

**Site 6 Residential Development
Felpham
Phase 5C**

Barratt David Wilson (Southampton) Ltd

Foul & Surface Water Statement

The following statement is in response to Arun District Councils drainage comments relating to Planning consultation on FP/95/16/DOC and reasons the storm water outfall was amended.

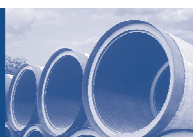
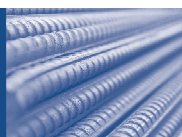
The original proposals for the development attenuation system followed the principals laid out in the outline consent and FRA. With all surface water runoff from roads and houses discharging to the attenuation features via an adoptable piped drainage system maintained by Southern Water. The storm drainage generally runs from east to west before discharging to Ponds A –D which lay on both sides of the Relief Road. Ponds C & D lie to the north and are permanently wet ponds to provide further ecological benefits whereas Ponds A & B are predominantly dry.

Based on discussions with Arun D.C. the storm water attenuation has been designed using the following agreed Greenfield runoff principals. Runoff from hard surfacing is 5 litres/sec/Ha and for gardens and soft landscaping 2.5 litres/sec/Ha. Impermeable areas on site have been assessed at being between 60 - 65% of the total area.

The plots known as Phase 5C lie on the western boundary of the main site and to the west of both an IDB ditch running through the site and the DN600 foul Bognor to Ford pumped main. During the preliminary and first detailed design stages the finished floor levels were set to enable storm and foul flows to gravitate towards the attenuation ponds and main foul network. In accordance with the drainage strategy.

The western boundary of Phase 5C lies adjacent to an IDB watercourse and Bognor Regis Golf Course, following initial designs a review of levels was undertaken due to the impact of the development on the golf course. These reduced levels had the resulting effect of not being able to drain the phase back to the main site foul & storm sewers.

Therefore alternative designs were required to drain both foul & storm from this area. Foul flows are now discharged via a small pumping station which has been offered to Southern Water for adoption; the storm water drains to a cellular attenuation tank located within the open space, flow is restricted at this point before outfalling to the adjacent IDB ditch system.



Flows from the attenuation tank are restricted to a maximum discharge of 5 l/sec for all storm events for up and including the 1 in 100 year + 30% climate change storm. The tank is 28x5x1.2m deep wrapped in an impermeable membrane to prevent ingress of groundwater. (see Micro Drainage calculations)

The restricted storm flow from Phase 5C discharges into the IDB watercourse located between the development and Bognor Golf Course, this in turn flows north towards the new BNRR. Flows from the main site join at this confluence with this watercourse from north of the BNRR at Stanover Lane before heading west and outfalling into the Lidsey Rife.

The proposed surface water drainage strategy offers a sustainable, safe and robust system which will afford complete flood risk protection to residents within the new site and to existing properties. This is achieved by ensuring that the peak rate of surface water runoff from the site post development will be no greater than the existing runoff rate for site.

Alistair McShane
FOR MJA CONSULTING
26.08.16

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58-62 Ock Street Abingdon Oxon OX14 5BZ	Phase 5C Felpham Development BDW Southampton				
Date 26/08/2016 14:21 File Phase 5C Storm.srcx	Designed by mcshane Checked by				
Micro Drainage	Source Control 2016.1				
<u>Summary of Results for 100 year Return Period (+30%)</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	3.427	0.477	5.0	66.8	O K
30 min Summer	3.595	0.645	5.0	90.3	O K
60 min Summer	3.763	0.813	5.0	113.8	O K
120 min Summer	3.895	0.945	5.0	132.3	O K
180 min Summer	3.936	0.986	5.0	138.1	O K
240 min Summer	3.939	0.989	5.0	138.4	O K
360 min Summer	3.917	0.967	5.0	135.4	O K
480 min Summer	3.890	0.940	5.0	131.6	O K
600 min Summer	3.860	0.910	5.0	127.3	O K
720 min Summer	3.828	0.878	5.0	122.9	O K
960 min Summer	3.761	0.811	5.0	113.6	O K
1440 min Summer	3.607	0.657	5.0	92.0	O K
15 min Winter	3.490	0.540	5.0	75.6	O K
30 min Winter	3.681	0.731	5.0	102.3	O K
60 min Winter	3.870	0.920	5.0	128.8	O K
120 min Winter	4.026	1.076	5.0	150.7	O K
180 min Winter	4.081	1.131	5.0	158.3	O K
240 min Winter	4.092	1.142	5.0	159.8	O K
360 min Winter	4.065	1.115	5.0	156.1	O K
480 min Winter	4.030	1.080	5.0	151.2	O K
600 min Winter	3.989	1.039	5.0	145.5	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
15 min Summer	115.731	0.0	74.8	34	
30 min Summer	77.804	0.0	100.6	46	
60 min Summer	49.937	0.0	129.1	72	
120 min Summer	30.956	0.0	160.1	126	
180 min Summer	23.058	0.0	178.9	182	
240 min Summer	18.577	0.0	192.2	240	
360 min Summer	13.656	0.0	211.9	300	
480 min Summer	10.974	0.0	227.1	364	
600 min Summer	9.254	0.0	239.4	432	
720 min Summer	8.046	0.0	249.8	502	
960 min Summer	6.447	0.0	266.8	642	
1440 min Summer	4.709	0.0	292.4	896	
15 min Winter	115.731	0.0	83.8	35	
30 min Winter	77.804	0.0	112.7	47	
60 min Winter	49.937	0.0	144.6	74	
120 min Winter	30.956	0.0	179.3	126	
180 min Winter	23.058	0.0	200.4	182	
240 min Winter	18.577	0.0	215.3	236	
360 min Winter	13.656	0.0	237.4	334	
480 min Winter	10.974	0.0	254.4	384	
600 min Winter	9.254	0.0	268.2	462	
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Micro Drainage Source Control 2016.1		

Model Details

Storage is Online Cover Level (m) 5.000

Tank or Pond Structure

Invert Level (m) 2.950

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	140.0	0.700	140.0	1.400	140.0	2.100	140.0
0.100	140.0	0.800	140.0	1.500	140.0	2.200	140.0
0.200	140.0	0.900	140.0	1.600	140.0	2.300	140.0
0.300	140.0	1.000	140.0	1.700	140.0	2.400	140.0
0.400	140.0	1.100	140.0	1.800	140.0	2.500	140.0
0.500	140.0	1.200	140.0	1.900	140.0		
0.600	140.0	1.300	140.0	2.000	140.0		

Hydro-Brake Optimum® Outflow Control

Unit Reference	MD-SHE-0102-5000-1250-5000
Design Head (m)	1.250
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	102
Invert Level (m)	2.945
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.250	5.0
Flush-Flo™	0.370	5.0
Kick-Flo®	0.772	4.0
Mean Flow over Head Range	-	4.4

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	3.4	1.200	4.9	3.000	7.5	7.000	11.2
0.200	4.7	1.400	5.3	3.500	8.1	7.500	11.6
0.300	5.0	1.600	5.6	4.000	8.6	8.000	12.0
0.400	5.0	1.800	5.9	4.500	9.1	8.500	12.3
0.500	4.9	2.000	6.2	5.000	9.6	9.000	12.7
0.600	4.7	2.200	6.5	5.500	10.0	9.500	13.0
0.800	4.1	2.400	6.8	6.000	10.4		
1.000	4.5	2.600	7.0	6.500	10.9		

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