



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 CCF = 40%**

Using in-line restrictors
Return period = 100 yrs
Climate change factor = 40

PEAK hydrograph values printed
Storm duration = 720 mins
No offline storage

Mean rain intens. 8.00 mm/hr
Storm profile = Summer
Using FSR data

Peak rain intens. 31.36 mm/hr
Sample period = 360.0 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		EXCESS FLOW l/s	FLOODED VOL m³	DRAINED AREA (m²) :x FACTOR	STATUS	
										fract.	Depth					
1	I	1.01	S-MH-01	42.1	2.0	225	1200	43.85	43.88	44.80	0.05	0.02	0.00	0.000	527	OK
2	I	1.02	S-MH-02	77.8	6.0	300	1200	43.58	43.62	44.80	0.08	0.04	0.00	0.000	1579	OK
3	I	1.03	S-MH-03	78.4	8.0	300	1200	43.43	43.48	44.80	0.10	0.05	0.00	0.000	2106	OK
4	I	1.04	S-MH-04	78.0	8.0	300	1500	43.30	43.35	44.60	0.10	0.05	0.00	0.000	2106	OK
5	B	2.01	S-MH-09	184.0	4.1	450	1500	43.08	43.11	44.35	0.02	0.03	0.00	0.000	1065	OK
6	B	2.02	S-MH-10	184.9	13.6	450	1500	42.99	43.05	44.35	0.07	0.06	0.00	0.000	3560	OK
7	B	2.03	S-MH-12	398.2	13.6	450	1500	42.87	42.90	44.35	0.03	0.03	0.00	0.000	3560	OK
8	I	1.05	S-MH-05	227.8	21.6	450	1500	42.79	42.86	44.42	0.09	0.07	0.00	0.000	5666	OK
9	B	3.01	S-MH-13	42.1	2.0	225	1200	43.90	43.92	44.80	0.05	0.02	0.00	0.000	527	OK
10	B	3.02	S-MH-14	95.8	6.0	300	1200	43.70	43.73	44.80	0.06	0.03	0.00	0.000	1582	OK
11	B	3.03	S-MH-15	298.4	8.0	300	1200	43.47	43.49	44.92	0.03	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 CCF = 40%**

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

Flood volumes

Check that the upstream storage of the manhole is adequate to take the flood volume - see Upstrm Vol above.



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

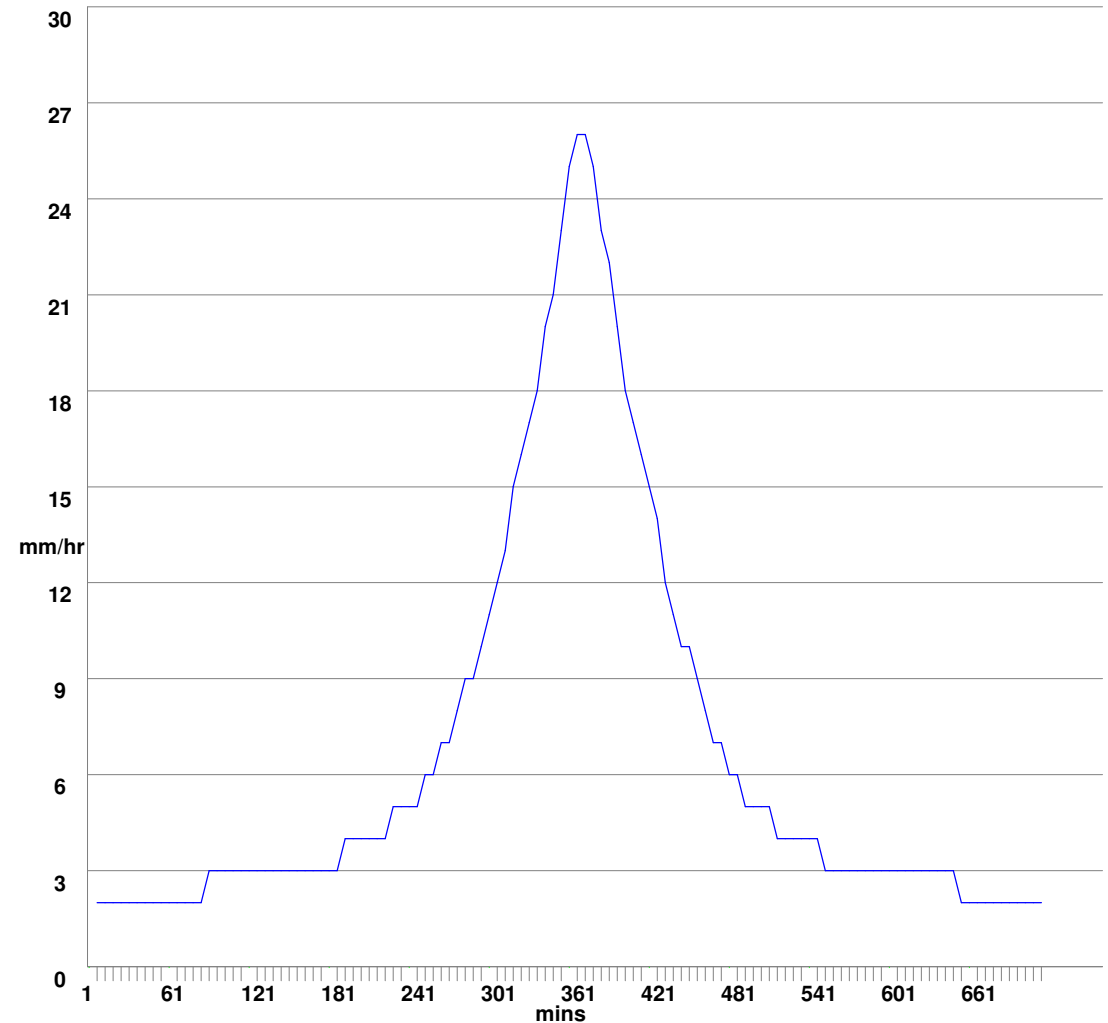
Project

Title **Surcharge calcs (Sized at 30 yrs storm) for SURFACE WATER DESIGN.SW CCF = 40%**

Time mins	Rain mm/hr	Time mins	Rain mm/hr	Time mins	Rain mm/hr
6:00	1.88	246:00	5.38	486:00	5.78
12:00	1.88	252:00	5.72	492:00	5.45
18:00	2.15	258:00	6.05	498:00	5.11
24:00	2.15	264:00	6.52	504:00	4.77
30:00	2.15	270:00	7.13	510:00	4.57
36:00	2.22	276:00	7.87	516:00	4.30
42:00	2.22	282:00	8.54	522:00	4.10
48:00	2.29	288:00	9.28	528:00	3.97
54:00	2.29	294:00	10.29	534:00	3.83
60:00	2.35	300:00	11.30	540:00	3.77
66:00	2.35	306:00	12.30	546:00	3.56
72:00	2.35	312:00	13.38	552:00	3.43
78:00	2.42	318:00	14.52	558:00	3.43
84:00	2.42	324:00	15.60	564:00	3.36
90:00	2.56	330:00	16.81	570:00	3.29
96:00	2.56	336:00	18.29	576:00	3.23
102:00	2.56	342:00	19.70	582:00	3.03
108:00	2.62	348:00	21.18	588:00	2.96
114:00	2.69	354:00	22.86	594:00	2.89
120:00	2.76	360:00	24.61	600:00	2.89
126:00	2.76	366:00	26.36	606:00	2.82
132:00	2.82	372:00	26.36	612:00	2.76
138:00	2.82	378:00	24.95	618:00	2.76
144:00	2.89	384:00	23.13	624:00	2.69
150:00	2.96	390:00	21.52	630:00	2.62
156:00	3.03	396:00	19.97	636:00	2.62
162:00	3.16	402:00	18.49	642:00	2.56
168:00	3.29	408:00	17.15	648:00	2.56
174:00	3.36	414:00	15.87	654:00	2.42
180:00	3.43	420:00	14.73	660:00	2.42
186:00	3.43	426:00	13.58	666:00	2.35
192:00	3.56	432:00	12.44	672:00	2.35
198:00	3.63	438:00	11.50	678:00	2.35
204:00	3.83	444:00	10.42	684:00	2.29
210:00	3.97	450:00	9.55	690:00	2.29
216:00	4.10	456:00	8.67	696:00	2.22
222:00	4.24	462:00	7.93	702:00	2.22
228:00	4.51	468:00	7.26	708:00	2.22
234:00	4.71	474:00	6.59	714:00	2.15
240:00	5.04	480:00	6.12	720:00	2.15

Hydrograph profile derived from data in the Flood Studies Report

Return period= 100 yrs Duration= 720 mins Profile - summer





MasterDrain
SW

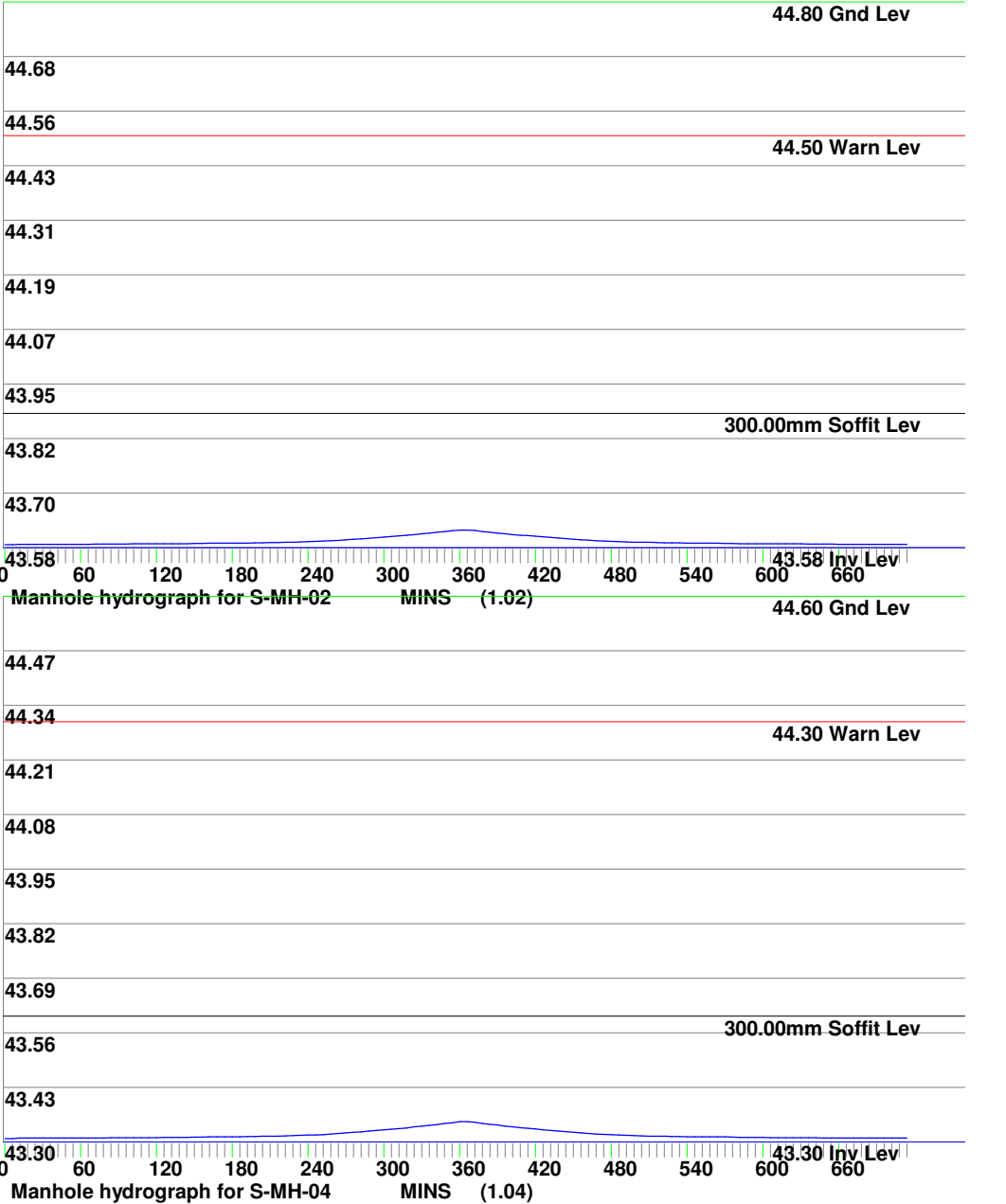
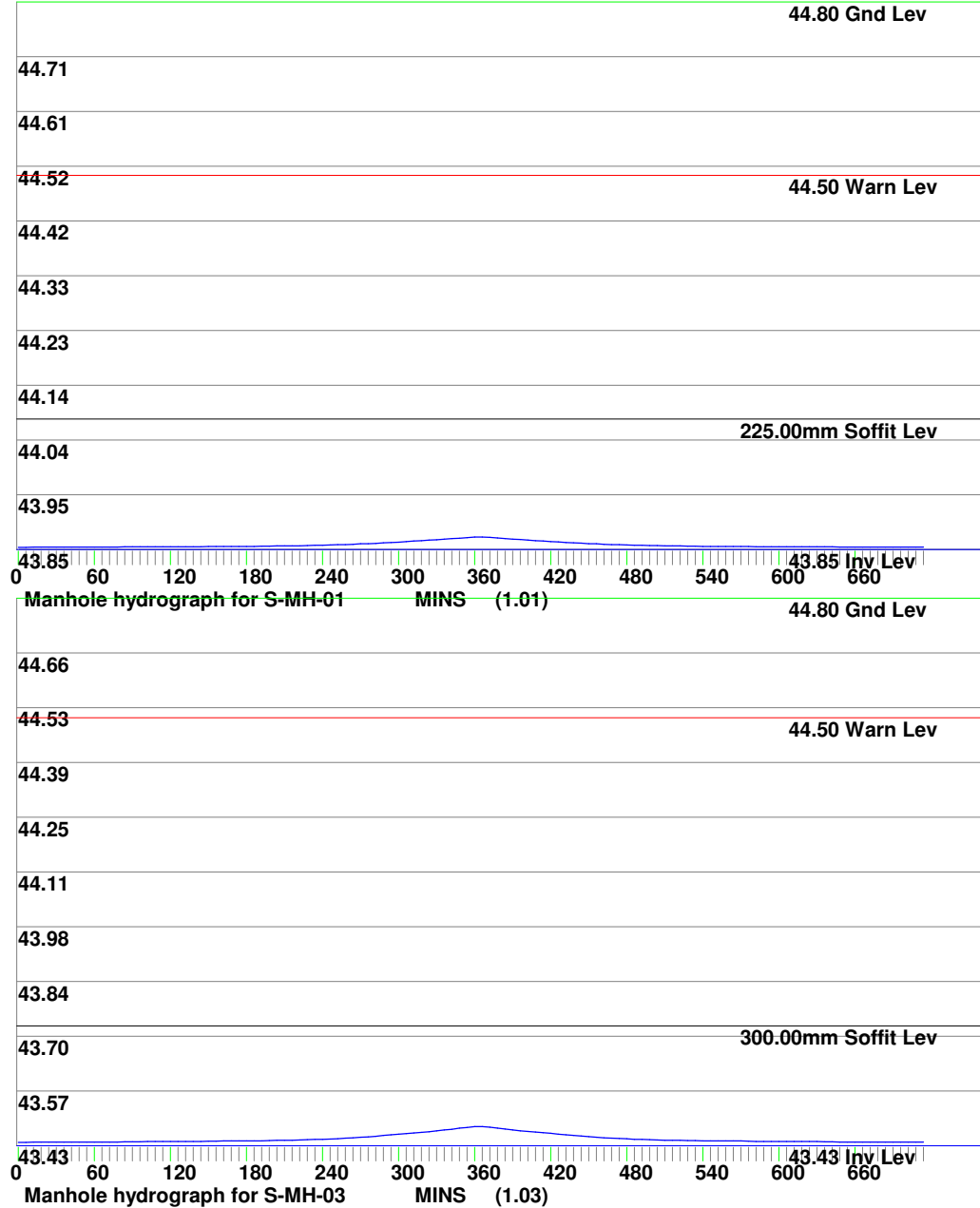
Muir Associates (UK) Limited

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 CCF = 40%





MasterDrain
SW

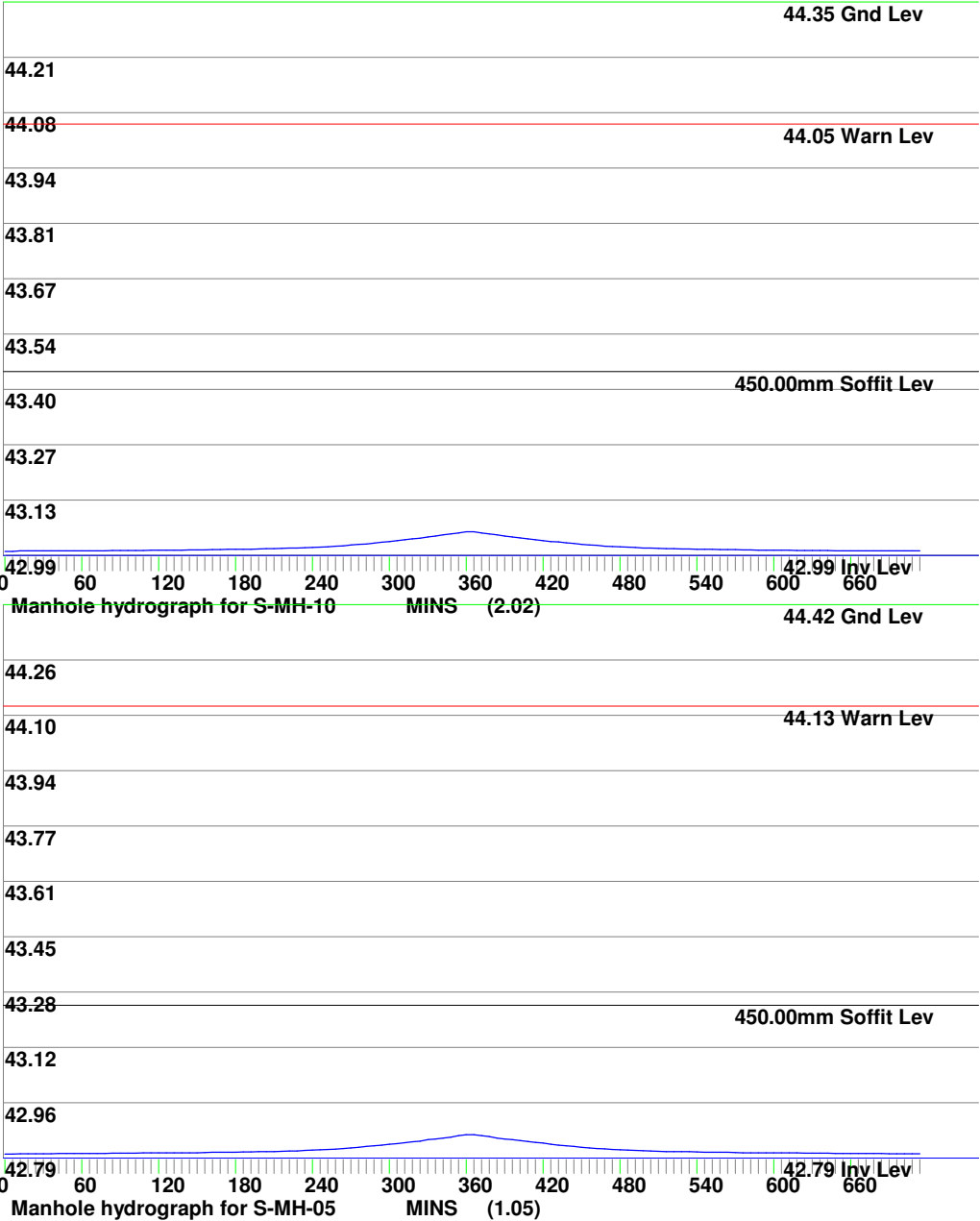
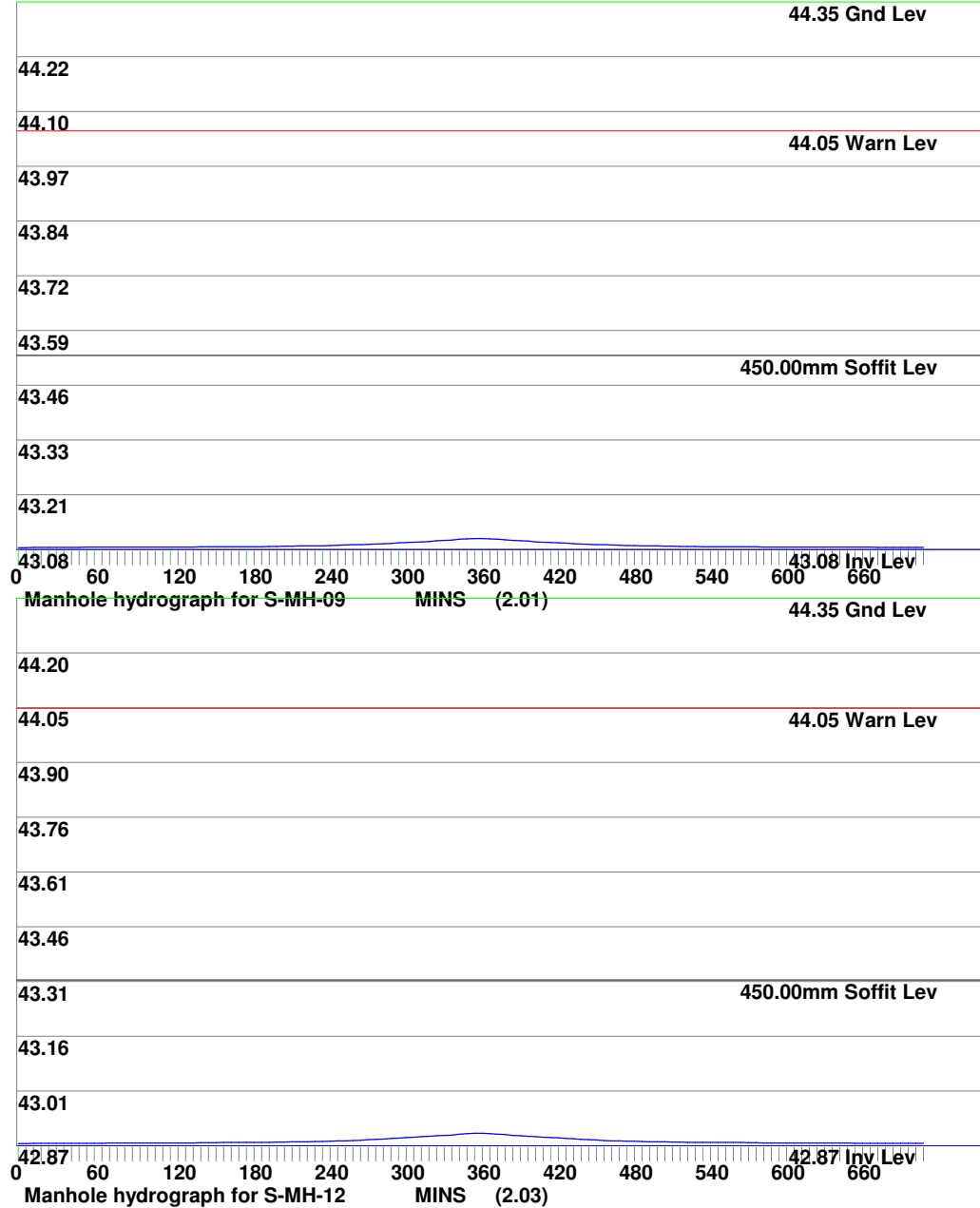
Muir Associates (UK)
Limited

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 CCF = 40%





MasterDrain
SW

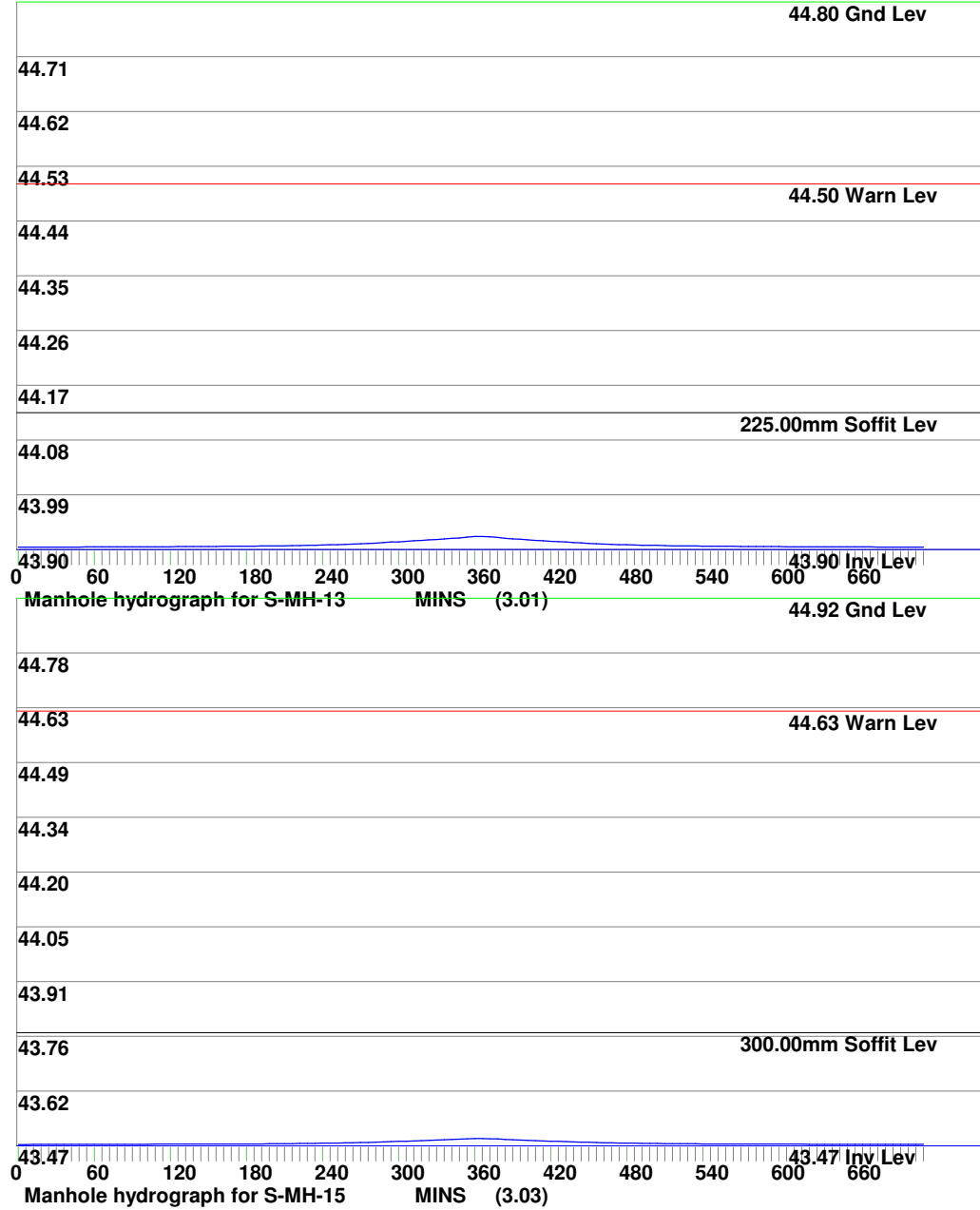
Muir Associates (UK)
Limited

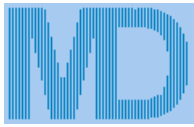
www.muir-associates.co.uk

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. 6		
Date 21/11/22		
By MJ	Checked	Reviewed

Project	
Title	Surcharge calcs (Sized at 30 yrs storm) for SURFACE WATER DESIGN.SW CCF = 40%





MasterDrain
SW

Muir Associates (UK) Limited

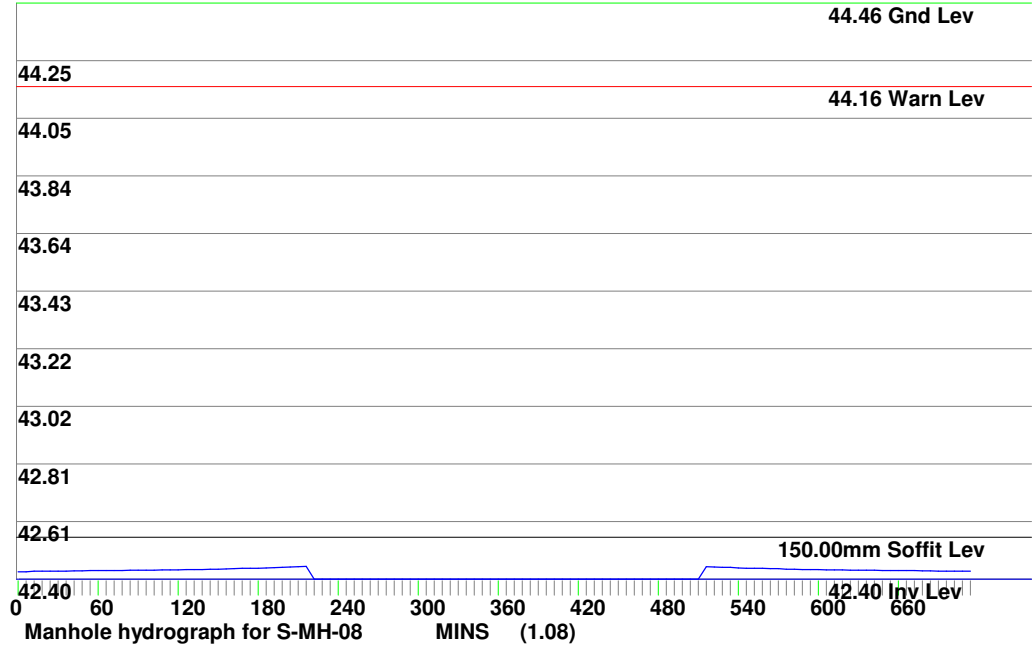
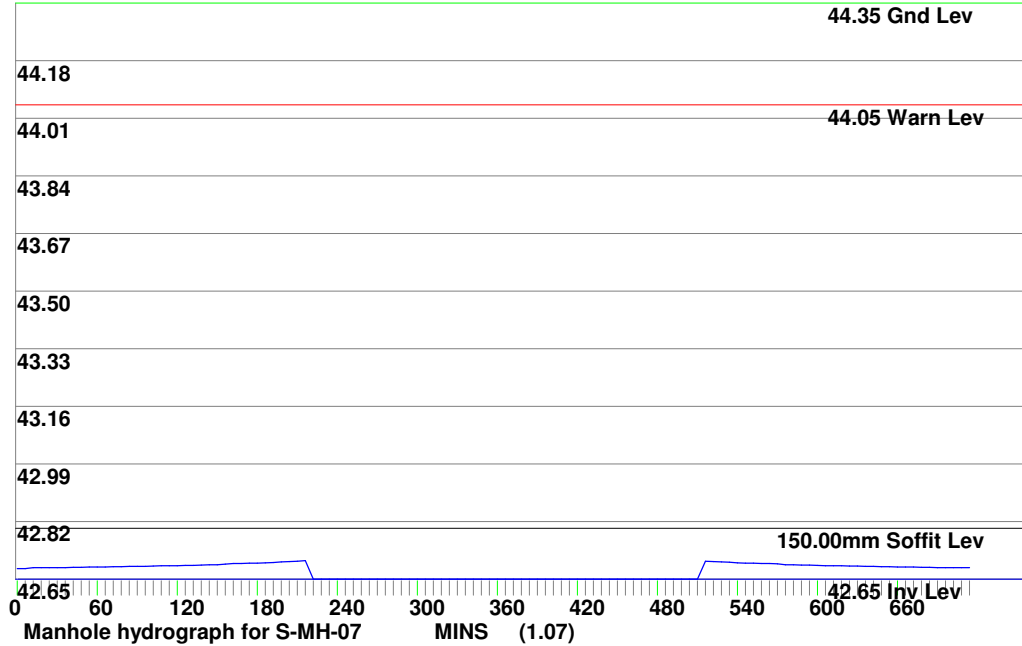
www.muir-associates.co.uk

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 CCF = 40%**





MasterDrain
SW

Muir Associates (UK) Limited

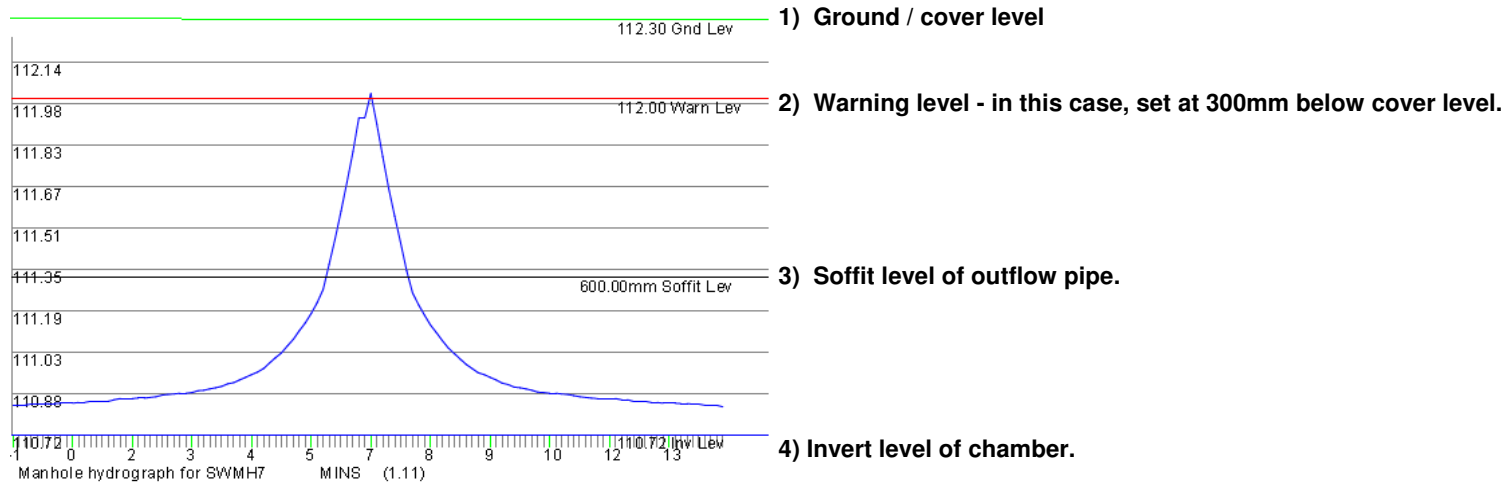
www.muir-associates.co.uk

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 CCF = 40%**



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.