

Name of Mine:	COWAL GOLD MINE
Titles/Mining Leases:	ML 1535
MOP Commencement Date:	January 2011
MOP Completion Date:	September 2012
AEMR Commencement Date:	23 DECEMBER 2009
AEMR End Date:	22 DECEMBER 2010
Name of Leaseholder:	BARRICK (COWAL) LIMITED
Name of Mine Operator (if different):	AS ABOVE
Reporting Officer:	GREG RITCHIE
Title:	ENVIRONMENTAL COORDINATOR
Signature:
Date:	24 August 2011

DOCUMENT COPY No:

ISSUED TO:

DATE: 24 August 2011

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PLANS

In accordance with Section 3 of the *Guidelines and Format for the Preparation of an Annual Environmental Management Report*: (NSW Department of Trade and Investment, Regional Infrastructure and Services [DTIRIS (Minerals), 2006]) a number of plans (including a land preparation plan, proposed mining activities plan and proposed rehabilitation plan) are required to be prepared for the Annual Environmental Management Report (AEMR). These plans are to show equivalent information to plans provided in the current Mining Operations Plan (MOP).

Land Preparation Plan

Areas that have been stripped of soil, vegetation disposal areas and soil stockpile areas are shown on Figure 4. Plans showing proposed land preparation areas for the next reporting period are included in the MOP (Figures 20 to 21).

Proposed Mining Activities Plan

Mining operations commenced on 21 April 2005.

Figure 4 shows the layout of the open cut pit, soil stockpiles and water management structures.

Mining activities for the next reporting period have been addressed in the MOP. A summary of operations for the next reporting period is provided in Section 6 of this report.

Rehabilitation Plan

Areas where rehabilitation activities have occurred during the reporting period are shown on Figure 4. Plans showing proposed rehabilitation activities for the next reporting period are included in the MOP (Figures 20 to 21).

Figures 1 to 21 provide additional plans and information.

1 INTRODUCTION

This Annual Environmental Management Report (AEMR) has been prepared by Barrick (Cowal) Limited (Barrick) for the Cowal Gold Mine (the CGM) in accordance with the conditions of the Development Consent for the CGM granted on 26 February 1999 (Development Consent) and the Conditions of Authority for Mining Lease (ML) 1535 granted on 13 June 2003. This AEMR has been prepared for the period 23 December 2009 to 22 December 2010. The requirements for the AEMR are set out in the Conditions of Authority for ML 1535 and the CGM Development Consent.

The AEMR has also been prepared in accordance with the NSW Department of Trade and Investment, Regional Infrastructure and Services (DTIRIS (Minerals)) *Guidelines and Format for Preparation of an Annual Environmental Management Report* (DII, 2006).

This AEMR has been prepared in consultation with relevant stakeholders. A meeting regarding the AEMR was held on 01 July 2010 at the CGM. Attendees included representatives from the Department of Environment, Climate Change and Water (OEH), the DTIRIS (Minerals) and Barrick. In addition, Barrick has been in contact with the DTIRIS (Minerals) and Department of Planning and Infrastructure (DoPI) regarding the development of the AEMR. No additional requirements in relation to the AEMR were requested by the DTIRIS (Minerals) or the DoPI.

In accordance with Development Consent Condition 9.2(iii), copies of the AEMR will be provided to the Director-General of the DoPI, OEH, OoW, DTIRIS (Minerals) (Minerals), the NSW Dams Safety Committee (DSC), DTIRIS (Fisheries), the Bland Shire Council (BSC) and the Community Environmental Monitoring and Consultative Committee (CEMCC).

1.1 CONSENTS, LEASES, LICENCES AND PERMITS

1.1.1 Current List of Consents, Leases, Licences and Permits

The key consents, leases, licences and permits under which the CGM operates are presented in Table 1.

Table 1
Key Consents, Leases, Licences and Permits

Instrument	Relevant Authority	Date of Grant	Duration of Approval
Development Consent (DA 14/98)	DoPI	26/02/1999	Mining operations may take place until 30 June 2019. "Mining operations" includes all ore extraction, processing and transportation activities carried out on site. The Development Consent then continues in force until Barrick rehabilitates the site in accordance with the conditions of the Development Consent.
Development Consent (DA2011/64)	Forbes Shire Council	20/12/2010	N/A
Mining Lease (ML 1535)	DTIRIS (Minerals)	13/06/2003	21 years.
Environment Protection Licence (EPL No. 11912)	OEH	23/12/2003	Until the licence is surrendered, suspended or revoked. The licence is subject to review every three years.
Permit #1361 under section 87(1) of the NPW Act	OEH	23/05/2002	Valid for period of exploration drilling on the lots covered by the permit.
Consent #1467 under section 90 of the NPW Act	OEH	27/11/2002	The approval lapses when the Minister for Environment acknowledges that satisfactory rehabilitation work has been completed under ML1535 or 18 years after completion of constructions works, whichever occurs first.

Table 1 (Continued)
Key Consents, Leases, Licences and Permits

Instrument	Relevant Authority	Date of Grant	Duration of Approval
Permit #1468 under section 87(1) of the NPW Act	OEH	27/10/2003	Same as Consent #1467.
Consent #1680 under section 90 of the NPW Act	OEH	28/07/2003	The approval lapses when the Minister for Environment acknowledges that satisfactory rehabilitation work has been completed under ML1535 or 18 years after completion of construction works, whichever occurs first.
Permit #1681 under section 87(1) of the NPW Act	OEH	28/07/2003	Same as Consent #1680.
Production bore licence (Bland Creek Palaeochannel borefield) #70BL229248	OoW and OEH	19/12/2008	18 December 2013.
Production bore licence (Bland Creek Palaeochannel borefield) #70BL229249	OoW and OEH	22/12/2008	21 December 2013.
Production bore licence (Bland Creek Palaeochannel borefield) #70BL229250	OoW and OEH	22/12/2008	21 December 2013.
Production bore licence (Bland Creek Palaeochannel borefield) #70BL229251	OoW and OEH	22/12/2008	21 December 2013.
Production bore licences (saline groundwater supply borefield within ML 1535) #70BL232691 - #70BL232692	OoW and OEH	28/01/2010	27 January 2015
DA No. 2011/0064 (eastern saline borefield)*	FSC	20/12/2010	20/12/2015. Valid for the operation of the eastern saline borefield.
Pit dewatering bore licences #70BL230205 – #70BL230234	OoW and OEH	6/1/2010	5 January 2015.
Monitoring and test bore licences	OoW and OEH	Various	Various.
High Security Title WAL13749 DNR Reference 70AL603333	LPMA, OoW and OEH	21/12/2006	Title for allocation from Regulated River Source.
General Security WAL13748 DNR Reference 70AL603332	LPMA, OoW and OEH	21/12/2006	Title for allocation from Regulated River Source.

Source: Barrick (2011)

DoPI: NSW Department of Planning and Infrastructure

DTIRIS: NSW Department of Trade and Investment, Regional Infrastructure and Services - Minerals and Energy

OEH: NSW Office of Environment and Heritage

FSC: Forbes Shire Council

LPMA: NSW Land and Property Management Authority

OoW: NSW Office of Water

NPW Act: NSW *National Parks and Wildlife Act 1974*

* Production bore licence applications lodged with the OoW during 2011.

Mining Operations Plan (MOP)

2009 to 2010 MOP

During the reporting period a MOP was prepared for the period April 2009 to December 2010 as a requirement of the ML Conditions of Authority and Development Consent conditions and in accordance with *Guidelines for the Preparation of a MOP* (Department of Primary Industries – Mineral Resources [DPI-MR], 2002) (the MOP guidelines). The 2009 to 2010 MOP was approved by the DII (Minerals) on 3 April 2009. An addendum to this MOP was prepared by Barrick to reflect the changes authorised by the modifications to the Development Consent approved by the Minister for Planning on 11 February 2009, 28 August 2009 and 10 March 2010. The addendum to the 2009 to 2010 MOP was approved by the DII (Minerals) on 19 March 2010. An extension to the submission of the new 2011 to 2012 MOP from December 2010 to the end of March 2011 was granted in writing by DII (Minerals) on 23 November 2010 (due to unresolved Hearing outcome for s75W).

2011 to 2012 MOP

Preparation of a new MOP for the period January 2011 to September 2012 commenced during the reporting period as a requirement of ML 1535 Conditions of Authority and Development Consent conditions and in accordance with the MOP guidelines. A description of the new 2011 to 2012 MOP will be provided in the 2011 AEMR.

1.1.2 Approval Variations Applicable to the Subject Area

Environment Protection Licence

Barrick applied to the OEHL for a variation to EPL No. 11912 (the EPL) in November 2010. The request for variation to the EPL was to reflect modifications to the Development Consent approved by the NSW Minister for Planning on 10 March 2010 and the change to the location at which monitoring of CN_{WAD} levels of the aqueous component of the tailings slurry stream is undertaken at the CGM. Barrick also sought to vary conditions in the EPL to avoid having to report non-compliances in the Annual Return where monitoring is not undertaken due to an absence of available surface water or if a piezometer has been lost/destroyed during mine development.

A description of the OEHL varied EPL of 24 June 2011 will be provided in the 2011 AEMR.

Development Consent

During the reporting period, Barrick sought modifications to the Development Consent to authorise, amongst other things:

- (a) extension of the footprint and height of the NWE and SWE and extension of the footprint of the soil stockpiles (modification pursuant to the *E42 Modification – Modified Request* under section 75W of the NSW *Environmental Planning and Assessment Act 1979* [EP&A Act] approved on 10 March 2010) (see below); and
- (b) change to the footprint of the open pit (modification pursuant to the *E42 Modification – Modified Request* under section 75W of the EP&A Act approved on 10 March 2010) (see below).

Further, on 17 January 2011, a modification of the Development Consent of an administrative nature was approved to confirm that the Development Consent authorises "Mining operations" to take place until 31 December 2019.

E42 Modification and E42 Modification - Modified Request

On 25 March 2008, Barrick lodged with the Minister for Planning an application for modification of the Development Consent pursuant to section 75W in Part 3A of the EP&A Act and clause 8J(8) of the NSW *Environmental Planning and Assessment Regulation 2000*. An Environmental Assessment (EA) to accompany the application was lodged in August 2008. The EA was placed on public exhibition from 22 August to 22 September 2008.

The application for the E42 Modification was the subject of proceedings commenced by Neville "Chappie" Williams in the NSW Land and Environment Court against the Director General of DoPI, the Minister for Planning and Barrick. Justice Biscoe of the NSW Land and Environment Court delivered the written reasons for his decision on 6 February 2009 and made final orders on 13 February 2009. The orders, amongst other things, restrained the Minister for Planning from determining the application for the E42 Modification under section 75W of the EP&A Act.

The judgment of Justice Biscoe was subsequently the subject of an appeal commenced by Barrick in the NSW Court of Appeal on 6 March 2009. The hearing of the appeal occurred on 1 July 2009. On 3 September 2009, the appeal judges unanimously upheld Barrick's appeal and set aside the judgment and orders of Justice Biscoe made on 13 February 2009.

Barrick lodged with the Minister for Planning the *E42 Modification – Modified Request* EA (E42 Modified Request) on 26 October 2009. The E42 Modified Request reduced the scope of the original E42 Modification. The Minister for Planning approved the E42 Modified Request on 10 March 2010.

The main features of the approved E42 Modified Request included:

- expanding the open cut pit from 95 ha to 107 hectares (ha) for a new approved pit of 1,100 metres (m) long, 1,050 m wide and 325 m deep, to extract an additional 23 million tonnes (Mt) of ore for processing and supply to market;
- increasing the CGM's maximum production rate from 6.9 to 7.5 Mt of ore a year;
- expanding a range of associated infrastructure at the mine, such as increasing the quantity of tailings produced from approximately 76 Mt to 99 Mt and new final heights of 243 m Australian Height Datum (AHD) for the northern tailings storage facility (NTSF) and 248 m AHD for the southern tailings storage facility (STSF), waste emplacement areas (NWE 266 m AHD [255 ha] and SWE 250 m AHD [140 ha]), and stockpiles; and
- extension of the operational mine life by 2 years to 2019.

For further information, the determination of the E42 Modified Request can be accessed at the following web address: http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=2717

CGM aspects that would remain unchanged as a result of the E42 Modified Request include the:

- Perimeter Waste Emplacement (PWE) disturbance area.
- Lake isolation system (there would be no change to the lake protection bund or temporary isolation bund, which has been constructed to hydrologically isolate the open pit and Lake Cowal during mining and post-mining).
- The CGM area of incursion into Lake Cowal.
- Tenement status – there would be no change to the status or the area of ML 1535.
- Gold extraction methods – gold would continue to be extracted from the ore using a conventional carbon-in-leach cyanide leaching circuit.
- Cyanide concentrations – there would be no change to the cyanide concentration levels at the discharge point to the tailings storage facilities.
- Method of development of the open pit – the open pit would continue to be developed using conventional open pit mining methods occurring in stages as the pit is widened and progressively deepened.
- Pit dewatering – there would be no change to the pit dewatering methods to manage potential surface and groundwater inflows.
- Tailings storage facilities area – there would be no change to the number of tailings storage facilities or currently approved disturbance area of the tailings storage facilities.
- Tailings storage facilities water management processes – tailings storage facility water management would continue to involve maximising water re-use through the under-drainage pipe network, decant towers and water return pipeline.
- Water supply – no change to the water supply sources except for the introduction of a saline groundwater supply borefield within ML 1535.
- Bland Creek Palaeochannel borefield – no change to the maximum extraction limits from the Bland Creek Palaeochannel borefield.
- Rehabilitation programme – overall, the approved CGM rehabilitation programme would remain unchanged.
- Power supply – electricity to the site would continue to be provided via the existing 132 kilovolt (kV) electricity transmission line (ETL) from Temora.
- Hours of operation – no change to the hours of operation of the mine.

The E42 Modified Request approved on 10 March 2010 and the modification approved on 17 January 2011 were the subject of proceedings commenced by Neville "Chappie" Williams in the Land and Environment Court against the Minister for Planning and Barrick. Justice Pain delivered judgment in these proceedings on 8 July 2011, dismissing the entirety of the applicant's claim.

Amendments and Revisions to Environmental Management Plans

Surface Water, Groundwater, Meteorological and Biological Management Plan

Barrick prepared a revised Surface Water, Groundwater, Meteorological and Biological Management Plan (SWGMBMP) and provided it to the Independent Monitoring Panel (IMP) and other appropriate regulators in accordance with CGM Development Consent Condition 3.2(a) for review. The DoPI approved the revision on 10 March 2010 after consultation with other departments and the IMP.

Site Water Management Plan

In terms of Barrick's requirements to review all environmental management plans (EMPs) at least every 5 years, Barrick (Cowal) was previously advised by the DoPI that a revision of mitigation measures in the Site Water Management Plan (SWMP) was all that remained to be completed by 30 April 2010 (letter from DoPI dated 08 April 2010). This was next extended to June 2010 after a written request from Barrick (Cowal). A revised SWMP was subsequently submitted to the DoPI in June 2010. Following the provision of additional review comments of the SWMP by the OoW (after the revised SWMP had been submitted to the DoPI), the revised SWMP was then re-submitted to the DoPI on 30 November 2010.

Erosion and Sediment Control Plan

The ESCP was amended to include the soil disturbance and management measures associated with the new saline bores on the lake floor. This addendum to the ESCP was approved by DoPI on 10 March 2010.

Cyanide Management Plan

The Cyanide Management Plan (CMP) was amended to reflect the Development Consent modification pursuant to section 96(1A) of the EP&A Act approved on 28 August 2009 (herein referred to as the June 2009 Modification) to allow the addition of a cyanide destruction method (i.e. the INCO process) as an alternative to Caro's Acid, and the associated introduction of sulphur dioxide (SO₂) as sodium metabisulphite (SMBS). The addendum to the CMP was approved by the DoPI on 24 March 2010.

Barrick commenced negotiations with the OEH and DTIRIS (Minerals) in September 2010 regarding a proposed change to the location at which monitoring of CN_{WAD} levels of the aqueous component of the tailings slurry stream is undertaken at the CGM. On 28 July 2010, pursuant to Development Consent condition 8.2(b)(ii), the Director-General of DoPI directed Barrick to change the location for the monitoring of cyanide levels in the tailings slurry stream, and this change in locations was then reflected in addendum to the CMP approved by the Director-General of DoPI on 20 October 2010 and a variation of the EPL issued on 24 June 2011. As discussed above, an EPL variation application was prepared during the reporting period and a description will be provided in the 2011 AEMR.

Noise Management Plan

The Noise Management Plan (NMP) was amended to include noise monitoring sites at 'West Lea' (NO7) and 'McLintock's' (NO8). The addendum to the NMP was approved by the DoP on 08 April 2010. The NMP was again revised during the reporting period to reflect the modification of the Development Consent conditions relevant to noise on 10 March 2010.

Hazardous Waste and Chemical Management Plan

Barrick (Cowal) also prepared a revised Hazardous Waste and Chemical Management Plan (HWCMP) during the reporting period (27 April 2011). The CGM HWCMP was updated in accordance with Development Consent Conditions 3.2 and 5.7 and revised to reflect changes in operational practices since the commencement of the CGM. DoPI approved this Revision on 13 May 2011.

Transport of Hazardous Materials Study

Addendums to the THMS were also prepared during the reporting period to include an alternative transport route for hydrogen peroxide from the Solvay Interlox Banksmeadow Facility (Sydney) to the CGM; an alternative transport route for sodium cyanide from the Chullora Railfast Centre (Sydney) to the Maritime Container Services (Sydney); and an alternative transport route for sodium cyanide from Goondiwindi (in Queensland) to the Patrick

Logistics Transport Facility (Dubbo). The addendums to the THMS were approved by the DoP on 13 October 2010, 16 June 2010 and 1 December 2010 respectively.

The amendments and/or revisions of the CGM EMPs to reflect the modification of the Development Consent on 10 March 2010 included revision of the CMP, NMP and Blast Management Plan (BLMP) and development of a Rehabilitation and Offset Management Plan (ROMP) to the satisfaction of the DII (Minerals) and Director-General of the DoP.

These EMP's have been revised in accordance with Development Consent condition 3.2(a) and have been submitted to the relevant authorities. A number of the revised EMP's are still awaiting approval from DoPI:

- The ROMP was reviewed by the relevant government departments from 30 July 2010 until forwarding to DoPI on 9 January 2011. The ROMP is currently awaiting DoPI approval.
- The Threatened Species Management Strategy was prepared in consultation with former DECCW (for the Inland Forest Bat, Sloane's Froglet and Woodland birds). The Strategy was submitted to DoPI on 28 February 2011 and is currently awaiting approval.
- The revised NMP was lodged with the DoPI on 30 July 2010 and is currently awaiting DoPI approval.
- The revised BLMP was submitted to the DoPI on 11 June 2010 and is currently awaiting DoPI approval.
- The revised SWMP was lodged with the DoPI in June 2010 and a further revised version was lodged on 30 November 2010 (following review comments provided by OEH (formerly DECCW), and OoW). The revised SWMP is currently awaiting DoPI approval

1.2 MINE CONTACTS

Contact details for the CGM are provided below:

General Manager Peter Geleta Telephone: (02) 6975 4707 Fax: (02) 6975 4740 Email: pgeleta@barrick.com	Environmental Manager Garry Pearson Telephone: (02) 6975 4708 Fax: (02) 6975 4740 Email: gpearson@barrick.com
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1.3 ACTIONS REQUIRED AT THE PREVIOUS AEMR REVIEW

The 2009 AEMR meeting was held 1 July 2010 at the CGM. Actions arising from this meeting are included in Table 2. No additional directions were given during site visits during the reporting period.

**Table 2
AEMR Meeting Actions**

Action	Responsibility	Status	Document Reference
Piezos at south-east corner of STSF need to be repaired or replaced to further determine trending of the shallow aquifer.	Barrick	In progress – Barrick to complete and provide an update via short report.	Future
Likely 2010/2011 Australian Plague Locust (APL) activity.	Barrick	In progress – Barrick will follow combat protocol with Livestock Health and Pest Authority (LHPA) instruction.	2010 AEMR
MOP/REMP	Barrick/DTIRIS (Minerals)	In progress – Barrick will review status during next reporting period.	CGM MOP(Jan 2011 – Sept 2012)

1.4 CGM BACKGROUND

The CGM is owned and operated by Barrick and is located approximately 38 kilometres (km) north-east of West Wyalong, New South Wales (NSW) (Figure 1). Figure 2 provides the cadastral boundaries of properties in the vicinity of the CGM. Figure 3 provides an aerial photograph of the CGM, flown in December 2009.

North Limited (North) commenced exploration along the western side of Lake Cowal in 1981. From 1981 to 1994, exploration was concentrated on the Endeavour 42 (E42) ore body to increase the size and confidence of the resource by infill and deep drilling.

North received Development Consent for the Cowal Gold Project in February 1999. North was later acquired by Rio Tinto which subsequently sold the Cowal Gold Project to Homestake Australia Limited (Homestake). Homestake commenced advanced drilling on E42 in late 2001. In December 2001, Barrick acquired Homestake and its operating subsidiary. Barrick continued the drilling programme. Additional drilling of the E42 ore body was undertaken between 2001 and 2005. During 2003 and 2004, the CGM underwent a detailed design phase and construction commenced on 12 January 2004. Mining operations commenced in April 2005 followed by operation of the final stage of the open pit dewatering system in June 2005.

As stated above, construction activities at the CGM commenced in January 2004. Construction was carried out in accordance with the Development Consent. Vegetation clearance and soil stripping activities were undertaken prior to the commencement of construction of mine infrastructure. All clearance areas were subject to Development Consent Condition 3.10(B) which required Barrick to minimise the removal of trees and other vegetation to approved areas specified in Development Consent Condition 3.10(B). Vegetation clearance activities were conducted in accordance with the Vegetation Clearance Protocol and Threatened Species Management Protocol. Details of these are provided in the Flora and Fauna Management Plan (FFMP) and Implementation of the Threatened Species Management Protocol (TSMP) (Barrick, 2003h).

The CGM was the first non-operational gold mine using cyanide in the world to be certified to the International Cyanide Management Institute Code for Cyanide Management (17 April 2006). The CGM was also the first gold mine using cyanide in the world to be pre-operationally and operationally certified to the ICMI Code (2 August 2007). An independent professional third-party re-certification audit occurred in early August 2009

during which the operations were found to have maintained full compliance during the previous three years. Details regarding the re-certification audit are provided on the ICM's website (dated 17 May 2010): http://www.cyanidecode.org/media_pr188.php.

1.5 INDEPENDANT ENVIRONMENTAL AUDIT

The Development Consent requires that a compliance audit be undertaken every three years to assess the performance of the CGM against conditions of the Development Consent and other licences and approvals and the results included in the AEMR. The CGM Independent Monitoring Panel (IMP) recommended in their 2007 Annual Report that "*Barrick consider continuing use of the template-based approach established by aemc for environmental auditing of operations in order to regularly and systematically update progress on each of the environmental management and monitoring components*".

An Independent Environmental Audit (IEA) of the CGM was conducted between 19 April and 23 April 2010 by Trevor Brown and Robert Drury of Trevor Brown & Associates. The IEA was conducted in accordance with the Australian/New Zealand Standards AS/NZS ISO 14010:1996 – *Guidelines and General Principles for Environmental Auditing* and AS/NZS ISO 14011:1996 – *Procedures for Environmental Auditing*. The scope of the work for the compliance audit included the following:

- review of the implementation of the requirements of the Development Consent, licences and approvals for the CGM;
- conduct a site inspection and review of on-site documentation and monitoring data relevant to the audit;
- discussions with CGM staff in relation to the requirements of the Development Consent;
- assessment of the CGM against the requirements of the Development Consent; and
- preparation of the Compliance Audit Report providing assessment of compliance against each condition of the Development Consent.

A copy of the 2010 IEA is provided as Appendix D. The 10th IEA of the CGM will be conducted by Trevor Brown & Associates during the next reporting period and the outcomes will be described in the 2011 AEMR.

2 OPERATIONS DURING THE REPORTING PERIOD

Sections 2.1 to 2.10 describe the operations undertaken at the CGM during the reporting period. Activities included exploration, land preparation, infrastructure construction, mining, mineral processing, waste management, ore and product stockpiles, water management, hazardous material management and other infrastructure management.

2.1 EXPLORATION

A summary of the exploration, drilling and other geology related activities undertaken within ML 1535 during the reporting period is provided below.

Exploration activities undertaken included resource definition drilling in areas to the north-east and south-east of the open pit area, with minor drilling around the E42 pit. Drilling was undertaken as part of a two year programme. Approximately 5,000 m was drilled during 2010. Activities predominantly involved diamond drilling (to an average depth of 500 m) and a minor component of reverse circulation (RC) drilling (to maximum depth of 150 m).

Exploration drilling also occurred from the outside and inside of the lake protection bund during the reporting period. Exploration drill holes completed on the lake bed at E42/E46 were rehabilitated and concreted over the top 200 m.

Land disturbance was minimal as a result of the exploration activities. Drill rigs were mounted on relocatable platforms with drilling operations conducted in self contained units. Works were conducted under an environmental management system (EMS) approved by the DTIRIS (Minerals). Rehabilitation of the drilling areas is described in detail in the April 2009 to December 2010 MOP and subsequent MOP addendum.

2.2 LAND PREPARATION

Land preparation activities for the reporting period involved soil stripping of the areas listed in Section 3.6.3.2.

Within ML 1535, soil stripping was undertaken within the open pit area, the PWE and the various stockpile locations. These locations are shown on Figure 4.

A total of 212,200 m³ of soil was stockpiled as a result of stripping activities carried out in the extension of the NWE as authorised by the approved E42 modified request (March – May 2010). A total of 20,000 m³ of topsoil was placed for rehabilitation purposes on the 5th lift of the NWRE and 24,000 m³ of topsoil was used for rehabilitation of the 3rd lift of the STSF.

Prior to soil stripping being undertaken at a particular location, the CGM Vegetation Clearance Protocol (VCP), Threatened Species Management Protocol and Aboriginal Heritage Clearance requirements were implemented.

Soil stripping within ML 1535 involved the removal of woody vegetation through the use of graders/scrapers followed by the removal of grasses and topsoil. Topsoil resources were stripped to a depth of approximately 0.25 m.

Stripped soils were either re-used or delivered directly to the soil stockpiles shown on Figure 4. The date, location, soil type, volume and description of any ameliorants added to stockpiled materials were recorded in the CGM soils database.

2.3 INFRASTRUCTURE CONSTRUCTION

The construction details and the construction status of infrastructure components at the end of the reporting period are provided in Table 3. The infrastructure components are shown on Figure 4. There were no variations to the MOP.

Table 3
Infrastructure Construction Components During the Reporting Period

Infrastructure Component	Construction Status
Temporary Isolation Bund Lake Cowal	Commenced filling and entered south-east corner ML (gate 12) by February 2010. Lake Cowal met the Temporary Isolation Bund (TIB) in August 2010 and the trigger point of 204.5mRL.
STSF	Tailings deposition ceased in September 2009, when construction works commenced on the third lift during the reporting period. The third lift will be operational from February 2011.
NTSF	Construction works ceased on the second lift in September 2009, when tailings deposition commenced. Third lift earthworks will commence in February 2011. Anticipated completion of third lift in August 2011.
SWE	Clearing of topsoil portions to the west occurred after Wiradjuri Monitor inspection in dry weather periods of October 2010 (and April 2011). 100 tube tree stock were planted into two plots on the subsoil and into two plots on no-subsoil in December 2010. Nearly all plants failed to thrive despite wet conditions. Herbaceous cover has remained strong on system, minimal recurrence of Bathurst Burr.
PWE	Cutback authorised by the January 2009 Modification occurred in September to October 2010. This necessitated the removal of the northern half of the east wall rehabilitation trail plots
SMBS cyanide destruct circuit	Infrastructure design and preliminary engineering completed last reporting period. Commissioned and operational from March 2010. No issues to date.
NWE (western extension)	Basal layer construction for the western extension completed last reporting period. VCP conducted in March 2010. New height of NWE approved by s75W modification to be exercised by May 2011. Preparation for northern replicate trials adjacent to Pond D1 undertaken since November 2010.
Mining Maintenance Boiler Makers Workshop	Construction commenced late 2010 and roofing was completed in April 2011.

2.4 MINING

Mining operations continued throughout 2010. Material types mined included ore and waste (including mineralised material). Mostly sulphide ores were extracted with some oxide ores being stockpiled for later use. A total of 7,800,016 t of ore was mined and 26,217,420 t of waste rock and 827,237 t of mineralised material were mined during the reporting period.

Topsoil and subsoil was stockpiled in advance of expanding the NWE. Expansion of the NWE occurred during the monitoring period. The SWE area was cleared of topsoil during the previous reporting period. Additional reclamation shaping of the outer northern batter was also undertaken using the new rock-topsoil method.

Sulphide waste mined from the open pit was stockpiled for the STSF and NTSF wall raise project works and outer slope rehabilitation. Clay obtained from phase F works was stockpiled for future works. The upstream lift material was direct hauled on occasions. This process of TSF lifts will be ongoing on an annual basis.

Mining during 2010 occurred in two separate areas Stage D and Stage F. Mining in Stage AC was completed in June 2009. Mining commenced in Stage F in October 2009 with both ore and waste being mined in that area during the reporting period.

Mining commenced in the Stage D pit from RL 1,056 m to RL 1,002 m, representing a vertical advance of 54 m. Mining commenced in the Stage F pit from the surface to RL 1,119 m, representing a vertical advance of 90 m.

Consistent with the January 2009 Modification, the height of the perimeter waste emplacement (PWE) was reduced in places to enable the expansion of the open pit, whilst meeting relevant geotechnical criteria. Vertical and horizontal dewatering systems were maintained throughout the reporting period. Additional horizontal holes were drilled as mining progressed through phase F.

A new MOP was approved during the reporting period. As stated in Section 1.1.1, a new MOP was prepared in the previous reporting period (for the period April 2009 – December 2010) and approved by the DTIRIS (Minerals) on 3 April 2009. An addendum to this MOP was approved by DTIRIS (Minerals) on 19 March 2010. Most recently, a new MOP was approved by the DTIRIS (Minerals) on 30 March 2011 for the period January 2011 to September 2012. The new MOP reflects the changes authorised by the modifications to the Development Consent approved by the Minister for Planning on 11 February 2009, 28 August 2009, 10 March 2010 and 17 January 2011.

2.5 MINERAL PROCESSING

Processing continued throughout 2010. The plant recovered 298,444 ounces of gold.

Tailings deposition continued throughout the entirety of 2010 within the second lift of the NTSF.

Construction works began on the STSF in September 2009 and continued throughout the 2010 reporting period.

The April 2009 to December 2010 MOP and subsequent MOP addendum provides further detail regarding minerals processing undertaken at the CGM.

2.6 WASTE MANAGEMENT

Waste Rock (including mineralised material), Ore and Processing Waste

The CGM produced waste rock (including mineralised material), ore, processing waste and product during the reporting period. Topsoil continued to be stripped, used and spread during the reporting period in accordance with the Soil Stripping Management Plan (SSMP) (Barrick, 2003a) as described in Section 3.6. The amount of ore and waste rock (including mineralised material), ore, processing waste and product produced and topsoil stripped, spread and used is set out in Table 4.

**Table 4
Production and Waste Summary**

	Cumulative Production		
	Start of Reporting Period	At End of Reporting Period	End of Next Reporting Period (estimated)
Waste Rock (Mt) (excluding mineralised material)	90.2	116.42	142.42
Mineralised Material (Mt)	11.16	12.00	12.70
Ore (Mt)	37.8	45.6	56.1
Processing Waste (Tailings) (Mt)	23.6	30.81	38.21
Product (oz)	785,918	1,084,362	1,382,806

Non-Mining Waste

Non-mining waste generated at the CGM during the reporting period was transported, handled and disposed of in accordance with the HWCMP (Barrick, 2006c). Wastes generated during the reporting period consisted of:

- administration area domestic and packaging waste;
- sewage effluent;
- waste hydrocarbons including lubricating oils, hydraulic oils, degreasing fluids, distillate and petroleum fuels;
- used oil filters, grease and fuel/oil contaminated rags;
- vehicle batteries and light vehicle tyres;
- general construction waste/obsolete construction chemicals;
- scrap metals including electrical off-cuts and undersized grinding media magnet rejects; and
- spent spill kit recovery/clean-up materials.

Any hazardous material or dangerous good not used or obsolete for site use is disposed to appropriate off-site disposal facilities by a licensed waste management contractor.

Table 5 provides a summary of operational waste types generated during the reporting period.

**Table 5
Operational Phase Wastes – Transport, Handling and Disposal**

Waste	Handling	Transport/Disposal
General inert construction waste (e.g. concrete, and timber)	Waste stockpiled on-site and progressively removed/disposed.	Disposal in West Wyalong landfill/refuse facility by arrangement with BSC.
Office and packaging waste	Waste collected on-site.	Removed by contractor or BSC truck or disposal on-site in waste rock emplacements only. Disposal to West Wyalong landfill/refuse facility by arrangement with BSC or recycling depot (e.g. cardboard, aluminium cans, plastics and paper). Cardboard bailer installed and operational in 2009. Bails taken to recycler in West Wyalong.
Food waste	Domestic solid waste held in specific storage containers.	Removed by contractor or BSC covered vehicle. Disposal to West Wyalong landfill/refuse facility by arrangement with BSC.
Scrap metal streams	Waste was segregated and held on-site in designated areas.	Removed from site by contractor for recycling. A steel drum crusher was purchased and will continue to be used during the next reporting period.
Used lead acid batteries	Used batteries were stored in a banded area.	Periodically removed from site by a licensed contractor. Recycled by licensed contractor.
Degreasing fluids, distillate and petroleum fluids	Used and flammable petroleum liquid wastes stored in dedicated storage vessel(s).	Removed from site by licensed contractor for recycling/disposal.

Table 5 (continued)
Operational Phase Wastes – Transport, Handling and Disposal

Waste	Handling	Transport/Disposal
Lubricating oils and hydraulic oils	Used and waste oils stored in dedicated storage vessel(s).	Removed from site by licensed contractor for recycling/disposal.
Used/rejected tyres	Tyre store was maintained in designated area.	On-site disposal at surveyed locations in waste rock emplacements.
Hydrocarbon tainted soils/rock.	Treated in on-site bioremediation facility.	Treated in on-site bioremediation facility.
Used oil/fuel filters	Filters stored in dedicated bins prior to removal.	Removed by licensed contractor. Disposal or recycling at licensed waste facility.
Drained/crushed oil/fuel filters	Filters stored in dedicated bins prior to removal.	Removed from site for recycling disposal via licensed contractor.
Used absorbents – free liquid	Clearly marked to avoid mixing of incompatible substances. Transferred to clearly labelled drums or similar containers.	Removed by licensed contractor. Disposal at licensed waste facility.
Liquid waste from sewage system	Contents of septic systems pumped out as required (currently). Portaloo units maintained by contractor.	Treated effluent from site sewage treatment facility disposed of via above ground pipeline to tailings storage. Solids from site sewage treatment facility pumped out and collected as required via licensed contractor. Grey water used for watering of Geology garden beds and landscaping or as TSF make-up water.

On-site disposal of trash screen oversize in waste rock emplacements is permitted but has not been conducted since 2008 due to a reduced loading of organic trash whilst treating sulphide ore. Analyses of the material have shown it to be inert as compared to OEH Guidelines for waste classification. The April 2009 to December 2010 MOP and subsequent MOP addendum provides further detail regarding waste management activities undertaken at the CGM.

2.7 ORE AND PRODUCT STOCKPILES

The amount of CGM ore and waste rock (including mineralised material) produced during the reporting period is set out in Table 4.

The April 2009 to December 2010 MOP and subsequent MOP addendum provides further detail regarding ore and product stockpile management undertaken at the CGM.

2.8 WATER MANAGEMENT

Groundwater

The quantity of water able to be extracted from the Bland Creek Palaeochannel (BCPC) is limited by:

- a) Development Consent Condition 4.4(a) which states:
 - (a) *The maximum daily extraction of water from the Bland Creek Palaeochannel shall not exceed 15 ML/day, and not exceed 3,650 ML/year. A total extraction of 30,000 ML shall not be exceeded for the life of the mine, unless otherwise agreed by the Director-General, in consultation with OoW. All bores from the Bland Creek Palaeochannel borefield used for mine purposes must be metered.*

and
- b) the OoW bore water licences.

Development Consent Condition 9.2(i)(f) requires the outcome of the water budget for the year and the quantity of water used from water storages and BCPC borefield to be included in the AEMR. A summary of the volume of water extracted from the BCPC is summarised in Section 3.4.3.2

A total of 1,808.26 megalitres (ML) of water was extracted from the BCPC during the reporting period.

The groundwater supply borefield within ML 1535 was commissioned in mid-2009 (5 year OoW Licences #70BL232691 to #70BL232692 were granted from 28 January 2010 to 27 January 2015). Approximately 0.5 ML/day was extracted from the saline groundwater supply borefield within ML 1535 over the period May 2009 to April 2010. No extraction has occurred since April 2010 due to access restrictions caused by the flooding of Lake Cowal.

The water extracted was used mainly for the treatment of sulphide ores through the processing plant. Water was also used for soil conditioning to achieve optimal compaction rates during STSF lift construction works.

Pond D9 held approximately 630 ML of groundwater (from the BCPC, saline groundwater supply borefield and rainfall) and surface water (Regulated River water) at the end of the reporting period.

The groundwater level associated with the BCPC borefield is monitored on a continuous basis by the OoW groundwater monitoring bore on Burcher Road (GW036553). Contingency measures have been developed for implementation when water levels reach either RL 137.5 m AHD or RL 134 m AHD. These trigger levels were developed in consultation with the OoW and other water users within the BCPC including stock and domestic users and irrigators. The trigger levels were not reached during the reporting period.

Notwithstanding, Barrick continues to assist local BCPC water users with access concerns. As per an agreement with the OoW (13 September 2006), Barrick supplied water to users in the West Plains scheme (35.13 ML) and Trigalana schemes (10.37 ML) via the Barrick BCPC borefield pipeline during the reporting period. Also as agreed with the OEH and BCPC Water Users Group, Barrick has conducted regular surveys to monitor nine monuments on the east side of Lake Cowal for any evidence of soil compaction.

Development Application No. 2011/0064 was granted by the Forbes Shire Council on 20 December 2010 for the construction and operation of the eastern saline borefield for a period of five years (until 20 December 2015). Details of the construction and operation of the eastern saline borefield and associated production bore licences will be provided in the next reporting period.

The open pit dewatering borefield was established external to the perimeter of the E42 open pit. A total of 92.55 ML was extracted from the open pit borefield and a further 915.97 ML from the open pit dewatering sumps (including ponds D4, D3, D8A and rainfall) during the reporting period. The water from the borefield was mainly used for dust control on pit haul roads however any surplus was used for plant ore treatment via Pond D6.

Surface Water

No water was purchased from the regulated Lachlan River trading market during the reporting period. Barrick's High Security and General Security zero allocation water access licences (High Security Title Identifier WAL13749 has a OoW Reference of 70AL603333, and General Security Title Identifier WAL13748 has a OoW Reference of 70AL603332) enable trade of Temporary Water. The Jemalong irrigation channel transfer to the Bore 4 intake pumping station to the CGM was not used during the reporting period.

Table 6 provides the volume of water contained in the water storages during the reporting period. The Cowal Gold Mine water management system is described in detail in Figure 5.

Table 6
Stored Water

	Volumes Held (ML)		
	Start of Reporting Period	End of Reporting Period	Storage Capacity
Contained Water Storage (D1, D2, D3, D4, D5, D8A and D8B)	10	26	375
Process Water Storage (D9)	500	630	700
Process Water Storage (D6 + TSF Decant[s])	40	85	250

The April 2009 to December 2010 MOP and subsequent MOP addendum provides further detail regarding water management undertaken at the CGM.

2.9 HAZARDOUS MATERIAL MANAGEMENT

Hazardous Materials and Dangerous Goods were managed in accordance with the EIS and HWCMP.

Emergency response spill kits are provided at all fuel storage locations. Licensed waste contractors remove all waste oil and used engine coolant from site for recycling.

In accordance with the Chemical Management Strategy described in the HWCMP, all raw materials/consumables brought on-site for use at the CGM are recorded in an Inventory Register which is updated and available for inspection by the appropriate authorities. Material Safety Data Sheets for these substances are also included in the Inventory Register. Substances that are designated as hazardous and/or dangerous goods are also included in the HSDG Register. Fuels and oils in the Inventory Register are also included in the FO Register. The HWCMP (Barrick, 2006c) was approved by the Director-General of the DoPI on 6 March 2006. In 2009 an addendum to the HWCMP was prepared to: revise the waste classifications in accordance with the *Waste Classification Guidelines* (OEH, 2008); revise the waste tracking requirements in accordance with the amended *Protection of the Environment Operations (Waste) Regulation, 2005*; revise the proposed management measures for waste tyres generated at the CGM; and include proposed management measures for the area of historic contamination. The addendum to the HWCMP was approved by the DoPI on 15 May 2009. Further, as described in Section 1.1.2, on 27 April 2011, Barrick lodged with DoPI a revised HWCMP for approval.

The application and approval process for the introduction of new substances at the CGM is conducted via the Cowal Risk Management Applications (CRMA) – Hazardous Substance Register (HSR). The MSDS information for approved chemicals, lubricants and fuels is available to all employees via the CGM intranet using the ChemAlert III software package. Laminated field hardcopy information folders are also available.

Any surplus chemical substances from the operations are removed by licensed contractors to approved locations for re-use/disposal.

As provided in Section 1.1.2, Barrick (Cowal) prepared a revised HWCMP during the reporting period. The CGM HWCMP was updated in accordance with Development Consent Conditions 3.2 and 5.7 and was revised to reflect changes in operational practices since the commencement of the CGM.

Hazard Audit

In accordance with the Development Consent Condition 5.4 (e), a Hazard Audit is required to be conducted 12 months after the commencement of operations (and three yearly thereafter).

An audit was conducted by an independent qualified person (Dean Shewring of Pinnacle Risk Management) using DoPI Hazard Audit Guidelines (Advisory Paper No 5) in 2007. No significant findings were made. A Progress Report detailing the status of the prior 14 recommendations of the report was prepared during the prior reporting period.

The first triennial Hazard audit occurred on 19 to 23 April 2010 and was conducted by an independent qualified person (Dean Shewring of Pinnacle Risk Management). A Progress Report detailing the status of the next 11 recommendations will occur during the next reporting period.

The April 2009 to December 2010 MOP and subsequent MOP addendum provides further detail regarding hazardous material management undertaken at the CGM.

2.10 OTHER INFRASTRUCTURE MANAGEMENT

This section is not applicable to the CGM for this reporting period.

3 ENVIRONMENTAL MANAGEMENT AND PERFORMANCE

Environmental management at the CGM during the reporting period has been conducted under the guidance of and in accordance with the numerous EMPs prepared specifically for the CGM.

Overall Performance against Licences, Approvals and Environmental Management Plans and Effectiveness of Environmental Management

The fourth twelve monthly operational phase IEA was conducted for the CGM from 19 April to 23 April 2010. The auditors concluded that Barrick has demonstrated general compliance with the conditions attached to the Development Consent, licences and approvals granted for the CGM. The results of the audit indicated that the overall performance against the licences, approvals and EMPs has been of a high standard. The report is attached in Appendix D. The IEA for the fifth 12 months of operations will be conducted during the next reporting period.

Barrick has complied with the commitments of the MOP for the approved current term (2009 – 2010) to the extent that site conditions permitted.

The Environment Protection Licence No. 11912 Annual Environmental Return (AER) for the 2010 reporting period was submitted to the OEH on 21 February 2011. The AER provides the OEH with (amongst other things) a Statement of Compliance by Barrick in relation to its monitoring obligations under Environment Protection Licence No. 11912. In its AER, Barrick identified non-compliances related to monitoring not being undertaken at some surface water, dust, groundwater, noise and blast monitoring points. The reasons for the non-compliances were inaccessibility of monitoring points due to weather, scheduling errors or equipment failure. There was also one 1dBA exceedance of the night time noise criteria and one 3 dBA and one 2 dBA exceedance of the evening noise criteria as defined in condition L6.1 of the EPL. The details of the noise non-compliances and actions planned to prevent reoccurrence were set out in the AER and are also described in Section 3.11. The occurrence of non-compliances is listed on the OEH website at:

<http://www.environment.nsw.gov.au/prpoeoapp/>

Sections 3.1 to 3.22 describe the objectives of relevant EMPs, their management measures and discuss the environmental performance of each EMP for the reporting period. Overall, due to Barrick's substantial compliance with the EMPs, environmental management for the CGM during the reporting period has been highly effective. Reportable incidents and any further improvements to the environmental management strategies at the CGM are also discussed.

Expected Performance of Licences, Approvals and Environmental Management Plans

Barrick has all the relevant Project Management systems, staffing and consultancy arrangements in place to enable it to be in a position of confidence regarding compliance with all relevant licences, approvals and EMPs. Barrick expects to undertake CGM activities for the next reporting year in accordance with all relevant licences, approvals and EMPs. Section 6 discusses the management objectives and targets for the CGM during the next reporting period.

Independent Environmental Audit

The Development Consent for the CGM requires an IEA of compliance. Development Consent Condition 8.8 states:

- (a) *An Independent Environmental Audit shall be completed:*
- a. *six monthly during construction;*
 - b. *12 months after the commencement of ore processing; and*
 - c. *then every three years thereafter until decommissioning of the mine and ore processing operations respectively, 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, BSC, DECCW, OoW, DII (Minerals) and CEMCC within two weeks of the report's completion for comment.

- (i) *The audit shall:*
- *assess compliance with the requirements of this consent, licences and approvals;*
 - *in the event of any non-compliance, report on the effectiveness of the environmental management of the mine as it may relate to the area of non-compliance;*
 - *be carried out at the Applicant's expense; and*
 - *be conducted by a duly qualified independent person or team approved by the Director-General in consultation with BSC and CEMCC.*
- (ii) *The Director-General may, after considering any submission made by the relevant government agencies, BSC and CEMCC on the report, notify the Applicant of any requirements with regard to any recommendations in the report. The Applicant shall comply with those reasonable requirements within such time as the Director-General may require.*

As described in Section 1.5, the IMP recommended in their 2007 Annual Report that “*Barrick consider continuing use of the template-based approach established by aemc for environmental auditing of operations in order to regularly and systematically update progress on each of the environmental management and monitoring components*”.

The IEA was conducted between 19 April and 23 April 2010 by Trevor Brown and Robert Drury of Trevor Brown & Associates to assess the status of the development activities undertaken during the fourth twelve months of Project operations. The audit concluded that the audit findings confirmed a general compliance with the Development Consent conditions, Environment Protection Licence conditions and requirements of the conditions attached to the mining lease.

Environmental Risk Identification

A Preliminary Hazard Analysis (PHA), Transport of Hazardous Materials Study (THMS), *Hazard and Operability Study Report, Cowal Gold Project* (HAZOP) (Pinnacle Risk Management, 2004b), *Fire Safety Study, Cowal Gold Project* (FSS) (Pinnacle Risk Management, 2005), HWCMP, Final Hazard Analysis (FHA), Bushfire Management Plan (BMP), CMP, Safety Management System (SMS) and Emergency Response Plan (ERP) have been completed and relevant measures implemented for the CGM. Relevant measures continue to be implemented for the CGM, as appropriate.

Revision of Monitoring Programmes

Development Consent Condition 8 requires the monitoring programmes in Development Consent Conditions 8.1 to 8.6 to be revised or updated annually to reflect changing environmental requirements, significant changes in technology/operational practices and results from monitoring conducted. The monitoring programmes include:

- Meteorological monitoring (Development Consent Condition 8.1).
- Surface water (and biological), groundwater and cyanide monitoring (Development Consent Condition 8.2).
- Air quality and dust monitoring (Development Consent Condition 8.3).
- Noise and blasting monitoring (Development Consent Conditions 6.3(b) and 6.4(g) respectively).
- Fauna and flora monitoring (Development Consent Condition 8.5).
- Cultural heritage monitoring (Development Consent Condition 8.6).

As discussed in Section 1.1.2, several EMPs (including monitoring programmes) were revised during the reporting period.

Comments on specific monitoring programs are set out below.

Surface Water, Groundwater, Meteorological and Biological Monitoring Programme

The SWGMBMP was revised in accordance with the recommendations made by the CGM IMP to revise the SWGMBMP during their 2005, 2006, 2007 and 2008 review periods *viz: “with a view to reviewing options and possibly developing a more useful and effective scaled-down environmental monitoring system”*.

Further, in March 2008, the Development Consent was modified to remove the requirement to continue baseline biological monitoring and enabled the SWGMBMP to adopt an approach that is consistent with the ANZECC/ARMCANZ Water Quality Guidelines.

As such, the biological monitoring programme was revised to:

- a) focus monitoring so it is relevant to the potential impact pathways from the CGM to Lake Cowal biology;
- b) adopt an approach to the assessment of potential impacts on Lake Cowal resulting from the CGM that is consistent with the ANZECC/ARMCANZ Water Quality Guidelines; and
- c) provide a more useful and effective biological monitoring programme.

The revised SWGMBMP was reviewed by Professor David Goldney of Cenwest Environmental Services. Following his review of the SWGMBMP, Professor Goldney stated that:

the Monitoring Programme fulfils the relevant development consent conditions and provides a robust programme of monitoring which will contribute to the assessment of the effectiveness of environmental impact mitigation measures during the operations phase of the Project.

The revised SWGMBMP was also reviewed by the IMP. Following their review, the IMP stated that:

The IMP has assessed the draft report and is satisfied that the revised Monitoring Programme is consistent with the IMP recommendations made in 2005, 2006, 2007 and 2008.

In accordance with Development Consent Condition 8.2(a)(ii), the SWGMBMP was revised in consultation with the OEHL, OoW and DII (Fisheries). The DoPI approved the revised SWGMBMP on 10 March 2010.

To maintain a consistency between the SWGMBMP and the FFMP, Barrick will revise the FFMP to incorporate the revised biological monitoring programme as presented in the approved SWGMBMP during the next reporting period.

Air Quality Monitoring Programme

In late 2008, it was identified that changes in surface conditions had made access to the dust monitoring site "DG2 - Bird Breeding Area" potentially hazardous. As such, an addendum to the Dust Management Plan (DMP) was prepared to reflect the change to the location of DG2. The addendum to the DMP was approved by the DoPI in February 2009.

The use of galvanized brushes during sample collection ceased during 2009. Regular cleaning, maintenance and replacement of dust gauge components were also introduced as part of regular monthly monitoring activities. On the recommendation of IMP, Barrick has implemented a QA/QC programme with respect to its air quality monitoring programme, incorporating a portable duplicate station. ALS Environmental, a NATA accredited laboratory, has continued to be used as the preferred laboratory for dust analysis. The ALS supplied depositional dust collection jars were supplied with a non-copper based algaecide during the 2010 monitoring period. ALS Environmental has stated that the algaecide is used for clients where copper analysis is required and has shown not to cause interference with metals detection.

Blast Monitoring Programme

In 2009, it was identified that changes in surface conditions had made access to the blast monitoring site "BM04 - Bird Breeding Area" potentially hazardous. As such, an addendum to the BLMP was prepared to reflect the change to the location of BM04. The addendum to the BLMP was approved by the former DoPI on 15 May 2009.

The modification to the Development Consent (approved by the DoPI in March 2010) deletes Development Consent Condition 8.4 which was relevant to blast monitoring. A revised BLMP was submitted to the Director-General of the DoPI at the end of July 2010 in accordance with Development Consent Condition 6.3(b) and is currently awaiting approval.

As investigated and reported by The Saros Group (report submitted to the OEHL on 2 March 2011) and reported in the AER to OEHL on the 21 February 2011, from the monitoring data and blasting information available, recorded levels of ground vibration and air overpressure induced by blasting activities conducted at the CGM were compliant with the recommended criteria detailed in the BMP.

Cyanide Management Programme

An amendment to the CMP was prepared in October 2010 to reflect the June 2009 Modification which allowed the addition of a cyanide destruction method (i.e. the INCO process) as an alternative to Caro's Acid and the associated introduction of sulphur dioxide (SO₂) as SMBS. The addendum to the CMP was approved by the DoPI on 24 March 2010.

As described in Section 1.1.2, Barrick commenced negotiations with the DECCW and DII (Minerals) in September 2010 regarding a proposed change to the location at which monitoring of CN_{WAD} levels of the aqueous component of the tailings slurry stream is undertaken at the CGM. An addendum to the CMP was subsequently prepared and approved by the Director-General of the DoPI on 20 October 2010. A variation of the EPL was also issued by OEH on 24 June 2011 to reflect this change in monitoring location.

Noise Monitoring Programme

As reported in the AER to OEH on 21 February 2011, monitoring was undertaken by SLR Consulting (formally Heggies) in January and July 2010. The control strategies implemented during the reporting period in accordance with the NMP are considered to be effective. During September 2009, noise monitoring locations NO7 ("West Lea") and NO8 ("McLintock's") were added to the NMP.

The modification to the Development Consent (approved by the DoPI in March 2010) replaces Development Consent Condition 6.4 relevant to noise monitoring and deletes Development Consent Condition 8.4. As a result, a revised NMP was submitted to the Director-General of the DoPI at the end of July 2010, in accordance with Development Consent Condition 6.4(g) and is currently awaiting approval.

Reporting Requirements

Development Consent Condition 9.2(i)(c) requires the AEMR to include results of all environmental monitoring under the Development Consent and other approvals which includes interpretation and discussion by a suitably qualified person. Accordingly, the requirements of this condition are provided for each of the environmental risks in the sub-sections below.

The Development Consent and the EPL have a complaints mechanism. All complaints received during the reporting period are discussed in Section 4.1.

The EPL requires that Barrick notify the OEH of incidents causing or threatening material harm to the environment. There have been no such incidents during the reporting period.

3.1 AIR QUALITY

3.1.1 Reporting Requirements

3.1.1.1 Development Consent

The reporting of air quality monitoring is required by Development Consent Condition 8.3(c), which states that the applicant shall:

provide all results and analysis of air quality monitoring in the AEMR including a determination of the dust deposition rate in g/m²/month, which shall be plotted in the AEMR.

The reporting of meteorological monitoring is required by Development Consent Condition 8.1, which states:

The Applicant shall continue meteorological monitoring by utilising and maintaining the existing weather station on-site. The data shall be particularly used for predicting noise, dust and blasting impacts on nearby residences, and bird breeding areas identified by the Applicant in consultation with DECCW.

The DMP (Barrick, 2003c) was prepared in accordance with Development Consent Condition 6.1 to establish a dust management strategy for the CGM.

In accordance with the DMP, the following air quality related issues are required to be reported in the AEMR:

- Annual average dust deposition results (plotted in g/m²/month) and comparison to the OEH amenity criteria;
- Total suspended particulates (TSP) monitoring results and comparison to the OEH criteria;

- Measures employed to minimise/prevent excessive dust emissions;
- Dust related complaints and amelioration measures undertaken in the event of any confirmed exceedances of the OEH criteria;
- Review of the performance of dust control measures and the monitoring program;
- Interpretation and discussion of the air quality monitoring program results and management measures by a suitably qualified person; and
- CEMCC decisions relating to CGM dust issues.

In order to improve access and reliability in collecting samples due to the effects of adverse weather conditions, wet weather access roads have been constructed where possible. In addition, Barrick has purchased a six-wheeled vehicle that is capable of operating in wet and muddy conditions. Further to that, a small aluminium boat was purchased during 2010 in order to access sites located within the inundated Lake Cowal area.

3.1.1.2 Environmental Protection Licence

The EPL requires Barrick to undertake dust and TSP monitoring at points identified in EPL Condition P1.1. The licence also requires Barrick to undertake weather monitoring at the location identified in EPL Condition P2.1 and M8.1.

Condition R1 of the licence requires the completion of an Annual Return comprising a Statement of Compliance and a Monitoring and Complaints Summary at the end of each annual reporting period (i.e. the AER). Barrick submitted an AER for the period 23 December 2009 to 22 December 2010 to the OEH on 21 February 2011. Dust, TSP and weather monitoring undertaken at the monitoring points identified in EPL Conditions P1.1, P2.1 and M8.1 were reported. Additionally, Condition R2 of the EPL requires Barrick to notify the OEH of incidents causing or threatening material harm to the environment as soon as practicable after Barrick becomes aware of the incident.

3.1.1.3 Any Other Relevant Approvals

Barrick reported to the Greenhouse and National Pollutant Inventory during the reporting period.

3.1.2 Environmental Management

3.1.2.1 Control Strategies

Air quality safeguards and control strategies were implemented at the CGM during the reporting period to minimise dust emissions from construction activities and exposed areas in accordance with the Development Consent, DMP and EPL. These control strategies are summarised in Table 7.

**Table 7
Air Quality Safeguards and Control Strategies Implemented During the Reporting Period
For Construction Generated Dust Sources**

Source	Control Strategies
Disturbed Surfaces	<ul style="list-style-type: none"> • Disturbed surfaces were watered using water trucks to suppress dust. • Areas for soil stripping were minimised to reduce the area of exposed ground at any one time.
Access Roads	<ul style="list-style-type: none"> • Access roads were watered and regularly maintained. • A dust suppressant chemical (PetroTac) was applied to 5 km of unsealed Mining Lease roads around the general Administration and Plant area to reduce dust generation. • Site access routes are clearly marked and workplace inductions specify routes. • The speed of vehicles travelling on unsealed surfaces is restricted.
Soil Stripping	<ul style="list-style-type: none"> • Access tracks used for soil stripping during the loading and unloading cycle were watered. • Soil stripping was limited to areas required for future mining operations.

Dust control equipment was maintained in accordance with the site maintenance schedule based on equipment manufacturer's specifications. Data provided by the Cowal Automatic Weather Station (AWS) and StormVue is monitored regularly for potential storm activity. The CGM pit and exploration geology supervisor vehicles are equipped with lightning warning alert meters in the event of approaching storms. Such information is utilised to make decisions regarding dust control strategies. The dust management procedures decision-making flowchart from the DMP is provided on Figure 6.

3.1.2.2 Effectiveness of Control Strategies

In accordance with the DMP, implementation of the control strategies at the CGM minimised dust emissions from construction activities. The control strategies implemented during the reporting period are considered effective as demonstrated by the environmental performance outcomes as discussed in Section 3.1.3.2.

3.1.2.3 Variations from Proposed Control Strategies

There were no variations from the proposed control strategies during the reporting period.

3.1.3 Environmental Performance

3.1.3.1 Monitoring

Meteorological Monitoring

A meteorological station located near the south Mining Lease boundary collected meteorological data throughout the reporting period. The station measures real-time wind speed and direction, standard deviation of wind direction, temperature (2m, 10m), barometric pressure, humidity, solar radiation and rainfall. The Cowal automatic weather station (AWS) is supported by quarterly independent maintenance and calibration as well as production of monthly data reviews by Sentinel Pty Ltd. Review of the AWS by Sentinel Pty Ltd in 2006 resulted in upgrades to the station to ensure uninterrupted collection of weather data.

Annual and monthly wind roses from the Cowal AWS are presented in Figures 7a and 7b. The annual wind rose reveals a relatively even distribution of winds, although winds from the south and south-west tend to dominate. East-north-easterlies and north-westerlies were the least common wind types for 2010. The monthly wind roses reveal considerable temporal variation in the prominent winds. South-westerlies, southerlies and south-south-easterlies were most prominent in April, May, June, July and August. In contrast, northerlies were prominent in the warmer months of January, November and December.

The strongest winds recorded during 2010 blew from the east in February, the east-southeast in March and the west and southwest on August.

Monthly total rainfall measured at the Cowal AWS is shown in Table 8. Total annual rainfall in 2010 was approximately 682.7 mm, which was 80% more than the total rainfall recorded in 2009 and 40% more than the long-term average annual rainfall at nearby Wyalong (480 mm/yr based on statistical averages from BOM Station ID 050017). The highest total rainfall was received during February, October and December where 95.6 mm, 94.0 mm and 111.7 mm of rain was received respectively. All other months during the year recorded more than 20 mm total rainfall with the exception of January where only 2.8 mm was recorded. The data indicates that conditions were relatively wet throughout the 2010 monitoring period, which saw the filling of Lake Cowal. The Cowal AWS was calibrated on 21 January 2010, 30 April 2010, 19 August 2010 and 16 December 2010.

Table 8
Monthly Rainfall (mm) Measured at the Cowal Gold Mine in 2009 and 2010

Month	Rainfall in 2009 (mm)	Rainfall in 2010 (mm)
January	35.0	2.8
February	45.6	95.6
March	11.0	44.6
April	42.0	50.6
May	3.0	40.0
June	80.0	22.8
July	23.6	62.2
August	7.8	34.0
September	11.8	64.2
October	43.0	94.0
November	28.0	60.2
December	83.6	111.7
TOTAL	414.4	682.7

The remaining monthly Cowal AWS meteorological station data for 2010 is presented in Table 9.

Table 9
2010 Monthly Average Meteorologic Data

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Mean Humidity (%)	34.24	56.24	52.04	60.28	67.19	74.29	79.05	75.75	70.98	66.21	58.68	55.58
Mean Pressure (mbar)	985.17	988.59	992.7	992.76	991.69	996.88	997.67	991.19	993.28	993.16	990.14	984.15
Mean Wind Direction (°)	197.31	142.22	160.49	178.23	171.84	189.76	179.74	220.73	203.22	165.04	161.04	169.59
Mean Wind Velocity (m/s) 15min	3.97	3.60	3.06	2.43	2.59	2.80	2.60	3.60	3.13	3.23	3.411	3.61
2m Temp Max (°C)	43.6	38.67	37.3	30.79	27.51	20.44	18.44	19.08	26.7	32.59	34.83	40.61
2m Temp Min (°C)	11.61	14	10.58	6.19	1.29	-0.65	-0.51	-0.86	-0.76	3.81	4.79	6.98

Air Quality Monitoring

During the reporting period dust monitoring was carried out in accordance with the DMP utilising depositional (static or gravimetric) and high-volume Total Suspended Particulate (TSP) sampling equipment. Dust deposition was monitored at 18 sites within and surrounding the CGM (including one portable duplicate station), as shown in Figure 8. A high-volume sampler (HV1) at 'Coniston' Homestead to the north of the CGM collected TSP data throughout 2010, operating for 24 hour periods every 6 days.

A summary of the dust deposition results for the reporting period is provided in Table 10. Detailed dust monitoring results are provided in Appendix A.

Review and interpretation of the dust monitoring data for the reporting period was conducted by Dr Stephen Cattle of the University of Sydney (2011) in accordance with requirements of the DMP. The main conclusions of Dr Cattle's analysis are summarised in Section 3.1.3.2.

Table 10
Monthly and Mean Dust (insoluble solids) Deposition Rates (2010)

Dust gauge site	Monthly deposition of insoluble solids in dust (g/m ² /month)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Mean
DG1	0.8	1.1	2.1	1.1	1.7	0.7	0.8	0.5	0.6	3	0.3	1.1	1.2
DG2	0.5	0.5	0.9	1.2	0.8	0.2	1.6	3.2	8.2	6.3	8.4	5.1	3.1
DG3	9.6	7.8	0.7	1.1	8.4	0.8	9.7	9.7	9.7	9.7	4.5	4.1	6.3
DG4	2.9	2.9	1	3.2	0.3	2.9	11.9	11.9	11.9	6.7	1.1	1	4.8
DG5	6.8	6.8	6.8	1.3	6.8	10.7	1.7	30.1	0.4	0.4	0.7	0.9	6.1
DG6	1.1	1.8	2.8	1.5	16.6	1.4	11.7	0.7	10.1	1.8	8.6	8.6	5.6
DG7	2.1	2.3	1	1.2	12.2	9.4	10.9	27	7	1.1	1.7	3.5	6.6
DG8	0.6	2.5	1	1	0.2	0.6	1.4	2.9	0.8	2.7	0.5	2.5	1.4
DG9	1	1.3	1.4	1.2	1.8	2.1	1	3	0.3	0.3	3.6	0.8	1.5
DG10	1.1	0.9	1.1	1.1	4.8	1	0.7	0.2	0.6	0.7	0.9	1.3	1.2
DG11	1.4	1.7	3.7	2.6	2.1	7.1	1.9	2	1.4	1.3	1.2	2.3	2.4
DG12	3.2	5.3	5.3	2.3	1.2	1.6	3.8	8.6	20.6	5.5	3.5	2.9	5.3
DG13	0.6	2.6	4.2	1.9	0.8	0.7	7.7	9.1	8.2	8.2	2.8	3.6	4.2
McLintock's Shed	1.8	2.4	4.3	50.8	8.4	6.5	0.8	0.7	1.8	3.4	3.6	3.7	7.4
Site Office	2.5	9.7	6	4	73	10.6	5.5	19.6	14.4	1.8	4.8	1.8	12.8
Site 52	2	2.2	2.3	3.8	3.2	1.8	2.4	2.4	3.6	1.9	3.1	7.2	3
I5	1	4.8	2	1.2	5.7	0.5	6.2	12.6	2.7	24.5	2	6	5.8
Lakeside	1.8	3.1	1.4	1.2	4.8	1.7	4.8	0.6	0.6	3.3	0.6	1.4	2.1
Mean	2.3	3.3	2.7	4.5	8.5	3.4	4.7	8	5.7	4.6	2.9	3.2	

Improvements to Dust Monitoring Program

Recommendations made in the previous AEMR were continued during the 2010 reporting period. This included the cessation of galvanised wire brushes, periodic changing of worn components and a monthly maintenance and cleaning program. Further improvements include the engagement of the ALS Environmental to produce a standard 'blank' sample for quality control purposes (although this process will not be concluded until sometime during the 2011 reporting period) and raising of jars in small increments as the level of Lake Cowal increased. The blank sample was not used during 2010 as the laboratory was not able to successfully create the blank sample. The issue was with the particle size being too small. This will be anticipated to be addressed during 2011. Laboratory analysis of dust samples was conducted by ALS Environmental in Newcastle. Further improvements are proposed for the 2011 reporting period, as described in Section 3.1.5.

No additional dust gauges were installed during the 2010 reporting period.

An independent monitoring program is being conducted (in addition to the program outlined in the DMP) by Dr Stephen Cattle and PhD students Karl Hemi and Adrienne Ryan of the University of Sydney to study the true provenance of dust on Lake Cowal and whether that dust is a fertiliser or a toxin. 12 additional depositional gauges were sampled until September 2010 on a monthly basis. Six inverted Frisbee depositional dust collectors were added during mid-2009 and will continue to be sampled for a further 6 months until early-2011.

3.1.3.2 Performance Outcomes

Total Suspended Particulates (TSP)

The high-volume TSP results for the reporting period are shown in Figure 9.

When assessing long-term dust impacts, the OEHL refers to the Australian National Health and Medical Research Council (NHMRC) goal of $90 \mu\text{g}/\text{m}^3$ annual average TSP. This is the recommended maximum level that should be permitted in urban environments.

The average 2010 TSP level ($39 \mu\text{g}/\text{m}^3$) was distinctly lower than that of 2009 ($63 \mu\text{g}/\text{m}^3$), but similar to those of 2008 ($43 \mu\text{g}/\text{m}^3$), 2007 ($43 \mu\text{g}/\text{m}^3$) and 2006 ($43 \mu\text{g}/\text{m}^3$). The 2010 data showed the same strong seasonality as the data from 2006-2008. For only two measurements, did the TSP exceed the criteria of $90 \mu\text{g}/\text{m}^3$. These periods were 13 January 2010 and 1 April 2010.

There appears to be distinct seasonality in the data, which correlates well to the TSP data for this site during the period 2006-2009. The data shows that TSP measurements of between 25 and $80 \mu\text{g}/\text{m}^3$ are common in late spring, summer and autumn, whereas while TSP measurements of between 5 and $35 \mu\text{g}/\text{m}^3$ are common in winter and early spring. During the two periods in 2010 when TSP values were higher than the criterion, southerly winds, which might transport dust from the ML to the sampler, were only appreciable for one of these periods. This indicates that the mine site was not the sole contributor to the suspended dust.

In his analysis of the TSP dataset, Cattle (2011) notes that the continuing trends seen in the TSP dataset reflect the seasonal variation in topsoil moisture content around Lake Cowal as well as remote source areas of fine-grained dust. In southern Australia, dust storm activity is generally limited in winter due to moist topsoil, which retards the entrainment of dust particles (ibid.). As topsoil dries, entrainment of particles by wind increases (ibid). The higher range of TSP data for summer and early autumn 2010 suggests that remote source areas were in drought at that time, as the cumulative rainfall at Lake Cowal during 2010 was above average from February onwards.

Dr Cattle also noted that the fineness of suspended particles intercepted by the sampling unit ($<50 \mu\text{m}$) means that it is likely that a substantial proportion of the intercepted dust has been transported from elsewhere in the district or from sources further away.

Total Particulate matter $<10 \mu\text{m}$ (PM10) emissions were 1,659,176 kg/yr as reported in the 2010 National Pollutant Inventory (NPI) report. This figure is independently calculated and verified by Greenbase.

Deposited Dust

In accordance with Development Consent Condition 8.3(c), the annual average dust deposition rate has been plotted in $\text{g}/\text{m}^2/\text{month}$ as shown in Figures 10a to 10d.

The NSW OEHL criterion for acceptable increases in dust deposition at a site is $2 \text{g}/\text{m}^2/\text{month}$. The acceptable limit for the annual average deposition rate has been set at $4 \text{g}/\text{m}^2/\text{month}$, as shown in Table 11. However, distinguishing an increase in dust deposition due to a new dust source (such as a mine) is difficult unless a large quantity of baseline monitoring data is available to determine natural variability. Because of the difficulty in determining background variability, this analysis has focused on whether or not the data complies with the annual average deposition rate of $4 \text{g}/\text{m}^2/\text{month}$.

Table 11
OEH Impact Assessment Criteria for Dust

Pollutant	Averaging Period	Maximum Increase in Deposited Dust Level	Maximum Total Deposited Dust Level
2009-2010 Reporting Period:			
<i>Long term impact assessment criteria for deposited dust</i>			
Deposited Dust	Annual	2 g/m ² /month	4 g/m ² /month
From 10 March 2010:			
	Averaging Period	Criterion	
<i>Long term impact assessment criteria for particulate matter</i>			
Total suspended particulate (TSP) matter	Annual	90 µg/m ³	
Particulate matter < 10 µm (PM10)	Annual	30 µg/m ³	
<i>Short term impact assessment criterion for particulate matter</i>			
Particulate matter < 10 µm (PM10)	24 hour	50 µg/m ³	

Source: EPA (2001)

Note 1: Dust is assessed as insoluble solids as defined by AS 3580.10.1-1991 (AM-19).

Note 2: Deposited dust is assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air - Determination of Particulate Matter - Deposited Matter - Gravimetric Method.

Note 3: Dust emissions generated by the development shall not cause additional exceedances of the air quality impact assessment criteria listed in the above Table at any residence on privately-owned land, or on more than 25 percent of privately-owned land not located within Lake Cowal (March 2010 section 75W approval condition).

Table 10 above indicates several exceedances of the total dust deposition rate of 4 g/m²/month with some increases above the 2 g/m²/month annual increase level. In accordance with Australian Standard 3580.10.1 - 2003 extraneous organic material has been removed, where possible, from insoluble solids reporting results. Verbal confirmation has also been gained from ALS Environmental that where possible, that they remove any obvious foreign material from dust samples (e.g. sticks, grass etc.). Dust monitoring procedures are outlined in the CGM procedure titled 'ENV-002 Depositional Dust Monitoring' and has been prepared in accordance with appropriate standards and guidelines. Causes for the exceedances are provided by Dr Stephen Cattle and are described below.

Tabulated results for all dust gauges are presented in Appendix A.

The main findings of the depositional dust monitoring program for the monitoring period are (Cattle, 2011):

- Temporal and spatial variation in monthly dust deposition was considerable, as is generally the case in dust monitoring studies. The consistently high rainfall from February onwards resulted in there being less dust deposited overall (25% less than the previous two years) and only a weak correlation between season and dust deposition rate.
- Compliance with the assessment criterion of 4 g/m²/month average annual deposited dust was achieved at 6 out of 14 gauges outside the ML during 2010. With the exception of DG4 (native flora, bird breeding area – 4.8 g/m²/month), DG6 (Gumbelah residence – 5.6 g/m²/month) and DG7 (Lake Cowal residence – 6.6 g/m²/month), compliance was achieved at all residences and bird-breeding and native fauna areas.
- For the eight gauges external to the ML that exceeded the assessment criterion of 4 g/m²/month (DG3, DG4, DG5, DG6, DG7, McLintock's Shed, Site Office, I5), there appear to be two groups of gauges with different contributing factors. Samples from DG3, DG4, DG5, DG6, DG7 and I5 contained a significant proportion of combustible matter such as insects, bird droppings and vegetative matter. If the combustible fraction of each dust deposit was removed, none of these gauges would have annual dust deposition exceeding the assessment criterion.
- At the McLintock's Shed and Site Office gauges, however, a small number of monthly samples returned very large dust masses considerably greater than those of the other gauges samples, suggesting possible vandalism and/or contamination by birds.
- Partly as a consequence of the very wet year experienced, changes in monthly depositional rates correlated only weakly with seasonal conditions. Because the seasonality of the monthly dust deposition data is weak, it seems likely that local Aeolian process generally played a more dominant role than regional processes in determining dust deposition load in 2010.
- Two of the four gauges located within the ML yielded levels in excess of 4 g/m²/month. Levels recorded in these four gauges are not relevant to the CGM assessment criterion.

- The same potential contributing factors to the spatial and temporal variability of deposited dust as those discussed for the 2009 reporting period are thought to again be relevant to the 2010 period (i.e. potential contributions from bird excreta, bird activity, insects, vegetative matter, willy-willies, agricultural, surrounding dirt roads and mining land-use activities). These same factors are thought to also contribute to deposition loads.
- Conversations with Dr Stephen Cattle via phone and on site confirm these comments. Dr Cattle also indicated that the larger than previously seen bird activity, as a result of the filling of Lake Cowal, has contributed to the exceedances recorded through increased usage of gauges as 'perching' sites. Also, Cattle concluded that several of the elevated results immediately stand out as erroneous due to bird activity or even as a result of vandalism
- The relatively high rainfall across New South Wales during 2010 means that regionally or remotely-sourced dust transported via dust storms was not a significant input to the deposited dust load. The prevalence of wet weather may have increased the amounts of vegetative and insect matter deposited into the gauges.

Metals Concentrations in Dust

The dust metals data for 2010 appears to have two areas that need to be addressed. Firstly, all of the Copper and Zinc metals concentrations are generally large and secondly, with the exception of Copper and Zinc, all the metal concentrations collected in April are extremely low. In the first case, this situation has been addressed by the removal of copper sulphate as a preservative against algal contamination and has been replaced with a non-copper based algacide. In the second case, the laboratory failed to analyse the samples for dust in the initial sample run and upon re-sampling for metals, were required to dilute the sample to obtain sufficient quantities.

Of the detectable metals, aluminium and lead were present in concentrations similar to, or slightly smaller than, those typically found in regolith materials. Cadmium and selenium were rarely detected in the dust samples, but in the case of selenium this is not unusual. It is not clear why cadmium was so rarely detected in the 2010 dust samples. The dust arsenic concentrations were quite variable, ranging from below the detection limit to more than 7 times that of typical regolith materials. The copper and zinc concentrations measured in the 2010 dust samples are inaccurate, as they are orders of magnitude greater than expected for regolith materials. It is assumed that these erroneously high concentrations are due to either contamination or analytical error.

Aluminium

The concentrations of aluminium (Al) in dust samples range from below detection limit in several of the April samples, up to 84,000 mg/kg in the DG10 November sample. Partly because the Al concentrations of all the April dust samples were small or below the detection limit, the mean Al concentrations of samples from the various gauges, ranging from 3,394 to 30,392 mg/kg, are distinctly smaller than mean values for soil and sediment Al (Cattle, 2011). This likely indicates the preferential aeolian transport of non-Al-containing minerals such as quartz.

Arsenic

The mean dust arsenic (As) concentrations are quite variable across the different gauges and sampling periods. The April dust samples yielded no As concentrations above the detection limit. For many of the May and November samples, the As concentrations are two to three times greater than those typical of regolith materials up to 132 mg/kg. However, a number of samples returned Arsenic concentrations between three to seven times higher than that typical of regolith materials (Cattle, 2011). These sites included DG12, DG13 and Site 52 in May and DG5, DG10, Site Office and Lakeside in November.

Cadmium

Cadmium (Cd) concentrations for nearly all of the dust samples analysed are below detection limits, but for the few measurable samples the Cd concentrations obtained are typical of regolith materials (Cattle, 2011). The one exception to this is the 11.9 mg/kg recorded for the DG4 gauge in May.

Copper

The copper (Cu) concentrations of all of the dust samples are between 3 and 500 times greater than those typical of regolith materials (Bowen, 1979). Even for the April dust samples collected, which yielded very little metal concentration data, the Cu concentrations were distinctly higher than those typical of regolith materials. Clearly, there has either been contamination of the dust samples, or there has been a measurement issue that has caused spurious results (Cattle, 2011).

Lead

All of the April dust samples have lead (Pb) concentrations below the detection limit, so for the DG2, DG4, DG7 and DG9 gauges, which all lacked a November dust sample for metal analysis, a mean Pb concentration was not able to be calculated. As confirmed with the laboratory, analysis was not able to be carried out due to insufficient sample size.

However, for all of the other gauges, the vast majority of detectable Pb concentrations, and the mean Pb concentrations, are similar to those of regolith materials (Cattle, 2011). The three exceptions to this are the May samples from DG13 and Site 52, and the November sample from DG10. These three samples yielded Pb concentrations 3-5 times higher than those typical of regolith materials.

Selenium

Selenium (Se) concentrations for virtually all dust samples analysed are below detection limits. In the one instance where Se has been detected (DG3 in November), a value of 1 mg/kg was recorded, which is typical of regolith materials (Cattle, 2011).

Zinc

The mean dust zinc (Zn) concentrations for all of the gauges are between 2 and 60 times greater than those typical of regolith materials (Cattle, 2011). Even for the April dust samples collected, which yielded very little metal concentration data, the Zn concentrations for most dust samples were distinctly higher than those typical of regolith materials. Clearly, there has either been contamination of the dust samples, or there has been a measurement issue that has caused spurious results (Cattle, 2011).

3.1.4 Reportable Incidents

The DMP requires that dust-related complaints and amelioration measures undertaken in the event of any confirmed exceedances of the OEH criteria be reported in the AEMR.

No complaints were received relating to dust at the CGM during the reporting period. PetroTac treatment was continued during the reporting period and will continue into the next reporting period. PetroTac was also applied near the 'Coniston' residence to minimize production of dust related to mine traffic on the road.

Pit dust control will continue to be via saline pit water unless a more effective control is identified.

3.1.5 Further Improvements

As described in Section 3, recommendations made in recent Independent Monitoring Panel (IMP) reports will continue to be actioned during the next reporting period.

Barrick engaged Dr Stephen Cattle of the University of Sydney to interpret the 2010 Air Quality Monitoring Results and will likely engage Dr Cattle again to interpret the 2011 data set.

To address the likely contamination issues contributing to elevated copper levels in dust, a non-copper based algacide was provided by ALS Environmental during and will be used throughout the next reporting period. If not proven to be 100% effective additional controls such as wrapping the dust jars in alfoil and gladwrap will be looked at to provide additional protection.

Other improvements to the air quality monitoring program that Barrick will continue to implement during the next reporting period to improve confidence in future analyses include:

- The continuing use of standardised sample collection procedures across both the site monitoring program, whilst maintaining current Barrick site standards.
- Barrick will continue to use a QA/QC system utilising trip blanks and duplicate samples during the next reporting period.
- Included in the QA/QC program is the ongoing development of a standard sample, comprising of representative soil types from site, for use as a trip blank standard to better improve interpretation of results. A composite solids sample of representative soil and waste materials was being analysed by laboratories during the next reporting period. Once compiled composite sample will be used.

- All monitoring equipment is currently and will continue to be decontaminated each sample round using a solution of deionised water and Decon 90.
- A secondary laboratory will be sourced to provide a third party QA/QC check against ALS Environmental and ideally will be able to produce the blank sample as described above.
- A review of laboratory testing procedures will also be carried out during 2011 to ascertain the most accurate method of calculating results in accordance with Australian Standards and applicable conditions.

The University of Sydney will continue to liaise with Barrick sampling personnel on routine dust sampling methodology, as a means to reduce the likelihood of sample contamination during collection and dispatch stages.

To mitigate dust generated by vehicle movements within ML 1535, PetroTac (a water emulsified bitumen sealant) was first applied to 5 km of unsealed Mining Lease roads during October 2006. PetroTac has since been routinely applied around the general administration and workshop areas, on roads within the processing plant.

Barrick will implement further applications of PetroTac dust suppressant to unsealed roads within ML 1535 that are subject to high-traffic light vehicle use.

Saline pit water is used on heavy mobile equipment haul roads in the open pit mine and waste emplacement areas to reduce dust generation.

Other dust mitigation measures employed at CGM include water sprays at the primary crusher, covered conveyors within the processing plant and a covered crushed ore stockpile.

3.2 EROSION AND SEDIMENT

3.2.1 Reporting Requirements

3.2.1.1 Development Consent

The ESCMP (Barrick, 2003d) was prepared in accordance with Development Consent Condition 3.5(a) to provide erosion and sediment control strategies for works to be undertaken throughout the life of the Project (i.e. construction and operations).

In accordance with the ESCMP, the following issues are required to be reported in the AEMR:

- surface and groundwater monitoring results;
- comparison of surface water and groundwater monitoring results with criteria in the SGWMBMP (Barrick, 2003e);
- interpretation and discussion of the surface and groundwater monitoring program results; and
- CEMCC decisions relating to CGM ESCMP issues.

In addition, any proposed improvements to erosion and sediment control systems are required to be included in the AEMR (when monitoring indicates the need).

The ESCP was amended to include the soil disturbance and management measures associated with the approved saline groundwater supply borefield within ML 1535. The addendum to the ESCP was approved by the DoP on 10 March 2010.

3.2.1.2 Environment Protection Licence

Condition R2 of the EPL requires Barrick to notify the DECCW of incidents causing or threatening material harm to the environment as soon as practicable after Barrick becomes aware of the incident.

3.2.1.3 Any Other Relevant Approval

There are no other relevant reporting requirements from approvals in relation to erosion and sediment management for the reporting period.

3.2.2 Environmental Management

3.2.2.1 Control Strategies

A summary of the control strategies/management measures implemented during the reporting period in accordance with the ESCMP (Barrick, 2003d) is provided in Table 12. The erosion and sediment control systems for the reporting period are shown in Figure 11.

Table 12
Summary of the Relevant Erosion and Sediment Control Strategies/
Management Measures

Project Development	Control Strategy/Management Measure
Temporary Erosion and Sediment Controls Systems	
Internal Mine Access Road	<ul style="list-style-type: none"> • Minimisation of disturbance to watercourses that cross the road. • Provision of culverts and diversion of runoff from undisturbed areas. • Erection of silt fences downslope of small, disturbed areas. • Provision of sediment basins for concentrated runoff areas. • Stabilisation of the access road surface. • Rapid stabilisation and revegetation of road batters.
ML 1535 Fences	<ul style="list-style-type: none"> • Minimising the area disturbed and restricting access to non-disturbed areas.
Ore Stockpile and Process Plant Area	<ul style="list-style-type: none"> • Minimising the area disturbed and restricting access to non-disturbed areas. • Settlement/plant runoff storage. • Installation of silt fences. • Installation of runoff collections drains. • Dewatering of settlement storage following rainfall events. • Ripping and rehabilitation of hardstand areas.
Soil Stockpiles	<ul style="list-style-type: none"> • Use of silt fences and sediment traps to minimise soil movement. • Use of diversion banks, channels and rip-rap structures to divert surface water around disturbed areas and control runoff velocity.
Internal Mine Roads	<ul style="list-style-type: none"> • Constructing all access roads at an appropriated slope along the contour, where practicable. • The use of spoon drains, table drains and concrete culverts to control surface runoff from access roads. • Ripping and rehabilitation of roads no longer required for access.
Contractors' Area	<ul style="list-style-type: none"> • Minimising the area disturbed and restricting access to non disturbed areas. • Erection of silt fences downslope of small, disturbed areas. • Provision of sediment basins for concentrated runoff areas. • Ripping and rehabilitation of hardstand areas.
Borrow Pits	<ul style="list-style-type: none"> • Use of temporary sediment traps and sediments filters. • Use of temporary sediment basins.
Earthworks Associated with Landscaping	<ul style="list-style-type: none"> • Use of silt fences and sediment traps to minimise soil movement.
Up-Catchment Diversion System (UCDS)	<ul style="list-style-type: none"> • Use of temporary sediment traps and sediments filters. • Installation of silt fences and hay bale weirs downslope of all disturbed areas. • Installation of rip-rap structures along UCDS. • Vegetation stabilisation.
Internal Catchment Drainage System	<ul style="list-style-type: none"> • Construction of the internal catchment drainage system as described in the ESCMP. • Construction of sediment retention storages to reduce non-colloidal fraction of sediment carried in runoff from large disturbed areas. Storages sized to provide flow detention and effective settlement during small to medium sized flood events (1 in 20 year 1 hour event). • Use of small-scale runoff controls comprising hay bales and rockfill bunds to control sediment loads in runoff from small areas. Silt fences and hay bale weirs installed downslope of all disturbed areas. • Rapid stabilisation of disturbed areas using contour banks and furrows, erosion-stable drainage paths and early revegetation or armouring of disturbed areas. Disturbed areas rapidly stabilised to reduce sediment fluxes.

Table 12 (Continued)
**Summary of the Relevant Erosion and Sediment Control Strategies/
Management Measures**

Project Development	Control Strategy/Management Measure
Permanent Erosion and Sediment Controls Systems	
Lake Isolation System	<ul style="list-style-type: none"> • Construction of the Temporary Isolation Bund and Lake Protection Bund as described in the ESCMP. • Erection of a continuous silt curtain around the construction zone. • Provision of clean water diversion and settlement storages for runoff control at borrow areas. • Stabilisation and revegetation of the batters of the Temporary Isolation Bund.
Earth Mounds	<ul style="list-style-type: none"> • Rapid vegetative stabilisation.
Monitoring and Maintenance	<ul style="list-style-type: none"> • Water quality monitoring in accordance with the SWGMBMP. • Maintenance of erosion and sediment control structure where necessary.

3.2.2.2 *Effectiveness of Control Strategies*

In accordance with the ESCP the primary objectives of the control strategies are to:

- control the movement of sediment and salinity migration from areas disturbed by mining and construction activities; and
- maintain downstream (Lake) water quality.

The control strategies implemented during the reporting period were considered to be effective in meeting the above objectives as demonstrated by the environmental performance indicators. The environmental performance indicators are discussed in Section 3.2.3 below.

3.2.2.3 *Variations from Proposed Control Strategies*

There were no variations to the Erosion and Sediment Control strategy during the 2010 reporting period.

3.2.3 **Environmental Performance**

3.2.3.1 *Monitoring*

In accordance with the ESCMP inspections and maintenance of erosion and sediment control structures (e.g. silt fences, hay-bales, sediment ponds and diversion structures) occurred as required during the reporting period.

As discussed in Section 3.2.1.1 above, the ESCMP also requires the following to be reported in the AEMR:

- Surface and groundwater monitoring results. The surface and groundwater monitoring results are provided in Sections 3.3.3.2 and 3.4.3.2 respectively.
- Comparison of surface water and groundwater monitoring results with criteria in the SWGMBMP. The surface and groundwater monitoring results are discussed in Sections 3.3.3.2 and 3.4.3.2 respectively.
- Interpretation and discussion of the surface and groundwater monitoring program results. The surface and groundwater monitoring results are discussed in Sections 3.3.3.2 and 3.4.3.2 respectively.
- CEMCC decisions relating to CGM ESCMP issues.

There were no CEMCC decisions relating to CGM erosion and sediment control issues.

There are no additional monitoring requirements in any other approval.

No additional improvements to erosion and sediment control systems were made during the reporting period.

3.2.3.2 *Performance Outcomes*

The Cowal geotechnical department conducted monthly monitoring and assessment of structures such as all water holding facilities on site, waste dumps and the lake protection bund for sediment movement and erosion control effectiveness. In particular, analysis of the lake protection bund indicated that the increased rainfall experienced during 2010 has not significantly impacted on the stability of the structure. Some erosion and sediment movement was found to be evident. The effects of which have been minimised by improved vegetative cover on all slopes on site, resulting in improved soil stability. Lake Cowal has not been impacted due to the presence and effectiveness of the temporary isolation bund trapping any sediment movement.

Furthermore, water quality results as discussed in section 3.3.3 have not indicated that any impact on Lake Cowal has occurred. Water quality monitoring results will continue to be monitored and evaluated throughout the next monitoring period.

As described in Section 5.4, the new rock-topsoil rehabilitation treatment method appears to have demonstrated greatly reduced risk of erosion loss as evidenced by independent review (DnA Environmental, 2010). The rehabilitation trial areas created during the reporting period are discussed further in Section 5.4 of this report.

3.2.4 **Reportable Incidents**

No environmental incidents or complaints were reported or received relating to erosion and sediment control at the CGM during the reporting period. There were no CEMCC decisions regarding erosion and sediment issues for the reporting period.

3.2.5 **Further Improvements**

Works were carried out during 2010 to enhance the southern portion of the UCDS through repair and strengthening of erosion control structures. Works included repairing any previous erosion damage and construction of rock weirs to strengthen the southern edge of UCDS. Further works planned for 2011 include installation of a concrete causeway, firm up lake side of dam to direct water flow to causeway and additional rock weirs to prevent further erosion damage. The aim of these works is to reduce any potential erosion footprint and to minimise any impact if at all of excessive water flows through this area.

Stabilisation works conducted on the downstream and upstream slopes of the STSF and NTSF were conducted using several methods which were all more effective than topsoil alone during the heavy summer storm rains of early 2010. Further independent confirmation and rehabilitation success monitoring works will occur during the next reporting period. A two year risk review workshop will occur during the next reporting period to assess the outcomes of the new rock-topsoil cross-rip erosion control method decision from the July 2008 on-site peer review workshop.

Further work will be conducted on the new Northern Diversion Channel and northern slope of the NWE around to Pond D1. The outer slopes of the 3rd Lift of the STSF will be completed using the new rock-topsoil method (as was used on the 8 ha of the outer slopes of the 2nd Lift of the NTSF during 2009).

3.3 SURFACE WATER

3.3.1 Reporting Requirements

3.3.1.1 *Development Consent*

The reporting of surface water monitoring is required by Development Consent Condition 8.2 (a)(iv), which states:

(iv) The results and interpretation of surface and ground water monitoring (including biological monitoring) are to be provided by the Applicant in an approved form to the OoW, DECCW, and DII (Fisheries) on a three monthly basis during construction and the first 12 months of ore processing operations and thereafter on an annual basis, unless otherwise agreed by the Director-General. The results are also to be contained and analysed in the Annual Environmental Management Report (Condition 9.2(a)).

The SWMP (Barrick, 2003b) and the SWGMBMP (Barrick, 2010) were prepared in accordance with Development Consent Conditions 4.1 and 8.2(ii), respectively, to provide management objectives for the CGM site water management system.

Barrick prepared a revised SWGMBMP and provided it to the IMP and other appropriate regulators in accordance with the consent condition requirements, for review. The DoPI approved the revision of the SWGMBMP on 10 March 2010 after consultation with other departments and the IMP.

In accordance with both the SWMP and the SWGMBMP the following water related issues are required to be reported in the AEMR:

- surface water, groundwater and biological monitoring results;
- details of any trends observed in the monitoring data;
- details of investigations and consultation with regulatory agencies;
- review of the performance of control measures and the monitoring program; and
- interpretation and discussion of the monitoring program results and management measures by a suitably qualified person.

3.3.1.2 *Environmental Protection Licence*

The EPL requires Barrick to undertake stormwater and ambient water quality monitoring at points identified in EPL Condition P1.3.

Condition R1 of the licence requires the completion of an Annual Return comprising a Statement of Compliance and a Monitoring and Complaints Summary at the end of each annual reporting period (i.e. the AER). Barrick submitted an Annual Return for the period 23/12/09 to 22/12/10 to the OEHL on 21 February 2011. Storm water and ambient water quality of monitoring points identified in EPL Condition P1.3 were reported. The storm water and ambient monitoring points and frequencies required by the EPL are consistent with monitoring required by the Development Consent and SWGMBMP. Additionally, Condition R2 of the EPL requires Barrick to notify the OEHL of incidents causing or threatening material harm to the environment as soon as practicable after Barrick becomes aware of the incident.

3.3.1.3 *Any Other Relevant Approval*

There are no other relevant reporting requirements for the reporting period.

3.3.2 Environmental Management

3.3.2.1 *Control Strategies*

The site water management system is designed to contain all potentially contaminated water and comprises the following major components as noted on Figure 11:

- (i) UCDS;
- (ii) Lake Isolation System (comprising the Temporary Isolation Bund ,Lake Protection Bund and PWE);
- (iii) Internal Catchment Drainage System (including the permanent catchment divide and contained water storages);
- (iv) Integrated Erosion and Sediment Control System (refer to Section 3.2); and
- (v) Pit Dewatering System.

3.3.2.2 *Effectiveness of the Control Strategies*

The site water management system is designed to contain all potentially contaminated water generated within the closed catchment of the ML 1535 area while diverting all other water around the perimeter of the site. The UCDS, Lake Isolation System and Internal Catchment Drainage System are designed to minimise the volume of surface water entering ML 1535 by isolating the site from Lake Cowal and the up-slope catchment above the UCDS. Surface water collected within ML 1535 is controlled using a number of water management structures which are designed to prevent discharge to Lake Cowal.

In accordance with the ESCMP, the primary objectives of the control strategies are to:

- Control the movement of sediment and salinity migration from areas disturbed by mining and construction activities; and
- Maintain downstream (Lake Cowal) water quality.

The control strategies implemented during the reporting period effectively met the above objectives as demonstrated by the environmental performance outcomes discussed in Section 3.2.3.

3.3.2.3 *Variations from Proposed Control Strategies*

There were no variations from the proposed control strategies during the reporting period.

3.3.3 Environmental Performance

3.3.3.1 *Monitoring*

Surface water monitoring was conducted in accordance with the SWGMBMP and EPL. Details of the location, frequency and analytical requirements for each monitoring point are presented below in Table 13. All monitoring results for the reporting period are provided in Appendix B with a summary discussion in Section 3.3.3.2.

Table 13
Surface Water Monitoring Programme

CGM Component	Site	Monitoring Frequency	Parameter/Analyte
Up-catchment Diversion System	Up-catchment diversions north and south (UCD north and UCD south)	Weekly and following rainfall events of 20 mm or greater in a 24 hour period	Suspended Solids, EC, pH.
Internal Catchment Drainage System	Contained water storages D1 and D4	Weekly and following rainfall events of 20 mm or greater in a 24 hour period	Suspended Solids, EC, pH.
	Contained water storages D2, D3 and D8A and D8B	Quarterly	Oil and grease, EC, pH.
	Contained water storages D5 and D6	Monthly	EC, pH, turbidity, dissolved oxygen, temperature.
		Quarterly	Biological oxygen demand, faecal indicators, total hardness, total suspended solids, total dissolved solids. Ca, Mg, K, sodium, chloride, sulphate, Total As, Cd, Mo, Ni, Pb, Sb and Zn Dissolved As, Cd, Mo, Ni, Pb, Sb and Zn
	Sediment control structures	Monthly and following rainfall events of 20 mm or greater in a 24 hour period	Structural integrity, Suspended Solids
	Overflow event	Suspended Solids, pH, EC.	
Open Pit/Void Water	Pit sumps	Monthly	Suspended Solids, EC, pH.
Lake Cowl Water Level	Lake Cowl gauge board	Monthly (when lake water is present)	Lake water level.
Lake Cowl Chemical Monitoring	C1, P1, L1, B1, E1	Weekly and following rainfall events of 20 mm or greater in a 24 hour period	Suspended Solids, EC, pH.
	Lake Cowl transect sampling sites (including the Lachlan floodway, irrigation channel, Bland Creek, east shore, Project and control transects [refer to Figure 8])	Monthly (when lake water is present)	EC, pH, turbidity, dissolved oxygen, temperature, lake water level.
		Quarterly (when lake water is present)	Suspended Solids, Alkalinity, cations and anions. Total Fe, Ca, Mg, K, sodium, chloride, sulphate, total phosphate, ortho phosphate, ammonium, nitrogen as nitrate and nitrite. Total As, Cd, Mo, Ni, Pb, Sb and Zn Dissolved As, Cd, Mo, Ni, Pb, Sb and Zn
Lake Cowl Inflow Sites	Lake inflow sites (including the Lachlan floodway, irrigation channel, Bland Creek and Sandy Creek inflow sites)	Monthly (when lake water is present)	EC, pH, turbidity, dissolved oxygen, temperature.
		Quarterly (when lake water is present)	Suspended Solids, Alkalinity, cations, anions Total Fe, Ca, Mg, K, sodium, chloride, sulphate, Total As, Cd, Mo, Ni, Pb, Sb and Zn Dissolved As, Cd, Mo, Ni, Pb, Sb and Zn
Other Waters	Lachlan River - Jemalong Weir Stream Gauge	Continuous (data to be obtained from OoW every 6 months)	Flow.
	Temporary Pond (lake isolation system)	Monthly following rainfall events of 20 mm or greater in a 24 hour period.	Suspended solids, pH, EC.

Source: SWGMBMP (Barrick, 2010)

3.3.3.2 Performance Outcomes

Surface water monitoring locations are illustrated in Figure 12. Due to previous conditions of below average rainfall and dewatering activities, some monitoring points were dry throughout periods of 2010. The 2010 monitoring period saw above average rainfall and the inundation of Lake Cowl, resulting in access to various

sites being restricted at various stages (summarised in Appendix B). Lake Cowlal reached the trigger level of 204.5RL on 07/12/2010. As a result, 2010 saw the commencement of surface water and sediment monitoring of Lake Cowlal for the first time. Meteorological monitoring and the influence of 2010 weather conditions on the environmental monitoring program are discussed in detail in Section 3.1.3.2. Inflows to all dams excluding Pond D6 and Pond D9 were generally sporadic and associated with rainfall events except D4 which received temporary inflow from saline bore water from test bores on the lake floor until the filling of Lake Cowlal when the bores were covered to prevent water ingress. A summary of the CGM and Lake Cowlal surface water monitoring results is provided in Tables 14 and 15 respectively while detailed data is presented in Appendix B. Lake Cowlal sediment monitoring results are presented in Table 16. Unless otherwise noted, all analytical data was obtained by ALS Environmental Laboratory in Sydney, NSW.

Table 14
Summary of Surface Water Monitoring Results for the Reporting Period

Weekly Surface Water Monitoring - D1, D4, UCD North & UCD South				
Pond D1	COUNT	MIN	MAX	MEAN
pH - Field	53	6.64	8.98	8.12
Electrical Conductivity - Field ($\mu\text{S}/\text{cm}$)	53	720	1590	1270.23
Total Suspended Solids (mg/L)	53	2	164	31.19
Pond D4*	COUNT	MIN	MAX	MEAN
pH - Field	40	6.07	9.08	7.85
Electrical Conductivity - Field ($\mu\text{S}/\text{cm}$)	40	2260	39600	9685.5
Total Suspended Solids (mg/L)	40	1	99	22.53
UCD North	COUNT	MIN	MAX	MEAN
pH - Field	51	6.68	8.45	7.63
Electrical Conductivity - Field ($\mu\text{S}/\text{cm}$)	51	155	272	187.22
Total Suspended Solids (mg/L)	51	16	146	49.1
UCD South	COUNT	MIN	MAX	MEAN
pH - Field	53	6.83	8.68	7.71
Electrical Conductivity - Field ($\mu\text{S}/\text{cm}$)	53	79	428	179.17
Total Suspended Solids (mg/L)	53	20	320	77.36
Monthly Surface Water Monitoring – D5, D6 and Pit Sumps				
Pond D5	COUNT	MIN	MAX	MEAN
pH - Field	13	7.24	9.11	8.43
Electrical Conductivity - Field ($\mu\text{S}/\text{cm}$)	13	2284	7548	5135
Dissolved Oxygen - Field (mg/L)	13	5.28	10.16	8.05
Temperature (Deg C)	13	7.44	32.11	19.72
Turbidity (NTU)	13	1.2	41.8	9.95
Pond D6	COUNT	MIN	MAX	MEAN
pH - Field	13	7.47	8.19	7.84
Electrical Conductivity - Field ($\mu\text{S}/\text{cm}$)	13	8620	24600	14068.46
Dissolved Oxygen - Field (mg/L)	13	2.79	7.11	5.09
Temperature (Deg C)	13	14.4	33.66	24.36
Turbidity (NTU)	13	6.5	87.5	43.7
Pit Sump 1	COUNT	MIN	MAX	MEAN
pH - Field	10	6.58	7.94	7.27
Electrical Conductivity - Field ($\mu\text{S}/\text{cm}$)	10	14500	49400	33688
Total Suspended Solids (mg/L)	10	1	106	25.5
Pit Sump 2	COUNT	MIN	MAX	MEAN
pH - Field	6	6.76	7.6	7.18
Electrical Conductivity - Field ($\mu\text{S}/\text{cm}$)	6	26970	60400	48525
Total Suspended Solids (mg/L)	6	1	138	41.83
Pit Sump 3	COUNT	MIN	MAX	MEAN
pH - Field	1	-	6.82	-
Electrical Conductivity - Field ($\mu\text{S}/\text{cm}$)	1	-	49300	-
Total Suspended Solids (mg/L)	1	-	13	-

* Saline borefield groundwater was again temporarily stored in Pond D4 during 2010.

Table 14 (continued)
Summary of Surface Water Monitoring Results for the Reporting Period

Quarterly Surface Water Monitoring – D2, D3, D8B, D9, D6				
Pond D2	COUNT	MIN	MAX	MEAN
pH - Field	4	7.91	9.04	8.71
Electrical Conductivity - Field (µS/cm)	4	669.2	3623	1586.55
Oil & Grease (mg/L)	4	<5	<5	-
Pond D3	COUNT	MIN	MAX	MEAN
pH - Field	2	7.94	9.18	8.56
Electrical Conductivity - Field (µS/cm)	2	7500	4720	6110
Oil & Grease (mg/L)	3	<5	6	-
Pond D8B	COUNT	MIN	MAX	MEAN
pH - Field	4	6.9	8.63	7.88
Electrical Conductivity - Field (µS/cm)	4	300	581.3	425.3
Oil & Grease (mg/L)	4	<5	<5	-
Pond D9	COUNT	MIN	MAX	MEAN
pH - Field	4	7.88	8.59	8.22
Electrical Conductivity - Field (µS/cm) [^]	4	7019	12870	11149.75
Oil & Grease (mg/L)	4	<5	<5	-
D6	COUNT	MIN	MAX	MEAN
Antimony - Total	5	0.003	0.007	0.0052
Arsenic - Total	5	0.003	0.007	0.0042
Biochemical Oxygen Demand	5	<2	120	27.8
Cadmium - Total	5	0.0003	0.0013	0.00078
Calcium - Dissolved	5	256	565	347
Chloride	5	2080	3460	3056
Coliforms	5	<1	1	0.5
Copper - Total	5	0.439	2.38	0.9972
Enterococci	5	< 1	< 1	-
Escherichia coli	5	< 1	< 1	-
Faecal Coliform -Total	5	< 1	< 1	-
Iron - Total	5	<0.05	0.92	0.577
Lead - Total	5	0.0005	0.006	0.0022
Magnesium - Dissolved	5	107	274	205.8
Manganese - Total	5	0.261	0.707	0.3838
Mercury - Total	5	< 0.0001	< 0.0001	-
Potassium - Dissolved	5	174	546	312.2
Selenium - Total	5	< 0.01	< 0.01	-
Sodium - Dissolved	5	1440	2330	1992
Sulfates	5	1220	2530	1594
Total Dissolved Solids	5	6060	9970	7860
Total hardness as CaCO ₃	5	1080	2520	1714
Total Suspended Solids	5	18	80	44.8
Zinc - Total	5	0.014	0.059	0.0272

[^] Pond D9 was used as storage for water collected from surface water runoff dams after heavy rain.

Table 15
Summary of Lake Water Monitoring Results for the Reporting Period

Parameter	Lake Cowl Water Quality Results (November 2010)	Lake Cowl Baseline Water Quality Results (1991 -1992)	Aquatic Ecosystems ²
Alkalinity (mg/L) ¹	105	NA	NA
Total Suspended Solids (mg/L)	6 - 192	NA	NA
pH	7.03 – 8.27	8.27 – 8.67	6.5 to 8.0
Electrical Conductivity (µS/cm)	100 – 701	222 – 1557	20 to 30 µS/cm
Turbidity (NTU)	8.2 – 211	22 – 224	1 to 20
Dissolved Oxygen (mg/L)	0.84 – 8.89	7.3 – 11.5	90 to 110 (derived from daytime measurements)
Temperature (°C) ¹	24.9	NA	Not applicable
Depth (m)	0.1 – 1.2	0.2 – 2.0	Not applicable
Lake Water Level (m)	204.5	205.1	Not applicable
Total Iron (mg/L) ¹	6.5	NA	NA (insufficient data)
Calcium (mg/L) ¹	17	NA	NA
Magnesium (mg/L) ¹	10	NA	NA
Potassium (mg/L) ¹	15	NA	NA
Sodium (mg/L) ¹	19	NA	NA
Chloride (mg/L) ¹	25	NA	NA
Sulphate (mg/L) ¹	3	NA	NA
Cations (mg/L) ¹	2.81	NA	NA
Anions (mg/L) ¹	2.83	NA	NA
Arsenic (mg/L) ¹	0.006 (total)	0.0026 (total)	0.008
	0.005 (dissolved)	0.0016 (dissolved)	
Cadmium (mg/L) ¹	0.0001 (total)	0.000055 (total)	0.0006
	0.0001 (dissolved)	0.00005 (dissolved)	
Molybdenum (mg/L) ¹	0.001 (total)	NA	NA (insufficient data)
	0.001 (dissolved)	NA	
Nickel(mg/L) ¹	0.007 (total)	NA	0.008
	0.004 (dissolved)	NA	
Lead (mg/L) ¹	0.003 (total)	0.0029(total)	0.001
	0.001 (dissolved)	0.0005 (dissolved)	
Antimony (mg/L) ¹	0.001 (total)	NA	NA (insufficient data)
	0.001 (dissolved)	NA	
Zinc (mg/L) ¹	0.012 (total)	0.012 (total)	0.0024
	0.015 (dissolved)	0.00306 (dissolved)	

Source: McMahon, D.M. (2011)

Note¹ = only one monitoring round conducted during 2010

Note² = ANZECC and ARMCANZ (2000) guideline values for aquatic ecosystems

Table 16
Summary of Sediment Monitoring Results for the Reporting Period

Parameter	Mean Lake Cowal Sediment Results (November 2010)	Aquatic Ecosystems
Arsenic (mg/L)	2.6 (total)	20
	1.5 (extractable)	
Cadmium (mg/L)	1 (total)	1.5
	0.1 (extractable)	
Lead (mg/L)	15 (total)	50
	8.7 (extractable)	
Zinc (mg/L)	31.5 (total)	200
	3.5 (extractable)	
Antimony (mg/L)	5 (total)	2
	1 (extractable)	

Source: McMahon, D.M. (2011)

3.3.3.3 Interpretation

A full summary of surface water monitoring results is shown in Appendix B. A comparison of surface water results with the ANZECC and ARMCANZ (2000) guidelines has not been undertaken on surface water ponds as they are contained inside a closed catchment in the mining lease area. The closed catchment is engineered to contain all runoff on the mining lease and physically separates mine water from offsite waters in the upstream diversion drains and Lake Cowal. A comparison has been carried however on all lake water and sediment monitoring locations and the results are summarised below.

UCD North and UCD South are stilling basins at the edges of Lake Cowal which collect upstream water flowing through diversion channels around the perimeter of the closed catchment. For the purpose of deriving ANZECC guideline trigger levels, they are classified as highly disturbed and the level of protection is thus 80% of species. The monitoring data for UCD North and South has been compared with the ANZECC guideline for "Regional Low-Risk" levels for lowland rivers in South-East Australia. This stipulates a pH range of between 6.5 and 8.5 and a conductivity range of between 125 and 220 $\mu\text{S}/\text{cm}$. The mean pH value for both ponds is within the guideline range. The mean conductivity values for both ponds are also within the ANZECC guideline conductivity range.

Electrical conductivity and pH values remained fairly constant during the 2010 reporting period for both UCD North and UCD South. Both dams overflowed several times during the reporting period with UCD North becoming and remaining inundated due to the filling of Lake Cowal. Samples are still taken from same sample point using a GPS unit and aluminium boat.

Pond D1 remains fairly consistent however some fluctuations have been noticed during 2010, likely attributed to rainfall events. Rainfall events are also a contributing factor to pond D1 not having an increasing trend of Electrical Conductivity as seen in previous years, during more drought like conditions.

Higher than expected EC levels in Pond D4 were due to temporary pumping of test water from the saline lake bores. Pond D4 showed a sharp decrease in electrical conductivity and subsequent increase in pH approximately half way through the monitoring period. Again, this is likely attributed to the rainfall event/s bringing about a cessation to temporary pumping of saline bore water into D4, resulting in a decrease in EC and increase in pH since the 2009 monitoring period.

The general trend seen in 2010 monitoring data is characterised by a reduction in pH and EC and an increase in total suspended solids since the previous monitoring period, probably due to sustained rainfall events experienced during 2010.

Pit sump monitoring points are continuously destroyed and recreated due to the vertical advancement of the pit floor. When they exist, sumps continue to be sampled on monthly basis.

A summary of the 2010 Lake Cowal surface water monitoring results compared with the baseline surface water monitoring results conducted during 1991 – 1992 and the ANZECC and ARMCANZ (2000) default trigger values is provided in Table 15.

Surface water and sediment monitoring of Lake Cowal commenced during November 2010. Monitoring was undertaken by David McMahon of DM McMahon Pty Ltd Environmental Consultants. Limited data was available for comparison as monitoring only occurred during November and December 2010.

Of the 34 lake water monitoring sites only 29 were able to be sampled with sites L9 to L13 (Figure 8) being dry at the time of sampling. pH results ranged from 7.03 to 8.27 with an average of 7.62. This is lower overall than the baseline water quality data collected in 1991 – 1992 and slightly higher than the ANZECC and ARMCANZ (2000) upper level of 8.0 although the average is still below the trigger value.

EC results ranged from 100 to 701 $\mu\text{S}/\text{cm}$ with an average of 293 $\mu\text{S}/\text{cm}$. Electrical conductivity (EC) results are lower than baseline data but higher than the ANZECC and ARMCANZ (2000) level of 30 $\mu\text{S}/\text{cm}$. However, ANZECC and ARMCANZ (2000) note that conductivity in lakes will vary depending on catchment geology (McMahon 2011).

Turbidity results ranged from 8.2 to 211 mg/L with an average of 100.6 mg/L. No baseline data for turbidity is available. The 2010 turbidity results are above the ANZECC and ARMCANZ (2000) level of 20 mg/L for slightly disturbed ecosystems (lakes). However, ANZECC and ARMCANZ (2000) note that lakes in catchments with highly dispersive soils will have high turbidity.

Total suspended solids ranged from 6 to 192 mg/L with an average of 42.4 mg/L which is lower than the baseline data. The ANZECC and ARMCANZ (2000) recommended guideline trigger values for toxicants do not include a trigger value for suspended solids (Source: McMahon, D.M. (2011)).

The average results for heavy metals (total and dissolved) were generally below the ANZECC and ARMCANZ (2000) except for lead and zinc. The average 2010 monitoring results for total lead and zinc are similar to the average total lead and zinc baseline results recorded in 1991-1992 which were also above ANZECC and ARMCANZ (2000) values (McMahon 2011).

A summary of 2010 sediment data is presented in Table 16.

Of the 34 lake sediment monitoring sites only 29 were able to be sampled with sites L9 to L13 (Figure 8) being dry at the time of sampling. Electrical conductivity (EC) results ranged from 1 to 142 $\mu\text{S}/\text{cm}$ with an average of 90.5 $\mu\text{S}/\text{cm}$. The ANZECC and ARMCANZ (2000) recommended guideline trigger values for sediments do not include a trigger value for EC.

Heavy metals results were all below the ANZECC and ARMCANZ (2000) sediment trigger values for extractable metals. The only exception was total antimony. All total antimony results were reported as <5 mg/L (laboratory minimum detection limit) which itself is above the sediment trigger value.

A comparison of the 2010 sediment monitoring results against the ANZECC and ARMCANZ (2000) default trigger values for sediment indicate that the 2010 extractable results were below the recommended trigger values (McMahon, 2011).

Despite the increased rainfall, no connections between the closed catchment and Lake Cowal have been identified.

3.3.4 Reportable Incidents

In accordance with the SWGMBMP, should monitoring results indicate values in excess of the ANZECC and ARMCANZ (2000) default 99% protection level triggers, an investigation shall be conducted to assess the need to implement additional management measures. Ameliorative measures will be developed in consultation with the relevant authorities based on the results of the investigative process.

No environmental incidents or complaints were received relating to surface water pollution at the CGM during the reporting period. There were no CEMCC resolutions regarding surface water quality during the reporting period.

3.3.5 Further Improvements

As described in Section 1.1.2, Barrick prepared a revised SWMP during the reporting period which was lodged with the DoPI in June 2010 and a further revised version was lodged on 30 November 2010 (following review comments provided by the former DECCW and OoW). The revised SWMP is currently awaiting DoPI approval. The monitoring and management measures as described in the SWGMBMP (revised during the previous reporting period) will continue to be implemented during the next reporting period.

To further improve the collection rate and accessibility of lake monitoring locations and other sites, an aluminium boat was purchased during the monitoring period.

Lake water and sediment monitoring data will continue to be collected during the next reporting period and once more data is available, a more comprehensive comparison and analysis of the data will be performed.

3.4 GROUNDWATER

3.4.1 Reporting Requirements

3.4.1.1 *Development Consent*

The reporting of groundwater monitoring is required by Development Consent Condition 8.2 (a)(iv), which states:

- (iv) The results and interpretation of surface and ground water monitoring (including biological monitoring) are to be provided by the Applicant in an approved form to the OoW, DECCW, and NSW DII-Fisheries on a three monthly basis during construction and the first 12 months of ore processing operations and thereafter on an annual basis, unless otherwise agreed by the Director-General. The results are also to be contained and analysed in the Annual Environmental Management Report (Condition 9.2(a)).*

The SWMP (Barrick, 2010a) and the SWGMBMP (Barrick, 2010b) were prepared in accordance with Development Consent Conditions 4.1 and 8.2 (ii) respectively to provide management objectives for the CGM site water management system.

In accordance with both the SWMP and the SWGMBMP the following water related issues are required to be reported in the AEMR:

- surface water, groundwater and biological monitoring results;
- details of any trends observed in the monitoring data;
- details of investigations and consultation with regulatory agencies;
- review of the performance of control measures and the monitoring program; and
- interpretation and discussion of the monitoring program results and management measures by a suitably qualified person.

3.4.1.2 *Environmental Protection Licence*

The CGM EPL requires Barrick to undertake groundwater quality monitoring at the points identified in EPL Condition P1.3.

Condition R1 of the licence requires the completion of an Annual Return comprising a Statement of Compliance and a Monitoring and Complaints Summary at the end of each annual reporting period (i.e. the AER). Barrick submitted an Annual Return for the period 23 December 2009 to 22 December 2010 to the OEH on 21 February 2011. The groundwater quality of monitoring points identified in EPL Condition P1.3 was reported. The groundwater monitoring points and frequencies required by the EPL are consistent with monitoring required by the Development Consent and SWGMBMP.

No groundwater bores were installed or decommissioned during the monitoring period.

3.4.1.3 *Any other Relevant Approval*

Barrick holds various licences for monitoring bores, open pit dewatering bores and BCPC production bores. Each of the four BCPC production bore licences require Barrick to provide the OoW with a return showing the meter readings of hours pumped and the extraction rate for each month during the previous 12 months. There is also an obligation to provide pumping and non-pumping levels at least quarterly (or on request to the OoW). Barrick

has met all OoW reporting requirements during the reporting period. The BCPC licences daily limit of 15 ML/day was not exceeded during the reporting period.

During the reporting period, Barrick submitted a development application to the Forbes Shire Council (FSC) for the construction and operation of the eastern saline borefield (ESB) located approximately 10 km east of Lake Cowal's eastern shoreline. The FSC approved the development application for the ESB on 20 December 2010. Details of the operation of the eastern saline borefield and associated production bore licences will be provided in the next reporting period (Section 2.8).

3.4.2 Environmental Management

3.4.2.1 Control Strategies

The site water management system is designed to contain all potentially contaminated water and comprises the following major components as noted on Figure 11:

- (vi) UCDS;
- (vii) Lake Isolation System (comprising the Temporary Isolation Bund ,Lake Protection Bund and PWE);
- (viii) Internal Catchment Drainage System (including the permanent catchment divide and contained water storages);
- (ix) Integrated Erosion and Sediment Control System (refer to Section 3.2); and
- (x) Pit Dewatering System.

3.4.2.2 Effectiveness of the Control Strategies

The site water management system is designed to contain all potentially contaminated water generated within the closed catchment of the ML 1535 area while diverting all other water around the perimeter of the site. The UCDS, Lake Isolation System and Internal Catchment Drainage System are designed to minimise the volume of surface water entering ML 1535 by isolating the site from Lake Cowal and the up-slope catchment above the UCDS. Surface water collected within ML 1535 is controlled using a number of water management structures which are designed to prevent discharge to Lake Cowal and divert captured stormwater into processing plant usage.

In accordance with the ESCMP, the primary objectives of the control strategies are to:

- control the movement of sediment and salinity migration from areas disturbed by mining activities; and
- maintain downstream (Lake Cowal) water quality.

The control strategies implemented during the reporting period effectively met the above objectives as demonstrated by the environmental performance outcomes discussed in Section 3.2.3.

3.4.2.3 Variations from Proposed Control Strategies

There were no variations from the control strategies during the reporting period

3.4.3 Environmental Performance

3.4.3.1 Monitoring

Groundwater monitoring was conducted in accordance with the SWGMBMP and EPL. Details of the location, frequency and analytical requirements for each monitoring point are presented in Table 17. Groundwater monitoring locations are shown in Figure 12. All monitoring results for the reporting period are provided in Appendix B with a summary discussion in Section 3.4.3.2.

Table 17
Groundwater Monitoring Program

Site	Monitoring Frequency	Parameters
Open pit area (PDB1A & PDB1B, PBD3A & PDB3B, and PDB5A & PDB5B).	Daily	Bore water level.
	Monthly.	SWL, EC, pH.
	Quarterly.	Total hardness, Alkalinity, total suspended solids. and anions. Chloride, sulphate, Ca, Mg, K and Na. Dissolved metals – As, Cd, Mo, Ni, Pb, Sb, Zn.
Processing plant area (PP03 & PP04).	Monthly	SWL, EC, pH.
	Quarterly.	Total hardness, Alkalinity, total suspended solids. and anions. WAD and total cyanide. Chloride, sulphate, Ca, Mg, K and Na. Dissolved metals – As, Cd, Mo, Ni, Pb, Sb, Zn.
Northern Tailings Storage Facility Area (P561A & P561B, P418 A & P418 B, MON01A & MON01B, TSFNA, TSFNB & TSFNC).	Monthly	SWL, EC, pH.
	Quarterly.	Total hardness, Alkalinity, total suspended solids. and anions. Chloride, sulphate, Ca, Mg, K and Na. Dissolved metals – As, Cd, Mo, Ni, Pb, Sb, Zn.
Southern Tailings Storage Facility Area (P412 A-R & P412 B, P414 A & P414 B, P417 A & P417 B, MON02A & MON02B).	Monthly	SWL, EC, pH.
	Quarterly.	Total hardness, Alkalinity, total suspended solids. and anions. Chloride, sulphate, Ca, Mg, K and Na. Dissolved metals – As, Cd, Mo, Ni, Pb, Sb, Zn.
Up-gradient of the northern and southern tailings storage facilities (P558A-R, P555A-R & P555B).	Monthly	SWL, EC, pH.
	Quarterly.	Total hardness, Alkalinity, total suspended solids. and anions. Chloride, sulphate, Ca, Mg, K and Na. Dissolved metals – As, Cd, Mo, Ni, Pb, Sb, Zn.
Northern, Southern and Perimeter Waste Rock Emplacement (External toe drain).	Monthly	SWL, EC, pH.
	Quarterly.	Total hardness, Alkalinity, total suspended solids. and anions. Chloride, sulphate, Ca, Mg, K and Na. Dissolved metals – As, Cd, Mo, Ni, Pb, Sb, Zn.
BLPR1, BLPR2, BLPR3, BLPR4 BLPR5, BLPR6, and BLPR7.	Monthly	SWL, EC, pH. Quantity of water extracted.
	Quarterly.	Total hardness, Alkalinity, total dissolved solids. Chloride, sulphate, Ca, Mg, K and Na. Dissolved metals: Fe, Mn.
Private registered bores 29094, 57974, 29574, and 31341.	As provided by private groundwater users	Bore water level.
OoW piezometers 36551, 36552, 36553, 36523, 36524, 36528, 36594, 36595, 36596, 36597, 36609, 36610, 36611, 36613, 36700, and 90093.	Monthly	Bore water level.
Above ground sections of the pipeline.	Monthly.	Visual inspection.
Tailings seepage (see above - northern and southern tailings storage facility monitoring bores).	See above -northern and southern tailings storage facility	See above -Northern and southern tailings storage facility monitoring bores.
Saline Groundwater Supply Borefield (MB1 & MB2).	Monthly.	SWL, EC, pH. Quantity of water extracted.
	Quarterly.	Total Hardness, Alkalinity, total dissolved solids, chloride, sulphate, calcium, magnesium, potassium, sodium, iron, manganese.
Water Supply Pipeline from Saline Borefield (Above ground sections of the pipeline).	Monthly.	Visual Inspection.

3.4.3.2 Performance Outcomes

Monitoring Data and Annual Monitoring Report

Graphical summaries of water quality and quantity results are provided in Figures 13a, 13b and Figure 14. Detailed monitoring data is provided in Appendix B. The annual report containing the results and interpretation of the groundwater monitoring programme is included in Appendix B of this report, in accordance with Development Consent Condition 8.2(a)(iv).

Groundwater Production

Groundwater extraction from the BCPC commenced in PB4 in August 2004. Extraction from production bores PB1, PB2 and PB3 commenced in June 2005. A summary of monthly extraction volumes from Bland Creek Palaeochannel in 2010 is presented in Table 18. The total volume extracted during the reporting period was 1808 ML. This equates an average of 4.95 ML/day over the 12 month period which is within the licence limit of 15 ML/day.

Table 18
Bland Creek Palaeochannel Production Bores - Extraction Volumes

Month	Extraction Volume (ML)				
	PB1	PB2	PB3	PB4	Total
January	50.97	68.35	97.84	51.82	268.98
February	50.66	72.15	78.11	15.33	216.25
March	55.57	53.98	55.61	0.00	165.16
April	50.35	48.04	49.29	0.00	147.68
May	61.15	59.05	59.60	0.00	179.80
June	61.95	60.10	60.09	0.00	182.14
July	61.13	55.68	52.94	0.03	169.78
August	48.03	46.04	38.63	0.00	132.70
September	42.99	46.44	6.69	0.00	96.12
October	55.89	45.14	17.55	0.00	118.58
November	48.39	42.98	0.00	0.00	91.37
December	32.58	1.84	0.24	5.04	39.70
ANNUAL TOTAL					1,808.26

As described in Section 2.8, the groundwater supply borefield within ML 1535 was commissioned in mid-2009 (including 5 year OoW Licences #70BL232691 to #70BL232692 from 28 January 2010 to 27 January 2015). The groundwater supply borefield has been estimated to supply up to 0.5 ML per day. Approximately 49 ML of water was extracted from the saline groundwater supply borefield within ML 1535 during the reporting period (Section 2.8).

As discussed in Section 3.4.1.3, Development Application No. 2011/0064 was granted by the FSC on 20 December 2010 for the operation of the eastern saline borefield for a period of five years (until 20 December 2015) (Section 2.8). Details of the operation of the eastern saline borefield and associated production bore licences will be provided in the next reporting period (Section 2.8).

Hydrogeological Setting

The geological setting of the Cowal area is dominated by Gilmore Fault Zone (GFZ), a structurally and lithographically complex feature which trends north-south through ML 1535 approximately 500 m west of E42 pit. It separates Late Ordovician igneous units of the Lake Cowal Volcanic Complex to the east from Siluro-Devonian sedimentary basement to the west. Siluro-Devonian sedimentary rocks also occur east of Lake Cowal Volcanic Complex on the eastern side of Lake Cowal where the basement has been deeply incised and lays host to Palaeochannel deposits of the Bland Creek Unit (part of the Lachlan Formation, inferred to be Miocene to Pliocene in age).

The entire area is covered by varying thicknesses of Tertiary and Quaternary regolith deposits, including Pleistocene Cowra alluvium across the Cowal Gold Mining Lease and thick Quaternary lacustrine sediments underlying Lake Cowal. The Cowra Formation consists of interbedded clays and sandy clays. It contains two minor clayey sand aquifers, separated and confined by clay aquitards (Hawkes, 1998; Lyons et al, 2000). Early

work by Hawkes (1998) and Coffey Partners (1995) identified five aquifer units across the mining lease and Jemalong Borefield area as summarised in Table 19.

Table 19
Preliminary Groundwater Model for the Cowl Mining Lease

Aquifer Unit	Sub-Unit and Occurrence	Hydrochemical Facies Characteristics	Intersecting Bores
Cowra Formation (Tertiary-Quaternary)	Upper Alluvial Aquifer - across mining lease and Cowl area	Na-Mg:Cl pH: Circum-neutral TDS: 17,000 – 41,000 mg/L mg/L. Low Fe: <0.5 mg/L Moderate Mn: 0.01 – 1.7 mg/L	P412B, P414B, P417B, P418B, P555B, P561B, TSFNC.
	Lower Alluvial Aquifer and saprolitic units - across mining lease and Cowl area (the saprolite-saprock is probably a distinct aquifer unit but the facies includes both)	Na-Mg:Cl Na-Mg:Cl-SO ₄ pH: Circum-neutral TDS: 20,000 – 42,000 mg/L. Low Fe (generally <0.5 mg/L) Moderate Mn, (generally <0.5 Mg/L) which increases with depth and intersection with saprolitic units eg. P555A-R, P331	P558A-R, P555A-R, P412A, P414A, P417A, P418A, P555A, P561A, TSFNB, MON02A, MON02B, PDB1B, PDB3B, PDB4B, PDB5B.
Siluro-Devonian Sedimentary Basement	Includes Burcher Greywacke & Ootha Group Sandstone	Na-Mg:Cl-SO ₄ pH: Circum-neutral Moderate to high Mn and Fe	MON01A, P412A-R, P555A-R.
Lake Cowl Volcanic Complex (Late Ordovician)	Volcanic and intrusive lithologies and the overlying saprolitic horizon immediately east of the GFZ underlies alluvial sediments in the open pit area beneath Lake Cowl	Na-Mg:Cl-SO ₄ pH: Circum-neutral TDS: 31,000 – 43,000 mg/L. Moderate Fe: <0.5 – 1.5 mg/L High Mn: 0.2 – 8.0 mg/L High trace element composition due to mineralisation history	TSFNA, PDB1A, PDB2A, PDB3A, PDB4A, PDB5A.
Bland Creek Palaeochannel		Na:Cl-HCO ₃ TDS: 900 – 3000 mg/L. pH: Circum-neutral Fe: 0.3 – 0.7 mg/L Mn: 0.07 – 0.16 mg/L	BLPR1, BLPR2, BLPR3, BLPR4, BLPR5, BLPR6, BLPR7, GW36553, GW36609

Source: Hawkes (1998) and Coffey (1995).

Groundwater Levels and Quality

Detailed groundwater monitoring data for the reporting period is presented in Appendix B. The 2010 data set was analysed by Coffey Geotechnics (2011).

A number of dry bores exist in the vicinity of the tailings storage facilities where the piezometers do not intersect the groundwater piezometric surface. These bores continued to be dry during 2010 and are expected to remain dry unless groundwater levels rise. Seven additional piezometers installed around the tailings storage facilities in late 2004 (P412A-R, P555A-R, P558A, MON01A, MON01B, MON02A, and MON02B) to complement the existing network. The standing water level and analytical data from these are consistent with older bores in the tailings storage facility area. PDB2A and PDB2B located on the north edge of the open pit became dry in May and February 2007 respectively due to open pit dewatering. Both bores were decommissioned in December 2008. Figure 15 depicts standing water levels of the pit dewatering bores. Due to proposed pit expansion activities, bores PDB4A and PDB4B were grouted and decommissioned between the 29th September 2009 and 3rd October 2009. No groundwater monitoring bores were decommissioned during 2010.

Since commencement of the groundwater monitoring program in 2004 a considerable hydrogeochemical database has been generated. The data has been expressed in a piper diagram shown in Figure 14 and six hydrogeochemical facies classifications have been identified. The relationship between these facies types and the hydrogeologic model is shown in Table 19. Summary stiff plots of six end-member representative bores are shown on Figures 13a and 13b.

In their evaluation of the 2010 groundwater monitoring data, Coffey Geotechnics concluded (Coffey Geotechnics, 2011):

- The zone of influence of the pit dewatering after five years of mine dewatering is small (around 1 km), indicating low lateral permeability.
- There has been a localised increase in groundwater levels south of the southern TSF and groundwater chemistry has remained relatively stable at monitoring bores MON02A and MON02B. A separate groundwater level investigation was conducted by Coffey to further assess the change in groundwater level in this area (Coffey, 2009b). It was concluded that increasing groundwater levels at MON02A and MON02B south of the southern TSF and northeast of the southern TSF at P412A-R are related to the movement of seepage from the TSF. The direction of seepage flow towards the open pit is consistent with the seepage flow direction in the EIS and in the recent hydrological assessment (Coffey, 2011).
- Water management control measures appear to have successfully prevented groundwater contamination.

BCPC Settlement Monuments

Barrick installed nine settlement monitoring monuments on and adjacent to the BCPC borefield. The inaugural survey of the monuments was conducted in August 2007. Additional surveys were conducted in March and September 2008. The 2009 survey was conducted in June 2009 and more recently occurred in March and December 2010. The monuments have shown between -22 mm and +9 mm movement in RL during the survey period.

3.4.4 Reportable Incidents

No environmental incidents or complaints were received relating to groundwater pollution at the CGM during the reporting period. There were no CEMCC resolutions regarding surface water quality during the reporting period.

3.4.5 Further Improvements

As described in Section 1.1.2, Barrick prepared a revised SWMP during the reporting period which was lodged with the DoPI in June 2010 and a further revised version was lodged on 30 November 2010 (following review comments provided by the DECCW and OoW). The revised SWMP is currently awaiting DoPI approval. The monitoring and management measures as described in the SWGMBMP (revised during the previous reporting period) will continue to be implemented during the next reporting period.

Proposed remedial work for BLPR2 was not completed in 2010. Discussions are ongoing with regards to the best approach for repairing this bore. It is expected that a decision will be made during 2011 and works undertaken at an appropriate future date.

Surveys of the BCPC settlement monument stations will continue during the next reporting period.

Monitoring of bores installed around the processing plant during 2008 continued during 2010 and will continue during the next reporting period.

Construction of wet weather access tracks and drainage was continued during 2010 to ensure more reliable access and safer travel to the sample collection sites. In addition, a six-wheeled vehicle was purchased during 2010 to aid in gaining access to 'wet' sites during the reporting period and was used on several occasions where otherwise, access would have been impossible.

3.5 CYANIDE MANAGEMENT

3.5.1 Reporting Requirements

3.5.1.1 Development Consent

The reporting of cyanide monitoring is required by Development Consent Condition 8.2(b), which states:

The Applicant shall prior to any tailings disposal prepare a cyanide monitoring program in consultation with the DECCW and DII (Minerals), and to the satisfaction of the Director-General. The plan shall include, but not be limited to, provision for:

- *monitoring of CN_{WAD} levels of the aqueous component of the tailings slurry stream at the discharge point to tailings twice daily or as otherwise directed by the Director-General, with any increases above 20mg CN_{WAD}/L to be assessed daily to ensure compliance and reported monthly to the DII (Minerals) and DECCW, unless otherwise agreed by the Director-General. If the CN_{WAD} levels of 30mg/L are exceeded in the liquid at any time, discharge to the tailings dams shall cease until CN_{WAD} levels can be achieved below the levels stated in condition 5.3(a) and such exceedance shall be reported to the EPA within 24 hours;*
- *monitoring CN_{WAD} levels in the decant water of the tailings dams twice daily or as otherwise directed by the Director-General;*
- *an onsite laboratory for quickly establishing CN_{WAD} levels in the liquid at the discharge point to tailings dams and in the decant ponds for monitoring purposes;*
- *on-line monitoring of CN (FREE) at locations where employees are operating; and*
- *establishing a monitoring regime for detection of cyanide movement beneath and adjacent to the tailings impoundments.*

A summary of the cyanide monitoring results shall be provided to the Director-General, DECCW and DII (Minerals) on a three monthly basis, unless otherwise agreed by the Director-General. All results shall be included in the AEMR.

The CMP (Barrick, 2006e) was prepared in accordance with Development Consent Condition 5.3(b) to provide objectives for monitoring and reporting of cyanide use on-site. The CMP was prepared prior to commissioning of cyanide use on-site and was approved by the DoPI on 9 January 2006. In 2008, both the FFMP and CMP were amended to reflect changes to the Development Consent related to reporting of fauna deaths.

Barrick has continued to report monthly weak acid dissociable (WAD) cyanide results to the Director-General of the DoPI, OEH and DTIRIS (Minerals) during the reporting period. Barrick also reported and discussed these results with the CEMCC at quarterly meetings.

An amendment to the CMP was prepared in October 2010 to reflect the June 2009 Modification which allowed the addition of a cyanide destruction method (i.e. the INCO process) as an alternative to Caro's Acid and the associated introduction of sulphur dioxide (SO_2) as SMBS. The addendum to the CMP was approved by the DoPI on 24 March 2010.

As described in Section 1.1.2, Barrick commenced negotiations with the DECCW and DII (Minerals) in September 2010 regarding a proposed change to the location at which monitoring of CN_{WAD} levels of the aqueous component of the tailings slurry stream is undertaken at the CGM. An addendum to the CMP was subsequently prepared and approved by the Director-General of the DoPI on 20 October 2010. A variation of the EPL was also issued by OEH on 24 June 2011 to reflect this change in monitoring location.

3.5.1.2 Environment Protection Licence

The CGM EPL requires Barrick to undertake cyanide monitoring at the points identified in EPL Condition P1.3.

Condition R1 of the licence requires the completion of an Annual Return comprising a Statement of Compliance and a Monitoring and Complaints Summary at the end of each annual reporting period (i.e. the AER). Barrick submitted an Annual Return for the period 23 December 2009 to 22 December 2010 to the OEH on 21 February 2011. Cyanide monitoring at points identified in EPL Condition P1.3 were reported. The cyanide monitoring points and frequencies required by the EPL are consistent with monitoring required by the Development Consent

and SWGMBMP. Additionally, Condition R2 of the EPL requires Barrick to notify the OEH of incidents causing or threatening material harm to the environment as soon as practicable after Barrick becomes aware of the incident.

A variation to the CGM EPL was prepared and submitted to the DoPI during the reporting period to reflect the section 75W modifications to the Development Consent regarding the change in cyanide monitoring location from the discharge pipe to the STSF to the process plant (among other things). The CMP was also revised during the reporting period to reflect the change in location of the cyanide monitoring point.

The DSC inspected the TSFs, various bunds and the new Pond D9 structure in June 2007 and approved their use. Barrick continues to engage the services of Dr Neil Mattes (URS Corporation) to advise in various matters of inspection, maintenance and construction of walls and dams. Outer surfaces on Pond D9 have been identified as requiring additional cover repair during the current reporting period. Continued wet weather until late-2010 prevented this work due to difficult push angles and wet toe conditions. The straw cover stockpile has been standing by and has been treated for mice activity.

3.5.1.3 *Any Other Relevant Approval*

There are no other relevant reporting requirements for the reporting period.

3.5.2 **Environmental Management**

3.5.2.1 *Control Strategies*

A summary of the control strategies implemented during the reporting period in accordance with the CMP is provided below:

- Containment of all tailings waters within the tailings storage facility, processing plant and processing plant dams. Maintenance of the Lake Protection Bund and upper catchment diversion drain systems;
- Provision of emergency containment channels alongside tailings storage pipelines to and from the tailings storage facility. Maintenance of process pipe work, equipment and leak detection equipment;
- Terrestrial fauna protection fencing and avifauna deterrent methods to minimize the potential for impacts of tailings operations;
- Use of Caro's acid to destruct cyanide in tailings slurry to permissible levels before the processing plant slurry discharge is pumped to the tailings storage facility;
- Routine monitoring and reporting of tailings facility flows, ground and surface waters, and employee work areas for cyanide levels;
- Maintenance of emergency preparedness of employees and supply chain in reporting and response capability; and
- Routine patrols of tailings and process areas to ensure the potential for spillage, dust or native fauna and flora impacts are minimized.

Barrick conducted quarterly meetings with the CEMCC open to the media and public during the previous reporting period. The June 2010 CEMCC was held with West Wyalong High School students and staff and discussed WAD cyanide trends and other management controls. As requested by the CEMCC, water use and sources were discussed at a special presentation in March 2010, and electricity and fuel sources were discussed during the September 2010 meeting. The December 2010 CEMCC session in the BSC Chambers particularly focused on emergency preparedness and general management of cyanide.

3.5.2.2 *Effectiveness of Control Strategies*

Monitoring and reporting was conducted in accordance with the CMP and resulted in the effective maintenance of WAD cyanide levels below 20 mg/L (90 percentile over six months) and below 30 mg/L at all times.

On 17 April 2006, the CGM became the first cyanide-using gold operation in the world to gain Pre-Operational Plant Certification under the International Cyanide Management Institute's (ICMI) Code for Cyanide Management. The ICMI required certification to Operational requirements within 12 months after first delivery of cyanide stock. An external independent ICMI Operational Phase Code for Cyanide Management Certification Audit was

undertaken from 23 to 30 March 2007. The operation was found to be in full compliance with the Code's Principles and Standards of Practice. On 2 August 2007, the CGM became the first gold operation using cyanide to be certified pre-operationally and operationally compliant with the ICMI Code. Cowal Gold was audited for 3-yearly re-certification in September 2009 and was confirmed as fully compliant with the Code.

An independent professional third-party re-certification audit occurred in early-August 2009 during which the operations were found to have maintained full compliance during the past three years. Details as per ICMI Media Room announcement of 17 February 2010 at http://www.cyanidecode.org/media_pr188.php. Additional details/media on the ICMI Code for Cyanide Management are available at www.cyanidecode.org.

3.5.2.3 Variations from Proposed Control Strategies

There were no variations from the proposed control strategies during the reporting period.

3.5.3 Environmental Performance

3.5.3.1 Monitoring

In accordance with the CMP and Development Consent Condition 8.2(b), results of WAD cyanide monitoring of tailings discharge and decant water were reported monthly, in writing by the Environmental Manager, to the DoPI, OEH and DTIRIS (Minerals), and by quarterly presentation to the CEMCC throughout the reporting period.

In accordance with Consent Condition 5.3(b)(ii), CN_{WAD} levels of the aqueous component of the tailings slurry stream will be maintained so that they do not exceed 20 mg/L CN_{WAD} (90 percentile over six months) and 30 mg/L CN_{WAD} (maximum permissible limit at any time) at the discharge point to the tailings storages. As described in Section 3.5.1.2, the CMP was revised following approval of the section 75W modification to the Development Consent (i.e. the E42 Modification - Modified Request) to incorporate relocation of the automated sampler from the discharge point to the tailings storage facilities to the process plant. The revision of the CMP was approved by the DoPI on 20 October 2010.

The current recognised international safe limit for tailings storage facility fauna usage protection is 50 mg/L WAD cyanide. Barrick internal environmental management controls and the ICMI Code for Cyanide Management requires signatories to ensure that any spillage outside a bunded area above 0.5 mg/L WAD cyanide is recorded as an incident and treated as an emergency requiring immediate surface clean up. As per the CMP, on and off-site laboratories are used to monitor reagent levels inside the fenced TSF. Approval was granted during the 2007 reporting period for use of the Picric Acid method for on-site WAD cyanide level determinations in the Plant Laboratory for cyanide destruction monitoring purposes. The Northern TSF was the only TSF in use during the monitoring period and results are shown in Table 20. Results have remained low and in control.

Table 20
WAD cyanide Day-Night Shift Monitoring Data for Tailings Discharge - Northern Tailings Facility
(01/01/2010 to 31/12/2010)

	WAD Cyanide			Total Cyanide (mg/L)		
	Site Lab	SGS, WWy	NATA, Syd	Site Lab	SGS, WWy	NATA, Syd
No. Samples Taken	699	699	51	51	53	51
Minimum (mg/L)	0.02	0.03	0.04	2.62	10.7	0.04
Mean (mg/L)	7.96	6.83	4.86	19.71	23.46	5.96
Maximum (mg/L)	21.84	21.5	11.5	32.54	38	11.8

3.5.3.2 Performance Outcome

A total of six bores showed total cyanide readings above the minimum laboratory detection limit of 0.004 mg/L. Monitoring bores MON01B, P414B and P417B, sampled 19 February 2010, showed readings of 0.014 mg/l, 0.006 mg/L and 0.007 mg/L respectively. Re-testing of the original samples showed a reduction in results to 0.005 mg/L for MON01B and <0.004 mg/L for P414B and P417B. All other results during 2010 remained below the laboratory detection limit.

Processing plant bores PP02, PP03 and PP04, sampled 17 February 2010 showed readings of 0.009 mg/L, 0.01 mg/L and 0.017 mg/L respectively. Laboratory re-tests of the original samples confirmed the original results. Samples were re-tested 11 March 2010 and all results returned a reading below the laboratory detection limit of 0.004 mg/L.

The most likely cause for the results recorded were either a false-positive caused by contamination of laboratory sampling equipment or some form of sampler contamination. All further testing carried out during the 2010 reporting period showed all results were below the laboratory detection limit. Sampling will continue to be carried out during 2011.

3.5.4 Reportable Incidents

As described in Section 3.8.3.2, the death of two Silver Gulls was formally reported to the OEH (formerly DECCW) on 10 December 2010. The fauna deaths were considered a result of the birds accessing process slurry (500ppm WAD CN), on the Leach tank concrete bund sump pump area during a planned Process Plant power supply shutdown period.

3.5.5 Further Improvements

An addendum to the CMP was prepared in October 2009 to include the June 2009 Modification to use SMBS as an alternative cyanide destruction method. The addendum of the CMP was approved by the DoPI on 24 March 2010. Construction and commissioning of the SMBS occurred during 2010 and has continued to operate effectively. The CEMCC will receive ongoing updates during the next reporting period.

Barrick commenced negotiations with OEH and DTIRIS (Minerals) in September 2010 regarding a proposed change to the location at which monitoring of CN_{WAD} levels of the aqueous component of the tailings slurry stream is undertaken at the CGM. On 28 July 2010, pursuant to Development Consent condition 8.2(b)(ii), the Director-General of DoPI directed Barrick to change the location for the monitoring of cyanide levels in the tailings slurry stream, and this change in locations was then reflected in addendum to the CMP approved by the Director-General of DoPI on 20 October 2010 and a variation of the EPL issued on 24 June 2011.

No additional management measures are proposed for the next reporting period. The cyanide management measures as described in the CMP will continue to be implemented during the next reporting period. As such, no further improvements are required for the management of cyanide.

3.6 CONTAMINATED LAND

3.6.1 Reporting Requirements

3.6.1.1 Development Consent

The Monitoring Programme for Detection of Any Movement of Lake Protection Bund, Water Storage and Tailings Structures and Pit/Void Walls (LPBMP) (Barrick, 2003f) was prepared in accordance with Development Consent Condition 8.2(a)(v) to establish a monitoring programme for the CGM to prevent the contamination of the land surrounding the CGM by providing for the detection of any movement of the Lake Protection Bund, water storage and tailings structures and pit/void walls during the life of the mine, with particular emphasis on monitoring after any seismic events.

In accordance with the LPBMP, the following related issues are required to be reported in the AEMR including:

- monitoring program results;
- measures employed in response to any identified movement where necessary;
- discussion of the definition of significant movement and whether a different definition is more appropriate; and
- interpretation and discussion of LPBMP results and management measures by a suitably qualified person.

The SSMP (Barrick, 2003a) prepared in accordance with Development Consent Condition 3.5(b) requires that the effectiveness of the soil stripping methods employed and the performance of CGM activities against the objectives of the SSMP are to be reported in the AEMR. Proposed improvements to soil stripping methods and any improvements to other soil management practices are also to be reported in the AEMR.

The HWCMP (Barrick, 2006c) prepared for the CGM in accordance with Development Consent Condition 5.7 requires that any major or emergency spills that occur during the reporting period as well as any remedial measures that have been implemented to reduce the risk of occurrence are to be reported in the AEMR. Since the construction phase was completed (i.e. April 2006), hydrocarbons and paints were no longer the major relevant substances used at the CGM and are further discussed in Sections 2.6, 2.9 and 3.18.2. The HWCMP (Barrick, 2006c) required revision of the plan to reflect results of pre-commissioning studies and the CMP. The revised HWCMP (Barrick, 2006c) was approved by the Director-General of the DoP on 6 March 2006.

As described in Section 1.1.2, an amendment of the HWCMP was approved by the Director-General of the DoP in January 2008 to reflect the proposed management procedures for two new waste streams generated at the CGM, viz.: trash screen oversize waste and hydrocarbon-impacted material. The amendment of the HWCMP is consistent with the variations to the EPL that were approved on 16 July 2008. Hydrocarbon impacted material will be treated at the site bioremediation area.

As described in Section 1.1.2, the HWCMP was amended to reflect the June 2009 Modification to allow the addition of a cyanide destruction method (i.e. the INCO process) as an alternative to Caro's Acid, and the associated introduction of sulphur dioxide (SO₂) as sodium metabisulphite (SMBS). The addendum to the HWCMP was approved by the DoPI on 10 March 2010.

In accordance with Development Consent Conditions 3.2 and 5.7, the HWCMP was updated/revised to reflect changes in operational practice since the commencement of the CGM. The revised HWCMP addresses aspects, recommendations and findings relating to hazardous waste and chemical management in a number of other CGM management plans that were prepared subsequent to the HWCMP. The revised HWCMP was submitted to the OEH (DECCW) and BSC for comment and DoPI approval in accordance with Development Consent Condition 5.7 during the reporting period.

3.6.1.2 *Environment Protection Licence*

Condition R2 of the EPL requires Barrick to notify the OEH of incidents causing or threatening material harm to the environment as soon as practicable after Barrick becomes aware of the incident.

3.6.1.3 *Any Other Relevant Approval*

The *Protection of the Environment Operations Act, 1997* (POEO Act) ensures licences are specified by activity to avoid associated impact e.g. Noise, Air, Water, etc. The POEO Act also requires the notification of potential environmental harm e.g. disposal of waste, leaks and spillages. In addition, the *Contaminated Land Management Act, 1997* (CLM Act) imposes a duty on a person who causes contamination or who is the owner of contaminated land to notify the OEH if the person becomes aware that the land is contaminated in such a way as to present a significant risk of harm. In addition to the POEO Act and CLM Act, numerous OEH guidelines referring to contaminated land state the requirements of land holders to effectively assess, manage and prevent land pollution.

During the 2008 reporting period, Barrick personnel identified a disused sheep dip facility. The facility was a legacy inherited from the previous farming owners. Barrick undertook an assessment to determine the lateral and vertical extent of contaminated soil. The contaminated area was further assessed with respect to human health and environmental impact by both Barrick environmental personnel and external environmental consultants engaged by Barrick (i.e. Coffey Environmental Pty Ltd, 2008).

In these circumstances, the following documents were relevant:

- Section 10 of the CLM Act allows the OEH to make or approve guidelines for purposes connected with the objectives of the Act.
- The NSW Agriculture and CMPS&F (1996) *Environmental Guidelines for the Assessment and Cleanup of Cattle Tick Dip Sites for Residential Purposes* was reviewed by the NSW EPA and considered to be consistent with the principles of the *Australian and New Zealand Guidelines for the Assessment and management of Contaminated Sites, 1992*. The guideline enables the assessment of impacted areas to human health and environment through investigation and remediation for land proposed for residential use.
- The NSW EPA (1997) *Guidelines for Reporting on Contaminated Sites*.

A report titled "Review of Contamination Assessment and Remediation Approach and Assessment of Risk of Harm, Sheep Spray Area, Cowal Gold Mine" (Coffeys, 2008) describes the results of the investigation. Upon

determining the extent of affected material, Barrick proposed to retain the soil within its *in-situ* location for burial beneath approximately 30 m of rock and the base drainage control zone of the southern waste emplacement (SWE). Further assessment was undertaken to determine the mobility/fate transport of the arsenic with regard to human health and environment.

Coffeys (2008) concluded that on-site containment of contaminated soil is a feasible remedial strategy, given the specific details of the planned construction and permanency of the SWE. Coffeys (2008) also recommended that:

- the location of the site be recorded with reference to a reliable map grid system; and
- a remediation report be prepared to provide information on the construction of the SWE in the context of containment of the arsenic contaminated soil in the sheep spray area.

As described in Section 1.1.2, an addendum to the HWCMP was prepared during 2009 that included the proposed management measures for the disused sheep dip area in accordance with Coffey's report. This addendum to the HWCMP was approved by the DoPI on 15 May 2009.

3.6.2 Environmental Management

3.6.2.1 Control Strategies

The overriding control strategy for the monitoring of any movement of the Lake Protection Bund and water storages at the CGM during the reporting period was to implement the LPBMP (Barrick, 2003f).

Significant movement is currently defined as (URS, pers. comm., 15 August 2003):

- lateral movement greater than 20 mm since previous survey, or greater than 500 mm in total; and/or
- vertical movement greater than 20 mm since previous survey, or greater than 0.1% of total embankment height.

This definition remains the most appropriate definition for detecting significant movement.

Visual and survey assessments of the Lake Protection Bund and Temporary Isolation Bund are the management measures described in the LPMBP (Barrick, 2003f). The NSW DSC approved Barrick's request for the de-prescription of the Lake Protection Bund from the DSC Register of Dams (05 March 2007 CGP letter attached to 2006 LPB Inspection Report, Dr. N. Mattes, URS Corporation).

The sheep dip was successfully buried under a basal layer of approximately 4m thickness followed by sufficient compaction and slope design. Compaction reduced-minimised potential mobilization from surface waters entering the impacted area and the slope design ensured surface waters that encountered the basal layer would drain across the surface of the basal layer back into the site away from the underlying impacted area. The sheep dip currently sits beneath approximately 21m's of stockpiled material.

Control strategies described in the SSMP (Barrick, 2003a) were implemented during the reporting period and included:

- scheduling of soil stripping activities (including meteorological monitoring);
- stripping of soil quantities/depths to reflect the intended use of the stripped soil;
- conducting soil stripping activities in accordance with other relevant requirements (e.g. Section 87 permits and Section 90 consents, Vegetation Clearance Protocol and Threatened Species Management Protocol);
- implementing appropriate dust, erosion and sediment control measures; and
- managing soil stockpiles to optimise the retention of soil characteristics.

The control strategies described in the HWCMP (Barrick, 2011) relevant to hydrocarbons are provided in Section 3.18.

3.6.2.2 *Effectiveness of the Control Strategies*

Open pit visual inspections of the Lake Protection Bund, Temporary Isolation Bund, NTSF and STSF and open pit/void walls were effective in determining the satisfactory construction of the bunds.

Monthly inspections of the waste emplacements (where the sheep dip is located) focusing on waste dump integrity (e.g. seepage inspections) were undertaken by Barrick geotechnical personnel.

The control strategies implemented during the reporting period were considered to be effective as discussed in Section 3.6.3 below.

3.6.2.3 *Variations from Proposed Control Strategies*

No variations to control strategies outlined in the SSMP and the LPBMP occurred during the reporting period.

Top of bank survey monuments exist every 200 m at the top of the NTSF and STSF. These monuments have been re-established and resurveyed (or will be scheduled), where required, after recent earthmoving works and/or after upcoming scheduled TSF earthworks. Survey monuments at the NTST and STSF will remain at their surveyed locations. Additional survey monuments will be installed at each progressive 3-metre lift.

3.6.3 **Environmental Performance**

3.6.3.1 *Monitoring*

The visual assessments of the Lake Protection Bund, Temporary Isolation Bunds and NTSF and STSF were undertaken by geotechnical engineers during the reporting period. The reporting focused on seepage, cracking, stability, depressions, vegetation growth, fauna activity and other necessary structural factors. Any issues raised were suitability managed.

Routine visual and annual written assessments and review of Barrick's survey works throughout the year were undertaken by URS Dam's specialist (Dr Neil Mattes) to review the NTSF, STSF and all structural walls for geotechnical engineering integrity.

Soil stripping activities were carried out during the reporting period in accordance with the SSMP. A site soil database was updated as new soil stripping was undertaken during the reporting period. The database recorded details such as soil stockpile locations, soil volumes, amelioration treatment, weed control, fertiliser application and date(s) of soil stripping.

3.6.3.2 *Performance Outcomes*

Routine visual assessments by URS and the Cowal Geotechnical Department did not detect any movement of the Temporary Isolation Bund or Lake Protection Bund. No seismic events were recorded during the reporting period. The URS 2005 Surveillance Report stated that under circumstances where the lake is a great distance from the bund, the groundwater level is well below piezometer level and consequently there is not any need to read the piezometers. The piezometers were not measured during the reporting period. Monitoring of the Lake Protection Bund piezometers began during early 2011. These results will be presented in the 2011 AEMR.

A summary of the locations where soil stripping activities occurred during the reporting period, including the volumes of soil used for rehabilitation and for stockpiling purposes, are provided in Table 21. The soil stockpile locations are shown on Figure 4.

Table 21
Summary of Soil Stripping Activities for the Reporting Period

Location of Areas Stripped	Volume of Soil Used for Rehabilitation (m ³)	Volume of Soil Stockpiled (m ³)
NWE as authorised by the approved E42 Modified Request (March - May).	0	212,200
5th Lift NWE	20,000	0
STSF (3 rd Lift)	24,000	0
Total	44,600	212,200

The site soil database enables records to be monitored to determine the effectiveness of soil stripping methods.

The soil management measures employed during the reporting period are considered to be effective in achieving the objectives set out in the SSMP and minimising impacts of the CGM during soil stripping. As stated above, the site soil database determines the effectiveness of soil stripping methods and will continue to be utilised during the next reporting period.

3.6.4 Reportable Incidents

In accordance with the LPBMP, should visual or survey assessments indicate any significant movement of the Lake Protection Bund or water storages, Barrick will record this movement in the database and undertake further monitoring to verify and assess the extent and potential impacts of the movement.

As required by the DTIRIS (Minerals), Barrick would then enter into discussions with the DTIRIS (Minerals) and DoPI to facilitate the undertaking of a risk assessment to devise ameliorative measures depending on the severity of the problem.

No environmental incidents were reported in relation to any movements of the Lake Protection Bund or water storages at the CGM during the reporting period.

In accordance with Development Consent Condition 9.1, soil stripping operations will be reported in accordance with the MOP. In accordance with Development Consent Condition 9.1, the predicted annual soil stripping volumes and detailed soil stockpile locations and soil management measures have been provided in the amended CGM MOP (2009-2010).

No environmental incidents or complaints were reported or received relating to soil stripping or soil management activities at the CGM during the reporting period.

Reportable incidents regarding hydrocarbons for the reporting period are discussed in Section 3.18.

3.6.5 Further Improvements

No other improvements are proposed for the next reporting period. Barrick will work with relevant government departments and external professional input to ensure that operations continue to prevent the contamination of the surrounding land.

3.7 FLORA

3.7.1 Reporting Requirements

3.7.1.1 Development Consent

The reporting of flora monitoring is required by Development Consent Condition 8.5, which states:

The Applicant shall monitor the effectiveness of measures outlined in the fauna management plan and Threatened Species Protocol (condition 3.4). A summary of monitoring results shall be included in the AEMR.

The FFMP (Barrick, 2003g) was prepared in accordance with Development Consent Condition 3.4(a). In accordance with the FFMP, the following flora related issues are required to be reported in the AEMR:

- vegetation clearance activities;
- weed and pest management;
- results of the flora monitoring program; and
- the progress of remnant vegetation and wetland enhancement programmes.

The TSMP (Barrick, 2003h) was prepared in accordance with Development Consent Condition 3.4(b).

In accordance with Development Consent Condition 8.5, a summary of the effectiveness of the measures outlined in the FFMP and TSMP are required to be included in the AEMR.

In accordance with Development Consent Condition 3.6(d), a ROMP was prepared in consultation with the OEH, OoW and BSC and was submitted to the DoPI for approval during the reporting period. Development Consent Conditions 3.6(d) provides:

Rehabilitation and Offset Management Plan

3.6(d) *The Applicant shall prepare and implement a Rehabilitation and Offset Management Plan for the Project to the satisfaction of DII and the Director-General. This plan must be prepared in consultation with DECCW, OoW and BSC, and be submitted to the Director-General and DII (Minerals) for approval by the end of July 2010.*

This plan must include:

- (i) *the rehabilitation objectives for the mine site and offset areas;*
- (ii) *a description of the short, medium, and long term measures that would be implemented to:*
 - *rehabilitate the mine site;*
 - *implement the offset strategy; and*
 - *manage the remnant vegetation and habitat on the mine site and in the offset areas;*
- (iii) *detailed performance and completion criteria for the mine site rehabilitation and implementation of the offset strategy;*
- (iv) *a detailed description of the measures that would be implemented, including the procedures to be implemented for:*
 - *progressively rehabilitating disturbed areas;*
 - *implementing revegetation and regeneration within the disturbance areas and offset areas, including establishment of canopy, sub-canopy (if relevant), understorey and ground strata;*
 - *protecting vegetation and soil outside the disturbance areas;*
 - *rehabilitating creeks and drainage lines on the site (both inside and outside the disturbance areas);*
 - *managing salinity;*
 - *conserving and reusing topsoil;*
 - *undertaking pre-clearance surveys;*
 - *managing impacts on terrestrial and aquatic fauna;*
 - *landscaping the mine site to minimise visual impacts;*
 - *collecting and propagating seed for rehabilitation works;*

- salvaging and reusing material from the mine site for habitat enhancement;
 - controlling weeds and feral pests, including terrestrial and aquatic species;
 - managing grazing and agriculture on site;
 - controlling access; and
 - bushfire management;
- (v) a program to monitor the effectiveness of these measures, and progress against the performance and completion criteria;
- (vi) a description of the potential risks to successful rehabilitation and/or revegetation, and a description of the contingency measures that would be implemented to mitigate these risks; and
- (vii) details of who would be responsible for monitoring, reviewing, and implementing the plan.

Development Consent Conditions 3.6(a), (b) and (c) are also relevant to rehabilitation of the mine site and implementation of the offset strategy. Development Consent Conditions 3.6(a) to (c) provide:

Rehabilitation and Offsets

3.6(a) The Applicant shall:

- (i) progressively rehabilitate the mine site in a manner that is generally consistent with the final landform in the EA (as shown in Appendix 1);
- (ii) maximise the salvage and beneficial use of resources in areas subject to disturbance; and
- (iii) Implement the biodiversity offset strategy as described in the EA, and summarised in Table 1 (and shown conceptually in Appendix 2), to the satisfaction of the Director-General and DII (Minerals).

Table 1: Offset Strategy

Area	Minimum Size
Offset - Enhancement Area	110 ha
Offset - Revegetation Area	100 ha
Total	210 ha

3.6(b) By the end of December 2011, the Applicant shall make suitable arrangements to provide appropriate long term security for the offset areas to the satisfaction of the Director-General.

3.6(c) By the end of December 2011, the Applicant shall demonstrate that appropriate monetary bonds are, or will be, in place with applicable authorities to fully implement the offset strategy, to the satisfaction of the Director-General.

3.7.1.2 Environment Protection Licence

Condition R2 of the EPL requires Barrick to notify the OEH of incidents causing or threatening material harm to the environment as soon as practicable after Barrick becomes aware of the incident.

3.7.1.3 Any Other Relevant Approvals

As per Consent Condition 3.6(c), Barrick (Cowal) advised the DoPI of the provision facility currently with DTIRIS (Minerals) holding the necessary amount on 17 December 2010.

There are no other relevant reporting requirements from other approvals in relation to threatened flora for the reporting period.

3.7.2 Environmental Management

3.7.2.1 Control Strategies

Flora control strategies are described in the FFMP (Barrick, 2003g) and ROMP (Barrick, 2010). The following control strategies were implemented at the CGM during the reporting period:

- implementation of Compensatory Wetland Management Plan (CWMP) (Barrick, 2003i) initiatives and the remnant vegetation enhancement program;
- incorporation of flora management initiatives during operational design;

- implementation of the Vegetation Clearance Protocol (VCP) (Figure 16);
- implementation of the TSMP;
- rehabilitation of disturbance areas;
- implementation of rehabilitation monitoring report;
- development of a ROMP (including mine site rehabilitation performance and completion criteria and a mine site rehabilitation monitoring programme and offset performance and completion criteria and an offset monitoring programme);
- assessment of Cowal completion criteria;
- weed management and pest control;
- flora monitoring programme;
- observance of the Endangered Ecological Communities (EECs) for three systems as prepared and reviewed by relevant departments prior to approval by the Director-General of the former DoPI. The CGM uses Threatened Species Management Strategies (TSMS) for:
 - Inland Grey Box Woodland – approved 31 August 2007;
 - Myall Woodland – approved 24 September 2007; and
 - Aquatic Ecosystems (lower Lachlan River) – approved 12 October 2007; and
- provision of information relevant to the management of native flora during employee and contractor inductions.

Mine Site Rehabilitation Monitoring Programme

In accordance with Consent Condition 3.6(d)(v), a rehabilitation monitoring programme has been developed to monitor the effectiveness of the short, medium and long-term mine site rehabilitation measures and progress against performance and completion criteria.

The performance of the mine site rehabilitation will be monitored annually against the performance and completion criteria provided in the ROMP. The performance criteria have been developed to reflect the measures for mine site rehabilitation. This monitoring will therefore assess the effectiveness of these measures and determine the need for additional measures. The quality of revegetation will be monitored using Ecosystem Function Analysis (EFA), or a similar systems-based monitoring approach. EFA is a method developed by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) which provides indicators of revegetation/rehabilitation success and allows the assessment of ecosystem sustainability through the plotting of development trajectories.

EFA monitoring of revegetated/rehabilitated areas will be used to measure the progression of the revegetation/rehabilitation towards a self-sustaining ecosystem. The mine site rehabilitation monitoring programme also includes monitoring of the:

- New Lake Foreshore;
- waste rock emplacements and tailings storage facilities;
- effectiveness of the erosion and sediment control systems; and
- fauna usage of rehabilitated areas and compensatory wetland.

Offset Areas

In accordance with Development Consent Condition 3.6 an offset strategy has been developed for the CGM and is detailed in the ROMP. The offset strategy involves the conservation and management of two designated areas located on land owned by Barrick, herein referred to as the northern and the southern offset areas (Figure 17).

The offset strategy includes:

- a description of the offset;
- objectives;

- short, medium and long-term management measures;
- performance and completion criteria; and
- a monitoring programme.

Management Areas

In accordance Development Consent Condition 3.6(a) two types of management areas have been defined in order to facilitate the management of remnant vegetation and habitat in the offset areas, namely, Offset Enhancement Areas and an Offset Revegetation Area (Table 22). The management areas are shown on Figure 17.

**Table 22
Offset Management Areas**

Offset Management Area	Description	Minimum Size (hectares [ha])
Offset Enhancement Area	Enhancement through natural regeneration and management for conservation.	110
Offset Revegetation Area	Re-establishment of woodland in cleared agricultural land by revegetation.	100
Total Area Conserved (ha)		210

Offset Objectives

The objectives for the offset areas are to:

- secure the tenure of the offset areas for long-term conservation purposes;
- enhance flora and fauna habitats within the offset areas, including increasing the area of Myall Woodland through regeneration and revegetation; and
- establish native vegetation characteristic of a Eucalypt Woodland in cleared agricultural land.

Short, medium and long-term measures will be implemented within the different management areas and are detailed in the ROMP. The flora and fauna characteristics, vegetation communities, habitat complexity and condition and threatened flora and fauna characteristics of the offset areas are described in the ROMP.

Offset Monitoring Programme

In accordance with Consent Condition 3.6(d)(v), an offset monitoring programme has been developed to monitor the effectiveness of the short, medium and long-term measures proposed to implement the offset strategy and to monitor the progress against performance and completion criteria.

The performance of the offset will be monitored regularly (and at least annually) against the performance and completion criteria provided in the ROMP. The performance criteria have been developed to reflect the offset strategy measures. This monitoring will therefore assess the effectiveness of these measures and determine the need for additional measures.

The offset monitoring programme will be conducted within both the Offset Revegetation Area and Offset Enhancement Areas and will include:

- a preliminary site inspection;
- visual monitoring;
- photographic monitoring; and
- permanent flora quadrats.

Results of the Offset Monitoring Programme will be reported in the 2011 AEMR.

3.7.2.2 *Effectiveness of Control Strategies*

Development Consent Condition 8.5 requires the effectiveness of the TSMP and FFMP to be reported in the AEMR. The control strategies implemented during the reporting period were considered to be effective in minimising impacts to threatened flora. In accordance with the CGM Vegetation Clearance Protocol (Figure 16), construction works were confined to delineated and cleared areas. Vehicle movements within ML 1535 were restricted to designated roads limiting the impact on threatened flora. The TSMP identified threatened flora populations and management strategies were implemented accordingly.

In accordance with the ROMP, the results of the monitoring programmes implemented to assess the effectiveness of mine site rehabilitation measures and offset strategy measures against performance criteria and completion criteria are to be provided in the AEMR.

3.7.2.3 *Variations from Proposed Control Strategies*

An area of EEC Myall Woodland was excised from the proposed clearing area for the Southern Waste (rock) Emplacement (previously approved for clearing in the EIS). This area has since been defined by three strand wire fencing and signage to identify the area as accessible to an authorised person only.

Barrick (Cowal) will review approval from DoPI and other relevant stakeholder commitments prior to any ROMP works during the next reporting period.

There are no anticipated variations to the proposed control strategies in the next reporting period.

3.7.3 **Environmental Performance**

3.7.3.1 *Monitoring*

Monitoring and management of flora continued in accordance with the requirements of the FFMP (Barrick, 2003g) and ROMP (Barrick, 2010) (Section 3.7.1), during the reporting period. Measures undertaken are discussed below.

Vegetation Clearance

Vegetation clearance activities conducted during the reporting period were monitored and undertaken in accordance with the VCP (Figure 16). The VCP was applied to the Northern and Southern Waste Emplacements areas and the soil stockpile area adjacent to the SWE during March 2010.

A VCP report was prepared by Resource Strategies in April 2010 for these areas. The objectives of the VCP report was to:

- report on the implementation of the VCP for vegetation clearance activities conducted at the CGM; and
- document the management of habitat trees throughout different stages of the VCP.

There were no other alterations to any vegetation clearance requirements during the reporting period.

Weed Management

The annual weed survey of Barrick property was undertaken in November 2010 by Carnegie Natives. Weed management measures resulting from the survey will be implemented during 2011.

There were no other alterations to any weed management requirements during the reporting period.

Weed management is discussed further in Section 3.9.2.

During the reporting period there were no other alterations to any weed management requirements.

Flora Monitoring Program

Flora monitoring was undertaken during the reporting period in the following areas:

- Compensatory Wetland;
- Rehabilitation Areas and Trials'
- Assessment of Cowal Completion Criteria;
- *Pilularia novae-hollandiae* (Austral Pillwort) habitat; and
- Remnant Vegetation Enhancement Programme areas.

Discussions of the Remnant Vegetation Enhancement Programme flora monitoring results from 2010 are included below.

Remnant Vegetation Enhancement Programme (RVEP)

Flora monitoring of the RVEP areas was undertaken during the reporting period. Visual inspections of the RVEP areas have been made on a regular basis during the reporting period to check fences, weed infestation and observe any natural regeneration.

Mine Site Rehabilitation and Offset Monitoring Programmes

Monitoring of revegetated and rehabilitated areas within ML 1535 and the offset areas will be conducted during the next reporting period in accordance with the ROMP. Results from the mine site rehabilitation monitoring and offset areas monitoring will be provided in the 2011 AEMR.

3.7.3.2 Performance Outcomes

Compensatory Wetland

Monitoring of regeneration in the Compensatory Wetland (CW) was undertaken by DnA Environmental 11th – 13th October 2010 and 25th – 29th October 2010. Monitoring during spring aims to capture a more accurate representation of species present in the area. Future monitoring of the CW will continue to be undertaken in spring, subject to the area not being inundated.

Due to the extensive rainfall events and flooding of Lake Cowal during 2010, only two of the twelve compensatory wetland sites could be accessed in 2010 as all the remaining sites were under water. The 2010 report therefore includes data from 2008 and 2009 from all sites, but only data from CW3 and GW1 in 2010 (DnA Environmental, 2011b).

CW1 and GW1 were situated on the lake foreshore and had shown a considerable improvement in total ground cover and floristic diversity, due to a combination of improved seasonal conditions, combined with absence or reduced grazing pressure. A marked improvement has been seen in the diversity and abundance of live ground species (including many annual species) and increased tree health and within the lake bed during 2010. The lignum shrubs have become well established and were large enough to protrude from the water and provide some habitat value to the lake environment. The increased fodder in the local pastures had also lead to reduction in grazing pressure within the grazed wetland areas, therefore there was also a considerable improvement in these grazed wetland areas during 2010 (DnA Environmental, 2011b). Results of the monitoring included:

- In 2010, a slight increase was seen in tree diameter at breast height (dbh) recorded at both sites and trees in most areas had recovered after improved conditions during 2010. Most trees continue to be considered in medium health condition.
- Tree hollows were present in all sites that contained trees, except site CW3 as it contained a dominance of comparatively smaller and presumably younger trees in this site.
- *Lycium ferocissimum* (African Boxthorn) numbers have declined since 2009, probably due to the continued weed control program.
- There was a very significant increase in native species diversity, increasing from 28 – 43 species in CW3 and 21 – 44 species in GW1. Exotic species increased from 7 – 21 species in CW3 and 4 -30 species in GW1.

- The majority of plants were herbs or grasses and most of the exotic species were annuals, while most of the native species were perennial species.
- In 2010, there was a significant increase in total ground cover recorded in both CW3 and GW1, with an increase from 73 – 92% and 49.8 – 71% respectively.
- Total ground cover consisted of a combination of dead leaf litter, annual plants, cryptogams, logs and perennial vegetation <0.5m in height.
- In 2010, there was considerable improvements in the extent of perennial ground cover in these two sites, and due to the flush of annual plants this year, there was a decline in the cover provide by dead leaf litter.
- *Lycium ferocissimum* (African Boxthorn) was indentified in GW1 during the 2010 survey with no *Xanthium spinosa* (Bathurst Burr) recorded during the survey. There were no *Sclerolaena birchii* (Galvanised Burr) located in any site in any year.

As the monitoring suggests that regeneration is occurring naturally within the CW due to the improved seasonal conditions experienced during 2010, with no additional planting being required during the reporting period. Monitoring of the CW regeneration will continue annually.

In order to limit the disturbance to the CW, vehicular access continued to be limited to authorised personnel. Areas within the CW that have been subject to exploration activities over the reporting period were roped off so as to minimise damage by vehicles. This has continued with the filling of Lake Cowal.

Rehabilitation Monitoring Report and Cowal Completion Criteria

Revegetation trials have been set up on the New Lake Foreshore in accordance with the CWMP (Barrick, 2003i). The trials are discussed in Section 5.4. Also discussed in Section 5.4 are the results of the 2010 rehabilitation trials monitoring and work carried out on the development of detailed CGM rehabilitation completion criteria for the mine.

***Pilularia novae-hollandiae* (Austral Pillwort) Habitat**

A survey of potential habitat for the threatened species *Pilularia novae-hollandiae* (Austral Pillwort) was undertaken within ML 1535 and nearby properties by DnA Environmental from the 11 – 13th October 2010, and due to wet weather the surveys were completed during 25 – 29th October 2010. Undisturbed areas of ML 1535 and nearby properties were searched targeting areas of potentially suitable habitat such as gilgais, farm dams, lake foreshore, areas of free water and areas previously surveyed.

Additional survey effort was undertaken due to the improved seasonal conditions and potential for suitable habitat. During 2010, above average rainfall was experienced at Lake Cowal resulting in localised flooding and the inundation of a large portion of Lake Cowal. Low lying depressions and gilgais were also inundated with water, with numerous wetland species occupying these habitats (DnA Environmental, 2011a).

Despite above average rainfall throughout 2010 causing localised flooding and the provision of potential habitat for this endangered species, much of its preferred habitat was flooded during the recent survey period (DnA Environmental, 2011a).

During the first survey attempt, water was beginning to recede and exposed areas of bare soil and mud however, no Austral Pillwort was found. After the first survey attempt, additional heavy rainfall events were experienced, resulting in preferred and potential habitats to become fully inundated and subsequently, if Austral Pillwort was present, it would have been fully inundated at the time of the second survey attempt (DnA Environmental, 2011a). The increased density of vegetation may also be impacting on Austral Pillwort populations, but the extent that this had occurred is presently unknown. Surveys to locate populations of *Pilularia novae-hollandiae* (Austral Pillwort) will continue during the next reporting period.

Remnant Vegetation Enhancement Program (RVEP)

A survey of the RVEP plots was undertaken by DnA Environmental from the 11 – 13th October 2010, and due to wet weather the surveys were completed during 25 – 29th October 2010.

During the 2010 survey, the number of RVEP monitoring sites was reduced from ten to five as there were a large number of sites being established as part of the annual rehabilitation monitoring program (DnA Environmental, 2011d). No monitoring was undertaken within the four Hill enclosure sites this year due to the good seasonal conditions relieving grazing pressure by macropods. However an additional RVEP site was established on

Fellmans Hill (RVEP05), so it could be utilised as a reference site as well as be incorporated into the RVEP monitoring program. One site (RVEP04) which was intended to be included in the monitoring program was unable to be accessed due to the flooding of Lake Cowal and low lying areas. Subsequently, only four RVEP sites were assessed this year and these were Hill01, Hill03, Hill05 (new site) and RVEP03.

Few trees were recorded in a healthy condition, with general tree health showing a decline in health condition up until above average rainfall experienced during 2010. As a result of the increased rainfall, there was an overall improvement in tree health although, all sites contained trees that were suffering from the previous prolonged dry conditions.

Juvenile shrubs and trees have shown a positive increase in numbers in 2010. Most sites recorded an increase in numbers with Hill03 recording 87 individuals. Hill01 increased from 2 to 3 individuals where as RVEP03 remained steady at 4 individuals. The newly established site Hill05 recoded 18 individuals, showing no overall increase from 113 to 112 individuals. Only 1 exotic shrub was recorded in RVEP03.

In 2010 there was an increase in total ground cover due to the good seasonal conditions experienced throughout 2010. There was a noticeable improvement in ground cover provided by perennial plants. However, in site RVEP03, introduced annual plants were very dominant and a reduction in cover in Hill03 due to disturbance by macropods. In all sites, there is adequate ground cover which ranged from 85% in Hill03 to 100% in RVEP03.

Good seasonal conditions throughout 2010 also resulted in increased floristic diversity at all sites, with Hill01 having an average species diversity of 11.4 species per m². Hill 03 had the lowest diversity with 5.0 species per m². Total numbers of species increased across both the native and exotic ranges. RVEP03 had the highest number of species with 32 natives where as RVEP03 recorded 29 exotic species. There were 29, 23 and 30 native species recorded in Hill01, Hill03 and Hill05 respectively with the significant increase due largely to the presence of spring growing wildflowers which have not been recorded in Hill01 since it was first monitored in 2005. Hill01 and Hill03 contained no exotic species in 2009 but exotic species recorded in all sites this year. The number of exotic species in Hill01 and Hill03 were relatively low with four and two exotic species respectively and in Hill05 there were ten exotic species

Three species were common to all four RVEP sites and one of these was the native forb *Crassula colorata* and two were the exotic annuals *Hypochaeris glabra* and *Vulpia sp.* Other species that were recorded that were native and occurred in at least three sites, included two grasses and a range of seasonal fobs and lilies. *Eucalyptus dwyeri* was also present in three sites and the native rock fern *Cheilanthes sieberi subsp. sieberi* was also common this year

In 2010, two noxious weed species were recorded. These were *Lycium ferocissimum* (African Boxthorn) and *Sclerolaene birchii* (Galvanised Burr) being recorded in RVEP03. It is noted that some sites that previously contained African Boxthorn were not monitored in 2010 due to sites being inaccessible due to the flooding of Lake Cowal.

Monitoring of the RVEP areas will continue during the next reporting period.

There were no alterations to any threatened flora species reporting requirements during the reporting period.

3.7.4 Reportable Incidents

The FFMP requires the reporting of any incidents relating to threatened flora. No environmental incidents or complaints were reported or received at the CGM relating to threatened flora during the reporting period.

3.7.5 Further Improvements

Revegetation, rehabilitation and wetland enhancement measures will continue to be implemented during the next reporting period.

In more favourable conditions tree and shrub plant outs would be proposed to address areas where high plant mortalities have been recorded.

NWE rehabilitation trial tree program on reclamation area work slopes to determine best rehabilitation method cost/time species.

The FFMP was revised to reflect the revised SGWMBMP during the prior reporting period (19 May 2010). This revision was approved by DoPI on 08 April 2010.

In accordance with the ROMP, results from the mine site rehabilitation monitoring and offset areas monitoring will be provided in the 2011 AEMR.

Improved spoil classification works prior to rehabilitation works is required to ensure the optimum substrate for plant growth and establishment. These works are proposed for the 2011 monitoring period.

The ROMP was reviewed by the relevant government departments from 30 July 2010 until forwarding to DoPI on 9 January 2011. The ROMP is currently awaiting DoPI approval. Barrick (Cowal) will review approval from DoPI and other relevant stakeholder commitments prior to any ROMP works during the next reporting period.

No further improvements to threatened flora management measures are proposed for the next reporting period.

3.8 FAUNA

3.8.1 Reporting Requirements

3.8.1.1 Development Consent

The reporting of fauna monitoring is required by Development Consent Condition 8.5, which states:

The Applicant shall monitor the effectiveness of measures outlined in the fauna management plan and Threatened Species Protocol (condition 3.4). A summary of monitoring results shall be included in the AEMR.

The AEMR is also required to include the results of fauna monitoring and records of any wildlife/fauna deaths or other incidents due to mining operations by Conditions 3.4(a)(ii) and 9.2(i)(d) of the Development Consent.

The FFMP (Barrick, 2003g) was prepared in accordance with the Development Consent Condition 3.4(a). In accordance with the FFMP, the following fauna related issues are required to be reported in the AEMR:

- a summary of deaths or other incidents involving native fauna;
- fauna usage of tailings storages;
- results of any native fauna autopsies;
- vegetation clearance activities (discussed in Section 3.7.3);
- weed and pest management (discussed in Section 3.7.3);
- results of the flora and fauna monitoring programs; and
- the progress of remnant vegetation and wetland enhancement programs (discussed in Section 3.7.3.2).

The FFMP and CMP were amended in 2008 to reflect changes to the Development Consent related to reporting of fauna deaths.

A TSMP (Barrick, 2003h) has been prepared in accordance with Development Consent Condition 3.4(b). In accordance with the TSMP, TSMS were prepared in consultation with the OEH during the reporting period for the following species:

- Inland Forest Bat;
- Sloane's Froglet;
- Woodland birds including:
 - Little Eagle;
 - Spotted Harrier;
 - Square-tailed Kite;
 - Varied Sitella; and
 - White-fronted Chat.

The above TSMS's have been submitted to the DoPI and are awaiting approval.

In accordance with Development Consent Condition 8.5 a summary of the effectiveness of the measures outlined in the FFMP (Barrick, 2003g) and TSMP (Barrick, 2003h) is required to be included in the AEMR.

In accordance with Development Consent Condition 3.6(d)(iv) (Section 3.7.1.1), the ROMP includes a description of measures that will be undertaken to manage the impacts on terrestrial and aquatic fauna and preliminary habitat assessment measures (including pre-clearance surveys) to identify roosting/nesting habitat resources that may be impacted by vegetation clearance activities.

3.8.1.2 Environment Protection Licence

Condition R2 of the EPL requires Barrick to notify the OEH of incidents causing harm or threatening material harm to the environment as soon as practicable after Barrick becomes aware of the incident.

3.8.1.3 Any Other Relevant Approvals

There are no other relevant reporting requirements from other approvals in relation to threatened fauna for the reporting period.

3.8.2 Environmental Management

3.8.2.1 Control Strategies

The relevant control strategies for the management of threatened fauna species are described in the FFMP (Barrick, 2003g) and the ROMP (Barrick, 2010) and include:

- implementation of CWMP (Barrick, 2003i) initiatives and the remnant vegetation enhancement program (discussed in Section 3.7.3.2);
- incorporation of fauna management initiatives during operational design;
- implementation of the VCP (Figure 16) (including pre-clearance surveys) (discussed in Section 3.7.3.2);
- implementation of the TSMP (Barrick, 2003h);
- implementation of the Plan to Protect Fauna from Interactions with the Tailings Storage Facilities (Barrick, 2005e);
- management of impacts on terrestrial and aquatic fauna;
- rehabilitation of disturbance areas;
- weed management and pest control (discussed in Section 3.9);
- fauna monitoring program;
- maintaining a clean, rubbish free environment to discourage scavenging;
- prohibition for the introduction of animals including domestic pets on ML 1535;
- imposing speed limits within ML 1535 to reduce the risk of fauna mortality via vehicular strike; and
- provision of information relevant to the management of native fauna during employee and contractor inductions.

3.8.2.2 Effectiveness of Control Strategies

In accordance with the FFMP, the implementation of the control strategies minimised impacts on threatened fauna species from the construction of the CGM and mining activities.

The number of native fauna fatalities on-site has remained similar to those reported in the previous reporting period. Section 3.8.3 lists the fauna deaths and incidents that have occurred on ML 1535 over the reporting period. The majority of native fauna deaths that occurred during the reporting period were associated with:

- (a) interactions with vehicles;
- (b) the continuation of the drought; or
- (c) mass fatalities of spotted marsh frogs in bunded areas.

Five native fauna deaths occurred as a result of the NWE vegetation clearance protocol (VCP) activities described in Section 3.7.3.

Several members of the Barrick Environmental team and some local community members (sponsored by Barrick) are trained NSW Wildlife Information Rescue & Education Service (WIRES) members. Many Barrick staff members have been trained in handling venomous snakes by Wildlife Australia (Living With Wildlife, S.A.). Having locally trained snake handlers and registered WIRES members has improved the care that can be given to injured native wildlife on ML 1535 and within the local community. The Cowal Gold Environmental Manager is the WIRES Riverina Publicity Officer & Reptiles Coordinator for 2010-2011.

Fish and aquatic invertebrate monitoring was not undertaken during the reporting period. However, due to above average rainfall throughout 2010, Lake Cowal rose above the 204.5 AHD trigger level on approximately 7 December 2010. Although significant water was present in the compensatory wetland, new lake foreshore and wetland areas within ML 1535 throughout much of 2010, the water level of the lake remained below the trigger water level (i.e. 204.5 m AHD) for fish and aquatic invertebrate monitoring. A fish and aquatic invertebrate survey was scheduled to be conducted during February 2011 in accordance with the SWGMBMP.

3.8.2.3 *Variations from proposed Control Strategies*

There were no variations from the proposed control strategies.

3.8.3 Environmental Performance

3.8.3.1 *Monitoring*

In accordance with the FFMP, monitoring in relation to fauna was conducted during the reporting period. Activities conducted during the reporting period relating to fauna monitoring included:

- continuation of long-term baseline monitoring of bird breeding (Table 23);
- twice daily fauna usage of the tailings storage facilities;
- regular checking of the main diesel tank and hydrogen peroxide tank concrete bund sumps after rainfall events to rescue and relocate frogs; and
- daily and weekly fauna incident inspections and field patrols.

**Table 23
Fauna Monitoring Conducted During the Reporting Period**

Monitoring Component	Summary
Birds	Continuation of long-term bird breeding monitoring, including: <ol style="list-style-type: none"> 1. Waterbird breeding surveys. 2. Collection of environmental data including lake depth, changes in depth, Southern Oscillation Index (SOI), season, and rainfall. 3. Statistical analysis to examine variation in the abundance of breeding birds, and the number and survival of fledglings and the mean number of breeding bird species between years, seasons, lake water cycle and climatic conditions.

Twice daily monitoring of fauna usage of the tailings facilities has been undertaken since the commissioning of the facilities in April 2006. One patrol is conducted after dawn and the other in the late afternoon. The patrol

includes inspection of the tailings dam fence for evidence of fauna usage (e.g. tracks or breaks in the fence) and to determine the need for any maintenance measures (e.g. fence repair). Any maintenance measures are undertaken, as soon as practicable. The fauna monitoring results will be utilised to determine the requirement for modifications to the mechanisms being utilised to deter fauna from the tailings dams.

The following details and observations are recorded:

- observer details (i.e. name and position);
- date and time of inspection;
- type of species present;
- number of individuals of each species;
- location within the tailings dam (e.g. on tailings dam, beach or embankment, etc);
- behaviour and habits of individuals (e.g. flying over tailings and/or wading in the tailings facility, etc);
- visually observed fauna effects; and
- any fauna incidents and/or fauna deaths.

Weekly boundary inspections of ML 1535 were conducted by environmental and/or security personnel to identify any native fauna incidents and/or deaths. On some occasions however, surveys were not able to be conducted due to access restrictions caused by wet weather, including for much of 2010, no inspection of the eastern fence and parts of the northern and southern fences was able to be undertaken due to the lake fill event that occurred during 2010. In this case, opportunistic inspections were carried when conducting water monitoring on Lake Cowal. An aluminium boat has been purchased to allow for access of inundated areas. Fauna '*incidents*' are considered to occur where the observed behaviour of native fauna indicates that a negative impact on individual(s) is occurring as a result of the presence or operation of the mine (e.g. fauna is observed trapped within the ML 1535 fence). In the event that fauna incidents are observed, the following details and observations will be recorded:

- observer details (i.e. name and position);
- date and time of inspection;
- type of species;
- number of individuals of each species;
- location; and
- any other details of the native fauna incident.

Any native fauna found dead in the ML 1535 area are reported to environmental personnel who coordinate collection. Dead fauna are collected for autopsy to enable the cause of death to be determined. The details and observations listed above are recorded, as well as condition of the species and surface water conditions of the Lake and surrounding area (when inundated). Where practicable, photographs or video footage are taken (e.g. of landscape, stance of clinically affected animal, place of death) to provide additional information for veterinarian and site investigation. If cyanide is suspected or known to be a contributor to the death of a native or feral animal, then the West Wyalong Veterinarian would be contacted immediately and special preservation techniques would apply for the sampling process to follow.

As described in Section 3.5.4, the death of two Silver Gulls on 19 November 2010 in the processing plant area was formally reported to the OEH (formerly DECCW) on 10 December 2010. The fauna deaths were considered a result of the birds accessing process slurry (500ppm WAD CN), on the Leach tank concrete bund sump pump area during a planned Process Plant power supply shutdown period and are described in Table 24 below. Previously no cyanide related deaths of animals have been recorded since the commencement of CGM processing operations in April 2006.

Pest Management

Observations of foxes, mice, feral cats and rabbits on the ML 1535 by Barrick staff led to the implementation of control programs on the ML 1535 during the reporting period. If pests continue to be located in the future, pest control measures as described in the FFMP and Draft Vertebrate Pest Control Manual (NSW Agriculture, 2003) will be considered and implemented where necessary.

3.8.3.2 *Performance Outcomes*

Fish and aquatic invertebrate monitoring was not undertaken during the reporting period as the water level of the lake remained below the trigger water level (i.e. 204.5 m AHD) in accordance with the SWGMBMP. Monitoring of fish and aquatic invertebrates in accordance with the SWGMBMP 2011 will commence during 2011 when the lake water level reaches the 204.5 m AHD trigger level.

Several WIRES rescues and relocations of native fauna have been undertaken during the reporting period, when mining activities have been a threat to their safety. There have also been a number of injured animals that have been taken into WIRES home care and later released at the site once rehabilitated.

The rescues and relocations to immediately adjacent suitable habitat for the 2010 reporting period were:

- 2 Australian Magpie relocations
- 1 Barn Owl relocation
- 1 Galah
- 3 Great Crested Grebe relocations
- 1 Heron relocation
- 1 Hoary Headed Grebe relocation
- 1 Kookaburra relocation (found offsite)
- 2 Bat relocations
- 2 Nankeen Kestrel relocations
- 1 Stubble Quail relocation
- 13 Snake relocations
- 10 Lizard relocations
- 18 Snake Necked Turtle relocations
- 1 Eastern Grey Kangaroo Relocation
- 1 Emu Relocation
- 1231 Frog relocations
- 6 Crucifix Toad relocations
- 110 Carp euthanasia
- 1 Feral Cat euthanasia

All native animals rescued at the CGM are entered into the WIRES database (www.wires.org.au).

Plate 1
Great Crested Grebe Relocation



A summary of all the reported fauna deaths during the reporting period is provided below in Table 24.

Table 24
Records of Fauna Deaths and Other Incidents for the Reporting Period

Date/Time of Incident	30 December 2009	
Location	Bitumen access roadway, Mining Lease.	
Species and number of individuals	Apostlebird	1
Description of Incident	Dead bird noted on road way. Taken to West Wyalong Veterinary Clinic for assessment reporting.	
Outcome	Massive, multiple internal injuries consistent with intense vehicle impact.	
Date/Time of Incident	01 January 2010	
Location	Bitumen access roadway, Mining Lease.	
Species and number of individuals	Apostlebird	1
Description of Incident	Dead bird noted on outbound lane of road way adjacent Pond D9. Taken to West Wyalong Veterinary Clinic for assessment reporting.	
Outcome	Massive, multiple internal injuries consistent with intense vehicle impact.	
Date/Time of Incident	01 January 2010	
Location	Bitumen access roadway, Mining Lease.	
Species and number of individuals	Black-faced Cuckoo-shrike	1
Description of Incident	Dead bird noted on outbound lane of road way adjacent creek near STSF fence. Taken to West Wyalong Veterinary Clinic for assessment reporting.	
Outcome	Internal injuries consistent with intense vehicle impact.	
Date/Time of Incident	19-Jan-10	
Location	Processing bulk oxygen tanks bund area, Mining Lease.	
Species and number of individuals	Richards Pipit	1
Description of Incident	Dead bird noted on concrete. Taken to West Wyalong Vet Clinic for inspection/reporting.	
Outcome	Desiccated, missing left wing, head and neck suggesting predation.	
Date/Time of Incident	20-Jan-10	
Location	Mining Maintenance area, Mining Lease.	
Species and number of individuals	Black-faced Cuckoo-shrike	1
Description of Incident	Injured bird taken into WIRES Care but died in transit to West Wyalong Vet Clinic.	
Outcome	Penetrating injury to brain suggesting collision with a sharp object in flight.	
Date/Time of Incident	25-Jan-10	
Location	Entangled in boundary electric stock fence, Mining Lease.	
Species and number of individuals	Emu	1
Description of Incident	Dead, predated and decomposed bird entangled in Mining Lease stock proof electric fence. Removed and taken to West Wyalong Vet Clinic for inspection and reporting.	
Outcome	Combination of electric shock, dehydration, stress and predation.	
Date/Time of Incident	2-Feb-10	
Location	Western outer bund wall of Pond D9, Mining Lease.	
Species and number of individuals	Black Swans	2
Description of Incident	Two deceased and heavily predated birds found under the 132kVA ETL adjacent Pond D9 west outer wall. About 400ML of fresh water in Pond D9.	
Outcome	Severe predation, likely power line strike fallen birds.	
Date/Time of Incident	3-Feb-10	
Location	Processing Plant Tanks area, Mining Lease.	
Species and number of individuals	Brown Songlark	
Description of Incident	Employee reported finding a desiccated dead bird at Processing Tanks 7-9. No apparent mud load on feather, possibly a flight misadventure related death. Taken to Vet Clinic.	
Outcome	Bird was assumed to have become stuck in mud/slurry and eventually perished.	

Table 24 (Continued)
Records of Fauna Deaths and Other Incidents for the Reporting Period

Date/Time of Incident	8-Feb-10	
Location	Adjacent a shed outside the Main Diesel tank bunded area, Mining Lease.	
Species and number of individuals	Galah	
Description of Incident	Dead bird found by vacation employees on ground above the Main Diesel Tank bunded area by blue sea container whilst relocating Frogs (x70).	
Outcome	Blunt trauma to the left side of the head and eye socket suggests impact during flight as the most likely cause of death.	
Date/Time of Incident	08 February 2010	
Location	Gravel access roadway to TSF, Mining Lease.	
Species and number of individuals	Bearded Dragon	1
Description of Incident	Employee noted a dead Dragon on the access road. Picked up and handed to Environmental Manager in office. Head crushed and obvious lower body evisceration injuries.	
Outcome	Injuries such as eviscerated intestines and fractured jaw, skull and right femur are consistent with being run over by a motor vehicle.	
Date/ Time of Incident	09 February 2010	
Location	Bitumen Access Rd, Mining Lease	
Species and Number of Individuals	Bearded Dragon	1
Description of incident	While driving along the Access Rd, a Bearded Dragon was sighted which had been run over. The dead lizard was bagged and taken to West Wyalong Vet	
Outcome	The body was completely compressed, rectum and intestines had prolapsed and legs were almost entirely severed. Such injuries are consistent with being run over.	
Date/Time of Incident	09 February 2010	
Location	Main Diesel Tank truck fill pumping system bund, Mining Lease.	
Species and number of individuals	Spotted Marsh Frogs	10
Description of Incident	Ten dead and x1 live frogs found in the pumping bund above the Main Diesel Tank bund. Diesel leaks from the truck refuelling glands likely cause of death.	
Outcome		
Date/Time of Incident	09 February 2010	
Location	Bitumen access road, Mining Lease.	
Species and number of individuals	Crested Pigeon	1
Description of Incident	Vehicle damaged bird noted on outbound lane of site bitumen access road by vacation employees.	
Outcome	Injuries included eviscerated abdominal cavity, fractured right wing and predation and are consistent with motor vehicle impact.	
Date/Time of Incident	9-Feb-10	
Location	Bulk Oxygen storage tank, Mining Lease.	
Species and number of individuals	Red-browed Treeclimber	1
Description of Incident	Dead bird found on ground near the bulk oxygen storage tank adjacent the lime storage silo area.	
Outcome	Bruising of the left eye socket and blood in the mouth are injuries which are consistent with death by sudden impact.	
Date/Time of Incident	9-Feb-10	
Location	Main Diesel Tank sump, Mining Lease.	
Species and number of individuals	Spotted Marsh Frogs	10
Description of Incident	Frogs found dead in the sump and likely died from contact with the slight diesel film.	
Outcome	Suspected cause of death was due to hydrocarbon contact.	

Table 24 (Continued)
Records of Fauna Deaths and Other Incidents for the Reporting Period

Date/Time of Incident	16 February 2010	
Location	Bitumen access road, Mining Lease.	
Species and number of individuals	Australian Magpie	1
Description of Incident	Injured Magpie noted as Community Relations Manager was entering site. Environmental Manager was not far away and issued a WIRES Call number (RIV647), however, bird had died within next 10mins before arrived on scene.	
Outcome	Injuries including fractures to the left side of the skull and lower jaw are consistent with collision with a motor vehicle.	
Date/Time of Incident	17 February 2010	
Location	Main Diesel Tank sump, Mining Lease	
Species and number of individuals	Spotted Marsh Frogs	10
Description of Incident	Frogs found dead in the sump and likely died from contact with the slight diesel film.	
Outcome		
Date/Time of Incident	17 February 2010	
Location	Bitumen access road, Mining Lease.	
Species and number of individuals	? unknown feathers	1
Description of Incident	Bitumen access road. Feathers collected in a plastic bag and taken to West Wyalong Vet Clinic for possible identification.	
Outcome		
Date/Time of Incident	18 February 2010	
Location	Process Plant Flocculent area sump, Mining Lease.	
Species and number of individuals	Brown Snake (juv)	1
Description of Incident	A juvenile snake was found squashed dead in the sump. Could have been walked on or a pallet may have been placed on it by accident.	
Outcome	Due to a compressed body and areas of broken skin, the cause of death is believed to be blunt trauma; human or vehicle.	
Date/Time of Incident	18 February 2010	
Location	Process Plant Flocculent area sump, Mining Lease.	
Species and number of individuals	Brown Snake (juv)	1
Description of Incident	A juvenile snake was found squashed dead in the sump. Could have been walked on or a pallet may have been placed on it by accident.	
Outcome	Due to a compressed body and areas of broken skin, the cause of death is believed to be blunt trauma; human or vehicle.	
Date/Time of Incident	22 February 2010	
Location	Processing Plant Hydrogen Peroxide sump, Mining Lease.	
Species and number of individuals	Spotted Marsh Frog	1
Description of Incident	A frog died during the capture of other live frogs in the sump. Possibly drowned in fresh water.	
Outcome	Cause of death was determine as being protein denaturation as a result of being accidentally placed in very hot water	
Date/Time of Incident	25 February 2010	
Location	Bitumen access road, Mining Lease.	
Species and number of individuals	Brown Snake	1
Description of Incident	A large snake was noted writhing and bleeding on the first concrete spillway adjacent to the Main Admin Car park just after 17:00hrs knock off. Snake was assessed, given a WIRES Call number (RIV666) and immediately euthanased by the Env Manager.	
Outcome		

Table 24 (Continued)
Records of Fauna Deaths and Other Incidents for the Reporting Period

Date/Time of Incident	02 March 2010	
Location	Processing Plant lime storage tanks area, Mining Lease.	
Species and number of individuals	Buff-banded Rail	1
Description of Incident	Employee found dead bird near Lime Silo inside Processing area.	
Outcome		
Date/Time of Incident	03 March 2010	
Location	Processing Plant lime storage tanks area, Mining Lease.	
Species and number of individuals	Buff-banded Rail	1
Description of Incident	Employee found dead bird near Lime Silo inside Processing area.	
Outcome		
Date/Time of Incident	03 March 2010	
Location	TSF gravel access road, Mining Lease.	
Species and number of individuals	Brown Snake	1
Description of Incident	A juvenile snake was noted opposite the Stop sign during a CEMCC vehicle tour.	
Outcome		
Date/Time of Incident	10 March 2010	
Location	Bitumen access road near Main Car Park, Mining Lease.	
Species and number of individuals	Brown Snake	1
Description of Incident	A full size snake was noted by employee to be writhing and bleeding on the concrete spillway. Env Manager called to scene to assess, issue a WIRES Call Number (RIV672) and euthanase. Bagged snake taken to West Wyalong Vet Clinic for report.	
Outcome		
Date/Time of Incident	18 March 2010	
Location	Processing Plant area, Mining Lease.	
Species and number of individuals	Brown Snake	1
Description of Incident	A juvenile snake was noted dead on access road.	
Outcome	Injury consistent with vehicle impact.	
Date/Time of Incident	18 March 2010	
Location	Processing Plant area bund, Mining Lease.	
Species and number of individuals	Spotted Marsh Frog	3
Description of Incident	OHS-Security staff inspecting bunded areas found three desiccated frogs in the corner of a dry concrete bund in the cyanide storage tank area. They were uncertain of whether the frogs may have been washed in from the truck parking apron entry point above. Bagged body taken to WWy Vet Clinic.	
Outcome	Injury consistent with dehydration.	
Date/Time of Incident	22 March 2010	
Location	VCP old 'Cowel West' quarry hillock, Mining Lease.	
Species and number of individuals	Legless Lizards	3
Description of Incident	Three small lizards found squashed dead on ground after dozer works to clear trees. Bagged bodies taken to WWy Vet Clinic.	
Outcome	Injured consistent with blunt impact (tree or dozer).	
Date/Time of Incident	29 March 2010	
Location	Bitumen access road, Mining Lease.	
Species and number of individuals	Snake-necked Turtle	1
Description of Incident	Employee noted a squashed turtle body adjacent the concrete spillway on the site bitumen entry road way. Large maggots inside carapace suggested a weekend incident had occurred. Bagged body taken to WWy Vet Clinic.	
Outcome	Injury consistent with vehicle impact.	

Table 24 (Continued)
Records of Fauna Deaths and Other Incidents for the Reporting Period

Date/Time of Incident	29 March 2010	
Location	Main Administration Building access path ways, Mining Lease.	
Species and number of individuals	Skink	1
	Spotted Marsh Frog	1
Description of Incident	Two dead animals were found dry and squashed into blue metal pavement dust in fairly busy a pedestrian access way. Env Mgr has previously noted small skinks dashing across walkways from under the buildings when using the pathways. Bagged bodies taken to WWy Vet Clinic.	
Outcome	Consistent with crush by pedestrian traffic.	
Date/Time of Incident	27 - 30 March 2010	
Location	Old 'Cowan West' quarry hillock VCP, Mining Lease.	
Species and number of individuals	Apostlebird	2
Description of Incident	Two juvenile Apostlebirds were taken into WIRES Home care during VCP works conducted on the 23 March and 24 March 2010 (Call numbers RIV682 and RIV688, respectively).	
Outcome	The birds were calling constantly, being fed as per guidelines but failed to thrive in home care and died overnight after just a few days in care in both cases.	
Date/Time of Incident	06 April 2010	
Location	Bitumen access road way, Mining Lease.	
Species and number of individuals	Black Snake	1
Description of Incident	Employee noticed a dead, flat black snake on road way during routine patrol.	
Outcome	Injury consistent with vehicle impact.	
Date/Time of Incident	09 April 2010	
Location	Processing Plant bulk hydrogen peroxide storage bund sump, Mining Lease.	
Species and number of individuals	Spotted, Stripped and Salmon-striped Marsh	97
Description of Incident	It appears that a delivery line was flushed into the sump after rainfall had encouraged Frogs to move into the area. 125 live frogs were rescued and relocated for the same sump after the dead ones were recovered. The sump was cleaned and flushed with fresh water. It will not possible to barricade mesh this low lying concrete bunded area.	
Outcome	Consistent with bleached skin tissue. Several of the better specimens were sent for histopathology by the local Veterinarian after initial examination to confirm this.	
Date/Time of Incident	15 April 2010	
Location	Bitumen access road, Mining Lease.	
Species and number of individuals	Bearded Dragon	1
Description of Incident	Dead, flat Dragon noted n road by employee.	
Outcome	Injuries consistent with vehicular impact.	
Date/Time of Incident	27 April 2010	
Location	Main Diesel Bund concrete sump, Mining Lease.	
Species and number of individuals	Spotted, Striped, Marsh Frogs	15
Description of Incident	These frogs suspected impact by slight diesel film. 150 unaffected frogs relocated from same sump. Sump flushed with fresh water. Barricade mesh installed at perimeter (50%).	
Outcome	Consistent with skin tissue. Several of the better specimens were sent for histopathology by the local Veterinarian after initial examination to confirm this.	
Date/Time of Incident	30 April 2010	
Location	Processing Maintenance Workshop concrete apron, Mining Lease.	
Species and number of individuals	Spotted Marsh Frog	1
Description of Incident	OHS employee noted a flattened, desiccated frog on concrete during walk around.	
Outcome	Injury consistent with blunt trauma.	

Table 24 (Continued)
Records of Fauna Deaths and Other Incidents for the Reporting Period

Date/Time of Incident	03 May 2010	
Location	Bitumen access road, Mining Lease.	
Species and number of individuals	Black Snake	1
Description of Incident	Employee noted a dead black snake on the bitumen whilst conducting routine duties.	
Outcome	Injuries consistent with vehicular impact.	
Date/Time of Incident	04 May 2010	
Location	Pond D6 outside fence by Philington's water pump, Mining Lease.	
Species and number of individuals	Australian Wood Duck	1
Description of Incident	Duck suspected to have flow into chain mesh wire security fence surrounding Pond D6 during afternoon lightning storm during a period of reduced visibility.	
Outcome	Injuries consistent with flight misadventure.	
Date/Time of Incident	06 May 2010	
Location	Main Administration pedestrian pathway, Mining Lease.	
Species and number of individuals	Spotted Marsh Frog	1
Description of Incident	A dead, desiccated frog was found on a pathway at Administration during a walk around.	
Outcome	Injuries consistent with pedestrian impact.	
Date/Time of Incident	07 May 2010	
Location	Main Diesel Tank bunded sump, Mining Lease.	
Species and number of individuals	Spotted Marsh Frog	1
Description of Incident	These frogs suspected impact by slight diesel film. 5 unaffected frogs relocated from same sump. Sump flushed with fresh water. Barricade mesh installed at perimeter (50%).	
Outcome	Consistent with skin tissue. Several of the better specimens were sent for histopathology by the local Veterinarian after initial examination to confirm this.	
Date/Time of Incident	12 May 2010	
Location	Hydrogen Peroxide concrete bund sump, Mining Lease.	
Species and number of individuals	Spotted Marsh Frog	3
Description of Incident	These frogs suspected impact by slight peroxide ingress from tanker unloading. Barricade mesh is not able to be installed at perimeter of this bund due to design constraints.	
Outcome	Consistent with skin tissue. Several of the better specimens were sent for histopathology by the local Veterinarian after initial examination to confirm this.	
Date/Time of Incident	14 May 2010	
Location	Main Diesel Tank bunded sump, Mining Lease.	
Species and number of individuals	Spotted Marsh Frog	1
Description of Incident	These frogs suspected impact by slight diesel film. 1 unaffected frog relocated from same sump. Sump flushed with fresh water. Barricade mesh installed at perimeter (50%).	
Outcome	Consistent with skin tissue damage.	
Date/Time of Incident	17 May 2010	
Location	Main Diesel Tank bunded sump, Mining Lease.	
Species and number of individuals	Spotted Marsh Frog	4
Description of Incident	These frogs suspected impact by slight diesel film. 19 unaffected frogs relocated from same sump. Sump flushed with fresh water. Barricade mesh installed at perimeter (50%).	
Outcome	Consistent with skin tissue. Several of the better specimens were sent for histopathology by the local Veterinarian after initial examination to confirm this.	

Table 24 (Continued)
Records of Fauna Deaths and Other Incidents for the Reporting Period

Date/ Time of Incident	18 May 2010	
Location	Bitumen access Rd adjacent to pond D9, Mining Lease.	
Species and Number of Individuals	Apostlebird	1
Description of Incident	While leaving site, the Environmental Manager sighted a crumpled body on the Access Rd. When collecting the bird, fresh blood was noticed suggesting vehicular impact minutes previously.	
Outcome	Laterally compressed with a fracture to the left humerus and a dislocated femur suggest vehicular impact during flight.	
Date/Time of Incident	19 May 2010	
Location	Hydrogen Peroxide concrete bund sump, Mining Lease.	
Species and number of individuals	Spotted Marsh Frog	1
Description of Incident	This frog suspected impact by slight peroxide ingress from tanker unloading. 8 unaffected frogs relocated from same sump. Barricade mesh is not able to be installed at perimeter of this bund due to design constraints.	
Outcome	Consistent with skin tissue. Several of the better specimens were sent for histopathology by the local Veterinarian after initial examination to confirm this.	
Date/Time of Incident	19 May 2010	
Location	Hydrogen Peroxide concrete bund sump, Mining Lease.	
Species and number of individuals	Spotted Marsh Frog	1
Description of Incident	This frog suspected impact by slight peroxide ingress from tanker unloading. 8 unaffected frogs relocated from same sump. Barricade mesh is not able to be installed at perimeter of this bund due to design constraints.	
Outcome	Consistent with skin tissue. Several of the better specimens were sent for histopathology by the local Veterinarian after initial examination to confirm this.	
Date/Time of Incident	25 May 2010	
Location	Primary Crusher lower levels, Mining Lease.	
Species and number of individuals	Spotted Marsh Frog	4
Description of Incident	4 dead frogs were recovered from a walk around of the lower Primary Crusher levels by OHS&Security Manager.	
Outcome	Undesirable environment, no suitable cover or foodweb.	
Date/Time of Incident	26 May 2010	
Location	Bitumen access road way, Mining Lease.	
Species and number of individuals	Masked Lapwing Plover	1
Description of Incident	Homeward bound employee noted a squashed Plover on inbound lane at 60kmph bend. Several vehicles had just entered the main car park area in darkness.	
Outcome	Injuries consistent with vehicle impact.	
Date/Time of Incident	31 May 2010	
Location	Main Diesel Tank banded sump, Mining Lease.	
Species and number of individuals	Spotted Marsh Frog	1
Description of Incident	This frog suspected impact by slight diesel film impact. 123 unaffected frogs relocated from same sump. Barricade mesh is installed at perimeter of 50% of this bund. On the 28 May, a further 163 unaffected frogs were rescued and relocated from the same sump.	
Outcome	Consistent with skin tissue. Several of the better specimens were sent for histopathology by the local Veterinarian after initial examination to confirm this.	

Table 24 (Continued)
Records of Fauna Deaths and Other Incidents for the Reporting Period

Date/Time of Incident	31 May 2010	
Location	Hydrogen Peroxide concrete bund sump, Mining Lease.	
Species and number of individuals	Spotted Marsh Frog	14
Description of Incident	These frogs suspected impact by slight peroxide ingress from tanker unloading. Barricade mesh is not able to be installed at perimeter of this bund due to design constraints. 56 unaffected frogs relocated from same sump.	
Outcome	Consistent with skin tissue. Several of the better specimens were sent for histopathology by the local Veterinarian after initial examination to confirm this.	
Date/Time of Incident	12 June 2010	
Location	Upper Waste Emplacement., Mining Lease.	
Species and number of individuals	Australian Magpie	1
Description of Incident	Mortally injured bird found at base of mobile lighting tower by Mining Shift Supervisor on routine patrol. Bird died during picking up, handed to Duty ERO who handed to Environmental manager who was in office. Fresh blood from beak but not outward visible injuries.	
Outcome	Consistent with in-flight misadventure.	
Date/Time of Incident	15 June 2010	
Location	Main Diesel Storage Tank concrete bund sump, Mining Lease.	
Species and number of individuals	Spotted Marsh Frogs	3
Description of Incident	Three deceased frogs recovered. Slight diesel film, colder weather.	
Outcome	Consistent with lack of suitable cover in concrete sump.	
Date/Time of Incident	29 July 2010	
Location	Boart Longyear gravel access road, Mining Lease.	
Species and number of individuals	Masked Lapwing Plover	1
Description of Incident	Exploration Geology employee collected a dead Plover found on gravel access road to Boart Longyear Depot after heavy fog lifted. Vehicle impact – unable to see immobile birds on road before sunrise.	
Outcome	Injuries consistent with vehicle impact.	
Date/Time of Incident	02 August 2010	
Location	HV powerline adjacent TSF access road, Mining Lease.	
Species and number of individuals	Australian Wood Duck	1
Description of Incident	Environmental Manager noted a Raven eating something under the HV power line running from Main Administration area to TSF pipelines corridor gravel track road.	
Outcome	Likely an early morning flight misadventure into power lines. West Wyalong Veterinarian unable to determine precise cause of death due to heavy upper body predation.	
Date/Time of Incident	16 August 2010	
Location	Main Gate pedestrian steps, Mining Lease.	
Species and number of individuals	Spotted Marsh Frog	1
Description of Incident	Gate Security Officer reported a dead frog on concrete at base of Main Gate steps.	
Outcome	Human pedestrian traffic impact at Main Gate access steps to Security Office.	
Date/ Time of Incident	19 August 2010	
Location	Bitumen Access Rd adjacent to STSF, Mining Lease	
Species and number of individuals	Apostlebird	1
Description of Incident	Employee accidentally hit the bird whilst driving to site via the Access Rd. The bird was collected and bagged to be taken to West Wyalong Vet.	
Outcome	Blood in the mouth and throat as well as haemorrhaging in the body cavity are suggestive of motor vehicle impact.	

Table 24 (Continued)
Records of Fauna Deaths and Other Incidents for the Reporting Period

Date/Time of Incident	01 September 2010	
Location	Bitumen access road, Mining Lease.	
Species and number of individuals	Apostlebird	1
Description of Incident	Dead bird noted on road verge. Vehicle impact.	
Outcome	Injuries consistent with vehicle impact.	
Date/ Time of Incident	01 September 2010	
Location	South rural protection fence TSR line, Mining Lease	
Species and number of individuals	Barn owl	1
Description of Incident	Barn Owl found trapped in fence line, possibly became trapped by a wrapped wing whilst trying to escape barbs.	
Outcome	Soft tissue of the left wing was torn, exposing bone at the radiocarpal joint up t the humero radial joint with significant injuries to digits on both feet. Euthanasia was recommended and carried out.	
Date/Time of Incident	11 September 2010	
Location	Mining Area, Mining Lease.	
Species and number of individuals	Pied Butcher Bird	1
Description of Incident	Butcher bird found in dying stage by Mining Shift Supervisor and was immediately rescued handed in box to ERO to pass on to the arriving Environmental Manager.	
Outcome	Internal evidence of in-flight injury (lighting tower).	
Date/Time of Incident	22 September 2010	
Location	Pond D9, Mining Lease.	
Species and number of individuals	? female Darter / ? White Necked-heron	1
Description of Incident	Dead juvenile bird found floating on east wall of Pond D9 by routine patrol employee. Env Manager recovered bird and transported to West Wyalong Veterinary Clinic.	
Outcome	Indeterminate cause of death. Natural cause during weather change?	
Date/Time of Incident	22 September 2010	
Location	Lower E42 Pit floor, Mining Lease.	
Species and number of individuals	Tiger Snake	1
Description of Incident	Mortally injured large Tiger Snake noted by employees near Grader parked for inspection with its blade grounded. Two venomous snake handler Env Officers responded on scene to rescue, assess and euthanase in a safer location with a cranial crush.	
Outcome	Injuries consistent as described above.	
Date/Time of Incident	23 September 2010	
Location	Main Administration car park, Mining Lease.	
Species and number of individuals	Galah	1
Description of Incident	Dead bird found on ground in car park by Duty ERO patrol near the front of parked cars. Likely fallen off after parking.	
Outcome	Injuries consistent with vehicle impact.	
Date/Time of Incident	24 September 2010	
Location	Pond D3, Mining Lease.	
Species and number of individuals	Galah	1
Description of Incident	Dead bird found on ground at north end of Pond D3. Fresh body, no signs of distress.	
Outcome	Flight misadventure, saline water in Pond D3? No obvious external injuries detected.	

Table 24 (Continued)
Records of Fauna Deaths and Other Incidents for the Reporting Period

Date/Time of Incident	26 September 2010	
Location	Mining Road, Mining Lease.	
Species and number of individuals	Coot	1
Description of Incident	Squashed dead black bird handed to Gate Duty ERO by Shift Mining Superintendent. Obvious heavy vehicle pneumatic wheel contact on haul road.	
Outcome	Injuries consistent with vehicular impact.	
Date/Time of Incident	27 September 2010	
Location	Bitumen access road, Mining Lease.	
Species and number of individuals	Australian Raven	1
Description of Incident	Dead bird noted on outgoing lane verge. Been a windy afternoon and this juvenile (pin feathers), likely blown from nest and then a misadventure into vehicle path.	
Outcome	Injuries consistent with vehicular impact.	
Date/Time of Incident	30 September 2010	
Location	Bitumen access road, Mining Lease.	
Species and number of individuals	Magpie Lark	1
Description of Incident	Dead bird noted on access road way verge.	
Outcome	Injuries consistent with vehicular impact.	
Date/Time of Incident	07 October 2010	
Location	Bitumen access road, Mining Lease.	
Species and number of individuals	Apostlebird	1
Description of Incident	Dead bird noted on road verge.	
Outcome	Injuries consistent with vehicular impact.	
Date/ Time of Incident	11 October 2010	
Location	E42 Pit at switchback No. 4, Mining Lease	
Species and number of individuals	Great Crested Grebe (juv)	1
Description of incident	Bird was sighted in the middle of the haul rd at switchback no. 4. The bird was rescued by Garry Pearson, taken to West Wyalong Vet for assessment. (RIV1632)	
Outcome	Fluids were administered for rehydration and the bird was then taken to Old Junee for specialised WIRES care. (RIV1632)	
Date/Time of Incident	11 October 2010	
Location	Bitumen Access Rd, adjacent to pond D9, Mining Lease	
Species and number of individuals	Black Snake	1
Description of incident	The Environmental Manager was notified of an injured snake on the access rd in need of rescue. Trained venomous snake handler, Greg Ritchie was dispatched to assess its condition and upon finding that the injuries sustained were fatal, a euthanasing head blow was administered. The body was bagged and taken to west Wyalong Vet for assessment	
outcome	The body had been compressed caudally, consistent with being run over. Immediate euthanasia was carried out (head blow) by Greg Ritchie. The body was kept for educational display in preservative at the LCCC.	

Table 24 (Continued)
Records of Fauna Deaths and Other Incidents for the Reporting Period

Date/Time of Incident	12 October 2010	
Location	Bitumen access road, Mining Lease.	
Species and number of individuals	Masked lapwing Plover	1
Description of Incident	Dead bird noted on access road way verge.	
Outcome	Injuries consistent with vehicular impact.	
Date/Time of Incident	13 October 2010	
Location	Bitumen access road, Mining Lease.	
Species and number of individuals	Galah	1
Description of Incident	Dead bird noted on access road way verge.	
Outcome	Injuries consistent with vehicular impact.	
Date/Time of Incident	13 October 2010	
Location	Bitumen access road, Mining Lease.	
Species and number of individuals	Australian Raven	1
Description of Incident	Dead bird noted on access road way verge.	
Outcome	Injuries consistent with vehicular impact.	
Date/Time of Incident	13 October 2010	
Location	Bitumen access road, Mining Lease.	
Species and number of individuals	Juvenile Australian Magpie	1
Description of Incident	Dead bird noted on access road way verge.	
Outcome	Injuries consistent with vehicular impact.	
Date/Time of Incident	14 October 2010	
Location	Site Access Rd, Mining Lease	
Species and number of individuals	Eastern Snake-necked Turtle	1
Description of Incident	Turtle was found alive on Access Rd and assigned WIRES Riverina Call No. RIV1638. The turtle was taken to West Wyalong Vet for assessment and decision regarding euthanasia.	
Outcome	Injuries warranted immediate euthanasia which was carried out.	
Date/Time of Incident	14 October 2010	
Location	Site Access Rd, Mining Lease	
Species and number of individuals	Bearded Dragon	1
Description of incident	Bearded Dragon was found alive on the Access Rd with visible injuries possibly sustained by being clipped by a car. The WIRES Riverina call No. RIV1640 was assigned and the lizard was taken to West Wyalong for assessment and decision regarding euthanasia.	
Outcome	Injuries warranted immediate euthanasia which was carried out.	
Date/Time of Incident	15 October 2010	
Location	Bitumen access road, Mining Lease.	
Species and number of individuals	Australian Raven	1
Description of Incident	Dead bird noted on access road way verge.	
Outcome	Injuries consistent with vehicular impact.	
Date/Time of Incident	18 October 2010	
Location	Bitumen access road, Mining Lease.	
Species and number of individuals	Galah	1
Description of Incident	Dead bird noted on access road way verge.	
Outcome	Injuries consistent with vehicular impact.	

Table 24 (Continued)
Records of Fauna Deaths and Other Incidents for the Reporting Period

Date/Time of Incident	19 October 2010	
Location	Bitumen access road, Mining Lease.	
Species and number of individuals	Bob Tail	1
Description of Incident	Dead large skink noted on access road way verge.	
Outcome	Injuries consistent with vehicular impact.	
Date/Time of Incident	20 October 2010	
Location	Bitumen access road, Mining Lease.	
Species and number of individuals	Galah	1
Description of Incident	Dead bird noted on access road way verge.	
Outcome	Injuries consistent with vehicular impact.	
Date/Time of Incident	20 October 2010	
Location	Bitumen access road, Mining Lease.	
Species and number of individuals	Australian Magpie	1
Description of Incident	Dead juvenile bird noted on access road way verge.	
Outcome	Injuries consistent with vehicular impact.	
Date/Time of Incident	23 October 2010	
Location	Bitumen access road, Mining Lease.	
Species and number of individuals	Galah	1
Description of Incident	Dead bird noted on access road way verge.	
Outcome	Injuries consistent with vehicular impact.	
Date/Time of Incident	23 October 2010	
Location	Bitumen Access Rd, Mining Lease	
Species and number of individuals	Magpie (juv.)	1
Description of incident	While leaving site via the access Rd, the environmental manager noted a motionless bird beside the road. Upon closer inspection, feeble and uncoordinated movement and squawk were observed. The bird was immediately euthanased.	
Outcome	A fractured right metacarpal and a wedged eyeball in the mouth likely caused choking and epistaxis from the nose. Cranial injury resulted from immediate euthanasia on mine site.	
Date/Time of Incident	29 October 2010	
Location	North Pit Haul Road, Mining Lease.	
Species and number of individuals	Blue-bellied Black Snake	1
Description of Incident	Dead snake noted on North Pit Haul road way.	
Outcome	Injuries consistent with vehicular impact.	
Date/Time of Incident	29 October 2010	
Location	Bitumen access road, Mining Lease.	
Species and number of individuals	Galah	1
Description of Incident	Dead bird noted on access road way verge.	
Outcome	Injuries consistent with vehicular impact.	
Date/Time of Incident	07 November 2010	
Location	Pit floor Haul Road, Mining Lease.	
Species and number of individuals	Tiger Snake	1
Description of Incident	Dead snake noted on Pit floor Haul road way.	
Outcome	Injuries consistent with vehicular impact.	

Table 24 (Continued)
Records of Fauna Deaths and Other Incidents for the Reporting Period

Date/Time of Incident	10 November 2010	
Location	Bitumen access road, Mining Lease.	
Species and number of individuals	Crested Pigeon	1
Description of Incident	Dead bird noted on access road way verge.	
Outcome	Injuries consistent with vehicular impact.	
Date/Time of Incident	17 November 2010	
Location	Bitumen access road, Mining Lease.	
Species and number of individuals	Bearded Dragons	2
Description of Incident	Two dead Dragons noted on access road way verge.	
Outcome	Injuries consistent with vehicular impact.	
Date/Time of Incident	19 November 2010	
Location	Process plant Leach floor sump, Mining Lease.	
Species and number of individuals	Silver Gull	2
Description of Incident	Two Silver Gulls were found dead, almost immediately after ingesting process slurry inside the bunded area by	
Outcome	Suspected as cyanide slurry cause of death (about 500ppm WAD CN process slurry).	
Date/ Time of Incident	22 November 2010	
Location	Bitumen Access Rd, Mining Lease	
Species and number of individuals	Australian Magpie (juv.)	
Description of incident	Environmental Manager noted a deceased Magpie on the Site Access Road. Handed to West Wyalong Vet at his Practice about 22:35hrs the 22 Nov 2010.	
Outcome	Detached and fractured right wing and prolapsed neck are injuries which are consistent with motor vehicle impact	
Date/ Time of Incident	22 November 2010	
Location	Bitumen Access Rd, Mining Lease	
Species and number of individuals	Australian Magpie (Juv.)	1
Description of event	CR Manager was leaving site 17:30hrs 25 November 2010 and noted a motionless Aust Magpie on bitumen access road. Environmental Manager delivered to West Wyalong Vet Clinic next morning.	
Outcome	Head trauma with associated haemorrhaging suggests motor vehicle impact	
Date/time of Incident	22 November 2010	
Location	Bitumen Access Rd, Mining Lease	
Species and number of individuals	Blue Bonnet	1
Description of incident	Employee handed in a decease Blue Bonnet to Environmental Manager	
Outcome	Cranial fractures with blood in the mouth and prolapsed of both eyes are injuries consistent with motor vehicle impact	
Date/Time of Incident	25 November 2010	
Location	Bitumen access road, Mining Lease.	
Species and number of individuals	Blue Bonnet	1
Description of Incident	Dead bird noted on access road way verge.	
Outcome	Injuries consistent with vehicular impact.	

Table 24 (Continued)
Records of Fauna Deaths and Other Incidents for the Reporting Period

Date/Time of Incident	25 November 2010	
Location	Within Sulphuric Acid bund in the Processing Plant, Mining Lease.	
Species and number of individuals	Nankeen Kestrel (Juv.)	1
Description of incident	During routine morning inspection, Phil Kosef found a deceased Nankeen Kestrel in the Sulphuric Acid bund. It was reported to the environmental department who then bagged the bird and took it to West Wyalong vet for an autopsy	
Outcome	The bird was in very poor condition, riddled with maggots and too autolyzed to determine the cause of death.	
Date/Time of Incident	14 December 2010	
Location	Bitumen access road, Mining Lease.	
Species and number of individuals	Australian Hobby	1
Description of Incident	Employee noted and recovered a dead bird from the road during routine environmental monitoring patrol works.	
Outcome	Injuries confirmed as consistent with vehicle impact.	
Date/Time of Incident	14 December 2010	
Location	Process Plant tailings disposal sump area, Mining Lease.	
Species and number of individuals	Stubble Quail	1
Description of Incident	Employee noted and recovered a dead bird from the concrete bund floor below the Nankeen Kestrel nest in the unused large diameter HDPE piping of the Oxide Circuit.	
Outcome	Veterinarian agreed that this was likely dropped feed to the chicks. HDPE pipe will be cleared and ends blanked after nesting and fledglings are departed.	
Date/Time of Incident	20 December 2010	
Location	Lake Protection Bund gravel road, Mining Lease.	
Species and number of individuals	Purple Swamp Hen	1
Description of Incident	Env Manager noted a recently deceased bird that wasn't there on Sunday morning patrol.	
Outcome	Veterinarian agreed that bird appears to have died of chronic illness with no other signs of injury present.	
Date/Time of Incident	20 December 2010	
Location	Bitumen access road, Mining Lease.	
Species and number of individuals	Bearded Dragon	1
Description of Incident	Employee noted and recovered a reptile from the road during routine environmental monitoring patrol works.	
Outcome	Injuries confirmed as consistent with vehicle impact.	
Date/Time of Incident	20 December 2010	
Location	Administration car park, Mining Lease	
Species and number of individuals	Galah	1
Description of Incident	Dead bird found in reverse parking area of administration carpark. The deceased bird was bagged and taken to West Wyalong vet for autopsy.	
Outcome	Congealed blood in the mouth and throat are consistent with suspected impact with the back of a motor vehicle.	
Date/Time of Incident	24 December 2010	
Location	Near guard rail adjacent to southern tailing dam, Mining Lease.	
Species and number of individuals	Apostlebird	1
Description of Incident	During a routine inspection of the STSF, the Environmental Manager found a deceased Apostlebird. The bird was bagged and chilled before being taken to the West Wyalong Vet clinic.	
Outcome	A fractured right radius and femur, blood from the nose, beak and upper airways are all injuries which are consistent with motor vehicle impact.	

Table 24 (Continued)
Records of Fauna Deaths and Other Incidents for the Reporting Period

Date/Time of Incident	27 December 2010	
Location	North Dump haul road (centre), Mining Lease.	
Species and number of individuals	Eastern Brown Snake	1
Description of Incident	Duty mine Shift Supervisor on the North Dump haul road noticed a dead Brown Snake on the road. This section of the road was isolated by cones until the body was collected and bagged by the Environmental manager. The snake was taken to the West Wyalong Vet for assessment.	
Outcome	The snake was eviscerated with blunt force trauma injury behind the head. Being run over by a motor vehicle is the likely cause of death.	
Date/Time of Incident	30 December 2010	
Location	Stairs to milling area in Processing plant, Mining Lease	
Species and number of individuals	Legless Lizard (Juv. Brown snake?)	1
Description of Incident	Duty ERO noted the dead lizard during his rounds. He bagged the lizard and placed in on the Environmental Manager's desk who discovered it on another call out on the 03/01/2011	
Outcome	The deceased lizard was found to be completely squashed, most probably as the result of being accidentally trodden on.	

Baseline bird breeding monitoring has been conducted at Lake Cowal since 1989. The long-term baseline monitoring of bird breeding was continued by Peter Gell from the University of Adelaide during January, August and October 2010 (potential bird breeding periods) and the results are summarised in Table 25.

The first survey was carried out on the 29th January 2010 by Peter Gell. No birds were observed breeding within the bounds of the lake and no water birds were recorded along the transect lines, to the dry conditions being observed.. However, sixty Wood Duck (*Chenonetta jubata*) were observed on a farm dam along the eastern lake boundary.

The second survey conducted during 2010 was carried out during 26th & 27th August by Peter Gell. No birds were observed breeding within the bounds of the lake. Transect survey results for transect 8 were presented by Peter Gell and presented in Table 25. Sixteen species were recorded, which is a moderately high species richness, particularly given the southern end of the transect was dry. The high numbers of Wood Duck mostly represented by a flock on the at the northern end of the transect, so Black-winged Stilt were the most abundant species within the shallows of the lake water. White-necked Heron have historically used Lake Cowal during filling phases and they were again well represented. Lake Cowal supported a wide range of species that prefer shallow, freshwater with abundant, short aquatic vegetation. Wading birds were also evident out to the centre of the lake. Winter rains had partially filled the lake during the time of the survey with the extent of the surface water being insufficient for all transects to be surveyed.

The third and final survey conducted was carried out by Peter Gell and Paul Peake on the 22nd October 2010. Nine species were observed breeding during the course of the survey. Results are included in Table 25 below. In the time preceding the third survey, winter and spring rains had continued to fill Lake Cowal, with three transects able to be sampled. Transect survey results were presented for transects 1, 2 and 8. A total of 32 species were observed, totalling 2961 individuals, The most common species observed were Hoary-headed Grebe (179), Plumed Whistling-duck (350 – mostly a single flock on transect 8), Pacific Black Duck (104), Grey Teal (612), Hardhead (128), Eurasian Coot (494) and Whisked Tern (638). In addition, White-necked Heron were also well represented with two Red-necked Avocets being observed in shallow water in the north-east of the lake.

The reasonably high diversity and abundance of water birds at Lake Cowal is of interest. It might be expected that the relatively low number of birds surviving the recent drought period to be located across much of NSW and the Murray-Darling Basin, with very few at a given locality. Lake Cowal presently supports a high diversity and abundance of wading birds, including species that typically occupy the lake during phases of filling. Current numbers are in the middle range of surveys conducted in the 1990s when Lake Cowal was generally full for a moderate period of time (32 species and almost 3000 individuals recorded in October 2010 compared to 19-40 species and 900-8000 individuals recorded in the 1990s).

Table 25
Bird Breeding Monitoring Results for the Reporting Period

Species	Survey Period				Total
	August 2010	October 2010			
	Transect 8	Transect 1	Transect 2	Transect 8	
Australasian Darter			1		1
Little Pied Cormorant		28	2	1	31
Great Cormorant			1	1	2
Great Crested Grebe			2		2
Hoary-headed Grebe		97	51	31	179
Australasian Grebe		27	4	4	35
Black Swan	5	6	35	11	57
Wandering Whistling-duck		18			18
Plumed Whistling-duck				350	350
Australian Shelduck		1	12	12	25
Pacific Black Duck	20	16	23	65	124
Grey Teal	33	90	130	392	645
Chestnut Teal		2			2
Australasian Shoveler	10	8	11	18	47
Pink-eared Duck				15	15
Hardhead		14	36	88	138
Australian Wood Duck	135			57	192
Musk Duck		1			1
Purple Swamphen	12	5	13		30
Eurasian Coot		150	184	160	494
White-necked Heron	9	7	4		20
White-faced Heron	24	3	4	2	33
Great Egret	8	39	5	2	54
Intermediate Egret		2			2
Glossy Ibis	4	4			8
Australian White Ibis	5	3	19	2	29
Straw-necked Ibis	58	23	2	8	91
Royal Spoonbill		2	1	2	5
Masked Lapwing	12	4	1	18	35
Black-winged Stilt	175	2			177
Whiskered Tern		216	383	39	638
Caspian Tern			1		1
Red-necked Avocet	5				5
Silver Gull	6				6
Total	521	768	925	1278	3492

Fauna monitoring of tailings storages and ML 1535 boundary

The NTSF was used during the entire reporting period. The STSF was out of commission for 2010 for annual upstream lift project work for 3 metres rise in the wall heights and decant road works. Fauna monitoring of the tailings storages was initiated at the time of commissioning of the facilities with the twice daily fauna inspections as described in Section 3.8.3.1.

Additional to the fauna observation monitoring, bat monitoring using Anabat detectors was undertaken over two consecutive nights each month during the reporting period at the active tailings facility.

Data collected from the monitoring is stored in a database, with the information being used to assess the seasonal usage of the tailings dam, the effectiveness of hazing techniques and to record any effects that the tailings may be having on native fauna.

Three reports were prepared by Donato Environmental Services during the reporting period, 01 October 2009 to 31 March 2010, 01 April 2010 to 30 September 2010 and 01 October 2010 to 31 March 2011, respectively. The main findings of the reports included:

- The cyanide discharge concentrations were below those established as a condition of operation.
- Monitoring of cyanide concentrations within the active TSF and other water bodies has been conducted frequently and at a high standard consistent with industry best practice.
- No cyanide-related wildlife mortality or effect was recorded.
- Considering currently accepted knowledge of cyanide toxicoses in the gold industry the range of concentrations reported at CGM are considered benign to wildlife.
- No evidence suggests that insectivorous bats have been subject to incident or effect at CGM TSFs between 01 October 2009 and 31 March 2011.
- Nocturnal surveys indicate that insectivorous bats were consistently present in the airspace above the active TSF and the control site.
- Monthly nocturnal surveying conducted at CGM represents a proactive approach to environmental monitoring and it is clearly best practice methodology employed by a gold mining operation in Australia and internationally.
- Birds were the only diurnal vertebrate wildlife guild recorded to visits and interact with the active TSF.
- The low cyanide concentrations recorded at the active TSF significantly reduced the risk of cyanide toxicosis to avifauna.
- The frequency of systematic wildlife surveys makes it very unlikely that cyanide-related wildlife deaths were occurring and not detected.
- Rainfall patterns were not the sole influence on wildlife patterns during the reporting period.

Six-monthly reporting on fauna usage of the TSFs will be continued in the future and results will be included in future AEMRs.

Hazing techniques were employed during the last reporting period at the tailings facilities. The following different methods are still being used to deter different bird species and have included:

- one to two radar lobe systems that detect avifauna presence at the facilities;
- five-six bird deterrent stations, activated remotely by either the radar or timer mode which broadcast bird distress calls, barking dogs, gun shots etc.;
- one to two gas cannons linked to the radar or timer-mode control station/s;
- car horns; and
- human presence.

These hazing techniques will continue to be used and monitored over the next reporting period, with new methods being trialled if required.

The management measures as described in the TSMP (Barrick, 2003h) were implemented during the reporting period. Weekly visual inspections of the ML 1535 boundary fence were conducted and fence maintenance conducted as necessary.

Vegetation clearance activities conducted during the reporting period and details of the RVEP are discussed in Section 3.7. Weed and pest management activities and a summary of the wetland rehabilitation and enhancement measures are described in Sections 3.9 and 3.22 respectively.

3.8.4 Reportable Incidents

In accordance with Development Consent Condition 3.4(a)(ii), any deaths or other incidents involving native fauna (except those attributable to physical trauma such as vehicle strike) on ML 1535 have been reported to the DTIRIS (Minerals) and the OEH within 24 hours (or the next working day), and to the CEMCC as soon as practicable. All deaths or other incidents attributable to physical trauma are summarised in this report. The

CEMCC requested at the meeting in December 2006 that in the future they would like a summary of native fauna deaths to be provided on a quarterly basis at each meeting, rather than individual letters for each incident.

As discussed in Section 3.5.4, the death of two Silver Gulls on 19 November 2010 in the processing plant area was formally reported to the OEH (formally DECCW) on 10 December 2010. The fauna deaths were considered a result of the birds accessing process slurry (500ppm WAD CN), on the Leach tank concrete bund sump pump area during a planned Process Plant power supply shutdown period.

A summary of the reported native fauna deaths that occurred on ML 1535 in 2010 is provided in Table 24. Incident reports and investigations are undertaken for all native fauna deaths occurring on ML 1535 and are recorded on a site data base.

There were no alterations to any threatened fauna species reporting requirements during the reporting period.

No complaints were received relating to threatened fauna at the CGM during the reporting period.

3.8.5 Further Improvements

Ongoing annual training of staff and interested town WIRES rescuers and carers, including Emergency Response and Security staff, will occur as required in the next reporting period. This will maintain or increase the number of staff on-site that can respond to native fauna incidents.

Further improvements in best practice avifauna deterrence will be investigated and implemented as new methods become available.

Approximately 50 mammal and bat boxes are already in position at 'Lakeside' and 'Hillgrove' and, a further 10 boxes are located on ML 1535 in the fenced forest areas. Usage of these boxes by possums, spiders, bats, galahs and other birds was observed during checks throughout 2010. A further \$4,000 of nesting boxes were manufactured locally and will be installed by elevated work platform during 2011 (Plate 5).

"Beep for Birds" warning signs were installed along the bitumen access roads to the CGM during the reporting period. The signs aimed to reduce the number of bird deaths on ML 1535 due to the increased number of birds in the vicinity of the Mining Lease as a result of the wet conditions experienced throughout 2010.

3.9 WEEDS AND PESTS

3.9.1 Reporting Requirements

3.9.1.1 Development Consent

The Land Management Plan (LMP) (Barrick, 2003j) was prepared in accordance with Development Consent Condition 3.10(A)(i) to provide for proper land management for all of Barrick's landholdings including the control of noxious weeds as required by the Lachlan Livestock Health and Pest Authority (LHPA), BSC and DTIRIS. In accordance with Development Consent Condition 3.6(d)(iv) the ROMP is also required to describe measures for controlling weeds and feral pests (including both terrestrial and aquatic species) within ML 1535 and the offset areas.

In accordance with the LMP (Barrick, 2003j) and the ROMP (Barrick 2010), general weed and pest management activities within ML 1535 and the offset areas will be reported in the AEMR. As a component of the AEMR reporting, the weed control program will be assessed for performance annually, and amended where necessary (e.g. to implement new control measures as advised by BSC or DPI [Agriculture]). Proposed significant amendments to weed monitoring and management will be discussed with BSC.

3.9.1.2 Environment Protection Licence

Condition R2 of the EPL requires Barrick to notify the OEH of incidents causing or threatening material harm to the environment as soon as practicable after Barrick becomes aware of the incident.

3.9.1.3 Any Other Reporting Requirement

There are no other relevant reporting requirements from other approvals in relation to weeds for the reporting period.

3.9.2 Environmental Management

3.9.2.1 Control Strategies

In accordance with the LMP and ROMP, the control strategies for weed management on Barrick-owned land include the following:

- identification of weeds by regular and annual site inspections;
- communication with other landholders/leaseholders and regulatory authorities to keep weed management practices in line with regional weed control activities;
- mechanical removal of identified noxious weeds and/or the application of approved herbicides in authorised areas (herbicide use in wetland areas will be strictly controlled);
- implementing follow-up site inspections to determine the effectiveness of the weed control measures;
- where practicable, prevention of the establishment of new weeds on Barrick-owned land by minimising seed transport of weed species to and from the CGM through the use of a vehicle wash bay (primarily for use on agricultural and earthmoving equipment that are likely to carry weed seeds); and
- pest control activities

The implementation of weed management strategies typically occurs according to seasonal and climatic requirements.

Weed control methods that may be applicable to the offset areas are described in the ROMP.

The pest control activities within ML 1535 and the offset areas described in the LMP and the ROMP include the following measures:

- regular property inspections to assess the status of pest populations within Barrick-owned land;
- mandatory pest control for declared pests (i.e. rabbits, pigs and wild dogs) in accordance with Pest Control Orders under the *Rural Lands Protection Act, 1998*; and
- inspections to assess the effectiveness of control measures implemented and review these if necessary.

Barrick undertakes pest control activities in conjunction with adjacent landholders for more effective pest control. This process is facilitated via consultation with local landholders and landholder groups through the CEMCC process.

The *Threat Abatement Plan for Predation by Feral Cats* (Commonwealth Department of the Environment, Water, Heritage and the Arts [DEWHA], 2008a) and the *Model Code of Practice for the Humane Control of Feral Cats* (Sharp and Saunders, 2004) will be used as a guide for the humane control of feral cats within ML 1535. The *Threat Abatement Plan for Predation by the European Red Fox* (DEWHA, 2008b) will be used to guide fox control within ML 1535.

In accordance with the LMP and ROMP, the control strategies for pest management on Barrick-owned land include those in Table 26.

Table 26
Summary of Vertebrate Pest Control Measures

Species	Status	Method of Control ²
¹ European Rabbit (<i>Oryctolagus cuniculus</i>)	Declared pest	<ul style="list-style-type: none"> • baiting rabbits with 1080 and pindone poisoned carrot; and • ripping of rabbit warrens.
¹ European Red Fox (<i>Vulpes vulpes</i>)	Nuisance animal	<ul style="list-style-type: none"> • fox baiting; and • implementing a shooting programme.
¹ Feral Cat (<i>Felis catus</i>)	Nuisance animal	<ul style="list-style-type: none"> • feral cat baiting; and • implementing a shooting programme.
Feral Pig	Declared pest	<ul style="list-style-type: none"> • feral pig trapping.
Wild Dog	Declared pest	<ul style="list-style-type: none"> • wild dog trapping; • wild dog baiting with 1080; and/or • implementing a shooting programme.

Source: ROMP (Barrick, 2010)

¹ Recorded in the surrounding area by Cenwest Environmental Services (2009).

² NSW Livestock Health and Pest Authority (2010).

Suitable pest controls will be determined in consultation with surrounding landholders, Lachlan LHPA and DTIRIS prior to the commencement of an integrated pest control programme on Barrick-owned land. This assists in integrating the controls implemented on Barrick-owned land with other pest control in the local area/region.

3.9.2.2 *Effectiveness of Control Strategies*

The implementation of control strategies adequately suppressed the spread of noxious weeds and pests during the reporting period within ML 1535 and on Barrick-owned land. Rabbit and fox baiting did not occur during the monitoring period as weather conditions were found to be ineffective and site inspections found that no problem existed. A formal pest inspection will be undertaken during the 2011 monitoring period as discussed with Lachlan LHPA staff.

3.9.2.3 *Variations from Proposed Control Strategies*

There were no variations from the proposed control strategies.

3.9.3 **Environmental Performance**

3.9.3.1 *Monitoring*

In accordance with the LMP and the ROMP, Barrick has implemented a weed monitoring program at the CGM. Barrick-owned land is to be surveyed for weeds annually. Follow-up inspections are also to be made for specific areas following the implementation of weed control measures (to assess the success of the weed controls). Follow-up inspections may also be required after control implementation, depending on the weed species and nature of the problem. Weed monitoring is to be conducted by suitably qualified personnel from a slow moving vehicle.

Weed monitoring includes identification of:

- extent of weed occurrence (noxious or otherwise);
- details of weed distribution (i.e. locations of infested areas) and possible reasons for any infestations (e.g. a change in landuse practices);
- optimum herbicide application or physical removal timing (for implementation of controls);
- any resistance to a herbicide type or herbicide application technique (on the basis of success of previous controls); and
- identification of any new weed species that may be carried into the CGM area on vehicles accessing the site and become established near the vehicle wash-down area.

3.9.3.2 Performance Outcome

As a result of the weed survey conducted in 2009, weed control measures were undertaken on ML 1535 and Barrick-owned lands during the reporting period. Control methods included chemical boom and spot spraying of the plants when conditions were suitable or their physical removal by manually chipping the weeds out. Weed spraying activities were carried out by a local contractor, with the measures used satisfactorily controlling any outbreaks within the site and on Barrick-owned land.

The 2010 weed survey was undertaken during January 2011 by Carnegie Natives on behalf of Barrick (Cowel) Limited.

The survey involved recording the extent of weed occurrences, details of weed distribution and any new weed species infestations on Barrick lands. Photographs, general descriptions and GPS coordinates were taken of each of the surveyed areas covering the extent of Barrick-owned land and ML 1535. Weeds of concern, those that are declared noxious in the BSC Local Government Area, and environmental weeds were targeted.

Above average rainfall during 2010 result in exceptional growth conditions being experienced for all plant species, resulting in increased proliferation of weed species seen on Barrick owned lands. The spring – early summer period was particularly favourable for proliferation of weed species. Bathurst Burr (*Xanthium spinosum*) is the most prevalent species occurring on the mining lease, “Lake Cowal” and “Hillgrove” properties and requires further control throughout the next monitoring period. Noogoora Burr (*Xanthium occidentale*) was found on the mining lease along the eastern edge of the northern low-flow channel and along spring creek at the “Lake Cowal” property. African Boxthorn (*Lycium ferrovissimum*) continues to be a problem on the “Lake Cowal” and “Hillgrove” properties despite large areas being sprayed during 2010.

Scotch Thistle (*Onopordum sp.*) has increased in numbers, also due to the above average rainfall in 2010. Galvanised Burr (*Sclerolaena birchii*) has been significantly diminished with a combination of weed control activities and improved seasonal conditions reducing available bare ground. Purple-Flowered Devil’s Claw (*Proboscidea louisianica*) remains a potential problem at the “Lake Cowal” property despite being reasonably isolated as it has the potential to invade ephemeral wetlands with no truly viable control options. Although it is believed that current control methods and tactics will effectively control the species.

Other species recorded during the 2010 survey include St. Barnaby’s Thistle (*Centaurea solstitialis*), Khaki Weed (*Alternanthera pungens*), Flax-Leaf Fleabane (*Conyza bonariensis*) and Stinkwort (*Dittrichia graveolens*).

Better timing of chemical application is required to target weed species when at their most vulnerable stages, particularly African Boxthorn which is required to be targeted during early vegetative growth stages during March and September. Other recommendations include continue regular inspections of sprayed areas as well as opportunistic inspections of Barrick owned lands to monitor effectiveness of control programs and identify any potential new areas for control.

Weed occurrence and abundance in 2010 was found to be more extensive than in the 2009 survey. This would be largely due to the above average rainfall received during 2010. Targeted control programs will continue to be implemented during 2011 with implementation of weed control strategies resulting from the 2010 survey to commence in the first quarter of 2011.

There were no alterations to any weed management requirements during the reporting period.

A formal Locust inspection was carried out on 27/09/2010 by Craig Ridley from the Lachlan LHPA. The inspection was carried out on the mining lease and all Barrick owned land. Significant populations of locusts were found on the Lakeside property on the western edge of Lake Cowal with sparse populations found on various other sites. The LHPA supplied Barrick with the required approved chemicals and locust populations were treated by accredited chemical applicators from Jonesy’s Gardening Service. The control activities carried out resulted in effective containment of local populations of locusts.

No formal inspection was carried out during 2010 for rabbits and foxes. Pest inspections in 2010 were conducted out on an opportunistic basis with some evidence of fox and rabbit populations being noticed. Barry Maybury (pest animal and insect Ranger with the Lachlan LHPA) was consulted on various occasions and he stated that carrying out formal pest inspections for rabbits and foxes would not be worthwhile as the conditions were generally too wet. The wet conditions prevented access to most sites and the available sites were not a good enough indication to whether Cowal had a problem or not.

Mr Maybury also stated that due the good seasonal conditions that there was an abundance of food available for rabbits and baiting would be an ineffective control method. The chances of being able to rip were minimal due to the wet conditions. With regards to fox baiting, the wet conditions, made it difficult to carry out baiting activities as the baits are destroyed when wet. Mr Maybury suggested that we wait until the new year when weather conditions are more suitable and stated that if we wait, any potential problem will not worsen too much between now and then and we will still be able to control it. Inspections of sites previously ripped were carried out by Barrick staff and no evidence of rabbits returning was observed.

A formal inspection of rabbit and fox populations will again occur during 2011 when conditions are suitable.

During 2010, extensive control activities were directed at controlling mice populations. They were not only a visual pest (i.e. infesting work areas) but they also caused a large amount of damage, chewing through many fibre optic and other cables. Talon rodenticide mouse baits were used in conjunction with care in maintaining a clean work environment, throughout the later part of 2010. As a result, regular inspections and maintenance activities have been and will continue to be carried in an ongoing effort to contain the pest mouse populations.

A feral cat eradication program was continued during 2010. Collapsible cat traps with crush end modifications (retrofitted by the West Wyalong TAFE) were purchased during 2009 and have continued to be used whenever feral cats were observed on Barrick-owned property. Two feral cats were trapped during 2010, however one escaped. Trapped feral cats were registered with WIRES and humanly euthanased at the local West Wyalong Veterinary Clinic.

The 2011 monitoring and controlled baiting program will continue to assess the effectiveness of baiting and other control measures.

During the reporting period there were no other alterations to any pest management requirements.

3.9.4 Reportable Incidents

The LMP and the ROMP require any incidents regarding weed and pest management to be reported in the AEMR. There were no complaints or incident reports required for weeds or pests.

3.9.5 Further Improvements

Fox, mouse and feral cat eradication programs will be continued during the next reporting period on ML 1535 and Barrick-owned land. Rabbit baiting and warren ripping will be undertaken during the next reporting period as required, should populations be observed during regular monitoring programs.

It is expected that during the 2011 reporting period that a licence contractor will be engaged to assist Barrick in the control and eradication of pest rodent populations.

The use of a 6 wheeled Polaris all wheel drive vehicle and aluminium boat will assist in accessing locations though to be previously inaccessible due to wet conditions.

Current weed and pest monitoring will continue during the next reporting period as stated in the LMP and ROMP along with weed eradication programs across ML 1535 and Barrick-owned land. The 2010 lake fill event has reduced the area required for pest and weed control activities and could potentially concentrate pests onto Barrick owned land and reveal weed species not seen in previous years. Further effort will be put into control activities during the 2011 monitoring period.

3.10 BLASTING

3.10.1 Reporting Requirements

3.10.1.1 Development Consent

The modification to the CGM Development Consent (approved by the DoPI in March 2010) deleted Development Consent Condition 8.4. A revised BLMP was subsequently submitted to the Director-General of the DoPI at the end of July 2010, in accordance with Development Consent Condition 6.3(b) and is currently awaiting approval.

The reporting of blasting monitoring is required by Development Consent Condition 6.3(b)(iii), which states:

(iii) ensure that blast monitoring data is assessed regularly, and that operations are relocated, modified and/or stopped as required to ensure compliance with the relevant blast criteria;

The revised Blast Management Plan (BLMP) (Barrick, 2010) for the CGM requires that the AEMR reports on the following blasting related issues:

- a summary of all blast monitoring results;
- measures employed to minimise/prevent excessive blast emissions;
- blasting related complaints and amelioration measures undertaken in the event of any confirmed exceedances of blast criteria;
- review of the performance of blast control measures and the monitoring program by a suitably qualified person; and
- CEMCC decisions relating to CGM blast issues.

3.10.1.2 Environment Protection Licence

The EPL requires Barrick to undertake blast monitoring at the points identified in Licence Condition M7.

Condition R1 of the EPL requires the completion of an Annual Return comprising of a Statement of Compliance and a Monitoring and Complaints Summary at the end of each annual reporting period (i.e. the AER). Barrick submitted the Annual Return for the period 23 December 2009 to 22 December 2010 to the OEH on 21 February 2011. Condition R2 of the EPL requires Barrick to notify the OEH of incidents causing or threatening material harm to the environment as soon as practicable after Barrick becomes aware of the incident. Condition R4.2 of the EPL requires Barrick to report any exceedances of the EPL blasting limits to the regional office of the EPL as soon as practicable after the exceedances became known.

Condition R4 of the EPL requires the results of the blast monitoring requested by condition M7.1 to be submitted to the OEH at the end of the reporting period. Barrick has reviewed and submitted the 2010 Review of Blast Monitoring Results prepared by Saros (Australia) Pty Ltd., Brisbane to the OEH on 2 March 2011.

On 16 April 2009 Barrick lodged an application to vary the EPL to reflect the proposal to move blast monitoring site "BM04 – Bird Breeding Area", due to changes in surface conditions which have made access to the current site potentially hazardous. An addendum to the BLMP was prepared. Following approval of the revised BLMP and the EPL variation, the BM04 gauge was relocated and re-commissioned in March 2009.

Further, on 24 June 2011, a variation of the EPL was issued to Barrick, which amongst other things, amended the blasting limits and blast monitoring locations consistent with the approved E42 Modified Request. As per 1.1.2 a description of the OEH varied EPL of 24 June 2011 will be provided in the 2011 AEMR. The revised BLMP was awaiting DoPI approval at the time of writing.

3.10.1.3 Any Other Relevant Approval

There are no other relevant reporting requirements from approvals in relation to blasting for the reporting period.

3.10.2 Environmental Management

In accordance with Development Consent condition 8.4(b)(v), the BLMP and EPL Conditions L7 and M7, six blast monitors were installed at designated locations around the operation to record ground vibration and airblast overpressure.

3.10.2.1 Control Strategies

In accordance with Development Consent Condition 6.3(b), the BLMP and EPL Licence Condition M7, airblast overpressure and ground vibration level monitors must be measured at nearby residences BM01, BM02 and BM03, at bird breeding areas BM04 and BM05 and at the general monitoring site BM06. Figure 8 shows the locations of the monitors at distances of approximately 4.5 to 9 km from the open pit.

Monitoring units located in areas that have the potential to flood have been customised so that ground vibration sensors are waterproof and airblast overpressure sensors are above the high water mark.

Communication with the remote units is conducted via battery powered GSM modem fitted and recharged via solar panel. The units send data to Saros (Australia) Pty Ltd, Brisbane. All field monitoring stations are removed annually for independent off-site maintenance and calibration. Typically Barrick removes the units in early February and a Saros (Australia) Pty Ltd representative re-installs them in the field in early-March. A hired roving unit is maintained on-site during that time.

In accordance with the BLMP, the control strategies for blasting during the development and operation of the open pit include the following:

- Reducing the maximum instantaneous charge (MIC) to lowest possible level.
- Use of crushed aggregate material for stemming in blast holes to maximise confinement of the explosives in the blast hole thereby minimising the airblast effects.
- Design of drill patterns to ensure stemming heights in the blast holes are adequate to ensure confinement of the explosives.
- Delaying or postponing blast times in unfavourable weather conditions.

3.10.2.2 Effectiveness of Control Strategies

The implementation of control strategies resulted in no exceedances being recorded during the reporting period. One complaint was received during the reporting period relating to blasting. Details of the complaint are provided in Section 3.10.4.

3.10.2.3 Variations from Proposed Control Strategies

There were no variations from the proposed control strategies.

3.10.3 Environmental Performance

Blasting commenced at the CGM on 2 September 2005 and involved firing a small trial blast to ensure that ground vibration and airblast overpressure were within acceptable limits.

The fixed monitoring locations were initially configured to trigger off ground vibration, with levels set at 0.25mm/s in order to minimise spurious triggers. Given the very low levels of vibration induced by the blasting activities, no events correlating to the blasting activities were recorded. The units were re-configured to record continuously during the normal operational hours of the mine, providing peak levels for ground vibration and airblast overpressure levels for each minute interval at the 6 permanent fixed locations.

Annual calibration of all fixed and roving units occurred between 25 January 2010 and 16 February 2010.

A total of 317 blasts were fired during the period 23 December 2009 to 22 December 2010. Ground vibration monitoring results did not trigger a response associated with CGM blasts at any of the six operational monitors installed during that period. Air overpressure limits on six occasions during the monitoring period were above 115dB(L) (BM05: 16/11/2010 – 116.7 dB(L), BM01: 16/01/2010 – 115.3 dB(L), BM02: 04/05/2010 – 115.9 dB(L), BM04.1: 10/09/2010 – 116.1 dB(L), BM04.1: 16/10/2010 – 117.2 dB(L) and BM02: 18/12/2010 – 116.1 dB(L)), however, these were not an exceedance under condition L7.2 in the EPL or condition 6.3(a) of the March 2010 modified development consent.

In all cases, the air overpressure was found to be influenced by natural occurrences (i.e. wind, lightening etc), and were not the result of blasting activities (Saros (Australia) Pty Ltd (2011)).

A summary of the peak levels recorded at each of the six remote fixed monitoring stations for the blast times is presented in Table 27.

Table 27
Summary of Event and Monitor History for Cowal Gold Mine Blast Monitoring Stations

Monitoring	Locations	Peak Vibration			Peak Overpressure		
		Date	Time	Level	Date	Time	Level
BM01	Gumbelah residence	27/05/2010	12:42	0.363	16/01/2010	12:45	105.5
BM02	Hillgrove residence	19/02/2010	12:27	0.171	12/01/2010	12:30	109.9
BM03	Coniston residence	26/04/2010	12:41	0.125	17/11/2010	12:35	106.0
BM04.1	Bird Breeding Area	18/05/2010	12:58	0.525	16/10/2010	12:46	111.5
BM05	Bird Breeding Area	19/11/2010	12:43	0.484	16/11/2010	12:40	116.7
BM06	General Monitoring Location	19/02/2010	12:27	0.200	16/10/2010	12:46	107.5

According to the EPL, the recommended criteria will be as follows:

- The PVS level of 5mm/s for ground vibration may be exceeded for up to 5% of the total number of blasts for a period of 12 months. The level should not exceed 10mm/s at any time;
- The airblast overpressure level of 115dB (Linea Peak) may be exceeded for up to 5% of the total number of blasts for a period of 12 months. The level should not exceed 120dB (Linear Peak) at any time.

As investigated and reported by The Saros Group Limited, and also reported in the AER, from the monitoring data and blasting information available, recorded levels of ground vibration and airblast overpressure induced by blasting activities conducted at the CGM were compliant with the recommended criteria detailed in the BLMP.

3.10.4 Reportable Incidents

As noted in 3.10.1.2 above, Barrick reported in the AER some infrequent, short term equipment failure events. These failures were short term and addressed immediately with support from the Saros (Australia) Pty Ltd system.

There was one community complaint received during the reporting period. A resident of east Lake Cowal (Gumbelah Property) called the Environmental Manager 13 September 2010 to report a blast that occurred 10 September 2010. The response included the Environmental Manager advising the caller to lodge a call with the community complaints line. The Saros Group (in relation to the 12:55pm blast on the 10th September 2010) determined that “*there was no ground vibration picked up for the blast. There doesn’t appear to be any overpressure monitored that could be attributed to the blast, the peak being 112 dB(L) but there appears to be a low at around 12:30.*” The resident was contacted at 13:10 on the same day (13/09/2010) with feedback and were provided with reports from Saros (Australia) Pty Ltd to discuss the results.

No CEMCC issues were raised and no resolutions were made during the reporting period relating to blasting.

3.10.5 Further Improvements

Saros (Australia) Pty Ltd personnel in conjunction with Barrick personnel are cross-checking electronic blast notification data stored on Blasthub containing proposed blasting times with internal Blast Notification Reports that specify specific blast detonation times, location (RLs) and number/s shots fired.

Saros (Australia) Pty Ltd installed new communication hardware and system improvements at the start of the 2009 reporting period. As stated in the previous AEMR, the old 2G network cards were converted to 3G network cards during the months April to July 2010. Some data was lost over this period due to memory limits of the

monitors being reached during the change over period. Going forward, the new cards will allow for more reliable communication between The Saros Group and the monitors.

In addition, further works will be carried on blast monitors that have been inundated with the filling of Lake Cowal (BM06, added to EPL11912 on 24 June 2011), to protect the units in the long term against water inundation (greater than 12 months). In the short term The Group Saros has advised that the water should have no effect on the units. These works are scheduled to be carried out during the 2011 monitoring period.

3.11 OPERATIONAL NOISE

3.11.1 Reporting Requirements

3.11.1.1 Development Consent

The modification to the CGM Development Consent (approved by the DoPI in March 2010) deleted Development Consent Condition 8.4. Subsequently a revised NMP was submitted to the Director-General of the DoPI at the end of July 2010 in accordance with Development Consent Condition 6.4(g) and is currently awaiting approval.

The management and reporting of noise monitoring is required by Development Consent Condition 6.4(g), which states:

Noise Management Plan

- 6.4(g) *The Applicant shall prepare and implement a Noise Management Plan for the project in consultation with DECCW and to the satisfaction of the Director-General. This plan must be submitted to the Director-General for approval by the end of July 2010 and include provisions to:*
- (i) evaluate noise impacts on privately-owned residences*
 - (ii) demonstrate compliance with the noise impact assessment criteria in Table 8;*
 - (iii) implement all reasonable and feasible noise mitigation measures;*
 - (iv) investigate ways to reduce the noise generated by the project, including:*
 - off-site road noise; and*
 - noise levels which may result in sleep disturbance and disturbance to bird breeding behaviour; and*
 - (v) report on these investigations and the implementation and effectiveness of these measures in the AEMR.*

As described in Section 1.1.2, the NMP was amended during the reporting period to include noise monitoring sites at 'West Lea' (NO7) and 'McLintock's' (NO8). The addendum to the NMP was approved by the DoP on 08 April 2010.

The modification to the CGM Development Consent (approved by the DoP in March 2010) requires the management and reporting of traffic noise monitoring and truck movements in accordance with Development Consent Conditions 6.4(d) and (e), which provide:

- (d) The Applicant shall take all reasonable and feasible measures to ensure that traffic noise generated by the project does not exceed the traffic noise impact assessment criteria in Table 9.*

Table 9: Traffic noise criteria dB(A) L_{Aeq} (1 hour)

Road	Day/Evening	Night
<i>Ungarie Road</i>	60	55
<i>Wamboyne Road, Blow Clear Road, Carrawandool-Warroo Road, Burcher Road, Condobolin Road, Lake Cowal Road</i>	55	50

Note: Traffic noise generated by the project is to be measured in accordance with the relevant procedures in DECCW's Environmental Criteria for Road Traffic Noise.

- (e) Truck movements for material delivery purposes will be restricted as far as practicable to the day and evening periods.*

The relevant components of the Traffic Noise Management Plan (TNMP) have been incorporated into the revised NMP (submitted to the Director-General of Planning for approval at the end of July 2010, in accordance with Development Condition 6.4[g]). Following approval of the revised NMP, the TNMP will not be necessary.

SLR Consulting (formally Heggies Pty Ltd) was engaged to conduct mine operating noise and traffic noise monitoring during the reporting period in accordance with the NMP.

Noise monitoring was undertaken to demonstrate compliance with the noise impact assessment criteria set out in Development Consent Condition 6.4(c), which requires that noise generated by the CGM does not exceed the criteria in Table 28 at any residence on privately-owned land, or on more than 25 percent of privately owned land not located within Lake Cowal.

Table 28
Noise Impact Assessment Criteria dB(A) L_{Aeq} (15minute)

Location	Day/Evening/Night ¹	Day/Evening/Night ²
Bungabulla	N/A	39
Coniston	35	44
Cowel North	N/A	38
Gumbelah	35	39
Lake Cowal (non-Barrick)	35	38
Laurel Park	N/A	39
Mattiske	N/A	36
McLintock	35	41
The Glen	N/A	38
West Lea	35	41
All other residences	N/A	35

Notes:

- To interpret the locations referred to in Table 28, see Figure 8.
- Noise generated by the project is to be measured in accordance with the relevant requirements, and exemptions (including certain meteorological conditions), of the NSW INP.
- The noise limits do not apply if the Applicant has an agreement with the relevant owner/s of these residences/land to generate higher noise levels, and the Applicant has advised the Department of Planning in writing of the terms of this agreement.
- ¹Mine noise emission criteria – applicable to condition 6.4(a) of the August 2009 modified development consent and Barrick Australia Limited (2004c) *Cowel Gold Project Noise Management Plan*.
- ²Mine noise emission criteria – applicable to condition 6.3(a) of the March 2010 modified development consent

3.11.1.2 Environmental Protection Licence

As described in Section 3.11.1.1, the modification lodged in January 2009 sought changes to the Development Consent, to contemporise the Development Consent and for consistency with the EPL and INP. The application to modify the CGM was approved by the Minister for Planning on 11 February 2009. The NMP was revised/updated during 2009 to reflect the approved modifications. The revised NMP was approved on 8 April 2010.

The modification to the CGM Development Consent (approved by the DoPI in March 2010) again revised the Development Consent Conditions relating to noise. A revised NMP was subsequently submitted to the Director-General of the DoPI at the end of July 2010 in accordance with Development Consent Condition 6.4(g) and is currently awaiting approval.

An application to vary the EPL to reflect the modifications to the Development Consent was prepared during the reporting period and the application was approved by the DoPI on 20 June 2011. As per 1.1.2 a description of the OEHL varied EPL of 24 June 2011 will be provided in the 2011 AEMR.

3.11.1.3 Any Other Relevant Approval

There are no other relevant reporting requirements from approvals in relation to noise for the reporting period.

3.11.2 Environmental Management

3.11.2.1 Control Strategies

In accordance with the NMP, control strategies used at the CGM during the reporting period (for operational activities) utilised best management practices and the best available technology economically achievable.

Best Management Practice

Best management practices applied during the reporting period to minimise CGM noise emissions include:

- restricting movement of trucks on ridgelines and exposed haul routes where their noise can propagate over a wide area, especially at night. This means restricting night-time movement of material to areas shielded by barriers or mounds, and reserving large-scale material movement for daytime. The Lake Protection Bund (LPB) has been in place for past year and is increasing in mass as waste rock and overburden is placed. The LPB provides noise shielding, thereby reducing noise levels that could propagate from the open pit across Lake Cowal;
- scheduling the use of any noisy equipment during daytime;
- sitting noisy equipment behind structures that act as barriers, or at the greatest distance from the noise-sensitive area, or orienting the equipment so that noise emissions are directed away from any sensitive areas, to achieve the maximum attenuation of noise;
- where there are several noisy pieces of equipment, scheduling operations so they are used separately rather than concurrently;
- keeping equipment well maintained;
- employing 'quiet' practices when operating equipment (e.g. positioning idling trucks in appropriate areas);
- educating staff on the effects of noise and the use of quiet work practices;
- specify maximum noise/sound levels when purchasing equipment; and
- include maximum noise/sound levels in tender documents and contracts.

Best Available Technology Economically Achievable

Best available technology economically achievable that may be applied to minimise CGM noise emissions during the reporting period include:

- adjusting reversing alarms on heavy equipment to make them 'smarter', limiting acoustic range to the immediate danger area;
- using equipment with efficient mufflers and using quieter engines (such as electric instead of internal combustion);
- using efficient enclosures for noise;
- using vibratory piling in place of impact piling;
- using high-pressure hydraulic systems to split rock instead of hydraulic or pneumatic hammers;
- damping or lining metal trays; and/or
- employing active noise control measures.

3.11.2.2 Effectiveness of Control Strategies

In accordance with the NMP, the implementation of the control strategies minimised noise emissions from the CGM. The control strategies implemented during the reporting period are considered to be effective as demonstrated by the environmental performance indicators (discussed in Section 3.11.3 below).

3.11.2.3 Variations from Proposed Strategies

There were no variations from the proposed control strategies.

3.11.3 Environmental Performance

3.11.3.1 Monitoring

The daytime, evening and night-time operator-attended mine operating noise surveys were conducted in January 2010 (A) and July 2010 (B) by SLR Consulting with field assistance by the CGM Environmental Department. The survey results are presented together with the respective noise criteria in the NMP, determined in accordance with the NSW INP.

3.11.3.2 Daytime Operator-attended Noise Survey Results

Daytime operator-attended mine operating noise surveys were conducted in January 2010 (A) and July 2010 (B). A summary of the survey results is presented in Table 29 together with the respective noise criteria.

Table 29
Daytime Noise Emission Levels $L_{Aeq(15minute)}$

Location	Address	Mine Contributed ⁴	Mine Contributed ⁵	Noise Emission Criteria ⁴	Noise Emission Criteria ⁵
		$L_{Aeq(15minute)}$	$L_{Aeq(15minute)}$	$L_{Aeq(15minute)}$	$L_{Aeq(15minute)}$
		A (dBA)	B (dBA)		
No.1	New Lake Foreshore	40, 38	28, 29	3	3
No.2	'Coniston' Residence	<23, <23	<19, <19	35 dBA	44 dBA
No.3	Bird Breeding Area (South)	<24, <23	27, 28	3	3
No.4	Bird Breeding Area (North)	<23 N/A ¹ , <23 N/A ¹	<25, <26 N/A ¹	3	3
No.5	'Gumbelah' Residence	<22 N/A ¹ , <23 N/A ¹	28, <23 N/A ¹ , <27	35 dBA	39 dBA
No.6	'Lake Cowal' Residence	<27, <25	<21 N/A ¹ , <20 N/A ¹	35 dBA	38 dBA
No. 7	'West Lea' Property	<22 N/A ²	20, 30, <24 N/A ¹ , <27 N/A ¹	35 dBA	41 dBA
No. 8	'McLintock' Property	<32, <34	31, 32	35 dBA	41 dBA

Note:

N/A¹ - Mine noise emission not discernible.

N/A² - No Survey Conducted

³ - Mine noise emission criteria apply to residences only

⁴ - Mine noise emission criteria – applicable to condition 6.4(a) of the August 2009 modified development consent and Barrick Australia Limited (2004c) *Cowan Gold Project Noise Management Plan*.

⁵ - Mine noise emission criteria – applicable to condition 6.3(a) of the March 2010 modified development consent and Barrick Australia Limited (2004c) *Cowan Gold Project Noise Management Plan*

During the January 2010 (A) and July 2010 (B) monitoring periods, the measured daytime mine noise emissions at the residential dwellings were below the applicable daytime intrusive $L_{Aeq(15minute)}$ criteria.

3.11.3.3 Evening Operator-attended Noise Survey Results

Evening operator-attended mine operating noise surveys were conducted in January 2010 (A) and July 2010 (B). A summary of the survey results are presented in Table 30 together with the respective noise criteria.

Table 30
Evening Noise Emission Levels $L_{Aeq(15minute)}$

Location	Address	Mine Contributed ⁴ $L_{Aeq(15minute)}$	Mine Contributed ⁵ $L_{Aeq(15minute)}$	Noise Emission Criteria ⁴ $L_{Aeq(15minute)}$	Noise Emission Criteria ⁵ $L_{Aeq(15minute)}$
		A (dBA)	B (dBA)		
No.1	New Lake Foreshore	34, 34	N/A ² , N/A ² .	³	³
No.2	'Coniston' Residence	33, 35	38, 37	35 dBA	44 dBA
No.3	Bird Breeding Area (South)	N/A ²	N/A ² , N/A ²	³	³
No.4	Bird Breeding Area (North)	N/A ²	30, 28	³	³
No.5	'Gumbelah' Residence	<24 N/A ¹ , <22 N/A ¹	<16 N/A ¹ , <17 N/A ¹	35 dBA	39 dBA
No.6	'Lake Cowal' Residence	<23, <23	<20, <15 N/A ¹	35 dBA	38 dBA
No. 7	'West Lea' Property	<33 N/A ¹ , <26	35, 35	35 dBA	41 dBA
No. 8	'McLintock' Property	26, 34	<19, 21	35 dBA	41 dBA

Note:

N/A¹ - Mine noise emission not discernible.

N/A²- No Survey Conducted

³ - Mine noise emission criteria apply to residences only

⁴ - Mine noise emission criteria – applicable to condition 6.4(a) of the August 2009 modified development consent and Barrick Australia Limited (2004c) *Cowal Gold Project Noise Management Plan*.

⁵ - Mine noise emission criteria – applicable to condition 6.3(a) of the March 2010 modified development consent and Barrick Australia Limited (2004c) *Cowal Gold Project Noise Management Plan*

During the January 2010 (A) and July 2010 (B) monitoring periods, the measured evening mine noise emissions at the residential dwellings were below the applicable evening intrusive $L_{Aeq(15minute)}$ 35 dBA criteria with the exception of Coniston. Coniston returned two marginally elevated readings (2dBA and 3 dBA above criteria) during the July survey. According to the SLR Consulting Report the exceedances at NO2 on 06/07/2010 were attributed to the presence of wind which may have enhanced mine noise. Sites that were not measured were as a result of wet weather access issues or poor weather conditions preventing access to lake monitoring sites.

3.11.3.4 Night-time Operator-attended Noise Survey Results

Night-time operator-attended mine operating noise surveys were conducted in January 2010 (A) and July 2010 (B). A summary of the survey results are presented in Table 31 together with the respective noise criteria. Sites that were not measured were as a result of wet weather access issues or poor weather conditions preventing access to lake monitoring sites.).

Table 31
Night-time Noise Emission Levels $L_{Aeq(15minute)}$

Location	Address	Mine Contributed $L_{Aeq(15minute)}$	Mine Contributed $L_{Aeq(15minute)}$	Noise Emission Criteria ⁴ $L_{Aeq(15minute)}$	Noise Emission Criteria ⁵ $L_{Aeq(15minute)}$
		A (dBA)	B (dBA)		
No.1	New Lake Foreshore	33, 33	31, 30	3	3
No.2	'Coniston' Residence	33, 36	31, 32	35 dBA	44 dBA
No.3	Bird Breeding Area (South)	N/A ² , N/A ²	N/A ² , N/A ²	3	3
No.4	Bird Breeding Area (North)	N/A ² , N/A ²	<20, <15 N/A ¹	3	3
No.5	'Gumbelah' Residence	20, 21	<19, <19	35 dBA	39 dBA
No.6	'Lake Cowal' Residence	<21 N/A ¹ , <20 N/A ¹	32, 28	35 dBA	38 dBA
No. 7	'West Lea' Property	27, 27, 33, 33	<18 N/A ¹ , <17 N/A ¹	35 dBA	41 dBA
No. 8	'McLintock' Property	<20, <20	30, 30	35 dBA	41 dBA

Note:

N/A¹ - Mine noise emission not discernible.

N/A²- No Survey Conducted

³ - Mine noise emission criteria apply to residences only

⁴ - Mine noise emission criteria – applicable to condition 6.4(a) of the August 2009 modified development consent and Barrick Australia Limited (2004c) *Cowel Gold Project Noise Management Plan*.

⁵ - Mine noise emission criteria – applicable to condition 6.3(a) of the March 2010 modified development consent and Barrick Australia Limited (2004c) *Cowel Gold Project Noise Management Plan*

During the January 2010 (A) and July 2010 (B) monitoring periods, the measured night-time mine noise emissions at the residential dwellings were below the applicable night-time intrusive $L_{Aeq(15minute)}$ 35 dBA criteria with the exception of Coniston. Coniston returned marginally elevated readings (1 dBA above criteria) in the January attended survey. The exceedance at NO2 on 21/01/2010 was attributed to the presence of wind which may have enhanced mine noise. A weak temperature inversion was likely to have occurred which would have enhanced mine noise,

3.11.3.5 Unattended Continuous Noise Logging

For the residential dwellings as outlined in the NMP:

- The summer unattended monitoring showed a slight decrease (up to 1dBA) in the daytime/evening ambient noise climate since the commencement of operations.
- Comparison of the night-time noise levels indicates that there has been a slight decrease of up to 3 dBA since the commencement of operations.
- Unattended Logger failure at Coniston during the summer monitoring period resulted in LA90 (15 minute) not being recorded. Data from McIntock locations was used for comparison as it was deemed to be the most representative data available.
- In comparison, the winter round of monitoring indicates that the daytime ambient noise climate has decreased since the commencement of operations with the exception of West Lea where the daytime ambient noise climate remains generally unaltered since 2007.
- The winter evening/night-time ambient noise climate also shows a general decreasing trend since the commencement of operations. However, at West Lea, there appears to be an upward trend (perhaps up to 9dBA) in the evening/night-time ambient noise climate since 2007.

It is reasonable to conclude that changes in the winter ambient noise climate since the commencement of mine operations would be largely due to prevailing cold season temperature inversion conditions.

3.11.3.6 Operator-attended Traffic Noise

In addition to the operational noise monitoring, SLR Consulting have been engaged to conduct mine traffic noise surveys in accordance with the NMP.

The following monitoring locations were selected in the (pre-construction) Baseline Traffic Noise Assessment. These locations were and remain to be representative of the locality types which are potentially impacted along the access route between the CGM and West Wyalong.

- “Windstone”, 648 Wamboyne Road
Offset distance from road – 150 m
- “Clairview”, 56 – 86 Wamboyne road
Offset distance from road – 45 m
- 140 Ungarie Road, West Wyalong (near intersection with Dumaresq Street)
Offset distance from road – 30 m

To quantify traffic volumes and determine peak traffic periods, three traffic counters were deployed. To quantify overall ambient and traffic noise levels during mine operations, operator attended traffic noise measurements were conducted at the three monitoring locations listed above during the morning and evening peak-traffic movement periods for the duration 18th January to 20th January 2010.

In addition, unattended continuous noise loggers were positioned at the three monitoring locations for the period 18th January 2010 to 1st February 2010.

Traffic count data showed that the morning peak traffic period was from 0500 hours to 0700 hours, and the evening peak traffic period from 1600 hours to 1900 hours.

Table 32 presents a summary of the operator-attended traffic noise data for the daytime and night-time peak traffic movements together with the pre-construction baseline levels and applicable noise criteria.

Table 32
Operator-attended Traffic Noise Emission Survey Results (January 2010)

Hour End	Pre-Construction Operator-attended $L_{Aeq(1hour)}$ (dBA) ¹	Mine Operating Operator-attended $L_{Aeq(1hour)}$ (dBA)	Traffic Noise $L_{Aeq(1hour)}$ Criteria (dBA) ¹	Traffic Count (operator attended)		
				North Bound	South Bound	Total ²
'140 Ungarie Road' - offset distance 30m						
0500 ³	-	47	55	1	1	2
0600	-	57	55	42	10	52
0700	-	59	55	72	24	96
0800 ⁵	-	59	60	33	13	46
1700	-	-	60	-	-	-
1800 ⁵	-	59	60	51	50	101
1900	-	59	60	33	47	80
2000 ⁴	-	58	60	15	16	31
'Clairview' Residence – offset distance 45m						
0500 ³	-	36	50	0	0	0
0600	-	55	50	33	2	35
0700	-	60	50	47	8	55
0800 ⁵	-	55	55	17	2	19
1700 ⁴	-	53	55	2	11	13
1800	-	54	55	21	28	49
1900 ⁴	-	52	55	8	25	33
2000 ⁵	50	51	55	4	13	17
'Windstone' Residence - offset distance 150m						
0500 ³	-	27	50	0	0	0
0600	-	50	50	33	2	35
0700	-	54	50	45	9	54
0800 ⁵	-	56	55	14	1	15
1700 ⁴	-	45	55	1	9	10
1800	-	47	55	19	29	48
1900	-	49	55	8	24	32
2000 ⁵	32	44	55	1	8	9

Notes:

- 1 Daytime criteria applies – 0700 hours to 2200 hours, Night-time criteria applies – 2200 hours to 0700 hours.
- 2 Total traffic count comprising both mine generated and non-mine vehicles.
- 3 One hour value projected from 15 minute data sample, from operator attended measurement
1. One hour value projected from 30 minute data sample, from operator attended measurement
2. One hour value projected from 45 minute data sample, from operator attended measurement
3. Shading denotes a criterion exceedance
4. All ambient and estimated noise levels include a + 2.5dBA façade correction as the loggers and the operator were located more than 1m away from the house

The number of maximum noise events has increased along Ungarie Road from typically less than two events per night during the pre-mine operations baseline monitoring to up to 8 events per night.

The number of maximum noise events has increased along Wamboyne Road from typically one event per night during the pre-mine operations baseline monitoring to up to 6 events per night.

'140 Ungarie Road' - offset distance 30m

The $L_{Aeq(15hour)}$ daytime ambient noise levels have decreased by 4 dBA compared to the pre-mine ambient noise levels and have decreased by 3 dBA compared to the 2009 noise levels.

The $L_{Aeq(9hour)}$ night-time ambient noise levels have increased by 4 dBA compared to the pre-mine ambient noise levels and have decreased by 3 dBA compared to the 2009 noise levels.

'Clairview' Residence, 56 – 86 Wamboyne Road – offset distance 45 m

The $L_{Aeq(15hour)}$ daytime ambient noise levels have increased by 5 dBA compared to the pre-mine ambient noise levels and have decreased by 1 dBA compared to the 2009 noise levels.

The $L_{Aeq(9hour)}$ night-time ambient noise levels have increased by 5 dBA compared to the pre-mine ambient noise levels and have increased by 1 dBA compared to the 2009 noise levels.

'Windstone' Residence, 648 Wamboyne Road – offset distance 150 m

The $L_{Aeq(15hour)}$ daytime ambient noise levels have increased by 1 dBA compared to the pre-mine ambient noise levels and have increased by 1 dBA compared to the 2009 noise levels.

The $L_{Aeq(9hour)}$ night-time ambient noise levels have increased by 5 dBA compared to the pre-mine ambient noise levels and are the same as the 2009 noise levels.

Unattended Traffic Noise Logging

Unattended (continuous) noise loggers were positioned at the three monitoring locations (140 Ungarie Road, 'Windstone' Residence and 'Clairview' Residence) to quantify the overall ambient noise level (inclusive of traffic noise) for the period 18 January to 1 February 2010.

Table 33 presents a summary of the unattended traffic noise data for the daytime and night-time peak traffic movements. In accordance with the NMP, Tables 32 and 33 include pre-construction baseline levels and applicable noise criteria.

Table 33
Unattended Traffic Noise Emission Survey Results (January/February 2010)

Hour End	Pre-Construction Unattended $L_{Aeq(1hour)}$ (dBA)	Mine Operating Unattended L_{Aeq} (1hour) (dBA)	Traffic Noise $L_{Aeq(1hour)}$ Criteria (dBA) ¹	Traffic Count (Vehicles/hour) Unattended		
				North Bound	South Bound	Total ²
'140 Ungarie Road'- offset distance 30m						
0500 ³	-	41	55	4	2	6
0600	-	57	55	43	10	53
0700	-	59	55	70	24	94
0800 ⁵	-	59	60	46	22	68
1700	-	-	60	54	52	106
1800 ⁵	-	59	60	49	61	110
1900	-	59	60	33	48	81
2000 ⁴	-	57	60	22	22	44
'Clairview' Residence – offset distance 45m						
0500 ³	-	39	50	2	0	2
0600	-	52	50	34	2	36
0700	48	58	50	48	8	56
0800 ⁵	-	51	55	21	4	25
1700 ⁴	-	50	55	9	17	26
1800	45	51	55	21	28	49
1900	-	49	55	8	21	29
2000 ⁵	-	46	55	7	14	21
'Windstone' Residence - offset distance 150m						
0500 ³	-	34	50	1	0	1
0600	-	48	50	33	2	35
0700	44	53	50	45	9	54
0800 ⁵	-	47	55	21	2	23
1700 ⁴	-	48	55	6	18	24
1800	40	48	55	19	27	46
1900	38	45	55	7	24	31
2000 ³	-	42	55	6	12	18

Notes:

- ¹ Daytime criteria applies – 0700 hours to 2200 hours, Night-time criteria applies – 2200 hours to 0700 hours.
- ² Total traffic count comprising both mine generated and non-mine vehicles.
- ³ One hour value projected from 15 minute data sample, from operator attended measurement
- ⁴ One hour value projected from 30 minute data sample, from operator attended measurement
- ⁵ One hour value projected from 45 minute data sample, from operator attended measurement
- ⁶ Shading denotes a criterion exceedance
- ⁷ All ambient and estimated noise levels include a + 2.5dBA façade correction as the loggers and the operator were located more than 1m away from the house

Although exceedances were recorded during the traffic noise surveys, they have not coincided with complaints from the occupants of this (or any other) residence regarding traffic noise. Accordingly, the complaint validation monitoring process documented in the NMP was not enacted during the reporting period.

3.11.4 Reportable Incidents

There were two community complaints received during the reporting period. The first complaint involved a resident of east Lake Cowal (Gumbelah Property) who called the Environmental Manager 13 September 2010 to report night noise concerns on 05, 06, 08, 09, 10 and 12 September 2010.

The response included the Environmental Manager advising the caller to lodge a call with the community complaints line. In conjunction with the 6-monthly reporting conducted by SLR Consulting, an additional one month of monitoring was conducted at the residence until 20 August 2010, which failed to find any noise near or above the noise criteria at the location. The resident was contacted at 13:10 on the same day (13/09/2010) and was provided with feedback including reports to discuss the results. The Community Relations Manager is working with the neighbouring landholder couple towards an agreeable noise mitigation outcome by conventional and practical architectural control methodology.

The second complaint involved the same resident calling the CGM community complaints line to report noise concerns on 23 October 2010. The CGM Community Relations Manager responded to the resident at 09:00hrs the same day and arranged a meeting with the landowner couple at their residence on Wednesday 27 October 2010 to discuss the concerns. The Community Relations Manager and Environmental Manager visited the residence separately and together and the matter was still under negotiation at the end of the reporting period.

3.11.5 Further Improvements

As per the revision of the NMP approved in April 2010, Barrick has commenced monitoring at 'West Lea' (N07), and 'McLintock's' (N08). Monitoring in January/February 2010 occurred at these two new sites.

As discussed in Section 3.11.1.2, the modification to the CGM Development Consent (approved by the DoPI in March 2010), again revised the Development Consent Conditions relating to noise. A revised NMP was subsequently submitted to the Director-General of the DoPI at the end of July 2010 in accordance with Development Consent Condition 6.4(g) and is currently awaiting approval.

3.12 VISUAL, STRAY LIGHT

3.12.1 Reporting Requirements

3.12.1.1 Development Consent

In accordance with the Landscape Management Plan (LSMP) (Barrick, 2003m), the following visual issues are required to be reported in the AEMR:

- landscaping, rehabilitation and building, works and structure maintenance measures (including the reporting of any related complaints);
- contingent planting of additional screening vegetation on Barrick-owned land in consultation with the CGM CEMCC on an as needs basis; and
- any additional planting on neighbouring properties if required, in consultation with the affected landholder.

As described in the currently approved CGM MOP (January 2011 to September 2012) the relevant components of the LSMP have been incorporated into the ROMP (submitted to the Director – General of the DoPI for approval prior to July 2010 in accordance with Development Consent Condition 3.6[d]). Following approval of the ROMP by the DoPI, the LSMP will not be necessary.

In accordance with Development Consent Condition 3.6(d)(iv), the ROMP includes a description of landscaping measures that will be undertaken to minimise visual impacts of the CGM.

In addition, Development Consent Condition 6.5 requires:

The Applicant shall take all reasonable and feasible measures, in consideration of Australian Standard AS 4282-1997 Control of the obtrusive effects of outdoor lighting, to mitigate visual and off-site impacts of the project, to the satisfaction of the Director-General.

3.12.1.2 Environment Protection Licence

Condition R2 of the EPL requires Barrick to notify the OEH of incidents causing or threatening material harm to the environment as soon as practicable after Barrick becomes aware of the incident.

3.12.1.3 *Any other Relevant Approval*

There are no other relevant reporting requirements from approvals in relation to landscaping and visual impact for the reporting period.

3.12.2 **Environmental Management**

3.12.2.1 *Control Strategies*

In accordance with Development Consent Condition 3.6(d)(iv) and the ROMP, Barrick used the landscaping strategies/control measures outlined below to minimise visual impacts from the mine site.

Progressive Rehabilitation

Progressive rehabilitation of waste emplacements and tailings storage facilities was undertaken to reduce the contrast between the CGM landforms and the surrounding landscape. This included progressive rehabilitation with selected grass, shrub and/or tree species.

The final void is screened from public views on Lake Cowal Road by the tailings storage facilities and waste emplacements.

Foreground Visual Screening/Vegetation Screens

Earth mounds have been constructed on sections of the western and northern boundaries of ML 1535 to break up continuous views from Lake Cowal Road. These earth mounds and vegetation screen areas surrounding ML 1535 (including along Lake Cowal Road) have been planted with endemic plants that are compatible with the existing surrounding vegetation.

Maintenance of the vegetation screens (e.g. addition and replacement of plants, where required) will continue to be undertaken in these areas during the next reporting period. An increase in screening effect over time as plants grow will continue as a result.

Visual impact mitigation measures that have been employed at the CGM included landscaping and design specifically conducted for visual impact mitigation purposes. Specific landscaping strategies included:

- utilising existing vegetation as visual screens;
- vegetation screens planted around the ML 1535 boundary;
- construction of PWE, reducing visual impact of processing plant from the eastern side of Lake Cowal;
- placement of topsoil stockpiles on the southern and western sides of the STSF to break up the view from the relocated Travelling Stock Route;
- lighting design (such as directional lighting) to reduce any potential impacts of night lighting on wildlife and nearby residences; and
- selecting the colour of the processing plant buildings to blend with the adjacent landscape in accordance with the requirements of BSC.

Night Lighting

In accordance with the Modified Request Statement of Commitments (Barrick, 2009), Barrick employed one or more of the following measures to mitigate impacts from night-lighting, where practicable:

- Scheduling of mining operations, where practicable, so that evening and night-time operations on the waste emplacements will be located on the southern waste emplacement (i.e. the lower waste emplacement) to reduce the potential for direct lighting impacts to locations north of ML 1535.
- Restriction of night-lighting to the minimum required for operations and safety requirements, where appropriate.
- Use of unidirectional lighting techniques, where practicable.
- Use of light shields to limit the spill of lighting, where practicable.

- Provision of curtains, cladding and/or screens at nearby dwellings to help screen any potential night-time lighting impacts, in consultation with the landholder.
- Planting of trees at nearby dwellings to help screen any potential night-time lighting impacts, in consultation with the landholder.
- Waste rock dumping will be scheduled such that elevated bunds of waste rock are placed between primary work areas and residences, where practicable, to mitigate potential impacts from night-lighting.

3.12.2.2 Effectiveness of Control Strategies

In accordance with the LSMP, ROMP and Modified Request (Barrick, 2009), the implementation of the control strategies above minimised visual impacts from mining activities of the CGM. The control strategies implemented during the reporting period are considered to be effective in minimising visual impacts from the CGM.

3.12.2.3 Variations from Proposed Control Strategies

There were no variations from the proposed control strategies.

3.12.3 Environmental Performance

3.12.3.1 Monitoring

In accordance with Development Consent Condition 6.5, Barrick will take all reasonable and feasible measures, in consideration of Australian Standard AS 4282-1997 *Control of the obtrusive effects of outdoor lighting*, to mitigate visual and off-site impacts of the CGM, to the satisfaction of the Director-General of the DoPI.

Table 34 provides a summary of the landscape maintenance and monitoring programme.

Table 34
Landscape Maintenance and Monitoring Summary

Component	Monitoring Frequency	Monitoring Method	Typical Maintenance
Landscaping Works <ul style="list-style-type: none"> • General Inspections • Erosion Inspections 	Bi-monthly for first year, then annually. Following significant, high intensity rainfall events.	Visual assessment of moisture stress, plant survival, presence of weeds and erosion/ sedimentation. Visual assessment of earth mound screening to determine if significant erosion or washouts have occurred in accordance with the ESCMP.	<ul style="list-style-type: none"> • Supplementary watering if required. • Control of invasive weed species in accordance with the requirements of the Land Management Plan (LMP). • Supplementary planting of failed plants where necessary. • Repair any significant erosion or washout areas on earth mounds. • Stabilisation with Jute mesh or other materials as required. • Additional revegetation planting or sowing if required.
Buildings, Structures and Facilities	Annual	Visual assessment by a suitably qualified building inspector.	<ul style="list-style-type: none"> • Replace or repair items as necessary to maintain structural integrity. • Repaint any exterior surfaces where the finish has deteriorated.
Rehabilitation Works <ul style="list-style-type: none"> • General Inspections • Erosion Inspections 	Annual Following significant, high intensity rainfall events.	Monitoring in accordance with the MREMP (with reporting in the AEMR). Visual assessment of rehabilitation works to determine if significant erosion or washouts have occurred in accordance with the ESCMP.	<ul style="list-style-type: none"> • Repair any significant erosion or washout areas. • Control of invasive weed species in accordance with the LMP. • Supplementary planting or seeding of failed plants where necessary. • Repair any significant erosion or washout areas on earth mounds. • Stabilisation with Jute mesh or other materials as required. • Additional revegetation planting or sowing if required.

3.12.3.2 *Performance Outcomes*

Landscape maintenance and monitoring measures conducted during the reporting period included:

- general inspections of landscaping and rehabilitation works;
- monitoring of tree and shrub survival rates of landscape plantings; and
- erosion inspections of landscaping and rehabilitation works following periods of significant, high intensity rainfall.

As a result of this visual landscape monitoring the following maintenance activities were undertaken:

- Weed control within landscaping and rehabilitation areas by manual removal or chemical application.
- Removal of tree guards from sections of the boundary plantings.
- Planting of rye grass on the newly raised outer STSF slopes.

Most of the temporary office buildings and associated infrastructure used during the construction phase of the CGM have been removed from the site during the reporting period. Construction of the permanent buildings remaining onsite was completed early in 2006 and they are now subject to regular monitoring and maintenance by Barrick employees and contractors.

3.12.4 **Reportable Incidents**

No visual amenity or light-spill complaints were recorded during the reporting period.

3.12.5 **Further Improvements**

Monitoring will continue as summarised in Table 34 during the next reporting period. Maintenance, addition and replacement (if required) of plants within the boundary screen plantings will be of high importance.

3.13 **ABORIGINAL HERITAGE**

3.13.1 **Reporting Requirements**

3.13.1.1 *Development Consent*

The reporting of Aboriginal heritage issues is required by Development Consent Condition 8.6, which states:

The applicant shall monitor the effectiveness of measures outlined in the archaeology and heritage management plan (condition 3.3). A summary of monitoring results shall be included in the AEMR.

The Indigenous Archaeology and Cultural Heritage Management Plan (IACHMP) (Barrick, 2003n) was prepared in accordance with Development Consent Condition 3.3 to identify future salvage, excavation and monitoring of archaeological heritage within the CGM area prior to and during development and to address Aboriginal cultural heritage issues.

3.13.1.2 *Environment Protection Licence*

Condition R2 of the EPL requires Barrick to notify the OEH of incidents causing or threatening material harm to the environment as soon as practicable after Barrick becomes aware of the incident.

3.13.1.3 *Any Other Relevant Approvals*

Barrick and its consultant archaeologists have obtained permits and consents under s 87 and s 90 of the *National Parks and Wildlife Act 1974* (NSW) (the NPW Act) for the CGM. They are:

- Permit 1468 authorising certain archaeological works in the ML 1535 area, water pipeline area and borefield area.

- Consent 1467 authorising the destruction of Aboriginal objects (in certain circumstances) in the ML 1535 area, water pipeline area and borefield area.
- Permit 1681 authorising certain archaeological works in the relocated TSR area and road upgrade area.
- Consent 1680 authorising the destruction of Aboriginal objects (in certain circumstances) in the relocated TSR area and road upgrade area.

3.13.2 Environmental Management

3.13.2.1 Control Strategies

The IACHMP sets out the salvage, excavation, monitoring and other management measures that will be taken for each of the registered archaeological sites and other Aboriginal objects within the Barrick CGM area. The management measures include strategies for registered sites and other Aboriginal objects.

In general, the strategies include: protection; investigation; collection; excavation; documentation and storage of Aboriginal objects in an on-site "Keeping Place"; and collection and storage of objects during topsoil stripping and stockpiling.

A summary of the management measures for each of the registered sites is provided in Table 35.

Table 35
Summary of Major Management Measures for Registered Sites

Site Name	Zone and Location Relative to Currently Proposed Disturbance Areas	Condition of Permit 1468	Management Summary
Site P1	Lake Edge Ridge Zone Proposed Open Pit	Special Conditions 6, 12 and 13 Special Condition 3	Representative sample of surface Aboriginal objects to be collected, documented and stored at an onsite "Keeping Place". Remaining Aboriginal objects to be collected with the topsoil during soil stripping and temporarily stored in soil stockpiles. Collected surface Aboriginal objects to be eventually replaced. Excavation of 3 alluvial fans within footprint of proposed open pit and Site P1. A representative sample of sub-surface Aboriginal objects to be collected, documented and stored at an onsite "Keeping Place".
Site P2	Beach Zone Proposed Open Pit	Special Condition 4	Section of the scarred tree to be removed, conserved and stored or displayed at an onsite "Keeping Place".
Site LC1	Lake Edge Ridge Zone Between NWE and Open Pit	Special Conditions 6, 12 and 13 Special Condition 5.	Representative sample of surface Aboriginal objects to be collected, documented and stored for safe-keeping at an onsite "Keeping Place". Remaining Aboriginal objects to be collected with the topsoil during soil stripping and temporarily stored in soil stockpiles. Collected surface Aboriginal objects to be eventually replaced. Excavation of Site LC1. A representative sample of sub-surface Aboriginal objects to be collected, documented and stored at an onsite "Keeping Place".
Site LC2	Lake Edge Ridge Zone Close to NWE	Special Conditions 6, 12 and 13	If site can be avoided – fencing and sign posting to protect site. If site cannot be avoided - representative sample of surface Aboriginal objects to be collected, documented and stored for safe-keeping at an onsite "Keeping Place". Remaining Aboriginal objects to be collected with the topsoil during soil stripping and temporarily stored in soil stockpiles. All collected Aboriginal objects to be eventually replaced.
Site LC3	Lake Edge Ridge Zone Close to SWE	Special Conditions 6, 12 and 13	Representative sample of surface Aboriginal objects to be collected, documented and stored for safe-keeping at an onsite "Keeping Place". Remaining Aboriginal objects to be collected with the topsoil during soil stripping and temporarily stored in soil stockpiles. All collected Aboriginal objects to be eventually replaced.

Table 35 (Continued)
Summary of Major Management Measures for Registered Sites

Site Name	Zone and Location Relative to Currently Proposed Disturbance Areas	Condition of Permit 1468	Management Summary
Site LC4	Lake Edge Ridge Zone Close to SWE	Special Conditions 6, 12 and 13	Representative sample of surface Aboriginal objects to be collected, documented and stored for safe-keeping at an onsite "Keeping Place". Remaining Aboriginal objects to be collected with the topsoil during soil stripping and temporarily stored in soil stockpiles. All collected Aboriginal objects to be eventually replaced.
Exposure A	Back Plain Zone Within NWE	Special Conditions 6, 12 and 13	Representative sample of surface Aboriginal objects to be collected, documented and stored for safe-keeping at an onsite "Keeping Place". Remaining Aboriginal objects to be collected with the topsoil during soil stripping and temporarily stored in soil stockpiles. All collected Aboriginal objects to be eventually replaced.
Exposure B	Back Plain Zone Close to NWE	Special Condition 8	Conservation works - covering by geo-textile blanket and sign posting to protect site. If Site is proposed to be utilised – procedure in Special Condition 6 is authorised after notice to the DECC and consultation with Aboriginal community.
Exposure C	Back Plain Zone Close to Reclaim Water Dam	Special Condition 8	Conservation works - covering by geo-textile blanket and sign posting to protect site. If Site is proposed to be utilised – procedure in Special Condition 6 is authorised after notice to the DECC and consultation with Aboriginal community.
Exposure D	Back Plain Zone Close to Service Corridor	Special Condition 8	Conservation works - covering as much as possible of the site by geo-textile blanket and sign posting to protect site. If Site is proposed to be utilised – procedure in Special Condition 6 is authorised after notice to the DECC and consultation with Aboriginal community.
Exposure E	Back Plain Zone Close to Southern Tailings Storage	Special Condition 8	Conservation works - covering by geo-textile blanket and sign posting to protect site. If Site is proposed to be utilised – procedure in Special Condition 6 is authorised after notice to the DECC and consultation with Aboriginal community.
Exposure F	Back Plain Zone Within Northern Tailings Storage	Special Conditions 6, 12 and 13	Representative sample of surface Aboriginal objects to be collected, documented and stored for safe-keeping at an onsite "Keeping Place". Remaining Aboriginal objects to be collected with the topsoil during soil stripping and temporarily stored in soil stockpiles. All collected Aboriginal objects to be eventually replaced.
Exposure G	Back Plain Zone Within Northern Tailings Storage	Special Conditions 6, 12 and 13	Representative sample of surface Aboriginal objects to be collected, documented and stored for safe-keeping at an onsite "Keeping Place". Remaining Aboriginal objects to be collected with the topsoil during soil stripping and temporarily stored in soil stockpiles. All collected Aboriginal objects to be eventually replaced.
Exposure H	Back Plain Zone Close to Access Road and Southern Tailings Storage	Special Condition 8	Conservation works - covering by geo-textile blanket and sign posting to protect site. If Site is proposed to be utilised – procedure in Special Condition 6 is authorised after notice to the DECC and consultation with Aboriginal community.
Exposure I	Back Plain Zone Within Northern Tailings Storage	Special Conditions 6, 12 and 13	Representative sample of surface Aboriginal objects to be collected, documented and stored for safe-keeping at an onsite "Keeping Place". Remaining Aboriginal objects to be collected with the topsoil during soil stripping and temporarily stored in soil stockpiles. All collected Aboriginal objects to be eventually replaced.
Exposure J	Back Plain Zone Within Northern Tailings Storage	Special Conditions 6, 12 and 13.	Representative sample of surface Aboriginal objects to be collected, documented and stored for safe-keeping at an onsite "Keeping Place". Remaining Aboriginal objects to be collected with the topsoil during soil stripping and temporarily stored in soil stockpiles. All collected Aboriginal objects to be eventually replaced.

Table 35 (Continued)
Summary of Major Management Measures for Registered Sites

Site Name	Zone and Location Relative to Currently Proposed Disturbance areas	Condition of Permit 1468	Management Summary
Exposure K	Back Plain Zone Within Northern Tailings Storage	Special Conditions 6, 12 and 13.	Representative sample of surface Aboriginal objects to be collected, documented and stored for safe-keeping at an onsite "Keeping Place". Remaining Aboriginal objects to be collected with the topsoil during soil stripping and temporarily stored in soil stockpiles. All collected Aboriginal objects to be eventually replaced.
Exposure L	Back Plain Zone Within Southern Tailings Storage	Special Conditions 6, 12 and 13	Representative sample of surface Aboriginal objects to be collected, documented and stored for safe-keeping at an onsite "Keeping Place". Remaining Aboriginal objects to be collected with the topsoil during soil stripping and temporarily stored in soil stockpiles. All collected Aboriginal objects to be eventually replaced.
Exposure M	Back Plain Zone Within Southern Tailings Storage	Special Conditions 6, 12 and 13	Representative sample of surface Aboriginal objects to be collected, documented and stored for safe-keeping at an onsite "Keeping Place". Remaining Aboriginal objects to be collected with the topsoil during soil stripping and temporarily stored in soil stockpiles. All collected Aboriginal objects to be eventually replaced.
Exposure N	Back Plain Zone Within Southern Tailings Storage and close to Access Road	Special Conditions 6, 12 and 13.	If site can be avoided – fencing and sign posting to protect site. If site cannot be avoided - Representative sample of surface Aboriginal objects to be collected, documented and stored for safe-keeping at an onsite "Keeping Place". Remaining Aboriginal objects to be collected with the topsoil during soil stripping and temporarily stored in soil stockpiles. All collected Aboriginal objects to be eventually replaced.
Site LCB9	Back Plain Zone Within water pipeline area/borefield	Special Condition 7	Representative sample of surface Aboriginal objects to be collected, documented and stored for safe-keeping at an onsite "Keeping Place". Excavation of test pits and possible extended excavation. A representative sample of sub-surface Aboriginal objects to be collected, documented and stored at an onsite "Keeping Place". All collected Aboriginal objects to be eventually replaced.
Site LCB14	Back Plain Zone Within water pipeline area/borefield	Special Condition 7	Representative sample of surface Aboriginal objects to be collected, documented and stored for safe-keeping at an onsite "Keeping Place". Excavation of test pits and possible extended excavation. A representative sample of sub-surface Aboriginal objects to be collected, documented and stored at an onsite "Keeping Place". All collected Aboriginal objects to be eventually replaced.
Site LCB1- LCB8, LCB10– LCB13, LCB15, LCB16	Back Plain Zone Within water pipeline area/borefield	Special Condition 2	No specific archaeological works required.

Source: North Limited (1998); Pardoe (2002)

Management measures are not limited to the registered sites. Permit 1468 and Permit 1681 authorise a range of management measures proposed in the Research Design and Study Plan for other Aboriginal objects in the Barrick CGM Area that are not contained within the Registered Sites. The details of the management and mitigation measures for other Aboriginal objects is contained in the Research Design and Study Plan (Pardoe, 2002) for the Barrick CGM as amended by Permit 1468 and Permit 1681. Activities undertaken during the 2010 reporting period are provided below:

- Wiradjuri monitors from the Wiradjuri Condobolin Cultural Heritage Company (WCCHC) have been employed during the year on archaeological works at Cowal.
- The majority of cultural heritage work continues to be surface and subsurface monitoring for topsoil removal.

Cultural heritage work has been consistently carried out since the start of construction. Work areas had been examined previously (before construction works) and collections of cultural material were made in accordance with relevant approvals. The 2009 revised Ground Disturbance Procedure has led to improvements in both assessing and tracking ground disturbance on-site.

Barrick employees and contractors undertake a Cultural Heritage Induction presented by the Wiradjuri Condobolin Cultural Heritage Company (WCCHC). These inductions are held on an as needed basis's.

3.13.2.2 *Effectiveness of Control Strategies*

The control measures for managing and monitoring Aboriginal heritage were implemented in accordance with the IACHMP and were effective during the reporting period.

3.13.2.3 *Variations from Proposed Control Strategies*

There were no variations from the proposed control strategies.

3.13.3 Environmental Performance

3.13.3.1 *Monitoring*

In accordance with the IACHMP, all areas within the Development Consent area where soil stripping and construction earthworks occur surface and subsurface surveys are carried out by Wiradjuri monitors and, where appropriate, by archaeologists, to identify "datable materials".

3.13.3.2 *Performance Outcomes*

In accordance with Aboriginal heritage permits and consents and IACHMP, Aboriginal heritage objects were collected prior to the commencement of all earthworks under the supervision of a qualified archaeologist and representatives of the Wiradjuri Condobolin Cultural Heritage Company. Objects collected were stored in the on-site Keeping Place during the reporting period. Archaeological analysis of these objects is ongoing.

All construction earthworks were monitored by Wiradjuri monitors and/or an archaeologist. No non-compliance issues are reportable. Areas where soil stripping was undertaken were inspected under the supervision of representatives of the Wiradjuri Condobolin Cultural Heritage Company.

3.13.4 Reportable Incidents

No environmental incidents or complaints were reported or received relating to Aboriginal heritage at the CGM during the reporting period.

3.13.5 Further Improvements

An internal audit of the Barrick CGM Ground Disturbance Procedure will occur during the next reporting period to ensure Aboriginal heritage is being managed in accordance with the IACHMP. The Aboriginal heritage management measures as described in the IACHMP will continue to be implemented during the next reporting period.

3.14 EUROPEAN HERITAGE

3.14.1 Reporting Requirements

3.14.1.1 *Development Consent*

The reporting of European heritage issues is required by Development Consent Condition 8.6 which states the applicant shall:

Monitor the effectiveness of measures outlined in the archaeology and heritage management plan (condition 3.3). A summary of monitoring results shall be included in the AEMR.

The Heritage Management Plan (HMP) (Barrick, 2003o) was prepared in accordance with Development Consent Condition 3.3.

In accordance with the HMP, the following non-indigenous heritage-related issues are required to be reported in the AEMR:

- new items of non-indigenous heritage significance identified by the Environmental Manager within ML 1535;
- new listings of non-indigenous heritage significance items on the Local Environment Plan (LEP) or NSW State Heritage Register within ML 1535;
- a brief overview of maintenance conducted on listed non-indigenous heritage items; and
- a summary of results from any monitoring, management and maintenance measures undertaken.

In 2006, the BSC granted Development Consent for the demolition of the 'Cowal West' Shearer's Quarters and Kitchen. Demolition was required for the construction of contained water storage D9. Demolition of the remainder of the 'Cowal West Homestead Complex' (CWHC) (i.e. the Homestead; Shearing [Wool] Shed and Hayshed) was approved via the March 2010 modification.

3.14.1.2 Environment Protection Licence

Condition R2 of the EPL requires Barrick to notify the OEHL of incidents causing or threatening material harm to the environment as soon as practicable after Barrick becomes aware of the incident.

3.14.1.3 Any Other Relevant Approval

There are no other relevant reporting requirements from approvals in relation to European heritage issues for the reporting period.

3.14.2 Environmental Management

3.14.2.1 Control Strategies

European heritage control strategies and management measures were implemented at the Barrick CGM during 2010 to minimise impacts on the CWHC in accordance with the HMP.

Management measures implemented regarding the CWHC will include the maintenance of the fences around the buildings and general maintenance to the shearing shed and associated buildings until demolition of the CWHC occurs.

During the reporting period no incidents regarding the CWHC were noted or reported. The CWHC was monitored on a regular basis during the reporting period and will continue to be monitored until demolition of the CWHC occurs.

Management measures for implementation prior to demolition of the CWHC include:

- retrieval and salvage of items of historic uniqueness from the Shearing (Wool) Shed and Hayshed;
- compilation of a photographic record of the Homestead; and
- storage of the salvaged items at the Lake Cowal Conservation Centre (LCCC).

Additionally, an interpretive display will be established at the LCCC in consultation with the LCF, BSC and BDHS. The display will include maps, photographs, narrative, and fragments/elements salvaged from the CWHC to illustrate its history. Other items containing a level of local heritage significance identified in the HMP will continue to be maintained in accordance with the HMP.

3.14.2.2 Effectiveness of Control Strategies

No damage to the buildings from vehicle or general machinery movements around the CWHC during the reporting period was recorded, highlighting the effectiveness of the fences around the complex. Repair and maintenance activities undertaken have proved to be effective in maintaining the heritage value of the complex.

3.14.2.3 *Variations from Proposed Control Strategies*

There were no variations from the proposed control strategies.

3.14.3 **Environmental Performance**

3.14.3.1 *Monitoring*

In accordance with Development Consent Condition 8.6, Barrick shall monitor the effectiveness of European heritage management measures outlined in the HMP. Monitoring should where practicable and/or applicable report on the following (until demolition of the CWHC occurs):

- any maintenance and/or repairs conducted on the CWHC and the effectiveness of the maintenance and/or repairs;
- condition of fences and gates and around the CWHC; and
- installation of the Information Plaques at the CWHC.

Maintenance activities conducted at the CWHC included spraying of weeds, mowing of grass within the compound to reduce the fire hazard and checking of stored items within the large storage shed. The fences and gates around the complex remain in good condition with locks in place on the gates.

'Cowal West' information plaques for the 'Cowal West' Homestead complex were fabricated in early-2009 and stored at the 'Hillgrove' LCCC facility pending further planning works at the Homestead and Shearing Quarters. Barrick consulted with the prior land owners, and the West Wyalong Historical Society regarding the content of these plaques which will be installed adjacent any exhibit material which is planned to be housed at the nearby 'Hillgrove' LCCC facility.

Shearing Shed

Maintenance activities undertaken on the shearing shed during the reporting period included:

- Weed spraying (Bathurst Burr and Mustard weed in the old sheep pens, and Cat Head in the House backyard area).
- The shed was cleared of dust.
- The checking of the contents in the large storage shed.

3.14.3.2 *Performance Outcomes*

The maintenance works carried out within the CWHC have been effective in preserving the integrity and heritage value of the buildings.

3.14.4 **Reportable Incidents**

No environmental incidents or complaints were reported or received relating to European heritage at the CGM during the reporting period. No CEMCC issues were raised during the reporting period relating to European heritage.

3.14.5 **Further Improvements**

No further improvements to European heritage management measures are proposed for the next reporting period.

3.15 **SPONTANEOUS COMBUSTION**

This section is not applicable to the CGM for this reporting period.

3.16 BUSHFIRE

3.16.1 Reporting Requirements

3.16.1.1 Development Consent

The Bushfire Management Plan (BMP) (Barrick, 2003p) was prepared in August 2003 to establish a bushfire management strategy for the CGM that complies with Development Consent Condition 3.8. The BMP requires the following bushfire related issues to be reported in the AEMR:

- fuel management activities undertaken in the reporting period; and
- a summary of any bushfire events that involved Barrick lands or the use of CGM on-site fire control equipment during the reporting period.

Bushfire management measures for mine site rehabilitation areas and the offset areas are also required to be detailed in the ROMP in accordance with Development Consent Condition 3.6(d)(iv). Subsequently the ROMP (Barrick (2010) prepared during the reporting period describes bushfire preventative measures and fuel management measures for mine site rehabilitation areas and the offset areas.

3.16.1.2 Environment Protection Licence

Condition R2 of the EPL requires Barrick to notify the OEHL of incidents causing or threatening material harm to the environment as soon as practicable after Barrick becomes aware of the incident.

3.16.1.3 Any Other Relevant Approval

There are no other relevant reporting requirements from approvals in relation to bushfire for the reporting period.

3.16.2 Environmental Management

3.16.2.1 Control Strategies

In accordance with the BMP and the ROMP, bushfire preventative control strategies for the CGM and the CGM offset areas include:

- educating employees and contractors on general fire awareness and response procedures;
- fire track (and fire break) maintenance for fire control;
- annual inspections to identify areas requiring bushfire control measures including assessment of fuel loads; and
- fuel management (e.g. hazard reduction burns) in consultation with the NSW Rural Fire Service.

In accordance with the BMP and the ROMP, fuel management control strategies for the CGM and the CGM offset areas include:

- fuel management by means other than burning; including such methods as grazing, slashing, pruning, mulching or other operations (such as ploughing, herbicide application and rolling);
- fuel management via burning where conventional fuel management strategies are inappropriate, impracticable or not successful (undertaken in consultation with relevant authorities); and
- maintaining designated firebreaks.

3.16.2.2 Effectiveness of Control Strategies

The control strategies implemented during the reporting period are considered to be effective as demonstrated by the environmental performance outcomes (discussed in Section 3.16.3).

3.16.2.3 *Variations from Proposed Control Strategies*

There were no variations from the proposed control strategies.

3.16.3 **Environmental Performance**

3.16.3.1 *Monitoring*

In accordance with Development Consent Condition 8.1, data from the meteorological station maintained on-site will be used to determine whether current weather conditions are suitable for fire management activities, and to assist in the management of bushfire fighting activities. Meteorological monitoring data is discussed in Section 3.1.3.1.

3.16.3.2 *Performance Outcomes*

The bushfire management measures as described in the BMP (Barrick, 2003p) and the ROMP (Barrick, 2010) were implemented at the CGM during the reporting period. Fuel management activities carried out during the reporting period included:

- the creation of firebreaks around the ML 1535 boundary by slashing and grading;
- slashing of large open areas within ML 1535 that had high fuel loads;
- mowing and grounds maintenance of borefield stations;
- keeping all operating areas neat and tidy and with low fuel loads; and
- conducting regular inspections of the ML 1535 area to identify any significant fire risks.

Bushfire management measures and fuel management measures implemented for the offset areas will be provided in the 2011 AEMR. There were no bushfire events that occurred on Barrick-owned land or the use of CGM on-site fire control equipment during the reporting period.

The Emergency Response Team (ERT) currently consists of about 30 members consisting of Barrick staff members, five of which are full time Emergency Response Officers (EROs). The CGM Emergency Response Coordinator is now an accredited trainer with approval to train the Suppress Wildfire course from mid-2010 (currently the crews are trained to Suppress Urban Fire level).

The ERT fire fighting equipment currently consists of two Cat 7 equivalent 4WD fire tenders with a capacity of 1,000 L each, and two dedicated 1,000 L fire fighting trailers. Barrick currently has two 70,000 L water trucks, fitted with water cannons, used in mining operations and a number of contracted water trucks during construction which could be used to cart water in the event of a bushfire on ML 1535.

The fire trail register was maintained during the reporting period. New all weather access tracks were established to the DG2, BM04.1 and NO4 location and to the new lake floor saline bores system to assist in fire control.

The CGM Rescue Station houses all the ERT equipment, a clean room for bottle refilling and clothes cleaning, training facilities (smoke chamber, car rescue, fire extinguisher, ropes, hoses, BA, etc), offices, lockers and conference room for staff, volunteer trainees and visitors.

3.16.4 **Reportable Incidents**

No environmental incidents or complaints were reported or received relating to bushfires during the reporting period.

3.16.5 **Further Improvements**

No further improvements are proposed for the next reporting period.

3.17 **MINE SUBSIDENCE**

This section is not applicable to the CGM for this reporting period.

3.18 HYDROCARBON CONTAMINATION

3.18.1 Reporting Requirements

3.18.1.1 Development Consent

The HWCMP (Barrick, 2006c) was prepared in accordance with Development Consent Condition 5.7. The HWCMP (2006c) has previously been revised to reflect results of pre-commissioning studies and requirements of the CMP on 6 March 2006.

An amendment of the HWCMP was approved by the Director-General of the DoP in January 2008 to reflect the proposed management procedures for two new waste streams generated at the CGM, viz.: (classified as inert waste), and hydrocarbon-impacted material (classified as solid waste following treatment in a designated bioremediation facility). The EPL was varied to reflect these amendments in July 2008.

As described in Section 1.1.2, the HWCMP was amended to reflect the June 2009 Modification that approved the use of SMBS as an alternative cyanide destruction method. The December 2010 addendum of the HWCMP was approved by the DoPI on 10 March 2010.

In addition to the above, Barrick prepared a revised HWCMP during the reporting period (27 April 2011). The HWCMP was updated in accordance with Development Consent Conditions 3.2 and 5.7 and revised to reflect changes in operational practices since the commencement of the CGM. The DoPI approved the revised HWCMP on 13 May 2011.

The HWCMP contains provisions for the minimisation of hydrocarbon contamination. In accordance with the HWCMP, any major or emergency spills that occur during the reporting period as well as any remedial measures that have been implemented to reduce the risk of occurrence are required to be reported in the AEMR and are provided below.

In accordance with Development Consent Condition 5.4(d):

Within 24 hours or the next working day of any incident or potential incident with actual or potential significant off-site impacts on people, or the biophysical environment (including wildlife), a report shall be supplied to the Director-General outlining the basic facts and mitigation measures undertaken at the time. A further detailed report shall be prepared and submitted following investigations of the causes and identification of necessary additional preventative measures. The report must be submitted to the Director-General no later than 14 days after the incident or potential accident.

The incident report should include the following information:

- location of the incident;
- person's name and contact number who discovered the incident;
- the best estimate of the time the incident occurred;
- the time the person reporting the incident and/or the organisation/company they represent became aware of the incident;
- a description of the incident;
- the suspected cause of the incident;
- the environmental harm or environmental nuisance caused, threatened or suspected to be caused by the incident; and
- actions taken to prevent further similar incidents and mitigate any environmental harm or environmental nuisance caused by the incident.

In accordance with Development Consent Condition 5.4(d):

[Barrick] shall maintain a register of such accidents, incidents, and potential incidents. The register shall be made available for inspection at any time by the independent hazard auditor and the Director-General.

Barrick will maintain a record of/and report on any unauthorised release of hazardous waste or chemicals to the environment.

3.18.1.2 *Environment Protection Licence*

The OEH is required to be notified of any spills that cause "material harm" to the environment, whereby "material harm" is defined in Section 147 of the POEO Act.

3.18.1.3 *Any Other Relevant Approvals*

The approval for onsite remediation of hydrocarbon contaminated waste and further reuse requires that soils are sampled and assessed by external consultants for waste classification in accordance with NSW DECCW (2009) *Waste Classification Guidelines: Part 1: Classifying Waste*.

3.18.2 Environmental Management

3.18.2.1 *Control Strategies*

Based on the principles detailed in *Leading Practice Sustainable Development Program for the Mining Industry - Hazardous Materials Management* handbook (Department of Resources, Energy and Tourism, 2009), Barrick employees and contractors have adopted a Chemical Management Strategy (CMS) as part of the HWCMP. This strategy allows for the management of each chemical used at the CGM.

A discussion of the primary components of the CMS is provided in the following sub-sections.

Control Strategies for this section include:

- Site wide training on Hydrocarbon spills.
- Annual concreting bunding integrity audits.
- Area inspections.
- Hazardous Substance Register.
- Incident reporting and follow up action items.

Inventory Register

In accordance with best practice and the CMS all raw materials/consumables brought on-site for use at the CGM are recorded in an Inventory Register which is updated and available for inspection by the appropriate authorities. Material Safety Data Sheets (MSDSs) for all chemicals will also be included in the Inventory Register. The CGM uses the Chem Alert 3 system for the management of MSDSs of chemical/consumable on-site and to achieve site substance control.

Hazardous Substance and Dangerous Goods Register (HSDGR) and FOR

In accordance with Section 6.4.1 of the EIS (North Limited, 1998) and the Chemical Management Strategy, chemicals recorded on the Inventory Register that are designated as hazardous substances and/or dangerous goods and/or fuels and oils are included in the HSDGR and the FOR.

Personnel Training

Most if not all activities associated with hazardous consumables require the intervention or interaction of workers and management. In accordance with the CMS and HWCMP, Barrick employees and contractors are trained in:

- hazardous chemical/substance awareness;
- job hazard analysis preparation and use;
- use of MSDS information;
- measures to prevent accidental release;
- potential environmental impacts;

- ChemAlert III application and usage;
- use and maintenance of Personal Protective Equipment (PPE);
- emergency spill response and containment; and
- clean-up techniques.

Education and training programmes are used to instruct employees and contractors on the appropriate use of chemicals and requirement for “approved for use on-site” chemicals. The programme is also be used to distribute information on the occupational health and safety implications and potential environmental impacts of these consumables.

The education and training programmes were provided during the final construction phase and are being provided during the operational phases of the CGM. The training programmes include and are not necessarily limited to:

- induction of all company employees, contractors and first time visitors;
- training in the Job Hazard Analysis for the use of each chemical for those personnel whose work involves its use;
- specific emergency response training to suit individual work requirements; and
- ongoing refresher training programmes for key employees and contractors to improve skills and competencies as necessary.

Training also includes reinforcement by refresher courses, short ‘toolbox’ discussions, and/or routine discussion with supervisors. Records of all staff induction and environmental training are kept to assist in the identification of personnel who require ‘refresher’ training.

Operators moving or using any reagents are trained in the requirements of the material such as PPE, handling procedures and spill clean-up procedures in accordance with the HSDGR.

Specific HSDG training provided to employees during the reporting period was:

- The pocket-sized employee spill response handbook continues to be distributed across the site to all new employees or those not previously inducted.
- The environmental awareness handbook also continues to be distributed to all employees and visitors during the year.

Auditing of Chemical Management

The CGM is subject to periodic audit and review. During the audit and review process CGM chemical management practices and procedures are assessed against the CMS and the HWCMP. Audit results are used to identify improvements that can be made to the site CMS procedures, if appropriate.

No externally facilitated auditor training was conducted for new employees during the reporting period despite continued attempts to arrange for the service provider to visit site. ChemAlert III derived employee training is intended to occur during the next reporting period during the change over to the new system.

3.18.2.2 Effectiveness of Control Strategies

A number of minor substance spillage incidents occurred during the reporting period, however the control strategies set out in the HWCMP are considered to be effective as the spills were minor in nature and were fully contained. No further actions were required by the notified regulators (Section 3.18.3.2).

The number of internally reported spills reflects the effectiveness of site awareness training sessions undertaken with more intensive oil and chemical spill training sessions.

3.18.2.3 Variations from Proposed Control Strategies

There were no variations from the proposed control strategies.

3.18.3 Environmental Performance

3.18.3.1 Monitoring

There are no specific monitoring programmes for hydrocarbons relevant to the reporting period however there are a number of preliminary spill response procedures which are discussed below. Sampling of bioremediated soil is undertaken and confirmed to be suitable prior to reuse on rehabilitation locations on-site. In addition, hydrocarbon sampling is undertaken on a quarterly basis as per SGWMBMP.

Preliminary Spill Responses

A number of minor substance spillage incidents occurred during the reporting period and the spill response procedures outlined in the HWCMP were implemented at the CGM. The CGM preliminary spill responses were implemented for the minor incidents. Impacted material was then transferred to the temporary hydrocarbon waste transfer station for bioremediation.

A Total Waste Management Service to handle, transport and dispose of all waste material streams generated at CGM was maintained during the reporting period. JR Richards & Sons, West Wyalong, have provided this service during the construction and operational phases of the prior reporting periods. A number of licensed sub-contractors are coordinated by the JR Richards contract to appropriately recycle and/or dispose of the various waste streams.

3.18.3.2 Performance Outcomes

As described in Section 2.6, on-site bioremediation of site-generated hydrocarbon-tainted soils commenced in early 2009.

3.18.4 Reportable Incidents

There were no government reportable incidents relating to hydrocarbon spillage management during the reporting period. Barrick maintains records of loss control incident reports on any unauthorised release of hazardous waste or managed substances beyond bunded areas or to the environment.

In accordance with the HWCMP, relevant emergency services/agencies will be contacted if:

- the spill has spread or has the potential to spread beyond the boundaries of the CGM;
- it is beyond the resources of the CGM to respond to the spill;
- the available protective equipment is inadequate for dealing with the situation; or
- staff, the public or the environment is, or could potentially be placed at risk.

The incidents that occurred during the reporting period were minor in nature and therefore not required to be reported to emergency services.

3.18.5 Further Improvements

Whilst only minor substance spillage incident occurred during the reporting period, Barrick has continued to make additional improvements to infrastructure, systems and employee awareness about substance management and spillage prevention:

- Obsolete substances continued to be appropriately disposed of and new substances are registered for use on-site. Spillage clean up materials was disposed of appropriately.
- Continued maintenance of spill response stations. A register of bins continues to be maintained during the reporting period to facilitate content stock auditing and usage reporting.
- The Mining Hardstand truck and vehicle wash facility including the associated oily water coalescing plate separator by-product collected for off-site recycling by licensed waste management contractors.
- The Bioremediation area was commissioned in early-2009.
- Employee spill response and environmental awareness handbooks continue to be distributed to employees (includes contractors), government regulators, CEMCC, goods suppliers, various VIP visitors, etc.

- The fuel tracking system (Banlaw) hardware was installed at all diesel dispensing stations during the reporting period. The main diesel tank bund floor has continued to be maintained. A new sump pump has been installed at the main diesel tank bund sump pump and was being optimised as were frog exclusion curtains and employee access walkways for wet weather conditions.

The HSDG and hydrocarbon management measures as described in the HWCMP will continue to be implemented during the next reporting period.

3.19 METHANE DRAINAGE/VENTILATION

This section is not applicable to the CGM for this reporting period.

3.20 WASTE GEOCHEMISTRY

3.20.1 Reporting Requirements

During annual on-site AEMR performance review meetings in 2005 and 2006, the DTIRIS (formerly DPI) [Mineral Resources] requested confirmatory test-work of waste rock geochemistry be undertaken. In their 2007 report, the IMP also recommended that Barrick continue to monitor the waste rock being removed from the open pit, to facilitate identification of potentially acid-generating material (if present) and selective placement of that material within the waste emplacements.

In accordance with Recommendation 1 of the 2010 Sixth Annual Report of the IMP, the volume of benign, competent rock likely to be required for future rehabilitation and mine closure is proposed to be calculated based on the latest topsoil and subsoil inventory calculations; the Barrick Reclamation Cost Estimator (BRCE) model estimates; and proposed stockpiled soil resource characterisation. The volume of benign, competent waste rock anticipated to be available from future development of the open pit, is also proposed to be calculated during the next reporting period and used to update the materials inventory and evaluate the balance of materials available for future rehabilitation through to mine closure.

3.20.2 Environmental Management

The regional and local geology of the Endeavour 42 deposit (i.e E42 Deposit), has been described by Miles, Brooker, McInnes, *et al* [1993-1998]. The complex consists of calc-alkaline to shoshonitic volcanic rocks and related sedimentary rocks deposited in a deep water environment and are unconformably overlain, in parts, by the Siluro-Devonian Manna Conglomerate. The auriferous quartz-carbonate-sulphide and carbonate-quartz-sulphide veins occur throughout the deposit and have a consistent dip of 305° and dip of 35° to the southwest. McInnes *et al* describe the gold-bearing veins as generally being associated with one of two alteration styles: ankerite-quartz-pyrite-sphalerite-chalcopyrite-galena veins, which are associated with ankerite-quartz-sericite-carbonate alteration; and quartz, potassium feldspar, pyrite, sphalerite, and chalcopyrite veins associated with the chlorite-carbonate-pyrite alteration. Oxide blankets occur at the base of tertiary transported lacustrine cover, saprolite-saprock transition and at the base of oxidation (*pers. comm*, McInnes, Freer (2007)). These flat lying blankets can be up to several hundred metres wide and 1m to 15m thick and are interpreted to have formed as a result of remobilisation of gold during weathering processes in association with water table fluctuations.

3.20.2.1 Control Strategies

Based on prior test work there is no indication that the E42 Deposit or the process tailings are acid forming (Environmental Geochemistry International Pty Ltd [EGi], 2004; and Geo-Environmental Management [GEM], 2009). Overall, the EGi (2004) results indicated a very low likelihood of ARD generation from waste rock, CIL tailings and combined primary tailings represented by the samples included in the testing programs. Therefore, no special handling requirements were indicated for ARD control at the CGM. However, operational monitoring and testing was recommended to be carried out on an occasional and as needed basis to confirm the low ARD potential of all waste types with particular focus on any unexpected rock types or alteration types which may be exposed during mining.

Final cover material will be of low salinity to avoid the potential for saline runoff and enable satisfactory vegetation growth. It will comprise of a layer of non-saline or low salinity subsoil, covering the waste rock or process tailings, which will then be covered with the layer of low salinity topsoil.

Detailed geochemical investigations were conducted by EGi prior to commencing mining operations at the CGM. Subsequent geochemical investigations were also conducted by EGi in 2004 and by O'Kane Consultants Pty Ltd (O'Kane) in 2008. A Tailings and Waste Rock Geochemical Assessment was also conducted as part of the E42 Modification by Geo-Environmental Management Pty Limited (2009).

Chemical groundwater data will continue to be collected as part of the groundwater monitoring programme detailed in the SGWMBMP. Leachate water quality monitoring will continue to be undertaken at the NWE, SWE and PWE external toe drain points in accordance with the EPL.

As recommended by EGi in 2004, operational monitoring and testing will be carried out on an occasional and as-needed basis to confirm the low ARD potential of all waste types with particular focus on any unexpected rock types or alteration types that may be exposed during mining.

3.20.2.2 Effectiveness of Control Strategies

The current control strategies implemented during the reporting period are considered to remain adequate.

3.20.2.3 Variations from Proposed Control Strategies

There have been no variations from the proposed control strategies.

3.20.3 Environmental Performance

The results of detailed geochemical investigations of waste rock and tailings were reported in the EIS. The more recent drilling and metallurgical testing carried out by Barrick provided the opportunity to update the geochemical database for the project and to verify the findings of previous studies by EGi (2004).

As stated above, Barrick commissioned O'Kane in late 2007 to conduct repeat test work of the Waste (rock) Emplacement and the contents of actual TSFs. O'Kane representatives visited site to obtain samples in January 2008. A report was delivered in June 2008 (O'Kane, 2008) and was provided to the DTIRIS (Minerals). O'Kane (2008) concluded that the results are generally consistent with previous investigations, which predicated that waste rock would be predominantly non-acid forming. GEM (2009) also verified these findings.

Due to the continued severe drought conditions there has been no seepage from the waste (rock) emplacement areas.

3.20.4 Reportable Incidents

There were no reportable incidents relating to waste geochemistry during the reporting period.

3.20.5 Further Improvements

Chemical groundwater data will continue to be collected as part of the groundwater monitoring programme detailed in the SGWMBMP. Leachate water quality monitoring will continue to be undertaken at the northern, southern and PWE external toe drain points in accordance with the EPL if and when any seepage is detected.

As recommended during repeat external reviews (2004-2009), operational monitoring and testing will be carried out on an occasional and as-needed basis to confirm the low ARD potential of all waste types with particular focus on any unexpected rock types or alteration types that may be exposed during mining.

The waste rock-topsoil cross-rip methodology has been implemented on the 2nd Lift of the NTSF, at NWE and SWE trials and in part on the initial lift outer slopes of the STSF and NTSF. These areas have exhibited early signs of improved reclamation performance (DnA Environmental, 2010), which is a good outcome for salinity control on final slopes.

3.21 PUBLIC SAFETY

3.21.1 Reporting Requirements

The following control strategies have been implemented to ensure public safety is achieved on-site:

- general site induction programme (relevant to all personnel entering Barrick-owned land);
- specific area inductions (relevant to mining, processing and geology);
- visitors induction programme;
- all Barrick employees, contractors and visitors are issued with card access identification;
- appropriate Barrick employees including contractors have undertaken a First-Aid training course;
- the perimeter of ML 1535 is fenced restricting access to site (in accordance with Development Consent Condition 2.3);
- there is 24 hour security coverage at the Main Gate (including security cameras vision around the site);
- regular security patrols are performed of the external perimeter;
- off-site locations (e.g. borefields) are securely fenced;
- contained on-site is a Emergency Response Office equipped with a fully functional First-Aid room and a commissioned site based First Aid vehicle;
- in accordance with the BMP a fire break has been placed along the perimeter of ML 1535 and other structures of importance;
- the ERT was assembled and have been trained in fire fighting, First-Aid response, vehicle trauma, HAZMAT, rope rescue and basic bushfire fighting; and
- cyanide awareness sessions have been held for local Emergency Services groups and community groups.

Barrick has conducted quarterly meetings with the CEMCC open to the media and public on one occasion during the reporting period. The CEMCC session open to the public was particularly focused on emergency preparedness and general management of cyanide. Local Emergency Services personnel attended and contributed to the open discussion.

3.21.1.1 Effectiveness of Control Strategies

The control strategies implemented during the reporting period are considered to be effective.

3.21.1.2 Variations from Proposed Control Strategies

There were no variations from the proposed control strategies.

3.21.2 Environmental Performance

There were no reportable incidents relating to public safety during the reporting period (see Section 3.21.3 below). Therefore it is considered that the control strategies implemented above have been performing adequately to ensure public safety within ML 1535 and immediate surrounds.

3.21.3 Reportable Incidents

There were no reportable incidents relating to public safety during the reporting period.

3.21.4 Further Improvements

The ERT will continue to be trained in public safety preventative measures including fire fighting, First-Aid response, vehicle trauma, HAZMAT, rope rescue and basic bushfire fighting. The ERT will attend joint training sessions with the RFS, SES, St John Ambulance, Hospital and NSW Fire and Rescue.

3.22 NATURAL HERITAGE

Lake Cowal, a portion of which is located within ML 1535, is listed on the Register of the National Estate. The Lake is protected by CGM approvals and relevant EMPs. A summary of the landscape values in the CGM area and management initiatives is provided below.

The general landscape of the CGM mining operations area is flat to very gently undulating land with occasional hills such as Wamboyne Mountain. The region supports mainly dryland agriculture with irrigation farming practised in the Jemalong/Wyldes Plains to the north-east of the Lake.

Landuse surrounding the mine site is dominated by sheep and cattle grazing and grain cropping. Grazing and occasional cropping within the high water mark of the Lake occurs when moisture and market conditions are suitable. Irrigation farming is practised to the north-east of the Lake in the Jemalong-Wyldes Plains Irrigation District.

The game reserve previously located in ML 1535 was previously relocated to an area outside of ML 1535. The travelling stock reserve was also previously relocated around the western and parts of the southern and northern boundaries of ML 1535.

The management of grazing and cropping associated with the mine potentially allows native plant communities to recover from 150 years of agricultural pressure. This is expected to provide enhanced terrestrial and wetland habitat opportunities for threatened herb and grass species for which grazing is a dominant threatening process, as well as fauna species. The enhancement initiatives associated within the mine include a Remnant Vegetation Enhancement Programme, a Compensatory Wetland and the enhancement of remaining areas of wetland within ML 1535 (excluding the New Lake Foreshore). These enhancement initiatives are documented in the LMP, CWMP and ROMP. Two offset areas have also been designated on land owned by Barrick to the north and south of the CGM. In accordance with Development Consent Condition 3.6(a), the offset areas include offset enhancement areas and an offset revegetation area. A description of the offset areas and offset strategy is provided in Section 3.7.

After decommissioning of the CGM, the modified Lake foreshore, waste rock emplacements and tailings storages are predicted to expand habitat opportunities for wetland and terrestrial flora and fauna species. The rehabilitation programme will include the revegetation of the new landforms with selected communities of native vegetation that are suitable to both the physiographic and hydrological features of each landform, whilst expanding the areas of remnant native vegetation that currently exist in the region and providing habitat opportunities for flora and fauna.

Following decommissioning of the water pipeline and borefield it is expected that landuse of these areas will revert to the previous agricultural/rural landuses.

4 COMMUNITY RELATIONS

Barrick recognise developing and maintaining a positive relationship with the local community is essential to running a successful mining operation. Barrick have developed a “Community Relations Strategy” designed to support the Barrick Community Relations vision of:

“Working together with local communities for mutual long-term success”.

In addition to the strategy Barrick have developed a “Corporate Social Responsibility Charter”. The Charter states that at Barrick, we are committed to making a positive difference in the communities in which we live and work. Barrick strive to earn the trust of all with whom we interact, whether they be our employees, the community, Government or other stakeholders. The Charter guides Barrick in its conduct of business around the world.

4.1 COMMUNITY COMPLAINTS

A community complaints line was established on 9 December 2003 and operates 24 hours per day. Complaints and/or concerns can be made by dialling (02) 6975 3454 where an operator advises the caller that they have reached the CGM Complaints Line. This number is listed in the local Telstra Directory (2008-2010), West Wyalong Visitors Directory, Forbes Visitors Directory and the Condobolin Business Directory. The operator requests the caller’s name, the nature of their complaint/concern, and a return phone number. The information is logged along with the date and time that the call was made. A record of each call is immediately forwarded to the Barrick CGM Community Relations department via the CGPComplaints@barrick.com email. For immediate notification of complaints logged outside of regular business hours, the Community Relations Manager receives a copy to his mobile phone. Upon receiving an enquiry the Community Relations Manager conducts necessary investigations and prepares a response. The caller is contacted within 24 hours of the complaint, and notified of any action taken or proposed by Barrick.

A summary of the community complaints received during the reporting period (as required by the Development Consent) is provided in Table 36.

Table 36
Summary of Community Complaints during the Reporting Period

DETAILS	Resident of West Wyalong, West Wyalong.
COMPLAINT / CONCERN	Local resident – called the Telstra operator about loud music from a Barrick employee house in early hours of the evening. Declined to leave contact details. Cowal HR Manager contacted tenant’s to rectify the issue.
DATE	28 April 2010 12:47hrs (missed mobile call detail to complaints mobile)
OUTCOME	Discussions and assurances between Environmental Manager (EM) and caller and with local Police Sgt. Cowal HR Manager discussion with employee.
DATE OF RESPONSE	28 April 2010 18:07hrs (first voice message left for caller by EM). 29 April 2010 11:55hrs (phone message left for caller was returned). 29 April 2010 12:10hrs contact with WWy Police Sgt at Station. 29 April 2010 14:20hrs EM saw HRM place message at house door for employee to make prompt contact. 30 April 2010 15:00hrs EM assured caller that matter was closed.

Table 36 (continued)
Summary of Community Complaints during the Reporting Period

DETAILS	Resident of Lake Cowal, West Wyalong.
COMPLAINT / CONCERN	Adjacent local resident – called the Cowal Community Relations Manager to report two vehicles using Clear Ridge Road to access the mine and not driving to conditions.
DATE	03 May 2010 (call to Community Relations Manager direct)
OUTCOME	Discussions and assurances between employee and Cowal direct Supervisor about driving to conditions and not using the road to access site. Second driver not specifically found, however, the relevant contractor company who owned the ute was involved in formal discussion and resolution.
DATE OF RESPONSE	After internal investigation and discussions, the Cowal Community Relations Manager contacted the neighbour with feedback on the two concerned road use road use vehicles within 48 hours.
DETAILS	Resident of east Lake Cowal, West Wyalong.
COMPLAINT / CONCERN	Adjacent local resident – called the Cowal Environmental Manager to report night noise concerns (5, 6, 8, 9, 10, 12 September 2010), and comment on the blast of the 10 September 2010 that 'shook' the house.
DATE	13 September 2010 09:10hrs (call to Environmental Manager direct)
OUTCOME	<p>The Cowal Environmental Manager asked the caller to also lodge a call with the Telstra 24 hour Call line whilst commencing internal inquiries. TELSTRA Operator, "EXCESSIVE NOISE AND EXPLOSIONS".</p> <p>Same morning, independent review of the Cowal Blast Hub data by The Saros Group, Brisbane for the 12:55hrs blast on the 10th September 2010 determined that:</p> <p><i>"As both reports show there was no ground vibration picked up for the blast. There doesn't appear to be any overpressure monitored that could be attributed to the blast (Vibration & OP 2010-09-10 12 to 1.pdf), the peak being 112 dB(L) but there appears to be a low at around 12:30."</i></p> <p>Environmental Manager contacted the DECCW, Griffith at 11:10hrs and advised the Officer of the data inquiry checks, and the intended feedback process.</p> <p>Regarding the landholder stated noisy nights, the Cowal EPL11912 Heggies 6-monthly (January 2010 and July 2010), and as a prudent response to the landholder's concern, an additional month of ambient monitoring by Heggies until 20 August 2010, since received, have failed to find any noise near or above threshold concern at that location.</p>
DATE OF RESPONSE	<p>After internal investigation and discussions, the Cowal Environmental Manager contacted the neighbour at 13:10hrs same day with feedback and handed over reports after discussion at the front veranda of the residence for both concerns the following afternoon.</p> <p>The Environmental Manager and Community Relations Manager have since visited both together (on 27th October 2010 for a discussion to view the increasing Lake Cowal water level, and watch and listen to a Pit blast), and visit separately before and since.</p> <p>The Community Relations Manager is working with the neighbouring landholder couple towards an agreeable noise mitigation outcome by conventional and practical architectural control methodology.</p>

Table 36 (continued)
Summary of Community Complaints during the Reporting Period

DETAILS	Resident of Lake Cowal, West Wyalong.
COMPLAINT / CONCERN	Adjacent local resident – called the Telstra Cowal line regarding concerns about potential vehicle and harvest truck road use near misses around Bogies Island in coming weeks (this was just before the Lachlan Shire Council closed the Bogies Island road to all traffic after heavy, ongoing flooding of the Nerrang-Cowel Lake floor portion).
DATE	20 September 2010 08:34hrs (direct call to Telstra 24hr service)
OUTCOME	The Environmental Manager contacted the caller in the absence of the Community Relations Manager. The caller's concerns were noted, and the Community Relations Manager return called about a week after to discuss specific concerns. The caller was referred to local Shire Council to discuss his concerns with road condition and ongoing maintenance.
DATE OF RESPONSE	20 September 2010 10:07hrs by Environmental Manager.
DETAILS	Resident of east Lake Cowal, West Wyalong.
COMPLAINT / CONCERN	Adjacent local resident – called the Cowal Telstra 24hr service line to report mine noise concerns.
DATE	23 October 2010 08:36hrs (Environmental Manager forwarded and discussed mobile text duplicate with Community Relations Manager)
OUTCOME	The Cowal Community Relations Manager called the caller back 09:00hrs Saturday 23 October 2010 and arranged a meeting with the landowner couple at their residence on Wednesday 27 October 2010.
DATE OF RESPONSE	23 October 2010 09:00hrs by Community Relations Manager.
DETAILS	Resident of east Lake Cowal, West Wyalong.
COMPLAINT / CONCERN	Resident wrote a letter of dissatisfaction to the Cowal Community Relations Manager about two Mine Buses allegedly running his travelling mob of sheep off of the Burcher-Forbes gravel road into standing water.
DATE	13th December 2010
OUTCOME	Community Relations Manager contacted resident to discuss the incident. The matter was discussed in detail. The Community Relations Manager sent a formal written response to the resident regarding the incident.
DATE OF RESPONSE	30th December 2010

4.2 COMMUNITY LIAISON

Community Environmental Monitoring and Consultative Committee

Barrick established a CEMCC prior to commencement of construction works, in accordance with the Development Consent Condition 8.7(i). The CEMCC monitors compliance with conditions of the Development Consent and other matters relevant to the operation of the mine.

During the reporting period, Barrick conducted quarterly meetings with the CEMCC in West Wyalong, Condobolin and at the Barrick CGM. Invited guests were present at the December 2010 meeting.

The CEMCC quarterly meetings during the reporting period occurred on 3rd March 2010, 9th June 2010, 1st September 2010 and 1st December 2010. The CEMCC meets on-site or in local communities, undertakes regular inspections, reviews environmental and audit reports and discusses any incidents or complaints that may

have been registered. The CEMCC members are an active conduit between local communities and the CGM. Minutes are taken from each meeting and published in the local library and also on BSC and Lachlan Shire Council websites (see Appendix C).

During the reporting period it was suggested that Barrick provide presentations on particular topics of interest to the committee members. During the reporting period information was provided on the below topics:

- Water use;
- Energy Management;
- Sodium Metabisulphate: and
- Cyanide use.

The CEMCC had previously agreed to commence a quarterly article in the local newspapers of West Wyalong, Forbes and Condobolin to inform the public that CEMCC meetings are taking place with the first article published in January 2007. These articles continue to introduce the individual CEMCC members and their views of the committee's purpose and performance.

Community Information Newsletters

The "Cowal Update" is the CGM external newsletter that was released regularly during the construction and start up phase of the project (2003 to August 2006). A publication of the Cowal Update was released in July 2010 to all households in the Bland, Lachlan and Forbes Shires. It is scheduled that the Cowal Update will be published every six months with the next edition due in January 2011.

Other Community Involvement

Barrick extended invitations to numerous community groups to visit the CGM for presentations and site visits. Site visits were undertaken by a number of groups during the reporting period including:

- Bland, Forbes and Lachlan Shire Councils;
- Wiradjuri Condobolin Corporation ;
- local farmers;
- various community and charity groups from neighbouring towns and villages;
- various primary and secondary schools;
- employee family visits: and
- community visit day for community members of Bland, Forbes & Lachlan Shires

Community and Family visit days are conducted annually with up to 600 people in attendance over the two days. In addition, on average one community/school group visits the CGM once a month with an average of approximately 40 people in attendance. Stakeholder meetings are carried out on-site or in the local community depending upon the group and topic. These meetings can consist of 3 to 12 people, for example:

- CEMCC meetings (which are held quarterly – 8 to 10 persons in attendance);
- Business West Wyalong Committee and local community and charitable groups: and
- Local Government and State agency meetings.

Barrick also attended several off-site presentations involving the community including:

- local community and charitable groups;
- Wiradjuri Condobolin Corporation
- Lachlan, Bland and Forbes Shire Councils; and
- local secondary schools.

Barrick is involved with numerous committees and organisations such as the:

- Bland Catchment Management Committee;
- Lachlan Catchment Management Authority;
- Business West Wyalong;
- Lake Cowal Conservation Centre;
- Lake Cowal Foundation;
- NSW Minerals Council Social, Economic & Community working group;
- West Wyalong Community Education Fund;
- Events West Wyalong;
- NSW Minerals Council Royalties for Regions working group: and
- State Water – Lachlan Catchment Service Committee

Wiradjuri Liaison

Barrick works with the Wiradjuri Condobolin Community through the Wiradjuri Condobolin Corporation (WCC) and a number of formal committees:

- the Cowal Project Coordinating Committee (CPCC); and
- the Employment, Training and Business Committee (ETBC), which meets with the Wiradjuri Condobolin Corporation on a regular basis.

Barrick has committed to provide employment opportunities for Wiradjuri people on-site and at the end of the reporting period had a total of 18 Wiradjuri people employed onsite, 13 direct Barrick employees and 5 employed through a labour hire company. The Wiradjuri Traineeship Program was implemented in early 2010 with the introduction of a Business Administration Traineeship and a Store Warehousing Traineeship, both traineeships were successfully filled.

WCC was awarded the offices and facilities cleaning contract in February 2007, which is a further 12 employees. WCC were also successful in tendering for the CGM's freight and logistics contract in 2009.

During the reporting period the Wiradjuri Condobolin Cultural Heritage Company (WCCHC) has provided archaeological monitoring services on-site. Monitoring has been carried out on an as needs bases and commenced prior to construction.

Barrick employees and contractors continued to attend Cultural Heritage Inductions presented by the Wiradjuri Condobolin Cultural Heritage Company during the reporting period.

Through the ETBC, Barrick and the WCC have continued to award Scholarships to Wiradjuri students moving into University studies. Since the Scholarship program commenced in 2004 a total of 21 scholarships have been awarded. During the reporting period 5 Wiradjuri scholarships were awarded.

In addition to Wiradjuri support, Barrick continues to support students in the Bland, Lachlan and Forbes Shires and offers the "Endeavour" Scholarship program. In 2010 Barrick awarded eight scholarships for a total of \$15,000. In addition five students were awarded one-off merit awards for a total of \$2,000. During the reporting period, Barrick was supporting 46 Endeavour Scholarship recipients with a total financial investment of \$75,000. To date Barrick have provided a total of 96 scholarships.

In addition to providing financial support Barrick supported five "Endeavour" Scholarship recipients with between six and 12 weeks paid vacation placement. This work experience is awarded to students undertaking studies directly aligned to the Mining industry. During 2010 all five students undertook vacation work experience at the CGM and gained experiences that will assist them with their studies.

Barrick Donations

Barrick has continued to support numerous donation, sponsorships and partnerships to a variety of local schools, annual events, charity and not for profit groups, community infrastructure and town advancement groups. Barrick again made substantial contributions to the community during this reporting period.

Barrick operates two schemes to facilitate financial contributions to the community. The Cowal Partnering Program (CPP) and the Barrick Buddies (BB) Program, both programs were established in 2006 and both programs will continue to operate during the next reporting period.

The Barrick Buddies Program offers \$250 to successful employee volunteers, completing 25 or more hours of service to a charity, sporting or community group per annum. The employee presents the funds to their nominated group. The Barrick Buddies Program promotes community involvement amongst the work force.

The CPP was reviewed during the reporting period with changes made to ensure it aligned with the Barrick Gold Community Relations Strategy and sustainable development principals. The revised program was officially launched in West Wyalong, Forbes and Condobolin with the support of the three local shires during the reporting period.

The CPP allocated \$\$131,893.00 of funds to approved applications during 2010.

The Lake Cowal Foundation Limited

The Lake Cowal Foundation (LCF) continues to grow into an important local independent “Environmental Trust”. The Foundation is actively supported financially and in-kind by the CGM. The LCF Board meet as required, some meetings are held via teleconference.

In addition to housing the Lake Cowal Conservation Centre (LCCC) on Barrick owned property ‘Hillgrove’, Barrick has also provided the LCF with considerable freehold property to undertake conservation and research projects.

The LCF has now been involved in approximately 32 conservation projects in the Lake Cowal region and has developed a relationship with 34 project partners, including:

- numerous local land owners and managers;
- Lachlan Catchment Management Authority;
- OEH, National Landcare Program, Natural Heritage Trust, Environmental Trust, Greening Australia and DPI (Fisheries);
- Forbes, Lachlan, Weddin, Temora and Bland Shire Councils, and Condobolin, Forbes and Young Pastures Protection Boards;
- Charles Sturt University, CSIRO, Western Research Institute, Western Institute of TAFE and West Wyalong High School; and
- numerous local bodies such as the West Wyalong Anglers and Gardening Clubs.

Some of the projects that the LCF have completed or are involved in include:

- the restocking of Bland and Sandy Creeks with native fingerlings;
- Lake Cowal and Bland Creek revegetation projects;
- Bland Creek Catchment Incentives Grants Project that has combined contributions of approximately \$5 million;
- a Natural Sequence Farming project which aims to reconnect the hydrologic function of the ten kilometre Spring Creek with its floodplain;
- collaborative research with CSIRO Plant Industry into native grassland population dynamics;
- Pasture Re-establishment Trials and Pasture Cropping Trials;
- the Lake Cowal Conservation Centre; and
- seed collection, assessment of remnant vegetation and establishment of a herbarium.

The LCF continues to be an important organisation with conservation, pastoral, community, government, educational and mining groups working collaboratively together to achieve considerable outcomes for the Lake Cowal region.

5 REHABILITATION REPORT

5.1 BUILDINGS

No buildings were renovated or removed from ML 1535 during the reporting period.

5.2 REHABILITATION OF DISTURBED LAND

All disturbed areas/structures had temporary erosion and sediment control measures implemented during construction in accordance with the EIS and ESCP. Control measures included temporary sediment traps, sediment filters, diversion banks and silt fences. Further detail of erosion and sediment control measures for these areas/structures is presented in the ESCP.

A total of 22 ha were prepared for rehabilitation works during the 2008 reporting period (Figure 4) on the southern portion of the SWE and on the STSF. A large trial plot portion of this area was established in this area by the end of September 2009 to conduct trial work consistent with the on-site learnings from the inside east pit wall trials. Of the 100 tube stock trees planted across the topsoil plots in December 2010 there has been no survival. Direct seeding will be trialled in August 2011 after any significant rainfall (dry winter).

The 8ha of the outer slopes of the 2nd Lift of the NTSF was rehabilitated using the rock-topsoil method during 2009. North and south side trial plots were constructed on the lower slopes of the NTSF by the end of September 2009 in response to comments from the IMP. Independent evaluation of the outcomes of NTSF and SWE trial plot treatment covers for waste rock was ongoing in March 2010 (DnA Environmental, 2010).

There were no variations in activities undertaken from those proposed in the 18 March 2010 approved amended MOP (2009 - 2010). The rock-topsoil cross-rip rehabilitation method used in the 2nd Lift of NTSF was applied to the northern slopes of the western extension to NWE after agreement to extend the trial was received from DTIRIS (Minerals) on 6 January 2010. About 2 ha had been treated and a further 6 ha was in progress by the end of the reporting period. Wet weather and machinery availability delays have restricted the area repair rate since late-2009. Substantial re-shaping works were required adjacent Pond D1 which delayed progress by several weeks.

Table 37 provides details of the nature of disturbance, area and rehabilitation status for areas that have been disturbed before and during the reporting period.

Table 37
Nature of Disturbance and Rehabilitation Status of Disturbed Land at the end of the Reporting Period

Disturbed Area	Nature of Disturbance				Area (ha) (approximate)	Rehabilitation Status
	Vegetation Cleared	Topsoil and Subsoil Stripped	Earthworks	Construction Works Status*		
NTSF						
• Floor	✓	✓	✓	Complete	168	Not yet rehabilitated
• Starter embankment	✓	✓	✓	Complete	15	Shaped and covered
• Upstream lift	✓	✓	✓	Commenced	12	Rock-topsoil 2009
STSF						
• Floor	✓	✓	✓	Complete	156	Not yet rehabilitated
• Starter embankment	✓	✓	✓	Complete	15	Shaped and covered
• Downstream lift	✓	✓	✓	Complete	24	Some sections shaped and covered
Open Pit	✓	✓	✓	Commenced	107	Not yet rehabilitated
PWE	✓	✓	✓	Commenced	60	Southern section shaped and covered
NWE (excluding outer batters)	✓	✓	✓	Commenced	230	Not yet rehabilitated
SWE (excluding outer batters)	✓	✓	✓	Commenced	140	Southern section shaped
NWE and SWE outer batters	✓	✓	✓	Commenced	20	Some sections shaped and covered
Ore Stockpiles	✓	✓	✓	Commenced	58	Not yet rehabilitated
Tailings service corridor	✓	✓	✓	Complete	5	Not yet rehabilitated
Soil stockpiles	✓	✓	✓	Commenced	125	Not yet rehabilitated
Processing plant (including contained water storages D5 and D6)	✓	✓	✓	Complete	20	Not yet rehabilitated

* Construction works status refers to earthworks, excavations and/or emplacement of material.

Table 37 (Continued)
Nature of Disturbance and Rehabilitation Status of Land under Rehabilitation at the end of the Reporting Period

Disturbed Area	Nature of Disturbance				Area (ha) (approximately)	Rehabilitation Status
	Vegetation Cleared	Topsoil and Subsoil Stripped	Earthworks	Construction Works Status*		
Mining Hardstand (including workshop and fuel farm)	✓	✓	✓	Complete	8	Not yet rehabilitated
Internal mine access road	✓	✓	✓	Complete	8	Not yet rehabilitated
Contained water storages D1 and D4	✓	✓	✓	Complete	5	Not yet rehabilitated
Contained water storages D2, D3, D8A and D8B	✓	✓	✓	Complete	11	Not yet rehabilitated
Contained Water Storage D9	✓	✓	✓	Complete	13	Not yet rehabilitated
Stilling basin and outfall	✓	✓	✓	Complete	1	Not yet rehabilitated
Temporary tank and holding pond for bore field water	✓	✓	✓	Complete	<1	Not yet rehabilitated
Mine dewatering bores	✓	N/A	✓	Complete	<1	Not yet rehabilitated
Minor internal roads and haul roads	✓	✓	✓	Commenced	40	Not yet rehabilitated
Temporary laydown areas	✓	✓	✓	Complete	1	Not yet rehabilitated
Exploration Geology office	✓	✓	✓	Complete	1	Not yet rehabilitated
Administration office	✓	✓	✓	Complete	1	Not yet rehabilitated
Temporary administration office	✓	✓	✓	Complete	1	Not yet rehabilitated
Borrow pit within NWE	✓	✓	✓	Complete	10	Not yet rehabilitated
ML 1535 perimeter fence	✓	N/A	✓	Complete	<1	Not yet rehabilitated
Magazine compound	✓	✓	✓	Complete	2	Not yet rehabilitated

N/A: Not applicable

* Construction works status refers to earthworks, excavations and/or emplacement of material.

Table 37 (Continued)
Nature of Disturbance and Rehabilitation Status of Land under Rehabilitation at the end of the Reporting Period

Disturbed Area	Nature of Disturbance				Area (ha) (approximately)	Rehabilitation Status
	Vegetation Cleared	Topsoil and Subsoil Stripped	Earthworks	Construction Works Status*		
Temporary isolation bund	✓	✓	✓	Complete	10	Shaped and covered
Lake protection bund	✓	✓	✓	Complete	10	Shaped and covered
Up-catchment diversion system	✓	✓	✓	Complete	2	Rehabilitated and under maintenance
Internal catchment drainage system (permanent catchment divide)	✓	✓	✓	Complete	2	Rehabilitated and under maintenance
BCPC water supply pipeline	✓	✓	✓	Complete	2	Not yet rehabilitated
Saline groundwater supply borefield and associated pipeline	N/A	✓	✓	Commenced	10	Not yet rehabilitated
Boart Longyear office	✓	✓	✓	Complete	1	Not yet rehabilitated
Bioremediation area	✓	✓	✓	Complete	1	Not yet rehabilitated
Waste management yard	✓	✓	✓	Complete	1	Not yet rehabilitated
TSF construction compound	✓	✓	✓	Complete	1	Not yet rehabilitated

N/A: Not applicable

* Construction works status refers to earthworks, excavations and/or emplacement of material.

Rehabilitation works were carried out in the following areas during the reporting period:

- PWE - re-shaped in north-eastern section;
- NWE – North Wall (trial on north-eastern side);
- SWE – South Wall (trial plots);
- Temporary and Lake Protection Bund - road and weed maintenance;
- STSF – Walls (various trials); and
- NTSF – Walls (various trials and new method on 2nd Lift).

Perimeter Waste Emplacement

The PWE will be constructed to approximately RL 223 m and will surround the pit to the north, east and south (Figure 4). The emplacement will occupy an area of approximately 60 ha. It will form part of the series of embankments (i.e. Temporary Isolation Bund and Lake Protection Bund) between the open pit and Lake Cowal. The emplacement elevation has been designed to reduce potential noise and light impacts of mining and processing on the surrounding environment.

As per the January 2009 Modification, the PWE bund wall to the north-east of the open pit was reduced in height to maintain geotechnical performance during vertical advancement of the pit floor. This cut reshaped the inside eastern pit wall from June 2009 and removed the northern half of the earlier rehabilitation trial plots occurred mid-March 2010.

Physical and Chemical Characteristics of Emplaced Material Relevant to Rehabilitation

Material within the perimeter waste rock emplacement will consist primarily of oxide waste rock. Oxide waste rock will be typically saline and non-acid forming silty clayey rock fill. This material will break down following track rolling/compaction and will most likely form a material of medium to low permeability.

Method of Land Shaping

The perimeter waste rock emplacement will be constructed in approximately 5 m to 10 m lifts with land shaping and rehabilitation works to be undertaken progressively during run-of-mine operations.

Characteristics of Cover Material

The cover material will be of low salinity to avoid the potential for saline runoff and enable satisfactory vegetation growth. It will comprise of a layer of non-saline or low salinity subsoil, covering the waste rock, which will then be covered with the layer of low salinity topsoil. The future need for the subsoil is questionable with the rock-topsoil method.

Thicknesses of Cover Layers and Methods of Laying and Compaction

Gypsum-treated non-saline or low salinity subsoil will be laid to a depth of approximately 0.5 m over the outer face of the emplacement. Topsoil cover will be approximately 0.25 m deep over the entire emplacement surface. Subsoil will be transported from stockpiles using dump trucks and spread using dozers. Topsoil will be transferred from soil stockpiles or directly from newly stripped areas and be spread using dozers and scrapers.

Drainage and Erosion Control

Batter drainage will be affected by the use of wide reverse-graded berms every 5 m vertical height. The berms will diffusely grade inwards and the surfaces be kept as rough as possible to maximise absorption. This, together with the considerable depth of cover will have the effect of absorbing and storing rainfall in all but extreme events (in which case, runoff will longitudinally fall along the berms to be held for absorption by a series of depressions constructed every 50 m – 100 m in the reverse-grading berms). This minimises the use of artificial drainage structures on the batters. Drainage on the top surfaces of the emplacement will be similarly managed via a series of small shallow basins (depressions) and deep cover of high absorption capacity. The use of depressions is aimed at maximising internal drainage without creating permanent ponding during normal and heavy rainfall events. The reverse-graded berms will be progressively installed as the lifts are constructed.

In-field observations of slope response to heavy rainfall during the 2008 reporting period prompted a review of the risks associated with proposed methods of rehabilitation. At the time of writing, plans were being developed to assess various rehabilitation methods through consultation and large-scale trials.

Final Landform Profile and Slopes

A typical section through the waste rock emplacement is shown on Figure 18. Typical slopes of the perimeter waste rock emplacement will be 1(V):5(H) (Figure 18).

Soil Treatment

Soils to be used in rehabilitation are treated with gypsum where necessary. Gypsum will be spread over the waste rock by tractor spreader before topsoiling as areas become available. It is anticipated that a rate of 10 t/ha will be used. A scientific trial using six different types of mulch was initiated in 2006 with full results forming the basis of a thesis by an ANU honours student during the 2008 reporting period. An ANU PhD student has continued investigations into soil treatment and plant species combinations for optimum rehabilitation during the 2010 reporting period. This work is discussed further in Section 5.4.

Revegetation Species and Methods for Establishment

Top surfaces of the emplacements and outer batters will be revegetated following placement of topsoil with native and introduced grasses. Due to the continuation of drought conditions during the reporting period the planned seeding for the PWE was not conducted. Barrick (Cowal) is still reviewing options for the PWE with continued poor growth during early-2011 moderately wet conditions (dry winter). It is anticipated that the grey Lake soils are not holding water when using the prescribed method. The results of the 2nd Lift of NTSF and the SWE trial plots suggest that no seeding is necessary when using the new rock mulch-topsoil method. As discussed in Section 5.4, early observations of the surface treatments (e.g. rock mulch) trials on the outer batters of the waste rock emplacements are positive (i.e. landforms are stable and vegetation is establishing within the rock mulch) and indicate that this cover treatment is likely to provide for successful rehabilitation of mine landforms at the CGM (Barrick, 2011)

Long-term rehabilitation of the waste rock emplacement will include the progressive re-establishment of woodland communities with the planting/seeding of local native grasses, shrubs and trees.

Extent to which Agreed Rehabilitation Outcomes and Landuse Have Been Met

The proposed progressive rehabilitation of the perimeter waste rock emplacement is in accordance with rehabilitation concepts presented in the EIS. Further rehabilitation of the emplacement will be undertaken to achieve final rehabilitation outcomes and landuse in accordance with the EIS.

Maintenance Activities/Requirements

Visual monitoring of revegetated landforms including the perimeter waste rock emplacement will be conducted to ensure vegetation is establishing and to determine the need for any maintenance and/or contingency measures (such as the requirement for supplementary plantings, erosion control and weed control).

Northern and Southern Waste Rock Emplacements – Outer Batters

The NWE will be constructed to approximately 266 m AHD and will occupy an area of approximately 230 ha northwest of the pit. The SWE will be constructed to approximately 250 m AHD and will occupy an area of approximately 140 ha southwest of the pit (in accordance with the modification of the Development Consent on 10 March 2010).

Physical and Chemical Characteristics of Emplaced Material Relevant to Rehabilitation

Material within the northern and southern waste rock emplacements predominantly consists of primary waste rock and a minor proportion of oxide waste rock.

Method of Land Shaping

The waste rock emplacements will be constructed in lifts with land shaping and rehabilitation works to be undertaken progressively during run-of-mine operations. Land shaping will be carried out by graders and dozers and will involve the construction of drainage and erosion and sediment control features. During the 2008 reporting period, a 22ha portion of the southern wall of the SWE was shaped. During the 2009 reporting period, a series of large trial rehabilitation plots were established to check erosion potentials (Plate 2).

**Plate 2
SWE – Southern Slope Trial Plots**

(Sept 2009)



(July 2011)



No Subsoil										Subsoil													
3 tiered Batter (1:3)					Single continuous slope (1:5)					Single continuous slope (1:5)					3 tiered Batter (1:3)								
R	R+Wc	R,T+Wc	R+T	T	C	R	R+Wc	R,T+Wc	R+T	T	C	R	R+Wc	R,T+Wc	R+T	T	C	R	R+Wc	R,T+Wc	R+T	T	C

The trials were established on the SWE to examine the benefits of rehabilitating slopes with long continuous slopes compared to a three tiered battered slope, with and without different mulching treatments. The layout of the trial is shown above. The trials were constructed in September 2009 as follows using an 8m wide D9 dozer blade as a spacing guide:

- Subsoil (with and without);
- Slope (3 tiered 1:3 battered, single continuous slope);
- Rock mulch (R);
- Rock mulch + woodchips (R+Wc);
- Rock + topsoil + woodchips (R+T+Wc);
- Rock + topsoil (R+T);
- Topsoil (T); and
- Control or No treatment (C).

Characteristics of Cover Material

The cover material will be of low salinity to avoid the potential for saline runoff and enable satisfactory vegetation growth. It will comprise of a layer of non-saline or low salinity subsoil, covering the waste rock, which will then be covered with the layer of low salinity topsoil.

Thicknesses of Cover Layers and Methods of Laying and Compaction

Gypsum-treated non-saline or low salinity subsoil will be laid to a depth of approximately 0.5 m over the outer face of the emplacement. Topsoil cover will be approximately 0.25 m deep over the entire emplacement surface. Subsoil will be transported from stockpiles using dump trucks and spread using dozers. Topsoil will be transferred from soil stockpiles or directly from newly stripped areas and be spread using dozers and scrapers.

Drainage and Erosion Control

Batter drainage will be affected by the use of wide reverse-graded berms every 5 m vertical height. The berms will diffusely grade inwards and the surfaces be kept as rough as possible to maximise absorption. This, together with the considerable depth of cover will have the effect of absorbing and storing rainfall in all but extreme events (in which case, runoff will longitudinally fall along the berms to be held for absorption by a series of depressions constructed every 50 m – 100 m in the reverse-grading berms). This minimises the use of artificial drainage structures on the batters

Final Landform Profile and Slopes

A typical section through the waste rock emplacement is shown on Figure 18. Typical slopes of the waste rock emplacements will be 1(V):5(H) (Figure 18).

Soil Treatment

Soils to be used in rehabilitation will be treated with gypsum by tractor spreading 10 t/ha in the waste rock before topsoiling.

Revegetation Species and Methods for Establishment

Outer batters of the emplacements will be revegetated following placement of topsoil with native and introduced grasses. As discussed in Section 5.4, early observations of the surface treatments (e.g. rock mulch) trials on the outer batters of the waste rock emplacements are positive (i.e. landforms are stable and vegetation is establishing within the rock mulch) and indicate that this cover treatment is likely to provide for successful rehabilitation of mine landforms at the CGM (Barrick, 2011)

Long-term rehabilitation of the waste rock emplacements will include the progressive re-establishment of woodland communities.

Extent to which Agreed Rehabilitation Outcomes and Landuse Have Been Met

The proposed progressive rehabilitation of the waste rock emplacements is in accordance with rehabilitation concepts presented in the EIS. Further rehabilitation of the emplacements will be undertaken to achieve final rehabilitation outcomes and landuse in accordance with the EIS.

Maintenance Activities/Requirements

Visual monitoring of revegetated landforms including the northern and southern waste rock emplacements will be conducted to ensure vegetation is establishing and to determine the need for any maintenance and/or contingency measures (such as the requirement for supplementary plantings, erosion control and weed control).

Temporary Isolation Bund and Lake Protection Bund

The temporary isolation bund was designed to control water inflow to the open pit development area from the lake during construction of the lake protection bund (Figure 4). This structure was designed with a short-term function in mind (construction of the lake protection bund), however, it will remain in service until stability of the PWE is assured. The permanent lake protection bund is a low permeability embankment to prevent water inflow from the lake into the open pit development area over the life of the mine and in the longer term.

Physical and Chemical Characteristics of Emplaced Material Relevant to Rehabilitation

The Honours project (Section 5.4) undertaken during 2006 indicated that the soil was potentially dispersive. Amelioration with gypsum was undertaken in August 2006 at a rate of 5 t/ha tractor spread over the surface area of the Lake Protection Bund.

Method of Land Shaping

The temporary isolation bund was constructed to RL 206.5 m, has a crest length of 3,170 m and reaches a height of 2 m in the centre of the arc. Approximately 180,000 m³ of fill was required for construction. Settlement analysis undertaken by SNC Lavalin (SNC Lavalin, 2004) indicated the subsurface formation is typically well consolidated and any settlement is likely to cease soon after completion of the construction period. Prior to commencement of construction and, in accordance with the EIS, a silt fence was erected to provide the lake protection from any sediment laden runoff. Prior to the placement of fill, the upper approximate 300 mm of topsoil was stripped from the footprint area of the bund and stored for later rehabilitation of the bund. The bund was constructed in short sections with placement and compaction of the fill section in 0.3 m lifts. Following construction of the bund to its final height the structure was shaped and the side slopes were flattened to slopes of 4(H):1(V) on the mine side and 5(H):1(V) on the lake side (Barrick, 2007). Further details on rehabilitation of the structure are provided in Section 4 of the 2009 – 2010 MOP (Barrick, 2010).

The lake protection bund has been constructed to its final height of RL 208.35 m. The structure was built as a two-zone earthfill embankment and meets specific engineering criteria for compaction to ensure that required compaction densities are achieved. The bund has a crest length of 4,200 m and approximately 500,000 m³ of fill was used for construction. Prior to construction, the upper 300 mm of topsoil and loose clay sediment material were stripped and stored for future rehabilitation of the bund. A cut-off section a further 1.7 m deep was constructed as a means of even further reducing the expected minimal seepage under the bund system. Placement and compaction of the fill section was conducted in 0.3 m lifts. Following construction of the bund to its final height, the structure was shaped and the lake side slope flattened to 5(H):1(V) (Barrick, 2010). Further details on rehabilitation of the structure are provided in the 2009 - 2010 MOP (Barrick 2010).

Short-term heavy rain during the reporting period generally leads to degradation and temporary closure of the lake protection bund access road. The bund is repaired and re-sloped throughout the year using graders. The first lift of the LPB outer slope is intended to be rock-topsoil treated during the next reporting period, however, the north-east outer slopes of the NWE will be the priority work area.

Characteristics of Cover Material

The cover material will be of low salinity to avoid the potential for saline runoff and enable satisfactory vegetation growth.

Thicknesses of Cover Layers and Methods of Laying and Compaction

Prior to the placement of fill, the upper approximate 300 mm of topsoil was stripped from the footprint area of the bund and stored for later rehabilitation of the bund.

Drainage and Erosion Control

Incidental rainfall runoff from the LPB outer face is held by the temporary isolation bund.

Final Landform Profile and Slopes

A typical section through the perimeter waste rock emplacement and lake isolation system is shown on Figure 18. Typical slopes of the perimeter waste rock emplacement and lake protection bund will be 1(V):5(H) (Figure 18).

Soil Treatment

Soils used in rehabilitation have been treated with gypsum. Gypsum was tractor spread over the topsoiled surface of the LPB a rate of 5 t/ha.

Revegetation Species and Methods for Establishment

The New Lake Foreshore will continue to be revegetated using native seedlings (propagated on-site or obtained from a supplier) and direct seeding.

Extent to which Agreed Rehabilitation Outcomes and Landuse Have Been Met

During the prior 2years there was no additional revegetation work undertaken on the LPB. The 2010 rains and wet start to 2011 appears to have increased cover marginally, however, the cessation of traffic along the top of the bund by placement of log stocks was the main contributor to growth (G Pearson 2011, *pers. comm.*). The Lake Fill placed water against the TIB from August 2010 and water sat between the TIB and LPB for all of the recent reporting period.

Maintenance Activities/Requirements

Visual monitoring of revegetated landforms including the bunds will continue to be conducted to ensure vegetation is establishing and to determine the need for any maintenance and/or contingency measures (such as the requirement for supplementary plantings, erosion control and weed control). Vegetation monitoring of the new lake foreshore was undertaken during the reporting period.

There were no variations in activities undertaken from those proposed in the MOP.

Northern and Southern Tailings Storage Facility – Starter Embankments and Lifts

The tailings storage facilities are located 3.4 km west of the Lake shoreline. Starter embankments will be progressively raised throughout the mine life with tailings disposal alternating between each facility. The STSF starter embankment was completed and the facility was commissioned in May 2006 for disposal of oxide tailings. The NTSF starter embankment was completed and the dam commissioned in April 2007 for disposal of sulphide tailings. The STSF required a downstream and upstream lift to meet geotechnical design concerns for the oxide layer and was commissioned in mid-2008. The NTSF received a 2nd Lift in 2009 and was commissioned in late-2009. The 3rd augmentation Lift of the STSF was in progress from late-2009 until mid-2010.

The 8 ha of the outer slopes of the 2nd Lift of the NTSF was rehabilitated using the trial waste rock-topsoil cross-rip method during 2009. North and south side trial plots were constructed on the lower slopes of the NTSF by end-September 2009 after written approval was received from the DoP in response to supporting comments from the Lake Cowal IMP. Rock ribbons, woodchips, rock-topsoil, rock mulch and straw rehabilitation trials of outer slopes of the STSF occurred from February to October 2009. Outer slope rehabilitation trials on the initial lift walls of the NTSF during the same period consisted of biosolids, bioremediation solids, straw and rock mulch and rock-topsoil and were completed by October 2009. Monitoring of these trials continued during the reporting period.

Physical and Chemical Characteristics of Emplaced Material Relevant to Rehabilitation

Material used in the construction of the tailings storage facilities starter embankments includes soft oxide waste rock and clays. Results of recent and past geochemical testing indicate that oxide waste rock will be typically saline and non-acid forming silty clayey rock fill. Clays excavated from within the tailings storage footprints are expected to be stable with low permeability and high strength when compacted (North Limited, 1998).

Soils to be used in rehabilitation will be treated with gypsum by tractor spreading 10 t/ha in the waste rock before topsoiling.

Method of Land Shaping

Rehabilitation of the starter embankments of the northern and southern tailings storage facilities will commence following the placement of low salinity subsoil (gypsum-treated if necessary) followed by topsoil over the structural zone. Graders, scrapers and dozers will be used for these activities.

Characteristics of Cover Material

Cover material placed directly over the structural zone of the starter embankment will be low salinity sub-soil (gypsum-treated if necessary). Topsoil stripped during construction of the tailings storage facilities will be used in rehabilitation and will generally have low to very low salinity (URS, 2004).

Thicknesses of Cover Layers and Methods of Laying and Compaction

The progressive rehabilitation of the walls of the NTSF and STSF starter embankments is in accordance with rehabilitation concepts presented in the EIS. The subsoil cover layer of the downstream rehabilitation zone will be spread in layers and compacted to the required density using dozers. Thickness of this layer will vary but will be approximately 0.5 m thick. Topsoil will be spread to a nominal thickness of 250 mm using graders or dozers.

Final Landform Profile and Slopes

The final landform profile for the tailings facility starter embankments is shown in Plate 3 below. Typical slopes of the downstream rehabilitation zone will be 1(V):5(H).

Soil Treatment

Soils to be used in rehabilitation will be treated with gypsum where necessary.

Revegetation Species and Methods for Establishment

The downstream rehabilitation zone will be ripped and seeded. Revegetation species will include native and introduced grasses. As a result of the hay mulching on the northern wall of the NTSF in previous years, germination of annual grass species and groundcover was generally quite good compared to the untreated eastern wall. No additional seeding took place on the NTSF or STSF starter embankments during the reporting period.

As discussed in Section 5.4, early observations of the surface treatments (e.g. rock mulch) trials on the outer batters of the tailings storages are positive (i.e. landforms are stable and vegetation is establishing within the rock mulch) and indicate that this cover treatment is likely to provide for successful rehabilitation of mine landforms at the CGM (Barrick, 2011)

Extent to which Agreed Rehabilitation Outcomes and Landuse Have Been Met

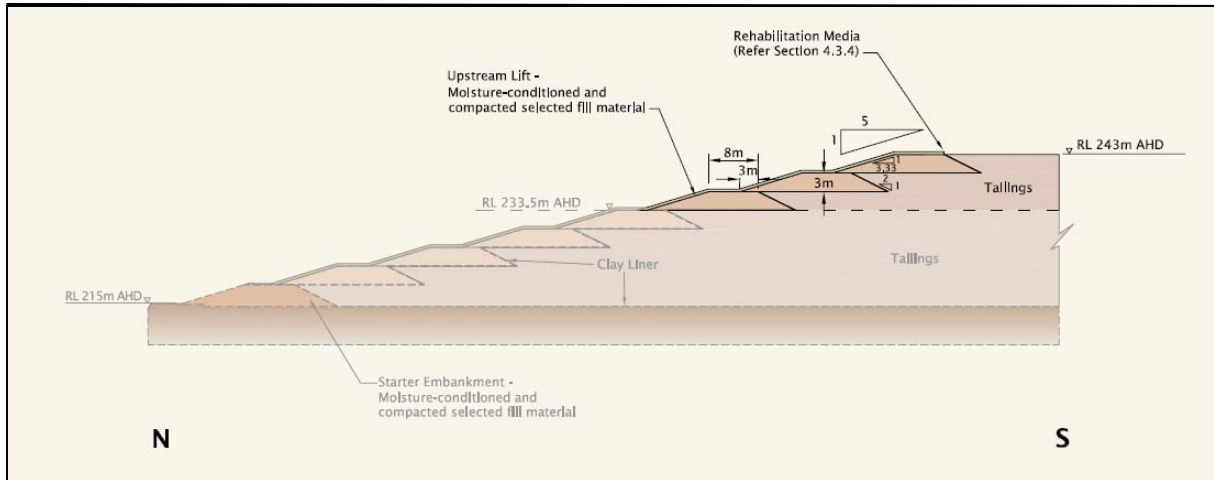
The proposed progressive rehabilitation of the walls of the NTSF and STSF starter embankments is in accordance with rehabilitation concepts presented in the EIS. Further rehabilitation of the emplacement will be undertaken to optimise rehabilitation outcomes and landuse in accordance with the EIS. The short term rehabilitation objectives for the NTSF are to establish good groundcover using native and exotic pasture species. The long-term rehabilitation of the tailings storages will include the re-establishment of woodland communities and will commence following the cessation of tailings deposition.

The existing rehabilitation trials on the tailings storage facilities involving various mulch treatments and native species combinations continued to be monitored during the reporting period in accordance with Recommendations 2 and 3 of the Sixth Annual Report of the IMP. Results from rehabilitation trials established on the tailings storage facilities are detailed in Section 5.4.

Maintenance Activities/Requirements

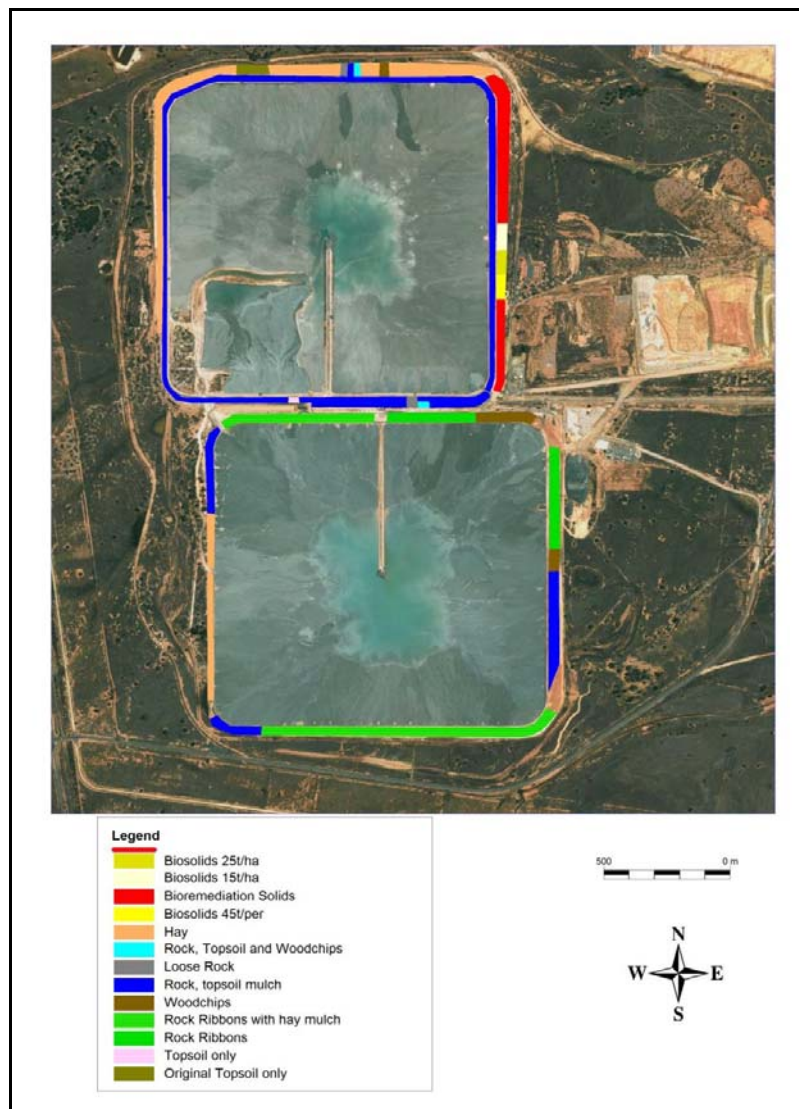
Visual monitoring of revegetated landforms including the NTSF and STSF starter embankments will be conducted to ensure vegetation is establishing and to determine the need for any maintenance and/or contingency measures (such as the requirement for supplementary plantings, erosion control and weed control). A 1 ha area was prepared for a small biosolids trial during the 2009-2010 reporting period. The intent of the trial was to assess the benefit of using biosolids with mulch for rehabilitation works. The trial showed best results for 45 tonnes per hectare application rate reducing to negligible growth at 15 tonnes per hectare. A monoculture of a grass appeared to flourish in this area and therefore biosolids is not being pursued as a rehabilitation tool at this time (G Pearson 2011, *pers. comm.*).

Plate 3
Conceptual Embankment TSF



Not to Scale (CGM MOP 2011-2012 Figure 11).

Plate 4
STSF and NTSF Wall Rehabilitation



Source: DnA Environmental , 2010

Contained Water Storage D9

The D9 water storage facility occupies an area of approximately 13 hectares and has an operational maximum volume of 700 million litres (ML) to 1 metre below the south-west emergency spillway.

Physical and Chemical Characteristics of Emplaced Material Relevant to Rehabilitation

Rehabilitation of the water storage will be undertaken to optimise rehabilitation outcomes and landuse in accordance with the EIS.

Method of Land Shaping

The water storage was constructed as a “turkey’s nest” type of dam with no direct catchment external to its perimeter embankment. The dam has a nominal fill height of 8 metres (m) and a nominal cut depth of approximately 2 m. Freeboard for a 1 in 100 year annual recurrence interval (ARI) 48 hour rainfall event will be maintained in the storage.

Characteristics of Cover Material

The cover material will be of low salinity to avoid the potential for saline runoff and enable satisfactory vegetation growth. It will comprise of a layer of non-saline or low salinity subsoil, covering the waste rock, which will then be covered with the layer of low salinity topsoil.

Thicknesses of Cover Layers and Methods of Laying and Compaction

Topsoil that had been stripped from the footprint of the dam was used to cover the outer batters of the facility with a depth of 250 mm using an excavator.

Drainage and Erosion Control

The outer walls drain to the adjacent stormwater Pond D8B.

Final Landform Profile and Slopes

The outer slopes of Pond D9 were topsoiled and are sloping at about 1 (V): 4 (H).

Soil Treatment

Soils to be used in rehabilitation will be treated with gypsum where necessary.

Revegetation Species and Methods for Establishment

Outer batters of the storage will be revegetated following placement of topsoil with native and introduced grasses.

Extent to which Agreed Rehabilitation Outcomes and Landuse Have Been Met

Pond D9 did not exhibit any useful surface growth on the northern face and much of the western face during the recent decade of drought. The wet start to 2011 resulted in good growth on all faces except the north. Consequently re-ripping and straw mulching of the northern face will occur during the next reporting period. Rehabilitation of the storage will be undertaken to achieve final rehabilitation outcomes and landuse in accordance with the EIS.

Maintenance Activities/Requirements

Visual monitoring of revegetated landforms including Pond D9 will be conducted to ensure vegetation is establishing and to determine the need for any maintenance and/or contingency measures (such as the requirement for supplementary plantings, erosion control and weed control).

Boundary Amenity Plantings

No additional tubestock was planted during the reporting period. Tree guards were removed from established tubestock at the end of 2008.

5.3 OTHER INFRASTRUCTURE

No other rehabilitation activities were conducted during the reporting period further to those described above.

5.4 REHABILITATION TRIALS AND RESEARCH

Barrick has commissioned the following specialists/expert personnel to work with mine and University personnel on the following issues relevant to the rehabilitation/stabilisation of landforms at the CGM:

- Geo-Environmental Management Pty Ltd – review of erosion control and restoration strategies for the Lake Protection Bund, Waste Rock Emplacement and Tailings Storage Facilities. Specifically, the investigation of the geochemical suitability of rock armouring on the outer batters of the mine landforms.
- Landloch – completion of a surface materials assessment and review of rehabilitation strategies and landform design. Specifically, investigation and recommendations regarding erosion control, landform design and the suitability of different treatment materials (e.g. rock mulching).
- Gilbert and Associates – assessment and revision of the rehabilitation and water management concepts, particularly in regard to erosion control and water management on the top surfaces of the mine landforms.
- Australian National University – ongoing trials and research relevant to revegetation and alternative surface treatment measures (e.g. mulch) that will assist in the refinement of revegetation objectives. Additional research into topsoil resources and investigation into optimal topsoil amendment rates (i.e. gypsum treatment) and fertiliser treatments.
- DnA Environmental - design of monitoring methodology and to determine a set of completion criteria that complies with and is consistent with conditions specified with Management Plans and approval documents and relevant NSW legislation, policies and best practice guidelines.

The results of the abovementioned investigations will be used to inform the progressive rehabilitation/stabilisation of mine landforms at the CGM. Other specialists/expert personnel experienced in dealing with the rehabilitation issues relevant to the CGM (e.g. URS Corporation, Principal GSS Environmental and the Lake Cowal Foundation) will continue to be engaged where necessary as rehabilitation progresses.

A detailed description of the monitoring results of the new lake foreshore revegetation trials, tailings storage facility and waste rock emplacement revegetation trials, offset areas monitoring and completion criteria establishment by DnA Environmental is provided below.

Rehabilitation Monitoring Methodology and Determination of Completion Criteria: Ecosystem Sustainability

DnA Environmental was engaged by Barrick to design a monitoring methodology and determine a set of rehabilitation completion criteria for the CGM. The primary objective of the monitoring of rehabilitation areas and trials was to establish an annual rehabilitation monitoring program and develop an set of completion criteria that complies and is consistent with conditions within applicable approval documents and management plans and aligns with the DII-MR (2011) *Rehabilitation and Environmental Management Plan (REMP) Guidelines Consultation Draft V2.0 June 2010*. Monitoring of rehabilitation areas and trials was undertaken by DnA Environmental 11th – 13th October 2010 and 25th – 29th October 2010. Monitoring during spring aims to capture a more accurate representation of species present in the area.

The project aimed to establish a program which used clearly defined, repeatable and consistent methodologies for monitoring changes in various aspects of ecosystem stability, recovery and long-term sustainability. Part of this process includes establishing a range of relevant reference sites to compare and track the progress of rehabilitation areas and ecosystem function, selecting a ranges of suitable reference sites that reflect the desired final land use, biodiversity targets, historical disturbances and local community expectations, and undertaking a monitoring program that provides simple but informative and reliable information that indicates positive recovery trends or rapid detection of rehabilitation failure. The process included:

- Establishing a range of relevant reference sites to compare and track the progress of rehabilitation areas and inherent ecosystem function;
- Selecting a range of suitable reference sites that reflect the desired final land use, biodiversity targets, historical disturbances and local community expectations; and
- Undertaking a monitoring program that provides simple and reliable information that indicates positive recovery trends or rapid detection of rehabilitation failure.

The objective behind the use of reference sites is to set the benchmark for rehabilitation success or to at least provide a target to achieve. To account for variations in ecosystems across the landscape, each vegetation community is best represented in triplicate. In 2010, there was difficulty in selecting three reference sites for each of the four broad vegetation community types. This was largely due to the lack of suitable area of remnant vegetation in the near vicinity of the mine and due to flooding of some the Lake Cowal Environment. Further attempts of establishing a full number of reference sites will be made during 2011.

The broad rehabilitation vegetation communities used within part of this program include those associated with:

- Lake: Woodlands occurring within the lake and lake foreshores (RL 205 – 220m) = 2 sites;
- Slopes: Woodland occurring on flat to gently undulating slopes (RL 210 – 225) = 2 sites;
- Hills: Woodlands occurring on low ridges, hills and elevated land (RL220 – 245m) = 3 sites; and
- Grass: Cleared native grasslands, predominantly occurring on flat to gently undulating slopes (RL 210 – 225m) = 2 sites.

A new approach to rehabilitation and environmental management accountability, including rehabilitation monitoring and completion criteria has recently been drafted and released for consultation by the DITRIS (DnA Environmental, 2011e). Essentially in order to receive closure sign-off of rehabilitation, it will be necessary to demonstrate that selected performance indicators (or criteria) have reached their established completion criteria or that a satisfactory successional trajectory has been established that will result in a self-sustainable ecosystem. The new draft approach has been broken down into five major stages of ecosystem development as demonstrated below, by which a set of performance indicators or criteria will need to be monitored and either be equivalent to or exceed those assessed for the reference sites (DnA Environmental, 2011e):

- Landform establishment;
- Growth medium development;
- Ecosystem establishment;
- Ecosystem development; and
- Ecosystem sustainability.

The monitoring methodology adopted is a standard and simple procedure that can be easily replicated over any vegetation community or revegetation area and importantly results in a system that essentially compares like with like (DnA environmental, 2011e). The methodology used included a combination of Landscape Function Analysis (LFA), accredited soil analyses and various measurements of ecosystem diversity and habitat values (DnA Environmental, 2011e). For a full description of rehabilitation methodology, refer to the DnA Environmental report titled '*Rehabilitation monitoring methodology & determination of completion criteria: Ecosystem sustainability*'.

Numerous areas have already undergone some rehabilitation and will be progressive over the life of the mine. The resultant number of revegetation monitoring sites established during 2010 was ten. Results of the DnA Environmental report '*2010 Cowal Rehabilitation Monitoring Report*' are described below.

New Lake Foreshore Revegetation Trials

Since 2005 there has been a significant increase in ground cover and species diversity due to a combination of the revegetation techniques and from natural regenerations of a variety of native and exotic species. A significant increase was seen in 2010, resulting from above average rainfall creating improved growing conditions. In addition, the above average rainfall has resulted in ponding of water between the permanent lake protection bund and the temporary isolation bund, creating additional aquatic habitat. There was a low cover abundance of native species recorded. However, there was a wide variety of native species recorded, including grasses, and many of them were observed to have set seed, resulting in an overall increasing trend in native species abundance.

There was little establishment of tree and shrub species, probably due to the dispersive nature of local soils with individuals present having increased in size during 2010. Soil surface protection is critical and disturbance can easily occur and impede revegetation if not considered. The site has been progressing and is beginning to

stabilise despite previous low rainfall conditions. A significant improvement was observed in 2010 due to the above average rainfall conditions experienced. The ponded water within the temporary isolation bund has become well established with a variety of aquatic species which have largely colonised from the soil seed bank with Lignum, Native Liquorice and River Red gums growing in scattered locations. There continues however to be active erosion which can be addressed with revegetation of the outer slopes.

Tailings Dam Revegetation Trials

The northern and southern tailings storage facilities have been the focus of additional rehabilitation trials, implemented during 2009. A variety of treatments were setup with a full description provided in the DnA Environmental report from 2011 titled *2010 Cowal Rehabilitation Monitoring Report*. The trial site rock mulch+topsoil (NTSF01) (MAP) appeared to be more stable and functional compared to sites with topsoil+wheaten hay (NTSF02) or rock ribbon+wheaten hay (STSF01) in terms of the Landscape Function Analysis performed and fell within or exceeded the target indices for infiltration and nutrient recycling. Site NTSF01 and STSF01 had slightly better total ground cover values and a higher percent on average of perennial plant cover. Site NTSF02 had the highest native floristic diversity but it also contained some active rilling. It must be noted that most sites were already constructed some time before trial establishment and much of the rilling and erosion was considered to have happened prior to establishment of trials.

All sites had strongly alkaline soils. Electrical conductivity was elevated and organic matter was low in all sites. Phosphorus was low in NTSF02 and STSF01. Where hay application levels were less dense, there was generally good establishment of wheat and other species, including a variety of natives from within the topsoil.

All sites performed relatively well despite not meeting all completion targets. The sites are immature and require time for ecological development to occur.

Southern Offset

Two monitoring sites were established in the southern offset area prior to rehabilitation occurring into those areas resembling woodlands occurring on low ridges, hills and elevated land (RL 220 – 245). These communities are dominated by *Eucalyptus dwyeri*, *Acacia doratoxylon*, *Callitris endlicheri* and *E. sideroxylon* on the rockier ridge tops and intergraded with *E. populnea*, *E. microcarpa* and *Callitris glaucophylla* woodlands on the lower parts of the slope. The reference sites that will form the revegetation benchmarks and completion targets were named "RHill01" and "RHill02".

The southern offset area contained a high diversity of ground cover plants but many of these were exotic annual species or colonising plants. With a reduction in disturbance and improved management these sites are likely to show an increased abundance of native perennial species and a reduction in exotics. The sites were demonstrating some successional recovery with the presence of soil surface crusts and in one site there were cryptograms colonising the bare areas (Offset01). The soils were within the local or desirable levels and adverse soil chemistry was apparent from initial results. There was a lack of tree and shrub species as well associated habitat requirements and in this area the monitoring sites fell below the completion targets. Continual rehabilitation of these sites should show an improvement in key performance indicators (KPIs) providing appropriate species and densities are implemented. As the completion criteria have been derived from the adjacent Hill communities, revegetation activities should aim to replicate these community types.

Northern Offset Woodland revegetation

Two monitoring sites (Offset03 and Offset04) were established in the northern offset area prior to rehabilitation. The established sites were chosen to resemble *Acacia pendula* – *Casuarina cristata* woodlands occurring on flat to gently undulating slopes. These sites were compared to reference sites RSlope01 and RSlope02.

The northern offset area was significantly diverse and contained a high diversity of groundcover plants including many exotics, but was dominated by native plants. The sites were showing some successional recovery with the presence of soil surface crusts and in one site (Offset03), there were cryptograms colonising these areas. The water filled gilgais that were present were an important feature and provided topographic relief and additional habitat features, resulting in a very high floral diversity.

The soils were considerably different between the two sites and further testing may be required as Offset03 contained numerous undesirable traits and was highly sodic. DnA Environmental recommended that as part of the rehabilitation process that deep ripping is not to be considered due to the highly sodic nature of the soils,

gilgais, and high species richness as deep ripping will compromise the relatively stable site (Offset03) and high conservation status. Any rehabilitation that is to occur should aim to replicate the associated reference sites, taking care to replicate the structure and future habitat requirements.

Southern Waste Emplacement rehabilitation trials

These trials were established on the southern waste emplacement to examine the benefits of rehabilitating slopes with long continuous slopes compared to a three tiered battered slope, with and without different mulching treatments. A variety of treatments were setup with a full description provided in the DnA Environmental report from 2011 titled *2010 Cowal Rehabilitation Monitoring Report*.

A preliminary assessment was undertaken during March 2010 by DnA Environmental (initial assessment not formal) and minimal difference was observed between the sub soil and no subsoil treatments. Differences between slope types were also minimal but more rilling had occurred on the single continuous slope. Mulch treatments showed more promising stabilising cover (rock and hay) and during this initial assessment there was little vegetative cover. Woodchips provided excellent stabilising cover but seemed to inhibit the growth of vegetation. The rock and topsoil and topsoil only treatments contained the highest establishment of plants, but site stability was questionable.

Whilst the treatments were not subjected to rigorous statistical analysis the results of the 2010 monitoring have shown that there was little difference in ecosystem function or plant cover and diversity whether subsoil was applied or not, but there may have been some slight advantage in using a subsoil treatment. There was also little difference between continuous slopes or 3-tiered reverse graded batters except for more rilling in the straight slope. Other observations include some additional erosion control within the reverse graded batter, as a temporary alluvial fan had developed within some of the sub-treatments. Other advantages of the 3-tiered slope include shorter slopes and better and safer access for ongoing revegetation and maintenance activities (DnA Environmental, 2011c).

The better performing sites in terms of ecological sustainability and similarity to the native grassland reference sites were those with a topsoil application. Rock mulch as a treatment (in shallow depths to allow for plant growth) also provides stability in the case of extreme climatic events. As a result, in order to prevent erosion from occurring before the plants have become well established, a light application of rock, woodchips or preferably native pasture hay will provide temporary and critical soil surface protection and erosion control in the initial site establishment phase (DnA Environmental, 2011c). As with all rehabilitation sites at Cowal, the ability to meet completion targets will depend on the capacity of native perennial plants to drive the ecological functions of the site. Whilst at this stage the sites contain a high number of weedy species, these species are part of the successional process and provide important ground cover and assist in the development of the microbial and nutrient recycling processes. On the other hand, these two sites contained a good representation of native species which are expected to set seed and become more abundant over time.

The treatments compared in these trials have shown that this can be achieved using topsoil, with or without a rock mulch underlay, but initial erosion control measures such as the light-medium application of native pasture hay or other mulch treatments in rows along the contour and/or shallow ripping along the contour may be required to provide immediate soil protective cover and additional erosion control features.

The main outcomes of the overall *2010 Cowal Rehabilitation Monitoring Report* included:

- Improved spoil classification prior to rehabilitation works is required to ensure the optimum substrate for plant growth and establishment. These works are proposed for the 2011 monitoring period.
- Where topsoil was applied, more key performance indicators were met.
- Soil surface protection is critical and erosion control is required until vegetation can establish.
- To prevent erosion occurring before plant establishment, a light application of rock, woodchips or preferably native pasture hay bearing mature seeds will provide some temporary and critical soil surface protection and allow seed to germinate.
- Long-term success and the ability to meet completion targets will largely depend on the capacity of native perennial plants to drive the ecological function of the site.
- Whilst the sites contained an abundance of weedy species, these species are part of the successional process and will make a positive contribution in providing protective ground cover and assisting with the

development of the microbial and nutrient cycling process. Many of the weedy species are common components of the grazed agricultural land in the Lake Cowal environment.

- A combination of rehabilitation methods such as applying a rock mulch underlay, ensuring good spoil classification and ground preparation (creation of microclimates and soil surface relief), applying ameliorants such as gypsum (and fertilisers) after soil testing, rock mulch or native pasture hay applied in rows along the contour and light mulching using seed bearing native pasture hay in between these rows are likely to offer better longer-term rehabilitation outcomes.
- Additional seeding using native pasture hay requires experimentation to determine best rate of application and spatial distribution rates.
- Revegetation can be further enhanced by seeding with sterile annual cover crops and native perennial grasses where applicable.
- The addition of missing structural components, species and habitat features such as logs will help further achieve objectives in order to satisfy completion criteria in due course.
- Some bare areas require earth works in order to ameliorate previous erosion.

5.5 DEVELOPMENT OF THE FINAL REHABILITATION PLAN

Proposed rehabilitation outcomes have been continuously developed throughout the CGM approval process. The EIS detailed a final rehabilitation philosophy and objectives for the CGM as well as the proposed rehabilitation programme and final landform and revegetation concepts.

Subsequent to the EIS approval a series of management plans were developed in accordance with Development Consent Conditions. The CWMP, FFMP, LSMP and ROMP further developed rehabilitation concepts presented in the EIS. The following stakeholders were consulted during preparation of these plans:

- DECCW (now OEH);
- DII (Fisheries);
- OoW;
- Lake Cowal Landowners Association;
- Lake Cowal Foundation;
- DoPI; and
- BSC.

Results of consultation undertaken with the abovementioned stakeholders were incorporated into the management plans where relevant.

In accordance with the EIS and subsequent to the commencement of mining operations, consultation with respect to the detail of the concepts will be commenced as part of an ongoing process (in accordance with the Mining Rehabilitation and Environmental Management Process [DMR, 2006]) throughout the life of the CGM. The Final Rehabilitation Plan will be included in the MOP for the period of the MOP. No additional consultation was carried out during the reporting period to further develop the Final Rehabilitation Plan.

Table 38 provides a summary of rehabilitation activities at the CGM during the reporting period. The table includes details of rehabilitation at the start of the reporting period and estimated for the next report.

**Table 38
Rehabilitation Summary**

	Area Affected/Rehabilitated (hectares)		
	Previous Report	Current Report	Next Report (estimated)
A MINE LEASE AREA			
A1 Mine Lease(s) Area	2,650	2,650	2,650
B DISTURBED AREAS			
B1 Infrastructure Area ¹	321	296	296
B2 Active Mining Area ²	95	107	107
B3 Waste Emplacements ³	210	335	335
B4 Tailings Emplacements	369	369	369
B5 Shaped Waste Emplacement ⁴	59	62	75
ALL DISTURBED AREAS⁵	1,029	1,156	1,156
C REHABILITATION PROGRESS			
C1 Total Rehabilitated Area ⁶	138	189	189
D REHABILITATION ON SLOPES			
D1 10 – 18 Degrees	84	151	151
D2 Greater than 18 Degrees	0	0	0
E SURFACE OF REHABILITATED LAND			
E1 Pasture and Grasses	84	151	151
E2 Native Forest/Ecosystems	38	38	38
E3 Plantations and Crops	0	0	0
E4 Other	0	0	0

1 Includes areas such as ore and soil stockpiles, contained water storages, processing plant and roads.

2 Open pit area.

3 Areas of waste emplacements yet to be shaped and rehabilitated.

4 Areas of waste emplacements that have been shaped and rehabilitated.

5 Includes any area that has been disturbed by mining activities. This value includes the Total Rehabilitation Area presented in C1.

6 Any areas that have been rehabilitated including areas of waste emplacements and tailings storage facilities progressively shaped and rehabilitated.

Table 39 below gives a summary of the maintenance works carried out on rehabilitated land over the reporting period. Also summarised are planned works to be undertaken during the next reporting period.

Table 39
Maintenance Activities on Rehabilitated Land

Nature of Treatment	Area Treated (ha)		Comments/Control Strategies/Treatment Detail
	Report Period	Next Period	
Additional erosion control works	2	15	The reverse-graded berms that were constructed at the top of the Lake Protection Bund were reshaped during the reporting period to remove sediment build up and improve their effectiveness in minimising runoff from the PWE. Maintenance of the road on the top of the Lake Protection Bund was also undertaken.
Re-covering	4	0	The NTSF outer slopes were re-covered during the reporting period.
Soil treatment	8	8	The STSF slopes were treated during the reporting period. The 3 rd augmentation Lift of NTSF is to be treated by rock-topsoil during 2011.
Treatment/Management	100	20	Slashing and grading of firebreaks was undertaken during the reporting period. It is expected that the same activities will undertaken in the next reporting period. Lake Fill event has covered the fire trails for now.
Re-seeding/Replanting	2	2	The southern slope of the STSF was re-seeded during the reporting period. Ripping and seeding of Topsoil stockpile 2 was conducted in April 2010. There was no replanting of any trees and shrubs in any area due to the continuous dry periods experienced.
Adversely affected by weeds	2,000	35	<i>Xanthium spinosum</i> (Bathurst Burr), <i>Sclerolaena birchii</i> (Galvanised Burr) <i>Ibicella lutea</i> (Devil's Claw) and <i>L ferrocissimum</i> (African Boxthorn) were treated by aerial and spot spraying with chemical or by manual removal. Infestations were mainly in isolated low lying areas that held enough moisture long enough for germination. Lake Fill event has covered the 'Lakeside' control areas since August 2010.
Feral animal control	2,650	2,650	Feral animal control activities were undertaken during the reporting period. Activities included fox and rabbit baiting on ML 1535 and parts of Barrick-owned land, and feral cat trapping.

6 ACTIVITIES PROPOSED FOR THE NEXT AEMR PERIOD

A number of activities are proposed to be undertaken in the next AEMR period in accordance with the Development Consent, EMPs and other approvals.

A number of operational activities including the continuation of mining and mineral processing will occur during the next reporting period.

6.1 ENVIRONMENTAL MANAGEMENT TARGETS AND STRATEGIES FOR THE NEXT YEAR

The majority of the management strategies set out in the CGM EMPs prepared to date would continue to be implemented during the next reporting period in order to meet the objectives and targets described in the EMPs. A summary of the management targets and objectives, as set out in the EMPs for the next reporting year is provided in Table 40.

Table 40
Summary of Environmental Targets and Management Strategies for the Next Reporting Year

Environmental Management Plan	Objectives/Targets (for next reporting period)	General Management Strategies
BLMP	<ul style="list-style-type: none"> Optimisation of blasts by Geotechnical personnel. Maintain network during Lake Fill. 	<ul style="list-style-type: none"> Blasting in accordance with the identified criteria. Maintain monitoring network and Cowal Blast Hub external services. Remedial measures in events which exceed blast criteria or disturb birdlife.
BMP	<ul style="list-style-type: none"> Conduct staff training and drills. Maintain the new fire trails from 'Lakeside' to Gate 10 after Lake Fill. 	<ul style="list-style-type: none"> Maintenance of Emergency Response Procedures. Reduction of bushfire threat and protection of assets at risk after growth period.

Table 40 (Continued)
Summary of Environmental Targets and Management Strategies for the Next Reporting Year

Environmental Management Plan	Objectives/Targets (for next reporting period)	General Management Strategies
CWMP	<ul style="list-style-type: none"> • Continue weed and pest control. • Continue to focus on herbicide control of South African Box Thorn and Bathurst Burr around flooded Lake floor and farm properties. 	<ul style="list-style-type: none"> • Prevention of grazing stock entry. • Frog surveys – annual. • Natural regeneration of native plants. • Limitation of vehicular access. • Improvement of habitats for wildlife.
DMP	<ul style="list-style-type: none"> • Continued use of Petro Tac on light roads. • Finalisation of University of Sydney dust provenance and impact assessment studies (2007-2010). • Continue the 2009 change to ICP-MS methodology for the analysis of dust samples at the CGM (prior OEH approval). The University of Sydney will continue to advise Barrick personnel on the dust sampling methodology, to reduce the likelihood of sample contamination via the incorrect implementation of sampling techniques. • Ongoing use of the University of Sydney alfoil covering of jars (cease use of copper sulphate treatment for algae). 	<ul style="list-style-type: none"> • Reduction/control of dust emissions.
HMP	<ul style="list-style-type: none"> • Finalise status of Cowal West heritage site and works to relocate portion of value. Revise HMP. • Post information plaques at proposed LCCC Museum if Barrick proceed with Shearing Shed component of section 75W approvals. 	<ul style="list-style-type: none"> • Maintenance of stored items. • Weed and pest control around items. • Fire control around stored items Shed. • Surface water control, basal layer. • Relocation to LCCC museum area.
ESCMP	<ul style="list-style-type: none"> • Continue event based structure inspections. • Enhance the southern portion of the UCDS through repair and strengthening of erosion control structures. • Continue ANU studies. • Conduct a 2-yearly peer risk review (July 2008-2010). • Reclamation Standard compliance. 	<ul style="list-style-type: none"> • Effective control of sediment and salinity migration. • Maintain lake floor access fire trail and planned general inspections of assets after lake Fill event. • Maintenance of downstream (Lake) water quality. • Ongoing approval use for the rock-topsoil method using independent review and amended MOP, EMPs, DC modification, etc.
CMP	<ul style="list-style-type: none"> • Continued cyanide management. • Continue commissioning of SMBS system and maintain Caro's Acid preparedness. • Relocate the TSF auto-sampler to the concrete banded tailings slurry pumping hopper area. 	<ul style="list-style-type: none"> • Maintain strategy of excellence in environmental management of installed facilities, process water streams, on-site reagent storage, use and emergency preparedness. • Maintain full compliance status with the ICMI Code.
FFMP	<ul style="list-style-type: none"> • Continue NSW WIRES training for employees. • Relocate wildlife as required. • Continue maintenance of TSF and Pond D6 bird deterrent system and fences. • Continue control of vermin and noxious weeds. • Additional bird nesting boxes and hollows at 'Hillgrove' (Plate 5). • Approval and implementation of ROMP. 	<ul style="list-style-type: none"> • Plans for the rescue and rehabilitation of wildlife. • Remnant vegetation enhancement programme. • Vegetation clearance protocol. • Weed management and pest control. • Protection of flora and fauna threatened species located within the CGM. • Prevention of fauna and avifauna use of the tailings storages and Ponds D5 and D6.

Table 40 (Continued)
Summary of Environmental Targets and Management Strategies for the Next Reporting Year

Environmental Management Plan	Objectives/Targets (for next reporting period)	General Management Strategies
HWCMP	<ul style="list-style-type: none"> • Continue appropriate transport, handling, disposal, and recycling of wastes. • Maintain steel drum crusher and cardboard bailer operations. • Ongoing ICMI Cyanide Code full compliance – operational phase. • Appropriate responses to spillages. • Ongoing use and management of bioremediation area. • Audit and maintain emergency preparedness oil & chemical spill kits. • Commissioning of on-site putrescibles & special waste (used Mine tyres) waste disposal into waste rock emplacements as per 2008-2009 varied EPL conditions. • Enhanced use of upgraded ChemaAlert 3 software system (retire CRMA-HSR). 	<ul style="list-style-type: none"> • Substances Inventory Register (IR). • Distribution of revised employee environmental awareness handbook and spill training. • Emergency preparedness contingency. • Root cause analysis of spill incidents with action programs to eliminate. • Copy of approved Revised CGM HWCMP to BSC Library.
IACHMP	<ul style="list-style-type: none"> • Continued assessment of areas as per IACHMP prior to soil stripping. • Revised IACHMP – include GDP process. 	<ul style="list-style-type: none"> • Protection/Management of sites within the CGM area. • Dissemination of cultural heritage information and offsets.
LMP	<ul style="list-style-type: none"> • Continue control of vermin and noxious weeds. • Maintain ML boundary buoys (Plate 6). • Approval and implementation of the ROMP. • Review the draft Lachlan River Floodplain MP (January 2011) and incorporate as required. 	<ul style="list-style-type: none"> • Pasture and remnant vegetation management. • Weed management and pest control. • Farm Planning.
Monitoring Programme for Detection of any Movement of Lake Protection Bund, Water Storage and Tailings Structures and Pit/Void Walls	<ul style="list-style-type: none"> • Maintain monuments inspection frequency of TSF walls. • Maintain Pond structure inspections. 	<ul style="list-style-type: none"> • Detection of any movement of the Lake Protection Bund, water storage and tailings structures, and pit/void walls. • Effective responses to any detected movement.
LSMP	<ul style="list-style-type: none"> • Continued building inspections. • Ongoing visual assessments. • Approval and implementation of the ROMP. 	<ul style="list-style-type: none"> • Blending of structures with the surrounding landscape as far as possible. • Establishment of shrubs and trees in accordance with the requirements of BSC. • Effective maintenance of landscapes and buildings.
SSMP	<ul style="list-style-type: none"> • Continue soil stockpile management. • Update database as required. • Implement use of ArcGIS as a management tool. 	<ul style="list-style-type: none"> • Effective scheduling and management of soil stripping operations.
SWMP	<ul style="list-style-type: none"> • Maintain monitoring and reporting of open pit dewatering system. • Continue process water management. • Water Conservation Standard compliance. • Review the draft Lachlan River Floodplain MP (January 2011) and incorporate as required. 	<ul style="list-style-type: none"> • Prevent the quality of any surface water (including waters within Lake Cowal) and groundwater being degraded. • Effective management of the quantity of surface water and groundwater generated within the CGM area. • Effective amelioration of potential impacts to surface water and groundwater.
SWGMBMP	<ul style="list-style-type: none"> • Ongoing use of approved revised SWGMBMP. 	<ul style="list-style-type: none"> • Detection of any adverse affects to surface water, groundwater, and/or biology. • Effective responses to any detected adverse affects.

Table 40 (Continued)
Summary of Environmental Targets and Management Strategies for the Next Reporting Year

Environmental Management Plan	Objectives/Targets (for next reporting period)	General Management Strategies
NMP (including traffic noise)	<ul style="list-style-type: none"> • Continue employee awareness. • Continued monitoring in accordance with NMP. • DoPI approval of the revised NMP to include traffic noise criteria to reflect the modification of the Development Consent on 10 March 2010. • Quarterly traffic noise monitoring review after 1 July 2011 release of new DoPI Guidelines. 	<ul style="list-style-type: none"> • Prevention of adverse mine operational noise. • Ongoing development of bund walls and waste rock emplacements. • Prevention of adverse mine traffic noise. • Ongoing roadside resident consultation as required. • Complaint response and dispute resolution procedures.
TSMP	<ul style="list-style-type: none"> • Develop species-specific plans as required. • Conduct surveys for threatened species as required • Biodiversity Conservation Standard compliance. 	<ul style="list-style-type: none"> • Ensure the viability of a local population of a threatened species is not put at risk by the CGM. • Species-specific management plans.
Implementation Plan to Protect Fauna from Interactions with the Tailings Storage Facilities	<ul style="list-style-type: none"> • Continue monthly bat monitoring • Conduct daily routine inspection and monitoring of fauna, process, tailings discharge, surface water and groundwater. • Investigate use of LRAD noise gun/s for recalcitrant visitors to TSF beaches. 	<ul style="list-style-type: none"> • Prevent fauna and avifauna use of operational tailings storage facilities. • Maintain TSF perimeter fencing and avifauna deterrents. • TSF Operations and Maintenance Plan. • Maintain readiness for end of current Lake Fill.
MOP (Jan 2011 – Sept 2012)	<ul style="list-style-type: none"> • Schedule Mine development. • Continue progressive landscape and rehabilitation management. 	<ul style="list-style-type: none"> • Soil stripping scheduling. • Soil stockpile management. • Mine waste rock emplacements. • Closure and decommissioning plan. • Life of Mine Plan. • TSF Operations and Maintenance Plan.
THMS	<ul style="list-style-type: none"> • Maintain arrangements for THMS. • Continue emergency preparedness contingency with external services. • Use of inland road and/or other emergency routing as required (2011-12 Flooding). 	<ul style="list-style-type: none"> • Employee awareness training. • On-site facilities inspection and maintenance. • Contract management. • Emergency preparedness.
ROMP	<ul style="list-style-type: none"> • Approval and implementation of the ROMP. 	<ul style="list-style-type: none"> • Mine site rehabilitation management. • Offset areas management.

Additional environmental management targets and strategies will be documented in the MOP for the next term of operations. Additionally, management strategies and targets are proposed to be developed and refined during the next reporting period. Barrick will also continue development of the CGM Environmental Management System in accordance with corporate standards during the next reporting period. Risk-based management of significant environmental aspects by ongoing management review and employee involvement in site wide planned general inspections will continue during the next reporting period.

Barrick has added five (5) additional environmental standards to the core EMS standard;

- Closure;
- Water;
- Biodiversity;
- Climate Change; and
- Incident Reporting and Investigation.

Internal and external review of compliance to these standards is ongoing across the global operations.

Plate 5

Locally manufactured bird nesting boxes for 2011.



Plate 6

One of the 31 ML1535 boundary buoys.



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8 GLOSSARY OF TERMS

AER	Annual Environmental Return (OEH)
AEMR	Annual Environmental Management Report (DTIRIS [Minerals] coordinated for DoPI and other regulators)
ANZECC	Australian New Zealand Environmental Conservation Council
ARD	Acid Rock Drainage
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
ASWAT	Aggregate Stability in Water
AWS	Automatic Weather Station
BCPC	Bland Creek Palaeochannel
BLMP	Blast Management Plan
BMP	Bushfire Management Plan
BSC	Bland Shire Council
CEMCC	Community Environmental Monitoring & Consultative Committee
CGM	Cowal Gold Mine
CLM	Contaminated Land Management
CMP	Cyanide Management Plan
CMS	Chemical Management Strategy
CPCC	Cowal Project Coordinating Committee (WCC - Barrick)
CRMA	Cowal Risk Management Application
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CW	Compensatory Wetland
CWMP	Compensatory Wetland Management Plan
DoPI	Department of Planning and Infrastructure
DECCW	Department of Environment, Climate Change and Water
DII	Department of Industry and Investment – Agriculture, Fisheries, Minerals Resources
DPI	Department of Primary Industries
DTIRIS	Department of Trade and Investment, Regional Infrastructure and Services
DSC	Dams Safety Committee
EA	Environmental Assessment
EC	Electrical Conductivity
EEC	Ecologically Endangered Community
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EMSS	Environmental Management System Standards
EPA	Environment Protection Authority
EPL	Environment Protection License
ERT	Emergency Response Team
ESCP	Erosion and Sediment Control Program
ESCMP	Erosion and Sediment Control Management Plan
ETBC	Employment Training Business Council
FFMP	Flora and Fauna Management Plan
FOR	Fuel and Oils Register
GDP	Ground Disturbance Protocol
GFZ	Gilmore Fault Zone
HMP	Heritage Management Plan
HSR	Hazardous Substances Register
HWCMP	Hazardous Waste and Chemical Management Plan
HSDG	Hazardous Substances and Dangerous Goods
IACHMP	Indigenous Archaeology and Cultural Heritage Management Plan
ICMC	International Cyanide Management Code
IEA	Independent Environmental Audit
IMP	Independent Monitoring Panel
KPI	Key Performance Indicator
LCF	Lake Cowal Foundation
LHPA	Livestock Health and Pest Authority (formerly RLPB).
LOR	Limit of Reporting
LPB	Lake Protection Bund

LPMBP	Monitoring Programme for Lake Protection Bund, Water Storage and Tailings Structures and Pit-Void Walls
LFA	Landscape Function Analysis
LMP	Land Management Plan
ML	Mining Lease
MOP	Mining Operations Plan
MSDS	Material Safety Data Sheet
NAF	Non Acid Forming (rock acid forming potential)
NGER	Australia's National Greenhouse and Energy Reporting Scheme
NMP	Noise Management Plan
NPI	National Pollutant Inventory
NPWS	National Park and Wildlife Service
NSWFR	NSW Fire and Rescue (formerly NSW Fire Brigade)
NTSF	Northern Tailings Storage Facility
NWE	Northern Waste (rock) Emplacement
OEH	Office of Environment and Heritage
OoW	NSW Office of Water within OEH (formerly DWE within DECCW).
OSCAR	Australian Online System for Comprehensive Activity Reporting
PPE	Personal Protective Equipment
PRA	Preliminary Risk Assessment
PWE	Perimeter Waste (rock) Emplacement
RAB	Rotary Air Blast
RFS	Rural Fire Service
RL	Relative Level
ROMP	Rehabilitation and Offset Management Plan
RVEP	Revegetation Enhancement Project
SMBS	Sodium metabisulphite (cyanide destruct reagent replacing Caro's Acid).
SOE	State of the Environment
SOI	Southern Oscillation Index
SSMP	Soil Stripping Management Plan
STSF	Southern Tailings Storage Facility
SWE	Southern Waste (rock) Emplacement
SWGMBMP	Surface Water, Groundwater, Meteorological and Biological Monitoring Programme
SWMP	Site Water Management Plan
THMS	Transport of Hazardous Materials Study
TSF	Tailings Storage Facility
TSMP	Threatened Species Management Protocol
TSP	Total Suspended Particulates
TSR	Travelling Stock Route
UCDS	Up Catchment Diversion System
VCP	Vegetation Clearance Permit
WAD	Weak Acid Dissociated
WCC	Wiradjuri Condobolin Corporation
WIRES	Wildlife Information Rescue and Education Service