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Ground Floor, 24 High Street Whittlesford Cambs, CB22 4LT	PLANNING REFERENCE 21/02524/FUL PROPOSED SWS	
Date 31/10/2023 09:28 File 3144-SWS.MDX	Designed by JTC Checked by	
Innovyze	Network 2020.1.3	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Surface Network 1

Pipe Sizes STANDARD Manhole Sizes STANDARD

FEH Rainfall Model	
Return Period (years)	2
FEH Rainfall Version	2013
Site Location	GB 540853 255779 TL 40853 55779
Data Type	Point
Maximum Rainfall (mm/hr)	100
Maximum Time of Concentration (mins)	30
Foul Sewage (l/s/ha)	0.000
Volumetric Runoff Coeff.	1.000
PIMP (%)	100
Add Flow / Climate Change (%)	0
Minimum Backdrop Height (m)	0.200
Maximum Backdrop Height (m)	1.500
Min Design Depth for Optimisation (m)	1.200
Min Vel for Auto Design only (m/s)	1.00
Min Slope for Optimisation (1:X)	500

Designed with Level Soffits




Time Area Diagram for Surface Network 1

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.203	4-8	0.106

Total Area Contributing (ha) = 0.308


Total Pipe Volume (m³) = 6.592

Network Design Table for Surface Network 1




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	18.156	0.108	168.2	0.103	5.00	0.0	0.600	o	225	Pipe/Conduit	
1.001	15.748	0.094	168.2	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.002	40.163	0.166	241.9	0.129	0.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	E I.Area (ha)	E Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	66.03	5.30	21.583	0.103	0.0	0.0	0.0	1.01	40.0	24.5
1.001	64.64	5.56	21.475	0.103	0.0	0.0	0.0	1.01	40.0	24.5
1.002	61.30	6.23	21.307	0.232	0.0	0.0	0.0	1.01	71.1	51.3


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Network Design Table for Surface Network 1

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
1.003	15.919	0.066	241.9	0.043	0.00	0.0	0.600	o	300	Pipe/Conduit		
1.004	14.207	0.059	241.9	0.034	0.00	0.0	0.600	o	300	Pipe/Conduit		
1.005	3.902	0.016	241.9	0.000	0.00	0.0	0.600	o	300	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)
1.003	60.07	6.49	21.141	0.274	0.0	0.0	0.0	1.01	71.1	59.5
1.004	59.00	6.73	21.075	0.308	0.0	0.0	0.0	1.01	71.1	65.7
1.005	58.72	6.79	21.016	0.308	0.0	0.0	0.0	1.01	71.1	65.7

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Manhole Schedules for Surface Network 1

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	Pipe Out		Pipes In		Backdrop (mm)	
					PN	Invert Level (m)	Diameter (mm)	PN		Invert Level (m)
S1	22.500	0.917	Open Manhole	1350	1.000	21.583	225			
S7	22.362	0.886	Open Manhole	1350	1.001	21.475	225	1.000	21.475	225
S2	22.765	1.458	Open Manhole	1350	1.002	21.307	300	1.001	21.382	225
S3	22.840	1.700	Open Manhole	1350	1.003	21.141	300	1.002	21.141	300
S4	22.703	1.628	Open Manhole	1350	1.004	21.075	300	1.003	21.075	300
S5	22.336	1.320	Open Manhole	1350	1.005	21.016	300	1.004	21.016	300
S6	22.500	1.500	Open Manhole	0		OUTFALL		1.005	21.000	300

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S1	540831.124	255730.843	540831.124	255730.843	Required	
S7	540838.299	255747.521	540838.299	255747.521	Required	
S2	540845.489	255761.531	540845.489	255761.531	Required	
S3	540864.783	255796.757	540864.783	255796.757	Required	
S4	540865.788	255812.644	540865.788	255812.644	Required	
S5	540872.850	255824.971	540872.850	255824.971	Required	
S6	540876.412	255826.566			No Entry	

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PIPELINE SCHEDULES for Surface Network 1

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	S1	22.500	21.583	0.692	Open Manhole	1350
1.001	o	225	S7	22.362	21.475	0.661	Open Manhole	1350
1.002	o	300	S2	22.765	21.307	1.158	Open Manhole	1350
1.003	o	300	S3	22.840	21.141	1.400	Open Manhole	1350
1.004	o	300	S4	22.703	21.075	1.328	Open Manhole	1350
1.005	o	300	S5	22.336	21.016	1.020	Open Manhole	1350

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	18.156	168.2	S7	22.362	21.475	0.661	Open Manhole	1350
1.001	15.748	168.2	S2	22.765	21.382	1.158	Open Manhole	1350
1.002	40.163	241.9	S3	22.840	21.141	1.400	Open Manhole	1350
1.003	15.919	241.9	S4	22.703	21.075	1.328	Open Manhole	1350
1.004	14.207	241.9	S5	22.336	21.016	1.020	Open Manhole	1350
1.005	3.902	241.9	S6	22.500	21.000	1.200	Open Manhole	0


Surcharged Outfall Details for Surface Network 1

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
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1.005 S6 22.500 21.000 21.000 0 0


Datum (m) 1.000 Offset (mins) 0

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
1	1.000	15	1.000	29	1.000	43	1.000	57	1.000
2	1.000	16	1.000	30	1.000	44	1.000	58	1.000
3	1.000	17	1.000	31	1.000	45	1.000	59	1.000
4	1.000	18	1.000	32	1.000	46	1.000	60	1.000
5	1.000	19	1.000	33	1.000	47	1.000	61	1.000
6	1.000	20	1.000	34	1.000	48	1.000	62	1.000
7	1.000	21	1.000	35	1.000	49	1.000	63	1.000
8	1.000	22	1.000	36	1.000	50	1.000	64	1.000
9	1.000	23	1.000	37	1.000	51	1.000	65	1.000
10	1.000	24	1.000	38	1.000	52	1.000	66	1.000
11	1.000	25	1.000	39	1.000	53	1.000	67	1.000
12	1.000	26	1.000	40	1.000	54	1.000	68	1.000
13	1.000	27	1.000	41	1.000	55	1.000	69	1.000
14	1.000	28	1.000	42	1.000	56	1.000	70	1.000

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Surcharged Outfall Details for Surface Network 1

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
85	1.000	135	1.000	185	1.000	235	1.000	285	1.000	335	1.000
86	1.000	136	1.000	186	1.000	236	1.000	286	1.000	336	1.000
87	1.000	137	1.000	187	1.000	237	1.000	287	1.000	337	1.000
88	1.000	138	1.000	188	1.000	238	1.000	288	1.000	338	1.000
89	1.000	139	1.000	189	1.000	239	1.000	289	1.000	339	1.000
90	1.000	140	1.000	190	1.000	240	1.000	290	1.000	340	1.000
91	1.000	141	1.000	191	1.000	241	1.000	291	1.000	341	1.000
92	1.000	142	1.000	192	1.000	242	1.000	292	1.000	342	1.000
93	1.000	143	1.000	193	1.000	243	1.000	293	1.000	343	1.000
94	1.000	144	1.000	194	1.000	244	1.000	294	1.000	344	1.000
95	1.000	145	1.000	195	1.000	245	1.000	295	1.000	345	1.000
96	1.000	146	1.000	196	1.000	246	1.000	296	1.000	346	1.000
97	1.000	147	1.000	197	1.000	247	1.000	297	1.000	347	1.000
98	1.000	148	1.000	198	1.000	248	1.000	298	1.000	348	1.000
99	1.000	149	1.000	199	1.000	249	1.000	299	1.000	349	1.000
100	1.000	150	1.000	200	1.000	250	1.000	300	1.000	350	1.000
101	1.000	151	1.000	201	1.000	251	1.000	301	1.000	351	1.000
102	1.000	152	1.000	202	1.000	252	1.000	302	1.000	352	1.000
103	1.000	153	1.000	203	1.000	253	1.000	303	1.000	353	1.000
104	1.000	154	1.000	204	1.000	254	1.000	304	1.000	354	1.000
105	1.000	155	1.000	205	1.000	255	1.000	305	1.000	355	1.000
106	1.000	156	1.000	206	1.000	256	1.000	306	1.000	356	1.000
107	1.000	157	1.000	207	1.000	257	1.000	307	1.000	357	1.000
108	1.000	158	1.000	208	1.000	258	1.000	308	1.000	358	1.000
109	1.000	159	1.000	209	1.000	259	1.000	309	1.000	359	1.000
110	1.000	160	1.000	210	1.000	260	1.000	310	1.000	360	1.000
111	1.000	161	1.000	211	1.000	261	1.000	311	1.000	361	1.000
112	1.000	162	1.000	212	1.000	262	1.000	312	1.000	362	1.000
113	1.000	163	1.000	213	1.000	263	1.000	313	1.000	363	1.000
114	1.000	164	1.000	214	1.000	264	1.000	314	1.000	364	1.000
115	1.000	165	1.000	215	1.000	265	1.000	315	1.000	365	1.000
116	1.000	166	1.000	216	1.000	266	1.000	316	1.000	366	1.000
117	1.000	167	1.000	217	1.000	267	1.000	317	1.000	367	1.000
118	1.000	168	1.000	218	1.000	268	1.000	318	1.000	368	1.000
119	1.000	169	1.000	219	1.000	269	1.000	319	1.000	369	1.000
120	1.000	170	1.000	220	1.000	270	1.000	320	1.000	370	1.000
121	1.000	171	1.000	221	1.000	271	1.000	321	1.000	371	1.000
122	1.000	172	1.000	222	1.000	272	1.000	322	1.000	372	1.000
123	1.000	173	1.000	223	1.000	273	1.000	323	1.000	373	1.000
124	1.000	174	1.000	224	1.000	274	1.000	324	1.000	374	1.000
125	1.000	175	1.000	225	1.000	275	1.000	325	1.000	375	1.000
126	1.000	176	1.000	226	1.000	276	1.000	326	1.000	376	1.000
127	1.000	177	1.000	227	1.000	277	1.000	327	1.000	377	1.000
128	1.000	178	1.000	228	1.000	278	1.000	328	1.000	378	1.000
129	1.000	179	1.000	229	1.000	279	1.000	329	1.000	379	1.000
130	1.000	180	1.000	230	1.000	280	1.000	330	1.000	380	1.000
131	1.000	181	1.000	231	1.000	281	1.000	331	1.000	381	1.000
132	1.000	182	1.000	232	1.000	282	1.000	332	1.000	382	1.000
133	1.000	183	1.000	233	1.000	283	1.000	333	1.000	383	1.000
134	1.000	184	1.000	234	1.000	284	1.000	334	1.000	384	1.000

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Surcharged Outfall Details for Surface Network 1

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
385	1.000	435	1.000	485	1.000	535	1.000	585	1.000	635	1.000
386	1.000	436	1.000	486	1.000	536	1.000	586	1.000	636	1.000
387	1.000	437	1.000	487	1.000	537	1.000	587	1.000	637	1.000
388	1.000	438	1.000	488	1.000	538	1.000	588	1.000	638	1.000
389	1.000	439	1.000	489	1.000	539	1.000	589	1.000	639	1.000
390	1.000	440	1.000	490	1.000	540	1.000	590	1.000	640	1.000
391	1.000	441	1.000	491	1.000	541	1.000	591	1.000	641	1.000
392	1.000	442	1.000	492	1.000	542	1.000	592	1.000	642	1.000
393	1.000	443	1.000	493	1.000	543	1.000	593	1.000	643	1.000
394	1.000	444	1.000	494	1.000	544	1.000	594	1.000	644	1.000
395	1.000	445	1.000	495	1.000	545	1.000	595	1.000	645	1.000
396	1.000	446	1.000	496	1.000	546	1.000	596	1.000	646	1.000
397	1.000	447	1.000	497	1.000	547	1.000	597	1.000	647	1.000
398	1.000	448	1.000	498	1.000	548	1.000	598	1.000	648	1.000
399	1.000	449	1.000	499	1.000	549	1.000	599	1.000	649	1.000
400	1.000	450	1.000	500	1.000	550	1.000	600	1.000	650	1.000
401	1.000	451	1.000	501	1.000	551	1.000	601	1.000	651	1.000
402	1.000	452	1.000	502	1.000	552	1.000	602	1.000	652	1.000
403	1.000	453	1.000	503	1.000	553	1.000	603	1.000	653	1.000
404	1.000	454	1.000	504	1.000	554	1.000	604	1.000	654	1.000
405	1.000	455	1.000	505	1.000	555	1.000	605	1.000	655	1.000
406	1.000	456	1.000	506	1.000	556	1.000	606	1.000	656	1.000
407	1.000	457	1.000	507	1.000	557	1.000	607	1.000	657	1.000
408	1.000	458	1.000	508	1.000	558	1.000	608	1.000	658	1.000
409	1.000	459	1.000	509	1.000	559	1.000	609	1.000	659	1.000
410	1.000	460	1.000	510	1.000	560	1.000	610	1.000	660	1.000
411	1.000	461	1.000	511	1.000	561	1.000	611	1.000	661	1.000
412	1.000	462	1.000	512	1.000	562	1.000	612	1.000	662	1.000
413	1.000	463	1.000	513	1.000	563	1.000	613	1.000	663	1.000
414	1.000	464	1.000	514	1.000	564	1.000	614	1.000	664	1.000
415	1.000	465	1.000	515	1.000	565	1.000	615	1.000	665	1.000
416	1.000	466	1.000	516	1.000	566	1.000	616	1.000	666	1.000
417	1.000	467	1.000	517	1.000	567	1.000	617	1.000	667	1.000
418	1.000	468	1.000	518	1.000	568	1.000	618	1.000	668	1.000
419	1.000	469	1.000	519	1.000	569	1.000	619	1.000	669	1.000
420	1.000	470	1.000	520	1.000	570	1.000	620	1.000	670	1.000
421	1.000	471	1.000	521	1.000	571	1.000	621	1.000	671	1.000
422	1.000	472	1.000	522	1.000	572	1.000	622	1.000	672	1.000
423	1.000	473	1.000	523	1.000	573	1.000	623	1.000	673	1.000
424	1.000	474	1.000	524	1.000	574	1.000	624	1.000	674	1.000
425	1.000	475	1.000	525	1.000	575	1.000	625	1.000	675	1.000
426	1.000	476	1.000	526	1.000	576	1.000	626	1.000	676	1.000
427	1.000	477	1.000	527	1.000	577	1.000	627	1.000	677	1.000
428	1.000	478	1.000	528	1.000	578	1.000	628	1.000	678	1.000
429	1.000	479	1.000	529	1.000	579	1.000	629	1.000	679	1.000
430	1.000	480	1.000	530	1.000	580	1.000	630	1.000	680	1.000
431	1.000	481	1.000	531	1.000	581	1.000	631	1.000	681	1.000
432	1.000	482	1.000	532	1.000	582	1.000	632	1.000	682	1.000
433	1.000	483	1.000	533	1.000	583	1.000	633	1.000	683	1.000
434	1.000	484	1.000	534	1.000	584	1.000	634	1.000	684	1.000

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Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
685	1.000	735	1.000	785	1.000	835	1.000	885	1.000	935	1.000
686	1.000	736	1.000	786	1.000	836	1.000	886	1.000	936	1.000
687	1.000	737	1.000	787	1.000	837	1.000	887	1.000	937	1.000
688	1.000	738	1.000	788	1.000	838	1.000	888	1.000	938	1.000
689	1.000	739	1.000	789	1.000	839	1.000	889	1.000	939	1.000
690	1.000	740	1.000	790	1.000	840	1.000	890	1.000	940	1.000
691	1.000	741	1.000	791	1.000	841	1.000	891	1.000	941	1.000
692	1.000	742	1.000	792	1.000	842	1.000	892	1.000	942	1.000
693	1.000	743	1.000	793	1.000	843	1.000	893	1.000	943	1.000
694	1.000	744	1.000	794	1.000	844	1.000	894	1.000	944	1.000
695	1.000	745	1.000	795	1.000	845	1.000	895	1.000	945	1.000
696	1.000	746	1.000	796	1.000	846	1.000	896	1.000	946	1.000
697	1.000	747	1.000	797	1.000	847	1.000	897	1.000	947	1.000
698	1.000	748	1.000	798	1.000	848	1.000	898	1.000	948	1.000
699	1.000	749	1.000	799	1.000	849	1.000	899	1.000	949	1.000
700	1.000	750	1.000	800	1.000	850	1.000	900	1.000	950	1.000
701	1.000	751	1.000	801	1.000	851	1.000	901	1.000	951	1.000
702	1.000	752	1.000	802	1.000	852	1.000	902	1.000	952	1.000
703	1.000	753	1.000	803	1.000	853	1.000	903	1.000	953	1.000
704	1.000	754	1.000	804	1.000	854	1.000	904	1.000	954	1.000
705	1.000	755	1.000	805	1.000	855	1.000	905	1.000	955	1.000
706	1.000	756	1.000	806	1.000	856	1.000	906	1.000	956	1.000
707	1.000	757	1.000	807	1.000	857	1.000	907	1.000	957	1.000
708	1.000	758	1.000	808	1.000	858	1.000	908	1.000	958	1.000
709	1.000	759	1.000	809	1.000	859	1.000	909	1.000	959	1.000
710	1.000	760	1.000	810	1.000	860	1.000	910	1.000	960	1.000
711	1.000	761	1.000	811	1.000	861	1.000	911	1.000	961	1.000
712	1.000	762	1.000	812	1.000	862	1.000	912	1.000	962	1.000
713	1.000	763	1.000	813	1.000	863	1.000	913	1.000	963	1.000
714	1.000	764	1.000	814	1.000	864	1.000	914	1.000	964	1.000
715	1.000	765	1.000	815	1.000	865	1.000	915	1.000	965	1.000
716	1.000	766	1.000	816	1.000	866	1.000	916	1.000	966	1.000
717	1.000	767	1.000	817	1.000	867	1.000	917	1.000	967	1.000
718	1.000	768	1.000	818	1.000	868	1.000	918	1.000	968	1.000
719	1.000	769	1.000	819	1.000	869	1.000	919	1.000	969	1.000
720	1.000	770	1.000	820	1.000	870	1.000	920	1.000	970	1.000
721	1.000	771	1.000	821	1.000	871	1.000	921	1.000	971	1.000
722	1.000	772	1.000	822	1.000	872	1.000	922	1.000	972	1.000
723	1.000	773	1.000	823	1.000	873	1.000	923	1.000	973	1.000
724	1.000	774	1.000	824	1.000	874	1.000	924	1.000	974	1.000
725	1.000	775	1.000	825	1.000	875	1.000	925	1.000	975	1.000
726	1.000	776	1.000	826	1.000	876	1.000	926	1.000	976	1.000
727	1.000	777	1.000	827	1.000	877	1.000	927	1.000	977	1.000
728	1.000	778	1.000	828	1.000	878	1.000	928	1.000	978	1.000
729	1.000	779	1.000	829	1.000	879	1.000	929	1.000	979	1.000
730	1.000	780	1.000	830	1.000	880	1.000	930	1.000	980	1.000
731	1.000	781	1.000	831	1.000	881	1.000	931	1.000	981	1.000
732	1.000	782	1.000	832	1.000	882	1.000	932	1.000	982	1.000
733	1.000	783	1.000	833	1.000	883	1.000	933	1.000	983	1.000
734	1.000	784	1.000	834	1.000	884	1.000	934	1.000	984	1.000

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Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
985	1.000	1035	1.000	1085	1.000	1135	1.000	1185	1.000	1235	1.000
986	1.000	1036	1.000	1086	1.000	1136	1.000	1186	1.000	1236	1.000
987	1.000	1037	1.000	1087	1.000	1137	1.000	1187	1.000	1237	1.000
988	1.000	1038	1.000	1088	1.000	1138	1.000	1188	1.000	1238	1.000
989	1.000	1039	1.000	1089	1.000	1139	1.000	1189	1.000	1239	1.000
990	1.000	1040	1.000	1090	1.000	1140	1.000	1190	1.000	1240	1.000
991	1.000	1041	1.000	1091	1.000	1141	1.000	1191	1.000	1241	1.000
992	1.000	1042	1.000	1092	1.000	1142	1.000	1192	1.000	1242	1.000
993	1.000	1043	1.000	1093	1.000	1143	1.000	1193	1.000	1243	1.000
994	1.000	1044	1.000	1094	1.000	1144	1.000	1194	1.000	1244	1.000
995	1.000	1045	1.000	1095	1.000	1145	1.000	1195	1.000	1245	1.000
996	1.000	1046	1.000	1096	1.000	1146	1.000	1196	1.000	1246	1.000
997	1.000	1047	1.000	1097	1.000	1147	1.000	1197	1.000	1247	1.000
998	1.000	1048	1.000	1098	1.000	1148	1.000	1198	1.000	1248	1.000
999	1.000	1049	1.000	1099	1.000	1149	1.000	1199	1.000	1249	1.000
1000	1.000	1050	1.000	1100	1.000	1150	1.000	1200	1.000	1250	1.000
1001	1.000	1051	1.000	1101	1.000	1151	1.000	1201	1.000	1251	1.000
1002	1.000	1052	1.000	1102	1.000	1152	1.000	1202	1.000	1252	1.000
1003	1.000	1053	1.000	1103	1.000	1153	1.000	1203	1.000	1253	1.000
1004	1.000	1054	1.000	1104	1.000	1154	1.000	1204	1.000	1254	1.000
1005	1.000	1055	1.000	1105	1.000	1155	1.000	1205	1.000	1255	1.000
1006	1.000	1056	1.000	1106	1.000	1156	1.000	1206	1.000	1256	1.000
1007	1.000	1057	1.000	1107	1.000	1157	1.000	1207	1.000	1257	1.000
1008	1.000	1058	1.000	1108	1.000	1158	1.000	1208	1.000	1258	1.000
1009	1.000	1059	1.000	1109	1.000	1159	1.000	1209	1.000	1259	1.000
1010	1.000	1060	1.000	1110	1.000	1160	1.000	1210	1.000	1260	1.000
1011	1.000	1061	1.000	1111	1.000	1161	1.000	1211	1.000	1261	1.000
1012	1.000	1062	1.000	1112	1.000	1162	1.000	1212	1.000	1262	1.000
1013	1.000	1063	1.000	1113	1.000	1163	1.000	1213	1.000	1263	1.000
1014	1.000	1064	1.000	1114	1.000	1164	1.000	1214	1.000	1264	1.000
1015	1.000	1065	1.000	1115	1.000	1165	1.000	1215	1.000	1265	1.000
1016	1.000	1066	1.000	1116	1.000	1166	1.000	1216	1.000	1266	1.000
1017	1.000	1067	1.000	1117	1.000	1167	1.000	1217	1.000	1267	1.000
1018	1.000	1068	1.000	1118	1.000	1168	1.000	1218	1.000	1268	1.000
1019	1.000	1069	1.000	1119	1.000	1169	1.000	1219	1.000	1269	1.000
1020	1.000	1070	1.000	1120	1.000	1170	1.000	1220	1.000	1270	1.000
1021	1.000	1071	1.000	1121	1.000	1171	1.000	1221	1.000	1271	1.000
1022	1.000	1072	1.000	1122	1.000	1172	1.000	1222	1.000	1272	1.000
1023	1.000	1073	1.000	1123	1.000	1173	1.000	1223	1.000	1273	1.000
1024	1.000	1074	1.000	1124	1.000	1174	1.000	1224	1.000	1274	1.000
1025	1.000	1075	1.000	1125	1.000	1175	1.000	1225	1.000	1275	1.000
1026	1.000	1076	1.000	1126	1.000	1176	1.000	1226	1.000	1276	1.000
1027	1.000	1077	1.000	1127	1.000	1177	1.000	1227	1.000	1277	1.000
1028	1.000	1078	1.000	1128	1.000	1178	1.000	1228	1.000	1278	1.000
1029	1.000	1079	1.000	1129	1.000	1179	1.000	1229	1.000	1279	1.000
1030	1.000	1080	1.000	1130	1.000	1180	1.000	1230	1.000	1280	1.000
1031	1.000	1081	1.000	1131	1.000	1181	1.000	1231	1.000	1281	1.000
1032	1.000	1082	1.000	1132	1.000	1182	1.000	1232	1.000	1282	1.000
1033	1.000	1083	1.000	1133	1.000	1183	1.000	1233	1.000	1283	1.000
1034	1.000	1084	1.000	1134	1.000	1184	1.000	1234	1.000	1284	1.000

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Surcharged Outfall Details for Surface Network 1


Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
1285	1.000	1311	1.000	1337	1.000	1363	1.000	1389	1.000	1415	1.000
1286	1.000	1312	1.000	1338	1.000	1364	1.000	1390	1.000	1416	1.000
1287	1.000	1313	1.000	1339	1.000	1365	1.000	1391	1.000	1417	1.000
1288	1.000	1314	1.000	1340	1.000	1366	1.000	1392	1.000	1418	1.000
1289	1.000	1315	1.000	1341	1.000	1367	1.000	1393	1.000	1419	1.000
1290	1.000	1316	1.000	1342	1.000	1368	1.000	1394	1.000	1420	1.000
1291	1.000	1317	1.000	1343	1.000	1369	1.000	1395	1.000	1421	1.000
1292	1.000	1318	1.000	1344	1.000	1370	1.000	1396	1.000	1422	1.000
1293	1.000	1319	1.000	1345	1.000	1371	1.000	1397	1.000	1423	1.000
1294	1.000	1320	1.000	1346	1.000	1372	1.000	1398	1.000	1424	1.000
1295	1.000	1321	1.000	1347	1.000	1373	1.000	1399	1.000	1425	1.000
1296	1.000	1322	1.000	1348	1.000	1374	1.000	1400	1.000	1426	1.000
1297	1.000	1323	1.000	1349	1.000	1375	1.000	1401	1.000	1427	1.000
1298	1.000	1324	1.000	1350	1.000	1376	1.000	1402	1.000	1428	1.000
1299	1.000	1325	1.000	1351	1.000	1377	1.000	1403	1.000	1429	1.000
1300	1.000	1326	1.000	1352	1.000	1378	1.000	1404	1.000	1430	1.000
1301	1.000	1327	1.000	1353	1.000	1379	1.000	1405	1.000	1431	1.000
1302	1.000	1328	1.000	1354	1.000	1380	1.000	1406	1.000	1432	1.000
1303	1.000	1329	1.000	1355	1.000	1381	1.000	1407	1.000	1433	1.000
1304	1.000	1330	1.000	1356	1.000	1382	1.000	1408	1.000	1434	1.000
1305	1.000	1331	1.000	1357	1.000	1383	1.000	1409	1.000	1435	1.000
1306	1.000	1332	1.000	1358	1.000	1384	1.000	1410	1.000	1436	1.000
1307	1.000	1333	1.000	1359	1.000	1385	1.000	1411	1.000	1437	1.000
1308	1.000	1334	1.000	1360	1.000	1386	1.000	1412	1.000	1438	1.000
1309	1.000	1335	1.000	1361	1.000	1387	1.000	1413	1.000	1439	1.000
1310	1.000	1336	1.000	1362	1.000	1388	1.000	1414	1.000	1440	1.000

Simulation Criteria for Surface Network 1

Volumetric Runoff Coeff	1.000	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha Storage	2.000
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	2
Number of Online Controls	2	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0


Synthetic Rainfall Details

Rainfall Model	FEH
Return Period (years)	2
FEH Rainfall Version	2013
Site Location	GB 540853 255779 TL 40853 55779
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes

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Synthetic Rainfall Details

Cv (Summer) 1.000
Cv (Winter) 0.840
Storm Duration (mins) 30

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Online Controls for Surface Network 1

Hydro-Brake® Optimum Manhole: S7, DS/PN: 1.001, Volume (m³): 1.9

Unit Reference	MD-SHE-0074-2000-0500-2000
Design Head (m)	0.500
Design Flow (l/s)	2.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	74
Invert Level (m)	21.475
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200


Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.500	2.0
Flush-Flo™	0.149	2.0
Kick-Flo®	0.342	1.7
Mean Flow over Head Range	-	1.7

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.9	1.200	3.0	3.000	4.6	7.000	6.8
0.200	2.0	1.400	3.2	3.500	4.9	7.500	7.1
0.300	1.8	1.600	3.4	4.000	5.2	8.000	7.3
0.400	1.8	1.800	3.6	4.500	5.5	8.500	7.5
0.500	2.0	2.000	3.8	5.000	5.8	9.000	7.8
0.600	2.2	2.200	3.9	5.500	6.1	9.500	8.0
0.800	2.5	2.400	4.1	6.000	6.3		
1.000	2.7	2.600	4.3	6.500	6.6		

Hydro-Brake® Optimum Manhole: S5, DS/PN: 1.005, Volume (m³): 2.8

Unit Reference	MD-SHE-0075-2500-1000-2500
Design Head (m)	1.000
Design Flow (l/s)	2.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	75
Invert Level (m)	21.016
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200


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Hydro-Brake® Optimum Manhole: S5, DS/PN: 1.005, Volume (m³): 2.8

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	2.5
Flush-Flo™	0.307	2.5
Kick-Flo®	0.627	2.0
Mean Flow over Head Range	-	2.2

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.1	1.200	2.7	3.000	4.1	7.000	6.2
0.200	2.4	1.400	2.9	3.500	4.5	7.500	6.4
0.300	2.5	1.600	3.1	4.000	4.7	8.000	6.6
0.400	2.5	1.800	3.3	4.500	5.0	8.500	6.8
0.500	2.4	2.000	3.4	5.000	5.3	9.000	7.0
0.600	2.1	2.200	3.6	5.500	5.5	9.500	7.1
0.800	2.3	2.400	3.7	6.000	5.7		
1.000	2.5	2.600	3.9	6.500	6.0		

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Storage Structures for Surface Network 1

Complex Manhole: S7, DS/PN: 1.001

Cellular Storage

Invert Level (m) 21.475 Safety Factor 2.0
 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
 Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	100.0	100.0	1.300	0.0	118.0
0.100	100.0	104.0	1.400	0.0	118.0
0.200	100.0	108.0	1.500	0.0	118.0
0.300	100.0	112.0	1.600	0.0	118.0
0.400	100.0	116.0	1.700	0.0	118.0
0.500	0.0	118.0	1.800	0.0	118.0
0.600	0.0	118.0	1.900	0.0	118.0
0.700	0.0	118.0	2.000	0.0	118.0
0.800	0.0	118.0	2.100	0.0	118.0
0.900	0.0	118.0	2.200	0.0	118.0
1.000	0.0	118.0	2.300	0.0	118.0
1.100	0.0	118.0	2.400	0.0	118.0
1.200	0.0	118.0	2.500	0.0	118.0


Porous Car Park

Infiltration Coefficient Base (m/hr) 0.00000 Width (m) 10.0
 Membrane Percolation (mm/hr) 1000 Length (m) 50.0
 Max Percolation (l/s) 138.9 Slope (1:X) 0.0
 Safety Factor 2.0 Depression Storage (mm) 5
 Porosity 0.30 Evaporation (mm/day) 3
 Invert Level (m) 21.875 Membrane Depth (mm) 0

Cellular Storage Manhole: S5, DS/PN: 1.005


Invert Level (m) 21.016 Safety Factor 2.0
 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
 Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	225.0	225.0	0.800	225.0	273.0
0.100	225.0	231.0	0.900	0.0	276.0
0.200	225.0	237.0	1.000	0.0	276.0
0.300	225.0	243.0	1.100	0.0	276.0
0.400	225.0	249.0	1.200	0.0	276.0
0.500	225.0	255.0	1.300	0.0	276.0
0.600	225.0	261.0	1.400	0.0	276.0
0.700	225.0	267.0	1.500	0.0	276.0

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Cellular Storage Manhole: S5, DS/PN: 1.005

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
1.600	0.0	276.0	2.100	0.0	276.0
1.700	0.0	276.0	2.200	0.0	276.0
1.800	0.0	276.0	2.300	0.0	276.0
1.900	0.0	276.0	2.400	0.0	276.0
2.000	0.0	276.0	2.500	0.0	276.0

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Innovyze	Network 2020.1.3	

2 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Surface Network 1

PN	US/MH Name	Surcharged Flooded			Half Drain Pipe		Status	Level Exceeded
		Depth (m)	Volume (m ³)	Flow / Overflow Cap. (l/s)	Time (mins)	Flow (l/s)		
1.004	S4	-0.154	0.000	0.47		28.1	OK	
1.005	S5	-0.112	0.000	0.05	270	2.2	OK	

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Innovyze	Network 2020.1.3	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Surface Network 1

Simulation Criteria

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 2
Number of Online Controls 2 Number of Time/Area Diagrams 0
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details


Rainfall Model FEH
FEH Rainfall Version 2013
Site Location GB 540853 255779 TL 40853 55779
Data Type Point
Cv (Summer) 0.750
Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 150.0 DVD Status OFF
Analysis Timestep Fine 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) 2, 30, 100
Climate Change (%) 0, 30, 40


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	S1	15 Winter	30	+30%	30/15 Summer				21.904
1.001	S7	180 Winter	30	+30%	30/15 Winter				21.846
1.002	S2	15 Winter	30	+30%	30/15 Summer				21.701
1.003	S3	15 Winter	30	+30%	30/15 Summer				21.559
1.004	S4	600 Winter	30	+30%	30/15 Summer				21.533
1.005	S5	600 Winter	30	+30%	30/60 Winter				21.531

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m ³)	Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S1	0.096	0.000	1.39		49.7	SURCHARGED	
1.001	S7	0.146	0.000	0.06	183	2.0	SURCHARGED	
1.002	S2	0.095	0.000	0.90		59.6	SURCHARGED	
1.003	S3	0.119	0.000	1.30		78.0	SURCHARGED	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Surface Network 1

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m ³)	Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.004	S4	0.159	0.000	0.18		10.5	SURCHARGED	
1.005	S5	0.215	0.000	0.05	530	2.5	SURCHARGED	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

Simulation Criteria

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 2
Number of Online Controls 2 Number of Time/Area Diagrams 0
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details


Rainfall Model FEH
FEH Rainfall Version 2013
Site Location GB 540853 255779 TL 40853 55779
Data Type Point
Cv (Summer) 0.750
Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 150.0 DVD Status OFF
Analysis Timestep Fine 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) 2, 30, 100
Climate Change (%) 0, 30, 40

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	S1	15 Winter	100	+40%	30/15 Summer				22.105
1.001	S7	240 Winter	100	+40%	30/15 Winter				21.978
1.002	S2	15 Winter	100	+40%	30/15 Summer				22.133
1.003	S3	15 Winter	100	+40%	30/15 Summer				21.837
1.004	S4	600 Winter	100	+40%	30/15 Summer				21.815
1.005	S5	600 Winter	100	+40%	30/60 Winter				21.813

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m ³)	Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S1	0.297	0.000	1.94		69.6	SURCHARGED	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

PN	US/MH Name	Surcharged Flooded		Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m ³)					
1.001	S7	0.278	0.000	0.06	540	2.0	SURCHARGED	
1.002	S2	0.526	0.000	1.28		84.6	SURCHARGED	
1.003	S3	0.396	0.000	1.86		111.9	SURCHARGED	
1.004	S4	0.440	0.000	0.25		14.5	SURCHARGED	
1.005	S5	0.497	0.000	0.05	1320	2.5	SURCHARGED	