

Bullsbrook Rd Substation:		Date: 24/02/2025			
		Designed by: CDH	Checked by: JET		Approved By: JET
Report Details: Type: Junctions Storm Phase: Restricted CV1.0 with porous car park (1)		Arup: Central Square, Forth Street Newcastle NE1 3PL			

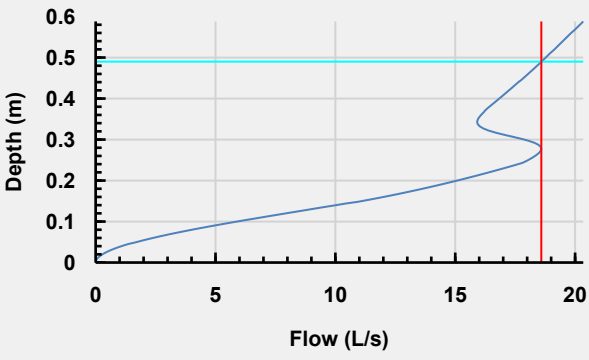
Name	Junction Type	Easting (m)	Northing (m)	Cover Level (m)	Depth (m)	Invert Level (m)	Chamber Shape	Diameter (m)
RP	Manhole	511513.368	180377.325	28.900	1.225	27.675	Circular	0.150
SW1	Manhole	511504.695	180344.029	28.900	1.455	27.445	Circular	1.350
SW5	Manhole	511520.553	180342.538	28.900	1.565	27.335	Circular	1.350
Separator Inlet	Manhole	511526.466	180365.240	28.900	1.725	27.175	Circular	0.300
Separator Outlet	Manhole	511527.580	180369.517	28.900	1.785	27.115	Circular	0.300
SW7	Manhole	511530.210	180379.612	28.700	1.650	27.050	Circular	1.200
SW2	Manhole	511539.779	180349.996	28.900	1.335	27.565	Circular	0.450
SW3	Manhole	511535.887	180335.055	28.900	1.440	27.460	Circular	0.450
SW4	Manhole	511521.997	180338.673	28.900	1.535	27.365	Circular	0.450
SW6	Manhole	511528.215	180371.953	28.900	1.800	27.100	Circular	1.500

Name	Lock
RP	None
SW1	None
SW5	None
Separator Inlet	None
Separator Outlet	None
SW7	None
SW2	None
SW3	None
SW4	None
SW6	None

Inlets

Junction	Inlet Name	Incoming Item(s)	Bypass Destination	Capacity Type
SW1	Inlet	1.000 Pipe (3)	(None)	No Restriction
SW5	Inlet	1.001	(None)	No Restriction
	Inlet (1)	2.003	(None)	No Restriction
	Inlet (2)	Catchment Area (3) Catchment Area (4)	(None)	No Restriction
Separator Inlet	Inlet (1)	1.002	(None)	No Restriction
Separator Outlet	Inlet (1)	Pipe	(None)	No Restriction
SW7	Inlet (1)	Pipe (2)	(None)	No Restriction
SW2	Inlet	Catchment Area Catchment Area (5)	(None)	No Restriction
SW3	Inlet	2.000	(None)	No Restriction
	Inlet (1)	Catchment Area (1)	(None)	No Restriction
SW4	Inlet	2.001	(None)	No Restriction
SW6	Inlet	Pipe (1)	(None)	No Restriction

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Outlets			
Junction	Outlet Name	Outgoing Connection	Outlet Type
RP	Outlet	1.000	Free Discharge
SW1	Outlet	1.001	Free Discharge
SW5	Outlet	1.002	Free Discharge
Separator Inlet	Outlet	Pipe	Free Discharge
Separator Outlet	Outlet	Pipe (1)	Free Discharge
SW2	Outlet	2.000	Free Discharge
SW3	Outlet	2.001	Free Discharge
SW4	Outlet	2.003	Free Discharge
SW6	Outlet	Pipe (2)	Hydro-Brake®
	Invert Level (m)	27.100	
	Design Depth (m)	0.490	
	Design Flow (L/s)	18.6	
	Objective	Minimise Upstream Storage Requirements	
	Application	Surface Water Only	
	Sump Available	☐	
	Unit Reference	CHE-0183-1860-0490-1860	
			

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Report Details:		Arup:		
Type: Stormwater Controls		Central Square, Forth Street		
Storm Phase: Restricted CV1.0 with porous car park (1)		Newcastle NE1 3PL		



Porous Paving

Type : Porous Paving

Dimensions

Exceedance Level (m)	28.900
Depth (m)	0.405
Base Level (m)	28.495
Paving Layer Depth (mm)	75
Membrane Percolation (m/hr)	100000.0
Porosity (%)	30
Length (m)	32.440
Long. Slope (1:X)	10000.00
Width (m)	4.482
Total Volume (m³)	14.796

Under Drain

Height Above Base (m)	0.000
Diameter (mm)	150
No. of Barrels	1
Release Height (m)	0.075
Friction Scheme	Manning's n
n	0.015

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (2)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	Pipe (3)
Outlet Type	Free Discharge

Advanced

Conductivity (m/hr)	250.0
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Bullsbrook Rd Substation:	Date: 24/02/2025			
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Report Details: Type: Manhole Schedule Storm Phase: Restricted CV1.0 with porous car park (1)	Arup: Central Square, Forth Street Newcastle NE1 3PL			

Name	Cover Level (m) Invert Level (m)	Manhole Size (m)	Connection Details				Type
Coordinates (m)	Depth (m)		Incoming Connections	Connection Type	Connection Invert (m)	Connection Size (mm)	Junction Type
			Outgoing Connections				Cover
RP	28.900 27.675	Diameter / Length: 0.150					Manhole
E:511513.368 N:180377.325	1.225						
			{a} 1.000	Pipe	27.675	Diam/Width:300	Not Applicable
SW1	28.900 27.445	Diameter / Length: 1.350	{1} 1.000	Pipe	27.445	Diam/Width:300 Diam/Width:300	Manhole
E:511504.695 N:180344.029	1.455		{2} Pipe (3)	Pipe	27.445		
			{a} 1.001	Pipe	27.445	Diam/Width:300	Not Applicable
SW5	28.900 27.335	Diameter / Length: 1.350	{1} 1.001	Pipe	27.335	Diam/Width:300 Diam/Width:300	Manhole
E:511520.553 N:180342.538	1.565		{2} 2.003	Pipe	27.335		
			{a} 1.002	Pipe	27.335	Diam/Width:300	Not Applicable
Separator Inlet	28.900 27.175	Diameter / Length: 0.300	{1} 1.002	Pipe	27.175	Diam/Width:300	Manhole
E:511526.466 N:180365.240	1.725		{a} Pipe	Pipe	27.175	Diam/Width:300	Not Applicable
Separator Outlet	28.900 27.115	Diameter / Length: 0.300	{1} Pipe	Pipe	27.115	Diam/Width:300	Manhole
E:511527.580 N:180369.517	1.785		{a} Pipe (1)	Pipe	27.115	Diam/Width:300	Not Applicable

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Name	Cover Level (m) Invert Level (m)	Manhole Size (m)	Connection Details				Type
Coordinates (m)	Depth (m)		Incoming Connections	Connection Type	Connection Invert (m)	Connection Size (mm)	Junction Type
			Outgoing Connections				Cover
SW7	28.700 27.050	Diameter / Length: 1.200	{1} Pipe (2)	Pipe	27.050	Diam/Width:300	Manhole
E:511530.210 N:180379.612	1.650						Not Applicable
SW2	28.900 27.565	Diameter / Length: 0.450					Manhole
E:511539.779 N:180349.996	1.335						
			{a} 2.000	Pipe	27.565	Diam/Width:300	Not Applicable
SW3	28.900 27.460	Diameter / Length: 0.450	{1} 2.000	Pipe	27.460	Diam/Width:300	Manhole
E:511535.887 N:180335.055	1.440						
			{a} 2.001	Pipe	27.460	Diam/Width:300	Not Applicable
SW4	28.900 27.365	Diameter / Length: 0.450	{1} 2.001	Pipe	27.365	Diam/Width:300	Manhole
E:511521.997 N:180338.673	1.535						
			{a} 2.003	Pipe	27.365	Diam/Width:300	Not Applicable
SW6	28.900 27.100	Diameter / Length: 1.500	{1} Pipe (1)	Pipe	27.100	Diam/Width:300	Manhole
E:511528.215 N:180371.953	1.800						
			{a} Pipe (2)	Pipe	27.100	Diam/Width:300	Not Applicable

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FEH 2022: 2 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Outflow

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
RP	FEH 2022: 2 years: +0 %: 15 mins: Summer	28.900	27.675	27.675	0.000	0.0	0.000	0.000	0.0	0.000	OK
SW1	FEH 2022: 2 years: +0 %: 15 mins: Summer	28.900	27.445	27.471	0.026	0.8	0.037	0.000	1.6	0.386	OK
SW5	FEH 2022: 2 years: +0 %: 15 mins: Summer	28.900	27.335	27.465	0.130	27.5	0.186	0.000	21.8	13.265	OK
Separator Inlet	FEH 2022: 2 years: +0 %: 15 mins: Summer	28.900	27.175	27.450	0.275	21.8	0.020	0.000	19.9	12.864	OK
Separator Outlet	FEH 2022: 2 years: +0 %: 15 mins: Summer	28.900	27.115	27.447	0.332	19.9	0.024	0.000	18.9	12.848	Surcharged
SW7	FEH 2022: 2 years: +0 %: 15 mins: Summer	28.700	27.050	27.141	0.091	18.0	0.000	0.000	18.0	12.785	OK
SW2	FEH 2022: 2 years: +0 %: 15 mins: Summer	28.900	27.565	27.622	0.057	6.9	0.009	0.000	6.7	2.975	OK
SW3	FEH 2022: 2 years: +0 %: 15 mins: Summer	28.900	27.460	27.525	0.065	9.7	0.010	0.000	9.6	4.290	OK
SW4	FEH 2022: 2 years: +0 %: 15 mins: Summer	28.900	27.365	27.469	0.104	9.6	0.017	0.000	7.7	4.282	OK
SW6	FEH 2022: 2 years: +0 %: 15 mins: Summer	28.900	27.100	27.446	0.346	18.9	0.611	0.000	17.9	12.797	Surcharged

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FEH 2022: 30 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Outflow

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
RP	FEH 2022: 30 years: +0 %: 30 mins: Summer	28.900	27.675	28.255	0.580	1.8	0.010	0.000	4.5	1.376	Surcharged
SW1	FEH 2022: 30 years: +0 %: 30 mins: Summer	28.900	27.445	28.255	0.810	14.6	1.159	0.000	11.1	9.377	Surcharged
SW5	FEH 2022: 30 years: +0 %: 15 mins: Summer	28.900	27.335	28.234	0.899	54.5	1.286	0.000	29.1	36.248	Surcharged
Separator Inlet	FEH 2022: 30 years: +0 %: 30 mins: Summer	28.900	27.175	28.246	1.071	28.6	0.076	0.000	26.2	43.254	Surcharged
Separator Outlet	FEH 2022: 30 years: +0 %: 30 mins: Summer	28.900	27.115	28.243	1.128	26.2	0.080	0.000	23.9	43.229	Surcharged
SW7	FEH 2022: 30 years: +0 %: 120 mins: Summer	28.700	27.050	27.147	0.097	20.3	0.000	0.000	20.3	69.032	OK
SW2	FEH 2022: 30 years: +0 %: 30 mins: Summer	28.900	27.565	28.253	0.688	10.8	0.109	0.000	10.6	9.389	Surcharged
SW3	FEH 2022: 30 years: +0 %: 30 mins: Summer	28.900	27.460	28.253	0.793	15.4	0.126	0.000	11.3	13.513	Surcharged
SW4	FEH 2022: 30 years: +0 %: 60 mins: Summer	28.900	27.365	28.089	0.724	10.8	0.115	0.000	9.5	16.657	Surcharged
SW6	FEH 2022: 30 years: +0 %: 15 mins: Summer	28.900	27.100	28.221	1.121	23.3	1.981	0.000	20.3	28.526	Surcharged

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FEH 2022: 100 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Outflow

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
RP	FEH 2022: 100 years: +0 %: 15 mins: Winter	28.900	27.675	28.631	0.956	16.4	0.017	0.000	3.8	1.515	Flood Risk
SW1	FEH 2022: 100 years: +0 %: 15 mins: Summer	28.900	27.445	28.632	1.187	33.7	1.698	0.000	13.1	12.359	Flood Risk
SW5	FEH 2022: 100 years: +0 %: 15 mins: Summer	28.900	27.335	28.627	1.292	76.7	1.849	0.000	35.2	43.537	Flood Risk
Separator Inlet	FEH 2022: 100 years: +0 %: 15 mins: Summer	28.900	27.175	28.620	1.445	35.2	0.103	0.000	30.7	32.449	Flood Risk
Separator Outlet	FEH 2022: 100 years: +0 %: 30 mins: Summer	28.900	27.115	28.627	1.512	30.6	0.107	0.000	26.6	54.517	Flood Risk
SW7	FEH 2022: 100 years: +0 %: 15 mins: Summer	28.700	27.050	27.147	0.097	20.3	0.000	0.000	20.3	30.357	OK
SW2	FEH 2022: 100 years: +0 %: 15 mins: Summer	28.900	27.565	28.624	1.059	21.7	0.168	0.000	16.7	9.030	Flood Risk
SW3	FEH 2022: 100 years: +0 %: 15 mins: Summer	28.900	27.460	28.625	1.165	26.3	0.185	0.000	20.2	12.112	Flood Risk
SW4	FEH 2022: 100 years: +0 %: 15 mins: Summer	28.900	27.365	28.627	1.262	20.2	0.201	0.000	14.2	11.284	Flood Risk
SW6	FEH 2022: 100 years: +0 %: 15 mins: Summer	28.900	27.100	28.615	1.515	26.6	2.677	0.000	20.3	30.481	Flood Risk

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FEH 2022: 2 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Outflow

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
RP	FEH 2022: 2 years: +40 %: 15 mins: Summer	28.900	27.675	27.675	0.000	0.0	0.000	0.000	0.0	0.000	OK
SW1	FEH 2022: 2 years: +40 %: 15 mins: Summer	28.900	27.445	27.622	0.177	9.2	0.254	0.000	5.2	1.983	OK
SW5	FEH 2022: 2 years: +40 %: 15 mins: Winter	28.900	27.335	27.608	0.273	34.2	0.391	0.000	22.0	19.815	OK
Separator Inlet	FEH 2022: 2 years: +40 %: 15 mins: Winter	28.900	27.175	27.603	0.428	22.0	0.030	0.000	20.4	18.262	Surcharged
Separator Outlet	FEH 2022: 2 years: +40 %: 15 mins: Winter	28.900	27.115	27.600	0.485	20.4	0.034	0.000	19.0	18.214	Surcharged
SW7	FEH 2022: 2 years: +40 %: 15 mins: Summer	28.700	27.050	27.143	0.093	18.6	0.000	0.000	18.6	18.092	OK
SW2	FEH 2022: 2 years: +40 %: 15 mins: Summer	28.900	27.565	27.633	0.068	9.6	0.011	0.000	9.6	4.184	OK
SW3	FEH 2022: 2 years: +40 %: 15 mins: Winter	28.900	27.460	27.609	0.149	12.8	0.024	0.000	10.3	6.015	OK
SW4	FEH 2022: 2 years: +40 %: 15 mins: Winter	28.900	27.365	27.609	0.244	10.3	0.039	0.000	8.3	5.998	OK
SW6	FEH 2022: 2 years: +40 %: 15 mins: Summer	28.900	27.100	27.611	0.511	18.3	0.904	0.000	18.6	18.116	Surcharged

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Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
RP	FEH 2022: 30 years: +40 %: 30 mins: Winter	28.900	27.675	28.674	0.999	3.3	0.018	0.000	4.3	1.892	Flood Risk
SW1	FEH 2022: 30 years: +40 %: 30 mins: Winter	28.900	27.445	28.674	1.229	26.0	1.759	0.000	14.3	21.676	Flood Risk
SW5	FEH 2022: 30 years: +40 %: 15 mins: Summer	28.900	27.335	28.676	1.341	69.0	1.919	0.000	45.3	46.650	Flood Risk
Separator Inlet	FEH 2022: 30 years: +40 %: 15 mins: Summer	28.900	27.175	28.670	1.495	45.3	0.106	0.000	37.7	32.911	Flood Risk
Separator Outlet	FEH 2022: 30 years: +40 %: 15 mins: Summer	28.900	27.115	28.667	1.552	37.7	0.110	0.000	30.6	32.088	Flood Risk
SW7	FEH 2022: 30 years: +40 %: 15 mins: Summer	28.700	27.050	27.147	0.097	20.3	0.000	0.000	20.3	30.597	OK
SW2	FEH 2022: 30 years: +40 %: 30 mins: Summer	28.900	27.565	28.672	1.107	15.1	0.176	0.000	13.4	13.126	Flood Risk
SW3	FEH 2022: 30 years: +40 %: 30 mins: Summer	28.900	27.460	28.672	1.212	20.1	0.193	0.000	18.1	18.901	Flood Risk
SW4	FEH 2022: 30 years: +40 %: 30 mins: Summer	28.900	27.365	28.672	1.307	18.1	0.208	0.000	15.8	18.884	Flood Risk
SW6	FEH 2022: 30 years: +40 %: 15 mins: Summer	28.900	27.100	28.665	1.565	30.6	2.765	0.000	20.3	30.724	Flood Risk

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RP	FEH 2022: 100 years: +40 %: 30 mins: Summer	28.900	27.675	28.856	1.181	12.7	0.021	0.000	4.8	2.408	Flood Risk
SW1	FEH 2022: 100 years: +40 %: 30 mins: Summer	28.900	27.445	28.862	1.417	48.2	2.028	0.000	16.8	44.763	Flood Risk
SW5	FEH 2022: 100 years: +40 %: 15 mins: Summer	28.900	27.335	28.861	1.526	97.4	2.184	0.000	56.4	59.944	Flood Risk
Separator Inlet	FEH 2022: 100 years: +40 %: 15 mins: Summer	28.900	27.175	28.841	1.666	56.4	0.118	0.000	46.1	35.012	Flood Risk
Separator Outlet	FEH 2022: 100 years: +40 %: 15 mins: Summer	28.900	27.115	28.837	1.722	46.1	0.122	0.000	35.9	33.627	Flood Risk
SW7	FEH 2022: 100 years: +40 %: 30 mins: Summer	28.700	27.050	27.147	0.097	20.3	0.000	0.000	20.3	64.190	OK
SW2	FEH 2022: 100 years: +40 %: 15 mins: Winter	28.900	27.565	28.901	1.336	28.5	0.689	0.476	28.7	12.148	Flood
SW3	FEH 2022: 100 years: +40 %: 15 mins: Winter	28.900	27.460	28.887	1.427	32.1	0.227	0.000	31.6	16.263	Flood Risk
SW4	FEH 2022: 100 years: +40 %: 15 mins: Summer	28.900	27.365	28.868	1.503	27.6	0.239	0.000	30.5	14.836	Flood Risk
SW6	FEH 2022: 100 years: +40 %: 15 mins: Summer	28.900	27.100	28.833	1.733	35.9	3.063	0.000	20.3	31.410	Flood Risk