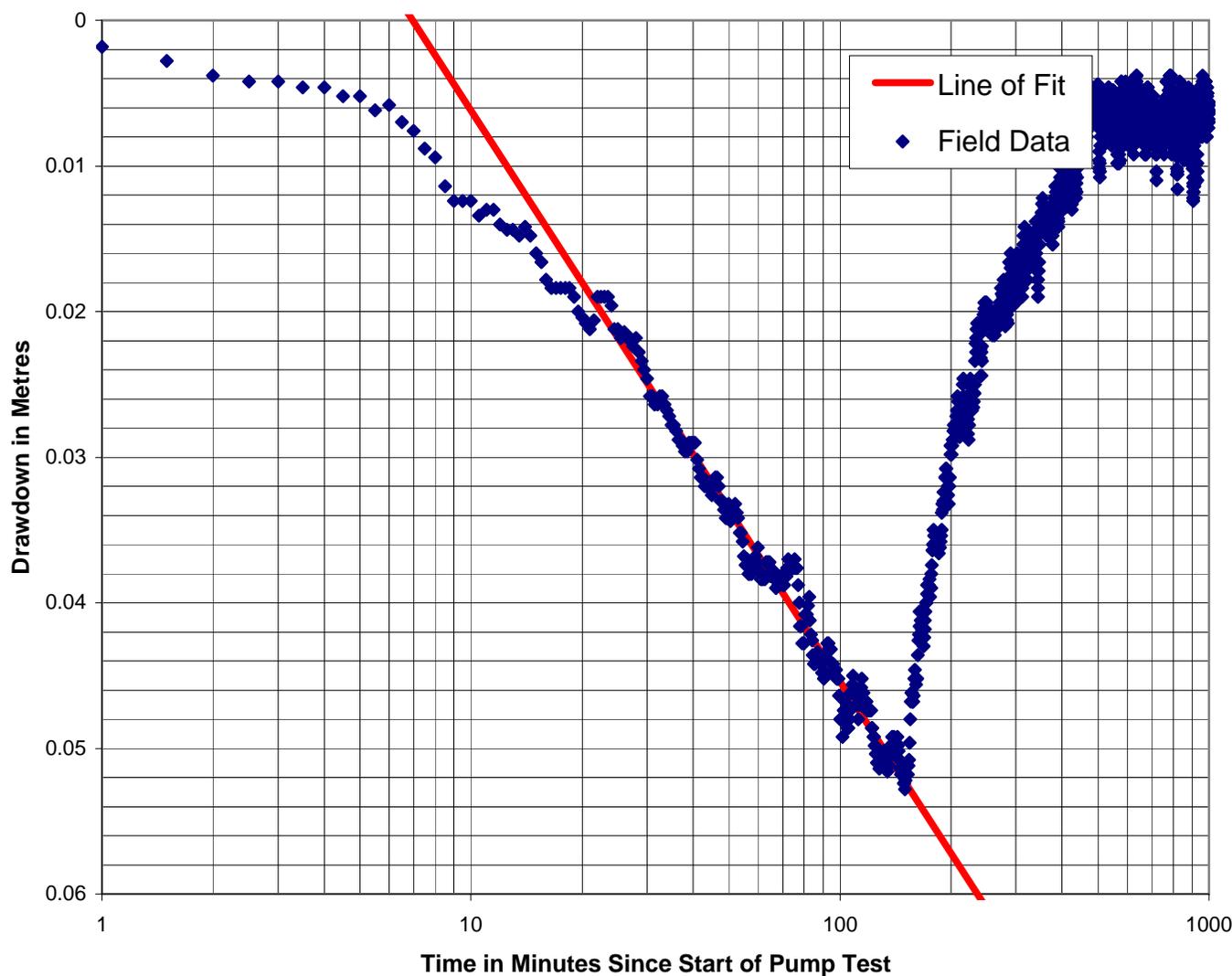


Appendix No.1

Pumping test BH 209 (2 & 6 February 2007 - 2.5 & 8 hour test) drawdown and recovery graphs

(Jacob Analysis)

4BH209 (lower gravel) 2.5hr Pump Test Observed at 4BH207 (upper/lower gravel) - Drawdown Analysis



Delta S: 0.0392 m

Flow Rate: 90.72 cu.m/day

T: 423.5795 sq.m/day

Project: Junction 5 M74 Raith

Client: Mouchel Fairhurst JV

Ref: J267_Radias001

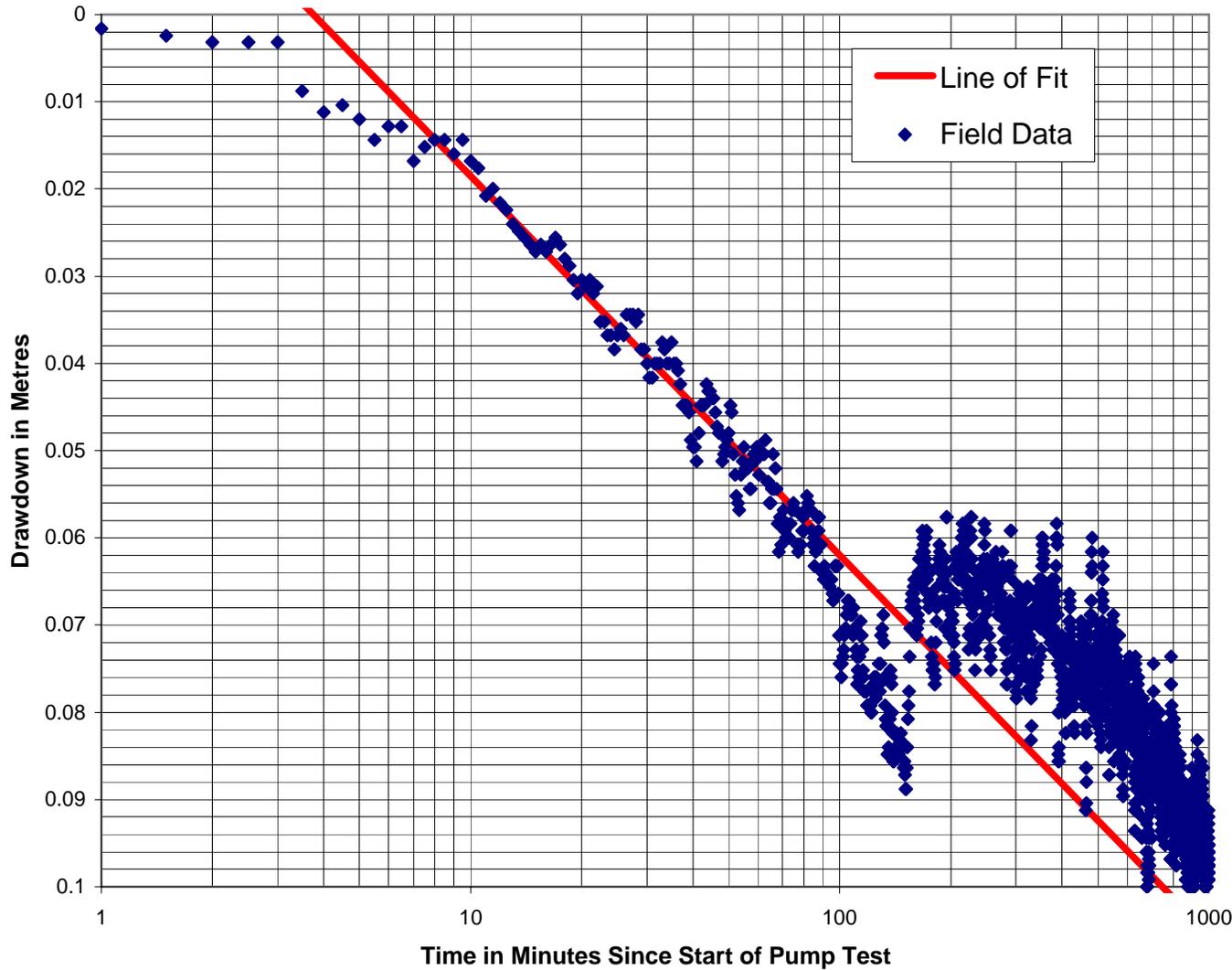
Start of Test: 02-Feb-06

Drawn By: JGG

Checked: DJF



4BH209 (lower gravel) 2.5hr Pump Test Observed at 4BH207A (upper/lower gravel) - Drawdown Analysis



Delta S: 0.0435 m

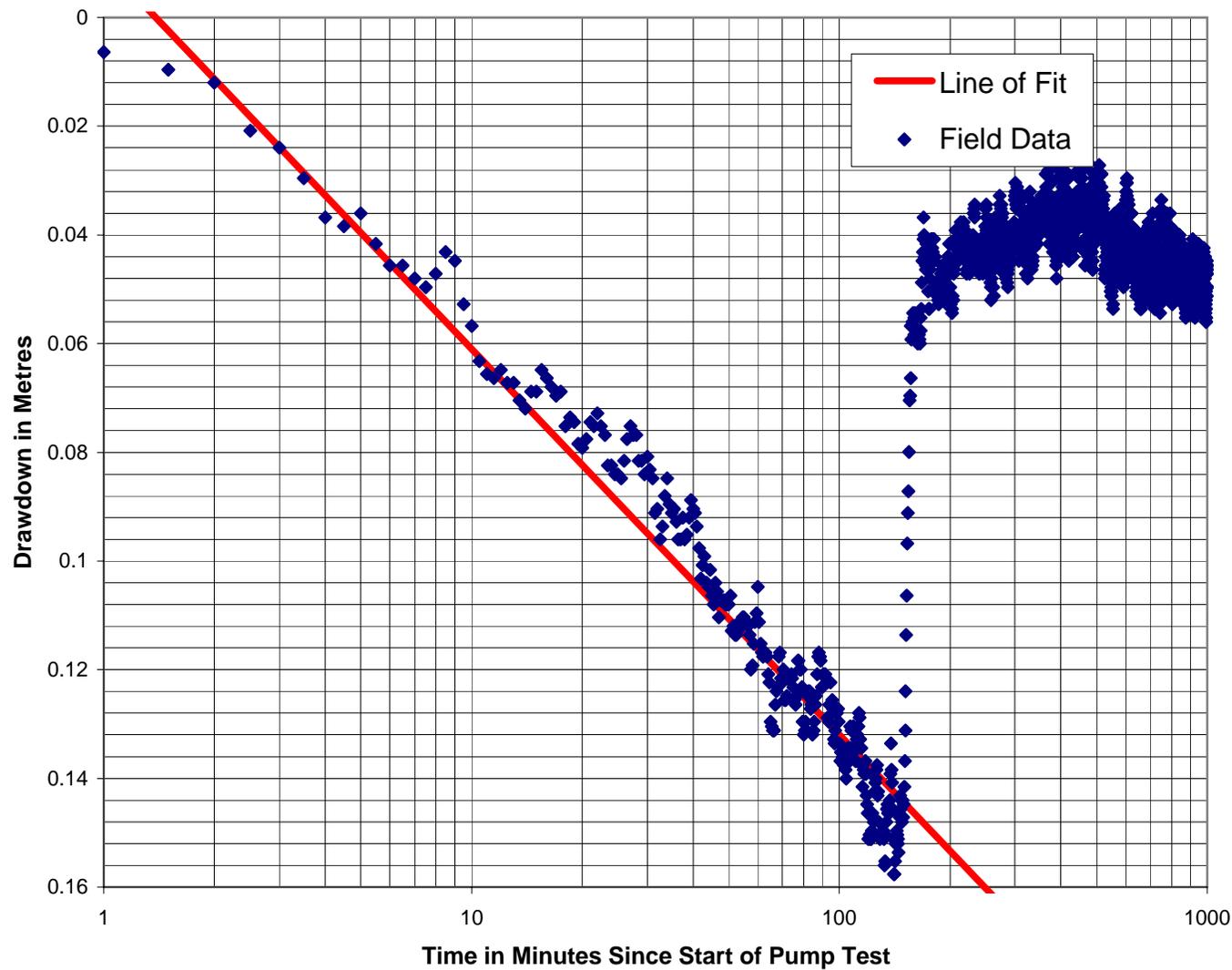
Flow Rate: 90.72 cu.m/day

T: 381.7084 sq.m/day

Project:	Junction 5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias001
Start of Test:	02-Feb-06
Drawn By:	JGG
Checked:	DJF



4BH209 (lower gravel) 2.5hr Pump Test Observed at 4BH208 (upper gravel) - Drawdown Analysis



Delta S: 0.071 m

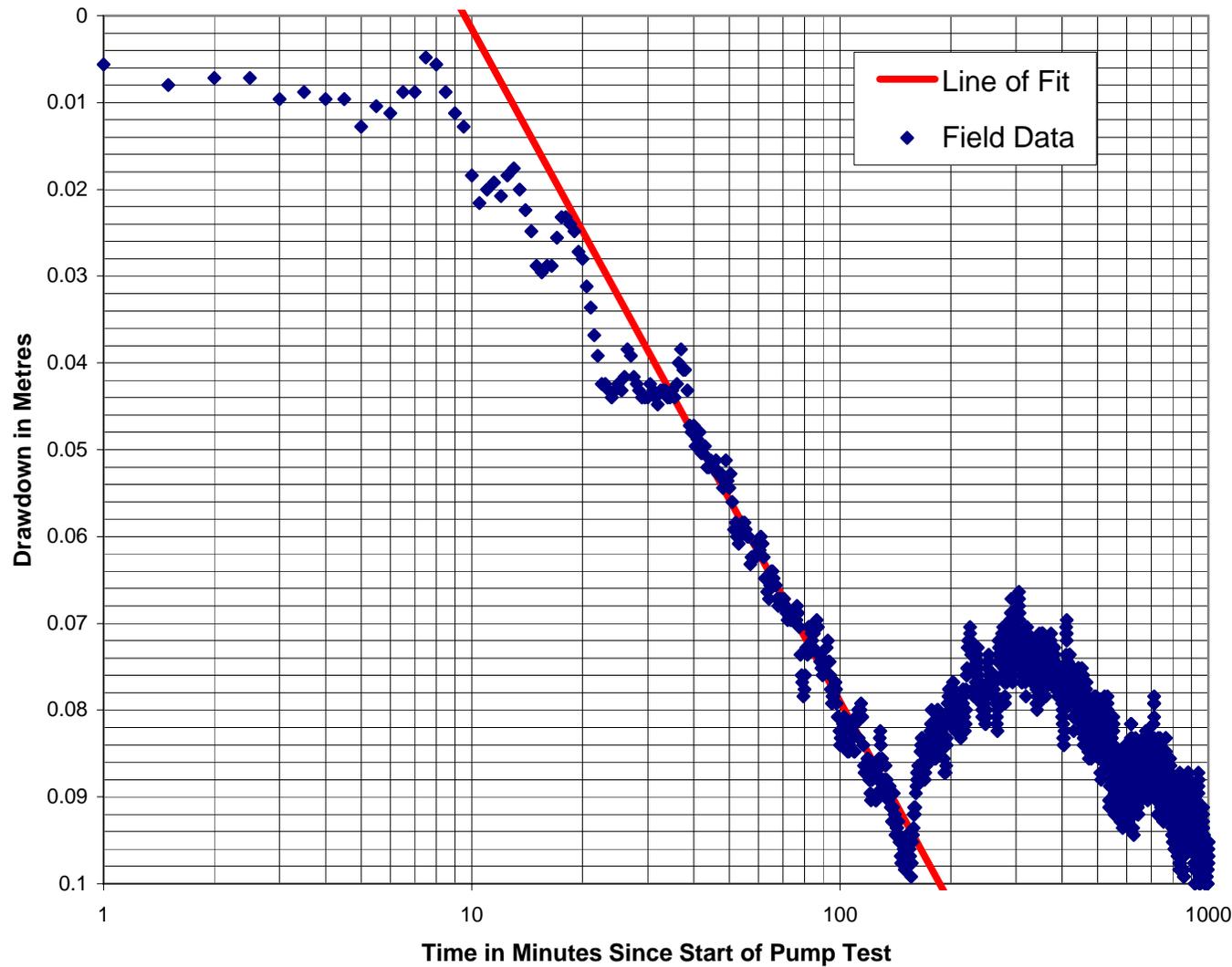
Flow Rate: 90.72 cu.m/day

T: 233.8636 sq.m/day

Project:	Junction 5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias001
Start of Test:	02-Feb-06
Drawn By:	JGG
Checked:	DJF



4BH209 (lower gravel) 2.5hr Pump Test Observed at 4BH217 (lower gravel) - Drawdown Analysis



Delta S: 0.0775 m

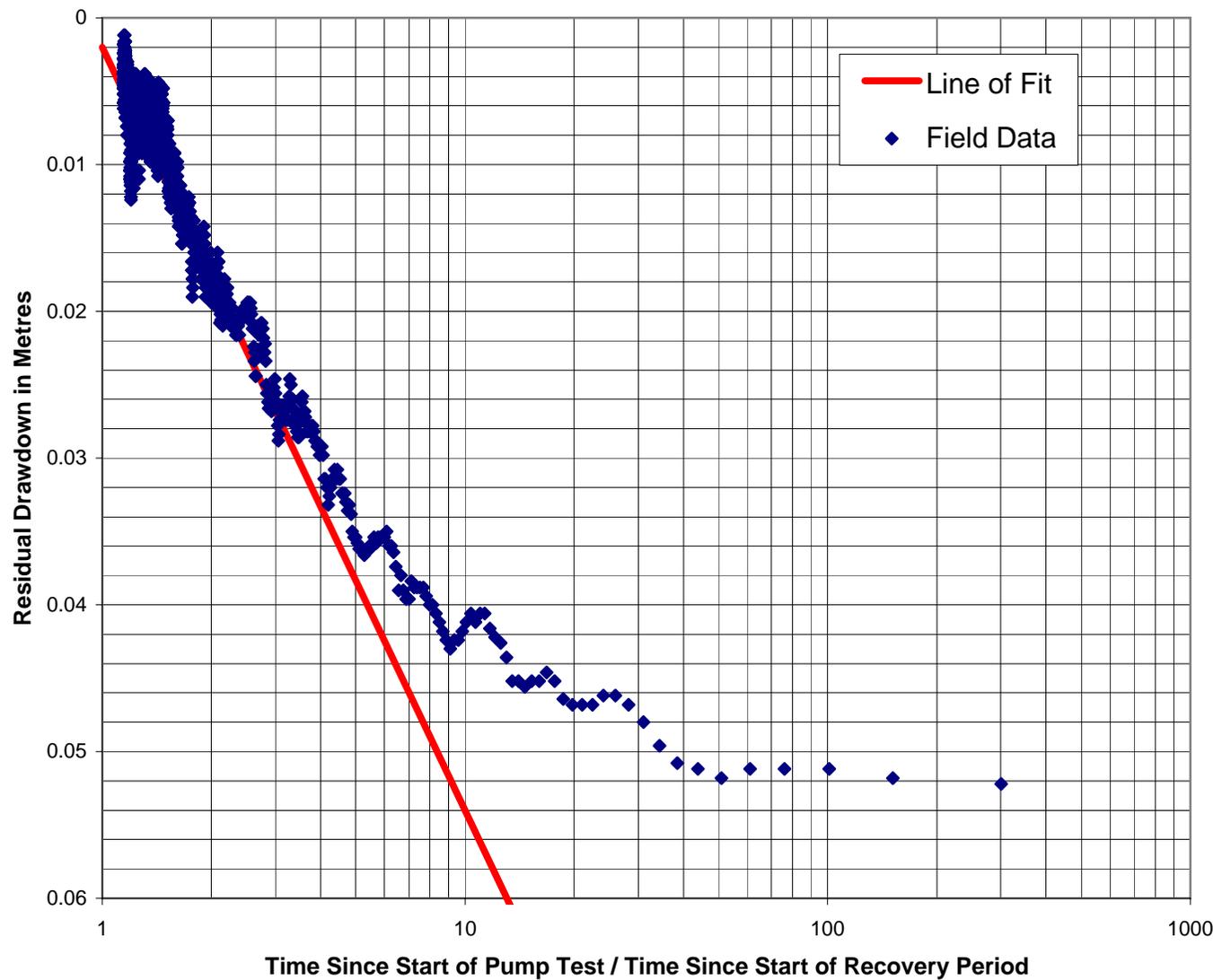
Flow Rate: 90.72 cu.m/day

T: 214.2493 sq.m/day

Project:	Junction 5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias001
Start of Test:	02-Feb-06
Drawn By:	JGG
Checked:	DJF



4BH209 (lower gravel) 2.5hr Pump Test Observed at 4BH207 (upper/lower gravel) - Recovery Analysis



Delta S: 0.052 m

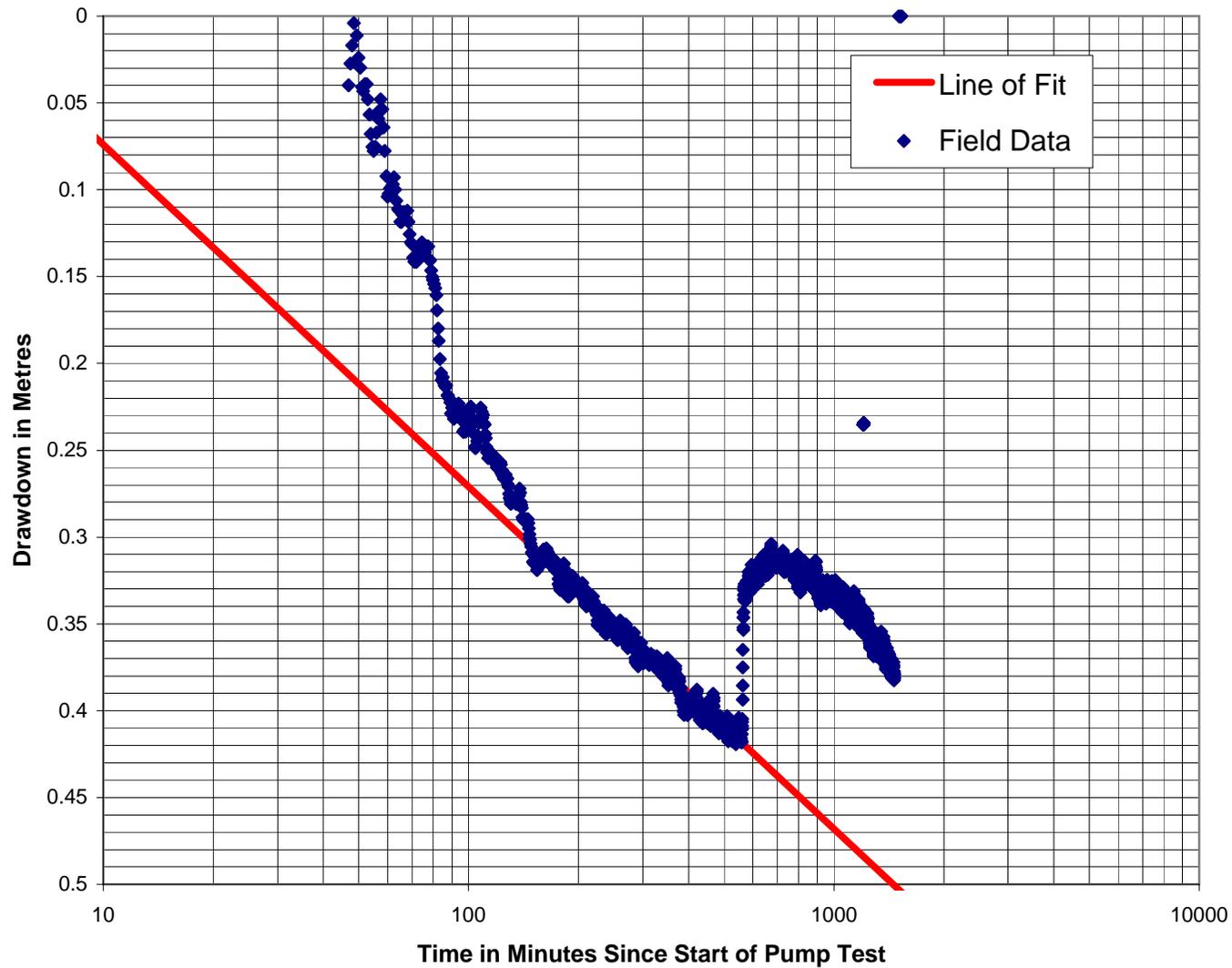
Flow Rate: 90.72 cu.m/day

T: 319.3138 sq.m/day

Project:	Junction 5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias001
Start of Test:	02-Feb-06
Drawn By:	JGG
Checked:	GR



4BH209 (lower gravel) 8hr Pump Test Observed at 4BH208 (upper gravel) - Drawdown Analysis



Delta S: 0.197 m

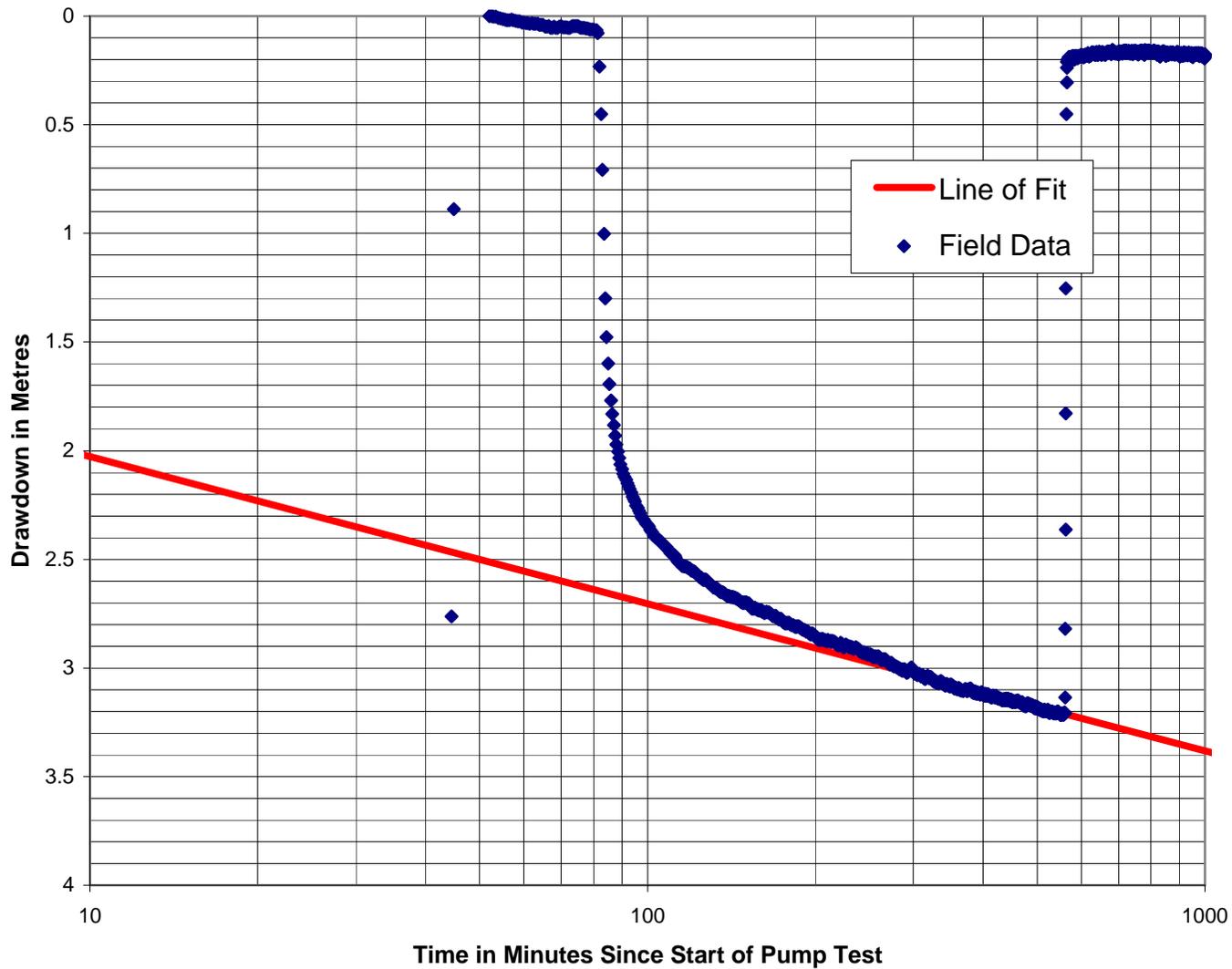
Flow Rate: 21.6 cu.m/day

T: 20.06806 sq.m/day

Project:	Junction 5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias002
Start of Test:	06-Feb-06
Drawn By:	JGG
Checked:	DJF



4BH209 (lower gravel) 8hr Pump Test Observed at 4BH209 (lower gravel) - Drawdown Analysis



Delta S: 0.6775 m

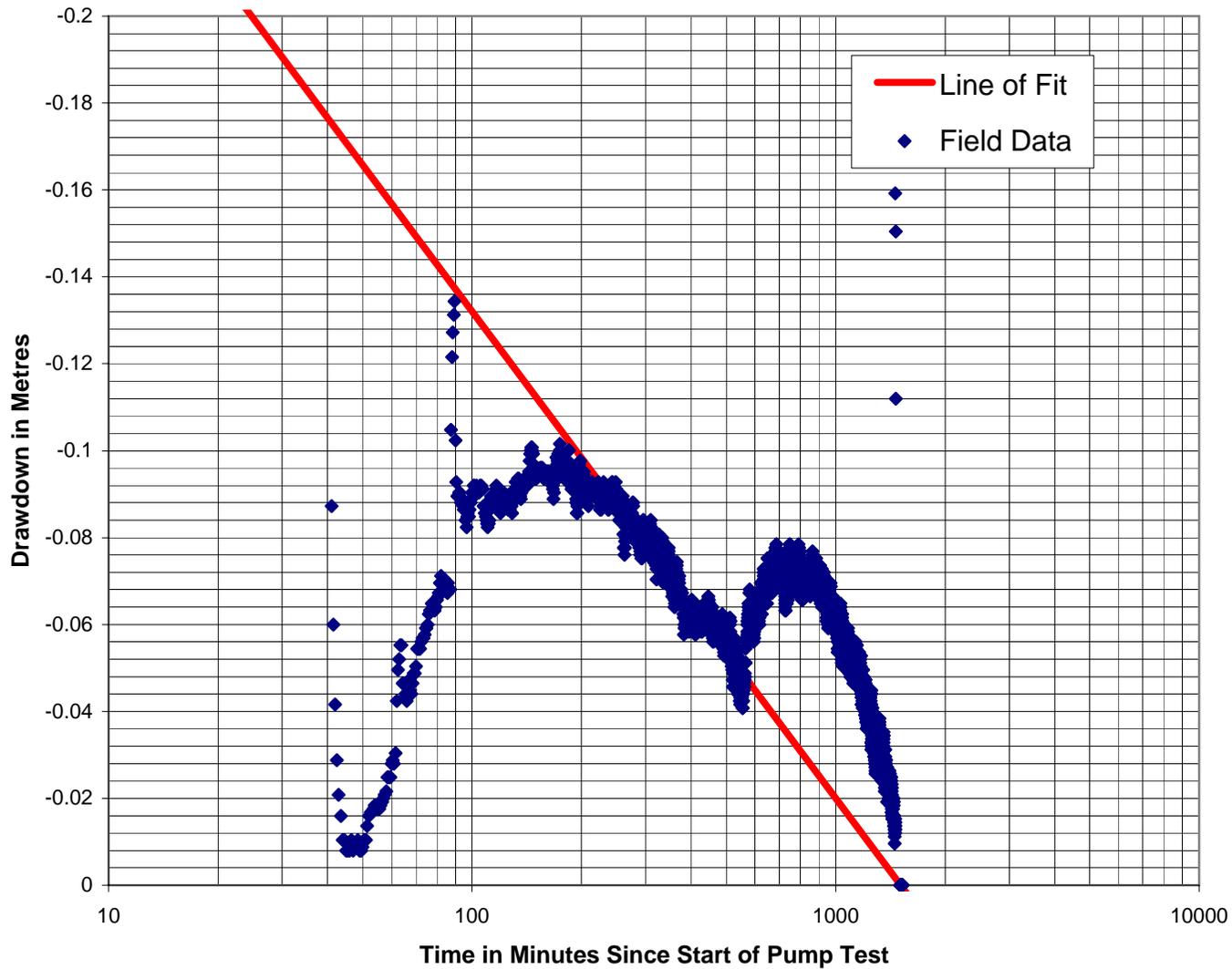
Flow Rate: 21.6 cu.m/day

T: 5.83529 sq.m/day

Project:	Junction 5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias002
Start of Test:	06-Feb-06
Drawn By:	JGG
Checked:	DJF



4BH209 (lower gravel) 8hr Pump Test Observed at 4BH217 (lower gravel) - Drawdown Analysis



Delta S: 0.112 m

Flow Rate: 21.6 cu.m/day

T: 35.29829 sq.m/day

Project:	Junction 5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias002
Start of Test:	06-Feb-06
Drawn By:	JGG
Checked:	DJF

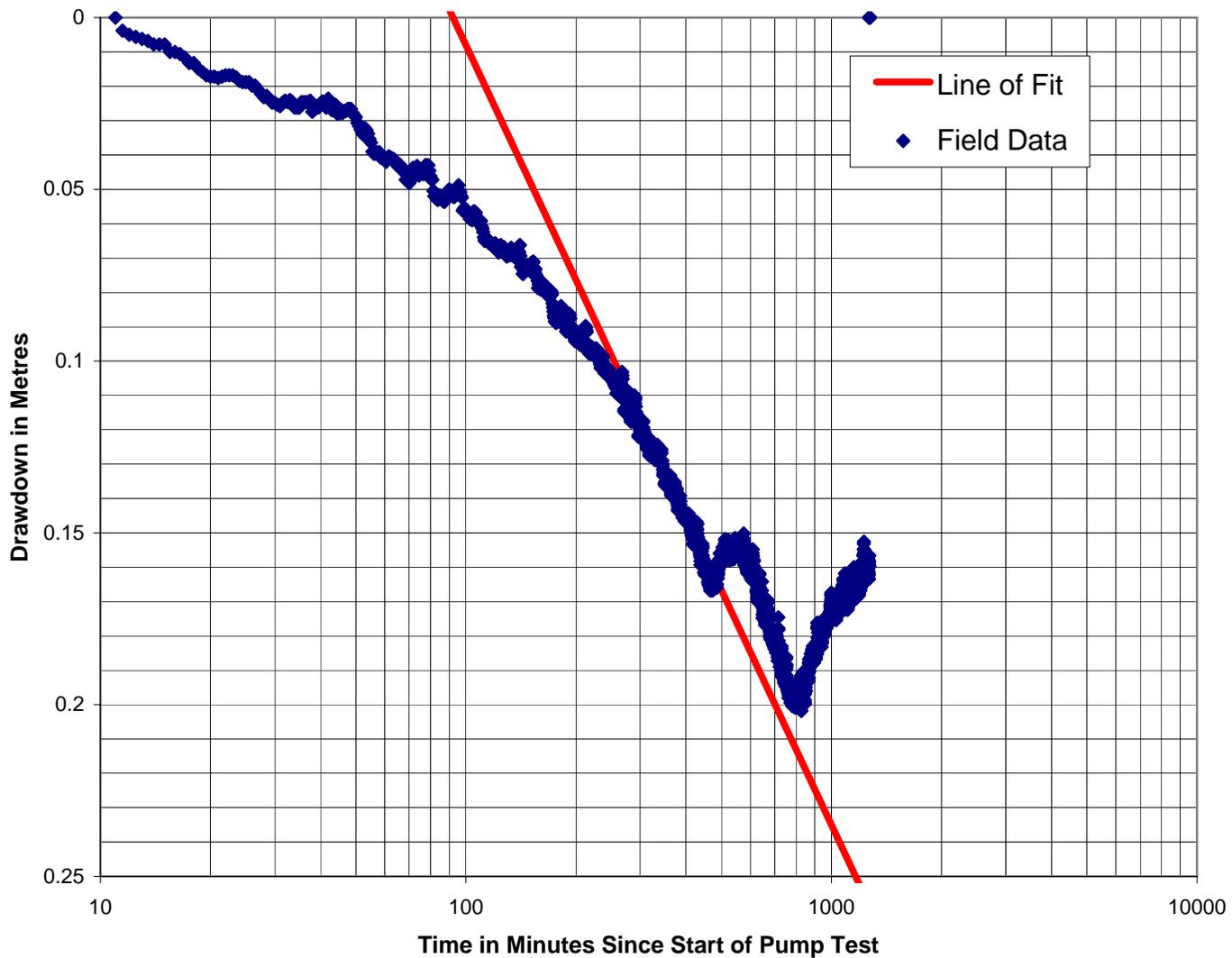


Appendix No.2

Pumping test BH 217 (14 February 2007 - 8 hour test) drawdown graphs

(Jacob Analysis)

4BH217 (lower gravel) 8hr Pump Test Observed at 4BH208 (upper gravel) - Drawdown Analysis



Delta S: 0.227 m

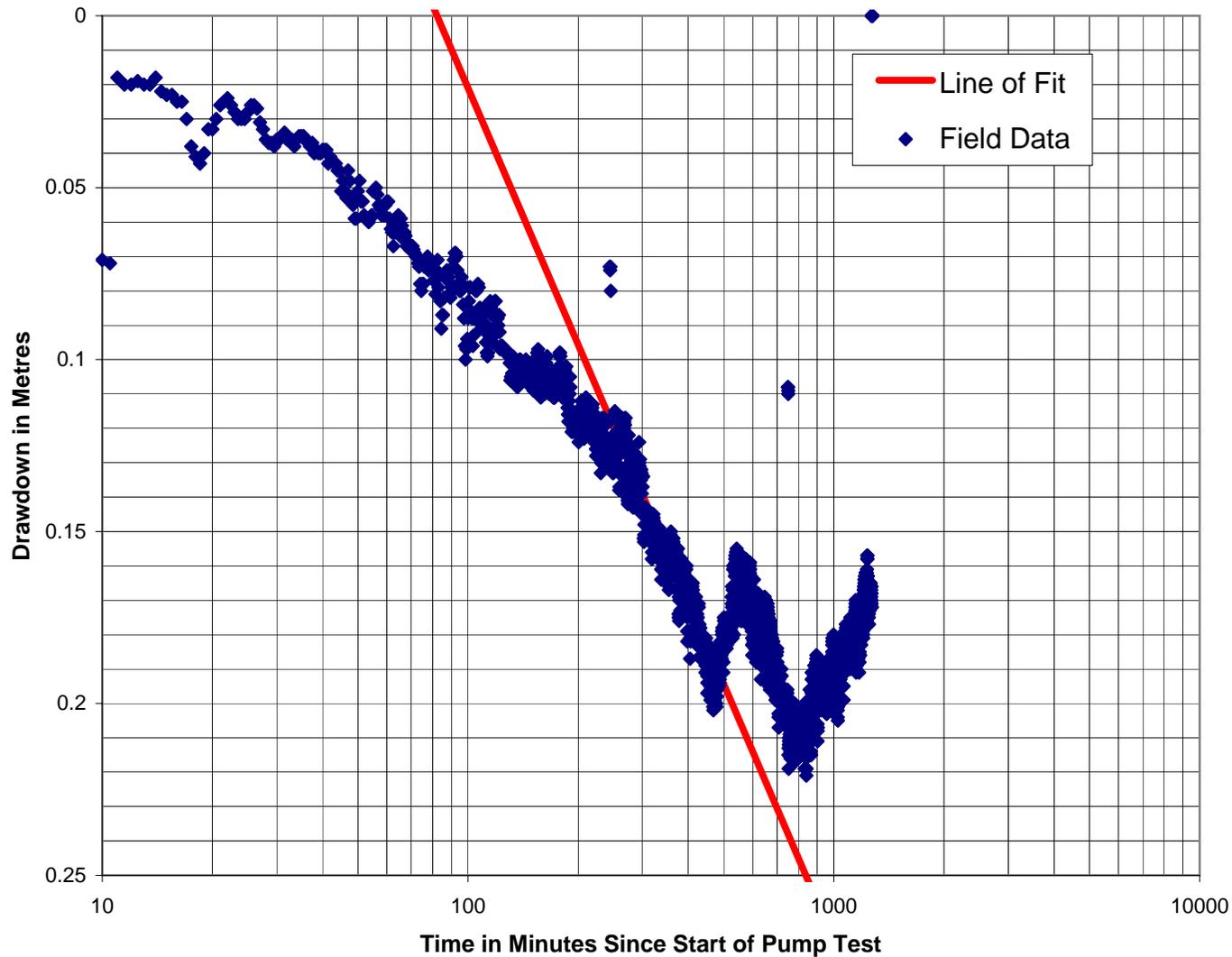
Flow Rate: 94.176 cu.m/day

T: 75.93331 sq.m/day

Project:	Junction 5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias003
Start of Test:	14-Feb-06
Drawn By:	JGG
Checked:	DJF



4BH217 (lower gravel) 8hr Pump Test Observed at 4BH209 (lower gravel) - Drawdown Analysis



Delta S: 0.248 m

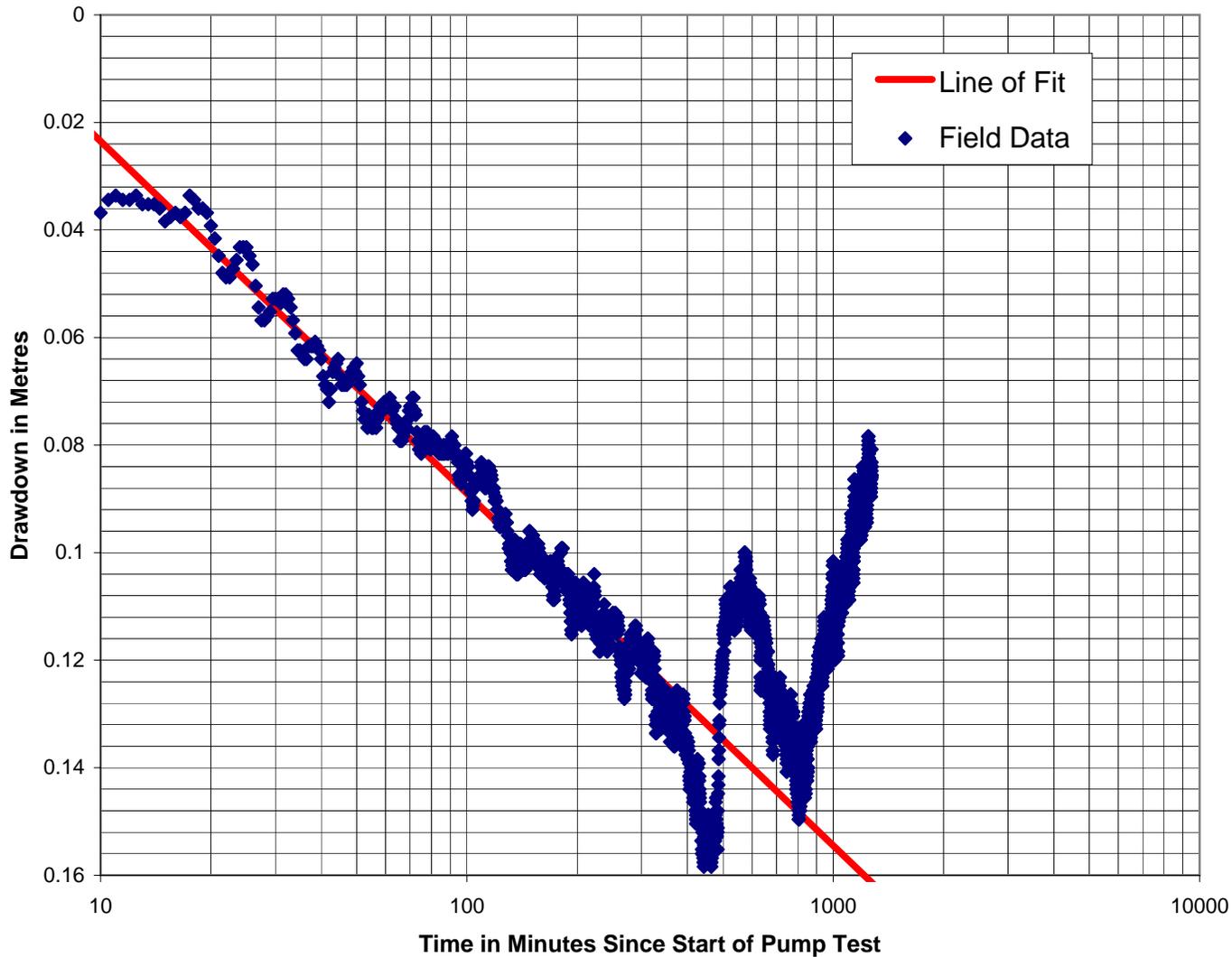
Flow Rate: 94.176 cu.m/day

T: 69.50348 sq.m/day

Project:	Junction 5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias003
Start of Test:	14-Feb-06
Drawn By:	JGG
Checked:	DJF



4BH217 (lower gravel) 8hr Pump Test Observed at 4BH216 (upper gravel) - Drawdown Analysis



Delta S: 0.0655 m

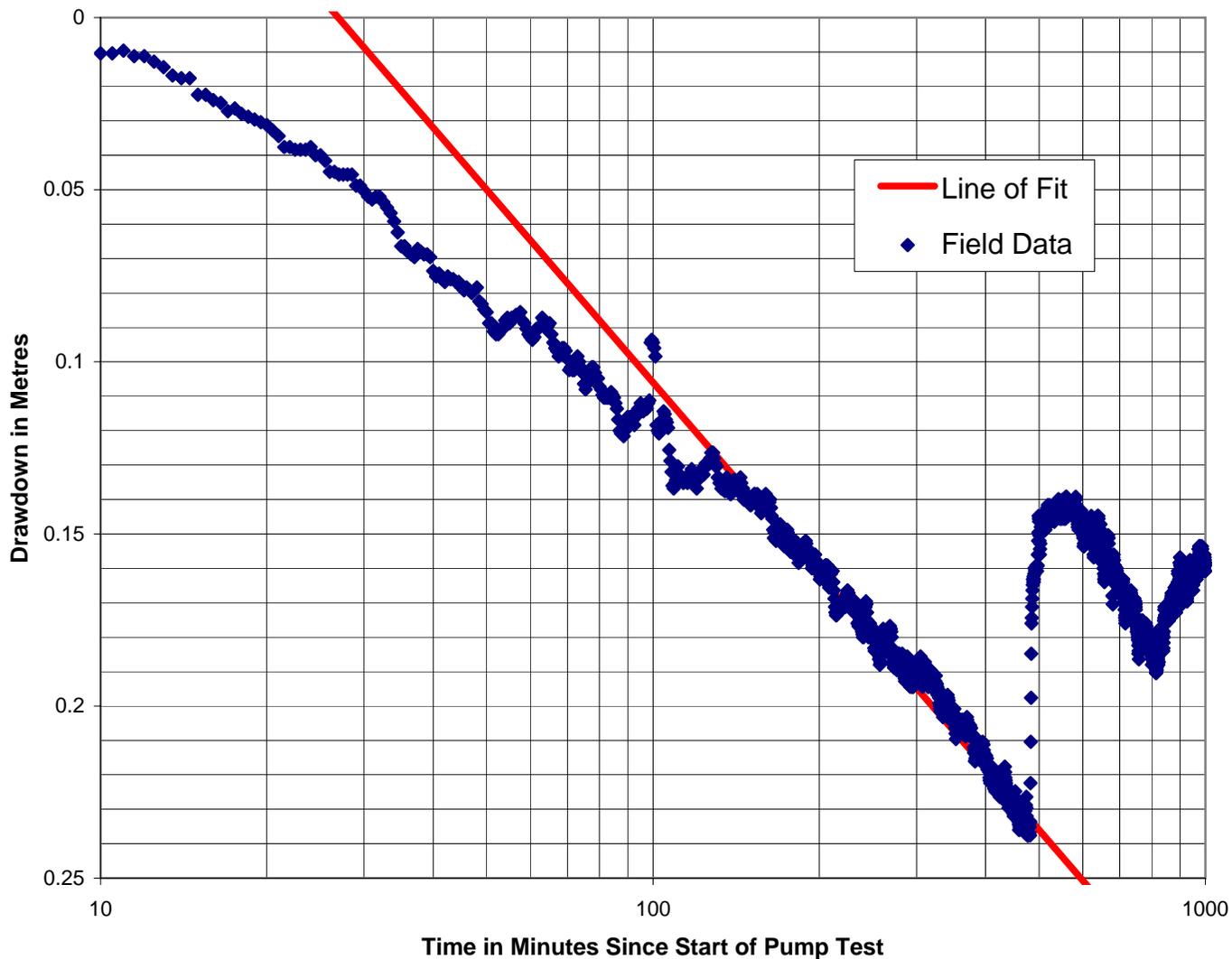
Flow Rate: 94.176 cu.m/day

T: 263.1582 sq.m/day

Project:	Junction 5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias003
Start of Test:	14-Feb-06
Drawn By:	JGG
Checked:	DJF



4BH217 (lower gravel) 8hr Pump Test Observed at 4BH218B (lower gravel) - Drawdown Analysis



Delta S: 0.186 m

Flow Rate: 94.176 cu.m/day

T: 92.6713 sq.m/day

Project: Junction 5 M74 Raith

Client: Mouchel Fairhurst JV

Ref: J267_Radias003

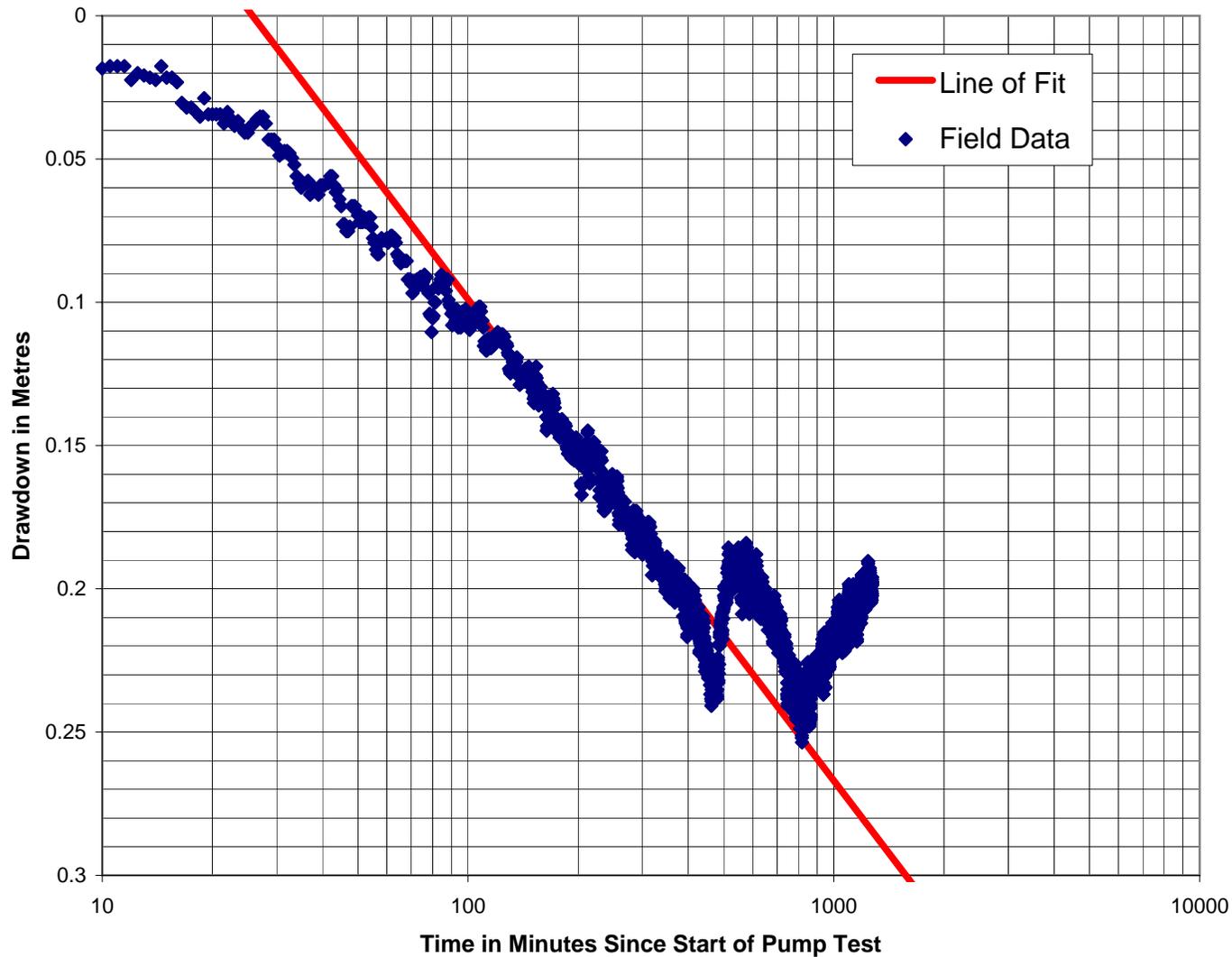
Start of Test: 14-Feb-06

Drawn By: JGG

Checked: DJF



4BH217 (lower gravel) 8hr Pump Test Observed at 4BH265 (rock) - Drawdown Analysis



Delta S: 0.168 m

Flow Rate: 94.176 cu.m/day

T: 102.6004 sq.m/day

Project:	Junction 5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias003
Start of Test:	14-Feb-06
Drawn By:	JGG
Checked:	DJF

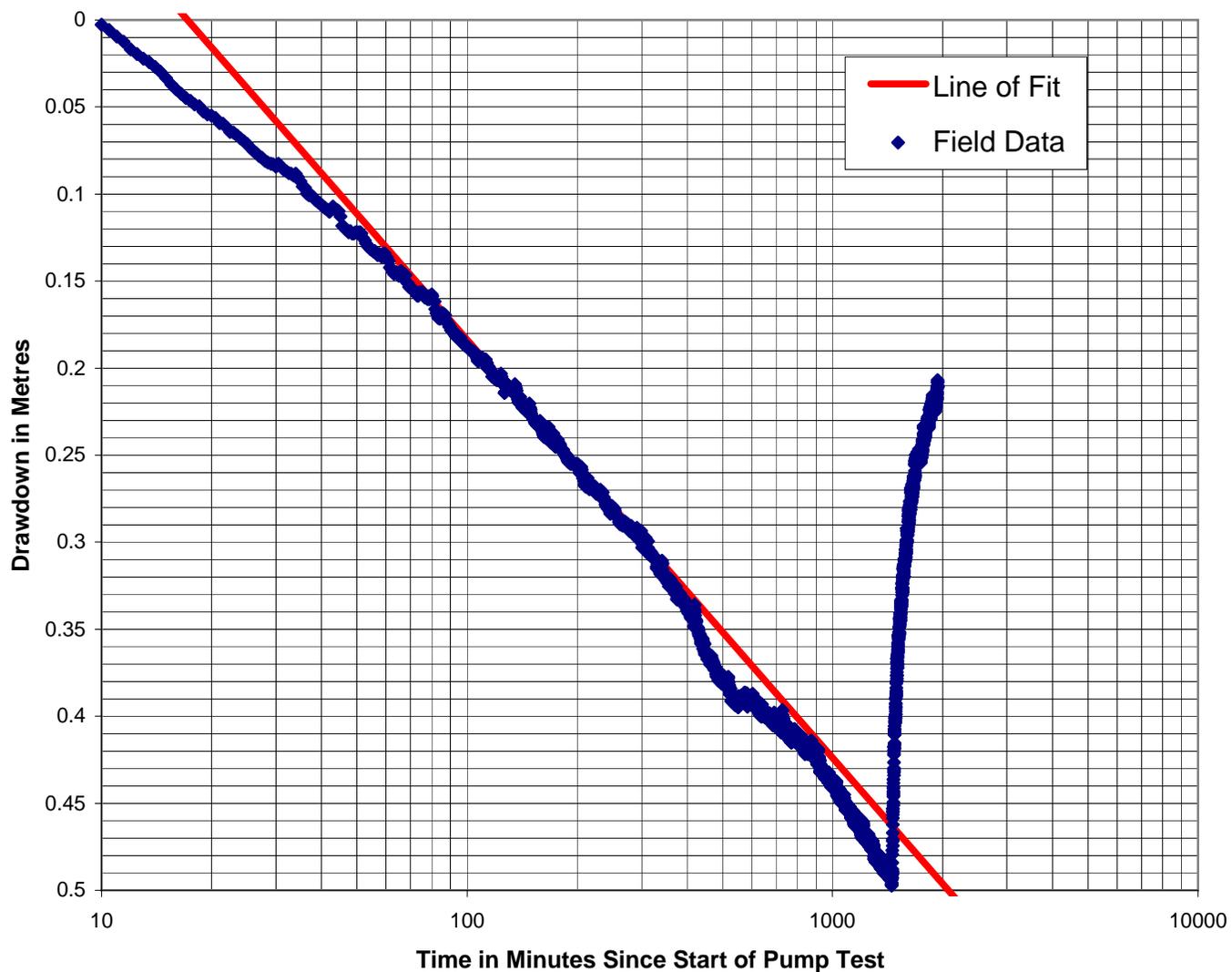


Appendix No.3

Pumping test BH 217 (23-24 February 2007 - 24 hour test) drawdown and recovery graphs

(Jacob Analysis)

4BH217 (lower gravel) 24hr Pump Test Observed at 4BH208 (upper gravel) - Drawdown Analysis

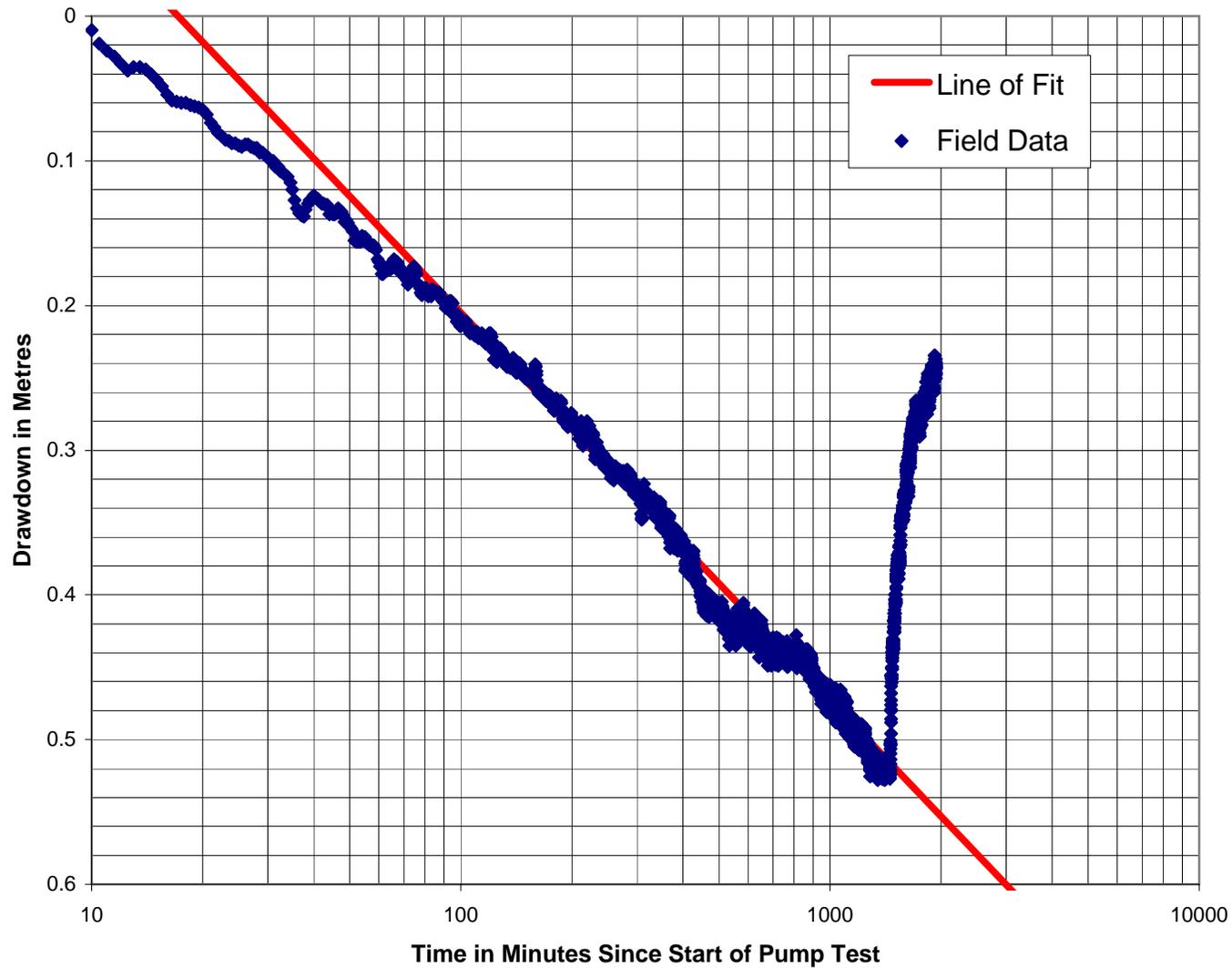


Delta S:	0.24025 m
Flow Rate:	483.84 cu.m/day
T:	368.6009 sq.m/day

Project:	Junction 5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias004
Start of Test:	23-Feb-06
Drawn By:	JGG
Checked:	DJF



4BH217 (lower gravel) 24hr Pump Test Observed at 4BH209 (lower gravel) - Drawdown Analysis



Delta S: 0.2675 m

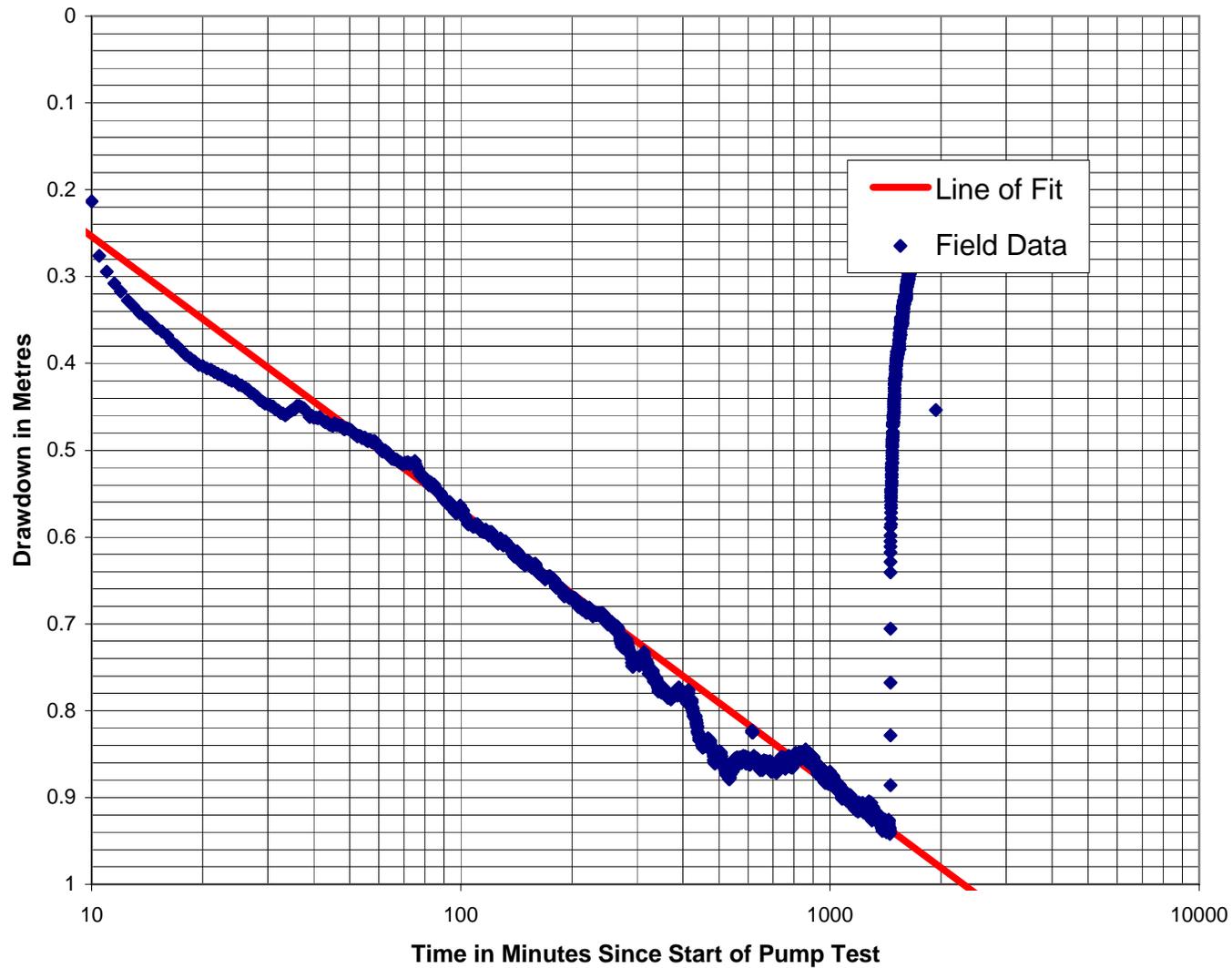
Flow Rate: 483.84 cu.m/day

T: 331.0518 sq.m/day

Project:	Junction 5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias004
Start of Test:	23-Feb-06
Drawn By:	JGG
Checked:	DJF



4BH217 (lower gravel) 24hr Pump Test Observed at 4BH218B (lower gravel) - Drawdown Analysis



Delta S: 0.316 m

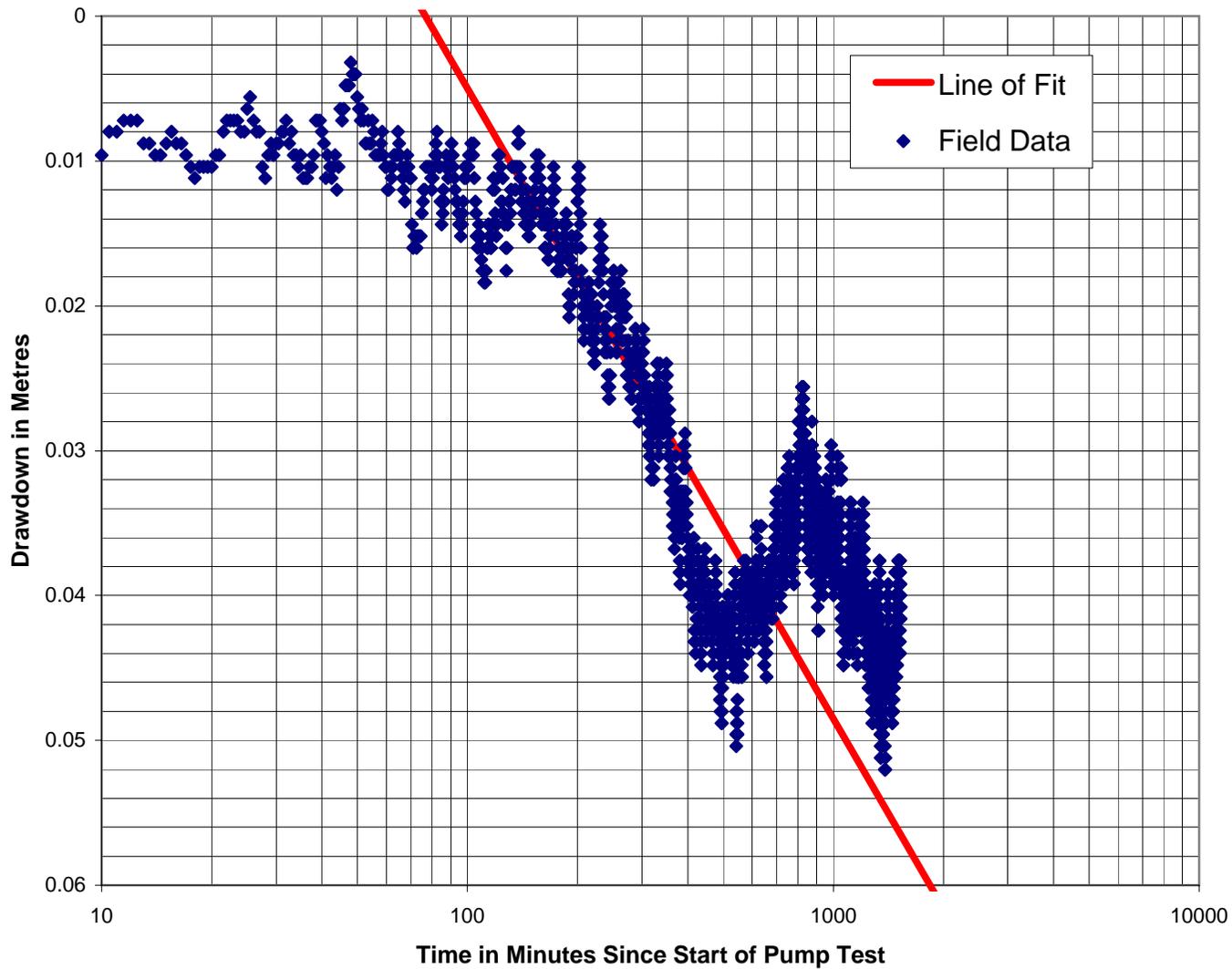
Flow Rate: 483.84 cu.m/day

T: 280.2416 sq.m/day

Project:	Junction 5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias004
Start of Test:	23-Feb-06
Drawn By:	JGG
Checked:	DJF



4BH217 (lower gravel) 24hr Pump Test Observed at 4BH225 (upper gravel) - Drawdown Analysis



Delta S: 0.0435 m

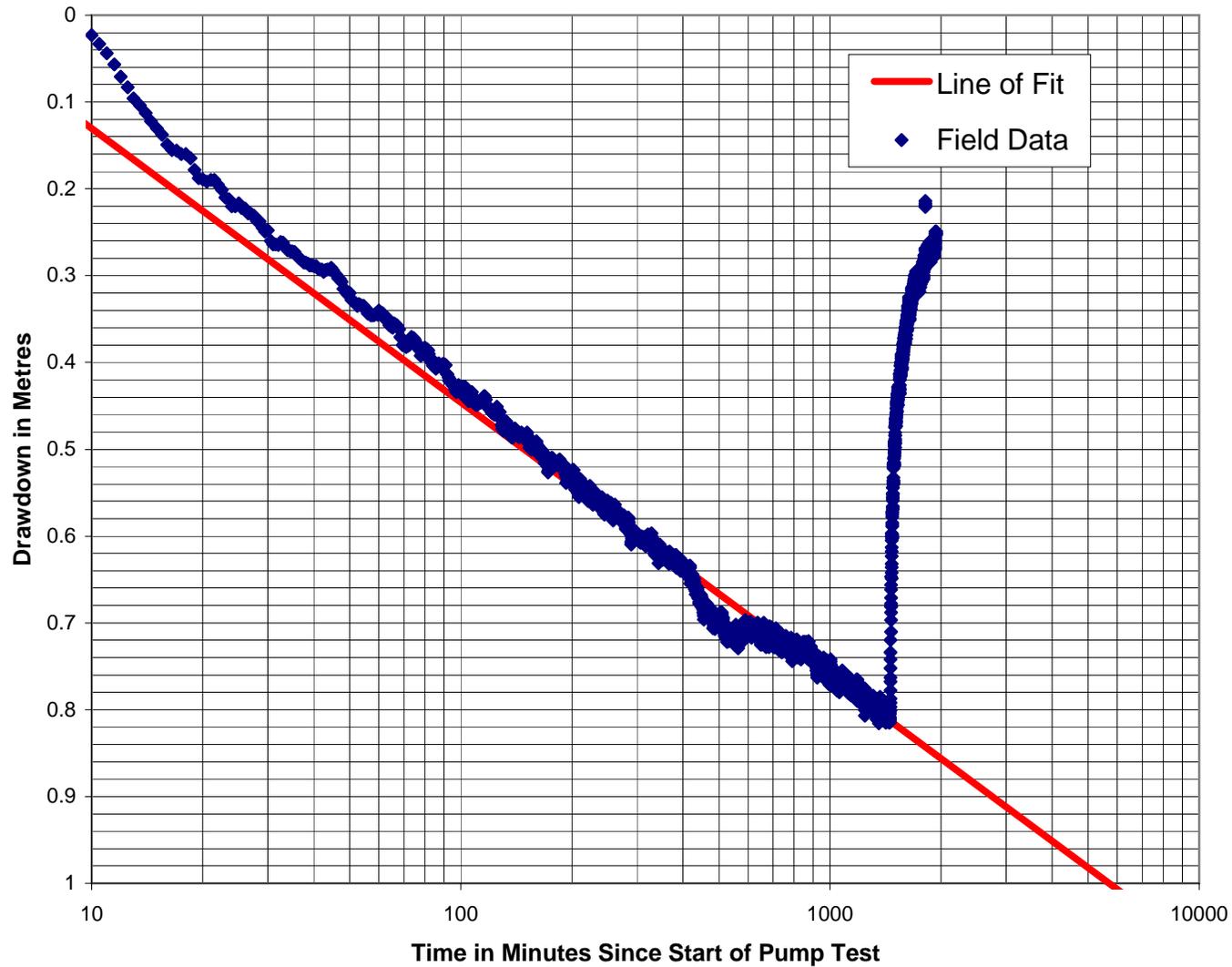
Flow Rate: 483.84 cu.m/day

T: 2035.778 sq.m/day

Project:	Junction 5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias004
Start of Test:	23-Feb-06
Drawn By:	JGG
Checked:	DJF



4BH217 (lower gravel) 24hr Pump Test Observed at 4BH265 (rock) - Drawdown Analysis



Delta S: 0.3155 m

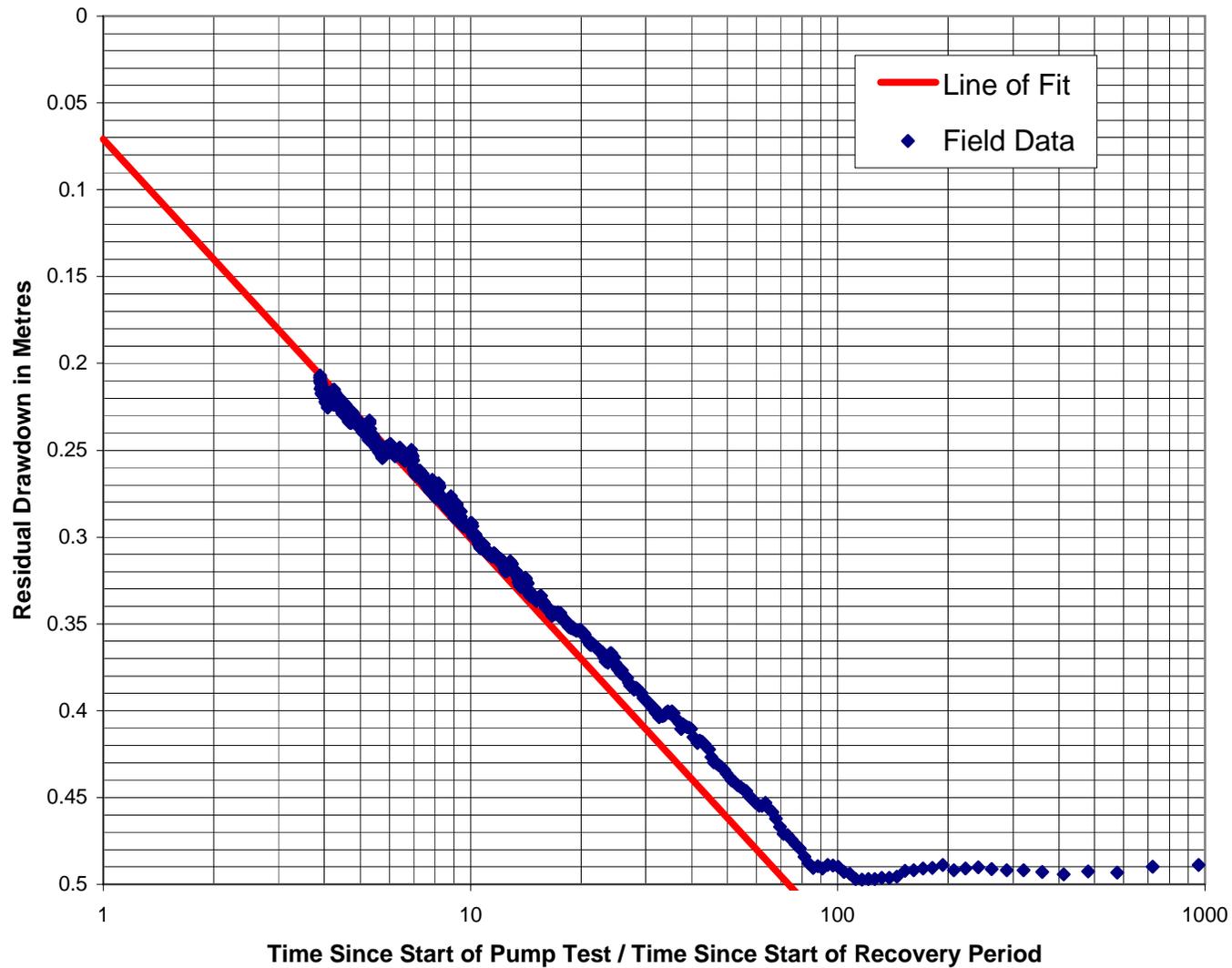
Flow Rate: 483.84 cu.m/day

T: 280.6858 sq.m/day

Project:	Junction 5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias004
Start of Test:	23-Feb-06
Drawn By:	JGG
Checked:	DJF



4BH217 (lower gravel) 24hr Pump Test Observed at 4BH208 (upper gravel) - Recovery Analysis



Delta S: 0.23 m

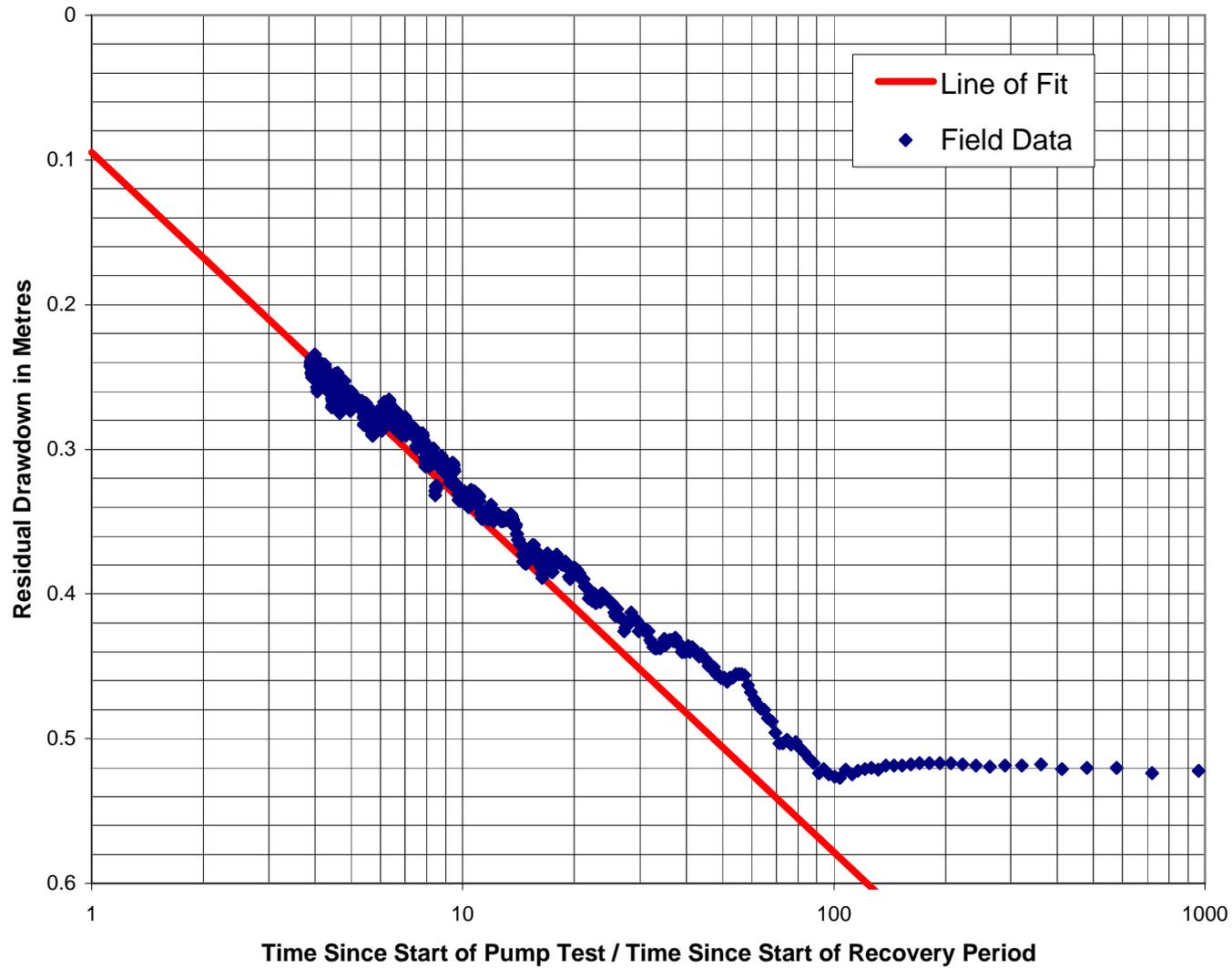
Flow Rate: 483.84 cu.m/day

T: 385.0276 sq.m/day

Project:	Junction 5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias004
Start of Test:	23-Feb-06
Drawn By:	JGG
Checked:	GR



4BH217 (lower gravel) 24hr Pump Test Observed at 4BH209 (lower gravel) - Recovery Analysis



Delta S: 0.24175 m

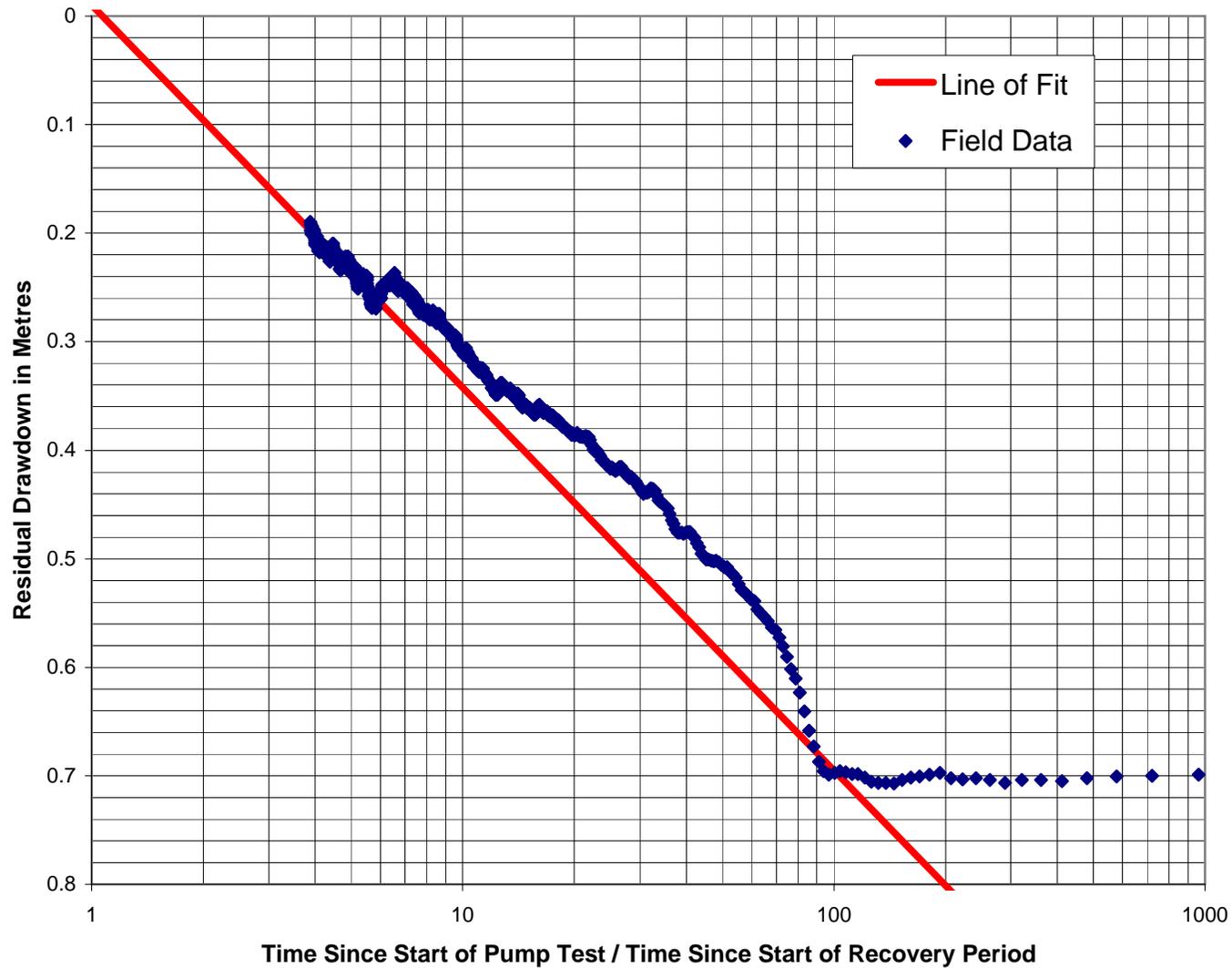
Flow Rate: 483.84 cu.m/day

T: 366.3138 sq.m/day

Project:	Junction 5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias004
Start of Test:	23-Feb-06
Drawn By:	JGG
Checked:	GR



4BH217 (lower gravel) 24hr Pump Test Observed at 4BH216 (upper gravel) - Recovery Analysis



Delta S: 0.3525 m

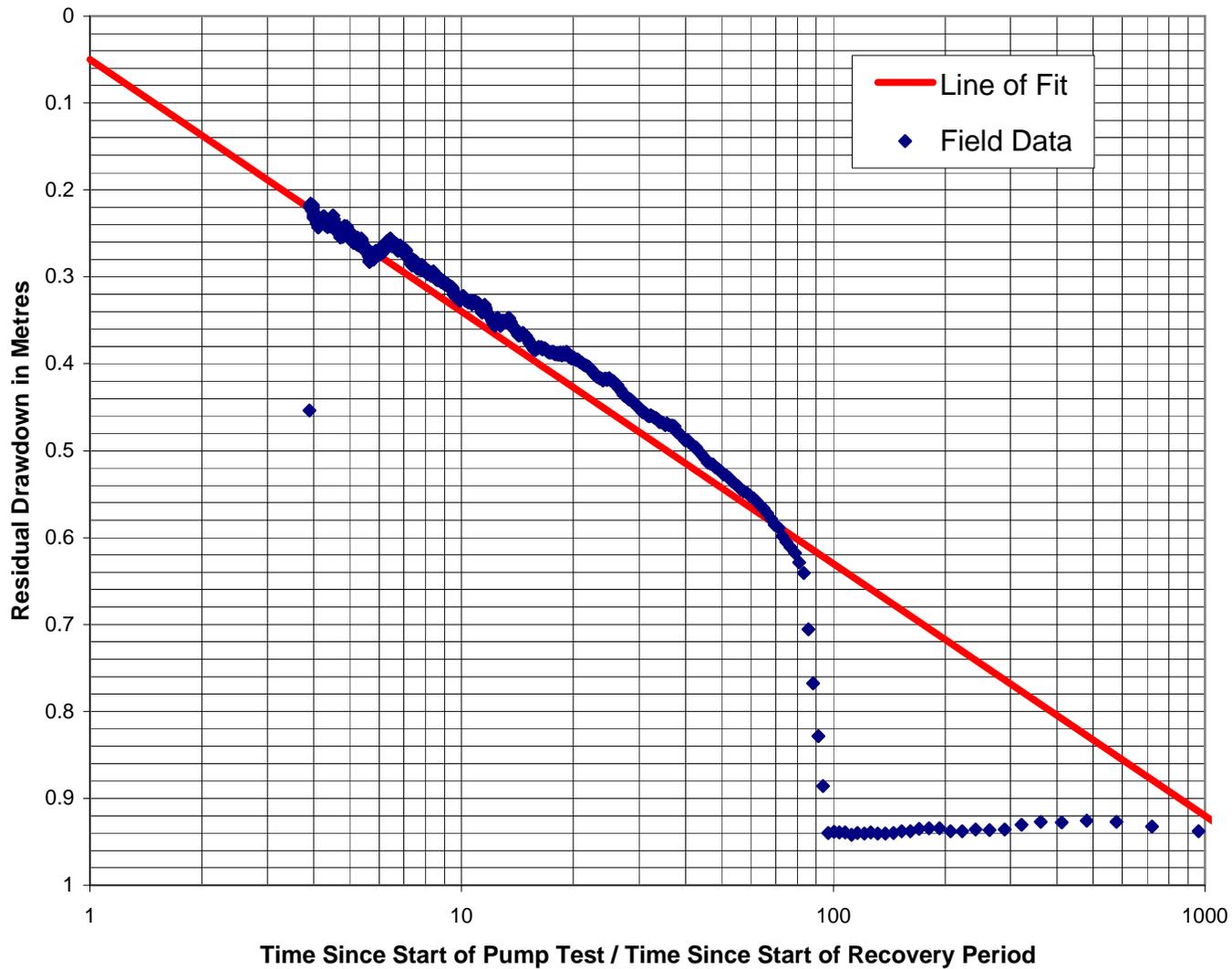
Flow Rate: 483.84 cu.m/day

T: 251.2237 sq.m/day

Project:	Junction 5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias004
Start of Test:	23-Feb-06
Drawn By:	JGG
Checked:	GR



4BH217 (lower gravel) 24hr Pump Test Observed at 4BH218B (lower gravel) - Recovery Analysis



Delta S: 0.29 m

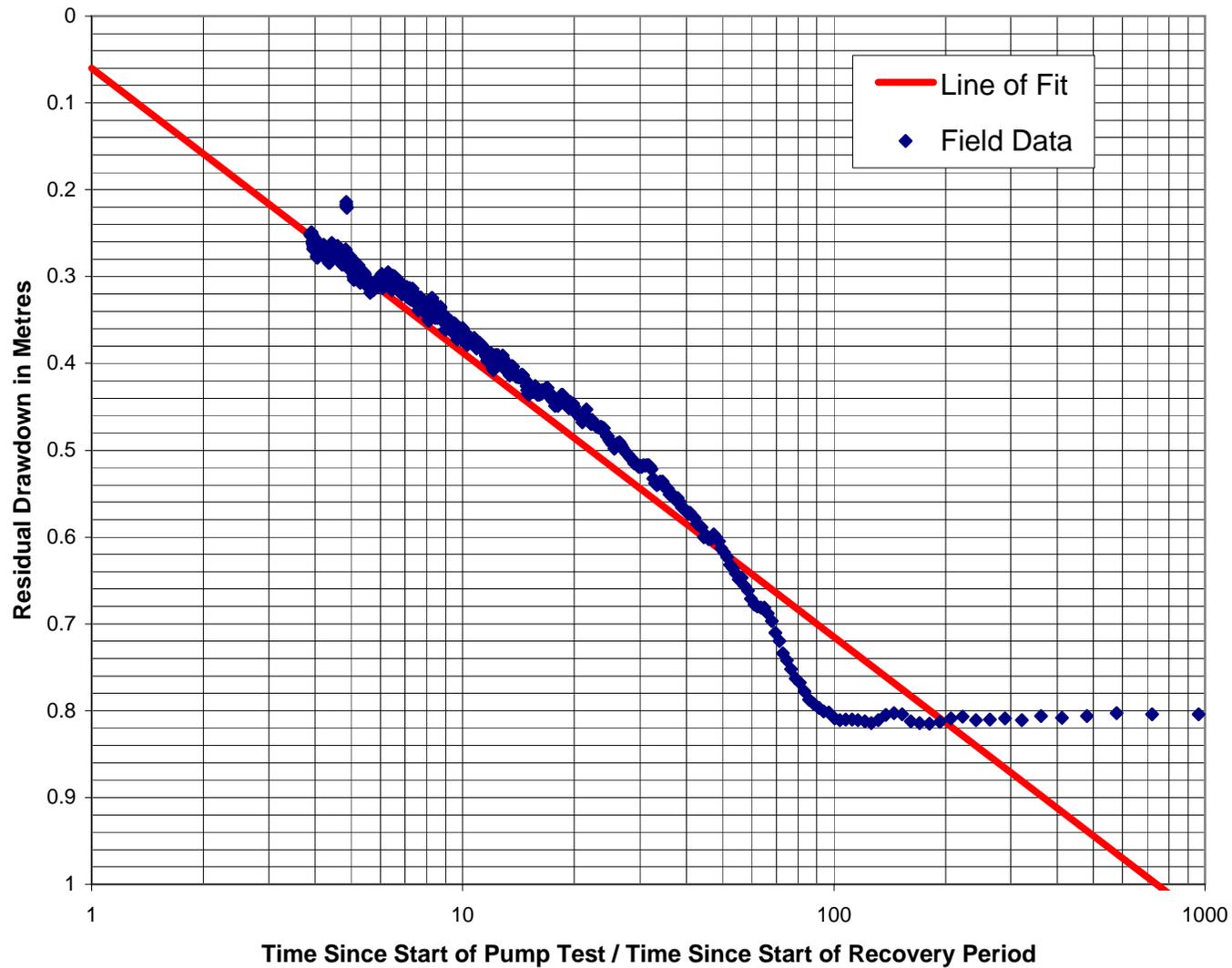
Flow Rate: 483.84 cu.m/day

T: 305.3667 sq.m/day

Project:	Junction 5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias004
Start of Test:	23-Feb-06
Drawn By:	JGG
Checked:	GR



4BH217 (lower gravel) 24hr Pump Test Observed at 4BH265 (rock) - Recovery Analysis



Delta S: 0.3275 m

Flow Rate: 483.84 cu.m/day

T: 270.4011 sq.m/day

Project:	Junction 5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias004
Start of Test:	23-Feb-06
Drawn By:	JGG
Checked:	GR

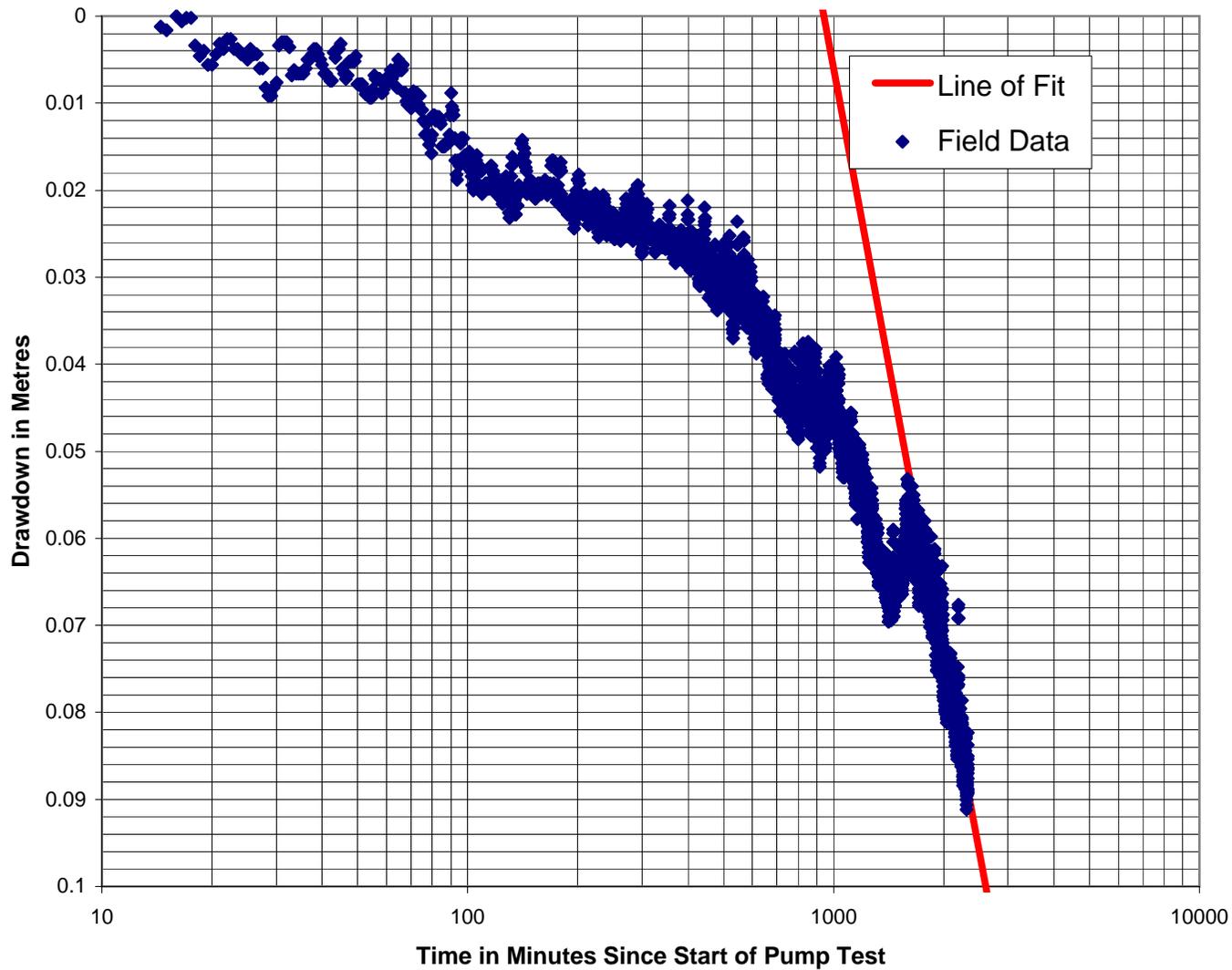


Appendix No.4

Pumping test BH 265 (28 February–1 March 2007- 24 hour test) drawdown and recovery graphs

(Jacob Analysis)

4BH265A (rock) 24hr Pump Test Observed at 4BH208 (upper gravel) - Drawdown Analysis



Delta S: 0.226 m

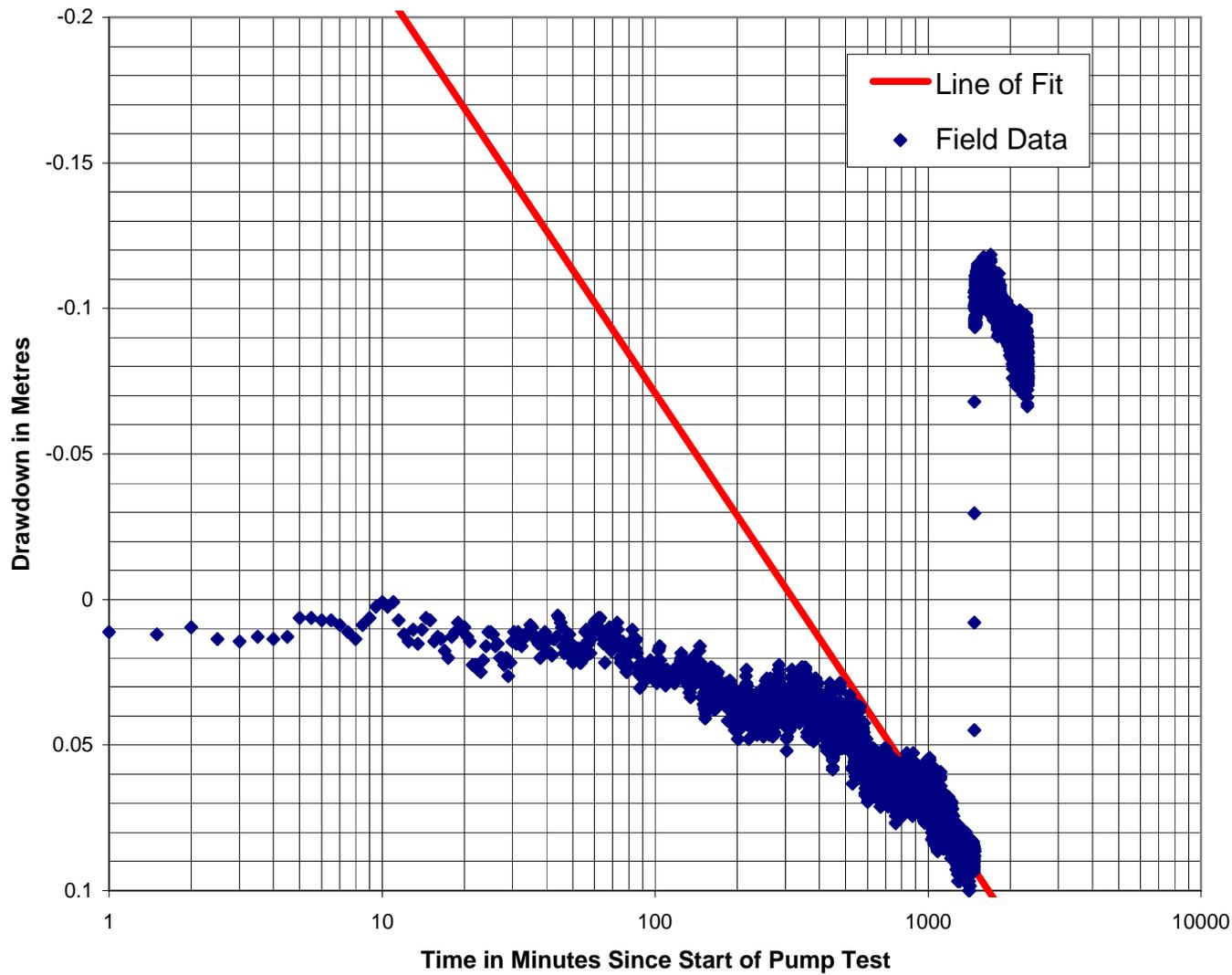
Flow Rate: 318 cu.m/day

T: 257.5352 sq.m/day

Project:	J5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias010
Start of Test:	27-Feb-06
Drawn By:	JGG
Checked:	DJF



4BH265A (rock) 24hr Pump Test Observed at 4BH209 (lower gravel) - Drawdown Analysis



Delta S: 0.14 m

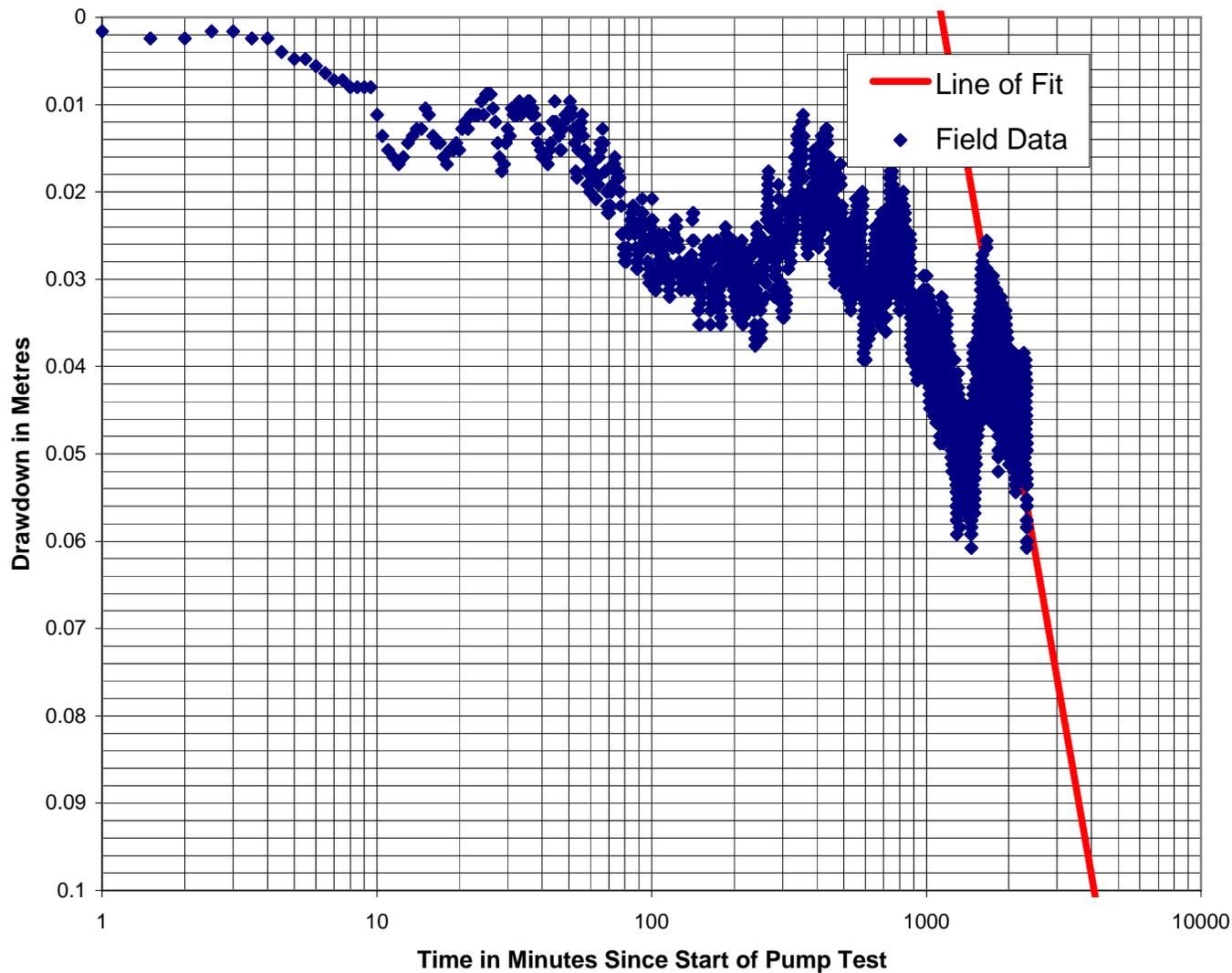
Flow Rate: 318 cu.m/day

T: 415.7354 sq.m/day

Project:	J5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias010
Start of Test:	27-Feb-06
Drawn By:	JGG
Checked:	DJF



4BH265A (rock) 24hr Pump Test Observed at 4BH216 (upper gravel) - Drawdown Analysis



Delta S: 0.18 m

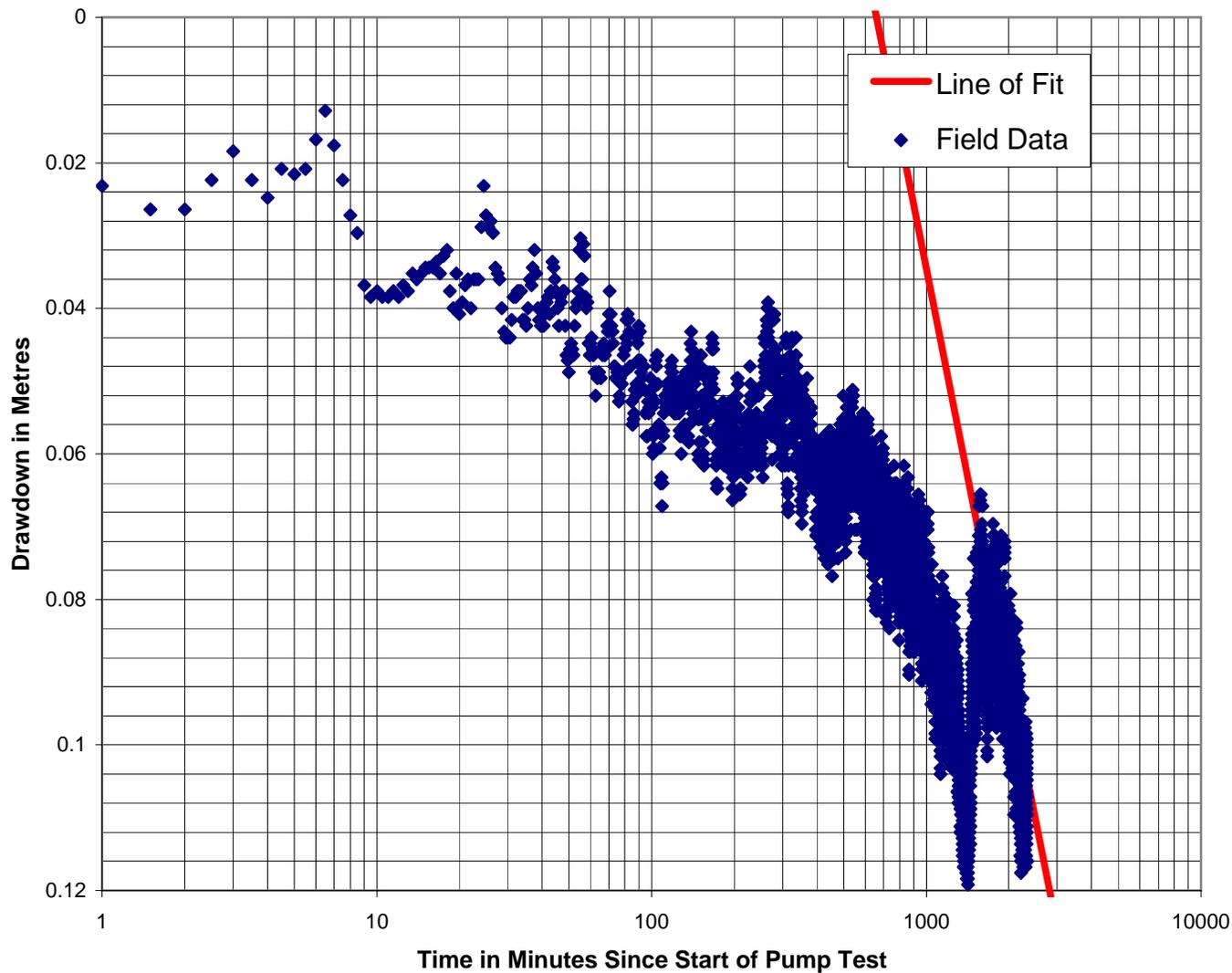
Flow Rate: 318 cu.m/day

T: 323.3498 sq.m/day

Project:	J5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias010
Start of Test:	27-Feb-06
Drawn By:	JGG
Checked:	DJF



4BH265A (rock) 24hr Pump Test Observed at 4BH217 (lower gravel) - Drawdown Analysis



Delta S: 0.1905 m

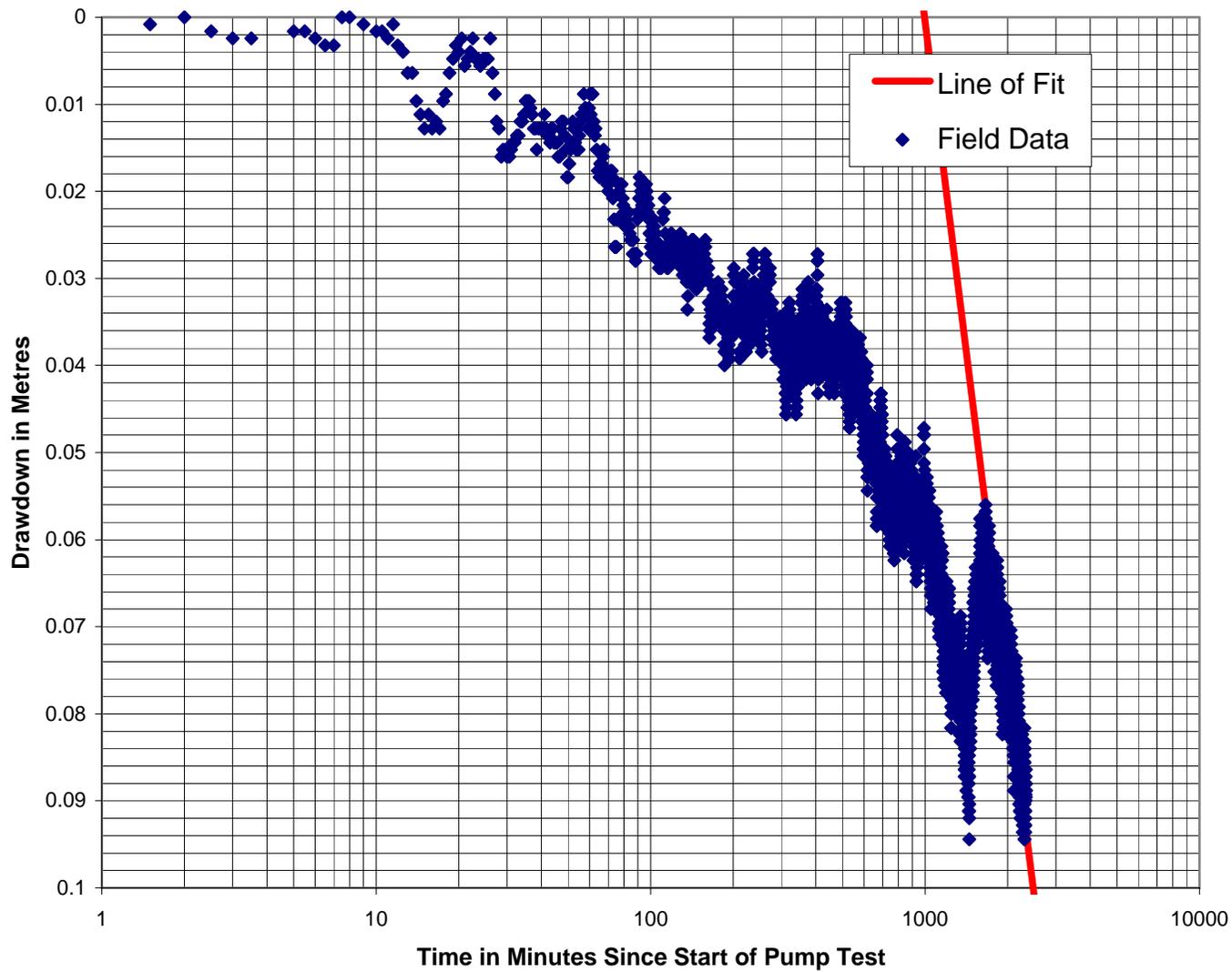
Flow Rate: 318 cu.m/day

T: 305.5274 sq.m/day

Project:	J5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias010
Start of Test:	27-Feb-06
Drawn By:	JGG
Checked:	DJF



4BH265A (rock) 24hr Pump Test Observed at 4BH218B (lower gravel) - Drawdown Analysis



Delta S: 0.2525 m

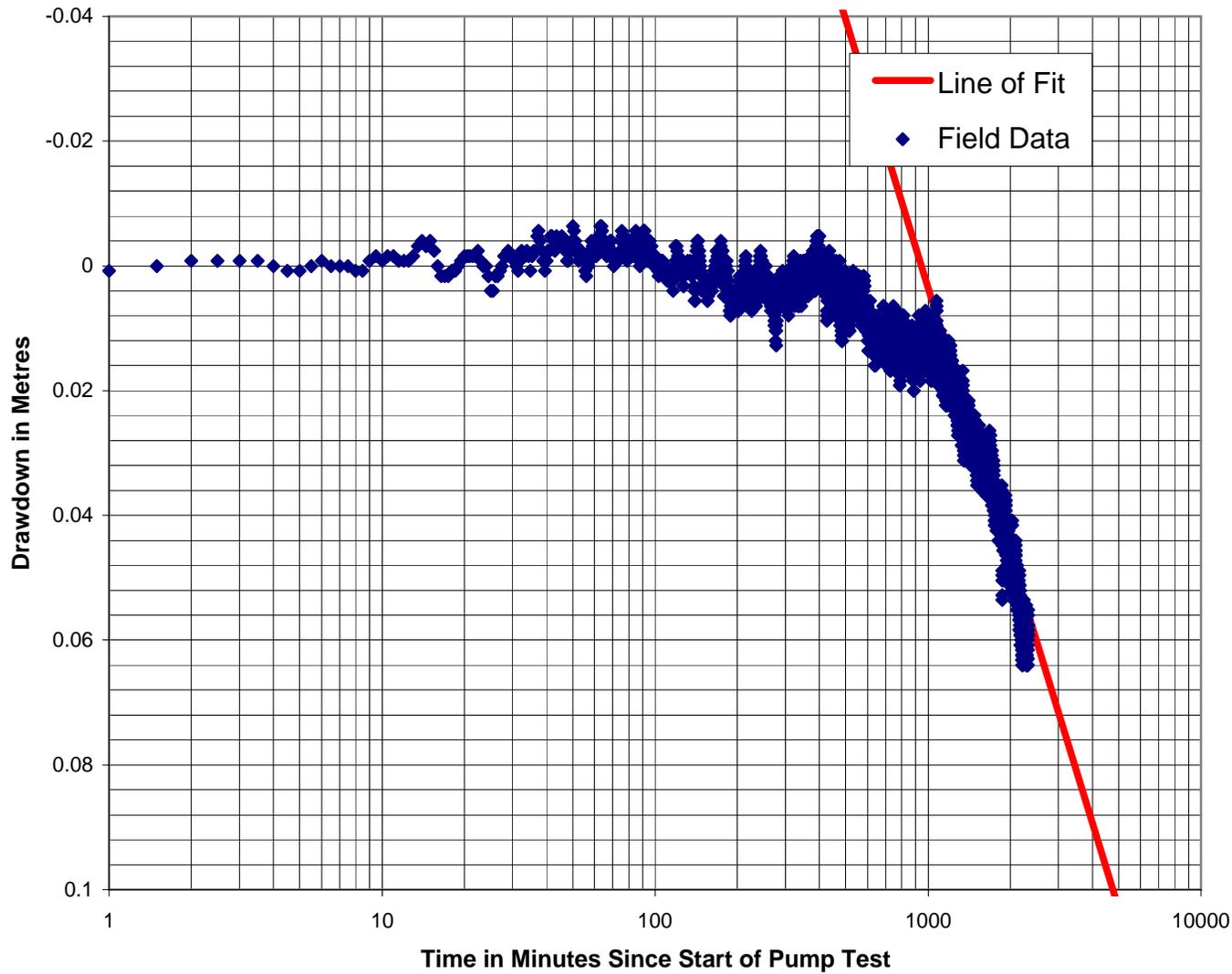
Flow Rate: 318 cu.m/day

T: 230.5068 sq.m/day

Project:	J5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias010
Start of Test:	27-Feb-06
Drawn By:	JGG
Checked:	DJF



4BH265A (rock) 24hr Pump Test Observed at 4BH225 (upper gravel) - Drawdown Analysis



Delta S: 0.1425 m

Flow Rate: 318 cu.m/day

T: 408.4418 sq.m/day

Project:	J5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias010
Start of Test:	27-Feb-06
Drawn By:	JGG
Checked:	DJF

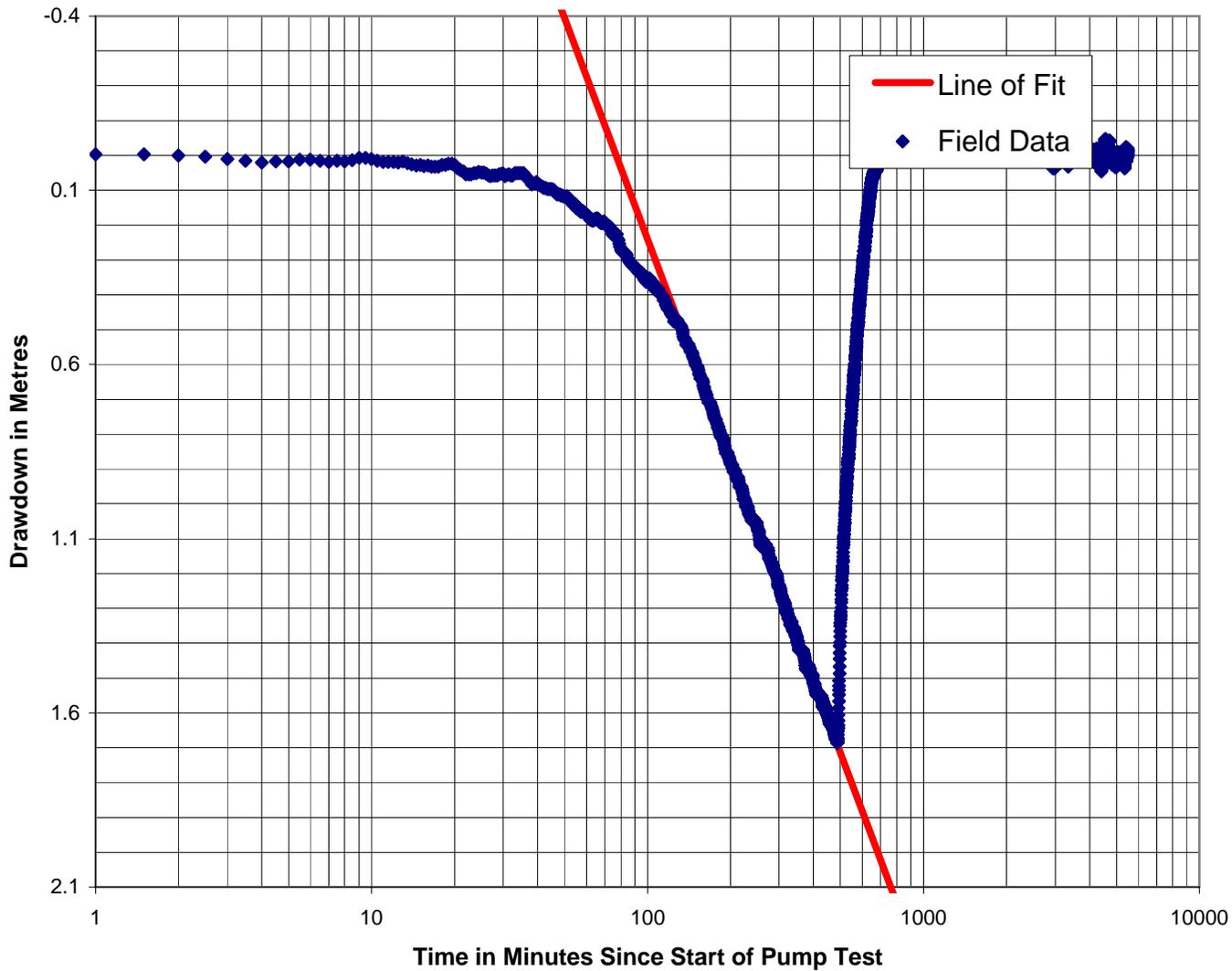


Appendix No.5

Pumping test BH 270A (14 April 2007 - 8 hour test) drawdown and recovery graphs

(Jacob Analysis)

4BH270A (rock) 8hr Pump Test Observed at 4BH272 (lower gravel) - Drawdown Analysis



Delta S: 2.11 m

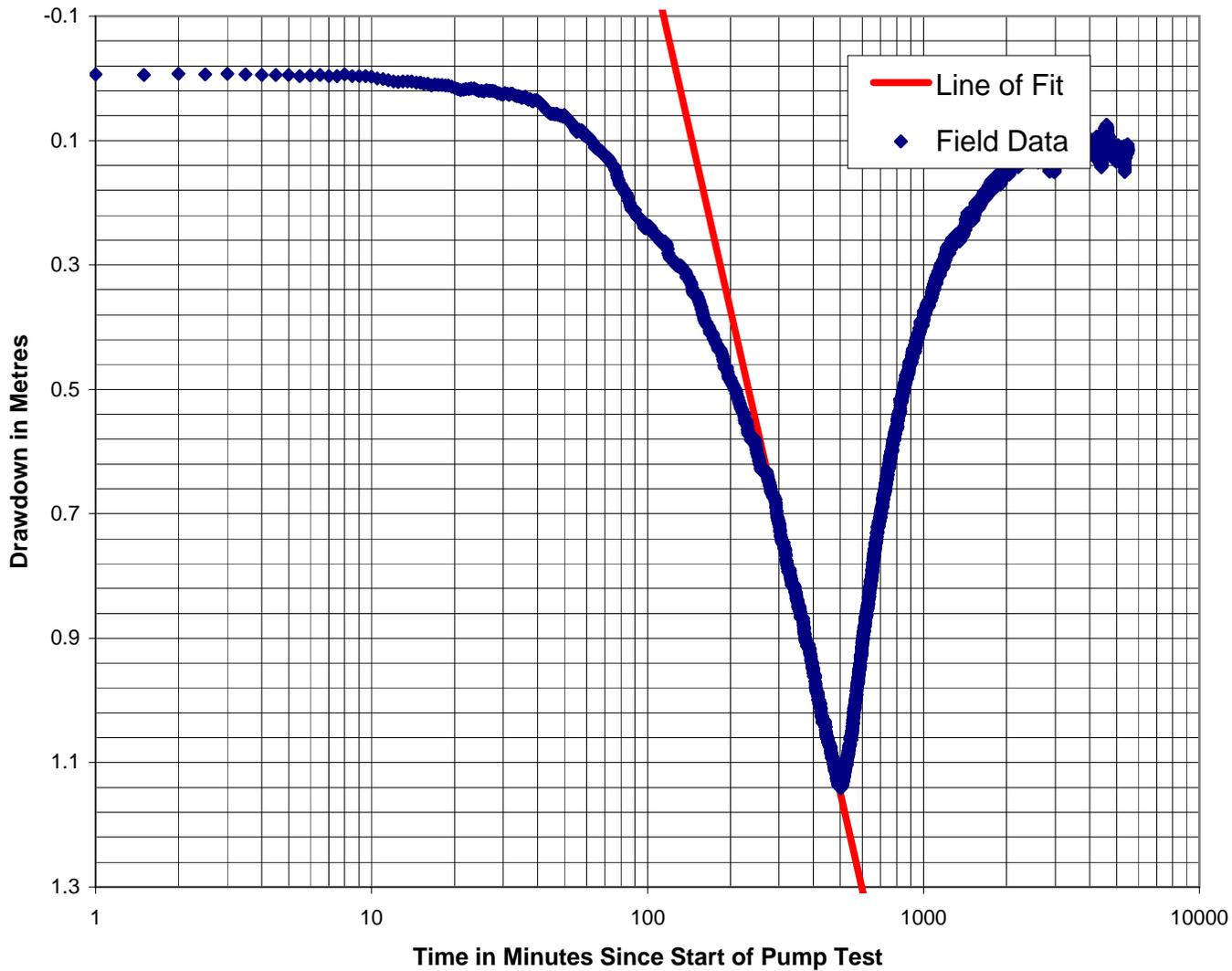
Flow Rate: 1135 cu.m/day

T: 98.45355 sq.m/day

Project:	J5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias011
Start of Test:	14-Apr-06
Drawn By:	JGG
Checked:	DJF



4BH270A (rock) 8hr Pump Test Observed at 4BH274 (lower gravel) - Drawdown Analysis



Delta S: 1.95 m

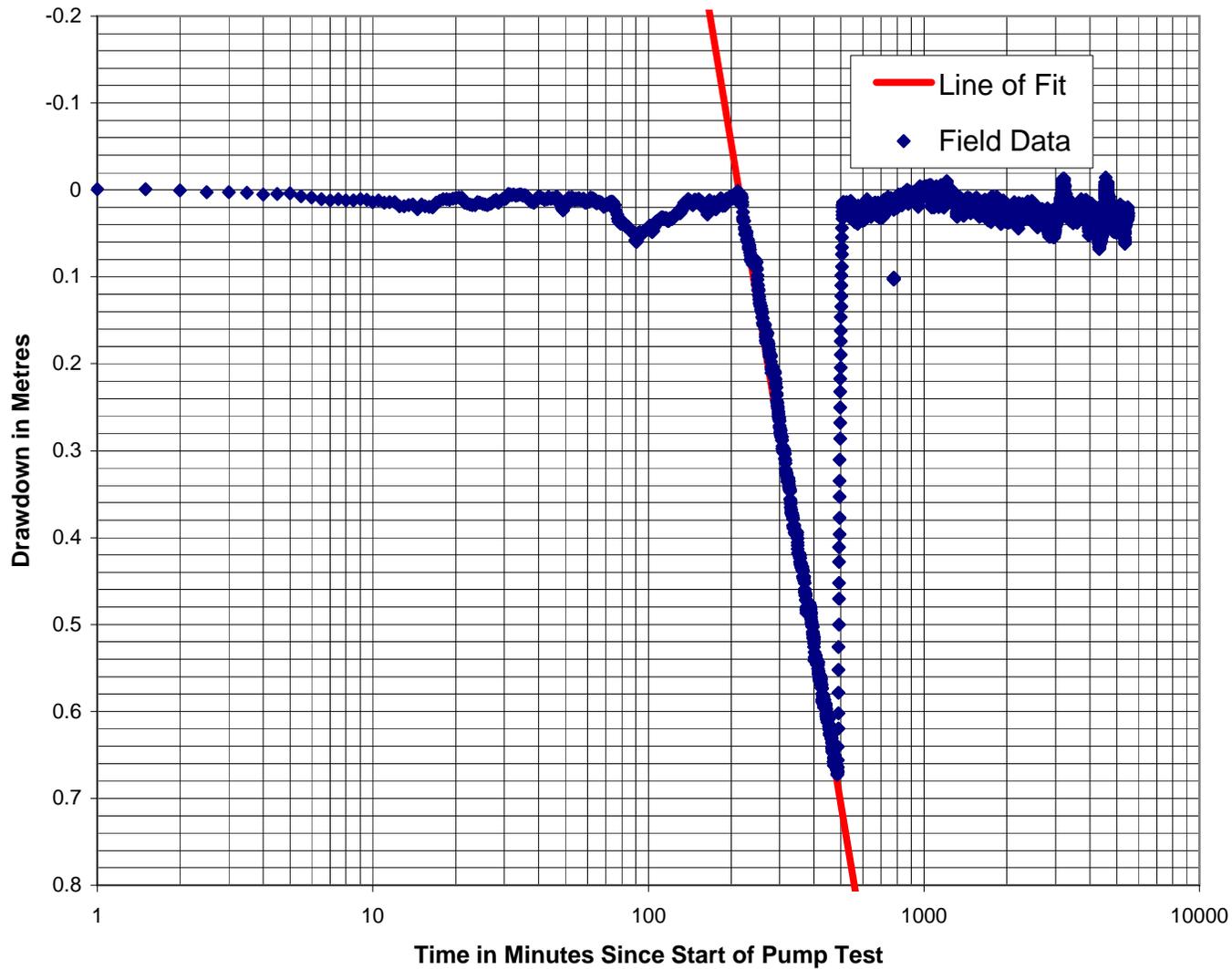
Flow Rate: 1135 cu.m/day

T: 106.5318 sq.m/day

Project:	J5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias011
Start of Test:	14-Apr-06
Drawn By:	JGG
Checked:	DJF



4BH270A (rock) 8hr Pump Test Observed at 4BH290 (rock) - Drawdown Analysis



Delta S: 1.91 m

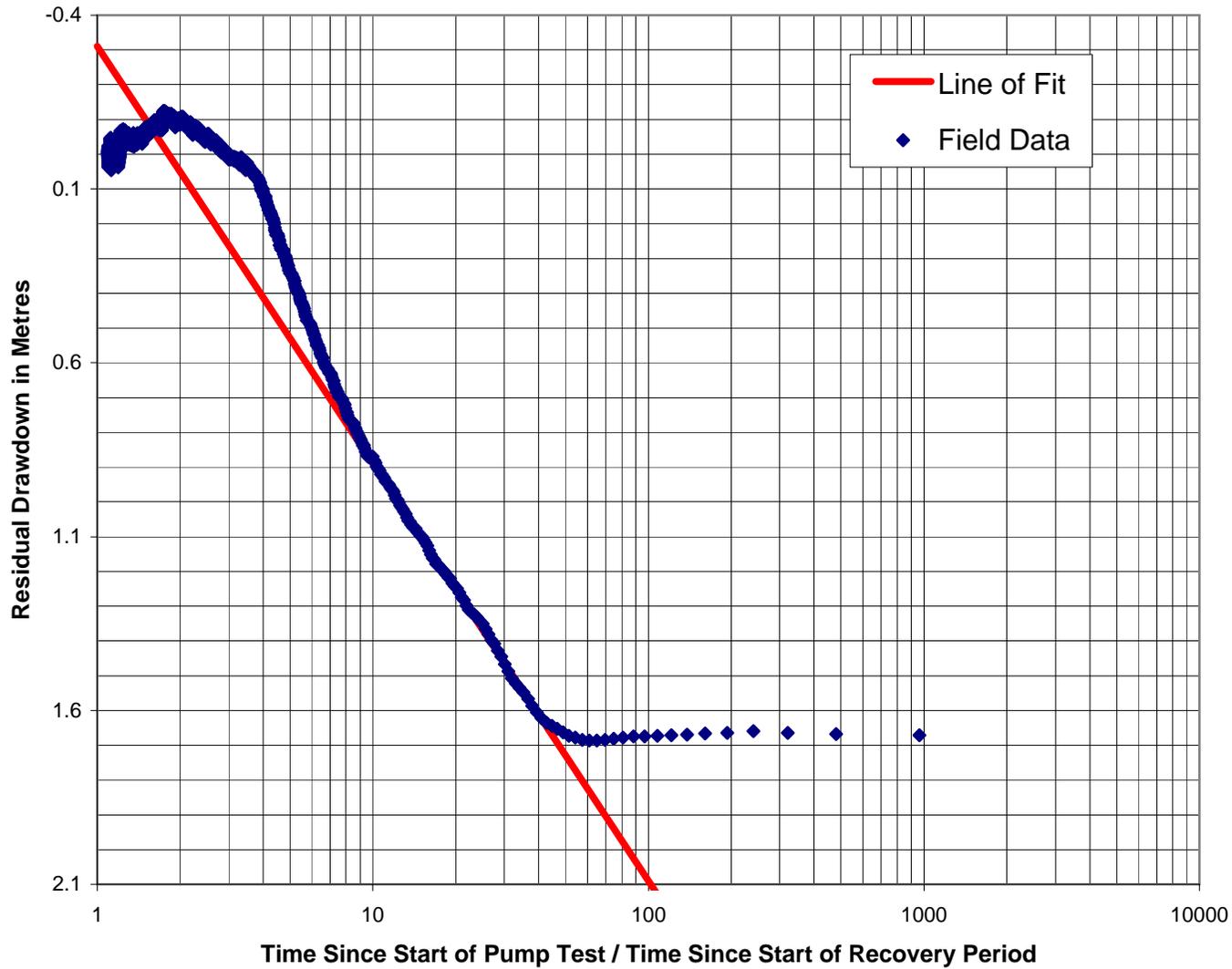
Flow Rate: 1135 cu.m/day

T: 108.7628 sq.m/day

Project:	J5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias011
Start of Test:	14-Apr-06
Drawn By:	JGG
Checked:	DJF



4BH270A (rock) 8hr Pump Test Observed at 4BH272 (lower gravel) - Recovery Analysis



Delta S: 1.2 m

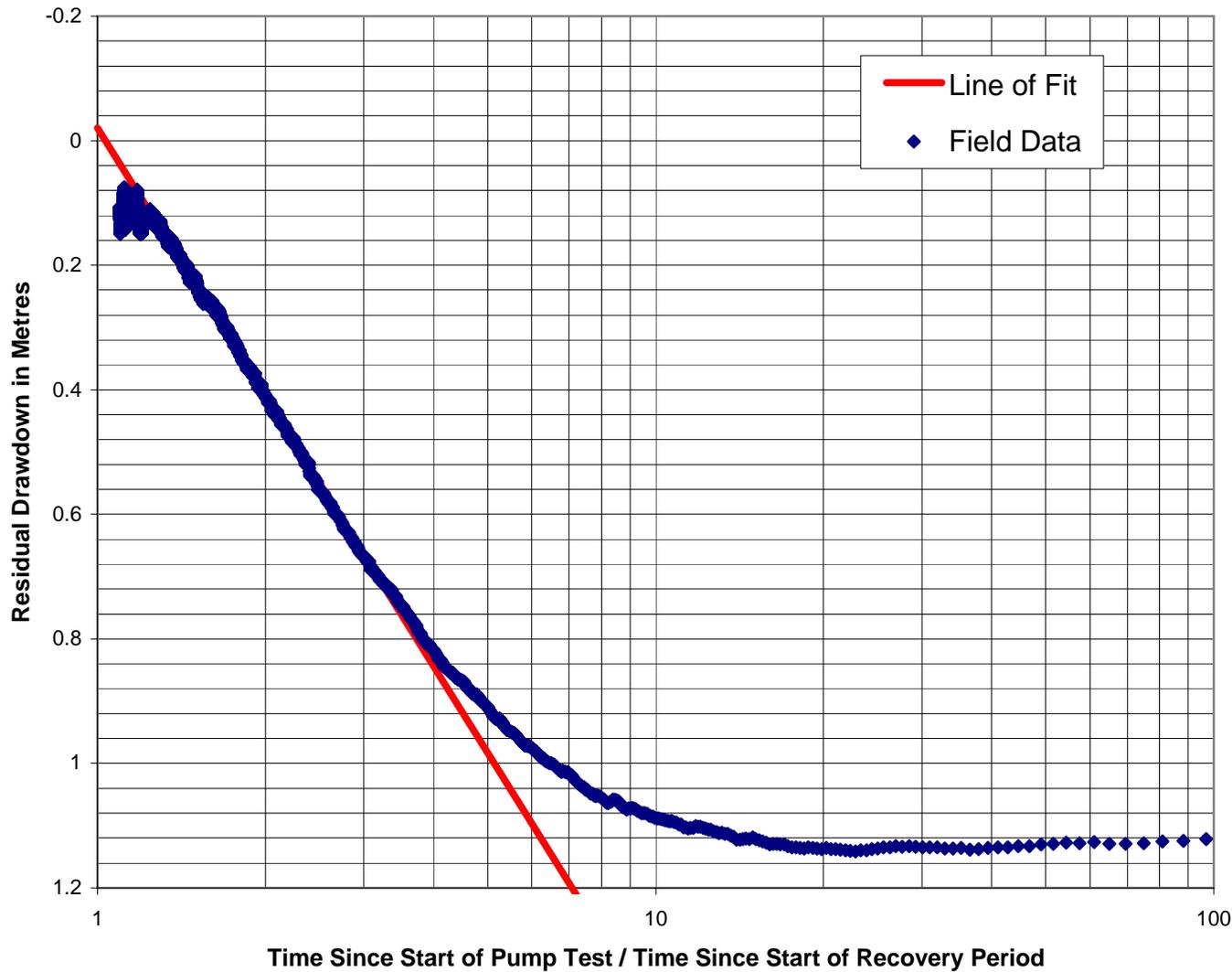
Flow Rate: 1135 cu.m/day

T: 173.1142 sq.m/day

Project:	J5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias011
Start of Test:	14-Apr-06
Drawn By:	JGG
Checked:	GR



4BH270A (rock) 8hr Pump Test Observed at 4BH274 (lower gravel) - Recovery Analysis



Delta S: 1.435 m

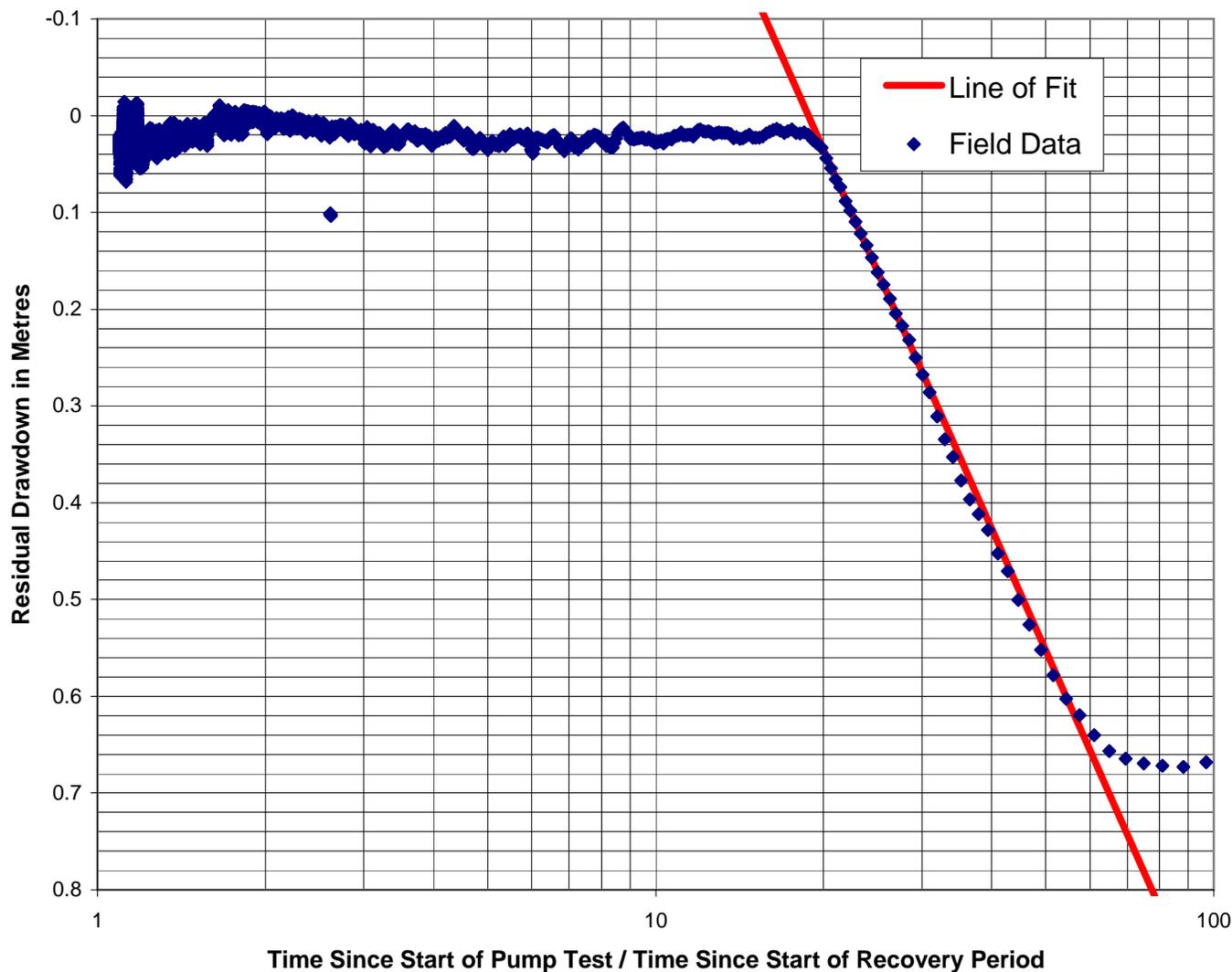
Flow Rate: 1135 cu.m/day

T: 144.7645 sq.m/day

Project:	J5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias011
Start of Test:	14-Apr-06
Drawn By:	JGG
Checked:	GR



4BH270A (rock) 8hr Pump Test Observed at 4BH290 (rock) - Recovery Analysis



Delta S: 1.3 m

Flow Rate: 1135 cu.m/day

T: 159.7977 sq.m/day

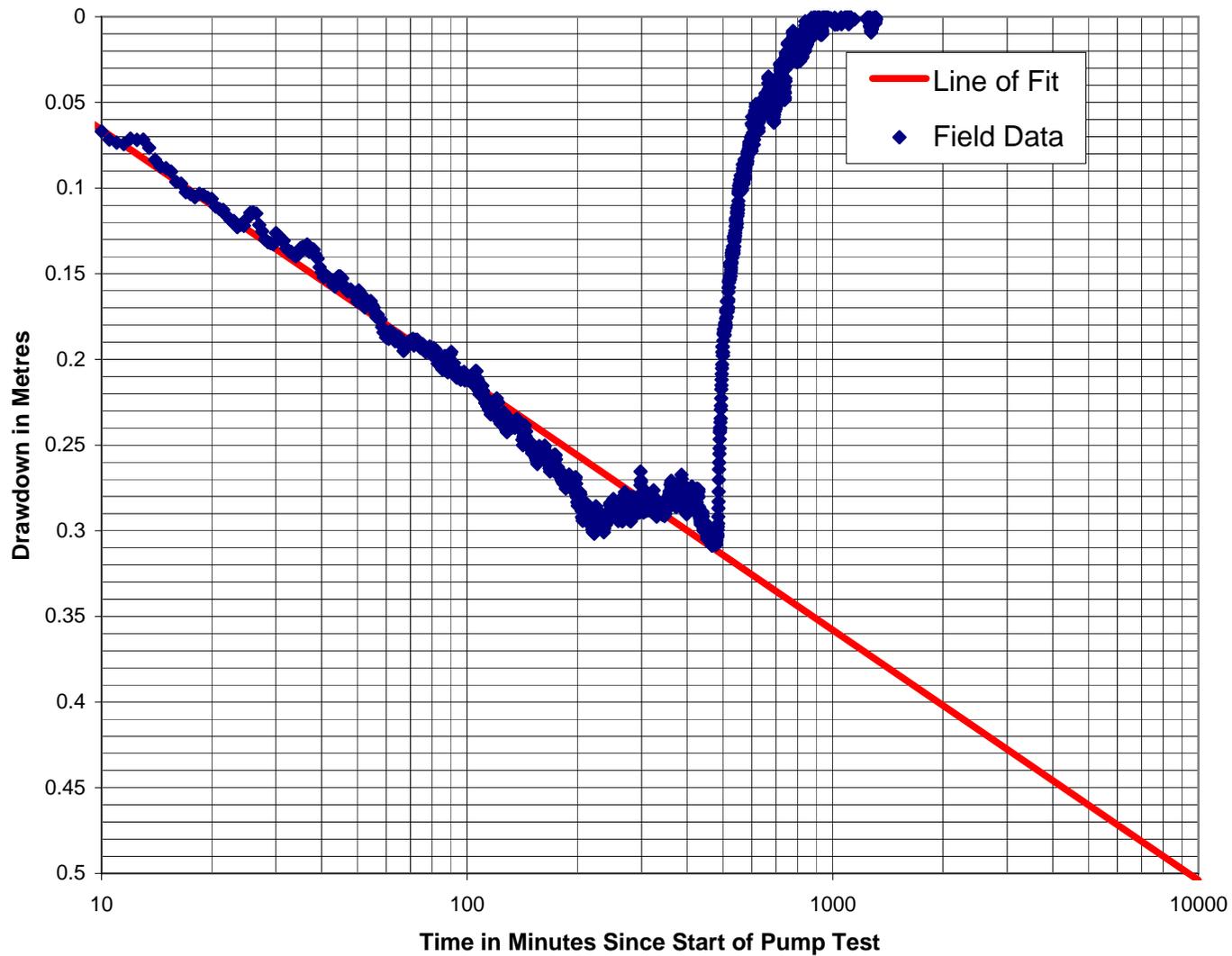
Project:	J5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias011
Start of Test:	14-Apr-06
Drawn By:	JGG
Checked:	GR



Appendix No.6

Pumping test BH 228 (4 May 2007 - 8 hour test) drawdown and recovery graphs
(Jacob Analysis)

4BH228 (lower gravel) 8hr Pump Test Observed at 4BH288 (lower gravel) - Drawdown Analysis



Delta S: 0.146 m

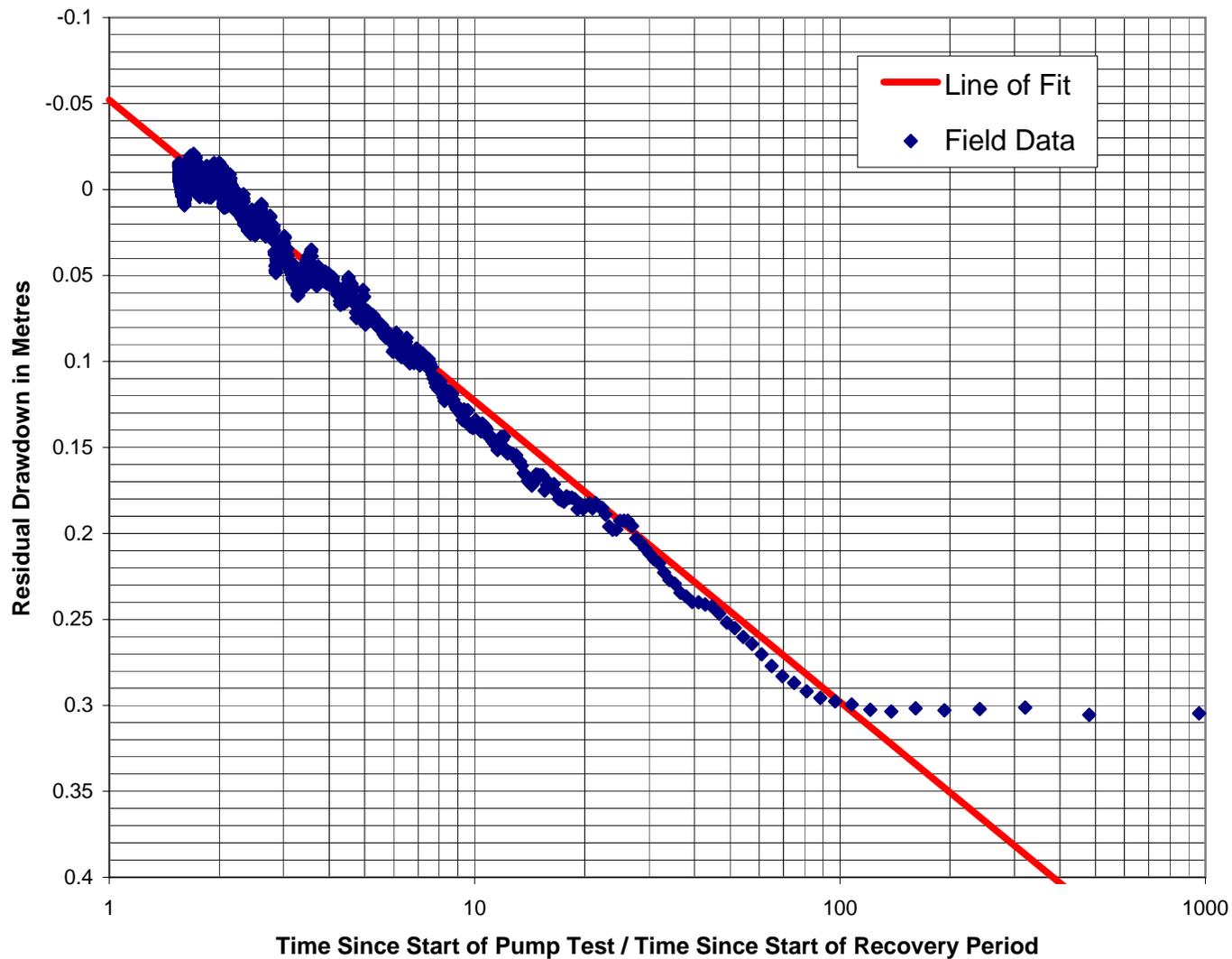
Flow Rate: 234 cu.m/day

T: 293.3465 sq.m/day

Project:	Junction 5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias007
Start of Test:	04-May-06
Drawn By:	JGG
Checked:	SDT



4BH228 (lower gravel) 8hr Pump Test Observed at 4BH288 (lower gravel) - Recovery Analysis



Delta S: 0.175 m

Flow Rate: 234 cu.m/day

T: 244.7348 sq.m/day

Project: Junction 5 M74 Raith

Client: Mouchel Fairhurst JV

Ref: J267_Radias007

Start of Test: 04-May-06

Drawn By: JGG

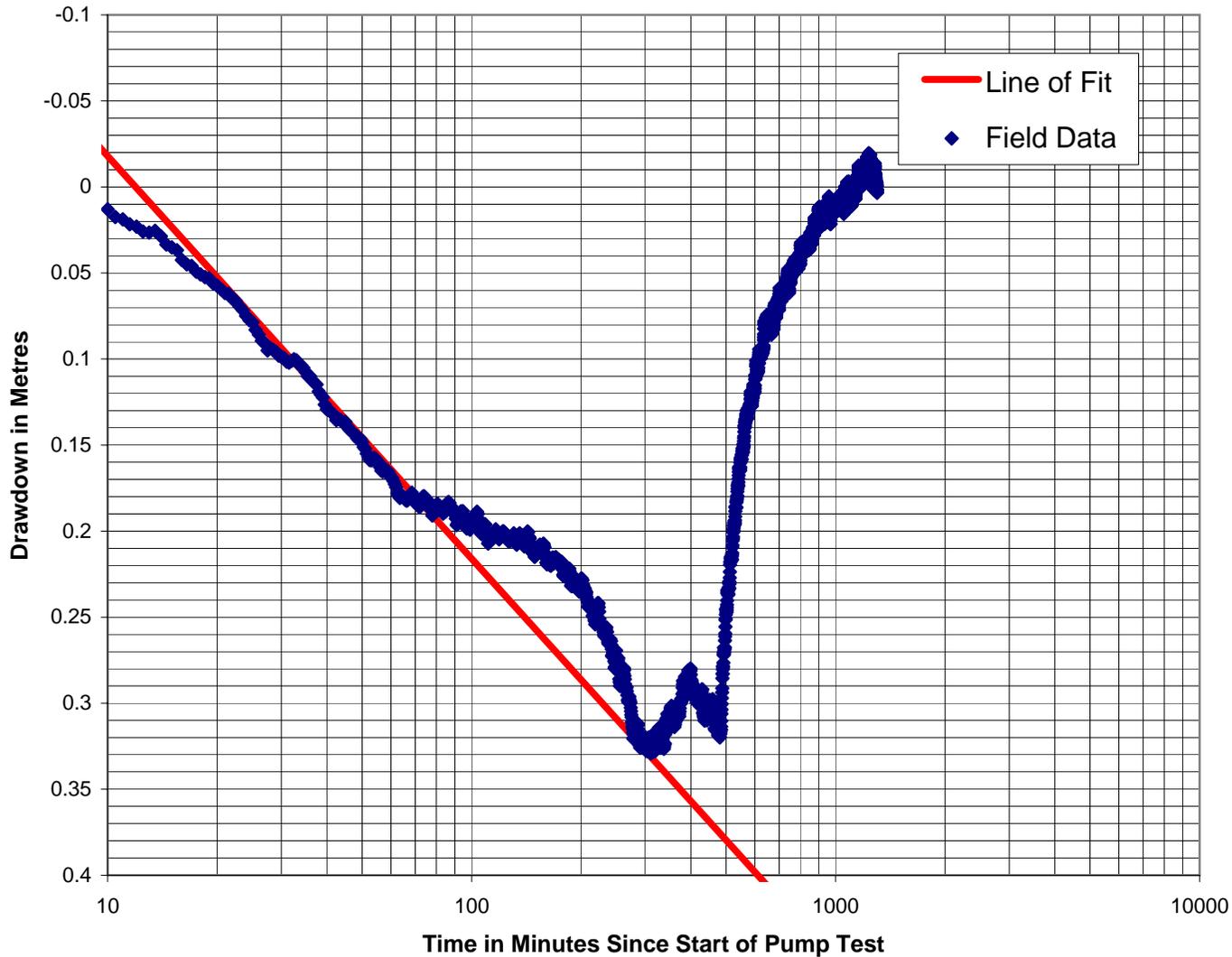
Checked: GR



Appendix No.7

Pumping test BH 224 (8 May 2007 - 8 hour test) drawdown and recovery graphs
(Jacob Analysis)

4BH224 (lower gravel) 8hr Pump Test Observed at 4BH218B (lower gravel) - Drawdown Analysis



Delta S: 0.234 m

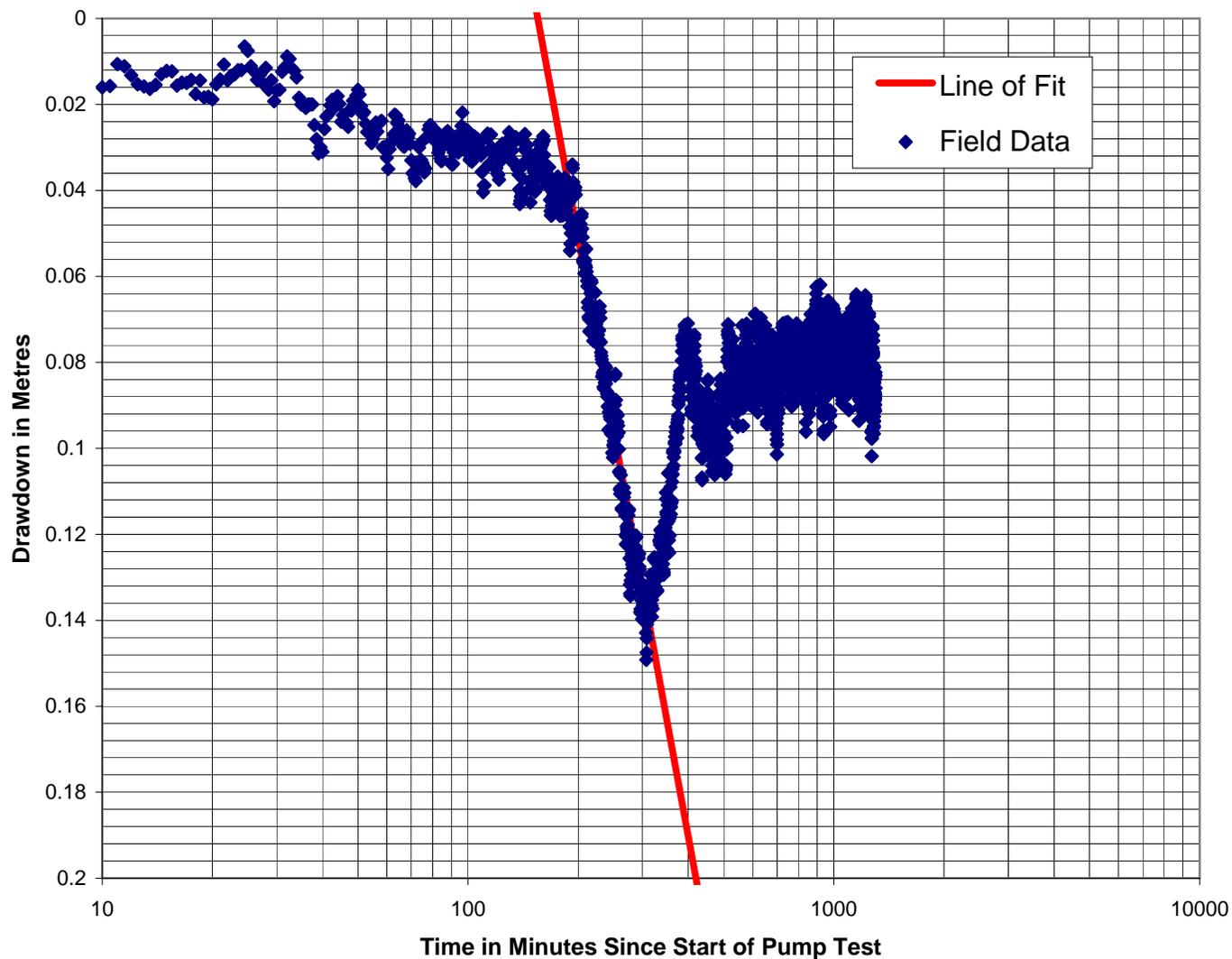
Flow Rate: 303.3 cu.m/day

T: 237.2327 sq.m/day

Project:	Junction 5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias006
Start of Test:	08-May-06
Drawn By:	JGG
Checked:	SDT



4BH224 8hr Pump Test Observed at 4BH234 (rock) - Drawdown Analysis

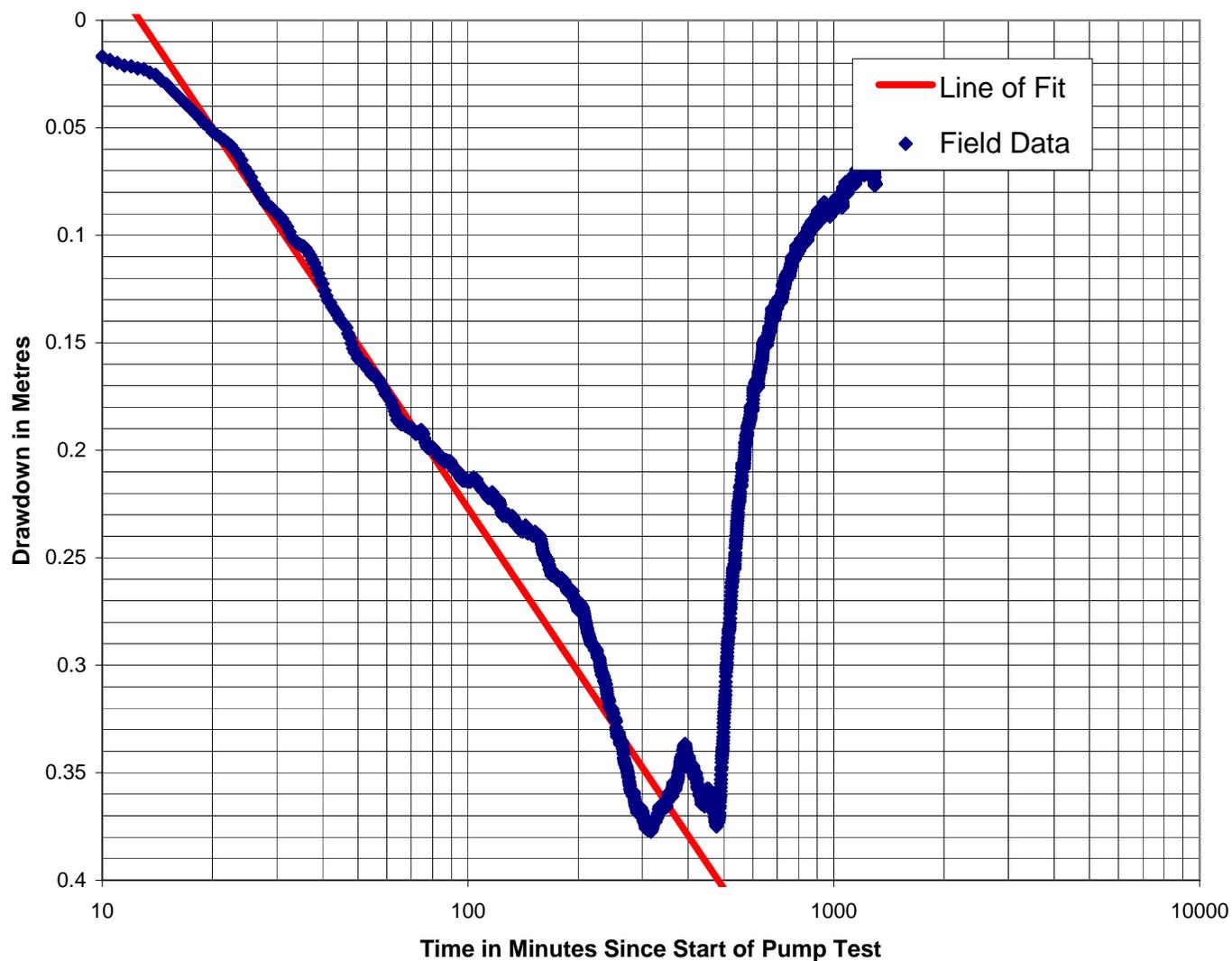


Delta S:	0.5 m
Flow Rate:	303.3 cu.m/day
T:	111.0249 sq.m/day

Project:	Junction 5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias006
Date:	08-May-06
Drawn By:	JGG
Checked:	SDT



4BH224 (lower gravel) 8hr Pump Test Observed at 4BH265 (rock) - Drawdown Analysis



Delta S: 0.253 m

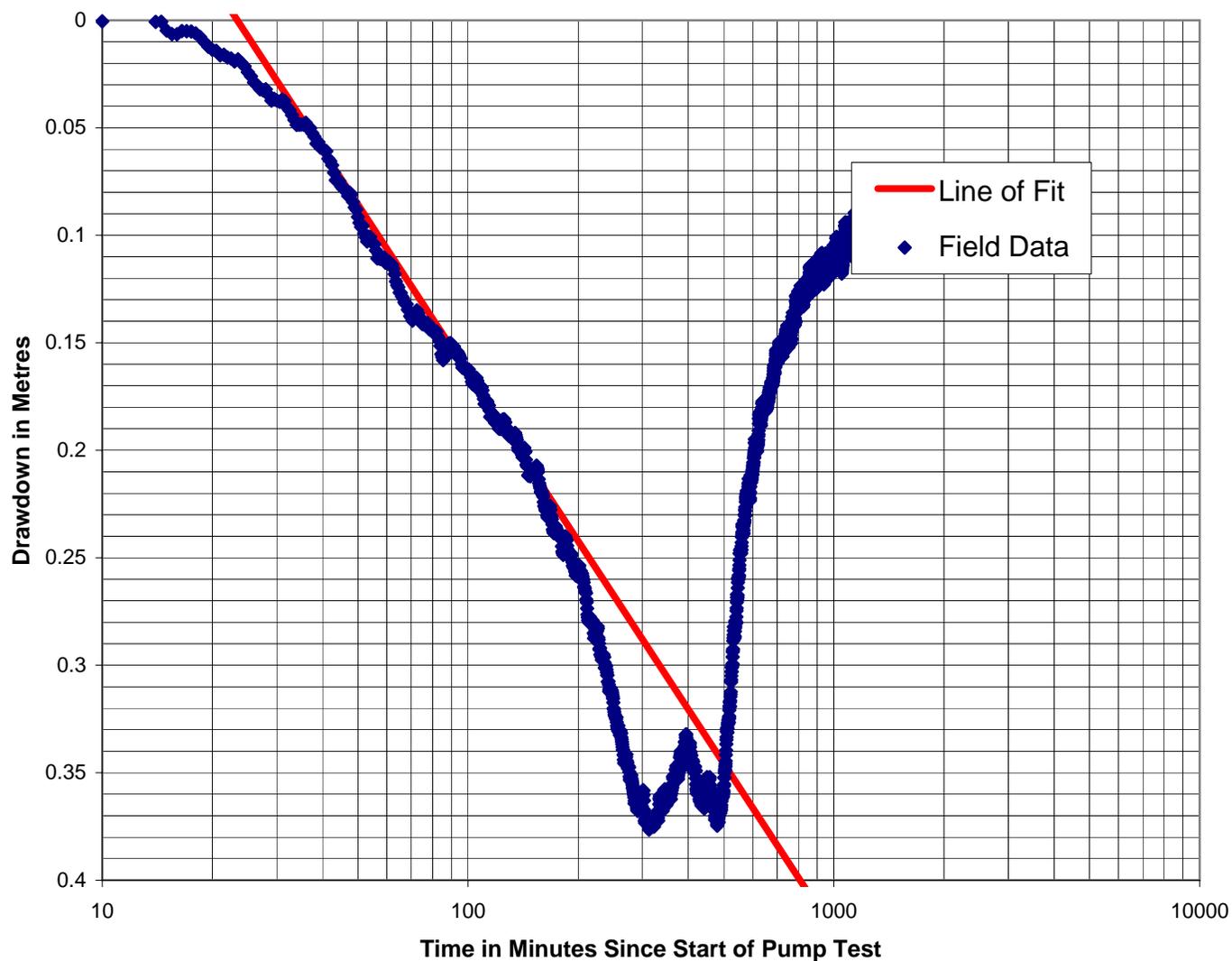
Flow Rate: 303.3 cu.m/day

T: 219.4168 sq.m/day

Project:	Junction 5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias006
Start of Test:	08-May-06
Drawn By:	JGG
Checked:	SDT



4BH224 (lower gravel) 8hr Pump Test Observed at 4BH266 (rock) - Drawdown Analysis



Delta S: 0.26 m

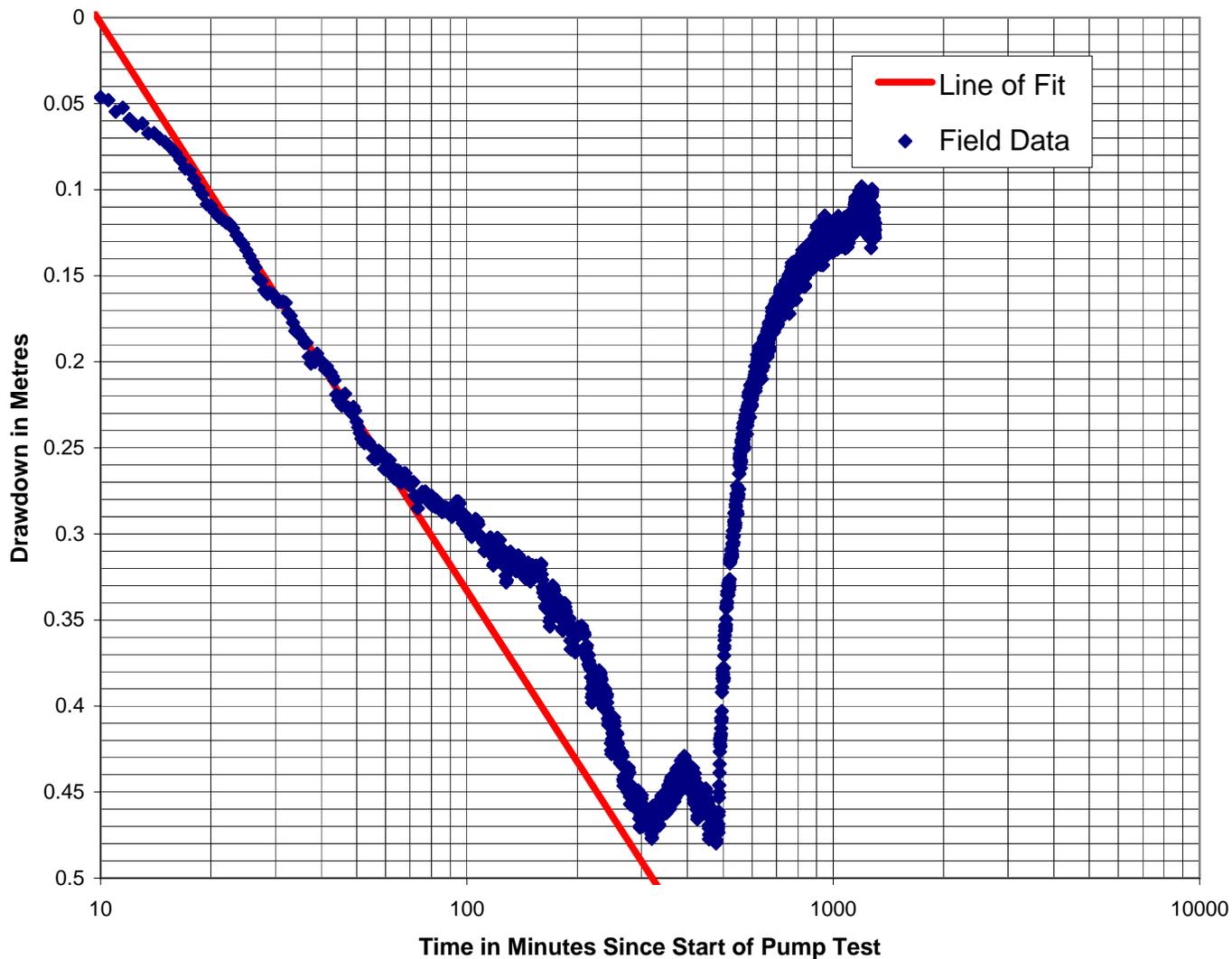
Flow Rate: 303.3 cu.m/day

T: 213.5094 sq.m/day

Project:	Junction 5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias006
Start of Test:	08-May-06
Drawn By:	JGG
Checked:	SDT



4BH224 (lower gravel) 8hr Pump Test Observed at 4BH288 (upper/lower gravel) - Drawdown Analysis



Delta S: 0.33 m

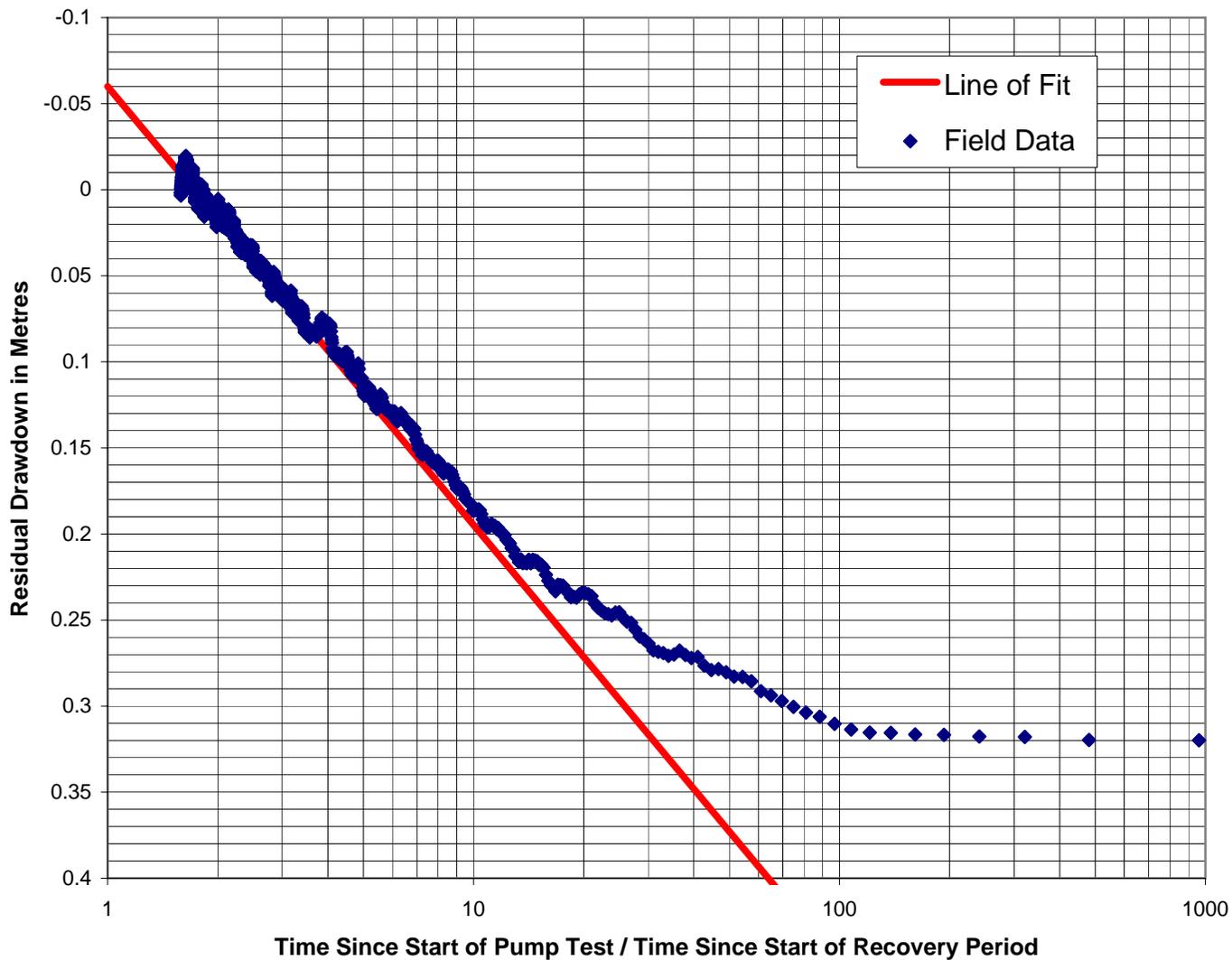
Flow Rate: 303.3 cu.m/day

T: 168.2195 sq.m/day

Project:	Junction 5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias006
Start of Test:	08-May-06
Drawn By:	JGG
Checked:	SDT



4BH224 (lower gravel) 8hr Pump Test Observed at 4BH218B (lower gravel) - Recovery Analysis



Delta S: 0.25475 m

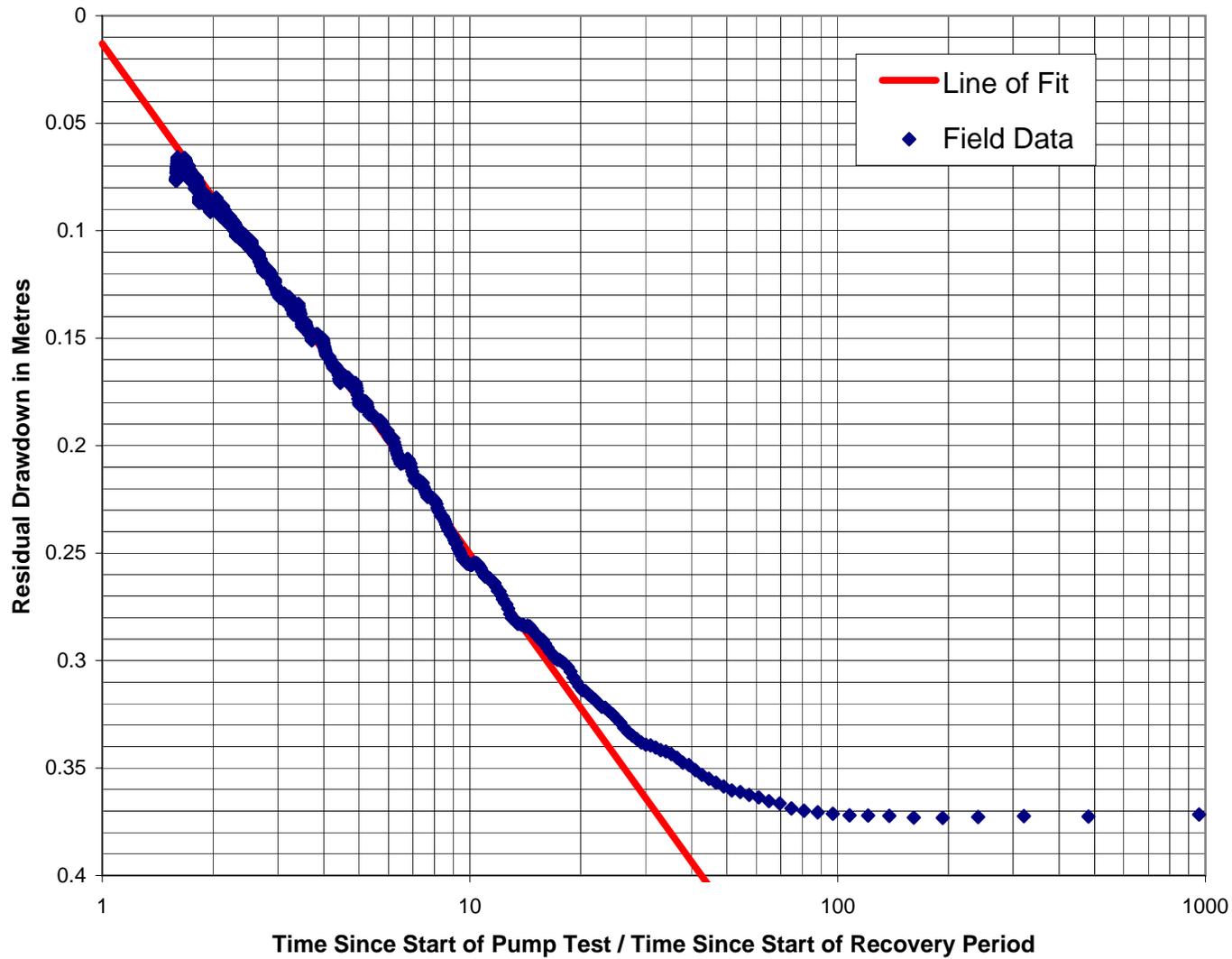
Flow Rate: 303.3 cu.m/day

T: 217.9095 sq.m/day

Project:	Junction 5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias006
Start of Test:	08-May-06
Drawn By:	JGG
Checked:	SDT



4BH224 (lower gravel) 8hr Pump Test Observed at 4BH265 (rock) - Recovery Analysis



Delta S: 0.2375 m

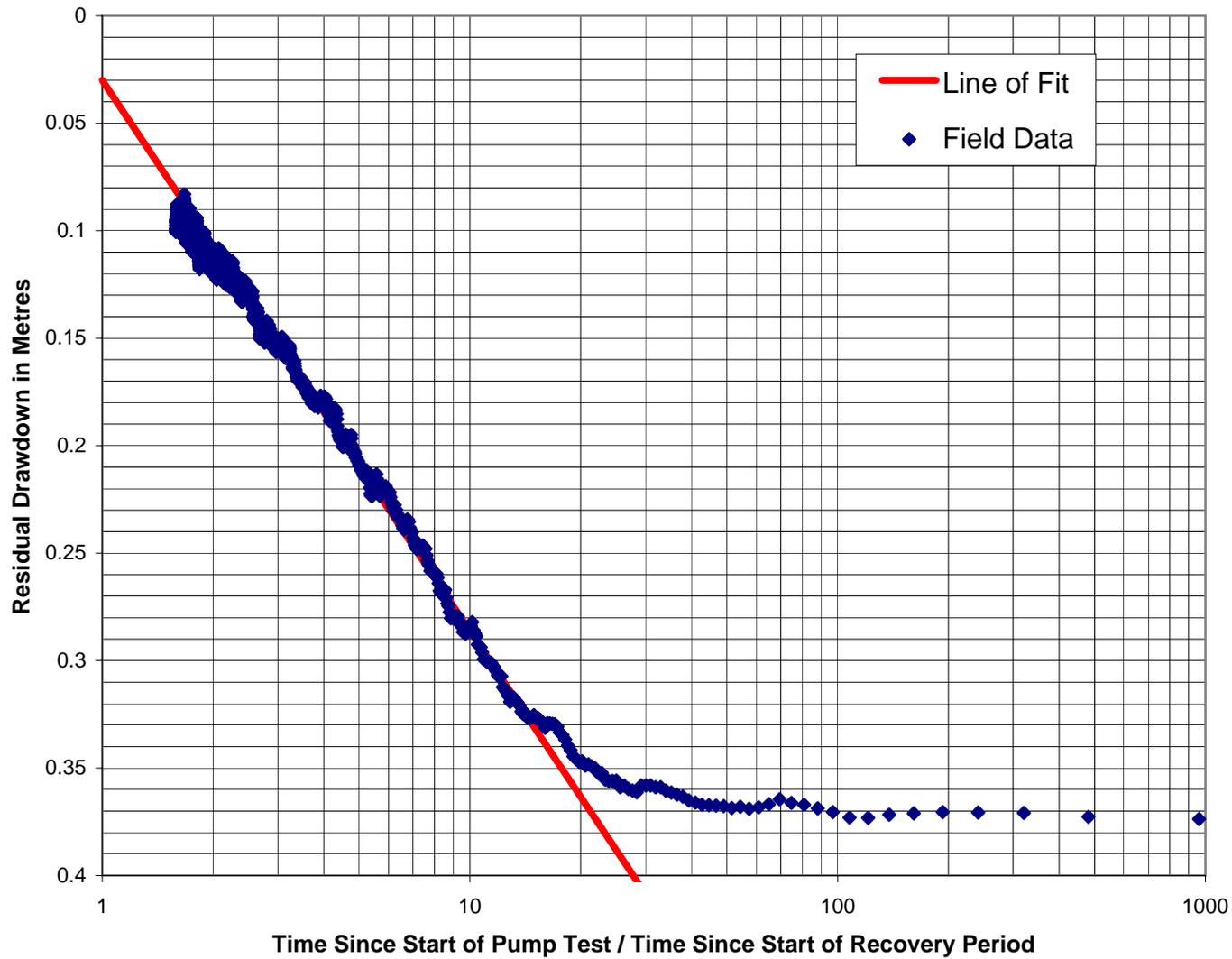
Flow Rate: 303.3 cu.m/day

T: 233.7366 sq.m/day

Project:	Junction 5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias006
Start of Test:	08-May-06
Drawn By:	JGG
Checked:	SDT



4BH224 (lower gravel) 8hr Pump Test Observed at 4BH266 (rock) - Recovery Analysis



Delta S: 0.25625 m

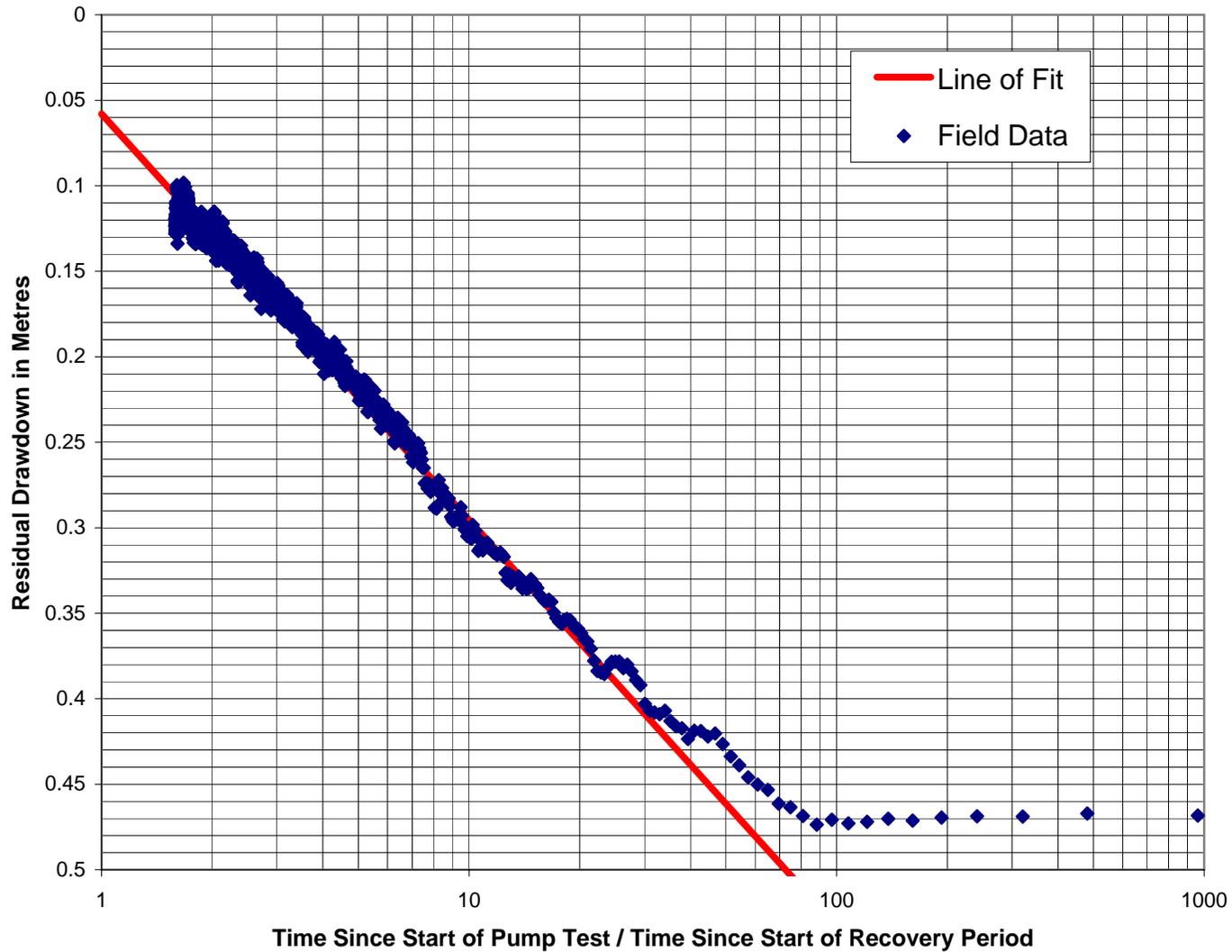
Flow Rate: 303.3 cu.m/day

T: 216.6339 sq.m/day

Project:	Junction 5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias006
Start of Test:	08-May-06
Drawn By:	JGG
Checked:	SDT



4BH224 (lower gravel) 8hr Pump Test Observed at 4BH288 (upper/lower gravel) - Recovery Analysis



Delta S: 0.2375 m

Flow Rate: 303.3 cu.m/day

T: 233.7366 sq.m/day

Project:	Junction 5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias006
Start of Test:	08-May-06
Drawn By:	JGG
Checked:	SDT

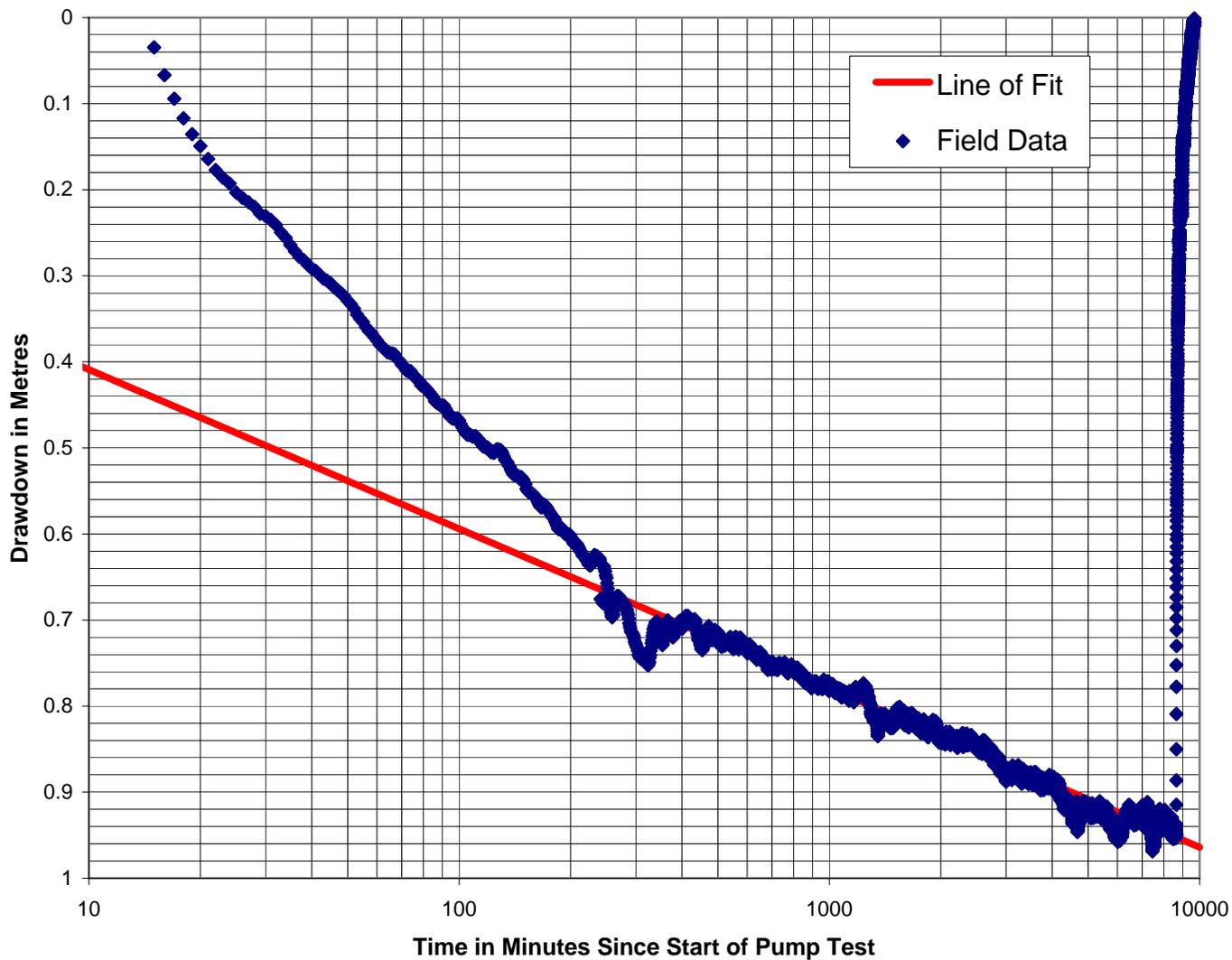


Appendix No.8

Pumping test BH 217 (13-19 May 2007 - 6 day test) drawdown and recovery graphs

(Jacob Analysis)

4BH217 (lower gravel) 144hr Pump Test Observed at 4BH216 (upper gravel) - Drawdown Analysis

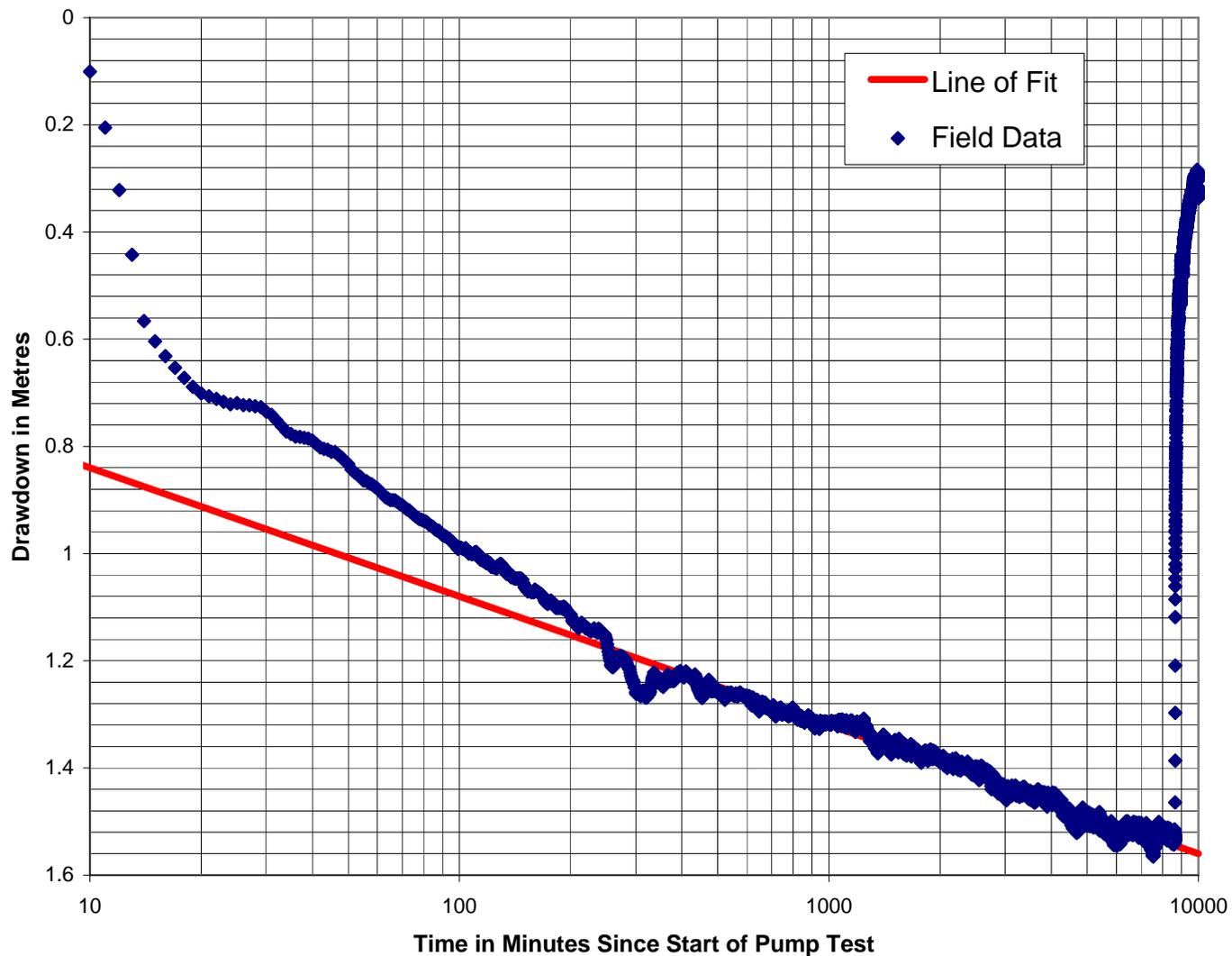


Delta S:	0.185 m
Flow Rate:	834.6 cu.m/day
T:	825.7044 sq.m/day

Project:	Junction 5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias005
Start of Test:	13-May-06
Drawn By:	JGG
Checked:	SDT



4BH217 (lower gravel) 144hr Pump Test Observed at 4BH218B (lower gravel) - Drawdown Analysis



Delta S: 0.24 m

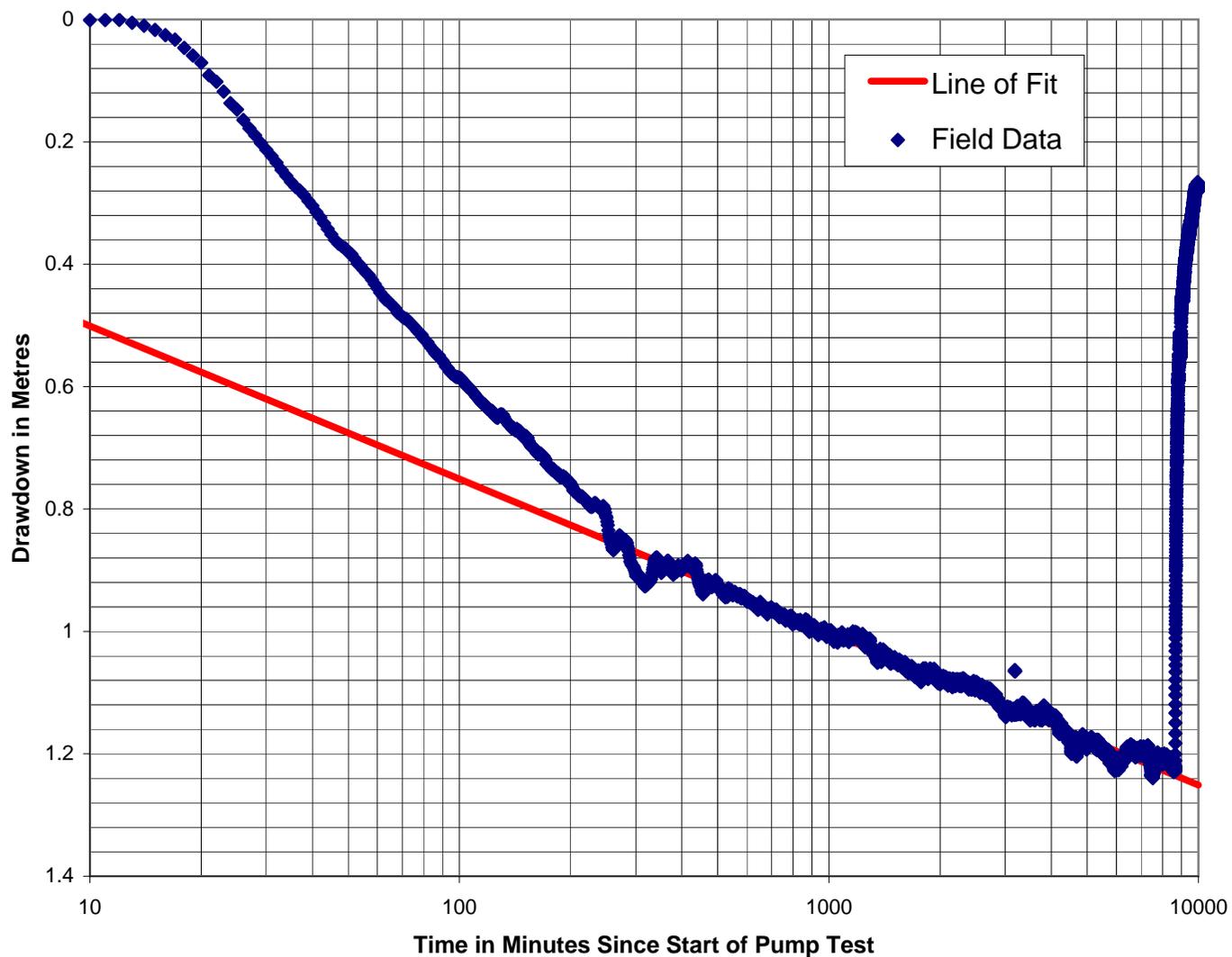
Flow Rate: 834.6 cu.m/day

T: 636.4805 sq.m/day

Project:	Junction 5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias005
Start of Test:	13-May-06
Drawn By:	JGG
Checked:	SDT



4BH217 (lower gravel) 144hr Pump Test Observed at 4BH266 (rock) - Drawdown Analysis



Delta S: 0.25 m

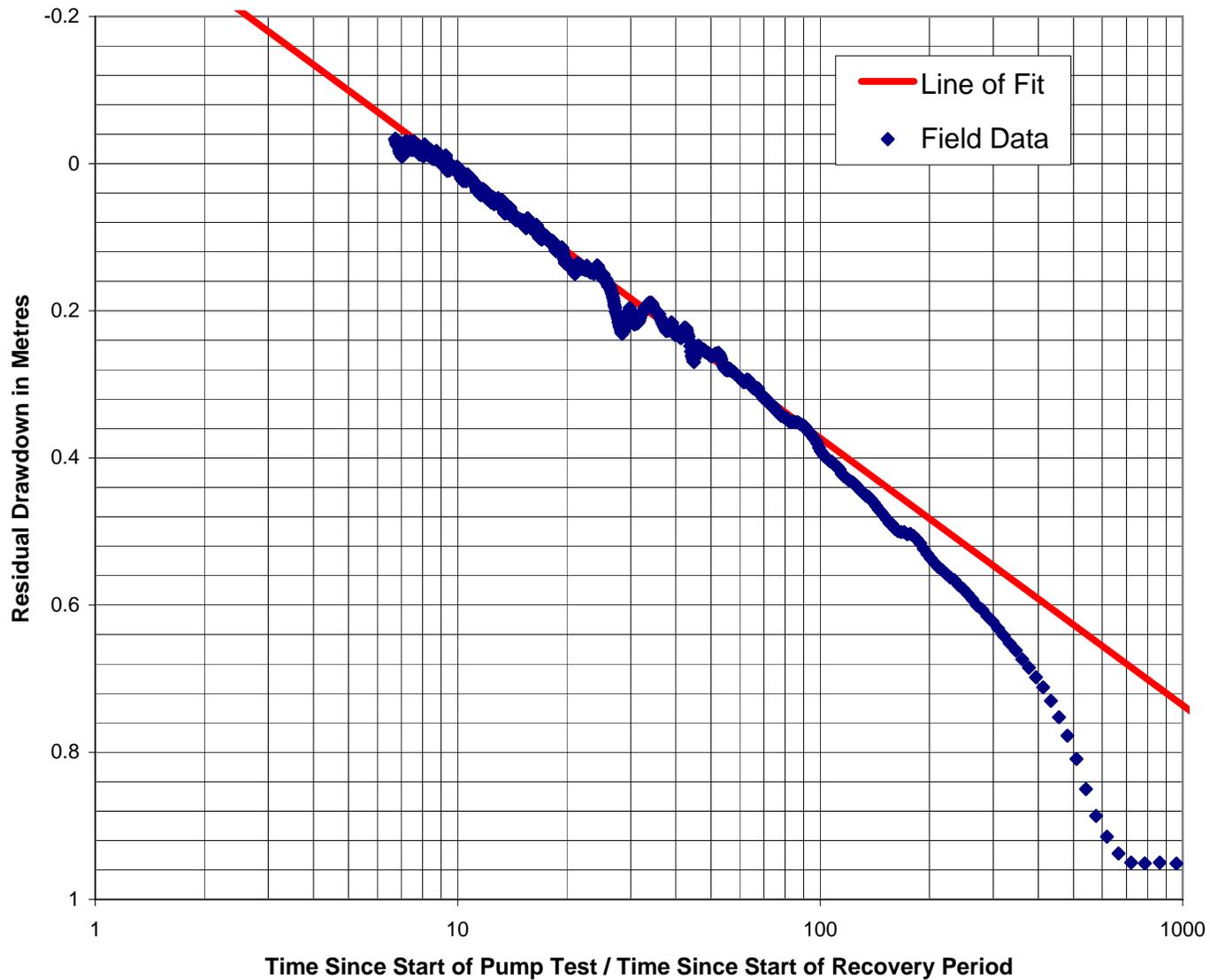
Flow Rate: 834.6 cu.m/day

T: 611.0213 sq.m/day

Project:	Junction 5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias005
Start of Test:	13-May-06
Drawn By:	JGG
Checked:	SDT



4BH217 (lower gravel) 144hr Pump Test Observed at 4BH216 (upper gravel) - Recovery Analysis



Delta S: 0.363 m

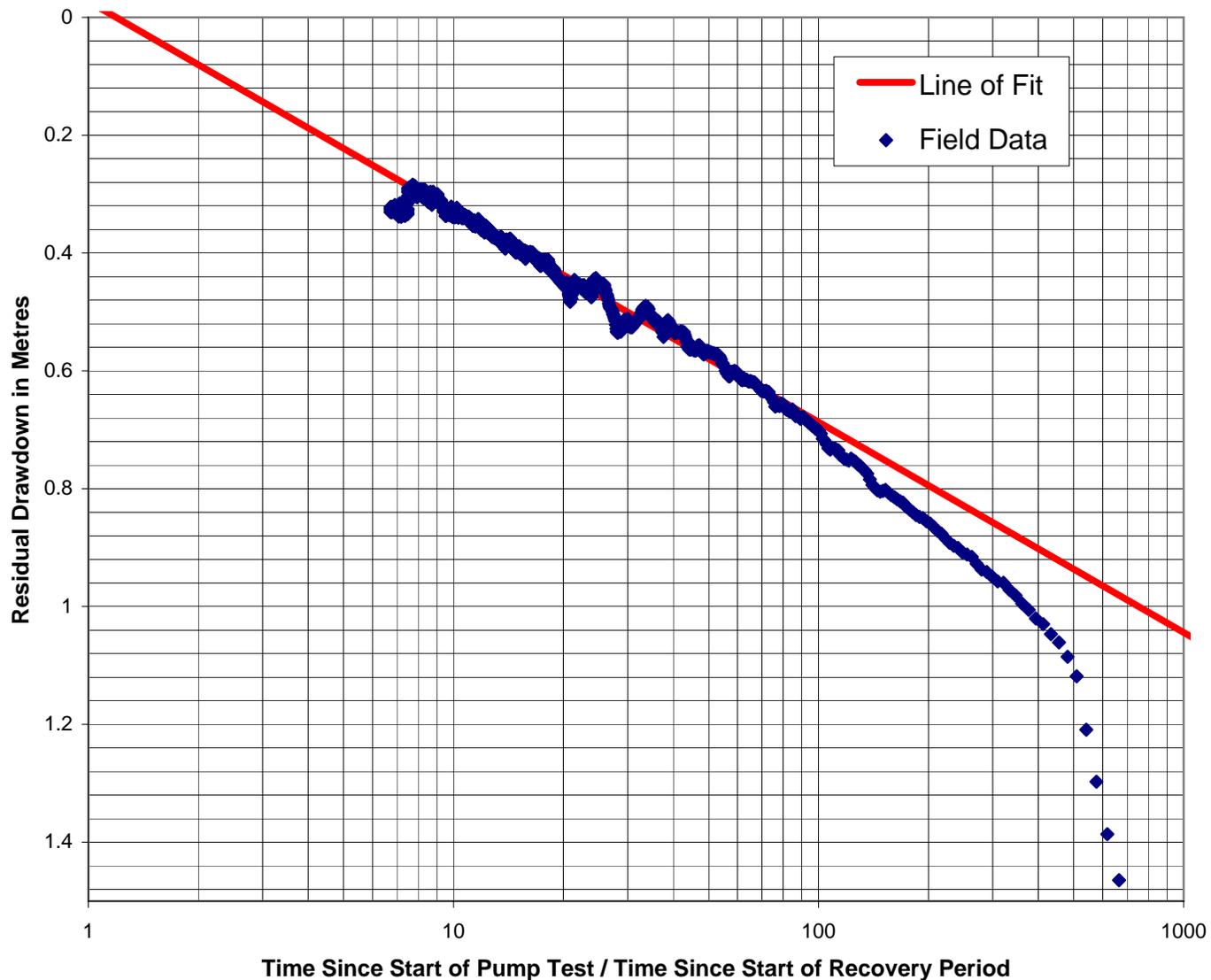
Flow Rate: 834.6 cu.m/day

T: 420.8136 sq.m/day

Project:	Junction 5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias005
Start of Test:	13-May-06
Drawn By:	JGG
Checked:	GR



4BH217 (lower gravel) 144hr Pump Test Observed at 4BH218B (lower gravel) - Recovery Analysis



Delta S: 0.357 m

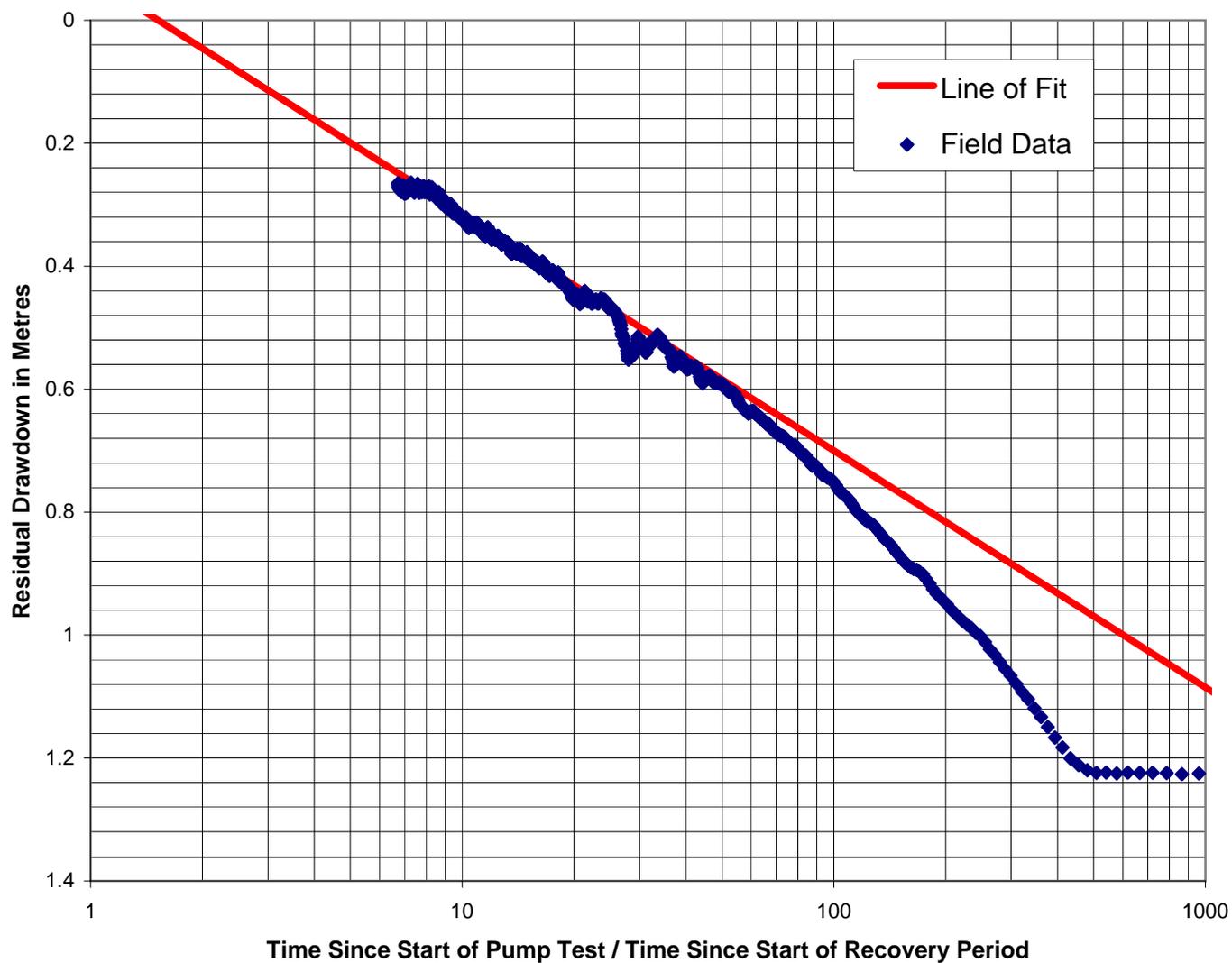
Flow Rate: 834.6 cu.m/day

T: 427.8861 sq.m/day

Project:	Junction 5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias005
Start of Test:	13-May-06
Drawn By:	JGG
Checked:	GR



4BH217 (lower gravel) 144hr Pump Test Observed at 4BH266 (rock) - Recovery Analysis



Delta S: 0.385 m

Flow Rate: 834.6 cu.m/day

T: 396.7671 sq.m/day

Project:	Junction 5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias005
Start of Test:	13-May-06
Drawn By:	JGG
Checked:	GR

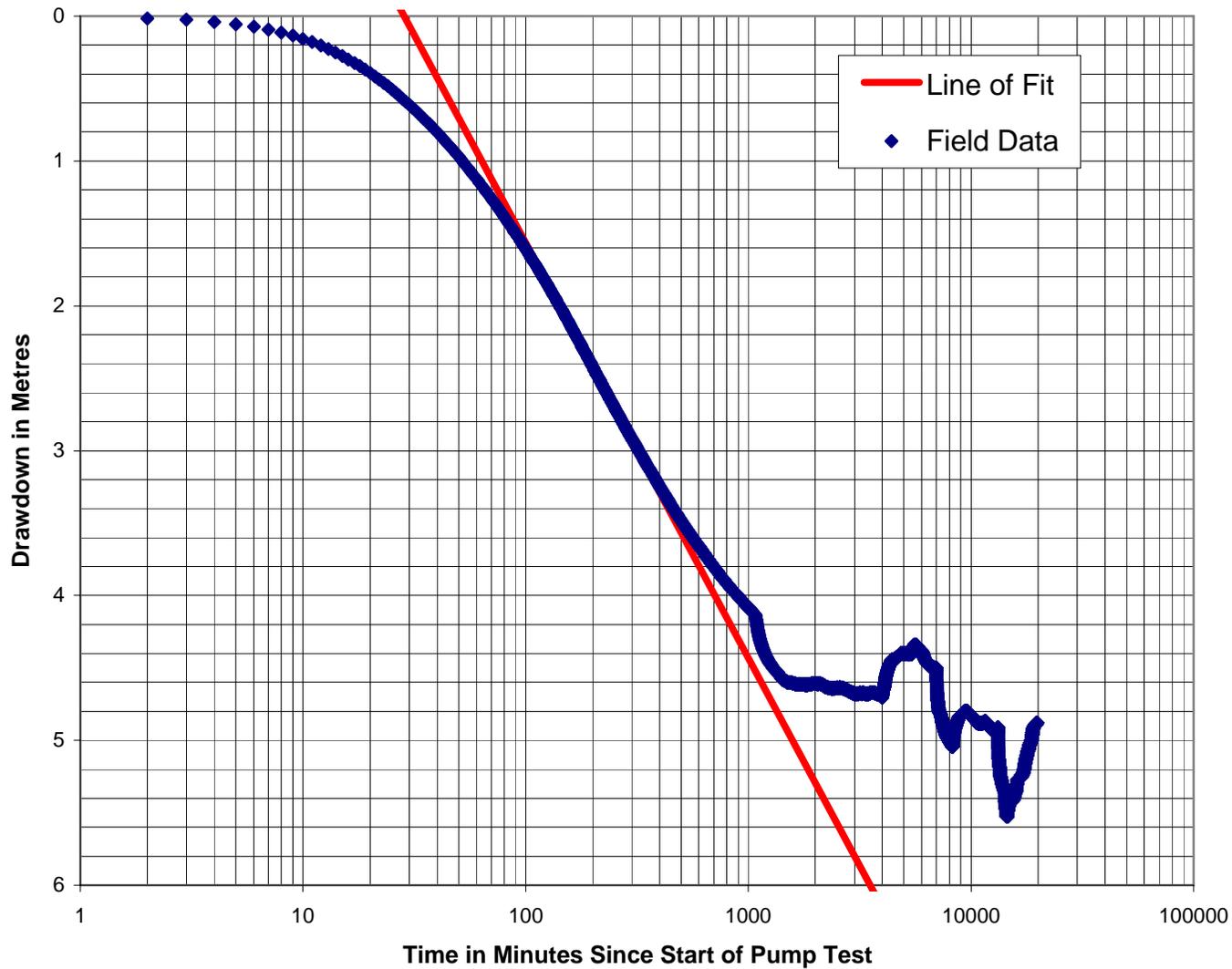


Appendix No.9

Pumping test BH 270A (22 May-5 June 2007 -14 day 18 hours test) drawdown and recovery graphs

(Jacob Analysis)

4BH270A (rock) 354hr Pump Test Observed at 4bh234 (rock) - Drawdown Analysis



Delta S: 2.867 m

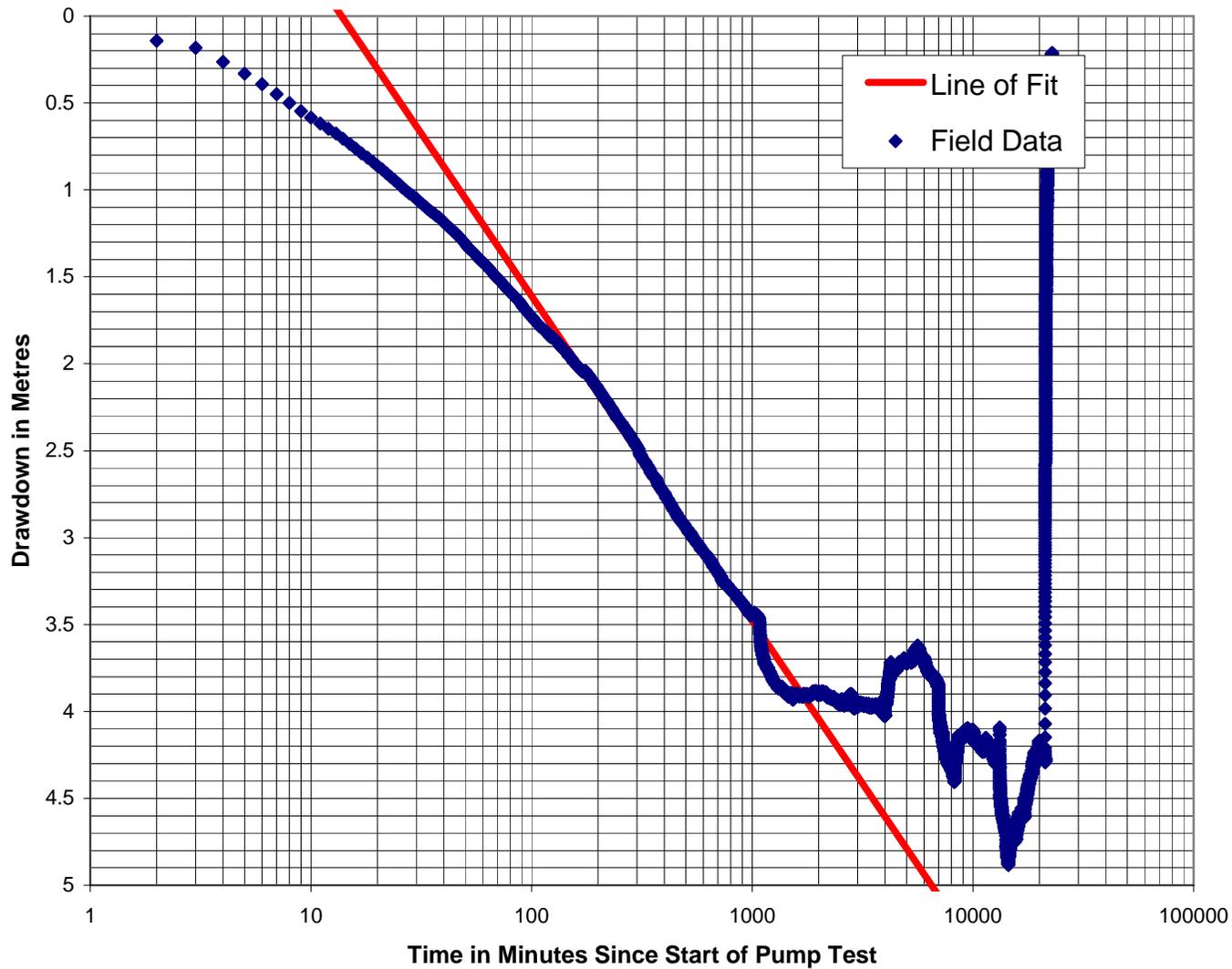
Flow Rate: 982.4 cu.m/day

T: 62.71604 sq.m/day

Project:	J5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias012
Start of Test:	22-May-06
Drawn By:	JGG
Checked:	DJF



4BH270A (rock) 354hr Pump Test Observed at 4bh238B (upper gravel) - Drawdown Analysis



Delta S: 1.87 m

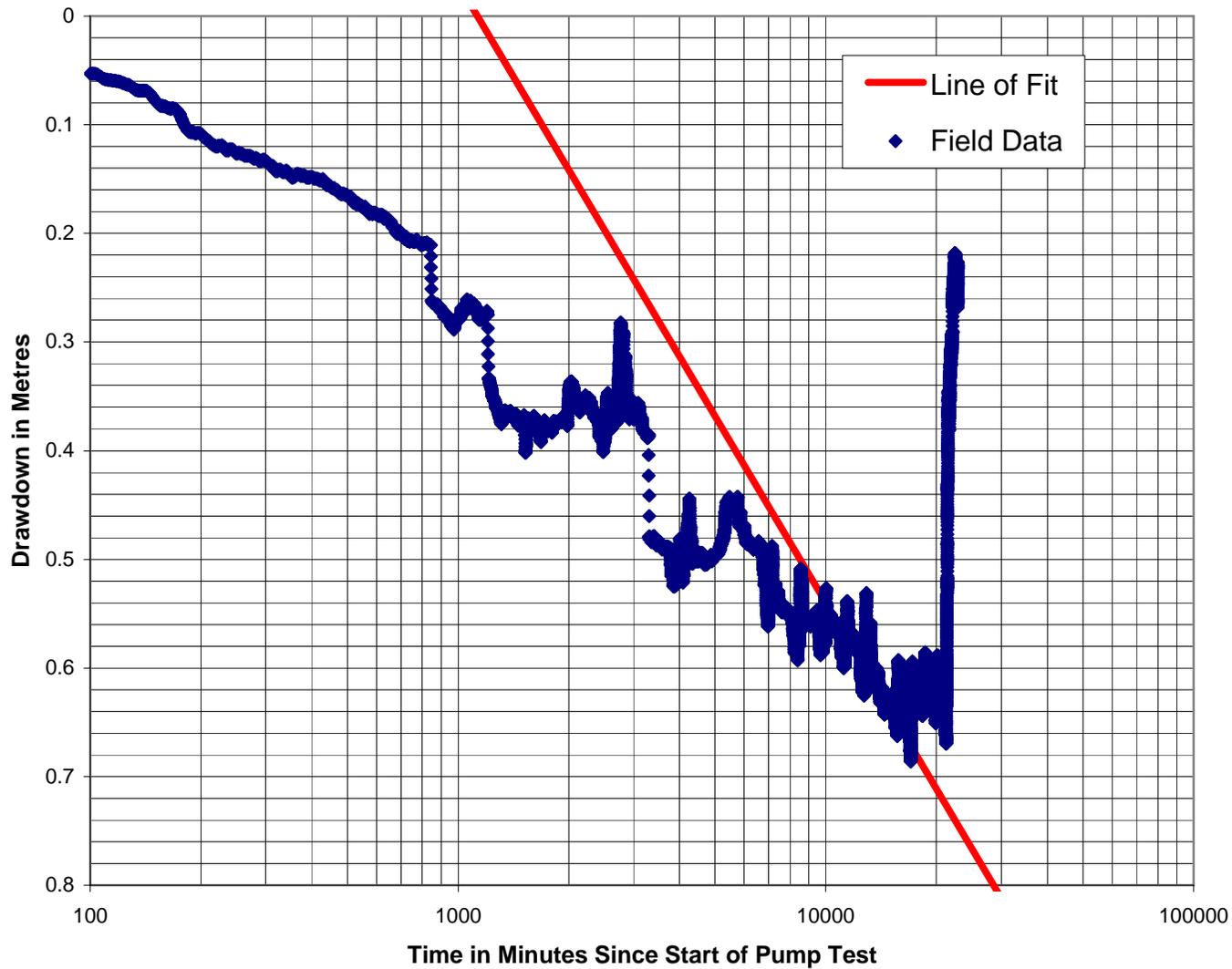
Flow Rate: 982.4 cu.m/day

T: 96.15342 sq.m/day

Project:	J5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias012
Start of Test:	22-May-06
Drawn By:	JGG
Checked:	DJF



4BH270A (rock) 354hr Pump Test Observed at 4bh239 (upper gravel) - Drawdown Analysis



Delta S: 0.57 m

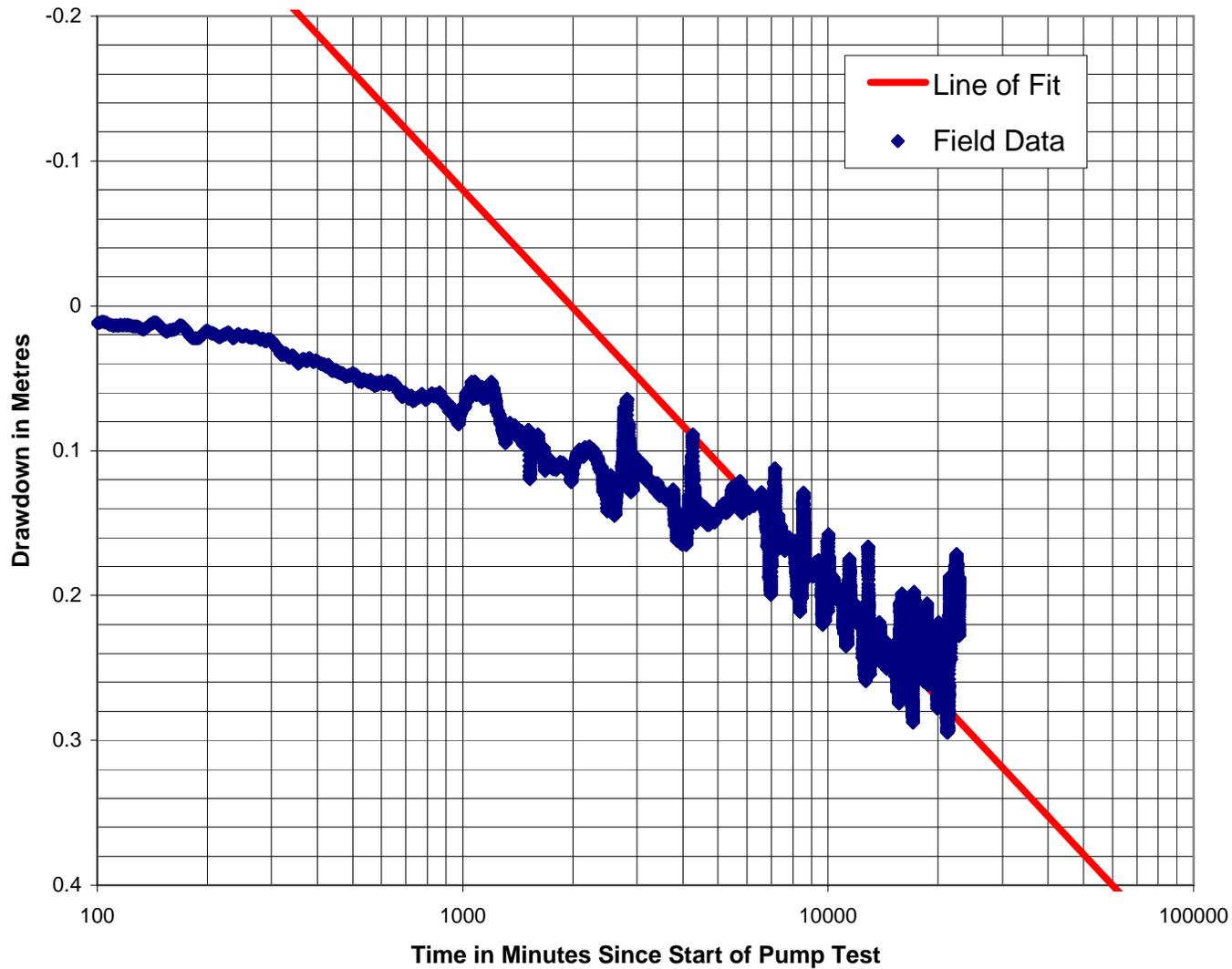
Flow Rate: 982.4 cu.m/day

T: 315.4507 sq.m/day

Project:	J5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias012
Start of Test:	22-May-06
Drawn By:	JGG
Checked:	DJF



4BH270A (rock) 354hr Pump Test Observed at 4bh252A (upper gravel) - Drawdown Analysis



Delta S: 0.27 m

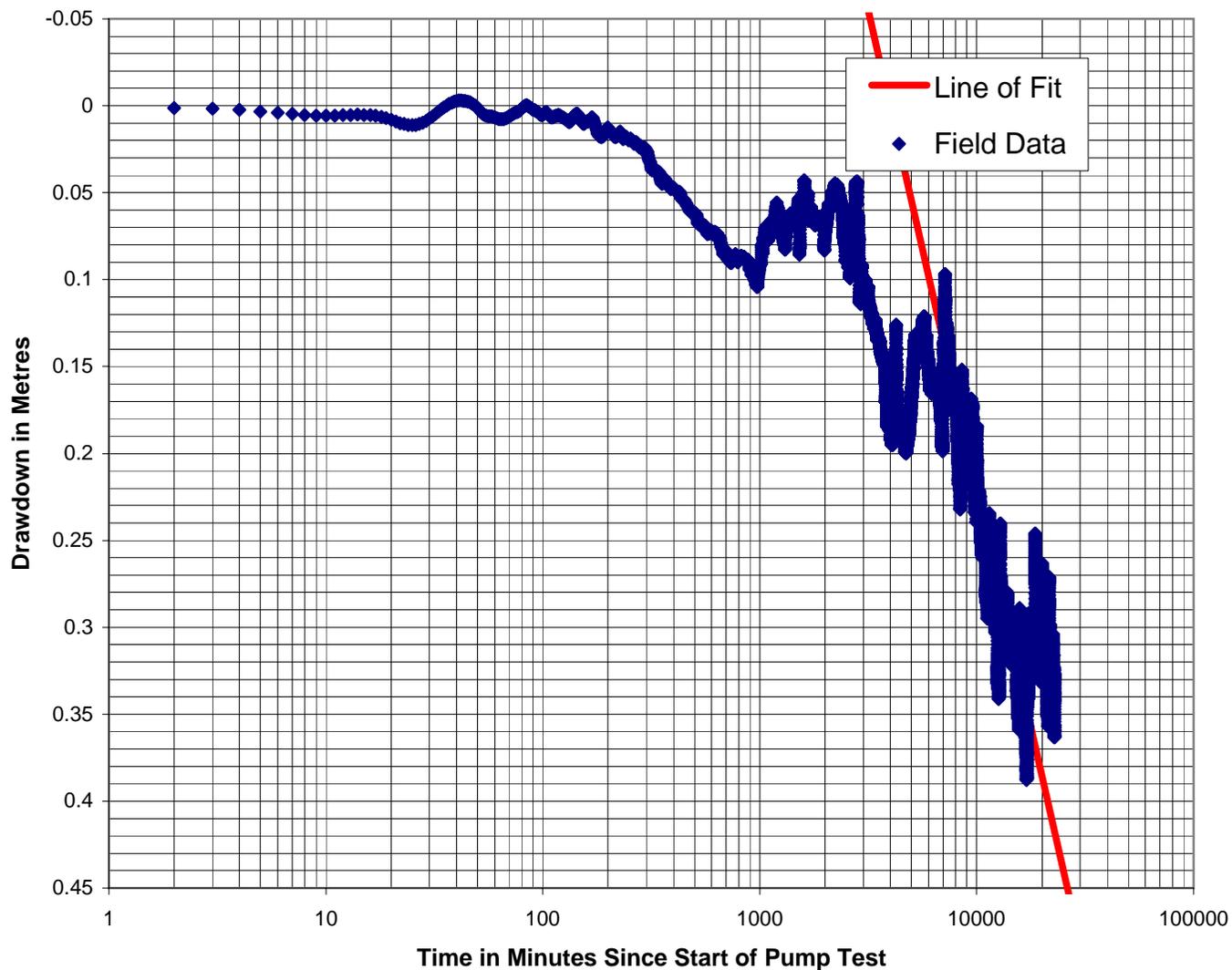
Flow Rate: 982.4 cu.m/day

T: 665.9514 sq.m/day

Project:	J5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias012
Start of Test:	22-May-06
Drawn By:	JGG
Checked:	DJF



4BH270A (rock) 354hr Pump Test Observed at 4bh266 (rock) - Drawdown Analysis



Delta S: 0.55 m

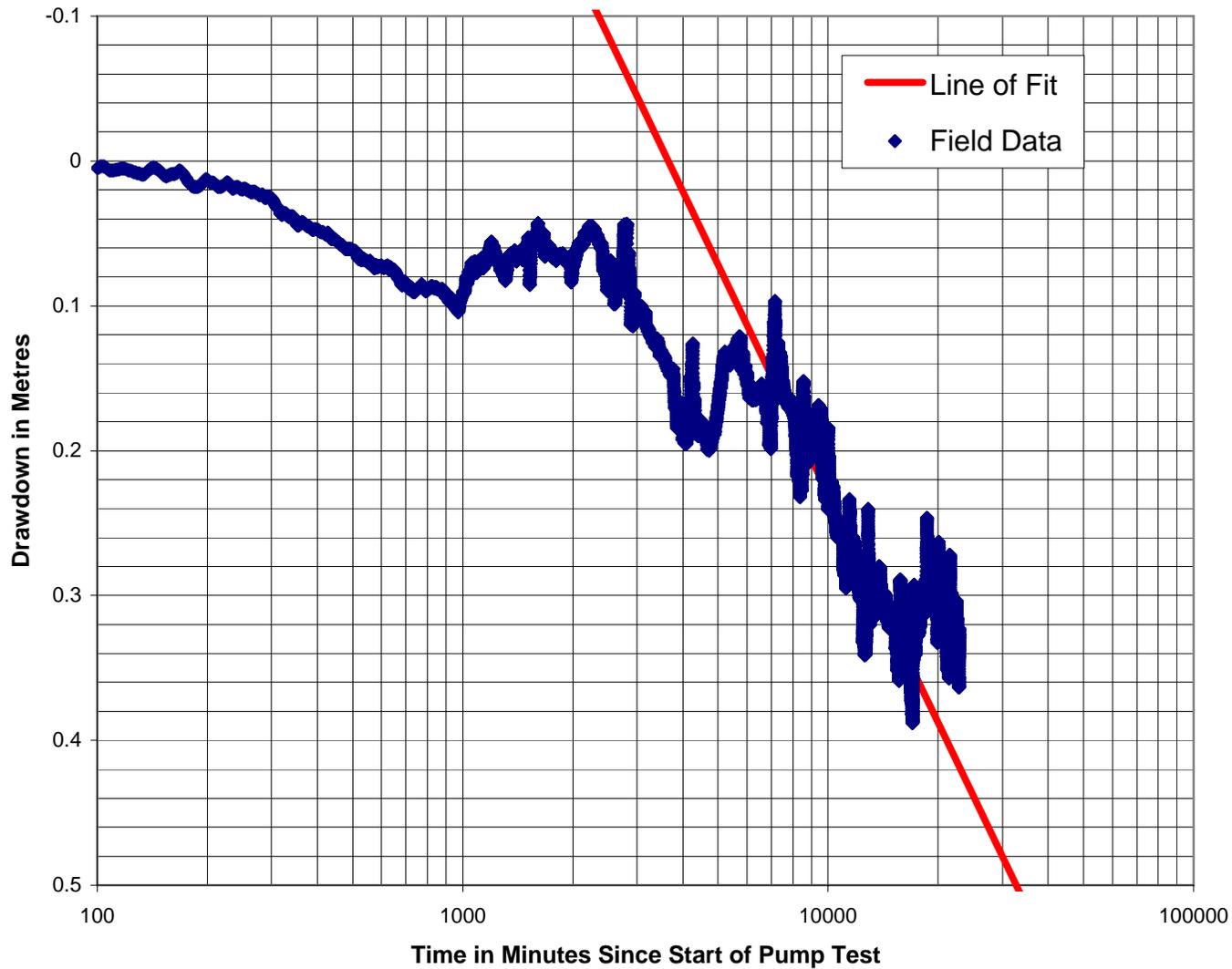
Flow Rate: 982.4 cu.m/day

T: 326.9216 sq.m/day

Project:	J5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias012
Start of Test:	22-May-06
Drawn By:	JGG
Checked:	DJF



4BH270A (rock) 354hr Pump Test Observed at 4BH268 (rock) - Drawdown Analysis



Delta S: 0.525 m

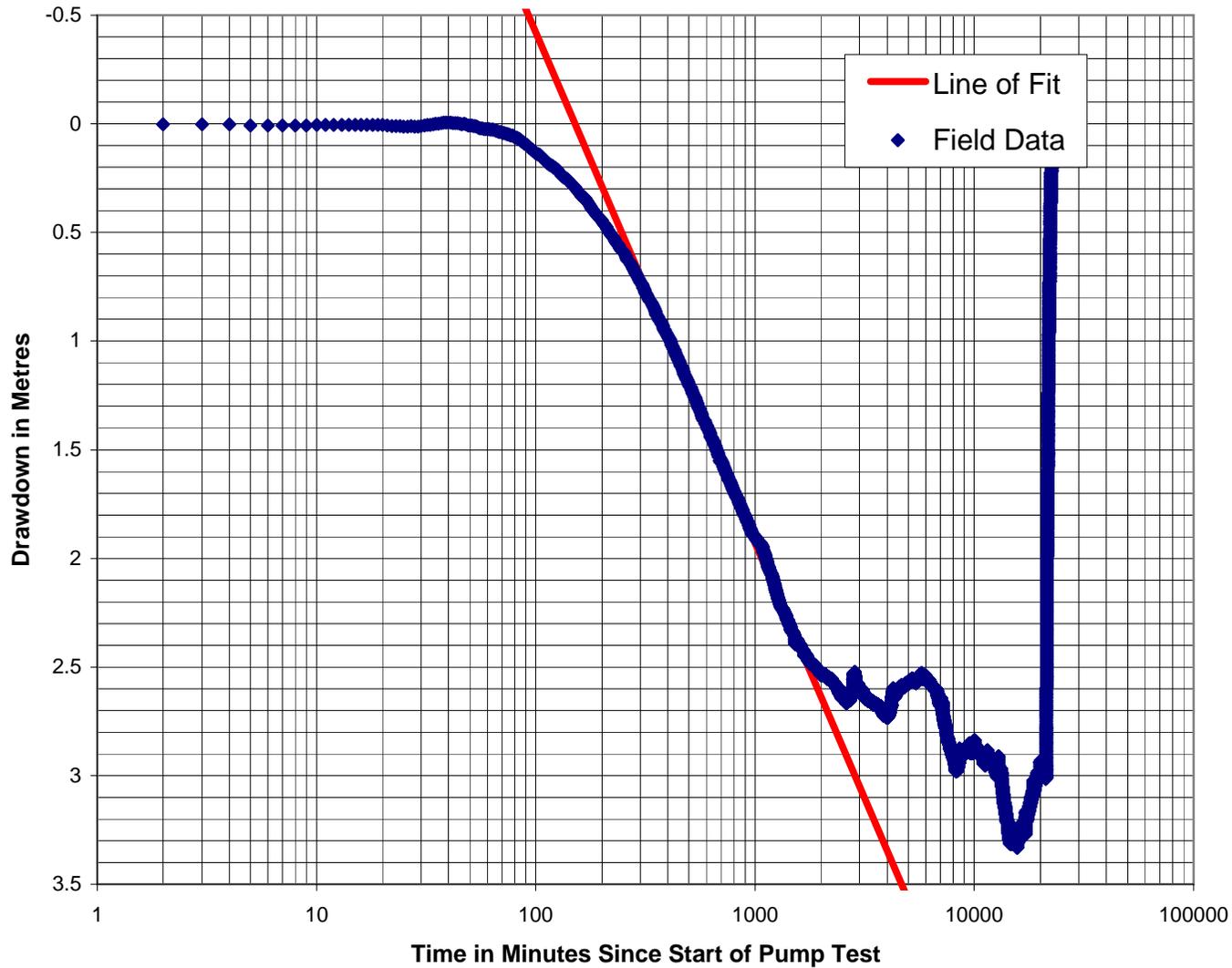
Flow Rate: 982.4 cu.m/day

T: 342.4893 sq.m/day

Project:	J5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias012
Start of Test:	22-May-06
Drawn By:	JGG
Checked:	DJF



4BH270A (rock) 354hr Pump Test Observed at 4BH274 (lower gravel) - Drawdown Analysis



Delta S: 2.35 m

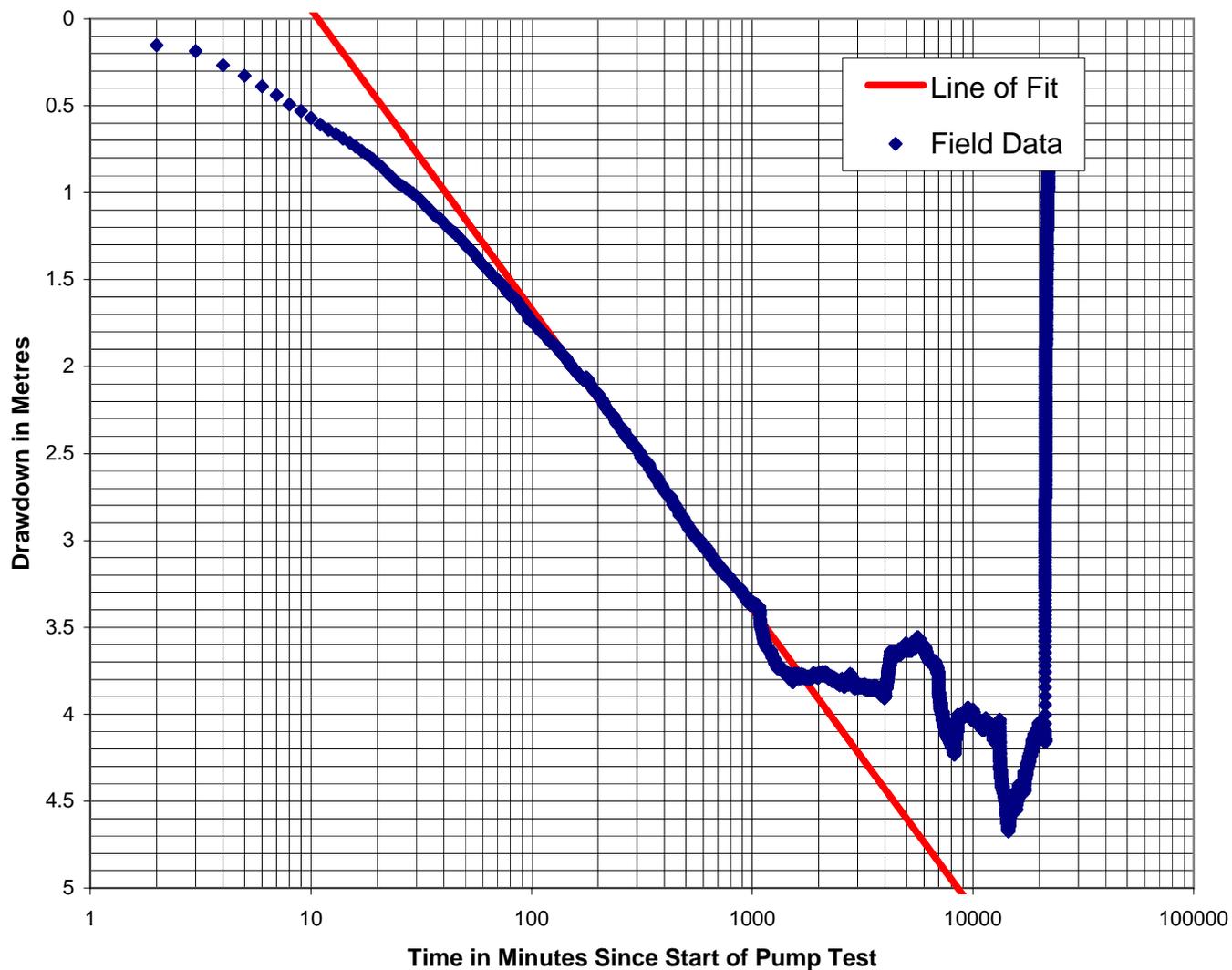
Flow Rate: 982.4 cu.m/day

T: 76.51357 sq.m/day

Project:	J5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias012
Start of Test:	22-May-06
Drawn By:	JGG
Checked:	DJF



4BH270A (rock) 354hr Pump Test Observed at 4bh290 (rock) - Drawdown Analysis

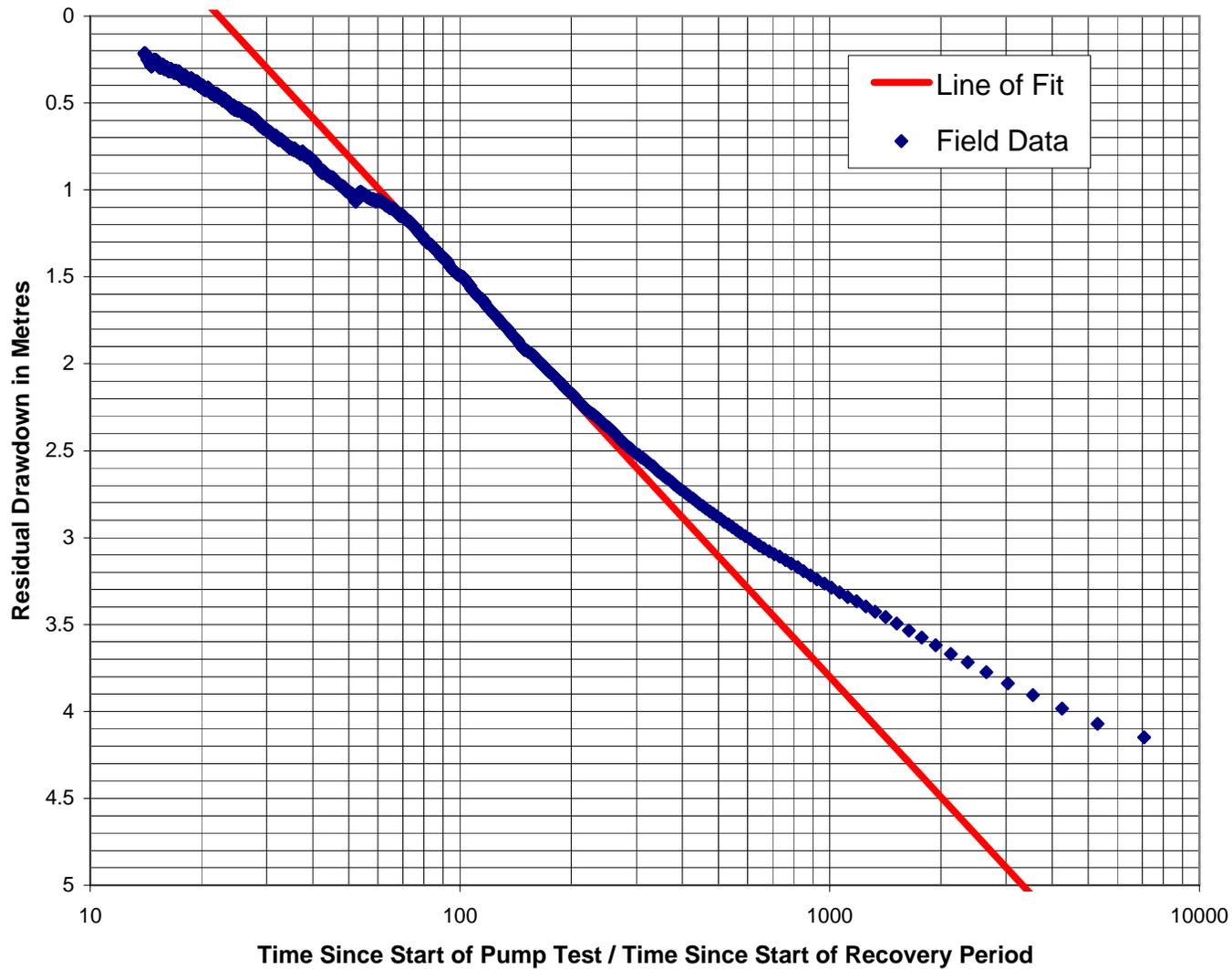


Delta S:	1.725 m
Flow Rate:	982.4 cu.m/day
T:	104.2359 sq.m/day

Project:	J5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias012
Start of Test:	22-May-06
Drawn By:	JGG
Checked:	DJF



4BH270A (rock) 354hr Pump Test Observed at 4bh238B (upper gravel) - Recovery Analysis



Delta S: 2.3 m

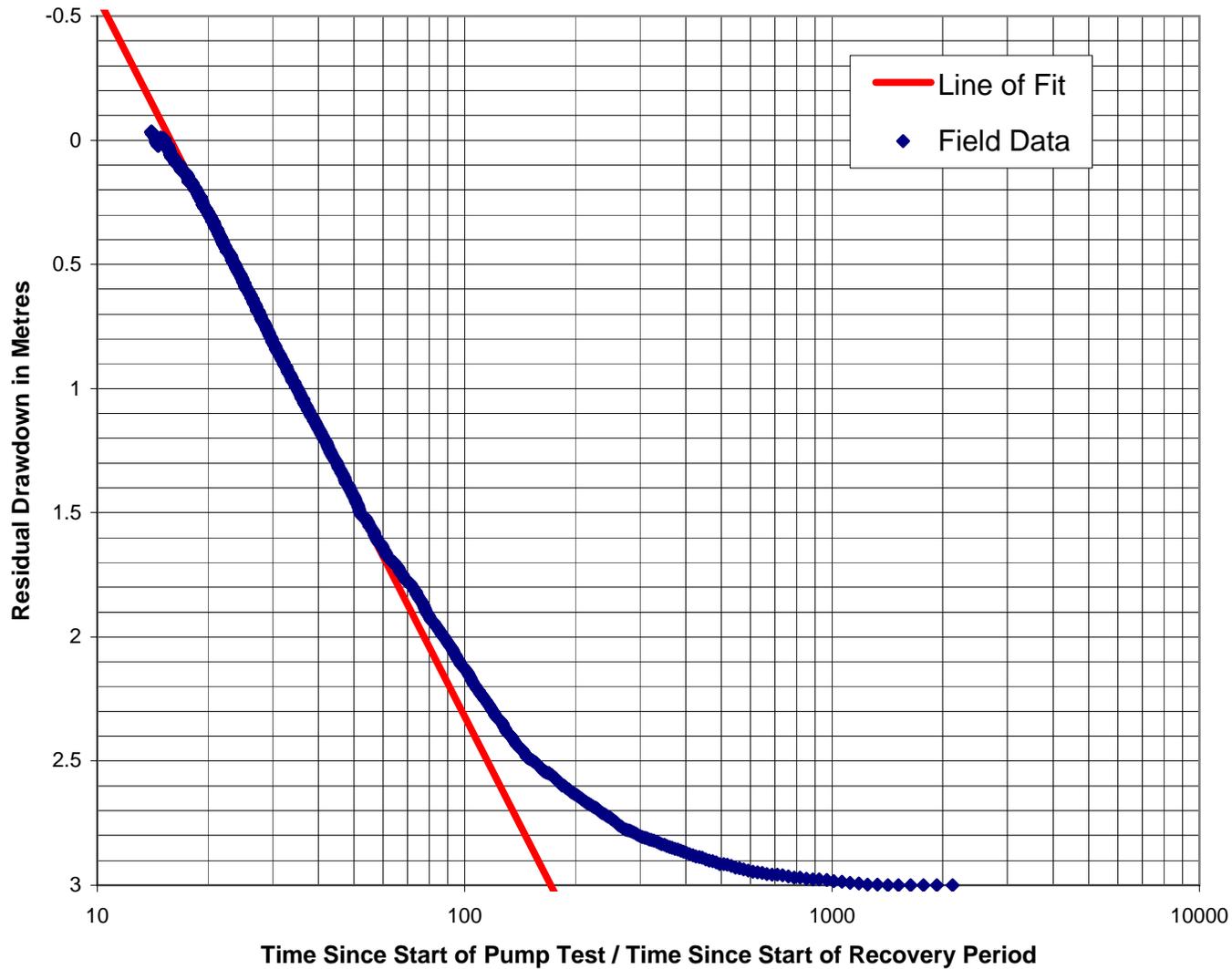
Flow Rate: 982.4 cu.m/day

T: 78.17691 sq.m/day

Project:	J5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias012
Start of Test:	22-May-06
Drawn By:	JGG
Checked:	GR



4BH270A (rock) 354hr Pump Test Observed at 4BH274 (lower gravel) - Recovery Analysis



Delta S: 2.9 m

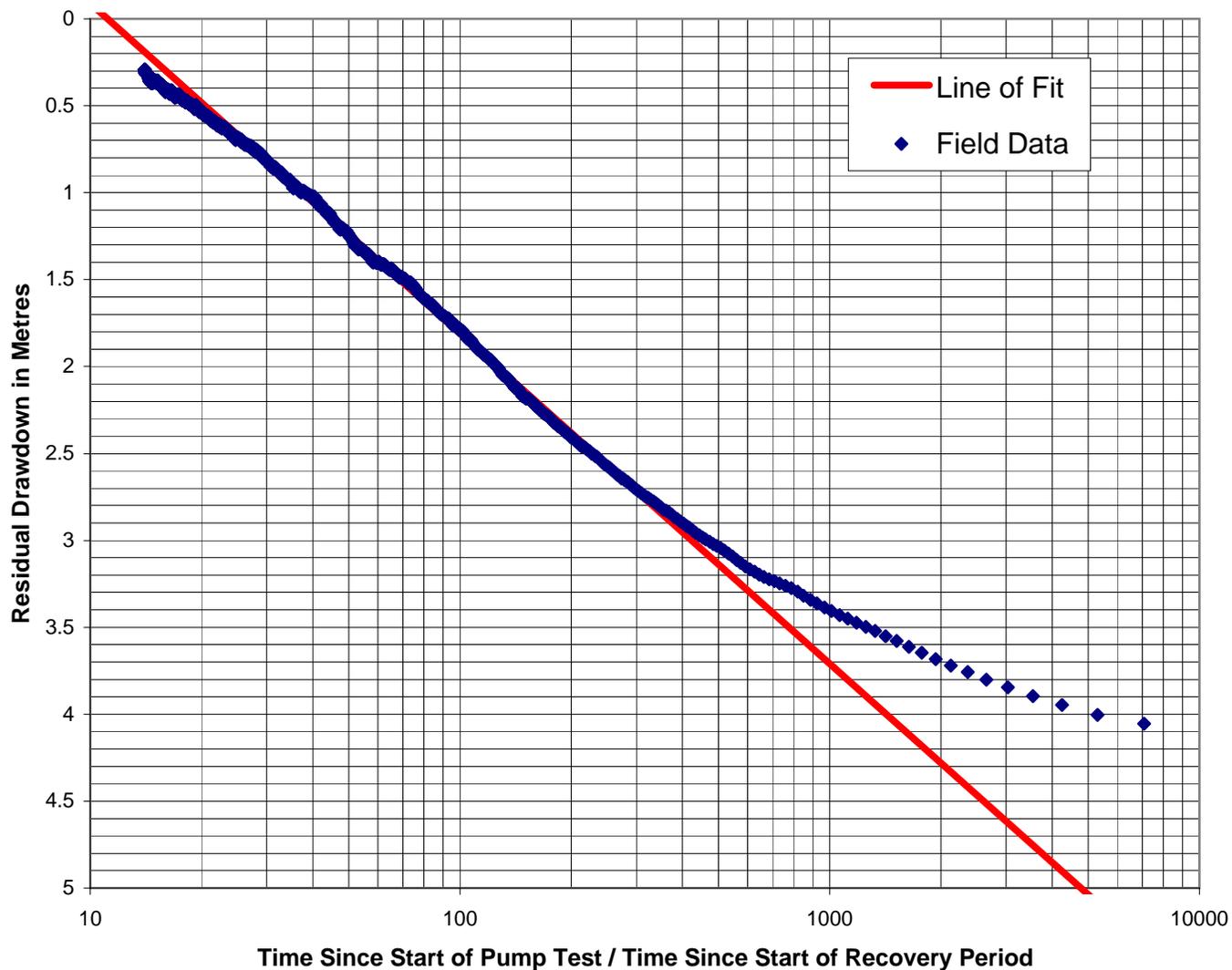
Flow Rate: 982.4 cu.m/day

T: 62.00238 sq.m/day

Project:	J5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias012
Start of Test:	22-May-06
Drawn By:	JGG
Checked:	GR



4BH270A (rock) 354hr Pump Test Observed at 4bh290 (rock) - Recovery Analysis



Delta S: 1.9 m

Flow Rate: 982.4 cu.m/day

T: 94.6352 sq.m/day

Project:	J5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias012
Start of Test:	22-May-06
Drawn By:	JGG
Checked:	GR

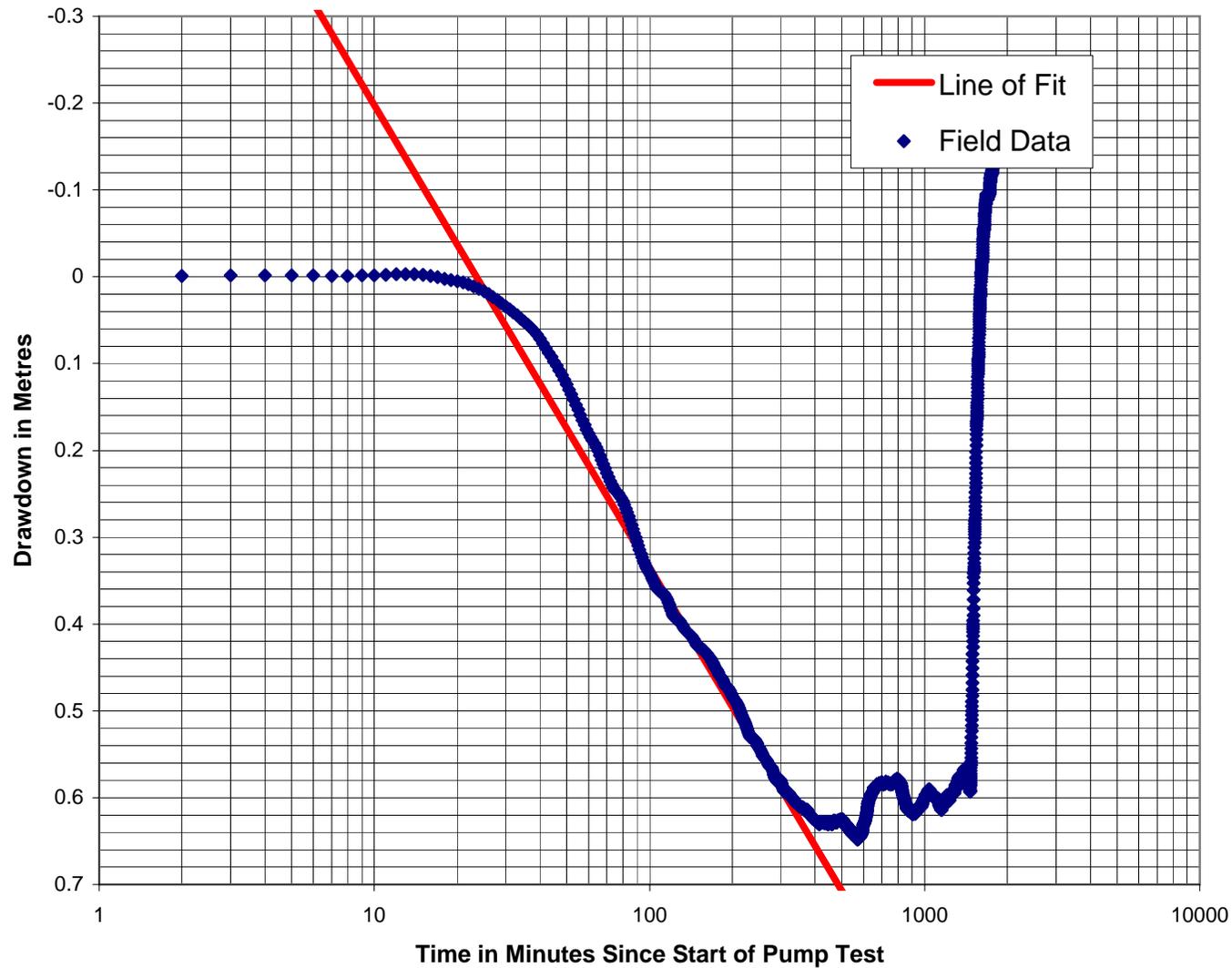


Appendix No.10

Pumping test BH 234 (10-11 June 2007 - 24 hour test) drawdown and recovery graphs

(Jacob Analysis)

4BH234 (rock) 24hr Pump Test Observed at 4BH231 (lower gravel) - Drawdown Analysis



Delta S: 0.5325 m

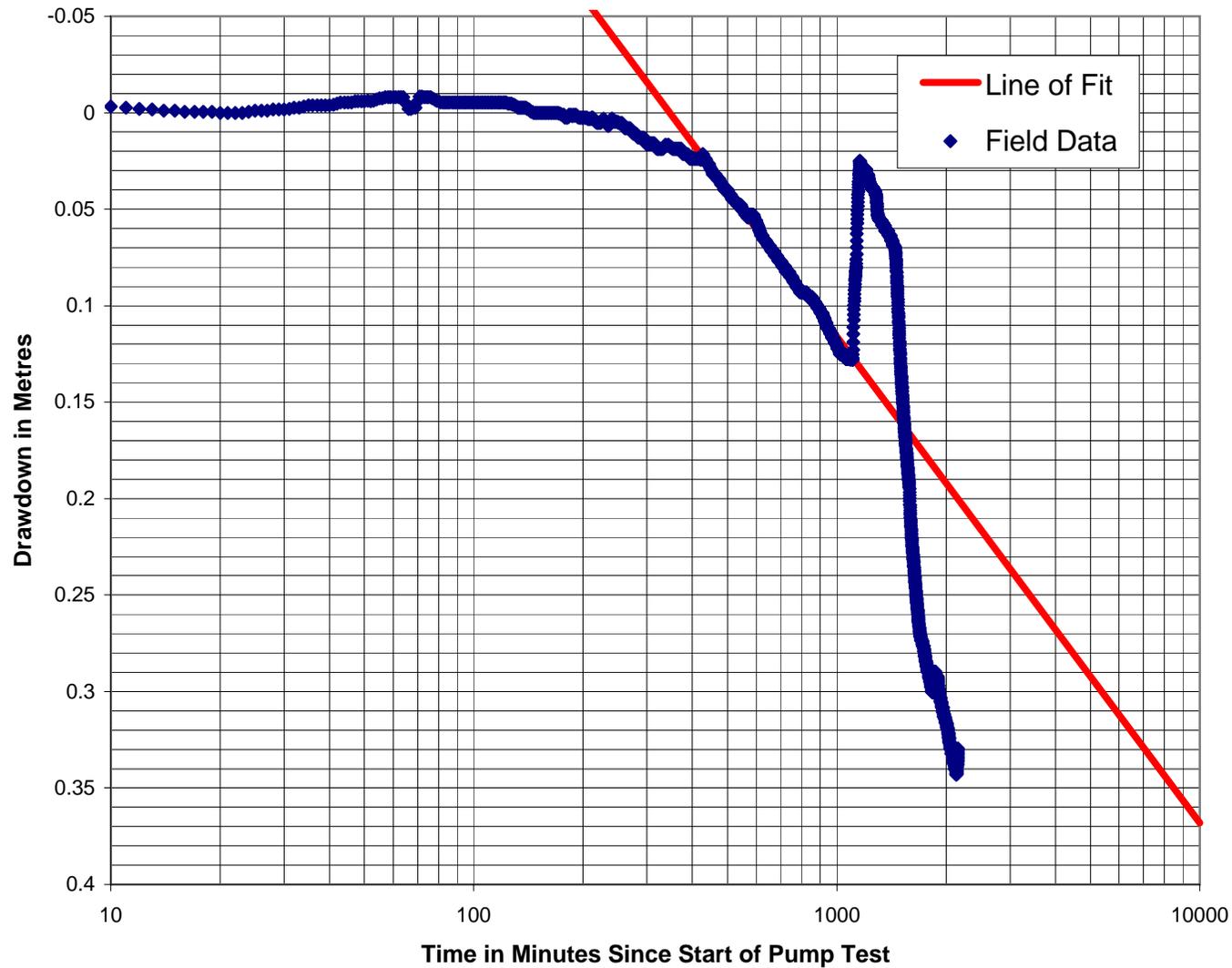
Flow Rate: 47.5 cu.m/day

T: 16.32646 sq.m/day

Project:	Junction 5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias008
Start of Test:	10-Jun-06
Drawn By:	JGG
Checked:	DJF



4BH234 (rock) 24hr Pump Test Observed at 4BH269 (rock) - Drawdown Analysis



Delta S: 0.252 m

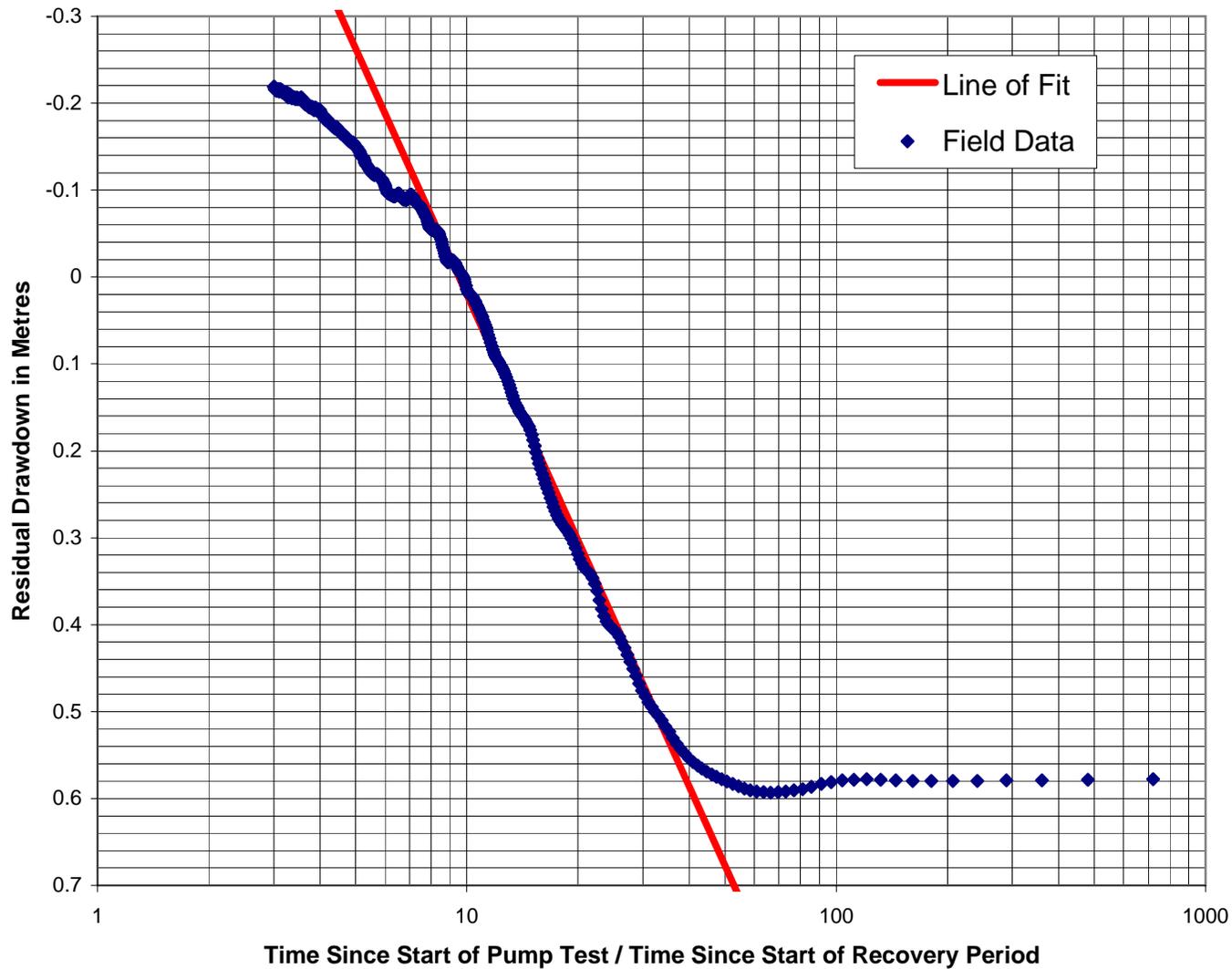
Flow Rate: 47.5 cu.m/day

T: 34.49936 sq.m/day

Project:	Junction 5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias008
Start of Test:	10-Jun-06
Drawn By:	JGG
Checked:	DJF



4BH234 (rock) 24hr Pump Test Observed at 4BH231 (lower gravel) - Recovery Analysis



Delta S: 0.94 m

Flow Rate: 47.5 cu.m/day

T: 9.248765 sq.m/day

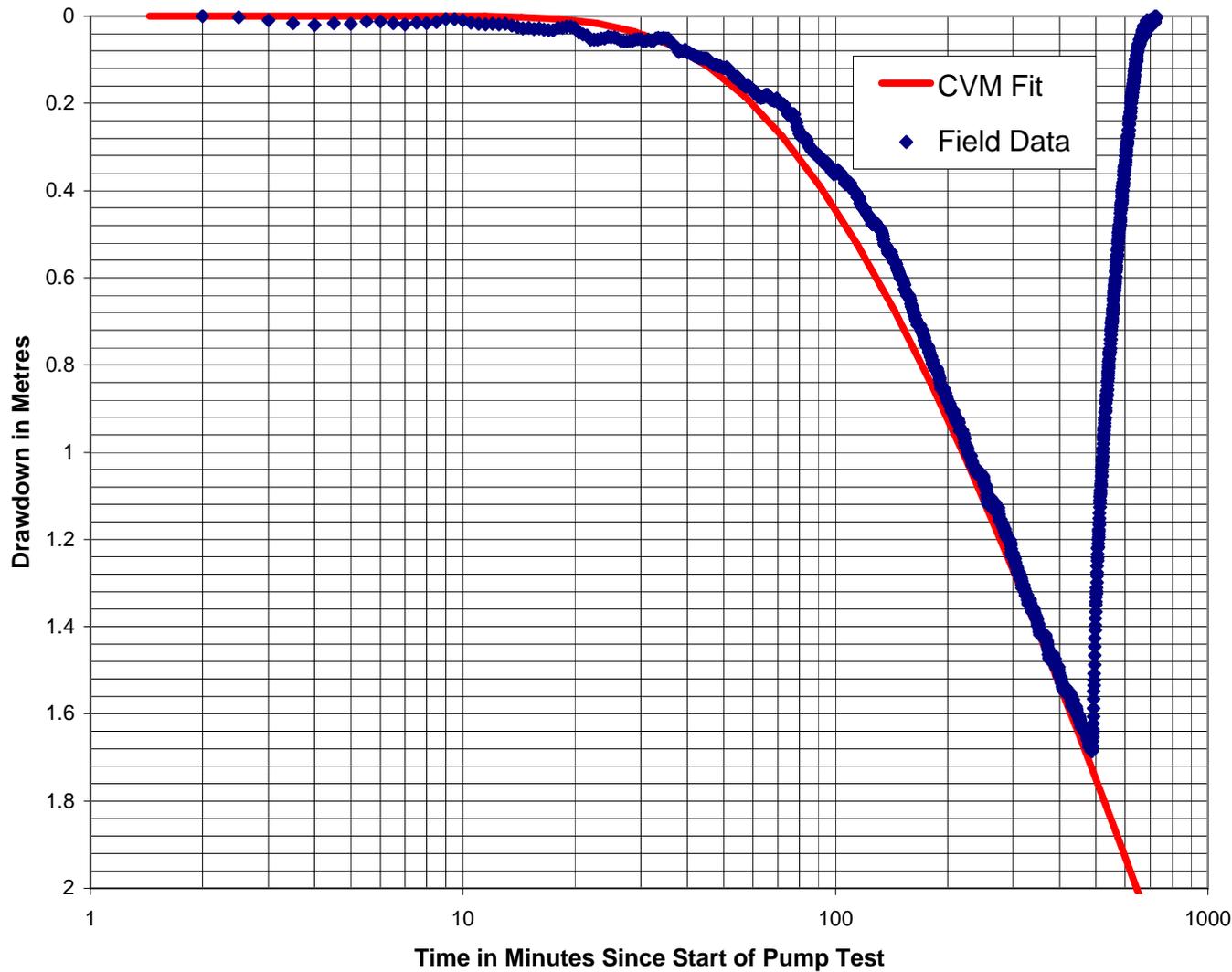
Project:	Junction 5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias008
Start of Test:	10-Jun-06
Drawn By:	JGG
Checked:	GR



Appendix No.11

Pumping test BH 270A (22 May-5 June 2007 - 14 day 18 hours) drawdown graphs
(CVM Analysis)

4BH270A 8hr Pump Test Observed at 4bh272 - CVM Drawdown Curve Fit



T: 80 sq.m/day

S: 0.0007

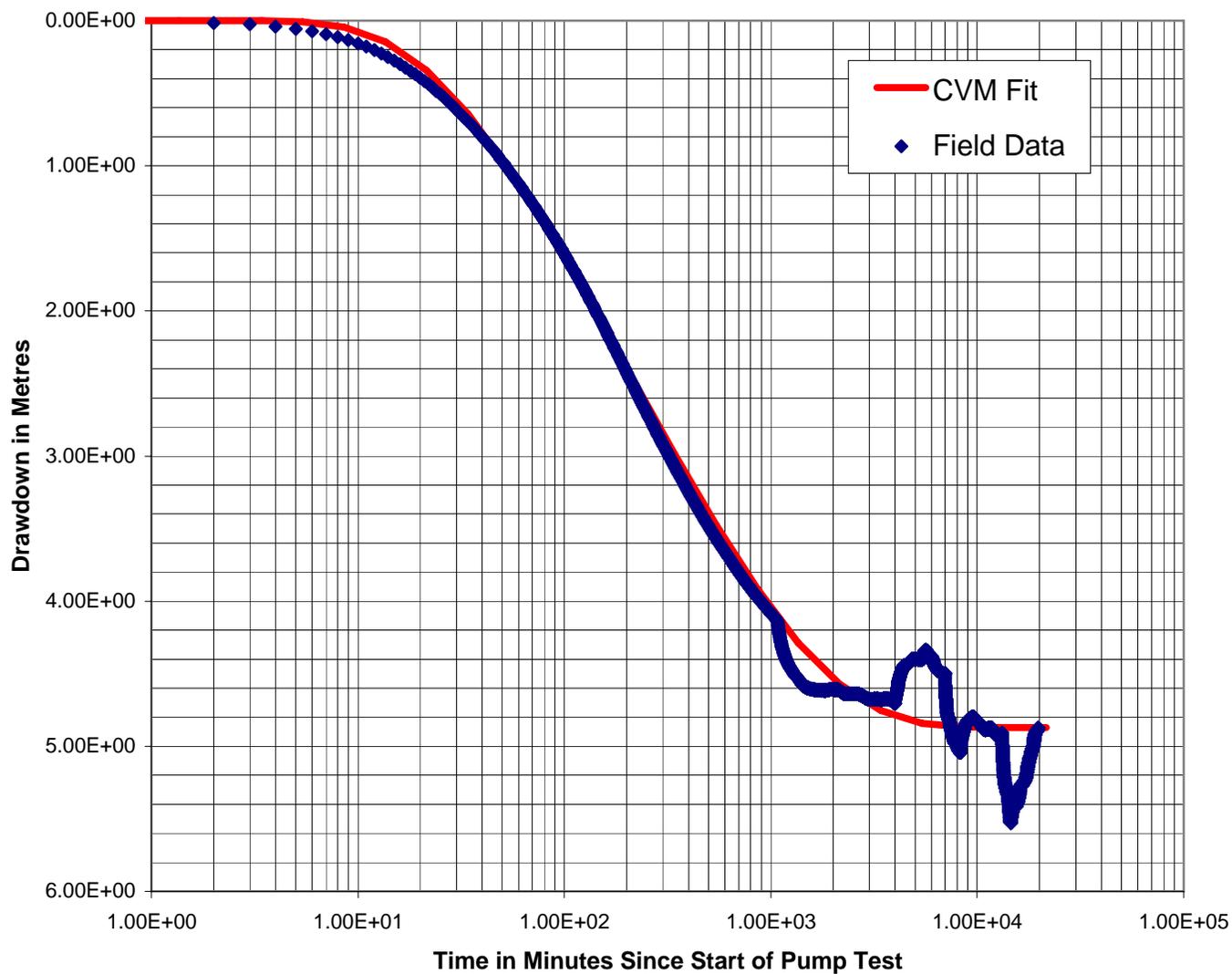
Leakance: 0 /day

Distance: 64.29 m

Project:	J5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias011 Re: CVMRaith001.inp
Date:	14-Apr-06
Drawn By:	JGG
Checked:	SDT



4BH270A 354hr Pump Test Observed at 4bh234 - CVM Drawdown Curve Fit



T: 58.5 sq.m/day

S: 0.00029

Leakance: 0.000185 /day

Distance: 104.29 m

Project: J5 M74 Raith

Client: Mouchel Fairhurst JV

Ref: J267_Radias012
Re: JohnRaith003.inp

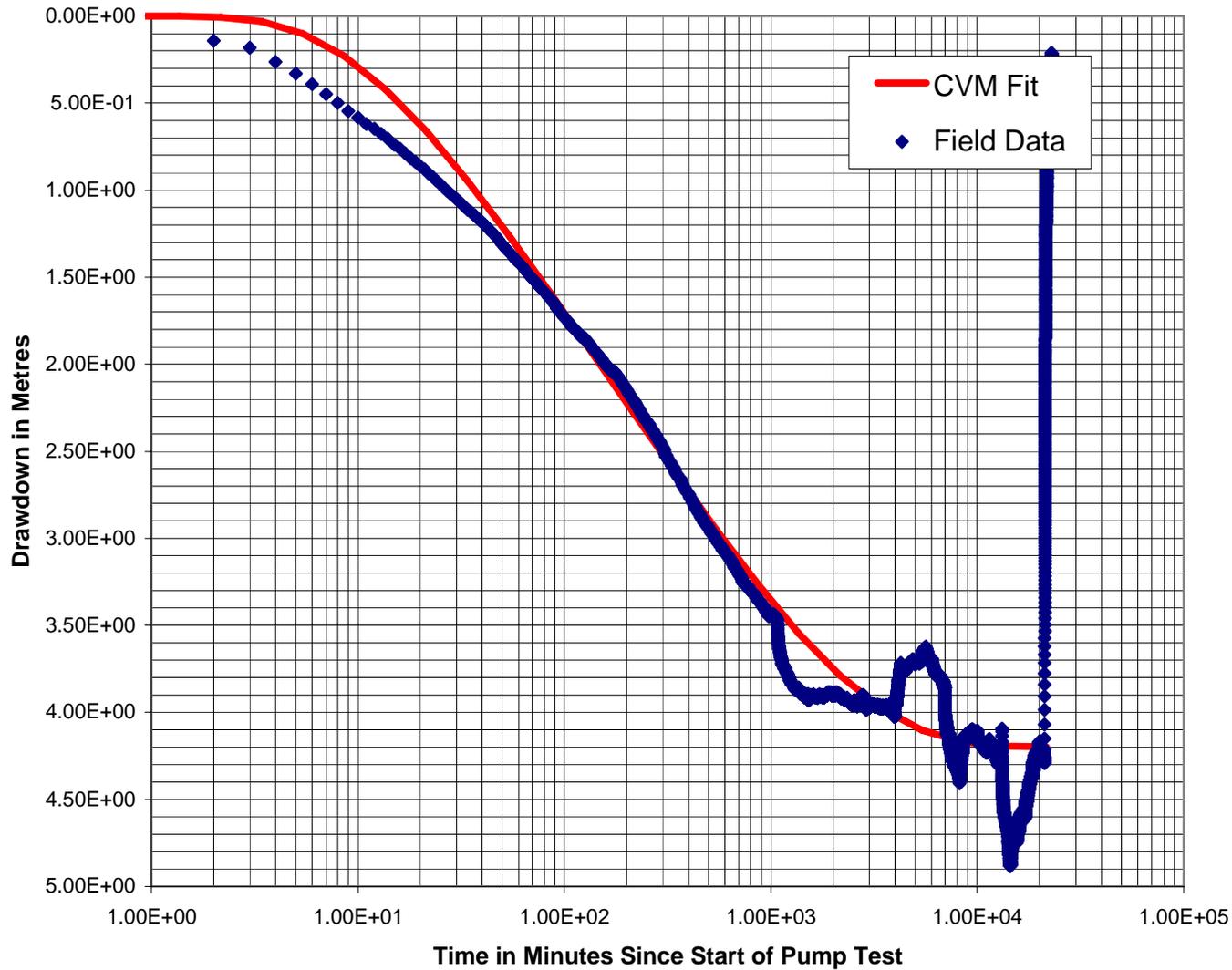
Date: 22-May-06

Drawn By: JGG

Checked: SDT



4BH270A 354hr Pump Test Observed at 4bh238B - CVM Drawdown Curve Fit



T: 96.2 sq.m/day

S: 0.007

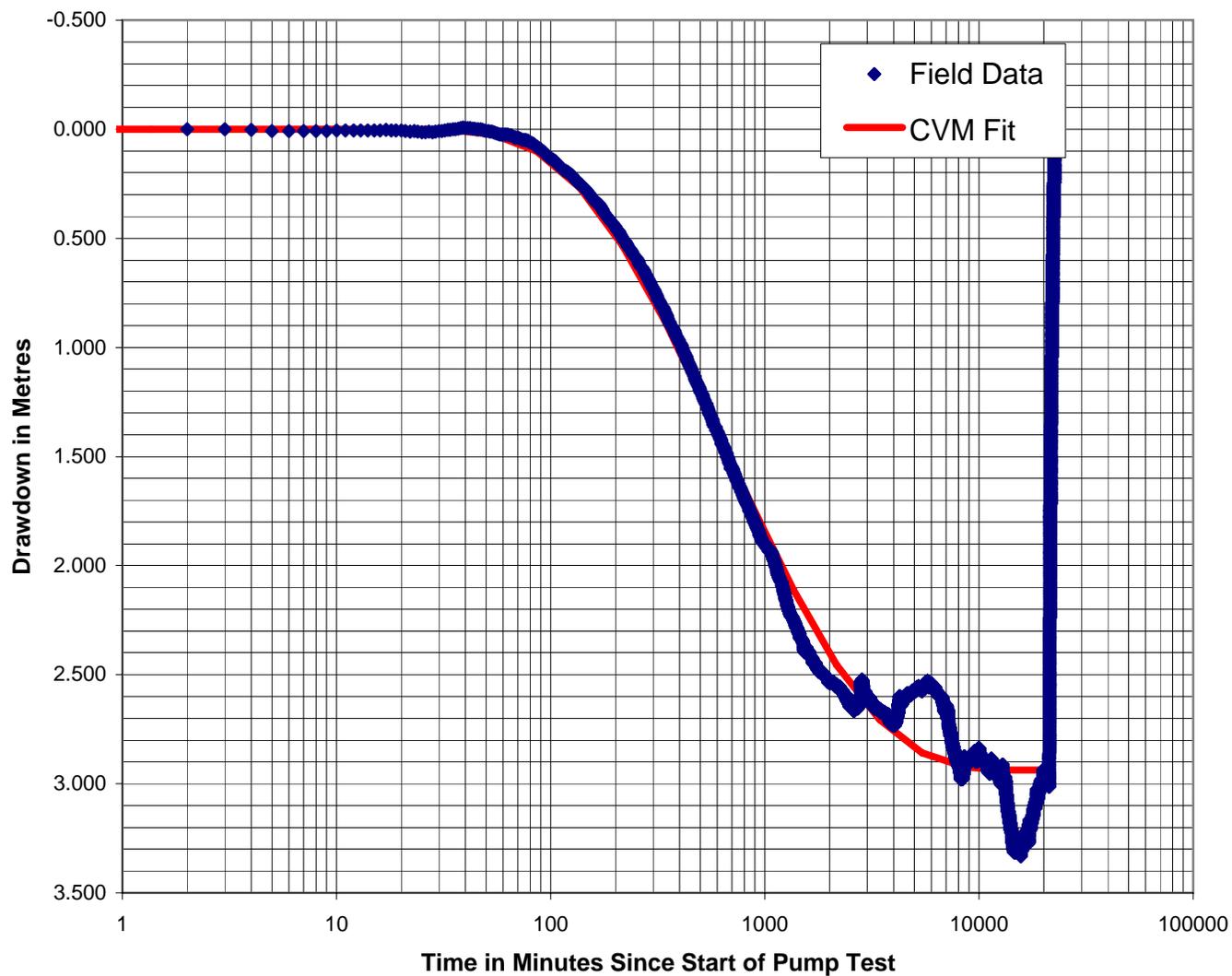
Leakance: 0.0025 /day

Distance: 16.7 m

Project:	J5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J267_Radias012 Re: JohnRaith004.inp
Date:	22-May-06
Drawn By:	JGG
Checked:	SDT



4BH270A 354hr Pump Test Observed at 4BH274 - CVM Drawdown Curve Fit



T: 55 sq.m/day

S: 0.0006

Leakance: 0.00285 day⁻¹

Distance: 192.78 m

Project: J5 M74 Raith

Client: Mouchel Fairhurst JV

Ref: J267_Radias012
Re: JohnRaith005.inp

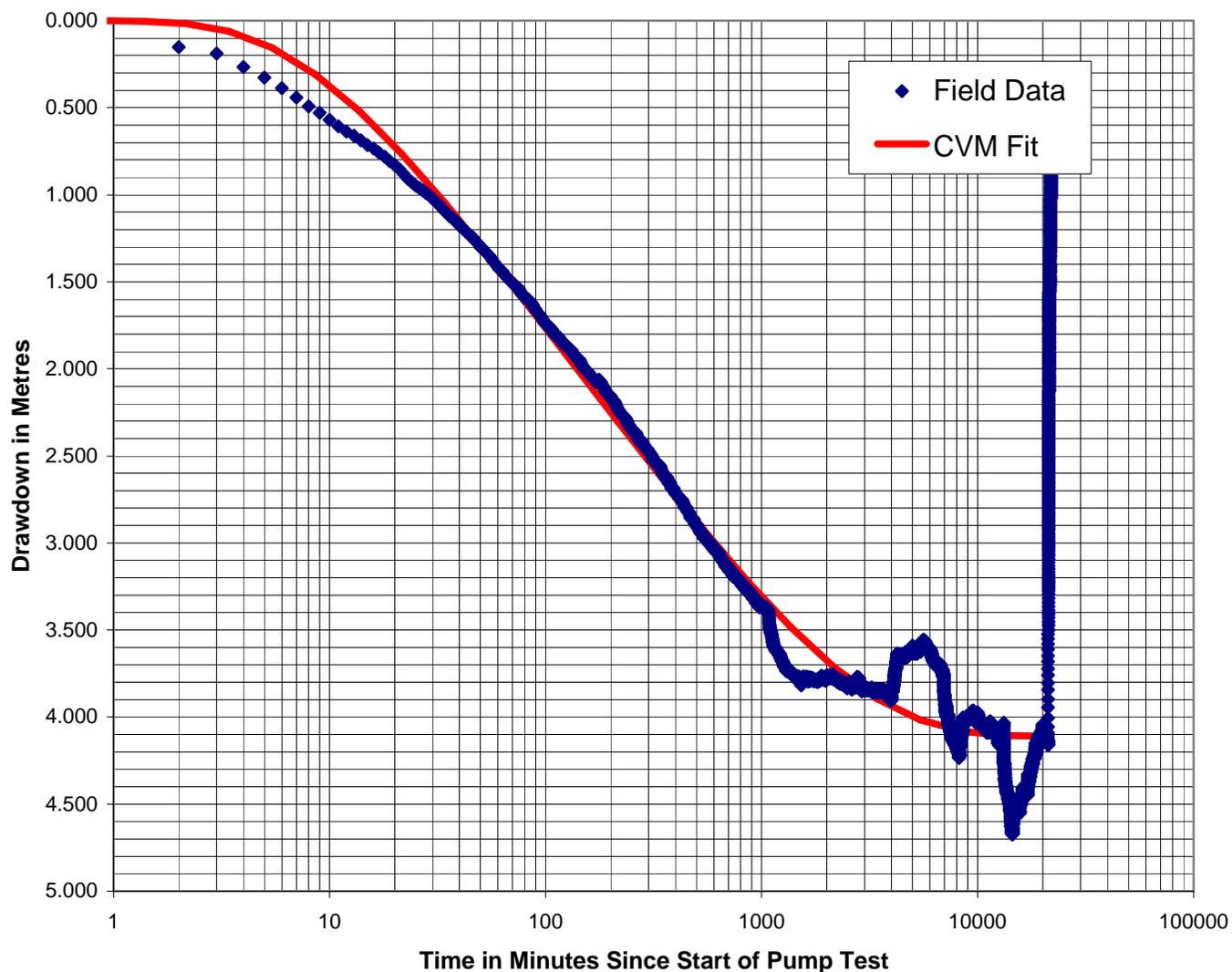
Date: 22-May-06

Drawn By: JGG

Checked: DJF



4BH270A 354hr Pump Test Observed at 4bh290 - CVM Drawdown Curve Fit



T: 104 sq.m/day

S: 0.035

Leakance: 0.012 /day

Distance: 6.8 m

Project: J5 M74 Raith

Client: Mouchel Fairhurst JV

Ref: J267_Radias012
Re: JohnRaith002.inp

Date: 22-May-06

Drawn By: JGG

Checked: SDT

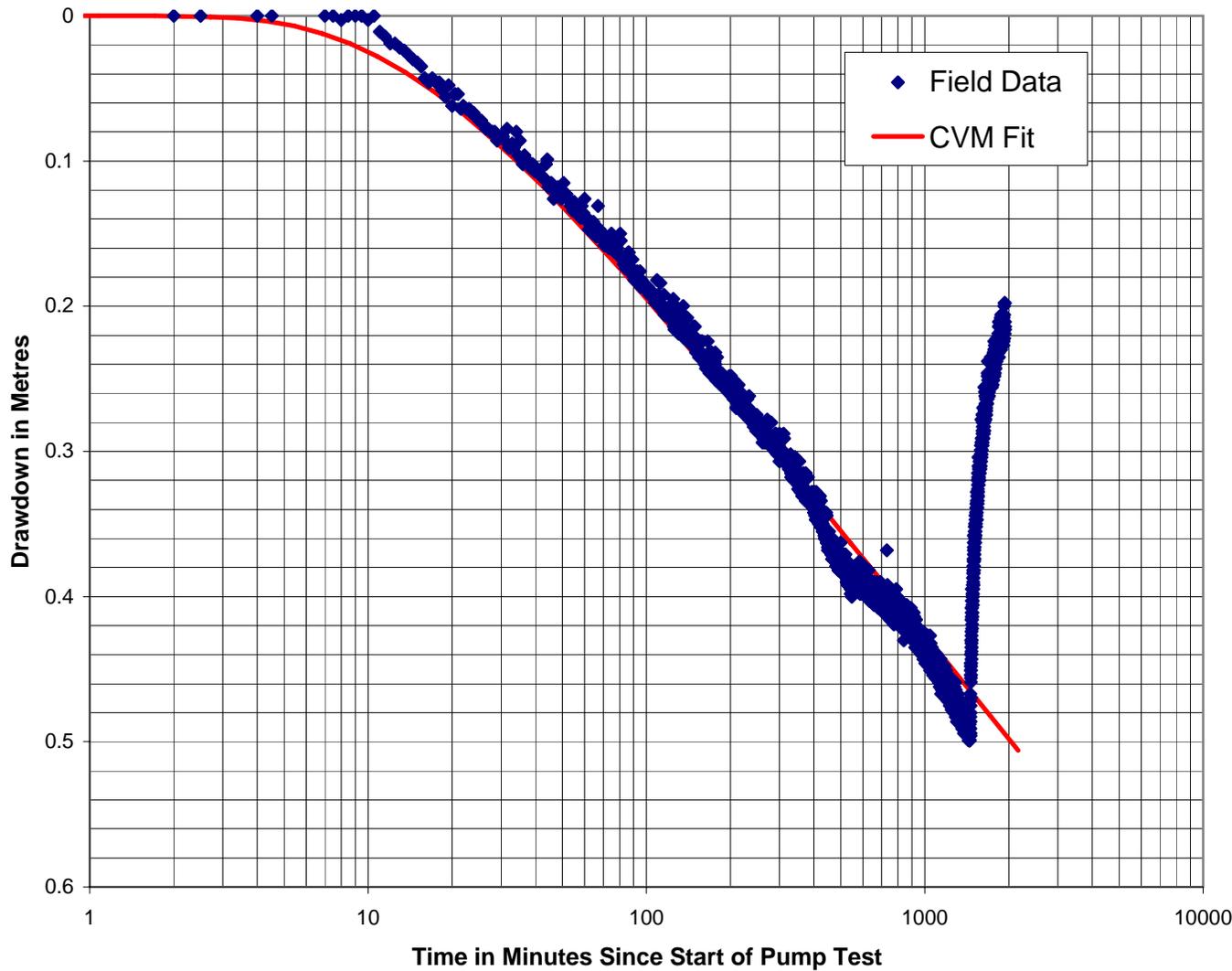


Appendix No.12

Pumping test BH 217 (14 February 2007 - 24 hour) drawdown graphs

(CVM Analysis)

4BH217 24hr Pump Test Observed at 4BH208 - CVM Drawdown Curve Fit



T: 368.6 sq.m/day

S: 1.06E-03

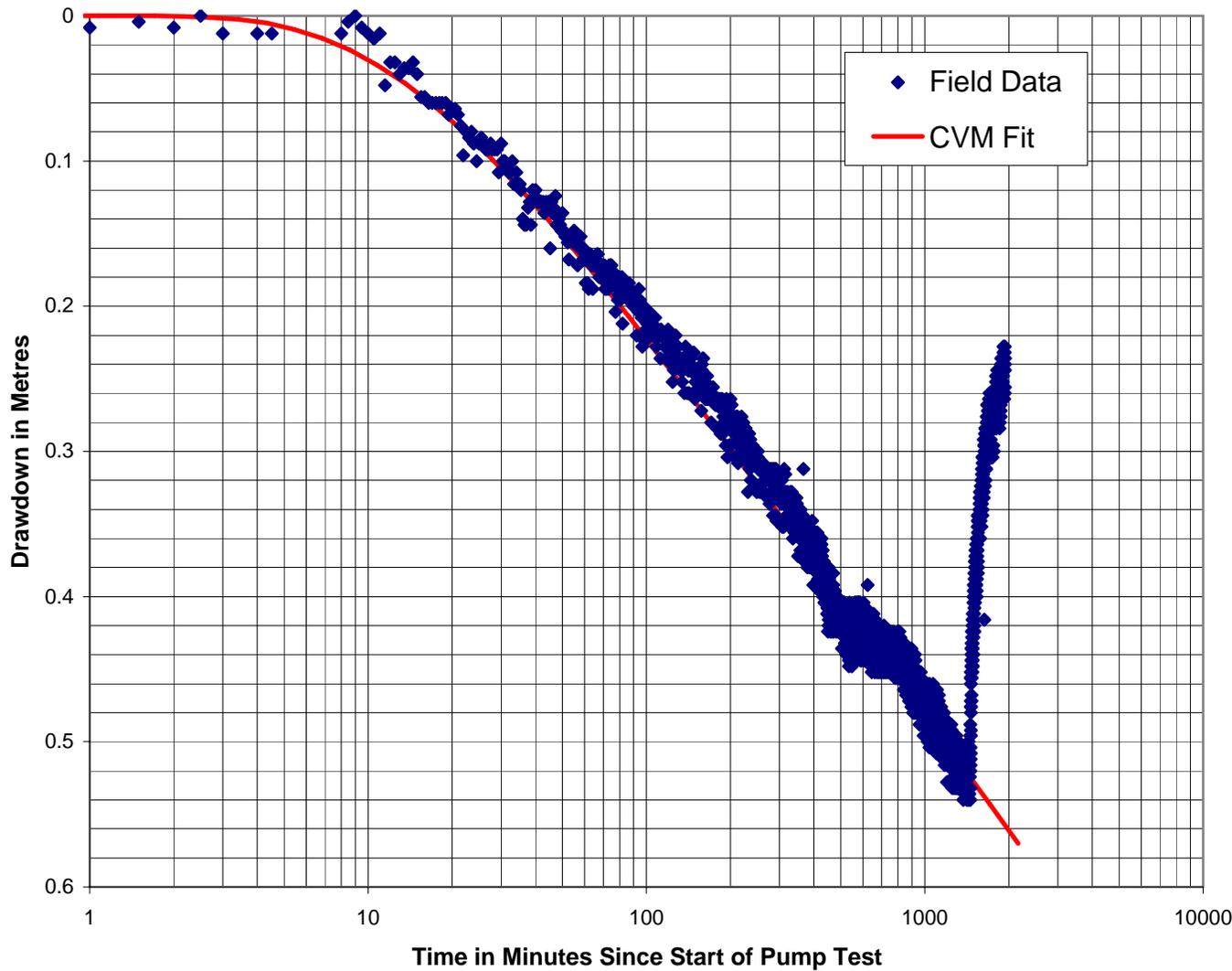
Distance: 96.12 m

Flow Rate: 483.84 cu.m/day

Project:	J5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J05_267_001CVM
Date:	January 2007
Drawn By:	JG
Checked:	ST



4BH217 24hr Pump Test Observed at 4BH209 - CVM Drawdown Curve Fit



T: 331.1 sq.m/day

S: 1.06E-03

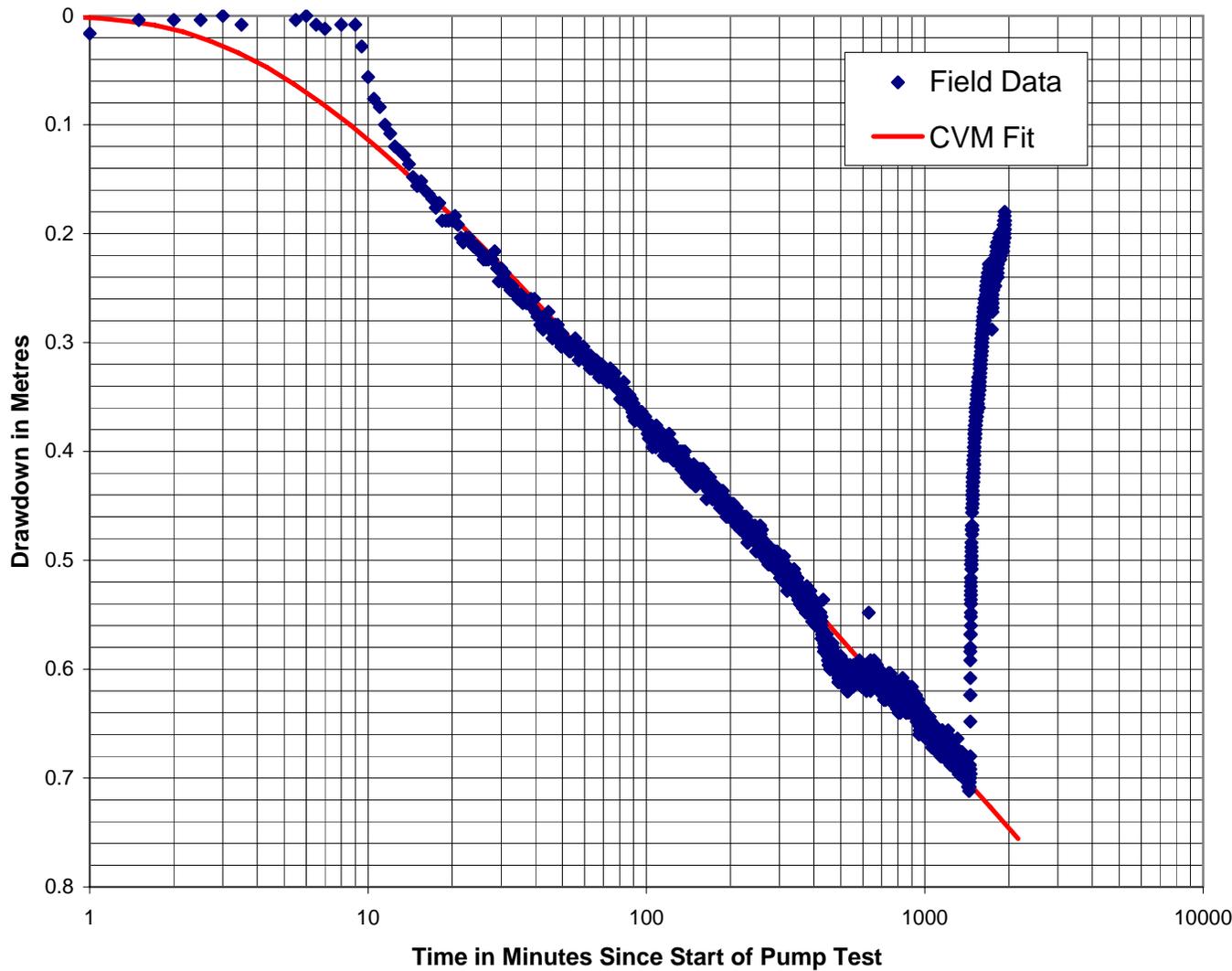
Distance: 88.72 m

Flow Rate: 483.84 cu.m/day

Project:	J5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J05_267_002CVM
Date:	January 2007
Drawn By:	JG
Checked:	ST



4BH217 24hr Pump Test Observed at 4BH216 - CVM Drawdown Curve Fit



T: 305.4 sq.m/day

S: 3.40E-02

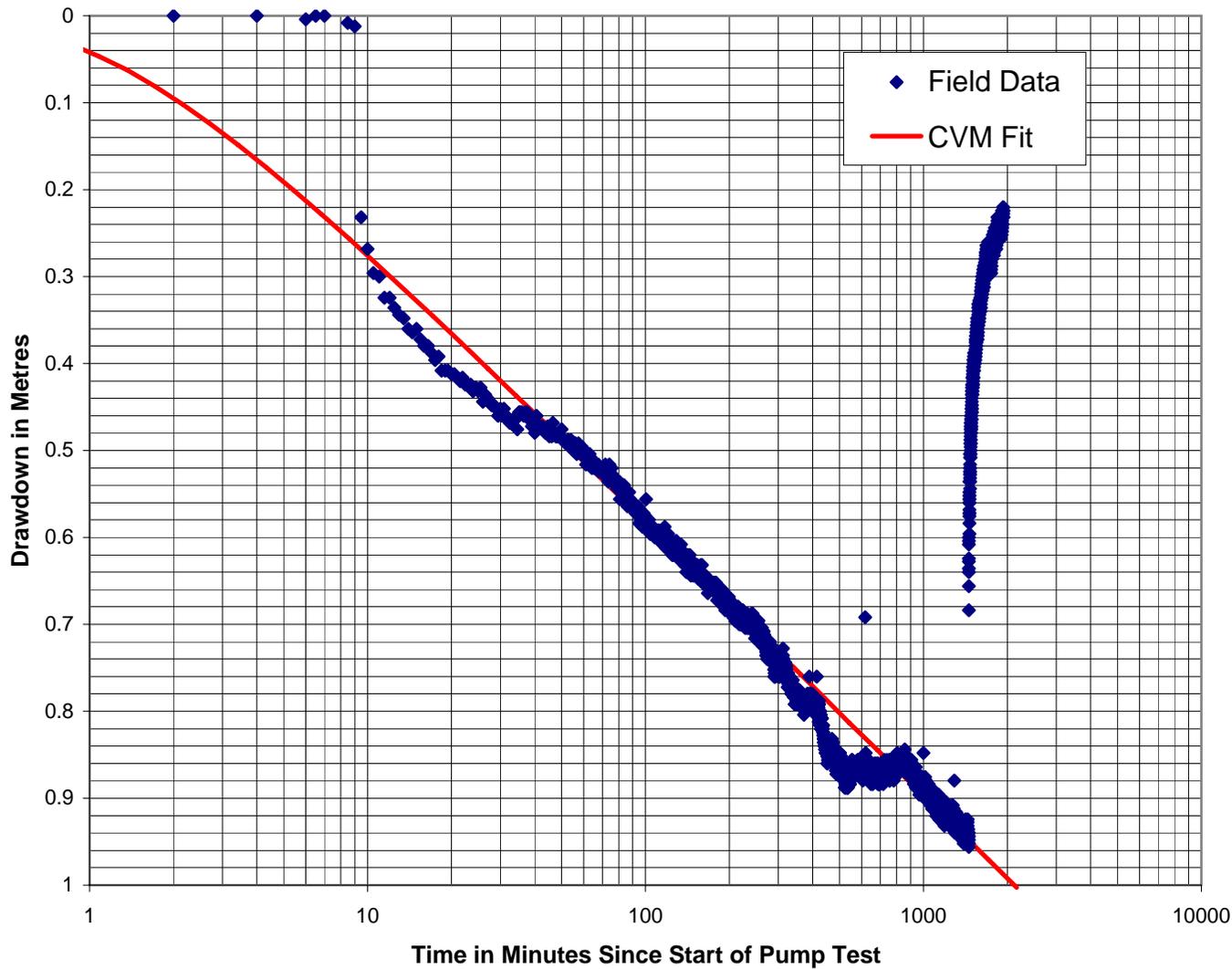
Distance: 8.68 m

Flow Rate: 483.84 cu.m/day

Project:	J5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J05_267_003CVM
Date:	January 2007
Drawn By:	JG
Checked:	ST



4BH217 24hr Pump Test Observed at 4BH218B - CVM Drawdown Curve Fit



T: 280.2 sq.m/day

S: 2.00E-02

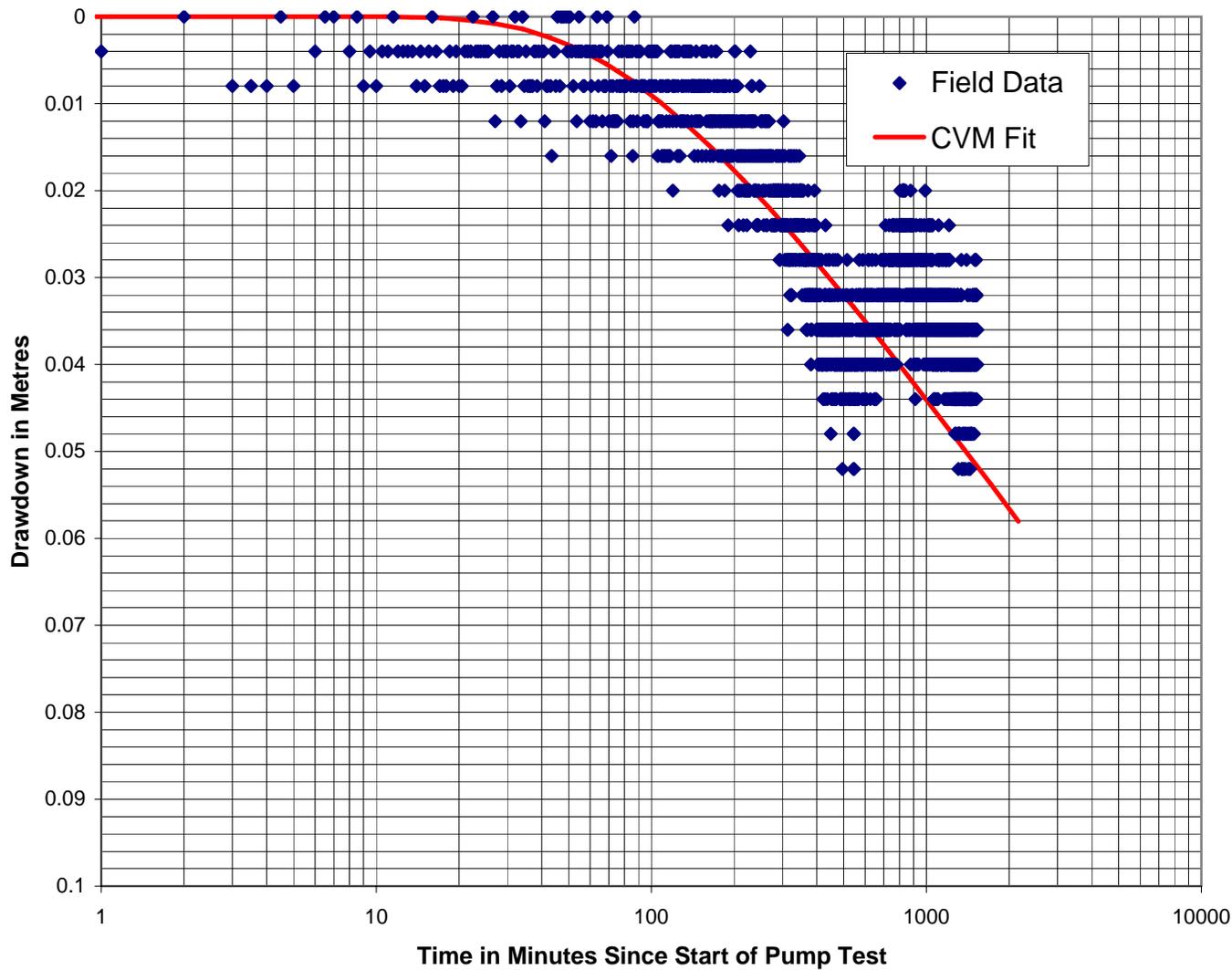
Distance: 5.65 m

Flow Rate: 483.84 cu.m/day

Project:	J5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J05_267_004CVM
Date:	January 2007
Drawn By:	JG
Checked:	ST



4BH217 24hr Pump Test Observed at 4BH225 - CVM Drawdown Curve Fit



T: 2035.8 sq.m/day

S: 2.10E-02

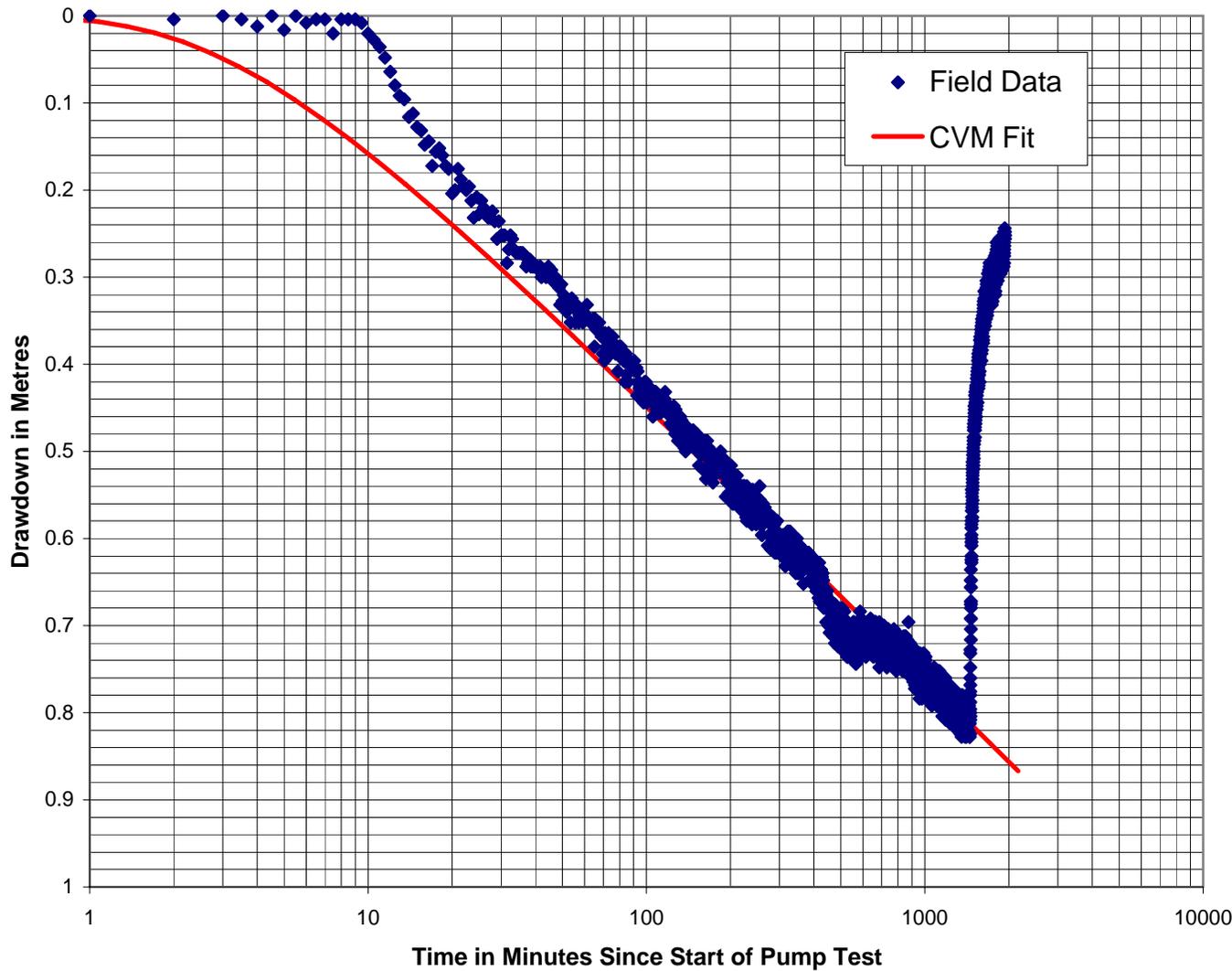
Distance: 124.94 m

Flow Rate: 483.84 cu.m/day

Project:	J5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J05_267_005CVM
Date:	January 2007
Drawn By:	JG
Checked:	ST



4BH217 24hr Pump Test Observed at 4BH265 - CVM Drawdown Curve Fit



T: 280.7 sq.m/day

S: 4.20E-03

Distance: 20.12 m

Flow Rate: 483.84 cu.m/day

Project:	J5 M74 Raith
Client:	Mouchel Fairhurst JV
Ref:	J05_267_006CVM
Date:	January 2007
Drawn By:	JG
Checked:	ST



Appendix No.13

Justification of a Single Layer Mathematical Model

Appendix 13 - Justification of Single Layer Mathematical Model

Groundwater modelling of the Raith dewatering operation has been conducted in order to predict the outcome of abstracting groundwater within the underpass excavation during the construction period. In particular, three main issues arising as a consequence of the dewatering operation need to be assessed. These issues can be summarised as:-

- (i) Are the hydrogeological conditions in the location of the underpass suitable to enable the lowering of the water table/artesian head, to a sufficient level to provide safe and stable conditions during the construction of the underpass?
- (ii) Are the required groundwater abstraction rates acceptable in order to lower the water table/artesian head at the underpass excavation?
- (iii) How far from the dewatered excavation will the impact of lowering the water table/artesian head be expected?

The ground investigation conducted at the Raith site by MFJV demonstrates that the geology and hydrogeology is complex and certainly multi-layered. The conceptual drawing of the geology by Mouchel – Fairhurst (Drawing No. 53213/002) clearly demonstrates this multi-layered nature of the ground.

Furthermore, from the results of the aquifer pump testing programme, the dominant aquifer at the southwest end of the site was found to be the Lower Gravel layer, with the Rock aquifer found to be the dominant aquifer at the northeast end of the site.

However, the purpose of the modelling is to assess whether the dewatering of the underpass excavation is feasible. It is not the purpose of the modelling to predict the exact quantity of groundwater abstraction required to lower the water table/artesian head to the target level.

To provide this assessment, it is the skill of the groundwater modeller to choose the appropriate model that will provide sufficient accuracy for which engineering designs can be produced. Furthermore, in making the decision of which model to use, account must be taken of the level of data available which is input into the model, together with sensitivity of the output to the level of input detail.

It is for this reason, that whilst it is accepted that the geology is multi-layered, it is considered that the application of a multi-layered numerical model is an unnecessarily complex solution to simulating the critical groundwater behaviour at Raith relevant to a dewatering operation.

As a consequence, it is OGI's view that the above three issues (i), (ii) and (iii) can be adequately assessed using a single aquifer layer regional model.

To assess the accuracy of using a single layer model to represent a multi-layer aquifer, a series of hydrogeological conditions have been simulated using a range of ground properties. This allows the sensitivity of using a single layer model to be assessed.

Radial simulation of groundwater flow through a layered aquifer

Figure A13.1 shows a plan of water flowing through a layered aquifer towards a circular excavation of 200m radius. The reduction in head in the excavation is 6m with the head fixed at the external boundary at 2000m from the centre of the excavation.

Figure A13.2 presents a radial cross section through a model of a multi-layer aquifer typical of a section through the geology at Raith at the southwest of the proposed underpass. This figure represents groundwater flow through two gravel layers, i.e. the upper and the lower gravel, separated by a single 4m thick silt aquitard.

The conceptual geology represented by Figure A13.2 is simulated by OGI's finite element model SEFTRANS (Thomas, et al. 1993). This model is able to simulate the changes in head in radial and cartesian coordinates during groundwater flow in a porous aquifer, and is able to calculate the resulting flow to the fixed head boundary conditions.

Simulation 1 – Comparison of predicted head in the upper gravel layer

The purpose of the first set of simulations is to calculate the head in the upper aquifer for a range of values of permeability of the aquitard that separates the upper and lower gravels. With dewatering wells installed inside the excavation within the cut off walls, the direct flow to the dewatering system is through the lower aquifer.

As a consequence, the groundwater in the upper gravel is required to flow through the separating aquitard to reach the lower aquifer and then the dewatering system.

For the purpose of this simulation, the upper and lower gravel aquifer are given the same permeability, that is $K_g = 20$ m/d. Five simulations are run to calculate the head under a range of values of the permeability of the separating aquitard (K_a) as follows:

Simulation RAITH024 – UG	$K_a = 20$ m/d	$K_a/K_g = 1$
Simulation RAITH025 – UG	$K_a = 2.0$ m/d	$K_a/K_g = 0.1$
Simulation RAITH026 – UG	$K_a = 0.2$ m/d	$K_a/K_g = 0.01$
Simulation RAITH027 – UG	$K_a = 0.02$ m/d	$K_a/K_g = 0.001$
Simulation RAITH028 – UG	$K_a = 0.002$ m/d	$K_a/K_g = 0.0001$

The resulting calculation of the head at the base of the upper gravel is plotted against radial distance for all five simulations above in Figure A13.3. Note that the impact of unsaturated conditions is not considered in this simulation as the purpose of the calculations is to assess the impact of the reduced permeability of the confining aquitard.

This figure demonstrates that there is no major difference between the changes in the head for $K_a/K_g < 0.001$. Below this difference in permeability ratio, there is less impact in the head reduction in the upper gravel layer.

From the field testing at the southwest end of the site, whilst there was a delay in the response, reduction in the head in the upper gravel aquifer was observed within a short time scale after the commencement of pumping. This implies that the lower and upper gravels are not separated by an impermeable layer and that there is a hydraulic connection between the layers.

Furthermore, during the drilling operation, whilst a separating aquitard was observed in a number of locations, the material is not considered of “low permeability” and would not be expected to be over 1000 time less permeable than the upper or lower gravel.

Simulation 2 – Comparison of predicted head in the lower gravel layer

The purpose of the second set of simulations is to calculate the head in the lower aquifer for a range of values of permeability of the aquitard that separates the upper and lower gravels. With dewatering installed inside the excavation within the cut off walls, the direct flow to the dewatering system is through the lower aquifer.

For the purpose of this simulation, the upper and lower gravel aquifer is given the same permeability, that is $K_g = 20$ m/d. Five simulations are run to calculate the head under a range of values of the permeability of the separating aquitard (K_a) as follows:

Simulation RAITH024 – LG	$K_a = 20$ m/d	$K_a/K_g = 1$
Simulation RAITH025 – LG	$K_a = 2.0$ m/d	$K_a/K_g = 0.1$
Simulation RAITH026 – LG	$K_a = 0.2$ m/d	$K_a/K_g = 0.01$
Simulation RAITH027 – LG	$K_a = 0.02$ m/d	$K_a/K_g = 0.001$
Simulation RAITH028 – LG	$K_a = 0.002$ m/d	$K_a/K_g = 0.0001$

The resulting calculation of the head at the base of the upper gravel is plotted against radial distance for all five simulations above in Figure A13.4.

This figure demonstrates that there is insignificant difference between the changes in the head for the above range of K_a/K_g . As such, it can be concluded that for the lower, and more transmissive aquifer, there is effectively no difference in the predicted change in head between a single and a multi-layered model.

Application of a single layered model to a multi-layered system

The above simulations demonstrate that for the hydrogeologic conditions expected at the South-West of the site, there are insignificant differences between the predicted heads in the upper and lower gravel layers.

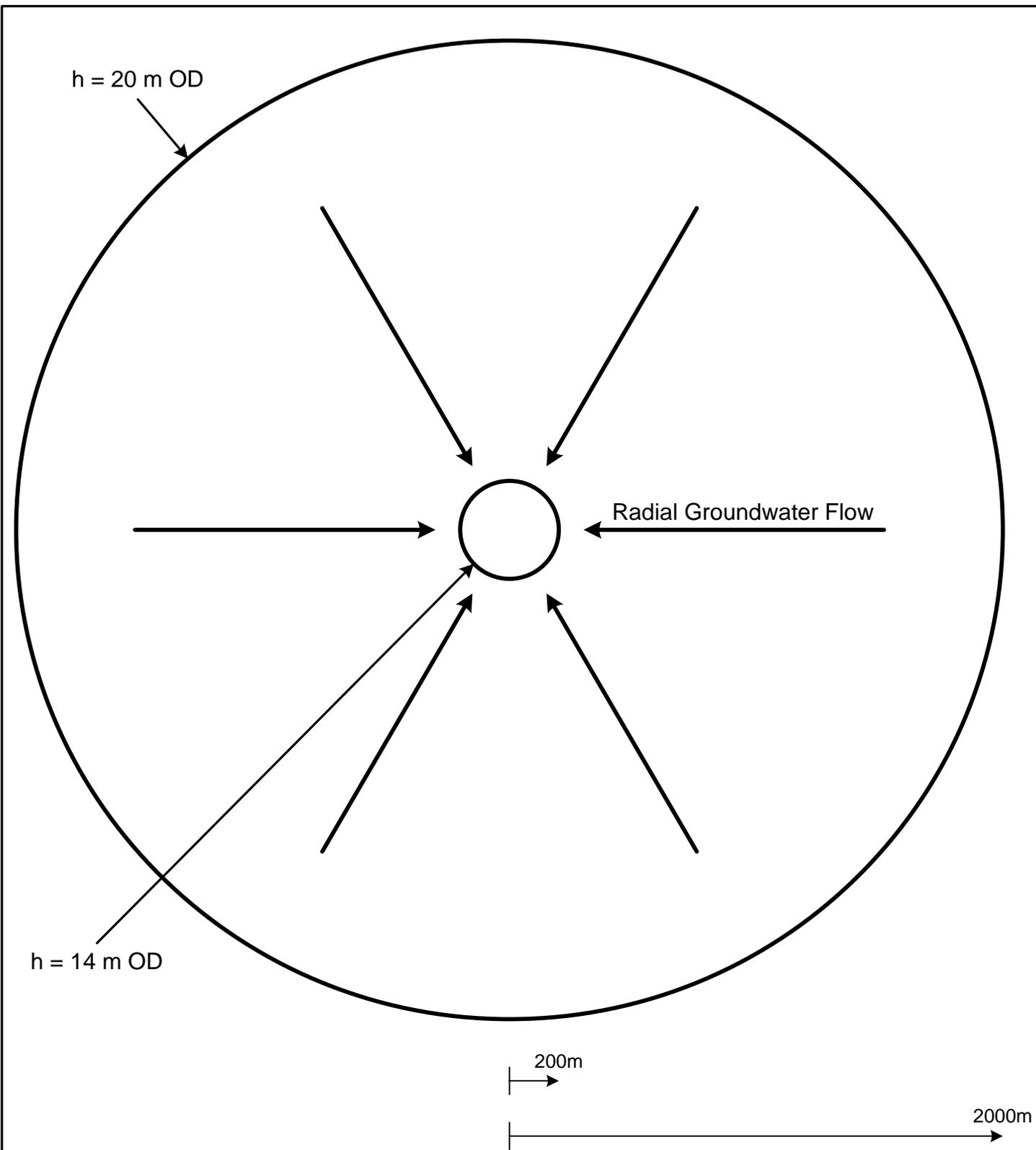
At the northeast of the site, the dominant aquifer is the rock which occurs below the lower gravel. From the field testing, high artesian heads are encountered in both the lower gravel and the rock. For the reasons stated in the above simulations, these two layers can be effectively considered as one hydrogeologic layer.

Above the lower gravel, there is encountered a thick lower permeability layer, which comprises till, silt and clay deposits. This low permeability layer separates the underlying confined aquifer from the near surface aquifer. Under these conditions, the upper and lower aquifers are effectively separated in this location.

However, for the purposes of modelling the impact of the underpass dewatering, it is only necessary to simulate the behaviour of the lower gravel/rock layer, this being the main water bearing aquifer. The groundwater flow in the near surface gravel layer, which is effectively perched, is likely to be dominated by topographical gradients together with a strong influence from the surface, or near surface, water behaviour.

In conclusion, whilst it is noted that using a single layer model has restrictions, we consider this an appropriate and pragmatic approach to the representation of the hydrogeology surrounding the proposed works at the Raith Junction.

However, during the detailed design of the dewatering system, it is OGI's view that significant benefits can be achieved by further detailed modelled within and surrounding the underpass excavation. These benefits include the ability to reduce the abstraction rate of groundwater and consequently reduce the wider drawdown impact in the surrounding hydrogeology.



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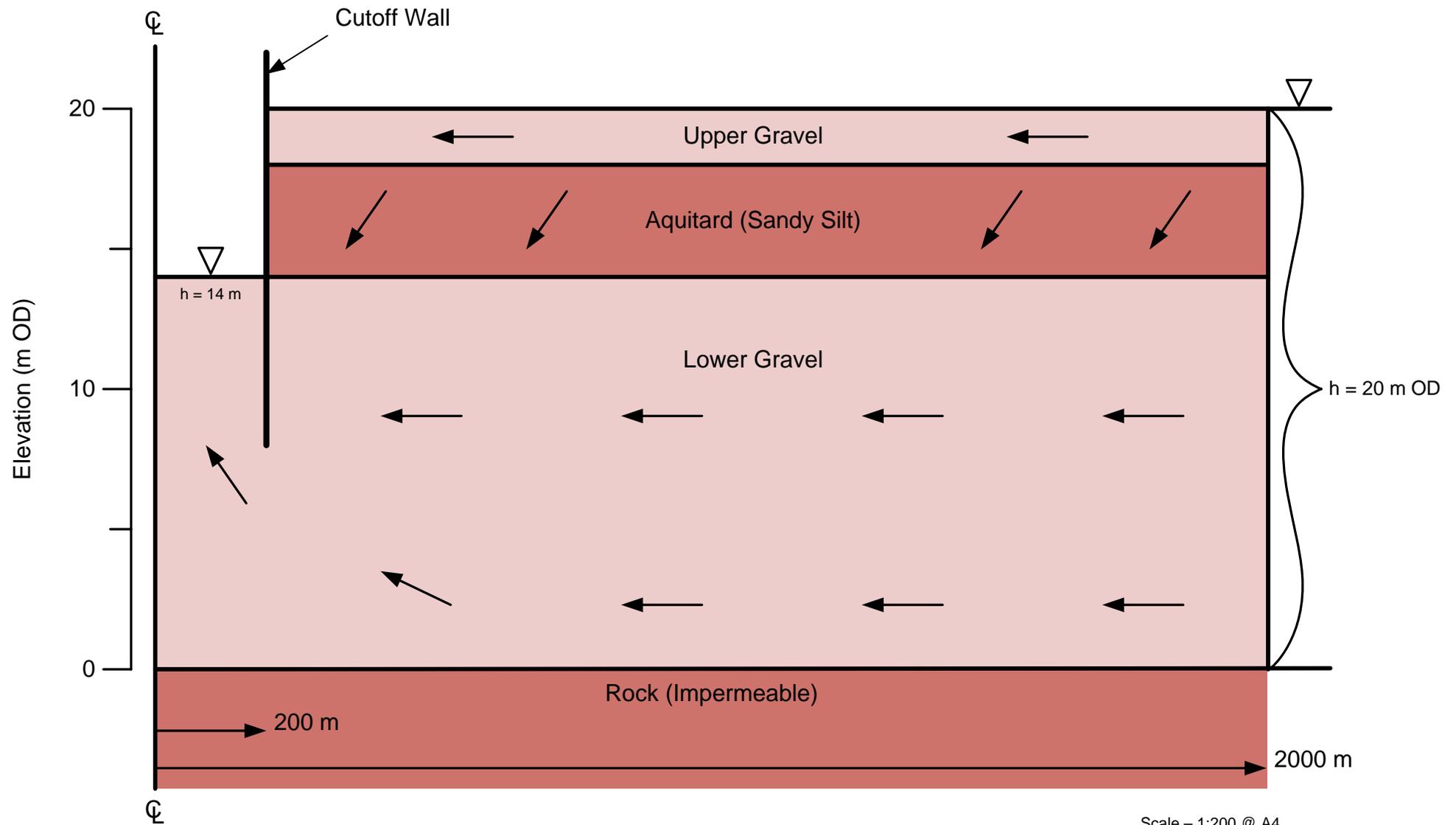
NOT TO SCALE
Based on J05/267/267D



Groundwater
Specialists

Project:	J5 M74 Raith	
Client:	Mouchel Fairhurst JV	
Date:	March 2007	

Drawing:	Figure A13.1 (J05/267/301D)	
Description:	Schematic drawing of radial flow to circular excavation	
Drawn by:	JG	Checked by: ST

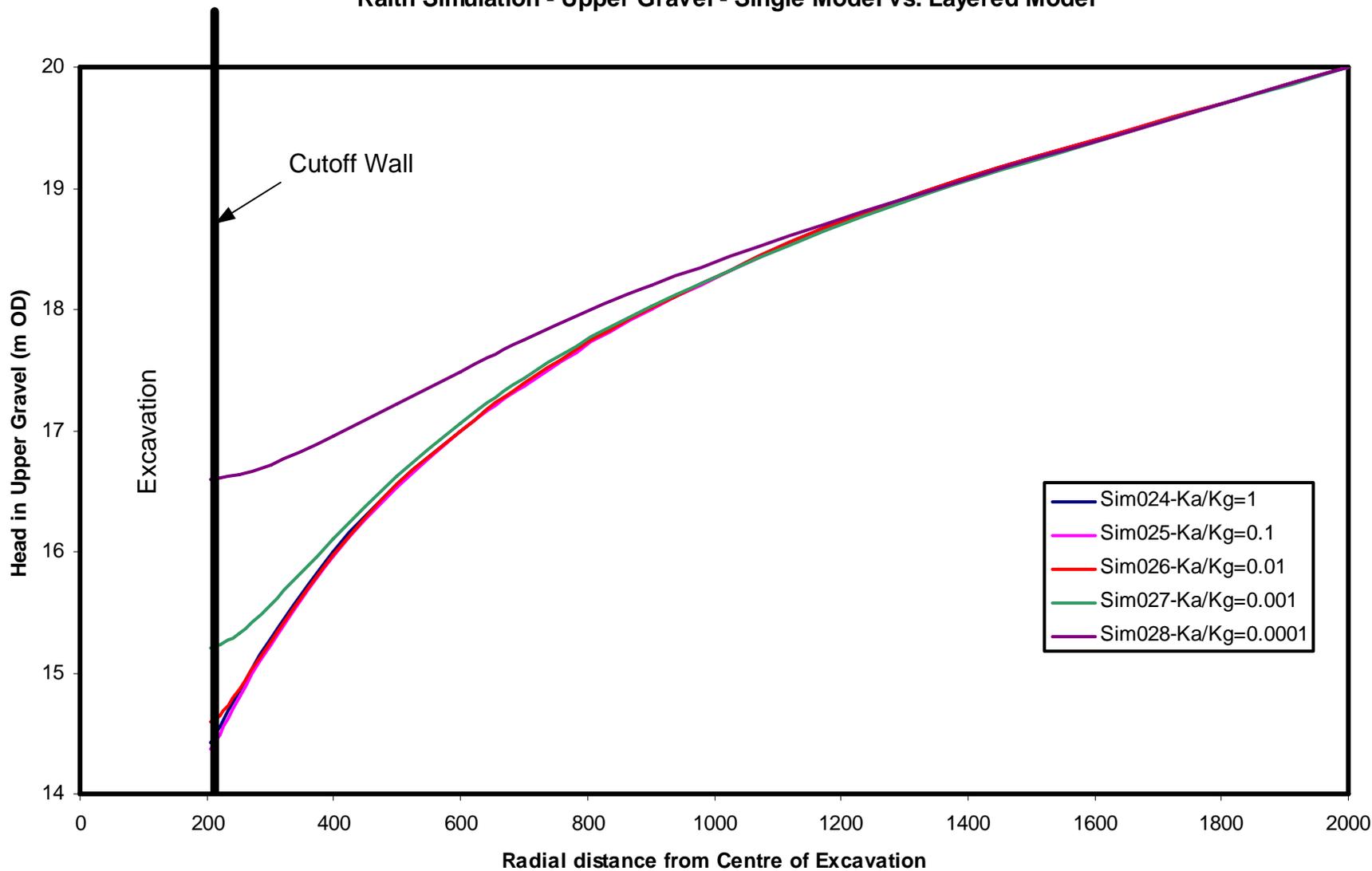


Scale - 1:200 @ A4
 Vertical Exaggeration x 50
 Drawing based on J05/267/268D

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	Project: J5 M74 Raith	Drawing: Figure A13.2 (J05/267/302D)	Date: March 2007	
	Client: Mouchel Fairhurst JV	Description: Cross-sectional drawing of radial flow to circular excavation	Drawn by: JG	Checked by: ST

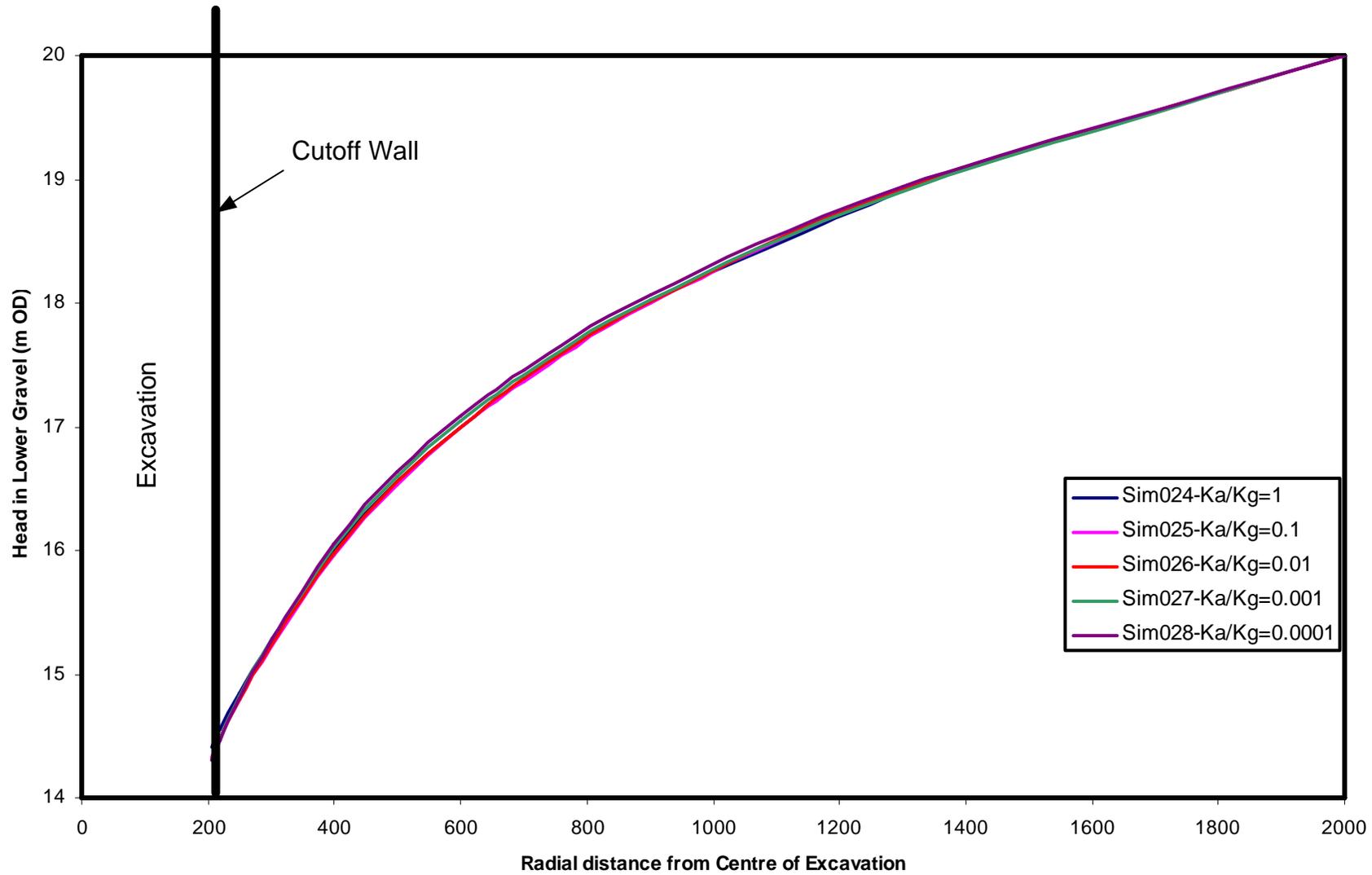
Raith Simulation - Upper Gravel - Single Model vs. Layered Model



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 <p>OGI Groundwater Specialists</p>	Project: J5 M74 Raith	Drawing: Figure A13.3 (J05/267/305D)	Date: March 2007	
	Client: Mouchel Fairhurst JV	Description: Sefcut94 Simulation (Upper Gravel)	Drawn by: JG	Checked by: ST

Raith Simulation - Lower Gravel - Single Model vs. Layered Model

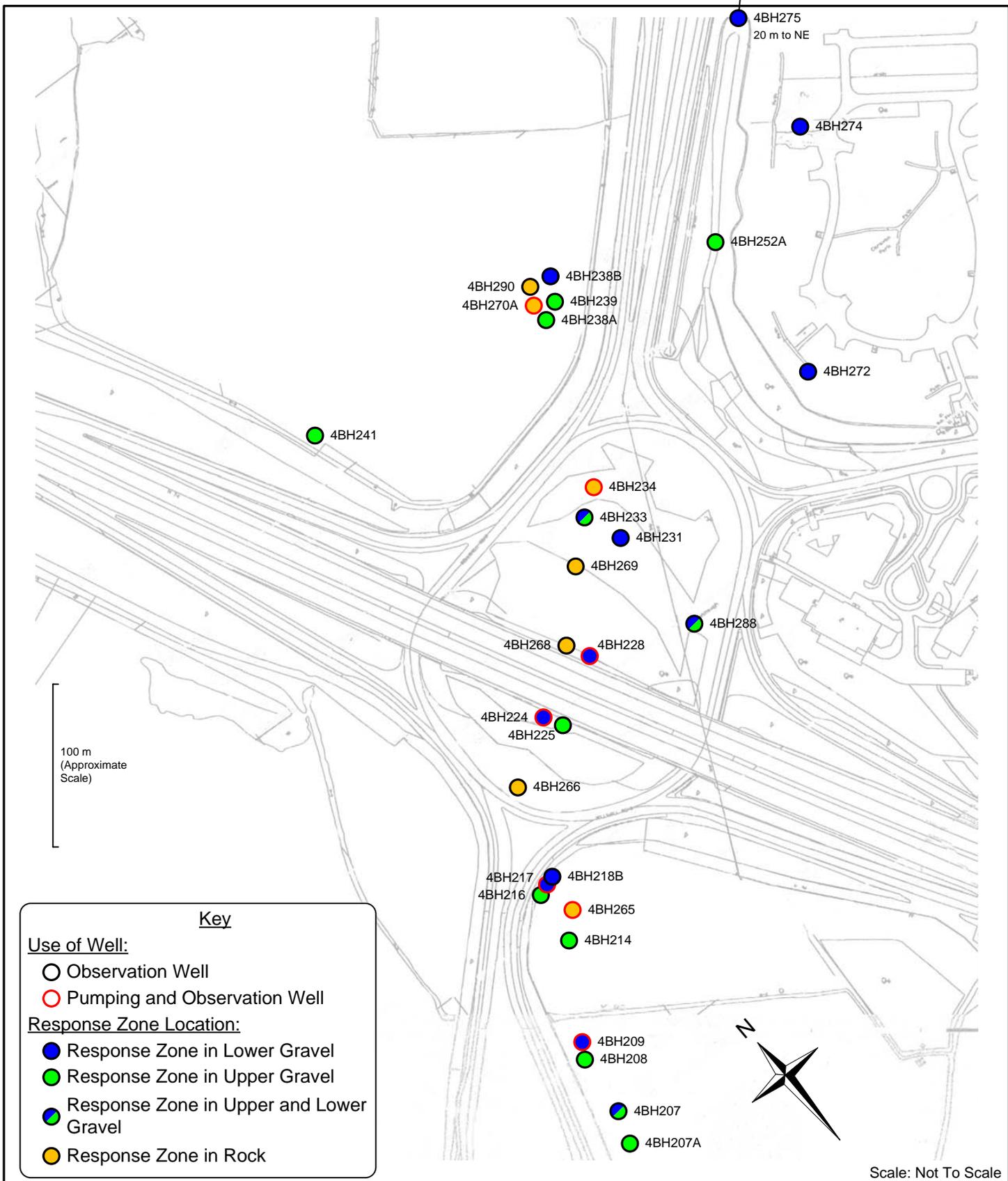


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 OGI Groundwater Specialists	Project: J5 M74 Raith	Drawing: Figure A13.4 (J05/267/306D)	Date: March 2007	
	Client: Mouchel Fairhurst JV	Description: Sefcut94 Simulation (Lower Gravel)	Drawn by: JG	Checked by: ST

Appendix No.14

Summary of Pump Test Data



Groundwater Specialists

Project:	J5 M74 Raith	
Client:	Mouchel-Fairhurst JV	
Date:	March 2007	

Drawing:	J05/267/277D	
Description:	Location of Boreholes	
Drawn by:	JG	Checked by:
		DF

Table No. A14.1 Pumping test data

Pumping Well	Duration of pumping	Transducer reading Intervals	Start of Data	End of Data	Observation Well	Analysed	Reason if not analysed
4BH209 Pumping from rock	2.5 hr	30 seconds	02/02/2006 10:28hrs	03/02/2006 08:43hrs	BH208	yes	
			02/02/2006 11:37hrs	03/02/2006 08:43hrs	BH207	yes	
			02/02/2006 11:45hrs	03/02/2006 08:43hrs	BH207A	yes	
			02/02/2006 11:22hrs	03/02/2006 08:43hrs	BH214	no	Small response
			02/02/2006 11:30hrs	03/02/2006 08:43hrs	BH217	yes	
BH209 Pumping from lower gravel	8 hr	30 seconds	06/02/2006 08:48hrs	07/02/2006 09:50hrs	BH208	yes	
			06/02/2006 08:43hrs	07/02/2006 10:05hrs	BH207	no	Small response
			06/02/2006 08:45hrs	07/02/2006 10:01hrs	BH207A	no	Small response
			06/02/2006 08:49hrs	07/02/2006 10:08hrs	BH209	yes	
			06/02/2006 08:42hrs	07/02/2006 09:52hrs	BH214	no	Small response
			06/02/2006 08:41hrs	07/02/2006 09:47hrs	BH217	yes	
BH217 Pumping from lower gravel	8 hr	30 seconds	14/02/2006 08:16hrs	15/02/2006 07:43hrs	BH265	yes	
			14/02/2006 08:19hrs	15/02/2006 07:43hrs	BH225	no	Small response
			14/02/2006 08:21hrs	15/02/2006 07:43hrs	BH216	yes	
			14/02/2006 08:18hrs	15/02/2006 07:43hrs	BH218	yes	
			14/02/2006 08:23hrs	15/02/2006 07:39hrs	BH208	yes	
			14/02/2006 08:16hrs	15/02/2006 07:39hrs	BH209	yes	
BH217 Pumping from lower gravel	24 hr	30 seconds	22/02/2006 14:54hrs	25/.2/2006 10:38hrs	BH208	yes	
			22/02/2006 14:55hrs	25/.2/2006 10:31hrs	BH209	yes	
			22/02/2006 14:54hrs	25/.2/2006 10:29hrs	BH216	yes	
			22/02/2006 14:55hrs	25/.2/2006 10:24hrs	BH218	yes	
			22/02/2006 14:52hrs	25/.2/2006 10:36hrs	BH225	yes	
			22/02/2006 14:60hrs	25/.2/2006 10:36hrs	BH265	yes	
BH217 Pumping from lower gravel	6 day	1 minute	12/05/2006 13:30hrs	21/05/2006 15:51hrs	BH216	yes	
			12/05/2006 13:31hrs	21/05/2006 15:48hrs	BH218	yes	
			12/05/2006 13:23hrs	21/05/2006 15:36hrs	BH233	no	Small response
			12/05/2006 13:33hrs	21/05/2006 15:40hrs	BH270A	no	Small response
			12/05/2006 13:35hrs	21/05/2006 15:33hrs	BH269	no	Small response
			12/05/2006 13:37hrs	21/05/2006 15:50hrs	BH266	yes	

Pumping Well	Duration of pumping	Transducer reading Intervals	Start of Data	End of Data	Observation Well	Analysed	Reason if not analysed
BH224	8 hr	30 seconds	05/05/2006 16:56hrs	09/05/2006 15:52hrs	BH218	yes	
			05/05/2006 16:58hrs	09/05/2006 14:52hrs	BH234	yes	
			05/05/2006 16:59hrs	09/05/2006 15:38hrs	BH265	yes	
			05/05/2006 17:02hrs	09/05/2006 15:54hrs	BH266	yes	
			05/05/2006 17:03hrs	09/05/2006 15:49hrs	BH268	no	Small response
			05/05/2006 17:05hrs	09/05/2006 15:45hrs	BH288	yes	
BH228	8 hr	30 seconds	02/05/2006 13:15hrs	05/05/2006 07:29hrs	BH225	no	Small response
			02/05/2006 13:17hrs	05/05/2006 07:29hrs	BH233	no	Small response
			02/05/2006 13:18hrs	05/05/2006 07:29hrs	BH239	no	Small response
			02/05/2006 13:20hrs	05/05/2006 07:29hrs	BH268	no	Small response
			02/05/2006 13:22hrs	05/05/2006 07:29hrs	BH241	no	Small response
			02/05/2006 13:24hrs	05/05/2006 07:29hrs	BH288	yes	
BH234	24 hr	1 minute	09/06/2006 16:12hrs	13/06/2006 08:18hrs	BH228	no	Small response
			09/06/2006 16:12hrs	13/06/2006 08:05hrs	BH266	no	Small response
			09/06/2006 16:15hrs	13/06/2006 08:18hrs	BH217	no	Small response
			09/06/2006 16:17hrs	13/06/2006 07:54hrs	BH238A	no	Small response
			09/06/2006 12:25hrs	13/06/2006 08:03hrs	BH290	no	Small response
			09/06/2006 16:32hrs	13/06/2006 07:58hrs	BH265	no	Small response
			09/06/2006 16:34hrs	13/06/2006 08:16hrs	BH224	no	Small response
			09/06/2006 16:43hrs	13/06/2006 07:51hrs	BH233	no	Small response
			09/06/2006 16:46hrs	13/06/2006 08:18hrs	BH231	yes	
			09/06/2006 16:48hrs	13/06/2006 08:01hrs	BH268	no	Small response
		10/06/2006 12:03hrs	13/06/2006 07:44hrs	BH269	yes		
BH238	89 hr	1 minute	04/07/2006 15:01hrs	10/07/2006 04:20hrs	BH290	no	Small response
			04/07/2006 15:01hrs	10/07/2006 04:20hrs	BH231	no	Small response
			04/07/2006 15:01hrs	10/07/2006 04:20hrs	BH239	no	Small response

Pumping Well	Duration of pumping	Transducer reading Intervals	Start of Data	End of Data	Observation Well	Analysed	Reason if not analysed
BH265 Pumping from rock	24 hr	30 seconds	27/02/2006 16:30hrs	01/03/2006 07:18hrs	BH225	yes	
			27/02/2006 16:30hrs	01/03/2006 07:18hrs	BH217	yes	
			27/02/2006 16:30hrs	01/03/2006 07:18hrs	BH218	yes	
			27/02/2006 16:30hrs	01/03/2006 07:18hrs	BH216	yes	
			27/02/2006 16:30hrs	01/03/2006 07:18hrs	BH209	yes	
			27/02/2006 16:30hrs	01/03/2006 07:18hrs	BH208	yes	
			27/02/2006 16:30hrs	01/03/2006 07:18hrs	BH265	yes	
BH270A Pumping from rock	8 hr	30 seconds	11/04/2006 13:21hrs	18/04/2006 04:09hrs	BH265	no	Small response
			11/04/2006 13:25hrs	18/04/2006 04:09hrs	BH290	yes	
			11/04/2006 13:33hrs	18/04/2006 04:09hrs	BH272	yes	
			11/04/2006 13:27hrs	18/04/2006 04:09hrs	BH274	yes	
			11/04/2006 13:38hrs	18/04/2006 04:09hrs	BH275	no	Small response
			11/04/2006 13:49hrs	18/04/2006 04:09hrs	BH241	no	Small response
BH270A Pumping from rock	14 day	1 minute	22/05/2006 12:29hrs	05/06/2006 09:48hrs	BH234	yes	
			22/05/2006 12:44hrs	05/06/2006 10:03hrs	BH288	no	Small response
			22/05/2006 10:07hrs	07/06/2006 13:11hrs	BH290	yes	
			22/05/2006 10:10hrs	07/06/2006 13:11hrs	BH238	yes	
			22/05/2006 10:17hrs	07/06/2006 13:11hrs	BH265	no	Small response
			22/05/2006 10:23hrs	07/06/2006 13:11hrs	BH266	yes	
			22/05/2006 10:27hrs	07/06/2006 13:11hrs	BH239	yes	
			22/05/2006 10:33hrs	07/06/2006 13:11hrs	BH228	no	Small response
			22/05/2006 10:29hrs	07/06/2006 13:11hrs	BH252A	yes	
			22/05/2006 13:47hrs	07/06/2006 13:11hrs	BH217	no	Small response
			22/05/2006 13:50hrs	07/06/2006 13:11hrs	BH268	yes	
22/05/2006 13:52hrs	07/06/2006 13:11hrs	BH274	yes				

Table 14.2 Transducer data from December 2005 to February 2006

Borehole transducer installed in	Response zone in Upper Gravel	Response zone in Lower Gravel	Transducer reading intervals	Start of data	End of data
BH 201	*	*	1 hour	22/12/05	20/02/06
BH 207	*	*	1 hour	22/12/05	13/02/06
BH 210	*	*	1 hour	13/12/05	09/02/06
BH 211	*		1 hour	13/12/05	13/02/06
BH 214	*	*	1 hour	22/12/06	06/02/06
BH 221	*		1 hour	13/12/05	13/02/06
BH 226		*	1 hour	22/12/05	13/02/06
BH 227	*	*	1 hour	22/12/05	13/02/06
BH 233	*	*	1 hour	22/12/05	13/02/06
BH 242	*		1 hour	15/12/06	13/02/06
BH 243	*		1 hour	22/12/05	14/02/06
BH 247	*		1 hour	22/12/05	14/02/06
BH 249	*		1 hour	15/12/06	14/02/06
BH 253	*		1 hour	13/12/06	14/02/06
BH 255	*		1 hour	22/12/05	14/02/06