

**Surface Water Calculations; Reen Sizing**

**Herbert Road, Newport**


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**CLIENT:** KEEPMOAT LTD  
**PROJECT:** Housing Development, Herbert Road, Newport  
**TITLE:** Surface Water Calculations; Reen Sizing  
**JOB NO:** 1155090  
**DOCUMENT REF:** 1155090 - Reen  
**Revision:** --

Revision	Purpose	Written	Reviewed	Date
Original	Discharge of Planning Conditions (Phase 1 only)	TDJ	SRM	06/03/17

Signed  .....

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Signed  .....

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COMPANY REGISTRATION No. 3017868

## 1.0 INTRODUCTION

The Reen currently flow east to west across the full width of site, bounded by the Welsh Marches Railway Line to the east & its outfall to the River Usk to the west. It acts as an attenuation pond for a culvert/storm water drainage system serving part of the St Julian's area.

Reen analysis has been based upon size shown is SMA 1155090 - 550/Reen. It is formed of three sections, separated by two bridges & the site boundary;

- Upper Section; existing culvert passes under the railway line, enters the site @ 331809, 189465, flows downstream to proposed road bridge.
- Main Section; passes under proposed road bridge @ 331764, 189460, flows downstream to existing footbridge.
- Lower Section; passes under existing foot bridge @ 331659, 189434, flows west then south to 575mm Ø outfall to Usk @ 331639, 189418

## 2.0 EXISTING VOLUME

Based upon the 3D topographical survey provided, volumes for the existing ree can be seen below.

	Upper Section	Main Section	Lower Section	Piped Outfall
Volume	84.68m <sup>3</sup>	839.72m <sup>3</sup>	324.03m <sup>3</sup>	2.65m <sup>3</sup>

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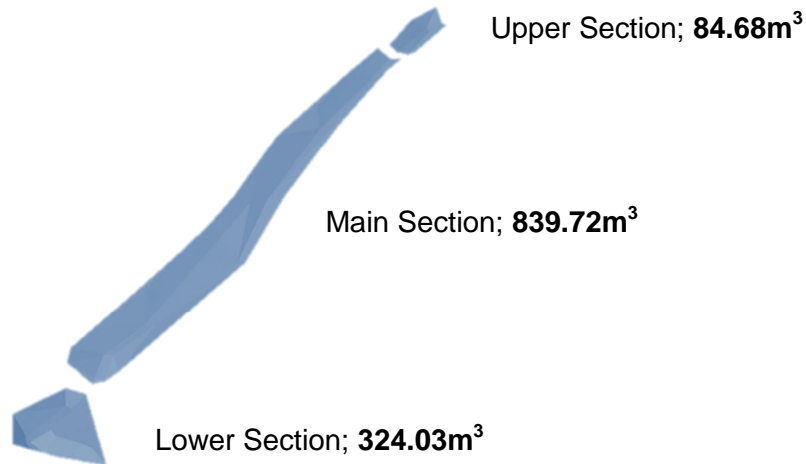
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## EXISTING VOLUME (Cont..)



### 3.0 VOLUME CALCULATIONS FOR PROPOSED SCHEME

As part of a previous planning application for the site a Hydrological Study & Flood Consequence Assessment were completed by Waterman Transport & Development Limited.

The hydrological study of the existing watercourse & reen confirmed it drains a catchment area of 4.865ha. It also confirms that *'the conveyance capacity of this channel is sufficient to accommodate any waters backing up as a result of tide-lock'* (based upon existing flows).

It has been proposed to enlarge the reen to accommodate these existing flows & SW (Storm/Surface Water) discharge from the site during a tidal lock scenario, estimated as a 4hr period.

## VOLUME CALCULATIONS FOR PROPOSED SCHEME (Cont...)

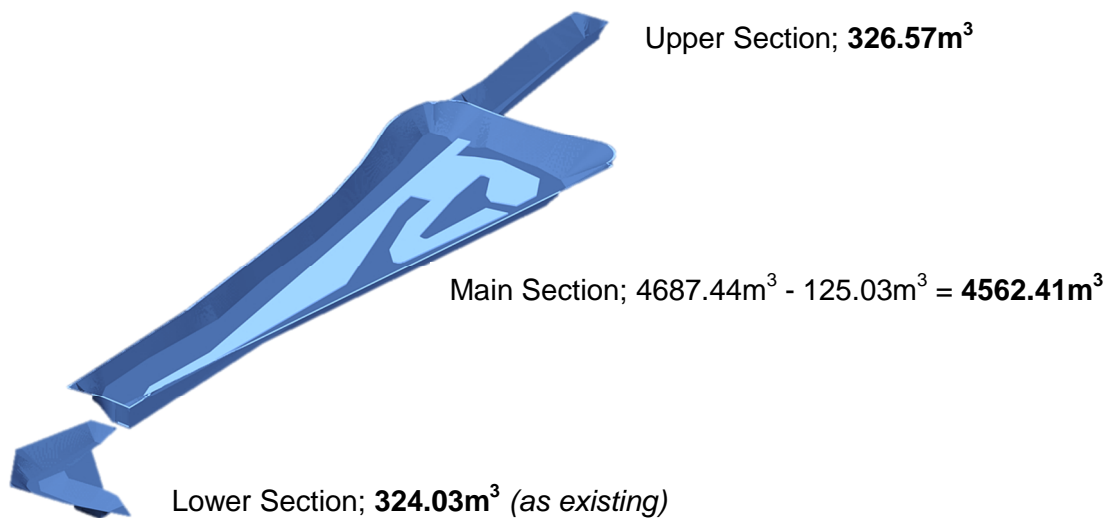
Based upon worst case, that a hightide/tidal lock scenario would co-inside with a storm event, the following volume was calculated;

	Area	Total Runoff Volume (based upon 1:100yr + 30%, 4hr storm event)
Impermeable Surfaces from proposed site layout (All Phases)	37617m <sup>2</sup>	<b>2835.2m<sup>3</sup></b>

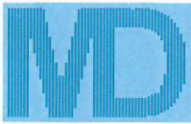
The existing piped outfall has a volume of 2.65m<sup>3</sup> and will be retained. Therefore the reen would need a total capacity ( $V_{min}$ ) of 4086.28m<sup>3</sup>. This is a conservative estimate ignoring the following:

- Potential storage within the existing culvert/pipe upstream of the site.
- The flap may open during a high tide event & discharge to the Usk if the hydraulic/pressure head is greater in the Reen than the adjacent river.

**PROPOSED SIZE;** Total Volume,  $V_{max} = 5213.01m^3$



As  $V_{max} > V_{min}$ ; Proposed Reen capacity is sufficient.



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Job No. <b>1155090</b>		
Sheet no. <b>1</b>		
Date <b>06/03/17</b>		
By <b>TDJ</b>	Checked	Reviewed
<b>Proposed Impermeable Areas</b>		

MasterDrain  
SW

Project **Herbert Road**

Title **Hydrograph runoff calcs (Winter profile) for NEWPORT (GWENT) - Proposed Impermeable Areas**

Data:-

**Hydrology:-**

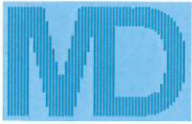
Grid reference = ST3187	Location = NEWPORT (GWENT)
M5-60 (mm) = 19.9	r = 0.32
WRAP/Soil = 3 / 0.40	SAAR (mm/yr) = 1130
Return period = 100	Mean intensity = 19.8mm/hr for a 4 hour storm
Climate change factor = 30%	

Percentage runoff = 95.0% (manual setting)

Imperv. area = 37617 m <sup>2</sup>	Pervious area = 0 m <sup>2</sup>
Total area = 37617 m <sup>2</sup>	Equiv area = 35736 m <sup>2</sup> (Tot. area x % runoff).
Total runoff = 2835.2 m <sup>3</sup>	
Total rainfall depth = 79.3 mm	

**Calculations :-**

Time (hrs)	%Mean intens	Rain mm/hr	Inflow (m3)	Cumulative (m3)
0.040	20.0	4.0	5.670	5.670
0.080	20.0	4.0	5.670	11.341
0.120	21.0	4.2	5.954	17.295
0.160	21.0	4.2	5.954	23.249
0.200	22.0	4.4	6.237	29.486
0.240	23.0	4.6	6.521	36.007
0.280	24.0	4.8	6.805	42.812
0.320	26.0	5.2	7.372	50.183
0.360	27.0	5.4	7.655	57.838
0.400	29.0	5.8	8.222	66.060
0.440	31.0	6.1	8.789	74.850
0.480	32.0	6.3	9.073	83.922
0.520	33.0	6.5	9.356	93.278
0.560	34.0	6.7	9.640	102.918
0.600	36.0	7.1	10.207	113.125
0.640	38.0	7.5	10.774	123.899
0.680	39.0	7.7	11.057	134.956
0.720	40.0	7.9	11.341	146.297
0.760	42.0	8.3	11.908	158.205
0.800	45.0	8.9	12.758	170.963
0.840	49.0	9.7	13.893	184.856
0.880	53.0	10.5	15.027	199.882
0.920	57.0	11.3	16.161	216.043
0.960	62.0	12.3	17.578	233.621
1.000	66.0	13.1	18.712	252.334
1.040	71.0	14.1	20.130	272.464
1.080	77.0	15.3	21.831	294.295
1.120	84.0	16.7	23.816	318.110
1.160	91.0	18.0	25.800	343.911
1.200	98.0	19.4	27.785	371.696
1.240	105.0	20.8	29.770	401.466
1.280	114.0	22.6	32.321	433.787
1.320	125.0	24.8	35.440	469.227
1.360	135.0	26.8	38.275	507.502
1.400	143.0	28.4	40.543	548.046
1.440	154.0	30.5	43.662	591.708
1.480	164.0	32.5	46.497	638.206
1.520	173.0	34.3	49.049	687.255
1.560	183.0	36.3	51.884	739.139
1.600	194.0	38.5	55.003	794.142
1.640	204.0	40.5	57.838	851.980
1.680	212.0	42.0	60.106	912.087
1.720	219.0	43.4	62.091	974.178



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Calculations (cont.) :-

Time (hrs)	%Mean intens	Rain mm/hr	Inflow (m3)	Cumulative (m3)
1.760	226.0	44.8	64.076	1038.254
1.800	233.0	46.2	66.060	1104.314
1.840	239.0	47.4	67.761	1172.076
1.880	244.0	48.4	69.179	1241.255
1.920	248.0	49.2	70.313	1311.568
1.960	249.0	49.4	70.597	1382.165
2.000	250.0	49.6	70.880	1453.045
2.040	250.0	49.6	70.880	1523.925
2.080	249.0	49.4	70.597	1594.522
2.120	248.0	49.2	70.313	1664.835
2.160	244.0	48.4	69.179	1734.014
2.200	239.0	47.4	67.761	1801.776
2.240	233.0	46.2	66.060	1867.836
2.280	226.0	44.8	64.076	1931.912
2.320	219.0	43.4	62.091	1994.003
2.360	212.0	42.0	60.106	2054.109
2.400	204.0	40.5	57.838	2111.948
2.440	194.0	38.5	55.003	2166.951
2.480	183.0	36.3	51.884	2218.835
2.520	173.0	34.3	49.049	2267.884
2.560	164.0	32.5	46.497	2314.381
2.600	154.0	30.5	43.662	2358.043
2.640	143.0	28.4	40.543	2398.587
2.680	135.0	26.8	38.275	2436.862
2.720	125.0	24.8	35.440	2472.302
2.760	114.0	22.6	32.321	2504.624
2.800	105.0	20.8	29.770	2534.394
2.840	98.0	19.4	27.785	2562.179
2.880	91.0	18.0	25.800	2587.979
2.920	84.0	16.7	23.816	2611.795
2.960	77.0	15.3	21.831	2633.626
3.000	71.0	14.1	20.130	2653.756
3.040	66.0	13.1	18.712	2672.468
3.080	62.0	12.3	17.578	2690.046
3.120	57.0	11.3	16.161	2706.207
3.160	53.0	10.5	15.027	2721.234
3.200	49.0	9.7	13.893	2735.126
3.240	45.0	8.9	12.758	2747.885
3.280	42.0	8.3	11.908	2759.793
3.320	40.0	7.9	11.341	2771.134
3.360	39.0	7.7	11.057	2782.191
3.400	38.0	7.5	10.774	2792.965
3.440	36.0	7.1	10.207	2803.171
3.480	34.0	6.7	9.640	2812.811
3.520	33.0	6.5	9.356	2822.167
3.560	32.0	6.3	9.073	2831.240
3.600	31.0	6.1	8.789	2840.029
3.640	29.0	5.8	8.222	2848.251
3.680	27.0	5.4	7.655	2855.906
3.720	26.0	5.2	7.372	2863.278
3.760	24.0	4.8	6.805	2870.082
3.800	23.0	4.6	6.521	2876.603
3.840	22.0	4.4	6.237	2882.841
3.880	21.0	4.2	5.954	2888.795
3.920	21.0	4.2	5.954	2894.749
3.960	20.0	4.0	5.670	2900.419
4.000	20.0	4.0	5.670	2906.089



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