

MasterDrain
SW

Muir Associates (UK) Limited

www.muir-associates.co.uk

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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 30 + 0% Climate Change**

Data:-

Location = IVERPOOL
M5-60 (mm) = 19
Soil index = 0.45
Return period = 30
UCWI = 0.0

Grid reference = SJ9766
r = 0.40
SAAR (mm/yr) = 800
WRAP = 4
Climate change = +0%

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 = 50.8 m³

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

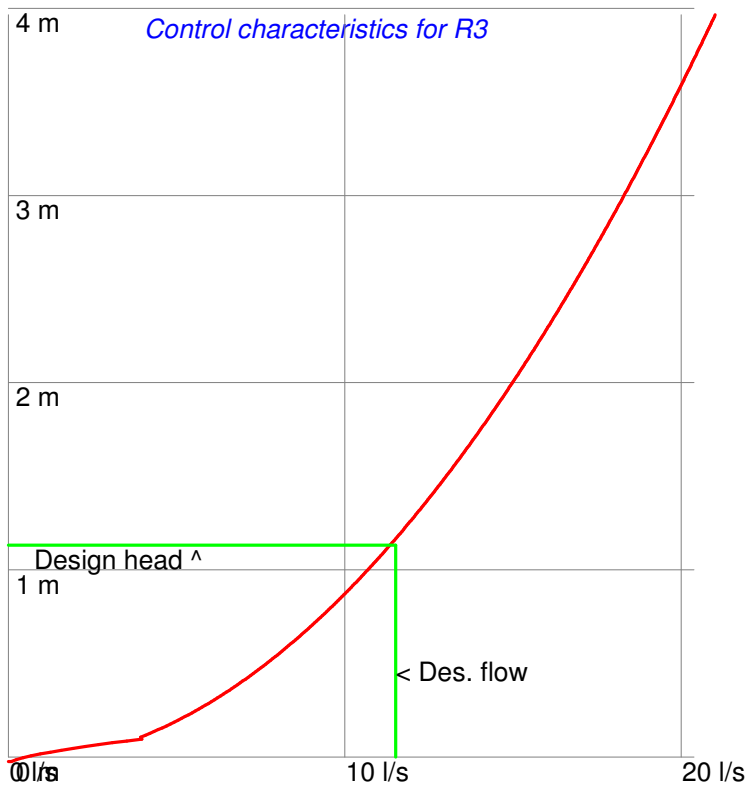
Design Head = 1.2m
Control device = R3
Max. calc. depth = 0.98 m

Peak flow = 10.35 l/s
Orifice diam = 90.6 mm
Available depth = 0.0 m³

Pipeline storage = 0.0 m³
Offline storage = 0.0 m³
Total storage = 34.0 m³

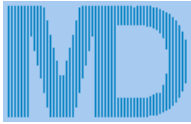
Available MH storage = 0.0 m³

Peak input flow = 35.26 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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Title **Hydrograph Storage Analysis (Winter profile) for Liverpool 1 in 30 + 0% Climate Change**

Storage curves for a 1 hours storm.

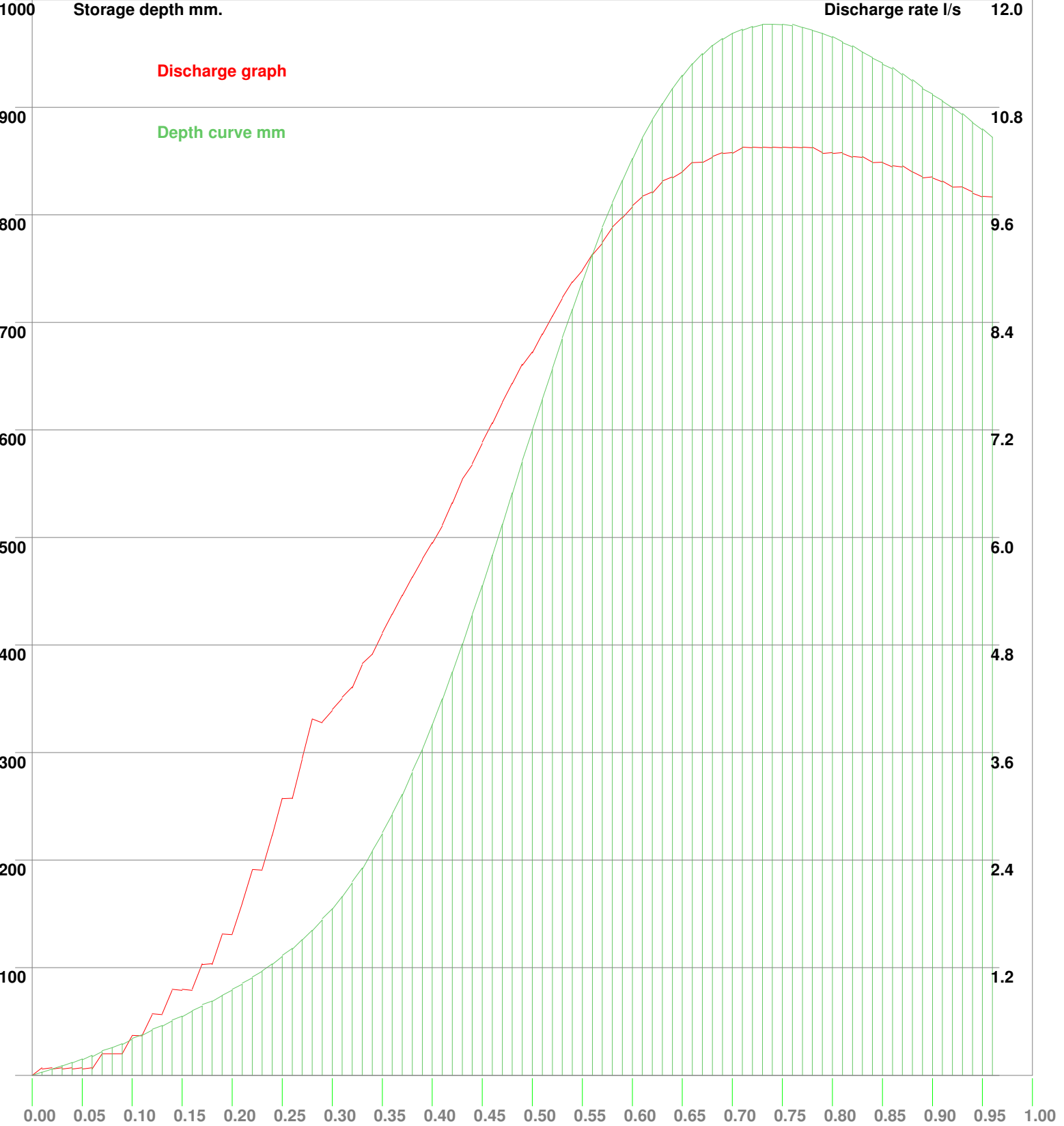
Storage depth mm.

Discharge rate l/s

12.0

Discharge graph

Depth curve mm





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Incremental rainfall figures.

Storm Mins	Storage Depth mm	Control Flow l/s	Storm Mins	Storage Depth mm	Control Flow l/s
0.6	3.0	0.08	30.6	628.2	8.27
1.2	5.9	0.08	31.2	656.6	8.47
1.8	8.9	0.08	31.8	684.6	8.66
2.4	12.0	0.08	32.4	711.9	8.85
3.0	15.2	0.08	33.0	738.2	8.98
3.6	18.5	0.08	33.6	763.5	9.16
4.2	22.0	0.24	34.2	787.6	9.28
4.8	25.6	0.24	34.8	810.4	9.46
5.4	29.4	0.24	35.4	832.1	9.57
6.0	33.5	0.44	36.0	852.4	9.69
6.6	37.7	0.44	36.6	871.1	9.80
7.2	42.0	0.68	37.2	888.1	9.86
7.8	46.2	0.68	37.8	903.5	9.97
8.4	50.5	0.95	38.4	917.4	10.02
9.0	54.9	0.95	39.0	929.8	10.08
9.6	59.6	0.95	39.6	940.5	10.19
10.2	64.4	1.25	40.2	949.9	10.19
10.8	69.1	1.25	40.8	957.7	10.24
11.4	74.0	1.57	41.4	963.9	10.29
12.0	79.1	1.57	42.0	968.7	10.29
12.6	84.7	1.92	42.6	972.4	10.35
13.2	90.6	2.29	43.2	975.1	10.35
13.8	96.7	2.29	43.8	976.7	10.35
14.4	103.5	2.68	44.4	977.2	10.35
15.0	110.6	3.09	45.0	976.8	10.35
15.6	117.9	3.09	45.6	975.7	10.35
16.2	126.1	3.52	46.2	974.0	10.35
16.8	134.9	3.97	46.8	971.6	10.35
17.4	144.3	3.93	47.4	968.6	10.29
18.0	154.8	4.07	48.0	965.0	10.29
18.6	166.1	4.20	48.6	960.8	10.29
19.2	178.7	4.33	49.2	956.2	10.24
19.8	192.8	4.58	49.8	951.3	10.24
20.4	208.1	4.70	50.4	946.3	10.19
21.0	224.5	4.93	51.0	941.2	10.19
21.6	242.3	5.15	51.6	935.8	10.13
22.2	261.3	5.36	52.2	930.1	10.13
22.8	281.5	5.56	52.8	924.3	10.08
23.4	302.9	5.76	53.4	918.4	10.02
24.0	325.8	5.94	54.0	912.4	10.02
24.6	350.0	6.13	54.6	906.1	9.97
25.2	375.1	6.39	55.2	899.6	9.91
25.8	401.1	6.65	55.8	893.0	9.91
26.4	427.8	6.81	56.4	886.1	9.86
27.0	455.4	7.05	57.0	879.1	9.80
27.6	483.6	7.28	57.6	872.0	9.80
28.2	512.3	7.50	58.2	864.8	9.74
28.8	541.4	7.72	58.8	857.6	9.69
29.4	570.4	7.93	59.4	850.3	9.69
30.0	599.4	8.07	60.0	843.0	9.63

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

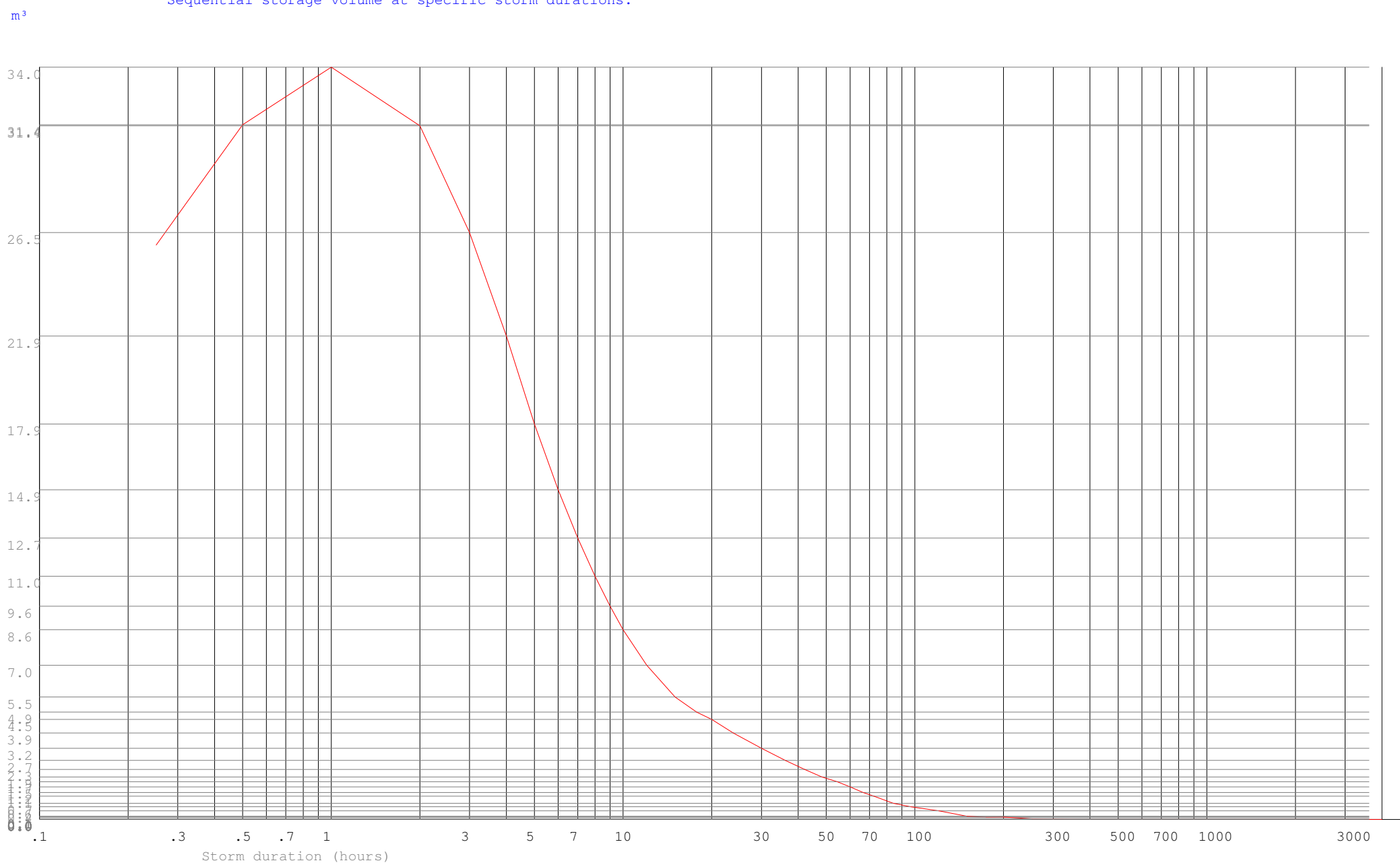
It should be noted that the six hour storm frequently requested rarely demonstrates the worst case for storage.

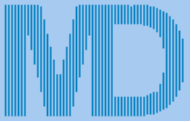


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Sequential storage volume at specific storm durations.





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