

BWB Consulting Ltd					Page 1																																																																																																																																																																																																																																																			
5th Floor, Waterfront House 35 Station Street Nottingham, NG2 3DQ			BMW3175 Brascote Lane Newbold Verdon Catchment 1 FEH																																																																																																																																																																																																																																																					
Date 22/02/2022 13:09 File Catchment 1 Storage 100...			Designed by L. Reeves Checked by C. Thorpe																																																																																																																																																																																																																																																					
Innovyze			Source Control 2019.1																																																																																																																																																																																																																																																					
Summary of Results for 100 year Return Period <table><tr><th>Storm Event</th><th>Max Level (m)</th><th>Max Depth (m)</th><th>Max Control (l/s)</th><th>Max Volume (m³)</th><th>Status</th></tr><tr><td>15 min Summer</td><td>99.237</td><td>0.237</td><td>23.1</td><td>870.2</td><td>O K</td></tr><tr><td>30 min Summer</td><td>99.274</td><td>0.274</td><td>23.2</td><td>1012.6</td><td>O K</td></tr><tr><td>60 min Summer</td><td>99.315</td><td>0.315</td><td>23.3</td><td>1168.6</td><td>O K</td></tr><tr><td>120 min Summer</td><td>99.356</td><td>0.356</td><td>23.3</td><td>1327.7</td><td>O K</td></tr><tr><td>180 min Summer</td><td>99.378</td><td>0.378</td><td>23.3</td><td>1413.5</td><td>O K</td></tr><tr><td>240 min Summer</td><td>99.391</td><td>0.391</td><td>23.3</td><td>1465.7</td><td>O K</td></tr><tr><td>360 min Summer</td><td>99.405</td><td>0.405</td><td>23.3</td><td>1517.8</td><td>O K</td></tr><tr><td>480 min Summer</td><td>99.408</td><td>0.408</td><td>23.3</td><td>1530.8</td><td>O K</td></tr><tr><td>600 min Summer</td><td>99.408</td><td>0.408</td><td>23.3</td><td>1530.8</td><td>O K</td></tr><tr><td>720 min Summer</td><td>99.407</td><td>0.407</td><td>23.3</td><td>1527.1</td><td>O K</td></tr><tr><td>960 min Summer</td><td>99.399</td><td>0.399</td><td>23.3</td><td>1495.3</td><td>O K</td></tr><tr><td>1440 min Summer</td><td>99.379</td><td>0.379</td><td>23.3</td><td>1418.2</td><td>O K</td></tr><tr><td>2160 min Summer</td><td>99.346</td><td>0.346</td><td>23.3</td><td>1289.6</td><td>O K</td></tr><tr><td>2880 min Summer</td><td>99.314</td><td>0.314</td><td>23.3</td><td>1163.9</td><td>O K</td></tr><tr><td>4320 min Summer</td><td>99.250</td><td>0.250</td><td>23.1</td><td>921.5</td><td>O K</td></tr><tr><td>5760 min Summer</td><td>99.203</td><td>0.203</td><td>22.8</td><td>743.7</td><td>O K</td></tr><tr><td>7200 min Summer</td><td>99.170</td><td>0.170</td><td>22.3</td><td>621.8</td><td>O K</td></tr><tr><td>8640 min Summer</td><td>99.151</td><td>0.151</td><td>20.6</td><td>549.6</td><td>O K</td></tr><tr><td>10080 min Summer</td><td>99.136</td><td>0.136</td><td>19.0</td><td>495.3</td><td>O K</td></tr><tr><td>15 min Winter</td><td>99.265</td><td>0.265</td><td>23.2</td><td>976.6</td><td>O K</td></tr><tr><td>30 min Winter</td><td>99.307</td><td>0.307</td><td>23.3</td><td>1138.0</td><td>O K</td></tr></table> <table><tr><th>Storm Event</th><th>Rain (mm/hr)</th><th>Flooded Volume (m³)</th><th>Discharge Volume (m³)</th><th>Time-Peak (mins)</th></tr><tr><td>15 min Summer</td><td>128.618</td><td>0.0</td><td>882.1</td><td>26</td></tr><tr><td>30 min Summer</td><td>75.539</td><td>0.0</td><td>1021.0</td><td>41</td></tr><tr><td>60 min Summer</td><td>44.365</td><td>0.0</td><td>1229.3</td><td>70</td></tr><tr><td>120 min Summer</td><td>26.056</td><td>0.0</td><td>1444.4</td><td>128</td></tr><tr><td>180 min Summer</td><td>19.085</td><td>0.0</td><td>1587.1</td><td>186</td></tr><tr><td>240 min Summer</td><td>15.303</td><td>0.0</td><td>1696.7</td><td>244</td></tr><tr><td>360 min Summer</td><td>11.209</td><td>0.0</td><td>1864.6</td><td>362</td></tr><tr><td>480 min Summer</td><td>8.988</td><td>0.0</td><td>1993.4</td><td>474</td></tr><tr><td>600 min Summer</td><td>7.572</td><td>0.0</td><td>2099.6</td><td>522</td></tr><tr><td>720 min Summer</td><td>6.583</td><td>0.0</td><td>2190.4</td><td>582</td></tr><tr><td>960 min Summer</td><td>5.236</td><td>0.0</td><td>2323.0</td><td>706</td></tr><tr><td>1440 min Summer</td><td>3.792</td><td>0.0</td><td>2489.7</td><td>974</td></tr><tr><td>2160 min Summer</td><td>2.746</td><td>0.0</td><td>2741.8</td><td>1380</td></tr><tr><td>2880 min Summer</td><td>2.184</td><td>0.0</td><td>2907.7</td><td>1768</td></tr><tr><td>4320 min Summer</td><td>1.556</td><td>0.0</td><td>3108.0</td><td>2516</td></tr><tr><td>5760 min Summer</td><td>1.224</td><td>0.0</td><td>3258.3</td><td>3232</td></tr><tr><td>7200 min Summer</td><td>1.016</td><td>0.0</td><td>3379.9</td><td>3896</td></tr><tr><td>8640 min Summer</td><td>0.872</td><td>0.0</td><td>3483.3</td><td>4592</td></tr><tr><td>10080 min Summer</td><td>0.767</td><td>0.0</td><td>3572.2</td><td>5344</td></tr><tr><td>15 min Winter</td><td>128.618</td><td>0.0</td><td>978.4</td><td>26</td></tr><tr><td>30 min Winter</td><td>75.539</td><td>0.0</td><td>1131.8</td><td>40</td></tr></table>							Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status	15 min Summer	99.237	0.237	23.1	870.2	O K	30 min Summer	99.274	0.274	23.2	1012.6	O K	60 min Summer	99.315	0.315	23.3	1168.6	O K	120 min Summer	99.356	0.356	23.3	1327.7	O K	180 min Summer	99.378	0.378	23.3	1413.5	O K	240 min Summer	99.391	0.391	23.3	1465.7	O K	360 min Summer	99.405	0.405	23.3	1517.8	O K	480 min Summer	99.408	0.408	23.3	1530.8	O K	600 min Summer	99.408	0.408	23.3	1530.8	O K	720 min Summer	99.407	0.407	23.3	1527.1	O K	960 min Summer	99.399	0.399	23.3	1495.3	O K	1440 min Summer	99.379	0.379	23.3	1418.2	O K	2160 min Summer	99.346	0.346	23.3	1289.6	O K	2880 min Summer	99.314	0.314	23.3	1163.9	O K	4320 min Summer	99.250	0.250	23.1	921.5	O K	5760 min Summer	99.203	0.203	22.8	743.7	O K	7200 min Summer	99.170	0.170	22.3	621.8	O K	8640 min Summer	99.151	0.151	20.6	549.6	O K	10080 min Summer	99.136	0.136	19.0	495.3	O K	15 min Winter	99.265	0.265	23.2	976.6	O K	30 min Winter	99.307	0.307	23.3	1138.0	O K	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	15 min Summer	128.618	0.0	882.1	26	30 min Summer	75.539	0.0	1021.0	41	60 min Summer	44.365	0.0	1229.3	70	120 min Summer	26.056	0.0	1444.4	128	180 min Summer	19.085	0.0	1587.1	186	240 min Summer	15.303	0.0	1696.7	244	360 min Summer	11.209	0.0	1864.6	362	480 min Summer	8.988	0.0	1993.4	474	600 min Summer	7.572	0.0	2099.6	522	720 min Summer	6.583	0.0	2190.4	582	960 min Summer	5.236	0.0	2323.0	706	1440 min Summer	3.792	0.0	2489.7	974	2160 min Summer	2.746	0.0	2741.8	1380	2880 min Summer	2.184	0.0	2907.7	1768	4320 min Summer	1.556	0.0	3108.0	2516	5760 min Summer	1.224	0.0	3258.3	3232	7200 min Summer	1.016	0.0	3379.9	3896	8640 min Summer	0.872	0.0	3483.3	4592	10080 min Summer	0.767	0.0	3572.2	5344	15 min Winter	128.618	0.0	978.4	26	30 min Winter	75.539	0.0	1131.8	40
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status																																																																																																																																																																																																																																																			
15 min Summer	99.237	0.237	23.1	870.2	O K																																																																																																																																																																																																																																																			
30 min Summer	99.274	0.274	23.2	1012.6	O K																																																																																																																																																																																																																																																			
60 min Summer	99.315	0.315	23.3	1168.6	O K																																																																																																																																																																																																																																																			
120 min Summer	99.356	0.356	23.3	1327.7	O K																																																																																																																																																																																																																																																			
180 min Summer	99.378	0.378	23.3	1413.5	O K																																																																																																																																																																																																																																																			
240 min Summer	99.391	0.391	23.3	1465.7	O K																																																																																																																																																																																																																																																			
360 min Summer	99.405	0.405	23.3	1517.8	O K																																																																																																																																																																																																																																																			
480 min Summer	99.408	0.408	23.3	1530.8	O K																																																																																																																																																																																																																																																			
600 min Summer	99.408	0.408	23.3	1530.8	O K																																																																																																																																																																																																																																																			
720 min Summer	99.407	0.407	23.3	1527.1	O K																																																																																																																																																																																																																																																			
960 min Summer	99.399	0.399	23.3	1495.3	O K																																																																																																																																																																																																																																																			
1440 min Summer	99.379	0.379	23.3	1418.2	O K																																																																																																																																																																																																																																																			
2160 min Summer	99.346	0.346	23.3	1289.6	O K																																																																																																																																																																																																																																																			
2880 min Summer	99.314	0.314	23.3	1163.9	O K																																																																																																																																																																																																																																																			
4320 min Summer	99.250	0.250	23.1	921.5	O K																																																																																																																																																																																																																																																			
5760 min Summer	99.203	0.203	22.8	743.7	O K																																																																																																																																																																																																																																																			
7200 min Summer	99.170	0.170	22.3	621.8	O K																																																																																																																																																																																																																																																			
8640 min Summer	99.151	0.151	20.6	549.6	O K																																																																																																																																																																																																																																																			
10080 min Summer	99.136	0.136	19.0	495.3	O K																																																																																																																																																																																																																																																			
15 min Winter	99.265	0.265	23.2	976.6	O K																																																																																																																																																																																																																																																			
30 min Winter	99.307	0.307	23.3	1138.0	O K																																																																																																																																																																																																																																																			
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)																																																																																																																																																																																																																																																				
15 min Summer	128.618	0.0	882.1	26																																																																																																																																																																																																																																																				
30 min Summer	75.539	0.0	1021.0	41																																																																																																																																																																																																																																																				
60 min Summer	44.365	0.0	1229.3	70																																																																																																																																																																																																																																																				
120 min Summer	26.056	0.0	1444.4	128																																																																																																																																																																																																																																																				
180 min Summer	19.085	0.0	1587.1	186																																																																																																																																																																																																																																																				
240 min Summer	15.303	0.0	1696.7	244																																																																																																																																																																																																																																																				
360 min Summer	11.209	0.0	1864.6	362																																																																																																																																																																																																																																																				
480 min Summer	8.988	0.0	1993.4	474																																																																																																																																																																																																																																																				
600 min Summer	7.572	0.0	2099.6	522																																																																																																																																																																																																																																																				
720 min Summer	6.583	0.0	2190.4	582																																																																																																																																																																																																																																																				
960 min Summer	5.236	0.0	2323.0	706																																																																																																																																																																																																																																																				
1440 min Summer	3.792	0.0	2489.7	974																																																																																																																																																																																																																																																				
2160 min Summer	2.746	0.0	2741.8	1380																																																																																																																																																																																																																																																				
2880 min Summer	2.184	0.0	2907.7	1768																																																																																																																																																																																																																																																				
4320 min Summer	1.556	0.0	3108.0	2516																																																																																																																																																																																																																																																				
5760 min Summer	1.224	0.0	3258.3	3232																																																																																																																																																																																																																																																				
7200 min Summer	1.016	0.0	3379.9	3896																																																																																																																																																																																																																																																				
8640 min Summer	0.872	0.0	3483.3	4592																																																																																																																																																																																																																																																				
10080 min Summer	0.767	0.0	3572.2	5344																																																																																																																																																																																																																																																				
15 min Winter	128.618	0.0	978.4	26																																																																																																																																																																																																																																																				
30 min Winter	75.539	0.0	1131.8	40																																																																																																																																																																																																																																																				
©1982-2019 Innovyze																																																																																																																																																																																																																																																								

BWB Consulting Ltd				Page 2	
5th Floor, Waterfront House 35 Station Street Nottingham, NG2 3DQ		BMW3175 Brascote Lane Newbold Verdon Catchment 1 FEH			
Date 22/02/2022 13:09 File Catchment 1 Storage 100...		Designed by L. Reeves Checked by C. Thorpe			
Innovyze		Source Control 2019.1			
<u>Summary of Results for 100 year Return Period</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	99.353	0.353	23.3	1315.2	O K
120 min Winter	99.400	0.400	23.3	1499.3	O K
180 min Winter	99.426	0.426	23.3	1601.4	O K
240 min Winter	99.442	0.442	23.3	1665.9	O K
360 min Winter	99.460	0.460	23.3	1736.5	O K
480 min Winter	99.467	0.467	23.3	1764.0	O K
600 min Winter	99.468	0.468	23.3	1767.3	O K
720 min Winter	99.465	0.465	23.3	1755.6	O K
960 min Winter	99.452	0.452	23.3	1703.8	O K
1440 min Winter	99.423	0.423	23.3	1590.7	O K
2160 min Winter	99.373	0.373	23.3	1394.5	O K
2880 min Winter	99.324	0.324	23.3	1202.4	O K
4320 min Winter	99.232	0.232	23.0	853.9	O K
5760 min Winter	99.173	0.173	22.4	630.0	O K
7200 min Winter	99.144	0.144	19.9	525.5	O K
8640 min Winter	99.126	0.126	17.7	455.6	O K
10080 min Winter	99.112	0.112	15.8	405.0	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
60 min Winter	44.365	0.0	1377.0	68	
120 min Winter	26.056	0.0	1617.9	126	
180 min Winter	19.085	0.0	1777.9	184	
240 min Winter	15.303	0.0	1900.6	240	
360 min Winter	11.209	0.0	2088.4	356	
480 min Winter	8.988	0.0	2232.8	466	
600 min Winter	7.572	0.0	2351.7	574	
720 min Winter	6.583	0.0	2453.5	676	
960 min Winter	5.236	0.0	2586.9	760	
1440 min Winter	3.792	0.0	2759.1	1062	
2160 min Winter	2.746	0.0	3070.9	1500	
2880 min Winter	2.184	0.0	3256.9	1908	
4320 min Winter	1.556	0.0	3481.1	2644	
5760 min Winter	1.224	0.0	3649.2	3288	
7200 min Winter	1.016	0.0	3785.6	3968	
8640 min Winter	0.872	0.0	3900.7	4672	
10080 min Winter	0.767	0.0	4000.9	5440	
©1982-2019 Innovyze					

BWB Consulting Ltd		Page 3
5th Floor, Waterfront House 35 Station Street Nottingham, NG2 3DQ	BMW3175 Brascote Lane Newbold Verdon Catchment 1 FEH	
Date 22/02/2022 13:09 File Catchment 1 Storage 100...	Designed by L. Reeves Checked by C. Thorpe	
Innovyze	Source Control 2019.1	

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	1999
Site Location	GB 443900 302500 SK 43900 02500
C (1km)	-0.028
D1 (1km)	0.361
D2 (1km)	0.333
D3 (1km)	0.293
E (1km)	0.309
F (1km)	2.371
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+0

Time Area Diagram

Total Area (ha) 3.700

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From:	To:	From:	To:	From:	To:
0	4	4	8	8	12
1.233	1.233	1.233	1.233	1.233	1.233

BWB Consulting Ltd		Page 4																																																																																															
5th Floor, Waterfront House 35 Station Street Nottingham, NG2 3DQ	BMW3175 Brascote Lane Newbold Verdon Catchment 1 FEH																																																																																																
Date 22/02/2022 13:09 File Catchment 1 Storage 100...	Designed by L. Reeves Checked by C. Thorpe																																																																																																
Innovyze Source Control 2019.1																																																																																																	
Model Details Storage is Online Cover Level (m) 100.000 Tank or Pond Structure Invert Level (m) 99.000 <table><tr><th>Depth (m)</th><th>Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th></tr><tr><td>0.000</td><td>3575.7</td><td>1.000</td><td>4473.9</td></tr></table> Hydro-Brake® Optimum Outflow Control Unit Reference MD-SHE-0212-2330-1050-2330 Design Head (m) 1.050 Design Flow (l/s) 23.3 Flush-Flo™ Calculated Objective Minimise upstream storage Application Surface Sump Available Yes Diameter (mm) 212 Invert Level (m) 98.950 Minimum Outlet Pipe Diameter (mm) 225 Suggested Manhole Diameter (mm) 1500 <table><tr><th>Control Points</th><th>Head (m)</th><th>Flow (l/s)</th></tr><tr><td>Design Point (Calculated)</td><td>1.050</td><td>23.3</td></tr><tr><td>Flush-Flo™</td><td>0.361</td><td>23.3</td></tr><tr><td>Kick-Flo®</td><td>0.757</td><td>19.9</td></tr><tr><td>Mean Flow over Head Range</td><td>-</td><td>19.6</td></tr></table> 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 <table><tr><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th></tr><tr><td>0.100</td><td>7.2</td><td>1.200</td><td>24.8</td><td>3.000</td><td>38.5</td><td>7.000</td><td>58.1</td></tr><tr><td>0.200</td><td>20.5</td><td>1.400</td><td>26.7</td><td>3.500</td><td>41.5</td><td>7.500</td><td>60.1</td></tr><tr><td>0.300</td><td>23.1</td><td>1.600</td><td>28.5</td><td>4.000</td><td>44.3</td><td>8.000</td><td>62.0</td></tr><tr><td>0.400</td><td>23.2</td><td>1.800</td><td>30.2</td><td>4.500</td><td>46.9</td><td>8.500</td><td>63.8</td></tr><tr><td>0.500</td><td>22.9</td><td>2.000</td><td>31.7</td><td>5.000</td><td>49.3</td><td>9.000</td><td>65.6</td></tr><tr><td>0.600</td><td>22.3</td><td>2.200</td><td>33.2</td><td>5.500</td><td>51.7</td><td>9.500</td><td>67.4</td></tr><tr><td>0.800</td><td>20.5</td><td>2.400</td><td>34.6</td><td>6.000</td><td>53.9</td><td></td><td></td></tr><tr><td>1.000</td><td>22.8</td><td>2.600</td><td>36.0</td><td>6.500</td><td>56.0</td><td></td><td></td></tr></table>			Depth (m)	Area (m²)	Depth (m)	Area (m²)	0.000	3575.7	1.000	4473.9	Control Points	Head (m)	Flow (l/s)	Design Point (Calculated)	1.050	23.3	Flush-Flo™	0.361	23.3	Kick-Flo®	0.757	19.9	Mean Flow over Head Range	-	19.6	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	0.100	7.2	1.200	24.8	3.000	38.5	7.000	58.1	0.200	20.5	1.400	26.7	3.500	41.5	7.500	60.1	0.300	23.1	1.600	28.5	4.000	44.3	8.000	62.0	0.400	23.2	1.800	30.2	4.500	46.9	8.500	63.8	0.500	22.9	2.000	31.7	5.000	49.3	9.000	65.6	0.600	22.3	2.200	33.2	5.500	51.7	9.500	67.4	0.800	20.5	2.400	34.6	6.000	53.9			1.000	22.8	2.600	36.0	6.500	56.0		
Depth (m)	Area (m²)	Depth (m)	Area (m²)																																																																																														
0.000	3575.7	1.000	4473.9																																																																																														
Control Points	Head (m)	Flow (l/s)																																																																																															
Design Point (Calculated)	1.050	23.3																																																																																															
Flush-Flo™	0.361	23.3																																																																																															
Kick-Flo®	0.757	19.9																																																																																															
Mean Flow over Head Range	-	19.6																																																																																															
Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)																																																																																										
0.100	7.2	1.200	24.8	3.000	38.5	7.000	58.1																																																																																										
0.200	20.5	1.400	26.7	3.500	41.5	7.500	60.1																																																																																										
0.300	23.1	1.600	28.5	4.000	44.3	8.000	62.0																																																																																										
0.400	23.2	1.800	30.2	4.500	46.9	8.500	63.8																																																																																										
0.500	22.9	2.000	31.7	5.000	49.3	9.000	65.6																																																																																										
0.600	22.3	2.200	33.2	5.500	51.7	9.500	67.4																																																																																										
0.800	20.5	2.400	34.6	6.000	53.9																																																																																												
1.000	22.8	2.600	36.0	6.500	56.0																																																																																												
©1982-2019 Innovyze																																																																																																	

BWB Consulting Ltd					Page 1
5th Floor, Waterfront House 35 Station Street Nottingham, NG2 3DQ		BMW3175 Brascote Lane Newbold Verdon Catchment 2 FEH			
Date 22/02/2022 13:11 File Catchment 2 Storage 100...		Designed by L. Reeves Checked by C. Thorpe			
Innovyze		Source Control 2019.1			
<u>Summary of Results for 100 year Return Period</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	99.241	0.241	11.0	422.2	O K
30 min Summer	99.278	0.278	11.0	491.2	O K
60 min Summer	99.318	0.318	11.0	566.2	O K
120 min Summer	99.359	0.359	11.0	641.8	O K
180 min Summer	99.380	0.380	11.0	681.9	O K
240 min Summer	99.392	0.392	11.0	705.7	O K
360 min Summer	99.404	0.404	11.0	728.3	O K
480 min Summer	99.406	0.406	11.0	732.3	O K
600 min Summer	99.404	0.404	11.0	728.5	O K
720 min Summer	99.401	0.401	11.0	723.5	O K
960 min Summer	99.390	0.390	11.0	702.6	O K
1440 min Summer	99.367	0.367	11.0	657.6	O K
2160 min Summer	99.330	0.330	11.0	588.7	O K
2880 min Summer	99.296	0.296	11.0	523.9	O K
4320 min Summer	99.229	0.229	11.0	401.1	O K
5760 min Summer	99.179	0.179	10.8	310.7	O K
7200 min Summer	99.143	0.143	10.5	246.0	O K
8640 min Summer	99.118	0.118	10.3	202.6	O K
10080 min Summer	99.103	0.103	9.5	176.8	O K
15 min Winter	99.269	0.269	11.0	474.1	O K
30 min Winter	99.311	0.311	11.0	552.3	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
15 min Summer	128.618	0.0	433.3	26	
30 min Summer	75.539	0.0	509.0	41	
60 min Summer	44.365	0.0	598.0	70	
120 min Summer	26.056	0.0	702.7	128	
180 min Summer	19.085	0.0	772.1	186	
240 min Summer	15.303	0.0	825.4	246	
360 min Summer	11.209	0.0	907.1	362	
480 min Summer	8.988	0.0	969.8	480	
600 min Summer	7.572	0.0	1021.4	534	
720 min Summer	6.583	0.0	1065.6	594	
960 min Summer	5.236	0.0	1130.2	716	
1440 min Summer	3.792	0.0	1227.9	982	
2160 min Summer	2.746	0.0	1333.9	1388	
2880 min Summer	2.184	0.0	1414.5	1788	
4320 min Summer	1.556	0.0	1511.9	2548	
5760 min Summer	1.224	0.0	1585.4	3232	
7200 min Summer	1.016	0.0	1644.4	3904	
8640 min Summer	0.872	0.0	1694.4	4584	
10080 min Summer	0.767	0.0	1737.9	5256	
15 min Winter	128.618	0.0	485.3	26	
30 min Winter	75.539	0.0	570.2	40	
©1982-2019 Innovyze					

BWB Consulting Ltd					Page 2
5th Floor, Waterfront House 35 Station Street Nottingham, NG2 3DQ		BMW3175 Brascote Lane Newbold Verdon Catchment 2 FEH			
Date 22/02/2022 13:11 File Catchment 2 Storage 100...		Designed by L. Reeves Checked by C. Thorpe			
Innovyze		Source Control 2019.1			
<u>Summary of Results for 100 year Return Period</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	99.356	0.356	11.0	637.7	O K
120 min Winter	99.402	0.402	11.0	725.8	O K
180 min Winter	99.427	0.427	11.0	774.0	O K
240 min Winter	99.443	0.443	11.0	804.2	O K
360 min Winter	99.459	0.459	11.0	836.3	O K
480 min Winter	99.465	0.465	11.0	847.6	O K
600 min Winter	99.465	0.465	11.0	847.3	O K
720 min Winter	99.461	0.461	11.0	839.8	O K
960 min Winter	99.445	0.445	11.0	808.2	O K
1440 min Winter	99.413	0.413	11.0	745.9	O K
2160 min Winter	99.359	0.359	11.0	643.3	O K
2880 min Winter	99.307	0.307	11.0	544.8	O K
4320 min Winter	99.210	0.210	10.9	367.1	O K
5760 min Winter	99.144	0.144	10.6	249.2	O K
7200 min Winter	99.109	0.109	9.9	187.4	O K
8640 min Winter	99.091	0.091	8.7	155.7	O K
10080 min Winter	99.078	0.078	7.8	133.4	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
60 min Winter	44.365	0.0	670.0	68	
120 min Winter	26.056	0.0	787.0	126	
180 min Winter	19.085	0.0	864.9	184	
240 min Winter	15.303	0.0	924.6	240	
360 min Winter	11.209	0.0	1016.1	356	
480 min Winter	8.988	0.0	1086.3	468	
600 min Winter	7.572	0.0	1144.0	578	
720 min Winter	6.583	0.0	1193.7	680	
960 min Winter	5.236	0.0	1265.9	770	
1440 min Winter	3.792	0.0	1375.3	1070	
2160 min Winter	2.746	0.0	1493.9	1512	
2880 min Winter	2.184	0.0	1584.5	1928	
4320 min Winter	1.556	0.0	1693.5	2680	
5760 min Winter	1.224	0.0	1775.4	3344	
7200 min Winter	1.016	0.0	1841.7	3960	
8640 min Winter	0.872	0.0	1897.8	4664	
10080 min Winter	0.767	0.0	1946.6	5344	
©1982-2019 Innovyze					

BWB Consulting Ltd		Page 3
5th Floor, Waterfront House 35 Station Street Nottingham, NG2 3DQ	BMW3175 Brascote Lane Newbold Verdon Catchment 2 FEH	
Date 22/02/2022 13:11 File Catchment 2 Storage 100...	Designed by L. Reeves Checked by C. Thorpe	
Innovyze	Source Control 2019.1	

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	1999
Site Location	GB 443900 302500 SK 43900 02500
C (1km)	-0.028
D1 (1km)	0.361
D2 (1km)	0.333
D3 (1km)	0.293
E (1km)	0.309
F (1km)	2.371
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+0

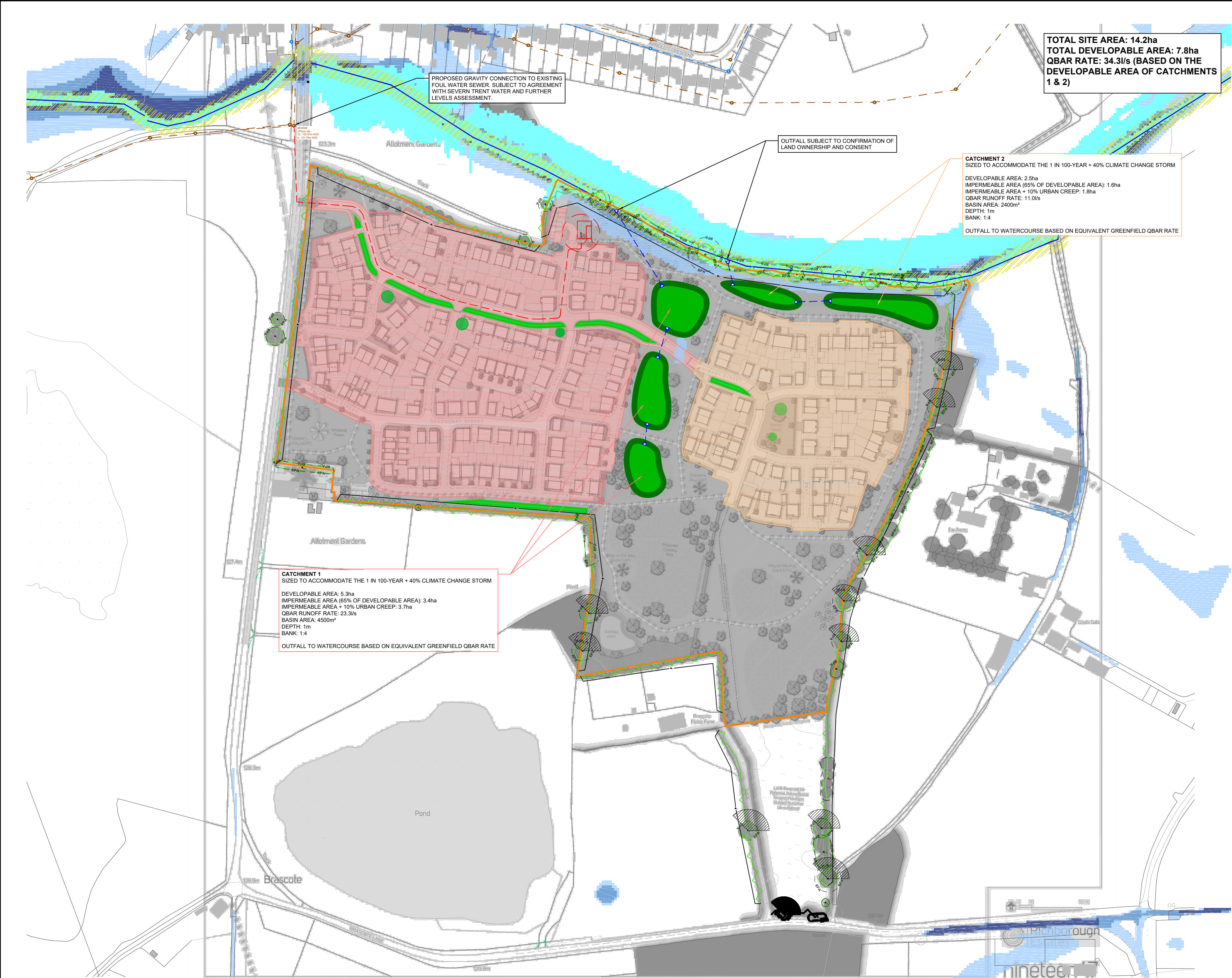
Time Area Diagram

Total Area (ha) 1.800

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From:	To:	From:	To:	From:	To:
0	4 0.600	4	8 0.600	8	12 0.600

BWB Consulting Ltd		Page 4																																																																																															
5th Floor, Waterfront House 35 Station Street Nottingham, NG2 3DQ	BMW3175 Brascote Lane Newbold Verdon Catchment 2 FEH																																																																																																
Date 22/02/2022 13:11 File Catchment 2 Storage 100...	Designed by L. Reeves Checked by C. Thorpe																																																																																																
Innovyze Source Control 2019.1																																																																																																	
Model Details Storage is Online Cover Level (m) 100.000 Tank or Pond Structure Invert Level (m) 99.000 <table><thead><tr><th>Depth (m)</th><th>Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th></tr></thead><tbody><tr><td>0.000</td><td>1683.8</td><td>1.000</td><td>2315.9</td></tr></tbody></table> Hydro-Brake® Optimum Outflow Control Unit Reference MD-SHE-0151-1100-1050-1100 Design Head (m) 1.050 Design Flow (l/s) 11.0 Flush-Flo™ Calculated Objective Minimise upstream storage Application Surface Sump Available Yes Diameter (mm) 151 Invert Level (m) 98.950 Minimum Outlet Pipe Diameter (mm) 225 Suggested Manhole Diameter (mm) 1200 <table><thead><tr><th>Control Points</th><th>Head (m)</th><th>Flow (l/s)</th></tr></thead><tbody><tr><td>Design Point (Calculated)</td><td>1.050</td><td>11.0</td></tr><tr><td>Flush-Flo™</td><td>0.318</td><td>11.0</td></tr><tr><td>Kick-Flo®</td><td>0.706</td><td>9.1</td></tr><tr><td>Mean Flow over Head Range</td><td>-</td><td>9.4</td></tr></tbody></table> 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 <table><thead><tr><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th></tr></thead><tbody><tr><td>0.100</td><td>5.5</td><td>1.200</td><td>11.7</td><td>3.000</td><td>18.1</td><td>7.000</td><td>27.2</td></tr><tr><td>0.200</td><td>10.6</td><td>1.400</td><td>12.6</td><td>3.500</td><td>19.5</td><td>7.500</td><td>28.1</td></tr><tr><td>0.300</td><td>11.0</td><td>1.600</td><td>13.4</td><td>4.000</td><td>20.8</td><td>8.000</td><td>29.0</td></tr><tr><td>0.400</td><td>10.9</td><td>1.800</td><td>14.2</td><td>4.500</td><td>22.0</td><td>8.500</td><td>29.8</td></tr><tr><td>0.500</td><td>10.7</td><td>2.000</td><td>14.9</td><td>5.000</td><td>23.1</td><td>9.000</td><td>30.7</td></tr><tr><td>0.600</td><td>10.2</td><td>2.200</td><td>15.6</td><td>5.500</td><td>24.2</td><td>9.500</td><td>31.5</td></tr><tr><td>0.800</td><td>9.7</td><td>2.400</td><td>16.3</td><td>6.000</td><td>25.2</td><td></td><td></td></tr><tr><td>1.000</td><td>10.7</td><td>2.600</td><td>16.9</td><td>6.500</td><td>26.2</td><td></td><td></td></tr></tbody></table>			Depth (m)	Area (m²)	Depth (m)	Area (m²)	0.000	1683.8	1.000	2315.9	Control Points	Head (m)	Flow (l/s)	Design Point (Calculated)	1.050	11.0	Flush-Flo™	0.318	11.0	Kick-Flo®	0.706	9.1	Mean Flow over Head Range	-	9.4	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	0.100	5.5	1.200	11.7	3.000	18.1	7.000	27.2	0.200	10.6	1.400	12.6	3.500	19.5	7.500	28.1	0.300	11.0	1.600	13.4	4.000	20.8	8.000	29.0	0.400	10.9	1.800	14.2	4.500	22.0	8.500	29.8	0.500	10.7	2.000	14.9	5.000	23.1	9.000	30.7	0.600	10.2	2.200	15.6	5.500	24.2	9.500	31.5	0.800	9.7	2.400	16.3	6.000	25.2			1.000	10.7	2.600	16.9	6.500	26.2		
Depth (m)	Area (m²)	Depth (m)	Area (m²)																																																																																														
0.000	1683.8	1.000	2315.9																																																																																														
Control Points	Head (m)	Flow (l/s)																																																																																															
Design Point (Calculated)	1.050	11.0																																																																																															
Flush-Flo™	0.318	11.0																																																																																															
Kick-Flo®	0.706	9.1																																																																																															
Mean Flow over Head Range	-	9.4																																																																																															
Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)																																																																																										
0.100	5.5	1.200	11.7	3.000	18.1	7.000	27.2																																																																																										
0.200	10.6	1.400	12.6	3.500	19.5	7.500	28.1																																																																																										
0.300	11.0	1.600	13.4	4.000	20.8	8.000	29.0																																																																																										
0.400	10.9	1.800	14.2	4.500	22.0	8.500	29.8																																																																																										
0.500	10.7	2.000	14.9	5.000	23.1	9.000	30.7																																																																																										
0.600	10.2	2.200	15.6	5.500	24.2	9.500	31.5																																																																																										
0.800	9.7	2.400	16.3	6.000	25.2																																																																																												
1.000	10.7	2.600	16.9	6.500	26.2																																																																																												
©1982-2019 Innovyze																																																																																																	

Appendix 6: Illustrative Drainage Strategy



TOTAL SITE AREA: 14.2ha
TOTAL DEVELOPABLE AREA: 7.8ha
QBAR RATE: 34.3l/s (BASED ON THE DEVELOPABLE AREA OF CATCHMENTS 1 & 2)

PROPOSED GRAVITY CONNECTION TO EXISTING FOUL WATER SEWER. SUBJECT TO AGREEMENT WITH SEVERN TRENT WATER AND FURTHER LEVELS ASSESSMENT.

OUTFALL SUBJECT TO CONFIRMATION OF LAND OWNERSHIP AND CONSENT

CATCHMENT 2
SIZED TO ACCOMMODATE THE 1 IN 100-YEAR + 40% CLIMATE CHANGE STORM
DEVELOPABLE AREA: 2.5ha
IMPERMEABLE AREA (65% OF DEVELOPABLE AREA): 1.6ha
IMPERMEABLE AREA + 10% URBAN CREEP: 1.8ha
QBAR RUNOFF RATE: 11.0l/s
BASIN AREA: 2400m²
DEPTH: 1m
BANK: 1:4
OUTFALL TO WATERCOURSE BASED ON EQUIVALENT GREENFIELD QBAR RATE

CATCHMENT 1
SIZED TO ACCOMMODATE THE 1 IN 100-YEAR + 40% CLIMATE CHANGE STORM
DEVELOPABLE AREA: 5.3ha
IMPERMEABLE AREA (65% OF DEVELOPABLE AREA): 3.4ha
IMPERMEABLE AREA + 10% URBAN CREEP: 3.7ha
QBAR RUNOFF RATE: 23.3l/s
BASIN AREA: 4500m²
DEPTH: 1m
BANK: 1:4
OUTFALL TO WATERCOURSE BASED ON EQUIVALENT GREENFIELD QBAR RATE

- Notes
- Do not scale this drawing. All dimensions must be checked/verified on site. If in doubt ask.
 - This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.
 - All dimensions in millimetres unless noted otherwise. All levels in metres unless noted otherwise.
 - Any discrepancies noted on site are to be reported to the engineer immediately.
 - Do not construct based on this drawing.
 - The Surface Water extents are extracted from the Environment Agency's Surface Water Flood Risk Mapping.
 - The assumed developable area is 7.8ha with 65% of the development assumed to be impermeable for Catchments 1 and 2. A 10% allowance for urban creep has been added to the impermeable area for Catchments 1 and 2, in line with Leicestershire County Council guidance. The allowance for urban creep should be confirmed once the development density is finalised.
 - The greenfield runoff rate for the area has been calculated at 34.3l/s or 4.4l/s/ha.
 - All SuDS features are indicative and subject to receipt of final masterplan.
 - SuDS locations to be confirmed following completion of hydraulic modelling.
 - Outfall to watercourse is subject to land ownership and consent.
 - Drawing intended as proof of concept only, subject to further design.
 - Sewer locations are approximate and taken from Severn Trent Sewer Records.
 - Tree Constraints taken from drawing reference: MF/LW/13085.01.

- Legend
- Illustrative Site Location
 - Watercourse
 - Illustrative 16m Watercourse Easement
 - Surface Water Flood Risk
 - High Risk
 - Medium Risk
 - Low Risk
 - Modelled Flood Extent (1000-year)
 - Indicative Drainage Catchments
 - Catchment 1
 - Catchment 2
 - Detention Basin
 - Illustrative Outfall Sewer
 - Headwall
 - Indicative Swale/Rain Garden
 - Indicative Tree Pits
 - Proposed Pumping Station
 - Proposed Foul Connection Route
 - Existing Surface Water Sewer
 - Existing Foul Water Sewer
 - Existing Overflow Sewer

P05	22.02.22	MASTERPLAN UPDATES	LR	CT
P05	15.12.21	MASTERPLAN UPDATES	LR	MB
P04	06.12.21	MASTERPLAN UPDATES	LR	CT
P03	03.11.21	TREE CONSTRAINTS PLAN ADDED	LR	CT
P02	07.10.21	FOUL NETWORK ADDED	LR	CT
P01	04.08.21	PRELIMINARY ISSUE	LR	CT
Rev	Date	Details of issue / revision	Drw	Rev

Issues & Revisions

BWB
A CAF GROUP COMPANY

■ Birmingham | 0121 233 3322
□ Leeds | 0113 233 8000
□ London | 020 7234 9122
□ Manchester | 0161 233 4260
□ Nottingham | 0115 924 1100
www.bwbconsulting.com

Client
Richborough Estates

Project Title
Brascote Lane, Newbold Verdon

Drawing Title
Illustrative Drainage Strategy

Drawn:	L. Reeves	Reviewed:	C. Thorpe
BWB Ref:	BMW3175	Date:	04.08.21
		Scale@A2:	1:2000

Drawing Status PRELIMINARY				
Project - Originator - Zone - Level - Type - Role - Number	Status	Rev		
BLN-BWB-ZZ-XX-DR-CD-0001	S2	P06		

Appendix 7: Severn Trent Water Developer Enquiry

WONDERFUL ON TAP

SEVERN

TRENT

Severn Trent Water Ltd

Regis Road
Wolverhampton
WV6 8RU

Tel: 0345 2667930
www.stwater.co.uk
net.dev.west@severntrent.co.uk

Contact: Sadeq Hadi

Your ref:
Our ref: 1019696

1st October 2021

Lucy Reeves
BWB Consulting Ltd
35 Livery Street
Birmingham
B3 2PB

Dear Lucy Reeves,

**Proposed development for 250 houses @ Newbold Verdon,
Leicester**

I refer to your Development Enquiry Request in respect of the above site. Please find enclosed the sewer records that are included in the fee together with the Supplementary Guidance Notes (SGN) referred to below.

Protective Strips

Due to recent change in legislation on 1st October 2011, there could be sewers, which have transferred over to the Company that are not shown on the statutory sewer records, but are located on your clients land. These sewers will have protective strips that we will not allow to be built over. The sewers could be identified whilst the land is being surveyed. If this is the case, please contact us for further guidance upon discovery.

Foul Water Drainage

The available sewer (375mm in Diameter) is located north west of the site at manhole 4309 located in grass verge near Brascote Lane. I can confirm the flows from the proposed development of 250 houses, will generate approximate peak flow of 3.9 l/s (2xDWF). Given the overall development size, it will be necessary to undertake a hydraulic assessment of the site to understand the impact on the receiving Sewerage Treatment Works (Newbold Verdon STW). As you may be aware, we no longer charge developers for the hydraulic modelling service. All sites now go forward for prioritization against our risk matrix that takes into account such things as planning status and potential impact on the environment or our existing customers.

We may contact you in due course for further information and will liaise with you over time with regard to the outcome of our investigations and any impact that may have on the Planning status, occupation, or phasing of the site. However, while we can provide a brief summary of our findings if you need us to, we will no longer provide the full external SCA report. In the meantime, as you progress matters for your site, we

would appreciate any updates you have regarding the development progression, as we will be reviewing the modelling requirements on a weekly basis. I would therefore be grateful if you would forward as soon as possible the following details:

- **Please advise us of your preferred connection point, at the earliest opportunity.**
- Proposed submission of your Planning Application
- Proposed planned start and completion date.
- Any phasing details of the proposed development
- Planned occupation dates

Surface Water Drainage

Under the terms of Section H of the Building Regulations 2010, the disposal of surface water by means of soakaways should be considered as the primary method. If this is not practical, you can liaise directly with the Lead Local Flood Authority (Local Council Authority) and Canal and River Trust for a discharge into the local brook/ditch or the pound south of the site

Connections

For any new connections including the use, reuse and indirect to the public sewerage system, the developer will need to submit Section 106 application. Our Developer Services department are responsible for handling all such enquiries and applications. To contact them for an application form and associated guidance notes please call 0800 7076600 or download from www.stwater.co.uk

Please quote 1019696 in any future correspondence (including e-mails) with STW Limited. Please note that Developer Enquiry responses are only valid for 6 months from the date of this letter.

Yours Sincerely,



Sadeq Hadi
Senior Evaluation Technician
Network Solutions
Developer Services

