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Tuscany House White Hart Lane Baskingstoke RG21 4AF	NORTH END ROAD YAPTON 70 UNITS	
Date 29/09/2020 11:25 File 19-156 70 Units Drainage Strategy.MDX	Designed by AK Checked by	
XP Solutions Network 2020.1		

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm_Rev.A

Pipe Sizes STANDARD Manhole Sizes STANDARD

FEH Rainfall Model

Return Period (years)	2	Volumetric Runoff Coeff.	0.750
		PIMP (%)	100
FEH Rainfall Version	2013	Add Flow / Climate Change (%)	0
Site Location	GB 497682 103581 SU 97682 03581	Minimum Backdrop Height (m)	0.200
Data Type	Point	Maximum Backdrop Height (m)	1.500
Maximum Rainfall (mm/hr)	250	Min Design Depth for Optimisation (m)	0.100
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)	500

Designed with Level Soffits

Time Area Diagram for Storm_Rev.A

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.136	4-8	0.385	8-12	0.032

Total Area Contributing (ha) = 0.553

Total Pipe Volume (m³) = 37.263

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<u>Network Design Table for Storm_Rev.A</u> « - Indicates pipe capacity < flow <table><tr><th>PN</th><th>Length (m)</th><th>Fall (m)</th><th>Slope (1:X)</th><th>I.Area (ha)</th><th>T.E. (mins)</th><th>Base Flow (l/s)</th><th>k (mm)</th><th>HYD SECT</th><th>DIA (mm)</th><th>Section Type</th><th>Auto Design</th></tr><tr><td>S1.000</td><td>20.712</td><td>0.075</td><td>276.2</td><td>0.059</td><td>5.00</td><td>0.0</td><td>0.600</td><td>o</td><td>300</td><td>Pipe/Conduit</td><td></td></tr><tr><td>S1.001</td><td>28.182</td><td>0.101</td><td>279.0</td><td>0.073</td><td>0.00</td><td>0.0</td><td>0.600</td><td>o</td><td>300</td><td>Pipe/Conduit</td><td></td></tr><tr><td>S1.002</td><td>19.944</td><td>0.071</td><td>280.9</td><td>0.040</td><td>0.00</td><td>0.0</td><td>0.600</td><td>o</td><td>300</td><td>Pipe/Conduit</td><td></td></tr><tr><td>S2.000</td><td>25.562</td><td>0.128</td><td>199.7</td><td>0.048</td><td>5.00</td><td>0.0</td><td>0.600</td><td>o</td><td>200</td><td>Pipe/Conduit</td><td></td></tr><tr><td>S2.001</td><td>20.186</td><td>0.100</td><td>201.9</td><td>0.000</td><td>0.00</td><td>0.0</td><td>0.600</td><td>o</td><td>225</td><td>Pipe/Conduit</td><td></td></tr><tr><td>S2.002</td><td>31.760</td><td>0.114</td><td>278.6</td><td>0.070</td><td>0.00</td><td>0.0</td><td>0.600</td><td>o</td><td>300</td><td>Pipe/Conduit</td><td></td></tr><tr><td>S2.003</td><td>15.016</td><td>0.068</td><td>220.8</td><td>0.000</td><td>0.00</td><td>0.0</td><td>0.600</td><td>o</td><td>300</td><td>Pipe/Conduit</td><td></td></tr></table> <u>Network Results Table</u> <table><tr><th>PN</th><th>Rain (mm/hr)</th><th>T.C. (mins)</th><th>US/IL (m)</th><th>Σ I.Area (ha)</th><th>Σ Base Flow (l/s)</th><th>Foul (l/s)</th><th>Add Flow (l/s)</th><th>Vel (m/s)</th><th>Cap (l/s)</th><th>Flow (l/s)</th></tr><tr><td>S1.000</td><td>64.58</td><td>5.37</td><td>5.714</td><td>0.059</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.94</td><td>66.5</td><td>10.3</td></tr><tr><td>S1.001</td><td>62.12</td><td>5.87</td><td>5.639</td><td>0.132</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.94</td><td>66.2</td><td>22.2</td></tr><tr><td>S1.002</td><td>60.49</td><td>6.22</td><td>5.538</td><td>0.172</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.93</td><td>66.0</td><td>28.2</td></tr><tr><td>S2.000</td><td>63.91</td><td>5.50</td><td>5.952</td><td>0.048</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.85</td><td>26.8</td><td>8.3</td></tr><tr><td>S2.001</td><td>62.13</td><td>5.87</td><td>5.824</td><td>0.048</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.92</td><td>36.4</td><td>8.3</td></tr><tr><td>S2.002</td><td>59.58</td><td>6.43</td><td>5.649</td><td>0.118</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.94</td><td>66.2</td><td>19.0</td></tr><tr><td>S2.003</td><td>58.58</td><td>6.67</td><td>5.535</td><td>0.118</td><td>0.0</td><td>0.0</td><td>0.0</td><td>1.05</td><td>74.5</td><td>19.0</td></tr></table> ©1982-2020 Innovyze												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	20.712	0.075	276.2	0.059	5.00	0.0	0.600	o	300	Pipe/Conduit		S1.001	28.182	0.101	279.0	0.073	0.00	0.0	0.600	o	300	Pipe/Conduit		S1.002	19.944	0.071	280.9	0.040	0.00	0.0	0.600	o	300	Pipe/Conduit		S2.000	25.562	0.128	199.7	0.048	5.00	0.0	0.600	o	200	Pipe/Conduit		S2.001	20.186	0.100	201.9	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit		S2.002	31.760	0.114	278.6	0.070	0.00	0.0	0.600	o	300	Pipe/Conduit		S2.003	15.016	0.068	220.8	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit		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	64.58	5.37	5.714	0.059	0.0	0.0	0.0	0.94	66.5	10.3	S1.001	62.12	5.87	5.639	0.132	0.0	0.0	0.0	0.94	66.2	22.2	S1.002	60.49	6.22	5.538	0.172	0.0	0.0	0.0	0.93	66.0	28.2	S2.000	63.91	5.50	5.952	0.048	0.0	0.0	0.0	0.85	26.8	8.3	S2.001	62.13	5.87	5.824	0.048	0.0	0.0	0.0	0.92	36.4	8.3	S2.002	59.58	6.43	5.649	0.118	0.0	0.0	0.0	0.94	66.2	19.0	S2.003	58.58	6.67	5.535	0.118	0.0	0.0	0.0	1.05	74.5	19.0
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<u>Network Design Table for Storm_Rev.A</u>											
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
S1.003	46.951	0.134	350.4	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
S1.004	42.988	0.123	349.5	0.034	0.00	0.0	0.600	o	375	Pipe/Conduit	
S1.005	15.269	0.043	355.1	0.029	0.00	0.0	0.600	o	375	Pipe/Conduit	
S1.006	30.192	0.086	351.1	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
S1.007	10.101	0.006	1683.5	0.038	0.00	0.0	0.600	o	375	Pipe/Conduit	
S3.000	14.852	0.053	280.2	0.038	5.00	0.0	0.600	o	300	Pipe/Conduit	
S3.001	40.956	0.146	280.5	0.036	0.00	0.0	0.600	o	300	Pipe/Conduit	
S3.002	13.967	0.050	279.3	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
<u>Network Results Table</u>											
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)	
S1.003	55.42	7.48	5.392	0.290	0.0	0.0	0.0	0.96	106.3	43.5	
S1.004	52.85	8.23	5.258	0.324	0.0	0.0	0.0	0.96	106.4	46.4	
S1.005	52.00	8.49	5.135	0.353	0.0	0.0	0.0	0.96	105.6	49.7	
S1.006	50.41	9.02	5.092	0.353	0.0	0.0	0.0	0.96	106.2	49.7	
S1.007	49.30	9.40	5.006	0.391	0.0	0.0	0.0	0.43	47.8«	52.2	
S3.000	65.10	5.26	5.450	0.038	0.0	0.0	0.0	0.93	66.0	6.7	
S3.001	61.52	6.00	5.397	0.074	0.0	0.0	0.0	0.93	66.0	12.3	
S3.002	60.40	6.24	5.251	0.074	0.0	0.0	0.0	0.94	66.1	12.3	
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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	
S3.003	41.442	0.148	280.0	0.088	0.00	0.0	0.600	o	300	Pipe/Conduit		
S3.004	6.564	0.024	273.5	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit		
S3.005	32.374	0.029	1116.3	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit		
S1.008	11.334	0.053	213.8	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit		
<u>Network Results Table</u>												
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)		
S3.003	57.31	6.98	5.201	0.162	0.0	0.0	0.0	0.93	66.1	25.1		
S3.004	56.86	7.10	5.053	0.162	0.0	0.0	0.0	0.95	66.9	25.1		
S3.005	52.72	8.27	5.029	0.162	0.0	0.0	0.0	0.46	32.7	25.1		
S1.008	48.82	9.58	5.000	0.553	0.0	0.0	0.0	1.07	75.7	73.1		
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Manhole Schedules for Storm_Rev.A											
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)
S1	6.600	0.886	Open Manhole	750 x 600	S1.000	5.714	300				
S2	6.800	1.161	Open Manhole	750 x 600	S1.001	5.639	300	S1.000	5.639	300	
S3	6.900	1.362	Open Manhole	750 x 600	S1.002	5.538	300	S1.001	5.538	300	
S4	6.450	0.498	Open Manhole	750 x 600	S2.000	5.952	200				
S5	6.400	0.576	Open Manhole	750 x 600	S2.001	5.824	225	S2.000	5.824	200	
S6	6.400	0.751	Open Manhole	750 x 600	S2.002	5.649	300	S2.001	5.724	225	
S7	6.700	1.165	Open Manhole	750 x 600	S2.003	5.535	300	S2.002	5.535	300	
S8	6.900	1.508	Open Manhole	1350	S1.003	5.392	375	S1.002	5.467	300	
								S2.003	5.467	300	
S9	6.550	1.292	Open Manhole	1350	S1.004	5.258	375	S1.003	5.258	375	
S10	5.850	0.715	Open Manhole	1350	S1.005	5.135	375	S1.004	5.135	375	
S11	5.750	0.658	Open Manhole	1350	S1.006	5.092	375	S1.005	5.092	375	
S12	5.700	0.694	Open Manhole	1350	S1.007	5.006	375	S1.006	5.006	375	
S13	5.950	0.500	Open Manhole	750 x 600	S3.000	5.450	300				
S14	5.900	0.503	Open Manhole	750 x 600	S3.001	5.397	300	S3.000	5.397	300	
S15	5.850	0.599	Open Manhole	750 x 600	S3.002	5.251	300	S3.001	5.251	300	
S16	5.800	0.599	Open Manhole	750 x 600	S3.003	5.201	300	S3.002	5.201	300	
S17	5.800	0.747	Open Manhole	750 x 600	S3.004	5.053	300	S3.003	5.053	300	
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<u>Manhole Schedules for Storm_Rev.A</u>											
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)
S18	5.700	0.671	Open Manhole	750 x 600	S3.005	5.029	300	S3.004	5.029	300	
Spond	5.600	0.600	Open Manhole	1350	S1.008	5.000	300	S1.007	5.000	375	
								S3.005	5.000	300	
S	5.600	0.653	Open Manhole	0		OUTFALL		S1.008	4.947	300	
	MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)				
	S1	497618.470	103554.058	497618.470	103554.058	Required					
	S2	497629.044	103571.868	497629.044	103571.868	Required					
	S3	497605.548	103587.430	497605.548	103587.430	Required					
	S4	497518.409	103603.577	497518.409	103603.577	Required					
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<u>Manhole Schedules for Storm_Rev.A</u> <table><thead><tr><th>MH Name</th><th>Manhole Easting (m)</th><th>Manhole Northing (m)</th><th>Intersection Easting (m)</th><th>Intersection Northing (m)</th><th>Manhole Access</th><th>Layout (North)</th></tr></thead><tbody><tr><td>S5</td><td>497537.255</td><td>103586.307</td><td>497537.255</td><td>103586.307</td><td>Required</td><td></td></tr><tr><td>S6</td><td>497554.633</td><td>103576.037</td><td>497554.633</td><td>103576.037</td><td>Required</td><td></td></tr><tr><td>S7</td><td>497576.351</td><td>103599.212</td><td>497576.351</td><td>103599.212</td><td>Required</td><td></td></tr><tr><td>S8</td><td>497591.220</td><td>103601.303</td><td>497591.220</td><td>103601.303</td><td>Required</td><td></td></tr><tr><td>S9</td><td>497623.878</td><td>103635.035</td><td>497623.878</td><td>103635.035</td><td>Required</td><td></td></tr><tr><td>S10</td><td>497653.780</td><td>103665.919</td><td>497653.780</td><td>103665.919</td><td>Required</td><td></td></tr><tr><td>S11</td><td>497661.681</td><td>103678.985</td><td>497661.681</td><td>103678.985</td><td>Required</td><td></td></tr><tr><td>S12</td><td>497669.475</td><td>103708.154</td><td>497669.475</td><td>103708.154</td><td>Required</td><td></td></tr></tbody></table>							MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)	S5	497537.255	103586.307	497537.255	103586.307	Required		S6	497554.633	103576.037	497554.633	103576.037	Required		S7	497576.351	103599.212	497576.351	103599.212	Required		S8	497591.220	103601.303	497591.220	103601.303	Required		S9	497623.878	103635.035	497623.878	103635.035	Required		S10	497653.780	103665.919	497653.780	103665.919	Required		S11	497661.681	103678.985	497661.681	103678.985	Required		S12	497669.475	103708.154	497669.475	103708.154	Required	
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Tuscany House White Hart Lane Baskingstoke RG21 4AF			NORTH END ROAD YAPTON 70 UNITS			
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XP Solutions			Network 2020.1			
<u>Manhole Schedules for Storm_Rev.A</u>						
MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S13	497546.977	103635.752	497546.977	103635.752	Required	
S14	497557.317	103646.414	497557.317	103646.414	Required	
S15	497585.830	103675.815	497585.830	103675.815	Required	
S16	497595.553	103685.841	497595.553	103685.841	Required	
S17	497624.404	103715.591	497624.404	103715.591	Required	
S18	497628.974	103720.303	497628.974	103720.303	Required	
Spond	497659.449	103709.379	497659.449	103709.379	Required	
S	497654.617	103719.631			No Entry	
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Tuscany House		NORTH END ROAD				
White Hart Lane		YAPTON				
Baskingstoke RG21 4AF		70 UNITS				
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<u>Area Summary for Storm_Rev.A</u>						
Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.059	0.059	0.059
1.001	-	-	100	0.073	0.073	0.073
1.002	-	-	100	0.040	0.040	0.040
2.000	-	-	100	0.048	0.048	0.048
2.001	-	-	100	0.000	0.000	0.000
2.002	-	-	100	0.070	0.070	0.070
2.003	-	-	100	0.000	0.000	0.000
1.003	-	-	100	0.000	0.000	0.000
1.004	-	-	100	0.034	0.034	0.034
1.005	-	-	100	0.029	0.029	0.029
1.006	-	-	100	0.000	0.000	0.000
1.007	-	-	100	0.038	0.038	0.038
3.000	-	-	100	0.038	0.038	0.038
3.001	-	-	100	0.036	0.036	0.036
3.002	-	-	100	0.000	0.000	0.000
3.003	-	-	100	0.088	0.088	0.088
3.004	-	-	100	0.000	0.000	0.000
3.005	-	-	100	0.000	0.000	0.000
1.008	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.553	0.553	0.553
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Tuscany House White Hart Lane Basingstoke RG21 4AF	NORTH END ROAD YAPTON 70 UNITS	
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Free Flowing Outfall Details for Storm_Rev.A

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.008	S	5.600	4.947	0.000	0	0

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<u>Online Controls for Storm_Rev.A</u> <u>Pump Manhole: Spond, DS/PN: S1.008, Volume (m³): 4.0</u> Invert Level (m) 5.000		
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<u>Storage Structures for Storm_Rev.A</u> <u>Infiltration Blanket Manhole: Spond, DS/PN: S1.008</u> Infiltration Coefficient Base (m/hr) 0.00648 Invert Level (m) 5.000 Cap Volume Depth (m) 0.400 Safety Factor 2.0 Diameter/Width (m) 36.0 Porosity 0.95 Length (m) 35.0		
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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm_Rev.A

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 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH	Data Type Point
FEH Rainfall Version	2013 Cv (Summer)	0.750
Site Location GB 497682 103581 SU 97682 03581	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep 2.5 Second Increment (Extended) 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 (%) 40

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

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Baskingstoke RG21 4AF					70 UNITS									
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<u>100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm_Rev.A</u>														

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<u>100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm_Rev.A</u>													
PN	US/MH Name	Event	Duration (mins)	US/CL (m)	Water Level (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Total Infil. Vol (m³)	Maximum Vol (m³)	Maximum Velocity (m/s)	Half Drain Time (mins)	Pipe Flow (l/s)
S1.000	S1	15 minute 100 year Winter I+40%	15	6.600	6.550	0.000	0.52			0.374	0.6		30.4
S1.001	S2	15 minute 100 year Winter I+40%	15	6.800	6.520	0.000	1.20			1.805	1.0		71.6
S1.002	S3	15 minute 100 year Winter I+40%	15	6.900	6.425	0.000	1.59			2.336	1.3		91.3
S2.000	S4	15 minute 100 year Winter I+40%	15	6.450	6.445	0.000	1.07			0.220	0.9		26.8
S2.001	S5	15 minute 100 year Winter I+40%	15	6.400	6.395	0.000	0.73			1.034	0.8		24.2
S2.002	S6	15 minute 100 year Winter I+40%	15	6.400	6.387	0.000	0.95			1.103	1.0		57.7
S2.003	S7	15 minute 100 year Winter I+40%	15	6.700	6.340	0.000	0.83			2.552	0.9		51.6
S1.003	S8	15 minute 100 year Winter I+40%	15	6.900	6.300	0.000	1.35			3.615	1.2		132.0
S1.004	S9	15 minute 100 year Winter I+40%	15	6.550	6.087	0.000	1.42			6.215	1.3		137.8
S1.005	S10	15 minute 100 year Winter I+40%	15	5.850	5.845	0.000	1.84			5.608	1.3		144.6
S1.006	S11	15 minute 100 year Winter I+40%	15	5.750	5.712	0.000	1.52			2.417	1.3		142.7
S1.007	S12	15 minute 100 year Winter I+40%	15	5.700	5.509	0.000	3.00			3.897	1.4		150.8
S3.000	S13	15 minute 100 year Winter I+40%	15	5.950	5.910	0.000	0.37			0.205	0.6		20.3
S3.001	S14	15 minute 100 year Winter I+40%	15	5.900	5.889	0.000	0.60			1.216	0.9		37.0
S3.002	S15	15 minute 100 year Winter I+40%	15	5.850	5.825	0.000	0.67			3.098	0.5		36.6
S3.003	S16	15 minute 100 year Winter I+40%	15	5.800	5.793	0.000	1.24			1.198	1.1		76.2
S3.004	S17	15 minute 100 year Winter I+40%	15	5.800	5.565	0.000	1.60			3.105	1.1		76.1
S3.005	S18	15 minute 100 year Winter I+40%	15	5.700	5.473	0.000	2.98			0.608	1.1		75.8
S1.008	Spond	2160 minute 100 year Winter I+40%	2160	5.600	5.369	0.000	0.00		9737.948	445.714	0.0		0.0
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