

FORTEM Civil Engineering Consultants Ltd		Page 0
11 The Covert York YO24 1JN	Gernhill Avenue Fixby Phase 2	
Date 19/01/2022 File 220118-SWdesign.MDX	Designed by Matt Lock Checked by Ricky Dale	
XP Solutions	Network 2017.1.2	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for 211210-OUTFROMPDS.SWS

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	1	PIMP (%)	100
M5-60 (mm)	19.000	Add Flow / Climate Change (%)	0
Ratio R	0.318	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	0.000
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

Designed with Level Soffits

Network Design Table for 211210-OUTFROMPDS.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)	Section Type	Auto Design
1.000	33.375	0.420	79.5	0.081	5.00	0.0	0.600	o	225	Pipe/Conduit	
1.001	42.280	0.285	148.4	0.034	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.002	5.481	0.045	121.8	0.069	0.00	0.0	0.600	o	225	Pipe/Conduit	
2.000	32.189	0.405	79.5	0.118	5.00	0.0	0.600	o	225	Pipe/Conduit	
2.001	27.865	0.190	146.7	0.072	0.00	0.0	0.600	o	225	Pipe/Conduit	
2.002	7.330	0.080	91.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.003	54.489	1.875	29.1	0.182	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.004	14.954	0.800	18.7	0.042	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.005	9.922	0.550	18.0	0.015	0.00	0.0	0.600	o	300	Pipe/Conduit	
3.000	29.879	0.475	62.9	0.029	5.00	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)
1.000	44.99	5.38	208.600	0.081	0.0	0.0	0.0	1.47	58.4	9.9
1.001	42.84	6.04	208.180	0.115	0.0	0.0	0.0	1.07	42.6	13.3
1.002	42.61	6.11	207.895	0.184	0.0	0.0	0.0	1.18	47.1	21.2
2.000	45.04	5.37	209.675	0.118	0.0	0.0	0.0	1.47	58.4	14.4
2.001	43.60	5.80	209.270	0.190	0.0	0.0	0.0	1.08	42.8	22.4
2.002	43.31	5.89	209.080	0.190	0.0	0.0	0.0	1.37	54.3	22.4
1.003	41.69	6.42	207.775	0.556	0.0	0.0	0.0	2.93	206.9	62.8
1.004	41.49	6.49	205.900	0.598	0.0	0.0	0.0	3.65	258.2	67.2
1.005	41.37	6.54	205.100	0.613	0.0	0.0	0.0	3.72	262.9	68.7
3.000	45.26	5.30	205.775	0.029	0.0	0.0	0.0	1.65	65.7	3.6

FORTEM Civil Engineering Consultants Ltd		Page 1
11 The Covert York YO24 1JN	Gernhill Avenue Fixby Phase 2	
Date 19/01/2022 File 220118-SWdesign.MDX	Designed by Matt Lock Checked by Ricky Dale	
XP Solutions	Network 2017.1.2	

Network Design Table for 211210-OUTFROMPDS.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)	Section Type	Auto Design
3.001	22.866	0.675	33.9	0.033	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.006	19.832	1.050	18.9	0.038	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.007	8.425	0.500	16.9	0.069	0.00	0.0	0.600	o	300	Pipe/Conduit	
4.000	23.971	0.300	79.9	0.072	5.00	0.0	0.600	o	375	Pipe/Conduit	
4.001	9.197	0.170	54.1	0.024	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.008	53.092	0.155	342.5	0.090	0.00	0.0	0.600	o	450	Pipe/Conduit	
5.000	8.265	0.105	78.7	0.184	5.00	0.0	0.600	o	300	Pipe/Conduit	
5.001	9.487	0.095	99.9	0.018	0.00	0.0	0.600	o	300	Pipe/Conduit	
5.002	42.269	0.290	145.8	0.124	0.00	0.0	0.600	o	300	Pipe/Conduit	
5.003	6.059	0.050	121.2	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
5.004	7.107	0.050	142.1	0.095	0.00	0.0	0.600	o	375	Pipe/Conduit	
5.005	23.802	1.030	23.1	0.020	0.00	0.0	0.600	o	375	Pipe/Conduit	
5.006	22.169	1.175	18.9	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
5.007	7.163	0.450	15.9	0.097	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.009	12.571	0.700	18.0	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.010	35.046	2.335	15.0	0.054	0.00	0.0	0.600	o	600	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)
3.001	44.68	5.47	205.300	0.062	0.0	0.0	0.0	2.26	89.7	7.5
1.006	41.11	6.63	204.550	0.713	0.0	0.0	0.0	3.63	256.9	79.4
1.007	41.01	6.66	203.500	0.782	0.0	0.0	0.0	3.85	272.1	86.8
4.000	45.64	5.20	201.100	0.072	0.0	0.0	0.0	2.03	224.0	8.9
4.001	45.41	5.26	200.800	0.096	0.0	0.0	0.0	2.47	272.6	11.8
1.008	38.90	7.47	200.555	0.968	0.0	0.0	0.0	1.09	173.8	102.0
5.000	46.07	5.08	203.795	0.184	0.0	0.0	0.0	1.77	125.4	23.0
5.001	45.70	5.18	203.690	0.202	0.0	0.0	0.0	1.57	111.2	25.0
5.002	43.85	5.72	203.595	0.326	0.0	0.0	0.0	1.30	91.9	38.7
5.003	43.65	5.78	203.230	0.326	0.0	0.0	0.0	1.64	181.7	38.7
5.004	43.40	5.86	203.180	0.421	0.0	0.0	0.0	1.52	167.6	49.5
5.005	43.07	5.96	203.130	0.441	0.0	0.0	0.0	3.78	417.8	51.4
5.006	42.79	6.05	202.100	0.441	0.0	0.0	0.0	4.19	462.6	51.4
5.007	42.71	6.08	200.925	0.538	0.0	0.0	0.0	4.56	503.7	62.2
1.009	38.79	7.52	200.400	1.506	0.0	0.0	0.0	4.82	765.8	158.2
1.010	38.57	7.61	199.550	1.560	0.0	0.0	0.0	6.31	1783.2	162.9

FORTEM Civil Engineering Consultants Ltd		Page 2
11 The Covert York YO24 1JN	Gernhill Avenue Fixby Phase 2	
Date 19/01/2022 File 220118-SWdesign.MDX	Designed by Matt Lock Checked by Ricky Dale	
XP Solutions	Network 2017.1.2	

PIPELINE SCHEDULES for 211210-OUTFROMPDS.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	1	210.099	208.600	1.274	Open Manhole	1200
1.001	o	225	2	211.598	208.180	3.193	Open Manhole	1350
1.002	o	225	3	210.850	207.895	2.730	Open Manhole	1350
2.000	o	225	4	211.113	209.675	1.213	Open Manhole	1200
2.001	o	225	5	211.511	209.270	2.016	Open Manhole	1500
2.002	o	225	6	210.820	209.080	1.515	Open Manhole	1200
1.003	o	300	7	210.593	207.775	2.518	Open Manhole	1500
1.004	o	300	8	207.588	205.900	1.388	Open Manhole	1500
1.005	o	300	9	206.761	205.100	1.361	Open Manhole	1350
3.000	o	225	10	207.369	205.775	1.369	Open Manhole	1200
3.001	o	225	11	206.849	205.300	1.324	Open Manhole	1500
1.006	o	300	12	206.183	204.550	1.333	Open Manhole	1500
1.007	o	300	13	205.163	203.500	1.363	Open Manhole	1500
4.000	o	375	14	202.707	201.100	1.232	Open Manhole	1500
4.001	o	375	15	204.114	200.800	2.939	Open Manhole	1500

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	33.375	79.5	2	211.598	208.180	3.193	Open Manhole	1350
1.001	42.280	148.4	3	210.850	207.895	2.730	Open Manhole	1350
1.002	5.481	121.8	7	210.593	207.850	2.518	Open Manhole	1500
2.000	32.189	79.5	5	211.511	209.270	2.016	Open Manhole	1500
2.001	27.865	146.7	6	210.820	209.080	1.515	Open Manhole	1200
2.002	7.330	91.6	7	210.593	209.000	1.368	Open Manhole	1500
1.003	54.489	29.1	8	207.588	205.900	1.388	Open Manhole	1500
1.004	14.954	18.7	9	206.761	205.100	1.361	Open Manhole	1350
1.005	9.922	18.0	12	206.183	204.550	1.333	Open Manhole	1500
3.000	29.879	62.9	11	206.849	205.300	1.324	Open Manhole	1500
3.001	22.866	33.9	12	206.183	204.625	1.333	Open Manhole	1500
1.006	19.832	18.9	13	205.163	203.500	1.363	Open Manhole	1500
1.007	8.425	16.9	16	204.663	203.000	1.363	Open Manhole	1500
4.000	23.971	79.9	15	204.114	200.800	2.939	Open Manhole	1500
4.001	9.197	54.1	16	204.663	200.630	3.658	Open Manhole	1500

FORTEM Civil Engineering Consultants Ltd		Page 3
11 The Covert York YO24 1JN	Gernhill Avenue Fixby Phase 2	
Date 19/01/2022 File 220118-SWdesign.MDX	Designed by Matt Lock Checked by Ricky Dale	
XP Solutions	Network 2017.1.2	

PIPELINE SCHEDULES for 211210-OUTFROMPDS.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)
1.008	o	450	16	204.663	200.555	3.658	Open Manhole	1500
5.000	o	300	17	205.438	203.795	1.343	Open Manhole	1200
5.001	o	300	18	205.506	203.690	1.516	Open Manhole	1200
5.002	o	300	19	205.662	203.595	1.767	Open Manhole	1200
5.003	o	375	20	205.811	203.230	2.206	Open Manhole	1350
5.004	o	375	21	205.479	203.180	1.924	Open Manhole	1350
5.005	o	375	22	205.050	203.130	1.545	Open Manhole	1350
5.006	o	375	23	203.798	202.100	1.323	Open Manhole	1500
5.007	o	375	24	202.595	200.925	1.295	Open Manhole	1500
1.009	o	450	25	202.146	200.400	1.296	Open Manhole	1500
1.010	o	600	26	201.463	199.550	1.313	Open Manhole	1500

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)
1.008	53.092	342.5	25	202.146	200.400	1.296	Open Manhole	1500
5.000	8.265	78.7	18	205.506	203.690	1.516	Open Manhole	1200
5.001	9.487	99.9	19	205.662	203.595	1.767	Open Manhole	1200
5.002	42.269	145.8	20	205.811	203.305	2.206	Open Manhole	1350
5.003	6.059	121.2	21	205.479	203.180	1.924	Open Manhole	1350
5.004	7.107	142.1	22	205.050	203.130	1.545	Open Manhole	1350
5.005	23.802	23.1	23	203.798	202.100	1.323	Open Manhole	1500
5.006	22.169	18.9	24	202.595	200.925	1.295	Open Manhole	1500
5.007	7.163	15.9	25	202.146	200.475	1.296	Open Manhole	1500
1.009	12.571	18.0	26	201.463	199.700	1.313	Open Manhole	1500
1.010	35.046	15.0	27	199.648	197.215	1.833	Open Manhole	1500

Free Flowing Outfall Details for 211210-OUTFROMPDS.SWS

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.010	27	199.648	197.215	197.215	1500	0

FORTEM Civil Engineering Consultants Ltd		Page 4
11 The Covert York YO24 1JN	Gernhill Avenue Fixby Phase 2	
Date 19/01/2022 File 220118-SWdesign.MDX	Designed by Matt Lock Checked by Ricky Dale	
XP Solutions	Network 2017.1.2	

Simulation Criteria for 211210-OUTFROMPDS.SWS

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m <sup>3</sup> /ha Storage	0.000
Hot Start (mins)	0	Inlet Coefficient	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 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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Storm Duration (mins)	30
Ratio R	0.318		

FORTEM Civil Engineering Consultants Ltd		Page 5
11 The Covert York YO24 1JN	Gernhill Avenue Fixby Phase 2	
Date 19/01/2022 File 220118-SWdesign.MDX	Designed by Matt Lock Checked by Ricky Dale	
XP Solutions	Network 2017.1.2	

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1)  
for 211210-OUTFROMPDS.SWS

Simulation Criteria

Areal Reduction Factor 1.000      Additional Flow - % of Total Flow 0.000  
Hot Start (mins)                      0                      MADD Factor \* 10m<sup>3</sup>/ha Storage 0.000  
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

Synthetic Rainfall Details

Rainfall Model                      FSR                      Ratio R 0.318  
Region England and Wales Cv (Summer) 0.750  
M5-60 (mm)                      19.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm)                      300.0  
Analysis Timestep 2.5 Second Increment (Extended)  
DTS Status                      OFF  
DVD Status                      ON  
Inertia 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, 30, 100  
Climate Change (%)                      0, 0, 30

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) SurchARGE	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	15 Winter	1	+0%	100/15 Summer				208.665
1.001	2	15 Winter	1	+0%	100/15 Summer				208.269
1.002	3	15 Winter	1	+0%	30/15 Summer				208.031
2.000	4	15 Winter	1	+0%	100/15 Summer				209.754
2.001	5	15 Winter	1	+0%	30/15 Summer				209.390
2.002	6	15 Winter	1	+0%	30/15 Summer				209.198
1.003	7	15 Winter	1	+0%	100/15 Summer				207.889
1.004	8	15 Winter	1	+0%	100/15 Summer				206.012
1.005	9	15 Winter	1	+0%	100/15 Summer				205.223
3.000	10	15 Winter	1	+0%					205.810
3.001	11	15 Winter	1	+0%	100/15 Summer				205.344
1.006	12	15 Winter	1	+0%	100/15 Summer				204.670
1.007	13	15 Winter	1	+0%	30/15 Summer				203.644
4.000	14	15 Winter	1	+0%	100/15 Summer				201.151
4.001	15	15 Winter	1	+0%	30/15 Summer				200.865
1.008	16	15 Winter	1	+0%	30/15 Summer				200.817
5.000	17	15 Winter	1	+0%	30/15 Summer				203.903

FORTEM Civil Engineering Consultants Ltd		Page 6
11 The Covert York YO24 1JN	Gernhill Avenue Fixby Phase 2	
Date 19/01/2022 File 220118-SWdesign.MDX	Designed by Matt Lock Checked by Ricky Dale	
XP Solutions	Network 2017.1.2	

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1)  
for 211210-OUTFROMPDS.SWS

PN	US/MH Name	Surcharged		Flooded		Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m <sup>3</sup> )	Flow / Cap.	Overflow (l/s)			
1.000	1	-0.160	0.000	0.18		9.7	OK	
1.001	2	-0.136	0.000	0.32		13.1	OK	
1.002	3	-0.089	0.000	0.66		19.8	OK	
2.000	4	-0.146	0.000	0.26		14.2	OK	
2.001	5	-0.105	0.000	0.54		21.7	OK	
2.002	6	-0.107	0.000	0.54		21.4	OK	
1.003	7	-0.186	0.000	0.30		59.1	OK	
1.004	8	-0.188	0.000	0.29		63.1	OK	
1.005	9	-0.177	0.000	0.35		64.8	OK	
3.000	10	-0.190	0.000	0.06		3.5	OK	
3.001	11	-0.181	0.000	0.08		6.9	OK	
1.006	12	-0.180	0.000	0.34		75.1	OK	
1.007	13	-0.156	0.000	0.46		81.8	OK	
4.000	14	-0.324	0.000	0.05		8.8	OK	
4.001	15	-0.310	0.000	0.07		11.2	OK	
1.008	16	-0.188	0.000	0.62		98.1	OK	
5.000	17	-0.192	0.000	0.28		22.5	OK	

FORTEM Civil Engineering Consultants Ltd		Page 7
11 The Covert York YO24 1JN	Gernhill Avenue Fixby Phase 2	
Date 19/01/2022 File 220118-SWdesign.MDX	Designed by Matt Lock Checked by Ricky Dale	
XP Solutions	Network 2017.1.2	

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1)  
for 211210-OUTFROMPDS.SWS

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
5.001	18 15	Winter	1	+0%	30/15	Summer			203.806
5.002	19 15	Winter	1	+0%	30/15	Summer			203.734
5.003	20 15	Winter	1	+0%	30/15	Winter			203.381
5.004	21 15	Winter	1	+0%	100/15	Summer			203.353
5.005	22 15	Winter	1	+0%					203.221
5.006	23 15	Winter	1	+0%					202.187
5.007	24 15	Winter	1	+0%	100/15	Summer			201.044
1.009	25 15	Winter	1	+0%	100/15	Summer			200.578
1.010	26 15	Winter	1	+0%					199.681

PN	US/MH Name	Surcharged		Flooded		Pipe		Level Exceeded
		Depth (m)	Volume (m <sup>3</sup> )	Flow / Cap.	Overflow (l/s)	Flow (l/s)	Status	
5.001	18	-0.184	0.000	0.31		24.0	OK	
5.002	19	-0.161	0.000	0.43		36.9	OK	
5.003	20	-0.224	0.000	0.34		36.7	OK	
5.004	21	-0.202	0.000	0.43		46.0	OK	
5.005	22	-0.284	0.000	0.13		47.8	OK	
5.006	23	-0.288	0.000	0.12		48.1	OK	
5.007	24	-0.256	0.000	0.22		57.3	OK	
1.009	25	-0.272	0.000	0.33		154.1	OK	
1.010	26	-0.469	0.000	0.11		159.1	OK	

FORTEM Civil Engineering Consultants Ltd		Page 8
11 The Covert York YO24 1JN	Gernhill Avenue Fixby Phase 2	
Date 19/01/2022 File 220118-SWdesign.MDX	Designed by Matt Lock Checked by Ricky Dale	
XP Solutions	Network 2017.1.2	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)  
for 211210-OUTFROMPDS.SWS

Simulation Criteria

Areal Reduction Factor 1.000      Additional Flow - % of Total Flow 0.000  
Hot Start (mins)                      0                      MADD Factor \* 10m<sup>3</sup>/ha Storage 0.000  
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

Synthetic Rainfall Details

Rainfall Model                      FSR                      Ratio R 0.318  
Region England and Wales Cv (Summer) 0.750  
M5-60 (mm)                      19.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm)                      300.0  
Analysis Timestep 2.5 Second Increment (Extended)  
DTS Status                      OFF  
DVD Status                      ON  
Inertia 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, 30, 100  
Climate Change (%)                      0, 0, 30

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1 15	Winter	30	+0%	100/15	Summer			208.705
1.001	2 15	Winter	30	+0%	100/15	Summer			208.396
1.002	3 15	Winter	30	+0%	30/15	Summer			208.205
2.000	4 15	Winter	30	+0%	100/15	Summer			209.842
2.001	5 15	Winter	30	+0%	30/15	Summer			209.690
2.002	6 15	Winter	30	+0%	30/15	Summer			209.354
1.003	7 15	Winter	30	+0%	100/15	Summer			207.980
1.004	8 15	Winter	30	+0%	100/15	Summer			206.100
1.005	9 15	Winter	30	+0%	100/15	Summer			205.326
3.000	10 15	Winter	30	+0%					205.831
3.001	11 15	Winter	30	+0%	100/15	Summer			205.374
1.006	12 15	Winter	30	+0%	100/15	Summer			204.836
1.007	13 15	Winter	30	+0%	30/15	Summer			204.023
4.000	14 15	Winter	30	+0%	100/15	Summer			201.276
4.001	15 15	Winter	30	+0%	30/15	Summer			201.263
1.008	16 15	Winter	30	+0%	30/15	Summer			201.254
5.000	17 15	Winter	30	+0%	30/15	Summer			204.164

FORTEM Civil Engineering Consultants Ltd		Page 9
11 The Covert York YO24 1JN	Gernhill Avenue Fixby Phase 2	
Date 19/01/2022 File 220118-SWdesign.MDX	Designed by Matt Lock Checked by Ricky Dale	
XP Solutions	Network 2017.1.2	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)  
for 211210-OUTFROMPDS.SWS

PN	US/MH Name	Surcharged		Flooded		Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m <sup>3</sup> )	Flow / Cap.	Overflow (l/s)			
1.000	1	-0.120	0.000	0.43		23.8	OK	
1.001	2	-0.009	0.000	0.81		32.8	OK	
1.002	3	0.085	0.000	1.74		52.1	SURCHARGED	
2.000	4	-0.058	0.000	0.63		34.5	OK	
2.001	5	0.195	0.000	1.31		52.3	SURCHARGED	
2.002	6	0.049	0.000	1.32		52.6	SURCHARGED	
1.003	7	-0.095	0.000	0.78		153.5	OK	
1.004	8	-0.100	0.000	0.77		165.4	OK	
1.005	9	-0.074	0.000	0.91		169.6	OK	
3.000	10	-0.169	0.000	0.14		8.6	OK	
3.001	11	-0.151	0.000	0.23		19.0	OK	
1.006	12	-0.014	0.000	0.87		194.9	OK	
1.007	13	0.223	0.000	1.20		213.0	SURCHARGED	
4.000	14	-0.199	0.000	0.10		20.0	OK	
4.001	15	0.088	0.000	0.20		31.8	SURCHARGED	
1.008	16	0.249	0.000	1.60		253.7	SURCHARGED	
5.000	17	0.069	0.000	0.66		53.2	SURCHARGED	

FORTEM Civil Engineering Consultants Ltd		Page 10
11 The Covert York YO24 1JN	Gernhill Avenue Fixby Phase 2	
Date 19/01/2022 File 220118-SWdesign.MDX	Designed by Matt Lock Checked by Ricky Dale	
XP Solutions	Network 2017.1.2	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)  
for 211210-OUTFROMPDS.SWS

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
5.001	18 15	Winter	30	+0%	30/15	Summer			204.049
5.002	19 15	Winter	30	+0%	30/15	Summer			203.944
5.003	20 15	Winter	30	+0%	30/15	Winter			203.629
5.004	21 15	Winter	30	+0%	100/15	Summer			203.538
5.005	22 15	Winter	30	+0%					203.274
5.006	23 15	Summer	30	+0%					202.237
5.007	24 15	Summer	30	+0%	100/15	Summer			201.124
1.009	25 15	Winter	30	+0%	100/15	Summer			200.711
1.010	26 15	Winter	30	+0%					199.760

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m <sup>3</sup> )	Flow / Cap. (l/s)	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
5.001	18	0.059	0.000	0.75		58.2	SURCHARGED	
5.002	19	0.049	0.000	1.07		91.3	SURCHARGED	
5.003	20	0.024	0.000	0.81		86.4	SURCHARGED	
5.004	21	-0.017	0.000	1.00		107.2	OK	
5.005	22	-0.231	0.000	0.31		112.8	OK	
5.006	23	-0.238	0.000	0.29		112.8	OK	
5.007	24	-0.176	0.000	0.53		139.7	OK	
1.009	25	-0.139	0.000	0.82		386.3	OK	
1.010	26	-0.390	0.000	0.27		396.8	OK	

FORTEM Civil Engineering Consultants Ltd		Page 11
11 The Covert York YO24 1JN	Gernhill Avenue Fixby Phase 2	
Date 19/01/2022 File 220118-SWdesign.MDX	Designed by Matt Lock Checked by Ricky Dale	
XP Solutions	Network 2017.1.2	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 211210-OUTFROMPDS.SWS

Simulation Criteria

Areal Reduction Factor 1.000      Additional Flow - % of Total Flow 0.000  
Hot Start (mins)                      0                      MADD Factor \* 10m<sup>3</sup>/ha Storage 0.000  
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

Synthetic Rainfall Details

Rainfall Model                      FSR                      Ratio R 0.318  
Region England and Wales Cv (Summer) 0.750  
M5-60 (mm)                      19.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm)                      300.0  
Analysis Timestep 2.5 Second Increment (Extended)  
DTS Status                      OFF  
DVD Status                      ON  
Inertia 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, 30, 100  
Climate Change (%)                      0, 0, 30

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1 15	Winter	100	+30%	100/15	Summer			209.930
1.001	2 15	Winter	100	+30%	100/15	Summer			209.793
1.002	3 15	Winter	100	+30%	30/15	Summer			209.503
2.000	4 15	Winter	100	+30%	100/15	Summer			210.874
2.001	5 15	Winter	100	+30%	30/15	Summer			210.474
2.002	6 15	Winter	100	+30%	30/15	Summer			209.637
1.003	7 15	Winter	100	+30%	100/15	Summer			209.333
1.004	8 15	Winter	100	+30%	100/15	Summer			207.290
1.005	9 15	Winter	100	+30%	100/15	Summer			206.503
3.000	10 15	Winter	100	+30%					205.849
3.001	11 15	Winter	100	+30%	100/15	Summer			205.780
1.006	12 15	Winter	100	+30%	100/15	Summer			205.741
1.007	13 15	Winter	100	+30%	30/15	Summer			204.439
4.000	14 15	Winter	100	+30%	100/15	Summer			201.970
4.001	15 15	Winter	100	+30%	30/15	Summer			201.951
1.008	16 15	Winter	100	+30%	30/15	Summer			201.821
5.000	17 15	Winter	100	+30%	30/15	Summer			205.099

FORTEM Civil Engineering Consultants Ltd		Page 12
11 The Covert York YO24 1JN	Gernhill Avenue Fixby Phase 2	
Date 19/01/2022 File 220118-SWdesign.MDX	Designed by Matt Lock Checked by Ricky Dale	
XP Solutions	Network 2017.1.2	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 211210-OUTFROMPDS.SWS

PN	US/MH Name	Surcharged Flooded		Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m <sup>3</sup> )					
1.000	1	1.105	0.000	0.63		34.5	FLOOD RISK	
1.001	2	1.388	0.000	1.11		45.0	SURCHARGED	
1.002	3	1.383	0.000	2.29		68.4	SURCHARGED	
2.000	4	0.974	0.000	0.98		53.8	FLOOD RISK	
2.001	5	0.979	0.000	2.09		83.2	SURCHARGED	
2.002	6	0.332	0.000	2.07		82.5	SURCHARGED	
1.003	7	1.258	0.000	1.06		207.2	SURCHARGED	
1.004	8	1.090	0.000	0.99		214.2	FLOOD RISK	
1.005	9	1.103	0.000	1.18		218.8	FLOOD RISK	
3.000	10	-0.151	0.000	0.24		14.4	OK	
3.001	11	0.255	0.000	0.36		29.7	SURCHARGED	
1.006	12	0.891	0.000	1.11		248.7	SURCHARGED	
1.007	13	0.639	0.000	1.51		267.4	SURCHARGED	
4.000	14	0.495	0.000	0.15		29.7	SURCHARGED	
4.001	15	0.776	0.000	0.23		36.9	SURCHARGED	
1.008	16	0.816	0.000	2.08		330.9	SURCHARGED	
5.000	17	1.004	0.000	1.09		88.4	SURCHARGED	

FORTEM Civil Engineering Consultants Ltd		Page 13
11 The Covert York YO24 1JN	Gernhill Avenue Fixby Phase 2	
Date 19/01/2022 File 220118-SWdesign.MDX	Designed by Matt Lock Checked by Ricky Dale	
XP Solutions	Network 2017.1.2	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 211210-OUTFROMPDS.SWS

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
5.001	18 15	Winter	100	+30%	30/15	Summer			204.975
5.002	19 15	Winter	100	+30%	30/15	Summer			204.834
5.003	20 15	Winter	100	+30%	30/15	Winter			203.891
5.004	21 15	Winter	100	+30%	100/15	Summer			203.739
5.005	22 15	Winter	100	+30%					203.333
5.006	23 15	Winter	100	+30%					202.292
5.007	24 15	Winter	100	+30%	100/15	Summer			201.512
1.009	25 15	Winter	100	+30%	100/15	Summer			201.130
1.010	26 15	Winter	100	+30%					199.810

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap. (l/s)	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
5.001	18	0.985	0.000	1.25		96.3	SURCHARGED	
5.002	19	0.939	0.000	1.77		151.3	SURCHARGED	
5.003	20	0.286	0.000	1.42		152.3	SURCHARGED	
5.004	21	0.184	0.000	1.80		193.0	SURCHARGED	
5.005	22	-0.172	0.000	0.56		201.2	OK	
5.006	23	-0.183	0.000	0.51		199.6	OK	
5.007	24	0.212	0.000	0.90		235.2	SURCHARGED	
1.009	25	0.280	0.000	1.19		563.1	SURCHARGED	
1.010	26	-0.340	0.000	0.39		579.1	OK	