



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. 1132-22		
Sheet no. 1		
Date 21/11/22		
By MJ	Checked	Reviewed

Project

Title **Surcharge calcs (Sized at 30 yrs storm) for SURFACE WATER DESIGN.SW**

Using in-line restrictors
Return period = 30 yrs
Climate change factor = 0

PEAK hydrograph values printed
Storm duration = 120 mins
No offline storage

Mean rain intens. 18.00 mm/hr
Storm profile = Winter
Using FSR data

Peak rain intens. 45.00 mm/hr
Sample period = 60.0 secs.

Entry No.	SECT. No.	MANHOLE REF	PIPE CAPACITY l/s	RATE FLOW l/s	PIPE SIZE mm	CHAMBER DIAM/LxW mm	INVERT LEVEL m	WATER LEVEL m	GRND LEVEL m	SURCHARGE fract.	Depth	EXCESS FLOW l/s	FLOODED VOL m³	DRAINED AREA (m²) :x FACTOR :	STATUS	
1	I	1.01	S-MH-01	42.1	2.8	225	1200	43.85	43.88	44.80	0.07	0.03	0.00	0.000	527	OK
2	I	1.02	S-MH-02	77.8	8.4	300	1200	43.58	43.63	44.80	0.11	0.05	0.00	0.000	1579	OK
3	I	1.03	S-MH-03	78.4	11.2	300	1200	43.43	43.49	44.80	0.14	0.06	0.00	0.000	2106	OK
4	I	1.04	S-MH-04	78.0	11.2	300	1500	43.30	43.36	44.60	0.14	0.06	0.00	0.000	2106	OK
5	B	2.01	S-MH-09	184.0	5.7	450	1500	43.08	43.11	44.35	0.03	0.03	0.00	0.000	1065	OK
6	B	2.02	S-MH-10	184.9	19.0	450	1500	42.99	43.07	44.35	0.10	0.07	0.00	0.000	3560	OK
7	B	2.03	S-MH-12	398.2	19.0	450	1500	42.87	42.91	44.35	0.05	0.04	0.00	0.000	3560	OK
8	I	1.05	S-MH-05	227.8	30.2	450	1500	42.79	42.88	44.42	0.13	0.09	0.00	0.000	5666	OK
9	B	3.01	S-MH-13	42.1	2.8	225	1200	43.90	43.93	44.80	0.07	0.03	0.00	0.000	527	OK
10	B	3.02	S-MH-14	95.8	8.4	300	1200	43.70	43.74	44.80	0.09	0.04	0.00	0.000	1582	OK
11	B	3.03	S-MH-15	298.4	11.2	300	1200	43.47	43.50	44.92	0.04	0.02	0.00	0.000	2109	OK
12	I	1.06	S-MH-06†	14.6	4.8	150	1500	42.72	42.77	44.75	0.33	0.05	0.00	0.000	7775	OK
13	I	1.07	S-MH-07	14.6	4.8	150	1200	42.65	42.71	44.35	0.33	0.05	0.00	0.000	7775	OK
14	I	1.08	S-MH-08	18.6	4.8	150	1200	42.40	42.45	44.46	0.26	0.05	0.00	0.000	7775	OK



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. 1132-22		
Sheet no. 2		
Date 21/11/22		
By MJ	Checked	Reviewed

Project	
Title	Surcharge calcs (Sized at 30 yrs storm) for SURFACE WATER DESIGN.SW

Notes

Printout headings

- | | | |
|---|---|--|
| 1) Entry no - position in file | 2) Section no - pipe identifier | 3) Manhole ref - Manhole identifier |
| 4) Pipe cap - full bore capacity of that pipe | 5) Rate of flow - calculated flow rate (l/s) ‡ = flow restrictor. | 6) Pipe diam - outlet pipe diameter (mm) |
| 7) Chamber diam - chamber diam. at base of MH | 8) Invert level - invert level of manhole | 9) Water level - calculated peak water level. |
| 10) Grnd level - ground / cover level | 11) Surch. fract - calc.flow/pipe capacity | 12) Surch. depth - surcharge level above soffit |
| 13) Overflow - surcharged flow rate (l/s) | 14) Flooded vol - volume of water above cover | 15) Upstrm Vol - upstream pipe vol to previous manhole(s) |
| 16) Status - OK - outlet not surcharged | 17) Status - Surcharged - outlet surcharged | 18) Status - Warning - water level within 299mm of cover level |
| 19) Status - Flooded - cover over-topped | 20) § against diameter indicates throttle pipe used. | |

Title box

Hydrograph data

- | | | |
|---|--------------------------------------|--|
| 1) Ret. period - that used to calculate profile | 2) Duration - length of storm (mins) | 3) Profile - either Winter (75%) or Summer (50%) |
|---|--------------------------------------|--|

Flow restrictors

Manhole reference - S-MH-06

Restrictor flowrate - 4.83 l/s



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. 1132-22		
Sheet no. 3		
Date 21/11/22		
By MJ	Checked	Reviewed

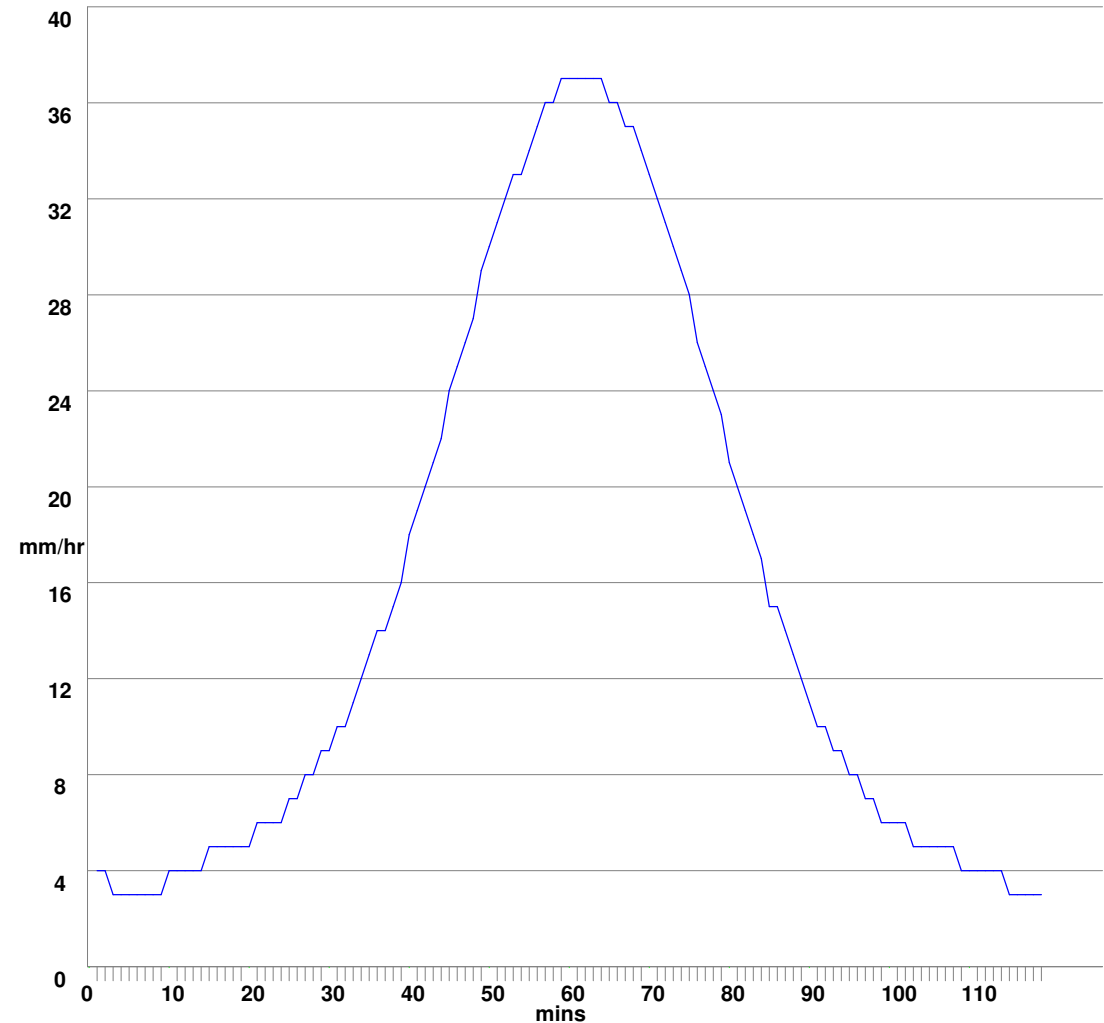
Project

Title **Surcharge calcs (Sized at 30 yrs storm) for SURFACE WATER DESIGN.SW**

Time mins	Rain mm/hr	Time mins	Rain mm/hr	Time mins	Rain mm/hr
1:00	3.98	41:00	18.88	81:00	20.21
2:00	3.98	42:00	20.07	82:00	19.18
3:00	2.95	43:00	21.10	83:00	18.00
4:00	2.95	44:00	22.43	84:00	16.52
5:00	2.95	45:00	23.75	85:00	15.49
6:00	2.95	46:00	24.93	86:00	14.61
7:00	3.25	47:00	25.97	87:00	13.72
8:00	3.25	48:00	27.29	88:00	12.84
9:00	3.39	49:00	28.77	89:00	12.10
10:00	3.69	50:00	29.80	90:00	11.21
11:00	3.84	51:00	30.98	91:00	10.33
12:00	3.98	52:00	31.72	92:00	9.74
13:00	4.28	53:00	32.61	93:00	9.29
14:00	4.43	54:00	33.49	94:00	8.85
15:00	4.57	55:00	34.23	95:00	8.11
16:00	4.72	56:00	35.11	96:00	7.67
17:00	4.87	57:00	35.70	97:00	7.23
18:00	5.02	58:00	36.29	98:00	6.64
19:00	5.16	59:00	36.59	99:00	6.20
20:00	5.46	60:00	36.74	100:00	6.05
21:00	5.61	61:00	36.88	101:00	5.90
22:00	5.90	62:00	36.88	102:00	5.75
23:00	5.90	63:00	36.74	103:00	5.46
24:00	6.20	64:00	36.59	104:00	5.31
25:00	6.64	65:00	36.29	105:00	5.16
26:00	7.08	66:00	35.85	106:00	4.87
27:00	7.52	67:00	35.26	107:00	4.72
28:00	8.11	68:00	34.52	108:00	4.72
29:00	8.56	69:00	33.64	109:00	4.43
30:00	9.15	70:00	32.75	110:00	4.28
31:00	9.59	71:00	32.02	111:00	3.98
32:00	10.33	72:00	31.13	112:00	3.84
33:00	11.07	73:00	30.10	113:00	3.69
34:00	11.80	74:00	28.92	114:00	3.54
35:00	12.69	75:00	27.59	115:00	3.25
36:00	13.57	76:00	26.26	116:00	3.25
37:00	14.31	77:00	25.08	117:00	3.10
38:00	15.34	78:00	23.90	118:00	2.95
39:00	16.38	79:00	22.87	119:00	2.95
40:00	17.70	80:00	21.39	120:00	2.95

Hydrograph profile derived from data in the Flood Studies Report

Return period= 30 yrs Duration= 120 mins Profile - winter





MasterDrain
SW

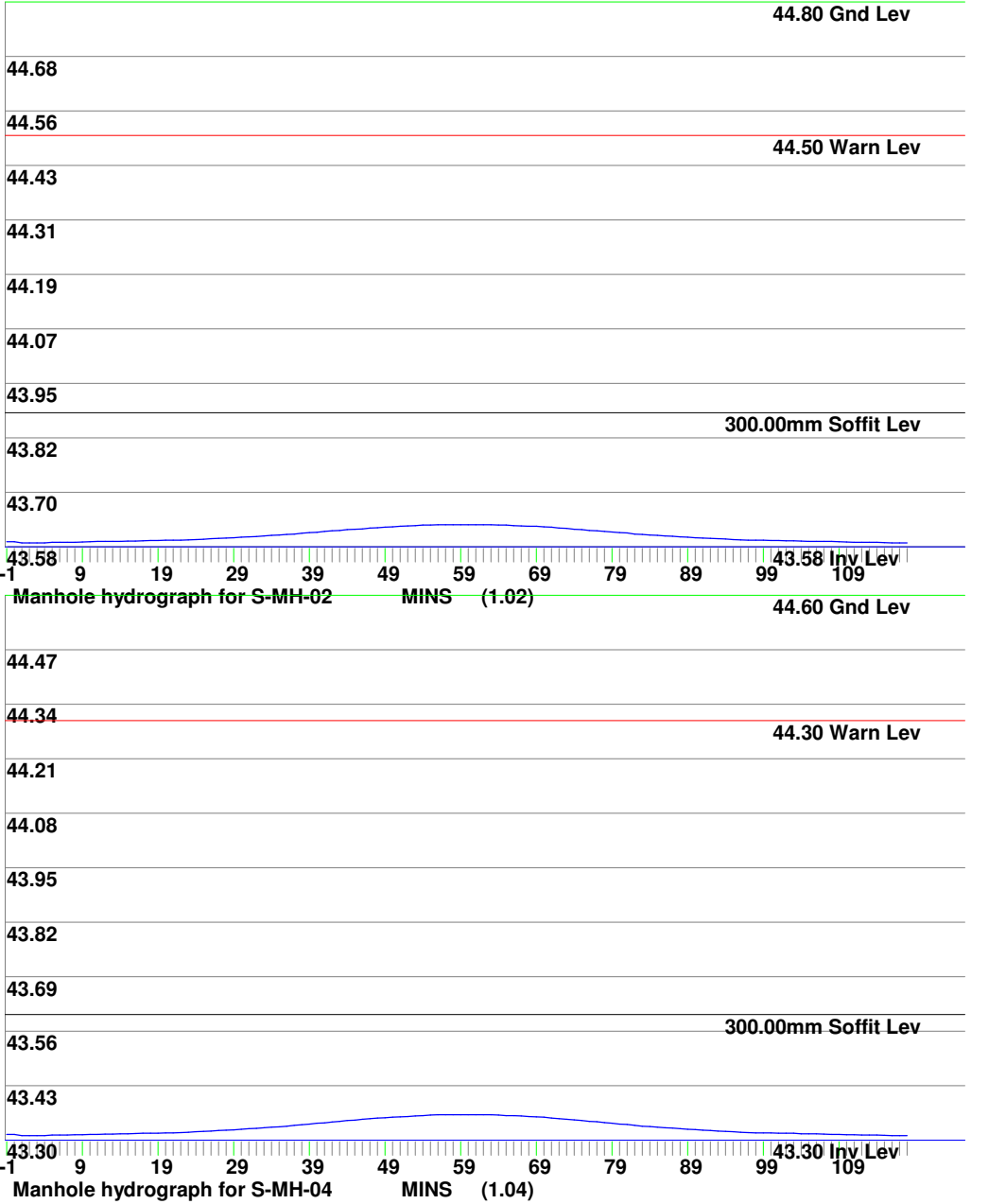
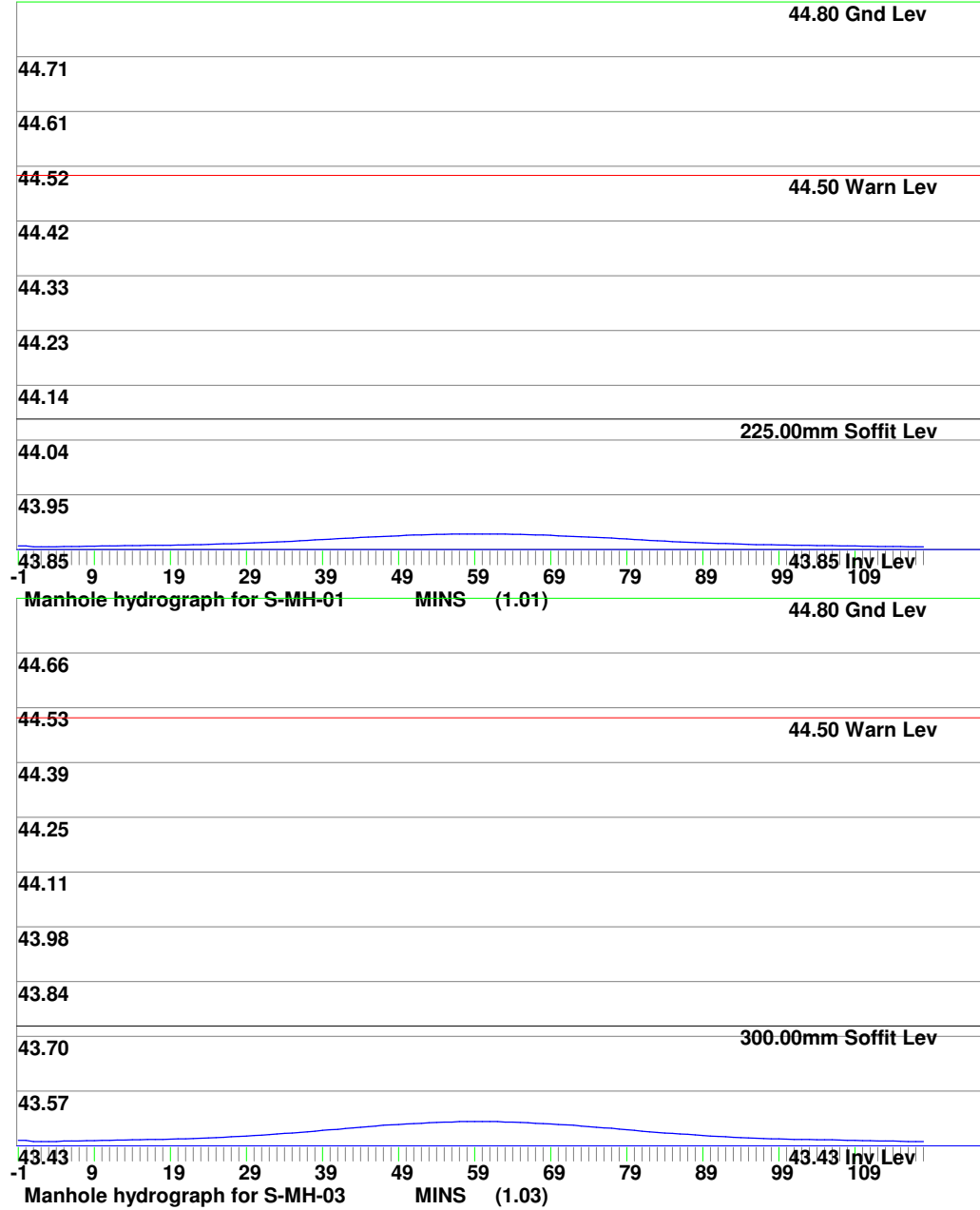
Muir Associates (UK)
Limited

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. 1132-22		
Sheet no. 4		
Date 21/11/22		
By MJ	Checked	Reviewed

Project	
Title	Surcharge calcs (Sized at 30 yrs storm) for SURFACE WATER DESIGN.SW





MasterDrain
SW

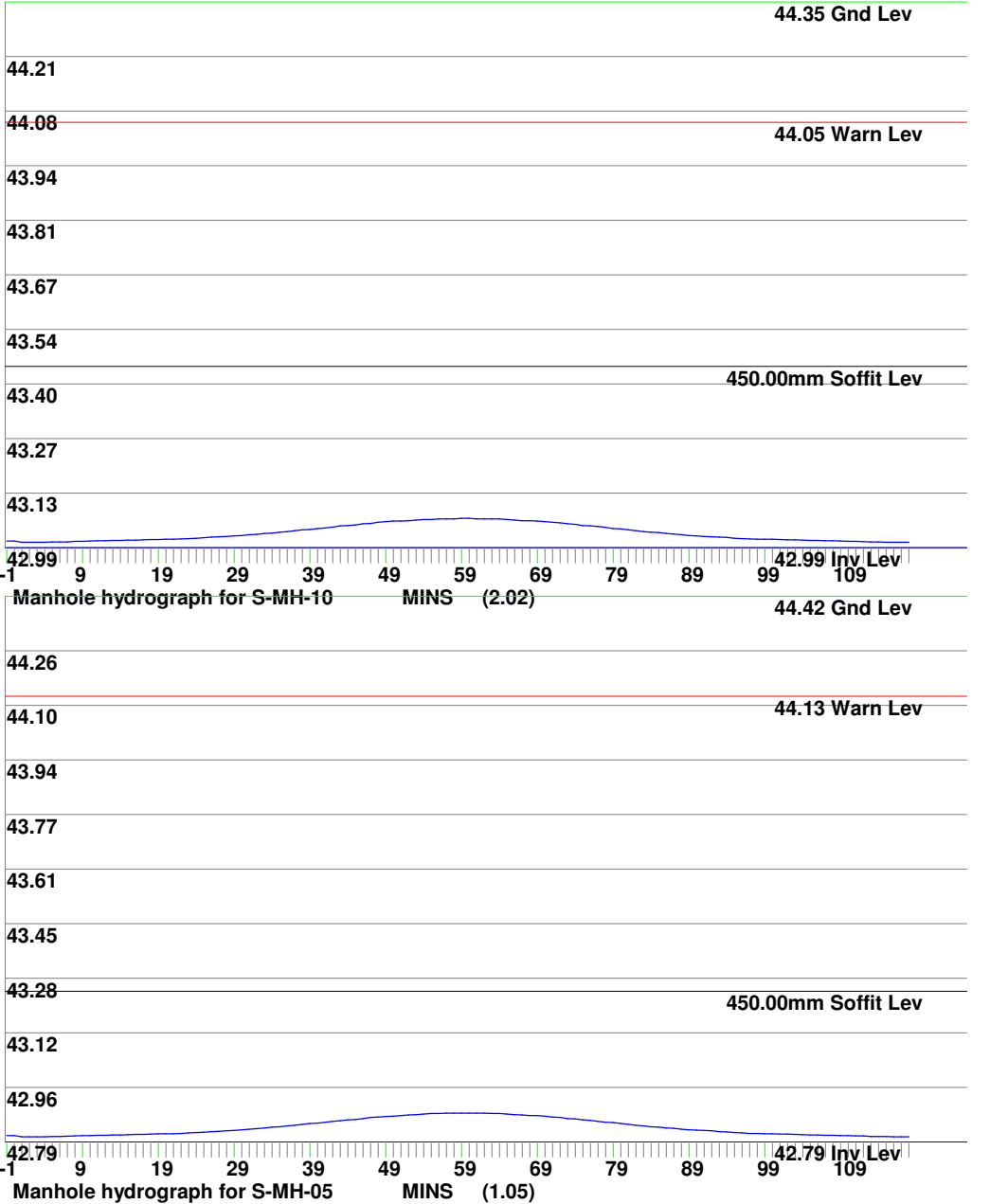
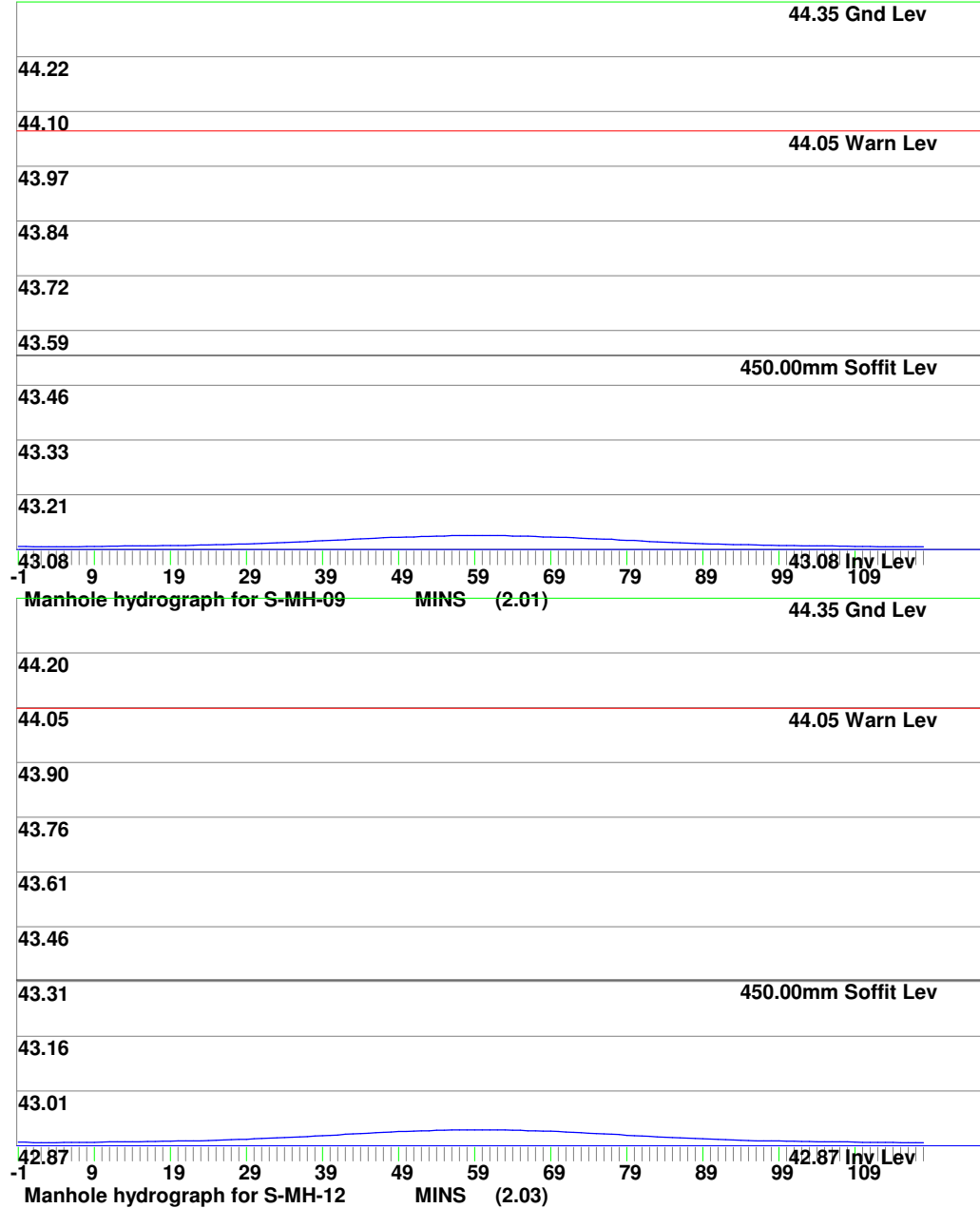
**Muir Associates (UK)
Limited**

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. 1132-22		
Sheet no. 5		
Date 21/11/22		
By MJ	Checked	Reviewed

Project	
Title	Surcharge calcs (Sized at 30 yrs storm) for SURFACE WATER DESIGN.SW

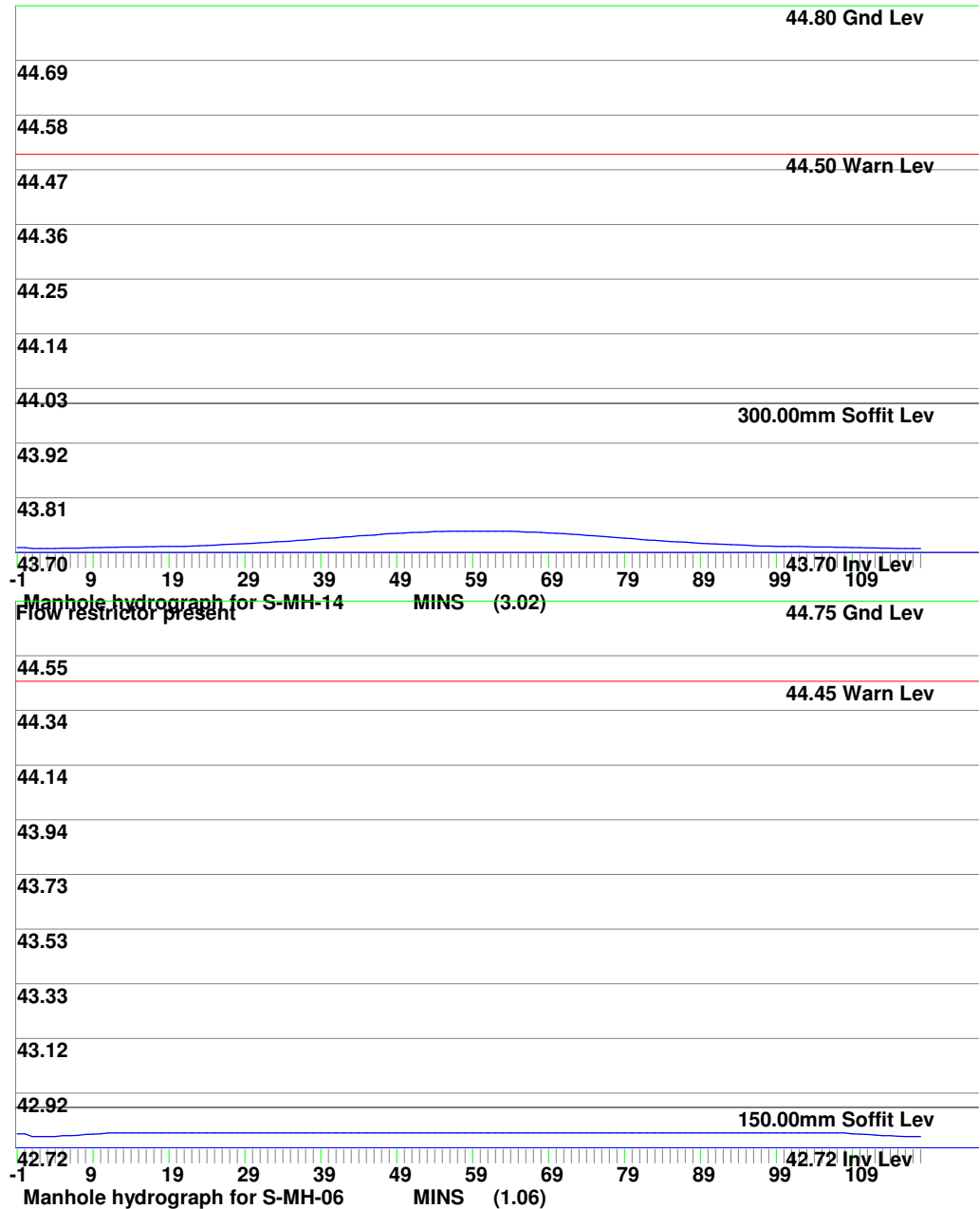




www.muir-associates.co.uk

Job No. 1132-22		
Sheet no. 6		
Date 21/11/22		
By MJ	Checked	Reviewed

Title **Surcharge calcs (Sized at 30 yrs storm) for SURFACE WATER DESIGN.SW**





MasterDrain
SW

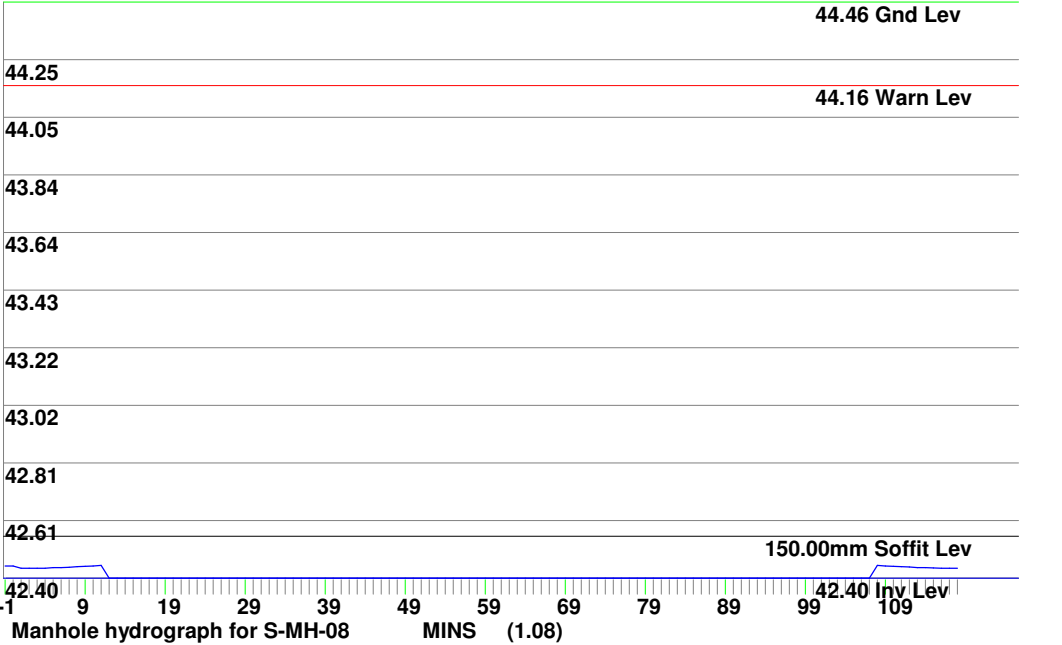
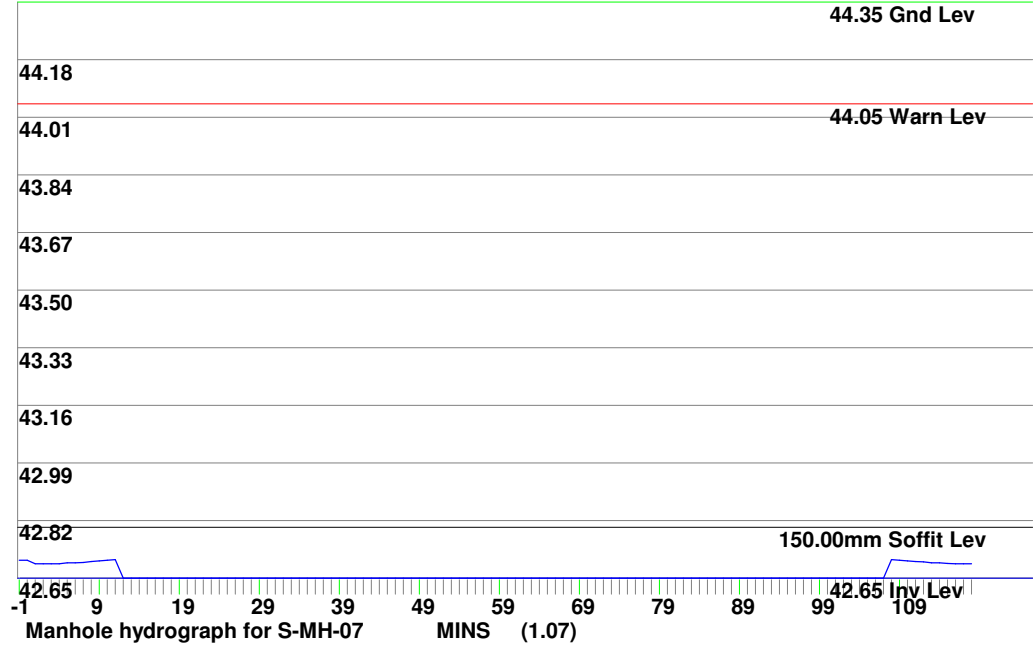
**Muir Associates (UK)
Limited**

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. 1132-22		
Sheet no. 7		
Date 21/11/22		
By MJ	Checked	Reviewed

Project	
Title	Surcharge calcs (Sized at 30 yrs storm) for SURFACE WATER DESIGN.SW





MasterDrain
SW

Muir Associates (UK) Limited

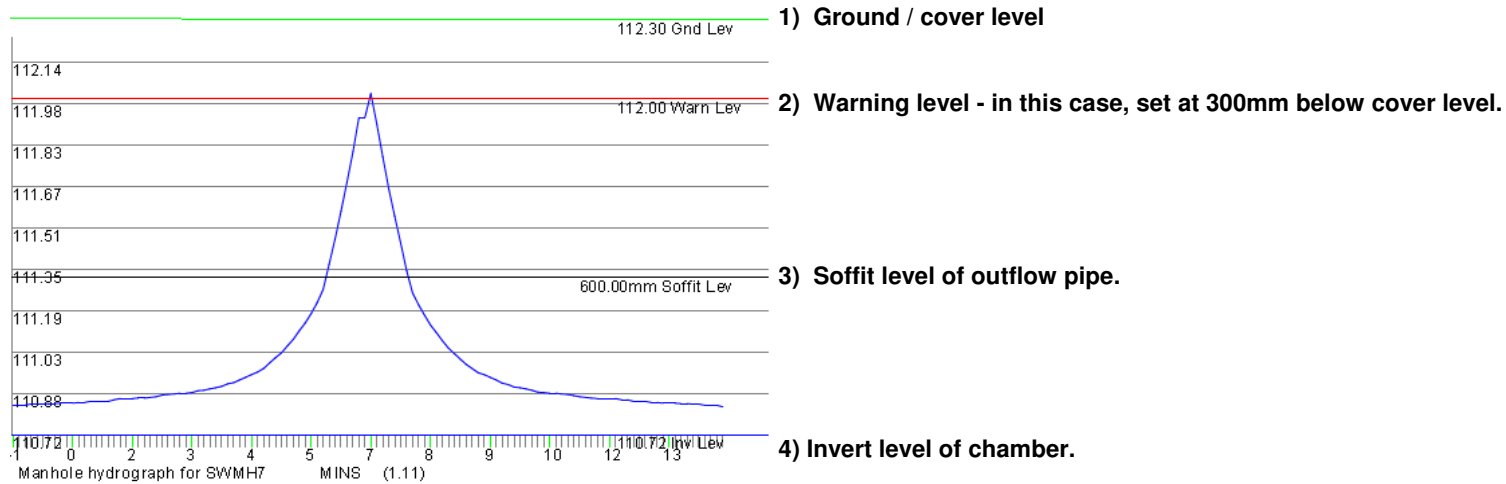
www.muir-associates.co.uk

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

Job No.	1132-22		
Sheet no.	8		
Date	21/11/22		
By	MJ	Checked	Reviewed

Project

Title **Surcharge calcs (Sized at 30 yrs storm) for SURFACE WATER DESIGN.SW**



Notes

- Lower section of the graph shows the water depth filling the channel. Channel is assumed to be a full pipe diameter in depth.
- Upper section of the graph shows the water depth filling the chamber. Chamber has a greater width/diameter than the channel, so increases in depth are proportionally less.
- The top of the graph clips the warning level and would be marked thus on the printout.
- In many cases the invert of the offline storage is required to enter at the channel soffit level, meaning that the pipe will still surcharge but flooding risk reduced.
- The diagram above is a general one and is not part of the current calculation.