



Dames & Moore  
Woodward Clyde

26 June 2001  
Project No. 46104.001

Hytech Sands  
Roberts Road  
MAROOTA NSW 2756

Attention: Mr Ross Davidson  
Director

Dear Doc,

Subject: June Semester Data Loggers Downloading

Attached are the plots of the groundwater level recorded in the bores at your Maroota property in the semester ending on the 20<sup>th</sup> June, 2001.

Since January 2001, Bores PT84MW1 and PT84MW3 have registered a steady rise in water level in response to the higher rainfall experienced in the first half of the year.

The graphs indicate that the water level decline observed in the previous semester halted as the aquifer storage was being replenished and then steadily rose following the rainfall pattern.

The fluctuations in water level in bore PT84MW1, near the nursery, experienced a slightly greater range of fluctuations than PT84MW3, near the plant and the supply dam.

This behaviour was reported in our letter dated the 11<sup>th</sup> July 2000 and again in October 2000, indicating the smaller aquifer storage at the perched water table around PT84MW1.

Table 1 (attached) presents a summary of the recorded field chemical parameters measurements. There are no unexpected results from this table, and the increased rainfall infiltration and recharge to the aquifer is reflected in the lower Electrical Conductivity and pH values.

The next downloading event will be in December 2001.

I trust the above meets with your approval.

Yours sincerely,  
URS AUSTRALIA PTY LTD  
(incorporating Dames & Moore and Woodward Clyde)

*Fabio Carosone*

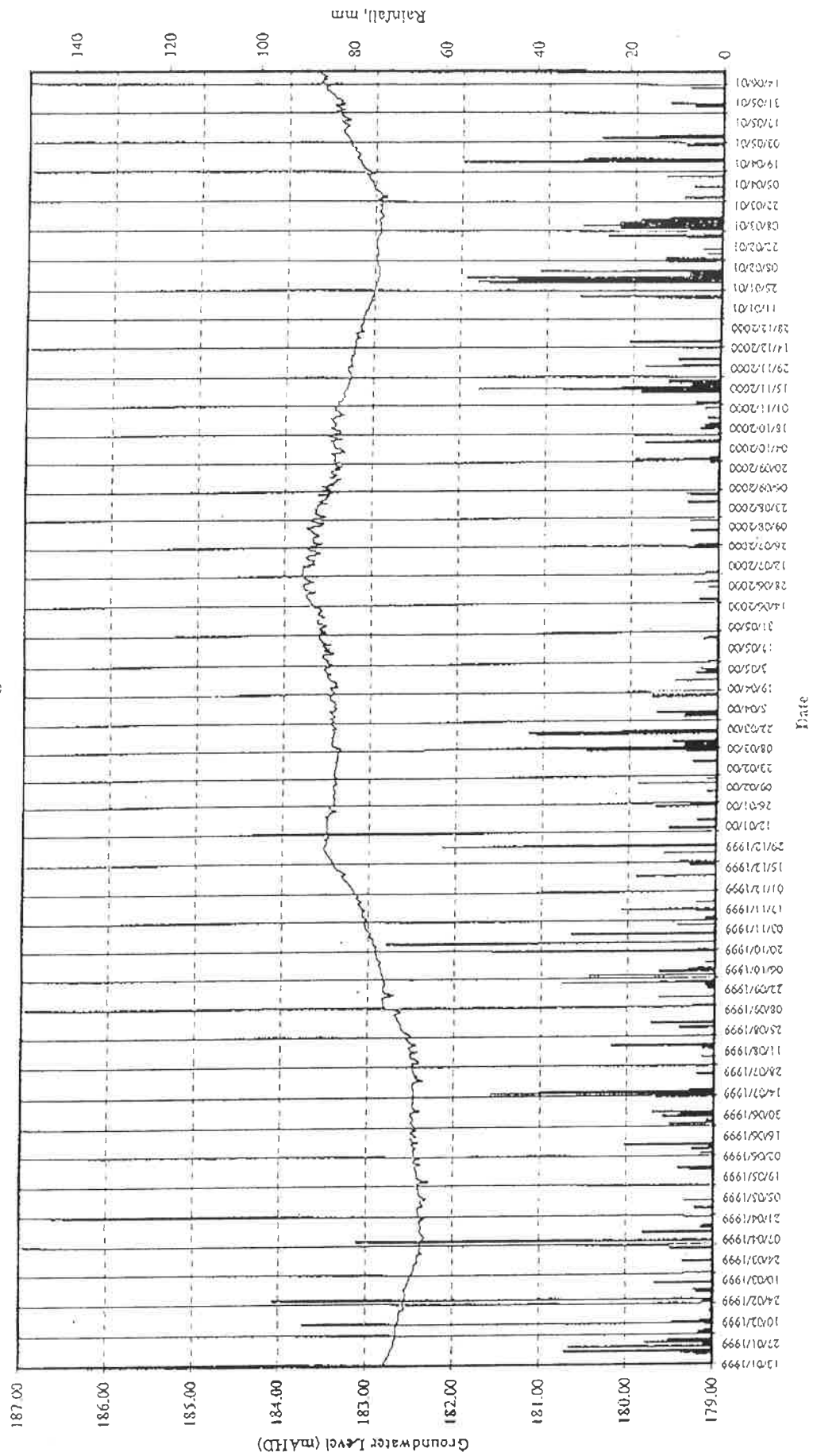
Fabio Carosone  
Associate, Hydrogeologist

*Don McKidd*  
Dfpt Land & Water Comm.

9895 7875



Hytech Sands, Lot 1 DP228308  
Groundwater Monitoring Bore PT84MW3



Hytech Sands, Lot 2, DP225306  
Groundwater Monitoring Bore PT84MW1

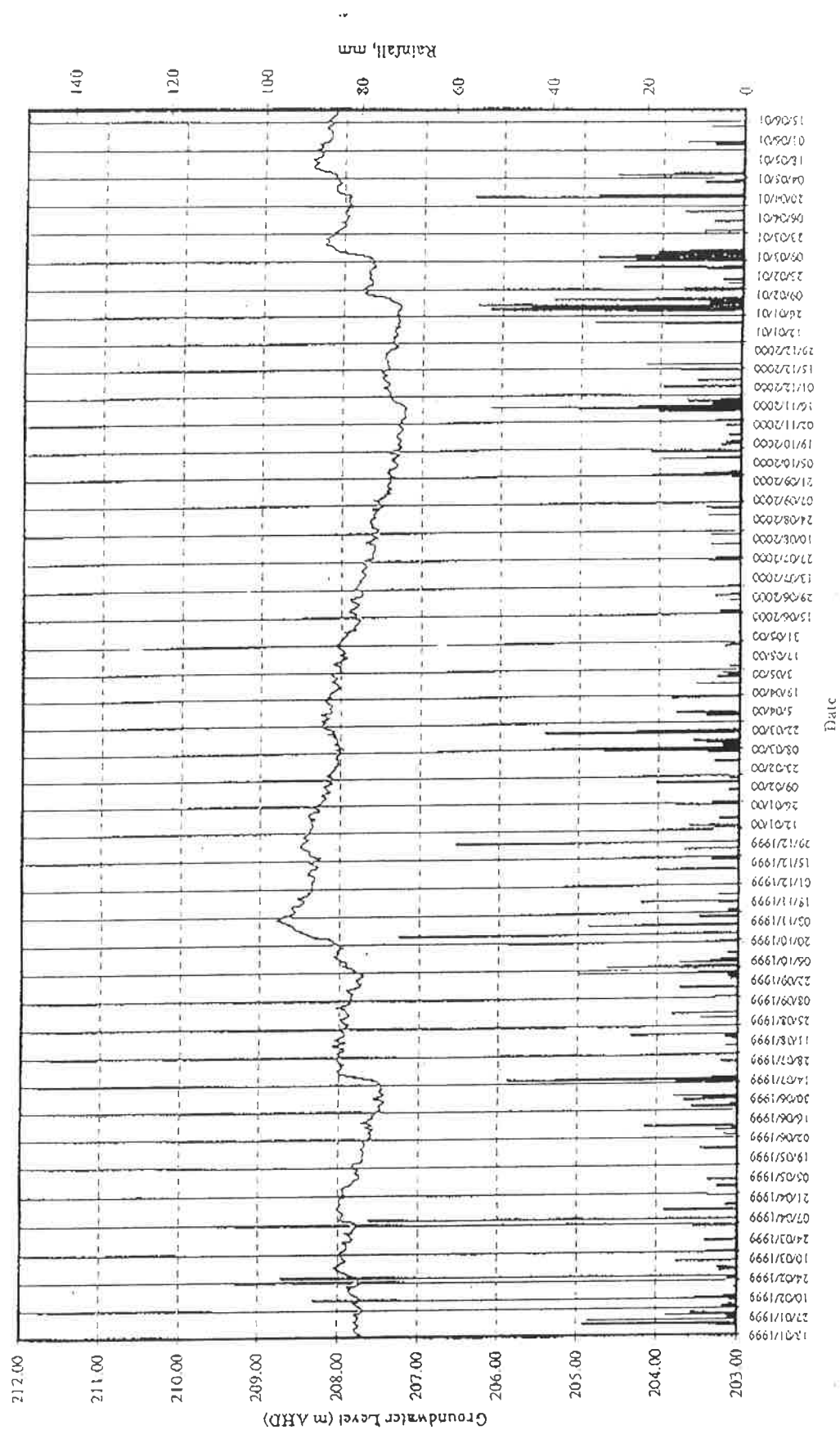


TABLE 1 - HYTECH SANDS, MAROOTA. FIELD MEASUREMENTS SUMMARY

| Bore    | Aquifer | Date       | pH             | EC<br>μS/cm | TDS<br>mg/L | SWL<br>m b TOC | TOC<br>m AHD | SWL<br>m AHD |
|---------|---------|------------|----------------|-------------|-------------|----------------|--------------|--------------|
| PT84MW1 | M.S.    | 23.10.1998 | 4.96*          | 246*        | 186*        | 5.05           | 214.24       | 209.19       |
| PT84MW1 | M.S.    | 29.10.1998 |                |             |             | 6.15           | 214.24       | 208.09       |
| PT84MW1 | M.S.    | 13.1.1999  |                |             |             | 6.43           | 214.24       | 207.81       |
| PT84MW1 | M.S.    | 11.2.1999  |                |             |             | 6.51           | 214.24       | 207.73       |
| PT84MW1 | M.S.    | 9.9.1999   | 4.13           | 326         | 196         | 6.37           | 214.24       | 207.87       |
| PT84MW1 | M.S.    | 22.12.1999 | 5              | 341         | 205         | 6.00           | 214.24       | 208.24       |
| PT84MW1 | M.S.    | 10.3.2000  | 3.88*          | 335*        | 242*        | 5.52           | 214.24       | 208.72       |
| PT84MW1 | M.S.    | 6.6.2000   | 3.90           | 275         | 165         | 6.33           | 214.24       | 207.91       |
| PT84MW1 | M.S.    | 29.9.2000  | 4.44           | 405         | 243         | 6.81           | 214.24       | 207.43       |
| PT84MW1 | M.S.    | 29.11.2000 | 4.38           | 340         | 204         | 6.80           | 214.24       | 207.44       |
| PT84MW1 | M.S.    | 21.6.01    | 3.88           | 253         | 152         | 6.09           | 214.24       | 208.15       |
| PT84MW2 | M.S.    | 23.10.1998 |                |             |             | 25.00          | 227.63       | 202.63       |
| PT84MW2 | M.S.    | 29.10.1998 |                |             |             | 25.35          | 227.63       | 202.28       |
| PT84MW2 | M.S.    | 13.1.1999  |                |             |             | 25.43          | 227.63       | 202.20       |
| PT84MW2 | M.S.    | 11.2.1999  |                |             |             | 25.49          | 227.63       | 202.14       |
| PT84MW2 | M.S.    | 9.9.1999   |                |             |             | 25.43          | 227.63       | 202.20       |
| PT84MW2 | M.S.    | 22.12.1999 |                |             |             |                | 227.63       |              |
| PT84MW2 | M.S.    | 10.3.2000  | 6.1*           | 543*        | 530*        | 24.55          | 227.63       | 203.08       |
| PT84MW3 | M.S.    | 23.10.1998 | 5.88*          | 381*        | 266*        | 19.61          | 203.25       | 183.64       |
| PT84MW3 | M.S.    | 29.10.1998 |                |             |             | 18.84          | 203.25       | 184.41       |
| PT84MW3 | M.S.    | 13.1.1999  |                |             |             | 20.40          | 203.25       | 182.85       |
| PT84MW3 | M.S.    | 11.2.1999  |                |             |             | 20.58          | 203.25       | 182.67       |
| PT84MW3 | M.S.    | 9.9.1999   | 4.64           | 134         | 80          | 20.43          | 203.25       | 182.82       |
| PT84MW3 | M.S.    | 22.12.1999 |                | 138         | 83          | 19.88          | 203.25       | 183.37       |
| PT84MW3 | M.S.    | 10.3.2000  | 4.51*          | 139*        | 97*         | 19.83          | 203.25       | 183.42       |
| PT84MW3 | M.S.    | 6.6.2000   | 4.80           | 160         | 96          | 19.65          | 203.25       | 183.60       |
| PT84MW3 | M.S.    | 29.9.2000  | 4.35           | 159         | 95          | 19.82          | 203.25       | 183.43       |
| PT84MW3 | M.S.    | 29.11.2000 | 5.24           | 159         | 95          | 19.95          | 203.25       | 183.30       |
| PT84MW3 | M.S.    | 21.6.01    | 4.57           | 139         | 83          | 19.53          | 203.25       | 183.72       |
| PT84PB1 | H.S.    | 19.8.1999  |                |             | 60          | 14.80          | 193.51       | 178.71       |
| PT84PB2 | H.S.    | 19.8.1999  | To be surveyed |             |             | 50             | 212.50       | 161.00       |
| PT84PB2 | H.S.    | 18.3.2000  |                |             |             | 48.38          | 212.00       | 163.62       |
| PT84PB2 | H.S.    | 6.6.2000   |                |             |             | 46.72          | 212.50       | 165.78       |
| PT84PB2 | H.S.    | 29.9.2000  | 4.74           | 154         | 92          | 46.09          | 212.50       | 166.41       |
| PT84PB2 | H.S.    | 29.11.2000 | 4.08           | 134         | 80          | 44.91          | 212.50       | 167.59       |
| PT84PB2 | H.S.    | 21.6.01    | **             | **          | **          | 43.00          | 212.50       | 169.50       |

212.5 = estimated from contour plan

M.S. = Maroota Sand

H.S. = Hawkesbury Sandstone

\* = laboratory measurements

\*\* = data logger no longer operational



17 January 2002  
Project No. 50541.001

Hodgson Contracting Services  
PO BOX 1470  
GOSFORD NSW 2250

Attention: Mr Ralph Betts  
Director

Dear Ralph,

**Subject: December 2001 Semester Data Loggers Downloading**

Attached are the plots of the groundwater level recorded in the bores at your Maroota property in the semester ending on the 19<sup>th</sup> December, 2001.

Since June 2001, Bores PT84MW1 has registered a steady decline in water level in response to the below average rainfall experienced in the second half of the year. This bore is shallow and displays a rapid response to the rainfall pattern, as shown in the attached water level and rainfall plot.

During the same period, bore PT84MW3 continued the steady rise begun in March 2001, following substantial rainfall, up to the end of August to then decline in the same fashion as the other bore. This delayed response is explained by the greater depth of this bore and by the greater storage in the aquifer in its proximity.

Table 1 (attached) presents a summary of the recorded field chemical parameters measurements. There are no unexpected results from this table, and the reduced rainfall infiltration and recharge to the aquifer is reflected in the marginally higher Electrical Conductivity values.

The next downloading event will be in June 2002.

I trust the above meets with your approval.

Yours sincerely,  
**URS AUSTRALIA PTY LTD**  
(incorporating Dames & Moore and Woodward Clyde)

Dr Fabio Carosone  
Associate, Hydrogeologist

URS Australia Pty Ltd (ACN 000 691 690)  
Dames & Moore Pty Ltd (ACN 003 293 696)  
Level 3, 116 Miller Street  
North Sydney, NSW 2060 Australia  
Tel: 61 2 8925 5500  
Fax: 61 2 8925 5555



Hodgson Contracting Services, Lot 2, DP228308, Maroota  
Groundwater Monitoring Bore PT84MW1

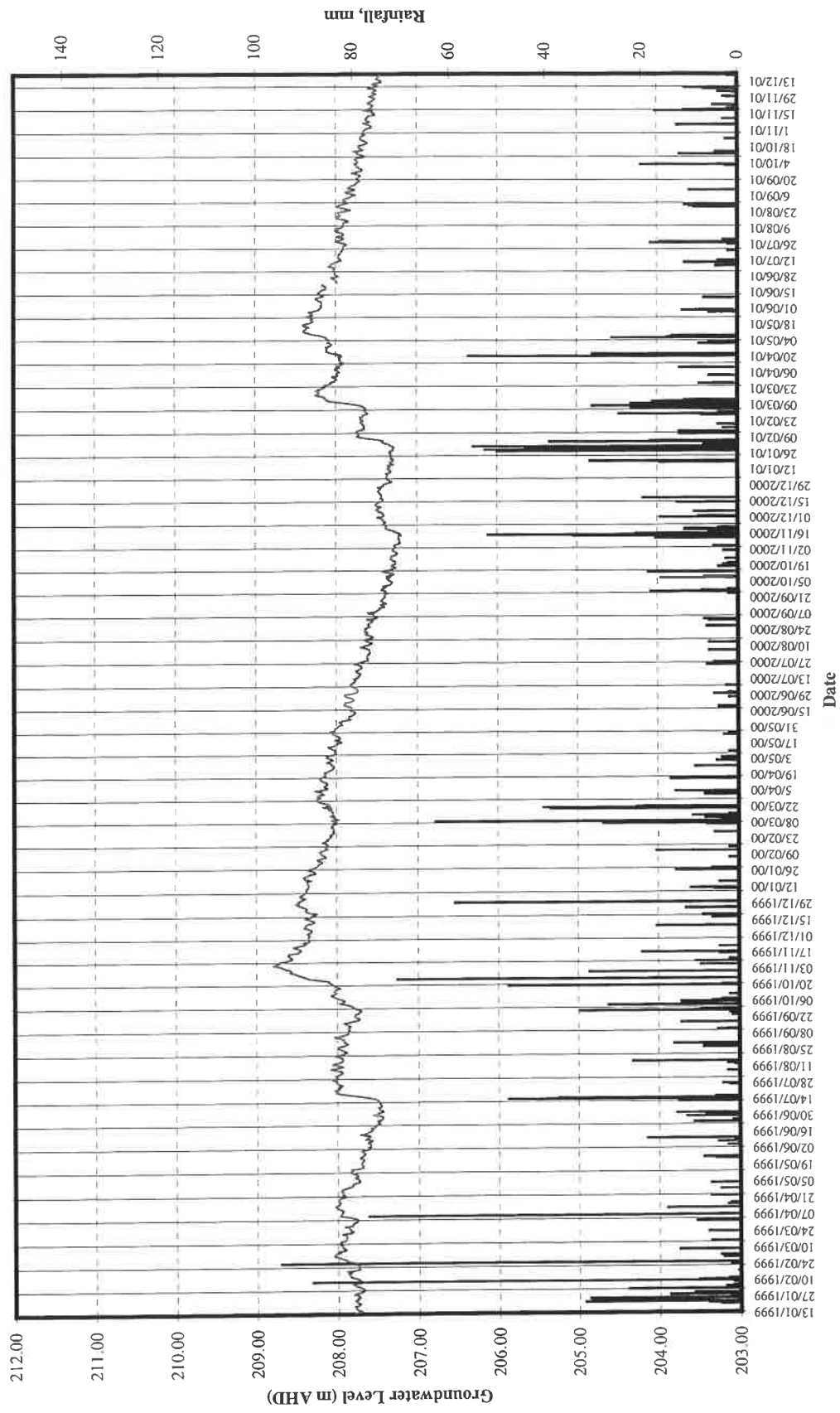


TABLE 1 -

## HODGSON CONTRACTING SERVICES, MAROOTA. FIELD MEASUREMENTS

| Bore    | Aquifer | Date       | pH             | EC<br>μS/cm | TDS<br>mg/L | SWL<br>m b.TOC | TOC<br>m AHD | SWL<br>m AHD |
|---------|---------|------------|----------------|-------------|-------------|----------------|--------------|--------------|
| PT84MW1 | M.S.    | 23.10.1998 | 4.96*          | 246*        | 186*        | 5.05           | 214.24       | 209.19       |
| PT84MW1 | M.S.    | 29.10.1998 |                |             |             | 6.15           | 214.24       | 208.09       |
| PT84MW1 | M.S.    | 13.1.1999  |                |             |             | 6.43           | 214.24       | 207.81       |
| PT84MW1 | M.S.    | 11.2.1999  |                |             |             | 6.51           | 214.24       | 207.73       |
| PT84MW1 | M.S.    | 9.9.1999   | 4.13           | 326         | 196         | 6.37           | 214.24       | 207.87       |
| PT84MW1 | M.S.    | 22.12.1999 | 5              | 341         | 205         | 6.00           | 214.24       | 208.24       |
| PT84MW1 | M.S.    | 10.3.2000  | 3.88*          | 335*        | 242*        | 5.52           | 214.24       | 208.72       |
| PT84MW1 | M.S.    | 6.6.2000   | 3.90           | 275         | 165         | 6.33           | 214.24       | 207.91       |
| PT84MW1 | M.S.    | 29.9.2000  | 4.44           | 405         | 243         | 6.81           | 214.24       | 207.43       |
| PT84MW1 | M.S.    | 29.11.2000 | 4.38           | 340         | 204         | 6.80           | 214.24       | 207.44       |
| PT84MW1 | M.S.    | 21.6.01    | 3.88           | 253         | 152         | 6.09           | 214.24       | 208.15       |
| PT84MW1 | M.S.    | 19.12.01   | 3.84           | 320         | 213         | 6.78           | 214.24       | 207.46       |
| PT84MW2 | M.S.    | 23.10.1998 |                |             |             | 25.00          | 227.63       | 202.63       |
| PT84MW2 | M.S.    | 29.10.1998 |                |             |             | 25.35          | 227.63       | 202.28       |
| PT84MW2 | M.S.    | 13.1.1999  |                |             |             | 25.43          | 227.63       | 202.20       |
| PT84MW2 | M.S.    | 11.2.1999  |                |             |             | 25.49          | 227.63       | 202.14       |
| PT84MW2 | M.S.    | 9.9.1999   |                |             |             | 25.43          | 227.63       | 202.20       |
| PT84MW2 | M.S.    | 22.12.1999 | -              | -           |             |                | 227.63       |              |
| PT84MW2 | M.S.    | 10.3.2000  | 6.1*           | 543*        | 530*        | 24.55          | 227.63       | 203.08       |
| PT84MW3 | M.S.    | 23.10.1998 | 5.88*          | 381*        | 266*        | 19.61          | 203.25       | 183.64       |
| PT84MW3 | M.S.    | 29.10.1998 |                |             |             | 18.84          | 203.25       | 184.41       |
| PT84MW3 | M.S.    | 13.1.1999  |                |             |             | 20.40          | 203.25       | 182.85       |
| PT84MW3 | M.S.    | 11.2.1999  |                |             |             | 20.58          | 203.25       | 182.67       |
| PT84MW3 | M.S.    | 9.9.1999   | 4.64           | 134         | 80          | 20.43          | 203.25       | 182.82       |
| PT84MW3 | M.S.    | 22.12.1999 | -              | 138         | 83          | 19.88          | 203.25       | 183.37       |
| PT84MW3 | M.S.    | 10.3.2000  | 4.51*          | 139*        | 97*         | 19.83          | 203.25       | 183.42       |
| PT84MW3 | M.S.    | 6.6.2000   | 4.80           | 160         | 96          | 19.65          | 203.25       | 183.60       |
| PT84MW3 | M.S.    | 29.9.2000  | 4.35           | 159         | 95          | 19.82          | 203.25       | 183.43       |
| PT84MW3 | M.S.    | 29.11.2000 | 5.24           | 159         | 95          | 19.95          | 203.25       | 183.30       |
| PT84MW3 | M.S.    | 21.6.01    | 4.57           | 139         | 83          | 19.53          | 203.25       | 183.72       |
| PT84MW3 | M.S.    | 19.12.01   | 4.49           | 191         | 122         | 19.41          | 203.25       | 183.84       |
| PT84PB1 | H.S.    | 19.8.1999  |                |             | 60          | 14.80          | 193.51       | 178.71       |
| PT84PB2 | H.S.    | 19.8.1999  | To be surveyed |             | 50          | 51.50          | 212.50       | 161.00       |
| PT84PB2 | H.S.    | 18.3.2000  |                |             |             | 48.38          | 212.00       | 163.62       |
| PT84PB2 | H.S.    | 6.6.2000   |                |             |             | 46.72          | 212.50       | 165.78       |
| PT84PB2 | H.S.    | 29.9.2000  | 4.74           | 154         | 92          | 46.09          | 212.50       | 166.41       |
| PT84PB2 | H.S.    | 29.11.2000 | 4.08           | 134         | 80          | 44.91          | 212.50       | 167.59       |
| PT84PB2 | H.S.    | 21.6.01    | **             | **          | **          | 43.00          | 212.50       | 169.50       |
| PT84PB2 | H.S.    | 19.12.01   | 4.09           | 139         | 88          | 43.24          | 212.50       | 169.26       |

212.5 = estimated from contour plan

M.S. = Maroota Sand

H.S. = Hawkesbury Sandstone

\* = laboratory measurements

\*\* = data logger no longer operational

7 April 2003  
Project No. 50541.001

H.B.Maroota Pty Ltd  
Roberts Road  
MAROOTA NSW 2756

Attention: Mr Ralph Betts  
Director

Dear Ralph,

**Subject: July 2002- February 2003 Data Loggers Downloading**

Attached are the plots of the groundwater level recorded in the bores at your Maroota property during the period July 2002 to February 2003.

## 1. MONITORING BORE PT84MW1

The monitoring period show a steady fall in the water table as a result of the unusually climatic dry conditions. As in previous occasions, bore PT84MW1 displays a rapid response to the rainfall pattern, as shown in the attached water level and rainfall plot.

## 2. MONITORING BORE PT84MW3

A similar response is visible in the plot of bore PT84MW3. A drop of approximately 2 metres is visible in the plot during the monitoring period; a similar water table fall has not been experienced since monitoring started in January 1999. Bore PT84MW3 commands a larger aquifer storage than PT84MW1 and is situated close to the centre of the palaeochannel. It is considered that the low water table is a result of an overall increase in pumpage from the agricultural pursuits surrounding the site to meet the area's requirements during the drought.

Table 1 presents a summary of the recorded field chemical parameters measurements. There are no unexpected results from this table, with the small changes in the Electrical Conductivity values being a reflection of the rainfall infiltration pattern. Water levels in bores PT84PB1 and PT84PB2 could not be measured as the pumps were in operation.

I trust the above meets with your approval.

Yours sincerely,  
**URS AUSTRALIA PTY LTD**

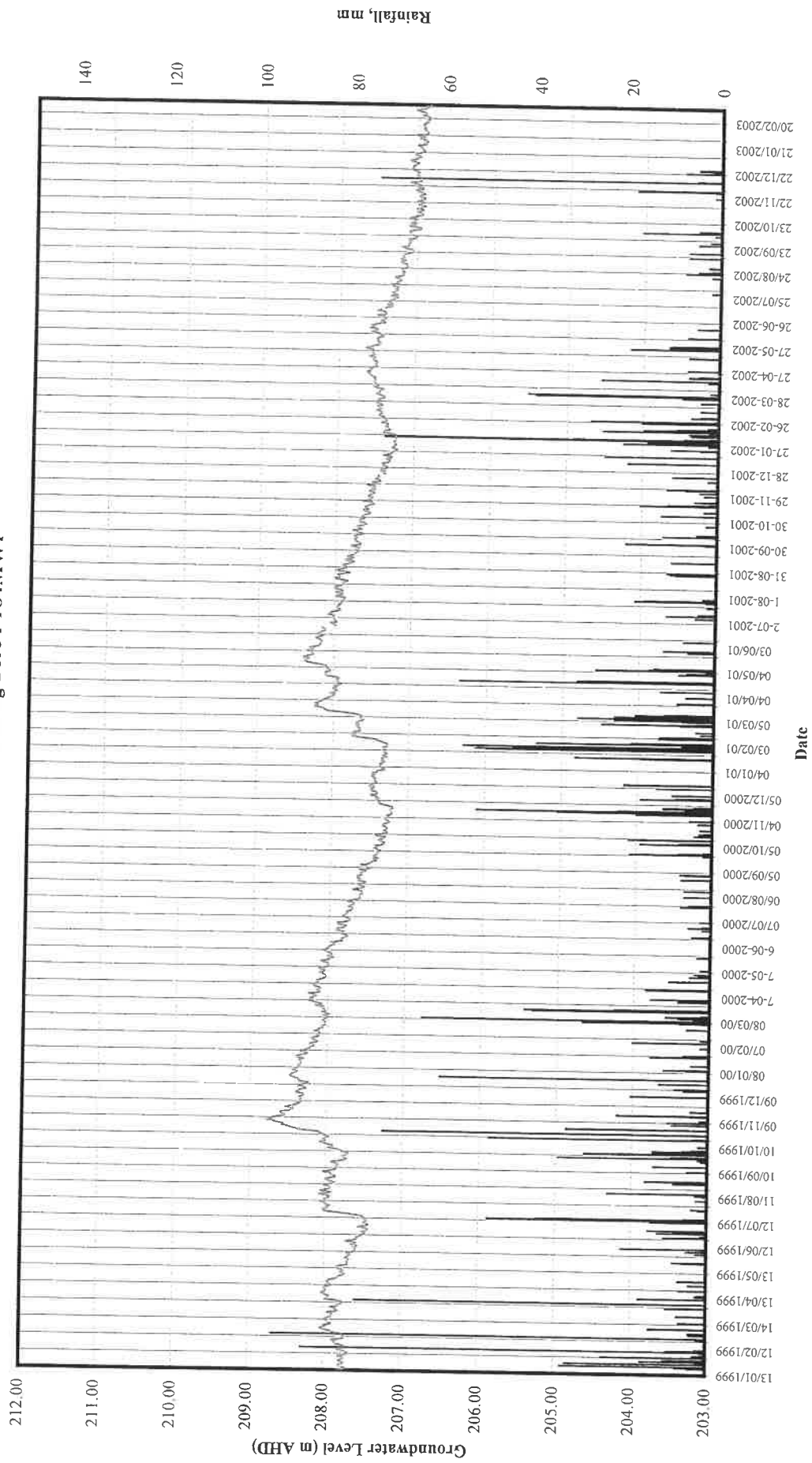


Dr Fabio Carosone  
Associate, Hydrogeologist

URS Australia Pty Ltd (ACN 000 691 690)  
Dames & Moore Pty Ltd (ACN 003 293 696)  
Level 3, 116 Miller Street  
North Sydney, NSW 2060 Australia  
Tel: 61 2 8925 5500  
Fax: 61 2 8925 5555



H.B.Maroota Pty Ltd, Lot 2, DP228308, Maroota  
Groundwater Monitoring Bore PT84MW1



**H.B.Maroota Pty. Ltd., Lot 1 DP228308, Maroota**  
**Groundwater Monitoring Bore PT84MW3**

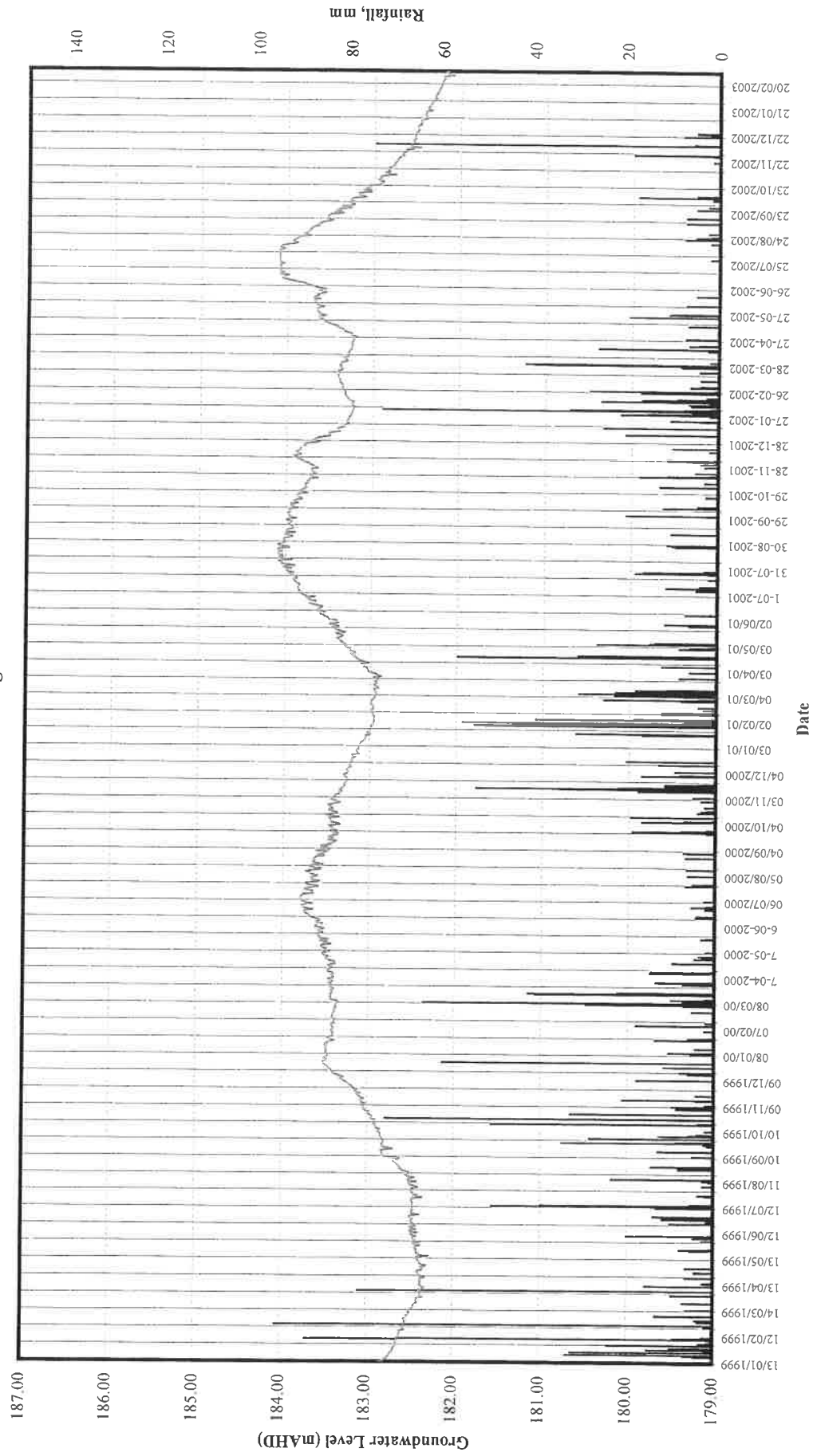


TABLE 1 -

## H.B. MAROOTA. FIELD MEASUREMENTS SUMMARY

| Bore      | Aquifer | Date       | pH             | EC<br>µS/cm | TDS<br>mg/L | SWL<br>m b.TOC | TOC<br>m AHD | SWL<br>m AHD |
|-----------|---------|------------|----------------|-------------|-------------|----------------|--------------|--------------|
| PT84MW1   | M.S.    | 23.10.1998 | 4.96*          | 246*        | 186*        | 5.05           | 214.24       | 209.19       |
| PT84MW1   | M.S.    | 29.10.1998 |                |             |             | 6.15           | 214.24       | 208.09       |
| PT84MW1   | M.S.    | 13.1.1999  |                |             |             | 6.43           | 214.24       | 207.81       |
| PT84MW1   | M.S.    | 11.2.1999  |                |             |             | 6.51           | 214.24       | 207.73       |
| PT84MW1   | M.S.    | 9.9.1999   | 4.13           | 326         | 196         | 6.37           | 214.24       | 207.87       |
| PT84MW1   | M.S.    | 22.12.1999 | 5              | 341         | 205         | 6.00           | 214.24       | 208.24       |
| PT84MW1   | M.S.    | 10.3.2000  | 3.88*          | 335*        | 242*        | 5.52           | 214.24       | 208.72       |
| PT84MW1   | M.S.    | 6.6.2000   | 3.90           | 275         | 165         | 6.33           | 214.24       | 207.91       |
| PT84MW1   | M.S.    | 29.9.2000  | 4.44           | 405         | 243         | 6.81           | 214.24       | 207.43       |
| PT84MW1   | M.S.    | 29.11.2000 | 4.38           | 340         | 204         | 6.80           | 214.24       | 207.44       |
| PT84MW1   | M.S.    | 21.6.2001  | 3.88           | 253         | 152         | 6.09           | 214.24       | 208.15       |
| PT84MW1   | M.S.    | 19.12.2001 | 3.84           | 320         | 213         | 6.78           | 214.24       | 207.46       |
| PT84MW1   | M.S.    | 5.7.2002   | 4.36           | 286         | 172         | 6.77           | 214.24       | 207.47       |
| PT84MW1   | M.S.    | 7.3.2003   | 3.72           | 240         | 172         | 7.38           | 214.24       | 206.86       |
| PT84MW2   | M.S.    | 23.10.1998 |                |             |             | 25.00          | 227.63       | 202.63       |
| PT84MW2   | M.S.    | 29.10.1998 |                |             |             | 25.35          | 227.63       | 202.28       |
| PT84MW2   | M.S.    | 13.1.1999  |                |             |             | 25.43          | 227.63       | 202.20       |
| PT84MW2   | M.S.    | 11.2.1999  |                |             |             | 25.49          | 227.63       | 202.14       |
| PT84MW2   | M.S.    | 9.9.1999   |                |             |             | 25.43          | 227.63       | 202.20       |
| PT84MW2   | M.S.    | 22.12.1999 | -              | -           | -           |                | 227.63       |              |
| PT84MW2   | M.S.    | 10.3.2000  | 6.1*           | 543*        | 530*        | 24.55          | 227.63       | 203.08       |
| PT84MW2** |         |            |                |             |             |                |              |              |
| PT84MW3   | M.S.    | 23.10.1998 | 5.88*          | 381*        | 266*        | 19.61          | 203.25       | 183.64       |
| PT84MW3   | M.S.    | 29.10.1998 |                |             |             | 18.84          | 203.25       | 184.41       |
| PT84MW3   | M.S.    | 13.1.1999  |                |             |             | 20.40          | 203.25       | 182.85       |
| PT84MW3   | M.S.    | 11.2.1999  |                |             |             | 20.58          | 203.25       | 182.67       |
| PT84MW3   | M.S.    | 9.9.1999   | 4.64           | 134         | 80          | 20.43          | 203.25       | 182.82       |
| PT84MW3   | M.S.    | 22.12.1999 | -              | 138         | 83          | 19.88          | 203.25       | 183.37       |
| PT84MW3   | M.S.    | 10.3.2000  | 4.51*          | 139*        | 97*         | 19.83          | 203.25       | 183.42       |
| PT84MW3   | M.S.    | 6.6.2000   | 4.80           | 160         | 96          | 19.65          | 203.25       | 183.60       |
| PT84MW3   | M.S.    | 29.9.2000  | 4.35           | 159         | 95          | 19.82          | 203.25       | 183.43       |
| PT84MW3   | M.S.    | 29.11.2000 | 5.24           | 159         | 95          | 19.95          | 203.25       | 183.30       |
| PT84MW3   | M.S.    | 21.6.2001  | 4.57           | 139         | 83          | 19.53          | 203.25       | 183.72       |
| PT84MW3   | M.S.    | 19.12.2001 | 4.49           | 191         | 122         | 19.41          | 203.25       | 183.84       |
| PT84MW3   | M.S.    | 5.7.2002   | 7.79           | 266         | 159         | 19.17          | 203.25       | 184.08       |
| PT84MW3   | M.S.    | 7.3.2003   | 4.29           | 170         | 122         | 21.08          | 203.25       | 182.17       |
| PT84PB1   | H.S.    | 19.8.1999  |                |             | 60          | 14.80          | 193.51       | 178.71       |
| PT84PB1   | H.S.    | 7.3.2003   | pumping        |             |             |                |              |              |
| PT84PB2   | H.S.    | 19.8.1999  | To be surveyed |             | 50          | 51.50          | 212.50       | 161.00       |
| PT84PB2   | H.S.    | 18.3.2000  |                |             |             | 48.38          | 212.00       | 163.62       |
| PT84PB2   | H.S.    | 6.6.2000   |                |             |             | 46.72          | 212.50       | 165.78       |
| PT84PB2   | H.S.    | 29.9.2000  | 4.74           | 154         | 92          | 46.09          | 212.50       | 166.41       |
| PT84PB2   | H.S.    | 29.11.2000 | 4.08           | 134         | 80          | 44.91          | 212.50       | 167.59       |
| PT84PB2   | H.S.    | 21.6.01    | **             | **          | **          | 43.00          | 212.50       | 169.50       |
| PT84PB2   | H.S.    | 19.12.01   | 4.09           | 139         | 88          | 43.24          | 212.50       | 169.26       |
| PT84PB2   | H.S.    | 5.7.02     | 4.44           | 127         | 76          | 42.81          | 212.50       | 169.69       |
| PT84PB2   | H.S.    | 7.3.2003   | pumping        |             |             |                |              |              |

212.5 = estimated from contour plan

M.S. = Maroota Sand

H.S. = Hawkesbury Sandstone

\* = laboratory measurements

\*\* = data logger no longer operational



18 July 2003  
Project No. 50541.001

H.B.Maroota Pty Ltd  
Roberts Road  
MAROOTA NSW 2756

Attention: Mr Ralph Betts  
Director

Dear Ralph,

**Subject: June 2003 Data Loggers Downloading**

Attached are the updated plots of the groundwater level recorded in the bores at your Maroota property to July 2003 and a summary of the groundwater field parameters.

## **1. MONITORING BORE PT84MW1**

The monitoring period shows a steady fall trend in the water table since March-April 2002 as a result of the unusually climatic dry conditions. Following the significant rainfall in the area since April 2003 a small recovery in the water table is apparent, although the levels remain at the lowest point since monitoring started at this site.

As in previous occasions, bore PT84MW1 displays a rapid response to the rainfall pattern, as shown in the attached water level and rainfall plot. The response may appear somewhat delayed with respect to the rainfall peaks, as the evapotranspiration and soil moisture requirements at the end of such prolonged dry period had to be met first before water table recovery could occur.

## **2. MONITORING BORE PT84MW3**

A similar response is visible in the plot of bore PT84MW3 at the end of the dry period, in spite of bore PT84MW3 commanding a larger aquifer storage than PT84MW1 and its location close to the centre of the palaeochannel. It is considered that the low water table is a result of an overall increase in pumpage from the agricultural pursuits surrounding the site to meet the area's requirements during the drought.

Table 1 presents a summary of the recorded groundwater field chemical parameters measurements. A drop in pH values is apparent in both bores mirrored by a slight fall in Electrical Conductivity. This is interpreted as an indication of the aquifer recharge by rainfall, although the pH values are at the lower end of the rainfall pH range.

URS Australia Pty Ltd (ACN 000 691 690)  
Dames & Moore Pty Ltd (ACN 003 293 696)  
Level 3, 116 Miller Street  
North Sydney, NSW 2060 Australia  
Tel: 61 2 8925 5500  
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Mr Ralph Betts  
Hodgson Contracting Services  
18 July 2003  
Page 2

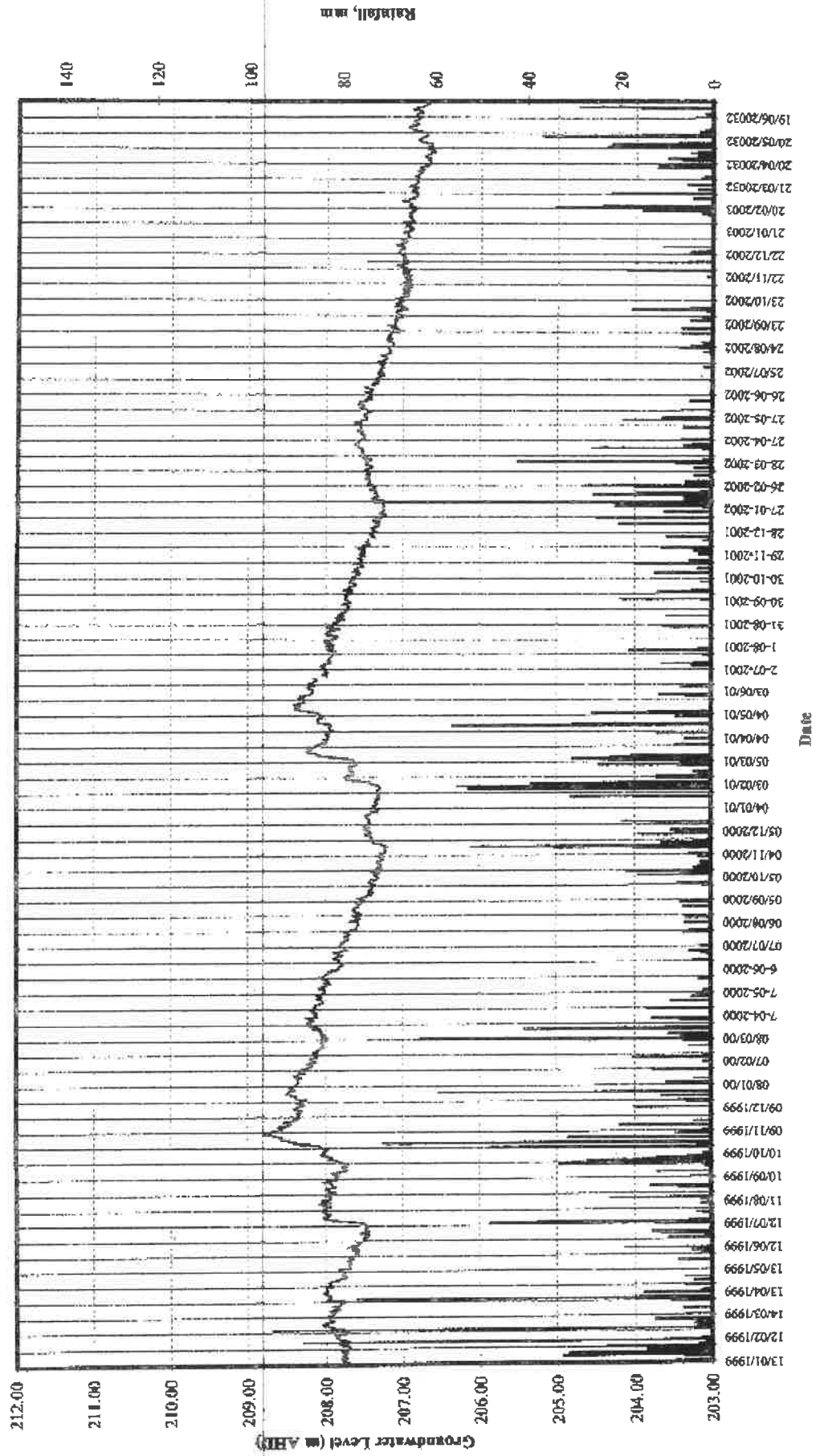
I trust the above meets with your approval.

Yours sincerely,  
**URS AUSTRALIA PTY LTD**

A handwritten signature in cursive script that reads 'Fabio Carosone'.

Dr Fabio Carosone  
Associate, Hydrogeologist

**H.B.Maroota Pty Ltd, Lot 2, DP228308, Maroota  
Groundwater Monitoring Bore PT84MW1**



**H.B. Maroota Pty. Ltd., Lot 1 DP228308, Maroota  
Groundwater Monitoring Bore PT84MW3**

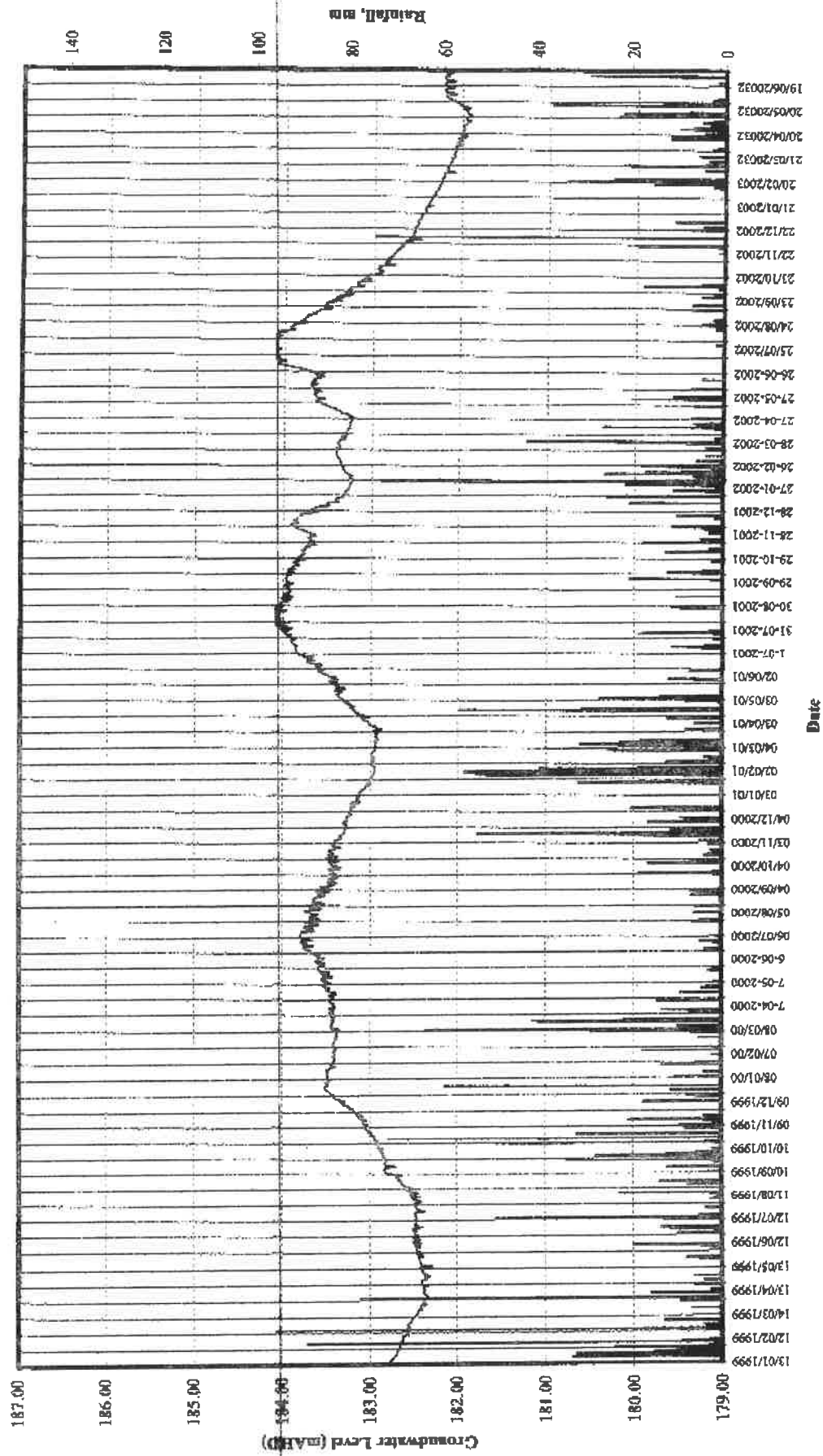


TABLE 1 -

## H.B. MAROOTA FIELD MEASUREMENTS SUMMARY

| Bore      | Aquifer | Date       | pH             | EC<br>µS/cm | TDS<br>mg/L | SWL<br>m b. TOC | TOC<br>m AHD | SWL<br>m AHD |
|-----------|---------|------------|----------------|-------------|-------------|-----------------|--------------|--------------|
| PT84MW1   | M.S.    | 23.10.1998 | 4.96*          | 246*        | 186*        | 5.05            | 214.24       | 209.19       |
| PT84MW1   | M.S.    | 29.10.1998 |                |             |             | 6.15            | 214.24       | 208.09       |
| PT84MW1   | M.S.    | 13.1.1999  |                |             |             | 6.43            | 214.24       | 207.81       |
| PT84MW1   | M.S.    | 11.2.1999  |                |             |             | 6.51            | 214.24       | 207.73       |
| PT84MW1   | M.S.    | 9.9.1999   | 4.13           | 326         | 196         | 6.37            | 214.24       | 207.87       |
| PT84MW1   | M.S.    | 22.12.1999 | 5              | 341         | 205         | 6.00            | 214.24       | 208.24       |
| PT84MW1   | M.S.    | 10.3.2000  | 3.88*          | 335*        | 242*        | 5.52            | 214.24       | 208.72       |
| PT84MW1   | M.S.    | 6.6.2000   | 3.90           | 275         | 165         | 6.33            | 214.24       | 207.91       |
| PT84MW1   | M.S.    | 29.9.2000  | 4.44           | 405         | 243         | 6.81            | 214.24       | 207.43       |
| PT84MW1   | M.S.    | 29.11.2000 | 4.38           | 340         | 204         | 6.80            | 214.24       | 207.44       |
| PT84MW1   | M.S.    | 21.6.2001  | 3.88           | 253         | 152         | 6.09            | 214.24       | 208.15       |
| PT84MW1   | M.S.    | 19.12.2001 | 3.84           | 320         | 192         | 6.78            | 214.24       | 207.46       |
| PT84MW1   | M.S.    | 5.7.2002   | 4.36           | 286         | 172         | 6.77            | 214.24       | 207.47       |
| PT84MW1   | M.S.    | 7.3.2003   | 3.72           | 240         | 144         | 7.38            | 214.24       | 206.86       |
| PT84MW1   | M.S.    | 9.7.2003   | 3.51           | 202         | 121         | 7.52            | 214.24       | 206.72       |
| PT84MW2   | M.S.    | 23.10.1998 |                |             |             | 25.00           | 227.63       | 202.63       |
| PT84MW2   | M.S.    | 29.10.1998 |                |             |             | 25.35           | 227.63       | 202.28       |
| PT84MW2   | M.S.    | 13.1.1999  |                |             |             | 25.43           | 227.63       | 202.20       |
| PT84MW2   | M.S.    | 11.2.1999  |                |             |             | 25.49           | 227.63       | 202.14       |
| PT84MW2   | M.S.    | 9.9.1999   |                |             |             | 25.43           | 227.63       | 202.20       |
| PT84MW2   | M.S.    | 22.12.1999 | -              |             |             |                 | 227.63       |              |
| PT84MW2   | M.S.    | 10.3.2000  | 6.1*           | 543*        | 530*        | 24.55           | 227.63       | 203.08       |
| PT84MW2** |         |            |                |             |             |                 |              |              |
| PT84MW3   | M.S.    | 23.10.1998 | 5.88*          | 381*        | 266*        | 19.61           | 203.25       | 183.64       |
| PT84MW3   | M.S.    | 29.10.1998 |                |             |             | 18.84           | 203.25       | 184.41       |
| PT84MW3   | M.S.    | 13.1.1999  |                |             |             | 20.40           | 203.25       | 182.85       |
| PT84MW3   | M.S.    | 11.2.1999  |                |             |             | 20.58           | 203.25       | 182.67       |
| PT84MW3   | M.S.    | 9.9.1999   | 4.64           | 134         | 80          | 20.43           | 203.25       | 182.82       |
| PT84MW3   | M.S.    | 22.12.1999 | -              | 138         | 83          | 19.88           | 203.25       | 183.37       |
| PT84MW3   | M.S.    | 10.3.2000  | 4.51*          | 139*        | 97*         | 19.83           | 203.25       | 183.42       |
| PT84MW3   | M.S.    | 6.6.2000   | 4.80           | 160         | 96          | 19.65           | 203.25       | 183.60       |
| PT84MW3   | M.S.    | 29.9.2000  | 4.35           | 159         | 95          | 19.82           | 203.25       | 183.43       |
| PT84MW3   | M.S.    | 29.11.2000 | 5.24           | 159         | 95          | 19.95           | 203.25       | 183.30       |
| PT84MW3   | M.S.    | 21.6.2001  | 4.57           | 139         | 83          | 19.53           | 203.25       | 183.72       |
| PT84MW3   | M.S.    | 19.12.2001 | 4.49           | 191         | 115         | 19.41           | 203.25       | 183.84       |
| PT84MW3   | M.S.    | 5.7.2002   | 7.79           | 266         | 160         | 19.17           | 203.25       | 184.08       |
| PT84MW3   | M.S.    | 7.3.2003   | 4.29           | 170         | 102         | 21.08           | 203.25       | 182.17       |
| PT84MW3   | M.S.    | 9.7.2003   | 3.72           | 105         | 63          | 21.00           | 203.25       | 182.25       |
| PT84PB1   | H.S.    | 19.8.1999  |                |             | 60          | 14.80           | 193.51       | 178.71       |
| PT84PB1   | H.S.    | 7.3.2003   | pumping        |             |             |                 |              |              |
| PT84PB2   | H.S.    | 19.8.1999  | To be surveyed |             | 50          | 51.50           | 212.50       | 161.00       |
| PT84PB2   | H.S.    | 18.3.2000  |                |             |             | 48.38           | 212.00       | 163.62       |
| PT84PB2   | H.S.    | 6.6.2000   |                |             |             | 46.72           | 212.50       | 165.78       |
| PT84PB2   | H.S.    | 29.9.2000  | 4.74           | 154         | 92          | 46.09           | 212.50       | 166.41       |
| PT84PB2   | H.S.    | 29.11.2000 | 4.08           | 134         | 80          | 44.91           | 212.50       | 167.59       |
| PT84PB2   | H.S.    | 21.6.01    | **             | **          | **          | 43.00           | 212.50       | 169.50       |
| PT84PB2   | H.S.    | 19.12.01   | 4.09           | 139         | 88          | 43.24           | 212.50       | 169.26       |
| PT84PB2   | H.S.    | 5.7.02     | 4.44           | 127         | 76          | 42.81           | 212.30       | 169.69       |
| PT84PB2   | H.S.    | 7.3.2003   | pumping        |             |             |                 |              |              |

212.5 = estimated from contour plan

M.S. = Maroota Sand

H.S. = Hawkesbury Sandstone

\* = laboratory measurements

\*\* = data logger no longer operational

10 February 2004  
Project No. 50541.001

H.B.Maroota Pty Ltd  
Roberts Road  
MAROOTA NSW 2756

Attention: Mr Ralph Betts  
Director

Dear Ralph,

**Subject: January 2004 Data Loggers Downloading**

Attached are the updated plots of the groundwater levels recorded in the bores at your Maroota property to January 2004 and a summary of the groundwater field parameters. The delay in the downloading of the data to the end of January was due to the late delivery of the replacement batteries for the dataloggers.

**1. GROUNDWATER MONITORING PROGRAMME**

The groundwater monitoring programme started in January 1999 with the installation of dataloggers in the three groundwater monitoring bores established in October/November 1998. Of the three bores, PT84MW2, drilled to a depth of 26.50 m (RL of bottom of the holes = 200.3 m AHD) failed to intersect a reliable water table and was decommissioned. The data loggers are downloaded biannually, at which time field parameters (pH, Electrical Conductivity) are normally measured.

Details of the existing environment, geology and hydrogeology, bore construction, hydraulic testing and water quality sampling were presented in a report by Woodward-Clyde Pty Ltd: *"Lots 1 and 2, DP228308, Lot 2, DP312327, Maroota, Development Application. Groundwater Impact Assessment", 4.6 1999*", prepared for Nexus Environmental Planning.

**2. WATER LEVELS**

**2.1 MONITORING BORE PT84MW1**

The monitoring period shows a steady fall trend in the water table since March-April 2002 as a result of the unusually climatic dry conditions that have persisted despite the total rainfall for year (797 mm recorded at the PF Formation offices) being not far below

Mr Ralph Betts  
Hodgson Contracting Services  
10 February 2004  
Page 2

the average (884.8mm). More than the amount of rainfall, its distribution during the year has a more direct bearing on the amount of recharge that can reach the water table.

Following some significant rainfall in the area during November and December 2003, a small recovery and stabilisation in the water table is apparent, although the levels in this bore remain at the lowest point since monitoring started at this site.

Since the start of water level data collection, records show that the watertable has fluctuated between 208.71 AHD in November 1999 and 206.41 m AHD in November 2003 (a maximum of 2.3 m). Bore PT84MW1 has been assessed on the basis of the geology intersected and of the elevation of the water table to represent an aquifer in the Maroota Sand perched above the Hawkesbury Sandstone. Perched Maroota Sand aquifers have been observed at other sites in the area, away from the main axis of the palaeochannel and commonly above substantial clay layers.

As in previous occasions, bore PT84MW1 displays a rapid response to the rainfall pattern, as shown in the attached water level and rainfall plot. The response appears with some minor delay with respect to the rainfall peaks, as the evapotranspiration and soil moisture requirements at the end of prolonged dry periods had to be met first before water table recovery could occur.

## **2.2 MONITORING BORE PT84MW3**

A similar pattern and response to rainfall is visible in the plot of bore PT84MW3 at the end of the dry period, the overall trend being a steady water table decline since May 2002.

Bore PT84MW3 commands a larger aquifer storage than PT84MW1 and is located close to the centre of the palaeochannel where the aquifer reaches its greatest thickness. It is considered that the low water table is a result of the combination of the dry period and of a probable overall increase in pumpage from the agricultural pursuits surrounding the site to meet the area's requirements during the drought.

The water table in bore PT84MW3 has ranged between 184.09 m AHD in July 2002 and 181.73 m AHD in December 2003. This range, 2.36 m, is of the same magnitude as that in PT84MW1 indicating that the two bores response in a similar manner to the variations in the climatic conditions. The histograms of the two bores follow a similar pattern.

## **3. WATER QUALITY**

### **3.1 MAROOTA SAND**

#### **3.1.1 PT84MW1**

Table 1 presents a summary of the recorded groundwater field chemical parameters measurements in the monitoring bores. pH values show some degree of variability possibly due to instrumentation reasons rather than aquifer variability.

Mr Ralph Betts  
Hodgson Contracting Services  
10 February 2004  
Page 3

Electrical Conductivity (EC) shows a steady decrease since September 2000. This is interpreted as an indication of improved aquifer recharge by rainfall, possibly stimulated by pumpage or drainage in the surrounding area.

### **3.1.2 PT84MW3**

An overall fall in EC is also noted in this bore, although the values recorded are somewhat more variable. There appears to be a coincidence between water table rises and decrease in EC, reflecting the rapid response of the aquifer to rainfall infiltration.

## **4. PRODUCTION BORES**

At the end of 1999, the Department of Land and Water Conservation granted a licence for the extraction of groundwater from the deeper Hawkesbury Sandstone to supply the operation of the plant.

Bore PT84PB1 water level and water quality data refer only to sampling after installation, as the bore has been in production at the time of dataloggers downloading. The water elevation in this bore was measured in August 1999 at 178.71 m AHD.

Bore PT84PB2 was not equipped with a pump due to its lower yield and was used as a monitoring bore from 1999 to the beginning of 2003, when a pump was eventually installed. The water table in this bore ranged between 161 m AHD and 169.7 m AHD, although some inaccuracy would derive from the fact that the wellhead elevation was estimated and not surveyed.

## **5. CENTRAL POND**

A surveyed peg was placed in the excavation of the pit in February 1999 and the water level measured at 180.29 m AHD. This measurement was taken after the water level was allowed to rest for a number of days. In view of the depth of the excavation it has always been considered that the water in the pit represented a window into the water table in the Maroota Sand aquifer. The excavation is close to the axis of the palaeochannel and the top of the Hawkesbury Sandstone was reported at the bottom of the pit, at an estimated RL of 178 m AHD.

## **6. ASSESSMENT OF THE WATER TABLE ELEVATION**

The watertable in the Maroota Sand aquifer has been found to be variable and depending on the position of the monitoring point with respect to the axis of the palaeochannel. This point has been proved by the data collected in the last 5 years of continuous recording at this site and at other sites in Maroota and acknowledged in the *DLWC Maroota Groundwater Study, Technical Status Report* July 2000. The report indicated that the assessment of the water table elevation has to be carried out on a site basis.

The table below presents a summary of the water table measurements at the site.

Mr Ralph Betts  
Hodgson Contracting Services  
10 February 2004  
Page 4

| Monitoring point | Site Elevation m AHD | Date        | Water Table Elevation m AHD | Aquifer                |
|------------------|----------------------|-------------|-----------------------------|------------------------|
| PT84MW1          | 213.43               | 1999-2004   | 206.41 - 208.71             | Maroota Sand (perched) |
| PT84MW3          | 202.43               | 1999-2004   | 181.73 - 184.08             | Maroota Sand           |
| PT84Pond         | 178                  | 1999        | 180.29                      | Maroota Sand           |
| PT84PB1          | 193                  | 1999        | 178.71                      | Hawkesbury Sandstone   |
| PT84PB2          | 161                  | 1999 - 2003 | 161.0 - 169.7               | Hawkesbury Sandstone   |

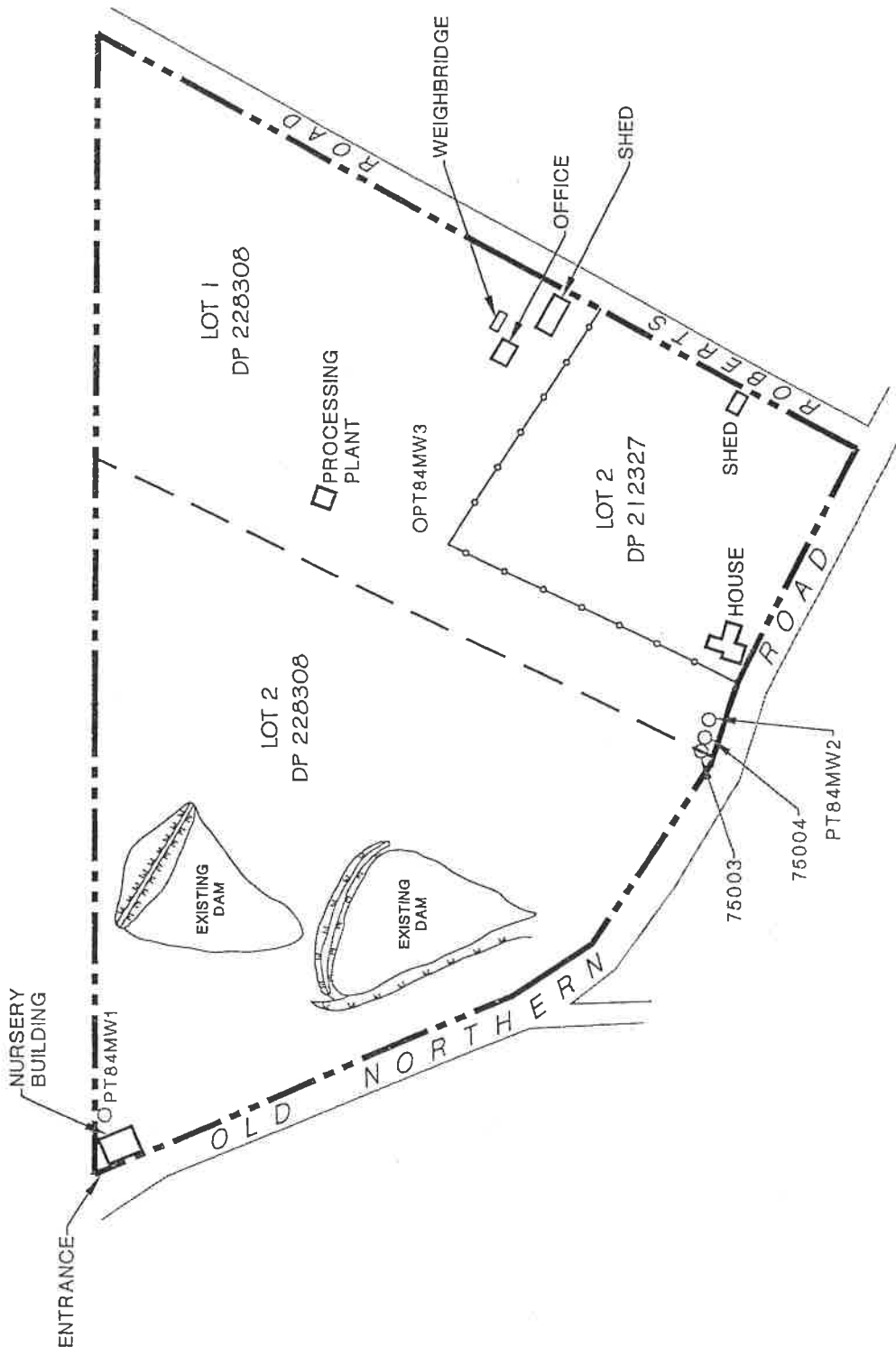
The variability of the water level data and the hydraulic tests results, which gave a hydraulic conductivity for the Maroota Sand aquifer of between 0.25 m/day and 0.05 m/day, with a most probable value of 0.14 m/day, indicate that relatively steep gradients can be maintained within the sand mass. The data quoted above indicate that the Maroota Sand aquifer water table within the H.B.Maroota Pty Ltd property is located at between 180 m and 180.5 m AHD. At the monitoring bores within the property (which include the DIPNR bores), located at higher elevations to the west and northwest of the pond area, the water table rises accordingly. This elevation was taken into account in the preparation of the original mining plans in order to maintain the 2 m buffer zone above the water table, as required by the Baulkham Hills Shire Council's DCP 500.

I trust the above meets with your requirements. Please, do not hesitate to contact the undersigned, should you need to discuss the matter further.

Yours sincerely,  
**URS AUSTRALIA PTY LTD**



Dr Fabio Carosone  
Associate, Hydrogeologist



REVISION: **A** DESIGNED: **PC**  
SCALE: **AS SHOWN** DRAWN: **LJE**  
DRAWING No: **ASG 2018/0001** CHECKED:  
CAD FILE NO: **0.002** APPROVED:  
DATE: STATUS: **FINAL**

**LEGEND**

- 75003 DLWC GROUNDWATER MONITORING BORE
- PT84MW1 SITE GROUNDWATER MONITORING BORES

CLIENT  
**NEXUS ENVIRONMENTAL PLANNING**

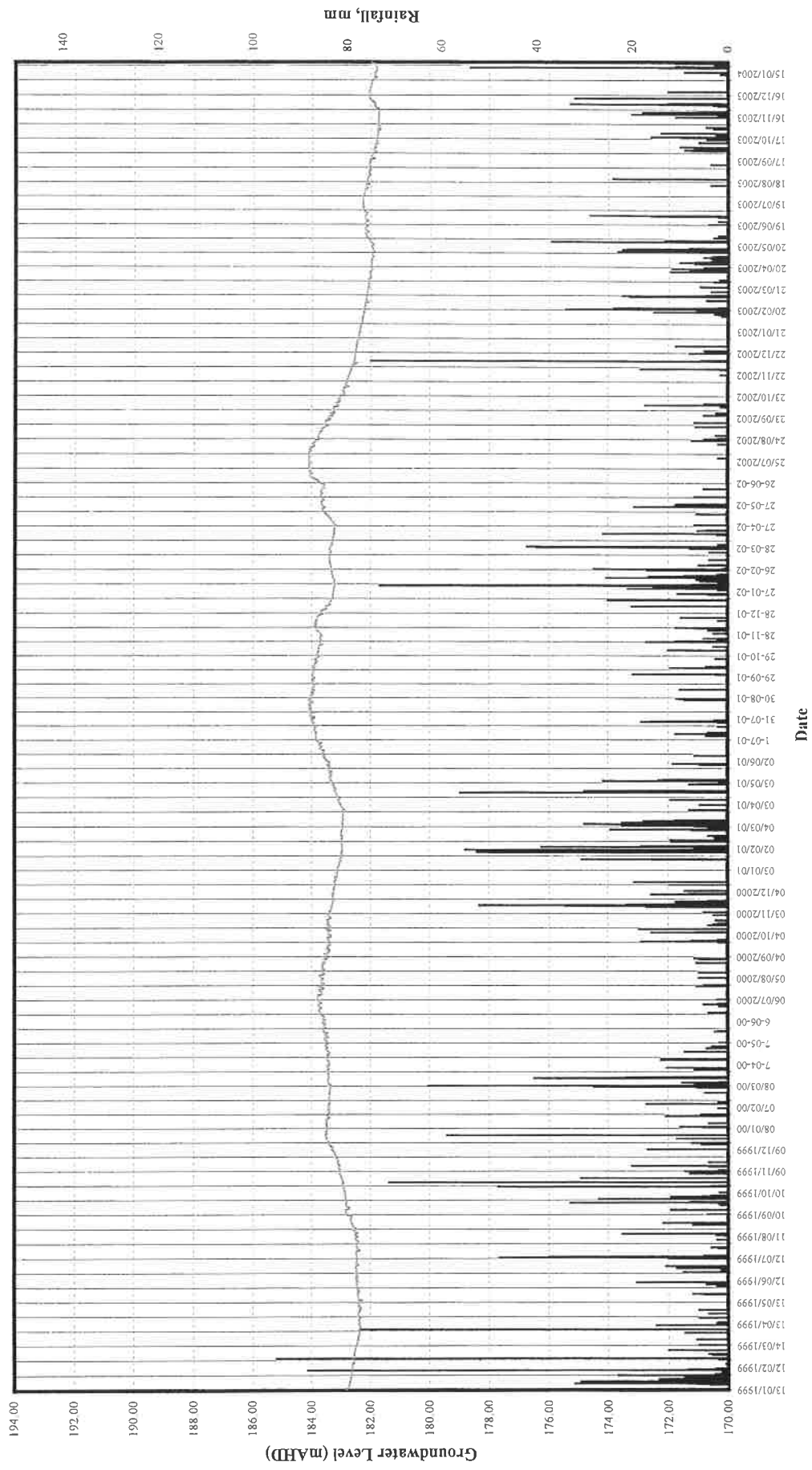
PROJECT  
**DR MARTIN EIS, MAROOTA**

TITLE  
**SITE PLAN**

FIGURE  
**2**

A4

H.B.Maroota Pty. Ltd., Lot 1 DP228308, Maroota  
Groundwater Monitoring Bore PT84MW3



H.B.Maroota Pty Ltd, Lot 2, DP228308, Maroota  
Groundwater Monitoring Bore PT84MW1

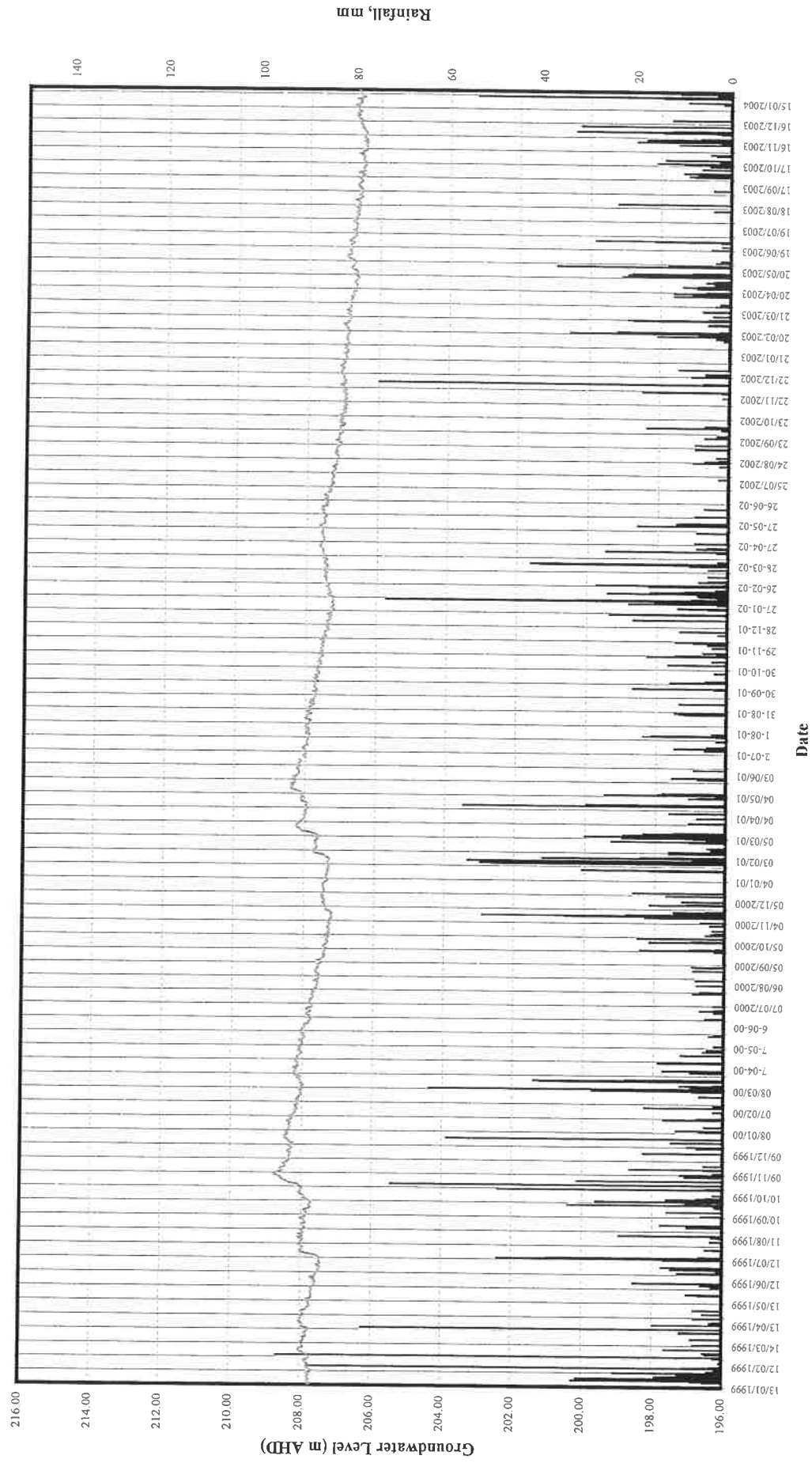


TABLE 1 -

## H.B. MAROOTA. FIELD MEASUREMENTS SUMMARY

| Bore      | Aquifer | Date       | pH             | EC<br>μS/cm | TDS<br>mg/L | SWL<br>m b. TOC | TOC<br>m AHD | SWL<br>m AHD |
|-----------|---------|------------|----------------|-------------|-------------|-----------------|--------------|--------------|
| PT84MW1   | M.S.    | 23.10.1998 | 4.96*          | 246*        | 186*        | 5.05            | 214.24       | 209.19       |
| PT84MW1   | M.S.    | 29.10.1998 |                |             |             | 6.15            | 214.24       | 208.09       |
| PT84MW1   | M.S.    | 13.1.1999  |                |             |             | 6.43            | 214.24       | 207.81       |
| PT84MW1   | M.S.    | 11.2.1999  |                |             |             | 6.51            | 214.24       | 207.73       |
| PT84MW1   | M.S.    | 9.9.1999   | 4.13           | 326         | 196         | 6.37            | 214.24       | 207.87       |
| PT84MW1   | M.S.    | 22.12.1999 | 5              | 341         | 205         | 6.00            | 214.24       | 208.24       |
| PT84MW1   | M.S.    | 10.3.2000  | 3.88*          | 335*        | 242*        | 5.52            | 214.24       | 208.72       |
| PT84MW1   | M.S.    | 6.6.2000   | 3.90           | 275         | 165         | 6.33            | 214.24       | 207.91       |
| PT84MW1   | M.S.    | 29.9.2000  | 4.44           | 405         | 243         | 6.81            | 214.24       | 207.43       |
| PT84MW1   | M.S.    | 29.11.2000 | 4.38           | 340         | 204         | 6.80            | 214.24       | 207.44       |
| PT84MW1   | M.S.    | 21.6.2001  | 3.88           | 253         | 152         | 6.09            | 214.24       | 208.15       |
| PT84MW1   | M.S.    | 19.12.2001 | 3.84           | 320         | 192         | 6.78            | 214.24       | 207.46       |
| PT84MW1   | M.S.    | 5.7.2002   | 4.36           | 286         | 172         | 6.77            | 214.24       | 207.47       |
| PT84MW1   | M.S.    | 7.3.2003   | 3.72           | 240         | 144         | 7.38            | 214.24       | 206.86       |
| PT84MW1   | M.S.    | 9.7.2003   | 3.51           | 202         | 121         | 7.52            | 214.24       | 206.72       |
| PT84MW1   | M.S.    | 30.1.2004  | 5.13           | 189         | 113         | 7.60            | 214.24       | 206.64       |
| PT84MW2   | M.S.    | 23.10.1998 |                |             |             | 25.00           | 227.63       | 202.63       |
| PT84MW2   | M.S.    | 29.10.1998 |                |             |             | 25.35           | 227.63       | 202.28       |
| PT84MW2   | M.S.    | 13.1.1999  |                |             |             | 25.43           | 227.63       | 202.20       |
| PT84MW2   | M.S.    | 11.2.1999  |                |             |             | 25.49           | 227.63       | 202.14       |
| PT84MW2   | M.S.    | 9.9.1999   |                |             |             | 25.43           | 227.63       | 202.20       |
| PT84MW2   | M.S.    | 22.12.1999 |                |             |             |                 | 227.63       |              |
| PT84MW2   | M.S.    | 10.3.2000  | 6.1*           | 543*        | 530*        | 24.55           | 227.63       | 203.08       |
| PT84MW2** |         |            |                |             |             |                 |              |              |
| PT84MW3   | M.S.    | 23.10.1998 | 5.88*          | 381*        | 266*        | 19.61           | 203.25       | 183.64       |
| PT84MW3   | M.S.    | 29.10.1998 |                |             |             | 18.84           | 203.25       | 184.41       |
| PT84MW3   | M.S.    | 13.1.1999  |                |             |             | 20.40           | 203.25       | 182.85       |
| PT84MW3   | M.S.    | 11.2.1999  |                |             |             | 20.58           | 203.25       | 182.67       |
| PT84MW3   | M.S.    | 9.9.1999   | 4.64           | 134         | 80          | 20.43           | 203.25       | 182.82       |
| PT84MW3   | M.S.    | 22.12.1999 |                | 138         | 83          | 19.88           | 203.25       | 183.37       |
| PT84MW3   | M.S.    | 10.3.2000  | 4.51*          | 139*        | 97*         | 19.83           | 203.25       | 183.42       |
| PT84MW3   | M.S.    | 6.6.2000   | 4.80           | 160         | 96          | 19.65           | 203.25       | 183.60       |
| PT84MW3   | M.S.    | 29.9.2000  | 4.35           | 159         | 95          | 19.82           | 203.25       | 183.43       |
| PT84MW3   | M.S.    | 29.11.2000 | 5.24           | 159         | 95          | 19.95           | 203.25       | 183.30       |
| PT84MW3   | M.S.    | 21.6.2001  | 4.57           | 139         | 83          | 19.53           | 203.25       | 183.72       |
| PT84MW3   | M.S.    | 19.12.2001 | 4.49           | 191         | 115         | 19.41           | 203.25       | 183.84       |
| PT84MW3   | M.S.    | 5.7.2002   | 7.79           | 266         | 160         | 19.17           | 203.25       | 184.08       |
| PT84MW3   | M.S.    | 7.3.2003   | 4.29           | 170         | 102         | 21.08           | 203.25       | 182.17       |
| PT84MW3   | M.S.    | 9.7.2003   | 3.72           | 105         | 63          | 21.00           | 203.25       | 182.25       |
| PT84MW3   | M.S.    | 30.1.2004  | 6.83           | 72          | 43          | 21.28           | 203.25       | 181.97       |
| PT84PB1   | H.S.    | 19.8.1999  |                |             | 60          | 14.80           | 193.51       | 178.71       |
| PT84PB1   | H.S.    | 7.3.2003   | pumping        |             |             |                 |              |              |
| PT84PB2   | H.S.    | 19.8.1999  | To be surveyed |             | 50          | 51.50           | 212.50       | 161.00       |
| PT84PB2   | H.S.    | 18.3.2000  |                |             |             | 48.38           | 212.00       | 163.62       |
| PT84PB2   | H.S.    | 6.6.2000   |                |             |             | 46.72           | 212.50       | 165.78       |
| PT84PB2   | H.S.    | 29.9.2000  | 4.74           | 154         | 92          | 46.09           | 212.50       | 166.41       |
| PT84PB2   | H.S.    | 29.11.2000 | 4.08           | 134         | 80          | 44.91           | 212.50       | 167.59       |
| PT84PB2   | H.S.    | 21.6.01    | **             | **          | **          | 43.00           | 212.50       | 169.50       |
| PT84PB2   | H.S.    | 19.12.01   | 4.09           | 139         | 88          | 43.24           | 212.50       | 169.26       |
| PT84PB2   | H.S.    | 5.7.02     | 4.44           | 127         | 76          | 42.81           | 212.50       | 169.69       |
| PT84PB2   | H.S.    | 7.3.2003   | pumping        |             |             |                 |              |              |

212.5 = estimated from contour plan

M.S. = Maroota Sand

H.S. = Hawkesbury Sandstone

\* = laboratory measurements

\*\* = data logger no longer operational

11 July 2005  
Project No. 50541.001

H.B.Maroota Pty Ltd  
Roberts Road  
MAROOTA NSW 2756

Attention: Mr Ralph Betts  
Director

Dear Ralph,

**Subject: June 2005 Data Loggers Downloading**

Attached are the updated plots of the groundwater levels recorded in the bores at your Maroota property up to the 22<sup>nd</sup> June 2005 and a summary of the groundwater field parameters.

**1. WATER LEVELS**

**1.1 MONITORING BORE PT84MW1**

At the beginning of July 2004, the water level dropped to the base of the bore, hence the flat line in the plot. The data for the last semester also indicate that the water level is below the base of the logger. For this reason the plot has not been updated.

Since the start of water level data collection, records show that the watertable has fluctuated between 208.71 AHD in November 1999 and 206.18 m AHD in July 2004 (a maximum of 2.53 m). Bore PT84MW1 has been assessed on the basis of the geology intersected and of the elevation of the water table to represent an aquifer in the Maroota Sand perched above the Hawkesbury Sandstone. This bore is monitoring a perched water table that has not been sufficiently recharged during the dry weather conditions experienced during last year.

**1.2 MONITORING BORE PT84MW3**

The hydrograph of this bore shows that the water level appears to have stabilised since the end of October 2003, with minor rises following rainfall events.

Bore PT84MW3 commands a larger aquifer storage than PT84MW1 and is located close to the centre of the palaeochannel, where the aquifer reaches its greatest thickness. A small recovery in the water table is visible following rain periods after November 2004.

Mr Ralph Betts  
Hodgson Contracting Services  
11 July 2005  
Page 2

The water table in bore PT84MW3 has ranged between 184.09 m AHD in July 2002 and 181.55 m AHD in September 2004. This range, 2.54 m, is of the same magnitude as that in PT84MW1 indicating that the two bores response in a similar manner to the variations in the climatic conditions.

## **2. WATER QUALITY**

Water quality in all the bores on the site is generally fresh and, potentially, of drinking water standard.

### **2.1.1 PT84MW1**

Table 1 presents a summary of the recorded groundwater field chemical parameters measurements in the monitoring bores. No water sample could be collected from this bore, as the water level was at the bottom of the casing.

### **2.1.2 PT84MW3**

There appears to be a general coincidence between water table rises and decrease in EC, reflecting the rapid response of the aquifer to rainfall infiltration. Overall, groundwater salinity is fairly constant in the very fresh range.

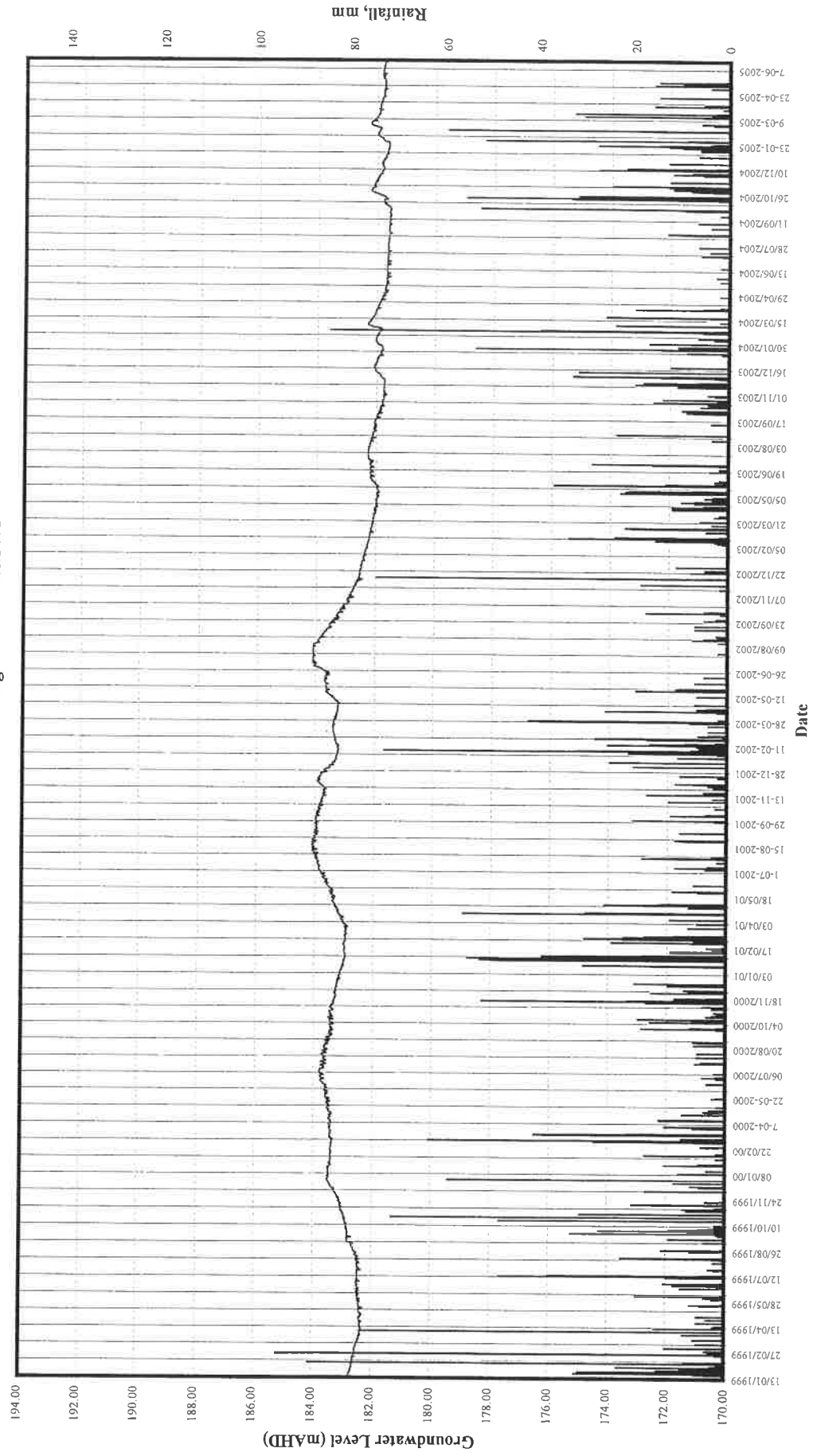
I trust the above meets with your requirements. Please, do not hesitate to contact the undersigned, should you need to discuss the matter further.

Yours sincerely,  
**URS AUSTRALIA PTY LTD**



Dr Fabio Carosone  
Associate, Hydrogeologist

H.B.Maroota Pty. Ltd., Lot 1 DP228308, Maroota  
Groundwater Monitoring Bore PT84MW3



H.B.Maroota Pty Ltd, Lot 2, DP228308, Maroota  
Groundwater Monitoring Bore PT84MW1

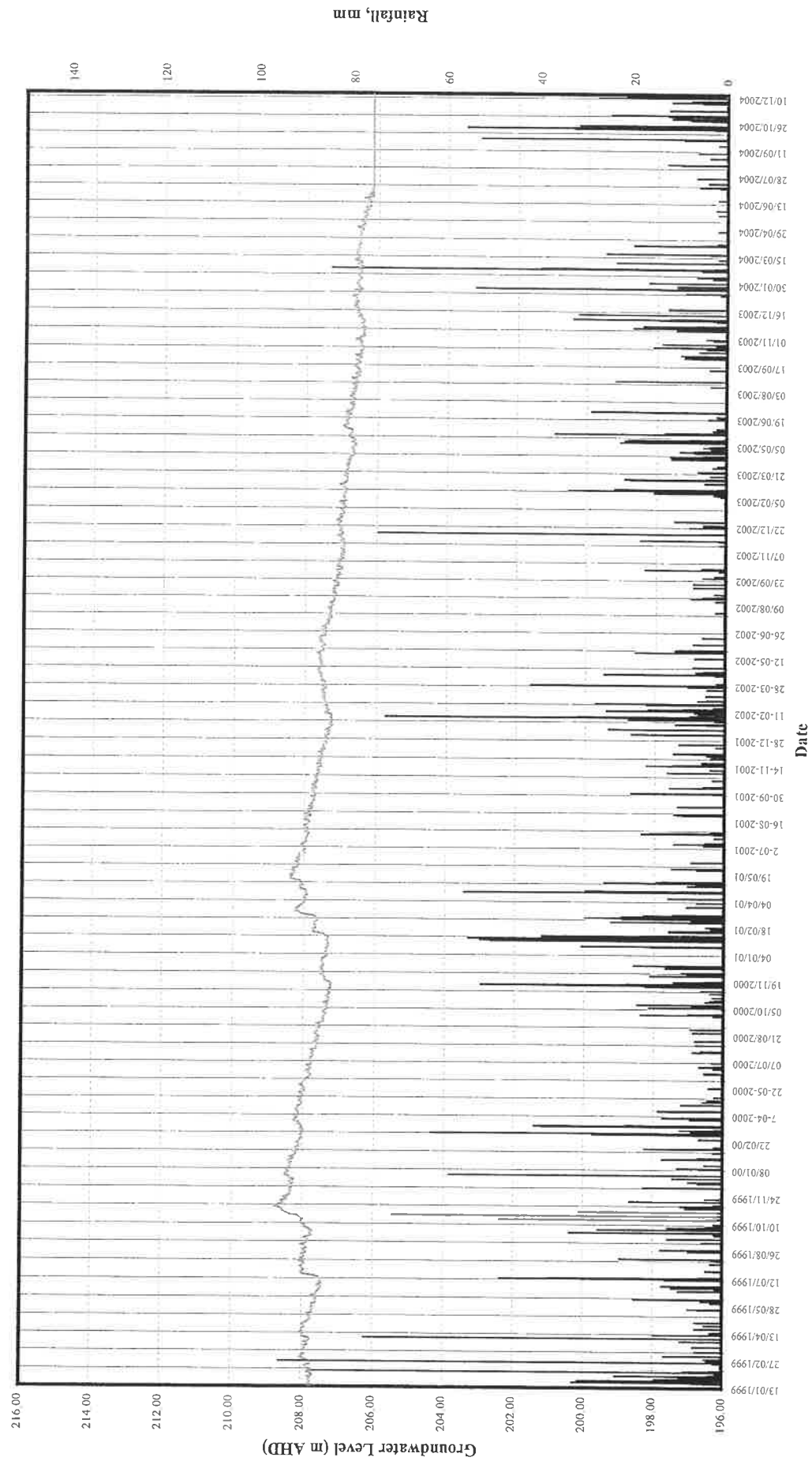


TABLE 1 - H.B. MAROOTA. FIELD MEASUREMENTS SUMMARY

| Bore      | Aquifer | Date       | pH      | EC<br>µS/cm | TDS<br>mg/L | SWL<br>m b.TOC | TOC<br>m AHD | SWL<br>m AHD |                |
|-----------|---------|------------|---------|-------------|-------------|----------------|--------------|--------------|----------------|
| PT84MW1   | M.S.    | 23.10.1998 | 4.96    | 246         | 186         | 5.05           | 214.24       | 209.19       |                |
| PT84MW1   | M.S.    | 29.10.1998 |         |             |             | 6.15           | 214.24       | 208.09       |                |
| PT84MW1   | M.S.    | 13.1.1999  |         |             |             | 6.43           | 214.24       | 207.81       |                |
| PT84MW1   | M.S.    | 11.2.1999  |         |             |             | 6.51           | 214.24       | 207.73       |                |
| PT84MW1   | M.S.    | 9.9.1999   | 4.13    | 326         | 196         | 6.37           | 214.24       | 207.87       |                |
| PT84MW1   | M.S.    | 22.12.1999 | 5       | 341         | 205         | 6.00           | 214.24       | 208.24       |                |
| PT84MW1   | M.S.    | 10.3.2000  | 3.88    | 335         | 242         | 5.52           | 214.24       | 208.72       |                |
| PT84MW1   | M.S.    | 6.6.2000   | 3.90    | 275         | 165         | 6.33           | 214.24       | 207.91       |                |
| PT84MW1   | M.S.    | 29.9.2000  | 4.44    | 405         | 243         | 6.81           | 214.24       | 207.43       |                |
| PT84MW1   | M.S.    | 29.11.2000 | 4.38    | 340         | 204         | 6.80           | 214.24       | 207.44       |                |
| PT84MW1   | M.S.    | 21.6.2001  | 3.88    | 253         | 152         | 6.09           | 214.24       | 208.15       |                |
| PT84MW1   | M.S.    | 19.12.2001 | 3.84    | 320         | 192         | 6.78           | 214.24       | 207.46       |                |
| PT84MW1   | M.S.    | 5.7.2002   | 4.36    | 286         | 172         | 6.77           | 214.24       | 207.47       |                |
| PT84MW1   | M.S.    | 7.3.2003   | 3.72    | 240         | 144         | 7.38           | 214.24       | 206.86       |                |
| PT84MW1   | M.S.    | 9.7.2003   | 3.51    | 202         | 121         | 7.52           | 214.24       | 206.72       |                |
| PT84MW1   | M.S.    | 30.1.2004  | 5.13    | 189         | 113         | 7.60           | 214.24       | 206.64       |                |
| PT84MW1   | M.S.    | 15.12.2004 |         |             |             | 8.07           | 214.24       | 206.17       | dry            |
| PT84MW1   | M.S.    | 22.6.05    |         |             |             |                |              |              | dry            |
| PT84MW2   | M.S.    | 23.10.1998 |         |             |             | 25.00          | 227.63       | 202.63       |                |
| PT84MW2   | M.S.    | 29.10.1998 |         |             |             | 25.35          | 227.63       | 202.28       |                |
| PT84MW2   | M.S.    | 13.1.1999  |         |             |             | 25.43          | 227.63       | 202.20       |                |
| PT84MW2   | M.S.    | 11.2.1999  |         |             |             | 25.49          | 227.63       | 202.14       |                |
| PT84MW2   | M.S.    | 9.9.1999   |         |             |             | 25.43          | 227.63       | 202.20       |                |
| PT84MW2   | M.S.    | 22.12.1999 |         |             |             |                | 227.63       |              |                |
| PT84MW2   | M.S.    | 10.3.2000  | 6.10    | 543         | 530         | 24.55          | 227.63       | 203.08       |                |
| PT84MW2** |         |            |         |             |             |                |              |              |                |
| PT84MW3   | M.S.    | 23.10.1998 | 5.88    | 381         | 266         | 19.61          | 203.25       | 183.64       |                |
| PT84MW3   | M.S.    | 29.10.1998 |         |             |             | 18.84          | 203.25       | 184.41       |                |
| PT84MW3   | M.S.    | 13.1.1999  |         |             |             | 20.40          | 203.25       | 182.85       |                |
| PT84MW3   | M.S.    | 11.2.1999  |         |             |             | 20.58          | 203.25       | 182.67       |                |
| PT84MW3   | M.S.    | 9.9.1999   | 4.64    | 134         | 80          | 20.43          | 203.25       | 182.82       |                |
| PT84MW3   | M.S.    | 22.12.1999 |         | 138         | 83          | 19.88          | 203.25       | 183.37       |                |
| PT84MW3   | M.S.    | 10.3.2000  | 4.51    | 139         | 97          | 19.83          | 203.25       | 183.42       |                |
| PT84MW3   | M.S.    | 6.6.2000   | 4.80    | 160         | 96          | 19.65          | 203.25       | 183.60       |                |
| PT84MW3   | M.S.    | 29.9.2000  | 4.35    | 159         | 95          | 19.82          | 203.25       | 183.43       |                |
| PT84MW3   | M.S.    | 29.11.2000 | 5.24    | 159         | 95          | 19.95          | 203.25       | 183.30       |                |
| PT84MW3   | M.S.    | 21.6.2001  | 4.57    | 139         | 83          | 19.53          | 203.25       | 183.72       |                |
| PT84MW3   | M.S.    | 19.12.2001 | 4.49    | 191         | 115         | 19.41          | 203.25       | 183.84       |                |
| PT84MW3   | M.S.    | 5.7.2002   | 7.79    | 266         | 160         | 19.17          | 203.25       | 184.08       |                |
| PT84MW3   | M.S.    | 7.3.2003   | 4.29    | 170         | 102         | 21.08          | 203.25       | 182.17       |                |
| PT84MW3   | M.S.    | 9.7.2003   | 3.72    | 105         | 63          | 21.00          | 203.25       | 182.25       |                |
| PT84MW3   | M.S.    | 30.1.2004  | 6.83    | 72          | 43          | 21.28          | 203.25       | 181.97       |                |
| PT84MW3   | M.S.    | 15.12.04   | 6.07    | 90          | 54          | 21.44          | 203.25       | 181.81       |                |
| PT84MW3   | M.S.    | 22.6.04    | 6.05    | 106         | 64          | 21.77          | 203.25       | 181.48       |                |
| PT84PB1   | H.S.    | 19.8.1999  |         |             | 60          | 14.80          | 193.51       | 178.71       |                |
| PT84PB1   | H.S.    | 7.3.2003   | pumping |             |             |                |              |              |                |
| PT84PB2   | H.S.    | 19.8.1999  |         |             | 50          | 51.50          | 212.50       | 161.00       | To be surveyed |
| PT84PB2   | H.S.    | 18.3.2000  |         |             |             | 48.38          | 212.00       | 163.62       |                |
| PT84PB2   | H.S.    | 6.6.2000   |         |             |             | 46.72          | 212.50       | 165.78       |                |
| PT84PB2   | H.S.    | 29.9.2000  | 4.74    | 154         | 92          | 46.09          | 212.50       | 166.41       |                |
| PT84PB2   | H.S.    | 29.11.2000 | 4.08    | 134         | 80          | 44.91          | 212.50       | 167.59       |                |
| PT84PB2   | H.S.    | 21.6.01    |         |             |             | 43.00          | 212.50       | 169.50       |                |
| PT84PB2   | H.S.    | 19.12.01   | 4.09    | 139         | 88          | 43.24          | 212.50       | 169.26       |                |
| PT84PB2   | H.S.    | 5.7.02     | 4.44    | 127         | 76          | 42.81          | 212.50       | 169.69       |                |
| PT84PB2   | H.S.    | 7.3.2003   |         |             |             |                |              |              | pumping        |

212.5 = estimated from contour plan

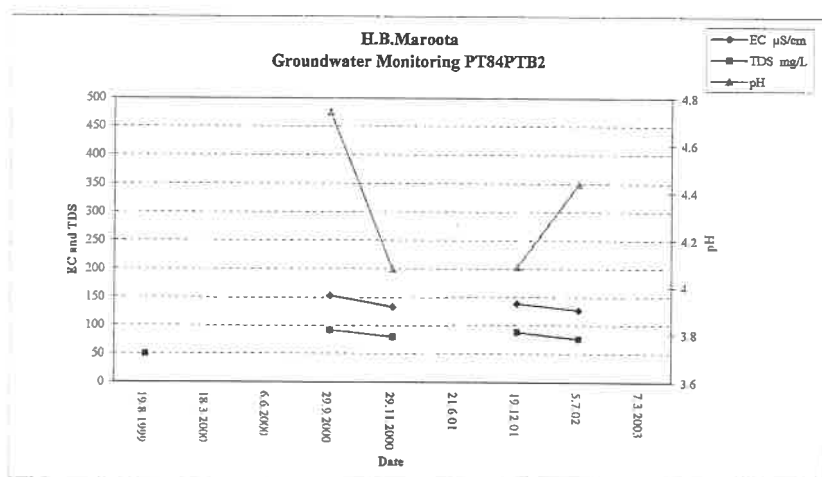
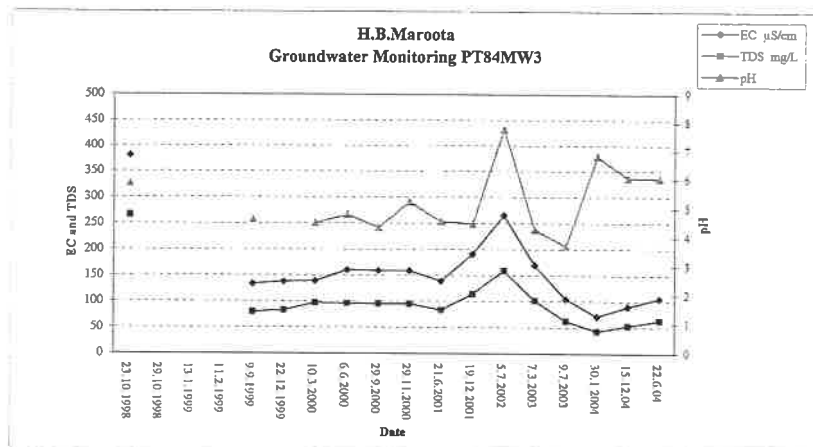
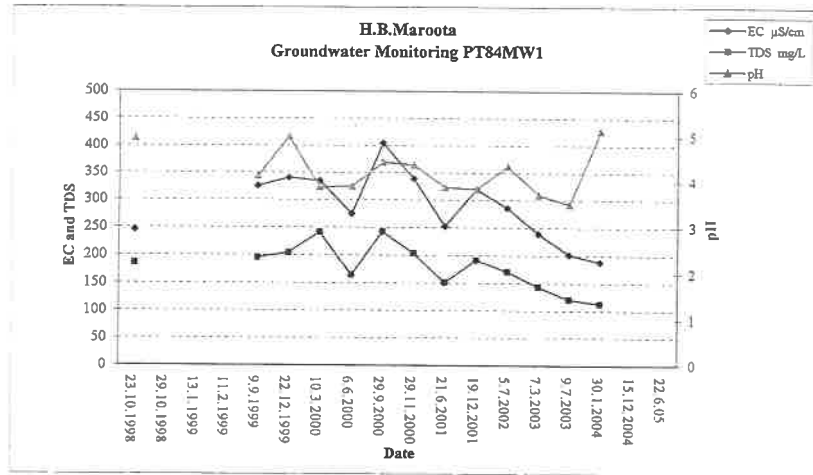
M.S. = Maroota Sand

H.S. = Hawkesbury Sandstone

97 = laboratory measurements

\*\* = data logger no longer operational

## H.B.Maroota - Groundwater Monitoring Data Plots



10 February 2006  
Project No. 43346058

H.B.Maroota Pty Ltd  
PO BOX 1778  
GOSFORD NSW 2250

Attention: Mr Ralph Betts  
Director

Dear Ralph,

**Subject: July 2006 Semester Data Loggers Downloading**

Attached are the updated plots of the groundwater levels recorded in the bores at your Maroota property up to the 6<sup>th</sup> July 2006 and a summary of the groundwater field parameters.

**1. WATER LEVELS**

**1.1 MONITORING BORE PT84MW1**

On the 1<sup>st</sup> February 2006, bore PT84MW1 was cleaned by airlift and a plug of rootlets removed. Below that interval the bore was clear to the drilled depth of 11.9 m below the top of casing. Small amounts of water were airlifted to the surface and a water level of 9.3 m was measured at the end of the airlift. It is anticipated that the water level may recover to a higher level after rest.

The old data logger was removed and replaced with a Solinst, Model 3001, set at a depth 11.5 m below the top of casing.

During a site visit on the 6<sup>th</sup> July 2006 to download the data loggers, it was found that the loggers had not started at the programmed date and no data were recorded since the 1<sup>st</sup> of February. Other attempts were made to get the loggers to operate correctly, but, as these attempts failed, a replacement unit was obtained from the manufacturer. This unit is now operating correctly and was checked two weeks after installation. The data presented in this report are those from the last period.

It is apparent that the perched water table at this site is being slowly depleted due to the persistent drought conditions and the water level is close to the bottom of the bore.

Mr Ralph Betts  
Hodgson Contracting Services  
16 August 2006  
Page 2

## **1.2 MONITORING BORE PT84MW3**

The data logger in this operated correctly and the data are presented in the attached graph.

The water level in this bore is at approximately one metre from the bottom of the casing and appears to be discoloured by some grey clay.

As indicated in previous reports, the water table in bore PT84MW3 has ranged between 184.09 m AHD in July 2002 and 181.55 m AHD in September 2004. This range, 2.54 m, is of the same magnitude as that in PT84MW1 indicating that the two bores response in a similar manner to the variations in the climatic conditions.

## **2. WATER QUALITY**

Water quality in all the bores on the site is generally fresh and, potentially, of drinking water standards.

### **2.1.1 PT84MW1**

Table 1 presents a summary of the recorded groundwater field chemical parameters measurements in the monitoring bores. No water sample could be collected from this bore due to the bore being nearly dry.

### **2.1.2 PT84MW3**

There appears to be a general coincidence between past water table rises and decrease in EC, reflecting the rapid response of the aquifer to rainfall infiltration. Overall, groundwater salinity is fairly constant in the very fresh range.

No groundwater sample was collected at this time due to the muddy appearance of the water.

I trust the above meets with your requirements. Please, do not hesitate to contact the undersigned, should you need to discuss the matter further.

Yours sincerely,

**URS AUSTRALIA PTY LTD**



Dr Fabio Carosone  
Associate, Hydrogeologist

TABLE 1 -

## H.B. MAROOTA. FIELD MEASUREMENTS AND LABORATORY SUMMARY

| Bore      | Aquifer | Date       | pH   | EC<br>µS/cm | TDS<br>mg/L | Ca<br>mg/L     | Mg<br>mg/L | Na<br>mg/L | K<br>mg/L | Cl<br>mg/L | HCO <sub>3</sub><br>mg/L | H <sub>2</sub> SO <sub>4</sub><br>mg/L | SWL<br>m b.TOC | TOC<br>m AHD | SWL<br>m AHD |
|-----------|---------|------------|------|-------------|-------------|----------------|------------|------------|-----------|------------|--------------------------|----------------------------------------|----------------|--------------|--------------|
| PT84MW1   | M.S.    | 23.10.1998 | 4.96 | 246         | 186         | 3              | 9          | 27         | 3         | 50         | 4                        | 3                                      | 5.05           | 214.24       | 209.19       |
| PT84MW1   | M.S.    | 29.10.1998 |      |             |             |                |            |            |           |            |                          |                                        | 6.15           | 214.24       | 208.09       |
| PT84MW1   | M.S.    | 13.1.1999  |      |             |             |                |            |            |           |            |                          |                                        | 6.43           | 214.24       | 207.81       |
| PT84MW1   | M.S.    | 11.2.1999  |      |             |             |                |            |            |           |            |                          |                                        | 6.51           | 214.24       | 207.73       |
| PT84MW1   | M.S.    | 9.9.1999   | 4.13 | 326         | 196         |                |            |            |           |            |                          |                                        | 6.37           | 214.24       | 207.87       |
| PT84MW1   | M.S.    | 22.12.1999 | 5    | 341         | 205         |                |            |            |           |            |                          |                                        | 6.00           | 214.24       | 208.24       |
| PT84MW1   | M.S.    | 10.3.2000  | 3.88 | 335         | 242         | -              | -          | -          | -         | -          | -                        | -                                      | 5.52           | 214.24       | 208.72       |
| PT84MW1   | M.S.    | 6.6.2000   | 3.90 | 275         | 165         |                |            |            |           |            |                          |                                        | 6.33           | 214.24       | 207.91       |
| PT84MW1   | M.S.    | 29.9.2000  | 4.44 | 405         | 243         |                |            |            |           |            |                          |                                        | 6.81           | 214.24       | 207.43       |
| PT84MW1   | M.S.    | 29.11.2000 | 4.38 | 340         | 204         |                |            |            |           |            |                          |                                        | 6.80           | 214.24       | 207.44       |
| PT84MW1   | M.S.    | 21.6.2001  | 3.88 | 253         | 152         |                |            |            |           |            |                          |                                        | 6.09           | 214.24       | 208.15       |
| PT84MW1   | M.S.    | 19.12.2001 | 3.84 | 320         | 192         |                |            |            |           |            |                          |                                        | 6.78           | 214.24       | 207.46       |
| PT84MW1   | M.S.    | 5.7.2002   | 4.36 | 286         | 172         |                |            |            |           |            |                          |                                        | 6.77           | 214.24       | 207.47       |
| PT84MW1   | M.S.    | 7.3.2003   | 3.72 | 240         | 144         |                |            |            |           |            |                          |                                        | 7.38           | 214.24       | 206.86       |
| PT84MW1   | M.S.    | 9.7.2003   | 3.51 | 202         | 121         |                |            |            |           |            |                          |                                        | 7.52           | 214.24       | 206.72       |
| PT84MW1   | M.S.    | 30.1.2004  | 5.13 | 189         | 113         |                |            |            |           |            |                          |                                        | 7.60           | 214.24       | 206.64       |
| PT84MW1   | M.S.    | 15.12.2004 |      |             |             | dry            |            |            |           |            |                          |                                        | 8.07           | 214.24       | 206.17       |
| PT84MW1   | M.S.    | 22.6.05    |      |             |             | dry            |            |            |           |            |                          |                                        |                |              |              |
| PT84MW1   | M.S.    | 19.1.06    |      |             |             | dry            |            |            |           |            |                          |                                        |                |              |              |
| PT84MW2   | M.S.    | 23.10.1998 |      |             |             |                |            |            |           |            |                          |                                        | 25.00          | 227.63       | 202.63       |
| PT84MW2   | M.S.    | 29.10.1998 |      |             |             |                |            |            |           |            |                          |                                        | 25.35          | 227.63       | 202.28       |
| PT84MW2   | M.S.    | 13.1.1999  |      |             |             |                |            |            |           |            |                          |                                        | 25.43          | 227.63       | 202.20       |
| PT84MW2   | M.S.    | 11.2.1999  |      |             |             |                |            |            |           |            |                          |                                        | 25.49          | 227.63       | 202.14       |
| PT84MW2   | M.S.    | 9.9.1999   |      |             |             |                |            |            |           |            |                          |                                        | 25.43          | 227.63       | 202.20       |
| PT84MW2   | M.S.    | 22.12.1999 | -    | -           |             |                |            |            |           |            |                          |                                        |                | 227.63       |              |
| PT84MW2   | M.S.    | 10.3.2000  | 6.10 | 543         | 530         | -              | -          | -          | -         | -          | -                        | -                                      | 24.55          | 227.63       | 203.08       |
| PT84MW2** |         |            |      |             |             |                |            |            |           |            |                          |                                        |                |              |              |
| PT84MW3   | M.S.    | 23.10.1998 | 5.88 | 381         | 266         | <1             | 2          | 79         | 1         | 9          | 14                       | 9                                      | 19.61          | 203.25       | 183.64       |
| PT84MW3   | M.S.    | 29.10.1998 |      |             |             |                |            |            |           |            |                          |                                        | 18.84          | 203.25       | 184.41       |
| PT84MW3   | M.S.    | 13.1.1999  |      |             |             |                |            |            |           |            |                          |                                        | 20.40          | 203.25       | 182.85       |
| PT84MW3   | M.S.    | 11.2.1999  |      |             |             |                |            |            |           |            |                          |                                        | 20.58          | 203.25       | 182.67       |
| PT84MW3   | M.S.    | 9.9.1999   | 4.64 | 134         | 80          |                |            |            |           |            |                          |                                        | 20.43          | 203.25       | 182.82       |
| PT84MW3   | M.S.    | 22.12.1999 |      | 138         | 83          |                |            |            |           |            |                          |                                        | 19.88          | 203.25       | 183.37       |
| PT84MW3   | M.S.    | 10.3.2000  | 4.51 | 139         | 97          | -              | -          | -          | -         | -          | -                        | -                                      | 19.83          | 203.25       | 183.42       |
| PT84MW3   | M.S.    | 6.6.2000   | 4.80 | 160         | 96          |                |            |            |           |            |                          |                                        | 19.65          | 203.25       | 183.60       |
| PT84MW3   | M.S.    | 29.9.2000  | 4.35 | 159         | 95          |                |            |            |           |            |                          |                                        | 19.82          | 203.25       | 183.43       |
| PT84MW3   | M.S.    | 29.11.2000 | 5.24 | 159         | 95          |                |            |            |           |            |                          |                                        | 19.95          | 203.25       | 183.30       |
| PT84MW3   | M.S.    | 21.6.2001  | 4.57 | 139         | 83          |                |            |            |           |            |                          |                                        | 19.53          | 203.25       | 183.72       |
| PT84MW3   | M.S.    | 19.12.2001 | 4.49 | 191         | 115         |                |            |            |           |            |                          |                                        | 19.41          | 203.25       | 183.84       |
| PT84MW3   | M.S.    | 5.7.2002   | 7.79 | 266         | 160         |                |            |            |           |            |                          |                                        | 19.17          | 203.25       | 184.08       |
| PT84MW3   | M.S.    | 7.3.2003   | 4.29 | 170         | 102         |                |            |            |           |            |                          |                                        | 21.08          | 203.25       | 182.17       |
| PT84MW3   | M.S.    | 9.7.2003   | 3.72 | 105         | 63          |                |            |            |           |            |                          |                                        | 21.00          | 203.25       | 182.25       |
| PT84MW3   | M.S.    | 30.1.2004  | 6.83 | 72          | 43          |                |            |            |           |            |                          |                                        | 21.28          | 203.25       | 181.97       |
| PT84MW3   | M.S.    | 15.12.04   | 6.07 | 90          | 54          |                |            |            |           |            |                          |                                        | 21.44          | 203.25       | 181.81       |
| PT84MW3   | M.S.    | 22.6.04    | 6.05 | 106         | 64          |                |            |            |           |            |                          |                                        | 21.77          | 203.25       | 181.48       |
| PT84MW3   | M.S.    | 19.1.06    | 6.10 | 98          | 59          |                |            |            |           |            |                          |                                        | 21.48          | 203.25       | 181.77       |
| PT84PB1   | H.S.    | 19.8.1999  |      |             | 60          |                |            |            |           |            |                          |                                        | 14.80          | 193.51       | 178.71       |
| PT84PB1   | H.S.    | 7.3.2003   |      |             |             |                |            |            |           |            |                          |                                        | pumping        |              |              |
| PT84PB2   | H.S.    | 19.8.1999  |      |             | 50          | To be surveyed |            |            |           |            |                          |                                        | 51.50          | 212.50       | 161.00       |
| PT84PB2   | H.S.    | 18.3.2000  |      |             |             |                |            |            |           |            |                          |                                        | 48.38          | 212.00       | 163.62       |
| PT84PB2   | H.S.    | 6.6.2000   |      |             |             |                |            |            |           |            |                          |                                        | 46.72          | 212.50       | 165.78       |
| PT84PB2   | H.S.    | 29.9.2000  | 4.74 | 154         | 92          |                |            |            |           |            |                          |                                        | 46.09          | 212.50       | 166.41       |
| PT84PB2   | H.S.    | 29.11.2000 | 4.08 | 134         | 80          |                |            |            |           |            |                          |                                        | 44.91          | 212.50       | 167.59       |
| PT84PB2   | H.S.    | 21.6.01    |      |             |             |                |            |            |           |            |                          |                                        | 43.00          | 212.50       | 169.50       |
| PT84PB2   | H.S.    | 19.12.01   | 4.09 | 139         | 88          |                |            |            |           |            |                          |                                        | 43.24          | 212.50       | 169.26       |
| PT84PB2   | H.S.    | 5.7.02     | 4.44 | 127         | 76          |                |            |            |           |            |                          |                                        | 42.81          | 212.50       | 169.69       |
| PT84PB2   | H.S.    | 7.3.2003   |      |             |             |                |            |            |           |            |                          |                                        | pumping        |              |              |
| PT84PB2   | H.S.    | 12.9.05    | 4.52 | 113         | 77          | <1             | 3          | 17         | <1        | 34         | <1                       | <1                                     | pumping        |              |              |

212.5 = estimated from contour plan

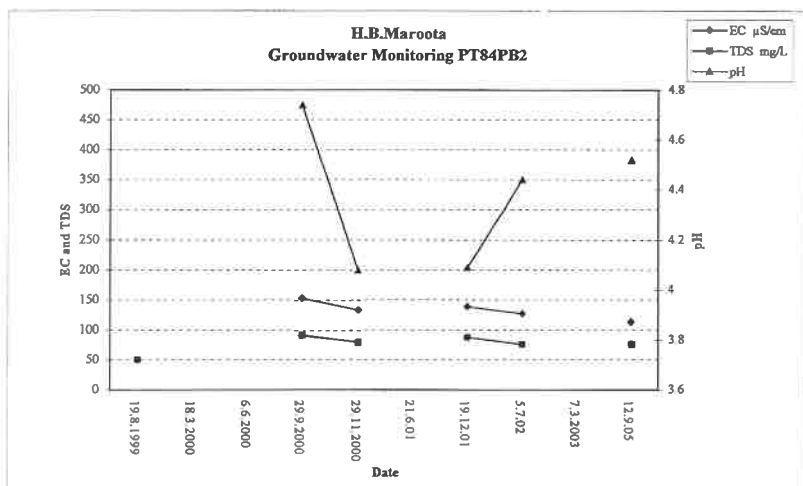
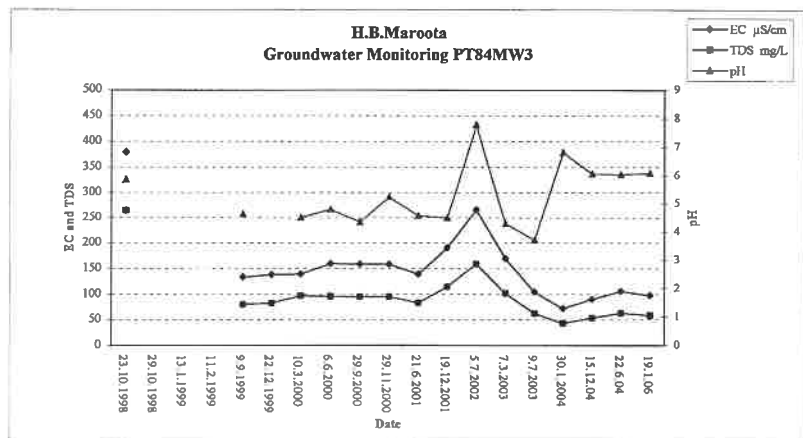
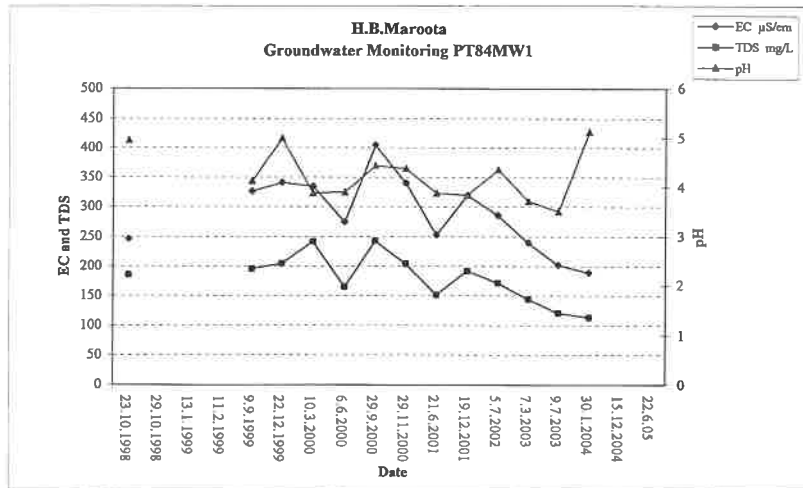
M.S. = Maroota Sand

H.S. = Hawkesbury Sandstone

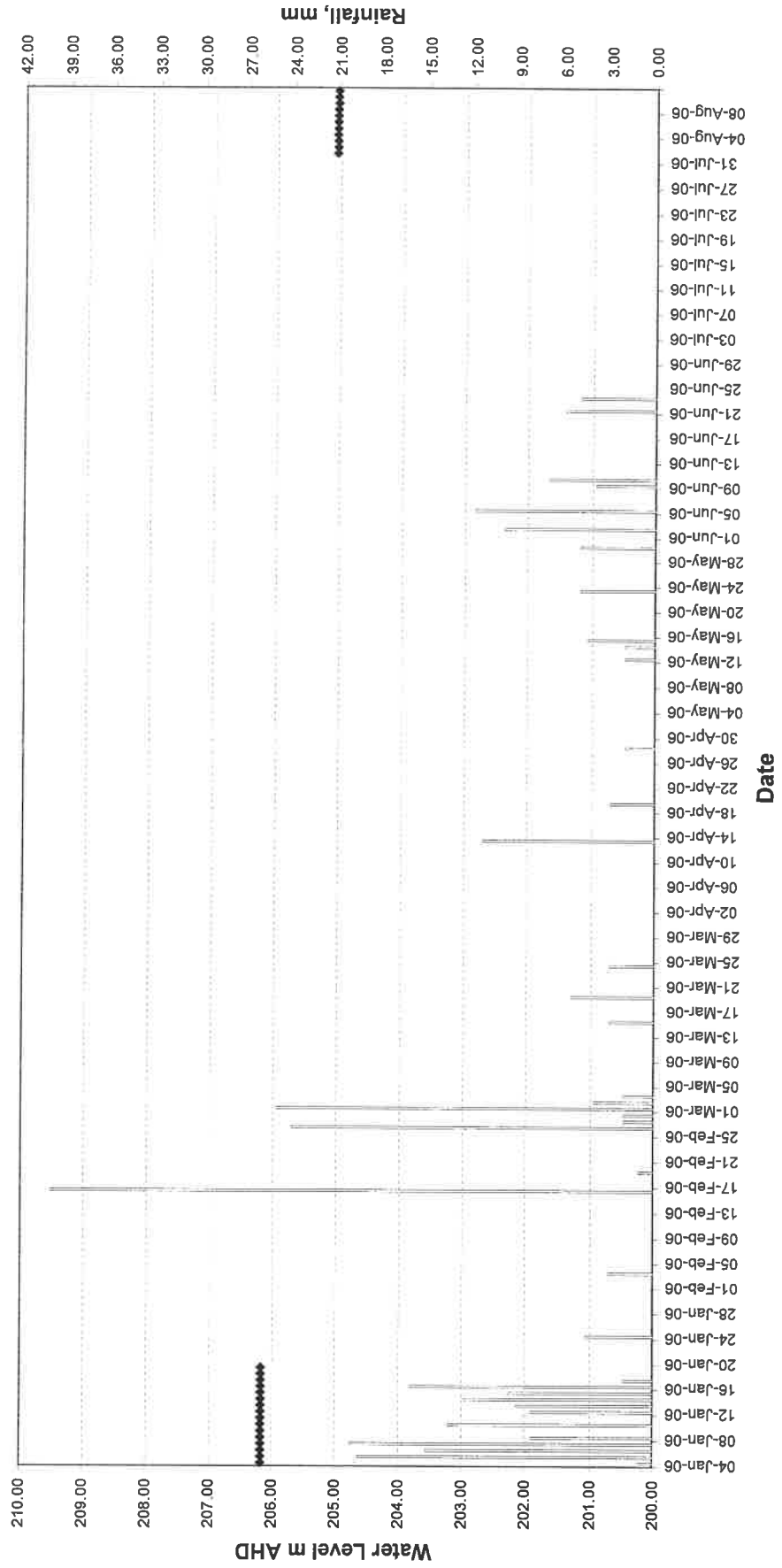
97 = laboratory measurements

\*\* = data logger no longer operational

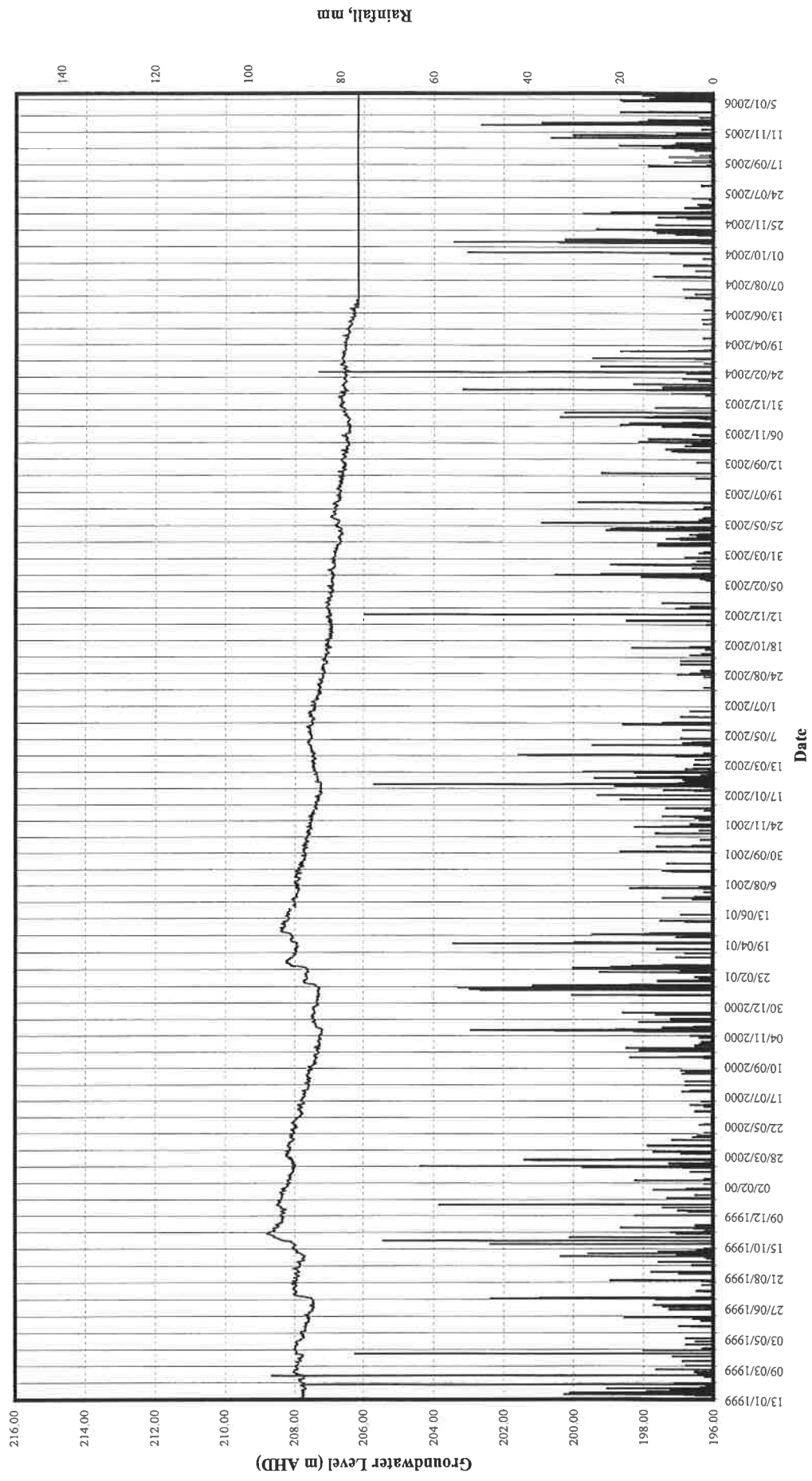
## H.B.Maroota - Groundwater Monitoring Data Plots



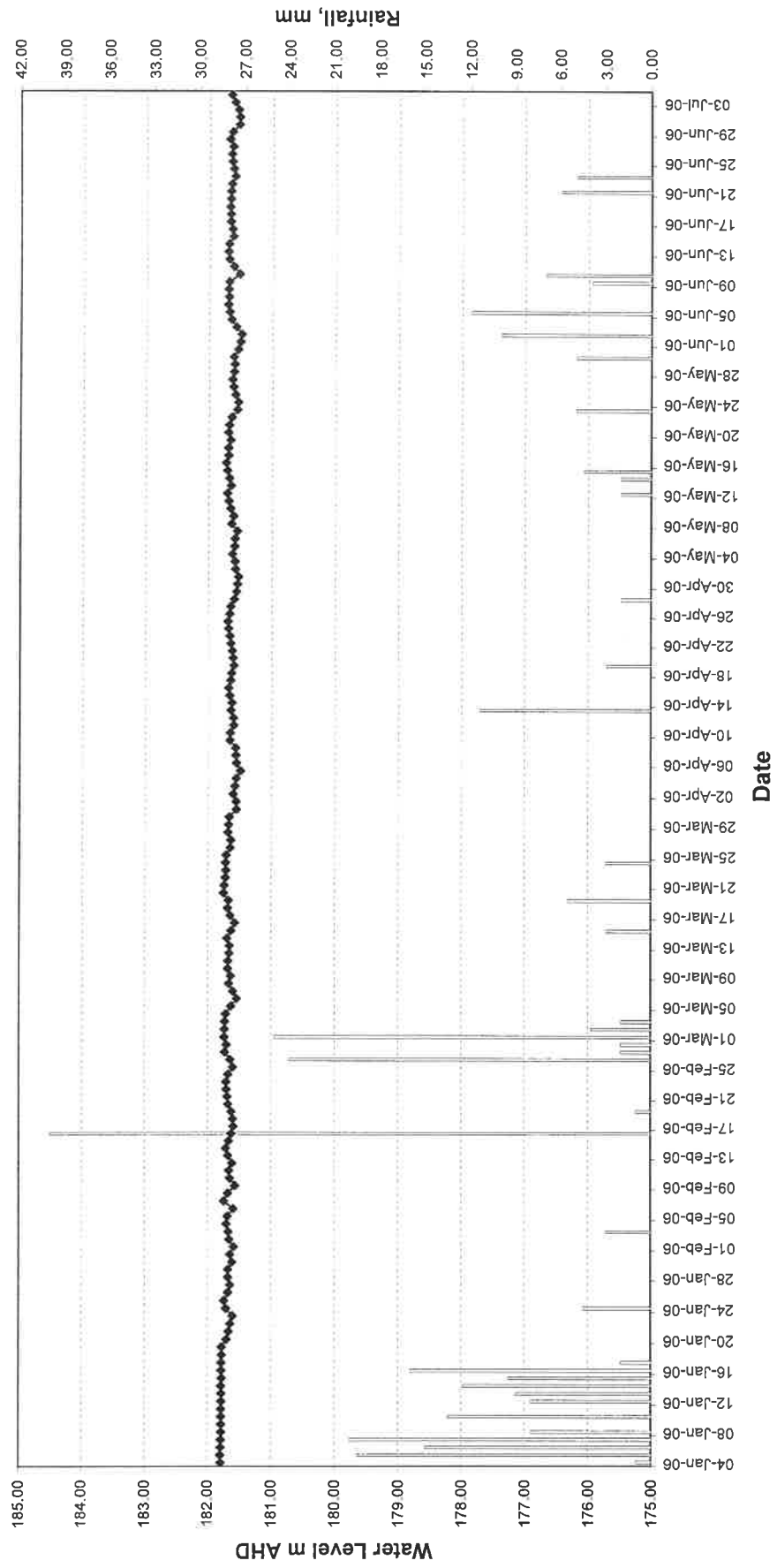
# **H.B.MAROOTA** **Bore PT84MW1** **Groundwater Monitoring Data**



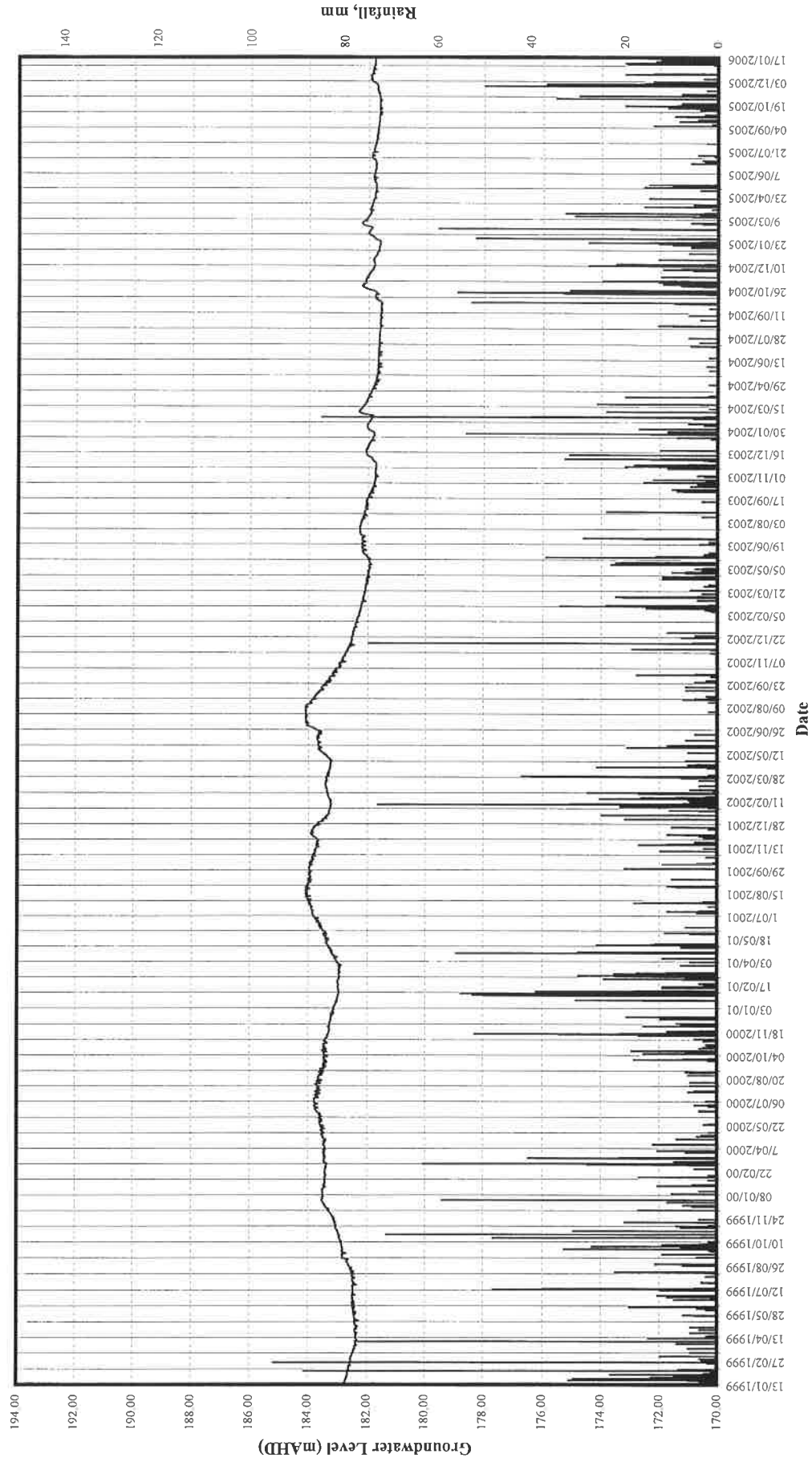
H.B.Maroota Pty Ltd, Lot 2, DP228308, Maroota  
Groundwater Monitoring Bore PT84MW1



**H.B.MAROOTA**  
**Bore PT84MW3**  
**Groundwater Monitoring Data**



H.B.Maroota Pty. Ltd., Lot 1 DP228308, Maroota  
Groundwater Monitoring Bore PT84MW3



16 July 2007  
Project No. 43346058

H.B.Maroota Pty Ltd  
PO BOX 1778  
GOSFORD NSW 2250

Attention: Mr Ralph Betts  
Director

Dear Ralph,

**Subject: June 2007 Data Loggers Downloading**

Attached are the updated plots of the groundwater levels recorded in the bores at your Maroota property up to the 4<sup>th</sup> July 2007 (Bore PT84MW3) and 12 July 2007 (PT84MW1) and a summary of the groundwater field parameters. The difference between the two dates is due to having to temporarily replace the data logger in PT84MW1 because of a corrupted file in the data logger. This problem has been resolved in the office and the logger tested in many ways to ensure that no recurring problem will occur. The logger has now been returned to the bore.

**1. WATER LEVELS**

**1.1 MONITORING BORE PT84MW1**

During a site visit on the 4<sup>th</sup> July 2007 to download the data loggers, it was found that the bore has been again "invaded" by rootlets, in spite of the clean up carried out in February 2006. This appears to be a persistent problem and it may be necessary to repeat the rootlets removal soon.

The hydrograph shows that the perched water table at this site has reacted rapidly to the substantial rainfall experienced in mid June 2007.

**1.2 MONITORING BORE PT84MW3**

The water level in this bore was at approximately one metre from the bottom of the casing and appeared to be discoloured by some grey clay for most of the last twelve months. A rapid rise by approximately one metre to RL 183 m has resulted from the mid June rainfall event.

Mr Ralph Betts  
Hodgson Contracting Services  
16 July 2007  
Page 2

As indicated in previous reports, the water table in bore PT84MW3 has ranged between 184.09 m AHD in July 2002 and 181.55 m AHD in September 2004. This range, 2.54 m, is of the same magnitude as that in PT84MW1 indicating that the two bores respond in a similar manner to the variations in the climatic conditions. Following the June rainfall, the water level in both bores rose by approximately one metre.

## **2. WATER QUALITY**

Water quality in all the bores on the site is generally fresh and, potentially, of drinking water standards.

### **2.1.1 PT84MW1**

Table 1 presents a summary of the recorded groundwater field chemical parameters measurements in the monitoring bores.

### **2.1.2 PT84MW3**

There appears to be a general coincidence between past water table rises and decrease in EC, reflecting the rapid response of the aquifer to rainfall infiltration. Overall, groundwater salinity is fairly constant in the very fresh range.

I trust the above meets with your requirements. Please, do not hesitate to contact the undersigned, should you need to discuss the matter further.

Yours sincerely,

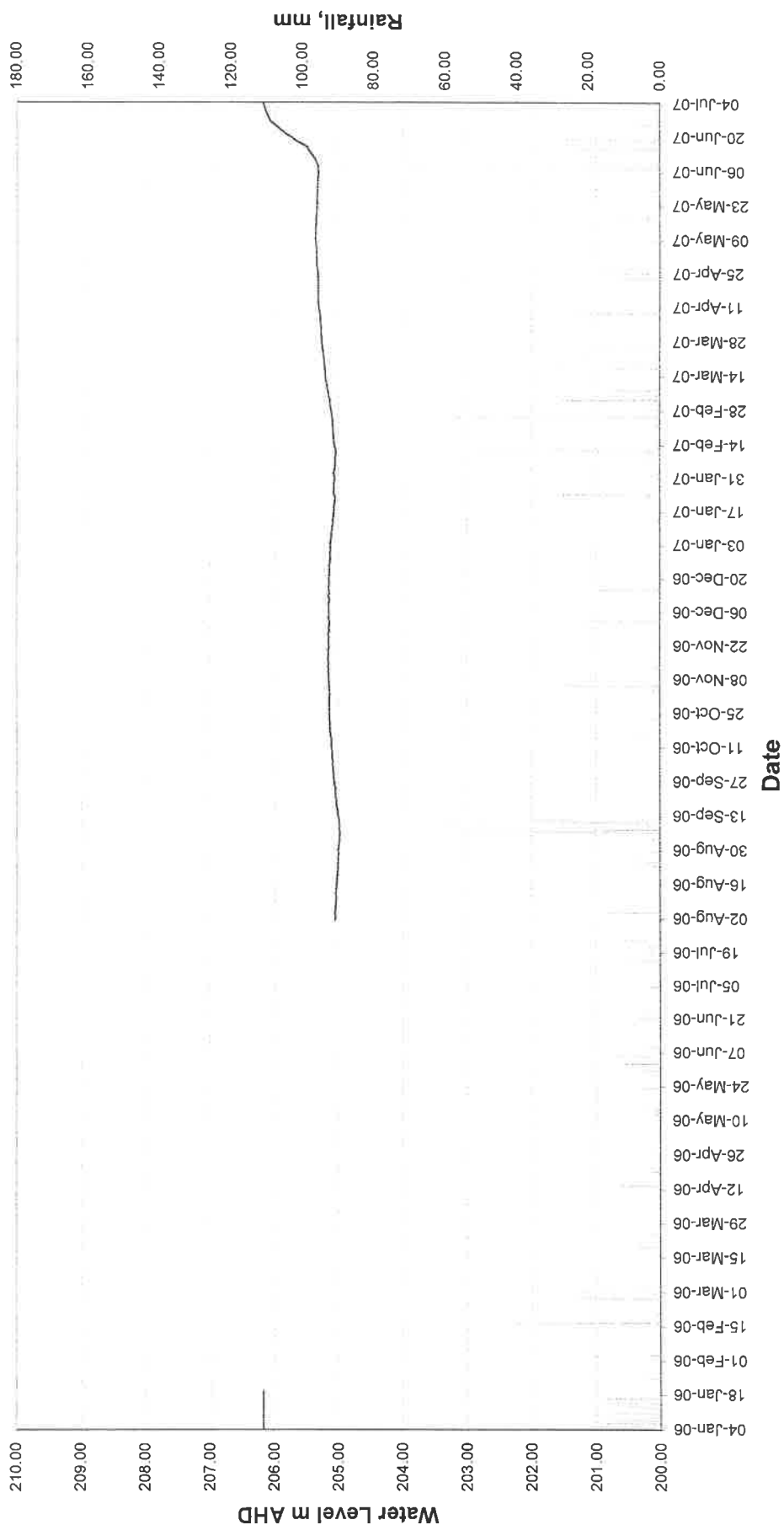
**URS AUSTRALIA PTY LTD**

Fabio Carosone  
Associate, Hydrogeologist

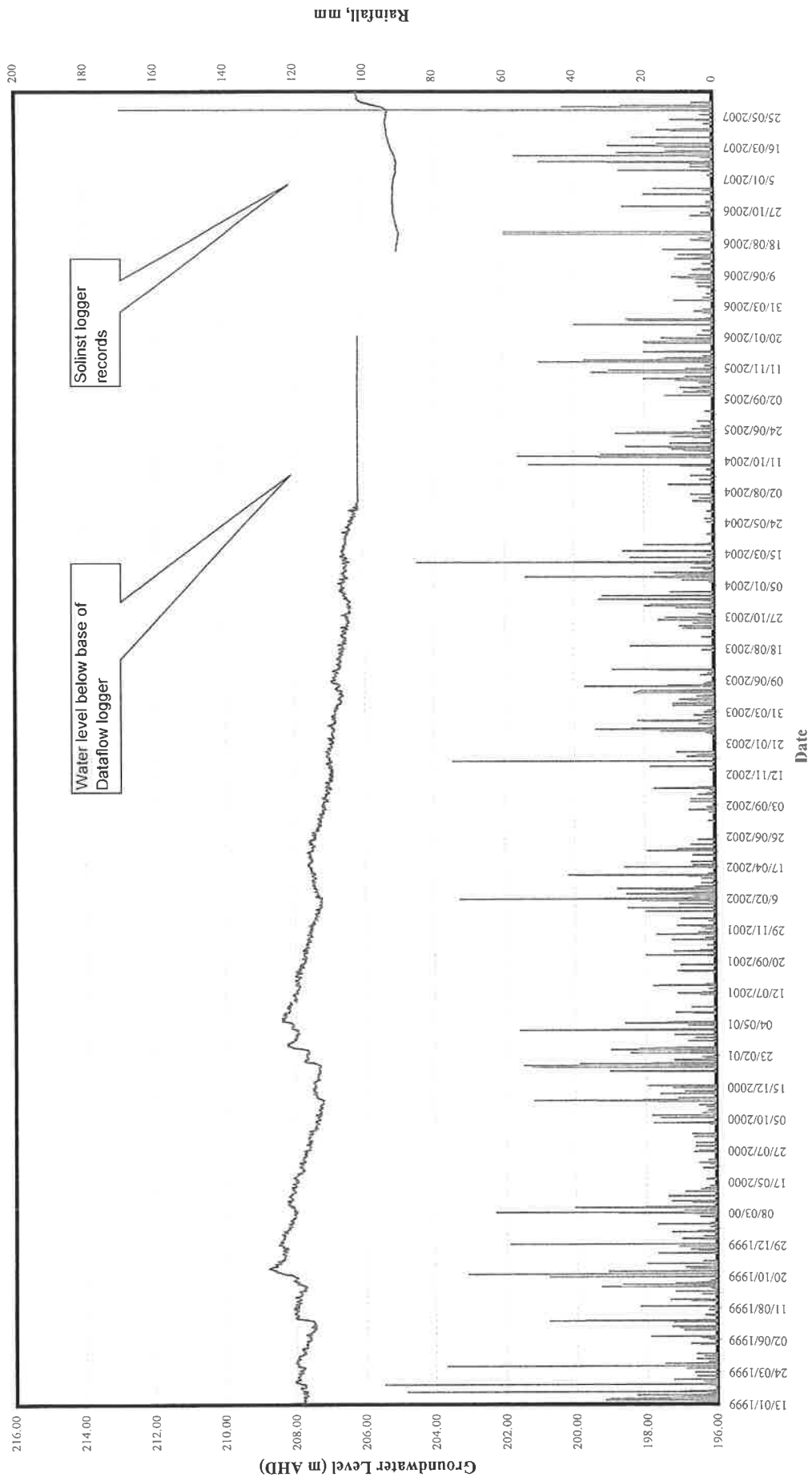


**H.B.MAROOTA**  
**Bore PT84MW1**  
**Groundwater Monitoring Data**

Rainfall, mm  
— Water Level, m AHD



H.B. Maroota Pty Ltd, Lot 2, DP228308, Maroota  
Groundwater Monitoring Bore PT84MW1





**H.B.MAROOTA**  
**Bore PT84MW3**  
**Groundwater Monitoring Data**

Rainfall, mm  
Water Level, m AHD

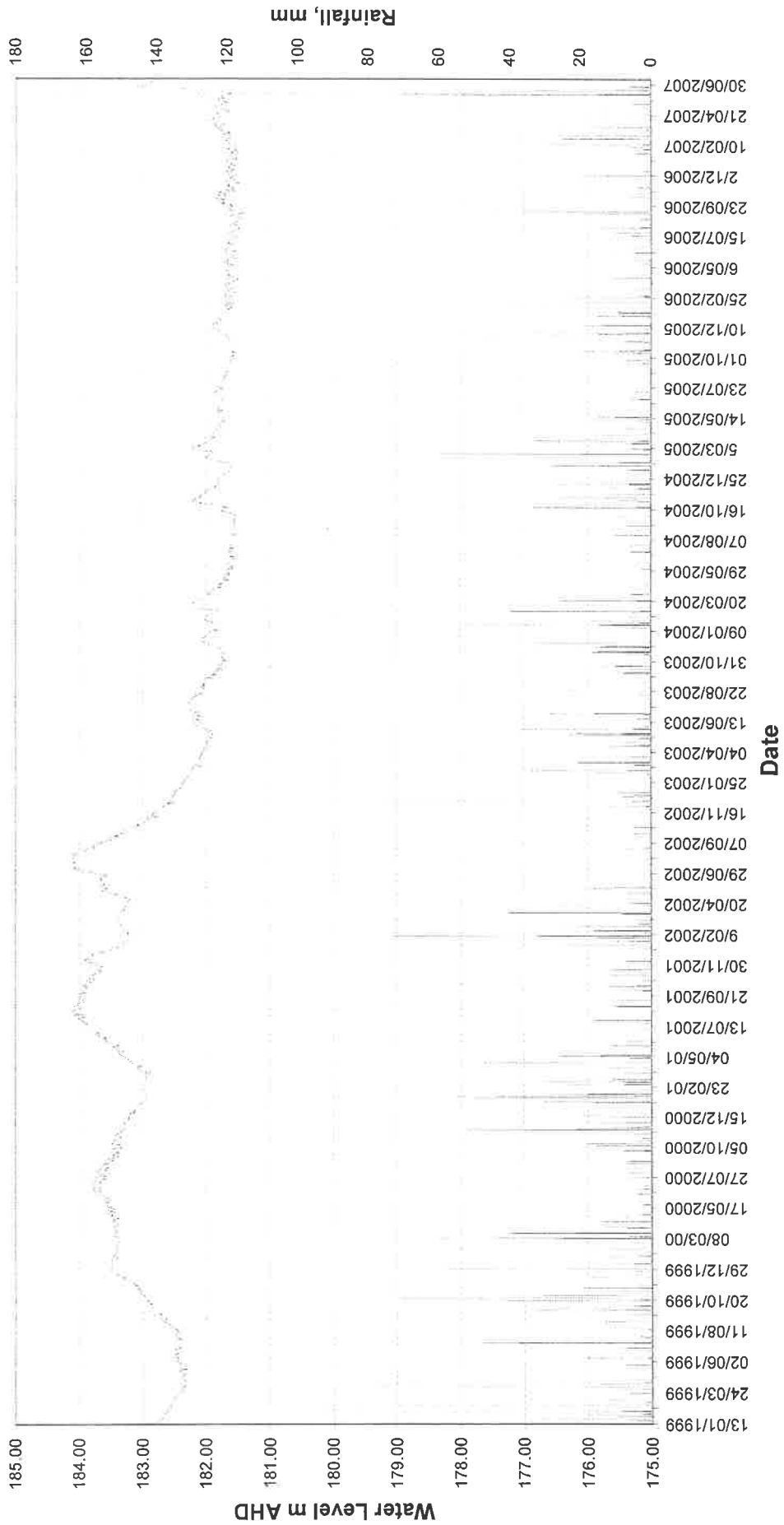


TABLE 1 -

## H.B. MAROOTA, FIELD MEASUREMENTS AND LABORATORY SUMMARY

| Bore      | Aquifer | Date       | pH   | EC<br>μS/cm | TDS<br>mg/L | Ca<br>mg/L     | Mg<br>mg/L | Na<br>mg/L | K<br>mg/L | Cl<br>mg/L | HCO3<br>mg/L | H2SO4<br>mg/L | SWL<br>m b TOC | TOC<br>m AHD | SWL<br>m AHD |
|-----------|---------|------------|------|-------------|-------------|----------------|------------|------------|-----------|------------|--------------|---------------|----------------|--------------|--------------|
| PT84MW1   | M.S.    | 23.10.1998 | 4.96 | 246         | 186         | 3              | 9          | 27         | 3         | 50         | 4            | 3             | 5.05           | 214.24       | 209.19       |
| PT84MW1   | M.S.    | 29.10.1998 |      |             |             |                |            |            |           |            |              |               | 6.15           | 214.24       | 208.09       |
| PT84MW1   | M.S.    | 13.1.1999  |      |             |             |                |            |            |           |            |              |               | 6.43           | 214.24       | 207.81       |
| PT84MW1   | M.S.    | 11.2.1999  |      |             |             |                |            |            |           |            |              |               | 6.51           | 214.24       | 207.73       |
| PT84MW1   | M.S.    | 9.9.1999   | 4.13 | 326         | 196         |                |            |            |           |            |              |               | 6.37           | 214.24       | 207.87       |
| PT84MW1   | M.S.    | 22.12.1999 | 5    | 341         | 205         |                |            |            |           |            |              |               | 6.00           | 214.24       | 208.24       |
| PT84MW1   | M.S.    | 10.3.2000  | 3.88 | 335         | 242         |                |            |            |           |            |              |               | 5.52           | 214.24       | 208.72       |
| PT84MW1   | M.S.    | 6.6.2000   | 3.90 | 275         | 165         |                |            |            |           |            |              |               | 6.33           | 214.24       | 207.91       |
| PT84MW1   | M.S.    | 29.9.2000  | 4.44 | 405         | 243         |                |            |            |           |            |              |               | 6.81           | 214.24       | 207.43       |
| PT84MW1   | M.S.    | 29.11.2000 | 4.38 | 340         | 204         |                |            |            |           |            |              |               | 6.80           | 214.24       | 207.44       |
| PT84MW1   | M.S.    | 21.6.2001  | 3.88 | 253         | 152         |                |            |            |           |            |              |               | 6.09           | 214.24       | 208.15       |
| PT84MW1   | M.S.    | 19.12.2001 | 3.84 | 320         | 192         |                |            |            |           |            |              |               | 6.78           | 214.24       | 207.46       |
| PT84MW1   | M.S.    | 5.7.2002   | 4.36 | 286         | 172         |                |            |            |           |            |              |               | 6.77           | 214.24       | 207.47       |
| PT84MW1   | M.S.    | 7.3.2003   | 3.72 | 240         | 144         |                |            |            |           |            |              |               | 7.38           | 214.24       | 206.86       |
| PT84MW1   | M.S.    | 9.7.2003   | 3.51 | 202         | 121         |                |            |            |           |            |              |               | 7.52           | 214.24       | 206.72       |
| PT84MW1   | M.S.    | 30.1.2004  | 5.13 | 189         | 113         |                |            |            |           |            |              |               | 7.60           | 214.24       | 206.64       |
| PT84MW1   | M.S.    | 15.12.2004 |      |             |             | dry            |            |            |           |            |              |               | 8.07           | 214.24       | 206.17       |
| PT84MW1   | M.S.    | 22.6.2005  |      |             |             | dry            |            |            |           |            |              |               |                |              |              |
| PT84MW1   | M.S.    | 19.1.2006  |      |             |             | dry            |            |            |           |            |              |               |                |              |              |
| PT84MW1   | M.S.    | 4.7.2007   | 4.55 | 135         | 81          |                |            |            |           |            |              |               | 7.96           | 214.24       | 206.28       |
| Average   |         |            |      | 289         | 180         |                |            |            |           |            |              |               |                |              |              |
| PT84MW2   | M.S.    | 23.10.1998 |      |             |             |                |            |            |           |            |              |               | 25.00          | 227.63       | 202.63       |
| PT84MW2   | M.S.    | 29.10.1998 |      |             |             |                |            |            |           |            |              |               | 25.35          | 227.63       | 202.28       |
| PT84MW2   | M.S.    | 13.1.1999  |      |             |             |                |            |            |           |            |              |               | 25.43          | 227.63       | 202.20       |
| PT84MW2   | M.S.    | 11.2.1999  |      |             |             |                |            |            |           |            |              |               | 25.49          | 227.63       | 202.14       |
| PT84MW2   | M.S.    | 9.9.1999   |      |             |             |                |            |            |           |            |              |               | 25.43          | 227.63       | 202.20       |
| PT84MW2   | M.S.    | 22.12.1999 |      |             |             |                |            |            |           |            |              |               |                | 227.63       |              |
| PT84MW2   | M.S.    | 10.3.2000  | 6.10 | 543         | 530         |                |            |            |           |            |              |               | 24.55          | 227.63       | 203.08       |
| PT84MW2** |         |            |      |             |             |                |            |            |           |            |              |               |                |              |              |
| PT84MW3   | M.S.    | 23.10.1998 | 5.88 | 381         | 266         | <1             | 2          | 79         | 1         | 9          | 14           | 9             | 19.61          | 203.25       | 183.64       |
| PT84MW3   | M.S.    | 29.10.1998 |      |             |             |                |            |            |           |            |              |               | 18.84          | 203.25       | 184.41       |
| PT84MW3   | M.S.    | 13.1.1999  |      |             |             |                |            |            |           |            |              |               | 20.40          | 203.25       | 182.85       |
| PT84MW3   | M.S.    | 11.2.1999  |      |             |             |                |            |            |           |            |              |               | 20.58          | 203.25       | 182.67       |
| PT84MW3   | M.S.    | 9.9.1999   | 4.64 | 134         | 80          |                |            |            |           |            |              |               | 20.43          | 203.25       | 182.82       |
| PT84MW3   | M.S.    | 22.12.1999 |      | 138         | 83          |                |            |            |           |            |              |               | 19.88          | 203.25       | 183.37       |
| PT84MW3   | M.S.    | 10.3.2000  | 4.51 | 139         | 97          |                |            |            |           |            |              |               | 19.83          | 203.25       | 183.42       |
| PT84MW3   | M.S.    | 6.6.2000   | 4.80 | 160         | 96          |                |            |            |           |            |              |               | 19.65          | 203.25       | 183.60       |
| PT84MW3   | M.S.    | 29.9.2000  | 4.35 | 159         | 95          |                |            |            |           |            |              |               | 19.82          | 203.25       | 183.43       |
| PT84MW3   | M.S.    | 29.11.2000 | 5.24 | 159         | 95          |                |            |            |           |            |              |               | 19.95          | 203.25       | 183.30       |
| PT84MW3   | M.S.    | 21.6.2001  | 4.57 | 139         | 83          |                |            |            |           |            |              |               | 19.53          | 203.25       | 183.72       |
| PT84MW3   | M.S.    | 19.12.2001 | 4.49 | 191         | 115         |                |            |            |           |            |              |               | 19.41          | 203.25       | 183.84       |
| PT84MW3   | M.S.    | 5.7.2002   | 7.79 | 266         | 160         |                |            |            |           |            |              |               | 19.17          | 203.25       | 184.08       |
| PT84MW3   | M.S.    | 7.3.2003   | 4.29 | 170         | 102         |                |            |            |           |            |              |               | 21.08          | 203.25       | 182.17       |
| PT84MW3   | M.S.    | 9.7.2003   | 3.72 | 105         | 63          |                |            |            |           |            |              |               | 21.00          | 203.25       | 182.25       |
| PT84MW3   | M.S.    | 30.1.2004  | 6.83 | 72          | 43          |                |            |            |           |            |              |               | 21.28          | 203.25       | 181.97       |
| PT84MW3   | M.S.    | 15.12.2004 | 6.07 | 90          | 54          |                |            |            |           |            |              |               | 21.44          | 203.25       | 181.81       |
| PT84MW3   | M.S.    | 22.6.2004  | 6.05 | 106         | 64          |                |            |            |           |            |              |               | 21.77          | 203.25       | 181.48       |
| PT84MW3   | M.S.    | 19.1.2006  | 6.10 | 98          | 59          |                |            |            |           |            |              |               | 21.48          | 203.25       | 181.77       |
| PT84MW3   | M.S.    | 4.7.2007   | 5.13 | 46          | 28          |                |            |            |           |            |              |               | 20.29          | 203.25       | 182.96       |
| Average   |         |            |      | 150         | 93          |                |            |            |           |            |              |               |                |              |              |
| PT84PB1   | H.S.    | 19.8.1999  |      |             | 60          |                |            |            |           |            |              |               | 14.80          | 193.51       | 178.71       |
| PT84PB1   | H.S.    | 7.3.2003   |      |             |             |                |            |            |           |            |              |               | pumping        |              |              |
| PT84PB2   | H.S.    | 19.8.1999  |      |             | 50          | To be surveyed |            |            |           |            |              |               | 51.50          | 212.50       | 161.00       |
| PT84PB2   | H.S.    | 18.3.2000  |      |             |             |                |            |            |           |            |              |               | 48.38          | 212.00       | 163.62       |
| PT84PB2   | H.S.    | 6.6.2000   |      |             |             |                |            |            |           |            |              |               | 46.72          | 212.50       | 165.78       |
| PT84PB2   | H.S.    | 29.9.2000  | 4.74 | 154         | 92          |                |            |            |           |            |              |               | 46.09          | 212.50       | 166.41       |
| PT84PB2   | H.S.    | 29.11.2000 | 4.08 | 134         | 80          |                |            |            |           |            |              |               | 44.91          | 212.50       | 167.59       |
| PT84PB2   | H.S.    | 21.6.01    |      |             |             |                |            |            |           |            |              |               | 43.00          | 212.50       | 169.50       |
| PT84PB2   | H.S.    | 19.12.01   | 4.09 | 139         | 88          |                |            |            |           |            |              |               | 43.24          | 212.50       | 169.26       |
| PT84PB2   | H.S.    | 5.7.02     | 4.44 | 127         | 76          |                |            |            |           |            |              |               | 42.81          | 212.50       | 169.69       |
| PT84PB2   | H.S.    | 7.3.2003   |      |             |             |                |            |            |           |            |              |               | pumping        |              |              |
| PT84PB2   | H.S.    | 12.9.05    | 4.52 | 113         | 77          | <1             | 3          | 17         | <1        | 34         | <1           | <1            | pumping        |              |              |

2/2.5 = estimated from contour plan

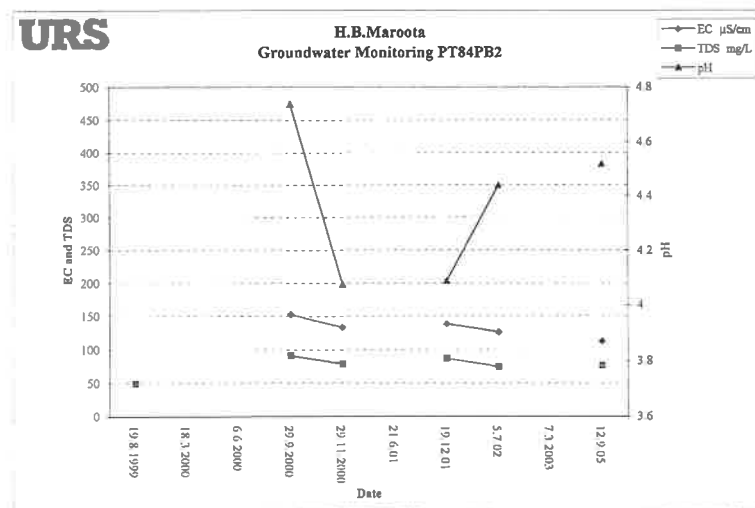
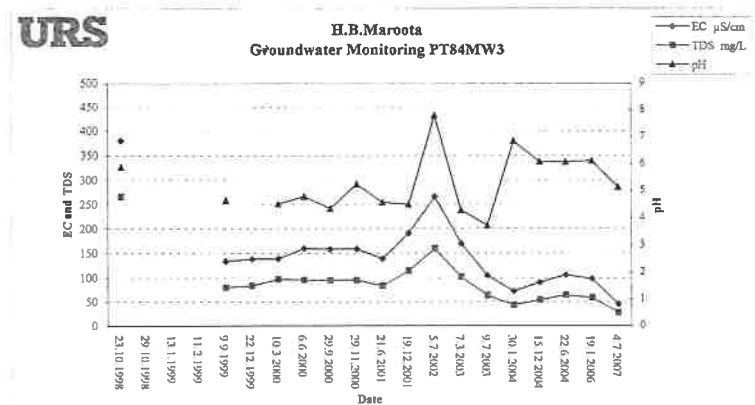
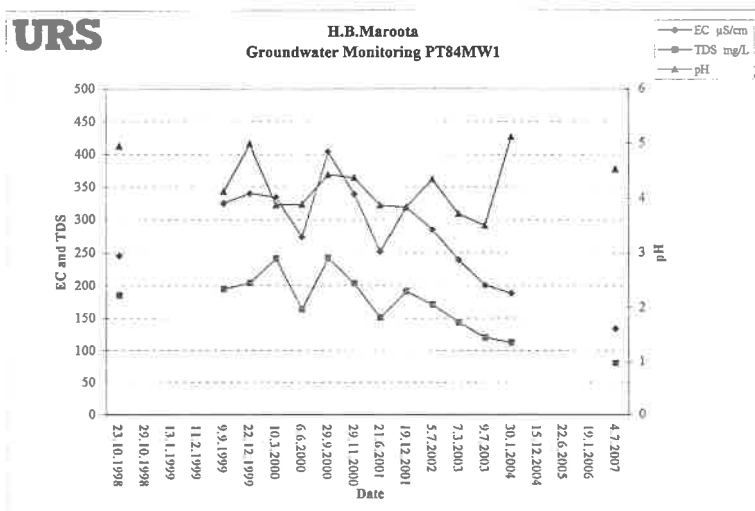
M.S. = Maroota Sand

H.S. = Hawkesbury Sandstone

97 = laboratory measurements

\*\* = data logger no longer operational

## H.B.Maroota - Groundwater Monitoring Data Plots



17 July 2008  
Project No. 43346058

H.B.Maroota Pty Ltd  
PO BOX 1778  
GOSFORD NSW 2250

Attention: Mr Martin Hodgson  
Director

Dear Martin,

**Subject: June 2008 Data Loggers Downloading**

Attached are the updated plots of the groundwater levels recorded in the two monitoring bores at your Maroota property up to the 3<sup>rd</sup> July 2008 and a summary of the groundwater field parameters.

**1. WATER LEVELS**

**1.1 MONITORING BORE PT84MW1**

As noted in the 2007 report, rootlets appear to be growing again in the screened section of this bore. This appears to be a persistent problem and it may be necessary to repeat the rootlets removal soon.

The hydrograph shows that the perched water table at this site has reacted rapidly to the substantial rainfall experienced in mid June 2007 (384.5 mm) and to the above average year 2007-2008 (1291.5 mm). Since June 2007, the water level in this bore has risen by approximately 2.5 m, the highest level since July 2001, but approximately 1 m below the highest recorded level (October 1999).

**1.2 MONITORING BORE PT84MW3**

A rapid rise of approximately 1.3 m to RL 183 m has resulted from the mid June rainfall event. After a brief decline, the water level has risen steadily throughout the above average 2007 – 2008 year rainfall.

As indicated in previous reports, the water table in bore PT84MW3 has ranged between 184.09 m AHD in July 2002 and 181.55 m AHD in September 2004. This range, 2.54 m, is of the same magnitude as that in PT84MW1 indicating that the two bores respond in a similar manner to the variations in the climatic conditions.

Mr Ralph Betts  
Hodgson Contracting Services  
17 July 2008  
Page 2

## **2. WATER QUALITY**

Water quality in all the bores on the site is generally fresh and, potentially, of drinking water standards.

### **2.1.1 PT84MW1**

Table 1 presents a summary of the recorded groundwater field chemical parameters measurements in the monitoring bores. The Total Dissolved Salts content of the groundwater at this site shows a steady declining trend since the year 2000, in apparent coincidence with the declining water level and lower rainfall. However, the July 2008 measurements indicate a small rise in TDS and pH, following the influx of acidic rainfall and the ensuing mobilisation of the aquifer matrix constituents.

### **2.1.2 PT84MW3**

There appears to be a general coincidence between past water table rises and decrease in EC, reflecting the rapid response of the aquifer to rainfall infiltration. Overall, since 2003 the groundwater salinity has been constant and in the very fresh range.

I trust the above meets with your requirements. Please, do not hesitate to contact the undersigned, should you need to discuss the matter further.

Yours sincerely,

**URS AUSTRALIA PTY LTD**



Fabio Carosone  
Senior Associate Hydrogeologist

TABLE 1 -

H.B. MAROOTA. FIELD MEASUREMENTS AND LABORATORY SUMMARY

| Bore      | Aquifer | Date       | pH   | EC<br>µS/cm | TDS<br>mg/L | Ca<br>mg/L     | Mg<br>mg/L | Na<br>mg/L | K<br>mg/L | Cl<br>mg/L | HCO <sub>3</sub><br>mg/L | H <sub>2</sub> SO <sub>4</sub><br>mg/L | SWL<br>m b TOC | TOC<br>m AHD | SWL<br>m AHD |
|-----------|---------|------------|------|-------------|-------------|----------------|------------|------------|-----------|------------|--------------------------|----------------------------------------|----------------|--------------|--------------|
| PT84MW1   | M.S.    | 23.10.1998 | 4.96 | 246         | 186         | 3              | 9          | 27         | 3         | 50         | 4                        | 3                                      | 5.05           | 214.24       | 209.19       |
| PT84MW1   | M.S.    | 29.10.1998 |      |             |             |                |            |            |           |            |                          |                                        | 6.15           | 214.24       | 208.09       |
| PT84MW1   | M.S.    | 13.1.1999  |      |             |             |                |            |            |           |            |                          |                                        | 6.43           | 214.24       | 207.81       |
| PT84MW1   | M.S.    | 11.2.1999  |      |             |             |                |            |            |           |            |                          |                                        | 6.51           | 214.24       | 207.73       |
| PT84MW1   | M.S.    | 9.9.1999   | 4.13 | 326         | 196         |                |            |            |           |            |                          |                                        | 6.37           | 214.24       | 207.87       |
| PT84MW1   | M.S.    | 22.12.1999 | 5    | 341         | 205         |                |            |            |           |            |                          |                                        | 6.00           | 214.24       | 208.24       |
| PT84MW1   | M.S.    | 10.3.2000  | 3.88 | 335         | 242         |                |            |            |           |            |                          |                                        | 5.52           | 214.24       | 208.72       |
| PT84MW1   | M.S.    | 6.6.2000   | 3.90 | 275         | 165         |                |            |            |           |            |                          |                                        | 6.33           | 214.24       | 207.91       |
| PT84MW1   | M.S.    | 29.9.2000  | 4.44 | 405         | 243         |                |            |            |           |            |                          |                                        | 6.81           | 214.24       | 207.43       |
| PT84MW1   | M.S.    | 29.11.2000 | 4.38 | 340         | 204         |                |            |            |           |            |                          |                                        | 6.80           | 214.24       | 207.44       |
| PT84MW1   | M.S.    | 21.6.2001  | 3.88 | 253         | 152         |                |            |            |           |            |                          |                                        | 6.09           | 214.24       | 208.15       |
| PT84MW1   | M.S.    | 19.12.2001 | 3.84 | 320         | 192         |                |            |            |           |            |                          |                                        | 6.78           | 214.24       | 207.46       |
| PT84MW1   | M.S.    | 5.7.2002   | 4.36 | 286         | 172         |                |            |            |           |            |                          |                                        | 6.77           | 214.24       | 207.47       |
| PT84MW1   | M.S.    | 7.3.2003   | 3.72 | 240         | 144         |                |            |            |           |            |                          |                                        | 7.38           | 214.24       | 206.86       |
| PT84MW1   | M.S.    | 9.7.2003   | 3.51 | 202         | 121         |                |            |            |           |            |                          |                                        | 7.52           | 214.24       | 206.72       |
| PT84MW1   | M.S.    | 30.1.2004  | 5.13 | 189         | 113         |                |            |            |           |            |                          |                                        | 7.60           | 214.24       | 206.64       |
| PT84MW1   | M.S.    | 15.12.2004 |      |             |             |                |            |            |           |            |                          |                                        | 8.07           | 214.24       | 206.17       |
| PT84MW1   | M.S.    | 22.6.2005  |      |             |             | dry            |            |            |           |            |                          |                                        |                |              |              |
| PT84MW1   | M.S.    | 19.1.2006  |      |             |             | dry            |            |            |           |            |                          |                                        |                |              |              |
| PT84MW1   | M.S.    | 4.7.2007   | 4.55 | 135         | 81          |                |            |            |           |            |                          |                                        | 7.96           | 214.24       | 206.28       |
| PT84MW1   | M.S.    | 3.7.2008   | 4.78 | 203         | 122         |                |            |            |           |            |                          |                                        | 6.42           | 214.24       | 207.82       |
| Average   |         |            |      | 273         | 169         |                |            |            |           |            |                          |                                        |                |              |              |
| PT84MW2   | M.S.    | 23.10.1998 |      |             |             |                |            |            |           |            |                          |                                        | 25.00          | 227.63       | 202.63       |
| PT84MW2   | M.S.    | 29.10.1998 |      |             |             |                |            |            |           |            |                          |                                        | 25.35          | 227.63       | 202.28       |
| PT84MW2   | M.S.    | 13.1.1999  |      |             |             |                |            |            |           |            |                          |                                        | 25.43          | 227.63       | 202.20       |
| PT84MW2   | M.S.    | 11.2.1999  |      |             |             |                |            |            |           |            |                          |                                        | 25.49          | 227.63       | 202.14       |
| PT84MW2   | M.S.    | 9.9.1999   |      |             |             |                |            |            |           |            |                          |                                        | 25.43          | 227.63       | 202.20       |
| PT84MW2   | M.S.    | 22.12.1999 |      |             |             |                |            |            |           |            |                          |                                        |                | 227.63       |              |
| PT84MW2   | M.S.    | 10.3.2000  | 6.10 | 543         | 530         |                |            |            |           |            |                          |                                        | 24.55          | 227.63       | 203.08       |
| PT84MW2** |         |            |      |             |             |                |            |            |           |            |                          |                                        |                |              |              |
| PT84MW3   | M.S.    | 23.10.1998 | 5.88 | 381         | 266         | <1             | 2          | 79         | 1         | 9          | 14                       | 9                                      | 19.61          | 203.25       | 183.64       |
| PT84MW3   | M.S.    | 29.10.1998 |      |             |             |                |            |            |           |            |                          |                                        | 18.84          | 203.25       | 184.41       |
| PT84MW3   | M.S.    | 13.1.1999  |      |             |             |                |            |            |           |            |                          |                                        | 20.40          | 203.25       | 182.85       |
| PT84MW3   | M.S.    | 11.2.1999  |      |             |             |                |            |            |           |            |                          |                                        | 20.58          | 203.25       | 182.67       |
| PT84MW3   | M.S.    | 9.9.1999   | 4.64 | 134         | 80          |                |            |            |           |            |                          |                                        | 20.43          | 203.25       | 182.82       |
| PT84MW3   | M.S.    | 22.12.1999 |      | 138         | 83          |                |            |            |           |            |                          |                                        | 19.88          | 203.25       | 183.37       |
| PT84MW3   | M.S.    | 10.3.2000  | 4.51 | 139         | 97          |                |            |            |           |            |                          |                                        | 19.83          | 203.25       | 183.42       |
| PT84MW3   | M.S.    | 6.6.2000   | 4.80 | 160         | 96          |                |            |            |           |            |                          |                                        | 19.65          | 203.25       | 183.60       |
| PT84MW3   | M.S.    | 29.9.2000  | 4.35 | 159         | 95          |                |            |            |           |            |                          |                                        | 19.82          | 203.25       | 183.43       |
| PT84MW3   | M.S.    | 29.11.2000 | 5.24 | 159         | 95          |                |            |            |           |            |                          |                                        | 19.95          | 203.25       | 183.30       |
| PT84MW3   | M.S.    | 21.6.2001  | 4.57 | 139         | 83          |                |            |            |           |            |                          |                                        | 19.53          | 203.25       | 183.72       |
| PT84MW3   | M.S.    | 19.12.2001 | 4.49 | 191         | 115         |                |            |            |           |            |                          |                                        | 19.41          | 203.25       | 183.84       |
| PT84MW3   | M.S.    | 5.7.2002   | 7.79 | 266         | 160         |                |            |            |           |            |                          |                                        | 19.17          | 203.25       | 184.08       |
| PT84MW3   | M.S.    | 7.3.2003   | 4.29 | 170         | 102         |                |            |            |           |            |                          |                                        | 21.08          | 203.25       | 182.17       |
| PT84MW3   | M.S.    | 9.7.2003   | 3.72 | 105         | 63          |                |            |            |           |            |                          |                                        | 21.00          | 203.25       | 182.25       |
| PT84MW3   | M.S.    | 30.1.2004  | 6.83 | 72          | 43          |                |            |            |           |            |                          |                                        | 21.28          | 203.25       | 181.97       |
| PT84MW3   | M.S.    | 15.12.2004 | 6.07 | 90          | 54          |                |            |            |           |            |                          |                                        | 21.44          | 203.25       | 181.81       |
| PT84MW3   | M.S.    | 22.6.2004  | 6.05 | 106         | 64          |                |            |            |           |            |                          |                                        | 21.77          | 203.25       | 181.48       |
| PT84MW3   | M.S.    | 19.1.2006  | 6.10 | 98          | 59          |                |            |            |           |            |                          |                                        | 21.48          | 203.25       | 181.77       |
| PT84MW3   | M.S.    | 4.7.2007   | 5.13 | 46          | 28          |                |            |            |           |            |                          |                                        | 20.29          | 203.25       | 182.96       |
| PT84MW3   | M.S.    | 3.7.2008   | 4.77 | 68          | 41          |                |            |            |           |            |                          |                                        | 19.32          | 203.25       | 183.93       |
| Average   |         |            |      | 146         | 90          |                |            |            |           |            |                          |                                        |                |              |              |
| PT84PB1   | H.S.    | 19.8.1999  |      |             | 60          |                |            |            |           |            |                          |                                        | 14.80          | 193.51       | 178.71       |
| PT84PB1   | H.S.    | 7.3.2003   |      |             |             |                |            |            |           |            |                          |                                        | pumping        |              |              |
| PT84PB2   | H.S.    | 19.8.1999  |      |             | 50          | To be surveyed |            |            |           |            |                          |                                        | 51.50          | 212.50       | 161.00       |
| PT84PB2   | H.S.    | 18.3.2000  |      |             |             |                |            |            |           |            |                          |                                        | 48.38          | 212.00       | 163.62       |
| PT84PB2   | H.S.    | 6.6.2000   |      |             |             |                |            |            |           |            |                          |                                        | 46.72          | 212.50       | 165.78       |
| PT84PB2   | H.S.    | 29.9.2000  | 4.74 | 154         | 92          |                |            |            |           |            |                          |                                        | 46.09          | 212.50       | 166.41       |
| PT84PB2   | H.S.    | 29.11.2000 | 4.08 | 134         | 80          |                |            |            |           |            |                          |                                        | 44.91          | 212.50       | 167.59       |
| PT84PB2   | H.S.    | 21.6.01    |      |             |             |                |            |            |           |            |                          |                                        | 43.00          | 212.50       | 169.50       |
| PT84PB2   | H.S.    | 19.12.01   | 4.09 | 139         | 88          |                |            |            |           |            |                          |                                        | 43.24          | 212.50       | 169.26       |
| PT84PB2   | H.S.    | 5.7.02     | 4.44 | 127         | 76          |                |            |            |           |            |                          |                                        | 42.81          | 212.50       | 169.69       |
| PT84PB2   | H.S.    | 7.3.2003   |      |             |             |                |            |            |           |            |                          |                                        | pumping        |              |              |
| PT84PB2   | H.S.    | 12.9.05    | 4.52 | 113         | 77          | <1             | 3          | 17         | <1        | 34         | <1                       | <1                                     | pumping        |              |              |

212.5 = estimated from contour plan

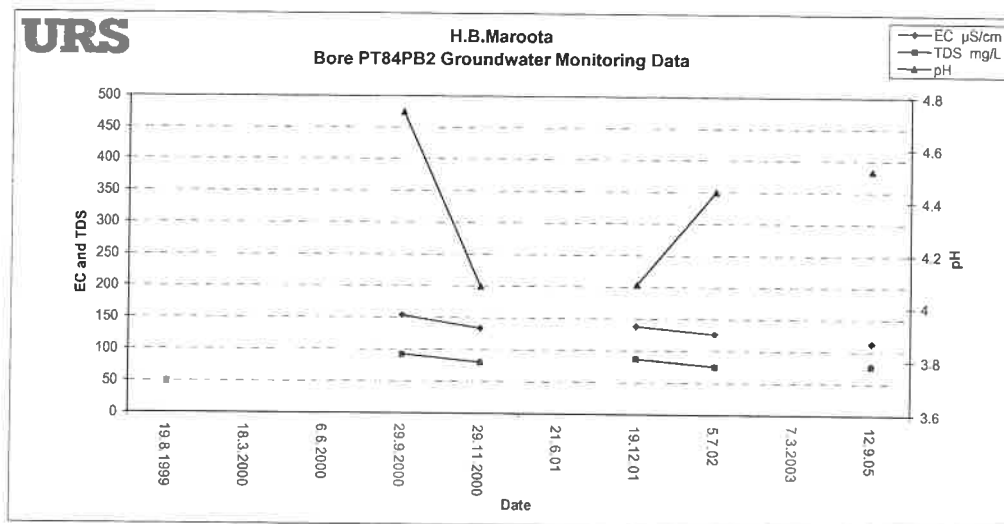
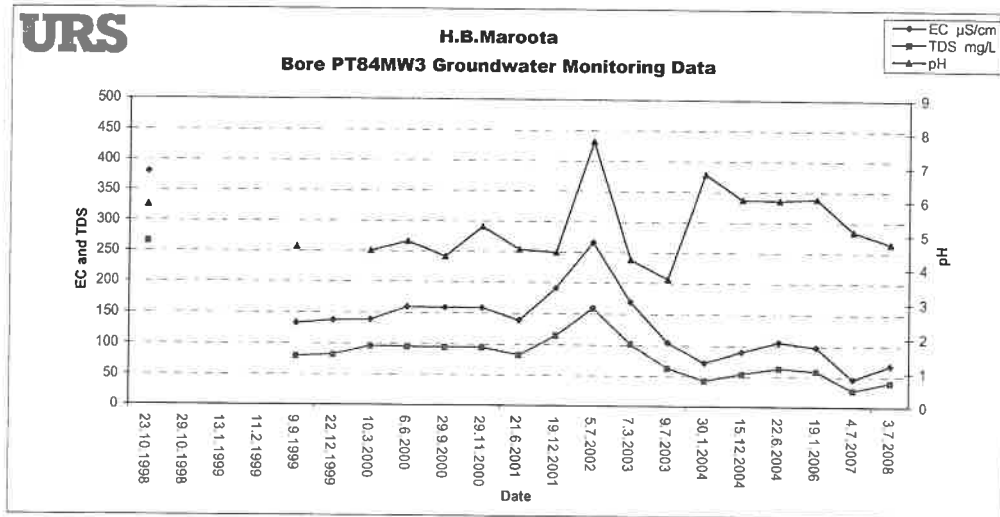
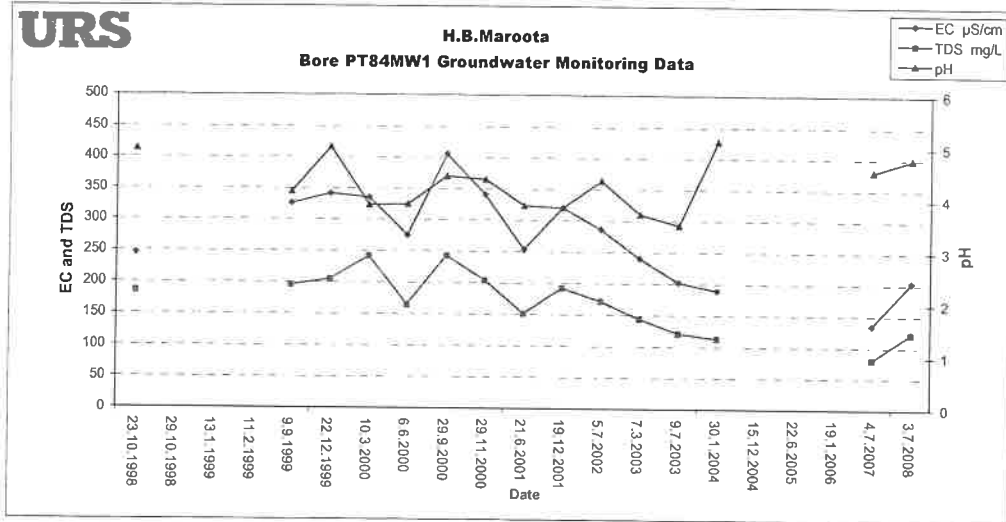
M.S. = Maroota Sand

H.S. = Hawkesbury Sandstone

97 = laboratory measurements

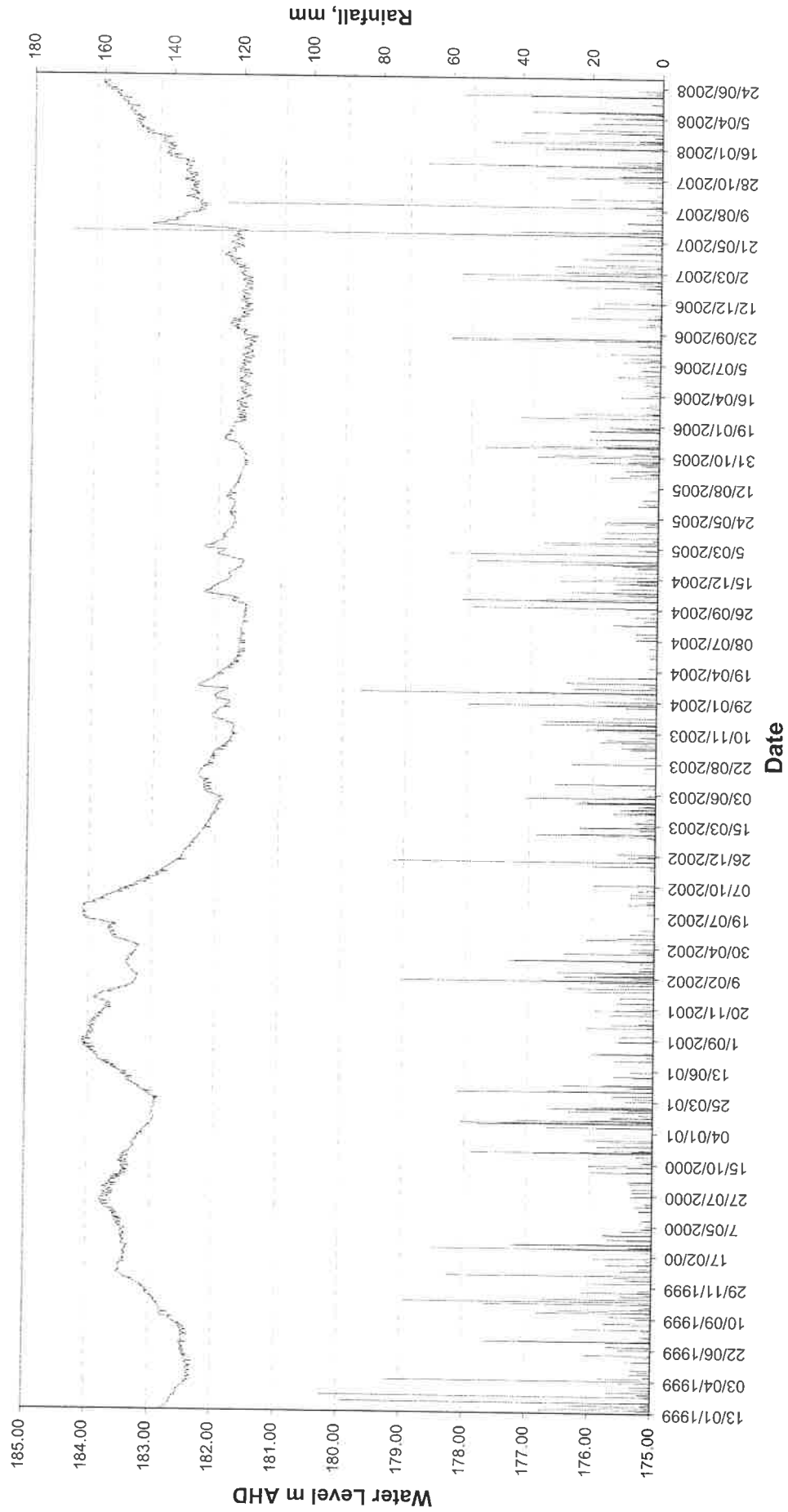
\*\* = data logger no longer operational

# H.B.Maroota - Groundwater Monitoring Data Plots



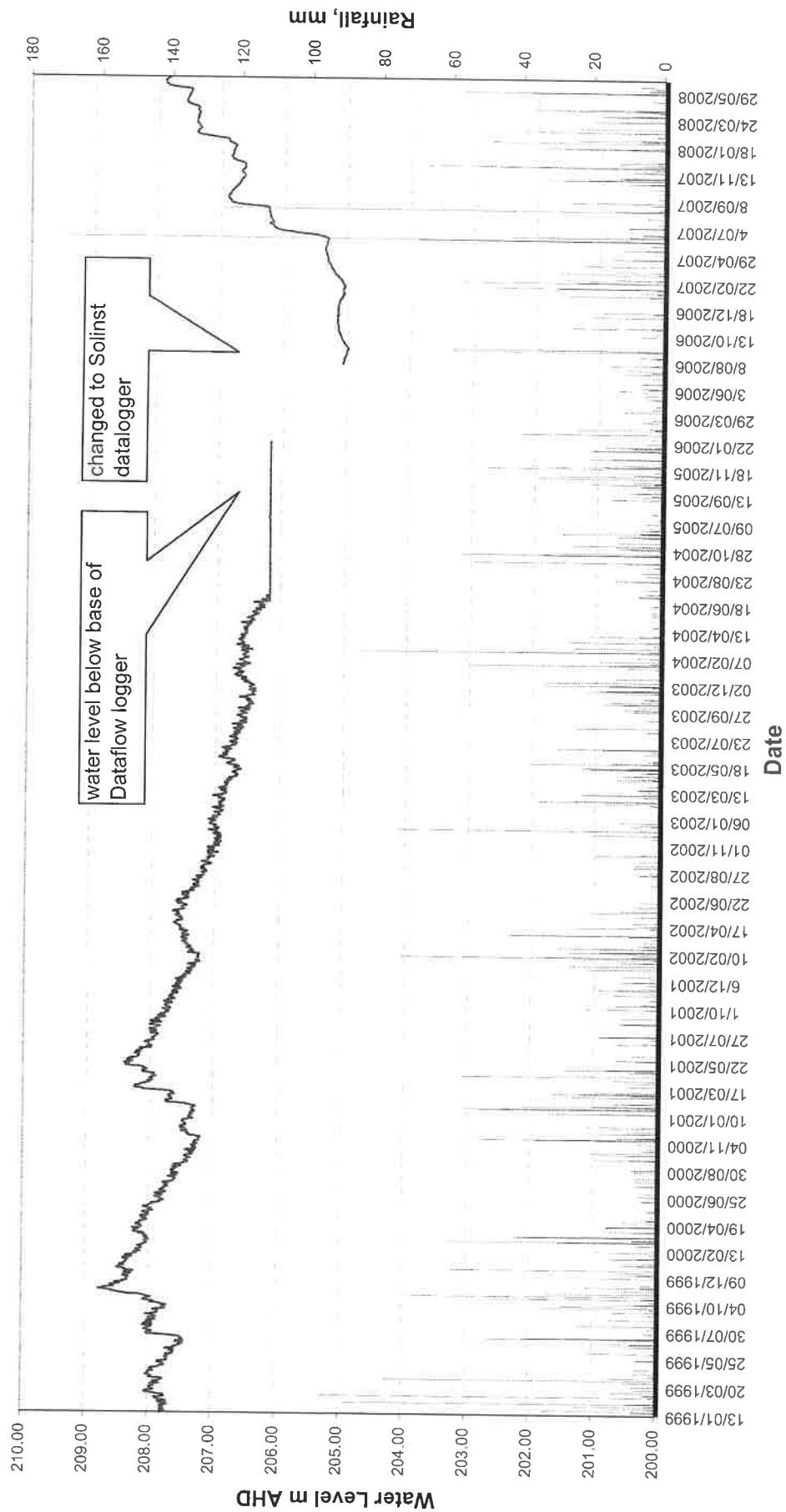
**H.B.MAROOTA**  
**Bore PT84MW3 Groundwater Monitoring Data**

 Rainfall, mm  
 Water Level, m AHD



# **H.B.MARROOTA** **Bore PT84MW1 Groundwater Monitoring Data**

Rainfall, mm  
 Water Level, m AHD



13 July 2009  
Project No. 43346058

H.B.Maroota Pty Ltd  
PO BOX 1778  
GOSFORD NSW 2250

Attention: Martin Hodgson  
Director

Dear Martin

**Subject: July 2009 Dataloggers Downloading**

Attached are the updated plots of the groundwater levels recorded in the two monitoring bores at your Maroota property up to the 6<sup>th</sup> July 2009 and a summary of the groundwater field parameters.

## **1 Water Levels**

### **1.1 Monitoring bore PT84MW1**

As noted in past occasions, a large volume of rootlets is growing again in the screened section of this bore. In this occasion, a large clump of rootlets was brought up attached to the logger stainless steel wire during the datalogger removal. This may have cleared the bore temporarily as there appeared to be no obstacle in measuring the water table and in re-installing the datalogger to its correct depth.

This is a persistent problem and it may be necessary to repeat the rootlets removal soon.

The hydrograph shows that the perched water table at this site has reacted rapidly to the substantial rainfall experienced between June 2007 and June 2008, a year of above average rainfall (1291.5 mm). However, since June 2008 the water level has fallen by approximately 1 m, despite the year 2008 – 2009 having also been an above average rainfall year (1294 mm against the long term average of 884.8 mm). It appears that the perched aquifer can briefly hold some additional storage above its long term level, but such level cannot be maintained, most likely due to drainage to the surrounding environment.

### **1.2 Monitoring bore PT84MW3**

The water level in this bore has risen steadily throughout the June 2007 to June 2009 period due to the above average rainfall recorded. During this period, the watertable has risen by approximately 3 m, but appears to have levelled out over the first half of 2009.

## **2 Water Quality**

Water quality in all the bores on the site is generally fresh and, potentially, of drinking water standards.

URS Australia Pty Ltd (ABN 46 000 691 690)  
Level 3, 116 Miller Street  
North Sydney NSW 2060  
Australia  
T: 61 2 8925 5500  
F: 61 2 8925 5555

### 2.1.1 Monitoring bore PT84MW1

Table 1 presents a summary of the recorded groundwater field chemical parameters measurements in the monitoring bores. The Total Dissolved Salts content of the groundwater at this site shows an apparent coincidence with the fluctuations of the groundwater level. This is exemplified in the changes in EC and pH since the July 2008 measurements when, following a substantial rainfall period, a small fall in TDS and pH is evident due to aquifer recharge by infiltrating rainwater.

### 2.1.2 Monitoring bore PT84MW3

There appears to be a general coincidence between past water table rises and decrease in EC, reflecting the rapid response of the aquifer to rainfall infiltration. Since 2006, the pH in this bore has fallen steadily and this is the likely cause of a parallel rise in EC and TDS, as the greater volume of more acidic (rainfall) water is releasing some of the constituents of the aquifer matrix.

I trust the above meets with your requirements. Please, do not hesitate to contact the undersigned, should you need to discuss the matter further.

Yours sincerely  
**URS Australia Pty Ltd**



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Fabio Carosone  
Senior Associate Hydrogeologist

#### Attachments

Table 1 – H.B.Maroota. Field Measurements and Laboratory Analyses

H.B.Maroota – Groundwater Quality Monitoring Data Plots

H.B.Maroota – Bore PT84MW1 Groundwater Monitoring Data

H.B.Maroota – Bore PT84MW3 Groundwater Monitoring Data

TABLE 1 -

H.B. MAROOTA. FIELD MEASUREMENTS AND LABORATORY ANALYSES

| Bore      | Aquifer | Date       | pH   | EC<br>μS/cm | TDS<br>mg/L | Ca<br>mg/L | Mg<br>mg/L | Na<br>mg/L | K<br>mg/L | Cl<br>mg/L | HCO3<br>mg/L | H2SO4<br>mg/L | SWL<br>m b.TOC | TOC<br>m AHD | SWL<br>m AHD |
|-----------|---------|------------|------|-------------|-------------|------------|------------|------------|-----------|------------|--------------|---------------|----------------|--------------|--------------|
| PT84MW1   | M.S.    | 23.10.1998 | 4.96 | 246         | 186         | 3          | 9          | 27         | 3         | 50         | 4            | 3             | 5.05           | 214.24       | 209.19       |
| PT84MW1   | M.S.    | 29.10.1998 |      |             |             |            |            |            |           |            |              |               | 6.15           | 214.24       | 208.09       |
| PT84MW1   | M.S.    | 13.1.1999  |      |             |             |            |            |            |           |            |              |               | 6.43           | 214.24       | 207.81       |
| PT84MW1   | M.S.    | 11.2.1999  |      |             |             |            |            |            |           |            |              |               | 6.51           | 214.24       | 207.73       |
| PT84MW1   | M.S.    | 9.9.1999   | 4.13 | 326         | 196         |            |            |            |           |            |              |               | 6.37           | 214.24       | 207.87       |
| PT84MW1   | M.S.    | 22.12.1999 | 5    | 341         | 205         |            |            |            |           |            |              |               | 6.00           | 214.24       | 208.24       |
| PT84MW1   | M.S.    | 10.3.2000  | 3.88 | 335         | 242         |            |            |            |           |            |              |               | 5.52           | 214.24       | 208.72       |
| PT84MW1   | M.S.    | 6.6.2000   | 3.90 | 275         | 165         |            |            |            |           |            |              |               | 6.33           | 214.24       | 207.91       |
| PT84MW1   | M.S.    | 29.9.2000  | 4.44 | 405         | 243         |            |            |            |           |            |              |               | 6.81           | 214.24       | 207.43       |
| PT84MW1   | M.S.    | 29.11.2000 | 4.38 | 340         | 204         |            |            |            |           |            |              |               | 6.80           | 214.24       | 207.44       |
| PT84MW1   | M.S.    | 21.6.2001  | 3.88 | 253         | 152         |            |            |            |           |            |              |               | 6.09           | 214.24       | 208.15       |
| PT84MW1   | M.S.    | 19.12.2001 | 3.84 | 320         | 192         |            |            |            |           |            |              |               | 6.78           | 214.24       | 207.46       |
| PT84MW1   | M.S.    | 5.7.2002   | 4.36 | 286         | 172         |            |            |            |           |            |              |               | 6.77           | 214.24       | 207.47       |
| PT84MW1   | M.S.    | 7.3.2003   | 3.72 | 240         | 144         |            |            |            |           |            |              |               | 7.38           | 214.24       | 206.86       |
| PT84MW1   | M.S.    | 9.7.2003   | 3.51 | 202         | 121         |            |            |            |           |            |              |               | 7.52           | 214.24       | 206.72       |
| PT84MW1   | M.S.    | 30.1.2004  | 5.13 | 189         | 113         |            |            |            |           |            |              |               | 7.60           | 214.24       | 206.64       |
| PT84MW1   | M.S.    | 15.12.2004 |      |             |             |            |            |            |           |            |              |               | 8.07           | 214.24       | 206.17       |
| PT84MW1   | M.S.    | 22.6.2005  |      |             |             | dry        |            |            |           |            |              |               |                |              |              |
| PT84MW1   | M.S.    | 19.1.2006  |      |             |             | dry        |            |            |           |            |              |               |                |              |              |
| PT84MW1   | M.S.    | 4.7.2007   | 4.55 | 135         | 81          |            |            |            |           |            |              |               | 7.96           | 214.24       | 206.28       |
| PT84MW1   | M.S.    | 3.7.2008   | 4.78 | 203         | 122         |            |            |            |           |            |              |               | 6.42           | 214.24       | 207.82       |
| PT84MW1   | M.S.    | 6.7.2009   | 4.63 | 152         | 91          |            |            |            |           |            |              |               | 7.60           | 215.24       | 207.64       |
| Average   |         |            |      | 273         | 169         |            |            |            |           |            |              |               |                |              |              |
| PT84MW2   | M.S.    | 23.10.1998 |      |             |             |            |            |            |           |            |              |               | 25.00          | 227.63       | 202.63       |
| PT84MW2   | M.S.    | 29.10.1998 |      |             |             |            |            |            |           |            |              |               | 25.35          | 227.63       | 202.28       |
| PT84MW2   | M.S.    | 13.1.1999  |      |             |             |            |            |            |           |            |              |               | 25.43          | 227.63       | 202.20       |
| PT84MW2   | M.S.    | 11.2.1999  |      |             |             |            |            |            |           |            |              |               | 25.49          | 227.63       | 202.14       |
| PT84MW2   | M.S.    | 9.9.1999   |      |             |             |            |            |            |           |            |              |               | 25.43          | 227.63       | 202.20       |
| PT84MW2   | M.S.    | 22.12.1999 |      |             |             |            |            |            |           |            |              |               |                | 227.63       |              |
| PT84MW2   | M.S.    | 10.3.2000  | 6.10 | 543         | 530         |            |            |            |           |            |              |               | 24.55          | 227.63       | 203.08       |
| PT84MW2** |         |            |      |             |             |            |            |            |           |            |              |               |                |              |              |
| PT84MW3   | M.S.    | 23.10.1998 | 5.88 | 381         | 266         | <1         | 2          | 79         | 1         | 9          | 14           | 9             | 19.61          | 203.25       | 183.64       |
| PT84MW3   | M.S.    | 29.10.1998 |      |             |             |            |            |            |           |            |              |               | 18.84          | 203.25       | 184.41       |
| PT84MW3   | M.S.    | 13.1.1999  |      |             |             |            |            |            |           |            |              |               | 20.40          | 203.25       | 182.85       |
| PT84MW3   | M.S.    | 11.2.1999  |      |             |             |            |            |            |           |            |              |               | 20.58          | 203.25       | 182.67       |
| PT84MW3   | M.S.    | 9.9.1999   | 4.64 | 134         | 80          |            |            |            |           |            |              |               | 20.43          | 203.25       | 182.82       |
| PT84MW3   | M.S.    | 22.12.1999 |      | 138         | 83          |            |            |            |           |            |              |               | 19.88          | 203.25       | 183.37       |
| PT84MW3   | M.S.    | 10.3.2000  | 4.51 | 139         | 97          |            |            |            |           |            |              |               | 19.83          | 203.25       | 183.42       |
| PT84MW3   | M.S.    | 6.6.2000   | 4.80 | 160         | 96          |            |            |            |           |            |              |               | 19.65          | 203.25       | 183.60       |
| PT84MW3   | M.S.    | 29.9.2000  | 4.35 | 159         | 95          |            |            |            |           |            |              |               | 19.82          | 203.25       | 183.43       |
| PT84MW3   | M.S.    | 29.11.2000 | 5.24 | 159         | 95          |            |            |            |           |            |              |               | 19.95          | 203.25       | 183.30       |
| PT84MW3   | M.S.    | 21.6.2001  | 4.57 | 139         | 83          |            |            |            |           |            |              |               | 19.53          | 203.25       | 183.72       |
| PT84MW3   | M.S.    | 19.12.2001 | 4.49 | 191         | 115         |            |            |            |           |            |              |               | 19.41          | 203.25       | 183.84       |
| PT84MW3   | M.S.    | 5.7.2002   | 7.79 | 266         | 160         |            |            |            |           |            |              |               | 19.17          | 203.25       | 184.08       |
| PT84MW3   | M.S.    | 7.3.2003   | 4.29 | 170         | 102         |            |            |            |           |            |              |               | 21.08          | 203.25       | 182.17       |
| PT84MW3   | M.S.    | 9.7.2003   | 3.72 | 105         | 63          |            |            |            |           |            |              |               | 21.00          | 203.25       | 182.25       |
| PT84MW3   | M.S.    | 30.1.2004  | 6.83 | 72          | 43          |            |            |            |           |            |              |               | 21.28          | 203.25       | 181.97       |
| PT84MW3   | M.S.    | 15.12.2004 | 6.07 | 90          | 54          |            |            |            |           |            |              |               | 21.44          | 203.25       | 181.81       |
| PT84MW3   | M.S.    | 22.6.2004  | 6.05 | 106         | 64          |            |            |            |           |            |              |               | 21.77          | 203.25       | 181.48       |
| PT84MW3   | M.S.    | 19.1.2006  | 6.10 | 98          | 59          |            |            |            |           |            |              |               | 21.48          | 203.25       | 181.77       |
| PT84MW3   | M.S.    | 4.7.2007   | 5.13 | 46          | 28          |            |            |            |           |            |              |               | 20.29          | 203.25       | 182.96       |
| PT84MW3   | M.S.    | 3.7.2008   | 4.77 | 68          | 41          |            |            |            |           |            |              |               | 19.32          | 203.25       | 183.93       |
| PT84MW3   | M.S.    | 6.7.2009   | 4.66 | 128         | 77          |            |            |            |           |            |              |               | 18.95          | 204.25       | 185.30       |
| Average   |         |            |      | 145         | 89          |            |            |            |           |            |              |               |                |              |              |

212.5 = estimated from contour plan

M.S. = Maroota Sand

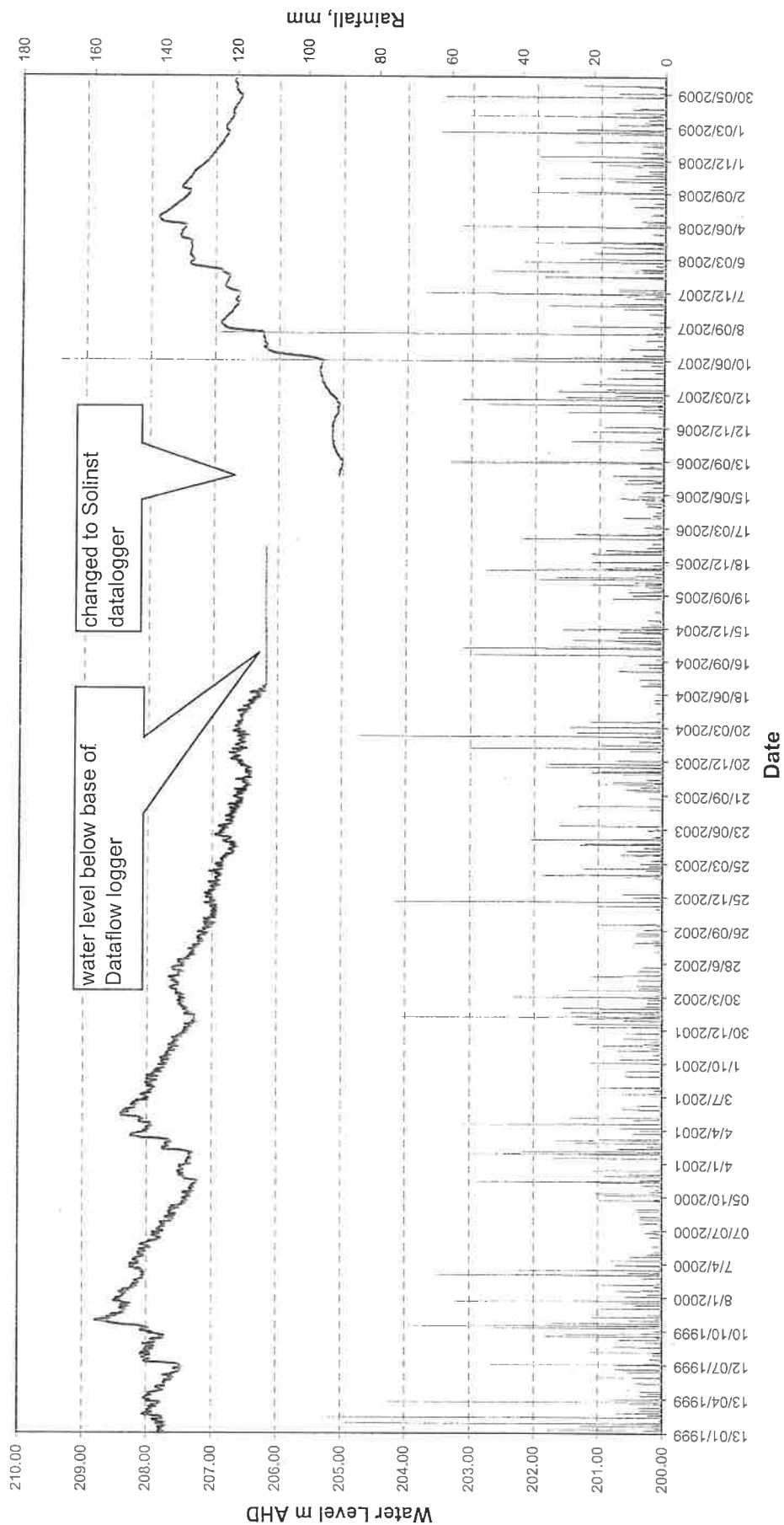
H.S. = Hawkesbury Sandstone

97 = laboratory measurements

\*\* = data logger no longer operational

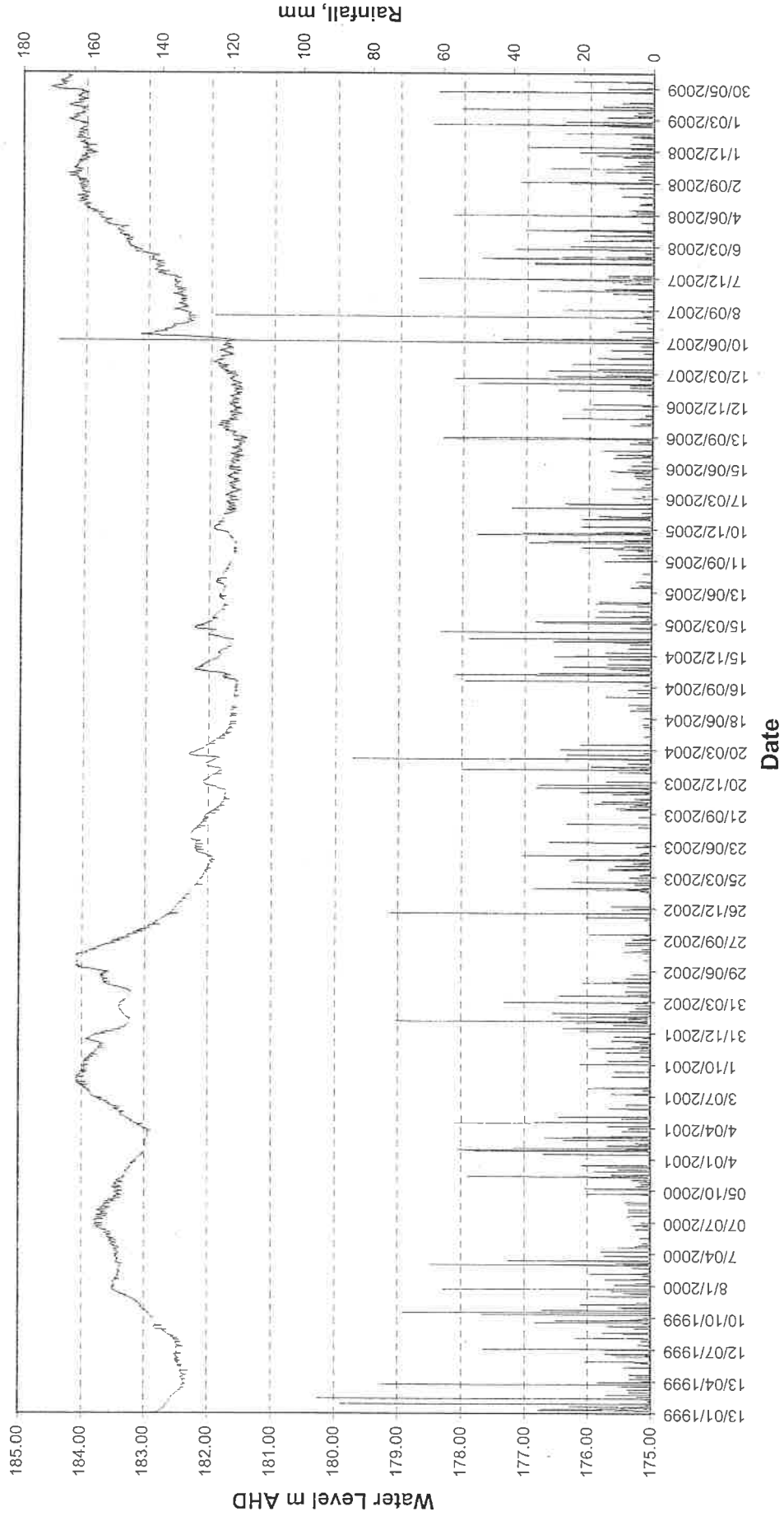
**H.B.MAROOTA**  
**Bore PT84MW1 Groundwater Monitoring Data**

— Rainfall, mm  
 — Water Level, m AHD

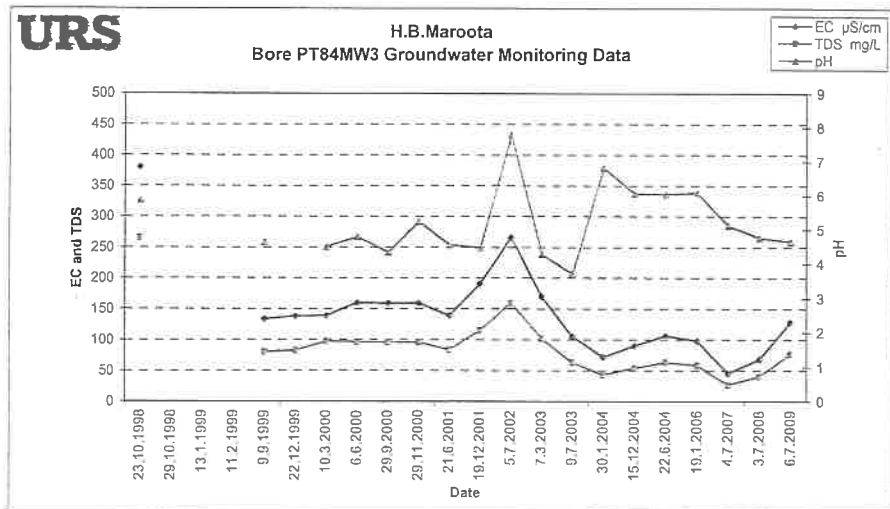
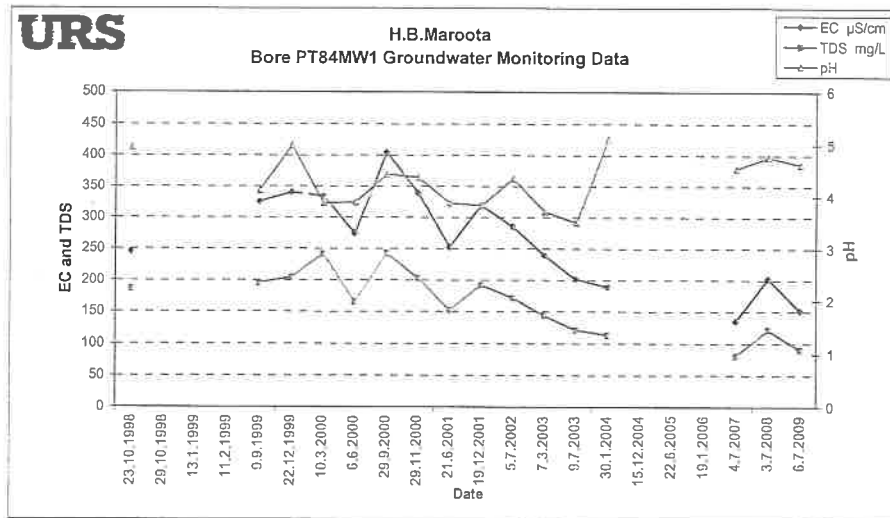


**H.B.MARROOTA**  
**Bore PT84MW3 Groundwater Monitoring Data**

— Rainfall, mm  
 --- Water Level, m AHD



# H.B.Maroota - Groundwater Quality Monitoring Data Plots



28 October 2010  
Project No. 43167795

H.B.Maroota Pty Limited  
Roberts Road  
Maroota NSW 2756

Attention: Martin Hodgson  
Director

Dear Martin

**Subject: October 2010 Groundwater Management Plan**

The 2010 Groundwater Management Plan has been prepared for the site following the downloading of the two monitoring bores dataloggers and the laboratory analyses of the groundwater samples collected from those bores on the 19<sup>th</sup> October 2010.

In addition, this report includes the geological log of bore PT84MW4, the replacement bore for PT84MW3 and the datalogger plot from that bore to the 22<sup>nd</sup> December 2009.

## **1 Water Levels**

### **1.1 Monitoring bore PT84MW1**

As noted in past occasions, a large volume of rootlets is growing again in the screened section of this bore. The rootlets were cleared on the 21<sup>st</sup> December 2009 by air pressure using the drilling rig. However, in the October data download, rootlets were again brought up to the surface.

This is a persistent problem and it may be necessary to repeat the rootlets removal soon. The matter has been discussed with you and a special tool may need to be fabricated to assist in the rootlets removal. This process is necessary to ensure that the data logger is repositioned at the correct depth after data download and to ensure that the sampling bailer can reach the bottom of the bore.

The hydrograph in Appendix A shows that the perched water table at this site has followed the previously observed decline since June 2008. Bureau of Meteorology records for the Roberts Road weather station no. 67014 indicate that the 2009 year total rainfall was below the long term average of 884.8 mm (i.e. 819.8 mm) and that the year to date has received 738.3 mm (this includes data for September and October 2010 provided by PF Formation, as the BOM records have not yet been updated). It is likely that, under the current weather pattern, rainfall in the area will be at or above average.

The location of bore PT84MW1 is shown in Figure 1.

### **1.2 Monitoring bore PT84MW3**

Monitoring bore PT84MW3 has been decommissioned due to the expansion of the quarry in that direction. The hydrograph in Appendix A shows that between May and December 2009 the water

level in this bore fell, but that it remained above the lowest levels recorded between 2003 and 2007.

### **1.3 Monitoring bore PT84MW4**

Monitoring Bore PT84MW4 was drilled between the 21<sup>st</sup> and 22<sup>nd</sup> December 2009 and the datalogger from the decommissioned PT84MW3 was installed at the site. The replacement bore was drilled under the existing DNR licence No.10BL158808 for the abandoned bore, as confirmed by the Department in the correspondence presented in Appendix E.

The location of bore PT84MW4 is shown in Figure 1 and the geological log of the new bore is presented in Appendix D.

The datalogger records hydrograph covering the period December 2009 to October 2010 is presented in Appendix A. The hydrograph shows that the water level in this bore has remained on average at around 186.5 m AHD since the beginning of May 2010.

## **2 Water Quality**

Water quality in all the bores on the site is generally fresh and, potentially, of drinking water standards. The analytical laboratory certificates are presented in Appendix C.

### **2.1.1 Monitoring bore PT84MW1**

Table 1 in Appendix B presents a summary of the recorded groundwater field chemical parameters measurements in the monitoring bores, and the laboratory analysis results from the sample collected during the October download event.

The Total Dissolved Salts content of the groundwater at this site shows a general decrease since records started, with fluctuations related to the rainfall pattern, as the shallow water table is readily recharged by infiltrating rainfall. This is also indicated by the chemical make-up of the water, which shows a typical Chloride/Sodium character.

### **2.1.2 Monitoring bore PT84MW4**

The single sample from this bore indicates a groundwater of similar character to that from bore PT84MW1.

## **3 Conclusions**

The above data indicate that the quarry operation does not have a negative impact upon the surrounding environment. No dewatering is carried out at the site and the water level in the pond at the base of the quarry, which previous studies have proved to be a window in the water table, has remained constant and, in fact, on recent observations has risen to approximately 182 m AHD from earlier long term average measurements of 180 m AHD. This rise is due in part to the breaking of drought and in part to the backfilling of the void by silt.



Martin Hodgson  
Director  
28 October 2010  
Page 3

I trust the above meets with your requirements. Please, do not hesitate to contact the undersigned, should you need to discuss the matter further.

Yours sincerely  
**URS Australia Pty Ltd**

A handwritten signature in cursive script, reading 'Fabio Carosone', is written over a horizontal line.

Fabio Carosone  
Senior Associate Hydrogeologist



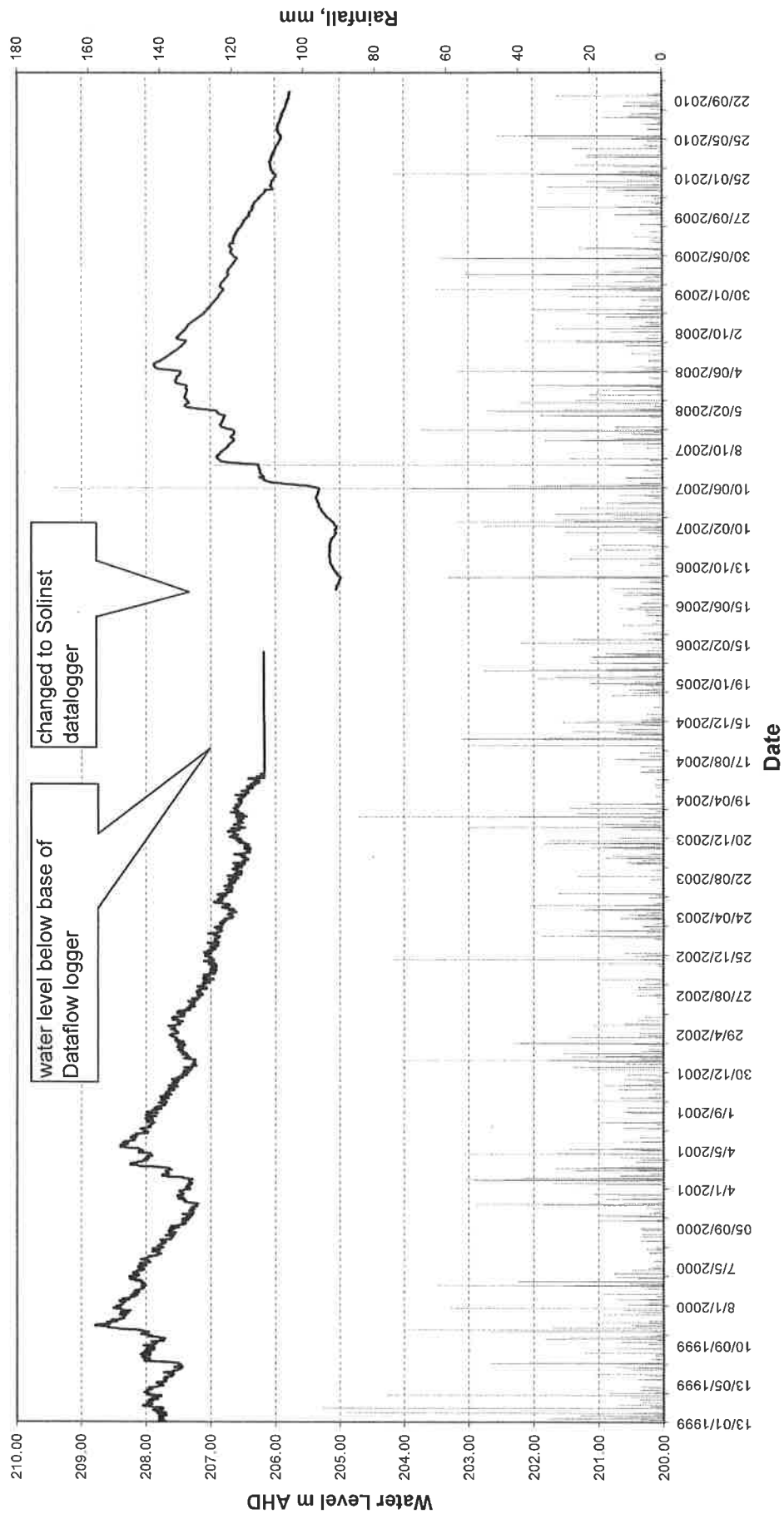
|                                                                                     |                                        |                                                                            |
|-------------------------------------------------------------------------------------|----------------------------------------|----------------------------------------------------------------------------|
| Client<br>HB MAROOTA PTY LTD                                                        | Project<br>GROUNDWATER MANAGEMENT PLAN | Title<br>SITE LOCALITY MAP                                                 |
|  | Drawn: AY<br>Job No: 43167795          | Approved: FC<br>Date: 02/11/2010<br>File No: 43167795-001.wor<br>Figure: 1 |



## Appendix A – Groundwater Monitoring Hydrographs

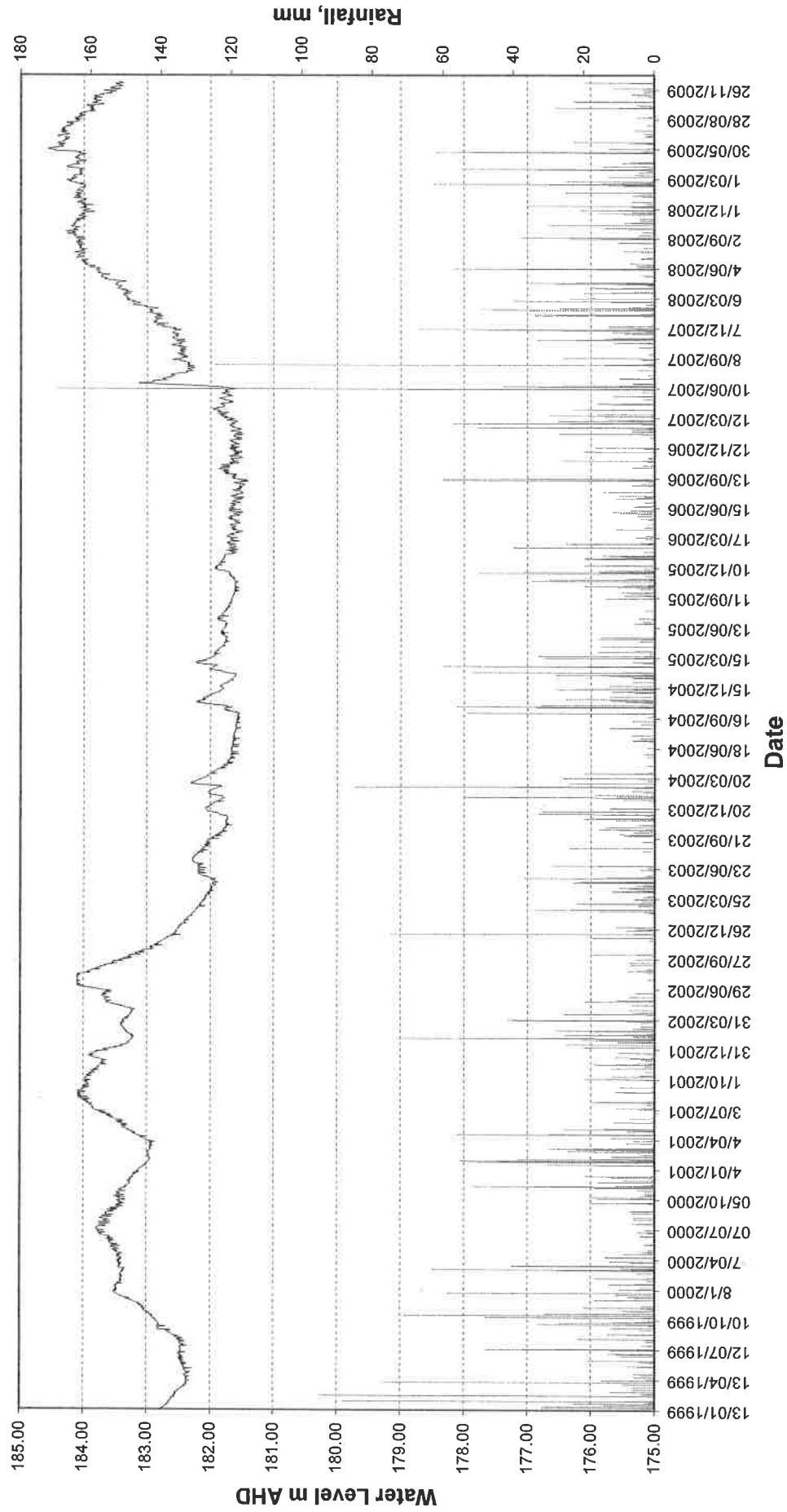
**H.B.MARROOTA**  
**Bore PT84MW1 Groundwater Monitoring Data**

□ Rainfall, mm  
 — Water Level, m AHD



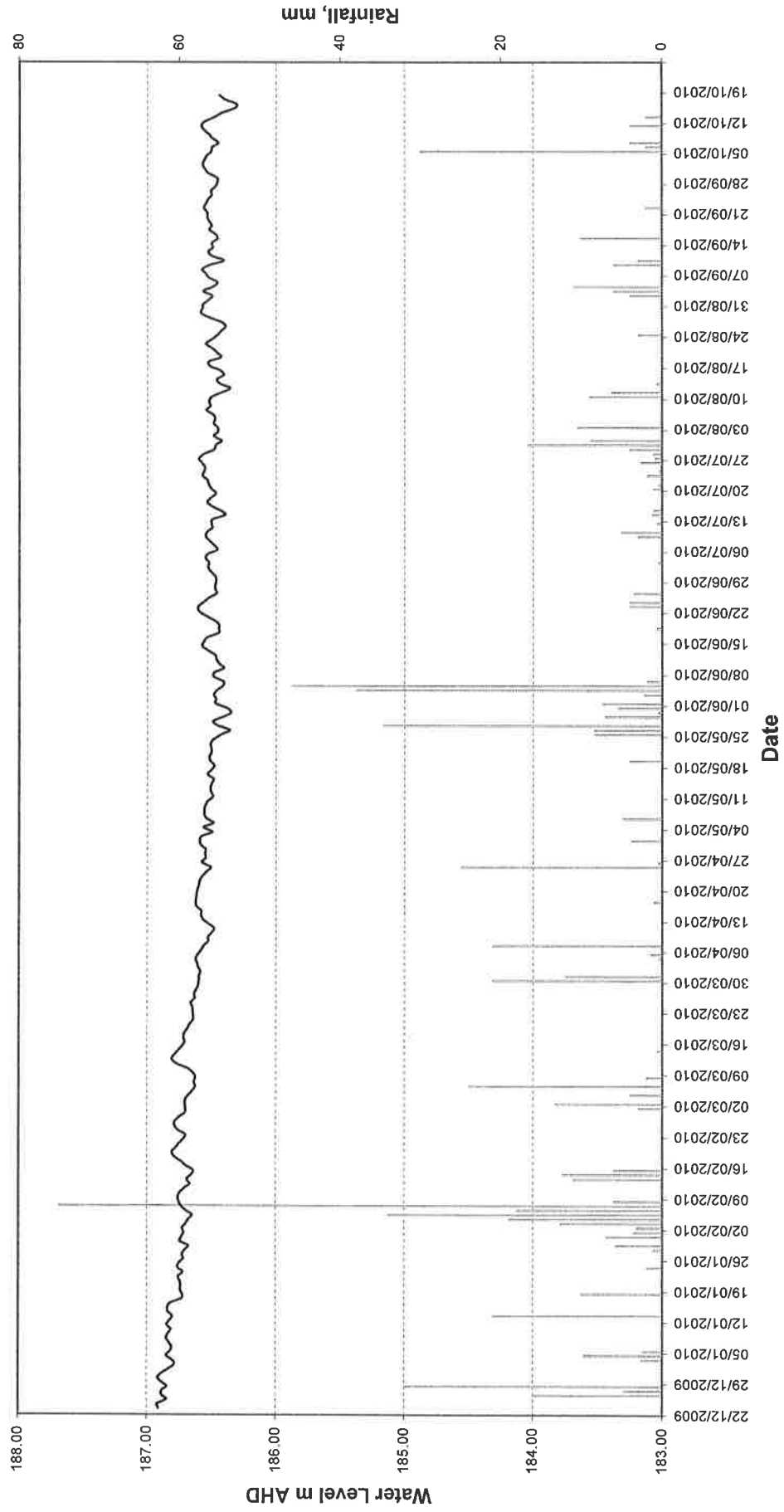
**H.B.MAROOTA  
Bore PT84MW3 Groundwater Monitoring Data**

□ Rainfall, mm  
— Water Level, m AHD



**H.B.MAROOTA**  
**Bore PT84MW4 Groundwater Monitoring Data**

□ Rainfall, mm  
 — Water Level, m AHD





## Appendix B – Water Quality Data and Plots

TABLE 1 - H.B. MAROOTA. FIELD MEASUREMENTS AND LABORATORY ANALYSES

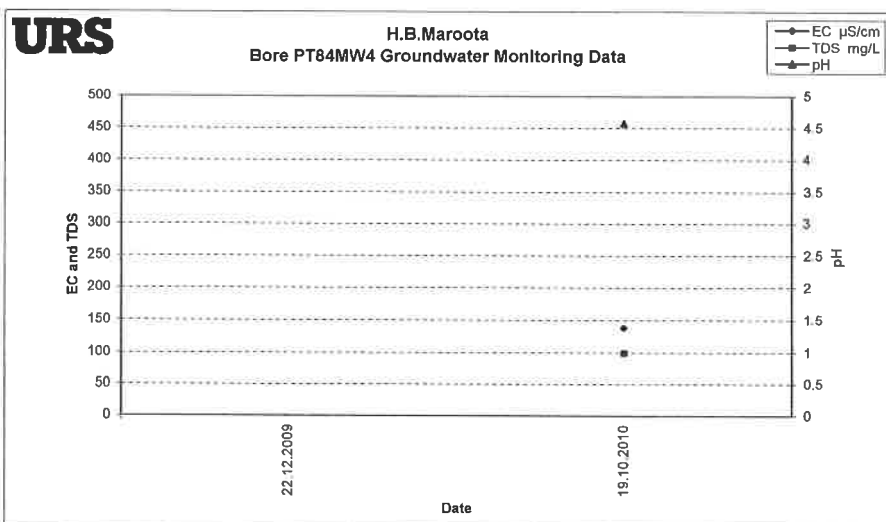
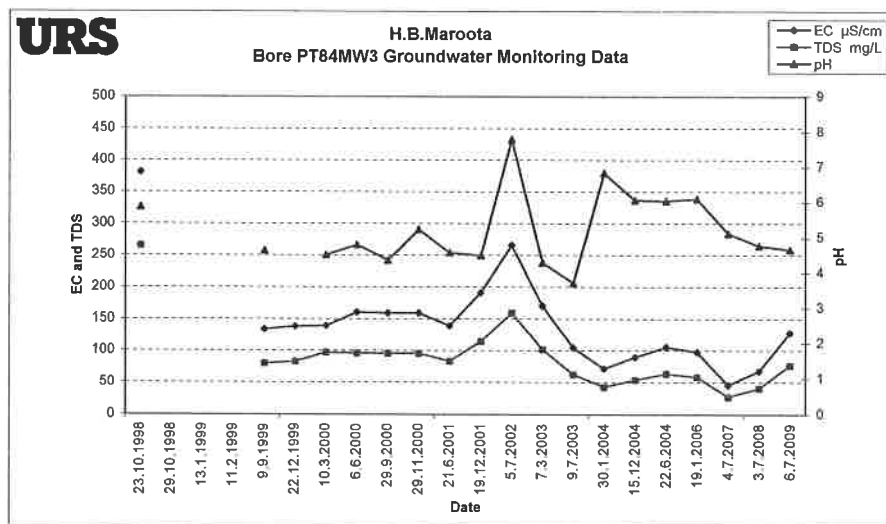
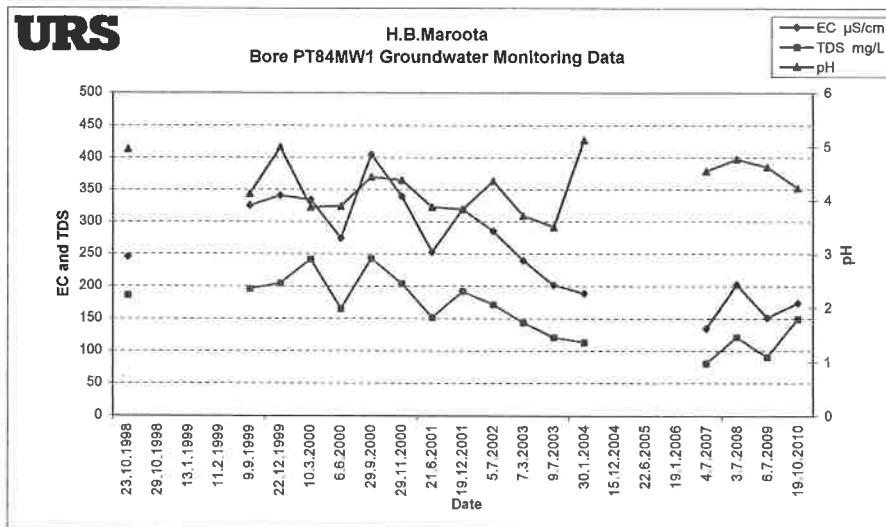
| Bore           | Aquifer | Date       | pH   | EC<br>µS/cm | TDS<br>mg/L | Ca<br>mg/L            | Mg<br>mg/L | Na<br>mg/L | K<br>mg/L | Cl<br>mg/L | HCO3<br>mg/L | SO4<br>mg/L | SWL<br>m b. TOC | TOC<br>m AHD | SWL<br>m AHD |
|----------------|---------|------------|------|-------------|-------------|-----------------------|------------|------------|-----------|------------|--------------|-------------|-----------------|--------------|--------------|
| PT84MW1        | M.S.    | 23.10.1998 | 4.96 | 246         | 186         | 3                     | 9          | 27         | 3         | 50         | 4            | 3           | 5.05            | 214.24       | 209.19       |
| PT84MW1        | M.S.    | 29.10.1998 |      |             |             |                       |            |            |           |            |              |             | 6.15            | 214.24       | 208.09       |
| PT84MW1        | M.S.    | 13.1.1999  |      |             |             |                       |            |            |           |            |              |             | 6.43            | 214.24       | 207.81       |
| PT84MW1        | M.S.    | 11.2.1999  |      |             |             |                       |            |            |           |            |              |             | 6.51            | 214.24       | 207.73       |
| PT84MW1        | M.S.    | 9.9.1999   | 4.13 | 326         | 196         |                       |            |            |           |            |              |             | 6.37            | 214.24       | 207.87       |
| PT84MW1        | M.S.    | 22.12.1999 | 5    | 341         | 205         |                       |            |            |           |            |              |             | 6.00            | 214.24       | 208.24       |
| PT84MW1        | M.S.    | 10.3.2000  | 3.88 | 335         | 242         |                       |            |            |           |            |              |             | 5.52            | 214.24       | 208.72       |
| PT84MW1        | M.S.    | 6.6.2000   | 3.90 | 275         | 165         |                       |            |            |           |            |              |             | 6.33            | 214.24       | 207.91       |
| PT84MW1        | M.S.    | 29.9.2000  | 4.44 | 405         | 243         |                       |            |            |           |            |              |             | 6.81            | 214.24       | 207.43       |
| PT84MW1        | M.S.    | 29.11.2000 | 4.38 | 340         | 204         |                       |            |            |           |            |              |             | 6.80            | 214.24       | 207.44       |
| PT84MW1        | M.S.    | 21.6.2001  | 3.88 | 253         | 152         |                       |            |            |           |            |              |             | 6.09            | 214.24       | 208.15       |
| PT84MW1        | M.S.    | 19.12.2001 | 3.84 | 320         | 192         |                       |            |            |           |            |              |             | 6.78            | 214.24       | 207.46       |
| PT84MW1        | M.S.    | 5.7.2002   | 4.36 | 286         | 172         |                       |            |            |           |            |              |             | 6.77            | 214.24       | 207.47       |
| PT84MW1        | M.S.    | 7.3.2003   | 3.72 | 240         | 144         |                       |            |            |           |            |              |             | 7.38            | 214.24       | 206.86       |
| PT84MW1        | M.S.    | 9.7.2003   | 3.51 | 202         | 121         |                       |            |            |           |            |              |             | 7.52            | 214.24       | 206.72       |
| PT84MW1        | M.S.    | 30.1.2004  | 5.13 | 189         | 113         |                       |            |            |           |            |              |             | 7.60            | 214.24       | 206.64       |
| PT84MW1        | M.S.    | 15.12.2004 |      |             |             |                       |            |            |           |            |              |             | 8.07            | 214.24       | 206.17       |
| PT84MW1        | M.S.    | 22.6.2005  |      |             |             | dry                   |            |            |           |            |              |             |                 |              |              |
| PT84MW1        | M.S.    | 19.1.2006  |      |             |             | dry                   |            |            |           |            |              |             |                 |              |              |
| PT84MW1        | M.S.    | 4.7.2007   | 4.55 | 135         | 81          |                       |            |            |           |            |              |             | 7.96            | 214.24       | 206.28       |
| PT84MW1        | M.S.    | 3.7.2008   | 4.78 | 203         | 122         |                       |            |            |           |            |              |             | 6.42            | 214.24       | 207.82       |
| PT84MW1        | M.S.    | 6.7.2009   | 4.63 | 152         | 91          |                       |            |            |           |            |              |             | 7.60            | 215.24       | 207.64       |
| PT84MW1        | M.S.    | 19.10.2010 | 4.24 | 174         | 150         | 1                     | 6          | 12         | 2         | 30         | 3.6          | 4           | 8.5             | 215.24       | 206.74       |
| <b>Average</b> |         |            |      | <b>273</b>  | <b>169</b>  |                       |            |            |           |            |              |             |                 |              |              |
| PT84MW2        | M.S.    | 23.10.1998 |      |             |             |                       |            |            |           |            |              |             | 25.00           | 227.63       | 202.63       |
| PT84MW2        | M.S.    | 29.10.1998 |      |             |             |                       |            |            |           |            |              |             | 25.35           | 227.63       | 202.28       |
| PT84MW2        | M.S.    | 13.1.1999  |      |             |             |                       |            |            |           |            |              |             | 25.43           | 227.63       | 202.20       |
| PT84MW2        | M.S.    | 11.2.1999  |      |             |             |                       |            |            |           |            |              |             | 25.49           | 227.63       | 202.14       |
| PT84MW2        | M.S.    | 9.9.1999   |      |             |             |                       |            |            |           |            |              |             | 25.43           | 227.63       | 202.20       |
| PT84MW2        | M.S.    | 22.12.1999 |      |             |             |                       |            |            |           |            |              |             |                 | 227.63       |              |
| PT84MW2        | M.S.    | 10.3.2000  | 6.10 | 543         | 530         |                       |            |            |           |            |              |             | 24.55           | 227.63       | 203.08       |
| PT84MW2        |         |            |      |             |             | no longer operational |            |            |           |            |              |             |                 |              |              |
| PT84MW3        | M.S.    | 23.10.1998 | 5.88 | 381         | 266         | <1                    | 2          | 79         | 1         | 9          | 14           | 9           | 19.61           | 203.25       | 183.64       |
| PT84MW3        | M.S.    | 29.10.1998 |      |             |             |                       |            |            |           |            |              |             | 18.84           | 203.25       | 184.41       |
| PT84MW3        | M.S.    | 13.1.1999  |      |             |             |                       |            |            |           |            |              |             | 20.40           | 203.25       | 182.85       |
| PT84MW3        | M.S.    | 11.2.1999  |      |             |             |                       |            |            |           |            |              |             | 20.58           | 203.25       | 182.67       |
| PT84MW3        | M.S.    | 9.9.1999   | 4.64 | 134         | 80          |                       |            |            |           |            |              |             | 20.43           | 203.25       | 182.82       |
| PT84MW3        | M.S.    | 22.12.1999 |      | 138         | 83          |                       |            |            |           |            |              |             | 19.88           | 203.25       | 183.37       |
| PT84MW3        | M.S.    | 10.3.2000  | 4.51 | 139         | 97          |                       |            |            |           |            |              |             | 19.83           | 203.25       | 183.42       |
| PT84MW3        | M.S.    | 6.6.2000   | 4.80 | 160         | 96          |                       |            |            |           |            |              |             | 19.65           | 203.25       | 183.60       |
| PT84MW3        | M.S.    | 29.9.2000  | 4.35 | 159         | 95          |                       |            |            |           |            |              |             | 19.82           | 203.25       | 183.43       |
| PT84MW3        | M.S.    | 29.11.2000 | 5.24 | 159         | 95          |                       |            |            |           |            |              |             | 19.95           | 203.25       | 183.30       |
| PT84MW3        | M.S.    | 21.6.2001  | 4.57 | 139         | 83          |                       |            |            |           |            |              |             | 19.53           | 203.25       | 183.72       |
| PT84MW3        | M.S.    | 19.12.2001 | 4.49 | 191         | 115         |                       |            |            |           |            |              |             | 19.41           | 203.25       | 183.84       |
| PT84MW3        | M.S.    | 5.7.2002   | 7.79 | 266         | 160         |                       |            |            |           |            |              |             | 19.17           | 203.25       | 184.08       |
| PT84MW3        | M.S.    | 7.3.2003   | 4.29 | 170         | 102         |                       |            |            |           |            |              |             | 21.08           | 203.25       | 182.17       |
| PT84MW3        | M.S.    | 9.7.2003   | 3.72 | 105         | 63          |                       |            |            |           |            |              |             | 21.00           | 203.25       | 182.25       |
| PT84MW3        | M.S.    | 30.1.2004  | 6.83 | 72          | 43          |                       |            |            |           |            |              |             | 21.28           | 203.25       | 181.97       |
| PT84MW3        | M.S.    | 15.12.2004 | 6.07 | 90          | 54          |                       |            |            |           |            |              |             | 21.44           | 203.25       | 181.81       |
| PT84MW3        | M.S.    | 22.6.2004  | 6.05 | 106         | 64          |                       |            |            |           |            |              |             | 21.77           | 203.25       | 181.48       |
| PT84MW3        | M.S.    | 19.1.2006  | 6.10 | 98          | 59          |                       |            |            |           |            |              |             | 21.48           | 203.25       | 181.77       |
| PT84MW3        | M.S.    | 4.7.2007   | 5.13 | 46          | 28          |                       |            |            |           |            |              |             | 20.29           | 203.25       | 182.96       |
| PT84MW3        | M.S.    | 3.7.2008   | 4.77 | 68          | 41          |                       |            |            |           |            |              |             | 19.32           | 203.25       | 183.93       |
| PT84MW3        | M.S.    | 6.7.2009   | 4.66 | 128         | 77          |                       |            |            |           |            |              |             | 18.95           | 204.25       | 185.30       |
| <b>Average</b> |         |            |      | <b>145</b>  | <b>89</b>   | no longer operational |            |            |           |            |              |             |                 |              |              |
| PT84MW4        | M.S.    | 22.12.2009 |      |             |             |                       |            |            |           |            |              |             | 25              | 212.00       | 187.00       |
| PT84MW4        | M.S.    | 19.10.2010 | 4.58 | 138         | 100         | <1                    | 3          | 16         | <1        | 29         | 2.4          | 1           | 25.40           | 212.00       | 186.60       |

M.S. = Maroota Sand

97 = laboratory measurements

Elevation estimated

# H.B.Maroota - Groundwater Quality Monitoring Data Plots





## Appendix C – Analytical Laboratory Certificates



Environmental Division

**CERTIFICATE OF ANALYSIS**

|                     |                                                                |                                |                                                       |
|---------------------|----------------------------------------------------------------|--------------------------------|-------------------------------------------------------|
| <b>Work Order</b>   | : ES1020907                                                    | <b>Page</b>                    | : 1 of 3                                              |
| <b>Client</b>       | : URS AUSTRALIA (NSW) PTY LTD                                  | <b>Laboratory</b>              | : Environmental Division Sydney                       |
| <b>Contact</b>      | : MR FABIO CAROSONE                                            | <b>Contact</b>                 | : Jacob Waugh                                         |
| <b>Address</b>      | : LEVEL 4, 407 PACIFIC HIGHWAY<br>ARTARMON NSW, AUSTRALIA 2064 | <b>Address</b>                 | : 277-289 Woodpark Road Smithfield NSW Australia 2164 |
| <b>E-mail</b>       | : fabio_carosone@urscorp.com                                   | <b>E-mail</b>                  | : jacob.waugh@alsenviro.com                           |
| <b>Telephone</b>    | : +61 89255500                                                 | <b>Telephone</b>               | : +61-2-8784 8555                                     |
| <b>Facsimile</b>    | : +61 02 89255555                                              | <b>Facsimile</b>               | : +61-2-8784 8500                                     |
| <b>Project</b>      | : 43167795                                                     | <b>QC Level</b>                | : NEPM 1999 Schedule B(3) and ALS QCS3 requirement    |
| <b>Order number</b> | : —                                                            | <b>Date Samples Received</b>   | : 19-OCT-2010                                         |
| <b>C-O-C number</b> | : —                                                            | <b>Issue Date</b>              | : 25-OCT-2010                                         |
| <b>Sampler</b>      | : FC                                                           | <b>No. of samples received</b> | : 2                                                   |
| <b>Site</b>         | : —                                                            | <b>No. of samples analysed</b> | : 2                                                   |
| <b>Quote number</b> | : EN/001/10                                                    |                                |                                                       |

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

**Signatories**

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

| Signatories      | Position                 | Accreditation Category |
|------------------|--------------------------|------------------------|
| Ankit Joshi      | Inorganic Chemist        | Inorganics             |
| Celine Conceicao | Spectroscopist           | Inorganics             |
| Sarah Millington | Senior Inorganic Chemist | Inorganics             |

**Environmental Division Sydney**

Part of the **ALS Laboratory Group**

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A Campbell Brothers Limited Company



Page : 2 of 3  
Work Order : ES1020907  
Client : URS AUSTRALIA (NSW) PTY LTD  
Project : 43167795

### General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Key :

CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

<sup>A</sup> = This result is computed from individual analyte detections at or above the level of reporting

- TDS by method EA-015 may bias high due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper ( confirmed by re-analysis ).

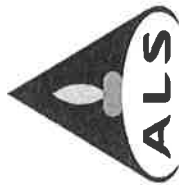


Page : 3 of 3  
Work Order : ES1020907  
Client : URS AUSTRALIA (NSW) PTY LTD  
Project : 43167795

## Analytical Results

Sub-Matrix: WATER

| Compound                                                          | Client sample ID |      | Client sampling date / time |         | Unit          |               |
|-------------------------------------------------------------------|------------------|------|-----------------------------|---------|---------------|---------------|
|                                                                   | CAS Number       | LOR  | PT84MW4                     | PT84MW1 | ES1020907-001 | ES1020907-002 |
| <b>EA005: pH</b>                                                  |                  |      |                             |         |               |               |
| pH Value                                                          | ---              | 0.01 | 4.58                        | 4.24    | ---           | ---           |
| <b>EA010P: Conductivity by PC Titrator</b>                        |                  |      |                             |         |               |               |
| Electrical Conductivity @ 25°C                                    | ---              | 1    | 138                         | 174     | ---           | ---           |
| <b>EA015: Total Dissolved Solids</b>                              |                  |      |                             |         |               |               |
| Total Dissolved Solids @180°C                                     | GIS-210-010      | 1    | 100                         | 150     | ---           | ---           |
| <b>ED037P: Alkalinity by PC Titrator</b>                          |                  |      |                             |         |               |               |
| Hydroxide Alkalinity as CaCO <sub>3</sub>                         | DMO-210-001      | 1    | <1                          | <1      | ---           | ---           |
| Carbonate Alkalinity as CaCO <sub>3</sub>                         | 3812-32-6        | 1    | <1                          | <1      | ---           | ---           |
| Bicarbonate Alkalinity as CaCO <sub>3</sub>                       | 71-52-3          | 1    | 2                           | 3       | ---           | ---           |
| Total Alkalinity as CaCO <sub>3</sub>                             | ---              | 1    | 2                           | 3       | ---           | ---           |
| <b>ED041G: Sulfate (Turbidimetric) as SO<sub>4</sub> 2- by DA</b> |                  |      |                             |         |               |               |
| Sulfate as SO <sub>4</sub> - Turbidimetric                        | 14808-79-8       | 1    | 1                           | 4       | ---           | ---           |
| <b>ED045G: Chloride Discrete analyser</b>                         |                  |      |                             |         |               |               |
| Chloride                                                          | 16887-00-6       | 1    | 29                          | 30      | ---           | ---           |
| <b>ED093F: Dissolved Major Cations</b>                            |                  |      |                             |         |               |               |
| Calcium                                                           | 7440-70-2        | 1    | <1                          | 1       | ---           | ---           |
| Magnesium                                                         | 7439-95-4        | 1    | 3                           | 6       | ---           | ---           |
| Sodium                                                            | 7440-23-5        | 1    | 16                          | 12      | ---           | ---           |
| Potassium                                                         | 7440-09-7        | 1    | <1                          | 2       | ---           | ---           |
| <b>END055: Ionic Balance</b>                                      |                  |      |                             |         |               |               |
| ^ Total Anions                                                    | ---              | 0.01 | 0.89                        | 1.00    | ---           | ---           |
| ^ Total Cations                                                   | ---              | 0.01 | 0.94                        | 1.14    | ---           | ---           |



Environmental Division

**QUALITY CONTROL REPORT**

|              |                                                                |                         |                                                       |
|--------------|----------------------------------------------------------------|-------------------------|-------------------------------------------------------|
| Work Order   | : ES1020907                                                    | Page                    | : 1 of 5                                              |
| Client       | : URS AUSTRALIA (NSW) PTY LTD                                  | Laboratory              | : Environmental Division Sydney                       |
| Contact      | : MR FABIO CAROSONE                                            | Contact                 | : Jacob Waugh                                         |
| Address      | : LEVEL 4, 407 PACIFIC HIGHWAY<br>ARTARMON NSW, AUSTRALIA 2064 | Address                 | : 277-289 Woodpark Road Smithfield NSW Australia 2164 |
| E-mail       | : fabio_carosone@urscorp.com                                   | E-mail                  | : jacob.waugh@alsenviro.com                           |
| Telephone    | : +61 89255500                                                 | Telephone               | : +61-2-8784 8555                                     |
| Facsimile    | : +61 02 89255555                                              | Facsimile               | : +61-2-8784 8500                                     |
| Project      | : 43167795                                                     | QC Level                | : NEPM 1999 Schedule B(3) and ALS QCS3 requirement    |
| Site         | : ---                                                          | Date Samples Received   | : 19-OCT-2010                                         |
| C-O-C number | : ---                                                          | Issue Date              | : 25-OCT-2010                                         |
| Sampler      | : FC                                                           | No. of samples received | : 2                                                   |
| Order number | : ---                                                          | No. of samples analysed | : 2                                                   |
| Quote number | : EN/001/10                                                    |                         |                                                       |

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits



NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

WORLD RECOGNISED  
**ACCREDITATION**

Accredited for compliance with  
ISO/IEC 17025.

**Signatories**

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

| Signatories      | Position                 | Accreditation Category |
|------------------|--------------------------|------------------------|
| Ankit Joshi      | Inorganic Chemist        | Inorganics             |
| Celine Conceicao | Spectroscopist           | Inorganics             |
| Sarah Millington | Senior Inorganic Chemist | Inorganics             |

**Environmental Division Sydney**

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Page  
Work Order  
Client  
Project

2 of 5  
ES1020907  
URS AUSTRALIA (NSW) PTY LTD  
43167795



### General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key :

Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot  
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.  
LOR = Limit of reporting  
RPD = Relative Percentage Difference  
# = Indicates failed QC



Page : 3 of 5  
Work Order : ES1020907  
Client : URS AUSTRALIA (NSW) PTY LTD  
Project : 43167795

## Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR:- No Limit; Result between 10 and 20 times LOR:- 0% - 50%; Result > 20 times LOR:- 0% - 20%.

Sub-Matrix: WATER

| Sub-Matrix: WATER                                                 |                  |                                          |             |      |         |                 |                  |           |                     |
|-------------------------------------------------------------------|------------------|------------------------------------------|-------------|------|---------|-----------------|------------------|-----------|---------------------|
| Laboratory sample ID                                              | Client sample ID | Method/Compound                          | CAS Number  | LOR  | Unit    | Original Result | Duplicate Result | RPD (%)   | Recovery Limits (%) |
| EA005: pH (QC Lot: 1527513)                                       |                  |                                          |             |      |         |                 |                  |           |                     |
| ES1020883-001                                                     | Anonymous        | EA005: pH Value                          | ---         | 0.01 | pH Unit | Anonymous       | Anonymous        | Anonymous | Anonymous           |
| ES1020453-001                                                     | Anonymous        | EA005: pH Value                          | ---         | 0.01 | pH Unit | Anonymous       | Anonymous        | Anonymous | Anonymous           |
| EA010P: Conductivity by PC Titrator (QC Lot: 1530332)             |                  |                                          |             |      |         |                 |                  |           |                     |
| ES1020654-001                                                     | Anonymous        | EA010-P: Electrical Conductivity @ 25°C  | ---         | 1    | µS/cm   | Anonymous       | Anonymous        | Anonymous | Anonymous           |
| ES1020848-003                                                     | Anonymous        | EA010-P: Electrical Conductivity @ 25°C  | ---         | 1    | µS/cm   | Anonymous       | Anonymous        | Anonymous | Anonymous           |
| EA010P: Conductivity by PC Titrator (QC Lot: 1530337)             |                  |                                          |             |      |         |                 |                  |           |                     |
| ES1020907-002                                                     | PT84MW1          | EA010-P: Electrical Conductivity @ 25°C  | ---         | 1    | µS/cm   | 174             | 174              | 0.0       | 0% - 20%            |
| ES1021049-003                                                     | Anonymous        | EA010-P: Electrical Conductivity @ 25°C  | ---         | 1    | µS/cm   | Anonymous       | Anonymous        | Anonymous | Anonymous           |
| EA015: Total Dissolved Solids (QC Lot: 1528601)                   |                  |                                          |             |      |         |                 |                  |           |                     |
| ES1020795-001                                                     | Anonymous        | EA015: Total Dissolved Solids @180°C     | GIS-210-010 | 1    | mg/L    | Anonymous       | Anonymous        | Anonymous | Anonymous           |
| ED037P: Alkalinity by PC Titrator (QC Lot: 1530336)               |                  |                                          |             |      |         |                 |                  |           |                     |
| ES1020907-002                                                     | PT84MW1          | ED037-P: Hydroxide Alkalinity as CaCO3   | DMO-210-001 | 1    | mg/L    | <1              | <1               | 0.0       | No Limit            |
|                                                                   |                  | ED037-P: Carbonate Alkalinity as CaCO3   | 3812-32-6   | 1    | mg/L    | <1              | <1               | 0.0       | No Limit            |
|                                                                   |                  | ED037-P: Bicarbonate Alkalinity as CaCO3 | 71-52-3     | 1    | mg/L    | 3               | 2                | 0.0       | No Limit            |
|                                                                   |                  | ED037-P: Total Alkalinity as CaCO3       | ---         | 1    | mg/L    | 3               | 2                | 0.0       | No Limit            |
| ES1020963-001                                                     | Anonymous        | ED037-P: Hydroxide Alkalinity as CaCO3   | DMO-210-001 | 1    | mg/L    | Anonymous       | Anonymous        | Anonymous | Anonymous           |
|                                                                   |                  | ED037-P: Carbonate Alkalinity as CaCO3   | 3812-32-6   | 1    | mg/L    | Anonymous       | Anonymous        | Anonymous | Anonymous           |
|                                                                   |                  | ED037-P: Bicarbonate Alkalinity as CaCO3 | 71-52-3     | 1    | mg/L    | Anonymous       | Anonymous        | Anonymous | Anonymous           |
|                                                                   |                  | ED037-P: Total Alkalinity as CaCO3       | ---         | 1    | mg/L    | Anonymous       | Anonymous        | Anonymous | Anonymous           |
| ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 1527693) |                  |                                          |             |      |         |                 |                  |           |                     |
| ES1020907-001                                                     | PT84MW4          | ED041G: Sulfate as SO4 - Turbidimetric   | 14808-79-8  | 1    | mg/L    | 1               | 1                | 0.0       | No Limit            |
| ED045G: Chloride Discrete analyser (QC Lot: 1527692)              |                  |                                          |             |      |         |                 |                  |           |                     |
| ES1020907-001                                                     | PT84MW4          | ED045G: Chloride                         | 16887-00-6  | 1    | mg/L    | 29              | 29               | 0.0       | 0% - 20%            |
| ES1020963-001                                                     | Anonymous        | ED045G: Chloride                         | 16887-00-6  | 1    | mg/L    | Anonymous       | Anonymous        | Anonymous | Anonymous           |
| ED093F: Dissolved Major Cations (QC Lot: 1527690)                 |                  |                                          |             |      |         |                 |                  |           |                     |
| ES1020906-001                                                     | Anonymous        | ED093F: Calcium                          | 7440-70-2   | 1    | mg/L    | Anonymous       | Anonymous        | Anonymous | Anonymous           |
|                                                                   |                  | ED093F: Magnesium                        | 7439-95-4   | 1    | mg/L    | Anonymous       | Anonymous        | Anonymous | Anonymous           |
|                                                                   |                  | ED093F: Sodium                           | 7440-23-5   | 1    | mg/L    | Anonymous       | Anonymous        | Anonymous | Anonymous           |
|                                                                   |                  | ED093F: Potassium                        | 7440-09-7   | 1    | mg/L    | Anonymous       | Anonymous        | Anonymous | Anonymous           |
| ES1020954-002                                                     | Anonymous        | ED093F: Calcium                          | 7440-70-2   | 1    | mg/L    | Anonymous       | Anonymous        | Anonymous | Anonymous           |
|                                                                   |                  | ED093F: Magnesium                        | 7439-95-4   | 1    | mg/L    | Anonymous       | Anonymous        | Anonymous | Anonymous           |
|                                                                   |                  | ED093F: Sodium                           | 7440-23-5   | 1    | mg/L    | Anonymous       | Anonymous        | Anonymous | Anonymous           |
|                                                                   |                  | ED093F: Potassium                        | 7440-09-7   | 1    | mg/L    | Anonymous       | Anonymous        | Anonymous | Anonymous           |



## Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: WATER

| Sub-Matrix: WATER                                                |             |     |       | Method Blank (MB) Report |                     | Laboratory Control Spike (LCS) Report |      |     |      |
|------------------------------------------------------------------|-------------|-----|-------|--------------------------|---------------------|---------------------------------------|------|-----|------|
| Method: Compound                                                 | CAS Number  | LOR | Unit  | Result                   | Spike Concentration | Spike Recovery (%)                    | LCS  | Low | High |
| EA010P: Conductivity by PC Titrator (QCLot: 1530332)             |             |     |       |                          |                     |                                       |      |     |      |
| EA010-P: Electrical Conductivity @ 25°C                          | ---         | 1   | µS/cm | <1                       | 2000 µS/cm          | 107                                   | 86.3 | 112 | 112  |
| EA010P: Conductivity by PC Titrator (QCLot: 1530337)             |             |     |       |                          |                     |                                       |      |     |      |
| EA010-P: Electrical Conductivity @ 25°C                          | ---         | 1   | µS/cm | <1                       | 2000 µS/cm          | 105                                   | 86.3 | 112 | 112  |
| EA015: Total Dissolved Solids (QCLot: 1528601)                   |             |     |       |                          |                     |                                       |      |     |      |
| EA015: Total Dissolved Solids @180°C                             | GIS-210-010 | 1   | mg/L  | <1                       | 293 mg/L            | 119                                   | 77.9 | 122 | 122  |
| ED037P: Alkalinity by PC Titrator (QCLot: 1530336)               |             |     |       |                          |                     |                                       |      |     |      |
| ED037-P: Total Alkalinity as CaCO3                               | ---         | 1   | mg/L  | ---                      | 200 mg/L            | 89.1                                  | 80.2 | 108 | 108  |
| ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 1527693) |             |     |       |                          |                     |                                       |      |     |      |
| ED041G: Sulfate as SO4 - Turbidimetric                           | 14808-79-8  | 1   | mg/L  | <1                       | 10 mg/L             | 97.9                                  | 70   | 130 | 130  |
| ED045G: Chloride Discrete analyser (QCLot: 1527692)              |             |     |       |                          |                     |                                       |      |     |      |
| ED045G: Chloride                                                 | 16887-00-6  | 1   | mg/L  | <1                       | 50 mg/L             | 114                                   | 83.7 | 124 | 124  |
| ED093F: Dissolved Major Cations (QCLot: 1527690)                 |             |     |       |                          |                     |                                       |      |     |      |
| ED093F: Calcium                                                  | 7440-70-2   | 1   | mg/L  | <1                       | 50 mg/L             | 96.3                                  | 88   | 110 | 110  |
| ED093F: Magnesium                                                | 7439-95-4   | 1   | mg/L  | <1                       | 50 mg/L             | 97.5                                  | 90   | 110 | 110  |
| ED093F: Sodium                                                   | 7440-23-5   | 1   | mg/L  | <1                       | 50 mg/L             | 94.8                                  | 81   | 107 | 107  |
| ED093F: Potassium                                                | 7440-09-7   | 1   | mg/L  | <1                       | 50 mg/L             | 97.6                                  | 89   | 109 | 109  |

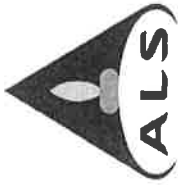


## Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: WATER

| Sub-Matrix: WATER                                                |                  |                                        | Matrix Spike (MS) Report |                     |                     |     |      |
|------------------------------------------------------------------|------------------|----------------------------------------|--------------------------|---------------------|---------------------|-----|------|
| Laboratory sample ID                                             | Client sample ID | Method: Compound                       | CAS Number               | Spike Concentration | Recovery Limits (%) |     |      |
|                                                                  |                  |                                        |                          |                     | Spike Recovery (%)  | Low | High |
| ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 1527693) |                  |                                        |                          |                     |                     |     |      |
| ES1020907-001                                                    | PT84MMW4         | ED041G: Sulfate as SO4 - Turbidimetric | 14808-79-8               | 2.5 mg/L            | 100                 | 70  | 130  |
| ED045G: Chloride Discrete analyser (QCLot: 1527692)              |                  |                                        |                          |                     |                     |     |      |
| ES1020907-001                                                    | PT84MMW4         | ED045G: Chloride                       | 16887-00-6               | 250 mg/L            | 113                 | 70  | 130  |



Environmental Division

**INTERPRETIVE QUALITY CONTROL REPORT**

|                     |                                                                |                                |                                                       |
|---------------------|----------------------------------------------------------------|--------------------------------|-------------------------------------------------------|
| <b>Work Order</b>   | <b>: ES1020907</b>                                             | <b>Page</b>                    | <b>: 1 of 5</b>                                       |
| <b>Client</b>       | : URS AUSTRALIA (NSW) PTY LTD                                  | <b>Laboratory</b>              | : Environmental Division Sydney                       |
| <b>Contact</b>      | : MR FABIO CAROSONE                                            | <b>Contact</b>                 | : Charlie Pierce                                      |
| <b>Address</b>      | : LEVEL 4, 407 PACIFIC HIGHWAY<br>ARTARMON NSW, AUSTRALIA 2064 | <b>Address</b>                 | : 277-289 Woodpark Road Smithfield NSW Australia 2164 |
| <b>E-mail</b>       | : fabio_carosone@urscorp.com                                   | <b>E-mail</b>                  | : charlie.pierce@alsglobal.com                        |
| <b>Telephone</b>    | : +61 89255500                                                 | <b>Telephone</b>               | : +61-2-8784 8555                                     |
| <b>Facsimile</b>    | : +61 02 89255555                                              | <b>Facsimile</b>               | : +61-2-8784 8500                                     |
| <b>Project</b>      | : 43167795                                                     | <b>QC Level</b>                | : NEPM 1999 Schedule B(3) and ALS QCS3 requirement    |
| <b>Site</b>         | : —                                                            | <b>Date Samples Received</b>   | : 19-OCT-2010                                         |
| <b>C-O-C number</b> | : —                                                            | <b>Issue Date</b>              | : 25-OCT-2010                                         |
| <b>Sampler</b>      | : FC                                                           | <b>No. of samples received</b> | : 2                                                   |
| <b>Order number</b> | : —                                                            | <b>No. of samples analysed</b> | : 2                                                   |
| <b>Quote number</b> | : EN/001/10                                                    |                                |                                                       |

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Interpretive Quality Control Report contains the following information:

- Analysis Holding Time Compliance
- Quality Control Parameter Frequency Compliance
- Brief Method Summaries
- Summary of Outliers



## Analysis Holding Time Compliance

The following report summarises extraction / preparation and analysis times and compares with recommended holding times. Dates reported represent first date of extraction or analysis and precludes subsequent dilutions and reruns. Information is also provided re the sample container (preservative) from which the analysis aliquot was taken. Elapsed period to analysis represents number of days from sampling where no extraction / digestion is involved or period from extraction / digestion where this is present. For composite samples, sampling date is assumed to be that of the oldest sample contributing to the composite. Sample date for laboratory produced leachates is assumed as the completion date of the leaching process. Outliers for holding time are based on USEPA SW 846, APHA, AS and NEPM (1999). A listing of breaches is provided in the Summary of Outliers.

Holding times for leachate methods (excluding elutriates) vary according to the analytes being determined on the resulting solution. For non-volatile analytes, the holding time compliance assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These soil holding times are: Organics (14 days); Mercury (28 days) & other metals (180 days). A recorded breach therefore does not guarantee a breach for all non-volatile parameters.

Matrix: WATER

Evaluation: \* = Holding time breach ; ✓ = Within holding time.

| Method                                                            | Container / Client Sample ID(s) | Sample Date | Extraction / Preparation |                    | Analysis      |                  |
|-------------------------------------------------------------------|---------------------------------|-------------|--------------------------|--------------------|---------------|------------------|
|                                                                   |                                 |             | Date extracted           | Due for extraction | Date analysed | Due for analysis |
| <b>EA005: pH</b>                                                  |                                 |             |                          |                    |               |                  |
| Clear Plastic Bottle - Natural                                    |                                 |             |                          |                    |               |                  |
| PT84MW4,                                                          | PT84MW1                         | 19-OCT-2010 | ---                      | ---                | 19-OCT-2010   | 19-OCT-2010 ✓    |
| <b>EA010P: Conductivity by PC-Titrator</b>                        |                                 |             |                          |                    |               |                  |
| Clear Plastic Bottle - Natural                                    |                                 |             |                          |                    |               |                  |
| PT84MW4,                                                          | PT84MW1                         | 19-OCT-2010 | ---                      | 16-NOV-2010        | 22-OCT-2010   | 16-NOV-2010 ✓    |
| <b>EA015: Total Dissolved Solids</b>                              |                                 |             |                          |                    |               |                  |
| Clear Plastic Bottle - Natural                                    |                                 |             |                          |                    |               |                  |
| PT84MW4,                                                          | PT84MW1                         | 19-OCT-2010 | ---                      | ---                | 20-OCT-2010   | 26-OCT-2010 ✓    |
| <b>ED037P: Alkalinity by PC Titrator</b>                          |                                 |             |                          |                    |               |                  |
| Clear Plastic Bottle - Natural                                    |                                 |             |                          |                    |               |                  |
| PT84MW4,                                                          | PT84MW1                         | 19-OCT-2010 | ---                      | 02-NOV-2010        | 22-OCT-2010   | 02-NOV-2010 ✓    |
| <b>ED041G: Sulfate (Turbidimetric) as SO<sub>4</sub> 2- by DA</b> |                                 |             |                          |                    |               |                  |
| Clear Plastic Bottle - Natural                                    |                                 |             |                          |                    |               |                  |
| PT84MW4,                                                          | PT84MW1                         | 19-OCT-2010 | ---                      | 16-NOV-2010        | 19-OCT-2010   | 16-NOV-2010 ✓    |
| <b>ED045G: Chloride Discrete analyser</b>                         |                                 |             |                          |                    |               |                  |
| Clear Plastic Bottle - Natural                                    |                                 |             |                          |                    |               |                  |
| PT84MW4,                                                          | PT84MW1                         | 19-OCT-2010 | ---                      | 16-NOV-2010        | 19-OCT-2010   | 16-NOV-2010 ✓    |
| <b>ED093F: Dissolved Major Cations</b>                            |                                 |             |                          |                    |               |                  |
| Clear Plastic Bottle - Natural                                    |                                 |             |                          |                    |               |                  |
| PT84MW4,                                                          | PT84MW1                         | 19-OCT-2010 | ---                      | 26-OCT-2010        | 19-OCT-2010   | 26-OCT-2010 ✓    |



## Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(where) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

### Matrix: WATER

Evaluation: \* = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

| Quality Control Sample Type                                                                                                                                                                                      |                                                                                                                                                                               | Count  |         | Rate (%) |          | Quality Control Specification |                                                  |                                                  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---------|----------|----------|-------------------------------|--------------------------------------------------|--------------------------------------------------|
| Analytical Methods                                                                                                                                                                                               |                                                                                                                                                                               | QC     | Regular | Actual   | Expected | Evaluation                    |                                                  |                                                  |
| Laboratory Duplicates (DUP)                                                                                                                                                                                      |                                                                                                                                                                               |        |         |          |          |                               |                                                  |                                                  |
| Alkalinity by PC Titrator<br>Chloride by Discrete Analyser<br>Conductivity by PC Titrator<br>Major Cations - Dissolved<br>pH<br>Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser<br>Total Dissolved Solids | ED037-P                                                                                                                                                                       | 2      | 20      | 10.0     | 10.0     | ✓                             | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |                                                  |
|                                                                                                                                                                                                                  | ED045G                                                                                                                                                                        | 2      | 17      | 11.8     | 10.0     | ✓                             | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |                                                  |
|                                                                                                                                                                                                                  | EA010-P                                                                                                                                                                       | 4      | 29      | 13.8     | 10.0     | ✓                             | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |                                                  |
|                                                                                                                                                                                                                  | ED093F                                                                                                                                                                        | 2      | 17      | 11.8     | 10.0     | ✓                             | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |                                                  |
|                                                                                                                                                                                                                  | EA005                                                                                                                                                                         | 2      | 20      | 10.0     | 10.0     | ✓                             | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |                                                  |
|                                                                                                                                                                                                                  | ED041G                                                                                                                                                                        | 1      | 7       | 14.3     | 10.0     | ✓                             | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |                                                  |
|                                                                                                                                                                                                                  | EA015                                                                                                                                                                         | 1      | 6       | 16.7     | 10.0     | ✓                             | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |                                                  |
|                                                                                                                                                                                                                  |                                                                                                                                                                               |        |         |          |          |                               |                                                  |                                                  |
|                                                                                                                                                                                                                  | Laboratory Control Samples (LCS)                                                                                                                                              |        |         |          |          |                               |                                                  |                                                  |
| Alkalinity by PC Titrator<br>Chloride by Discrete Analyser<br>Conductivity by PC Titrator<br>Major Cations - Dissolved<br>Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser<br>Total Dissolved Solids       | ED037-P                                                                                                                                                                       | 1      | 20      | 5.0      | 5.0      | ✓                             | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |                                                  |
|                                                                                                                                                                                                                  | ED045G                                                                                                                                                                        | 2      | 17      | 11.8     | 10.0     | ✓                             | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |                                                  |
|                                                                                                                                                                                                                  | EA010-P                                                                                                                                                                       | 2      | 29      | 6.9      | 5.0      | ✓                             | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |                                                  |
|                                                                                                                                                                                                                  | ED093F                                                                                                                                                                        | 1      | 17      | 5.9      | 5.0      | ✓                             | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |                                                  |
|                                                                                                                                                                                                                  | ED041G                                                                                                                                                                        | 1      | 7       | 14.3     | 5.0      | ✓                             | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |                                                  |
|                                                                                                                                                                                                                  | EA015                                                                                                                                                                         | 1      | 6       | 16.7     | 5.0      | ✓                             | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |                                                  |
|                                                                                                                                                                                                                  |                                                                                                                                                                               |        |         |          |          |                               |                                                  |                                                  |
|                                                                                                                                                                                                                  | Method Blanks (MB)                                                                                                                                                            |        |         |          |          |                               |                                                  |                                                  |
|                                                                                                                                                                                                                  | Chloride by Discrete Analyser<br>Conductivity by PC Titrator<br>Major Cations - Dissolved<br>Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser<br>Total Dissolved Solids | ED045G | 1       | 17       | 5.9      | 5.0                           | ✓                                                | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |
| EA010-P                                                                                                                                                                                                          |                                                                                                                                                                               | 2      | 29      | 6.9      | 5.0      | ✓                             | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |                                                  |
| ED093F                                                                                                                                                                                                           |                                                                                                                                                                               | 1      | 17      | 5.9      | 5.0      | ✓                             | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |                                                  |
| ED041G                                                                                                                                                                                                           |                                                                                                                                                                               | 1      | 7       | 14.3     | 5.0      | ✓                             | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |                                                  |
| EA015                                                                                                                                                                                                            |                                                                                                                                                                               | 1      | 6       | 16.7     | 5.0      | ✓                             | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |                                                  |
|                                                                                                                                                                                                                  |                                                                                                                                                                               |        |         |          |          |                               |                                                  |                                                  |
| Matrix Spikes (MS)                                                                                                                                                                                               |                                                                                                                                                                               |        |         |          |          |                               |                                                  |                                                  |
| Chloride by Discrete Analyser<br>Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser                                                                                                                          |                                                                                                                                                                               | ED045G | 1       | 17       | 5.9      | 5.0                           | ✓                                                | ALS QCS3 requirement                             |
|                                                                                                                                                                                                                  |                                                                                                                                                                               | ED041G | 1       | 7        | 14.3     | 5.0                           | ✓                                                | ALS QCS3 requirement                             |



## Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

| Analytical Methods                                     | Method     | Matrix | Method Descriptions                                                                                                                                                                                                                                                                                                                                                    |
|--------------------------------------------------------|------------|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| pH                                                     | EA005      | WATER  | APHA 21st ed. 4500 H <sup>+</sup> B. pH of water samples is determined by ISE either manually or by automated pH meter. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)                                                                                                                                                                             |
| Conductivity by PC Titrator                            | EA010-P    | WATER  | APHA 21st ed., 2510 B This procedure determines conductivity by automated ISE. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)                                                                                                                                                                                                                      |
| Total Dissolved Solids                                 | EA015      | WATER  | APHA 21st ed., 2540C A gravimetric procedure that determines the amount of 'filterable' residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180±/5C. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)                          |
| Alkalinity by PC Titrator                              | ED037-P    | WATER  | APHA 21st ed., 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)                                                                                                                                   |
| Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser | ED041G     | WATER  | APHA 21st ed., 4500-SO4 Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2) |
| Chloride by Discrete Analyser                          | ED045G     | WATER  | APHA 21st ed., 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003    |
| Major Cations - Dissolved                              | ED093F     | WATER  | APHA 21st ed., 3120; USEPA SW 846 - 6010 The ICPAES technique ionises the 0.45um filtered sample atoms emitting a characteristic spectrum. This spectrum is then compared against matrix matched standards for quantification. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)                                                                      |
| Ionic Balance by PCT DA and ICPAES                     | EN055 - PG | WATER  | APHA 21st Ed. 1030F. The Ionic Balance is calculated based on the major Anions and Cations. The major anions include Alkalinity, Chloride and Sulfate which determined by PCT and DA. The Cations are determined by ICPAES. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)                                                                         |



## Summary of Outliers

### Outliers : Quality Control Samples

The following report highlights outliers flagged in the Quality Control (QC) Report. Surrogate recovery limits are static and based on USEPA SW846 or ALS-QW/EN/38 (in the absence of specific USEPA limits). This report displays QC Outliers (breaches) only.

#### Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

- For all matrices, no Method Blank value outliers occur.
- For all matrices, no Duplicate outliers occur.
- For all matrices, no Laboratory Control outliers occur.
- For all matrices, no Matrix Spike outliers occur.

#### Regular Sample Surrogates

- For all regular sample matrices, no surrogate recovery outliers occur.

### Outliers : Analysis Holding Time Compliance

This report displays Holding Time breaches only. Only the respective Extraction / Preparation and/or Analysis component is/are displayed.

- No Analysis Holding Time Outliers exist

### Outliers : Frequency of Quality Control Samples

The following report highlights breaches in the Frequency of Quality Control Samples.

- No Quality Control Sample Frequency Outliers exist.

| THIS COLUMN FOR LAB USE ONLY                                                                       |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |  | CHAIN OF CUSTODY FORM                   |  |                                   |  |                     |  |                      |  | Container Size, Type, Preservative, and Analysis |  |                 |  |  |  |
|----------------------------------------------------------------------------------------------------|--|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|-----------------------------------------|--|-----------------------------------|--|---------------------|--|----------------------|--|--------------------------------------------------|--|-----------------|--|--|--|
| <b>FROM:</b><br>URS (AUSTRALIA)<br>ACN 000 691 690<br>116 Miller Street<br>North Sydney NSW 2060   |  |  | <b>DATE:</b> 19-10-10<br><br><b>TO:</b><br>ALS<br>277-289 Woodpark Road<br>SMITHFIELD NSW 2164                                                                                                                                                                                                                                                                                                                                                                                                                    |  |  | <b>Project No:</b> 43167795             |  | <b>Sampler(s):</b> Fabio Carosone |  | <b>Size</b><br>1000 |  |                      |  |                                                  |  |                 |  |  |  |
| <b>Job Code:</b>                                                                                   |  |  | <b>Ph:</b> 87848555                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |  | <b>F. Carosone</b>                      |  | <b>Signature(s):</b><br>          |  | <b>Type*</b><br>P   |  |                      |  |                                                  |  |                 |  |  |  |
| <b>Due Date:</b>                                                                                   |  |  | <b>Agreement No:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |  | <b>Released for URS by:</b> F. Carosone |  | <b>Checked:</b>                   |  |                     |  |                      |  |                                                  |  |                 |  |  |  |
| <b>Custody seal intact?</b><br>YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> |  |  | <b>Date:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |  |  | <b>Time:</b>                            |  | <b>Date:</b>                      |  | <b>Time:</b>        |  |                      |  |                                                  |  |                 |  |  |  |
| <b>Sample cold?</b><br>YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>         |  |  | <b>Lab identification</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |  | <b>Date</b>                             |  | <b>Time</b>                       |  | <b>Matrix</b>       |  | <b>Sample Number</b> |  | <b>Comments</b>                                  |  | <b>Total no</b> |  |  |  |
|                                                                                                    |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |  |                                         |  |                                   |  |                     |  | PT84MW4              |  |                                                  |  | 1               |  |  |  |
|                                                                                                    |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |  |                                         |  |                                   |  |                     |  | PT84MW1              |  |                                                  |  | 1               |  |  |  |
|                                                                                                    |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |  |                                         |  |                                   |  |                     |  |                      |  |                                                  |  |                 |  |  |  |
|                                                                                                    |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |  |                                         |  |                                   |  |                     |  |                      |  |                                                  |  |                 |  |  |  |
|                                                                                                    |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |  |                                         |  |                                   |  |                     |  |                      |  |                                                  |  |                 |  |  |  |
|                                                                                                    |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |  |                                         |  |                                   |  |                     |  |                      |  |                                                  |  |                 |  |  |  |
|                                                                                                    |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |  |                                         |  |                                   |  |                     |  |                      |  |                                                  |  |                 |  |  |  |
|                                                                                                    |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |  |                                         |  |                                   |  |                     |  |                      |  |                                                  |  |                 |  |  |  |
|                                                                                                    |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |  |                                         |  |                                   |  |                     |  |                      |  |                                                  |  |                 |  |  |  |
|                                                                                                    |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |  |                                         |  |                                   |  |                     |  |                      |  |                                                  |  |                 |  |  |  |
|                                                                                                    |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |  |                                         |  |                                   |  |                     |  |                      |  |                                                  |  |                 |  |  |  |
| <b>Remarks:</b>                                                                                    |  |  | <p align="center"><b>TOTAL</b></p> <p align="right">2      2</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |  |                                         |  |                                   |  |                     |  |                      |  |                                                  |  |                 |  |  |  |
| <b>Courier Job No:</b>                                                                             |  |  | <p>* Container Type and Preservative Codes: P = Neutral Plastic; N = Nitric Acid Preserved; C = Sodium Hydroxide Preserved; J = Solvent Washed Acid Rinsed Jar; S = Solvent Washed Acid Rinsed Glass Bottle; VC = Hydrochloric Acid Preserved Vial; VS = Sulfuric Acid Preserved Vial; BS = Sulfuric Acid Preserved Glass Bottle; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle</p> <p align="right"><b>NOTE: SAMPLES MAY CONTAIN DANGEROUS AND HAZARDOUS SUBSTANCES</b></p> |  |  |                                         |  |                                   |  |                     |  |                      |  |                                                  |  |                 |  |  |  |

19/10 1320



## Appendix D – Bore PT84MW4 Geological Log

PROJECT : HB Maroota Monitoring Bore  
 LOCATION: Roberts Road, Maroota  
 SUPERVISOR F.Carosone

JOB NO.: 43167795  
 DATE STARTED: 21/12/2009  
 DATE COMPLETED: 22/12/2009

DRILLED BY: Intertech Drilling Services  
 RIG: Intertech 850  
 DATUM: 0.57 m above concrete/ground  
 EASTING: 314121

METHOD: Mud rotary  
 TOTAL DEPTH: 28.5 m  
 SWL: m b.datum  
 NORTHING: 6295389

DIAMETER: 140 mm  
 R.L. CONCRETE: mAHD  
 R.L. STEEL PLATE: mAHD  
 R.L. SWL :

## WELL NUMBER: PT84MW4

| Lithological Log | Remarks                                                                                              | Depth (m) | Bore Construction                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|------------------|------------------------------------------------------------------------------------------------------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  |                                                                                                      |           | <p>Diagram labels:</p> <ul style="list-style-type: none"> <li>Datum</li> <li>152 mm monument</li> <li>Concrete pad</li> <li>sand backfill</li> <li>200 mm HFA hole</li> <li>152 mm diam. steel casing</li> <li>Rigid foam seal</li> <li>PVC Blank Casing, 60mm OD, 50mm ID cl 18</li> <li>bentonite pellets seal</li> <li>backfill</li> <li>140 mm diam hole</li> <li>2 mm washed sand gravel pack</li> <li>PVC screens 60mm OD, 50mm ID cl 18, 0.45 mm slot</li> <li>bottom cap</li> <li>bottom of the hole</li> </ul> |
| 0 - 0.5          | SOIL: brown, sandy.                                                                                  |           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 0.5 - 6          | SAND: orange/brown, fine, clayey, sorted subrounded quartz grains becoming lighter colour below 3 m. | 1         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                  |                                                                                                      | 2         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                  |                                                                                                      | 3         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                  |                                                                                                      | 4         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                  |                                                                                                      | 5         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 6 - 6.9          | SAND: orange, gravelly medium/coarse subangular quartz grains                                        | 6         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 6.9 - 8          | SAND: grey, gravelly, medium/coarse subangular quartz grains.                                        | 7         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 8 - 9            | SAND: orange, gravelly medium/coarse subangular quartz grains.                                       | 8         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 9 - 10           | CLAY: grey, soft, sandy.                                                                             | 9         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 10 - 12          | CLAY: grey and orange.                                                                               | 10        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                  |                                                                                                      | 11        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 12 - 14          | GRAVEL: grey, sandy, with some clay, fine, subrounded, clear and white quartz grains.                | 12        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                  |                                                                                                      | 13        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 14 - 15          | CLAY: grey and red, layered, some sand.                                                              | 14        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 15 - 17          | CLAY: grey and white, soft, some sand.                                                               | 15        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                  |                                                                                                      | 16        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 17 - 20          | GRAVEL: grey and white with some white clay, 2 -5 mm quartz grains.                                  | 17        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                  |                                                                                                      | 18        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                  |                                                                                                      | 19        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 20 - 25.5        | SAND: red, gravelly medium/coarse subangular quartz grains.                                          | 20        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                  |                                                                                                      | 21        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                  |                                                                                                      | 22        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                  |                                                                                                      | 23        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                  |                                                                                                      | 24        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 25.5 - 27.5      | SAND: grey, gravelly, angular to subangular quarts grains                                            | 25        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                  |                                                                                                      | 26        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 27.5 - 28.5      | Ironstone, red with dark red clay, very hard.                                                        | 27        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                  |                                                                                                      | 28        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 28.5             | Bottom of the hole                                                                                   | 29        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

PROJECT: HB Maroota Monitoring Bore  
 LOCATION: Roberts Road, Maroota  
 SUPERVISOR: F. Carosone

JOB NO.: 43167795  
 DATE STARTED: 21/12/2009  
 DATE COMPLETED: 22/12/2009

DRIILLED BY: Intertech Drilling Services  
 RIG: Intertech 850  
 DATUM: 0.57 m above concrete/ground  
 ASTING: 314121

METHOD: Mud rotary  
 TOTAL DEPTH: 28.5 m  
 SWL: m b. datum  
 NORTHING: 6295389

DIAMETER: 140 mm  
 R.L. CONCRETE: mAHD  
 R.L. STEEL PLATE: mAHD  
 R.L. SWL:

## WELL NUMBER: PT84MW4

| Lithological Log |                                                                                                      | Remarks | Depth (m) | Bore Construction |                                                  |
|------------------|------------------------------------------------------------------------------------------------------|---------|-----------|-------------------|--------------------------------------------------|
|                  |                                                                                                      |         |           |                   | Datum<br>152 mm monument<br>Concrete pad         |
| 0.5              | SOIL: brown, sandy.                                                                                  |         |           |                   |                                                  |
| 0.5 - 6          | SAND: orange/brown, fine, clayey, sorted subrounded quartz grains becoming lighter colour below 3 m. |         | 1         |                   | sand backfill                                    |
|                  |                                                                                                      |         | 2         |                   |                                                  |
|                  |                                                                                                      |         | 3         |                   | 200 mm HFA hole                                  |
|                  |                                                                                                      |         | 4         |                   | 152 mm diam. steel casing                        |
|                  |                                                                                                      |         | 5         |                   | Rigid foam seal                                  |
|                  |                                                                                                      |         | 6         |                   |                                                  |
| 6.5 - 8          | SAND: orange, gravelly medium/coarse subangular quartz grains                                        |         | 7         |                   | PVC Blank Casing, 60mm OD, 50mm ID cl 18         |
|                  | SAND: grey, gravelly, medium/coarse subangular quartz grains.                                        |         | 8         |                   |                                                  |
|                  |                                                                                                      |         | 9         |                   | bentonite pellets seal                           |
| 9 - 10           | CLAY: grey, soft, sandy.                                                                             |         | 10        |                   |                                                  |
|                  | CLAY: grey and orange.                                                                               |         | 11        |                   |                                                  |
|                  |                                                                                                      |         | 12        |                   |                                                  |
| 11 - 14          | GRAVEL: grey, sandy, with some clay, fine, subrounded, clear and white quartz grains.                |         | 13        |                   | backfill                                         |
|                  |                                                                                                      |         | 14        |                   | 140 mm diam. hole                                |
| 15 - 17          | CLAY: grey and red, layered, some sand.                                                              |         | 15        |                   |                                                  |
|                  | CLAY: grey and white, soft, some sand.                                                               |         | 16        |                   |                                                  |
|                  |                                                                                                      |         | 17        |                   | 2 mm washed sand gravel pack                     |
| 17 - 20          | GRAVEL: grey and white with some white clay, 2 - 5 mm quartz grains.                                 |         | 18        |                   |                                                  |
|                  |                                                                                                      |         | 19        |                   |                                                  |
|                  |                                                                                                      |         | 20        |                   |                                                  |
| 20.5             | SAND: red, gravelly medium/coarse subangular quartz grains.                                          |         | 21        |                   |                                                  |
|                  |                                                                                                      |         | 22        |                   | PVC screens 60mm OD, 50mm ID cl 18, 0.45 mm slot |
|                  |                                                                                                      |         | 23        |                   |                                                  |
|                  |                                                                                                      |         | 24        |                   |                                                  |
|                  |                                                                                                      |         | 25        |                   |                                                  |
| 25 - 27.5        | SAND: grey, gravelly, angular to subangular quartz grains                                            |         | 26        |                   |                                                  |
|                  |                                                                                                      |         | 27        |                   |                                                  |
| 27.5 - 28.5      | Ironstone, red with dark red clay, very hard.                                                        |         | 28        |                   |                                                  |
|                  | Bottom of the hole                                                                                   |         | 29        |                   | bottom cap bottom of the hole                    |



## Appendix E – Copy of Correspondence with DNR

"Wayne Conners"

<Wayne.Conners@dnr.nsw.gov.au>

To: <Fabio\_Carosone@URSCorp.com>

cc:

Subject: Re: Monitoring bore replacement at Maroota

27/11/2009 11:13 a.m.

Fabio,

I can confirm that a replacement monitoring bore can be drilled under groundwater licence 10BL158808.

Please forward the bore log to me upon completion together with a site plan.

Wayne Conners

Natural Resource Project Officer

NSW Office of Water

Level 11, 10 Valentine Ave Parramatta 2150 PO Box 3720 Parramatta 2124

T: (02) 9895 7194 F: (02) 9895 7255

E: wayne.conners@dnr.nsw.gov.au

W: www.dwe.nsw.gov.au

Department of Environment, Climate Change and Water

>>> <Fabio\_Carosone@URSCorp.com> 19/11/2009 9:38 am >>>

Wayne,

thank you for your advice this morning on the replacement monitoring at the H.B.Maroota site, Maroota. As indicated by you, the replacement bore can be drilled under the same licence number issued for the three monitoring bores on the property. The licence number is 10BL158808, Lot1, DP228308. As requested, I attach copy of the bore log PT84MW3 (which includes the surveyed coordinates) and a site plan showing the current bores location. I have not marked the proposed new location for the bore, but it will be a short distance south along the fence between Lot 1 and Lot 2 , on Lot 1. Thank you for your assistance on this matter.

(See attached file: HB Maroota PT84MW3.pdf)

Regards

Fabio Carosone

Senior Associate Hydrogeologist

URS Australia Pty Ltd

Level 3, 116 Miller Street

North Sydney NSW 2060 Australia

Tel: +61 2 8925 5714 | Fax: +61 2 8925 5555

mobile: 0417 258379

mail to: fabio\_carosone@urscorp.com

Visit our website at <http://www.ap.urscorp.com/>



25 July 2011  
Project No. 43167795

H.B.Maroota Pty Limited  
Roberts Road  
Maroota NSW 2756

Attention: Martin Hodgson  
Director

Dear Martin

**Subject: 2011 Groundwater Management Plan**

The 2010 Groundwater Management Plan has been prepared for the site following the downloading of the two monitoring bores dataloggers and the laboratory analyses of the groundwater samples collected from those bores on the 22<sup>nd</sup> June 2011.

## **1 Water Levels**

### **1.1 Monitoring bore PT84MW1**

As noted in past occasions, a large volume of rootlets is growing again in the screened section of this bore. The rootlets were cleared on the 21<sup>st</sup> December 2009 by air pressure using the drilling rig. However, in the October data download, rootlets were again brought up to the surface.

This is a persistent problem and it will be necessary to repeat the rootlets removal at each download. This process is necessary to ensure that the data logger is repositioned at the correct depth after data download and to ensure that the sampling bailer can reach the bottom of the bore.

The hydrograph in Appendix A shows that the perched water table at this site has reversed the previously observed decline since June 2008. Bureau of Meteorology records for the Old Telegraph Road weather station no. 67014 indicate that the 2010 - 2011 year total rainfall (976.8 mm) was marginally above the long term average of 922.7 mm.

The location of bore PT84MW1 is shown in Figure 1.

### **1.2 Monitoring bore PT84MW3**

Monitoring bore PT84MW3 has been decommissioned due to the expansion of the quarry in that direction. The hydrograph in Appendix A shows that between May and December 2009 the water level in this bore fell, but that it remained above the lowest levels recorded between 2003 and 2007.

### **1.3 Monitoring bore PT84MW4**

Monitoring Bore PT84MW4 was drilled between the 21<sup>st</sup> and 22<sup>nd</sup> December 2009 and the datalogger from the decommissioned PT84MW3 was installed at the site. The replacement bore

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J:\JOBS\43167795\6 Deliv\July 2011 GMPlan Report to HB Maroota\2011 Groundwater Management Plan (Letter).doc

was drilled under the existing DNR licence No.10BL158808 for the abandoned bore, as confirmed by the Department in the correspondence presented in Appendix E.

The location of bore PT84MW4 is shown in Figure 1 and the geological log of the new bore is presented in Appendix D.

The datalogger records hydrograph covering the period December 2009 to October 2010 is presented in Appendix A. The hydrograph shows that the water level in this bore has risen by approximately 0.5 m between December 2010 and February 2011. Since then it has remained at around 187 m AHD.

## **2 Water Quality**

Water quality in all the bores on the site is generally fresh and, potentially, of drinking water standards. The analytical laboratory certificates are presented in Appendix C.

### **2.1.1 Monitoring bore PT84MW1**

Table 1 in Appendix B presents a summary of the recorded groundwater field chemical parameters measurements in the monitoring bores, and the laboratory analysis results from the sample collected during the October download event.

The Total Dissolved Salts content of the groundwater at this site shows a general decrease since records started, with fluctuations related to the rainfall pattern, as the shallow water table is readily recharged by infiltrating rainfall. This is also indicated by the chemical make-up of the water, which shows a typical Chloride/Sodium character.

### **2.1.2 Monitoring bore PT84MW4**

The single sample from this bore indicates a groundwater of similar character to that from bore PT84MW1.

## **3 Conclusions**

The above data indicate that the quarry operation does not have a negative impact upon the surrounding environment. No dewatering is carried out at the site and the water level in the pond at the base of the quarry, which previous studies have proved to be a window in the water table, has remained constant and, in fact, on recent observations has risen to approximately 182 m AHD from earlier long term average measurements of 180 m AHD. This rise is due in part to the breaking of drought and in part to the backfilling of the void by silt.



Martin Hodgson  
Director  
25 July 2011  
Page 3

I trust the above meets with your requirements. Please, do not hesitate to contact the undersigned, should you need to discuss the matter further.

Yours sincerely  
**URS Australia Pty Ltd**

A handwritten signature in black ink, reading 'Fabio Carosone'. The signature is written in a cursive style with a horizontal line underneath it.

---

Fabio Carosone  
Senior Associate Hydrogeologist



Legend  
 ● Monitoring Wells

0 100.0  
 meters

Map compiled using MapInfo StreetView Data. © 2010 Microsoft Australia Pty Ltd. URS Australia and PSMA Australia Ltd. URS Australia, MapInfo Australia or PSMA Australia do not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that these companies shall bear no responsibility or liability whatsoever for any errors, omissions, defects or limitations in the information.

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|                                                                                     |                                                                                                |                            |
|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|----------------------------|
| Client<br>HB MAROOTA PTY LTD                                                        | Project<br>GROUNDWATER MANAGEMENT PLAN                                                         | Title<br>SITE LOCALITY MAP |
|  | Drawn: AY    Approved: FC    Date: 02/11/2010<br>Job No: 43167795    File No: 43167795-001.wor | Figure: 1                  |

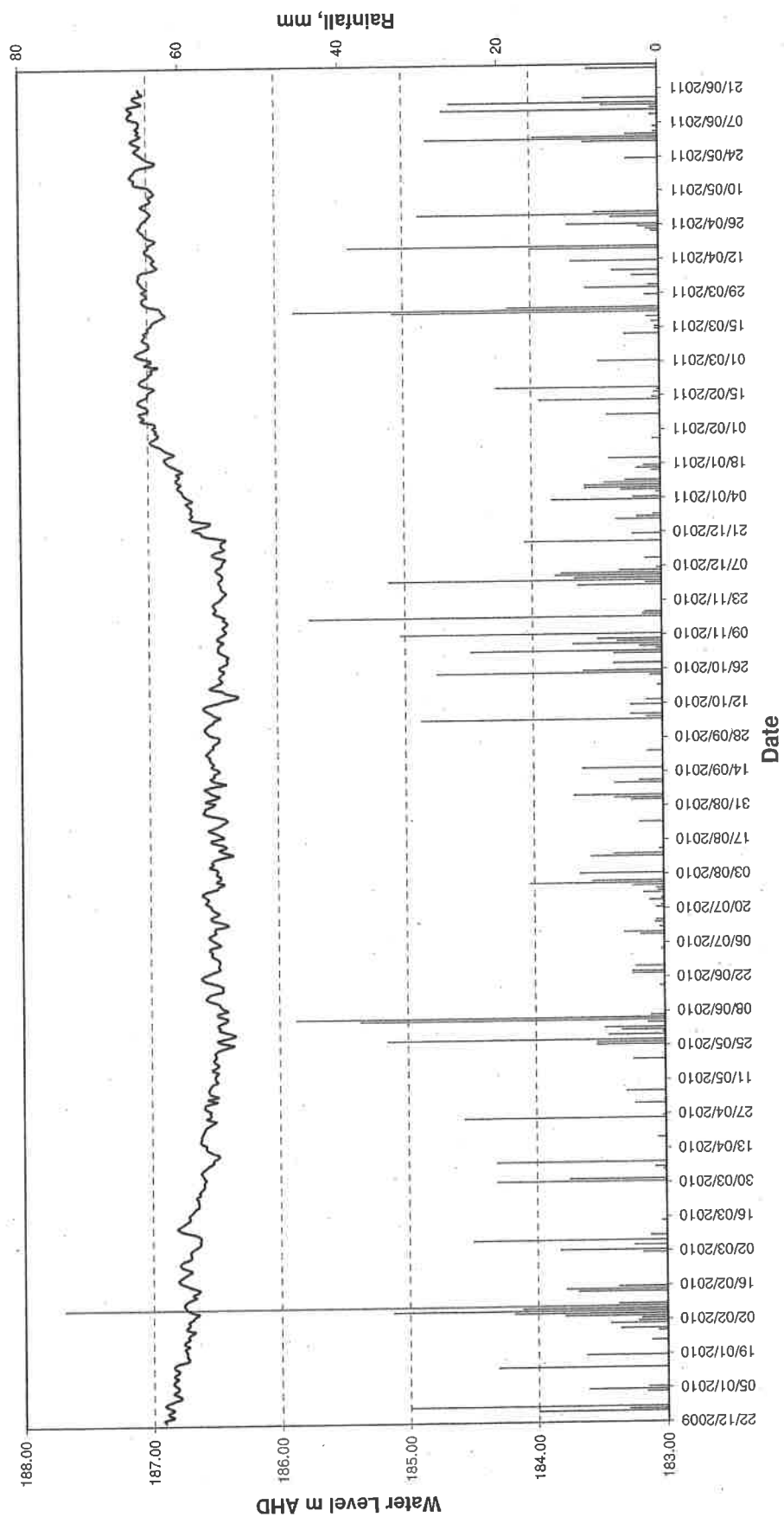


## Appendix A – Groundwater Monitoring Hydrographs



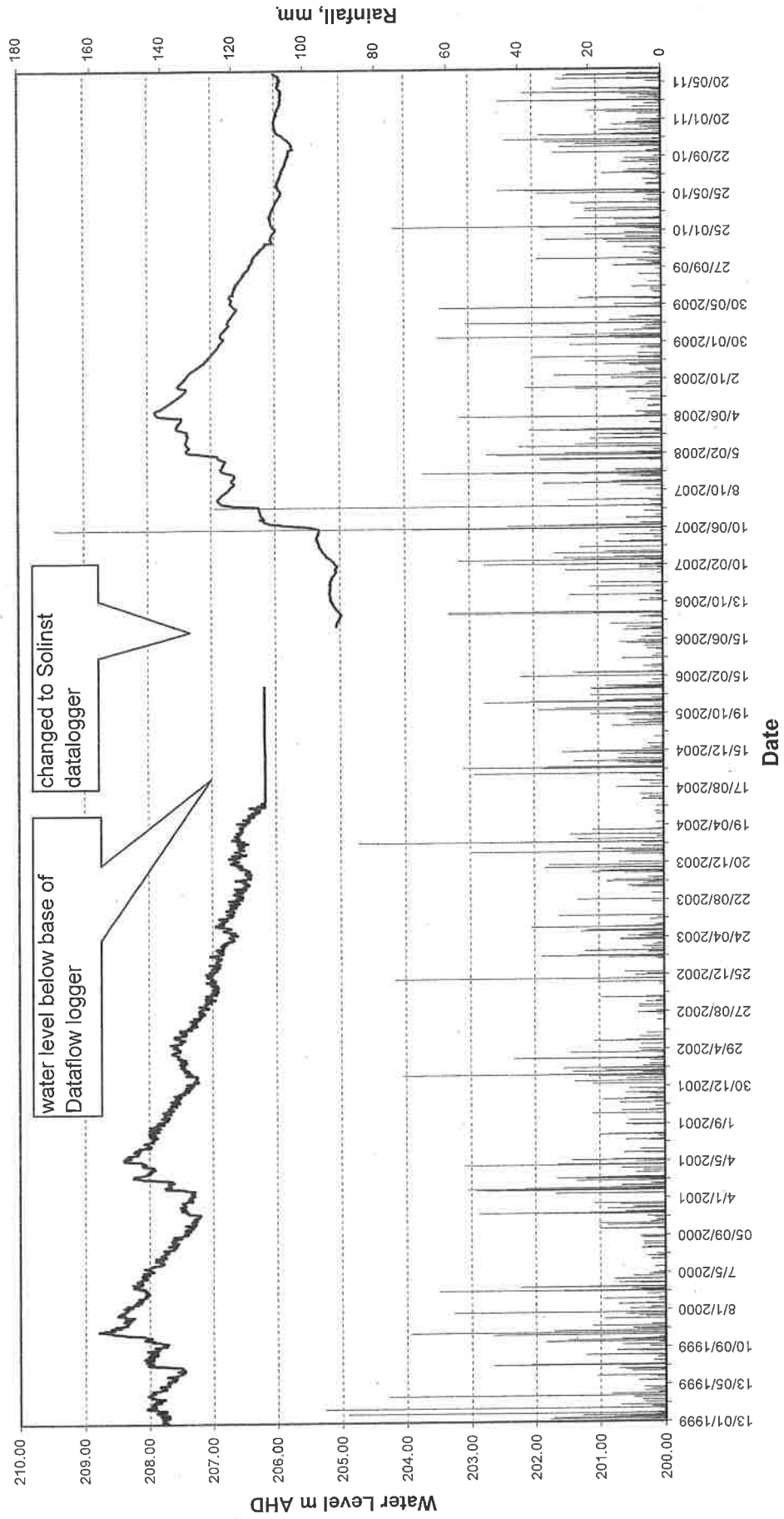
**H.B.MAROOTTA**  
**Bore PT84MW4 Groundwater Monitoring Data**

□ Rainfall, mm  
— Water Level, m AHD



**H.B.MARROOTA**  
**Bore PT84MW1 Groundwater Monitoring Data**

□ Rainfall, mm  
 — Water Level, m AHD





## Appendix B – Water Quality Data and Plots

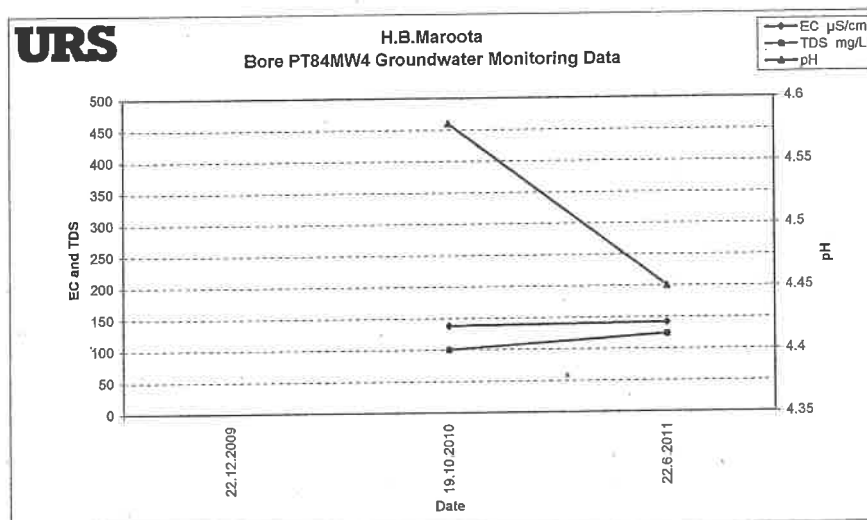
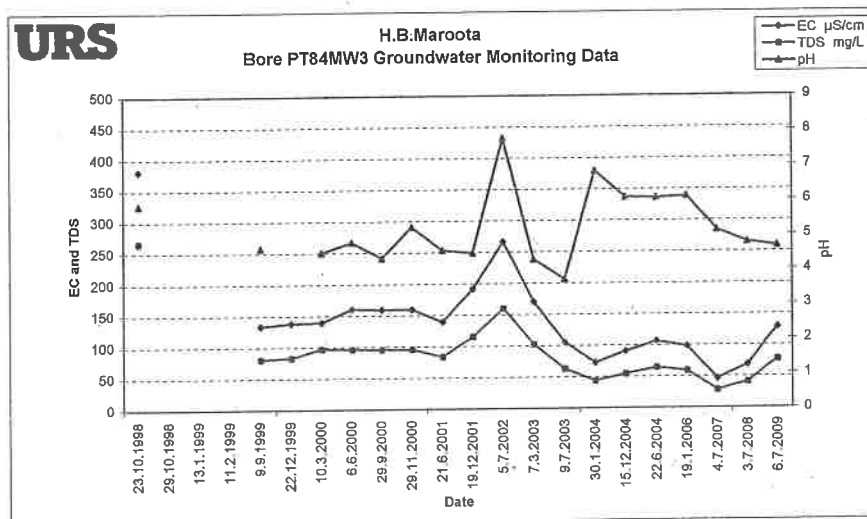
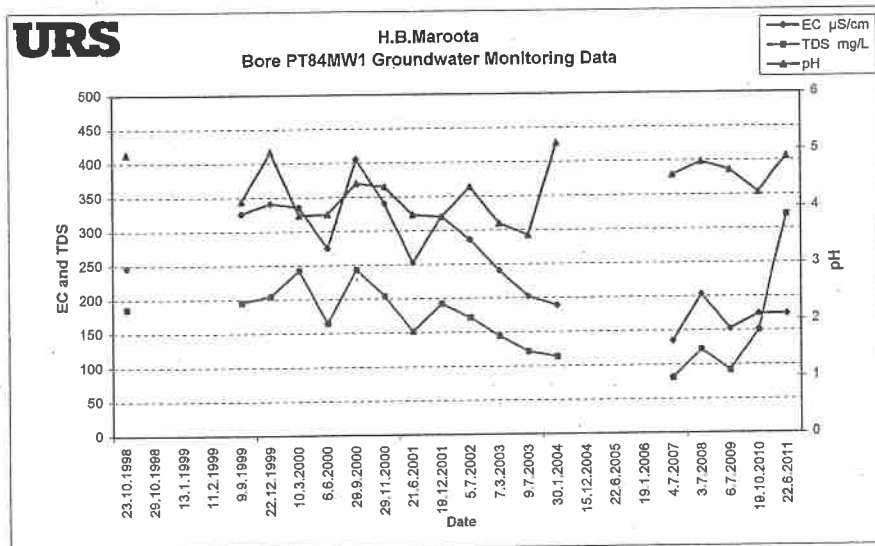
TABLE 1 -

## H.B. MAROOTA. FIELD MEASUREMENTS AND LABORATORY ANALYSES

| Bore    | Aquifer | Date       | pH   | EC<br>µS/cm | TDS<br>mg/L | Ca<br>mg/L            | Mg<br>mg/L | Na<br>mg/L | K<br>mg/L | Cl<br>mg/L | HCO3<br>mg/L | SO4<br>mg/L | SWL<br>m b.TOC | TOC<br>m AHD | SWL<br>m AHD |
|---------|---------|------------|------|-------------|-------------|-----------------------|------------|------------|-----------|------------|--------------|-------------|----------------|--------------|--------------|
| PT84MW1 | M.S.    | 23.10.1998 | 4.96 | 246         | 186         | 3                     | 9          | 27         | 3         | 50         | 4            | 3           | 5.05           | 214.24       | 209.19       |
| PT84MW1 | M.S.    | 29.10.1998 |      |             |             |                       |            |            |           |            |              |             | 6.15           | 214.24       | 208.09       |
| PT84MW1 | M.S.    | 13.1.1999  |      |             |             |                       |            |            |           |            |              |             | 6.43           | 214.24       | 207.81       |
| PT84MW1 | M.S.    | 11.2.1999  |      |             |             |                       |            |            |           |            |              |             | 6.51           | 214.24       | 207.73       |
| PT84MW1 | M.S.    | 9.9.1999   | 4.13 | 326         | 196         |                       |            |            |           |            |              |             | 6.37           | 214.24       | 207.87       |
| PT84MW1 | M.S.    | 22.12.1999 | 5    | 341         | 205         |                       |            |            |           |            |              |             | 6.00           | 214.24       | 208.24       |
| PT84MW1 | M.S.    | 10.3.2000  | 3.88 | 335         | 242         |                       |            |            |           |            |              |             | 5.52           | 214.24       | 208.72       |
| PT84MW1 | M.S.    | 6.6.2000   | 3.90 | 275         | 165         |                       |            |            |           |            |              |             | 6.33           | 214.24       | 207.91       |
| PT84MW1 | M.S.    | 29.9.2000  | 4.44 | 405         | 243         |                       |            |            |           |            |              |             | 6.81           | 214.24       | 207.43       |
| PT84MW1 | M.S.    | 29.11.2000 | 4.38 | 340         | 204         |                       |            |            |           |            |              |             | 6.80           | 214.24       | 207.44       |
| PT84MW1 | M.S.    | 21.6.2001  | 3.88 | 253         | 152         |                       |            |            |           |            |              |             | 6.09           | 214.24       | 208.15       |
| PT84MW1 | M.S.    | 19.12.2001 | 3.84 | 320         | 192         |                       |            |            |           |            |              |             | 6.78           | 214.24       | 207.46       |
| PT84MW1 | M.S.    | 5.7.2002   | 4.36 | 286         | 172         |                       |            |            |           |            |              |             | 6.77           | 214.24       | 207.47       |
| PT84MW1 | M.S.    | 7.3.2003   | 3.72 | 240         | 144         |                       |            |            |           |            |              |             | 7.38           | 214.24       | 206.86       |
| PT84MW1 | M.S.    | 9.7.2003   | 3.51 | 202         | 121         |                       |            |            |           |            |              |             | 7.52           | 214.24       | 206.72       |
| PT84MW1 | M.S.    | 30.1.2004  | 5.13 | 189         | 113         |                       |            |            |           |            |              |             | 7.60           | 214.24       | 206.64       |
| PT84MW1 | M.S.    | 15.12.2004 |      |             |             |                       | dry        |            |           |            |              |             | 8.07           | 214.24       | 206.17       |
| PT84MW1 | M.S.    | 22.6.2005  |      |             |             |                       | dry        |            |           |            |              |             |                |              |              |
| PT84MW1 | M.S.    | 19.1.2006  |      |             |             |                       | dry        |            |           |            |              |             |                |              |              |
| PT84MW1 | M.S.    | 4.7.2007   | 4.55 | 135         | 81          |                       |            |            |           |            |              |             | 7.96           | 214.24       | 206.28       |
| PT84MW1 | M.S.    | 3.7.2008   | 4.78 | 203         | 122         |                       |            |            |           |            |              |             | 6.42           | 214.24       | 207.82       |
| PT84MW1 | M.S.    | 6.7.2009   | 4.63 | 152         | 91          |                       |            |            |           |            |              |             | 7.60           | 215.24       | 207.64       |
| PT84MW1 | M.S.    | 19.10.2010 | 4.24 | 174         | 150         | 1                     | 6          | 12         | 2         | 30         | 3.6          | 4           | 8.5            | 215.24       | 206.74       |
| PT84MW1 | M.S.    | 22.6.2011  | 4.87 | 174         | 320         | 1                     | 5          | 13         | 6         | 31         | <1           | 8           | 8.1            | 215.24       | 207.14       |
| Average |         |            |      | 273         | 169         |                       | 1          |            |           |            |              |             |                |              |              |
| PT84MW2 | M.S.    | 23.10.1998 |      |             |             |                       |            |            |           |            |              |             | 25.00          | 227.63       | 202.63       |
| PT84MW2 | M.S.    | 29.10.1998 |      |             |             |                       |            |            |           |            |              |             | 25.35          | 227.63       | 202.28       |
| PT84MW2 | M.S.    | 13.1.1999  |      |             |             |                       |            |            |           |            |              |             | 25.43          | 227.63       | 202.20       |
| PT84MW2 | M.S.    | 11.2.1999  |      |             |             |                       |            |            |           |            |              |             | 25.49          | 227.63       | 202.14       |
| PT84MW2 | M.S.    | 9.9.1999   |      |             |             |                       |            |            |           |            |              |             | 25.43          | 227.63       | 202.20       |
| PT84MW2 | M.S.    | 22.12.1999 |      |             |             |                       |            |            |           |            |              |             |                | 227.63       |              |
| PT84MW2 | M.S.    | 10.3.2000  | 6.10 | 543         | 530         |                       |            |            |           |            |              |             | 24.55          | 227.63       | 203.08       |
| PT84MW2 |         |            |      |             |             | no longer operational |            |            |           |            |              |             |                |              |              |
| PT84MW3 | M.S.    | 23.10.1998 | 5.88 | 381         | 266         | <1                    | 2          | 79         | 1         | 9          | 14           | 9           | 19.61          | 203.25       | 183.64       |
| PT84MW3 | M.S.    | 29.10.1998 |      |             |             |                       |            |            |           |            |              |             | 18.84          | 203.25       | 184.41       |
| PT84MW3 | M.S.    | 13.1.1999  |      |             |             |                       |            |            |           |            |              |             | 20.40          | 203.25       | 182.85       |
| PT84MW3 | M.S.    | 11.2.1999  |      |             |             |                       |            |            |           |            |              |             | 20.58          | 203.25       | 182.67       |
| PT84MW3 | M.S.    | 9.9.1999   | 4.64 | 134         | 80          |                       |            |            |           |            |              |             | 20.43          | 203.25       | 182.82       |
| PT84MW3 | M.S.    | 22.12.1999 |      | 138         | 83          |                       |            |            |           |            |              |             | 19.88          | 203.25       | 183.37       |
| PT84MW3 | M.S.    | 10.3.2000  | 4.51 | 139         | 97          |                       |            |            |           |            |              |             | 19.83          | 203.25       | 183.42       |
| PT84MW3 | M.S.    | 6.6.2000   | 4.80 | 160         | 96          |                       |            |            |           |            |              |             | 19.65          | 203.25       | 183.60       |
| PT84MW3 | M.S.    | 29.9.2000  | 4.35 | 159         | 95          |                       |            |            |           |            |              |             | 19.82          | 203.25       | 183.43       |
| PT84MW3 | M.S.    | 29.11.2000 | 5.24 | 159         | 95          |                       |            |            |           |            |              |             | 19.95          | 203.25       | 183.30       |
| PT84MW3 | M.S.    | 21.6.2001  | 4.57 | 139         | 83          |                       |            |            |           |            |              |             | 19.53          | 203.25       | 183.72       |
| PT84MW3 | M.S.    | 19.12.2001 | 4.49 | 191         | 115         |                       |            |            |           |            |              |             | 19.41          | 203.25       | 183.84       |
| PT84MW3 | M.S.    | 5.7.2002   | 7.79 | 266         | 160         |                       |            |            |           |            |              |             | 19.17          | 203.25       | 184.08       |
| PT84MW3 | M.S.    | 7.3.2003   | 4.29 | 170         | 102         |                       |            |            |           |            |              |             | 21.08          | 203.25       | 182.17       |
| PT84MW3 | M.S.    | 9.7.2003   | 3.72 | 105         | 63          |                       |            |            |           |            |              |             | 21.00          | 203.25       | 182.25       |
| PT84MW3 | M.S.    | 30.1.2004  | 6.83 | 72          | 43          |                       |            |            |           |            |              |             | 21.28          | 203.25       | 181.97       |
| PT84MW3 | M.S.    | 15.12.2004 | 6.07 | 90          | 54          |                       |            |            |           |            |              |             | 21.44          | 203.25       | 181.81       |
| PT84MW3 | M.S.    | 22.6.2004  | 6.05 | 106         | 64          |                       |            |            |           |            |              |             | 21.77          | 203.25       | 181.48       |
| PT84MW3 | M.S.    | 19.1.2006  | 6.10 | 98          | 59          |                       |            |            |           |            |              |             | 21.48          | 203.25       | 181.77       |
| PT84MW3 | M.S.    | 4.7.2007   | 5.13 | 46          | 28          |                       |            |            |           |            |              |             | 20.29          | 203.25       | 182.96       |
| PT84MW3 | M.S.    | 3.7.2008   | 4.77 | 68          | 41          |                       |            |            |           |            |              |             | 19.32          | 203.25       | 183.93       |
| PT84MW3 | M.S.    | 6.7.2009   | 4.66 | 128         | 77          |                       |            |            |           |            |              |             | 18.95          | 204.25       | 185.30       |
| Average |         |            |      | 145         | 89          | no longer operational |            |            |           |            |              |             |                |              |              |
| PT84MW4 | M.S.    | 22.12.2009 |      |             |             |                       |            |            |           |            |              |             | 25             | 212.00       | 187.00       |
| PT84MW4 | M.S.    | 19.10.2010 | 4.58 | 138         | 100         | <1                    | 3          | 16         | <1        | 29         | 2.4          | 1           | 25.40          | 212.00       | 186.60       |
| PT84MW4 | M.S.    | 22.6.2011  | 4.45 | 141         | 123         | <1                    | 4          | 14         | 1         | 26         | <1           | 2           | 24.84          | 212.00       | 187.16       |

M.S. = Maroota Sand  
 97 = laboratory measurements  
 Elevation estimated

# H.B.Maroota - Groundwater Quality Monitoring Data Plots





## Appendix C – Analytical Laboratory Certificates



Environmental Division

**CERTIFICATE OF ANALYSIS**

|                     |                                                              |                                |                                                     |
|---------------------|--------------------------------------------------------------|--------------------------------|-----------------------------------------------------|
| <b>Work Order</b>   | <b>ES1113308</b>                                             | <b>Page</b>                    | <b>1 of 3</b>                                       |
| <b>Client</b>       | URS AUSTRALIA (NSW) PTY LTD                                  | <b>Laboratory</b>              | Environmental Division Sydney                       |
| <b>Contact</b>      | MR FABIO CAROSONE                                            | <b>Contact</b>                 | Angela Pavlovic                                     |
| <b>Address</b>      | LEVEL 4, 407 PACIFIC HIGHWAY<br>ARTARMON NSW, AUSTRALIA 2064 | <b>Address</b>                 | 277-289 Woodpark Road Smithfield NSW Australia 2164 |
| <b>E-mail</b>       | fabio_carosone@urscorp.com                                   | <b>E-mail</b>                  | angela.pavlovic@alsenviro.com                       |
| <b>Telephone</b>    | +61 892555500                                                | <b>Telephone</b>               | +61 2 8784 8523                                     |
| <b>Facsimile</b>    | +61 02 89255555                                              | <b>Facsimile</b>               | +61 2 8784 8500                                     |
| <b>Project</b>      | 43167795                                                     | <b>QC Level</b>                | NEPM 1999 Schedule B(3) and ALS QCS3 requirement    |
| <b>Order number</b> | —                                                            | <b>Date Samples Received</b>   | 22-JUN-2011                                         |
| <b>C-O-C number</b> | —                                                            | <b>Issue Date</b>              | 30-JUN-2011                                         |
| <b>Sampler</b>      | FC                                                           | <b>No. of samples received</b> | 2                                                   |
| <b>Site</b>         | —                                                            | <b>No. of samples analysed</b> | 2                                                   |
| <b>Quote number</b> | EN/001/10                                                    |                                |                                                     |

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

**WORLD RECOGNISED  
ACCREDITATION**

Accredited for compliance with ISO/IEC 17025.

**Signatories**

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

| Signatories      | Position                 | Accreditation Category |
|------------------|--------------------------|------------------------|
| Ankit Joshi      | Inorganic Chemist        | Sydney Inorganics      |
| Sarah Millington | Senior Inorganic Chemist | Sydney Inorganics      |
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A Campbell Brothers Limited Company

Page

: 2 of 3

Work Order

: ES1113308

Client

: URS AUSTRALIA (NSW) PTY LTD

Project

: 43167795



## General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

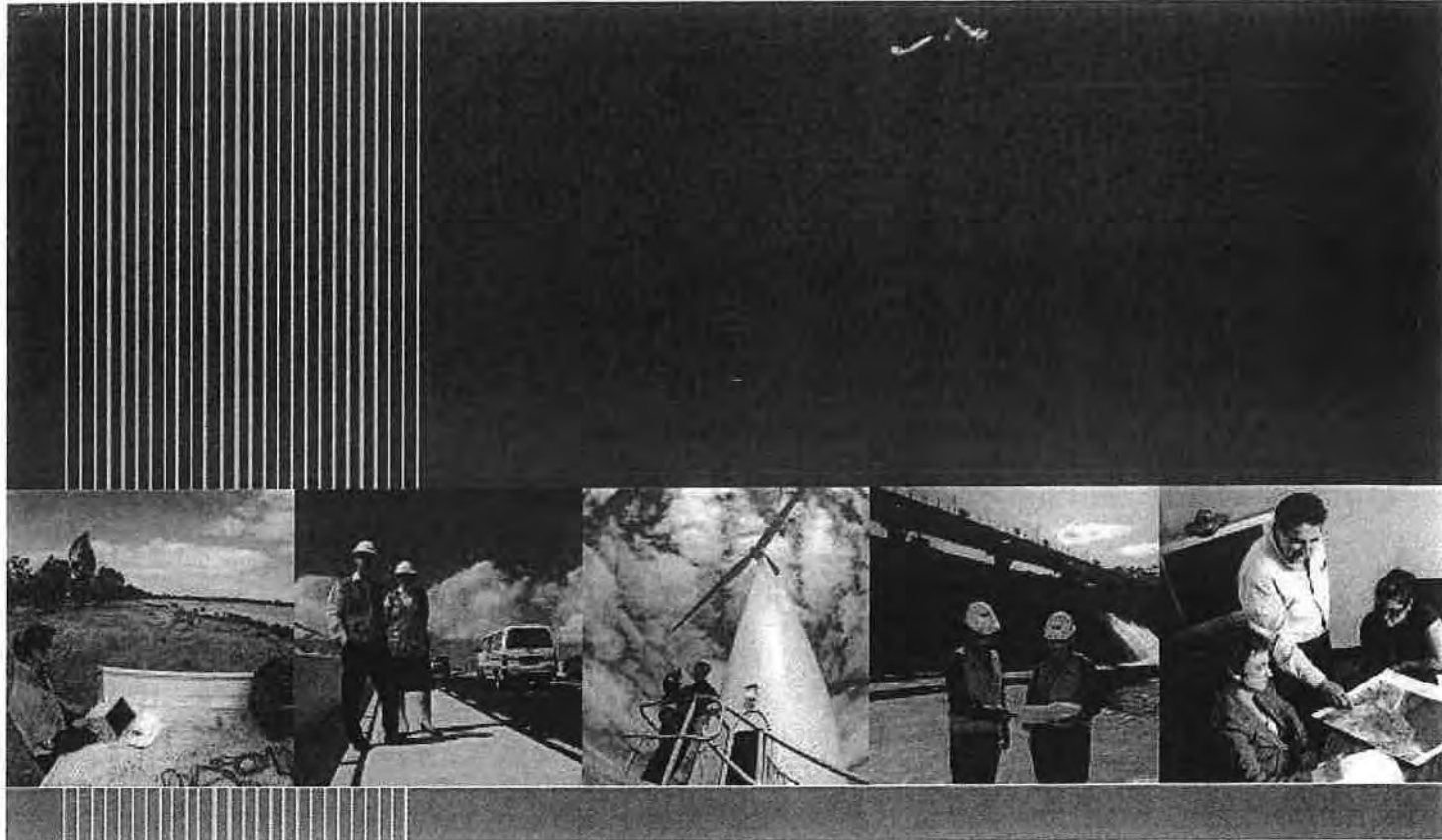
Key :

CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

A = This result is computed from individual analyte detections at or above the level of reporting

- TDS by method EA-015 may bias high due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.



# Report

Roberts Road, Maroota, NSW

2013 Groundwater Management Plan

16 JULY 2013

Prepared for  
Hodgson Quarries and Plant Pty Ltd  
PO BOX 1778  
GOSFORD NSW 2250

43167954

**URS**

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Manager

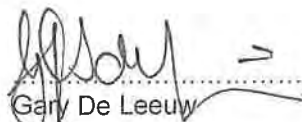
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Manager

Date:

16 July 2013

Reference:

43167954/6000.REP0

Status:

02/A

Final

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## Table of Contents

|                                                             |          |
|-------------------------------------------------------------|----------|
| <b>1 Introduction .....</b>                                 | <b>2</b> |
| <b>1.1 General.....</b>                                     | <b>2</b> |
| <b>2 Groundwater Monitoring Facilities .....</b>            | <b>3</b> |
| <b>2.1 General.....</b>                                     | <b>3</b> |
| <b>3 Data Assessment.....</b>                               | <b>4</b> |
| <b>3.1 Water Levels.....</b>                                | <b>4</b> |
| 3.1.1 Monitoring bore PT84MW1 .....                         | 4        |
| 3.1.2 Monitoring bore PT84MW4 .....                         | 4        |
| 3.1.3 Monitoring bore PT84MW5 .....                         | 4        |
| <b>3.2 Water Quality .....</b>                              | <b>4</b> |
| 3.2.1 Monitoring bore PT84MW1 .....                         | 4        |
| 3.2.2 Monitoring bore PT84MW4 .....                         | 5        |
| 3.2.3 Monitoring bore PT84MW5 .....                         | 5        |
| <b>3.3 Quality Control .....</b>                            | <b>5</b> |
| <b>4 Conclusions.....</b>                                   | <b>6</b> |
| <b>4.1 General.....</b>                                     | <b>6</b> |
| <b>5 Limitations .....</b>                                  | <b>7</b> |
| <b>5.1 Geotechnical &amp; Hydro Geological Report .....</b> | <b>7</b> |

## Figures

## Appendices

- Appendix A Groundwater Monitoring Hydrographs
- Appendix B Water Quality Data and Plots
- Appendix C Analytical Laboratory Certificates
- Appendix D Monitoring Bore PT84MW5 Bore Log and Form A

## **1 Introduction**

### **Introduction**

#### **1.1 General**

Hodgson Quarries and Plant Pty Ltd are required under the Development Approval conditions set for Roberts Road property (Figure 1) to prepare an annual Water Management Plan (WMP) report to the Baulkham Hills Shire Council (BHSC). The WMP is part of the overall Environmental Management Plan and addresses the surface water and groundwater aspects of the sand extraction operations at the site.

URS Australia Pty Ltd (URS) has been retained by Hodgson Quarries and Plant Pty Ltd (HQP) to prepare the groundwater component of the above report, which is presented in the following sections.

The WMP for the year July 2012 to June 2013 also includes the monitoring data collected from 1998 to date for the Portion 84 site.

## Groundwater Monitoring Facilities

### 2.1 General

Groundwater has been monitored at the Portion 84 site since 1996 at bores drilled for the purpose in various locations. Three monitoring bores were originally drilled around the periphery of the existing excavation:

1. PT84MW1 intended to monitor a perched water table at the north-western corner of the site;
2. PT84MW2 installed along the south-western boundary the property to monitor the groundwater in the Maroota Sand aquifer in the palaeochannel, and
3. PT84MW3 installed in the central area of the property to monitor the groundwater in the Maroota Sand aquifer.

Datalogger were installed in the three bores to record water level and water temperature. Two years after installation it became clear that bore PT84MW2 had not been drilled to sufficient depth and became dry. This bore was located close to the Department of Land and Water Conservation monitoring bores 75003 and 75004, completed in the underlying Hawkesbury Sandstone.

In December 2009, bore PT84MW3 was replaced by bore PT84MW4, as the quarry excavation had extended to the area of the former bore.

In April 2013, bore PT84MW4 also needed to be replaced due to the progress of the quarry and a site was chosen close to the original site of bore PT84MW2, with replacement bore PT84MW5 drilled to a greater depth. Drilling records for this bore are included in Appendix D. This information has been forwarded to the NSW Office of Water for their records.

All water levels since 1998 for the monitoring bores are tabulated and presented as graphs in Appendix A.

Groundwater quality was monitored in the original bores by field parameters measurements. Since 2010, samples were collected from the three active bores and submitted under Chain of Custody procedures to Australian Analytical Services Pty Ltd. The analytical results are summarised and graphed in Appendix B; the laboratory reports are presented in Appendix C.

The analytical list for all bores, which was discussed and agreed upon with the DLWC (now the NSW Office of Water) has included:

- pH, Electrical Conductivity and Total Dissolved Solids;
- Calcium, Magnesium, Sodium and Potassium;
- Chloride, Sulphate, Bicarbonate.

## Data Assessment

### 3.1 Water Levels

#### 3.1.1 Monitoring bore PT84MW1

The hydrograph in Appendix A shows that the perched water table at this site has reversed the previously observed decline since June 2008, peaking at 208.3 m AHD in March 2012, followed by a slow decline. The water level pattern in the perched water table follows closely the rainfall pattern, with visible rises and falls highlighted in the graph. A sharp rise is visible at the beginning of 2013, when rainfall well above the average was experienced in the area.

The location of bore PT84MW1 is shown in Figure 1.

#### 3.1.2 Monitoring bore PT84MW4

Monitoring Bore PT84MW4 was drilled between the 21st and 22nd December 2009 after PT84MW3 was decommissioned due to the expansion of the quarry in that area. The location of bore PT84MW4 is shown in Figure 1.

The datalogger records hydrograph covering the period December 2009 to June 2013 is presented in Appendix A. The hydrograph shows that the water level in this bore has been rising steadily since December 2010, peaking at 189.35 m AHD in June 2012. Since June 2012 the water level has fallen by approximately 1.5 to February 2013 when it rose again sharply in response of the high rainfall over the area.

In June 2013, monitoring bore pt84MW4 has been decommissioned as a result of the quarry expansion and has been replaced by bore PT84MW5.

#### 3.1.3 Monitoring bore PT84MW5

Bore PT84MW5 has been drilled in March 2013 as a replacement of bore PT84MW4, but water level measurements by datalogger have only started in June 2013. Manual water level measurements indicate that the water level at this site is at RL 193m AHD. The new bore is still to be surveyed and levelled, but its vicinity to the abandoned bore PT84MW2 on a level site makes this elevation acceptable for the current purposes.

### 3.2 Water Quality

Water quality in all the bores on the site is generally fresh and, potentially, of drinking water standards. The analytical laboratory certificates are presented in Appendix C.

#### 3.2.1 Monitoring bore PT84MW1

Table 1 in Appendix B presents a summary of the recorded groundwater field chemical parameters measurements in the monitoring bores, and the laboratory analysis results from the sample collected during the June 2013 download event.

The Total Dissolved Salts content of the groundwater at this site shows a marginal decrease since records started, with fluctuations related to the rainfall pattern, as the shallow water table is readily recharged by infiltrating rainfall. Since June 2007, the Total Dissolved Solids show a steady rise in part due to the difficulty of collecting a sample without some clay content.

### 3 Data Assessment

The influence of the rainfall recharge pattern is also indicated by the chemical make-up of the water, which shows a typical Chloride/Sodium character.

#### 3.2.2 Monitoring bore PT84MW4

The groundwater sample from this bore indicates a groundwater of similar character to that from bore PT84MW1, but showing a level pattern with the Total Dissolved Solids content remaining in the range 100 - 200 mg/L.

#### 3.2.3 Monitoring bore PT84MW5

No trends or pattern can be discerned from the only sample collected in this bore. Total Dissolved Solids are in the range of the results from the other monitoring bores at the site.

### 3.3 Quality Control

The laboratory quality control samples (laboratory duplicates, procedure blanks and control spikes) returned results within the required limits and acceptance criteria. The quality control data generated by the laboratory are presented with the Certificates of Analysis in Appendix B.

Based on the evaluation of the data, it is assessed that the accuracy and precision of the analytical data in this sampling round, as reported by the analytical laboratory, are acceptable as a basis for interpretation.

## Conclusions

### 4.1 General

The water level and water quality data indicate only minor changes and fluctuations in synchronism with the pattern of rainfall over the area.

The above data indicate that the quarry operation does not have a negative impact upon the surrounding environment. No dewatering is carried out at the site as mining is kept at the prescribed depth above the monitored groundwater level

## Limitations

### 5.1 Geotechnical & Hydro Geological Report

URS Australia Pty Ltd (URS) has prepared this report in accordance with the usual care and thoroughness of the consulting profession for the use of Hogdson Quarries and Plant Pty Ltd.

Except as required by law, no third party may use or rely on, this Report unless otherwise agreed by URS in writing. Where such agreement is provided, URS will provide a letter of reliance to the agreed third party in the form required by URS.

It is based on generally accepted practices and standards at the time it was prepared. No other warranty, expressed or implied, is made as to the professional advice included in this Report. It is prepared in accordance with the scope of work and for the purpose outlined in the contract dated 28 March 2013.

The methodology adopted and sources of information used by URS are outlined in this the Report.

Where this Report indicates that information has been provided to URS by third parties, URS has made no independent verification of this information unless required as part of the agreed scope of work. URS assumes no liability for any inaccuracies in or omissions to that information.

This Report was prepared between 19 March 2013 and 16 July 2013. The information in this Report is considered to be accurate at the date of issue and is in accordance with conditions at the site at the dates sampled. Opinions and recommendations presented herein apply to the site existing at the time of our investigation and cannot necessarily apply to site changes of which URS is not aware and has not had the opportunity to evaluate. This document and the information contained herein should only be regarded as validly representing the site conditions at the time of the investigation unless otherwise explicitly stated in a preceding section of this Report. URS disclaims responsibility for any changes that may have occurred after this time.

This Report should be read in full. No responsibility is accepted for use of any part of this Report in any other context or for any other purpose. This Report does not purport to give legal advice. Legal advice can only be given by qualified legal practitioners.

This Report contains information obtained by inspection, sampling, testing or other means of investigation. This information is directly relevant only to the points in the ground where they were obtained at the time of the assessment. The borehole logs indicate the inferred ground conditions only at the specific locations tested. The precision with which conditions are indicated depends largely on the uniformity of conditions and on the frequency and method of sampling as constrained by the project budget limitations. The behaviour of groundwater and some aspects of contaminants in soil and groundwater are complex. Our conclusions are based upon the analytical data presented in this Report and our experience. Future advances in regard to the understanding of chemicals and their behaviour, and changes in regulations affecting their management, could impact on our conclusions and recommendations regarding their potential presence on this site.

Where conditions encountered at the site are subsequently found to differ significantly from those anticipated in this Report, URS must be notified of any such findings and be provided with an opportunity to review the recommendations of this Report.

## 5 Limitations

Whilst to the best of our knowledge information contained in this Report is accurate at the date of issue, subsurface conditions, including groundwater levels can change in a limited time.

Therefore this document and the information contained herein should only be regarded as valid at the time of the investigation unless otherwise explicitly stated in this Report.

To the extent permitted by law, URS expressly disclaims and excludes liability for any loss, damage, cost or expenses suffered by any third party relating to or resulting from the use of, or reliance on, any information contained in this Report. URS does not admit that any action, liability or claim may exist or be available to any third party.

URS does not represent that this Report is suitable for use by any third party.

Except as specifically stated in this section, URS does not authorise the use of this Report by any third party.

It is the responsibility of third parties to independently make inquiries or seek advice in relation to their particular requirements and proposed use of the relevant property.

Any estimates of potential costs which have been provided are presented as estimates only as at the date of the Report. Any cost estimates that have been provided may therefore vary from actual costs at the time of expenditure.

## Figures

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HB MAROOTA PTY LTD

SITE LOCALITY MAP

**URS**

GROUNDWATER MANAGEMENT PLAN

Figure: 1

File No: 43167795.001.mxd

Drawn: MH

Approved: FC

Date: 17/07/2013

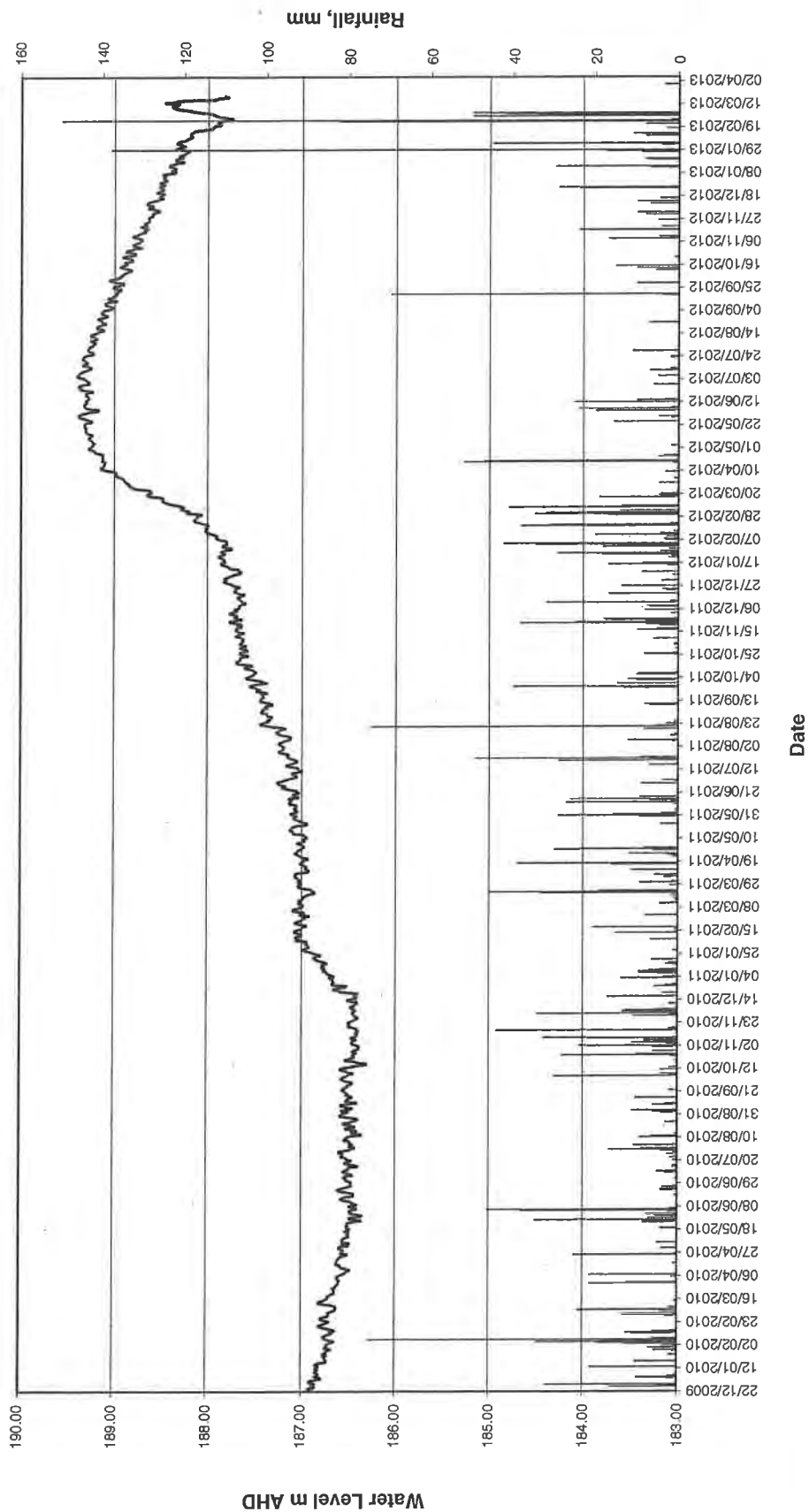
Rev: A A4

## Appendix A Groundwater Monitoring Hydrographs



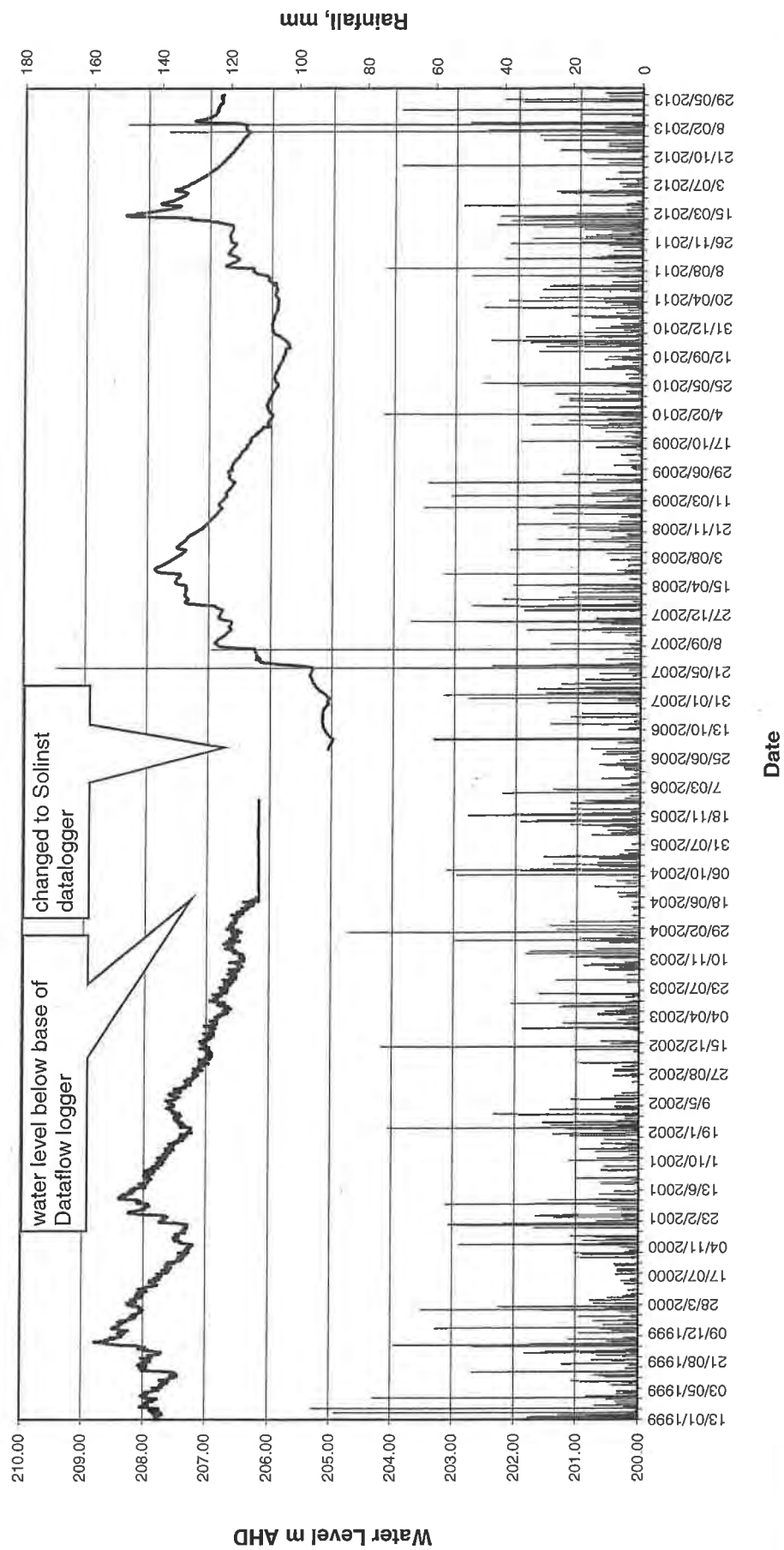
Hodgson Quarries and Plant Pty Ltd  
Bore PT84MW4 Groundwater Monitoring Data

□ Rainfall, mm  
— Water Level, m AHD



## Hogdson Quarries and Plant Pty Ltd Bore PT84MW1 Groundwater Monitoring Data

Rainfall, mm  
 Water Level, m AHD



## **Appendix B Water Quality Data and Plots**

TABLE 1 - HODGSON QUARRIES AND PLANT PTY LTD. FIELD MEASUREMENTS AND LABORATORY ANALYSES

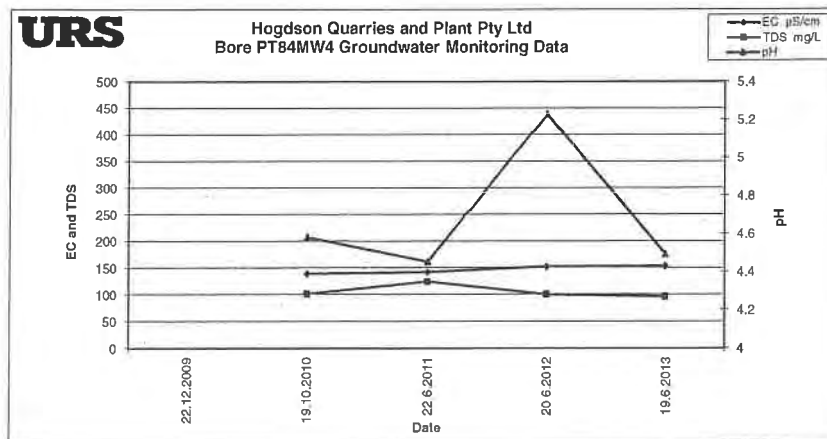
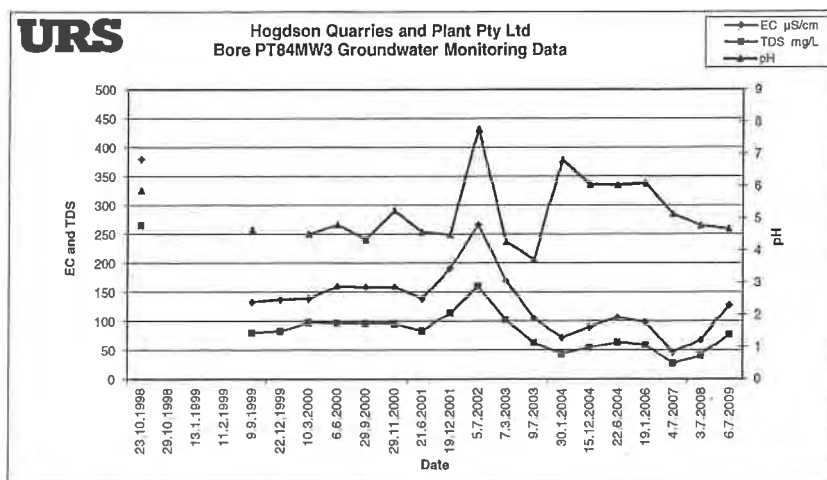
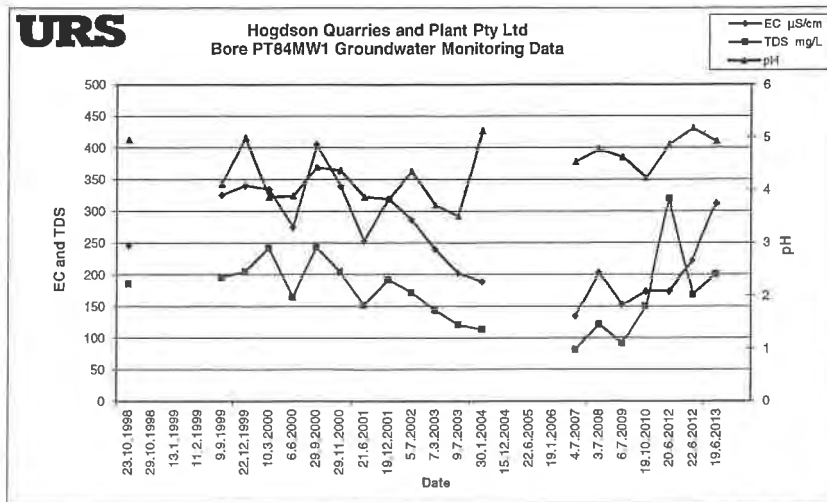
| Bore    | Aquifer | Date       | pH   | EC<br>µS/cm | TDS<br>mg/L | Ca<br>mg/L            | Mg<br>mg/L | Na<br>mg/L | K<br>mg/L | Cl<br>mg/L | HCO3<br>mg/L | SO4<br>mg/L | SWL<br>m b.TOC | TOC<br>m AHD | SWL<br>m AHD |
|---------|---------|------------|------|-------------|-------------|-----------------------|------------|------------|-----------|------------|--------------|-------------|----------------|--------------|--------------|
| PT84MW1 | M.S.    | 23.10.1998 | 4.96 | 246         | 186         | 3                     | 9          | 27         | 3         | 50         | 4            | 3           | 5.05           | 214.24       | 209.19       |
| PT84MW1 | M.S.    | 29.10.1998 |      |             |             |                       |            |            |           |            |              |             | 6.15           | 214.24       | 208.09       |
| PT84MW1 | M.S.    | 13.1.1999  |      |             |             |                       |            |            |           |            |              |             | 6.43           | 214.24       | 207.81       |
| PT84MW1 | M.S.    | 11.2.1999  |      |             |             |                       |            |            |           |            |              |             | 6.51           | 214.24       | 207.73       |
| PT84MW1 | M.S.    | 9.9.1999   | 4.13 | 326         | 196         |                       |            |            |           |            |              |             | 6.37           | 214.24       | 207.87       |
| PT84MW1 | M.S.    | 22.12.1999 | 5    | 341         | 205         |                       |            |            |           |            |              |             | 6.00           | 214.24       | 208.24       |
| PT84MW1 | M.S.    | 10.3.2000  | 3.88 | 335         | 242         |                       |            |            |           |            |              |             | 5.52           | 214.24       | 208.72       |
| PT84MW1 | M.S.    | 6.6.2000   | 3.90 | 275         | 165         |                       |            |            |           |            |              |             | 6.33           | 214.24       | 207.91       |
| PT84MW1 | M.S.    | 29.9.2000  | 4.44 | 405         | 243         |                       |            |            |           |            |              |             | 6.81           | 214.24       | 207.43       |
| PT84MW1 | M.S.    | 29.11.2000 | 4.38 | 340         | 204         |                       |            |            |           |            |              |             | 6.80           | 214.24       | 207.44       |
| PT84MW1 | M.S.    | 21.6.2001  | 3.88 | 253         | 152         |                       |            |            |           |            |              |             | 6.09           | 214.24       | 208.15       |
| PT84MW1 | M.S.    | 19.12.2001 | 3.84 | 320         | 192         |                       |            |            |           |            |              |             | 6.78           | 214.24       | 207.46       |
| PT84MW1 | M.S.    | 5.7.2002   | 4.36 | 286         | 172         |                       |            |            |           |            |              |             | 6.77           | 214.24       | 207.47       |
| PT84MW1 | M.S.    | 7.3.2003   | 3.72 | 240         | 144         |                       |            |            |           |            |              |             | 7.38           | 214.24       | 206.86       |
| PT84MW1 | M.S.    | 9.7.2003   | 3.51 | 202         | 121         |                       |            |            |           |            |              |             | 7.52           | 214.24       | 206.72       |
| PT84MW1 | M.S.    | 30.1.2004  | 5.13 | 189         | 113         |                       |            |            |           |            |              |             | 7.60           | 214.24       | 206.64       |
| PT84MW1 | M.S.    | 15.12.2004 |      |             |             |                       |            |            |           |            |              |             | 8.07           | 214.24       | 206.17       |
| PT84MW1 | M.S.    | 22.6.2005  |      |             |             | dry                   |            |            |           |            |              |             |                |              |              |
| PT84MW1 | M.S.    | 19.1.2006  |      |             |             | dry                   |            |            |           |            |              |             |                |              |              |
| PT84MW1 | M.S.    | 4.7.2007   | 4.55 | 135         | 81          |                       |            |            |           |            |              |             | 7.96           | 214.24       | 206.28       |
| PT84MW1 | M.S.    | 3.7.2008   | 4.78 | 203         | 122         |                       |            |            |           |            |              |             | 6.42           | 214.24       | 207.82       |
| PT84MW1 | M.S.    | 6.7.2009   | 4.63 | 152         | 91          |                       |            |            |           |            |              |             | 7.60           | 215.24       | 207.64       |
| PT84MW1 | M.S.    | 19.10.2010 | 4.24 | 174         | 150         | 1                     | 6          | 12         | 2         | 30         | 3.6          | 4           | 8.5            | 215.24       | 206.74       |
| PT84MW1 | M.S.    | 20.6.2012  | 4.87 | 174         | 320         | 1                     | 5          | 13         | 6         | 31         | <1           | 8           | 8.1            | 215.24       | 207.14       |
| PT84MW1 | M.S.    | 22.6.2012  | 5.18 | 222         | 169         | 5                     | 5          | 19         | 2         | 143        | 4.8          | 8           | 6.47           | 215.24       | 208.77       |
| PT84MW1 | M.S.    | 19.6.2013  | 4.93 | 312         | 200         | 6                     | 12         | 22         | 6         | 59         | <1           | 8           | 7.36           | 215.24       | 207.88       |
| Average |         |            |      | 273         | 169         |                       | 1          |            |           |            |              |             |                |              |              |
| PT84MW2 | M.S.    | 23.10.1998 |      |             |             |                       |            |            |           |            |              |             | 25.00          | 227.63       | 202.63       |
| PT84MW2 | M.S.    | 29.10.1998 |      |             |             |                       |            |            |           |            |              |             | 25.35          | 227.63       | 202.28       |
| PT84MW2 | M.S.    | 13.1.1999  |      |             |             |                       |            |            |           |            |              |             | 25.43          | 227.63       | 202.20       |
| PT84MW2 | M.S.    | 11.2.1999  |      |             |             |                       |            |            |           |            |              |             | 25.49          | 227.63       | 202.14       |
| PT84MW2 | M.S.    | 9.9.1999   |      |             |             |                       |            |            |           |            |              |             | 25.43          | 227.63       | 202.20       |
| PT84MW2 | M.S.    | 22.12.1999 |      |             |             |                       |            |            |           |            |              |             |                | 227.63       |              |
| PT84MW2 | M.S.    | 10.3.2000  | 6.10 | 543         | 530         |                       |            |            |           |            |              |             | 24.55          | 227.63       | 203.08       |
| PT84MW2 |         |            |      |             |             | no longer operational |            |            |           |            |              |             |                |              |              |
| PT84MW3 | M.S.    | 23.10.1998 | 5.88 | 381         | 266         | <1                    | 2          | 79         | 1         | 9          | 14           | 9           | 19.61          | 203.25       | 183.64       |
| PT84MW3 | M.S.    | 29.10.1998 |      |             |             |                       |            |            |           |            |              |             | 18.84          | 203.25       | 184.41       |
| PT84MW3 | M.S.    | 13.1.1999  |      |             |             |                       |            |            |           |            |              |             | 20.40          | 203.25       | 182.85       |
| PT84MW3 | M.S.    | 11.2.1999  |      |             |             |                       |            |            |           |            |              |             | 20.58          | 203.25       | 182.67       |
| PT84MW3 | M.S.    | 9.9.1999   | 4.64 | 134         | 80          |                       |            |            |           |            |              |             | 20.43          | 203.25       | 182.82       |
| PT84MW3 | M.S.    | 22.12.1999 |      | 138         | 83          |                       |            |            |           |            |              |             | 19.88          | 203.25       | 183.37       |
| PT84MW3 | M.S.    | 10.3.2000  | 4.51 | 139         | 97          |                       |            |            |           |            |              |             | 19.83          | 203.25       | 183.42       |
| PT84MW3 | M.S.    | 6.6.2000   | 4.80 | 160         | 96          |                       |            |            |           |            |              |             | 19.65          | 203.25       | 183.60       |
| PT84MW3 | M.S.    | 29.9.2000  | 4.35 | 159         | 95          |                       |            |            |           |            |              |             | 19.82          | 203.25       | 183.43       |
| PT84MW3 | M.S.    | 29.11.2000 | 5.24 | 159         | 95          |                       |            |            |           |            |              |             | 19.95          | 203.25       | 183.30       |
| PT84MW3 | M.S.    | 21.6.2001  | 4.57 | 139         | 83          |                       |            |            |           |            |              |             | 19.53          | 203.25       | 183.72       |
| PT84MW3 | M.S.    | 19.12.2001 | 4.49 | 191         | 115         |                       |            |            |           |            |              |             | 19.41          | 203.25       | 183.84       |
| PT84MW3 | M.S.    | 5.7.2002   | 7.79 | 266         | 160         |                       |            |            |           |            |              |             | 19.17          | 203.25       | 184.08       |
| PT84MW3 | M.S.    | 7.3.2003   | 4.29 | 170         | 102         |                       |            |            |           |            |              |             | 21.08          | 203.25       | 182.17       |
| PT84MW3 | M.S.    | 9.7.2003   | 3.72 | 105         | 63          |                       |            |            |           |            |              |             | 21.00          | 203.25       | 182.25       |
| PT84MW3 | M.S.    | 30.1.2004  | 6.83 | 72          | 43          |                       |            |            |           |            |              |             | 21.28          | 203.25       | 181.97       |
| PT84MW3 | M.S.    | 15.12.2004 | 6.07 | 90          | 54          |                       |            |            |           |            |              |             | 21.44          | 203.25       | 181.81       |
| PT84MW3 | M.S.    | 22.6.2004  | 6.05 | 106         | 64          |                       |            |            |           |            |              |             | 21.77          | 203.25       | 181.48       |
| PT84MW3 | M.S.    | 19.1.2006  | 6.10 | 98          | 59          |                       |            |            |           |            |              |             | 21.48          | 203.25       | 181.77       |
| PT84MW3 | M.S.    | 4.7.2007   | 5.13 | 46          | 28          |                       |            |            |           |            |              |             | 20.29          | 203.25       | 182.96       |
| PT84MW3 | M.S.    | 3.7.2008   | 4.77 | 68          | 41          |                       |            |            |           |            |              |             | 19.32          | 203.25       | 183.93       |
| PT84MW3 | M.S.    | 6.7.2009   | 4.66 | 128         | 77          |                       |            |            |           |            |              |             | 18.95          | 204.25       | 185.30       |
| Average |         |            |      | 145         | 89          |                       |            |            |           |            |              |             |                |              |              |
| PT84MW4 | M.S.    | 22.12.2009 |      |             |             |                       |            |            |           |            |              |             | 25             | 212.00       | 187.00       |
| PT84MW4 | M.S.    | 19.10.2010 | 4.58 | 138         | 100         | <1                    | 3          | 16         | <1        | 29         | 2.4          | 1           | 25.40          | 212.00       | 186.60       |
| PT84MW4 | M.S.    | 22.6.2011  | 4.45 | 141         | 123         | <1                    | 4          | 14         | 1         | 26         | <1           | 2           | 24.84          | 212.00       | 187.16       |
| PT84MW4 | M.S.    | 20.6.2012  | 5.23 | 151         | 99          | <1                    | 3          | 17         | 1         | 33         | 2.4          | 2           | 22.68          | 212.00       | 189.32       |
| PT84MW4 | M.S.    | 19.6.2013  | 4.49 | 152         | 95          | <1                    | 4          | 16         | 1         | 36         | <1           | <1          | 24.06          | 212.00       | 187.94       |
|         |         |            |      |             |             | no longer operational |            |            |           |            |              |             |                |              |              |
| PT84MW5 | M.S.    | 19.6.2013  | 4.13 | 146         | 158         | <1                    | 2          | 15         | <1        | 34         | <1           | 1           | 34.60          | 227.63       | 193.03       |

M.S. = Maroota Sand

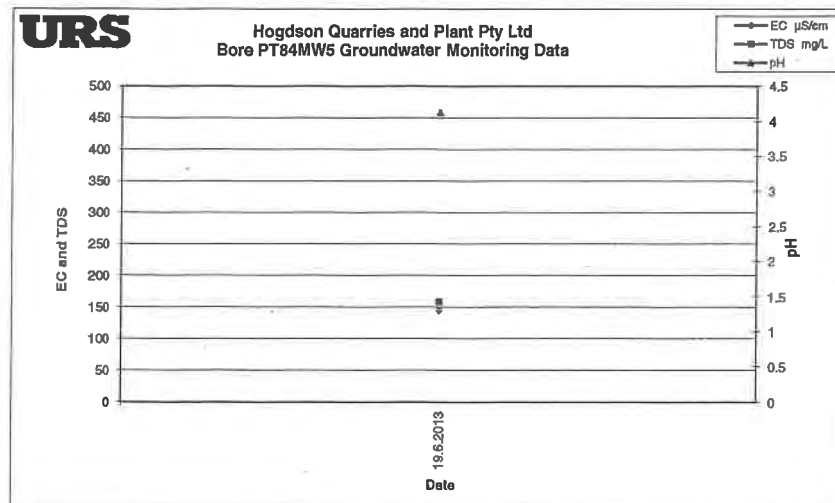
97 = laboratory measurements

Elevation estimated

# HOGSDON QUARRIES AND PLANT PTY LTD - Groundwater Quality Monitoring Data Plots



HOGDSON QUARRIES AND PLANT PTY LTD - Groundwater Quality Monitoring Data Plots



## Appendix C Analytical Laboratory Certificates



Environmental Division



## CERTIFICATE OF ANALYSIS

Work Order

: ES1314009

Page

: 1 of 3

Client

: URS AUSTRALIA (NSW) PTY LTD

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: +61 02 89255555

Project

: 43167954

Order number

: ---

C-O-C number

: ---

Sampler

: FC

Site

: ---

Date Samples Received

: 20-JUN-2013

Issue Date

: 26-JUN-2013

Quote number

: EN/001/13

No. of samples received

: 3

No. of samples analysed

: 3

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



WORLD RECOGNISED  
ACCREDITATION

NATA Accredited Laboratory 825

Accredited for compliance with  
ISO/IEC 17025.

### Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories

Position

Accreditation Category

Ankit Joshi  
Ashesh Patel  
Celine Conceicao  
Hoa Nguyen

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Inorganic Chemist  
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Page : 2 of 3  
Work Order : ES1314009  
Client : URS AUSTRALIA (NSW) PTY LTD  
Project : 43167954

## General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.  
LOR = Limit of reporting

▲ = This result is computed from individual analyte detections at or above the level of reporting

- EN055: % Ionic Balance not reported when Total Anions are <3meq/L. At this level, % difference is deemed not applicable.
- TDS by method EA-015 may bias high due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)

| Sub-Matrix: WATER (Matrix: WATER)               |             |      | Client sample ID            |         |         |         |
|-------------------------------------------------|-------------|------|-----------------------------|---------|---------|---------|
|                                                 |             |      | Client sampling date / time |         |         |         |
| Compound                                        | CAS Number  | LOR  | Unit                        | PT84MW4 | PT84MW1 | PT84MW5 |
| EA005P: pH by PC Titrator                       |             |      |                             |         |         |         |
| pH Value                                        | ---         | 0.01 | pH Unit                     | 4.49    | 4.93    | 4.13    |
| EA010P: Conductivity by PC Titrator             |             |      |                             |         |         |         |
| Electrical Conductivity @ 25°C                  | ---         | 1    | µS/cm                       | 152     | 312     | 146     |
| EA015: Total Dissolved Solids                   |             |      |                             |         |         |         |
| Total Dissolved Solids @180°C                   | ---         | 10   | mg/L                        | 2940    | 820     | 158     |
| ED037P: Alkalinity by PC Titrator               |             |      |                             |         |         |         |
| Hydroxide Alkalinity as CaCO3                   | DMO-210-001 | 1    | mg/L                        | <1      | <1      | <1      |
| Carbonate Alkalinity as CaCO3                   | 3812-32-6   | 1    | mg/L                        | <1      | <1      | <1      |
| Bicarbonate Alkalinity as CaCO3                 | 71-52-3     | 1    | mg/L                        | <1      | <1      | <1      |
| Total Alkalinity as CaCO3                       | ---         | 1    | mg/L                        | <1      | <1      | <1      |
| ED041G: Sulfate (Turbidimetric) as SO4 2- by DA |             |      |                             |         |         |         |
| Sulfate as SO4 - Turbidimetric                  | 14808-79-8  | 1    | mg/L                        | <1      | 8       | 1       |
| ED045G: Chloride Discrete analyser              |             |      |                             |         |         |         |
| Chloride                                        | 16887-00-6  | 1    | mg/L                        | 36      | 59      | 34      |
| ED093F: Dissolved Major Cations                 |             |      |                             |         |         |         |
| Calcium                                         | 7440-70-2   | 1    | mg/L                        | <1      | 6       | <1      |
| Magnesium                                       | 7439-95-4   | 1    | mg/L                        | 4       | 12      | 2       |
| Sodium                                          | 7440-23-5   | 1    | mg/L                        | 16      | 22      | 15      |
| Potassium                                       | 7440-09-7   | 1    | mg/L                        | 1       | 6       | <1      |
| EN055: Ionic Balance                            |             |      |                             |         |         |         |
| Total Anions                                    | ---         | 0.01 | meq/L                       | 1.02    | 1.83    | 0.98    |
| Total Cations                                   | ---         | 0.01 | meq/L                       | 1.05    | 2.40    | 0.82    |



Environmental Division



## QUALITY CONTROL REPORT

|              |                                                                |                         |                                                       |
|--------------|----------------------------------------------------------------|-------------------------|-------------------------------------------------------|
| Work Order   | : ES1314009                                                    | Page                    | : 1 of 5                                              |
| Client       | : URS AUSTRALIA (NSW) PTY LTD                                  | Laboratory              | : Environmental Division Sydney                       |
| Contact      | : FABIO CAROSONE                                               | Contact                 | : Loren Schiavon                                      |
| Address      | : LEVEL 4, 407 PACIFIC HIGHWAY<br>ARTARMON NSW, AUSTRALIA 2064 | Address                 | : 277-289 Woodpark Road Smithfield NSW Australia 2164 |
| E-mail       | : fabio_carosone@urscorp.com                                   | E-mail                  | : loren.schiavon@alsglobal.com                        |
| Telephone    | : +61 89255500                                                 | Telephone               | : +61 2 8784 8503                                     |
| Facsimile    | : +61 02 89255555                                              | Facsimile               | : +61 2 8784 8500                                     |
| Project      | : 43167954                                                     | QC Level                | : NEPM 1999 Schedule B(3) and ALS QCS3 requirement    |
| Site         | : ---                                                          | Date Samples Received   | : 20-JUN-2013                                         |
| C-O-C number | : ---                                                          | Issue Date              | : 26-JUN-2013                                         |
| Sampler      | : FC                                                           | No. of samples received | : 3                                                   |
| Order number | : ---                                                          | No. of samples analysed | : 3                                                   |
| Quote number | : EN/001/13                                                    |                         |                                                       |

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits



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### Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

| Signatories      | Position                 | Accreditation Category |
|------------------|--------------------------|------------------------|
| Ankit Joshi      | Inorganic Chemist        | Sydney Inorganics      |
| Ashesh Patel     | Inorganic Chemist        | Sydney Inorganics      |
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Page : 2 of 5  
Work Order : ES1314009  
Client : URS AUSTRALIA (NSW) PTY LTD  
Project : 43167954

### General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key :

Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot  
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.  
LOR = Limit of reporting  
RPD = Relative Percentage Difference  
# = Indicates failed QC



## Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR:- No Limit; Result between 10 and 20 times LOR:- 0% - 50%; Result > 20 times LOR:- 0% - 20%.

Sub-Matrix: WATER

| Sub-Matrix: WATER                                                 |  | Laboratory sample ID |  | Client sample ID                         |                  | Method: Compound | CAS Number | LOR  | Unit    | Laboratory Duplicate (DUP) Report |                     |      |          |
|-------------------------------------------------------------------|--|----------------------|--|------------------------------------------|------------------|------------------|------------|------|---------|-----------------------------------|---------------------|------|----------|
| Laboratory sample ID                                              |  | Client sample ID     |  | Original Result                          | Duplicate Result |                  |            |      |         | RPD (%)                           | Recovery Limits (%) |      |          |
| EA005P: pH by PC Titrator (QC Lot: 2928667)                       |  |                      |  |                                          |                  |                  |            |      |         |                                   |                     |      |          |
| ES1313966-002                                                     |  | Anonymous            |  | EA005-P: pH Value                        |                  | ---              | ---        | 0.01 | pH Unit | 7.72                              | 7.73                | 0.1  | 0% - 20% |
| ES1313966-011                                                     |  | Anonymous            |  | EA005-P: pH Value                        |                  | ---              | ---        | 0.01 | pH Unit | 7.49                              | 7.49                | 0.0  | 0% - 20% |
| EA010P: Conductivity by PC Titrator (QC Lot: 2928666)             |  |                      |  |                                          |                  |                  |            |      |         |                                   |                     |      |          |
| ES1313966-002                                                     |  | Anonymous            |  | EA010-P: Electrical Conductivity @ 25°C  |                  | ---              | ---        | 1    | µS/cm   | 6430                              | 6400                | 0.5  | 0% - 20% |
| ES1313966-011                                                     |  | Anonymous            |  | EA010-P: Electrical Conductivity @ 25°C  |                  | ---              | ---        | 1    | µS/cm   | 11000                             | 11000               | 0.09 | 0% - 20% |
| EA015: Total Dissolved Solids (QC Lot: 2933565)                   |  |                      |  |                                          |                  |                  |            |      |         |                                   |                     |      |          |
| ES1313882-003                                                     |  | Anonymous            |  | EA015H: Total Dissolved Solids @180°C    |                  | ---              | ---        | 10   | mg/L    | 473                               | 492                 | 3.9  | 0% - 20% |
| ES1313935-004                                                     |  | Anonymous            |  | EA015H: Total Dissolved Solids @180°C    |                  | ---              | ---        | 10   | mg/L    | 306                               | 306                 | 0.0  | 0% - 20% |
| EA015: Total Dissolved Solids (QC Lot: 2933566)                   |  |                      |  |                                          |                  |                  |            |      |         |                                   |                     |      |          |
| ES1314009-003                                                     |  | PT84MW5              |  | EA015H: Total Dissolved Solids @180°C    |                  | ---              | ---        | 10   | mg/L    | 158                               | 178                 | 11.7 | 0% - 50% |
| ED037P: Alkalinity by PC Titrator (QC Lot: 2928665)               |  |                      |  |                                          |                  |                  |            |      |         |                                   |                     |      |          |
| ES1313914-003                                                     |  | Anonymous            |  | ED037-P: Hydroxide Alkalinity as CaCO3   |                  | DMO-210-001      | ---        | 1    | mg/L    | <1                                | <1                  | 0.0  | No Limit |
|                                                                   |  |                      |  | ED037-P: Carbonate Alkalinity as CaCO3   |                  | 3812-32-6        | ---        | 1    | mg/L    | <1                                | <1                  | 0.0  | No Limit |
|                                                                   |  |                      |  | ED037-P: Bicarbonate Alkalinity as CaCO3 |                  | 71-52-3          | ---        | 1    | mg/L    | 59                                | 58                  | 0.0  | 0% - 20% |
|                                                                   |  |                      |  | ED037-P: Total Alkalinity as CaCO3       |                  | ---              | ---        | 1    | mg/L    | 59                                | 58                  | 0.0  | 0% - 20% |
| ES1314009-001                                                     |  | PT84MW4              |  | ED037-P: Hydroxide Alkalinity as CaCO3   |                  | DMO-210-001      | ---        | 1    | mg/L    | <1                                | <1                  | 0.0  | No Limit |
|                                                                   |  |                      |  | ED037-P: Carbonate Alkalinity as CaCO3   |                  | 3812-32-6        | ---        | 1    | mg/L    | <1                                | <1                  | 0.0  | No Limit |
|                                                                   |  |                      |  | ED037-P: Bicarbonate Alkalinity as CaCO3 |                  | 71-52-3          | ---        | 1    | mg/L    | <1                                | <1                  | 0.0  | No Limit |
|                                                                   |  |                      |  | ED037-P: Total Alkalinity as CaCO3       |                  | ---              | ---        | 1    | mg/L    | <1                                | <1                  | 0.0  | No Limit |
| ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2932730) |  |                      |  |                                          |                  |                  |            |      |         |                                   |                     |      |          |
| ES1313980-019                                                     |  | Anonymous            |  | ED041G: Sulfate as SO4 - Turbidimetric   |                  | 14808-79-8       | ---        | 1    | mg/L    | 344                               | 343                 | 0.0  | 0% - 20% |
| ES1314010-001                                                     |  | Anonymous            |  | ED041G: Sulfate as SO4 - Turbidimetric   |                  | 14808-79-8       | ---        | 1    | mg/L    | 1                                 | 1                   | 0.0  | No Limit |
| ED045G: Chloride Discrete analyser (QC Lot: 2932729)              |  |                      |  |                                          |                  |                  |            |      |         |                                   |                     |      |          |
| ES1313980-019                                                     |  | Anonymous            |  | ED045G: Chloride                         |                  | 16887-00-6       | ---        | 1    | mg/L    | 6200                              | 6180                | 0.4  | 0% - 20% |
| ES1314010-001                                                     |  | Anonymous            |  | ED045G: Chloride                         |                  | 16887-00-6       | ---        | 1    | mg/L    | 42                                | 42                  | 0.0  | 0% - 20% |
| ED093F: Dissolved Major Cations (QC Lot: 2932732)                 |  |                      |  |                                          |                  |                  |            |      |         |                                   |                     |      |          |
| ES1313980-019                                                     |  | Anonymous            |  | ED093F: Calcium                          |                  | 7440-70-2        | ---        | 1    | mg/L    | 257                               | 255                 | 0.8  | 0% - 20% |
|                                                                   |  |                      |  | ED093F: Magnesium                        |                  | 7439-95-4        | ---        | 1    | mg/L    | 671                               | 668                 | 0.8  | 0% - 20% |
|                                                                   |  |                      |  | ED093F: Sodium                           |                  | 7440-23-5        | ---        | 1    | mg/L    | 2900                              | 2890                | 0.6  | 0% - 20% |
|                                                                   |  |                      |  | ED093F: Potassium                        |                  | 7440-09-7        | ---        | 1    | mg/L    | 58                                | 58                  | 0.0  | 0% - 20% |
|                                                                   |  |                      |  | ED093F: Calcium                          |                  | 7440-70-2        | ---        | 1    | mg/L    | <1                                | <1                  | 0.0  | No Limit |
|                                                                   |  |                      |  | ED093F: Magnesium                        |                  | 7439-95-4        | ---        | 1    | mg/L    | 4                                 | 4                   | 0.0  | No Limit |
| ES1314010-001                                                     |  | Anonymous            |  | ED093F: Sodium                           |                  | 7440-23-5        | ---        | 1    | mg/L    | 22                                | 22                  | 0.0  | 0% - 20% |
|                                                                   |  |                      |  | ED093F: Potassium                        |                  | 7440-09-7        | ---        | 1    | mg/L    | 2                                 | 2                   | 0.0  | No Limit |



## Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: WATER

| Method Blank (MB) Report                                         |            |     | Laboratory Control Spike (LCS) Report |                     |                    |                     |
|------------------------------------------------------------------|------------|-----|---------------------------------------|---------------------|--------------------|---------------------|
| Method: Compound                                                 | CAS Number | LOR | Unit                                  | Spike Concentration | Spike Recovery (%) | Recovery Limits (%) |
| EA010P: Conductivity by PC Titrator (QCLot: 2928666)             |            |     |                                       |                     |                    |                     |
| EA010-P: Electrical Conductivity @ 25°C                          | ---        | 1   | µS/cm                                 | 2000 µS/cm          | 104                | 96 110              |
| EA015: Total Dissolved Solids (QCLot: 2933565)                   |            |     |                                       |                     |                    |                     |
| EA015H: Total Dissolved Solids @180°C                            | ---        | 10  | mg/L                                  | 293 mg/L            | 88.8               | 87 125              |
| EA015: Total Dissolved Solids (QCLot: 2933566)                   |            |     |                                       |                     |                    |                     |
| EA015H: Total Dissolved Solids @180°C                            | ---        | 10  | mg/L                                  | 293 mg/L            | 88.8               | 87 125              |
| ED037P: Alkalinity by PC Titrator (QCLot: 2928665)               |            |     |                                       |                     |                    |                     |
| ED037-P: Total Alkalinity as CaCO3                               | ---        | 1   | mg/L                                  | 200 mg/L            | 82.9               | 74 110              |
| ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2932730) |            |     |                                       |                     |                    |                     |
| ED041G: Sulfate as SO4 - Turbidimetric                           | 14808-79-8 | 1   | mg/L                                  | 25 mg/L             | 91.1               | 86 122              |
| ED045G: Chloride Discrete analyser (QCLot: 2932729)              |            |     |                                       |                     |                    |                     |
| ED045G: Chloride                                                 | 16887-00-6 | 1   | mg/L                                  | 1000 mg/L           | 91.1               | 77 123              |
| ED093F: Dissolved Major Cations (QCLot: 2932732)                 |            |     |                                       |                     |                    |                     |
| ED093F: Calcium                                                  | 7440-70-2  | 1   | mg/L                                  | 50 mg/L             | 95.6               | 85 111              |
| ED093F: Magnesium                                                | 7439-95-4  | 1   | mg/L                                  | 50 mg/L             | 92.6               | 87 111              |
| ED093F: Sodium                                                   | 7440-23-5  | 1   | mg/L                                  | 50 mg/L             | 88.1               | 79 109              |
| ED093F: Potassium                                                | 7440-09-7  | 1   | mg/L                                  | 50 mg/L             | 88.4               | 86 112              |

## Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs) (ideal recovery ranges stated may be waived in the event of sample matrix interference).

Sub-Matrix: WATER

| Laboratory sample ID                                             |                  |                                        | Matrix Spike (MS) Report |                  |                     |        |
|------------------------------------------------------------------|------------------|----------------------------------------|--------------------------|------------------|---------------------|--------|
| Client sample ID                                                 | Method: Compound | CAS Number                             | Spike Concentration      | SpikeRecovery(%) | Recovery Limits (%) |        |
| ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2932730) |                  |                                        |                          |                  |                     |        |
| ES1313980-019                                                    | Anonymous        | ED041G: Sulfate as SO4 - Turbidimetric | 14808-79-8               | 10 mg/L          | # Not Determined    | 70 130 |
| ED045G: Chloride Discrete analyser (QCLot: 2932729)              |                  |                                        |                          |                  |                     |        |
| ES1313980-019                                                    | Anonymous        | ED045G: Chloride                       | 16887-00-6               | 250 mg/L         | # Not Determined    | 70 130 |

## Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report



The quality control term Matrix Spike (MS) and Matrix Spike Duplicate (MSD) refers to intralaboratory split samples spiked with a representative set of target analytes. The purpose of these QC parameters are to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: WATER

| Sub-Matrix: WATER                                                |                  |                                        |            |                                                           |                    |     |                     |      |          |               |
|------------------------------------------------------------------|------------------|----------------------------------------|------------|-----------------------------------------------------------|--------------------|-----|---------------------|------|----------|---------------|
|                                                                  |                  |                                        |            | Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report |                    |     |                     |      |          |               |
| Laboratory sample ID                                             | Client sample ID | Method: Compound                       | CAS Number | Spike Concentration                                       | Spike Recovery (%) |     | Recovery Limits (%) |      | RPDs (%) |               |
|                                                                  |                  |                                        |            |                                                           | MS                 | MSD | Low                 | High | Value    | Control Limit |
| ED045G: Chloride Discrete analyser (QCLot: 2932729)              |                  |                                        |            |                                                           |                    |     |                     |      |          |               |
| ES1313980-019                                                    | Anonymous        | ED045G: Chloride                       | 16887-00-6 | 250 mg/L                                                  | # Not Determined   | --- | 70                  | 130  | ---      | ---           |
| ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2932730) |                  |                                        |            |                                                           |                    |     |                     |      |          |               |
| ES1313980-019                                                    | Anonymous        | ED041G: Sulfate as SO4 - Turbidimetric | 14808-79-8 | 10 mg/L                                                   | # Not Determined   | --- | 70                  | 130  | ---      | ---           |



Environmental Division



## INTERPRETIVE QUALITY CONTROL REPORT

|              |                                                                |                         |                                                       |
|--------------|----------------------------------------------------------------|-------------------------|-------------------------------------------------------|
| Work Order   | : ES1314009                                                    | Page                    | : 1 of 5                                              |
| Client       | : URS AUSTRALIA (NSW) PTY LTD                                  | Laboratory              | : Environmental Division Sydney                       |
| Contact      | : FABIO CAROSONE                                               | Contact                 | : Loren Schiavon                                      |
| Address      | : LEVEL 4, 407 PACIFIC HIGHWAY<br>ARTARMON NSW, AUSTRALIA 2064 | Address                 | : 277-289 Woodpark Road Smithfield NSW Australia 2164 |
| E-mail       | : fabio_carosone@urscorp.com                                   | E-mail                  | : loren.schiavon@alsglobal.com                        |
| Telephone    | : +61 89255500                                                 | Telephone               | : +61 2 8784 8503                                     |
| Facsimile    | : +61 02 89255555                                              | Facsimile               | : +61 2 8784 8500                                     |
| Project      | : 43167954                                                     | QC Level                | : NEPM 1999 Schedule B(3) and ALS QCS3 requirement    |
| Site         | : ---                                                          | Date Samples Received   | : 20-JUN-2013                                         |
| C-O-C number | : ---                                                          | Issue Date              | : 26-JUN-2013                                         |
| Sampler      | : FC                                                           | No. of samples received | : 3                                                   |
| Order number | : ---                                                          | No. of samples analysed | : 3                                                   |
| Quote number | : EN/001/13                                                    |                         |                                                       |

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Interpretive Quality Control Report contains the following information:

- Analysis Holding Time Compliance
- Quality Control Parameter Frequency Compliance
- Brief Method Summaries
- Summary of Outliers



## Analysis Holding Time Compliance

The following report summarises extraction / preparation and analysis times and compares with recommended holding times. Dates reported represent first date of extraction or analysis and precludes subsequent dilutions and reruns. Information is also provided re the sample container (preservative) from which the analysis aliquot was taken. Elapsed period to analysis represents number of days from sampling where no extraction / digestion is involved or period from extraction / digestion where this is present. For composite samples, sampling date is assumed to be that of the oldest sample contributing to the composite. Sample date for laboratory produced leachates is assumed as the completion date of the leaching process. Outliers for holding time are based on USEPA SW 846, APHA, AS and NEPM (1999). A listing of breaches is provided in the Summary of Outliers.

Holding times for leachate methods (excluding elutriates) vary according to the analytes being determined on the resulting solution. For non-volatile analytes, the holding time compliance assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These soil holding times are: Organics (14 days); Mercury (28 days) & other metals (180 days). A recorded breach therefore does not guarantee a breach for all non-volatile parameters.

Matrix: WATER

| Matrix: WATER                                   |             |                          |                    |            |               |                  |            |
|-------------------------------------------------|-------------|--------------------------|--------------------|------------|---------------|------------------|------------|
| Method                                          | Sample Date | Extraction / Preparation |                    | Analysis   |               |                  |            |
| Container / Client Sample ID(s)                 |             | Date extracted           | Due for extraction | Evaluation | Date analysed | Due for analysis | Evaluation |
| EA005P: pH by PC Titrator                       |             |                          |                    |            |               |                  |            |
| Clear Plastic Bottle - Natural (EA005-P)        |             |                          |                    |            |               |                  |            |
| PT84MW4,<br>PT84MW5                             | 19-JUN-2013 | ---                      | 19-JUN-2013        | ---        | 21-JUN-2013   | 19-JUN-2013      | ✖          |
| EA010P: Conductivity by PC Titrator             |             |                          |                    |            |               |                  |            |
| Clear Plastic Bottle - Natural (EA010-P)        |             |                          |                    |            |               |                  |            |
| PT84MW4,<br>PT84MW5                             | 19-JUN-2013 | ---                      | 17-JUL-2013        | ---        | 21-JUN-2013   | 17-JUL-2013      | ✓          |
| EA015: Total Dissolved Solids                   |             |                          |                    |            |               |                  |            |
| Clear Plastic Bottle - Natural (EA015H)         |             |                          |                    |            |               |                  |            |
| PT84MW4,<br>PT84MW5                             | 19-JUN-2013 | ---                      | 26-JUN-2013        | ---        | 25-JUN-2013   | 26-JUN-2013      | ✓          |
| ED037P: Alkalinity by PC Titrator               |             |                          |                    |            |               |                  |            |
| Clear Plastic Bottle - Natural (ED037-P)        |             |                          |                    |            |               |                  |            |
| PT84MW4,<br>PT84MW5                             | 19-JUN-2013 | ---                      | 03-JUL-2013        | ---        | 21-JUN-2013   | 03-JUL-2013      | ✓          |
| ED041G: Sulfate (Turbidimetric) as SO4 2- by DA |             |                          |                    |            |               |                  |            |
| Clear Plastic Bottle - Natural (ED041G)         |             |                          |                    |            |               |                  |            |
| PT84MW4,<br>PT84MW5                             | 19-JUN-2013 | ---                      | 17-JUL-2013        | ---        | 24-JUN-2013   | 17-JUL-2013      | ✓          |
| ED045G: Chloride Discrete analyser              |             |                          |                    |            |               |                  |            |
| Clear Plastic Bottle - Natural (ED045G)         |             |                          |                    |            |               |                  |            |
| PT84MW4,<br>PT84MW5                             | 19-JUN-2013 | ---                      | 17-JUL-2013        | ---        | 24-JUN-2013   | 17-JUL-2013      | ✓          |
| ED093F: Dissolved Major Cations                 |             |                          |                    |            |               |                  |            |
| Clear Plastic Bottle - Natural (ED093F)         |             |                          |                    |            |               |                  |            |
| PT84MW4,<br>PT84MW5                             | 19-JUN-2013 | ---                      | 26-JUN-2013        | ---        | 24-JUN-2013   | 26-JUN-2013      | ✓          |

Evaluation: \* = Holding time breach ; ✓ = Within holding time.



## Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(ware) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: WATER

| Quality Control Sample Type                            |         | Count |         |        | Rate (%) |            | Quality Control Specification                    |  |
|--------------------------------------------------------|---------|-------|---------|--------|----------|------------|--------------------------------------------------|--|
| Analytical Methods                                     | Method  | QC    | Regular | Actual | Expected | Evaluation |                                                  |  |
| <b>Laboratory Duplicates (DUP)</b>                     |         |       |         |        |          |            |                                                  |  |
| Alkalinity by PC Titrator                              | ED037-P | 2     | 20      | 10.0   | 10.0     | ✓          | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |  |
| Chloride by Discrete Analyser                          | ED045G  | 2     | 19      | 10.5   | 10.0     | ✓          | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |  |
| Conductivity by PC Titrator                            | EA010-P | 2     | 20      | 10.0   | 10.0     | ✓          | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |  |
| Major Cations - Dissolved                              | ED093F  | 2     | 19      | 10.5   | 10.0     | ✓          | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |  |
| pH by PC Titrator                                      | EA005-P | 2     | 20      | 10.0   | 10.0     | ✓          | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |  |
| Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser | ED041G  | 2     | 19      | 10.5   | 10.0     | ✓          | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |  |
| Total Dissolved Solids (High Level)                    | EA015H  | 3     | 27      | 11.1   | 10.0     | ✓          | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |  |
| <b>Laboratory Control Samples (LCS)</b>                |         |       |         |        |          |            |                                                  |  |
| Alkalinity by PC Titrator                              | ED037-P | 1     | 20      | 5.0    | 5.0      | ✓          | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |  |
| Chloride by Discrete Analyser                          | ED045G  | 2     | 19      | 10.5   | 10.0     | ✓          | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |  |
| Conductivity by PC Titrator                            | EA010-P | 1     | 20      | 5.0    | 5.0      | ✓          | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |  |
| Major Cations - Dissolved                              | ED093F  | 1     | 19      | 5.3    | 5.0      | ✓          | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |  |
| Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser | ED041G  | 1     | 19      | 5.3    | 5.0      | ✓          | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |  |
| Total Dissolved Solids (High Level)                    | EA015H  | 4     | 27      | 14.8   | 10.0     | ✓          | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |  |
| <b>Method Blanks (MB)</b>                              |         |       |         |        |          |            |                                                  |  |
| Chloride by Discrete Analyser                          | ED045G  | 1     | 19      | 5.3    | 5.0      | ✓          | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |  |
| Conductivity by PC Titrator                            | EA010-P | 1     | 20      | 5.0    | 5.0      | ✓          | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |  |
| Major Cations - Dissolved                              | ED093F  | 1     | 19      | 5.3    | 5.0      | ✓          | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |  |
| Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser | ED041G  | 1     | 19      | 5.3    | 5.0      | ✓          | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |  |
| Total Dissolved Solids (High Level)                    | EA015H  | 2     | 27      | 7.4    | 5.0      | ✓          | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |  |
| <b>Matrix Spikes (MS)</b>                              |         |       |         |        |          |            |                                                  |  |
| Chloride by Discrete Analyser                          | ED045G  | 1     | 19      | 5.3    | 5.0      | ✓          | ALS QCS3 requirement                             |  |
| Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser | ED041G  | 1     | 19      | 5.3    | 5.0      | ✓          | ALS QCS3 requirement                             |  |

Evaluation: x = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.



## Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

| Analytical Methods                                     | Method     | Matrix | Method Descriptions                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------------------------------------------------|------------|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| pH by PC Titrator                                      | EA005-P    | WATER  | APHA 21st ed., 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)                                                                                                                                                                                                                                                                        |
| Conductivity by PC Titrator                            | EA010-P    | WATER  | APHA 21st ed., 2510 B This procedure determines conductivity by automated ISE. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)                                                                                                                                                                                                                                                                                   |
| Total Dissolved Solids (High Level)                    | EA015H     | WATER  | In-House, APHA 21st ed., 2540C A gravimetric procedure that determines the amount of 'filterable' residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)                                                                            |
| Alkalinity by PC Titrator                              | ED037-P    | WATER  | APHA 21st ed., 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrator) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)                                                                                                                                                                                               |
| Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser | ED041G     | WATER  | APHA 21st ed., 4500-SO4 Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2) |
| Chloride by Discrete Analyser                          | ED045G     | WATER  | APHA 21st ed., 4500 Cl - G The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003                                                                  |
| Major Cations - Dissolved                              | ED093F     | WATER  | Major Cations is determined based on APHA 21st ed., 3120; USEPA SW 846 - 6010 The ICPAES technique ionises the 0.45um filtered sample atoms emitting a characteristic spectrum. This spectrum is then compared against matrix matched standards for quantification. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)                                                                                              |
|                                                        |            |        | Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)                                                                                                                                                                                                                                                  |
|                                                        |            |        | Hardness parameters are calculated based on APHA 21st ed., 2340 B. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)                                                                                                                                                                                                                                                                                               |
| Ionic Balance by PCT DA and Turbi SO4 DA               | EN055 - PG | WATER  | APHA 21st Ed. 1030F. The Ionic Balance is calculated based on the major Anions and Cations. The major anions include Alkalinity, Chloride and Sulfate which determined by PCT and DA. The Cations are determined by Turbi SO4 by DA. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)                                                                                                                             |



## Summary of Outliers

### Outliers : Quality Control Samples

The following report highlights outliers flagged in the Quality Control (QC) Report. Surrogate recovery limits are static and based on USEPA SW846 or ALS-QW/EN/38 (in the absence of specific USEPA limits). This report displays QC Outliers (breaches) only.

### Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: WATER

| Compound Group Name                             | Laboratory Sample ID | Client Sample ID | Analyte                        | CAS Number | Data           | Limits | Comment                                                                               |
|-------------------------------------------------|----------------------|------------------|--------------------------------|------------|----------------|--------|---------------------------------------------------------------------------------------|
| <b>Matrix Spike (MS) Recoveries</b>             |                      |                  |                                |            |                |        |                                                                                       |
| ED041G: Sulfate (Turbidimetric) as SO4 2- by DA | ES1313980-019        | Anonymous        | Sulfate as SO4 - Turbidimetric | 14808-79-8 | Not Determined | ---    | MS recovery not determined, background level greater than or equal to 4x spike level. |
| ED045G: Chloride Discrete analyser              | ES1313980-019        | Anonymous        | Chloride                       | 16887-00-6 | Not Determined | ---    | MS recovery not determined, background level greater than or equal to 4x spike level. |

- For all matrices, no Method Blank value outliers occur.
- For all matrices, no Duplicate outliers occur.
- For all matrices, no Laboratory Control outliers occur.

### Regular Sample Surrogates

- For all regular sample matrices, no surrogate recovery outliers occur.

### Outliers : Analysis Holding Time Compliance

This report displays Holding Time breaches only. Only the respective Extraction / Preparation and/or Analysis component is/are displayed.

Matrix: WATER

| Method<br>Container / Client Sample ID(s) | Extraction / Preparation |                    | Analysis      |                  |
|-------------------------------------------|--------------------------|--------------------|---------------|------------------|
|                                           | Date extracted           | Due for extraction | Date analysed | Due for analysis |
| <b>EA005P: pH by PC Titrator</b>          |                          |                    |               |                  |
| Clear Plastic Bottle - Natural            |                          |                    |               |                  |
| PT84MW4,                                  |                          |                    |               |                  |
| PT84MW5                                   |                          |                    |               |                  |
|                                           | ---                      | ---                | 21-JUN-2013   | 19-JUN-2013      |
|                                           |                          |                    |               | 2                |

### Outliers : Frequency of Quality Control Samples

The following report highlights breaches in the Frequency of Quality Control Samples.

- No Quality Control Sample Frequency Outliers exist.

Sheet of

| THIS COLUMN<br>FOR LAB USE ONLY                                                                        |  |                                                                                                                                                                                                                                                                                                                                                                                                                   |  | CHAIN OF CUSTODY FORM                                        |  |                                                                           |  | Sheet    of                                        |  |  |  |
|--------------------------------------------------------------------------------------------------------|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--------------------------------------------------------------|--|---------------------------------------------------------------------------|--|----------------------------------------------------|--|--|--|
| Job Code:                                                                                              |  | FROM:<br>URS (AUSTRALIA)<br>ACN 000 691 690<br>116 Miller Street<br>North Sydney NSW 2060                                                                                                                                                                                                                                                                                                                         |  | DATE:                                                        |  | TO:<br>ALS<br>277-289 Woodpark Road<br>SMITHFIELD NSW 2164                |  | Container Size, Type, Preservative<br>and Analysis |  |  |  |
|                                                                                                        |  |                                                                                                                                                                                                                                                                                                                                                                                                                   |  | Ph: 87848555                                                 |  | Fax: 87848500                                                             |  | Container Identification                           |  |  |  |
| Due Date:                                                                                              |  | Project No.: 43167354                                                                                                                                                                                                                                                                                                                                                                                             |  | Sampler(s): Fabio Carosone                                   |  | Size<br>250mL                                                             |  |                                                    |  |  |  |
| Custody seal intact?<br><div><input type="checkbox"/> YES <input checked="" type="checkbox"/> NO</div> |  | Project Manager:<br>F. Carosone                                                                                                                                                                                                                                                                                                                                                                                   |  | Signature(s):                                                |  | Type*                                                                     |  |                                                    |  |  |  |
| Sample cold?<br><div><input type="checkbox"/> YES <input checked="" type="checkbox"/> NO</div>         |  | Agreement No:                                                                                                                                                                                                                                                                                                                                                                                                     |  | Checked:                                                     |  | Label Colour<br>Preservative                                              |  |                                                    |  |  |  |
| Lab identification                                                                                     |  | Released for URS by: F. Carosone                                                                                                                                                                                                                                                                                                                                                                                  |  | Received for Laboratory by:<br><i>Fenil</i>                  |  | pH, EC, TDS                                                               |  |                                                    |  |  |  |
| Date: 20.6.13                                                                                          |  | Time: 10.00am                                                                                                                                                                                                                                                                                                                                                                                                     |  | Date: 20/6                                                   |  | Anions (HCO <sub>3</sub> , SO <sub>4</sub> , Cl), Cations (Ca, Mg, Na, K) |  |                                                    |  |  |  |
| Matrix                                                                                                 |  | Sample Number                                                                                                                                                                                                                                                                                                                                                                                                     |  | Comments                                                     |  | Total no                                                                  |  | Tick required analytes                             |  |  |  |
| Water                                                                                                  |  | PT84MW4                                                                                                                                                                                                                                                                                                                                                                                                           |  |                                                              |  | 1                                                                         |  | <input checked="" type="checkbox"/>                |  |  |  |
| Water                                                                                                  |  | PT84MW1                                                                                                                                                                                                                                                                                                                                                                                                           |  |                                                              |  | 1                                                                         |  | <input checked="" type="checkbox"/>                |  |  |  |
| Water                                                                                                  |  | PT84MW5                                                                                                                                                                                                                                                                                                                                                                                                           |  |                                                              |  | 1                                                                         |  | <input checked="" type="checkbox"/>                |  |  |  |
| Water                                                                                                  |  |                                                                                                                                                                                                                                                                                                                                                                                                                   |  |                                                              |  |                                                                           |  |                                                    |  |  |  |
| Water                                                                                                  |  |                                                                                                                                                                                                                                                                                                                                                                                                                   |  |                                                              |  |                                                                           |  |                                                    |  |  |  |
| Water                                                                                                  |  |                                                                                                                                                                                                                                                                                                                                                                                                                   |  |                                                              |  |                                                                           |  |                                                    |  |  |  |
| Water                                                                                                  |  |                                                                                                                                                                                                                                                                                                                                                                                                                   |  |                                                              |  |                                                                           |  |                                                    |  |  |  |
| Water                                                                                                  |  |                                                                                                                                                                                                                                                                                                                                                                                                                   |  |                                                              |  |                                                                           |  |                                                    |  |  |  |
| Remarks:                                                                                               |  | TOTAL                                                                                                                                                                                                                                                                                                                                                                                                             |  | 3                                                            |  | 3                                                                         |  |                                                    |  |  |  |
| Courier Job No:                                                                                        |  | * Container Type and Preservative Codes: P = Neutral Plastic; N = Nitric Acid Preserved; G = Sodium Hydroxide Preserved; J = Solvent Washed Acid Rinsed Jar; S = Solvent Washed Acid Rinsed Glass Bottle; VC = Hydrochloric Acid Preserved Vial; VS = Sulfuric Acid Preserved Vial; BS = Sulfuric Acid Preserved Glass Bottle; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle |  | Note: SAMPLES MAY CONTAIN DANGEROUS AND HAZARDOUS SUBSTANCES |  | Telephone : + 61-2-8784 8555                                              |  |                                                    |  |  |  |

## Appendix D Monitoring Bore PT84MW5 Bore Log and Form A

PROJECT : Hodgson Quarries and Plant  
 LOCATION: Roberts Road, Maroota  
 SUPERVISOR F.Carosone

JOB NO.: 43167954  
 DATE STARTED: 11/04/2013  
 DATE COMPLETED: 11/04/2013

DRILLED BY: Ultra Drilling  
 RIG: Mayhew 1000  
 DATUM: 0.73 m above concrete/ground  
 EASTING: 313896

METHOD: Air rotary  
 TOTAL DEPTH: 44 m  
 SWL: 34.6m b.datum  
 NORTHING: 6295313

DIAMETER: 120mm  
 R.L. CONCRETE: mAHD  
 R.L. STEEL PLATE: mAHD  
 R.L. SWL :

## WELL NUMBER: PT84MW5

| Lithological Log | Remarks                                                                                                                | Depth (m) | Bore Construction |
|------------------|------------------------------------------------------------------------------------------------------------------------|-----------|-------------------|
|                  |                                                                                                                        |           |                   |
| 0 - 4            | SAND: red/orange, fine to medium rounded quartz grains, clayey                                                         | 1         |                   |
|                  |                                                                                                                        | 2         |                   |
|                  |                                                                                                                        | 3         |                   |
| 4 - 8            | SAND + CLAY: grey and brown, fine grained with grey clay                                                               | 4         |                   |
|                  |                                                                                                                        | 5         |                   |
|                  |                                                                                                                        | 6         |                   |
|                  |                                                                                                                        | 7         |                   |
| 8 - 13           | CLAY: grey, brown and dark red, stiff, dry                                                                             | 8         |                   |
|                  |                                                                                                                        | 9         |                   |
|                  |                                                                                                                        | 10        |                   |
|                  |                                                                                                                        | 11        |                   |
|                  |                                                                                                                        | 12        |                   |
| 13 - 15          | SAND: red, dark red, iron stained, fine, sorted, subrounded to rounded quartz grains                                   | 13        |                   |
|                  |                                                                                                                        | 14        |                   |
| 15 - 17          | SAND: grey, light grey and buff coloured, fine, sorted, subrounded to rounded quartz grains                            | 15        |                   |
|                  |                                                                                                                        | 16        |                   |
| 17 - 21          | SAND: orange to dark orange, fine to medium, sorted, subrounded quartz grains                                          | 17        |                   |
|                  |                                                                                                                        | 18        |                   |
|                  |                                                                                                                        | 19        |                   |
|                  |                                                                                                                        | 20        |                   |
| 21 - 30          | GRAVEL: orange, Fe stained, medium to coarse, subrounded, with white poorly sorted quartz grains. Becoming fine @ 26 m | 21        |                   |
|                  |                                                                                                                        | 22        |                   |
|                  |                                                                                                                        | 23        |                   |
|                  |                                                                                                                        | 24        |                   |
|                  |                                                                                                                        | 25        |                   |
|                  |                                                                                                                        | 26        |                   |
|                  |                                                                                                                        | 27        |                   |
|                  |                                                                                                                        | 28        |                   |
|                  |                                                                                                                        | 29        |                   |
|                  |                                                                                                                        | 30        |                   |
| 30 - 44          | SAND: gray/ brown, fine to medium, subrounded to subangular some clear quartz grains. Traces of grey clay.             | 31        |                   |
|                  |                                                                                                                        | 32        |                   |
|                  |                                                                                                                        | 33        |                   |
|                  |                                                                                                                        | 34        |                   |
|                  |                                                                                                                        | 35        |                   |
|                  |                                                                                                                        | 36        |                   |
|                  |                                                                                                                        | 37        |                   |
|                  |                                                                                                                        | 38        |                   |
|                  |                                                                                                                        | 39        |                   |
|                  |                                                                                                                        | 40        |                   |
|                  |                                                                                                                        | 41        |                   |
|                  |                                                                                                                        | 42        |                   |
|                  |                                                                                                                        | 43        |                   |
| 44               | Bottom of the hole                                                                                                     | 44        |                   |

## FORM A

## PARTICULARS OF COMPLETED BORE

(This form MUST be completed and returned to the Department)

BORE NO.

PT84 MW5

1. NAME OF LICENSEE: Martin Hodgson

LICENSE NO.: 108L158808

ADDRESS: old northern Rd.

## 2. DRILLER

License No. 021600

## 3. DRILLING SUMMARY

Depth (m)

From

To

Hole Diameter (mm)

Method

Fluid Used

Name: Brad Dodd.

Contractor: Ultradrilling

Rig Type: Kelly drive

0

44

125

Rotary

Air

Air

## 4. MAIN SUMMARY

New Bore



Replacement Bore

Deepening

Enlarging

Reconditioning

Date Completed 11-4-13

Final Depth

44 m

Intended Use monitoring

Final Salinity mg/L or taste

Temperature

If abandoned state procedure

\*If water analysis is available please supply copy or report

## 5. PUMPING TESTS ON COMPLETION

If 3-stage and single-rate tests available, enter in this order \*

| Date | Duration (hours) | S.W.L. (m) | D.W.L. (m) at end of period | Yield (L/s) | Pump Intake Depth (m) | Testing Equipment Used |                        |                      |
|------|------------------|------------|-----------------------------|-------------|-----------------------|------------------------|------------------------|----------------------|
|      |                  |            |                             |             |                       | Method                 | To Measure Water Level | To Measure Discharge |
| 1    |                  |            |                             |             |                       |                        |                        |                      |
| 2    |                  |            |                             |             |                       |                        |                        |                      |
| 3    |                  |            |                             |             |                       |                        |                        |                      |
| 4    |                  |            |                             |             |                       |                        |                        |                      |
|      |                  |            |                             |             |                       | Tested by:             |                        |                      |

\*Please supply copy of data 1If artesian flow, please supply static and dynamic pressure (kPa) respectively

IF NOT DRILLED BY BORING PLANT PLEASE GO TO SECTION 12

## 6. AQUIFERS Depths from natural surface level to nearest 0.1 m

| Water Bearing |        | S.W.L. (m) | D.W.L. (m) | Yield (L/s) | Hole Depth At Test (m) | Test Method | Duration (Hrs) | Salinity* Mg/L or Taste | Remarks |
|---------------|--------|------------|------------|-------------|------------------------|-------------|----------------|-------------------------|---------|
| From (m)      | To (m) |            |            |             |                        |             |                |                         |         |
| 1 32          | 44     |            |            | 0.2         |                        | Air Lift    | 0.5            | 110 ppm                 |         |
| 2             |        |            |            |             |                        |             |                |                         |         |
| 3             |        |            |            |             |                        |             |                |                         |         |
| 4             |        |            |            |             |                        |             |                |                         |         |
| 5             |        |            |            |             |                        |             |                |                         |         |

## 7. CASING Depths from natural surface level to nearest 0.1 m. If above surface level: 0.5 m above surface

| Type and Thickness | Outside Diameter (mm) | From To (m) |    | Welded Screwed Glued etc | How Fixed     |                  |                        |       | Cemented |        | Casing Shoe |    |
|--------------------|-----------------------|-------------|----|--------------------------|---------------|------------------|------------------------|-------|----------|--------|-------------|----|
|                    |                       |             |    |                          | Held In clamp | Seated On bottom | Driven Into small hole | Other | From (m) | To (m) | Yes         | No |
|                    |                       |             |    |                          |               |                  |                        |       |          |        |             |    |
| 1 P.V.C. 4112      | 60                    | 0.5         | 44 | screwed                  |               | ✓                |                        |       | 0        | 6      |             |    |
| 2                  |                       |             |    |                          |               |                  |                        |       |          |        |             |    |
| 3                  |                       |             |    |                          |               |                  |                        |       |          |        |             |    |

## 8. COMPLETION DETAILS

## SLOTTED CASING :

| SUMMARY           | Material | Outer Diameter (mm) | oxy cut          |          | sawn       |               | slotted in hole                          |  | stamped slot |  |
|-------------------|----------|---------------------|------------------|----------|------------|---------------|------------------------------------------|--|--------------|--|
|                   |          |                     | From (m)         | To (m)   | Length (m) | Width (mm)    | Direction e.g. Vertical                  |  |              |  |
|                   |          |                     |                  |          |            |               |                                          |  |              |  |
| Open hole         |          |                     |                  |          |            |               |                                          |  |              |  |
| Open ended casing |          |                     |                  |          |            |               |                                          |  |              |  |
| Slotted casing    |          |                     |                  |          |            |               |                                          |  |              |  |
| Slotted liner     |          |                     |                  |          |            |               |                                          |  |              |  |
| Screen            | X        | Brand / Material    | Outer Diam. (mm) | From (m) | To (m)     | Aperture (mm) | Method of Fixing e.g. Packer Screwed etc |  |              |  |
| Gravel pack       | X        | 1. P.V.C. 4112      | 60               | 32       | 44         | 0.5           | screwed                                  |  |              |  |
| Type of bottom    |          | 2.                  |                  |          |            |               |                                          |  |              |  |
| Cap               | X        | 3.                  |                  |          |            |               |                                          |  |              |  |
| Plug              |          | 4.                  |                  |          |            |               |                                          |  |              |  |
|                   |          | 5.                  |                  |          |            |               |                                          |  |              |  |

|                                                                       |                                     |           |  |            |     |                 |    |                                                 |  |                               |        |                         |         |  |  |
|-----------------------------------------------------------------------|-------------------------------------|-----------|--|------------|-----|-----------------|----|-------------------------------------------------|--|-------------------------------|--------|-------------------------|---------|--|--|
| <b>9. GRAVEL PACK</b>                                                 |                                     |           |  | Depth (m)  |     | Grain Size (mm) |    | Quantity (mm)                                   |  | <b>10. CHEMICAL TREATMENT</b> |        |                         |         |  |  |
| TYPE                                                                  |                                     | GRADE     |  | From       | To  | From            | To |                                                 |  | Treatment                     | Method | Duration                | Success |  |  |
| Rounded                                                               | <input checked="" type="checkbox"/> | Graded    |  | 2.9        | 4.4 | 2               | 5  | 300 Kg                                          |  |                               |        |                         |         |  |  |
| Crushed                                                               | <input type="checkbox"/>            | Ungraded  |  |            |     |                 |    |                                                 |  |                               |        |                         |         |  |  |
| <b>11. DEVELOPMENT</b>                                                |                                     |           |  |            |     |                 |    |                                                 |  |                               |        |                         |         |  |  |
| Method                                                                |                                     | Surging   |  | Jetting    |     | Air             |    | <input checked="" type="checkbox"/> Backwashing |  | Pumping                       |        | Other                   |         |  |  |
| Time Taken                                                            |                                     | hrs       |  | hrs        |     | 5 hrs           |    | hrs                                             |  | hrs                           |        | hrs                     |         |  |  |
| <b>12. IF NOT DRILLED HOLE</b> i.e. hand dug, back hoe, dragline etc. |                                     |           |  |            |     |                 |    |                                                 |  |                               |        |                         |         |  |  |
| Method                                                                |                                     | Depth (m) |  | Length (m) |     | Width (m)       |    | Diameter (m)                                    |  | Lining Material               |        | Dimensions of Liner (m) |         |  |  |
|                                                                       |                                     |           |  |            |     |                 |    |                                                 |  |                               |        |                         |         |  |  |
|                                                                       |                                     |           |  |            |     |                 |    |                                                 |  |                               |        |                         |         |  |  |
|                                                                       |                                     |           |  |            |     |                 |    |                                                 |  |                               |        |                         |         |  |  |
|                                                                       |                                     |           |  |            |     |                 |    |                                                 |  |                               |        |                         |         |  |  |
| <b>13. STEP PILING</b>                                                |                                     |           |  |            |     |                 |    |                                                 |  |                               |        |                         |         |  |  |





## Analytical Results

Sub-Matrix: WATER

| Compound                                                          | CAS Number  | LOR  | Client sample ID |         | Unit | Client sampling date / time | PT84MW4           | PT84MW1           |  |  |
|-------------------------------------------------------------------|-------------|------|------------------|---------|------|-----------------------------|-------------------|-------------------|--|--|
|                                                                   |             |      |                  |         |      |                             | 22-JUN-2011 15:15 | 22-JUN-2011 16:00 |  |  |
|                                                                   |             |      |                  |         |      |                             | ES1113308-001     | ES1113308-002     |  |  |
| <b>EA005P: pH by PC Titrator</b>                                  |             |      |                  |         |      |                             |                   |                   |  |  |
| pH Value                                                          | ---         | 0.01 |                  | pH Unit |      | 4.45                        | 4.87              |                   |  |  |
| <b>EA010P: Conductivity by PC Titrator</b>                        |             |      |                  |         |      |                             |                   |                   |  |  |
| Electrical Conductivity @ 25°C                                    | ---         | 1    |                  | µS/cm   |      | 141                         | 174               |                   |  |  |
| <b>EA015: Total Dissolved Solids</b>                              |             |      |                  |         |      |                             |                   |                   |  |  |
| ^ Total Dissolved Solids @180°C                                   | GIS-210-010 | 5    |                  | mg/L    |      | 123                         | 320               |                   |  |  |
| <b>ED037P: Alkalinity by PC Titrator</b>                          |             |      |                  |         |      |                             |                   |                   |  |  |
| Hydroxide Alkalinity as CaCO <sub>3</sub>                         | DMO-210-001 | 1    |                  | mg/L    |      | <1                          | <1                |                   |  |  |
| Carbonate Alkalinity as CaCO <sub>3</sub>                         | 3812-32-6   | 1    |                  | mg/L    |      | <1                          | <1                |                   |  |  |
| Bicarbonate Alkalinity as CaCO <sub>3</sub>                       | 71-52-3     | 1    |                  | mg/L    |      | <1                          | <1                |                   |  |  |
| Total Alkalinity as CaCO <sub>3</sub>                             | ---         | 1    |                  | mg/L    |      | <1                          | <1                |                   |  |  |
| <b>ED041G: Sulfate (Turbidimetric) as SO<sub>4</sub> 2- by DA</b> |             |      |                  |         |      |                             |                   |                   |  |  |
| Sulfate as SO <sub>4</sub> - Turbidimetric                        | 14808-79-8  | 1    |                  | mg/L    |      | 2                           | 8                 |                   |  |  |
| <b>ED045G: Chloride Discrete analyser</b>                         |             |      |                  |         |      |                             |                   |                   |  |  |
| Chloride                                                          | 16887-00-6  | 1    |                  | mg/L    |      | 26                          | 31                |                   |  |  |
| <b>ED093F: Dissolved Major Cations</b>                            |             |      |                  |         |      |                             |                   |                   |  |  |
| Calcium                                                           | 7440-70-2   | 1    |                  | mg/L    |      | <1                          | 1                 |                   |  |  |
| Magnesium                                                         | 7439-95-4   | 1    |                  | mg/L    |      | 4                           | 5                 |                   |  |  |
| Sodium                                                            | 7440-23-5   | 1    |                  | mg/L    |      | 14                          | 13                |                   |  |  |
| Potassium                                                         | 7440-09-7   | 1    |                  | mg/L    |      | 1                           | 6                 |                   |  |  |
| <b>EN055: Ionic Balance</b>                                       |             |      |                  |         |      |                             |                   |                   |  |  |
| ^ Total Anions                                                    | ---         | 0.01 |                  | meq/L   |      | 0.78                        | 1.04              |                   |  |  |
| ^ Total Cations                                                   | ---         | 0.01 |                  | meq/L   |      | 0.96                        | 1.18              |                   |  |  |



Environmental Division

**QUALITY CONTROL REPORT**

|              |                                                                |                         |                                                       |
|--------------|----------------------------------------------------------------|-------------------------|-------------------------------------------------------|
| Work Order   | : ES1113308                                                    | Page                    | : 1 of 5                                              |
| Client       | : URS AUSTRALIA (NSW) PTY LTD                                  | Laboratory              | : Environmental Division Sydney                       |
| Contact      | : MR FABIO CAROSONE                                            | Contact                 | : Angela Pavlovic                                     |
| Address      | : LEVEL 4, 407 PACIFIC HIGHWAY<br>ARTARMON NSW, AUSTRALIA 2064 | Address                 | : 277-289 Woodpark Road Smithfield NSW Australia 2164 |
| E-mail       | : fabio_carosone@urscorp.com                                   | E-mail                  | : angela.pavlovic@alsenviro.com                       |
| Telephone    | : +61 892555500                                                | Telephone               | : +61 2 8784 8523                                     |
| Facsimile    | : +61 02 89255555                                              | Facsimile               | : +61 2 8784 8500                                     |
| Project      | : 43167795                                                     | QC Level                | : NEPM 1999 Schedule B(3) and ALS QCS3 requirement    |
| Site         | : ---                                                          | Date Samples Received   | : 22-JUN-2011                                         |
| C-O-C number | : ---                                                          | Issue Date              | : 30-JUN-2011                                         |
| Sampler      | : FC                                                           | No. of samples received | : 2                                                   |
| Order number | : ---                                                          | No. of samples analysed | : 2                                                   |
| Quote number | : EN/001/10                                                    |                         |                                                       |

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits



NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

**Signatories**

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

| Signatories      | Position                 | Accreditation Category |
|------------------|--------------------------|------------------------|
| Ankit Joshi      | Inorganic Chemist        | Sydney Inorganics      |
| Sarah Millington | Senior Inorganic Chemist | Sydney Inorganics      |
| Wisam Marassa    | Metals Coordinator       | Sydney Inorganics      |

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Page : 2 of 5  
Work Order : ES1113308  
Client : URS AUSTRALIA (NSW) PTY LTD  
Project : 43167795

### General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key :

Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot

CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

RPD = Relative Percentage Difference

# = Indicates failed QC



Page : 3 of 5  
Work Order : ES1113308  
Client : URS AUSTRALIA (NSW) PTY LTD  
Project : 43157795

## Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

| Sub-Matrix: WATER                                     |                  |                                                                   | Laboratory Duplicate (DUP) Report |      |         |                 |                  |         |                     |  |
|-------------------------------------------------------|------------------|-------------------------------------------------------------------|-----------------------------------|------|---------|-----------------|------------------|---------|---------------------|--|
| Laboratory sample ID                                  | Client sample ID | Method: Compound                                                  | CAS Number                        | LOR  | Unit    | Original Result | Duplicate Result | RPD (%) | Recovery Limits (%) |  |
| EA005P: pH by PC Titrator (QC Lot: 1842263)           |                  |                                                                   |                                   |      |         |                 |                  |         |                     |  |
| ES1113201-001                                         | Anonymous        | EA005-P: pH Value                                                 | ---                               | 0.01 | pH Unit | 9.15            | 9.13             | 0.2     | 0% - 20%            |  |
| ES1113306-001                                         | Anonymous        | EA005-P: pH Value                                                 | ---                               | 0.01 | pH Unit | 4.22            | 4.45             | 5.3     | 0% - 20%            |  |
| EA010P: Conductivity by PC Titrator (QC Lot: 1842262) |                  |                                                                   |                                   |      |         |                 |                  |         |                     |  |
| ES1113201-001                                         | Anonymous        | EA010-P: Electrical Conductivity @ 25°C                           | ---                               | 1    | µS/cm   | 4200            | 4190             | 0.3     | 0% - 20%            |  |
| ES1113306-001                                         | Anonymous        | EA010-P: Electrical Conductivity @ 25°C                           | ---                               | 1    | µS/cm   | 208             | 207              | 0.5     | 0% - 20%            |  |
| EA015: Total Dissolved Solids (QC Lot: 1846302)       |                  |                                                                   |                                   |      |         |                 |                  |         |                     |  |
| ES1113202-001                                         | Anonymous        | EA015H: Total Dissolved Solids @180°C                             | GIS-210-010                       | 5    | mg/L    | 14700           | 14800            | 0.4     | 0% - 20%            |  |
| ES1113308-001                                         | PT84MW4          | EA015H: Total Dissolved Solids @180°C                             | GIS-210-010                       | 5    | mg/L    | 123             | 135              | 9.0     | 0% - 20%            |  |
| ED037P: Alkalinity by PC Titrator (QC Lot: 1842265)   |                  |                                                                   |                                   |      |         |                 |                  |         |                     |  |
| ES1113245-001                                         | Anonymous        | ED037-P: Hydroxide Alkalinity as CaCO3                            | DMO-210-001                       | 1    | mg/L    | <1              | <1               | 0.0     | No Limit            |  |
|                                                       |                  | ED037-P: Carbonate Alkalinity as CaCO3                            | 3812-32-6                         | 1    | mg/L    | <1              | <1               | 0.0     | No Limit            |  |
|                                                       |                  | ED037-P: Bicarbonate Alkalinity as CaCO3                          | 71-52-3                           | 1    | mg/L    | 105             | 104              | 1.0     | 0% - 20%            |  |
|                                                       |                  | ED037-P: Total Alkalinity as CaCO3                                | ---                               | 1    | mg/L    | 105             | 104              | 1.0     | 0% - 20%            |  |
|                                                       |                  | ED037-P: Hydroxide Alkalinity as CaCO3                            | DMO-210-001                       | 1    | mg/L    | <1              | <1               | 0.0     | No Limit            |  |
|                                                       |                  | ED037-P: Carbonate Alkalinity as CaCO3                            | 3812-32-6                         | 1    | mg/L    | <1              | <1               | 0.0     | No Limit            |  |
|                                                       |                  | ED037-P: Bicarbonate Alkalinity as CaCO3                          | 71-52-3                           | 1    | mg/L    | <1              | <1               | 0.0     | No Limit            |  |
| ES1113306-003                                         | Anonymous        | ED037-P: Total Alkalinity as CaCO3                                | ---                               | 1    | mg/L    | <1              | <1               | 0.0     | No Limit            |  |
|                                                       |                  | ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 1846370) |                                   |      |         |                 |                  |         |                     |  |
|                                                       |                  | ED041G: Sulfate as SO4 - Turbidimetric                            | 14808-79-8                        | 1    | mg/L    | 112             | 107              | 5.1     | 0% - 20%            |  |
|                                                       |                  | ED041G: Sulfate as SO4 - Turbidimetric                            | 14808-79-8                        | 1    | mg/L    | 28              | 28               | 0.0     | 0% - 20%            |  |
|                                                       |                  | ED045G: Chloride Discrete analyser (QC Lot: 1846369)              |                                   |      |         |                 |                  |         |                     |  |
|                                                       |                  | ED045G: Chloride                                                  | 16887-00-6                        | 1    | mg/L    | 750             | 745              | 0.7     | 0% - 20%            |  |
|                                                       |                  | ED045G: Chloride                                                  | 16887-00-6                        | 1    | mg/L    | 143             | 141              | 1.5     | 0% - 20%            |  |
| ED093F: Dissolved Major Cations (QC Lot: 1846368)     |                  |                                                                   |                                   |      |         |                 |                  |         |                     |  |
| ES1113275-009                                         | Anonymous        | ED093F: Calcium                                                   | 7440-70-2                         | 1    | mg/L    | 22              | 23               | 0.0     | 0% - 20%            |  |
|                                                       |                  | ED093F: Magnesium                                                 | 7439-95-4                         | 1    | mg/L    | 19              | 20               | 0.0     | 0% - 20%            |  |
|                                                       |                  | ED093F: Sodium                                                    | 7440-23-5                         | 1    | mg/L    | 674             | 651              | 3.6     | 0% - 20%            |  |
|                                                       |                  | ED093F: Potassium                                                 | 7440-09-7                         | 1    | mg/L    | 2               | 2                | 0.0     | No Limit            |  |



Page : 4 of 5  
Work Order : ES1113308  
Client : URG AUSTRALIA (NSW) PTY LTD  
Project : 43137795

### Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: WATER

| Sub-Matrix: WATER                                                |             |     |       |                          | Laboratory Control Spike (LCS) Report |                    |      |                     |  |
|------------------------------------------------------------------|-------------|-----|-------|--------------------------|---------------------------------------|--------------------|------|---------------------|--|
| Method/Compound                                                  | CAS Number  | LOR | Unit  | Method Blank (MB) Report | Spike Concentration                   | Spike Recovery (%) |      | Recovery Limits (%) |  |
|                                                                  |             |     |       |                          |                                       | LCS                | Low  | High                |  |
| Method: Conductivity                                             |             |     |       |                          |                                       |                    |      |                     |  |
| EA010P: Conductivity by PC Titrator (QCLot: 1842262)             |             |     |       |                          |                                       |                    |      |                     |  |
| EA010-P: Electrical Conductivity @ 25°C                          | ---         | 1   | µS/cm | <1                       | 2000 µS/cm                            | 107                | 86.3 | 112                 |  |
| EA015: Total Dissolved Solids (QCLot: 1846302)                   |             |     |       |                          |                                       |                    |      |                     |  |
| EA015H: Total Dissolved Solids @180°C                            | GIS-210-010 | 5   | mg/L  | <5                       | 293 mg/L                              | 109                | 70   | 130                 |  |
| ED037P: Alkalinity by PC Titrator (QCLot: 1842265)               |             |     |       |                          |                                       |                    |      |                     |  |
| ED037-P: Total Alkalinity as CaCO3                               | ---         | 1   | mg/L  | ---                      | 200 mg/L                              | 89.3               | 80.2 | 108                 |  |
| ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 1846370) |             |     |       |                          |                                       |                    |      |                     |  |
| ED041G: Sulfate as SO4 - Turbidimetric                           | 14808-79-8  | 1   | mg/L  | <1                       | 25 mg/L                               | 99.3               | 70   | 130                 |  |
| ED045G: Chloride Discrete analyser (QCLot: 1846369)              |             |     |       |                          |                                       |                    |      |                     |  |
| ED045G: Chloride                                                 | 16887-00-6  | 1   | mg/L  | <1                       | 1000 mg/L                             | 97.7               | 70   | 130                 |  |
| ED093F: Dissolved Major Cations (QCLot: 1846368)                 |             |     |       |                          |                                       |                    |      |                     |  |
| ED093F: Calcium                                                  | 7440-70-2   | 1   | mg/L  | <1                       | 50 mg/L                               | 94.9               | 88   | 110                 |  |
| ED093F: Magnesium                                                | 7439-95-4   | 1   | mg/L  | <1                       | 50 mg/L                               | 96.4               | 90   | 110                 |  |
| ED093F: Sodium                                                   | 7440-23-5   | 1   | mg/L  | <1                       | 50 mg/L                               | 96.8               | 81   | 107                 |  |
| ED093F: Potassium                                                | 7440-09-7   | 1   | mg/L  | <1                       | 50 mg/L                               | 104                | 89   | 109                 |  |



Page : 5 of 5  
Work Order : ES1113308  
Client : URS AUSTRALIA (NSW) PTY LTD  
Project : 43167795

### Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: WATER

| Laboratory sample ID                                             | Client sample ID | Method: Compound                       | CAS Number | Spike Concentration | Matrix Spike (MS) Report |                     |      |
|------------------------------------------------------------------|------------------|----------------------------------------|------------|---------------------|--------------------------|---------------------|------|
|                                                                  |                  |                                        |            |                     | Spike Recovery (%)       | Recovery Limits (%) | High |
| ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 1846370) |                  |                                        |            |                     |                          |                     |      |
| ES1113275-009                                                    | Anonymous        | ED041G: Sulfate as SO4 - Turbidimetric | 14808-79-8 | 10 mg/L             | # Not Determined         | 70                  | 130  |
| ED045G: Chloride Discrete analyser (QCLot: 1846369)              |                  |                                        |            |                     |                          |                     |      |
| ES1113275-009                                                    | Anonymous        | ED045G: Chloride                       | 16887-00-6 | 250 mg/L            | 89.2                     | 70                  | 130  |



Environmental Division

**INTERPRETIVE QUALITY CONTROL REPORT**

|                     |                                                                        |                                |                                                              |
|---------------------|------------------------------------------------------------------------|--------------------------------|--------------------------------------------------------------|
| <b>Work Order</b>   | <b>: ES1113308</b>                                                     | <b>Page</b>                    | <b>: 1 of 5</b>                                              |
| <b>Client</b>       | <b>: URS AUSTRALIA (NSW) PTY LTD</b>                                   | <b>Laboratory</b>              | <b>: Environmental Division Sydney</b>                       |
| <b>Contact</b>      | <b>: MR FABIO CAROSONE</b>                                             | <b>Contact</b>                 | <b>: Angela Pavlovic</b>                                     |
| <b>Address</b>      | <b>: LEVEL 4, 407 PACIFIC HIGHWAY<br/>ARTARMON NSW, AUSTRALIA 2064</b> | <b>Address</b>                 | <b>: 277-289 Woodpark Road Smithfield NSW Australia 2164</b> |
| <b>E-mail</b>       | <b>: fabio_carosone@urscorp.com</b>                                    | <b>E-mail</b>                  | <b>: angela.pavlovic@alsenviro.com</b>                       |
| <b>Telephone</b>    | <b>: +61 892555500</b>                                                 | <b>Telephone</b>               | <b>: +61 2 8784 8523</b>                                     |
| <b>Facsimile</b>    | <b>: +61 02 89255555</b>                                               | <b>Facsimile</b>               | <b>: +61 2 8784 8500</b>                                     |
| <b>Project</b>      | <b>: 43167795</b>                                                      | <b>QC Level</b>                | <b>: NEPM 1999 Schedule B(3) and ALS QCS3 requirement</b>    |
| <b>Site</b>         | <b>: ---</b>                                                           | <b>Date Samples Received</b>   | <b>: 22-JUN-2011</b>                                         |
| <b>C-O-C number</b> | <b>: ---</b>                                                           | <b>Issue Date</b>              | <b>: 30-JUN-2011</b>                                         |
| <b>Sampler</b>      | <b>: FC</b>                                                            | <b>No. of samples received</b> | <b>: 2</b>                                                   |
| <b>Order number</b> | <b>: ---</b>                                                           | <b>No. of samples analysed</b> | <b>: 2</b>                                                   |
| <b>Quote number</b> | <b>: EN/001/10</b>                                                     |                                |                                                              |

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Interpretive Quality Control Report contains the following information:

- Analysis Holding Time Compliance
- Quality Control Parameter Frequency Compliance
- Brief Method Summaries
- Summary of Outliers



Page : 2 of 5  
 Work Order : ES1113308  
 Client : URS AUSTRALIA (NSW) PTY LTD  
 Project : 43167795

## Analysis Holding Time Compliance

The following report summarises extraction / preparation and analysis times and compares with recommended holding times, Dates reported represent first date of extraction or analysis and precludes subsequent dilutions and reruns. Information is also provided re the sample container (preservative) from which the analysis aliquot was taken. Elapsed period to analysis represents number of days from sampling where no extraction / digestion is involved or period from extraction / digestion where this is present. For composite samples, sampling date is assumed to be that of the oldest sample contributing to the composite. Sample date for laboratory produced leachates is assumed as the completion date of the leaching process. Outliers for holding time are based on USEPA SW 846, APLA, AS and NEMP (1999). A listing of breaches is provided in the Summary of Outliers.

Holding times for leachate methods (excluding elutriates) vary according to the analytes being determined on the resulting solution. For non-volatile analytes, the holding time compliance assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These soil holding times are: Organics (14 days); Mercury (28 days); Mercury (180 days). A recorded breach therefore does not guarantee a breach for all non-volatile parameters.

Matrix: WATER

Evaluation: \* = Holding time breach ; ✓ = Within holding time.

| Method<br>Container / Client Sample ID(s)                         | Sample Date | Extraction / Preparation |                    | Analysis      |                  |
|-------------------------------------------------------------------|-------------|--------------------------|--------------------|---------------|------------------|
|                                                                   |             | Date extracted           | Due for extraction | Date analysed | Due for analysis |
| <b>EA005P: pH by PC Titrator</b>                                  |             |                          |                    |               |                  |
| Clear Plastic Bottle - Natural<br>PT84MW4,                        | 22-JUN-2011 | ---                      | 22-JUN-2011        | 23-JUN-2011   | 22-JUN-2011      |
|                                                                   |             |                          |                    |               | *                |
| <b>EA010P: Conductivity by PC Titrator</b>                        |             |                          |                    |               |                  |
| Clear Plastic Bottle - Natural<br>PT84MW4,                        | 22-JUN-2011 | ---                      | 20-JUL-2011        | 23-JUN-2011   | 20-JUL-2011      |
|                                                                   |             |                          |                    |               | ✓                |
| <b>EA015: Total Dissolved Solids</b>                              |             |                          |                    |               |                  |
| Clear Plastic Bottle - Natural<br>PT84MW4,                        | 22-JUN-2011 | ---                      | ---                | 27-JUN-2011   | 29-JUN-2011      |
|                                                                   |             |                          |                    |               | ✓                |
| <b>ED037P: Alkalinity by PC Titrator</b>                          |             |                          |                    |               |                  |
| Clear Plastic Bottle - Natural<br>PT84MW4,                        | 22-JUN-2011 | ---                      | 06-JUL-2011        | 23-JUN-2011   | 06-JUL-2011      |
|                                                                   |             |                          |                    |               | ✓                |
| <b>ED041G: Sulfate (Turbidimetric) as SO<sub>4</sub> 2- by DA</b> |             |                          |                    |               |                  |
| Clear Plastic Bottle - Natural<br>PT84MW4,                        | 22-JUN-2011 | ---                      | 20-JUL-2011        | 27-JUN-2011   | 20-JUL-2011      |
|                                                                   |             |                          |                    |               | ✓                |
| <b>ED045G: Chloride Discrete analyser</b>                         |             |                          |                    |               |                  |
| Clear Plastic Bottle - Natural<br>PT84MW4,                        | 22-JUN-2011 | ---                      | 20-JUL-2011        | 27-JUN-2011   | 20-JUL-2011      |
|                                                                   |             |                          |                    |               | ✓                |
| <b>ED093F: Dissolved Major Cations</b>                            |             |                          |                    |               |                  |
| Clear Plastic Bottle - Natural<br>PT84MW4,                        | 22-JUN-2011 | ---                      | 29-JUN-2011        | 27-JUN-2011   | 29-JUN-2011      |
|                                                                   |             |                          |                    |               | ✓                |



## Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: WATER

Evaluation: \* = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

| Quality Control Sample Type                            |         | Method |         | Count  |          | Rate (%)   |  | Quality Control Specification                    |  |
|--------------------------------------------------------|---------|--------|---------|--------|----------|------------|--|--------------------------------------------------|--|
|                                                        |         | QC     | Regular | Actual | Expected | Evaluation |  |                                                  |  |
| Analytical Methods                                     |         |        |         |        |          |            |  |                                                  |  |
| Laboratory Duplicates (DUP)                            |         |        |         |        |          |            |  |                                                  |  |
| Alkalinity by PC Titrator                              | ED037-P | 2      | 12      | 16.7   | 10.0     | ✓          |  | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |  |
| Chloride by Discrete Analyser                          | ED045G  | 2      | 11      | 18.2   | 10.0     | ✓          |  | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |  |
| Conductivity by PC Titrator                            | EA010-P | 2      | 15      | 13.3   | 10.0     | ✓          |  | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |  |
| Major Cations - Dissolved                              | ED093F  | 1      | 7       | 14.3   | 10.0     | ✓          |  | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |  |
| pH by PC Titrator                                      | EA005-P | 2      | 15      | 13.3   | 10.0     | ✓          |  | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |  |
| Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser | ED041G  | 2      | 13      | 15.4   | 10.0     | ✓          |  | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |  |
| Total Dissolved Solids (High Level)                    | EA015H  | 2      | 19      | 10.5   | 10.0     | ✓          |  | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |  |
| Laboratory Control Samples (LCS)                       |         |        |         |        |          |            |  |                                                  |  |
| Alkalinity by PC Titrator                              | ED037-P | 1      | 12      | 8.3    | 5.0      | ✓          |  | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |  |
| Chloride by Discrete Analyser                          | ED045G  | 2      | 11      | 18.2   | 10.0     | ✓          |  | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |  |
| Conductivity by PC Titrator                            | EA010-P | 1      | 15      | 6.7    | 5.0      | ✓          |  | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |  |
| Major Cations - Dissolved                              | ED093F  | 1      | 7       | 14.3   | 5.0      | ✓          |  | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |  |
| Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser | ED041G  | 1      | 13      | 7.7    | 5.0      | ✓          |  | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |  |
| Total Dissolved Solids (High Level)                    | EA015H  | 1      | 19      | 5.3    | 5.0      | ✓          |  | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |  |
| Method Blanks (MB)                                     |         |        |         |        |          |            |  |                                                  |  |
| Chloride by Discrete Analyser                          | ED045G  | 1      | 11      | 9.1    | 5.0      | ✓          |  | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |  |
| Conductivity by PC Titrator                            | EA010-P | 1      | 15      | 6.7    | 5.0      | ✓          |  | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |  |
| Major Cations - Dissolved                              | ED093F  | 1      | 7       | 14.3   | 5.0      | ✓          |  | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |  |
| Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser | ED041G  | 1      | 13      | 7.7    | 5.0      | ✓          |  | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |  |
| Total Dissolved Solids (High Level)                    | EA015H  | 1      | 19      | 5.3    | 5.0      | ✓          |  | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |  |
| Matrix Spikes (MS)                                     |         |        |         |        |          |            |  |                                                  |  |
| Chloride by Discrete Analyser                          | ED045G  | 1      | 11      | 9.1    | 5.0      | ✓          |  | ALS QCS3 requirement                             |  |
| Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser | ED041G  | 1      | 13      | 7.7    | 5.0      | ✓          |  | ALS QCS3 requirement                             |  |



Page : 4 of 5  
 Work Order : ES1113308  
 Client : URS AUSTRALIA (NSW) PTY LTD  
 Project : 43167795

## Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

| Analytical Methods                                     | Method     | Matrix | Method Descriptions                                                                                                                                                                                                                                                                                                                                                    |
|--------------------------------------------------------|------------|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| pH by PC Titrator                                      | EA005-P    | WATER  | APHA 21st ed., 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)                                                                                                                                                                                                           |
| Conductivity by PC Titrator                            | EA010-P    | WATER  | APHA 21st ed., 2510 B This procedure determines conductivity by automated ISE. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)                                                                                                                                                                                                                      |
| Total Dissolved Solids (High Level)                    | EA015H     | WATER  | APHA 21st ed., 2540C A gravimetric procedure that determines the amount of 'filterable' residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)                         |
| Alkalinity by PC Titrator                              | ED037-P    | WATER  | APHA 21st ed., 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrator) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)                                                                                                                                  |
| Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser | ED041G     | WATER  | APHA 21st ed., 4500-SO4 Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2) |
| Chloride by Discrete Analyser                          | ED045G     | WATER  | APHA 21st ed., 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003    |
| Major Cations - Dissolved                              | ED093F     | WATER  | APHA 21st ed., 3120; USEPA SW 846 - 6010 The ICAPAES technique ionises the 0.45um filtered sample atoms emitting a characteristic spectrum. This spectrum is then compared against matrix matched standards for quantification. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)                                                                     |
| Ionic Balance by PCT DA and ICAPAES                    | EN055 - PG | WATER  | APHA 21st Ed. 1030F. The Ionic Balance is calculated based on the major Anions and Cations. The major anions include Alkalinity, Chloride and Sulfate which determined by PCT and DA. The Cations are determined by ICAPAES. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)                                                                        |



Page : 5 of 5  
Work Order : ES1113308  
Client : URS AUSTRALIA (NSW) PTY LTD  
Project : 43167795

## Summary of Outliers

### Outliers : Quality Control Samples

The following report highlights outliers flagged in the Quality Control (QC) Report. Surrogate recovery limits are static and based on USEPA SW846 or ALS-QWI/EN/38 (in the absence of specific USEPA limits). This report displays QC Outliers (breaches) only.

### Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: WATER

| Compound Group Name                             | Laboratory Sample ID | Client Sample ID | Analyte                        | CAS Number | Data           | Limits | Comment                                                                               |
|-------------------------------------------------|----------------------|------------------|--------------------------------|------------|----------------|--------|---------------------------------------------------------------------------------------|
| <b>Matrix Spike (MS) Recoveries</b>             |                      |                  |                                |            |                |        |                                                                                       |
| EDD41G: Sulfate (Turbidimetric) as SO4 2- by DA | ES1113275-009        | Anonymous        | Sulfate as SO4 - Turbidimetric | 14808-79-8 | Not Determined | ---    | MS recovery not determined, background level greater than or equal to 4x spike level. |

- For all matrices, no Method Blank value outliers occur.
- For all matrices, no Duplicate outliers occur.
- For all matrices, no Laboratory Control outliers occur.

### Regular Sample Surrogates

- For all regular sample matrices, no surrogate recovery outliers occur.

### Outliers : Analysis Holding Time Compliance

This report displays Holding Time breaches only. Only the respective Extraction / Preparation and/or Analysis component is/are displayed.

Matrix: WATER

| Method                          | Extraction / Preparation |                    | Analysis         |                  |
|---------------------------------|--------------------------|--------------------|------------------|------------------|
|                                 | Date extracted           | Due for extraction | Date analysed    | Due for analysis |
| Container / Client Sample ID(s) | Date extracted           |                    | Due for analysis |                  |
| EA005P: pH by PC Titrator       | ---                      |                    | ---              |                  |
| Clear Plastic Bottle - Natural  | ---                      |                    | ---              |                  |
| PT84MW4,                        | ---                      |                    | ---              |                  |
| PT84MW1                         | ---                      |                    | ---              |                  |
|                                 | 23-JUN-2011              |                    | 22-JUN-2011      |                  |
|                                 | ---                      |                    | 1                |                  |

### Outliers : Frequency of Quality Control Samples

The following report highlights breaches in the Frequency of Quality Control Samples.

- No Quality Control Sample Frequency Outliers exist.

30/b

Sheet of

# CHAIN OF CUSTODY FORM

|                                                                                                                                                                            |       |                                                                                                                                     |  |                                                                                    |  |                                                                                                                                                                                                                                                              |  |      |      |       |   |              |       |              |  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------------------------------------------------------------------------------------------------------------------------------------|--|------------------------------------------------------------------------------------|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|------|------|-------|---|--------------|-------|--------------|--|
| <b>THIS COLUMN FOR LAB USE ONLY</b><br>Job Code:                                                                                                                           |       | <b>FROM:</b><br>URS (AUSTRALIA)<br>ACN 000 691 690<br>116 Miller Street<br>North Sydney NSW 2060<br>PH: 87848555                    |  | <b>TO:</b><br>ALS<br>277-289 Woodpark Road<br>SMITHFIELD NSW 2164<br>Fax: 87848500 |  | <b>Container Size, Type, Preservative and Analysis</b><br><table border="1"> <tr> <td>Size</td> <td>1000</td> </tr> <tr> <td>Type*</td> <td>P</td> </tr> <tr> <td>Label Colour</td> <td>green</td> </tr> <tr> <td>Preservative</td> <td></td> </tr> </table> |  | Size | 1000 | Type* | P | Label Colour | green | Preservative |  |
| Size                                                                                                                                                                       | 1000  |                                                                                                                                     |  |                                                                                    |  |                                                                                                                                                                                                                                                              |  |      |      |       |   |              |       |              |  |
| Type*                                                                                                                                                                      | P     |                                                                                                                                     |  |                                                                                    |  |                                                                                                                                                                                                                                                              |  |      |      |       |   |              |       |              |  |
| Label Colour                                                                                                                                                               | green |                                                                                                                                     |  |                                                                                    |  |                                                                                                                                                                                                                                                              |  |      |      |       |   |              |       |              |  |
| Preservative                                                                                                                                                               |       |                                                                                                                                     |  |                                                                                    |  |                                                                                                                                                                                                                                                              |  |      |      |       |   |              |       |              |  |
| <b>Due Date:</b>                                                                                                                                                           |       | <b>Project No:</b> 43187795<br><b>Project Manager:</b> F. Carosone<br><b>Signature(s):</b> <i>Fabio Carosone</i><br><b>Checked:</b> |  | <b>Sample(s):</b> Fabio Carosone                                                   |  | <b>Container Identification</b><br><div style="font-size: 48px; text-align: center;">HT</div>                                                                                                                                                                |  |      |      |       |   |              |       |              |  |
| <b>Custody seal intact?</b><br>YES <input type="checkbox"/> NO <input type="checkbox"/><br><b>Sample cold?</b><br>YES <input type="checkbox"/> NO <input type="checkbox"/> |       | <b>Released for URS by:</b> F. Carosone<br><b>Date:</b>                                                                             |  | <b>Received for Laboratory by:</b><br><b>Date:</b>                                 |  | <b>Tick required analyses</b>                                                                                                                                                                                                                                |  |      |      |       |   |              |       |              |  |
| <b>Lab Identification</b><br>1<br>2                                                                                                                                        |       | <b>Date</b>                                                                                                                         |  | <b>Time</b>                                                                        |  | <b>Matrix</b><br>Water<br>Water<br>Water<br>Water<br>Water<br>Water<br>Water                                                                                                                                                                                 |  |      |      |       |   |              |       |              |  |
| <b>Sample Number</b><br>PT84MW4<br>PT84MW1                                                                                                                                 |       | <b>Comments</b>                                                                                                                     |  | <b>Total no</b><br>1<br>1                                                          |  | <b>Tick required analyses</b><br>✓<br>✓                                                                                                                                                                                                                      |  |      |      |       |   |              |       |              |  |
| <b>Remarks:</b>                                                                                                                                                            |       | <b>TOTAL</b><br>2                                                                                                                   |  | <b>2</b>                                                                           |  | <b>2</b>                                                                                                                                                                                                                                                     |  |      |      |       |   |              |       |              |  |
| <b>Courier Job No:</b>                                                                                                                                                     |       | <b>NOTE: SAMPLES MAY CONTAIN DANGEROUS AND HAZARDOUS SUBSTANCES</b>                                                                 |  |                                                                                    |  |                                                                                                                                                                                                                                                              |  |      |      |       |   |              |       |              |  |

Environmental Division  
 Sydney  
 Work Order  
**ES1113308**



Telephone : + 61-2-8784 8555

Sam 22/6/11  
 1740

25 June 2012  
Project No. 43167954

H.B.Plant Hire Pty Ltd  
PO BOX 1778  
GOSFORD NSW 2250

Attention: Martin Hogdson  
Director

Dear Martin

**Subject: Roberts Road 2012 Groundwater Management Plan**

The 2012 Groundwater Management Plan has been prepared for the site following the downloading of the two monitoring bores dataloggers and the laboratory analyses of the groundwater samples collected from those bores on the 20th June 2012.

## **1 Water Levels**

### **1.1 Monitoring bore PT84MW1**

The hydrograph in Appendix A shows that the perched water table at this site has reversed the previously observed decline since June 2008, peaking at 208.3 m AHD in March 2012, followed by a slow decline. The Maroota area has experienced a sustained period of above average rainfall since September 2010 which accounts for the rise in the watertable at this site. Bureau of Meteorology records for the weather station no. 67014, located on Old Telegraph Road, indicate that the 2011 - 2012 year total rainfall (976.8 mm) was marginally above the long term average of 910.3 mm.

As noted in past occasions, a large volume of rootlets is growing again in the screened section of this bore. As this appears to be a persistent problem will be necessary to repeat the rootlets removal at each download. This process is necessary to ensure that the data logger is repositioned at the correct depth after data download and to ensure that the sampling bailer can reach the bottom of the bore.

The location of bore PT84MW1 is shown in Figure 1.

### **1.2 Monitoring bore PT84MW4**

Monitoring Bore PT84MW4 was drilled between the 21<sup>st</sup> and 22<sup>nd</sup> December 2009 after PT84MW3 was decommissioned due to the expansion of the quarry in that area. The location of bore PT84MW4 is shown in Figure 1.

The datalogger records hydrograph covering the period December 2009 to June 2012 is presented in Appendix A. The hydrograph shows that the water level in this bore has been rising steadily since December 2010, peaking at 189.3 m AHD in May 2012 and levelling out since then.

## **2 Water Quality**

Water quality in all the bores on the site is generally fresh and, potentially, of drinking water standards. The analytical laboratory certificates are presented in Appendix C.

### **2.1 Monitoring bore PT84MW1**

Table 1 in Appendix B presents a summary of the recorded groundwater field chemical parameters measurements in the monitoring bores, and the laboratory analysis results from the sample collected during the October download event.

The Total Dissolved Salts content of the groundwater at this site shows a general decrease since records started, with fluctuations related to the rainfall pattern, as the shallow water table is readily recharged by infiltrating rainfall. This is also indicated by the chemical make-up of the water, which shows a typical Chloride/Sodium character.

#### **2.1.1 Monitoring bore PT84MW4**

The groundwater sample from this bore indicates a groundwater of similar character to that from bore PT84MW1, with minor differences due to the perched watertable nature in Bore PT84MW1.

## **3 Conclusions**

The above data indicate that the quarry operation does not have a negative impact upon the surrounding environment. No dewatering is carried out at the site and the water level in the pond at the base of the quarry, which previous studies have proved to be a window in the water table, has remained constant.

I trust the above meets with your requirements. Please, do not hesitate to contact the undersigned, should you need to discuss the matter further.

Yours sincerely  
**URS Australia Pty Ltd**



---

Fabio Carosone  
Senior Associate Hydrogeologist

Martin Hogdson  
Director  
25 June 2012  
Page 3

**Figure**



Legend

- Monitoring Wells

0 100.0  
metres

Map compiled using MapInfo StreetView Data. © 2010 MapInfo Australia Pty Ltd, URS Australia and PSMA Australia Ltd. URS Australia, MapInfo Australia or PSMA Australia do not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that these companies shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.

Source: Aerial Imagery from Google Earth Pro [2005]

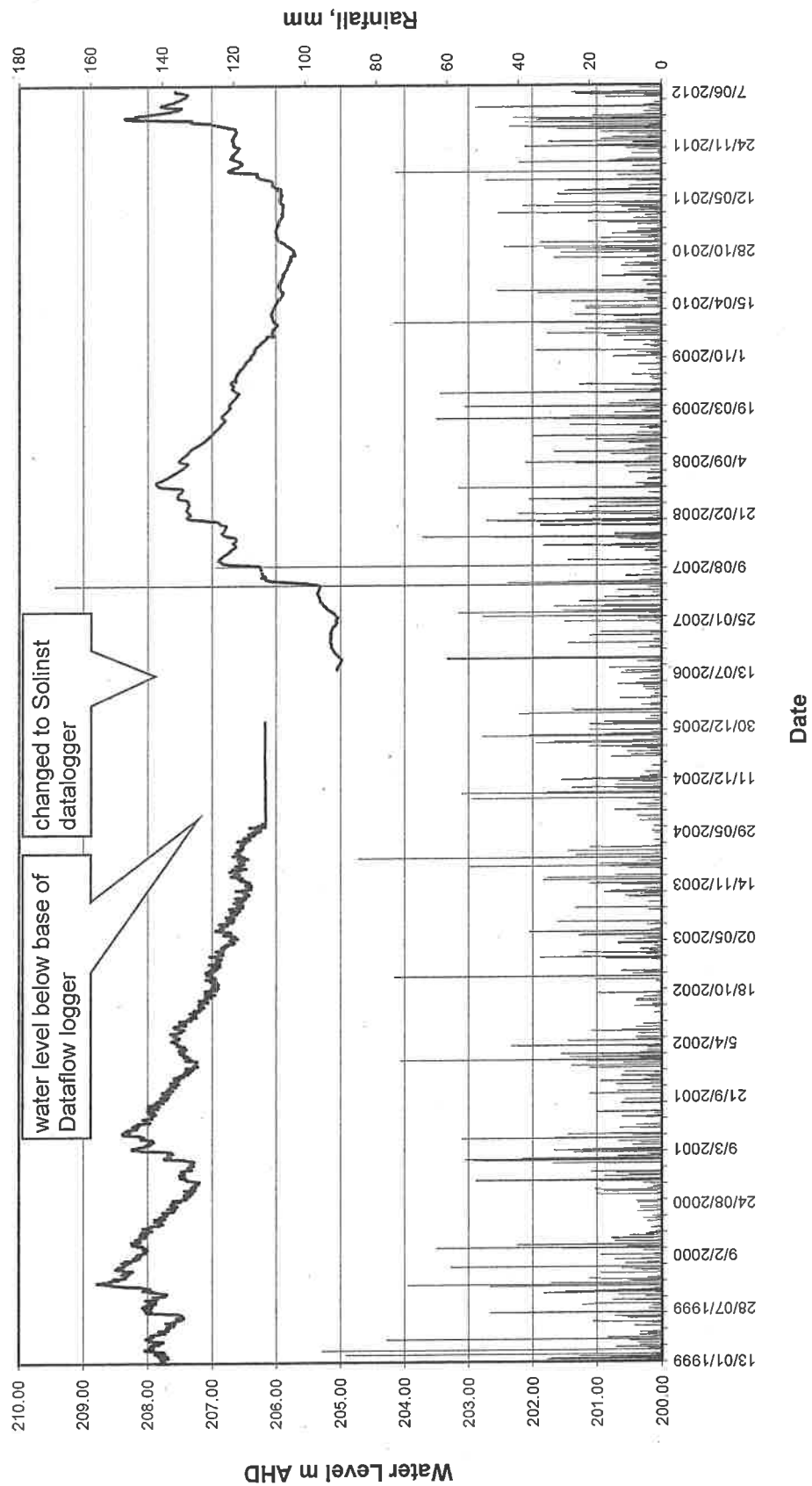
|                    |                             |                   |
|--------------------|-----------------------------|-------------------|
| Client             | Project                     | Title             |
| HB MAROOTA PTY LTD | GROUNDWATER MANAGEMENT PLAN | SITE LOCALITY MAP |
|                    | Drawn: SB                   | Figure: 1         |
|                    | Approved: FC                |                   |
|                    | Date: 05/07/2012            |                   |
|                    | Job No: 43167795            |                   |
|                    | File No: 43167795-001.wor   |                   |

## **Appendix A – Groundwater Monitoring Hydrographs**



**H.B.MAROOTTA**  
**Bore PT84MW1 Groundwater Monitoring Data**

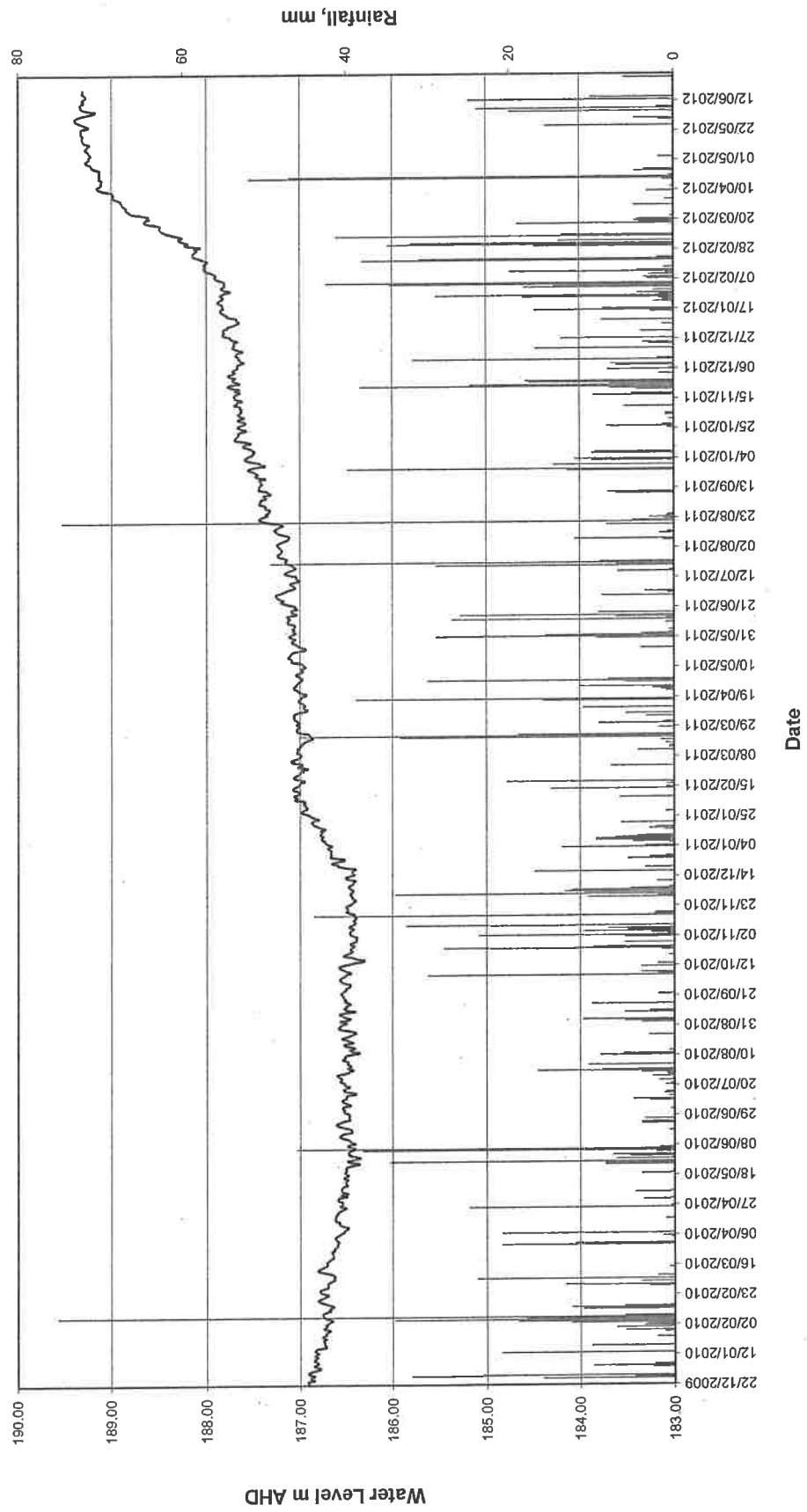
□ Rainfall, mm  
— Water Level, m AHD





**H.B.MAROOOTA**  
**Bore PT84MW4 Groundwater Monitoring Data**

□ Rainfall, mm  
— Water Level, m AHD





Martin Hogdson  
Director  
25 June 2012  
Page 5

## Appendix B – Water Quality Data and Plots

TABLE 1 -

## H.B. MAROOTA. FIELD MEASUREMENTS AND LABORATORY ANALYSES

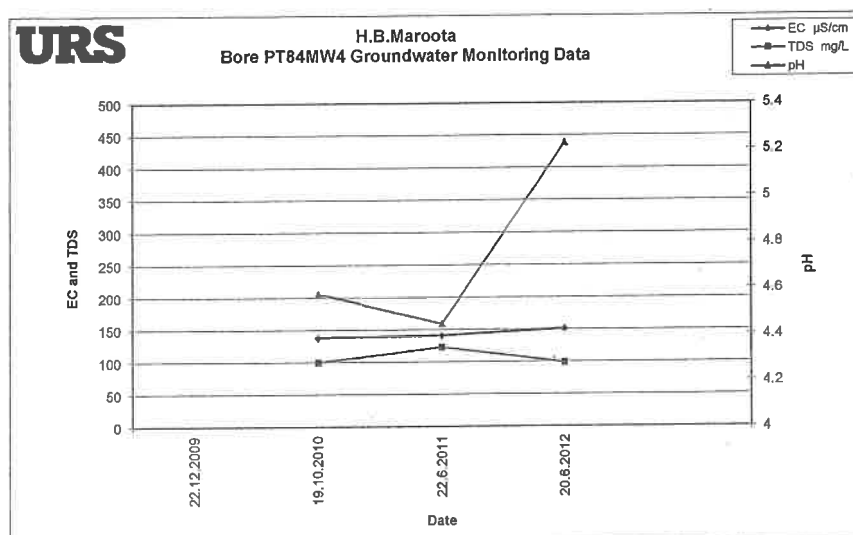
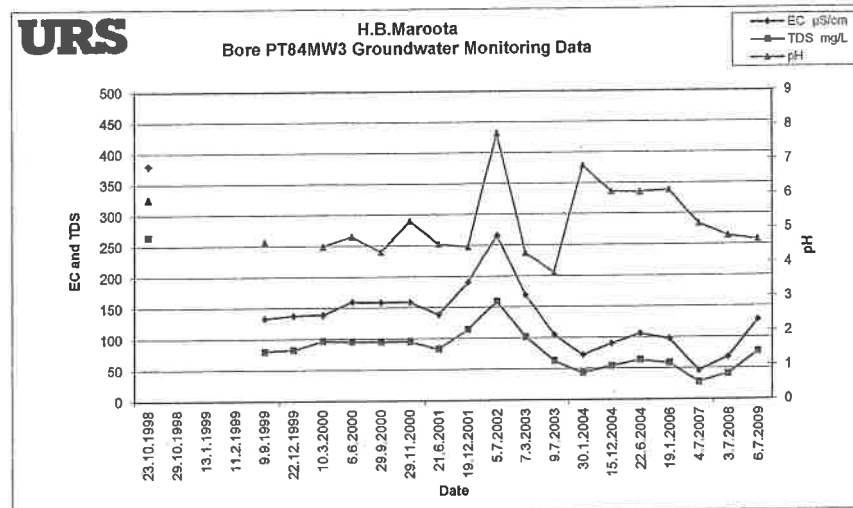
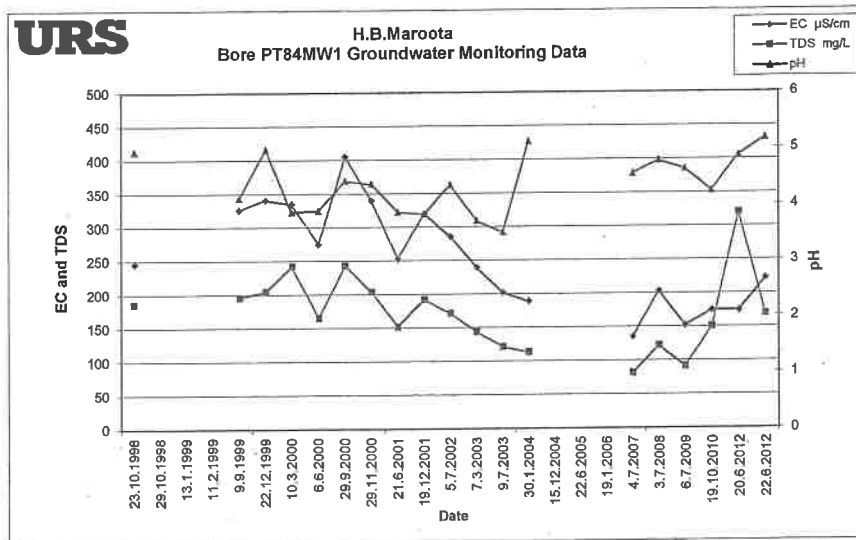
| Bore    | Aquifer | Date       | pH   | EC<br>µS/cm | TDS<br>mg/L | Ca<br>mg/L            | Mg<br>mg/L            | Na<br>mg/L | K<br>mg/L | Cl<br>mg/L | HCO3<br>mg/L | SO4<br>mg/L | SWL<br>m b.TOC | TOC<br>m AHD | SWL<br>m AHD |  |
|---------|---------|------------|------|-------------|-------------|-----------------------|-----------------------|------------|-----------|------------|--------------|-------------|----------------|--------------|--------------|--|
| PT84MW1 | M.S.    | 23.10.1998 | 4.96 | 246         | 186         | 3                     | 9                     | 27         | 3         | 50         | 4            | 3           | 5.05           | 214.24       | 209.19       |  |
| PT84MW1 | M.S.    | 29.10.1998 |      |             |             |                       |                       |            |           |            |              |             | 6.15           | 214.24       | 208.09       |  |
| PT84MW1 | M.S.    | 13.1.1999  |      |             |             |                       |                       |            |           |            |              |             | 6.43           | 214.24       | 207.81       |  |
| PT84MW1 | M.S.    | 11.2.1999  |      |             |             |                       |                       |            |           |            |              |             | 6.51           | 214.24       | 207.73       |  |
| PT84MW1 | M.S.    | 9.9.1999   | 4.13 | 326         | 196         |                       |                       |            |           |            |              |             | 6.37           | 214.24       | 207.87       |  |
| PT84MW1 | M.S.    | 22.12.1999 | 5    | 341         | 205         |                       |                       |            |           |            |              |             | 6.00           | 214.24       | 208.24       |  |
| PT84MW1 | M.S.    | 10.3.2000  | 3.88 | 335         | 242         |                       |                       |            |           |            |              |             | 5.52           | 214.24       | 208.72       |  |
| PT84MW1 | M.S.    | 6.6.2000   | 3.90 | 275         | 165         |                       |                       |            |           |            |              |             | 6.33           | 214.24       | 207.91       |  |
| PT84MW1 | M.S.    | 29.9.2000  | 4.44 | 405         | 243         |                       |                       |            |           |            |              |             | 6.81           | 214.24       | 207.43       |  |
| PT84MW1 | M.S.    | 29.11.2000 | 4.38 | 340         | 204         |                       |                       |            |           |            |              |             | 6.80           | 214.24       | 207.44       |  |
| PT84MW1 | M.S.    | 21.6.2001  | 3.88 | 253         | 152         |                       |                       |            |           |            |              |             | 6.09           | 214.24       | 208.15       |  |
| PT84MW1 | M.S.    | 19.12.2001 | 3.84 | 320         | 192         |                       |                       |            |           |            |              |             | 6.78           | 214.24       | 207.46       |  |
| PT84MW1 | M.S.    | 5.7.2002   | 4.36 | 286         | 172         |                       |                       |            |           |            |              |             | 6.77           | 214.24       | 207.47       |  |
| PT84MW1 | M.S.    | 7.3.2003   | 3.72 | 240         | 144         |                       |                       |            |           |            |              |             | 7.38           | 214.24       | 206.86       |  |
| PT84MW1 | M.S.    | 9.7.2003   | 3.51 | 202         | 121         |                       |                       |            |           |            |              |             | 7.52           | 214.24       | 206.72       |  |
| PT84MW1 | M.S.    | 30.1.2004  | 5.13 | 189         | 113         |                       |                       |            |           |            |              |             | 7.60           | 214.24       | 206.64       |  |
| PT84MW1 | M.S.    | 15.12.2004 |      |             |             |                       |                       |            |           |            |              |             | 8.07           | 214.24       | 206.17       |  |
| PT84MW1 | M.S.    | 22.6.2005  |      |             |             | dry                   |                       |            |           |            |              |             |                |              |              |  |
| PT84MW1 | M.S.    | 19.1.2006  |      |             |             | dry                   |                       |            |           |            |              |             |                |              |              |  |
| PT84MW1 | M.S.    | 4.7.2007   | 4.55 | 135         | 81          |                       |                       |            |           |            |              |             | 7.96           | 214.24       | 206.28       |  |
| PT84MW1 | M.S.    | 3.7.2008   | 4.78 | 203         | 122         |                       |                       |            |           |            |              |             | 6.42           | 214.24       | 207.82       |  |
| PT84MW1 | M.S.    | 6.7.2009   | 4.63 | 152         | 91          |                       |                       |            |           |            |              |             | 7.60           | 215.24       | 207.64       |  |
| PT84MW1 | M.S.    | 19.10.2010 | 4.24 | 174         | 150         | 1                     | 6                     | 12         | 2         | 30         | 3.6          | 4           | 8.5            | 215.24       | 206.74       |  |
| PT84MW1 | M.S.    | 20.6.2012  | 4.87 | 174         | 320         | 1                     | 5                     | 13         | 6         | 31         | <1           | 8           | 8.1            | 215.24       | 207.14       |  |
| PT84MW1 | M.S.    | 22.6.2012  | 5.18 | 222         | 169         | 5                     | 5                     | 19         | 2         | 143        | 4.8          | 8           | 6.47           | 215.24       | 208.77       |  |
| Average |         |            |      | 273         | 169         |                       | 1                     |            |           |            |              |             |                |              |              |  |
| PT84MW2 | M.S.    | 23.10.1998 |      |             |             |                       |                       |            |           |            |              |             | 25.00          | 227.63       | 202.63       |  |
| PT84MW2 | M.S.    | 29.10.1998 |      |             |             |                       |                       |            |           |            |              |             | 25.35          | 227.63       | 202.28       |  |
| PT84MW2 | M.S.    | 13.1.1999  |      |             |             |                       |                       |            |           |            |              |             | 25.43          | 227.63       | 202.20       |  |
| PT84MW2 | M.S.    | 11.2.1999  |      |             |             |                       |                       |            |           |            |              |             | 25.49          | 227.63       | 202.14       |  |
| PT84MW2 | M.S.    | 9.9.1999   |      |             |             |                       |                       |            |           |            |              |             | 25.43          | 227.63       | 202.20       |  |
| PT84MW2 | M.S.    | 22.12.1999 |      |             |             |                       |                       |            |           |            |              |             |                | 227.63       |              |  |
| PT84MW2 | M.S.    | 10.3.2000  | 6.10 | 543         | 530         |                       |                       |            |           |            |              |             | 24.55          | 227.63       | 203.08       |  |
| PT84MW2 |         |            |      |             |             | no longer operational |                       |            |           |            |              |             |                |              |              |  |
| PT84MW3 | M.S.    | 23.10.1998 | 5.88 | 381         | 266         | <1                    | 2                     | 79         | 1         | 9          | 14           | 9           | 19.61          | 203.25       | 183.64       |  |
| PT84MW3 | M.S.    | 29.10.1998 |      |             |             |                       |                       |            |           |            |              |             | 18.84          | 203.25       | 184.41       |  |
| PT84MW3 | M.S.    | 13.1.1999  |      |             |             |                       |                       |            |           |            |              |             | 20.40          | 203.25       | 182.85       |  |
| PT84MW3 | M.S.    | 11.2.1999  |      |             |             |                       |                       |            |           |            |              |             | 20.58          | 203.25       | 182.67       |  |
| PT84MW3 | M.S.    | 9.9.1999   | 4.64 | 134         | 80          |                       |                       |            |           |            |              |             | 20.43          | 203.25       | 182.82       |  |
| PT84MW3 | M.S.    | 22.12.1999 |      | 138         | 83          |                       |                       |            |           |            |              |             | 19.88          | 203.25       | 183.37       |  |
| PT84MW3 | M.S.    | 10.3.2000  | 4.51 | 139         | 97          |                       |                       |            |           |            |              |             | 19.83          | 203.25       | 183.42       |  |
| PT84MW3 | M.S.    | 6.6.2000   | 4.80 | 160         | 96          |                       |                       |            |           |            |              |             | 19.65          | 203.25       | 183.60       |  |
| PT84MW3 | M.S.    | 29.9.2000  | 4.35 | 159         | 95          |                       |                       |            |           |            |              |             | 19.82          | 203.25       | 183.43       |  |
| PT84MW3 | M.S.    | 29.11.2000 | 5.24 | 159         | 95          |                       |                       |            |           |            |              |             | 19.95          | 203.25       | 183.30       |  |
| PT84MW3 | M.S.    | 21.6.2001  | 4.57 | 139         | 83          |                       |                       |            |           |            |              |             | 19.53          | 203.25       | 183.72       |  |
| PT84MW3 | M.S.    | 19.12.2001 | 4.49 | 191         | 115         |                       |                       |            |           |            |              |             | 19.41          | 203.25       | 183.84       |  |
| PT84MW3 | M.S.    | 5.7.2002   | 7.79 | 266         | 160         |                       |                       |            |           |            |              |             | 19.17          | 203.25       | 184.08       |  |
| PT84MW3 | M.S.    | 7.3.2003   | 4.29 | 170         | 102         |                       |                       |            |           |            |              |             | 21.08          | 203.25       | 182.17       |  |
| PT84MW3 | M.S.    | 9.7.2003   | 3.72 | 105         | 63          |                       |                       |            |           |            |              |             | 21.00          | 203.25       | 182.25       |  |
| PT84MW3 | M.S.    | 30.1.2004  | 6.83 | 72          | 43          |                       |                       |            |           |            |              |             | 21.28          | 203.25       | 181.97       |  |
| PT84MW3 | M.S.    | 15.12.2004 | 6.07 | 90          | 54          |                       |                       |            |           |            |              |             | 21.44          | 203.25       | 181.81       |  |
| PT84MW3 | M.S.    | 22.6.2004  | 6.05 | 106         | 64          |                       |                       |            |           |            |              |             | 21.77          | 203.25       | 181.48       |  |
| PT84MW3 | M.S.    | 19.1.2006  | 6.10 | 98          | 59          |                       |                       |            |           |            |              |             | 21.48          | 203.25       | 181.77       |  |
| PT84MW3 | M.S.    | 4.7.2007   | 5.13 | 46          | 28          |                       |                       |            |           |            |              |             | 20.29          | 203.25       | 182.96       |  |
| PT84MW3 | M.S.    | 3.7.2008   | 4.77 | 68          | 41          |                       |                       |            |           |            |              |             | 19.32          | 203.25       | 183.93       |  |
| PT84MW3 | M.S.    | 6.7.2009   | 4.66 | 128         | 77          |                       |                       |            |           |            |              |             | 18.95          | 204.25       | 185.30       |  |
| Average |         |            |      | 145         | 89          |                       | no longer operational |            |           |            |              |             |                |              |              |  |
| PT84MW4 | M.S.    | 22.12.2009 |      |             |             |                       |                       |            |           |            |              |             | 25             | 212.00       | 187.00       |  |
| PT84MW4 | M.S.    | 19.10.2010 | 4.58 | 138         | 100         | <1                    | 3                     | 16         | <1        | 29         | 2.4          | 1           | 25.40          | 212.00       | 186.60       |  |
| PT84MW4 | M.S.    | 22.6.2011  | 4.45 | 141         | 123         | <1                    | 4                     | 14         | 1         | 26         | <1           | 2           | 24.84          | 212.00       | 187.16       |  |
| PT84MW4 | M.S.    | 20.6.2012  | 5.23 | 151         | 99          | <1                    | 3                     | 17         | 1         | 33         | 2.4          | 2           | 22.68          | 212.00       | 189.32       |  |

M.S. = Maroota Sand

97 = laboratory measurements

Elevation estimated

# H.B.Maroota - Groundwater Quality Monitoring Data Plots





Martin Hogdson  
Director  
25 June 2012  
Page 6

## Appendix C - Analytical Laboratory Certificates



Environmental Division



## CERTIFICATE OF ANALYSIS

|              |                                                                |                         |                                                       |
|--------------|----------------------------------------------------------------|-------------------------|-------------------------------------------------------|
| Work Order   | : ES1215429                                                    | Page                    | : 1 of 3                                              |
| Client       | : URS AUSTRALIA (NSW) PTY LTD                                  | Laboratory              | : Environmental Division Sydney                       |
| Contact      | : FABIO CAROSONE                                               | Contact                 | : Glenys Weeks                                        |
| Address      | : LEVEL 4, 407 PACIFIC HIGHWAY<br>ARTARMON NSW, AUSTRALIA 2064 | Address                 | : 277-289 Woodpark Road Smithfield NSW Australia 2164 |
| E-mail       | : fabio_carosone@urscorp.com                                   | E-mail                  | : Glenys.Weeks@alsglobal.com                          |
| Telephone    | : +61 892555500                                                | Telephone               | : +61 2 8784 8555                                     |
| Facsimile    | : +61 02 89255555                                              | Facsimile               | : +61 2 8784 8531                                     |
| Project      | : 43167954                                                     | QC Level                | : NEPM 1999 Schedule B(3) and ALS QCS3 requirement    |
| Order number | : 43167954                                                     | Date Samples Received   | : 21-JUN-2012                                         |
| C-O-C number | : ---                                                          | Issue Date              | : 28-JUN-2012                                         |
| Sampler      | : FC                                                           | No. of samples received | : 2                                                   |
| Site         | : ---                                                          | No. of samples analysed | : 2                                                   |
| Quote number | : EN/001/11                                                    |                         |                                                       |

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



NATA Accredited Laboratory 825

Accredited for compliance with  
ISO/IEC 17025.

WORLD RECOGNISED  
ACCREDITATION

### Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

| Signatories      | Position                 | Accreditation Category |
|------------------|--------------------------|------------------------|
| Ankit Joshi      | Inorganic Chemist        | Sydney Inorganics      |
| Celine Conceicao | Senior Spectroscopist    | Sydney Inorganics      |
| Sarah Millington | Senior Inorganic Chemist | Sydney Inorganics      |

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Page  
Work Order  
Client  
Project

: 2 of 3  
: ES1215429  
: URS AUSTRALIA (NSW) PTY LTD  
: 43167954



### General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Key :

CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting



## Analytical Results

Sub-Matrix: WATER

| Compound                                                    | CAS Number  |  | LOR     |  | Unit    |  | Client sample ID |  | Client sampling date / time |  |
|-------------------------------------------------------------|-------------|--|---------|--|---------|--|------------------|--|-----------------------------|--|
|                                                             | PT84MW4     |  | PT84MW1 |  | PT84MW1 |  | PT84MW1          |  | PT84MW1                     |  |
| EA005P: pH by PC Titrator                                   | ---         |  | 0.01    |  | pH Unit |  | 5.23             |  | 5.18                        |  |
| EA010P: Conductivity by PC Titrator                         | ---         |  | 1       |  | µS/cm   |  | 151              |  | 222                         |  |
| EA015: Total Dissolved Solids                               | ---         |  | 10      |  | mg/L    |  | 99               |  | 169                         |  |
| Total Dissolved Solids @180°C                               | GIS-210-010 |  | 10      |  | mg/L    |  | 99               |  | 169                         |  |
| ED037P: Alkalinity by PC Titrator                           | ---         |  | 1       |  | mg/L    |  | <1               |  | <1                          |  |
| Hydroxide Alkalinity as CaCO <sub>3</sub>                   | DMO-210-001 |  | 1       |  | mg/L    |  | <1               |  | <1                          |  |
| Carbonate Alkalinity as CaCO <sub>3</sub>                   | 3812-32-6   |  | 1       |  | mg/L    |  | <1               |  | <1                          |  |
| Bicarbonate Alkalinity as CaCO <sub>3</sub>                 | 71-52-3     |  | 1       |  | mg/L    |  | 2                |  | 4                           |  |
| Total Alkalinity as CaCO <sub>3</sub>                       | ---         |  | 1       |  | mg/L    |  | 2                |  | 4                           |  |
| ED041G: Sulfate (Turbidimetric) as SO <sub>4</sub> 2- by DA | ---         |  | 1       |  | mg/L    |  | 2                |  | 8                           |  |
| Sulfate as SO <sub>4</sub> - Turbidimetric                  | 14808-79-8  |  | 1       |  | mg/L    |  | 2                |  | 8                           |  |
| ED045G: Chloride Discrete analyser                          | ---         |  | 1       |  | mg/L    |  | 33               |  | 43                          |  |
| Chloride                                                    | 16887-00-6  |  | 1       |  | mg/L    |  | 33               |  | 43                          |  |
| ED093F: Dissolved Major Cations                             | ---         |  | 1       |  | mg/L    |  | <1               |  | 5                           |  |
| Calcium                                                     | 7440-70-2   |  | 1       |  | mg/L    |  | <1               |  | 5                           |  |
| Magnesium                                                   | 7439-95-4   |  | 1       |  | mg/L    |  | 3                |  | 5                           |  |
| Sodium                                                      | 7440-23-5   |  | 1       |  | mg/L    |  | 17               |  | 19                          |  |
| Potassium                                                   | 7440-09-7   |  | 1       |  | mg/L    |  | 1                |  | 2                           |  |
| EN055: Ionic Balance                                        | ---         |  | 0.01    |  | meq/L   |  | 1.01             |  | 1.46                        |  |
| Total Anions                                                | ---         |  | 0.01    |  | meq/L   |  | 1.01             |  | 1.54                        |  |
| Total Cations                                               | ---         |  | 0.01    |  | meq/L   |  | 1.01             |  | 1.54                        |  |



Environmental Division



## QUALITY CONTROL REPORT

|              |                                                                |                         |                                                       |
|--------------|----------------------------------------------------------------|-------------------------|-------------------------------------------------------|
| Work Order   | : ES1215429                                                    | Page                    | : 1 of 5                                              |
| Client       | : URS AUSTRALIA (NSW) PTY LTD                                  | Laboratory              | : Environmental Division Sydney                       |
| Contact      | : FABIO CAROSONE                                               | Contact                 | : Glenyss Weeks                                       |
| Address      | : LEVEL 4, 407 PACIFIC HIGHWAY<br>ARTARMON NSW, AUSTRALIA 2064 | Address                 | : 277-289 Woodpark Road Smithfield NSW Australia 2164 |
| E-mail       | : fabio_carosone@urscorp.com                                   | E-mail                  | : Glenyss.Weeks@alsglobal.com                         |
| Telephone    | : +61 89255500                                                 | Telephone               | : +61 2 8784 8555                                     |
| Facsimile    | : +61 02 89255555                                              | Facsimile               | : +61 2 8784 8531                                     |
| Project      | : 43167954                                                     | QC Level                | : NEPM 1999 Schedule B(3) and ALS QCS3 requirement    |
| Site         | : —                                                            |                         |                                                       |
| C-O-C number | : —                                                            | Date Samples Received   | : 21-JUN-2012                                         |
| Sampler      | : FC                                                           | Issue Date              | : 28-JUN-2012                                         |
| Order number | : 43167954                                                     | No. of samples received | : 2                                                   |
| Quote number | : EN/001/11                                                    | No. of samples analysed | : 2                                                   |

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits



NATA Accredited Laboratory 825

Accredited for compliance with  
ISO/IEC 17025.

WORLD RECOGNISED  
ACCREDITATION

### Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

| Signatories      | Position                 | Accreditation Category |
|------------------|--------------------------|------------------------|
| Ankit Joshi      | Inorganic Chemist        | Sydney Inorganics      |
| Celine Conceicao | Senior Spectroscopist    | Sydney Inorganics      |
| Sarah Millington | Senior Inorganic Chemist | Sydney Inorganics      |

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Page : 2 of 5  
Work Order : ES1215429  
Client : URS AUSTRALIA (NSW) PTY LTD  
Project : 43167854

### General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key :      Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot  
         CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.  
         LOR = Limit of reporting  
         RPD = Relative Percentage Difference  
         # = Indicates failed QC



## Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR:- No Limit; Result between 10 and 20 times LOR:- 0% - 50%; Result > 20 times LOR:- 0% - 20%.

| Sub-Matrix: WATER                                                 |                  |                                          |             |      |         |                 |                  |         |                                   |  |  |
|-------------------------------------------------------------------|------------------|------------------------------------------|-------------|------|---------|-----------------|------------------|---------|-----------------------------------|--|--|
| Laboratory sample ID                                              | Client sample ID | Method: Compound                         | CAS Number  | LOR  | Unit    | Original Result | Duplicate Result | RPD (%) | Laboratory Duplicate (DUP) Report |  |  |
| EA005P: pH by PC Titrator (QC Lot: 2368163)                       |                  |                                          |             |      |         |                 |                  |         |                                   |  |  |
| ES1215429-001                                                     | PT84MMW4         | EA005-P: pH Value                        | ---         | 0.01 | pH Unit | 5.23            | 5.87             | 11.5    | 0% - 20%                          |  |  |
| ES1215430-001                                                     | Anonymous        | EA005-P: pH Value                        | ---         | 0.01 | pH Unit | 4.65            | 4.37             | 6.2     | 0% - 20%                          |  |  |
| EA010P: Conductivity by PC Titrator (QC Lot: 2368162)             |                  |                                          |             |      |         |                 |                  |         |                                   |  |  |
| ES1215429-001                                                     | PT84MMW4         | EA010-P: Electrical Conductivity @ 25°C  | ---         | 1    | µS/cm   | 151             | 156              | 3.2     | 0% - 20%                          |  |  |
| ES1215430-001                                                     | Anonymous        | EA010-P: Electrical Conductivity @ 25°C  | ---         | 1    | µS/cm   | 100             | 99               | 0.0     | 0% - 20%                          |  |  |
| EA015: Total Dissolved Solids (QC Lot: 2371886)                   |                  |                                          |             |      |         |                 |                  |         |                                   |  |  |
| EP1205027-001                                                     | Anonymous        | EA015H: Total Dissolved Solids @180°C    | GIS-210-010 | 10   | mg/L    | 890             | 852              | 4.4     | 0% - 20%                          |  |  |
| ES1215213-011                                                     | Anonymous        | EA015H: Total Dissolved Solids @180°C    | GIS-210-010 | 10   | mg/L    | 368             | 368              | 0.0     | 0% - 20%                          |  |  |
| EA015: Total Dissolved Solids (QC Lot: 2371887)                   |                  |                                          |             |      |         |                 |                  |         |                                   |  |  |
| ES1215503-001                                                     | Anonymous        | EA015H: Total Dissolved Solids @180°C    | GIS-210-010 | 10   | mg/L    | 4900            | 5080             | 3.6     | 0% - 20%                          |  |  |
| ES1215560-003                                                     | Anonymous        | EA015H: Total Dissolved Solids @180°C    | GIS-210-010 | 10   | mg/L    | 288             | 282              | 2.1     | 0% - 20%                          |  |  |
| ED037P: Alkalinity by PC Titrator (QC Lot: 2368161)               |                  |                                          |             |      |         |                 |                  |         |                                   |  |  |
| ES1215429-001                                                     | PT84MMW4         | ED037-P: Hydroxide Alkalinity as CaCO3   | DMO-210-001 | 1    | mg/L    | <1              | <1               | 0.0     | No Limit                          |  |  |
|                                                                   |                  | ED037-P: Carbonate Alkalinity as CaCO3   | 3812-32-6   | 1    | mg/L    | <1              | <1               | 0.0     | No Limit                          |  |  |
|                                                                   |                  | ED037-P: Bicarbonate Alkalinity as CaCO3 | 71-52-3     | 1    | mg/L    | 2               | 9                | 128     | No Limit                          |  |  |
|                                                                   |                  | ED037-P: Total Alkalinity as CaCO3       | ---         | 1    | mg/L    | 2               | 9                | 128     | No Limit                          |  |  |
| ES1215430-001                                                     | Anonymous        | ED037-P: Hydroxide Alkalinity as CaCO3   | DMO-210-001 | 1    | mg/L    | <1              | <1               | 0.0     | No Limit                          |  |  |
|                                                                   |                  | ED037-P: Carbonate Alkalinity as CaCO3   | 3812-32-6   | 1    | mg/L    | <1              | <1               | 0.0     | No Limit                          |  |  |
|                                                                   |                  | ED037-P: Bicarbonate Alkalinity as CaCO3 | 71-52-3     | 1    | mg/L    | <1              | <1               | 0.0     | No Limit                          |  |  |
|                                                                   |                  | ED037-P: Total Alkalinity as CaCO3       | ---         | 1    | mg/L    | <1              | <1               | 0.0     | No Limit                          |  |  |
| ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2373664) |                  |                                          |             |      |         |                 |                  |         |                                   |  |  |
| ES1215391-002                                                     | Anonymous        | ED041G: Sulfate as SO4 - Turbidimetric   | 14808-79-8  | 1    | mg/L    | 155             | 152              | 1.8     | 0% - 20%                          |  |  |
| ES1215429-002                                                     | PT84MMW1         | ED041G: Sulfate as SO4 - Turbidimetric   | 14808-79-8  | 1    | mg/L    | 8               | 8                | 0.0     | No Limit                          |  |  |
| ED045G: Chloride Discrete analyser (QC Lot: 2373662)              |                  |                                          |             |      |         |                 |                  |         |                                   |  |  |
| ES1215378-001                                                     | Anonymous        | ED045G: Chloride                         | 16887-00-6  | 1    | mg/L    | 65              | 65               | 0.0     | 0% - 20%                          |  |  |
| ES1215420-003                                                     | Anonymous        | ED045G: Chloride                         | 16887-00-6  | 1    | mg/L    | 37              | 37               | 0.0     | 0% - 20%                          |  |  |
| ED093F: Dissolved Major Cations (QC Lot: 2373659)                 |                  |                                          |             |      |         |                 |                  |         |                                   |  |  |
| ES1215213-017                                                     | Anonymous        | ED093F: Calcium                          | 7440-70-2   | 1    | mg/L    | 22              | 23               | 0.0     | 0% - 20%                          |  |  |
|                                                                   |                  | ED093F: Magnesium                        | 7439-95-4   | 1    | mg/L    | 5               | 6                | 0.0     | No Limit                          |  |  |
|                                                                   |                  | ED093F: Sodium                           | 7440-23-5   | 1    | mg/L    | 18              | 18               | 0.0     | 0% - 50%                          |  |  |
|                                                                   |                  | ED093F: Potassium                        | 7440-09-7   | 1    | mg/L    | 2               | 2                | 0.0     | No Limit                          |  |  |
|                                                                   |                  | ED093F: Calcium                          | 7440-70-2   | 1    | mg/L    | 36              | 37               | 3.2     | 0% - 20%                          |  |  |
|                                                                   |                  | ED093F: Magnesium                        | 7439-95-4   | 1    | mg/L    | 39              | 40               | 2.6     | 0% - 20%                          |  |  |
| ES1215397-003                                                     | Anonymous        | ED093F: Sodium                           | 7440-23-5   | 1    | mg/L    | 18              | 18               | 0.0     | 0% - 50%                          |  |  |
|                                                                   |                  | ED093F: Potassium                        | 7440-09-7   | 1    | mg/L    | 5               | 5                | 0.0     | No Limit                          |  |  |



Page : 4 of 5  
Work Order : ES1215429  
Client : URS AUSTRALIA (NSW) PTY LTD  
Project : 43167954

### Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: WATER

| Method Blank (MB)                                                            |             | Laboratory Control Spike (LCS) Report |                     |
|------------------------------------------------------------------------------|-------------|---------------------------------------|---------------------|
| Method/Compound                                                              | CAS Number  | Result                                | Recovery Limits (%) |
|                                                                              | LOR         | Unit                                  | Low                 |
| Method: Compound                                                             |             |                                       |                     |
| EA010P: Conductivity by PC Titrator (QCLot: 2368162)                         | ---         | <1                                    | 92                  |
| EA010-P: Electrical Conductivity @ 25°C                                      | 1           | µS/cm                                 | 102                 |
| EA015: Total Dissolved Solids (QCLot: 2371886)                               |             |                                       |                     |
| EA015H: Total Dissolved Solids @180°C                                        | 10          | mg/L                                  | 70                  |
| EA015H: Total Dissolved Solids @180°C                                        | GIS-210-010 | 293 mg/L                              | 98.8                |
| EA015: Total Dissolved Solids (QCLot: 2371887)                               |             |                                       |                     |
| EA015H: Total Dissolved Solids @180°C                                        | 10          | mg/L                                  | 70                  |
| EA015H: Total Dissolved Solids @180°C                                        | GIS-210-010 | 293 mg/L                              | 99.2                |
| ED037P: Alkalinity by PC Titrator (QCLot: 2368161)                           |             |                                       |                     |
| ED037-P: Total Alkalinity as CaCO <sub>3</sub>                               | ---         | ---                                   | 75                  |
| ED037-P: Total Alkalinity as CaCO <sub>3</sub>                               | 1           | mg/L                                  | 87.0                |
| ED041G: Sulfate (Turbidimetric) as SO <sub>4</sub> 2- by DA (QCLot: 2373664) |             |                                       |                     |
| ED041G: Sulfate as SO <sub>4</sub> - Turbidimetric                           | 14808-79-8  | mg/L                                  | 77                  |
| ED041G: Sulfate as SO <sub>4</sub> - Turbidimetric                           | 1           | mg/L                                  | 101                 |
| ED045G: Chloride Discrete analyser (QCLot: 2373662)                          |             |                                       |                     |
| ED045G: Chloride                                                             | 16887-00-6  | mg/L                                  | 79                  |
| ED045G: Chloride                                                             | 1           | mg/L                                  | 99.8                |
| ED093F: Dissolved Major Cations (QCLot: 2373659)                             |             |                                       |                     |
| ED093F: Calcium                                                              | 7440-70-2   | mg/L                                  | 88                  |
| ED093F: Magnesium                                                            | 7439-95-4   | mg/L                                  | 90                  |
| ED093F: Sodium                                                               | 7440-23-5   | mg/L                                  | 81                  |
| ED093F: Potassium                                                            | 7440-09-7   | mg/L                                  | 89                  |

### Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: WATER

| Sub-Matrix: WATER                                                |                  |                                        |            |                     |                          |                     |     |
|------------------------------------------------------------------|------------------|----------------------------------------|------------|---------------------|--------------------------|---------------------|-----|
| Laboratory sample ID                                             | Client sample ID | Method: Compound                       | CAS Number | Spike Concentration | Matrix Spike (MS) Report |                     |     |
|                                                                  |                  |                                        |            |                     | Spike Recovery (%)       | Recovery Limits (%) |     |
| ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2373664) |                  |                                        |            |                     |                          |                     |     |
| ES1215391-002                                                    | Anonymous        | ED041G: Sulfate as SO4 - Turbidimetric | 14808-79-8 | 10 mg/L             | # Not Determined         | 70                  | 130 |
| ED045G: Chloride Discrete analyser (QCLot: 2373662)              |                  |                                        |            |                     |                          |                     |     |
| ES1215378-001                                                    | Anonymous        | ED045G: Chloride                       | 16887-00-6 | 250 mg/L            | 113                      | 70                  | 130 |

### Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report

The quality control term Matrix Spike (MS) and Matrix Spike Duplicate (MSD) refers to intralaboratory split samples spiked with a representative set of target analytes. The purpose of these QC parameters are to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.



Sub-Matrix: WATER

| Sub-Matrix: WATER                                                |                  |                                        |            |                                                           |                    |       |                     |      |          |               |
|------------------------------------------------------------------|------------------|----------------------------------------|------------|-----------------------------------------------------------|--------------------|-------|---------------------|------|----------|---------------|
|                                                                  |                  |                                        |            | Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report |                    |       |                     |      |          |               |
| Laboratory sample ID                                             | Client sample ID | Method: Compound                       | CAS Number | Spike Concentration                                       | Spike Recovery (%) |       | Recovery Limits (%) |      | RPDs (%) |               |
|                                                                  |                  |                                        |            |                                                           | MS                 | MSD   | Low                 | High | Value    | Control Limit |
| ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2373664) |                  |                                        |            |                                                           |                    |       |                     |      |          |               |
| ES1215391-002                                                    | Anonymous        | ED041G: Sulfate as SO4 - Turbidimetric | 14808-79-8 | 10 mg/L                                                   | # Not Determined   | ----  | 70                  | 130  | ----     | ----          |
| ED045G: Chloride Discrete analyser (QCLot: 2373662)              |                  |                                        |            |                                                           |                    |       |                     |      |          |               |
| ES1215378-001                                                    | Anonymous        | ED045G: Chloride                       | 16887-00-6 | 250 mg/L                                                  | 113                | ----- | 70                  | 130  | -----    | -----         |



Environmental Division



## INTERPRETIVE QUALITY CONTROL REPORT

|              |                                                                |                         |                                                       |
|--------------|----------------------------------------------------------------|-------------------------|-------------------------------------------------------|
| Work Order   | : ES1215429                                                    | Page                    | : 1 of 5                                              |
| Client       | : URS AUSTRALIA (NSW) PTY LTD                                  | Laboratory              | : Environmental Division Sydney                       |
| Contact      | : FABIO CAROSONE                                               | Contact                 | : Glenyss Weeks                                       |
| Address      | : LEVEL 4, 407 PACIFIC HIGHWAY<br>ARTARMON NSW, AUSTRALIA 2064 | Address                 | : 277-289 Woodpark Road Smithfield NSW Australia 2164 |
| E-mail       | : fabio_carosone@urscorp.com                                   | E-mail                  | : Glenyss.Weeks@alsglobal.com                         |
| Telephone    | : +61 89255500                                                 | Telephone               | : +61 2 8784 8555                                     |
| Facsimile    | : +61 02 89255555                                              | Facsimile               | : +61 2 8784 8531                                     |
| Project      | : 43167954                                                     | QC Level                | : NEPM 1999 Schedule B(3) and ALS QCS3 requirement    |
| Site         | :                                                              | Date Samples Received   | : 21-JUN-2012                                         |
| C-O-C number | :                                                              | Issue Date              | : 28-JUN-2012                                         |
| Sampler      | : FC                                                           | No. of samples received | : 2                                                   |
| Order number | : 43167954                                                     | No. of samples analysed | : 2                                                   |
| Quote number | : EN/001/11                                                    |                         |                                                       |

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Interpretive Quality Control Report contains the following information:

- Analysis Holding Time Compliance
- Quality Control Parameter Frequency Compliance
- Brief Method Summaries
- Summary of Outliers

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## Analysis Holding Time Compliance

The following report summarises extraction / preparation and analysis times and compares with recommended holding times. Dates reported represent first date of extraction or analysis and precludes subsequent dilutions and reruns. Information is also provided re the sample container (preservative) from which the analysis aliquot was taken. Elapsed period to analysis represents number of days from sampling where no extraction / digestion is involved or period from extraction / digestion where this is present. For composite samples, sampling date is assumed to be that of the oldest sample contributing to the composite. Sample date for laboratory produced leachates is assumed as the completion date of the leaching process. Outliers for holding time are based on USEPA SW 846, APHA, AS and NEPM (1999). A listing of breaches is provided in the Summary of Outliers.

Holding times for leachate methods (excluding elutriates) vary according to the analytes being determined on the resulting solution. For non-volatile analytes, the holding time compliance assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These soil holding times are: Organics (14 days); Mercury (28 days) & other metals (180 days). A recorded breach therefore does not guarantee a breach for all non-volatile parameters.

Matrix: WATER

Evaluation: \* = Holding time breach ; ✓ = Within holding time.

| Method<br>Container / Client Sample ID(s)                                                                         | Sample Date | Extraction / Preparation |                    | Analysis      |                  |
|-------------------------------------------------------------------------------------------------------------------|-------------|--------------------------|--------------------|---------------|------------------|
|                                                                                                                   |             | Date extracted           | Due for extraction | Date analysed | Due for analysis |
| EA005P: pH by PC Titrator<br>Clear Plastic Bottle - Natural (EA005-P)<br>PT84MW4                                  | 20-JUN-2012 | ---                      | 20-JUN-2012        | 22-JUN-2012   | 20-JUN-2012      |
| EA010P: Conductivity by PC Titrator<br>Clear Plastic Bottle - Natural (EA010-P)<br>PT84MW4                        | 20-JUN-2012 | ---                      | 18-JUL-2012        | 22-JUN-2012   | 18-JUL-2012      |
| EA015: Total Dissolved Solids<br>Clear Plastic Bottle - Natural (EA015H)<br>PT84MW4                               | 20-JUN-2012 | ---                      | ---                | 26-JUN-2012   | 27-JUN-2012      |
| ED037P: Alkalinity by PC Titrator<br>Clear Plastic Bottle - Natural (ED037-P)<br>PT84MW4                          | 20-JUN-2012 | ---                      | 04-JUL-2012        | 22-JUN-2012   | 04-JUL-2012      |
| ED041G: Sulfate (Turbidimetric) as SO <sub>4</sub> 2- by DA<br>Clear Plastic Bottle - Natural (ED041G)<br>PT84MW4 | 20-JUN-2012 | ---                      | 18-JUL-2012        | 26-JUN-2012   | 18-JUL-2012      |
| ED045G: Chloride Discrete analyser<br>Clear Plastic Bottle - Natural (ED045G)<br>PT84MW4                          | 20-JUN-2012 | ---                      | 18-JUL-2012        | 26-JUN-2012   | 18-JUL-2012      |
| ED093F: Dissolved Major Cations<br>Clear Plastic Bottle - Natural (ED093F)<br>PT84MW4                             | 20-JUN-2012 | ---                      | 27-JUN-2012        | 26-JUN-2012   | 27-JUN-2012      |



Page : 3 of 5  
 Work Order : ES1215429  
 Client : URS AUSTRALIA (NSW) PTY LTD  
 Project : 43167954

## Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(when) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: WATER

Evaluation: x = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

| Quality Control Sample Type                            |  | Method  | Count |         |        | Rate (%) |            | Quality Control Specification                    |  |
|--------------------------------------------------------|--|---------|-------|---------|--------|----------|------------|--------------------------------------------------|--|
| Analytical Methods                                     |  |         | QC    | Regular | Actual | Expected | Evaluation |                                                  |  |
| Laboratory Duplicates (DUP)                            |  |         |       |         |        |          |            |                                                  |  |
| Alkalinity by PC Titrator                              |  | ED037-P | 2     | 20      | 10.0   | 10.0     | ✓          | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |  |
| Chloride by Discrete Analyser                          |  | ED045G  | 2     | 20      | 10.0   | 10.0     | ✓          | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |  |
| Conductivity by PC Titrator                            |  | EA010-P | 2     | 20      | 10.0   | 10.0     | ✓          | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |  |
| Major Cations - Dissolved                              |  | ED093F  | 2     | 20      | 10.0   | 10.0     | ✓          | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |  |
| pH by PC Titrator                                      |  | EA005-P | 2     | 20      | 10.0   | 10.0     | ✓          | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |  |
| Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser |  | ED041G  | 2     | 20      | 10.0   | 10.0     | ✓          | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |  |
| Total Dissolved Solids (High Level)                    |  | EA015H  | 4     | 39      | 10.3   | 10.0     | ✓          | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |  |
| Laboratory Control Samples (LCS)                       |  |         |       |         |        |          |            |                                                  |  |
| Alkalinity by PC Titrator                              |  | ED037-P | 1     | 20      | 5.0    | 5.0      | ✓          | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |  |
| Chloride by Discrete Analyser                          |  | ED045G  | 2     | 20      | 10.0   | 10.0     | ✓          | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |  |
| Conductivity by PC Titrator                            |  | EA010-P | 1     | 20      | 5.0    | 5.0      | ✓          | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |  |
| Major Cations - Dissolved                              |  | ED093F  | 1     | 20      | 5.0    | 5.0      | ✓          | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |  |
| Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser |  | ED041G  | 1     | 20      | 5.0    | 5.0      | ✓          | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |  |
| Total Dissolved Solids (High Level)                    |  | EA015H  | 4     | 39      | 10.3   | 10.0     | ✓          | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |  |
| Method Blanks (MB)                                     |  |         |       |         |        |          |            |                                                  |  |
| Chloride by Discrete Analyser                          |  | ED045G  | 1     | 20      | 5.0    | 5.0      | ✓          | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |  |
| Conductivity by PC Titrator                            |  | EA010-P | 1     | 20      | 5.0    | 5.0      | ✓          | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |  |
| Major Cations - Dissolved                              |  | ED093F  | 1     | 20      | 5.0    | 5.0      | ✓          | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |  |
| Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser |  | ED041G  | 1     | 20      | 5.0    | 5.0      | ✓          | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |  |
| Total Dissolved Solids (High Level)                    |  | EA015H  | 2     | 39      | 5.1    | 5.0      | ✓          | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |  |
| Matrix Spikes (MS)                                     |  |         |       |         |        |          |            |                                                  |  |
| Chloride by Discrete Analyser                          |  | ED045G  | 1     | 20      | 5.0    | 5.0      | ✓          | ALS QCS3 requirement                             |  |
| Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser |  | ED041G  | 1     | 20      | 5.0    | 5.0      | ✓          | ALS QCS3 requirement                             |  |



Page : 4 of 5  
 Work Order : ES1215429  
 Client : URS AUSTRALIA (NSW) PTY LTD  
 Project : 43167954

## Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

| Analytical Methods                                     | Method     | Matrix | Method Descriptions                                                                                                                                                                                                                                                                                                                                                    |
|--------------------------------------------------------|------------|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| pH by PC Titrator                                      | EA005-P    | WATER  | APHA 21st ed., 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)                                                                                                                                                                                                           |
| Conductivity by PC Titrator                            | EA010-P    | WATER  | APHA 21st ed., 2510 B This procedure determines conductivity by automated ISE. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)                                                                                                                                                                                                                      |
| Total Dissolved Solids (High Level)                    | EA015H     | WATER  | In-House, APHA 21st ed., 2540C A gravimetric procedure that determines the amount of 'filterable' residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)               |
| Alkalinity by PC Titrator                              | ED037-P    | WATER  | APHA 21st ed., 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrator) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)                                                                                                                                  |
| Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser | ED041G     | WATER  | APHA 21st ed., 4500-SO4 Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2) |
| Chloride by Discrete Analyser                          | ED045G     | WATER  | APHA 21st ed., 4500 Cl- G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride in the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003      |
| Major Cations - Dissolved                              | ED093F     | WATER  | Major Cations is determined based on APHA 21st ed., 3120; USEPA SW 846 - 6010 The ICPAES technique ionises the 0.45um filtered sample atoms emitting a characteristic spectrum. This spectrum is then compared against matrix matched standards for quantification. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)                                 |
|                                                        |            |        | Sodium Absorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWL-EN/ED093F. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)                                                                                                                                                                                     |
|                                                        |            |        | Total Hardness is calculated based on APHA 21st ed., 2340 B. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)                                                                                                                                                                                                                                        |
| Ionic Balance by PCT DA and Turbi SO4 DA               | EN055 - PG | WATER  | APHA 21st Ed. 1030F. The Ionic Balance is calculated based on the major Anions and Cations. The major anions include Alkalinity, Chloride and Sulfate which determined by PCT and DA. The Cations are determined by Turbi SO4 by DA. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)                                                                |



## Summary of Outliers

### Outliers : Quality Control Samples

The following report highlights outliers flagged in the Quality Control (QC) Report. Surrogate recovery limits are static and based on USEPA SW846 or ALS-QW/EN/38 (in the absence of specific USEPA limits). This report displays QC Outliers (breaches) only.

### Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: WATER

| Compound Group Name                             | Laboratory Sample ID | Client Sample ID | Analyte                        | CAS Number | Data           | Limits | Comment                                                                               |
|-------------------------------------------------|----------------------|------------------|--------------------------------|------------|----------------|--------|---------------------------------------------------------------------------------------|
| <b>Matrix Spike (MS) Recoveries</b>             |                      |                  |                                |            |                |        |                                                                                       |
| ED041G: Sulfate (Turbidimetric) as SO4 2- by DA | ES1215391-002        | Anonymous        | Sulfate as SO4 - Turbidimetric | 14808-79-8 | Not Determined | ---    | MS recovery not determined, background level greater than or equal to 4x spike level. |

- For all matrices, no Method Blank value outliers occur.
- For all matrices, no Duplicate outliers occur.
- For all matrices, no Laboratory Control outliers occur.

### Regular Sample Surrogates

- For all regular sample matrices, no surrogate recovery outliers occur.

### Outliers : Analysis Holding Time Compliance

This report displays Holding Time breaches only. Only the respective Extraction / Preparation and/or Analysis component is/are displayed.

Matrix: WATER

| Method                                  | Extraction / Preparation |                    | Analysis      |                  |
|-----------------------------------------|--------------------------|--------------------|---------------|------------------|
|                                         | Date extracted           | Due for extraction | Date analysed | Due for analysis |
| <b>EA005P: pH by PC Titrator</b>        |                          |                    |               |                  |
| Clear Plastic Bottle - Natural PT84MW4, | ---                      | ---                | 22-JUN-2012   | 20-JUN-2012      |
| PT84MW1                                 |                          |                    |               | 2                |

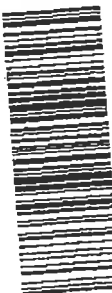
### Outliers : Frequency of Quality Control Samples

The following report highlights breaches in the Frequency of Quality Control Samples.

- No Quality Control Sample Frequency Outliers exist.

## CHAIN OF CUSTODY FORM

Sheet of

|                                                                                                                                                                            |  |                                                                                                                                  |  |                                                                                                                                                                                                                                                                |  |                                                                                                                                                                                          |  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|----------------------------------------------------------------------------------------------------------------------------------|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <b>THIS COLUMN FOR LAB USE ONLY</b><br><br>Job Code:                                                                                                                       |  | <b>FROM:</b><br>URS<br>ACN 000 691 690<br>407 Pacific Hwy<br>Adamson 2084<br><br>Ph: 8925 5500                                   |  | <b>DATE:</b> 21.6.12<br><br><b>TO:</b> ALS<br>277-289 Woodpark Road<br>Smithfield NSW 2164<br><br>Fax: 8925 5555                                                                                                                                               |  | <b>Container Size, Type, Preservative and Analysis</b><br>Container Identification                                                                                                       |  |
| <b>Due Date:</b><br><br>Project No: 43167954<br>Project Manager: Fabio Carosone<br>Agreement No:                                                                           |  | Sampler(s): Fabio Carosone<br>Signature(s): <i>Fabio Carosone</i><br>Checked:                                                    |  | 1 L<br>P<br>green<br>H2SO4<br>oil and grease                                                                                                                                                                                                                   |  | 1 L<br>G<br>purple<br>H2SO4                                                                                                                                                              |  |
| <b>Custody seal intact?</b><br>YES <input type="checkbox"/> NO <input type="checkbox"/><br><b>Sample cold?</b><br>YES <input type="checkbox"/> NO <input type="checkbox"/> |  | Released for URS by: Fabio Carosone<br>Date: 20.6.12 Time: 9.00<br>Received for Laboratory by: Frank<br>Date: 21.6.12 Time: 1420 |  | Number of containers<br>pH, EC, TDS, Ca, Mg, Na, K, Cl, HCO3, SO4                                                                                                                                                                                              |  | Environmental Division<br>Sydney<br>Work Order<br><b>ES1215432</b><br><br>Telephone : + 61-2-8784 8585 |  |
| <b>Lab identification</b><br>Date: 20.6.12 Time: 12.30 Matrix: Water<br>Sample Number: PFL3MW1                                                                             |  | Total no: 2<br>Tick required analytes: <input checked="" type="checkbox"/>                                                       |  | Total no: 2<br>Tick required analytes: <input checked="" type="checkbox"/>                                                                                                                                                                                     |  | Total no: 2<br>Tick required analytes: <input checked="" type="checkbox"/>                                                                                                               |  |
| <b>Remarks:</b>                                                                                                                                                            |  | TOTAL 2                                                                                                                          |  | 2                                                                                                                                                                                                                                                              |  | 2                                                                                                                                                                                        |  |
| <b>Courier Job No:</b>                                                                                                                                                     |  | Specify Turnaround Time:                                                                                                         |  | * Container Type and Preservative Codes: P = Neutral Plastic; N = Nitric Acid Preserved; C = Sodium Hydroxide Preserved; J = Solvent Washed Acid Rinsed Jar; S = Solvent Washed Acid Rinsed Glass Bottle; VC = Hydrochloric Acid Preserved Vial; VS = Sulfuric |  | NOTE: SAMPLES MAY CONTAIN DANGEROUS AND HAZARDOUS SUBSTANCES                                                                                                                             |  |