



PO Box 28057
Havelock North
New Zealand
Tel: +64 6 877 1652

Our Ref: 160605214-01

29 January 2017

Hastings District Council
Private Bag 9002
Hastings

Attn: Mr Brett Chapman

INTRODUCTION

Hastings District Council (HDC) engaged Resource Development Consultants Ltd (RDCL) to undertake geophysical logging of Brookvale Bore 1.

This letter presents a summary of findings from signals processed so far and interpretative comment on the condition of the well.

SCOPE OF WORK

TOOL SURVEY

Downhole logging was undertaken by RDCL under supervision of a Senior Geophysicist with extensive experience in the work.

The hole was prepared by removing the downhole pump and riser prior to logging and two runs by downhole (video) camera were also made by others before and after the geophysics runs.

GEOPHYSICAL TOOLS AND PROCESSING

Downhole tools run included:

- Acoustic Televierer (ATV);
- Optical Televierer (OTV);
- Full Waveform Sonic (FWS); and
- Density, mechanical caliper, natural gamma.

DOWNHOLE VIDEO

Downhole video was run before and after geophysical tools by:

- Honour Well Drillers Ltd (Honour) (before geophysics tools); and
- Baylis Bothers Ltd (Baylis) (after geophysical tools).

QUALITY ASSURANCE

- All tools are calibrated as required and operated according to RDCL internal standards and industry operating procedures.
- All signals are processed using WellCAD software version 5.1, also being industry standard.
- Downhole video images were used to correlate the geophysical signals where possible.

SUMMARY

Outputs (DRAFT only, Final not issued) of the well survey and as-built records construction and geology including measured water levels and observations on day of logging are in:

- Appendix A: BH01_with Geology; and
- Appendix B: BH01_Internal Condition.

FINDINGS

Downhole geophysical survey was completed to 19.09m depth where a partial blockage of the casing prevented the tools from continuing deeper (the full depth of the well from drillers log is 22m with a sump to 24m).

From the geophysical logs over the surveyed length:

- Casing is continuous with no lengths missing.
- Defects comprise:
 - Rust inside the upper casing (steel) to 11.26m below datum.
 - Electrolysis at screen joints leading to encrustation and partial blockage at 19.09m.
 - No obvious voids behind well casing.

Interpretation of available geophysical data suggests:

- The as-built record of construction (drillers log) is accurate; and
- There is no evidence of perforation (hole) in the casing, or significant void behind the casing wall.

On the basis of evidence, RDCL expects the casing to perform as designed.

LIMITATIONS

- This letter has been prepared for the particular purpose outlined in the project brief and no responsibility is accepted for the use of any part in other contexts or for any other purpose.
- Ground conditions assessed in this letter are inferred from published sources, site inspection and the investigations described. Variations from the interpreted conditions may occur, and special conditions relating to the site may not have been revealed by this investigation, and which are therefore not taken into account. No warranty is included either expressed or implied that the actual conditions will conform to the interpretation contained in this letter.
- No responsibility is accepted by Resource Development Consultants Ltd for inaccuracies in data supplied by others. Where data has been supplied by others, it has been assumed that this information is correct.
- Groundwater conditions can vary with season or due to other events. Any comments on groundwater conditions are based on observations at the time.
- This letter is provided for sole use by the client and is confidential to the client and their professional advisors. No responsibility whatsoever for the contents of this letter shall be accepted for any person other than the client.

We trust this meets your current needs. Should you wish to discuss any aspect of the contents of this document please contact me the undersigned on 06 877 1652.

Sincerely,



Tom Grace

General Manager – Operations

BSc, MAusIMM CP (Geology)



Cam Wylie

Managing Director

MSc, CPEng, MAusIMM CP (Mine Geotech)

Attachments (12 pages)

Appendix A: BH01_with Geology

Appendix A: BH01_Internal Condition

APPENDIX A
BH01_WITH GEOLOGY



PO Box 28057
308 Queen's Street East
Hastings 4130
New Zealand

Ph: +64 6 8771652
Fax: +64 6 8775015
Email: info@rdcl.co.nz

Log Nomenclature:

Graphic Log = Graphical Log of Geology derived from drill cuttings.
Geo.Log Decrp = Geological Log Text Description with depths of contacts.
Well Construction = Diagrammatical representation of Well Construction.
Well Constr Descrp = Description of well construction.
GAM(NAT) = Natural Gamma count recorded by 9239 tool.
DEN(SS) = Short Spaced Density Measure.
DEN(LS) = Long Spaced Density Measure.
Velocity Analysis = Semblance Analysis plot of FWSS data.
Comments = Comments on geophysical results.

Basic Information:

Well Name: BH01 (AKA 1329)
Company: Hawke's Bay District Council
Run No: 04, 06, 08 & 09
Tool Type(s): 9239 Century Coal Combination Tool
Full Wave Form Sonic Tool - FWSS
Acoustic Televiewer - ABI40-2G
Service Company: RDCL
Operator: O Gibson
Witness: B Bistouni
Date Logged: 24/01/2017 & 25/01/2017
Field: Havelock North
State / Province: Hawke's Bay
Country: New Zealand

Drillhole Information:

Bit Size: 320 mm
Log interval from: 2.40 m Log interval to: -22.14 m
Depth Driller: -22.14 m Depth Logger: -19.09 m
Fluid Type: Water Fluid Level: -1.708 m
Northing: 5603357.058 Easting: 1935189.763
Elevation: N/A Projection: TBC
Hole Azimuth: N/A Hole Inclination: -90°
Magnetic Declination: N/A Magnetic Inclination: N/A
Casing Size: 335 & 300 mm Casing Depth: TD

Printing Information:

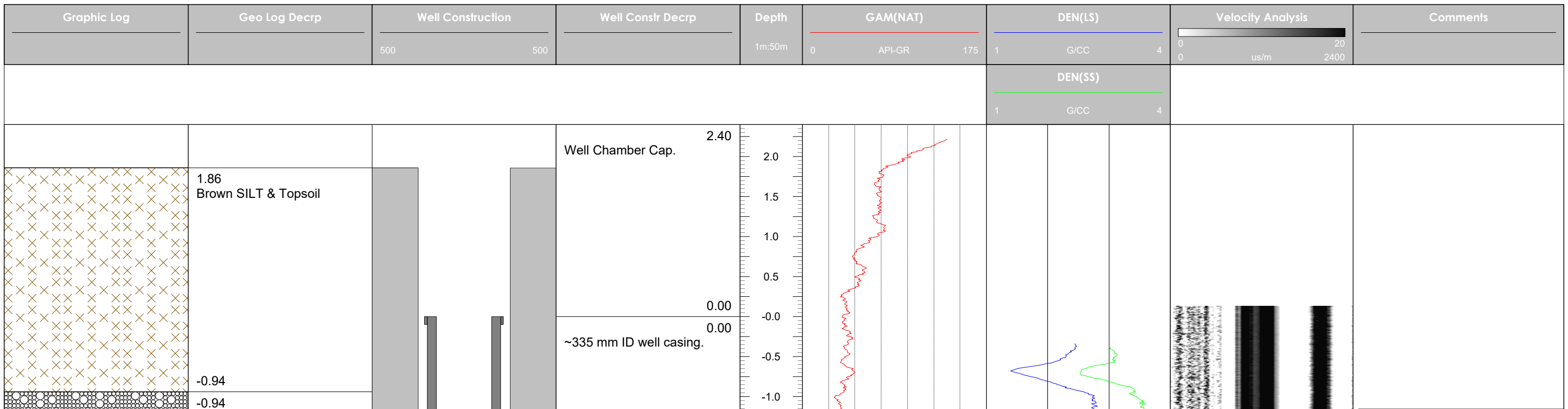
Print Type: Paginated Log Version: DRAFT
Depth Unit: Metres Scale Ratio: 1:50

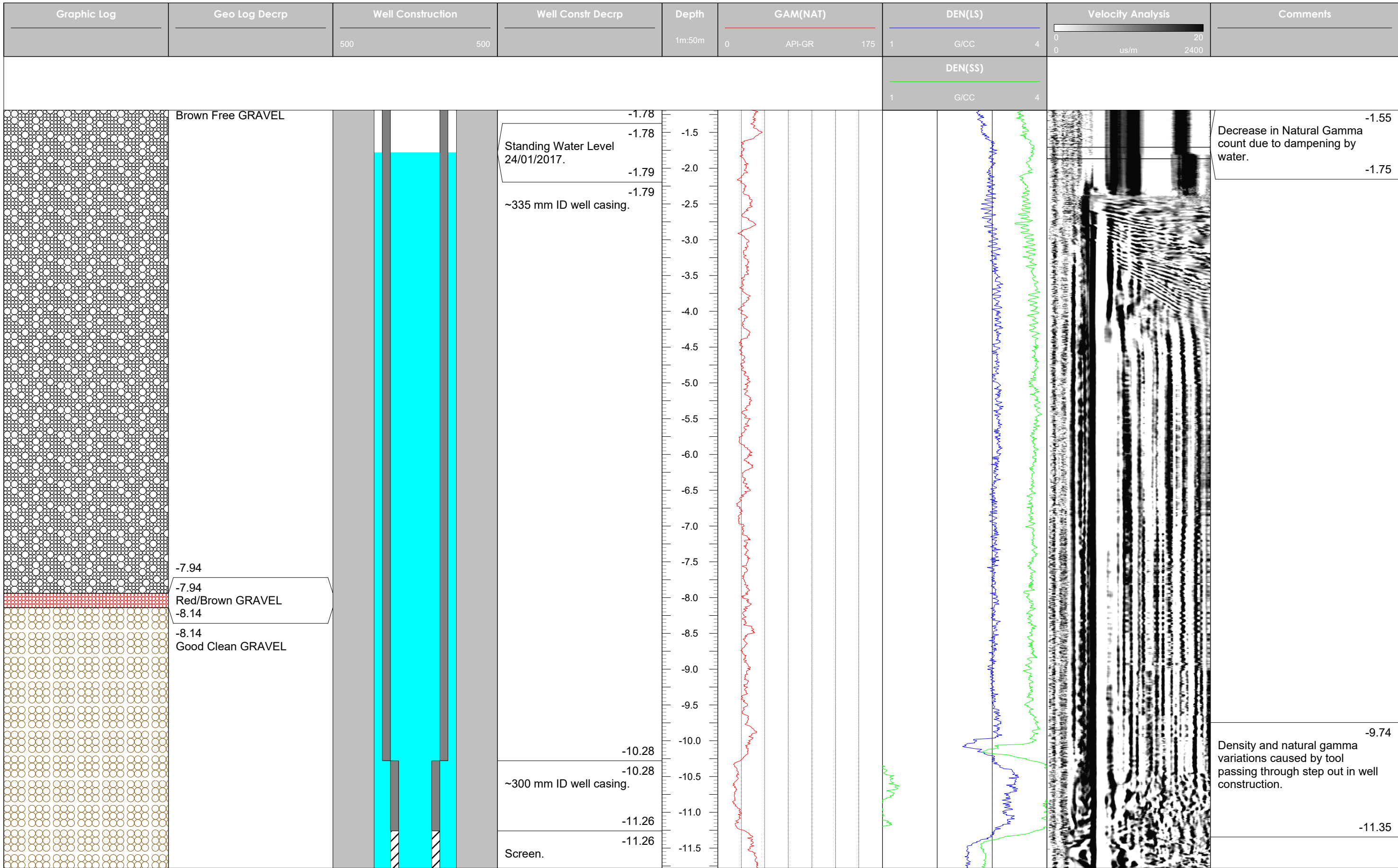
Location Description:

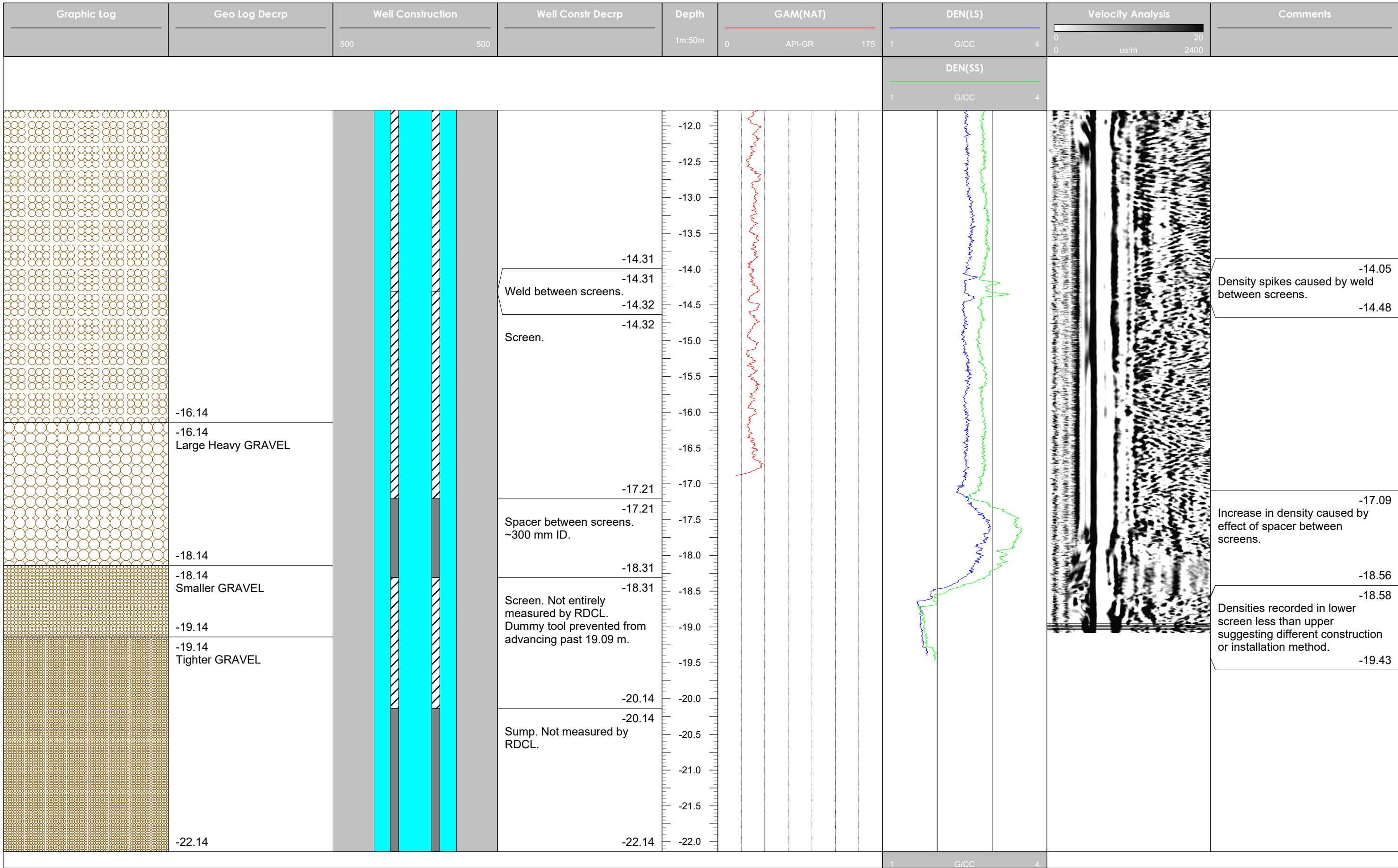
Brookvale Road, Havelock North

Comments:

1. All depths relative to top of flange on casing. To correct to ground level subtract 1.86 m. Water levels at time of logging.
2. Well coordinates and geological log derived from T&T report 31301, August 2016.
3. Density measures are relative and should not be considered absolute measures of density.







					DEN(SS)											
		500	500	1m:50m		0	API-GR	175	1	G/CC	4	0	us/m	2400		
						GAM(NAT)						0		20		
Graphic Log		Geo Log Decrp		Well Construction		Well Constr Decrp		Depth		DEN(LS)		Velocity Analysis		Comments		

APPENDIX A
BH01_INTERNAL CONDITION



PO Box 28057
308 Queen's Street East
Hastings 4130
New Zealand

Ph: +64 6 8771652
Fax: +64 6 8775015
Email: info@rdcl.co.nz

Log Nomenclature:

Acoustic Calliper = Average well calliper measured by acoustic signal
Calliper from centralised travel time = 360° image of acoustic calliper
Amplitude = strength of returned acoustic signal
Image_adj = Adjusted image recorded by optical televiewer
3D Acoustic = 3D representation of acoustic televiewer data
3D Optical = 3D representation of optical televiewer data

Basic Information:

Well Name: BH01 (AKA 1329)
Company: Hawke's Bay District Council
Run No: 04 & 06
Tool Type(s): Acoustic Televiewer - ABI40-2G
Optical Televiewer - OBI40
Service Company: RDCL
Operator: O Gibson
Witness: Ben Bistouni
Date Logged: 24/01/2017 & 25/01/2017
Field: Havelock North
State / Province: Hawke's Bay
Country: New Zealand

Drillhole Information:

Bit Size: 320 mm
Log interval from: -0.14 m Log interval to: 18.50 m
Depth Driller: 24 m Depth Logger: 19.09 m
Fluid Type: Water Fluid Level: 1.708 m
Northing: 5603357.058 Easting: 1935189.763
Elevation: N/A Projection: TBC
Hole Azimuth: N/A Hole Inclination: -90°
Magnetic Declination: N/A Magnetic Inclination: N/A
Casing Size: 335 & 300 mm Casing Depth: TD

Printing Information:

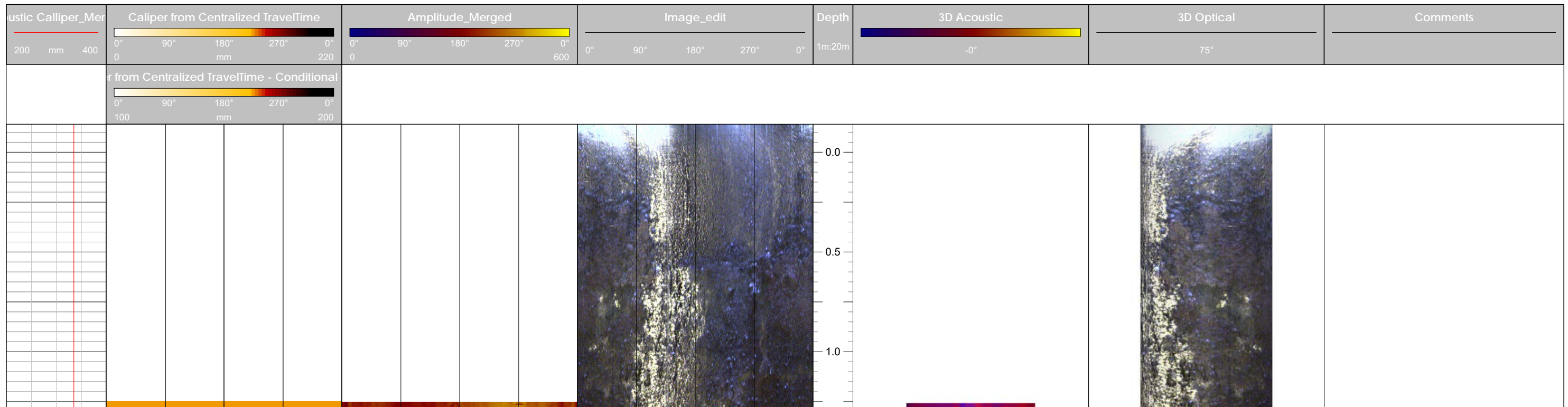
Print Type: Paginated Log Version: DRAFT
Depth Unit: Metres Scale Ratio: 1:20

Location Description:

Brookvale Road, Havelock North

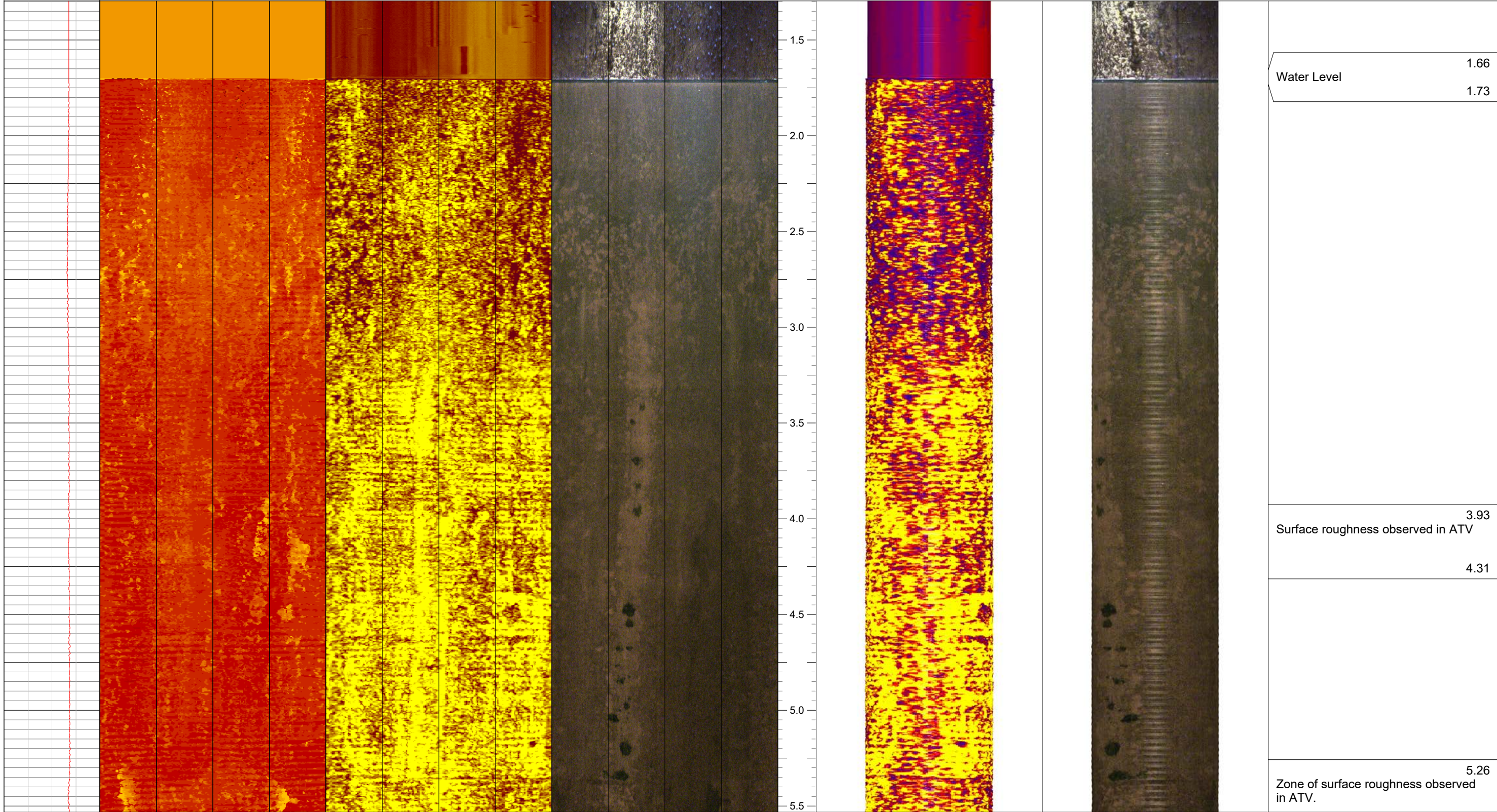
Comments:

1. All depths relative to top of flange on casing. To correct to ground level subtract 1.86 m.
2. Water levels at time of logging.
3. No absolute image orientation is recorded or implied. All orientations are relative.
4. Well coordinates derived from T&T report 31301, August 2016.



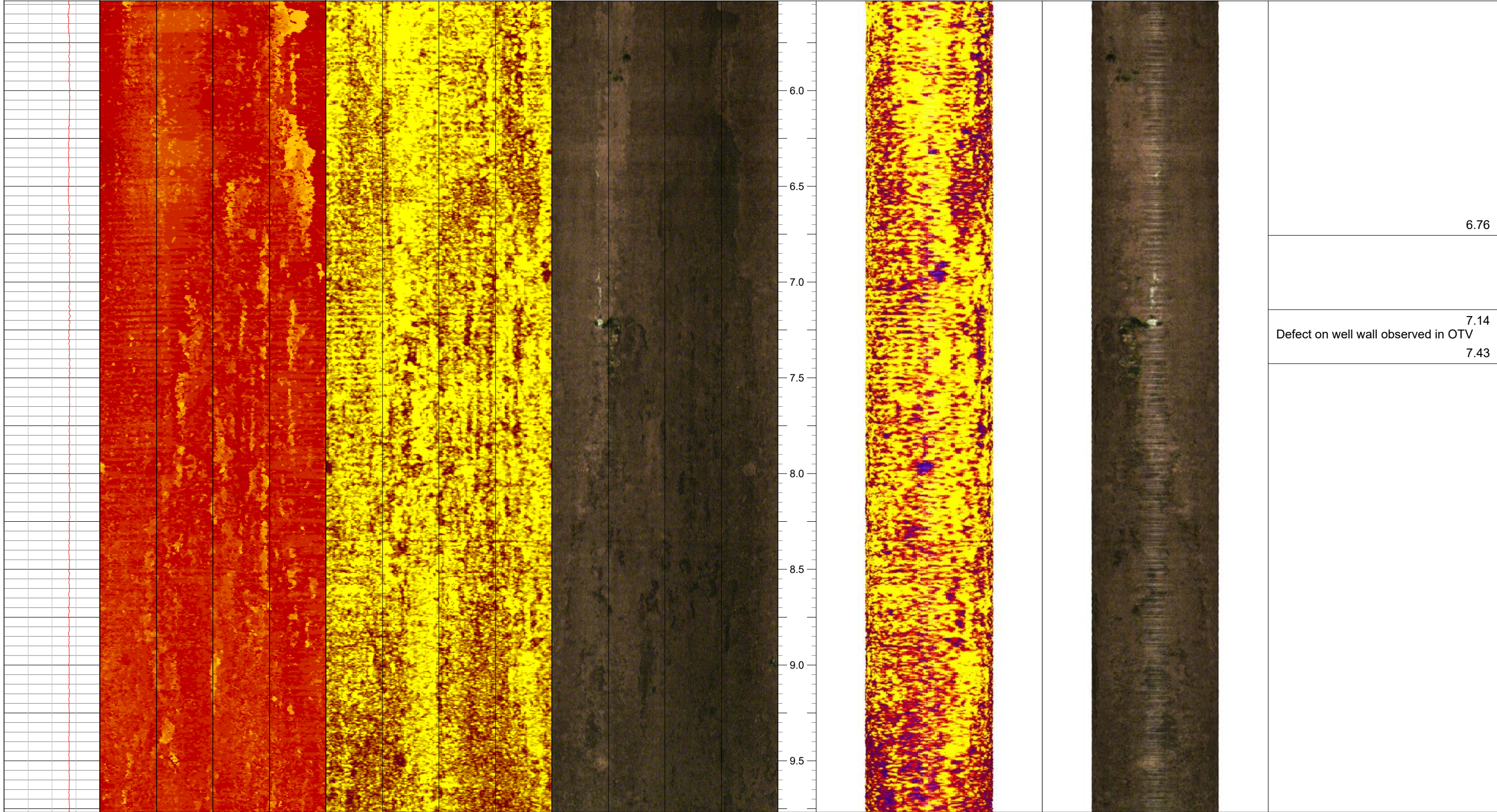
Acoustic Calliper_Mer	Caliper from Centralized TravelTime	Amplitude_Merged	Image_edit	Depth	3D Acoustic	3D Optical	Comments
200 mm 400	0° 90° 180° 270° 0° 0 mm 220	0° 90° 180° 270° 0° 0 600	0° 90° 180° 270° 0°	1m:20m	-0°	75°	

Acoustic Calliper_Mer	Caliper from Centralized TravelTime - Conditional
	0° 90° 180° 270° 0° 100 mm 200



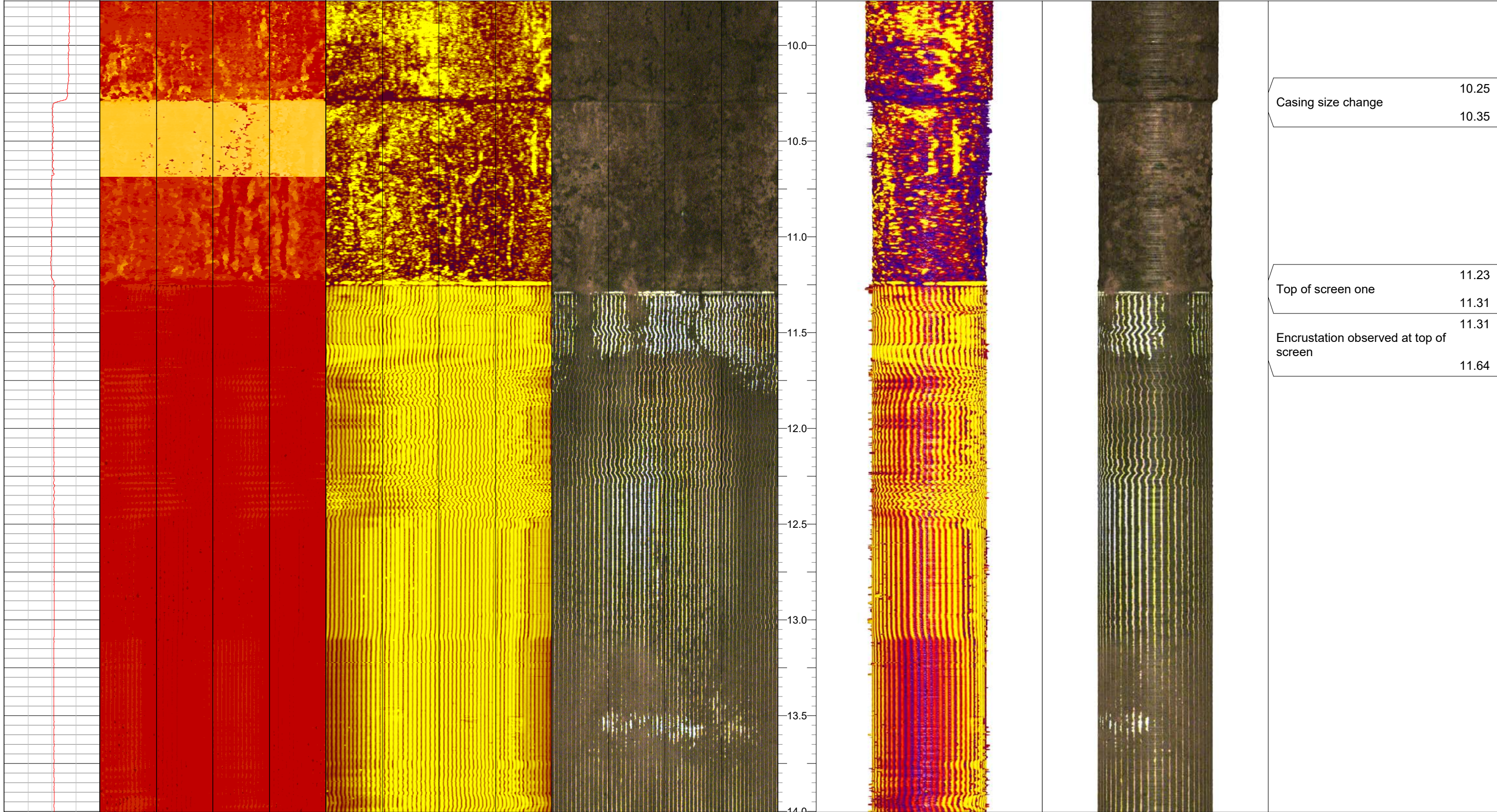
Acoustic Calliper_Mer	Caliper from Centralized TravelTime	Amplitude_Merged	Image_edit	Depth	3D Acoustic	3D Optical	Comments
200 mm 400	0° 90° 180° 270° 0° 0 mm 220	0° 90° 180° 270° 0° 0 600	0° 90° 180° 270° 0°	1m:20m	-0°	75°	

Caliper from Centralized TravelTime - Conditional
0° 90° 180° 270° 0° 100 mm 200



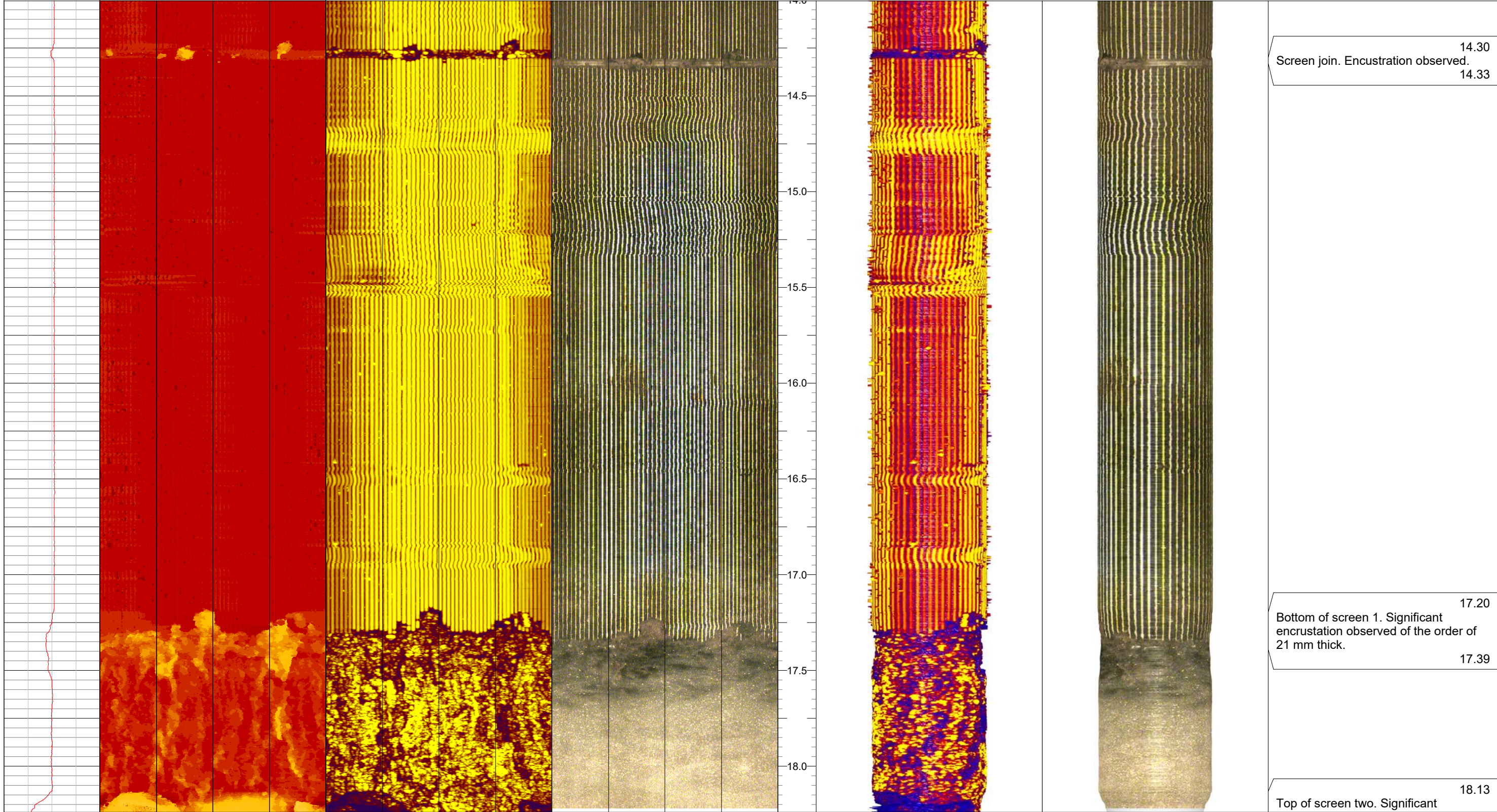
Acoustic Calliper_Mer	Caliper from Centralized TravelTime	Amplitude_Merged	Image_edit	Depth	3D Acoustic	3D Optical	Comments
200 mm 400	0° 90° 180° 270° 0° 0 mm 220	0° 90° 180° 270° 0° 0 600	0° 90° 180° 270° 0°	1m:20m	-0°	75°	

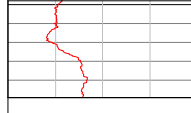
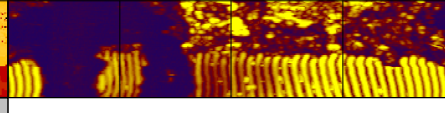

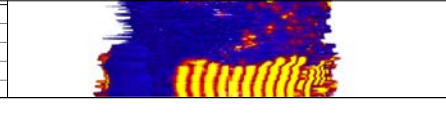

Acoustic Calliper_Mer	Caliper from Centralized TravelTime - Conditional
	0° 90° 180° 270° 0° 100 mm 200



Acoustic Calliper_Mer	Caliper from Centralized TravelTime	Amplitude_Merged	Image_edit	Depth	3D Acoustic	3D Optical	Comments
200 mm 400	0° 90° 180° 270° 0° 0 mm 220	0° 90° 180° 270° 0° 0 600	0° 90° 180° 270° 0°	1m:20m	-0°	75°	

Acoustic Calliper_Mer	Caliper from Centralized TravelTime - Conditional
200 mm 400	0° 90° 180° 270° 0° 100 mm 200



Acoustic Calliper_Mer	Caliper from Centralized TravelTime	Amplitude_Merged	Image_edit	Depth	3D Acoustic	3D Optical	Comments
200 mm 400	0° 90° 180° 270° 0° 0 mm 220	0° 90° 180° 270° 0° 0 600	0° 90° 180° 270° 0°	1m:20m	-0°	75°	
	r from Centralized TravelTime - Conditional 0° 90° 180° 270° 0° 100 mm 200			18.5			encrustation observed of the order of 53 mm thick. 18.40
200 mm 400	100 mm 200 0° 90° 180° 270° 0° r from Centralized TravelTime - Conditional	0 600 0° 90° 180° 270° 0°	0° 90° 180° 270° 0°	1m:20m	-0°	75°	
Acoustic Calliper_Mer	Caliper from Centralized TravelTime	Amplitude_Merged	Image_edit	Depth	3D Acoustic	3D Optical	Comments