


PROJECT: East West Rail Phase 2	TOTAL NUMBER OF PAGES IN CALCULATION: 29
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Section A: Defining the Calculation Package

PHASE: 2A A1 COMPOUND			
DESCRIPTION OF CALCULATION: Surface Water Drainage Calculation Summary			
REFERENCES:			
SOFTWARE USED: MICRODRAINAGE	VERSION	DISC/FILE IDENTIFIER	
		INPUT DATA	OUTPUT DATA
	2018		
PREPARED BY (PRINT NAME):	RAMA SASTRY	SIGN:	DATE: 09.06.2020
CHECKED BY (PRINT NAME):	MARK STEVENS	SIGN:	DATE: 09.06.2020
APPROVED BY (PRINT NAME):	ADRIAN ROSE	SIGN:	DATE: 09.06.2020

Section B: Revision Details

PROJECT NUMBER: 133735			DOCUMENT REF: 133735_RW-EWR-XX-A1-M2-DH-001102		
REVISION	PURPOSE AND DESCRIPTION	ORIGINATED	CHECKED	AUTHORISED	DATE
B01	FOR ISSUE TO LOCAL PLANNING AUTHORITY	RAMA SASTRY	G ALADAKATTI	ADRIAN ROSE	29.10.2019
B02	FOR ISSUE TO LOCAL PLANNING AUTHORITY	RAMA SASTRY	P LAWRENCE	ADRIAN ROSE	11.02.2020
B03	FOR ISSUE TO LOCAL PLANNING AUTHORITY	RAMA SASTRY	MARK STEVENS	ADRIAN ROSE	09.06.2020

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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm A1.1

Pipe Sizes EWRP2 Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	100	Foul Sewage (l/s/ha)	0.000	Maximum Backdrop Height (m)	1.500
M5-60 (mm)	20.000	Volumetric Runoff Coeff.	0.750	Min Design Depth for Optimisation (m)	1.200
Ratio R	0.409	PIMP (%)	100	Min Vel for Auto Design only (m/s)	1.00
Maximum Rainfall (mm/hr)	50	Add Flow / Climate Change (%)	0	Min Slope for Optimisation (1:X)	500
Maximum Time of Concentration (mins)	30	Minimum Backdrop Height (m)	0.200		

Designed with Level Inverts

Time Area Diagram for Storm A1.1


Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)		
0-4	0.000	4-8	0.189	8-12	0.512	12-16	0.520	16-20	0.107

Total Area Contributing (ha) = 1.328









Total Pipe Volume (m³) = 361.698

Network Design Table for Storm A1.1

« - Indicates pipe capacity < flow

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Network Design Table for Storm A1.1

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
1_A1.1_1.000	25.741	0.051	500.1	0.043	5.00	0.0	0.035	1 _/_	500	1:1 Ditch		
1_A1.1_1.001	28.847	0.157	183.7	0.021	0.00	0.0	0.035	1 _/_	500	1:1 Ditch		
1_A1.1_1.002	41.861	0.255	164.2	0.017	0.00	0.0	0.035	1 _/_	500	1:1 Ditch		
1_A1.1_1.003	43.092	0.664	64.9	0.127	0.00	0.0	0.035	1 _/_	500	1:1 Ditch		
1_A1.1_2.000	14.672	0.029	500.0	0.078	5.00	0.0	0.035	1 _/_	500	1:1 Ditch		
1_A1.1_2.001	15.297	0.031	500.0	0.155	0.00	0.0	0.035	1 _/_	500	1:1 Ditch		
1_A1.1_2.002	30.503	0.061	500.0	0.101	0.00	0.0	0.035	1 _/_	500	1:1 Ditch		
1_A1.1_2.003	17.876	0.036	500.0	0.006	0.00	0.0	0.035	1 _/_	500	1:1 Ditch		

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_A1.1_1.000	50.00	5.82	70.368	0.043	0.0	0.0	0.0	0.52	261.0	5.8
1_A1.1_1.001	50.00	6.38	70.317	0.064	0.0	0.0	0.0	0.86	430.6	8.7
1_A1.1_1.002	50.00	7.15	70.160	0.081	0.0	0.0	0.0	0.91	455.6	10.9
1_A1.1_1.003	50.00	7.64	69.905	0.208	0.0	0.0	0.0	1.45	724.6	28.2
1_A1.1_2.000	50.00	5.47	69.694	0.078	0.0	0.0	0.0	0.52	261.1	10.6
1_A1.1_2.001	50.00	5.96	69.665	0.234	0.0	0.0	0.0	0.52	261.1	31.6
1_A1.1_2.002	50.00	6.93	69.634	0.335	0.0	0.0	0.0	0.52	261.0	45.3
1_A1.1_2.003	50.00	7.50	69.573	0.341	0.0	0.0	0.0	0.52	261.1	46.1

Network Design Table for Storm A1.1






PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
1_A1.1_2.004	16.392	0.033	500.0	0.133	0.00	0.0		0.035	1 _ /	500	1:1 Ditch	🔒
1_A1.1_2.005	20.062	0.201	99.8	0.018	0.00	0.0	0.600		o	225	Pipe/Conduit	🔒
1_A1.1_2.006	15.528	0.062	250.5	0.023	0.00	0.0		0.035	1 _ /	500	1:1 Ditch	🔒
1_A1.1_1.004	58.198	0.116	501.7	0.020	0.00	0.0		0.035	1 _ /	500	1:1 Ditch	🔒
1_A1.1_1.005	14.664	0.077	190.4	0.173	0.00	0.0		0.035	1 _ /	500	1:1 Ditch	🔒
1_A1.1_1.006	35.718	0.029	1231.7	0.000	0.00	0.0		0.035	1 _ /	500	1:1 Ditch	🔒
1_A1.1_3.000	12.680	0.025	500.0	0.121	5.00	0.0		0.035	1 _ /	500	1:1 Ditch	🔒
1_A1.1_3.001	11.488	0.432	26.6	0.018	0.00	0.0		0.035	1 _ /	500	1:1 Ditch	🔒

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_A1.1_2.004	50.00	8.02	69.537	0.474	0.0	0.0	0.0	0.52	261.1	64.2
1_A1.1_2.005	50.00	8.28	69.504	0.491	0.0	0.0	0.0	1.31	52.0<<	66.5
1_A1.1_2.006	50.00	8.63	69.303	0.514	0.0	0.0	0.0	0.74	368.9	69.6
1_A1.1_1.004	50.00	10.49	69.241	0.742	0.0	0.0	0.0	0.52	260.6	100.5
1_A1.1_1.005	50.00	10.78	69.125	0.915	0.0	0.0	0.0	0.85	423.0	124.0
1_A1.1_1.006	50.00	13.09	69.044	0.915	0.0	0.0	0.0	0.26	61.8<<	124.0
1_A1.1_3.000	50.00	5.52	69.752	0.121	0.0	0.0	0.0	0.40	97.0	16.4
1_A1.1_3.001	50.00	5.63	69.727	0.139	0.0	0.0	0.0	1.75	420.7	18.9

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Network Design Table for Storm A1.1

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
1_A1.1_3.002	23.903	0.199	120.1	0.033	0.00	0.0	0.600		o	225	Pipe/Conduit	
1_A1.1_3.003	13.470	0.018	741.8	0.046	0.00	0.0		0.035	1 _/_	500	1:1 Ditch	
1_A1.1_1.007	21.137	0.001	21137.3	0.194	0.00	0.0	0.600		o	225	Pipe/Conduit	
1_A1.1_1.008	22.702	0.048	475.9	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
1_A1.1_1.009	16.461	0.034	491.2	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)
1_A1.1_3.002	50.00	5.97	69.295	0.173	0.0	0.0	0.0	1.19	47.4	23.4
1_A1.1_3.003	50.00	6.64	69.096	0.219	0.0	0.0	0.0	0.33	79.7	29.6
1_A1.1_1.007	50.00	17.40	68.860	1.328	0.0	0.0	0.0	0.08	3.2«	179.8
1_A1.1_1.008	50.00	18.04	68.859	1.328	0.0	0.0	0.0	0.59	23.6«	179.8
1_A1.1_1.009	50.00	18.51	68.811	1.328	0.0	0.0	0.0	0.58	23.2«	179.8

Manhole Schedules for Storm A1.1

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
1_A1.1_1	70.868	0.500	Junction		1_A1.1_1.000	70.368	500				
1_A1.1_2	70.864	0.548	Junction		1_A1.1_1.001	70.317	500	1_A1.1_1.000	70.317	500	
1_A1.1_3	70.660	0.500	Junction		1_A1.1_1.002	70.160	500	1_A1.1_1.001	70.160	500	
1_A1.1_4	70.405	0.500	Junction		1_A1.1_1.003	69.905	500	1_A1.1_1.002	69.905	500	
1_A1.1_5	70.444	0.750	Junction		1_A1.1_2.000	69.694	500				
1_A1.1_6	70.456	0.791	Junction		1_A1.1_2.001	69.665	500	1_A1.1_2.000	69.665	500	
1_A1.1_7	70.525	0.891	Junction		1_A1.1_2.002	69.634	500	1_A1.1_2.001	69.634	500	
1_A1.1_8	70.626	1.053	Junction		1_A1.1_2.003	69.573	500	1_A1.1_2.002	69.573	500	
1_A1.1_9	70.622	1.085	Junction		1_A1.1_2.004	69.537	500	1_A1.1_2.003	69.537	500	
1_A1.1_10	70.507	1.003	Junction		1_A1.1_2.005	69.504	225	1_A1.1_2.004	69.504	500	
1_A1.1_11	70.212	0.909	Junction		1_A1.1_2.006	69.303	500	1_A1.1_2.005	69.303	225	
1_A1.1_12	70.091	0.850	Junction		1_A1.1_1.004	69.241	500	1_A1.1_1.003	69.241	500	
								1_A1.1_2.006	69.241	500	
1_A1.1_13	69.807	0.682	Junction		1_A1.1_1.005	69.125	500	1_A1.1_1.004	69.125	500	
1_A1.1_14	69.773	0.729	Junction		1_A1.1_1.006	69.044	500	1_A1.1_1.005	69.044	500	204
1_A1.1_15	70.252	0.500	Junction		1_A1.1_3.000	69.752	500				
1_A1.1_16	70.283	0.557	Junction		1_A1.1_3.001	69.727	500	1_A1.1_3.000	69.727	500	
1_A1.1_17	70.310	1.015	Junction		1_A1.1_3.002	69.295	225	1_A1.1_3.001	69.295	500	
1_A1.1_18	70.013	0.917	Junction		1_A1.1_3.003	69.096	500	1_A1.1_3.002	69.096	225	

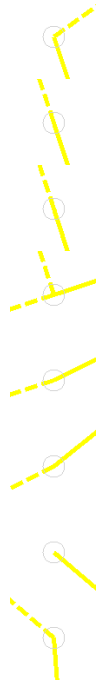
Manhole Schedules for Storm A1.1

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)
1_A1.1_19	69.415	0.555	Junction		1_A1.1_1.007	68.860	225	1_A1.1_1.006	69.015	500	230
1_A1.1_20	69.470	0.611	Junction		1_A1.1_1.008	68.859	225	1_A1.1_3.003	69.078	500	293
1_A1.1_21	69.398	0.587	Open Manhole	1500	1_A1.1_1.009	68.811	225	1_A1.1_1.007	68.859	225	
1_A1.1_22	69.310	0.533	Open Manhole	0		OUTFALL		1_A1.1_1.008	68.811	225	
								1_A1.1_1.009	68.777	225	

Setting Out Information - True Coordinates (Storm A1.1)

PN	USMH Name	Dia/Len (mm)	Width (mm)	US Easting (m)	US Northing (m)	Layout (North)
1_A1.1_1.000	1_A1.1_1			177018.241	141645.699	○
1_A1.1_1.001	1_A1.1_2			177023.008	141620.403	○
1_A1.1_1.002	1_A1.1_3			177028.280	141592.043	○
1_A1.1_1.003	1_A1.1_4			177068.129	141604.863	○
1_A1.1_2.000	1_A1.1_5			177143.870	141726.332	○
1_A1.1_2.001	1_A1.1_6			177134.989	141714.653	○
1_A1.1_2.002	1_A1.1_7			177125.377	141702.753	○
1_A1.1_2.003	1_A1.1_8			177107.425	141678.093	○

Setting Out Information - True Coordinates (Storm A1.1)

PN	USMH Name	Dia/Len (mm)	Width (mm)	US Easting (m)	US Northing (m)	Layout (North)
1_A1.1_2.004	1_A1.1_9			177092.909	141667.659	
1_A1.1_2.005	1_A1.1_10			177098.084	141652.106	
1_A1.1_2.006	1_A1.1_11			177104.325	141633.039	
1_A1.1_1.004	1_A1.1_12			177109.086	141618.259	
1_A1.1_1.005	1_A1.1_13			177164.375	141636.429	
1_A1.1_1.006	1_A1.1_14			177177.489	141642.991	
1_A1.1_3.000	1_A1.1_15			177169.906	141711.763	
1_A1.1_3.001	1_A1.1_16			177179.523	141703.498	

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Setting Out Information - True Coordinates (Storm A1.1)


PN	USMH Name	Dia/Len (mm)	Width (mm)	US Easting (m)	US Northing (m)	Layout (North)
1_A1.1_3.002	1_A1.1_17			177180.383	141692.042	
1_A1.1_3.003	1_A1.1_18			177199.004	141677.054	
1_A1.1_1.007	1_A1.1_19			177205.445	141665.223	
1_A1.1_1.008	1_A1.1_20			177225.988	141660.247	
1_A1.1_1.009	1_A1.1_21	1500		177248.591	141662.360	

PN	DSMH Name	Dia/Len (mm)	Width (mm)	DS Easting (m)	DS Northing (m)	Layout (North)
1_A1.1_1.009	1_A1.1_22	0		177264.685	141665.816	

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Area Summary for Storm A1.1

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	Classification	Paved/Welfare Facilities	100	0.023	0.023	0.023
	Classification	Topsoil Storage	40	0.047	0.019	0.041
	Classification	Vegetation	15	0.009	0.001	0.043
1.001	Classification	Topsoil Storage	40	0.052	0.021	0.021
	Classification	Vegetation	15	0.005	0.001	0.021
1.002	Classification	Topsoil Storage	40	0.037	0.015	0.015
	Classification	Vegetation	15	0.011	0.002	0.017
1.003	Classification	Topsoil Storage	40	0.216	0.086	0.086
	Classification	Vegetation	15	0.009	0.001	0.088
	Classification	Paved/Welfare Facilities	100	0.040	0.040	0.127
2.000	Classification	Laydown (Granular)	50	0.009	0.005	0.005
	Classification	Paved/Welfare Facilities	100	0.065	0.065	0.070
	Classification	Laydown (Granular)	50	0.014	0.007	0.077
	Classification	Vegetation	15	0.006	0.001	0.078
	Classification	Vegetation	15	0.006	0.001	0.078
2.001	Classification	Laydown (Granular)	50	0.005	0.002	0.002
	Classification	Paved/Welfare Facilities	100	0.032	0.032	0.034
	Classification	Paved/Welfare Facilities	100	0.021	0.021	0.055
	Classification	Laydown (Granular)	50	0.016	0.008	0.063
	Classification	Granular Paved Areas (Walkways & Car Park)	50	0.124	0.062	0.125
	Classification	Granular Paved Areas (Walkways & Car Park)	50	0.059	0.030	0.155
2.002	Classification	Laydown (Granular)	50	0.009	0.004	0.004
	Classification	Paved/Welfare Facilities	100	0.022	0.022	0.027
	Classification	Paved/Welfare Facilities	100	0.033	0.033	0.060
	Classification	Laydown (Granular)	50	0.008	0.004	0.064
	Classification	Paved/Welfare Facilities	100	0.033	0.033	0.097
	Classification	Laydown (Granular)	50	0.008	0.004	0.101

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Area Summary for Storm A1.1

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
2.003	Classification	Laydown (Granular)	50	0.012	0.006	0.006
2.004	Classification	Paved/Welfare Facilities	100	0.093	0.093	0.093
	Classification	Laydown (Granular)	50	0.042	0.021	0.114
	Classification	Paved/Welfare Facilities	100	0.010	0.010	0.124
	User		- 100	0.009	0.009	0.133
2.005	Classification	Topsoil Storage	40	0.044	0.018	0.018
2.006	Classification	Topsoil Storage	40	0.057	0.023	0.023
1.004	Classification	Vegetation	15	0.012	0.002	0.002
	Classification	Topsoil Storage	40	0.045	0.018	0.020
1.005	Classification	Vegetation	15	0.018	0.003	0.003
	Classification	Granular Paved Areas (Walkways & Car Park)	50	0.341	0.171	0.173
1.006	-		- 100	0.000	0.000	0.000
3.000	Classification	Laydown (Granular)	50	0.165	0.082	0.082
	Classification	Paved/Welfare Facilities	100	0.039	0.039	0.121
3.001	Classification	Laydown (Granular)	50	0.023	0.011	0.011
	Classification	Paved/Welfare Facilities	100	0.007	0.007	0.018
3.002	Classification	Laydown (Granular)	50	0.047	0.024	0.024
	Classification	Paved/Welfare Facilities	100	0.010	0.010	0.033
3.003	Classification	Paved/Welfare Facilities	100	0.046	0.046	0.046
1.007	Classification	Vegetation	15	0.012	0.002	0.002
	Classification	Paved/Welfare Facilities	100	0.007	0.007	0.009
	Classification	Topsoil Storage	40	0.058	0.023	0.032
	Classification	Paved/Welfare Facilities	100	0.019	0.019	0.050
	Classification	Pond	100	0.073	0.073	0.124
	Classification	Pond	100	0.070	0.070	0.194
1.008	-		- 100	0.000	0.000	0.000
1.009	-		- 100	0.000	0.000	0.000

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Area Summary for Storm A1.1

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
				Total	Total	Total
				2.178	1.328	1.328

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Network Classifications for Storm A1.1

PN	USMH Name	Pipe Dia (mm)	Min Cover Depth (m)	Max Cover Depth (m)	Pipe Type	MH Dia (mm)	MH Width (mm)	MH Ring Depth (m)	MH Type
1_A1.1_1.000	1_A1.1_1	500	0.000	0.048	Unclassified				Junction
1_A1.1_1.001	1_A1.1_2	500	0.015	0.214	Unclassified				Junction
1_A1.1_1.002	1_A1.1_3	500	0.000	0.053	Unclassified				Junction
1_A1.1_1.003	1_A1.1_4	500	0.000	0.350	Unclassified				Junction
1_A1.1_2.000	1_A1.1_5	500	0.250	0.291	Unclassified				Junction
1_A1.1_2.001	1_A1.1_6	500	0.291	0.391	Unclassified				Junction
1_A1.1_2.002	1_A1.1_7	500	0.391	0.553	Unclassified				Junction
1_A1.1_2.003	1_A1.1_8	500	0.553	0.647	Unclassified				Junction
1_A1.1_2.004	1_A1.1_9	500	0.453	0.585	Unclassified				Junction
1_A1.1_2.005	1_A1.1_10	225	0.654	0.778	Unclassified				Junction
1_A1.1_2.006	1_A1.1_11	500	0.333	0.409	Unclassified				Junction
1_A1.1_1.004	1_A1.1_12	500	0.182	0.350	Unclassified				Junction
1_A1.1_1.005	1_A1.1_13	500	0.182	0.225	Unclassified				Junction
1_A1.1_1.006	1_A1.1_14	500	0.100	0.450	Unclassified				Junction
1_A1.1_3.000	1_A1.1_15	500	0.200	0.257	Unclassified				Junction
1_A1.1_3.001	1_A1.1_16	500	0.256	0.715	Unclassified				Junction
1_A1.1_3.002	1_A1.1_17	225	0.692	0.852	Unclassified				Junction
1_A1.1_3.003	1_A1.1_18	500	0.037	0.617	Unclassified				Junction
1_A1.1_1.007	1_A1.1_19	225	0.330	0.527	Unclassified				Junction
1_A1.1_1.008	1_A1.1_20	225	0.362	0.407	Unclassified				Junction
1_A1.1_1.009	1_A1.1_21	225	0.308	0.490	Unclassified	1500	0	0.362	Unclassified

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Free Flowing Outfall Details for Storm A1.1

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1_A1.1_1.009	1_A1.1_22	69.310	68.777	68.777	0	0


Simulation Criteria for Storm A1.1

Volumetric Runoff Coeff	0.840	Manhole Headloss Coeff (Global)	0.500	Inlet Coeffiecient	0.800
Areal Reduction Factor	1.000	Foul Sewage per hectare (l/s)	0.000	Flow per Person per Day (l/per/day)	0.000
Hot Start (mins)	0	Additional Flow - % of Total Flow	0.000	Run Time (mins)	960
Hot Start Level (mm)	0	MADD Factor * 10m ³ /ha Storage	2.000	Output Interval (mins)	8

Number of Input Hydrographs 0 Number of Offline Controls 1 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm)	20.000	Cv (Summer)	0.750
Return Period (years)	100	Ratio R	0.409	Cv (Winter)	0.840
Region England and Wales		Profile Type	Winter Storm	Duration (mins)	480

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Online Controls for Storm A1.1

Orifice Manhole: 1_A1.1_8, DS/PN: 1_A1.1_2.003, Volume (m³): 37.8

Diameter (m) 0.100 Discharge Coefficient 0.600 Invert Level (m) 69.573


Complex Manhole: 1_A1.1_21, DS/PN: 1_A1.1_1.009, Volume (m³): 1.9

Orifice

Diameter (m) 0.095 Discharge Coefficient 0.600 Invert Level (m) 68.811

Orifice


Diameter (m) 0.210 Discharge Coefficient 0.600 Invert Level (m) 69.061

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Offline Controls for Storm A1.1

Weir Manhole: 1_A1.1_8, DS/PN: 1_A1.1_2.003, Loop to PN: 1_A1.1_2.004

Discharge Coef 0.544 Width (m) 1.300 Invert Level (m) 69.973


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Storage Structures for Storm A1.1

Tank or Pond Manhole: 1_A1.1_19, DS/PN: 1_A1.1_1.007

Invert Level (m) 68.860

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	875.0	0.540	1053.1	0.555	1058.3

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm A1.1

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 1 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 1 Number of Real Time Controls 0


Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 20.000 Cv (Summer) 0.750
Region England and Wales Ratio R 0.409 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status ON
Analysis Timestep 2.5 Second Increment (Extended) Inertia Status ON
DTS Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 10, 10, 10

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m ³)	Flow / Overflow Cap. (l/s)	Pipe Flow (l/s)
1_A1.1_1.000	1_A1.1_1	15 Winter	1	+10%					70.438	-0.430	0.000	0.02	6.4
1_A1.1_1.001	1_A1.1_2	15 Winter	1	+10%					70.375	-0.489	0.000	0.02	9.0


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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm A1.1

PN	US/MH Name	Status	Level Exceeded
1_A1.1_1.000	1_A1.1_1	OK	
1_A1.1_1.001	1_A1.1_2	OK	


1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm A1.1

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water	Surcharged	Flooded	Flow / Cap.	Overflow (1/s)
									Level (m)	Depth (m)	Volume (m ³)		
1_A1.1_1.002	1_A1.1_3	15 Winter	1	+10%					70.222	-0.438	0.000	0.02	
1_A1.1_1.003	1_A1.1_4	15 Winter	1	+10%					69.983	-0.422	0.000	0.04	
1_A1.1_2.000	1_A1.1_5	30 Winter	1	+10%					70.004	-0.440	0.000	0.02	
1_A1.1_2.001	1_A1.1_6	30 Winter	1	+10%					70.004	-0.452	0.000	0.03	
1_A1.1_2.002	1_A1.1_7	30 Winter	1	+10%					70.003	-0.522	0.000	0.03	
1_A1.1_2.003	1_A1.1_8	30 Winter	1	+10%			1/15 Winter	34	69.998	-0.628	0.000	0.01	2.3
1_A1.1_2.004	1_A1.1_9	15 Winter	1	+10%					69.673	-0.949	0.000	0.02	
1_A1.1_2.005	1_A1.1_10	15 Winter	1	+10%	30/15 Summer				69.618	-0.111	0.000	0.50	
1_A1.1_2.006	1_A1.1_11	15 Winter	1	+10%					69.485	-0.727	0.000	0.02	
1_A1.1_1.004	1_A1.1_12	15 Winter	1	+10%					69.473	-0.618	0.000	0.06	
1_A1.1_1.005	1_A1.1_13	15 Winter	1	+10%					69.343	-0.464	0.000	0.07	
1_A1.1_1.006	1_A1.1_14	15 Winter	1	+10%					69.320	-0.453	0.000	0.17	
1_A1.1_3.000	1_A1.1_15	15 Winter	1	+10%					69.871	-0.381	0.000	0.09	
1_A1.1_3.001	1_A1.1_16	15 Winter	1	+10%					69.781	-0.502	0.000	0.02	
1_A1.1_3.002	1_A1.1_17	15 Winter	1	+10%	30/15 Summer				69.411	-0.109	0.000	0.52	
1_A1.1_3.003	1_A1.1_18	15 Winter	1	+10%					69.273	-0.740	0.000	0.06	
1_A1.1_1.007	1_A1.1_19	480 Winter	1	+10%	30/15 Winter				69.064	-0.021	0.000	0.71	
1_A1.1_1.008	1_A1.1_20	480 Winter	1	+10%					69.040	-0.044	0.000	0.33	
1_A1.1_1.009	1_A1.1_21	480 Winter	1	+10%	30/15 Winter				69.024	-0.012	0.000	0.44	

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm A1.1

PN	US/MH Name	Pipe Flow (l/s)	Status	Level Exceeded
1_A1.1_1.002	1_A1.1_3	10.7	OK	
1_A1.1_1.003	1_A1.1_4	25.4	OK	
1_A1.1_2.000	1_A1.1_5	8.0	OK	
1_A1.1_2.001	1_A1.1_6	18.0	OK	
1_A1.1_2.002	1_A1.1_7	22.4	OK	
1_A1.1_2.003	1_A1.1_8	11.5	OK	
1_A1.1_2.004	1_A1.1_9	24.4	OK	
1_A1.1_2.005	1_A1.1_10	26.3	OK*	
1_A1.1_2.006	1_A1.1_11	28.3	OK	
1_A1.1_1.004	1_A1.1_12	51.1	OK	
1_A1.1_1.005	1_A1.1_13	59.5	OK	
1_A1.1_1.006	1_A1.1_14	59.3	OK	
1_A1.1_3.000	1_A1.1_15	18.4	OK	
1_A1.1_3.001	1_A1.1_16	20.9	OK	
1_A1.1_3.002	1_A1.1_17	24.8	OK*	
1_A1.1_3.003	1_A1.1_18	30.5	OK	
1_A1.1_1.007	1_A1.1_19	7.7	OK*	
1_A1.1_1.008	1_A1.1_20	7.7	OK*	
1_A1.1_1.009	1_A1.1_21	7.7	OK	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm A1.1

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 1 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 1 Number of Real Time Controls 0


Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 20.000 Cv (Summer) 0.750
Region England and Wales Ratio R 0.409 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status ON
Analysis Timestep 2.5 Second Increment (Extended) Inertia Status ON
DTS Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 10, 10, 10

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m ³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)
1_A1.1_1.000	1_A1.1_1	15 Winter	30	+10%					70.486	-0.382	0.000	0.06		15.8
1_A1.1_1.001	1_A1.1_2	15 Winter	30	+10%					70.420	-0.444	0.000	0.05		23.4


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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm A1.1

PN	US/MH Name	Status	Level Exceeded
1_A1.1_1.000	1_A1.1_1	OK	
1_A1.1_1.001	1_A1.1_2	OK	


30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm A1.1

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water	Surcharged	Flooded	Flow / Cap.	Overflow (1/s)
									Level (m)	Depth (m)	Volume (m ³)		
1_A1.1_1.002	1_A1.1_3	15 Winter	30	+10%					70.271	-0.389	0.000	0.06	
1_A1.1_1.003	1_A1.1_4	15 Winter	30	+10%					70.052	-0.353	0.000	0.10	
1_A1.1_2.000	1_A1.1_5	30 Winter	30	+10%					70.158	-0.286	0.000	0.05	
1_A1.1_2.001	1_A1.1_6	30 Winter	30	+10%					70.155	-0.301	0.000	0.12	
1_A1.1_2.002	1_A1.1_7	30 Winter	30	+10%					70.147	-0.378	0.000	0.10	
1_A1.1_2.003	1_A1.1_8	30 Winter	30	+10%			1/15 Winter	34	70.130	-0.496	0.000	0.01	76.3
1_A1.1_2.004	1_A1.1_9	30 Winter	30	+10%					70.070	-0.552	0.000	0.08	
1_A1.1_2.005	1_A1.1_10	30 Winter	30	+10%	30/15 Summer				70.056	0.327	0.000	1.44	
1_A1.1_2.006	1_A1.1_11	15 Winter	30	+10%					69.643	-0.569	0.000	0.06	
1_A1.1_1.004	1_A1.1_12	15 Winter	30	+10%					69.633	-0.458	0.000	0.17	
1_A1.1_1.005	1_A1.1_13	30 Winter	30	+10%					69.511	-0.296	0.000	0.19	
1_A1.1_1.006	1_A1.1_14	30 Winter	30	+10%					69.494	-0.279	0.000	0.44	
1_A1.1_3.000	1_A1.1_15	15 Winter	30	+10%					69.952	-0.300	0.000	0.22	
1_A1.1_3.001	1_A1.1_16	15 Winter	30	+10%					69.820	-0.463	0.000	0.04	
1_A1.1_3.002	1_A1.1_17	15 Winter	30	+10%	30/15 Summer				69.699	0.179	0.000	1.26	
1_A1.1_3.003	1_A1.1_18	15 Winter	30	+10%					69.384	-0.629	0.000	0.14	
1_A1.1_1.007	1_A1.1_19	360 Winter	30	+10%	30/15 Winter				69.263	0.178	0.000	1.92	
1_A1.1_1.008	1_A1.1_20	60 Winter	30	+10%					69.084	0.000	0.000	0.63	
1_A1.1_1.009	1_A1.1_21	360 Winter	30	+10%	30/15 Winter				69.181	0.145	0.000	1.18	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm A1.1

PN	US/MH Name	Pipe Flow (l/s)	Status	Level Exceeded
1_A1.1_1.002	1_A1.1_3	28.2	OK	
1_A1.1_1.003	1_A1.1_4	72.6	OK	
1_A1.1_2.000	1_A1.1_5	22.3	FLOOD RISK*	
1_A1.1_2.001	1_A1.1_6	63.4	OK	
1_A1.1_2.002	1_A1.1_7	87.9	OK	
1_A1.1_2.003	1_A1.1_8	11.5	OK	
1_A1.1_2.004	1_A1.1_9	89.0	OK	
1_A1.1_2.005	1_A1.1_10	75.0	SURCHARGED*	
1_A1.1_2.006	1_A1.1_11	76.8	OK	
1_A1.1_1.004	1_A1.1_12	131.4	OK	
1_A1.1_1.005	1_A1.1_13	150.4	FLOOD RISK*	
1_A1.1_1.006	1_A1.1_14	149.9	FLOOD RISK*	
1_A1.1_3.000	1_A1.1_15	45.1	OK	
1_A1.1_3.001	1_A1.1_16	52.1	OK	
1_A1.1_3.002	1_A1.1_17	59.5	SURCHARGED*	
1_A1.1_3.003	1_A1.1_18	72.5	OK	
1_A1.1_1.007	1_A1.1_19	20.7	FLOOD RISK*	
1_A1.1_1.008	1_A1.1_20	14.9	SURCHARGED*	
1_A1.1_1.009	1_A1.1_21	20.7	FLOOD RISK	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm A1.1

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 1 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 1 Number of Real Time Controls 0


Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 20.000 Cv (Summer) 0.750
Region England and Wales Ratio R 0.409 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status ON
Analysis Timestep 2.5 Second Increment (Extended) Inertia Status ON
DTS Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 10, 10, 10

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m ³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)
1_A1.1_1.000	1_A1.1_1	15 Winter	100	+10%					70.504	-0.364	0.000	0.08		20.5
1_A1.1_1.001	1_A1.1_2	15 Winter	100	+10%					70.435	-0.429	0.000	0.06		29.8


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XP Solutions	Network 2018.1	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm A1.1

PN	US/MH Name	Status	Level Exceeded
1_A1.1_1.000	1_A1.1_1	OK	
1_A1.1_1.001	1_A1.1_2	OK	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm A1.1

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water	Surcharged	Flooded	Flow / Cap.	Overflow (1/s)
									Level (m)	Depth (m)	Volume (m ³)		
1_A1.1_1.002	1_A1.1_3	15 Winter	100	+10%					70.287	-0.373	0.000	0.08	
1_A1.1_1.003	1_A1.1_4	15 Winter	100	+10%					70.075	-0.330	0.000	0.13	
1_A1.1_2.000	1_A1.1_5	30 Winter	100	+10%					70.297	-0.147	0.000	0.06	
1_A1.1_2.001	1_A1.1_6	30 Winter	100	+10%					70.291	-0.165	0.000	0.15	
1_A1.1_2.002	1_A1.1_7	30 Winter	100	+10%					70.278	-0.247	0.000	0.12	
1_A1.1_2.003	1_A1.1_8	30 Winter	100	+10%			1/15 Winter	34	70.252	-0.374	0.000	0.01	85.8
1_A1.1_2.004	1_A1.1_9	30 Winter	100	+10%					70.209	-0.413	0.000	0.09	
1_A1.1_2.005	1_A1.1_10	30 Winter	100	+10%	30/15 Summer				70.191	0.462	0.000	1.60	
1_A1.1_2.006	1_A1.1_11	15 Winter	100	+10%					69.689	-0.523	0.000	0.07	
1_A1.1_1.004	1_A1.1_12	15 Winter	100	+10%					69.680	-0.411	0.000	0.20	
1_A1.1_1.005	1_A1.1_13	30 Winter	100	+10%					69.566	-0.241	0.000	0.24	
1_A1.1_1.006	1_A1.1_14	30 Winter	100	+10%					69.549	-0.224	0.000	0.55	
1_A1.1_3.000	1_A1.1_15	15 Winter	100	+10%					69.983	-0.269	0.000	0.29	
1_A1.1_3.001	1_A1.1_16	15 Winter	100	+10%					69.863	-0.420	0.000	0.05	
1_A1.1_3.002	1_A1.1_17	15 Winter	100	+10%	30/15 Summer				69.850	0.330	0.000	1.49	
1_A1.1_3.003	1_A1.1_18	15 Winter	100	+10%					69.413	-0.600	0.000	0.16	
1_A1.1_1.007	1_A1.1_19	240 Winter	100	+10%	30/15 Winter				69.356	0.271	0.000	2.57	
1_A1.1_1.008	1_A1.1_20	60 Winter	100	+10%					69.084	0.000	0.000	1.02	
1_A1.1_1.009	1_A1.1_21	240 Winter	100	+10%	30/15 Winter				69.228	0.192	0.000	1.58	

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XP Solutions	Network 2018.1	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm A1.1

PN	US/MH Name	Pipe Flow (l/s)	Status	Level Exceeded
1_A1.1_1.002	1_A1.1_3	35.8	OK	
1_A1.1_1.003	1_A1.1_4	93.7	OK	
1_A1.1_2.000	1_A1.1_5	28.5	FLOOD RISK*	
1_A1.1_2.001	1_A1.1_6	81.2	FLOOD RISK*	
1_A1.1_2.002	1_A1.1_7	106.9	FLOOD RISK*	
1_A1.1_2.003	1_A1.1_8	11.5	OK	
1_A1.1_2.004	1_A1.1_9	97.4	OK	
1_A1.1_2.005	1_A1.1_10	83.2	SURCHARGED*	
1_A1.1_2.006	1_A1.1_11	84.4	OK	
1_A1.1_1.004	1_A1.1_12	159.5	OK	
1_A1.1_1.005	1_A1.1_13	188.2	FLOOD RISK*	
1_A1.1_1.006	1_A1.1_14	188.0	FLOOD RISK*	
1_A1.1_3.000	1_A1.1_15	58.4	FLOOD RISK*	
1_A1.1_3.001	1_A1.1_16	66.3	OK	
1_A1.1_3.002	1_A1.1_17	70.4	SURCHARGED*	
1_A1.1_3.003	1_A1.1_18	87.6	OK	
1_A1.1_1.007	1_A1.1_19	27.7	FLOOD RISK*	
1_A1.1_1.008	1_A1.1_20	24.0	SURCHARGED*	
1_A1.1_1.009	1_A1.1_21	27.7	FLOOD RISK	