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<u>STORM SEWER DESIGN by the Modified Rational Method</u> <u>Design Criteria for NETWORK 1.SWS</u> Pipe Sizes NETWORK 9 Manhole Sizes NETWORK 9 FSR Rainfall Model - England and Wales <table><tr><td>Return Period (years)</td><td>2</td><td>PIMP (%)</td><td>100</td></tr><tr><td>M5-60 (mm)</td><td>19.600</td><td>Add Flow / Climate Change (%)</td><td>0</td></tr><tr><td>Ratio R</td><td>0.350</td><td>Minimum Backdrop Height (m)</td><td>0.500</td></tr><tr><td>Maximum Rainfall (mm/hr)</td><td>50</td><td>Maximum Backdrop Height (m)</td><td>1.000</td></tr><tr><td>Maximum Time of Concentration (mins)</td><td>30</td><td>Min Design Depth for Optimisation (m)</td><td>1.200</td></tr><tr><td>Foul Sewage (l/s/ha)</td><td>0.000</td><td>Min Vel for Auto Design only (m/s)</td><td>0.75</td></tr><tr><td>Volumetric Runoff Coeff.</td><td>0.750</td><td>Min Slope for Optimisation (1:X)</td><td>500</td></tr></table> Designed with Level Soffits												Return Period (years)	2	PIMP (%)	100	M5-60 (mm)	19.600	Add Flow / Climate Change (%)	0	Ratio R	0.350	Minimum Backdrop Height (m)	0.500	Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.000	Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200	Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	0.75	Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500																																																																																																																																																																																																										
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<u>PIPELINE SCHEDULES for NETWORK 1.SWS</u> <u>Upstream Manhole</u> <table><tr><th>PN</th><th>Hyd Sect</th><th>Diam (mm)</th><th>MH Name</th><th>C.Level (m)</th><th>I.Level (m)</th><th>D.Depth (m)</th><th>MH Connection</th><th>MH DIAM., (mm)</th><th>L*W</th></tr><tr><td>1.000</td><td>o</td><td>100</td><td>101</td><td>16.666</td><td>15.366</td><td>1.200</td><td>Open Manhole</td><td></td><td>1200</td></tr><tr><td>1.001</td><td>o</td><td>100</td><td>102</td><td>16.464</td><td>15.164</td><td>1.200</td><td>Open Manhole</td><td></td><td>1200</td></tr><tr><td>1.002</td><td>o</td><td>100</td><td>103</td><td>16.387</td><td>15.087</td><td>1.200</td><td>Open Manhole</td><td></td><td>1200</td></tr><tr><td>2.000</td><td>o</td><td>100</td><td>104</td><td>16.350</td><td>15.050</td><td>1.200</td><td>Open Manhole</td><td></td><td>1200</td></tr><tr><td>1.003</td><td>o</td><td>100</td><td>105</td><td>16.322</td><td>14.713</td><td>1.509</td><td>Open Manhole</td><td></td><td>1200</td></tr><tr><td>1.004</td><td>o</td><td>150</td><td>106</td><td>16.220</td><td>14.514</td><td>1.556</td><td>Open Manhole</td><td></td><td>1200</td></tr><tr><td>3.000</td><td>o</td><td>100</td><td>107</td><td>15.489</td><td>14.189</td><td>1.200</td><td>Open Manhole</td><td></td><td>1200</td></tr><tr><td>3.001</td><td>o</td><td>100</td><td>108</td><td>15.732</td><td>13.960</td><td>1.672</td><td>Open Manhole</td><td></td><td>1200</td></tr><tr><td>4.000</td><td>o</td><td>100</td><td>109</td><td>15.825</td><td>14.525</td><td>1.200</td><td>Open Manhole</td><td></td><td>1200</td></tr><tr><td>3.002</td><td>o</td><td>100</td><td>110</td><td>15.717</td><td>13.930</td><td>1.687</td><td>Open Manhole</td><td></td><td>1200</td></tr><tr><td>3.003</td><td>o</td><td>100</td><td>111</td><td>15.974</td><td>13.687</td><td>2.187</td><td>Open Manhole</td><td></td><td>1200</td></tr><tr><td>1.005</td><td>o</td><td>150</td><td>112</td><td>16.008</td><td>13.550</td><td>2.308</td><td>Open Manhole</td><td></td><td>1200</td></tr></table> <u>Downstream Manhole</u> <table><tr><th>PN</th><th>Length (m)</th><th>Slope (1:X)</th><th>MH Name</th><th>C.Level (m)</th><th>I.Level (m)</th><th>D.Depth (m)</th><th>MH Connection</th><th>MH DIAM., (mm)</th><th>L*W</th></tr><tr><td>1.000</td><td>20.697</td><td>102.5</td><td>102</td><td>16.464</td><td>15.164</td><td>1.200</td><td>Open Manhole</td><td></td><td>1200</td></tr><tr><td>1.001</td><td>6.648</td><td>86.3</td><td>103</td><td>16.387</td><td>15.087</td><td>1.200</td><td>Open Manhole</td><td></td><td>1200</td></tr><tr><td>1.002</td><td>6.073</td><td>16.2</td><td>105</td><td>16.322</td><td>14.713</td><td>1.509</td><td>Open Manhole</td><td></td><td>1200</td></tr><tr><td>2.000</td><td>8.048</td><td>23.9</td><td>105</td><td>16.322</td><td>14.713</td><td>1.509</td><td>Open Manhole</td><td></td><td>1200</td></tr><tr><td>1.003</td><td>13.287</td><td>89.2</td><td>106</td><td>16.220</td><td>14.564</td><td>1.556</td><td>Open Manhole</td><td></td><td>1200</td></tr><tr><td>1.004</td><td>20.099</td><td>174.8</td><td>112</td><td>16.008</td><td>14.399</td><td>1.459</td><td>Open Manhole</td><td></td><td>1200</td></tr><tr><td>3.000</td><td>23.611</td><td>103.1</td><td>108</td><td>15.732</td><td>13.960</td><td>1.672</td><td>Open Manhole</td><td></td><td>1200</td></tr><tr><td>3.001</td><td>3.105</td><td>103.5</td><td>110</td><td>15.717</td><td>13.930</td><td>1.687</td><td>Open Manhole</td><td></td><td>1200</td></tr><tr><td>4.000</td><td>11.118</td><td>18.7</td><td>110</td><td>15.717</td><td>13.930</td><td>1.687</td><td>Open Manhole</td><td></td><td>1200</td></tr><tr><td>3.002</td><td>24.981</td><td>102.8</td><td>111</td><td>15.974</td><td>13.687</td><td>2.187</td><td>Open 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Manhole		1200	3.003	o	100	111	15.974	13.687	2.187	Open Manhole		1200	1.005	o	150	112	16.008	13.550	2.308	Open Manhole		1200	PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., (mm)	L*W	1.000	20.697	102.5	102	16.464	15.164	1.200	Open Manhole		1200	1.001	6.648	86.3	103	16.387	15.087	1.200	Open Manhole		1200	1.002	6.073	16.2	105	16.322	14.713	1.509	Open Manhole		1200	2.000	8.048	23.9	105	16.322	14.713	1.509	Open Manhole		1200	1.003	13.287	89.2	106	16.220	14.564	1.556	Open Manhole		1200	1.004	20.099	174.8	112	16.008	14.399	1.459	Open Manhole		1200	3.000	23.611	103.1	108	15.732	13.960	1.672	Open Manhole		1200	3.001	3.105	103.5	110	15.717	13.930	1.687	Open Manhole		1200	4.000	11.118	18.7	110	15.717	13.930	1.687	Open Manhole		1200	3.002	24.981	102.8	111	15.974	13.687	2.187	Open Manhole		1200	3.003	2.503	28.8	112	16.008	13.600	2.308	Open Manhole		1200	1.005	4.226	176.1	113	15.964	13.526	2.288	Open Manhole		0
PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., (mm)	L*W																																																																																																																																																																																																																																																																				
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<u>Summary of Critical Results by Maximum Level (Rank 1) for NETWORK 1.SWS</u>																																																																																																																																																				
<u>Simulation Criteria</u>																																																																																																																																																				
Areal Reduction Factor		1.000	Additional Flow - % of Total Flow		0.000																																																																																																																																															
Hot Start (mins)		0	MADD Factor * 10m³/ha Storage		2.000																																																																																																																																															
Hot Start Level (mm)		0	Inlet Coefficient		0.800																																																																																																																																															
Manhole Headloss Coeff (Global)		0.500	Flow per Person per Day (l/per/day)		0.000																																																																																																																																															
Foul Sewage per hectare (l/s)		0.000																																																																																																																																																		
Number of Input Hydrographs		0	Number of Storage Structures		0																																																																																																																																															
Number of Online Controls		0	Number of Time/Area Diagrams		0																																																																																																																																															
Number of Offline Controls		0	Number of Real Time Controls		0																																																																																																																																															
<u>Synthetic Rainfall Details</u>																																																																																																																																																				
Rainfall Model		FSR	Ratio R		0.350																																																																																																																																															
Region England and Wales		Cv (Summer)	0.750																																																																																																																																																	
M5-60 (mm)		19.500	Cv (Winter)		0.840																																																																																																																																															
Margin for Flood Risk Warning (mm)		300.0	DVD Status		OFF																																																																																																																																															
Analysis Timestep		Fine	Inertia Status		OFF																																																																																																																																															
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Duration(s) (mins)		15, 30, 60, 120, 240, 360, 480, 960, 1440																																																																																																																																																		
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Climate Change (%)		40																																																																																																																																																		
<table><tr><th></th><th>US/MH</th><th></th><th>Return</th><th>Climate</th><th>First (X)</th><th>First (Y)</th><th>First (Z)</th><th>Overflow</th><th>Water</th></tr><tr><th>PN</th><th>Name</th><th>Storm</th><th>Period</th><th>Change</th><th>Surcharge</th><th>Flood</th><th>Overflow</th><th>Act.</th><th>Level</th></tr><tr><td>1.000</td><td>101 15</td><td>Winter</td><td>100</td><td>+40%</td><td>100/15</td><td>Summer</td><td></td><td></td><td>15.831</td></tr><tr><td>1.001</td><td>102 15</td><td>Winter</td><td>100</td><td>+40%</td><td>100/15</td><td>Summer</td><td></td><td></td><td>15.721</td></tr><tr><td>1.002</td><td>103 15</td><td>Winter</td><td>100</td><td>+40%</td><td>100/15</td><td>Summer</td><td></td><td></td><td>15.680</td></tr><tr><td>2.000</td><td>104 15</td><td>Winter</td><td>100</td><td>+40%</td><td>100/15</td><td>Summer</td><td></td><td></td><td>15.705</td></tr><tr><td>1.003</td><td>105 15</td><td>Winter</td><td>100</td><td>+40%</td><td>100/15</td><td>Summer</td><td></td><td></td><td>15.600</td></tr><tr><td>1.004</td><td>106 15</td><td>Winter</td><td>100</td><td>+40%</td><td>100/15</td><td>Summer</td><td></td><td></td><td>14.767</td></tr><tr><td>3.000</td><td>107 15</td><td>Winter</td><td>100</td><td>+40%</td><td>100/15</td><td>Summer</td><td></td><td></td><td>15.057</td></tr><tr><td>3.001</td><td>108 15</td><td>Winter</td><td>100</td><td>+40%</td><td>100/15</td><td>Summer</td><td></td><td></td><td>14.852</td></tr><tr><td>4.000</td><td>109 15</td><td>Winter</td><td>100</td><td>+40%</td><td>100/15</td><td>Summer</td><td></td><td></td><td>14.839</td></tr><tr><td>3.002</td><td>110 15</td><td>Winter</td><td>100</td><td>+40%</td><td>100/15</td><td>Summer</td><td></td><td></td><td>14.799</td></tr><tr><td>3.003</td><td>111 15</td><td>Winter</td><td>100</td><td>+40%</td><td>100/15</td><td>Summer</td><td></td><td></td><td>14.046</td></tr><tr><td>1.005</td><td>112 15</td><td>Winter</td><td>100</td><td>+40%</td><td>100/15</td><td>Summer</td><td></td><td></td><td>13.889</td></tr></table>										US/MH		Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Water	PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.	Level	1.000	101 15	Winter	100	+40%	100/15	Summer			15.831	1.001	102 15	Winter	100	+40%	100/15	Summer			15.721	1.002	103 15	Winter	100	+40%	100/15	Summer			15.680	2.000	104 15	Winter	100	+40%	100/15	Summer			15.705	1.003	105 15	Winter	100	+40%	100/15	Summer			15.600	1.004	106 15	Winter	100	+40%	100/15	Summer			14.767	3.000	107 15	Winter	100	+40%	100/15	Summer			15.057	3.001	108 15	Winter	100	+40%	100/15	Summer			14.852	4.000	109 15	Winter	100	+40%	100/15	Summer			14.839	3.002	110 15	Winter	100	+40%	100/15	Summer			14.799	3.003	111 15	Winter	100	+40%	100/15	Summer			14.046	1.005	112 15	Winter	100	+40%	100/15	Summer			13.889
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<table><tr><th colspan="5">Surcharged Flooded</th><th colspan="2">Pipe</th><th colspan="2"></th></tr><tr><th></th><th>US/MH</th><th>Depth</th><th>Volume</th><th>Flow /</th><th>Overflow</th><th>Flow</th><th></th><th>Level</th></tr><tr><th>PN</th><th>Name</th><th>(m)</th><th>(m³)</th><th>Cap.</th><th>(l/s)</th><th>(l/s)</th><th>Status</th><th>Exceeded</th></tr><tr><td>1.000</td><td>101</td><td>0.365</td><td>0.000</td><td>0.92</td><td></td><td>5.3</td><td>SURCHARGED</td><td></td></tr><tr><td>1.001</td><td>102</td><td>0.457</td><td>0.000</td><td>0.87</td><td></td><td>5.1</td><td>SURCHARGED</td><td></td></tr><tr><td>1.002</td><td>103</td><td>0.493</td><td>0.000</td><td>0.54</td><td></td><td>7.3</td><td>SURCHARGED</td><td></td></tr><tr><td>2.000</td><td>104</td><td>0.555</td><td>0.000</td><td>0.56</td><td></td><td>6.4</td><td>SURCHARGED</td><td></td></tr></table>									Surcharged Flooded					Pipe					US/MH	Depth	Volume	Flow /	Overflow	Flow		Level	PN	Name	(m)	(m³)	Cap.	(l/s)	(l/s)	Status	Exceeded	1.000	101	0.365	0.000	0.92		5.3	SURCHARGED		1.001	102	0.457	0.000	0.87		5.1	SURCHARGED		1.002	103	0.493	0.000	0.54		7.3	SURCHARGED		2.000	104	0.555	0.000	0.56		6.4	SURCHARGED																																																																														
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The Civil Engineering Practice						Page 5	
11 Tungsten Building George Street Fishersgate BN41 1RA			Manor Nursery Angmering West Sussex				
Date 28/06/2019 File Planning Network File.MDX			Designed by S Burgess Checked by SRD				
Innovyze			Network 2017.1.2				
<u>Summary of Critical Results by Maximum Level (Rank 1) for NETWORK 1.SWS</u>							
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