BMC

BELL MUNRO CONSULTING LTD.

Portway, Wythenshawe
Drainage Strategy

	Initials	Signature	Date
Prepared by:	SMB		Sept 19
Checked by:	AM		Sept 19
Approved by:	AM		Sept 19

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27/09/2019 by SMB

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BMC Drainage Design Statement

Portway, Wythenshawe (J6497)

The site known as Portway Hotel, Ruddpark Road, Wythenshawe, Manchester contains a hotel and bar building and adjacent detached garage with rear concrete car park and tarmac surfaced car park to the front. The site is proposed for redevelopment with the demolition of the existing structures and erection of 7 no. 2 storey residential dwellings and one 3 storey building to form 3 no. self-contained apartments. Planning condition number 9 associated with the development states;

> *"no development shall take place until surface water drainage works have been implemented in accordance with Non-Statutory Technical Standards for Sustainable Drainage Systems (March 2015) or any subsequent replacements national standards and details that have been submitted to and approved in writing by the Local Planning Authority."*

Additionally, in line with the Manchester Trafford and Salford Strategic Flood Risk Assessment, owing to the fact that the site is located within the Conurbation Core Critical Drainage Area, the proposed development runoff rate is required to be at most 50% of the pre-development, brownfield run-off rate.

The site ground conditions consisted of stiff impermeable clay overlain by approximately 0.2-1.0m of made ground. Soakaway tests carried out in accordance with BRE365, results of which can be viewed overleaf, indicate that the ground was not suitable for infiltration, therefore the strategy adopted was to discharge to the surface water sewer in Ruddpark Road at a maximum rate of 5L/s, as agreed with United Utilities in correspondence dated 7th August (see overleaf).

The impermeable area of the pre-development, brownfield site comprises 0.206 hectares with the post-development impermeable area being approximately 0.119 hectares. The proposed post-development impermeable area is greater than 50% of the pre-development impermeable area; therefore it is evident that the implementation of attenuation infrastructure is required to meet the criteria. Microdrainage was used to calculate the peak pre-development run-off rate at a 1 in 1 year storm event, a 1 in 30 year storm event and a 1 in 100 year storm event. These values were calculated to be 1.0L/s, 1.9L/s and 2.4L/s respectively, calculation of which can be viewed overleaf.

From the above, in order to satisfy the 50% betterment criteria, design flow rates were limited to 0.5L/s for the 1 in 1 year event, 0.95L/s for the 1 in 30 year event and 1.2L/s for the 1 in 100 year event with 40% allowance for climate changed adopted. SuDs requirements state that there should be no surcharge at a 1 in 1 year event, no flooding at a 1 in 30 year events and any minor flooding at a 1 in 100 year plus 40% climate change must be contained on site.

The method of attenuation chosen was 16x6x.8m storage crates located in the car park, upstream of a pre-cast manhole containing a 22mm diameter orifice plate flow limiter. This resulted in the following peak run-off flows for the aforementioned storm events: 1 in 1 year event resulted in a flow of 0.4L/s, 1 in 30 year event resulted in 0.6L/s and the 1 in 100 year event plus 40% climate change was 0.9L/s. Evidently, all three events resulted in design run-off flows with greater betterment than 50%. The reason for the above was that at the critical 1 in 100 year plus 40% storm event, the maximum flooded volume returned was 73.5m^3, resulting in the attenuation storage size required (76.8m^3). In all three storm events, no flooding was experienced across the site. All Microdrainage calculations can be viewed overleaf.

27/09/2019 by SMB

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We trust the above is satisfactory, however if you have any queries, please do not hesitate to contact.

Kind regards,

Steve McBride

For and on behalf of Bell Munro Consulting Limited

ICP SUDS Mean Annual Flood

Input

Return Period (years) 1 SAAR (mm) 856 Urban 0.000
Area (ha) 0.206 Soil 0.450 Region Number Region 10

Results l/s

QBAR Rural 1.1
QBAR Urban 1.1

Q1 year 1.0

Q1 year 1.0
Q30 years 1.9
Q100 years 2.4

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Summary of Results for 1 year Return Period

Half Drain Time : 336 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	64.594	0.064	0.0	0.3	0.3	5.8	O K
30 min Summer	64.613	0.083	0.0	0.3	0.3	7.5	O K
60 min Summer	64.633	0.103	0.0	0.4	0.4	9.4	O K
120 min Summer	64.653	0.123	0.0	0.4	0.4	11.2	O K
180 min Summer	64.662	0.132	0.0	0.4	0.4	12.1	O K
240 min Summer	64.667	0.137	0.0	0.4	0.4	12.5	O K
360 min Summer	64.674	0.144	0.0	0.4	0.4	13.2	O K
480 min Summer	64.677	0.147	0.0	0.4	0.4	13.4	O K
600 min Summer	64.678	0.148	0.0	0.4	0.4	13.5	O K
720 min Summer	64.679	0.149	0.0	0.4	0.4	13.6	O K
960 min Summer	64.677	0.147	0.0	0.4	0.4	13.4	O K
1440 min Summer	64.671	0.141	0.0	0.4	0.4	12.9	O K
2160 min Summer	64.659	0.129	0.0	0.4	0.4	11.8	O K
2880 min Summer	64.648	0.118	0.0	0.4	0.4	10.7	O K
4320 min Summer	64.628	0.098	0.0	0.3	0.3	8.9	O K
5760 min Summer	64.613	0.083	0.0	0.3	0.3	7.6	O K
7200 min Summer	64.601	0.071	0.0	0.3	0.3	6.5	O K
8640 min Summer	64.592	0.062	0.0	0.3	0.3	5.7	O K
10080 min Summer	64.585	0.055	0.0	0.3	0.3	5.0	O K
15 min Winter	64.602	0.072	0.0	0.3	0.3	6.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	26.851	0.0	5.7	18
30 min Summer	17.712	0.0	7.5	33
60 min Summer	11.376	0.0	10.0	62
120 min Summer	7.186	0.0	12.7	122
180 min Summer	5.470	0.0	14.5	180
240 min Summer	4.503	0.0	15.9	222
360 min Summer	3.421	0.0	18.1	284
480 min Summer	2.795	0.0	19.7	348
600 min Summer	2.390	0.0	21.1	416
720 min Summer	2.103	0.0	22.3	486
960 min Summer	1.719	0.0	24.3	624
1440 min Summer	1.295	0.0	27.4	896
2160 min Summer	0.976	0.0	31.3	1296
2880 min Summer	0.798	0.0	34.1	1676
4320 min Summer	0.601	0.0	38.4	2424
5760 min Summer	0.491	0.0	42.1	3168
7200 min Summer	0.421	0.0	45.0	3888
8640 min Summer	0.371	0.0	47.5	4584
10080 min Summer	0.333	0.0	49.7	5248
15 min Winter	26.851	0.0	6.4	18

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Summary of Results for 1 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	64.623	0.093	0.0	0.3	0.3	8.5	O K
60 min Winter	64.646	0.116	0.0	0.4	0.4	10.6	O K
120 min Winter	64.669	0.139	0.0	0.4	0.4	12.6	O K
180 min Winter	64.680	0.150	0.0	0.4	0.4	13.7	O K
240 min Winter	64.687	0.157	0.0	0.4	0.4	14.3	O K
360 min Winter	64.693	0.163	0.0	0.4	0.4	14.9	O K
480 min Winter	64.696	0.166	0.0	0.4	0.4	15.1	O K
600 min Winter	64.696	0.166	0.0	0.4	0.4	15.2	O K
720 min Winter	64.695	0.165	0.0	0.4	0.4	15.1	O K
960 min Winter	64.692	0.162	0.0	0.4	0.4	14.7	O K
1440 min Winter	64.680	0.150	0.0	0.4	0.4	13.6	O K
2160 min Winter	64.660	0.130	0.0	0.4	0.4	11.9	O K
2880 min Winter	64.643	0.113	0.0	0.4	0.4	10.3	O K
4320 min Winter	64.616	0.086	0.0	0.3	0.3	7.8	O K
5760 min Winter	64.597	0.067	0.0	0.3	0.3	6.1	O K
7200 min Winter	64.584	0.054	0.0	0.3	0.3	4.9	O K
8640 min Winter	64.577	0.047	0.0	0.3	0.3	4.3	O K
10080 min Winter	64.572	0.042	0.0	0.2	0.2	3.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	17.712	0.0	8.5	33
60 min Winter	11.376	0.0	11.2	62
120 min Winter	7.186	0.0	14.2	118
180 min Winter	5.470	0.0	16.2	176
240 min Winter	4.503	0.0	17.8	230
360 min Winter	3.421	0.0	20.3	298
480 min Winter	2.795	0.0	22.1	370
600 min Winter	2.390	0.0	23.7	448
720 min Winter	2.103	0.0	25.0	526
960 min Winter	1.719	0.0	27.2	674
1440 min Winter	1.295	0.0	30.7	966
2160 min Winter	0.976	0.0	35.0	1384
2880 min Winter	0.798	0.0	38.2	1784
4320 min Winter	0.601	0.0	43.0	2512
5760 min Winter	0.491	0.0	47.1	3232
7200 min Winter	0.421	0.0	50.4	3896
8640 min Winter	0.371	0.0	53.3	4600
10080 min Winter	0.333	0.0	55.8	5344

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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Shortest Storm (mins)	15
Ratio R	0.361	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.119

Time (mins) From:	To:	Area (ha)
0	4	0.119

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Model Details

Storage is Online Cover Level (m) 65.830

Cellular Storage Structure

Invert Level (m) 64.530 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	96.0	96.0	0.900	0.0	131.2
0.800	96.0	131.2			

Hydro-Brake Optimum® Outflow Control

Unit Reference	MD-SCU-0029-1200-1640-1200
Design Head (m)	1.640
Design Flow (l/s)	1.2
Flush-Flo™	Calculated
Objective	Linear discharge profile
Diameter (mm)	29
Invert Level (m)	64.530
Minimum Outlet Pipe Diameter (mm)	75
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.640	1.2
Flush-Flo™	0.044	0.3
Kick-Flo®	0.044	0.3
Mean Flow over Head Range	-	0.8

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	0.4	1.200	1.0	3.000	1.6	7.000	2.3
0.200	0.5	1.400	1.1	3.500	1.7	7.500	2.4
0.300	0.6	1.600	1.2	4.000	1.8	8.000	2.5
0.400	0.6	1.800	1.3	4.500	1.9	8.500	2.6
0.500	0.7	2.000	1.3	5.000	2.0	9.000	2.6
0.600	0.8	2.200	1.4	5.500	2.1	9.500	2.7
0.800	0.9	2.400	1.4	6.000	2.2		
1.000	1.0	2.600	1.5	6.500	2.3		

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Summary of Results for 30 year Return Period

Half Drain Time : 562 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	64.688	0.158	0.0	0.4	0.4	14.4	O K
30 min Summer	64.737	0.207	0.0	0.5	0.5	18.8	O K
60 min Summer	64.787	0.257	0.0	0.5	0.5	23.4	O K
120 min Summer	64.835	0.305	0.0	0.6	0.6	27.9	O K
180 min Summer	64.860	0.330	0.0	0.6	0.6	30.1	O K
240 min Summer	64.873	0.343	0.0	0.6	0.6	31.3	O K
360 min Summer	64.883	0.353	0.0	0.6	0.6	32.2	O K
480 min Summer	64.887	0.357	0.0	0.6	0.6	32.5	O K
600 min Summer	64.888	0.358	0.0	0.6	0.6	32.7	O K
720 min Summer	64.888	0.358	0.0	0.6	0.6	32.6	O K
960 min Summer	64.885	0.355	0.0	0.6	0.6	32.4	O K
1440 min Summer	64.872	0.342	0.0	0.6	0.6	31.2	O K
2160 min Summer	64.847	0.317	0.0	0.6	0.6	28.9	O K
2880 min Summer	64.823	0.293	0.0	0.6	0.6	26.7	O K
4320 min Summer	64.780	0.250	0.0	0.5	0.5	22.8	O K
5760 min Summer	64.745	0.215	0.0	0.5	0.5	19.6	O K
7200 min Summer	64.717	0.187	0.0	0.5	0.5	17.0	O K
8640 min Summer	64.693	0.163	0.0	0.4	0.4	14.9	O K
10080 min Summer	64.673	0.143	0.0	0.4	0.4	13.1	O K
15 min Winter	64.707	0.177	0.0	0.4	0.4	16.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	65.686	0.0	14.2	19
30 min Summer	43.528	0.0	18.8	33
60 min Summer	27.653	0.0	24.5	64
120 min Summer	17.080	0.0	30.3	122
180 min Summer	12.754	0.0	33.9	182
240 min Summer	10.322	0.0	36.6	242
360 min Summer	7.615	0.0	40.5	360
480 min Summer	6.137	0.0	43.5	412
600 min Summer	5.188	0.0	45.9	476
720 min Summer	4.521	0.0	48.0	538
960 min Summer	3.636	0.0	51.5	672
1440 min Summer	2.672	0.0	56.5	950
2160 min Summer	1.961	0.0	62.9	1360
2880 min Summer	1.573	0.0	67.2	1760
4320 min Summer	1.152	0.0	73.7	2548
5760 min Summer	0.922	0.0	79.0	3288
7200 min Summer	0.776	0.0	83.1	4040
8640 min Summer	0.674	0.0	86.5	4760
10080 min Summer	0.598	0.0	89.4	5456
15 min Winter	65.686	0.0	15.9	19

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Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	64.762	0.232	0.0	0.5	0.5	21.2	O K
60 min Winter	64.819	0.289	0.0	0.6	0.6	26.4	O K
120 min Winter	64.874	0.344	0.0	0.6	0.6	31.4	O K
180 min Winter	64.903	0.373	0.0	0.6	0.6	34.0	O K
240 min Winter	64.919	0.389	0.0	0.6	0.6	35.5	O K
360 min Winter	64.934	0.404	0.0	0.6	0.6	36.8	O K
480 min Winter	64.938	0.408	0.0	0.6	0.6	37.2	O K
600 min Winter	64.937	0.407	0.0	0.6	0.6	37.2	O K
720 min Winter	64.937	0.407	0.0	0.6	0.6	37.1	O K
960 min Winter	64.931	0.401	0.0	0.6	0.6	36.6	O K
1440 min Winter	64.911	0.381	0.0	0.6	0.6	34.7	O K
2160 min Winter	64.873	0.343	0.0	0.6	0.6	31.3	O K
2880 min Winter	64.837	0.307	0.0	0.6	0.6	28.0	O K
4320 min Winter	64.775	0.245	0.0	0.5	0.5	22.4	O K
5760 min Winter	64.728	0.198	0.0	0.5	0.5	18.1	O K
7200 min Winter	64.692	0.162	0.0	0.4	0.4	14.7	O K
8640 min Winter	64.663	0.133	0.0	0.4	0.4	12.1	O K
10080 min Winter	64.641	0.111	0.0	0.4	0.4	10.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	43.528	0.0	21.1	33
60 min Winter	27.653	0.0	27.4	62
120 min Winter	17.080	0.0	33.9	120
180 min Winter	12.754	0.0	38.0	178
240 min Winter	10.322	0.0	41.0	236
360 min Winter	7.615	0.0	45.3	348
480 min Winter	6.137	0.0	48.7	454
600 min Winter	5.188	0.0	51.5	506
720 min Winter	4.521	0.0	53.8	566
960 min Winter	3.636	0.0	57.6	722
1440 min Winter	2.672	0.0	63.2	1024
2160 min Winter	1.961	0.0	70.4	1468
2880 min Winter	1.573	0.0	75.3	1876
4320 min Winter	1.152	0.0	82.6	2680
5760 min Winter	0.922	0.0	88.5	3456
7200 min Winter	0.776	0.0	93.0	4184
8640 min Winter	0.674	0.0	96.9	4928
10080 min Winter	0.598	0.0	100.2	5648

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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Shortest Storm (mins)	15
Ratio R	0.361	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.119

Time (mins) From:	To:	Area (ha)
0	4	0.119

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Model Details

Storage is Online Cover Level (m) 65.830

Cellular Storage Structure

Invert Level (m) 64.530 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	96.0	96.0	0.900	0.0	131.2
0.800	96.0	131.2			

Hydro-Brake Optimum® Outflow Control

Unit Reference	MD-SCU-0029-1200-1640-1200
Design Head (m)	1.640
Design Flow (l/s)	1.2
Flush-Flo™	Calculated
Objective	Linear discharge profile
Diameter (mm)	29
Invert Level (m)	64.530
Minimum Outlet Pipe Diameter (mm)	75
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.640	1.2
Flush-Flo™	0.044	0.3
Kick-Flo®	0.044	0.3
Mean Flow over Head Range	-	0.8

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	0.4	1.200	1.0	3.000	1.6	7.000	2.3
0.200	0.5	1.400	1.1	3.500	1.7	7.500	2.4
0.300	0.6	1.600	1.2	4.000	1.8	8.000	2.5
0.400	0.6	1.800	1.3	4.500	1.9	8.500	2.6
0.500	0.7	2.000	1.3	5.000	2.0	9.000	2.6
0.600	0.8	2.200	1.4	5.500	2.1	9.500	2.7
0.800	0.9	2.400	1.4	6.000	2.2		
1.000	1.0	2.600	1.5	6.500	2.3		

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Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 813 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	64.816	0.286	0.0	0.6	0.6	26.1	O K
30 min Summer	64.910	0.380	0.0	0.6	0.6	34.7	O K
60 min Summer	65.009	0.479	0.0	0.7	0.7	43.7	O K
120 min Summer	65.106	0.576	0.0	0.7	0.7	52.6	O K
180 min Summer	65.158	0.628	0.0	0.8	0.8	57.3	O K
240 min Summer	65.188	0.658	0.0	0.8	0.8	60.0	O K
360 min Summer	65.217	0.687	0.0	0.8	0.8	62.7	O K
480 min Summer	65.230	0.700	0.0	0.8	0.8	63.8	O K
600 min Summer	65.232	0.702	0.0	0.8	0.8	64.0	O K
720 min Summer	65.232	0.702	0.0	0.8	0.8	64.1	O K
960 min Summer	65.229	0.699	0.0	0.8	0.8	63.8	O K
1440 min Summer	65.213	0.683	0.0	0.8	0.8	62.3	O K
2160 min Summer	65.178	0.648	0.0	0.8	0.8	59.1	O K
2880 min Summer	65.140	0.610	0.0	0.8	0.8	55.6	O K
4320 min Summer	65.068	0.538	0.0	0.7	0.7	49.1	O K
5760 min Summer	65.007	0.477	0.0	0.7	0.7	43.5	O K
7200 min Summer	64.954	0.424	0.0	0.7	0.7	38.7	O K
8640 min Summer	64.910	0.380	0.0	0.6	0.6	34.6	O K
10080 min Summer	64.871	0.341	0.0	0.6	0.6	31.1	O K
15 min Winter	64.851	0.321	0.0	0.6	0.6	29.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	118.728	0.0	25.6	19
30 min Summer	79.453	0.0	33.8	34
60 min Summer	50.812	0.0	45.0	64
120 min Summer	31.453	0.0	55.8	122
180 min Summer	23.449	0.0	62.3	182
240 min Summer	18.923	0.0	67.1	242
360 min Summer	13.867	0.0	73.6	362
480 min Summer	11.129	0.0	78.7	480
600 min Summer	9.376	0.0	82.7	562
720 min Summer	8.146	0.0	86.0	614
960 min Summer	6.520	0.0	90.7	740
1440 min Summer	4.755	0.0	94.4	998
2160 min Summer	3.461	0.0	111.0	1408
2880 min Summer	2.760	0.0	118.0	1820
4320 min Summer	2.002	0.0	128.1	2636
5760 min Summer	1.592	0.0	136.4	3408
7200 min Summer	1.332	0.0	142.6	4176
8640 min Summer	1.151	0.0	147.8	4928
10080 min Summer	1.017	0.0	152.3	5648
15 min Winter	118.728	0.0	28.6	19

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Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	64.956	0.426	0.0	0.7	0.7	38.9	O K
60 min Winter	65.068	0.538	0.0	0.7	0.7	49.0	O K
120 min Winter	65.179	0.649	0.0	0.8	0.8	59.2	O K
180 min Winter	65.238	0.708	0.0	0.8	0.8	64.6	O K
240 min Winter	65.274	0.744	0.0	0.8	0.8	67.8	O K
360 min Winter	65.311	0.781	0.0	0.9	0.9	71.2	O K
480 min Winter	65.329	0.799	0.0	0.9	0.9	72.9	O K
600 min Winter	65.336	0.806	0.0	0.9	0.9	73.5	O K
720 min Winter	65.336	0.806	0.0	0.9	0.9	73.4	O K
960 min Winter	65.327	0.797	0.0	0.9	0.9	72.7	O K
1440 min Winter	65.304	0.774	0.0	0.9	0.9	70.6	O K
2160 min Winter	65.252	0.722	0.0	0.8	0.8	65.9	O K
2880 min Winter	65.196	0.666	0.0	0.8	0.8	60.7	O K
4320 min Winter	65.092	0.562	0.0	0.7	0.7	51.2	O K
5760 min Winter	65.005	0.475	0.0	0.7	0.7	43.3	O K
7200 min Winter	64.934	0.404	0.0	0.6	0.6	36.9	O K
8640 min Winter	64.876	0.346	0.0	0.6	0.6	31.6	O K
10080 min Winter	64.828	0.298	0.0	0.6	0.6	27.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	79.453	0.0	37.4	33
60 min Winter	50.812	0.0	50.5	62
120 min Winter	31.453	0.0	62.5	120
180 min Winter	23.449	0.0	69.8	180
240 min Winter	18.923	0.0	75.1	238
360 min Winter	13.867	0.0	82.4	352
480 min Winter	11.129	0.0	87.9	464
600 min Winter	9.376	0.0	92.2	572
720 min Winter	8.146	0.0	95.5	678
960 min Winter	6.520	0.0	99.7	770
1440 min Winter	4.755	0.0	102.6	1080
2160 min Winter	3.461	0.0	124.3	1532
2880 min Winter	2.760	0.0	132.1	1964
4320 min Winter	2.002	0.0	143.4	2812
5760 min Winter	1.592	0.0	152.8	3632
7200 min Winter	1.332	0.0	159.7	4392
8640 min Winter	1.151	0.0	165.6	5184
10080 min Winter	1.017	0.0	170.6	5856

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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Shortest Storm (mins)	15
Ratio R	0.361	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.119

Time (mins) From:	To:	Area (ha)
0	4	0.119

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Model Details

Storage is Online Cover Level (m) 65.830

Cellular Storage Structure

Invert Level (m) 64.530 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	96.0	96.0	0.900	0.0	131.2
0.800	96.0	131.2			

Hydro-Brake Optimum® Outflow Control

Unit Reference	MD-SCU-0029-1200-1640-1200
Design Head (m)	1.640
Design Flow (l/s)	1.2
Flush-Flo™	Calculated
Objective	Linear discharge profile
Diameter (mm)	29
Invert Level (m)	64.530
Minimum Outlet Pipe Diameter (mm)	75
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.640	1.2
Flush-Flo™	0.044	0.3
Kick-Flo®	0.044	0.3
Mean Flow over Head Range	-	0.8

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	0.4	1.200	1.0	3.000	1.6	7.000	2.3
0.200	0.5	1.400	1.1	3.500	1.7	7.500	2.4
0.300	0.6	1.600	1.2	4.000	1.8	8.000	2.5
0.400	0.6	1.800	1.3	4.500	1.9	8.500	2.6
0.500	0.7	2.000	1.3	5.000	2.0	9.000	2.6
0.600	0.8	2.200	1.4	5.500	2.1	9.500	2.7
0.800	0.9	2.400	1.4	6.000	2.2		
1.000	1.0	2.600	1.5	6.500	2.3		

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Subject: FW: PDE Portway, Wythenshawe 4200027348
From: "Chris Munro" <cmunro@bellmunro.co.uk>
Date: 07/08/2019, 08:56
To: <smcbride@bellmunro.co.uk>, "'Alan Morris'" <amorris@bellmunro.co.uk>
CC: <store@bellmunro.co.uk>

BMC

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VAT registration number - 826072242

From: Mura, Marie [mailto:Marie.Mura@uuplc.co.uk]
Sent: 07 August 2019 08:52
To: bellmunroconsulting@gmail.com
Cc: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>
Subject: FW: PDE Portway, Wythenshawe 4200027348

Dear Steve,

Our reference for this pre-development enquiry: 4200027348

We have carried out an assessment of your application which is based on the information provided; this pre development advice will be valid for 12 months

Foul

Foul will be allowed to drain to the public combined sewer network at an unrestricted rate, and at any convenient point. Our preferred point of discharge would be 825dia sewer on Ruddpark Road.

Surface Water

In order to follow the drainage hierarchy outlined in Building Regulations part H3 and National Planning Practice Guidance (NPPG), surface water should be drained via infiltration systems/soakaways wherever possible. We would be willing to allow a connection into the 225dia surface water sewer on Ruddpark Road with a maximum pass forward flow rate of 5 l/s.

General Information:

Please be aware that on site drainage must be designed in accordance with Building Regulations, National Planning Policy, and local flood authority guidelines, we would recommend that you speak and make suitable agreements with the relevant statutory bodies.

Connection Application

Although we may discuss and agree discharge points & rates in principle, please be aware that you will have to apply for a formal sewer connection. This is so that we can assess the method of construction, Health & Safety requirements and to ultimately inspect the connection when it is made. Details of the application process and the form itself can be obtained from our website by following the link below

http://www.unitedutilities.com/connecting-public-sewer.aspx

Sewer Adoption Agreement

You may wish to offer the proposed new sewers for adoption. United Utilities assess adoption application based on Sewers adoption 6th Edition and for any pumping stations our company addenda document. Please refer to link below to obtain further guidance and application pack:

http://www.unitedutilities.com/sewer-adoption.aspx

Please note, if you intend to put forward your wastewater assets for adoption by United Utilities, the proposed detail design will be subject to a technical appraisal by an Adoption Engineer as we need to be sure that the proposals meets the requirements of Sewers for adoption and United Utilities Asset Standards. The proposed design should give consideration to long term operability and give United Utilities a cost effective proposal for the life of the assets. Therefore, further to this enquiry should you wish to progress a Section 104 agreement, we strongly recommend that no construction commences until the detailed drainage design, submitted as part of the Section 104 agreement, has been assessed and accepted in writing by United Utilities. Any works carried out prior to the technical assessment being approved is done entirely at the developers own risk and could be subject to change.

Existing Sewers Crossing the Site

Public sewers cross this site and we will require unrestricted access to the sewer for maintenance purposes, we would ask that you maintain a minimum clearance of (3M refer to Sewers for adoption 6th edition, Section 2.5, Table 2.1) which is measured 3m from the centre line of the pipe. If you cannot achieve this then you may wish to consider diverting the public sewer.

Please refer to the link below to obtain full details of the processes involved in sewer diversion.

http://www.unitedutilities.com/sewer-diversion.aspx

Kind regards,

Marie Mura
Assistant Developer Engineer
Developer Services & Metering (Wastewater)
United Utilities
External 01925 537745 Internal: 37745

From: Bell Munro [mailto:bellmunroconsulting@gmail.com]
Sent: 29 July 2019 14:08
To: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>
Cc: smcbride@bellmunro.co.uk; amorris@bellmunro.co.uk
Subject: Portway, Wythenshawe

Afternoon,

Please find pre-development enquiry attached for a proposed housing development at Portway, Wythenshawe, Manchester.

Regards,

Steve

EMGateway3.uuplc.co.uk made the following annotations

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Attachments:

J6497 Pre-development Enquiry.pdf	824 kB
17-2763 Portway PH Drainge FOR PLANNING-DR01.pdf	640 kB

DMW Drilling Ltd

DMW Drilling Ltd, 7 Glenbeck Close, Horwich, Bolton, BL6 6SG
(07525) 393 909

Borehole Log

Borehole No.
WS01
Sheet 1 of 1

Project Name:	Portway Pub, Wythenshawe	Project No. 17188	Co-ords:	Hole Type WS
Location:	Portway Pub, Portway, Wythenshawe		Level:	Scale 1:50
Client:	Gustav Bonnier		Dates: 08/12/2017	Logged By NRBA

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.10			Concrete
		0.20	ES		0.30			MADE GROUND: Black sandy slightly gravelly clay. Sand is fine to medium. Gravel is fine to medium, is very angular to sub-angular and includes ceramic and brick.
		1.00	D					Stiff brown gravelly CLAY. Gravel is fine to medium, is sub-angular to rounded and is of mixed lithologies.
		1.00	SPT	N=14 (2,2/3,3,4,4)				
		2.00	D		2.00			Weathered red MUDSTONE
		2.00	SPT	N=24 (1,2/4,6,7,7)				
		2.20	D					
					2.50			Grey MUDSTONE
		3.00	D					
		3.00	SPT	50 (6,11/50 for 225mm)				
					3.45			End of Borehole at 3.45m

Remarks
No groundwater encountered.

AGS

DMW Drilling Ltd

DMW Drilling Ltd, 7 Glenbeck Close, Horwich, Bolton, BL6 6SG
(07525) 393 909

Borehole Log

Borehole No.
WS02
Sheet 1 of 1

Project Name:	Portway Pub, Wythenshawe	Project No. 17188	Co-ords:	Hole Type WS
Location:	Portway Pub, Portway, Wythenshawe		Level:	Scale 1:50
Client:	Gustav Bonnier		Dates: 08/12/2017	Logged By NRBA

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.10			Bitumen tarmac
		0.20	ES		0.25			MADE GROUND: Black sandy slightly gravelly clay. Sand is fine to medium. Gravel is fine to medium, is very angular to sub-angular and includes ceramic and brick. Slight hydrocarbon smell.
		1.00	SPT	N=10 (1,1/2,2,3,3)				Stiff to very stiff brown gravelly CLAY. Gravel is fine to medium, is sub-angular to rounded and is of mixed lithologies.
		1.50	D					
		2.00	SPT	N=19 (2,2/3,4,6,6)				
		2.50	D					
		2.50	SPT	N=23 (5,6/5,5,6,7)				
					2.95			End of Borehole at 2.95m

1 2 3 4 5 6 7 8 9 10

Remarks
No groundwater encountered.

AGS

DMW Drilling Ltd

DMW Drilling Ltd, 7 Glenbeck Close, Horwich, Bolton, BL6 6SG
(07525) 393 909

Borehole Log

Borehole No.
WS03
Sheet 1 of 1

Project Name:	Portway Pub, Wythenshawe	Project No. 17188	Co-ords:	Hole Type WS
Location:	Portway Pub, Portway, Wythenshawe		Level:	Scale 1:50
Client:	Gustav Bonnier		Dates: 08/12/2017	Logged By NRBA

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.20	ES		0.10			Bitumen tarmac MADE GROUND: Brown gravelly clay. Gravel is fine, is sub-angular to rounded and is of brick.
		1.00 1.00	D SPT	N=11 (1,1/2,3,3,3)	0.60			Stiff to very stiff brown gravelly CLAY. Gravel is fine to medium, is sub-angular to rounded and is of mixed lithologies.
		2.00 2.00	D SPT	N=21 (3,3/2,8,6,5)				
		2.50	SPT	N=27 (4,4/4,6,7,10)	2.50			Weathered red MUDSTONE
					2.95			End of Borehole at 2.95m

Remarks
No groundwater encountered.

AGS

DMW Drilling Ltd

DMW Drilling Ltd, 7 Glenbeck Close, Horwich, Bolton, BL6 6SG
(07525) 393 909

Borehole Log

Borehole No.
WS04
Sheet 1 of 1

Project Name:	Portway Pub, Wythenshawe	Project No. 17188	Co-ords:	Hole Type WS
Location:	Portway Pub, Portway, Wythenshawe		Level:	Scale 1:50
Client:	Gustav Bonnier		Dates: 08/12/2017	Logged By NRBA

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.10			Bitumen Tarmac
		0.20	ES					MADE GROUND: Black sandy slightly gravelly clay. Sand is fine to medium. Gravel is fine to medium, is very angular to sub-angular and includes ceramic and brick.
		0.50	ES		0.40			
					0.90			MADE GROUND: Black ashy sand and gravel. Gravel is fine and is angular to subrounded and is of brick.
		1.00	SPT	N=9 (1,2/2,2,3,2)				Stiff to very stiff brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is fine to medium, is sub-angular to rounded and is of mixed lithologies.
		1.50	D					
		2.00	SPT	N=19 (2,3/4,5,5,5)				
		2.50	D					
		2.80	SPT	N=53 (7,12/15,14,12,12)	2.80			Weathered red MUDSTONE.
					3.25			End of Borehole at 3.25m

Remarks
No groundwater encountered.

AGS

DMW Drilling Ltd

DMW Drilling Ltd, 7 Glenbeck Close, Horwich, Bolton, BL6 6SG
(07525) 393 909

Borehole Log

Borehole No.
WS05
Sheet 1 of 1

Project Name:	Portway Pub, Wythenshawe	Project No. 17188	Co-ords:	Hole Type WS
Location:	Portway Pub, Portway, Wythenshawe		Level:	Scale 1:50
Client:	Gustav Bonnier		Dates: 08/12/2017	Logged By NRBA

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.10			Bitumen Tarmac
		0.20	ES		0.30			MADE GROUND: Black sandy slightly gravelly clay. Sand is fine to medium. Gravel is fine to medium, is very angular to sub-angular and includes ceramic and brick. Slight hydrocarbon smell.
		1.00	D					Very stiff brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is fine to medium, is sub-angular to rounded and is of mixed lithologies.
		1.00	SPT	N=17 (2,2/3,4,5,5)				
		2.00	D		2.00			No recovery (assumed to be stiff to very stiff CLAY).
		2.00	SPT	N=16 (1,2/2,4,5,5)				
					2.45			End of Borehole at 2.45m

1 2 3 4 5 6 7 8 9 10

Remarks
No groundwater encountered.

AGS

DMW Drilling Ltd

DMW Drilling Ltd, 7 Glenbeck Close, Horwich, Bolton, BL6 6SG
(07525) 393 909

Borehole Log

Borehole No.
WS06
Sheet 1 of 1

Project Name:	Portway Pub, Wythenshawe	Project No. 17188	Co-ords:
Location:	Portway Pub, Portway, Wythenshawe		Level:
Client:	Gustav Bonnier		Dates: 08/12/2017

Hole Type: WS
Scale: 1:50
Logged By: NRBA

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					0.10			Bitumen Tarmac
		0.20	ES					MADE GROUND: Brown sandy slightly gravelly clay. Sand is fine to medium. Gravel is fine to medium, is very angular to sub-angular and includes concrete and brick.
		1.00	SPT	N=11 (2,2/2,3,3,3)	1.00			Stiff brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is fine to medium, is sub-angular to rounded and is of mixed lithologies.
		1.50	D					
		2.00	SPT	N=11 (3,2/2,3,3,3)				
		2.60	D		2.60			Weathered red MUDSTONE
		2.75	SPT	N=40 (10,10/10,10,10,10)				
					3.20			End of Borehole at 3.20m

Remarks
No groundwater encountered.

AGS

DMW Drilling Ltd

DMW Drilling Ltd, 7 Glenbeck Close, Horwich, Bolton, BL6 6SG
(07525) 393 909

Borehole Log

Borehole No.
WS07
Sheet 1 of 1

Project Name:	Portway Pub, Wythenshawe	Project No. 17188	Co-ords:
Location:	Portway Pub, Portway, Wythenshawe		Level:
Client:	Gustav Bonnier		Dates: 08/12/2017

Hole Type: WS
Scale: 1:50
Logged By: NRBA

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.10			Bitumen Tarmac
		0.30	ES		0.40			MADE GROUND: Black sandy slightly gravelly clay. Sand is fine to medium. Gravel is fine to medium, is very angular to sub-angular and includes brick.
		0.60	ES		0.70			MADE GROUND: Brown slightly gravelly clay. Gravel is fine, sub-angular to subrounded and is of brick.
		1.00	D		1.00			Light brown very sandy CLAY. Sand is fine to coarse.
		1.00	SPT	N=9 (3,3/2,3,2,2)				Stiff brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is fine to medium,. Is sub-angular to rounded and is of mixed lithologies.
		2.00	D					
		2.00	SPT	N=15 (3,3/3,4,4,4)				
		2.50	D		2.50			Red weathered MUDSTONE
		2.50	SPT	N=27 (6,7/8,7,6,6)				
					2.95			End of Borehole at 2.95m

1 2 3 4 5 6 7 8 9 10

Remarks
No groundwater encountered.

AGS

DMW Drilling Ltd

DMW Drilling Ltd, 7 Glenbeck Close, Horwich, Bolton, BL6 6SG
(07525) 393 909

Borehole Log

Borehole No.
WS08
Sheet 1 of 1

Project Name:	Portway Pub, Wythenshawe	Project No. 17188	Co-ords:
Location:	Portway Pub, Portway, Wythenshawe		Level:
Client:	Gustav Bonnier		Dates: 08/12/2017

Hole Type: WS
Scale: 1:50
Logged By: NRBA

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					0.10			Bitumen Tarmac
		0.40	ES					MADE GROUND: Brown slightly gravelly clay. Gravel is fine, sub-angular to subrounded and is of brick.
		1.00	SPT	N=20 (3,3/5,5,5,5)	0.90			Very stiff brown gravelly CLAY. Gravel is fine, is sub-angular to rounded and is of mixed lithologies.
	▼	2.00	D		2.00			No recovery (assumed to be stiff to very stiff CLAY).
		2.00	SPT	N=18 (3,4/5,5,4,4)				
					3.00			End of Borehole at 3.00m

1 2 3 4 5 6 7 8 9 10

Remarks
Groundwater strike at 2.0m bgl.

AGS