCHARGED	
S13.002	SS203	0.593	0.000	0.60		33.0	SURCHARGED	
S13.003	SS204	0.603	0.000	0.57		34.8	SURCHARGED	
S13.004	SS205	0.632	0.000	0.64		44.3	SURCHARGED	
S14.000	SS206	0.790	0.000	0.39		10.4	SURCHARGED	
S13.005	SS207	0.691	0.000	0.79		98.3	SURCHARGED	
S13.006	SS208	0.796	0.000	1.04		101.6	SURCHARGED	
S11.002	SS212	0.735	0.000	1.58		159.0	SURCHARGED	
S11.003	SS213	0.521	0.000	1.02		201.9	SURCHARGED	
S10.002	SS216	0.590	0.000	0.45		96.6	SURCHARGED	
S15.000	SS222	0.100	0.000	0.01		1.6	SURCHARGED	
S15.001	SS223	0.130	0.000	0.02		6.2	SURCHARGED	
S16.000	SS217	0.264	0.000	1.14		38.2	SURCHARGED	
S16.001	SS218	0.231	0.000	1.38		43.7	SURCHARGED	
S16.002	SS219	0.126	0.000	1.57		43.7	SURCHARGED	
S17.000	SS220	-0.037	0.000	0.04		1.3	OK	
S16.003	SS221	-0.053	0.000	0.18		11.8	OK	
S15.002	SS224	0.200	0.000	0.05		20.5	SURCHARGED	
S18.000	SS225	0.095	0.000	0.04		2.6	SURCHARGED	
S15.003	SS220	0.271	0.000	0.08		32.1	SURCHARGED	
S19.000	SS229	0.405	0.000	0.06		2.0	SURCHARGED	
S20.000	SS228	0.353	0.000	0.07		3.8	SURCHARGED	
S19.001	SS230	0.456	0.000	0.27		19.6	SURCHARGED	
S15.004	SS227	0.376	0.000	0.12		57.0	SURCHARGED	
S15.005	SS231	0.457	0.000	0.17		61.6	SURCHARGED	
S10.003	SS232	0.481	0.000	0.59		157.9	SURCHARGED	
S10.004	SS233	0.521	0.000	0.63		154.4	SURCHARGED	
S10.005	SS234	0.550	0.000	0.12		50.8	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)	Pipe Flow (l/s)	Status	Level Exceeded
S10.006	SS235	0.209	0.000	3.06		50.8	SURCHARGED	

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	10.000
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 2 Number of Storage Structures 2 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.200
Region	Scotland and Ireland	Cv (Summer)	0.750
M5-60 (mm)	20.000	Cv (Winter)	0.850

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Coarse Inertia Status OFF
DTS Status ON

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)	100
Climate Change (%)	0

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	SS110	15 Winter	100	+0%	100/15 Summer				65.845
S2.000	SS111	15 Winter	100	+0%	100/15 Summer				65.819
S1.001	SS112	30 Winter	100	+0%	100/15 Summer				65.893
S3.000	SS108	15 Winter	100	+0%	100/15 Summer				65.830
S4.000	SS107	15 Winter	100	+0%	100/15 Summer				65.728
S3.001	SS109	15 Winter	100	+0%	100/15 Summer				65.675
S1.002	SS113	960 Winter	100	+0%	100/15 Summer				65.646
S5.000	SS101	15 Winter	100	+0%	100/15 Summer				65.988
S5.001	SS102	15 Winter	100	+0%	100/15 Summer				65.771
S5.002	SS103	960 Winter	100	+0%	100/15 Summer				65.649
S6.000	SS104	960 Winter	100	+0%	100/15 Summer				65.647
S5.003	SS105	960 Winter	100	+0%	100/15 Summer				65.644
S5.004	SS106	960 Winter	100	+0%	100/15 Summer				65.640
S7.000	SS116	15 Winter	100	+0%	100/15 Summer				66.379
S8.000	SS114	15 Winter	100	+0%	100/15 Summer				65.971
S8.001	SS115	15 Winter	100	+0%	100/15 Summer				65.876

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)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	SS110	0.641	0.000	0.65		68.0	FLOOD RISK	
S2.000	SS111	1.094	0.000	0.41		39.2	FLOOD RISK	
S1.001	SS112	1.540	0.000	1.16		90.3	FLOOD RISK	
S3.000	SS108	1.030	0.000	0.67		38.0	FLOOD RISK	
S4.000	SS107	1.028	0.000	0.51		43.0	FLOOD RISK	
S3.001	SS109	1.281	0.000	0.89		108.6	FLOOD RISK	
S1.002	SS113	1.458	0.000	0.42		32.4	SURCHARGED	
S5.000	SS101	0.438	0.000	0.83		41.9	SURCHARGED	
S5.001	SS102	0.621	0.000	1.63		50.6	SURCHARGED	
S5.002	SS103	0.654	0.000	0.13		12.4	SURCHARGED	
S6.000	SS104	0.997	0.000	0.11		4.5	FLOOD RISK	
S5.003	SS105	1.149	0.000	0.17		20.0	FLOOD RISK	
S5.004	SS106	1.106	0.000	0.07		27.6	FLOOD RISK	
S7.000	SS116	1.089	0.000	1.05		86.0	FLOOD RISK	
S8.000	SS114	0.926	0.000	0.82		98.7	FLOOD RISK	
S8.001	SS115	1.056	0.000	0.76		82.8	SURCHARGED	

Campus Innovation Centre
Green Road
Carlow

Capdoo,
Clane,
Co. Kildare

Date 12/3/2020 12:42 AM | Designed by LMc
File IE2181-Storm-Tweak-6.mdx | Checked by PMS
Innovyze | Network 2017.1.1

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)
S7.001	SS116	15 Winter	100	+0%	100/15 Summer				65.807
S9.000	SS118	15 Winter	100	+0%	100/15 Summer				66.401
S7.002	SS119	960 Winter	100	+0%	100/15 Summer				65.642
S1.003	SS120	960 Winter	100	+0%	100/15 Summer				65.638
S1.004	SS121	960 Winter	100	+0%	100/30 Winter				65.636
S1.005	SS122	60 Summer	100	+0%	100/15 Summer				63.891
S1.006	SS123	480 Winter	100	+0%					63.796
S1.007	SS124	60 Summer	100	+0%					63.657
S1.008	SS125	2160 Winter	100	+0%					63.516
S10.000	SS214	15 Winter	100	+0%	100/15 Summer				66.057
S10.001	SS215	15 Winter	100	+0%	100/15 Summer				65.518
S11.000	SS210	30 Winter	100	+0%	100/15 Summer				66.214
S12.000	SS209	30 Winter	100	+0%	100/15 Summer				66.551
S11.001	SS211	30 Winter	100	+0%	100/15 Summer				66.085
S13.000	SS201	30 Winter	100	+0%	100/15 Summer				66.440
S13.001	SS202	30 Winter	100	+0%	100/15 Summer				66.388
S13.002	SS203	30 Winter	100	+0%	100/15 Summer				66.240
S13.003	SS204	30 Winter	100	+0%	100/15 Summer				66.194
S13.004	SS205	30 Winter	100	+0%	100/15 Summer				66.138
S14.000	SS206	30 Winter	100	+0%	100/15 Summer				66.023
S13.005	SS207	30 Winter	100	+0%	100/15 Summer				65.996
S13.006	SS208	30 Winter	100	+0%	100/15 Summer				65.696
S11.002	SS212	30 Winter	100	+0%	100/15 Summer				65.555
S11.003	SS213	30 Winter	100	+0%	100/15 Summer				65.287
S10.002	SS216	480 Winter	100	+0%	100/15 Summer				65.079
S15.000	SS222	600 Winter	100	+0%	100/120 Summer				65.051
S15.001	SS223	600 Winter	100	+0%	100/60 Winter				65.051
S16.000	SS217	15 Winter	100	+0%	100/15 Summer				65.532
S16.001	SS218	15 Winter	100	+0%	100/15 Summer				65.105
S16.002	SS219	600 Winter	100	+0%	100/15 Summer				65.062
S17.000	SS220	600 Winter	100	+0%	100/15 Summer				65.059
S16.003	SS221	600 Winter	100	+0%	100/15 Summer				65.058
S15.002	SS224	600 Winter	100	+0%	100/30 Winter				65.051
S18.000	SS225	480 Winter	100	+0%	100/60 Winter				65.056
S15.003	SS220	480 Winter	100	+0%	100/15 Winter				65.054
S19.000	SS229	600 Winter	100	+0%	100/15 Summer				65.061
S20.000	SS228	480 Winter	100	+0%	100/15 Summer				65.065
S19.001	SS230	480 Winter	100	+0%	100/15 Summer				65.070
S15.004	SS227	480 Winter	100	+0%	100/15 Winter				65.067
S15.005	SS231	480 Winter	100	+0%	100/15 Summer				65.072
S10.003	SS232	480 Winter	100	+0%	100/15 Summer				65.072
S10.004	SS233	480 Winter	100	+0%	100/15 Summer				65.071
S10.005	SS234	480 Winter	100	+0%	100/30 Summer				65.075
S10.006	SS235	60 Summer	100	+0%	100/15 Summer				63.614

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)	Pipe Flow (l/s)	Status	Level Exceeded
S7.001	SS116	1.072	0.000	1.28		199.1	SURCHARGED	
S9.000	SS118	1.051	0.000	1.09		72.3	FLOOD RISK	
S7.002	SS119	1.362	0.000	0.19		39.8	SURCHARGED	
S1.003	SS120	1.342	0.000	0.43		99.5	SURCHARGED	
S1.004	SS121	1.214	0.000	0.07		24.9	SURCHARGED	
S1.005	SS122	0.061	0.000	1.01		23.5	SURCHARGED	
S1.006	SS123	-0.011	0.000	0.85		24.0	OK	
S1.007	SS124	-0.020	0.000	0.86		24.5	OK	
S1.008	SS125	0.000	0.000	1.07		24.4	OK	
S10.000	SS214	1.697	0.000	1.71		118.3	SURCHARGED	
S10.001	SS215	1.368	0.000	1.54		108.9	SURCHARGED	
S11.000	SS210	1.789	0.000	0.68		22.6	SURCHARGED	
S12.000	SS209	2.116	0.000	1.45		47.7	FLOOD RISK	
S11.001	SS211	1.890	0.000	2.12		68.8	SURCHARGED	
S13.000	SS201	1.405	0.000	0.40		13.0	SURCHARGED	
S13.001	SS202	1.513	0.000	1.06		33.2	SURCHARGED	
S13.002	SS203	1.410	0.000	0.74		40.4	SURCHARGED	
S13.003	SS204	1.404	0.000	0.73		44.7	SURCHARGED	
S13.004	SS205	1.408	0.000	0.80		55.8	SURCHARGED	
S14.000	SS206	1.528	0.000	0.42		11.3	SURCHARGED	
S13.005	SS207	1.421	0.000	1.00		124.2	SURCHARGED	
S13.006	SS208	1.431	0.000	1.30		127.7	SURCHARGED	
S11.002	SS212	1.330	0.000	2.00		200.4	SURCHARGED	
S11.003	SS213	1.037	0.000	1.29		255.8	SURCHARGED	
S10.002	SS216	1.119	0.000	0.45		97.8	SURCHARGED	
S15.000	SS222	0.631	0.000	0.01		2.0	SURCHARGED	
S15.001	SS223	0.661	0.000	0.02		8.3	SURCHARGED	
S16.000	SS217	0.667	0.000	1.36		45.6	SURCHARGED	
S16.001	SS218	0.470	0.000	1.72		54.3	SURCHARGED	
S16.002	SS219	0.517	0.000	0.36		10.0	SURCHARGED	
S17.000	SS220	0.494	0.000	0.05		1.6	SURCHARGED	
S16.003	SS221	0.478	0.000	0.22		14.4	SURCHARGED	
S15.002	SS224	0.731	0.000	0.07		25.7	SURCHARGED	
S18.000	SS225	0.631	0.000	0.04		2.7	SURCHARGED	
S15.003	SS220	0.804	0.000	0.08		31.6	SURCHARGED	
S19.000	SS229	0.936	0.000	0.08		2.4	SURCHARGED	
S20.000	SS228	0.883	0.000	0.07		3.8	SURCHARGED	
S19.001	SS230	0.990	0.000	0.28		20.5	SURCHARGED	
S15.004	SS227	0.907	0.000	0.12		56.8	SURCHARGED	
S15.005	SS231	0.992	0.000	0.17		59.8	SURCHARGED	
S10.003	SS232	1.002	0.000	0.57		153.2	SURCHARGED	
S10.004	SS233	1.032	0.000	0.61		151.1	SURCHARGED	
S10.005	SS234	1.063	0.000	0.12		50.8	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)	Pipe Flow (l/s)	Status	Level Exceeded
S10.006	SS235	0.209	0.000	3.06		50.8	SURCHARGED	

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	10.000
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 2 Number of Storage Structures 2 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.200
Region	Scotland and Ireland	Cv (Summer)	0.750
M5-60 (mm)	20.000	Cv (Winter)	0.850

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Coarse Inertia Status OFF
DTS Status ON

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)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 0

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	SS110	15 Winter	100	+0%	30/15 Winter				65.845
S2.000	SS111	15 Winter	100	+0%	30/15 Summer				65.819
S1.001	SS112	30 Winter	100	+0%	1/15 Winter				65.893
S3.000	SS108	15 Winter	100	+0%	30/15 Summer				65.830
S4.000	SS107	15 Winter	100	+0%	30/15 Summer				65.728
S3.001	SS109	15 Winter	100	+0%	2/15 Summer				65.675
S1.002	SS113	960 Winter	100	+0%	1/15 Summer				65.646
S5.000	SS101	15 Winter	100	+0%	30/15 Winter				65.988
S5.001	SS102	15 Winter	100	+0%	30/15 Summer				65.771
S5.002	SS103	960 Winter	100	+0%	30/15 Winter				65.649
S6.000	SS104	960 Winter	100	+0%	30/15 Summer				65.647
S5.003	SS105	960 Winter	100	+0%	30/15 Summer				65.644
S5.004	SS106	960 Winter	100	+0%	30/15 Winter				65.640
S7.000	SS116	15 Winter	100	+0%	30/15 Summer				66.379
S8.000	SS114	15 Winter	100	+0%	30/15 Summer				65.971
S8.001	SS115	15 Winter	100	+0%	30/15 Summer				65.876

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)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	SS110	0.641	0.000	0.65		68.0	FLOOD RISK	
S2.000	SS111	1.094	0.000	0.41		39.2	FLOOD RISK	
S1.001	SS112	1.540	0.000	1.16		90.3	FLOOD RISK	
S3.000	SS108	1.030	0.000	0.67		38.0	FLOOD RISK	
S4.000	SS107	1.028	0.000	0.51		43.0	FLOOD RISK	
S3.001	SS109	1.281	0.000	0.89		108.6	FLOOD RISK	
S1.002	SS113	1.458	0.000	0.42		32.4	SURCHARGED	
S5.000	SS101	0.438	0.000	0.83		41.9	SURCHARGED	
S5.001	SS102	0.621	0.000	1.63		50.6	SURCHARGED	
S5.002	SS103	0.654	0.000	0.13		12.4	SURCHARGED	
S6.000	SS104	0.997	0.000	0.11		4.5	FLOOD RISK	
S5.003	SS105	1.149	0.000	0.17		20.0	FLOOD RISK	
S5.004	SS106	1.106	0.000	0.07		27.6	FLOOD RISK	
S7.000	SS116	1.089	0.000	1.05		86.0	FLOOD RISK	
S8.000	SS114	0.926	0.000	0.82		98.7	FLOOD RISK	
S8.001	SS115	1.056	0.000	0.76		82.8	SURCHARGED	

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)
S7.001	SS116	15 Winter	100	+0%	30/15 Summer				65.807
S9.000	SS118	15 Winter	100	+0%	30/15 Summer				66.401
S7.002	SS119	960 Winter	100	+0%	1/480 Winter				65.642
S1.003	SS120	960 Winter	100	+0%	1/480 Winter				65.638
S1.004	SS121	960 Winter	100	+0%	2/480 Winter				65.636
S1.005	SS122	60 Summer	100	+0%	1/180 Winter				63.891
S1.006	SS123	60 Winter	30	+0%					63.797
S1.007	SS124	60 Summer	100	+0%					63.657
S1.008	SS125	2160 Winter	100	+0%					63.516
S10.000	SS214	15 Winter	100	+0%	30/15 Summer				66.057
S10.001	SS215	15 Winter	100	+0%	30/15 Summer				65.518
S11.000	SS210	30 Winter	100	+0%	30/15 Summer				66.214
S12.000	SS209	30 Winter	100	+0%	2/15 Summer				66.551
S11.001	SS211	30 Winter	100	+0%	1/15 Summer				66.085
S13.000	SS201	30 Winter	100	+0%	30/15 Summer				66.440
S13.001	SS202	30 Winter	100	+0%	30/15 Summer				66.388
S13.002	SS203	30 Winter	100	+0%	30/15 Summer				66.240
S13.003	SS204	30 Winter	100	+0%	30/15 Summer				66.194
S13.004	SS205	30 Winter	100	+0%	30/15 Summer				66.138
S14.000	SS206	30 Winter	100	+0%	30/15 Summer				66.023
S13.005	SS207	30 Winter	100	+0%	30/15 Summer				65.996
S13.006	SS208	30 Winter	100	+0%	2/15 Winter				65.696
S11.002	SS212	30 Winter	100	+0%	2/30 Winter				65.555
S11.003	SS213	30 Winter	100	+0%	30/15 Summer				65.287
S10.002	SS216	480 Winter	100	+0%	1/30 Winter				65.079
S15.000	SS222	600 Winter	100	+0%	30/240 Winter				65.051
S15.001	SS223	600 Winter	100	+0%	30/180 Winter				65.051
S16.000	SS217	15 Winter	100	+0%	30/15 Summer				65.532
S16.001	SS218	15 Winter	100	+0%	30/15 Summer				65.105
S16.002	SS219	600 Winter	100	+0%	30/15 Summer				65.062
S17.000	SS220	600 Winter	100	+0%	100/15 Summer				65.059
S16.003	SS221	600 Winter	100	+0%	100/15 Summer				65.058
S15.002	SS224	600 Winter	100	+0%	30/180 Winter				65.051
S18.000	SS225	480 Winter	100	+0%	30/240 Winter				65.056
S15.003	SS220	480 Winter	100	+0%	30/120 Winter				65.054
S19.000	SS229	600 Winter	100	+0%	30/15 Summer				65.061
S20.000	SS228	480 Winter	100	+0%	30/15 Summer				65.065
S19.001	SS230	480 Winter	100	+0%	30/15 Summer				65.070
S15.004	SS227	480 Winter	100	+0%	30/60 Winter				65.067
S15.005	SS231	480 Winter	100	+0%	30/15 Winter				65.072
S10.003	SS232	480 Winter	100	+0%	30/15 Winter				65.072
S10.004	SS233	480 Winter	100	+0%	30/60 Summer				65.071
S10.005	SS234	480 Winter	100	+0%	30/60 Summer				65.075
S10.006	SS235	360 Summer	30	+0%	1/30 Summer				63.614

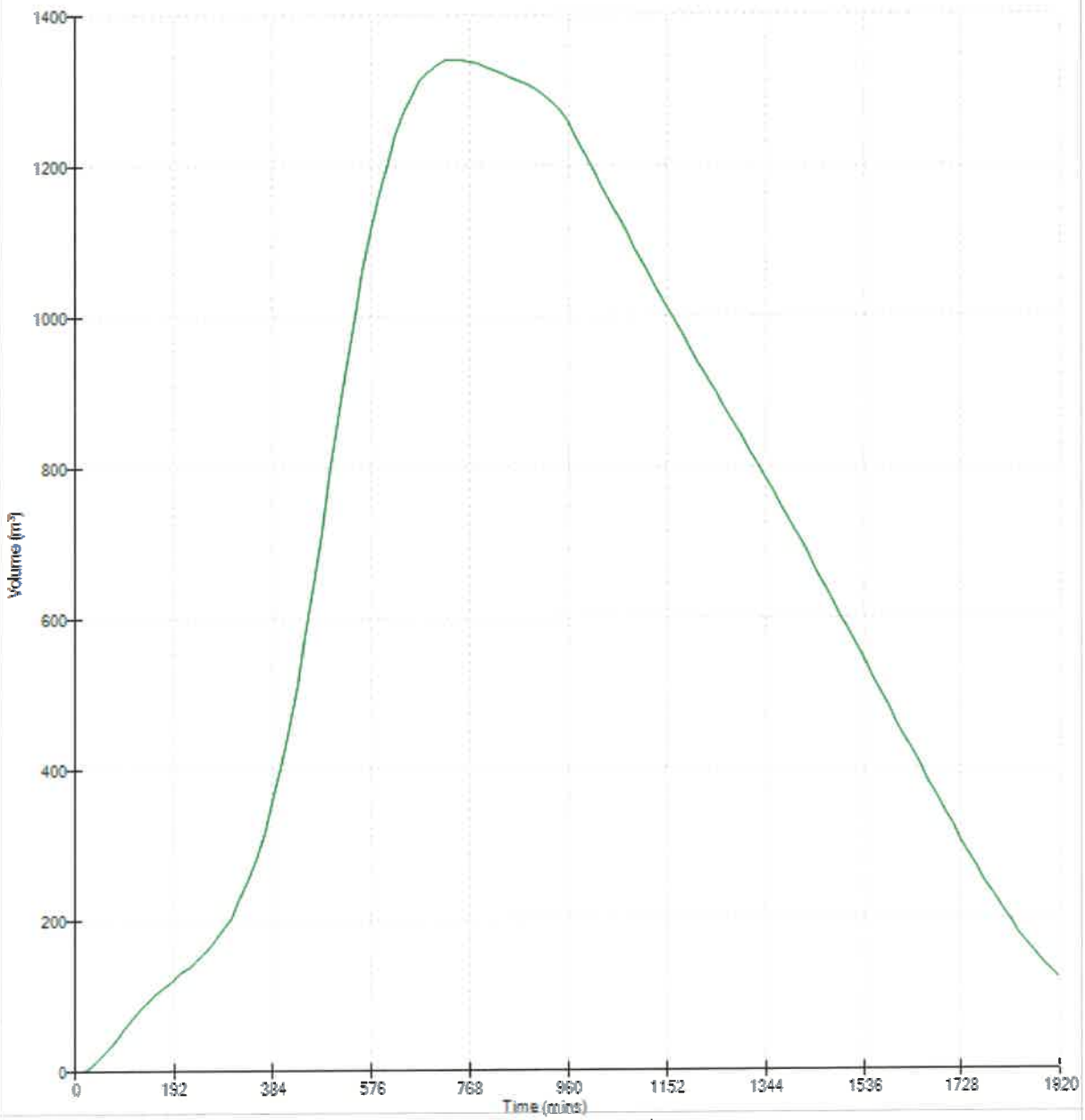
Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S7.001	SS116	1.072	0.000	1.28		199.1	SURCHARGED	
S9.000	SS118	1.051	0.000	1.09		72.3	FLOOD RISK	
S7.002	SS119	1.362	0.000	0.19		39.8	SURCHARGED	
S1.003	SS120	1.342	0.000	0.43		99.5	SURCHARGED	
S1.004	SS121	1.214	0.000	0.07		24.9	SURCHARGED	
S1.005	SS122	0.061	0.000	1.01		23.5	SURCHARGED	
S1.006	SS123	-0.010	0.000	0.83		23.6	OK	
S1.007	SS124	-0.020	0.000	0.86		24.5	OK	
S1.008	SS125	0.000	0.000	1.07		24.4	OK	
S10.000	SS214	1.697	0.000	1.71		118.3	SURCHARGED	
S10.001	SS215	1.368	0.000	1.54		108.9	SURCHARGED	
S11.000	SS210	1.789	0.000	0.68		22.6	SURCHARGED	
S12.000	SS209	2.116	0.000	1.45		47.7	FLOOD RISK	
S11.001	SS211	1.890	0.000	2.12		68.8	SURCHARGED	
S13.000	SS201	1.405	0.000	0.40		13.0	SURCHARGED	
S13.001	SS202	1.513	0.000	1.06		33.2	SURCHARGED	
S13.002	SS203	1.410	0.000	0.74		40.4	SURCHARGED	
S13.003	SS204	1.404	0.000	0.73		44.7	SURCHARGED	
S13.004	SS205	1.408	0.000	0.80		55.8	SURCHARGED	
S14.000	SS206	1.528	0.000	0.42		11.3	SURCHARGED	
S13.005	SS207	1.421	0.000	1.00		124.2	SURCHARGED	
S13.006	SS208	1.431	0.000	1.30		127.7	SURCHARGED	
S11.002	SS212	1.330	0.000	2.00		200.4	SURCHARGED	
S11.003	SS213	1.037	0.000	1.29		255.8	SURCHARGED	
S10.002	SS216	1.119	0.000	0.45		97.8	SURCHARGED	
S15.000	SS222	0.631	0.000	0.01		2.0	SURCHARGED	
S15.001	SS223	0.661	0.000	0.02		8.3	SURCHARGED	
S16.000	SS217	0.667	0.000	1.36		45.6	SURCHARGED	
S16.001	SS218	0.470	0.000	1.72		54.3	SURCHARGED	
S16.002	SS219	0.517	0.000	0.36		10.0	SURCHARGED	
S17.000	SS220	0.494	0.000	0.05		1.6	SURCHARGED	
S16.003	SS221	0.478	0.000	0.22		14.4	SURCHARGED	
S15.002	SS224	0.731	0.000	0.07		25.7	SURCHARGED	
S18.000	SS225	0.631	0.000	0.04		2.7	SURCHARGED	
S15.003	SS220	0.804	0.000	0.08		31.6	SURCHARGED	
S19.000	SS229	0.936	0.000	0.08		2.4	SURCHARGED	
S20.000	SS228	0.883	0.000	0.07		3.8	SURCHARGED	
S19.001	SS230	0.990	0.000	0.28		20.5	SURCHARGED	
S15.004	SS227	0.907	0.000	0.12		56.8	SURCHARGED	
S15.005	SS231	0.992	0.000	0.17		59.8	SURCHARGED	
S10.003	SS232	1.002	0.000	0.57		153.2	SURCHARGED	
S10.004	SS233	1.032	0.000	0.61		151.1	SURCHARGED	
S10.005	SS234	1.063	0.000	0.12		50.8	SURCHARGED	

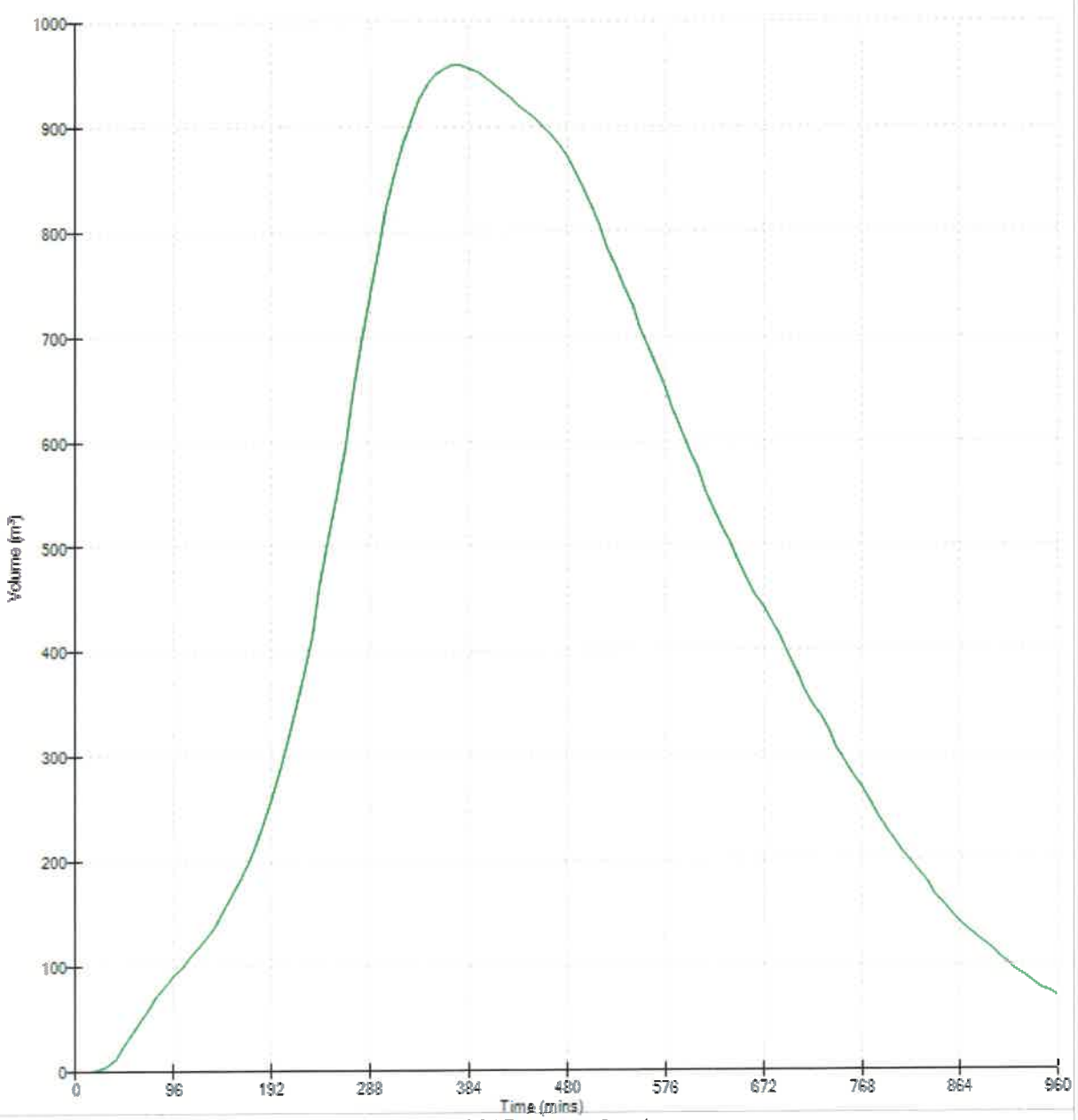
Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S10.006	SS235	0.209	0.000	3.06		50.8	SURCHARGED	

Graphs for Pipe S1.004 US/MH SS121 (Storm)
960 minute 100 year Winter I+0%
Status: SURCHARGED



Graphs for Pipe S10.005 US/MH SS234 (Storm)
480 minute 100 year Winter I+0%
Status: SURCHARGED



Appendix D

FOUL SEWER CALCULATIONS

Title:	Job Ref.:	Calcs. By	Drg. No.		
Housing scheme at Capdoo Commons	20017	Brian Connolly	P- 20017-303	ks: 1.5 mm	brian connolly associates
Client: Westar Investmemts Ltd.	section 100			Discharge: 14 units per house	consulting engineers
Subject: FOUL SEWER DESIGN	sheet 01 of 02			Sewage @ 15 ° C	the studio, wood's way, clane, co. kildare
					tel: (045) 892211; fax (045) 892420

Pipe Section	No. of Houses	Discharge (units)	Total Discharge (units)	Pipe Diam (mm)	U/S I.L. (m)	Length L_{pipe} (m)	Gradient 1 in ...	D/S I.L. (m)	Flow Q (l/s)	Pipe Cap. Q_{cap} (l/s)	CHECK Capacity of pipe. Qcap >Q	Proport. Flow Q/Qp	Velocity V_{pipe} (m/s)	Proport. Velocity V/Vp	Discharge. Velocity $V_{proportional}$ (m/s)	CHECK Self clean vel. V_p >0.75m/sec
F.I.C. 101 to F.I.C. 102	8	112	112	150	65.85	70	80	64.98	3.96	17.29	✓	0.23	0.98	0.82	0.80	✓
F.I.C. 102 to F.I.C. 104	4	56	168	150	64.98	68	100	64.30	4.40	15.46	✓	0.28	0.87	0.86	0.76	✓
F.I.C. 104 to F.I.C. 106	21	294	462	150	64.30	66	100	63.64	6.05	15.46	✓	0.39	0.87	0.94	0.82	✓
F.I.C. 106 to F.I.C. 107	10	140	602	225	63.64	36	175	63.43	6.68	34.40	✓	0.19	0.87	0.78	0.67	✗
F.I.C. 107 to F.I.C. 108	12	168	770	225	63.43	54	175	63.12	7.37	34.40	✓	0.21	0.87	0.80	0.69	✗
F.I.C. 108 to F.I.C. 109	8	112	882	225	63.12	67	175	62.74	7.80	34.40	✓	0.23	0.87	0.81	0.70	✗
F.I.C. 109 to F.I.C. 115	0	0	882	225	62.74	11	200	62.68	7.80	32.17	✓	0.24	0.81	0.83	0.67	✗
F.I.C. 115 to F.I.C. 116	68	952	1834	225	62.68	39	200	62.49	11.05	32.17	✓	0.34	0.81	0.91	0.74	✗
F.I.C. 116 to F.I.C. A	0	0	1834	225	62.49	7	200	62.45	11.05	32.17	✓	0.34	0.81	0.91	0.74	✗
F.I.C. 103 to F.I.C. 104	17	238	238	150	64.99	69	100	64.30	4.86	15.46	✓	0.31	0.87	0.89	0.78	✓
F.I.C. 105 to F.I.C. 106	0	0	0	225	63.67	7	200	63.64	SPUR FOR FUTURE DEVELOPMENT							

Title:	Job Ref.:	Calcs. By	Drg. No.		
Housing scheme at Capdoo Commons	20017	Brian Connolly	P- 20017-303	ks: 1.5 mm	brian connolly associates
Client: Westar Investemts Ltd.	Section 100			Discharge: 14 units per house	consulting engineers
Subject: FOUL SEWER DESIGN	sheet 02 of 02			Sewage @ 15 ° C	the studio, wood's way
					clane, co. kildare
					tel: (045) 892211; fax (045) 892420

Pipe Section	No. of Houses	Discharge (units)	Total Discharge (units)	Pipe Diam (mm)	U/S I.L. (m)	Length L_{pipe} (m)	Gradient 1 in …	D/S I.L. (m)	Flow Q (l/s)	Pipe Cap. Q_{cap} (l/s)	CHECK Capacity of pipe. Qcap >Q	Proport. Flow Q/Qp	Velocity V_{pipe} (m/s)	Proport. Velocity V/Vp	Discharge. Velocity $V_{proportional}$ (m/s)	CHECK Self clean vel. V_p >0.75m/sec
F.I.C. 110 to F.I.C. 111	12	168	168	150	65.39	80	80	64.39	4.40	17.29	✓	0.25	0.98	0.84	0.82	✓
F.I.C. 111 to F.I.C. 114	8	112	280	150	64.39	71	80	63.50	5.11	17.29	✓	0.30	0.98	0.87	0.85	✓
F.I.C. 114 to F.I.C. 115	25	350	630	150	63.50	66	80	62.68	6.80	17.29	✓	0.39	0.98	0.94	0.92	✓
F.I.C. 112 to F.I.C. 113	7	98	98	150	65.46	54	60	64.56	3.84	19.99	✓	0.19	1.13	0.78	0.88	✓
F.I.C. 113 to F.I.C. 114	5	70	168	150	64.56	85	80	63.50	4.40	17.29	✓	0.25	0.98	0.84	0.82	✓

Title:	Job Ref.:	Calcs. By	Drg. No.		
Housing scheme at Capdoo Commons	20017	Brian Connolly	P- 20017-303	ks: 1.5 mm	brian connolly associates
Client: Westar Investments Ltd.	Section 200			Discharge: 14 units per house	consulting engineers the studio, wood's way clane, co. kildare tel: (045) 892211; fax (045) 892420
Subject: FOUL SEWER DESIGN	sheet 01 of 03			Sewage @ 15 °C	

Pipe Section	No. of Houses	Discharge (units)	Total Discharge (units)	Pipe Diam (mm)	U/S I.L. (m)	Length L_{pipe} (m)	Gradient 1 in ...	D/S I.L. (m)	Flow Q (l/s)	Pipe Cap. Q_{cap} (l/s)	CHECK Capacity of pipe. Qcap >Q	Proport. Flow Q/Qp	Velocity V_{pipe} (m/s)	Proport. Velocity V/Vp	Discharge. Velocity $V_{proportional}$ (m/s)	CHECK Self clean vel. V_p >0.75m/sec
F.I.C. 202 to F.I.C. 203	23	322	322	150	65.71	42	80	65.19	5.35	17.29	✓	0.31	0.98	0.88	0.87	✓
F.I.C. 203 to F.I.C. 204	24	336	658	225	65.19	68	150	64.73	6.91	37.18	✓	0.19	0.94	0.77	0.72	✗
F.I.C. 204 to F.I.C. 210	0	0	658	225	64.73	10	150	64.67	6.91	37.18	✓	0.19	0.94	0.77	0.72	✗
F.I.C. 210 to F.I.C. 211	64	896	1554	225	64.67	14	175	64.59	10.15	34.40	✓	0.30	0.87	0.87	0.76	✓
F.I.C. 211 to F.I.C. 213	17	238	1792	225	64.59	66	175	64.21	10.91	34.40	✓	0.32	0.87	0.89	0.78	✓
F.I.C. 213 to F.I.C. 215	26	364	2156	225	64.21	60	200	63.91	12.04	32.17	✓	0.37	0.81	0.93	0.76	✓
F.I.C. 215 to F.I.C. 216	15	210	2366	225	63.91	60	200	63.61	12.68	32.17	✓	0.39	0.81	0.94	0.76	✓
F.I.C. 216 to F.I.C. 218	0	0	2366	225	63.61	7	200	63.57	12.68	32.17	✓	0.39	0.81	0.94	0.76	✓
F.I.C. 218 to F.I.C. 223	10	140	2506	225	63.57	52	225	63.34	13.09	30.31	✓	0.43	0.76	0.96	0.74	✗
F.I.C. 223 to F.I.C. 225	14	196	2702	225	63.34	23	225	63.24	13.67	30.31	✓	0.45	0.76	0.97	0.74	✗
F.I.C. 225 to F.I.C. 226	6	84	2786	225	63.24	25	225	63.13	13.92	30.31	✓	0.46	0.76	0.98	0.75	✓
F.I.C. 226 to F.I.C. B	2	28	2814	225	63.13	28	225	63.00	14.00	30.31	✓	0.46	0.76	0.98	0.75	✓
F.I.C. 201 to F.I.C. 203	0	0	0	225	65.40	26	125	65.19				FOR FUTURE DEVELOPMENT				

Title:	Job Ref.:	Calcs. By	Drg. No.		
Housing scheme at Capdoo Commons	**20017**	**Brian Connolly**	**P-** 20017-303	**ks:** 1.5 mm	brian connolly associates
Client: Westar Investments Ltd	**Section 200**			**Discharge:** 14 units per house	consulting engineers the studio, wood's way clane, co. kildare
Subject: FOUL SEWER DESIGN	**sheet 02 of 03**			**Sewage @** 15 °C	tel: (045) 892211: fax (045) 892420

Pipe Section	No. of Houses	Discharge (units)	Total Discharge (units)	Pipe Diam (mm)	U/S I.L. (m)	Length L_{pipe} (m)	Gradient 1 in ...	D/S I.L. (m)	Flow Q (l/s)	Pipe Cap. Q_{cap} (l/s)	CHECK Capacity of pipe. Qcap >Q	Proport. Flow Q/Qp	Velocity V_{pipe} (m/s)	Proport. Velocity V/Vp	Discharge. Velocity $V_{proportional}$ (m/s)	CHECK Self clean vel. V_p >0.75m/sec
F.I.C. 205 to F.I.C. 206	24	336	336	150	65.79	29	80	65.43	5.42	17.29	✓	0.31	0.98	0.89	0.87	✓
F.I.C. 206 to F.I.C. 207	0	0	336	150	65.43	18	125	65.28	5.42	13.81	✓	0.39	0.78	0.94	0.74	✗
F.I.C. 207 to F.I.C. 209	24	336	672	150	65.28	57	125	64.83	6.97	13.81	✓	0.50	0.78	1.00	0.78	✓
F.I.C. 209 to F.I.C. 210	0	0	672	150	64.83	23	150	64.67	6.97	12.60	✓	0.55	0.71	1.02	0.74	✗
F.I.C. 208 to F.I.C. 209	16	224	224	150	65.49	53	80	64.83	4.78	17.29	✓	0.28	0.98	0.86	0.84	✓
F.I.C. 212 to F.I.C. 213	23	322	322	150	65.15	75	80	64.21	5.35	17.29	✓	0.31	0.98	0.88	0.87	✓
F.I.C. 214 to F.I.C. 215	13	182	182	150	64.86	76	80	63.91	4.50	17.29	✓	0.26	0.98	0.84	0.83	✓
F.I.C. 217 to F.I.C. 218	4	56	56	150	63.84	22	80	63.57	3.38	17.29	✓	0.20	0.98	0.78	0.77	✓
F.I.C. 224 to F.I.C. 225	2	28	28	150	63.82	35	60	63.24	2.95	19.99	✓	0.15	1.13	0.72	0.82	✓

Title:	Job Ref.:	Calcs. By	Drg. No.		
Housing scheme at Capdoo Commons	20017	Brian Connolly	P- 20017-303	ks: 1.5 mm	brian connolly associates
Client: Westar Investments Ltd.	section 200			Discharge: 14 units per house	consulting engineers
Subject: FOUL SEWER DESIGN	sheet 03 of 03			Sewage @ 15 °C	the studio, wood's way, clane, co. kildare
					tel: (045) 892211; fax (045) 892420

Pipe Section	No. of Houses	Discharge (units)	Total Discharge (units)	Pipe Diam (mm)	U/S I.L. (m)	Length L_{pipe} (m)	Gradient 1 in ...	D/S I.L. (m)	Flow Q (l/s)	Pipe Cap. Q_{cap} (l/s)	CHECK Capacity of pipe. Qcap >Q	Proport. Flow Q/Qp	Velocity V_{pipe} (m/s)	Proport. Velocity V/Vp	Discharge. Velocity $V_{proportional}$ (m/s)	CHECK Self clean vel. V_p >0.75m/sec
F.I.C. 219 to F.I.C. 220	9	126	126	150	64.82	74	80	63.90	4.08	17.29	✓	0.24	0.98	0.82	0.80	✓
F.I.C. 220 to F.I.C. 222	0	0	126	150	63.90	12	100	63.78	4.08	15.46	✓	0.26	0.87	0.85	0.74	✗
F.I.C. 222 to F.I.C. 223	2	28	154	150	63.78	44	100	63.34	4.30	15.46	✓	0.28	0.87	0.86	0.75	✓
F.I.C. 221 to F.I.C. 222	2	28	28	150	64.11	20	60	63.78	2.95	19.99	✓	0.15	1.13	0.72	0.82	✓

Title:	Job Ref.:	Calcs. By	Drg. No.	
Housing scheme at Capdoo Commons **Client: WESTAR INVESTMENTS LTD** **Subject: FOUL SEWER DESIGN**	**sheet 006**	**Brian Connolly**	**P-** 20017-303	brian connolly associates consulting engineers the studio, wood's way clane, co. kildare tel: (045) 892211: fax (045) 892420

ABBEYPARK PUMPING STATION CAPACITY

Existing Houses	Total Units
Abbeypark	121
Brooklands	164
The Oaks	20
Private Houses	4
The Cloisters	32
Abbeywood	44
Total No of units	385

Allow 500 litres per dwelling per day = 500l. x 385 dwellings = 192,500 litres/day

Capacity of tank :
Diameter 13.5 m
depth 2.8m (64.23-61.43) lowest I.L. at end of line
Volume 400.95 m3 = 400,950 litres/day
at 500 litres per dwelling
Tank Capacity 400,950 / 500 = 802 dwellings

Spare Capacity of Abbeylands Tank = 802 - 385 = 417 dwellings.

Check: Tank to service 333 dwellings + Creche from proposed development.

Appendix E

IRISH WATER PRE-CONNECTION ENQUIRY FORM

Pre-connection enquiry form

Business developments, mixed use developments, housing developments

This form is to be filled out by applicants enquiring about the feasibility of a water and/or wastewater connection to Irish Water infrastructure. If completing this form by hand, please use BLOCK CAPITALS and black ink.

Please refer to the **Guide to completing the pre-connection enquiry form** on page 13 of this document when completing the form.

*** Denotes mandatory/ required field. Please note, if mandatory fields are not completed the application will be returned.**

Section A | Applicant details

1 *Applicant details:

Registered company name (if applicable): Westar Investments Limited

Trading name (if applicable):

Company registration number (if applicable): 132382

If you are not a registered company/business, please provide the applicant's name:

*Contact name: William Fadden

*Postal address: Dublin Road
Clane
Co Kildare

*Eircode: W91FPW2

*Telephone: 0879325254

Mobile:

*Email: williamj@westargroup.ie

2 Agent details (if applicable):

Contact name: Brian Connolly

Company name (if applicable): BCA Assoc Engineers

Postal address: Woods Way
Clane
Co Kildare

Eircode: W91V256

Telephone: 0458922 11

Email: bca.brianc@gmail.com

3 ***Please indicate whether it is the applicant or agent who should receive future correspondence in relation to the enquiry:**

Applicant [x] Agent [ ]

Section B | Site details

4 ***Site address:** Capdoo & Abbeylands
Clane
Co Kildare

5 ***Irish Grid co-ordinates of site:** Eastings (X) 688309 Northings (Y) 727982

Eg. co-ordinates of GPO, O'Connell St., Dublin: E(X) 315,878 N(Y) 234,619

6 ***Local Authority:**

Local Authority that granted planning permission (if applicable):

Kildare County Council

7 ***Has full planning permission been granted?** Yes [ ] No [x]

If 'Yes', please provide the current or previous planning reference number:

Section C | Development details

8 Please outline the domestic and/or industry/business use proposed:

Property type	Number of units	Property type	Number of units	Property type	Number of units
House	215	Apartments	90	Agricultural	0
Office	0	School	0	Retail unit	0
Residential care home	0	Institution	0	Industrial unit	0
Hotel	0	Factory	0	Other	Creche - 1
Other (please specify type)					

9 *Approximate start date of proposed development: 0 1 / 0 1 / 2 0 2 1

10 *Is the development multi-phased? Yes [x] No [ ]

If 'Yes', application must include a master-plan identifying the development phases and the current phase number.

If 'Yes', please provide details of variations in water demand volumes and wastewater discharge loads due to phasing requirements.

11 *Please indicate the type of connection required by ticking the appropriate box below:

Water [ ] Please go to Section D

Wastewater [ ] Please go to Section E

Both [x] Please complete both Sections D and E

Section D | Water connection and demand details

12 ***Is there an existing connection to public water mains at the site?** Yes [ ] No [x]

12.1 If yes, is this enquiry for an additional connection to one already installed? Yes [ ] No [ ]

12.2 If yes, is this enquiry to increase the size of an existing connection? Yes [ ] No [ ]

13 **Approximate date water connection is required:** [0][1] / [0][2] / [2][0][2][1]

14 ***What diameter of water connection is required to service the development?** [1][0][0] mm

15 ***Is more than one connection required to the public infrastructure to service this development?** Yes [ ] No [x]

If 'Yes', how many? [ ][ ]

16 **Please indicate the business water demand (shops, offices, schools, hotels, restaurants, etc.):**

Post-development peak hour water demand	0	**l/s**
Post-development average hour water demand	0	**l/s**

Please include calculations on the attached sheet provided. Where there will be a daily/weekly/seasonal variation in the water demand profile, please provide all such details.

17 **Please indicate the industrial water demand (industry-specific water requirements):**

Post-development peak hour water demand	0	**l/s**
Post-development average hour water demand	0	**l/s**

Please include calculations on the attached sheet provided. Where there will be a daily/weekly/seasonal variation in the water demand profile, please provide all such details.

18 **What is the existing ground level at the property boundary at connection point (if known) above Malin Head Ordnance Datum?**

[6][5][.][2][5] m

19 **What is the highest finished floor level of the proposed development above Malin Head Ordnance Datum?**

[6][5][.][4][8] m

20 **Is on-site water storage being provided?** Yes [ ] No [x]

Please include calculations on the attached sheet provided.

21 **Are there fire flow requirements?** Yes [x] No [ ]

Additional fire flow requirements over and above those identified in Q16-17	22.5	**l/s**

Please include calculations on the attached sheet provided, and include confirmation of requirements from the Fire Authority.

22 **Do you propose to supplement your potable water supply from other sources?** Yes [ ] No [x]

If 'Yes', please indicate how you propose to supplement your potable water supply from other sources (see **Guide to completing the application form** on page 12 of this document for further details):

Section E | Wastewater connection and discharge details

23 ***Is there an existing connection to a public sewer at the site?** Yes [ ] No [x]

23.1 If yes, is this enquiry for an additional connection to the one already installed? Yes [ ] No [ ]

23.2 If yes, is this enquiry to increase the size of an existing connection? Yes [ ] No [ ]

24 ***Approximate date that wastewater connection is required:** 01 / 02 / 2021

25 ***What diameter of wastewater connection is required to service the development?** 225 mm

26 ***Is more than one connection required to the public infrastructure to service this development?** Yes [x] No [ ]

If 'Yes', how many? 02

27 **Please indicate the commercial wastewater hydraulic load (shops, offices, schools, hotels, restaurants, etc.):**

Post-development peak discharge	0	**l/s**
Post-development average discharge	0	**l/s**

Please include calculations on the attached sheet provided.

28 **Please indicate the industrial wastewater hydraulic load (industry-specific discharge requirements):**

Post-development peak discharge	0	**l/s**
Post-development average discharge	0	**l/s**

Please include calculations on the attached sheet provided.

29 Wastewater organic load:

Characteristic	Max concentration (mg/l)	Average concentration (mg/l)	Maximum daily load (kg/day)
Biochemical oxygen demand (BOD)			
Chemical oxygen demand (COD)			
Suspended solids (SS)			
Total nitrogen (N)			
Total phosphorus (P)			
Other			

Temperature range	
pH range	

30 *Storm water run-off will only be accepted from brownfield sites that already have a storm/surface water connection to a combined sewer. In the case of such brownfield sites, please indicate if the development intends discharging surface water to the combined wastewater collection system:

Yes [ ] No [x]

If 'Yes', please give reason for discharge and comment on adequacy of SUDS/attenuation measures proposed.

31 *Do you propose to pump the wastewater? Yes [ ] No [x]

If 'Yes', please include justification for your pumped solution with this application.

32 What is the existing ground level at the property boundary at connection point (if known) above Malin Head Ordnance Datum?

65.25 m

33 What is the lowest finished floor level on site above Malin Head Ordnance Datum? 65.48 m

34 What is the proposed invert level of the pipe exiting the property to the public road?

62.65 m

Section F | Supporting documentation

Please provide the following additional information (all mandatory):

> Site location map: A site location map to a scale of 1:1000, which clearly identifies the land or structure to which the enquiry relates. The map shall include the following details: [x]

i. The scale shall be clearly indicated on the map.

ii. The boundaries shall be delineated in red.

iii. The site co-ordinates shall be marked on the site location map.

> Details of planning and development exemptions (if applicable). [ ]

> Calculations (calculation sheets provided below). [x]

> Site layout map to a scale of 1:500 showing layout of proposed development, water network and wastewater network layouts, additional water/wastewater infrastructure if proposed, connection points to Irish Water infrastructure. [x]

> Conceptual design of the connection asset from the proposed development to the existing Irish Water infrastructure, including service conflicts, gradients, pipe sizes and invert levels. [x]

> Any other information that might help Irish Water assess this pre-connection enquiry. [x]

Section G | Declaration

I/We hereby make this application to Irish Water for a water and/or wastewater connection as detailed on this form.

I/We understand that any alterations made to this application must be declared to Irish Water.

The details that I/we have given with this application are accurate.

I/We have enclosed all the necessary supporting documentation.

Any personal data you provide will be stored and processed by Irish Water and may be transferred to third parties for the purposes of the water and/or wastewater connection process. I hereby give consent to Irish Water to store and process my personal data and to transfer my personal data to third parties, if required, for the purposes of the connection process.

If you wish to revoke consent at any time or wish to see Irish Water's full Data Protection Notice, please see **https://www.water.ie/privacy-notice/**

Signature: William Fadden Digitally signed by William Fadden Date: 2020.03.30 10:27:10 +01'00'

Date: 30 / 03 / 2020

Your full name (in BLOCK CAPITALS):

WILLIAM FADDEN

Irish Water will carry out a formal assessment based on the information provided on this form.
Any future connection offer made by Irish Water will be based on the information that has been provided here.

Please submit the completed form to **newconnections@water.ie** or alternatively, post to:

Irish Water
PO Box 860
South City Delivery Office
Cork City

Please note that if you are sending us your application form and any associated documentation by email, the maximum file size that we can receive in any one email is 35MB.

Please note, if mandatory fields are not completed the application will be returned.

Irish Water is subject to the provisions of the Freedom of Information Act 2014 ("FOIA") and the codes of practice issued under FOIA as may be amended, updated or replaced from time to time. The FOIA enables members of the public to obtain access to records held by public bodies subject to certain exemptions such as where the requested records may not be released, for example to protect another individual's privacy rights or to protect commercially sensitive information. Please clearly label any document or part thereof which contains commercially sensitive information. Irish Water accepts no responsibility for any loss or damage arising as a result of its processing of freedom of information requests.

Calculations

Water demand

The average and peak water demand rates are calculated in accordance with Irish Water pre-connection enquiry form which assumes:
- Load rating of 150L/person/day and,
- Average occupancy ratio of 2.7 persons per dwelling.

The average day, peak week demand is taken as 1.25 times the average day, peak week demand.

Number of Properties = 305

Average Daily Domestic Demand (ADDD) = 150 L/Day x No. Houses x Occupancy
= 123,525 L/Day
= 1.4 L/sec

Average Day Peak Week Demand (ADPWD) = ADDD x 1.25
= 1.75 L/sec

Peak Demand = ADPWD x 2.1
= 3.675 L/sec

Normal Demand (assuming principle of water usage over 8 hours) = ADPWD x 24/8
= 5.25 L/sec

PHASE BREAKDOWN:

PHASE A = 80 Units
Phase A Peak Demand = 0.96 L/sec
Phase A Normal Demand = 1.38 L/sec

PHASE B = 75 Units
Phase B Peak Demand = 0.9 L/sec
Phase B Normal Demand = 1.29 L/sec

PHASE C = 75 Units
Phase C Peak Demand = 0.9 L/sec
Phase C Normal Demand = 1.29 L/sec

PHASE D = 75 Units
Phase D Peak Demand = 0.9 L/sec
Phase D Normal Demand = 1.29 L/sec

On-site storage

Fire flow requirements

22.5 L/sec

The average and peak discharge rates are calculated using loading rates provided by Irish Water:

Dry Weather Flow (DWF) = 600 L per Dwelling

Number of Properties = 300

Total DWF = 600 x Number of Properties
= 183,000 L/day
= 2.11 L/sec

Peak Discharge = 6 x DWF
= 12.7 L/sec

PHASE BREAKDOWN:

PHASE A = 80 Units
Phase A Total DWF = 0.55 L/day
Phase A Peak Discharge = 3.33 L/sec

PHASE B = 75 Units
Phase B Total DWF = 0.52 L/day
Phase B Peak Discharge = 3.12 L/sec

PHASE C = 75 Units
Phase C Total DWF = 0.52 L/day
Phase C Peak Discharge = 3.12 L/sec

PHASE D = 75 Units
Phase D Total DWF = 0.52 L/day
Phase D Peak Discharge = 3.12 L/sec

Flow balancing and pumping

N/A

Guide to completing the pre-connection enquiry form

This form should be completed by applicants enquiring about the feasibility of a water and/or wastewater connection to Irish Water infrastructure.

The Irish Water Codes of Practice are available at **www.water.ie** for reference.

Section A | Applicant Details

Question 1: This question requires the applicant or company enquiring about the feasibility of a connection to identify themselves, their postal address, and to provide their contact details.

Question 2: If the applicant has employed a consulting engineer or an agent to manage the enquiry on their behalf, the agent's address and contact details should be recorded here.

Question 3: Please indicate whether it is the applicant or the agent who should receive future correspondence in relation to the enquiry.

Section B | Site details

Question 4: This is the address of the site requiring the water/wastewater service connection and for which this enquiry is being made.

Question 5: Please provide the Irish Grid co-ordinates of the proposed site. Irish grid positions on maps are expressed in two dimensions as Eastings (E or X) and Northings (N or Y) relative to an origin. You will find these coordinates on your Ordnance Survey map which is required to be submitted with an application.

Question 6: Please identify the Local Authority that is or will be dealing with your planning application, for example Cork City Council.

Question 7: Please indicate if planning permission has been granted for this application, and if so, please provide the planning permission reference number.

Section C | Development details

Question 8: Please specify the number of different property/premises types by filling in the tables provided.

Question 9: Please indicate the approximate commencement date of works on the development.

Question 10: Please indicate if a phased building approach is to be adopted when developing the site. If so, please provide details of the phase master-plan and the proposed variation in water demand/wastewater discharge as a result of the phasing of the development.

Question 11: Please indicate the type of connection required by ticking the appropriate box and proceed to complete the appropriate section or sections.

Section D | Water connection and demand details

Question 12: Please indicate if a water connection already exists for this site.

Question 12.1: Please indicate if this enquiry concerns an additional connection to one already installed on the site.

Question 12.2: Please indicate if you are proposing to upgrade the water connection to facilitate an increase in water demand. Irish Water will determine what impact this will have on our infrastructure.

Question 13: Please indicate the approximate date that the proposed connection to the water infrastructure will be required.

Question 14: Please indicate what diameter of water connection is required to service this development.

Question 15: Please indicate if more than one connection is required to service this development. Please note that the connection size provided may be used to determine the connection charge.

Question 16: If this connection enquiry concerns a business premises, please provide calculations for the water demand and include your calculations on the calculation sheet provided. Business premises include shops, offices, hotels, schools, etc. Demand rates (peak and average) are site specific. Average demand is the total daily volume divided by a 24-hour time period and expressed in litres per second (l/s). For design purposes, please refer to the Irish Water Codes of Practice for Water Infrastructure.

Question 17: If this connection enquiry is for an industrial premises, please calculate the water demand and include your calculations on the calculation sheet provided. Demand rates (peak and average) are site specific. Average demand is the total daily volume divided by a 24-hour time period and expressed in litres per second (l/s). The peak demand for sizing of the pipe network will be as per the specific business production requirements. For design purposes, please refer to the Irish Water Codes of Practice for Water Infrastructure.

Question 18: Please specify the ground level at the location where connection to the public water mains will be made. This is required in order to determine if there is sufficient pressure in the existing water infrastructure to serve your proposed development. Levels should be quoted in metres relative to Malin Head Ordnance Datum.

Question 19: Please specify the highest finished floor level on site. This is required in order to determine if there is sufficient pressure in the existing water infrastructure to serve your proposed development. Levels should be quoted in metres relative to Malin Head Ordnance Datum.

Question 20: If storage is required, water storage capacity of 24-hour water demand must usually be provided at the proposed site. In some cases, 24-hour storage capacity may not be required, for example 24-hour storage for a domestic house would be provided in an attic storage tank. Please calculate the 24-hour water storage requirements and include your calculations on the attached sheet provided. Please also confirm that on-site storage is being provided by ticking the appropriate box.

Question 21: The water supply system shall be designed and constructed to reliably convey the water flows that are required of the development including fire flow requirements by the Fire Authority. The Fire Authority will provide the requirement for fire flow rates that the water supply system will have to carry. Please note that while flows in excess of your required demand may be achieved in the Irish Water network and could be utilised in the event of a fire, Irish Water cannot guarantee a flow rate to meet your fire flow requirement. To guarantee a flow to meet the Fire Authority requirements, you should provide adequate fire storage capacity within your development. Please include your calculations on the attached sheet provided, and further provide confirmation of the Fire Authority requirements.

Question 22: Please identify proposed additional water supply sources, that is, do you intend to connect to the public water mains or the public mains and supplement from other sources? If supplementing public water supply with a supply from another source, please provide details as to how the potable water supply is to be protected from cross contamination at the premises.

Section E | Wastewater connection and discharge details

Question 23: Please indicate if a wastewater connection to a public sewer already exists for this site.

Question 23.1: Please indicate if this enquiry relates to an additional wastewater connection to one already installed.

Question 23.2: Please indicate if you are proposing to upgrade the wastewater connection to facilitate an increased discharge. Irish Water will determine what impact this will have on our infrastructure.

Question 24: Please specify the approximate date that the proposed connection to the wastewater infrastructure will be required.

Question 25: Please indicate what diameter of wastewater connection is required to service this development.

Question 26: Please indicate if more than one connection is required to service this development. Please indicate number required.

Question 27: If this enquiry relates to a business premises, please provide calculations for the wastewater discharge and include your calculations on the attached sheet provided. Business premises include shops, offices, hotels, schools, etc. Discharge rates (peak and average) are site specific. Average discharge is the total daily volume divided by a 24-hour time period and expressed in litres per second (l/s). For design purposes, please refer to the Irish Water Codes of Practice for Wastewater Infrastructure.

Question 28: If this enquiry relates to an industrial premises, please provide calculations for the wastewater discharge and include your calculations on the calculation sheet provided. Discharge rates (peak and average) are site specific. Average discharge is the total daily volume divided by a 24-hour time period and expressed in litres per second (l/s). The peak discharge for sizing of the pipe network will be as per the specific business production requirements. For design purposes, please refer to the Irish Water Codes of Practice for Wastewater Infrastructure.

Question 29: Please specify the maximum and average concentrations and the maximum daily load of each of the wastewater characteristics listed in the wastewater organic load table (if not domestic effluent), and also specify if any other significant concentrations are expected in the effluent. Please complete the table and provide additional supporting documentation if relevant. Note that the concentration shall be in mg/l and the load shall be in kg/day. Note that for business premises (shops, offices, schools, hotels, etc.) for which only domestic effluent will be discharged (excluding discharge from canteens/ restaurants which would require a Trade Effluent Discharge licence), there is no need to complete this question.

Question 30: In exceptional circumstances, such as brownfield sites, where the only practical outlet for storm/ surface water is to a combined sewer, Irish Water will consider permitting a restricted attenuated flow to the combined sewer. Storm/surface water will only be accepted from brownfield sites that already have a storm/surface water connection to a combined sewer and the applicant must demonstrate how the storm/surface water flow from the proposed site is minimised using sustainable urban drainage system (SUDS). This type of connection will only be considered on a case by case basis. Please advise if the proposed development intends discharging surface water to the combined wastewater collection system.

Question 31: Please specify if the development needs to pump its wastewater discharge to gain access to Irish Water infrastructure.

Question 32: Please specify the ground level at the location where connection to the public sewer will be made. This is required to determine if the development can be connected to the public sewer via gravity discharge. Levels should be quoted in metres relative to Malin Head Ordnance Datum.

Question 33: Please specify the lowest floor level of the proposed development. This is required in order to determine if the development can be connected to the public sewer via gravity discharge. Levels should be quoted in metres relative to Malin Head Ordnance Datum.

Question 34: Please specify the proposed invert level of the pipe exiting the property to the public road.

Section F | Supporting documentation

Please provide additional information as listed.

Section G | Declaration

Please review the declaration, sign, and return the completed application form to Irish Water by email or by post using the contact details provided in Section G.

Notes

Notes

William Fadden

Dublin Road,
Clane,
Co. Kildare
W91FPW2

UisceÉireann
Bosca OP 448
Oifig Sheachadta n
Cathrach Theas
Cathair Chorcaí

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

www.water.ie

3 July 2020

Re: CDS20002208 pre-connection enquiry - Subject to contract | Contract denied

Connection for Multi/Mixed Use Development of 306 units at Capdoo & Abbeylands, Clane, Kildare

Dear Sir/Madam,

Irish Water has reviewed your pre-connection enquiry in relation to a Water & Wastewater connection at Capdoo & Abbeylands, Clane, Kildare (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	• On site storage for the average day peak week demand of the commercial section (crèche) is required to supply this demand for 24 hours and have a re-fill time of 12 hours.
Wastewater Connection	• Irish Water has a project underway to relieve capacity constraints in Clane (Upper Liffey Valley Sewerage Scheme Contract 2B – ULVSS). Connections of units can be facilitated during the commissioning phase scheduled for Q3/2021 (this may be subject to change). Connection of Phase A in advance of Q3/2021 will be subject to a Connection Agreement with Irish Water. • Connection of the Development should be via the private wastewater infrastructure in Abbeylands Housing Estate. At connection application stage the Developer has to demonstrate that the Third Party infrastructure is in compliance with requirements of

	Irish Water Code of Practice and Standard Details and has adequate capacity and integrity to cater for the additional load.

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:

Reproduced from the Ordnance Survey of Ireland by Permission of the Government. License No. 3-3-34

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 Marina Zivanovic Byrne from the design team on 01 89 25991 or email mzbyrne@water.ie For further information, visit **www.water.ie/connections.**

Yours sincerely,

Maria O'Dwyer

Connections and Developer Services

Appendix F

IGSL INFILTRATON REPORT

Appendix F

IGSL INFILTRATON REPORT

IGSL Limited

Westar Group

Dublin Road, Clane

Infiltration Test Report

Project No. 21680

April 2019

M7 Business Park
Naas
Co. Kildare
Ireland

T: +353 (45) 846176
E: info @igsl.ie
W: www.igsl.ie

Document Verification

Project:	Dublin Road, Clane
Project No.	21680

Revision	Date	Title		
Rev 0	15/04/2019	Report		
	Copies	Document Format	Prepared By	Reviewed By
	1	Digital	Brian Green Chartered Engineer	David Green Chartered Engineer
	To	Westar Group		
Revision	**Date**	**Title**		
	Copies	Document Format	Prepared By	Reviewed By
	To			
Revision	**Date**	**Title**		
	Copies	Document Format	Prepared By	Reviewed By
	To			
Revision	**Date**	**Title**		
	Copies	Document Format	Prepared By	Reviewed By
	To			

Report on Infiltration Testing
At
Housing Development
Dublin Road, Clane
On behalf of
Westar Group

Report No. 21680

Contents

Appendices

Report on Infiltration Testing
At
Housing Development
Dublin Road, Clane
On behalf of
Westar Group

Report No. 21680 Date April 2019

1.0 Introduction

The proposed new housing development at Dublin Road, Clane will include a system for the storage and dispersion of storm water. Infiltration tests were, therefore, carried out to ascertain the suitability of the sub-soils for permeable pavement purposes.

2.0 Sub-soil conditions

The test pits revealed brown sandy clay with occasional gravel to the excavated depth of 0.65 metres. No groundwater was encountered during the course of excavation operations

3.0 Infiltration Testing

The infiltration tests were performed in accordance with BRE Digest 365 'Soakaway Design'.

To obtain a measure of the infiltration rate of the sub-soils, water was poured into each of the three test pits, and records taken of the fall in water level against time. This procedure was repeated twice more to ensure saturation of the sub-soils.

The infiltration rate is the volume of water dispersed per unit exposed area per unit of time, and is generally expressed as metres/minute or metres/second. Designs are based on the slowest infiltration rate, which is generally calculated from the final cycle.

The results for the final two stages of testing, following the saturation periods, are enclosed in appendix1.

4.0 Principles of Permeable Pavement

Permeable paving systems are designed to provide temporary storage of water in a reservoir of crushed stone underlying the paved area. In an attenuation system where the sub-soils are relatively impermeable the base and sides of the reservoir are lined with an impermeable membrane and the stored water is discharged through an outflow pipe to a suitable surface water system. Where the sub-soils can provide infiltration a geotextile replaces the impermeable liner. As an added precaution an overflow pipe can be installed to avoid flooding of the paved area in extreme storm conditions.

5.0 Results

The infiltration rates indicated by the field tests are shown in Table 1.

Location	Infiltration Rate (f-value)	
	* (First Cycle) (m/min)	* (Second Cycle) (m/min)
SA01	0.0003	0.0001
SA02	0.00007	0
SA03	0.00006	0
SA04	0.0002	0.00008
SA05	0.0023	0.002
SA06	0	
SA07	0	

* First and second measured cycles were preceded by saturation stages

Table 1

The results indicate that the soils in the vicinity of SA02, SA03, SA06 and SA07 are relatively impermeable.

Appendix 1 Infiltration Test Results

Soakaway Design f -value from field tests

IGSL

Contract: Capdoo, Clane, Co. Kildare
Contract No. 21680
Test No. SA01 (First Cycle)
Engineer Westar Group
Date: 05.04.2019

Summary of ground conditions

from	to	Description	Ground water
0.00	0.20	Firm brown TOPSOIL	Dry
0.20	0.65	Firm brown/light brown sandy CLAY with rare gravel, locally very sandy	

Field Data

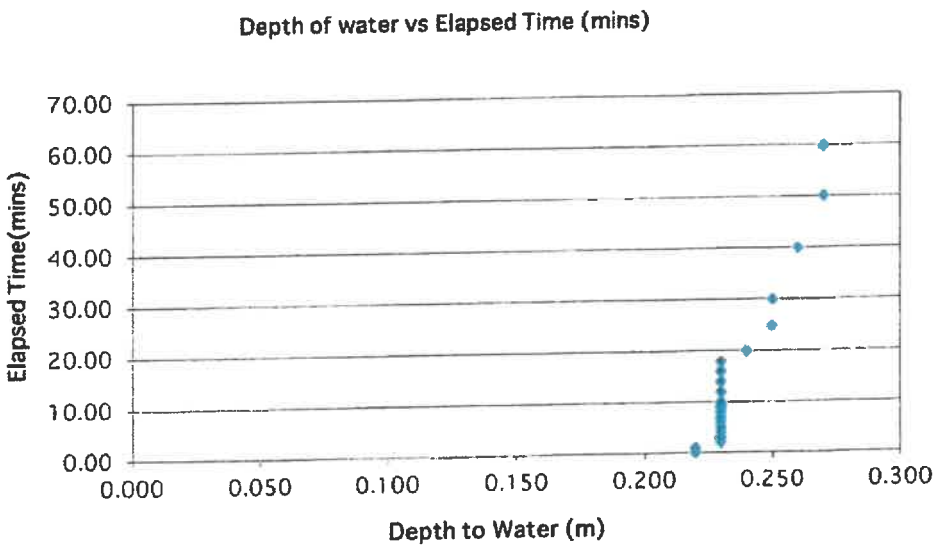
Depth to Water (m)	Elapsed Time (min)
0.220	0.00
0.220	1.00
0.230	2.00
0.230	3.00
0.230	4.00
0.230	5.00
0.230	6.00
0.230	7.00
0.230	8.00
0.230	9.00
0.230	10.00
0.230	12.00
0.230	14.00
0.230	16.00
0.230	18.00
0.240	20.00
0.250	25.00
0.250	30.00
0.260	40.00
0.270	50.00
0.270	60.00

Field Test

Depth of Pit (D)	0.65	m
Width of Pit (B)	0.60	m
Length of Pit (L)	1.20	m
Initial depth to Water =	0.22	m
Final depth to water =	0.270	m
Elapsed time (mins)=	60.00	
Top of permeable soil	0.20	m
Base of permeable soil	0.65	m
Base area=	0.72	m2
*Av. side area of permeable stratum over test perio	1.458	m2
Total Exposed area =	2.178	m2

Infiltration rate (f) = Volume of water used/unit exposed area / unit time

f= 0.0003 m/min or 4.59137E-06 m/sec



Soakaway Design f -value from field tests

IGSL

Contract: Capdoo, Clane, Co. Kildare
Contract No. 21680
Test No. SA01 (Second Cycle)
Engineer Westar Group
Date: 05.04.2019

Summary of ground conditions

from	to	Description	Ground water
0.00	0.20	Firm brown TOPSOIL	Dry
0.20	0.65	Firm brown/light brown sandy CLAY with rare gravel, locally very sandy	

Field Data

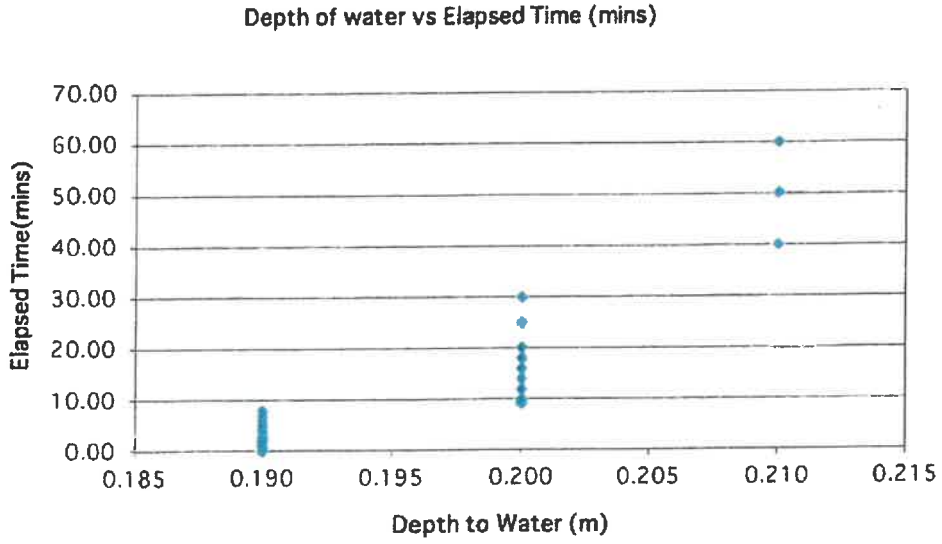
Depth to Water (m)	Elapsed Time (min)
0.190	0.00
0.190	1.00
0.190	2.00
0.190	3.00
0.190	4.00
0.190	5.00
0.190	6.00
0.190	7.00
0.190	8.00
0.200	9.00
0.200	10.00
0.200	12.00
0.200	14.00
0.200	16.00
0.200	18.00
0.200	20.00
0.200	25.00
0.200	30.00
0.210	40.00
0.210	50.00
0.210	60.00

Field Test

Depth of Pit (D)	0.65	m
Width of Pit (B)	0.60	m
Length of Pit (L)	1.20	m
Initial depth to Water =	0.19	m
Final depth to water =	0.210	m
Elapsed time (mins)=	60.00	
Top of permeable soil	0.20	m
Base of permeable soil	0.65	m
Base area=	0.72	m2
*Av. side area of permeable stratum over test perio	1.62	m2
Total Exposed area =	2.34	m2

Infiltration rate (f) = Volume of water used/unit exposed area / unit time

f= 0.0001 m/min or 1.7094E-06 m/sec



Soakaway Design f -value from field tests

IGSL

Contract: Capdoo, Clane, Co. Kildare
Contract No. 21680
Test No. SA02 (First Cycle)
Engineer Westar Group
Date: 05.04.2019

Summary of ground conditions

from	to	Description	Ground water
0.00	0.20	Firm brown TOPSOIL	Dry
0.20	0.60	Firm brown/light brown sandy CLAY with rare gravel	

Field Data

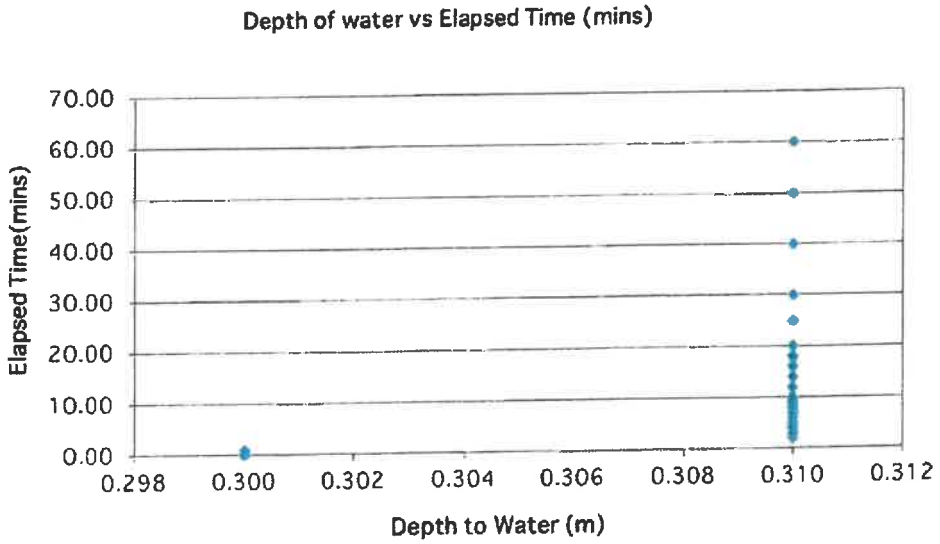
Depth to Water (m)	Elapsed Time (min)
0.300	0.00
0.300	1.00
0.310	2.00
0.310	3.00
0.310	4.00
0.310	5.00
0.310	6.00
0.310	7.00
0.310	8.00
0.310	9.00
0.310	10.00
0.310	12.00
0.310	14.00
0.310	16.00
0.310	18.00
0.310	20.00
0.310	25.00
0.310	30.00
0.310	40.00
0.310	50.00
0.310	60.00

Field Test

Depth of Pit (D)	0.60	m
Width of Pit (B)	0.80	m
Length of Pit (L)	1.00	m
Initial depth to Water =	0.30	m
Final depth to water =	0.310	m
Elapsed time (mins)=	60.00	
Top of permeable soil	0.20	m
Base of permeable soil	0.60	m
Base area=	0.8	m2
*Av. side area of permeable stratum over test perio	1.062	m2
Total Exposed area =	1.862	m2

Infiltration rate (f) = Volume of water used/unit exposed area / unit time

f= 7E-05 m/min or 1.19346E-06 m/sec



Soakaway Design f -value from field tests

IGSL

Contract: Capdoo, Clane, Co. Kildare
Contract No. 21680
Test No. SA02 (Second Cycle)
Engineer Westar Group
Date: 05.04.2019

Summary of ground conditions

from	to	Description	Ground water
0.00	0.20	Firm brown TOPSOIL	Dry
0.20	0.60	Firm brown/light brown sandy CLAY with rare gravel	

Field Data

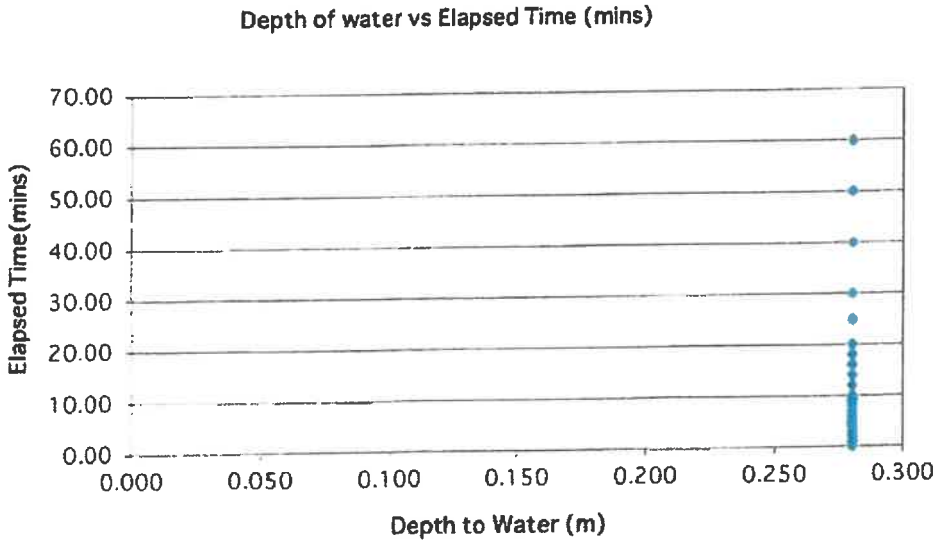
Depth to Water (m)	Elapsed Time (min)
0.280	0.00
0.280	1.00
0.280	2.00
0.280	3.00
0.280	4.00
0.280	5.00
0.280	6.00
0.280	7.00
0.280	8.00
0.280	9.00
0.280	10.00
0.280	12.00
0.280	14.00
0.280	16.00
0.280	18.00
0.280	20.00
0.280	25.00
0.280	30.00
0.280	40.00
0.280	50.00
0.280	60.00

Field Test

Depth of Pit (D)	0.60	m
Width of Pit (B)	0.80	m
Length of Pit (L)	1.00	m
Initial depth to Water =	0.28	m
Final depth to water =	0.280	m
Elapsed time (mins)=	60.00	
Top of permeable soil	0.20	m
Base of permeable soil	0.60	m
Base area=	0.8	m2
*Av. side area of permeable stratum over test perio	1.152	m2
Total Exposed area =	1.952	m2

Infiltration rate (f) = Volume of water used/unit exposed area / unit time

f= 0 m/min or 0 m/sec



Soakaway Design f -value from field tests

IGSL

Contract: Capdoo, Clane, Co. Kildare
Contract No. 21680
Test No. SA03 (First Cycle)
Engineer Westar Group
Date: 04.04.2019

Summary of ground conditions

from	to	Description	Ground water
0.00	0.20	Firm brown TOPSOIL	Dry
0.20	0.65	Firm brown/brownish grey very sandy SILT with occasional gravel, gravel	
		content increases with depth	

Field Data

Depth to Water (m)	Elapsed Time (min)
0.280	0.00
0.280	1.00
0.280	2.00
0.280	3.00
0.280	4.00
0.280	5.00
0.280	6.00
0.280	7.00
0.280	8.00
0.280	9.00
0.280	10.00
0.280	12.00
0.280	14.00
0.280	16.00
0.280	18.00
0.280	20.00
0.280	25.00
0.280	30.00
0.280	40.00
0.290	50.00
0.290	60.00

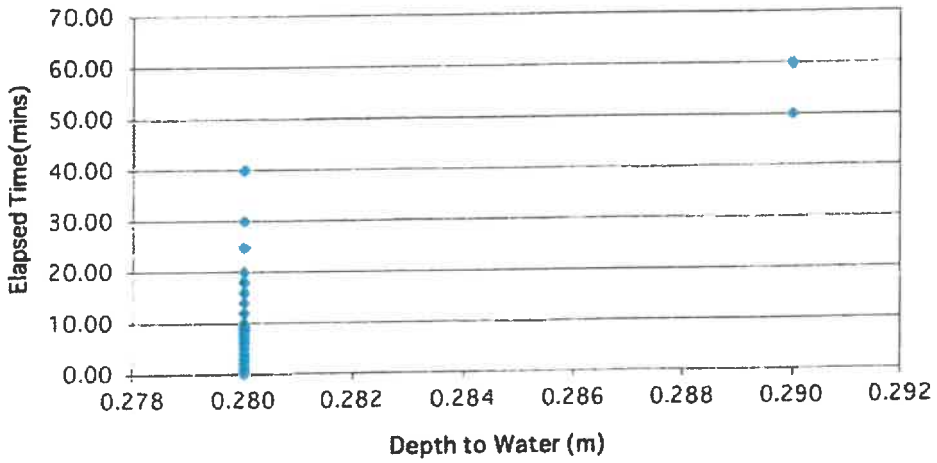
Field Test

Depth of Pit (D)	0.65	m
Width of Pit (B)	0.80	m
Length of Pit (L)	1.00	m
Initial depth to Water =	0.28	m
Final depth to water =	0.290	m
Elapsed time (mins)=	60.00	
Top of permeable soil	0.20	m
Base of permeable soil	0.65	m
Base area=	0.8	m2
*Av. side area of permeable stratum over test perio	1.314	m2
Total Exposed area =	2.114	m2

Infiltration rate (f) = Volume of water used/unit exposed area / unit time

f= 6E-05 m/min or 1.05119E-06 m/sec

Depth of water vs Elapsed Time (mins)



Soakaway Design f -value from field tests

IGSL

Contract: Capdoo, Clane, Co. Kildare
Contract No. 21680
Test No. SA03 (Second Cycle)
Engineer Westar Group
Date: 04.04.2019

Summary of ground conditions

from	to	Description	Ground water
0.00	0.20	Firm brown TOPSOIL	Dry
0.20	0.65	Firm brown/brownish grey very sandy SILT with occasional gravel, gravel content increases with depth	

Field Data

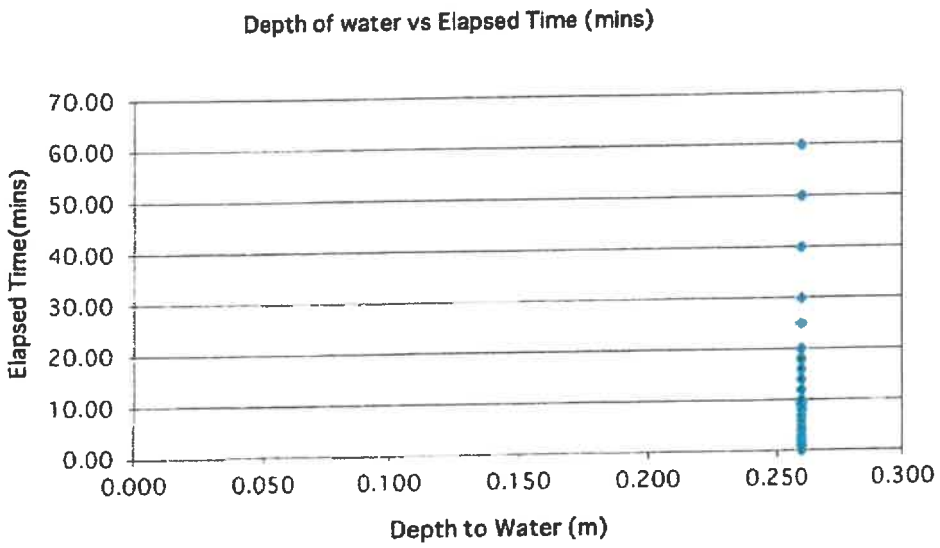
Depth to Water (m)	Elapsed Time (min)
0.260	0.00
0.260	1.00
0.260	2.00
0.260	3.00
0.260	4.00
0.260	5.00
0.260	6.00
0.260	7.00
0.260	8.00
0.260	9.00
0.260	10.00
0.260	12.00
0.260	14.00
0.260	16.00
0.260	18.00
0.260	20.00
0.260	25.00
0.260	30.00
0.260	40.00
0.260	50.00
0.260	60.00

Field Test

Depth of Pit (D)	0.65	m
Width of Pit (B)	0.80	m
Length of Pit (L)	1.00	m
Initial depth to Water =	0.26	m
Final depth to water =	0.260	m
Elapsed time (mins)=	60.00	
Top of permeable soil	0.20	m
Base of permeable soil	0.65	m
Base area=	0.8	m2
*Av. side area of permeable stratum over test perio	1.404	m2
Total Exposed area =	2.204	m2

Infiltration rate (f) = Volume of water used/unit exposed area / unit time

f= 0 m/min or 0 m/sec



Soakaway Design f -value from field tests

IGSL

Contract: Capdoo, Clane, Co. Kildare
Contract No. 21680
Test No. SA04 (First Cycle)
Engineer Westar Group
Date: 04.04.2019

Summary of ground conditions

from	to	Description	Ground water
0.00	0.20	Firm brown TOPSOIL	Dry
0.20	0.65	Firm brown slightly sandy SILT with rare gravel	

Field Data

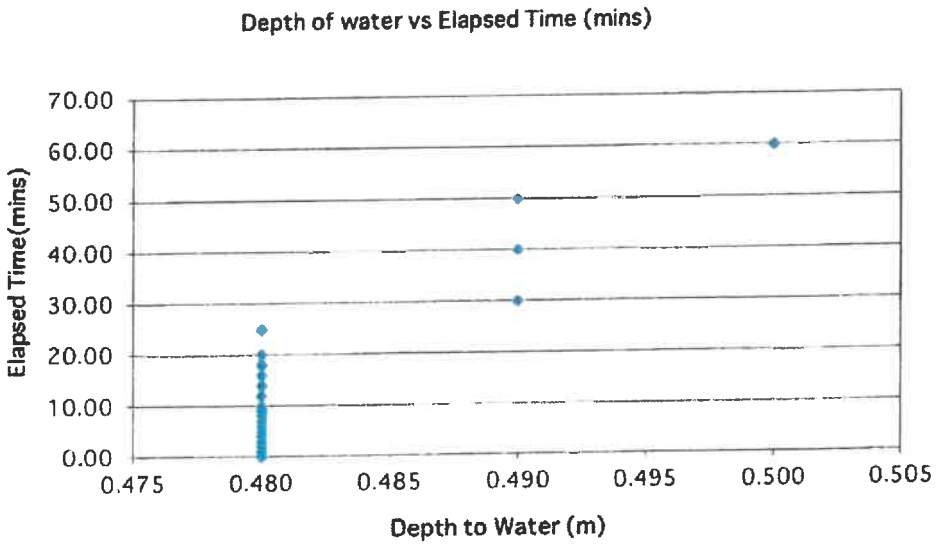
Depth to Water (m)	Elapsed Time (min)
0.480	0.00
0.480	1.00
0.480	2.00
0.480	3.00
0.480	4.00
0.480	5.00
0.480	6.00
0.480	7.00
0.480	8.00
0.480	9.00
0.480	10.00
0.480	12.00
0.480	14.00
0.480	16.00
0.480	18.00
0.480	20.00
0.480	25.00
0.490	30.00
0.490	40.00
0.490	50.00
0.500	60.00

Field Test

Depth of Pit (D)	0.65	m
Width of Pit (B)	0.80	m
Length of Pit (L)	1.40	m
Initial depth to Water =	0.48	m
Final depth to water =	0.500	m
Elapsed time (mins)=	60.00	
Top of permeable soil	0.20	m
Base of permeable soil	0.65	m
Base area=	1.12	m2
*Av. side area of permeable stratum over test perio	0.704	m2
Total Exposed area =	1.824	m2

Infiltration rate (f) = Volume of water used/unit exposed area / unit time

f= 0.0002 m/min or 3.41131E-06 m/sec



Soakaway Design f -value from field tests

IGSL

Contract: Capdoo, Clane, Co. Kildare
Contract No. 21680
Test No. SA04 (Second Cycle)
Engineer Westar Group
Date: 04.04.2019

Summary of ground conditions

from	to	Description	Ground water
0.00	0.20	Firm brown TOPSOIL	Dry
0.20	0.65	Firm brown slightly sandy SILT with rare gravel	

Field Data

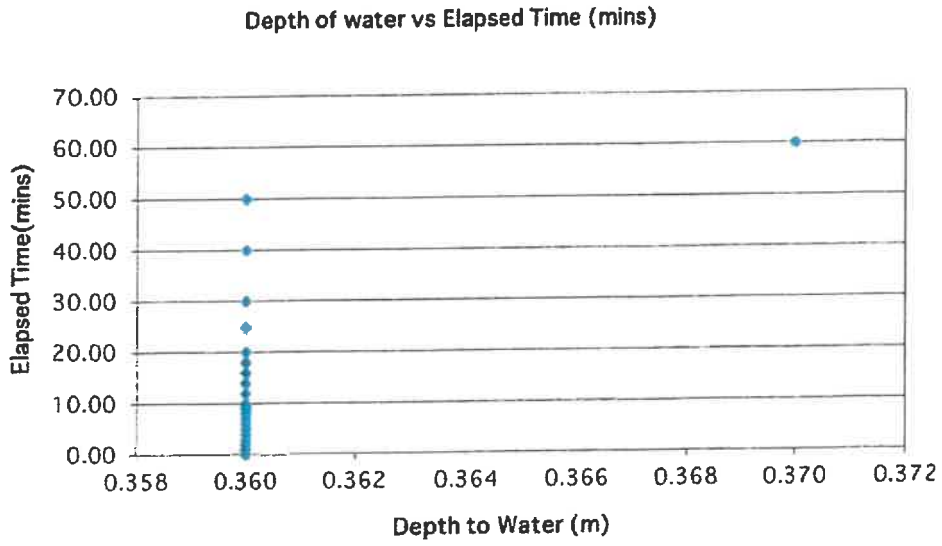
Depth to Water (m)	Elapsed Time (min)
0.360	0.00
0.360	1.00
0.360	2.00
0.360	3.00
0.360	4.00
0.360	5.00
0.360	6.00
0.360	7.00
0.360	8.00
0.360	9.00
0.360	10.00
0.360	12.00
0.360	14.00
0.360	16.00
0.360	18.00
0.360	20.00
0.360	25.00
0.360	30.00
0.360	40.00
0.360	50.00
0.370	60.00

Field Test

Depth of Pit (D)	0.65	m
Width of Pit (B)	0.80	m
Length of Pit (L)	1.40	m
Initial depth to Water	0.36	m
Final depth to water	0.370	m
Elapsed time (mins)	60.00	
Top of permeable soil	0.20	m
Base of permeable soil	0.65	m
Base area=	1.12	m2
*Av. side area of permeable stratum over test perio	1.254	m2
Total Exposed area =	2.374	m2

Infiltration rate (f) = Volume of water used/unit exposed area / unit time

f= 8E-05 m/min or 1.31049E-06 m/sec



Soakaway Design f -value from field tests

IGSL

Contract: Capdoo, Clane, Co. Kildare
Contract No. 21680
Test No. SA05 (First Cycle)
Engineer Westar Group
Date: 04.04.2019

Summary of ground conditions

from	to	Description	Ground water
0.00	0.20	Medium dense grey very silty GRAVELwith brick fragments	Dry
0.20	0.70	Firm brownish grey/grey sandy very gravelly SILT with rare cobbles up to 1	

Field Data

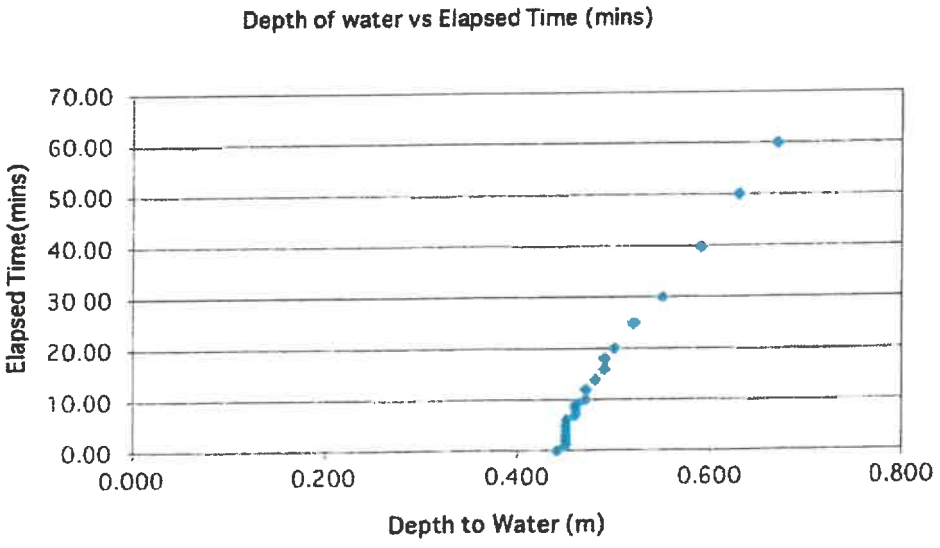
Depth to Water (m)	Elapsed Time (min)
0.440	0.00
0.450	1.00
0.450	2.00
0.450	3.00
0.450	4.00
0.450	5.00
0.450	6.00
0.460	7.00
0.460	8.00
0.460	9.00
0.470	10.00
0.470	12.00
0.480	14.00
0.490	16.00
0.490	18.00
0.500	20.00
0.520	25.00
0.550	30.00
0.590	40.00
0.630	50.00
0.670	60.00

Field Test

Depth of Pit (D)	0.70	m
Width of Pit (B)	0.80	m
Length of Pit (L)	1.00	m
Initial depth to Water =	0.44	m
Final depth to water =	0.670	m
Elapsed time (mins)=	60.00	
Top of permeable soil	0.20	m
Base of permeable soil	0.70	m
Base area=	0.8	m2
*Av. side area of permeable stratum over test perio	0.522	m2
Total Exposed area =	1.322	m2

Infiltration rate (f) = Volume of water used/unit exposed area / unit time

f= 0.0023 m/min or 3.8662E-05 m/sec



Soakaway Design f -value from field tests

IGSL

Contract: Capdoo, Clane, Co. Kildare
Contract No. 21680
Test No. SA05 (Second Cycle)
Engineer Westar Group
Date: 04.04.2019

Summary of ground conditions

from	to	Description	Ground water
0.00	0.20	Medium dense grey very silty GRAVELwith brick fragments	Dry
0.20	0.70	Firm brownish grey/grey sandy very gravelly SILT with rare cobbles up to 1	

Field Data

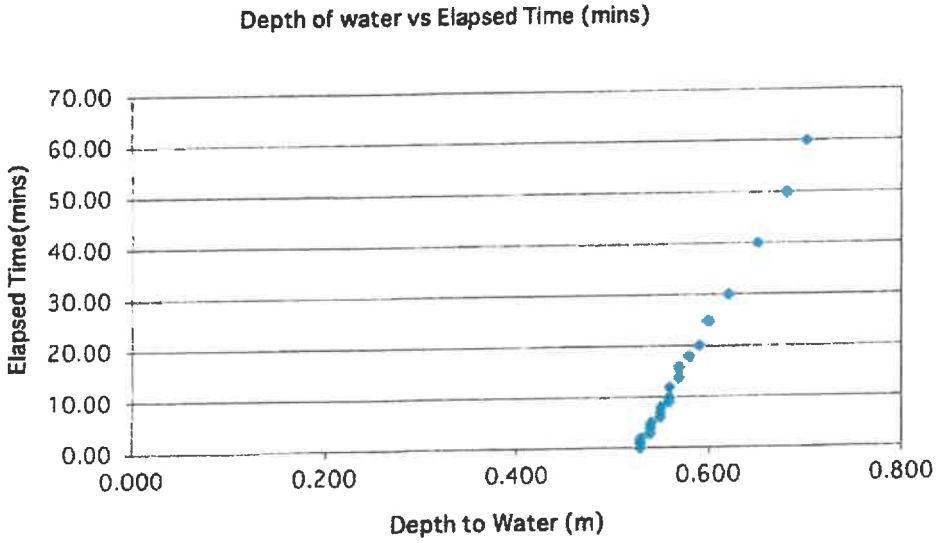
Depth to Water (m)	Elapsed Time (min)
0.530	0.00
0.530	1.00
0.530	2.00
0.540	3.00
0.540	4.00
0.540	5.00
0.550	6.00
0.550	7.00
0.550	8.00
0.560	9.00
0.560	10.00
0.560	12.00
0.570	14.00
0.570	16.00
0.580	18.00
0.590	20.00
0.600	25.00
0.620	30.00
0.650	40.00
0.680	50.00
0.700	60.00

Field Test

Depth of Pit (D)	0.70	m
Width of Pit (B)	0.80	m
Length of Pit (L)	1.00	m
Initial depth to Water =	0.53	m
Final depth to water =	0.700	m
Elapsed time (mins)=	60.00	
Top of permeable soil	0.20	m
Base of permeable soil	0.70	m
Base area=	0.8	m2
*Av. side area of permeable stratum over test perio	0.306	m2
Total Exposed area =	1.106	m2

Infiltration rate (f) = Volume of water used/unit exposed area / unit time

f= 0.002 m/min or 3.41571E-05 m/sec



Soakaway Design f -value from field tests

IGSL

Contract: Capdoo, Clane, Co. Kildare
Contract No. 21680
Test No. SA06 (First Cycle)
Engineer Westar Group
Date: 04.04.2019

Summary of ground conditions

from	to	Description	Ground water
0.00	0.20	Firm brown TOPSOIL	
0.20	0.70	Stiff brown/brownish grey sandy CLAY with rare to occasional gravel	Seepage at 1.8m
0.70	1.30	Firm brownsh grey very sandy CLAY with occasional gravel	
1.30	2.00	Firm light brownish grey clayey SAND with rare gravel	

Field Data

Depth to Water (m)	Elapsed Time (min)
1.410	0.00
1.400	1.00
1.400	2.00
1.390	3.00
1.380	4.00
1.370	5.00
1.370	6.00
1.360	7.00
1.360	8.00
1.350	9.00
1.350	10.00
1.340	12.00
1.330	14.00
1.320	16.00
1.310	18.00
1.300	20.00
1.290	25.00
1.280	30.00

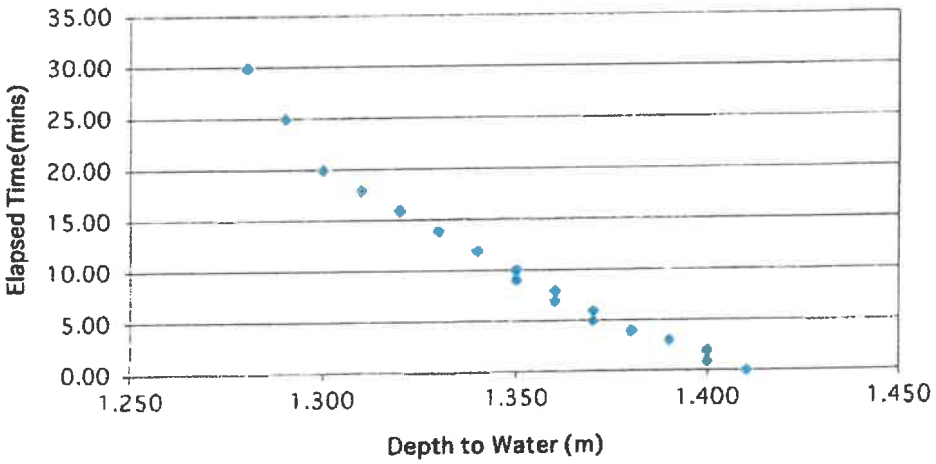
Field Test

Depth of Pit (D)	2.00	m
Width of Pit (B)	0.80	m
Length of Pit (L)	1.50	m
Initial depth to Water =	1.41	m
Final depth to water =	1.280	m
Elapsed time (mins)=	30.00	
Top of permeable soil	0.20	m
Base of permeable soil	2.00	m
Base area=	1.2	m2
*Av. side area of permeable stratum over test perio	3.013	m2
Total Exposed area =	4.213	m2

Infiltration rate (f) = Volume of water used/unit exposed area / unit time

f= 0 m/min or 0 m/sec

Depth of water vs Elapsed Time (mins)



Soakaway Design f -value from field tests

IGSL

Contract: Capdoo, Clane, Co. Kildare
Contract No. 21680
Test No. SA07 (First Cycle)
Engineer Westar Group
Date: 05.04.2019

Summary of ground conditions

from	to	Description	Ground water
0.00	0.20	Firm brown TOPSOIL	Seepage at 1.75m
0.20	0.90	Firm brown/light brown sandy CLAY with rare gravel	
0.90	2.10	Firm grey/brownish grey very sandy CLAY with occasional gravel, contains	
		very clayey sand pockets	

Field Data

Depth to Water (m)	Elapsed Time (min)
1.120	0.00
1.120	1.00
1.110	2.00
1.110	3.00
1.110	4.00
1.110	5.00
1.110	6.00
1.110	7.00
1.100	8.00
1.100	9.00
1.100	10.00
1.100	12.00
1.090	14.00
1.090	16.00
1.080	18.00
1.070	20.00
1.070	25.00
1.070	30.00

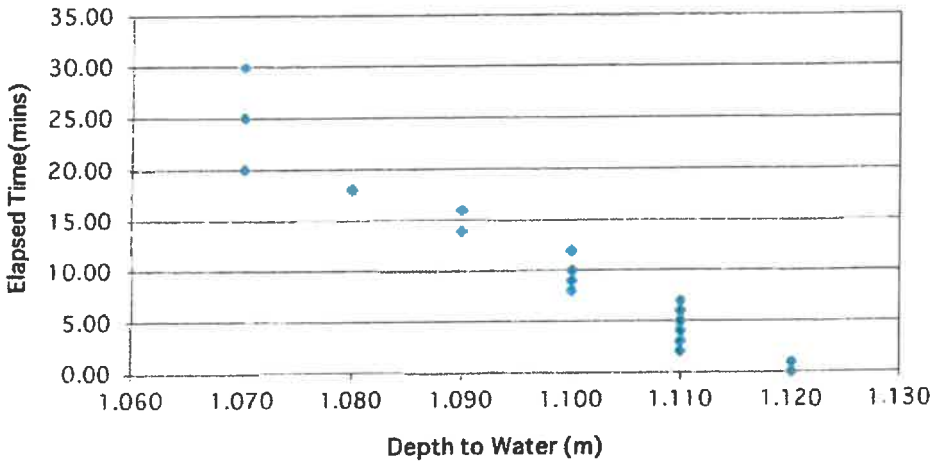
Field Test

Depth of Pit (D)	2.10	m
Width of Pit (B)	0.60	m
Length of Pit (L)	1.40	m
Initial depth to Water =	1.12	m
Final depth to water =	1.070	m
Elapsed time (mins) =	30.00	
Top of permeable soil	0.20	m
Base of permeable soil	2.10	m
Base area=	0.84	m2
*Av. side area of permeable stratum over test perio	4.02	m2
Total Exposed area =	4.86	m2

Infiltration rate (f) = Volume of water used/unit exposed area / unit time

f= 0 m/min or 0 m/sec

Depth of water vs Elapsed Time (mins)



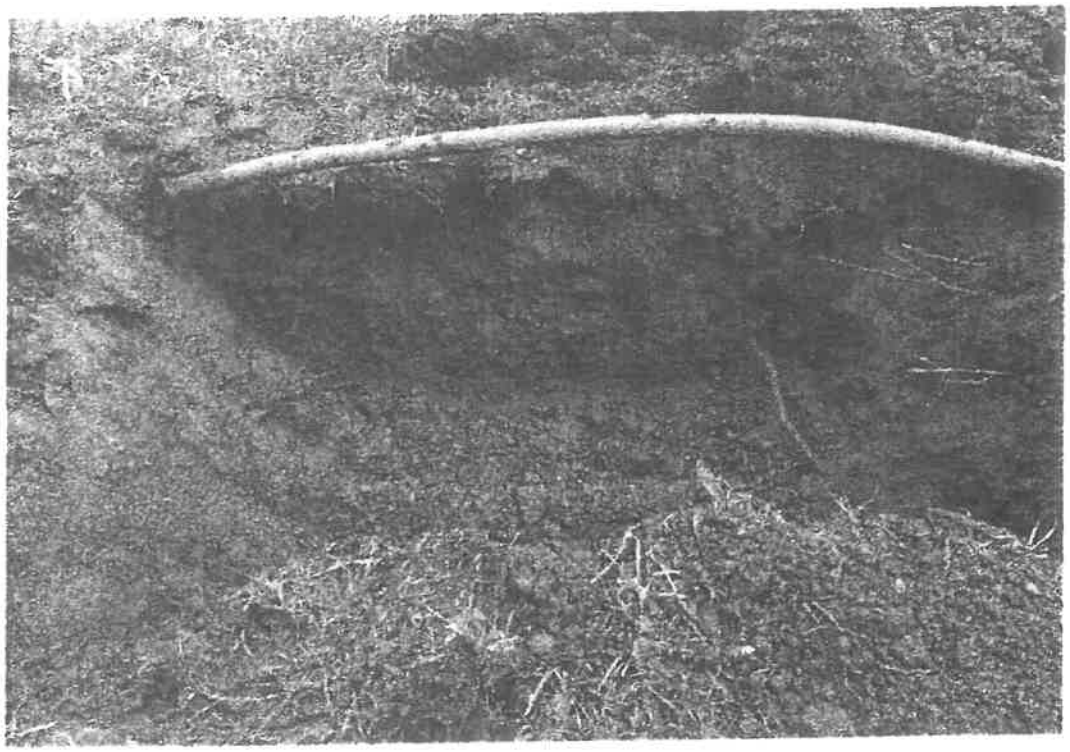
Appendix 2 Photographs

21680 – Capdoo, Clane, Co. Kildare – Test Photography

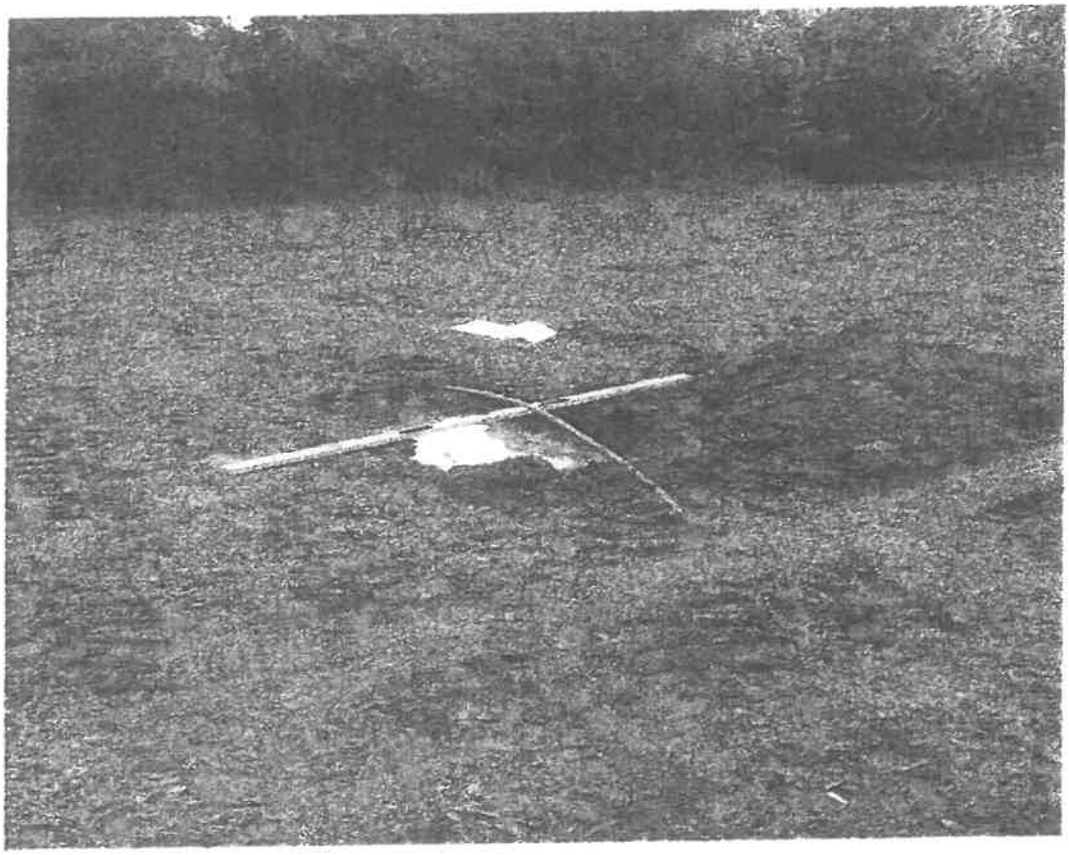
SA01 1 of 4

SA01 2 of 4

SA01 3 of 4



SA01 4 of 4

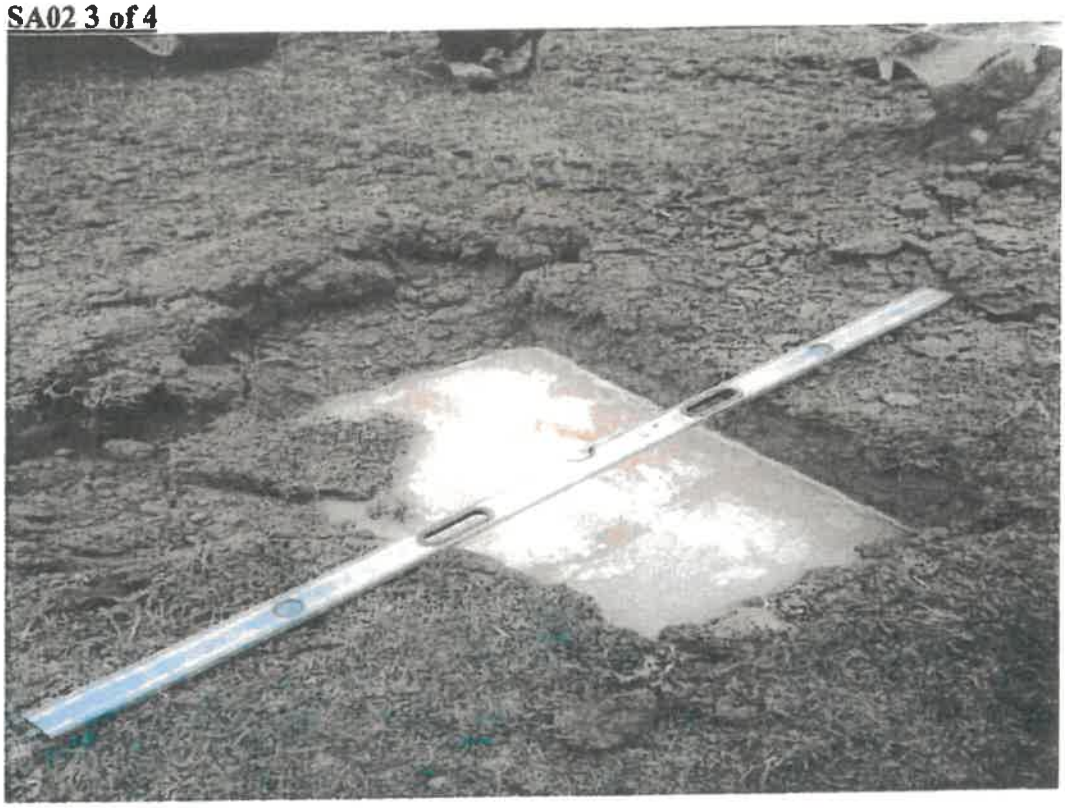


21680 – Capdoo, Clane, Co. Kildare – Test Photography

SA02 1 of 4

SA02 2 of 4

SA02 3 of 4

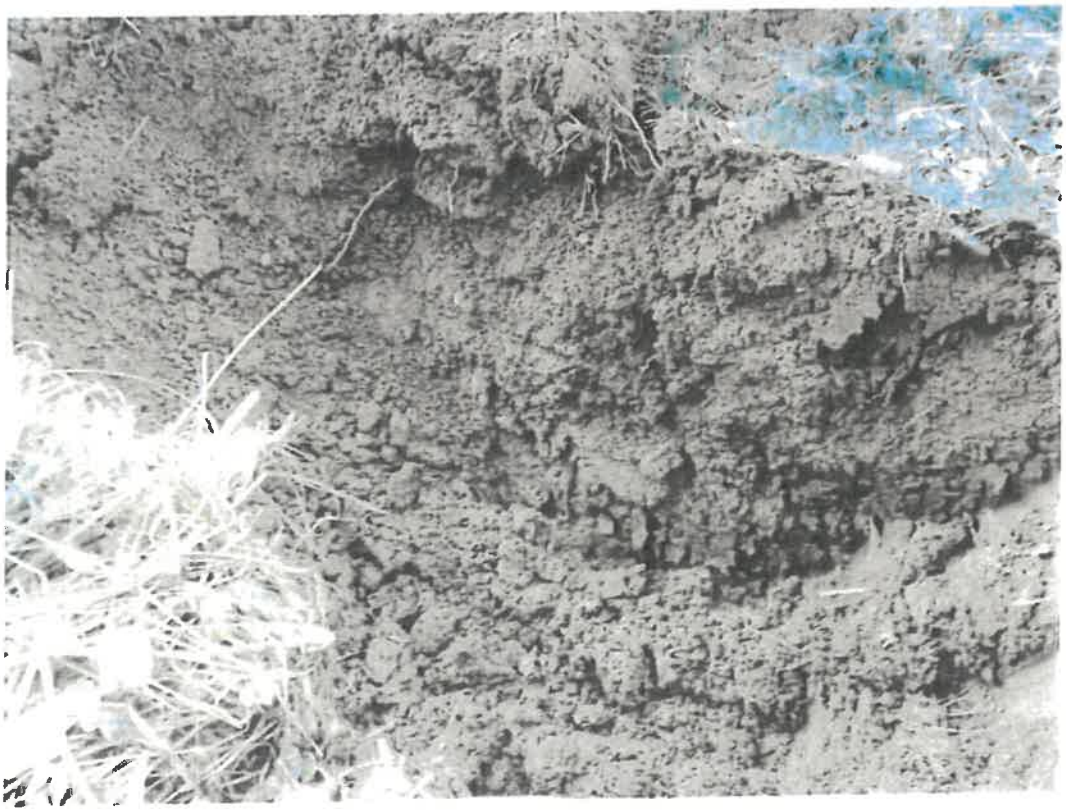


SA02 4 of 4

21680 – Capdoo, Clane, Co. Kildare – Test Photography

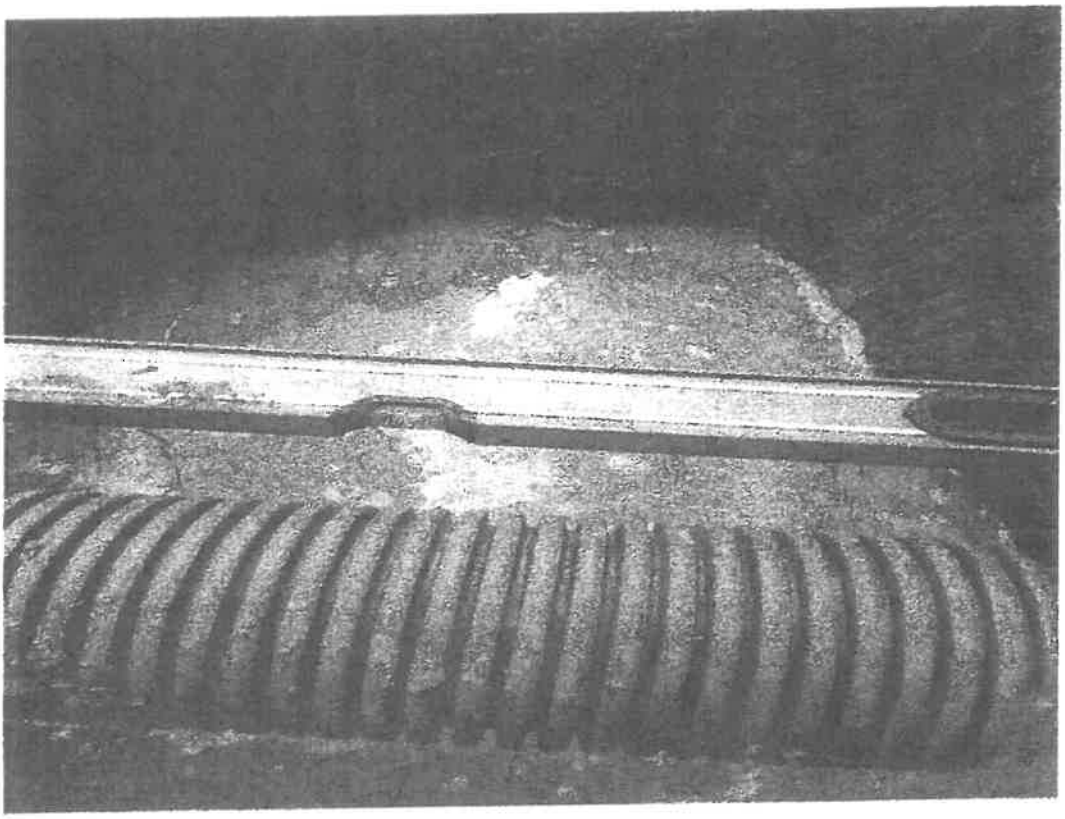
SA03 1 of 4

SA03 2 of 4



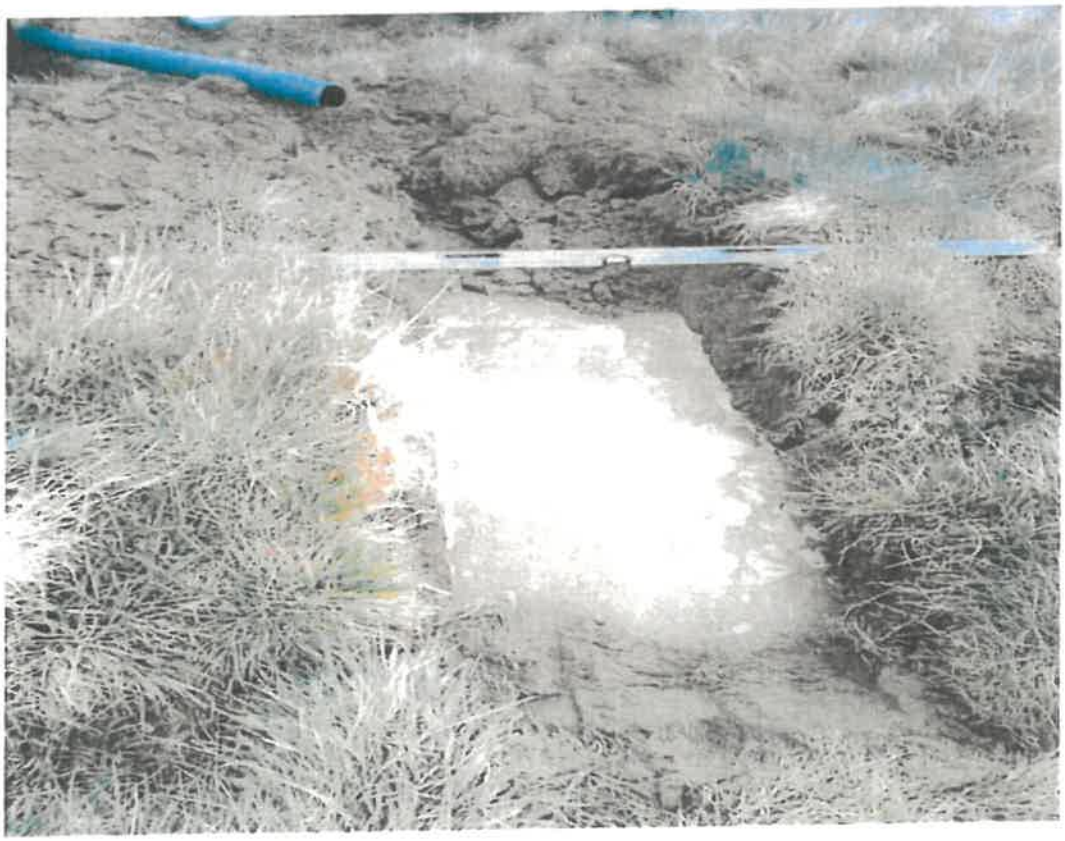
SA03 3 of 4

SA03 4 of 4



SA04 1 of 3

SA04 2 of 3



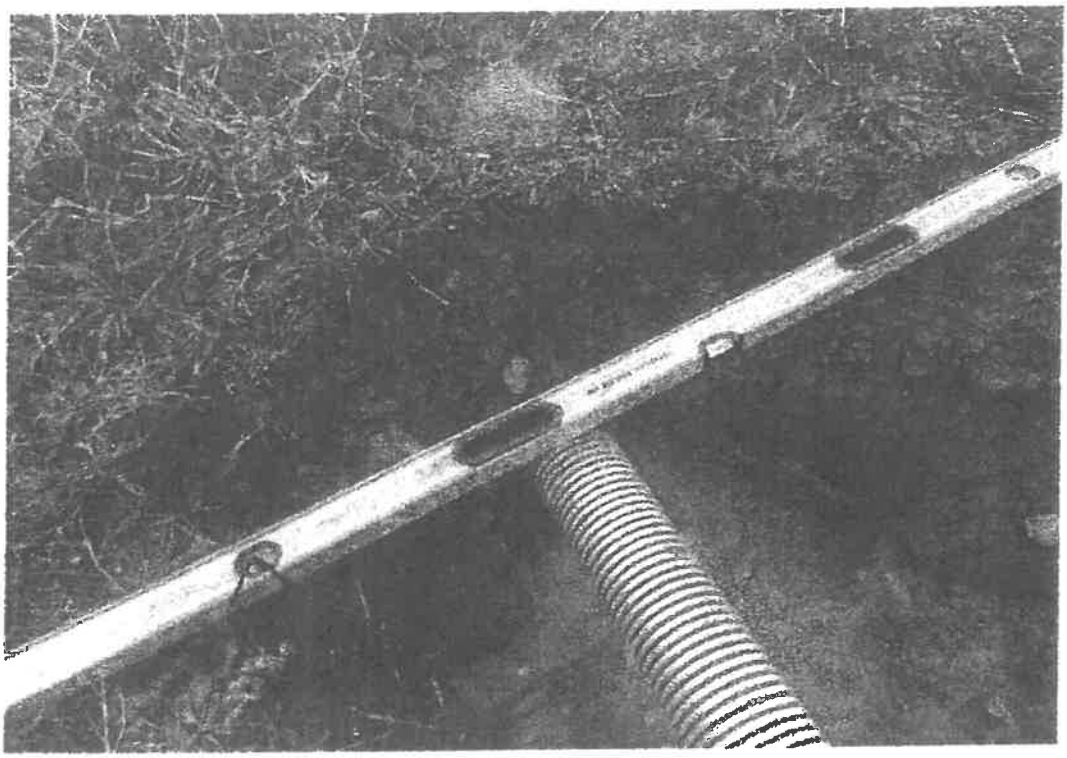
SA04 3 of 3

21680 – Capdoo, Clane, Co. Kildare – Test Photography

SA05 1 of 3

SA05 2 of 3

SA05 3 of 3



21680 – Capdoo, Clane, Co. Kildare – Test Photography

SA06 1 of 4

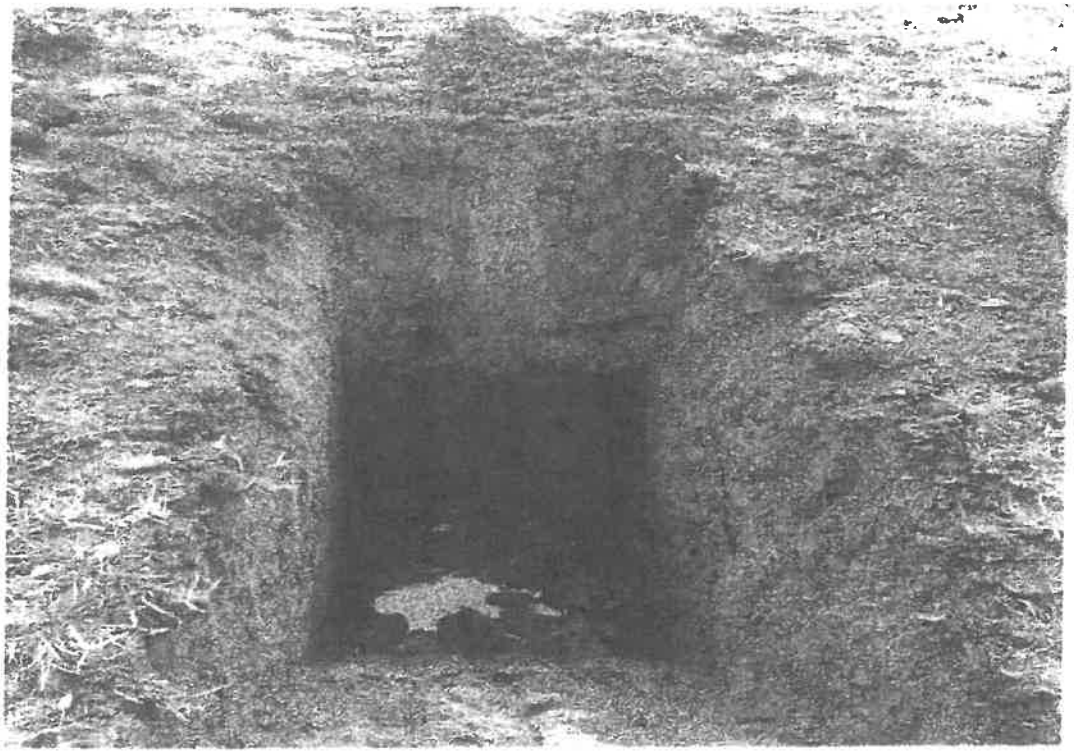
SA06 2 of 4

SA06 3 of 4

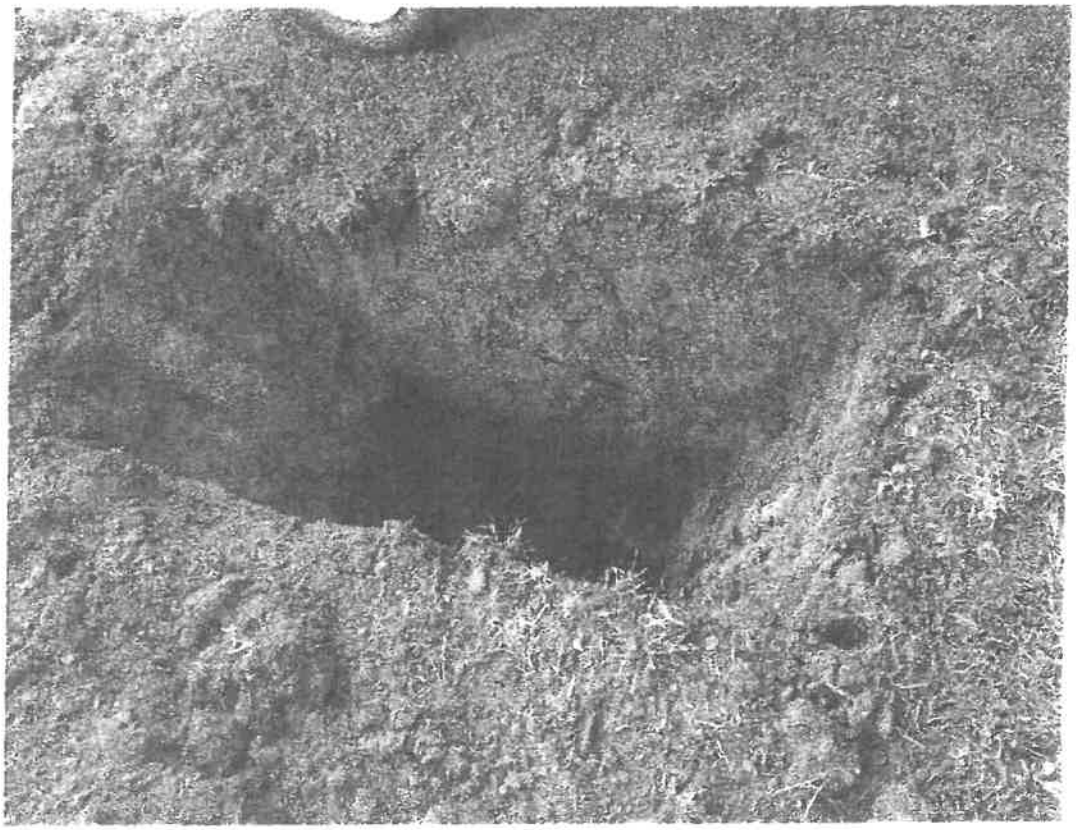
SA06 4 of 4

21680 – Capdoo, Clane, Co. Kildare – Test Photography

SA07 1 of 5

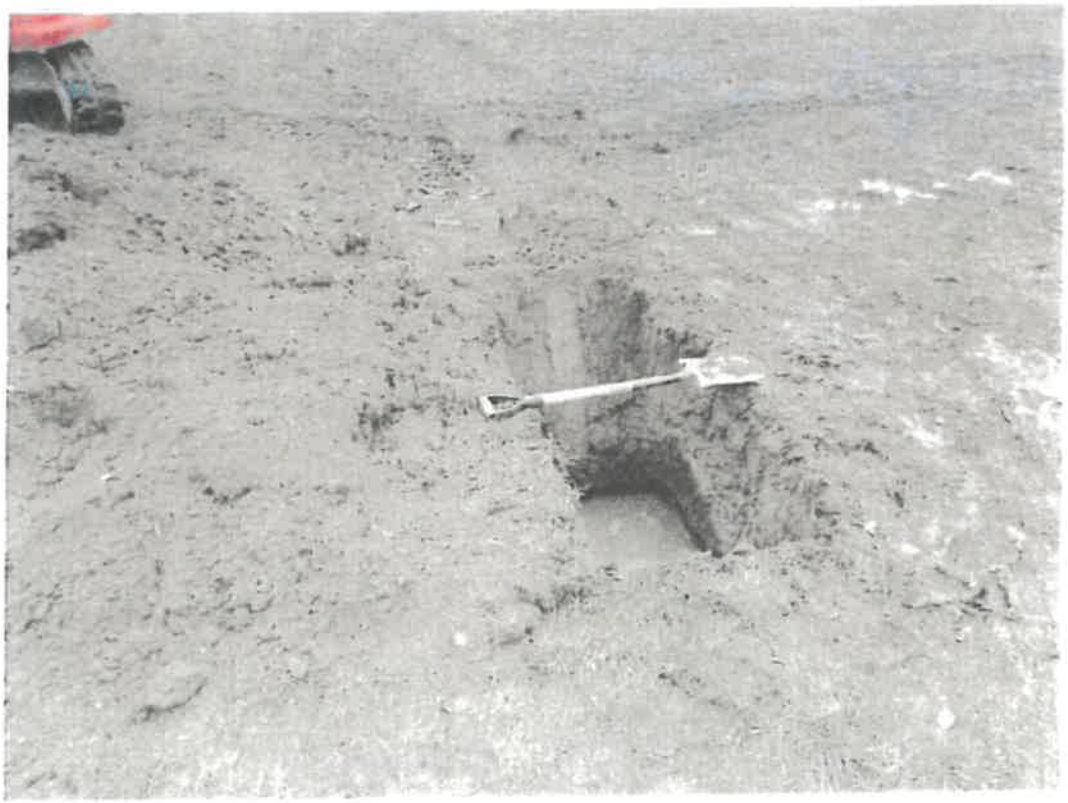


SA07 2 of 5



SA07 3 of 5

SA07 4 of 5



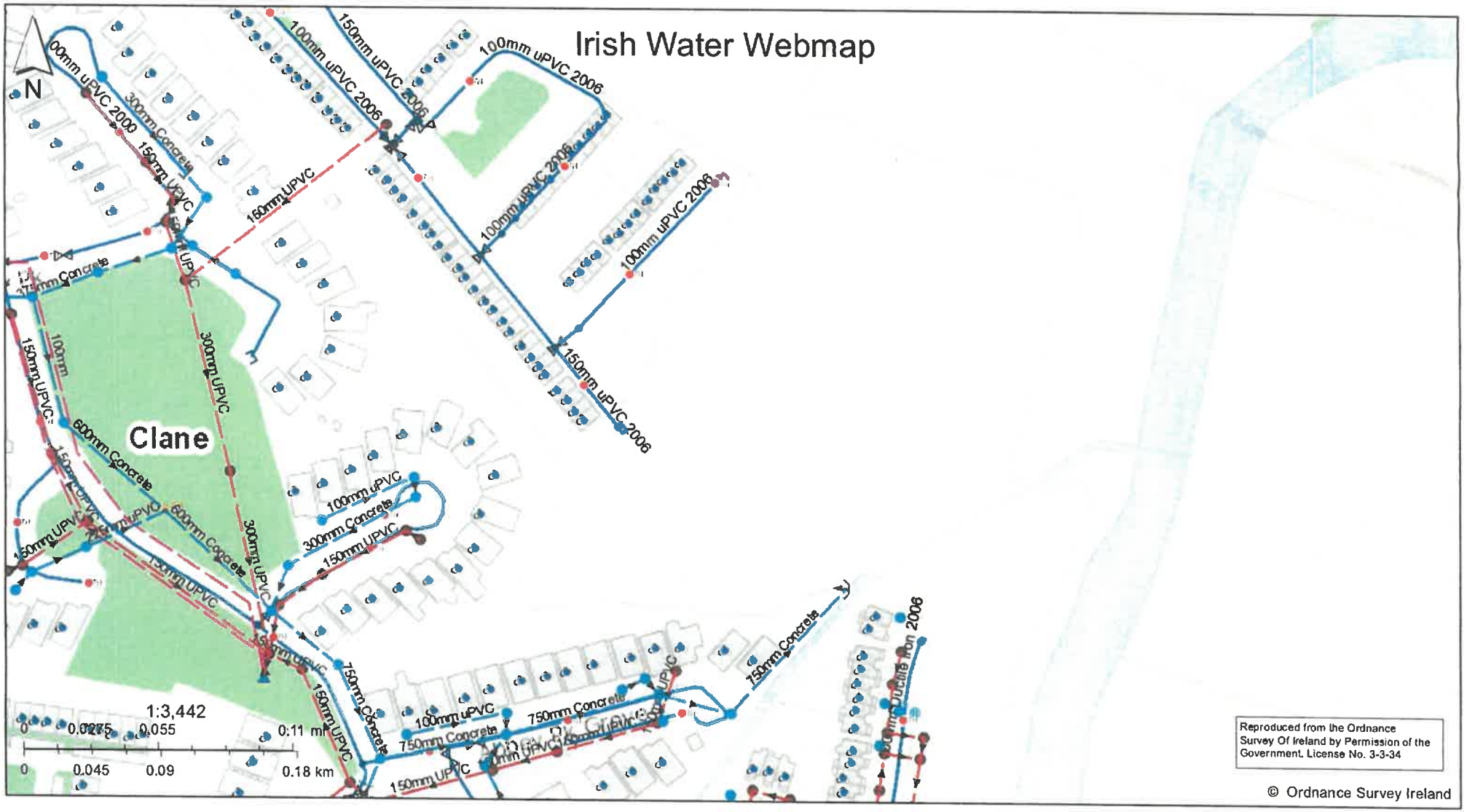
SA07 5 of 5

Appendix 3 Site Plan


Autoline Car Sales
Lidl
Maxol Behanis
Capdoo Park
Capdoo Ave
Tesco Metro
Kinesicare
Clane Motor Factors
Clane Tennis Club
Abbey Park View
SA1
SA2
SA3
SA4
SA5
SA6
SA7
Google
Imagery ©2019 Google, Map data ©2019 Google
Ireland
Terms
Send feedback
100 m
3D

Appendix G

IRISH WATER MAPS



4/24/2019 1:18:18 PM

Legend

Stormwater Gravity Mains (Irish Water Owned)

- Surface

Stormwater Gravity Mains (Non-Irish Water Owned)

- Surface

Storm Manholes

- Cascade
- Catchpit
- Hatchbox
- Lamphole
- Standard
- Other; Unknown

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. It should not be relied upon in the event of excavations or other works being carried out in the vicinity of the network. The onus is on the parties carrying out the works to ensure the exact location of the network is identified prior to mechanical works being carried out. Service pipes are not generally shown but their presence should be

Appendix H

IRISH WATER LETTER OF DESIGN ACCEPTANCE

Patrick Fadden
Capdoo
Dublin Road
Clane, Kildare W91NNK2

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

26 November 2020

Re: Design Submission for Capdoo Commons, Clane, Kildare (the "Development") (the "Design Submission") / Connection Reference No: CDS19006765

Dear Patrick Fadden,

Many thanks for your recent Design Submission.

We have reviewed your proposal for the connection(s) at the Development. Based on the information provided, which included the documents outlined in Appendix A to this letter, Irish Water has no objection to your proposals.

This letter does not constitute an offer, in whole or in part, to provide a connection to any Irish Water infrastructure. Before you can connect to our network you must sign a connection agreement with Irish Water. This can be applied for by completing the connection application form at www.water.ie/connections. Irish Water's current charges for water and wastewater connections are set out in the Water Charges Plan as approved by the Commission for Regulation of Utilities (CRU)(https://www.cru.ie/document_group/irish-waters-water-charges-plan-2018/).

You the Customer (including any designers/contractors or other related parties appointed by you) is entirely responsible for the design and construction of all water and/or wastewater infrastructure within the Development which is necessary to facilitate connection(s) from the boundary of the Development to Irish Water's network(s) (the "**Self-Lay Works**"), as reflected in your Design Submission. Acceptance of the Design Submission by Irish Water does not, in any way, render Irish Water liable for any elements of the design and/or construction of the Self-Lay Works.

If you have any further questions, please contact your Irish Water representative:
Name: Kevin McManmon
Phone: 018230374
Email: kmcmanmon@water.ie

Yours sincerely,

Yvonne Harris

Yvonne Harris
Head of Customer Operations

Appendix A

Document Title & Revision

- 20017 304-1-B Water Services Layout 201126 DC
- 20017 304-2-B Water Services Layout 201126 DC
- 20017 300 -Site Layout Services 201117 DC-303-1 Sewer Sections (100)
- 20017 300 -Site Layout Services 201117 DC-303-2 Sewer Sections (200)
- 20017 300 -Site Layout Services 201117 DC-304 Foul & Surface Layout

For further information, visit ***www.water.ie/connections***

Notwithstanding any matters listed above, the Customer (including any appointed designers/contractors, etc.) is entirely responsible for the design and construction of the Self-Lay Works. Acceptance of the Design Submission by Irish Water will not, in any way, render Irish Water liable for any elements of the design and/or construction of the Self-Lay Works.