



**CARBON BASED ENVIRONMENTAL  
PTY LIMITED**  
ABN 74 102 920 285

**ROCLA QUARRY PRODUCTS  
CALGA QUARRY**

**ENVIRONMENTAL MONITORING**

**DUST DEPOSITION GAUGES, SURFACE AND  
GROUND WATERS AND METEOROLOGICAL  
STATION**

**JUNE 2009**

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## EXECUTIVE SUMMARY

Carbon Based Environmental is contracted by Rocla Quarry Products to conduct environmental monitoring at the Calga Sand Quarry.

The monitoring includes;

- Dust Deposition Gauges;
- Surface Waters;
- Ground Waters; and
- Meteorological Station.

This report was prepared by Carbon Based Environmental and includes the following;

- Dust Deposition results for June 2009;
- Surface Water quality results for June 2009;
- Ground Water depth and quality results for June 2009; and
- Meteorological report for June 2009.

The June 2009 dust deposition results were generally lower than May 2009. All sites, on a year to date average basis, are currently below the Air Quality Management Plan exceedence level of 3.7g/m<sup>2</sup>.month. Results were found to be representative of dust levels as determined by the Australian Standard.

Surface water samples were collected for the normal monthly sampling event on the 1 July 2009 at sites A, B, C, D and F. At the time of sample collection, there was no water discharge observed from the site. Results show generally good quality water with most sites sampled maintaining pH within the slightly acidic range, low Electrical Conductivity, low Total Dissolved Solids and Total Suspended Solids and no detectable Oil and Grease.

Groundwaters were sampled for normal monthly monitoring on 1 July 2009. Groundwater depths decreased at the majority of monitoring bores this month, indicating water moving towards the surface. pH levels generally increased slightly compared to the previous month. EC levels remained relatively steady.

The meteorological station data recovery for the month was approximately 100%. The predominant winds were from the W-WNW, with strongest winds from the WSW. Recorded rainfall on site for June was 68.4mm, lower than that recorded at the BOM Peats Ridge Station and below the Peats Ridge long-term average for June. Results are detailed below:

|  |         |
|--|---------|
| Rocla Calga Quarry                       | 68.4mm  |
| BOM Peats Ridge*                         | 79.8mm  |
| BOM Gosford*                             | 132.6mm |
| BOM Peats Ridge Long term mean for June* | 98.0mm  |

\*Data sourced from Bureau of Meteorology (BOM) website ([www.bom.gov.au](http://www.bom.gov.au))

Note: Differences in the daily rainfall readings between BOM and the Rocla station may occur due to BOM stations reporting rainfall at 9am and the Rocla station recording rainfall at midnight.

## 1.0 SAMPLING PROGRAM

Rocla Calga Quarry conducts environmental monitoring in accordance to Development Consent, DEC (EPA) licence and Environmental Management Plans. Carbon Based Environmental are contracted to undertake dust deposition gauge, surface and groundwater and meteorological monitoring for the project. Carbon Based Environmental commenced monitoring from the April 2006 monitoring period.

Dust deposition gauges are operated to the Australian Standard AS3580.10.1 “Methods for Sampling and Analysis of Ambient Air Method 10.1 Determination of Particulates—Deposited Matter—Gravimetric Method”. Sampling is undertaken every 30 +/- 2 days and each gauge is analysed for insoluble solids and ash residue. The results are reported as g/m<sup>2</sup>.month.

Surface water sites include local streams and dams. Basic analysis including pH, Electrical Conductivity, Total Suspended Solids, Total Dissolved Solids and Total Oil and Grease is conducted monthly at Sites A and F (dams), and when Sites B, C and D are flowing. Additional samples are collected when daily rainfall exceeds 50mm.

Groundwater sites are monitored at least bi-monthly for water quality and at least quarterly for water level. Groundwater monitoring loggers continuously record water levels in a selection of bores.

Meteorological monitoring is conducted at the quarry and displayed on the site computer with a real time display. Wind parameters are measured according to Australian Standard AS 2923 “Ambient Air— Guide for Measurement of Horizontal Wind for Air Quality Applications”.

The weather stations have the following sensor configuration;

- Air temperature
- Humidity
- Rainfall
- Atmospheric pressure
- Evaporation
- Solar radiation
- Wind speed
- Wind direction

Carbon Based Environmental continued to operate the monitoring equipment and utilise site collections at their existing locations.

## 2.0 MONTHLY RESULTS

### 2.1 DUST DEPOSITION GAUGES

**Table 1** displays the results for June 2009 and the project average. Results are in g/m<sup>2</sup>.month.

**Table 1: Dust Deposition results: 01-Jun-2009 to 01-Jul-2009**

| Site | Monthly Insoluble Solids | Monthly Ash Residue | Monthly Combustible Matter | Monthly Ash Residue/ Insoluble Solids % | Current Project Average Insoluble Solids |
|------|--------------------------|---------------------|----------------------------|---|--|
| CD1  | 0.3                      | 0.2                 | 0.1                        | 67                                      | 1.3                                      |
| CD2b | 1.6                      | 1.4                 | 0.2                        | 88                                      | 1.7                                      |
| CD3  | 0.1                      | 0.1                 | <0.1                       | 100                                     | 0.8                                      |
| CD4  | 0.1                      | 0.1                 | <0.1                       | 100                                     | 1.0                                      |
| CD5  | 0.1                      | <0.1                | 0.1                        | ---                                     | 0.9                                      |
| CD6  | 0.3                      | 0.1                 | 0.2                        | 33                                      | 1.1                                      |

Insoluble Solids marked with an \* indicate an excessively contaminated gauge. Contamination can include bird droppings, vegetation (such as plant matter, algae, pollen, seeds), and insects. Results in bold indicate insoluble solids levels above 3.7 g/m<sup>2</sup>.month, the Development Consent annual average amenity criteria at residential locations. Project average was calculated from the 28 October 2005 (start of the Development Consent period) from results supplied by Rocla or from the installation date of the gauges.

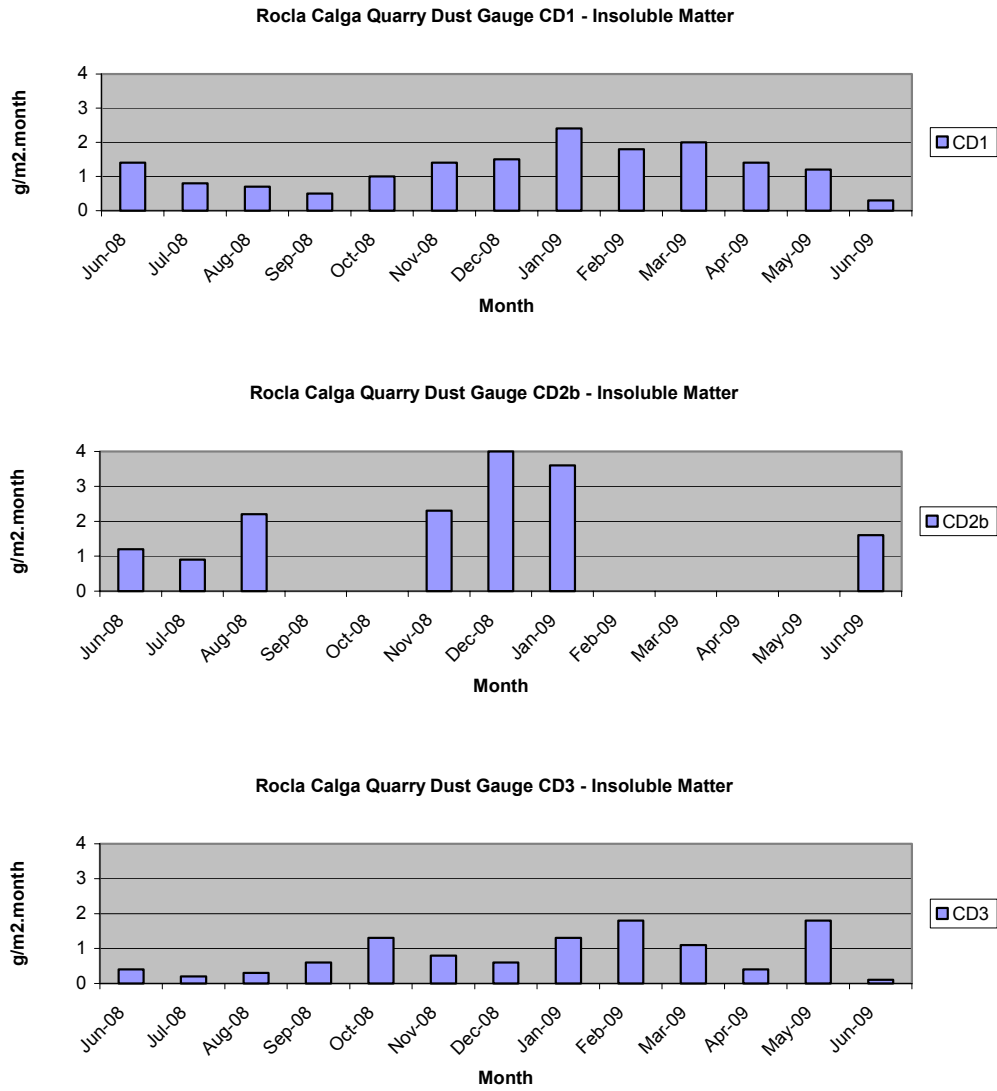
NA= Not Available.

CD1 was installed on the 1 May 2006. CD2a was discontinued at the start of August 2006 due to quarry operations “mining out” the site of the gauge. The replacement gauge, Site CD2b, was located in a position adjacent to the boundary between B. Kashouli and F. & J. Gazzana in conformance with the Air Quality Management Plan. CD4 was installed on 3 October 2006, to gauge air quality impacts to the south of the site operations, as were CD5 and CD6 which were installed on the 14 December 2006.

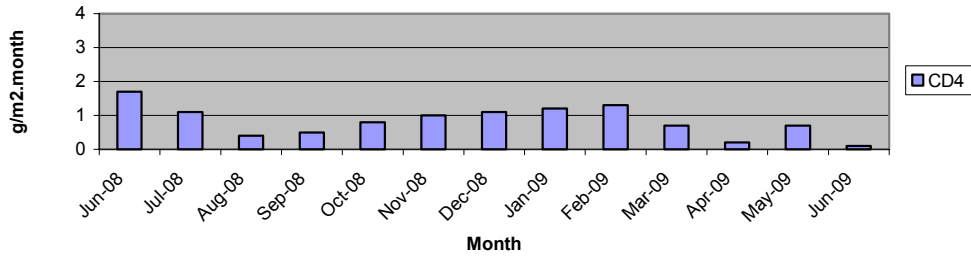
Dust deposition charts for all dust gauge sites appear in **Figure 1** below. The laboratory analysis is provided in **Appendix 1**.

The predominant winds were from the W-WNW, with strongest winds from the WSW.

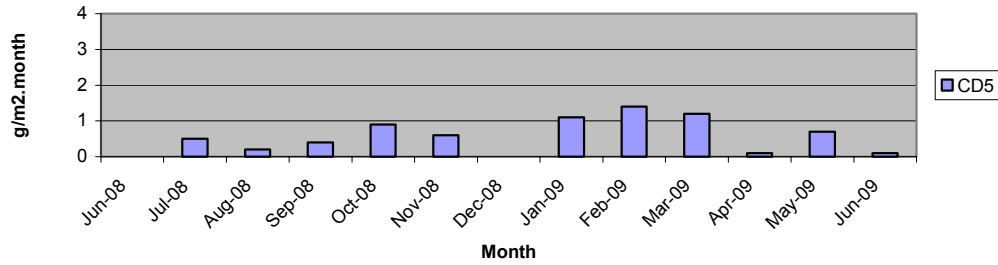
**Figure 1: Dust Deposition Charts**



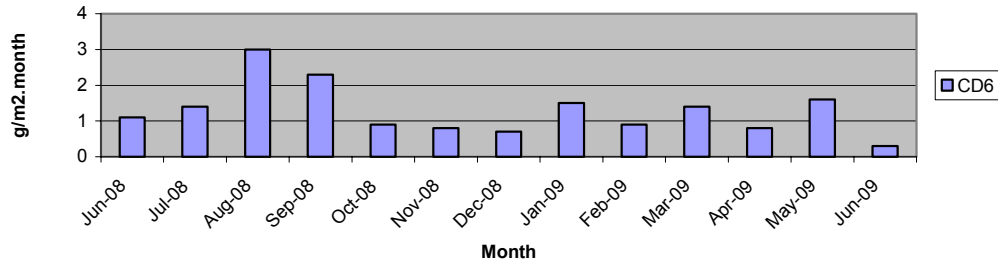
Rocla Calga Quarry Dust Gauge CD4 - Insoluble Matter



Rocla Calga Quarry Dust Gauge CD5 - Insoluble Matter



Rocla Calga Quarry Dust Gauge CD6 - Insoluble Matter



## 2.2 WATER MONITORING

### 2.2.1 Surface Waters

Monthly surface water monitoring was conducted on the 1 July 2009 and results are listed in **Table 2**. The laboratory analysis sheets are provided in **Appendix 1**.

**Table 2: Monthly surface water monitoring – June grab sample results**

| Site | Observed Flow Rate | Water Colour | Turbidity | pH   | EC (µS/cm) | TDS (mg/L) | TSS (mg/L) | Oil and Grease (mg/L) |
|------|--------------------|--------------|-----------|------|------------|------------|------------|-----------------------|
| A    | Dam                | Clear        | Clear     | 5.43 | 67         | 45         | 5          | <5                    |
| B    | Trickle            | Clear        | Clear     | 6.41 | 87         | 65         | 10         | <5                    |
| C    | Steady             | Clear        | Clear     | 5.47 | 100        | 68         | 2          | <5                    |
| D    | Trickle            | Clear        | Clear     | 5.13 | 96         | 70         | 2          | <5                    |
| F    | Dam                | Clear        | Clear     | 5.89 | 62         | 42         | 8          | <5                    |

At the time of sampling, there were no water discharges off site from any sampling location.

Sites B, C and D were flowing at the time of sampling, and two samples were taken from dams A and F. The samples were collected and analysed for a monthly sampling event. Results show generally good water quality with slightly acidic pH, low Electrical Conductivity, low Total Dissolved Solids and Total Suspended Solids and no detectable Oil and Grease.

### 2.2.2 Ground Waters

Groundwaters were sampled on 1 July 2009. Water quality tests for pH and electrical conductivity were conducted by Carbon Based Environmental Pty Limited. For water quality purposes, water was purged from the bore until constant pH (+/- 0.1 pH units) and Electrical Conductivity (+/- 5%) was obtained between samples. Data is displayed in **Table 3** and **Figures 2 to 5**.

Groundwater depths decreased at the majority of monitoring bores this month, indicating water moving towards the surface. The CP series of bores generally show larger increases and decreases in depth to water due to pumping from the bores. Longer term monitoring is required to fully evaluate groundwater depth trends.

pH levels generally increased slightly compared to the previous month, while EC levels generally remained steady. Detailed biannual water quality monitoring was conducted during April 2009 and is next due in October 2009.

**Table 3: Ground Water Quality Data**

| Reference | Bore       | Type       | Depth to water TOC (m) April 06 | Depth to water TOC (m) This report | pH This report | Electrical Conductivity (uS/cm) This report |
|-----------|------------|------------|---------------------------------|------------------------------------|----------------|---|
| CQ1       | Voutos     | * Monitor  | 20.59                           | 19.24                              | 4.6            | 120   |
| CQ3       | Voutos     | * Monitor  | 10.53                           | 10.11                              | 6.2            | 140   |
| CQ4       | Voutos     | * Monitor  | 8.78                            | 6.45                               | 5.1            | 70  |
| CQ5       | Gazzana    | DIP Only   | 8.69                            | 4.74                               | 4.6            | 140   |
| CQ6       | Gazzana    | DIP Only   | 16.00                           | 9.96                               | 4.4            | 190   |
| CQ7       | Gazzana    | * Monitor  | 6.89                            | 5.85                               | 4.9            | 80  |
| CQ8       | Gazzana    | * Monitor  | 11.03                           | 5.19                               | 5.2            | 150   |
| CQ9       | Gazzana    | DIP Only   | 10.10                           | 8.71                               | 4.8            | 100   |
| CQ10      | Voutos     | * Monitor  | NI                              | 21.99                              | 5.2            | 180   |
| CQ11S     | Gazzana    | * Monitor  | NI                              | 7.78                               | 5.3            | 140   |
| CQ11D     | Gazzana    | * Monitor  | NI                              | 9.12                               | 6.0            | 110   |
| CQ12      | Gazzana    | * Monitor  | NI                              | 3.40                               | 4.8            | 130   |
| CQ13      | Kashouli   | * Monitor  | NI                              | 11.36                              | 5.7            | 170   |
| CP3       | Gazzana    | Domestic   | 10.40                           | 6.75                               | 5.3            | 140   |
| CP4       | Kashouli   | Domestic   | 13.63                           | 6.20                               | 4.7            | 170   |
| CP5       | Kashouli   | Domestic   | 16.61                           | NM                                 | NM             | NM  |
| CP6       | Kashouli   | Domestic   | 16.27                           | 8.26                               | 5.0            | 200   |
| CP7       | Kashouli   | Production | 8.56                            | 1.60                               | 5.0            | 250   |
| CP8       | Rozmanec   | Domestic   | 22.17                           | NR                                 | NR             | NR  |
| MW7       | Rocla Bore | * Monitor  | 15.76                           | 14.87                              | 4.7            | 100   |
| MW8       | Rocla Bore | * Monitor  | 9.82                            | 6.53                               | 5.0            | 70  |
| MW9       | Rocla Bore | * Monitor  | 22.44                           | 21.28                              | 4.7            | 70  |
| MW10      | Rocla Bore | * Monitor  | 15.41                           | 11.19                              | 5.0            | 110   |
| MW13      | Rocla Bore | DIP Only   | NI                              | 7.36                               | 4.5            | 90  |
| MW16      | Rocla Bore | DIP Only   | NI                              | 7.91                               | 4.7            | 100   |

Notes:

TOC = Water level measured from top of bore case to water.

NM = Not Monitored – unable to sample water due to access restrictions.

NR = Not Required by resident.

\* = Logger Installed.

NI = These bores were not installed in April 2006 but are now operational. April 2006 was the first set of measurements taken by Carbon Based Environmental Pty Limited.

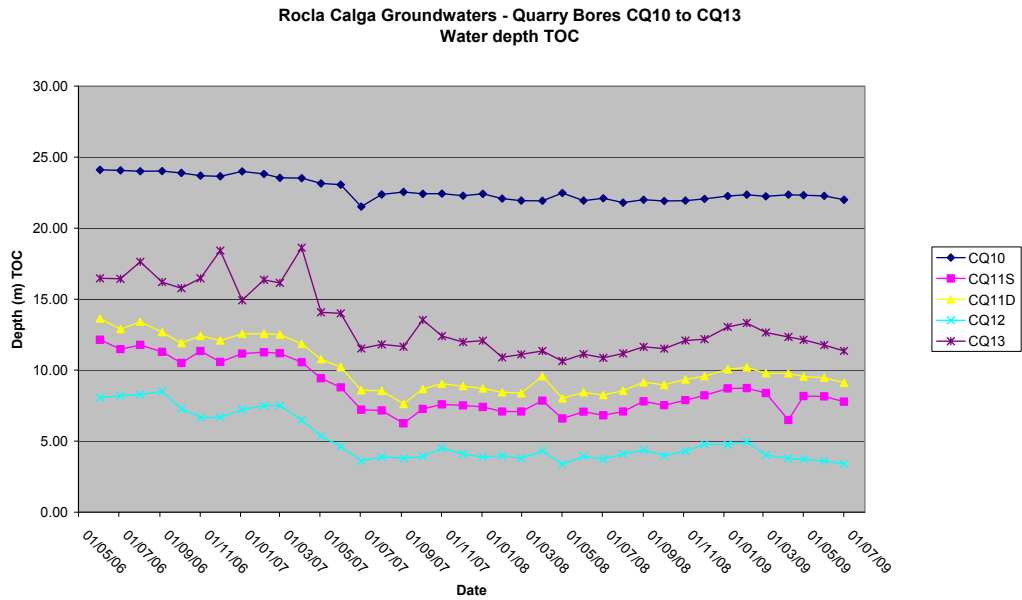
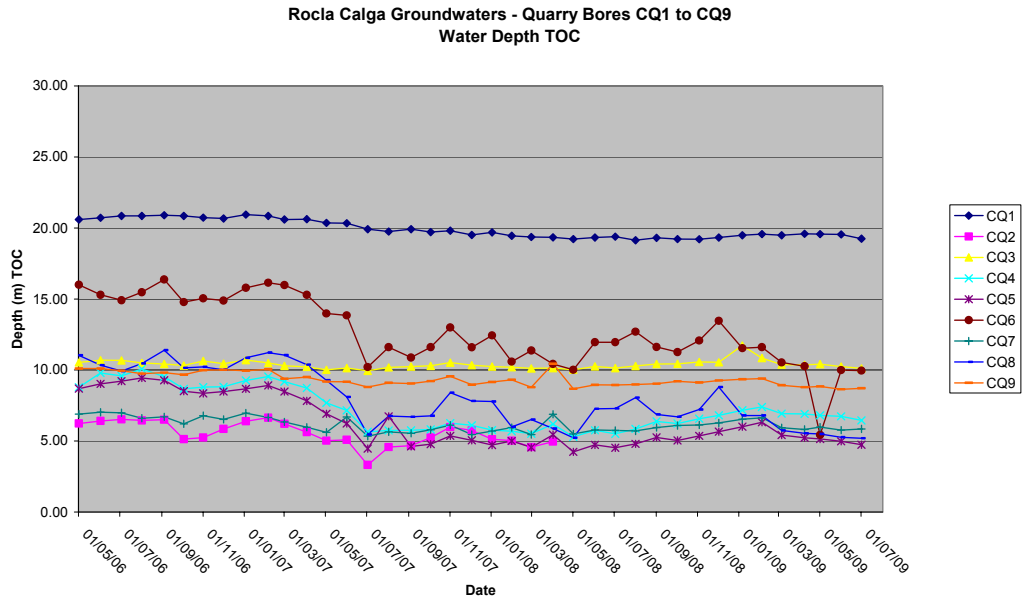
CP5 could not be sampled this month as the pump is broken.

Shading is used to indicate the following trends in water depth (compared to last reading):

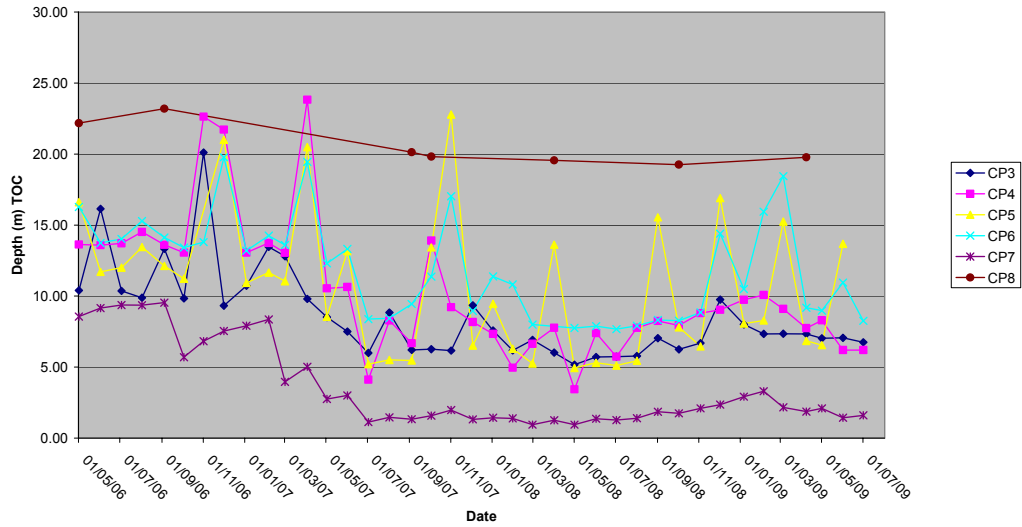
|  |  |
|--|--|
|  | Increase to ground water depth (water moved away from surface) |
|  | Decrease to ground water depth (water moved towards surface)   |
|  | Stable water depth (+/- 0.01m)                                 |

Available groundwater loggers were downloaded and will be forwarded to the Rocla Calga Quarry groundwater consultant.

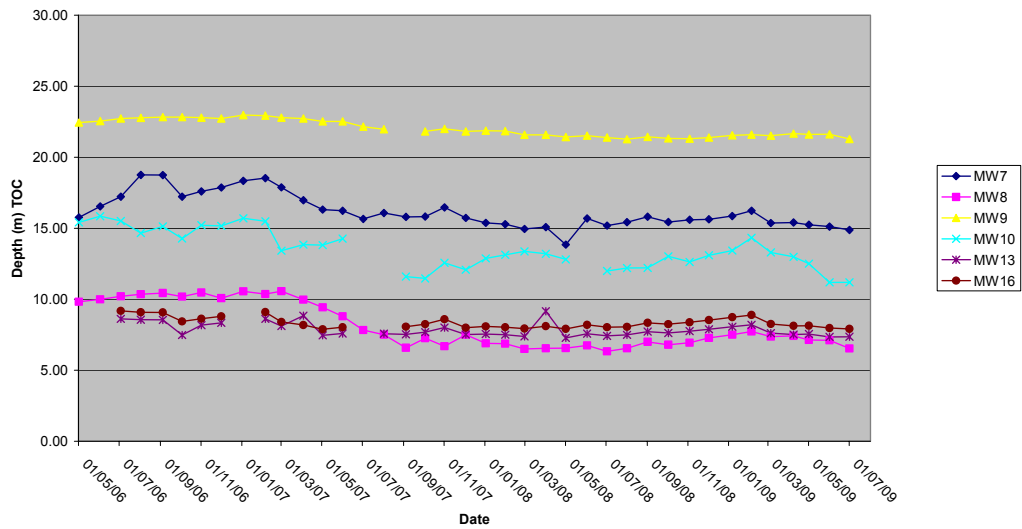
Figures 2 to 5: Groundwater Depth Charts.



Rocla Calga Groundwaters - Quarry Bores CP3 to CP8  
Water Depth TOC



Rocla Calga Groundwaters - Quarry Bores MW7 to MW16  
Water Depth TOC



## 2.3 METEOROLOGICAL MONITORING

The Rocla Calga Quarry weather station data recovery in June was approximately 100%. The weather station data follows and includes;

- Monthly data numerical summary;
- Weather charts of air temperature, humidity, heat index and wind chill, atmospheric pressure, solar radiation, evapotranspiration, rain, wind speed and data reception; and
- Wind rose (frequency distribution diagram of wind speed and direction).

Monthly weather statistics from two nearby Bureau of Meteorology (BOM) stations, Peats Ridge and Gosford are included in **Appendix 2** for comparison purposes.

Data for June 2009 shows lower rainfall at the Rocla Calga Quarry station compared to the nearby Peats Ridge BOM station and Gosford BOM station. The rainfall comparison is provided below:

|  |         |
|--|---------|
| Rocla Calga Quarry                       | 68.4mm  |
| BOM Peats Ridge*                         | 79.8mm  |
| BOM Gosford*                             | 132.6mm |
| BOM Peats Ridge Long term mean for June* | 98.0mm  |

\*Data sourced from Bureau of Meteorology (BOM) website ([www.bom.gov.au](http://www.bom.gov.au))

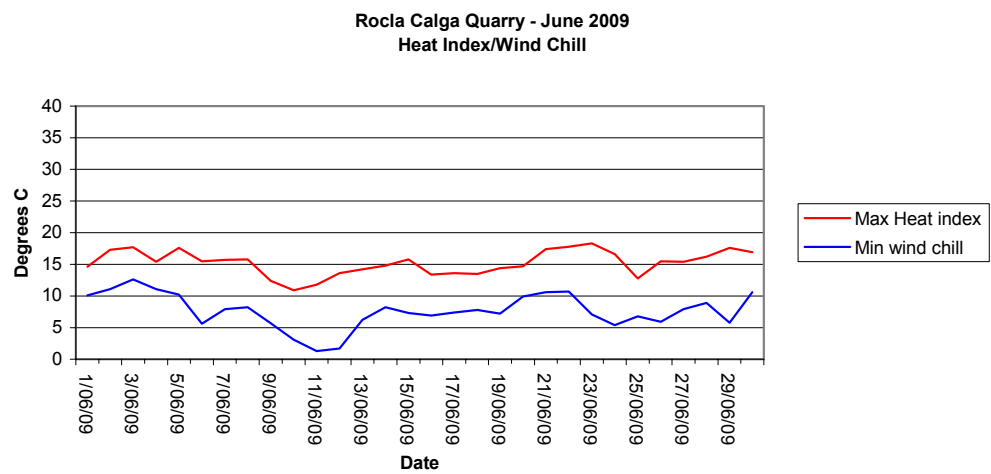
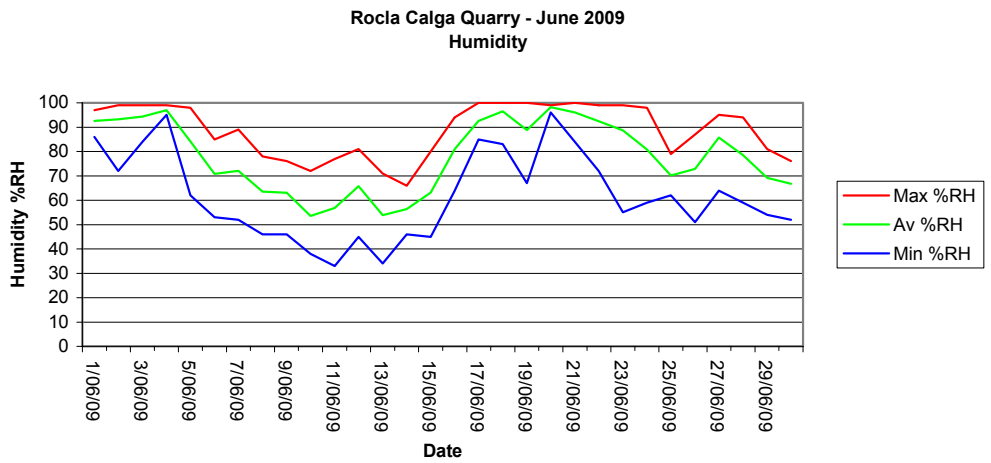
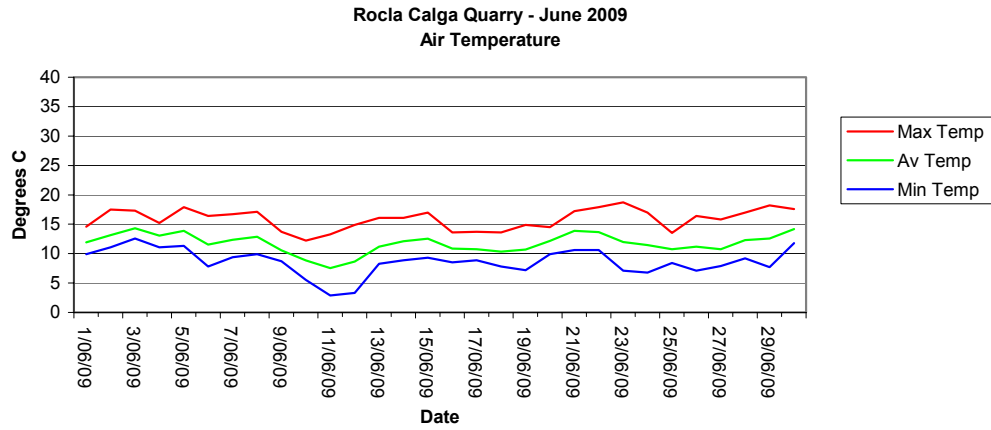
**Results are displayed in the following table and figures.**

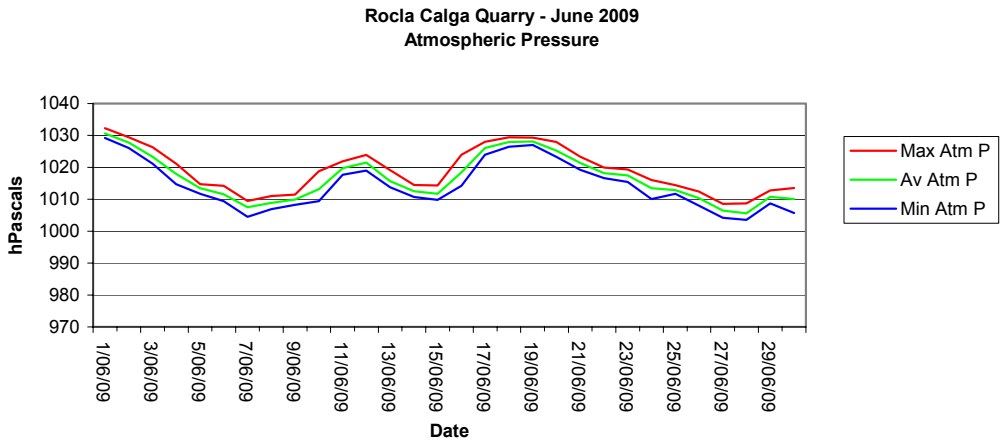
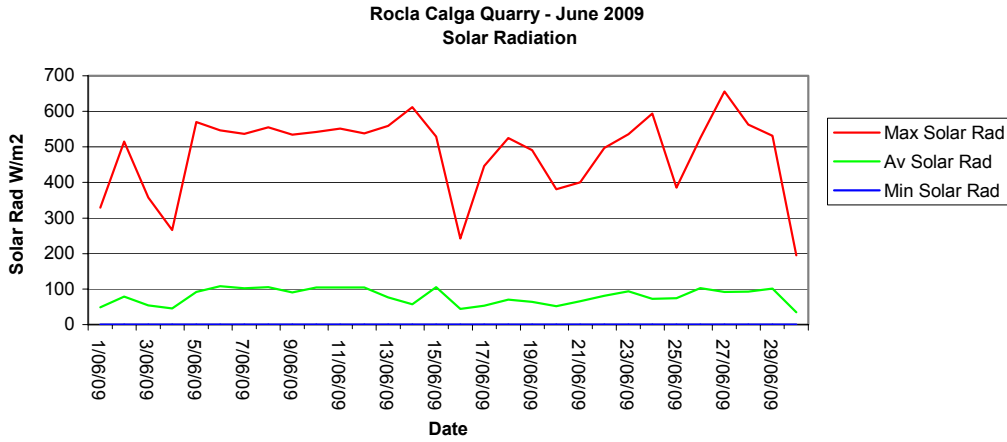
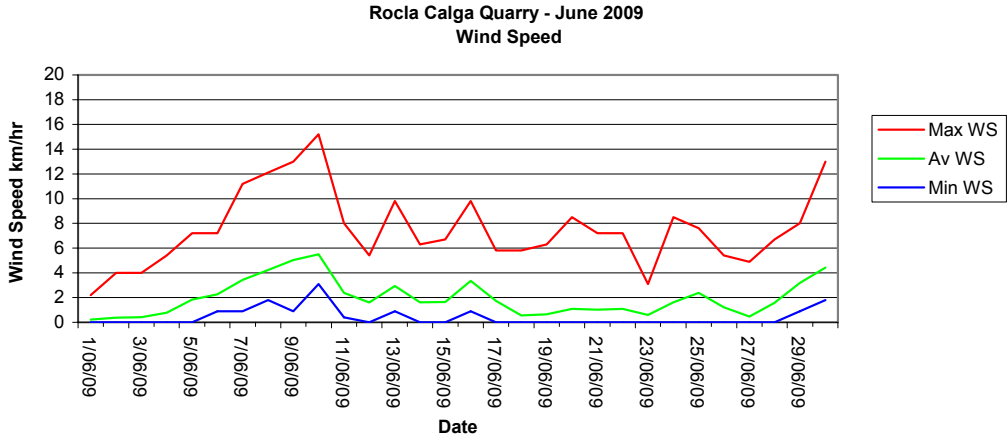
### 2.3.1 Monthly Meteorological Data Summary

Summary Jun-09 Rocla - Calga

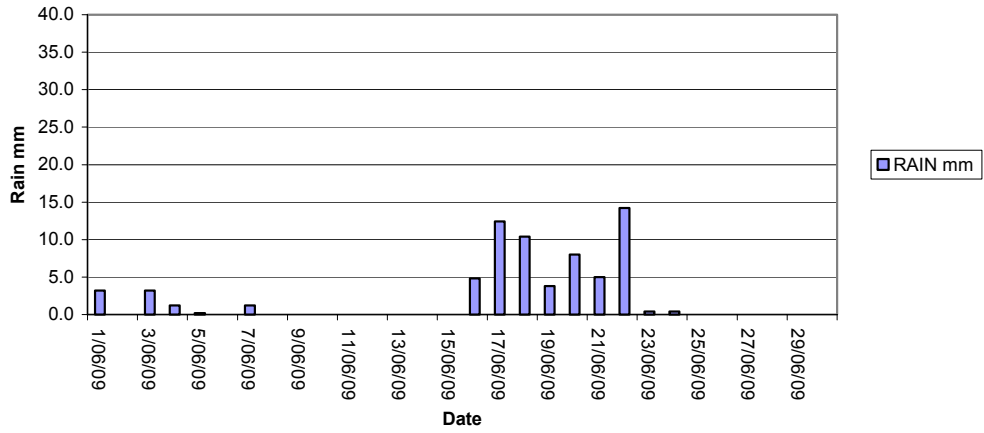
| Date     | Min Temp | Av Temp | Max Temp | Min %RH | Av %RH | Max %RH | RAIN mm | ET mm | Min WS | Av WS | Max WS | Min wind chill | Max Heat index | Min Atm P | Av Atm P | Max Atm P | Min Solar Rad | Av Solar Rad | Max Solar Rad | Min Data % | Av data % | Max Data % |
|----------|----------|---------|----------|---------|--------|---------|---------|-------|--------|-------|--------|----------------|----------------|-----------|----------|-----------|---------------|--------------|---------------|------------|-----------|------------|
| 1/06/09  | 9.9      | 11.9    | 14.6     | 86      | 93     | 97      | 3.2     | 0.6   | 0      | 0.2   | 2.2    | 10.1           | 14.6           | 1029.2    | 1030.6   | 1032.2    | 0             | 48.8         | 329           | 95.3       | 99.9      | 100        |
| 2/06/09  | 11.1     | 13.2    | 17.5     | 72      | 93     | 99      | 0.0     | 1.1   | 0      | 0.4   | 4      | 11.1           | 17.3           | 1026      | 1027.8   | 1029.4    | 0             | 78.9         | 515           | 96.8       | 100.0     | 100        |
| 3/06/09  | 12.6     | 14.3    | 17.3     | 84      | 94     | 99      | 3.2     | 0.8   | 0      | 0.4   | 4      | 12.6           | 17.7           | 1021.1    | 1023.3   | 1026.3    | 0             | 54.3         | 358           | 92.7       | 99.5      | 100        |
| 4/06/09  | 11.1     | 13.0    | 15.2     | 95      | 97     | 99      | 1.2     | 0.6   | 0      | 0.8   | 5.4    | 11.1           | 15.4           | 1014.7    | 1017.9   | 1021.1    | 0             | 45.3         | 266           | 92.7       | 99.9      | 100        |
| 5/06/09  | 11.3     | 13.9    | 17.9     | 62      | 84     | 98      | 0.2     | 1.5   | 0      | 1.9   | 7.2    | 10.2           | 17.6           | 1011.7    | 1013.4   | 1014.7    | 0             | 92.1         | 570           | 98.2       | 100.0     | 100        |
| 6/06/09  | 7.8      | 11.5    | 16.4     | 53      | 71     | 85      | 0.0     | 2.2   | 0.9    | 2.3   | 7.2    | 5.6            | 15.5           | 1009.4    | 1011.6   | 1014.2    | 0             | 108.3        | 547           | 97.7       | 99.9      | 100        |
| 7/06/09  | 9.4      | 12.4    | 16.7     | 52      | 72     | 89      | 1.2     | 2.5   | 0.9    | 3.4   | 11.2   | 7.9            | 15.7           | 1004.5    | 1007.5   | 1009.5    | 0             | 102.3        | 537           | 98.8       | 100.0     | 100        |
| 8/06/09  | 9.9      | 12.9    | 17.1     | 46      | 64     | 78      | 0.0     | 3.1   | 1.8    | 4.2   | 12.1   | 8.2            | 15.8           | 1006.9    | 1008.9   | 1011      | 0             | 105.5        | 555           | 99.4       | 100.0     | 100        |
| 9/06/09  | 8.7      | 10.6    | 13.7     | 46      | 63     | 76      | 0.0     | 2.9   | 0.9    | 5.0   | 13     | 5.7            | 12.4           | 1008.3    | 1009.9   | 1011.5    | 0             | 90.4         | 534           | 98.8       | 99.9      | 100        |
| 10/06/09 | 5.5      | 8.8     | 12.2     | 38      | 54     | 72      | 0.0     | 3.7   | 3.1    | 5.5   | 15.2   | 3.1            | 10.9           | 1009.4    | 1013.2   | 1018.8    | 0             | 104.5        | 542           | 95.3       | 99.9      | 100        |
| 11/06/09 | 2.9      | 7.5     | 13.3     | 33      | 57     | 77      | 0.0     | 2.3   | 0.4    | 2.4   | 8      | 1.3            | 11.8           | 1017.7    | 1019.8   | 1021.9    | 0             | 104.2        | 551           | 93         | 99.5      | 100        |
| 12/06/09 | 3.3      | 8.6     | 14.9     | 45      | 66     | 81      | 0.0     | 2.0   | 0      | 1.6   | 5.4    | 1.7            | 13.6           | 1019      | 1021.5   | 1023.9    | 0             | 104.7        | 538           | 96.5       | 99.8      | 100        |
| 13/06/09 | 8.3      | 11.2    | 16.1     | 34      | 54     | 71      | 0.0     | 2.5   | 0.9    | 2.9   | 9.8    | 6.2            | 14.2           | 1013.8    | 1015.7   | 1019.1    | 0             | 76.5         | 559           | 98.2       | 99.9      | 100        |
| 14/06/09 | 8.9      | 12.1    | 16.1     | 46      | 56     | 66      | 0.0     | 1.8   | 0      | 1.6   | 6.3    | 8.2            | 14.8           | 1010.7    | 1012.5   | 1014.5    | 0             | 56.9         | 612           | 99.7       | 100.0     | 100        |
| 15/06/09 | 9.3      | 12.6    | 17       | 45      | 63     | 80      | 0.0     | 2.2   | 0      | 1.7   | 6.7    | 7.3            | 15.8           | 1009.8    | 1011.7   | 1014.3    | 0             | 105.5        | 529           | 98.2       | 99.9      | 100        |
| 16/06/09 | 8.5      | 10.9    | 13.6     | 64      | 81     | 94      | 4.8     | 1.3   | 0.9    | 3.4   | 9.8    | 6.9            | 13.4           | 1014.2    | 1018.5   | 1024      | 0             | 44.4         | 242           | 97.4       | 99.9      | 100        |
| 17/06/09 | 8.9      | 10.7    | 13.7     | 85      | 92     | 100     | 12.4    | 0.9   | 0      | 1.7   | 5.8    | 7.4            | 13.6           | 1024      | 1026.1   | 1028      | 0             | 53.4         | 446           | 90.4       | 99.8      | 100        |
| 18/06/09 | 7.8      | 10.3    | 13.6     | 83      | 97     | 100     | 10.4    | 0.9   | 0      | 0.6   | 5.8    | 7.8            | 13.5           | 1026.5    | 1027.9   | 1029.4    | 0             | 70.5         | 525           | 93         | 99.9      | 100        |
| 19/06/09 | 7.2      | 10.7    | 14.9     | 67      | 89     | 100     | 3.8     | 1.0   | 0      | 0.7   | 6.3    | 7.2            | 14.4           | 1027      | 1028.1   | 1029.3    | 0             | 64.2         | 491           | 85.1       | 99.3      | 100        |
| 20/06/09 | 9.9      | 12.2    | 14.5     | 96      | 98     | 99      | 8.0     | 0.6   | 0      | 1.1   | 8.5    | 9.9            | 14.7           | 1023.3    | 1025.3   | 1027.9    | 0             | 51.7         | 381           | 98.8       | 100.0     | 100        |
| 21/06/09 | 10.6     | 13.9    | 17.2     | 84      | 96     | 100     | 5.0     | 0.9   | 0      | 1.0   | 7.2    | 10.6           | 17.4           | 1019.2    | 1021.4   | 1023.4    | 0             | 65.9         | 400           | 99.7       | 100.0     | 100        |
| 22/06/09 | 10.6     | 13.6    | 17.9     | 72      | 92     | 99      | 14.2    | 1.1   | 0      | 1.1   | 7.2    | 10.7           | 17.8           | 1016.6    | 1018.2   | 1019.9    | 0             | 81.3         | 497           | 96.2       | 99.9      | 100        |
| 23/06/09 | 7.1      | 12.0    | 18.7     | 55      | 89     | 99      | 0.4     | 1.2   | 0      | 0.6   | 3.1    | 7.1            | 18.3           | 1015.4    | 1017.5   | 1019.3    | 0             | 94.1         | 536           | 94.2       | 99.8      | 100        |
| 24/06/09 | 6.8      | 11.5    | 17       | 59      | 81     | 98      | 0.4     | 1.4   | 0      | 1.6   | 8.5    | 5.4            | 16.6           | 1010.1    | 1013.5   | 1016      | 0             | 72.9         | 594           | 84.5       | 99.6      | 100        |
| 25/06/09 | 8.4      | 10.8    | 13.5     | 62      | 70     | 79      | 0.0     | 1.8   | 0      | 2.4   | 7.6    | 6.8            | 12.8           | 1011.7    | 1012.8   | 1014.4    | 0             | 74.1         | 386           | 98.5       | 99.9      | 100        |
| 26/06/09 | 7.1      | 11.2    | 16.4     | 51      | 73     | 87      | 0.0     | 1.9   | 0      | 1.2   | 5.4    | 5.9            | 15.5           | 1008      | 1010.3   | 1012.4    | 0             | 102.7        | 525           | 97.1       | 99.7      | 100        |
| 27/06/09 | 7.9      | 10.8    | 15.8     | 64      | 86     | 95      | 0.0     | 1.2   | 0      | 0.5   | 4.9    | 7.9            | 15.4           | 1004.2    | 1006.4   | 1008.5    | 0             | 92.0         | 656           | 92.7       | 99.8      | 100        |
| 28/06/09 | 9.2      | 12.3    | 17       | 59      | 78     | 94      | 0.0     | 1.7   | 0      | 1.6   | 6.7    | 8.9            | 16.2           | 1003.5    | 1005.6   | 1008.7    | 0             | 92.7         | 563           | 92.7       | 99.8      | 100        |
| 29/06/09 | 7.7      | 12.6    | 18.2     | 54      | 69     | 81      | 0.0     | 2.4   | 0.9    | 3.2   | 8      | 5.8            | 17.6           | 1008.7    | 1010.8   | 1012.8    | 0             | 101.8        | 531           | 97.1       | 99.8      | 100        |
| 30/06/09 | 11.8     | 14.2    | 17.6     | 52      | 67     | 76      | 0.0     | 2.1   | 1.8    | 4.4   | 13     | 10.6           | 16.9           | 1005.7    | 1010.1   | 1013.5    | 0             | 34.6         | 195           | 98.8       | 100.0     | 100        |
| Monthly  | 2.9      | 11.7    | 18.7     | 33      | 78     | 100     | 68.4    | 50.2  | 0      | 2.0   | 15.2   | 1.3            | 18.3           | 1003.5    | 1016.6   | 1032.2    | 0             | 79.2         | 656           | 84.5       | 99.8      | 100        |

2.3.2 Monthly weather charts

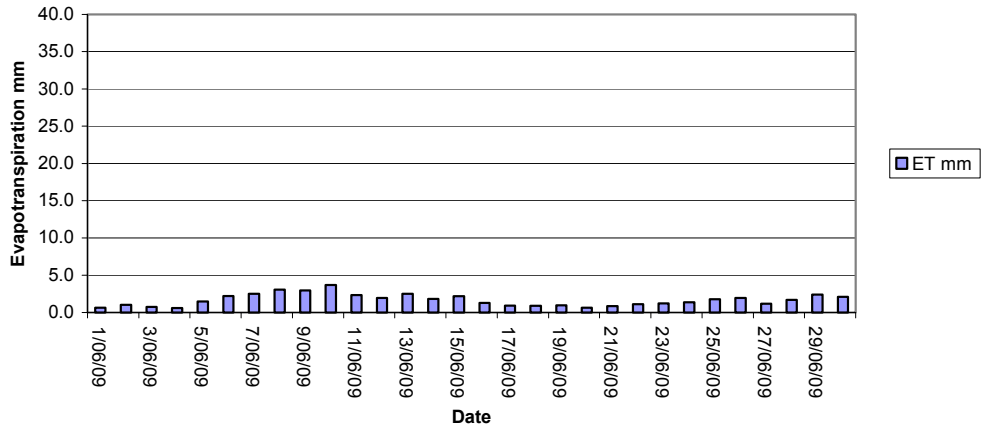




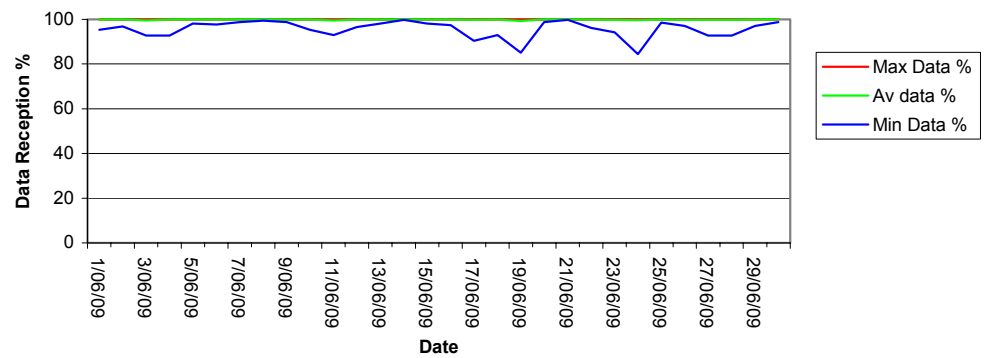
Rocla Calga Quarry - June 2009  
Rainfall



Rocla Calga Quarry - June 2009  
Evapotranspiration



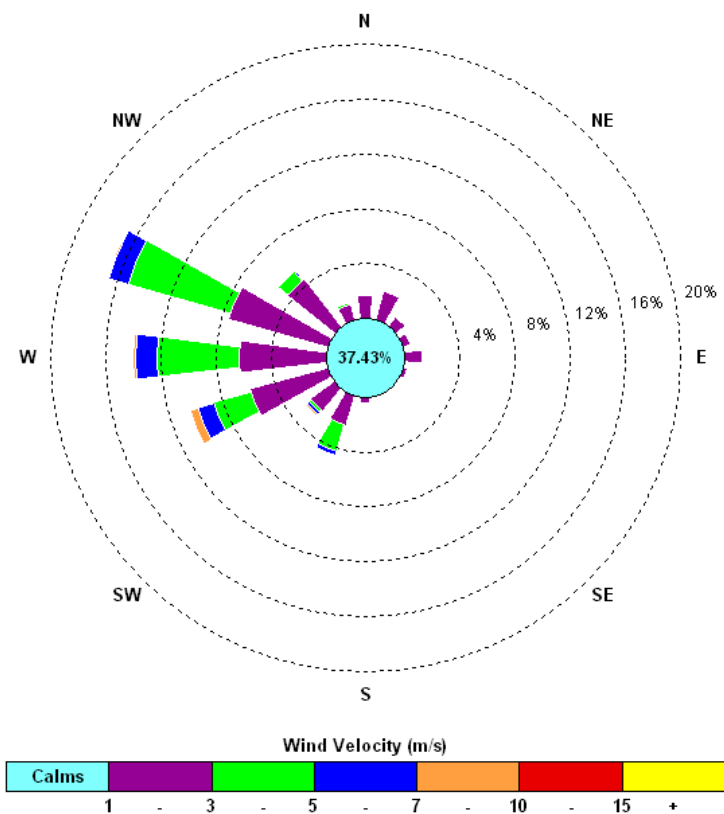
Rocla Calga Quarry - June 2009  
Data Reception



### 2.3.3 Windrose plot

Frequency plot of the average wind speed and average direction over each 15 minute sampling period. Wind is considered calm when less than a 15 minute average of 1m/s.

00:00, 1 June 2009 – 23:45, 30 June 2009



The windrose shows predominant winds were from the W-WNW, with strongest winds from the WSW. The maximum wind speed was 15.2 m/s from the SSW.

**APPENDIX 1**  
**LABORATORY CERTIFICATES**

## **APPENDIX 2**

### **ADDITIONAL BUREAU OF METEOROLOGY DATA FROM PEATS RIDGE AND GOSFORD MONITORING STATIONS**



