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 2010**
AEMR End Date:	**22 DECEMBER 2011**
Name of Leaseholder:	**BARRICK (COWAL) LIMITED**
Name of Mine Operator (if different):	**AS ABOVE**
Reporting Officer:	**DAVID KELLETT**
Title:	**ENVIRONMENTAL OFFICER**
Signature:	
Date:	**28 June 2012**

DOCUMENT COPY No:

ISSUED TO:

DATE: **28 June 2012**

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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 Paragraph 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 (**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 2010 to 22 December 2011. 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* (**DTIRIS, 2006**).

This AEMR has been prepared in consultation with relevant stakeholders. A meeting regarding the AEMR was held on 5 October 2011 at the CGM**.** Attendees included representatives from the Environmental Protection Authority (**EPA**) (formerly part of the Office of Environment and Heritage [**OEH**]), the DTIRIS (Minerals), DPI-Agriculture and Barrick (Cowal) Limited. In addition, Barrick has been in contact with the DTIRIS (Minerals) and Department of Planning and Infrastructure (**DP&I**) regarding the development of the AEMR. No additional requirements in relation to the AEMR were requested by the DTIRIS (Minerals) or the DP&I.

In accordance with Development Consent Condition 9.2(iii), copies of the AEMR will be provided to the Director-General of the DP&I, EPA, NSW Office of Water (**NoW**), DTIRIS (Minerals), the NSW Dams Safety Committee (**DSC**), DPI-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 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)	DP&I	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 (2024).
Environment Protection Licence (EPL No. 11912)	EPA	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	EPA	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	EPA	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	EPA	27/10/2003	Same as Consent #1467.
Consent #1680 under section 90 of the NPW Act	EPA	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	EPA	28/07/2003	Same as Consent #1680.
Production bore licence (Bland Creek Palaeochannel borefield) #70BL229248	NoW and EPA	19/12/2008	18 December 2013.
Production bore licence (Bland Creek Palaeochannel borefield) #70BL229249	NoW and EPA	22/12/2008	21 December 2013.
Production bore licence (Bland Creek Palaeochannel borefield) #70BL229250	NoW and EPA	22/12/2008	21 December 2013.
Production bore licence (Bland Creek Palaeochannel borefield) #70BL229251	NoW and EPA	22/12/2008	21 December 2013.
Production bore licences (saline groundwater supply borefield within ML 1535) #70BL232691 - #70BL232692	NoW and EPA	28/01/2010	27 January 2015. Valid for the operation of three lake floor saline production bores when not inundated by Lake Cowal.
DA No. 2011/0064 #70BL233321 #70BL233323	FSC and NoW	20/12/2010	20/12/2015. Valid for the operation of the eastern saline borefield.
Pit dewatering bore licences #70BL230205 – #70BL230234 and newer.	NoW and EPA	6/1/2010	5 January 2015. Replacement de-watering bore licenses as exchanged for decommissioned bores.
Monitoring and test bore licences	NoW and EPA	Various	Various.
High Security Title WAL14981 NoW Reference 70WA603145 (80 Units)	LPI and NoW	15/09/2011	Title for allocation from Lachlan River Regulated Source- Water Sharing Plan. Followed WAL13749 / 70AL603333 (21/12/2006).
General Security WAL13748 DNR Reference 70AL603332	LPI and NoW	21/12/2006	Title for allocation from Regulated River Source.

Source: Barrick (2012)
DP&I: NSW Department of Planning and Infrastructure
DTIRIS: NSW Department of Trade and Investment, Regional Infrastructure and Services – Mineral Resources and Energy
EPA: NSW Environmental Protection Authority
FSC: Forbes Shire Council
LPI: NSW Land and Property Information
NoW: NSW Office of Water
NPW Act: NSW *National Parks and Wildlife Act 1974.*

Mining Operations Plan (MOP)

2009 to 2010 MOP

The 2009 to 2010 MOP was approved by the DTIRIS (Minerals) on 3 April 2009. 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 DTIRIS (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 previous reporting period as a requirement of ML 1535 Conditions of Authority and Development Consent conditions and in accordance with the MOP guidelines.

The 2011 to 2012 MOP was approved by the DTIRIS (Minerals) on 30 March 2011.

During the current reporting period of the 2011 to 2012 MOP the footprints of the Perimeter Waste Emplacement (**PWE**), Northern Waste (rock) Emplacement (**NWE**) and Southern Waste (rock) Emplacement (**SWE**) remained unchanged. E42 Pit walls continued to lay back and deepen in Stages D, E and F. The outer batters of the third Lift (second augmentation), of the Southern Tailings Storage Facility (**STSF**) were rehabilitated and filling with tailings was nearly completed. The third Lift of the Northern Tailings Storage Facility (**NTSF**) was constructed and ready for use at the end of the reporting period. Stripping of topsoil from the subsoil stockpiling area adjacent the Tailings Storage Facility (**TSF**) Depot commenced and provided the majority of the fill for the waste rock – topsoil cover rehabilitation method needs of the outer batters of the third Lift of the NTSF. The Lake Protection Bund (**LPB**) outer bund and eastern face of Pond D1 were rock armoured before Lake Cowal levels rose over the Temporary Isolation Bund (**TIB**) shortly after 1:100yr ARI flood event. The Pond D1 north rehabilitation trial area was constructed and covered with waste rock, 10t/ha of gypsum and 150 to 300mm topsoil in preparation for final plot design treatments at start of the next reporting period.

1.1.2 Approval Variations Applicable to the Subject Area

Environment Protection Licence

Barrick applied to the EPA for a variation to Environmental Protection Licence No. 11912 (**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. BM06 on east Lake Cowal was added. New DC ambient noise conditions for private residences were added. Barrick also sought to vary conditions in the EPL to avoid the need 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.

The S 58 variation request was suspended briefly until new Department of Planning and Infrastructure (**DP&I**) traffic noise guidelines could be assessed for relevance. The EPA varied EPL on 24 June 2011 and the changes described above appear in track change at:
http://www.environment.nsw.gov.au/prpoeoapp/ViewPOEONotice.aspx?DOCID=-1&SYSUID=1&LICID=11912 .

Development Consent

During the reporting period, Barrick received a Notice of Modification (s75W of the *Environment Planning and Assessment Amendment (Infrastructure and Other Planning Reform) Act 2005 (NSW)*) (**s75W**) to the Development Consent to allow the operation of stage 1 of the eastern saline borefield (MOD10, July 2011).

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 DP&I approved the revision on 10 March 2010 after consultation with other departments and the IMP. Lake Cowal has remained full since August 2010.

An addendum to the SWGMBMP was submitted to relevant government departments after DP&I approval of MOD10 in July 2011. Barrick is currently awaiting DP&I approval of the addendum submitted in February 2012.

Site Water Management Plan
In terms of Barrick's requirements to review all Environmental Management Plan (**EMP's**) at least every 5 years, Barrick (Cowal) was previously advised by the DP&I 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 DP&I dated 08 April 2010). This was extended to June 2010 after a written request from Barrick. A revised SWMP was subsequently submitted to the DP&I in June 2010. Following the provision of additional review comments of the SWMP by the NoW (after the revised SWMP had been submitted to the DP&I), the revised SWMP was then re-submitted to the DP&I on 30 November 2010. In February 2012 a revised SWMP incorporating the eastern saline borefield modification was submitted to relevant government departments for comment. Comments were collated and forwarded to the DP&I in February 2012. Barrick is currently awaiting DP&I approval of the revised SWMP.

Cyanide Management Plan
The Cyanide Management Plan (**CMP**) was amended to reflect the Development Consent modification pursuant to section 96(1A) of the *Environment Planning & Assessment Act 1979 (NSW)(**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 (**SO_2**) as sodium metabisulphite (**SMBS**). The addendum to the CMP was approved by the DP&I on 24 March 2010.

Barrick commenced negotiations with the EPA 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 DP&I 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 the DP&I on 20 October 2010 and a variation of the EPL issued on 24 June 2011. As discussed above, an EPL variation was received and Point 48 replaced Points 46 and 47 in the new Licence.

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 DP&I 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. Currently awaiting DP&I approval of the revised NMP.

Transport of Hazardous Material Study
Barrick advised the Major Hazards Unit of two emergency route changes during the reporting period. The first was for the two weeks in December 2011 that Orica was unable to supply explosives and Maxam was sought as an alternative supplier using the approved caustic soda route. The second occasion was when Lake Cowal flooded in February 2012 the Newell Highway and sodium cyanide was transported for two weeks via an alternate risk assessed route.

S75W Modified Modification Development Consent EMPs
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 DTIRIS (Minerals) and Director-General of the DP&I.

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 DP&I:

- The ROMP was reviewed by the relevant government departments from 30 July 2010 until forwarding to DP&I on 9 January 2011. The ROMP is currently awaiting DP&I approval.
- The Threatened Species Management Strategy was prepared in consultation with former EPA (for the Inland Forest Bat, Sloane's Froglet and Woodland birds). The Strategy was submitted to DP&I on 28 February 2011 and is currently awaiting DP&I approval.
- The revised NMP was lodged with the DP&I on 30 July 2010 and is currently awaiting D&PI approval.
- The revised BLMP was submitted to the DP&I on 11 June 2010 and is currently awaiting DP&I approval.
- The revised SWMP was lodged with the DP&I in June 2010 and a further revised version was lodged on 30 November 2010 (following review comments provided by EPA (formerly Office of Environment and Heritage (**OEH**)), and NoW). The November 2011 revised SWMP (eastern saline borefield MOD10), replaced the prior revision in February 2012. The revised SWMP is currently awaiting DP&I approval.

1.2 MINE CONTACTS

Contact details for the CGM are provided below:

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1.3 ACTIONS REQUIRED AT THE PREVIOUS AEMR REVIEW

The 2011 Annual Environmental Management Report (**AEMR**) meeting was held on 5 October 2011 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
Series of questions on various technical items within the report.	Barrick	**Completed** – by correspondence with EPA Griffith.	-
Timing of 2011 AEMR for review in 2012.	Barrick	**In progress** – Barrick scheduling resources for 31 May 2012 publication as per prior years.	2011 AEMR
MOP/REMP	Barrick/DTIRIS (Minerals)	**In progress** – Barrick will review status during next reporting period.	CGM MOP(Jan 2011 – 30th 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 September 2011.

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 specified approved areas. 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 (**ICMI 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.

A further independent professional re-certification audit occurred between12 – 15 December 2011. Details regarding the re-certification audit are provided on the ICMI's website (dated 17 May 2010) *viz*. http://www.cyanidecode.org/media_pr403.php

Barrick (Cowal) Limited was again officially re-certified for a third time on 3 May 2012.

1.5 INDEPENDENT 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 11 April and 16 April 2011 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 2011 IEA is provided as Appendix D. The 12th IEA of the CGM will be conducted by Trevor Brown & Associates during the next reporting period and the outcomes will be described in the 2012 AEMR.

2 OPERATIONS DURING THE REPORTING PERIOD

Paragraph 2.1 to 2.10 below describes 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 drilling also on the eastern side of the E42 pit. The majority of this drilling was undertaken as part of a Prefeasibility Study (**PFS**) looking at the open pit viability of satellite advanced prospects close to E42. The PFS exploration drilling involved infill resource drilling (25m by 25m) and metallurgical and geotechnical studies. Approximately 34,316 m was drilled during 2011 within ML1535. Activities predominantly involved diamond drilling (to an average depth of 250 m) and a minor component of air core (AC) drilling (to maximum depth of 120 m). Minor deeper drilling tested underground possibilities at E46 with 600-650m deep holes.

This drilling was concentrated along the outside and inside of the LPB during the reporting period as well as within the lake at Regal/E46. All drill holes completed during the program as well as those drilled on the lake bed at E46 were concrete grouted throughout the entire length after completion of each hole.

Land disturbance was minimal as a result of the exploration activities. Lake drilling was conducted from track mounted platform rigs with a self contained fluid retention system. 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 January 2011 to September 2012 MOP.

2.2 LAND PREPARATION

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

A total of 26,100 m³ of soil was temporarily stockpiled as a result of stripping activities adjacent the TSF Depot so that s75W approved subsoil stockpiling could commence in 2011. A total of 24,000 m³ of topsoil was used for rehabilitation of the 3rd lift of the NTSF with the difference stockpiled inside the fauna fence on the south side of the STSF in readiness for the 4th Lift of the STSF. The Pond D1 north trials cover topsoil was drawn from Topsoil stockpile No. 6 (about 3,600m^3 – November 2011 to mid-January 2012).

Prior to soil stripping being undertaken at a particular location, the CGM Vegetation Clearance Protocol (**VCPL**), 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.

ML1535 stripped soils are either re-used or delivered directly to the soil stockpiles for use in the rehabilitation as 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 and Pond D1	Lake Cowal met the Temporary Isolation Bund (TIB) in August 2010 and the trigger point of 204.5mRL. The 1:100 year ARI designed TIB was overtopped by Lake Cowal in mid-February 2012 after flood water entered from the south and cut the Newell Highway for two weeks. The south wall of Pond D1 was raised 0.50m as a precaution against any further heavy rain in mid-February 2012. Works are proposed to raise the TIB by 0.50m when Lake Cowal has receded to a safe distance for earthworks to occur. These works would be detailed in the next relevant AEMR reporting period.
STSF	Tailings deposition ceased in March 2012. Planning for construction works on the fourth lift (third augmentation) commenced during the reporting period. The fourth lift will be operational from February 2013.
NTSF	Construction and rehabilitation works ceased on the third lift in early 2012, and tailings deposition commenced in March 2012. Fourth lift planning will commence in late 2012.
SWE	The emplacement has been used to store waste rock from Pit stages D, E and F. The rehabilitation trials on the south side of the SWE have continued. Pre-treated seed was spread across the trial plots with topsoil treatment in late 2011. The much wetter year has not resulted in any significant erosion on the treated areas.

Table 3 (Continued)
Infrastructure Construction Components during the Reporting Period

Infrastructure Component	Construction Status
PWE	Rehabilitation of the outside lifts above and below the LPB roadway occurred. The LPB road was rocked from the north to the Drill Rig Boat Jetty during the start of the reporting period. The remainder of the LPB to the south was planned for rocking after the January-February 2012 rains.
SMBS cyanide destruct circuit	Commissioned and operational from March 2010. No issues to date.
NWE (western extension)	The emplacement continued to receive waste from the Pit stages D, E and F. The northern replicate trials adjacent to Pond D1 were constructed in readiness for wheaten-lucerne straw and pasture hay cover treatments early in 2012. The timing of tube stock planting and seeding will be dependent on a period of suitable rainfall.
TSF Sub-soil Stockpile	Construction commenced for the E42 modified request after WCC inspection. Stripped topsoil was used for the rehabilitation needs of the third lift of the NTSF. Surplus material was stockpiled to the south of the STSF for the rehabilitation needs of the fourth lift (third augmentation).
Lake Cowal monitoring equipment	Lake Cowal blast monitoring stations were inundated by 0.10 to 0.50m just before annual maintenance and recalibration checks were due. New blast logging stations were installed in the land-based cabinets in early 2012. New technology Lake loggers will arrive in June 2012 for fitting onto tall tripod stations of between 2 and 4m in height. Toward the end of 2012, further enhanced logging capabilities will be installed at each of the stations to access meteorological conditions at each station. New tripod stations have been manufactured in early 2012 to install duplicate, taller dust gauges alongside existing 2m tall monitors. Lake Cowal levels rose quickly and dropped slowly as waters entered from the south and left the north end of the Lake system, respectively. Deployment of the raised dust tripods and ambient noise monitoring chairs and logger stands in the 3 to 4m deep parts of Lake Cowal will occur from May 2012.

2.4 MINING

Mining operations continued throughout 2011. Material types mined included ore and waste (including mineralised material). Mostly sulphide ores were extracted with some oxide ores being stockpiled for later processing. A total of 8,083,950 t of ore and 24,190,869 t of waste rock was mined during the reporting period. A further 924,546 t of mineralised material was also mined during the reporting period.

No expansions occurred on either of the waste emplacements. Expansion of the NWE occurred during the previous reporting period. No reclamation shaping of the outer northern batter occurred during 2011. Pond D1 trial plots were constructed adjacent to Pond D1 using the rock-topsoil method as a basis. The outer faces either side of the LPB road were stabilised using the rock-topsoil method from late-2011 to the start of the heavy rains of early 2012.

Waste rock mined from the open pit was stockpiled for the STSF and NTSF wall raise project works and outer slope rehabilitation. Clay obtained from phase E works was stockpiled near the TSF Depot for future works. The upstream lift material was direct hauled on occasions. This process of TSF lifts will continue on an annual basis.

Mining during 2011 occurred in three separate areas Stage D, Stage E and Stage F. Mining commenced in Stage E in February 2011 with both ore and waste being mined in that area during the reporting period.

Mining occurred in the Stage D pit from RL 1,002 m to RL 948 m, representing a vertical advance of 54 m. Mining commenced in the Stage F pit from RL 1,146 m to RL 1,047 m, representing a vertical advance of 99 m.

Vertical and horizontal dewatering systems were maintained throughout the reporting period. Additional horizontal holes were drilled as mining progressed through phase F. Development of the Stage E pushback mined out several of the older vertical bores. These were replaced with new bores outside the current pit perimeter.

A new MOP was approved during the reporting period. As stated in Paragraph 1.1.1, the preparation of the MOP for the period January 2011 to September 2012 commenced during the previous reporting period as a requirement of ML 1535 Conditions of Authority and Development Consent conditions and in accordance with the MOP guidelines. The 2011 to 2012 MOP was approved by the DTIRIS (Minerals) on 30 March 2011.

2.5 MINERAL PROCESSING

Processing continued throughout 2011. The plant recovered 268,851 ounces of gold.

Tailings deposition continued throughout the entirety of 2011 within the third lift of the STSF. Construction works began on the third lift of the NTSF in March 2011 and continued throughout the 2011 reporting period.

The January 2011 to September 2012 MOP 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 Paragraph 3.6. The amount of ore and waste rock (including mineralised material), ore, processing waste and product produced is set out in Table 4. Table 21 describes 2011 year topsoil stripped, spread and used.

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)	116.42	140.61	162.98
Mineralised Material (Mt)	12.00	12.92	14.35
Ore (Mt)	45.6	53.68	64.25
Processing Waste (Tailings) (Mt)	30.81	37.84	45.05
Product (oz)	1,084,362	1,353,213	1,605,178

Non-Mining Waste

Non-mining waste generated at the CGM during the reporting period was transported, handled and disposed of in accordance with the Hazardous Waste and Chemical Management Plan (**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 waste/obsolete operational and maintenance chemicals;
- process plant trash screen oversize plastic mulch;
- scrap metals including electrical off-cuts and undersized grinding media magnet rejects; and
- 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.
Used lead acid batteries	Used batteries were stored in a bunded 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.
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 (material is inert by EPA Guidelines for waste classification).
Processing Plant trash screen oversize plastic mulch	Dried and boxed for disposal in WRE layer.	Not used 2008 through 2011. Commenced early 2012 to address build up of plastic in carbon stripping circuit.
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.

The January 2011 to September 2012 MOP 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 January 2011 to September 2012 MOP 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 of the DP&I, in consultation with NoW. All bores from the Bland Creek Palaeochannel borefield used for mine purposes must be metered.

and

b) the NoW 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 borefield is summarised in Paragraph 3.4.3.2.

A total of 699.89 megalitres (ML) of water was extracted from the BCPC borefield and 8.61 ML from the eastern saline borefield during the reporting period.

The saline groundwater supply borefield on the floor of Lake Cowal within ML 1535 was commissioned in mid-2009 (Production bore licences #70BL232691 and #70BL232692 were granted by the NoW for the period 28 January 2010 to 27 January 2015). No extraction has occurred since April 2010 due to access restrictions since mid-2010 inundation of Lake Cowal. The production and monitoring bores on the floor of Lake Cowal remain capped.

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

Pond D9 held approximately 641.4 ML of groundwater (from the BCPC, saline groundwater de-watering/supply borefields and rainfall) and surface water (Regulated Lachlan 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 NoW 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 NoW 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 NoW (13 September 2006), Barrick previously supplied water to users in the West Plains and Trigalana schemes via the Barrick (Cowal) Limited BCPC borefield pipeline during the reporting period. Also as agreed with the NoW 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. Both the West Plains and Trigalana schemes have since been removed from the Barrick pipeline system by mutual agreements.

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 (ESB), located approximately 10 km east of Lake Cowal's eastern shoreline, for a period of five years (until 20 December 2015). The November 2011 revised SWMP (eastern saline borefield MOD10), replaced the November 2010 SWMP. The revised SWMP is currently awaiting DP&I approval following submission with the Department in February 2012. NoW summarily issued two presently unused production bore and monitoring bore piezometer licenses. The eastern saline borefield and

associated production bore licences are included in the addendum to the SWGMBMP awaiting DP&I approval (submitted February 2012). SB01 (#70BL233321) and SB02 (#70BL233323) have not been used during the reporting period due to wet regional conditions and local access issues.

The E42 open pit dewatering borefield was established external to the perimeter of the E42 Pit. A total of 6.33 ML was extracted from the open pit borefield, and a further 940.42 ML from the open pit de-watering sumps (including ponds D4, D3, D8A and heavy rainfall) during the reporting period. The water from the borefield was mainly used for plant ore treatment via Pond D6 and also for dust control on E42 Pit and TSF haul roads.

Surface Water

A total of 2,000 ML water was purchased from the regulated Lachlan River trading market, however only 857.38 ML was pumped during the reporting period due to the wetter conditions. Barrick's High Security (80 Units) and General Security (zero allocation) water access licences (High Security Title Identifier WAL14981 has a NoW Lachlan River Regulated Water Source – Water Sharing Plan Reference of 70WA603145 (previously 70AL603333), and General Security Title Identifier WAL13748 (NoW Reference of 70AL603332), enable trade of Temporary Water. The Jemalong irrigation channel transfer to the Bore 4 intake pumping station to the CGM was used for the 857.38 ML transfer 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 and D8B)	26	103.8	375
Process Water Storage (D9)	630	641.4	700
Process Water Storage (D6 + TSF Decant[s])	85	51.5	250

The January 2011 to September 2012 MOP 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 Environmental Impact Statement (**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 (**CMS**) 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 Fuels and Oils Register (**FOR**). The HWCMP (Barrick, 2006c) was approved by the Director-General of the DP&I 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* (EPA, 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 DP&I on 15 May 2009. Further, as described in Paragraph 1.1.2 of 2010 AEMR, on 27 April 2011, Barrick lodged with DP&I a revised HWCMP for approval. The DP&I approved the revision on 12 May 2011.

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 Material Safety Data Sheet (**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.

Barrick prepared a revised HWCMP during the 2010 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 DP&I 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). The eleven findings have been addressed and tracked.

The January 2011 to September 2012 MOP provides further detail regarding hazardous material management undertaken at the CGM.

2.10 OTHER INFRASTRUCTURE MANAGEMENT

This Paragraph 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 fifth, annual operational phase IEA was conducted for the CGM from 11 April to 16 April 2011. 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 sixth 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 (January 2011 – September 2012) to the extent that site conditions permitted.

The Environment Protection Licence No. 11912 Annual Environmental Return (**AER**) for the 23 December 2010 to 22 December 2011 reporting period was submitted to the EPA on 21 February 2012. The AER provides the EPA 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 and blast monitoring points. The reasons for the non-compliances were inaccessibility of monitoring points due to weather, scheduling errors or equipment failure. The occurrence of non-compliances is listed on the EPA website at:
http://www.environment.nsw.gov.au/prpoeoapp/

Paragraphs 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. Paragraph 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 of the DP&I.

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 of the DP&I. Copies of the report shall be submitted by the Applicant to the Director-General of the DP&I, BSC, EPA, NoW, DTIRIS (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 of the DP&I 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 Paragraph 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 2012 IEA was conducted between 16 April and 20 April 2012 by Trevor Brown and Robert Drury of Trevor Brown & Associates to assess the status of the development activities undertaken during the prior year of operations. The audit concluded that the audit findings generally confirmed a high degree of compliance with the Minister's Conditions of Approval, Environment Protection Licence conditions and requirements of the conditions attached to the Mining Lease. Upon receipt this report will be distributed to the above Development Consent stakeholders in July 2012, and be appended in the 2012 AEMR of the next reporting period.

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 Paragraph 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 Surface Water, Groundwater, Meteorological and Biological Monitoring Programme ***(*SWGMBMP**) was revised in accordance with the recommendations made by the CGM Independent Monitoring Panel (**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 EPA, NoW and DPI (Fisheries). The DP&I approved the revised SWGMBMP on 10 March 2010.

To maintain consistency between the SWGMBMP and the FFMP, Barrick also revised the FFMP to incorporate the revised biological monitoring programme as presented in the approved SWGMBMP for the 2011 reporting period.

Air Quality Monitoring Programme

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 National Association of Testing Authorities (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 2010-2011 monitoring periods. ALS Environmental has stated that the algaecide is used for clients where copper analysis is required and has been shown to cause no interference with metals detection.

In 2011 Barrick successfully approached the National Measurement Institute (**NMI**), Sydney Laboratory regarding the creation of a new dust standard for Cowal operations QA/QC works. Barrick will switch from ICP-AES to ICP-MS methodology with ALS, Sydney Laboratory during the 2012 reporting period. Barrick advised the EPA and IMP of this intended change in analysis in February 2012.

Blast Monitoring Programme

The modification to the Development Consent (approved by the DP&I in March 2010) deletes Development Consent Condition 8.4 which was relevant to blast monitoring. A revised Blast Management Plan (**BLMP**) was submitted to the Director-General of the DP&I 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 EPA on 02 March 2011) and reported in the AER to the EPA on the 21 February 2012, 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 BLMP.

Enhanced technology has been installed in the land-based cabinets of blast monitoring units around Lake Cowal. The inundated blast monitoring units in Lake Cowal (BM04, BM05 and BM06) will be replaced with enhanced technology units mounted upon taller tripod stands from May 2012.

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 (SO_2) as SMBS. The addendum to the CMP was approved by the DP&I on 24 March 2010.

As described in Paragraph 1.1.2, Barrick commenced negotiations with the EPA 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. An addendum to the CMP was subsequently prepared and approved by the Director-General of the DP&I on 20 October 2010. A variation of the EPL was also issued by EPA on 24 June 2011 to reflect this change in monitoring location.

SMBS has continued to be an effective CN_{WAD} level control at TSFs during the current reporting period.

Noise Monitoring Programme

As reported in the AER to EPA on 21 February 2012, monitoring was undertaken by SLR Consulting Australia Pty Ltd (formerly Heggies Pty Ltd) (**SLR Consulting**) in January and July 2011. 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 DP&I 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 DP&I 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-Paragraphs below.

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

The EPL requires that Barrick notify the EPA 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/m^2/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 EPA.*

The Dust Management Plan (**DMP**) (Barrick, 2003c) was prepared in accordance with Development Consent Condition 6.1 to establish a dust management strategy for 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/m^2/month) and comparison to the EPA amenity criteria;
- Total suspended particulates (TSP) monitoring results and comparison to the EPA 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 EPA 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
- Community Environmental Monitoring & Consultative Committee (**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 and/or repaired where possible. Recommendations by Dr Cattle to change dust analysis from ICP-AES to ICP-MS will begin in the next reporting period; this change in method will result in a lower detection limit.

3.1.1.2 Environmental Protection Licence

The EPL requires Barrick to undertake dust and Total Suspended Particulates (**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 Environmental Return (**AER**) comprising of a Statement of Compliance and a Monitoring and Complaints Summary at the end of each annual reporting period. Barrick submitted an AER for the period 23 December 2010 to 22 December 2011 to the EPA on 21 February 2012. 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 EPA 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 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	• 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	• 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	• 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 Paragraph 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 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.

Monthly total rainfall measured at the Cowal AWS is shown in Table 8. Total annual rainfall in 2011 was approximately 744.6 mm, with the highest total rainfall recorded during March (146.2 mm) and the lowest recorded in July (11.8 mm). The data indicates that conditions were relatively wet throughout the 2011 monitoring

period, which saw Lake Cowal with a steady supply of water for most of the year. The Cowal AWS was only calibrated three times during the 2011 reporting period due to wet weather.

Table 8
Monthly Rainfall (mm) Measured at CGM in 2010 and 2011

Month	Rainfall in 2010 (mm)	Rainfall in 2011 (mm)
January	2.8	24.4
February	95.6	138.6
March	44.6	146.2
April	50.6	20.2
May	40.0	22.0
June	22.8	29.4
July	62.2	11.8
August	34.0	41.8
September	64.2	13.8
October	94.0	31.0
November	60.2	130.4
December	111.7	135.0
TOTAL	**682.7**	**744.6**

The remaining monthly Cowal AWS meteorological station data for 2011 is presented in Table 9**.**

Table 9
2011 Monthly Average Meteorological Data

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Mean Humidity (%)	45.29	59.18	62.74	65.73	70.52	72.45	69.01	66.83	53.19	57.78	54.41	55.16
Mean Pressure (mbar)	983.75	988.05	988.54	994.62	993.04	994.92	995.33	993.91	991.66	990.17	987.77	986.07
Mean Wind Direction (^{o})	144.75	163.15	159.08	169.78	180.28	200.96	193.91	173.84	188.17	159.97	174.53	124.43
Mean Wind Velocity (m/s) 15min	3.55	3.50	3.20	2.81	2.63	3.23	3.06	2.68	3.79	3.27	3.57	3.60
2m Temp Max (^{o}C)	44.74	42.38	34.55	30.35	26.80	21.95	20.77	25.78	32.85	35.09	38.40	35.13
2m Temp Min (^{o}C)	14.17	11.73	9.06	4.57	-1.87	-1.33	-1.86	-0.45	-0.30	2.83	8.84	8.47

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 (as well as 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 2011, 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 (2012) in accordance with requirements of the DMP. The main conclusions of Dr Cattle's analysis are summarised in Paragraph 3.1.3.2.

Table 10
Monthly and Mean Dust (insoluble solids) Deposition Rates (2011)

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	1.6	1.3	0.9	0.8	0.4	0.5	0.2	0.5	0.7	0.7	2.5	3.9	**1.2**
DG2		4.3	0.6	5.3	1.1	0.4	0.1	0.4	0.8	0.9	1.6	1.3	**1.5**
DG3	3.3		4.0	0.9	0.6	0.6	0.1	0.4	0.5	0.7	1.4	0.4	**1.2**
DG4	2.3	2.2	1.2	0.2	0.5	0.5	0.1	0.4	0.6	0.4	1.1	0.9	**0.9**
DG5	6.7	1.1	1.6	0.5	0.6	0.4	0.2	0.2	0.6	0.4	1.0	1.1	**1.2**
DG6	5.8	2.8	4.1	0.6	0.4	0.5	0.3	0.7	0.8	1.7	3.0	1.6	**1.9**
DG7	3.0	0.8	4.8	0.2	2.7	1.7	0.8	2.0	1.9	5.0	10.6	4.9	**3.2**
DG8	0.6	0.7	0.8	0.2	0.4	1.1	0.2	0.5	0.7	0.6	1.7	2.1	**0.8**
DG9	2.1	0.8	0.9	1.4	0.7	0.6	0.3	2.8	0.9	0.6	1.6	1.8	**1.2**
DG10	1.1	1.9	1.8	1.3	0.8	2.0	24.0	0.9	0.6	3.6	1.5	1.0	**3.4**
DG11	2.0	1.9	12.3	2.1	0.7	6.8	6.4	6.0	1.1	0.5	2.4	1.8	**3.7**
DG12	10.2	2.5	3.9	3.0	5.0	11.7	17.7	16.3	34.1	6.8	14.8	7.6	**11.1**
DG13		1.9	1.7	1.1	0.6	0.5	0.6	1.2	1.4	0.5	4.0	1.8	**1.4**
McLintock's Shed	5.9	2.7	7.8	1.4	1.0	1.5	4.1	1.0	1.1	3.3	5.6	2.4	**3.2**
Duplicate	1.3	4.5	12.4	1.9	2.7	0.7	0.4	0.5	0.8	1.1		2.1	**2.6**
Site Office	3.2	5.0	1.9	0.4	0.6	0.7	2.1	3.2	3.2	9.3	35.2	1.3	**5.5**
Site 52	6.3	3.2	2.6	1.9	3.4	1.6	1.8	1.5	2.1	1.3	8.5	3.0	**3.1**
I5	5.7	16.3	9.8	3.7	2.2	1.6	3.1	1.5	1.3	1.0	4.1	1.9	**4.4**
Lakeside	1.8	3.9	1.4	3.0	1.0	1.5	0.5	1.4	1.5	1.8	3.8	2.5	**2.0**
Mean	**3.8**	**3.2**	**4.0**	**1.6**	**1.4**	**1.8**	**3.3**	**2.2**	**2.9**	**2.1**	**5.8**	**2.3**	

Yellow highlight indicates and exceedance of NSW EPA Impact Assessment Criteria for Dust (EPA, 2001)

Improvements to Dust Monitoring Program

- The issue of dust copper and zinc concentrations remains a problem. All sets of dust samples analysed for metal concentrations in 2011 (including *Trip blank* samples) returned copper and zinc values orders of magnitude greater than those typical of regolith and local soil material. As Cu and Zn-enrichment of the dust itself does not appear to be the cause, Barrick should closely re-examine every step of the dust sampling, transport, processing and analytical procedures to identify the cause of these anomalously high values.
- As was the case in 2010, although the measured concentrations of arsenic in 2011 dust samples were somewhat erratic, mean values for several gauges in or near the ML area were substantially higher than expected for typical regolith materials and should be closely monitored in the near future.
- The innovation of collecting a *Trip blank* sample and analysing such samples for dust amount and metals content is worth continuing whilst ever there is uncertainty about the dust Cu and Zn data. Although the *Trip blank* sample masses are not particularly useful, the metals data from these samples in 2011 have been very useful in indicating that the likely cause of anomalous Cu and Zn data is external to the dust itself. That is, even though most metal analytes are not detectable in the very small *Trip Blank* dust samples, Cu and Zn are present in very high concentrations, suggesting an external source.
- Barrick should consider re-negotiating the need for reporting the average deposition rate of insoluble solids. The inclusion of substantial amounts of combustible organic material (e.g. insects, bird droppings and vegetative material) in the amounts of insoluble solids gives an over-estimate of the actual (inorganic) dust deposition. The ash fraction is a more realistic estimate of inorganic dust deposition.

- Barrick should consider changing the dust metal analysis method from ICP-AES to ICP-MS so that there is a greater probability of dust AS, Cd and Se concentrations being detectable (i.e. above the detection limit).

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 EPA refers to the Australian National Health and Medical Research Council (NHMRC) goal of 90 µg/m^3 annual average TSP. This is the recommended maximum level that should be permitted in urban environments.

The average 2011 TSP level (28 µg/m3) was distinctly lower than that of 2010 (39 µg/m3), this is the lowest recording since 2006 when the High Volume Air Sampler (**HVAS**) was first installed. The TSP did not exceed the National Health and Medical Research Council's (**NHMRC**) goal of 90 µg/m3 for the entire reporting period and the highest TSP reading fell well below at 59 µg/m3.

The consistently low values of TSP recorded during 2011 reflect the very wet weather that occurred across all of New South Wales during that year. At nearby West Wyalong and at other semi-arid and arid locations further upwind of Lake Cowal (e.g. Broken Hill, Wilcannia, Mildura, Hillston), the rainfall received in 2011 was between 30 and 200% greater than the long-term annual average amounts (Bureau of Meteorology, 2012). Consequently, there was negligible dust storm activity in New South Wales during 2011.

Dr Cattle also noted that the fineness of suspended particles intercepted by the sampling unit (<50 µm) 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 <10µm (PM_{10}) emissions were 1,045,976 kg/yr as reported in the 2011 National Pollutant Inventory (NPI) report, this was a 37% decrease from the 2010 reporting period. 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 g/m^2/month as shown in Figures 10a to 10d.

The NSW EPA criterion for acceptable increases in dust deposition at a site is 2 g/m^2/month. The acceptable limit for the annual average deposition rate has been set at 4 g/m^2/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 g/m^2/month.

Table 11
EPA Impact Assessment Criteria for Dust

Pollutant	Averaging Period	Maximum Increase in Deposited Dust Level	Maximum Total Deposited Dust Level
2010-2011 Reporting Period:			
Long term impact assessment criteria for deposited dust			
Deposited Dust	Annual	2 g/m^2/month	4 g/m^2/month
	Averaging Period	**Criterion**	
Long term impact assessment criteria for particulate matter			
Total suspended particulate (TSP) matter	Annual	90 µg/m^3	
Particulate matter < 10 µm (PM_{10})	Annual	30 µg/m^3	
Short term impact assessment criterion for particulate matter			
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/m^2/month with some increases above the 2 g/m^2/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, 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, 2012):

- Temporal and spatial variation in monthly dust deposition in 2011 was only moderate, due in large part to the high amount of rainfall that occurred both in the Project area and in dust source areas to the west of the Project. Overall dust deposition in 2011 was approximately 50% less than that of each of the previous three years.

- Compliance with the assessment criterion of 4 g/m^2/month average annual deposited dust was achieved at 13 out of 15 gauges outside the ML during 2011. Compliance was achieved at all residences and bird-breeding and native fauna areas.

- For the two gauges external to the ML that exceeded the assessment criterion of 4 g/m^2/month (*Site Office*, *I5*), there are different causes for these exceedances. At the *Site Office* gauge, a very large deposit in one sampling period (35 g/m^2/month in November) accounted for nearly 55% of the total deposition in that gauge in 2011. As the November sample was dominated by inorganic solids, it is likely that vandalism and/or contamination by birds occurred. At the *I5* gauge, the two largest deposits contained 73% combustible matter such as insects, bird droppings and vegetative matter. If the combustible fraction of each dust deposit at this gauge was removed, annual average dust deposition would not exceed the assessment criterion.

- Only one of the four gauges located within the ML (*DG12*) yielded levels of deposited dust in excess of 4 g/m^2/month. Levels recorded in these gauges are not relevant to the assessment criterion.

- Due to the relatively high rainfall across New South Wales during 2011, regionally- and remotely-sourced dust was not a significant input to the deposited dust load. Instead, isolated local sources (e.g. bird excreta, insects, vegetative matter, willy-willies, agricultural and mining land-use activities) are thought to account for most of the input to gauges in 2011. A further consequence of the very wet year encountered was that changes in monthly depositional rates at each gauge correlated only very weakly with seasonal conditions. Although greater amounts of deposition occurred in warmer months, if the few conspicuously larger deposits were removed from calculation of means, there would be little variation in the mean deposition across all gauges for all 12 months.

Metals Concentrations in Dust

Although an extensive dust metal dataset was collected during 2011, this dataset appears to contain two serious anomalies; (1) all of the Cu concentrations measured are extremely large, and (2) all of the Zn concentrations measured are extremely large. These anomalies suggest a continuing Cu and Zn contamination issue that was found in both the 2008 and 2010 dust metal datasets. In every dust metal dataset collected since 2006, concentrations of either Zn, or Cu, or both Zn and Cu, have been anomalously high in deposited dust samples.

Aluminium

The concentrations of aluminium (Al) in dust samples ranged from below detection limit in one *DG10* sample, up to 109000 mg/kg in the *DG13* May sample. The mean aluminium concentrations of samples from the various gauges, which ranged from 15128 to 46860 mg/kg, are distinctly smaller than mean values for soil and sediment aluminium (Bowen, 1979). This likely indicates the preferential æolian transport of non-aluminium-containing minerals such as quartz.

Arsenic

The mean dust arsenic (As) concentrations are quite variable across the different gauges and different sampling periods. Mean dust arsenic concentrations were not able to be estimated for five of the gauges (*DG2*, *DG3*, *DG4*,

DG6, *I5*) due to a majority of samples having As concentrations below the detection limit. For the other 14 gauges, ten returned mean arsenic concentrations typical of soil and sediments (6-8 mg/kg; Bowen, 1979), whilst the other four (*DG1*, *DG12*, *DG13*, *S52*) returned mean dust As concentrations 4 to 6 times greater than those of soil and sediments. The January and June sampling periods tended to yield the highest number of large dust arsenic values. Some of the conspicuously high values of dust arsenic were 171 mg/kg at *DG1* in April, 76 mg/kg at *DG13* in June, 72 mg/kg at *S52* in May and June, and 65 mg/kg at *DG13* in April.

Cadmium

Cadmium (Cd) concentrations for the majority of the dust samples analysed are below detection limits, such that mean values of dust cadmium concentrations were obtained for only three gauges (*DG7*, *DG12*, *DG13*). For the measurable samples in these gauges, and for the isolated measurements of cadmium in other gauge samples, the cadmium concentrations obtained are typical of regolith materials (Bowen, 1979). In only five samples were cadmium concentrations ten times greater than the mean cadmium value for soils (0.35 mg/kg; Bowen, 1979), with the highest cadmium concentration of any dust sample being 7.1 mg/kg in *DG7* in the June sampling period.

Copper

The mean copper (Cu) concentrations of dust samples from all 19 gauges are between 4 and 125 times greater than those typical of regolith materials (50 mg/kg; Bowen, 1979). As was the case for the 2010 dust copper concentration data, there appears to have been either contamination of the dust samples, or there has been a measurement issue that has caused spurious results. Of the 19 gauges, the *DG12* gauge returned a conspicuously smaller mean dust copper concentration (196 mg/kg) than the others, while the *DG2*, *DG3* and *DG5* gauges all yielded mean dust copper concentrations of over 4600 mg/kg. Because the *DG12* gauge received the highest amount of deposited dust in 2011 (of any gauge), the smaller copper concentrations in those deposits suggest an external source of contamination, rather than a natural copper-enrichment of the dust itself.

Lead

The vast majority of detectable lead (Pb) concentrations, and the mean lead concentrations for dust samples from each gauge, are similar to those of regolith materials (Bowen, 1979). The only three gauges to yield dust samples with a mean lead concentration of more than twice that of soil materials (35 mg/kg; Bowen, 1979), were *DG4*, *DG13* and *Site 52*.

Selenium

Selenium (Se) concentrations for all dust samples analysed are below detection limits.

Zinc

The mean dust zinc (Zn) concentrations of dust samples from all 19 gauges are between 6 and 135 times greater than those typical of regolith materials (95 mg/kg; Bowen, 1979). As was the case for the 2010 dust zinc concentration data, there appears to have been either contamination of the dust samples, or there has been a measurement issue that has caused spurious results. Of the 19 gauges, the *DG12* gauge returned a conspicuously smaller mean dust zinc concentration (545 mg/kg) than the others, while the *DG2*, *DG3*, *DG6* and *DG7* gauges all yielded mean dust zinc concentrations of over 6500 mg/kg. Because the *DG12* gauge received the highest amount of deposited dust in 2011 (of any gauge), the smaller zinc concentrations in those deposits suggest an external source of contamination, rather than a natural zinc-enrichment of the dust itself.

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 EPA 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.

3.1.5 Further Improvements

As described in Paragraph 3, recommendations made in recent 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 2011 Air Quality Monitoring Results and will likely engage Dr Cattle again to interpret the 2012 data set.

To address the likely contamination issues contributing to elevated copper levels in dust, a non-copper based algaecide was provided by ALS Environmental during 2011 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 investigated 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 the site monitoring program, whilst maintaining current Barrick site standards.
- Barrick will continue 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 standard to improve interpretation of results. A composite solids sample of representative soil and waste materials is to be analysed by laboratories during the next reporting period. Once compiled composite sample will be used within the QA/QC program.
- 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 2012 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 apply further PetroTac dust suppressant to unsealed roads within ML 1535 that are subject to high-frequency light vehicle use during the next reporting period.

The use of saline pit water on heavy mobile equipment haul roads in the open pit mine and waste emplacement areas to reduce dust generation will continue throughout the next reporting period.

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 Erosion and Sediment Control Management Plan (**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 Surface Water, Groundwater, Meteorological and Biological Monitoring Programme (**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 ESCMP 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 DP&I on 10 March 2010. Lake Cowal filled to the TIB by August 2010 and the Lake floor saline bore has remained capped and inundated during the reporting period.

3.2.1.2 Environment Protection Licence

Condition R2 of the EPL requires Barrick to notify the EPA 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	• Minimisation of disturbance to watercourses that cross the road. • Provision of culverts and diversion of runoff from undisturbed areas. • Erection of sediment control barrier 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	• Minimising the area disturbed and restricting access to non-disturbed areas.
Ore Stockpile and Process Plant Area	• Minimising the area disturbed and restricting access to non-disturbed areas. • Settlement/plant runoff storage. • Installation of sediment control barrier. • Installation of runoff collections drains. • Dewatering of settlement storage following rainfall events. • Ripping and rehabilitation of hardstand areas.
Soil Stockpiles	• Use of sediment control barrier 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	• 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	• Minimising the area disturbed and restricting access to non disturbed areas. • Erection of sediment control barrier downslope of small, disturbed areas. • Provision of sediment basins for concentrated runoff areas. • Ripping and rehabilitation of hardstand areas.

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

Project Development	Control Strategy/Management Measure
Temporary Erosion and Sediment Controls Systems	
Borrow Pits	• Use of temporary sediment traps and sediment control barrier filters. • Use of temporary sediment basins.
Earthworks Associated with Landscaping	• Use of sediment control barriers and sediment traps to minimise soil movement.
Up-Catchment Diversion System (UCDS)	• Use of temporary sediment traps and sediment barrier 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	• 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 control 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.
Permanent Erosion and Sediment Controls Systems	
Lake Isolation System	• 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	• Rapid vegetative stabilisation.
Monitoring and Maintenance	• 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 Paragraph 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 2011 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 Paragraph 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 Paragraph's 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 Paragraph's 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 Paragraph's 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 (LPB) indicated that the increased rainfall experienced during 2010 and 2011 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 (TIB) and initial vegetation covers on the adjacent lifts trapping any sediment movement.

Furthermore, water quality results as discussed in Paragraph 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.

Early in 2011, Barrick conducted repair of the eastern edge of UCDS and the installation of a concrete causeway apron, to direct water flow to causeway and additional rock weirs to prevent further erosion damage. These works were very timely given the excess water flows through this area in early-2012 and subsequent lake inundation of the area.

As described in Paragraph 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 Paragraph 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 similar to those carried out during 2010 and 2011 to enhance the eastern edge of the Up Catchment Diversion System (**UCDS**) by repair and strengthening of erosion control structures. Works will include repairing any previous erosion damage and construction of diversion weirs to direct storm water into the E42 Pit or towards Pond D4 catchment.

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 and in early-2012. Further independent confirmation and rehabilitation success monitoring works will occur during the next reporting period. Annual risk review workshops occur during the each 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 works will be conducted on the Northern Diversion Channel to those completed in mid-2011. The outer slopes of the 4th 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 3rd Lift of the NTSF during 2011).

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 NoW, EPA, and DTIRIS (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 Site Water Management Plan (**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.

The revised SWMP was lodged with the DP&I in June 2010 and a further revised version was lodged on 30 November 2010 (following review comments provided by EPA, and NoW). The November 2011 revised SWMP (eastern saline borefield MOD10), is currently awaiting DP&I approval.

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 DP&I approved the revision of the SWGMBMP on 10 March 2010 after consultation with other departments and the IMP.

An addendum to the SWGMBMP was submitted to relevant government departments after DP&I approval of MOD10 in July 2011. The addendum is currently awaiting DP&I approval.

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 December 2010 to 22 December 2011 to the EPA on 21 February 2012. 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 EPA 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 Perimeter Waste (rock) Emplacement (**PWE**));
(iii) Internal Catchment Drainage System (including the permanent catchment divide and contained water storages);
(iv) Integrated Erosion and Sediment Control System (refer to Paragraph 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 Paragraph 3.3.3.

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 Paragraph 3.3.3.2.

3.3.3.2 Performance Outcomes

A summary of the CGM and Lake Cowal surface water monitoring results is provided in Tables 14 and 15 respectively while detailed data is presented in Appendix B. Water quality monitoring at Lake Cowal Inflow Sites

is summarised in Table 16. Lake Cowal sediment monitoring results are presented in Table 17. Unless otherwise noted, all analytical data was obtained by ALS Environmental Laboratory (Sydney, NSW).

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 Cowal Water Level	Lake Cowal gauge board	Monthly (when lake water is present)	Lake water level.
Lake Cowal 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 Cowal 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, and 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 Cowal 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 NoW 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)

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

Weekly Surface Water Monitoring - D1, D4, UCD North, UCD South, Pit Sumps 1, 2 & 3				
Pond D1	**COUNT**	**MIN**	**MAX**	**MEAN**
pH - Field	50	5.25	11.14	8.49
Electrical Conductivity - Field (µS/cm)	50	379	1784	1274
Total Suspended Solids (mg/L)	49	2	164	31.19
Pond D4*	**COUNT**	**MIN**	**MAX**	**MEAN**
pH - Field	50	6.11	10.93	8.01
Electrical Conductivity - Field (µS/cm)	50	3390	64550	9793
Total Suspended Solids (mg/L)	52	3	246	36.98
UCD North	**COUNT**	**MIN**	**MAX**	**MEAN**
pH - Field	53	5.75	8.68	7.73
Electrical Conductivity - Field (µS/cm)	53	99	3160	367
Total Suspended Solids (mg/L)	52	6	282	39.5
UCD South	**COUNT**	**MIN**	**MAX**	**MEAN**
pH - Field	49	6.15	9.73	8.05
Electrical Conductivity - Field (µS/cm)	49	112.9	972	292
Total Suspended Solids (mg/L)	49	54	442	181
Monthly Surface Water Monitoring – D5, D6 and Pit Sumps				
Pond D5	**COUNT**	**MIN**	**MAX**	**MEAN**
pH - Field	13	7.74	9.04	8.34
Electrical Conductivity - Field (µS/cm)	13	1685	17120	9004
Dissolved Oxygen - Field (mg/L)	13	5.56	10.05	8.54
Temperature (Deg C)	13	4.30	25.77	15.50
Turbidity (NTU)	13	1.4	94.7	18.92
Pond D6	**COUNT**	**MIN**	**MAX**	**MEAN**
pH - Field	13	7.47	8.19	7.91
Electrical Conductivity - Field (µS/cm)	13	8780	24990	16024
Dissolved Oxygen - Field (mg/L)	13	3.81	7.82	5.92
Temperature (Deg C)	13	9.0	28.25	18.86
Turbidity (NTU)	13	4.3	79.6	32.29
Pit Sump 1	**COUNT**	**MIN**	**MAX**	**MEAN**
pH - Field	13	6.83	10.21	7.56
Electrical Conductivity - Field (µS/cm)	13	22390	54300	40417
Total Suspended Solids (mg/L)	12	1	281	86.25
Pit Sump 2	**COUNT**	**MIN**	**MAX**	**MEAN**
pH - Field	13	2.38	7.57	6.98
Electrical Conductivity - Field (µS/cm)	13	26970	57600	48928
Total Suspended Solids (mg/L)	12	1	1630	170
Pit Sump 3	**COUNT**	**MIN**	**MAX**	**MEAN**
pH - Field	-	-	-	-
Electrical Conductivity - Field (µS/cm)	-	-	-	-
Total Suspended Solids (mg/L)	-	-	-	-

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	8.43	9.53	8.94
Electrical Conductivity - Field (µS/cm)	4	2869	5360	4065
Oil & Grease (mg/L)	4	<5	<5	-
Pond D3	**COUNT**	**MIN**	**MAX**	**MEAN**
pH - Field	4	8.23	8.69	8.41
Electrical Conductivity - Field (µS/cm)	4	3050	35100	17258
Oil & Grease (mg/L)	4	<5	<5	-
Pond D8B	**COUNT**	**MIN**	**MAX**	**MEAN**
pH - Field	4	8.34	9.82	9.01
Electrical Conductivity - Field (µS/cm)	4	641	872	785
Oil & Grease (mg/L)	4	<5	<5	-
Pond D9	**COUNT**	**MIN**	**MAX**	**MEAN**
pH - Field	4	7.87	8.35	8.07
Electrical Conductivity - Field (µS/cm)^	4	12790	15630	14265
Oil & Grease (mg/L)	4	<5	<5	-
D6	**COUNT**	**MIN**	**MAX**	**MEAN**
Antimony - Total	5	0.004	0.007	0.006
Arsenic - Total	5	0.0010	0.009	0.005
Biochemical Oxygen Demand	4	2	61	20.75
Cadmium - Total	5	0.0007	0.005	0.0023
Calcium - Dissolved	4	217	601	427.75
Chloride	4	3000	5380	4315
Coliforms	4	1	2	1.25
Copper - Total	5	0.61	2.19	1.56
Enterococci	4	1	1	1
Escherichia coli	4	1	2	1.25
Faecal Coliform -Total	4	1	2	1.25
Iron - Total	4	0.05	2.03	0.88
Lead - Total	5	0.0010	0.02	0.006
Magnesium - Dissolved	4	186	331	274.75
Manganese - Total	5	0.36	0.58	0.50
Mercury - Total	4	0.00010	0.00010	0.00010
Potassium - Dissolved	5	191	558	335
Selenium - Total	4	0.01	0.01	0.01
Sodium - Dissolved	5	1730	4310	2800
Sulfates	4	788	3410	2074.50
Total Dissolved Solids	4	6300	14500	10300
Total hardness as CaCO3	4	1310	2860	2182.5
Total Suspended Solids	14	26	179	68.86
Zinc - Total	5	0.02	0.59	0.15

^ 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 Cowal Water Quality Results (November 2010)	Lake Cowal Water Quality Results (2011) Ranges (Mean)	Lake Cowal Baseline Water Quality Results (1991 -1992)	Aquatic Ecosystems^ ~
Alkalinity (mg/L)	105	64 – 142 (100)	NA	NA
Suspended Solids (mg/L)	6 - 192	5 – 184 (38)	NA	NA
Acidity – Alkalinity scale (pH)	7.03 – 8.27	7.22 – 8.82 (8.14)	8.27 – 8.67	6.5 to 8.0
Electrical Conductivity (µS/cm)	100 – 701	190 – 727 (322)	222 – 1557[1, 3]	20 to 30 µS/cm[1]
Turbidity (NTU)	8.2 – 211	11.5 – 144 (53.3)	22 – 224	1 to 20[2]
Dissolved Oxygen (mg/L)	0.84 – 8.89	1.64 – 14.74 (9.76)	7.3 – 11.5	90 to 110 (derived from daytime measurements)
Temperature (°C)	24.9	9.6 – 29.8 (18.4)	NA	Not applicable
Depth (m)	0.1 – 1.2	0.6 – 2.5 (1.7)	0.2 – 2.0	Not applicable
Lake Water Level (m)	204.5	205.25 – 205.75	205.1	Not applicable
Total Iron (mg/L)	6.50	0.36 – 11.00 (2.50)	NA	NA (insufficient data)
Calcium (mg/L)	17	10 – 26 (19)	NA	NA
Magnesium (mg/L)	10	6 – 12 (9)	NA	NA
Potassium (mg/L)	15	12 – 19 (15)	NA	NA
Sodium (mg/L)	19	13 – 35 (24)	NA	NA
Chloride (mg/L)	25	19 – 41 (28)	NA	NA
Sulphate (mg/L)	3	1 – 10 (2)	NA	NA
Cations (mg/L)	2.81	1.98 – 3.77 (3.02)	NA	NA
Anions (mg/L)	2.83	1.93 – 3.67 (2.91)	NA	NA
Arsenic (mg/L)	0.006[3] (total)	<0.001 – 0.007 (0.003[3]) (total)	0.0026[3] (total)	0.008
	0.005[3] (dissolved)	<0.0003 – 0.006 (0.0026[3]) (dissolved)	0.0016[3] (dissolved)	
Cadmium (mg/L)	0.0001[3] (total)	<0.0001 - 0.001 (0.0001)[3] (total)	0.000055[3] (total)	0.0006
	0.0001[3] (dissolved)	<0.0001 – 0.0004 (0.0001)[3] (dissolved)	0.00005[3] (dissolved)	
Molybdenum (mg/L)	0.001[3] (total)	<0.001 – 0.006 (0.0012)[3] (total)	NA	NA (insufficient data)
	0.001[3] (dissolved)	<0.001 - 0.001[3] (0.001) (dissolved)	NA	
Nickel(mg/L)	0.007[3] (total)	<0.001 – 0.009 (0.0036)[3] (total)	NA	0.008
	0.004[3] (dissolved)	<0.001 – 0.004 (0.0023)[3] (dissolved)	NA	
Lead (mg/L)	0.003[3] (total)	<0.001 – 0.004 (0.0013)[3] (total)	0.0029[3](total)	0.001
	0.001[3] (dissolved)	<0.001 - 0.001[3] (0.001) (dissolved)	0.0005[3] (dissolved)	

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

Parameter	Lake Cowal Water Quality Results (November 2010)	Lake Cowal Water Quality Results (2011) Ranges (Mean)	Lake Cowal Baseline Water Quality Results (1991 -1992)	Aquatic Ecosystems^ ~
Antimony (mg/L)	0.001[3] (total)	<0.001 – 0.004 (0.0014)[3] (total)	NA	NA (insufficient data)
	0.001[3] (dissolved)	<0.001 - 0.001[3] (0.001) (dissolved)	NA	
Zinc (mg/L)	0.012[3] (total)	<0.005 – 0.038 (0.0074)[3] (total)	0.012[3](total)	0.0024
	0.015[3] (dissolved)	<0.005 – 0.022 (0.0109)[3] (dissolved)	0.00306[3] (dissolved)	

Source: McMahon, D.M. (2012)
After: North Limited (1998) and NSR Environmental Consultants (1995)
^ Guideline values in accordance with ANZECC and ARMCANZ (2000).
~ 99% protection level trigger values for toxicants – lakes and reservoirs.
NA – Not Available.
[1] ANZECC and ARMCANZ (2000) notes that conductivity in lakes is generally low, but will vary depending upon catchment geology.
[2] ANZECC and ARMCANZ (2000) notes that lakes in catchments with highly dispersible soils will have high turbidity.
[3] Mean values.

Table 16
Summary of Lake Cowal Inflow Water Monitoring Results for the Reporting Period

Parameter	Lake Inflow Water Quality Results (2011) Ranges (Mean)	Lake Cowal Water Quality Results (2011) Ranges (Mean)[#]	Lake Cowal Baseline Water Quality Results (1991 -1992)[#]	Aquatic Ecosystems^ ~
Alkalinity (mg/L)	16 – 79 (56.25)	64 – 142 (100)	NA	NA
Suspended Solids (mg/L)	11 – 201 (53.25)	5 – 184 (38)	NA	NA
Acidity – Alkalinity scale (pH)	7.17 – 8.82 (7.37)	7.22 – 8.82 (8.14)	8.27 – 8.67	6.5 to 8.0
Electrical Conductivity (µS/cm)	126 – 348 (198.5)	190 – 727 (322)	222 – 1557[1, 3]	20 to 30 µS/cm[1]
Turbidity (NTU)	31.3 – 62 (46.4)	11.5 – 144 (53.3)	22 – 224	1 to 20[2]
Total Iron (mg/L)	0.9 – 18.3 (6.12)	0.36 – 11.00 (2.50)	NA	NA (insufficient data)
Calcium (mg/L)	3 – 15 (8.25)	10 – 26 (19)	NA	NA
Magnesium (mg/L)	2 – 9 (4.75)	6 – 12 (9)	NA	NA
Potassium (mg/L)	8 – 17 (12.38)	12 – 19 (15)	NA	NA
Sodium (mg/L)	11 -34 (17.38)	13 – 35 (24)	NA	NA
Chloride (mg/L)	9 – 28 (17.88)	19 – 41 (28)	NA	NA
Sulphate (mg/L)	1 -13 (3)	1 – 10 (2)	NA	NA
Cations (mg/L)	1.11 – 2.4 (1.71)	1.98 – 3.77 (3.02)	NA	NA
Anions (mg/L)	1.26 – 2.27 (1.74)	1.93 – 3.67 (2.91)	NA	NA
Arsenic (mg/L)	0.001 - 0.007 (0.003)[3] (total)	<0.001 – 0.007 (0.003[3]) (total)	0.0026[3] (total)	0.008
	0.001 – 0.004 (0.002)[3] (dissolved)	<0.0003 – 0.006 (0.0026[3]) (dissolved)	0.0016[3] (dissolved)	
Cadmium (mg/L)	<0.0001 – 0.0001 (0.0001)[3] (total)	<0.0001 - 0.001 (0.0001)[3] (total)	0.000055[3] (total)	0.0006
	<0.0001 - <0.0001 (<0.0001)[3](dissolved)	<0.0001 – 0.0004 (0.0001)[3] (dissolved)	0.00005[3] (dissolved)	

Table 16 (Continued)
Summary of Lake Cowal Inflow Water Monitoring Results for the Reporting Period

Parameter	Lake Inflow Water Quality Results (2011) Ranges (Mean)	Lake Cowal Water Quality Results (2011) Ranges (Mean)[#]	Lake Cowal Baseline Water Quality Results (1991 -1992)[#]	Aquatic Ecosystems^ ~
Molybdenum (mg/L)	<0.001 – 0.004 (0.002)[3] (total)	<0.001 – 0.006 (0.0012)[3] (total)	NA	NA (insufficient data)
	<0.001 - <0.001 (<0.001)[3] (dissolved)	<0.001 - 0.001[3] (0.001) (dissolved)	NA	
Nickel (mg/L)	0.001 – 0.026 (0.008)[3] (total)	<0.001 – 0.009 0.0036[3] (total)	NA	0.008
	0.002 – 0.005 (0.003)[3] (dissolved)	<0.001 – 0.004 0.0023[3] (dissolved)	NA	
Lead (mg/L)	<0.001 – 0.029 (0.006)[3] (total)	<0.001 – 0.004 0.0013[3] (total)	0.0029[3](total)	0.001
	<0.001 – 0.003 (0.002)[3] (dissolved)	<0.001 - 0.001[3] (0.001) (dissolved)	0.0005[3] (dissolved)	
Antimony (mg/L)	<0.001 - 0.004 (0.002)[3] (total)	<0.001 – 0.004 0.0014[3] (total)	NA	NA (insufficient data)
	<0.001 - <0.001 (<0.001)[3] (dissolved)	<0.001 - 0.001[3] (0.001) (dissolved)	NA	
Zinc (mg/L)	<0.005 – 0.074 (0.022)[3] (total)	<0.005 – 0.038 0.0074[3] (total)	0.012[3](total)	0.0024
	<0.005 – 0.219 (0.046)[3] (dissolved)	<0.005 – 0.022 0.0109[3] (dissolved)	0.00306[3] (dissolved)	

Source: McMahon, D.M. (2012)
After: North Limited (1998) and NSR Environmental Consultants (1995)
^ Guideline values in accordance with ANZECC and ARMCANZ (2000).
~ 99% protection level trigger values for toxicants – lakes and reservoirs.
NA – Not Available.
[1] ANZECC and ARMCANZ (2000) notes that conductivity in lakes is generally low, but will vary depending upon catchment geology.
[2] ANZECC and ARMCANZ (2000) notes that lakes in catchments with highly dispersible soils will have high turbidity.
[3] Mean values.

Table 17
Summary of Lake Cowal Sediment Monitoring Results for the Reporting Period

Parameter	Lake Cowal Sediment Results (November 2010)	Lake Cowal Sediment Results (2011) Range (Mean)	Aquatic Ecosystems^
Arsenic (mg/L)	2.6[1] (total)	0.02 – 5.6 (3.1)[1] (total)	20
	1.5[1] (extractable)	<0.1 – 1.8 (1.25)[1] (extractable)	
Cadmium (mg/L)	1[1] (total)	<1 - <1 (1)[1] (total)	1.5
	0.1[1] (extractable)	<0.1 - <0.1 (0.1)[1] (extractable)	
Lead (mg/L)	15[1] (total)	8 – 20 (13.7)[1] (total)	50
	8.7[1] (extractable)	3.8 – 15 (8.8)[1] (extractable)	
Zinc (mg/L)	31.5[1] (total)	14 - 57 (32.5)[1] (total)	200
	3.5[1] (extractable)	1 - 14.8 (3.9)[1] (extractable)	
Antimony (mg/L)	5[1] (total)	<5 - <5 (5)[1] (total)	2
	1[1] (extractable)	<1 – 6.9 (1.1)[1] (extractable)	

Source: McMahon, D.M. (2012)
After: NSR Environmental Consultants (1995)
^ Guideline values in accordance with ANZECC and ARMCANZ (2000) recommended sediment quality guidelines
[1] Mean value

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 Australian and New Zealand Environmental Conservation Council (**ANZECC**) and Agriculture and Resource Management Council of Australia and New Zealand (**ARMCANZ**) (2000) guidelines has not been undertaken on on-site 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 summary of the on-site water quality monitoring results and a comparison of all lake water and sediment monitoring results against ANZECC and ARMCANZ (2000) guidelines is provided below.

Up Catchment Diversion North (**UCD North**) and Up Catchment Diversion South (**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.

Electrical conductivity and pH values remained fairly constant during the 2011 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 2011, likely attributed to rainfall events. Rainfall events are also a contributing factor to pond D1 not having an increasing trend of Electrical Conductivity (**EC**) 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 2011 on-site water quality 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 2011.

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 a monthly basis.

Lake Cowal Surface Water Monitoring Results

A summary of the 2011 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. 2011 saw the first full year of Lake Water monitoring since production commenced in 2005.

Of the 34 lake surface water sample sites specified only 29 were able to be sampled in February 2011 with the sites L9 to L13 being dry at the time of sampling. All 34 sites were able to be sampled in May and August 2011. 32 sites were able to be sampled in November 2011 with the sites L12 to L13 being unable to be accessed at the time of sampling.

pH and Electrical Conductivity

pH results ranged from 7.22 to 8.82 with a mean of 8.14. This is lower overall than the baseline water quality data collected in 1991 – 1992 (Appendix B) and slightly higher than the ANZECC and ARMCANZ (2000) upper level of 8.0 and 2010 results.

EC results ranged from 190 to 727 µS/cm with a mean of 322 µS/cm which is overall lower than the baseline data but higher than the ANZECC and ARMCANZ (2000) level of 30 µS/cm for slightly disturbed ecosystems (lakes). However, ANZECC and ARMCANZ (2000) note that conductivity in lakes will vary depending on catchment geology (Appendix B). These results are similar to those recorded in 2010.

Turbidity and Suspended Solids

Turbidity results ranged from 11.5 to 144 mg/L NTU with a mean of 53.3 mg/L. No baseline data for turbidity from 1991 – 1992 is available. The turbidity results are above the ANZECC and ARMCANZ (2000) level of 20 mg/L for slightly disturbed ecosystems (lakes). However, as described in Table 4 of Appendix B, ANZECC and ARMCANZ (2000) note that lakes in catchments with highly dispersive soils will have high turbidity. These results are slightly lower to those recorded in 2010.

The suspended solids results ranged from 5 to 184 mg/L with a mean of 38 mg/L which is similar to the baseline data and 2010 results. The ANZECC and ARMCANZ (2000) recommended guideline trigger values for toxicants do not include a trigger value for suspended solids. (Source: McMahon, D.M. (2012)).

Heavy Metals

The mean results for dissolved heavy metals are below or equal to the ANZECC and ARMCANZ (2000) default trigger values, except for zinc. The mean 2011 monitoring results for total heavy metals marginally exceeded ANZECC and ARMCANZ (2000) default trigger values, except for arsenic which remained below. Notwithstanding, the mean 2011 results for total heavy metals are similar to the mean total baseline results recorded in 1991-1992 and 2010 results which were also above ANZECC and ARMCANZ (2000) values and were similar to the mean 2010 monitoring results.

Lake Cowal Sediment Monitoring Results

A summary of 2011 Lake Cowal sediment data is presented in Table 17.

Of the 34 lake surface water sample sites specified only 29 were able to be sampled in February 2011 with the sites L9 to L13 being dry at the time of sampling. All 34 sites were able to be sampled in May and August 2011. 32 sites were able to be sampled in November 2011 with the sites L12 to L13 being unable to be accessed at the time of sampling.

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 2011 sediment monitoring results against the ANZECC and ARMCANZ (2000) default trigger values for sediment indicate that the 2011 extractable results were below the recommended trigger values (McMahon, 2012).

Despite the increased rainfall, no interactions 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 Paragraph 1.1.2, the revised SWMP (November 2010) was withdrawn and the revised SWMP (November 2011) is currently awaiting DP&I approval. The monitoring and management measures as described in the SWGMBMP (addendum to the SWGMBMP was submitted to relevant government departments after DP&I approval of MOD10 in July 2011 Barrick (Cowal) Limited is currently awaiting DP&I approval of the February 2011 addendum), will continue to be implemented during the next reporting period.

Lake water and sediment monitoring data will continue to be collected during the next reporting period should the lake level remain at or above 204.5 m AHD, 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 NoW, EPA, and NSW DPI-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 2010 to 22 December 2011 to the EPA on 21 February 2012. 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 Bland Creek Palaeochannel (**BCPC**) production bores. Each of the four BCPC production bore licences require Barrick to provide the NoW 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 NoW). Barrick has met all NoW reporting requirements during the reporting period. The BCPC licences daily limit of 15 ML/day was not exceeded during the reporting period.

During the previous 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. The November 2011 revised SWMP (eastern saline borefield MOD10), is currently awaiting DP&I approval. NoW summarily issued two presently unused production bore and monitoring bore piezometer licenses. The eastern saline borefield and associated production bore licences are described in 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:

(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 Paragraph 3.2); and
(v) 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 Up Catchment Diversion System (**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 Paragraph 3.4.3.

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 18. 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 Paragraph 3.4.3.2.

Table 18
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.

Table 18 (Continued)
Groundwater Monitoring Program

Site	Monitoring Frequency	Parameters
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.
NoW 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 BCPC in 2011 is presented in Table 19. The total volume extracted during the reporting period was 695.43 ML. This equates an average of 1.91 ML/day over the 12 month period which is within the licence limit of 15 ML/day.

Table 19
Bland Creek Palaeochannel Production Bores - Extraction Volumes

Month	Extraction Volume (ML)				
	PB1	PB2	PB3	PB4	Total
January	22.10	34.11	5.98	17.93	80.12
February	43.04	6.28	0.38	4.55	54.25
March	43.39	2.07	2.64	0.50	48.60
April	34.06	0	8.06	2.50	44.62
May	36.32	0	0.13	0.08	36.53
June	33.48	0	0.06	0	33.54
July	49.07	16.89	39.81	16.92	122.69
August	56.92	19.92	65.73	0.07	142.64
September	5.87	0.06	4.61	0	10.54
October	0	0.45	0	0.001	0.451
November	0.29	38.98	0.02	24.36	63.65
December	0	2.81	0	54.99	57.80
ANNUAL TOTAL					**695.43**

As described in Section 2.8, the groundwater supply borefield within ML 1535 was commissioned in mid-2009 (Production bore licences #70BL232691 and #70BL232692 were granted by the NoW for the period 28 January 2010 to 27 January 2015). The groundwater supply borefield has been estimated to supply up to 0.5 ML per day. No water was extracted from the saline groundwater supply borefield within ML 1535 during the reporting period (Paragraph 2.8).

As discussed in Paragraph 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).

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 though 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 CGM ML 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 Coffee Partners (1995) identified five aquifer units across the mining lease and Jemalong Borefield area as summarised in Table 20.

Table 20
Preliminary Groundwater Model for the Cowal Mining Lease

Aquifer Unit	Sub-Unit and Occurrence	Hydrochemical Facies Characteristics	Intersecting Bores
Cowra Formation (Tertiary-Quaternary)	Upper Alluvial Aquifer - across mining lease and Cowal 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 Cowal 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 Cowal 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 Cowal	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-HCO3 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 2011 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 2011.

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 20. Summary stiff plots of six end-member representative bores are shown on Figures 13a and 13b.

In their evaluation of the 2011 groundwater monitoring data, Coffey Geotechnics concluded (Coffey Geotechnics, 2012):

- 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, 2012).

The groundwater quality results and trends reported in this assessment illustrate that the water management control measures for full containment of mine site water and control of runoff from the TSF and waste rock emplacements 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. Surveys were also conducted in June 2009, March 2010 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 Paragraph 1.1.2, the revised SWMP (November 2010) was withdrawn and the revised SWMP (November 2011) is currently awaiting DP&I approval. The monitoring and management measures as described in the SWGMBMP (addendum to the SWGMBMP currently awaiting DP&I approval), will continue to be implemented during the next reporting period.

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 EPA and DTIRIS (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 DTIRIS (Minerals) and EPA, 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, EPA and DTIRIS (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 DP&I 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 (CN_{WAD}) cyanide results to the Director-General of the DP&I, EPA 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 DP&I on 24 March 2010.

As described in Paragraph 1.1.2, Barrick commenced negotiations with the EPA 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. An addendum to the CMP was subsequently prepared and approved by the Director-General of the DP&I on 20 October 2010. A variation of the EPL was also issued by EPA 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 2010 to 22 December 2011 to the EPA on 21 February 2012. 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 EPA 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 DP&I 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 TSF's to the process plant. 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.

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 LPB 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 December 2010 meeting in the BSC Chambers particularly focused on emergency preparedness and general management of cyanide. The September 2011 CEMCC session at the West Wyalong High School included a talk about the natural cycles of Lake Cowal by Professor David Goldney. The Forbes Shire Council will host a CEMCC meeting in Forbes during 2012.

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. Effective 3 May 2012 Cowal Gold was again re-certified to the Code for a further 3 years after an independent ICMI site audit was conducted on 12-15 December 2011. 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 DP&I, EPA 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 Paragraph 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 DP&I 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 21. Results have remained low and in control.

Table 21
WAD cyanide Day-Night Shift Monitoring Data for Tailings Discharge - Northern Tailings Facility (01/01/2011 to 17/01/2011) Southern Tailings Facility (18/01/2011 to 31/12/2011)

NTSF	WAD Cyanide (mg/L)			Total Cyanide (mg/L)		
	Site Lab	SGS, WWy	NATA, Syd	Site Lab	SGS, WWy	NATA, Syd
No. Samples Taken	33	33	3	3	3	3
Minimum	3.48	2.14	3.4	18.44	11.2	3.4
Mean	9.06	7	6.86	22.32	17.93	6.86
Maximum	20.79	16.1	9.6	27.16	22.4	9.6
STSF	WAD Cyanide (mg/L)			Total Cyanide (mg/L)		
	Site Lab	SGS, WWy	NATA, Syd	Site Lab	SGS, WWy	NATA, Syd
No. Samples Taken	661	660	48	48	48	48
Minimum	0.01	0.07	1.32	6.14	9.76	2.22
Mean	6.75	5.47	4.21	17.53	19.19	6.15
Maximum	17.61	16	7.55	27.35	29.3	10.1

3.5.3.2 Performance Outcome

Two groundwater monitoring bores detected total cyanide levels above the minimum detection limit of 0.004 mg/L during the reporting period. Processing plant monitoring bore PP02 detected 0.004 mg/L when sampled on 27 September 2011, but was below detection when sampled on the 13 December 2011. A TSF monitoring bore, MON01A recorded 0.045 mg/L on the 21 November 2011. Follow up monitoring of this bore on the 12 January 2012 did not detect cyanide above the laboratory Limit of Reporting (**LOR**).

All other groundwater results for cyanide in the monitoring period remained below the laboratory detection limit.

3.5.4 Reportable Incidents

No reportable Incidents during the reporting 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 DP&I 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 EPA 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 DP&I 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 DP&I on 20 October 2010 and a variation of the EPL issued on 24 June 2011. Point 48 replaced Points 46 and 47 in the varied EPL.

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, 2003) was prepared in accordance with Development Consent Condition 8.2(a)(v) to establish a monitoring programme for 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 LPMBP, 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 CGM and are further discussed in Paragraphs 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 DP&I on 6 March 2006.

A prior amendment of the HWCMP was approved by the Director-General of the DP&I 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 was 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.

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 (SO_2) as sodium metabisulphite (SMBS). The addendum to the HWCMP was approved by the DP&I on 10 March 2010.

In accordance with Development Consent Conditions 3.2 ad 5.7, the HWCMP was updated/ revised to reflect changes in operational practice since the commencement of 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 EPA (formerly OEH) and BSC for comment and received DP&I approval in accordance with Development Consent Condition 5.7 early during the 2011 reporting period.

3.6.1.2 Environment Protection Licence

Condition R2 of the EPL requires Barrick to notify the EPA 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 (NSW)* (**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 (NSW)* (**CLM Act**) imposes a duty on a person who causes contamination or who is the owner of contaminated land to notify the EPA 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 EPA 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). This assessment report remains stored at CGM as per NSW SEPP 55 requirements (POEO Act).

In these circumstances, the following documents were relevant:

- Section 10 of the CLM Act allows the EPA 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 (rock) 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 is 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 Paragraph 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 DP&I 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 LPB 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 LPB and TIB are the management measures described in the LPMBP (Barrick, 2003f). The NSW DSC approved Barrick’s request for the de-prescription of the LPB from the DSC

Register of Dams (5 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 21 metres 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 (NSW) NPW Act), 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 Paragraph 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 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 Paragraph 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 LPB, TIB 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 during the reporting period. No seismic events were recorded during the reporting period.

Given that 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 has been no prior need to read the piezometers. However, due to the Lake filling event of mid-2010, the piezometers were again measured during the reporting period. Monitoring of the Lake Protection Bund piezometers began during early-2011. No influence beyond that anticipated in the shallow aquifer response zone has occurred since the lake fill.

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 22. The soil stockpile locations are shown on Figure 4.

Table 22
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	26,100
3rd Lift NTSF	24,000	0
Pond D1 north trial plots	3,600	0
Total	27,600	26,100

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 LPB 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 DP&I 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 LPB 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 varied CGM MOP (2011 - 2012).

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 Paragraph 3.18.

3.6.5 Further Improvements

Soil stockpile characterisation commenced during the reporting period and will conclude during the 2012 reporting period. Characterisation will allow Barrick to better define the quality and volume of soil resources present and inform rehabilitation efforts now and into the future. The next MOP will describe how higher salinity subsoil and topsoil stockpiles will be ameliorated by gypsum treatment.

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 Flora and Fauna Management Plan (**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 Threatened Species Management Protocol (**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 Rehabilitation and Offset Management Plan (**ROMP**) was prepared in consultation with the EPA, NoW and BSC and was submitted to the DP&I for approval during the reporting period (Barrick (Cowal) Limited is currently awaiting approval of the ROMP by the DP&I). Development Consent Conditions 3.6(d) provides:

> ***Rehabilitation and Offset Management Plan***
>
> *3.6(d) The Applicant shall prepare and implement Rehabilitation and Offset Management Plan for the Project to the satisfaction of DTIRIS and the Director-General. This plan must be prepared in consultation with EPA, NoW and BSC, and be submitted to the Director-General and DTIRIS (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), understory 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 DTIRIS (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 2001, 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 EPA 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 DP&I of the provision facility currently with DTIRIS (Minerals) holding the necessary security bond 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 VCPL) (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 (**EEC**s) for three systems as prepared and reviewed by relevant departments prior to approval by the Director-General of the DP&I. 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 23). The management areas are shown on Figure 17.

Table 23
Offset Management Areas

Offset Management Area	Description	Minimum Size (hectares [ha])
Offset Enhancement Area (Southern Offset Area)	Enhancement through natural regeneration and management for conservation.	110
Offset Revegetation Area (Northern Offset 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 (Northern Offset Area) and Offset Enhancement Areas (Southern Offset Area) and will include:

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

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 VCPL (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 (this area was 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 authorised personnel only.

Barrick (Cowal) will review approval from DP&I 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) (Paragraph 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 VCPL (Figure 16). The VCP was applied to the NTSF east wall toe haul road area and the subsoil stockpile area adjacent to the STSF during September 2011.

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 December 2011 by Carnegie Natives. Weed management measures resulting from the survey will be implemented during 2012.

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

Weed management is discussed further in Paragraph 3.9.2.

Flora Monitoring Program

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

- Compensatory Wetland;
- Rehabilitation Areas and Trials;
- Offset Management Areas;
- *Pilularia novae-hollandiae* (Austral Pillwort) habitat; and
- Remnant Vegetation Enhancement Programme areas.

Monitoring of revegetated and rehabilitated areas within ML1535 and the offset areas was conducted during the reporting period in accordance with the ROMP, and is discussed in Paragraph 5.

3.7.3.2 Performance Outcomes

The Australian Museum Business Services undertook flora surveys covering Barrick-owned land surrounding the CGM between the 28 to 30 October 2011 and between 13 to 16 December 2011. The aim of the flora surveys was to map and validate vegetation communities present, assess vegetation condition, and target potentially occurring threatened flora. A total of 116 full floristic survey sites were proposed to be placed within the study area along with an additional 65 rapid data point sites which recorded dominant species only.

No threatened species were found during the surveys. One threatened ecological community, the Weeping Myall Woodland, was identified. This community is listed under both the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* and the *NSW Threatened Species Conservation Act 1995*.

The Australian Museum Business Services conducted additional targeted flora work (including surveys for the Austral Pillwort) during April 2012 and the results of these surveys will be reported in the next AEMR.

Compensatory Wetland

Monitoring of regeneration in the Compensatory Wetland (**CW**) was undertaken by DnA Environmental between the 7 to 15 November 2011. 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 filling of Lake Cowal during 2010, only two of the twelve compensatory wetland sites could be accessed that year. Further rain in early 2011 ensured those ten sites remained inundated during the 2011 survey. Consequently, the remaining two monitoring sites (CW3 and GW1) were the only sites accessible for both the 2010 and 2011 surveys. Comparisons between the compensatory, remaining and grazed wetland areas could therefore not be made this year (DnA Environmental, 2012b).

The 2011 report includes data from 2008 and 2009 for all 12 monitoring sites, but only data from CW3 and GW1 in 2010 and 2011 (DnA Environmental, 2012b).

CW3 and GW1, situated on the lake foreshore, shows a reduced species diversity in 2011 compared to 2010 and due to their partial inundation there was also a net loss of species from these plots. Within the lake bed, Lignum shrubs continued to be well established, were large enough to protrude from the water and provide habitat and nesting sites for a range of migratory birds (DnA Environmental, 2012b).

Results of the 2011 monitoring included:

- Despite significant rainfall during 2010 and early 2011, most trees within the monitoring plots continue to be considered in “medium” health condition;
- Tree hollows were present in GW1, however site CW3 contained a dominance of smaller/ younger trees, hence no hollows were noted;
- Five trees within CW3 and all five trees within GW1 were heavily laden with bud, flowers and fruit;
- No further recruitment of shrubs and juvenile trees has taken place in CW3 since 2009, with the population standing at 18;
- In GW1, there has been an increase of four shrub/ juvenile tree individuals, although the population remained low with a total of only five individuals;
- *Lycium ferocissimum* (African Boxthorn) numbers have been declining since 2009 due to the targeted weed control program, and no specimens were present in CW3 or GW1 in 2011;
- A significant increase in total groundcover in both CW3 and GW1 with both sites reaching 100% coverage in 2011, however site CW3 was partially inundated with the edge of the lake at 27.60m along the vegetation transect hence data could not be obtained for the last four replicates;
- The dry conditions prior to the 2011 monitoring led to a reduction in native and exotic species in both CW3 and GW1 (compared to 2010); these sites recorded 28 and 32 natives and 9 and 13 exotic species respectively;
- A noxious weed of the Bland Shire, Xanthium occidentale (Nagoora Burr) was recorded inGW1.

It appears grazing pressure and climatic influences have had the largest effect on the wetland communities with early results indicating that improved management in the grazed wetland areas is required, particularly in dry years (DnA Environmental, 2012b). With ten of the twelve sites situated within the Lake bed inundated over the past two years, there appears to be little merit in undertaking this compensatory wetland monitoring program while Lake Cowal continues to be inundated (DnA Environmental, 2012b).

Monitoring of the CW regeneration will continue annually.

In order to limit 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 Paragraph 5.4. Also discussed in Paragraph 5.4 are the results of the 2011 rehabilitation trials monitoring and work carried out on the development of detailed CGM rehabilitation completion criteria for the mine.

Offset Management Areas

Two monitoring sites were established at each of the Offset Management Areas (Northern Offset Area and Southern Offset Area) in 2010 in accordance with the ROMP. The Offset Areas are discussed in Paragraph 5 along with the results of the 2011 monitoring program.

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 7 – 15th November 2011. 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 or recently receded water and areas previously surveyed.

Above average rainfall throughout 2010 resulted in localised flooding and the inundation of a large portion of Lake Cowal. The wet weather continued into 2011, resulting in Lake Cowal maintaining a very high water level throughout the year. At the time of monitoring, the water level was 205.4mRL.

Hot, dry weather preceding the survey resulted in the Lake starting to recede, and all gilgais were dry during the 2011 survey (DnA Environmental, 2012a).

The Austral Pillwort was not found during 2011 despite expanding the search areas. Suitable habitat may have been present along the receding lake foreshore; however no specimens were located during the survey.

The increased density of vegetation resulting from reduced grazing pressure, may be impacting on Austral Pillwort populations, but the extent that this has occurred is presently unknown (DnA Environmental, 2012). The results of surveys for the Austral Pillwort conducted by the Australian Museum Business Services during April 2012 will be reported during the next reporting period.

Remnant Vegetation Enhancement Program (RVEP)

A survey of the RVEP plots was undertaken by DnA Environmental between the 07 to 15 November 2011.

Due to the August 2010 filling of Lake Cowal, the number of Revegetation Enhancement Project (**RVEP**) monitoring sites has previously been reduced from ten to five. Due to the further inundation of Lake Cowal, one site (RVEP03) was unable to be accessed during the 2011 survey. Subsequently, only four RVEP sites were assessed – Hill01, Hill03, Hill05 and RVEP04 (DnA Environmental, 2012d). Despite the above average rainfall received during 2011, most of the year and several months preceding the survey were especially dry, which had a significant impact on the floristic diversity in most sites (DnA Environmental, 2012d).

All four sites were suffering from the prolonged dry conditions, with few trees considered to be in healthy condition. The general health of the trees has shown a decline in condition up until above average rainfall was experienced in 2010. As a result, there was an overall improvement in the condition of the vegetation since 2010, and up to four individuals were bearing reproductive structures at the time of the 2011 survey.

Native shrubs and juvenile trees have shown a positive increase in numbers in 2011, with the exception of flora species at site Hill05. There was a reduction in shrub density at this site due to high competition and heavy browsing by macropods. No monitoring site recorded exotic shrubs during the 2011 survey.

There has been no consistent trend in changes in total ground cover since 2008, but sites Hill01, Hill05, RVEP03 and RVEP04 have demonstrated an overall improvement due to improved seasonal conditions, which have promoted plant growth and the development of a litter and cryptogram layer. In 2011, the drier conditions have resulted in a decline in perennial plant cover but there were generally improved levels of litter cover in the majority of sites. Overall, there is generally adequate total ground cover in all sites - ranging between 86% and 93%.

Changes in total floristic diversity since 2008 has shown no consistent trend over time however changing seasonal conditions have had a major influence in all sites. The lowest floristic diversity was recorded in all sites in 2009, a particularly dry year, while there was a peak in 2010 due to above average rainfall conditions. 2011 recorded a reduction in diversity due to the dry period preceding the survey. The majority of species recorded in

all sites were native, ranging from 10 in Hill05 to 23 in RVEP04. Only three exotic species were recorded this year, in RVEP04.

There were no species common to all four monitoring sites in 2011, however four species were common to three sites. These species were the native perennial grasses *Austrodanthonia caespitosa*, *Austrostipa densiflora* and Speargrass (*Austrostipa scabra subsp. scabra*. Dwyer's Red Gum (*Eucalyptus dwyeri*) was common in all of the Hill sites.

No noxious weeds were observed in any of the 2011 monitored sites. African Boxthorn (*Lycium ferocissimum*) that had been found in previous years in RVEP04 has been controlled by targeted weed control activities in that area.

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

Improved spoil classification works prior to rehabilitation works is required to ensure the optimum substrate for plant growth and establishment. These works commenced during the 2011 monitoring period and will continue.

The ROMP was reviewed by the relevant government departments from 30 July 2010 until forwarding to DP&I on 9 January 2011. The ROMP is currently awaiting DP&I approval. Barrick is currently pursuing a Voluntary Planning Agreement (VPA) as the mechanism for ensuring the long-term security of the offset areas. Barrick will review approval from DP&I and other relevant stakeholder commitments prior to any ROMP works during the next reporting period.

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

The PWE (including Pond D1 north) and SWE rehabilitation trials program on reclamation area work slopes to determine the best rehabilitation method in terms of cost/time for the planting of grass, forbs, shrub and tree species will continue during the next reporting period.

The Australian Museum Business Services will conduct additional targeted flora work (including surveys for the Austral Pillwort) at the end of April 2012.

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 Paragraph 3.7.3);
- weed and pest management (discussed in Paragraphs 3.7.3 and 3.9.2);
- results of the flora and fauna monitoring programs; and
- the progress of remnant vegetation and wetland enhancement programs (discussed in Paragraph 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 EPA during the current 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 were submitted to the DP&I on 28 February 2011 and at time of writing, were 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) (Paragraph 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 EPA 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 Paragraph 3.7.3.2);
- incorporation of fauna management initiatives during operational design;
- implementation of the VCP (Figure 16) (including pre-clearance surveys) (discussed in Paragraph 3.7.3.1);
- 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 Paragraph 3.7.3 and 3.9.2);
- 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, implementation of the control strategies minimised impacts on threatened fauna species during the operation of the CGM.

The number of native fauna fatalities on-site has remained similar to those reported in the previous reporting period. Paragraph 3.8.3.2 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 interactions with vehicles.

No native fauna deaths occurred as a result of the VCPL activities described in Paragraph 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 employee 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 Barrick Cowal Environmental Manager is the WIRES Riverina Reptiles Coordinator for 2010-2012.

A compensatory wetland habitat and fish investigation was conducted during February 2011 in accordance with the CWMP. The primary findings of the survey were that the fish communities of the study area were species-poor and dominated by exotic species (i.e. eastern gambusia; goldfish and the common carp). Of the four fish species recorded during the survey, only one was a native species, namely the western carp gudgeon (*Hypseleotris klunzingeri*), while the exotic eastern gambusia (*Gambusia holbrooki*) accounted for 98% of the total catch. Abundance of fish was higher at sites within ML 1535 than at comparative sites, although the high abundance was related to high abundances of eastern gambusia (*Gambusia holbrooki*) (frc environmental, 2011).

Much wetter conditions prevailed at the same time in 2012 and no survey occurred due to site access issues. The next fish survey shall occur during the 2012 reporting period.

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 24);
- 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 24
Fauna Monitoring Conducted During the Reporting Period

Monitoring Component	Summary
Birds	Continuation of long-term bird breeding monitoring, including: 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 are 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 all of 2011, no inspection of the eastern fence and parts of the northern and southern fences was able to be undertaken due to the high lake water level during the reporting period. In this case, opportunistic inspections were carried when conducting water monitoring on Lake Cowal. An aluminium boat is utilised to allow access to 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 are 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 relevant 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, the West Wyalong Veterinarian is contacted immediately and special preservation techniques followed for the sampling process. Two Silver Gulls that died of cyanide slurry ingestion on 19 November 2010 in the processing plant area were formally reported to the EPA (formerly OEH) on 10 December 2010. These two 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. These birds remain the only cyanide related recorded deaths of animals 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 2010 reporting period and have continued throughout 2011. 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. (REFER to Paragraph 3.9)

3.8.3.2 Performance Outcomes

There were 99 WIRES rescues and relocations of native fauna that 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 2011 reporting period were:

2	Great Crested Grebe	3	Australian Raven
16	Brown Snake	2	Short-beaked Echidna
39	Hoary-headed Grebe	4	Tiger Snake
2	Straw-necked Ibis	1	Australian Wood Duck
1	Australian Ibis	3	Eastern Grey Kangaroo
5	Snake Necked Turtle	1	Myall Snake
3	Diamond (Carpet) Python	4	Masked Lapwing Plover
1	Eurasian Coot	1	Microchiroptera (Bat)
1	Blue-Billed Duck	1	Blue Tongued Lizard
2	Pacific Black Duck	1	Blue-bellied Black Snake
1	Chestnut Teal	1	Purple Swamp hen
2	Bearded Dragon	1	Blind Snake
1	Spotted Marsh Frog		

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

A summary of all the reported fauna deaths during the reporting period is provided in Table 25.

Table 25
Records of Fauna Deaths and Other Incidents for the Reporting Period

Date/Time of Incident	**24 December 2010**	
Location	Bitumen access road, Mining Lease.	
Species and number of individuals	Apostlebird	1
Description of Incident	Env Manager noted a deceased bird on bitumen access road and recovered it for Veterinary inspection and reporting.	
Outcome	Injuries were consistent with vehicle impact.	
Date/Time of Incident	**27 December 2010**	
Location	North Waste Rock Emplacement haul road near tipping head turn-off, Mining Lease.	
Species and number of individuals	Eastern Brown Snake	1
Description of Incident	Shift Supervisor called on-site Env Manager to scene to recover a deceased 3-foot Brown from the centre of the haul truck road.	
Outcome	Eviscerated mid-body intestines consistent with vehicle impact.	
Date/Time of Incident	**30 December 2010**	
Location	Grid mesh stairs toward Processing Milling, Mining Lease.	
Species and number of individuals	Legless Lizard	1
Description of Incident	Duty ERO noted a small, eviscerated, dead lizard on steel grid mesh steps during foot patrol rounds.	
Outcome	Likely unseen pedestrian traffic contact.	
Date/Time of Incident	**31 December 2010**	
Location	Bitumen access road, Mining Lease.	
Species and number of individuals	Eastern Grey Kangaroo	1
Description of Incident	Motor vehicle contact juvenile dead animal noted on verge as employees began entering site. Animal removed from road verge by Duty ERO.	
Outcome	Injuries consistent with motor vehicle impact.	
Date/Time of Incident	**4 January 2011**	
Location	Bitumen access road, Mining Lease.	
Species and number of individuals	Apostlebird	1
Description of Incident	Env Manager noted a deceased bird on bitumen access road and recovered it for Veterinary inspection and reporting.	
Outcome	Injuries were consistent with vehicle impact.	
Date/Time of Incident	**4 January 2011**	
Location	Bitumen access road, Mining Lease.	
Species and number of individuals	Stubble Quail	1
Description of Incident	Env Manager noted a deceased bird on bitumen access road and recovered it for Veterinary inspection and reporting.	
Outcome	Injuries were consistent with vehicle impact.	
Date/Time of Incident	**5 January 2011**	
Location	E42 Pit floor, Mining Lease.	
Species and number of individuals	Hoary-headed Grebe	1
Description of Incident	One dead bird located near six fully fledged of same species. Appears to have been run over by machinery on night shift.	
Outcome	Injuries were consistent with vehicle impact. Could have been rock movement before/after blasting.	
Date/Time of Incident	**7 January 2011 15:30hrs**	
Location	Bitumen access road, Mining Lease.	
Species and number of individuals	Brown Snake	1
Description of Incident	Dead snake on road called in by employee departing site for day. Bagged and delivered to local Vet Clinic for Env Dept.	
Outcome	Injuries consistent with vehicle contact.	

Table 25 (continued)
Records of Fauna Deaths and Other Incidents for the Reporting Period

Date/Time of Incident	**10 January 2011 21:30hrs**	
Location	North Dump haul truck road, Mining Lease.	
Species and number of individuals	Brown Snake	1
Description of Incident	Dead snake on road called in by grader driver. Duty Shift Supervisor placed dead snake in a box and delivered to Main Gate Duty ERO and already on-site Env Mgr. Eviscerated intestines.	
Outcome	Injuries consistent with vehicle contact.	
Date/Time of Incident	**13 January 2011**	
Location	Unknown	
Species and number of individuals	Straw-necked Ibis	1
Description of Incident	On the 13th Jan 2011 a straw-necked Ibis (Threskiomis spinicollis) was bought to the clinic for assessment by Garry Pearson, Barrick Gold. I found no obvious injuries or trauma to the bird; however it was in rather poor body condition. The bird was collected from the clinic by Barrick Gold Environmental Officer, Tammy Wright.	
Outcome	The Ibis was release back into the wild.	
Date/Time of Incident	**14 January 2011 07:30 – 14:30 hrs**	
Location	E42 Pit floor / blast floor, Mining Lease.	
Species and number of individuals	Dusky Moorhen Hoary-headed Grebe	1 3
Description of Incident	Dead birds located in Pit floor area amongst the rescued juvenile birds (x7 Hoary-headed Grebes, x1 Great Crested Grebe, and x1 Australian Ibis).	
Outcome		
Date/Time of Incident	**14 January 2011 16:40 hrs**	
Location	Hydrogen Peroxide bunded sump, Mining Lease.	
Species and number of individuals	Spotted Marsh Frogs	2
Description of Incident	Frogs located in hydrogen peroxide bund in algae affected rain water. Placed in formaline-saline solution for histopathology for herpes and chytrid fungus.	
Outcome		
Date/Time of Incident	**16 January 2011**	
Location	Unknown	
Species and number of individuals	Red-rumped Parrot	1
Description of Incident	On examination the bird was ataxic and unable to ambulate or maintain normal resting balance. Euthanasia was requested and performed by me. Autopsy showed petecchial haemorrhaging(no brain haemorrhaging) over the surface of the skull, consistent with impact during flight.	
Outcome	Bird was Euthanased	
Date/Time of Incident	**16 January 2011 11:00 hrs**	
Location	Hydrogen Peroxide bunded sump, Mining Lease.	
Species and number of individuals	Spotted Marsh Frogs	4
Description of Incident	Frogs located under tarps in sun in area to be spider control sprayed on a hot morning in algae affected rain water. Dried skin, not well. Assessed and placed in formaline-saline solution for histopathology for herpes and chytrid fungus.	
Outcome		
Date/Time of Incident	**17 January 2011**	
Location	Access road	
Species and number of individuals	Hoary-headed Grebe	1
Description of Incident	The Grebe was too autolyzed to determine the cause of death. Likely to be vehicular trauma as with other Grebes.	
Outcome	Cause of death unknown, likely MV impact.	

Table 25 (continued)
Records of Fauna Deaths and Other Incidents for the Reporting Period

Date/Time of Incident	**19 January 2011**	
Location	E42 Pit floor, Mining Lease.	
Species and number of individuals	Hoary-headed Grebe	1
Description of Incident	Deceased bird on Pit floor taken to West Wyalong Vet Clinic. Vehicular impact.	
Outcome		
Date/Time of Incident	**19 January 2011**	
Location	North Dump waste rock emplacement haul road, Mining Lease.	
Species and number of individuals	Brown Snake	1
Description of Incident	Deceased snake noted on haul road and bagged and delivered to Env Manager for transfer to West Wyalong Vet Clinic assessment.	
Outcome		
Date/Time of Incident	**20 January 2011**	
Location	Mining Maintenance tank farm 30W hydraulic oil sump, Mining Lease.	
Species and number of individuals	Stubble Quail	1
Description of Incident	Deceased bird found floating in autolysed state on about 50mm of 30W hydraulic waste oil in spill tray at rear of Mining Maintenance Workshop tank farm.	
Outcome		
Date/Time of Incident	**24 January 2011**	
Location	Boat ramp near Boart Longyear Compound, Mining Lease.	
Species and number of individuals	Chestnut Teal	1
Description of Incident	Recently deceased / predated bird found in grass at Lake foreshore whilst relocating two waterbirds from an earlier E42 Pit rescue. Likely a fox attack victim as fresh blood chest wound.	
Outcome		
Date/Time of Incident	**24 January 2011 19:20hrs**	
Location	Bitumen access road, Mining Lease.	
Species and number of individuals	Apostlebird	1
Description of Incident	Deceased juvenile noted on road verge of bitumen access road as leaving site. Bagged and delivered to West Wyalong Vet Clinic.	
Outcome		
Date/Time of Incident	**27 January 2011 09:00hrs**	
Location	Bitumen access road, Mining Lease.	
Species and number of individuals	Apostlebird	1
Description of Incident	Deceased adult bird noted on road verge of bitumen access road as entering site. Bagged and delivered to West Wyalong Vet Clinic.	
Outcome		
Date/Time of Incident	**1 February 2011**	
Location	E42 Pit floor, Mining Lease.	
Species and number of individuals	Chestnut Teal	1
Description of Incident	Deceased bird found by work crew and returned to the surface for assessment and reporting.	
Outcome	Injuries consistent with impact.	
Date/Time of Incident	**2 February 2011**	
Location	E42 Pit floor, Mining Lease.	
Species and number of individuals	Australian Wood Duck	5
Description of Incident	Deceased birds found by work crew and returned to the surface for assessment and reporting.	
Outcome	Injuries consistent with impact.	

Table 25 (continued)
Records of Fauna Deaths and Other Incidents for the Reporting Period

Date/Time of Incident	**2 February 2011**	
Location	E42 Pit floor, Mining Lease.	
Species and number of individuals	Australian White Ibis	1
Description of Incident	Sick bird found by work crew on Lake Bund Wall. Rescued and immediate basic care. Taken to West Wyalong Vet Clinic for assessment and requested euthanasure (WIRES Riverina Call No. RIV1740). West Wyalong Vet Clinic took samples of a sub-set of less advanced states of decay and sent to Sydney Laboratory for histopathology reporting. Botulism like symptoms noted in dying bird. Very feeble neck movements.	
Outcome	Euthanasure by Vet. Bird unwell and too far gone to save.	
Date/Time of Incident	**2 February 2011**	
Location	Main Administration Warehouse Receivals area, Mining Lease.	
Species and number of individuals	Spotted Marsh Frog	1
Description of Incident	Dead frog noted by employee on floor by pallet/boxes and reported to Env Dept for collection and transfer to Vet Clinic for assessment reporting.	
Outcome	Injuries consistent with squashing impact.	
Date/Time of Incident	**3 February 2011**	
Location	Bitumen access road, Mining Lease.	
Species and number of individuals	Galah	2
Description of Incident	Two deceased birds reported on bitumen access road about 10:00hrs by employee entering site.	
Outcome	Injuries consistent with vehicle impact.	
Date/Time of Incident	**3 February 2011**	
Location	UCD North Lake Foreshore, Mining Lease.	
Species and number of individuals	Dusky Moorhen Australian Magpie 2 x Australian White Ibis Purple Swamp Hen HardheadGreat Cormorant Blue-billed Duck 2 x Chestnut Teal 2 x Grey Teal 250 x Goldfish	19 250 (40 litres dead fish – only 9 fish to Vet of fresher 50 - 100mm size).
Description of Incident	Deceased floating birds detected during weekly water sampling in boat. Also noted hundreds of deceased floating goldfish.	
Outcome	frc environmental electro-fishing survey scientists were on site 3-4 Feb 2011 and identified the impact as being confined to goldfish with only other dominant species of Gambusia being seemingly unaffected. Reported fish kill to DPI-Fisheries, EPA, and DTIRIS-MR (3 & 7 Feb 2011 follow-up as per NSW Government Protocol). Likely a fish species specific virus rather than the heat wave.	

Table 25 (continued)
Records of Fauna Deaths and Other Incidents for the Reporting Period

Date/Time of Incident	**3 February 2011**	
Location	UCD North Lake Foreshore, Mining Lease.	
Species and number of individuals	2 x Australian Magpie RIV1743 & RIV1744 Australian White Ibis RIV1745 Dusky Moorhen RIV 1746 2 x Chestnut Teal RIV1747 & RIV1748 Grey Teal RIV1749 Rescued (WIRES - Vet died/ Euthanased) Pacific Black Duck RIV 1741 Chestnut Teal RIV1742	7 2
Description of Incident	Deceased floating birds detected during weekly water sampling in boat. Also noted hundreds of deceased floating goldfish.	
Outcome	West Wyalong Vet Clinic took samples of a sub-set of less advanced states of decay and sent to Sydney Laboratory for histopathology reporting. Botulism like symptoms noted in dying birds. Very feeble neck movements.	
Date/Time of Incident	**9 February 2011**	
Location	Lake Protection Bund Wall access track to Drilling Rig, Mining Lease.	
Species and number of individuals	Brown Snake	1
Description of Incident	Drilling crew employee reported dead snake to patrolling Env Officer who bagged and transferred to Env Manager for forward to Vet Clinic.	
Outcome	Injuries consistent with vehicle impact.	
Date/Time of Incident	**11 February 2011**	
Location	Bitumen access road, Mining Lease.	
Species and number of individuals	Apostlebird	1
Description of Incident	Env Manager noted deceased bird on incoming road verge adjacent STSF and creek crossing railing on way into site. Bagged for Vet assessment.	
Outcome	Injuries consistent with vehicular impact.	
Date/Time of Incident	**11 February 2011**	
Location	Bitumen access road, Mining Lease.	
Species and number of individuals	Brown Snake	1
Description of Incident	Env Manager noted multiple vehicles impacted, possibly day old Brown Snake body on hot bitumen road by entry gate flag poles and sign.	
Outcome	Injuries consistent with vehicular impact.	
Date/Time of Incident	**14 February 2011**	
Location	TSF gravel access track, Mining Lease.	
Species and number of individuals	Dwyer's Black-headed Snake	1
Description of Incident	Env Manager noted deceased snake on gravel road during first turtle patrol of the day. Not a juvenile Brown Snake but an adult Black-headed snake possibly sunning on sunrise by frog swamp area.	
Outcome	Injuries consistent with vehicular impact.	

Table 25 (continued)
Records of Fauna Deaths and Other Incidents for the Reporting Period

Date/Time of Incident	**14 February 2011**	
Location	TSF gravel access track, Mining Lease.	
Species and number of individuals	Brown Snake	1
Description of Incident	Patrolling Env Officer noted a deceased Brown Snake on the TSF gravel access road about 2 hours later. Freshly graded gravel road and dust making it difficult to see.	
Outcome	Injuries consistent with vehicular impact.	
Date/Time of Incident	**14 February 2011**	
Location	Pond D1 access road near Lake Protection Bund Wall, Mining Lease.	
Species and number of individuals	Bearded Dragon	1
Description of Incident	Patrolling Env Officer noted a deceased Dragon on the access track whilst sampling surface waters. Dragons are about on most bitumen and gravel tracks at this time in considerable numbers.	
Outcome	Injuries consistent with vehicular impact.	
Date/Time of Incident	**15 February 2011**	
Location	Western Haul Road, Mining Lease.	
Species and number of individuals	Brown Snake	1
Description of Incident	Duty ERO bagged and reported a deceased snake to Env Manager. Taken to Vet Clinic for assessment. Badly eviscerated in multiple places and appeared to have been run over by a large vehicle.	
Outcome	Injuries consistent with vehicular impact.	
Date/Time of Incident	**23 February 2011**	
Location	Process water bund	
Species and number of individuals	Nankeen Kestrel	1
Description of Incident	Significant haemorrhaging inside the mouth consistent with impact with a solid structure during flight which most likely stunned the bird causing it to fall and drown in the process water bund, where it was found.	
Outcome	Injuries consistent with in-flight collision	
Date/Time of Incident	**27 February 2011**	
Location	Southern Haul Road, Mining Lease.	
Species and number of individuals	Brown Snake	1
Description of Incident	Deceased snake retrieved, bagged and transported to West Wyalong Vet Clinic for assessment reporting.	
Outcome	Injuries consistent with vehicular impact.	
Date/Time of Incident	**28 February 2011**	
Location	Southern haul road	
Species and number of individuals	Brown Snake	1
Description of Incident	Whilst travelling on the southern haul road on top of the ramp, the road not in use at the time. The snake was spotted by Stuart Wright, who investigated and found the snake was deceased. It was bagged and stored in the fridge ready to be taken to the vet on the same day.	
Outcome	Unknown	
Date/Time of Incident	**1 March 2011**	
Location	Bitumen access road, Mining Lease.	
Species and number of individuals	Brown Snake	1
Description of Incident	Deceased snake retrieved, bagged and transported to West Wyalong Vet Clinic for assessment reporting.	
Outcome	Injuries consistent with vehicular impact.	

Table 25 (continued)
Records of Fauna Deaths and Other Incidents for the Reporting Period

Date/Time of Incident	**3 March 2011**	
Location	Bitumen access road, Mining Lease.	
Species and number of individuals	Brown Snake	1
Description of Incident	Deceased snake retrieved, bagged and transported to West Wyalong Vet Clinic for assessment reporting.	
Outcome	Injuries consistent with vehicular impact.	
Date/Time of Incident	**3 March 2011**	
Location	Bitumen access road, Mining Lease.	
Species and number of individuals	Australian Magpie	1
Description of Incident	Deceased bird retrieved, bagged and transported to West Wyalong Vet Clinic for assessment reporting.	
Outcome	Injuries consistent with vehicular impact.	
Date/Time of Incident	**7 March 2011**	
Location	E42 Pit floor, Mining Lease.	
Species and number of individuals	Hoary-headed Grebe	1
Description of Incident	Juvenile bird recovered from E42 Pit floor and handed to Env Dept for transport to Vet Clinic for assessment reporting. Advanced decomposition.	
Outcome		
Date/Time of Incident	**7 March 2011**	
Location	TSF access road, Mining Lease.	
Species and number of individuals	Bearded Dragon	1
Description of Incident	Deceased reptile retrieved, bagged and transported to West Wyalong Vet Clinic for assessment reporting.	
Outcome	Injuries consistent with vehicular impact.	
Date/Time of Incident	**7 March 2011**	
Location	Temporary isolation bund.	
Species and number of individuals	Myall Snake	1
Description of Incident	Deceased Myall snake found on temporary isolation bund. Bagged and taken to vet same day	
Outcome	Retrieved and Taken to the vet. No suspicious cause of death	
Date/Time of Incident	**7 March 2011**	
Location	Belah Woodland enclosure, Mining Lease.	
Species and number of individuals	Kangaroo	1
Description of Incident	Deceased Kangaroo found stuck in fence.	
Outcome	Stress related demise, dehydration.	
Date/Time of Incident	**7 March 2011**	
Location	Flotation Thickener bunded sump, Mining Lease.	
Species and number of individuals	Stubble Quail	1
Description of Incident	Deceased bird retrieved, bagged and transported to West Wyalong Vet Clinic for assessment reporting.	
Outcome	Injuries consistent with being covered in slurry and/or drowning, stress.	
Date/Time of Incident	**7 March 2011**	
Location	E42 Pit Drill Rig, Mining Lease.	
Species and number of individuals	Hoary-headed Grebe	1
Description of Incident	Juvenile bird recovered deceased from Pit floor area.	
Outcome	Injuries consistent with vehicular impact.	

Table 25 (continued)
Records of Fauna Deaths and Other Incidents for the Reporting Period

Date/Time of Incident	**8 March 2011**	
Location	Windrows on Lake Cowal study area.	
Species and number of individuals	Brown Snake	1
Description of Incident	Deceased juv Brown Snake noted by WCC whilst walking graded windrows on Lake Cowal study area for PFS drilling.	
Outcome	Confirmed cause of death was a MV impact	
Date/Time of Incident	**8 March 2011**	
Location	Pond D1 Lake floor (WCC soil clearance), Mining Lease.	
Species and number of individuals	Brown Snake	1
Description of Incident	Grader used to make inspection paths for artefacts. Grader blade injury / death noted in windrow by WCC Inspection Team.	
Outcome	Injuries consistent with vehicular impact.	
Date/Time of Incident	**9 March 2011**	
Location	Mining Maintenance Laydown area, Mining Lease.	
Species and number of individuals	Dwyer's Black-headed Snake	1
Description of Incident	Deceased reptile retrieved, bagged and transported to West Wyalong Vet Clinic for assessment reporting.	
Outcome	Injuries consistent with vehicular impact.	
Date/Time of Incident	**10 March 2011**	
Location	NTSF upper access road, Mining Lease.	
Species and number of individuals	Myall Snake	1
Description of Incident	Deceased reptile retrieved, bagged and transported to West Wyalong Vet Clinic for assessment reporting.	
Outcome	Injuries consistent with vehicular impact.	
Date/Time of Incident	**13 March 2011**	
Location	Processing Plant CN Destruct Tank, Mining Lease.	
Species and number of individuals	Nankeen Kestrel	1
Description of Incident	Deceased bird noted during routine patrol. Fresh blood coming from mouth indicating in flight misadventure and sudden contact with steelwork.	
Outcome	Injuries consistent with flight misadventure.	
Date/Time of Incident	**18 March 2011**	
Location	Bitumen access road, Mining Lease.	
Species and number of individuals	Blue-bellied Black Snake	1
Description of Incident	Deceased reptile retrieved, bagged and transported to West Wyalong Vet Clinic for assessment reporting.	
Outcome	Injuries consistent with vehicular impact.	
Date/Time of Incident	**24 March 2011**	
Location	Bulk oxygen tank truck delivery driveway, Mining Lease.	
Species and number of individuals	Stubble Quail	1
Description of Incident	Deceased bird noted during routine patrol. Fresh blood coming from missing head indicating in flight misadventure by sudden contact with steelwork and near immediate predation by fox (no feral cats seen for months).	
Outcome	Injuries consistent with flight misadventure.	
Date/Time of Incident	**29 March 2011**	
Location	Tailings Storage facility WCC grader lines, Mining Lease.	
Species and number of individuals	Brown Snake	1
Description of Incident	Deceased juvenile reptile retrieved, bagged and transported to West Wyalong Vet Clinic for assessment reporting.	
Outcome	Injuries consistent with motor grader impact.	

Table 25 (continued)
Records of Fauna Deaths and Other Incidents for the Reporting Period

Date/Time of Incident	**30 March 2011**	
Location	11,000 Volt Transformer bunds yard, Mining Lease.	
Species and number of individuals	Australian Magpie	1
Description of Incident	Deceased Magpie reported to Env Mgr, before electrician bagged and delivered frizzled (desiccated) bird to Env Mgr's office. Found during periodic maintenance works.	
Outcome	Electrocuted.	
Date/Time of Incident	**4 April 2011**	
Location	Bitumen access road, Mining Lease.	
Species and number of individuals	Tiger Snake	1
Description of Incident	Found on road with eviscerated intestines, deceased.	
Outcome	Injuries consistent with vehicular impact.	
Date/Time of Incident	**5 April 2011**	
Location	Drill Rig in E42 Pit	
Species and number of individuals	Microbat	1
Description of Incident	Employee delivered a heavily greased Microbat in a weakened state to Env Manager's office from Drill Rig in E42 Pit. Env Manager used WIRES Authority to immediately euthanase call number RIV1775 by cranial crush	
Outcome	Euthanased by cranial crush	
Date/Time of Incident	**5 April 2011**	
Location	Lake foreshore entrance east Millers Crusher, Mining Lease.	
Species and number of individuals	Brown Snake	1
Description of Incident	Deceased snake called in by Geologist. Road side.	
Outcome	Injuries consistent with vehicular impact.	
Date/Time of Incident	**5 April 2011**	
Location	Lake Protection Bund by Boart Longyear, Mining Lease.	
Species and number of individuals	Tiger Snake	1
Description of Incident	Seemingly deceased juvenile reptile retrieved, bagged and transported to West Wyalong Vet Clinic for assessment reporting. Euthanased by Vet.	
Outcome	Injuries consistent with vehicular impact.	
Date/Time of Incident	**10 April 2011**	
Location	11,000 Volt Transformer bunds yard, Mining Lease.	
Species and number of individuals	Australian Magpie	1
Description of Incident	2 hour and 10 minute outage of Milling Operations Plant when an Australian Magpie contacted and made an earth for the 11,000 Volt transformer.	
Outcome	Scorch marks on ground. Nothing left to take to the local Veterinarian to assess.	
Date/Time of Incident	**11 April 2011**	
Location	Flotation tailings thickener concrete sump floor, Mining Lease.	
Species and number of individuals	Australian Wood Duck	1
Description of Incident	Appears to have flown into Tailings Thickener tank wall and fallen into inert slurry on floor.	
Outcome	Flight misadventure.	
Date/Time of Incident	**18 April 2011**	
Location	Mining Dept Administration Offices area, Mining Lease.	
Species and number of individuals	Black Kite	1
Description of Incident	Bird reported as having literally fallen from the sky and dead on impact with ground.	
Outcome	Mouse baits may have had an unintended secondary kill. Isolated observation.	

Table 25 (continued)
Records of Fauna Deaths and Other Incidents for the Reporting Period

Date/Time of Incident	**18 April 2011**	
Location	Northern Waste Rock Emplacement, Mining Lease.	
Species and number of individuals	Brown Snake	1
Description of Incident	Geology Technician called in a deceased snake near where other vehicles and scrapers were driving.	
Outcome	Injuries consistent with motor vehicle impact.	
Date/Time of Incident	**19 April 2011**	
Location	Bitumen access road adjacent Pond D8B, Mining Lease.	
Species and number of individuals	Australian White Ibis	1
Description of Incident	Injured bird with broken left humero radial junction euthanased under WIRES Authority, body taken to Vet Clinic after cranial crush and bagging.	
Outcome	Injuries consistent with motor vehicle impact.	
Date/Time of Incident	**20 April 2011**	
Location	11,000 Volt Transformer bunds yard, Mining Lease.	
Species and number of individuals	Australian Magpie	1
Description of Incident	Second Australian Magpie contacted and made an earth for the 11,000 Volt transformer for the month.	
Outcome	Electrocution. Primary flight feathers frizzled.	
Date/Time of Incident	**20 April 2011**	
Location	Mining Hardstand, Mining Lease.	
Species and number of individuals	Noisy Miner	1
Description of Incident	Deceased bird on ground.	
Outcome	Possible vehicle impact during flight misadventure.	
Date/Time of Incident	**25 April 2011**	
Location	East inner northern wall of STSF, Mining Lease.	
Species and number of individuals	Australian Raven	1
Description of Incident	Deceased Australian Raven noted in wet tailings at third spigot west of decant road on inner northern wall of STST during routine TSF patrol on 25 April 2011. Quite likely that bird was picking up a mouse stuck in wet tails and became a victim	
Outcome	Drowned in inert tailings mud.	
Date/Time of Incident	**27 April 2011**	
Location	Bitumen access road, Mining Lease.	
Species and number of individuals	Galah	1
Description of Incident	Deceased Galah observed and collected from road verge. Road verges been slashed and been BEEPing for BIRDS since October 2010.	
Outcome	Vehicle impact flight misadventure.	
Date/Time of Incident	**1 May 2011**	
Location	Coarse Ore Stockpile perimeter road, Mining Lease.	
Species and number of individuals	Brown Snake	1
Description of Incident	Employee noted a small deceased snake on light vehicle road during routine patrol.	
Outcome	Travel path misadventure on light vehicle road way.	
Date/Time of Incident	**8 May 2011**	
Location	Temporary Isolation Bund boat pontoon area, Mining Lease.	
Species and number of individuals	Silver Gull	1
Description of Incident	Deceased Gull found on bund near lake.	
Outcome	Natural causes.	

Table 25 (continued)
Records of Fauna Deaths and Other Incidents for the Reporting Period

Date/Time of Incident	**9 May 2011**	
Location	Temporary Isolation Bund	
Species and number of individuals	Australian White Ibis	1
Description of Incident	A Deceased White Ibis was found by Geotech Department staff member. Bird was seen on the inside edge of the temporary isolation bund	
Outcome		
Date/Time of Incident	**9 May 2011**	
Location	Vicinity of Lake Drill Rig, Mining Lease	
Species and number of individuals	Grebes	2
Description of Incident	Two deceased Ibis noted in water near Drill Rig on Lake Cowal.	
Outcome	Natural causes.	
Date/Time of Incident	**26 May 2011**	
Location	Bunded concrete area between lime and cyanide mixing, Mining Lease.	
Species and number of individuals	Apostlebird	1
Description of Incident	A deceased bird was found by processing operator during routine checks.	
Outcome	Natural causes.	
Date/Time of Incident	**26 May 2011**	
Location	Bitumen access road, Mining Lease.	
Species and number of individuals	Unidentified bird	1
Description of Incident	Remnant deceased bird on bitumen road by front gate flag posts.	
Outcome	Travel path misadventure.	
Date/Time of Incident	**27 May 2011**	
Location	Bitumen access road, Mining Lease.	
Species and number of individuals	Emu	1
Description of Incident	Incoming 60-seater evening Mine bus driver rang and reported that an Emu had ran in front of the bush and not sighted until side impact. No damage to bus or passengers. Inspection of area noted an adult deceased Emu cut through its middle resting across the road verge fog line.	
Outcome	Travel path misadventure.	
Date/Time of Incident	**2 June 2011**	
Location	Bitumen access road, Mining Lease.	
Species and number of individuals	Australian Magpie	1
Description of Incident	Deceased bird (multiple hits) observed and collected from road verge in darkness. Road verges been slashed and been BEEPing for BIRDS since October 2010.	
Outcome	Travel path misadventure.	
Date/Time of Incident	**6 June 2011**	
Location	Bitumen access road, Mining Lease.	
Species and number of individuals	Apostlebird	2
Description of Incident	Two deceased birds observed and collected from road verge. Many other Apostlebird family members were hanging around on road. Road verges been slashed and been BEEPing for BIRDS since October 2010.	
Outcome	Travel path misadventure.	
Date/Time of Incident	**6 June 2011**	
Location	South-east corner STSF, Mining Lease.	
Species and number of individuals	Australian Magpie	1
Description of Incident	Deceased Australian Magpie noted in wet tailings during routine patrol. Appears to have drowned day prior. Unlikely any mice stuck in that wet area, possibly involved in territorial aerial dispute with another Magpie.	
Outcome	Drowned in inert tailings mud.	

Table 25 (continued)
Records of Fauna Deaths and Other Incidents for the Reporting Period

Date/Time of Incident	**9 June 2011**	
Location	Oversize Rock Stockpile on ROM, Mining Lease.	
Species and number of individuals	Southern Boobook	1
Description of Incident	Deceased bird found squashed flat on ROM by Shift Supervisor during patrol.	
Outcome	Travel path misadventure.	
Date/Time of Incident	**15 June 2011**	
Location	North-east corner STSF, Mining Lease.	
Species and number of individuals	Magpie Lark	1
Description of Incident	Deceased Australian Magpie Lark noted in wet tailings during routine patrol.	
Outcome	Drowned in inert tailings mud.	
Date/Time of Incident	**15 June 2011**	
Location	Pond D9 upper wall under poly pipe, Mining Lease.	
Species and number of individuals	? Snake	1
Description of Incident	Geotechnical employee noted desiccated body under poly pipe during crest walk.	
Outcome	Travel path misadventure. Possible predation victim.	
Date/Time of Incident	**21 June 2011**	
Location	Bitumen access road, Mining Lease.	
Species and number of individuals	Red-rumped Parrot	1
Description of Incident	Deceased bird (multiple hits) observed and collected from road centre in morning.	
Outcome	Travel path misadventure.	
Date/Time of Incident	**22 June 2011**	
Location	Bitumen access road, Mining Lease.	
Species and number of individuals	Apostlebird	1
Description of Incident	Deceased bird observed and collected from bitumen road verge.	
Outcome	Travel path misadventure.	
Date/Time of Incident	**22 June 2011**	
Location	Exploration Geology Compound gravel access road, Mining Lease.	
Species and number of individuals	Apostlebird	1
Description of Incident	Deceased bird observed and collected from gravel road verge.	
Outcome	Travel path misadventure.	
Date/Time of Incident	**23 June 2011**	
Location	Exploration Geology Compound gravel access road to BLY, Mining Lease.	
Species and number of individuals	Apostlebird	2
Description of Incident	Deceased birds observed and collected from gravel road verge.	
Outcome	Travel path misadventure.	
Date/Time of Incident	**24 June 2011**	
Location	Bitumen access road, Mining Lease.	
Species and number of individuals	Apostlebird	1
Description of Incident	Deceased bird observed and collected from bitumen road verge.	
Outcome	Travel path misadventure.	
Date/Time of Incident	**27 June 2011**	
Location	North ML interior Lake foreshore, Mining Lease.	
Species and number of individuals	Australian Wood Duck Blue Tongue Lizard	1 1
Description of Incident	Two deceased native animals found on foreshore access track during routine boundary inspection patrol.	
Outcome	Signs of light vehicle path misadventure.	

Table 25 (continued)
Records of Fauna Deaths and Other Incidents for the Reporting Period

Date/Time of Incident	**28 June 2011**	
Location	Processing Plant Leach tank 2-3 concrete bund floor, Mining Lease.	
Species and number of individuals	Barn Owl	1
Description of Incident	Deceased Owl found on concrete floor adjacent Leach Tanks 2-3 near deceased field mice. Casings full of mouse fur found near by. Non-target secondary death by Talon mouse baits is likely. Rentokil service for 440 bait stations – weekly and has been in operation for a month.	
Outcome		
Date/Time of Incident	**28 June 2011**	
Location	STSF Decant rock bar crest, Mining Lease.	
Species and number of individuals	Silver Gull	1
Description of Incident	Deceased Gull found on top of STSF Decant rock bar crest. Gulls and Plovers have been heard in area on darkness and setting off bird deter radar on dusk – roosting nearby. Non-target secondary death by Talon mouse baits is likely. Rentokil service for 440 bait stations – weekly and has been in operation for a month. Last WAD CN check was only 9.5 ppm.	
Outcome		
Date/Time of Incident	**4 July 2011**	
Location	Bitumen access road, Mining Lease.	
Species and number of individuals	Australian Magpie	1
Description of Incident	Deceased bird observed and collected from bitumen road verge.	
Outcome	Travel path misadventure.	
Date/Time of Incident	**6 July 2011**	
Location	Boart Longyear Drilling Compound, Mining Lease.	
Species and number of individuals	Australian Magpie	1
Description of Incident	Deceased bird observed and collected from sampling boat access ramp near Boart Longyear Drilling Compound.	
Outcome		
Date/Time of Incident	**14 July 2011**	
Location	Lake Foreshore adjacent Boart Longyear Pontoon Jetty, Mining Lease.	
Species and number of individuals	Hoary-headed Grebe juvenile Hoary-headed Grebe Galah	1 1 1
Description of Incident	Three deceased birds noted in various stages of advanced decomposition on foreshore wash zone. No obvious cause of death. Recent colder weather.	
Outcome		
Date/Time of Incident	**19 July 2011**	
Location	Lake Foreshore adjacent Boart Longyear Pontoon Jetty, Mining Lease.	
Species and number of individuals	Australian Wood Duck	1
Description of Incident	Deceased bird noted during level gauge reading on foreshore wash zone. No obvious cause of death. Recent colder weather.	
Outcome	Indeterminate cause of death by Vet. Gassy state of advanced decay of body.	
Date/Time of Incident	**20 July 2011**	
Location	Process Plant chain mesh fenced CN Mixing Area, Mining Lease.	
Species and number of individuals	Magpie Lark	1
Description of Incident	Deceased bird found on concrete floor with some mud on otherwise intact plumage.	
Outcome	Indeterminate cause of death by Vet. Most likely flight misadventure into fence. Unlikely to have died from mouse plague control baiting secondary impact.	

Table 25 (continued)
Records of Fauna Deaths and Other Incidents for the Reporting Period

Date/Time of Incident	**2 August 2011**	
Location	Main Administration bitumen car parking area, Mining Lease.	
Species and number of individuals	Apostlebird	1
Description of Incident	Deceased bird found on ground in Main Admin outside car park. Likely fallen off a parked car grill.	
Outcome	Injuries consistent with motor vehicle impact.	
Date/Time of Incident	**24 August 2011**	
Location	Bitumen access road, Mining Lease.	
Species and number of individuals	Stubble Quail	1
Description of Incident	Deceased bird noted on road centre near entry flag poles during heavy morning fog conditions.	
Outcome	Injuries consistent with motor vehicle impact.	
Date/Time of Incident	**31 Aug 2011**	
Location	Adjacent to TIB floating in Lake water, Mining Lease.	
Species and number of individuals	Hoary-headed Grebe	1
Description of Incident	Emergency Response Team launching patrol boat near Drill Rig pontoon noted at floating deceased bird in a very advanced state of decay.	
Outcome	State of badly decomposed bird was consistent with death by natural causes.	
Date/Time of Incident	**05 September 2011**	
Location	Processing Warehouse compound, Mining Lease.	
Species and number of individuals	Galah	1
Description of Incident	Deceased bird found on ground and taken to Vet Clinic for COD determination.	
Outcome		
Date/Time of Incident	**7 September 2011**	
Location	Geology access road way, Mining Lease.	
Species and number of individuals	Bearded Dragon	1
Description of Incident	Employee noted a deceased lizard on road way near Exploration Geology.	
Outcome	Injuries consistent with MV impact.	
Date/Time of Incident	**15 September 2011**	
Location	Bitumen access road way, Mining Lease.	
Species and number of individuals	Bearded Dragon	1
Description of Incident	Employee noted a deceased lizard on bitumen access road.	
Outcome	Injuries consistent with MV impact.	
Date/Time of Incident	**20 September 2011**	
Location	LPB access road way, Mining Lease.	
Species and number of individuals	Myall (Curl) Snake	1
Description of Incident	Employee noted a deceased small brown snake on road way near Exploration Geology.	
Outcome	Injuries consistent with MV impact.	
Date/Time of Incident	**21 September 2011**	
Location	TSF haul road way cross-over, Mining Lease.	
Species and number of individuals	Brown Snake	1
Description of Incident	ERO employee noted a deceased large brown snake on road way near TSF Depot haul road.	
Outcome	Injuries consistent with MV impact.	

Table 25 (continued)
Records of Fauna Deaths and Other Incidents for the Reporting Period

Date/Time of Incident	**21 September 2011**	
Location	Bitumen access road way, Mining Lease.	
Species and number of individuals	Bearded Dragon	1
Description of Incident	Employee noted a deceased lizard on bitumen access road.	
Outcome	Injuries consistent with MV impact.	
Date/Time of Incident	**27 September 2011**	
Location	E42 Pit Phase E sub-soil removal dig area, Mining Lease.	
Species and number of individuals	Hoary-headed Grebe	1
Description of Incident	Shift supervisor noted a decaying deceased bird in saline muddy area of Pit floor.	
Outcome		
Date/Time of Incident	**27 September 2011**	
Location	Bitumen access road way, Mining Lease.	
Species and number of individuals	Bearded Dragon	1
Description of Incident	Employee noted a deceased lizard on bitumen access road. Minimal remnant left after B-double truck wheels impact.	
Outcome	Injuries consistent with MV impact.	
Date/Time of Incident	**28 September 2011**	
Location	TSF gravel access road by poly pipes adjacent ER Shed, Mining Lease.	
Species and number of individuals	Black Snake	1
Description of Incident	Employee noted a deceased large black snake on road way to TSF which was slightly pinned under poly pipes after obvious upper body MV contact. Alerted to advanced decay body by presence of a Raven picking at something in distance.	
Outcome	Injuries consistent with MV impact.	
Date/Time of Incident	**28 September 2011**	
Location	Main Gate Security Administration entry ramp, Mining Lease.	
Species and number of individuals	Microbat	1
Description of Incident	Employee noted a decaying deceased bat in whilst getting out of vehicle in the temporary bitumen parking area.	
Outcome	Injuries consistent with MV or pedestrian impact (pre-post mortem unable to be established to smelly, maggoty state).	
Date/Time of Incident	**29 September 2011**	
Location	E42 Pit Phase E sub-soil removal dig area, Mining Lease.	
Species and number of individuals	Australian Raven	1
Description of Incident	Shift supervisor noted a recently deceased bird in saline muddy area of Pit floor.	
Outcome		
Date/Time of Incident	**2 October 2011**	
Location	ML1535 entry Gate 1 south fence 200m, Mining Lease.	
Species and number of individuals	Barn Owl	1
Description of Incident	Duty ERO called in a R wing entangled Owl in fence. Env Manager attended site, issued WIRES call number GP/RIV2408, removed it from wire fence, assessed and immediately euthanased the bird at an off-site location.	
Outcome	Euthanased under WIRES Authority 10970.	
Date/Time of Incident	**14 October 2011**	
Location	Bitumen access road way, Mining Lease.	
Species and number of individuals	Black Snake	1
Description of Incident	Employee noted an injured black snake on road way and called it in to Env Mgr. Animal died shortly before collection by trained venomous snake handlers. Not sent to Vet as witnessed event.	
Outcome	Injuries consistent with MV collision.	

Table 25 (continued)
Records of Fauna Deaths and Other Incidents for the Reporting Period

Date/Time of Incident	**14 October 2011**	
Location	Bitumen access road way, Mining Lease.	
Species and number of individuals	Bearded Dragon	1
Description of Incident	Employee noted a deceased lizard on bitumen access road.	
Outcome	Injuries consistent with MV collision.	
Date/Time of Incident	**21 October 2011**	
Location	TSF gravel access road way, Mining Lease.	
Species and number of individuals	Bearded Dragon	1
Description of Incident	Employee noted a deceased lizard on gravel TSF access road shortly before PetroTac bitumen seal truck arrival in that area.	
Outcome	Injuries consistent with MV collision.	
Date/Time of Incident	**3 November 2011**	
Location	Bitumen access road way, Mining Lease.	
Species and number of individuals	Eastern Grey Kangaroo	1
Description of Incident	Small adult female found in morning with rigour set in. No joey. MV impact.	
Outcome	Injuries consistent with MV collision.	
Date/Time of Incident	**22 November 2011**	
Location	Bitumen access road way, Mining Lease.	
Species and number of individuals	Australian Magpie	1
Description of Incident	Employee noted a deceased lizard on bitumen access road.	
Outcome	Injuries consistent with MV collision.	
Date/Time of Incident	**22 November 2011**	
Location	Pond D6 HDPE fresh water storage, Mining Lease.	
Species and number of individuals	Australian Wood Duck	1
Description of Incident	Employee reported a recently deceased duck as floating in Pond D6 HDPE lined emergency fire fighting water storage.	
Outcome	Retrieved and taken to Vet Clinic. No suspicious cause.	
Date/Time of Incident	**4 December 2011**	
Location	Bitumen access road way, Mining Lease.	
Species and number of individuals	Masked Lapwing Plover	1
Description of Incident	Employee noted a deceased bird on bitumen access road.	
Outcome	Injuries consistent with MV collision.	
Date/Time of Incident	**5 December 2011**	
Location	Southern Lowflow Dam concrete spillway crossing, Mining Lease.	
Species and number of individuals	Curl (Myall) Snake	1
Description of Incident	Geology employee noted a deceased adult Curl on concrete spillway whilst driving.	
Outcome	Injuries consistent with MV impact.	
Date/Time of Incident	**12 December 2011**	
Location	Bitumen access road way, Mining Lease.	
Species and number of individuals	Australian Magpie	1
Description of Incident	Employee noted a deceased bird on bitumen access road.	
Outcome	Injuries consistent with MV collision.	
Date/Time of Incident	**15 December 2011**	
Location	Bitumen access road way, Mining Lease.	
Species and number of individuals	Buff-banded Rail	1
Description of Incident	Employee noted a deceased bird on bitumen access road.	
Outcome	Injuries consistent with MV collision.	

Table 25 (continued)
Records of Fauna Deaths and Other Incidents for the Reporting Period

Date/Time of Incident	16 December 2011	
Location	Bitumen access road way, Mining Lease.	
Species and number of individuals	Apostlebird	1
Description of Incident	Employee noted a deceased bird on bitumen access road.	
Outcome	Injuries consistent with MV collision.	
Date/Time of Incident	**19 December 2011**	
Location	Bitumen access road way, Mining Lease.	
Species and number of individuals	Bearded Dragon	1
Description of Incident	Employee noted a deceased lizard on bitumen access road.	
Outcome	Injuries consistent with MV collision.	

Lake Cowal Waterbird Monitoring

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 Ballarat during January, August and October 2011 (potential bird breeding periods) with the results summarised in Table 26.

January 2011

The first survey for 2011 was carried out between the 2 and 3 January by Peter Gell and Paul Peake. Several species were observed breeding during the course of the survey. Leading up to this survey, much of NSW had experienced above average rainfall and the catchments to the lake received rainfall well in excess of the long term average. Inflows from the Lachlan River were observed to the north of the lake which, while not full, was entirely covered with water. The above average rainfall across the eastern and much of northern and central Australia in the preceding months resulted in the flooding of thousands of wetlands that have been dry for much of the preceding 15 year drought. The low numbers of waterbirds in eastern Australia may now be thinly scattered across these wetlands, leading to lower numbers present or breeding than might otherwise be expected at this stage of the flooding cycle at Lake Cowal. Transect survey results were presented for transects 1, 2, 8 and 7 (the first time it has been possible to survey this transect since 2001).

Several thousand Straw-necked Ibis and several hundred Australian White Ibis were observed breeding on tangled lignum shrubs. Half or more of the flying birds were juvenile, reflecting breeding success earlier in the season, yet there were also many new nests with eggs. Several Royal Spoonbill and ten Little Egret pairs were all found nesting with eggs. Four duck species were found with clutches of young and successful breeding by Hoary-headed Grebe, Australian Grebe, Purple Swamphen, Eurasian Coot, Black-winged Stilt, Silver Gull and Whiskered Tern was evident from the presence of numerous juvenile birds. Several clutches of Black Swan cygnets were also observed along with new nests with eggs.

A total of 37 species were observed along transects, totalling 5840 birds. The most numerous species observed were the Eurasian Coot (1620), Grey Teal (1119), Hoary-headed Grebe (973), Whiskered Tern (366), Pacific Black Duck (258) and Hardhead (236). Large numbers of Australian Pelican (197), Black-winged Stilt (107) and Black Swan (59) were observed on T7 and a large flock of Silver Gulls (162) was observed with juveniles at the northern end of T8.

This survey revealed that Lake Cowal continues to support a high diversity and abundance of wading birds, including species that typically occupy the lake during phases of lake filling. The total numbers of birds and bird species observed is well above the average from surveys in the 1990s despite the widespread availability of suitable habitat given the recent flooding across eastern, northern and central Australia. Notably, this survey marked a return to considerable colonial breeding activity. Large numbers of Ibis were observed nesting and these were associated with large numbers of juveniles reflecting successful breeding. Among these were Royal Spoonbills and Little Egrets – the latter being the first documented breeding on Lignum or close to water level and the first documented breeding at Lake Cowal for this species (Gell, 2011a).

Table 26
Bird Breeding Monitoring Results for the Reporting Period

	2011 Survey Period												
	January				August				October				
Species	**T1**	**T2**	**T7**	**T8**	**T1**	**T2**	**T7**	**T8**	**T1**	**T2**	**T7**	**T8**	**Total**
Australian Pelican			197			1				5			**203**
Australasian Darter		8	2	1	2				5	40	2	12	**72**
Little Pied Cormorant	3	22	4		10	4	1	1	11	6	3	2	**67**
Great Cormorant	1	8			13	1	1		6				**30**
Little Black Cormorant	1	6		1		1			9	182	1		**201**
Great Crested Grebe		1											**1**
Hoary-headed Grebe	376	290	97	210	255	168	44	117	166	11	29	25	**1788**
Australasian Grebe	5	3		1	1	6	141		31	123	129	1	**441**
Black Swan		7	59	21	2	18	3	6	7	43	8	8	**182**
Wandering Whistling-duck	1												**1**
Plumed Whistling-duck		2	1										**3**
Australian Shelduck			4	10	1		7						**22**
Pacific Black Duck	71	128	29	30	50	133	107	100	57	292	96	65	**1340**
Grey Teal	89	318	355	357	51	263	244	353	188	492	411	250	**3371**
Chestnut Teal		2		2				2					**6**
Australasian Shoveler		25	7	20		38	50	4			22		**166**
Pink-eared Duck		9	53	63		1	47	35			12	11	**231**
Hardhead	43	78	79	36	21	28	96	87	52	266	87	13	**886**
Australian Wood Duck	7	47	8	50	6	16	18	62	7	64	122	37	**444**
Musk Duck	2	1			1		1						**5**
Buff-banded Rail							1	1			1		**3**
Australian Spotted Crake											1		**1**
Black-tailed Native hen			3		3		20	3	2		47	13	**91**
Dusky Moorhen		1			7	9	36	16	1	51	19	2	**142**
Purple Swamphen	8	19				3	21	2	39	50	18	12	**172**
Eurasian Coot	917	432	53	218	411	1041	207	326	796	1800	382	378	**6961**
Eastern Great Egret									3	1	2	2	**8**
Intermediate Egret					1			1	12	3	3	10	**30**
White-necked Heron			5	9				13	1	1	2	6	**37**
White-faced Heron	1	7	5	6	1	3	12	9	4	9	1	5	**63**
Nankeen Night-Heron										1	13	5	**19**
Glossy Ibis									36	7	8		**51**
Australian White Ibis	37	5	5	7		6		3	18	10		10	**101**
Straw-necked Ibis	18	37	9	51						4	3		**122**
Royal Spoonbill		7	4	1				5	1		4		**22**
Yellow-billed Spoonbill			9	5				1					**15**
Masked Lapwing	2		9	22	1		5	10					**49**
Red-kneed Dotterel	2												**2**
Black-fronted Plover		1								1	2		**4**
Black-winged Stilt			107	32									**139**
Masked Lapwing									5		6	14	**25**
Latham's Snipe											1		**1**
Silver Gull	1	2	2	162	53		7	3	6	6	8	5	**255**
Whiskered Tern	18	180	49	119	64	50	1		165	113	118		**877**
Gull-billed Tern			2										**2**
Total	**1603**	**1646**	**1157**	**1434**	**954**	**1790**	**1070**	**1160**	**1628**	**3581**	**1561**	**886**	**18470**

August 2011

The second survey conducted during 2011 was carried out on 1 and 2 August by Peter Gell and Paul Peake. Transect survey results were presented for transects 1, 2, 7 and 8 (Table 25). Farm dams were full and connected directly to the lake, with surface water levels higher than during the January survey. There was no evidence of breeding activity on the lake, however previous breeding success was evident in the abundance of juvenile Hoary-headed Grebes and Eurasian Coot.

A total of 31 species were observed along the transects, totalling 4975 birds. The most common species observed were Hoary-headed Grebe (584), Pacific Black Duck (390), Grey Teal (911), Hardhead (232), Eurasian Coot (1985) and Whiskered Tern (115). Species notable in their absence were Straw-necked Ibis, Black-winged Stilt and Black-fronted Dotterel.

At the time of the survey, Lake Cowal was deeper and therefore supported fewer species that prefer shallow, fresh water with abundant short aquatic vegetation. Areas to the north of the lake, and adjacent farmland, had been inundated providing suitable habitat for wading species.

Transect surveys revealed that Lake Cowal continues to support a high diversity and abundance of waterbirds, particularly waterfowl and waterhens, including species that typically occupy the lake during phases of lake filling. Fish-eating species, such as cormorants and Australian Pelican, were not well represented owing to the relatively short period of filling to date. Seasonal breeding activity was yet to commence consistent with previous years (Gell, 2011b).

October 2011

The final survey conducted during 2011 was completed on the 24 and 25 October by Peter Gell and Paul Peake. Transect survey results for transects 1, 2, 7 and 8 (Table 25) were presented. Surface water levels remained high and the Lake margins were extensively inundated at the time of the survey. Despite these high water levels, there was little evidence of colonial waterbird breeding in the north of the Lake.

A total of 34 species were observed along transects, totalling 7656 birds. The most common species observed were Hoary-headed Grebe (231), Pacific Black Duck (510), Grey Teal (1341), Hardhead (418), Eurasian Coot (3356) and Whiskered Tern (396).

Fish-eating species such as cormorants and Australian Pelican, were not well represented owing to the relatively short period of filling to date, but numbers are beginning to increase. The numbers of ibis were low, possibly due to the attraction of other, more shallow waterbodies in the region.

Transect surveys indicate Lake Cowal continues to support a high, and increasing diversity and abundance of waterbirds, particularly waterfowl and waterhens (Gell, 2012).

Plate 1 is a low altitude aerial oblique photograph taken west of the TSFs looking east across Lake Cowal. The February 2012 flood event raised the lake level over the top of the majority of the Lignum beds until drainage to the north re-exposed much of the vegetation.

Plate 1
Aerial Photograph from over TSFs towards Lake Cowal (October 2011)

Fauna monitoring of tailings storages and ML 1535 boundary

The NTSF was receiving tailings at the commencement of the reporting period. The STSF became the active cell from the mid-January changeover, for the remainder of the reporting period. The NTSF was decommissioned for most of 2011 for annual upstream lift project work, including a 3 metre rise in wall height and associated 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 Paragraph 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 2010 to 31 March 2011, 01 April 2011 to 30 September 2011 and 01 October 2011 to 31 March 2012, 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 during the reporting period.
- 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 visit 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.
- The drying and filling phases of Lake Cowal has been a significant influence on bird visitations to the TSF.

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

Hazing techniques were employed during the last reporting period at the tailings facilities. The following different methods are utilised 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 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 completed as necessary.

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 EPA 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 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.

A summary of the reported native fauna deaths that occurred on ML 1535 in 2011 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 were to be installed by elevated work platform during 2011. Due to wet conditions these habitat boxes have been stored at the LCCC and shall be installed when safer to do so.

"Beep for Birds" warning signs were installed along the bitumen access roads to the CGM in October 2010. The signs are intended to reduce the number of bird deaths on ML 1535 due to the increased number of birds in the vicinity of the ML as a result of the wet conditions experienced since mid-2010. Bird deaths on the bitumen access road of the ML remain lower than prior since the installation of the eight road signs.

Approximately 440 mouse bait stations have been placed in and around all buildings and perimeter fences on the mining lease and Barrick owned properties around Lake Cowal due to the mouse population increasing to plaque proportions in early-2011. Rentokil, Albury staff are contracted to restock bait stations on a fortnightly basis.

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**), Bland Shire Council (**BSC**) and DTIRIS (Minerals). 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]). Any 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 EPA 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 27.

Table 27
Summary of Vertebrate Pest Control Measures

Species	Status	Method of Control[2]
[1]European Rabbit (*Oryctolagus cuniculus*)	Declared pest	• baiting rabbits with 1080 and pindone poisoned carrot; and • ripping of rabbit warrens.
[1]European Red Fox (*Vulpes vulpes*)	Nuisance animal	• fox baiting; and • implementing a shooting programme.
[1]Feral Cat (*Felis catus*)	Nuisance animal	• feral cat baiting; and • implementing a shooting programme.
Feral Pig	Declared pest	• feral pig trapping.
Wild Dog	Declared pest	• 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 (Minerals) 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. Fox baiting did occur during the monitoring period when weather prevailed however, during periods of wet weather was ineffective and site inspections found that no problem existed. Semi-formal pest threat level dialogue was maintained with Lachlan LHPA staff during the prior and current monitoring period for the observed presence of mice, foxes and locusts around Lake Cowal.

3.9.2.3 Variations from Proposed Control Strategies

There were no variations from the proposed control strategies.

During November 2011, Cenwest was consulted in the matter of continued unwelcome nuisance numbers of the Welcome Swallow in the large Mining Maintenance and Processing Warehouse Sheds. Whilst the numbers have not escalated to a significant workplace health concern the numbers will continue to be checked. A somewhat disruptive result was obtained by operating a Scary Man bird deterrent unit in the top of the Mining Maintenance Workshop Shed.

Spider spray fogging by local contractors in the same large sheds and around operations has been an effective control since 2010. This will need to continue in order to manage Red-back, Black and Orb spider numbers.

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

The 2011 weed survey was undertaken during December 2011 by Carnegie Natives on behalf of Barrick (Cowal) Limited. The survey involved recording the extent of weed occurrences, details of weed distribution and any new weed species infestations. 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.

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.

Above average rainfall in 2011, particularly in the summer months has resulted in exceptional growth of all plant species in the Lake Cowal area, allowing species to build upon the optimal conditions of 2010. The spring- early summer 2011 period has again been particularly favourable for a proliferation of noxious weeds in the resultant mild, wet environment.

Xanthium spinosum (Bathurst Burr) is the most prevalent of the summer weeds and requires an extensive control program on the ML, 'Lake Cowal' and 'Hillgrove' properties. Bathurst Burr is widespread on all of these areas, typically growing on any disturbed soil, along roadsides, dams and around buildings. A close relative, *Xanthium occidentale* (Noogoora Burr) was found on the ML along the eastern reach of the Northern Low-Flow channel and along Spring Creek on the 'Lake Cowal' property. Two small stands of Noogoora Burr were removed by hand near the creek at ML Gate 7 and on the north side of the ML in the Travelling Stock Route (**TSR**) reserve during 2011.

Lycium ferocissimum (African Boxthorn) control on the 'Lake Cowal' and 'Hillgrove' properties is reducing the prevalence of this problematic weed. During 2011 monitoring and follow-up spraying has continued on both properties with more timely spraying operations in March and September yielding good results. Spraying of large stands of Boxthorn under mature, isolated trees in the TSR outside the 'Lake Cowal' entrance by Spring Creek commenced in early 2012. Spraying in these windows also reduces the risk of damage to desirable species due to volatilisation of the most effective chemicals used in control. All areas must continue to be monitored closely, carefully assessing kill rates due to the persistent nature of this pest. Some recruitment is present in relocated and stored topsoil on the southern wall of the Permanent Isolation Bund and the Southern Waste Emplacement.

Populations of *Onopordum sp.* (Scotch Thistle) located on the ML have been reduced significantly since 2009 through strict chemical control which have been and must remain a major part of the Barrick Cowal weed control program. Small pockets of this weed continue to establish in other locations following wind dispersal of seed from this primary site.

Marrubium vulgare (Horehound) was included as a target weed on the 'Hillgrove' property following establishment of a significant infestation in Paddock 8. Monitoring for this weed must continue at this location.

Hypericum perforatum (St John's Wort) is a persistent problem, particularly at the Lake Cowal Grain Storage Shed with current control measures containing the infestation to this area. Barrick contractors and staff from Lachlan LHPA and the BSC have been spraying for this weed as part of a concentrated effort to eradicate it in the shorter term.

Sclerolaena birchii (Galvanised Burr) prevalence has been significantly diminished as a result of Barrick"s control program and the increase in groundcover due to improved seasonal conditions reducing the opportunity of bare ground for the recruitment of this pioneer species.

Proboscidea louisianica (Purple-Flowered Devil's Claw) remains a problem on the low-lying moist clay soils of the 'Lake Cowal' property, often in association with *Xanthium spinosum. Phyla nodiflora* (Lippia) was also observed on this property at the confluence of Spring Creek and Lake Cowal. This weed presents a major concern for Lake

Cowal itself as it is a vigorous weed of ephemeral wetlands without truly viable options for control. It is spread via the movement of seed and plant segments in water flows and can be transported on the feet of waterbirds.

Centaurea solstitialis (St. Barnaby's Thistle) was also present in the Southern Low-Flow channel running along the southern side of the Mine Access Road from the mine entrance to the first road bend throughout the winter months. This area was sprayed for control and follow-up monitoring of this area is required to ensure eradication. This weed was introduced in straw which was brought in for mulching of bare soils. Devil's Claw heads were also detected in some bales at this location during spreading in 2010. The detected heads and seeds in those pods were removed to landfill disposal. Future straw mulch purchases need to be restricted to suppliers of weed-free, high quality product preferably from the local area to reduce the potential for import of new weed species.

Other weeds of concern observed during the survey include: *Nicotiana glauca* (Tobacco Bush) at the confluence of Sandy Creek and Lake Cowal; *Conyza bonariensis* (Flax-Leaf Fleabane) is present across the majority of the survey area; and *Euphorbia sp.* (False Caper) on the roadside verge of Boneham's Lane at Lake Cowal silos. The general locations and way points of noxious and other weed species observed during the 2011 survey can be obtained from the 2011 Weed Survey & Farm Management Report produced by Carnegie Natives.

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. Initially a small number of Talon bait stations and then Mouse-Off was used to try and control mice in offices and warehouse locations. When the mice number began to increase during daylight hours of business, Rentokil staff from Albury were engaged to promptly install an eventual 440 large bait stations using Talon XP rodentcide mouse baits in conjunction with care in maintaining a clean work environment, throughout the later part of 2010 and throughout 2011 into 2012. 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. Live, large Black Snakes and the occasional Brown Snake have been found inside the bait boxes on multiple inspections.

A feral cat eradication program continued during 2011. Collapsible cat traps with crush end modifications (retrofitted by the West Wyalong TAFE) were purchased during 2009 and used twice in 2010 when feral cats were observed on Barrick-owned property. Due to the ongoing presence of mice, no feral cat trapping occurred during 2011. Any trapped feral cats are registered with WIRES and humanly euthanased at the local West Wyalong Veterinary Clinic. Two non-target Little Red Foxes were found deceased near the Processing Plant area in early 2011. These deaths coincided with a large number of other ducks, owls, eagles and galah actual or near deaths in the local region. Brown Falcon numbers have boomed during the recent 12 months on the ML, and Nankeen Kestrels are also in fair number and clearly eating mice. Silver Gulls have been noted chasing and eating mice around the Administration areas through 2011. Letter-wing Kites made an appearance early in 2012 and so are in lesser numbers than the well established Brown Falcon numbers in and around the E42 Pit walls and waste rock stockpiles.

The 2011 monitoring and controlled mouse and fox 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

Review of fox, mouse and feral cat control programs will continue 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.

Rentokil, Albury were contracted during the 2011 reporting period to assist Barrick in the control and eradication of pest rodent populations.

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 Cowal 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. Sustained, adaptive response weed and pest control activities will occur during the next 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 DP&I in March 2010) deleted Development Consent Condition 8.4. A revised BLMP was subsequently submitted to the Director General of the DP&I 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 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 2010 to 22 December 2011 to the EPA on 21 February 2012. Condition R2 of the EPL requires Barrick to notify the EPA 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 EPA as soon as practicable after the exceedance becomes known.

Condition R4 of the EPL requires the results of the blast monitoring required by condition M7.1 to be submitted to the EPA at the end of the reporting period. Barrick has reviewed and submitted the 2011 Review of Blast Monitoring Results, prepared by Saros (Australia) Pty Ltd (ACN 123 144 632) (**Saros**), to the EPA on 24 February 2012.

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. A description of the varied EPL is provided in this AEMR (see Paragraph 1.1.2).

The revised BLMP (Barrick, 2010) was awaiting DP&I approval at the time of writing.

During the next reporting period the recently introduced EPA Pollution Incident Response Management Plan and the monthly EPL monitoring data, available online, shall be discussed further.

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 6.3(a) & (b), the revised 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. In addition, a 'control' monitor is installed at BM07, located at the main administration building.

3.10.2.1 Control Strategies

In accordance with Development Consent Condition 6.3(a) & (b), the revised BLMP and EPL Condition M7, airblast overpressure and ground vibration levels 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 (and remained so during the 2011 monitoring period). During early 2012, another series of rainfall events occurred which resulted in a further rise of the Lake Cowal water level and inundation of three blast monitors situated in Lake Cowal. Further improvements to the monitoring technology and height of logging are expected during the next reporting period.

Communication with the remote units is conducted via battery powered GSM modem fitted and recharged via solar panel. The units send data to Saros, Brisbane. All field monitoring stations are removed annually for independent off-site maintenance and calibration. Barrick typically removes the units in early February and a Saros 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 revised BLMP, the control strategies for blasting during the 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 100% compliance with licence conditions during the reporting period. Fourteen complaints were received during the reporting period relating to blasting. Details of the complaints are provided in Paragraph 4.1.

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.

Given the updated licence conditions, monitoring data is now divided into *'residence on privately owned land'* and *'specified sensitive locations'.* Monitoring locations BM01 (Gumbelah) and BM03 (Coniston) are categorised as *'residence on privately owned land'* and are affected by altered compliance limits as of 24 June 2011. All other monitoring locations are referred to as '*specified sensitive locations'*, with limits in line with the previous conditions.

Annual calibration of all fixed and roving units was performed by Saros and occurred during the period 9 to 27 February 2011, in accordance with Australian Standard 2187.1 and the manufacturer's specifications.

Ground Vibration

A total of 387 blasts were fired during the period 23 December 2010 to 22 December 2011. Ground vibration monitoring results did not trigger a significant response associated with CGM blasts at any of the operational monitors installed during the monitoring period. The maximum blast induced ground vibration level at the nearest residence was 0.26 mm/s recorded at BM03 (Coniston) on 5 July 2011. This level is significantly lower than the compliance level (5 mm/s).

Air Overpressure

A total of 18 events were identified as having a peak overpressure level exceeding the compliance criteria. A detailed analysis was performed by Saros to determine the likely source of overpressure. Of the 18 exceedance events, 12 were caused by localised environmental factors such as wind. The majority of exceedances identified at blast times were related to the Sunday and Public Holiday compliance level of 95 dB(L), which is a 20 dB(L) reduction to the normal weekday and Saturday limit of 115 dB(L).

One non-compliant event was recorded at BM01 (Gumbelah) on 5 July 2011, reaching a peak level of 123.1 dB(L) (8.3 km from the blast). When compared to the results from all other monitoring locations at the blast time, it was evident that this was a localised anomaly, given that a peak level of 107.5 dB(L) was recorded in the near field monitor BM07 (Administration), 1.1 km from the blast. All other far field monitors recorded peak levels at least 20 dB(L) lower.

Air overpressure readings of 117.9 dB(L), 119.9 dB(L) and 118.6 dB(L) were recorded on 22 April, 14 August and 2 July 2011 respectively. These were identified as blast related due to the correlation of all other monitoring locations.

In summary, no blast related events exceeded the maximum compliance level of 120 dB(L), three blast events exceeded the 115 dB(L) level on normal weekdays and Saturdays, three blast related events exceeded the 95 dB(L) levels on Sundays and public holidays and the number of exceedances at each location was not more than the 5% of the total number of blasts.

CGM achieved full compliance in relation to the specified air overpressure levels for the period 23 December 2010 until the 22 December 2011 (Saros, 2012).

A summary of the peak overpressure levels exceeding the compliance criteria, complete with likely cause, is presented in Table 28.

From the monitoring data and blasting information available, recorded levels of ground vibration and airblast overpressure induced by blasting activities conducted at CGM were 100% compliant with licence conditions during the reporting period (Saros, 2012).

Table 28
Summary of peak overpressure levels exceeding compliance criteria for CGM (23/12/10-22/12/11)

Location	Date	Time	Time		Compliance Limit	Comments
			PPV (mm/s)	O'Press dB(L)		
BM01 - Gumbelah Residence	26/06/2011	12:33	0.033	110.9	95dB(L) - Sundays and Public Holidays	Likely blast related.
BM05 - Bird Breeding	22/04/2011	12:36	0.059	117.9	115dB(L)	Likely blast related.
BM01 - Gumbelah Residence	2/07/2011	12:28	0.054	118.6	115dB(L)	Likely blast related.
BM01 - Gumbelah Residence	5/07/2011	16:47	0.083	123.1	120dB(L)	Localised anomaly/ environmental factors.
BM01 - Gumbelah Residence	10/07/2011	13:24	0.009	109.9	95dB(L) - Sundays and Public Holidays	Local environmental factors, unable to differentiate from background levels.
BM03 - Coniston Residence	7/08/2011	12:47	0.040	95.9	95dB(L) - Sundays and Public Holidays	Local environmental factors, unable to differentiate from background levels.
BM05 - Bird Breeding	14/08/2011	12:35	0.191	119.9	115dB(L)	Likely blast related.
BM03 - Coniston Residence	21/08/2011	12:37	0.075	98.8	95dB(L) - Sundays and Public Holidays	Local environmental factors, unable to differentiate from background levels.
BM01 - Gumbelah Residence	28/08/2011	15:34	0.019	95.9	95dB(L) - Sundays and Public Holidays	Likely blast related.
BM01 - Gumbelah Residence	18/09/2011	12:42	0.019	95.9	95dB(L) - Sundays and Public Holidays	Likely blast related.
BM01 - Gumbelah Residence	25/09/2011	12:34	0.011	104.9	95dB(L) - Sundays and Public Holidays	Local environmental factors, unable to differentiate from background levels.
BM01 - Gumbelah Residence	2/10/2011	12:31	0.019	104.9	95dB(L) - Sundays and Public Holidays	Local environmental factors, unable to differentiate from background levels.
BM01 - Gumbelah Residence	9/10/2011	12:41	0.011	97.5	95dB(L) - Sundays and Public Holidays	Local environmental factors, unable to differentiate from background levels.
BM01 - Gumbelah Residence	16/10/2011	12:25	0.018	100	95dB(L) - Sundays and Public Holidays	Local environmental factors, unable to differentiate from background levels.
BM01 - Gumbelah Residence	16/10/2011	12:32	0.014	98.8	95dB(L) - Sundays and Public Holidays	Local environmental factors, unable to differentiate from background levels.
BM03 - Coniston Residence	30/10/2011	12:34	0.014	98.8	95dB(L) - Sundays and Public Holidays	Local environmental factors, unable to differentiate from background levels.
BM01 - Gumbelah Residence	30/10/2011	12:35	0.018	98.8	95dB(L) - Sundays and Public Holidays	Local environmental factors, unable to differentiate from background levels.
BM01 - Gumbelah Residence	6/11/2011	12:28	0.011	97.5	95dB(L) - Sundays and Public Holidays	Local environmental factors, unable to differentiate from background levels.

New EPL compliance limits with respect to residences on privately owned land, instated 24 June 2011:

- the PPV level of 5mm/s for ground vibration during the day 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 noise sensitive location;
- the air blast overpressure level of 115dB (Linear Peak) during the day 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 noise sensitive location; and
- the airblast overpressure level of 95dB (Linear Peak) on Sundays (24 hours) and Public Holidays (24 hours) may be exceeded for up to 5% of the total number of blasts for a period of 12 months.

3.10.4 Reportable Incidents

In the AER, Barrick reported short periods of non-recording due to the units being off-site for annual calibration, and two events of units calling home during a blast event.

Several occurrences where the blast monitoring devices were not operational were identified since the reporting of the 2011 AER. A summary is presented below.

- BM01 - 31/05/12 to 06/06/12
- BM02 - 09/10/12 to 12/10/12
- BM03 - 17/01/12 and 01/03/12 to 05/03/12
- BM04.1 - 01/08/12
- BM05 - 25/07/12
- BM06 - 31/05/12 and 05/07/12 to 24/12/12

As reported by Saros in the 2011 annual report, the downtime occurrences listed above were due to "insufficient power caused by extended periods of overcast weather. In the case of the BM06 – General Monitoring Location the unit was offline for a prolonged period of time due to restricted access to the monitoring location."

The cause for the initial non-report of the downtime periods above was due to several factors including four revisions of the 2011 Saros report (due to legal review and technical adequacy purposes), each containing additional or altered information. The issue was immediately reported to the Environmental Manager once identified.

There were 14 community complaints received during the reporting period. A summary of which is provided in Paragraph 4.1.

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

3.10.5 Further Improvements

Saros 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.

During 25 to 26 July 2011, as a result of the inundation of Lake Cowal, monitoring locations BM04, BM05 and BM06 were fitted with new geophones designed to withstand long periods of water inundation. This was carried out to protect the units in the long term against water inundation (greater than 12 months).

In addition, further works will be carried out during 2012 on all blast monitors used by CGM. This will involve upgrading all monitors with new versions, as all current equipment has now been in the field for up to 7 years or more. Also, anemometers and wind direction sensors will be installed, with enhanced loggers at each location, later in 2012. This will minimise equipment failures and improve the determination of localised effects of weather conditions. Complete inundation and loss of the three loggers in Lake Cowal during February 2012 has delayed the changeover until June 2012, by which time the new supporting tripods will have been deployed in the field. The enhanced technology required for the meteorological system upgrade will still follow in 2012, and fit easily into the new cabinet design.

The 2011 monitoring period also saw extra blast monitoring carried out at the 'Cowal North' residence, on the north-east side of Lake Cowal, to determine any likely blasting effects on the residences as a result of complaints received. Temporary hire logger BM08 will continue to operate until the replacement BM06 logger is operational (June 2012). The BM08 logger was not sent to Brisbane for annual maintenance and calibration work in February 2012, however this monitor was checked in the field in May 2011 by Saros (Australia).

Further improvements include a new rental agreement with Saros, whereby incoming units (for calibration) will be swapped out with 'duty' units on the same day to further minimise data loss.

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

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 EPA 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 Paragraph 1.1.2 above, the NMP was amended during the 2010 reporting period to include noise monitoring sites at 'West Lea' (NO7) and 'McLintock's' (NO8). The addendum to the NMP was approved by the DP&I on 8 April 2010.

The modification to the CGM Development Consent (approved by the DP&I 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
Ungarie Road	*60*	*55*
Wamboyne Road, Blow Clear Road, Carrawandool-Warroo Road, Burcher Road, Condobolin Road, Lake Cowal Road	*55*	*50*

Note: Traffic noise generated by the project is to be measured in accordance with the relevant procedures in EPA'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 the DP&I 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 was engaged to conduct mine operating noise and traffic noise monitoring during the reporting period and 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 29 below, at any residence on privately-owned land, or on more than 25 percent of privately owned land not located within Lake Cowal.

Table 29
Noise Impact Assessment Criteria dB(A) $L_{Aeq\ (15minute)}$

Location	Day/Evening/Night[1]
Bungabulla	39
Coniston	44
Cowal North	38
Gumbelah	39
Lake Cowal (non-Barrick)	38
Laurel Park	39
Mattiske	36
McLintock	41
The Glen	38
West Lea	41
All other residences	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 Industrial Noise Policy.
- 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.
- [1]Mine 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 Paragraph 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 Industrial Noise Policy (**INP**). The application to modify the Development Consent 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 DP&I in April 2010) again revised the Development Consent Conditions relating to noise. A revised NMP was subsequently submitted to the Director-General of the DP&I 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 DP&I on 20 June 2011. As per Paragraph 1.1.2 above, a description of the EPL, varied by the EPA, of 24 June 2011 is included in this 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 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;
- sighting 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
- including 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 Paragraph 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 2011 (B) and July 2011 (C) 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 2011 (B) and July 2011 (C). A summary of the survey results is presented in Table 30, together with the respective noise criteria.

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

Location	Address	Mine Contributed $L_{Aeq(15minute)}$ B (dBA)	Mine Contributed $L_{Aeq(15minute)}$ C (dBA)	Noise Emission Criteria[4] $L_{Aeq(15minute)}$
No.1	New Lake Foreshore	29, 32	38, 39	[3]
No.2	'Coniston' Residence	<21, <18 (N/A[1])	<19, <21	44 dBA
No.3	Bird Breeding Area (South)	31, 30	32, 33	[3]
No.4	Bird Breeding Area (North)	17, 19	<33, <33	[3]
No.5	'Gumbelah' Residence	<23 (N/A[1]), <24 (N/A[1])	<27 (N/A[1]), <31 (N/A[1])	39 dBA
No.6	'Lake Cowal' Residence	<23 (N/A[1]), <25	<23, <22	[5]
No. 7	'West Lea' Property	<14 (N/A[1]), <19	<19 (N/A[1]), <23	41 dBA
No. 8	'McLintock' Property	<19, <18	<19, <20	41 dBA

Note:
N/A[1] - Mine noise emission not discernible.
N/A[2]- No Survey Conducted
[3] - Mine noise emission criteria apply to residences only
[4] - Mine noise emission criteria – applicable to condition 6.4(c) of the March 2010 modified development consent and Barrick Australia Limited (2004c) *Cowal Gold Project Noise Management Plan*
[5] – Mine owned property

During the January 2011 (B) and July 2011 (C) 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 2011 (B) and July 2011 (C). A summary of the survey results are presented in Table 31 together with the respective noise criteria.

Table 31
Evening Noise Emission Levels $L_{Aeq(15minute)}$

Location	Address	Mine Contributed $L_{Aeq(15minute)}$ B (dBA)	Mine Contributed $L_{Aeq(15minute)}$ C (dBA)	Noise Emission Criteria[4] $L_{Aeq(15minute)}$
No.1	New Lake Foreshore	27, 27	37, 37	[3]
No.2	'Coniston' Residence	<31 (N/A[1]), <32 (N/A[1])	27, 27	44 dBA
No.3	Bird Breeding Area (South)	N/A[2]	N/A[2]	[3]
No.4	Bird Breeding Area (North)	N/A[2]	N/A[2]	[3]
No.5	'Gumbelah' Residence	25, 25	31, 31	39 dBA
No.6	'Lake Cowal' Residence	<24 (N/A[1]), <26 (N/A[1])	29, 28	[5]
No. 7	'West Lea' Property	<24 (N/A[1]), <21 (N/A[1])	<16 (N/A[1]), <17 (N/A[1])	41 dBA
No. 8	'McLintock' Property	<27 (N/A[1]), <29	19, <15	41 dBA

Note:
N/A[1] - Mine noise emission not discernible.
N/A[2]- No Survey Conducted
[3] - Mine noise emission criteria apply to residences only
[4] - Mine noise emission criteria – applicable to condition 6.4(c) of the March 2010 modified development consent and Barrick (Australia Pacific) Limited (2004c) *Cowal Gold Project Noise Management Plan*
[5] – Mine owned property

During the January 2011 (B) and July 2011 (C) monitoring periods, the measured daytime mine noise emissions at the residential dwellings were below the applicable daytime intrusive $L_{Aeq(15minute)}$ 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.

3.11.3.4 Night-time Operator-attended Noise Survey Results

Night-time operator-attended mine operating noise surveys were conducted in January 2011 (B) and July 2011 (C). A summary of the survey results are presented in Table 32 together with the respective noise criteria.

Table 32
Night-time Noise Emission Levels $L_{Aeq(15minute)}$

Location	Address	Mine Contributed $L_{Aeq(15minute)}$	Mine Contributed $L_{Aeq(15minute)}$	Noise Emission Criteria[4] $L_{Aeq(15minute)}$
		B (dBA)	C (dBA)	
No.1	New Lake Foreshore	21, 20	28, 28	[3]
No.2	'Coniston' Residence	<11, <11	28, 26	44 dBA
No.3	Bird Breeding Area (South)	N/A[2]	N/A[2]	[3]
No.4	Bird Breeding Area (North)	N/A[2]	N/A[2]	[3]
No.5	'Gumbelah' Residence	<25, <25	<23, <23, <31, <32, <34, <34	39 dBA
No.6	'Lake Cowal' Residence	24, 23	28, 28	[5]
No. 7	'West Lea' Property	23, 25	28, 27	41 dBA
No. 8	'McLintock' Property	19, 21	25, 25	41 dBA

Note:
N/A[1] - Mine noise emission not discernible.
N/A[2]- No Survey Conducted
[3] - Mine noise emission criteria apply to residences only
[4] - Mine noise emission criteria – applicable to condition 6.4(c) of the March 2010 modified development consent and Barrick (Australia Pacific) Limited (2004c) *Cowal Gold Project Noise Management Plan*
[5] – Mine owned property

During the January 2011 (B) and July 2011 (C) monitoring periods, the measured daytime mine noise emissions at the residential dwellings were below the applicable daytime intrusive $L_{Aeq(15minute)}$ 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.

3.11.3.5 Unattended Continuous Noise Logging

Unattended continuous noise loggers were positioned at all monitoring locations from 24 January to 8 February 2011 and from 11 July to 27 July 2011. The loggers were used to quantify the ambient noise environment in the vicinity of CGM. Upgraded loggers, capable of recording wave files, were installed at Location 5 ('Gumbelah' residence) and Location 7 ('West Lea' residence) in July 2011 to enable additional analysis.

A summary is presented below:

- A comparison of the noise levels indicated that the noise levels monitored in January 2011 were generally higher than the previous summer at Gumbelah (No 5) and Lake Cowal (No 6), especially during the evening and night-time. The likely cause of increase in background noise is due to increased frog and insect activity as a result of the filling of Lake Cowal.
- Noise levels monitored in January 2011 were generally similar to noise levels detected during previous monitoring periods at Westlea (No 7) and McLintock (No 8).
- Noise levels measured during July 2011 were generally higher than the previous winter at Gumbelah (No 5), especially during the evening and night-time.
- Noise levels measured during July 2011 were generally lower than the noise levels monitored during the previous years at Coniston (No 2), Westlea (No 2) and McLintock (No 8).

CGM was seen to be in conformance with the relevant noise requirements (SLR Consulting, 2011b & c).

3.11.3.6 Operator-attended and Unattended 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. In addition, unattended continuous noise loggers were positioned at the three monitoring locations for the period 24 January and 8 February 2011, including:

- "Windstone", 648 Wamboyne Road
  Offset distance from the road – 150 m
- "Clairview", 56 – 86 Wamboyne Road
  Offset distance from the road – 45 m
- 140 Ungarie Road, West Wyalong (near intersection with Dumaresq Street)
  Offset distance from the 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 on 24 January and 28 January 2011.

In order to quantify the overall traffic volumes and determine peak traffic periods, three traffic counters were deployed next to the monitoring locations (TN1, TN2 and TN3, for a 7-day period commencing 22 January 2011. Four additional traffic counters were deployed during the same period in order to identify the traffic associated with CGM at those monitoring locations. The additional traffic counters were installed on Condobolin Wyalong Road (north of the junction with Wamboyne Road), on Wamboyne Road (north of the junction with Blow Clear Road), on the sealed main mine entrance road from the west (leading off Bonehams Lane), and on the sealed Blow Clear/Lake Coal Road (immediately west of the junction with Bonehams Lane) to count the mine related traffic which enters the mine from the east via the unsealed Lake Cowal Wamboyne Road.

Weather analysis was conducted in order to determine if weather conditions were a significant variable in the noise levels recorded. The analysis found that weather conditions were not a significant variable in the traffic noise levels recorded.

Traffic count data showed that the morning peak traffic period was from 0600 hours to 0730 hours, and the evening peak traffic period from 1730 hours to 1900 hours.

The ambient LAeq (1hour) noise levels and corresponding calculated LAeq (1hour) traffic noise contribution at 140 Ungarie Road are presented in Table 33, together with the respective vehicle counts.

The measured LAeq(1hour) mine generated traffic noise at TN1 during the daytime/evening period was 54 dBA (i.e. below the 60 dBA criterion). The measured LAeq(1hour) mine generated traffic noise at TN1 during the night-time (early morning peak) was 56 dBA and marginally (1 dBA) above the 55 dBA criterion.

The measured LAeq(1hour) non-mine traffic noise at TN1 during the daytime/evening (afternoon peak) was 57 dBA and during the night-time (early morning peak) was 56 dBA. The non-mine traffic noise at TN1 during the afternoon peak is therefore 3 dBA higher by comparison to the mine generated traffic noise of 54 dBA. The non-mine traffic noise at TN1 during the early morning peak is the same as the mine generated traffic noise of 56 dBA (SLR Consulting, 2011a).

Furthermore, dwellings located within 34 m of Ungarie Road may potentially receive traffic noise levels in excess of 55 dBA during the early morning peak hour. Based on the "*Cowal Gold Mine Noise Management Plan*" (Barrick, 2010a), approximately five dwellings are located within 34 m from Ungarie Road. The nearest dwelling(s) (140 Ungarie Road) being approximately 30 m from Ungarie Road where the mine generated traffic noise is marginally (1 dBA) above the 55 dBA criterion.

Table 33
Operator-attended Traffic Noise Emission Survey Results (January 2011)
TN 1 - 140 Ungarie Road

'140 Ungarie Road'									
Night/Morning (0600-0700) [1]	**Traffic Noise $L_{Aeq(1hour)}$ Criteria (dBA)** [1]	**Mine Operating Operator-attended $L_{Aeq\ (1hour)}$ (dBA)**[7]			**Traffic Count**			**Unattended**[5]	**Attended**[6]
		Non-Mine Vehicles	**Mine Vehicles**	**Total**	**Non-Mine Vehicles**	**Mine Vehicles**	**Total**[2]		
Monday	55	55	56	58	53	57	110	-	-
Tuesday	55	57	57	60	68	69	137	59	-
Wednesday	55	56	55	58	48	46	94	57	-
Thursday	55	55	56	58	47	53	100	57	-
Friday	55	57	56	59	59	53	112	58	58
Five-Day Average	55	56	56	59	55	56	111	57	-
Afternoon (17:15-18:15) [1]									
Monday	60	58	55	60	87	59	146	58	-
Tuesday	60	58	55	60	99	63	162	57	-
Wednesday	60	55	52	56	49	29	78	53	-
Thursday	60	58	55	59	78	51	129	58	-
Friday	60	57	54	59	87	43	130	56	-
Five-Day Average	60	57	54	59	80	49	129	56	-

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 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

5 'Unattended' – Results obtained from actual unattended traffic noise monitoring

6 'Attended' – Results obtained from actual attended traffic noise monitoring

7 Predicted traffic noise contribution

The ambient LAeq (1hour) noise levels and corresponding calculated LAeq (1hour) traffic noise contribution at 'Clairview' Residence are presented in Table 34, together with the respective vehicle counts.

The measured LAeq(1hour) mine generated traffic noise at TN2 during the daytime/evening (afternoon peak) was 51 dBA (ie below the 55 dBA criterion). The measured LAeq(1hour) mine generated traffic noise at TN2 during the night-time (early morning peak) was 54 dBA and moderately above the 50 dBA criterion (SLR Consulting, 2011a).

Table 34
Operator-attended Traffic Noise Emission Survey Results (January 2011)
TN2 - 'Clairview' Residence

'Clairview' Residence									
Night/Morning (0600-0700) [1]	**Traffic Noise $L_{Aeq(1hour)}$ Criteria (dBA)** [1]	**Mine Operating Operator-attended $L_{Aeq\ (1hour)}$ (dBA)** [7]			**Traffic Count**			**Unattended** [5]	**Attended** [6]
		Non-Mine Vehicles	**Mine Vehicles**	**Total**	**Non-Mine Vehicles**	**Mine Vehicles**	**Total** [2]		
Monday	50	45	54	55	7	57	64	-	-
Tuesday	50	45	55	55	8	69	77	55	56
Wednesday	50	43	53	54	4	46	50	54	-
Thursday	50	45	54	54	6	53	60	53	-
Friday	50	44	54	54	6	53	59	56	-
Five-Day Average	50	44	54	54	6	56	62	55	-
Afternoon (17:15-18:15) [1]									
Monday	55	46	52	53	10	59	69	52	-
Tuesday	55	46	53	53	10	63	73	51	-
Wednesday	55	45	49	51	9	29	38	48	-
Thursday	55	45	52	53	8	51	59	50	-
Friday	55	44	51	52	6	43	49	49	-
Five-Day Average	55	45	51	52	9	49	58	50	-

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 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

5 'Unattended' – Results obtained from actual unattended traffic noise monitoring

6 'Attended' – Results obtained from actual attended traffic noise monitoring

7 Predicted traffic noise contribution

The ambient LAeq (1hour) noise levels and corresponding calculated LAeq (1hour) traffic noise contribution at 'Windstone' Residence are presented in Table 35, together with the respective vehicle counts.

The measured LAeq(1hour) mine generated traffic noise at TN3 during the daytime/evening (afternoon peak) was 48 dBA (ie below the 55 dBA criterion). The measured LAeq(1hour) mine generated traffic noise at TN3 during the night-time (early morning peak) was 48 dBA and below the 50 dBA criterion.

Table 35
Operator-attended Traffic Noise Emission Survey Results (January 2011)
TN3 - 'Windstone' Residence

'Windstone' Residence									
Night/Morning (0600-0700) [1]	Traffic Noise $L_{Aeq(1hour)}$ Criteria (dBA) [1]	Mine Operating Operator-attended $L_{Aeq\ (1hour)}$ (dBA)[7]			Traffic Count			Unattended[5]	Attended[6]
		Non-Mine Vehicles	Mine Vehicles			Mine Vehicles	Total[2]		
Monday	50	39	48	49	7	57	64	-	-
Tuesday	50	40	49	50	9	69	78	54	55
Wednesday	50	40	47	48	10	46	56	50	-
Thursday	50	41	48	49	12	53	65	48	-
Friday	50	36	48	48	4	53	57	47	-
Five-Day Average	50	40	48	49	8	56	64	49	-
Afternoon (17:15-18:15) [1]									
Monday	55	43	49	50	13	59	72	48	-
Tuesday	55	44	49	50	11	63	74	52	-
Wednesday	55	41	46	47	6	29	35	47	-
Thursday	55	40	48	49	7	51	58	47	-
Friday	55	42	48	49	7	43	50	43	-
Five-Day Average	55	42	48	49	9	49	58	48	-

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 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

5 'Unattended' – Results obtained from actual unattended traffic noise monitoring

6 'Attended' – Results obtained from actual attended traffic noise monitoring

7 Predicted traffic noise contribution

Furthermore, dwellings located within 103 m of Wamboyne Road may potentially receive traffic noise levels in excess of 50 dBA during the early morning peak hour. Based on the "*Cowal Gold Mine Noise Management Plan*" (Barrick, 2010a), approximately four dwellings are located within 103 m from Wamboyne Road, with the nearest being "Clairview" (TN2) where the mine generated traffic noise is up to 4 dBA above the relevant traffic assessment criterion during the early morning peak (SLR Consulting, 2011a).

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 no community complaints received during the reporting period relating to operational or traffic noise.

3.11.5 Further Improvements

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

During the next monitoring period, additional operation noise monitoring will be carried out to assess noise impacts outside the regular monitoring window. It is anticipated that monitoring will occur throughout the first half of 2012.

Barrick (Cowal) community relations employees visited all premises (including the nine potentially more sensitive premises) along the approved mine access road in late 2011 to discuss traffic noise monitoring results. When the January/February 2012 traffic noise survey report data is available it shall be presented with independent interpretation to the residents.

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 DP&I for approval prior to July 2010 in accordance with Development Consent Condition 3.6[d]). Following approval of the ROMP by the DP&I, 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 EPA 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 will result over time as plants continue to grow.

Visual impact mitigation measures that have been employed at 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 Modification Environmental Assessment Statement of Commitments (Barrick, 2010), 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 EA (Barrick, 2010), the implementation of the control strategies above minimised visual impacts from mining activities of 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 DP&I.

Table 36 provides a summary of the landscape maintenance and monitoring programme.

Table 36
Landscape Maintenance and Monitoring Summary

Component	Monitoring Frequency	Monitoring Method	Typical Maintenance
Landscaping Works • General Inspections	Bi-monthly for first year, then annually.	Visual assessment of moisture stress, plant survival, presence of weeds and erosion/ sedimentation.	• Supplementary watering if required. • Control of invasive weed species in accordance with the requirements of the LMP. • Supplementary planting of failed plants where necessary.
• Erosion Inspections	Following significant, high intensity rainfall events.	Visual assessment of earth mound screening to determine if significant erosion or washouts have occurred in accordance with the ESCMP.	• 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.	• Replace or repair items as necessary to maintain structural integrity. • Repaint any exterior surfaces where the finish has deteriorated.
Rehabilitation Works • General Inspections	Annual	Monitoring in accordance with the MREMP (with reporting in the AEMR).	• 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.
• Erosion Inspections	Following significant, high intensity rainfall events.	Visual assessment of rehabilitation works to determine if significant erosion or washouts have occurred in accordance with the ESCMP.	• 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.
- Maintenance of erosion control structures.
- Placement of native pasture hay on newly constructed TSF slopes.

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 36, 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 EPA 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) (**NPW Act**) for 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 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 37.

Table 37
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	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.
		Special Condition 3	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	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.
		Special Condition 5.	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.
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 OEH 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.

Table 37 (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 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.
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.

Table 37 (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 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 Plan 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 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 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 CGM as amended by Permit 1468 and Permit 1681. Activities undertaken during the 2011 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 CGM.
- 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 WCCHC. These inductions are held on an as needed basis.

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 WCCHC. 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 were reported. Areas where soil stripping has taken place were inspected under the supervision of representatives of the WCCHC.

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 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 EPA 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 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 Lake Cowal Foundation (**LCF**), BSC and Bland District Historical Society (**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

Since prior reporting periods, 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.

From March to July 2011 the peripheral items and gardens to the ‘Cowal West’ homestead and Shearing Shed were removed or cleared. Windows, doors and other items of interest from the homestead were placed in on-site storage shed. The asbestos was removed from the ‘Cowal West’ homestead in early August 2011. The demolished portion of the ‘Cowal west’ homestead was trucked away and encapsulated in waste rock at the Southern Waste Rock Emplacement on 12 August 2011.

3.14.2.3 Variations from Proposed Control Strategies

There were no variations from the proposed control strategies.

Dismantling and relocation of the ‘Cowal West’ Shearing Shed to the ‘Hillgrove’ LCCC will occur from April 2012. After the Shearing Shed has commenced reconstruction at the LCCC, the Stable remnants and any out buildings and Sheep Yard components will be relocated to the ‘Hillgrove’ LCCC to re-create the out buildings. VCPL will be followed in mid-May 2012 to remove the 43 trees in the immediate vicinity in preparation for final grading and establishment of the clay basal layer of the completed portion of the Southern Waste Rock Emplacement near Pond D9. The heritage security fencing will be rolled up and recycled as scrap metal. Signage and fencing will remain intact around the large adjacent heritage items storage shed near Pond D9.

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 Paragraph is not applicable to CGM for this reporting period.

3.16 BUSHFIRE

3.16.1 Reporting Requirements

3.16.1.1 Development Consent

The 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 2010 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 EPA 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 Paragraph 3.16.3 above).

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 Paragraph 3.1.3.1 above.

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. Barrick will take delivery of a loan Temora-Bland RFS water truck in early-2012 to used in on-site training and awareness.

The fire trail register was maintained during the reporting period. New all weather access tracks were established in 2010 to the DG2, BM04.1 and NO4 location and to the new lake floor saline bores system to assist in fire control. Since March-August 2010 the majority of these tracks have been completely inundated by Lake Cowal.

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, breathing apparatus, 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 Paragraph 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 to the HWCMP was approved by the Director-General of the DP&I in January 2008 to reflect the proposed management procedures for two new waste streams generated at the CGM, viz.: trash screen oversize waste (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 Paragraph 1.1.2 above, the HWCMP was amended to reflect the June 2009 Modification that approved the use of SMBS as an alternative cyanide destruction method. The December 2009 addendum of the HWCMP was approved by the DP&I 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 DP&I 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 EPA 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 EPA (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-paragraphs.

Control Strategies 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 Fuel and Oils Register (FOR)

In accordance with Paragraph 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.

SAI Global conducted several days of audit training during 2011; this was the first basic audit training conducted on site for some years. ChemAlert III derived employee training did not occur in 2010 or 2011 and 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 (Paragraph 3.18.3.2 below).

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 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 & Sons contract to appropriately recycle and/or dispose of the various waste streams.

3.18.3.2 Performance Outcomes

As described in Paragraph 2.6 above, on-site bioremediation of site-generated hydrocarbon contaminated 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 were 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 Facility 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 Paragraph 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-MR (formerly DTIRIS & 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 was calculated in 2011 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 re-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 (**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 Acid Rock Drainage (**ARD**) generation from waste rock, Carbon in Leach (**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 a 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. Although it was not conducted during 2011, a review study will occur during the next reporting period.

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-MR. 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.

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 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-need 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.

Although it was not conducted during 2011, a review study will occur during the next reporting period.

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

The final 18 of the 31 yellow maritime special buoys have been placed along the inundated ML boundary to advise any potential members of the public of access restrictions.

3.21.2 Environmental Performance

There were no reportable incidents relating to public safety during the reporting period (see Paragraph 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 Paragraph 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 38.

Table 38
Summary of Community Complaints during the Reporting Period

DETAILS	Resident of Lake Cowal, (east) West Wyalong.
COMPLAINT / CONCERN	Local Landholder – called the Community Relations Manager direct regarding noise and vibration from the 21 February 2011blast.
DATE	**21 February 2011**
OUTCOME	The Community Relations Manager informed the Landholder that he would investigate the contributing factors to the blast they felt. The Community Relations Manager contacted the Landholder again on 1 March 2011 to discuss the contributing factors and also posted a map of the pit showing the blast area.
DATE OF RESPONSE	22 February 2011
DETAILS	Resident of Lake Cowal, (east) West Wyalong.
COMPLAINT / CONCERN	Local Landholder – called the Community Relations Manager direct regarding noise and vibration from the 21 February 2011 blast.
DATE	**23 February 2011**
OUTCOME	The Community Relations Manager informed the Landholder of the contributing factors to the blast they felt on 21 February 2011 and also informed him that neighbouring Landholders had also felt and heard the blast. The Community Relations Manager also advised that he would provide a map of the pit blast area at their next meeting.
DATE OF RESPONSE	23 February 2011
DETAILS	Resident of east Lake Cowal, (east) West Wyalong.
COMPLAINT / CONCERN	Local Landholder – called the CGM Complaints Line regarding excessive noise and vibrations from the 22April 2011 blast.
DATE	**22 April 2011**
OUTCOME	A meeting was held on 9 May 2011 to discuss complaints made on the 21 February, 22 April and 29 April 2011. The meeting resolved that the Community Relations Manager would speak with Barrick to determine if a temporary blast monitor could be installed at their property for a period of 3 to 4 months to ascertain if a blast issue exists. The Community Relations Manager will work with the Region to formally respond confirming Barrick are willing to coordinate the installation of a blast monitor. A formal letter confirming this was posted to the Landholder on 13 May 2011. A blast monitor was installed at the property on 19 May 2011. A findings report will be issued to the Landholder following the monitoring period.
DATE OF RESPONSE	2 May 2011. Messages were left by the Community Relations Manager on 22, 26 & 28 April.

Table 38 (continued)
Summary of Community Complaints during the Reporting Period

DETAILS	Resident of Lake Cowal, (east) West Wyalong.
COMPLAINT / CONCERN	Local Landholder – called the CGM Complaints Line regarding a "loud explosion" at the mine on 22 April 2011.
DATE	**22 April 2011**
OUTCOME	The Community Relations called the Landholder. The Landholder advised there was a large explosion from the mine. The Community Relations Manager information the Landholder he would look into the "loud explosion" and provide details. The Community Relations Manager contacted the Landholder on 3 May 2011 to arrange a meeting with him to discuss noise mitigation options at his property. A meeting was held on 30 May 2011 to discuss and table a SLR noise mitigation report. The outcome of the meeting was that while Barrick were not under any legal obligation to initiate noise mitigation at the property, Barrick would agree to provide noise mitigation at the property in the interest of maintaining a positive relationship. The Landholder is to review the SLR report and advise Barrick if they would like to proceed with noise mitigation measures.
DATE OF RESPONSE	22 April 2011
DETAILS	Resident of Lake Cowal (east), West Wyalong.
COMPLAINT / CONCERN	Local Landholder – A letter was received regarding airblast overpressure and ground vibrations concerns associated with Cowal's blasting activities.
DATE	**29 April 2011**
OUTCOME	A meeting was held on 9 May 2011 to discuss complaints made on the 21 February, 22 April and 29 April 2011. The meeting resolved that the Community Relations Manager would speak with Barrick to determine if a temporary blast monitor could be installed at their property for a period of 3 to 4 months to ascertain if a blast issue exists. The Community Relations Manager will work with the Region to formally respond confirming Barrick are willing to coordinate the installation of a blast monitor. A formal letter confirming this was posted to the Landholder on 13 May 2011. A blast monitor was installed at the property on 19 May 2011. A findings report will be issued to the Landholder following the monitoring period.
DATE OF RESPONSE	2 May 2011. This is on ongoing issue. The Community Relations Manager left messages for the landholder on the 22, 26 & 28 April 2011 regarding the 22 April 2011 complaint. Contact was made on 2 May 2011 at which time the 9 May 2011 meeting was arranged.

Table 38 (continued)
Summary of Community Complaints during the Reporting Period

DETAILS	Resident of Lake Cowal, (east) West Wyalong.
COMPLAINT / CONCERN	Local Landholder – called the CGM Complaints Line to make a complaint.
DATE	**9 June 2011**
OUTCOME	The Community Relations Manager contacted the Landholder to discuss his complaint. The Landholder advised the blast today (9 June 2011) vibrated their house. The Community Relations Manager advised that the temporary blast monitor had been installed and will have picked up any vibration caused by the blast. The Community Relations Manager advised he would contact Heggies and have the data reviewed from the blast and through a process of consultation with the Landholder will work towards resolving their concerns.
DATE OF RESPONSE	9 June 2011
DETAILS	Resident of Lake Cowal, (east) West Wyalong.
COMPLAINT / CONCERN	Local Landholder – called the CGM Complaints Line to make a complaint.
DATE	2 July 2011
OUTCOME	The Community Relations Manager spoke with the Landholder and advised data from the blast monitor would be reviewed and any abnormalities would be reported to the landholder.
DATE OF RESPONSE	2 July 2011
DETAILS	Resident of Lake Cowal, (east) West Wyalong.
COMPLAINT / CONCERN	Local Landholder – called the CGM Complaints Line to make a complaint.
DATE	5 July 2011
OUTCOME	The Environment Manager spoke with the Landholder and advised data from the blast monitor would be reviewed and any abnormalities would be reported to the landholder. However, the data was not yet available. Once the data was available the information was passed to the landholder.
DATE OF RESPONSE	5 July 2011
DETAILS	Resident of Lake Cowal, (east) West Wyalong.
COMPLAINT / CONCERN	Local Landholder – called the CGM Complaints Line to make a complaint.
DATE	18 July 2011
OUTCOME	The Community Relations Manager spoke with the Landholder at 4pm and advised that Saros had been contacted re: providing an initial blast monitoring summary report from the temporary blast monitor at east Lake. The Community Relations Manager also advised site are speaking with the drill and blast dept re: understanding what is occurring by way of blasts when the complaints are lodged. The Community Relations Manager advised he would provide a summary report once obtained (data subsequently provided).
DATE OF RESPONSE	18 July 2011

Table 38 (continued)
Summary of Community Complaints during the Reporting Period

DETAILS	Resident of West Wyalong (Operator Street)
COMPLAINT / CONCERN	Contacted Barrick Cowal direct regarding noise from a Barrick Property
DATE	17 August 2011
OUTCOME	Cowal Environment Manager contacted the resident after receiving a noise compliant regarding a Barrick property. The Environment Manager followed up with Human Resources and the compliant was addressed.
DATE OF RESPONSE	17 August 2011
DETAILS	Resident of Lake Cowal, (east) West Wyalong.
COMPLAINT / CONCERN	Local Landholder – called the CGM Complaints Line to make a complaint.
DATE	30 August 2011
OUTCOME	The Community Relations Officer called the landowner at 3:55pm, the phone went through to message bank. The Community Relations Officer left a message for the landowner acknowledging the call regarding today's blast. The Community Relations Officer left relevant contact details. 2 September 2011 – Community Relations Officer called again 9:39am and left a message stating this was a follow up call regarding Tuesday's blast. The Community Relations Officer advised they would try to call again later. Also, advised that the Environmental Manager was following up on what data is available and if the July data was finalised Barrick would arrange to have a copy sent over. Barrick reiterated their intention to leave the temporary blast monitor in place for a further 3 months. A meeting was arranged with the Landowners, Environment Manager and Community Relations Officer at east Lake on 9 September 2011. A copy of the relevant data was provided to the Landowners during the meeting. The blast monitor was checked prior to leaving the property.
DATE OF RESPONSE	30 August 2011 / closed 9 September 2011
DETAILS	Resident of, (east) Forbes
COMPLAINT / CONCERN	Local Landholder – called the CGM Complaints Line to make a complaint.
DATE	9 September 2011
OUTCOME	The Community Relations Officer contacted the landowner at 3:52pm. The landowner stated that yesterday morning through to about lunchtime the mine was very noisy. No follow up was requested from the landowner.
DATE OF RESPONSE	9 September 2011

Table 38 (continued)
Summary of Community Complaints during the Reporting Period

DETAILS	Resident of Lake Cowal area (Clear Ridge Road) West Wyalong.
COMPLAINT / CONCERN	E-mail sent direct to Community Relations Manager
DATE	20 October 2011
OUTCOME	Barrick Community Relations Manager responded to a concern regarding traffic and mine related noise. The landowner was invited to visit the mine and view the operation. The landowner attended site and spoke with the Community Relations Manager about their concerns.
DATE OF RESPONSE	20 October 2011 (site visit 13 December 2011)
DETAILS	Resident of Lake Cowal, (east) West Wyalong.
COMPLAINT / CONCERN	Local Landholder – called the CGM Complaints Line to make a complaint.
DATE	21 October 2011
OUTCOME	Barrick Community Relations Manager and General Manager requested a meeting with landowners on Friday 25 November 2011 to discuss the blast and noise issues. Landowner advised they were unavailable and a new time could be scheduled.
DATE OF RESPONSE	21 October 2011
DETAILS	Resident of Lake Cowal, (east) West Wyalong.
COMPLAINT / CONCERN	Local Landholder – formal written complaint from Minter Ellison acting on behalf of Resident of Lake Cowal, (east) West Wyalong
DATE	5 December 2011
OUTCOME	Subsequent to the above meeting request correspondence was received by Minter Ellison suggesting exceedance of the Cowal Development Consent. Barrick carried out an extensive assessment of the suggested exceedance and responded accordingly on 19 December 2011 noting that no exceedance of the development consent had been recorded. The correspondence invited the landowners to contact Barrick direct to discuss their concerns.
DATE OF RESPONSE	19 December 2011

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.

The CEMCC quarterly meetings during the reporting period occurred on 2 March, 1 June, 14 September, and 6 December 2011. 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).

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 2011 with a further edition released in February 2012 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 July 2012.

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 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 WCC 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 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 WCCHC 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. Since 2006, Barrick has awarded 133 scholarships for a total of for a total annual investment of over $100,000.

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 BB 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 BB Program promotes community involvement amongst the work force.

The CPP allocated approximately $90,000 of funds to approved applications during 2011.

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 CGM. The LCF Board meet as required, some meetings are held via teleconference.

In addition to housing the 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;
- EPA, 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 LCCC; 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

Aside from the asbestos taken to BSC landfill under permit, and the items of interest disturbed at the 'Cowal West' heritage site works, 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 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 was no survival. Direct seeding was trialled in October 2011 just prior to a significant rainfall event (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). The outcomes of the rehabilitation trials to date are described in Section 5.4.

There were no variations in activities undertaken from those proposed in the 18 March 2010 approved amended MOP (2010 - 2011). 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 2010 reporting period. Substantial re-shaping works were required adjacent Pond D1 during 2010 and 2011 to facilitate the establishment of the Pond D1 north trial plot area.

The rehabilitation activities undertaken during the reporting period were consistent with the principles and objectives described in the MOP (2011 – 2012). The next MOP would update the cover system concept for the final landform batters based on the results of rehabilitation cover treatment trials conducted to date. The concept would include using a rock mulch-topsoil cover on the batter slopes and include cross-ripping with approximately 10 t/ha gypsum. The concept (based on CGM rehabilitation trial outcomes) is considered in accordance with CGM rehabilitation principles and objectives presented in the EIS.

The 3rd Lift of the 8 ha of the STSF was rehabilitated using the waste rock – topsoil cross-rip method with gypsum at 10 t/ha with wheaten straw used to protect the northern slope from the harsher conditions in the times between rains. During late-2011 and into early-2012 the 8 ha of the 3rd Lift of the NTSF was rehabilitated using the waste rock – topsoil cross-rip method with gypsum at 10 t/ ha.

During late-2012 to early-2013, the 8 ha of the 4th Lift of the NTSF is expected to be ready for rehabilitation using the waste rock – topsoil cross-rip method and with gypsum at least 10 t/ha (MOP varied for construction of walls of 4th Lift of STSF to commence in early-June 2012).

During November – December 2011 the foreshore of the LPB was rock armoured given the forecast of a wet start to 2012. The Lift above the LPB received all the striped waste rock – topsoil layer from the proposed Pond D1 north trial area (fresher, more homogenous topsoil was required for the replicate trial plots to be of value). A number of large gullies toward the southern end of the first Lift above the LPB were dozed out and re-packed, and then covered with waste rock – topsoil cross-ripped with gypsum at 10 t/ha as added protection.

Table 39 provides details of the nature of disturbance, area and rehabilitation status for areas that have been disturbed before and during the reporting period.

Rehabilitation works were carried out in the following areas during the reporting period:

- PWE - re-shaped in north-eastern section;
- NWE – North Wall (Pond D1 rock – topsoil method extension trials on north-eastern side);
- SWE – South Wall (rock – topsoil trial plots) direct seeding in October 2011;
- LPB – re-shaped and rocked – topsoiled with gypsum 10 t/ha lower and 1st upper Lift;
- Pond D1 – 0.5m wall rise on eastern face to Lake Cowal;
- Temporary and Lake Protection Bund - road and weed maintenance;
- STSF – Walls (various trials, repairs on north lower wall, and rock - topsoil method on 3rd Lift); and
- NTSF – Walls (various trials and rock - topsoil method on 3rd Lift).

Table 39
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	20	Rock-topsoil cover
STSF						
• Floor	✓	✓	✓	Complete	156	Not yet rehabilitated
• Starter embankment	✓	✓	✓	Complete	15	Shaped and covered
• Downstream lift	✓	✓	✓	Complete	24	Some sections shaped and covered
• Upstream lift	✓	✓	✓	Complete	8	Rock-topsoil cover
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
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

* Construction works status refers to earthworks, excavations and/or emplacement of material.

Table 39 (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*		
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
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.

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. The 1st eastern Lift of the PWE was repaired using the rock – topsoil method with gypsum at 10 t/ha along the full length whilst rock armouring of the outer face of the LPB was conducted from November 2011.

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 5m to 10m 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. As described above, based on rehabilitation trial results to date, the cover material of the waste emplacement batters likely to provide stable landforms and successful revegetation performance includes a rock mulch topsoil cover treatment. As a result, the future need for the subsoil is questionable with the rock-topsoil method.

Thicknesses of Cover Layers and Methods of Laying and Compaction
The current cover system concept provides that gypsum-treated non-saline or low salinity subsoil will be laid to a depth of approximately 0.5m over the outer face of the emplacement. Topsoil cover will be approximately 0.25m deep over the entire emplacement surface. Topsoil will be transferred from soil stockpiles or directly from newly stripped areas and be spread using dozers and scrapers. The proposed updated cover system would include differing cover layer thicknesses and laying method and would be detailed in the next MOP and next AEMR reporting period.

Drainage and Erosion Control
Batter drainage will be affected by the use of wide reverse-graded berms every 5m 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 50m – 100m 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 in 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 and 2011 reporting periods. This work is discussed further in Paragraph 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. Barrick 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). 3rd Lifts of the STSF and NTSF have also been conducted using waste rock – topsoil method using gypsum at 10 t/ha and wheaten straw along the northern face and are demonstrating similar trends.

Long-term rehabilitation of the waste rock emplacement will be informed by the results of the rehabilitation trials carried out over the mine life and would include the progressive re-establishment of woodland community species 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 3).

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 waste emplacement outer batter cover material will be of low salinity to avoid the potential for saline runoff and enable satisfactory vegetation growth. The current cover system concept comprises 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. As described above, this cover system is proposed to be updated to include the rock mulch topsoil method and would be detailed in the next MOP and next AEMR reporting period.

Thicknesses of Cover Layers and Methods of Laying and Compaction

The current cover system concept provides that gypsum-treated non-saline or low salinity subsoil will be laid to a depth of approximately 0.5m over the outer face of the emplacement. Topsoil cover will be approximately 0.25m deep over the entire emplacement surface. Topsoil will be transferred from soil stockpiles or directly from newly stripped areas and be spread using dozers and scrapers. The proposed updated cover system would include

differing cover layer thicknesses and laying method and would be detailed in the next MOP and the next AEMR reporting period.

Drainage and Erosion Control
Batter drainage will be affected by the use of wide reverse-graded berms every 5m 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 50m – 100m 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 Paragraph 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 be informed by the results of the rehabilitation trials carried out over the mine life and would include the progressive re-establishment of woodland community species 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 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 (Paragraph 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 206.5m, has a crest length of 3,170m and reaches a height of 2m in the centre of the arc. Approximately 180,000m^3 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 300mm 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 0.3m 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 Paragraph 4 of the 2011 – 2012 MOP (Barrick, 2011).

The lake protection bund has been constructed to its final height of RL 208.35m. 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 4,200m and approximately 500,000m^3 of fill was used for construction. Prior to construction, the upper 300mm of topsoil and loose clay sediment material were stripped and stored for future rehabilitation of the bund. A cut-off section a further 1.7m 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 0.3m 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 2011 - 2012 MOP (Barrick 2011).

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 was repaired using the rock-topsoil method and gypsum at 10 t/ha from November 2011 after the north-east outer slopes of the NWE were shaped up and rock – topsoil treated for the Pond D1 north trials.

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 300mm 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 had previously 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 opportunistically 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 3.4km 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 Lift (2nd augmentation) of the STSF was in progress from late-2009 until mid-2010 and used the waste rock – topsoil cross-rip method with 10 tonnes of gypsum per ha and wheaten straw mulch was also applied along the northern face. Repairs were made along the original un-rocked lower Lift face using the waste rock – topsoil method with straw after gully erosion occurred on them in several places. The 4th Lift (3rd augmentation) of the STSF is planned for progress from mid-2012 until end-2012 (a MOP (2011-2012) variation would be sought for this activity).

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 DP&I 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. The 3rd Lift of the NTSF was rehabilitated using the waste rock – topsoil method and 10 tonnes gypsum / ha from late-2011 until early-2012.

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
The previous rehabilitation concept for the starter embankments and lifts 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 using graders, scrapers and dozers. The cover system concept for the tailings storage facility batters is also proposed to be updated and would be consistent with the updated concept for the waste emplacement batter cover system.

Characteristics of Cover Material
The current cover system concept provides that low salinity sub-soil cover material would be placed directly over the structural zone of the starter embankment, then spread with low salinity topsoil. As described above, this cover system concept is proposed to be updated to only include rock mulch and gypsum treated topsoil materials.

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 current cover system concept includes spreading the subsoil cover layer of the downstream rehabilitation zone in layers and compacting to the required density using dozers. The current cover system concept includes subsoil layer thickness approximately 0.5m thick and topsoil thickness of 250mm. Similar to the proposed waste rock emplacement cover system, the proposed thickness of the rock mulch layer would be 0.25 m followed by a 0.25 m thick layer of topsoil.

Final Landform Profile and Slopes

The final landform profile for the tailings facility starter embankments is shown in Plate 4 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.

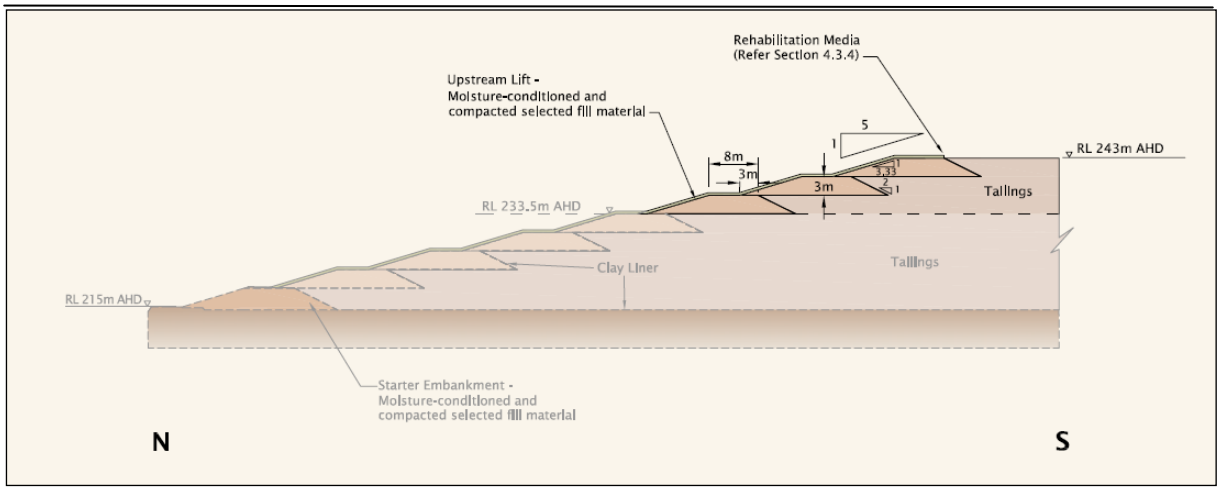
As discussed in Paragraph 5.4, early observations of the surface treatments (e.g. rock mulch) trials on the outer batters of the tailings storages are positive (i.e. landforms are stable and vegetation is establishing within the rock mulch) and indicate that this cover treatment is likely to provide 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 Paragraph 5.4.

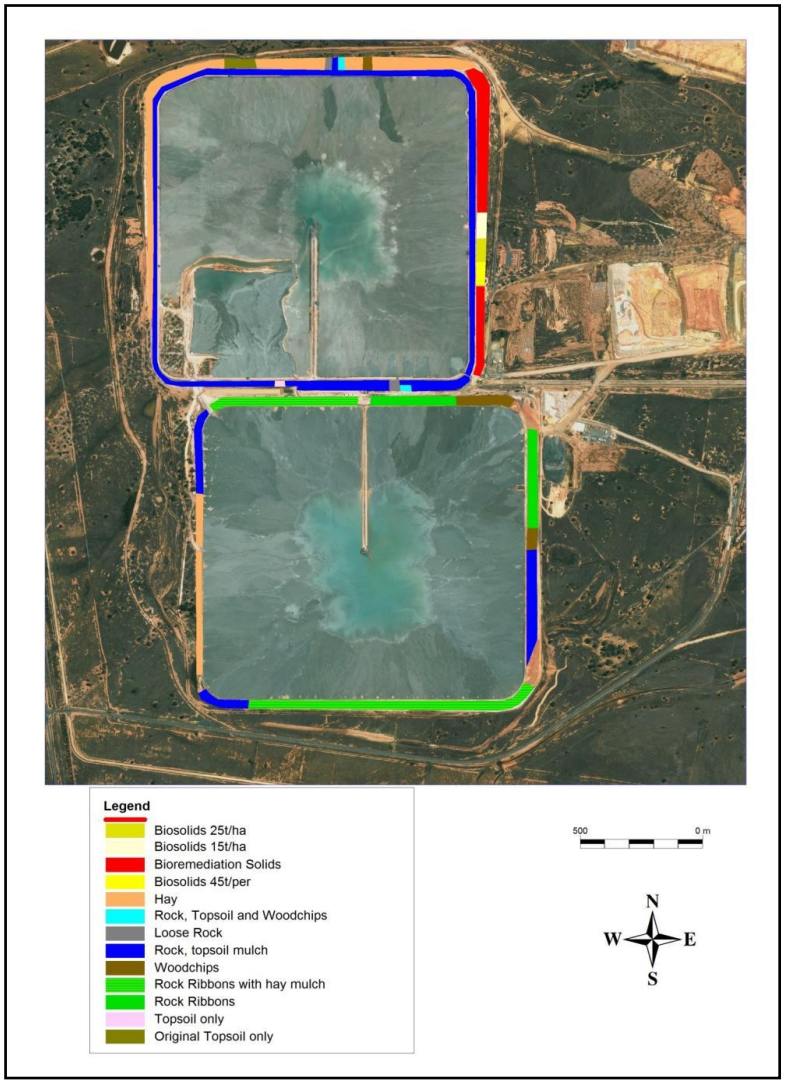
Maintenance Activities/Requirements
Visual monitoring of revegetated landforms including the NTSF and STSF starter embankments will be conducted to ensure vegetation is establishing and to determine the need for any maintenance and/or contingency measures (such as the requirement for supplementary plantings, 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 was conducted during the 2011 reporting period. Rehabilitation of the storage will be undertaken to achieve final rehabilitation outcomes and landuse in accordance with the EIS. Only the north-eastern corner has remained un-strawed due to dozer access issues.

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 from 2008 – 2011 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 rehabilitation monitoring methodology and trial design 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.
- Carnegie Natives - design of rehabilitation monitoring methodology and revegetation tube trial design to assist in informing CGM's rehabilitation programme.
- 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 (2010,2011) 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 DTIRIS-MR (2011) *Rehabilitation and Environmental Management Plan Guidelines Consultation Draft V2.0 June 2010*. Monitoring of rehabilitation areas and trials was undertaken by DnA Environmental during 7 to 15 November 2011. 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. 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 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 (one 2010 site inaccessible; one new site established);
- Slopes: Woodland occurring on flat to gently undulating slopes (RL 210 – 225m) = 2 sites:
- Hills: Woodlands occurring on low ridges, hills and elevated land (RL 220 – 245m) = 3 sites; and
- Grass: Cleared native grasslands, predominantly occurring on flat to gently undulating slopes (RL 210 – 225m) = 2 sites.

The resultant number of revegetation monitoring sites established during 2011 was nine. Results of the DnA Environmental report *'2011 Rehabilitation Monitoring Report'* are described below.

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). The DTIRIS draft guidelines indicate that 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 includes 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, which will be progressive over the life of the mine.

New Lake Foreshore Revegetation Trials

There have been significant changes occurring on the new lake foreshore area since 2005. The sites have been progressing and are beginning to stabilise despite extreme climatic conditions. The ponded water within the temporary bund has become well established with a variety of aquatic species which have largely colonised from the soil seed bank. There continues to be active erosion derived from the unvegetated slope and poor drainage construction of the perimeter waste emplacement above the permanent lake protection bund. Despite some remedial earthworks being undertaken during 2011, numerous active gullies remain along the foreshore bunds and will require further amelioration.

Two six year old lake foreshore rehabilitation sites (CWT2 and CWT3) have demonstrated a dramatic improvement in ecological function, but remain short of meeting LFA completion targets. Increasing trends in ecosystem function at these sites can be attributed to increasing cover of vegetative materials including litter and annual and perennial plants.

One lake foreshore rehabilitation site (CWT6) has been significantly affected by wave action eroding almost half of the site, estimated to be in the order of 10m from the original foreshore area. Despite increasing vegetation cover, it appears that the sodic soils are particularly susceptible to waves from the lake. Rock lining may be required to half further deterioration of the lake foreshore area.

Tailings Dam Walls Revegetation Trials

The northern and southern tailings storage facility walls have been the focus of additional rehabilitation trials, implemented during 2009. A variety of treatments were setup with a full description provided in the report "*2010 Cowal Rehabilitation Monitoring Report"* (DnA Environmental, 2011)*.*

NTSF01 (rock mulch + topsoil on northern TSF) appeared to be more stable and functional compared to other rehabilitation sites in 2010 however there was a significant improvement in NTSF02 (topsoil + wheaten hay on northern TSF) in 2011. Both sites on the northern TSF now have very similar LFA indices for infiltration and nutrient cycling capacity to the grassland reference sites, but remained lower in stability. STSF01 (rock ribbon + wheaten hay) has demonstrated a decline in overall ecological function and continues to fall well short of meeting LFA targets.

Major changes occurring within the rehabilitation areas in 2011 included increased perennial ground cover and typically increased levels of litter cover due to the abundance of annual plants which have colonised the sites.

Sites situated on the NTSF have performed relatively well, but are still considered immature and have further ecological development to undertake. It has been noted in treatments using wheaten hay, the hay was often applied in far greater depths than required, limiting the establishment of plants.

For future rehabilitation, recommendations include applying locally harvested native pasture hay bearing mature seeds immediately onto newly prepared rehabilitation areas, rather than using wheaten hay. Improved analysis of spoil materials prior to use in rehabilitation programs is also required to improve the condition of the growing mediums.

Southern Offset

Two reference sites were established in the southern offset area 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 form the revegetation benchmarks and completion targets are named "RHill01" and "RHill02".

The southern offset area contained a high diversity of ground cover plants and while many of these were exotic annual species or colonising plants, the majority were native species which were increasing in numbers. Exotic species had declined in 2011 and this trend is expected to continue provided there is limited disturbance. The sites were demonstrating additional successional recovery with the further development of vegetative cover and soils surface crusting, increasing abundance of cryptograms, increased soil coherency and reduced erosion and deposition.

Soil properties remained within the local or desirable levels and no adverse soil chemistry was apparent from the soil test results with the exception of increased ESP in Offest02 indicating the soils may have a tendency to disperse. There was a lack of tree and shrub species as well associated structure and habitat requirements indicating these monitoring sites currently fall short of 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.

AMBS are anticipated to conduct a flora survey and mapping of the CGM and its surrounds (including the offset areas) in 2012. The results of the survey and mapping will be included in the next AEMR reporting period.

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 continued to be a diverse environment and despite a reduction in total floristic diversity, it maintained a high diversity of ground cover plants and was dominated by native plants. The sites were demonstrating positive successional recovery with improved ground cover and in terms of ecological function, both sites were within ranges provided by the woodland slope reference sites. The water filled gilgais were a particularly important feature in these sites in 2010 and while they were dry this year they continued to provide topographic relief and additional habitat features, resulting in a relatively high floral diversity. The sites were similar in composition to the reference sites however they contained slightly more exotic species and lacked a population of trees and shrubs.

The soils differed considerably between the two sites with some significant changes having occurred over the past year. Most primary soil characteristics were similar to the reference sites in 2011 with the exception of low nitrates. Most changes in soil chemistry were attributed to the variable topographic relief provided by the gilgais landscape in combination with high rainfall throughout 2011.

DnA Environmental recommended that as part of the rehabilitation process that deep ripping is not undertaken due to the occurrence of potentially highly sodic soils, gilgais, and the high species richness. Deep ripping may compromise the ecological function and high conservation significance of the site. Any rehabilitation that is to occur should aim to replicate the associated reference sites, taking care to replicate the structure and future habitat requirements of these communities.

As described above, AMBS are anticipated to conduct a flora survey and mapping of the CGM and its surrounds (including the offset areas) in 2012. The results of the survey and mapping will be included in the next AEMR reporting period.

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 main outcomes of the overall *2010 Cowal Rehabilitation Monitoring Report* (DnA) 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.

A helium filled survey blimp was flown over the SWE trials after the first year, and will be flown over the SWE trials again in early-2012 to determine whether the method is suitable to measure surface erosion at this and future rehabilitation areas of similar slope angle on site.

DnA will be consulted for a progress review on the performance of these trials in years 2012 and 2013. Direct seeding may have produced a suitable number of seedlings in the next few years to assist future rehabilitation.

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:

- EPA (formerly OEH);
- DPI - Fisheries;
- NoW;
- Lake Cowal Landowners Association;
- Lake Cowal Foundation;
- DP&I; 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 concepts will be developed based on results of rehabilitation trials and formulated in consultation with DTIRIS (Minerals) and other relevant stakeholders. The Final Rehabilitation Plan (**FRP**) will be included in the CGM Mine Closure Plan.

Table 40 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 repo**rt.**

Table 40
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]	107	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 AREAS[5]		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	151	159	167
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 41 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 41
Maintenance Activities on Rehabilitated Land

Nature of Treatment	Area Treated (ha)		Comments/Control Strategies/Treatment Detail
	Report Period	Next Period	
Additional erosion control works	30	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	8	8	The NTSF outer slopes were re-covered during the reporting period. The 3rd augmentation Lift of NTSF is to be treated by rock-topsoil during 2011. The 4th augmentation Lift of NTSF is to be treated by rock-topsoil in late-2012.
Soil treatment	8	8	The STSF slopes were treated during the reporting period. The 3rd Lift (2nd augmentation) of STSF was treated by rock-topsoil during 2010.
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 SWE was seeded during October 2011. There was no replanting of any trees and shrubs in any area.
Adversely affected by weeds	2,000	35	*Xanthium spinosum* (Bathurst Burr), *Sclerolaena birchii* (Galvanised Burr) *Ibicella* lutea (Devil's Claw) and *L ferrocissimum* (African Boxthorn) were treated by aerial (2010) 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 42.

Table 42
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	• Optimisation of blasts by Geotechnical personnel. • Maintain network during Lake Fill.	• 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. • Install new tripods and blast loggers. • Ongoing consultation with affected landholders as required.
BMP	• Conduct staff training and drills. • Maintain the new fire trails from 'Lakeside' to Gate 10 after Lake Fill.	• Maintenance of Emergency Response Procedures. • Reduction of bushfire threat and protection of assets at risk after growth period.
CWMP	• 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. • Re-stocking of Lake Cowal with 45,000 Golden Perch fingerlings. • Obtaining stakeholder support for re-stocking with Catfish fingerlings.	• Prevention of grazing stock entry. • Frog surveys – annual. • Natural regeneration of native plants. • Limitation of vehicular access. • Improvement of habitats for wildlife. • 2012 Lake Cowal fish survey. • Re-stocking Lake Cowal with native fish.
DMP	• Continued use of Petro Tac on light roads. • Finalisation of University of Sydney dust provenance and impact assessment studies (2007-2010). • Convert from ICP-AES to ICP-MS. • Commence NMI and ALS use of CGM bulk dust standard (2011). • Evaluate use of original and new tripod gauges in Lake Cowal for duplicates.	• Reduction/control of dust emissions. • Change to ICP-MS methodology for the analysis of dust samples at the CGM (prior EPA approval). • Install new Lake tripods and dust gauges. • 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.
HMP	• 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.	• 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	• Continue event based structure inspections. • Enhance the southern portion of the UCDS through repair and strengthening of erosion control structures. • Continue ANU studies. • Conduct annual peer risk review. • Reclamation Standard compliance.	• 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	• Continued cyanide management. • Continue commissioning of SMBS system and maintain Caro's Acid preparedness. • Relocate the TSF auto-sampler to the concrete bunded tailings slurry pumping hopper area.	• 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.

Table 42 (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
FFMP	• 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'. • Approval and implementation of ROMP.	• 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.
HWCMP	• 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 Chemalert III software system.	• 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.
IACHMP	• Continued assessment of areas as per IACHMP prior to soil stripping. • Revised IACHMP – include GDP process.	• Protection/Management of sites within the CGM area. • Dissemination of cultural heritage information and offsets.
LMP	• 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.	• 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	• Maintain monuments inspection frequency of TSF walls. • Maintain Pond structure inspections.	• 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	• Continued building inspections. • Ongoing visual assessments. • Approval and implementation of the ROMP.	• 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	• Continue soil stockpile management. • Update database as required. • Implement use of ArcGIS as a management tool.	• Effective scheduling and management of soil stripping operations.

Table 42 (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
SWMP	• 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.	• 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 (Programme)	• Ongoing use of approved revised SWGMBMP. • 2012 Lake Cowal fish survey. • Re-stocking Lake with native fish.	• Detection of any adverse affects to surface water, groundwater, and/or biology. • Effective responses to any detected adverse affects.
NMP (including traffic noise)	• Continue employee awareness. • Continued monitoring in accordance with NMP. • DP&I 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 DP&I Guidelines.	• Prevention of adverse mine operational noise. • Ongoing development of bund walls and waste rock emplacements. • Prevention of adverse mine traffic noise. • Ongoing consultation with affected landholders as required. • Complaint response and dispute resolution procedures.
TSMP	• Develop species-specific plans as required. • Conduct surveys for threatened species as required • Biodiversity Conservation Standard compliance.	• 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	• 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.	• 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 (January 2011 – September 2012)	• Schedule Mine development. • Continue progressive landscape and rehabilitation management.	• Soil stripping scheduling. • Soil stockpile management. • Mine waste rock emplacements. • Closure and decommissioning plan. • Life of Mine Plan. • TSF Operations and Maintenance Plan.
THMS	• 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).	• Employee awareness training. • On-site facilities inspection and maintenance. • Contract management. • Emergency preparedness.
ROMP	• Approval and implementation of the ROMP.	• Mine site rehabilitation management. • Offset areas management. • Establish mechanism for long-term security of the offset areas.

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 EMS 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

A Monitor Lizard basking in the sun west of the Mine entrance.

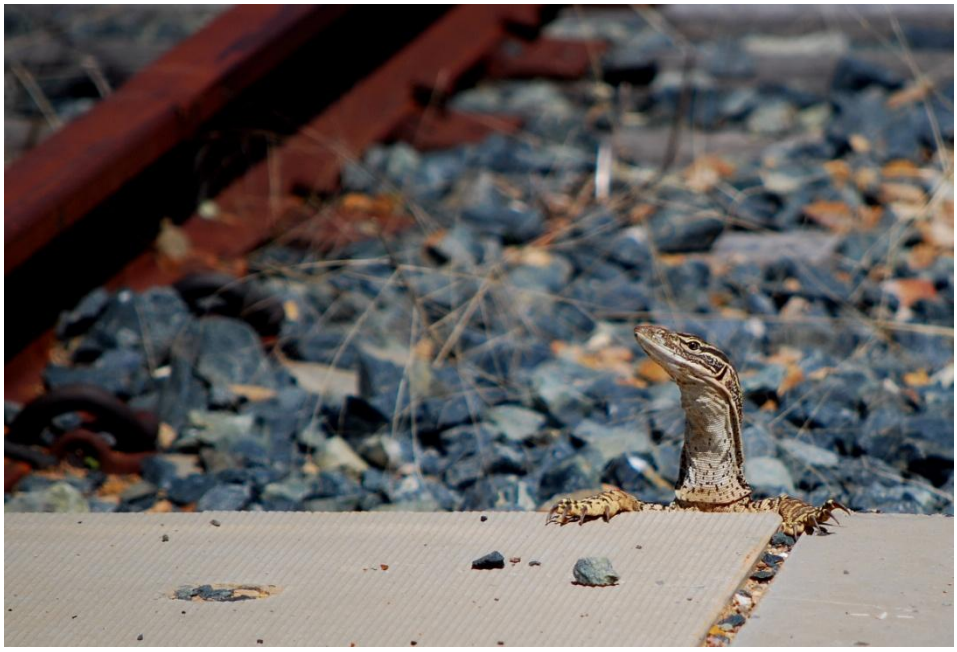


Plate 6

Storm clouds over the NTSF (December 2011).

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8 GLOSSARY OF TERMS

AER	Annual Environmental Return (EPA)
AEMR	Annual Environmental Management Report (DTIRIS [Minerals] coordinated for DP&I 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
ARI	Annual Recurrence Interval
ASWAT	Aggregate Stability in Water
AWS	Automatic Weather Station
BB	Barrick Buddies
BCPC	Bland Creek Palaeochannel
BDHS	Bland District Historical Society
BLMP	Blast Management Plan
BMP	Bushfire Management Plan
BSC	Bland Shire Council
CEMCC	Community Environmental Monitoring & Consultative Committee
CGM	Cowal Gold Mine
CIL	Carbon in Leach
CLM	Contaminated Land Management
CMP	Cyanide Management Plan
CMS	Chemical Management Strategy
CPCC	Cowal Project Coordinating Committee (WCC - Barrick)
CWHC	Cowal Partnering Program
CRMA	Cowal Risk Management Application
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CW	Compensatory Wetland
CWHC	Cowal West Homestead Complex
CWMP	Compensatory Wetland Management Plan
DMP	Department of Mines & Petroleum
DP&I	Department of Planning and Infrastructure
DECCW	Department of Environment, Climate Change and Water (now EPA)
DII	Department of Industry and Investment - Minerals Resources (DTIRIS)
DPI	Department of Primary Industries – Agriculture, Fisheries
DTIRIS-MR	Department of Trade, Investment and Regional Infrastructure Services – Mineral Resources
DSC	Dams Safety Committee
EA	Environmental Assessment
EC	Electrical Conductivity
EEC	Ecologically Endangered Community
EFA	Ecosystem Function Analysis
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EMS	Environmental Management System
EMSS	Environmental Management System Standards
EPA	Environment Protection Authority
EPL	Environment Protection License
ERO	Emergency Response Officer
ERT	Emergency Response Team
ESCP	Erosion and Sediment Control Program
ESB	Eastern Saline Borefield
ESCMP	Erosion and Sediment Control Management Plan
ETBC	Employment Training Business Council
FFMP	Flora and Fauna Management Plan
FOR	Fuel and Oils Register
FRP	Final Rehabilitation Plan
GDP	Ground Disturbance Protocol
GEM	Geo-Environmental Management
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
HSDGR	Hazardous Substances and Dangerous Goods Register
IACHMP	Indigenous Archaeology and Cultural Heritage Management Plan
ICMC	International Cyanide Management Code
IEA	Independent Environmental Audit
IMP	Independent Monitoring Panel
INP	Industrial Noise Policy
KPI	Key Performance Indicator
LCCC	Lake Cowal Conservation Centre
LCF	Lake Cowal Foundation
LEP	Local Environment Plan
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
LSMP	Landscape Management Plan
MIC	Maximum Instantaneous Charge
Milli L	Million Litres
m	Metres
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
NoW	New South Wales Office of Water (formerly DWE within OEH - EPA).
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
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
Registered Site	Registered Site (NSW) NPW Act
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
TIB	Temporary Isolation Bund
TNMP	Traffic Noise Management Plan
TSF	Tailings Storage Facility
TSMP	Threatened Species Management Protocol
TSMS	Threatened Species Management Strategy

TSP	Total Suspended Particulates
TSR	Travelling Stock Route
UCDS	Up Catchment Diversion System
VCP	Vegetation Clearance Permit
VCPL	Vegetation Clearance Protocol
VPA	Voluntary Planning Agreement
WAD	Weak Acid Dissociated
WCC	Wiradjuri Condobolin Corporation
WCCHC	Wiradjuri Condobolin Cultural Heritage Company
WIRES	Wildlife Information Rescue and Education Service