

APPENDICES

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APPENDIX A

WORK SUMMARIES FOR REGISTERED BORES

Groundwater Works Summary

For information on the meaning of fields please see [Glossary](#)
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Work Requested -- GW055436

Works Details (top)

GROUNDWATER NUMBER	GW055436
LIC-NUM	10BL120421
AUTHORISED-PURPOSES	DOMESTIC STOCK
INTENDED-PURPOSES	DOMESTIC STOCK
WORK-TYPE	Bore
WORK-STATUS	(Unknown)
CONSTRUCTION-METHOD	Rotary Air
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	1981-09-01
FINAL-DEPTH (metres)	76.20
DRILLED-DEPTH (metres)	76.20
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	LOCKYERSLEIGH
GWMA	- CENTRAL WEST ALLUVIUM [REST]
GW-ZONE	- ZONE 7 BLAND CREEK SYSTEM
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	10 - SYDNEY SOUTH COAST
RIVER-BASIN	212 - HAWKESBURY RIVER
AREA-DISTRICT	
CMA-MAP	8828-1S
GRID-ZONE	55/3
SCALE	1:25,000
ELEVATION	
ELEVATION-SOURCE	(Unknown)
NORTHING	6157226.00
EASTING	768542.00
LATITUDE	34 41' 30"
LONGITUDE	149 55' 53"
GS-MAP	0074D3

AMG-ZONE 55
COORD-SOURCE GD.,ACC.MAP
REMARK

Form-A (top)

COUNTY ARGYLE
PARISH BILLYRAMBIJA
PORTION-LOT-DP 6

Licensed (top)

COUNTY ARGYLE
PARISH BILLYRAMBIJA
PORTION-LOT-DP 6

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE- NO	PIPE- NO	COMPONENT- CODE	COMPONENT- TYPE	DEPTH- FROM (metres)	DEPTH- TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1	1	Casing	Threaded Steel	-0.30	10.70	165			Driven into Hole
1	1	Opening	Slots - Vertical	7.90	11.00	165		1	Oxy- Acetylene Slotted; SL: 0mm; A: 2mm

Water Bearing Zones (top)

FROM- DEPTH (metres)	TO- DEPTH (metres)	THICKNESS (metres)	ROCK- CAT- DESC	S- W-L	D- D- L	YIELD	TEST- HOLE- DEPTH (metres)	DURATION	SALINITY
7.90	11.00	3.10	Fractured	4.60		0.37			Good
48.80	49.10	0.30	Fractured	4.60		0.37			Good

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	0.30	0.30	Topsoil		
0.30	1.50	1.20	Clay		
1.50	10.70	9.20	Granite Decomposed Water Supply		
10.70	19.80	9.10	Granite Porphyry		
19.80	76.20	56.40	Granite Water Supply		

Warning To Clients: This raw data has been supplied to the Department of Infrastructure, Planning and Natural Resources (DIPNR) by drillers, licensees and other sources. The DIPNR does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

Groundwater Works Summary

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Work Requested -- GW056376

Works Details (top)

GROUNDWATER NUMBER	GW056376
LIC-NUM	10BL121918
AUTHORISED-PURPOSES	STOCK
INTENDED-PURPOSES	STOCK
WORK-TYPE	Bore open thru rock
WORK-STATUS	(Unknown)
CONSTRUCTION-METHOD	Rotary Air
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	1982-01-01
FINAL-DEPTH (metres)	51.00
DRILLED-DEPTH (metres)	51.00
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	N/A
GWMA	- CENTRAL WEST ALLUVIUM [REST]
GW-ZONE	- ZONE 7 BLAND CREEK SYSTEM
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	10 - SYDNEY SOUTH COAST
RIVER-BASIN	212 - HAWKESBURY RIVER
AREA-DISTRICT	
CMA-MAP	8828-1S
GRID-ZONE	55/3
SCALE	1:25,000
ELEVATION	
ELEVATION-SOURCE	(Unknown)
NORTHING	6158259.00
EASTING	773285.00
LATITUDE	34 40' 52"
LONGITUDE	149 58' 58"
GS-MAP	0074D3

AMG-ZONE55

COORD-SOURCEGD.,ACC.MAP

REMARK

Form-A (top)

COUNTYARGYLE

PARISHURINGALLA

PORTION-LOT-DP L1 DP589965 (213)

Licensed (top)

COUNTYARGYLE

PARISHURINGALLA

PORTION-LOT-DP 1 589965

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter; ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1	1	Casing	P.V.C.	0.00	6.00	165			Driven into Hole

Water Bearing Zones (top)

FROM-DEPTH (metres)	TO-DEPTH (metres)	THICKNESS (metres)	ROCK-CAT-DESC	S-W-L	D-D-L	YIELD	TEST-HOLE-DEPTH (metres)	DURATION	SALINITY
22.00	23.00	1.00	Fractured	12.00		0.15			(Unknown)

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	6.00	6.00	Granite Decomposed		
6.00	51.00	45.00	Granite Water Supply		

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Groundwater Works Summary

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Print Report

[Works Details](#) [Site Details](#) [Form A](#) [Licensed](#) [Construction](#) [Water Bearing Zones](#) [Drillers Log](#)

Work Requested -- GW105357

Works Details (top)

GROUNDWATER NUMBER	GW105357
LIC-NUM	10BL161170
AUTHORISED-PURPOSES	DOMESTIC STOCK
INTENDED-PURPOSES	DOMESTIC STOCK
WORK-TYPE	Bore
WORK-STATUS	
CONSTRUCTION-METHOD	
OWNER-TYPE	
COMMENCE-DATE	
COMPLETION-DATE	2002-12-29
FINAL-DEPTH (metres)	60.00
DRILLED-DEPTH (metres)	60.00
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	SPELLBROOK
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	10 - SYDNEY SOUTH COAST
RIVER-BASIN	
AREA-DISTRICT	
CMA-MAP	
GRID-ZONE	
SCALE	
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6161764.00
EASTING	771289.00
LATITUDE	34 39' 1"
LONGITUDE	149 57' 36"
GS-MAP	

AMG-ZONE55

COORD-SOURCE

REMARK

Form-A (top)

COUNTYARGYLE

PARISHBILLYRAMBIJA

PORTION-LOT-DP63 1053197

Licensed (top)

COUNTYARGYLE

PARISHMULWAREE

PORTION-LOT-DP63 1053197

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE- NO	PIPE- NO	COMPONENT- CODE	COMPONENT- TYPE	DEPTH- FROM (metres)	DEPTH- TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	1.50	200			Rotary Air
1		Hole	Hole	1.50	60.00	150			Rotary Air

Water Bearing Zones (top)

no details

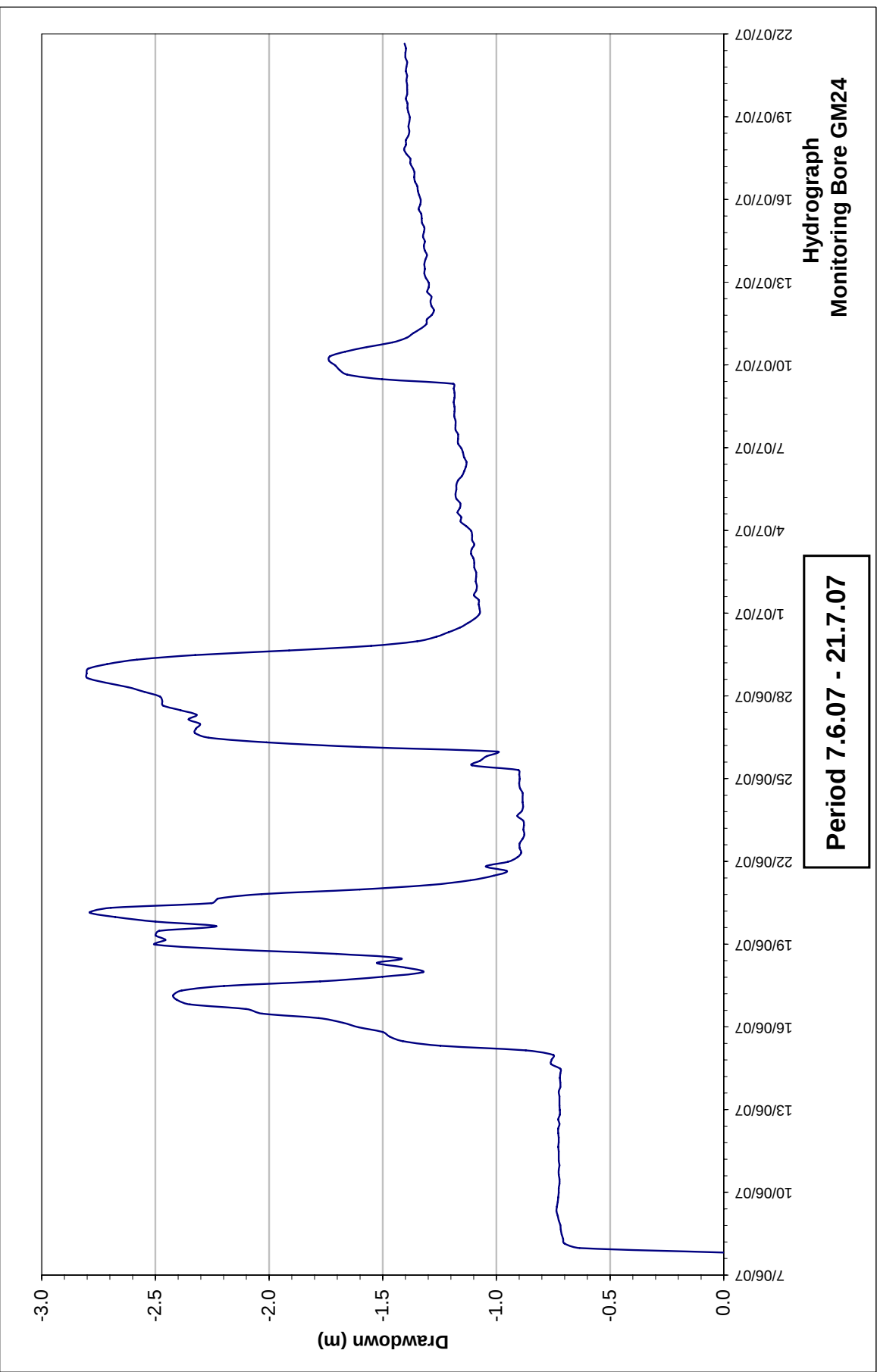
Drillers Log (top)

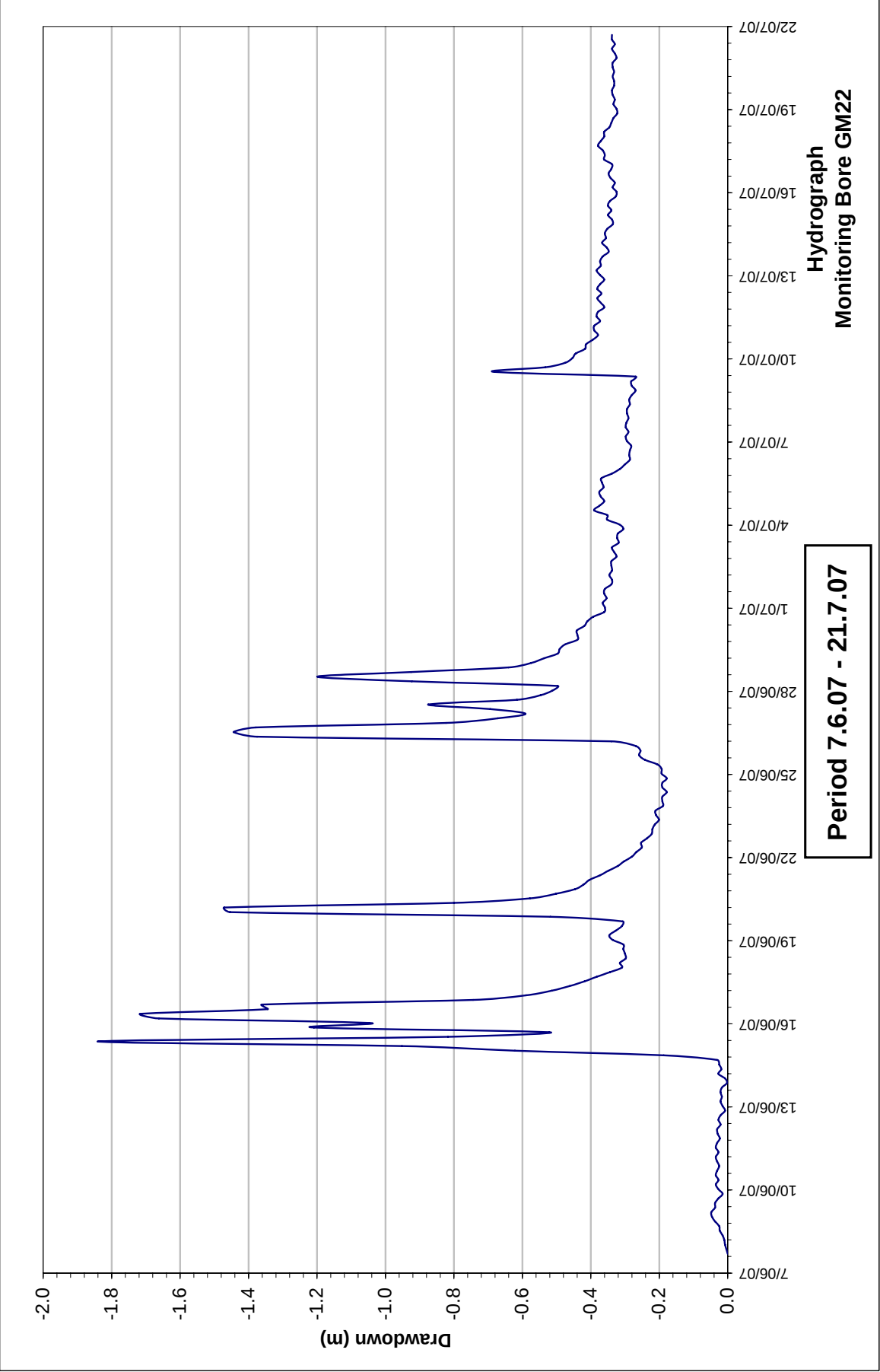
FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	1.50	1.50	TOPSOIL		
1.50	18.00	16.50	GRANITE		
18.00	60.00	42.00	GRANITE		

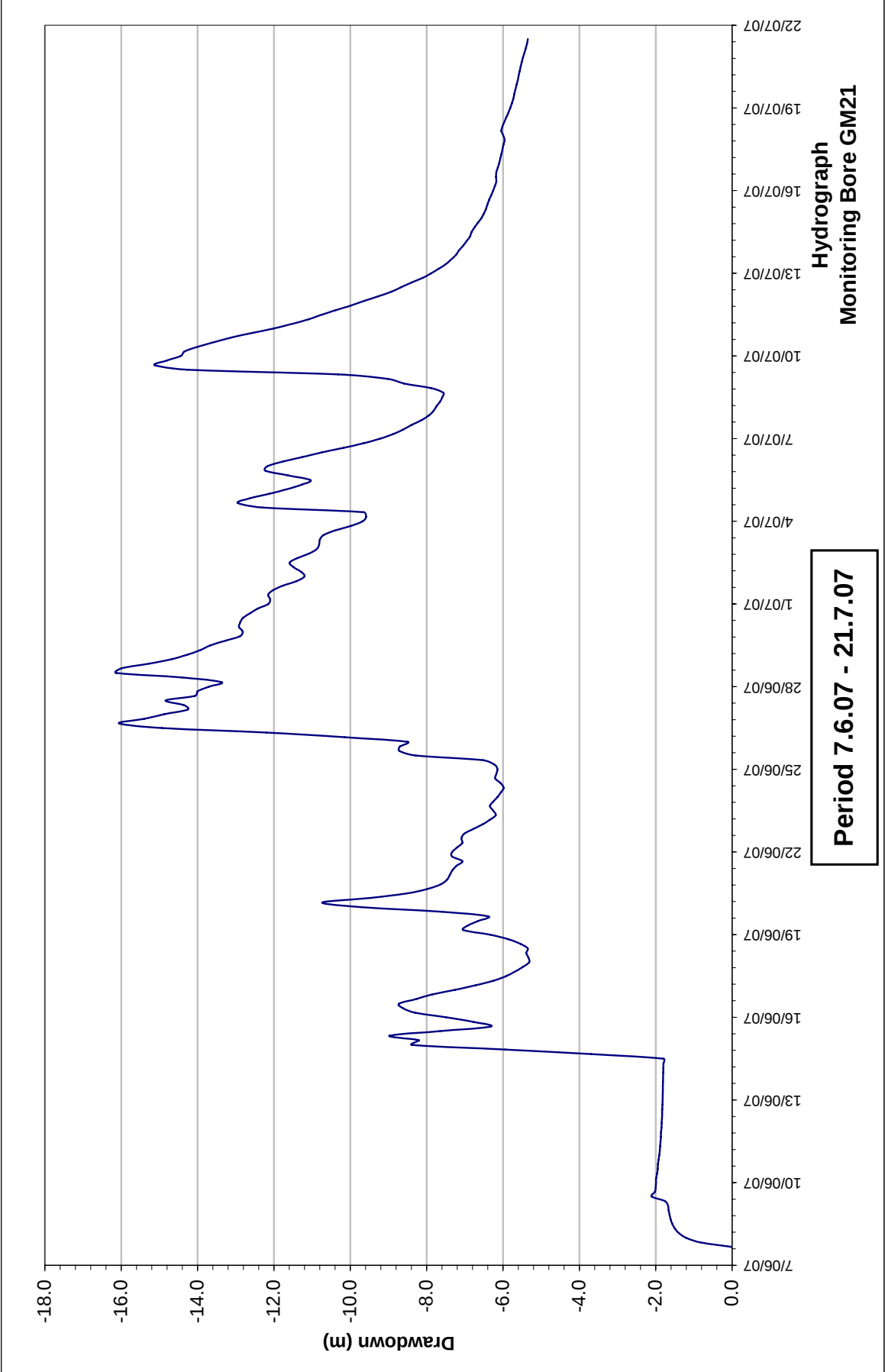
Warning To Clients: This raw data has been supplied to the Department of Infrastructure, Planning and Natural Resources (DIPNR) by drillers, licensees and other sources. The DIPNR does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

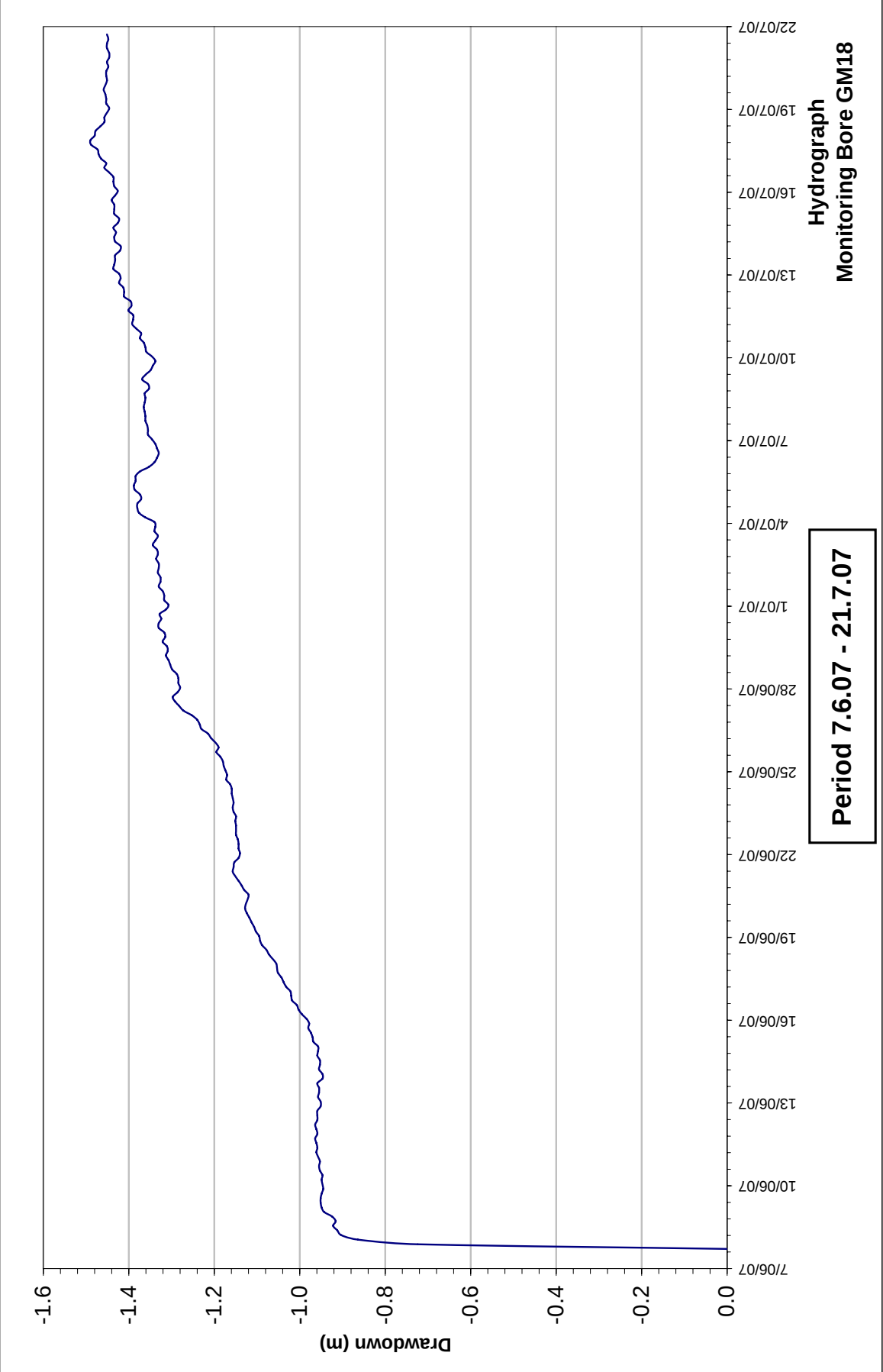
APPENDIX B

HYDROGRAPHS FOR MONITORING BORES



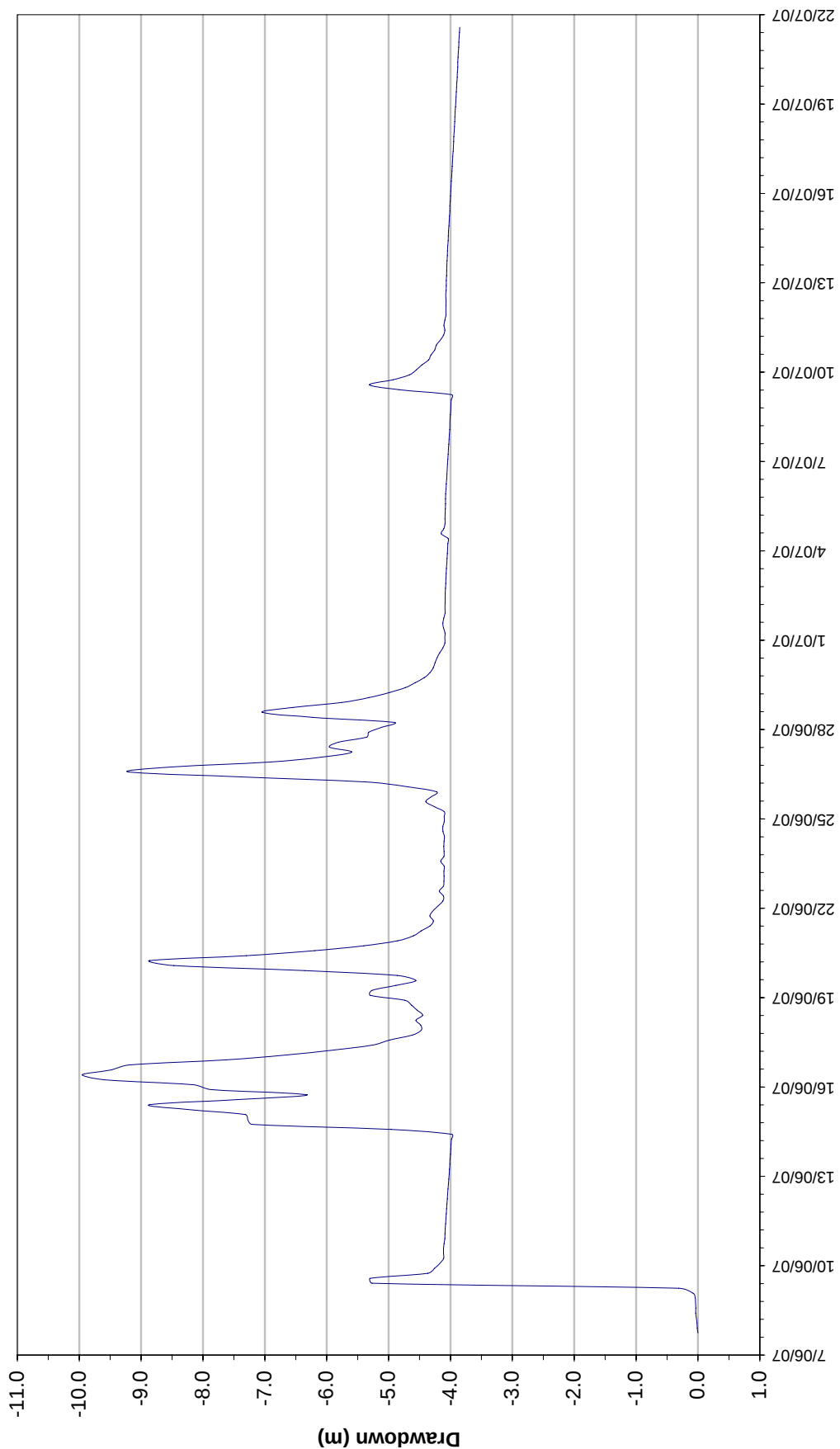


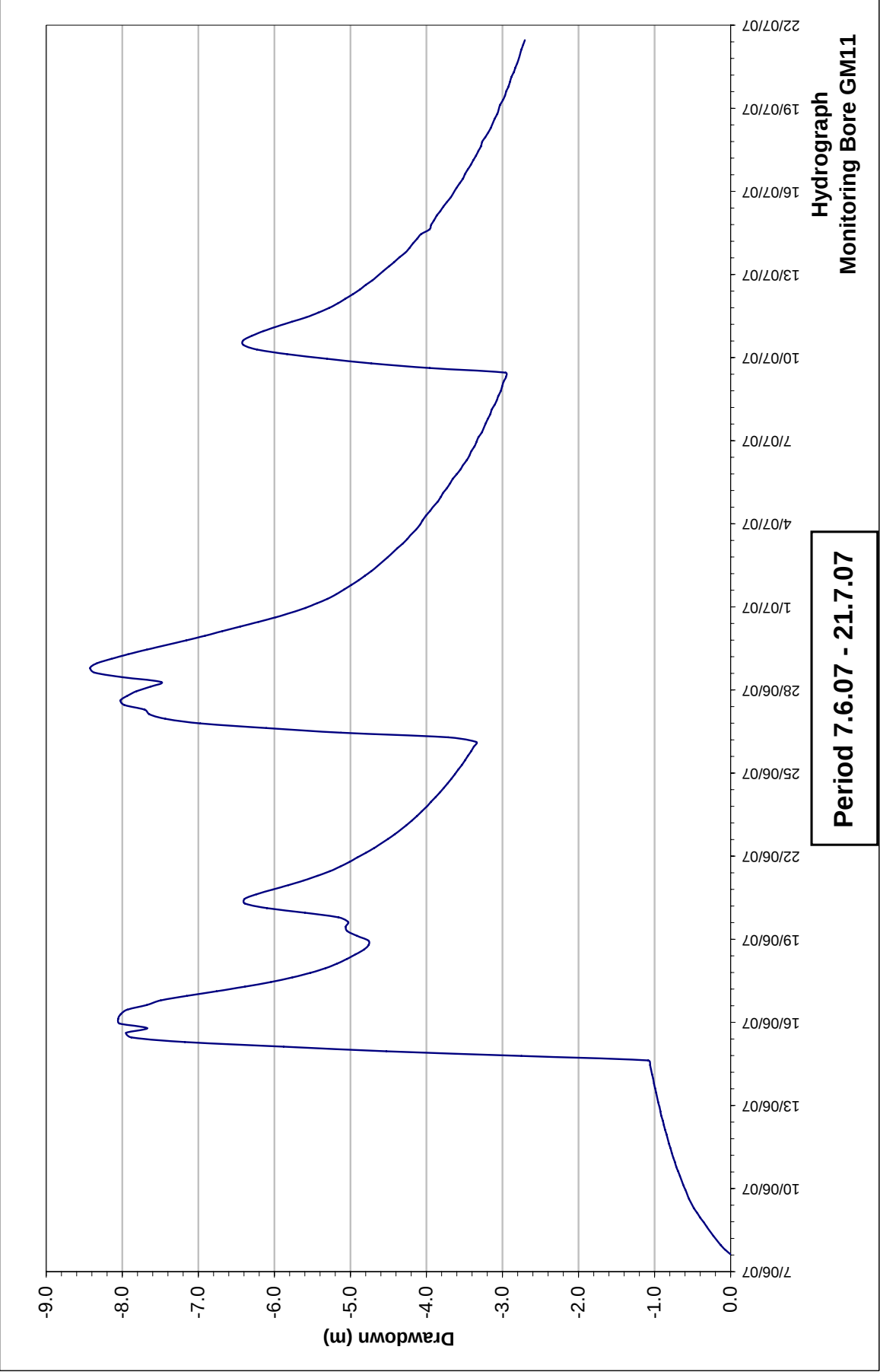




Hydrograph
Monitoring Bore GM13

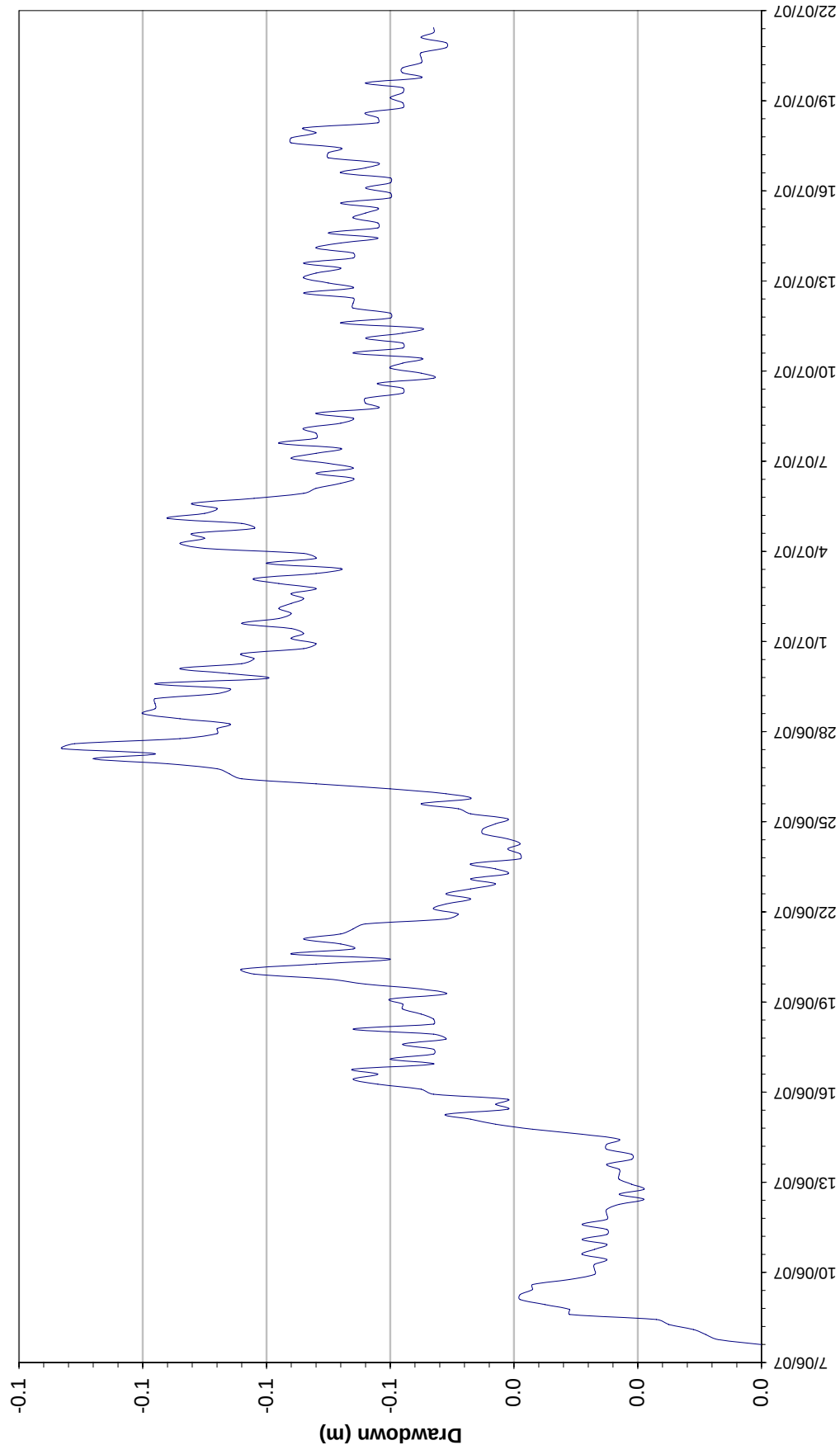
Period 7.6.07 - 21.7.07

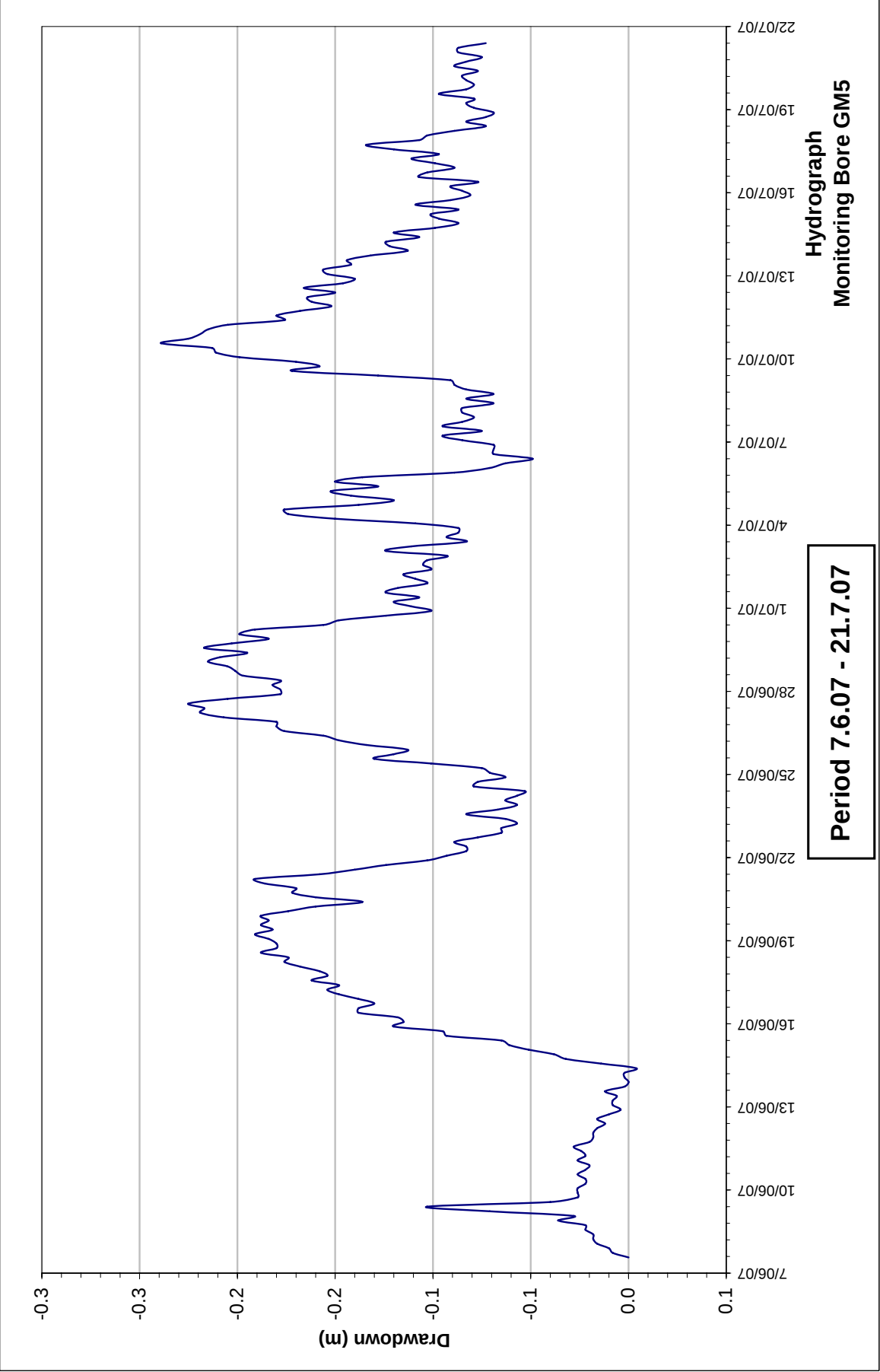


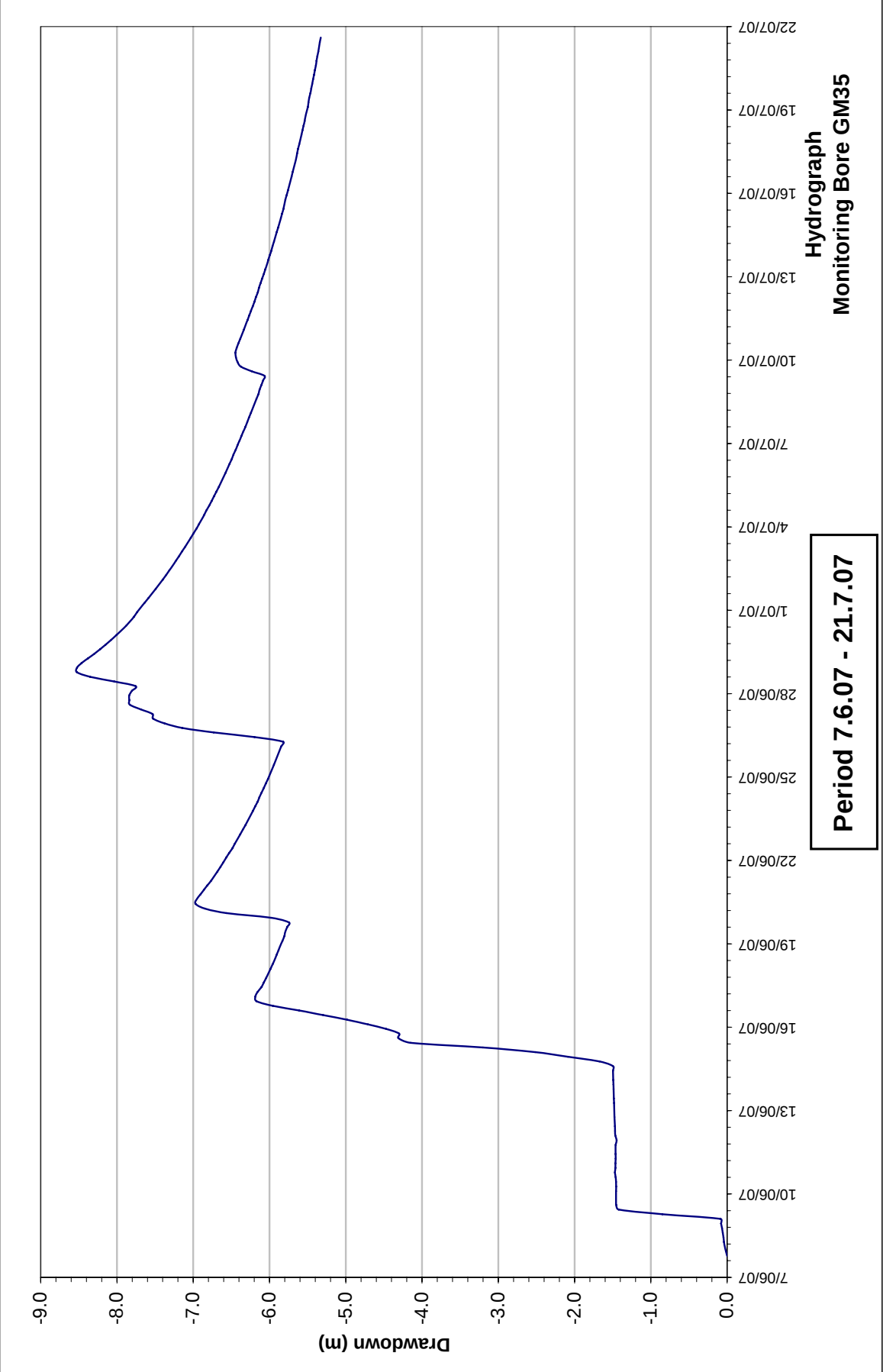


Hydrograph
Monitoring Bore GM6

Period 7.6.07 - 21.7.07

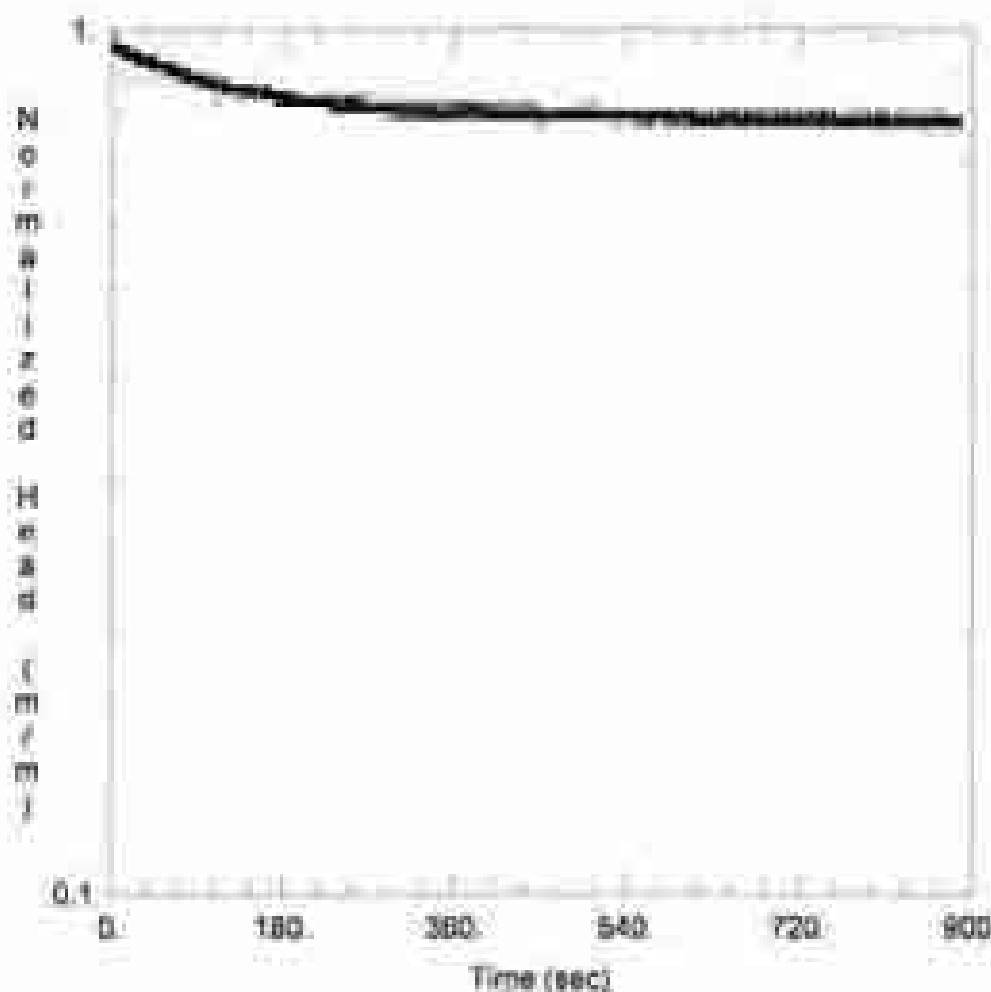






APPENDIX C

SLUG TEST MODELS



WELL TEST ANALYSIS

Data Set: C:_GM21.aqt
Date: 08/02/07

Time: 10:32:41

PROJECT INFORMATION

Company: Larry Cook & Associates
Client: Guntlake Quarry
Project: 06130
Location: Mahan
Test Well: GM21
Test Date: 21.7.07

AQUIFER DATA

Saturated Thickness: 9.79 m

Anisotropy Ratio (K_z/K_r): 1

WELL DATA (GM21)

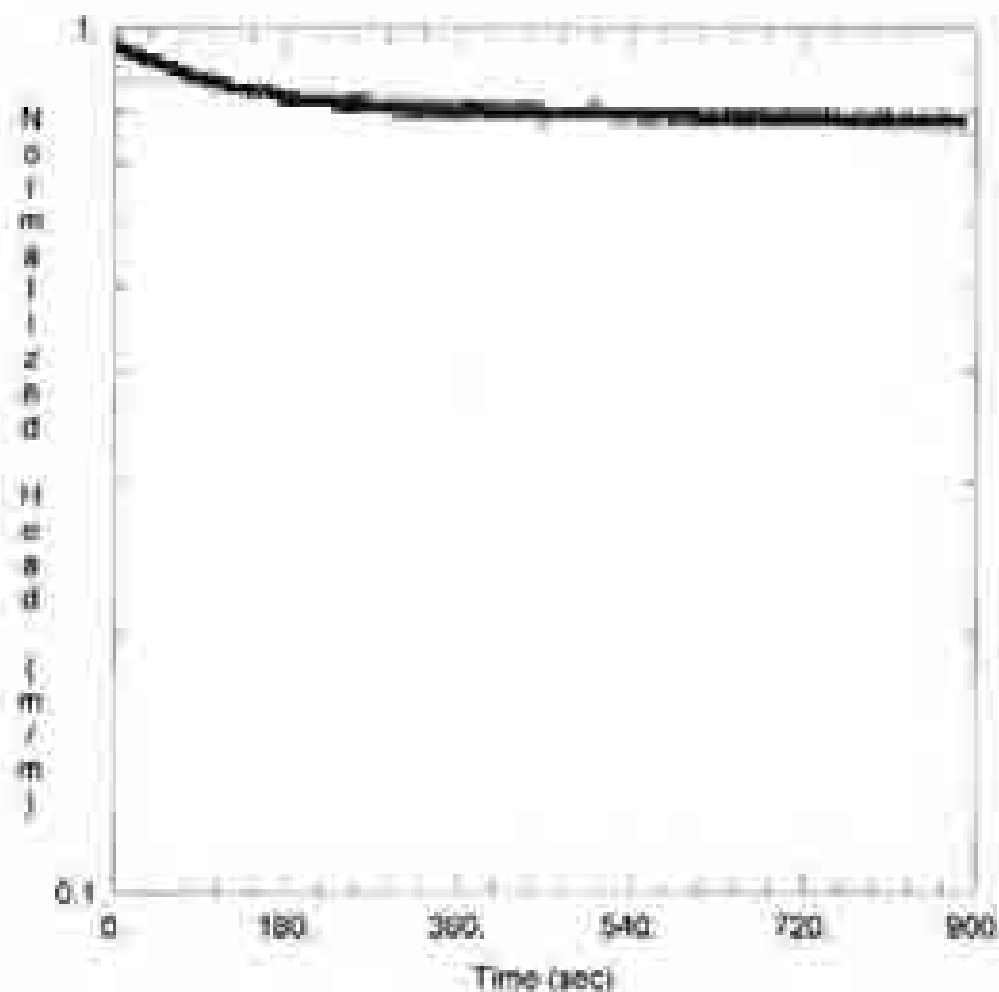
Initial Displacement: 0.402 m
Total Well Penetration Depth: 9.79 m
Casing Radius: 0.089 m

Static Water Column Height: 0.79 m
Screen Length: 9.79 m
Well Radius: 0.089 m

SOLUTION

Aquifer Model: Confined
 $K = 0.02048$ m/day

Solution Method: Bouwer-Rice
 $y_0 = 0.361$ m



WELL TEST ANALYSIS

Data Set: C:_IGM21.aqt

Date: 06/02/07

Time: 10:31:57

PROJECT INFORMATION

Company: Larry Cook & Associates

Client: Gurlake Quarry

Project: 06130

Location: Marulan

Test Well: GM21

Test Date: 21.7.07

AQUIFER DATA

Saturated Thickness: 9.79 m

Anisotropy Ratio (K_z/K_r): 1

WELL DATA (GM21)

Initial Displacement: 0.402 m

Static Water Column Height: 9.79 m

Total Well Penetration Depth: 9.79 m

Screen Length: 9.79 m

Casing Radius: 0.085 m

Well Radius: 0.089 m

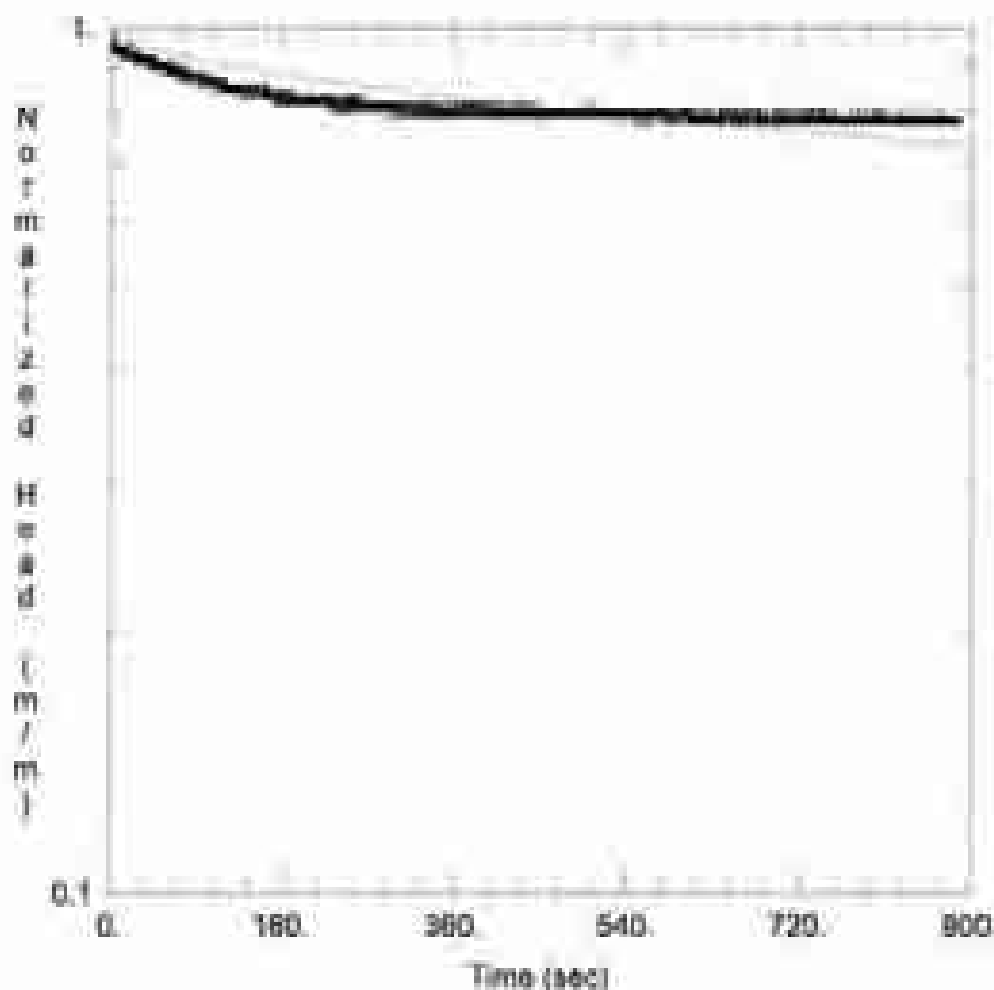
SOLUTION

Aquifer Model: Confined

Solution Method: Hvorslev

$K = 0.02997$ m/day

$y_0 = 0.351$ m



WELL TEST ANALYSIS

Data Set: C:\GM21.aqt
Date: 08/02/07

Time: 10:36:51

PROJECT INFORMATION

Company: Larry Cook & Associates
Client: Guntake Quarry
Project: 08130
Location: Marulan
Test Well: GM21
Test Date: 21.7.07

AQUIFER DATA

Saturated Thickness: 9.79 m

WELL DATA (GM21)

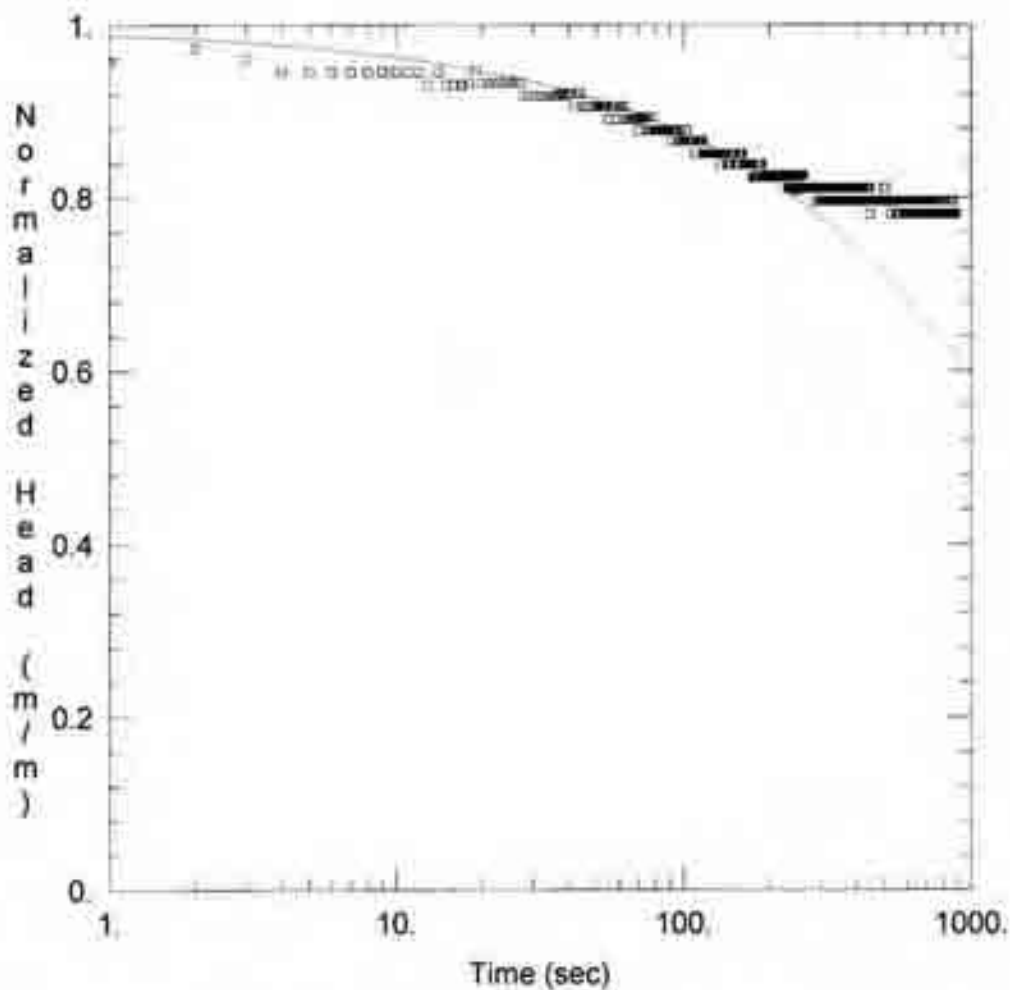
Initial Displacement: 0.402 m
Total Well Penetration Depth: 9.79 m
Casing Radius: 0.089 m

Static Water Column Height: 9.79 m
Screen Length: 9.79 m
Well Radius: 0.089 m

SOLUTION

Aquifer Model: Confined
 $K_r = 0.008705 \text{ m/day}$
 $K_b/K_r = 1$

Solution Method: KGS Model
 $S_s = 0.01021 \text{ m}^3$



WELL TEST ANALYSIS

Data Set: C:\...\GM21.aqt

Date: 08/02/07

Time: 10:36:30

PROJECT INFORMATION

Company: Larry Cook & Associates

Client: Gunlake Quarry

Project: 06130

Location: Marulan

Test Well: GM21

Test Date: 21.7.07

AQUIFER DATA

Saturated Thickness: 9.79 m

WELL DATA (GM21)

Initial Displacement: 0.402 m

Total Well Penetration Depth: 9.79 m

Casing Radius: 0.089 m

Static Water Column Height: 9.79 m

Screen Length: 9.79 m

Well Radius: 0.089 m

SOLUTION

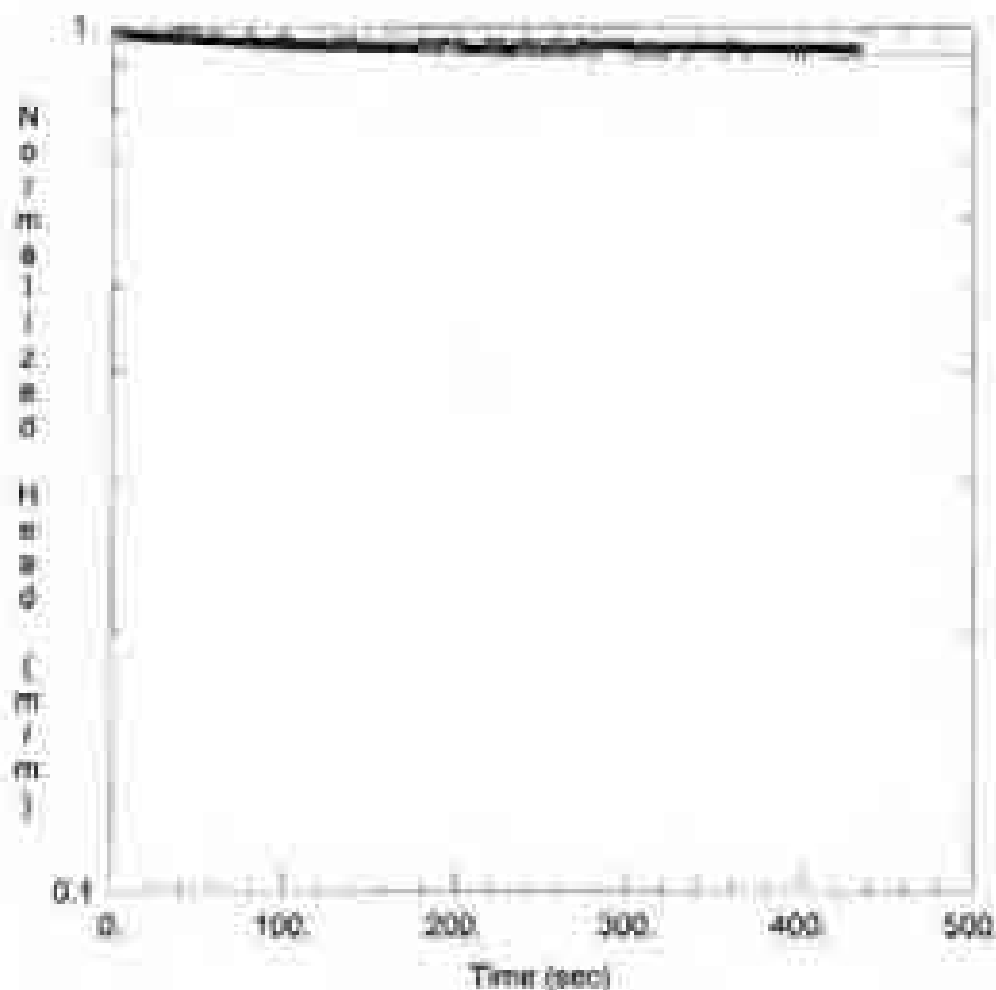
Aquifer Model: Confined

Kr = 0.01804 m/day

Kz/Kr = 1

Solution Method: KGS Model

Ss = 0.01021 m⁻¹



WELL TEST ANALYSIS

Data Set: C:_GM35.aq5
Date: 05/02/07

Time: 10:54:11

PROJECT INFORMATION

Company: Larry Cook & Associates
Client: Gunlake Quarry
Project: 00130
Location: Marulan
Test Well: GM35
Test Date: 21.7.07

AQUIFER DATA

Saturated Thickness: 11.93 m

Anisotropy Ratio (K_z/K_r): 1

WELL DATA (GM35)

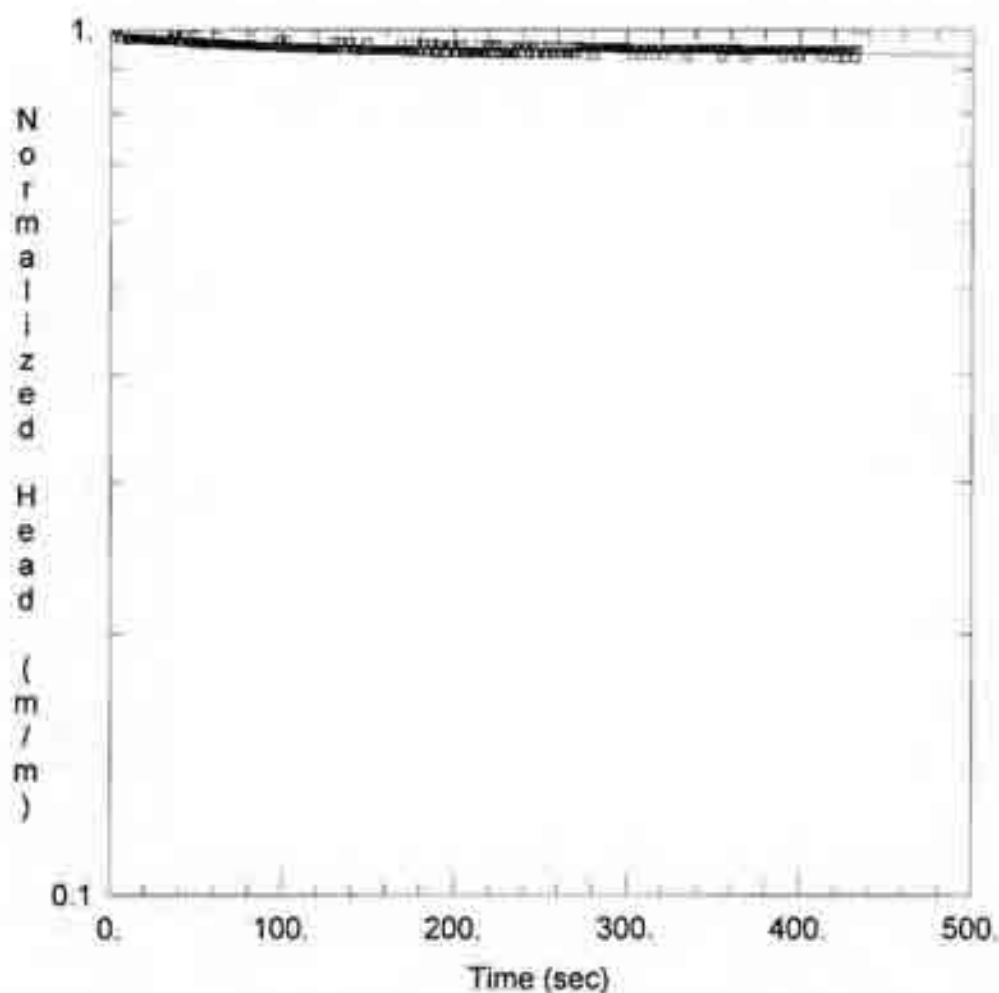
Initial Displacement: 0.319 m
Total Well Penetration Depth: 11.93 m
Casing Radius: 0.089 m

Static Water Column Height: 11.93 m
Screen Length: 11.93 m
Well Radius: 0.089 m

SOLUTION

Aquifer Model: Confined
 $T = 0.01239 \text{ m}^2/\text{day}$

Solution Method: Cooper-Breidehoeft-Papadopoulos
 $S = 0.1$



WELL TEST ANALYSIS

Data Set: C:\...GM36.aqt
 Date: 08/02/07

Time: 10:55:25

PROJECT INFORMATION

Company: Larry Cook & Associates
 Client: Gunlake Quarry
 Project: 06130
 Location: Marulan
 Test Well: GM36
 Test Date: 21.7.07

AQUIFER DATA

Saturated Thickness: 11.93 m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (GM36)

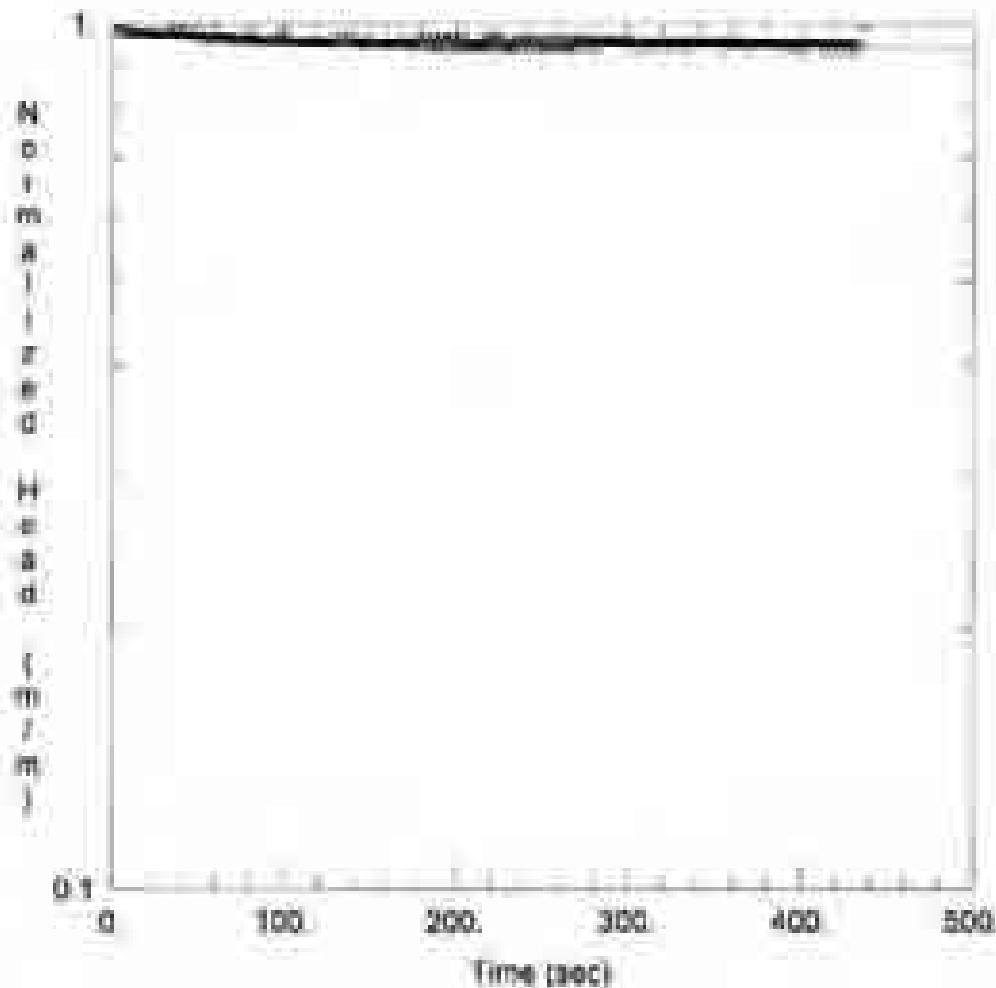
Initial Displacement: 0.319 m
 Total Well Penetration Depth: 11.93 m
 Casing Radius: 0.089 m

Static Water Column Height: 11.93 m
 Screen Length: 11.93 m
 Well Radius: 0.089 m

SOLUTION

Aquifer Model: Confined
 $K = 0.007228$ m/day

Solution Method: Bouwer-Rice
 $y_0 = 0.3084$ m



WELL TEST ANALYSIS

Data Set: C:\GM38.aqt

Date: 08/02/07

Time: 10:53:17

PROJECT INFORMATION

Company: Larry Cook & Associates

Client: Gurneys Quarry

Project: 06130

Location: Marulan

Test Well: GM38

Test Date: 21.7.07

AQUIFER DATA

Saturated Thickness: 11.93 m

Anisotropy Ratio (R_x/R_y): 1

WELL DATA (GM38)

Initial Displacement: 0.319 m

Static Water Column Height: 11.93 m

Total Well Penetration Depth: 11.93 m

Screen Length: 11.93 m

Casing Radius: 0.089 m

Well Radius: 0.089 m

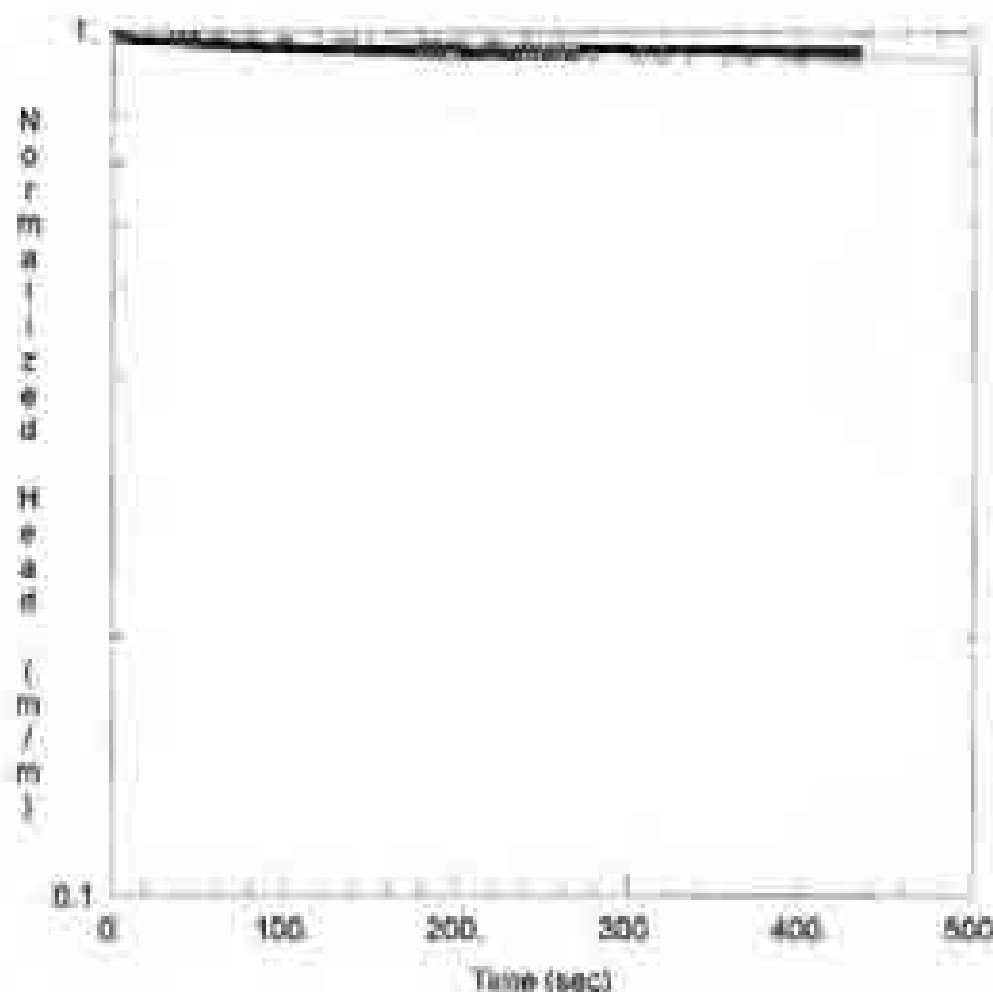
SOLUTION

Aquifer Model: Confined

Solution Method: Hvorslev

$K = 0.01012$ m/day

$y_0 = 0.3084$ m



WELL TEST ANALYSIS

Data Set: C:\GM35.sqt

Date: 08/02/07

Time: 10:54:41

PROJECT INFORMATION

Company: Larry Cook & Associates

Client: Gurlake Quarry

Project: 05130

Location: Marulan

Test Well: GM35

Test Date: 21.7.07

AQUIFER DATA

Saturated Thickness: 11.93 m

WELL DATA (GM35)

Initial Displacement: 0.319 m

Total Well Penetration Depth: 11.93 m

Casing Radius: 0.089 m

Static Water Column Height: 11.93 m

Screen Length: 11.93 m

Well Radius: 0.089 m

SOLUTION

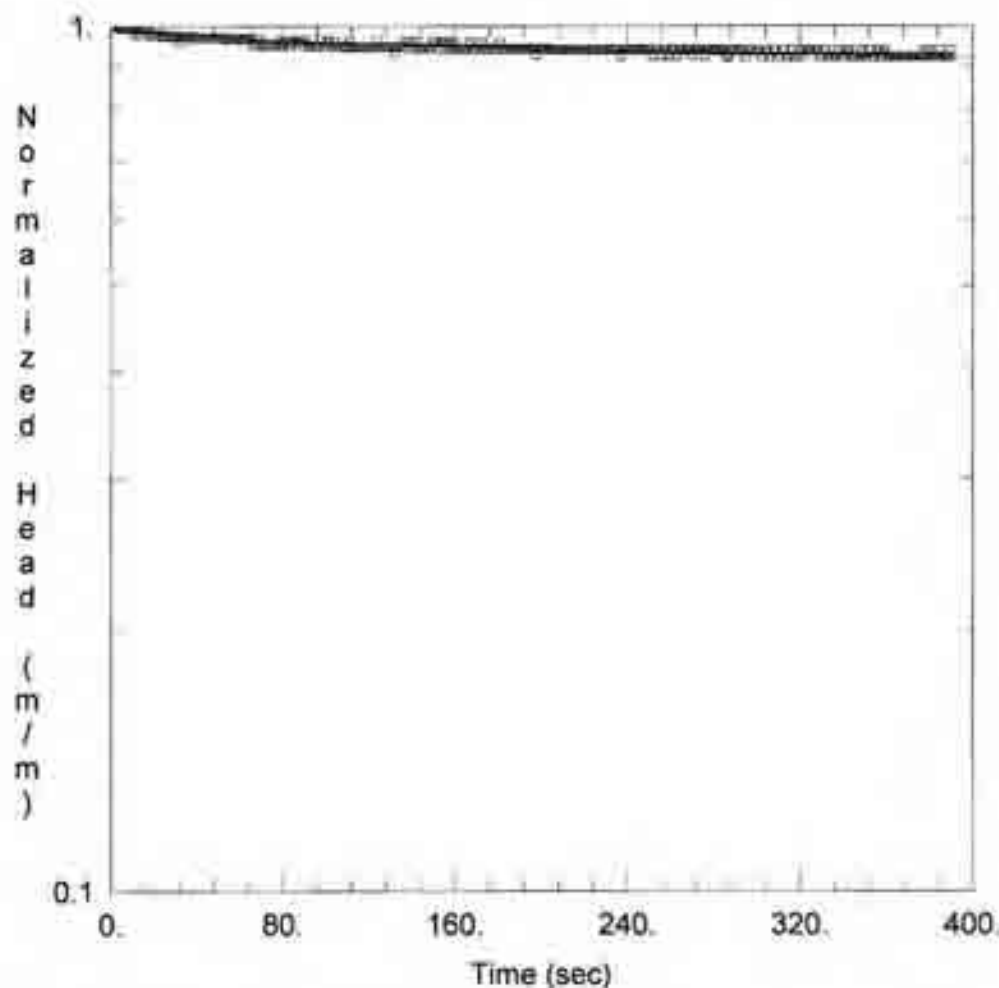
Aquifer Model: Confined

$K_r = 0.001038$ m/day

$K_{20}/K_r = 1$

Solution Method: RGS Model

$S_s = 0.008382$ m³



WELL TEST ANALYSIS

Data Set: C:\...IGM35.aqt
 Date: 08/02/07

Time: 10:50:17

PROJECT INFORMATION

Company: Larry Cook & Associates
 Client: Gunlake Quarry
 Project: 06130
 Location: Marulan
 Test Well: GM35
 Test Date: 21.7.07

AQUIFER DATA

Saturated Thickness: 17.2 m

Anisotropy Ratio (K_z/K_r): 1

WELL DATA (GM35)

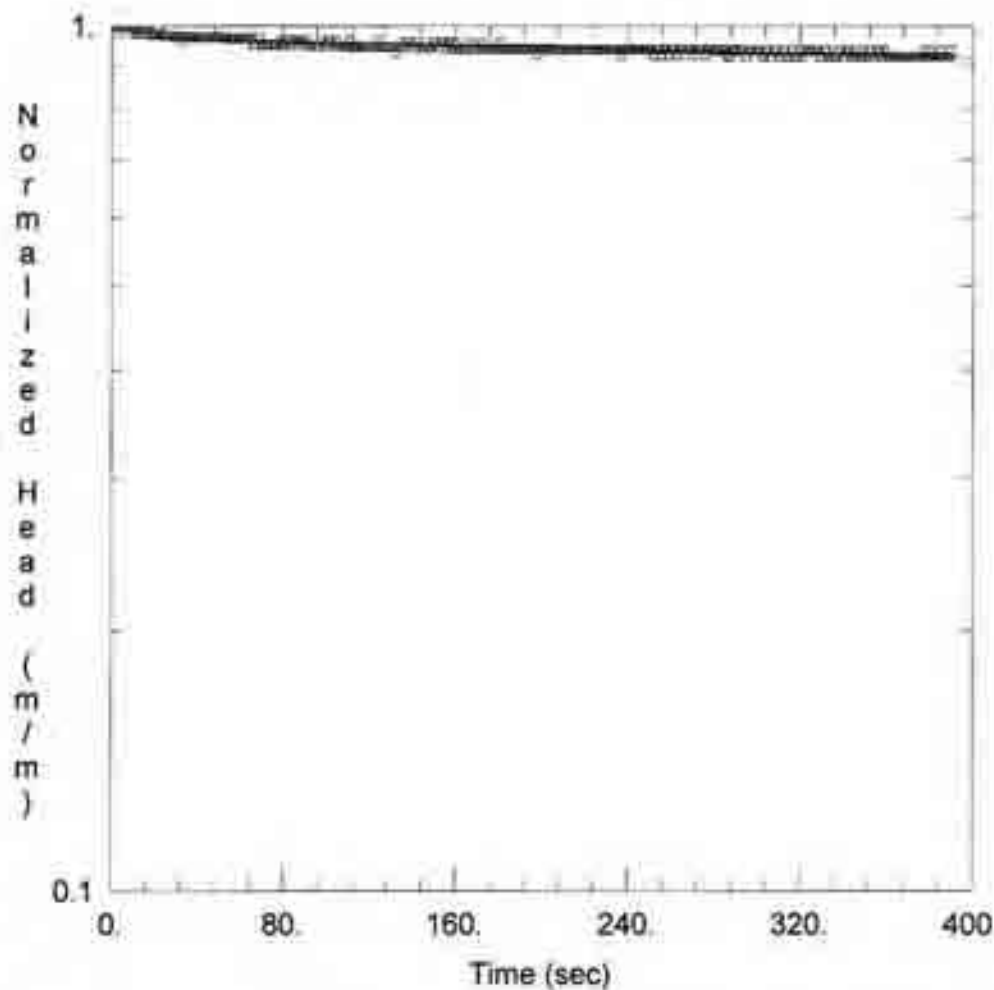
Initial Displacement: 0.407 m
 Total Well Penetration Depth: 17.2 m
 Casing Radius: 0.089 m

Static Water Column Height: 17.2 m
 Screen Length: 17.2 m
 Well Radius: 0.089 m

SOLUTION

Aquifer Model: Confined
 $T = 0.02 \text{ m}^2/\text{day}$

Solution Method: Cooper-Bredehoeft-Papadopoulos
 $S = 0.1$



WELL TEST ANALYSIS

Data Set: C:\...GM35.aqt
 Date: 08/02/07

Time: 10:50:47

PROJECT INFORMATION

Company: Larry Cook & Associates
 Client: Gunlake Quarry
 Project: 06130
 Location: Marulan
 Test Well: GM35
 Test Date: 21.7.07

AQUIFER DATA

Saturated Thickness: 17.2 m

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (GM35)

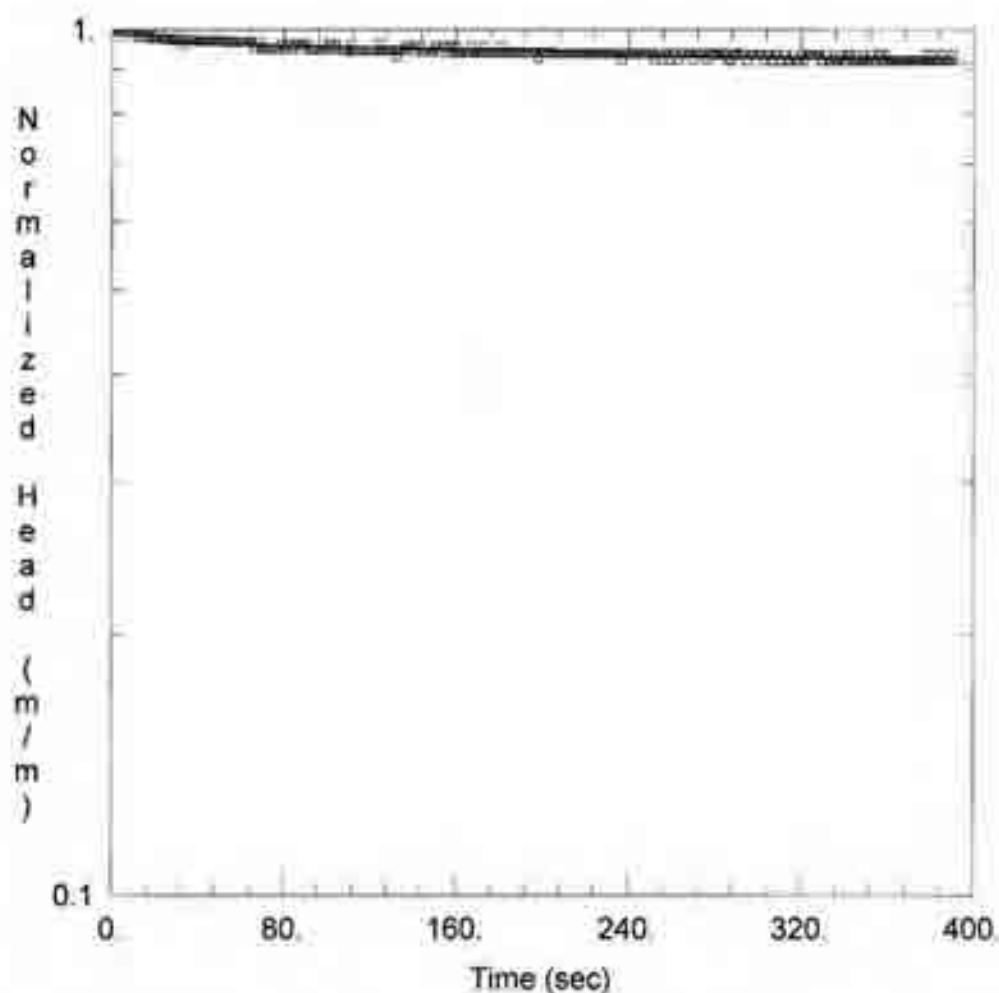
Initial Displacement: 0.407 m
 Total Well Penetration Depth: 17.2 m
 Casing Radius: 0.089 m

Static Water Column Height: 17.2 m
 Screen Length: 17.2 m
 Well Radius: 0.089 m

SOLUTION

Aquifer Model: Confined
 $K = 0.01242$ m/day

Solution Method: Bouwer-Rice
 $y_0 = 0.3963$ m



WELL TEST ANALYSIS

Data Set: C:\... \GM35.aqt

Date: 08/02/07

Time: 10:50:31

PROJECT INFORMATION

Company: Larry Cook & Associates

Client: Gunlake Quarry

Project: 06130

Location: Marulan

Test Well: GM35

Test Date: 21.7.07

AQUIFER DATA

Saturated Thickness: 17.2 m

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (GM35)

Initial Displacement: 0.407 m

Static Water Column Height: 17.2 m

Total Well Penetration Depth: 17.2 m

Screen Length: 17.2 m

Casing Radius: 0.089 m

Well Radius: 0.089 m

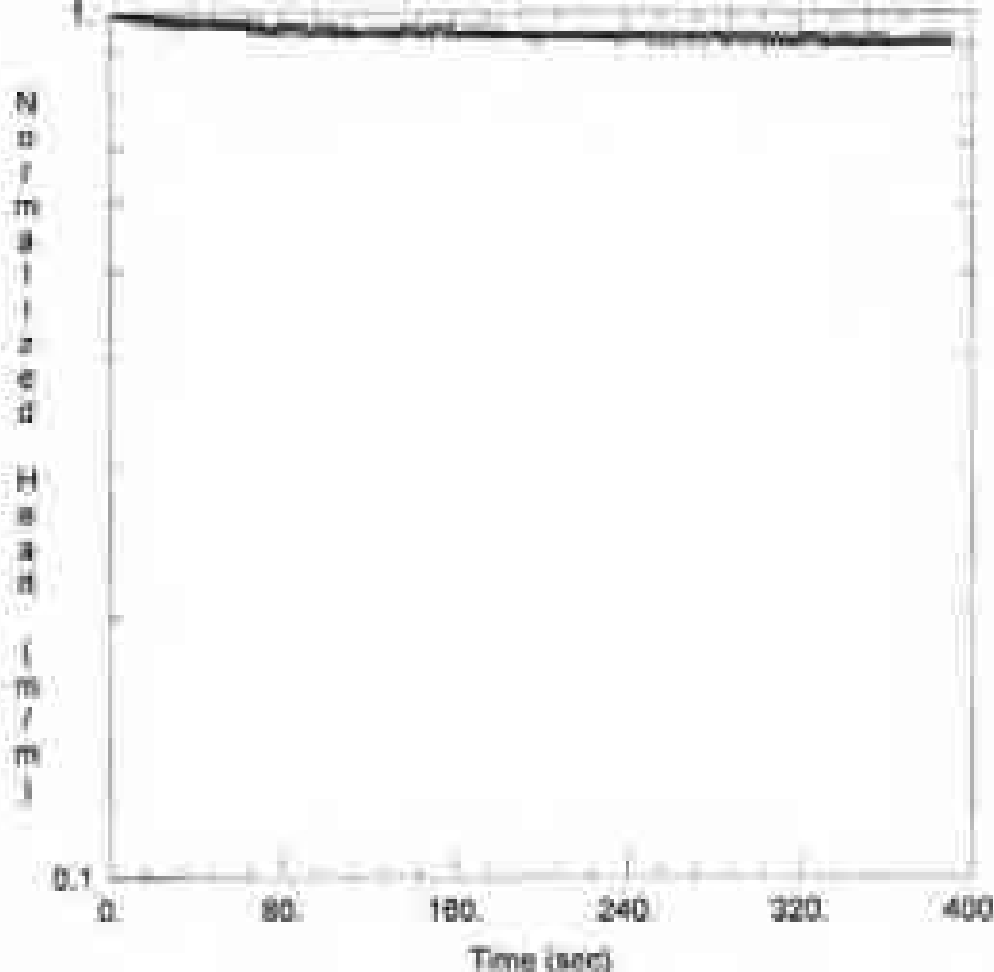
SOLUTION

Aquifer Model: Confined

Solution Method: Hvorslev

$K = 0.01606$ m/day

$y_0 = 0.3963$ m



WELL TEST ANALYSIS

Data Set: C:\GM35.auf
Date: 09/02/07

Time: 10:51:53

PROJECT INFORMATION

Company: Larry Cook & Associates
Client: Gunlake Quarry
Project: 06130
Location: Marulan
Test Well: GM35
Test Date: 21.7.07

AQUIFER DATA

Saturated Thickness: 17.2 m

WELL DATA (GM35)

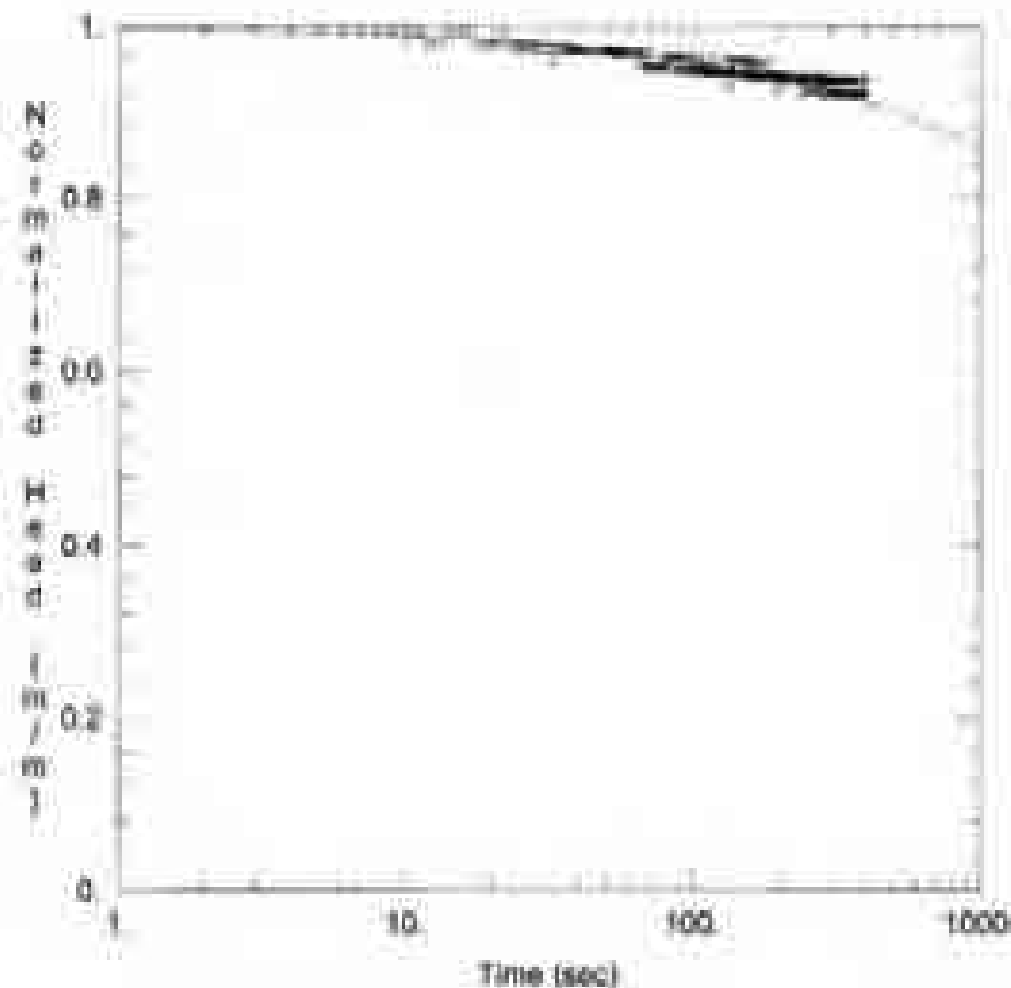
Initial Displacement: 0.407 m
Total Well Penetration Depth: 17.2 m
Casing Radius: 0.069 m

Static Water Column Height: 17.2 m
Screen Length: 17.2 m
Well Radius: 0.069 m

SOLUTION

Aquifer Model: Confined
 $K_1 = 0.001358$ m/day
 $K_2/K_1 = 1$

Solution Method: KG5 Model
 $S_a = 0.005814$ m³



WELL TEST ANALYSIS

Data Set: C:\IGM35.wgt

Date: 08/02/07

Time: 10:51:28

PROJECT INFORMATION

Company: Larry Cook & Associates

Client: Gunlake Quarry

Project: 08130

Location: Marulan

Test Well: GM35

Test Date: 21/7/07

AQUIFER DATA

Saturated Thickness: 17.2 m

WELL DATA (GM35)

Initial Displacement: 0.407 m

Total Well Penetration Depth: 17.2 m

Casing Radius: 0.089 m

Static Water Column Height: 17.2 m

Screen Length: 17.2 m

Well Radius: 0.089 m

SOLUTION

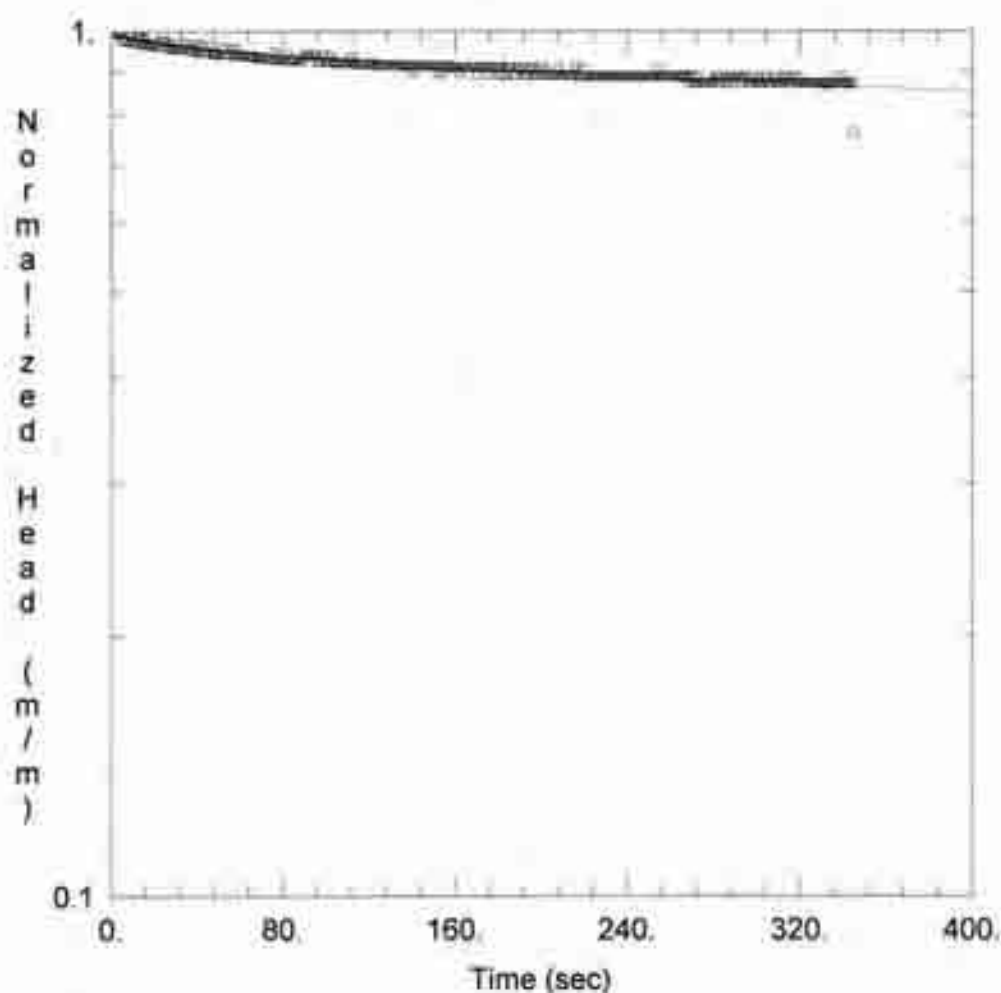
Aquifer Model: Confined

$K_r = 0.001358$ m/day

$K_z/K_r = 1$

Solution Method: RGS Model

$S_s = 0.005814$ m³



WELL TEST ANALYSIS

Data Set: C:\... \GM24.aqt
 Date: 08/02/07

Time: 10:47:51

PROJECT INFORMATION

Company: Larry Cook & Associates
 Client: Gunlake Quarry
 Project: 06130
 Location: Marulan
 Test Well: GM24
 Test Date: 21.7.07

AQUIFER DATA

Saturated Thickness: 13.58 m

Anisotropy Ratio (Kz/Kr): 1

WELL DATA (GM24)

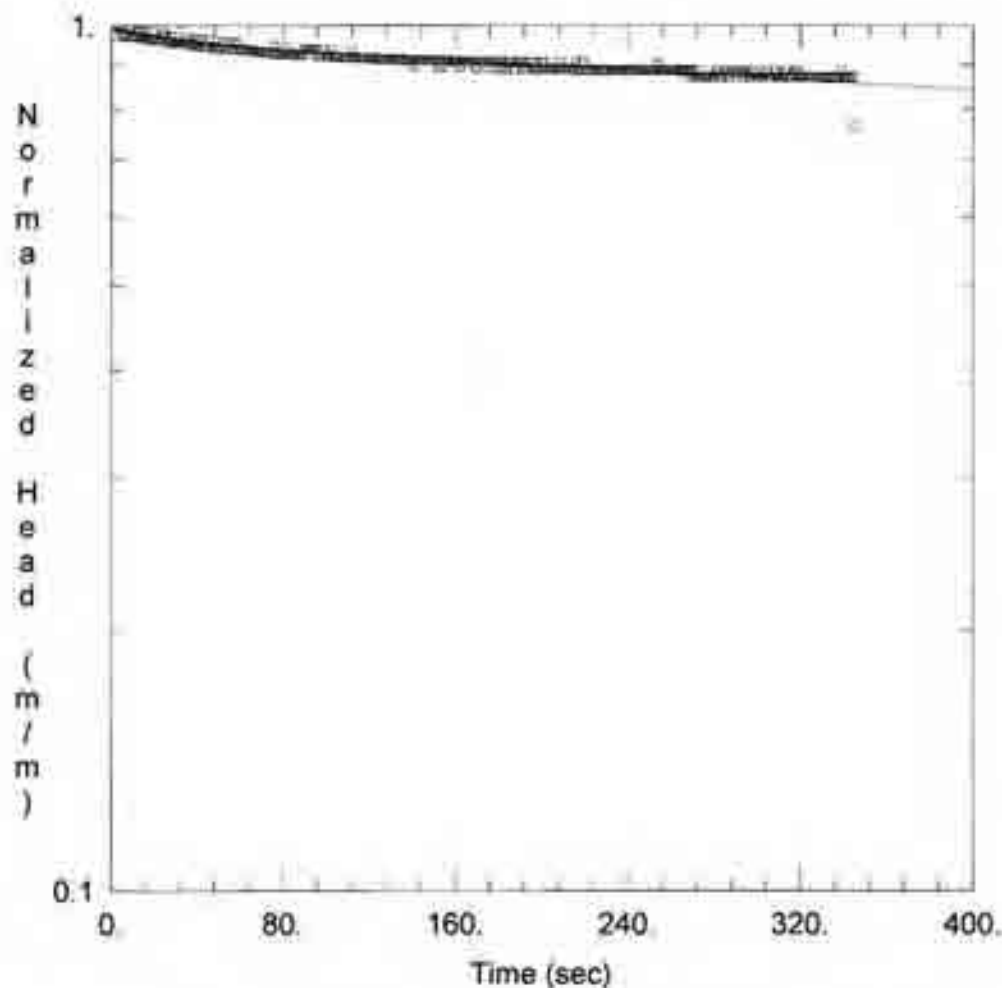
Initial Displacement: 0.373 m
 Total Well Penetration Depth: 13.58 m
 Casing Radius: 0.089 m

Static Water Column Height: 13.58 m
 Screen Length: 13.58 m
 Well Radius: 0.089 m

SOLUTION

Aquifer Model: Confined
 $T = 0.06048 \text{ m}^2/\text{day}$

Solution Method: Cooper-Bredehoeft-Papadopoulos
 $S = 0.1$



WELL TEST ANALYSIS

Data Set: C:\... \GM24.aqt
Date: 08/02/07

Time: 10:46:15

PROJECT INFORMATION

Company: Larry Cook & Associates
Client: Gunlake Quarry
Project: 06130
Location: Marulan
Test Well: GM24
Test Date: 21.7.07

AQUIFER DATA

Saturated Thickness: 13.58 m

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (GM24)

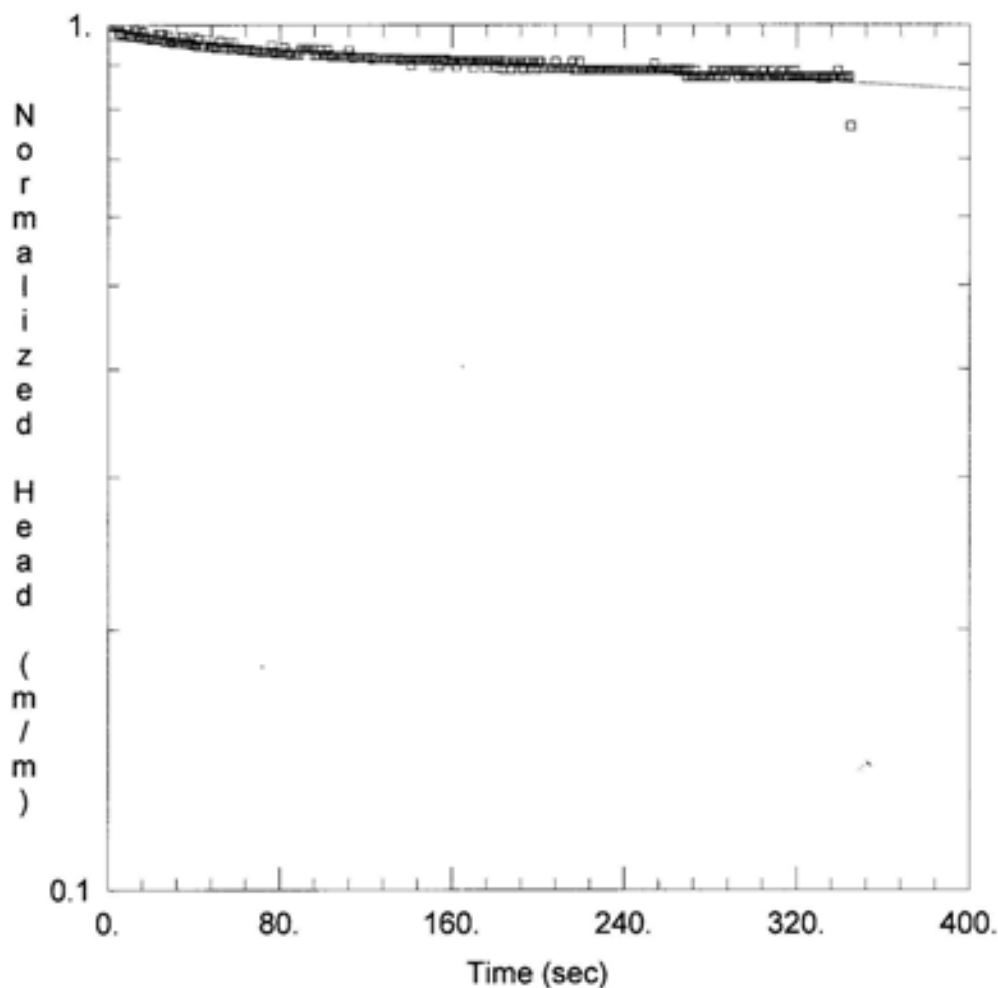
Initial Displacement: 0.373 m
Total Well Penetration Depth: 13.58 m
Casing Radius: 0.089 m

Static Water Column Height: 13.58 m
Screen Length: 13.58 m
Well Radius: 0.089 m

SOLUTION

Aquifer Model: Confined
 $K = 0.03275$ m/day

Solution Method: Bouwer-Rice
 $y_0 = 0.3591$ m



WELL TEST ANALYSIS

Data Set: C:\...\GM24.aqt

Date: 08/02/07

Time: 10:45:39

PROJECT INFORMATION

Company: Larry Cook & Associates

Client: Gunlake Quarry

Project: 06130

Location: Marulan

Test Well: GM24

Test Date: 21.7.07

AQUIFER DATA

Saturated Thickness: 13.58 m

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (GM24)

Initial Displacement: 0.373 m

Static Water Column Height: 13.58 m

Total Well Penetration Depth: 13.58 m

Screen Length: 13.58 m

Casing Radius: 0.089 m

Well Radius: 0.089 m

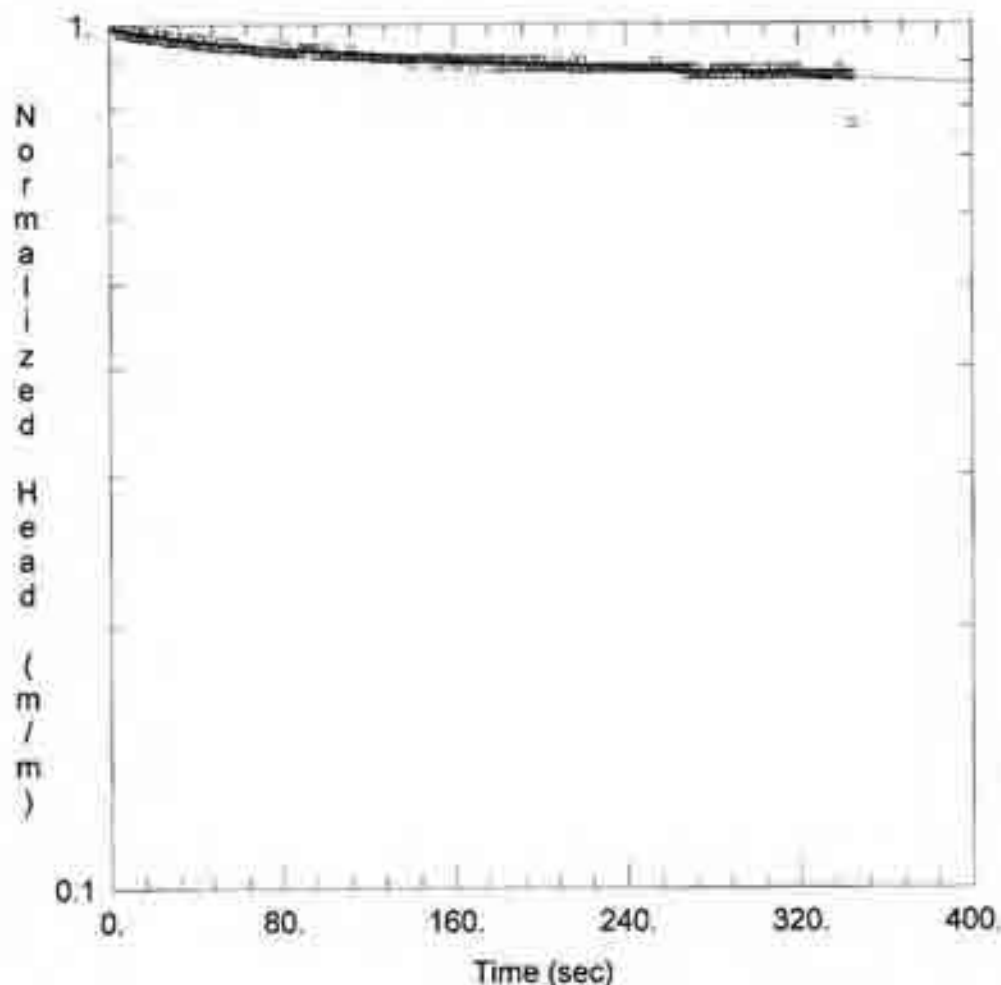
SOLUTION

Aquifer Model: Confined

Solution Method: Hvorslev

$K = 0.04458$ m/day

$y_0 = 0.3591$ m



WELL TEST ANALYSIS

Data Set: C:\...GM24.aqt
Date: 08/02/07

Time: 10:47:22

PROJECT INFORMATION

Company: Larry Cook & Associates
Client: Gunlake Quarry
Project: 06130
Location: Marulan
Test Well: GM24
Test Date: 21.7.07

AQUIFER DATA

Saturated Thickness: 13.58 m

WELL DATA (GM24)

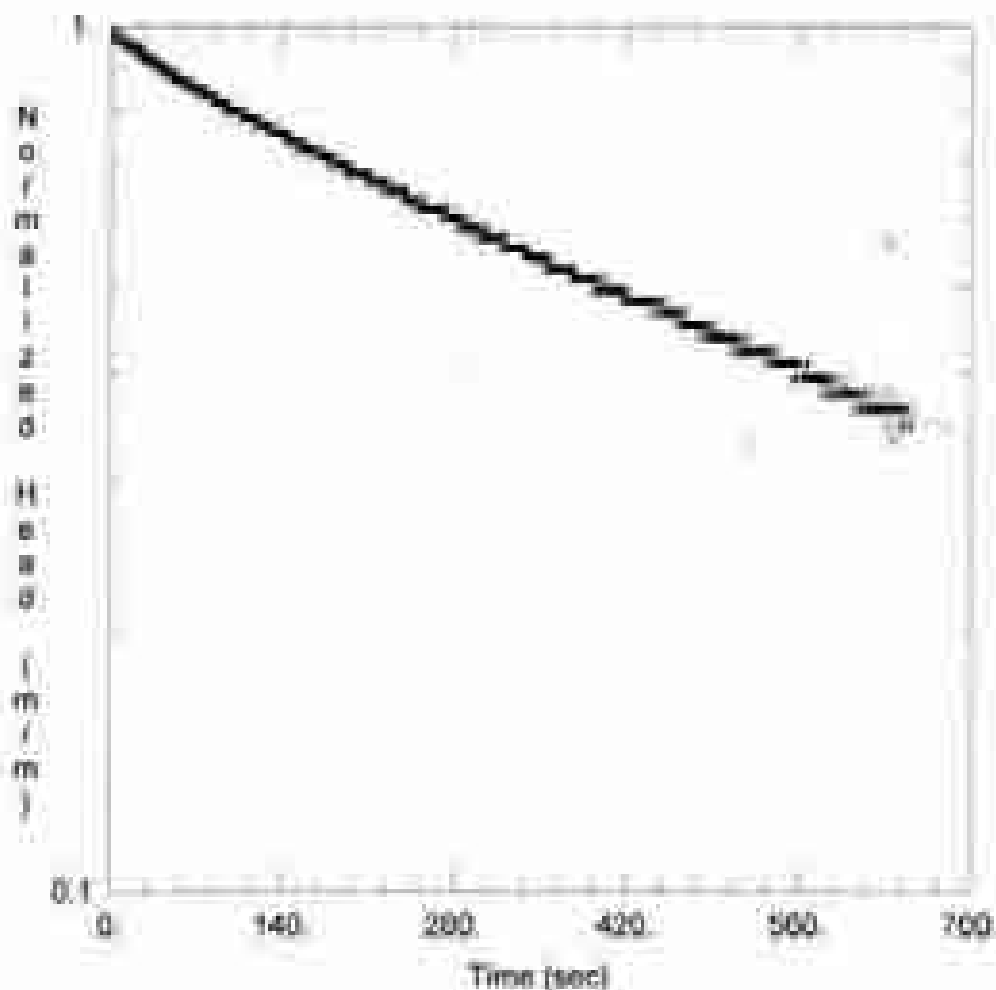
Initial Displacement: 0.373 m
Total Well Penetration Depth: 13.58 m
Casing Radius: 0.089 m

Static Water Column Height: 13.58 m
Screen Length: 13.58 m
Well Radius: 0.089 m

SOLUTION

Aquifer Model: Confined
 $K_r = 0.004443$ m/day
 $K_z/K_r = 1$

Solution Method: KGS Model
 $S_s = 0.007364$ m⁻¹



WELL TEST ANALYSIS

Data Set: C:_YGM22.aqt
Date: 06/02/07

Time: 10:41:01

PROJECT INFORMATION

Company: Larry Cook & Associates
Client: Gunlake Quarry
Project: 06130
Location: Marulan
Test Well: GM22
Test Date: 21.7.07

AQUIFER DATA

Saturated Thickness: 3.68 m

Anisotropy Ratio (K_x/K_y): 1

WELL DATA (GM22)

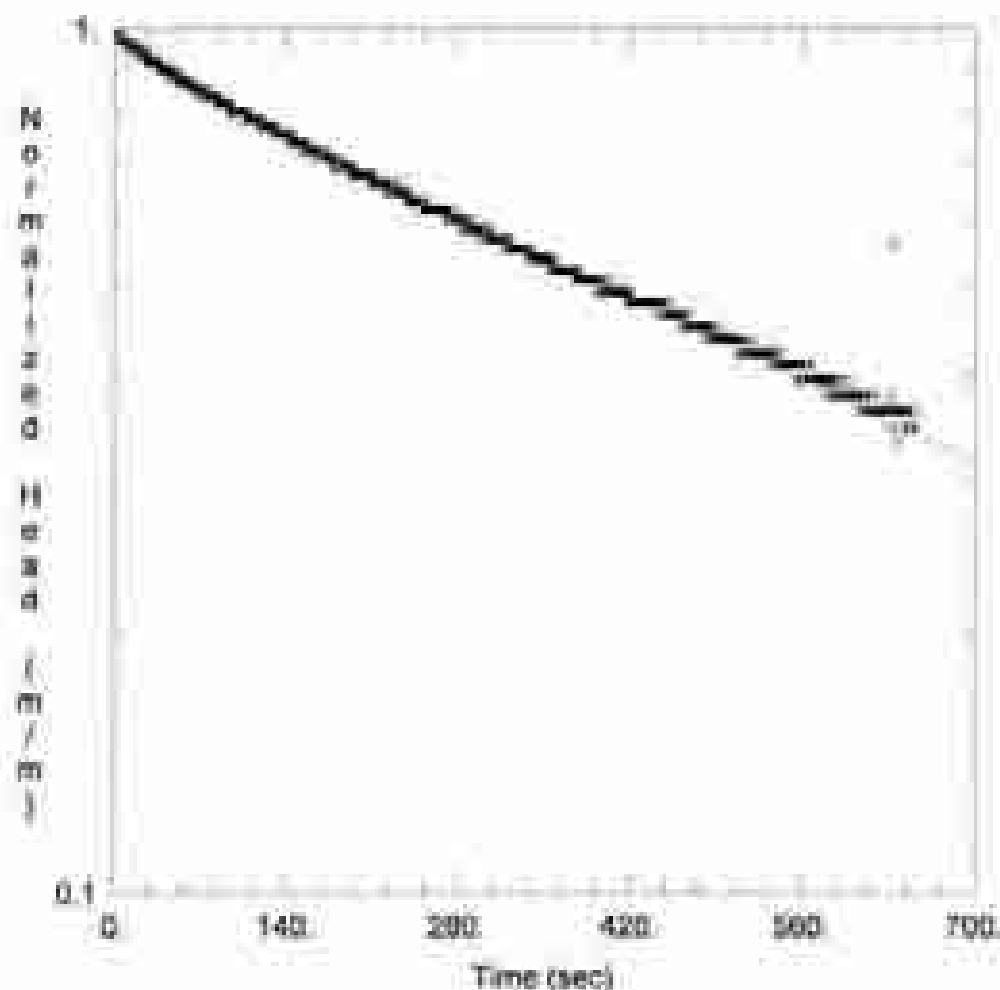
Initial Displacement: 0.395 m
Total Well Penetration Depth: 3.68 m
Casing Radius: 0.089 m

Static Water Column Height: 3.68 m
Screen Length: 3.68 m
Well Radius: 0.089 m

SOLUTION

Aquifer Model: Confined
 $T = 2.345 \text{ m}^2/\text{day}$

Solution Method: Cooper-Brederhoff-Papadopoulos
 $S = 0.0007034$



WELL TEST ANALYSIS

Data Set: C:_GM22.aqt
Date: 09/02/07

Time: 10:40:30

PROJECT INFORMATION

Company: Larry Cook & Associates
Client: Gunlake Quarry
Project: 06130
Location: Marjari
Test Well: GM22
Test Date: 21.7.07

AQUIFER DATA

Saturated Thickness: 3.68 m

Anisotropy Ratio (K_x/K_y): 1

WELL DATA (GM22)

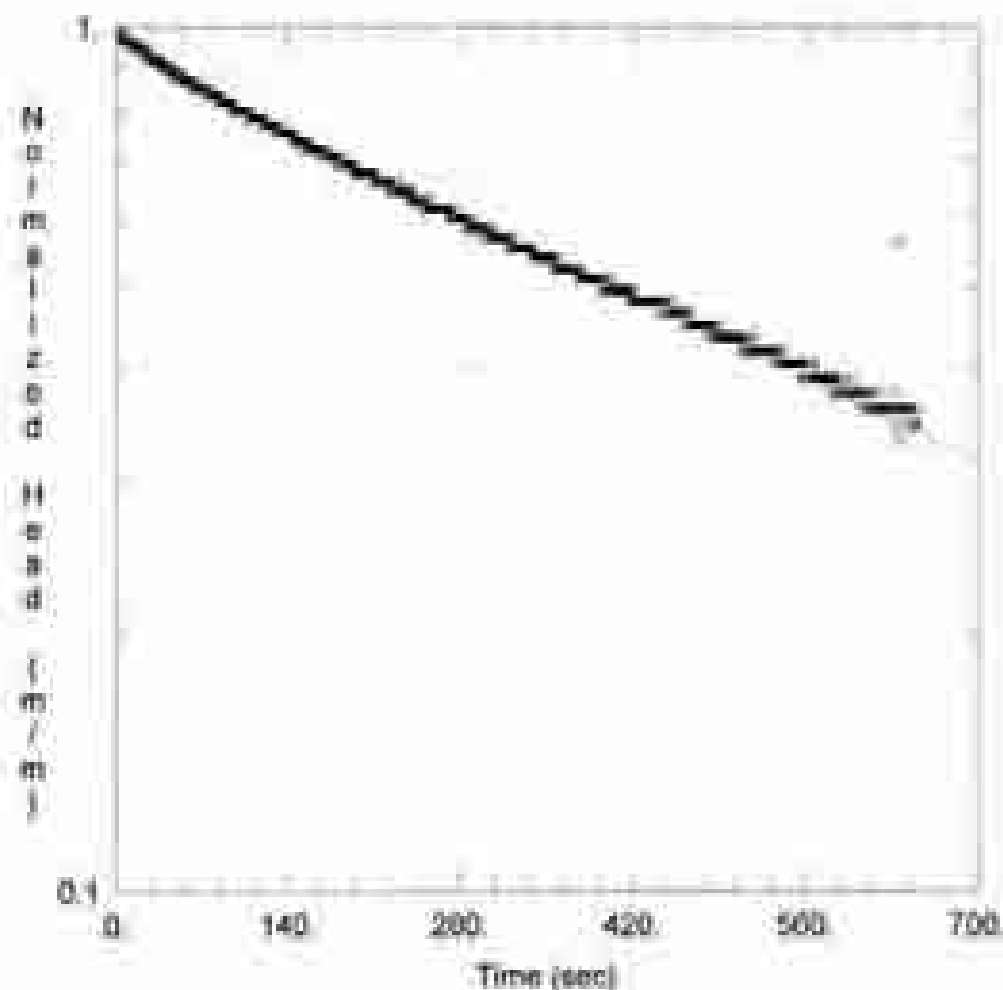
Initial Displacement: 0.385 m
Total Well Penetration Depth: 3.68 m
Casing Radius: 0.089 m

Static Water Column Height: 3.68 m
Screen Length: 3.68 m
Well Radius: 0.089 m

SOLUTION

Aquifer Model: Confined
 $K = 0.415$ m/day

Solution Method: Bouwer-Rice
 $y_0 = 0.3732$ m



WELL TEST ANALYSIS

Data Set: C:\GM22.sqt
Date: 08/02/07

Time: 10:40:02

PROJECT INFORMATION

Company: Larry Cook & Associates
Client: Gunlake Quarry
Project: 08130
Location: Marutan
Test Well: GM22
Test Date: 21.7.07

AQUIFER DATA

Saturated Thickness: 3.68 m

Anisotropy Ratio (K_z/K_r): 1

WELL DATA (GM22)

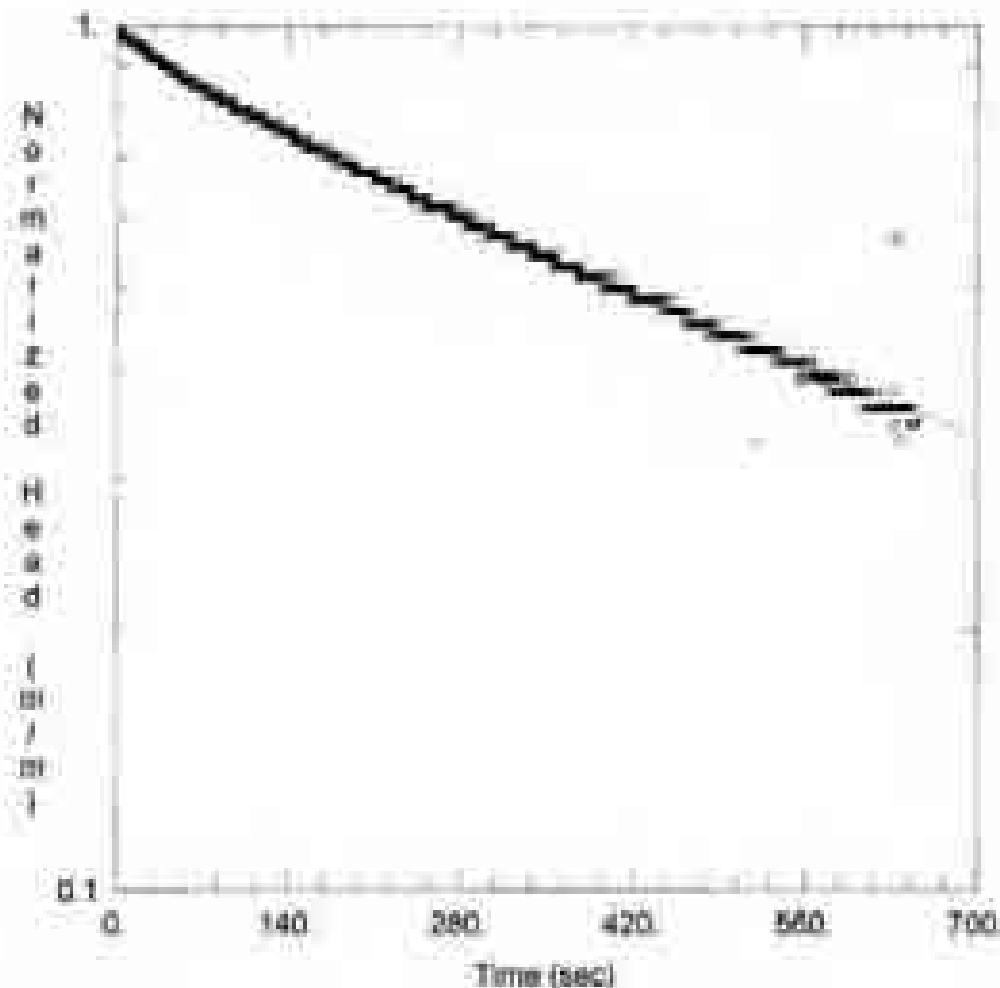
Initial Displacement: 0.385 m
Total Well Penetration Depth: 3.68 m
Casing Radius: 0.089 m

Static Water Column Height: 3.68 m
Screen Length: 3.68 m
Well Radius: 0.089 m

SOLUTION

Aquifer Model: Confined
 $K = 0.7743$ m/day

Solution Method: Hvorslev
 $y_0 = 0.3732$ m



WELL TEST ANALYSIS

Data Set: C:\VGM22.aqf

Date: 08/02/07

Time: 10:41:41

PROJECT INFORMATION

Company: Larry Cook & Associates

Client: Gunlake Quarry

Project: 06130

Location: Marulan

Test Well: GM22

Test Date: 21/7/07

AQUIFER DATA

Saturated Thickness: 3.88 m

WELL DATA (GM22)

Initial Displacement: 0.395 m

Total Well Penetration Depth: 3.88 m

Casing Radius: 0.089 m

Static Water Column Height: 3.68 m

Screen Length: 3.88 m

Well Radius: 0.089 m

SOLUTION

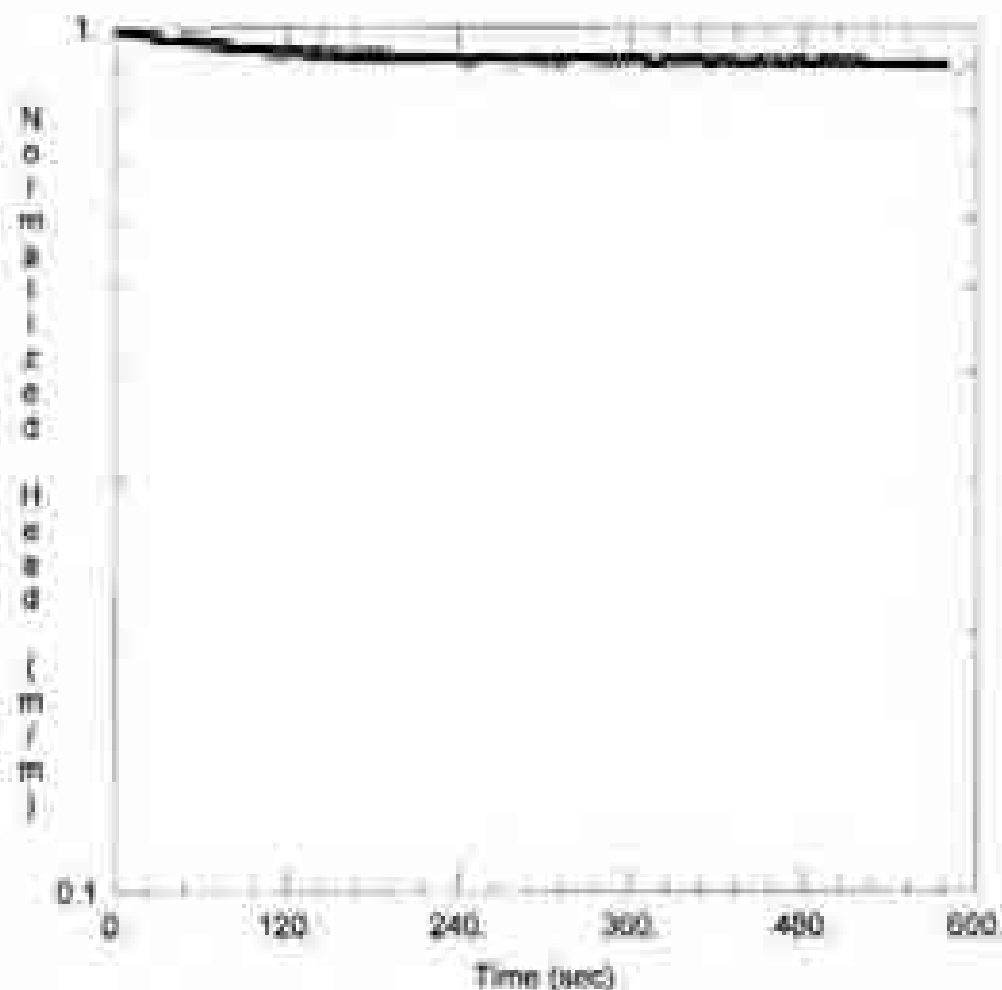
Aquifer Model: Confined

Kr = 0.6372 m/day

K290 = 1

Solution Method: HGS Model

Sa = 0.0001011 m³



WELL TEST ANALYSIS

Data Set: C:_GM13.aqt
Date: 08/02/07

Time: 10:29:57

PROJECT INFORMATION

Company: Larry Cook & Associates
Client: Gunlake Quarry
Project: 06130
Location: Mondak
Test Well: GM13
Test Date: 21.7.07

AQUIFER DATA

Saturated Thickness: 3.87 m

Anisotropy Ratio (K_z/K_r): 1

WELL DATA (GM13)

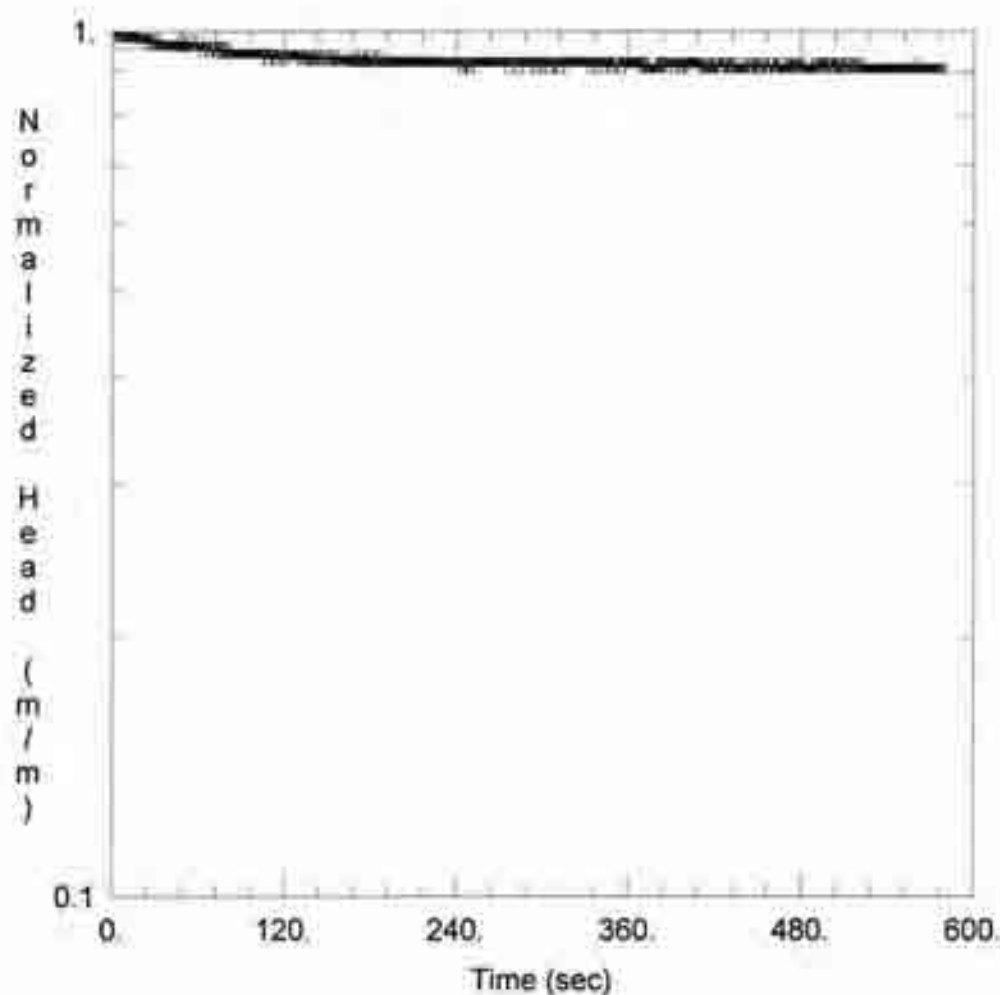
Initial Displacement: 0.381 m
Total Well Penetration Depth: 3.87 m
Casing Radius: 0.089 m

Static Water Column Height: 3.87 m
Screen Length: 3.87 m
Well Radius: 0.089 m

SOLUTION

Aquifer Model: Confined
 $T = 0.02347 \text{ m}^2/\text{day}$

Solution Method: Cooper-Brederhoff-Papadopoulos
 $S = 0.1$



WELL TEST ANALYSIS

Data Set: C:\...GM13.aqt
Date: 08/02/07

Time: 10:29:08

PROJECT INFORMATION

Company: Larry Cook & Associates
Client: Gunlake Quarry
Project: 06130
Location: Marulan
Test Well: GM13
Test Date: 21.7.07

AQUIFER DATA

Saturated Thickness: 3.87 m

Anisotropy Ratio (K_z/K_r): 1

WELL DATA (GM13)

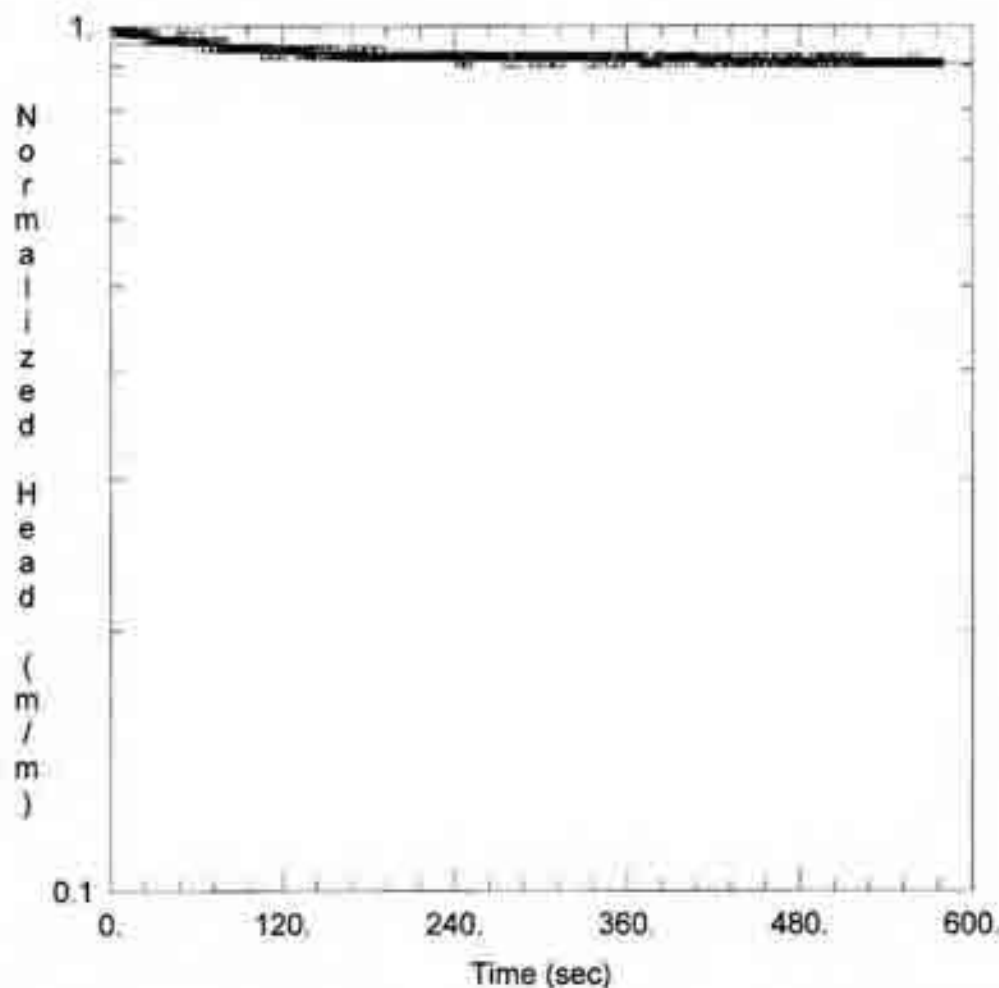
Initial Displacement: 0.381 m
Total Well Penetration Depth: 3.87 m
Casing Radius: 0.089 m

Static Water Column Height: 3.87 m
Screen Length: 3.87 m
Well Radius: 0.089 m

SOLUTION

Aquifer Model: Confined
 $K = 0.02874$ m/day

Solution Method: Bouwer-Rice
 $y_0 = 0.3643$ m



WELL TEST ANALYSIS

Data Set: C:\... \GM13.aqt
Date: 06/02/07

Time: 10:28:29

PROJECT INFORMATION

Company: Larry Cook & Associates
Client: Gunlake Quarry
Project: 06130
Location: Marulan
Test Well: GM13
Test Date: 21.7.07

AQUIFER DATA

Saturated Thickness: 3.87 m

Anisotropy Ratio (K_z/K_r): 1

WELL DATA (GM13)

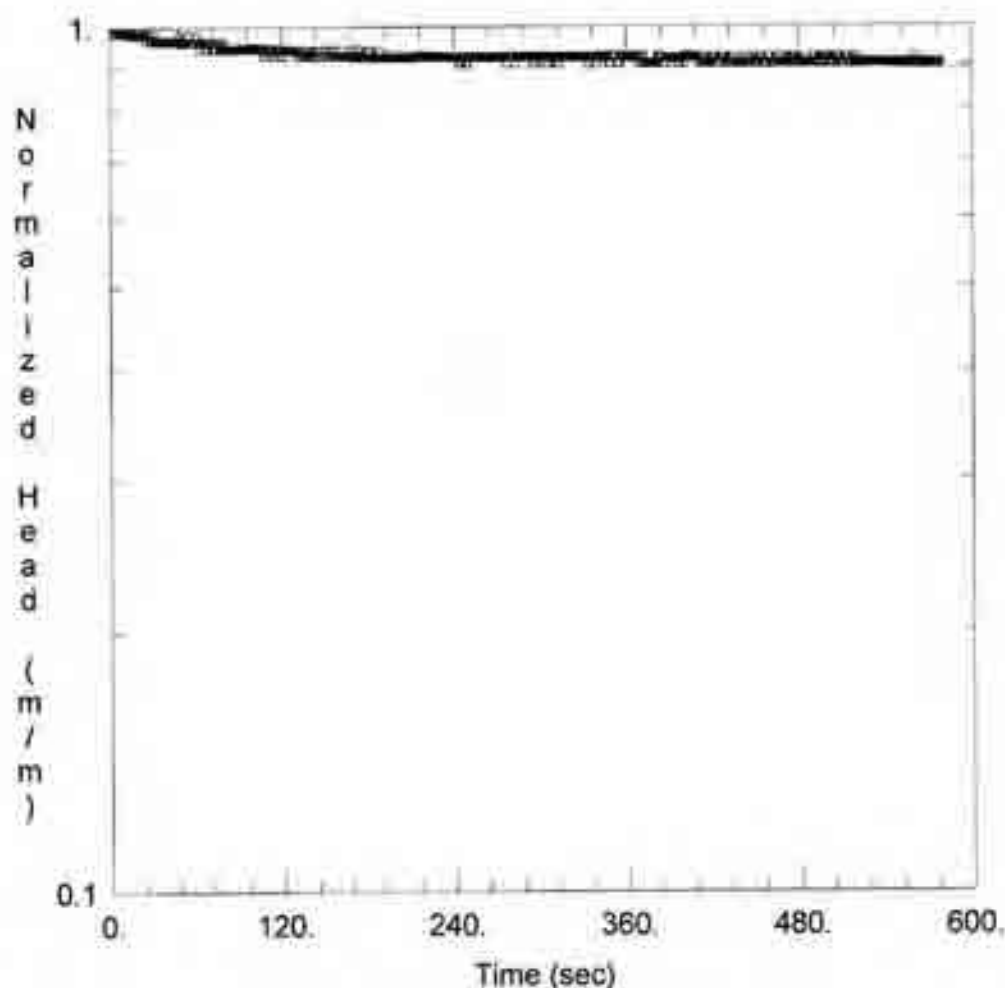
Initial Displacement: 0.381 m
Total Well Penetration Depth: 3.87 m
Casing Radius: 0.089 m

Static Water Column Height: 3.87 m
Screen Length: 3.87 m
Well Radius: 0.089 m

SOLUTION

Aquifer Model: Confined
 $K = 0.04372$ m/day

Solution Method: Hvorslev
 $y_0 = 0.364$ m



WELL TEST ANALYSIS

Data Set: C:\GM13.aqt
Date: 08/02/07

Time: 10:30:23

PROJECT INFORMATION

Company: Larry Cook & Associates
Client: Gunlake Quarry
Project: 06130
Location: Marulan
Test Well: GM13
Test Date: 21.7.07

AQUIFER DATA

Saturated Thickness: 3.87 m

WELL DATA (GM13)

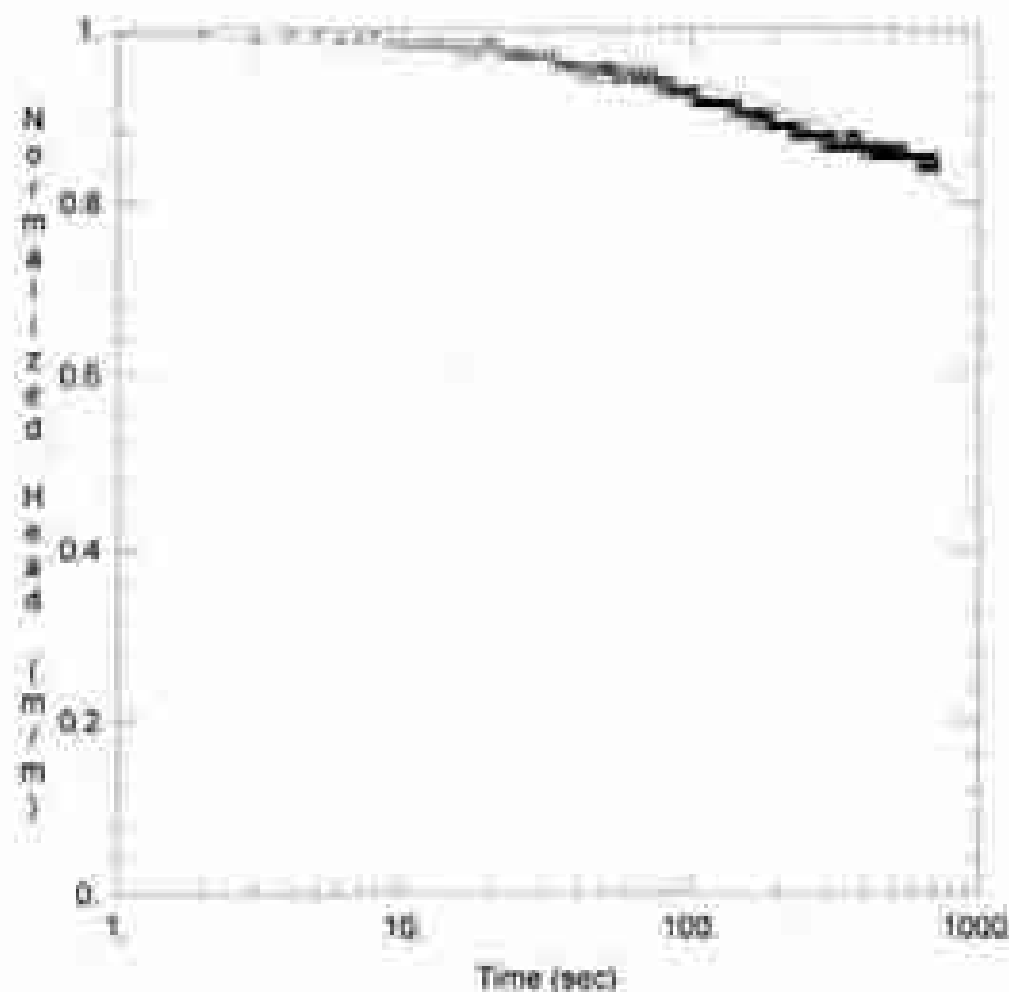
Initial Displacement: 0.381 m
Total Well Penetration Depth: 3.87 m
Casing Radius: 0.089 m

Static Water Column Height: 3.87 m
Screen Length: 3.87 m
Well Radius: 0.089 m

SOLUTION

Aquifer Model: Confined
 $K_r = 0.006065$ m/day
 $K_z/K_r = 1$

Solution Method: KGS Model
 $S_s = 0.02584$ m⁻¹



WELL TEST ANALYSIS

Data Set: C:\GM11.log
Date: 08/02/07

Time: 10:19:55

PROJECT INFORMATION

Company: Larry Cook & Associates
Client: Guntake Quarry
Project: 08130
Location: Marulan
Test Well: GM11
Test Date: 21.7.07

AQUIFER DATA

Saturated Thickness: 11.13 m

Anisotropy Ratio (K_z/K_y): 1

WELL DATA (GM11)

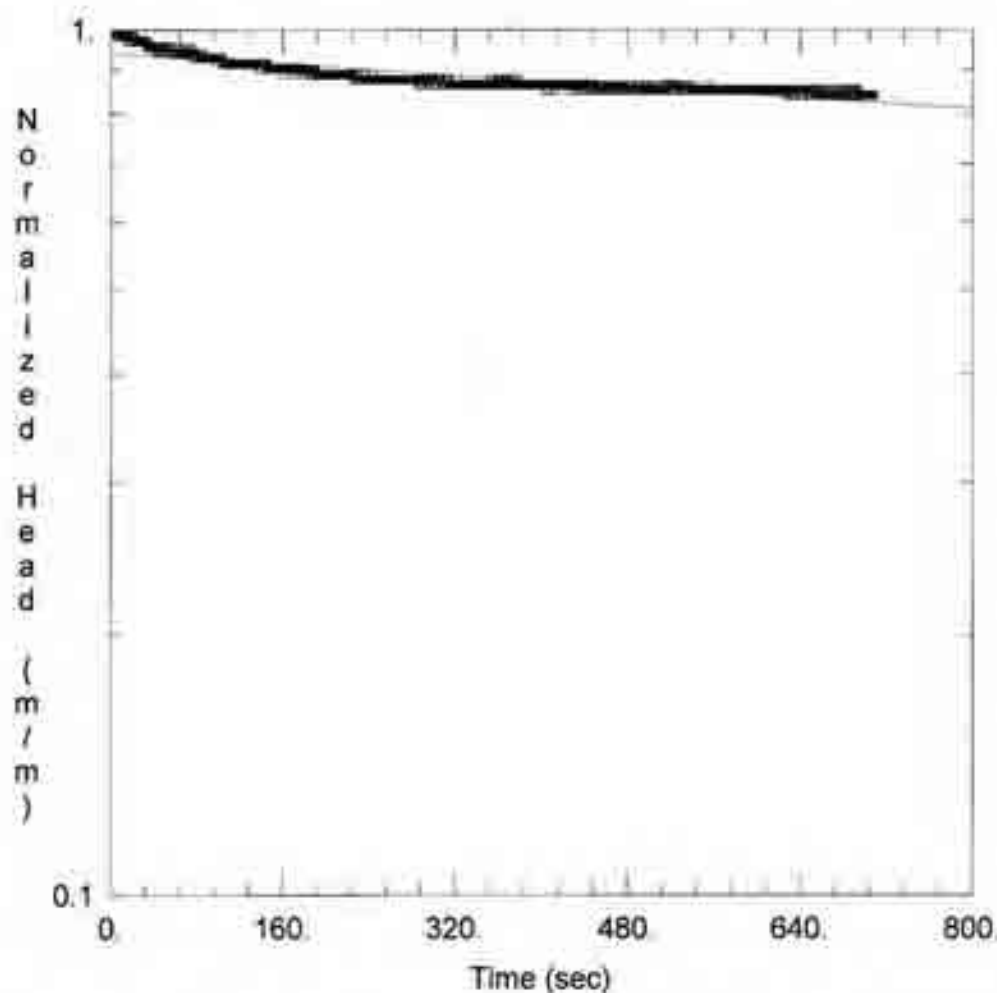
Initial Displacement: 0.5 m
Total Well Penetration Depth: 11.13 m
Casing Radius: 0.089 m

Static Water Column Height: 11.13 m
Screen Length: 11.13 m
Well Radius: 0.089 m

SOLUTION

Aquifer Model: Confined
 $T = 0.04928 \text{ m}^2/\text{day}$

Solution Method: Cooper-Bredehoeft-Papadopoulos
 $S = 0.1$



WELL TEST ANALYSIS

Data Set: C:\...GM11.aqt
 Date: 08/02/07

Time: 10:21:25

PROJECT INFORMATION

Company: Larry Cook & Associates
 Client: Gunlake Quarry
 Project: 06130
 Location: Marulan
 Test Well: GM11
 Test Date: 21.7.07

AQUIFER DATA

Saturated Thickness: 11.13 m

Anisotropy Ratio (K_z/K_r): 1

WELL DATA (GM11)

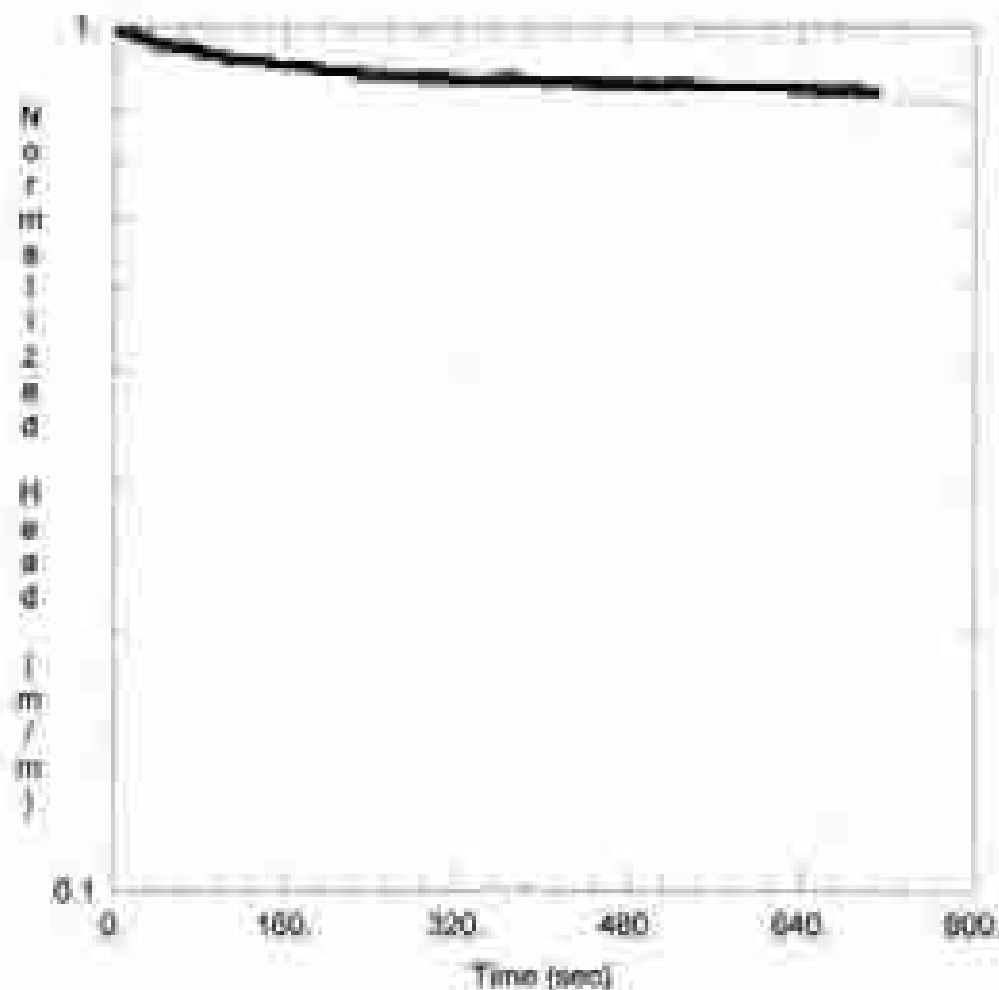
Initial Displacement: 0.5 m
 Total Well Penetration Depth: 11.13 m
 Casing Radius: 0.089 m

Static Water Column Height: 11.13 m
 Screen Length: 11.13 m
 Well Radius: 0.089 m

SOLUTION

Aquifer Model: Confined
 $K = 0.02097$ m/day

Solution Method: Bouwer-Rice
 $y_0 = 0.4694$ m



WELL TEST ANALYSIS

Data Set: C:\VGM11.agt
Date: 08/02/07

Time: 10:23:02

PROJECT INFORMATION

Company: Larry Cook & Associates
Client: Guntake Quarry
Project: 06130
Location: Marulan
Test Well: GM11
Test Date: 21.7.07

AQUIFER DATA

Saturated Thickness: 11.13 m

Anisotropy Ratio (K_z/K_r): 1

WELL DATA (GM11)

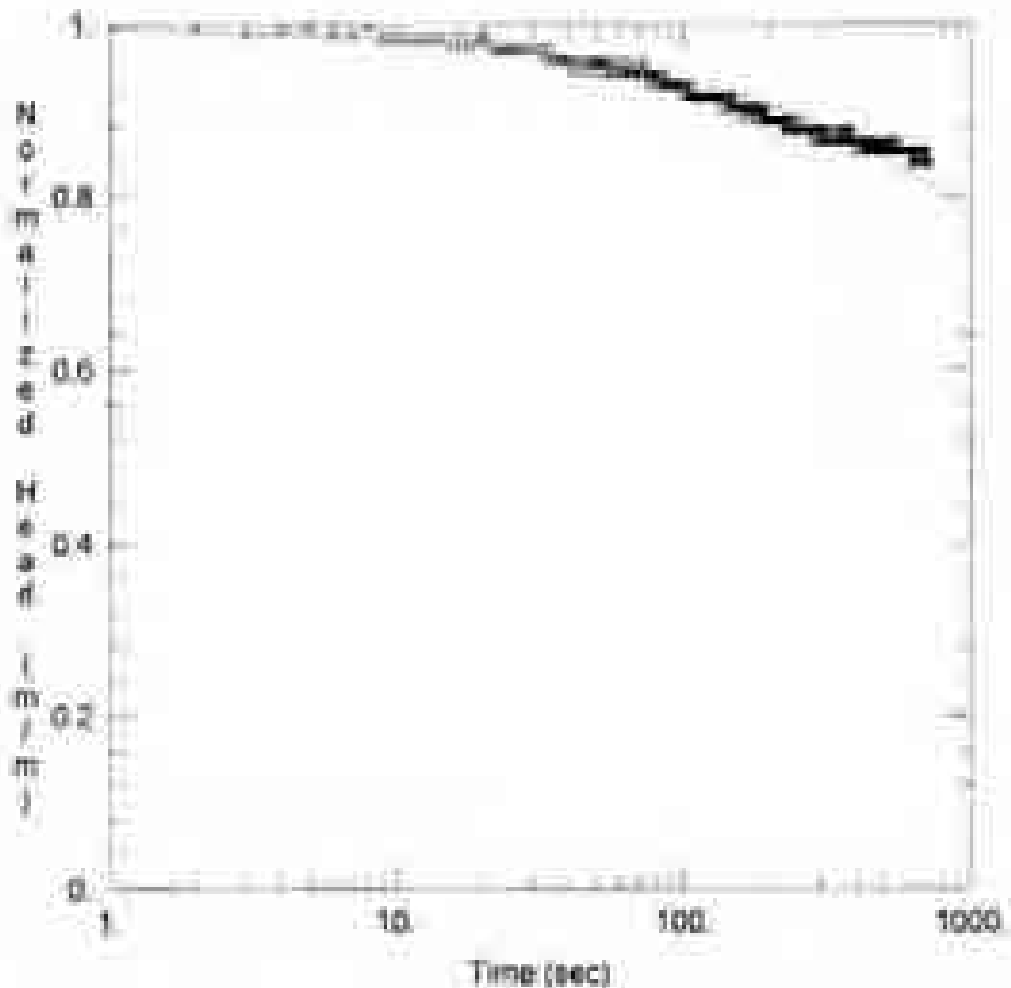
Initial Displacement: 0.5 m
Total Well Penetration Depth: 11.13 m
Casing Radius: 0.089 m

Static Water Column Height: 11.13 m
Screen Length: 11.13 m
Well Radius: 0.089 m

SOLUTION

Aquifer Model: Confined
 $K = 0.02983$ m/day

Solution Method: Hantushy
 $y_0 = 0.4694$ m



WELL TEST ANALYSIS

Data Set: C:\GM11.aqt
Date: 08/02/07

Time: 10:28:50

PROJECT INFORMATION

Company: Larry Cook & Associates
Client: Guntlake Quarry
Project: 08130
Location: Marulan
Test Well: GM11
Test Date: 21.7.07

AQUIFER DATA

Saturated Thickness: 11.13 m

WELL DATA (GM11)

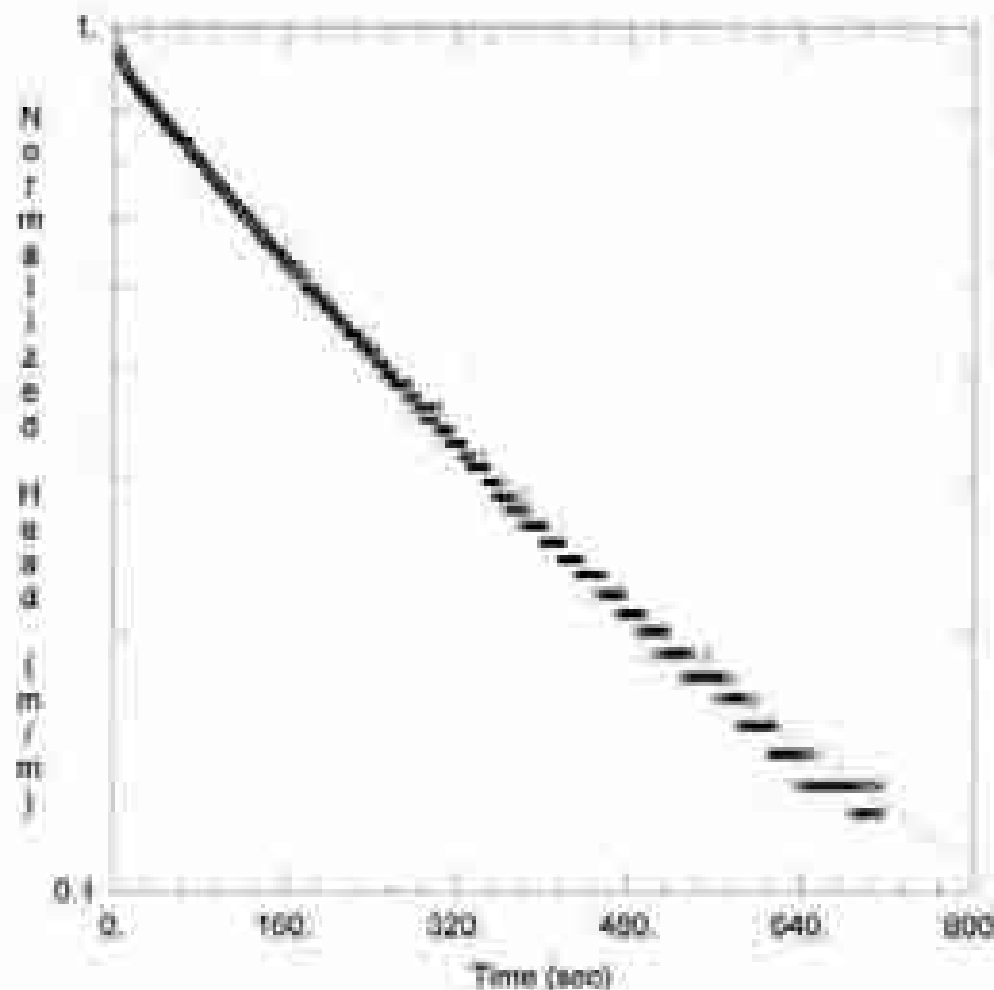
Initial Displacement: 0.5 m
Total Well Penetration Depth: 11.13 m
Casing Radius: 0.089 m

Static Water Column Height: 11.13 m
Screen Length: 11.13 m
Well Radius: 0.089 m

SOLUTION

Aquifer Model: Confined
 $Kr = 0.004775$ m/day
 $Ks/Kr = 1$

Solution Method: KGS Model
 $Ss = 0.008995$ m⁻¹



WELL TEST ANALYSIS

Data Set: C:_GMS.aqt
Date: 08/02/07

Time: 08:59:11

PROJECT INFORMATION

Company: Larry Cook & Associates
Client: Guntake Quarry
Project: 06130
Location: Mandan
Test Well: GMS
Test Date: 21.7.07

AQUIFER DATA

Saturated Thickness: 6.52 m

Anisotropy Ratio (K_z/K_r): 1

WELL DATA (GMS)

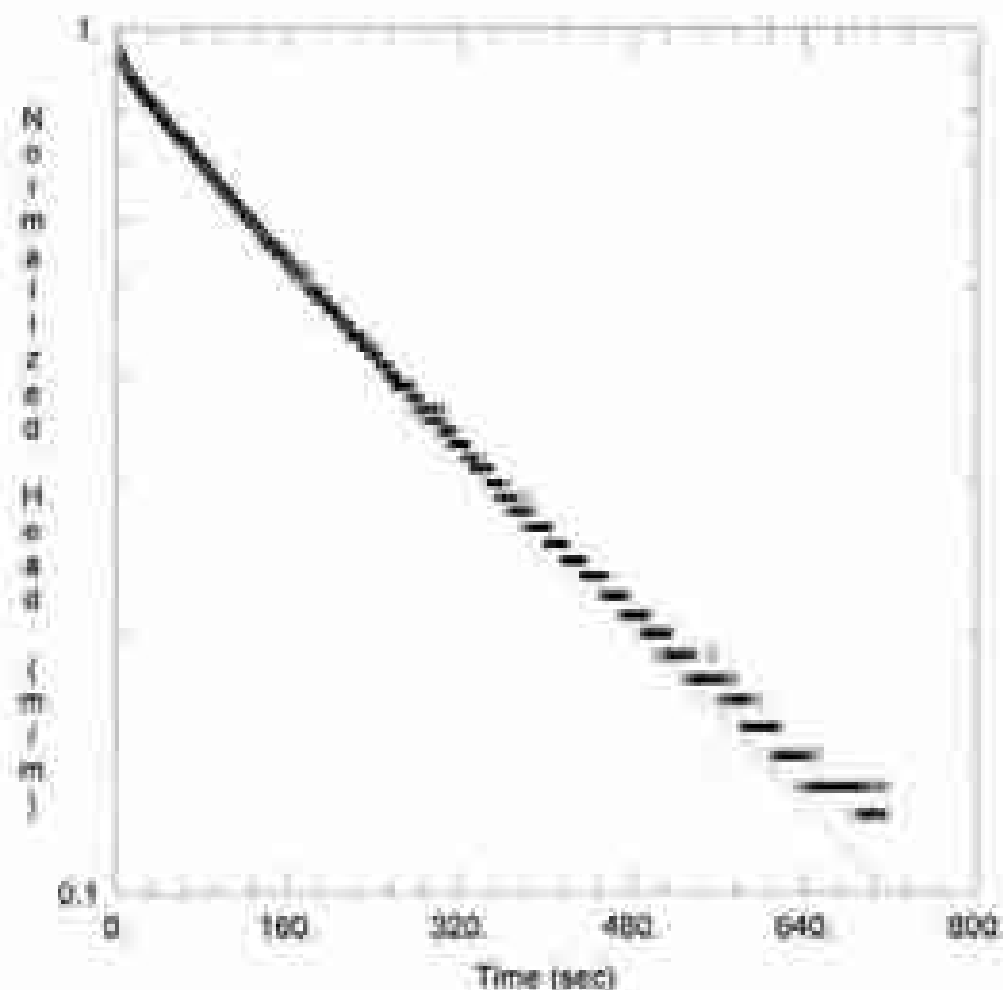
Initial Displacement: 0.52 m
Total Well Penetration Depth: 6.52 m
Casing Radius: 0.089 m

Static Water Column Height: 6.52 m
Screen Length: 6.52 m
Well Radius: 0.089 m

SOLUTION

Aquifer Model: Confined
 $T = 5.375 \text{ m}^2/\text{day}$

Solution Method: Cooper-Breidehoeft-Papadopoulos
 $S = 0.0006489$



WELL TEST ANALYSIS

Data Set: C:_GM5.aqt
Date: 08/02/07

Time: 08:55:27

PROJECT INFORMATION

Company: Larry Cook & Associates
Client: Gunlake Quarry
Project: 08130
Location: Marulan
Test Well: GM5
Test Date: 21.7.07

AQUIFER DATA

Saturated Thickness: 6.52 m

Anisotropy Ratio (K_z/K_r): 1

WELL DATA (GM5)

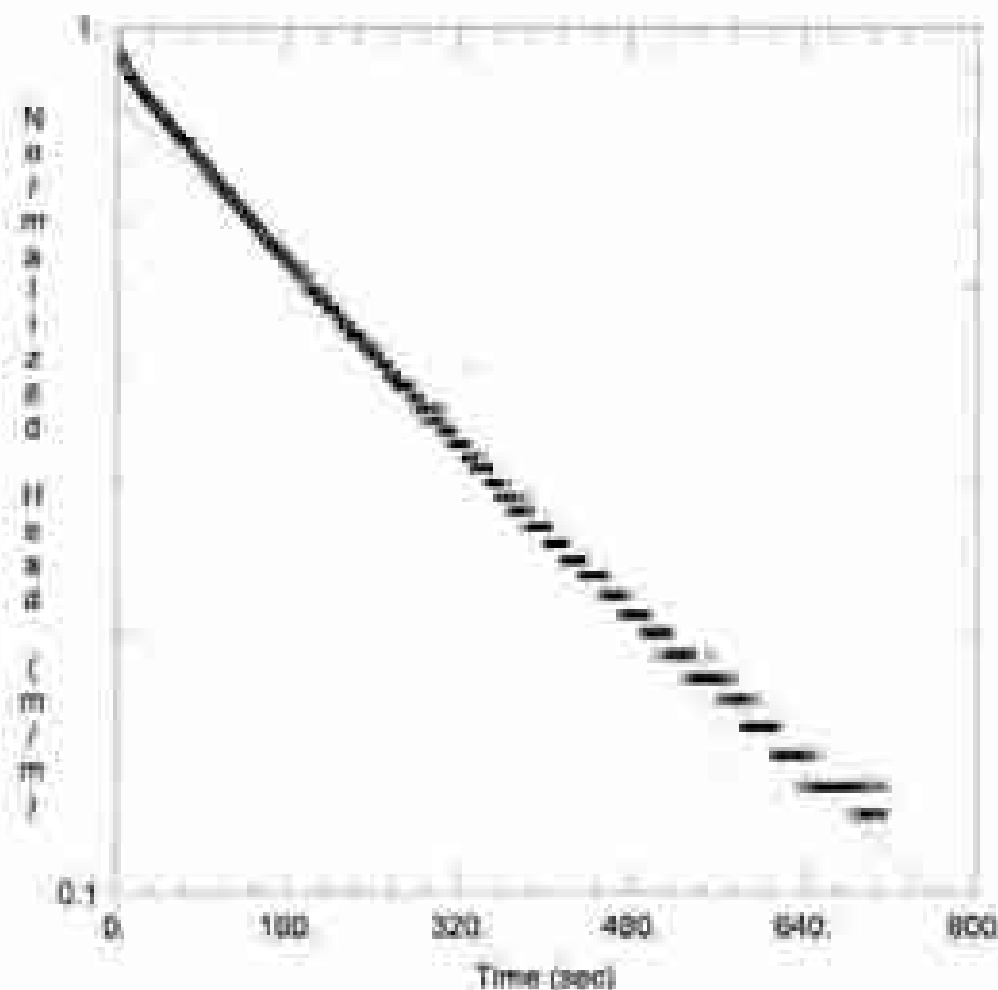
Initial Displacement: 0.52 m
Total Well Penetration Depth: 6.52 m
Casing Radius: 0.089 m

Static Water Column Height: 6.52 m
Screen Length: 6.52 m
Well Radius: 0.089 m

SOLUTION

Aquifer Model: Confined
 $K = 0.5275 \text{ m/day}$

Solution Method: Bouwer-Rice
 $y_0 = 0.4641 \text{ m}$



WELL TEST ANALYSIS

Data Set: C:_GM5.aqt
Date: 08/03/07

Time: 08:49:30

PROJECT INFORMATION

Company: Larry Cook & Associates
Client: Gunlake Quarry
Project: 08130
Location: Marulan
Test Well: GM5
Test Date: 21.7.07

AQUIFER DATA

Saturated Thickness: 6.52 m

Anisotropy Ratio (K_z/K_r): 1

WELL DATA (GM5)

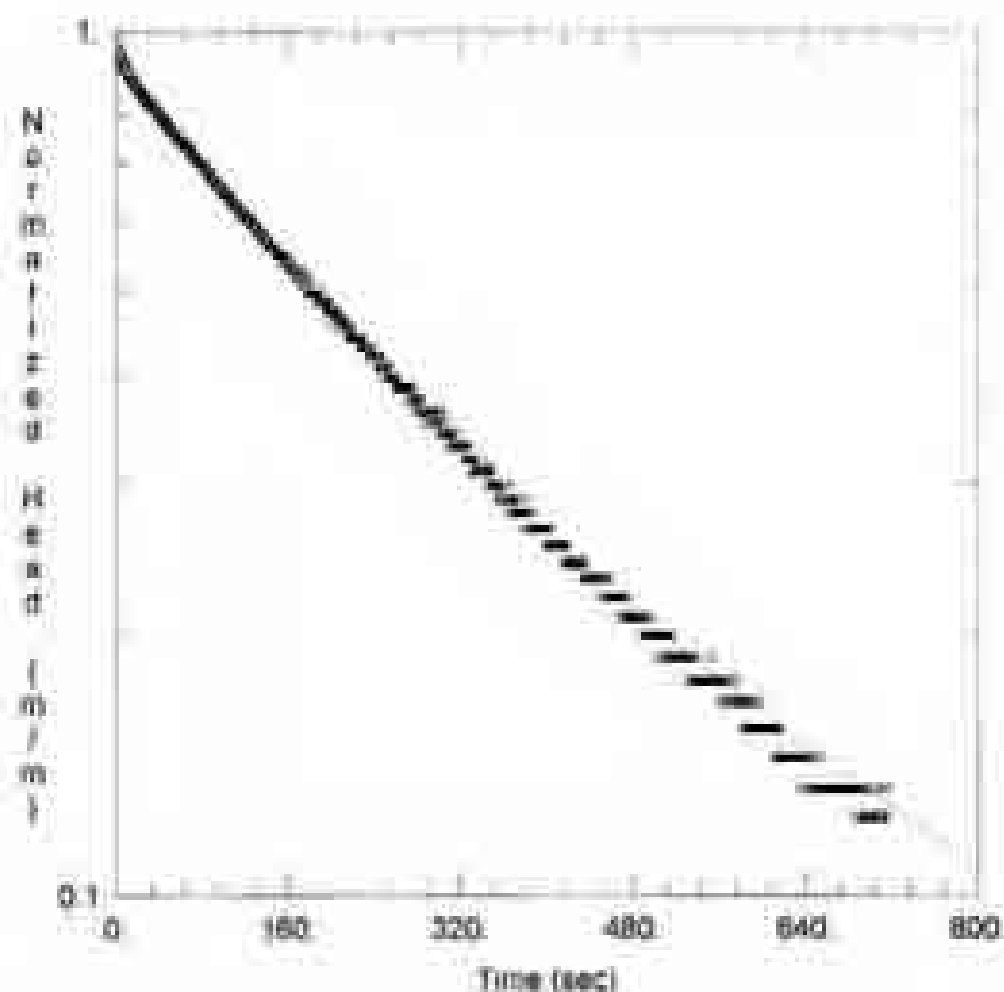
Initial Displacement: 0.52 m
Total Well Penetration Depth: 6.52 m
Casing Radius: 0.089 m

Static Water Column Height: 6.52 m
Screen Length: 6.52 m
Well Radius: 0.089 m

SOLUTION

Aquifer Model: Confined
 $K = 0.7160$ m/day

Solution Method: Hursley
 $y_0 = 0.4323$ m



WELL TEST ANALYSIS

Data Set: C:_IGM5.sgl

Date: 08/02/07

Time: 09:02:22

PROJECT INFORMATION

Company: Larry Cook & Associates

Client: Gunlake Quarry

Project: 06130

Location: Marulan

Test Well: GM5

Test Date: 21/7/07

AQUIFER DATA

Saturated Thickness: 6.52 m

WELL DATA (GM5)

Initial Displacement: 0.52 m

Total Well Penetration Depth: 6.52 m

Casing Radius: 0.089 m

Static Water Column Height: 6.52 m

Screen Length: 6.52 m

Well Radius: 0.080 m

SOLUTION

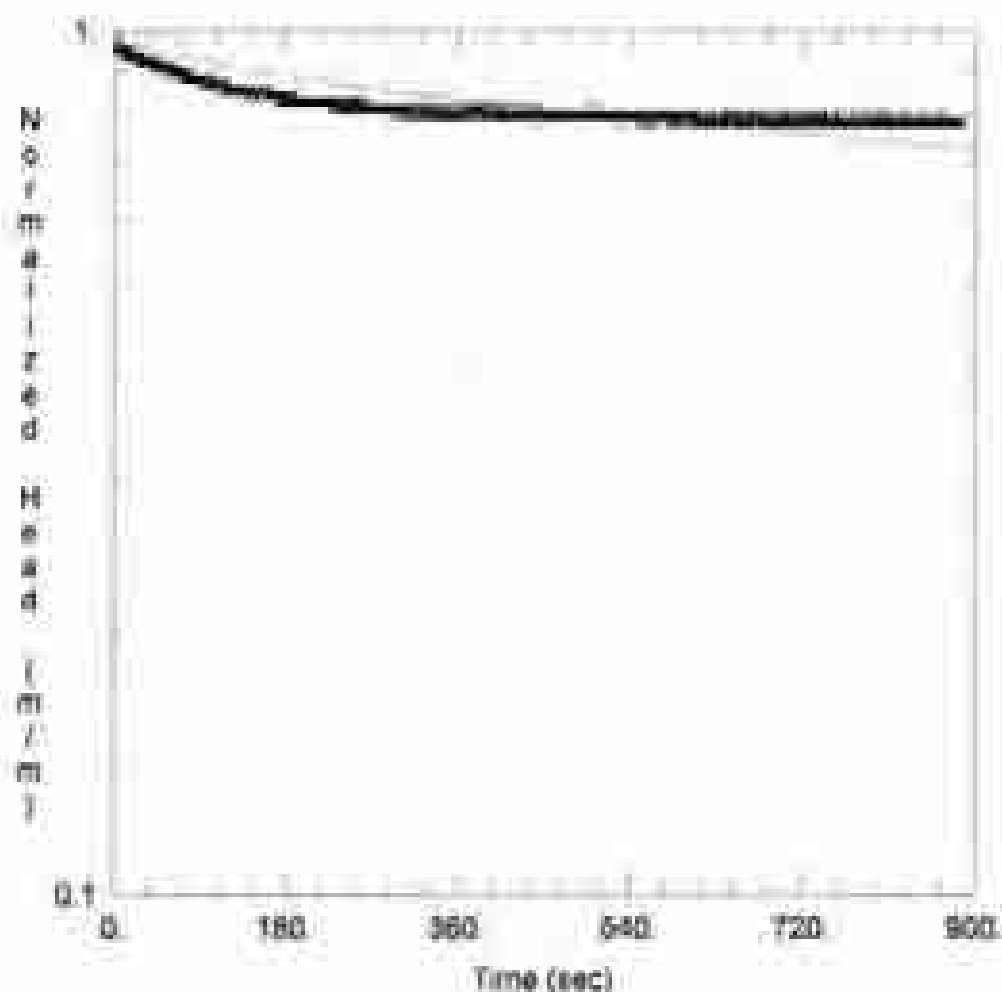
Aquifer Model: Confined

$K_r = 0.8235 \text{ m/day}$

$K_z/K_r = 1$

Solution Method: KGS Model

$3s = 0.0001003 \text{ m}^2$



WELL TEST ANALYSIS

Data Set: C-1, GM21.aqt
Date: 08/02/07

Time: 10:35:10

PROJECT INFORMATION

Company: Larry Cook & Associates
Client: Guntake Quarry
Project: 06130
Location: Manjari
Test Well: GM21
Test Date: 21.7.07

AQUIFER DATA

Saturated Thickness: 9.79 m

Anisotropy Ratio (K_z/K_r): 1

WELL DATA (GM21)

Initial Displacement: 0.402 m
Total Well Penetration Depth: 9.79 m
Casing Radius: 0.089 m

Static Water Column Height: 9.79 m
Screen Length: 9.79 m
Well Radius: 0.089 m

SOLUTION

Aquifer Model: Confined
 $T = 0.08589 \text{ m}^2/\text{day}$

Solution Method: Cooper-Brechenhoff-Papadopoulos
 $S = 0.1$

APPENDIX D

LABORATORY CERTIFICATE AND CHAIN OF CUSTODY DOCUMENTATION

LABORATORY DUPLICATE REPORT

JOB NO: SAL19361

CLIENT ORDER: GUNLAKH

Sample Number	Analyte	Units	MDL	Sample Result	Duplicate Result	%RPD
GM18	pH		0.1	6.9	6.9	0
GM18	TDS	mg/L	1	4650	4650	1
GM18	Sodium	mg/L	0.1	575	585	2
GM18	Calcium	mg/L	0.1	530	540	2
GM18	Potassium	mg/L	0.1	16	16	0
GM18	Magnesium	mg/L	0.1	410	400	2
GM18	Chloride	mg/L	1	2620	2590	1
GM18	Nitrate	mg/L	0.1	3.2	3.2	0
GM18	Nitrite	mg/L	0.1	0.33	0.36	9
GM18	Sulphate	mg/L	2	22	22	0
GM18	Bicarbonate	mg/L	1	740	740	0
GM18	Carbonate	mg/L	1	<1	<1	0
GM18	Conductivity	uS/cm	0.1	7210	7130	1
GM18	Ammonia	mg/L	0.1	1.4	1.4	0
GM18	Phosphate	mg/L	0.01	0.03	0.02	0
GM18	Total P	mg/L	0.1	4.0	3.9	3
GM18	Copper	mg/L	0.001	0.002	0.002	0
GM18	Lead	mg/L	0.001	<0.001	<0.001	0
GM18	Zinc	mg/L	0.001	0.003	0.004	17
GM18	Cadmium	mg/L	0.0002	<0.0002	<0.0002	0
GM18	Chromium	mg/L	0.01	<0.01	<0.01	0
GM18	Nickel	mg/L	0.01	<0.01	<0.01	0
GM18	Fe (Total)	mg/L	0.01	43	43	5
GM18	Fe (Dissolved)	mg/L	0.01	<0.01	<0.01	0
GM18	Arsenic	mg/L	0.01	<0.01	<0.01	0
GM18	Mercury	mg/L	0.0001	<0.0001	<0.0001	0

Acceptance criteria:

RPD <50% for low level (<10xMDL)

RPD <20% for medium level (10-50xMDL)

RPD <10% for high level (>50xMDL)

No limit applies at <2xMDL

MDL = Method Detection Limit

All results are within the acceptance criteria

ANALYTICAL REPORT

JOB NO: SAL19361
CLIENT ORDER: GUNLAKE

DATE OF COLLECTION
SAMPLES

12/06/07
GM18
DUP

pH		6.9
Total Dissolved Solids	mg/L	4590
Conductivity	uS/cm	7120
Total Phosphorus	mg/L	3.9
Copper	mg/L	0.002
Lead	mg/L	<0.001
Zinc	mg/L	0.006
Cadmium	mg/L	<0.0002
Chromium	mg/L	<0.01
Nickel	mg/L	<0.01
Iron (Total)	mg/L	43
Iron (Dissolved)	mg/L	<0.01
Arsenic	mg/L	<0.01
Mercury	mg/L	<0.0001

	mg/L	meq/L
Sodium Na+	585	25.448
Calcium Ca++	540	26.946
Potassium K+	16	0.410
Magnesium Mg++	400	32.920
Ammonia NH4-N	1.4	0.100

TOTAL CATIONS	85.824
---------------	--------

Chloride Cl-	2590	73.038
Nitrate NO3-	3.2	0.052
Nitrite NO2-	0.36	0.008
Sulphate SO4--	22	0.458
Bicarbonate HCO3-	740	12.136
Carbonate CO3--	<1	
Phosphate PO4-P	0.02	0.002

TOTAL ANIONS	85.694
--------------	--------

ANALYTICAL REPORT

JOB NO: SAL19161
CLIENT ORDER: GUNLAK

DATE OF COLLECTION
SAMPLES

12/06/07
CHDUP/L

12/06/07
CHSLANE

pH		6.8	6.8
Total Dissolved Solids	mg/L	360	<1
Conductivity	uS/cm	880	1.2
Total Phosphorus	mg/L	0.84	<0.1
Copper	mg/L	0.001	<0.001
Lead	mg/L	<0.001	<0.001
Zinc	mg/L	0.004	<0.001
Cadmium	mg/L	<0.0002	<0.0002
Chromium	mg/L	<0.01	<0.01
Nickel	mg/L	<0.01	<0.01
Iron (Total)	mg/L	45	<0.01
Iron (Dissolved)	mg/L	0.02	<0.01
Arsenic	mg/L	<0.01	<0.01
Mercury	mg/L	<0.0001	<0.0001

	mg/L	mg/L	mg/L	mg/L
Sodium Na+	110	4.785	<0.1	
Calcium Ca++	45	2.246	<0.1	
Potassium K+	7.0	0.179	<0.1	
Magnesium Mg++	34	2.798	<0.1	
Ammonia NH4-N	0.2	0.014	<0.1	

TOTAL CATIONS 10.032

Chloride Cl-	340	6.768	<1
Nitrate NO3-	0.27	0.004	<0.1
Nitrite NO2-	<0.1		<0.1
Sulphate SO4--	5	0.104	<2
Bicarbonate HCO3-	310	3.444	<1
Carbonate CO3--	<1		<1
Phosphate PO4-P	0.01	0.001	<0.01

TOTAL ANIONS 10.131

ANALYTICAL REPORT

JOB NO: SAL19161
CLIENT ORDER: GUYLAXE

DATE OF COLLECTION		12/06/07	12/06/07
SAMPLES		GM35	GM35
pH		6.8	7.3
Total Dissolved Solids	mg/L	3920	460
Conductivity	uS/cm	8200	720
Total Phosphorus	mg/L	0.73	0.46
Copper	mg/L	0.002	0.001
Lead	mg/L	<0.001	<0.001
Zinc	mg/L	0.002	0.003
Cadmium	mg/L	<0.0002	<0.0002
Chromium	mg/L	<0.01	<0.01
Nickel	mg/L	<0.01	<0.01
Iron (Total)	mg/L	61	82
Iron (Dissolved)	mg/L	<0.01	0.69
Arsenic	mg/L	<0.01	<0.01
Mercury	mg/L	<0.0001	<0.0001

	mg/L	meq/L	mg/L	meq/L
Sodium Na+	460	20.010	130	5.655
Calcium Ca++	800	24.950	17	0.840
Potassium K+	12	0.307	2.5	0.064
Magnesium Mg++	135	27.571	17	1.399
Ammonia NH4-N	0.2	0.014	<0.1	

TOTAL CATIONS	73.852	7.968
---------------	--------	-------

Chloride Cl-	3210	62.322	110	3.102
Nitrate NO3-	2.4	0.039	1.1	0.018
Nitrite NO2-	0.13	0.003	0.10	0.002
Sulphate SO4--	20	0.414	14	0.281
Bicarbonate HCO3-	870	10.888	290	4.756
Carbonate CO3--	<1		<1	
Phosphate PO4-P	<0.01		0.04	0.008

TOTAL ANIONS	73.768	8.173
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ANALYTICAL REPORT

JOB NO: SAL19361
CLIENT ORDER: GUNLAKE

DATE OF COLLECTION
SAMPLES

12/06/07
GM22

12/06/07
GM24

pH		6.8	6.9
Total Dissolved Solids	mg/L	1710	570
Conductivity	uS/cm	2750	880
Total Phosphorus	mg/L	0.49	0.76
Copper	mg/L	0.001	0.002
Lead	mg/L	<0.001	<0.001
Zinc	mg/L	0.006	0.005
Cadmium	mg/L	<0.0002	<0.0002
Chromium	mg/L	<0.01	<0.01
Nickel	mg/L	<0.01	<0.01
Iron (Total)	mg/L	14	43
Iron (Dissolved)	mg/L	<0.01	0.02
Arsenic	mg/L	<0.01	<0.01
Mercury	mg/L	<0.0001	<0.0001

	mg/L	meq/L	mg/L	meq/L
Sodium Na+	280	12.180	120	5.220
Calcium Ca++	160	7.984	45	2.246
Potassium K+	6.6	0.169	6.8	0.174
Magnesium Mg++	140	11.522	35	2.881
Ammonia NH4-N	0.8	0.057	0.2	0.014

TOTAL CATIONS	31.912	10.535
---------------	--------	--------

Chloride Cl-	910	25.662	250	7.050
Nitrate NO3-	0.31	0.005	0.22	0.004
Nitrite NO2-	0.33	0.007	<0.1	
Sulphate SO4--	3	0.062	5	0.104
Bicarbonate HCO3-	350	5.740	220	3.608
Carbonate CO3--	<1		<1	
Phosphate PO4-P	0.01	0.001	0.01	0.001

TOTAL ANIONS	31.477	10.767
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ANALYTICAL REPORT

JOB NO: SAL19361
CLIENT ORDER: GUNLAKE

DATE OF COLLECTION	12/06/07	12/06/07
SAMPLES	GM18	GM21

pH		6.9	6.8
Total Dissolved Solids	mg/L	4650	725
Conductivity	uS/cm	7210	1090
Total Phosphorus	mg/L	4.0	0.21
Copper	mg/L	0.002	0.002
Lead	mg/L	<0.001	<0.001
Zinc	mg/L	0.005	0.011
Cadmium	mg/L	<0.0002	<0.0002
Chromium	mg/L	<0.01	<0.01
Nickel	mg/L	<0.01	<0.01
Iron (Total)	mg/L	45	8.4
Iron (Dissolved)	mg/L	<0.01	0.01
Arsenic	mg/L	<0.01	<0.01
Mercury	mg/L	<0.0001	<0.0001

	mg/L	meq/L	mg/L	meq/L
Sodium Na+	575	25.013	60	2.610
Calcium Ca++	530	26.447	73	3.643
Potassium K+	16	0.410	8.6	0.220
Magnesium Mg++	410	33.743	94	7.736
Ammonia NH4-N	1.4	0.100	1.4	0.100

TOTAL CATIONS	85.713	14.309
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Chloride Cl-	2620	73.884	330	9.306
Nitrate NO3-	3.2	0.052	40	0.644
Nitrite NO2-	0.33	0.007	4.5	0.098
Sulphate SO4--	22	0.458	9	0.187
Bicarbonate HCO3-	740	12.136	240	3.936
Carbonate CO3--	<1		<1	
Phosphate PO4-P	0.02	0.002	0.05	0.005

TOTAL ANIONS	86.539	14.176
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SYDNEY ANALYTICAL LABORATORIES

Page 3 of 10

ANALYTICAL REPORT

JOB NO: SAL19161
CLIENT ORDER: GUNLAKK

DATE OF COLLECTION		12/06/07		12/06/07	
SAMPLES		CH11		CH13	
pH		6.8		6.8	
Total Dissolved Solids	mg/L	1680		820	
Conductivity	uS/cm	2580		1300	
Total Phosphorus	mg/L	0.85		0.13	
Copper	mg/L	0.001		0.001	
Lead	mg/L	<0.001		<0.001	
Zinc	mg/L	0.010		0.008	
Cadmium	mg/L	<0.0003		<0.0003	
Chromium	mg/L	<0.01		<0.01	
Nickel	mg/L	<0.01		<0.01	
Iron (Total)	mg/L	34		16	
Iron (Dissolved)	mg/L	0.05		0.03	
Arsenic	mg/L	<0.01		<0.01	
Mercury	mg/L	<0.0001		<0.0001	
		mg/L	mg/L	mg/L	mg/L
Sodium Na+		300	13.050	145	6.307
Calcium Ca++		130	4.487	85	4.243
Potassium K+		13	0.382	7.6	0.195
Magnesium Mg++		140	11.522	49	4.033
Ammonia NH4-N		2.2	0.157	0.5	0.036
TOTAL CATIONS		11.498		14.813	
		mg/L	mg/L	mg/L	mg/L
Chloride Cl-		710	30.028	350	7.050
Nitrate NO3-		<0.1		7.1	0.114
Nitrite NO2-		<0.1		0.13	0.003
Sulphate SO4--		9	0.187	44	0.918
Bicarbonate HCO3-		710	11.544	430	7.052
Carbonate CO3--		<1		<1	
Phosphate PO4-P		0.04	0.004	0.03	0.003
TOTAL ANIONS		11.857		15.116	

ANALYTICAL REPORT

JOB NO: SAL19361
CLIENT ORDER: GUNLAKE

DATE OF COLLECTION		12/06/07		12/06/07
SAMPLES		GM5		GM6
pH		6.7		6.7
Total Dissolved Solids	mg/L	2610		4320
Conductivity	uS/cm	4100		6590
Total Phosphorus	mg/L	1.2		2.0
Copper	mg/L	0.002		0.002
Lead	mg/L	<0.001		<0.001
Zinc	mg/L	0.011		0.005
Cadmium	mg/L	<0.0002		<0.0002
Chromium	mg/L	<0.01		<0.01
Nickel	mg/L	<0.01		<0.01
Iron (Total)	mg/L	41		35
Iron (Dissolved)	mg/L	<0.01		<0.01
Arsenic	mg/L	<0.01		<0.01
Mercury	mg/L	<0.0001		<0.0001

	mg/L	meq/L	mg/L	meq/L
Sodium Na+	320	13.920	520	22.620
Calcium Ca++	280	13.972	500	24.950
Potassium K+	13	0.333	18	0.461
Magnesium Mg++	245	20.164	435	35.801
Ammonia NH4-N	4.5	0.321	0.8	0.057

TOTAL CATIONS	48.710	83.889
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Chloride Cl-	1420	40.044	2540	71.628
Nitrate NO3-	0.58	0.009	3.5	0.056
Nitrite NO2-	0.10	0.002	0.13	0.003
Sulphate SO4--	19	0.395	34	0.707
Bicarbonate HCO3-	560	9.184	760	12.464
Carbonate CO3--	<1		<1	
Phosphate PO4-P	0.06	0.006	0.02	0.002

TOTAL ANIONS	49.640	84.860
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Laboratory:
1/4 ABBOTT ROAD
SEVEN HILLS NSW 2147
Telephone: (02) 9838 8903
Fax: (02) 9838 8918
A.C.N. 001 614 655
A.B.N. 61 829 182 852
NATA No: 1884

ANALYTICAL REPORT FOR:

LARRY COOK

PO BOX 8146
TUNBI UNBI 2261

ATTN: LARRY COOK

JOB NO: EML19361
CLIENT ORDER: GUNLAKH
DATE RECEIVED: 19/06/07
DATE COMPLETED: 05/07/07
TYPE OF SAMPLE: WATER
NO OF SAMPLES: 11



Ull
Issued on 12/07/07
Lance Smith
(Chief Chemist)

SYDNEY ANALYTICAL LABORATORIES

Page 10 of 10

ANALYTICAL REPORT

JOB NO: SAL19361
CLIENT ORDER: GUNLAKE

METHODS OF PREPARATION AND ANALYSIS

The tests contained in this report have been carried out on the samples as received by the laboratory, in accordance with APHA Standard Methods of Water and Wastewater 21st Edition, or other approved methods listed below:

4500B	pH
2540C	Total Dissolved Solids
3500B	Sodium Na+
3111B	Calcium Ca++
3500B	Potassium K+
3111B	Magnesium Mg++
4500D	Chloride Cl-
4500F	Nitrate NO3-
4500F	Nitrite NO2-
2320B	Bicarbonate HCO3-
2320B	Carbonate CO3--
2510B	Conductivity
4500G	Ammonia NH4-N
4500F	Phosphate PO4-P
4500BF	Total Phosphorus
3111C	Copper
3111C	Lead
3111C	Zinc
3111C	Cadmium
3111B	Chromium
3111B	Nickel
3111B	Iron (Total)
3111B	Iron (Dissolved)
3114B	Arsenic
3112B	Mercury

Sulphate: Dept Mineral Resources - BaCrO4 Method

A preliminary report was faxed on 05/07/07

APPENDIX E

FIELD TEMPLATE FORM FOR WATER LEVEL DATA LOGGERS

FIGURES



Larry Cook & Associates
PO Box 8146
Tumbi Umbi NSW 2261
Phone 0428 884645

Groundwater Impact Assessment

Gunlake Quarry Project
Project Site

Scale: As shown

FIGURE 1



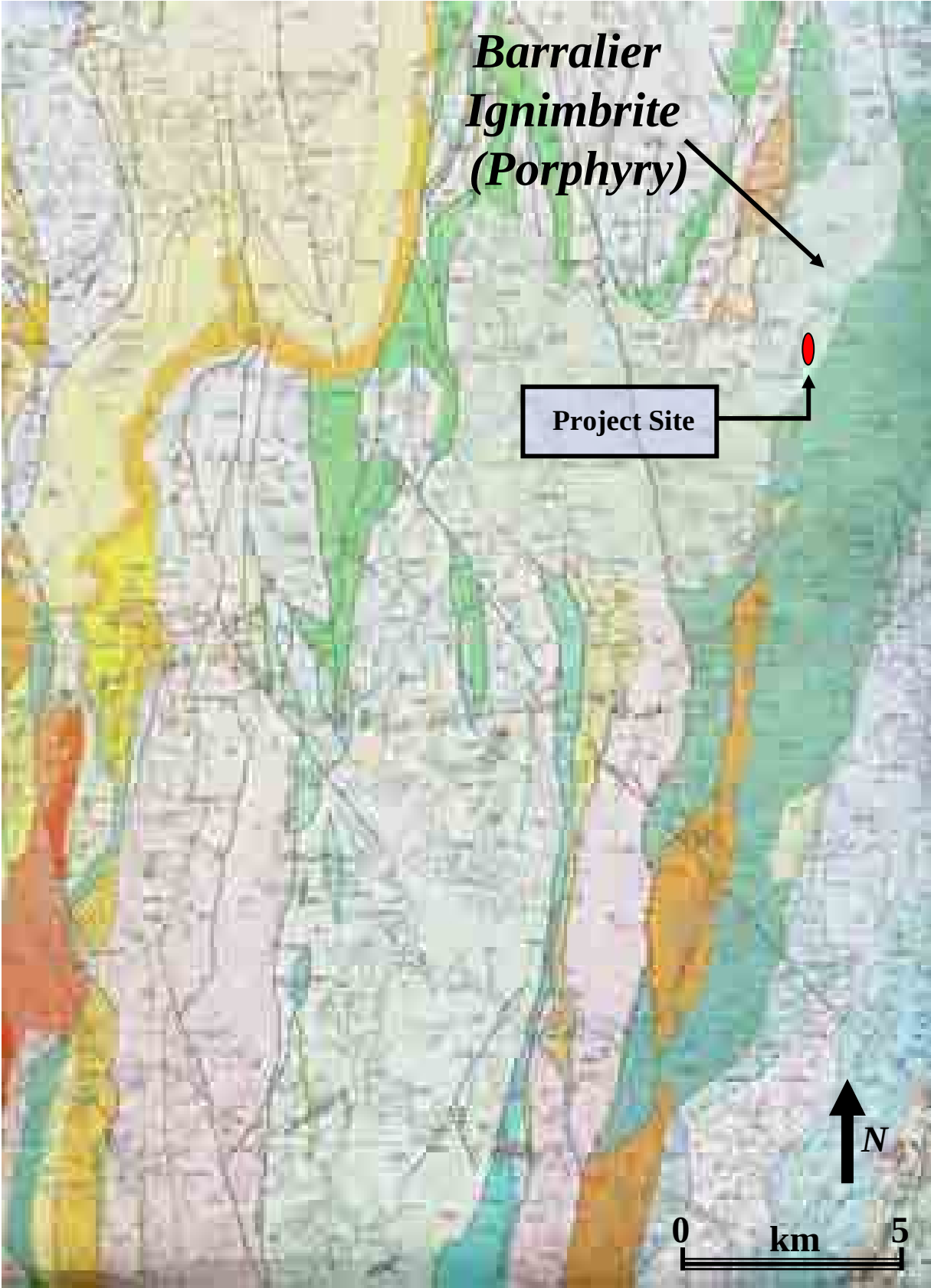
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Phone 0428 884645

Groundwater Impact Assessment

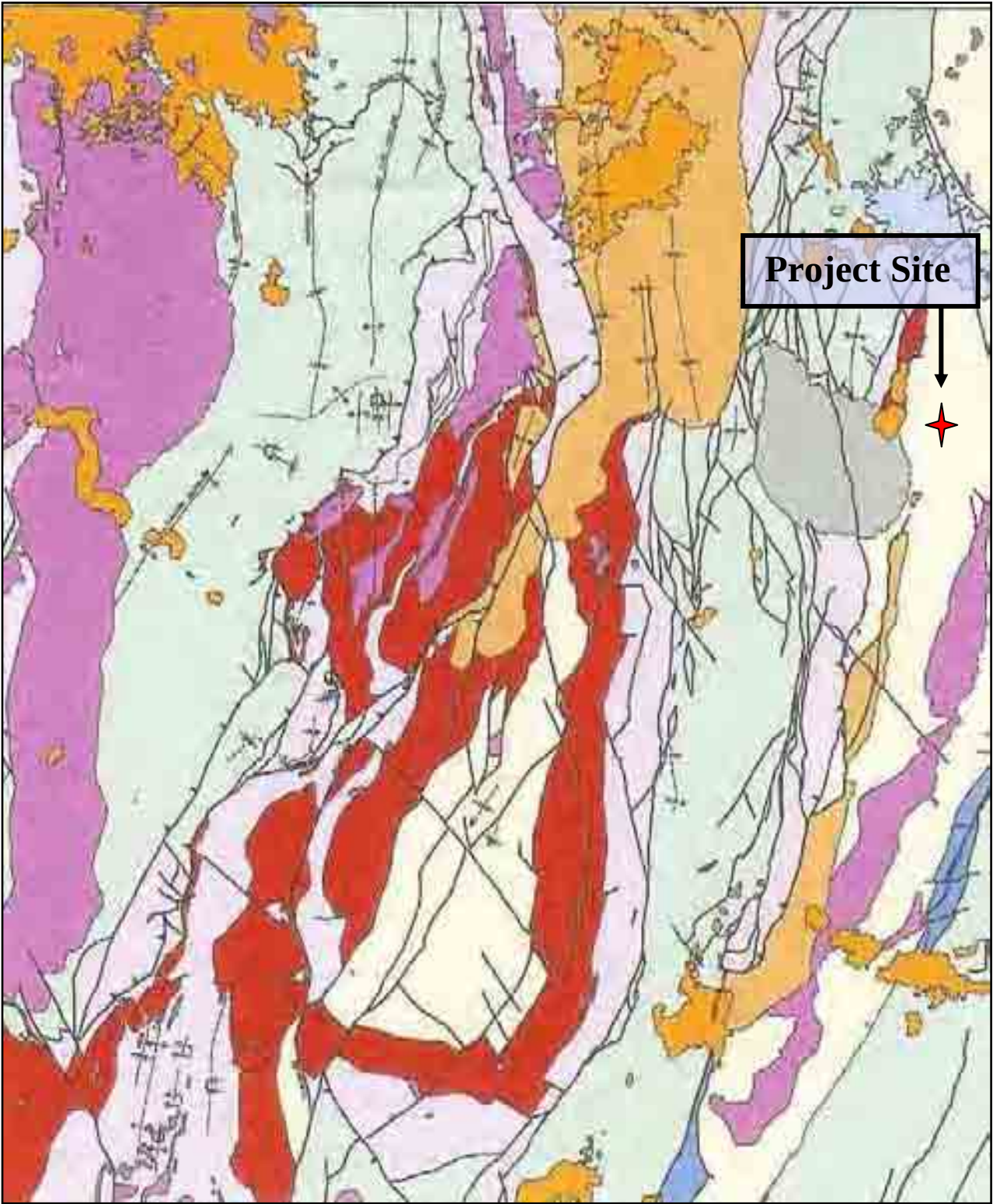
Gunlake Quarry Project
Aerial Photo

Scale: As shown

FIGURE 2



<i>Larry Cook & Associates</i> PO Box 8146 Tumbi Umbi NSW 2261 Phone 0428 884645	Groundwater Impact Assessment	Scale: As shown
	Gunlake Quarry Project Regional Geology	FIGURE 3



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Phone 0428 884645

Groundwater Impact Assessment

Gunlake Quarry Project
Regional Structural Framework

FIGURE 4



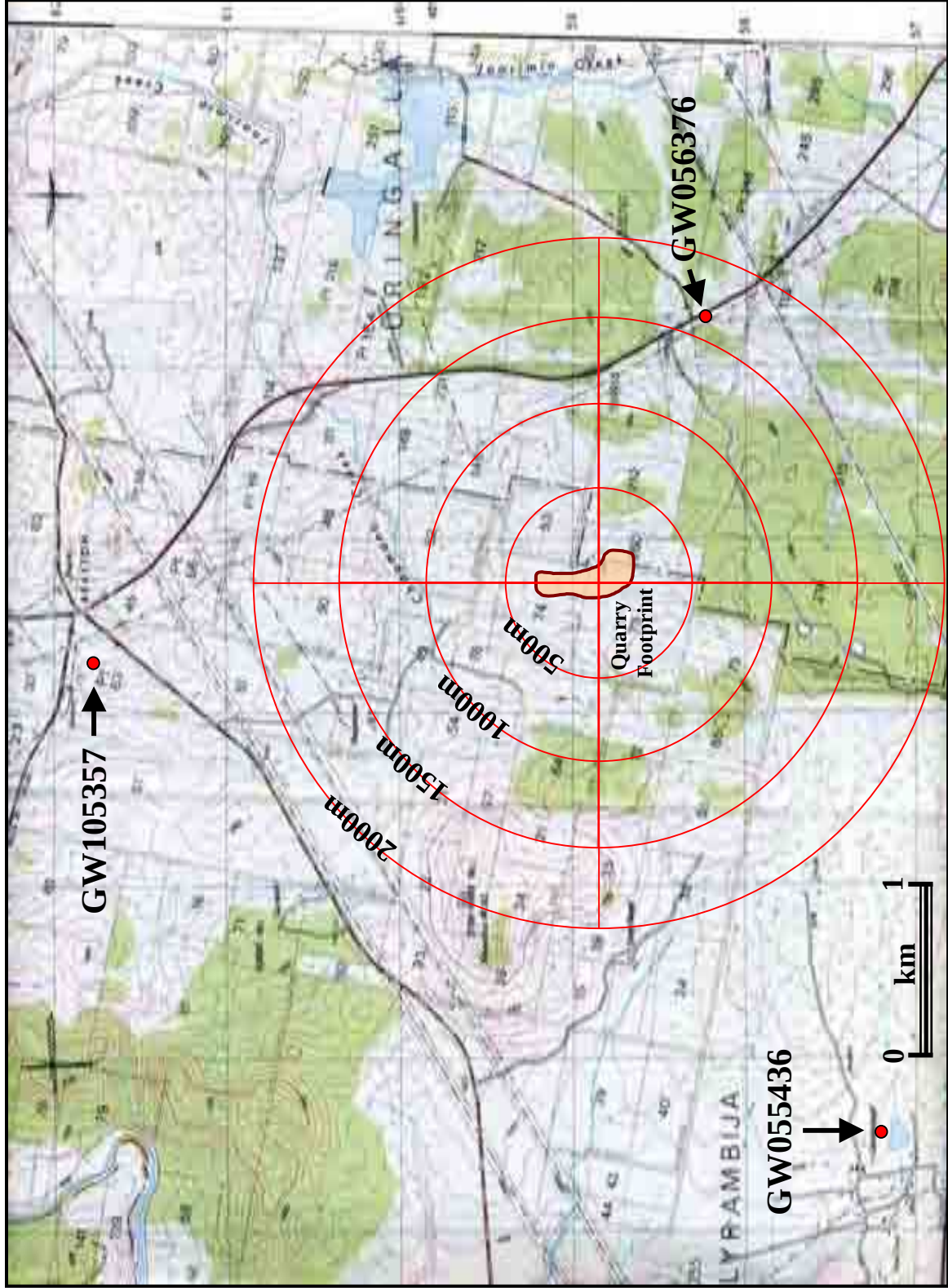
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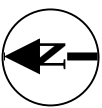
Groundwater Impact Assessment

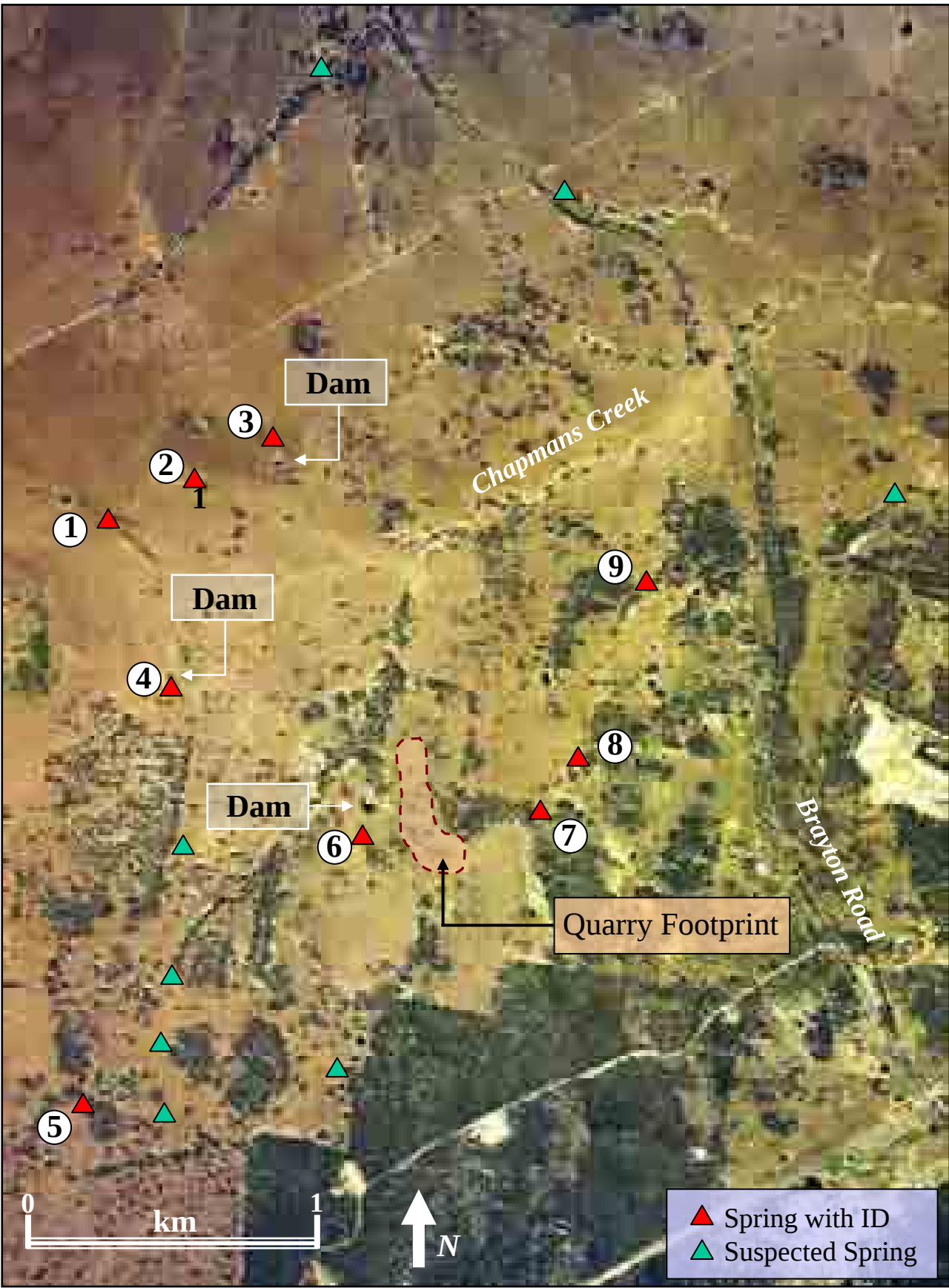
Gunlake Quarry Project
Interpreted Linear Features

Scale: As shown

FIGURE 5



<i>Larry Cook & Associates</i> PO Box 8146 Tumbi Umbi NSW 2261 Ph 0428 884645	Groundwater Impact Assessment			Scale: As shown
	Gunlake Quarry Project Location of Registered Bores			FIGURE 6



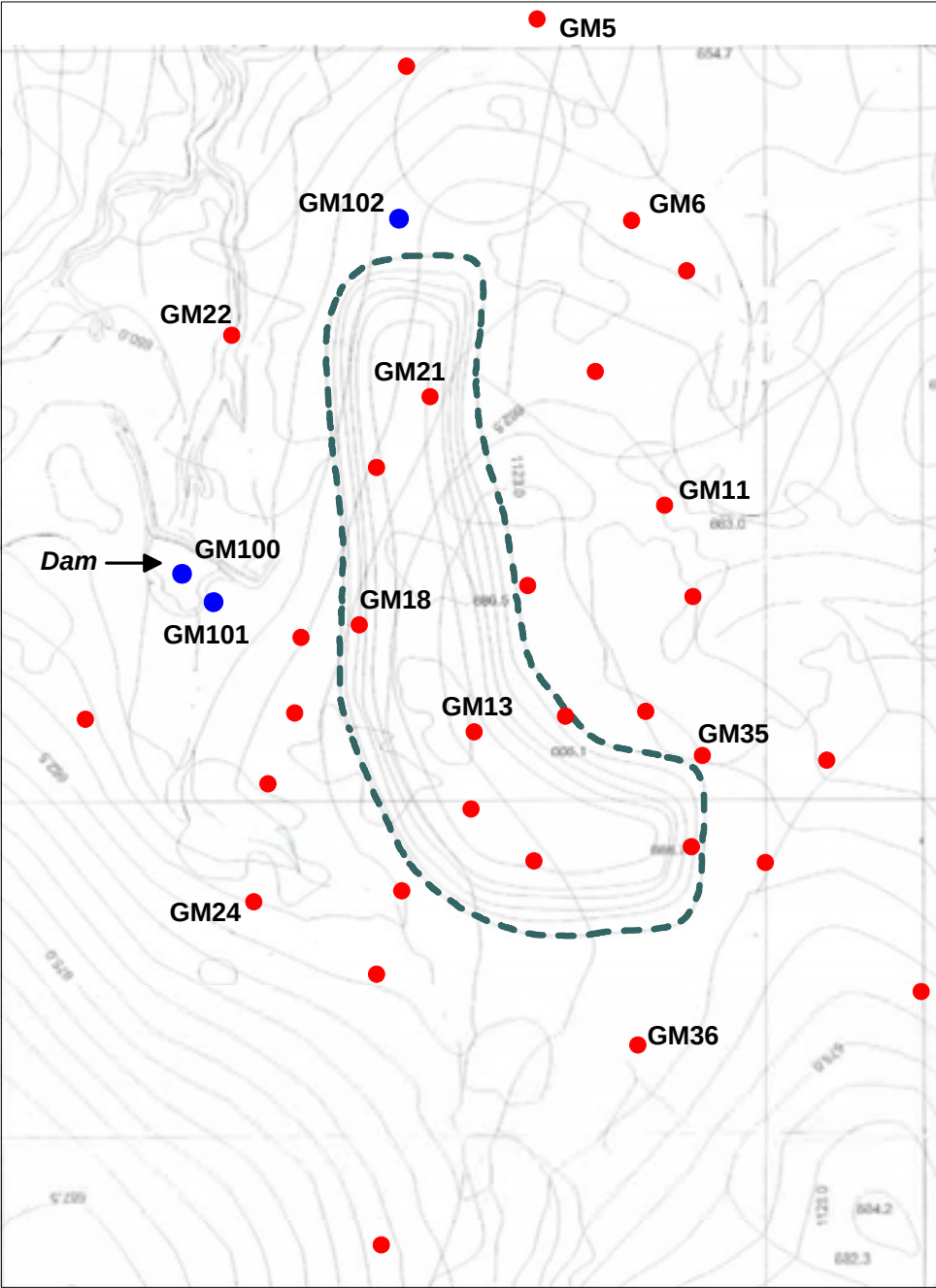
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Groundwater Impact Assessment

Gunlake Quarry Project
Location of Water Features

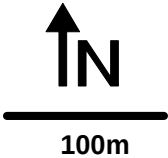
Scale: As shown

FIGURE 7

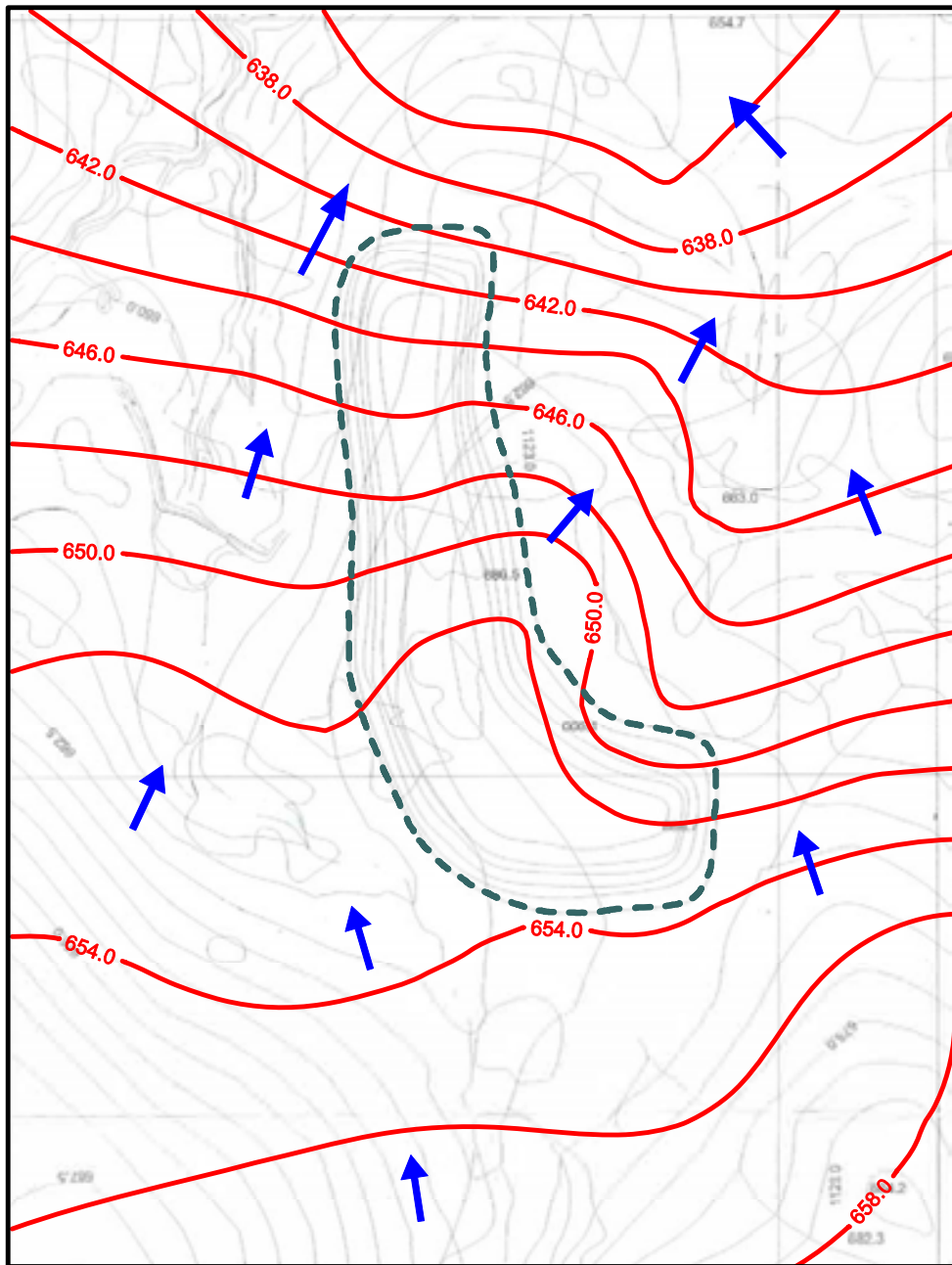


- Existing Monitoring Bore
- Proposed New Monitoring Bore

Note: Topographic and water level contours in m AHD



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	Gunlake Quarry Project Location of Monitoring Bores	FIGURE 8



 Contours of Water Surface Elevation
 Direction of Groundwater Flow


 100m

Note: Topographic and water level contours in m AHD

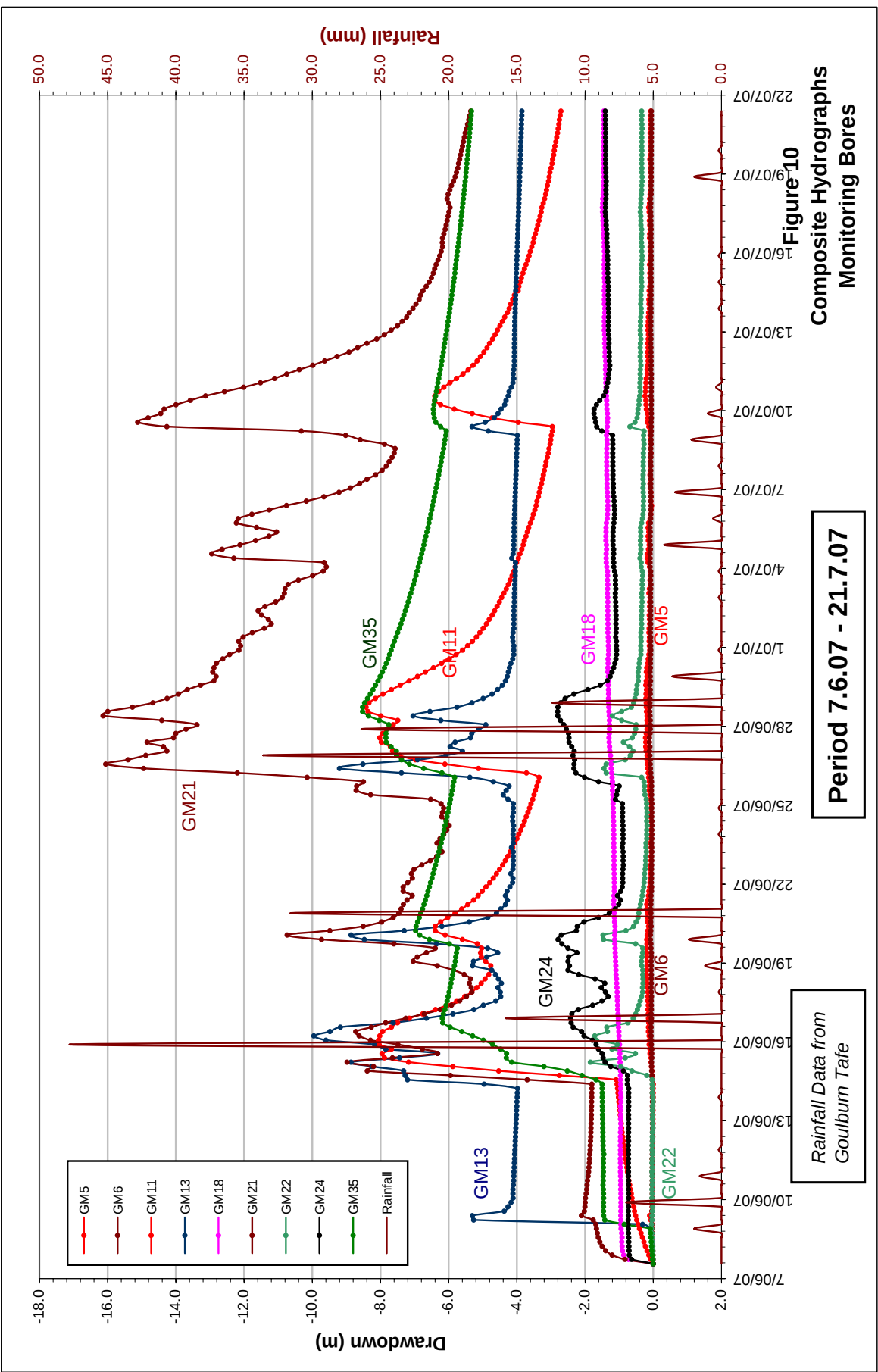
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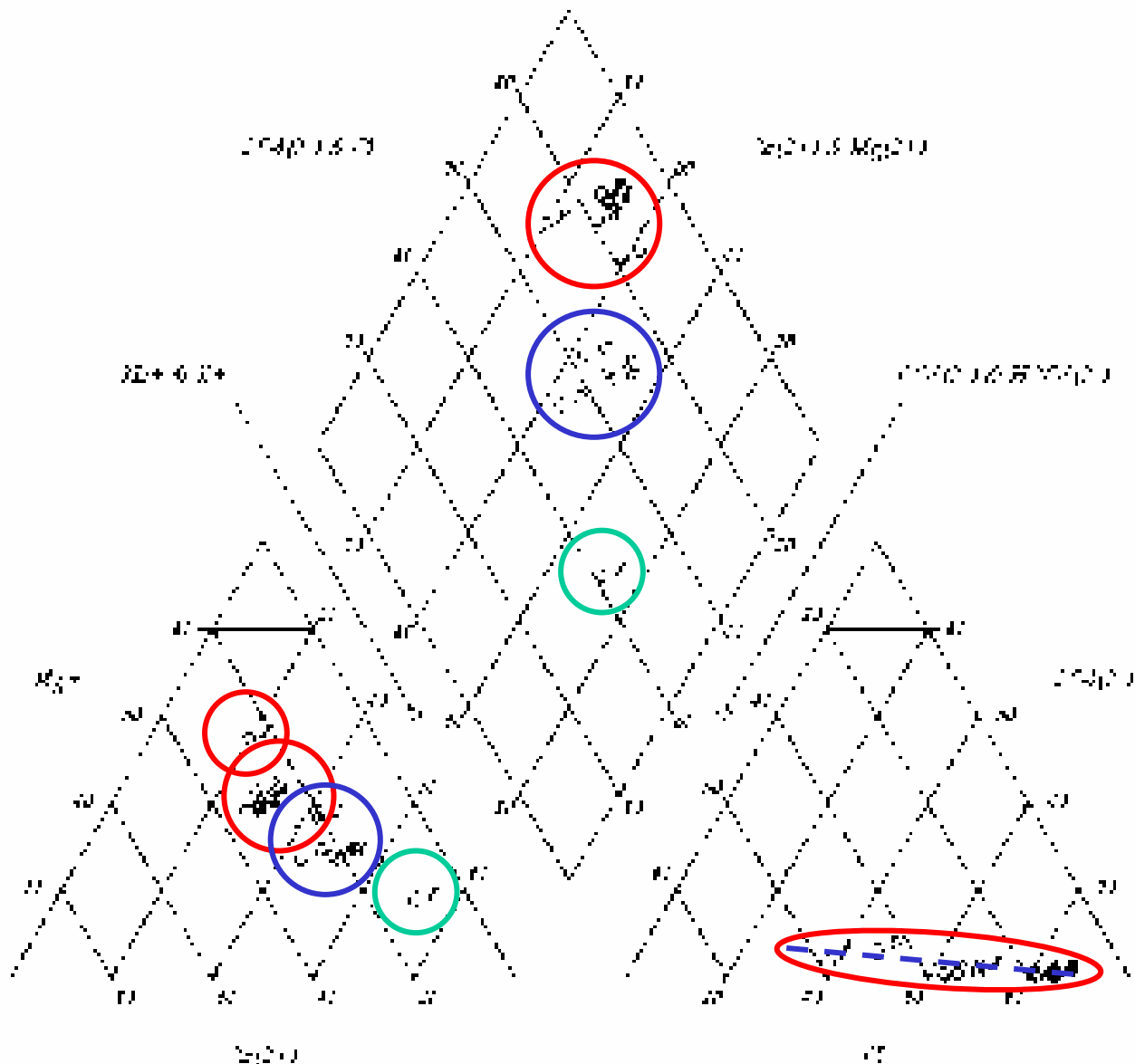
Groundwater Impact Assessment

Gunlake Quarry Project

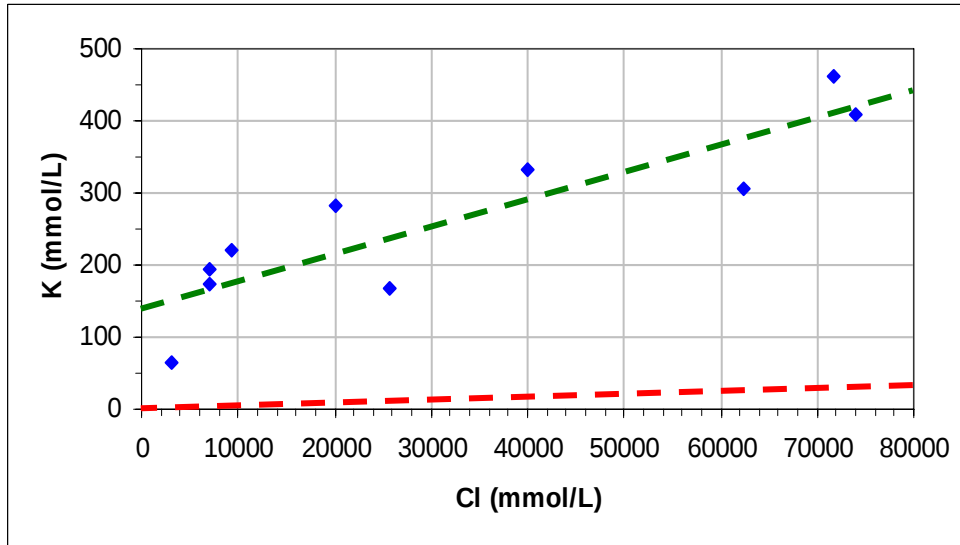
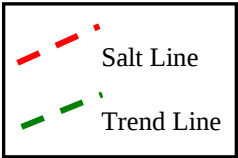
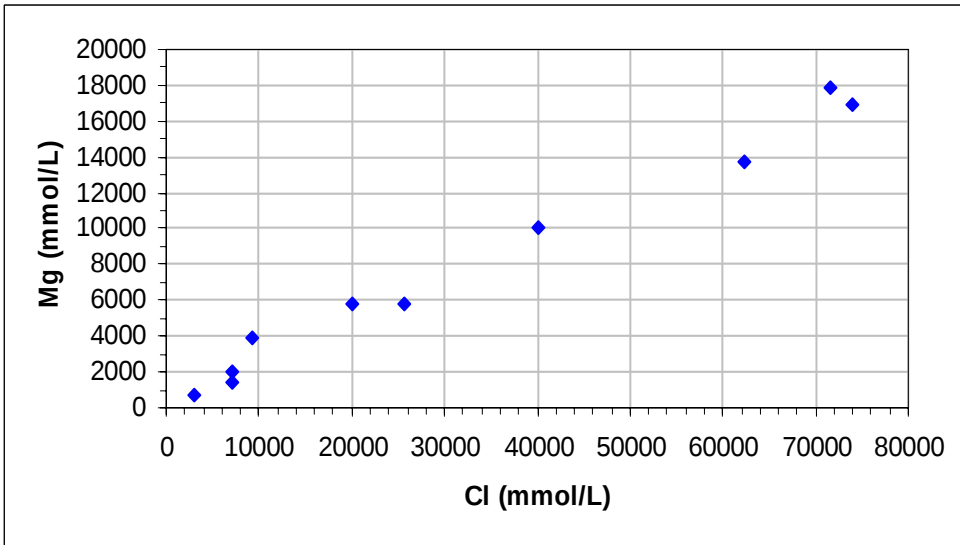
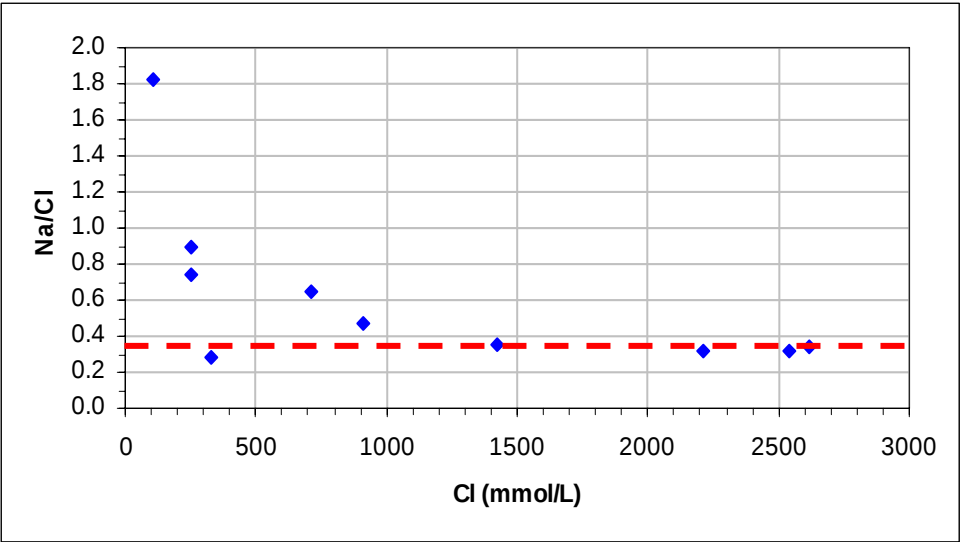
Contours of the Elevation of the Piezometric Surface

FIGURE 9

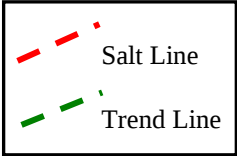
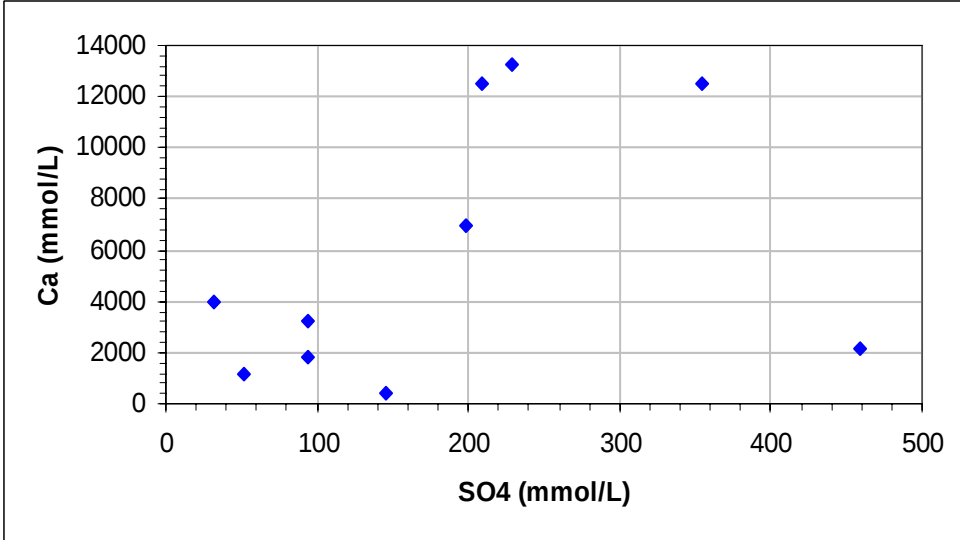
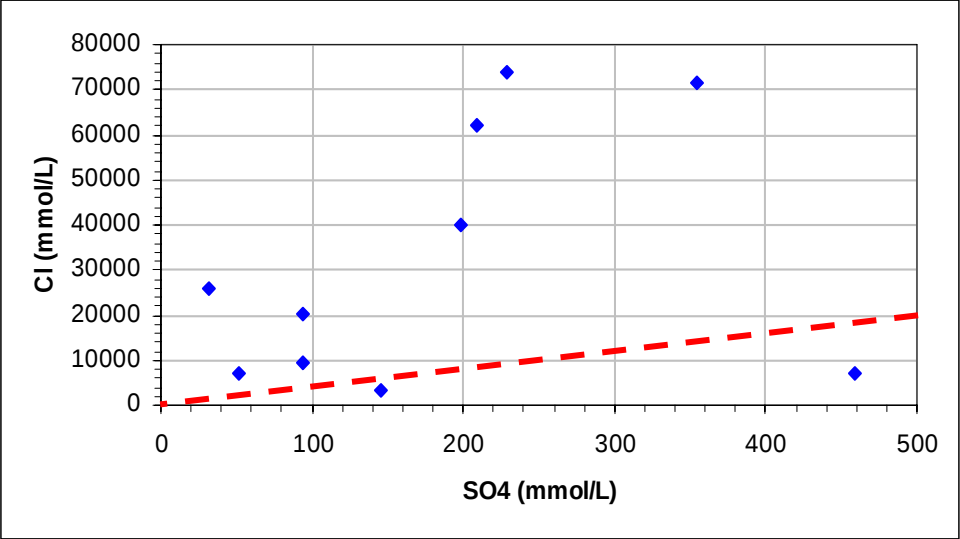


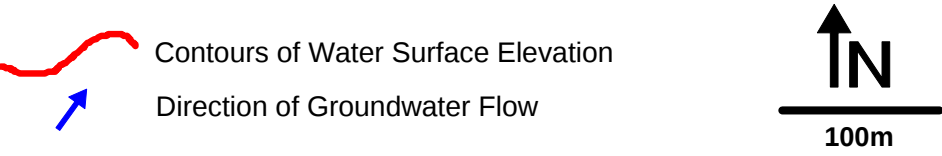
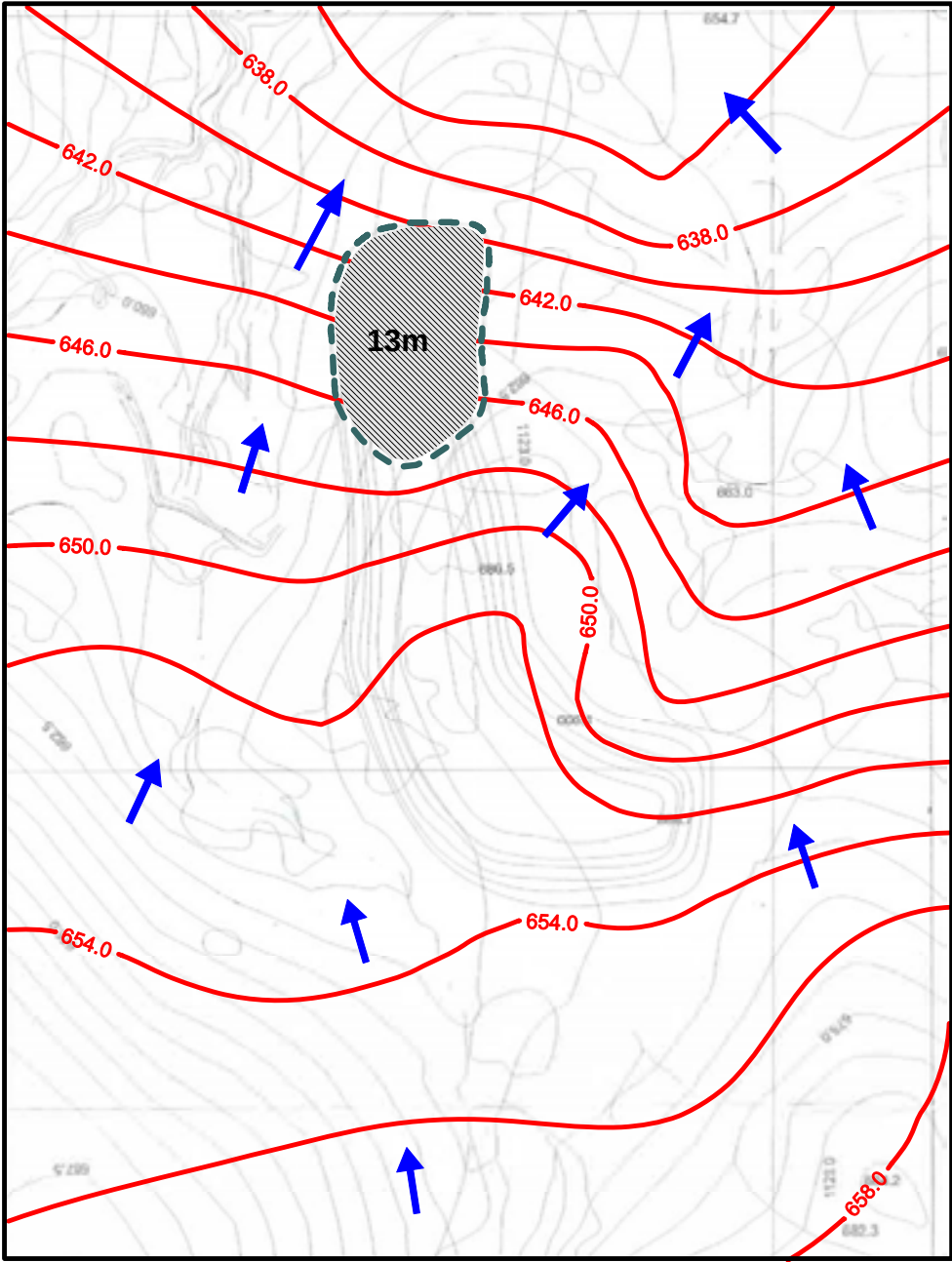


A	GM5
B	GM6
C	GM11
D	GM13
E	GM18
F	GM21
G	GM22
H	GM24
I	GM35
J	GM36



Larry Cook & Associates PO Box 8146 Tumbi Umbi NSW 2261 Phone 0428 884645	Groundwater Impact Statement	FIGURE 12
	Gunlake Quarry Project Chemical Ratio Plots - 1	

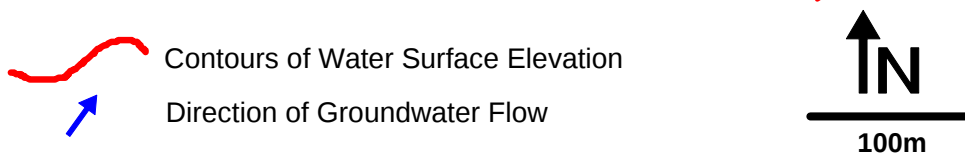
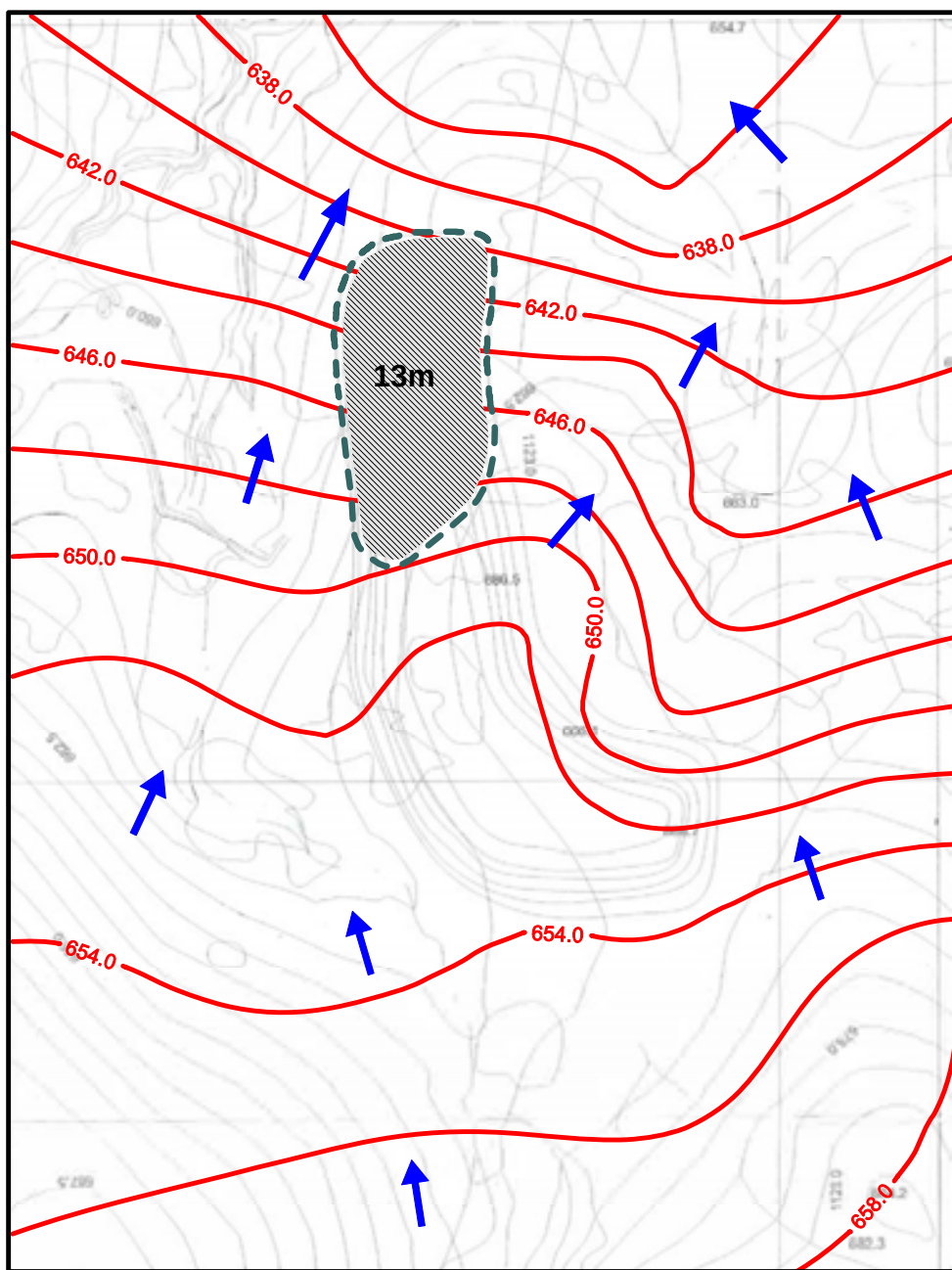




Note: Topographic and water level contours in m AHD

Stage 1

Larry Cook & Associates PO Box 8146 Tumbi Umbi NSW 2261 Phone 0428 884645	Groundwater Impact Assessment Gunlake Quarry Project Quarry Plan – Stage 1	FIGURE 14
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Note: Topographic and water level contours in m AHD

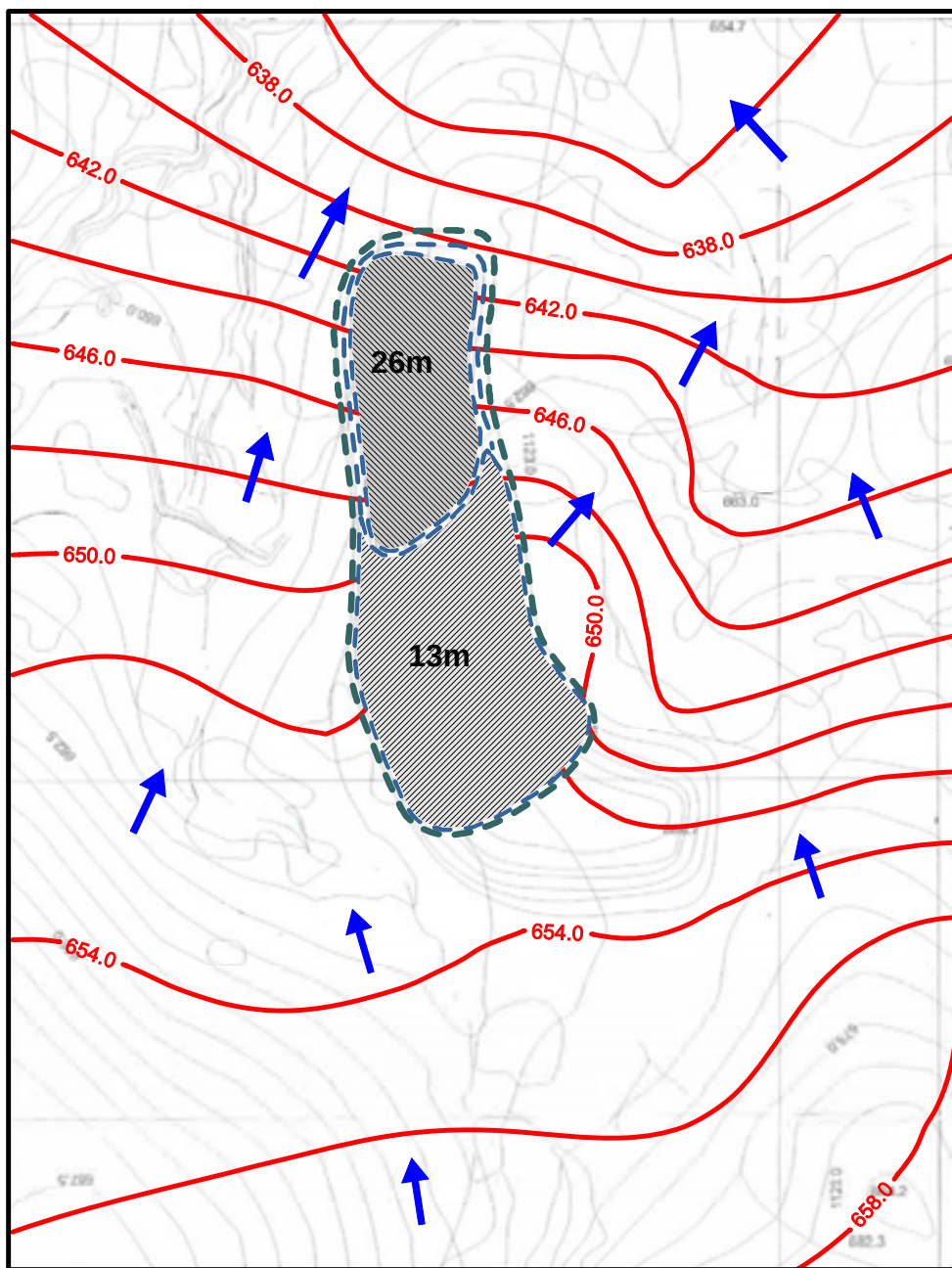
↑ N
 100m
Stage 2

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Groundwater Impact Assessment

Gunlake Quarry Project
 Quarry Plan – Stage 2

FIGURE 15



 Contours of Water Surface Elevation
 Direction of Groundwater Flow

Note: Topographic and water level contours in m AHD

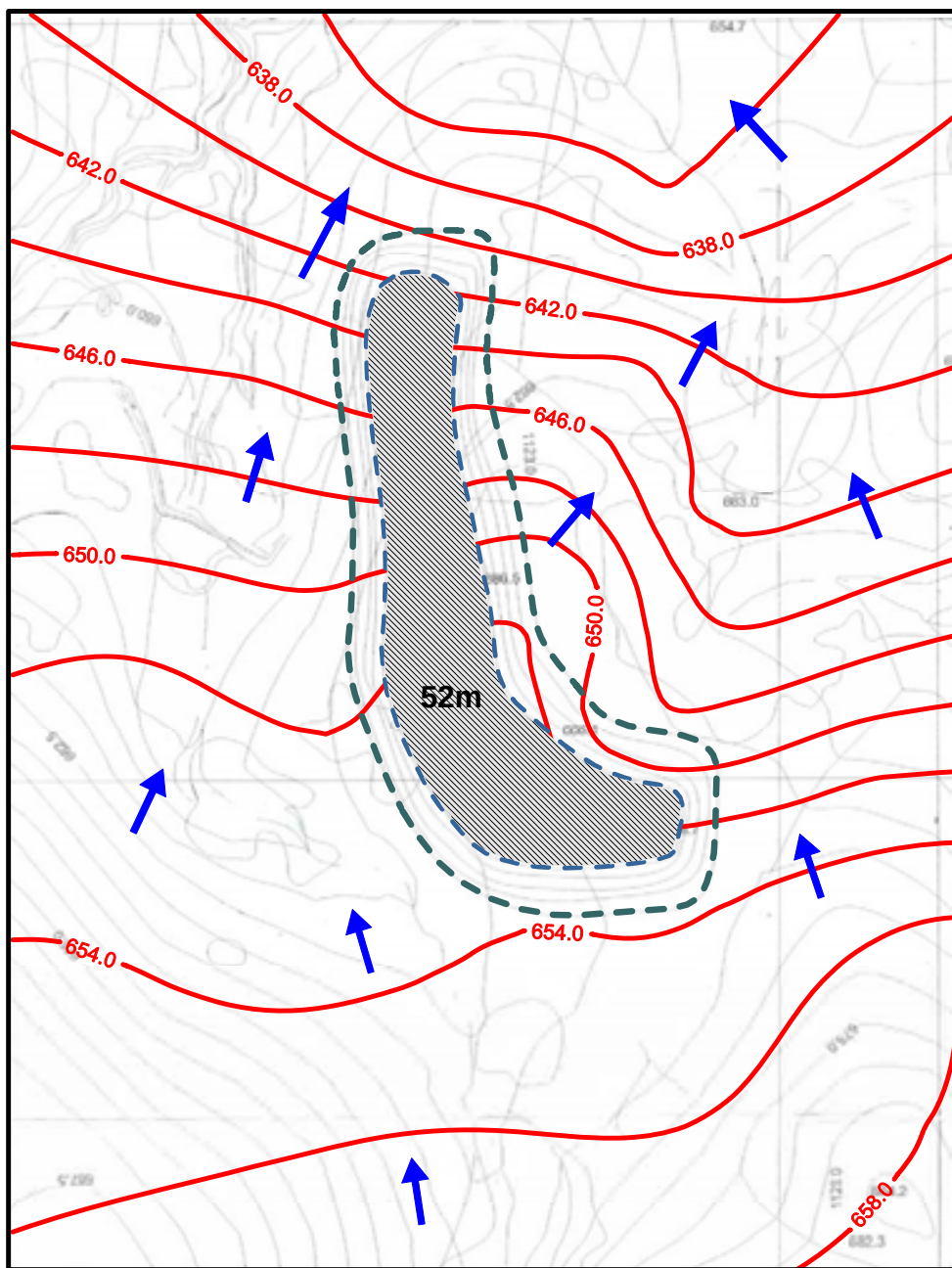

 100m
 Stage 3

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Groundwater Impact Assessment

Gunlake Quarry Project
 Quarry Plan – Stage 3

FIGURE 16



 Contours of Water Surface Elevation
 Direction of Groundwater Flow

Note: Topographic and water level contours in m AHD

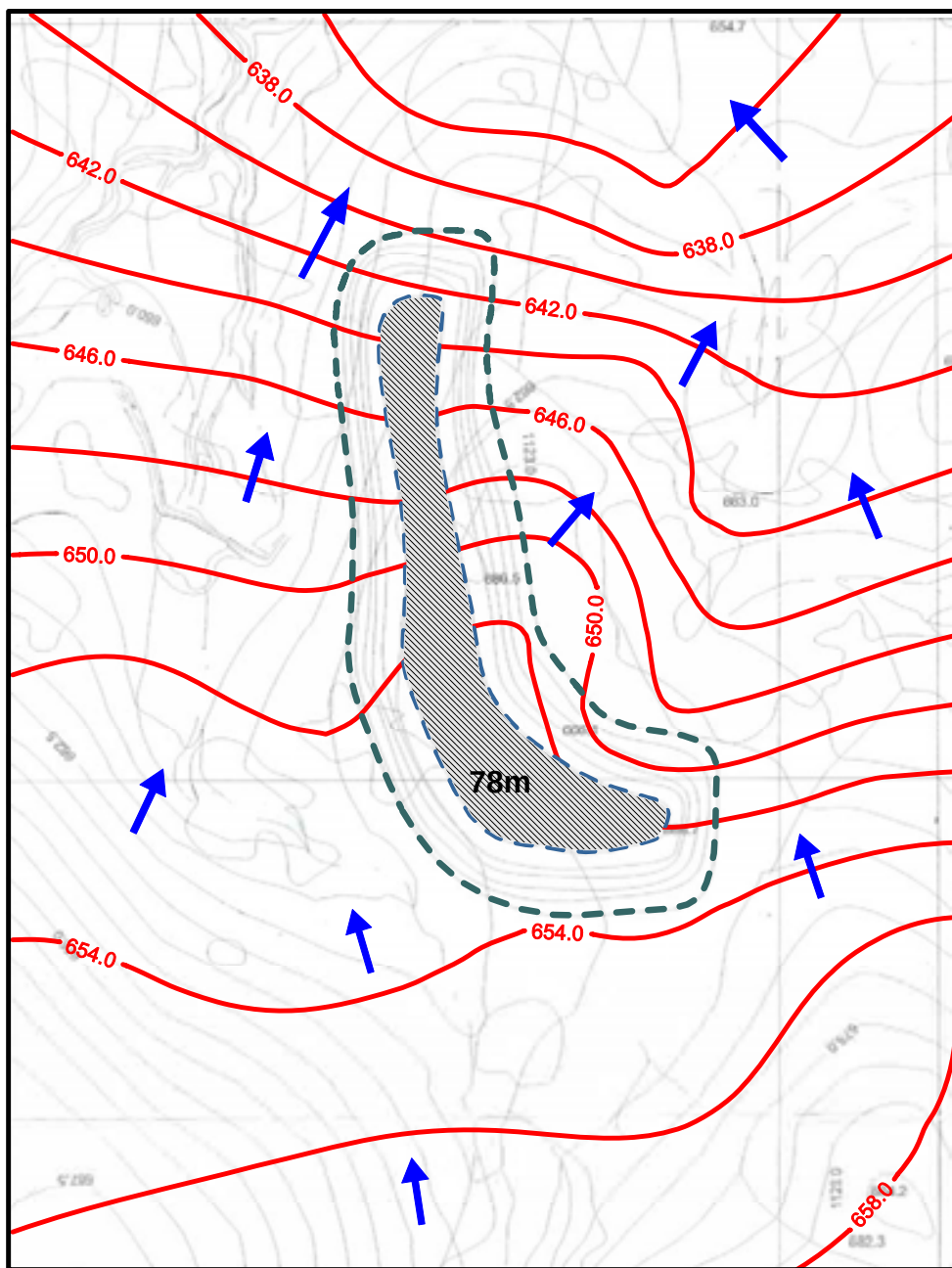

 100m
Stage 4

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 Tumby Umbi NSW 2261
 Phone 0428 884645

Groundwater Impact Assessment

Gunlake Quarry Project
 Quarry Plan – Stage 4

FIGURE 17



 Contours of Water Surface Elevation
 Direction of Groundwater Flow

Note: Topographic and water level contours in m AHD


 100m
Stage 5

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Groundwater Impact Assessment

Gunlake Quarry Project
 Quarry Plan – Stage 5

FIGURE 18