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Atlantic Wharf	Network: Surface Water Dra...	
Cardiff CF10 4AL		
Date 19 July 2013	Designed by nick.lewis	
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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Adoptable Surface Water.sws

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	30	Add Flow / Climate Change (%)	0
M5-60 (mm)	18.000	Minimum Backdrop Height (m)	1.600
Ratio R	0.329	Maximum Backdrop Height (m)	1.800
Maximum Rainfall (mm/hr)	50	Min Design Depth for Optimisation (m)	1.000
Maximum Time of Concentration (mins)	30	Min Vel for Auto Design only (m/s)	1.00
Foul Sewage (l/s/ha)	0.000	Min Slope for Optimisation (1:X)	145
Volumetric Runoff Coeff.	0.750		

Designed with Level Soffits

Time Area Diagram for Adoptable Surface Water.sws

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.184	4-8	0.103

Total Area Contributing (ha) = 0.287

Total Pipe Volume (m³) = 5.537

Network Design Table for Adoptable Surface Water.sws

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)
1.000	12.796	0.088	145.0	0.049	6.00	0.0	0.600	o	225
1.001	14.071	0.097	145.0	0.018	0.00	0.0	0.600	o	225
2.000	15.536	0.545	28.5	0.044	6.00	0.0	0.600	o	225
1.002	34.575	0.238	145.0	0.013	0.00	0.0	0.600	o	225
1.003	7.357	0.051	145.0	0.091	0.00	0.0	0.600	o	225
3.000	10.755	0.607	17.7	0.032	6.00	0.0	0.600	o	225
1.004	12.909	0.089	145.0	0.008	0.00	0.0	0.600	o	225

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)
1.000	50.00	6.20	56.829	0.049	0.0	0.0	0.0	1.08	43.1	6.6
1.001	50.00	6.41	56.741	0.067	0.0	0.0	0.0	1.08	43.1	9.1
2.000	50.00	6.11	57.189	0.044	0.0	0.0	0.0	2.46	97.8	6.0
1.002	50.00	6.94	56.644	0.124	0.0	0.0	0.0	1.08	43.1	16.8
1.003	50.00	7.06	56.405	0.215	0.0	0.0	0.0	1.08	43.1	29.1
3.000	50.00	6.06	56.962	0.032	0.0	0.0	0.0	3.12	124.2	4.3
1.004	50.00	7.26	56.355	0.255	0.0	0.0	0.0	1.08	43.1	34.5

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Network Design Table for Adoptable Surface Water.sws

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)
1.005	17.724	0.122	145.0	0.004	0.00	0.0	0.600	o	225
1.006	3.974	0.027	145.0	0.028	0.00	0.0	0.600	o	225
1.007	9.562	0.066	145.0	0.000	0.00	0.0	0.600	o	225

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)
1.005	50.00	7.53	56.266	0.259	0.0	0.0	0.0	1.08	43.1	35.1
1.006	50.00	7.59	56.143	0.287	0.0	0.0	0.0	1.08	43.1	38.9
1.007	50.00	7.74	56.116	0.287	0.0	0.0	0.0	1.08	43.1	38.9

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Manhole Schedules for Adoptable Surface Water.sws

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)
SW1	57.926	1.097	Open Manhole	1200	1.000	56.829	225				
SW2	58.049	1.308	Open Manhole	1200	1.001	56.741	225	1.000	56.741	225	
SW2A	58.414	1.225	Open Manhole	1200	2.000	57.189	225				
SW3	58.272	1.628	Open Manhole	1200	1.002	56.644	225	1.001	56.644	225	
								2.000	56.644	225	
SW4	58.038	1.633	Open Manhole	1200	1.003	56.405	225	1.002	56.405	225	
SW4A	58.187	1.225	Open Manhole	1200	3.000	56.962	225				
SW5	58.051	1.696	Open Manhole	1200	1.004	56.355	225	1.003	56.355	225	
								3.000	56.355	225	
SW6	58.320	2.054	Open Manhole	1200	1.005	56.266	225	1.004	56.266	225	
SW7	58.250	2.107	Open Manhole	1200	1.006	56.143	225	1.005	56.143	225	
SW8 HB	58.150	2.034	Open Manhole	1200	1.007	56.116	225	1.006	56.116	225	
SW9	56.720	0.670	Open Manhole	1200		OUTFALL		1.007	56.050	225	

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PIPELINE SCHEDULES for Adoptable Surface Water.sws

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)
1.000	o	225	SW1	57.926	56.829	0.872	Open Manhole	1200
1.001	o	225	SW2	58.049	56.741	1.083	Open Manhole	1200
2.000	o	225	SW2A	58.414	57.189	1.000	Open Manhole	1200
1.002	o	225	SW3	58.272	56.644	1.403	Open Manhole	1200
1.003	o	225	SW4	58.038	56.405	1.408	Open Manhole	1200
3.000	o	225	SW4A	58.187	56.962	1.000	Open Manhole	1200
1.004	o	225	SW5	58.051	56.355	1.471	Open Manhole	1200
1.005	o	225	SW6	58.320	56.266	1.829	Open Manhole	1200
1.006	o	225	SW7	58.250	56.143	1.882	Open Manhole	1200
1.007	o	225	SW8 HB	58.150	56.116	1.809	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)
1.000	12.796	145.0	SW2	58.049	56.741	1.083	Open Manhole	1200
1.001	14.071	145.0	SW3	58.272	56.644	1.403	Open Manhole	1200
2.000	15.536	28.5	SW3	58.272	56.644	1.403	Open Manhole	1200
1.002	34.575	145.0	SW4	58.038	56.405	1.408	Open Manhole	1200
1.003	7.357	145.0	SW5	58.051	56.355	1.471	Open Manhole	1200
3.000	10.755	17.7	SW5	58.051	56.355	1.471	Open Manhole	1200
1.004	12.909	145.0	SW6	58.320	56.266	1.829	Open Manhole	1200
1.005	17.724	145.0	SW7	58.250	56.143	1.882	Open Manhole	1200
1.006	3.974	145.0	SW8 HB	58.150	56.116	1.809	Open Manhole	1200
1.007	9.562	145.0	SW9	56.720	56.050	0.445	Open Manhole	1200

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Setting Out Information - True Coordinates (Adoptable Surface Water.sws)

PN	USMH Name	Dia/Len (mm)	Width (mm)	US Easting (m)	US Northing (m)	Layout (North)
1.000	SW1	1200		335226.624	349823.530	
1.001	SW2	1200		335220.431	349834.728	
2.000	SW2A	1200		335220.131	349856.952	
1.002	SW3	1200		335210.537	349844.732	
1.003	SW4	1200		335186.224	349869.316	
3.000	SW4A	1200		335185.602	349882.296	
1.004	SW5	1200		335179.945	349873.149	
1.005	SW6	1200		335168.927	349879.876	
1.006	SW7	1200		335159.920	349864.611	
1.007	SW8 HB	1200		335156.237	349866.102	
PN	DSMH Name	Dia/Len (mm)	Width (mm)	DS Easting (m)	DS Northing (m)	Layout (North)
1.007	SW9	1200		335149.158	349859.696	

Free Flowing Outfall Details for Adoptable Surface Water.sws

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D, L (mm)	W (mm)
1.007	SW9	56.720	56.050	56.050	1200	0

Simulation Criteria for Adoptable Surface Water.sws

Volumetric Runoff Coeff	0.840	Foul Sewage per hectare (l/s)	0.000
Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Run Time (mins)	720
Manhole Headloss Coeff (Global)	0.500	Output Interval (mins)	6

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 1

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Simulation Criteria for Adoptable Surface Water.sws

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Winter
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Storm Duration (mins)	360
Ratio R	0.322		