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Trinity Islands – Plot C1, Manchester

Non-Surcharged Surface Water Calculations

Curtins Ref: C1-Z1-CUR-G580-CA-GRD-92501

Revision: P02

Issue Date: 17 October 2025

Client Name: Renaker Build Ltd

Site Address: Site C (Buildings C1),Trinity Islands, Manchester

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	100	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	17.000	Minimum Backdrop Height (m)	0.500
Ratio-R	0.400	Preferred Cover Depth (m)	0.900
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	x

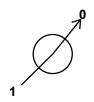
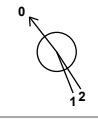
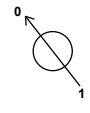
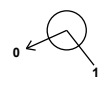
Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
S1	0.027	5.00	26.150	600	382832.588	397810.859	1.125
S2	0.026	5.00	26.100	600	382849.634	397827.724	1.220
S3	0.016	5.00	26.170	1200	382869.044	397851.684	1.552
S4	0.031	5.00	26.200	1200	382865.591	397857.206	1.609
S5	0.061	5.00	26.110	600	382850.466	397879.848	1.770
S6			26.100	1200	382849.722	397881.717	1.770
S7			26.110	1200	382845.482	397887.136	1.808
S8	0.054	5.00	26.050	1200	382839.584	397894.675	1.912
S9	0.054	5.00	25.480	1200	382821.104	397886.325	1.440
S10	0.013	5.00	25.450	1200	382813.807	397883.029	1.437
S11	0.073	5.00	25.190	1200	382784.615	397867.027	1.150
S12	0.037	5.00	25.450	1200	382793.183	397873.711	1.512
C1 OUTFALL			25.250		382788.423	397878.557	1.335

Links (Input)

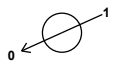
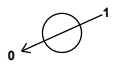
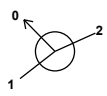
Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	S1	S2	23.979	0.600	25.025	24.880	0.145	165.0	225	5.39	50.0
1.001	S2	S3	30.836	0.600	24.880	24.693	0.187	165.0	225	5.90	50.0
1.002	S3	S4	6.513	0.600	24.618	24.591	0.027	245.0	300	6.01	50.0
1.003	S4	S6	29.200	0.600	24.591	24.330	0.261	111.9	300	6.34	50.0
2.000	S5	S6	2.012	0.600	24.340	24.330	0.010	201.2	225	5.04	50.0
1.004	S6	S7	6.881	0.600	24.330	24.302	0.028	245.0	300	6.45	50.0
1.005	S7	S8	9.572	0.600	24.302	24.255	0.047	203.7	300	6.60	50.0
1.006	S8	S9	20.279	0.600	24.138	24.040	0.098	206.9	375	6.87	50.0
1.007	S9	S10	8.007	0.600	24.040	24.013	0.027	300.0	375	6.99	50.0
1.008	S10	S12	22.631	0.600	24.013	23.938	0.075	300.0	375	7.36	50.0
3.000	S11	S12	10.867	0.600	24.040	23.938	0.102	106.5	375	5.10	50.0
1.009	S12	C1 OUTFALL	6.793	0.600	23.938	23.915	0.023	300.0	375	7.47	50.0

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S1	382832.588	397810.859	26.150	1.125	600				
						0	1.000	25.025	225
S2	382849.634	397827.724	26.100	1.220	600		1	1.000	24.880	225
							0	1.001	24.880	225
S3	382869.044	397851.684	26.170	1.552	1200		1	1.001	24.693	225
							0	1.002	24.618	300
S4	382865.591	397857.206	26.200	1.609	1200		1	1.002	24.591	300
							0	1.003	24.591	300
S5	382850.466	397879.848	26.110	1.770	600					
						0	2.000	24.340	225
S6	382849.722	397881.717	26.100	1.770	1200		1	2.000	24.330	225
							2	1.003	24.330	300
							0	1.004	24.330	300
S7	382845.482	397887.136	26.110	1.808	1200		1	1.004	24.302	300
							0	1.005	24.302	300
S8	382839.584	397894.675	26.050	1.912	1200		1	1.005	24.255	300
							0	1.006	24.138	375

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Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S9	382821.104	397886.325	25.480	1.440	1200	1	1.006	24.040	375
									
						0	1.007	24.040	375
S10	382813.807	397883.029	25.450	1.437	1200	1	1.007	24.013	375
									
						0	1.008	24.013	375
S11	382784.615	397867.027	25.190	1.150	1200				
						0	3.000	24.040	375
S12	382793.183	397873.711	25.450	1.512	1200	1	3.000	23.938	375
									
						2	1.008	23.938	375
						0	1.009	23.938	375
C1 OUTFALL	382788.423	397878.557	25.250	1.335		1	1.009	23.915	375
									

Simulation Settings

Rainfall Methodology	FSR	Summer CV	0.750	Additional Storage (m³/ha)	0.0
Rainfall Events	Singular	Winter CV	0.840	Starting Level (m)	
FSR Region	England and Wales	Analysis Speed	Detailed	Check Discharge Rate(s)	x
M5-60 (mm)	17.000	Skip Steady State	x	Check Discharge Volume	x
Ratio-R	0.400	Drain Down Time (mins)	240		

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)	Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0	100	40	0	0
30	0	0	0				

Node PP1 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.33	Width (m)	7.000	Depth (m)	0.190
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	0.000	Length (m)	21.000	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)		Slope (1:X)	400.0		

Node PP2 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.33	Width (m)	7.000	Depth (m)	0.190
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	0.000	Length (m)	35.000	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)		Slope (1:X)	400.0		

Node PP3 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.33	Width (m)	15.000	Depth (m)	0.190
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	0.000	Length (m)	37.000	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)		Slope (1:X)	400.0		

Node PP4 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.33	Width (m)	16.700	Depth (m)	0.190
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	0.000	Length (m)	21.000	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)		Slope (1:X)	400.0		

Node PP5 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Width (m)	5.500	Depth (m)	0.190
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	0.000	Length (m)	12.000	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)		Slope (1:X)	400.0		

Node PP6 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.33	Width (m)	7.600	Depth (m)	0.190
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	0.000	Length (m)	11.000	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)		Slope (1:X)	400.0		

Node PP7 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.33	Width (m)	9.600	Depth (m)	0.190
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	0.000	Length (m)	15.000	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)		Slope (1:X)	400.0		

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Node PP8 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.33	Width (m)	4.500	Depth (m)	0.190
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	0.000	Length (m)	13.000	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)		Slope (1:X)	400.0		

Node PP9 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.33	Width (m)	7.300	Depth (m)	0.190
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	0.000	Length (m)	19.000	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)		Slope (1:X)	400.0		

Node PP10 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.33	Width (m)	8.000	Depth (m)	0.190
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	0.000	Length (m)	12.400	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)		Slope (1:X)	400.0		

Node PP11 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.33	Width (m)	11.600	Depth (m)	0.190
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	0.000	Length (m)	3.800	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)		Slope (1:X)	400.0		

Node PP12 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.33	Width (m)	5.800	Depth (m)	0.190
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	0.000	Length (m)	8.700	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)		Slope (1:X)	400.0		

Node PP13 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.33	Width (m)	10.000	Depth (m)	0.190
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	0.000	Length (m)	10.000	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)		Slope (1:X)	400.0		

Node PP14 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.33	Width (m)	12.200	Depth (m)	0.190
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	0.000	Length (m)	9.800	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)		Slope (1:X)	400.0		

Node PP15 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.33	Width (m)	11.200	Depth (m)	0.190
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	0.000	Length (m)	10.700	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)		Slope (1:X)	400.0		

Node PP16 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.33	Width (m)	10.000	Depth (m)	0.190
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	0.000	Length (m)	17.000	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)		Slope (1:X)	400.0		

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Results for 1 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S1	10	25.067	0.042	3.2	0.0119	0.0000	OK
15 minute winter	S2	11	24.940	0.059	6.2	0.0168	0.0000	OK
15 minute winter	S3	11	24.689	0.071	7.8	0.0807	0.0000	OK
15 minute winter	S4	11	24.657	0.066	11.3	0.0746	0.0000	OK
15 minute winter	S5	11	24.447	0.107	7.3	0.0304	0.0000	OK
15 minute winter	S6	11	24.444	0.114	18.1	0.1288	0.0000	OK
15 minute winter	S7	11	24.407	0.105	18.1	0.1189	0.0000	OK
15 minute winter	S8	11	24.246	0.108	24.1	0.1221	0.0000	OK
15 minute winter	S9	11	24.188	0.148	30.1	0.1671	0.0000	OK
15 minute winter	S10	11	24.155	0.142	31.3	0.1606	0.0000	OK
15 minute winter	S11	11	24.104	0.064	8.7	0.0719	0.0000	OK
15 minute winter	S12	11	24.107	0.169	43.2	0.1916	0.0000	OK
15 minute winter	C1 OUTFALL	12	24.063	0.148	42.1	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S1	1.000	S2	3.1	0.476	0.077	0.1610	
15 minute winter	S2	1.001	S3	6.0	0.729	0.149	0.2546	
15 minute winter	S3	1.002	S4	7.8	0.646	0.111	0.0790	
15 minute winter	S4	1.003	S6	11.3	0.639	0.108	0.5250	
15 minute winter	S5	2.000	S6	7.1	0.484	0.196	0.0391	
15 minute winter	S6	1.004	S7	18.1	0.778	0.256	0.1600	
15 minute winter	S7	1.005	S8	18.0	0.862	0.232	0.1998	
15 minute winter	S8	1.006	S9	24.0	0.726	0.173	0.6744	
15 minute winter	S9	1.007	S10	29.8	0.758	0.259	0.3144	
15 minute winter	S10	1.008	S12	30.8	0.718	0.268	0.9791	
15 minute winter	S11	3.000	S12	8.6	0.410	0.044	0.3295	
15 minute winter	S12	1.009	C1 OUTFALL	42.1	0.952	0.366	0.3011	21.5

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Results for 30 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S1	10	25.091	0.066	7.9	0.0188	0.0000	OK
15 minute winter	S2	11	24.977	0.097	15.4	0.0275	0.0000	OK
15 minute winter	S3	11	24.734	0.116	19.4	0.1315	0.0000	OK
15 minute winter	S4	11	24.696	0.105	28.0	0.1186	0.0000	OK
15 minute winter	S5	11	24.537	0.197	17.8	0.0557	0.0000	OK
15 minute winter	S6	11	24.530	0.200	44.9	0.2264	0.0000	OK
15 minute winter	S7	11	24.483	0.181	45.0	0.2049	0.0000	OK
15 minute winter	S8	11	24.345	0.207	59.8	0.2337	0.0000	OK
15 minute winter	S9	11	24.316	0.276	74.3	0.3116	0.0000	OK
15 minute winter	S10	11	24.281	0.268	77.4	0.3035	0.0000	OK
15 minute winter	S11	11	24.229	0.189	21.3	0.2132	0.0000	OK
15 minute winter	S12	11	24.229	0.291	106.3	0.3287	0.0000	OK
15 minute winter	C1 OUTFALL	11	24.155	0.240	105.9	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S1	1.000	S2	7.8	0.601	0.192	0.3112	
15 minute winter	S2	1.001	S3	15.0	0.933	0.371	0.4950	
15 minute winter	S3	1.002	S4	19.5	0.826	0.275	0.1534	
15 minute winter	S4	1.003	S6	28.1	0.784	0.268	1.0490	
15 minute winter	S5	2.000	S6	17.5	0.678	0.480	0.0746	
15 minute winter	S6	1.004	S7	45.0	0.953	0.637	0.3248	
15 minute winter	S7	1.005	S8	45.0	1.082	0.580	0.3980	
15 minute winter	S8	1.006	S9	59.5	0.803	0.429	1.5108	
15 minute winter	S9	1.007	S10	73.8	0.863	0.642	0.6853	
15 minute winter	S10	1.008	S12	76.7	0.877	0.668	1.9921	
15 minute winter	S11	3.000	S12	20.1	0.514	0.103	0.7995	
15 minute winter	S12	1.009	C1 OUTFALL	105.9	1.271	0.921	0.5638	52.6

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Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.94%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S1	10	25.116	0.091	14.2	0.0257	0.0000	OK
15 minute winter	S2	11	25.020	0.140	27.7	0.0395	0.0000	OK
15 minute winter	S3	12	24.849	0.231	35.0	0.2613	0.0000	OK
15 minute winter	S4	12	24.836	0.245	50.0	0.2766	0.0000	OK
15 minute winter	S5	11	24.809	0.469	32.1	0.1326	0.0000	SURCHARGED
15 minute winter	S6	11	24.788	0.458	75.4	0.5174	0.0000	SURCHARGED
15 minute winter	S7	11	24.728	0.426	76.9	0.4822	0.0000	SURCHARGED
15 minute winter	S8	11	24.658	0.519	99.6	0.5876	0.0000	SURCHARGED
15 minute winter	S9	11	24.585	0.545	125.3	0.6162	0.0000	SURCHARGED
15 minute winter	S10	11	24.520	0.507	131.4	0.5729	0.0000	SURCHARGED
15 minute winter	S11	11	24.388	0.348	38.4	0.3931	0.0000	OK
15 minute winter	S12	11	24.382	0.444	185.6	0.5024	0.0000	SURCHARGED
15 minute winter	C1 OUTFALL	11	24.230	0.315	185.6	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S1	1.000	S2	14.0	0.691	0.348	0.4885	
15 minute winter	S2	1.001	S3	27.1	1.062	0.671	0.8298	
15 minute winter	S3	1.002	S4	33.8	0.912	0.479	0.3899	
15 minute winter	S4	1.003	S6	50.6	0.858	0.482	1.9260	
15 minute winter	S5	2.000	S6	30.5	0.768	0.837	0.0800	
15 minute winter	S6	1.004	S7	76.9	1.093	1.089	0.4846	
15 minute winter	S7	1.005	S8	79.1	1.175	1.019	0.6741	
15 minute winter	S8	1.006	S9	100.5	0.912	0.725	2.2367	
15 minute winter	S9	1.007	S10	125.0	1.134	1.088	0.8831	
15 minute winter	S10	1.008	S12	131.2	1.190	1.142	2.4961	
15 minute winter	S11	3.000	S12	36.7	0.582	0.189	1.1787	
15 minute winter	S12	1.009	C1 OUTFALL	185.6	1.697	1.615	0.7102	94.9

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