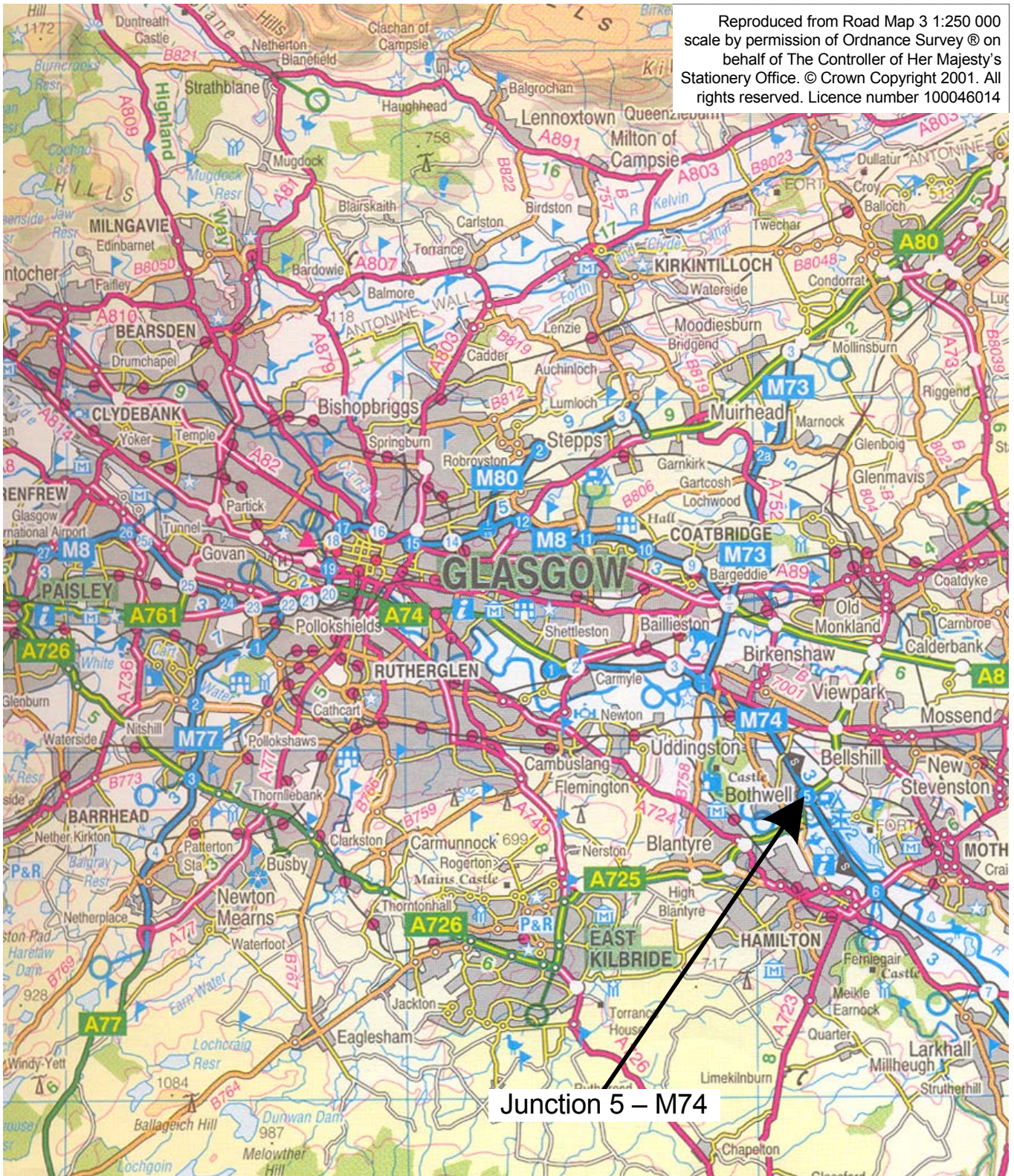


Figures

Not To Scale

Reproduced from Road Map 3 1:250 000 scale by permission of Ordnance Survey © on behalf of The Controller of Her Majesty's Stationery Office. © Crown Copyright 2001. All rights reserved. Licence number 100046014



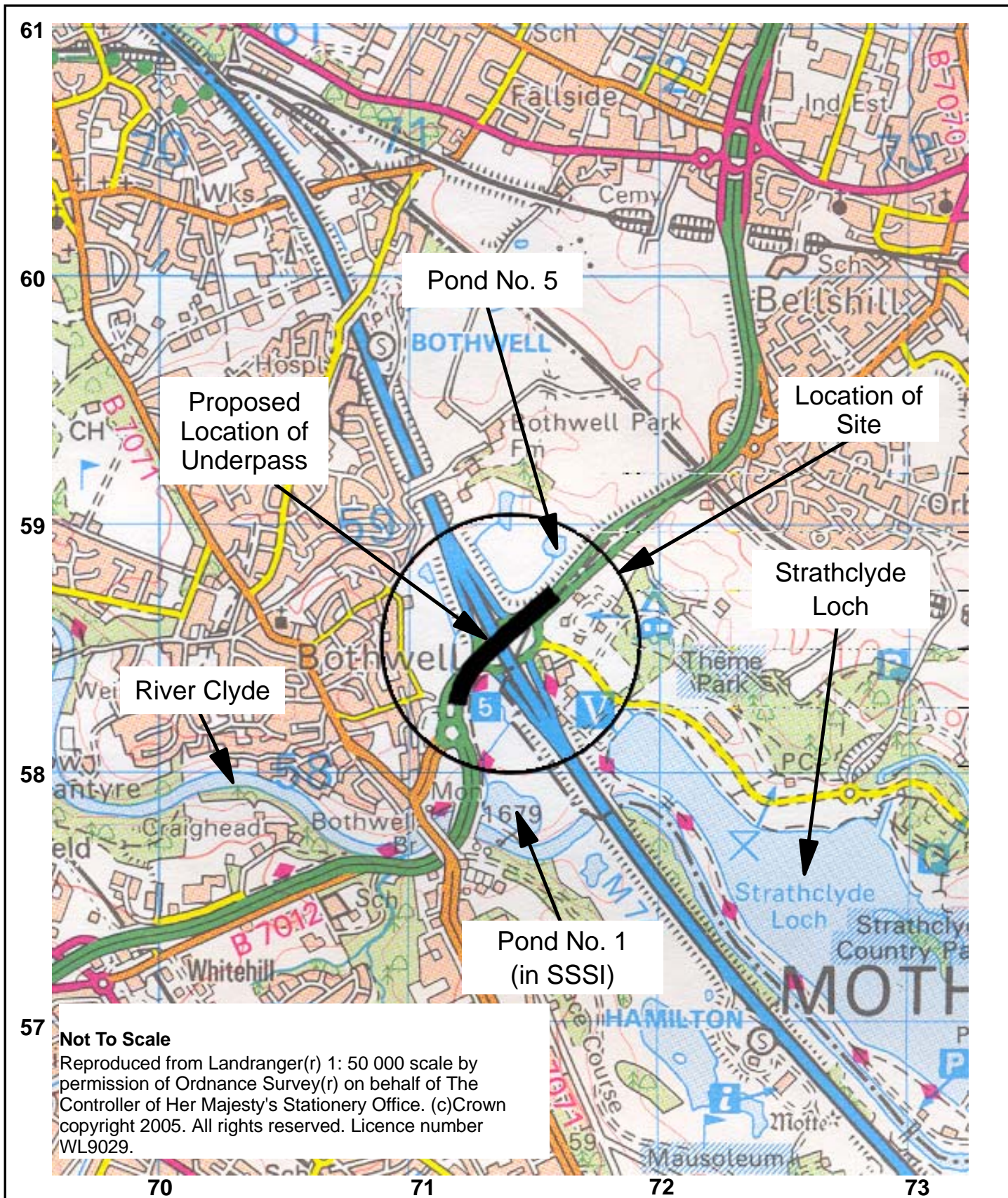
Junction 5 – M74

0m 500m 1000m

© Oxford Geotechnica International (UK) Ltd 2006



Project: Junction 5 - M74 Raith	Drawing: Figure 1.1 (J05/267/223D)	
Client: Mouchel Fairhurst JV	Description: Site location	
Date: August 2006	Drawn by: JGG	Checked by: DJF

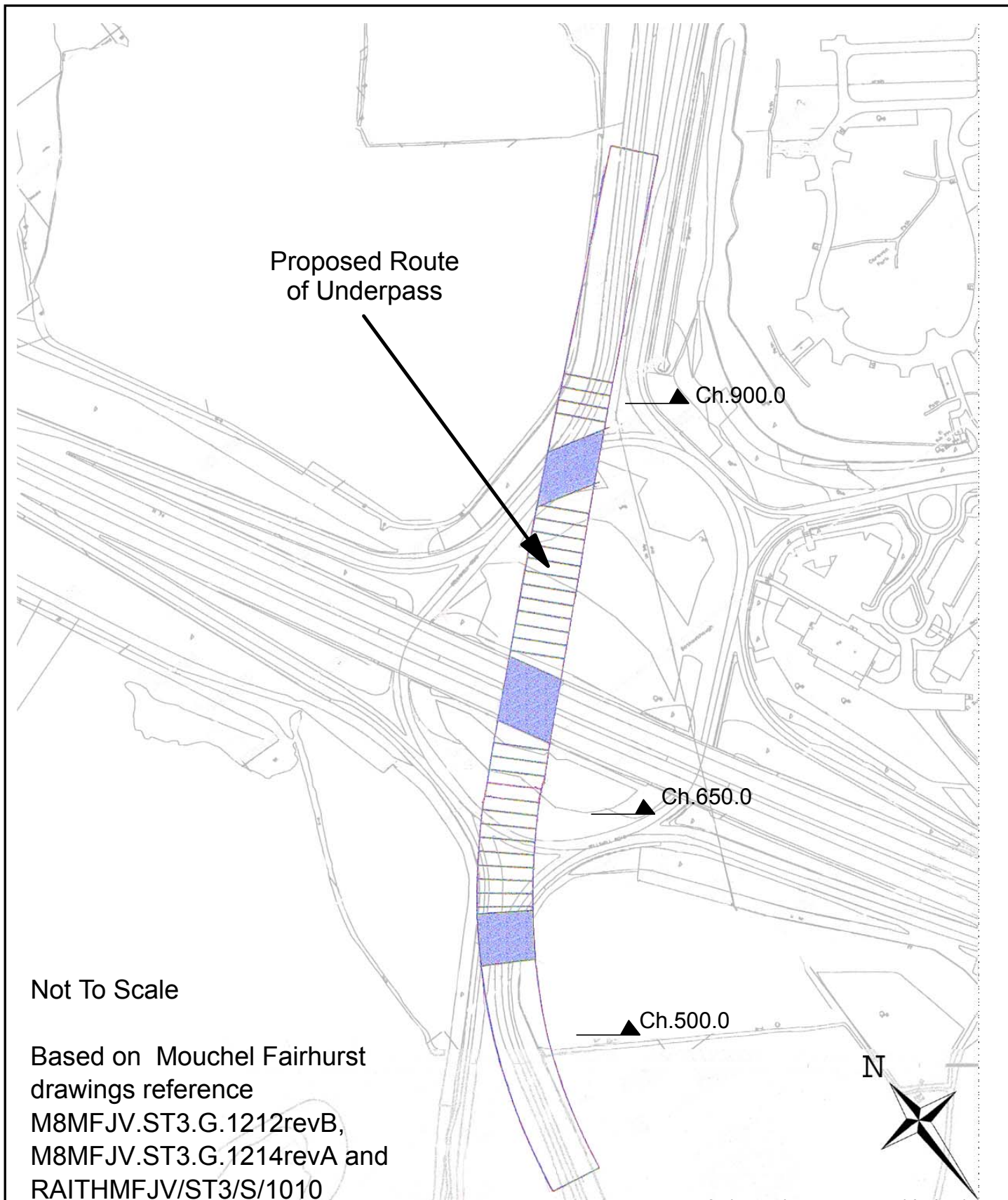


© Oxford Geotechnica International (UK) Ltd 2006



Groundwater Specialists

Project: Junction 5 - M74 Raith	Drawing: Figure 2.1 (J05/267/264D)
Client: Mouchel Fairhurst JV	Description: Site location and surrounding area
Date: August 2006	Drawn by: JGG
	Checked by: DJF



© Oxford Geotechnica International (UK) Ltd 2006



Groundwater Specialists

Project:
Junction 5 - M74
Raith

Client:
Mouchel Fairhurst JV

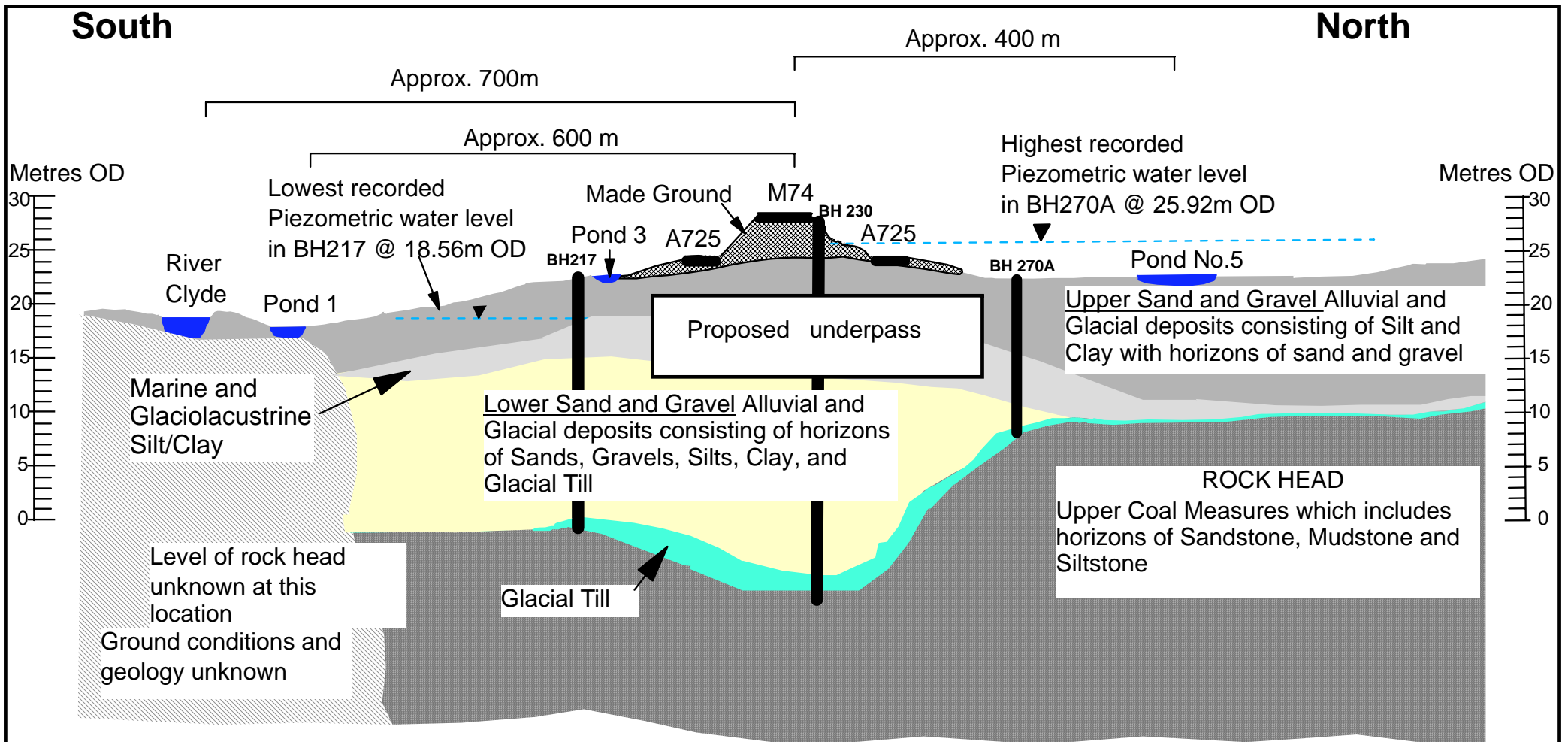
Date:
August 2006

Drawing:
Figure 2.2
(J05/267/225D)

Description:
Proposed route of
underpass


Drawn by:
JGG

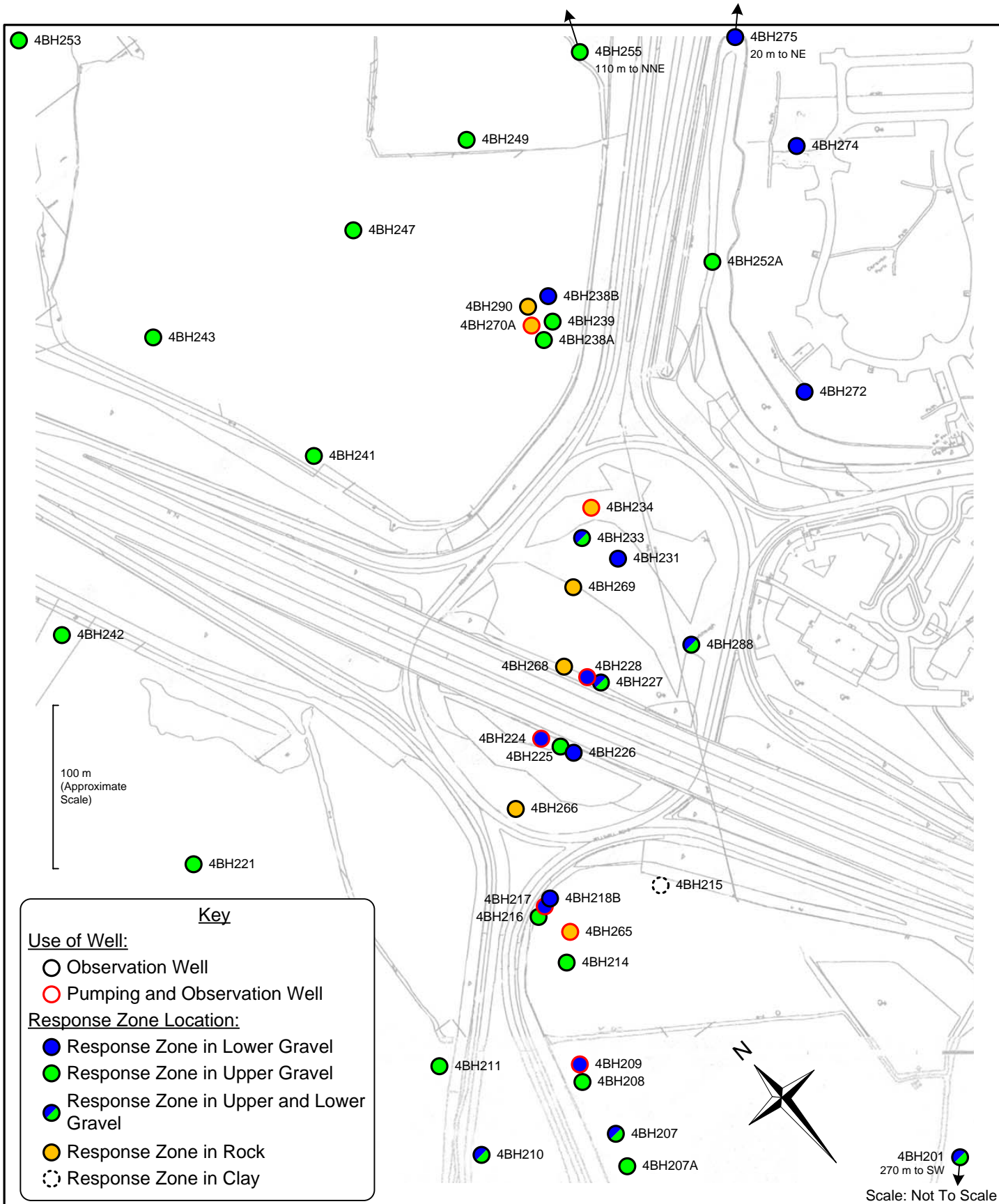
Checked by:
DJF



Idealised Conceptual model


Not to Scale

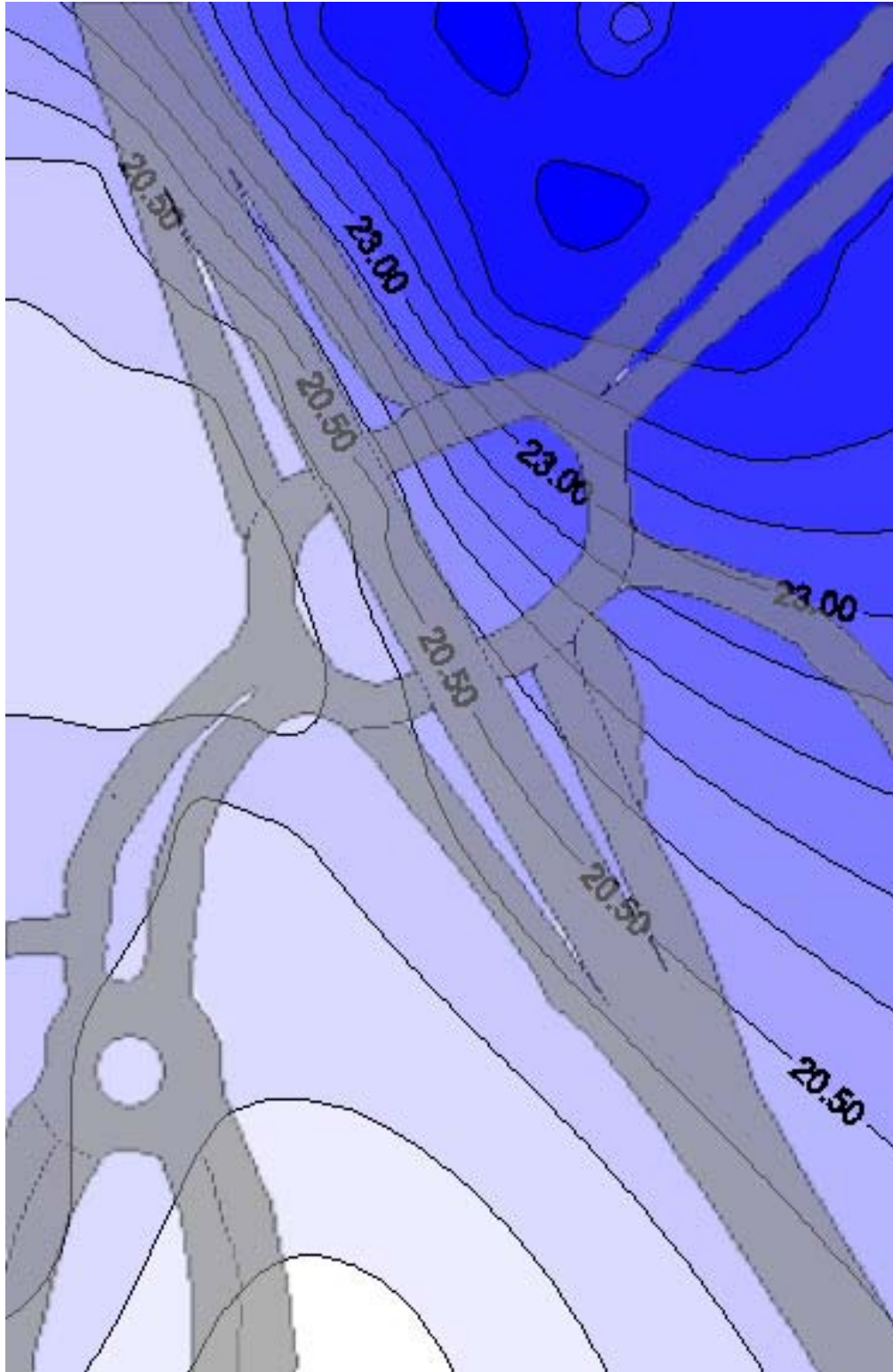
	Project: Junction 5 - M74 Raith	Drawing: Figure 3.1 J05/267/266D	Date: November 2006	
	Client: Mouchel Fairhurst JV	Description: Idealised Conceptual Model	Drawn by: DJF	Checked by: SDT



© OGI Groundwater Specialists Limited 2007

Drawing based on: Raeburn Fig No A2 (Contract No. 18622-04)

 <p>OGI Groundwater Specialists</p>	<p>Project:</p> <p>J5 M74 Raith</p>	<p>Drawing:</p> <p>Figure 4.1 (J05/267/276D)</p>	
	<p>Client:</p> <p>Mouchel-Fairhurst JV</p>	<p>Description:</p> <p>Location of Boreholes</p>	
	<p>Date:</p> <p>March 2007</p>	<p>Drawn by:</p> <p>JG</p>	<p>Checked by:</p> <p>DF</p>



© OGI Groundwater Specialists Limited 2007

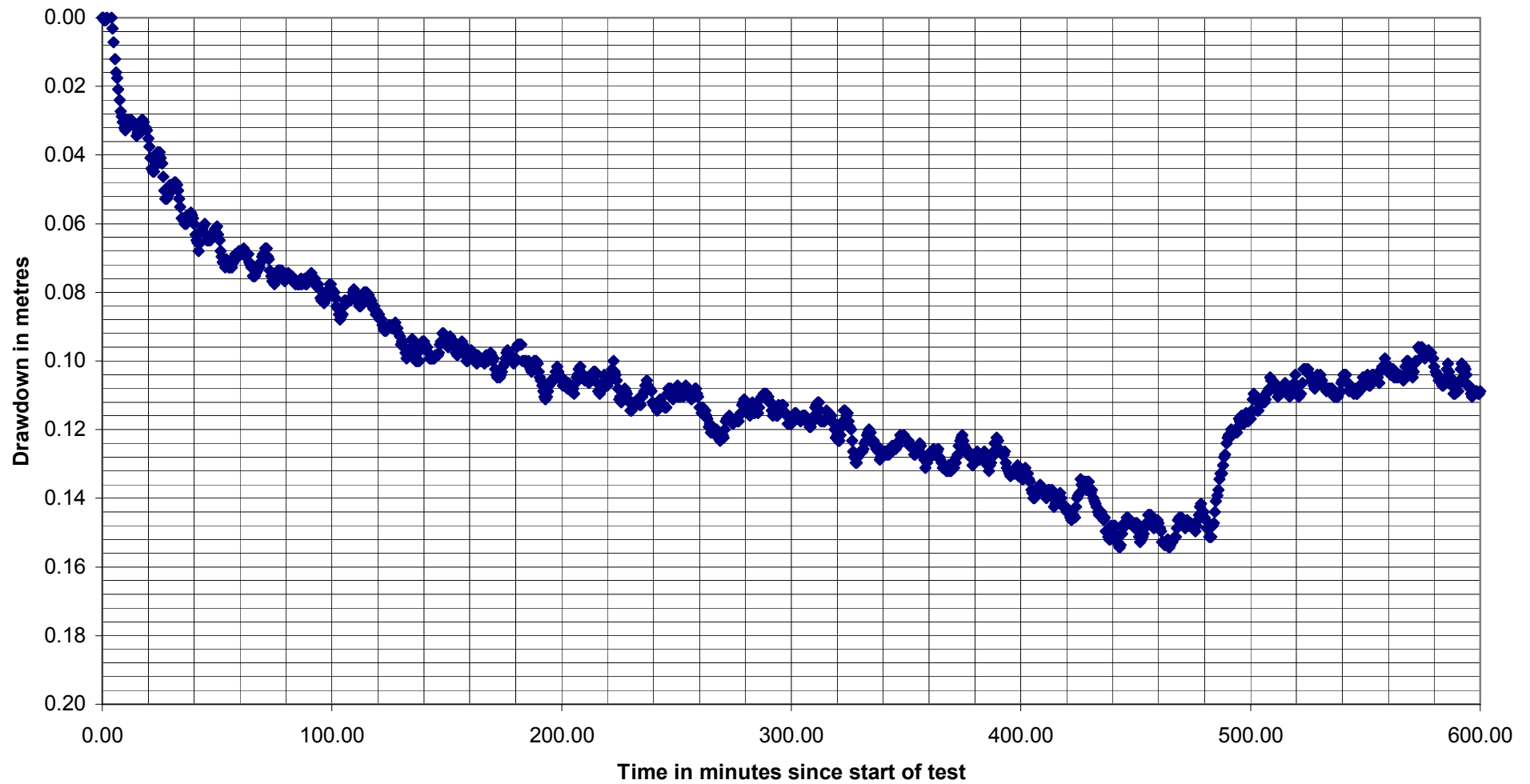


Groundwater
Specialists

Project: Junction 5 - M74 Raith	Drawing: Figure 4.2 (J05/267/298D)	
Client: Mouchel Fairhurst JV	Description: Contour plot of groundwater levels	
Date: March 2007	Drawn by: LCP	Checked by: SDT

Drawing: Figure 4.2 (J05/267/298D)	
Description: Contour plot of groundwater levels	
Drawn by: LCP	Checked by: SDT

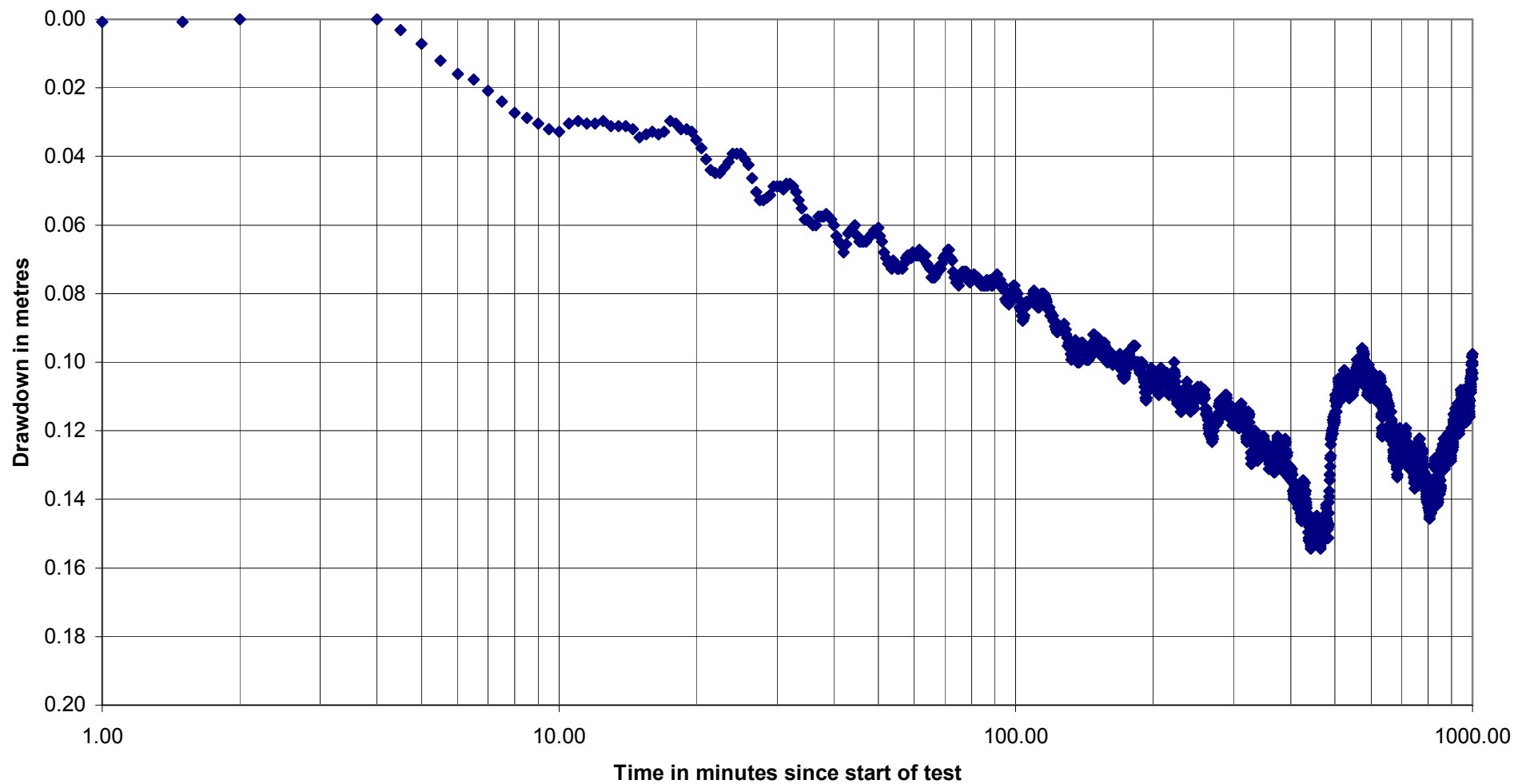
**Pumping from 4BH217 - 8hr test
Drawdown observed in 4BH216**



Groundwater
Specialists

Project: Junction 5 - M74 Raith	Drawing: Figure 5.1 J05/267/230D	Date: August 2006	
Client: Mouchel Fairhurst JV	Description: Drawdown curve	Drawn by: JGG	Checked by: SDT

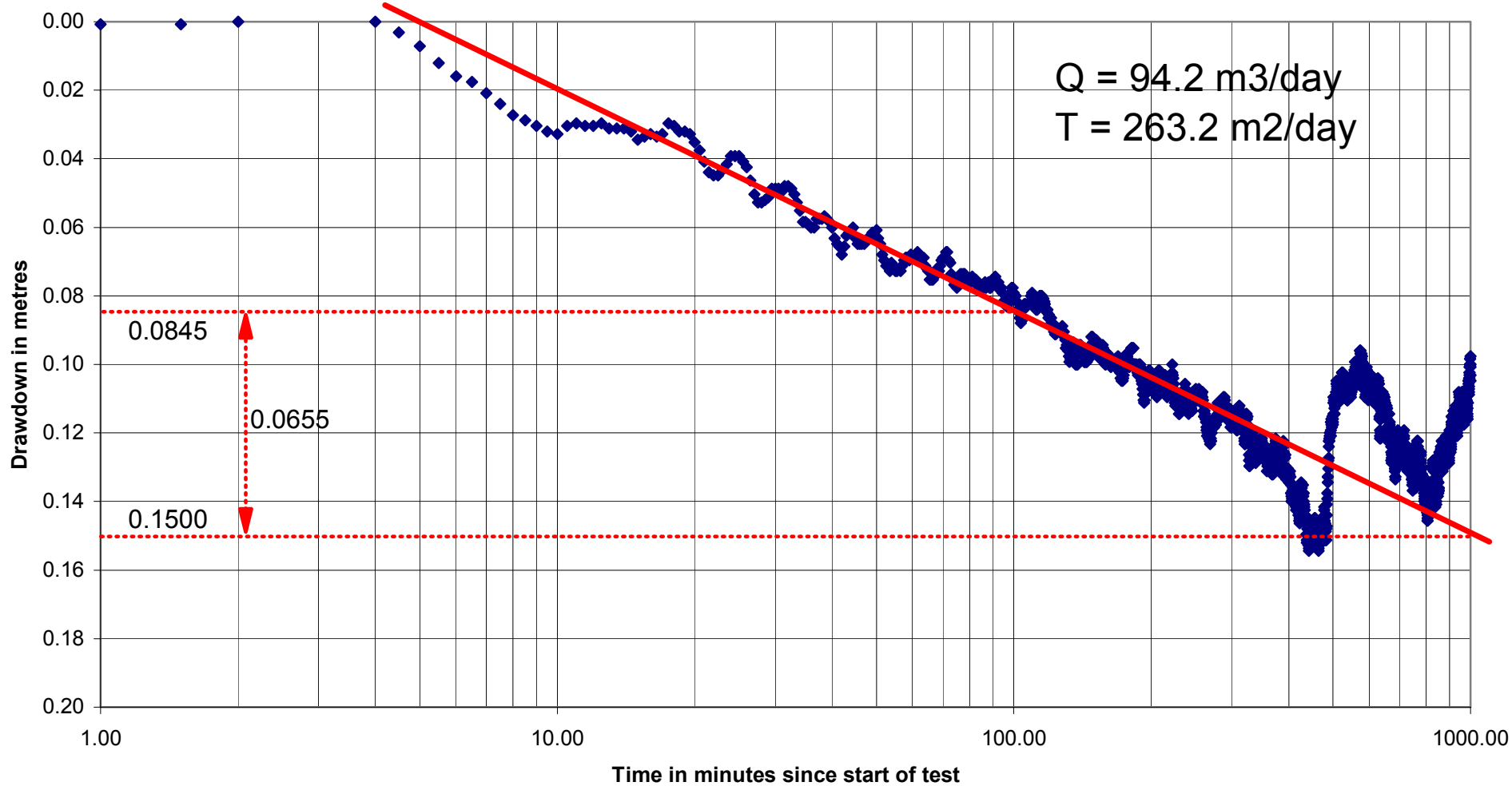
**Pumping from 4BH217 - 8hr test
 Drawdown observed in 4BH216 (semi-log graph)**



**Groundwater
Specialists**

Project: Junction 5 - M74 Raith	Drawing: Figure 5.2 J05/267/231D	Date: August 2006	
Client: Mouchel Fairhurst JV	Description: Logarithmic drawdown curve	Drawn by: JGG	Checked by: SDT

**Pumping from 4BH217 - 8hr test
 Drawdown observed in 4BH216 (semi-log graph)**



Groundwater
 Specialists

Project:
 Junction 5 - M74
 Raith

Client:
 Mouchel Fairhurst JV

Drawing:
 Figure 5.3
 J05/267/232D

Description:
 Logarithmic curve
 and best fit line

Date:
 August 2006

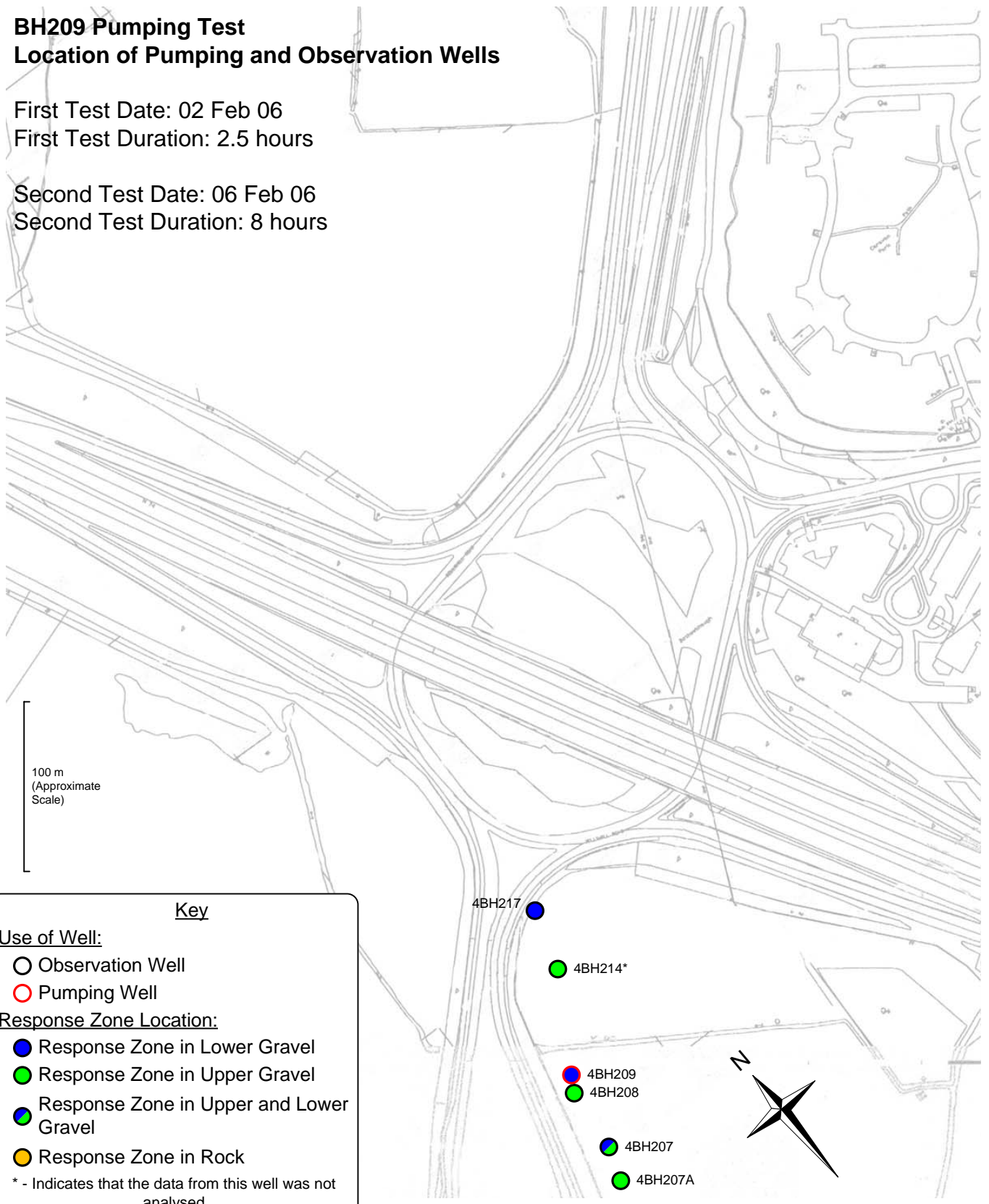
Drawn by:
 JGG

Checked by:
 SDT

**BH209 Pumping Test
Location of Pumping and Observation Wells**

First Test Date: 02 Feb 06
First Test Duration: 2.5 hours

Second Test Date: 06 Feb 06
Second Test Duration: 8 hours



Key

Use of Well:

- Observation Well
- Pumping Well

Response Zone Location:


- Response Zone in Lower Gravel
- Response Zone in Upper Gravel
- Response Zone in Upper and Lower Gravel
- Response Zone in Rock

* - Indicates that the data from this well was not analysed

© OGI Groundwater Specialists Limited 2007

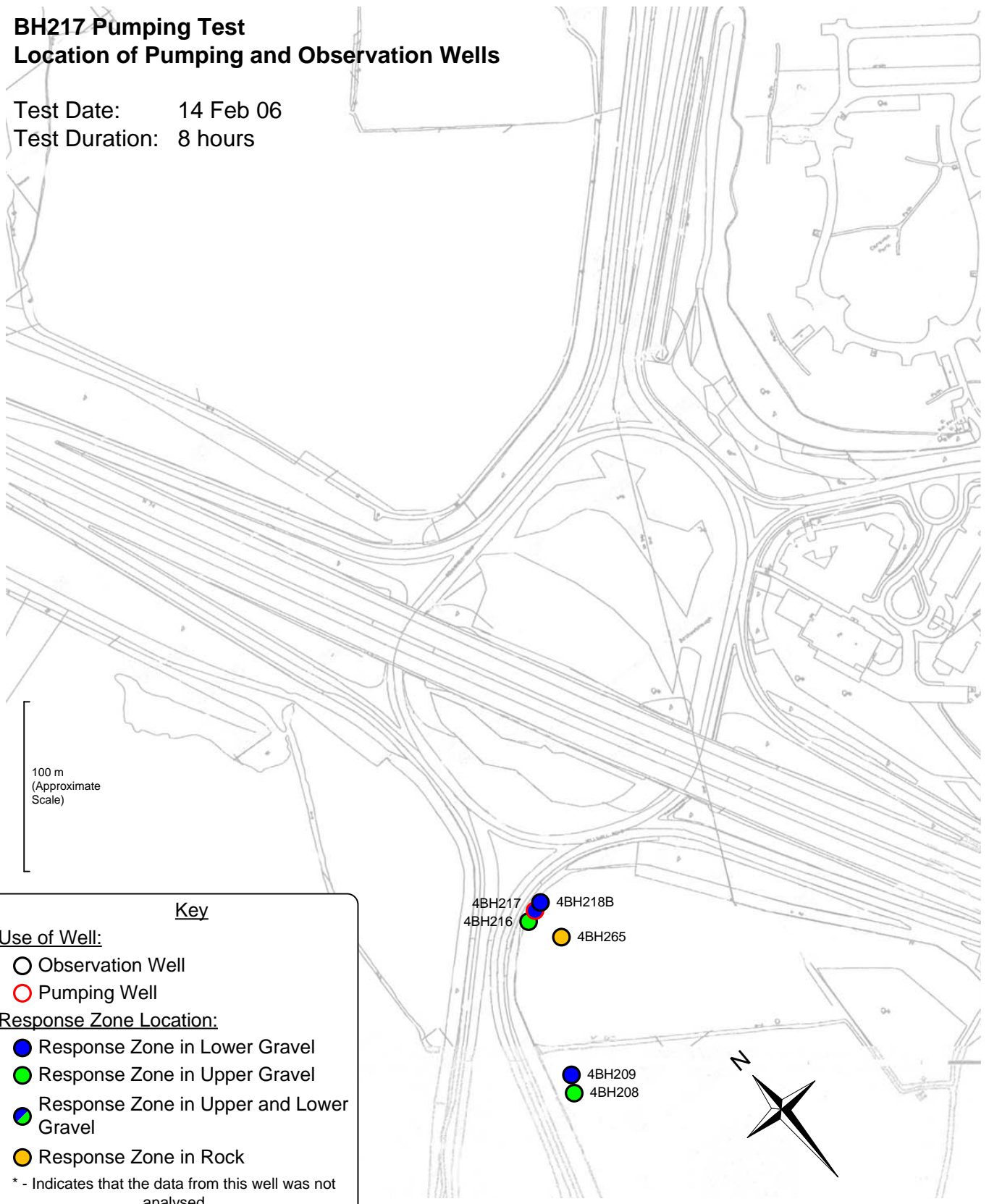
Drawing based on: Raeburn Fig No A2 (Contract No. 18622-04)

Scale: Not To Scale

	Project: J5 M74 Raith		Drawing: Figure 5.4 (J05/267/278D)	
	Client: Mouchel-Fairhurst JV		Description: BH209 Pump Test Well Locations	
	Date: March 2007	Drawn by: JG	Checked by: DF	

**BH217 Pumping Test
Location of Pumping and Observation Wells**

Test Date: 14 Feb 06
Test Duration: 8 hours



Key

Use of Well:

- Observation Well
- Pumping Well

Response Zone Location:


- Response Zone in Lower Gravel
- Response Zone in Upper Gravel
- Response Zone in Upper and Lower Gravel
- Response Zone in Rock

* - Indicates that the data from this well was not analysed

Scale: Not To Scale

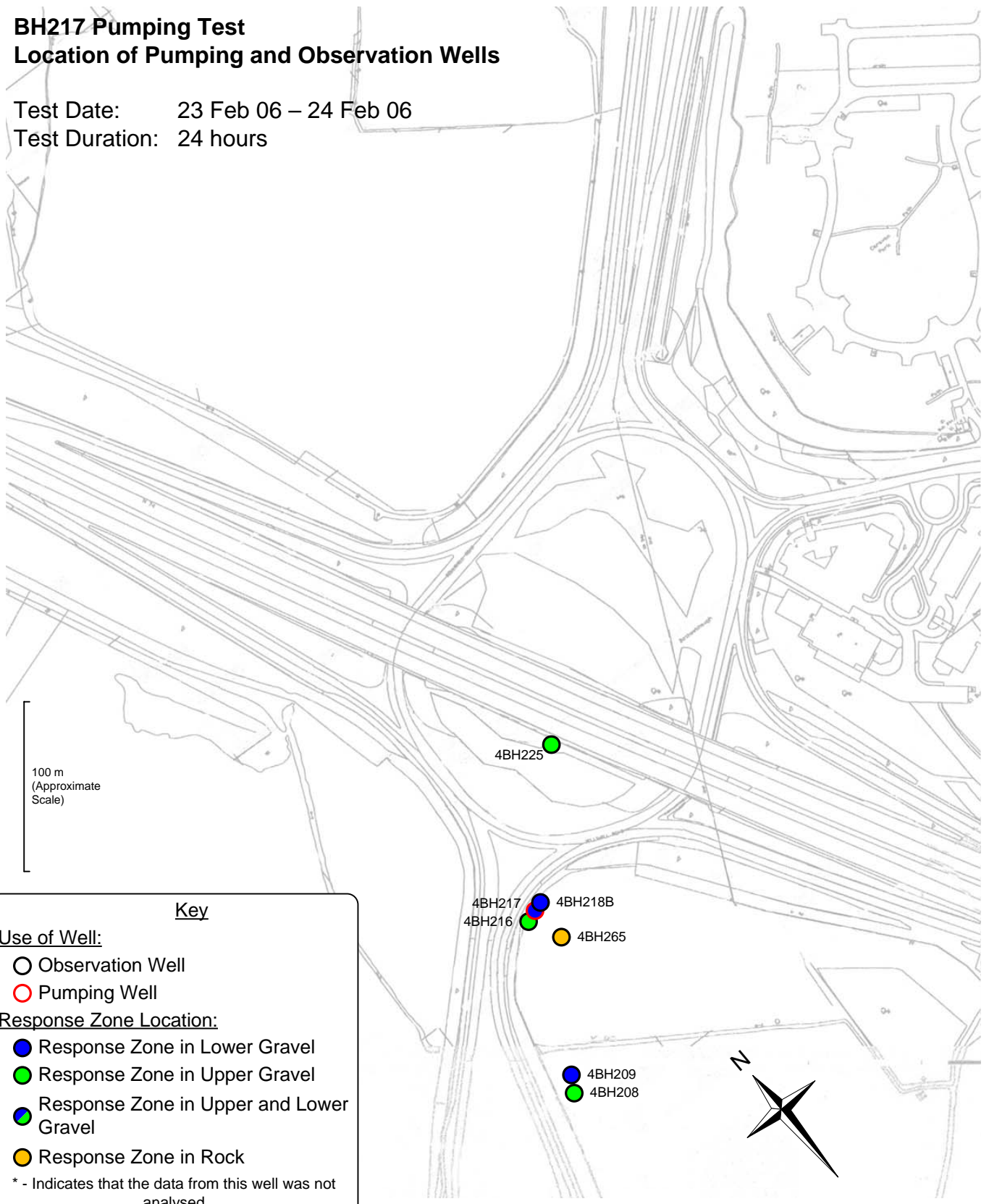
© OGI Groundwater Specialists Limited 2007

Drawing based on: Raeburn Fig No A2 (Contract No. 18622-04)

	Project: J5 M74 Raith		Drawing: Figure 5.5 (J05/267/279D)	
	Client: Mouchel-Fairhurst JV		Description: BH217 Pump Test Well Locations	
	Date: March 2007	Drawn by: JG	Checked by: DF	

**BH217 Pumping Test
Location of Pumping and Observation Wells**

Test Date: 23 Feb 06 – 24 Feb 06
Test Duration: 24 hours



Key

Use of Well:

- Observation Well
- Pumping Well

Response Zone Location:


- Response Zone in Lower Gravel
- Response Zone in Upper Gravel
- Response Zone in Upper and Lower Gravel
- Response Zone in Rock

* - Indicates that the data from this well was not analysed

Scale: Not To Scale

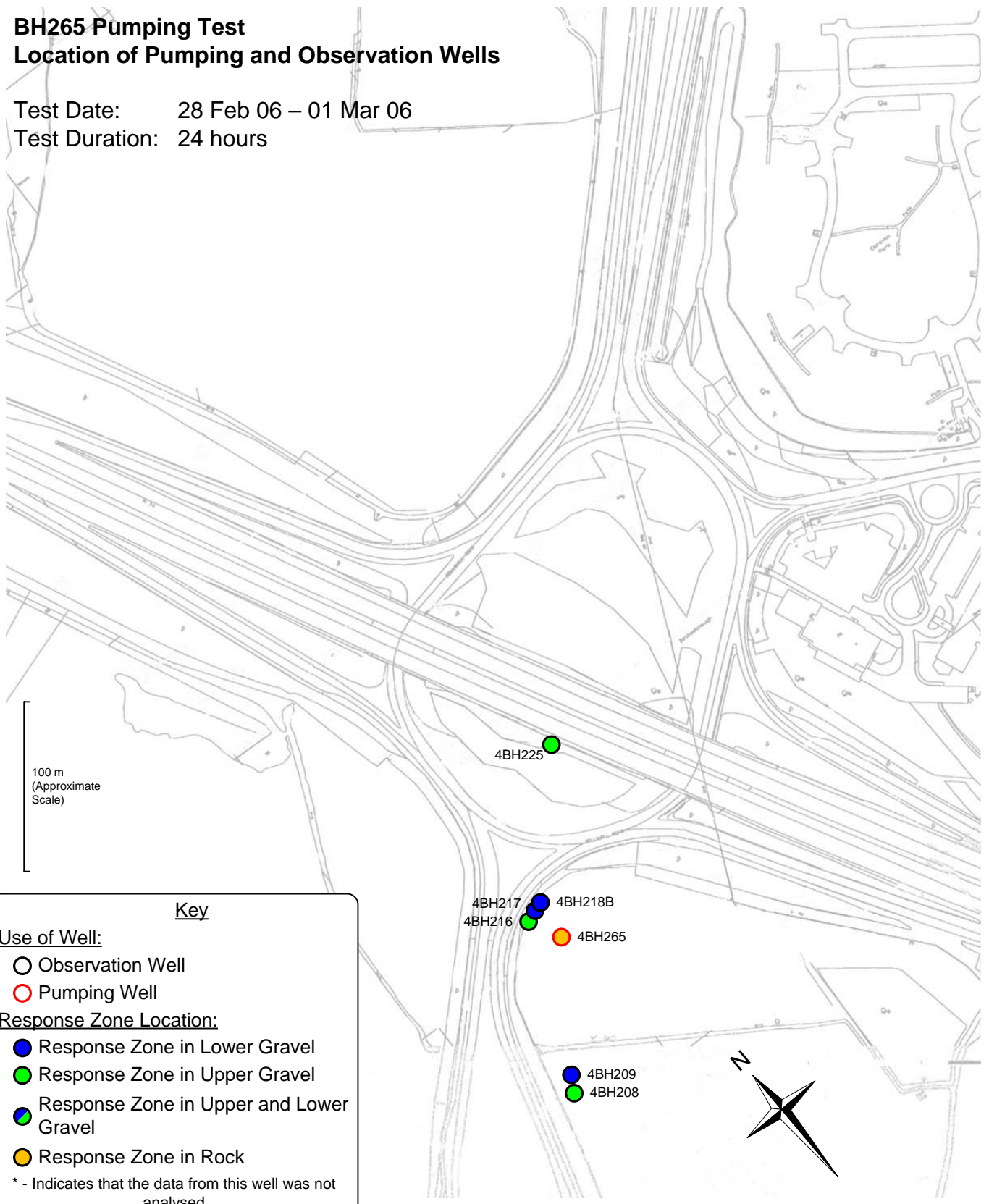
© OGI Groundwater Specialists Limited 2007

Drawing based on: Raeburn Fig No A2 (Contract No. 18622-04)

	Project:		Drawing:	
	J5 M74 Raith		Figure 5.6 (J05/267/280D)	
	Client:		Description:	
Mouchel-Fairhurst JV		BH217 Pump Test Well Locations		
Date:		Drawn by:	Checked by:	
March 2007		JG	DF	

**BH265 Pumping Test
Location of Pumping and Observation Wells**

Test Date: 28 Feb 06 – 01 Mar 06
Test Duration: 24 hours



Scale: Not To Scale

© OGI Groundwater Specialists Limited 2007

Drawing based on: Raeburn Fig No A2 (Contract No. 18622-04)

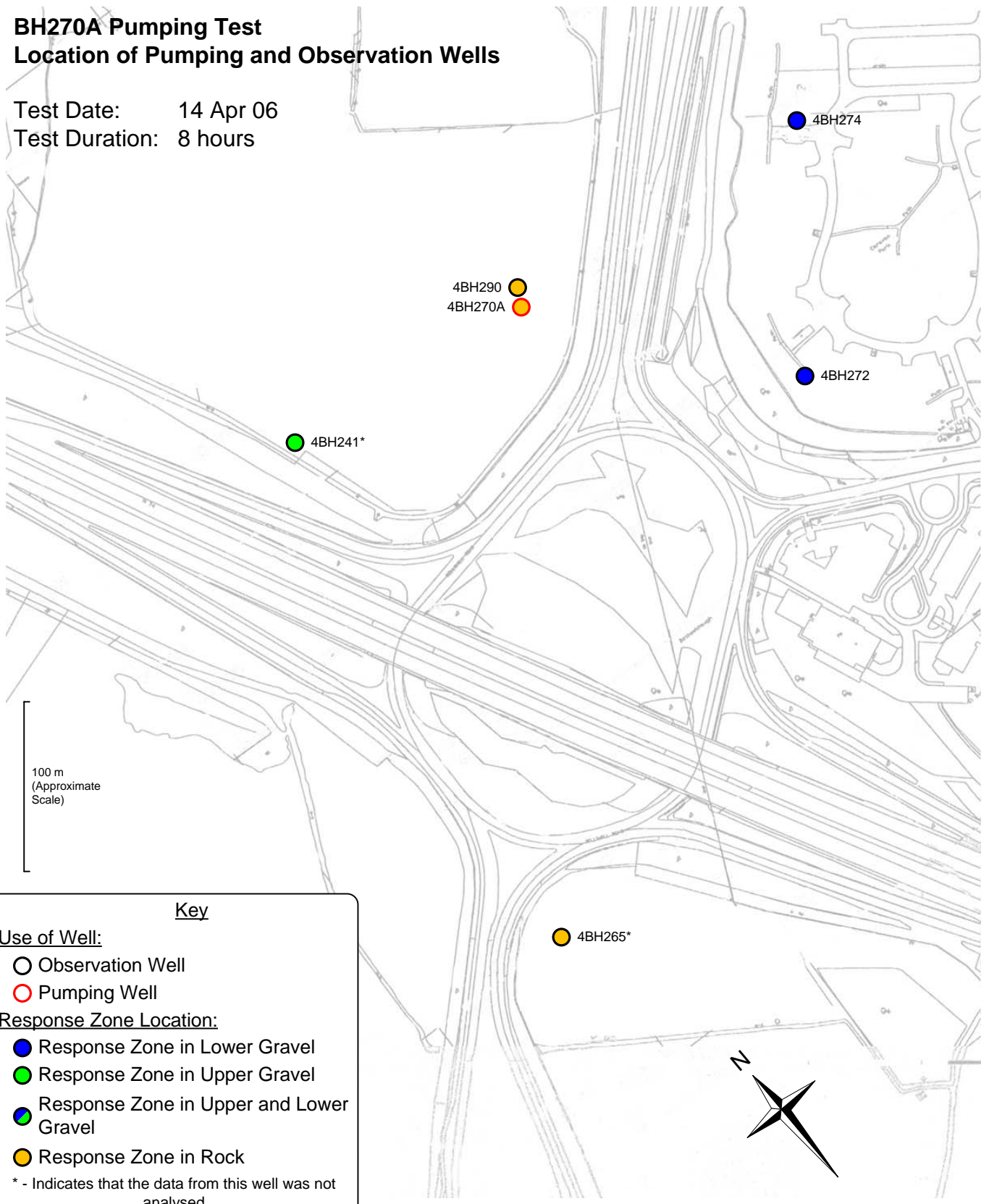


**Groundwater
Specialists**

	Project: J5 M74 Raith	Drawing: Figure 5.7 (J05/267/300D)	
	Client: Mouchel-Fairhurst JV	Description: BH265A Pump Test Well Locations	
	Date: March 2007	Drawn by: JG	Checked by: DF

BH270A Pumping Test Location of Pumping and Observation Wells

Test Date: 14 Apr 06
Test Duration: 8 hours



Key

Use of Well:

- Observation Well
- Pumping Well

Response Zone Location:


- Response Zone in Lower Gravel
- Response Zone in Upper Gravel
- Response Zone in Upper and Lower Gravel
- Response Zone in Rock

* - Indicates that the data from this well was not analysed

Scale: Not To Scale

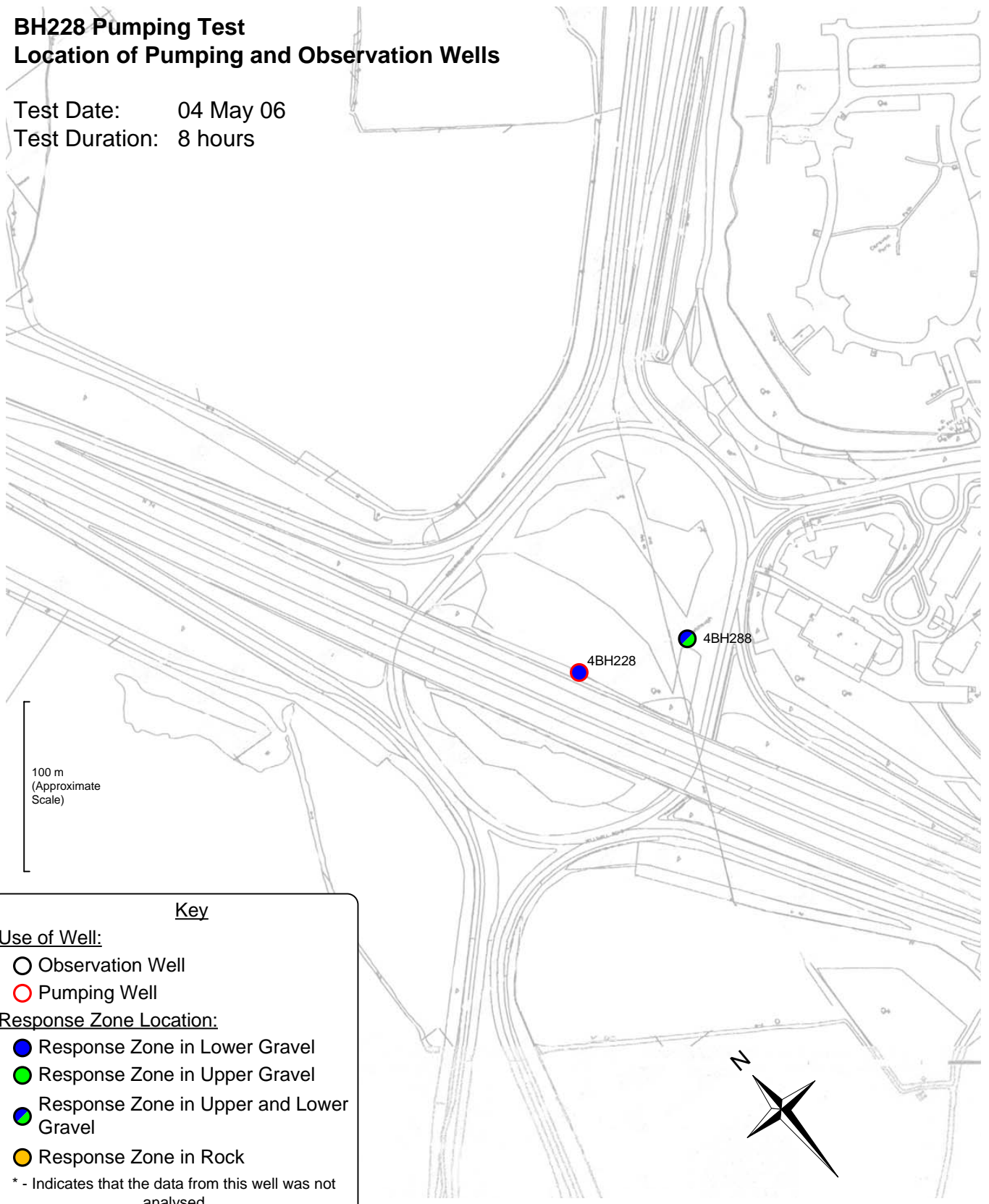
© OGI Groundwater Specialists Limited 2007

Drawing based on: Raeburn Fig No A2 (Contract No. 18622-04)

 OGI Groundwater Specialists	Project: J5 M74 Raith		Drawing: Figure 5.8 (J05/267/282D)	
	Client: Mouchel-Fairhurst JV		Description: BH270A Pump Test Well Locations	
	Date: March 2007	Drawn by: JG	Checked by: DF	

**BH228 Pumping Test
Location of Pumping and Observation Wells**

Test Date: 04 May 06
Test Duration: 8 hours



Key

Use of Well:

- Observation Well
- Pumping Well

Response Zone Location:


- Response Zone in Lower Gravel
- Response Zone in Upper Gravel
- Response Zone in Upper and Lower Gravel
- Response Zone in Rock

* - Indicates that the data from this well was not analysed

Scale: Not To Scale

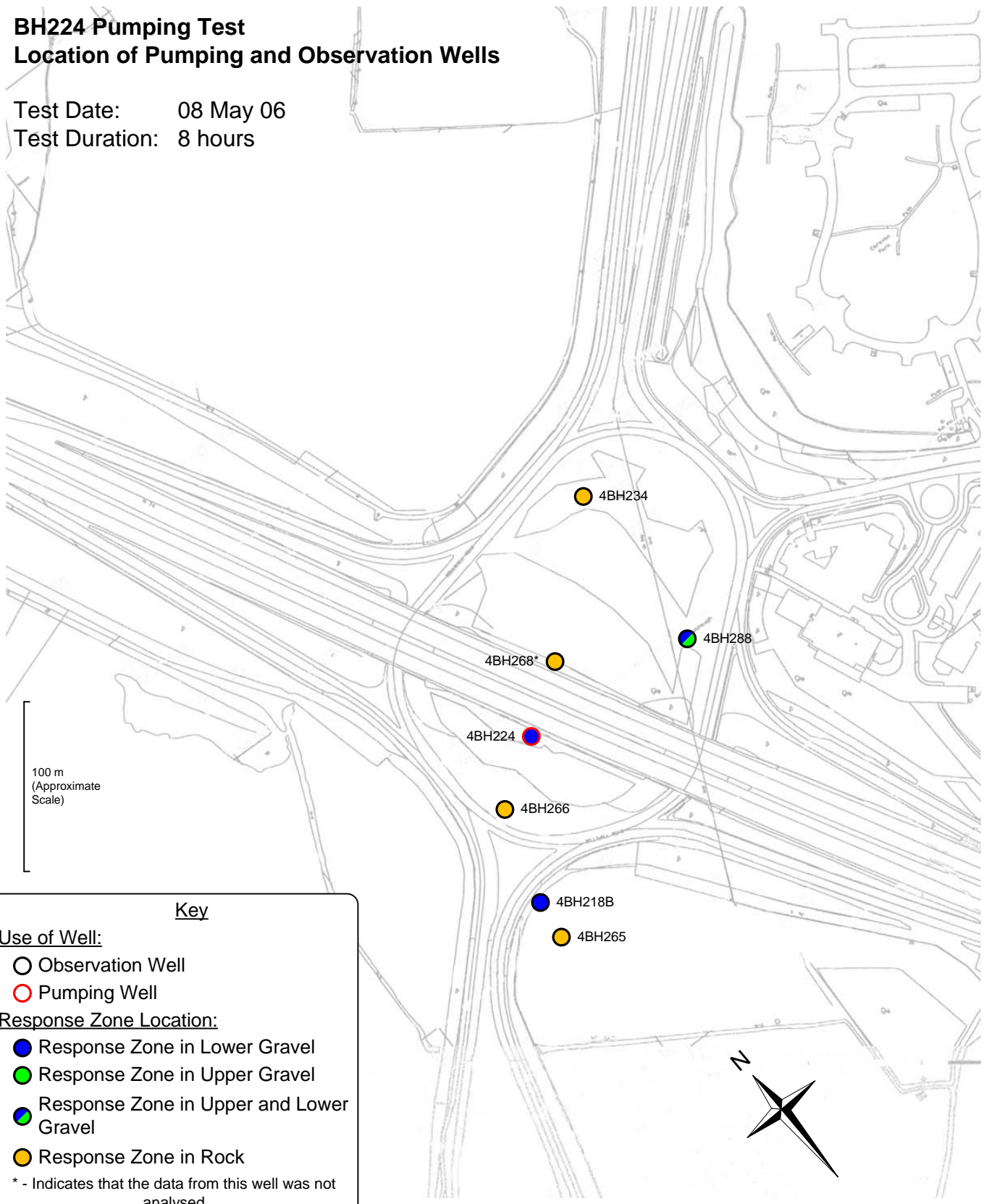
© OGI Groundwater Specialists Limited 2007

Drawing based on: Raeburn Fig No A2 (Contract No. 18622-04)

 OGI Groundwater Specialists	Project:		Drawing:	
	J5 M74 Raith		Figure 5.9 (J05/267/283D)	
	Client:		Description:	
Mouchel-Fairhurst JV		BH228 Pump Test Well Locations		
Date:		Drawn by:	Checked by:	
March 2007		JG	DF	

BH224 Pumping Test Location of Pumping and Observation Wells

Test Date: 08 May 06
Test Duration: 8 hours



Key

Use of Well:

- Observation Well
- Pumping Well

Response Zone Location:


- Response Zone in Lower Gravel
- Response Zone in Upper Gravel
- Response Zone in Upper and Lower Gravel
- Response Zone in Rock

* - Indicates that the data from this well was not analysed

Scale: Not To Scale

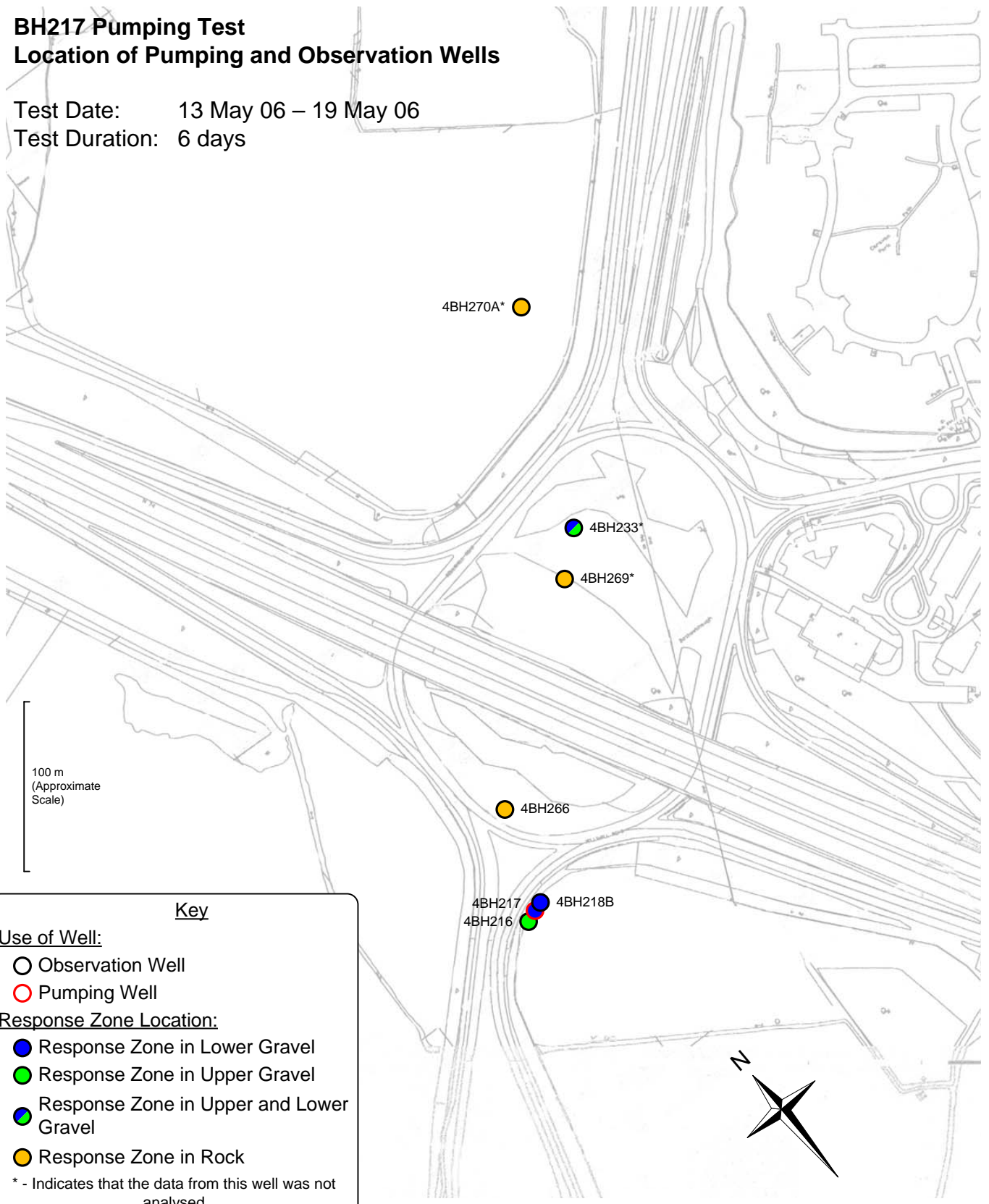
© OGI Groundwater Specialists Limited 2007

Drawing based on: Raeburn Fig No A2 (Contract No. 18622-04)

 OGI Groundwater Specialists	Project:		Drawing:	
	J5 M74 Raith		Figure 5.10 (J05/267/284D)	
	Client:		Description:	
Mouchel-Fairhurst JV		BH224 Pump Test Well Locations		
Date:		Drawn by:	Checked by:	
March 2007		JG	DF	

**BH217 Pumping Test
Location of Pumping and Observation Wells**

Test Date: 13 May 06 – 19 May 06
Test Duration: 6 days



Key

Use of Well:

- Observation Well
- Pumping Well

Response Zone Location:


- Response Zone in Lower Gravel
- Response Zone in Upper Gravel
- Response Zone in Upper and Lower Gravel
- Response Zone in Rock

* - Indicates that the data from this well was not analysed

Scale: Not To Scale

© OGI Groundwater Specialists Limited 2007

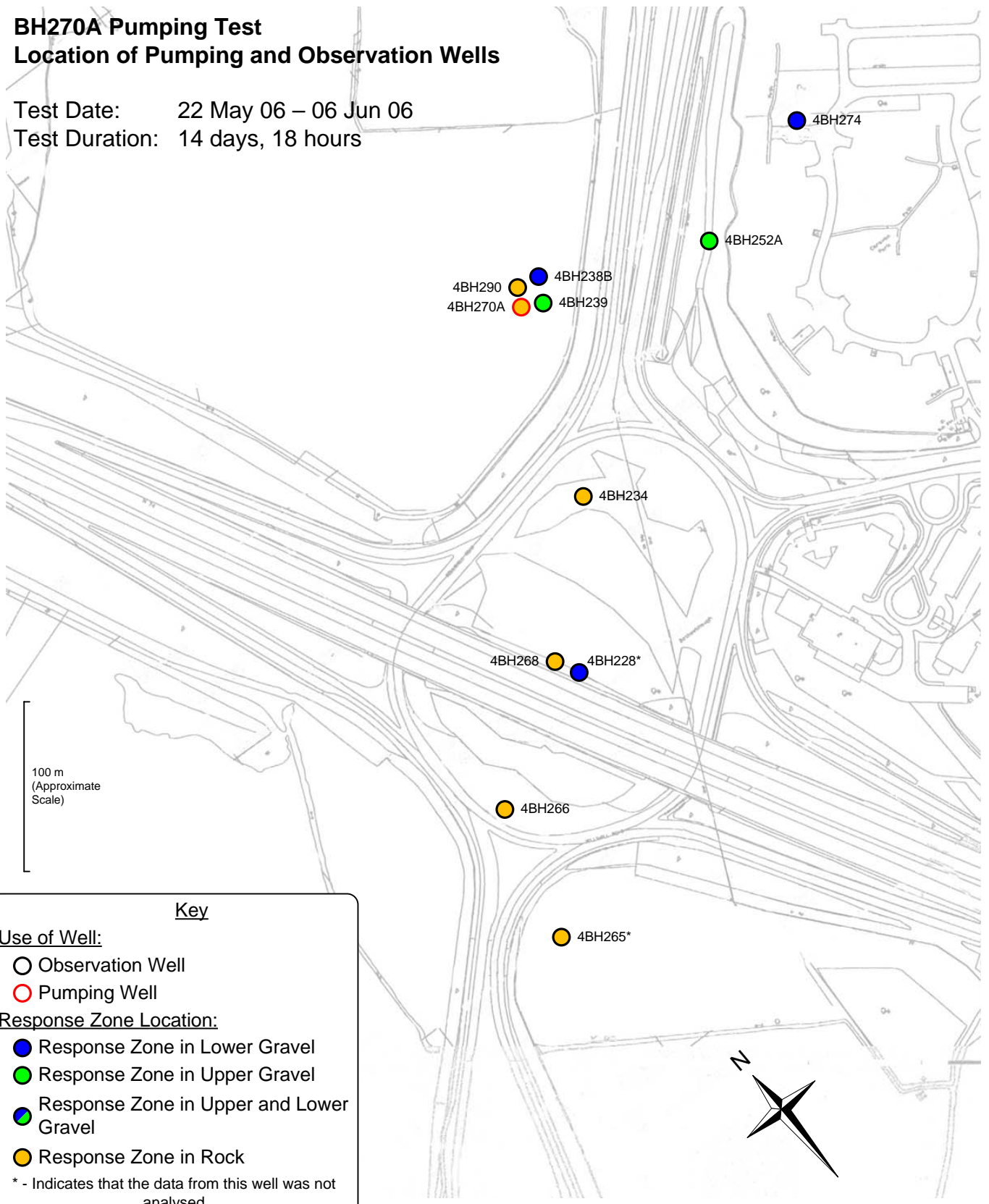
Drawing based on: Raeburn Fig No A2 (Contract No. 18622-04)

	Project: J5 M74 Raith		Drawing: Figure 5.11 (J05/267/285D)	
	Client: Mouchel-Fairhurst JV		Description: BH217 Pump Test Well Locations	
	Date: March 2007	Drawn by: JG	Checked by: DF	

BH270A Pumping Test Location of Pumping and Observation Wells

Test Date: 22 May 06 – 06 Jun 06

Test Duration: 14 days, 18 hours



Key

Use of Well:

- Observation Well
- Pumping Well

Response Zone Location:


- Response Zone in Lower Gravel
- Response Zone in Upper Gravel
- Response Zone in Upper and Lower Gravel
- Response Zone in Rock

* - Indicates that the data from this well was not analysed

Scale: Not To Scale

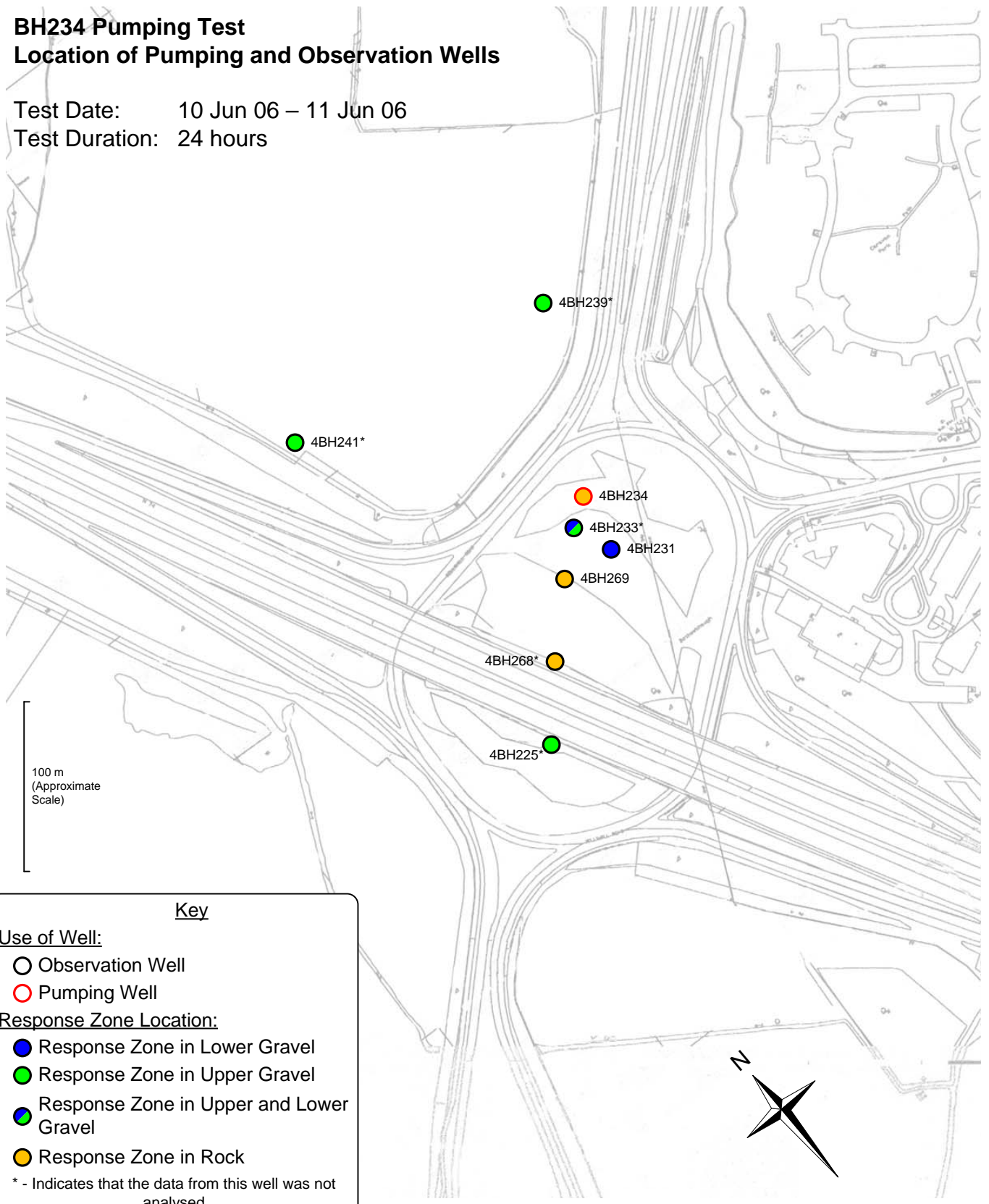
© OGI Groundwater Specialists Limited 2007

Drawing based on: Raeburn Fig No A2 (Contract No. 18622-04)

 OGI Groundwater Specialists	Project: J5 M74 Raith		Drawing: Figure 5.12 (J05/267/286D)	
	Client: Mouchel-Fairhurst JV		Description: BH270A Pump Test Well Locations	
	Date: March 2007	Drawn by: JG	Checked by: DF	

BH234 Pumping Test Location of Pumping and Observation Wells

Test Date: 10 Jun 06 – 11 Jun 06
Test Duration: 24 hours



Key

Use of Well:

- Observation Well
- Pumping Well

Response Zone Location:


- Response Zone in Lower Gravel
- Response Zone in Upper Gravel
- Response Zone in Upper and Lower Gravel
- Response Zone in Rock

* - Indicates that the data from this well was not analysed

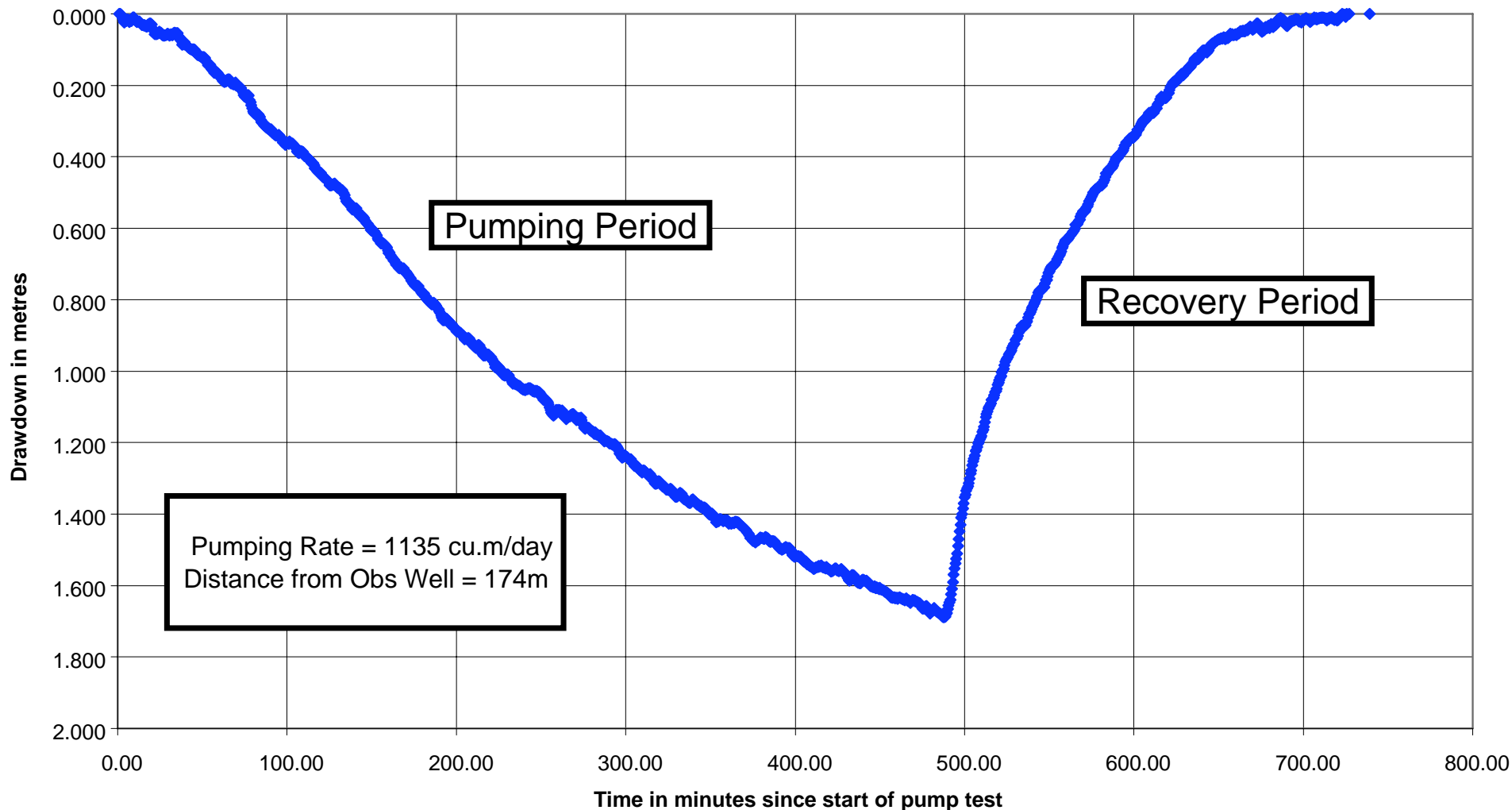
Scale: Not To Scale

© OGI Groundwater Specialists Limited 2007

Drawing based on: Raeburn Fig No A2 (Contract No. 18622-04)

 OGI Groundwater Specialists	Project:		Drawing:	
	J5 M74 Raith		Figure 5.13 (J05/267/287D)	
	Client:		Description:	
Mouchel-Fairhurst JV		BH234 Pump Test Well Locations		
Date:		Drawn by:	Checked by:	
March 2007		JG	DF	

Pumping from BH270A - 14 Apr 06
 Drawdown in Observation Well 272



Pumping Rate = 1135 cu.m/day
 Distance from Obs Well = 174m

Pumping Period

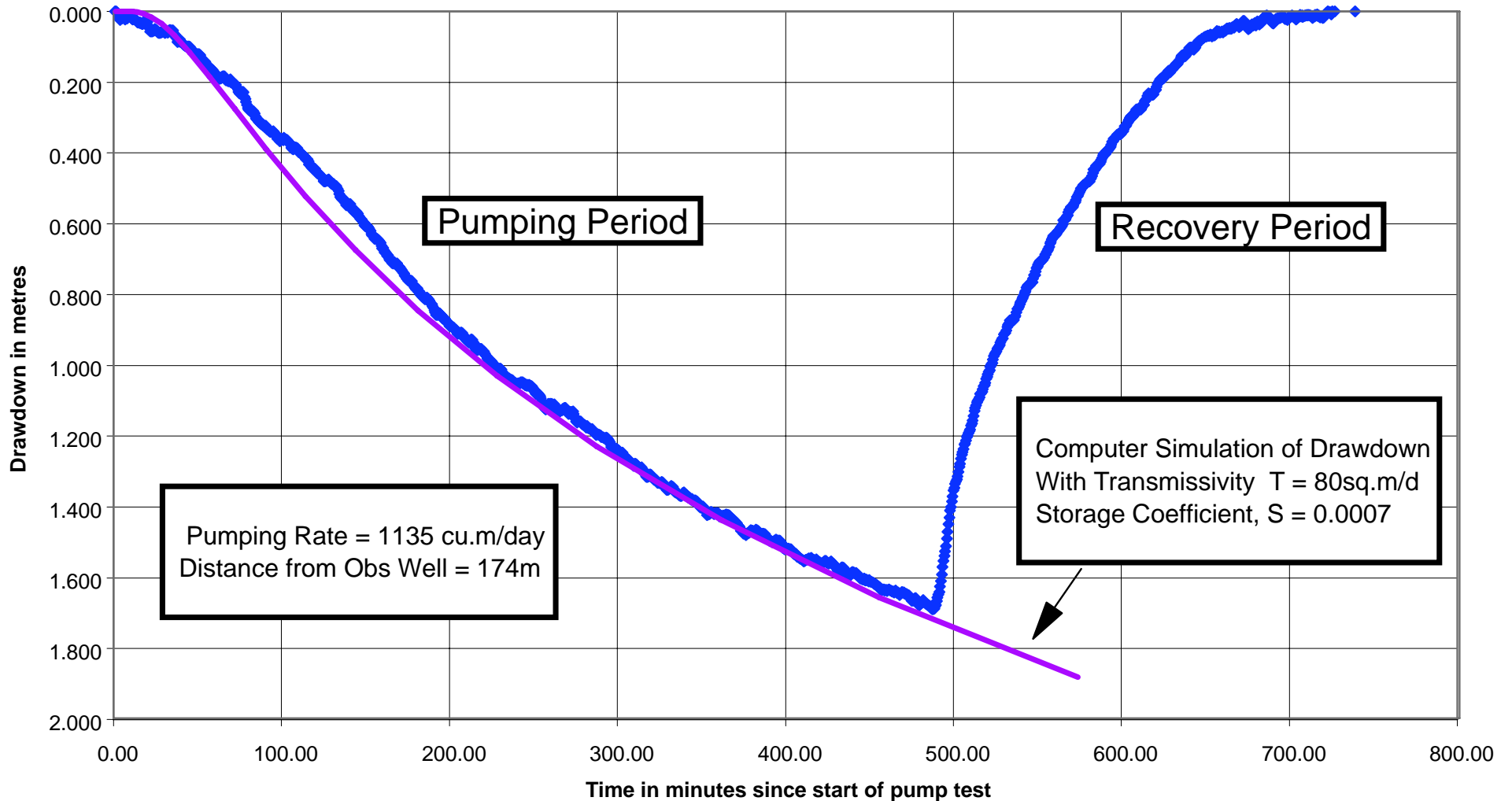
Recovery Period



Groundwater Specialists

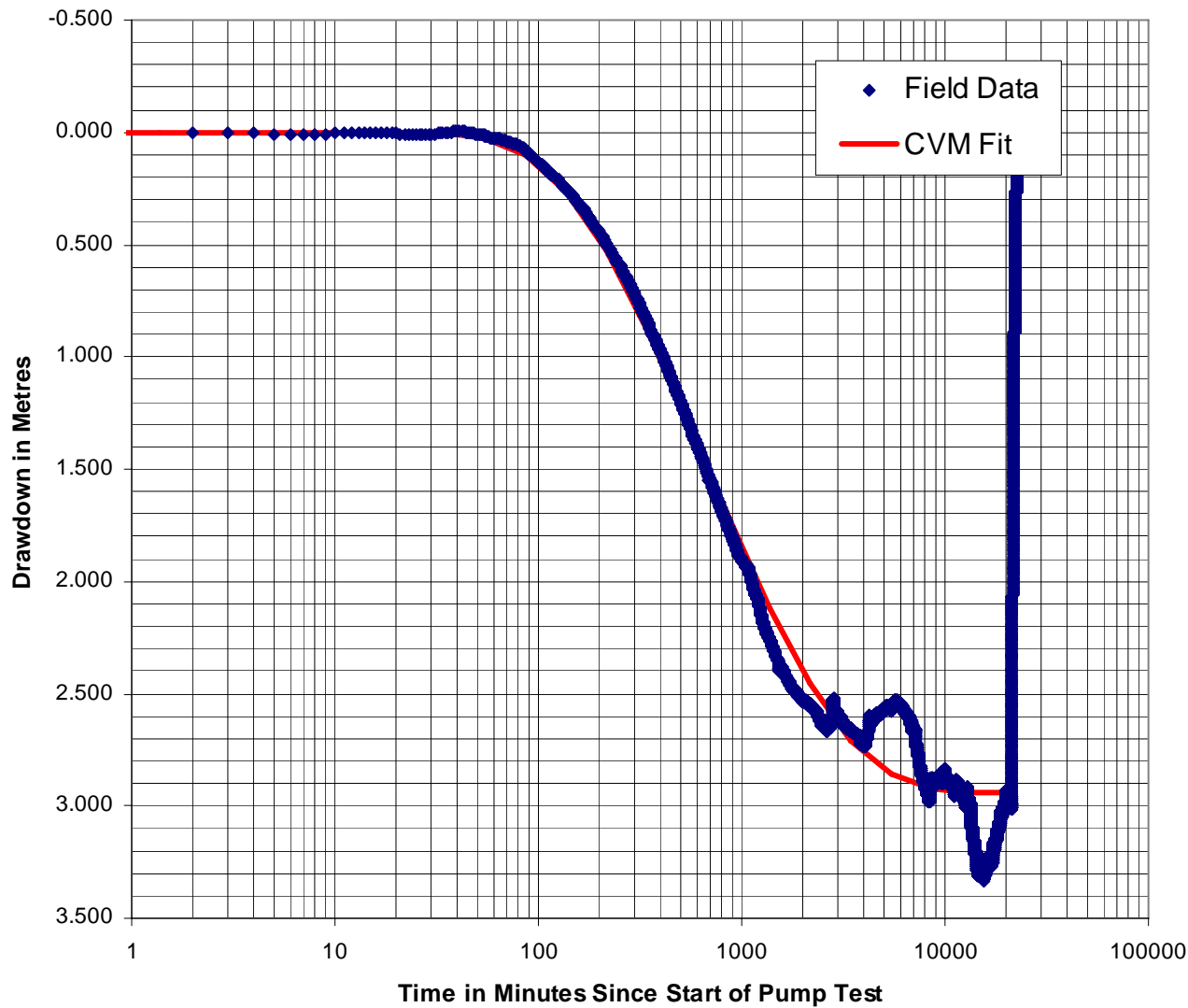
Project: Junction 5 - M74 Raith	Drawing: Figure 5.14 (J05/267/288D)	Date: March 2007	
Client: Mouchel Fairhurst JV	Description: Pump Well 270A Observation 272	Drawn by: SDT	Checked by: JGG

**Pumping from BH270A - 14 Apr 06
 Drawdown in Observation Well 272
 Simulated by Groundwater Computer Model**



Groundwater
Specialists

Project: Junction 5 - M74 Raith	Drawing: Figure 5.15 (J05/267/289D)	Date: March 2007	
Client: Mouchel Fairhurst JV	Description: Pump Well 270A Observation 272	Drawn by: SDT	Checked by: JGG



$T = 55 \text{ sq.m/day}$

$S = 0.0006$

$\text{Leakance} = 0.00285 \text{ /day}$



Groundwater
Specialists

Project:
Junction 5 - M74
Raith

Client:
Mouchel Fairhurst JV

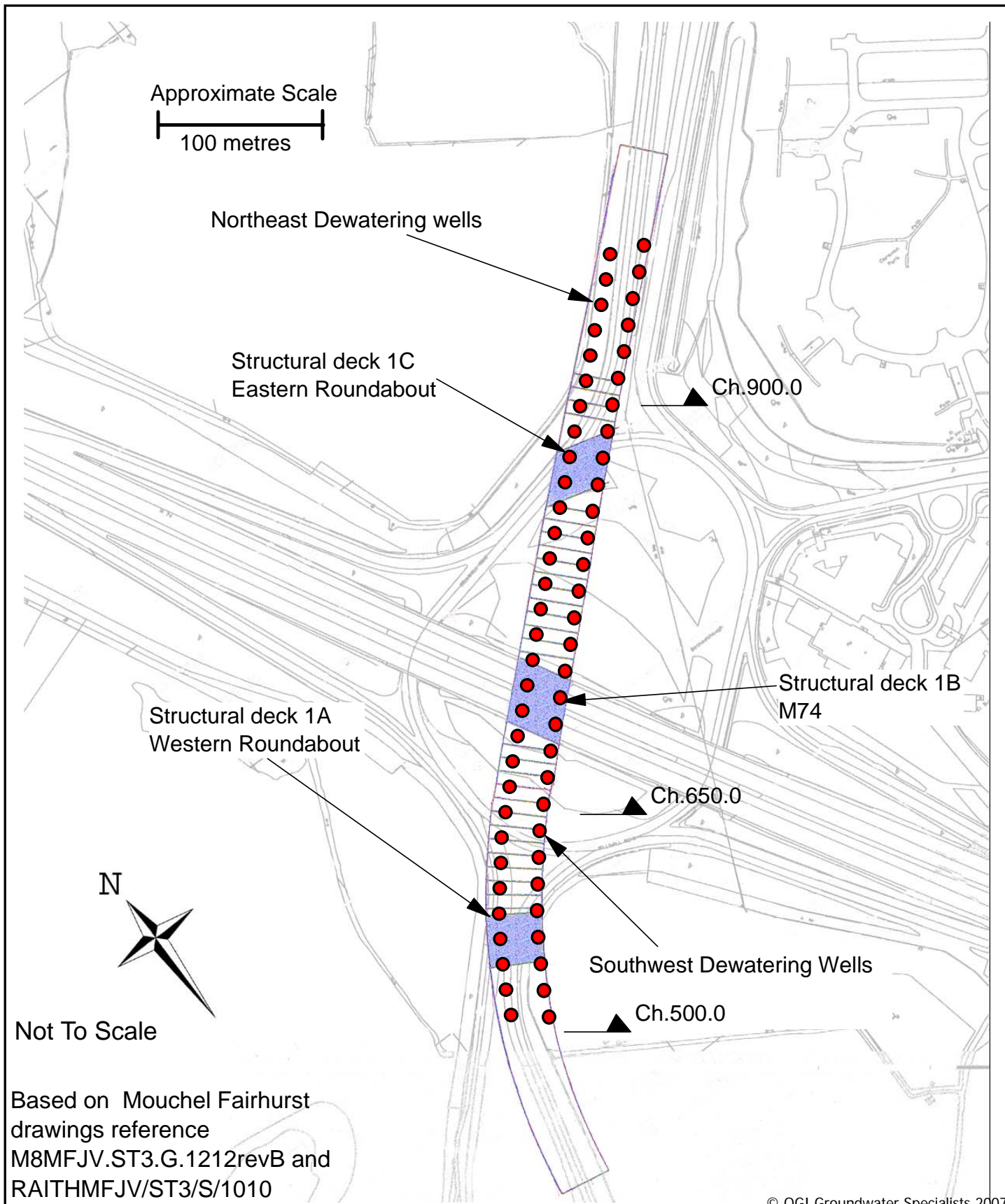
Drawing:
Figure 5.16
J05/267/290D

Description:
Logarithmic curve
and CVM fit line

Date:
March 2007

Drawn by:
JGG

Checked by:
SDT



Groundwater Specialists

Project:
Junction 5 - M74
Raith

Client:
Mouchel Fairhurst JV

Date:
March 2007

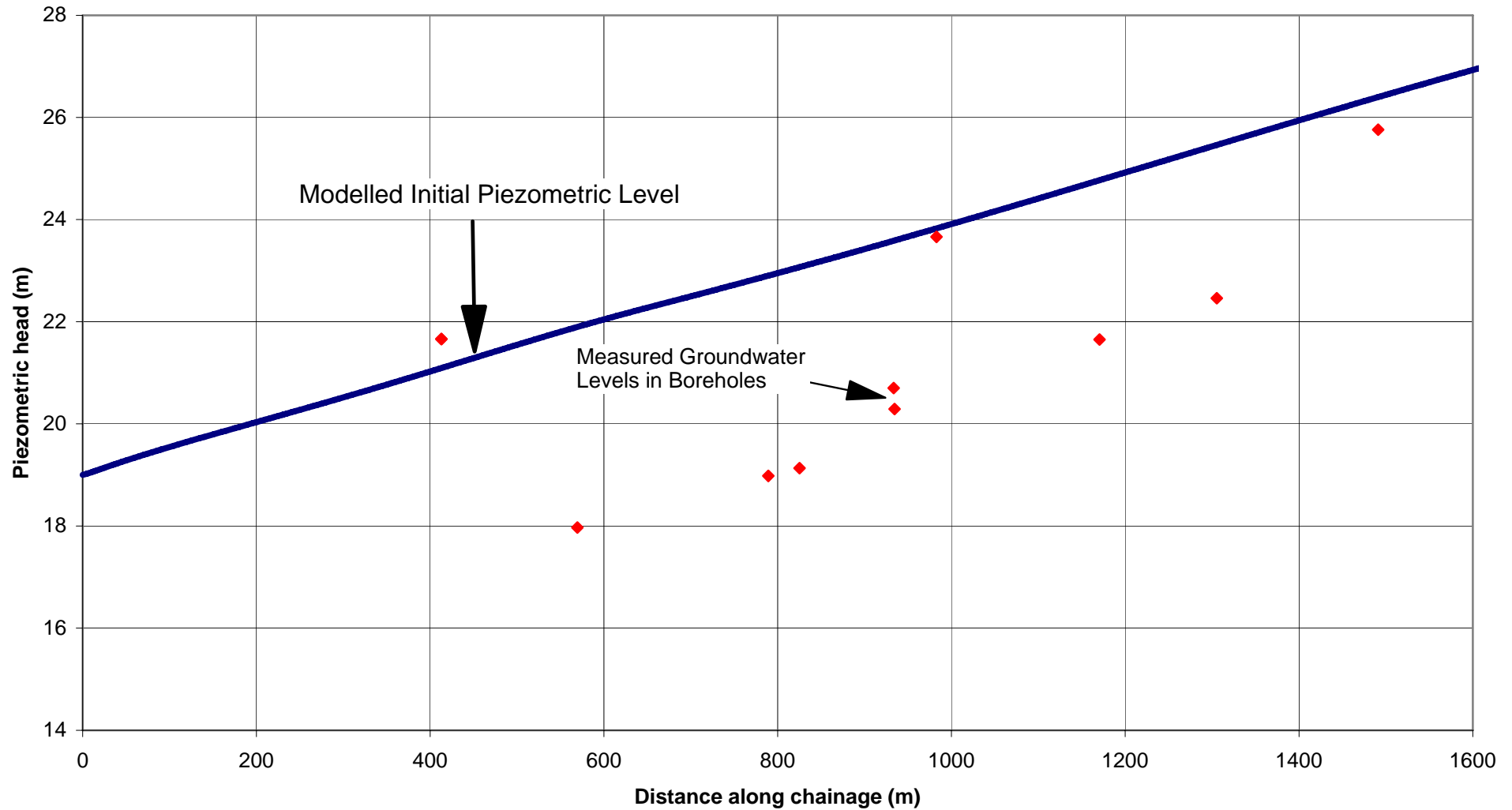
Drawing:
Figure 6.1
(Ref:J05/267/291D)

Description:
Drawing showing possible location of internal wells

Drawn by:
SDT

Checked by:
JGG

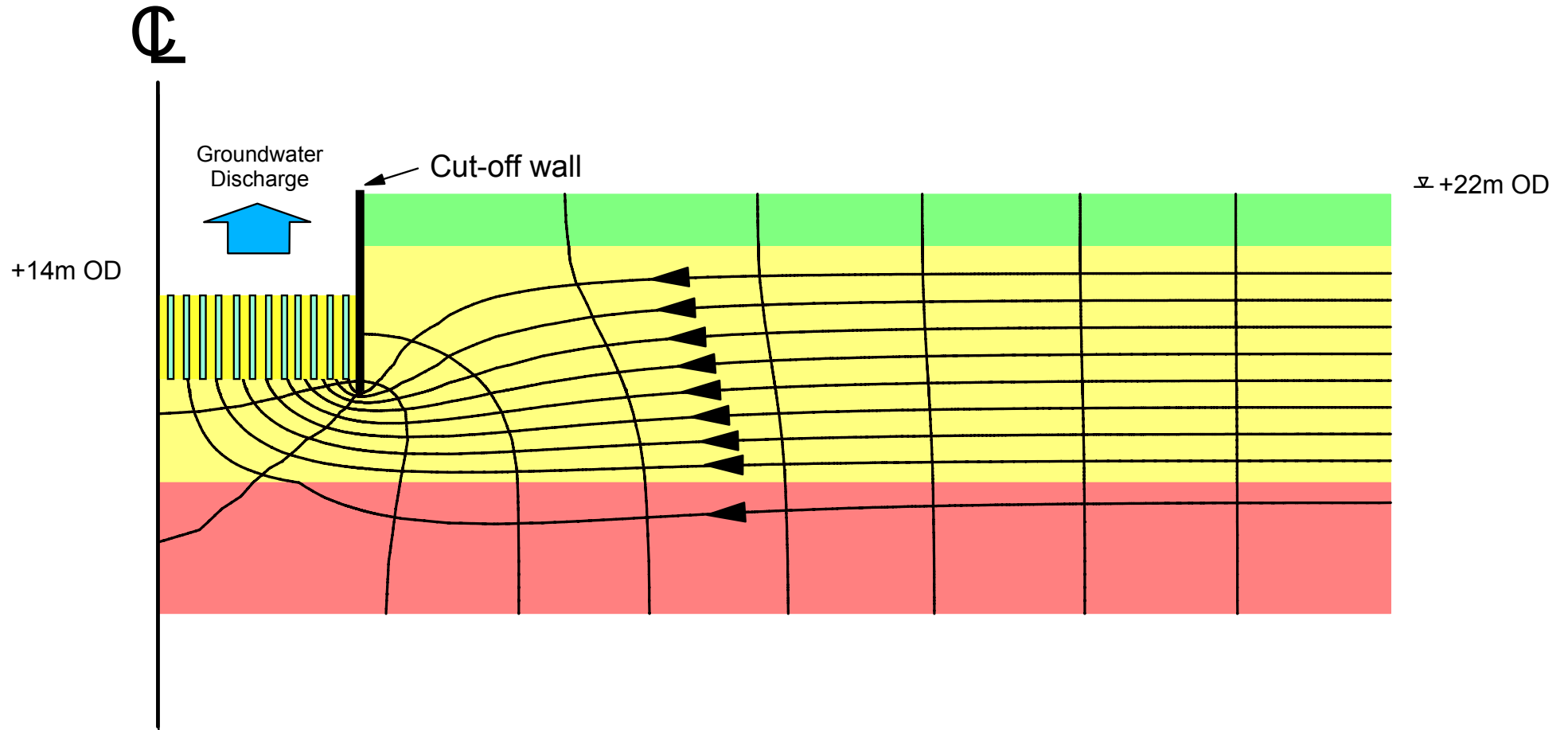
Piezometric Levels (Chainage Section)



Groundwater Specialists

Project: Junction 5 - M74 Raith		Drawing: Figure 6.2 (J05/267/292D)		Date: March 2007	
Client: Mouchel Fairhurst JV		Description: Preconstruction groundwater level SW - NE section		Drawn by: JGG	Checked by: SDT

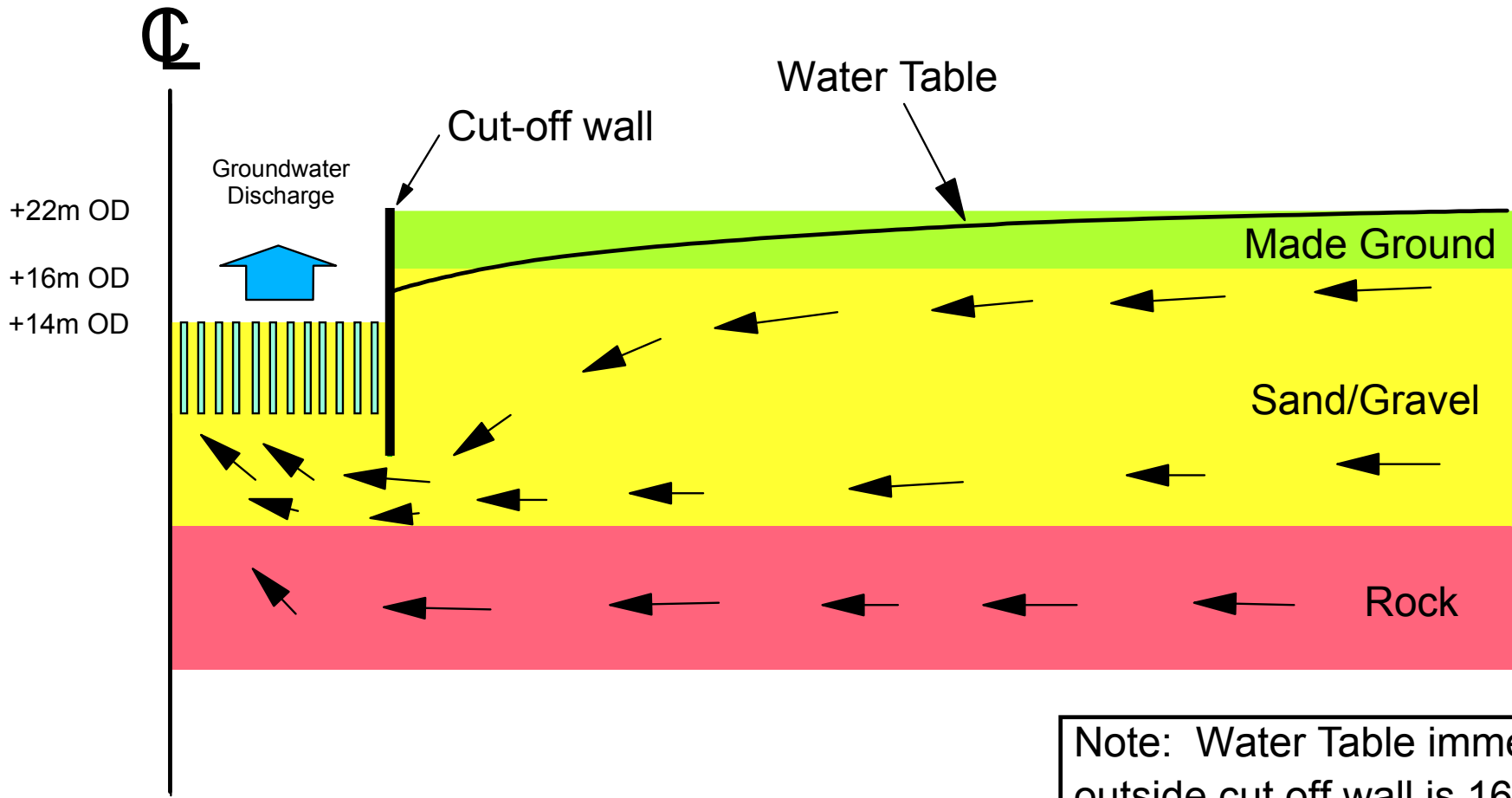
Simulated groundwater flow to underpass
excavation with cut-off wall penetrating to 7m OD




Groundwater
Specialists

Project: Junction 5 - M74 Raith	Drawing: Figure 6.3 (J05/267/247D)	Date: August 2006	
Client: Mouchel Fairhurst JV	Description: Groundwater flow net with penetrating cut-off wall to 7m OD	Drawn by: SDT	Checked by: LCP

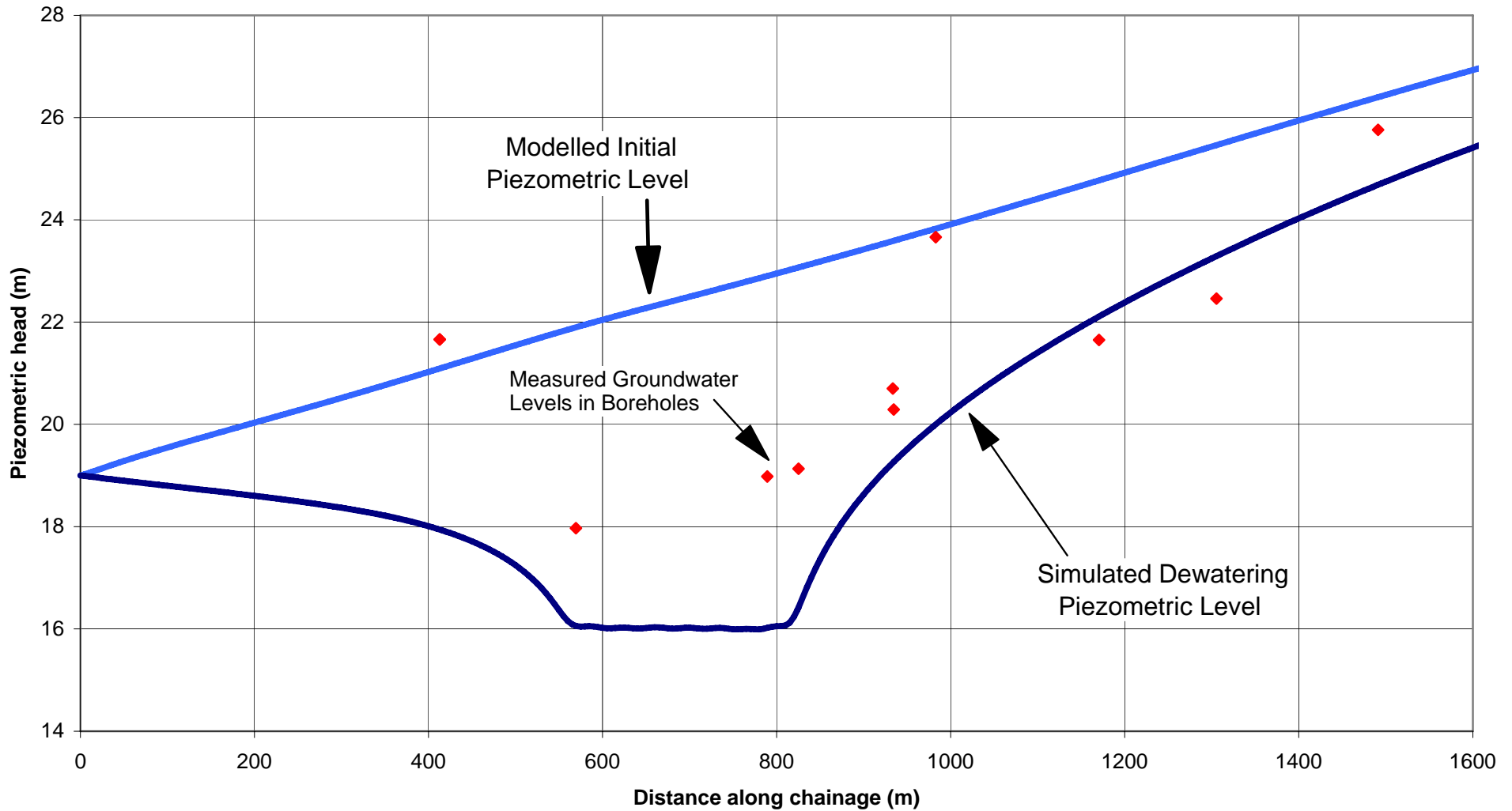
Simulated groundwater flow to underpass excavation with cut-off wall penetrating to 7m OD



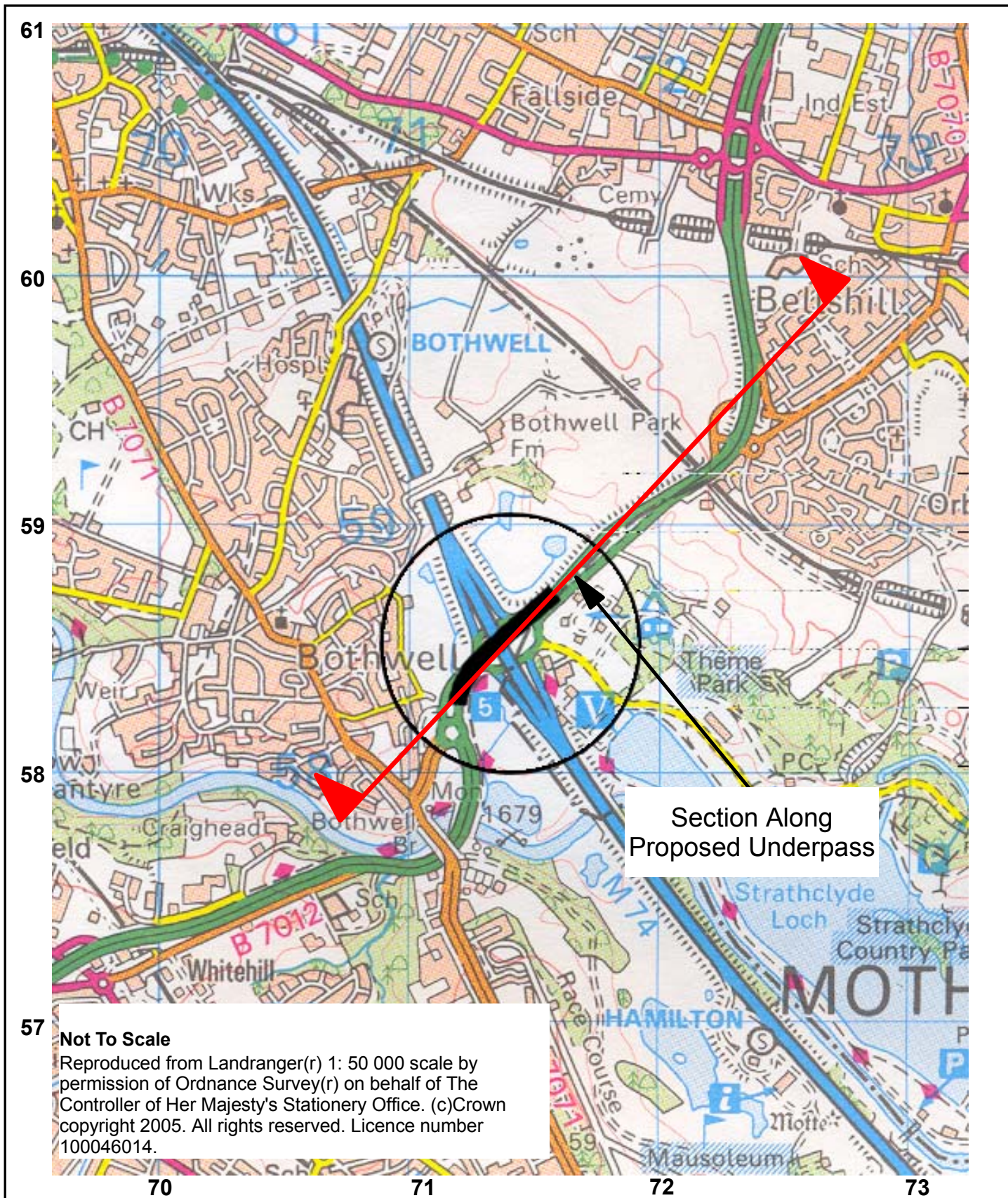
Note: Water Table immediately outside cut off wall is 16m OD

	Project: Junction 5 - M74 Raith	Drawing: Figure 6.4 (J05/267/248D)	Date: August 2006	
	Client: Mouchel Fairhurst JV	Description: Water table with cut-off penetrating wall to 7m OD	Drawn by: SDT	Checked by: LCP

Piezometric Levels (Chainage Section)



Project: Junction 5 - M74 Raith	Drawing: Figure 6.5 (J05/267/293D)		Date: March 2007	
	Client: Mouchel Fairhurst JV	Description: Dewatered groundwater level SW - NE section	Drawn by: JGG	Checked by: SDT



© Oxford Geotechnica International (UK) Ltd 2006

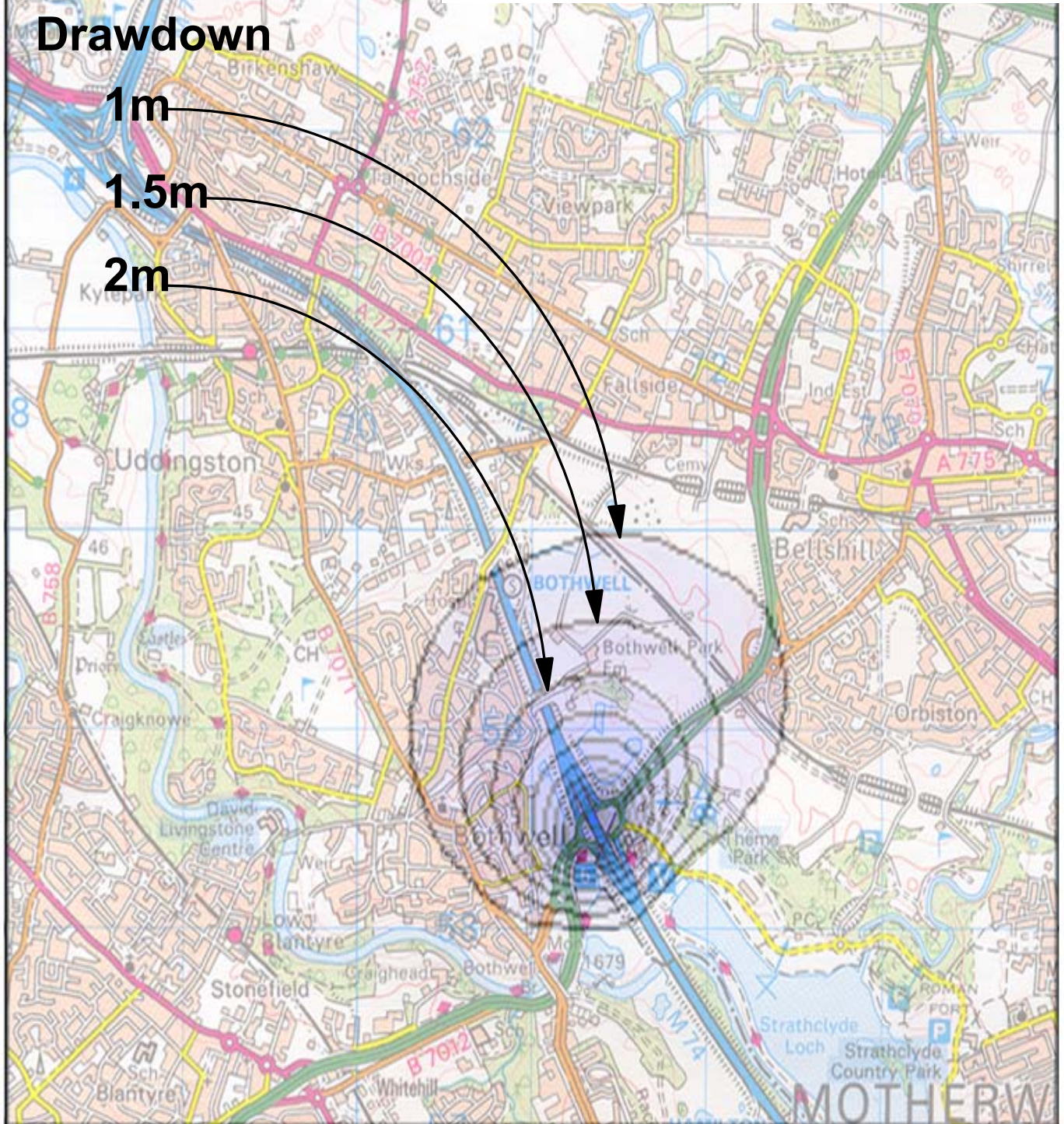


Project: Junction 5 - M74 Raith	Drawing: Figure 6.6 (J05/267/250D)	
	Description: Plan view of section along proposed unerpass	
	Date: August 2006	Drawn by: JGG

Predicted Piezometric Drawdown

Not To Scale

Reproduced from Landranger(r) 1: 50 000 scale by permission of Ordnance Survey(r) on behalf of The Controller of Her Majesty's Stationary Office. (c)Crown copyright 2005. All rights reserved. Licence number WL9029.



Piezometric head at excavation at 16m OD.

© Oxford Geotechnica International (UK) Ltd 2006



Groundwater
Specialists

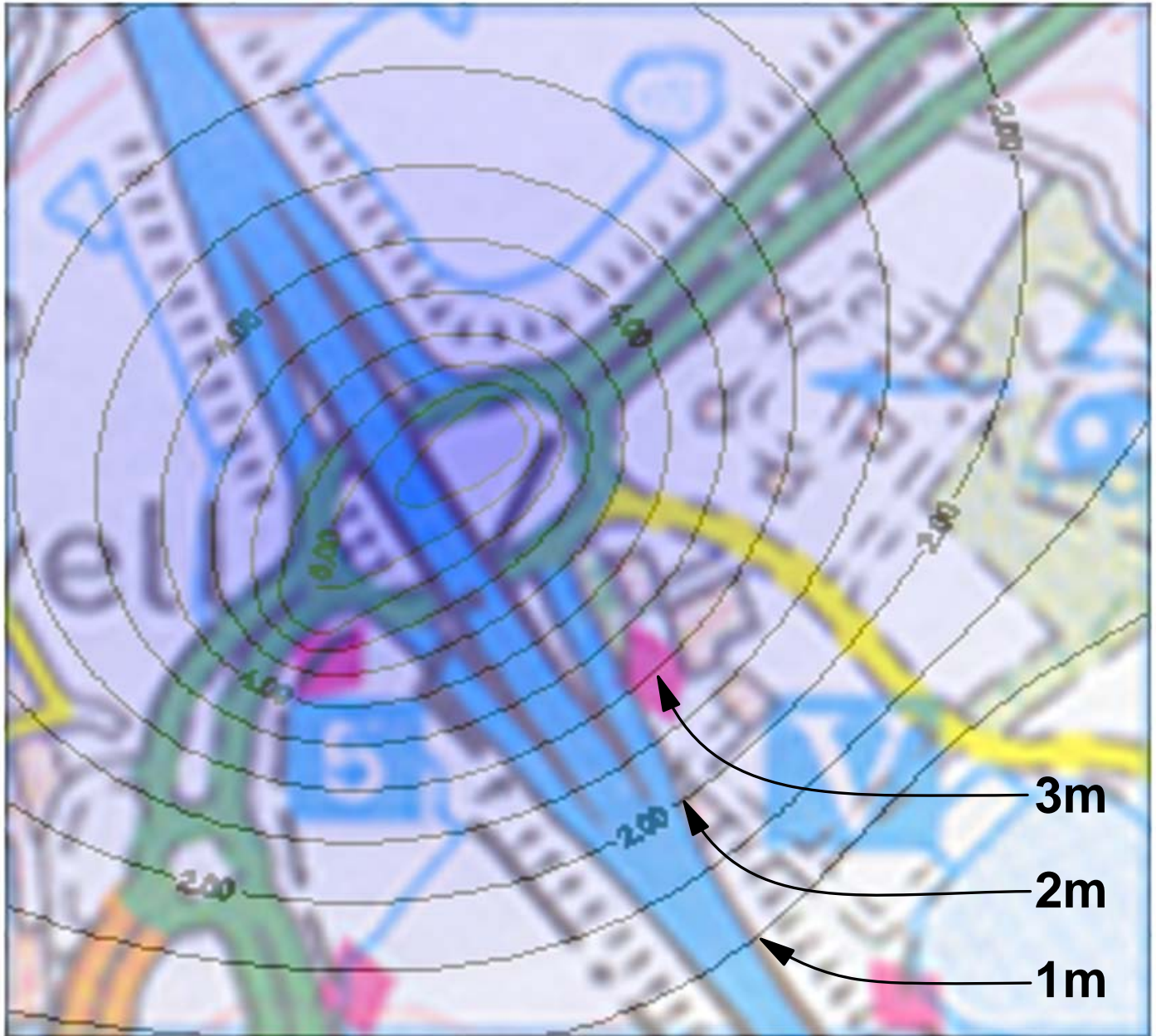
Project:	Junction 5 - M74 Raith	
Client:	Mouchel Fairhurst JV	
Date:	August 2006	

Drawing:	Figure 6.7 (J05/267/251D)	
Description:	Simulated drawdown	
Drawn by:	JGG	Checked by: SDT

Predicted Piezometric Drawdown

Not To Scale

Reproduced from Landranger(r) 1: 50 000 scale by permission of Ordnance Survey(r) on behalf of The Controller of Her Majesty's Stationery Office. (c)Crown copyright 2005. All rights reserved. Licence number 100046014.



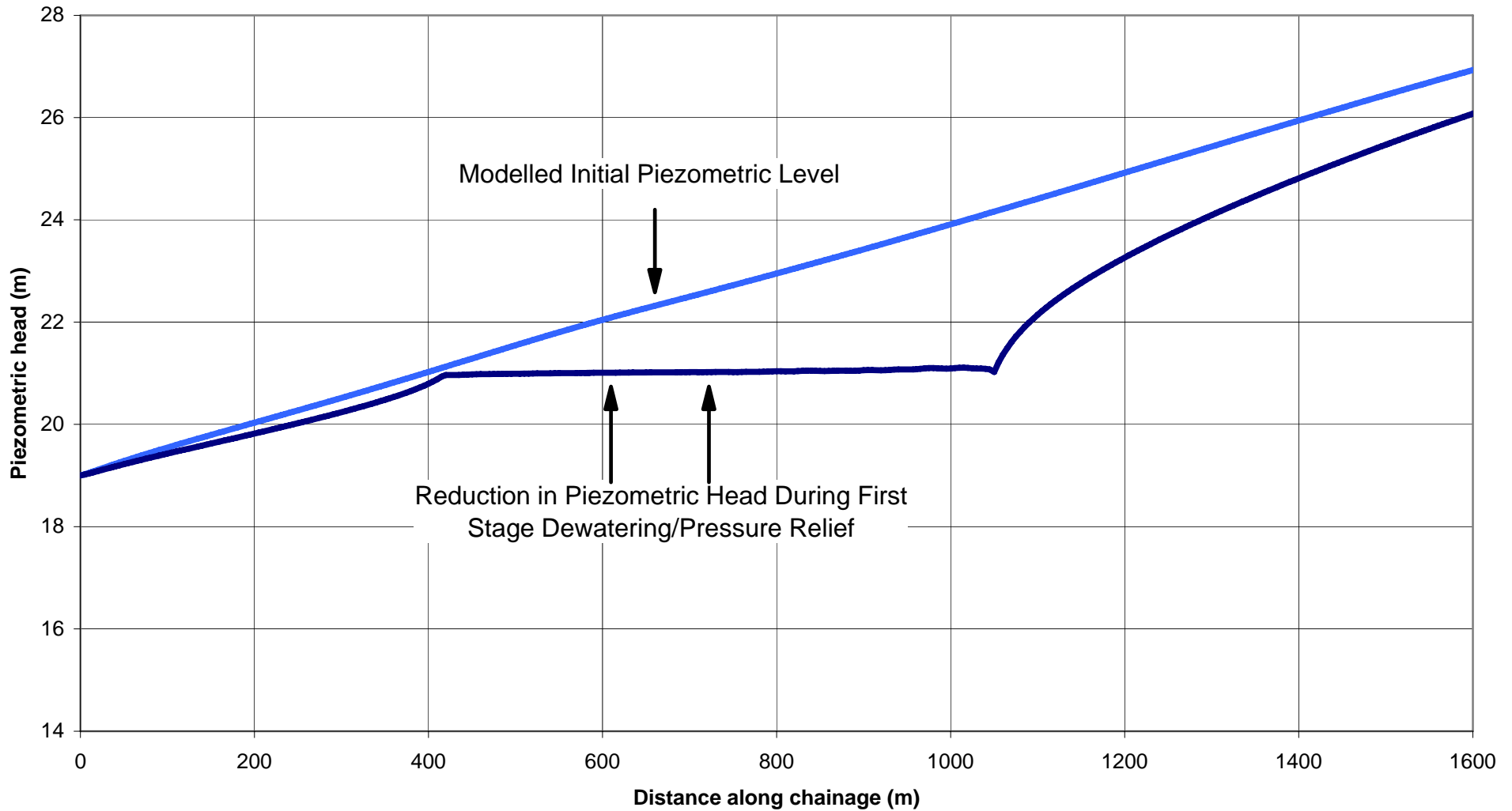
© OGI Groundwater Specialists 2007



Groundwater
Specialists

Project: Junction 5 - M74 Raith	Drawing: Figure 6.8 (J05/267/299D)	
	Description: Drawdown simulation for 14m OD inside excavation	
	Date: March 2007	Drawn by: JGG

Piezometric Levels (Chainage Section)



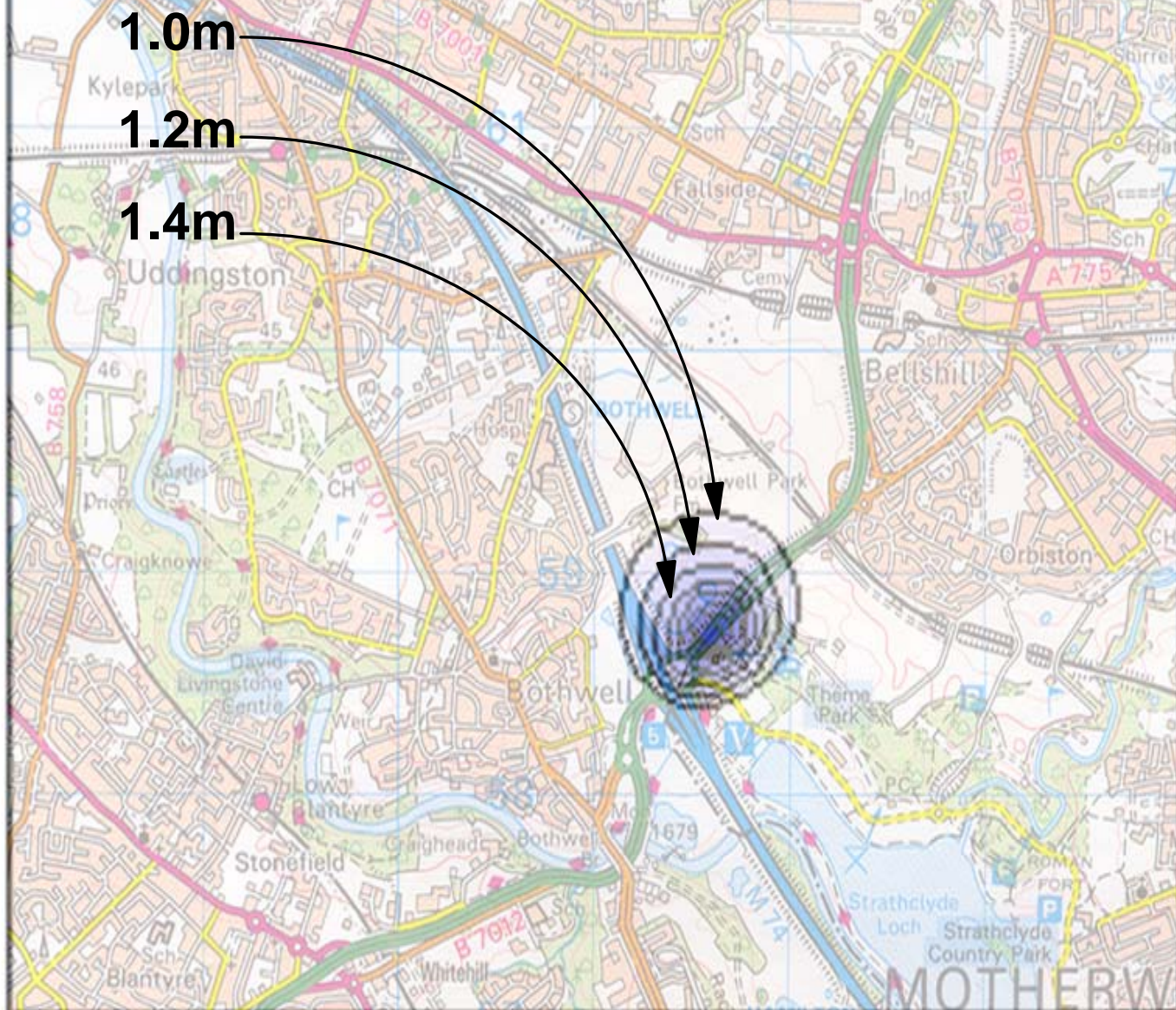
Groundwater Specialists

Project: Junction 5 - M74 Raith		Drawing: Figure 6.9 (J05/267/294D)		Date: March 2007	
Client: Mouchel Fairhurst JV		Description: Artesian pressure relief SW-NE along underpass		Drawn by: JGG	Checked by: SDT

Not To Scale

Reproduced from Landranger(r) 1: 50 000 scale by permission of Ordnance Survey(r) on behalf of The Controller of Her Majesty's Stationary Office. (c)Crown copyright 2005. All rights reserved. Licence number WL9029.

Simulated Reduction in Artesian Pressure Head Due to First Stage Dewatering and Artesian Pressure Relief



© OGI Groundwater Specialists Limited 2007



Groundwater
Specialists

Project:
Junction 5 - M74
Raith

Client:
Mouchel Fairhurst JV

Date:
March 2007

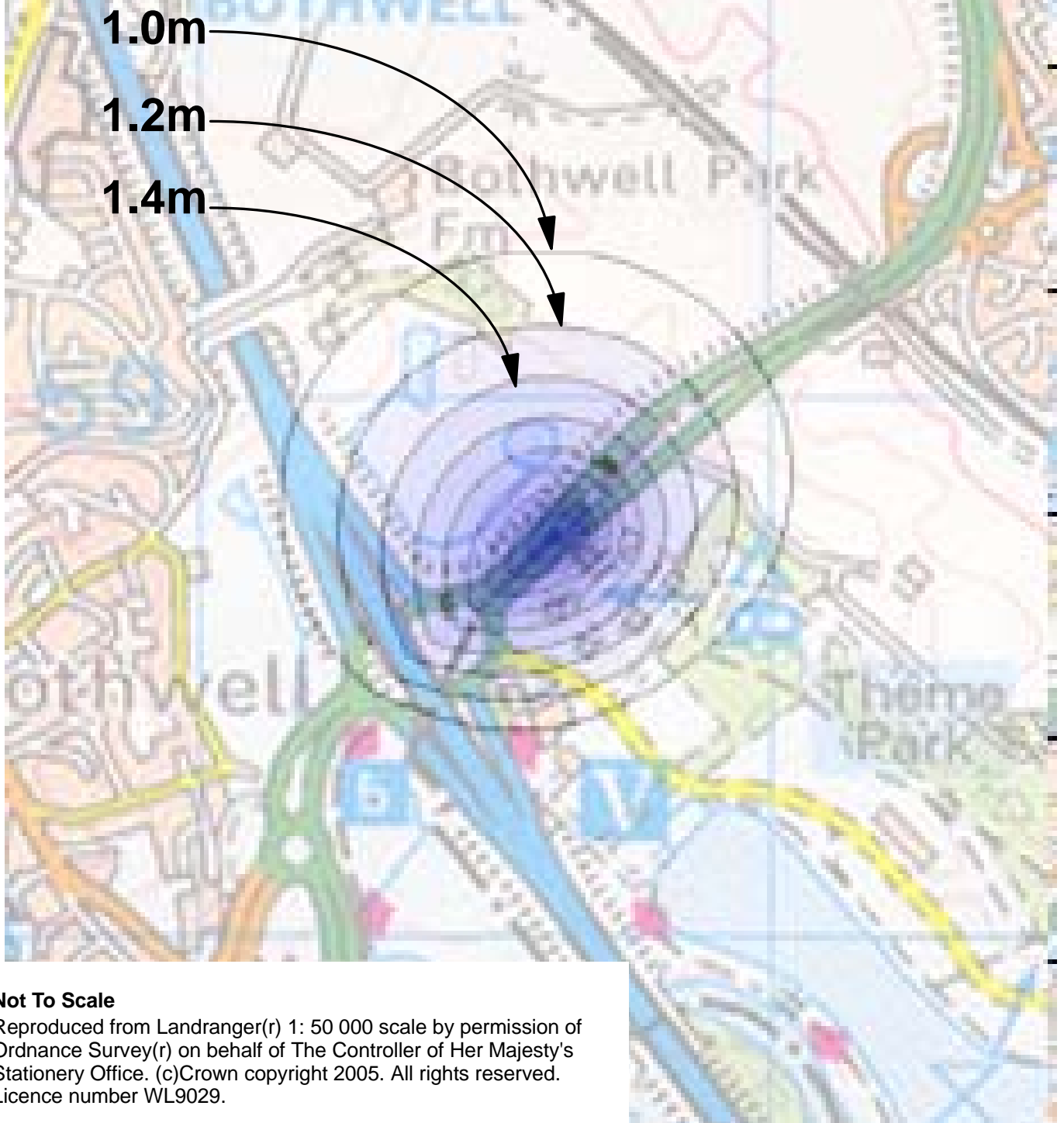
Drawing:
Figure 6.10
(J05/267/295D)

Description:
Simulated reduction in
artesian pressure head

Drawn by:
JGG

Checked by:
SDT

Simulated Reduction in Artesian Pressure Head Due to First Stage Dewatering and Artesian Pressure Relief



Not To Scale

Reproduced from Landranger(r) 1: 50 000 scale by permission of Ordnance Survey(r) on behalf of The Controller of Her Majesty's Stationery Office. (c)Crown copyright 2005. All rights reserved. Licence number WL9029.

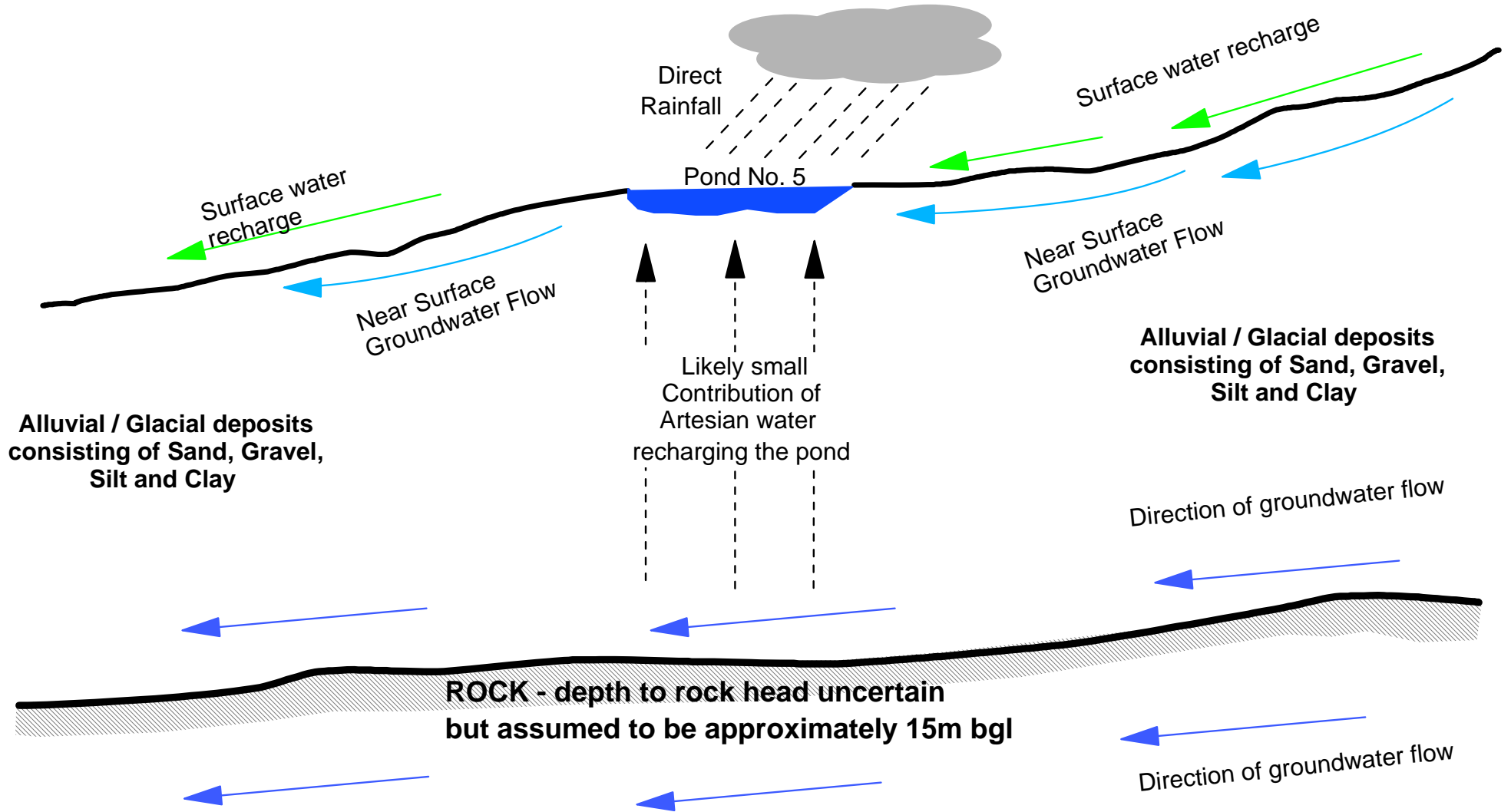
© OGI Groundwater Specialists 2007



Groundwater Specialists

Project: Junction 5 - M74 Raith	Drawing: Figure 6.11 (J05/267/296D)	
	Description: Simulated reduction in artesian pressure head	
	Date: March 2007	Drawn by: JGG

Conceptual model of the groundwater and surface water flow recharging at Pond No. 5



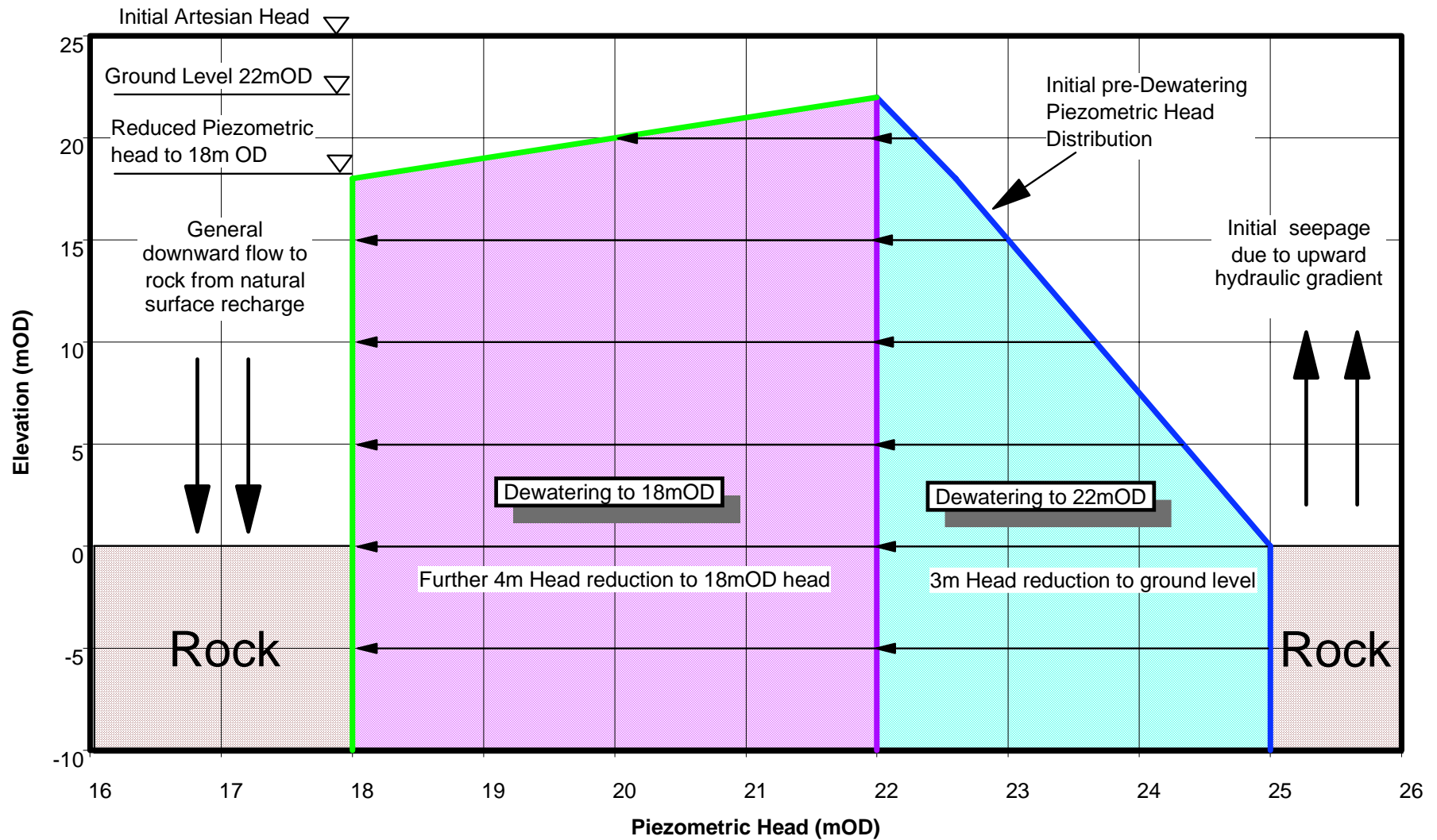
Not to Scale



Groundwater Specialists

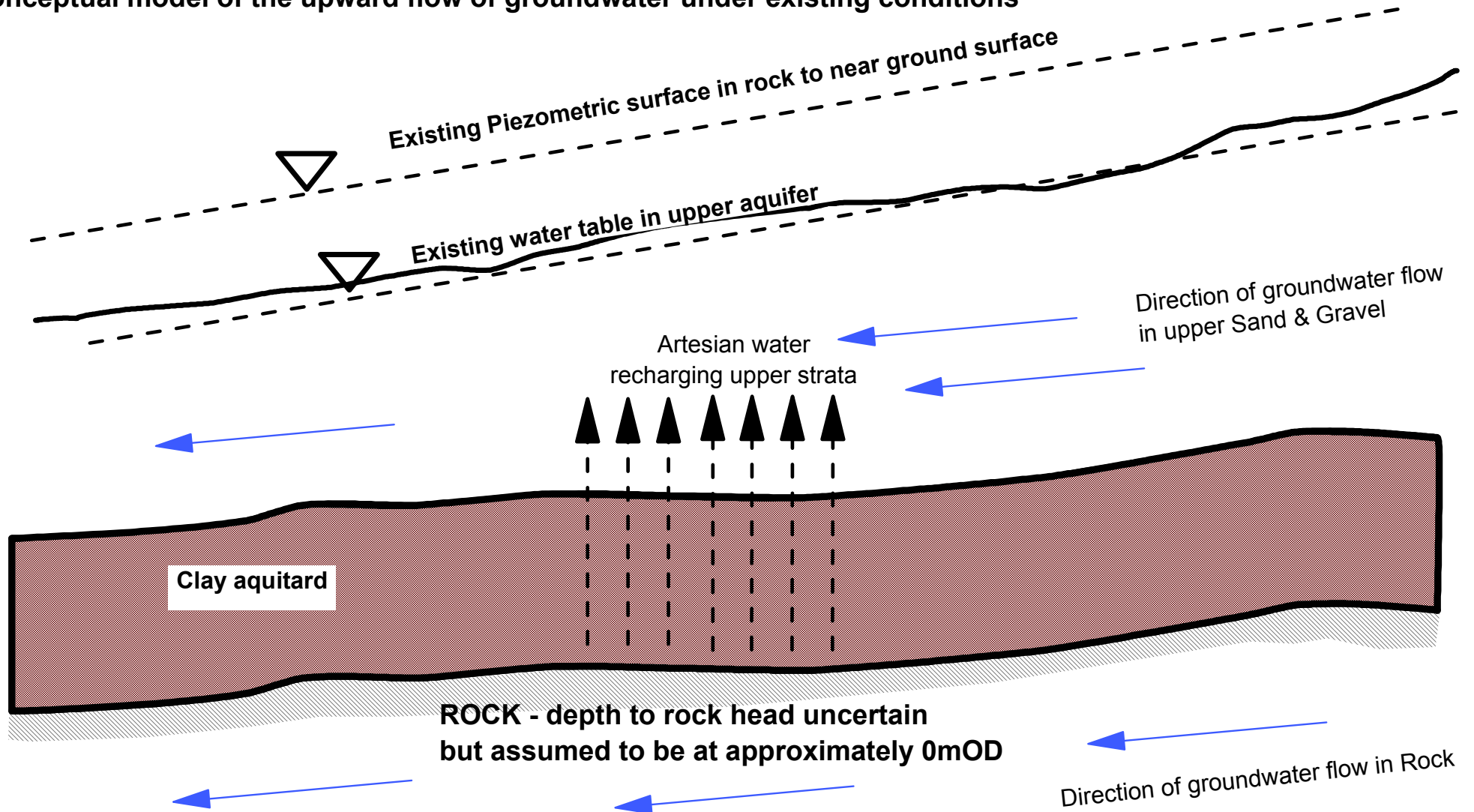
Project: Junction 5 - M74 Raith	Drawing: Figure 6.12 J05/267/275D	Date: February 2007
Client: Mouchel Fairhurst JV	Description: Conceptual model at Pond No.5	Drawn by: SDT Checked by: JGG

Pre-Construction & during Dewatering Piezometric Head



Project: Junction 5 - M74 Raith	Drawing: Figure 7.1 (J05/267/297D)	Date: March 2007	
Client: Mouchel Fairhurst JV	Description: Piezometric head during dewatering	Drawn by: SDT	Checked by: DJF

Conceptual model of the upward flow of groundwater under existing conditions



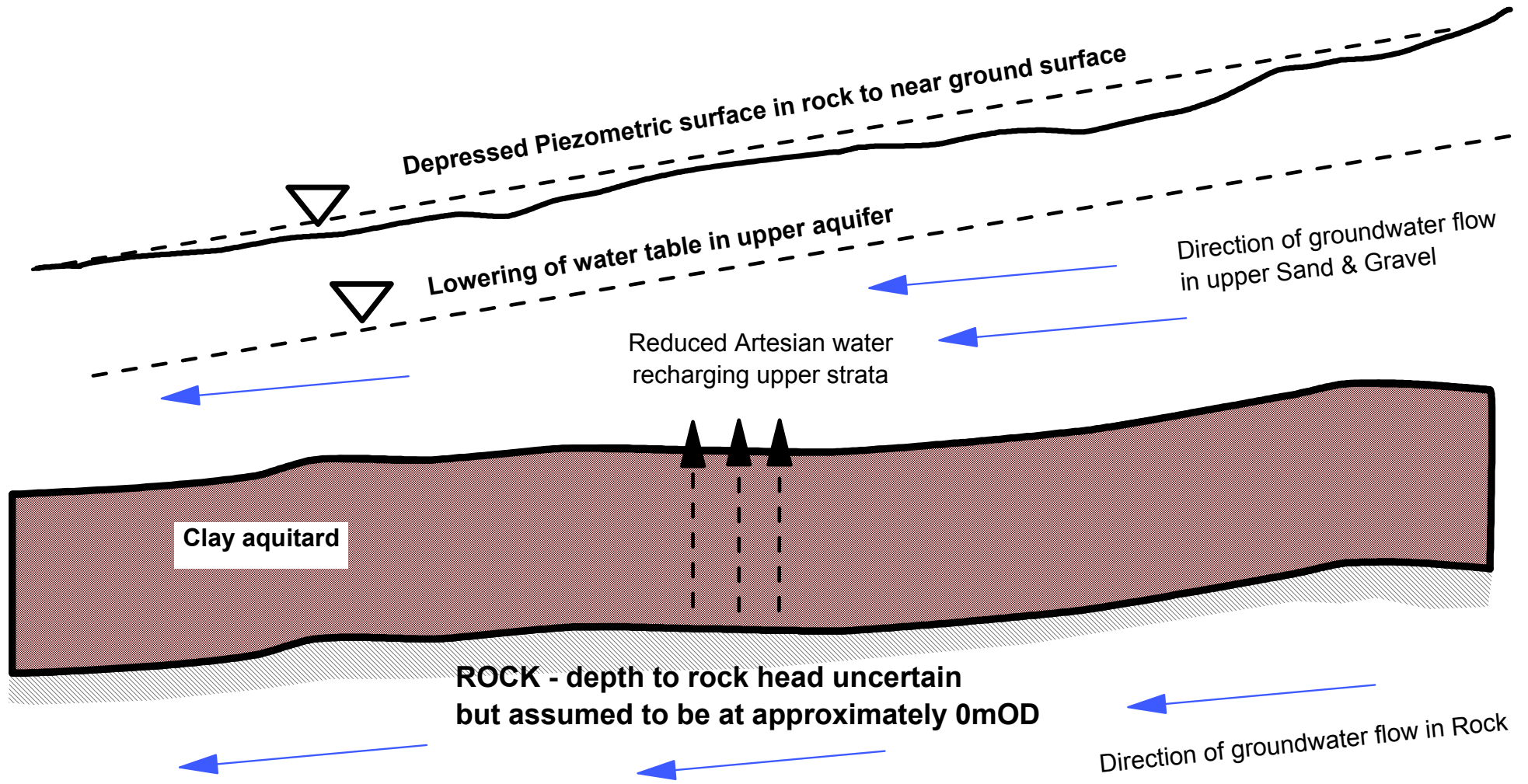
Not to Scale



Groundwater Specialists

Project: Junction 5 - M74 Raith	Drawing: Figure 7.2 (J05/267/258D)	Date: August 2006		
Client: Mouchel Fairhurst JV	Description: Conceptual model of existing conditions at north of site	<table border="1"> <tr> <td>Drawn by: SDT</td> <td>Checked by: DJF</td> </tr> </table>	Drawn by: SDT	Checked by: DJF
Drawn by: SDT	Checked by: DJF			

Conceptual model of the upward flow of groundwater under dewatering conditions

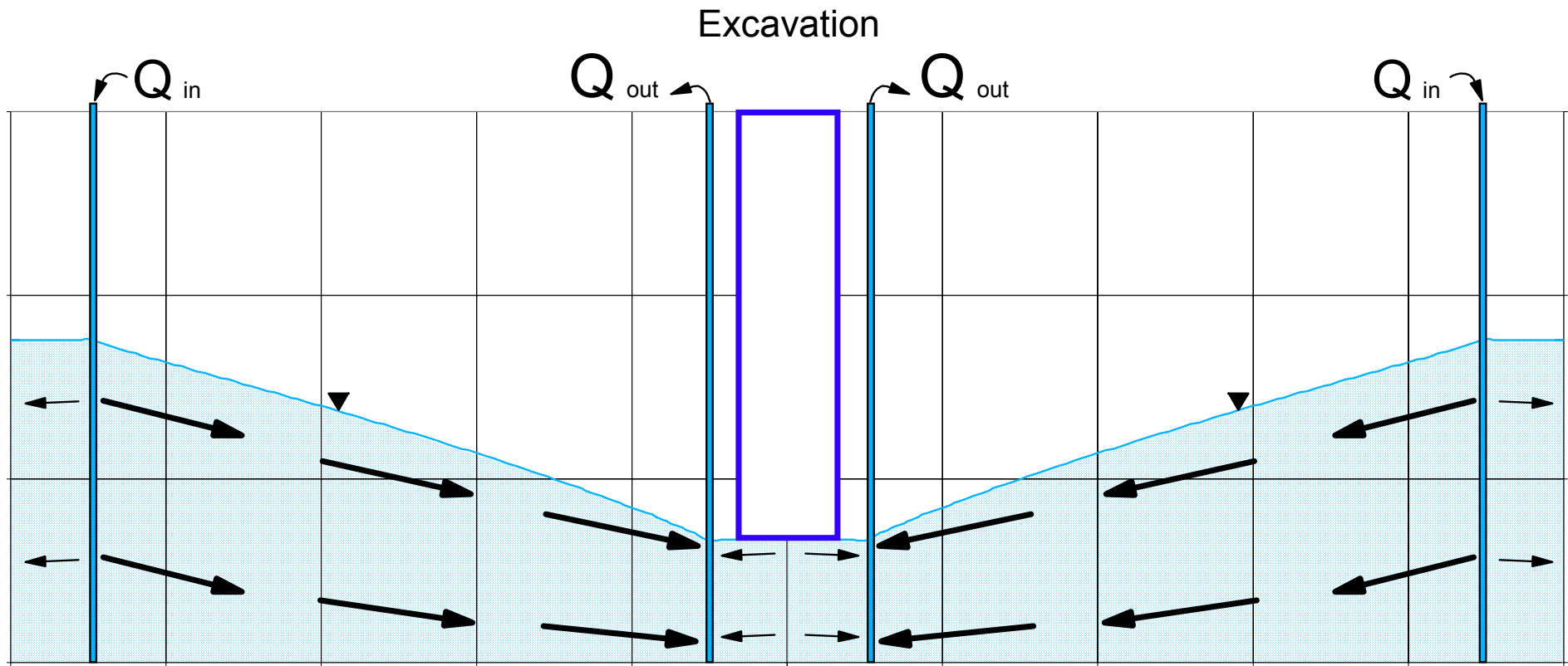


Not to Scale



Groundwater Specialists

Project: Junction 5 - M74 Raith	Drawing: Figure 7.3 (J05/267/259D)	Date: August 2006		
Client: Mouchel Fairhurst JV	Description: Conceptual model at north of site	<table border="1"> <tr> <td>Drawn by: SDT</td> <td>Checked by: DJF</td> </tr> </table>	Drawn by: SDT	Checked by: DJF
Drawn by: SDT	Checked by: DJF			

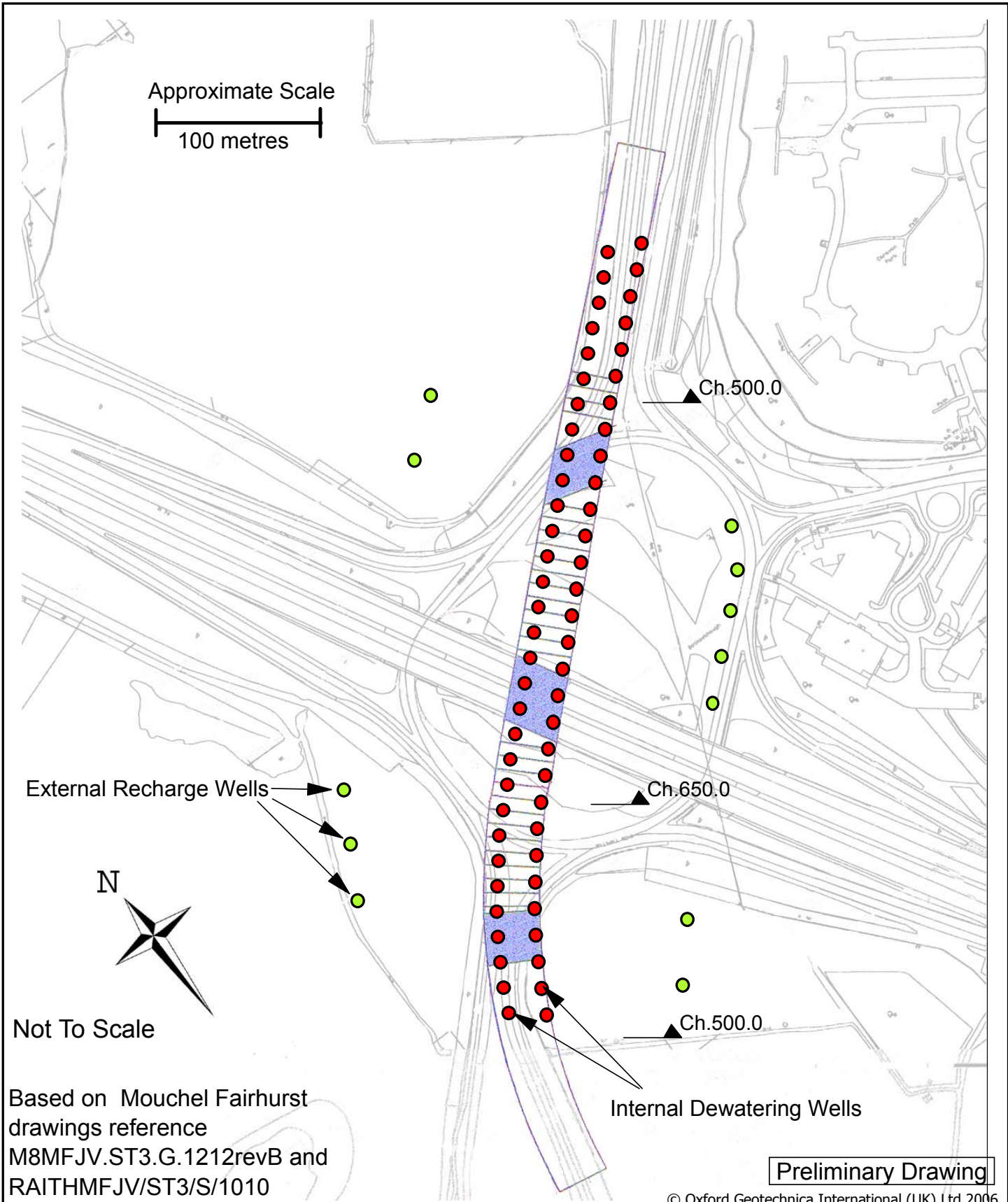


Not to Scale



Groundwater Specialists

Project: Junction 5 - M74 Raith	Drawing: Figure 7.4 (J05/267/260D)	Date: August 2006	
Client: Mouchel Fairhurst JV	Description: Schematic of recharge system	Drawn by: LCP	Checked by: SDT



Project:
Junction 5 - M74
Raith

Client:
Mouchel Fairhurst JV

Date:
August 2006

Drawing:
Figure 7.5
(Ref:J05/267/261D)

Description:
Possible location of dewatering
and external recharge wells

Drawn by:
SDT

Checked by:
JGG