

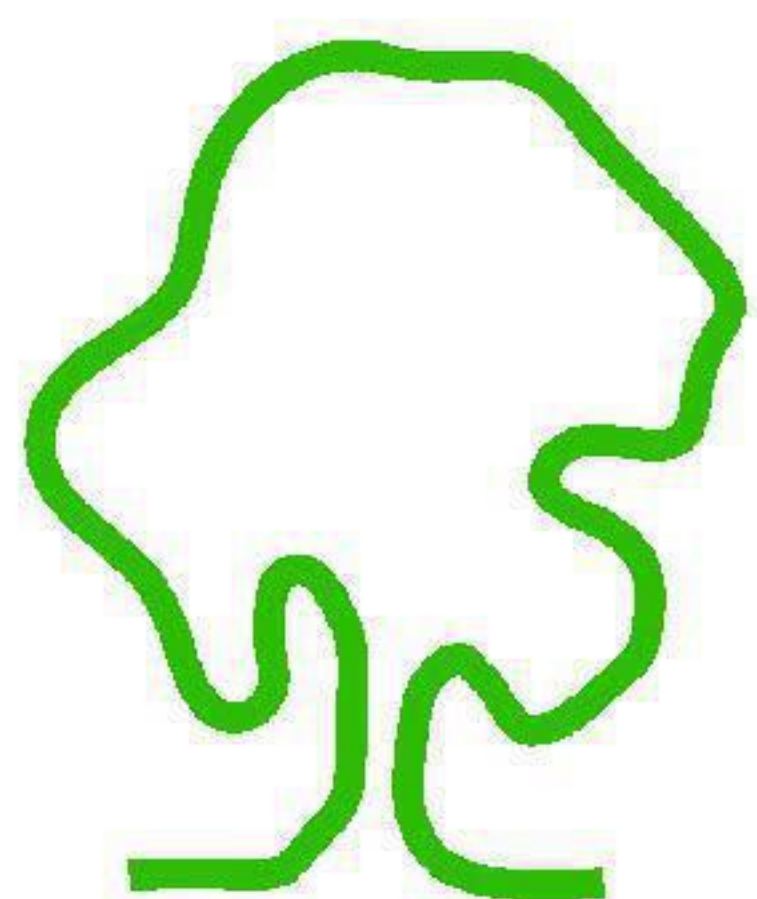
LESSTOBUILDIT LTD



LAND TO THE SOUTH OF LEACROFT, LONDON ROAD,
HICKSTEAD, WEST SUSSEX, RH17 5LZ

Drainage Strategy

May 2026
(Revised July 2026)



eas ltd

Environmental Assessment Services Ltd

REPORT DATA SHEET

Requirement	Data
Report Ref:	872/Ellisdon/Leacroft/DS
Date	May 2026
Client	Less2Build Ltd
Report type	Drainage Strategy
Purpose	Planning Application
Revisions	July 2026
Prepared by	Eur Ing Malcolm McKemey BSc (Hons), CEng, CEnv, MICE, MCIWEM, MIEnvSc
Approved by	

LESS2BUILD LTD

**LAND TO THE SOUTH OF LEACROFT, LONDON ROAD, HICKSTEAD
WEST SUSSEX, RH17 5LZ**

Drainage Strategy

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CONTENTS

1. THE SITE & PROPOSED REDEVELOPMENT
2. GEOLOGY, HYDROGEOLOGICAL CONSIDERATIONS & FLOOD RISK
3. EXISTING SITE DRAINAGE
4. PERCOLATION TESTING
5. PROPOSED SURFACE WATER DRAINAGE OPTIONS
6. SURFACE WATER DRAINAGE DESIGN
7. PROPOSED FOUL DRAINAGE
8. OPERATION & MAINTENANCE OF THE SYSTEM
9. SUMMARY, CONCLUSIONS & RECOMMENDATIONS

APPENDIX A:

- | | |
|-----------|---------------------------------------|
| Figure 1: | Location Plan |
| Figure 2: | Existing Site Layout |
| Figure 3: | Proposed Redevelopment |
| Figure 4: | Suggested Drainage Arrangement |
| Figure 5: | Drainage Details |

APPENDIX B: Photographs

APPENDIX C: Environment Agency Flood Maps

APPENDIX D: Greenfield Flow Rates

APPENDIX E: Output from the Drainage Design model

APPENDIX F: Plan showing easement corridor for outfall pipes.

APPENDIX G: Operation and Maintenance Manual

LESSTOBUILDIT LTD**LAND TO THE SOUTH OF LEACROFT, LONDON ROAD, HICKSTEAD
WEST SUSSEX, RH17 5LZ****Drainage Strategy**

May 2026
(Revised July 2026)

1. THE SITE AND PROPOSED REDEVELOPMENT

- 1.1 The site comprises a plot of land, currently used for the storage and distribution of bricks for the building trade with a site office building to the northeast corner, located off London Road, Hickstead, some 800 m north of the centre of Hickstead Village. The site area is approximately 0.4 ha. The Ordnance Survey (OS) map reference for the site is TQ 2668 2092. The site elevation is approximately +14 m OD. See Appendix A, Figure 1 for the site location plan, Figure 2 for the existing site layout.
- 1.2 The site is bordered to the north by a detached residential property, Leacroft, to the east by the A2300, which also acts as a slip road to the northbound A23, to the south by a detached residential dwelling, Rendena, plus the offices of Sweeptech and to the west by a detached residential dwelling, Sunny Acres. The neighbouring residential properties all have garden areas surrounding the dwellings.
- 1.3 It is proposed to redevelop the site for a commercial use with seven warehouse units arranged around the outside of the site and a central yard and parking area. See Appendix A, Figure 3 for the proposed site layout
- 1.4 A drainage strategy was previously prepared by Hemsley Orrel Partnership of Hove in September 2023.
- 1.5 There is a planning application submitted for the site with prior approval, subject to conditions. One of the Conditions requires the preparation of a drainage strategy for the proposed redevelopment.

2. GEOLOGY, HYDROGEOLOGICAL CONSIDERATIONS & FLOOD RISK

- 2.1 According to the British Geological Survey (available online), the site lies on Weald Clay Formation (mudstone).
- 2.2 Trial pits excavated at the site revealed made ground of gravel, road planings and mixed soils over Weald Clay. The Weald Clay was encountered 0.5 – 1.0 m below the surface. Groundwater was encountered at shallow depth within the Weald Clay.

- 2.3 The Department for Environment, Food and Rural Affairs (Defra) online mapping (MAGIC) shows the site lies on unproductive bedrock (Weald Clay). DEFRA classify the soil type as “ *slightly acid but base-rich loamy and clayey soils*”. The site lies on an area of ‘unproductive’ groundwater vulnerability and does not lie in a groundwater source protection zone (SPZ).
- 2.4 According to the EA online Flood Map for Planning, the site lies within Flood Zone 1 (low risk of flooding from fluvial sources) and will remain in Flood Zone 1 the 2070 - 2125 scenario. The site is not at risk from surface water flooding in the 1 in 30-year scenario, but the adjacent road, A2300 is at risk; the very edge of the eastern boundary of the site is at risk from surface water flooding in the 1 in 100-year scenario, this area increases slightly in the 1 in 1000-year scenario. Groundwater flooding or reservoir flooding are deemed unlikely at the site.

3. EXISTING SITE DRAINAGE

- 3.1 There is presently no formal surface water drainage at the site. Rainfall presently soaks into the site’s permeable gravel surface or flows, following the slight fall across the site, to the north and west.
- 3.2 There is some pipework in chambers beneath a broken concrete bell-mouth at the site entrance, but this appears to connect to the highway drainage and receives no runoff from the site.
- 3.3 The existing office/messing area on the northern edge of the site is connected to a small sewage treatment plant in the northwest corner. Treated effluent drains via an easement corridor to a large north-flowing watercourse on the far side of Sunny Acres.
- 3.4 The watercourse joins a branch of the River Adur that flows west under Rice Bridge and joins the main river at Wineham.

4. PERCOLATION TESTING

- 4.1 The preferred sustainable drainage (SuDS) option is drainage to soakaway, where the surface water will not leave the site. This option requires suitably permeable underlying soils.
- 4.2 In this case the underlying Weald Clay has low permeability and percolation testing carried out by Land Science in August 2023 revealed an infiltration coefficient of 5.63×10^{-7} (too low for infiltration drainage). Recent (2026) trial pits were found to have flooded after rainfall and remained flooded to the top after two days. Only one (Northeast corner) even approached half emptying within 48 Hours.

- 4.3 It was concluded that drainage to soakaway would not be practicable at this site. This was also the conclusion of the Sustainable Drainage Assessment prepared by Hemsly Orrell Partnership (HOP) in 2023.

5. PROPOSED SURFACE WATER DRAINAGE OPTIONS

- 5.1 The hierarchy for SuDS is as follows:

- i. Re-use of harvested rainwater.
- ii. Disposal to soakaway
- iii. Attenuation storage with release of rainwater to a watercourse at a maximum of greenfield flow.
- iv. Attenuation storage with release of rainwater to a surface water sewer at a maximum of greenfield flow.
- v. Attenuation storage with release of rainwater to a combined sewer at a maximum of greenfield flow.

- 5.2 The opportunities for using harvested rainwater in the proposed development are uncertain. Rainwater could be collected for irrigation of any planted areas, for washdown and/or for lavatory flushing.

- 5.3 Disposal to soakaway has already been ruled out as impracticable, Attenuation storage with discharge to a watercourse would appear to be practicable. There is a suitable watercourse to the west of the site with an existing easement for a pipe route.

- 5.4 How the attenuation storage is provided is to be decided. Above ground locations (a pond or swale) are preferred as the storage remains visible and accessible. However, there does not appear to sufficient room available within the site and underground storage will be the favoured option. The Greenfield flow rates are summarised in Table 5.1 below:

TABLE 5.1
GREENFIELD FLOW RATES

Return Period	Greenfield Flow l/s
1 in 1 year	3.3
1 in 2 year	3.4
1 in 10 year	6.2
1 in 30 year	8.8
1 in 100 year	12.3
1 in 200 year	14.4

- 5.5 The Environment Agency non-statutory recommendation is that the maximum flow rate should not exceed the 1 in 1 year return period flow (3.3 l/s).

6. SURFACE WATER DRAINAGE DESIGN

- 6.1 A surface water drainage scheme has been designed in outline using the MasterDrain network drainage model. See Figure 4. Pipe and chamber sizes plus other details are given in Appendix E.
- 6.2 The attenuation volume required has been calculated at 110 m³. Due to high groundwater levels, the attenuation volume should be as shallow as practicable.
- 6.3 An underground crate system has been suggested. The crate units come in 400 mm deep modules and one layer of the system is recommended. An 18 m x 18 m x 0.4 m deep AquaCell Core or similar has been proposed. An alternative would be to create the void in a drainage blanket laid under the proposed parking area permeable paving.
- 6.4 The outfall from the attenuation storage would be via a flow control chamber, with vortex valve set to a maximum flow of 3.3 l/s, or an orifice plate of 57.7 mm diameter. The outfall pipe would be connected to the watercourse to the northwest via the easement corridor. See Appendix F.
- 6.5 Risks of contamination from the proposed development should be fairly low. The permeable surfacing on drainage blanket proposed for the parking area and the attenuation storage will provide some protection against pollution of the watercourse. See Tables 26.2 and 26.3 in the SuDS Manual.

7. PROPOSED FOUL DRAINAGE

- 7.1 There are no public foul sewers within practicable reach from the site.
- 7.2 Foul sewage from the proposed units would have to be treated by a package sewage treatment plant discharging treated effluent to the aforementioned watercourse to the northwest via the easement pipe corridor.
- 7.3 A foul sewerage scheme has been designed in outline using the MasterDrain (Foul) network drainage model. A foul sewerage layout is shown in Figure 4. Chamber details and pipe sizes are given in Appendix E.

8. OPERATION & MAINTENANCE OF THE SYSTEM

- 8.1 The surface water drainage system should require minimal operational input once construction has been completed. However, it will require regular maintenance.
- 8.2 Items requiring maintenance (mainly the removal of silt) will include:
- Gullies, strip drains and channels.
 - Chambers.

- Flow control device (vortex valve or orifice plate).
- Occasional maintenance of the attenuation storage.

8.3 The sewage treatment plant will require regular maintenance, at least annually. Maintenance costs to be covered by the freeholder with input from the unit tenants where appropriate.

9. SUMMARY, CONCLUSIONS & RECOMMENDATIONS

9.1 It is proposed to redevelop the site, presently used for the storage and distribution of bricks to the south of Leacroft on London Road (A2300) in Hickstead, for a commercial use with seven warehouse units arranged around the outside of the site and a central yard and parking area. See Appendix A, Figure 3 for the proposed site layout.

9.2 The underlying Weald Clay has been found to be unsuitable for drainage to soakaway (the preferred SuDS option) and a scheme based on attenuation storage with outflow limited to greenfield flow has been recommended as the surface water drainage strategy. The controlled flow would be piped to an outfall on the substantial watercourse to the northwest of the site via an easement crossing the northern edge of the adjacent Sunny Acres property. An outline design has been prepared and is shown in Figure 4.

9.3 There are no public sewers within the vicinity of the site and the foul drainage strategy will require a package sewage treatment plant with outfall of treated effluent to the abovementioned watercourse to the northwest of the site via the existing pipe easement across the northern edge of the adjacent Sunny Acres property. An outline design has been prepared and is shown in Figure 4.

9.4 Some maintenance will be required, particularly to ensure the proper operation of the flow control device and the sewage treatment plant.

9.5 It is recommended that:

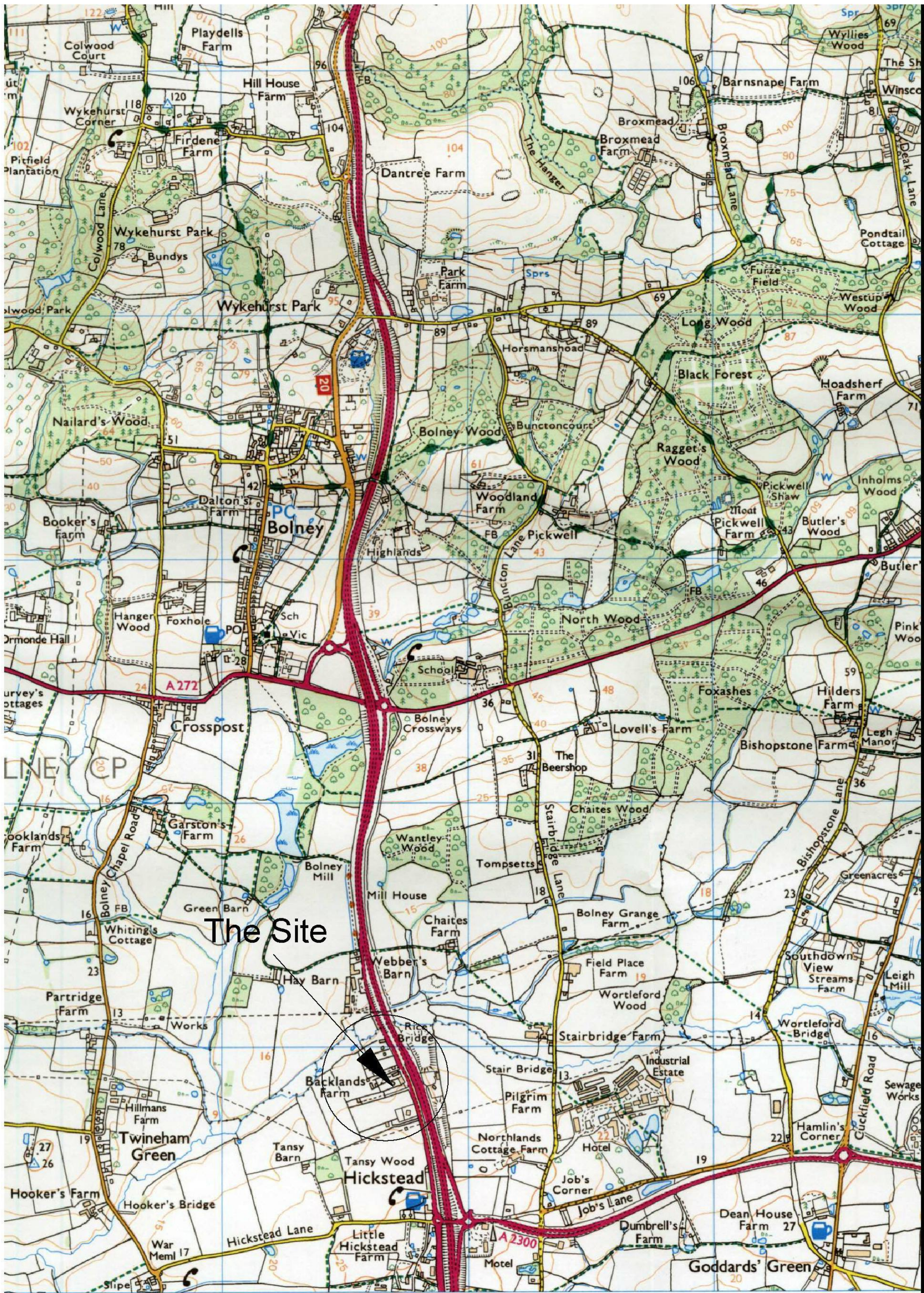
9.5.1 All paved areas should be permeable comprising a proprietary permeable blockwork system on a sand bed with an underlying permeable geotextile (Terram 1000 or similar) over a 250 mm thick drainage blanket of no-fines 20 – 50 mm stone wrapped in permeable geotextile.

9.5.2 The finished site level should be raised to (at least) +14.75 m and the drainage scheme re-levelled to suit as this would improve the otherwise poor available drainage falls. This is more likely to reduce development costs, rather than increase them.

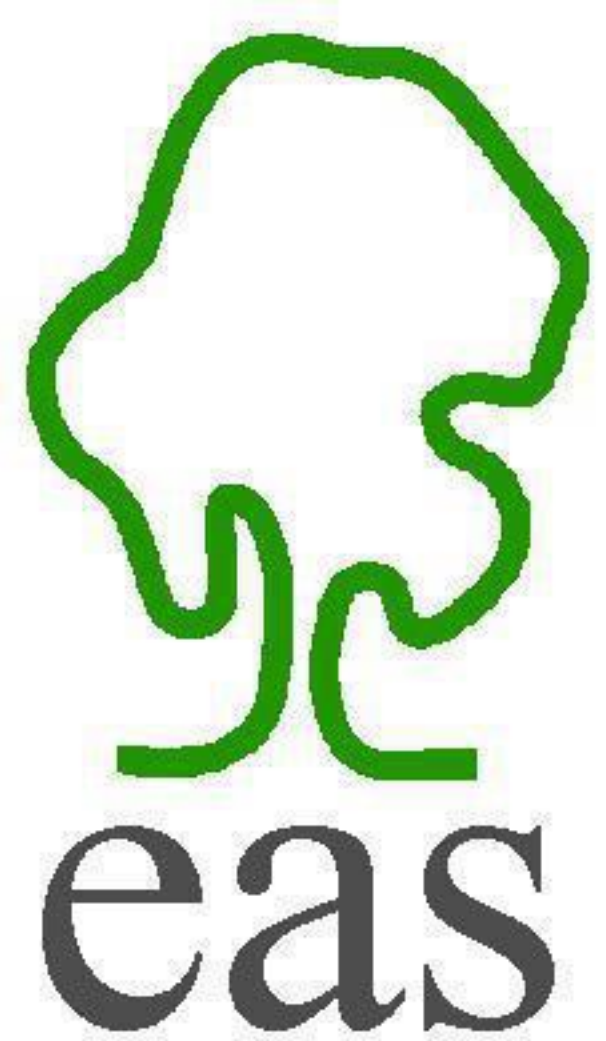


APPENDIX A

- Figure 1: **Location Plan**
- Figure 2: **Existing Site Layout**
- Figure 3: **Proposed Redevelopment**
- Figure 4: **Suggested Drainage Arrangement**
- Figure 5: **Drainage Details**



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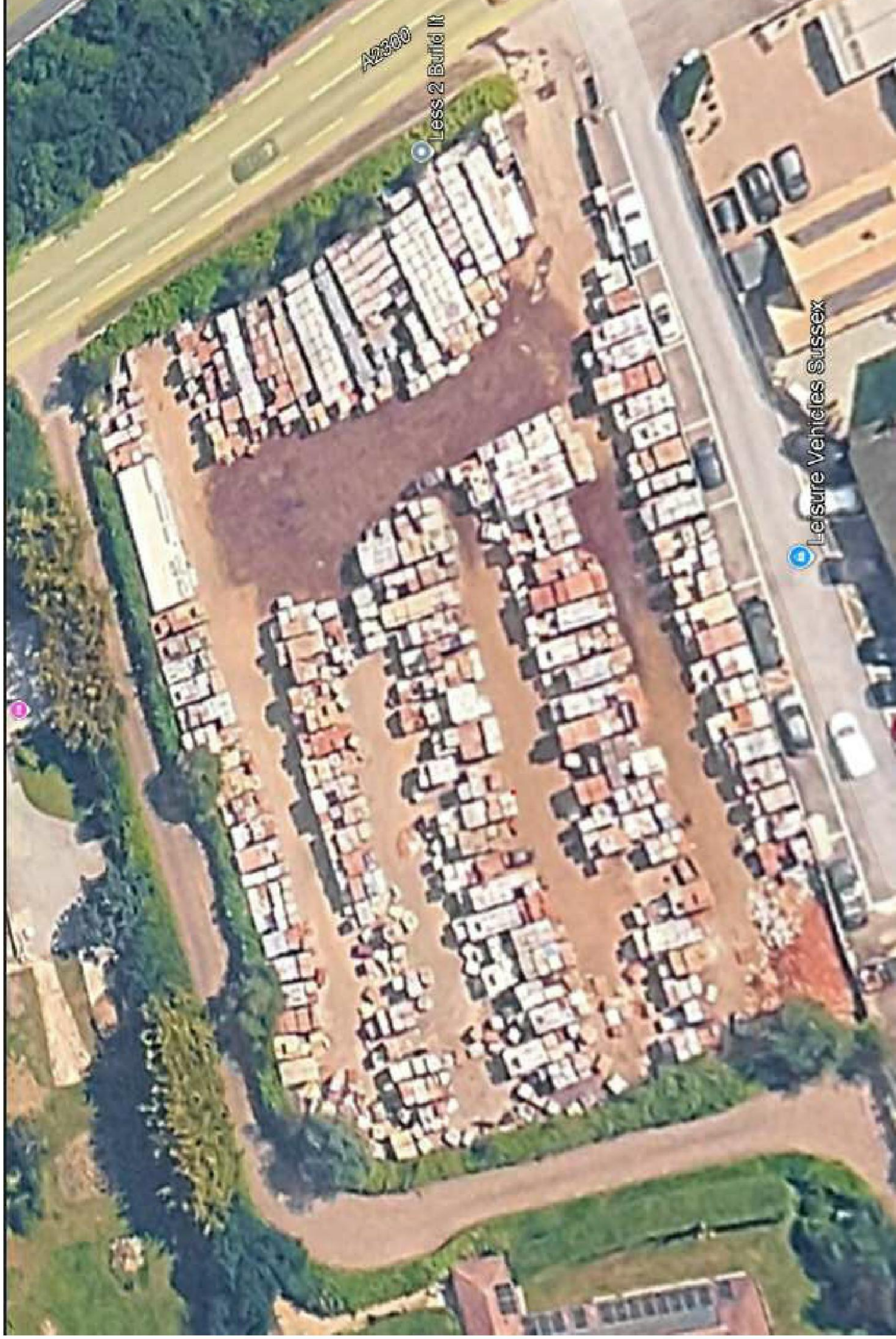
Land to the South of Leacroft

London Road, Hickstead, West Sussex, RH17 5LZ

Scale 1:25000

Figure 1: Site Location

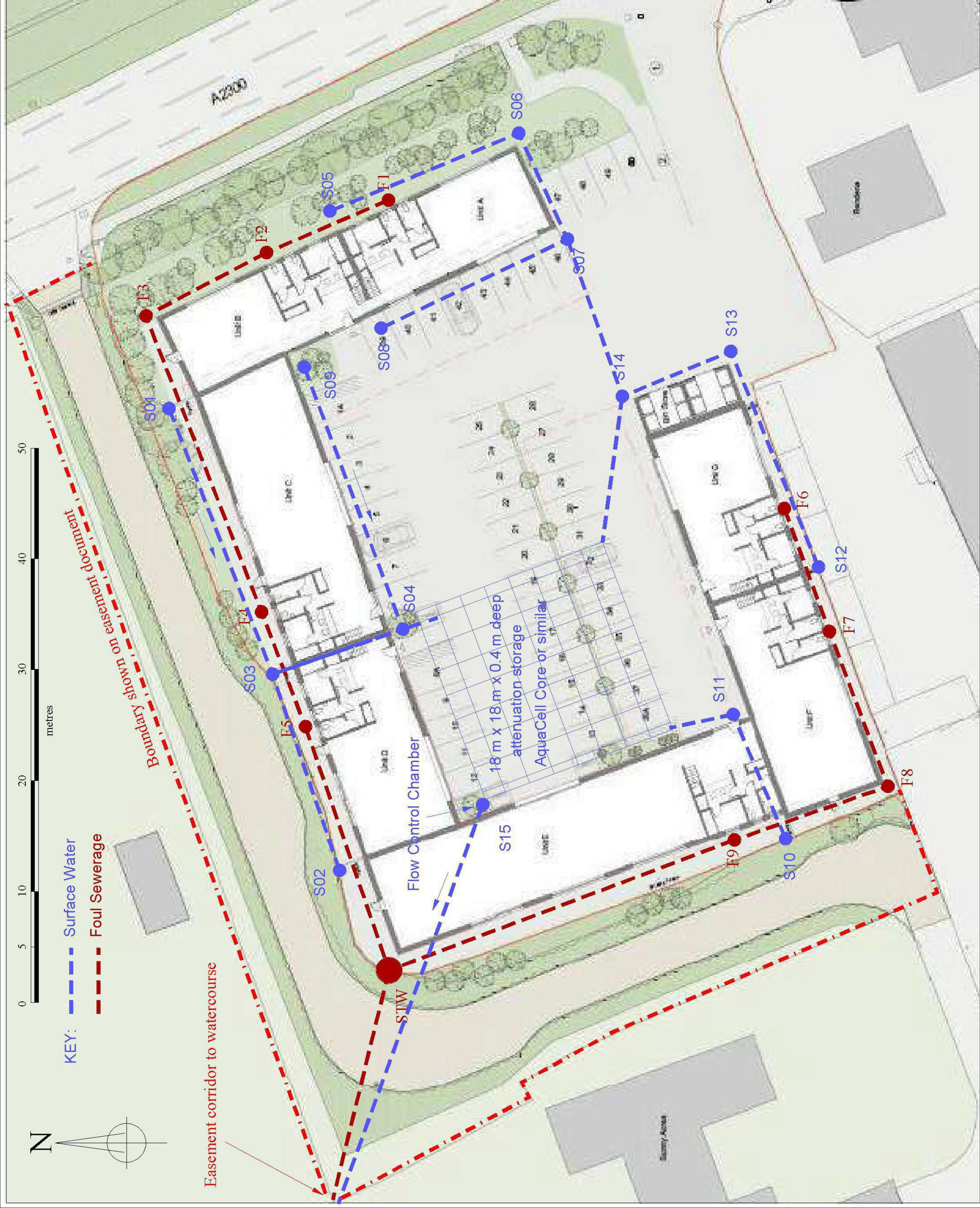
May 2026

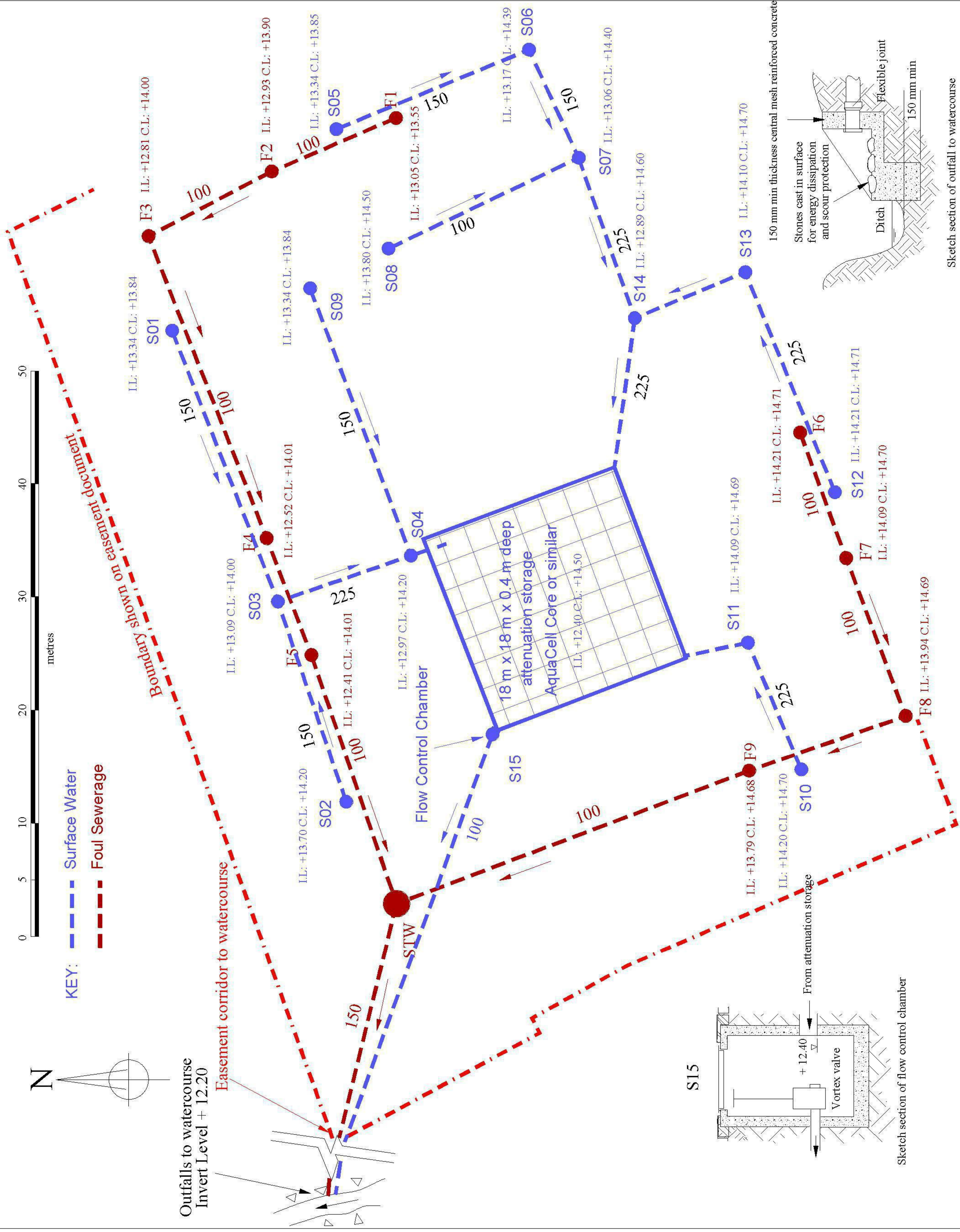


Land to the South of Leacroft
London Road, Hickstead, West Sussex, RH17 5LZ

Figure 2: Site as Existing







APPENDIX B:

Photographs



Photo 1: Chambers in the site entrance



Photo 2: Trial hole excavation. Note clay close to the surface.



Photo 3: Site office/messing.



Photo 4: The watercourse to the northwest of the site.

APPENDIX C:

Flood Mapping



Rivers and sea map

Yearly chance of flooding

☒ Extent

- High chance
More than 3.3% chance each year
- Medium chance
Between 1% and 3.3% chance each year
- Low chance
Between 0.1% and 1% chance each year
- Very low chance
Less than 0.1% chance each year

☐ Depth

Yearly chance of flooding between 2036 and 2069

☐ Extent



Surface water map

Yearly chance of flooding

☒ Extent

- High chance
More than 3.3% chance each year
- Medium chance
Between 1% and 3.3% chance each year
- Low chance
Between 0.1% and 1% chance each year

☐ Depth

Yearly chance of flooding between 2040 and 2060

☐ Extent

☐ Depth

APPENDIX D:
Greenfield Flow Rates

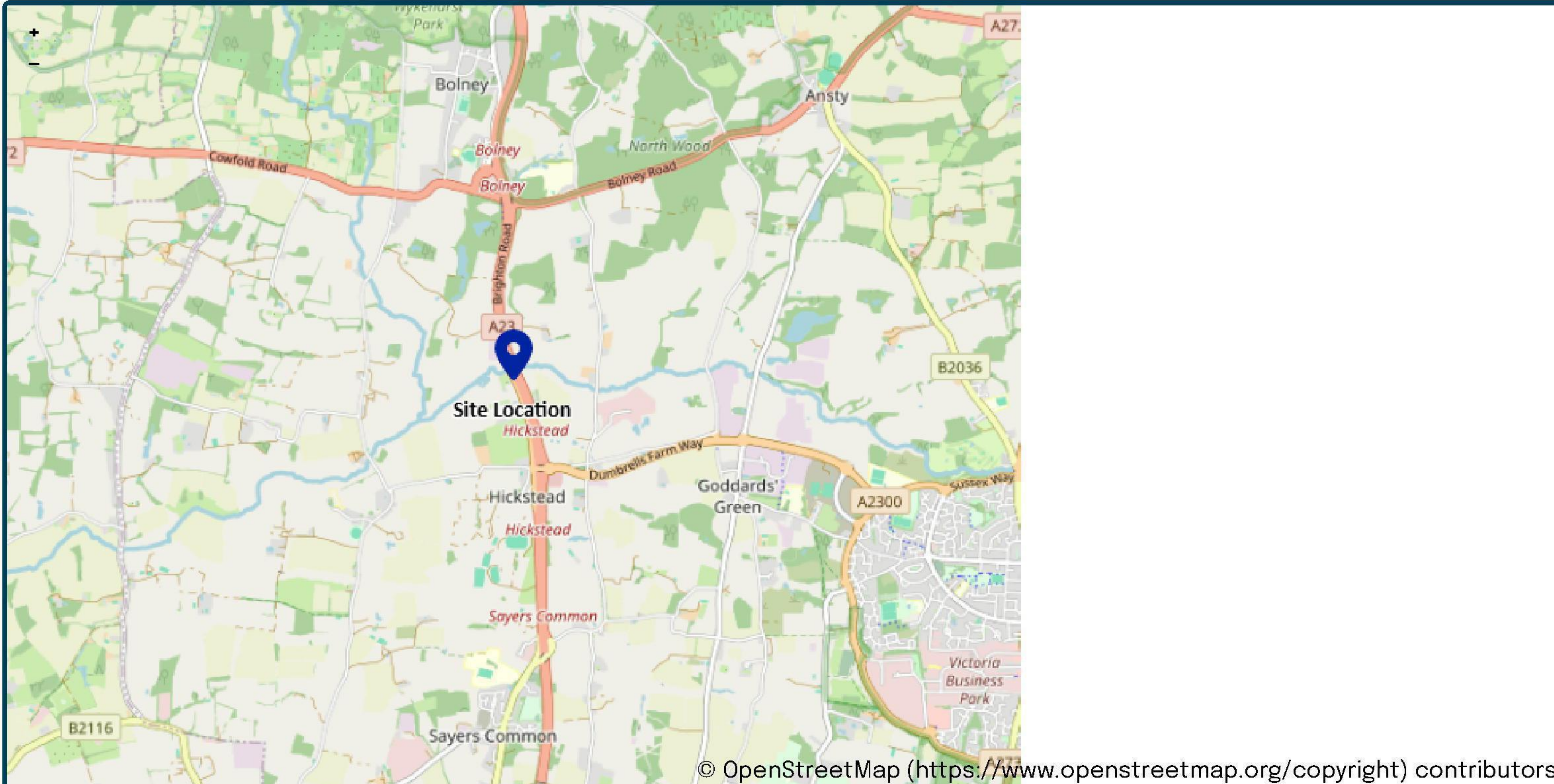
This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Project details

Date	05/05/2026
Calculated by	Malcolm McKemey
Reference	Land south of Leacroft
Model version	2.2.3

Location

Site name	Land south of Leacroft
Site location	Hickstead



Site easting (British National Grid)	526697
Site northing (British National Grid)	120801

Site details

Total site area (ha)	0.432	h
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Greenfield runoff

Method

Method

FEH statistical (2025)

FEH statistical (2025)

	<u>My value</u>		<u>Map value</u>
SAAR9120 (mm)	831		mm
BFIHOST19scaled	0.236		
QMed-QBar conversion	1.136		1.136
QMed (l/s)	3.4	l/s	
QBar (FEH statistical 2025) (l/s)	3.8	l/s	

Growth curve factors

	<u>My value</u>		<u>Map value</u>
Hydrological region	7		7
1 year growth factor	0.85		
2 year growth factor	0.88		
10 year growth factor	1.62		
30 year growth factor	2.3		
100 year growth factor	3.19		
200 year growth factor	3.74		

Results

Method	FEH statistical (2025)
Flow rate 1 year (l/s)	3.3 l/s
Flow rate 2 year (l/s)	3.4 l/s
Flow rate 10 years (l/s)	6.2 l/s
Flow rate 30 years (l/s)	8.8 l/s
Flow rate 100 years (l/s)	12.3 l/s
Flow rate 200 years (l/s)	14.4 l/s

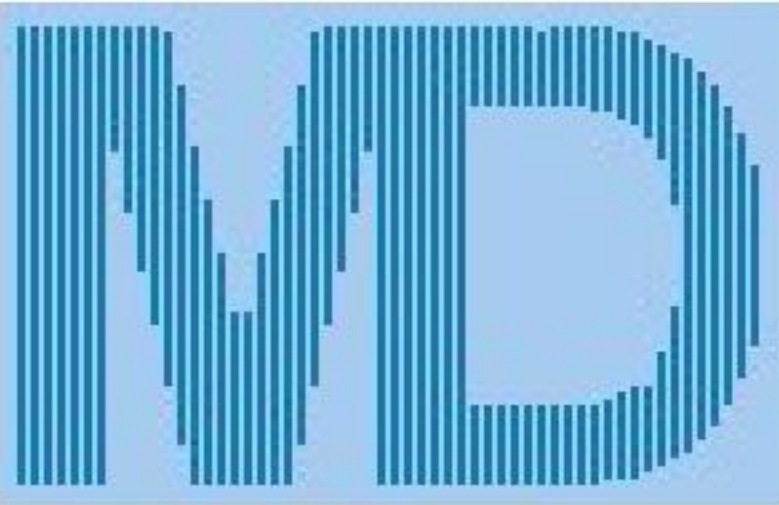
Please note runoff estimation is subject to significant uncertainty. Results are therefore normally reported to only 1 decimal place. Where 2 decimal places are provided, this does not indicate accuracy to this level, it has been adopted to prevent ‘zero’ figures from being reported. Outputs less than 0.01 l/s are reported as 0.01 l/s.

Disclaimer

This report was produced using the Greenfield runoff rate estimation tool (2.2.3) developed by HR Wallingford and available at uksuds.com (<https://www.uksuds.com/>). The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at uksuds.com/terms-conditions (<https://www.uksuds.com/terms-conditions>). The outputs from this tool have been used to estimate Greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, Centre for Ecology and Hydrology, Wallingford Hydrosolutions or any other organisation for the use of these data in the design or operational characteristics of any drainage scheme.

APPENDIX E:

Output from the Drainage Design model



MasterDrain
SW

Environmental Assessment Services Ltd http://www.easltd.co.uk		London Rd, Hickstead Haywards Heath, West Sussex, RH17 5LZ Tel: 01444 882552 email: info@easltd.co.uk		Job No. 872	
				Sheet no. 1	
				Date 07/05/26	
Project Land south of Leacroft, Hickstead		By MDM	Checked	Reviewed	
Title Hydrograph storage analysis (Winter profile) for HASSOCKS					

Data:-

FEH Hydrology:-

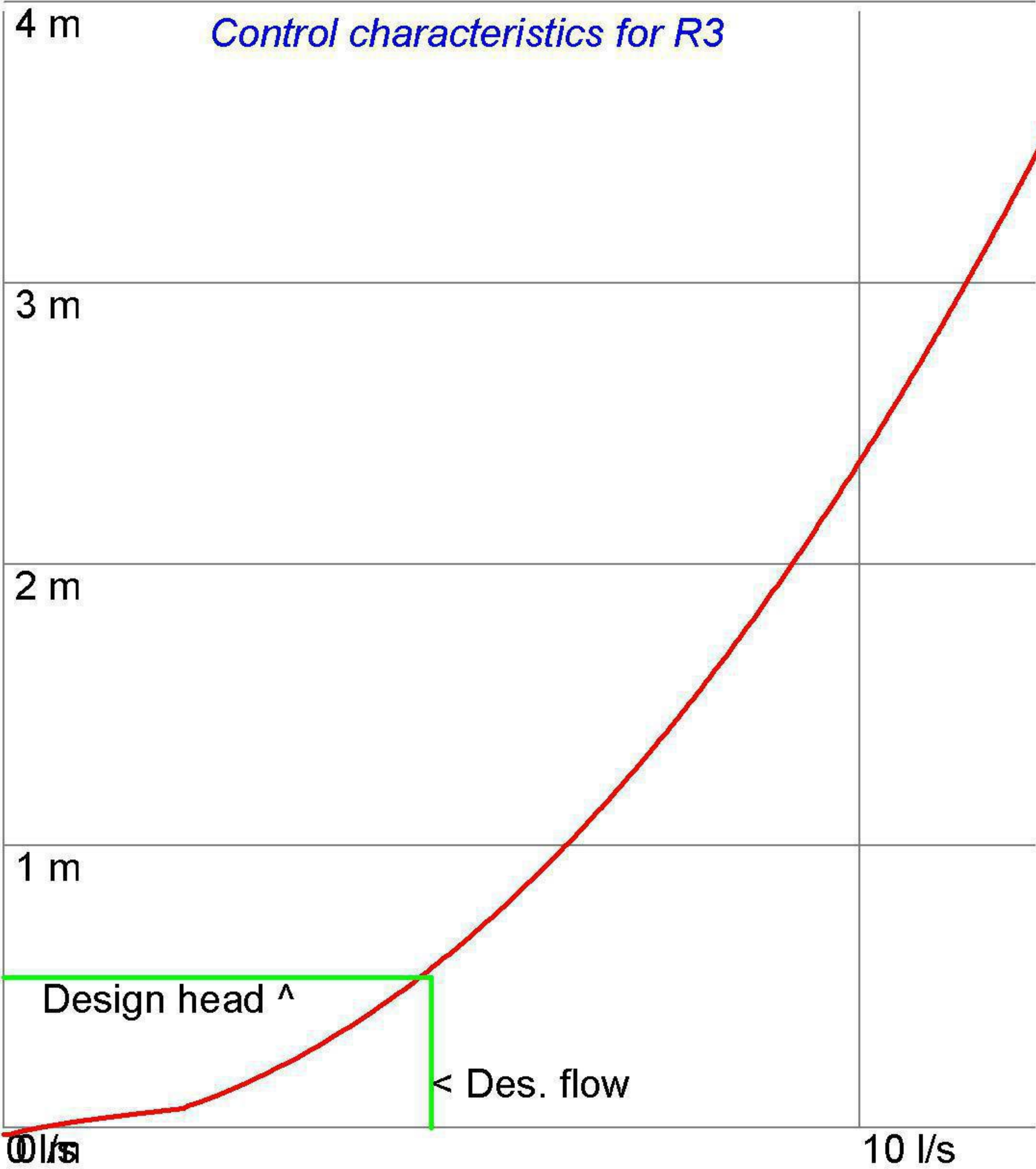
Location = HASSOCKS Grid reference = TQ3015
c = -0.0270 d1 = 0.3790 d2 = 0.2810
d3 = 0.4170 e = 0.3170 f = 2.4620
Return period = 100 Climate change = 45%

Percentage runoff = 100.0% (manual setting)

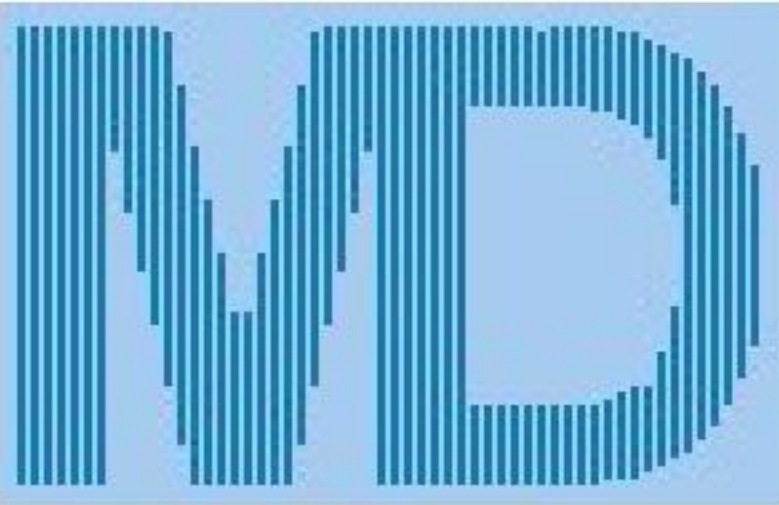
Imperv. area = 1323 m² Pervious area = 0 m²
Total area = 1323 m² Equiv area = 1323 m² (Tot. area x % runoff).
Total runoff = 145.7 m³ Discharge rate = 5.000 l/s

Design Head = 0.6m Peak flow = 4.96 l/s
Control device = R3 Orifice diam = 71.0 mm
Max. calc. depth = 0.6 m Available depth = 0.0 m³
Mean discharge = 3.08 l/s

Available system storage = 0.00 m³ under a system plane at the design head level.
Offline storage = 0.0 m³
Total storage = 104.0 m³ Peak input flow =20.24 l/s



Head (m)	Flow (l/s)	Head (m)	Flow (l/s)
0.01	0.07	2.01	9.15
0.05	0.74	2.05	9.24
0.10	2.10	2.10	9.35
0.15	2.50	2.15	9.46
0.20	2.89	2.20	9.57
0.25	3.23	2.25	9.68
0.30	3.54	2.30	9.79
0.35	3.82	2.35	9.90
0.40	4.08	2.40	10.00
0.45	4.33	2.45	10.10
0.50	4.56	2.50	10.21
0.55	4.79	2.55	10.31
0.60	5.00	2.60	10.41
0.65	5.20	2.65	10.51
0.70	5.40	2.70	10.61
0.75	5.59	2.75	10.70
0.80	5.77	2.80	10.80
0.85	5.95	2.85	10.90
0.90	6.12	2.90	10.99
0.95	6.29	2.95	11.09
1.00	6.45	3.00	11.18
1.05	6.61	3.05	11.27
1.10	6.77	3.10	11.37
1.15	6.92	3.15	11.46
1.20	7.07	3.20	11.55
1.25	7.22	3.25	11.64
1.30	7.36	3.30	11.73
1.35	7.50	3.35	11.81
1.40	7.64	3.40	11.90
1.45	7.77	3.45	11.99
1.50	7.91	3.50	12.08
1.55	8.04	3.55	12.16
1.60	8.16	3.60	12.25
1.65	8.29	3.65	12.33
1.70	8.42	3.70	12.42
1.75	8.54	3.75	12.50
1.80	8.66	3.80	12.58
1.85	8.78	3.85	12.67
1.90	8.90	3.90	12.75
1.95	9.01	3.95	12.83
2.00	9.13	4.00	12.91



MasterDrain
SW

Environmental Assessment Services Ltd http://www.easltd.co.uk London Rd, Hickstead Haywards Heath, West Sussex, RH17 5LZ Tel: 01444 882552 email: info@easltd.co.uk		Job No. 872		
		Sheet no. 2		
		Date 07/05/26		
Project Land south of Leacroft, Hickstead		By MDM	Checked	Reviewed
Title Hydrograph storage analysis (Winter profile) for HASSOCKS				

Storage curves for a 5 hours storm.

Storage depth mm.

Discharge graph

Depth curve mm

Discharge rate l/s

5.00

4.50

4.00

3.50

3.00

2.50

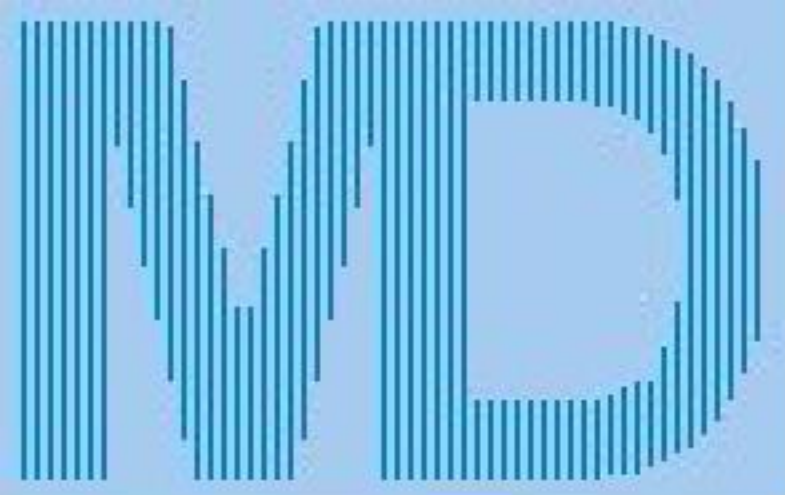
2.00

1.50

1.00

0.50

0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75 4.00 4.25 4.50 4.75 5.00



Environmental Assessment Services Ltd http://www.easltd.co.uk		Job No. 872	
		Sheet no. 3	
		Date 07/05/26	
Project	Land south of Leacroft, Hickstead		By
Title			MDM
		Checked	Reviewed

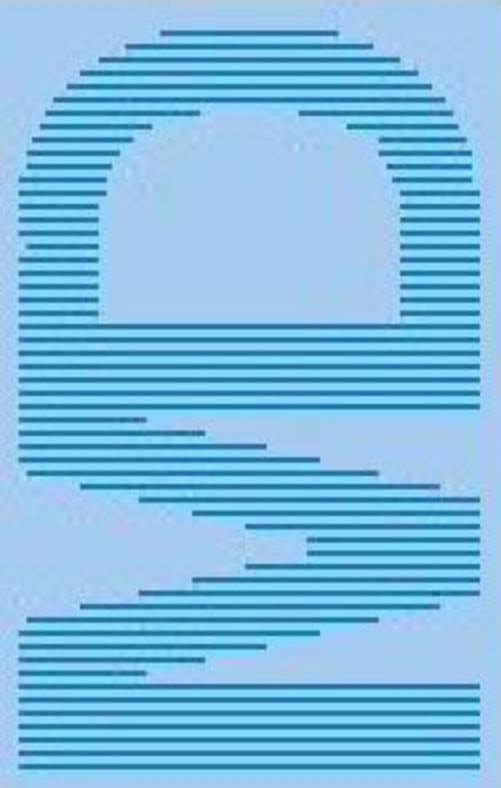
Incremental rainfall figures.

Storm Mins	Storage Depth mm	Control Flow l/s	Storm Mins	Storage Depth mm	Control Flow l/s
3.0	1.7	0.07	153.0	375.6	3.93
6.0	3.3	0.07	156.0	392.4	4.03
9.0	5.0	0.07	159.0	409.1	4.08
12.0	6.7	0.07	162.0	425.4	4.18
15.0	8.5	0.07	165.0	441.1	4.28
18.0	10.3	0.07	168.0	456.2	4.33
21.0	12.3	0.07	171.0	470.8	4.43
24.0	14.4	0.07	174.0	484.6	4.47
27.0	16.6	0.07	177.0	497.7	4.52
30.0	19.0	0.07	180.0	510.2	4.61
33.0	21.5	0.19	183.0	521.7	4.65
36.0	24.0	0.19	186.0	532.3	4.70
39.0	26.6	0.19	189.0	542.0	4.74
42.0	29.2	0.19	192.0	550.8	4.79
45.0	32.1	0.35	195.0	558.8	4.79
48.0	34.9	0.35	198.0	565.8	4.83
51.0	37.8	0.35	201.0	572.2	4.87
54.0	40.8	0.53	204.0	577.6	4.87
57.0	43.8	0.53	207.0	582.2	4.92
60.0	47.0	0.53	210.0	585.9	4.92
63.0	50.6	0.74	213.0	589.0	4.92
66.0	54.3	0.74	216.0	591.6	4.96
69.0	58.3	0.74	219.0	593.5	4.96
72.0	62.8	0.98	222.0	594.8	4.96
75.0	67.3	0.98	225.0	595.6	4.96
78.0	72.3	1.23	228.0	596.0	4.96
81.0	77.5	1.23	231.0	596.1	4.96
84.0	83.2	1.50	234.0	595.7	4.96
87.0	89.3	1.50	237.0	595.0	4.96
90.0	96.0	1.79	240.0	594.0	4.96
93.0	103.0	2.10	243.0	592.6	4.96
96.0	110.4	2.14	246.0	591.0	4.96
99.0	118.7	2.14	249.0	589.2	4.92
102.0	127.8	2.24	252.0	587.4	4.92
105.0	137.5	2.33	255.0	585.5	4.92
108.0	148.0	2.42	258.0	583.4	4.92
111.0	159.3	2.50	261.0	581.2	4.92
114.0	171.3	2.66	264.0	578.8	4.87
117.0	183.9	2.74	267.0	576.5	4.87
120.0	197.3	2.81	270.0	574.0	4.87
123.0	211.6	2.96	273.0	571.4	4.87
126.0	226.3	3.03	276.0	568.6	4.83
129.0	241.6	3.16	279.0	565.8	4.83
132.0	257.3	3.23	282.0	562.8	4.83
135.0	273.5	3.35	285.0	559.7	4.79
138.0	290.2	3.48	288.0	556.6	4.79
141.0	307.1	3.54	291.0	553.4	4.79
144.0	324.2	3.65	294.0	550.2	4.79
147.0	341.4	3.76	297.0	546.9	4.74
150.0	358.5	3.82	300.0	543.6	4.74

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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Project

Land south of Leacroft, Hickstead

Title

Hydrograph storage analysis (Winter profile) for HAS SOCKS

Job No.

872

Sheet no.

4

Date

07/05/26

By

MDM

Checked

Reviewed

Sequential storage volume at specific storm durations.

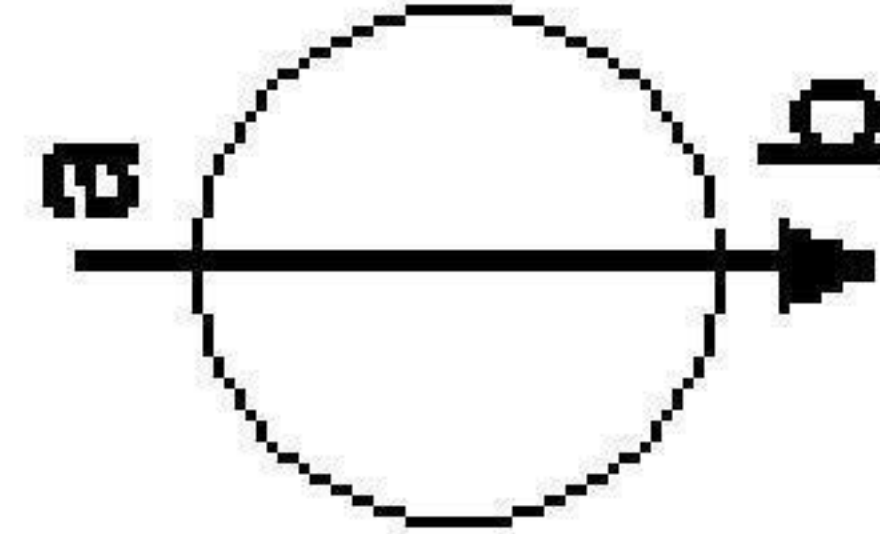
Storm duration (hours)	Sequential storage volume (m³)
0.1	104.9
0.3	101.9
0.5	99.9
0.7	97.8
1.0	95.4
1.5	90.2
2.0	86.4
3.0	79.6
5.0	74.7
10.0	69.7
30.0	63.9
100.0	53.6
300.0	41.7
1000.0	33.6
3000.0	27.9
5000.0	23.8
10000.0	21.0
20000.0	18.8
30000.0	17.0
40000.0	15.6
50000.0	13.4
60000.0	12.1
70000.0	10.1
80000.0	8.3
90000.0	6.4
100000.0	4.3
110000.0	2.0
120000.0	0.0

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		Sheet no. 1	
		Date 07/05/26 11:43	
		By MDM	Checked
Project	Land South of Leacroft, London Road, Hickstead		
Title	Manhole printout for HICKSTEAD.SW		

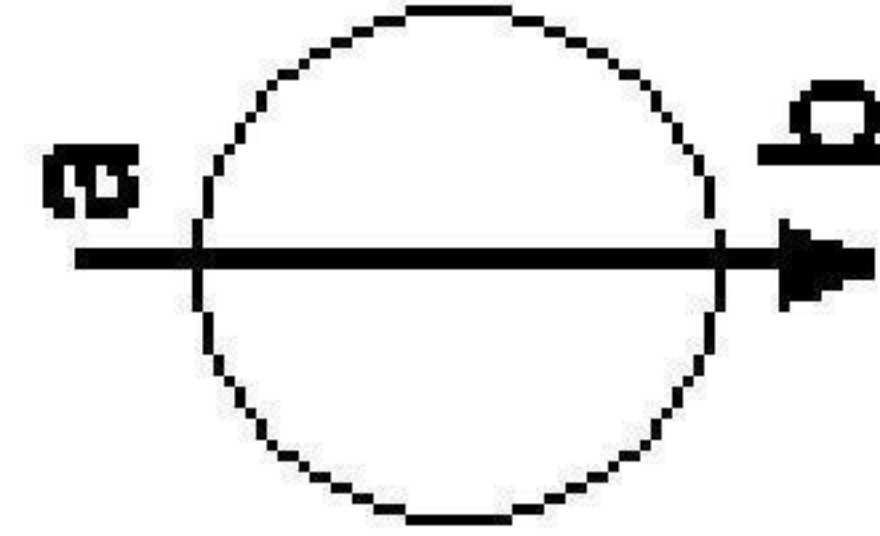
Manhole ref.	X ref	Y ref	Form	Cham diam. or length	Rect. width	Chamb. height	Shaft height	MH Volume	Exit Diam	Exit Crown	Exit Invert	Chamb const	slab level	Cover level	Dwnstr MH
S01	71.61	73.00	circ	450	N/A	0.50		0.08	150	13.515	13.340	N/A	13.290	13.840	S03
S02	29.98	57.74	circ	450	N/A	0.50		0.08	150	13.875	13.700	N/A	13.650	14.200	S03
S03	48.21	63.56	circ	1200	N/A	0.91		1.03	225	13.340	13.090	N/A	13.040	14.000	S04
S09	76.34	60.81	circ	450	N/A	0.50		0.08	150	13.515	13.340	N/A	13.290	13.840	S04
S04	51.73	52.03	circ	1200	N/A	1.23		1.39	225	13.220	12.970	N/A	12.920	14.200	Atten
S05	89.4	58.39	circ	450	N/A	0.51		0.08	150	13.515	13.340	N/A	13.290	13.850	S06
S06	96.43	41.47	circ	1200	N/A	1.22		1.38	150	13.345	13.170	N/A	13.120	14.390	S07
S08	78.75	54.11	circ	450	N/A	0.50		0.08	100	13.925	13.800	N/A	13.750	14.300	S07
S07	86.77	37.19	circ	1200	N/A	1.34		1.52	225	13.310	13.060	N/A	13.010	14.400	S14
S12	57.32	14.67	circ	600	N/A	0.50		0.14	225	14.460	14.210	N/A	14.160	14.710	S13
S13	76.77	22.36	circ	1200	N/A	0.69		0.78	225	14.260	14.010	N/A	13.960	14.700	S14
S14	72.7	32.24	circ	1200	N/A	1.71		1.93	300	13.215	12.890	N/A	12.840	14.600	Atten
S10	32.83	17.41	circ	1200	N/A	0.50		0.57	225	14.450	14.200	N/A	14.150	14.700	S11
S11	43.92	22.36	circ	1200	N/A	0.60		0.68	225	14.340	14.090	N/A	14.040	14.690	Atten
Atten	45.37	43.72	circ	20000	N/A	2.10		659.73	225	12.650	12.400	N/A	12.350	14.500	S15

All manholes to be as per 'Sewers for Adoption'

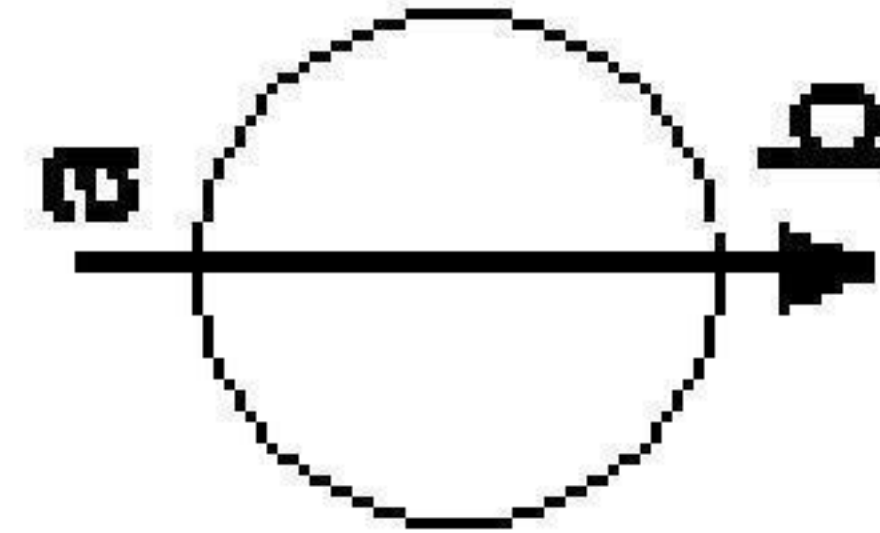
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				Sheet no. 2				
				Date 07/05/26 11:43				
Project	Land South of Leacroft, London Road, Hickstead			By	Checked	Reviewed		
Title	Manhole printout for HICKSTEAD.SW			MDM				



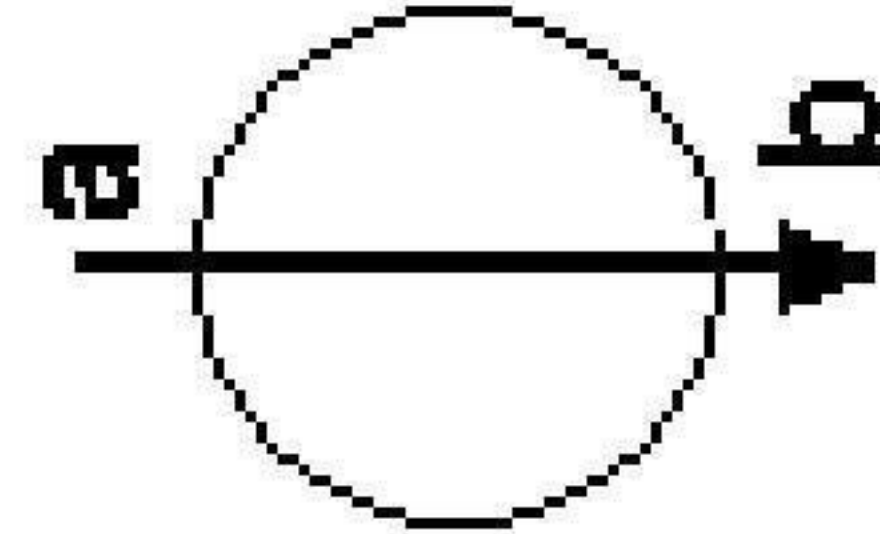
MH = S01
a=head
b = 150



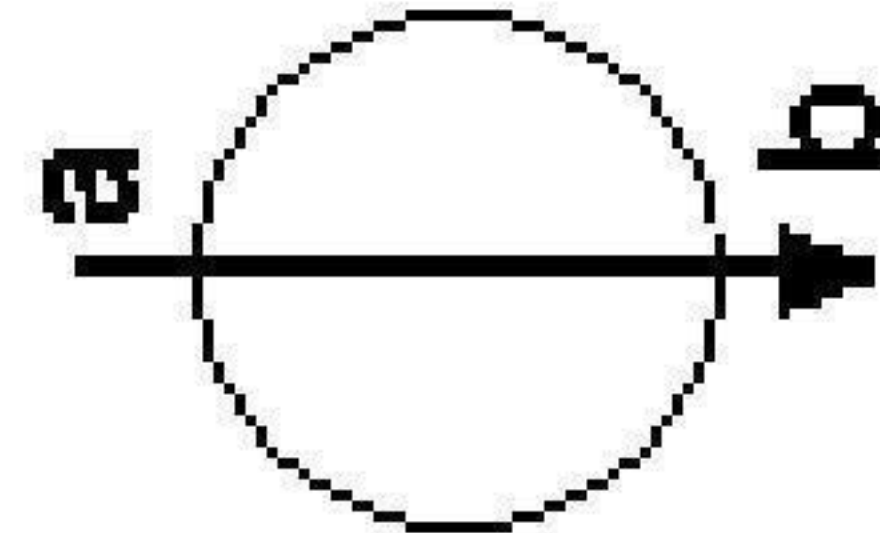
MH = S02
a=head
b = 150



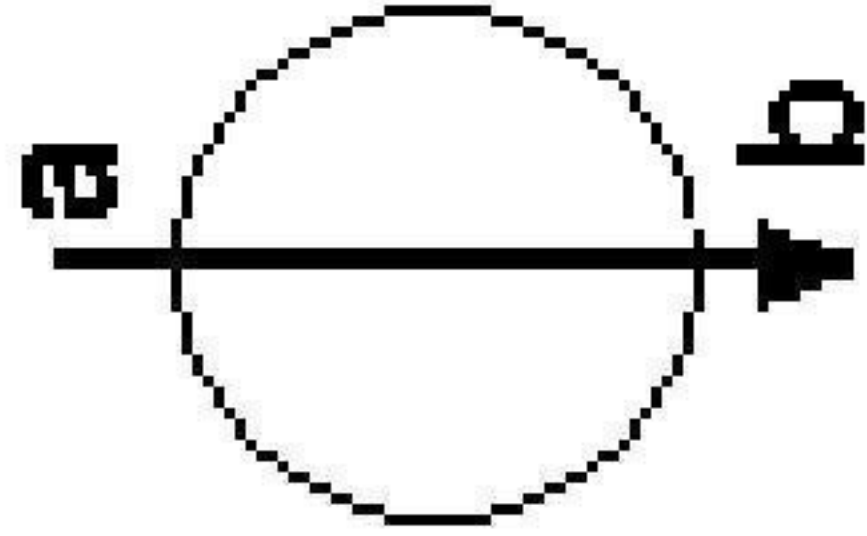
MH = S09
a=head
b = 150



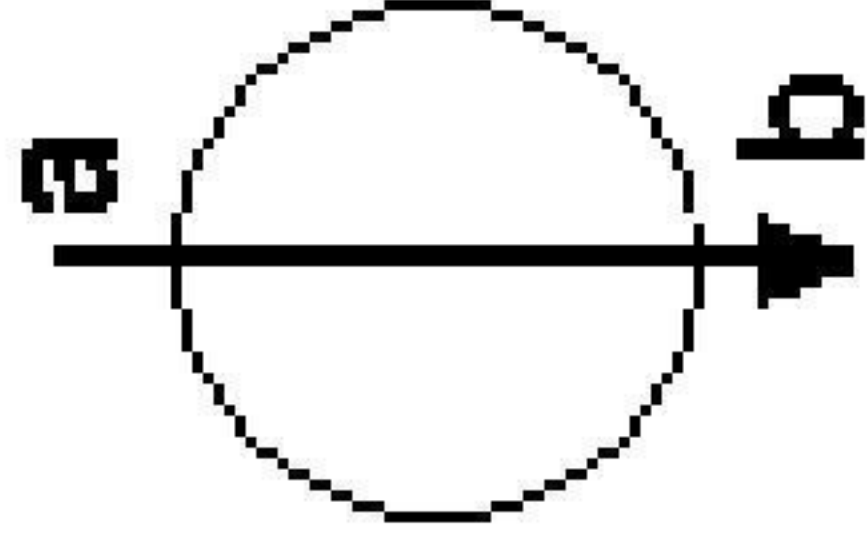
MH = S05
a=head
b = 150



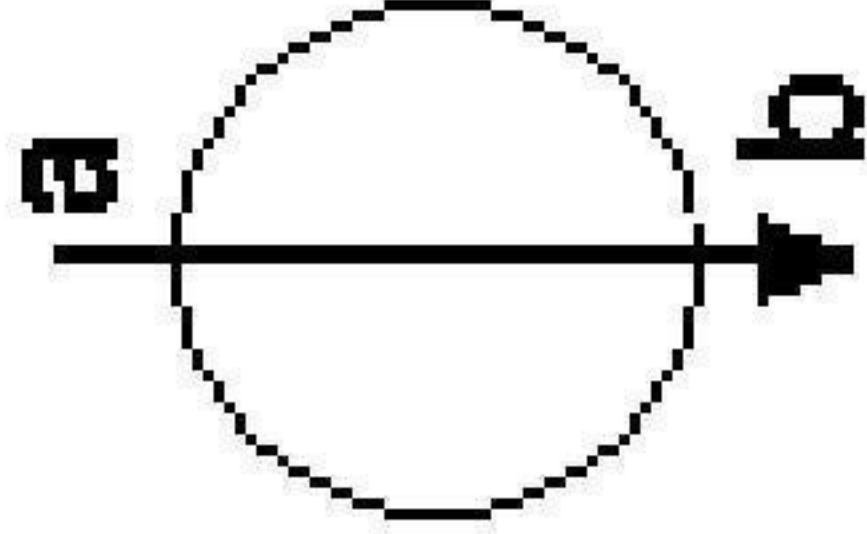
MH = S08
a=head
b = 100



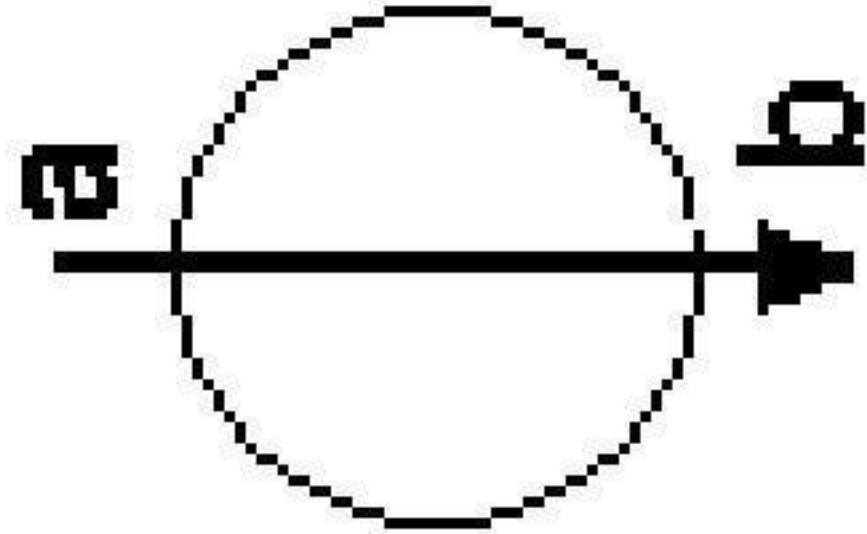
MH = S07
a= 150
b = 225
c = 100
d = 150



MH = S12
a=head
b = 225



MH = S10
a=head
b = 225



MH = S11
a= 225
b = 225



MH = S06
a= 150
b = 150

MH = Atten
a= 225
b = 225
c = 225
d = 300

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				Sheet no. 3			
				Date 07/05/26 11:43			
Project	Land South of Leacroft, London Road, Hickstead			By MDM	Checked	Reviewed	
Title	Manhole printout for HICKSTEAD.SW						

These explanatory notes should be read in conjunction with the Manhole printout

- 1) Manhole ref - the reference for the manhole in question
- 2) Form - either circular or rectangular
- 3) Chamber diam or length - diameter of chamber if circular, or length if rectangular - in metres
- 4) Rectangular width - if form is rectangular, this gives the width of the chamber
- 5) Chamber height - height of chamber from invert
- 6) Shaft height - height of access shaft if applicable, from top of chamber to ground level
- 7) Manhole volume - cubic capacity of manhole chamber
- 8) Exit diameter - diameter of pipe leaving this manhole
- 9) Exit crown - crown level of pipe leaving this manhole
- 10) Exit invert - invert level of pipe leaving this manhole
- 11) Chamb const - manhole construction :-

N/A - not specified

Conc - concrete rings

Poly - polypropylene rings surrounded by selected fill

Poly/conc - polypropylene rings surrounded by concrete

Brick - brick built with waterproof render

In situ - concrete cast in situ
- 12) Slab level - surface level of base slab (if no sump, this is placed at 50mm below exit invert to allow levels manipulation) .
- 13) Manhole diameters of 9999 have exceeded the sizes available in SFA
- 14) Manhole diameters may have to be modified due to the number of branches



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Job No. 872		1	
Sheet no.		07/05/26	
Date			
By	MDM	Checked	Reviewed
Project Land south of Leacroft			
Title Surchage calcs (Sized at 30 yrs storm) for HICKSTEAD.SW CCF = 45%			

MasterDrain
SW

Free flowing outlet				PEAK hydrograph values printed				Mean rain intens. 298.00 mm/hr				Peak rain intens. 1168.16 mm/hr			
Return period = 100 yrs				Storm duration = 15 mins				Storm profile = Summer				Sample period = 7.5 secs.			
Climate change factor = 45				No offline storage				Using FEH data							
Entry No.	SECT. No.	MANHOLE REF	PIPE CAPACITY	PIPE RATE	PIPE FLOW	PIPE SIZE	CHAMBER DIAM/LxW	INVERT LEVEL	WATER LEVEL	GRND LEVEL	SURCHARGE	EXCESS FLOW	FLOODED VOL	DRAINED AREA	STATUS
			l/s	l/s	l/s	mm	mm	m	m	m	fract.	l/s	m³	:x FACTOR	
1	I	1.01	S01	17.6	10.9	150	450	13.34	13.43	13.84	0.62	0.00	0.000	77	OK
2	B	2.01	S02	32.0	26.1	150	450	13.70	13.81	14.20	0.81	0.00	0.000	183	OK
3	I	1.02	S03	51.9	51.9	225	1200	13.09	13.31	14.00	1.00	0.00	0.000	365	OK
4	B	3.01	S09	21.1	10.8	150	450	13.34	13.42	13.84	0.51	0.00	0.000	76	OK
5	I	1.03	S04	123.1	78.8	225	1200	12.97	13.11	14.20	0.64	0.00	0.000	554	OK
6	B	4.01	S05	17.0	10.5	150	450	13.34	13.43	13.85	0.62	0.00	0.000	74	OK
7	B	4.02	S06	18.1	14.9	150	1200	13.17	13.29	14.39	0.82	0.00	0.000	104	OK
8	S1	5.01	S08	12.2	7.0	100	450	13.80	13.86	14.30	0.58	0.00	0.000	49	OK
9	B	4.03	S07	55.4	26.4	225	1200	13.06	13.17	14.40	0.48	0.00	0.000	185	OK
10	S1	6.01	S12	50.7	21.9	225	600	14.21	14.31	14.71	0.43	0.00	0.000	154	OK
11	S1	6.02	S13	165.4	29.3	225	1200	14.01	14.06	14.70	0.18	0.00	0.000	206	OK
12	B	4.04	S14	143.6	63.1	300	1200	12.89	13.03	14.60	0.44	0.00	0.000	444	OK
13	B	7.01	S10	49.5	18.4	225	1200	14.20	14.29	14.70	0.37	0.00	0.000	129	OK
14	B	7.02	S11	145.0	36.9	225	1200	14.09	14.16	14.69	0.25	0.00	0.000	259	OK
15	I	1.04	Atten†	104.4	178.8	225	20000	12.40	12.63	14.50	1.71	74.42	0.000	1257	Surch



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Job No. 872		
Sheet no. 2		
Date 07/05/26		
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Project Land south of Leacroft		
Title Surcharge calcs (Sized at 30 yrs storm) for HICKSTEAD.SW CCF = 45%		

MasterDrain
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 - Atten	Restrictor flowrate - 3.3 l/s
---------------------------	-------------------------------

Flood volumes

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



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Sheet no.
3

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07/05/26

By
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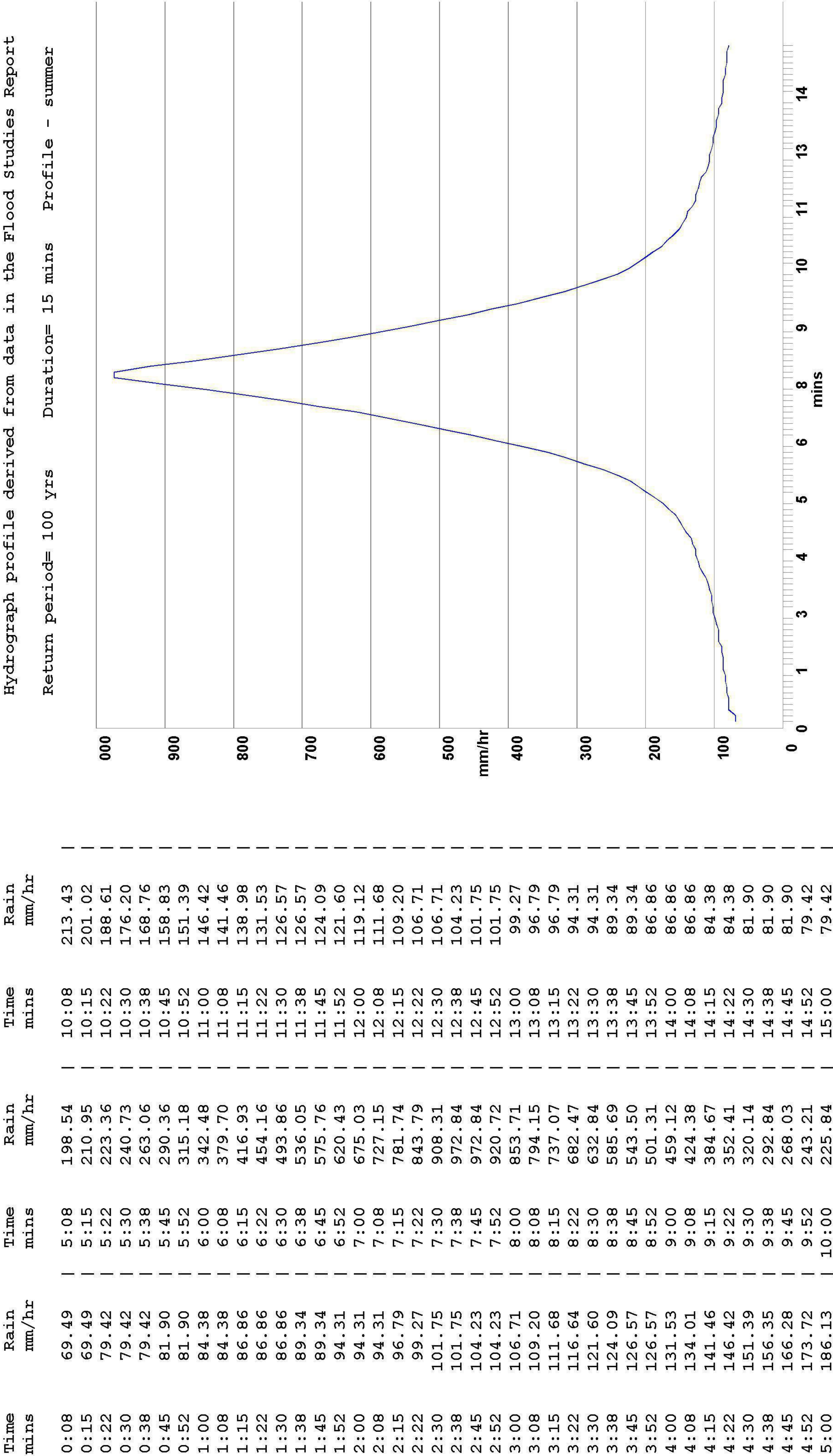
Reviewed

Project
Land south of Leacroft

Title
Surcharge calcs (Sized at 30 yrs storm) for HICKSTEAD.SW CCF = 45%

Hydrograph profile derived from data in the Flood Studies Report

Return period= 100 yrs Duration= 15 mins Profile - summer





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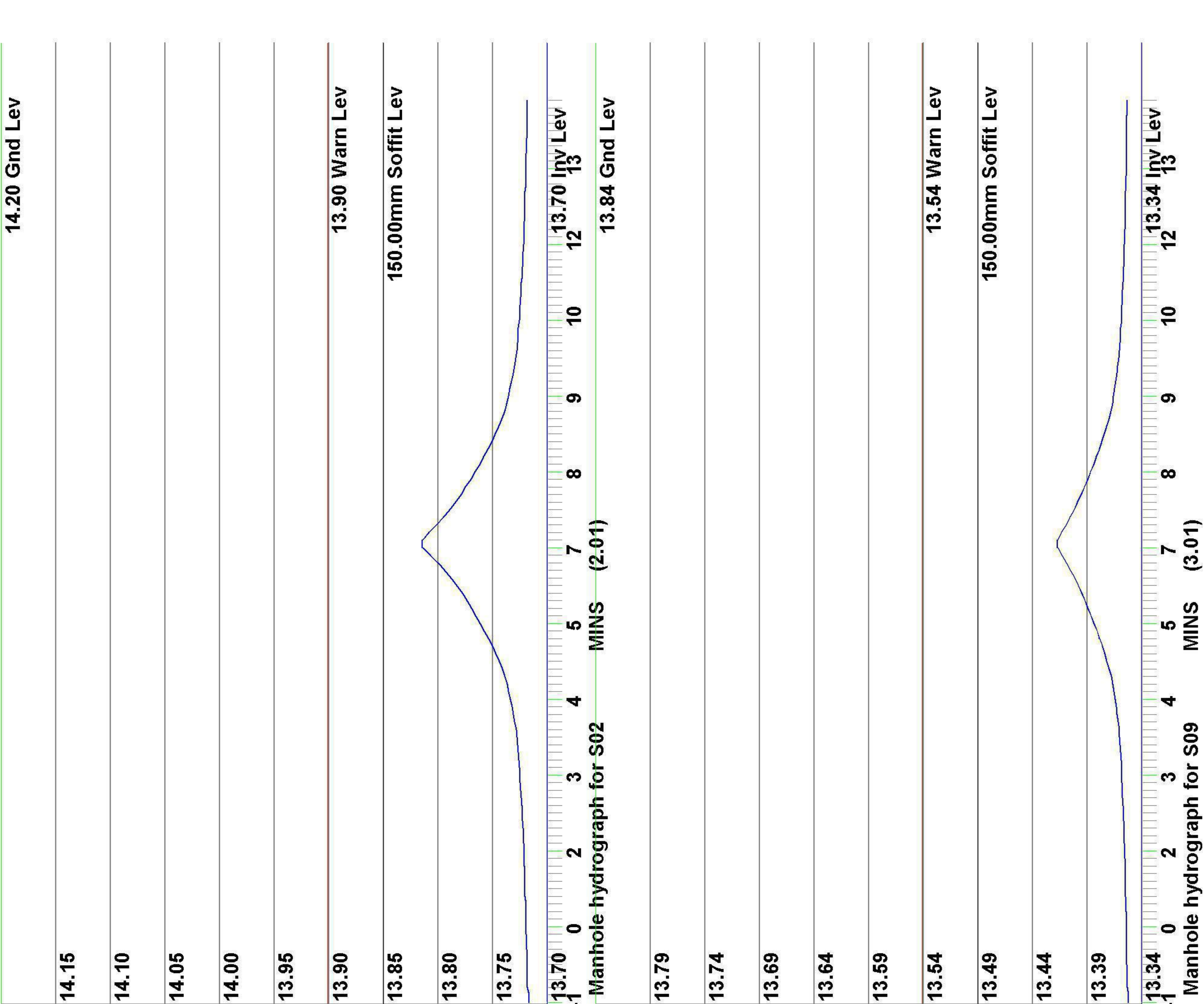
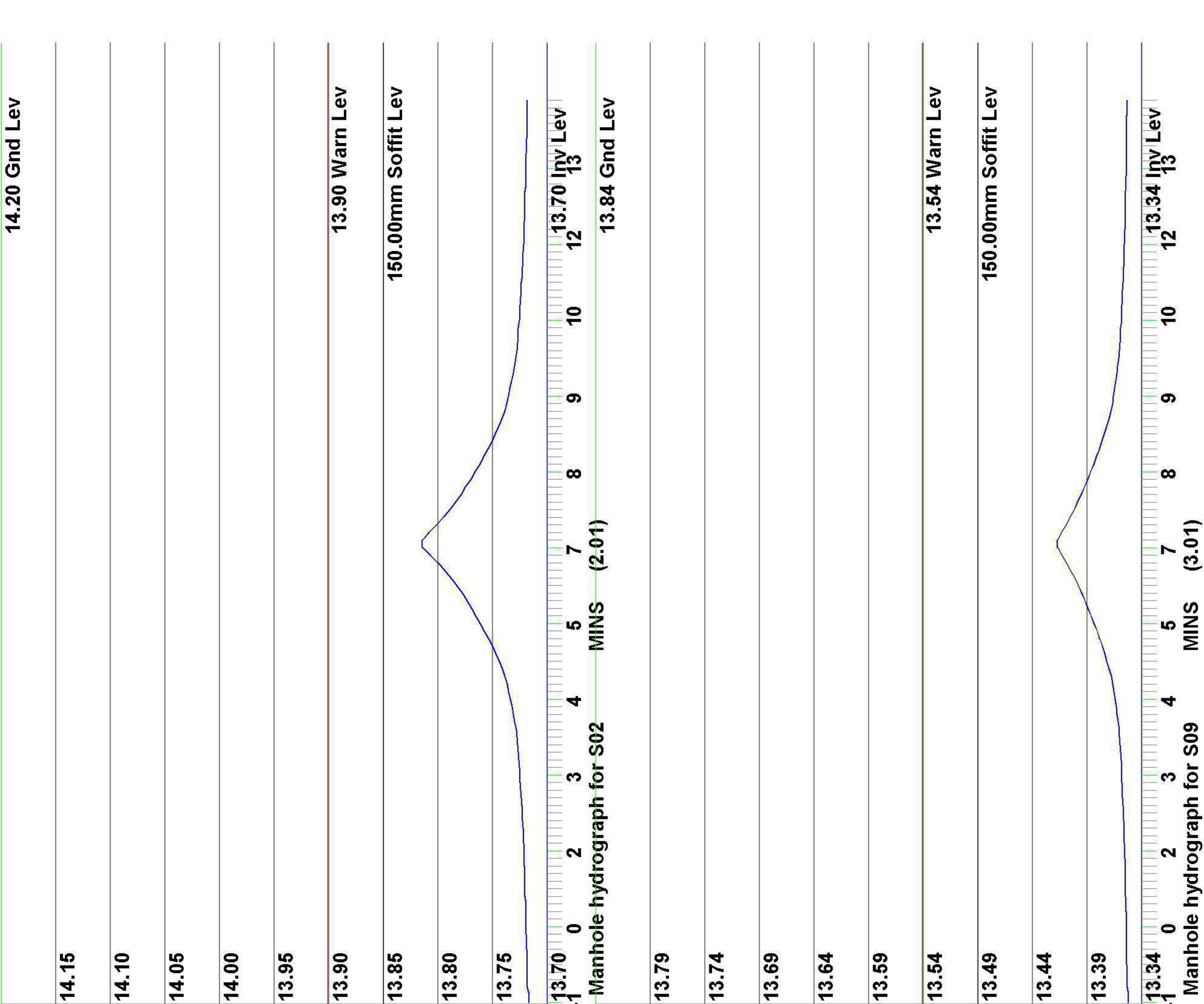
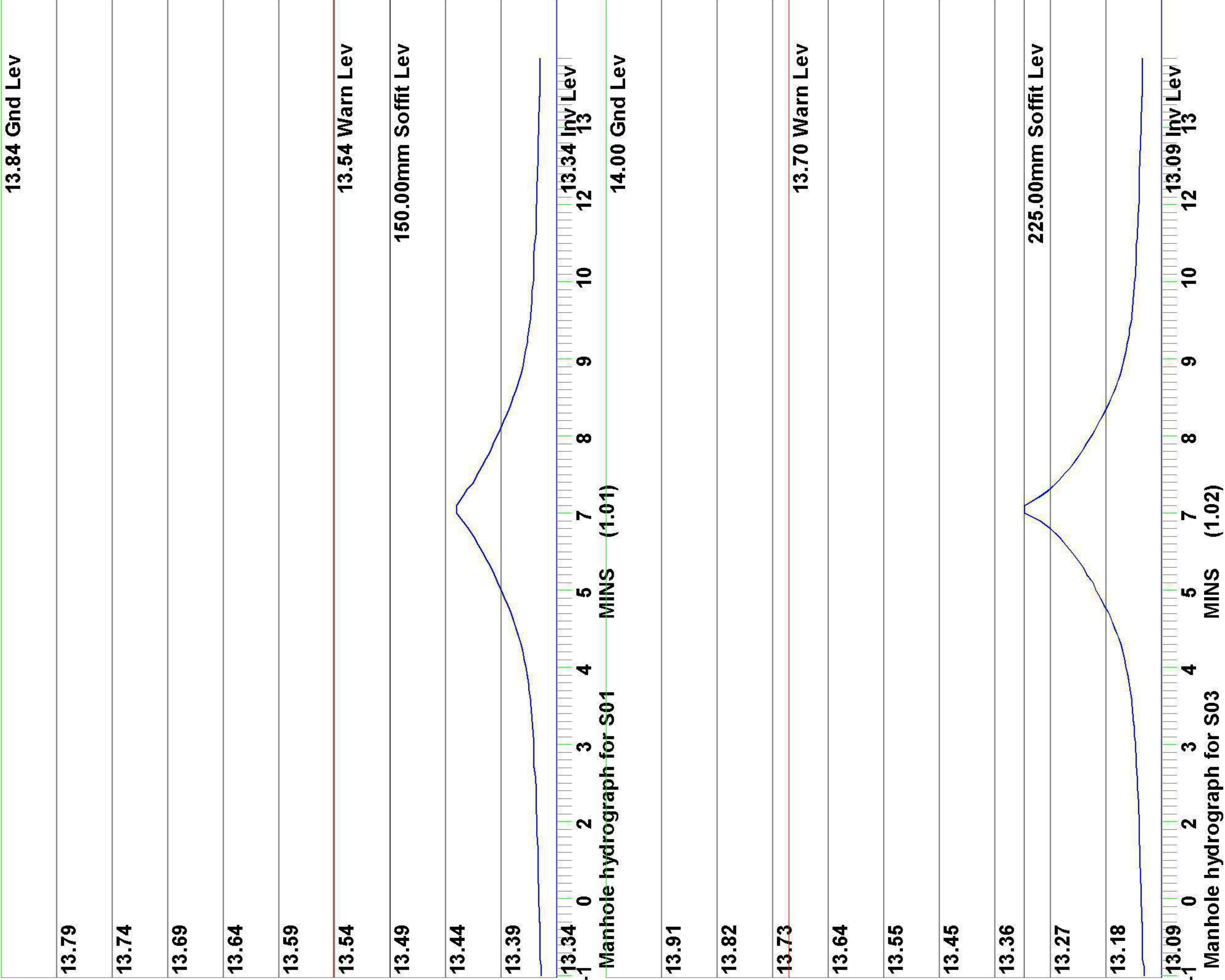
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Project Land south of Leacroft

Title Surcharge calcs (Sized at 30 yrs storm) for HICKSTEAD.SW CCF = 45%

Job No. 872		Date 07/05/26
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Sheet no.

Date _____

07/05/26

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SW**

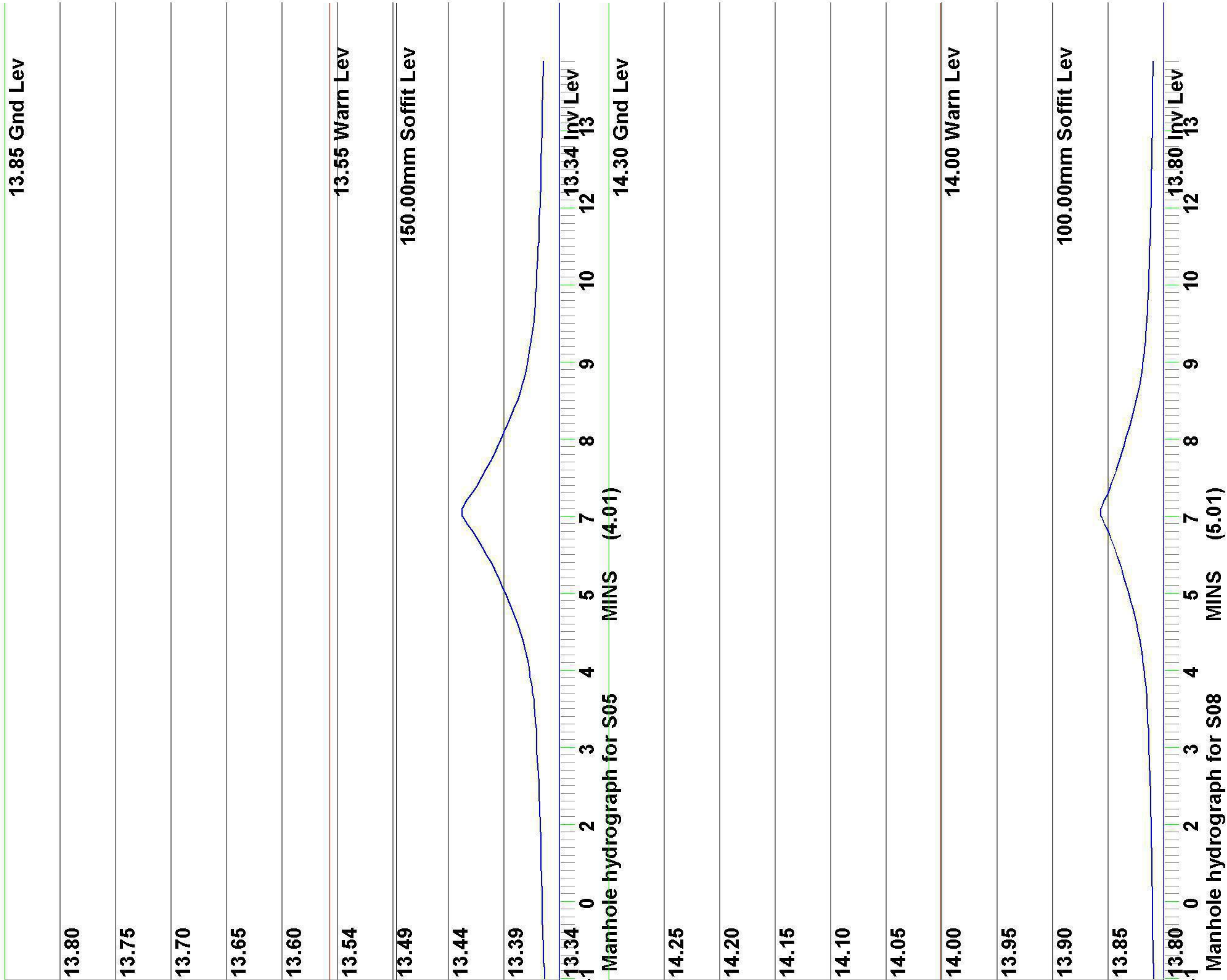
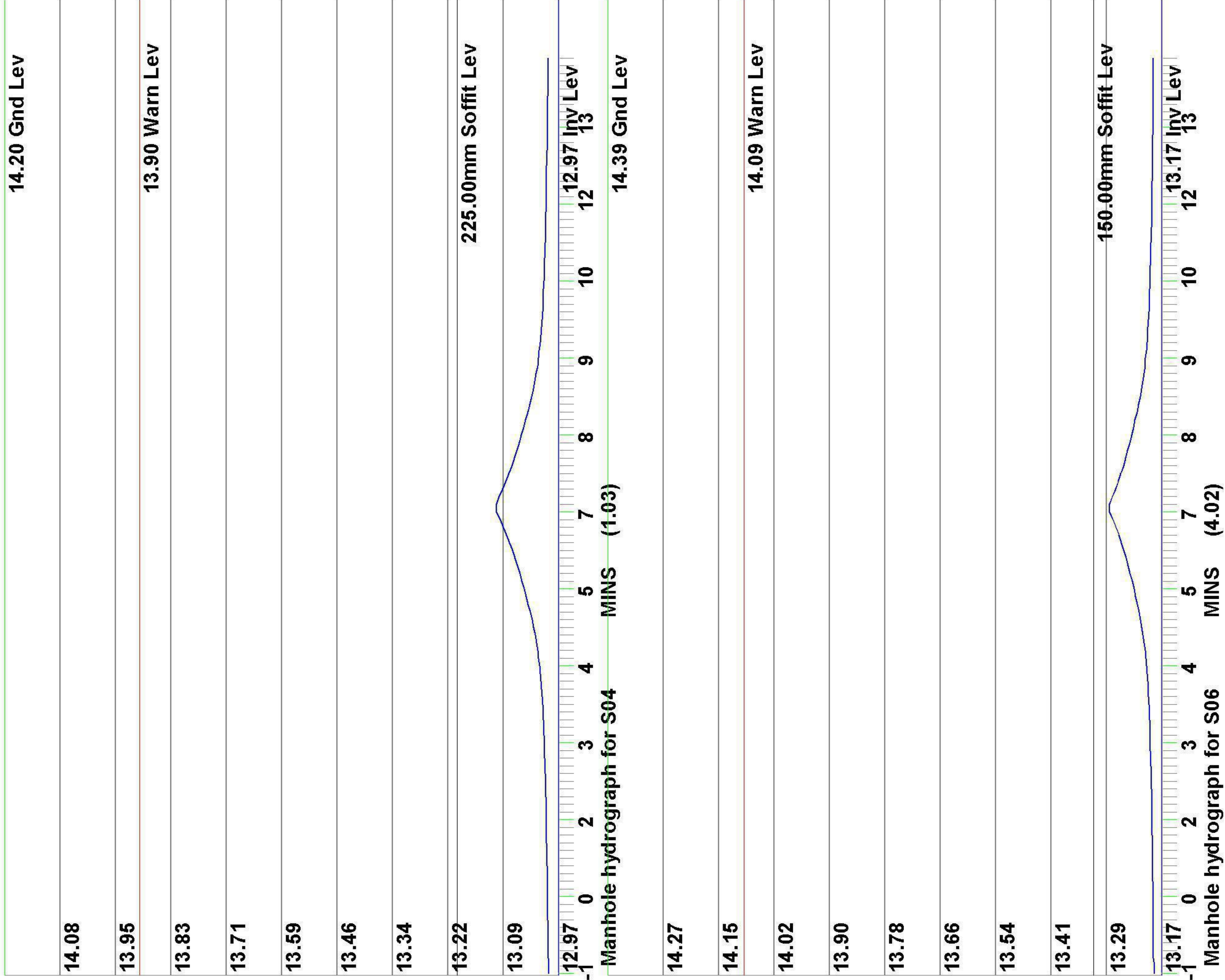
Project Land south of Leacroft

Title **Surcharge calcs (Sized at 30 yrs storm) for HICKSTEAD.SW CCF = 45%**

By **MDM**

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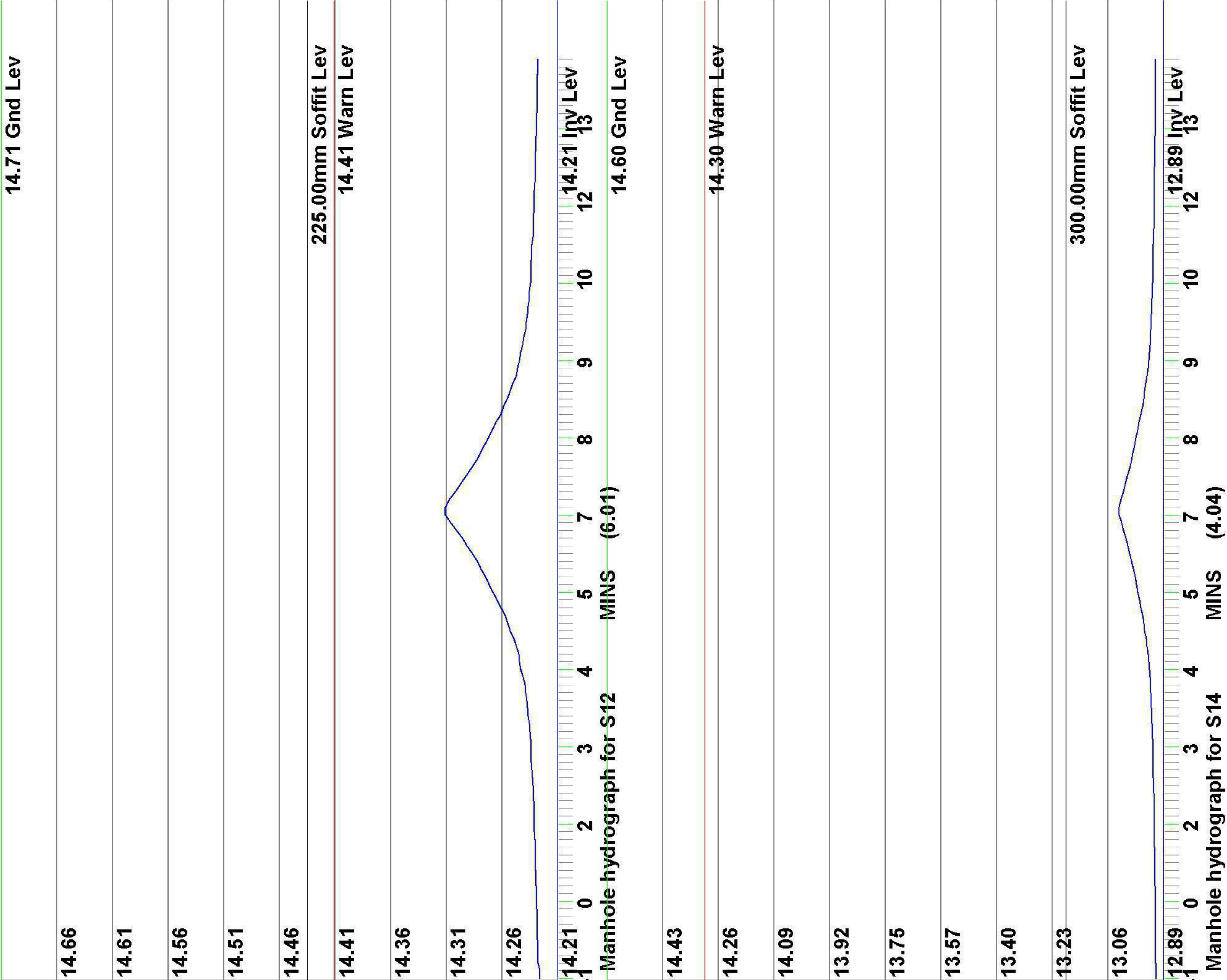
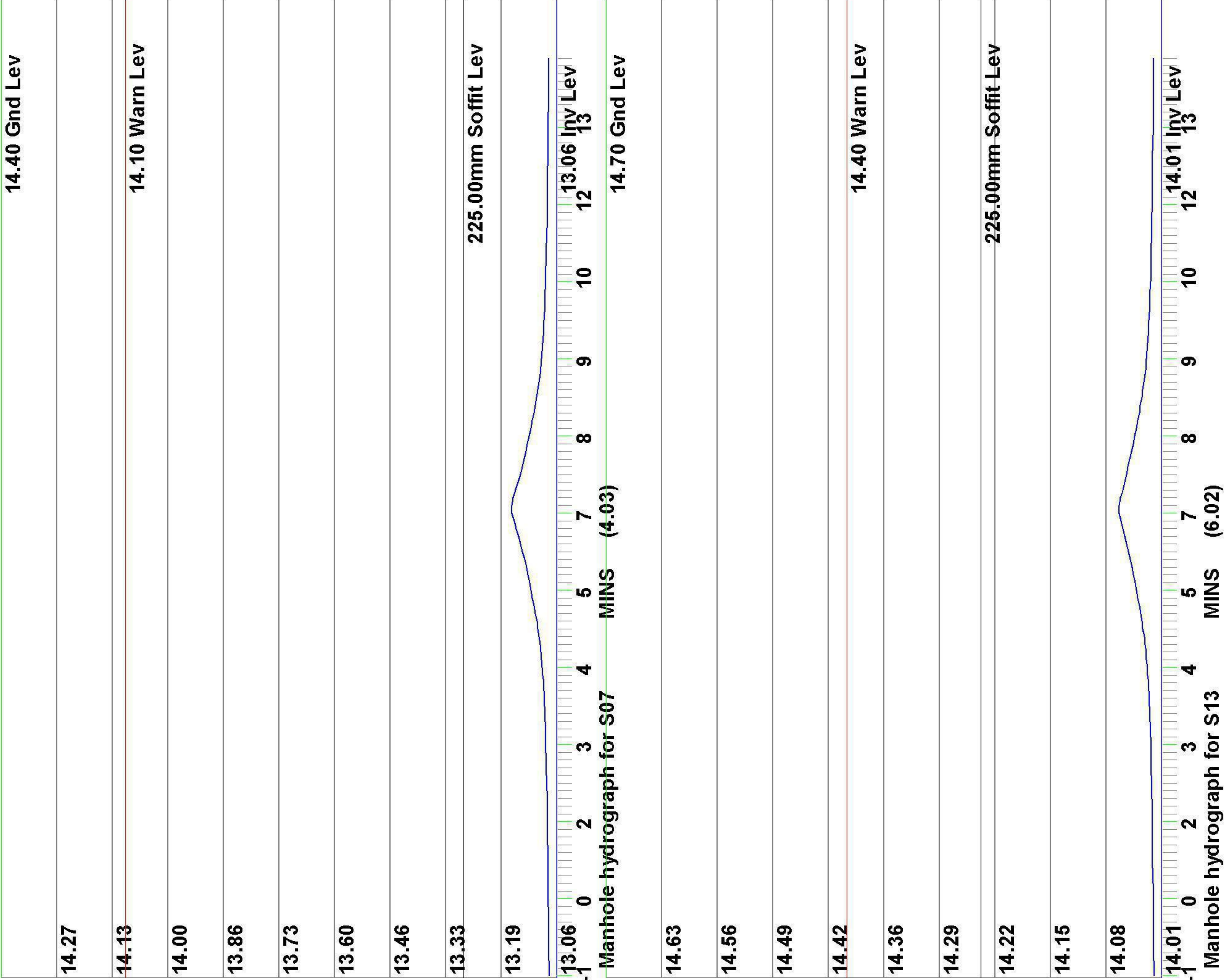
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Project Land south of Leacroft

Title Surcharge calcs (Sized at 30 yrs storm) for HICKSTEAD.SW CCF = 45%

Job No. 872		07/05/26
Sheet no. 6		
Date		
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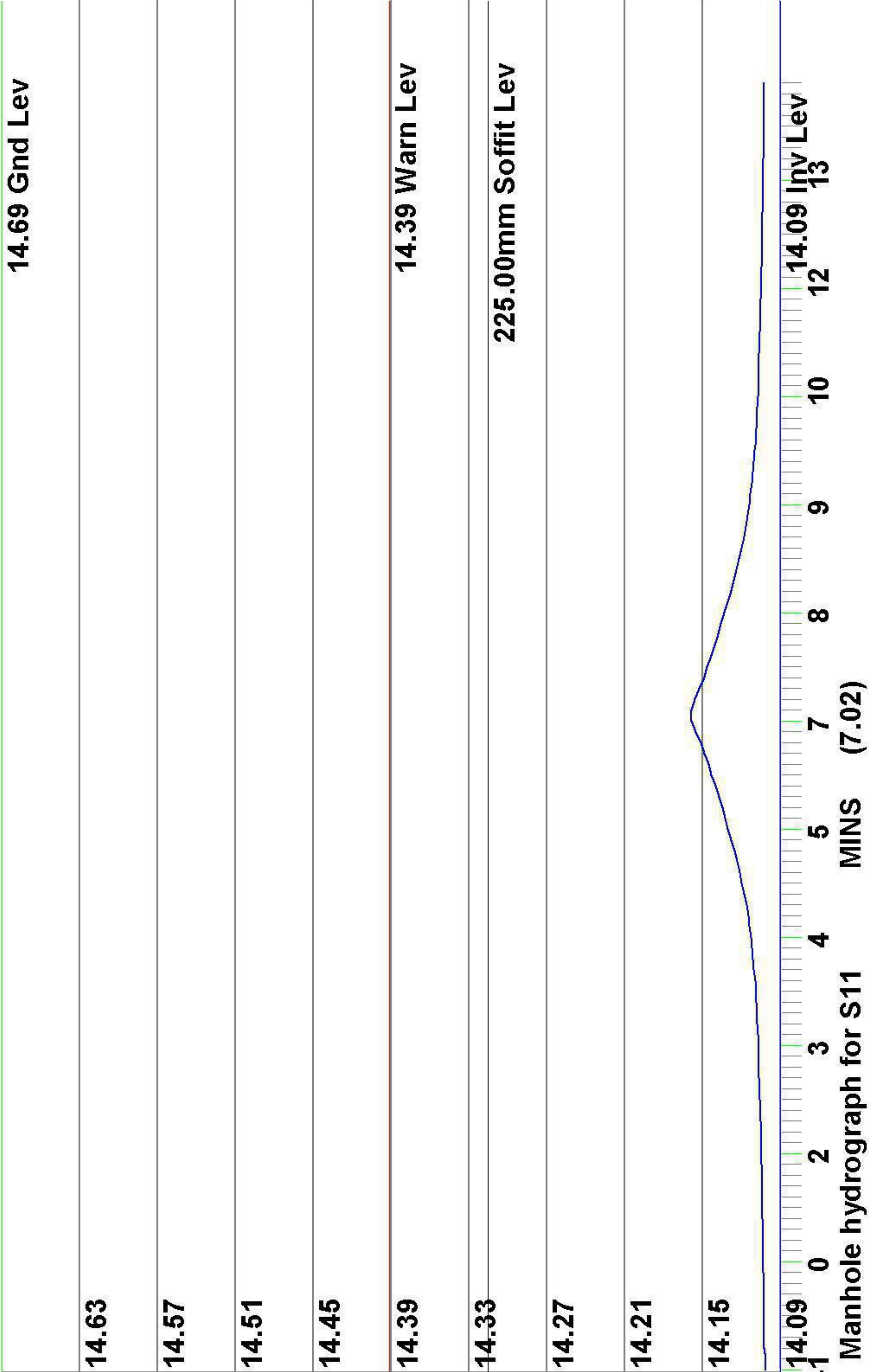
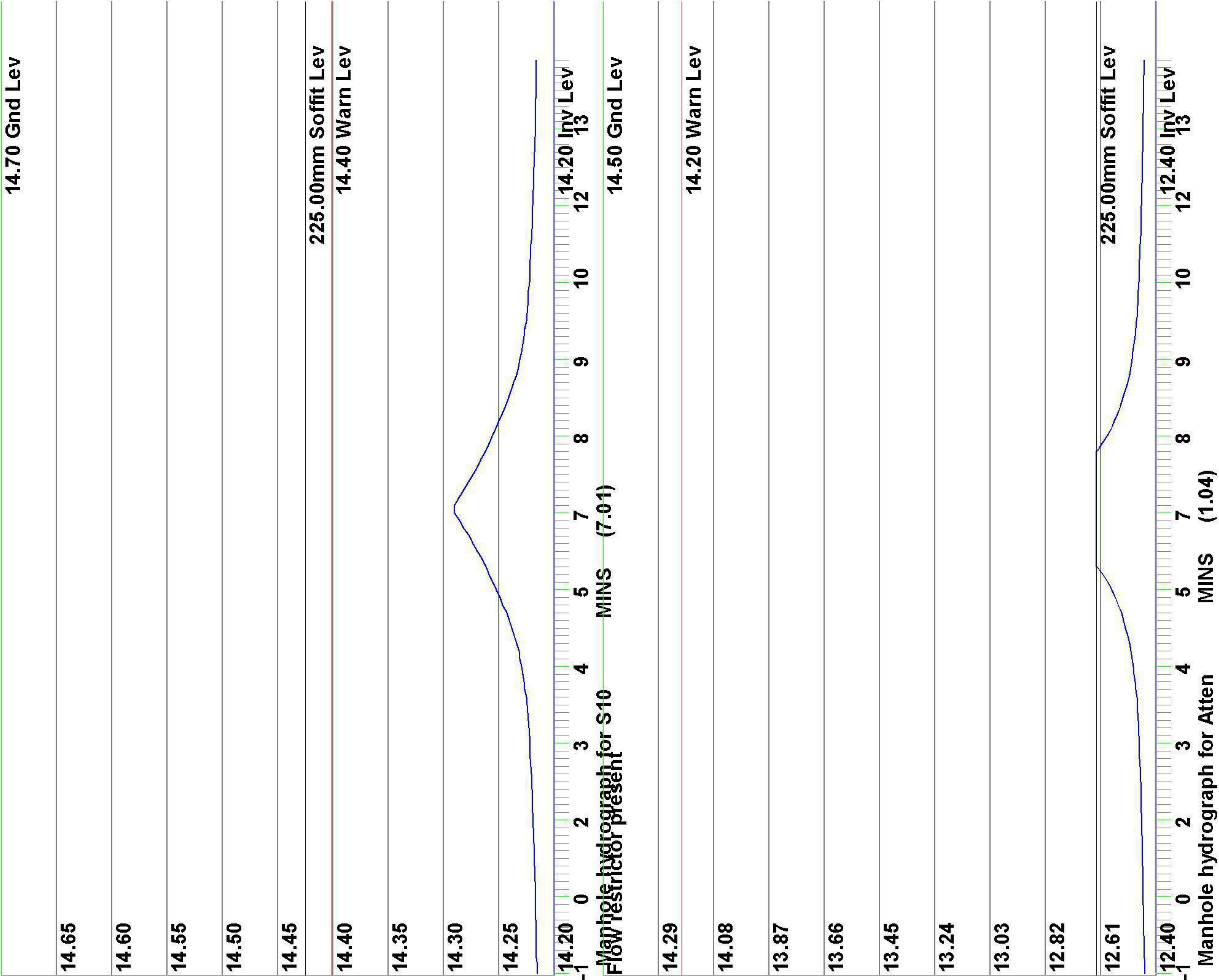
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Project Land south of Leacroft	Job No. 872		
	Sheet no. 7		
	Date 07/05/26		
Title Surcharge calcs (Sized at 30 yrs storm) for HICKSTEAD.SW CCF = 45%	By MDM	Checked	Reviewed

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Job No. 872		Job No. 872	
Sheet no. 1		Sheet no. 1	
Date 07/05/26		Date 07/05/26	
Project	By MDM	Checked	Reviewed
Title Surcharge calcs (Sized at 30 yrs storm) for HICKSTEAD.SW CCF = 45%			

MasterDrain
SW

Free flowing outlet				PEAK hydrograph values printed				Mean rain intens. 178.00 mm/hr				Peak rain intens. 697.76 mm/hr			
Return period = 100 yrs				Storm duration = 30 mins				Storm profile = Summer				Sample period = 15.0 secs.			
Climate change factor = 45				No offline storage				Using FEH data							
Entry No.	SECT.:	MANHOLE	PIPE	RATE	PIPE	CHAMBER	INVERT:	WATER	GRND	SURCHARGE	EXCESS	FLOODED	DRAINED	STATUS	
No.	No.	REF	CAPACITY	FLOW	SIZE	:DIAM/LxW	LEVEL	LEVEL	LEVEL		FLOW	VOL	:AREA (m²):		
:	:	:	l/s	l/s	mm	: mm	: m	: m	: m	fract.	l/s	m³	:x FACTOR:		
1	I	1.01	S01	17.6	6.5	150	450	13.34	13.40	13.84	0.37	0.00	0.000	77	OK
2	B	2.01	S02	32.0	15.6	150	450	13.70	13.77	14.20	0.49	0.00	0.000	183	OK
3	I	1.02	S03	51.9	31.0	225	1200	13.09	13.22	14.00	0.60	0.00	0.000	365	OK
4	B	3.01	S09	21.1	6.5	150	450	13.34	13.39	13.84	0.31	0.00	0.000	76	OK
5	I	1.03	S04	123.1	47.0	225	1200	12.97	13.06	14.20	0.38	0.00	0.000	554	OK
6	B	4.01	S05	17.0	6.3	150	450	13.34	13.40	13.85	0.37	0.00	0.000	74	OK
7	B	4.02	S06	18.1	8.9	150	1200	13.17	13.24	14.39	0.49	0.00	0.000	104	OK
8	S1	5.01	S08	12.2	4.2	100	450	13.80	13.84	14.30	0.34	0.00	0.000	49	OK
9	B	4.03	S07	55.4	15.7	225	1200	13.06	13.13	14.40	0.28	0.00	0.000	185	OK
10	S1	6.01	S12	50.7	13.1	225	600	14.21	14.28	14.71	0.26	0.00	0.000	154	OK
11	S1	6.02	S13	165.4	17.5	225	1200	14.01	14.05	14.70	0.11	0.00	0.000	206	OK
12	B	4.04	S14	143.6	37.7	300	1200	12.89	12.98	14.60	0.26	0.00	0.000	444	OK
13	B	7.01	S10	49.5	11.0	225	1200	14.20	14.26	14.70	0.22	0.00	0.000	129	OK
14	B	7.02	S11	145.0	22.0	225	1200	14.09	14.14	14.69	0.15	0.00	0.000	259	OK
15	I	1.04	Atten†	104.4	106.7	225	20000	12.40	12.63	14.50	1.02	2.28	0.000	1257	Surch



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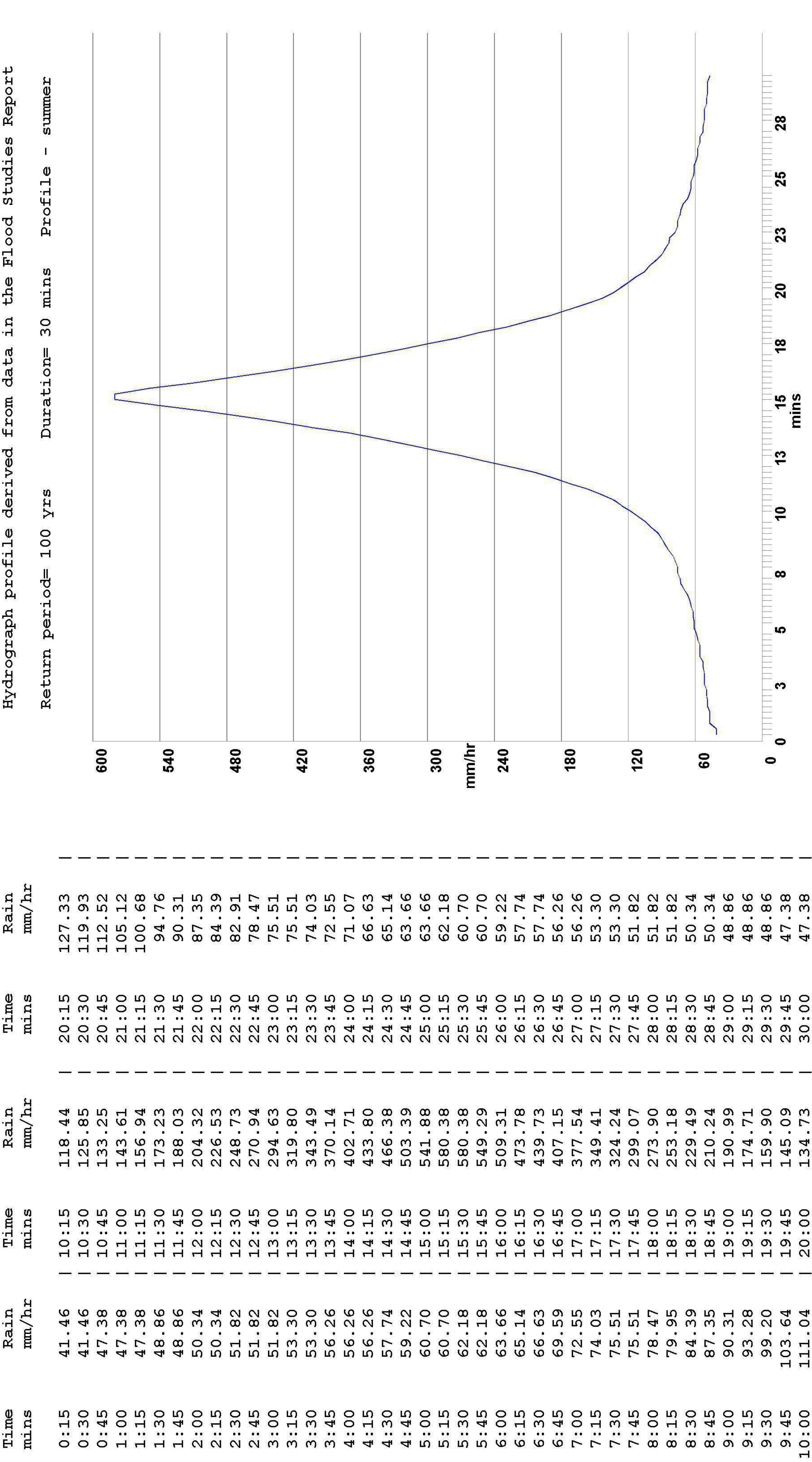
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Sheet no.
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Date
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Title				
Surcharge calcs (Sized at 30 yrs storm) for HICKSTEAD.SW CCF = 45%				





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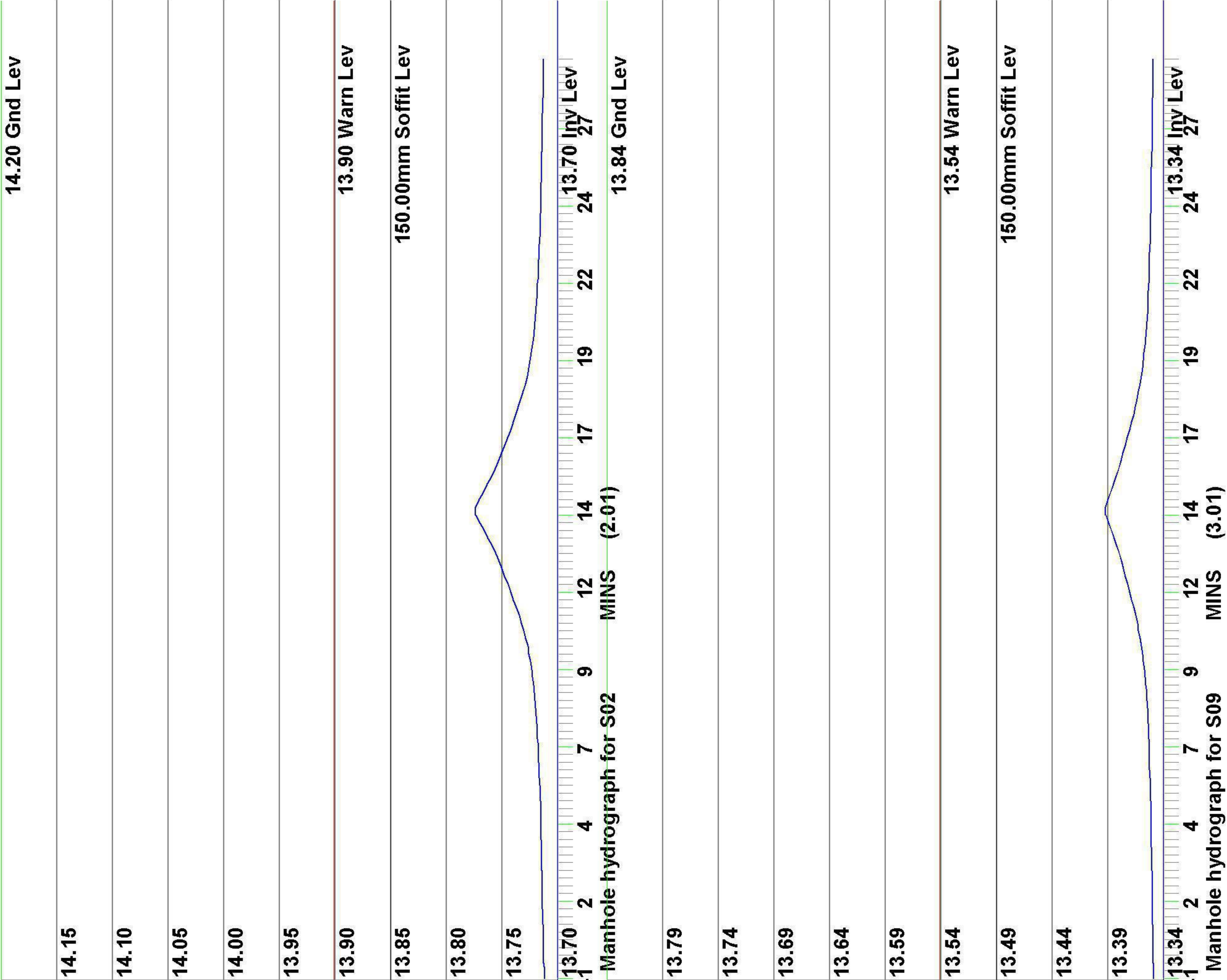
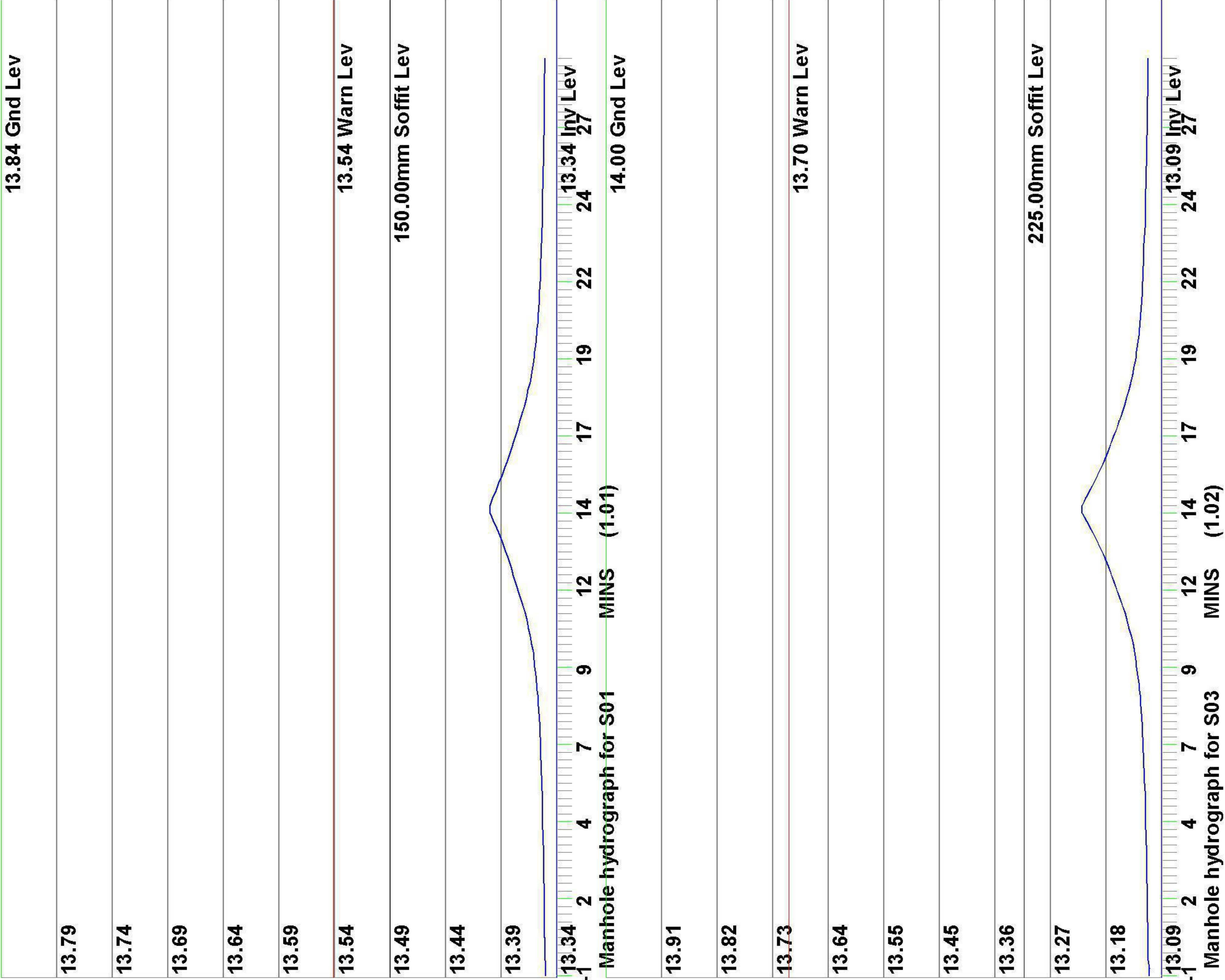
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Title	Date 07/05/26				
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Surcharge calcs (Sized at 30 yrs storm) for HICKSTEAD.SW CCF = 45%					

Surcharge calcs (Sized at 30 yrs storm) for HICKSTEAD.SW CCF = 45%





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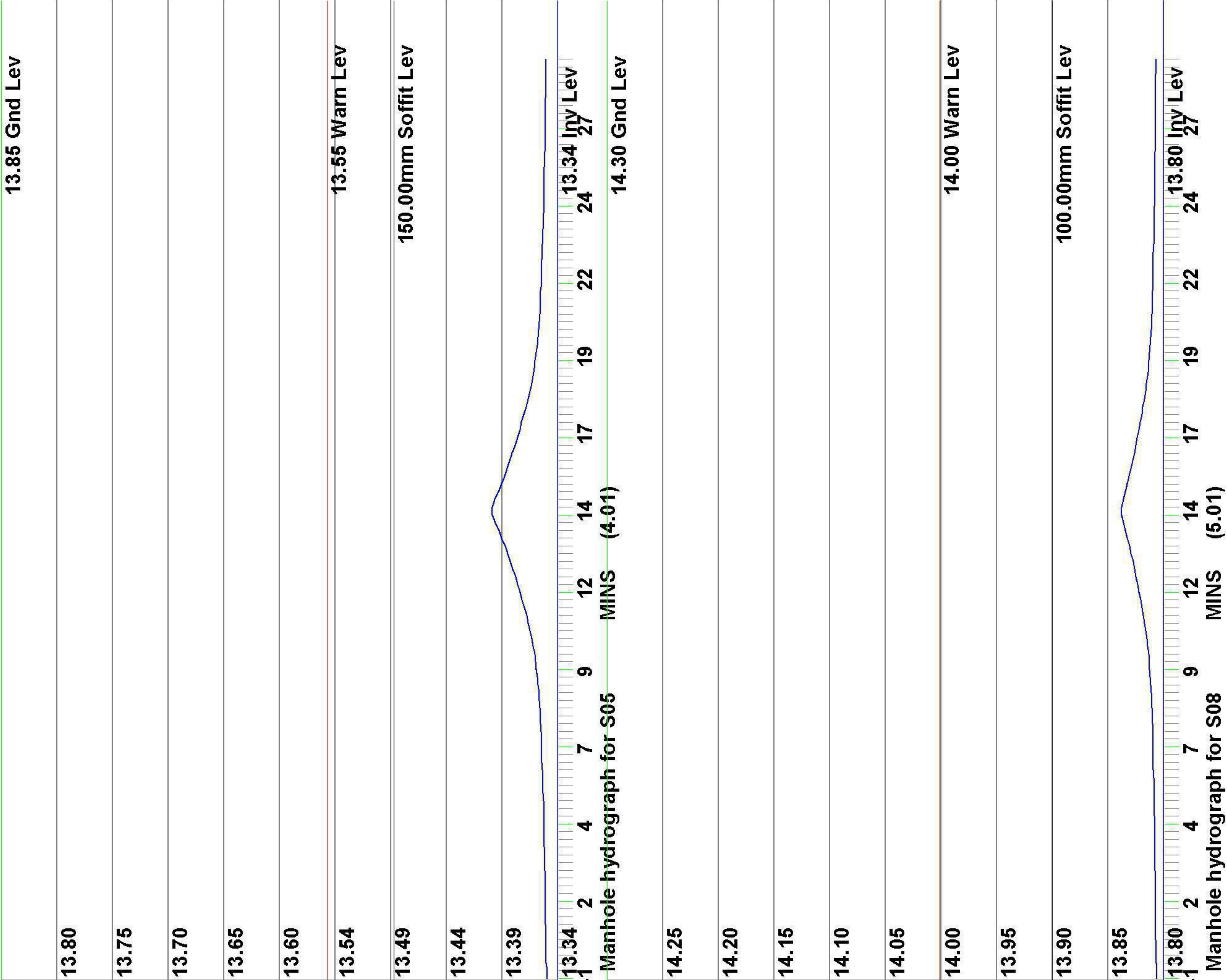
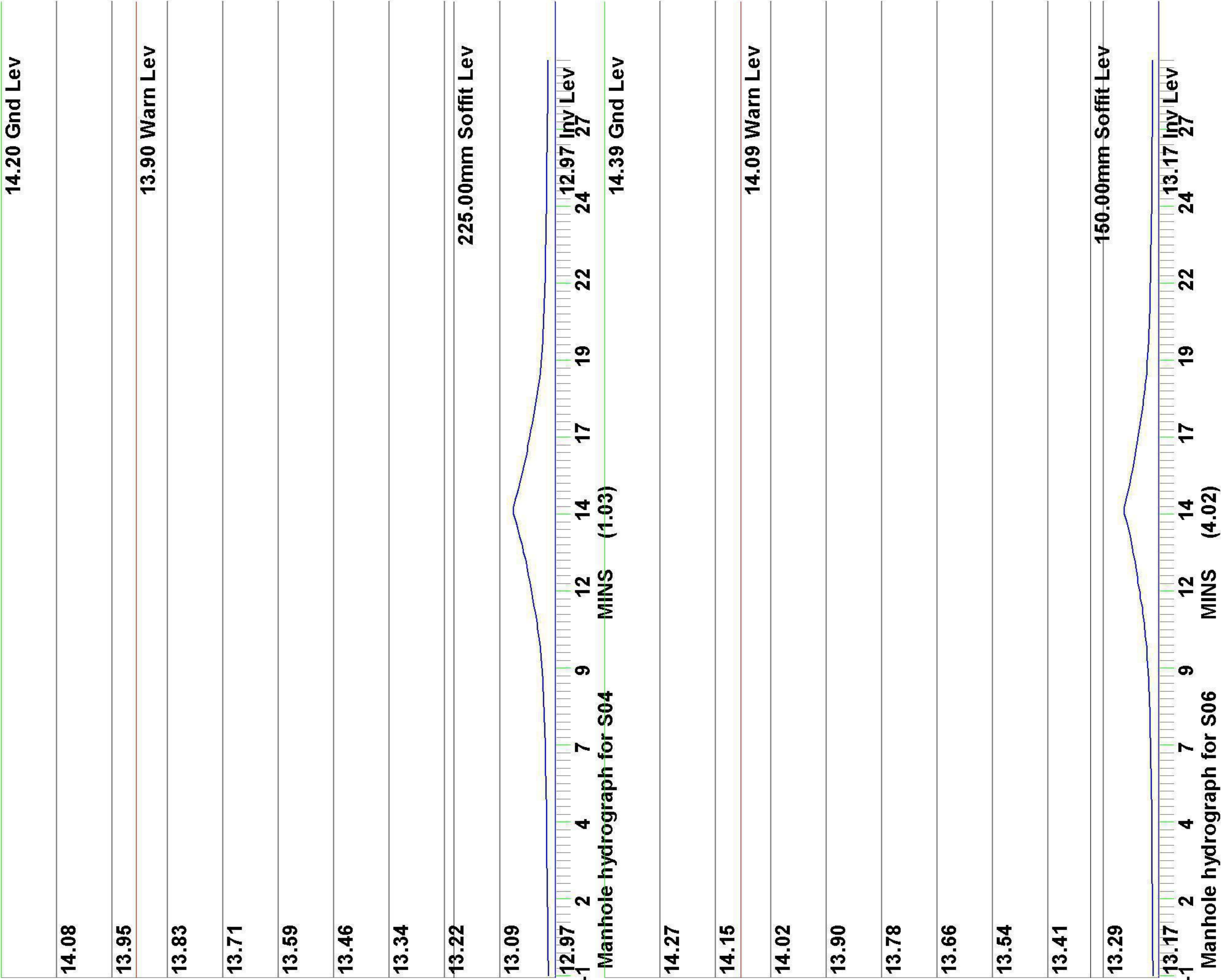
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Title	Date 07/05/26			
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Surcharge calcs (Sized at 30 yrs storm) for HICKSTEAD.SW CCF = 45%





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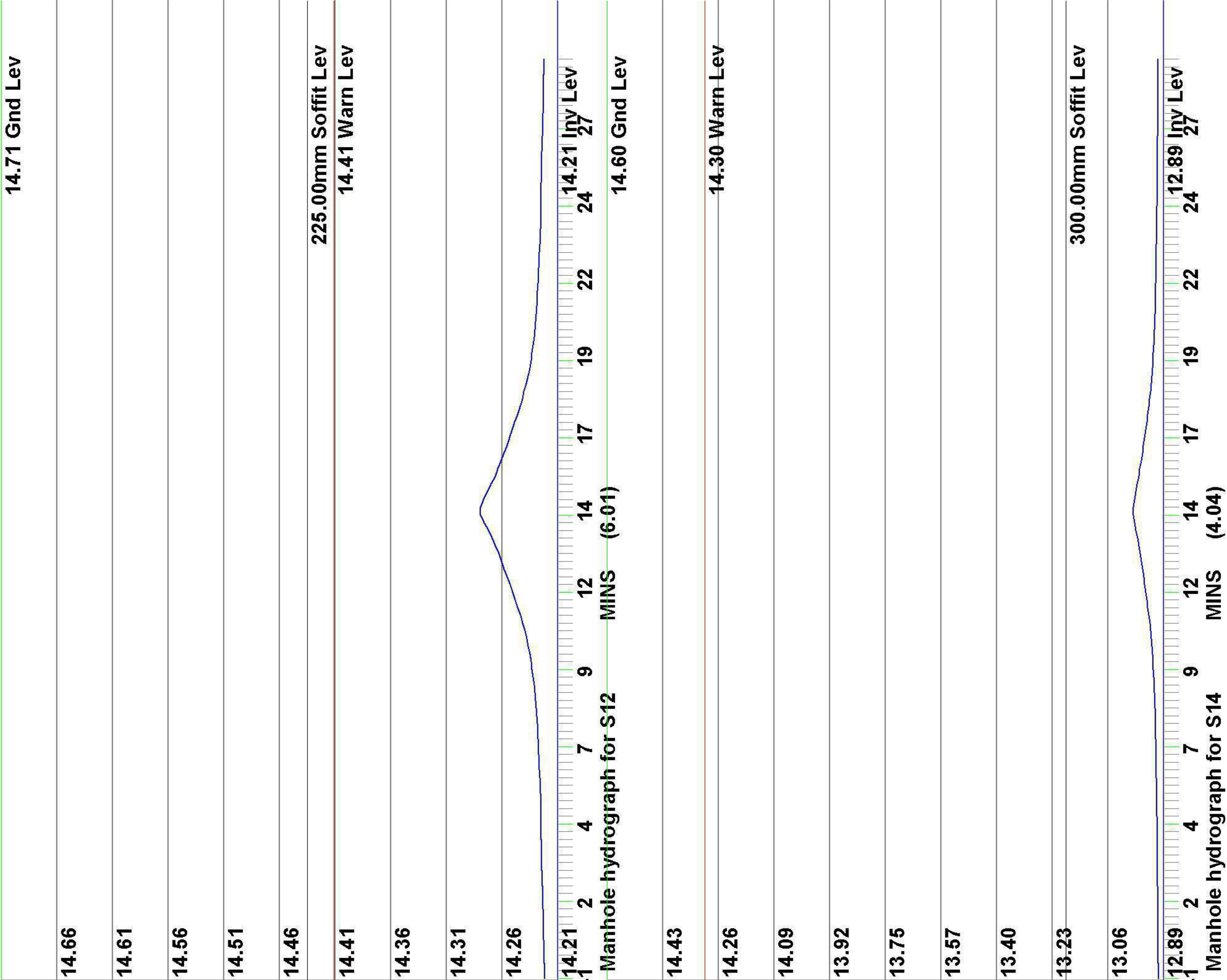
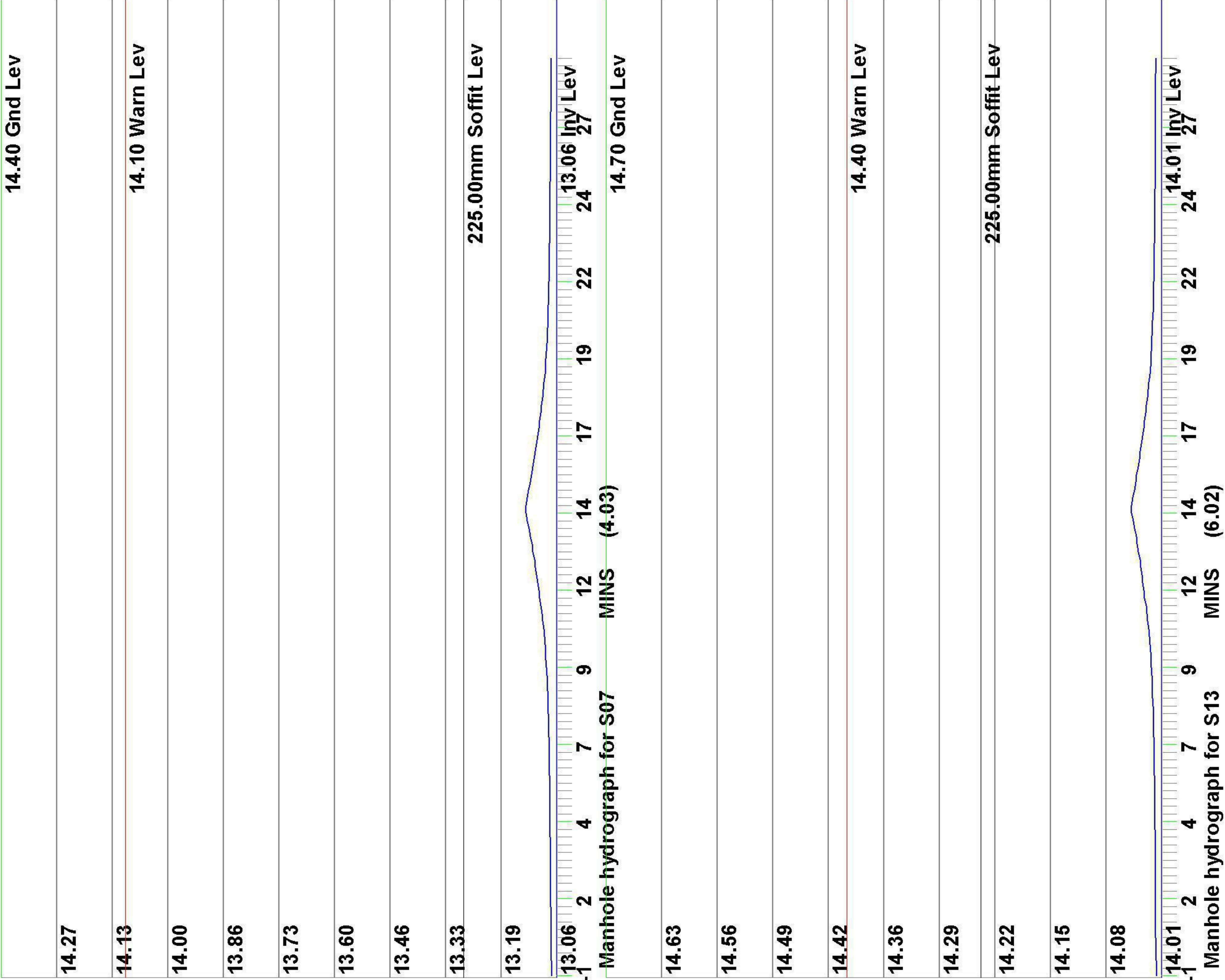
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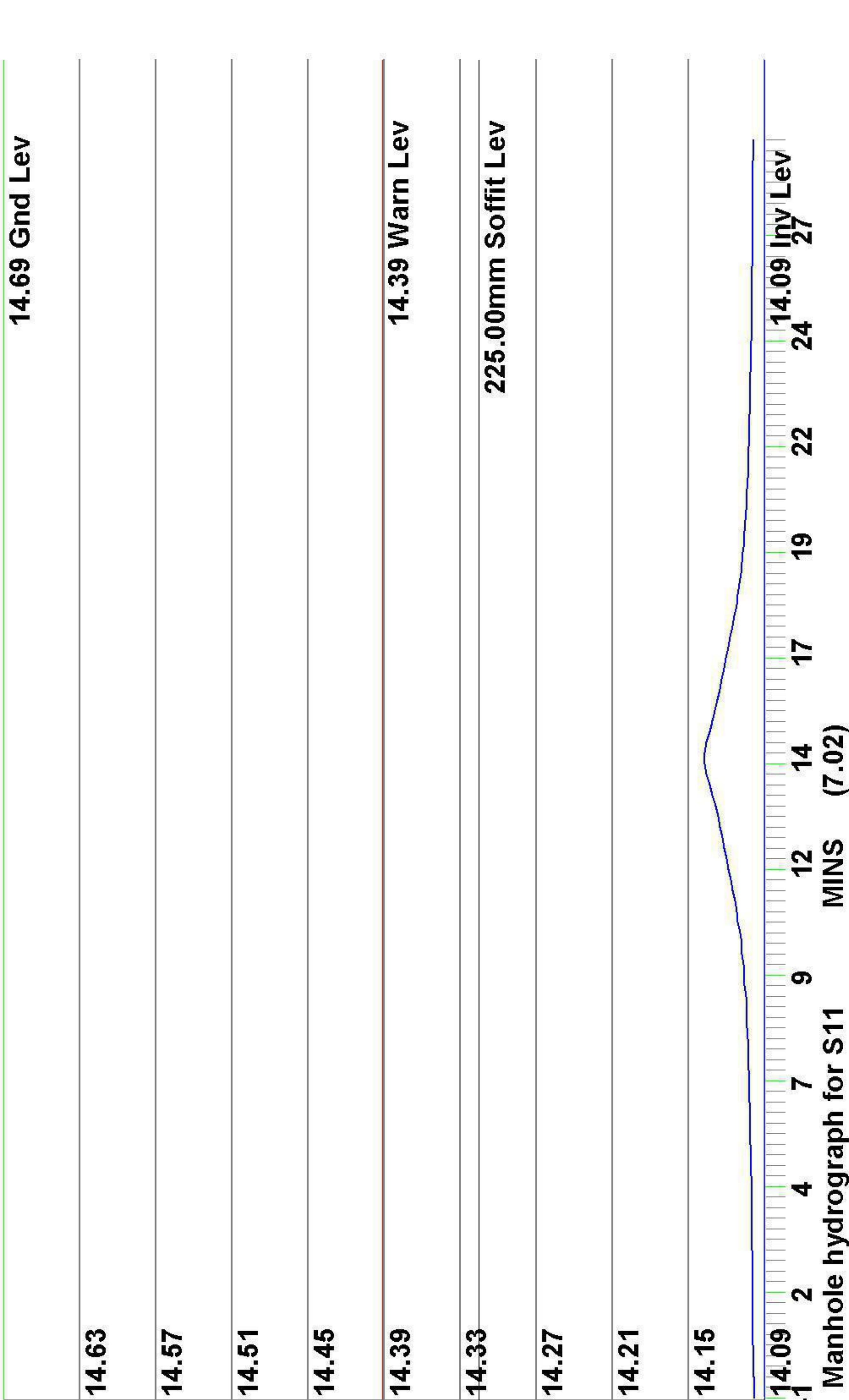
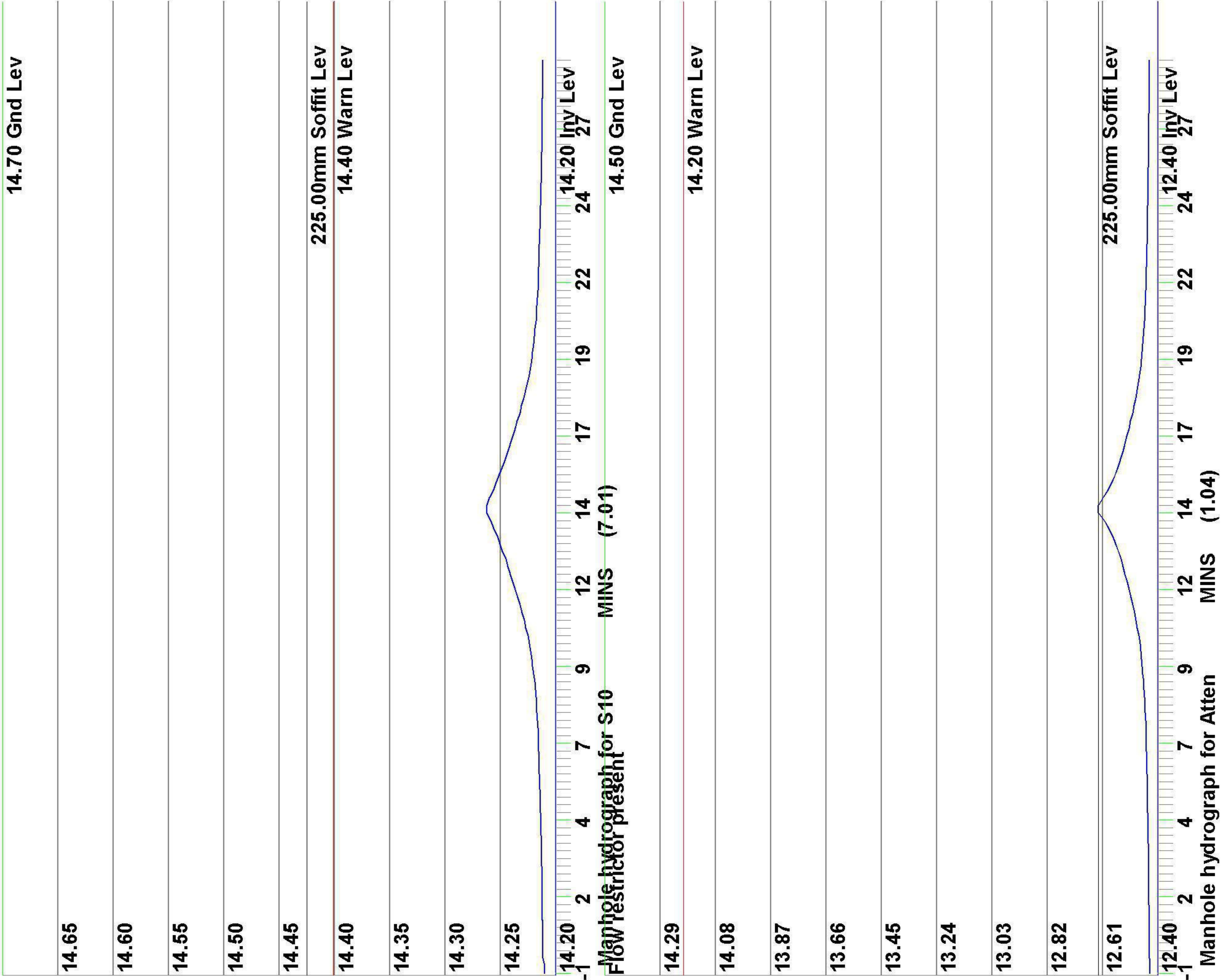
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Surcharge calcs (Sized at 30 yrs storm) for HICKSTEAD.SW CCF = 45%





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Sheet no. 1		Sheet no. 1	
Date 07/05/26		Date 07/05/26	
Project	By MDM	Checked	Reviewed
Title Surcharge calcs (Sized at 30 yrs storm) for HICKSTEAD.SW CCF = 45%			

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SW

Free flowing outlet
Return period = 100 yrs
Climate change factor = 45

PEAK hydrograph values printed
Storm duration = 45 mins
No offline storage

Mean rain intens. 131.00 mm/hr
Storm profile = Summer
Using FEH data

Peak rain intens. 513.52 mm/hr
Sample period = 22.5 secs.

Entry No.	SECT. No.	MANHOLE REF	PIPE CAPACITY : l/s	PIPE SIZE	PIPE RATE : FLOW : l/s	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	S01	17.6	4.8	150	13.34	13.39	13.84	0.27	0.05	0.00	0.000	77	OK
2	B	2.01	S02	32.0	11.5	150	13.70	13.76	14.20	0.36	0.06	0.00	0.000	183	OK
3	I	1.02	S03	51.9	22.9	225	13.09	13.19	14.00	0.44	0.10	0.00	0.000	365	OK
4	B	3.01	S09	21.1	4.8	150	13.34	13.38	13.84	0.23	0.04	0.00	0.000	76	OK
5	I	1.03	S04	123.1	34.8	225	12.97	13.04	14.20	0.28	0.07	0.00	0.000	554	OK
6	B	4.01	S05	17.0	4.6	150	13.34	13.39	13.85	0.27	0.05	0.00	0.000	74	OK
7	B	4.02	S06	18.1	6.6	150	13.17	13.23	14.39	0.36	0.06	0.00	0.000	104	OK
8	S1	5.01	S08	12.2	3.1	100	13.80	13.83	14.30	0.25	0.03	0.00	0.000	49	OK
9	B	4.03	S07	55.4	11.6	225	13.06	13.12	14.40	0.21	0.06	0.00	0.000	185	OK
10	S1	6.01	S12	50.7	9.7	225	14.21	14.27	14.71	0.19	0.06	0.00	0.000	154	OK
11	S1	6.02	S13	165.4	12.9	225	14.01	14.04	14.70	0.08	0.03	0.00	0.000	206	OK
12	B	4.04	S14	143.6	27.8	300	12.89	12.97	14.60	0.19	0.07	0.00	0.000	444	OK
13	B	7.01	S10	49.5	8.1	225	14.20	14.25	14.70	0.16	0.05	0.00	0.000	129	OK
14	B	7.02	S11	145.0	16.3	225	14.09	14.13	14.69	0.11	0.04	0.00	0.000	259	OK
15	I	1.04	Atten†	104.4	78.9	225	12.40	12.56	14.50	0.76	0.16	0.00	0.000	1257	OK



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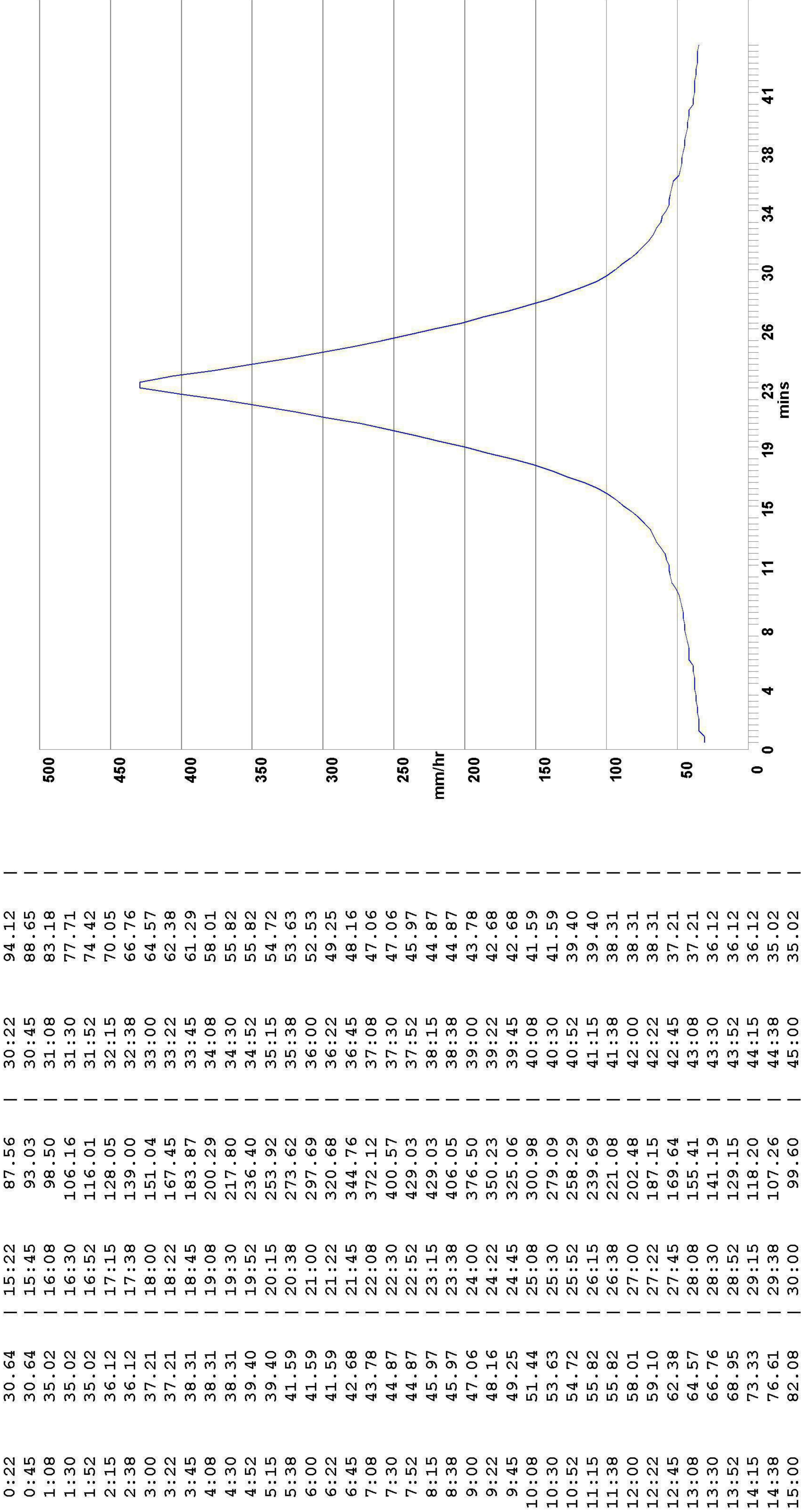
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Hydrograph profile derived from data in the Flood Studies Report

Return period= 100 yrs Duration= 45 mins Profile - summer





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Project

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By

MDM

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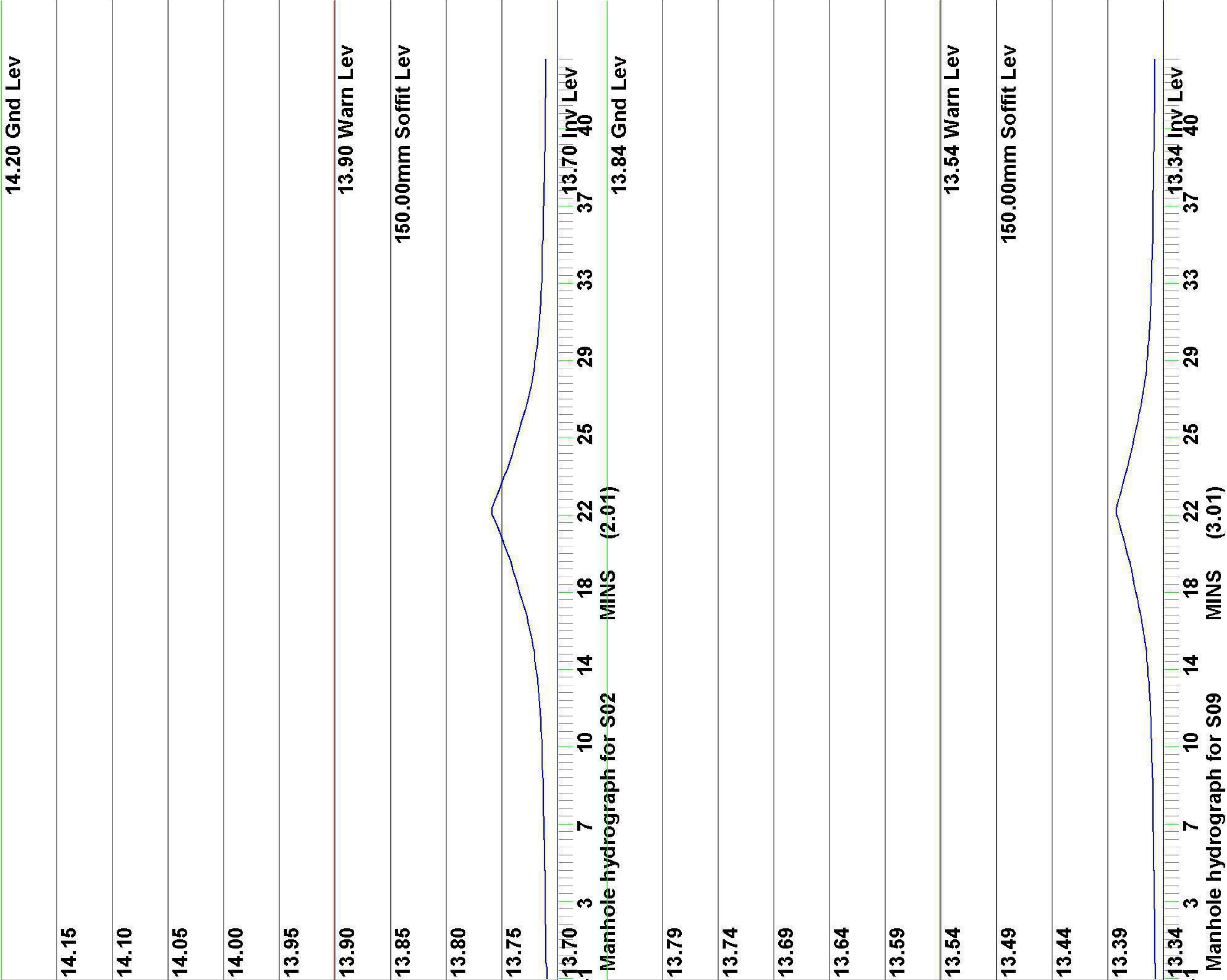
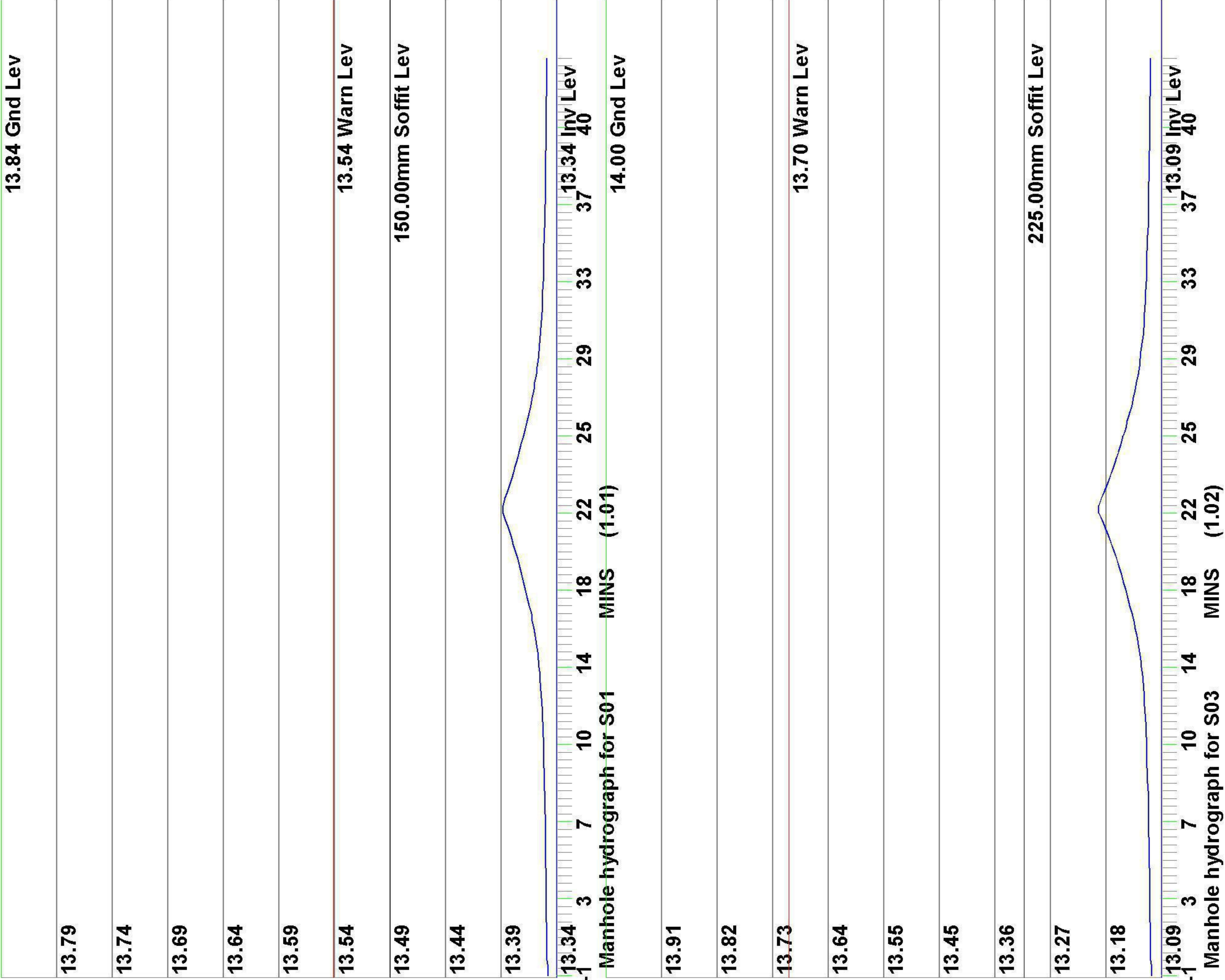
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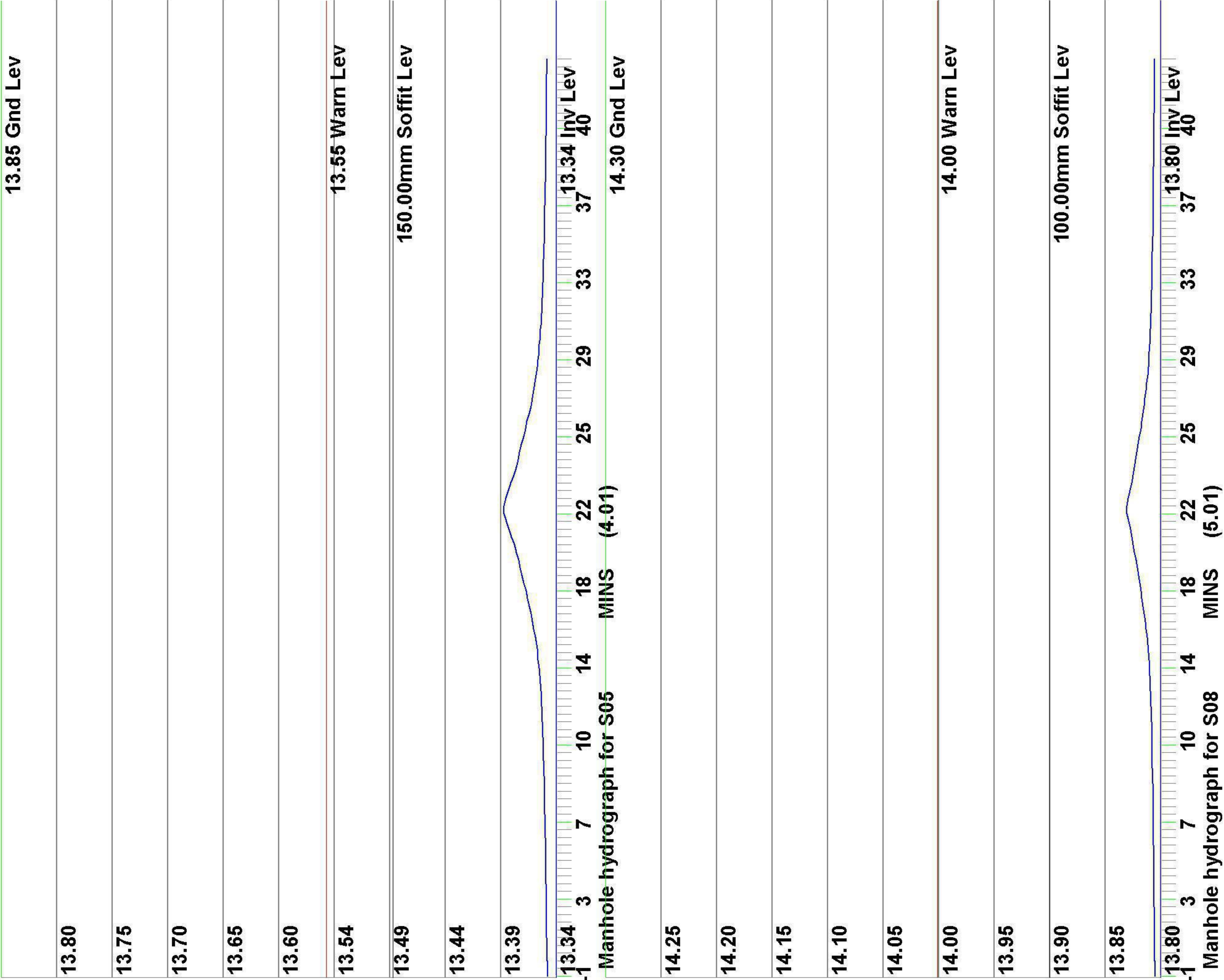
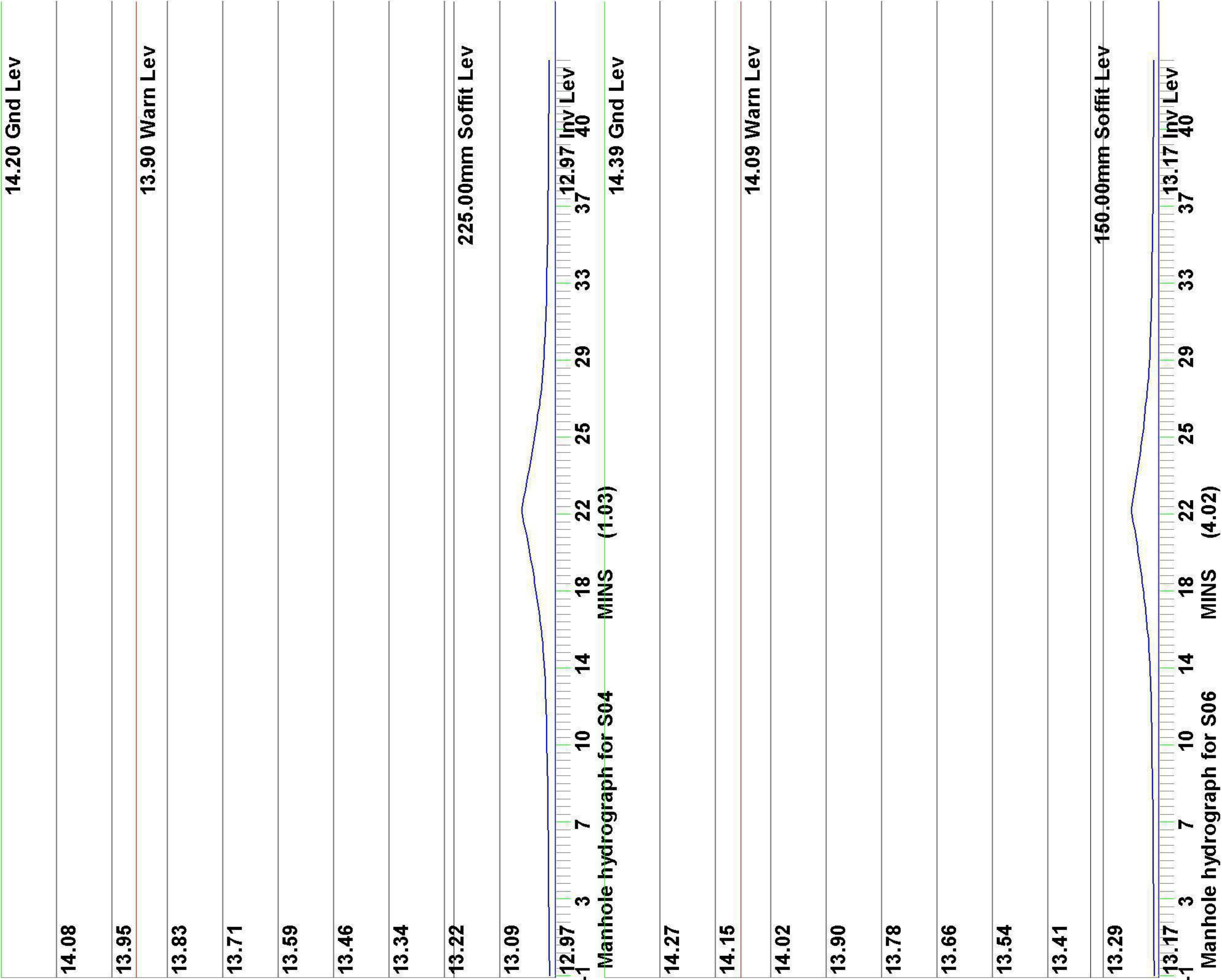
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Project			By MDM	Checked	Reviewed
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Surcharge calcs (Sized at 30 yrs storm) for HICKSTEAD.SW CCF = 45%





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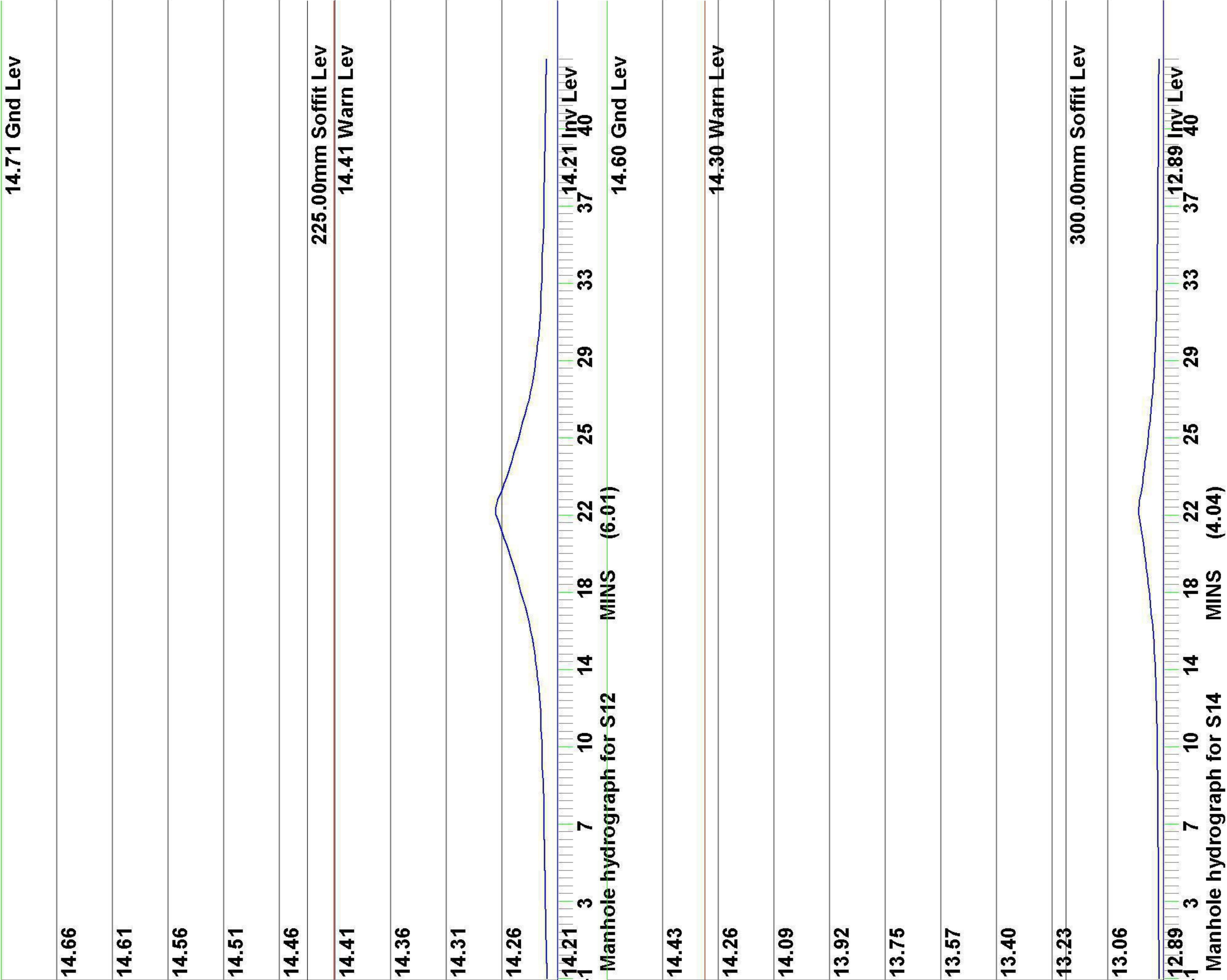
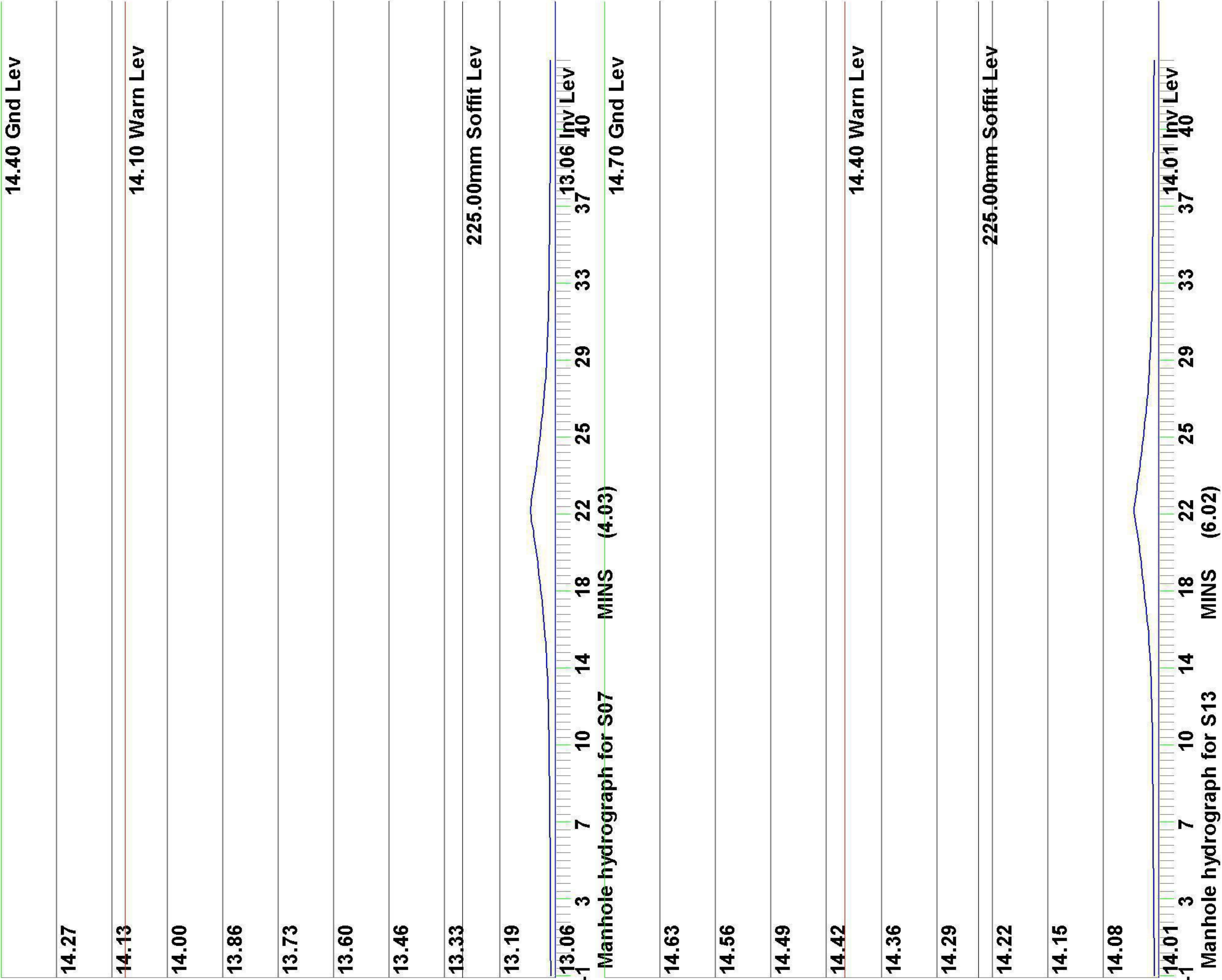
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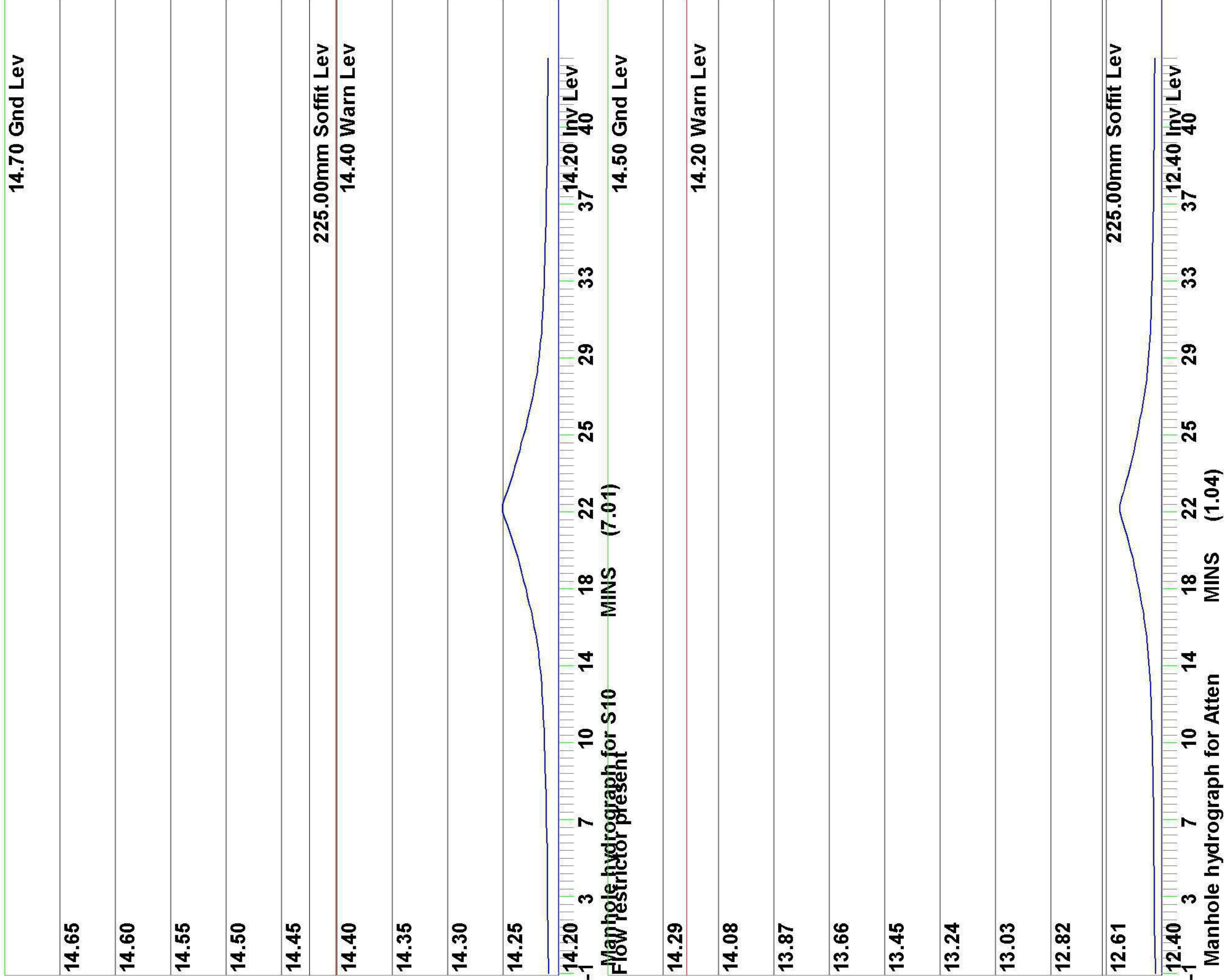
By

MDM

Reviewed

Reviewed

Title **Surcharge calcs (Sized at 30 yrs storm) for HICKSTEAD.SW CCF = 45%**





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MasterDrain
SW

Free flowing outlet
Return period = 100 yrs
Climate change factor = 45

PEAK hydrograph values printed
Storm duration = 60 mins
No offline storage

Mean rain intens. 106.00 mm/hr
Storm profile = Summer
Using FEH data

Peak rain intens. 415.52 mm/hr
Sample period = 30.0 secs.

Entry No.	SECT. No.	MANHOLE REF	PIPE CAPACITY	PIPE l/s	RATE	PIPE SIZE	CHAMBER DIAM/LxW	INVERT LEVEL	WATER LEVEL	GRND LEVEL	SURCHARGE	EXCESS FLOW	FLOODED VOL	DRAINED AREA	STATUS
1	I	1.01	S01	17.6	3.9	150	450	13.34	13.38	13.84	0.22	0.00	0.000	77	OK
2	B	2.01	S02	32.0	9.3	150	450	13.70	13.75	14.20	0.29	0.00	0.000	183	OK
3	I	1.02	S03	51.9	18.5	225	1200	13.09	13.18	14.00	0.36	0.00	0.000	365	OK
4	B	3.01	S09	21.1	3.8	150	450	13.34	13.38	13.84	0.18	0.00	0.000	76	OK
5	I	1.03	S04	123.1	28.0	225	1200	12.97	13.03	14.20	0.23	0.00	0.000	554	OK
6	B	4.01	S05	17.0	3.8	150	450	13.34	13.38	13.85	0.22	0.00	0.000	74	OK
7	B	4.02	S06	18.1	5.3	150	1200	13.17	13.22	14.39	0.29	0.00	0.000	104	OK
8	S1	5.01	S08	12.2	2.5	100	450	13.80	13.83	14.30	0.21	0.00	0.000	49	OK
9	B	4.03	S07	55.4	9.4	225	1200	13.06	13.11	14.40	0.17	0.00	0.000	185	OK
10	S1	6.01	S12	50.7	7.8	225	600	14.21	14.26	14.71	0.15	0.00	0.000	154	OK
11	S1	6.02	S13	165.4	10.4	225	1200	14.01	14.04	14.70	0.06	0.00	0.000	206	OK
12	B	4.04	S14	143.6	22.5	300	1200	12.89	12.96	14.60	0.16	0.00	0.000	444	OK
13	B	7.01	S10	49.5	6.5	225	1200	14.20	14.24	14.70	0.13	0.00	0.000	129	OK
14	B	7.02	S11	145.0	13.1	225	1200	14.09	14.12	14.69	0.09	0.00	0.000	259	OK
15	I	1.04	Atten†	104.4	63.6	225	20000	12.40	12.53	14.50	0.61	0.00	0.000	1257	OK



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SW

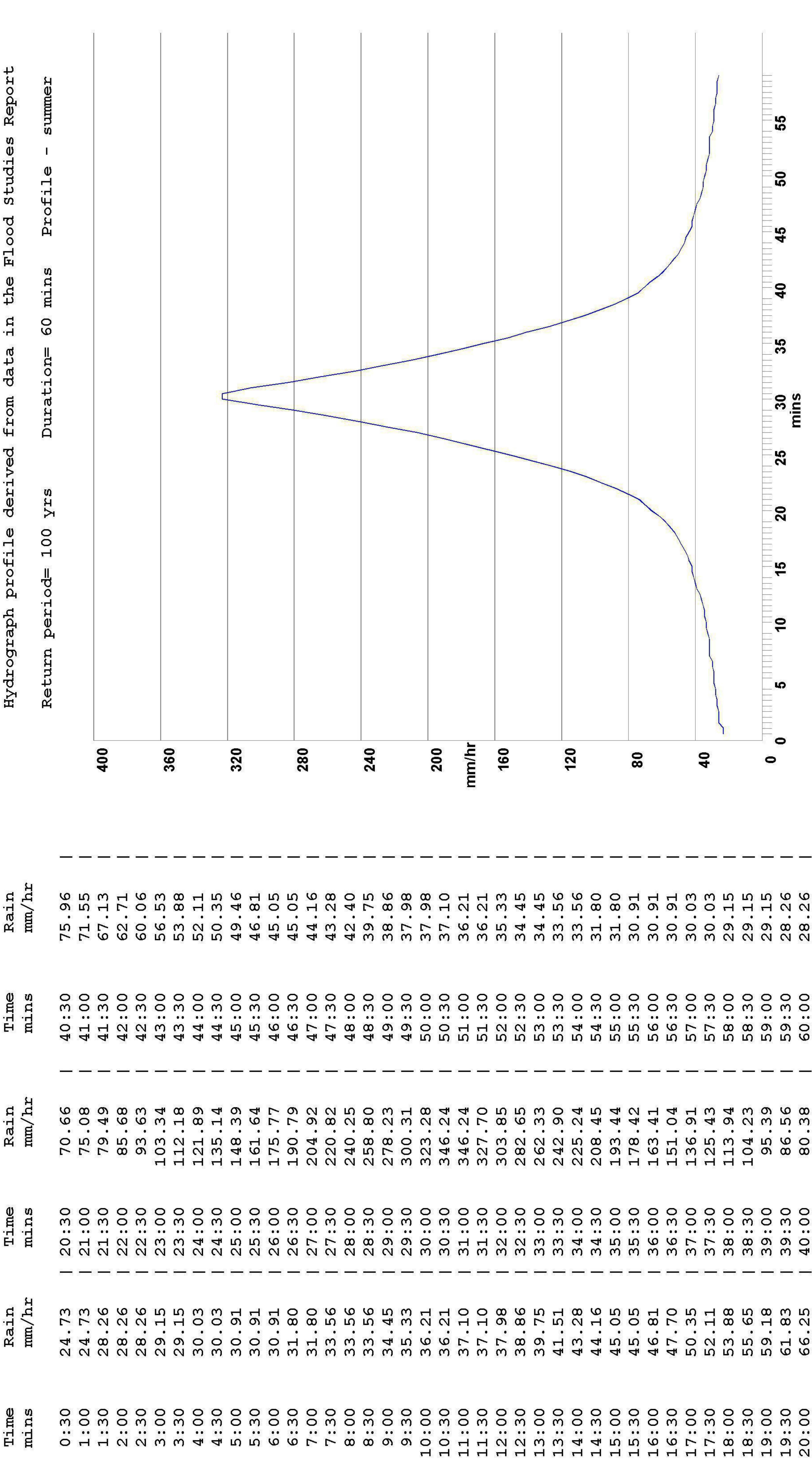
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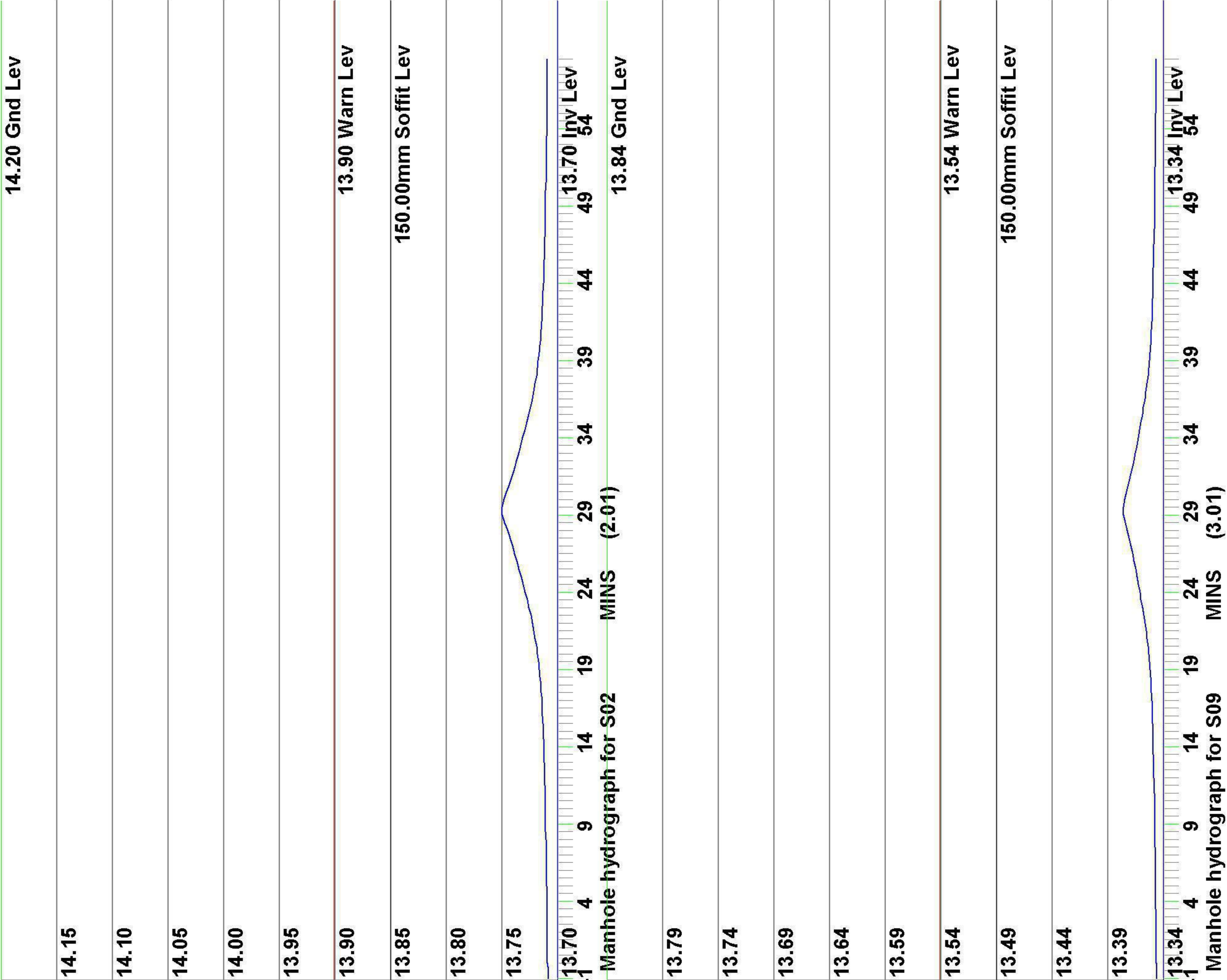
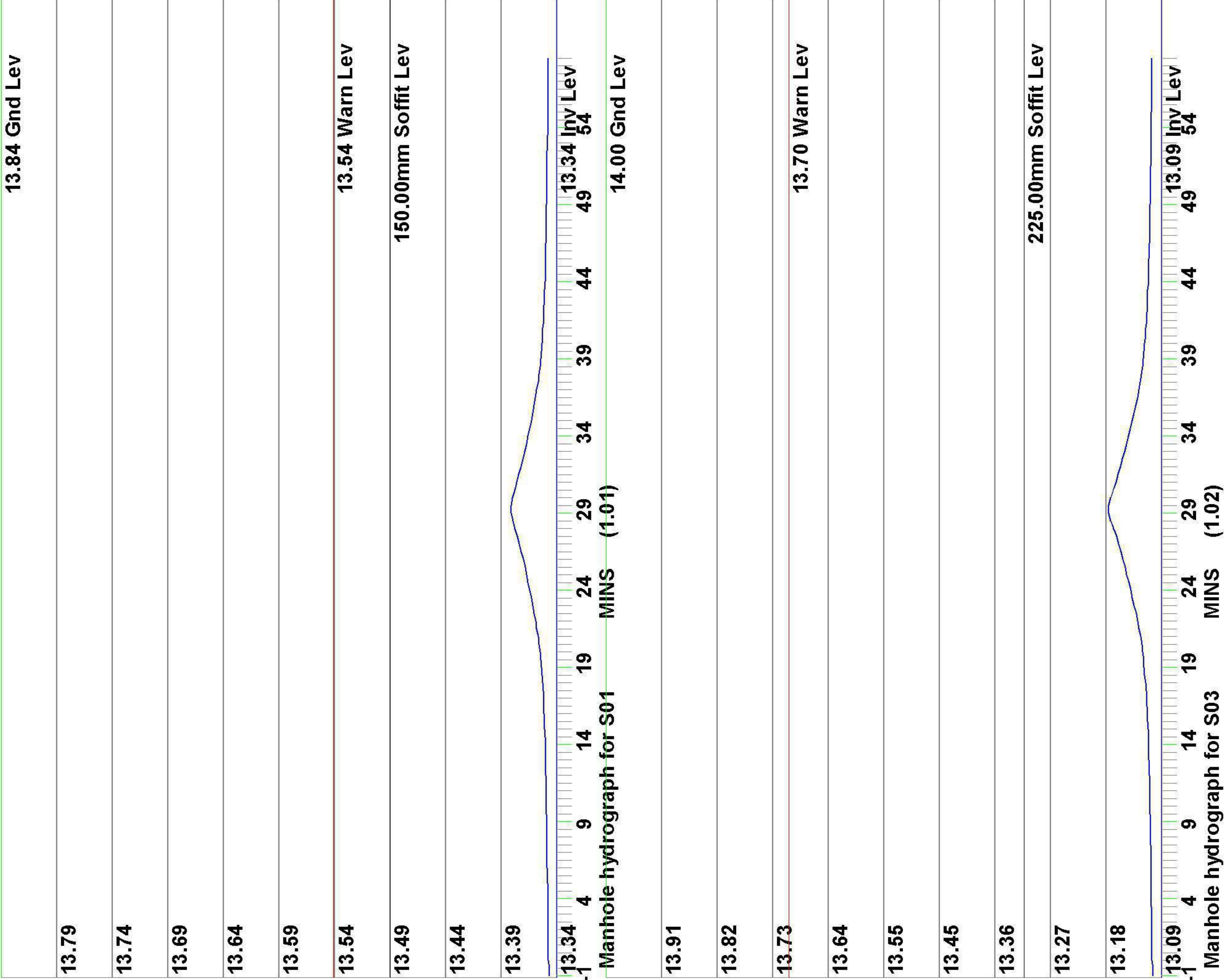
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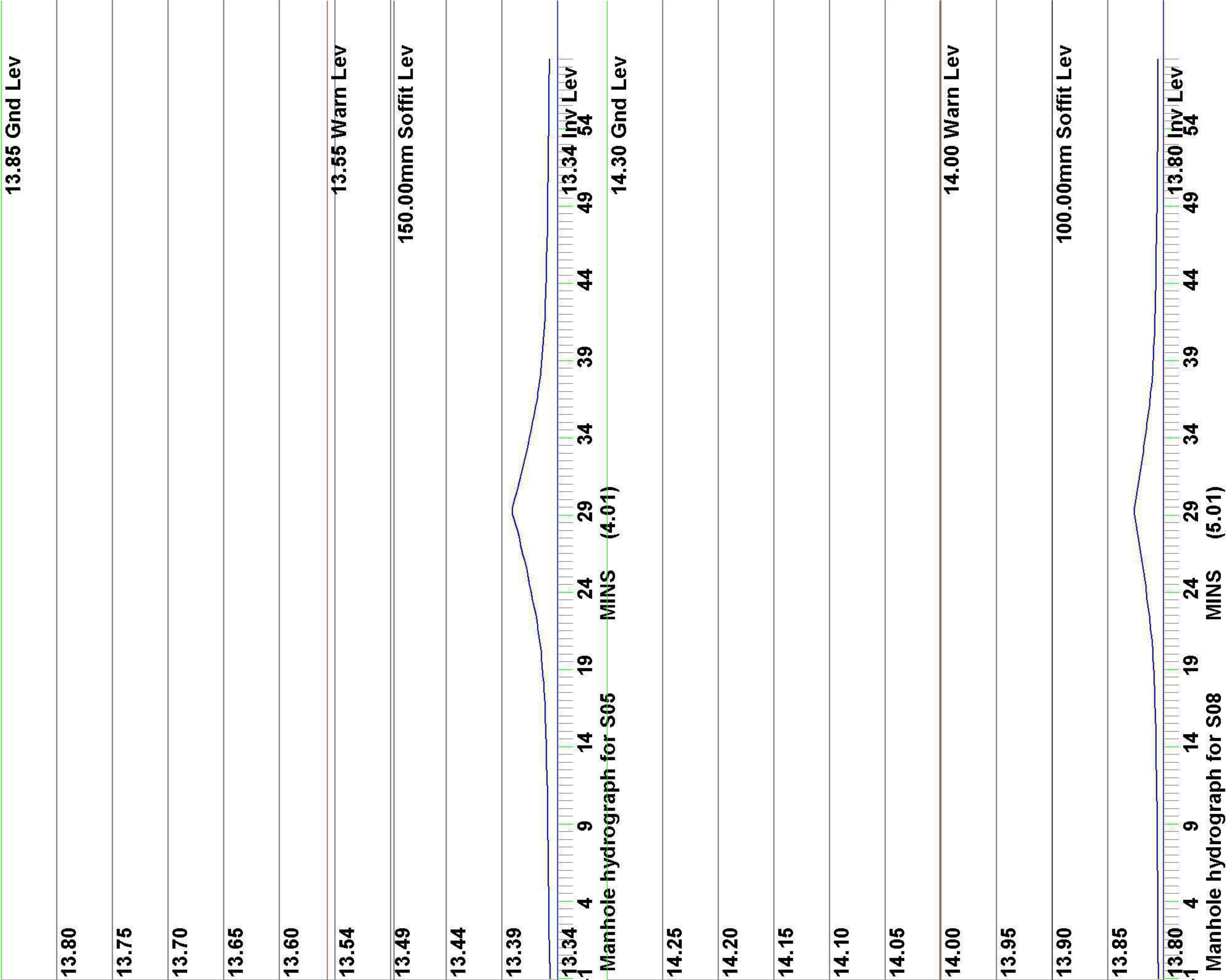
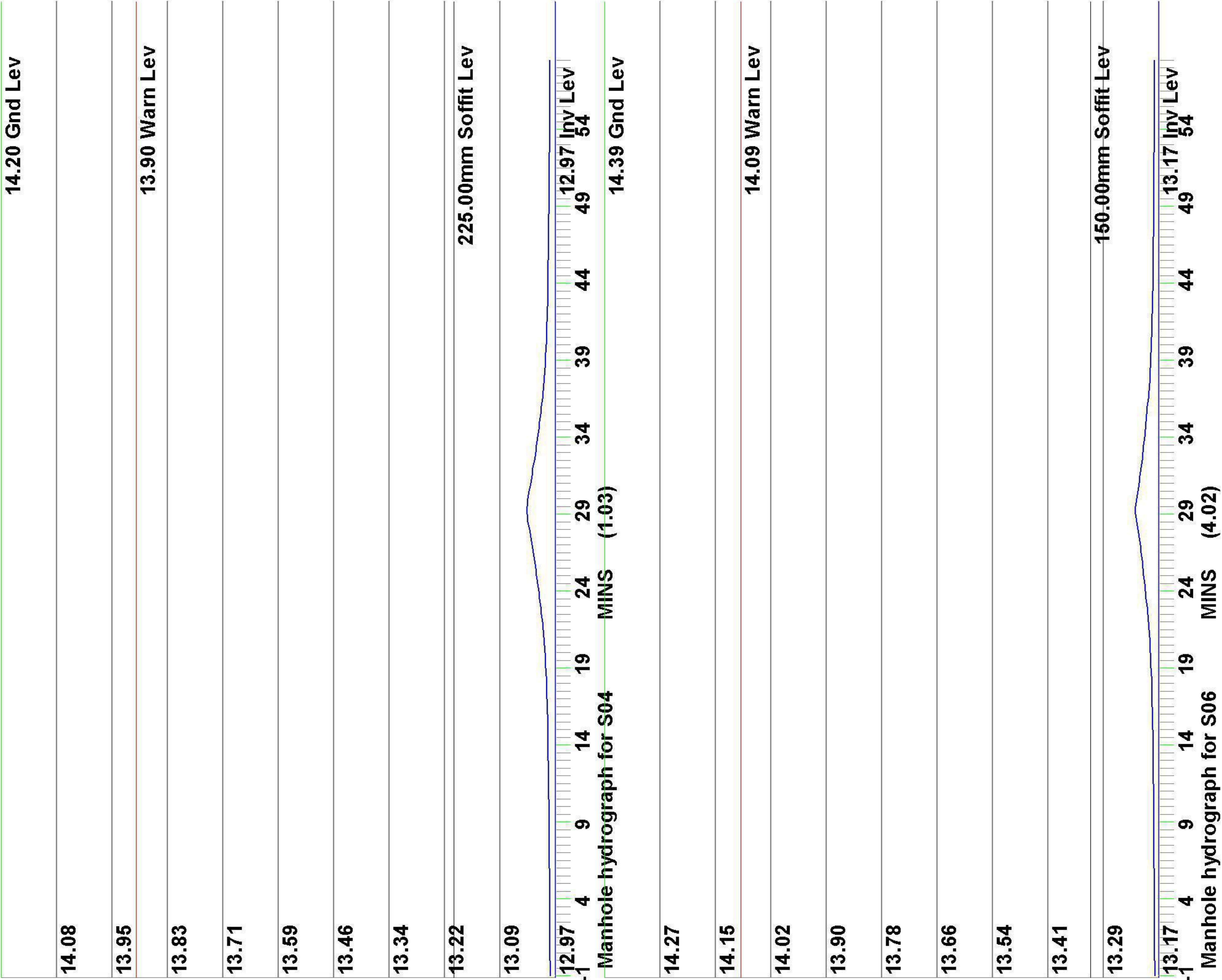
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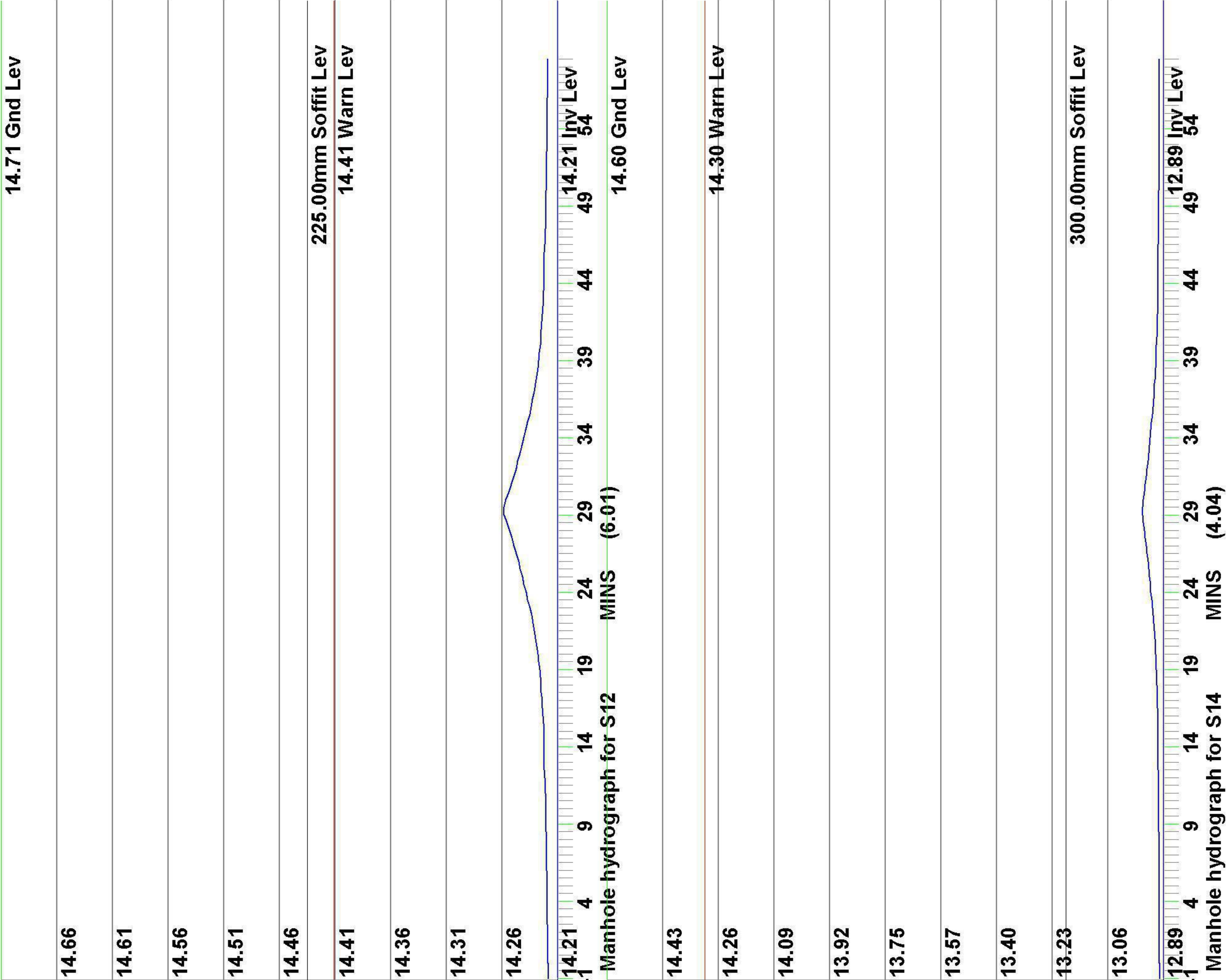
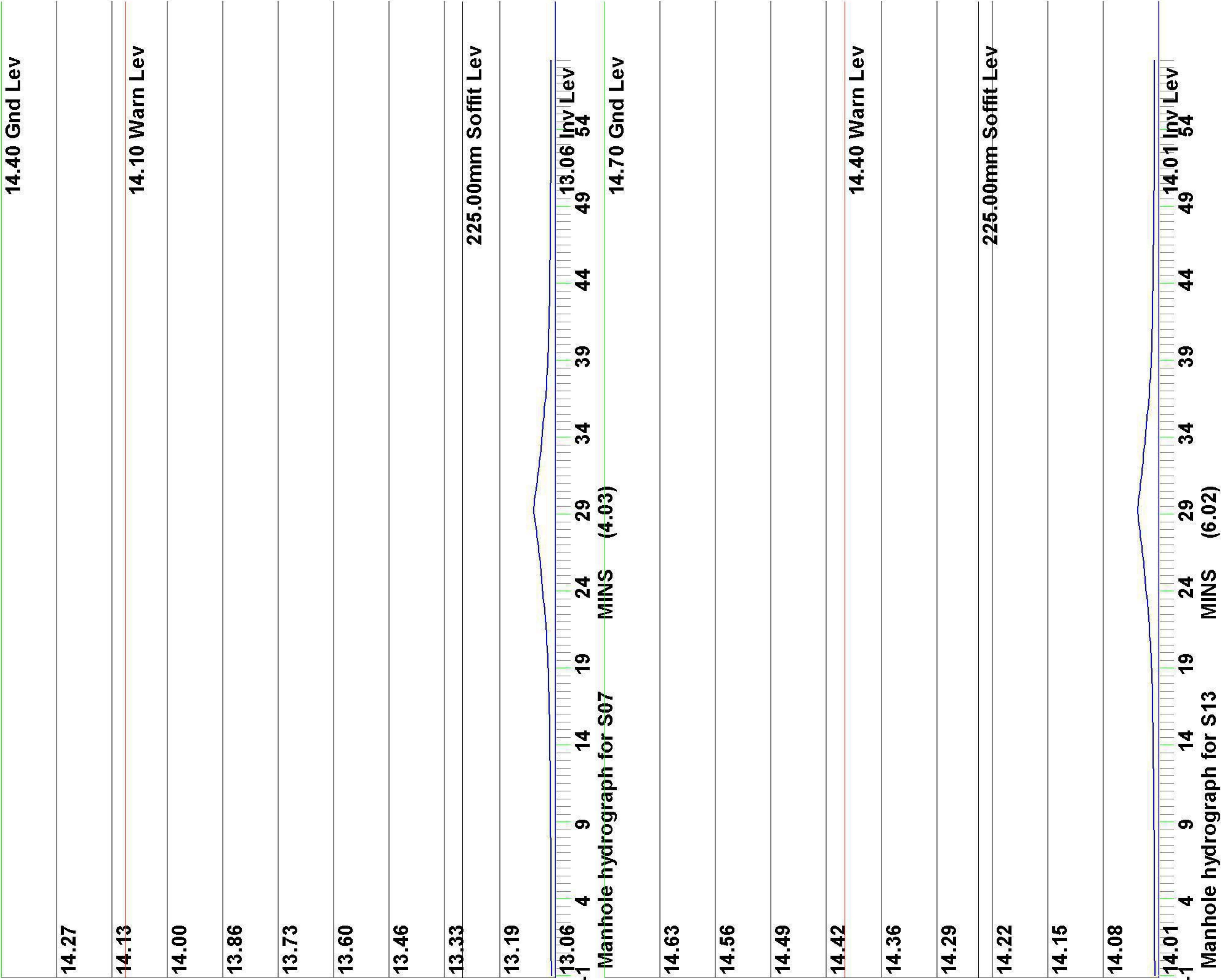
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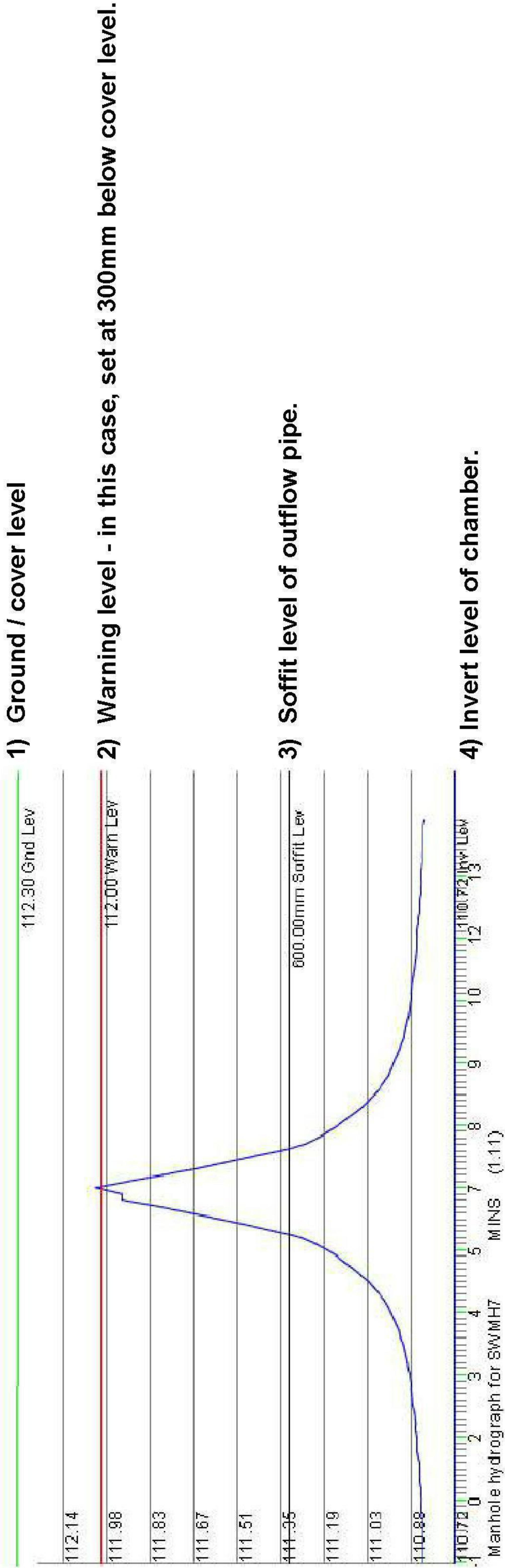
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Surcharge calcs (Sized at 30 yrs storm) for HICKSTEAD.SW CCF = 45%

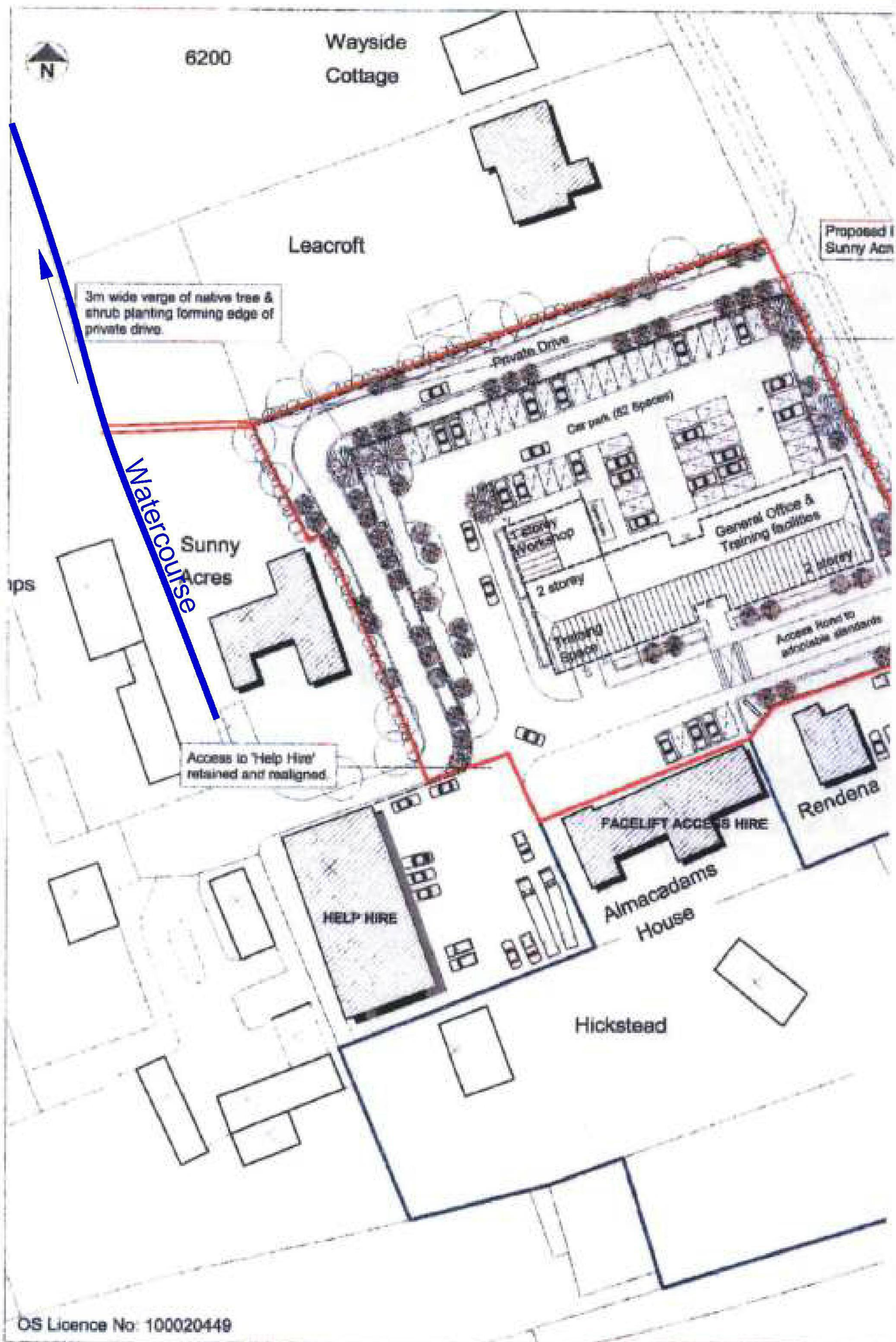


Notes

- a) Lower section of the graph shows the water depth filling the channel. Channel is assumed to be a full pipe diameter in depth.
- b) 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.
- c) The top of the graph clips the warning level and would be marked thus on the printout.
- d) 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.
- e) The diagram above is a general one and is not part of the current calculation.

APPENDIX F

Plan showing easement corridor for outfall pipes.



APPENDIX G

Operation & Maintenance Manual

OPERATION & MAINTENANCE MANUAL

1. OPERATION OF THE DRAINAGE SYSTEM

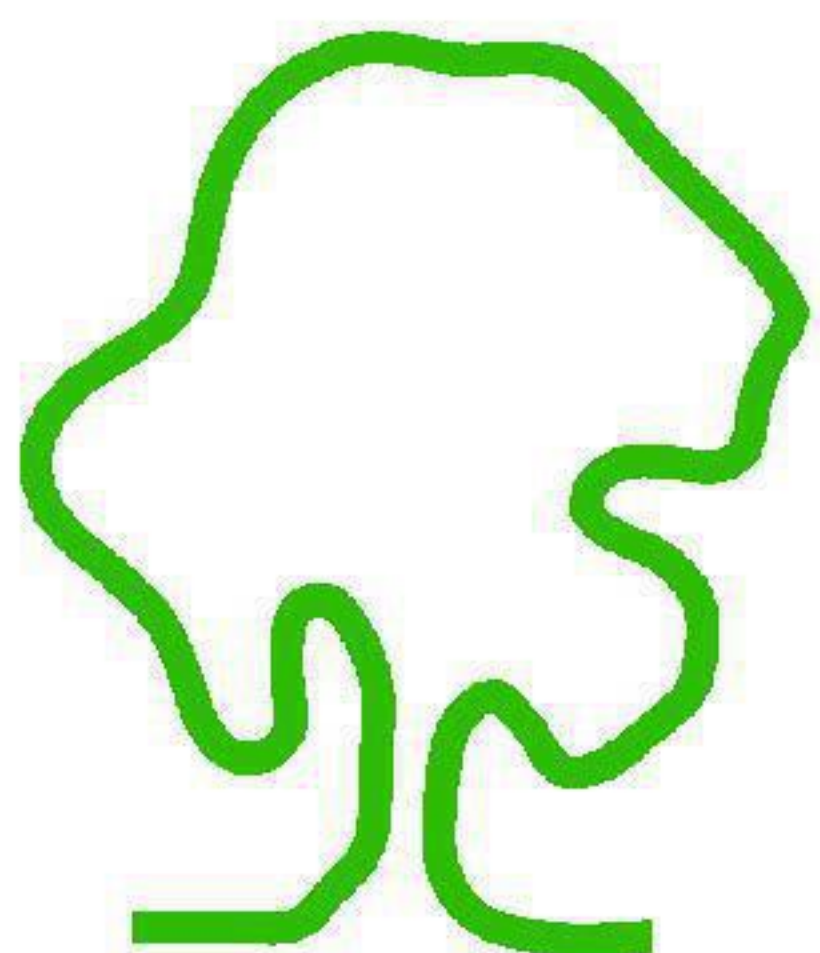
- 1.1 The surface water drainage system collects surface water from roofs, impermeable surfaced areas using gullies, strip drains and French drains. The yard/access area is surfaced with permeable block paving laid over no-fines drainage blanket wrapped in permeable geotextile.
- 1.2 The collected water is discharged via a network of pipes and chambers which drains into attenuation storage. The attenuation storage is in the form of plastic crates wrapped in a geotextile membrane in a sand surround. The attenuation storage drains to an existing watercourse via a flow control chamber fitted with a vortex valve flow control device.
- 1.3 The gullies and strip drains are manufactured pattern types. French drain comprises 20 – 70 mm no fines stone (or recycled concrete aggregate) wrapped in permeable geotextile, with a plastic slotted carrier pipe in the base. Chambers are generally cast in plastic for the smaller sizes and concrete ring types for the larger diameters. Chambers S04, S11 & S14 are all to be silt trap types.
- 1.4 The foul sewerage comprises a pipe network discharging to a package sewage treatment plant. Treated effluent from the package sewage treatment plant discharges to the watercourse to the northwest of the site via the pipe easement.
- 1.5 Once the construction of the surface water drainage system is complete, minimal operational input should be required. A schedule of maintenance is given below.
- 1.6 The sewage treatment plant will require annual servicing by a specialist contractor.

2. SCHEDULE OF MAINTENANCE

- 2.1 The drainage system will require continual maintenance to ensure that it is operating properly.
- 2.2 The flow control device represents a particular constriction of the system and may be vulnerable to blocking by debris, although the attenuation storage should protect it.
- 2.3 The maintenance should generally follow the following schedule, but this will probably be modified over time as it becomes apparent where more frequent or less frequent maintenance is indicated. Outside of the schedule, a walk-over inspection of the drainage system should be carried out after a very severe storm/extended period of very heavy rainfall.

SCHEDULE OF MAINTENANCE

TIME	ACTION	COMMENT
On completion of construction		
3 months	Check all gullies, strip drains, chambers, vortex valve and screen. Clean out, de-silt and repair as necessary. Check package sewage treatment plant operation.	Contractor's maintenance period
6 months	Check condition of surface of permeable paving and brush in clean sand as per manufacturers' instructions.	
12 months	Repeat checks and actions described above.	
In service		
Every year	Check all gullies, strip drains, chambers, trash racks, orifice plate/vortex valve and screen. Clean out, de-silt and repair as necessary. Check permeable paving surface. Check outfalls into watercourse.	Work to be carried out in late winter after leaf fall has occurred.
	Service package sewage treatment plant	To be carried out by specialist contractor



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