

Flood Risk Assessment & Preliminary Foul & Surface Water Drainage Strategy

1.0 Introduction

- 1.1 Following instructions from Portal Construction, Muir Associates (UK) Ltd have undertaken an initial assessment of flooding and drainage issues in relation to a proposed redevelopment site located at Bridge Road North for the construction of 2 No detached industrial units and associated parking and service yards on an existing area currently used as lorry trailer parking within the site.
- 1.2 The site is located in an existing industrial developed area.
- 1.3 The Local Authority is Wrexham County Borough Council, and the wastewater undertaker is Welsh Water.
- 1.4 The comments given in this report and recommendations made are based in the information that could be obtained from reasonably accessible sources and site visits.
- 1.5 Detailed discussions are still to be held with Welsh Water in regard to the outline proposal to make the connection for the foul wastewater to the existing unmapped foul drain to the other side of the road as shown on the plans.
- 1.6 Due to the current ground conditions on site being clay the proposed surface water generated from the site will be retained on site within a below ground storm water attenuation tank, fitted with a flow control device to limit the flow to a maximum pass forward rate of 5 l/s for up to and including the 1 in 100 + 40 % Climate change allowance. The redeveloped site will be connected to the existing surface water drainage holding tank on site.

2.0 Drainage Hierarchy

- 2.1 Current guidance looks to outline all new developments must consider the how they will deal with their surface water drainage and follow the standard rules for such discharge in the following order of priority :
 - 2.1.1 Infiltration – Into the ground by way of soakaway or similar
 - 2.1.2 Surface Water Body – Discharge the surface water generated into a surface water water course or similar existing feature
 - 2.1.3 Existing surface water sewer or highway drain
 - 2.1.4 Existing combined sewer

3.0 Site Flood Risk

- 3.1 The existing site is located within the grounds of Unit 6 Pacific Park, Bridge Road North, Wrexham Industrial Estate LL13 9PN and is located within an area defined as being in a flood risk zone 1 an area with a low probability of flooding from rivers and sea.
- 3.2 A review of the information in relation to both the risk associated with flooding from surface water and reservoirs also show the site as being in a low risk area.

4.0 Existing Drainage

- 4.1** The existing site is currently used for Industrial purposes and consists of an industrial unit with a large service yard, parking areas.
- 4.2** The site currently has an existing surface water connection which is proposed to be used for the new connection within the site whilst the current foul drainage is served by a septic tank.
- 4.3** The ground conditions on site are believed to be firm clay at relatively shallow depths and as such the use of infiltration (soakaways) is extremely unlikely to be a viable option. The adjacent site looks to have undertaken such tests on site and the results were found to demonstrate the ground conditions being unsuitable for such.
- 4.4** There are no water courses within the land immediately around the site and any such connection would be across third party land so the use of attenuation with a control outflow of 5 l/s is to be adopted as the drainage strategy for the site redevelopment.
- 4.5** A review of the sewer records for the area only indicate the site as having no existing public sewers within the immediate vicinity however the presence of both gullies and manhole covers within the road would suggest there is a highway drain available in addition to both surface water and foul sewers being evident to the other side of the road for which the existing surface water drainage on site is connected to the surface water to the other side of the road.
- 4.6** The public sewer records show the location of the public foul sewer within the grassed area to the front of Unit 6 Tower Close, Bridge Road North some 200m away from the site for which the foul sewer located on the opposite side of the road to the site appears to connect to.

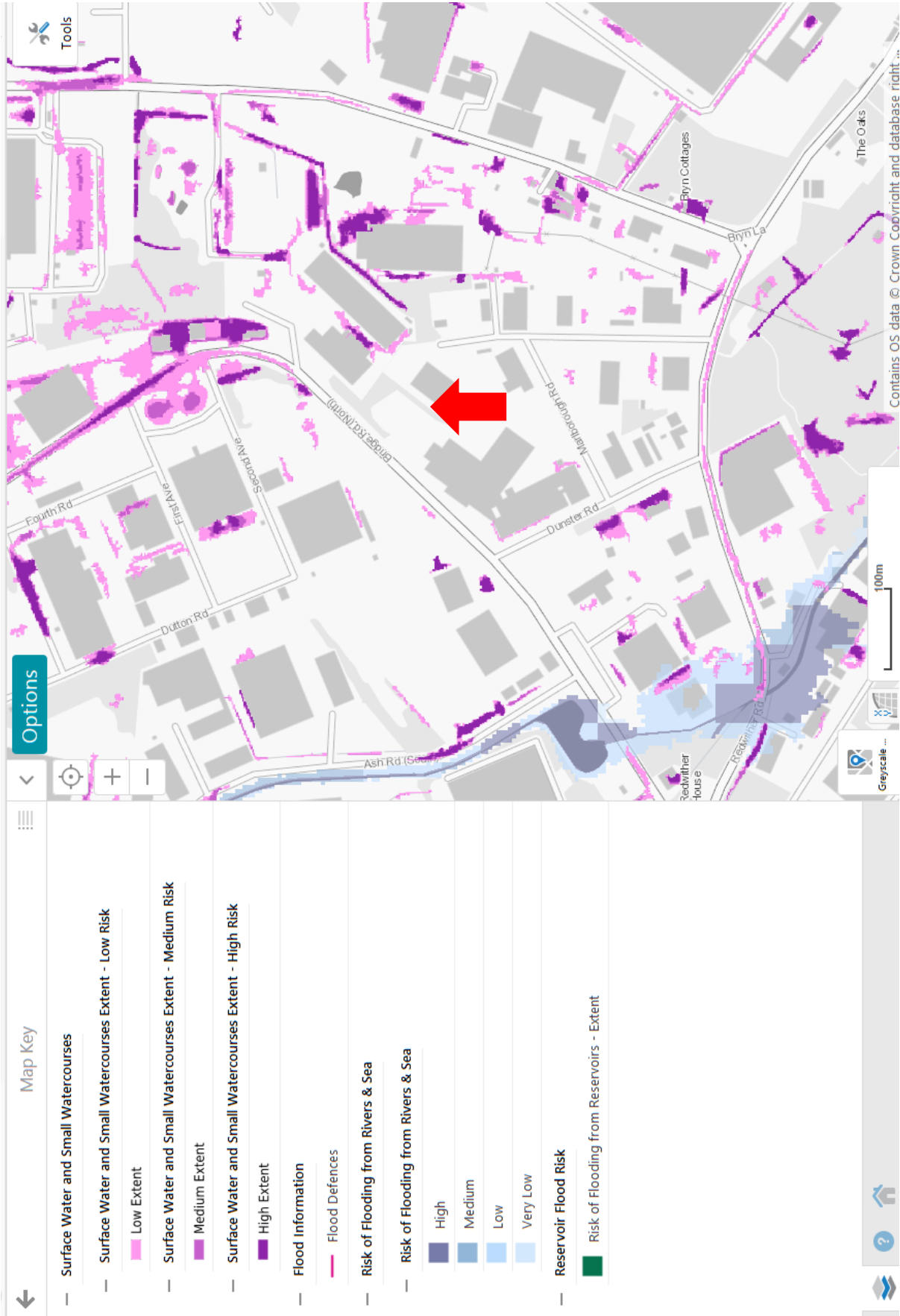
5.0 Proposed Drainage

- 5.1** The development proposal is to therefore attenuate the flow of surface water generated from the site to a control flow of 5 l/s for storm events up to and including the 1 in 100 + 40% Climate change event whilst no flooding will occur to buildings on site or to buildings or land off site.
- 5.2** The below ground system will be designed to accommodate the 1 in 100 + 30% climate change allowance with no flooding occurring on site whilst the additional 10% will be retained on site by means of shallow flooding of service yards and the drainage network on site prior to the attenuation tank.
- 5.3** All below ground drainage will be designed to accommodate the 1 in 30 year event with no flooding occurring on site within the system.
- 5.4** The use of shallow flooding or car park areas will be permitted for exceedances above the 1 in 30 year event so long as they can demonstrate that no flooding will occur off site.

6.0 Conclusion

- 6.1** The site has limited available surface water drainage options available and based on the current surface water drainage hierarchy the use of the existing surface water sewer is likely to be the only appropriate option.
- 6.2** The development proposal looks to use a stormwater attenuation tank (tubosider helibore pipes) to generate the required storage volume whilst limiting the flow from site to 5 l/s.
- 6.3** The proposal looks to limit the flow from site to 5 l/s which will allow the prevention of silting up of any drainage downstream of the attenuation tank and is deemed to be an acceptable discharge flow for new developments.
- 6.4** The maintenance strategy for the proposed attenuation tank system allows full access into the tank for periodic inspections and maintenance in the way of any silt removal should this be required.
- 6.5** Whilst infiltration tests have not been carried out on site the proposal is based on the information reviewed from site investigation data and knowledge of the surrounding area.

Appendix A – Flood Risk Map



The map illustrates the proposed rail alignment through the City of Portland, Oregon. The route is marked by a dashed red line with red dots at key points. The alignment starts in the city center, passes through the city limits, and continues towards the airport. Key locations labeled on the map include 'Anasay To', 'Pond', 'Sub Sta', 'Depot', 'Line B2', and 'Line B1'. A large red arrow points to the central part of the map, indicating the proposed rail alignment. The map also shows various streets, buildings, and other infrastructure in the area.

Appendix C – Proposed Site Drainage Layout



Appendix E – Drainage Calculations



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.	20-1110		
Sheet no.	1		
Date	11/09/20		
By	M	Checked	Reviewed

Project Pacific Park Wrexham

Title Hydrograph Storage Analysis 1 in 100 Year + 30% CC

Data:-

Location = WREXHAM
M5-60 (mm) = 18
Soil index = 0.45
Return period = 100
UCWI = 0.0

Grid reference = SJ3349
r = 0.32
SAAR (mm/yr) = 800
WRAP = 4
Climate change = +30%

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

Percentage runoff = 95.0% (manual setting)

Imperv. area = 4997 m²
Total area = 4997 m²
Total runoff = 485.8 m³

Pervious area = 0 m²
Equiv area = 4747 m² (Tot. area x % runoff).
Discharge rate = 5.000 l/s

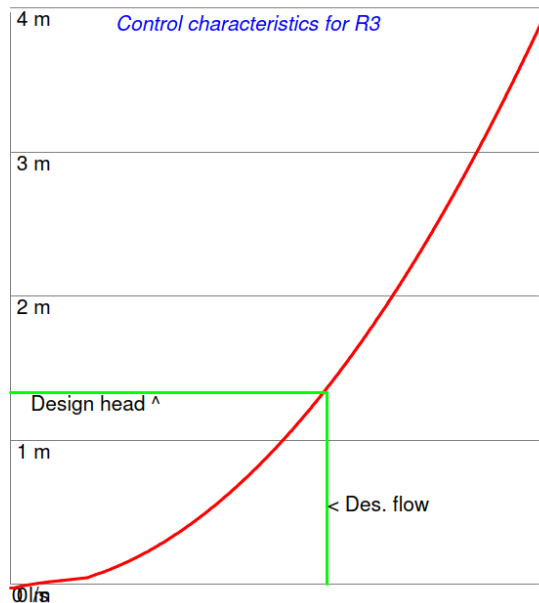
Design Head = 1.4m
Control device = R3
Max. calc. depth = 1.4 m

Peak flow = 4.98 l/s
Orifice diam = 57.5 mm
Available depth = 0.0 m³

Pipeline storage = 0.0 m³
Offline storage = 0.0 m³
Total storage = 351.0 m³

Available MH storage = 0.0 m³

Peak input flow = 22.49 l/s



Head (m)	Flow (l/s)	Head (m)	Flow (l/s)
0.01	0.05	2.01	5.99
0.05	0.60	2.05	6.05
0.10	1.34	2.10	6.12
0.15	1.64	2.15	6.20
0.20	1.89	2.20	6.27
0.25	2.11	2.25	6.34
0.30	2.31	2.30	6.41
0.35	2.50	2.35	6.48
0.40	2.67	2.40	6.55
0.45	2.83	2.45	6.61
0.50	2.99	2.50	6.68
0.55	3.13	2.55	6.75
0.60	3.27	2.60	6.81
0.65	3.41	2.65	6.88
0.70	3.54	2.70	6.94
0.75	3.66	2.75	7.01
0.80	3.78	2.80	7.07
0.85	3.90	2.85	7.13
0.90	4.01	2.90	7.20
0.95	4.12	2.95	7.26
1.00	4.23	3.00	7.32
1.05	4.33	3.05	7.38
1.10	4.43	3.10	7.44
1.15	4.53	3.15	7.50
1.20	4.63	3.20	7.56
1.25	4.72	3.25	7.62
1.30	4.82	3.30	7.68
1.35	4.91	3.35	7.73
1.40	5.00	3.40	7.79
1.45	5.09	3.45	7.85
1.50	5.18	3.50	7.91
1.55	5.26	3.55	7.96
1.60	5.35	3.60	8.02
1.65	5.43	3.65	8.07
1.70	5.51	3.70	8.13
1.75	5.59	3.75	8.18
1.80	5.67	3.80	8.24
1.85	5.75	3.85	8.29
1.90	5.82	3.90	8.35
1.95	5.90	3.95	8.40
2.00	5.98	4.00	8.45

Calculation data provided by Crown Water Ltd, SLS 7NT



MasterDrain
SW

**Muir Associates (UK)
Limited**

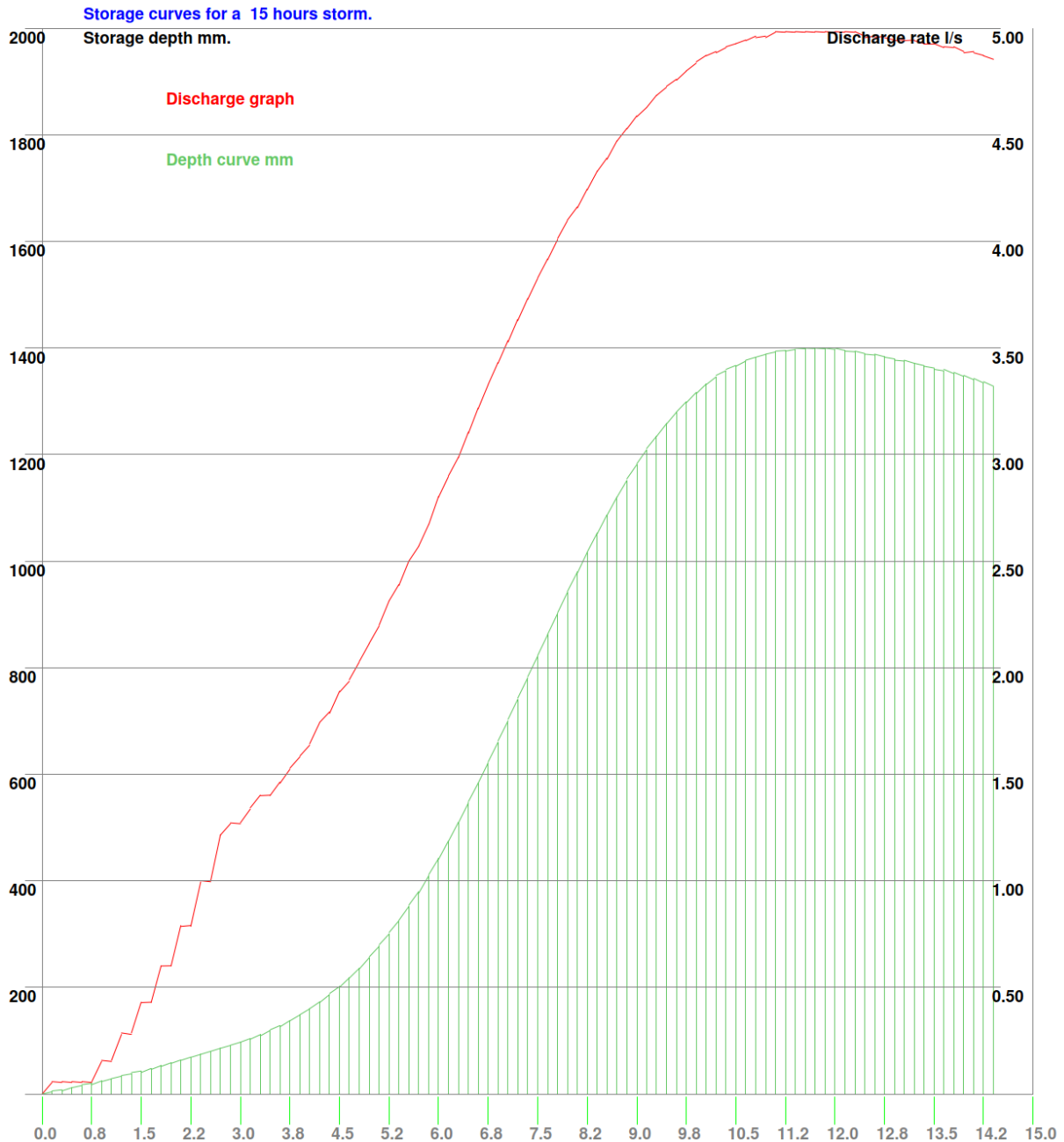
www.muir-associates.co.uk

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

Job No.	20-1110		
Sheet no.	2		
Date	11/09/20		
By	M	Checked	Reviewed

Project **Pacific Park Wrexham**

Title **Hydrograph Storage Analysis 1 in 100 Year + 30% CC**





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.	20-1110		
Sheet no.	3		
Date	11/09/20		
By	M	Checked	Reviewed

Project	Pacific Park Wrexham
Title	Hydrograph Storage Analysis 1 in 100 Year + 30% CC

Incremental rainfall figures.

Storm Mins	Storage Depth mm	Control Flow l/s	Storm Mins	Storage Depth mm	Control Flow l/s
9.0	3.9	0.05	459.0	861.7	3.92
18.0	7.6	0.05	468.0	901.5	4.01
27.0	11.6	0.05	477.0	940.9	4.10
36.0	15.5	0.05	486.0	979.4	4.16
45.0	19.7	0.05	495.0	1016.7	4.25
54.0	24.0	0.15	504.0	1052.7	4.33
63.0	28.4	0.15	513.0	1087.2	4.39
72.0	33.1	0.28	522.0	1120.2	4.47
81.0	37.7	0.28	531.0	1151.6	4.53
90.0	42.7	0.43	540.0	1181.4	4.59
99.0	47.8	0.43	549.0	1209.1	4.63
108.0	53.1	0.60	558.0	1234.6	4.69
117.0	58.2	0.60	567.0	1258.0	4.72
126.0	63.5	0.79	576.0	1279.6	4.76
135.0	68.7	0.79	585.0	1299.2	4.80
144.0	74.4	1.00	594.0	1316.6	4.84
153.0	79.8	1.00	603.0	1332.3	4.87
162.0	85.4	1.22	612.0	1346.0	4.89
171.0	90.9	1.27	621.0	1357.6	4.91
180.0	96.9	1.27	630.0	1367.4	4.93
189.0	103.7	1.34	639.0	1375.8	4.95
198.0	111.1	1.40	648.0	1382.7	4.96
207.0	119.1	1.40	657.0	1388.3	4.96
216.0	128.1	1.46	666.0	1392.5	4.98
225.0	137.7	1.52	675.0	1395.6	4.98
234.0	148.2	1.58	684.0	1397.6	4.98
243.0	159.7	1.64	693.0	1398.9	4.98
252.0	172.5	1.74	702.0	1399.2	4.98
261.0	186.4	1.79	711.0	1398.8	4.98
270.0	201.5	1.89	720.0	1397.5	4.98
279.0	217.8	1.94	729.0	1395.5	4.98
288.0	235.7	2.03	738.0	1392.9	4.98
297.0	255.6	2.11	747.0	1390.0	4.96
306.0	277.2	2.20	756.0	1386.8	4.96
315.0	300.1	2.31	765.0	1383.5	4.96
324.0	325.0	2.39	774.0	1379.8	4.95
333.0	351.6	2.50	783.0	1375.7	4.95
342.0	379.8	2.57	792.0	1371.4	4.95
351.0	409.7	2.67	801.0	1367.0	4.93
360.0	441.5	2.80	810.0	1362.4	4.93
369.0	475.0	2.90	819.0	1357.4	4.91
378.0	509.9	2.99	828.0	1352.1	4.91
387.0	545.9	3.11	837.0	1346.5	4.89
396.0	583.0	3.22	846.0	1340.6	4.89
405.0	621.2	3.33	855.0	1334.6	4.87
414.0	660.3	3.43	864.0	1328.3	4.86
423.0	700.2	3.54	873.0	1321.9	4.86
432.0	740.7	3.64	882.0	1315.5	4.84
441.0	781.1	3.73	891.0	1309.0	4.82
450.0	821.5	3.83	900.0	1302.5	4.82

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.