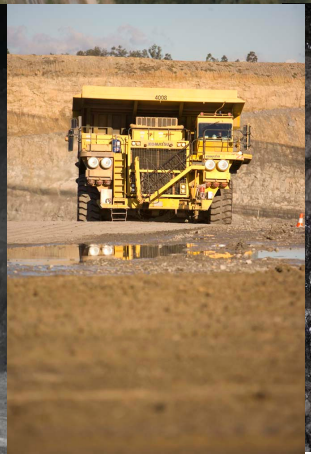
# Ashton Coal Operations Pty Limited
# Annual Environmental Management Report 2009/2010



| | |
|---|---|
| **Name of Mine:** | Ashton Coal Mine |
| **Titles/Mining Leases:** | ML1526 and ML1533 |
| **MOP Commencement Date:** | 1 November 2007 |
| **MOP Completion Date:** | 31 December 2012 |
| **AEMR Commencement Date:** | 2 September 2009 |
| **AEMR Completion Date:** | 1 September 2010 |
| **Name of Leaseholder:** | White Mining NSW Limited &<br>ICRA (Ashton) Pty Ltd &<br>International Marine Corporation |
| **Name of Operator (if different):** | Ashton Coal Operations Pty Ltd |
| **Reporting Officer:** | Brian Wesley |
| **Title:** | General Manager |

**Signature** _____ **Date**_____

# TABLE OF CONTENTS

# LIST OF TABLES

## LIST OF FIGURES

# 1.0 INTRODUCTION

The Ashton Coal Project (ACP) is located approximately 14km north-west of Singleton near the village of Camberwell. During the period of this Annual Environmental Management Report (AEMR), both the Open Cut and Underground mines have continued at full production.

The project currently consists of an open cut truck and shovel mine, underground longwall mine, associated Coal Handling Preparation Plant (CHPP), stockpiling, administration buildings, workshops, stores, bathhouse facilities and car parking.

This report has been developed in accordance with the conditions of Environmental Protection Licence No. 11879 and all relevant development consent conditions. The structure of this report is based on the document "*Guidelines and Format for Preparation of Annual Environmental Management Report*", Department of Mineral Resources, Document No. EDG03 MREMP Guide V3 dated January 2006.

Ashton Coal is owned by Felix Resources (60%), Itochu Corporation (10%) and International Marine Corporation Group (30%) and operated by Ashton Coal Operations Pty Limited (ACOL). During the reporting period Felix Resources, was fully acquired by Yancoal Australia Limited meaning Felix resources is 100% ownership subsidiary of Yancoal Australia Limited.

This report covers the period 2 September 2009 to 1 September 2010. In accordance with Condition 9.3 of the Development Consent, Ashton has consulted with the Director-General of the Department of Planning (DoP) and the NSW Office of Water (NOW) in relation to the preparation of this report.

## 1.1 CONSENTS, LEASE AND LICENCES

An interim Mining Operations Plan (MOP) was submitted to the Department of Mineral Resources (now Industry and Investment NSW (I&I NSW)) in August 2003, prior to the commencement of construction activities on site. The Open Cut MOP was approved in 2004 and subsequently modified in 2005. The Underground MOP was approved in 2006. A variation to the Underground MOP allowing the installation of a dewatering bore and ventilation bore was approved in March 2007. A combined Site MOP which incorporates both the Open Cut and Underground operations was approved on the 1 September 2008. The Site MOP superseded the Open Cut and Underground MOPs. The Site MOP covers the period 1 November 2007 to 31 December 2012.

ACOL received approval of development consent modification 309-11-2001-i (M4) from the DoP on the 26 March 2010, allowing extraction of an additional longwall, Longwall/Miniwall 9 (LW/MW9), and increasing total Run-of-Mine (ROM) production from 5.2 Mtpa to 5.8Mtpa. Subsequently ACOL received SMP approval to extract coal from LW/MW 9 from I&I NSW on the 18 June 2010. The SMP application for LW/MW 9 was incorporated in the document "Subsidence Management Plan Variation – Longwall and Miniwall Panel 9". Approval of the

SMP for Longwalls 5 – 6 and Miniwalls 7 – 8 was received on the 2 July 2009. Extraction of Longwall 6 is expected to finish in November 2010.

The following table (**Table 1**) provides a summary of the status of all leases, licences and approvals relevant to environmental management obtained by ACOL.

Copies of all licences and approvals have been provided to government agencies and Singleton Council and are available for inspection at the ACOL site office.

**Table 1. LEASES, LICENCES AND APPROVALS**

| Ref | Detail | Granted | Authority | Area | Status | Expiry |
|---|---|---|---|---|---|---|
| | **PLANNING APPROVALS** | | | | | |
| 1 | 309-11-2001-i Development Consent | 11/10/02 | DoP ^ | Schedule 1 of the Consent | Current | 11/10/23 |
| 2 | 309-11-2001-i (M1) Modification to Development Consent (allows EPA to specify noise criteria in Table 5) | 15/10/03 | DoP | Schedule 1 of the Consent | Current | 11/10/23 |
| 3 | 309-11-2001-i (M2) Modification to Development Consent (permits 10 m increase in height of EEA) | 27/01/05 | DoP | Schedule 1 of the Consent | Current | 11/10/23 |
| 4 | 309-11-2001-i (M3) Modification to Development Consent (for the construction and operations of tailings pipelines between the mine and the former Ravensworth Mine) | 19/02/07 | DoP | Schedule 1 of the Consent | Current | 11/10/23 |
| 5 | 309-11-2001-i (M4) Modification to Development Consent ( for the Mining of an additional longwall panel and an increase in run-of-mine (ROM) production from 5.2 to 5.8 Mtpa) | 26/03/10 | DoP | Schedule 1 of the Consent | Current | 11/10/23 |
| 6 | DA 144/1993 Amendment for use of Ravensworth Void 4 – Tailings Disposal. (held by Macquarie Generation) | 25/05/07 | SSC | NA | Current | NA |
| 7 | DA486/2006 Train fuelling facility (held By QR) | 28/11/06 | SSC | Rail Siding | Current | 28/11/11 |
| 8 | ML 1533 | 26/02/03 | I&I^^ | 883.4 ha | Current | 26/02/24 |
| 9 | ML 1529 | 17/09/03 | I&I | 128.7 ha (sub surface) | Current | 11/11/12 |
| 10 | ML 1623 | 5/11/08 | I&I | 26.17ha | Current | 30/10/29 |
| 11 | Exploration Licence (EL) 5860 | 14/03/04 | I&I | 272 ha | Current | 21/05/12 |
| 12 | Exploration Licence (EL) 4918 | 17/09/99 | I&I | 370 ha | Current | 17/12/10 |

**Table 1. LEASES, LICENCES AND APPROVALS**

| Ref | Detail | Granted | Authority | Area | Status | Expiry |
|---|---|---|---|---|---|---|
| 13 | EPL 11879 (Open Cut Area and processing facilities) | 02/09/03 | DECCW * | As shown on EPL 11879 Fig 1 | S/S | S/S |
| 14 | Variation to EPL 11879 (established Construction Noise Criteria) | 10/11/03 | DECCW | As above | S/S | S/S |
| 15 | Variation to EPL 11879 (modified dust sampling requirements) | 28/02/05 | DECCW | As above | S/S | S/S |
| 16 | Variation to EPL 11879 (incorporation of UG mine) | 17/11/05 | DECCW | ML1533 | Current | 06/11/11 |
| 17 | **MINING OPERATIONS PLAN** | | | | | |
| 18 | Interim MOP (for construction and initial 12 months operation of Open Cut & CHPP) | 11/08/04 | I&I | N/A | S/S | S/S |
| 19 | MOP for Open Cut (for all associated life of mine activities) | 22/07/04 | I&I | N/A | S/S | S/S |
| 20 | MOP Modification (for increase in EEA height & removal of WEA) | Jan 2005 | I&I | N/A | S/S | S/S |
| 21 | MOP Modification (for Glennies Creek Road Environmental Bund) | 31/05/05 | I&I | N/A | SS | S/S |
| 22 | Interim Underground MOP (for first workings development) | 20/12/05 | I&I | N/A | S/S | S/S |
| 23 | MOP for the Ashton Underground Mine (Development of underground operations for LW1-4 and associated facilities) | 23/01/06 | I&I | N/A | S/S | S/S |
| 24 | Variation to the MOP for the Ashton Underground Mine | 28/02/07 | I&I | N/A | S/S | S/S |
| 25 | MOP combining Open Cut and Underground operations | 1/09/08 | I&I | N/A | Current | 31/12/12 |
| 26 | **SUBSIDENCE MANAGEMENT PLAN** | | | | | |
| 27 | Subsidence Management Plan (for the extraction of LW1–4) | 08/03/07 | I&I | N/A | Current | Based on area not on year |
| 28 | Subsidence Management Plan (for the extraction of LW5–8) | 02/07/09 | I&I | N/A | Current | Based on area not on year |
| | Subsidence Management Plan (for the extraction of LW/MW 9) | 18/06/10 | I&I | N/A | Current | Based on area not on year |

**Table 1. LEASES, LICENCES AND APPROVALS**

| Ref | Detail | Granted | Authority | Area | Status | Expiry |
|---|---|---|---|---|---|---|
| 29 | **WATER ACCESS LICENCES** | | | | | |
| | WAL1358 / 20AL203056 Glennies Creek Supplementary 4ML | NA | DECCW | NA | Current | NA |
| | WAL15583 / 20AL204249 Glennies Creek General Security 354ML | | | | | |
| | WAL8404 / 20AL200941 Glennies Creek High Security 80ML | | | | | |
| | WAL997 / 20AL201311 Glennies Creek High Security 11ML | | | | | |
| | WAL1120 / 20AL201624 Hunter River High Security 3ML | | | | | |
| | WAL1121 / 20AL201625 Hunter River General Security 335ML | | | | | |
| | WAL6346 / 20AL203106 Hunter River Supplementary 15.5ML | | | | | |
| | 20AL210986 Bowmans Creek Irrigation 366ML | | | | | |
| | 20SL042214 Bowmans Creek Irrigation 14ML | | | | | |
| | **WORKS APPROVALS** | | | | | |
| | 20CA201565 Glennies Creek | 1/07/04 | DECCW | NA | Current | 11/03/19 |
| | 20WA203822 Glennies Creek | 14/12/07 | DECCW | NA | Current | 13/12/17 |
| | 20CA201626 Hunter River | 1/07/04 | DECCW | NA | Current | 7/04/19 |
| | **GROUNDWATER LICENCES** | | | | | |
| | 20BL136766 Stock Domestic | 12/01/88 | DECCW | NA | Current | Perpetuity |
| | 20BL168848 Test Bore | 27/08/03 | DECCW | NA | Current | Perpetuity |
| | 20BL168849 Test Bore | 27/08/03 | DECCW | NA | Current | Perpetuity |
| | 20BL169508 Mining 10ML | 15/03/05 | DECCW | NA | Current | 14/03/15 |
| | 20BL169937 Mining 100ML Objection lodged with NOW regarding modification to new condition statement 09/10 | 06/04/06 | DECCW | NA | Current | See note inset |
| | 20BL170596 Monitoring | 16/10/06 | DECCW | NA | Current | Perpetuity |
| | 20BL171364 Mining 100ML | 17/05/07 | DECCW | NA | Current | 16/05/12 |
| | 20BL172142 Test Bore | 16/04/09 | DECCW | NA | Current | Perpetuity |
| | 20BL172143 Test Bore | 16/04/09 | DECCW | NA | Current | Perpetuity |
| | 20BL172144 Test Bore | 16/04/09 | DECCW | NA | Current | Perpetuity |

**Table 1. LEASES, LICENCES AND APPROVALS**

| Ref | Detail | Granted | Authority | Area | Status | Expiry |
|---|---|---|---|---|---|---|
| | **OTHER LICENSES** | | | | | |
| | Dangerous goods notification | 17/08/09 | Workcover | NA | Current | 17/01/12 |
| | Licence to Sell/Possess radioactive sources 28485 | 19/06/09 | DECCW | NA | Current | 18/06/12 |
| | Radiation Registration 1281 | 02/05/09 | DECCW | NA | Current | 01/05/11 |
| | Radiation Registration 12903 | 16/01/08 | DECCW | NA | Current | 16/01/12 |
| | Radiation Registration 12905 | 16/01/08 | DECCW | NA | Current | 16/01/12 |
| | Radiation Registration 12906 | 16/01/08 | DECCW | NA | Current | 16/01/12 |
| | Radiation Registration 21160 | 10/12/09 | DECCW | NA | Current | 09/12/11 |
| | AHIMS Permit No 1591 to collect Aboriginal artefacts north of the New England Highway under S90 of NPW Act | 21/07/03 | DECCW (NPWS) | 239.8 | Complete | 21/07/08 |
| | AHIMS Permit No 2783 to collect Aboriginal artefacts EWA86 under S90 of NPW Act | 28/09/07 | DECCW (NPWS) | NA | Complete | NA |
| | Part 3A permit No P1819 to install two power poles near Bowmans Creek | 05/12/03 | DECCW | N/A | Current | 05/12/04 |
| | Permit No CW802609 to construct levee bank on Bowmans Creek | 08/09/03 | DECCW | N/A | Current | 07/09/13 |
| | Clause 88(1) approval for safe operations and stability of workings and resource recovery longwall mining | 28/02/07 | DII | N/A | Current | 1/06/2011 |
| | S126 Approvals for emplacement of carbonaceous materials Ashton Open Cut | 08/04/04 | DII | N/A | Current | NA |
| | S126 Approvals for emplacement of carbonaceous materials Ravensworth Void 4 | 17/01/07 | DII | N/A | Current | NA |

*^ Department of Planning (DoP)*
*^^ Department of Industry and Investment (DII)*
** Department of Environment, Climate Change and Water (DECCW)*

*S/S – superseded*
*N/A – Not available*
*TBA – To be advised*

## 1.2 MINE CONTACTS

Positions of responsibility for operations and environment are detailed hereunder:

**Table 2. KEY MINE CONTACTS**

| Area of Responsibility | Name | Title | Contact Number(s) |
|---|---|---|---|
| General Manager | B. Wesley | General Manager | (02) 6570 9104 |
| Open Cut Mine | B. Chilcott | Open Cut Mine Manager | (02) 6570 9128 |
| Underground Mine | H. Drummond | Underground Mine Manager | (02) 6570 9260 |
| CHPP | P. Davis | Declared Plant Manager | (02) 6570 9148 |
| Environment | L. Richards | Environment and Community Relations Manager | (02) 6570 9219 |
| Environmental Contact Line | | | 1800 657 639 |

Brian Wesley replaced Peter Barton as General Manager shortly after the end of the reporting period. Brian Wesley has overall responsibility for the operational and development phases of the project. Lisa Richards is responsible for day-to-day environmental management and community relations and is the nominated Environmental Manager for the project. ACOL's Board of Directors has ultimate responsibility for Ashton's environmental performance.

## 1.3 INDEPENDENT ENVIRONMENTAL AUDITING

Under condition 9.2 of DA 309-11-2001-i ACOL is required to undertake an internal audit of the performance of the project against conditions of the consent and other statutory approvals. Furthermore, condition 8.8 – Independent Environmental Auditing requires ACOL to conduct an independent third party audit of compliance every three years. To satisfy both conditions, Trevor Brown and Associates were contracted, following approval from the DoP, to conduct an independent audit of the operations against the conditions of the development consent and other statutory approvals, licences and permits. The audit also compared the operations performance against the predictions made in the Environmental Impact Statement (EIS) and the approved SMP's.

The audit was conducted by Trevor Brown, Principal Environmental Consultant for Trevor Brown and Associates, on the 9 and 10 August 2010. The audit involved a desktop review of documentation and monitoring results, and a field inspection to assess the status of environmental compliance of the Open Cut and Underground Mine operations for the period August 2007 to August 2010.

All the required documentation for verification of compliance with the MCoA and other statutory approvals held by ACOL for the ACP, were provided to the auditor in an efficient manner and were adequate for verification of the status of the project operations with the relevant approvals.

The Environmental Management Strategy and Environmental Management Plans and Procedures in place for the approved project provide a sound basis for protection of the surrounding environment and the community.

Non-compliances Identified during the Independent Environmental Audit were related to Environmental Management Plan review, blast overpressure, noise and dust deposition in the 2007-2010 period and are presented in **Table 3**.

The management of the major environmental aspects of the ACP operations demonstrated that the project had been developed generally in accordance with the EIS and subsequent documentation approved by the administering authorities, and generally complied with the requirements of the MCoA and other approvals granted to the project:

***Air***

Dust deposition monitoring exhibited an increase in levels during 2009-2010 affected by high winds and dust storms (August 2009) but generally the levels complied with the <4 g/m²/mth criteria at the Camberwell residential sites. The HVAS-TSP levels exceeded the cumulative rolling annual average of 90µg/m³ between September 2009 and August 2010. PM10 monitoring indicated compliance with the annual cumulative average criteria of 30µg/m³ and the 24hour average criteria of 150µg/m³ at the community sites except under high wind conditions from the northwest.

The air quality results have not exceeded the predicted levels in the EIS.

***Surface Water Management***

The ACP operations have not discharged water from the site during 2007-2010. Water quality monitoring conducted under the Site Water Management Plan is adequate to assess water quality management on the site and in the surrounding natural waterways. The water quality monitoring has demonstrated the water quality of Bowmans Creek, Glennies Creek and the Hunter River have not been affected by the ACP operations.

***Groundwater***

The results of groundwater monitoring and an analysis of trends compared to the impacts predicted for the current stage of mining in both the EIS studies and subsequent studies carried out have concluded that all groundwater-related impacts from underground mining during the review period were below the levels predicted in the EIS, and in the SMP groundwater assessment.

The groundwater inflows have been well below the EIS predictions between 2007 and 2010.

### *Erosion and Sediment Control*

The erosion and sediment controls established for the ACP project provide for collection of surface runoff waters with increased suspended solids to ponds established on site. The retention of the waters from the disturbed areas of the project site and retention and settlement of the suspended solids in the ponds provides protection of water quality of natural waterways around the mine operations.

### *Blast/Vibration*

Exceedence of >5% of overpressure >115dBL occurred between 2007 and 2010 at St Clements Church and Camberwell Village and blast overpressure of >120dBL occurred on 3 occasions in the same period.

The MCoA/EPL criteria of <5% of blasts >2mm/s peak particle vibration (ppv), was not exceeded between 2007 and 2010.

### *Light*

Management of light positioning has reduced light scatter from the mine operations and reduced the number of community complaints during 2007-2010 compared with the previous 3 year period.

### *Bushfire*

The requirements in the Bushfire Management Plan have been implemented for the site and the Plan will be reviewed during 2010.

### *Noise*

A report on Comparison of Actual Noise Levels against EIS Predictions was prepared by ACP and submitted to DECCW on 22 July 2009. Exceedence of the 38dBA noise criteria occurred during the 5year period - 2005 to 2009. The exceedence events were reported as non-compliances to the relevant administering authorities.

Submission of the report to DECCW on noise compliance satisfied the requirement of EPL condition U1.

### *Weed and Pest Control*

Weed control is an ongoing program that is planned annually and proposed in the AEMR's. The management of weeds occurs in accordance with the requirements of the relevant legislation and weed / land management authorities.

### *Mine Subsidence*

Monitoring of the surface areas above the longwall panels 1-4 has confirmed that in general the maximum subsidence movements detected to date were less than the subsidence predicted in the Subsidence Management Plan. Subsidence monitoring also showed that there had been

negligible subsidence on the steep slopes of Glennies Creek. Visual inspection revealed that near complete subsidence occurred immediately after passage of the longwall. Cracks in land and the access road to Property 130 have been repaired satisfactorily to date.

***Conclusion***

In general the independent environmental audit findings for the Ashton Coal Project operations during the 2007 to 2010 period demonstrated compliance with the MCoA and conditions attached to other approvals granted for the project.

**Table 3. ENVIRONMENTAL AUDIT – NON-COMPLIANCES IDENTIFIED DURING THE INDEPENDENT ENVIRONMENTAL AUDIT**

<table>
<tr><th>Condition</th><th>Description</th><th>Comments</th></tr>
<tr><td>3.6</td><td>“Environmental management plans are to be reviewed, and updated as necessary, at least every 5 years or as otherwise directed by the Director-General, in consultation with the relevant government agencies. Plans shall reflect changing environmental circumstances and changes in technology or best-practice management procedures”.</td><td>Six EMP’s (i.e. Lighting, Soil Stripping, Spontaneous Combustion, Waste, Bushfire and Road and Rail Closure Management Plans) require review and revision. ACP indicated that the six EMP’s were to be reviewed and revised following the decision on the South East Open Cut EA, and the Bowmans Creek Diversion EA currently with the DoP for assessment. This extended time frame has been accepted by DoP. All other EMP’s have been reviewed and revised as necessary in the last 5 years.</td></tr>
<tr><td>6.1</td><td>The Applicant shall comply with the following ambient air quality standards / goals:<br>Table 3 Amenity Based Criteria for Dust Fallout
<table>
<tr><td>Pollutant</td><td>Averaging Period</td><td>Max total dust deposition</td></tr>
<tr><td>Deposited Dust</td><td>Annual</td><td>4 g/m2/month</td></tr>
<tr><td>Total Suspended Particulate Matter (TSP)</td><td>Annual</td><td>90µg/m$^3$ (annual mean)</td></tr>
</table></td><td>Generally the dust levels were within the <4 g/m²/month criteria at the Camberwell residential sites. Dust deposition monitoring exhibited increased levels during 2009-2010 affected by high winds and dust storms (August 2009). The following sites were in exceedence of the criteria at August 2010: D5, D6, D7, D8, and D13.<br>TSP was exceeded consistently at Site 1 in Camberwell village and at Sites 3 and 8 in 2009.</td></tr>
<tr><td>6.22 and EPL L7.2</td><td>The Airblast overpressure level from blasting operations carried out in or on the premises must not exceed:<br>(a) 115 dB( Lin Peak) for more than 5% of the total number of blasts during each</td><td>The blast overpressure criteria of >115dBL was exceeded more than 5% of the time at both the St Clements Church and Camberwell village monitoring</td></tr>
</table>

**Table 3. ENVIRONMENTAL AUDIT – NON-COMPLIANCES IDENTIFIED DURING THE INDEPENDENT ENVIRONMENTAL AUDIT**

<table>
<tr><th>Condition</th><th>Description</th><th>Comments</th></tr>
<tr><td></td><td>reporting period; and<br><br>(b) 120 dB (Lin Peak) at any time.<br><br>at any residence or other noise sensitive receiver such as the St Clements Anglican Church and Camberwell Community Hall.</td><td>locations during the 2008-09 period.<br><br>The >120dBL criteria was exceeded once in June 2009 at both the Church and Camberwell Village locations.<br><br>For the period September 2009 to August 2010 the >115dBL criteria exceeding 5% occurred at both the Camberwell Village and Camberwell Church sites. There were two exceedences of the >120dBL level recorded at Camberwell Church - one in December 2009 and one in January 2010.</td></tr>
<tr><td>6.34</td><td>Except as may be expressly provided by a DECCW licence, noise generated by the development must not exceed the limits specified in Table 5 below.<br><br>Table 5 Noise Limits (dB(A))
<table>
<tr><th>Location</th><th>Day</th><th>Evening</th><th>Night</th></tr>
<tr><td></td><td>LAeq (15 min)</td><td>LAeq (15min)</td><td>LAeq (15 min)</td></tr>
<tr><td>Any residence not owned by the Applicant or not subject to an agreement between the Applicant and he residence owner as to an alternate noise.</td><td>38</td><td>38</td><td>36</td></tr>
</table></td><td>The results of the noise monitoring between 2007 and 2010 generally demonstrate conformance of the noise emissions from the ACP operations with the predicted noise levels and the MCoA/EPL criteria. There were minor exceedences of the 38dB (A) criteria during the monitoring in Q1 and Q4 2007-08.</td></tr>
</table>

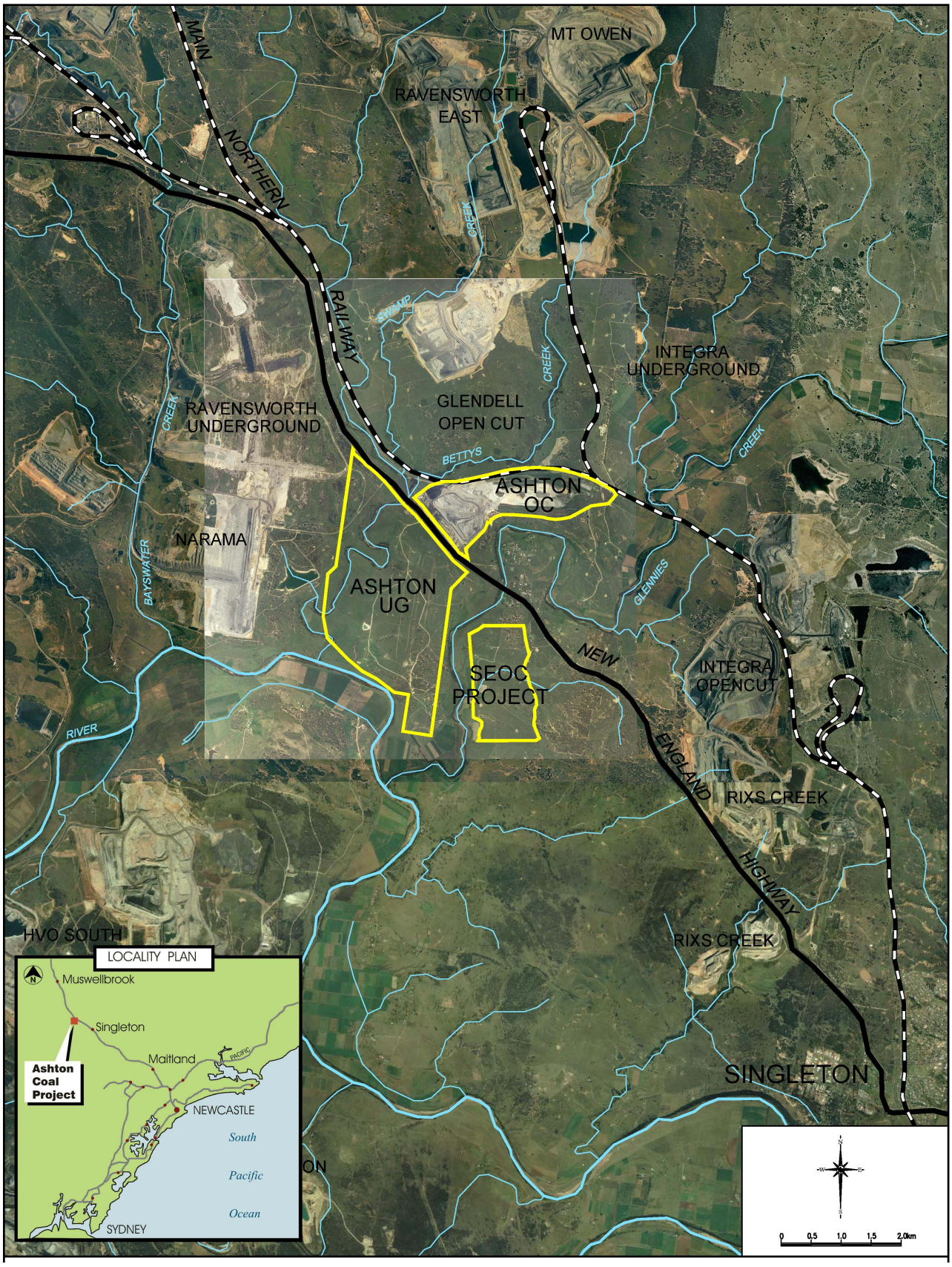



**Figure 1. Ashton Coal Location Plan**

### 1.4 ENVIRONMENTAL MANAGEMENT PLAN UPDATE

There were no Environmental Management Plans updated during the AEMR period.

## 2.0 OPERATIONS DURING THE REPORTING PERIOD

### 2.1 EXPLORATION

**Mining Lease 1533**

- Open Cut - No exploration activities were undertaken.
- Underground - 16 holes (2 cored holes and 14 open holes)

**Exploration Licences 5860 & 4918**

- Area being assessed - No exploration activities were undertaken.

### 2.2 LAND PREPARATION

No clearing was undertaken during the reporting period.

### 2.3 CONSTRUCTION

#### 2.3.1 Underground

During the period ACOL installed and commissioned the Borehole Number 2 dewatering production pump. The pump is located at the southern end of Longwall 5 and is used for dewatering of the Underground operations. Water is conveyed across ACOL property from the borehole to the Process Water Dam at the CHPP via a buried pipeline. Operation of the pump is driven by a float system which activates pumping. The capacity of the pump is 45 L/s to the Process Water Dam.

An extension of the Backroad Ventilation Borehole was completed with a ventilation fan being installed and commissioned onto the borehole. The vent fan draws 20$m^3$/second of air out of the mine as a return. Prior to installation the borehole served as a ventilation intake point.

#### 2.3.2 Coal Handling and Preparation Plant

During the period the saddle dam at the eastern end of the Void 4 tailings dam was constructed and the final lift of the western wall was completed. Due to the location of the eastern saddle dam was required to be a prescribed dam under the NSW Dams Safety Act, however the western wall was categorised as low potential risk and was not required to be prescribed.

The eastern saddle embankment was constructed in two stages due to timing issues and the requirement for power line relocations to allow the full height to be achieved. The first stage of

the eastern saddle embankment was constructed to a level of RL 90 m. The second stage also completed during the reporting period raised the embankment to a final level of RL 95 m. The eastern embankment comprises a zoned embankment constructed of mine spoil, with the upstream face sloping at 2:1 and the downstream face sloping at 2.5:1. The dam incorporates a foundation blanket filter to intercept any seepage which may infiltrate the spoil material beneath the embankment.

The design of the western embankment of the tailings facility incorporated a staged construction, with the second stage to be constructed when the undermining from Ravensworth underground was complete. The aim of this was to minimise the potential for subsidence damage. The stage 1 embankment had an initial height of 45 metres (RL 95m), with a final second stage height of 55 metres (RL 105m). The dam comprises a zoned earthfill/rockfill embankment, with the upstream face sloping at 2:1 and the downstream face sloping at 2.5:1. A chimney filter and foundation filter blanket are also included as a protective measure against possible cracking and piping caused by mine subsidence.

During the reporting period Ravensworth Underground completed mining under the tailings facility allowing the final stage of the western wall lift to be completed. During undermining routine monitoring was undertaken by a qualified dam safety specialist and there were no detrimental impacts to the facility identified.

### 2.3.3 Open Cut

No construction was undertaken in the Open Cut operations during the reporting period.

## 2.4 MINING

### 2.4.1 Estimated Mine Life

The life-of-mine plan for the Open Cut Mine anticipates that open cut mining will be completed by January 2011.

The Underground Mine has now been operating since December 2005. The expected mine life is until 2023.

### 2.4.2 Mine Production and Mining Constraints

#### 2.4.2.1 Geology

The major coal seams identified at Ashton are (in descending stratigraphical order); the Lemington, Pikes Gully, Arties, Upper Liddell, Middle Liddell, Upper Lower Liddell, Lower Lower Liddell, Upper Barrett and Lower Barrett seams.

The strata within the Foybrook Formation comprises in order of predominance, fine to coarse grained sandstone, siltstone, conglomerate, mudstone, shale and coal. The top of the formation

corresponds with the base of the overlying Bulga Formation which in turn is overlain by the Archerfield Sandstone and Jerrys Plains Sub group respectively. The later includes the Bayswater Seam that has been mined in the adjacent Ravensworth development. Only a remnant portion of the Bayswater seam exists in the far western part of the project area.

The principal structural feature of the project area is the Camberwell Anticline. The axis of this structure trends along the eastern boundary of EL4918. The coal seams of principal interest subcrop along the eastern part of the mining area. These subcrops define the westerly dipping limb of the Camberwell Anticline. In the north eastern part of the project area the formation is folded around the axis of the Camberwell Anticline. At this location the formation is more steeply inclined, up to 22 degrees on the eastern limb, with a flatter dip of less than 10 degrees on the western limb. As mining has progressed minor faulting has been detected sub parallel with, and adjacent to, the crest of the anticline in the open cut operation. This faulting is predominantly reverse faults formed in conjunction with the Camberwell Anticline.

During the period minor north-south trending normal faults have been intersected in the underground longwall panels. Small scale compression structures have also been encountered in the north-west development panel.

Total geological resources within Ashton was 441 Million tonnes (Mt) at the end of December 2009. Of this quantum, 248 Mt is measured and 139 Mt indicated. Coal resources have been assessed from the in-situ coal inventory and have been further segregated on the basis of Underground or Open Cut development potential.

### 2.4.2.2 Open Cut

#### Seams

The seams targeted during Open Cut operations (in descending order) are as follows:

- *Pikes Gully;*
- *Upper Arties;*
- *Arties;*
- *Upper Liddell;*
- *Middle Liddell;*
- *Upper Lower Liddell;*
- *Lower Lower Liddell;*
- *Upper Barrett;*
- *Upper Barrett Split;*
- *Lower Barrett Split; and*
- *Lower Barrett.*

#### *Coal Analysis*

An assessment of the ROM coal that is recovered from the Open Cut mine found that it generally has an ash content of 18% to 32%. Following processing in the CHPP, steaming and semi soft coking coal is produced for the export market and sized raw coal for domestic consumption. Analysis of the recoverable coal revealed significant proportions of Vitrinite and low amounts of elements such as sulphur, chlorine and phosphorous.

#### Coal Reserves

The Open Cut is encompassed by ML 1533 which covers an area of 883 hectares (ha) and by the end of January 2011 all extractable coal reserves will have been mined.

#### Mining Constraints

Significant mining constraints in the Open Cut operation include:

- The proximity of the village of Camberwell to the site;
- The location of the Main Northern Railway;
- Glennies Creek Road; and
- Geological conditions that limit the area available for Open Cut mining.

## Mining Operations

The Ashton Open Cut is expected to cease operations in January 2011. Ashton Open Cut operates a fleet of hydraulic excavators and associated haul trucks along with support equipment consisting of watercarts, dozers and graders. Overburden is drilled and blasted prior to removal by the excavators. Overburden between seams is typically 15 – 20 m thick. Coal is usually free-dug by excavator or windrowed by dozers prior to loading in the case of thinner seams.

The Ashton Open Cut mine design has been developed to minimise environmental impacts on Camberwell village, particularly in relation to impacts from blasting vibration, dust and noise. The original mine plan with north-south strips and pit progressing from east to west has been progressively changed to east-west strips and mining from north to south. This concentrates the mining activity initially in the north-west corner of the pit, furthest from the village, and has the effect of creating a buffer as the mining operations deepen. Mining with this modified orientation minimises hauling of overburden along the southern boundary of the pit and concentrates most of the mining and hauling at levels below the environmental bund for longer periods. Mining is currently situated in the southeast zone with dumping also occurring in this area. The remaining void at the southern end of the operation will be progressively filled with CHPP reject from the continuing Underground operation.

Rehabilitation has continued on the northern face of the RL 135 dump during this reporting period. A major part of this year's rehabilitation was the construction of the second drainage drop structure on the northern face of the RL 135 dump. The dump's drainage structure design incorporates water recovery maximisation for ongoing utilisation in the CHPP. The final void drainage will ensure decant water from CHPP reject co-disposal will also be recycled once the Open Cut operations cease.

Sufficient overburden will be stockpiled to enable the rehabilitation of ACOL's disturbance area, including Underground and CHPP areas following cessation of mining.

## Hours of Operation

Under the conditions of the Development Consent and EPL11879, Open Cut mining operations are limited to the hours of 7:00 am to 10:00 pm, Monday to Saturday and 8:00 am to 10:00 pm on Sundays and public holidays. Hauling of reject material within the Open Cut pit area, operation of water carts and maintenance of equipment may be undertaken 24 hours a day, 7 days a week.

**Equipment Fleet**

Mining of overburden and coal is conducted using hydraulic excavators supported by a range of trucks and other ancillary equipment.

The Open Cut mining fleet at Ashton consists of the equipment as outlined in **Table 4**.

| Table 4. OPEN CUT AND CHPP MINING EQUIPMENT | | | |
|---|---|---|---|
| **Number** | **Description** | **Number** | **Description** |
| 2 | Liebherr 994B excavators | 4 | Cat D10T dozer |
| 1 | Liebherr 994 excavator | 2 | Cat D10R dozer |
| 9 | Komatsu 630E trucks | 1 | Cat D8R dozer |
| 3 | Komatsu 730E trucks | 2 | Cat 16H grader |
| 2 | Cat 789 trucks | 1 | Komatsu WA 600 wheel dozer |
| 3 | Cat 777 water trucks | 1 | Cat 994 wheel loader |
| 1 | Atlas L8 hammer drill | 2 | Cat 938 wheel loader |
| 1 | Atlas PM275 rotary drill | 2 | Cat 992G wheel loader |
| 1 | CAT 950E | 1 | Cat 992C wheel loader |

Permanent workshop, office and refuelling facilities are located at the northern limit of the developing open cut and in the vicinity of the Clean Coal Stockpile and Train Loading Infrastructure.

### 2.4.2.3 Underground

At the end of September 2010, the Underground Mine had Reserve of 45.0Mt, of which 21.1Mt was proved and 23.9Mt was probable. The mining plan includes sequential mining of the Pikes Gully, Upper Liddell, Upper Lower Liddell and the Lower Barrett coal seams. Underground development commenced on the 21st of December 2005.

The subsidence requirements of the development consent and the subsidence guidelines of I&I NSW have been merged. The SMP for Longwalls 1 to 4 was approved in February 2007. The SMP for Longwalls 5 & 6 and Miniwalls 7 & 8 was approved in June 2009 which included the undermining of sections of Bowmans Creek. During this reporting period, on the 18 June 2010 ACOL received SMP approval for LW/MW 9. Miniwalls have been designed for panels 7 and 8 to ensure an aquaclude is maintained between the underground workings and Bowmans Creek. Panels 5 and 6 will remain at the full width of 205m whilst the miniwalls will utilise a width to depth ratio of 0.6, Miniwalls 7 & 8 have widths of 70m and 76m respectively. Extraction of Longwall 6 is expected to finish in November 2010. The development operations in this reporting period included the drivage for Panels 5, 6 and 8.

The Underground Mine has approval to operate 24hrs a day 7 days a week. At this stage mining production activities are undertaken on a five day week basis. Additional crews are available on the weekend for maintenance and services support. Underground equipment is listed in **Table 5**.

| Table 5. ASHTON INDICATIVE UNDERGROUND MINING EQUIPMENT | | | |
|---|---|---|---|
| **Number** | **Development** | **Number** | **Production** |
| 4 | Joy 12CM 12B | 1 | Eickhoff SL750 DERDS |
| 4 | Joy Shuttle Car | 120 | Bucyrus 2 leg shield |
| 1 | Joy FX240 roof bolting miner mounted rigs | 1 | Bucyrus face conveyer (AFC) |
| 2 | Stamler Breaker Feeders | 1 | Bucyrus stage loader |
| 2 | Boot Ends | 1 | Bucyrus coal crusher |
| 1 | Contract road header | 2 | Contract Eimco LHD's |
| 1 | QDS platform roof/rib bolter | | |
| **Number** | **Ancillary** | **Number** | **Ancillary** |
| 10 | PJB Mk4.5 Man transports | 1 | Ballast trailer |
| 8 | Jug-A-O LHD's | 5 | Rambor portable roof bolters |
| 1 | Airtrak - Coalroc | 1 | QDS platform rib bolter - Coalroc |
| 2 | Flaktwoods 315kW centrifugal fans | | 21$m^3$/s auxiliary ventilation fans |
| 1 | 1600mm stacker conveyor (single VVVF drive) | 3 | Integral Rand 160 – 1000cfm air compressors |
| 2 | 1600mm conveyors (two VVVF drives each) | 2 | 1400mm conveyors (two VVVF drives each) |
| 2 | 1050 Temporary conveyors (jiffy belt) | | |

The presence of a sandstone parting within the Pikes Gully seam resulted in the shortening of Longwall panels 1, 2, 3 and 4. The shortening of the panels creates an even greater distance from the saturated alluvial of the Hunter River.

### 2.4.3 Production and Waste Summary

Operations in the reporting period and predictions for the next reporting period are detailed in **Table 6**.

**Table 6. PRODUCTION WASTE SUMMARY**

| | CUMULATIVE PRODUCTION | | |
|---|---|---|---|
| | Start of this Reporting Period | At end of this Reporting Period | Est. end of next Reporting Period |
| Topsoil Stripped ($m^3$) | 158,200 | 158,200 | 158,200 |
| Topsoil used/spread ($m^3$) | 99,798 | 105,758 | 117,758 |
| Overburden (bcm) | 59,196,434 | 67,434,057 | 70,209,931 |
| Open Cut ROM Coal (t) | 10,550,572 | 12,388,329 | 13,000,915 |
| Underground ROM Coal (t) | 7,281,038 | 9,739,802 | 11,378,978 |
| Total ROM Coal (t) | 17,831,610 | 22,128,131 | 24,379,893 |
| Processing Waste (t) | 6,706,605 | 8,402,110 | 9,335,273 |
| Open Cut Product Coal (t) | 6,481,656 | 7,583,945 | 7,951,375 |
| Underground Product Coal (t) | 4,260,836 | 5,687,590 | 6,638,759 |
| Total Product Coal (t) | 10,742,492 | 13,271,535 | 14,590,134 |

### 2.4.4 Changes in Mining Equipment or Method

During this period there were no changes in mining equipment or methods.

## 2.5 MINERAL PROCESSING

The CHPP incorporates two modules (400tph and 600tph) which are operated independently to produce the total designed throughput of 1000tph. The associated materials handling is designed for 1000tph and includes two rotary breakers on the ROM coal side, one feeding Open Cut coal and the other Underground, and a skyline conveyor on the product coal side. Product coal is recovered through a series of coal valves and conveyed to a Train Loading Station mounted over a dedicated rail siding.

The CHPP is operated by ACOL and manned on a 24 hours a day 5 days per week basis. However if required the CHPP has the ability to operate 24 hours a day 7 days a week. Train loading may operate 7 days a week and is dependent on the rail schedule.

The CHPP processed 4.44Mt ROM coal during the reporting period to produce 2.53Mt of semi-soft and thermal product coal. Coal was transported by rail to the Port of Newcastle for sale on the export market. Some semi soft coking coal was sold to domestic steel mills.

**Figure 2. Coal Handling Preparation Plant**

## 2.6 WASTE MANAGEMENT

Coarse rejects are transferred to a rejects bin, loaded on to ACOL trucks and transported to the overburden dump for disposal. A total of 1.38Mt of coarse reject material were disposed of in this manner during the reporting period.

Fine rejects are pumped to the Mac Gen Void 4 tailings dam. A total of 545Kt of fine reject material was pumped to the Mac Gen tailings dam during the period.

### 2.6.1 Chemical/Physical Characteristics of Residues

Coarse rejects are generally mudstones and claystones, with some sandstones, and generally contain minimal amounts of carbonaceous material.

The fine rejects contain finely disseminated clays and mudstone, which have been flocculated using a relatively inert chemical. It contains a higher concentration of carbonaceous material than the coarse reject.

### 2.6.2 Handling and Disposal Procedures

Procedures for the disposal of both coarse and fine reject material are contained in the MOP and the Tipping Rules developed by the Open Cut Mine Manager.

### 2.6.3 Monitoring and Maintenance of Containment Facilities

All coarse reject material is disposed of within the Eastern Emplacement Area and covered with inert overburden material.

Emplacement of all tailings occurs in the Ravensworth Void 4 tailings dam. The Tailings Emplacement Operations Plan defines the management of the Void 4 tailings facility.

Monitoring includes;

- Continuous Flow Monitoring,
- Twice a week inspections,
- Monthly inspections,
- Subsidence Monitoring, and
- Emplacement Surveillance Report

### 2.6.4 Sewage Treatment/Disposal

ACOL operates three (3) on-site sewerage management systems, these being:

1. Underground mine bathhouse and administration building combined, which treats the waste from 48 showers, 14 WC's, 11 hand basins and 2 sinks. The sewage treatment system is a two stage Biolytix type with tertiary bromide dosing. Treated effluent is disposed of by spray irrigation. During the reporting period a buffer tank and controlled release pumping system was installed to alleviate surges in bathhouse water being delivered to the Biolytix system during shift change.

2. CHPP facilities and open cut bathhouse combined, which treats waste from 25 showers, 11 WC's, 8 hand basins and 3 sinks. The sewage treatment system is an Envirocycle type with disposal of the treated effluent by spray irrigation.

3. Open cut mine workshop which treats 4 showers, 4 WC's, three hand basins and a sink. The sewage treatment system is an Envirocycle type with disposal of the treated effluent by spray irrigation.

### 2.6.5 Total Site Waste Management Program

Ashton Coal has contracted Transpacific Industries to operate a total waste management program. The key objective of the program is to reduce waste to landfill by 20% over the first 5 years. To date the following changes have been implemented as part of the program:

- Increase in paper and cardboard recycling bins including under desk baskets, wheelie bins and skip bins across site.
- Timber recycling skip bins have been placed at each of the surface areas (UG surface, CHPP and OC workshop).
- Batteries are now recycled where possible.

- Used printer cartridges are now fully recycled through the 'Cartridges 4 Planet Ark' program.

A Transpacific Waste Management Officer (WMO) inspects ACOL's waste streams on a weekly basis. During these inspections the WMO identifies contamination of waste streams, and where efficiencies and improvements can be made to the system. All of this information is provided in a monthly report which is presented in Occupational Health, Safety and Environment meetings. Where heavy contamination is identified, the WMO will provide a toolbox talk to the relevant employees to increase awareness of the problem.

Waste tracking is also completed by Transpacific with data provided in the monthly reports.

### 2.6.6 Waste Stream Volumes

The waste stream volumes are shown in **Table 7** below.

Waste streams are separated into five end uses. These being:

- Disposal – general waste and contaminated rags.
- Energy Recovery – waste oil.
- Recycling – timber, oil filters, batteries, paper and cardboard and scrap metal.
- Reuse – refurbished air filters.
- Treatment – effluent.

**Table 7. WASTE STREAM WEIGHTS (KG) SEPTEMBER 09 – AUGUST 10**

| Waste Stream | Volume (kg)^ |
|---|---|
| General Waste (kg) | 344,130 |
| Contaminated Rags – Hydrocarbons (kg) | 1,460 |
| Effluent (kg) | 9,000 |
| Scrap Metal (kg) | 238,230 |
| Waste Oil (kg) | 146,200 |
| Oil Filters (kg) | 5,435 |
| Timber (kg) | 90,100 |
| Paper & Cardboard (kg) | 17,870 |
| Batteries - Lead Acid (kg) | 5,860 |

^ Volume for some wastes is estimated from bin collections. This method is a conservative approach and potentially overestimates the actual waste produced.

**Figure 3** presents percentage makeup of waste end use for the period.

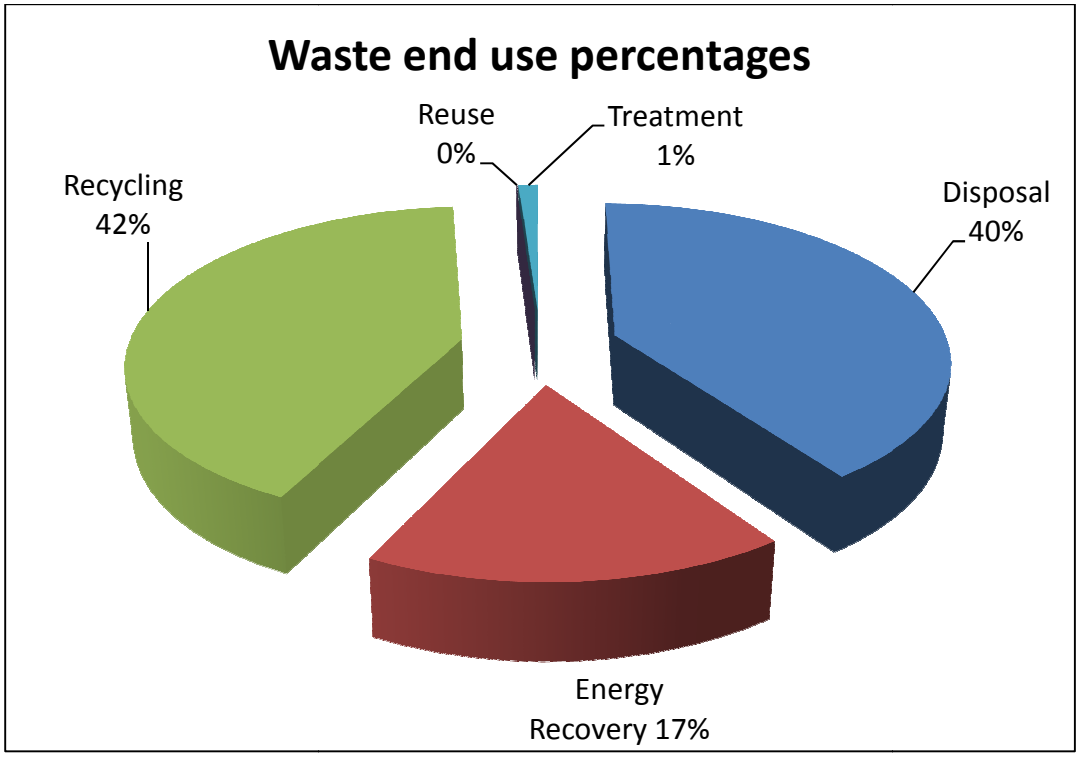



**Figure 3. Waste end use percentages**

## 2.7 ROM COAL AND COAL PRODUCT STOCKPILES

Both ROM coal and product coal are stockpiled adjacent to the CHPP. ROM coal from the Open Cut is stockpiled in a 100Kt stockpile. While the ROM coal from the Underground is stockpiled in a 160Kt stockpile. The capacity of the product coal stockpile is approximately 380Kt. All product coal was transported off site by rail during the reporting period. No changes are envisaged to this mode of transport.

## 2.8 WATER MANAGEMENT

Ashton is a nil discharge site and split water into three distinct water categories, Clean Water, Runoff Water and Mine Water.

### 2.8.1 Clean Water Management

Clean water is used only where there exists a need for water of that quality or there is a shortfall of Mine water for reuse. Clean water is currently sourced from:

- Glennies Creek; and
- The Hunter River.

This water is used untreated as raw water in the Underground, treated in an on-site water treatment plant for use in the office and bath house facilities, or used as raw top up water to the process water dam for use in the CHPP, wash down and dust suppression.

### 2.8.2 Runoff Water Management

Runoff water from some of the rehabilitation areas is directed to sediment control structures prior to runoff from site. These areas are minimised and the water is harvested back onto site for reuse as a priority.

### 2.8.3 Mine Water Management

All water contaminated by contact with carbonaceous material or collected from the general mining area catchment is classed as Mine Water and is collected on site in storage dams. This mine water is utilised in the mining process for dust suppression and in the CHPP. Where the quality is suitable this water may also be used to irrigate rehabilitated areas. There has been no irrigation of rehabilitation areas within the open cut undertaken during the reporting period.

There is an agreement in place to use excess underground water from Glennies Creek Underground Coal Mine (Integra Coal). This water supply is used to top up process water levels and for dust suppression.

### 2.8.4 Drainage

Drainage from undisturbed areas is managed in one of two ways:

- The drainage from small undisturbed areas that do not form part of the general mine catchment area are permitted to follow their natural drainage path; or
- The drainage from areas that do form part of the general mine catchment area is channelled into the runoff water dam where it is pumped to the process water dam and used in the CHPP, for wash down or dust suppression.

Drainage from disturbed areas is captured in sedimentation control dams and transferred to the process water dam and used in the CHPP, for wash down or dust suppression.

### 2.8.5 Water Supply and Demand

Licences are held by ACOL to pump water from Glennies Creek and the Hunter River for use on the mine site (refer to **Table 1**). Full allocation of Water Access Licences (WAL) was made available for the 2009-10 water year and the current 2010-11 water year.

**Tables 8** and **9** show the balance of water draw from Glennies Creek and the Hunter River respectively over the reporting period. The Glennies Creek water draw includes pumped volume as well as an underground seepage calculation to balance approved draw down in the Glennies Creek alluvium due to the underground operations. **Section 3.4** discusses in more detail the Underground alluvium impacts.

During 2006-2007 an extensive metering network was installed across site to enable detailed monitoring of all water movements. In 2008 Worley Parsons completed a water balance model for the site which has now been calibrated against three years of real site data. This model allows for future water management planning and is also utilised to undertake the 6 month site water balance. Site water balances are presented in **Table 10** and **11** for the periods 1 September 2009 to 28 February 2010 and 1 March 2010 to 31 August 2010 respectively. As detailed in **Table 10**, the initial 6 month period experienced average rainfall with 295mm recorded. This rainfall was reasonably dispersed throughout the period, with no significant runoff producing events. There was a 15 day CHPP shutdown in November 2009 which led to a decrease in water consumption during this period. All other water inflows and outflows were close to historical averages, with no water surpluses or deficits experienced.

As detailed in **Table 11**, the second half of the reporting period experienced close to average rainfall with 288mm recorded. Again the rainfall was reasonably dispersed throughout the period with no significant runoff producing events. Dust suppression water usage declined in the winter months following consistent rainfall whilst extraction from the open cut pit also decreased due to water loss into backfill material. Due to construction works at the Tailings Dam, return water pumping ceased in May 2010 leading to an increase in water loss in the CHPP water cycle. As a result, a decrease of 29ML in the water storages was observed for the second half of the reporting period.

**Table 8. BALANCE OF LICENSED WATER DRAW FROM GLENNIES CREEK**

| Month | Total Volume Pumped | Underground Seepage | Total Volume Extracted (Total Volume + Underground seepage) | Cumulative Total | Available Water Determination | Total Licensed ML | Drawdown from Total Licensed ML |
|---|---|---|---|---|---|---|---|
| A | B | C | D | E | F | G | H |
| | | | = A + B | = cum D | | | = G - E |
| **2009-10 Water Year** | | | | | | | |
| Jul-09 | 19.2 | 5.27 | 24.4 | 24.4 | 100% GS & HS, 10% CO | 480.4 | 456.0 |
| Aug-09 | 64.0 | 5.27 | 69.2 | 93.6 | 100% GS & HS, 10% CO | 480.4 | 386.8 |
| Sep-09 | 52.3 | 5.1 | 57.4 | 151.0 | 100% GS & HS, 10% CO | 480.4 | 329.4 |
| Oct-09 | 17.1 | 5.27 | 22.4 | 173.4 | 100% GS & HS, 10% CO | 480.4 | 307.0 |
| Nov-09 | 30.3 | 5.1 | 35.4 | 208.7 | 100% GS & HS, 10% CO | 480.4 | 271.7 |
| Dec-09 | 21.1 | 5.27 | 26.4 | 235.1 | 100% GS & HS, 10% CO | 480.4 | 245.3 |
| Jan-10 | 22.9 | 5.1 | 28.0 | 263.1 | 100% GS & HS, 10% CO | 480.4 | 217.3 |
| Feb-10 | 49.8 | 4.76 | 54.6 | 317.7 | 100% GS & HS, 10% CO | 480.4 | 162.7 |
| Mar-10 | 21.1 | 5.27 | 26.4 | 344.1 | 100% GS & HS, 10% CO | 480.4 | 136.3 |
| Apr-10 | 33.1 | 5.1 | 38.2 | 382.3 | 100% GS & HS, 10% CO | 480.4 | 98.1 |
| May-10 | 19.8 | 5.27 | 25.0 | 407.3 | 100% GS & HS, 10% CO | 480.4 | 73.1 |
| Jun-10 | 9.1 | 5.1 | 14.2 | 421.5 | 100% GS & HS, 10% CO | 480.4 | 58.9 |
| **Total at end of Water Year** | **359.6** | **61.9** | **421.5** | **421.5** | | **480.4** | **58.9** |
| **2010-11 Water Year** | | | | | | | |
| Jul-10 | 16.7 | 5.27 | 22.0 | 22.0 | 100% GS & HS, 10% CO | 480.4 | 458.4 |
| Aug-10 | 20.3 | 5.27 | 25.6 | 47.6 | 100% GS & HS, 10% CO | 480.4 | 432.8 |

GS – General Security
HS – High Security
CO – Carry Over

**Table 9. BALANCE OF LICENSED WATER DRAW FROM HUNTER RIVER**

| Month | Total Volume Pumped | Cumulative Total | Available Water Determination | Total Licensed ML | Drawdown from Total Licensed ML |
|---|---|---|---|---|---|
| **2009-10 Water Year** | | | | | |
| Jul-09 | 14.0 | 14.0 | 100% GS & HS, 10% CO | 386.5 | 372.5 |
| Aug-09 | 44.4 | 58.4 | 100% GS & HS, 10% CO | 386.5 | 328.1 |
| Sep-09 | 26.0 | 84.4 | 100% GS & HS, 10% CO | 386.5 | 302.1 |
| Oct-09 | 4.9 | 89.3 | 100% GS & HS, 10% CO | 386.5 | 297.2 |
| Nov-09 | 13.2 | 102.5 | 100% GS & HS, 10% CO | 386.5 | 284.0 |
| Dec-09 | 9.6 | 112.0 | 100% GS & HS, 10% CO | 386.5 | 274.5 |
| Jan-10 | 6.8 | 118.8 | 100% GS & HS, 10% CO | 386.5 | 267.7 |
| Feb-10 | 30.3 | 149.1 | 100% GS & HS, 10% CO | 386.5 | 237.4 |
| Mar-10 | 32.9 | 182.1 | 100% GS & HS, 10% CO | 386.5 | 204.4 |
| Apr-10 | 25.9 | 208.0 | 100% GS & HS, 10% CO | 386.5 | 178.5 |
| May-10 | 34.7 | 242.7 | 100% GS & HS, 10% CO | 386.5 | 143.8 |
| Jun-10 | 30.2 | 272.9 | 100% GS & HS, 10% CO | 386.5 | 113.6 |
| **Total at end of Water Year** | **272.9** | **272.9** | | **386.5** | **113.6** |
| **2010-11 Water Year** | | | | | |
| Jul-10 | 11.5 | 11.5 | 100% GS & HS, 10% CO | 386.5 | 375.0 |
| Aug-10 | 2.4 | 13.9 | 100% GS & HS, 10% CO | 386.5 | 372.6 |

GS – General Security
HS – High Security
CO – Carry Over

| Table 10. WATER BALANCE RESULTS FROM 1 SEPTEMBER '09 TO 28 FEBRUARY '10 | |
|---|---|
| Rainfall Over Period | 295mm |
| Stored Water at Start of Period | 107 ML |
| Stored Water at End of period | 163 ML |
| Change in Storage | +56 ML |
| **Water Movements** | **Total Flow Over Period (ML)** |
| **Water Inflows** | |
| • Rainfall Runoff (estimated)^ | 52 |
| • Hunter River Extraction (measured) | 90.8 |
| • Glennies Creek Extraction (measured) | 224.2 |
| • Inflow from Glennies Creek Mine (measured) | 217 |
| • Pump out from open cut (estimated) | 122 |
| • Net Water make from underground operation (measured) | 77 |
| **Total Inflows** | **783** |
| **Water Outflows** | |
| • Dust Suppression (estimated) | 239 |
| • Coal Processing Plant (measured) | 443 |
| • Evaporation Losses (estimated) | 45 |
| **Total Outflows** | **727** |
| **Inflows – Outflows** | **+56** |

^Based on a 144ha Catchment area. Does not include runoff from the Open Cut pit.

| Table 11. WATER BALANCE RESULTS FROM 1 MARCH '10 TO 31 AUGUST '10 | |
|---|---|
| Rainfall Over Period | 288 mm |
| Stored Water at Start of Period | 163 ML |
| Stored Water at End of period | 174 ML |
| Change in Storage | +11 ML |
| **Water Movements** | **Total Flow Over Period (ML)** |
| **Water Inflows** | |
| • Rainfall Runoff (estimated)^ | 86 |
| • Hunter River Extraction (measured) | 137.6 |
| • Glennies Creek Extraction (measured) | 151.4 |
| • Inflow from Glennies Creek Mine (measured) | 219 |
| • Pump out from open cut (estimated) | 84 |
| • Net Water make from underground operation (measured) | 93 |
| **Total Inflows** | **771** |
| **Water Outflows** | |
| • Dust Suppression | 186 |
| • Coal Processing Plant | 550 |
| • Evaporation Losses | 24 |
| **Total Outflows** | **760** |
| **Inflows – Outflows** | **+11** |

^Based on a 144ha Catchment area. Does not include runoff from the Open Cut pit.

## 2.9 HAZARDOUS MATERIAL MANAGEMENT

### 2.9.1 Fuel Containment

The open cut workshop and fuel storage facilities have a dedicated bunded area for both fuel and oil storage. No changes have been made to these facilities during the reporting period.

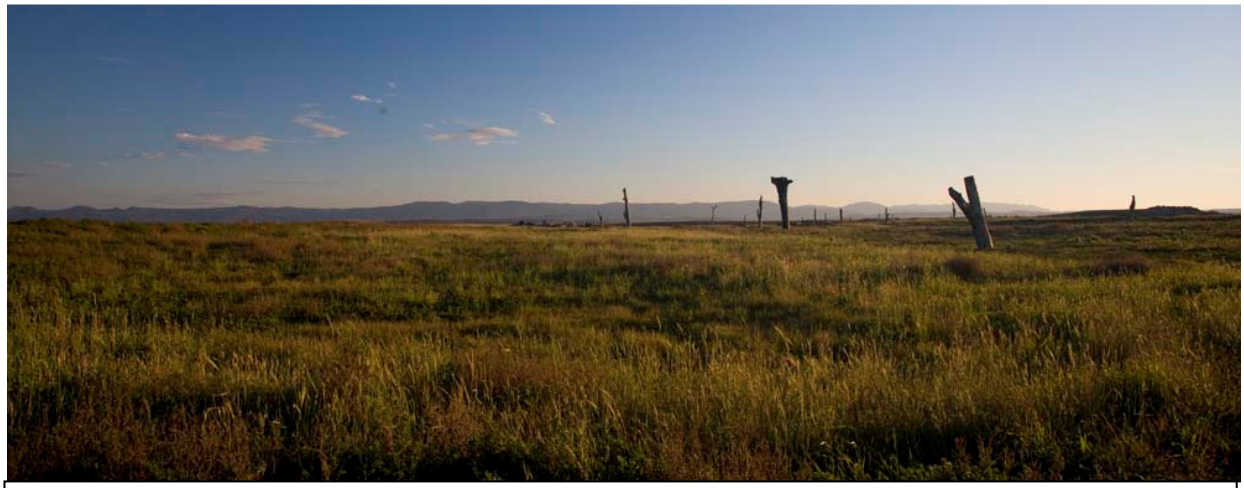
Only small volumes of specialised lubricants are stored at the CHPP. These are stored in a dedicated bunded area.

## 2.10 OTHER INFRASTRUCTURE MANAGEMENT

Other infrastructure established on site includes a railway siding, various roads, electricity reticulation, site communications and water reticulation system.

***Tailings Disposal***

ACOL disposes of tailings in Macquarie Generation's Void 4 (East) at Ravensworth. Inspections are undertaken to assess the storage capacity of the detention ponds and check for any damage or leaking in the pipeline.



Top of eastern emplacement rehabilitation

# 3.0 ENVIRONMENTAL MANAGEMENT AND PERFORMANCE

## 3.1 AIR POLLUTION

### 3.1.1 Air Pollution Management

Ashton Coal has an approved Air Quality Management Plan. Controls have been put in place in accordance with this plan to control potential causes of air pollution. These controls are considered to have been adequate for the reporting period, and are described below.

***Planning Controls***

ACOL has implemented the following planning controls:

- A network of real time environmental monitoring stations has been established on site;
- ACOL has developed protocols involving specific operational controls when the wind is emanating from the northwest sector to minimise the effect of emissions on the village of Camberwell. The trigger to stop operations is generated by real-time monitoring.
- Large earth berms and tree plantations between the operations and the village have been constructed and planted;
- The active mining area continues to be minimised.

***Engineering Controls***

Engineering controls are implemented on the ACOL site during mining operations. These include but are not necessarily limited to:

- Water carts utilised around the site to keep trafficked areas in a damp condition;
- All stockpiles are kept damp by the use of fixed or mobile water sprays under dry and windy conditions;
- Roads are regularly graded to ensure that loose dust-generating surface material is kept to the lowest level practicable;
- Speed limits on mine roads are restricted to 60 km/hr. Speed limits will be reduced if required to maintain dust emission at minimum levels;
- Roads are clearly delineated to minimise trafficked areas and to ensure that traffic is kept to watered areas;
- Drills are fitted with dust control equipment and graded rock will be used to stem blast holes. Drill rigs use water injection for drilling and drill areas are wet down prior to drilling during dry and windy conditions;
- Haul trucks and other earthmoving equipment with upwardly directed exhausts are used on site to minimise the generation of dust by exhaust emissions;
- All diesel equipment used on site is maintained properly and fitted with appropriate pollution control devices; and

***Operational Controls***

Active controls involve the continuous management of dust generating activities to ensure that dust emissions do not affect nearby sensitive receptors. Operations are managed in response to real time air quality and weather data measured within the village and surrounds in accordance with set protocols. Other controls include day-to-day planning of mining activities and taking account of forecast weather and actual weather conditions.

Specific Operational controls include:

- There will be no dumping on high levels of emplacement areas when ten minute average wind speeds exceed 10 m/s and the wind is emanating from the northwest sector;
- Dumping, dozing, loading and haulage operations will be managed to minimise the amount of visible dust exiting the “lease” area; and
- Blasting is to be undertaken using procedures that will involve an assessment of meteorological conditions and will be designed to prevent dust and other emissions causing exceedences, or air quality goals or nuisance effects. Such controls are detailed in the Blasting and Vibration Management Plan.
- Four water carts are used onsite at Ashton Coal. Two of these operate permanently during open cut operations with the remainder being utilised when the conditions necessitate.

***Improvements during the Reporting Period***

Improvements made during the reporting period to reduce the potential for the generation of dust from site activities include;

- A further 9.75ha of the Eastern Emplacement Area was rehabilitated,

There are daily operational changes which are undertaken as standard practice by the Open Cut Examiner, and CHPP supervisors. These are based on standard scenarios of pit and weather conditions and/or response to complaints. These standard controls are listed above and are inclusive of moving operations within the pit, operation of additional water carts and stockpile water sprays. In addition to these standard scenario controls other higher level operational changes may be undertaken on site at the discretion of the Mine Manager in consultation with the Environmental Officer. These additional higher level operational changes are listed in **Table 12.** Things that may be considered higher level controls include cancellation or change of blast times and shutting down of pit operations.

| Table 12. OPERATIONAL CHANGES RELATING TO DUST IMPACTS | | |
|---|---|---|
| **Date** | **Issue** | **Changes Undertaken** |
| 17/09/2009 | Increase in PM10 levels following strong winds. | Excavator 19 shutdown at 3:00pm. Blast patterns were wet down to prevent dust generation from drill cuttings. Ex 19 started back up at 4:30pm. |
| 23/09/2009 | Severe dust storm experienced. | All operations shutdown in Open Cut pit for entire day due to elevated $PM_{10}$ levels. |
| 23/09/2009 | Severe dust storm experienced. | Blast cancelled. |
| 26/09/2009 | Dust Storm experienced in Hunter Valley 24hr average PM10 levels approaching 150µg/m³. | All water carts operating from 6:30am onwards. Shutdown 2 Excavators from 11:00am for remainder of day. |
| 14/10/2009 | Dust storm experienced leading to 24hr average PM10 levels above 150µg/m³. | All equipment shutdown at 12pm for remainder of day. |
| 22/11/2009 | PM10 levels increased from 6pm on the 22nd through till 4am the following day | All water carts operating following increase in PM10 levels. No decrease in PM10 levels following ACOL shutdown at 10pm. PM10 increase appears to be associated with outside source. |
| 27/11/09 | Windy conditions. | Blast cancelled. |
| 28/11/09 | PM10 levels increased due to dust storm. Elevated levels experienced from 7:30pm on the 28th through to 2:30am the following day | All remaining water carts started up following increase in PM10 levels. All exposed operations ceased. PM10 levels continued to increase following shutdown. |
| 29/11/2009 | Dust storm experienced. PM10 levels exceeding 150µg/m³. | At 9am two surface Excavators shutdown with coal loader and Lower Barrett Excavator running in pit. At 1pm all operations shutdown. |
| 18/01/2010 | $PM_{10}$ levels increasing. North easterly winds | A third water cart began operating. All equipment was shut down during crib times. All 3 water carts continued to work for the remainder of the shift. $PM_{10}$ levels decreased in response. |
| 20/01/2010 | $PM_{10}$ levels increasing Ashton contribution increasing towards 50 micrograms | At 8:30am the third water cart was put into operation. 4:30pm the 994 Loader was shutdown and all water carts continued to operate. 5pm Ex19 was also shutdown for the remainder of the shift. $PM_{10}$ levels decreased in response. |
| 12/02/2010 | North westerly winds greater the 6m/s | Blast scheduled for 12pm was postponed until 4pm. |
| 16/03/2010 | North Westerly winds unfavourable for blasting | Blast postponed from 9am to 11am |
| 19/03/2010 | North Westerly winds unfavourable for blasting | Blast postponed until 22/03/2010 9am. |
| 09/04/2010 | Light North Westerly winds unfavourable conditions for blasting were being experienced. Blast postponed until predicted South Easterly wind direction changes came through. | Blast postponed until 1pm. |
| 05/05/210 | North Westerly wind conditions experienced (8.7m/s). | Blast postponed until 9am Thursday 6 May. |
| 11/06/2010 | 8.4m/s NW winds | Blast postponed until Saturday 12/06/10 |
| 19/07/2010 | High Inversion | Bulldozer shutdown on CHPP Stockpiles |
| 25/08/2010 | Due to predicted winds greater than 10m/s | Due to the high winds on Wednesday 25th and |

| Table 12. OPERATIONAL CHANGES RELATING TO DUST IMPACTS | | |
|---|---|---|
| **Date** | **Issue** | **Changes Undertaken** |
| | | expected high winds for Thursday and Friday blast has been postponed until Saturday 28th. |
| 26/08/2010 | Due to increased winds OGM was blowing around when spending | Ceased spreading OGM at 8am |
| 27/08/2010 | >10m/s winds | Ceased dumping on high dump until wind levels came back below 10m/s |

### 3.1.2 Meteorological Monitoring

Ashton established two meteorological monitoring stations prior to the commencement of construction and operation activities on site. These are located at Monitoring Location 1 in the village of Camberwell and at the Repeater Station on the ridge above the village (see **Figure 4**). The repeater station is the primary meteorological station from which wind direction and speed are assessed for mine operation purposes, whilst Location 1 is primarily used to measure temperature inversions. These weather stations are calibrated annually.

**Rainfall**
Rainfall data for the reporting period is displayed in the following table.

| Table 13. RAINFALL DATA 2009-2010 | | |
|---|---|---|
| **Month** | **Rainfall (mm)** | **Long Term Median Rainfall *(mm)** |
| Sep-09 | 27.6 | 50.4 |
| Oct-09 | 47.0 | 34.5 |
| Nov-09 | 28.4 | 64.6 |
| Dec-09 | 67.6 | 83.4 |
| Jan-10 | 51.0 | 69.6 |
| Feb-10 | 66.6 | 94.7 |
| Mar-10 | 69.8 | 68.5 |
| Apr-10 | 24.8 | 41.3 |
| May-10 | 70.2 | 43.6 |
| Jun-10 | 40.2 | 43.8 |
| Jul-10 | 64.8 | 40.8 |
| Aug-10 | 24.5 | 31.5 |
| **Total** | **582.5** | **666.7** |

*Long Term Median Data from Bureau of Meteorology, for Singleton STP.

Annual rainfall for the period was below the long term median for Singleton NSW. A drier period was experienced throughout the first 6 months of the reporting period (September 2009 to February 10) receiving 288.2mm compared to the long term average of 397.2mm. The second half of the reporting period, March 2010 to August 2010, above average rainfall was received with 294.3mm compared to 269.5mm for the long term median rainfall.

**Wind Speed and Direction**

Observed wind patterns for the period are outlined in **Table 14**.

**Table 14. WIND PATTERNS BY MONTH 2009- 2010**

| Month | Primary Wind Direction (Quadrant) |
|---|---|
| September | NW |
| October | SE |
| November | SE |
| December | SE |
| January | SE |
| February | SE |
| March | SE |
| April | SE |
| May | NW |
| June | NW |
| July | NW |
| August | NW |

Winds generally followed a consistent trend to the longterm climatic conditions experienced in the Hunter Valley with a dominance of north westerlies from mid-autumn through to mid-spring and southerlies through October to April.

### 3.1.3 Dust Criteria and Monitoring

A network of real-time environmental monitoring stations was installed prior to the commencement of operations and is utilised to ensure continued compliance with the criteria established in the Development Consent and the EPL.

#### 3.1.3.1 Particulate Matter < 10µg ($PM_{10}$)

The criteria for particulate matter less than 10µm ($PM_{10}$) is as follows:

- Annual mean less than 30µg/$m^3$ on a cumulative basis,
- 24 hour average contribution from Ashton Mine not to exceed 50µg/$m^3$, and
- Maximum cumulative 24 hour average not to exceed 150µg/$m^3$.

Locations of $PM_{10}$ monitoring stations are detailed on **Figure 5** and **Table 15**.

| Table 15. LOCATION OF $PM_{10}$ MONITORING STATIONS | |
|---|---|
| **Monitoring Station No** | **Location** |
| 1 | Camberwell village (north) |
| 2 | Camberwell village (south) |
| 3 | Property east of Camberwell village |
| 4 | Onsite north of Eastern Emplacement Area |
| 7 | Onsite at country end of rail siding |
| 8 | Camberwell village (east) |

Monitoring Locations 4 and 7 are situated to the north of mining operations, immediately south of the Main Northern Railway and are intended to monitor the incoming concentrations of $PM_{10}$ dust when the prevailing winds are from the northwest, which is the wind direction that presents the greatest risk of impact to the village of Camberwell.

The Ashton contribution to the concentration of $PM_{10}$ at community sites is calculated by subtracting the incoming dust concentration (the lowest level recorded at sites 4 or 7 is used for this calculation) from the ambient level of dust concentration at the four community sites. This is a very conservative calculation.

PM10 data for the reporting period is presented below. Monitoring results indicate that the annual cumulative average at all 4 Community sites (1, 2, 3 and 8) was below the annual criteria of 30µg/m³. With the exception of the regional dust storms experienced near the beginning of the reporting period, there were no recorded exceedences of the 24hour average criteria of 150µg/m³ at all Community sites. There were no occasions where the 24hour Average Ashton Contribution of 50µg/m³ was exceeded at the downwind Community sites (1, 2, 3 and 8).

During the reporting period a portion of PM10 data was lost during a routine software update of the real-time monitoring system. On the 22 October 2009 a software upgrade was undertaken by the operating contractor. The first step in the upgrade process is to undertake a backup of the system; this step was commenced however unknown to the technician the backup had failed. A second failure occurred when during the software upgrade all of the historic data stored within the real time monitoring system was deleted due to a technician error. ACOL's internal backup procedure is undertaken at the end of each month hence 22 days (1 to 22 October 2009) had not been backed up by this process and was lost from the long term record. A data recovery software package was run on the computer's hard drive however no data between 1 to 22 October 2009 was retrieved.

Following the failure ACOL immediately installed a triple redundancy system providing daily backups of data to ensure the data loss will not occur in the future.

In addition, a full review of the system was undertaken and a decision made to retender the operation and maintenance of ACOL's real-time monitoring network. As a result from September 2010 ACOL has implemented a new real-time monitoring system operated by Novecom who are in the final stages of implementation of the new system. This contract has a rigorous maintenance component, and standby equipment is available locally to reduce down

time following equipment failure.

Other minor PM10 data loss events were generally caused by equipment failure, power outage or evaporation within the unit causing inaccurate results.

### Historic Trends

Long term PM 10 results from 1996 to 2001 are available for a monitoring location in close proximity to ACOL's Site 1. These results are shown below. It is difficult to undertake a direct comparrison of these results with the the ACOL monitoring results as the historic results are based on the operations of a HVAS PM10 operated every 6 days and the ACOL monitoring system is a realtime monitoring system operating 24 hours a day 7 days a week . The results however do give an indication of the historic PM10 levels within the Village of Camberwell prior to the commencment of the ACOL operations. As seen in the graph below there are several periods in time where the historic annual average is above the cummulative annual average criteria of 30µg/m$^3$.

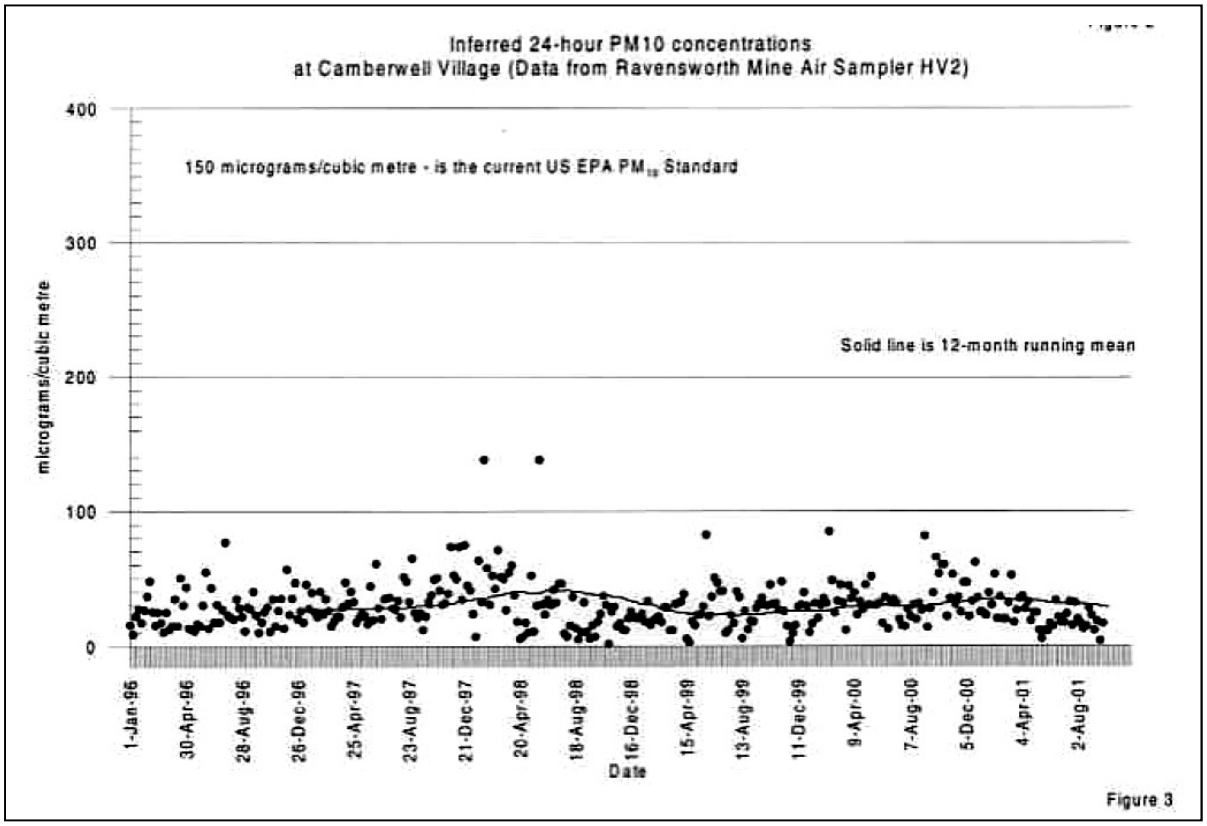


Figure 3

THIS PAGE LEFT BLANK INTENTIALLY

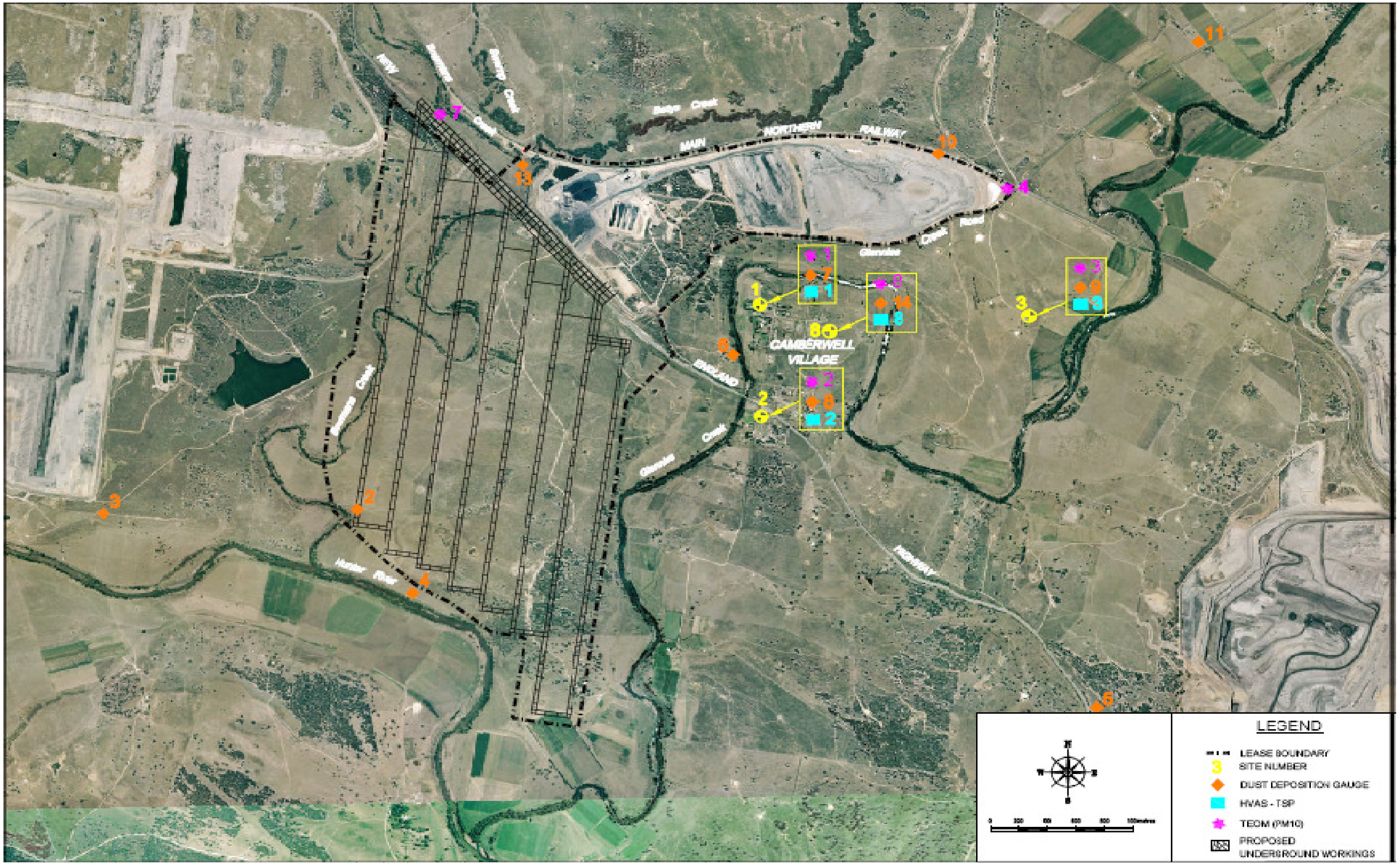
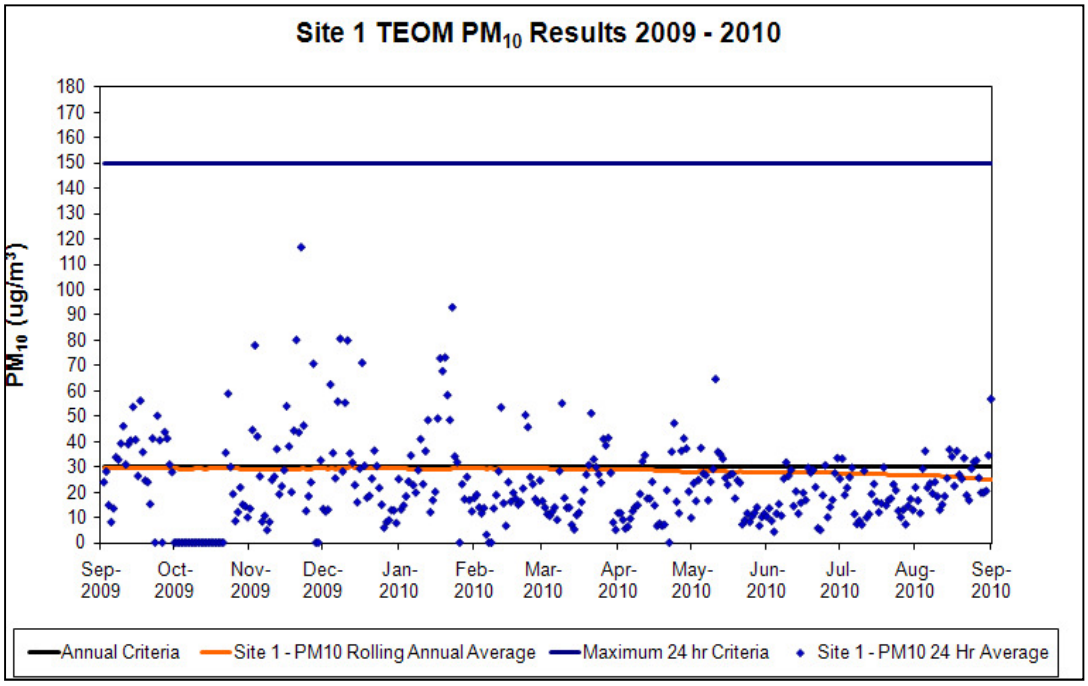



**Figure 4. Air Quality Monitoring Locations**

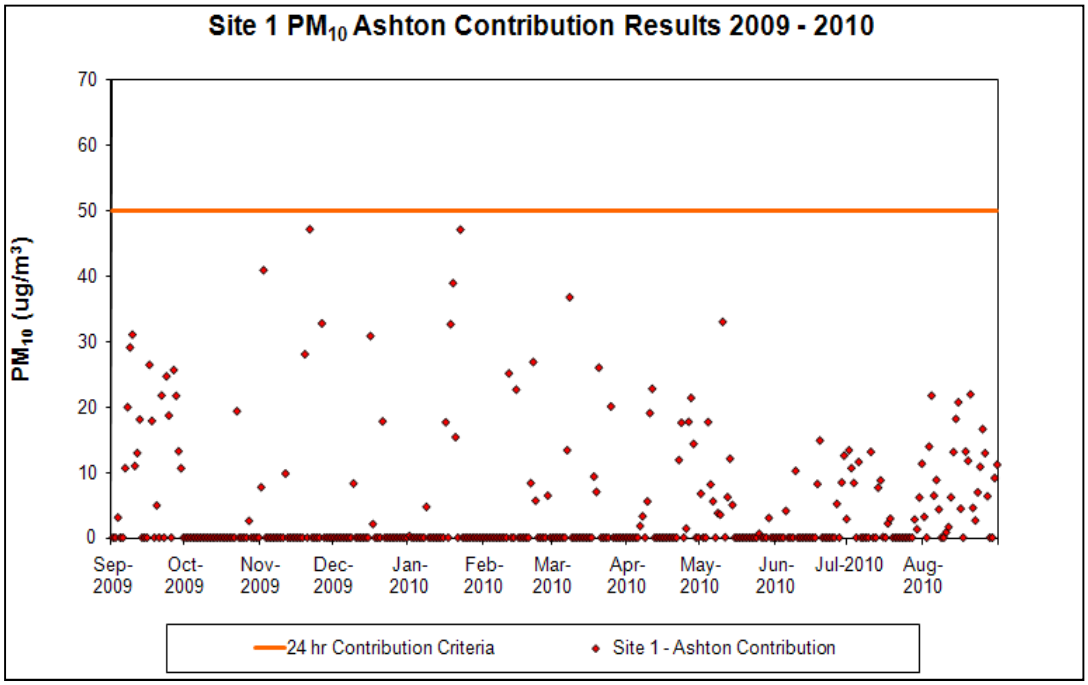
THIS PAGE LEFT BLANK INTENTIALLY

### Site 1 TEOM

Site 1 is located in the northern portion of the village of Camberwell. 93% of data was captured for Site 1 for the reporting period. Results of $PM_{10}$ monitoring at this location were as follows.




The rolling average $PM_{10}$ results for Site 1 (25µg/m$^3$) demonstrates compliance with the annual goal of 30µg/m$^3$. Site 1 also demonstrated compliance with the maximum 24hr Criteria of 150µg/m$^3$.

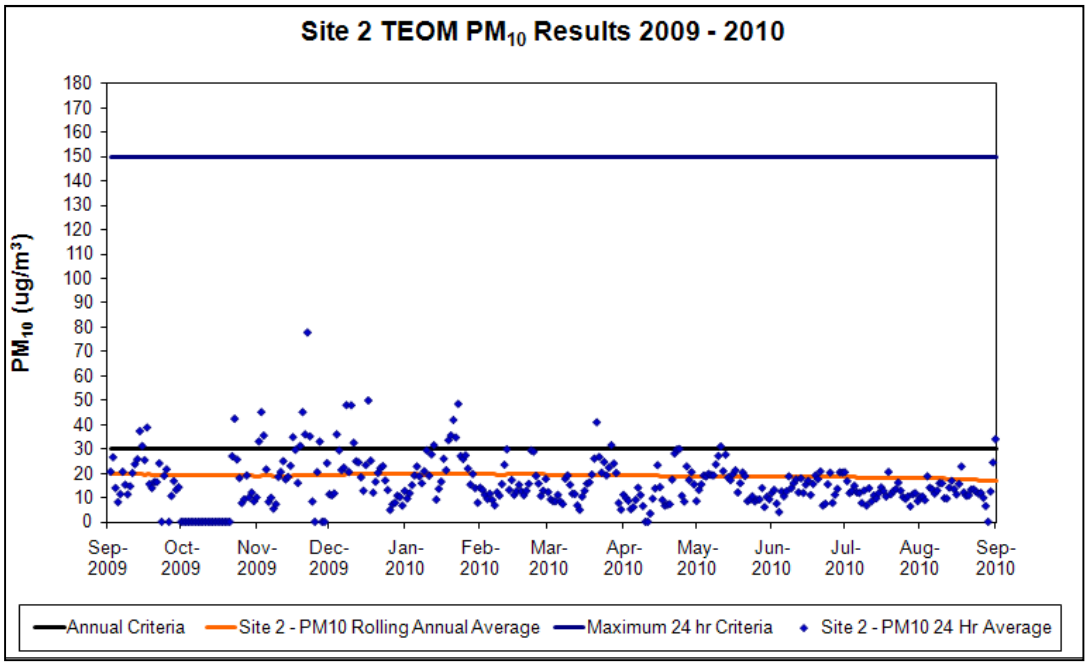



Note: Ashton Contributions are calculated where there is a NW wind direction otherwise the contribution is plotted as 0.

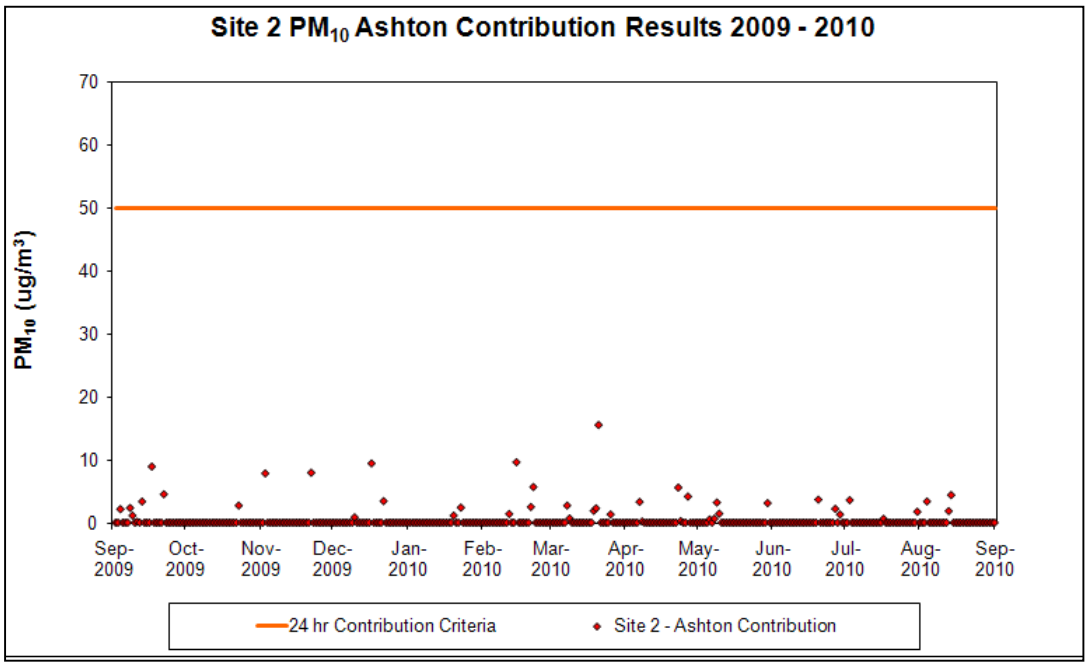
Site 1 remained in compliance with the Ashton contribution criteria of 50µg/m$^3$ at all times.

### Site 2 TEOM

Site 2 is located in Camberwell village on the south side of the New England Highway. 93% of data was captured from Site 2 for the reporting period. Results of $PM_{10}$ monitoring at this location were as follows:




The rolling average $PM_{10}$ results for Site 2 (17 µg/m$^3$) demonstrates compliance with the annual criteria of 30µg/m$^3$ and with the maximum 24 hour criteria of 150µg/m$^3$.

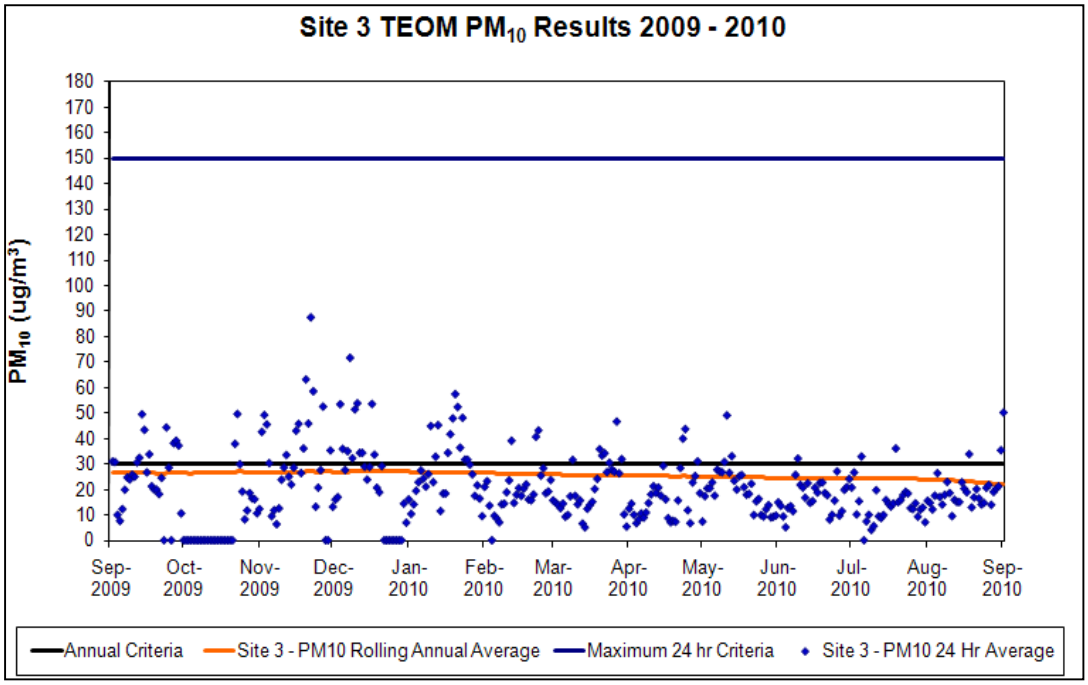



Note: Ashton Contributions are calculated where there is a NW wind direction otherwise the contribution is plotted as 0.

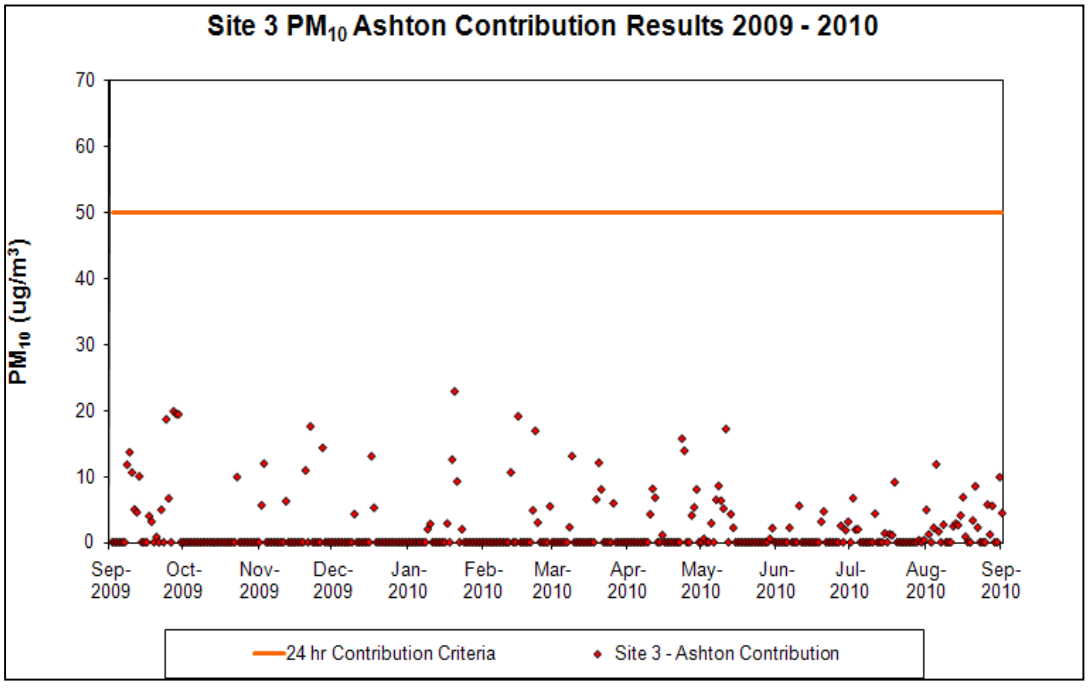
Site No 2 is located close to the New England Highway, and may be influenced by passing traffic when the winds emanate from the north, however Ashton remained in compliance with the criteria of 50µg/m$^3$ at all times.

### Site 3 TEOM

Site 3 is located on a farming property to the east of the Eastern Emplacement Area. 92% of data was recovered at Site 3 for the reporting period. Results of $PM_{10}$ monitoring at this location were as follows:




The rolling average $PM_{10}$ results for Site 3 (22 µg/m$^3$) demonstrates compliance with the annual criteria of 30µg/m$^3$. Site 3 also complied with the maximum 24 hour criteria of 150µg/m$^3$.

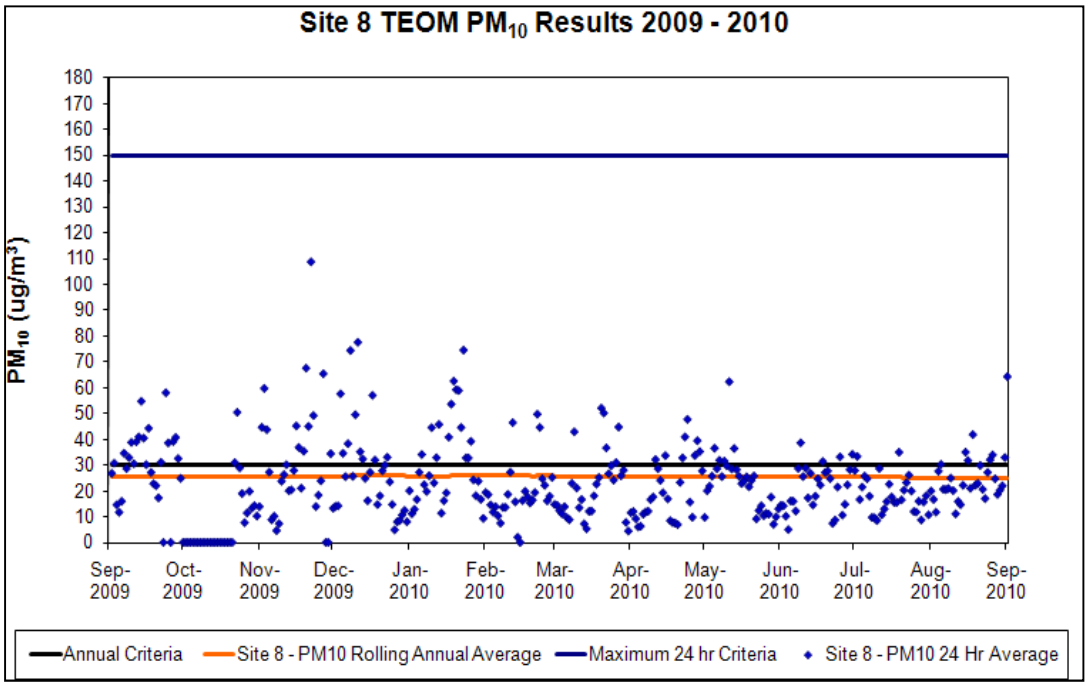



Note: Ashton Contributions are calculated where there is a NW wind direction otherwise the contribution is plotted as 0.

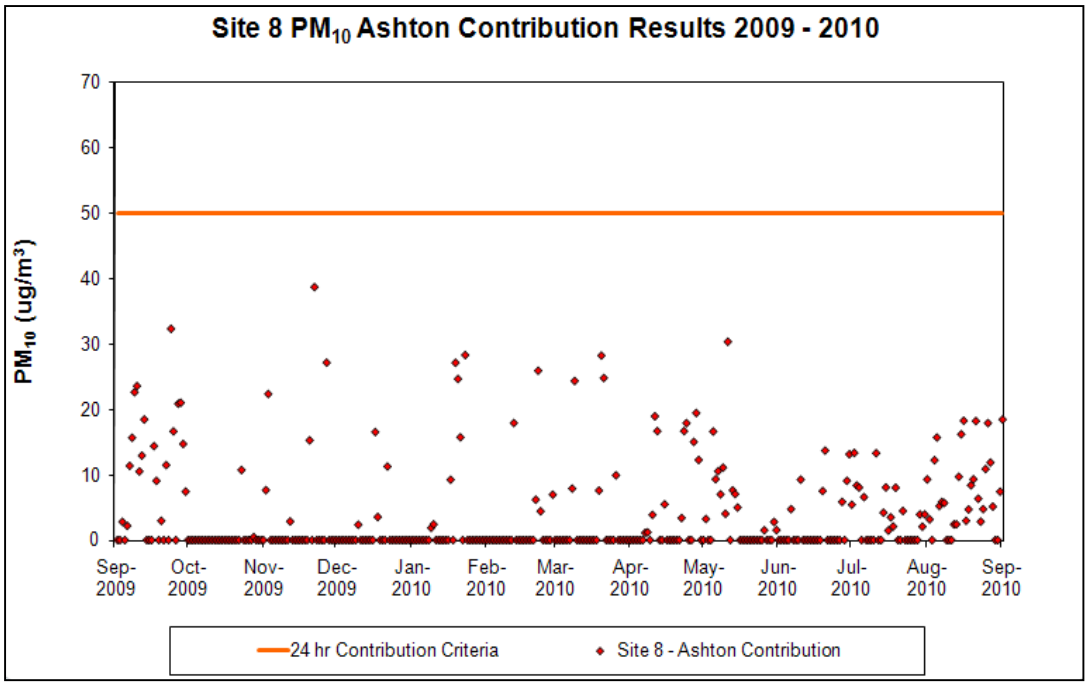
Site 3 remained in compliance with the Ashton contribution criteria of 50µg/m$^3$ at all times.

### Site 8 TEOM

Site 8 is located on the eastern side of Camberwell Village. The site recorded a 94% data recovery rate.




Site 8 (24µg/m$^3$) showed compliance with the annual criteria of 30µg/m$^3$. Site 8 also complied with the maximum 24 hour criteria of 150µg/m$^3$.



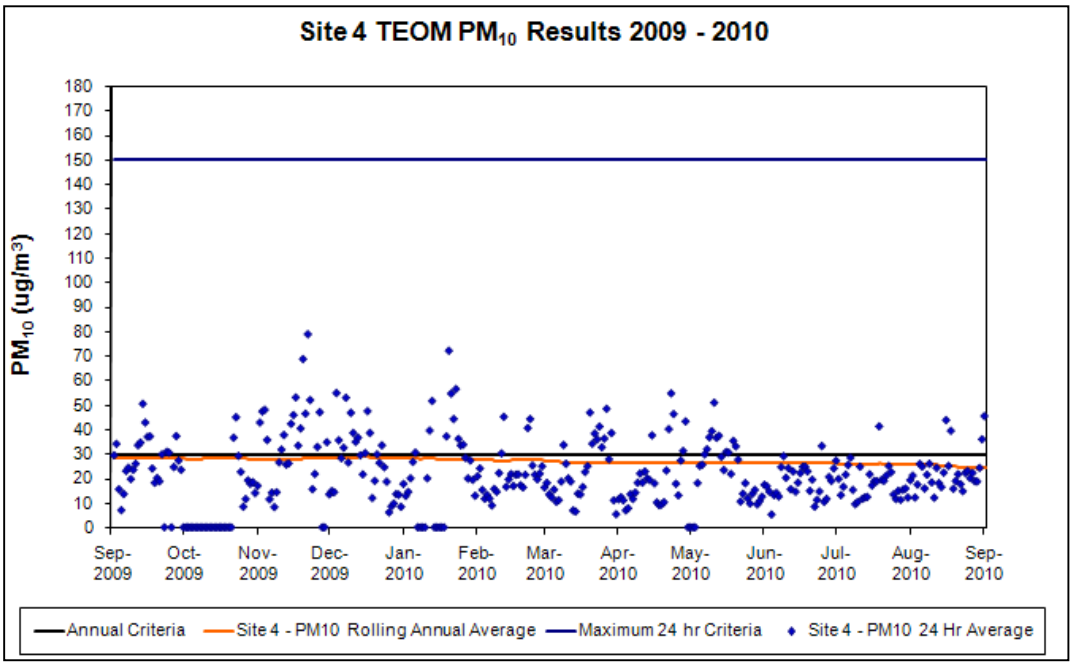

Note: Ashton Contributions are calculated where there is a NW wind direction otherwise the contribution is plotted as 0.

Site 8 remained in compliance with the Ashton contribution criteria of 50µg/m$^3$ at all times.

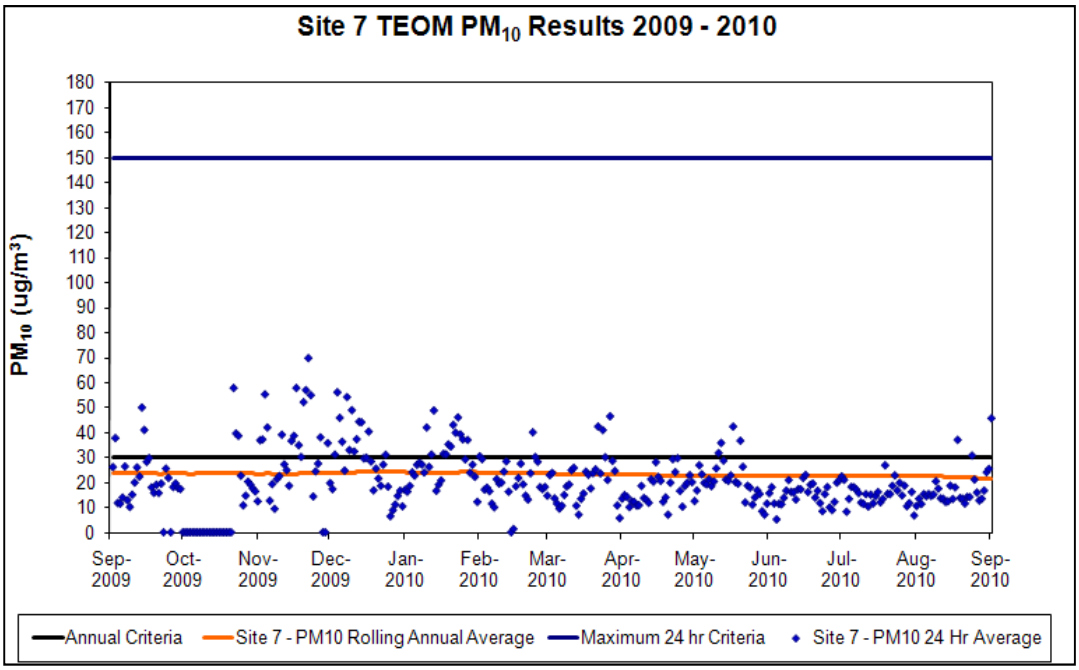
### Site 4 / 7 TEOMs (On-Site)

The annual criteria of 30µg/m$^3$ is not expected to apply to onsite TEOMS however the annual criteria was still achieved at Site 4 and 7. Comparison of Site 4 and 7 results show why Site 7 is selected for most calculations of Ashton's Contribution. It is generally the lowest of the background TEOMs.

Site 4 (24µg/m$^3$) is located on the eastern tip of the eastern emplacement area, next to Dam 5/6. 92% of data was recovered at Site 4 for the reporting period.




Site 7 (22µg/m$^3$) is located adjacent to the Main Northern Railway at the country end turnout. The site is remote from mining operations. 94% of data was recovered from this site during the monitoring period.



### 3.1.3.2 Total Suspended Particulate Matter

The High Volume Air Samplers (HVAS) operate for a 24 hour period on every sixth day (specified DECCW schedule). HVAS measure cumulative dust levels from all sources. The criterion applicable to these gauges is an annual average of 90µg/m$^3$. 100% of data was recovered at sites 1, 3 and 8. 99.2% of data was recovered at site 2 due to a power failure. There is no 24 hour criterion for Total Suspended Particulates (TSP).

The locations of High Volume Air Samplers to monitor TSP are detailed in **Figure 5** above. They are as follows:

**Table 16. LOCATION OF TSP MONITORING STATIONS**

| Monitoring Station No | Location |
|---|---|
| 1 | Camberwell village (north) |
| 2 | Camberwell village (south) |
| 3 | Property east of Camberwell village |
| 8 | Camberwell village (east) |

**Historic Trends**

Historic TSP results are available for a location close to Site 1 in Camberwell Village. The results for this site are shown below. They show historically prior to the commencement of the ACOL operations the annual average has exceeded the 90µg/m$^3$ (annual mean) criteria at various times.

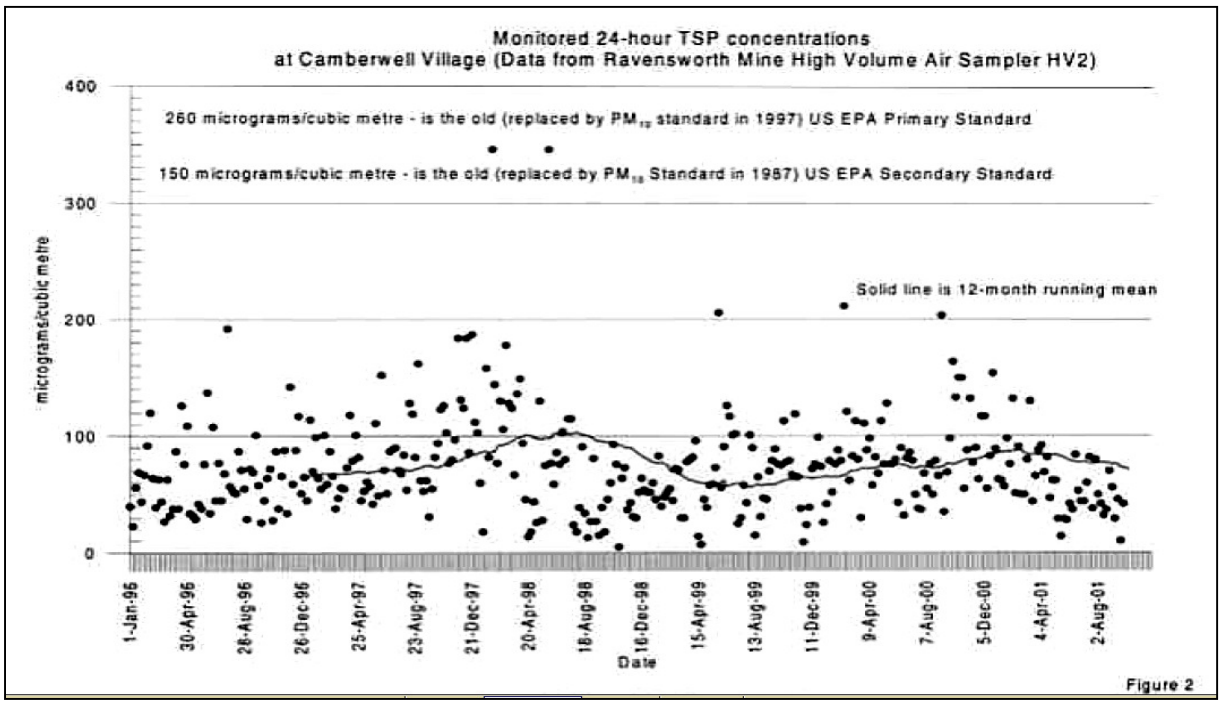
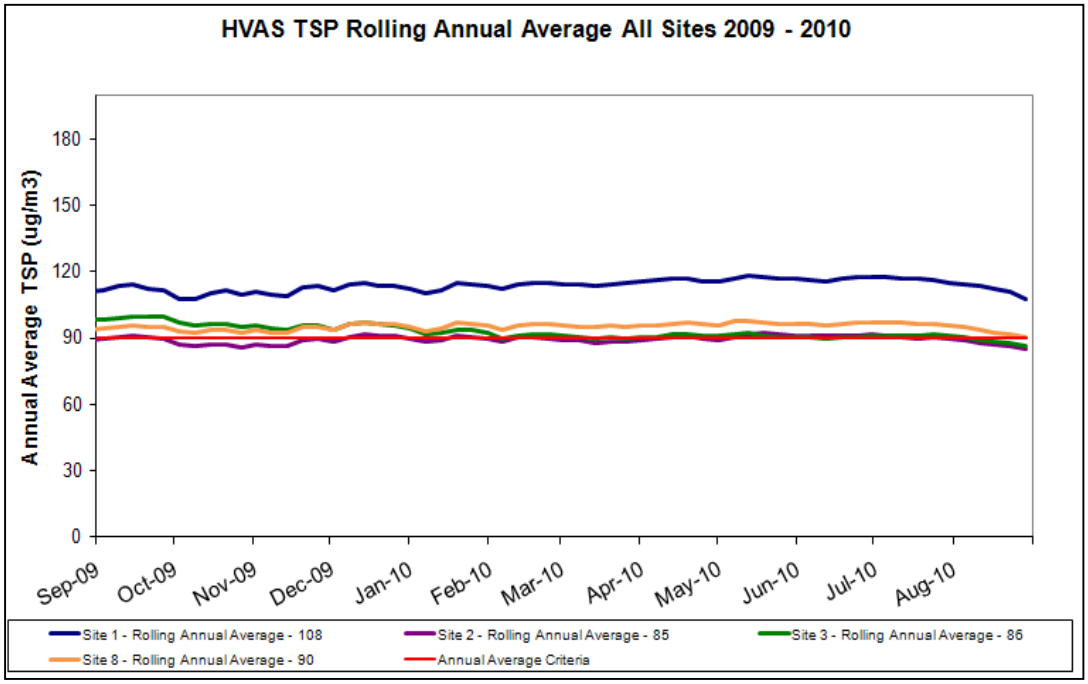
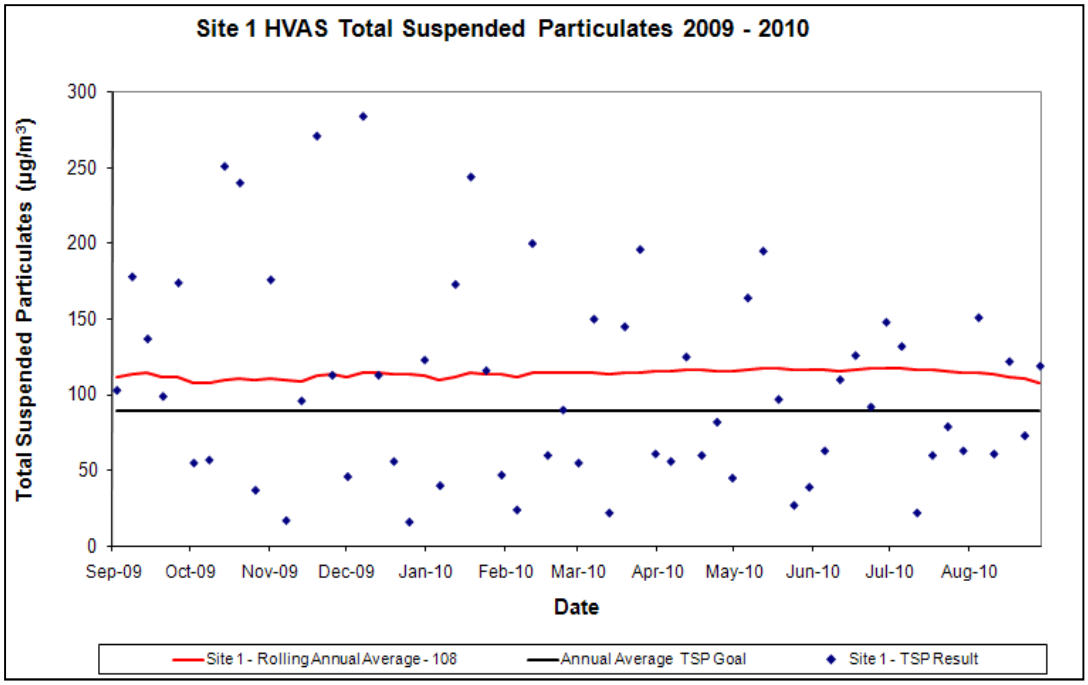


Figure 2

## HVAS TSP Rolling Annual Average

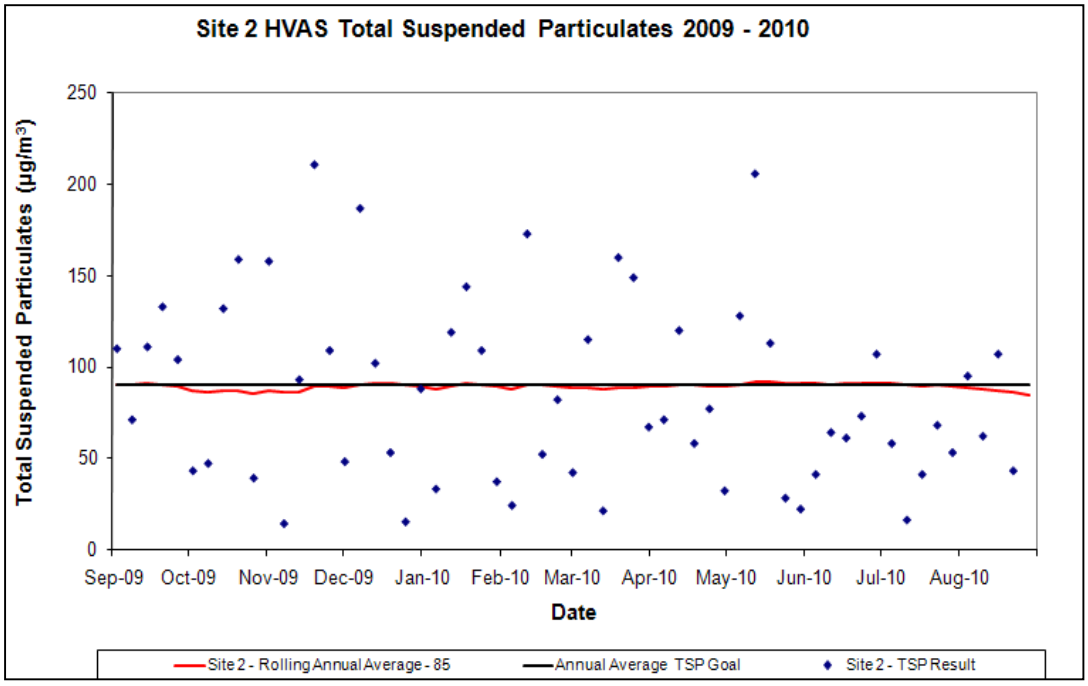



## Site 1 HVAS



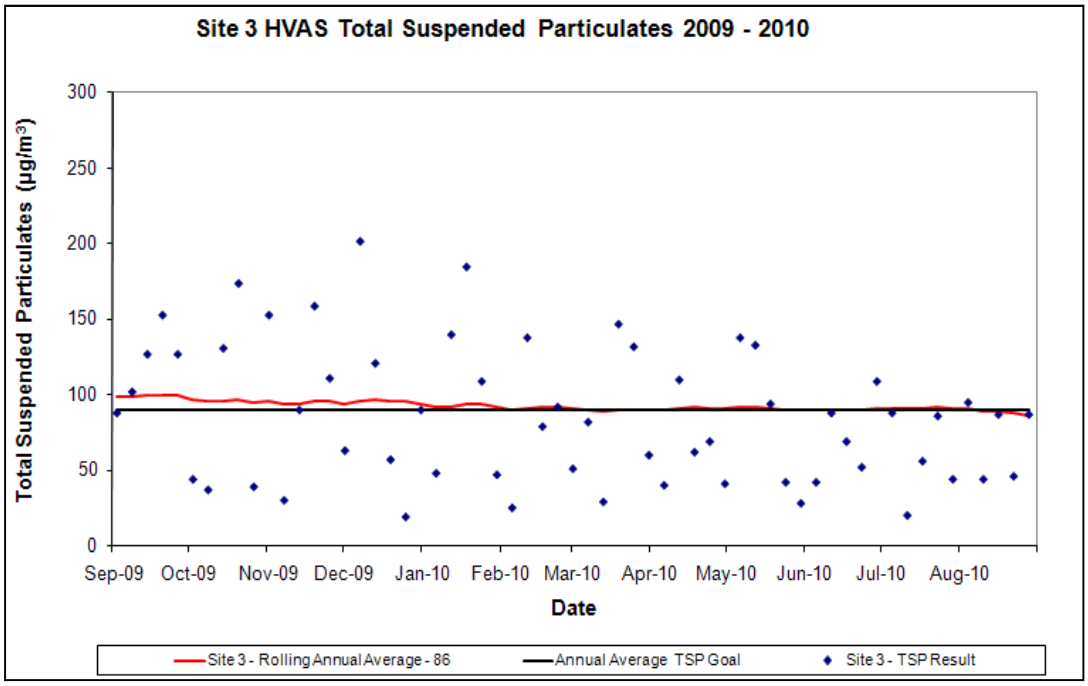

The cumulative rolling annual average for TSP at Site 1 demonstrated non-compliance with the annual average criteria of 90µg/m$^3$. The annual average for the reporting period was 108µg/m$^3$. The figure above shows a fairly constant rolling annual average of TSP results at Site 1 over the past 12 months, with a slight decrease at the end of the reporting period.

### Site 2 HVAS



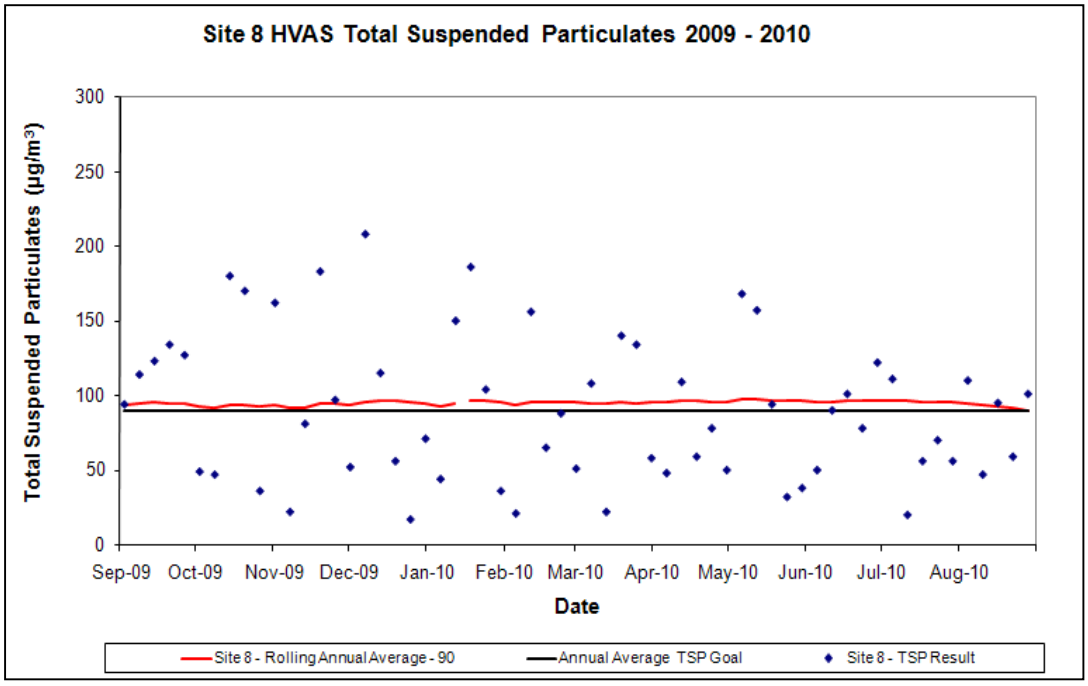

The cumulative rolling average TSP results for Site 2 complied with the annual average TSP goal of 90µg/m$^3$ for the reporting period. The annual average for the reporting period at Site 2 was 85µg/m$^3$.

### Site 3 HVAS




The cumulative rolling average TSP results for Site 3 complied with the annual average TSP goal of 90µg/m$^3$ for the reporting period. The annual average for the reporting period at Site 3 was 86µg/m$^3$.

**Site 8 HVAS**




The cumulative rolling average TSP results for Site 8 complied with the annual average TSP goal of 90µg/m$^3$ for the reporting period. The annual average for the reporting period at Site 8 was 90µg/m$^3$.

### 3.1.3.3 Dust Deposition Gauges

The location of Dust Deposition gauges is detailed on **Figure 5**. They are as follows:

**Table 17. LOCATION OF DUST DEPOSITION GAUGES**

| Monitoring Station No | Location |
|---|---|
| 2 | Ravensworth property west of open cut |
| 4 | Ashton property near Hunter River |
| 5 | New England Highway SE of Camberwell village |
| 6 | St Clements Church |
| 7 | TEOM site 1 - Camberwell Village |
| 8 | TEOM site 2 - Camberwell Village |
| 9 | TEOM site 3 – Property east of Camberwell |
| 10 | Onsite - TEOM site 4 (near East OB dump) |
| 11 | NE of Emplacement Area on Glennies Creek Rd |
| 13 | Onsite – TEOM site 7 (country end turnout) |
| 14 | TEOM site 8 – Camberwell Village |

Data recovery for all depositional dust gauges is as follows:

**Table 18. DUST DEPOSITION GAUGES – EXTENT OF CONTAMINATION**

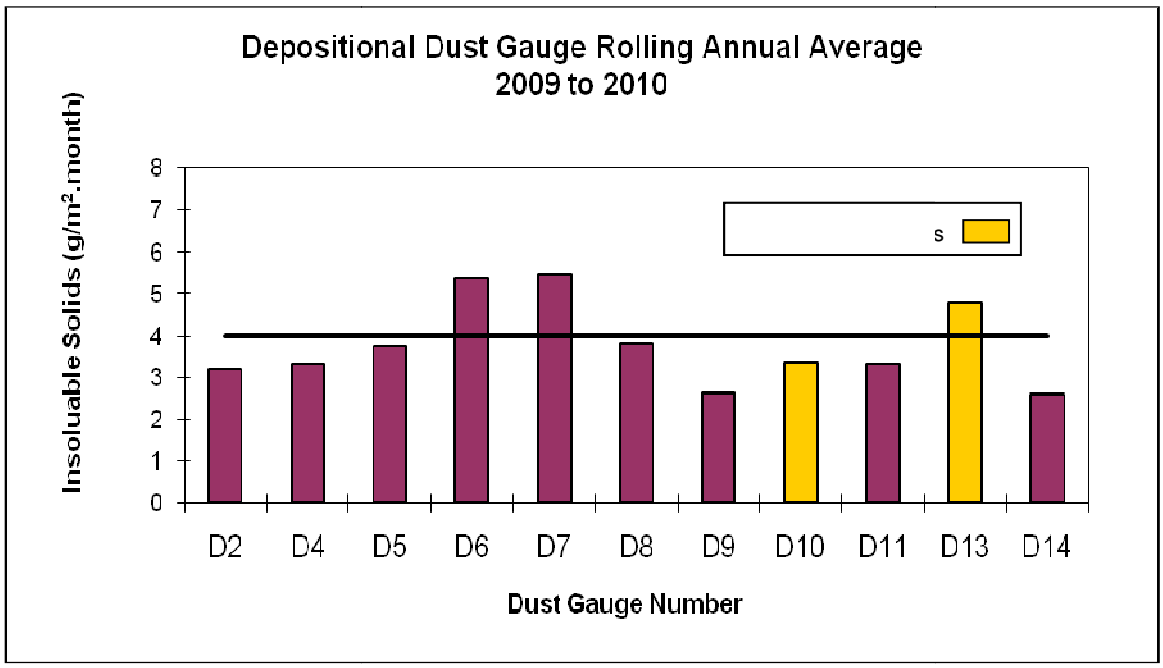
| Gauge Number | Data Availability (%) | Data Loss |
|---|---|---|
| D2 | 100 | NA |
| D4 | 100 | NA |
| D5 | 100 | NA |
| D6 | 100 | NA |
| D7 | 100 | NA |
| D8 | 100 | NA |
| D9 | 100 | NA |
| D10 | 100 | NA |
| D11 | 100 | NA |
| D13 | 100 | NA |
| D14 | 100 | NA |

The following table shows the annual average insoluble solids for each gauge over the 2009 – 2010 reporting period. Dust gauge D2 (annual average = 3.18g/m²/month) is located in close proximity to a neighbouring operation and due to the progression of their pit, now lies within the 4g/m$^2$/month impact zone identified in their environmental impact assessment. Gauges D6, D7 and D13 exceeded the annual average of 4g/m²/month for the reporting period. Gauge D13 is an onsite gauge to which criteria is not expected to apply. During the September 2009 dust monitoring period (10/09/2009 to 12/10/2009) two separate dust storm events occurred that led to ACOL shutting down all operations. These were observed on the 23 and 26 September 2009. High depositional dust results recorded in the September 2009 period will have been significantly impacted by these two events.

A dust storm was also observed during the October 2009 dust monitoring period (12/10/2009 to 12/11/2009) resulting in ACOL shutting down operations from 12pm for the remainder of the day. This dust event occurred on the 14 October 2009 however this event had a lesser impact on the results as compared to the dust storms experienced in September.

| Table 19. INSOLUBLE SOLIDS ANNUAL AVERAGE RESULTS (EXCLUDING CONTAMINATED GAUGES) | | |
|---|---|---|
| **Dust Gauge** | **Annual Average EIS Background Values ($g/m^2$.month)** | **Annual Average 2009– 2010 ($g/m^2$/month)** |
| D2 | 3.5 | 3.18 |
| D4 | 1.6 | 3.32 |
| D5 | 2.0 | 3.74 |
| D6 | 1.5 | **5.36** |
| D7 | NA | **5.48** |
| D8 | NA | 3.80 |
| D9 | NA | 2.63 |
| D10 (onsite) | NA | 3.36 |
| D11 | NA | 3.33 |
| D13 (onsite) | NA | **4.77** |
| D14 | NA | 2.61 |

The annual average dust deposition for all depositional dust gauges is as follows:



## 3.2 EROSION AND SEDIMENT

### 3.2.1 Erosion and Sediment Management

All runoff from disturbed areas is collected in a series of sedimentation and settling dams established in accordance with the Erosion and Sediment Control Management Plan (ESCP). Monitoring indicates that these dams have been working effectively in controlling sediment flow. Gypsum has been used in drains where there is a high potential for sediment movement during heavy rainfall events. The Gypsum works by dropping the sediment out of entrainment in the overland water flow.

Major runoff storage dams are located in the following areas:

- On the north-west side of the CHPP (Process Water Dam and Settling Dam);
- On the eastern side of the Eastern Emplacement Area (Dam 5/6); and

In addition, there are a number of minor runoff capture dams that intercept runoff water before it departs site. These dams also contain sedimentation control devices in the form of hay bales, silt fences, etc where required.

### 3.2.2 Erosion and Sediment Monitoring

Visual inspections are undertaken on a regular basis and stream water quality results are presented in the following section.

## 3.3 SURFACE WATER POLLUTION

### 3.3.1 Surface Water Management

ACOL has an approved Site Water Management Pan. Controls have been put in place in accordance with this plan to control potential causes of water pollution. These controls are considered to have been adequate for the reporting period.

### 3.3.2 Surface Water Monitoring

The water monitoring locations are detailed in **Figure 5** as well as the following table:

**Table 20. SURFACE WATER MONITORING LOCATIONS**

| Monitoring Station | Stream | Location |
|---|---|---|
| SM 1 | Bettys Creek | Glendell land upstream of Ashton |
| SM 2 | Bettys Creek | Just upstream of confluence with Bowmans Creek |
| SM 3 | Bowmans Creek | Water pool at north west corner of mine lease |
| SM 4 | Bowmans Creek | Water pool just downstream of New England Highway |
| SM 5 | Bowmans Creek | Halfway down Ashton property |
| SM 6 | Bowmans Creek | Just upstream of confluence with Hunter River |
| SM 7 | Glennies Creek | Upstream of Ashton Mine |
| SM 8 | Glennies Creek | Halfway down Ashton property |
| SM 9 | Hunter River | Upstream of confluence with Bowmans Creek |
| SM 10 | Hunter River | Downstream of confluence with Bowmans Creek |
| SM 11 | Glennies Creek | Upstream of confluence with Hunter River |
| SM 12 | Hunter River | Downstream of confluence with Glennies Creek |
| SM 13 | Hunter River | Upstream of confluence with Glennies Creek midway between Bowmans Creek and Glennies Creek. |
| SM 14 | Hunter River | Directly Upstream of confluence with Glennies Creek |

**Abbreviations used within Section 3.3 are as follows:**

| | |
|---|---|
| *µS/cm* | *microsiemens per centimetre* |
| *mg/l* | *milligrams per litre* |
| *TDS* | *Total Dissolved Solids* |
| *TSS* | *Total Suspended Solids* |
| EC | Electrical Conductivity |

THIS PAGE LEFT BLANK INTENTIALLY

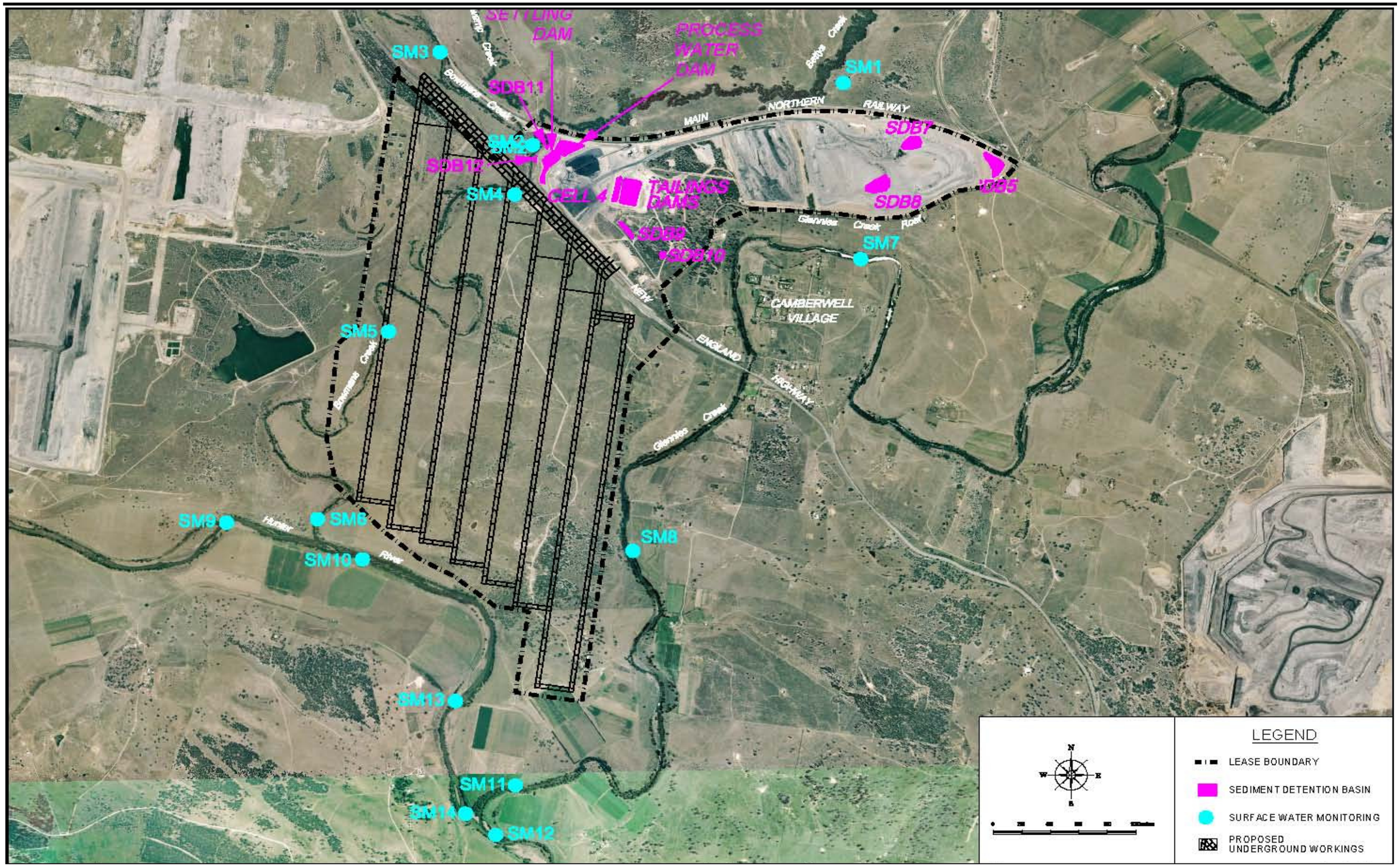



**Figure 5. Water Quality Monitoring Locations**

THIS PAGE LEFT BLANK INTENTIALLY

### 3.3.2.1 Monthly Water Quality Monitoring Results

All monthly water samples were collected and analysed during the reporting period for pH, Electrical Conductivity (EC), Total Dissolved Solids (TDS), Total Suspended Solids (TSS) Total Hardness ($CaCO_3$), and Oil and Grease (O & G). Monitoring locations SM1 and SM2 in Betty's Creek were consistently dry with the exception of July 2010 following heavy rainfall.

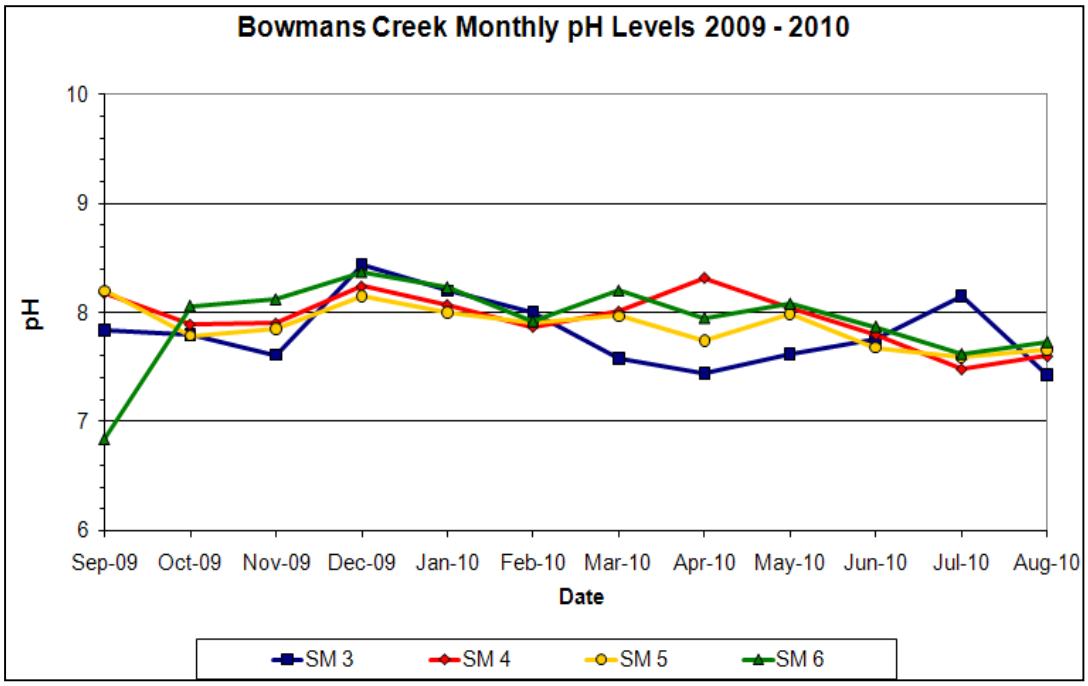
***pH***

The results of monthly pH monitoring were as follows:

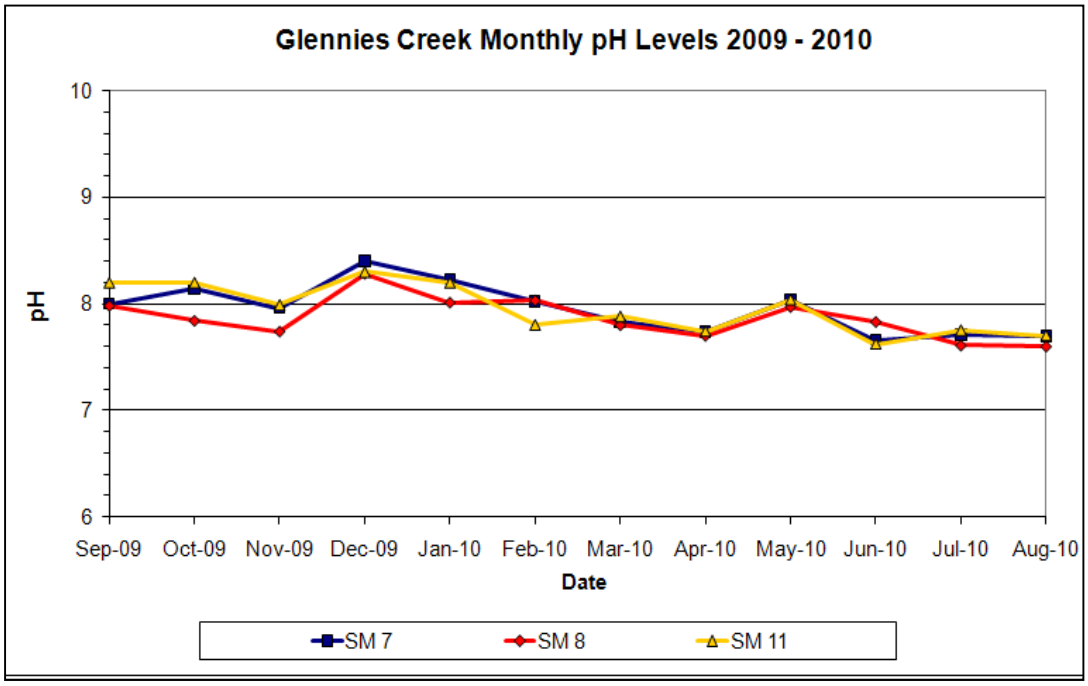
**Table 21. pH RESULTS 2009 - 2010**

| pH | SM 1 | SM 2 | SM 3 | SM 4 | SM 5 | SM 6 | SM 7 | SM 8 | SM 9 | SM 10 | SM 11 | SM 12 | SM 13 | SM 14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sep-09 | Dry | Dry | 7.8 | 8.2 | 8.2 | 6.8 | 8.0 | 8.0 | 8.3 | 8.3 | 8.2 | 8.3 | 8.4 | 8.5 |
| Oct-09 | Dry | Dry | 7.8 | 7.9 | 7.8 | 8.1 | 8.1 | 7.8 | 7.5 | 8.0 | 8.2 | 7.8 | 8.1 | 8.0 |
| Nov-09 | Dry | Dry | 7.6 | 7.9 | 7.9 | 8.1 | 8.0 | 7.7 | 8.1 | 8.2 | 8.0 | 7.9 | 8.2 | 8.3 |
| Dec-09 | Dry | Dry | 8.4 | 8.2 | 8.2 | 8.4 | 8.4 | 8.3 | 8.5 | 8.4 | 8.3 | 8.2 | 8.4 | 8.4 |
| Jan-10 | Dry | Dry | 8.2 | 8.1 | 8.0 | 8.2 | 8.2 | 8.0 | 8.3 | 8.3 | 8.2 | 8.2 | 8.3 | 8.3 |
| Feb-10 | Dry | Dry | 8.0 | 7.9 | 7.9 | 7.9 | 8.0 | 8.0 | 7.9 | 8.0 | 7.8 | 7.8 | 7.9 | 7.9 |
| Mar-10 | Dry | Dry | 7.6 | 8.0 | 8.0 | 8.2 | 7.8 | 7.8 | 8.2 | 8.3 | 7.9 | 8.0 | 8.2 | 8.2 |
| Apr-10 | Dry | Dry | 7.4 | 8.3 | 7.7 | 8.0 | 7.7 | 7.7 | 8.1 | 8.1 | 7.7 | 7.8 | 8.1 | 8.1 |
| May-10 | Dry | Dry | 7.6 | 8.0 | 8.0 | 8.1 | 8.0 | 8.0 | 8.3 | 8.3 | 8.0 | 8.2 | 8.4 | 8.4 |
| Jun-10 | Dry | Dry | 7.8 | 7.8 | 7.7 | 7.9 | 7.7 | 7.8 | 8.1 | 8.1 | 7.6 | 8.1 | 8.2 | 8.0 |
| Jul-10 | 7.8 | 7.6 | 8.2 | 7.5 | 7.6 | 7.6 | 7.7 | 7.6 | 8.1 | 7.8 | 7.8 | 7.7 | 7.9 | 7.9 |
| Aug-10 | Dry | Dry | 7.4 | 7.6 | 7.7 | 7.7 | 7.7 | 7.7 | 7.6 | 7.7 | 7.7 | 7.7 | 7.7 | 7.7 |
| **Min** | 7.8 | 7.6 | 7.4 | 7.5 | 7.6 | 6.8 | 7.7 | 7.6 | 7.5 | 7.7 | 7.6 | 7.7 | 7.7 | 7.7 |
| **Ave** | 7.8 | 7.6 | 7.8 | 8.0 | 7.9 | 7.9 | 8.0 | 7.9 | 8.1 | 8.1 | 7.9 | 8.0 | 8.1 | 8.1 |
| **Max** | 7.8 | 7.6 | 8.4 | 8.3 | 8.2 | 8.4 | 8.4 | 8.3 | 8.5 | 8.4 | 8.3 | 8.3 | 8.4 | 8.5 |

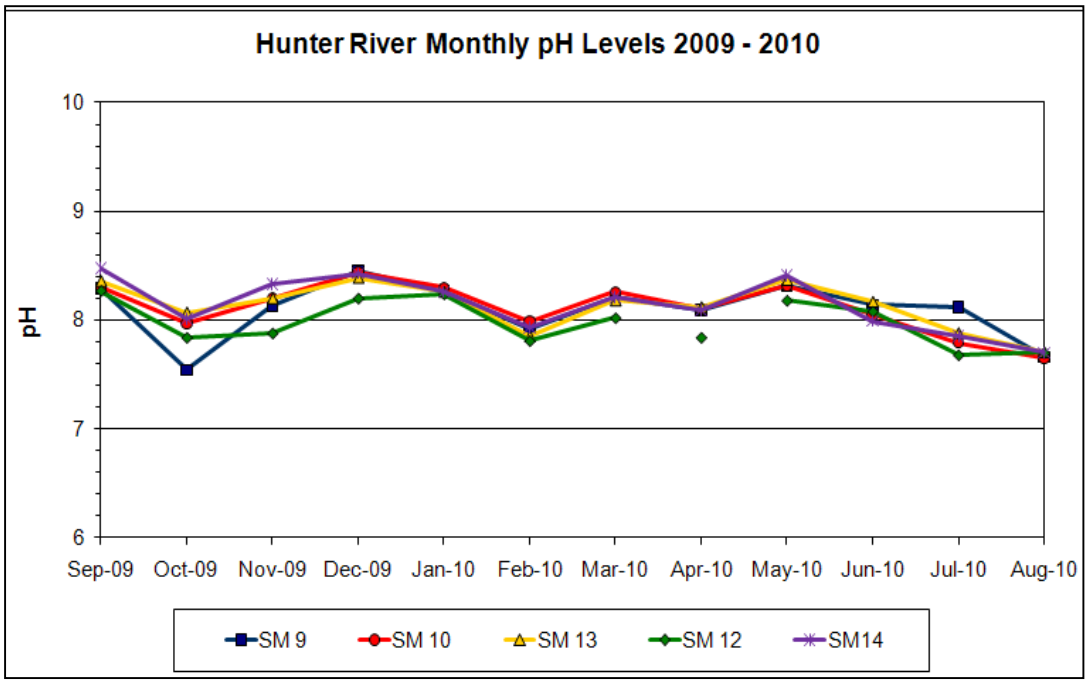
Monthly water quality monitoring in Bowmans Creek, Glennies Creek and the Hunter River indicated that pH levels throughout the reporting period were consistently within the neutral to slightly alkaline range (7.4 - 8.5).




pH levels in Bowmans Creek (SM3, SM4, SM5 and SM6) were neutral to slightly alkaline (ranging from 6.8 to 8.4) and remained within the acceptable recommended pH range.




Glennies Creek (SM7, SM8 and SM11) pH levels were neutral to slightly alkaline (ranging from 7.6 to 8.4) with little variation between sites, and remained within the acceptable recommended pH range.



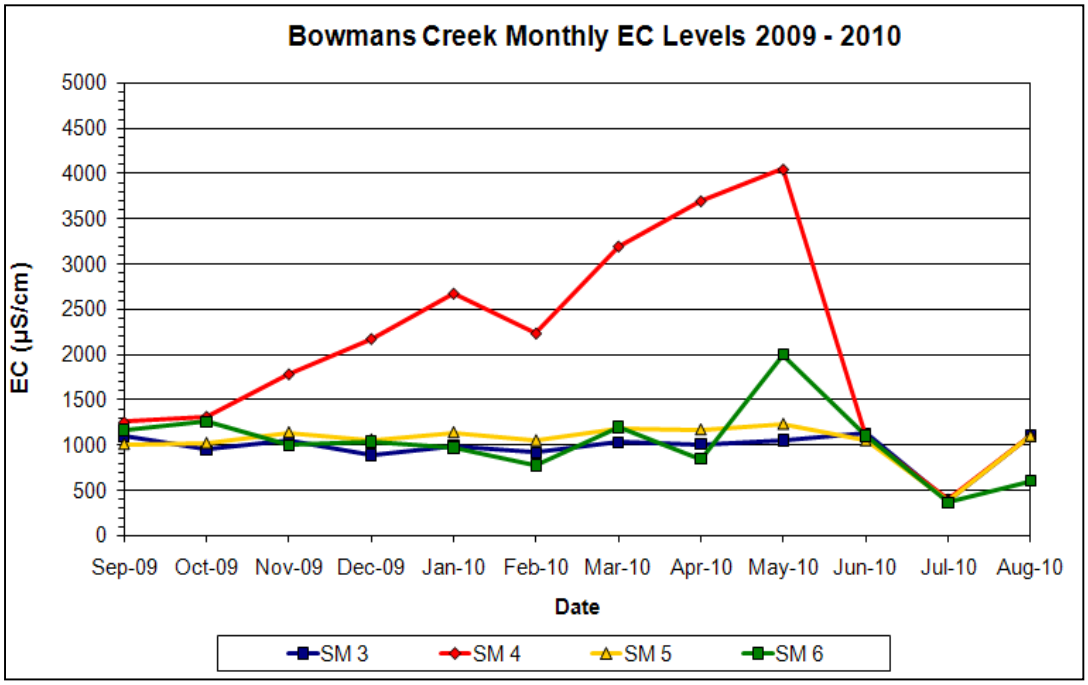

pH levels in the Hunter River (SM9, SM10, SM12, SM13 and SM14) were neutral to slightly alkaline (ranging from 7.5 to 8.5) with minimal variation between sites, and remained within the acceptable recommended pH range. Similar to Glennies Creek slight pH fluctuations throughout the reporting period followed a very similar pattern across all sites.

### *Electrical Conductivity (EC)*

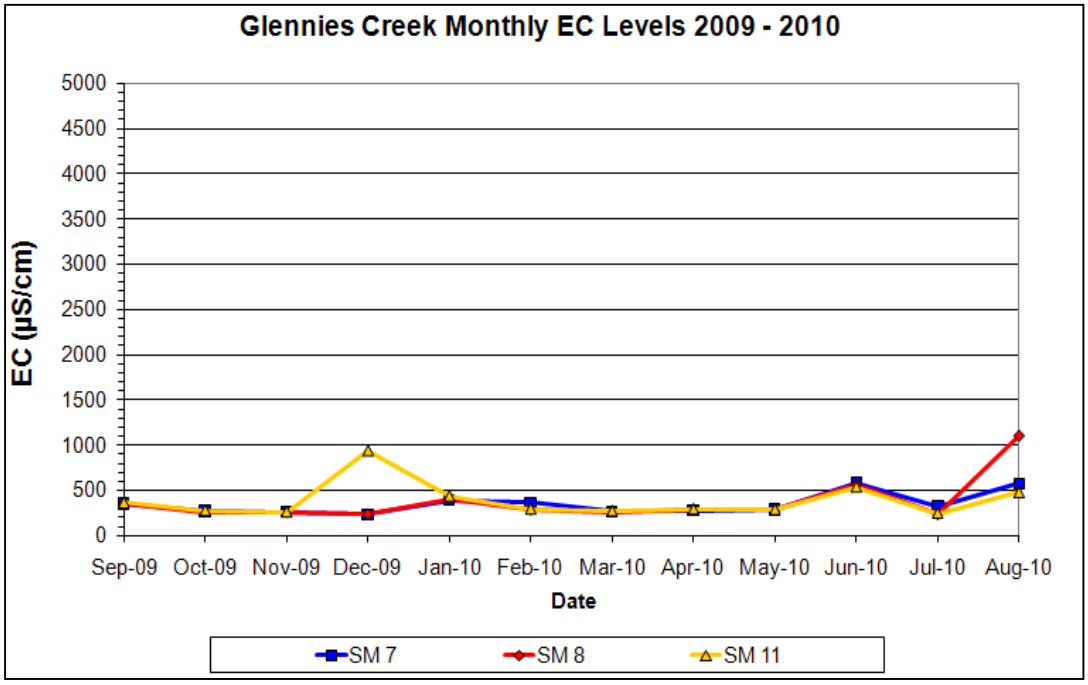
The results of EC monitoring are as follows:

**Table 22. ELECTRICAL CONDUCTIVITY RESULTS 2009 – 2010**

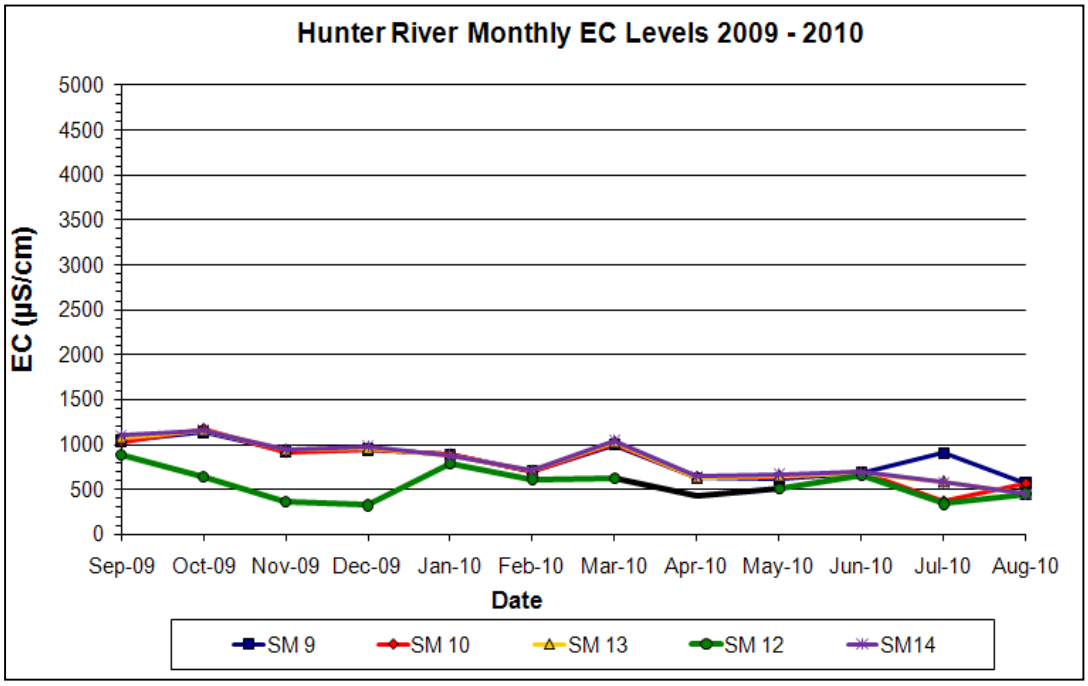
| EC | SM 1 | SM 2 | SM 3 | SM 4 | SM 5 | SM 6 | SM 7 | SM 8 | SM 9 | SM 10 | SM 11 | SM 12 | SM 13 | SM 14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sep-09 | Dry | Dry | 1100 | 1260 | 1010 | 1170 | 351 | 350 | 1040 | 1030 | 363 | 883 | 1080 | 1100 |
| Oct-09 | Dry | Dry | 950 | 1320 | 1020 | 1260 | 270 | 264 | 1140 | 1170 | 277 | 645 | 1160 | 1160 |
| Nov-09 | Dry | Dry | 1060 | 1790 | 1140 | 1000 | 261 | 260 | 927 | 916 | 261 | 364 | 946 | 936 |
| Dec-09 | Dry | Dry | 891 | 2180 | 1060 | 1040 | 236 | 237 | 942 | 949 | 243 | 324 | 961 | 982 |
| Jan-10 | Dry | Dry | 992 | 2680 | 1140 | 975 | 393 | 408 | 889 | 892 | 436 | 786 | 881 | 880 |
| Feb-10 | Dry | Dry | 916 | 2240 | 1050 | 775 | 366 | 287 | 697 | 705 | 293 | 617 | 710 | 709 |
| Mar-10 | Dry | Dry | 1030 | 3200 | 1190 | 1200 | 265 | 264 | 998 | 1010 | 270 | 623 | 1030 | 1040 |
| Apr-10 | Dry | Dry | 1010 | 3700 | 1170 | 850 | 277 | 286 | 627 | 641 | 290 | 433 | 639 | 644 |
| May-10 | Dry | Dry | 1050 | 4050 | 1230 | 2000 | 291 | 281 | 620 | 637 | 288 | 511 | 657 | 666 |
| Jun-10 | Dry | Dry | 1130 | 1090 | 1050 | 1100 | 578 | 559 | 687 | 695 | 538 | 659 | 687 | 695 |
| Jul-10 | 322 | 322 | 386 | 407 | 381 | 367 | 318 | 234 | 903 | 376 | 245 | 343 | 592 | 580 |
| Aug-10 | Dry | Dry | 1100 | 1100 | 1080 | 1100 | 606 | 576 | 1100 | 566 | 575 | 476 | 453 | 449 |
| **Min** | 322 | 322 | 386 | 407 | 381 | 367 | 236 | 234 | 620 | 376 | 243 | 324 | 453 | 449 |
| **Ave** | 322 | 322 | 968 | 2085 | 1043 | 1070 | 351 | 334 | 881 | 799 | 340 | 555 | 816 | 820 |
| **Max** | 322 | 322 | 1130 | 4050 | 1230 | 2000 | 606 | 576 | 1140 | 1170 | 575 | 883 | 1160 | 1160 |



Electrical Conductivity (EC) levels in Bowmans Creek fluctuated between 367µS/cm and 4050µS/cm. Elevated levels in EC at SM4 have been observed previously and result from natural saline groundwater inflows to the pool. During periods of low flow in Bowmans Creek, the saline groundwater discharge becomes the dominant supply of water to the pool resulting in increasingly elevated EC levels as flow decreases. EC levels greater than 10,000 µS/cm have been historically observed at the site. EC levels returned to natural flow levels following heavy rainfall recorded in June 2010.




The EC of water in Glennies Creek (SM7, SM8 and SM11) remained consistently low, fluctuating between 234µS/cm to 1100µS/cm.

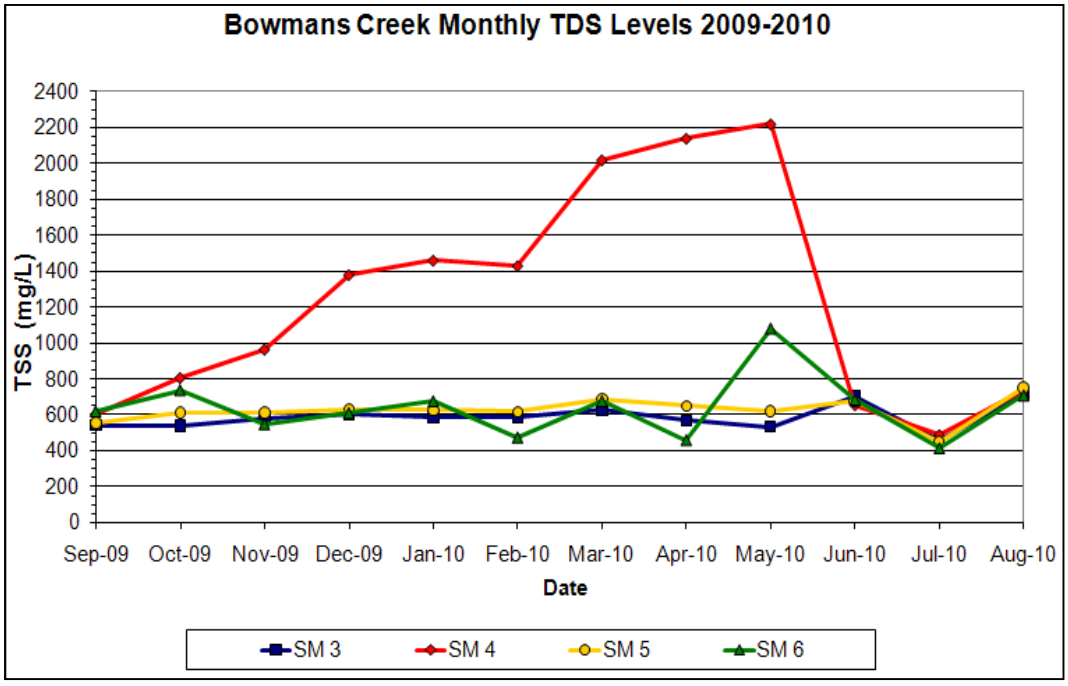


The EC of the Hunter River (SM9, SM10, SM12, SM13 and SM14) generally trended together throughout the period. SM12 is located downstream of the confluence with Glennies Creek and is affected by the lower EC levels of Glennies Creek under low flow conditions as seen in October to December 2009.

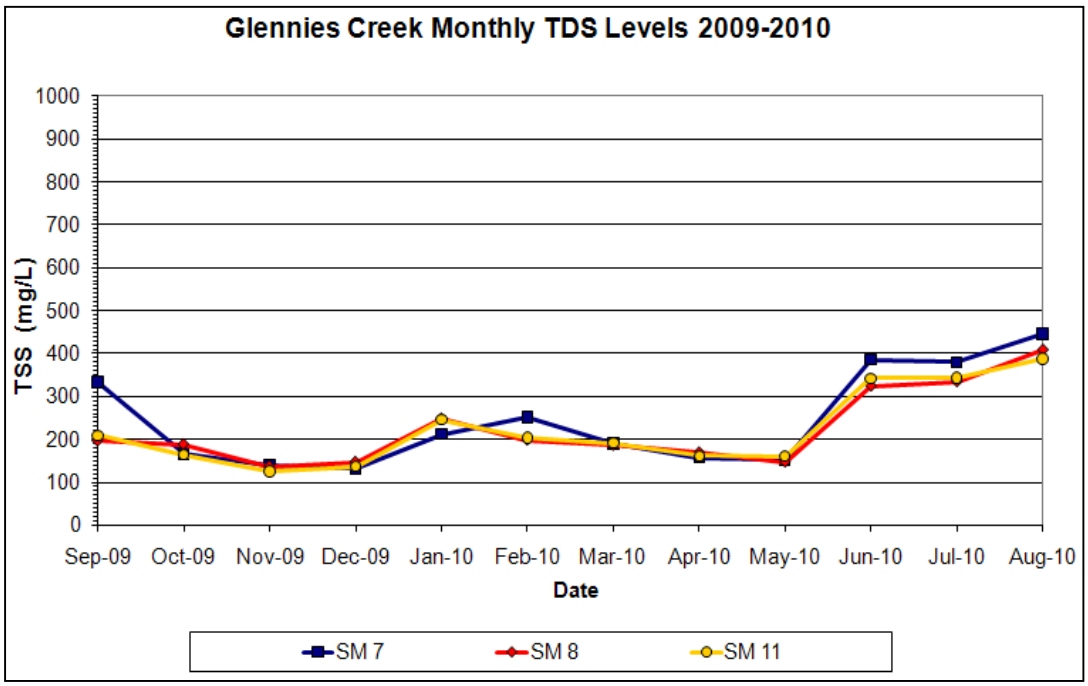
***Total Dissolved Solids (TDS)***
Monthly TDS results are as follows:

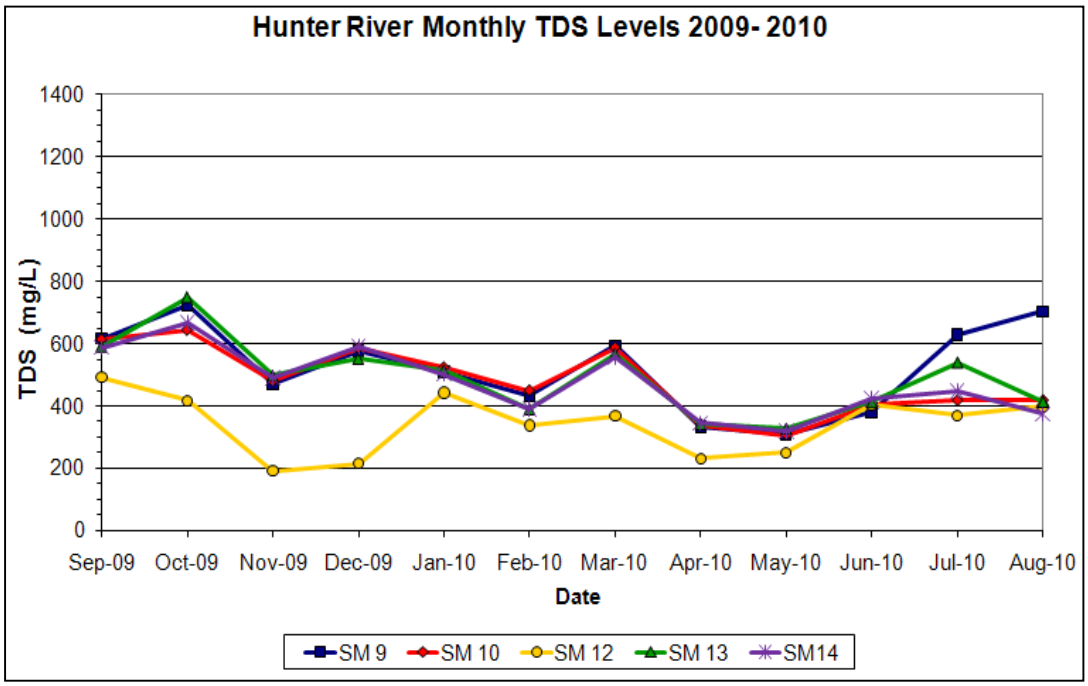
**Table 23. TOTAL DISSOLVED SOLIDS RESULTS 2009 - 2010**

| TDS | SM 1 | SM 2 | SM 3 | SM 4 | SM 5 | SM 6 | SM 7 | SM 8 | SM 9 | SM 10 | SM 11 | SM 12 | SM 13 | SM 14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sep-09 | Dry | Dry | 542 | 602 | 556 | 620 | 334 | 196 | 616 | 614 | 210 | 492 | 592 | 588 |
| Oct-09 | Dry | Dry | 538 | 806 | 614 | 738 | 167 | 188 | 722 | 644 | 164 | 418 | 750 | 666 |
| Nov-09 | Dry | Dry | 582 | 964 | 614 | 548 | 140 | 137 | 470 | 480 | 126 | 192 | 498 | 492 |
| Dec-09 | Dry | Dry | 600 | 1380 | 632 | 610 | 131 | 147 | 576 | 586 | 137 | 216 | 552 | 590 |
| Jan-10 | Dry | Dry | 584 | 1460 | 626 | 676 | 212 | 248 | 510 | 524 | 246 | 442 | 514 | 502 |
| Feb-10 | Dry | Dry | 586 | 1430 | 618 | 474 | 252 | 198 | 432 | 450 | 204 | 338 | 390 | 390 |
| Mar-10 | Dry | Dry | 626 | 2020 | 688 | 676 | 191 | 186 | 594 | 588 | 192 | 368 | 568 | 558 |
| Apr-10 | Dry | Dry | 568 | 2140 | 650 | 460 | 158 | 169 | 334 | 340 | 162 | 232 | 342 | 346 |
| May-10 | Dry | Dry | 534 | 2220 | 619 | 1080 | 152 | 147 | 308 | 307 | 161 | 250 | 327 | 318 |
| Jun-10 | Dry | Dry | 702 | 654 | 674 | 684 | 386 | 324 | 382 | 406 | 342 | 404 | 412 | 424 |
| Jul-10 | 1260 | 1230 | 456 | 488 | 452 | 414 | 380 | 334 | 628 | 418 | 344 | 370 | 540 | 448 |
| Aug-10 | Dry | Dry | 716 | 734 | 752 | 708 | 446 | 408 | 704 | 418 | 388 | 398 | 414 | 374 |
| **Min** | 1260 | 1230 | 456 | 488 | 452 | 414 | 131 | 137 | 308 | 307 | 126 | 192 | 327 | 318 |
| **Ave** | 1260 | 1230 | 586 | 1242 | 625 | 641 | 246 | 224 | 523 | 481 | 223 | 343 | 492 | 475 |
| **Max** | 1260 | 1230 | 716 | 2220 | 752 | 1080 | 446 | 408 | 722 | 644 | 388 | 492 | 750 | 666 |



As with EC results above, TDS levels at SM4 were elevated following low flow conditions in Bowmans Creek resulting in natural saline groundwater recharge dominating water supply to the site. TDS levels returned to natural flow levels following heavy rainfall in June 2010.



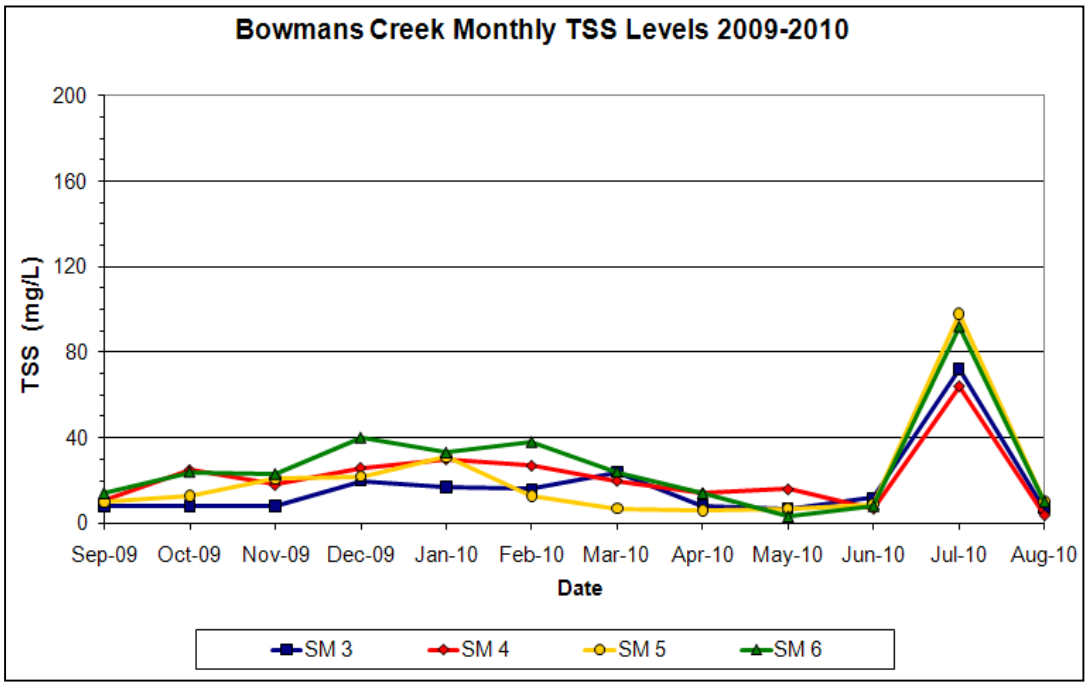



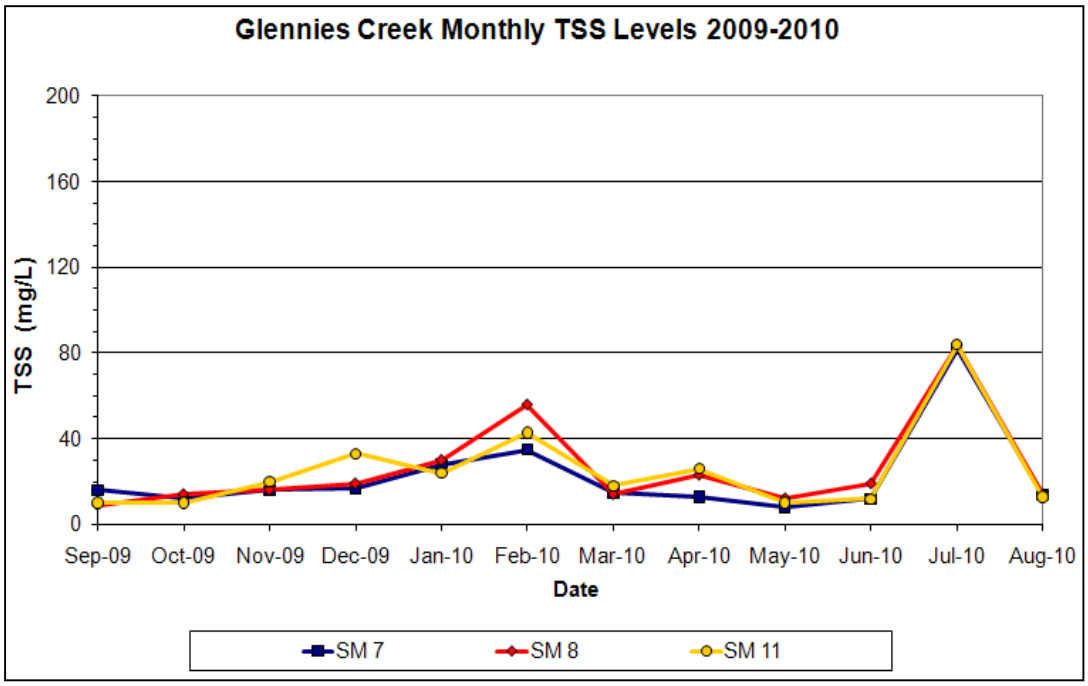
### *Total Suspended Solids (TSS)*

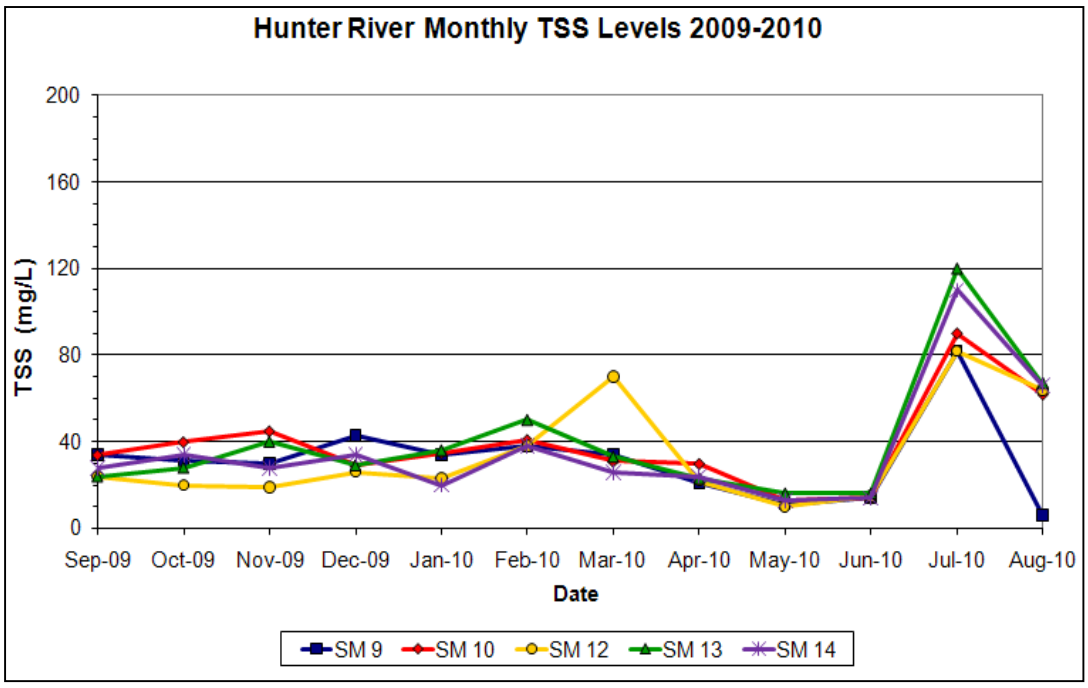
Monthly TSS results are as follows:

**Table 24. TOTAL SUSPENDED SOLIDS RESULTS 2009 - 2010**

| TSS (mg/L) | SM 1 | SM 2 | SM 3 | SM 4 | SM 5 | SM 6 | SM 7 | SM 8 | SM 9 | SM 10 | SM 11 | SM 12 | SM 13 | SM 14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sep-09 | Dry | Dry | 8 | 11 | 10 | 14 | 16 | 9 | 34 | 34 | 10 | 24 | 24 | 28 |
| Oct-09 | Dry | Dry | 8 | 25 | 13 | 24 | 12 | 14 | 31 | 40 | 10 | 20 | 28 | 34 |
| Nov-09 | Dry | Dry | 8 | 18 | 21 | 23 | 16 | 16 | 30 | 45 | 20 | 19 | 40 | 28 |
| Dec-09 | Dry | Dry | 20 | 26 | 22 | 40 | 17 | 19 | 43 | 29 | 33 | 26 | 29 | 34 |
| Jan-10 | Dry | Dry | 17 | 30 | 31 | 33 | 28 | 30 | 34 | 35 | 24 | 23 | 36 | 20 |
| Feb-10 | Dry | Dry | 16 | 27 | 13 | 38 | 35 | 56 | 38 | 41 | 43 | 38 | 50 | 38 |
| Mar-10 | Dry | Dry | 24 | 20 | 7 | 24 | 15 | 14 | 34 | 31 | 18 | 70 | 33 | 26 |
| Apr-10 | Dry | Dry | 8 | 14 | 6 | 14 | 13 | 23 | 21 | 30 | 26 | 22 | 23 | 24 |
| May-10 | Dry | Dry | 7 | 16 | 7 | 3 | 8 | 12 | 11 | 13 | 10 | 10 | 16 | 13 |
| Jun-10 | Dry | Dry | 12 | 7 | 9 | 8 | 12 | 19 | 14 | 14 | 12 | 15 | 16 | 14 |
| Jul-10 | 716 | 724 | 72 | 64 | 98 | 92 | 82 | 84 | 82 | 90 | 84 | 82 | 120 | 110 |
| Aug-10 | Dry | Dry | 7 | 4 | 10 | 10 | 14 | 14 | 6 | 62 | 13 | 64 | 67 | 66 |
| **Min** | 716 | 724 | 7 | 4 | 6 | 3 | 8 | 9 | 6 | 13 | 10 | 10 | 16 | 13 |
| **Ave** | 716 | 724 | 17 | 22 | 21 | 27 | 22 | 26 | 32 | 39 | 25 | 34 | 40 | 36 |
| **Max** | 716 | 724 | 72 | 64 | 98 | 92 | 82 | 84 | 82 | 90 | 84 | 82 | 120 | 110 |






The sharp increase in TSS observed across all surface water monitoring sites during July 2010 was the result of heavy rainfall occurring immediately prior to the sampling event.

### *Total Hardness ($CaCO_3$)*

Monthly Total Hardness results are as follows:

**Table 25. TOTAL HARDNESS RESULTS 2009- 2010**

| $CaCO_3$ (mg/L) | SM 1 | SM 2 | SM 3 | SM 4 | SM 5 | SM 6 | SM 7 | SM 8 | SM 9 | SM 10 | SM 11 | SM 12 | SM 13 | SM 14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sep-09 | Dry | Dry | 214 | 225 | 195 | 218 | 87 | 101 | 314 | 323 | 90 | 256 | 323 | 333 |
| Oct-09 | Dry | Dry | 204 | 256 | 186 | 292 | 73 | 74 | 364 | 362 | 76 | 184 | 361 | 360 |
| Nov-09 | Dry | Dry | 200 | 304 | 193 | 274 | 59 | 60 | 257 | 262 | 64 | 95 | 266 | 268 |
| Dec-09 | Dry | Dry | 184 | 379 | 200 | 256 | 61 | 62 | 272 | 265 | 64 | 89 | 270 | 292 |
| Jan-10 | Dry | Dry | 199 | 450 | 213 | 273 | 98 | 100 | 272 | 272 | 102 | 232 | 273 | 282 |
| Feb-10 | Dry | Dry | 211 | 416 | 244 | 253 | 93 | 79 | 250 | 262 | 78 | 200 | 252 | 252 |
| Mar-10 | Dry | Dry | 188 | 535 | 215 | 298 | 64 | 64 | 284 | 277 | 66 | 167 | 297 | 296 |
| Apr-10 | Dry | Dry | 194 | 702 | 241 | 214 | 74 | 77 | 201 | 203 | 78 | 120 | 198 | 196 |
| May-10 | Dry | Dry | 198 | 773 | 231 | 343 | 77 | 74 | 198 | 200 | 77 | 154 | 204 | 204 |
| Jun-10 | Dry | Dry | 244 | 227 | 239 | 233 | 138 | 134 | 211 | 208 | 125 | 193 | 220 | 214 |
| Jul-10 | 28 | 37 | 85 | 88 | 81 | 78 | 61 | 56 | 278 | 80 | 58 | 84 | 156 | 145 |
| Aug-10 | Dry | Dry | 237 | 228 | 228 | 226 | 132 | 132 | 224 | 159 | 128 | 157 | 142 | 142 |
| **Min** | 28 | 37 | 85 | 88 | 81 | 78 | 59 | 56 | 198 | 80 | 58 | 84 | 142 | 142 |
| **Ave** | 28 | 37 | 197 | 382 | 206 | 247 | 85 | 84 | 260 | 239 | 84 | 161 | 247 | 249 |
| **Max** | 28 | 37 | 244 | 773 | 244 | 343 | 138 | 134 | 364 | 362 | 128 | 256 | 361 | 360 |

### *Oil and Grease*

Monthly Oil and Grease results are as follows:

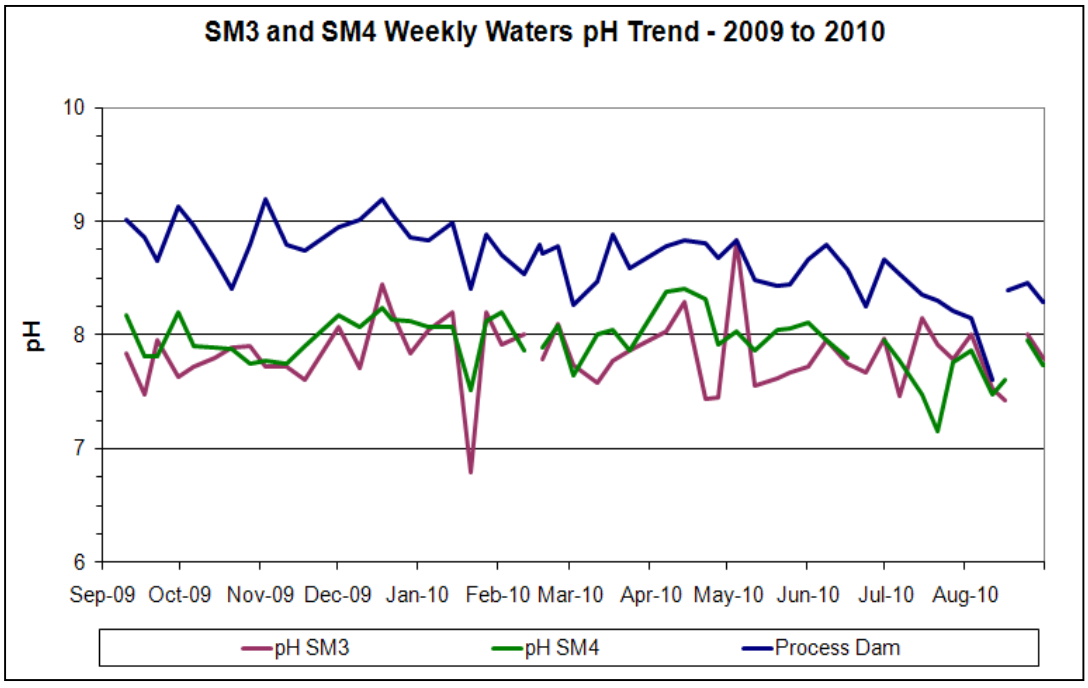
**Table 26. TOTAL OIL & GREASE RESULTS 2009 – 2010**

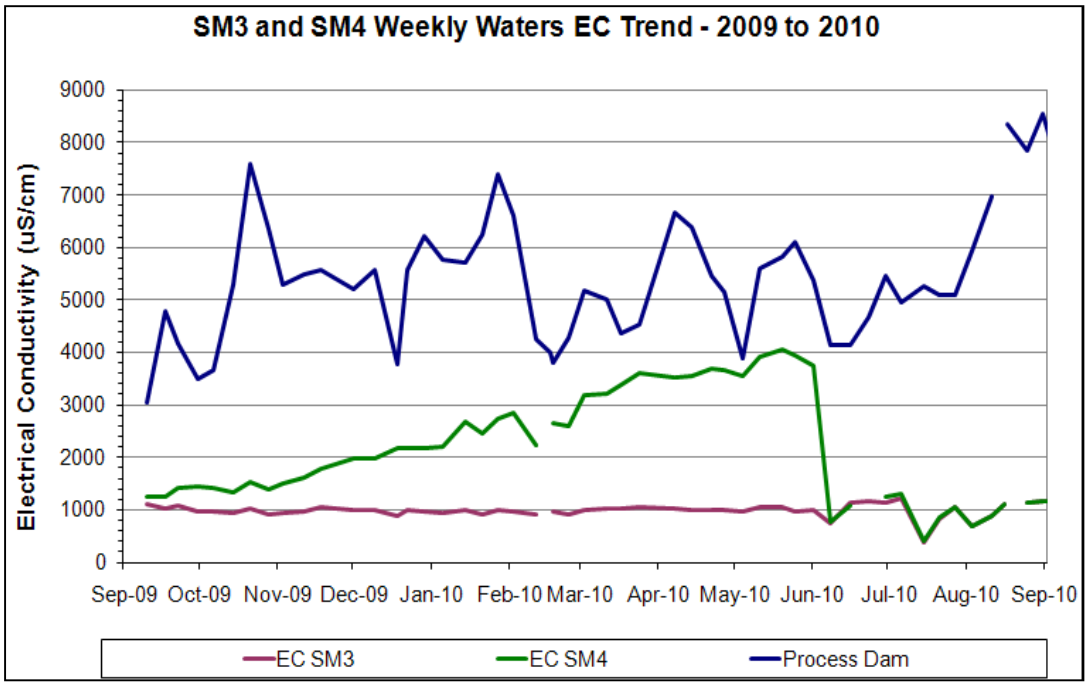
| Oil & Grease (mg/L) | SM 1 | SM 2 | SM 3 | SM 4 | SM 5 | SM 6 | SM 7 | SM 8 | SM 9 | SM 10 | SM 11 | SM 12 | SM 13 | SM 14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sep-09 | Dry | Dry | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| Oct-09 | Dry | Dry | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| Nov-09 | Dry | Dry | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| Dec-09 | Dry | Dry | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| Jan-10 | Dry | Dry | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| Feb-10 | Dry | Dry | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| Mar-10 | Dry | Dry | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| Apr-10 | Dry | Dry | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| May-10 | Dry | Dry | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| Jun-10 | Dry | Dry | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| Jul-10 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| Aug-10 | Dry | Dry | 7 | <5 | <5 | <5 | <5 | 6 | <5 | <5 | <5 | <5 | <5 | <5 |
| **Min** | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| **Ave** | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| **Max** | <5 | <5 | 7 | <5 | <5 | <5 | <5 | <5 | 6 | <5 | <5 | <5 | <5 | <5 |

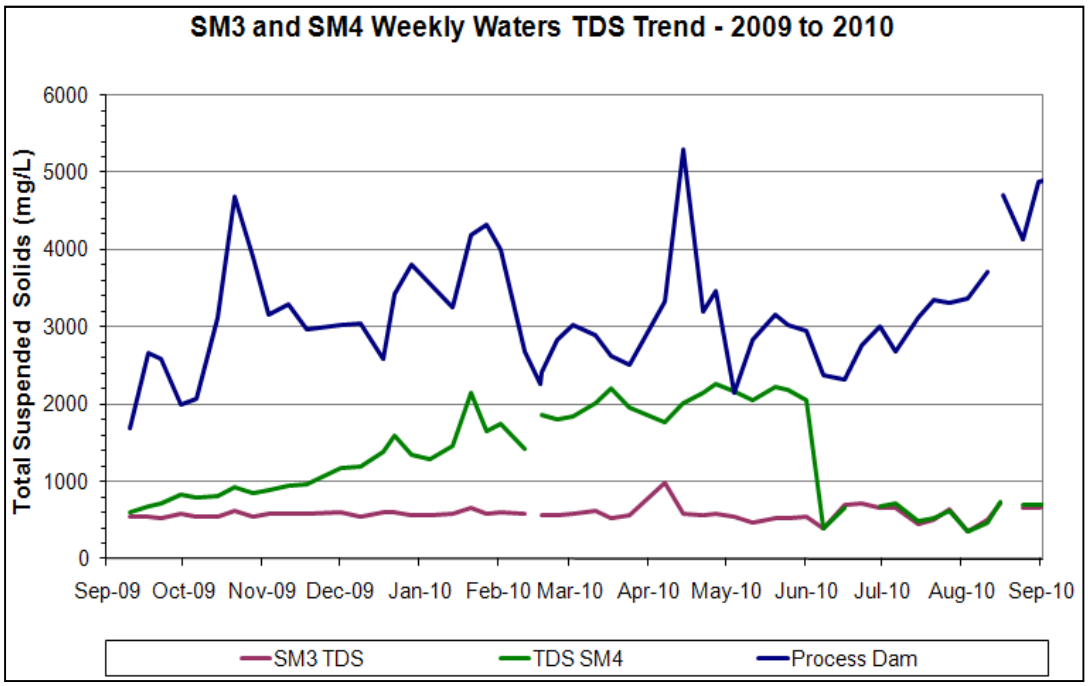
### 3.3.2.2 Weekly Water Quality Monitoring Results

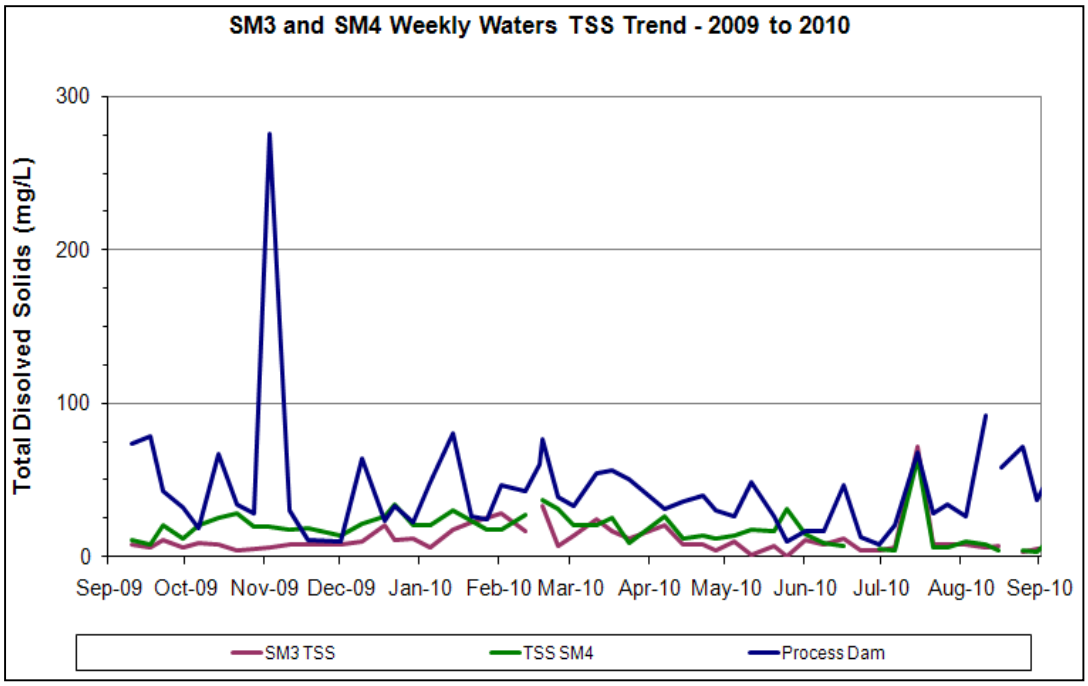
Weekly water samples were collected and analysed during the reporting period for pH, Electrical Conductivity (EC), Total Dissolved Solids (TDS), Total Suspended Solids (TSS) Total Hardness ($CaCO_3$) and Oil and Grease (O & G). The purpose of sites SM3 and SM4 are to identify if the process water dam located adjacent to Betty's and Bowmans Creek is discharging dirty water into the creek system. The results of this monitoring indicate that there were no discharges during the monitoring period.

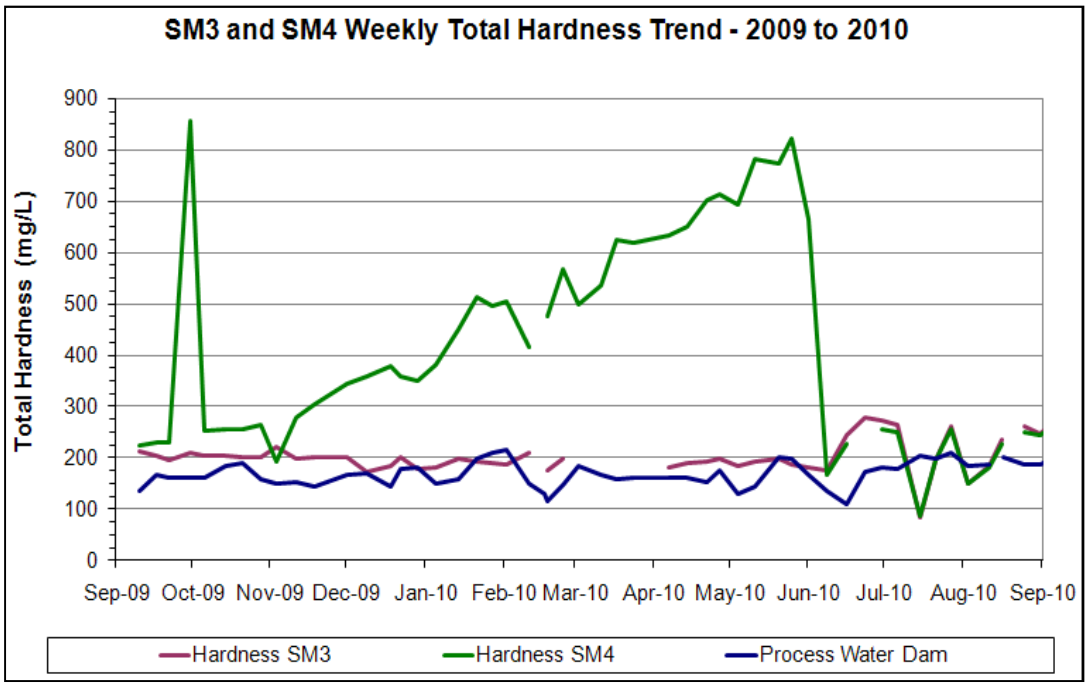
Elevated levels in EC, TDS and Hardness recorded at SM4 resulted from saline groundwater discharge into the pool at SM4. During periods of low flow in Bowmans Creek, the groundwater discharge dominates the water supply to the pool. Following heavy rainfall observed in June 2010, water chemistry returned to natural flow levels following the dilution of the groundwater discharge.




SM3 and SM4 Weekly Waters EC Trend - 2009 to 2010
Electrical Conductivity (uS/cm)
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
Sep-09 Oct-09 Nov-09 Dec-09 Jan-10 Feb-10 Mar-10 Apr-10 May-10 Jun-10 Jul-10 Aug-10 Sep-10
EC SM3
EC SM4
Process Dam


SM3 and SM4 Weekly Waters TDS Trend - 2009 to 2010
Total Suspended Solids (mg/L)
6000
5000
4000
3000
2000
1000
0
Sep-09 Oct-09 Nov-09 Dec-09 Jan-10 Feb-10 Mar-10 Apr-10 May-10 Jun-10 Jul-10 Aug-10 Sep-10
SM3 TDS
TDS SM4
Process Dam


SM3 and SM4 Weekly Waters TSS Trend - 2009 to 2010
Total Disolved Solids (mg/L)
300
200
100
0
Sep-09 Oct-09 Nov-09 Dec-09 Jan-10 Feb-10 Mar-10 Apr-10 May-10 Jun-10 Jul-10 Aug-10 Sep-10
SM3 TSS
TSS SM4
Process Dam


SM3 and SM4 Weekly Total Hardness Trend - 2009 to 2010
Total Hardness (mg/L)
900
800
700
600
500
400
300
200
100
0
Sep-09 Oct-09 Nov-09 Dec-09 Jan-10 Feb-10 Mar-10 Apr-10 May-10 Jun-10 Jul-10 Aug-10 Sep-10
Hardness SM3
Hardness SM4
Process Water Dam

## 3.4 GROUND WATER POLLUTION

As required by Consent Condition 9.2 (d), a groundwater reports has been prepared by an independent expert covering the reporting period 1 September 2009 to 1 September 2010. This report has been included in **Appendix 2**.

### 3.4.1 Summary

The groundwater report included in **Appendix 2** details the monitoring and other work carried out as part of the groundwater management activities for the period. The results of all groundwater monitoring are presented, together with analysis of trends. Actual impacts derived from the analysis of this data are compared to the impacts predicted for this stage of mining in both the EIS studies and studies carried out in support of the LW1-4 SMP and LW/MW 9 SMP Applications.

Over the 2009-10 reporting period:

- The groundwater monitoring network was expanded to improve monitoring of groundwater conditions in the:
    - Bowmans Creek and Hunter River alluvium, in support of the proposed Bowmans Creek Diversion and mining beyond LW6.
    - Main coal seams in the Upper Liddell SMP1-4 underground area.
- Groundwater monitoring frequency was increased during the early stages of LW5 and LW6 panel extraction, to monitor the impacts of subsidence in accordance with SMP Consent Condition 22.
- Apart from the initial drawdown observed in the Glennies Creek alluvium during the mining of LW1, no mining impacts have been observed in the Glennies Creek, Bowmans Creek or Hunter River alluvium as a result of underground mining.
- Large drawdown responses in the Pikes Gully Seam and Permian overburden units have been observed in the immediate LW1 - 6 mining area. Piezometers located in the barrier between LW1 and Glennies Creek have demonstrated that groundwater levels continue to show steady recovery of approximately 0.7 m/y, that is approximately 80% of the initial 3.0 m drawdown has now been recovered. The partial recovery in water levels suggests a steady reduction in the hydraulic conductivity of the Pikes Gully Seam between LW1 and the subcrop line beneath the Glennies Creek floodplain, possibly due to delayed response to the in-seam grouting carried out in 2007. The gradual recovery in water levels has been accompanied by a gradual reduction in the rate of underground seepage inflows to the tailgate 1 backroad weir. No additional responses to underground mining were observed in the Pikes Gully Seam.
- Total groundwater inflows to the underground (0.4 to 10 L/s) have been below inflow rates predicted in the EIS (16 to 17 L/s).

- Actual seepage inflow rates from the Glennies Creek alluvium (0.66 to 1.0 L/s), have been below the EIS predictions of 3 L/s, and there were no seepage losses from Bowmans Creek alluvium. The actual seepage rates have therefore continued to be less than the maximum rates contained in the EIS, LW1-4 and LW/MW 5-9 SMP predictions.

In summary, the monitoring program has been carried out in accordance with ACOL's Ground Water Management Plan (GWMP) and the requirements detailed in the Consent Conditions. All groundwater-related impacts from underground mining during the review period were below the levels predicted in the EIS, and in the LW1-4 SMP and LW/MW 5-9 groundwater assessments.

## 3.5 CONTAMINATED AND POLLUTED LAND

On Thursday 19 August 2010 ACOL identified a tailings slurry (tailings diluted with process water to allow pumping) discharge from a containment dam (Containment Storage Dam 1 (CS1)). The DECCW and Industry and Investment were immediately informed of the incident and a full investigation report was provided to each agency shortly after. The spill was fully cleaned up and the area remediated. ACOL have implemented corrective actions to prevent a possible recurrence.

## 3.6 THREATENED FLORA AND FAUNA

### 3.6.1 Flora and Fauna Management

Condition 3.46 of the Development Consent requires the preparation of a Flora and Fauna Management Plan (FFMP), which was approved by DECCW, DoP, NoW and I&I in August 2006. Autumn and Spring Fauna monitoring was conducted during the period as part of the Flora and Fauna Management Plan.

#### 3.6.1.1 Conservation Area

ACOL have been working with DECCW NPWS to finalise the Voluntary Conservation Area (VCA) conservation agreement. In March 2010 ACOL provided a final document to NPWS for the Minister's approval. ACOL received final sign off from the Minister on the 14 October 2010. Monitoring of the flora and fauna within the VCA has been ongoing including monitoring of a number of nest boxes. The VCA has been fully fenced for several years to exclude grazing and sign posted as a conservation area. Weed works have been conducted during the reporting period including the maintenance follow up removal of African Boxthorn, removal of Green Cestrum, and spraying of St John's Wort. Works to be conducted in the next reporting period include further follow up maintenance weed works focusing on St John's Wort and African Boxthorn.

### 3.6.2 Fauna Monitoring

Fauna habitat surveys were carried out in both the spring and autumn seasons during the reporting period. These surveys continually assess the habitat value and species and abundance and diversity within ACOL lands. The main focus of the monitoring is the southern woodland (VCA) which consists of open grassy woodland dominated by *Allocasuarina luehmannii*. Sub-dominant species include *Eucalyptus crebra* (narrow-leaved ironbark), *Eucalyptus melliodora* (yellow box) and *eucalyptus fibrosa* (grey box).

#### 3.6.2.1 Spring 2009

The spring 2009 survey was conducted by ERM consultants. A number of monitoring techniques are undertaken as part of the Fauna surveys. These include:

- Elliot A Traps. 50 traps were placed along two transects to monitor small and medium terrestrial mammals.
- Hair funnels. 19 funnels were placed throughout the southern woodland for 12 nights to monitor small and medium terrestrial mammals.
- Elliot B Traps. Twenty traps were mounted on trees along the survey transects at approximately 2 metres above the ground. They were used to target small to medium sized arboreal mammals.
- Hair funnels. 11 funnels were on the ground along the transects for 12 nights targeting arboreal mammals.
- An Anabat echolocation call detector was used over two non-consecutive nights to record and identify bat calls.
- 10 minute diurnal bird point surveys were conducted over five days.
- Targeted Grey-Crowned Babbler, Speckled Warbler and Hooded Robin surveys were conducted (see 3.6.2.1 below).
- Spotlighting was undertaken.
- Nest boxes. A total of 28 nest boxes and 14 bat boxes have been installed on ACOL property and these boxes were monitored for species use.
- Targeted amphibian surveys were undertaken.

Flora surveys indicate that the Southern Woodland is regenerating slowly, however this is generally dominated by Bull Oak. Terrestrial and arboreal mammal trapping recorded the presence of the Yellow-footed Antechinus (*Antechinus flavipes*), Common Brushtail Possum (*Trichosurus vulpecula*), Brown Antechinus (*Antechinus stuartii*) and the introduced House Mouse (*Mus musculus*). This was the first time the Brown Antechinus has been recorded in the biannual surveys of the southern woodland.

A large number of common bird species were observed in the southern woodland throughout the period, similar to those previously recorded.

The Little Forest Bat (*Vespadelus vulturnus*) was recorded during the survey period. The number of recorded bat species has decreased since the previous survey period conducted in autumn 2009.

A total of 5 threatened bird species have now been identified within the Southern Woodland (Grey-Crowned Babbler (*Pomatostomus temporalis*), Speckled Warbler (*Pyrrholaemus sagittatus*), Flame Robin (*Petroica phoenicea*), Scarlet Robin (*Petroica boodang*), and Hooded Robin (*Melanodryas cucullata cucullata*)). The Grey-crowned Babbler was the only species of these 5 to be recorded in the Spring 2009 survey in the Southern Woodland.

During the Spring 2009 survey the observed sightings of the Grey-Crowned Babbler population situated within the Southern Woodland decreased from the previous survey from 35 to 25. However this remains higher than survey records prior to Autumn 2009. Another pleasing result is the significant increase in Grey-Crowned Babbler nests recorded during the Spring 2009 survey, increasing from 2 to 18. Cattle have been excluded from the southern woodland for 5 years and during this period there has been a natural restoration of the previously degraded shrub layer. This is likely the cause for the increased population of Grey-Crowned Babbler with the species requiring a dense shrub layer for foraging. **Figure 6** below shows the change in population size of the Grey-Crowned Babbler over time.

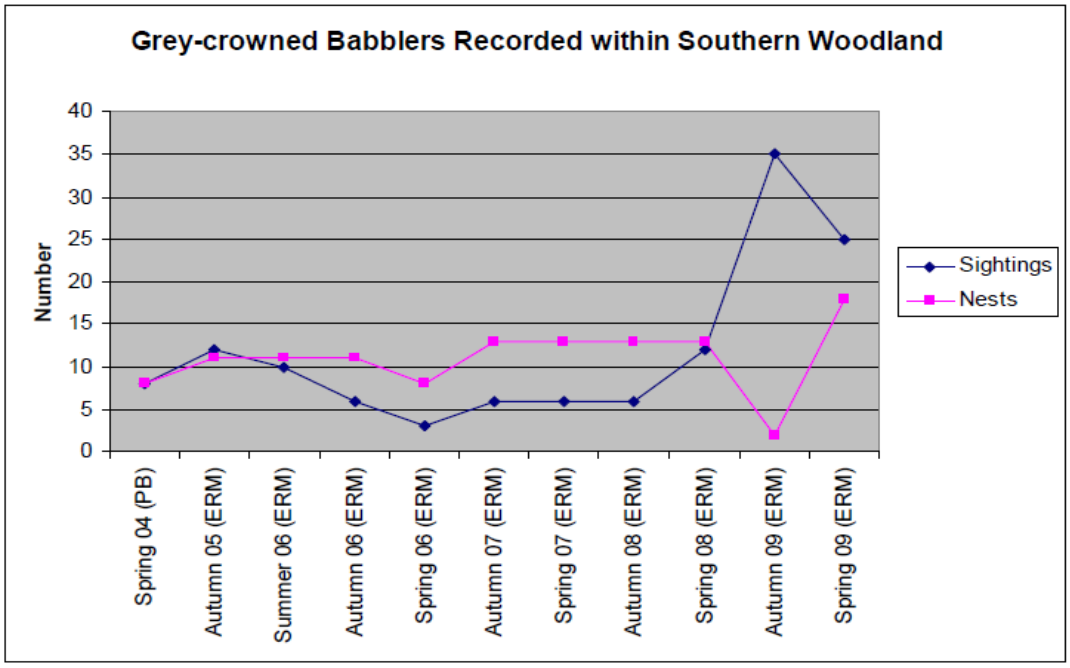



**Figure 6. Southern population of the Grey-crowned Babbler**

Prior to clearing for Open Cut mining in the North East Open Cut Pit, a Grey-Crowned Babbler population was present within the grassy woodland habitat. Ongoing monitoring of the progressively cleared area and the adjacent remnant vegetation south east of Glennies Creek Road suggests that the resident population previously located within the Open Cut disturbance area has relocated to the adjacent remnant. **Figure 7** shows the change in population size and presence of nests over time. All vegetation within the North East Open Cut has now been cleared. No assessment of the remnant was undertaken during Autumn 2009.

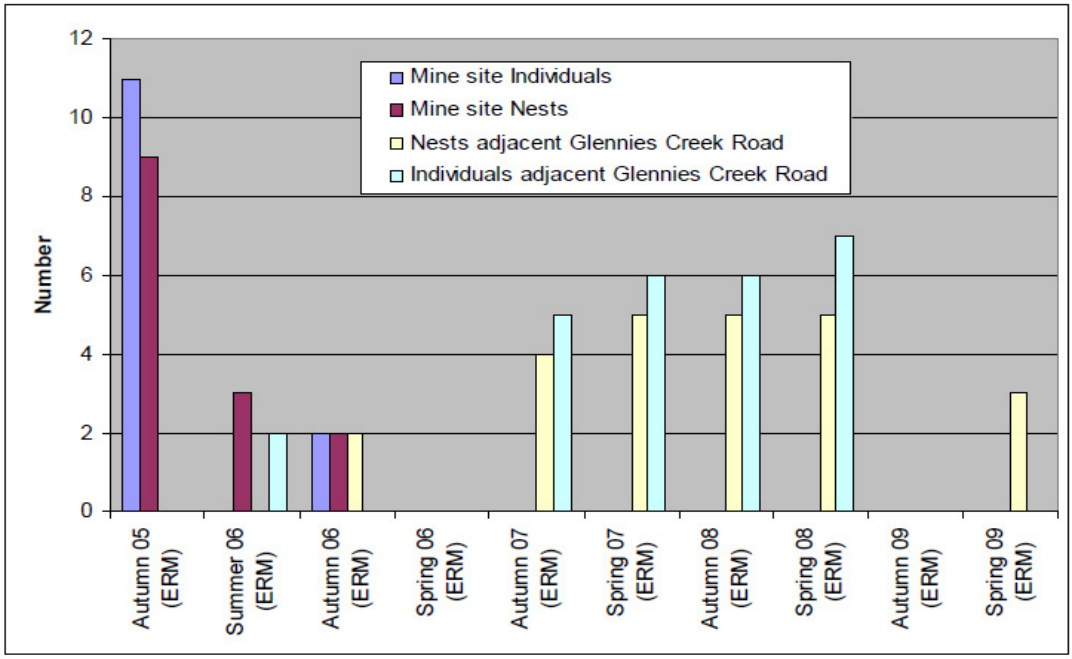



**Figure 7. Distribution of northern population of Grey-crowned Babbler**

A total of 28 nest boxes and 14 Bat boxes have been installed within ACOL property. The nest boxes target a number of different species. They are monitored biannually for resident fauna, evidence of use and presence of pest species.

The species most commonly ustilising the nest boxes is the existing Brushtail Possum population with evidence of use in a number of boxes with the Southern Woodland (scat and hair analysis). The number of pest species occupying nest boxes has decreased over recent survey periods. This may be due to the removal of pest species during nest box monitoring and the increased utilisation of these nest boxes by native fauna. Whilst 6 microchiropteran bat species have been identified within the Southern Woodland only one possible incidence of bat box use has been recorded (Autumn 2009) with evidence of nesting material however no hair or scat samples were found. It is expected that the presence of rough barked eucalypts within the Southern Woodland is providing preferable roosting sites for bat species. **Figure 8** shows nest box usage over time. In general it is evident that there has been a gradual increase in usage since their installation.

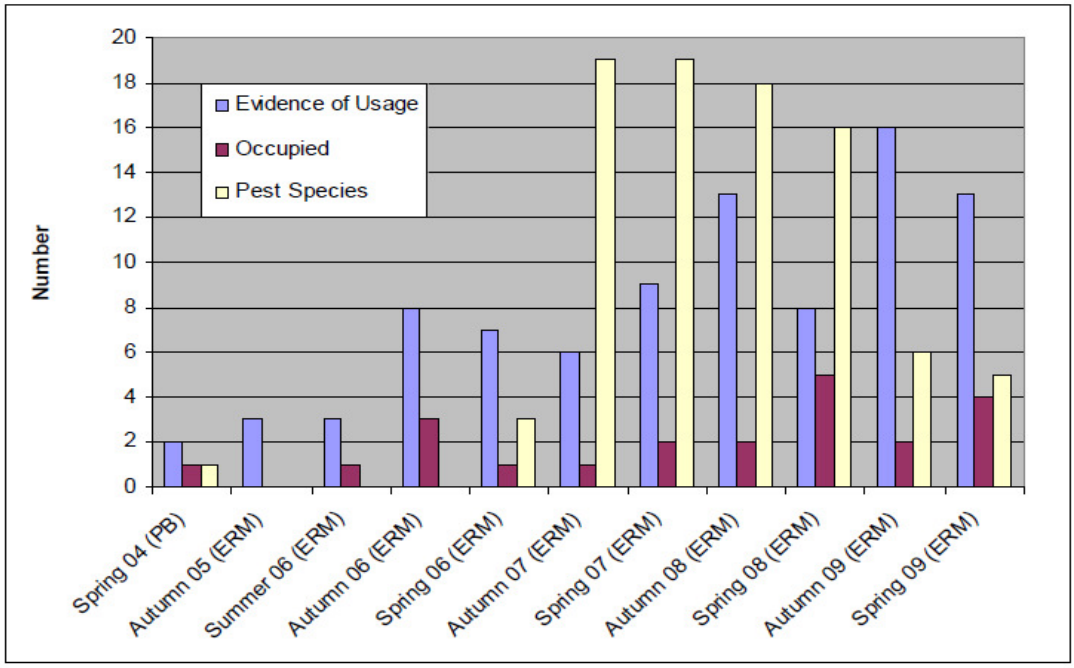



**Figure 8. Nest box usage**

### 3.6.2.2 Autumn 2010

The Autumn 2010 survey was conducted by PEA consulting. The survey areas have been increased to assess fauna return to rehabilitation areas and now include five sites (3 analogue and 2 impact). These sites are the South Woodland (SW), Northern Woodland (NW), South East Open Cut Proposed Reserve Area (SOC), Open Cut Regeneration Area (OC) and Common Woodland (CW). **Figure 9** shows their locations.


**Figure 9. Monitoring survey sites**

The Autumn 20010 survey was conducted over 13 consecutive days. Fauna investigations identified 75 species comprising 52 birds, 10 mammals, 7 reptiles, 1 amphibian, and ants from five family groups. The greatest diversity was recorded in the Southern Woodland and South East Open Cut Reserve area. Increased diversity for nocturnal species in the Common Woodland and Northern Woodland areas is likely a function of spatial autocorrelation with development, as increases were largely from domestic species. A total of 4 significant bird species were recorded during surveys (Grey-Crowned Babbler, Turquoise Parrot, Speckled Warbler and Hooded Robin), however not all habitats contained within each site would be considered suitable for supporting the species recorded in the remanent. Bird species diversity for each woodland is presented in **Figure 10**.

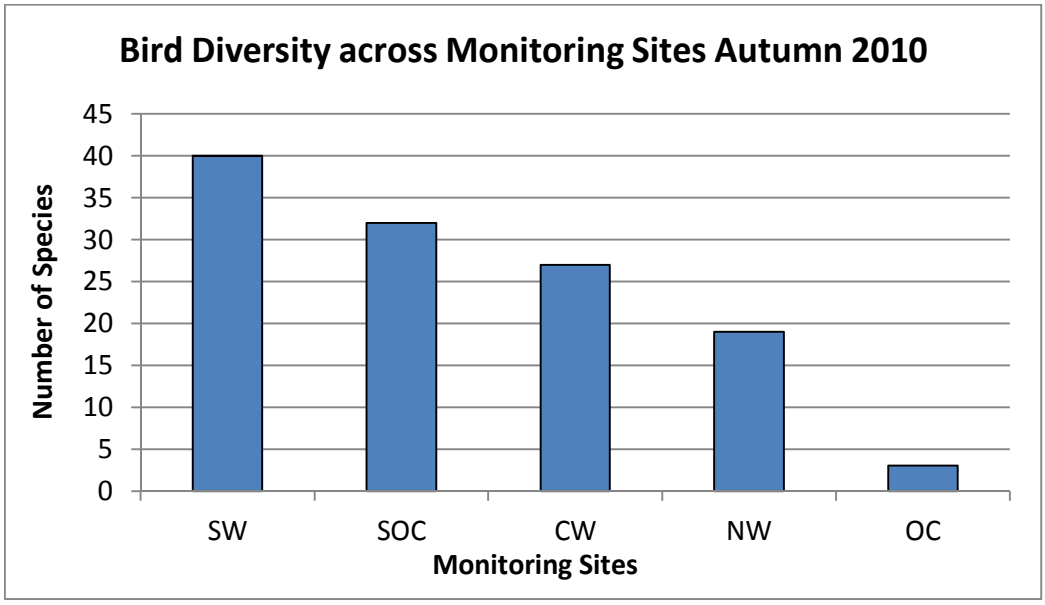



**Figure 10. Bird species diversity recorded Autumn 2010.**

Reptile surveys identified a high number of species considering the seasonality of these surveys, during the cooler months of Autumn it would be expected to see reduced numbers of reptiles. Reptile habitat in the Southern Woodland and Northern Woodland were more diverse than the remaining sites. **Figure 11** presents the reptile species identified within each woodland site. No utilisation of the Open Cut rehabilitation by reptiles was observed during the Autumn 2010 survey period.

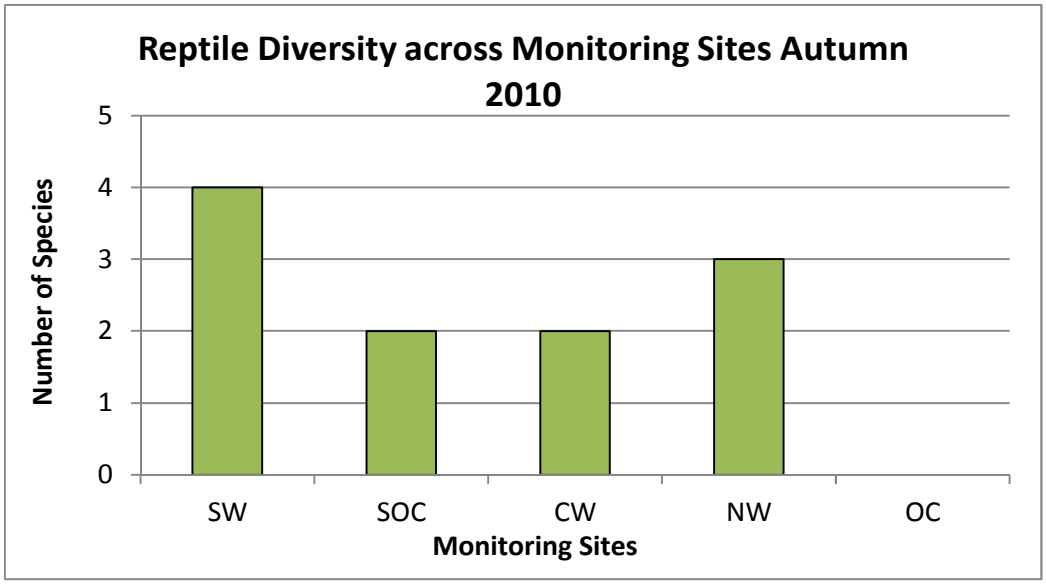



**Figure 11. Reptile diversity recorded Autumn 2010.**

No micro-bats were recorded during this survey by Anabat or harp trapping. The conditions were very cold during the night time period and outside of the activity period for these species.

Walking nocturnal transects and set hair tubes along the transects were used to sample large mammal species in the study area. The Common Woodland recorded the greatest diversity however this was due to the inclusion of domestic species from nearby homes. Large mammal diversity is shown in **Figure 12**.

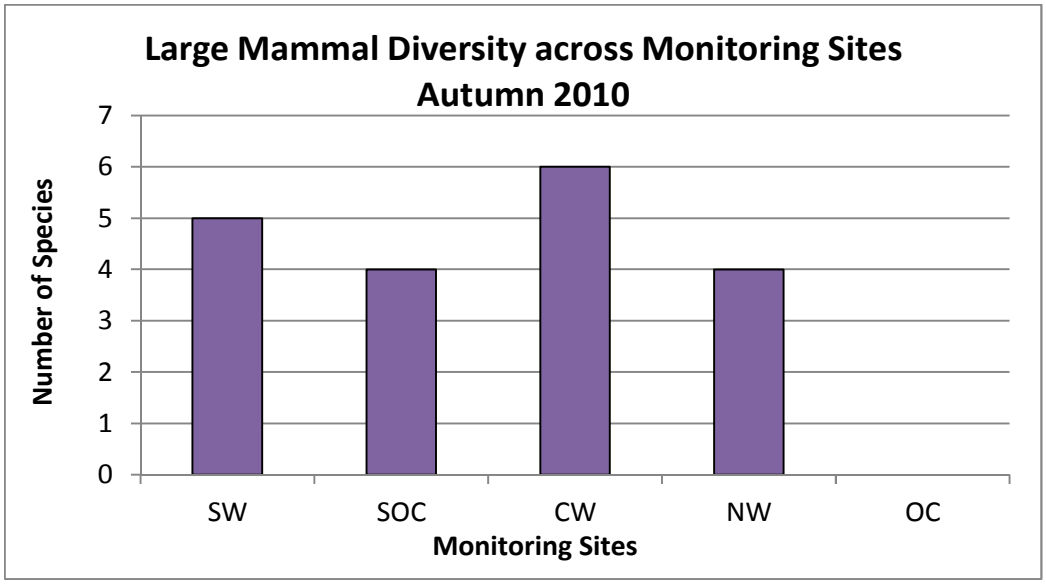



**Figure 12. Large mammal diversity recorded Autumn 2010.**

Nocturnal surveys were undertaken along the same transects as the hair tubes and diurnal transects. A greater abundance and diversity was recorded within the Common Woodland, however this is again due to the proximity to residences. A greater abundance of native nocturnal species was observed within the Southern Woodland and the South East Open Cut

Reserve Area. Spotlighting results are presented in **Figure 13** for the Autumn 2010 survey period.

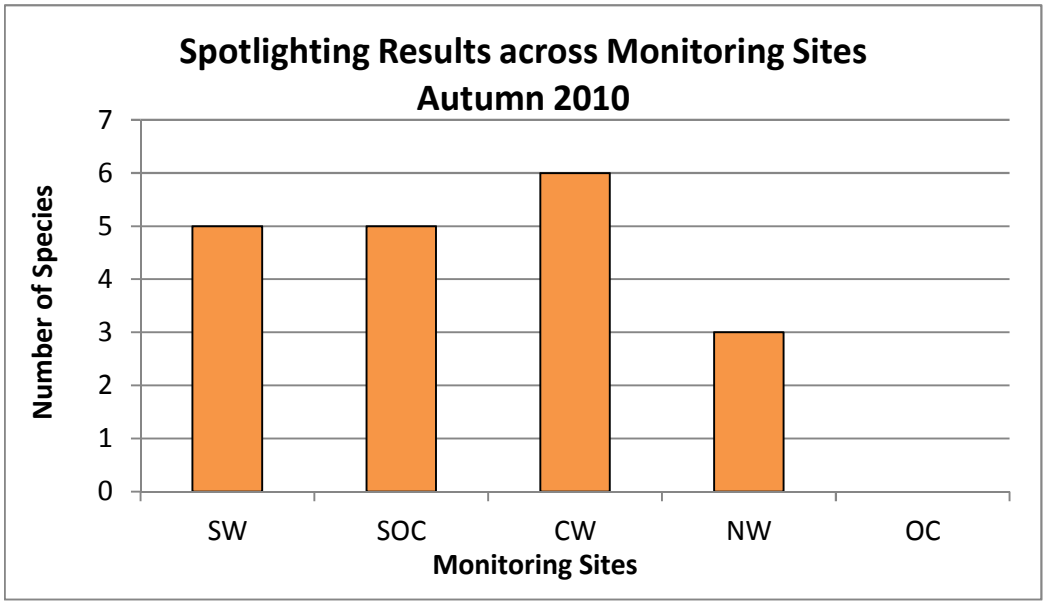



**Figure 13. Spotlighting diversity recorded Autumn 2010.**

Fauna results from the Autumn 2010 survey indicate the Southern Woodland, South East Open Cut Reserve Area and Common Woodland provide a greater range of habitats for a more significant range of species. The Southern Woodland in particular provides habitat for more significant species than all other sites, whilst having greater abundance of species and the smallest edge to area ratio of the remnants. Management of the Southern Woodland has removed impacts such as grazing which has no-doubt improved conditions for woodland bird species. Moreover, there was a marked difference in the diversity and abundance of ground foraging woodland birds in the Southern Woodland compared to that of areas still impacted by grazing or have yet to recover from historical activities.

## 3.7 AQUATIC ECOLOGY MONITORING BOWMANS AND GLENNIES CREEK

As required by Consent Conditions 3.19 and 3.20 under Development Application DA No 309-11-2001-i issued by the Minister for Planning, aquatic ecological monitoring was undertaken during the reporting period. Monitoring conducted during the period builds on sampling studies conducted between 2006 and 2009 and the initial benchmarking conducted during the EIS phase in 2001. Monitoring was conducted in spring 2009 and autumn 2010.

In terms of overall study aims, the Aquatic Ecology Monitoring study endeavours to answer the following questions:

- Are there measurable differences in aquatic ecological attributes between creek pools upstream, alongside and downstream of mining operations?
- Are observed differences directly attributable to mining impacts or can differences be attributed to spatial (between-site) and/or temporal (between-survey) differences?
- Do the creeks provide (and continue to provide) suitable aquatic habitat?
- Do the creeks continue to provide suitable fish passage?

### 3.7.1 Sampling Methods

The adopted sampling methods are based on existing methods being utilised for monitoring long-term aquatic ecological change in several of the Illawarra coal mining catchments (e.g., BHP Billiton 2001). The study follows the National River Process and Management Program River Bio-assessment Manual methods (NRPMP 1994) as adapted for the National River Health Program (now referred to as the AusRivAS method (Turak et al 1999).

The AusRivAS protocol provides a number of definitions of sites and habitats within sites for selection of sampling locations and recommends that, wherever possible, two habitats (riffles and edges) be sampled at each site. The following AusRivAS definitions are relevant and sampling has conformed to these definitions:

- A site is "a stream reach with a length of 100 m or 10 times the stream width, whichever is the greater"
- A riffle habitat is "an area of broken water with rapid current that has some cobble or boulder substratum". However, "sampling riffles where the substratum consists predominantly of large boulders may be difficult and may not produce reliable results".
- Edge habitat is "an area along the creek with little or no current".

Given the location of a number of the study sites in reaches of creeks where there are predicted to be periods of little or no connecting flow between pools or where there are predicted to be no riffle sections available for sampling, it was decided that only pool 'edge' samples would be sampled, as riffle samples could not be guaranteed for all (or possibly even for most) sites at all sample times.

Since the spring 2008 survey the monitoring locations were reviewed and altered due to changes in the mine plan. There are now 13 monitoring sites located on Bowmans Creek and Glennies Creek. Not all sites are being sampled for the full stream health monitoring program but are being sampled for fish passage and/or field water quality as necessary. This new study design enables the direct assessment of mining impacts on individual pools as mining proceeds and also facilitates the interpretation of long-term monitoring results.

- Ten sites were sampled for water quality profiles.
- Six sites were utilised for over-night fish trapping.
- Six sites are sampled for aquatic macro invertebrates plus site aquatic habitat assessment.

As for previous surveys the particular reach selected for sampling within each of the sample locations was selected on the basis of it being (i) a reach with high drought resistance (generally based on pool size, depth and riparian cover) and (ii) a reach with high aquatic habitat diversity; ideally deep pools connected by gentle riffles, abundance of stream bed litter, presence of snags, presence of aquatic vegetation and good extent of cover of overhanging riparian vegetation.

### 3.7.2 Monitoring Results

#### 3.7.2.1 Bowmans Creek

Stream flows were low for both surveys, with the spring 2009 flows being very low ranging between 0.86ML/day to 0.99ML/day while the autumn 2010 survey the flow rate was ranging between 3.49ML/day to 3.70ML/day.

During the spring 2009 survey a total of 46 macro invertebrate taxa were recorded from the six Bowmans Creek sites, which is the highest number of taxa found over a single survey to date. After both survey periods it brings the total number of macro invertebrate taxa identified from Bowmans Creek sites over the six seasonal surveys to 70. The average number of taxa for spring 2009 was 21.2 ± 2.6 which was the highest average recorded for Bowmans. However for the autumn survey the average number of taxa was down to 17.5 ± 2.4 which hasn't been that low since spring 2007.

In terms of SIGNAL grades, the most sensitive taxa were the dragonfly family Telephlebiidae with a SIGNAL value of 9 and the mayfly family Leptophlebiidae with a SIGNAL value of 8. Site SIGNAL scores for spring 2009 ranged between 3.15 to 3.82 with a combined Bowmans Creek survey score of 3.55. While for autumn 2010 the site SIGNAL scores ranged between 2.83 to 4.09 with a combined Bowmans Creek survey score of 3.61 (**Figure 15**).

There were 5 fish species confirmed from Bowmans Creek sites during the spring 2009 and autumn 2010 surveys. Three native species flathead gudgeon, mullet (*Mugil cephalus*) and striped gudgeon (*Gobiomorphus australis*). Striped gudgeons have not been recorded from the Bowmans Creek study over the previous six surveys, and were now found at sites BCLW7B and BCLW7A. The introduced pest species plague minnow (*Gambusia holbrooki*) and carp

(*Cyprinus carpio*) were again common for these surveys. Carp were found at every site and plague minnow were found at all sites except BCLW7B.

Long-necked turtles (*Chelodina longicollis*) were observed at BCLW7B and BC3. Another reptile, the eastern water dragon (*Physignathus lesueurii lesueurii*) was noted at two sites, BCLW7B and BCLW6Bd. Tadpoles were found at three sites during spring 2009.

SIGNAL scores were relatively moderate in comparison to pre autumn 2010 surveys. Site BCLW7B recorded the lowest diversity for the survey and BC3 recorded the highest, which contrasts to the spring 2009 survey in which BC3 recorded the lowest and BCLW7B recorded the highest.

For the autumn 2010 survey there was no fish passage available within the ephemeral portion of the creek between BCLW7A and Bowmans Creek upstream site BCUp and, based on an inspection of daily flow rates for Bowmans Creek, there has most likely not been any fish passage throughout this creek section since the spring 2009 survey.

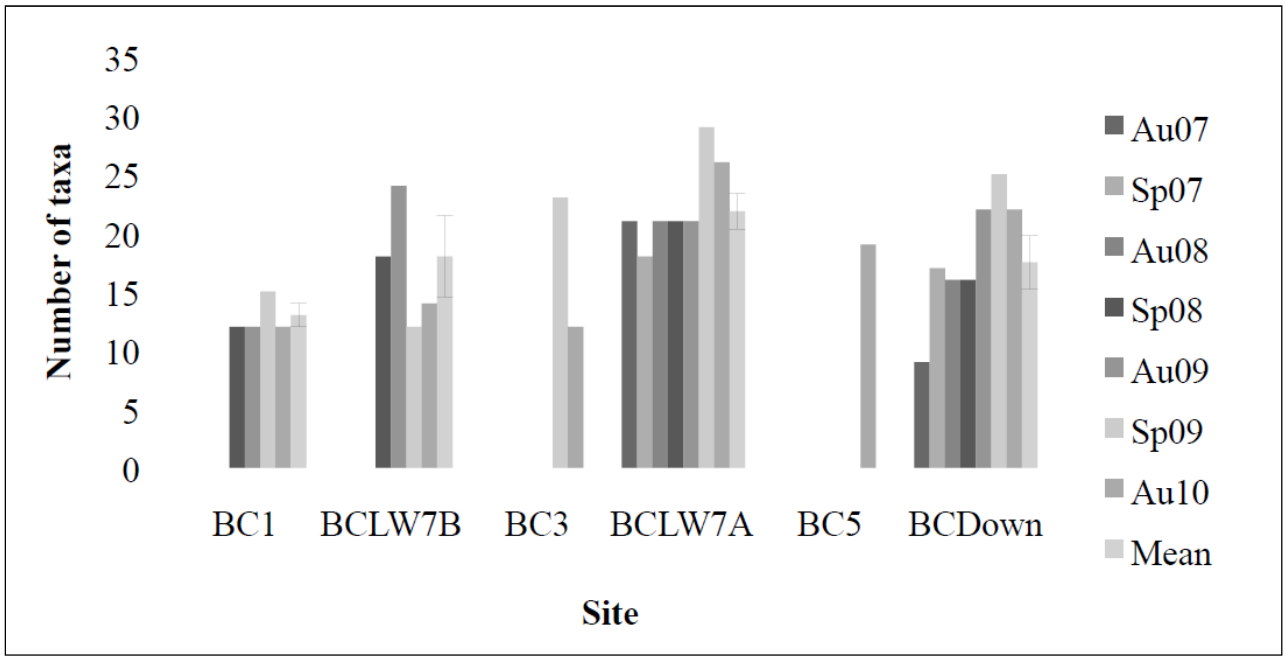



**Figure 14. Bowmans Creek Seasonal Site Macro Invertebrate Diversity**

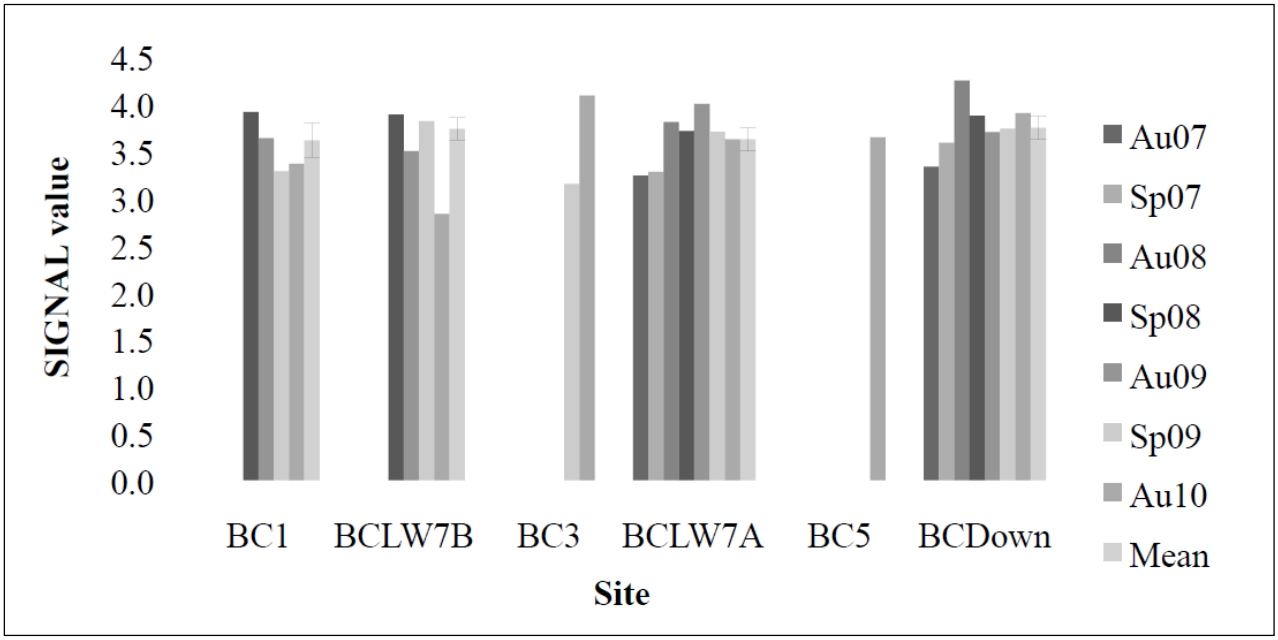



**Figure 15. Bowmans Creek Seasonal Site SIGNAL Index**

### 3.7.2.2 Glennies Creek

During the spring 2009 survey stream flows were higher than the previous three surveys with mean daily flows ranging between 222.3 and 223.6 ML/day. For autumn 2010 the flow was similar to that recorded in autumn 2009 ranging from 47.3 ML/day to 56.9 ML/day.

All macrophytes present had been recorded from the Glennies Creek study area over the previous six surveys, which consisted mainly of *Myriophyllum,* clasped pondweed, cumbungi, and river clubrush. Though there was an exception with duckweed, which was now present at all three sites.

Water quality was generally good across all parameters measured for the spring 2009 and autumn 2010 surveys. Water turbidity was low across all sites.

There were 33 and 36 macro invertebrate indentified from the three Glennies Creek sites during the spring 2009 and autumn 2010 surveys respectively. These were some of the lowest total number of taxa recorded at the Glennies Creek sites from the previous surveys. However the mean number of taxa identified were 21.0 ± 0.6 for spring 2009 and 22.0 ± 2.1 for autumn 2010 (**Figure 16**). These mean values sit in the middle of the survey mean values recorded over the previous surveys. Also there were 6 new taxa identified at the Glennies Creek sites during the spring 2009 and autumn 2010 surveys bringing the total of macro invertebrate taxa to 69.

Individual site SIGNAL scores ranged between 3.56 at GCMid and 3.90 at GCDown, with an overall spring 2009 combined creek score of 3.71. This matches the original lowest creek score from combined creek SIGNAL score recorded over all seasons. Individual site SIGNAL scores ranged between 3.68 at GCDown and 4.25 at GCMid, with an overall autumn 2010 combined creek score of 3.98. This is the highest combined creek SIGNAL score recorded over all seasons, marginally higher than both autumn 2009 (3.95) and autumn 2008 (3.90). GCMid

recorded its highest SIGNAL value to date at 4.25, compared to the previous highest value of 4.10 in autumn 2009 (**Figure 17**).

There were five fish species recorded for the spring 2009 survey and four species during the autumn 2010 survey. The introduced pest species carp and plague minnow were the only fish observed or caught at all three sites during the spring 2009 survey. Carp have been increasingly common over the past three surveys.

During the spring 2009 survey the native fish identified were juvenile gudgeons and schooling mullet were found at two sites, and Australian smelt were found at one site. An eel-tailed catfish (*Tandanus tandanus*) juvenile was found at GCMid. This species had not been recorded from any of the Glennies Creek sites previously (it is known from Bowmans Creek study area), and indicates that the Creek most probably has suitable breeding habitat. During the autumn 2010 survey the native fish fauna included mullet and firetail gudgeon (*Hypseleotris galii*) with the latter not having been recorded from Glennies Creek sites before.

Tadpoles have also not been recorded from Glennies Creek sites before, and were found at GCMid during the spring 2009 survey. Numerous adult dwarf tree frogs (*Litoria fallax*) were also observed in a stand of river clubrush within site GCUp. This species had not been recorded previously within Glennies Creek pools, although they have been noted from riparian banks at GCOCUp during autumn 2009. Though in the autumn 2010 survey there were no tadpoles or other aquatic fauna recorded.

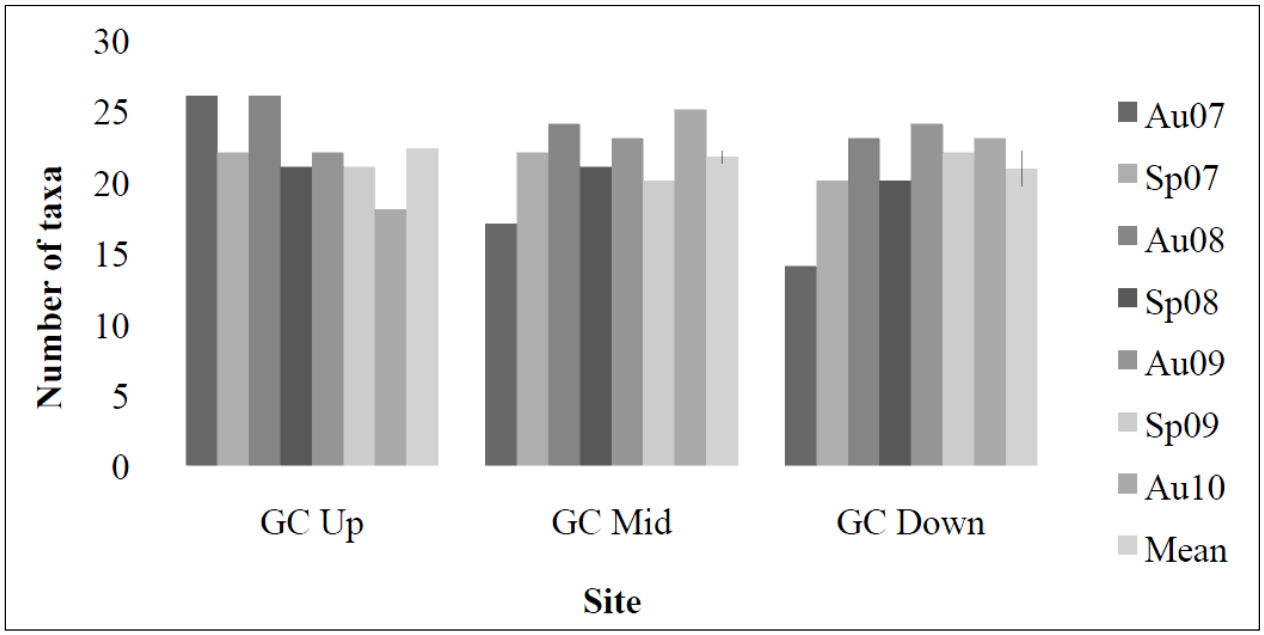



**Figure 16. Glennies Creek Seasonal Site Macro Invertebrate Diversity**

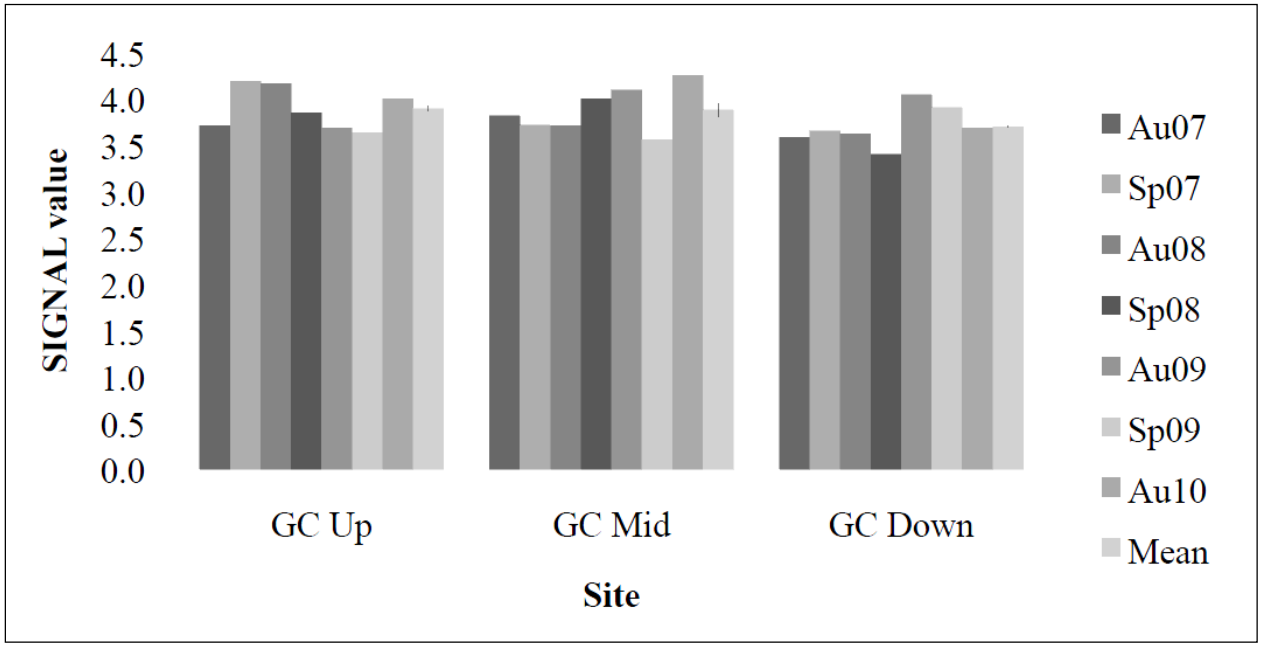



**Figure 17. Glennies Creek Seasonal Site SIGNAL Index**

## 3.8 WEEDS

### 3.8.1 Weed Management

Weed works conducted during the period focused on the following species:

- Green Cestrum, a Class 3 noxious weed. Controlled using cut and paint techniques with Roundup Biactive®. Approximately 11ha situated along the banks of Glennies Creek and the Hunter River were treated.
- African Boxthorn, a Class 4 noxious weed. Controlled using cut and paint techniques with Roundup Biactive®. A total of 6.49ha were treated.
- Galinea, an environmental weed. Treatment targeted topsoil stockpiles which were sprayed with Grazon Extra®. A total of 2.4ha were treated.
- St John's Wort, a Class 4 noxious weed. Sprayed with Grazon Extra®. A total of 24ha were treated during the period.

**Figure 18** shows the location of weed works conducted during the period.

A weed survey was undertaken during the period. This identified key areas for treatment in the 2010-11 reporting period. Key weeds to be addressed are:

- Follow up treatment of St John's Wort throughout all ACOL land holdings;
- Continued treatment and follow up treatment of Green Cestrum throughout all ACOL land holdings;
- Continued treatment of African Boxthorn across the Ashton Property and VCA;
- Treatment of Galinea in rehabilitation areas;
- Treatment of Mother of Millions along Bowman's Creek;

- Treatment of 2 infestations of Lantana along the Main North Railway and Bowman's Creek; and
- Treatment of an isolated Blackberry infestation before propagation of the species can occur.

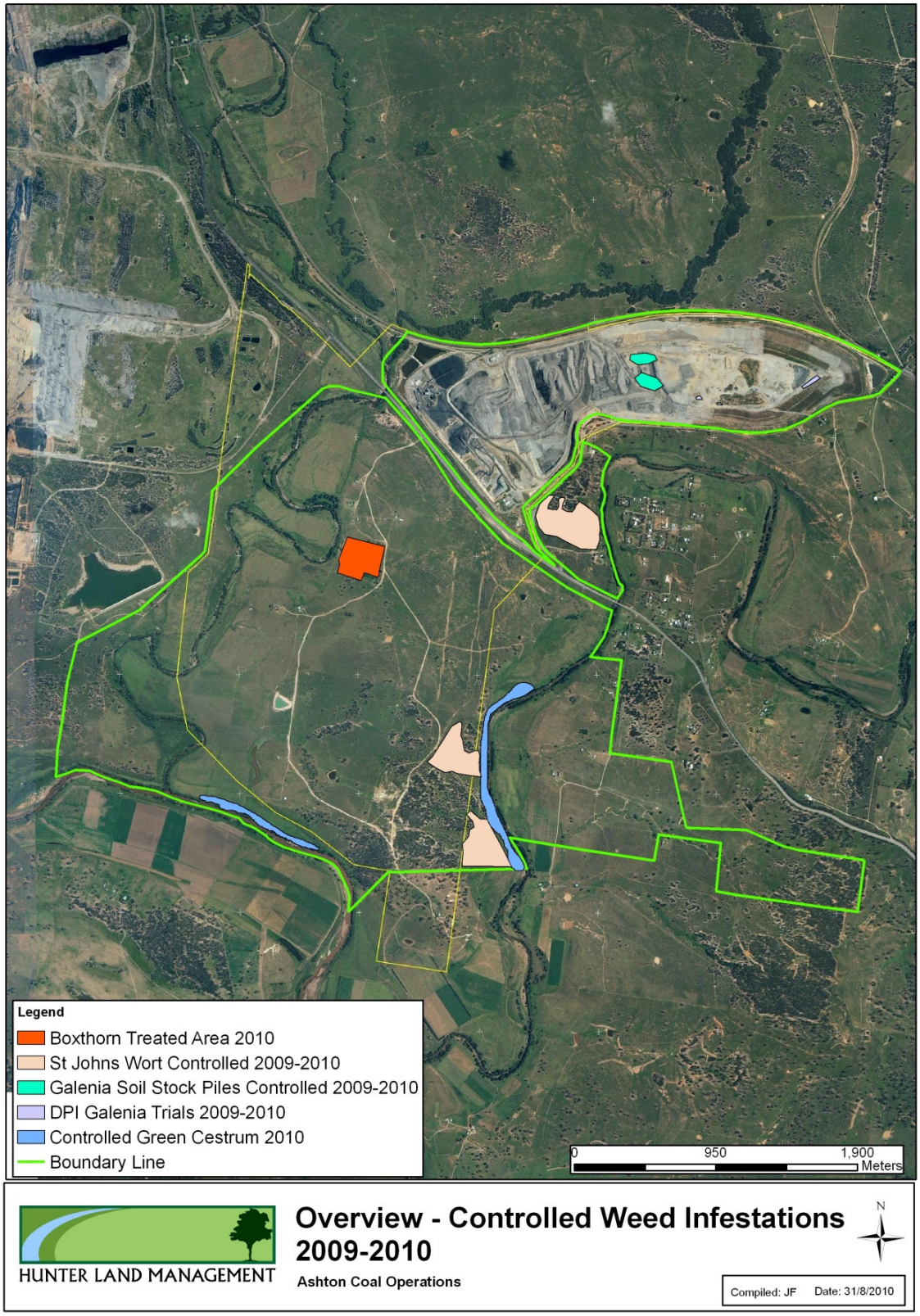



**Figure 18. Overview of weed control works September 2009 to August 2010**

## 3.9 BLASTING

### 3.9.1 Blast Management

Due to the proximity of the Main Northern Railway, Glennies Creek Road and the village of Camberwell to the mining operations area, the Blasting and Vibration Management Plan (BVMP) along with a complex series of controls have been established to ensure that blasts conform to the criteria defined in the Development Consent and the EPL.

Blasting times are limited to the hours of 9am to 5pm Monday to Saturday inclusive by the Development Consent, However the EPL states that blasting cannot occur on Sundays or public holidays without the prior approval of the DECC. During the reporting period no blasts were conducted on Sundays or Public Holidays.

To ensure that ground vibration does not exceed criteria at receptor locations, the Maximum Instantaneous Charge (MIC) is calculated for each blast at the design stage. Procedures are also in place to ensure that sufficient depth of crushed stemming material is also placed in the collar of each blast hole to minimise the effects of air blast (air overpressure).

The BVMP also requires the completion of a Blasting Environmental Checklist prior to each blast. This checklist ensures that meteorological conditions are appropriate for the blast to occur. There are also checklists for Community Notification and Notification of the Common Management Committee when the common requires closing.

The Road and Rail Closure Management Plan (RRCMP) also requires the closure of Glennies Creek Road or the New England Highway if any part of the road comes within the 300 metre zone of exclusion that is required to be established around each blast. If any blast is within 200 metres of the Main Northern Railway, ACOL seek possession of the railway for the duration of the blast. This ensures that no rail traffic enters the zone of exclusion within the blast period.

The residents of Camberwell village and all occupiers of buildings within 2 kilometres of blasting locations are provided advance notice of planned blasting events on the Ashton website (www.ashtoncoal.com.au) and, excepting where they have requested to be removed from the contact list, at least one hour prior to each blasting event, by telephone.

Due to fire damage to St Clements Church caused by an arsonist attack, no structural assessments were undertaken by ACOL on St Clements Church during the reporting period. Ashton Coal had assisted with the cleanup project by providing labour and support and has extended an offer to provide any assistance to the congregation where required.

### 3.9.2 Blast Criteria and Monitoring

The Development Consent defines the following criteria:

*"The Airblast overpressure level from blasting operations carried out in or on the premises must not exceed:*

*(a) 115dB (Lin Peak) for more than 5% of the total number of blasts during each reporting period; and*

*(b) 120dB (Lin Peak) at any time*

*At any residence or other noise sensitive receiver such as the St Clements Anglican Church and Camberwell Community Hall*

*The ground vibration peak particle velocity from blasting operations carried out in or on the premises must not exceed:*

*(a) 2mm/s for more than 5% of the total number of blasts carried out in or on the premises during each reporting period; and*

*(b) Exceed 10mm/s at any time*

*At any residence or other noise sensitive receiver such as the St Clements Anglican Church and Camberwell Community Hall."*

A total of 136 blasts took place during the reporting period. A summary of the results is provided below while a comprehensive list of blast monitoring results is presented in **Appendix 3**.

Blast monitoring locations are detailed hereunder:

**Table 27. LOCATION OF BLAST MONITORING STATIONS**

| Monitoring Station No | Location |
|---|---|
| 1 | Camberwell village (north) |
| 2 | St Clements Church |

**Table 28. SUMMARY BLAST MONITORING RESULTS**

| | St Clements Church | | Camberwell Village | |
|---|---|---|---|---|
| | Vibration | Overpressure | Vibration | Overpressure |
| Results Captured | 136 | 136 | 136 | 136 |
| Data Recovery (%) | 100% | 100% | 100% | 100% |
| Results >2mm/s | 2 | | 6 | |
| Results >2mm/s (%) | 1.47% | | 4.41% | |
| Results >10mm/s | 0 | | 0 | |
| Results > 115dBL | | 7 | | 9 |
| Results > 115dBL (%) | | 5.15% | | 6.62% |
| Results > 120bBL | | 2 | | 0 |

At the end of the 2009-10 reporting period blast vibration results remained within all criteria at both the St Clements Church and Camberwell Village locations. The 115dBL overpressure limit was exceeded more than 5% of the time at both the Church (5.15%) and Village (6.62%) blast monitoring locations. The 120dBL limit was also exceeded on 2 occasions at the Church monitoring location.

The first exceedence (124dBL) was recorded at the Church location on the 4 December 2009. Investigations into the exceedence identified the high overpressure recording was caused by a single 4.5m stab hole that had not been stemmed. The corrective action rising from the investigation requires that no unstemmed hole will be tied into the shot prior to the stemming being completed. If a hole is not tied in, the electronic detonation pre blast check will identify that a detonator is missing from the pattern alerting the Shotfirer to check the relevant hole.

The second exceedence was recorded on the 6 January 2010 at the Church location (123dBL). The overpressure wave trace from the blast showed a single peak in overpressure exceeding the 120dBL limit suggesting the exceedence was the result of a single hole blow out. Investigations following the exceedence suggest muddy material displaced the explosives vertically up the column reducing the effective stemming depth. It is believed that the weather conditions at the time of drilling and firing the shot contributed to the event. The drilling of the blast pattern was completed on the 24 December 2009 however due to weather conditions the shot was not loaded until the 4 and 5 January 2010. During this period the shot was exposed to heavy rainfall. During loading it was noted that the shot and holes were wet and muddy. The investigation actions require where any drill pattern has been exposed to significant rainfall and drill holes are noted to be wet and muddy, those drill holes will be pumped out before loading is to occur.

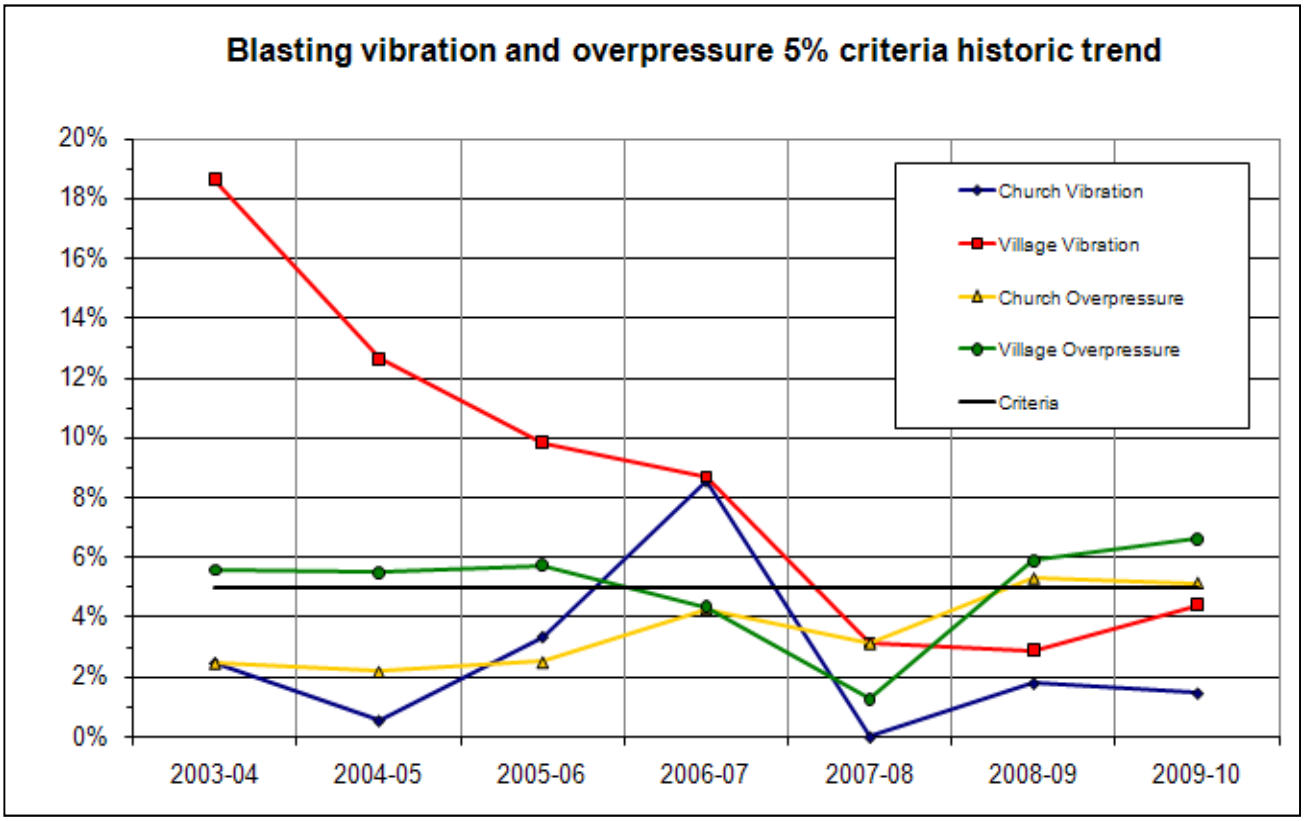
Throughout the reporting period a number of blasts were cancelled or rescheduled due to weather forecasts or experienced weather conditions. These are detailed in **Table 29**.

**Table 29. OPERATIONAL CHANGES RELATING TO BLAST IMPACTS**

| Date | Issue | Changes Undertaken |
|---|---|---|
| 23/09/2009 | Dust storm experienced. | Blast cancelled. |
| 27/11/2009 | Winds greater than 6m/s. | Blast cancelled due to windy conditions. |
| 12/02/2010 | Windy conditions experienced. NW winds at >6m/s. | Blast postponed from 12pm till 4pm. |
| 16/03/2010 | Windy conditions experienced. | Blast postponed from 9am till 11am. |
| 19/03/2010 | Windy conditions experienced. Wind emanating from the NW. | Blast postponed until 22 March 2010. |
| 9/04/2010 | NW wind conditions at time of blast. Expected SE change to come. | Blast postponed until 1pm (scheduled at 12pm). |
| 5/05/2010 | Strong NW winds - 8.7m/s. | Blast postponed until 9am Thursday 6 May 2010. |
| 11/06/2010 | Strong NW winds - 8.4m/s. | Blast postponed until Saturday 12 June 2010. |
| 22/06/2010 | Wet weather conditions. | Blast postponed until Thursday 24 June 2010. |
| 25/08/2010 | Weather forecast predicted winds above 10m/s from the NW | Due to the high winds on Wednesday 25th and expected high winds for Thursday and Friday blast postponed until Saturday 28th. |

### 3.9.3 Long-term Blasting Trends

Long term blasting trends are presented in **Figure 19**. Compliance with the 5% criteria for overpressure and vibration has significantly improved over the past 7 years of operation. Electronic detonation has allowed the continued decrease in blast vibration results at both the Church and Village monitors. The increase in overpressure results above 115dBL is primarily the result of the close proximity of blasting to Camberwell Village during the first quarter of the period. During this time a number of near surface shots (including the two 120dBL exceedences) were fired.



## 3.10 OPERATIONAL NOISE

### 3.10.1 Noise Management

The Noise Management Plan for phase 2 of Ashton Coal's mining operations has been approved by the Department of Planning. As part of this plan a set of proactive and reactive mitigation measures have been identified to assist in reducing the noise impact from ACOL on the neighbouring residence. The inversion study conducted by Spectrum Acoustics during the 2007-2008 reporting period indicated that even when a strong inversion (+7.5$^{O}$C/100m) is in place, trucks that are dumping on the northern side of the 135RL dump, Camberwell village falls in the acoustic shadow zone of the eastern emplacement. As a result ACOL has committed to restricting dumping at night to both the northern side and lower areas of the Open Cut, particularly when winds are emanating from the North West.

Major noise mitigation measures implemented during the reporting period include:

- During the cooler months of this reporting period Ashton Coal implemented a proactive operational noise monitoring assessment program. This allowed us to get a better understanding of the noise conditions during these winter months with prevailing north-westerly winds and high inversions.

There are also a number of standard operational controls undertaken to reduce the noise impact on the Village of Camberwell, these are;

- During inversion and NW wind conditions (noise enhancing conditions) machinery is removed from the southern exposed faces and relocated to the northern boundary or lower levels within the pit.
- When achievable after 6pm in the evening under NW winds, machinery is removed from the southern exposed faces and relocated to the northern boundary or lower levels within the pit.

In addition to these standard practices a number of specific operational changes were made during the reporting period in response to either complaints or identified noise issues, these are presented in the table below.

| Table 30. OPERATIONAL CHANGES REGARDING NOISE IMPACTS | | |
|---|---|---|
| **Date** | **Issue** | **Changes Undertaken** |
| 10/04/2010 | A noise complaint was received at 8:49pm. | The OCE inspected Camberwell Village and noted dozer and truck noise was audible near St Clements Church. The OCE relocated the dozer responsible for the noise source at 8:55pm. Reinspection of Camberwell Village indicated the audible noise had reduced. |
| 30/05/2010 | A noise Complaint was at 8:32pm. | The OCE shut down the Open Cut ROM stockpile dozer and coal haul trucks running to the ROM stockpile. |
| 02/08/2010 | Complaint was received regarding noise at 7:25pm. | Equipment was operating in ideal locations to reduce noise propagation. (i.e. under highwall and low in pit). OCE instructed drivers to reduce speed of haul trucks and drive to conditions to minimise noise. |
| 16/08/2010 | Noise complaint received at 7:20pm. | Trucks running to high level dumps were relocated to in pit locations. |
| 20/08/2010 | Noise complaint received at 8:30pm. | Stopped all dumping on high level dumps and relocated trucks to a low dump in pit. |

### 3.10.2 Noise Criteria and Monitoring

Noise generated by the Ashton Coal Project must not exceed the limits specified in Condition 6.34 (Table 5), which is detailed hereunder, except as may be expressly provided by an EPA Licence,

| Table 31. (DC TABLE 5) NOISE LIMITS (DB(A)) | | | | |
|---|---|---|---|---|
| **Location** | **Day** | **Evening** | **Night** | |
| | $L_{Aeq(15\ minute)}$ | $L_{Aeq(15\ minute)}$ | $L_{Aeq(15\ minute)}$ | $L_{Aeq(1\ minute)}$ |
| Any residence not owned by the Applicant or not subject to an agreement between the Applicant and the residence owner as to an alternate noise limit | 38 | 38 | 36 | 46 |

The above criteria do not apply when wind speeds are greater than 3m/s and/or there is an inversion in place of greater than 3°C/100m.

#### Quarterly Noise Monitoring

Condition 6.44 of the Development Consent requires detailed noise monitoring surveys at potentially affected residences on a 3-monthly basis. All monitoring was performed by Spectrum Acoustics, utilising manned monitoring methods as specified in the EIS.

Quarterly noise monitoring results are as follows. There were no noise exceedences of the EPL and DC criteria recorded during the 4 quarterly surveys conducted during this reporting period.

**Table 32. 1ST QUARTER NOISE RESULTS NOVEMBER 2009 (24 NOVEMBER 2009):**

**ACP Noise Monitoring Results – 24 November 2009 – Day**

| Location | Time | dB(A) Leq | ACOL dB(A) | Comments | WS (m/s)/ WD (°) | Inversion °C/ 100m | ACP Noise Sources |
|---|---|---|---|---|---|---|---|
| Richards | 5:12 pm | 37 | Inaudible | Wind (35), other mines (31), birds & insects (29), **ACP inaudible** | 3.6/119 | n/a | n/a |
| Stapleton | 4:13 pm | 49 | Inaudible | Traffic (47), birds (43), **ACP inaudible** | 4.4/111 | n/a | n/a |
| Clark | 4:30 pm | 46 | Inaudible | Traffic (44), birds & insects (41), domestic noise (30), **ACP inaudible** | 4.5/109 | n/a | n/a |
| Horadam | 4:48 pm | 47 | Inaudible | Traffic (47), insects (30), **ACP inaudible** | 5.0/106 | n/a | n/a |
| Moss | 3:55 pm | 67 | Inaudible | Traffic (67), **ACP inaudible** | 4.4/112 | n/a | n/a |

**ACP Noise Monitoring Results – 24 November 2009 - Evening**

| Location | Time | dB(A) Leq | ACOL dB(A) | Comments | WS (m/s)/ WD (°) | Inversion °C/ 100m | ACP Noise Sources |
|---|---|---|---|---|---|---|---|
| Richards | 7:24 pm | 49 | Inaudible | Dog (49), other mines (34), birds & insects (32), **ACP inaudible** | 3.2/133 | Lapse | n/a |
| Stapleton | 7:46 pm | 47 | Inaudible | Traffic (45), birds & insects (40), domestic noise (37), **ACP inaudible** | 3.2/142 | Lapse | n/a |
| Clark | 8:03 pm | 43 | Inaudible | Traffic (43), insects (31), other mines (30), **ACP inaudible** | 3.0/124 | Lapse | n/a |
| Horadam | 8:20 pm | 47 | Inaudible | Traffic (45), frogs & insects (42), **ACP inaudible** | 2.7/116 | Lapse | n/a |
| Moss | 8:40 pm | 65 | Inaudible | Traffic (65), **ACP inaudible** | 2.8/134 | Lapse | n/a |

**ACP Noise Monitoring Results – 24 November 2009 - Night**

| Location | Time | dB(A) Leq | ACOL dB(A) | Comments | WS (m/s)/ WD (°) | Inversion °C/ 100m | ACP Noise Sources |
|---|---|---|---|---|---|---|---|
| Richards | 11:05 pm | 36 | Inaudible | Birds & insects (34), dog (30), other mines (29), **ACP inaudible** | 2.8/104 | Lapse | n/a |
| Stapleton | 10:22 pm | 47 | Inaudible | Traffic (46), birds & insects (40), **ACP inaudible** | 3.2/142 | Lapse | n/a |
| Clark | 10:40 pm | 40 | Inaudible | Insects (38), traffic (36), **ACP inaudible** | 3.0/124 | Lapse | n/a |
| Horadam | 11:30 pm | 42 | Inaudible | Traffic (41), insects (34), **ACP inaudible** | 2.7/116 | Lapse | n/a |
| Moss | 10:05 pm | 65 | Inaudible | Traffic (65), **ACP inaudible** | 2.8/134 | Lapse | n/a |

During the monitoring conducted on the 24 November 2009 winds were light to medium and emanating from the South East throughout the period. There were no noise exceedences recorded during the survey.

**Table 33. 2ND QUARTER NOISE RESULTS FEBRUARY 2010 (11 FEBRUARY 2010):**

**ACP Noise Monitoring Results – 11 February 2010 – Day**

| Location | Time | dB(A) Leq | ACOL dB(A) | Comments | WS (m/s)/ WD (°) | Inversion °C/ 100m | ACP Noise Sources |
|---|---|---|---|---|---|---|---|
| Richards | 4:12 pm | 31 | Inaudible | Insects (31), **ACP inaudible** | 1.4/119 | n/a | n/a |
| Stapleton | 4:50 pm | 43 | Inaudible | Insects (42), traffic (33), **ACP inaudible** | 1.8/91 | n/a | n/a |
| Clark | 4:34 pm | 42 | Barely audible <25 | Birds & insects (42), traffic (30), **ACP (<25)**, | 1.6/105 | n/a | Haul trucks |
| Horadam | 5:23 pm | 50 | Inaudible | Traffic (47), insects (47), **ACP inaudible** | 1.8/90 | n/a | n/a |
| Moss | 5:06 pm | 55 | Inaudible | Traffic (55), insects (42) **ACP inaudible** | 1.4/113 | n/a | n/a |

**ACP Noise Monitoring Results – 11 February 2010 – Evening**

| Location | Time | dB(A) Leq | ACOL dB(A) | Comments | WS (m/s)/ WD (°) | Inversion °C/ 100m | ACP Noise Sources |
|---|---|---|---|---|---|---|---|
| Richards | 7:50 pm | 41 | Inaudible | Insects (41), other mines (30), **ACP inaudible** | 2.5/98 | <3 | n/a |
| Stapleton | 8:30 pm | 45 | Inaudible | Insects (44), traffic (35), **ACP inaudible** | 2.0/95 | <3 | n/a |
| Clark | 8:17 pm | 39 | Inaudible | Insects (39), **ACP inaudible** | 2.5/94 | <3 | n/a |
| Horadam | 8:59 pm | 45 | 28 | Insects(45), traffic (33) **ACP (28)** | 1.6/101 | >3 | Mine hum |
| Moss | 8:45 pm | 50 | Inaudible | Traffic (49), insects (43), **ACP inaudible** | 2.3/95 | >3 | n/a |

**ACP Noise Monitoring Results – 11 February 2010 – Night**

| Location | Time | dB(A) Leq | ACOL dB(A) | Comments | WS (m/s)/ WD (°) | Inversion °C/ 100m | ACP Noise Sources |
|---|---|---|---|---|---|---|---|
| Richards | 10:02 pm | 45 | Inaudible | Insects (45), other mines (30), **ACP inaudible** | 1.7/181 | <3 | n/a |
| Stapleton | 10:37 pm | 40 | Inaudible | Insects (39), traffic (34), **ACP inaudible** | 2.4/149 | >3 | n/a |
| Clark | 10:20 pm | 42 | Inaudible | Insects (41), traffic (35), **ACP inaudible** | 2.4/152 | <3 | n/a |
| Horadam | 11:17 pm | 43 | Inaudible | Insects(42), traffic (33), **ACP inaudible** | 1.4/134 | >3 | n/a |
| Moss | 10:55 pm | 50 | Inaudible | Traffic (50), **ACP inaudible** | 2.4/142 | >3 | n/a |

Throughout the monitoring survey winds were light and emanating from the. An inversion was present for the evening and night time periods. Throughout the monitoring survey ACOL operations were inaudible. There were no noise exceedences recorded during the survey.

**Table 34. 3RD QUARTER NOISE RESULTS MAY 2010 (6 MAY 2010):**

| ACP Noise Monitoring Results – 6 May 2010 – Day | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Location** | **Time** | **dB(A) Leq** | **ACOL dB(A)** | **Comments** | **WS (m/s)/ WD (°)** | **Inversion °C/ 100m** | **ACP Noise Sources** |
| Richards | 5:23 pm | 44 | Inaudible | Farm noise (43), cattle (35), birds & insects (30), **ACP inaudible** | 2.7/5 | n/a | n/a |
| Stapleton | 4:40 pm | 46 | 37 | Traffic (45), **ACP (37)**, birds & insects (36) | 2.3/323 | n/a | Mine hum |
| Clark | 5:07 pm | 43 | 35 | Traffic (41), birds & insects (36), **ACP (35)** | 1.8/230 | n/a | Mine hum |
| Horadam | 4:00 pm | 54 | Inaudible | Traffic (54), birds & insects (30), **ACP inaudible** | 2.7/304 | n/a | n/a |
| Moss | 4:22 pm | 71 | Inaudible | Traffic (68), **ACP inaudible** | 1.9/322 | n/a | n/a |
| **ACP Noise Monitoring Results – 6 May 2010 – Evening** | | | | | | | |
| **Location** | **Time** | **dB(A) Leq** | **ACOL dB(A)** | **Comments** | **WS (m/s)/ WD (°)** | **Inversion °C/ 100m** | **ACP Noise Sources** |
| Richards | 9:40 pm | 43 | Inaudible | Cattle (42), other mines (36), birds & insects (30), **ACP inaudible** | 1.4/288 | >3 | n/a |
| Stapleton | 8:30 pm | 47 | 37 | Traffic (46), **ACP (37)**, birds & insects (29) | 0.7/216 | >3 | Mine hum, dozer tracks |
| Clark | 8:51 pm | 45 | 35 | Traffic (44), **ACP (35)**, birds & insects (27) | 1.7/300 | >3 | Mine hum |
| Horadam | 7:50 pm | 52 | 35 | Traffic (51), **ACP (35)** | 1.6/278 | >3 | Mine hum |
| Moss | 8:10 pm | 66 | 32 | Traffic (66), insects (32), **ACP (32)** | 1.0/278 | >3 | Mine hum |
| **ACP Noise Monitoring Results – 6 May 2010 – Night** | | | | | | | |
| **Location** | **Time** | **dB(A) Leq** | **ACOL dB(A)** | **Comments** | **WS (m/s)/ WD (°)** | **Inversion °C/ 100m** | **ACP Noise Sources** |
| Richards | 10:05 pm | 36 | Inaudible | Cattle (33), other mines (33), **ACP inaudible** | 1.3/283 | >3 | n/a |
| Stapleton | 10:47 pm | 51 | 32 | Traffic (51), **ACP (32)** | 1.5/287 | >3 | CHPP |
| Clark | 11:05 pm | 46 | 32 | Traffic (46), **ACP (32)** | 1.8/268 | >3 | CHPP |
| Horadam | 10:25 pm | 54 | Inaudible | Traffic (54), **ACP inaudible** | 1.3/281 | >3 | n/a |
| Moss | 11:26 pm | 68 | Inaudible | Traffic (68), **ACP inaudible** | 1.6/289 | >3 | n/a |

During the survey period the winds were light from the west-north-west direction. A strong inversion was present for the evening and night time periods. There were no exceedences of noise criteria recorded.

**Table 35. 4TH QUARTER NOISE RESULTS AUGUST 2010 (30 AUGUST 2010):**

| ACP Noise Monitoring Results – 30 August 2010 – Day | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Location** | **Time** | **dB(A) Leq** | **ACOL dB(A)** | **Comments** | **WS (m/s)/ WD (°)** | **Inversion °C/ 100m** | **ACP Noise Sources** |
| Richards | 4:00 pm | 30 | <25 | Birds & farm animals (29), **ACP (<25)** | 0.8/100 | n/a | Mine hum |
| Stapleton | 4:23 pm | 41 | Barely audible | Traffic (40), birds (36) **ACP barely audible** | 0.8/53 | n/a | Mine hum |
| Clark | 4:40 pm | 44 | Barely audible | Birds & insects (43), traffic (35), **ACP barely audible** | 1.0/95 | n/a | Mine hum |
| Horadam | 5:05 pm | 54 | Inaudible | Traffic (53), birds & insects (46), **ACP inaudible** | 0.8/101 | n/a | n/a |
| Moss | 4:49 pm | 67 | Inaudible | Traffic (67), **ACP inaudible** | 0.9/101 | n/a | n/a |
| **ACP Noise Monitoring Results – 30 August 2010 – Evening** | | | | | | | |
| **Location** | **Time** | **dB(A) Leq** | **ACOL dB(A)** | **Comments** | **WS (m/s)/ WD (°)** | **Inversion °C/ 100m** | **ACP Noise Sources** |
| Richards | 9:33 pm | 39 | inaudible | Traffic (37), other mines (35), **ACP inaudible** | 2.4/156 | >+3 | n/a |
| Stapleton | 8:27 pm | 49 | <30 | Traffic (49), birds (35), **ACP (<30)** | 2.3/150 | >+3 | Mine hum |
| Clark | 8:47 pm | 47 | <30 | Traffic (47), other mines (30) **ACP (<30)** | 2.6/135 | >+3 | Mine hum |
| Horadam | 9:10 pm | 49 | Barely audible | Traffic (49), **ACP barely audible** | 2.4/155 | >+3 | Mine hum |
| Moss | 8:10 pm | 66 | Inaudible | Traffic (66), **ACP inaudible** | 0.9/110 | +2 | n/a |
| **ACP Noise Monitoring Results – 30 August 2010 – Night** | | | | | | | |
| **Location** | **Time** | **dB(A) Leq** | **ACOL dB(A)** | **Comments** | **WS (m/s)/ WD (°)** | **Inversion °C/ 100m** | **ACP Noise Sources** |
| Richards | 10:05 pm | 38 | Inaudible | Other mines (37), traffic (30), **ACP not audible** | 1.9/128 | >+3 | n/a |
| Stapleton | 11:00 pm | 44 | Inaudible | Traffic (44), **ACP inaudible** | 1.4/201 | >+3 | n/a |
| Clark | 10:43 pm | 52 | Inaudible | Traffic (52), **ACP inaudible** | 2.1/164 | >+3 | n/a |
| Horadam | 10:26 pm | 49 | Inaudible | Traffic (49), other mines (30), **ACP inaudible** | 2.3/162 | >+3 | n/a |
| Moss | 11:20 pm | 66 | Inaudible | Traffic (66), **ACP inaudible** | 1.2/217 | >+3 | n/a |

During the survey period winds were light and from the south east. A strong inversion was present during the evening and night periods. There were no exceedences of noise criteria recorded.

## 3.11 VISUAL, STRAY LIGHT

Lighting issues on site are managed through the Lighting Management Plan (LMP).

Three types of lighting are utilised on site. They are:

- Fixed lighting utilised to illuminate the areas arrange the CHPP and open cut workshop;
- Mobile lighting plants utilised to illuminate the open cut, the overburden dump, the tailings disposal area and some maintenance operations; and
- Lighting equipped on mobile plant.

Fixed lighting is generally high pressure sodium vapour lights, which minimise the glare usually associated with “white” lights.

Historically mobile lighting plants have been the source of lighting complaints, particularly those stationed on the Eastern Emplacement Area (EEA). During the reporting period one complaint regarding the positioning of lights on the EEA was received. The placement of the light was changed once the complaint was received. Positioning of lighting plants to reduce off-site impacts is included in ACOL’s induction process to ensure employees and contractors are aware of potential impacts to Ashton’s neighbours.

## 3.12 ABORIGINAL HERITAGE

Ashton Coal currently holds Heritage Impact Permits under *Section 90* of the *NPW Act 1974* for the area encompassed by the Open Cut. ACOL also held an AHIP Section 90 for the area above Longwall 1-4. The later Section 90 permit application was submitted with a detailed management plan that aimed to, where possible, preserve and manage artefacts and only collecting where necessary. While preservation is the ongoing aim of ACOL, due to the nature of subsidence impacts and the potential for emergency remediation works being required due to safety related issues the submission was for a blanket S90 over the entire LW1-4 Underground area.

The management plan was developed in conjunction with relevant community groups, Ashton Coal and Angela Besant of Insite Heritage. The plan will be revised at the end of mining of each seam by all parties and any subsequent adjustments made to the management plan will be lodged with the DECCW. The plan aims to minimise impact on Aboriginal relics and the integrity of sites while retaining the maximum possible site/s in situ.

The management plan may result in the surface collection of some artefacts which may be impacted by ripping of cracks due to subsidence. There may also be some limited excavation of sub surface deposits where necessary. The artefacts collected as part of this process will be redeposited within the relevant site and an updated site card lodged with DECC.

The implementation of the management plan is considered to have been effective to date. The process of assessing the potential impacts on artefact sites based on predictions of crack locations, and only disturbing sites where necessary, has led to only a single artefact being disturbed during the mining of Longwalls 1, 2, 3 and 4. Ongoing monitoring of crack positions

has shown little impact from cracking at other sites and the need for destructive remediation measures has not been required. Due to an administrative over site in defining the duration the permit when it was issued by the DECCW, this permit is now complete. To address this administrative issue Ashton Coal will be applying for a new permit to cover the same area.

**Consultation with the Indigenous Community**

The Wonnarua Liaison Committee met twice during the reporting period. Discussion included the implementation of the deed of agreement between ACOL and the Wonnarua people and potential for employment of Wonnarua people at ACOL.

Consultation with Indigenous community groups was also undertaken as part of the SMP application process for LW/MW 5 to 9, the Bowmans Creek Diversion Project Environmental Assessment (EA) and the SEOC EA. The Indigenous Community Consultation Log for the reporting period is included in **Appendix 6**

Pre-disturbance assessments were also conducted prior to undertaking construction works for the gas drainage infrastructure required for the underground ventilation system. The dates for these inspections and participating Indigenous representatives are detailed in **Appendix 6**.

## 3.13 NATURAL HERITAGE

No items of natural or European heritage were identified during the EIS process as being likely to be disturbed by mining operations.

During the reporting period Ashton Coal reaffirmed its position to provide assistance to the St Clements Church for structural repairs to the building following an arson attack. This includes the attachment of the roof structure to the walls of the church which had previously not been completed. The Diocese is currently reviewing its plans for St Clements Church however Ashton Coal will continue to support the building in its current and future forms for the sustainability of Camberwell Village.

## 3.14 SPONTANEOUS COMBUSTION

A Spontaneous Combustion Management Plan has been prepared and implemented on site.

ACOL have taken on the responsibility of an area of Macquarie Generations Ravensworth Void 4 area for the disposal of Tailings. This area has significant spontaneous combustion instances and is managed under the Tailings Emplacement Operations Plan. Part of this management includes regular monitoring by CHPP personnel and detailed surveys of the area to record the location and severity of spontaneous combustion points. Photographic records of each area are also included in the report. Monitoring during this period has shown an increase in instances of Spontaneous combustion as discussed below.

During the reporting period Ravensworth Underground extracted their Longwall 4 which resulted in increased instances of spontaneous combustion occurring in the area. Under the agreements with Macquarie Generation agreements Xstrata are responsible for the remediation of any spontaneous combusting resulting from impacts of underground mining. Of particular concern to ACOL were the areas adjacent to the ACOL flocculent tanks, tailings and flocculent lines, viewing platform and the western tailings dam wall access road. Routine access to these areas is required by ACOL employees to maintain and operate the tailings system and to undertake the scheduled dam wall lift. The increased spontaneous combustion restricted access to the tailings facilities and had a high potential to melt and burn the pipelines in that area. As a result remediation works were undertaken by ACOL on behalf of Xstrata. Approximately 1ha was remediated adjacent to the flocculent tanks and the western dam wall. Remediation works included cracking that had occurred across the western dam wall access road. ACOL are continuing to liaise with Ravensworth Underground in the management of the spontaneous combustion in the area.

## 3.15 BUSHFIRE

A Bushfire Management Plan (BMP) has been developed and implemented on site. This BMP requires that a risk assessment be undertaken in consultation with the Singleton Rural Fire Service to assess the risks of fire breaking out, or entering on to the site, as well as the development of risk reduction measures. This risk assessment was completed prior to the commencement of the 2003 / 2004 fire season and all agreed actions have been implemented. The BMP is currently being reviewed in consultation with the Singleton Rural Fire Service.

There were no outbreaks of bushfire on the project lands during this reporting period.

## 3.16 MINE SUBSIDENCE

During the reporting period the Underground mine continued extraction of coal in the Pikes Gully Seam mining along the length of Longwalls 4 to 6 which were approximately 2.5m high. The seam dips to the southwest at a grade of up to 1 in 10. The overburden ranges in thickness from 70m at the end of Longwall 4 to 169m at the start of Longwall 6. The final extraction void is nominally 216m with chain pillars 25m rib-to-rib at 150m cut-through centres.

Longwall operation commenced in February 2007 and Longwall 6 is excepted to be completed in November 2010. The progress of longwall extraction is shown in **Figure 22.**

### 3.16.1 Monitoring

Ashton Coal has monitored the subsidence movement on the surface during the extraction of Longwalls 1 to 6 using longitudinal subsidence lines over the start and finish of each panel and a main cross line extending over all three panels. Several other subsidence lines have been used to monitor the slope leading down to Glennies Creek, closure across the New England Highway, and subsidence across a dyke.

A plan showing the location of the subsidence lines is included as **Figure 23**.

**Table 36** outlines the maximum subsidence parameters recorded during regular survey of subsidence lines throughout the mine life as the longwall passed each location.

Additional monitoring was undertaken of fixed stations on a 132kV power line crossing the longwall panels on the southern side of the mining lease. Monitoring was conducted prior to, during and post undermining of the 2 and 3 pole structures. Survey monitoring was supplemented with visual monitoring of subsidence areas, powerlines, infrastructure, dams and any applicable steep slopes. Subsidence information was reported and distributed to relevant stakeholders including the DII, Energy Australia, and an adjacent land owner.

**Table 36. SUBSIDENCE LEVELS**

| | Maximum Predicted | Maximum Measured | | | |
|---|---|---|---|---|---|
| **North End of LW1** | | **CL2** | **XL8** | | |
| Subsidence (mm) | 1800 | 1528 | 1500 | | |
| Tilt (mm/m) | 244 | 100 | 103 | | |
| Horizontal Movement (mm) | >500 | 476 | 500 | | |
| Tensile Strain (mm/m) | 73 | 40 | 15 | | |
| Compressive Strain (mm/m) | 98 | 28 | 27 | | |
| **Remainder of LW1** | | **CL1** | **XL5** | | |
| Subsidence (mm) | 1700 | 1318 | 1436 | | |
| Tilt (mm/m) | 141 | 60 | 75 | | |
| Horizontal Movement (mm) | 300-500 | 480 | 503 | | |
| Tensile Strain (mm/m) | 42 | 49 | 17 | | |
| Compressive Strain (mm/m) | 56 | 23 | 24 | | |
| **Longwall 2** | | **CL1** | **CL2** | **XL5** | |
| Subsidence (mm) | 1600 | 1296 | 1513 | 1266 | |
| Tilt (mm/m) | 102 | 40 | 82 | 78 | |
| Horizontal Movement (mm) | 300-500 | 440 | 298 | 390 | |
| Tensile Strain (mm/m) | 30 | 17 | 16 | 11 | |
| Compressive Strain (mm/m) | 41 | 16 | 32 | 28 | |
| **Longwall 3** | | **CL1** | **CL2** | **XL5** | |
| Subsidence (mm) | 1600 | 1420 | 1354 | 1429 | |
| Tilt (mm/m) | 78 | 41 | 48 | 97 | |
| Horizontal Movement (mm) | 300-500 | 463 | 345 | 394 | |
| Tensile Strain (mm/m) | 23 | 10 | 17 | 22 | |
| Compressive Strain (mm/m) | 31 | 7 | 18 | 24 | |
| **Longwall 4** | | **CL1** | **CL2** | **XL5** | **XL10** |
| Subsidence (mm) | 1600 | 1397 | 1194 | 1546 | 1263 |
| Tilt (mm/m) | 78 | 36 | 40 | 53 | 33 |
| Horizontal Movement (mm) | 300-500 | 230 | 560 | 360 | 258 |
| Tensile Strain (mm/m) | 23 | 10 | 18 | 9 | 6 |
| Compressive Strain (mm/m) | 31 | 9 | 67 | 9 | 10 |
| **Longwall 5** | | **CL1** | **CL2** | **XL5** | |
| Subsidence (mm) | 1600 | 212 | 1326 | 1198 | |
| Tilt (mm/m) | 67 | 3.5 | 28.8 | 32.7 | |
| Horizontal Movement (mm) | 300-500 | 68 | 339 | 266 | |
| Tensile Strain (mm/m) | 20 | 3.9 | 5.5 | 13.8 | |
| Compressive Strain (mm/m) | 27 | 3.3 | 7.2 | 5.2 | |
| **Longwall 6** | | **CL1** | **XL5** | | |
| Subsidence (mm) | 1600 | 1352 | 43 | | |
| Tilt (mm/m) | 57 | 18.2 | 1.6 | | |
| Horizontal Movement (mm) | 300-500 | 263.4 | 27 | | |
| Tensile Strain (mm/m) | 17 | 7 | 2.5 | | |
| Compressive Strain (mm/m) | 23 | 3.9 | 0.1 | | |

### 3.16.2 Impacts

Surface subsidence cracks have developed along each edge of the longwall panels. These cracks are particularly evident on the uphill side of each panel as the longwall face approaches the hill. In most places, these cracks have been rehabilitated by ripping the surface to reduce surface water ingress and reduce the risk of injury to stock. This was the case for Longwall 4 and 5 during this reporting period. Cracked areas in open fields were remediated using a D6 dozer with ripping tines. The extent of subsidence remediation at the goaf edge is outlined in **Figure 24**.

Initial subsidence above Longwalls 4 and 5 was typical of the subsidence behaviour observed in previous panels. However no cracking has been observed around the start line of Longwall 6 with only limited gateroad cracking evident. This is due to the area being predominantly overlain by alluvial's. Observed subsidence has been within SMP predicted limits for Longwalls 4 and 5 and over the extent of extraction for Longwall 6.

Cracking occurred in the both the main access and alternate access roads to Property 130 during the reporting period. During undermining of either access road a diversion was put in place during the impact period and until road repairs were completed. Small farm dams in areas of shallow cover were dewatered prior to the longwall undermining. Following undermining subsequent rain events re-filled these dams indicating no damage had occurred.

A buried Telstra cable that runs over Longwall 4 and Longwall 5 was undermined without any negative impacts. This line remained in service during the impact period. An overhead 132kV electricity transmission line was also undermined. A pole set was positioned over all Longwalls. These were subsided without any damage. Prior to undermining, powerlines were placed in rollers to prevent overstressing of the poles. Following an assessment by Energy Australia prior to extraction of Longwall 5, the wooden 3 pole structure located above Longwall 5 was replaced with concrete poles. 2 of ACOL's water supply lines were also undermined by Longwalls 4, 5 and 6 with no damage observed.

Undermined farm sheds remained stable and usable during and post longwall extraction. No damage was observed to farm gates, grids or fences during the reporting period.

In general, the maximum subsidence movements detected were less than those predicted. There is no indication of any significant lateral movement of the steep slope adjacent to Glennies Creek or of the New England Highway road cutting.

**Figure 20. Subsidence cracks, Longwall 4**

**Figure 21. Subsidence crack remediation**

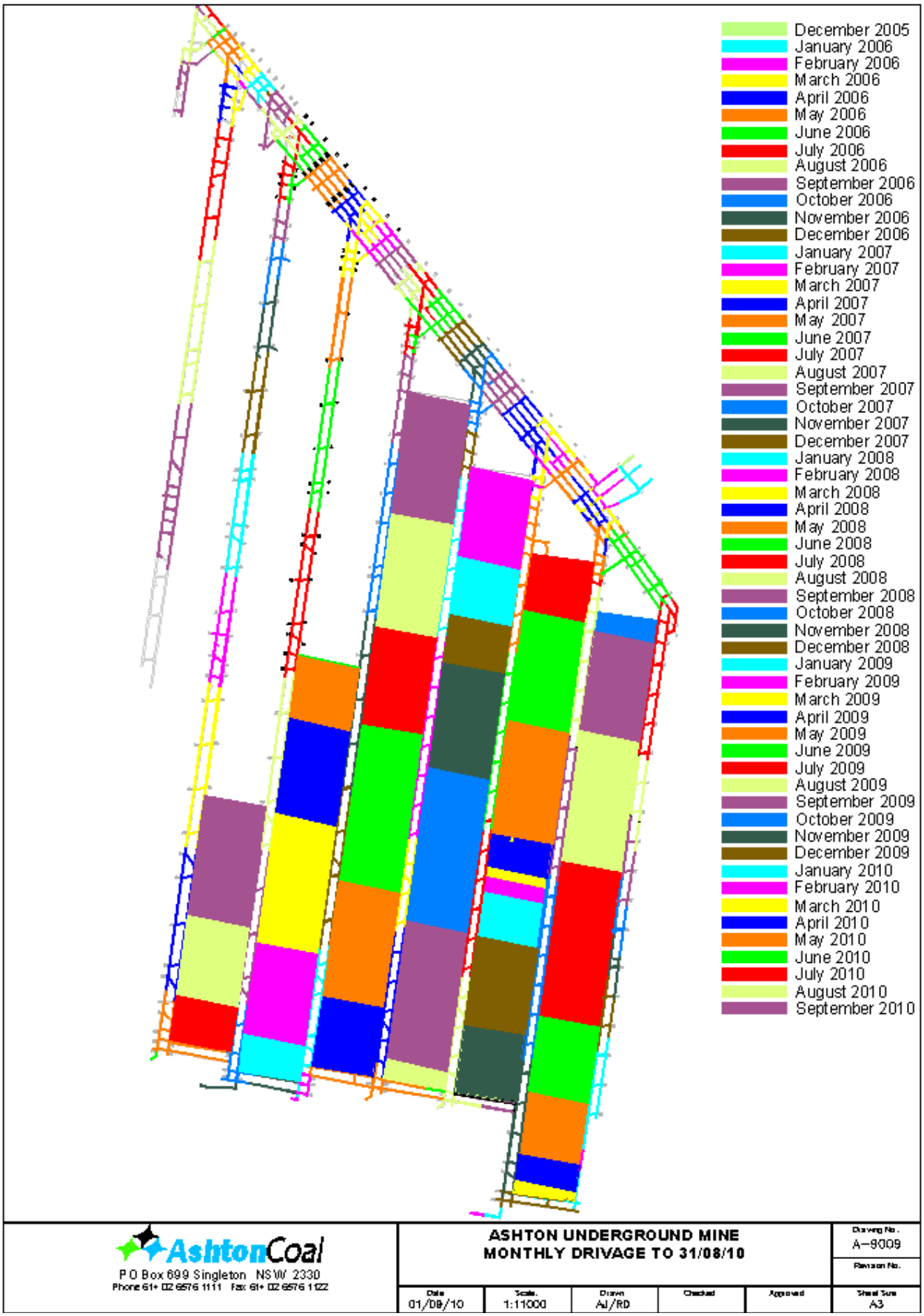



**Figure 22. Progression of Longwall Extraction**

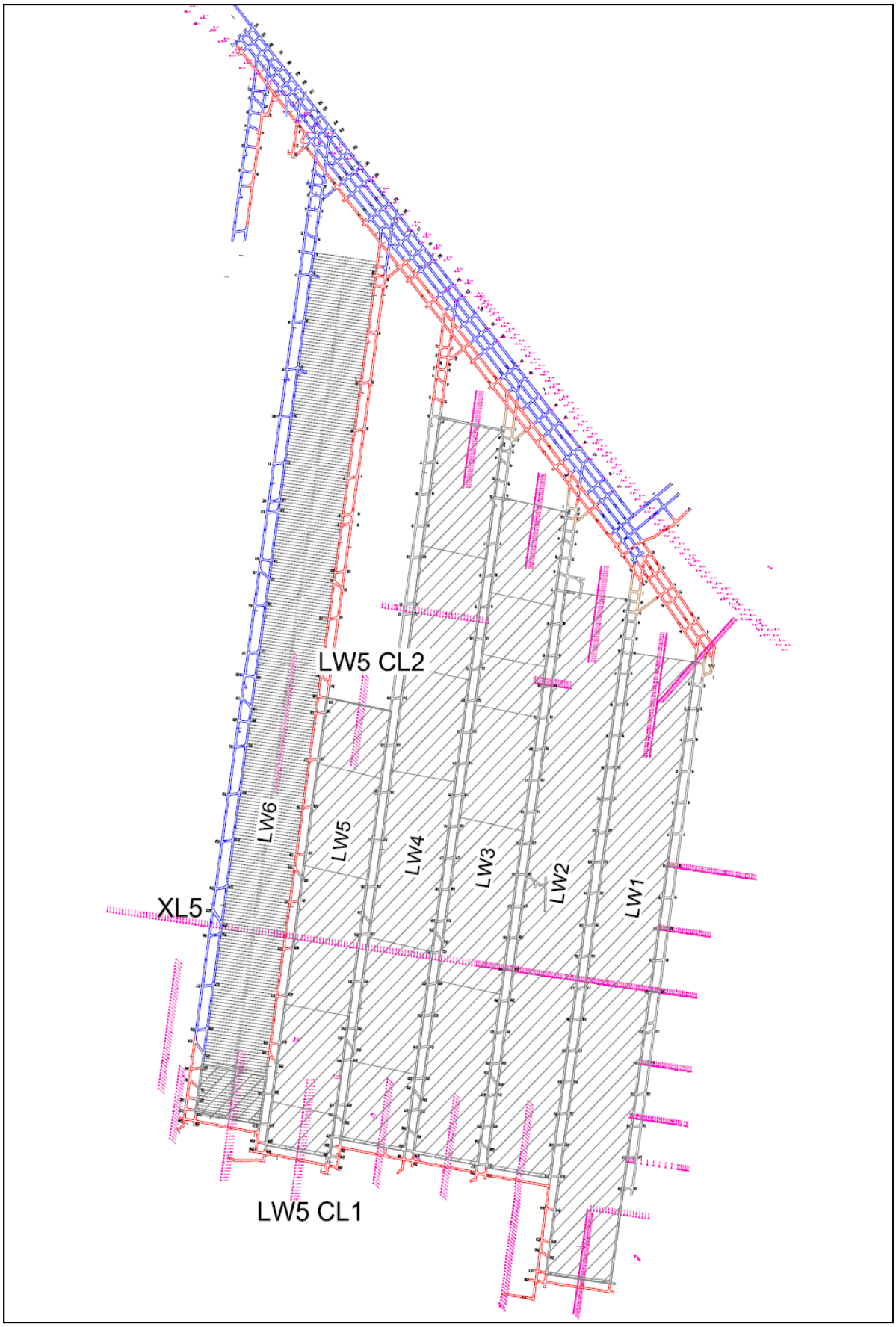



**Figure 23. Subsidence Monitoring Cross Lines**

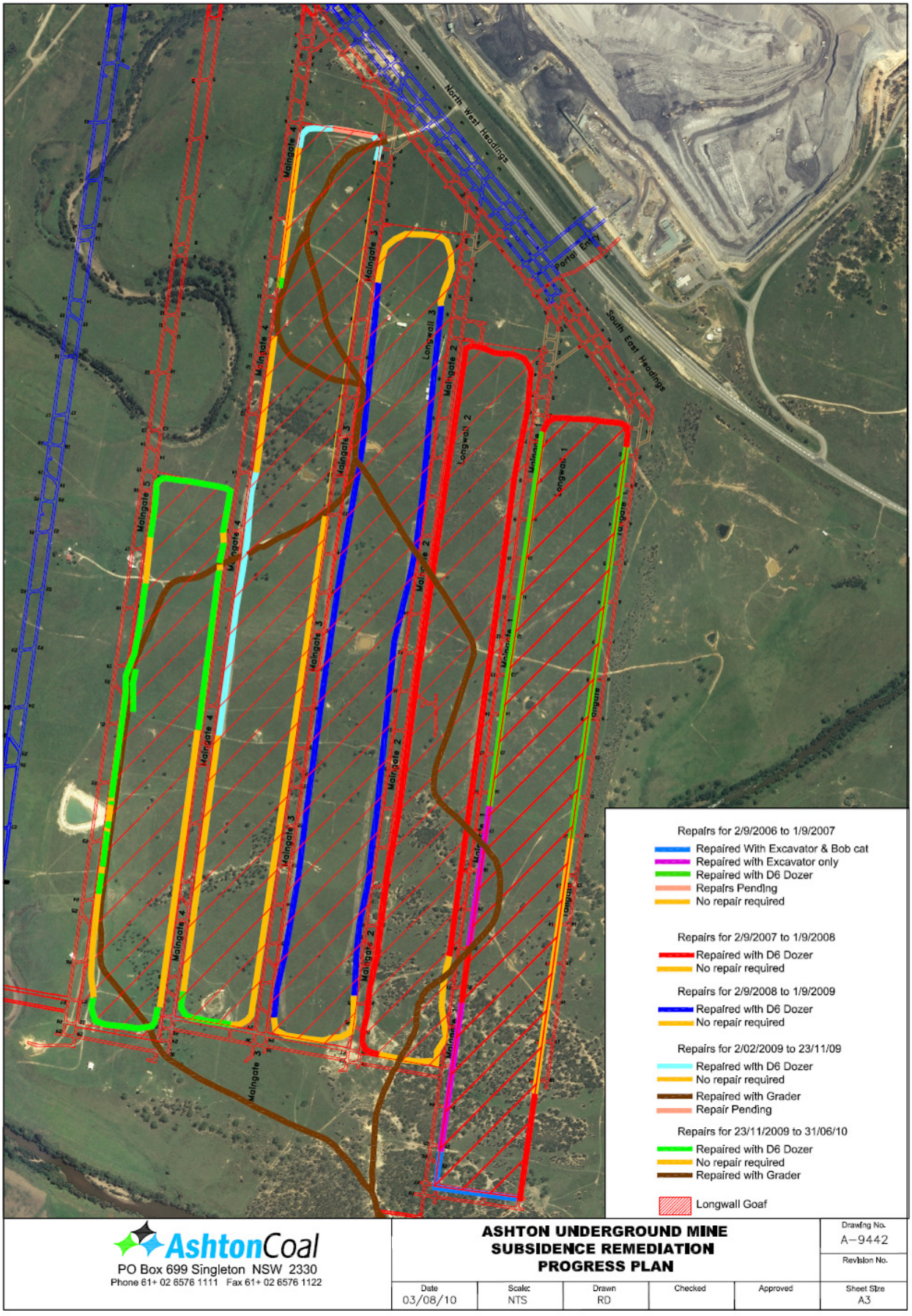



**Figure 24. Subsidence Remediation Progress**

## 3.17 HYDROCARBON CONTAMINATION

Minor hydrocarbon spills occurred on hardstand areas during the reporting period. All spills were contained and promptly collected with appropriate absorbent products prior to any hydrocarbons moving out of the immediate work areas.

## 3.18 METHANE DRAINAGE/VENTILATION

Mine ventilation began in May 2006 and has continued throughout the period. The ventilation quantity is currently approximately 216 cubic metres per second. This airflow quantity is pulled through the mine via two main ventilation fans at the portal and one at the backroad ventilation fan on the surface adjacent to Longwall 1. Total emissions from the underground ventilation were:

- Methane ($CH_4$) – 17,134.1 tonnes,
- Carbon Dioxide ($CO_2$) – 2141.1 tonnes, and
- Carbon monoxide (CO) – 21.7 tonnes.

No methane drainage activities occurred during the reporting period. Methane drainage will occur during the next 12 months through surface gas drainage wells utilising a venturi effect to draw gas to the surface.

## 3.19 PUBLIC SAFETY

A boundary fence surrounds the open cut operations with warning signs indicating the area is subject to mining. Only one access road to the site is in general use and all visitors are directed to the ACOL office for further directions on the roads that they are permitted to access. All other vehicular access points are locked. A boom gate system that remains closed outside normal office hours has been installed to prevent ad hoc public access.

The safety of public travelling on trains or along the access roads alongside the railway has also been an area of focus. Procedures are in place to ensure the Main Northern Railway is clear of trains before blasting within 500 metres of the rail line, and to take possession of the rail line if blasting occurs within 200 metres. This has occurred for every relevant blast in the reporting period.

The safety of public travelling along the New England Highway has been of major consideration when blasting within 500m. Due to the progression of Open Cut mining to the western portion of the pit there were a small number of highway closures undertaken during the first half of this reporting period. Highway closures are designed to impact on motorists for a maximum of 2 to 3 minutes.

The safety of public travelling along Glennies Creek Road has also been a major consideration during the reporting period, with numerous closures of the road when blasting occurs within 500 metres. The Glennies Creek Road Environmental Bund has further isolated mining activities from the public's view increasing safety levels along the road.

Since the commencement of subsidence over the longwall area signage has been erected on the Right of Way (ROW) leading to property 130 on Ashton Property. An alternate access road has also been established and road closure signs are placed when possible subsidence impact may be experienced on the ROW. As detailed in the approved SMP Road Management Plan and Property 130 Management Plan, the tenants and owner of Property 130 are notified when any such impacts are expected to be experienced.

## 3.20 OTHER ISSUES AND RISKS

No other risks or issues have been identified during the reporting period.

# 4.0 COMMUNITY RELATIONS

## 4.1 ENVIRONMENTAL COMPLAINTS

A total of 32 complaints were received directly by ACOL during the reporting period and 84 complaints were received through the DECCW. Of the 32 complaints received directly to ACOL, 25 were received from a single resident. This is a continuing trend observed in previous reporting periods. Historically the majority of complaints received through the DECCW corresponded to a complaint received directly to ACOL. During the second half of the reporting period an increasing trend in DECCW complaints that did not correspond with complaints received by ACOL was observed. This can be observed in **Figures 25** and **26** below. A full list of complaints is provided in **Appendix 4**.

Complaints increased during the winter months corresponding with the onset of strong north westerly winds and consistent temperature inversions. Ashton Coal commit to reducing the impact of noise from the Open Cut operations by restricting dumping after 6:00pm to lower or northern dumps. On several occasions Open Cut operations were relocated and/or shutdown to reduce both dust and noise impacts on Camberwell Village. These operational changes were both pro-active following inspections from ACOL staff and reactive following complaints from residents.

The historic trend of complaints (**Figure 30**) shows a similar number of complaints over the past 3 years. This is being driven by complaints received from a single resident making up a total of 78% of complaints received by Ashton over this reporting period and an increase in the number of complaints received by the DECCW in the past 6 months. Overall there has been a decrease in complaints received directly to Ashton Coal since the beginning of the project.

Complaints received during the reporting period are presented in **Tables 37** and **38** below.

| Table 37. SUMMARY OF COMPLAINT ISSUES RECEIVED TO ASHTON COAL 2009 - 2010 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Month** | **Noise** | **Lights** | **Dust** | **Operating Time** | **Blast** | **Flora & Fauna** | **Other** | **TOTAL** |
| Sep | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 2 |
| Oct | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| Nov | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dec | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| Jan | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Feb | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Mar | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 2 |
| Apr | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| May | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| Jun | 6 | 0 | 0 | 0 | 2 | 0 | 1 | 9 |
| Jul | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Aug | 3 | 1 | 3 | 0 | 0 | 0 | 0 | 7 |
| **TOTAL** | 22 | 1 | 4 | 0 | 4 | 0 | 1 | 32 |

| Table 38. SUMMARY OF COMPLAINT ISSUES RECEIVED FROM DECCW 2009 - 2010 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Month** | **Noise** | **Lights** | **Dust** | **Operating Time** | **Blast** | **Flora & Fauna** | **Other** | **TOTAL** |
| Sep | 1 | 0 | 3 | 0 | 1 | 0 | 0 | 5 |
| Oct | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Nov | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dec | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| Jan | 7 | 0 | 2 | 0 | 0 | 0 | 0 | 9 |
| Feb | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 3 |
| Mar | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 4 |
| Apr | 8 | 0 | 1 | 0 | 2 | 0 | 0 | 11 |
| May | 4 | 0 | 2 | 0 | 4 | 0 | 0 | 10 |
| Jun | 13 | 0 | 4 | 0 | 2 | 0 | 3 | 22 |
| Jul | 9 | 0 | 2 | 0 | 2 | 0 | 0 | 13 |
| Aug | 5 | 1 | 9 | 0 | 2 | 0 | 0 | 17 |
| **TOTAL** | 51 | 1 | 25 | 0 | 15 | 0 | 4 | 96* |

*The total number of DECCW complaints was 84 however there were some complaints which had multiple issues resulting in a total of 96 issues.

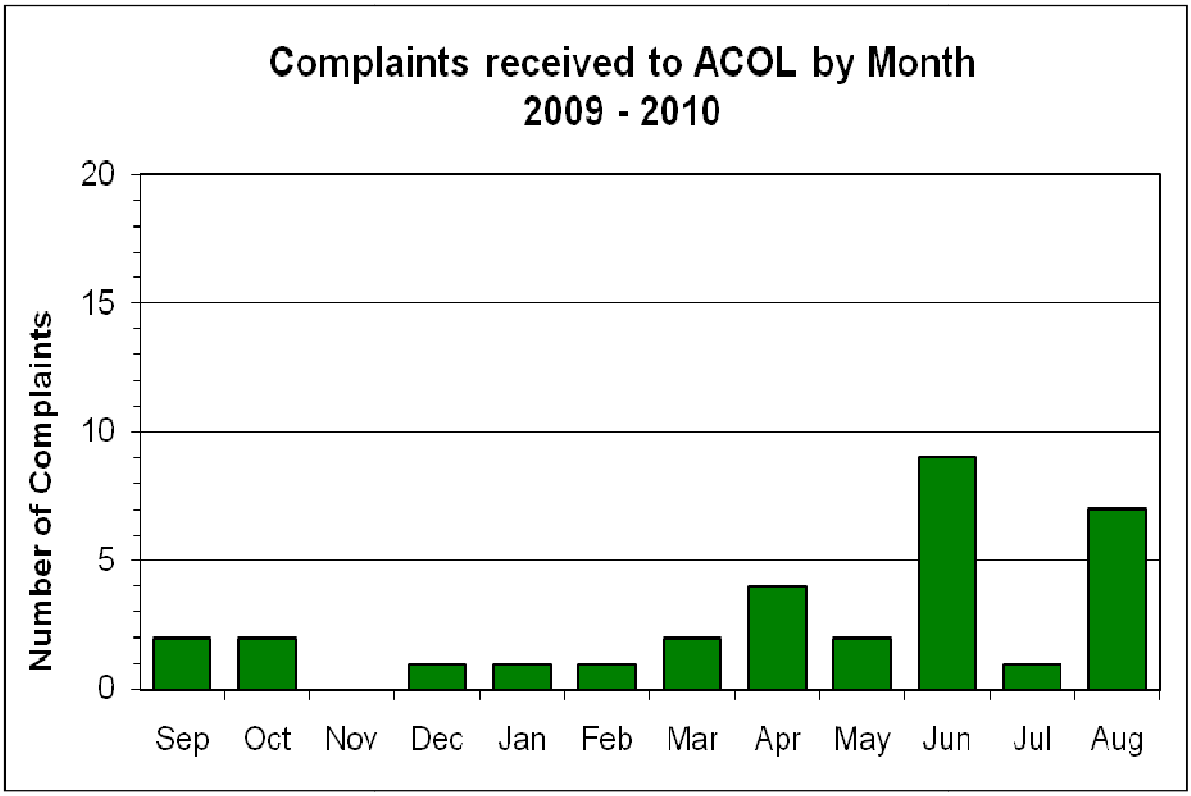



**Figure 25. Complaints received to Ashton Coal by Month 2009 - 2010**

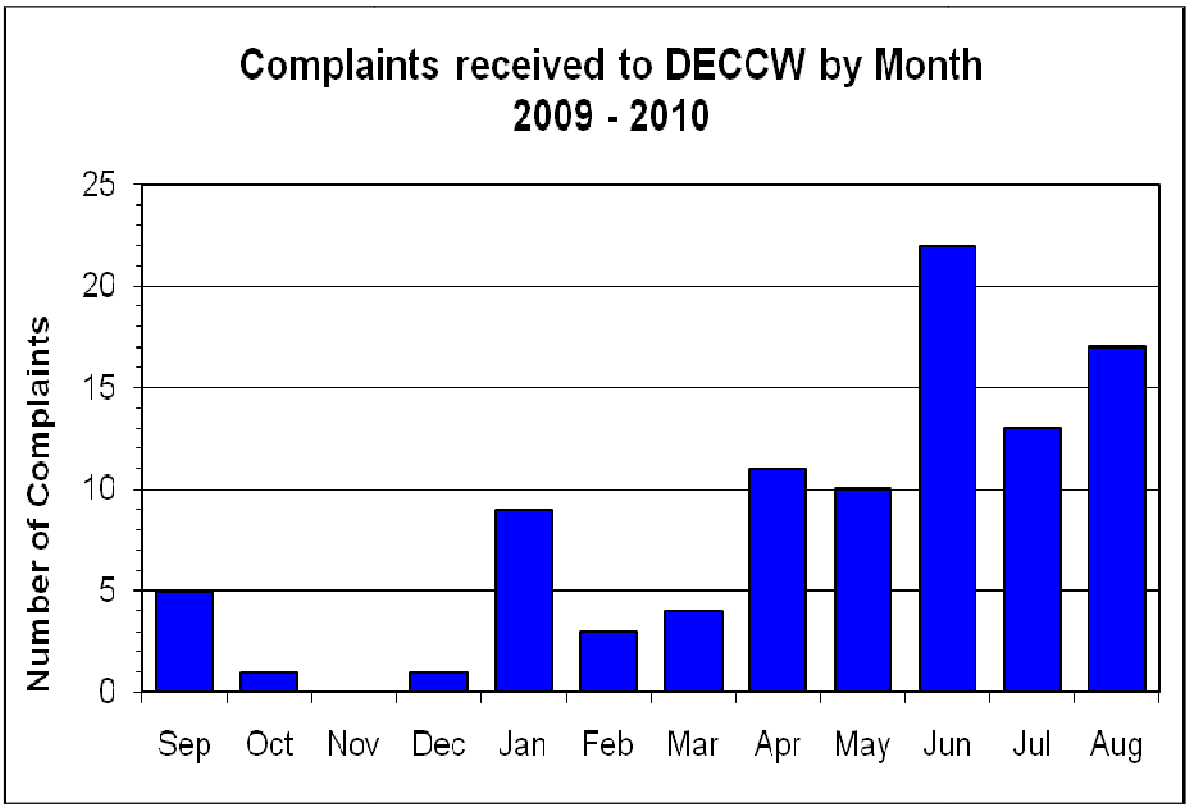



**Figure 26. Complaints received to DECCW by Month 2009 - 2010**

The percentage breakdown of complaint issue for complaints received by ACOL and for complaints received by the DECCW for the period are detailed below.

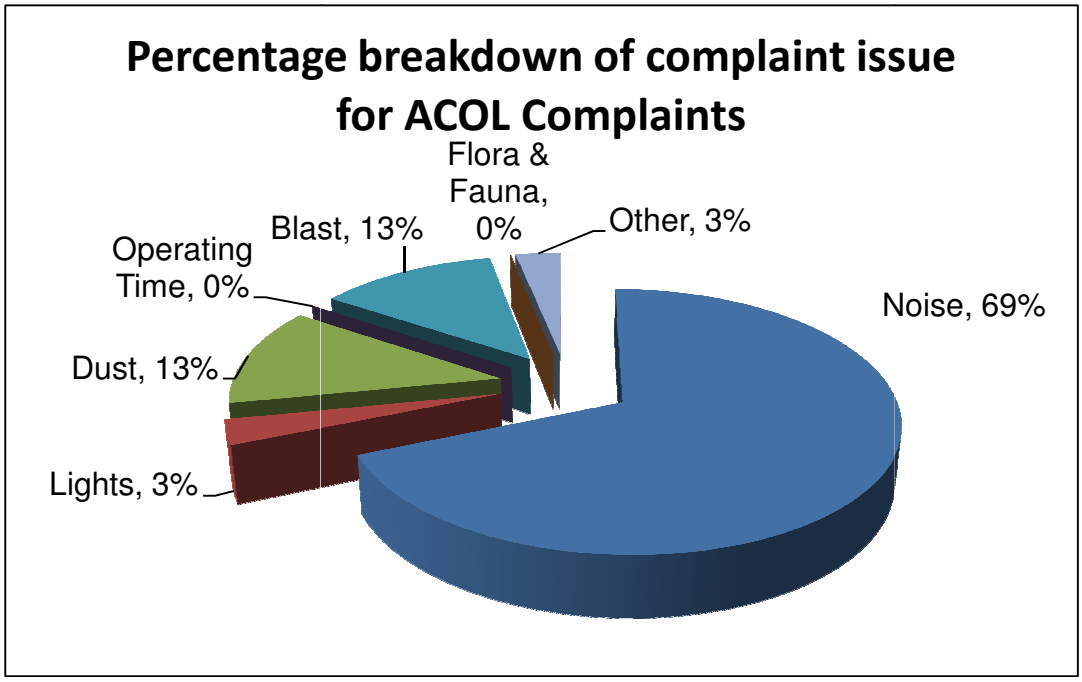



**Figure 27. Percentage Breakdown of Complaint Issue for Complaints received by ACOL**

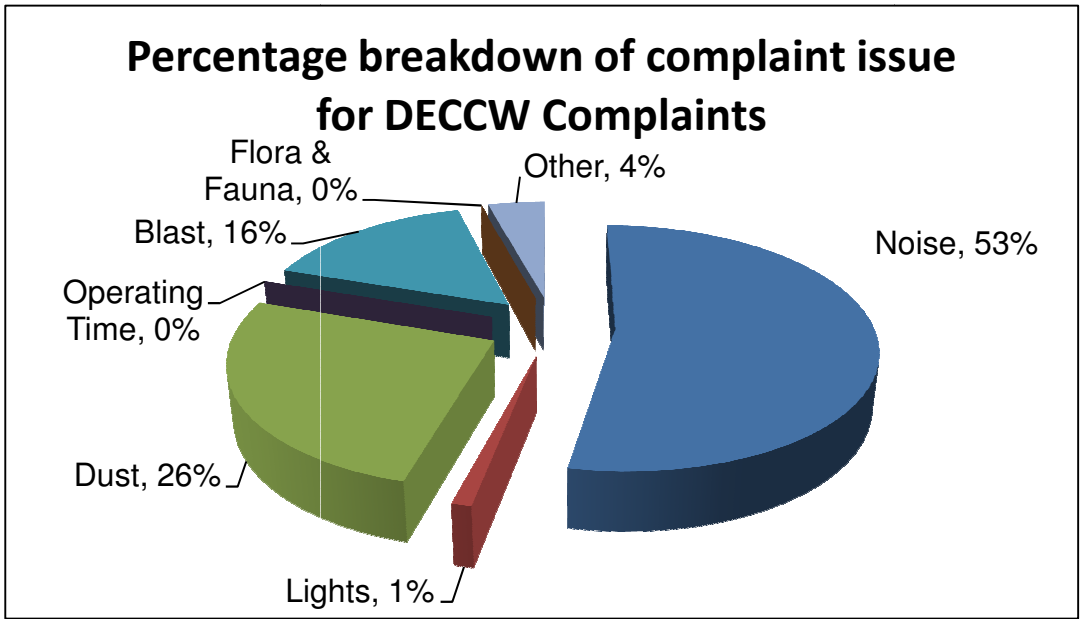



**Figure 28. Percentage Breakdown of Complaint Issue for Complaints received by DECCW**

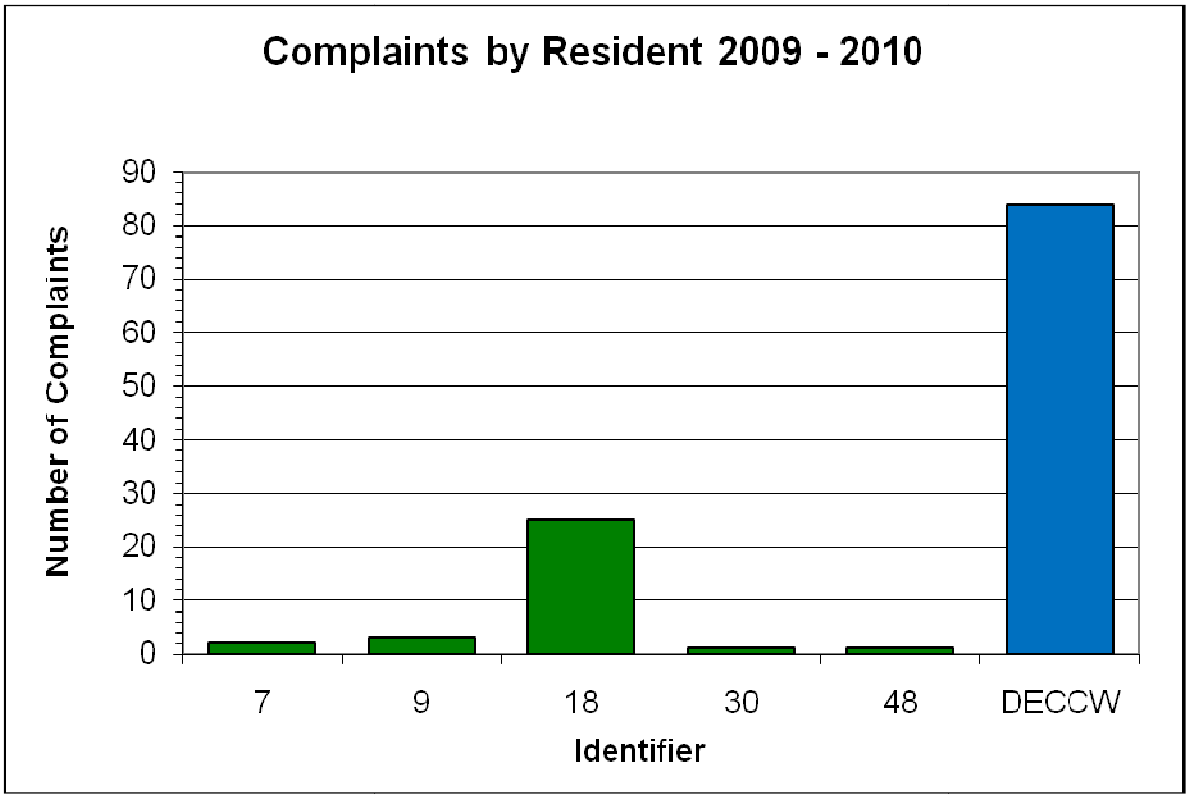



**Figure 29. Complaints by Resident 2009 - 2010**

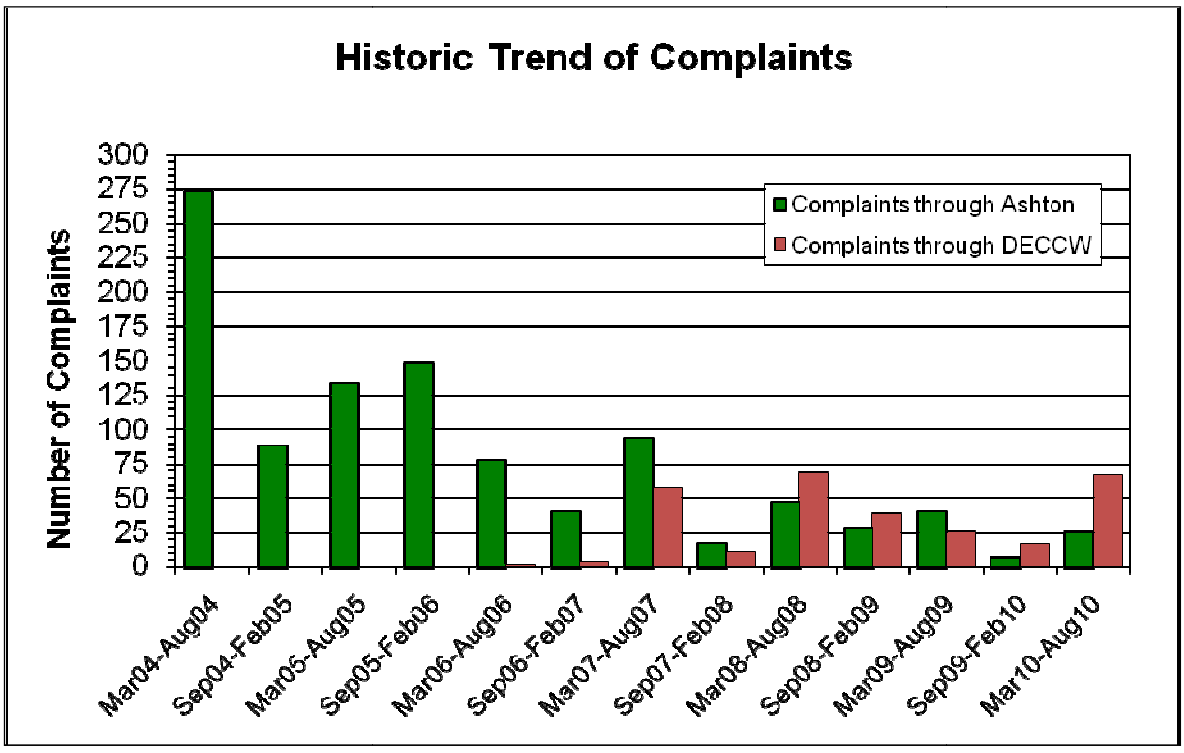



**Figure 30. Historic Trend of Complaints**

## 4.2 COMMUNITY LIAISON

On top of the community newsletters and Community Consultative Committee meetings ACOL has committed to a community program that provides a budget for undertaking activities that aim to reduce the impact of mining on the residents of Camberwell. Continuing from the work completed in previous years ACOL conducted water tank cleaning on household water tanks for all residents in Camberwell who wished to receive the offer. This involved cleaning the sludge layer that builds up on the bottom of all tanks from plant matter and dust. Rainwater tank guidelines suggest that all tanks regardless of the area should be cleaned on a regular basis, generally every two years. ACOL also installed a number of whole house filters on water tanks to provide cleaner and clearer drinking water.

CCC meetings were conducted quarterly during the reporting period. CCC members were provided with information on the project as well as updates on environmental monitoring and any future projects.

The CCC met on the following dates:

**Table 39. COMMUNITY CONSULTATIVE COMMITTEE**

| Meeting Date | Items Addressed |
|---|---|
| 8th September 2009 | Environmental monitoring, operations overview, SEOC update, Bowman's Creek Diversion proposal, rehabilitation report, section 94 contribution. |
| 8th December 2009 | Environmental monitoring, operations overview, SEOC update, Bowman's Creek Diversion update, section 94 contribution, AEMR, rehabilitation report. |
| 16th March 2010 | Environmental monitoring, operations overview, SEOC update, Bowman's Creek Diversion update, rehabilitation report. |
| 13th July 2010 | Environmental monitoring, operations overview, SEOC update, Bowman's Creek Diversion update, rehabilitation report. |

The CCC has been actively involved in questioning ACOL's commitment to the village as well as asking questions on the South East Open Cut Project Approval, Bowman's Creek Diversion Project Approval, rehabilitation, dust generation, blasts and the project for the S94 contribution funds. The S94 contribution will go towards the construction of entry signs to Camberwell Village which ACOL are liaising with Singleton Shire Council to gain the relevant approvals to allow construction to begin.

Two newsletters were also distributed amongst the local community detailing progress of operations at ACOL. The dates and contents of these newsletters were as follows:

**Table 40. COMMUNITY NEWSLETTERS**

| Newsletter # | Issued | Contents |
|---|---|---|
| 31 | October 2009 | Open Cut and Underground update, new CCC member, SEOC proposal and information, Bowman's Creek Diversion proposal and information. |
| 32 | June 2010 | Open Cut and Underground update, Bowman's Creek Diversion progress update, SEOC progress update, new employees at Ashton Coal. |

# 5.0 REHABILITATION

## 5.1 OPEN CUT

A total of 14.25ha were rehabilitated during the reporting period. This included 3.79ha of native woodland vegetation and 5.96ha of grazing pasture. Organic Growth Medium (OGM) was spread across all rehabilitation areas at 100t/ha. The rehabilitation processes used during the reporting period were as follow:

- Woodland Rehabilitation – 3.79ha of the Eastern Emplacement Area (EEA) was rehabilitated as woodland. This was achieved through direct seeding. The 3.79ha of woodland was situated around the second catchment dam on top of the EEA. Overburden was deep ripped followed by application of OGM at 100t/ha. A cover crop of rye corn was included in the seed mix to provide an initial stabilisation of the soil.
- Pasture Rehabilitation – a total of 10.46ha of pasture was seeded. Pasture seed was applied at 50kg/ha with fertiliser at 200 kg/ha. OGM was applied to all areas at 100t/ha.

## 5.2 REHABILITATION TRIALS AND RESEARCH

I&I NSW in conjunction with ACOL are conducting a Galinea treatment trial program. The trial is being conducted in ACOL's woodland rehabilitation areas. The trial aims to identify alternative herbicides and spray rates for eradicating Galinea around native saplings. Grazon, the chemical traditionally used to treat Galinea on mine site rehabilitation is highly aggressive against Eucalypt and Acacia saplings. The trial will address effects on both young saplings (<18 months and < 1 m height) and adolescent saplings (3 years old and 2 to 3 m height). This will provide advice on the ideal growth stage at which to treat Galinea infestation within recently rehabilitated woodland sites.

## 5.3 FURTHER DEVELOPMENT OF THE FINAL REHABILITATION PLAN

In the previous reporting period ACOL received approval from I&I NSW of a new Mine Operations Plan. As part of the submission a new final rehabilitation plan was submitted which incorporated slight changes to the EEA topography allowing undulation and relief across the landscape. No further changes have been made to this plan.

**Figure 31. Pasture rehabilitation seeded Autumn 2008**

**Figure 32. Woodland rehabilitation seeded Autumn 2007**

**Figure 33. Woodland rehabilitation on the top of the EEA Autumn 2008**

**Figure 34. Woodland rehabilitation on the top of the EEA Autumn 2009**

**Figure 35. Northern drop structure**

**Figure 36. Pasture rehabilitation and drainage drop structure Winter 2010**

## 5.4 REHABILITATION SUMMARY

**Table 41. REHABILITATION SUMMARY 2009– 2010**

| | Area Affected / Rehabilitated (hectares) | | |
|---|---|---|---|
| | End of this reporting period (ha) | Last Report (ha) | Next Report (estimated) (ha) |
| **A: MINE LEASE AREA** | | | |
| **Mine Lease 1529** | 128.7 | 128.7 | 128.7 |
| **Mine Lease 1533** (part overlies ML 1529) | 883.4 | 883.4 | 883.4 |
| **Mine Lease 1623** | 26.17 | N/A | 26.17 |
| **B: DISTURBED AREAS** | | | |
| **B1 Infrastructure area** | 41.8 | 49.2 | 38.6 |
| **B2 Active Mining Area** (Excluding B3 – B5) | 17.9 | 19 | 0 |
| **B3 Waste Emplacement** (Active / unshaped) | 31.9 | 38.8 | 29.8 |
| **B4 Tailings emplacements** (active / uncapped) | 3 | 2 | 13 |
| **B5 Shaped waste emplacement** (awaits final vegetation) | 13.8 | 21.8 | 0 |
| **B6 Ravensworth Void 4 area of responsibility** (Active / unshaped / partially rehabilitated) | 41 | 41 | 41 |
| **ALL DISTURBED AREAS** | 149.4 | 171.8 | 122.4 |
| **C. REHABILITATION PROGRESS** | | | |
| **C1 Total Rehabilitated Area** (except for maintenance) | 118 | 104 | 138 |
| **D. REHABILITATION ON SLOPES** | | | |
| **D1 10 to 18 degrees** | 89.5 | 79.4 | 101.5 |
| **D2 Greater than 18 degrees** | 0 | 0 | 0 |

**Table 42. REHABILITATION SUMMARY 2009- 2010**

| | Area Affected / Rehabilitated (hectares) | | |
|---|---|---|---|
| | End of this reporting period (ha) | Last Report (ha) | Next Report (estimated) (ha) |
| **E. SURFACE OF REHABILITATED LAND** | | | |
| **E1 Pasture and grasses** | 72.5 | 62 | 84.5 |
| **E2 Native woodland / ecosystems** | 39.8 | 36 | 47.8 |
| **E3 Plantations and crops** | 0 | 0 | 0 |
| **E4 Other** (includes non-vegetative outcomes) | 5 (Dams and drainage) | 3 (Dams and drainage) | 5 |

**Table 43. MAINTENANCE ACTIVITIES ON REHABILITATED LAND**

| NATURE OF TREATMENT | Area Treated (ha) | | Comment / control strategies / treatment detail |
|---|---|---|---|
| | Report Period | Next Period | |
| **Additional erosion control works** (drains re-contouring, rock protection) | 0 | 3 | There were no major erosion works needed on contour drains during this reporting period |
| **Re-covering** (detail – further topsoil, subsoil sealing, etc) | 0 | 0 | No areas were re-covered during the period. |
| **Soil treatment** (detail – fertiliser, lime, gypsum, ogm, etc) | 0 | 40 | A full application of maintenance OGM spreading across the rehab was done last reporting period looking at doing it every two years if required. |
| **Treatment / Management** (detail – grazing, cropping, slashing, etc) | 0 | 0 | |
| **Re-seeding / Replanting** (detail – species density, season, etc) | 0 | 1 | No reseeding or replanting was undertaken during the reporting period. |
| **Adversely Affected by Weeds** (detail – type and treatment) | 2.4 | 10 | Galinea was sprayed on the topsoil stockpiles. |
| **Feral animal control** (detail – additional fencing, trapping, baiting, etc) | 0 | 0 | No feral animal control within rehabilitation areas was undertaken during the reporting period. |

# 6.0 MAJOR PROJECTS

## 6.1 DEVELOPMENT CONSENT MODIFICATION – LONGWALL 9

On the 26th March 2010 ACOL gained approval for Longwall 9 DA 309-11-2001 Modification 4 . The proposed modification involves:

- Authorising the development and mining of an additional longwall/miniwall panel;
- Increasing overall production of coal from the ACP underground mine by an additional 250,000 tonnes per annum of run of mine (ROM) coal;
- Deleting Conditions 3.18, 3.24, 3.25, 3.26, 3.27 and 3.28 of Schedule 2 of the existing development consent.

The primary aim of the development consent modification is to allow extraction of coal from Longwall/Miniwall 9, previously not included in the original mine plan.

## 6.2 DEVELOPMENT CONSENT MODIFICATION – BOWMANS CREEK DIVERSION

During the reporting period ACOL submitted an environmental assessment in support of the Bowmans Creek Diversion DA 309-11-2001 Modification 6. The modification proposes to re-design the underground mine layout to allow additional extraction beneath the creek and its alluvium. The proposal involves:

- allowing longwall mining operations that would result in a direct hydraulic connection between the Bowmans Creek alluvium and the underground workings due to connective cracking;
- amending the mine plan for all four coal seams to optimise resource extraction;
- diverting two sections of Bowmans Creek to ensure that the integrity of the creek system and associated alluvium is not permanently impacted by the proposal; and
- modifying relevant development consent conditions to facilitate the above

**Key Benefits of the Project**

The revised underground mine plan, which is the subject of this proposal, contains the following key benefits:

- It permits the maintenance of a cost effective business, with sustainable capital and operating costs, and thereby provides security of employment for 195 direct employees and 35 construction positions as well as flow on effects to the regional economy;
- It provides access to an additional 5.3 million tonnes of run of mine (ROM) coal through significantly improved resource recovery, and reduced sterilisation, over the four targeted seams than would be possible under constraints imposed by the existing development consent;
- It provides approximately $80 million of additional revenue to the State and Federal Governments;
- It provides significantly improved flexibility to modify the mine plan within the mining footprint and certainty that mining of lower seams will be technically and economically feasible;

In order to mitigate the effects of subsidence on the flow transmission capacity of Bowmans Creek, the project involves the diversion of two sections of Bowmans Creek (total 1.7km) that will mimic or enhance the hydraulic, geomorphic and habitat features of the existing channel including, pools and terraces within the stream bed, and large woody debris as a supplementary habitat feature;

- It will create diversions that can evolve in time to form ecologically diverse habitat in association with adjoining floodplain areas from which domestic stock will be excluded;
- It provides significant environmental benefits by way of enhanced riparian vegetation and a large area of existing creek and floodplain that will be excluded from degradation by domestic stock; and
- It reduces the salt load to Bowmans Creek and the Hunter River.

**Background**

The original underground mining proposal in the EIS (HLA, 2001) involved 250m wide longwall panels and a 2.4km diversion of Bowmans Creek around the northern and western sides of the proposed underground mine footprint. At the time of the original EIS, there were a number of concerns relating to the Bowmans Creek alluvial aquifer that influenced the approved project:

- The Bowmans Creek alluvium aquifer was considered worthy of preservation;
- Groundwater was considered to flow downwards from alluvium to underlying coal measures;
- Following underground mining, the groundwater levels in the coal measures were predicted to be higher than pre-mining, and higher than those in the alluvium; and
- In the event of direct hydraulic connection between the Bowmans Creek alluvium and the underground workings through connective cracking, saline groundwater would flow upwards from the coal measures and would contribute to the baseflow in Bowmans Creek. This would result in an increase in salinity in the Hunter River.

**New Understandings**

With the benefit of additional monitoring of groundwater, subsidence and surface water since the commencement of the development of the ACP, several studies have been undertaken that have improved the understanding of the Bowmans Creek alluvium since the preparation of the original EIS. In particular, groundwater investigations have improved the understanding of the nature, extent and quality of Bowmans Creek alluvial aquifer and its degree of connection to Bowmans Creek. Monitoring of groundwater during the first five years of open cut mining and three years of underground mining has provided significantly better understanding and greater certainty in relation to potential impacts of longwall mining. The recent data and analysis shows that:

- The quality of water in the alluvial aquifer ranges from moderately to highly saline (up to 6,400 µS/cm EC). The alluvial groundwater is not a high quality resource and provides only limited environmental and economic value;
- Prior to mining there is a natural upwards seepage of saline groundwater from the coal measures to the alluvium;

- The alluvium has relatively low hydraulic conductivity and only makes a very small contribution to baseflow to Bowmans Creek;
- Contrary to the 2002 EIS prediction there will be a decrease in Hunter River salinity post
- mining; and
- The existing creek provides a range of aquatic and riparian ecosystem services but has been degraded as a consequence of past land use practices.

**The Project**

In addition to the improved understanding of groundwater and subsidence issues, the detailed features of this project are based on a range of physical, ecological and heritage issues that have been the subject of specialist studies. In particular, significant attention has been given to the development of designs for the diversion channels which will have similar hydraulic and geomorphic characteristics to the existing creek and provide opportunities for significant enhancement of the riparian and aquatic habitat.

## 6.3 MODIFICATION IN CONVEYOR AND CHPP FOR SOUTH EAST OPEN CUT

The South East Open Cut (SEOC) is located outside of the area of the existing development consent for the Ashton Coal projects (ACP) and as such will be developed as a separate project with its own Project Approval hence it has not been addressed in detail within the Major Project section of this report. However it is intended that the SEOC will be managed as a part of the ACOL operation and to achieve this integration it will be necessary to also modify the existing ACP. As such the Environmental Assessment submitted during the reporting period for the SEOC incorporated DA 309-11-2001 Modification 5. The modification seeks to;

- Increase the through put of the CHPP and rail loading facilities to cater for approximately 8.6Mtpa of ROM coal (or an additional 2.3Mtpa of product coal);
- Modification of the existing CHPP facilities to allow the receipt of coal from the SEOC;
- Disposal of coal tailings form the existing underground coal mine in the SEOC final void;
- Increased coal extraction rate from 2.95Mtpa ROM to 5MtpaROM coal in the existing Underground mine; and
- Associated modifications to the conditions of DA 309-11-2001 to facilitate the above changes.

# 7.0 ACTIVITIES PROPOSED IN THE NEXT AEMR PERIOD

## 7.1 EXPLORATION

Anticipated Exploration for period to Aug 2011

Mining Lease 1533

- Open cut - No activity planned.
- Underground - It is expected that between 4 to 6 holes are likely to be drilled for gas drainage and up to another 10 exploration holes if required.

Exploration Licences 5860 & 4918

- Exploration continuing with 10 holes planned (3 cored and 7 open holes).

## 7.2 REHABILITATION

A further 20ha of rehabilitation is expected to be undertaken during 2010 - 2011. This area will include pasture rehabilitation on the slopes of the EEA and woodland rehabilitation on the top of the EEA.

## 7.3 BUFFER LAND

It is proposed to undertake more weed works and tree planting within the crown land lease areas. There will be more maintenance weed works in the Voluntary Conservation Area targeting African Boxthorn and St John's Wort

## 7.4 OTHER ACTIVITIES

Other activities planned for the next AEMR (2010 – 2011) period include:

- Formalise Closure Criteria for the Open Cut rehabilitation utilising analogue sites within Ashton Coals buffer lands.
- Submit the Mine Closure Management Plan.
- New upgrade and implementation of Sentinex Real Time Environmental Monitoring System.

## DISTRIBUTION

Ashton Coal Operations Pty Limited
Annual Environmental Management Report 2009 - 2010

4 February 2011

| | |
|---|---|
| 1 Copy | Department of Planning |
| 2 Copy | Department of Environment, Climate Change and Water |
| 1 Copy | Industry and Investment NSW – Minerals |
| 1 Copy | Industry and Investment NSW – Fisheries |
| 1 Copy | Department of Environment, Climate Change and Water - Parks and Wildlife |
| 1 Copy | Singleton Shire Council |
| 4 Copy | Community Consultative Committee |
| 4 Copy | Ashton Coal Operations Pty Limited |
| 1 Copy | Macquarie Generation |
| 1 Copy | Yancoal Australia Limited |
| 1 Copy | ICRA Pty Ltd |
| 1 Copy | International Marine Corporation |
| 1 Copy | Alistair Bowman |