BARRICK

COWAL

COWAL GOLD MINE EXTENSION MODIFICATION

Modification Description and Preliminary Environmental Assessment

MAY 2013

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1 INTRODUCTION

The Cowal Gold Mine (CGM) is an open cut gold mining operation located approximately 38 kilometres (km) north-east of West Wyalong, New South Wales (NSW) (Figure 1). Barrick (Cowal) Limited (Barrick) is the current owner/operator of the CGM. The CGM has been operating since 2005 and is approved under Development Consent (DA 14/98) to operate until 31 December 2019.

Barrick is seeking approval to modify the CGM Development Consent (DA 14/98) to extend the life of the CGM by approximately 5 years (i.e. to 2024) by accessing gold-bearing ore adjacent to the existing open pit (herein referred to as the Cowal Gold Mine Extension Modification [the Modification]).

The Modification would involve continued operations at the existing CGM within Mining Lease (ML) 1535 (Figure 2) to enable an additional 5 years of operations and 0.7 million ounces (Moz) of gold production (i.e. a total of approximately 3.8 Moz over the life of the CGM).

The Modification is proposed in order to secure the future of the CGM for another decade, providing job security for local mine employees and contractors, and to continue to stimulate demand in the local and regional economy.

The Modification general arrangement is shown on Figure 3. In general, there would be no change to the existing functionality of the CGM due to the Modification, as the Modification would involve:

- continued mining in the existing open pit for the extraction of gold-bearing ore and waste rock;
- continued use of existing waste rock emplacements for the placement of waste rock extracted from the open pit;
- continued use of existing ore processing infrastructure; and
- continued use tailings storage facilities for the storage of tailings associated with ore processing.

To enable the increase in the total gold produced over the life of the CGM, extensions to the surface area and depth of the existing open pit would be required (Figure 3) to access additional gold-bearing ore.

The expanded pit areas would be within existing approved disturbance areas and would not change the existing isolation system that currently separates the open pit from Lake Cowal (comprising the temporary isolation bund, lake protection bund and perimeter waste rock emplacement).

Existing CGM infrastructure would continue to be used for the Modification, with some alterations where necessary, including the expansion of existing waste rock emplacements.

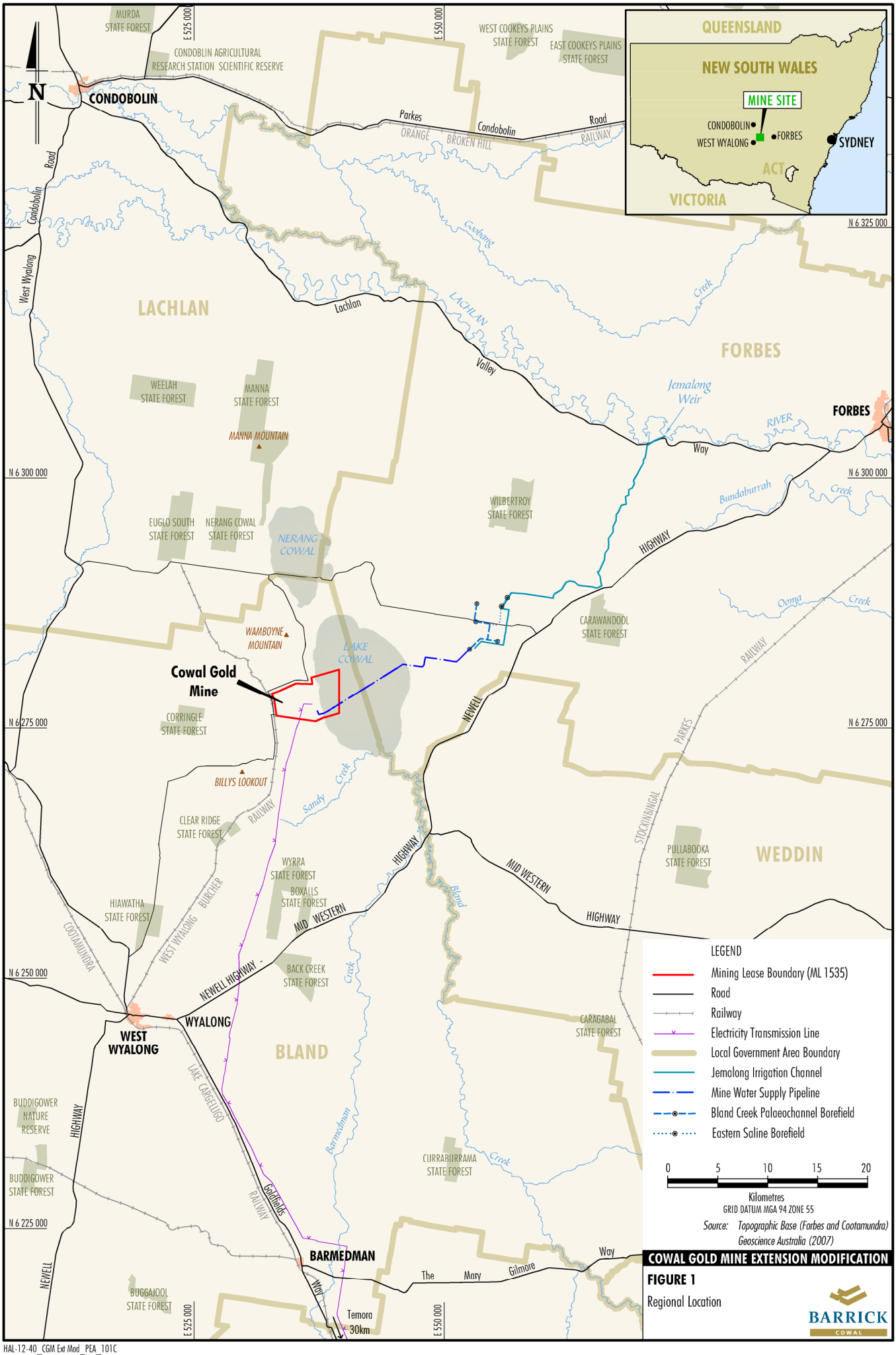
A qualitative assessment of the likelihood of the Modification resulting in additional environmental impacts has been conducted.

Fundamental design principles of the CGM that limit potential environmental impacts (e.g. the lake isolation system) would not change for the Modification. As such, the Modification layout and description have been developed such that the CGM would continue to operate with limited changes to existing approved environmental management measures and commitments.

It is likely that the Modification would result in not more than limited environmental consequence in comparison to currently approved CGM. Given this, and given that the Modification would not generally change the functionality of the existing approved CGM, approval for the Modification is sought as a modification to Development Consent (DA 14/98) under section 75W of the NSW *Environmental Planning and Assessment Act, 1979* (EP&A Act).

Notwithstanding the above, a detailed Environmental Assessment for the Modification (the Modification EA) will be prepared to support the application to modify Development Consent (DA 14/98). The Modification EA will provide an assessment of potential environmental impacts relevant to the Modification, including those associated with:

- hydrogeology;
- hydrology;
- visual;
- threatened species;
- Aboriginal heritage;
- noise and blasting;
- air quality;
- socio-economics;
- geochemistry; and
- rehabilitation.



COWAL GOLD MINE EXTENSION MODIFICATION

FIGURE 1

Regional Location

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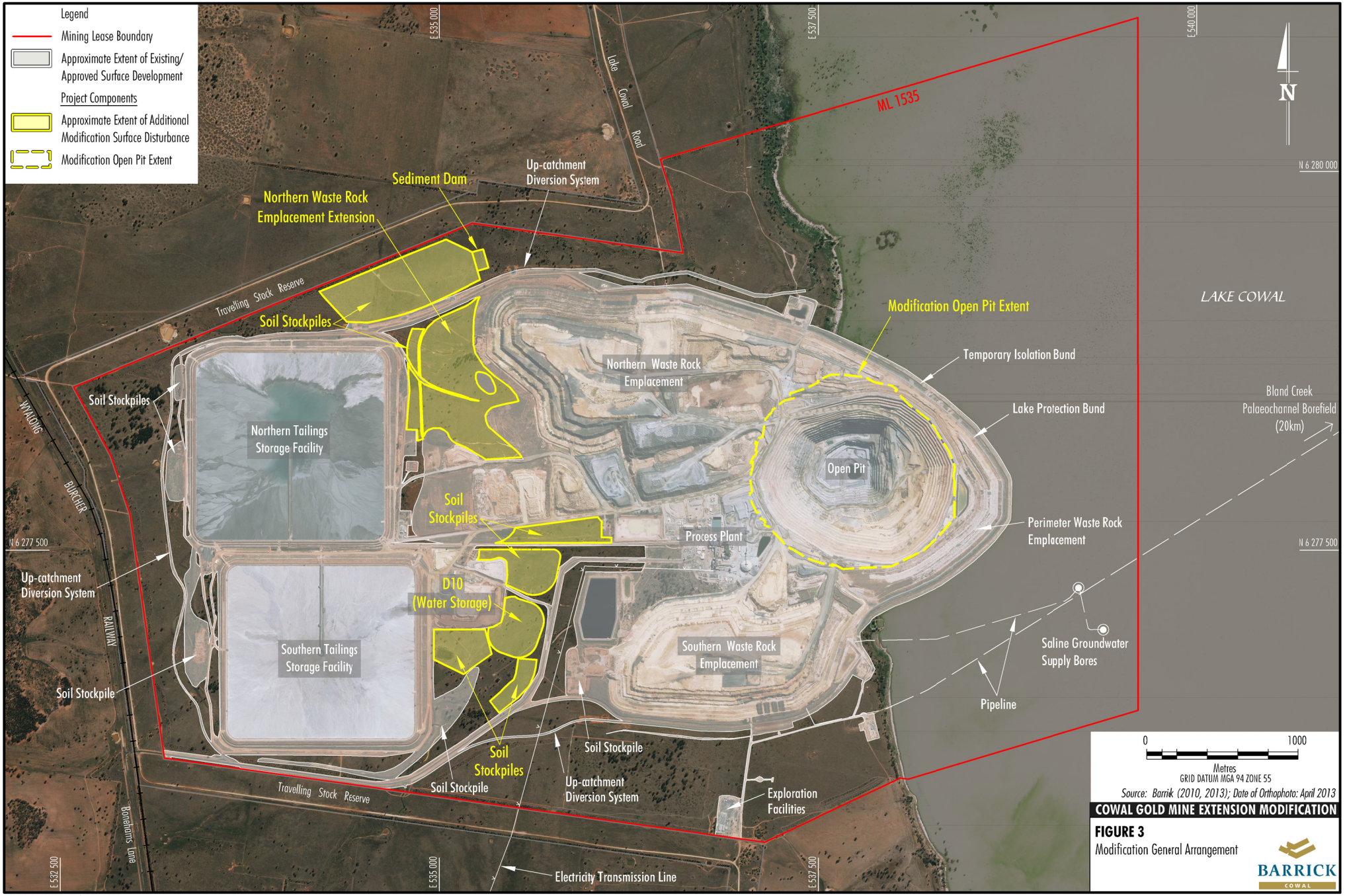

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1.1 COWAL GOLD MINE APPROVAL HISTORY

A study into the CGM's compatibility with critical conservation values of Lake Cowal over the long-term was completed and reported in the *Cowal Gold Project Environmental Impact Statement* (the EIS) (North Limited, 1998). A Commission of Inquiry was held in November 1998 into the environmental aspects of the proposed CGM and related infrastructure. Development Consent for the CGM and Bland Creek Palaeochannel Borefield water supply pipeline (Figure 2) was granted by the NSW Minister for Urban Affairs and Planning under Part 4 of the EP&A Act on 26 February 1999 (DA 14/98).

Separate approvals processes were also undertaken during the same period for the following CGM-related infrastructure components:

- Upgrade of the mine access road from West Wyalong to the CGM: Development Consent for the upgrade of the mine access road was granted by the Bland Shire Council on 21 April 1999 under Part 5 of the EP&A Act.
- Temora to Cowal 132 kilovolt (kV) electricity transmission line (ETL): Approval for the ETL (Figure 2) was granted by the NSW Minister for Urban Affairs and Planning on 3 August 1999 under Part 5 of the EP&A Act.

The CGM Development Consent (DA 14/98) has been modified on 10 occasions, *viz.* 11 August 2003, 22 December 2003, 4 August 2004, 23 August 2006, 12 March 2008 (Mod 5), 11 February 2009 (Mod 7), 28 August 2009 (Mod 8), 10 March 2011 (Mod 6), 17 January 2011 (Mod 9) and 6 July 2011 (Mod 10).

The majority of these modifications have involved minor changes to the CGM, and were assessed under section 96 of the EP&A Act.

Three modifications (Mods 6, 9 and 10) have been assessed under section 75W of the EP&A Act. Of these, only Mod 6 (herein referred to as the Modified Request) involved changes to the previously approved mining operations (e.g. open pit extent) of the CGM.

Development Consent for the operation of the eastern saline borefield (Figure 2) was granted by the Forbes Shire Council on 20 December 2010 (DA 2011/64). The approved operation of the eastern saline borefield includes the use of two production bores to extract water from the Cowra aquifer and the use of existing associated works (including a pipeline) to deliver the extracted saline water to the Bland Creek Palaeochannel Borefield pipeline.

1.2 PURPOSE AND STRUCTURE OF THIS DOCUMENT

This document has been prepared to provide the NSW Department of Planning and Infrastructure (DP&I) with a:

- summary description of the Modification;
- qualitative summary of potential environmental consequences associated with the Modification; and
- summary description of relevant legislative and planning instruments.

The remainder of this document is structured as follows:

Section 2 Description of the Existing CGM – provides a description of the currently approved CGM.

Section 3 Modification Description – provides a summary description of the Modification.

Section 4 Preliminary Environmental Assessment (EA) – identifies key environmental issues of particular relevance to the Modification, provides an analysis of the likely nature and extent of potential impacts and environmental consequence, and identifies the level and scope of environmental impact assessment to be undertaken for the EA.

Section 5 Planning Considerations – provides a description of legislative and planning instruments relevant to the Modification.

Section 6 Conclusion and Justification – provides a justification of the Modification, as described in this document.

Section 7 References – lists documents referenced in Sections 1 to 6 of this document.

1.3 PROPONENT

The Modification is being developed by Barrick (ABN 75 007 857 598), a wholly owned subsidiary of Barrick (Australia Pacific) Limited.

The registered and principal office for Barrick (Australia Pacific) Limited is:

Barrick (Australia Pacific) Limited
Level 9
125 St George Terrace
Perth WA 6000

The contact details for the CGM are:

Barrick (Cowal) Limited
PO Box 210
WEST WYALONG NSW 2671
Telephone: (02) 6975 4700

Further information on the proponent and its mining operations can be found at: http://www.barrick.com/

2 DESCRIPTION OF EXISTING COWAL GOLD MINE

The existing/approved layout of the CGM is shown on Figure 4. A summary of the existing operations undertaken at the CGM is provided below. Where relevant, a description of measures incorporated into the existing CGM layout and operation, which has been designed to minimise potential environmental impacts, is also provided below.

2.1 MINING OPERATIONS

Mining operations at the CGM are currently conducted in accordance with Development Consent (DA 14/98) and the conditions of ML 1535 held by Barrick. The CGM operates 24 hours per day, 7 days per week.

Mining Method Overview

The CGM is a typical open pit mining operation. Waste rock and ore is broken through a routine sequence of in-pit drilling and blasting.

Broken waste rock is loaded into large rear dump trucks using hydraulic excavators and is then hauled from the open pit to be placed within the dedicated waste rock emplacements or, in the case of ore, direct to the primary crusher (adjacent the process plant), run-of-mine pad or to the low grade ore stockpile (Figure 4).

The open pit has been developed in stages as the orebody is progressively mined via widening and deepening of the open pit (Figure 4).

Mobile Equipment Fleet

The existing mobile equipment fleet used for ore extraction, waste rock handling and tailings storage facility lift construction includes hydraulic excavators, haul trucks, dozers, loaders, water trucks, dump trucks, scrapers, compactors, graders and drill rigs.

2.2 MINE WASTE ROCK MANAGEMENT

Waste rock is placed in a continuous waste rock emplacement around the open pit consisting of the following three areas (Figure 4):

- northern waste rock emplacement;
- southern waste rock emplacement; and
- perimeter waste rock emplacement.

Northern and Southern Waste Rock Emplacements

The northern waste rock emplacement has been designed to contain the majority of the waste rock generated from the CGM. The northern waste rock emplacement and the southern waste rock emplacement are located to the north-west and south-west of the open pit, respectively (Figure 4).

The approved maximum height of the northern waste rock emplacement is 266 metres (m) Australian Height Datum (AHD). The approved maximum height of the southern waste rock emplacement is 250 m AHD.

The mine waste rock emplacements have been designed to meet the long-term goal of directing potential seepage generated from waste rock emplacement areas during operation and post-closure toward the open pit. This has involved construction of a low permeability basement for the waste rock emplacement which slopes towards the open pit and would provide drainage control (i.e. the base drainage control zone). Waters permeating through the waste rock emplacements would be intercepted by this low permeability layer and would ultimately flow to the open pit.

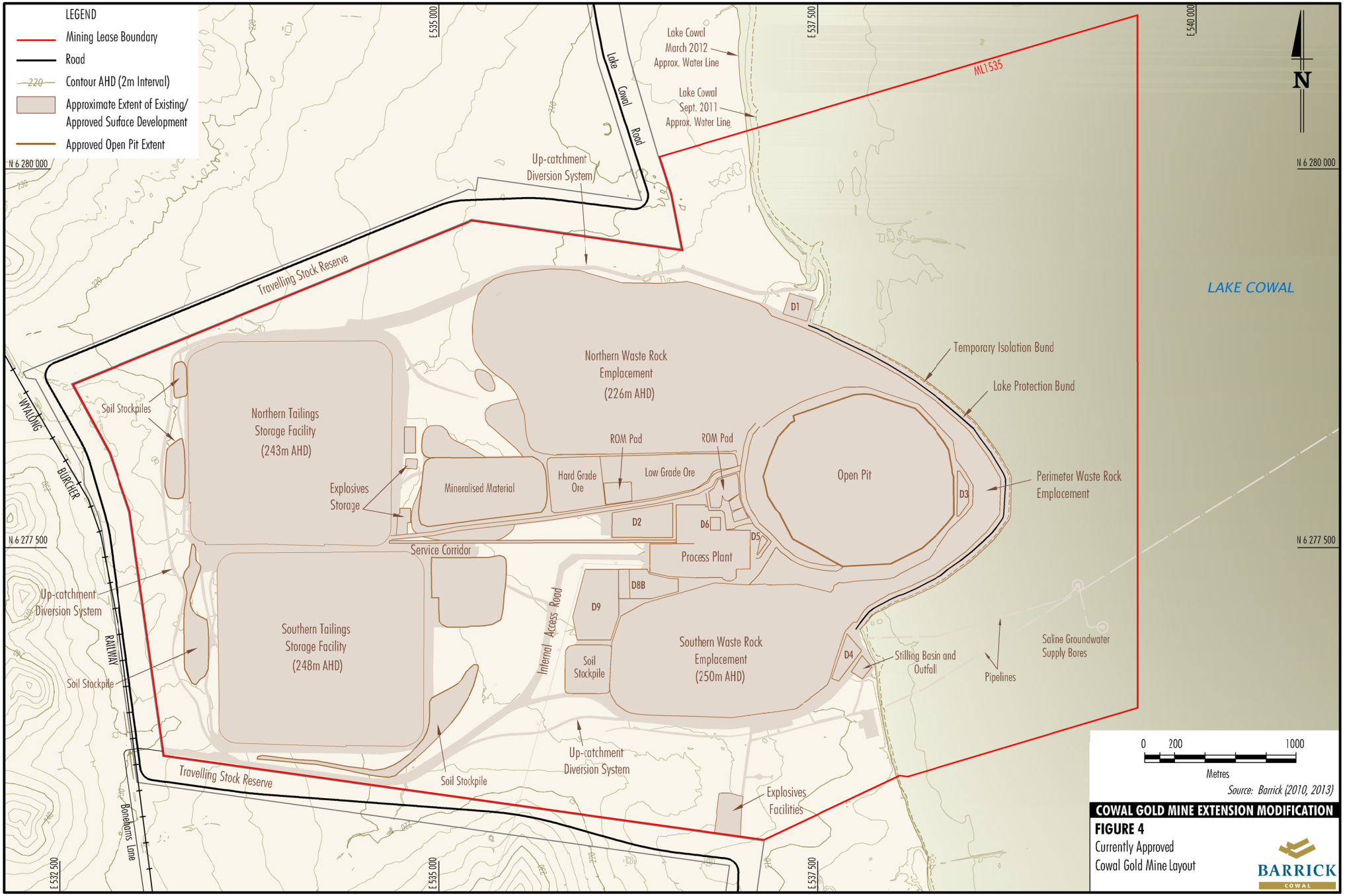
In accordance with the Environment Protection Licence (EPL) No. 11912 for the CGM, the waste rock emplacements are located on a base drainage control zone with a minimum slope towards the open pit of 1 (vertical):200 (horizontal).

Perimeter Waste Rock Emplacement

The perimeter waste rock emplacement has been constructed to surround the open pit to the north, east and south (Figure 4). The perimeter waste rock emplacement forms part of the series of embankments (i.e. temporary isolation bund and lake protection bund) between the open pit and Lake Cowal. The perimeter waste rock emplacement is located behind the lake protection bund (Figure 4) and has been constructed from mined oxide waste rock.

The approved maximum height of the perimeter waste rock emplacement is 223 m AHD.

The existing temporary isolation bund and lake protection bund are described further in Section 2.5.



COWAL GOLD MINE EXTENSION MODIFICATION

FIGURE 4

Currently Approved
Cowal Gold Mine Layout

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2.3 ORE PROCESSING

Ore at the CGM is differentiated into oxide[1] and primary[2] ore. Gold is extracted from the ore using a conventional carbon-in-leach cyanide leaching circuit in the process plant.

The process plant operates at approximately 890 tonnes per hour (tph) for oxide ore and approximately 925 tph for primary ore on average. The ore processing rate at the CGM is currently approved up to 7.5 million tonnes per annum (Mtpa).

The gold extracted from the ore is recovered and poured as gold bars or doré. The finely ground rock residue left after the leaching process (i.e. tailings) is passed through a cyanide destruction process before being discharged to the tailings storage facilities.

Cyanide Use

The use of cyanide at the CGM is managed in accordance with the existing Cyanide Management Plan. Sodium cyanide (NaCN) is taken from the storage facility at the CGM as required and mixed in a dedicated mixing tank. The cyanide solution (mixed to 30 percent) is conveyed to a storage tank then to the leaching circuit in the process plant. Cyanide consumption for the primary and oxide circuits is approximately 0.3 and 0.8 kilograms of cyanide per tonne of ore, respectively.

Cyanide Destruction

As described above, the tailings slurry is passed through a cyanide destruction process before being discharged to the tailings storage facilities. The CGM Development Consent details the approved cyanide concentrations in the aqueous component of the tailings slurry stream at the process plant (measured via an automated sampler), which are:

- 20 milligrams per litre (mg/L) weak acid dissociable cyanide (CN_{WAD}) (90 percentile over 6 months); and
- 30 mg/L CN_{WAD} (maximum permissible limit at any time).

Cyanide destruction at the CGM is acieved via the use of either Caro's Acid or the INCO process.

Caro's Acid is a mixture of sulphuric acid (H_2SO_4) and hydrogen peroxide (H_2O_2). The INCO process involves the introduction of sulphur dioxide (SO_2) as sodium metabisulphite (SMBS). Similar to Caro's Acid, the main by-product from the INCO destruction process is cyanate which decays through natural processes.

The quantity of reagents added to the tailings (for either the Caro's Acid or INCO processes) is regulated by an on-line free cyanide measurement to monitor the effectiveness of cyanide destruction in the tailings.

2.4 TAILINGS MANAGEMENT

Tailings are delivered from the process plant via a pipeline to two tailings storage facilities located approximately 3.5 km west of the Lake Cowal shoreline (Figure 4). The approved maximum heights of the northern and southern tailings storage facilities are 243 m AHD and 248 m AHD, respectively.

As the tailings storage facilities are filled, the embankments are raised in a series of upstream lifts constructed using soft oxide waste rock stockpiled during mining operations, with the lift section extending from the existing embankment crest and supported by the dry tailings beach.

The tailings storage facilities have been designed with sufficient freeboard to store water from a 1 in 1,000 average recurrence interval (ARI) rainfall event. The required free-board is maintained as the storage fills with tailings via a series of embankment lifts.

Following tailings deposition, supernatant water drains to the central pond and decant towers. The decant tower is accessible via a causeway. An underdrainage pipe network has also been installed to facilitate drainage of the tailings mass. The bulk of the water from each tailings storage drains from the surface of the tailings and collects in the centre of each storage.

This water, as well as underdrainage water, is reclaimed and used within the process plant. The decant system (including access causeway) is progressively raised during development of the tailings storage facilities.

[1] Oxide ore is the component of the ore which is composed of weathered (oxidised) rock.

[2] Primary ore is the component of the ore which is composed of unweathered rock.

A number of seepage control measures have been incorporated into the tailings storage facilities for the CGM, including:

- the pre-stripping of surficial soils beneath the embankment footprint;
- construction of a moisture-conditioned and compacted-low-permeability storage floor, where necessary, to achieve permeability criteria;
- excavation of a central cut-off trench along the length of the starter embankment to a nominal 2.5 m below surface level or to the depth of a low-permeability clay layer, and backfilled with compacted and moisture-conditioned low permeability clay; and
- installation of an underdrainage and decant network.

2.5 SITE WATER MANAGEMENT INFRASTRUCTURE

The CGM water management infrastructure is designed to contain potentially contaminated water (contained water) generated within the mining area, and to divert all other water around the perimeter of the site. The existing CGM water management infrastructure is comprised of the following major components described below.

Up-catchment Diversion System

The Up-catchment Diversion System (UCDS) allows upper catchment surface water runoff to flow around the western, northern and southern edges of the site and into the existing drainage lines prior to entering Lake Cowal (Figure 4).

Internal Catchment Drainage System

The Internal Catchment Drainage System (ICDS) is a permanent water management feature designed to operate during the life of the mine and after mine rehabilitation and mining lease relinquishment. The system involves a low bund running alongside the UCDS from the western side of the tailings storage facilities extending around the northern and southern perimeter of the northern and southern waste rock emplacements, respectively (Figure 4).

Surface water that is collected within the ICDS is managed by a series of contained water storages, bunds and drains.

Contained water storages D1 to D5 and D8B (Figure 4) are used to contain surface water runoff from the mine waste rock emplacements and general site area. Water is pumped to contained water storages D6 or D9 (process water supply storages) (Figure 4) for use during ore processing. The contained water storages have been designed to contain a minimum 1 in 100 year ARI rainfall event or greater (i.e. D6 and D9 have been designed to contain a 1 in 1,000 year ARI rainfall event).

Lake Isolation System

The lake isolation system has been constructed to hydrologically isolate the open pit development area from Lake Cowal during mining and post-mining. The lake isolation system is comprised of a series of isolation embankments designed to prevent the inflow of water from Lake Cowal into the open pit development area. The lake isolation system includes the temporary isolation bund, lake protection bund and perimeter waste rock emplacement (Figure 4).

Integrated Erosion, Sediment and Salinity Control System

Sediment control structures, dams and waterways around individual infrastructure components have been constructed at the CGM as part of the ICDS, in accordance with the erosion and sediment control strategies described in the existing Erosion and Sediment Control Management Plan.

Open Pit Sump and Dewatering Borefield

An open pit dewatering programme is currently in operation at the CGM to manage surface water and groundwater inflows to the open pit.

The catchment area draining to the open pit during operation is restricted to the open pit (i.e. incident rainfall) and the small perimeter area enclosed by an external bund.

Water management structures have been installed to divert water from other areas outside the external bund to contained water storages.

The open pit includes water management structures (face seepage collection drains) and an in-pit sump in the floor of the open pit with capacity to contain a 1 in 10 year ARI rainfall event.

The open pit dewatering bores are located on the periphery and within the open pit extent. Individual bores have been located to coincide with structures/features (shear zones, fractured dykes and faults). Saline groundwater generated during open pit dewatering is pumped to the contained water storages for use in ore processing. A network of piezometers has been installed to monitor groundwater draw-down levels over time.

2.6 WATER SUPPLY

Water for the CGM is required mainly for ore processing, as well as dust suppression and potable and non-potable uses.

The majority of water used in processing operations is recycled within the process plant. Water losses from the system include tailings pore water and evaporative loss principally from the tailings storage facilities. Water used for ore processing is sourced from the following internal and external sources:

- Water returned from the tailings storage facilities, which is stored in contained water storage D6 (process water supply storage).
- Water from the open pit sump and dewatering borefield which is stored in contained water storages D6 and/or D9 (process water supply storages).
- Runoff water from the waste rock emplacements, open pit area and other areas within the ICDS which is collected in contained water storages and transferred to the process water supply storages (D6 and/or D9) for re-use in the process plant.
- Water from the saline groundwater supply bores within ML 1535 (external water supply source).
- Water from the eastern saline borefield located approximately 10 km east of Lake Cowal's eastern shoreline (external water supply source).
- Water from the Bland Creek Palaeochannel Borefield (external water supply source) which is pumped from four production bores within the Bland Creek Palaeochannel located approximately 20 km to the east-northeast of the CGM in accordance with approved extraction limits.
- Licensed water accessed from the Lachlan River (external water supply source) which is supplied via a pipeline from the Jemalong Irrigation Channel.

Some water from the external water supply sources is treated by a reverse osmosis (RO) plant prior to use in the process plant or to satisfy other operational requirements. Brine from the RO plant is disposed of in the tailings storage facilities.

2.7 ELECTRICITY SUPPLY

The electricity supply requirement at the CGM is, on average, approximately 23 megawatts.

Electricity to the site is provided via the existing 132 kV electricity transmission line (ETL) from Temora.

2.8 OTHER SUPPORTING INFRASTRUCTURE AND SERVICES

The CGM has extensive existing infrastructure and services to support its operations, including (in addition to those described in the preceding sub-sections):

- soil stockpiles;
- minor internal roads and haul roads;
- mine access road;
- mineral exploration infrastructure;
- open pit dewatering bores;
- waste storage and transfer facility;
- administration buildings;
- workshop facilities;
- tailings storage facility fence; and
- ML 1535 perimeter fence.

2.9 WORKFORCE

The existing operations at the CGM have an average workforce (including Barrick staff and on-site contractor's personnel) of approximately 385 people. During peak periods, the CGM employs up to 435 people.

2.10 ENVIRONMENTAL MONITORING AND MANAGEMENT

Environmental management at the CGM encompasses a range of management plans and monitoring programmes overseen by statutory planning provisions. Approved and internal management plans/monitoring programmes include:

- Blast Management Plan;
- Bushfire Management Plan;
- Compensatory Wetland Management Plan;

- Cyanide Management Plan;
- Dust Management Plan;
- Emergency Response Plan;
- Erosion and Sediment Control Management Plan;
- Final Hazard Analysis;
- Fire Safety Study;
- Flora and Fauna Management Plan;
- Hazard and Operability Study;
- Hazardous Waste and Chemical Management Plan;
- Heritage Management Plan;
- Implementation of the Threatened Species Management Protocol;
- Indigenous Archaeology and Cultural Heritage Management Plan;
- Land Management Plan;
- Landscape Management Plan;
- Monitoring Programme for Detection of any Movement of Lake Protection Bund, Water Storage and Tailings Structures and Pit/Void Walls;
- Noise Management Plan;
- Site Water Management Plan;
- Soil Stripping Management Plan;
- Surface Water, Groundwater, Meteorological and Biological Monitoring Programme – Construction Phase;
- Surface Water, Groundwater, Meteorological and Biological Monitoring Programme – Mine Operations;
- Traffic Noise Management Plan; and
- Transport of Hazardous Materials Study.

Barrick maintains an extensive monitoring programme whereby data is collected, analysed and maintained for reporting, future examination and assessment.

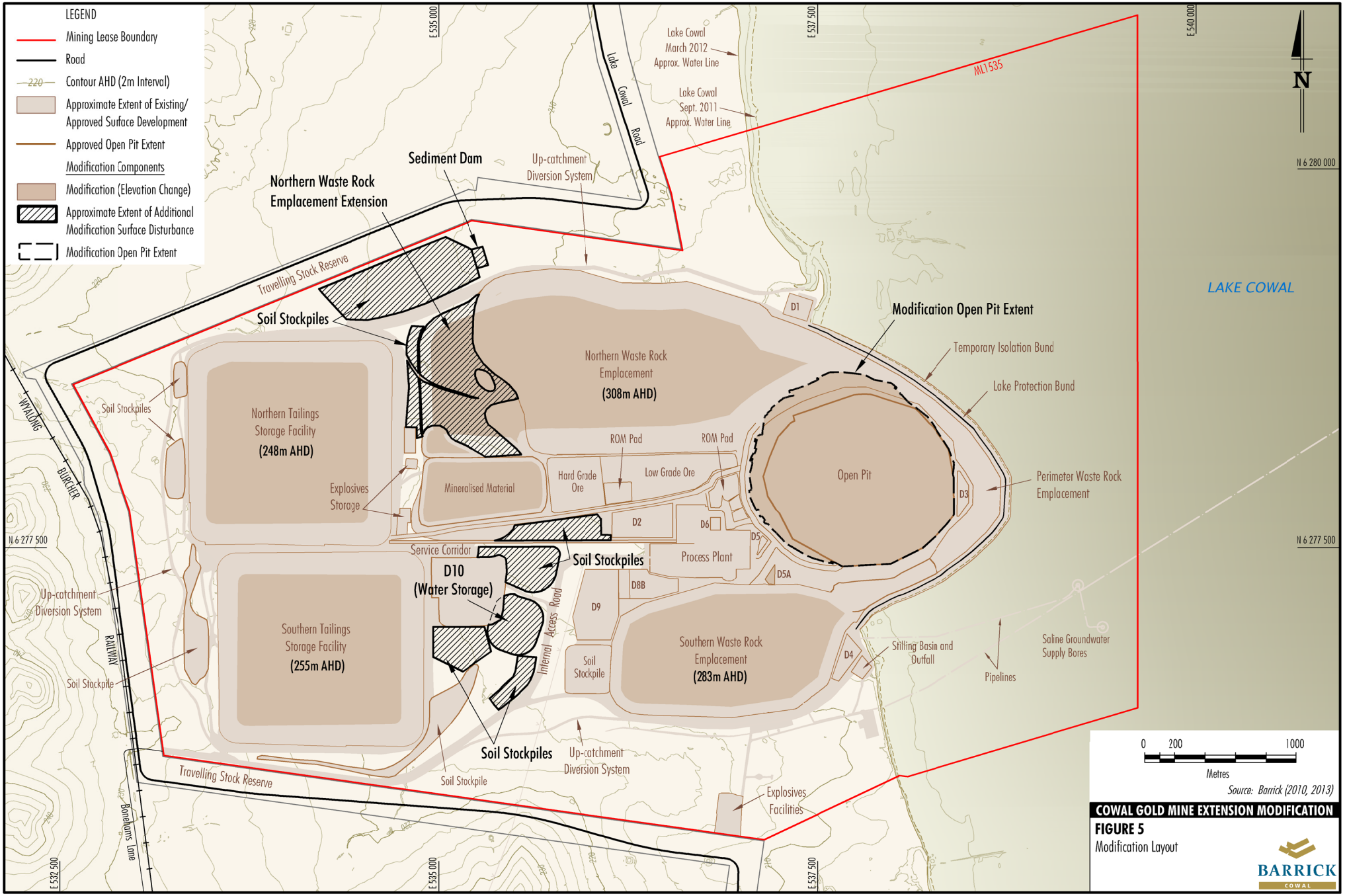
3 MODIFICATION DESCRIPTION

The Modification would involve the continued development of open pit mining operations at the CGM for an additional 5 years (i.e. until 2024).

In general, the Modification would not change the functionality of the currently approved CGM, as it would involve the continued use of the existing open pit, waste rock emplacement, tailings storage facilities and ore processing facilities within ML 1535, with some alterations where necessary to enable the increased gold production (i.e. extension to the existing open pit and existing northern waste emplacement) (Figure 5).

In comparison to the existing approved CGM, the Modification would involve:

- extension of the operational life of the CGM by an additional 5 years (i.e. until 2024);
- no change to ML 1535, and no requirement for additional mining lease tenement applications;
- continued development of open pit mining operations at the CGM, including expansion of the extent and depth of the existing open pit (Figure 5);
- an increase in the total quantities of waste rock, ore and tailings produced over the life of the mine;
- continued use of the existing mine fleet, with three additional haul trucks required;
- an increase in total gold production to approximately 3.8 Moz;
- no change to the existing process plant or its currently installed capacity to continue ore processing at a rate up to 7.5 Mtpa;
- continued and expanded development of the existing northern and southern waste rock emplacements within ML 1535 for placement of mined waste rock over the life of the CGM, including (Figure 5):
  - raising the maximum design height of the northern waste rock emplacement to 308 m AHD;
  - raising the maximum design height of the southern waste rock emplacement to 283 m AHD; and
  - extension of the northern waste rock emplacement to the west with an additional disturbance footprint of approximately 39 hectares (ha);
- no change to the existing perimeter waste rock emplacement;
- no change to the existing intrusion of the CGM into Lake Cowal;
- continued and expanded development of soil stockpiles, the relocation of existing soil stockpiles and stockpiling of mineralised material (i.e. potentially commercial ore) within ML 1535 (Figure 5);
- an increase in the total disturbance area of approximately 118 ha (i.e. in addition to the currently approved disturbance area of 1,095 ha);
- continued use of the existing tailings storage facilities for the deposition of tailings produced over the life of the CGM, including raising the maximum design height of (Figure 5):
  - the northern tailings storage facility to 248 m AHD; and
  - the southern tailings storage facility to 255 m AHD;
- no change to the use of cyanide destruction in tailings prior to deposition in tailings storage facilities, with no change to the approved cyanide concentration limits in the aqueous component of the tailings slurry stream specified in the CGM Development Consent (DA 14/98);
- no change to the design objectives of the existing CGM water management system (i.e. UCDS, ICDS and lake isolation system);
- additional internal surface water management infrastructure, including (Figure 5):
  - modifications to the existing contained water storage D5 (including the potential for a new D5A water storage) to maintain the storage capacity of the existing D5; and
  - construction of a new water supply storage (D10);
- additional sediment control system and associated dam for the topsoil stockpile located outside of the ICDS;
- no change to the operation of the existing saline groundwater supply bores within ML 1535 during suitable lake conditions;
- no change to the use of currently approved external water supply sources (e.g. Bland Creek Palaeochannel Borefield, eastern saline borefield and Lachlan River water entitlements via the Jemalong Irrigation Channel);
- no change to approved daily and annual extraction limits for the Bland Creek Palaeochannel Borefield;



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- construction of a new pump station on the eastern side of Lake Cowal adjacent to the existing mine water supply pipeline to improve capacity/flows, with electricity to the pump station sourced via an ETL from the Bore 4 pump station (Figure 2) or from a diesel generator located adjacent to the pump station;
- no change to existing ETL supplying electricity to the mine site;
- no change to the approved operating hours (i.e. 24 hours per day, seven days per week) of the CGM;
- no change to the existing CGM workforce numbers;
- an additional 5 years of workforce employment;
- no change to existing deliveries and consumables;
- no change to the current storage and handling of hazardous materials;
- no change to other supporting infrastructure and services;
- no change to approved exploration activities;
- the treatment of some soil (e.g. with gypsum) in a dedicated stockpile to improve its characteristics as a plant growth medium prior to use in progressive rehabilitation; and
- a revised rehabilitation cover system to reflect the findings of ongoing rehabilitation trials at the CGM.

Some alterations to the Modification summary description provided above may be required in consideration of the results of environmental studies as they become available during the preparation and finalisation of the Modification EA.

The Modification EA would provide the final Modification description for which Barrick would seek approval for.

4 PRELIMINARY ENVIRONMENTAL ASSESSMENT

The following preliminary environmental assessment has been prepared to qualitatively assess the likelihood of potential environmental consequences associated with key environmental aspects relevant to the construction and operation of the Modification.

The preliminary environmental assessment has drawn on:

- the outcomes of the preliminary environmental risk assessment undertaken as part of the Pre-feasibility Study for the Modification, which was conducted by Barrick representatives and environmental specialists;
- experience from key environmental management and impact assessment issues at the CGM;
- understanding of the local and regional context and the Modification description; and
- additional baseline surveys conducted for the Modification.

The EA to be prepared for the Modification would quantitatively assess and fully describe potential environmental consequences associated with the Modification.

4.1 HYDROGEOLOGY

Existing Environment

Groundwater resources within the region are generally associated with two geological formations (Coffey Geotechnics, 2008):

- the Lachlan Formation (Bland Creek Palaeochannel), which comprises an aquifer of quartz gravel with groundwater of generally low salinity; and
- the Cowra Formation, which comprises aquifers of isolated sand and gravel lenses in predominantly silt and clay alluvial deposits, with perched groundwater of generally higher salinity.

Locally, four saline aquifers have been identified within ML 1535 (Coffey Geotechnics, 2008):

- two alluvial saline aquifers at varying depths within the alluvium of the Quaternary-aged Cowra Formation;
- a local saline aquifer in an alluvial deposit (Groundwater Consulting Services, 2008) occurring in the upper part of the profile likely to be a part of the Cowra Formation discussed above; and
- a saline alluvial aquifer that occurs in weathered fractured rock below the Cowra Formation (this aquifer is not part of the Cowra Formation or the Bland Creek Palaeochannel).

Previous Assessment

A hydrogeological study of the currently approved CGM was conducted by Coffey Geotechnics (2009) for the Modification Request EA. In addition, a hydrogeological study for the originally approved CGM was conducted for the EIS.

Key findings of the studies in regard to the potential impacts of the CGM to groundwater were as follows:

- No regional groundwater drawdown impacts on the Lachlan Formation (i.e. Bland Creek Palaeochannel) were predicted due to mining activities, as the Lachlan Formation is hydraulically separated from mining area and saline bores within ML 1535.
- The use of the CGM Bland Creek Palaeochannel Borefield would alter groundwater levels in the Lachlan Formation, however, groundwater levels would be maintained at approved levels designed to avoid potential impacts to other groundwater users through the implementation of approved investigation (at 137.5 m AHD) and mitigation trigger (at 134 m AHD) levels, as determined by continuous groundwater level monitoring conducted by the NSW Office of Water.
- No groundwater dependent ecosystems were identified within the zone of influence of the CGM.
- Groundwater within the zone of influence of the CGM was not identified as providing baseflow to perennial watercourses.
- Groundwater drawdown would occur in the shallow saline alluvium aquifers surrounding the CGM due to the mining operations, however, Barrick is the only known user of this aquifer.
- Seepage from Lake Cowal to the final void was predicted to be insignificant due to very low permeability of the clay pan deposits that form the lake bed and isolate Lake Cowal from the underlying aquifers.

- Seepage from tailings storages and waste rock emplacement was predicted to have a negligible impact on existing groundwater quality, due to:
  - the design of waste rock emplacements and tailings storage facilities (i.e. slope and low permeability of basement layer), which would minimise seepage, with any seepage that does occur migrating to the open pit; and
  - the existing cyanide concentration limits in the tailings slurry, as specified in the CGM Development Consent.

Existing measures to manage groundwater levels and quality, as well as monitoring requirements, are documented in the SWMP.

Potential Impacts of the Modification

The Modification would potentially result in minor changes to the total and annual quantity of groundwater inflow to the open pit. In addition, the increased operational life of the CGM would increase the duration of extraction of groundwater from the CGM Bland Creek Palaeochannel Borefield.

However, it is unlikely that potential groundwater impacts associated the Modification would result in more than limited environmental consequence in comparison to currently approved CGM, given:

- There would be no change to existing approved daily or annual limits on the extraction of water from the CGM Bland Creek Palaeochannel Borefield, or the current system for the management of groundwater levels within the Bland Creek Palaeochannel.
- No material change to rate of groundwater inflow to the open pit is expected given that dewatering of the surrounding aquifers has already occurred during the ongoing operation of the existing open pit.
- There are no identified groundwater dependent ecosystems within the zone of influence of the CGM, and no identified perennial watercourses receiving groundwater baseflow.
- There are no identified users of the shallow saline alluvium aquifers surrounding the CGM other than Barrick.
- The extension to the northern waste rock emplacement would be designed to limit seepage (i.e. low permeability base drainage control zone), with any seepage occurring being directed to the open pit, as per existing waste rock emplacement designs.
- The increased height of the tailings storage facilities would likely increase the depth of low permeability (i.e. consolidated) material at their bases, and would, therefore, likely reduce potential seepage.
- There would be no change to the permeability of the geological layers that isolate Lake Cowal from the underlying aquifers.
- There is likely to be no change to the quality of groundwater seepage from the tailings storage facilities or waste rock emplacements, given that no change to the geochemistry of waste rock or ore is expected.
- There would be no change to the hydraulic separation between the CGM mining area and the Lachlan Formation (i.e. Bland Creek Palaeochannel).
- Potential impacts to groundwater levels and quality would continue to be managed and monitored in accordance with the existing SWMP for the Modification. In addition, there would be no proposed change to the existing groundwater performance criteria specified the CGM Development Consent or EPL No. 11912.

Notwithstanding the above, a comprehensive hydrogeological assessment, undertaken by a recognised expert, would be undertaken for the Modification, which would include detailed modelling of potential groundwater impacts (i.e. revision and calibration of the existing Bland Creek Palaeochannel and ML 1535 groundwater models) and assessment of impacts on affected licensed water users and basic landholder rights.

4.2 SURFACE WATER

Existing Environment

The CGM is located on the western side of Lake Cowal, an ephemeral, fresh water lake filled by runoff from the Bland Creek catchment to the south and flood breakout from the Lachlan River the north. The Lachlan River is the major regional surface water system, forming part of the Murray-Darling Basin.

When full, the lake has a maximum depth of approximately 4 m, at which stage it overflows into Nerang Cowal to the north-west, which ultimately drains to the Lachlan River via Bogandillon Creek. Rainfall events in March 2012 saw levels in Lake Cowal peak at approximately 206.7 m AHD.

The area surrounding the CGM site is drained by ephemeral drainage lines which flow to Lake Cowal. Bland Creek and all other tributaries of Lake Cowal are also ephemeral.

Previous Assessment

A hydrological assessment of the currently approved CGM was undertaken by Gilbert & Associates (2009) for the Modified Request EA. In addition, a hydrological study for the originally approved CGM was conducted for the EIS.

The existing CGM water management system (Section 2.5) minimises potential impacts to surface water quality and quantity, as it:

- diverts up-catchment (i.e. undisturbed) runoff around the CGM to existing drainage lines and to Lake Cowal (i.e. the UCDS);
- captures all runoff from disturbed mining areas within ML 1535 to internal water storages or the open pit (i.e. the ICDS); and
- isolates Lake Cowal from the CGM.

Given this, the key findings of the hydrological studies were as follows:

- The CGM is unlikely to have any measurable influence on the water balance of Lake Cowal.
- The intrusion of the CGM isolation embankment into Lake Cowal would potentially result in a very slight increase in the volume of spill from Lake Cowal to Lake Nerang, and a very slight increase in water levels in Lake Cowal.

Existing surface water quality and quantity management measures and monitoring requirements are documented in the SWMP.

Potential Impacts of the Modification

There would be additional surface water management infrastructure associated with the Modification (Section 3), as well as changes to internal catchment areas (e.g. due to the extension of the northern waste rock emplacement).

In addition, a sediment control system and associated dam would be developed for the topsoil stockpile which would be located outside of the ICDS.

However, it is unlikely that potential surface water impacts associated with the Modification would result in more than limited environmental consequence in comparison to the currently approved CGM, given:

- There would be no change to the design objectives of the existing CGM water management system, with:
  - all runoff from disturbed mining areas continuing to be captured on-site via the ICDS, or via the dedicated sediment control system for the topsoil stockpile proposed to be located outside of the ICDS;
  - all up-catchment runoff continuing to be diverted around the CGM to existing drainage lines and to Lake Cowl via the UCDS; and
  - Lake Cowal continuing to be isolated from the CGM via the lake isolation system.
- There would be no change to the existing intrusion of the CGM into Lake Cowal.
- The management and monitoring surface water quality and quantity would continue to be conducted in accordance with the existing SWMP for the Modification. In addition, there would be no proposed change to the existing surface water quality performance criteria specified in the CGM Development Consent or EPL No. 11912.

Notwithstanding the above, a comprehensive surface water assessment would be conducted for the Modification by a recognised expert to confirm that the existing design objectives of the CGM surface water management system could be maintained for the Modification, and would include:

- revision of the site water balance, incorporating alterations to the site water management system resulting from the Modification;
- calibration of site water balance model based on recent site water management behaviour and monitoring data;
- assessment of potential surface water related impacts to erosion and sedimentation resulting from the Modification; and
- consideration of the interaction between surface water and groundwater.

4.3 VISUAL

Existing Environment

Landforms found on and near ML 1535 include ephemeral lacustrine features (i.e. Lake Cowal), extensive gilgai areas, alluvial plains with ephemeral drainage lines and low hills (e.g. Cowal West Hill).

Local elevations range from approximately 201.5 m AHD in Lake Cowal, to approximately 368 m AHD at Billys Lookout to the south-west of the CGM and 412 m AHD at Wamboyne Mountain to the north of the CGM.

Previous Assessment

A visual assessment for the currently approved CGM was undertaken for the Modified Request EA. In addition, a visual study for the originally approved CGM was conducted for the EIS.

Key findings of the studies were as follows:

- The CGM would be visible from the surrounding area, including at public roads and lookouts and the edge of Lake Cowal.
- "Low" to "Medium" visual impacts were predicted at some of the closest private dwellings (i.e. between 1 to 5 km from the CGM).
- "Medium" visual impacts were predicted in the local setting (i.e. at public locations up to 1 km from the CGM).
- Night-lighting was predicted to be visible at locations in the region surrounding the CGM.

Mitigation and management measures implemented to maintain visual amenity for the approved CGM are presented in the Landscape Management Plan. Key mitigation measures include progressive rehabilitation of mine landforms, the development of visual screening and the scheduling of mining activities to shield mining activities during the night (i.e. to reduce direct lighting impacts).

Potential Impacts of the Modification

The CGM is already a feature of the visual landscape of the region, and this would continue for the Modification with the increased elevations of the northern waste emplacement and tailings storage facilities required for the Modification having the potential to increase the visibility of the CGM.

However, it is unlikely that potential visual impacts associated with the Modification would result in more than limited environmental consequence in comparison to currently approved CGM.

This is because, consistent with the currently approved CGM, the final landforms of the CGM for the Modification would be designed to be compatible with the surrounding visual landscape, as:

- the elevated CGM landforms for the Modification would continue to be lower than the elevations of other features in the region, including Wamboyne Mountain (412 mAHD) and the north-south orientated ridgeline that runs to the west of the CGM, which reaches a maximum elevation of 368 mAHD at Billy's Lookout (Figure 2); and
- the rehabilitation concepts for the Modification would continue to include the revegetation of the elevated final landforms with native plant species consistent with those found on other elevated landforms in the region.

The existing mitigation and management measures described in the Landscape Management Plan to maintain visual amenity would continue to be implemented for the Modification.

Notwithstanding the above, an assessment of the potential visual impacts would be prepared for the Modification, which would include the preparation of visual simulations/renders for key sensitive viewpoints surrounding the CGM.

4.4 THREATENED SPECIES (FLORA AND FAUNA)

Existing Environment

The CGM is located in the central north-west of the NSW South Western Slopes bioregion and also within the Eyrean zoogeographic region.

The ML area is former cleared and semi-cleared farmland that was used for grazing of predominantly native pastures by livestock. Lands surrounding ML 1535 are predominantly used for agriculture.

Previous Assessment

A significant number of vegetation, flora and fauna surveys of the ML area and surrounds have been conducted for the CGM. Based on the findings of these surveys, flora and fauna assessments of the currently approved CGM were prepared for the Modified Request EA. In addition, flora and fauna assessments of the originally approved CGM were conducted for the EIS.

The key findings of flora and fauna studies were that the currently approved CGM would result in the following potential impacts:

- Clearance of a total of approximately 1,095 ha of land (including an additional 105 ha associated with the Modified Request only), resulting in the:
  - clearance of approximately 15 ha of the Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions Endangered Ecological Community (EEC) (herein referred to as the Weeping Myall EEC) listed under the NSW *Threatened Species Conservation Act, 1995*;
  - loss of potential habitat for four threatened flora species; and
  - loss of potential habitat for thirteen threatened fauna species.
- Potential exposure to cyanide for threatened bird and bat species, which are not excluded by the fence around the tailings storages.
- Potential indirect impacts to threatened fauna species associated with potential noise, dust, blasting and water quality impacts from the CGM.

These impacts to flora and fauna have been approved for the CGM, subject to the impacts being managed, mitigated and monitored in accordance with the requirements of CGM Development Consent, and the management commitments detailed in the Modified Request EA and EIS, which include:

- CGM Biodiversity Offset (Figure 6);
- Threatened Species Management Protocol and Threatened Species Management Strategies;
- Flora and Fauna Management Plan including Vegetation Clearance Protocol and implementation of methods to deter avifauna away from the tailings storage facilities;
- Compensatory Wetland Management Plan;
- the protection of Wilga and Belah Woodland identified within ML 1535 (as required by the CGM Development Consent [DA 14/98]);
- Lake Cowal Waterbird Monitoring Programme;
- cyanide concentration limits, as specified in the CGM Development Consent;
- Site Water Management Plan, which describes the surface water management system and surface water quality monitoring network; and
- Noise and Blast Management Plans, which include noise and blast monitoring, targeted at identifying behavioural changes in waterbirds, and commitments for the implementation of mitigation measures if suitably qualified experts identify noise or blasting impacts to fauna.

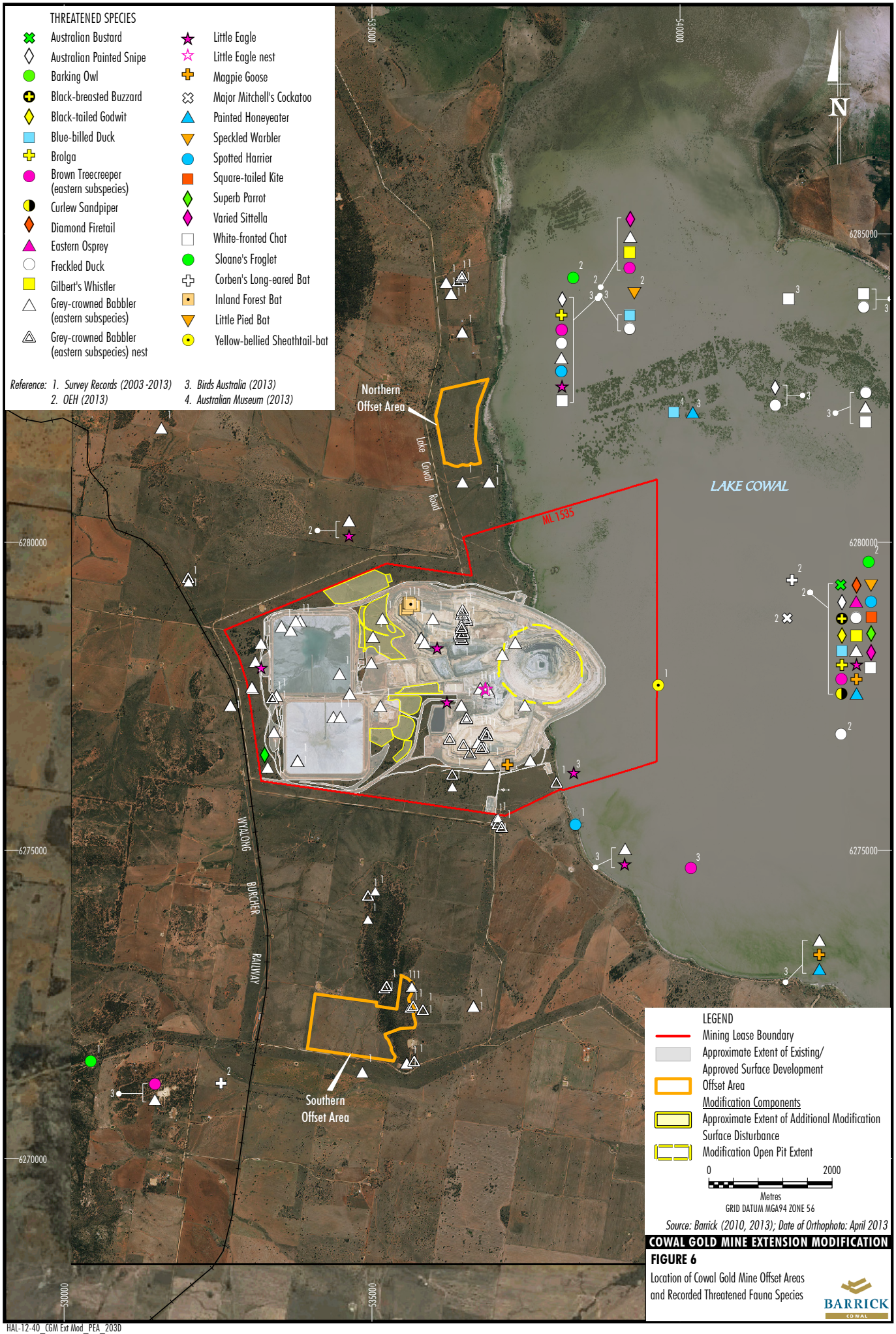
Potential Impacts of the Modification

Approximately 118 ha of additional surface disturbance would be required for the Modification. The additional land disturbance associated with the Modification is within the central portions of ML 1535 and the pump station and ETL located on the eastern side of Lake Cowal.

Threatened Flora Species and Vegetation Communities

Flora and vegetation surveys have been conducted for the Modification, to supplement the previous surveys conducted for the CGM. The surveys identified that the additional disturbance area for the Modification comprises mostly derived native grasslands (98 ha) which remain after historic clearing of the pre-European Woodland/Forest communities.

The additional surface disturbance would also include the clearance of a single stand of Weeping Myall EEC listed under the TSC Act approximately 1.2 ha in size. For comparison, approximately 276 ha of Weeping Myall EEC has been mapped within ML 1535 (Figure 7) (Australian Museum Business Services, 2012) which would not be disturbed. The stand of Weeping Myall EEC to be removed does not meet the criteria for classification as the Weeping Myall Woodlands EEC listed under the EPBC Act (Australian Museum Business Services, 2012).



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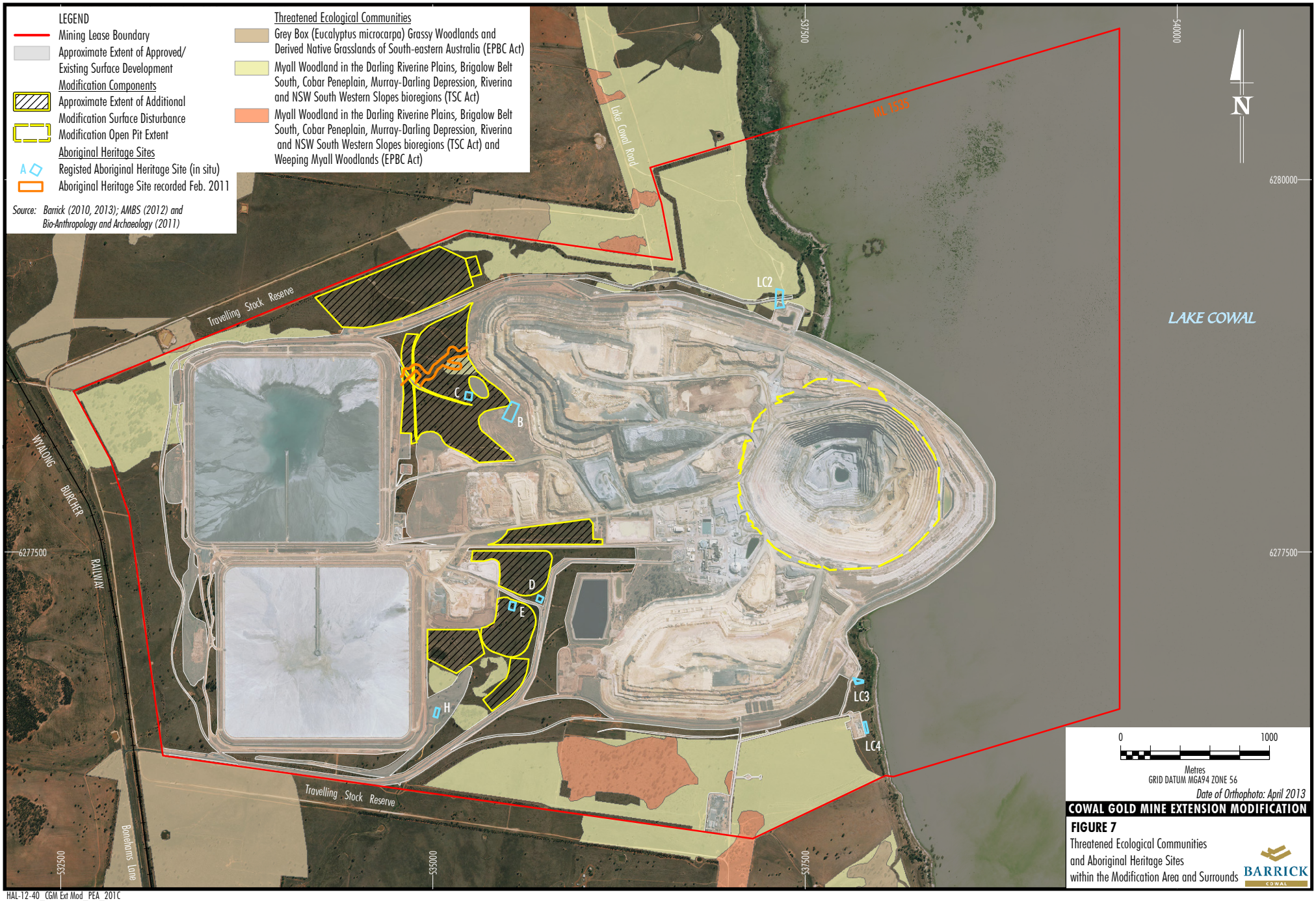

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The patch of Weeping Myall EEC which would be removed is associated with the extension of the northern waste emplacement footprint to the west. It is considered that there are no reasonable measures to avoid the clearance of the Weeping Myall EEC given that northern waste emplacement is constrained to the north by ML 1535, to the south by existing processing infrastructure and to the east by the location of the open pit.

No threatened flora species have been identified within the additional disturbance area for the Modification.

Threatened Fauna Species

Target fauna surveys for threatened species (particularly for the Sloane's Froglet [*Crinia sloanei*], Grey-crowned Babbler [eastern subspecies] [*Pomatostomus temporalis temporalis*] and Superb Parrot [*Polytelis swainsonii*]) and habitat assessments have been recently conducted within ML 1535 and Barrick-owned land to supplement the surveys previously conducted for the CGM (Kerle, 2013).

The targeted surveys did not record any threatened fauna species within the Modification area, however, the Grey-crowned Babbler (eastern subspecies) has been previously recorded within the additional disturbance area associated with the Modification during fauna surveys undertaken for the E42 Modification and during pre-clearance surveys in 2005 (Western Research Institute, 2008). The recent surveys recorded this species in the wider landscape (Kerle, 2013).

Previous surveys have also identified other threatened species in the wider landscape (i.e. outside the Modification area). It is noted that the area that is proposed to be cleared for the Modification may provide habitat for threatened fauna species (other than the Grey-crowned Babbler), however, it is a small component of a much larger area of similar and more intact habitat in the wider landscape.

Biodiversity Offset and Management, Mitigation and Monitoring Measures

A biodiversity offset would be established for the proposed additional disturbance associated with the Modification. The biodiversity offset would be designed to maintain or improve biodiversity values in the region.

All existing management, mitigation and monitoring measures for the CGM relevant to threatened species (listed above) would be maintained for the Modification.

Likely Environmental Consequence

Measures to offset and/or mitigate potential impacts to threatened species would be adopted such that it is likely that the biodiversity values of the region would be likely to be maintained, and possibly improved. Given this, it is considered unlikely that potential impacts to threatened species associated with the Modification would result in more than limited environmental consequence in comparison to the currently approved CGM.

In addition, the following is relevant to the likelihood of the Modification resulting in additional impacts to threatened species:

- While the Modification would result in the loss of a local occurrence of approximately 1.2 ha of the Weeping Myall EEC, the community occurs more extensively in the surrounding area.
- The Modification would be unlikely to affect any listed threatened flora species or populations, as no threatened flora species have been identified in the Modification area during previous surveys.
- Potential impacts to threatened fauna species and their habitat are expected to be minimal, as the potential habitat present in the Modification area would be a small component of a much larger area of similar and more intact habitat in the wider landscape.
- There would be no change to the cyanide concentration limits in the tailings slurry, which have been designed to protect bird and bat species that are not excluded by the fence around the tailings storages.
- Slight increases in general emissions from the ongoing operation of the CGM (e.g. noise and light) (Sections 4.6 and 4.3, respectively) are unlikely to result in a significant impact on the lake or lake fauna.
- No adverse water quality impacts are expected (Section 4.2), so no potential impacts to fauna species (e.g. wetland birds) due to adverse water quality impacts are expected.

As described above, flora, vegetation and targeted fauna surveys have been conducted for the Modification. Based on this survey work, and the extensive assessment previously conducted for the CGM, a comprehensive threatened species assessment would be prepared for the Modification.

The assessment would be prepared in accordance with the *Draft Guidelines for Threatened Species Assessment* (NSW Department of Environment and Conservation [DEC] and NSW Department of Primary Industries, 2005) and the *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities* (DEC, 2004).

4.5 ABORIGINAL HERITAGE

Existing Environment

A description of Aboriginal heritage history in the CGM region was prepared for the EIS. It noted that, in general, there is a dearth of historical information available on the first inhabitants of the region. However, it described that historical information suggests that Wiradjuri was the language group occupying the region surrounding Lake Cowal, and that Lake Cowal is likely to have been important to Aboriginal people.

Lake Cowal itself is named after the Aboriginal word "cowal" meaning "large water", while "nerang" (as in Nerang Cowal) means "little water".

Previous Assessment and Consultation

Aboriginal cultural heritage assessments were conducted for the Modified Request EA, as well as for the EIS.

Aboriginal heritage sites have been identified by qualified archaeologists and Aboriginal stakeholders as occurring within ML 1535. These sites range from open scatters to base camps and a scarred tree. The recorded artefacts associated with these sites include quartz flakes, backed blades and axes.

Barrick and its consultant archaeologists have obtained permits and consents under section 87 and section 90 (herein referred to as the permits and consents), respectively, pursuant to the NSW *National Parks and Wildlife Act, 1974*, for the management of Aboriginal heritage artefacts at the approved CGM, including the Bland Creek Palaeochannel Borefield and associated water supply pipeline.

All activities for the approved CGM have been conducted in accordance with the relevant permit and consent conditions, as well as the Cowal Gold Project Indigenous Archaeology and Cultural Heritage Management Plan.

Consultation with Aboriginal groups about the approved CGM has been extensive and has involved various methods including advertisements, meetings, correspondence and archaeological survey attendance. Consultation occurred prior to the commencement of the CGM, and has continued during the operation of the approved CGM.

The consultation undertaken relevant to applications for the permits and consents is described in the relevant applications. Consultation regarding the Indigenous Archaeology and Cultural Heritage Management Plan was undertaken in accordance with requirements of the CGM Development Consent.

Barrick has provided funding for the offset of potential impacts to Aboriginal cultural heritage at the approved CGM (as agreed with the Wiradjuri Condobolin Corporation and West Wyalong Local Aboriginal Land Council). This includes the funding by Barrick of the design and construction of a Keeping Place for Aboriginal objects collected pursuant to Permit 1468 (at a location agreed with the Aboriginal community).

Potential Impacts of the Modification

There are existing registered sites located within, or in close proximity to, the proposed additional disturbance area located within ML 1535 (Figure 7).

Any disturbance of these sites associated with the Modification would be managed in accordance with the existing permit and consent conditions (which covers all Aboriginal heritage items within ML 1535, even if they have not been previously identified) as well as in accordance with the Cowal Gold Project Indigenous Archaeology and Cultural Heritage Management Plan.

Additional Aboriginal heritage surveys would be conducted for the Modification disturbance area in consultation with the Aboriginal community.

Previous assessment, survey work and consultation with the Aboriginal community has provided detailed information regarding Aboriginal artefacts/sites found at the CGM, and their cultural significance. Based on this previous work and understanding of the existing environment, it is considered likely that any additional sites found in the Modification area would be of a similar type and cultural significance as the existing sites already identified.

Any potential impacts to newly identified artefacts/sites associated with the Modification would be managed in accordance with existing protocols, or additional management measures would be developed in consultation with the Aboriginal community.

An Aboriginal Cultural Heritage Assessment will be prepared for the Modification, by an appropriately qualified archaeologist, in accordance with the relevant NSW Office of Environment and Heritage and DP&I requirements.

As described above, the Aboriginal Cultural Heritage Assessment would include additional surveys of the Modification disturbance area and would be prepared in consultation with the Aboriginal community.

4.6 NOISE AND BLASTING

Existing Environment

Background noise surveys to characterise and quantify the background (i.e. prior to the development of the CGM) acoustical environment in the area surrounding ML 1535 were conducted in July and December 1994. Unattended noise loggers were positioned at the "Coniston", "Lakeside (Barrick)", "Lake Cowal (Barrick)" and "Gumbelah" receiver locations (Figure 2).

In accordance with the *NSW Industrial Noise Policy* (NSW Environment Protection Authority, 2000), the rating background noise level was determined to be 30 "A-weighted" decibels (dBA).

Previous Assessment

A noise and blasting assessment of the currently approved CGM was undertaken by Heggies (2009) for the Modified Request EA. In addition, a noise and blasting study for the originally approved CGM was conducted for the EIS.

Noise

Noise modelling conducted for the Modified Request EA indicated that 10 privately-owned receivers would experience noise levels above the project-specific noise criteria of 35 dBA $L_{Aeq(15\ minute)}$, including seven receivers in the noise management zone and three receivers in the noise affectation zone (Table 1).

These exceedances of the project-specific noise criteria were approved for the CGM, subject to the management, mitigation and monitoring of potential noise impacts in accordance with the requirements of the CGM Development Consent. This includes:

- the right to request property acquisition for receivers identified to be the affectation zone (Table 1), in accordance with the requirements of Condition 6.4(a) of Schedule 2 of the CGM Development Consent; and
- the right to request additional mitigation measures for receivers identified to be in the noise management zone or noise affectation zone (Table 1), in accordance with the requirements Condition 6.4(f) of Schedule 2 of the CGM Development Consent.

Existing noise management, mitigation and monitoring measures are described in the Noise Management Plan, and have been developed in accordance with the requirements of the CGM Development Consent.

Table 1
Privately-owned Receivers within Noise Management and Affectation Zones for the Currently Approved CGM

	Receivers Located within the Noise Management Zone		Receivers Located within the Noise Affectation Zone
	1 to 2 dBA above Project-specific Criteria	**3 to 5 dBA above Project-specific Criteria**	**>5 dBA above Project-specific Criteria**
Privately-owned Receiver	Mattiske	Bungabulla Gumbelah Laurel Park The Glen Cowal North Lake Cowal	Coniston Westlea McLintock

Note: Refer to Figure 2 for receiver locations.

Blasting

Calculated blast emissions for the maximum blast configuration for the CGM were predicted to be below the relevant human comfort and building damage criteria at all sensitive locations for both vibration and blast overpressure.

Existing blast management, mitigation and monitoring measures are described in the Blast Management Plan.

Potential Impacts of the Modification

The Modification would result in a minor increase in the mobile fleet approved to operate at the CGM (i.e. an additional three trucks hauling waste and ore from the open pit), and would also increase the height of the CGM waste emplacements and tailings storage facilities, and as such, there is the potential for changes to noise emissions from the CGM.

The pump station and, if required, the associated diesel generator, proposed to be located on the eastern side of the lake (Figure 2) would also produce some noise emissions.

In addition, the extension to the open pit would result in a slight change in the location of blasts.

However, it is unlikely that potential noise and blasting impacts associated with the Modification would result in more than limited environmental consequence in comparison to the currently approved CGM, given:

- The addition of three haul trucks at the CGM is expected to increase the total sound power level of the CGM by approximately 1 decibel, in comparison to the currently approved fleet for the CGM.
- The currently approved tailings lift fleet would not operate during the night (i.e. 10.00 pm to 6.00 am) for the Modification, whereas, potential noise impacts assessed for the currently approved CGM included the operation of the tailings lift fleet during the night.
- The Modification would not materially change the locations of noise generating plant at the CGM (i.e. would not bring sources of noise materially closer to the nearest privately-owned receivers).
- The closest privately-owned receivers to the CGM have existing noise mitigation and/or acquisition rights as per the CGM Development Consent.
- There would be no change to the currently approved and assessed blast designs or methods for the Modification.
- The pump station and, if required, diesel generator would be housed to mitigate potential noise emissions, and would be located such that compliance with noise limits at receiver locations would be achieved.
- The location of blasts would not materially change for the Modification in relation to the proximity to the nearest receiver locations.
- Potential noise and blasting impacts would continue to be managed, mitigated and monitored in accordance with the CGM Development Consent conditions, the Noise Management Plan and Blast Management Plan for the Modification.

Notwithstanding the above, a detailed noise and blasting impact assessment would be prepared for the Modification by an appropriately qualified expert, to quantify potential noise and blasting impacts through numerical modelling.

4.7 AIR QUALITY

Existing Environment

Background (i.e. non-mining) sources of dust emissions in the CGM region include traffic on unsealed roads and agricultural activities, as well as short-term events such as bush fires and regional dust storms. Background dust deposition levels, and total suspended particulate (TSP) and particulate matter with diameter less than 10 micrometres (PM_{10}) concentrations were determined by Holmes Air Sciences (2008) to be:

- 3.1 grams per square metre per month for dust deposition (annual average);
- 43 micrograms per cubic metre ($\mu g/m^3$) for TSP (annual average); and
- 17 $\mu g/m^3$ for PM_{10} (annual average).

Previous Assessment

An air quality assessment for the currently approved CGM was undertaken by PAEHolmes (2009) for the Modified Request EA. In addition, an air quality assessment for the originally approved CGM was conducted for the EIS.

No exceedances of the relevant health-based or amenity-based air quality criteria for dust deposition, PM_{10} or TSP, as specified in the CGM Development Consent, were predicted at any privately-owned receiver due to the currently approved CGM.

Existing air quality management, mitigation and monitoring measures are described in the Dust Management Plan.

Potential Impacts of the Modification

The Modification would have the potential to change dust emissions at the CGM. However, the intensity of mining operations (i.e. annual quantities of waste rock or ore mined) would reduce for the Modification, in comparison to what was previously assessed for the currently approved CGM, and as such, annual dust emission are also likely to reduce.

As described above, no exceedances of relevant air quality criteria were predicted for the currently approved CGM at a privately-owned receiver.

Potential air quality impacts would continue to be managed, mitigated and monitored in accordance with the existing Dust Management Plan. In addition, the Modification would operate in accordance with the existing air quality criteria specified in the CGM Development Consent.

Given the above, it is considered unlikely that, in comparison to the currently approved CGM, the Modification would result in additional air quality impacts.

Notwithstanding the above, an air quality assessment would be prepared for the Modification by appropriately qualified experts, to quantify potential air quality impacts at privately-owned receivers through numerical modelling.

4.8 OTHER ENVIRONMENTAL ASPECTS

In comparison to what has been described and assessed for the currently approved CGM, the Modification would have the potential to alter impacts associated with the environmental aspects described in the subsections below.

The CGM would continue to operate in accordance with the existing mitigation, management and monitoring commitments relevant to each environmental aspect for the Modification.

On this basis, it is likely that no additional adverse environmental impacts, relevant to these aspects, would occur due to the Modification.

Notwithstanding, detailed studies would be conducted for the Modification EA, as described below.

Socio-Economics

The Modification would result in the following benefits to the location and regional economy:

- Continued employment of the CGM workforce for an additional 5 years.
- Flow-on effects to the regional and NSW economy.
- Continued payment of royalties to the State and other tax payments.

A socio-economic assessment of potential impacts on the regional and NSW community and economy, including a cost-benefit analysis, would be prepared for the Modification.

Geochemistry of Waste Rock, Ore and Tailings

Testwork has been conducted by Geo-Environmental Management for the Modification to assess the geochemical characteristics (including acid-generating potential and metal-leaching behaviour of mine waste rock) associated with the development of the Modification.

The testwork indicates that the waste rock likely to be produced from the Modification would have similar geochemical characteristics to waste rock from the approved CGM. As a result, the existing mine waste rock management strategies would continue to be implemented for the Modification.

A tailings and waste rock geochemical assessment would be prepared for the Modification, and would describe the results of the testwork and relevant management measures.

Rehabilitation and Mine Closure

Rehabilitation principles and objectives and final landform concepts for the currently approved CGM are described in the Modified Request EA.

Barrick has developed plans and strategies in accordance with the requirements of the CGM Development Consent in consultation with the relevant regulatory agencies to rehabilitate the CGM consistent with approved rehabilitation concepts. These include the:

- Rehabilitation and Offset Management Plan;
- Strategy for the Decommissioning of Water Management Structures and Long-term Management of the Final Void and Lake Protection Bund; and
- Long-term Land Use Strategy.

The Modification would alter the implementation and timing of progressive rehabilitation, as well as the layout of the final landforms.

Notwithstanding, progressive rehabilitation of the CGM would occur for the Modification, with no change to final land use in comparison to the currently approved CGM.

The Modification EA would describe the progressive rehabilitation and final land use for the Modification, and the plans and strategies listed above would be revised for the Modification to reflect these changes.

In addition, a rehabilitation assessment would be prepared for the Modification, which would describe proposed changes to the rehabilitation cover system of the final landform to reflect the results of ongoing rehabilitation trials at the CGM.

5 RELEVANT LEGISLATIVE AND PLANNING INSTRUMENTS

5.1 SECTION 75W OF ENVIRONMENTAL PLANNING AND ASSESSMENT ACT, 1979

As described in Section 1.1, the CGM was approved under Part 4 of the EP&A Act in February 1999.

Clause 12 of Schedule 6A of the EP&A Act provides that section 75W of Part 3A of the EP&A Act continues to apply to modifications of Development Consents referred to in clause 8J(8) of the *Environmental Planning and Assessment Regulation, 2000* (EP&A Regulation) following the repeal of Part 3A.

The CGM was approved under Part 4 of the EP&A Act in February 1999 by Development Consent under Division 4 of Part 4 of the Act (relating to State significant development). Therefore the Development Consent (DA 14/98) is a Development Consent that falls within clause 8J(8)(c) of the EP&A Regulation. That is, section 75W of the EP&A Act continues to apply to modifications to the CGM Development Consent (DA 14/98), notwithstanding its repeal[3].

Approval for the Modification will be sought as a modification to the Development Consent (DA 14/98) under section 75W of the EP&A Act. Section 75W of the EP&A Act relevantly provides:

> **75W Modification of Minister's approval**
>
> *(1) In this section:*
>
> ***Minister's approval** means an approval to carry out a project under this Part, and includes an approval of a concept plan.*
>
> ***modification of approval** means changing the terms of a Minister's approval, including:*
>
> *(a) revoking or varying a condition of the approval or imposing an additional condition of the approval, and*
>
> *(b) changing the terms of any determination made by the Minister under Division 3 in connection with the approval.*
>
> *(2) The proponent may request the Minister to modify the Minister's approval for a project. The Minister's approval for a modification is not required if the project as modified will be consistent with the existing approval under this Part.*
>
> *(3) The request for the Minister's approval is to be lodged with the Director-General. The Director-General may notify the proponent of environmental assessment requirements with respect to the proposed modification that the proponent must comply with before the matter will be considered by the Minister.*
>
> *(4) The Minister may modify the approval (with or without conditions) or disapprove of the modification.*
>
> *….*

5.2 PLANNING PROVISIONS

State Environmental Planning Policies

The following State Environmental Planning Policies (SEPPs) may be potentially relevant to the Modification:

- *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007*).
- *State Environmental Planning Policy No. 33 (Hazardous and Offensive Development)*.
- *State Environmental Planning Policy No. 44 (Koala Habitat Protection).*
- *State Environmental Planning Policy No. 55 (Remediation of Land)*.

Relevant provisions and objectives of the above SEPPs would be considered in the preparation of the Modification EA.

Local Environmental Plans

ML 1535 and part of the borefield pipeline are located within the Bland Local Government Area (LGA) (Figure 1) on land zoned RU1 "Primary Production" in the *Bland Local Environmental Plan, 2011* (Bland LEP).

The approved Bland Creek Palaeochannel borefield, the eastern saline borefield and part of the borefield pipeline are located in the Forbes LGA (Figure 1) on land zoned 1a (Rural Zone) in the *Forbes Local Environmental Plan, 1986* (Forbes LEP).

The Bland and Forbes LEPs are discussed further in Section 5.3.

The draft *Forbes Local Environment Plan, 2012* was placed on public exhibition in 2012, but is not currently finalised. The relevant provisions of the draft *Forbes Local Environment Plan, 2012* would be considered in the Modification EA.

[3] Part 3A of the EP&A Act (as in force immediately before its repeal) continues to apply for the CGM. The description and quotations of relevant references to clauses of Part 3A in this document are as if Part 3A of the EP&A Act is still in force.

5.3 PERMISSIBILITY OF THE MODIFICATION

The CGM is located on land zoned “Primary Production” (Zone RU1) in the Bland LEP. The pump station on the eastern side of Lake Cowal proposed for the Modification is located on land zoned “Rural Zone” (Zone 1[a]) in the Forbes LEP.

Under the Bland LEP, “extractive industries” and “open cut mining” is permissible on lands in the Primary Production Zone with Development Consent as mining is not listed as being a prohibited use in the zoning table.

Under the Forbes LEP, construction of a pump station and associated water management infrastructure is permissible on lands in the Rural Zone with Development Consent as construction and/or operation of this infrastructure is not listed as being a prohibited use in the zoning table.

6 CONCLUSION AND JUSTIFICATION

The Modification is a proposed extension of the existing CGM open cut to access additional gold-bearing ore adjacent to the existing open pit.

The Modification will secure the future of the mine for another decade, providing job security for local mine employees and contractors.

The Modification location is defined by the location of the existing CGM and the ore deposit. The Modification involves the extension of the currently approved open pit and associated extensions of some existing mine landforms.

In general, there would be no change to the existing functionality of the CGM due to the Modification, as the Modification would involve:

- continued mining in the existing open pit for the extraction of waste rock and gold-bearing ore;
- continued use of existing waste rock emplacements for the placement of waste rock extracted from the open pit;
- continued use of existing ore processing infrastructure; and
- continued use tailings storage facilities for the storage of tailings associated with ore processing.

Fundamental design principles of the CGM that limit potential environmental impacts would not change for the Modification, for example the isolation bunds that separate the CGM from Lake Cowal. As such, the Modification layout and description have been developed such that the CGM would continue to operate with limited changes to existing approved environmental management measures and commitments.

Based on a qualitative assessment of potential impacts associated the Modification, it is considered likely that the Modification would result in not more than limited environmental consequence in comparison to currently approved CGM.

Approval for the Modification is sought as a modification to Development Consent (DA 14/98) under section 75W of the EP&A Act.

A detailed Environmental Assessment for the Modification will be prepared in support of the application to modify the CGM Development consent.

The Modification EA will provide an assessment of potential environmental impacts relevant to the Modification.

7 REFERENCES

Australian Museum Business Services (2012) *Cowal Gold Mine and Surrounds Flora Survey.*

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