
INDEPENDENT ENVIRONMENTAL AUDIT

for

THE DENDROBIUM MINE

FOR

BHP Billiton

**Dendrobium Coal Pty Ltd
PO Box 275
Unanderra NSW 2526**

September 2008

By

**KADENZ Pty Ltd - Environmental Consultancy
1 Fairweather Street, Bellevue Hill, NSW 2023**

Dendrobium Project

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1. EXECUTIVE SUMMARY

Dennis Zines of KADENZ Pty Ltd – Environmental Consultancy was commissioned by BHP Billiton to undertake an independent environmental audit of the Dendrobium Mine to address their Consent Condition 8.1 Third Party Monitoring/Auditing. KADENZ was supported by several specialist consultants as follows:

- Air Quality – Matt Scholl of Pacific Air & Environment
- Noise – Nigel Holmes of Holmes Air Sciences
- Subsidence - Steve Ditton of Ditton Geotechnical Services

Background:

The Dendrobium Project comprises the development of a new underground coal mine, and construction and operation of associated surface facilities (“the Development”).

Consent condition 8.1 requires that

The audit shall:

- (i) assess compliance with the requirements of this consent, licences and approvals;
- (ii) assess the development against the predictions made in the EIS;
- (iii) review the effectiveness of the environmental management of the mine, including any avoidance, mitigation and remedial measures;

The Consent was dated 20 November 2001 and construction work on the site commenced in January 2002. There have been a number of modifications to the consent since its original issue and a further modification is due to be issued in September/October 2008. The latter modification is expected to greatly simplify the consent conditions.

The previous audit under consent condition 8.1 (first audit under the condition) covered the period from the date of the Consent to 31 December 2004 for site activities and to 31 March 2005 for approval documentation. This Audit covers the period from the completion of the first audit to September 2008.

The DoP commenced a compliance audit of selected conditions of consent in July 2005 which was completed in March 2006.

The audit focused on five main areas, which included:

- Noise;
- Rail issues;
- Dust;

- Traffic and Road Safety; and
- Mine operator response to complaints from the local community.

The DoP Audit 2006 identified a number of non-compliances and made a number of observations in respect of improvements that could be made.

In response, Dendrobium provided a detailed report dated November 2006 which identified that approximately 95% of the issues raised by DoP had been addressed.

Subsequently DoP produced a follow-up audit dated May 2007 which acknowledged the progress made as per the November 2006 report but which still required further efforts to be made to manage noise and air quality issues.

As at September 2008 which is the date selected for the limit of data collection for this audit, all of the surface facilities have been constructed and the underground development completed which has allowed commencement of the long wall mining in Areas 1 and 2. Longwall mining commenced in April 2005. Mining has now progressed to Longwall 4 in Area 2 with completion of this longwall due before end 2008.

Most of the major construction was completed prior to April 2005. The surface and drilling works for Ventilation Shafts 2 & 3 are yet to be completed but are well advanced and are expected to be complete before the end of 2008. First workings are currently being developed for underground mining in Area 3.

The audit process consisted of:

- Pre-audit preparations and review of documentation;
- Telephone conversation with Department of Planning as a follow up to their letter approving the Audit Team;
- Site inspection of the main aspects of the mining operation including the Vent Shafts 2 & 3 and subsidence areas (19 August 2008 for Dennis Zines and Steve Ditton and 22 August for Matt Scholl and Nigel Holmes);
- Review of documentation, files, reports, records and data at the Mine Site Office
- Interviewing relevant Dendrobium personnel Richard Walsh, Gary Brassington, Chris Schultz, Scott Coleman, and Luke Pascot, and
- Preparation of this Audit Report.

Summary of Findings

Compliance

With respect to Consents, Licences and Approvals, Dendrobium has made a conscientious and concerted effort to achieve and maintain compliance with the Consent conditions, Licences and Approvals. The audit considers that the project has achieved a very high and satisfactory level of compliance in this regard.

The audit has observed that there have been a limited number of non-compliances since commencement (discussed to an extent in Section 3 of this audit), but that Dendrobium has taken prompt actions to rectify the non-compliances.

It is recommended that when the September/October 2008 amendment to the Consent is issued, that Dendrobium modify their Compliance report (attached to the AEMRs) in accordance with the new consent so that ongoing monitoring of compliance is facilitated.

EIS Predictions and Effectiveness of Environmental Management

Construction Impacts

Assessment of construction activities impacts during the audit period only address Water Management in respect of the Vent Shafts 2 & 3 site works. Other construction impacts for the audit period have not been separated from the discussion on operational impacts provided below. In this case, reference to Consent conditions also addresses EIS predictions.

All of the required plans and reports were prepared in accordance with the consent.

The Morse McVey Audit (2007) identified a number of non-compliances in respect erosion and water management at the Vent Shafts 2 & 3 site which arose because of the soil types encountered at the site. The non-compliances primarily related to excess sediment run-off onto the surrounding SCA land. It is possible that a more extensive soil testing program at the time of preparation of the 2005 Soil and Water Management Plan (Olsen) may have reduced the number of non-compliances. It is unlikely that the non-compliances led to any significant deterioration of water quality in the SCA dam.

The non-compliances were subsequently subject to PRP 12 and then addressed as reported in the Cardno Forbes Rigby (2007) report.

Overall, the Dendrobium management satisfied the intent of the Consent conditions and were seen to be appropriately responsive in applying successful and necessary additional mitigation measures.

Operational Impacts

EIS Predictions

For the most part, the EIS predictions have been met apart from two key areas of noise and dust.

Noise

The predicted levels were initially exceeded in particular locations requiring the addition of further mitigation measures. The auditor supposes that the noise assessment in the EIS underestimated the noise sources and may have underestimated propagation conditions. Occasional exceedances of the noise assessment criteria have been recorded in the period covered by the audit however the extent of the exceedances are minor. The effect of some of the remedial measures recently applied have not been tested by sufficient monitoring as yet and so the current situation may well be that the mine is now in compliance in regard to railway noise. This will be assessed in the 2008 AEMR.

Dust

Over the audit period there have been a number of technical non-compliances in respect of Condition 6.1 (a) of the Consent (dust deposition rates). From May 2006, visual analysis of high dust deposition results was conducted to determine the type of material comprising the sample. This analysis shows that there are many potential sources of the material that deposited in the dust gauge that could have contributed to the non-compliances beyond the impact of coal dust. Non-compliance with Condition 6.1 (a) of the Consent cannot be determined when other sources appear to contribute more to the result than coal dust from the mining activity.

Subsidence

Subsidence is a significant issue for the Dendrobium Mine and there are many Consent Conditions that need to be monitored and assessed. The findings to date are extremely positive and strongly support the conclusion that the subsidence experienced so far is within the EIS predictions. Importantly, Dendrobium decided after the consent was issued to mine in a reduced area which apart from leaving resource in the ground (cost disbenefit to the mine) greatly reduced the risk of possible subsidence in key impact areas. This is undoubtedly a contributor to the meeting of the EIS predictions.

Effectiveness of Environmental Management of the Mine

The effectiveness of the environmental management of the project is reflected in the compliance with the consent conditions and in the mitigation measures applied and in the performance of the project personnel.

The Dendrobium management has demonstrated a very high level of compliance with approvals, licences and consents for approval conditions that are seen as being very comprehensive.

There have been a significant number of improvements made to the mitigation measures described in the EIS, particularly in respect of noise and dust mitigation. The fact that so many additional measures were required for these two issues supports the audit finding that the EIS underestimated the potential impacts for these two issues.

It is assessed that the SEMP has performed satisfactorily in terms of subsidence impact management in the Areas 1 and 2 and the Conditions of Consent during the 2005 – 2008 reporting period. The mine (and their consultants) should be commended for recognising and managing the high risk issues associated with longwall mining adjacent to a significant water supply dam and sensitive surface waters of Kembla Creek.

Based on the inspection of the rock fall areas, the audit considers that some of the rock falls in Area 1 (e.g. Rock Fall Site E) may need to be specifically reviewed in future monitoring events to check that they are still classed as ‘minor’ and not ‘moderate’. Currently, the Dendrobium landscape specialist assessed these sites as “minor” and this has been approved in the SLMMP and SEMP. (Note the ‘moderate’ category includes statements to the effect that the character of the cliff is changed and significant ground disturbance has resulted). Future monitoring should consider the possibility of initiating a further CMA for limiting degradation of the sites should this be warranted.

It is also apparent that the CMA for ‘moderate’ impact rock falls has recommended on-going monitoring to determine if erosion and sedimentation control measures are required when it is likely that the exposed cliff faces and damaged vegetation areas may need minor works to be implemented now.

The audit notes that on-going monitoring is occurring and that it includes a specific recommendation from the Dendrobium specialist if any CMAs are required – at this stage none have been recommended.

In regards to the Conditions of Consent, the requirement for compliance reporting after the completion of each longwall panel and at 6 monthly and 12 monthly intervals as well appears to be excessive. It is questionable whether preparing all of these documents actually increases, or decreases the effectiveness of the SEMP, based on the results of this audit.

This comment is further reinforced by the mines commitment to providing 24 hour notice to stakeholders of any notifiable incident or impact exceedance.

It is therefore recommended that the DoP and DPI consider further streamlining the reporting process, based on negotiation with the mine and stakeholders. A suitable alternative may be to reduce the level of reporting required on some of the lower risk items in the SEMP.

The mine management has responded appropriately in respect of traffic management, addressing community complaints and in working its way through the water discharge non-compliances for zinc, copper and dissolved oxygen at Allans Creek.

As a result of the mine personnel and management being very responsive to environmental management, the mitigation measures applied over the audit period and their implementation are assessed as being very effective.

Overall, the environmental management for the project is also assessed as being very effective.

2. INTRODUCTION

2.1 Dendrobium Mine Outline

The Dendrobium Mine comprises the development of a new underground coal mine, and construction and operation of associated surface facilities (“the Development”).

The Dendrobium Mine Proposal was subject to extensive environmental examination under the NSW *Environmental Planning & Assessment Act 1979 (EP&A Act)* and received Approval from the Minister for Urban Affairs and Planning for the Project to proceed on 20 November 2001, subject to conditions of approval (“the Consent”). A listing of the conditions and the state of compliance of each condition is kept by Dendrobium and included with their Annual Environment Management Report (AEMR) which is provided to the government authorities each year.

The Dendrobium Mine is owned and operated by Dendrobium Coal Pty Ltd, a wholly owned subsidiary of BHP Billiton (BHPB) and is located at Mt Kembla, approximately 8 km west of Wollongong NSW on the Illawarra Escarpment.

The Dendrobium Project consists of a number of sites in addition to the mine site. The sites associated with the Project and discussed in this audit are:

- Dendrobium Pit Top – administration, workshop and people and materials access, via the Dendrobium Tunnel, to the underground workings;
- Kemira Valley Coal Loading Facility (KVCLF) – coal clearance via the Kemira Valley Tunnel, stockpile and train loading facility (now including a new coal sizer);
- No.1 Ventilation Shaft – currently operating as an upcast ventilation shaft;
- Nos.2 & 3 Ventilation Shaft – upcast ventilation shaft and fan providing fresh air to the mine for Area 3;
- Kemira Valley Rail Line – transport route from stockpile facilities to the Port Kembla Steel Works;
- Dendrobium Coal Preparation Plant – located within Port Kembla Steel Works providing washing and drying facilities for the Dendrobium coal product;
- The West Cliff coal emplacement area; and
- Mining Areas 1 (Longwalls 1 and 2) and 2 (Longwalls 3 to 5a).

Figure 1 in Section 6 of this report shows the location of all of the above apart from the West Cliff coal emplacement area. Figure 2 shows the location of the Pit Top, Kemira Valley, the Vent shafts, and the mining areas at larger scale.

The new Dendrobium Mine Pit Top facilities have been developed on the site previously known as Nebo Colliery, which was formerly combined with Wongawilli Colliery in 1993 to form Elouera Colliery. The Nebo Portal site was relinquished from the ownership and responsibility of Elouera Colliery in December 2001 to enable the Dendrobium Mine to acquire formal responsibility, ownership and identity of the site.

The Dendrobium Mine is designed to access and mine coal from the No.3 Seam of the Illawarra Coalfields, known as the Wongawilli Seam. Coal will be mined from 3 mining areas, known as Areas 1, 2 and 3 as shown in Figure 2 (previously noted as Areas A, B and C in the Environmental Impact Statement (EIS)).

The principal market for the coal is currently the Port Kembla Steel Works for steel making with domestic and export markets as required.

Mt Kembla Village is located immediately adjacent to and below the Pit Top area and Kembla Heights is located immediately above the Pit Top area. The village has intimate historical links with mining in the area.

2.2 Project Status

Construction on the works commenced in January 2002. The mine became operational during early 2003.

As at September 2008 which is the date selected for the limit of data collection for this audit, all of the surface facilities and the underground development for Areas 1 and 2 have been completed which has allowed commencement of the long wall mining in these areas. Longwall mining commenced in April 2005. Mining has now progressed to Longwall 4 in Area 2 with completion of this longwall due before end 2008.

Most of the major construction was completed prior to April 2005. The surface and drilling works for Ventilation Shafts 2 & 3 are yet to be completed but are well advanced and are expected to be complete before the end of 2008. First workings are currently being developed for underground mining in Area 3.

Section 3 of this audit report contains more specific details of the construction activities that have taken place during the period of this audit report.

Coal Production and Other Activities

Coal production in 2003 was 242,195 tonnes (ROM).

Coal recovery during 2002 to end 2005 was 3,329,322 tonnes (run of mine – ROM). In 2005, the Coal Preparation Plant processed 2.505 million tonnes averaging 61% saleable product.

Coal Wash emplacement occurred at Wongawilli during January to March 2005 and thereafter at West Cliff Area 2.

The 2006 reporting period was the first full year of longwall production at Dendrobium Mine resulting in an increase in Run of Mine (ROM) tonnes compared to previous years. ROM product for the period January 2006 to December 2006 was 2,799,426 tonnes. Saleable product yield was 50.6% of ROM production for the reporting period with a total of 1,381,574 tonnes of coal wash emplaced at the West Cliff emplacement.

Run of Mine (ROM) product for the period January 2007 to December 2007 was 2,496,344 tonnes, with a saleable product yield of 71.9% for the reporting period. 1,084,109 tonnes of coal wash was emplaced at the West Cliff emplacement.

The AEMRs contain summary tables of cumulative coal production totals.

Project Changes since the date of Consent

Changes to the project since the Consent include:

- Some minor amendments were made to the consent reported in the Annual Environmental Management Reports (AEMR) for 2002 and 2003 which addressed changes to names of government authorities, additional traffic conditions, the approval to submit an application for second workings, and specific limits on mine water discharge to Allans Creek.
- Dendrobium altered the long wall mining plan for Area 1 to reduce the number of long walls from 3 to 2 which would result in less coal being mined from the area and correspondingly a reduction in associated potential subsidence impacts.
- The rail transport from KVCLF introduced longer rail cars, reducing the number of train journeys.
- In April 2006 there was a further modification to the consent which included the addition of the coal sizer and a number of conditions arising from the Department of Planning Audit of March 2006. In particular, the new conditions required upgrades to the Air Quality Management Plan and the Noise Management Plan.
- In April 2007, Dendrobium applied for a further modification to the consent to address proposed changes to Mining Area 3, incorporating the requirements of Staged Development Area C, and an administrative review of the conditions of consent. It is understood from verbal advice from the Department of Planning that this application will be approved in September/October 2008. Importantly, the consent conditions are to be simplified in number and to eliminate a degree of duplication.

2.3 Purpose and Status of This Report

This report addresses Condition 8.1 Third Party Monitoring/Auditing of the Consent which is repeated here for convenience.

Independent Environmental Audit

- (a) Every three years from the date of this consent until the completion of mining in the DA area, or as otherwise directed by the Director-General, the Applicant shall conduct an environmental audit of the mining and infrastructure areas of the development in accordance with ISO 14010 – Guidelines and General Principles for Environmental Auditing, and ISO 14011 – Procedures for Environmental Auditing (or the current versions), and in accordance with any specifications required by the Director-General. Copies of the report shall be submitted by the Applicant to the Director-General, WCC, WSC, WdSC, EPA, DLWC, DMR, SCA, NPWS, NSW Fisheries and CCC within two weeks of the report's completion for comment.
- (b) The audit shall:
 - (i) assess compliance with the requirements of this consent, licences and approvals;
 - (ii) assess the development against the predictions made in the EIS;
 - (iii) review the effectiveness of the environmental management of the mine, including any avoidance, mitigation and remedial measures;
 - (iv) be carried out at the Applicant's expense; and
 - (v) be conducted by a duly qualified independent person or team approved by the Director-General in consultation with SCA, WCC, WSC and WdSC. Such approval shall not be unreasonably withheld.
- (c) The Director-General may, after considering any submission made by the relevant government agencies, WCC, WSC, WdSC and CCC on the report, notify the Applicant of any requirements with regard to any recommendations in the report. This may include any requirements to revise the Environmental Management Strategy [refer to Condition 3.2(c)]. The applicant shall comply with those reasonable requirements within such time as the Director-General may require.

The date of the Consent was 20 November 2001 meaning that the first Audit report was due on 20 November 2004. Dendrobium sought from the Director-General and was granted a postponement of this date to 30 April 2005. Within the first audit report, there were three AEMRs for the periods Jan-Dec 2002, 2003 and 2004.

The three year anniversary for this Audit was the end of April 2008. Due to the application for a change to the consent conditions of 11 April 2007 and the Director-

General's agreement to do so (scheduled granting of the modified consent due approximately in September/October 2008 – pers. comm. Department of Planning), it was agreed between Dendrobium and Department of Planning that the audit period will cover from May 2005 to end September 2008 so that future audits can be undertaken against the modified consent.

For this Audit, there are the three AEMRs for the periods Jan-Dec 2005, 2006 and 2007. The AEMRs provide a substantial amount of data for the audit. In addition, there are several monitoring and investigation reports that have been undertaken during 2008 which have been referred to in the audit.

2.4 Authorities Names

There have been a number of organisational changes to State government authorities since the date of the Consent. The EPA and NPWS became part of the Department of Environment and Conservation (DEC) which name was subsequently altered to the Department of Environment and Climate Change (DECC). The DMR is now part of the Department of Primary Industries (DPI – Mineral Resources). DUAP became the Department of Infrastructure and Planning (DIPNR) and in turn became the Department of Planning (DoP). DLWC is now referred to as the Department of Natural Resources (DNR) and NSW Agriculture and NSW Fisheries became part of DPI.

The consent was modified on April 2006 and this matter was noted within that modification.

While it is intended that the latest names be used in this document, direct references to the Consent Conditions may require use of the names included in the original consent.

2.5 Report Contents

The report consists of a further 4 Sections.

Section 3 of this report deals with Consent Condition 8.1 (b) (i) Compliance with the requirements of this consent, licences and approvals.

Section 4 of this report deals with Consent conditions 8.1 (b) (ii) and (iii) Assessment against the EIS predictions and the effectiveness of the environmental management of the mine relating to the Construction stage.

Section 5 of this report deals with Consent conditions 8.1 (b) (ii) and (iii) Assessment against the EIS predictions and the effectiveness of the environmental management of the mine relating to the operations after the longwall mining commencement.

Section 6 of this report contains the figures referred to in the audit report.

Section 7 contains the Appendices referred to in the audit report.

2.6 Preparation of the Report and Sign-Off

Dennis Zines of KADENZ Pty Ltd – Environmental Consultancy was commissioned by BHP Billiton to undertake an independent environmental audit of the Dendrobium Mine to address their Consent Condition 8.1 Third Party Monitoring/Auditing.

KADENZ was supported by several specialists as follows:

- Air Quality – Matt Scholl of Pacific Air & Environment
- Noise – Nigel Holmes of Holmes Air Sciences
- Subsidence - Steve Ditton of Ditton Geotechnical Services

The appointment of the KADENZ team was approved by the Department of Planning by a letter dated 14 July 2008 (refer Appendix A). This letter specifically required that the audit team assess the company's progress in implementing the recommendations, or addressing non-compliances identified in the following audits:

- Compliance Audit Dendrobium Coal Mine – Department of Planning, March 2006;
- Independent Audit – Dendrobium Mine Vent Shafts 2 & 3 – Morse McVey for Department of Planning, March 2007; and
- Follow Up Compliance Audit Dendrobium Coal Mine - Department of Planning, May 2007.

The audit process consisted of:

- Pre-audit preparations and review of documentation;
- Telephone conversation with Department of Planning as a follow up to their letter approving the Audit Team;
- Site inspection of the main aspects of the mining operation including the Vent Shafts 2 & 3 and subsidence areas (19 August 2008 for Dennis Zines and Steve Ditton and 22 August for Matt Scholl and Nigel Holmes);
- Review of documentation, files, reports, records and data at the Mine Site Office;
- Interviewing relevant Dendrobium personnel Richard Walsh, Gary Brassington, Chris Schultz, Scott Coleman, and Luke Pascot; and
- Preparation of this Audit Report.

Information contained in the report is predominantly sourced from the original Project EIS documents and then from Dendrobium documents with certain sections sourced from Dendrobium's sub-consultants reports plus the audit documents by Department of Planning and Morse McVey.

KADENZ and the specialist consultants have relied solely on these processes in respect of the integrity of the data included in this report.

Sign-off

KADENZ Representative:

A handwritten signature in black ink, appearing to read 'D. Zines', with a large, stylized flourish at the end.

Dennis Zines

Director

Date: 22 September 2008

3. CONSENTS, LICENCES AND APPROVALS

This chapter deals with Consent Condition 8.1 (b) (i) Compliance with the requirements of this consent, licences and approvals.

This Section of the Audit report generally addresses all of the conditions of the Consent under the same headings used in the consent.

1. General
2. Mine Management
3. Land and Site Environmental Management
4. Water Management
5. Rejects Emplacement Area and Waste Management
6. Air Quality, Blast, Noise and Light Management and Monitoring
7. Transport and Utilities
8. Monitoring/Auditing
9. Reporting
10. Community Consultation/Obligations
11. Proponents Obligations
12. Further Approvals and Agreements

3.1 Listing of Consents, Licences and Approvals Achieved

As noted above, this form of compliance record was attached as an Appendix in the AEMRs of 2005, 2006 and 2007 and as such is not duplicated here. Due to the continued acceptance of the AEMRs each year, the Dendrobium document in the AEMR Appendices is assessed as being an accurate representation of the status of the Project with respect to compliance.

Unless there is full compliance, outstanding matters are considered to be non-compliances. This Section discusses where there are non-compliances and discusses the environmental significance of the non-compliances.

In the following text, the assessment of compliance is made against each indexed component of the Consent. Note that the text below only deals with major matters.

1. General

Consent Condition 1.2 – Period of Approval/Project Commencement

Condition 1.2 (b) of the Consent is

“At least two weeks prior to commencement of construction and Mining Operations respectively or within such period as agreed by the Director-General, the Applicant shall submit for the approval of the Director-General a compliance report detailing compliance with all the relevant conditions that apply prior to the commencement of construction and Mining Operations.”

This condition has been satisfied.

2. Mine Management

The early mining activities were covered by the Mining Operations Plan Site Development and First Workings accepted by the Department of Mineral Resources on 30 June 2004.

The Mine Operations Plan (MOP) for the long wall mining (Consent condition 2.1) was submitted to the Department of Primary Industries – Mineral Resources on 30 November 2004 with acceptance received on 22 March 2005.

The 2005 AEMR was based on the MOP for Mining Area 1 (Rev 1) submitted to the DPI in March 2005.

Mining during 2006 was also covered by the MOP for Mining Area 1 (Rev 1) submitted to the DPI in March 2005.

The MOP for Mining Area 2 was submitted to the DPI in July 2006.

The 2007 AEMR was based on the Mining Operations Plan for Mining Area 2 (rev 2) submitted to the DPI on 7th December 2006 (an update to the first document submitted in July 2006).

This condition appears to be satisfied.

3. Land and Site Environmental Management

The Environmental Strategy was prepared in September 2002 (conditions 3.2 (a) – (c) and accepted in January 2003.

Environmental Management Plans were prepared as per conditions 3.2 (d) – (f).

A Subsidence Environmental Management Plan has been prepared (Dec 2004) as per condition 3.3.2 which incorporates conditions 3.3.1 (Longwall Mining Community Communication and Consultation Plan), 3.3.3 (Subsidence Monitoring), 3.3.4 (Adverse longwall subsidence impacts), 3.3.5 (Subsidence impacts on threatened fish, aquatic habitat and terrestrial habitat), 3.3.6 (Longwall subsidence impacts on steep

slopes), 3.4 (Heritage Assessment, Management and Monitoring), 3.5 (Flora and Fauna Assessment, Management and Monitoring), 3.6 (Prevention of Soil Erosion), and 3.7 (Site Rehabilitation Management).

The SEMP was approved on 1 April 2005.

The required protocol for DIPNR, DMR and SCA was achieved on 16 March 2004.

The SEMP and its associated plans are required to report on annual monitoring which includes in some cases for pre-mining surveys at least one year in advance of the longwall mining. The monitoring results and the interpreted results are to be included in the AEMRs.

The AEMR's submitted to the DoP for 2005, 2006 and 2007 periods indicate that maximum subsidence over LWs 1 to 3 has ranged between 2.0 and 2.4 m. Subsidence predictions and impacts have been reported as all being within expected levels, except for a 300 mm prediction exceedance above old mine workings in the Bulli Seam.

Several Corrective Management Actions (CMAs) were invoked by the Dendrobium Landscape Impact Assessment Trigger Levels (Table 19.2 in the SEMP), with the subsequent back filling of surface cracks along the fire trails and across power line easements in Areas 1 and 2. Further details are provided in the attached DgS Report in Appendix B. (The DgS report is in Section 7 of this audit report).

The trigger levels define 'minor', 'moderate' and 'severe' impact categories based on visual assessment. Consideration of CMAs is usually invoked when mine subsidence damage is assessed by mining representatives as being 'moderate' or 'severe'.

Monitoring of all features will continue for a period of 5 years after mining is completed with periodic inspections by Dendrobium's environmental management team of the subsided areas to identify any new damage that may require CMAs to be implemented.

As specifically required by the Consent, the audit confirms compliance with 3.3.5 (a), 3.3.5 (b) and 3.3.6 (a)-(c).

Condition 3.4 Heritage Assessment, Management and Monitoring requirements have been addressed with respect to reports with other consultation commitments ongoing.

Condition 3.5 Flora and Fauna Assessment, Managing and Monitoring requirements have been addressed for the current stages of the project.

Condition 3.6 Prevention of Soil Erosion requirements have been addressed.

Condition 3.7 Site Rehabilitation Management requirements have been addressed for the current stages of the project (included under the satisfaction of condition 4.1 (s)).

Condition 3.8 Visual Amenity and Landscaping was addressed prior to the commencement of construction.

Condition 3.9 Bushfire and other Fire Controls have been satisfied.

Condition 3.10 Land Management was satisfied prior to the commencement of construction.

During 2005, there was very little land preparation apart from that associated with the Vent Shafts 2 & 3 (discussed in Section 4).

During 2006, further land preparation took place at the Vent Shafts 2 & 3 (up to 5.3 ha) as well as minor areas being affected in relation to the coal sizer works. No further land preparation occurred in 2007 or 2008.

Asset Protection Plans have been prepared for the relevant SCA properties as per condition 3.11.

This condition appears to be satisfied.

4. Water Management

Most of the issues required here are addressed in the Subsidence Environmental Management Plan (SEMP). New conditions in the form of Pollution Reduction Programs (PRPs) are discussed in Section 5 of this audit.

This condition appears to be satisfied.

5. Rejects Emplacement Area and Waste Management

5.1 Coal Wash Emplacement

Relevant reports have been submitted. In 2005 the annual report on this issue was submitted to DPI (December 2005). The report examined minimisation, reuse and alternative options apart from aboveground placement.

A similar report was submitted in December 2006. During 2006, a proposal for increasing the capacity of West Cliff Stage 2 Coal Wash Emplacement Area 2 by 39% was developed and site investigations, studies and approvals for West Cliff Stage 3 Coal Wash Emplacement Area were commenced.

During 2007, coal waste was placed at West Cliff Stage 2 Coal Wash Emplacement Area. On 18 July 2007, an application was made to the Minister for Planning for Stage 3 in accordance with the consent conditions. The required study into alternative coal waste options was submitted to DPI in July 2007. On 20 December 2007, the Minister for Planning approved the West Cliff Stage 3 Coal Wash Emplacement Area.

This condition appears to be satisfied.

5.2 Waste Management

All approvals under the consent have been obtained.

This condition appears to be satisfied.

5.3 Hazards

All hazard reports have been completed.

In 2005 an internal Hazards audit was undertaken and there was a further audit undertaken in relation to the renewal of the site's Dangerous Goods Licence. A radiation gauge at the Kemira Valley portal product conveyor was registered with the EPA.

In 2006, Dendrobium was audited internally against BHP Billiton Fatal Risk Control Protocol No.5, which specifically relates to hazardous materials management. As a result of the audit, updated procedures have been developed for storage of gas cylinders, and a review is to be undertaken of training requirements for the site's workforce. Regular inspections of the sites are undertaken to ensure compliance with relevant standards.

An application for a Licence to Store (Explosives) and Notification of Dangerous Goods on Premises (Explosives) Form was submitted to WorkCover in 2007. The Licence to Store was received on 14 January 2008.

This condition appears to be satisfied.

5.4 Land Stability

This condition is addressed in the already approved Landscape and Land Management Plan.

This condition appears to be satisfied.

6. Air Quality, Blast, Noise and Light Management and Monitoring

6.1 Air Quality

Air Quality Management Plan (AQMP)

An original AQMP was produced in November 2004 and approved by the Director General on 1st April 2005. A refined AQMP was subsequently produced during the period of this audit, i.e. October 2006. The refined plan takes account of experience gained with the operation of the mine and takes account of the recommendations of a Department of Planning (DoP) compliance audit and subsequent consultation process with DENDROBIUM, DoP, Department of Environment and Climate Change (DECC) and a dust expert from an Independent Expert Review Panel (IERP).

The refined AQMP brings Dendrobium into compliance with the sub-clauses Condition 6.1 (b), (i) to (xviii) and (b1), except that Condition 6.1 (b1) required the revised Plan to be submitted in September 2006.

The sub-clauses listed under Condition 6.1 (b) (i) to (xviii) are addressed by the revised AQMP and these sub-clauses are considered to be satisfied. Detailed discussion is provided on each sub-clause and the action/commitment to address each sub-clause of this Condition is provided in the revised AQMP (October 2006).

Prior to the revised AQMP being released, i.e. between April 2005 and October 2006, there were a number of issues raised as a result of audits that were undertaken by DoP and the dust expert from the IERP. These issues are outlined below:

- Non-compliance with Condition 8.2, namely that no meteorological station complying with Condition 8.2 was in place. See response for this matter under Condition 8 Monitoring/Auditing (below).
- Non-compliance with Condition 1.1 concerning the enclosure of the conveyor supplying coal to the KVCLF stockpile. The IERP dust expert noted that the conveyor had gaps between panels enclosing the conveyor. Also the conveyor was described as enclosed in the 2004 AQMP whereas a more accurate description is that it is covered not enclosed. This issue has been addressed in detail in the revised AQMP and is considered to be in compliance.
- Non-compliance with condition 6.1(a1) in that dust deposition levels at several of the monitoring gauges exceeded the consent criteria for at least one month.

See Section 5 of this audit in regard to Consent condition 6.1 (b) Air Quality and Dust Monitoring for response about dust deposition 'exceedances'.

- Non-compliance with Condition 6.2(k) that the road from the pit top portal to the storage area southeast of the portal is unsealed. See section 6.2 Air Quality Control (below) for the response about sealing this road. In addition, the audits made a number of observations, which are summarised below.

DoP Audit Observations

- The high volume air sampler at Kemira Valley is not equipped with an Osiris continuous monitor to provide continuous records of PM₁₀ concentrations as indicated in the original AQMP.
- Ventilation air from the train loading tunnel is not de-dusted prior to release as stated in the 2004 AQMP.
- The Kemira Valley high volume air sampler is operated on a 12-day cycle rather than the 6-day cycle as indicated in the 2004 AQMP.
- The high volume air sampler located near the KVCLF site entrance may not be located to provide representative particulate matter concentrations experienced within the valley.
- The monitoring locations within Kemira Valley may not fully account for the dominant wind directions, topography and the influence of katabatic flows.

- Monitoring locations are not consistently referred to in the documentation and the high volume air sampler locations are not explicit in the AQMP or the mine's monitoring location plan.
- Monitoring sites do not correspond fully with the figures provided by the mine.

A detailed response has been provided for these observations in the revised AQMP.

The Dendrobium site is considered to be in compliance with Condition 6.1 (b) Air Quality Management Plan.

Air Quality and Dust Monitoring

The sub-clauses (b) to (g) under this Condition appear to have been met during the period of this audit, through consultation between DENDROBIUM, DoP, DECC and a dust expert from the IERP. In addition, PRP 9 of EPL 3241 Review of Dust Monitoring Network was conducted in March 2006 to review the dust monitoring network against its effectiveness in determining amenity impacts.

The sub-clauses (h) (i) and (j) of Condition 6.1, which refers to the Coal Dryer Hot Gas Exhaust Stack, are addressed as part of the BlueScope Steel Port Kembla Steelworks EPL.

Air Quality Control

Condition 6.2 is considered to be met for the audit period.

Air quality control measures included:

- Automatic water sprays for dust suppression along the pit top portal road;
- Road vacuum sweeping, undertaken on a regular basis, to minimise dust generated from the pit top portal road and general yard area;
- The installation of a state-of-the-art water spray dust suppression system on the Kemira Valley stockpile;
- Dust suppression during loading of coal trains was improved by using water sprays to maintain moisture content of the coal be transported at a level to reduce windborne dust;
- Modifications to the loading chutes at the Coal Loading Facility to reduce potential for dust generation from coal in rail wagons travelling from the KVCLF to the DCP; and
- Water quality studies conducted to improve the turbidity of the water used for dust suppression.

AEMR (2005) notes that in accordance with Condition 6.2 (h) (i), emissions from Ventilation Shaft 1 were tested in April 2005 for PM₁₀, odour and over 60 VOCs. The results confirmed that it is not likely that emissions from Ventilation Shafts 1, 2 or 3 would cause adverse impacts on surrounding residential locations.

In addition site progressive remediation and revegetation spray grassing was completed in April 2006 on the topsoil stockpiles and along sections of the access track for the ventilation shaft, to minimise surface erosion. Mulch spreading over exposed future shaft spoil storage areas was also conducted.

In December 2006 a coal sizer was installed at the Kemira Valley portal to ensure uniform size of coal being sent to the rill tower. The air quality management system for the sizer requires the building to be fully enclosed and a ventilation system acting to keep the building in negative pressure compared to outside. The building draws air in through any openings hence preventing dust from exiting the building. The air borne dust within the sizer building is captured by the ventilation system. Dust inside the chute work will be controlled by spray systems, and the chute inlet and exit points covered with skirts. The ventilation system has internal bag filtration to remove dust from the air before releasing it to the atmosphere via the stack.

The DoP audit identified a non-compliance with Condition 6.2(k) that the road from the pit top portal to the storage area southeast of the portal was unsealed. The AEMR (2006) reports that the road was subsequently sealed, however the road cover has subsequently broken up. Dendrobium does not intend to reseal this section of road for the present since it is lightly trafficked and therefore experiences minimal dust generation. The audit (through the site inspection) considers that re-sealing of this road is not a high priority as it will not make any significant improvement to air quality within the site and will not make any significant contribution to the mitigation of potential off-site air quality impacts. The traffic is light and the road section is short and steep with an angled approach which results in limited vehicle and machinery speeds. However, the type of traffic load would be expected (from past experience) to break up the surface again over a short period when eventually resealed.

The sub-clauses of the Condition pertaining to the Coal Dryer Hot Gas Exhaust Stack are addressed as part of the BlueScope Steel Port Kembla Steelworks EPL.

This condition appears to be satisfied.

6.2 Blasting

Section 6.3 of the Conditions of Consent sets out the conditions that are to be met for blast overpressure, ground vibration and blast monitoring; however blasting is not applicable during this period.

6.3 Noise Control

Noise Management Plan

A Noise Management Plan was published on 29 September 2005 and appears to meet the requirements of Conditions 6.4.2a to e. One of the modifications to the Consent required that the noise management plan be updated by 31 October 2006.

The 2006 AEMR reports that the Operational Noise and Vibration Management Plan was reviewed and updated in consultation with the DEC and DoP during the reporting year.

Sections 6.4 of the Conditions of Consent specifies (1) intrusiveness criteria (noise acquisition criteria requirements for monitoring, the limits for construction noise, noise monitoring sites, sleep disturbance limit, rail haulage noise and the requirements to prepare and implement a noise management plan. Further details on these requirements and how the Applicant has performed in relation to the requirements in the conditions is provided in Section 5.10.

This condition appears to be satisfied.

6.4 Light Management

This condition is addressed in the already approved Lighting Management Plan.

This condition appears to be satisfied.

7. Transport and Utilities

This condition is addressed in the already approved Traffic Management Plan. Specific issues under this part of the Consent are addressed in Section 5 of this audit report.

This condition appears to be satisfied.

8. Monitoring/Auditing

CoA 8 (c) The Independent Review panel was established and it is noted that they have participated in a number of assessments of Management Plans etc. It is understood that they have not produced any State of Environment reports to date and that the D-G has not yet taken any action under clause (iii).

CoA 8.2 Meteorological Station – this condition requires that a station be installed, but does not set any time frame on its installation. However the condition does require that the data monitored be used to characterise the site.

Meetings have been held with the DoP and DECC and the dust and noise experts of the Dendrobium IERP in an attempt to identify appropriate actions to address the non-compliances and other issues in the early stages of operation. The following is an extract from a letter from DoP to Karen Marshall (DENDROBIUM) dated 27 September 2006.

“It was accepted that the current weather station did not comply with condition 8.2, which requires a weather station to be established at a relevant location(s) in accordance with the requirements of AS 2922 1987 "Ambient Air Guide for Siting of Sampling Units" or its updated version or as directed by the EPA. It was also agreed that the current location did have benefits in terms of its proximity to the KVCLF, and also that it did satisfy the intent of the condition. It was discussed and generally

agreed that due to the geography of the area, it would be difficult, or impossible, to find a site for a Met station that complied fully with AS 2922 1987, and was positioned in a location close to the mine that would be useful to help determine environmental impacts from the mine. It was acknowledged that the installation of an additional weather station would have marginal benefit because of the variability of wind conditions in the locality making full compliance with AS 2922 1987 difficult and characterisation of the site unlikely. Whilst the matter remains a non-compliance, it was decided to review the need for the possible installation of a second weather station, based on a future review of the mine's performance to manage dust and noise emissions in the Department's planned re-audit of the mine. The Department agreed to provide adequate discussion on the difficulties of compliance in any report on the follow-up audit." (Revised AQMP, October 2006).

It was also agreed that the existing weather station would be augmented by installing temperature sensors at three levels on the supports for the conveyor. This will provide temperature measurements at 2 and 10 m above local ground level (meeting the temperature monitoring requirements of the EPL and Condition 8.2 of the Minister's Conditions of Approval). It will also include a monitor at approximately 1 to 2 m above the top of the conveyor.

This condition appears to be satisfied.

9. Reporting

Consent Condition 9.2 – Environmental Reporting

Condition 9.2 (a) of the Consent is

“Annual Environmental Management Report (AEMR)”

- (a) The Applicant shall, throughout the life of the mine and for a period of at least three years after the completion of mining in the DA area, prepare and submit an Annual Environmental Management Report (AEMR) to the satisfaction of the Director-General and DMR on all aspects of the proposal. The AEMR shall review the performance of the mine against the Environmental Strategy and the relevant Mining Operation Plans, the conditions of this consent, and other licences and approvals relating to the mine. To enable ready comparison with the predictions made in the EIS, diagrams and tables, the report shall include, but not be limited to, the following matters:
- (i) an annual compliance audit of the performance of the project against conditions of this consent and statutory approvals;
 - (ii) a review of the effectiveness of the environmental management of the mine in terms of EPA, DLWC, NPWS, DMR, DSC, NSW Fisheries, SCA, WCC, WSC and WdSC requirements;
 - (iii) results of all environmental monitoring required under this consent or other approvals, including interpretations and discussion by a suitably qualified person;
 - (iv) identify trends in monitoring results over the life of the mine;
 - (v) an assessment of any changes to agricultural land suitability resulting

from the mining operations;

- (vi) a listing of any variations obtained to approvals applicable to the subject area during the previous year;
- (vii) subsidence during the preceding twelve months;
- (viii) socio-economic impact of the development including the workforce characteristics of the previous year;
- (ix) the outcome of the water budget for the year, the quantity of water used from water storages and details of discharge of any water from the site due to subsidence and/or upsidence;
- (x) rehabilitation report;
- (xi) environmental management targets and strategies for the next year, taking into account identified trends in monitoring results: and
- (xii) a report on the surveillance of any prescribed dam on the site to the satisfaction of the DSC and the SCA.

In addition, Consent condition 9.2 (d) requires:

“(d) Construction noise compliance reports must be submitted to the EPA 6 and 12 months after the commencement of construction activities to assess the performance of the applicant in complying with the noise limits during the construction phase of the development. The outcomes of these reports may result in the EPL being varied.

Dendrobium advises that these reports have been submitted and that compliance with the condition was completed according to the scheduled dates. It is noted that these reports would also have formed part of the AEMR for the period Jan-Dec 2002.

A further Consent condition is 9.2 (f) which requires

“The Applicant must complete and supply to the EPA an Annual Return in the approved form comprising:

- a Statement of Compliance; and
- a Monitoring and Complaints Summary.”

This condition is one of the EPA’s General Conditions of Approval. Dendrobium satisfies this condition with their Annual Return for their Environmental Protection Licence and this is also attached to the AEMRs. The Annual Return is for the period 1 June to 31 May each year and only deals with a limited amount of the monitoring required under the Consent.

In compliance with this Consent condition (Reporting), three AEMRs have been produced for the periods Jan – Dec 2005, 2006 and 2007. It is considered that these documents plus the SEMP provide the primary sources of information for the purposes of this audit report since they summarise the compliance issues, provide the results from the monitoring programs, identify to a certain extent the effectiveness of the environmental management of the mine and address other issues including Community relations. It is noted that the AEMRs include the documents required under Consent condition 1.2 (b) discussed above. The compliance of the AEMRs is separately discussed below.

Discussion

CoA 9.2 – Annual Environmental Management Report (AEMR)

These reports have been prepared to be in accordance with the Department of Mineral Resources “Guidelines for the preparation of AEMRs”.

The 2004 AEMR was accepted on 22 April 2005. The DPI acceptance letter identified areas for further clarification which were specifically addressed in the 2005 AEMR.

The 2005 AEMR was accepted by DPI on 27 July 2006.

The 2006 AEMR was accepted by DPI on 3 October 2007.

The 2007 AEMR was accepted by DPI on 26 June 2008.

This Audit has found the AEMRs to be one of the main documents that outlines compliance and details environmental impacts. The AEMR documents are very detailed and comprehensive. Each AEMR indicates where deficiencies were noted by the approval authorities and how they were addressed in the following year.

It is likely that the role of the AEMRs will need to be reviewed against the proposed change to the consent conditions due for issue in September/October 2008.

This condition appears to be satisfied.

10. Community Consultation/Obligations

The AEMRs contain details of the Community Consultation activities during the period of reporting (annually) and provide evidence that most of the conditions are within compliance.

Complaint summaries are included in the AEMRs.

The Compliance Report attached to each AEMR shows the current status of each consent condition.

This condition appears to be satisfied.

11. Proponents Obligations

This condition appears to be satisfied.

12. Further Approvals and Agreements

This condition appears to be satisfied.

3.2 Audit Findings

With respect to Consents, Licences and Approvals, Dendrobium has made a conscientious and concerted effort to achieve and maintain compliance with the Consent conditions. The auditor considers that the project has achieved a very high and satisfactory level of compliance.

4. CONSTRUCTION IMPACTS

This chapter deals with the Construction component of the Consent conditions 8.1 (b) (ii) and (iii) which are:

- (ii) assess the development against the predictions made in the EIS;
- (iii) review the effectiveness of the environmental management of the mine, including any avoidance, mitigation and remedial measures;

This Section primarily identifies what construction activities took place during the audit period with commentary on the Consent condition 4. Water Management in respect of the Vent Shafts 2 & 3 site works.

Details of construction impacts associated with the Consent conditions

3.3 Subsidence Management and Monitoring

5. Rejects Emplacement Area and Waste Management

6. Air Quality, Blast, Noise and Light Management and Monitoring

7. Transport and Utilities

are addressed in conjunction with the operation impacts as it was not possible to separate the respective impacts.

As indicated above, this report follows the AEMR periods of January to December each year and Section 2 above and the text below describes the range of activities undertaken in those years.

During the period January to December 2005, there was limited construction which included:

- Effective completion of construction activities (Pit Top, Vent Shaft No. 1 and underground works) to allow mining to commence in longwall 1;
- Completion of stage 2 upgrade of the Coal Preparation Plant at BlueScope Steelworks;
- Exploration boreholes and other boreholes (used for geological and geotechnical investigations), seismic and aeromagnetic surveys to assist in subsidence assessments;
- Upgrade to surface water drainage system for the portal access; and
- Upgrade to a bridge across a tributary of American Creek.

During the period January to December 2006, three major construction projects were commenced:

- An above ground coal sizer at Kemira Valley;
- The No.2 and 3 ventilation shaft site; and
- An extension to the existing bathhouse at Dendrobium pit top site.

Coal Sizer - The sizer design was subject to an extensive community consultation program before approval for its construction was achieved in April 2006. The approved design contained many mitigation measures particularly in relation to noise control and air quality management.

Vent Shafts 2 & 3 - The construction and related works completed at the No.2 and 3 Ventilation Shaft site during the reporting period included:

- Site Setup;
- Installation of an Electrical sub-station;
- Commencement of Ventilation Shaft No.3 construction; and
- Site progressive remediation and revegetation.

Environmental Management Plans prepared for the site include the Soil & Water Management Plan (prepared in March 2005 by Olsen Environmental Consulting) and the Flora and Fauna Management Plan (prepared in April 2005 by Biosis Research), were prepared in consultation with the SCA and outline in detail how the site is to be managed during the land preparation and construction phase.

Concrete bridges were installed over the two mine site easement creeks in early May 2006 to minimise the potential impacts to the creeks from vehicular movements. A larger bridge was also constructed over Sandy Creek in April 2006 as required by the Dendrobium development consent.

An upgrade of the SCA access track was completed in April 2006 to ensure adequate erosion control was achieved as well as safe vehicular access during the construction phase. The access track crosses several smaller watercourses as well as Sandy Creek crossing. Drainage pipes sufficient to carry normal water flow were placed across the road with concrete causeways placed over the pipes.

Regular inspections of the access track were undertaken by the site supervisor with maintenance work carried out when required. A security fence was erected around the perimeter of the ventilation shaft site in May 2006 to prevent unauthorised access.

Installation of Electrical sub-station 10m High Voltage wooden power poles were erected along the site easement in May 2006 to provide power to the site from the Integral Energy power line. A 33kV substation was installed and powered up (by Integral) in July 2006 allowing the site to have the power required for the drilling

process. The sub-station is surrounded by a 2m high security fence. Prior to the installation of the sub-station, power was provided to the site via a diesel-powered generator.

Shaft Construction – Ventilation Shaft No. 3

Site amenities, which were originally located along the eastern boundary during the initial site setup phase, were relocated in August 2006. The shaft collar and shaft pad were installed in June 2006, which allowed the drill rig to be set up shortly after. The Shaft liner construction slab was completed in July 2006 allowing for the concrete/steel liners to be constructed on site.

Site Sediment and Erosion Controls

The sediment and erosion control structures at the No.2 and 3 shaft site have been regularly audited and enhanced during 2006 based on the results of regular audits by environmental consultants and feedback from government agency representatives. The capacity of the site sediment ponds has been increased on a number occasions and exceeds the “Blue Book” standard.

Site Progressive Remediation and Revegetation

Spray grassing was completed in April 2006 on the topsoil stockpiles and along sections of the access track. Mulch spreading over exposed future shaft spoil storage areas was progressively completed from April 2006 to November 2006. The purpose of the mulch material is to minimise the exposed site footprint and reduce the sediment load on the sedimentation ponds.

Bathroom - An extension to the bathroom at the Pit Top site commenced during December 2006 to provide additional meeting rooms and change facilities. The design is a modular portable building type construction supported on structural steel above the diesel transport shelter roof. There is no additional footprint area used as it spans the existing structure.

During the period January to December 2007, No major construction projects commenced during 2007. Construction activities continued at the No.2 and 3 Shaft site with construction scheduled to be completed during 2008. The construction activities at the above ground coal sizer, located at Kemira Valley, concluded in February 2007 with commissioning occurring in March 2007. The extension of the existing bathroom at the Dendrobium Pit Top site was also completed in the first quarter of 2007.

The construction and related works completed at the No.2 and 3 Ventilation Shaft site during the reporting period included:

- Finalisation of Ventilation Shaft No.3 construction;
- Commencement of Ventilation Shaft No.2 construction; and
- Ongoing sediment and erosion control measure maintenance.

The Vent Shafts 2 & 3 Construction site was subject to an Environmental Audit for Soil and Water Management by Morse McVey & Associates (March 2007) at the request of the Department of Planning.

The Audit identified a number of non-compliances which included:

- The Soil and Water Management Plan (SWMP) was not updated to reflect actual alterations and amendments.
- Visual inspection by the auditor identified discharges of total suspended solids in excess of 50 mg/L on the day of inspection.

The auditor also observed that the sediment basins were designed as Type C Basins but because of the dispersibility of the soil was of the opinion that they should be re-designed as Type D Basins. The audit concluded with a number of recommendations.

Pollution reduction program (PRP) 12 on the Dendrobium EPL (which was required as a result of the Morse McVey Audit was completed and submitted to the DECC during 2007. The aim of this PRP was to identify potential opportunities to enhance the water management at the No.2 and 3 shaft site, in particular the sediment control and stormwater capture, and potentially become a zero discharge site. The requirement of the PRP, as stated in EPL 3241, was as follows:

The Licensee must undertake an investigation of options to enable the site to be managed to minimise stormwater discharges, where practicable, during the construction period of the vent shaft construction project. The Licensee must submit a written report to the EPA detailing the results of the investigation by the due date.

The PRP, prepared by the environmental consultancy firm Cardno Forbes Rigby, was submitted to the DECC on 30 April 2007. The report identified twenty options that could be implemented to assist in the management of stormwater at the shaft site, with varying degrees of effectiveness.

While the report had identified twenty options, it is important to note that eight of the top ten ranked options were already in progress at the shaft site. Option 9 (i.e. trucking water off site) has since been implemented with water trucked to the West Cliff Emplacement Site while Option 10 was recommended for further consideration but is subject to additional approvals and further analysis. The remaining ten options were precluded from further consideration due to the very high-anticipated costs and/or time required to obtain approvals considering the relatively short period of time remaining on the construction project (i.e. scheduled to be completed in 2008).

Coal sizer - As reported in the 2006 AEMR, construction commenced on an above ground coal sizer in September 2006 after a significant amount of planning and community consultation. The construction activities concluded in February 2007. Dry commissioning occurred in February prior to the conveyor system being connected up to the sizer unit in March 2007.

Several environmental modifications, to the noise and air management aspects of the sizer, were incorporated into the design of the coal sizer following an extensive community consultation program including information sheets and door knocking.

As reported in the 2006 AEMR, an extension to the bathhouse at the Pit Top site commenced during December 2006. The purpose of the extension was to provide an additional training room and change facilities. The 'modular portable building type' extension was completed in February 2007.

During the period January to September 2008

Underground works relating to Ventilation Shaft No.3 were completed in early 2008. Drilling works for the No.2 Shaft were completed including the installation of shaft liners and the drill plug. Works relating to a communications borehole, measuring 150mm diameter, were also undertaken during 2008.

During the audit inspection in August 2008, works still outstanding included landscape rehabilitation and installation of fans.

The Post Construction Rehabilitation Plan Dendrobium Area 2 was prepared in October 2007 by Biosis Research. This document provides a management strategy for the proposed rehabilitation of the shaft site.

AUDIT COMMENTARY

All of the required plans and reports were prepared in accordance with the consent.

The Morse McVey Audit (2007) identified a number of non-compliances in respect erosion and water management at the Vent Shafts 2 & 3 site which arose because of the soil types encountered at the site. The non-compliances primarily related to excess sediment run-off onto the surrounding SCA land. It is possible that a more extensive soil testing program at the time of preparation of the 2005 Soil and Water Management Plan (Olsen) may have reduced the number of non-compliances. It is unlikely that the non-compliances led to any significant deterioration of water quality in the SCA dam.

The non-compliances were subsequently subject to PRP 12 and then addressed as reported in the Cardno Forbes Rigby (2007) report.

Overall, the Dendrobium management satisfied the intent of the Consent conditions and were seen to be appropriately responsive in applying successful and necessary additional mitigation measures.

5. OPERATION IMPACTS

This chapter deals with the Operation component of the Consent conditions 8.1 (b) (ii) and (iii) which are:

- (ii) assess the development against the predictions made in the EIS;
- (iii) review the effectiveness of the environmental management of the mine, including any avoidance, mitigation and remedial measures;

This Section deals with the Consent conditions

3.3 Subsidence Management and Monitoring

3.4 Heritage Assessment, Management and Monitoring

3.5 Flora and Fauna Assessment, Managing and Monitoring

3.6 Prevention of Soil Erosion

3.7 Site Rehabilitation Management requirements

3.8 Visual Amenity and Landscaping

3.9 Bushfire and other Fire Controls

4. Water Management

5. Rejects Emplacement Area and Waste Management

6. Air Quality, Blast, Noise and Light Management and Monitoring

7. Transport and Utilities

8. Monitoring/Auditing

9. Reporting

10. Community Consultation/Obligations

11. Proponents Obligations

5.1 Condition 3.3 Subsidence Management and Monitoring

The SEMP, which received approval in March 2005, contains details of baseline studies and pre-mining monitoring for the programs shown in the SEMP. The 2004 AEMR indicates that the 2005 AEMR will contain updates of subsidence predictions

and monitoring and comparison of predicted impacts with actual impacts, including mapping of subsidence profiles. The primary method of monitoring is noted as being Airborne Laser Scanning (ALS) which was used in base surveys in 2002.

The 2004 AEMR also refers to a changed mine layout in response to a better understanding obtained through the pre-longwall period monitoring. The assessed subsidence impacts are predicted to be less than those of the earlier mine plan.

The monitoring data contained in the SEMP satisfactorily meets the Consent requirements.

Actual subsidence and impact predictions at surface features within the area of influence of mining have generally been less than or consistent with the EIS predictions during the period of this audit (2005 to 2008).

Actual impacts have been assessed as ranging from negligible or no impact to 'minor' and 'moderate' impact, based on the trigger level definitions provided in the SEMP.

As part of the audit, an inspection of some of the features described above in Areas 1 and 2 (including un-remediated and remediated areas) was completed on 19 August 2008. The purpose of the inspection (which was met) was to (i) confirm that the assessed impacts and outcomes of the remediation measures described in the AEMRs were consistent with the TARPs (Triggers for Action Response Plans) defined in the SEMP and (ii) determine if any un-remediated areas should be considered for CMA (Corrective Management Action) or remediation.

5.2 Condition 3.4 Heritage Assessment, Management and Monitoring

In the 2005 period there were two Section 90 approvals in relation to the construction works at Vent Shafts 2 & 3. Consultation with local Aboriginal groups and the relevant authorities was undertaken. There were no natural heritage activities during this period.

There were no heritage activities in the 2006 to 2008 period beyond those covered in the Subsidence Section 5.1.

The heritage management approaches are in keeping with the EIS commitments and the approval conditions.

This condition appears to be satisfied.

5.3 Condition 3.5 Flora and Fauna Assessment, Managing and Monitoring

Terrestrial

The 2005 AEMR reports that “Statistical analysis confirmed that the Invertebrate monitoring program provides a robust pre-extraction benchmark of environmental conditions at the Dendrobium Coal Mine against which it will be possible to determine the potential environmental consequences of subsidence and its rehabilitation”.

The monitoring of the aquatic ecology is targeted at establishing a baseline set of data.

The 2006 and 2007 AEMRs reports that to date, four years of monitoring has been completed for Area 1 which includes two years of baseline data. One year of baseline data has been collected for Area 2. Statistical Analysis of the Area 1 data suggests: There were no reliable variations in measured parameters attributable to mining at present apart from:

- The change detected for total bird movement in creeklines may be a long-term natural trend, or related to subsidence. The addition of a second year’s post-mining data will assist in determining the cause of the change to bird movement.
- Detected changes to bird numbers in ridgetop habitats are based on low count data and are therefore not reliable. An exception to this is a change detected for Crimson Rosella, which is supported by good data. There appears to have been a greater decline in the species at the impact site when compared with a smaller decline in numbers at the control sites.

These conclusions may change when more data is collected.

To date one threatened plant species, *Pultenaea aristata*, has been recorded in the monitoring sites for Areas 1 and Area 2. In addition, 13 threatened animal species have been recorded in Areas 1 and 2 and reference sites during the field surveys: Gang-gang Cockatoo, Glossy Black-cockatoo, Powerful Owl, Red-crowned Toadlet, Broad-headed Snake, Sooty Owl, Black-chinned Honeyeater, Littlejohn’s Tree Frog, Giant Burrowing Frog, Grey-headed Flying-fox, Rosenberg’s Goanna, Eastern Pygmy-possum and Koala. A significant population of Littlejohn’s Tree Frog was also recorded in Area 2.

The 2007 AEMR reports that a post mining survey was conducted for Longwall 3 on the 30 January 2008. The survey effort was focused on the creeks and steep slopes in the study area which were considered most likely to be subject to subsidence related disturbance. The study area included the area directly above Longwall 3 and a 500m buffer zone in order to capture non-direct subsidence impacts. The post mining habitat assessment concluded that plant communities, fauna habitats, threatened species, populations and ecological communities are not considered to have been affected by subsidence related impacts associated with the mining in Longwall 3.

Aquatic

Only survey work was reported in the 2005 and 2006 AEMRs.

The 2007 AEMR reports that no outstanding changes in water quality have been observed between the May/June survey undertaken this year and the values recorded throughout the pre-mining baseline survey.

Macroinvertebrate monitoring indicates no significant change from pre-mining conditions. Overall, no distinctive changes in Fish and Mobile Invertebrates have been observed in comparison with baseline surveys and/or previous mining surveys.

The flora and fauna management approaches are in keeping with the EIS commitments and the approval conditions.

This condition appears to be satisfied.

5.4 Condition 3.6 Prevention of Soil Erosion

Erosion and sediment control at Dendrobium is managed in accordance with the Operational Water, Erosion and Sediment Control Management Plan. This plan addresses erosion and sediment controls for the Dendrobium Pit Top, KVCLF, No.1 Ventilation shaft, Kemira Valley Rail Line and the DCP. A Construction Soil and Water Management Plan was developed for the No. 2 and 3 shaft site.

The 2005 AEMR indicates upgrade work on the access road to Vent Shafts 2 & 3 and planned construction of bridges across Sandy Creek and along the roads. This was under the Number 2 & 3 Vent Shaft Water Management Plan.

Late in 2005, there was stabilisation work on the embankment within the Kemira Valley railway cutting close to Kemira Valley.

Routine management and clean-outs of sediment pits at the pit top site and KVCLF were undertaken during 2006 and 2007. Management in respect of the site at Vent Shafts 2 & 3 is discussed in Section 4 of this report.

There were no reported issues during the audit period with respect to erosion and sediment control for the mine areas.

The erosion management approaches are in keeping with the EIS commitments and the approval conditions.

This condition appears to be satisfied.

5.5 Condition 3.7 Site Rehabilitation Management

Rehabilitation of mine-affected areas occurred at the following sites:

- Revegetation of the disturbed area at Vent Shaft No 1.

- Rehabilitation of the Wongawilli Emplacement Area.
- Rehabilitation of a small area used for constructing the Coal Sizer.

Revegetation of the area at Vent Shaft 2 & 3 is scheduled to commence in September 2008. The AEMRs (Section 5) contain details of areas subject to rehabilitation.

This condition appears to be satisfied.

5.6 Condition 3.8 Visual Amenity and Landscaping

This condition requires that a Landscape Management Plan be prepared for the vent shafts (completed and approved). Rehabilitation of Vent shaft No 1 is complete and has just commenced at Vent Shaft Nos 2 & 3 (coincident with this audit).

This condition appears to be satisfied.

5.7 Condition 3.9 Bushfire and Other Controls

During the reporting period, bushfire mitigation work has been carried out in accordance with the Operational Bushfire Management Plan. This work included:

- scheduled hazard reduction works;
- establishment/maintenance of asset protection zones;
- fire trail establishment and maintenance.

This condition appears to be satisfied.

5.8 Condition 4 – Water Management and Monitoring

5.8.1 Consent Requirements

Groundwater Effects

CoA 4.1 (b) requires a study of groundwater effects and annual assessment of the accuracy of the groundwater model predictions compared with the monitored groundwater impacts.

Monitoring Conditions

CoA 4.2 requires the following monitoring programs

(a) Surface and Groundwater monitoring programs in general

(f) Dendrobium pit top surface water monitoring program

(h) KV biological monitoring program

(i) KV stockpile monitoring program

(m) discharge monitoring program for KV facility

(n) re-injection monitoring program

CoA 4.2 (a) requires the following reporting in the AEMRs (interpreted by the auditor as relating specifically to groundwater)

- 1) A basic statistical analysis (mean, range, variance, standard deviation) of the results of the parameters measured in individual bores/wells and as a subset of the aquifer;
- 2) An interpretation of the water quality results and changes in time for water quality and water levels (supported by graphs, contour plots showing changes in aquifer pressure levels);
- 3) An interpretation of the water balance identifying the volume of water and comparing this to predictions made in the EIS or the previous AEMR;
- 4) Details of the collection of daily rainfall and water level measurements at sites agreed to by DLWC where possible.

CoA 4.2 (c) requires an annual report to DLWC re volumes of groundwater pumped from the mine in the previous 12 months with water levels and quality plus remediation actions if necessary.

CoA 4 (d) sets out various measurements to be taken for a number of identified parameters to be discharged to Allans Creek.

Auditor's Comments

In order to simplify the reporting on this topic, the following headings are used:

- Water Management System
- Surface Water
- Groundwater

5.8.2 Water Management System

Dendrobium's water usage on the surface and underground include both clean and recycled mine water. The clean water is sourced through Sydney Water. Recycled water is used underground for mining processes and on the surface for wash down, portal road dust suppression and other general areas. The recycled water is obtained

by transfer from adjacent flooded underground workings and from the pit top wash water treatment plant.

Recycled water is also used at the Kemira Valley site. Surface runoff is captured on site, treated and then utilised for dust suppression on the stockpile and in the fire water system. A new pipeline has also recently been installed to allow use of recycled water from the Nebo workings at the Kemira Valley site.

All clean water streams are diverted around both the Pit Top and Kemira Valley sites.

At the Pit Top surface water is separated into three separate streams:

1. Clean water – diverted around site and to American Creek
2. Dirty water – general site runoff (e.g. from roads and carpark) which is directed to the site sediment pond.
3. Oily water – workshop water which passes through the separation plant before transfer to adjacent flooded underground workings.

At the Kemira Valley site, surface water is separated into two streams, which include:

- Clean Water – This system captures clean runoff originating from the upstream side of the site. The runoff is diverted around the western side of the site and through a culvert beneath the rail line and into Brandy and Water Creek.
- Dirty Water – This system captures all site runoff. The runoff is treated and reused in the site dust suppression system and/or the fire fighting system. If there is excess water in the sedimentation ponds, water may be discharged via the mine water discharge pipeline into Allans Creek via Licensed Discharge Point 5, however the water quality must meet the EPL limits.

Dendrobium collects annual rainfall data.

The mine site currently participates in the Sydney Water 'Every Drop Counts' program in order to investigate additional possibilities for water savings and recycle upgrades. The initial 'Every Drop Counts' review was conducted in 2006.

The 2007 AEMR reported that a capital project relating to the site's water management system would result in recycled water being used for all general-purpose applications on the surface. The project, implemented during the first quarter of 2008, is expected to result overall in a fresh water saving of up to 75-80% per annum.

The recycled water is regularly tested for OHS related parameters and to meet DSC requirements.

This condition appears to be satisfied.

5.8.3 Surface Water

At the end of 2005, Dendrobium's surface water monitoring was composed of nine sites each monitored monthly. Surface water sites were monitored for pH, Conductivity, Total Suspended Solids and Oil and Grease. The results enable Dendrobium to maintain a database of Regional Water Quality.

To improve the surface water monitoring program, two new sites were added in 2005 to allow improved characterisation of American Creek upstream and downstream of the Dendrobium Pit Top:

- Site 12 located upstream of the junction of Cordeaux Road and Harry Graham Drive, and
- Site 13 downstream adjacent to the Bridge on Benjamin Road.

These sites have replaced 3 and 6 which are neither easily accessible nor representative of upstream/downstream environments during the operational phase.

The sampling was affected by variable flow regimes, but the data collected was for the most part within desired levels.

During 2005, the Licensed Discharge Point 4 (LDP4) was removed from the EPL licence in consultation with EPA since it had ceased discharging mine waters. Prior to its removal from the licence, no pollutant results occurred above the EPL limits (except for one pH sample).

During 2005, Dendrobium continued to experience issues (i.e. non-compliances) with Zinc, Copper and Dissolved Oxygen (DO) from discharges from LDP5. Dendrobium committed resources (including an external audit) into addressing this issue and identified differences in water quality between the upstream sample tank and the actual discharge point. There was one occurrence of a non-compliance with the TSS, but this had occurred after a longish stagnant flow period and was not considered significant.

During 2005 Dendrobium prepared management and monitoring programs to address the requirements of PRPs 5 and 6 under the EPL. These programs will characterise the sediment ponds at Kemira Valley to allow compliance in the event of an overflow. Both programs were accepted by the EPA and works commenced.

At the end of 2006, there were 10 surface water monitoring sites. As the majority of the monitoring sites are located in natural watercourses that surround the Dendrobium Pit Top and Kemira Valley sites, including Brandy & Water Creek and American Creek, normal variations in response to local geology and rainfall occurred during the reporting period. The data collected during 2006 suggests that neither the mine site nor the KVCLF has had an impact on the surrounding water quality.

Licensed Discharge Point 5 (LDP5) continued to operate during the 2006 reporting period, discharging a total of 564 ML. A small section of copper pipe which connects the sample tank to the discharge pipeline at the Allan's Creek was removed in March 2006 which subsequently led to a reduction in copper levels in the sample tank. A regular maintenance program encompassing both physical and chemical cleaning, has been established for the sample tank in order to keep the tank clean. Because of continuing non-compliance issues with copper and zinc discharge concentrations additional monitoring took place.

As a result of the additional monitoring undertaken throughout the reporting period, it is considered (2006 AEMR) that the quality of the water entering Allans Creek is close to EPL limits, with the exception of zinc. In consultation with DEC, Dendrobium has undertaken a Pollution Reduction Program (PRP 11) to further investigate the levels and environmental effects of copper and zinc. PRP 11 also includes consideration of the cumulative impacts on Allans Creek from the brine discharge from the proposed desalination plant at Douglas Mine. Dendrobium contracted Water Research Laboratory and SMEC to assist in the report for PRP 11 which was reported in AEMR 2006 to be due for submission to DECC in 2007. The outcomes of this PRP would form the basis for a review of the discharge conditions in relation to LDP5.

At the end of the 2007 period, the surface water-monitoring network consisted of seven regular sites including sites upstream and downstream of both the Pit Top and Kemira Valley sites. Samples may also be taken from additional sites during/after rainfall events when requested by Dendrobium personnel. This occurred on a number of occasions during the reporting period.

As the majority of the monitoring sites are located in natural watercourses that surround the Dendrobium Pit Top and Kemira Valley sites, including Brandy and Water Creek and American Creek, normal variations in response to local geology and rainfall occurred during the reporting period. The data suggests that neither the mine site nor the KVCLF has had an impact on the surrounding water quality.

Licensed Discharge Point 5 (LDP5), located at Marley Place, continued to operate during the 2007 reporting period, discharging a total of 570 ML.

As a result of the two studies, carried out by WRL and SMEC respectively in relation to PRP 11, it was concluded that Dendrobium's discharge water was not negatively impacting on the water quality in either Allans Creek or Port Kembla Harbour due to the amount of dilutions that are achieved in Allans Creek. The report was submitted to the DECC on 15 February 2007. The PRP was accepted by the DECC and the licence limits for Copper, Zinc, Arsenic, Nickel and pH were increased on the 27 June 2007. Additional monitoring is required to be undertaken in Allans Creek for a period of two years from the start date of the brine disposal into Allans Creek (i.e. PRP13).

Monitoring associated with PRP13, to verify the prediction reported under PRP11, began during 2007. The report associated with PRP13 will be submitted to the DECC during the 2009 reporting period.

The surface water management approaches are in keeping with the EIS commitments and the approval conditions.

This condition appears to be satisfied.

5.8.4 Groundwater

Monitoring of groundwater took place in accordance with the consent to serve the following purposes:

- Compliance with the consent conditions
- In respect of suitability for use
- Compliance for Health and Safety
- To enable completion of the water balance

The 2005 AEMR indicated that PRP 7 Reinjection Monitoring Program was due for completion in 2006.

Two PRPs relating to the underground re-injection system were undertaken during the 2006 reporting period. PRP7, which related to the development of a monitoring program to determine the quality of water discharged underground, was completed and submitted to the DEC in March 2006. The program, developed by Eco-Engineers Pty Ltd, involved establishing water quality monitoring sites at the grey water treatment facility (located at the pit top site) and the two Nebo injection points located underground. This PRP has since been accepted by DECC and removed from the mine's EPL.

PRP 10 relates to the implementation of the underground re-injection monitoring program that was developed as part of PRP 7. Work commenced on PRP 10 during November 2006 with the report analysing the monitoring results scheduled to be submitted to the DEC in June 2007. On 30 January 2008, DECC wrote back accepting PRP 10 as being completed.

A water inflow event occurred in June 2007 in which an increase in water flow entering the goaf area of LW3 was observed. The water flow exceeded the pump capacity and hence operations ceased immediately and extra pumps were installed to allow for the situation to be controlled. Relevant agencies, including DPI, DSC, SCA and DoP were notified of the event and were liaised with regularly for a number of weeks following the event. At the time of the event, representatives from Illawarra Coal inspected the area above the Longwall to determine if there was any fresh cracking which could have potentially resulted in the water inflow event. This inspection did not uncover any such impacts that could have led to the inflow event.

An 'additional' extensive water testing regime was instigated underground in order to pick up any changes in water quality that could potentially provide information on

where the water had come from. The results from the water testing, which were reviewed by the relevant government agencies and a water chemist, indicated that the inflow water was some decades old as there was an elevated concentration of dissolved minerals in the water. The inflow levels returned to normal within a week.

The Dendrobium Community Consultative Committee was also informed of the inflow event.

Note that the consent condition 4.2 (a) groundwater reporting requirements in relation to:

1. Statistics
2. Time changes
3. Water balance
4. Daily rainfall

Plus 4.2 (h) KV biological monitoring are addressed in the SEMP discussed elsewhere in this audit.

The groundwater management approaches are in keeping with the EIS commitments and the approval conditions.

This condition appears to be satisfied.

5.9 Condition 5 – Coal Wash Emplacement Area and Waste Management

Coal Wash Emplacement

The consent conditions require Dendrobium to take active steps to fully evaluate the technical and commercial aspects of using alternatives to the proposed waste emplacement area No 3 at the West Cliff site. The consent conditions also require annual reporting on progress to the DPI.

The 2005 AEMR reports significant progress on consideration of alternatives as well as meeting the DPI reporting requirement. During this period coal wash was emplaced at Stage 2 Emplacement Area at West Cliff.

The 2006 AEMR reports continuation of emplacement at Stage 3 Emplacement Area plus compliance with the DPI reporting. The AEMR also indicates a potential 39% increase in storage capacity at area No 2, subject to access being granted to the proposed Stage 3 Emplacement Area. Preliminary work was undertaken for the proposed Stage 3 emplacement as required under the consent conditions. The AEMR details the advances made into the study of alternative uses for the coal wash.

During the 2007 reporting period, Dendrobium coal wash was emplaced in the West Cliff Stage 2 Emplacement Area. On 18 July 2007, Illawarra Coal submitted an application to the Minister for Planning to seek the necessary further approval for the West Cliff Stage 3 Emplacement Area in accordance with Conditions 1.1 (c) and 5.1 of the Dendrobium Development Consent. In support of the application and in accordance with Condition 5.1 of the Development Consent, a comprehensive review and update on all Illawarra Coal's investigations on alternatives to coal wash emplacement was prepared and submitted to the DPI-MR and other relevant agencies inv (report dated July 2007).

On 20 December 2007, the Minister for Planning approved the West Cliff Stage 3 Emplacement Area. The Minister imposed three conditions in the approval in addition to the commitments made by Illawarra Coal concerning the management of the emplacement.

The coal wash management approaches are in keeping with the EIS commitments and the approval conditions.

This condition appears to be satisfied.

Waste Management

The 2005 AEMR reports on a waste audit and indicates where various improvements have been pursued.

The 2006 AEMR reports a combination of facility improvements and support for behavioural change have been provided during this reporting period. Correct waste management behaviours have been emphasised through the use of toolbox talks and educational posters.

The 2007 AEMR reports further training and facility improvements.

The waste management approaches are in keeping with the EIS commitments and the approval conditions.

This condition appears to be satisfied.

5.10 Condition 6 – Air Quality, Blast, Noise and Light Management and Monitoring

Consent Condition 6.1 (a) Air Quality Standards/Goals

The Development Consent Conditions for Dendrobium set out relevant air quality standards and goals in Table 1 of Condition 6.1 (a1) for Total Suspended Particulates (TSP) and Particulate Matter less than 10 µm in aerodynamic diameter (PM₁₀) and in

Table 2 (for dust deposition). PM₁₀ criteria were added to Table 1 as part of an update to the Consent in 2006. Previously the PM₁₀ criteria were listed in Condition 6.1 (b) (xix) - Air Quality Management Plan.

These air quality standards and goals are shown below.

Table 1: Health based air quality standards/goals

Dust Type	Standard/Goal	Source Agency
Total suspended particulate (TSP) matter	90 µg/m ³ (annual average)	NHMRC ¹
Particulate Matter less than 10 Microns (PM ₁₀)	50 µg/m ³ (1 day, 24 hr average)	EPA
Particulate Matter less than 10 Microns (PM ₁₀)	30 µg/m ³ (annual average)	EPA

¹ National Health and Medical Research Council.

Table 2: NSW EPA amenity based air quality standards/goals

Existing dust fallout Level (g/m ² /month)	Maximum acceptable increase over existing deposition levels (g/m ² /month)	
	Residential	Other
2	2	2
3	1	2
4	0	1

The criteria set out in Table 1 have been met for the period of this audit.

The dust deposition criteria provided in Table 2 have at times been exceeded at various locations where monitoring has been conducted. These 'exceedances' do not constitute a non-compliance of this Condition. Further assessment of these 'exceedances' has been conducted and the results are additionally discussed below under the section - Air Quality and Dust Monitoring.

The Dendrobium site is considered to be in compliance with Condition 6.1 (a) Air Quality Standards/Goals.

Air Quality and Dust Monitoring

The 2005 AEMR provides monitoring results for 14 dust deposition gauges as set out by the site Environment Protection Licence (EPL 3241), i.e. D6 – D19 inclusive. In addition to the 14 monitoring sites outlined in the EPL, two new dust deposition gauges were added to the monitoring program at residential properties on the eastern side of Stones Road in 2005.

Out of the 14 EPL dust deposition gauges, 9 sites (i.e. sites EPA ID 6, 7, 11, 12, 13, 14, 15, 18 and 19) recorded at least one month and in most cases two or three individual monthly deposition rates higher than 4 g/m²/month. Although the NSW

EPA amenity criteria is usually assessed as an annual average of monthly deposition, these 9 sites are in technical non-compliance with CoA 6.1 (a) if they are located at sites where the criteria are applicable, since the Dendrobium Consent is currently set as deposition rate per month. However, the AQMP has been approved on the basis of assessment against annual average monitoring data.

If the annual average monthly dust deposition data for 2005 is assessed (as per the intent of the DECC amenity criteria), sites EPA ID 13 and 18 exceed the 4 g/m²/month limit. Site 13 is very close to the Dendrobium pit top portal road) and site 18 is located east of the Kemira Valley Coal Loading Facility (KVCLF), both of which are on BHPB property. These sites are not representative of off-site receptors and the amenity criteria do not apply at these locations. Therefore, if assessing the dust deposition data using the annual average monthly deposition rate against the amenity criteria, then although sites 13 and 18 exceed 4 g/m²/month, they do not constitute a breach of Condition 6.1 (a1).

The pit top High Volume Air Sampler (HVAS) (EPA ID 21) was commissioned and began recording data for PM₁₀ and TSP in September 2005. The KVCLF HVAS (EPA ID 20) recorded PM₁₀ and TSP data for the entire year of 2005. Both HVASs produced data that was in compliance with Condition 6.1 (a1), except for a 24-hour average PM₁₀ concentration recorded at EPA ID 21, which marginally breached the 24-hour average criteria on 6/12/05 when a staff BBQ was held in close proximity to the sampler.

The 2006 AEMR provides data for 17 dust deposition sites, i.e. the same 14 EPL sites, plus another new site in addition to the two new dust gauges that were set up in 2005. The three non-EPA sites are referred to as Chapman, Medina and Bruce.

Out of the 14 EPL dust deposition gauges, 11 sites (i.e. sites EPA ID 6, 7, 10, 12, 13, 14, 15, 16, 17, 18 and 19) recorded at least one month and in some cases many individual monthly deposition rates higher than 4 g/m²/month. In addition, all 3 non-EPA sites recorded a month where deposition exceeded 4 g/m²/month. These exceedances are a technical non-compliance with Condition 6.1 (a) since the Dendrobium Consent is currently set as deposition rate per month.

If the annual average monthly dust deposition data for 2006 is assessed, sites EPA ID 6, 13, 14 and 18 exceed the criteria of 4 g/m²/month. The Chapman and Bruce sites recorded annual average deposition rates exceeding 4 g/m²/month as well.

From May 2006, visual analysis of deposition results was conducted at selected sites to determine the type of material comprising the sample. Site 6 recorded three months of deposition results that were higher than 4 g/m²/month where compositional analysis was conducted, i.e. May, June and December. All three high records returned low proportions of coal. In May and December the highest composition was dirt. In June it was predominantly vegetation. This analysis shows that there are many potential sources of the material that can be deposited in the dust gauge. Non-compliance with Condition 6.1 (a) of the Consent cannot be determined when other sources appear to contribute more to the result than coal dust from the mining activity.

Site 14 also recorded 3 months that were higher than 4 g/m²/month where visual analysis was available. August 2006 recorded an abnormally high result, which was determined to be predominantly vegetative matter. The results for the months of May and July were not as high, however they both contained dirt and vegetative matter, as well as coal dust and the May sample also contained insect matter.

As previously mentioned, sites 13 and 18 are located on BHPB property and therefore the amenity goal is not considered applicable.

In 2006 the HVAS results at sites 20 and 21 were in compliance with the criteria in Condition 6.1 (a1) for PM₁₀ (24-hour and annual average) and TSP (annual average).

The 2007 AEMR provides dust deposition data for the same dust deposition sites as 2006. All 14 EPL dust deposition gauges recorded at least one month and in some cases many individual monthly deposition rates higher than 4 g/m²/month. In addition, the 3 non-EPA sites also recorded a month where deposition exceeded 4 g/m²/month. These exceedances are a technical non-compliance with Condition 6.1 (a) since the Dendrobium Consent is currently set as deposition rate per month. It is also noted that visual analysis of these high results indicates the existence of other material besides coal dust in the samples. Non-compliance with Condition 6.1 (a) of the Consent cannot be determined when other sources appear to contribute more to the result than coal dust from the mining activity.

The annual average monthly dust deposition data for 2007 shows that sites EPA ID 12 and 13 exceed the criteria of 4 g/m²/month. The Chapman site recorded annual average deposition above the criteria as well.

Visual analysis of dust deposition results was completed for site 12 in 2007. The composition analysis for the three high dust deposition records in February, June and November returned low proportions of coal and high proportions of dirt. The visual results for the Chapman site shows variation in the sampling contents, however for the high recordings in February and March the samples contained a high proportion of dirt, in June it was predominantly vegetative matter, July returned a mix of coal, dirt and vegetative matter, November contained insect and dirt and December recorded insect, coal and dirt.

As previously mentioned, site 13 is located on the mine site and therefore the amenity goal is not considered applicable.

In 2007 the HVAS at site 20 recorded one reading in December when the PM₁₀ level was marginally above the 24-hour goal. The cause of this marginal exceedance is unknown.

All other data for sites 20 and 21 for PM₁₀ (24-hour and annual average) and for TSP (annual average) were compliant with the criteria in Condition 6.1 (a1).

The 2008 AEMR has not been completed at this point in time. Therefore the data collated to date and the 2008 Annual Return has been used to determine if air quality and dust monitoring for the period of 2008 that falls within this audit, is compliant with the Consent Conditions.

The data provided for the 2008 Annual Return indicates that the HVAS at sites 20 and 21 for PM₁₀ (24-hour and annual average) and for TSP (annual average) were compliant with the criteria in Condition 6.1 (a1).

So far for 2008, there have been a few individual monthly exceedances of the 4 g/m²/month (similarly to previous periods discussed above), however, the annual average dust deposition levels for the EPL dust deposition gauges have complied with the annual average 4 g/m²/month DECC assessment criteria for all off site deposition monitors. The Chapman and Medina sites are currently recording an annual average deposition rate above the criteria. Visual analysis for these sites indicates a large influence of insect matter during 2008 at the Medina site and a combination of insect matter and coal at the Chapman site.

Blast Management and Monitoring

The Conditions of Consent issued by the Minister of Urban Affairs and Planning for the Dendrobium Project refers to four areas: (1) Pit Top Area (2) Kemira Valley Area (3) Ventilation Shaft Area and (4) Washery Area and specifies limits for blasting overpressure, ground vibration and the times and frequency of blasting and a requirement to develop a blast management plan.

The Annual Environmental Management Reports (AEMR) for 2005, 2006 and 2007 indicate that the conditions for blasting were not applicable for any of the years.

Noise

The Conditions of Consent specify intrusiveness criteria for seven receivers at the *Dendrobium Site* and two receivers at the Kemira Valley Coal Loading Facility (KVCLF). Compliance monitoring has been undertaken four times per year in 2005 and 2006 and three times in 2007. Only three monitoring programs were completed in 2007 because of unsuitable weather conditions for the program scheduled for December 2007. This session was postponed until January 2008.

In 2005 the AEMR discusses the noise monitoring work and lists the noise mitigation work undertaken.

In 2006 monitoring was undertaken at ten sites covering eight of the nine sites referred to in the Conditions of Consent. Monitoring results were not reported for R9. Seven of the ten sites achieved compliance on all occasions and overall 92% of all the monitoring results complied with the L_{Aeq, 15 minute} assessment criteria. The report identified a range of noise mitigation measures that were planned to be implemented in an attempt to achieve a greater level of compliance.

In 2007 many of the remedial measures identified in 2006 were implemented, but the effects of these would not be expected to be reflected in the monitoring data because there were undertaken progressively throughout the year. A total of 13 non-compliances of the $L_{A,15\text{-minute}}$ intrusiveness criteria were detected out of a total 181 measurements. This gave a compliance rate of 93% of the tests, which is slightly better than the 92% achieved in 2006. In most cases the non-compliances were minor (less than 2dB(A)) but an exceedance of 5 dB(A) was detected on one occasion at site R15a and was described as “most likely associated with mine vehicle movements on the Pit Top site”.

Nine exceedances were measured at R39a and these have been attributed to noise from the KVCLF conveyor and the associated rill tower which has undergone significant noise reduction treatment since the last monitoring program.

The postponed December monitoring program was undertaken in January 2008.

In response to an audit report conducted by the Department of Planning the report focused on the late evening and early morning periods as these were considered by the auditors to be the most sensitive periods. The monitoring did not identify any exceedances of the $L_{Aeq, 15 \text{ min}}$ criteria at any of the sites. Two exceedances of the L_{Amax} criterion were measured and these were due to noise due to dropping of metal objects at the pit top. The results suggest that the remedial engineering works (see later) have been effective in reducing noise. The two exceedances of the L_{Amax} are attributed to the dropping of heavy metal objects at the pit top. This suggests that training, or modifications to the way that operators deal with heavy metal objects should be reviewed and this might allow 100% compliance with all criteria.

The autumn audit completed in May 2008 identified an exceedance of the night time criterion at the Mine Manager’s Residence due to vehicle noise and dropping of heavy metal objects. In addition an exceedance of the evening ($L_{Aeq, 15 \text{ min}}$) criterion was measured at Location 39a (Figtree Farm). This was attributed to train noise augmented by barely audible noise from the conveyor.

The remedial measures undertaken to date are extensive and include:

1. The use of low frequency reversing alarms on underground and surface based vehicles
2. Modifications to the Rill Tower
3. Works on the rail track
4. The use of polyurethane coated steel rollers on the conveyor
5. Self imposed night-time curfews on ballast movements
6. Community awareness training for contractors and staff.

Based on the monitoring data it is concluded that a number of minor non-compliances with the “Intrusiveness Criteria” specified in the Conditions of Consent (6.4.1a) have occurred and continue to occur although the incidence of these has reduced as a result of the remedial measures. The remaining exceedances appear to be attributable to

vehicles at the Pit Top and noise from the handling of heavy metal objects and train noise.

The “Acquisition Criteria” are specified in the Conditions of Consent (6.4.1b).

Conditions 6.4.1c to g are not relevant at present, but would be if noise levels were such as to trigger acquisition of a property.

Condition 6.4.1h requires that the Applicant shall, by 31 July 2006, undertake comprehensive noise monitoring at specified sites in the area. This condition has been complied with.

Conditions 6.4.1i to k are not relevant in current circumstances.

Construction Noise

Conditions 6.4.1a to i deal with the control of construction activities including the hours of work, the noise criteria not to be exceeded. The conditions relate to the construction of the sizer as well as other works commenced prior to 2006. As far as can be ascertained, the mine has complied with these conditions.

Sleep Disturbance

Condition 6.4.1a appears to be met most of the time but exceedances have been recorded and remedial measures implemented. The most recent monitoring data (May 2008) shows two exceedances at two separate sites associated with noise from the Pit Top; either vehicle noise or noise associated with the handling of heavy metal objects).

Rail Haulage Noise

Conditions 6.4.1 a to f deal with railway noise. Since wheel squeal and brake squeal and wheel slippage are inevitable there are technical breaches of Condition 6.1.1a. The mine has undertaken significant works in an attempt to minimise these noise sources.

In 2007, GL 105 and 111 class rail locomotives were used for a two month period (November – December) to transport coal to the steelworks, with 81 Class Locomotives (8117 & 8142) servicing the line for the duration of 2007. Noise emissions test on rail locomotive noise has been tested on two occasions, once on the GL Locomotives, and once on the 81 Class Locomotives. These tests showed that the GL 105 exceeded the noise limit criteria by a marginal 2 dB for idling noise and the GL 111 exceeded all of the three criteria that the locomotives are required to meet. The GL class of locomotives were replaced by Class 81 locomotives after noise testing was carried out. Noise test results for the Class 81 locomotive demonstrated full compliance to conditions. It is therefore concluded that the mine has not complied with Condition 6.1.1b for a two month period during operation of the GL locomotives, although clearly attempts are being made to achieve compliance through continued use of the 81 class locomotives.

Noise Monitoring

Conditions 6.4.3 (a) to (d) require the Applicant to prepare and implement a noise monitoring program. These conditions appear to have been met although there was a later requirement for the plan to be revised by 31 July 2006 to the satisfaction of the Director General.

Dendrobium advises that a letter was received by the Department of Planning on 25 October 2007 indicating that there were some additional changes required to the Noise Management Plan. As all Management Plans were supposed to have been submitted in March 2008 and Dendrobium received an extension to the submission of these revised documents to three (3) months after the receipt of the modified development consent (now due in September/October 2008), the revised NMP has not been submitted for approval.

Complaints still continue to be received in relation to noise from trains and trucks and activities taking place at the Pit Top and at KVCLF. However, the existence of a complaint does not necessarily indicate that noise levels have exceeded noise limits. Most complaints appear to be recorded and dealt with in a timely manner. In some cases there does not appear to be enough time for the response to be provided within the time limits set for response.

Light Management

The AEMRs for 2005, 2006 and 2007 report that light from the operations have been managed satisfactorily.

On 6 May 2008, a lighting survey and impact assessment was undertaken in response to concerns about light spillage resulting from Dendrobium Mine's operations during night-time hours. The survey included the Pit Top and the KVCLF and also addressed possible sensitive receivers. The outcomes were published in the report Dendrobium Mine Lighting Impact Assessment by Cardno Lawson Treloar dated 25 June 2008 (CLT 2008).

The results of the Lighting Impact Assessment did not reveal any of Dendrobium Mine operations to exceed any of the requirements of AS 4282 at any of the identified sensitive receivers at any time. The possibility of private properties, particularly those located within Kemira Valley, having specific aspects not able to be surveyed at which these requirements are exceeded was considered. However, as measurements taken at the immediate site boundary of the Kemira Valley Coal Loading Facility were within the AS 4282 requirements it is considered unlikely that this is the case.

The Lighting Impact Assessment and Lighting Survey did identify that, although not in excess of requirements, light spillage (particularly sky glow resulting from both Kemira and Pit Top) was produced by the operations of both sites, and that substantial reductions in this effect could be achieved through the modification of lighting practices. Similarly, the Lighting Survey results indicate that energy and cost savings may be made through adopting more efficient lighting practices.

This condition appears to be satisfied. Dendrobium Mine is still considering the CLT 2008 recommendations and actions arising will be reported in the 2008 AEMR.

5.11 Condition 7 – Transport and Utilities

There are no ongoing monitoring requirements during the mine operation however, complaints in respect of traffic are separately noted in the Complaints Section of the AEMRs.

In 2005, there were 35 traffic complaints. The 2006 Department of Planning Audit noted “In respect of traffic, the audit found that delivery vehicles have, on occasions, accessed the mine at times outside those permitted by the consent.”

To address the complaints and the Planning Audit, Dendrobium has created a preferred supplier list for transport companies and has held a forum with suppliers advising them of penalties for breaches of codes of conduct.

Traffic complaints have dramatically decreased from 2005 through 2006 and 2007.

The 2006 Department of Planning Audit also made a number of other observations in respect of traffic issues including a list of minor works which are understood to have now been completed and the fact that the original Traffic Management Plan (TMP) underestimated the number of personnel (Dendrobium employees and contractors) working at the mine. Dendrobium encourages car pooling where feasible. Also, a further traffic study was undertaken after the Planning Audit which noted that the additional number of workers at the mine did not result in a significant increase in traffic issues.

This condition appears to be satisfied.

5.12 Condition 8 - Monitoring/Auditing

The mine has been subject to a range of audits by the Independent Expert Review Panel, by the Department of Planning, in compliance with Subsidence Auditing (condition 8.2) as well as under condition 8.1 Triennial Environmental Audit (this document).

In addition, Dendrobium undertakes many other internal audits as reported in the AEMRs which include:

- Environmental Management System (EMS) audits;
- HSEC Standards audit;
- ISO14001 audit.

This condition appears to be satisfied.

5.13 Condition 9 – Reporting

Dendrobium meets its obligations under this condition by completion of the AEMRs and the submission of the Annual Returns to the EPA.

This condition appears to be satisfied.

5.14 Condition 10 - Community Consultation/Obligations

Dendrobium complies with the Community Consultation requirements via regular meetings with the Community Consultative Committee and via Newsletters, information sheets, letterbox drops and door knocks, resident interviews and community surveys, information sessions and a website.

In addition, Dendrobium keeps a record of community complaints in First Priority, in an event management database, which includes records of the complaint and the complainant and actions taken in response.

The 2006 Department of Planning Audit noted that Dendrobium had not complied with a 6 monthly report of the Community Complaints Register to the Director-General. It is understood that this has now been addressed.

In addition, the 2006 Department of Planning Audit made observations that the complaint responses need enhancement and suggested that each complaint be allocated a specific complaint number. It is understood that these issues have now been addressed.

This condition appears to be satisfied.

5.15 Condition 11 - Proponents Obligations

Dendrobium has a responsibility under condition 11.1 to assess cumulative impact assessment between its operation and surrounding future mining activities. It has not been necessary to address this condition as yet, but the audit notes that cumulative assessment is required in respect of the Dendrobium water discharge to Allans Creek together with the proposed nearby desalination discharge.

Under condition 11.2, a land owner may request Dendrobium to purchase their property if noise and/air quality criteria are exceeded. It is understood that no such requests have been made although certain properties are reported to be subject to noise and/or air impacts in excess of criteria.

Conditions 11.3 address Contributions to Council. In this regard, a Community Enhancement Fund (CEF) and a Community Enhancement Committee (CEC) has been established by the mine and the AEMR indicates compliance plus other local support programs.

This condition appears to be satisfied.

5.16 Audit Findings

Comparison against EIS predictions:

For the most part, the EIS predictions have been met apart from two key areas of noise and dust.

With respect to noise impacts, the mine has undertaken significant works in an attempt to minimise these noise sources.

Noise

The predicted levels were initially exceeded in particular locations requiring the addition of further mitigation measures. The auditor supposes that the noise assessment in the EIS underestimated the noise sources and may have underestimated propagation conditions. Occasional exceedances of the noise assessment criteria have been recorded in the period covered by the audit however the extent of the exceedances are minor. The effect of some of the remedial measures recently applied have not been tested by sufficient monitoring as yet and so the current situation may well be that the mine is now in compliance in regard to railway noise. This will be assessed in the 2008 AEMR.

Dust

Over the audit period there have been a number of technical non-compliances in respect of Condition 6.1 (a) of the Consent (dust deposition rates. From May 2006, visual analysis of high dust deposition results has been conducted at selected sites to determine the type of material comprising the sample. This analysis shows that there are many potential sources of the material that deposited in the dust gauge that could have contributed to the non-compliances beyond the impact of coal dust. Non-compliance with Condition 6.1 (a) of the Consent cannot be determined when other sources appear to contribute more to the result than coal dust from the mining activity.

Subsidence

Subsidence is a significant issue for the Dendrobium Mine and there are many Consent Conditions that need to be monitored and assessed. The findings to date are extremely positive and strongly support the conclusion that the subsidence experienced so far is within the EIS predictions. Importantly, Dendrobium decided after the consent was issued to mine in a reduced area which apart from leaving resource in the ground (cost disbenefit to the mine) greatly reduced the risk of subsidence in key impact areas. This is undoubtedly a contributor to the meeting of the EIS predictions.

Effectiveness of Environmental Management of the Mine

The effectiveness of the environmental management of the project is reflected in the compliance with the consent conditions and in the mitigation measures applied and in the performance of the project personnel.

The Dendrobium management has demonstrated a very high level of compliance with approvals, licences and consents for approval conditions that are seen as being very comprehensive.

There have been a significant number of improvements made to the mitigation measures described in the EIS, particularly in respect of noise and dust mitigation. The fact that so many additional measures were required for these two issues supports the audit finding that the EIS underestimated the potential impacts for these two issues.

It is assessed that the SEMP has performed satisfactorily in terms of subsidence impact management in the Areas 1 and 2 and the Conditions of Consent during the 2005 – 2008 reporting period. The mine (and their consultants) should be commended for recognising and managing the high risk issues associated with longwall mining adjacent to a significant water supply dam and sensitive surface waters of Kembla Creek.

Based on the inspection of the rock fall areas, the audit considers that some of the rock falls in Area 1 (e.g. Rock Fall Site E) may need to be specifically reviewed in future monitoring events to check that they are still classed as ‘minor’ and not ‘moderate’. Currently, the Dendrobium landscape specialist assessed these sites as ‘minor’ and this has been approved in the SLMMP and SEMP. (Note the ‘moderate’ category includes statements to the effect that the character of the cliff is changed and significant ground disturbance has resulted). Future monitoring should consider the possibility of initiating a further CMA for limiting degradation of the sites should this be warranted.

It is also apparent that the CMA for ‘Moderate’ impact rock falls has recommended on-going monitoring to determine if erosion and sedimentation control measures are required when it is likely that the exposed cliff faces and damaged vegetation areas may need minor works to be implemented now.

The audit notes that on-going monitoring is occurring and that it includes a specific recommendation from the Dendrobium specialist if any CMAs are required – at this stage none have been recommended.

In regards to the Conditions of Consent, the requirement for compliance reporting after the completion of each longwall panel and at 6 monthly and 12 monthly intervals as well appears to be excessive. It is questionable whether preparing all of these documents actually increases, or decreases the effectiveness of the SEMP, based on the results of this audit.

This comment is further reinforced by the mines commitment to providing 24 hour notice to stakeholders of any notifiable incident or impact exceedance.

It is therefore recommended that the DoP and DPI consider further streamlining the reporting process, based on negotiation with the mine and stakeholders. A suitable alternative may be to reduce the level of reporting required on some of the lower risk items in the SEMP.

The mine management has responded appropriately in respect of traffic management, addressing community complaints and in working its way through the water discharge non-compliances for zinc, copper and dissolved oxygen at Allans Creek.

As a result of the mine personnel and management being very responsive to environmental management, the mitigation measures applied over the audit period and their implementation are assessed as being very effective.

The mine personnel have demonstrated a commitment to achieving compliance and have also demonstrated prompt actions to mitigate impacts.

Overall, the environmental management for the project is assessed as being very effective.

6. FIGURES

Figure 1 – Location Plan for the Various Dendrobium Mine Sites including the Rail Line and BlueScope Steel.

Figure 2 – Location Plan for the Pit Top, Kemira Valley, Vent Shafts and Mine Areas.

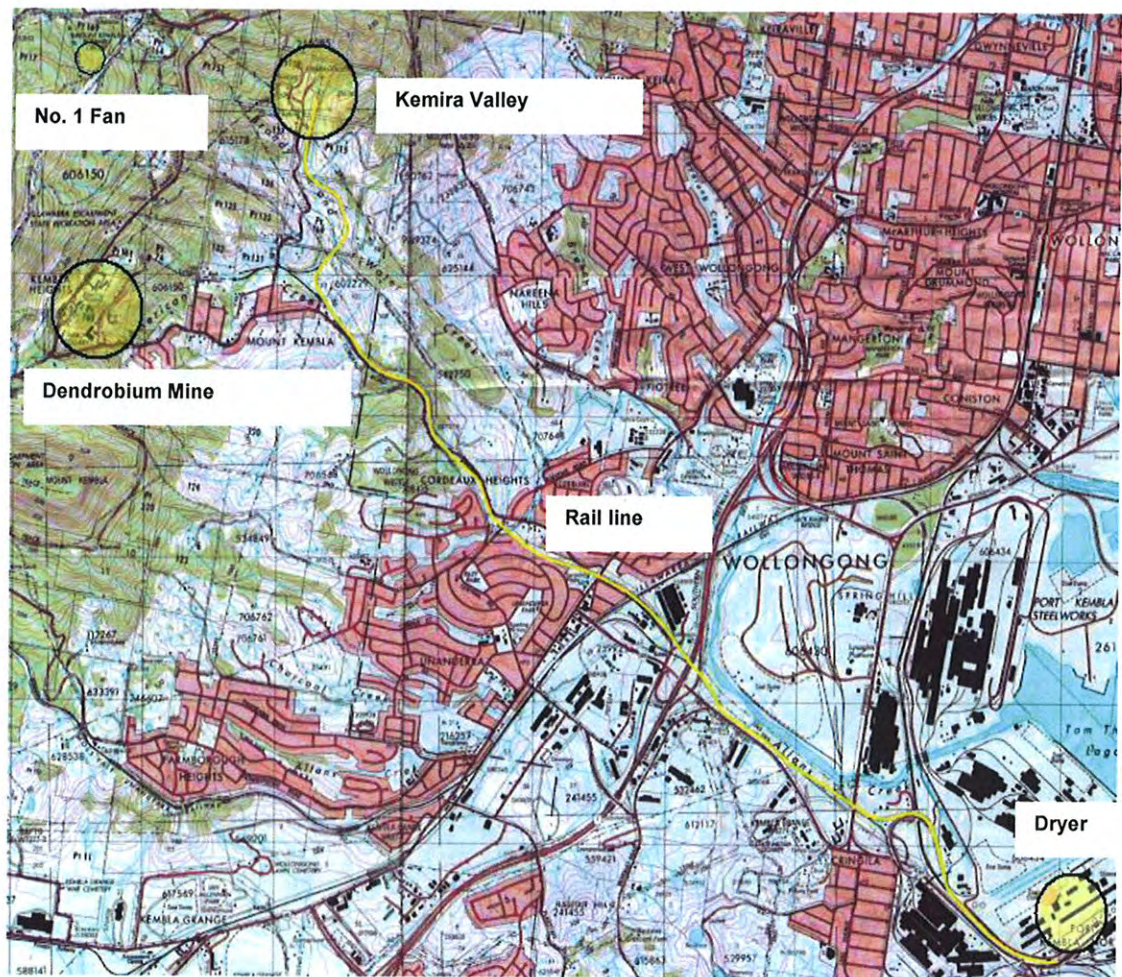


Figure 1: Location plan for the various Dendrobium mine sites including the rail line and BlueScope Steel.

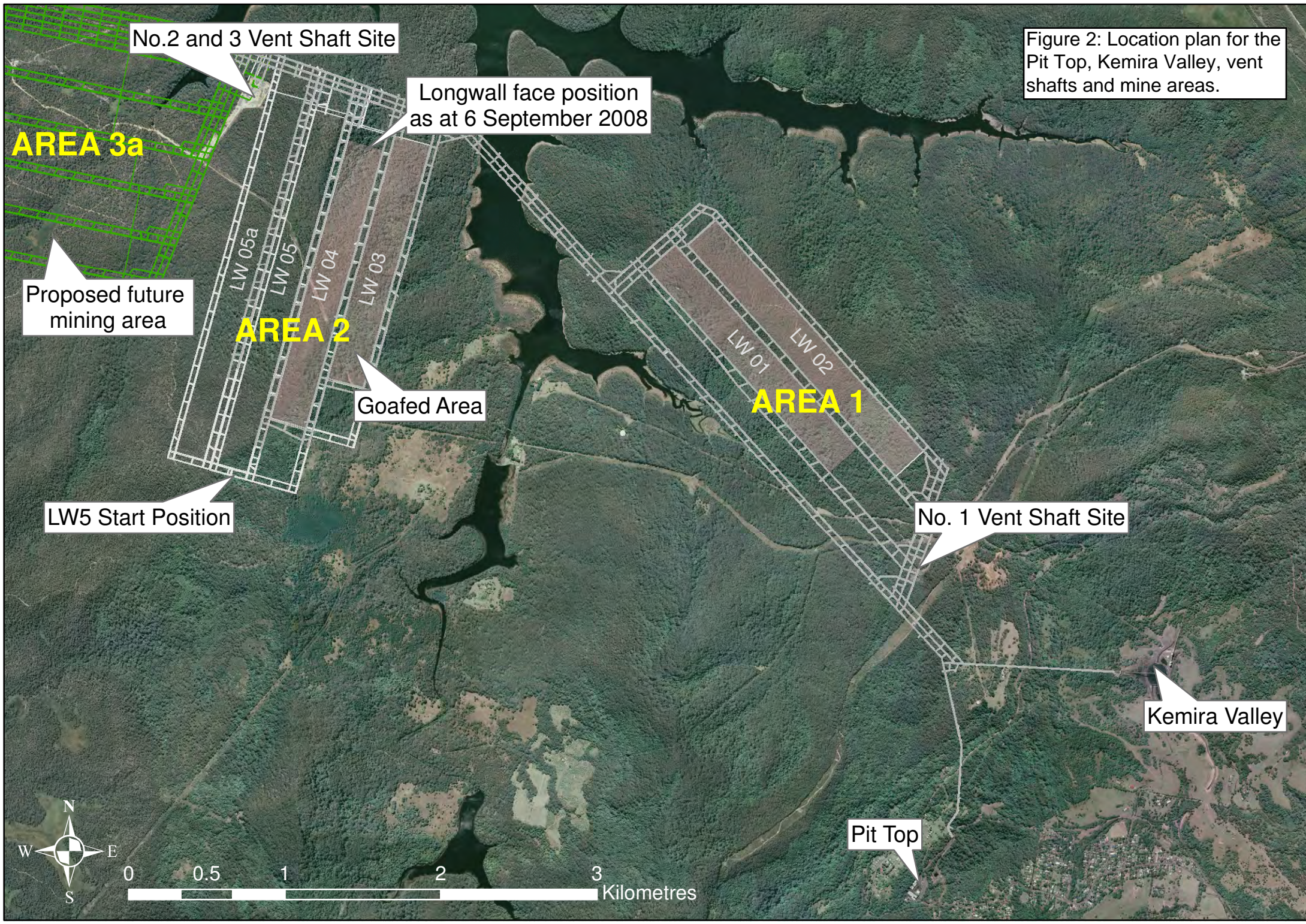


Figure 2: Location plan for the Pit Top, Kemira Valley, vent shafts and mine areas.

No.2 and 3 Vent Shaft Site

Longwall face position as at 6 September 2008

AREA 3a

Proposed future mining area

AREA 2

Goafed Area

LW5 Start Position

AREA 1

No. 1 Vent Shaft Site

Kemira Valley

Pit Top

0 0.5 1 2 3 Kilometres



7. APPENDICES

Appendix A – Copy of letter from NSW Department of Planning dated 14 July 2008 approving the audit team.

Appendix B – Subsidence Consultant DgS Report



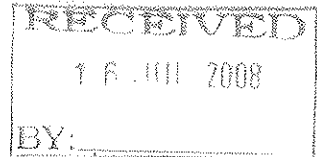
NSW GOVERNMENT

Department of Planning

Dendrobium Mine DOCUMENT REGISTRATION STAMP	
Ref: <i>CO38537A</i>	
File Loc'n: :	
Distribution	Ticks
Ops Manager	
Mine Manager	
Eng Manager	
E & C Manager	<input checked="" type="checkbox"/>
Officing Manager	
H R Manager	
Mine Surveyor	

Contact: Colin Phillips
 Phone: (02)9228 6483
 Fax: (02) 9228 6466
 Email: colin.phillips@planning.nsw.gov.au
 Our ref: DA-60-03-2001
 Your ref:
 File:

Mr Chris Schultz
 Environment and Community Relations Manager
 Dendrobium Coal Pty Limited
 PO Box 275
 UNANDERRA NSW 2526



Dear Mr Schultz

DENDROBIUM COAL MINE

Triennial Independent Environmental Audit

I refer to your letter, dated 9 July 2008, regarding the selection of an audit team to undertake a compliance audit at the Dendrobium mine in accordance with condition 8.1 of the Dendrobium development consent.

The Department has considered the supplied information on the qualifications and experience of the nominees and approves the audit team of KADENZ Pty Ltd to undertake the environmental compliance audit. The approved audit team consists of:

- Dennis Zines – Lead auditor;
- Nigel Holmes – Noise;
- Matt Scholl – Air; and
- Steve Ditton – Subsidence.

The Department requires that the audit team's report assess the company's progress in implementing the recommendations, or addressing any non-compliances identified in the following audits:

- Compliance Audit Dendrobium Coal Mine – Department of Planning, March 2006;
- Independent Audit – Dendrobium Mine Vent Shafts No 2 & 3 – Morse McVey for Department of Planning, March 2007; and
- Follow Up Compliance Audit Dendrobium Coal Mine – Department of Planning, May 2007.

Should you have any queries, please contact Colin Phillips at the details listed above.

Yours sincerely

Howard Reed *14.7.08*
 Manager
 Mining and Extractive Industries
 as Delegate for the Director-General

Ditton Geotechnical Services Pty Ltd
80 Roslyn Avenue Charlestown NSW 2290
PO Box 5100 Kahibah NSW 2290



4 September, 2008

Dennis Zines
Kadenz Pty Limited
1 Fairweather Street
Bellevue Hill NSW 2023

Report No. DEN-001/1

Dear Dennis,

Subject: Subsidence Impact Management Compliance Assessment for the 2nd Triennial Independent Audit of Dendrobium Mine, Mount Kembla

1.0 Introduction

This report provides a review by Ditton Geotechnical Services Pty Ltd (DgS) of the performance of the Subsidence Environmental Management Plan (SEMP) prepared by Illawarra Coal (BHP Billiton) for Areas 1 and 2 at the Dendrobium Mine, Mount Kembla

This report forms part of the 2nd Triennial Independent Audit Report by KADENZ Pty Ltd, which is required by the NSW Department of Planning's Development Consent Condition 8.1 Third Party Monitoring/Auditing for the Dendrobium Mine.

This audit has included the outcomes of mining impacts for the period from 31 March 2005 to September 2008. Mining activities resulting in the development of subsidence and associated impacts during this period include the extraction of longwalls LW1 to 3.

2.0 Scope of Work

The scope of the work consisted of the following:

- (i) A desktop review of the Dendrobium Mine's Subsidence Environmental Management Plan (SEMP) and Annual Environmental Management Reports (AEMRs) for 2005, 2006 and 2007.
- (ii) A brief walkover inspection of Areas 1 (LW 1 and 2) and Area 2 (LWs 3 to 5a) to confirm claimed surface impacts and identify possible inconsistencies in the application of the SEMF.
- (iii) Provide an assessment of the effectiveness of the SEMF in regards to subsidence related impacts and possible avoidance of remediation measures or strategies.
- (iv) Provide recommendations on any changes to the SEMF and or the overall reporting process such that it may improve the effectiveness of SEMF in future mining areas.

3.0 Desktop Review

3.1 Subsidence Environmental Management Plan (SEMP)

The SEMP for Areas 1 and 2 provides a framework for addressing monitoring and impact management requirements for the following features within the area of mining influence:

- Aboriginal archaeology and European heritage buildings.
- Flowing/ephemeral creeks and tributaries with rock bars.
- Steep slopes up to 2V:1H and cliff lines up to 20 m high.
- Wetland areas.
- Igneous intrusions (Crinanite Sill) overlying the south-eastern corner of Area 2.
- Groundwater aquifers
- Cordeaux dam and storage area between Areas 1 and 2.
- 33 kV Powerline easement in Area 2 only.
- Alinta gas pipeline.
- Telstra telecommunications.
- Fire trails.
- Terrestrial and Aquatic flora and fauna.
- Old flooded pillar extraction workings in the Bulli Seam above Area 1.

Subsidence contour predictions and impact management plans have been developed in association with the relevant stakeholders for each feature. Baseline studies of pre-mining conditions for each feature have been prepared and used for monitoring outcome and impact assessment purposes.

Trigger Action Response Plans have been provided to (i) assess if subsidence impacts were significantly higher than predicted and (ii) ascertain if Corrective Management Actions (CMAs) are necessary to either remediate damage or review/adjust proposed mine plans.

It is of note that the mine has taken a pro-active approach to adjusting proposed mining layouts if the uncertainties and consequences of possible subsidence damage are considered too great a risk to the environment and the mine operations. An example of this action was the shortening of LW 1 to avoid potential damage to Kembla Creek.

The performance of the SEMP during and after mining of LWs 1 to 3 has been assessed in the AEMRs for 2005, 2006 and 2007 and the outcomes summarised in **Section 3.2**.

3.2 Annual Environmental Management Reports (AEMRs)

Three AEMR's have been submitted to the DoP for 2005, 2006 and 2007 periods. Maximum subsidence over LWs 1 to 3 have ranged between 2.0 and 2.4 m. Subsidence predictions and impacts have been reported as all being within expected levels, except for a 300 mm prediction exceedance above old mine workings in the Bulli Seam.

Several Corrective Management Actions (CMAs) were invoked by the Dendrobium Landscape Impact Assessment Trigger Levels (Table 19.2 in the SEMP), with the subsequent

back filling of surface cracks along the fire trails and across power line easements in Areas 1 and 2.

The trigger levels define 'minor', 'moderate' and 'severe' impact categories based on visual assessment. Consideration of CMAs is usually invoked when mine subsidence damage is assessed by mining representatives as being 'moderate' or 'severe'. Monitoring of all features will continue for a period of 5 years after mining is completed with periodic inspections by BHPB's environmental management team of the subsided areas to identify any new damage that may require CMAs to be implemented.

A summary of the impacts to-date and responses by Dendrobium Mine management are presented below:

- Some minor cracking (1 to 25 mm wide) to the main tributary of Kembla Creek in Area 1 has not resulted in any significant change to surface flows, ponding levels or water quality/biota. No gas release has been detected. Minor damage - No further action (i.e. CMA) required at this stage.
- An Aboriginal archaeological site (D4 - Rock Shelter) in Area 1 has been subject to minor cracking to the soils areas surrounding the overhang. There has been dilation of an existing joint at the base of the shelter with no impact to artwork. Minor damage - No further action required at this stage.
- No damage to an Aboriginal archaeological site (D9 - Rock Shelter) in Area 1. No damage - No further action required at this stage.
- Cracking from 350 mm to 1 m wide across fire trails and power line easements in Areas 1 and 2. Moderate Damage - CMA was infilling of cracks with screened crushed sandstone, based on consultation with Sydney Catchment Authority (SCA).
- Some larger cracks up to 1 m wide away from the trafficked areas. Moderate damage - Cracks are not considered a risk to SCA/Mine vehicles and personnel and have not been repaired. Monitoring of cracks is ongoing.
- Cracking and tilting to cliff lines with eight rock falls in Area 1 and two rock falls in Area 2.

The rock falls in Area 1 included cracking, down hill boulder displacement up to 10 m and tilting / toppling of trees. Minor damage - no further action required at this stage.

The rock falls in Area 2 included cracking, down hill boulder displacement up to 50 m and toppling of trees. Moderate damage - no further action required at this stage due to assessed low levels of environmental impacts and difficulties in implementing effective repairs.

It was assessed that 7 to 10 % of the length of cliff lines in Areas 1 and 2 have been affected by rock falls to-date.

- No cracking or impact to steep slopes. Minor damage - No further action at this stage.
- No movement to the Cordeaux Dam walls or storage area impacts have been detected.
- <20% change to terrestrial / aquatic flora and fauna which is considered unlikely to be as a result of mining. Minor impact - No further action required at this stage. Monitoring is ongoing.
- The power poles (Integral) supporting the 33 kV power line has not been adversely affected by the subsidence of up to 2 m and tilts of about 20 mm/m. Minor impact - No further action required at this stage.
- Gas pipelines and Telstra telecommunications lines have not been affected. No damage - No further action required at this stage.
- SCA heritage buildings associated with old railway line have not been affected by mining to-date. No damage - No further action required at this stage.
- No damage to the Crinanite Sill or groundwater system (as reflected by there being no impact to surface groundwater interaction, no flow from the dam to workings, no loss of catchment yield etc) has been detected by the monitoring programs to-date. No damage - No further action required at this stage.

An inspection of some of the features described above in Areas 1 and 2 (including un-remediated and remediated areas) was completed on 19 August 2008. The purpose of the inspection was to (i) confirm that the assessed impacts and outcomes of the remediation measures described in the AEMRs were consistent with the TARPs defined in the SEMP and (ii) determine if any un-remediated areas should be considered for CMA or remediation.

4.2 Site Inspection

4.1 Area 1

The following sites were visited in Area 1 and notes / photographs made of the impact of LWs 1 and 2 and any remediation works observed:

Fire trail

The fire trail consisted of an unsealed access way along the crest of a NW/SE trending ridge.

Several 300 mm wide cracks that had developed across the road two to three years ago (2005) were subsequently backfilled with imported crushed and screened sandstone. The backfill material was still level with the road and blended in well with the terrain (see **Photo 1**).

Some other smaller cracks that were not backfilled, ranged between 10 mm and 15 mm wide across the road and were orientated sub-parallel to the longwall rib-side. The cracks were partially infilled with transported sediment from natural storm flow runoff (see **Photo 2**).

A 600 mm wide crack was observed about 10 to 15 m from the road and was partially infilled with sediment to about 2 m depth from the surface (see **Photo 3**). It is understood that an agreement has been made between the SCA and the mine to only remediate cracks which directly affect trafficability/safety risk along fire trails.

Rock Fall G along cliff lines

The rock falls affected a 10 m wide section of a south-west facing, 5 m high, sandstone cliff face. Several 3 mm wide vertical tensile and horizontal bedding shear cracks were observed in the existing face with several 2 to 3 m diameter boulders at the base of the cliff. The freshly exposed rock face surface was highly weathered and friable (see **Photo 4**).

Vertical joints were spaced at 0.3 to 1.0 m and sub-parallel to the 330° (NW) striking cliff face. Natural overhangs up to 2 m deep have been created by differential weathering of weaker shale beds and were observed further along the cliff line (see **Photo 5**). The slope below the cliff dips at about 20° and is densely wooded. Some mature trees were tilted down slope.

This rock fall was assessed to be a 'minor' impact fall, based on the Dendrobium Landscape Impact Assessment Trigger Levels (Table 19.2 in the SEMP).

Rock Fall E along cliff lines

The rock falls affected a 15 m wide section of a south-west facing, 5 m high, sandstone cliff face. Several large, 5 to 10 m diameter boulders had move up to 20 m down slope with several mature trees felled. The volume of the rock disturbed was about 200 m³ and the freshly exposed rock face surface was highly weathered and friable (see **Photos 6 and 7**). The slope above and below the cliff dips at about 20° and is densely wooded. Some mature trees were tilted down slope.

This rock fall was assessed to be a ‘minor’ fall, based on the Dendrobium Landscape Impact Assessment Trigger Levels (Table 19.2 in the SEMP).

4.2 Area 2

The following sites were visited in Area 2 and notes / photographs made of the impact of LWs 3 and any remediation works observed:

Fire-trail

The fire trail above the LW3-4 chain pillar had been affected by several 100 to 300 mm wide tapered vertical cracks, some of which had been backfilled for trafficability / safety reasons (see **Photo 8**).

Cliff crest and steep slope A2-SL1 (adjacent to 33 kV Power Pole (Integral))

The south east facing cliff line at the crest of the steep slope (SL1) was 5 to 10 m high with wide open, vertical joints spaced at 1 to 2 m. The timber power pole was about 10 m from the crest of the cliff line and supported conductors that run down to the valley floor about 300 m to the south east.

The cliff face and power pole had been subsided and tilted with negligible visual impact. It is understood that additional monitoring was undertaken during subsidence development to manage any potential adverse impacts (see **Photos 9 to 11**).

Rock Fall A2 - RFA

The rock fall occurred along a 10 m high, east facing cliff line and affected approximately 20 m length of cliff. Three large boulders with dimensions of about 2 m x 3 m x 5 m have rolled about 20 to 30 m down slope, knocking down trees and partly clearing vegetation (see **Figures 12 to 14**).

The slope above and below the cliff dips at about 20° and is densely wooded. Some mature trees were tilted down slope.

This rock fall was assessed to be a ‘moderate’ impact fall, based on the Dendrobium Landscape Impact Assessment Trigger Levels (Table 19.2 in the SEMP). The CMA for the



site included on-going inspections to monitor / assess the need for erosion or sediment control measures to be implemented.

5.0 Discussion and Recommendations

5.1 SEMP Compliance with Consent Conditions

Based on the review of the SEMP and AEMR documents for 2005 to 2007 it is concluded that Dendrobium Mine has complied with the relevant Conditions of Consent for mine subsidence impact management for this reporting period.

There are two minor issues regarding the damage assessment and remediation management of cliff line impacts that could be improved however, and is further discussed in **Section 5.3**.

5.2 Actual v. Expected Impacts

Actual subsidence and impact predictions at surface features within the area of influence of mining have generally been less than or consistent with the EIS predictions.

Actual impacts have been assessed as ranging from negligible or no impact to ‘minor’ and ‘moderate’ impact, based on the trigger level definitions provided in the SEMP.

5.3 Effectiveness of SEMP

Overall, the SEMP is considered to be performing well in regards to subsidence related impacts. The mine (and their consultants) should also be commended for recognizing and managing the high risk issues associated with longwall mining adjacent to a significant water supply dam and sensitive surface waters of Kembla Creek.

Based on the inspection of the rock fall areas, the audit considers that some of the rock falls in Area 1 (e.g. Rock Fall Site E) may need to be specifically reviewed in future monitoring events to check that they are still classed as “minor” and not “moderate”. Currently, the Dendrobium landscape specialist assessed these sites as “minor” and this has been approved in the SLMMP and SEMP. (Note the “moderate” category includes statements to the effect that the character of the cliff is changed and significant ground disturbance has resulted). Future monitoring should consider the possibility of initiating a further CMA for limiting degradation of the sites should this be warranted.

It is also apparent that the CMA for ‘Moderate’ impact rock falls has recommended on-going monitoring to determine if erosion and sedimentation control measures are required when it is likely that the exposed cliff faces and damaged vegetation areas may need minor works to be implemented now.

The audit notes that on-going monitoring is occurring and that it includes a specific recommendation from the Dendrobium specialist if any CMAs are required – at this stage none have been recommended.

Due to the remoteness of the sites, future monitoring should consider the value of minor works such as the installation of silt fences immediately below the disturbed areas and the re-



establishment of vegetation (i.e. brush matting and tree plantings) to minimise potential future degradation.

6.0 Conclusions

It is assessed that the SEMP has performed satisfactorily in terms of subsidence impact management in the Areas 1 and 2 and the Conditions of Consent during the 2005 – 2008 reporting period.

A review of the cliff line impacts in regards to installing minor erosion and sedimentation works at some of the more exposed sites is suggested.

In regards to the Conditions of Consent, the requirement for compliance reporting after the completion of each longwall panel and at 6 monthly and 12 monthly intervals as well appears to be excessive. It is questionable whether preparing all of these documents actually increases, or decreases the effectiveness of the SEMP, based on the results of this audit.

This comment is further reinforced by the mines commitment to providing 24 hour notice to stakeholders of any notifiable incident or impact exceedance.

It is therefore recommended that the DoP and DPI consider further streamlining the reporting process, based on negotiation with the mine and stakeholders. A suitable alternative may be to reduce the level of reporting required on some of the lower risk items in the SEMP.

For and on behalf of
Ditton Geotechnical Services Pty Ltd



Steven Ditton
Principal Engineer and Director
BE(Civil/Hons) C.P.Eng(Civil), M.I.E.(Aust)

NPER 342140

Attachments:

Photos 1 to 14

Photo 1 - Remnant Fire Trail Cracks in Area 1 (2 years since mining of LWs 1 and 2)



Photo 2 - Remediation Works of 300 mm wide Fire Trail Cracks in Area 1 (2-3 years old)



Photo 3 - Remnant 600 mm Wide Crack in Area 1 (2 years since mining of LWs 1 & 2)



Photo 4 - Area 1 Rock fall Site G (exposed cliff face)



Photo 5 - Area 1 Rock Overhang Between Rock Fall Sites



Photo 6 - Area 1 Rock Fall Site E

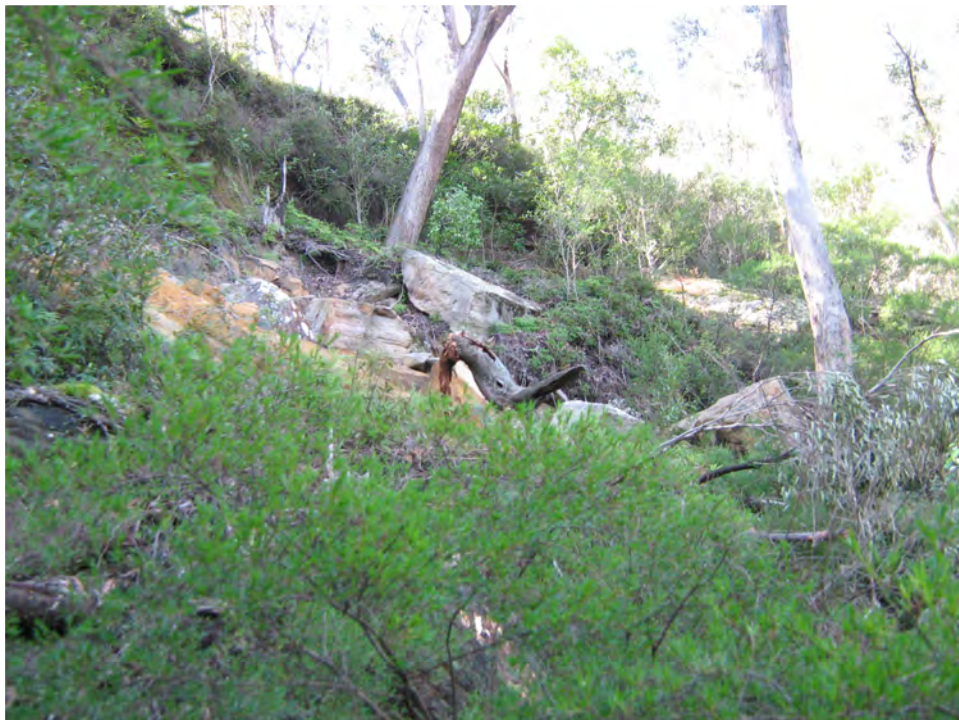


Photo 7 - Area 1 Rock Fall Site E (Boulder roll out stopped by tree)



Photo 8 - Area 2 Fire Trail Cracking (1 year since mining)



Photo 9 - Area 2 Steep Slope (SL1) and Cliff Crest



Photo 10 - Cliff Crest Cracking above Area 2 Steep Slope (SL1)



Photo 11 - Tilted Timber Power Pole behind A2 - SL1 Cliff Crest



Photo 12 - Area 2 East Facing Ridgeline Slopes above LW3



Photo 13 - Area 2 East Facing Rock Fall A Site above LW3



Photo 14 - Immediate Area Below Area 2 Rock Fall A Site above LW3

