



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 = Winter
Using FSR data

Peak rain intens. 20.00 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	1.3	225	1200	43.85	43.87	44.80	0.03	0.02	0.00	0.000	527	OK
2	I	1.02	S-MH-02	77.8	3.8	300	1200	43.58	43.61	44.80	0.05	0.03	0.00	0.000	1579	OK
3	I	1.03	S-MH-03	78.4	5.1	300	1200	43.43	43.47	44.80	0.07	0.04	0.00	0.000	2106	OK
4	I	1.04	S-MH-04	78.0	5.1	300	1500	43.30	43.34	44.60	0.07	0.04	0.00	0.000	2106	OK
5	B	2.01	S-MH-09	184.0	2.6	450	1500	43.08	43.10	44.35	0.01	0.02	0.00	0.000	1065	OK
6	B	2.02	S-MH-10	184.9	8.6	450	1500	42.99	43.04	44.35	0.05	0.04	0.00	0.000	3560	OK
7	B	2.03	S-MH-12	398.2	8.6	450	1500	42.87	42.89	44.35	0.02	0.03	0.00	0.000	3560	OK
8	I	1.05	S-MH-05	227.8	13.8	450	1500	42.79	42.85	44.42	0.06	0.05	0.00	0.000	5666	OK
9	B	3.01	S-MH-13	42.1	1.3	225	1200	43.90	43.92	44.80	0.03	0.02	0.00	0.000	527	OK
10	B	3.02	S-MH-14	95.8	3.8	300	1200	43.70	43.73	44.80	0.04	0.03	0.00	0.000	1582	OK
11	B	3.03	S-MH-15	298.4	5.1	300	1200	43.47	43.49	44.92	0.02	0.01	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

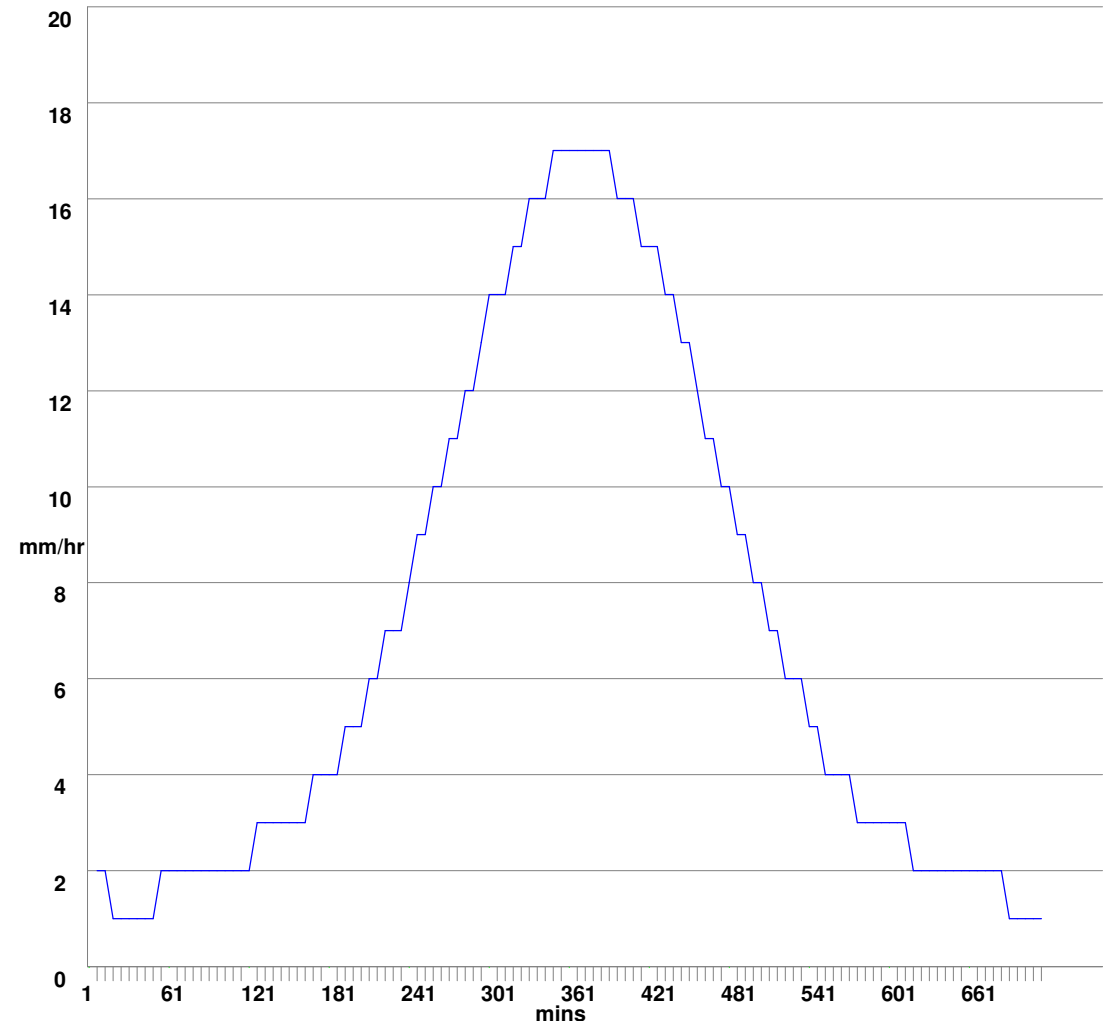
Project

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	1.82	246:00	8.61	486:00	9.21
12:00	1.82	252:00	9.14	492:00	8.74
18:00	1.34	258:00	9.62	498:00	8.20
24:00	1.34	264:00	10.22	504:00	7.53
30:00	1.34	270:00	10.83	510:00	7.06
36:00	1.34	276:00	11.36	516:00	6.66
42:00	1.48	282:00	11.83	522:00	6.25
48:00	1.48	288:00	12.44	528:00	5.85
54:00	1.55	294:00	13.11	534:00	5.51
60:00	1.68	300:00	13.58	540:00	5.11
66:00	1.75	306:00	14.12	546:00	4.71
72:00	1.82	312:00	14.46	552:00	4.44
78:00	1.95	318:00	14.86	558:00	4.24
84:00	2.02	324:00	15.26	564:00	4.03
90:00	2.08	330:00	15.60	570:00	3.70
96:00	2.15	336:00	16.00	576:00	3.50
102:00	2.22	342:00	16.27	582:00	3.29
108:00	2.29	348:00	16.54	588:00	3.03
114:00	2.35	354:00	16.68	594:00	2.82
120:00	2.49	360:00	16.74	600:00	2.76
126:00	2.56	366:00	16.81	606:00	2.69
132:00	2.69	372:00	16.81	612:00	2.62
138:00	2.69	378:00	16.74	618:00	2.49
144:00	2.82	384:00	16.68	624:00	2.42
150:00	3.03	390:00	16.54	630:00	2.35
156:00	3.23	396:00	16.34	636:00	2.22
162:00	3.43	402:00	16.07	642:00	2.15
168:00	3.70	408:00	15.73	648:00	2.15
174:00	3.90	414:00	15.33	654:00	2.02
180:00	4.17	420:00	14.93	660:00	1.95
186:00	4.37	426:00	14.59	666:00	1.82
192:00	4.71	432:00	14.19	672:00	1.75
198:00	5.04	438:00	13.72	678:00	1.68
204:00	5.38	444:00	13.18	684:00	1.61
210:00	5.78	450:00	12.57	690:00	1.48
216:00	6.19	456:00	11.97	696:00	1.48
222:00	6.52	462:00	11.43	702:00	1.41
228:00	6.99	468:00	10.89	708:00	1.34
234:00	7.46	474:00	10.42	714:00	1.34
240:00	8.07	480:00	9.75	720:00	1.34

Hydrograph profile derived from data in the Flood Studies Report

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





MasterDrain
SW

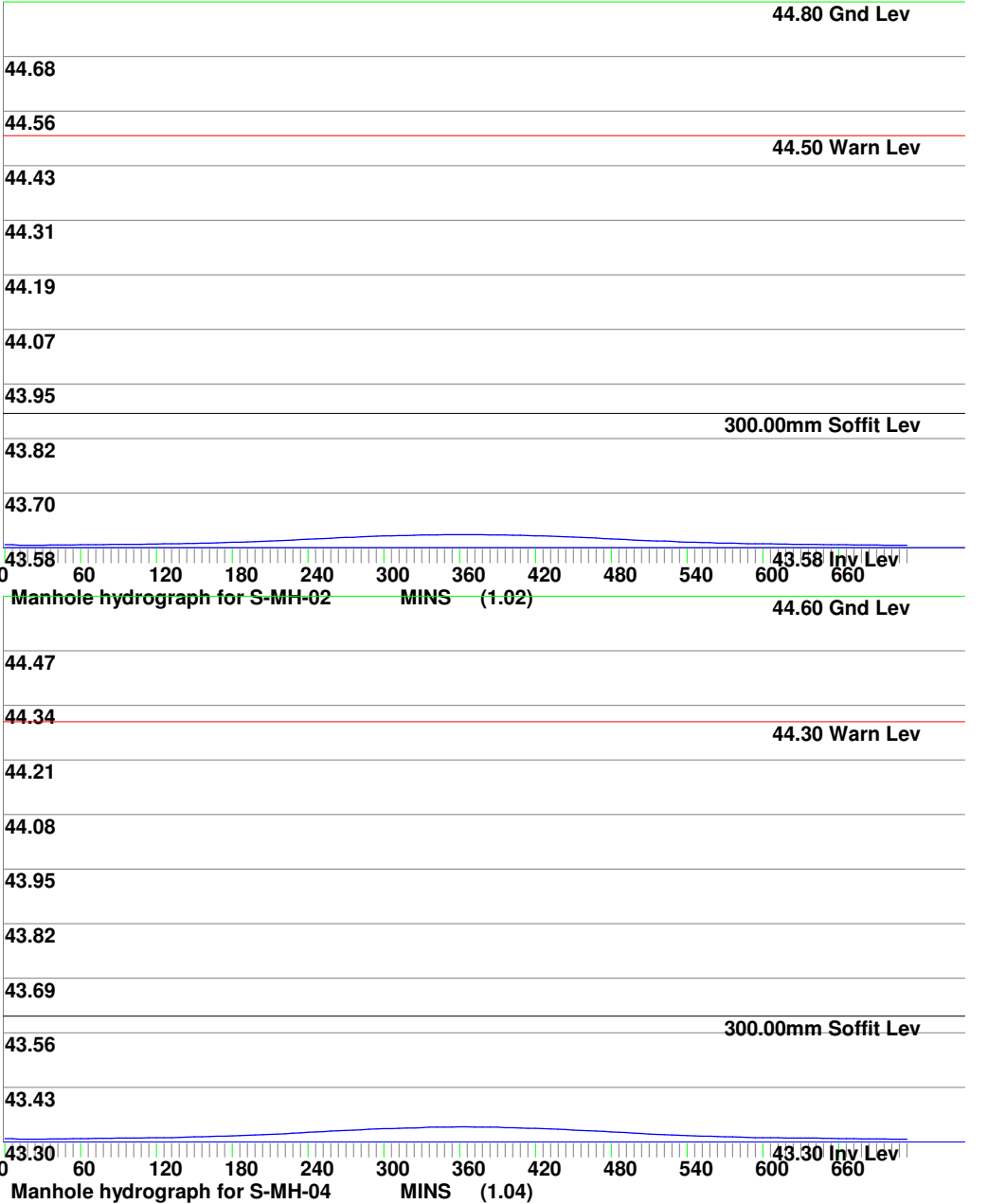
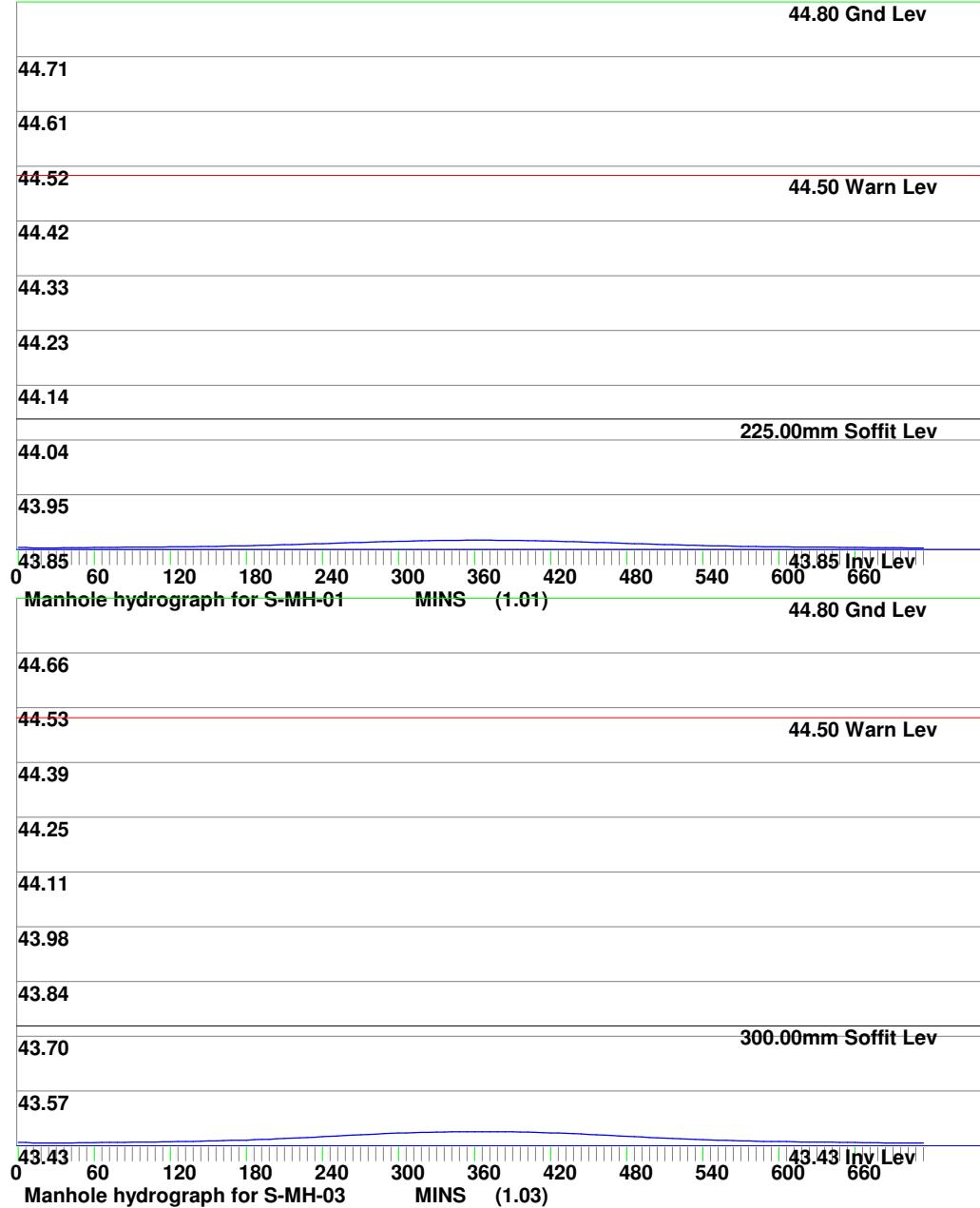
Muir Associates (UK)
Limited

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 CCF = 40%





MasterDrain
SW

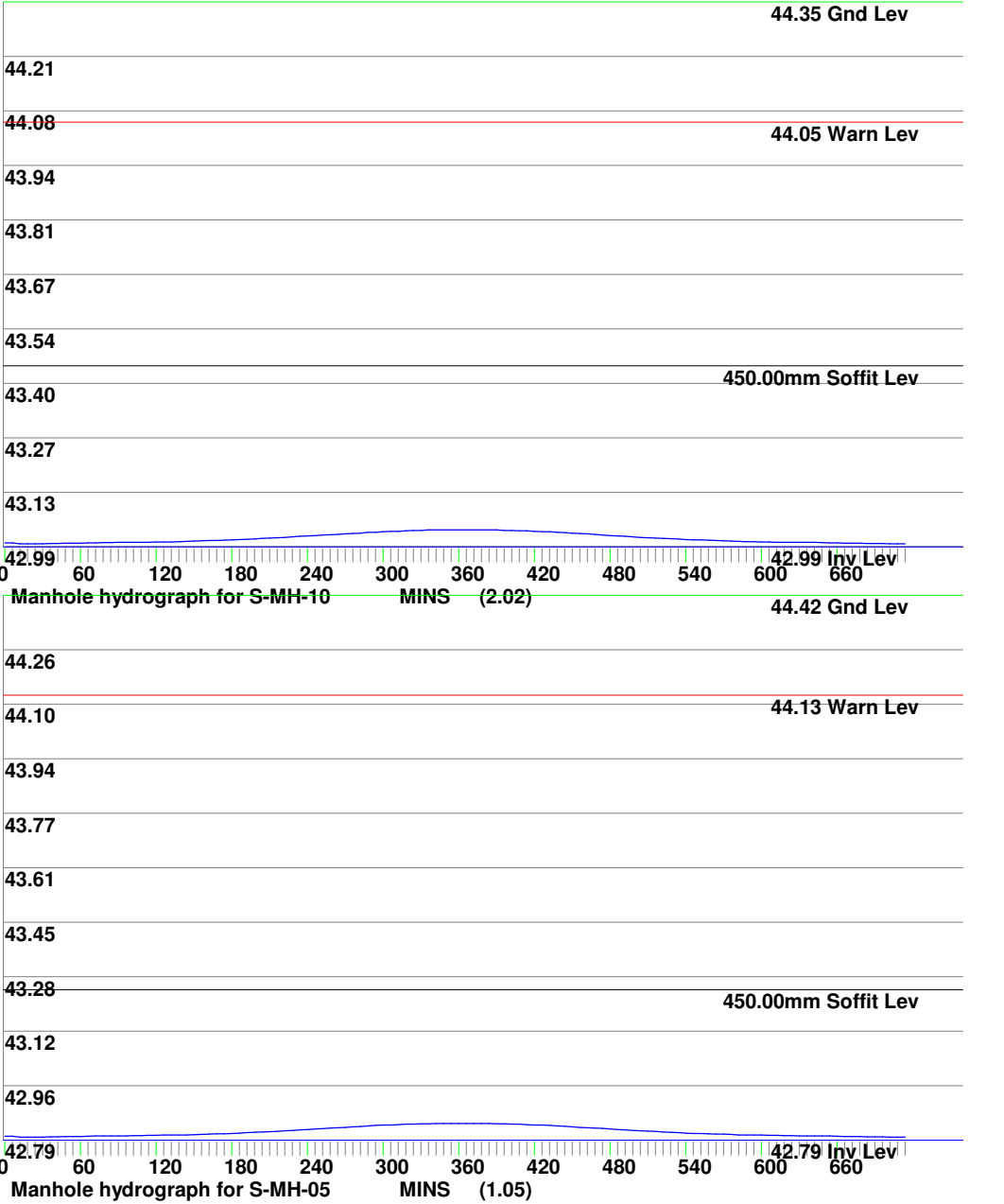
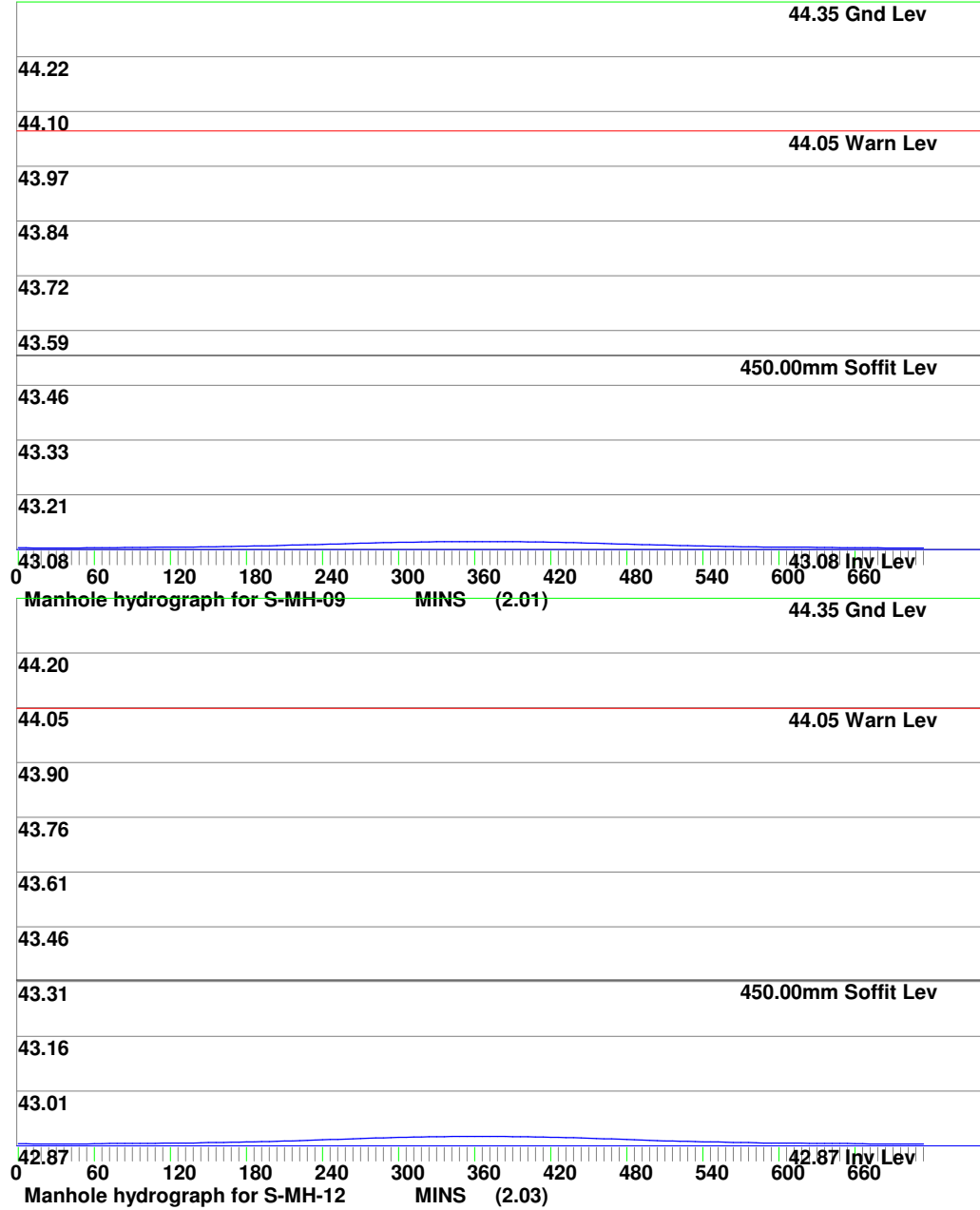
Muir Associates (UK)
Limited

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

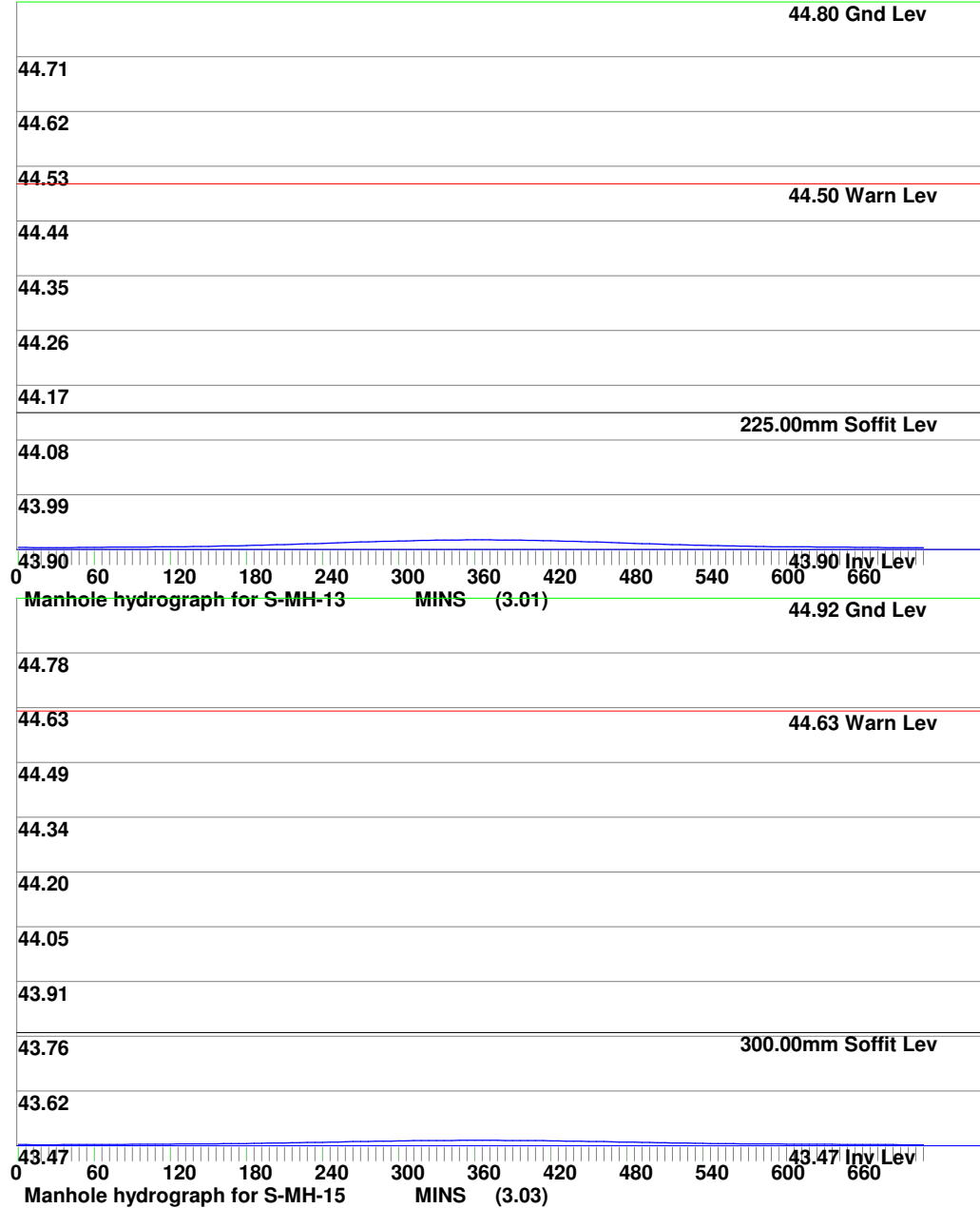
Muir Associates (UK)
Limited

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

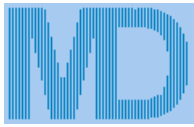
Job No. 1132-22		
Sheet no. 6		
Date 21/11/22		
By MJ	Checked	Reviewed

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



Manhole hydrograph for S-MH-06

MINS (1.06)



MasterDrain
SW

Muir Associates (UK) Limited

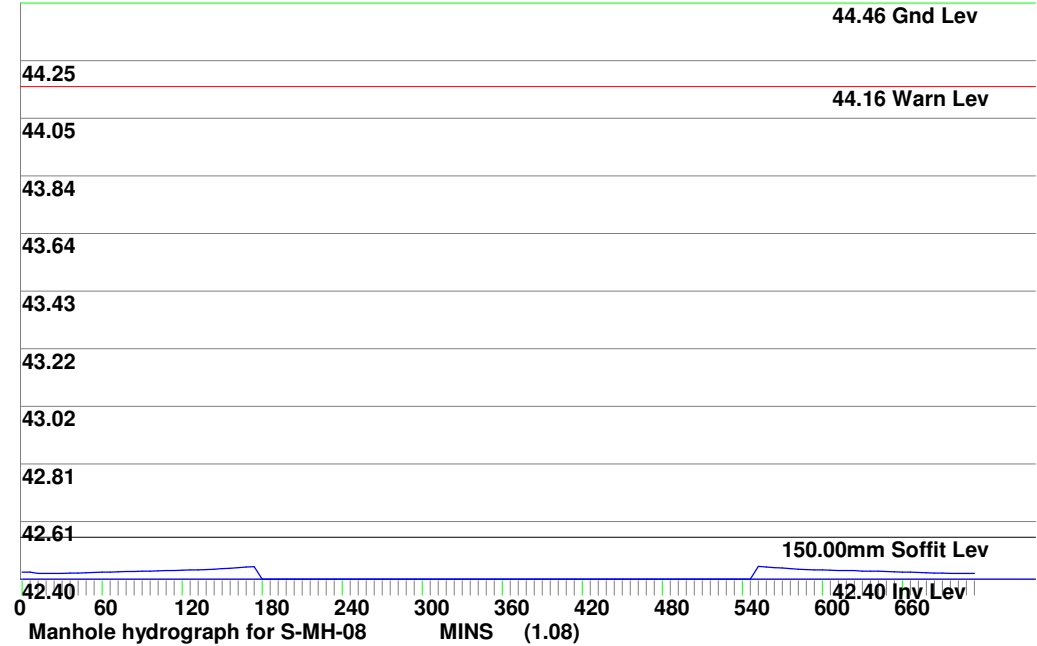
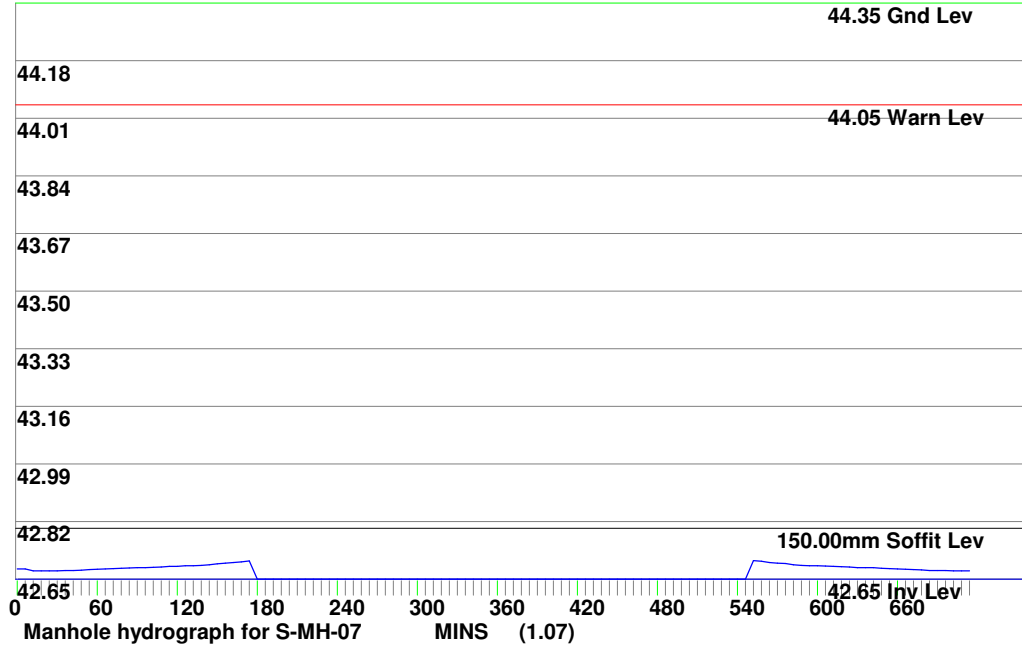
www.muir-associates.co.uk

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

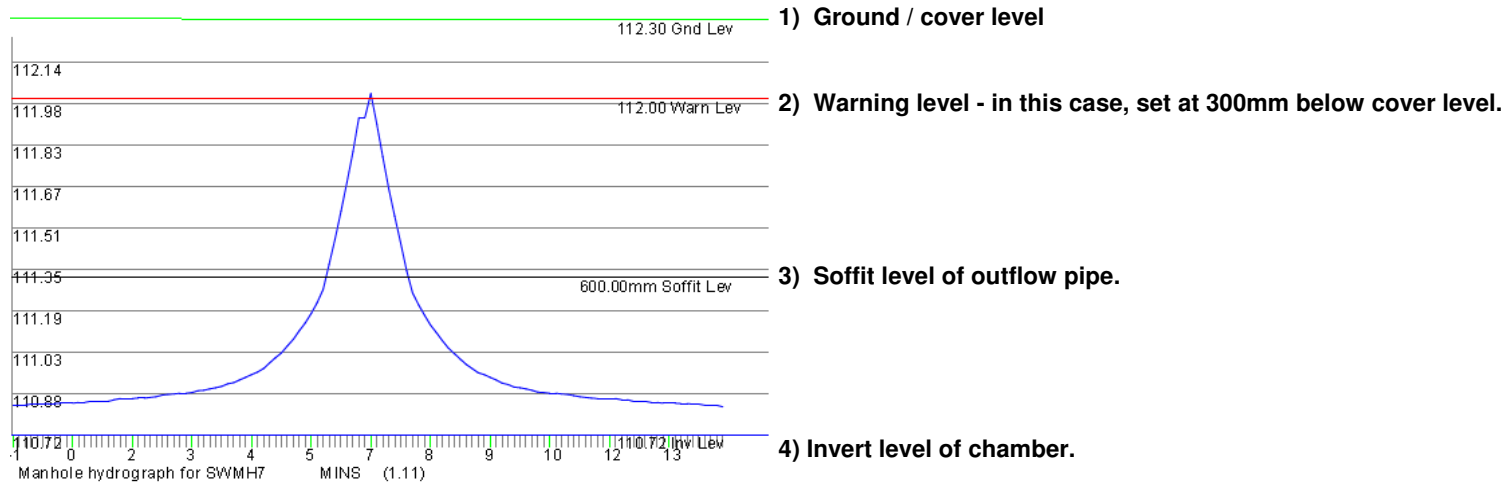
www.muir-associates.co.uk

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.