

MasterDrain
SW

Muir Associates (UK) Limited

www.muir-associates.co.uk

Trinity Chambers,
18 Ivy Street,
Birkenhead CH41 5EF
Tel: 0151 650 1200 Mob: 07813 7770514
email: design@muir-associates.co.uk

Job No. 18-1038		
Sheet no. 1		
Date 11/03/19		
By MDJ	Checked	Reviewed

Project **L3 Vauxhall Road Liverpool - Phase 1**

Title **Hydrograph Storage Analysis (Winter profile) for Liverpool 1 in 100 + 40% Climate Change**

Data:-

Location = IVERPOOL
M5-60 (mm) = 19
Soil index = 0.45
Return period = 100
UCWI = 0.0

Grid reference = SJ9766
r = 0.40
SAAR (mm/yr) = 800
WRAP = 4
Climate change = +40%

Clayey, or loamy over clayey soils with an impermeable layer at shallow depth.

Percentage runoff = 95.0% (manual setting)

Imperv. area = 1828 m²
Total area = 1828 m²
Total runoff = 93.4 m³

Pervious area = 0 m²
Equiv area = 1737 m² (Tot. area x % runoff).
Discharge rate = 11.510 l/s

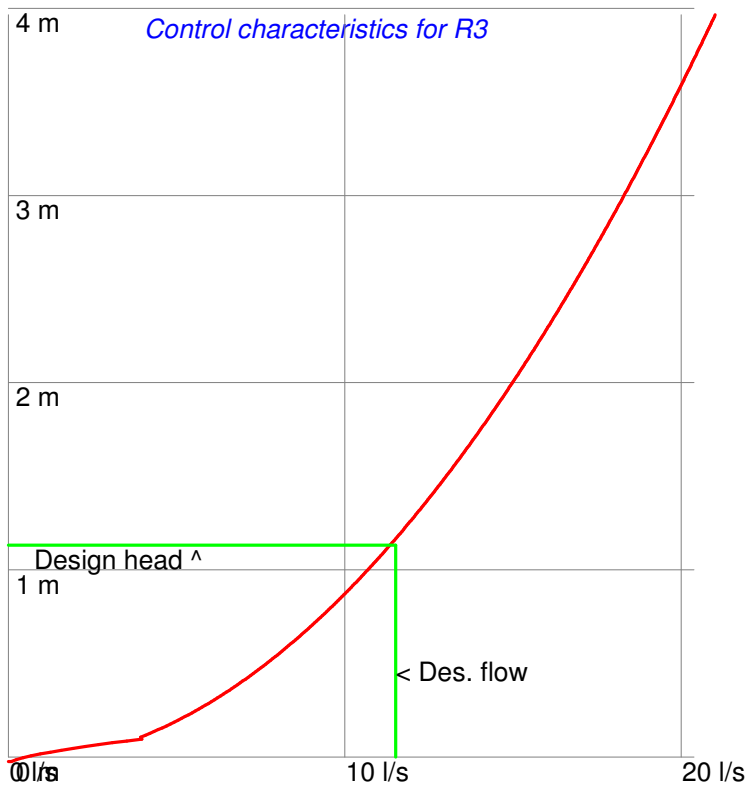
Design Head = 1.2m
Control device = R3
Max. calc. depth = 0.99 m

Peak flow = 12.00 l/s
Orifice diam = 90.6 mm
Available depth = 0.0 m³

Pipeline storage = 0.0 m³
Offline storage = 0.0 m³
Total storage = 75.0 m³

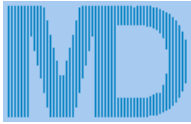
Available MH storage = 0.0 m³

Peak input flow = 64.86 l/s



Head (m)	Flow (l/s)	Head (m)	Flow (l/s)
0.01	0.08	2.01	14.90
0.05	0.95	2.05	15.04
0.10	2.68	2.10	15.23
0.15	4.07	2.15	15.41
0.20	4.70	2.20	15.58
0.25	5.25	2.25	15.76
0.30	5.76	2.30	15.93
0.35	6.22	2.35	16.11
0.40	6.65	2.40	16.28
0.45	7.05	2.45	16.45
0.50	7.43	2.50	16.61
0.55	7.79	2.55	16.78
0.60	8.14	2.60	16.94
0.65	8.47	2.65	17.10
0.70	8.79	2.70	17.26
0.75	9.10	2.75	17.42
0.80	9.40	2.80	17.58
0.85	9.69	2.85	17.74
0.90	9.97	2.90	17.89
0.95	10.24	2.95	18.05
1.00	10.51	3.00	18.20
1.05	10.77	3.05	18.35
1.10	11.02	3.10	18.50
1.15	11.27	3.15	18.65
1.20	11.51	3.20	18.80
1.25	11.75	3.25	18.94
1.30	11.98	3.30	19.09
1.35	12.21	3.35	19.23
1.40	12.43	3.40	19.37
1.45	12.65	3.45	19.52
1.50	12.87	3.50	19.66
1.55	13.08	3.55	19.80
1.60	13.29	3.60	19.94
1.65	13.50	3.65	20.07
1.70	13.70	3.70	20.21
1.75	13.90	3.75	20.35
1.80	14.10	3.80	20.48
1.85	14.29	3.85	20.62
1.90	14.48	3.90	20.75
1.95	14.67	3.95	20.88
2.00	14.86	4.00	21.01

Calculation data provided by Crown Water Ltd, SL5 7NT



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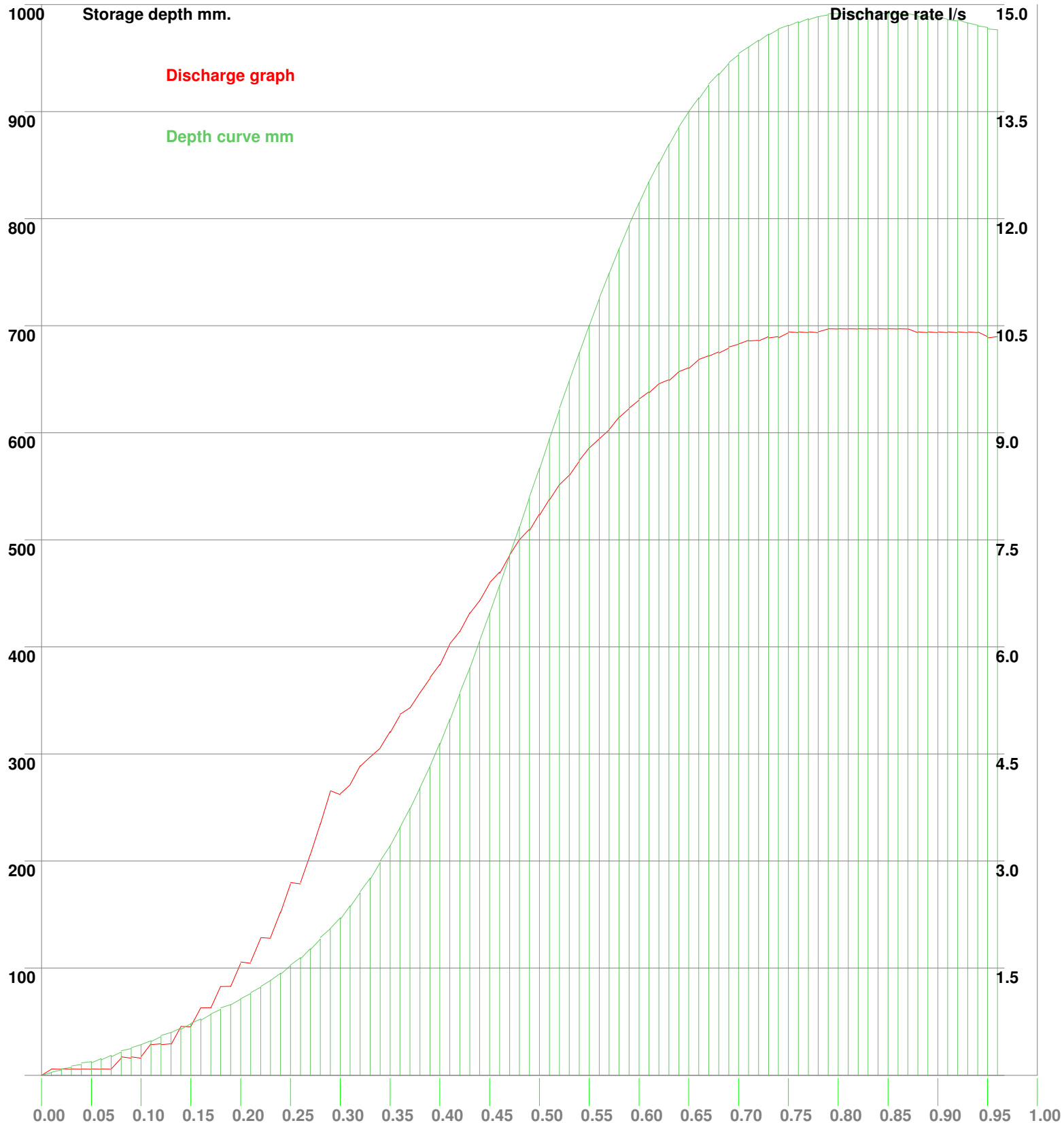
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Project **L3 Vauxhall Road Liverpool - Phase 1**

Title **Hydrograph Storage Analysis (Winter profile) for Liverpool 1 in 100 + 40% Climate Change**

Storage curves for a 1 hours storm.





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Project	L3 Vauxhall Road Liverpool - Phase 1		
Title	Hydrograph Storage Analysis (Winter profile) for Liverpool 1 in 100 + 40% Climate Change		

Incremental rainfall figures.

Storm Mins	Storage Depth mm	Control Flow l/s	Storm Mins	Storage Depth mm	Control Flow l/s
0.6	2.5	0.08	30.6	594.3	8.07
1.2	4.9	0.08	31.2	621.4	8.27
1.8	7.5	0.08	31.8	648.4	8.41
2.4	10.1	0.08	32.4	674.7	8.60
3.0	12.8	0.08	33.0	700.3	8.79
3.6	15.6	0.08	33.6	725.1	8.92
4.2	18.6	0.08	34.2	749.0	9.04
4.8	21.8	0.24	34.8	771.9	9.22
5.4	25.0	0.24	35.4	793.9	9.34
6.0	28.5	0.24	36.0	814.8	9.46
6.6	32.2	0.44	36.6	834.4	9.57
7.2	36.0	0.44	37.2	852.6	9.69
7.8	39.9	0.44	37.8	869.5	9.74
8.4	43.9	0.68	38.4	885.3	9.86
9.0	48.1	0.68	39.0	899.7	9.91
9.6	52.5	0.95	39.6	912.8	10.02
10.2	56.9	0.95	40.2	924.8	10.08
10.8	61.4	1.25	40.8	935.5	10.13
11.4	66.1	1.25	41.4	944.8	10.19
12.0	71.1	1.57	42.0	953.0	10.24
12.6	76.4	1.57	42.6	960.3	10.29
13.2	82.3	1.92	43.2	966.7	10.29
13.8	88.4	1.92	43.8	972.2	10.35
14.4	95.2	2.29	44.4	976.8	10.35
15.0	102.4	2.68	45.0	980.7	10.40
15.6	109.9	2.68	45.6	983.9	10.40
16.2	118.2	3.09	46.2	986.6	10.40
16.8	127.2	3.52	46.8	988.8	10.40
17.4	136.8	3.97	47.4	990.4	10.45
18.0	147.1	3.93	48.0	991.4	10.45
18.6	158.3	4.07	48.6	992.0	10.45
19.2	170.6	4.33	49.2	992.2	10.45
19.8	184.0	4.46	49.8	992.2	10.45
20.4	198.7	4.58	50.4	992.0	10.45
21.0	214.3	4.81	51.0	991.8	10.45
21.6	231.2	5.04	51.6	991.2	10.45
22.2	249.2	5.15	52.2	990.4	10.45
22.8	268.3	5.36	52.8	989.5	10.40
23.4	288.5	5.56	53.4	988.5	10.40
24.0	310.0	5.76	54.0	987.4	10.40
24.6	332.6	6.04	54.6	986.0	10.40
25.2	356.1	6.22	55.2	984.4	10.40
25.8	380.4	6.48	55.8	982.6	10.40
26.4	405.4	6.65	56.4	980.6	10.40
27.0	431.3	6.89	57.0	978.5	10.35
27.6	457.7	7.05	57.6	976.3	10.35
28.2	484.7	7.28	58.2	973.9	10.35
28.8	512.1	7.50	58.8	971.6	10.35
29.4	539.5	7.65	59.4	969.1	10.29
30.0	567.0	7.86	60.0	966.6	10.29

Using the Get Max button causes the program to step through a series of storm durations until a maximum volume is obtained.

Each duration is sampled 600 times and the results recorded. The storm durations (hrs) are:-

0.25, 0.5, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 15, 18, 20, 24, 30, 36, 42, 48, 54, 60, 66, 72, 84, 96, 120, 150, 175, 200, 250, 300, 375, 500, 750, 1000, 1250, 1500, 1570, 2000, 2500, 3000, 3500, 4000

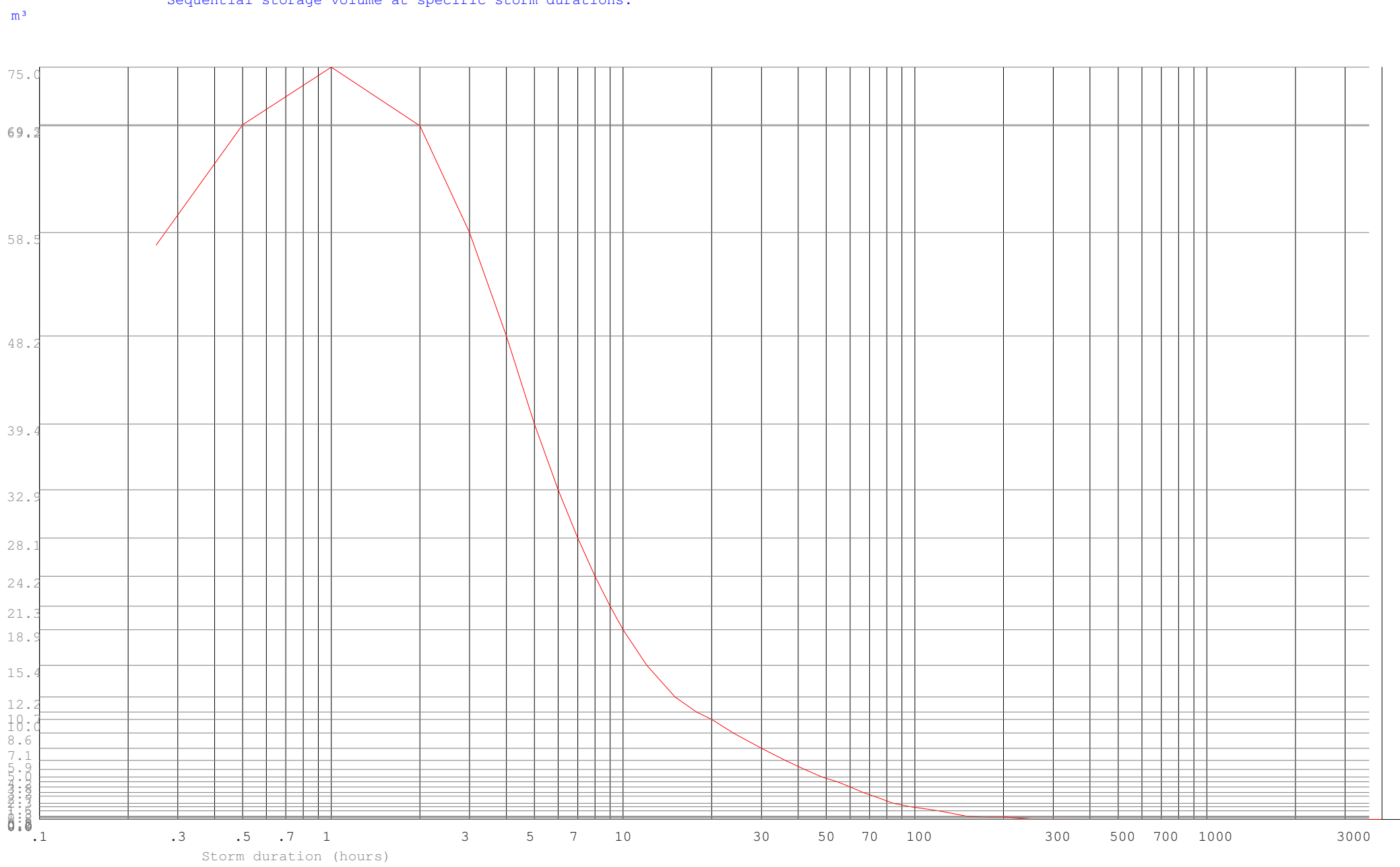
It should be noted that the six hour storm frequently requested rarely demonstrates the worst case for storage.



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Sequential storage volume at specific storm durations.





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