

Cowal Gold Operation

Biodiversity Offset Management Plan



May 2015

COWAL GOLD MINE
BIODIVERSITY OFFSET MANAGEMENT PLAN



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All	ROMP-F (July 2010) Document No. 356199	Original Rehabilitation and Offset Management Plan (ROMP)	DECCW, NOW and BSC	NA (consultation version)
All	ROMP-G (Dec 2010) Document No. 356199	Amendments to address DECCW and NOW comments dated 18 August 2010 and 27 August 2010 respectively	DII and DP&I	DII approved the ROMP on 18 August 2010 DP&I comments provided 14 August 2012
All	ROMP-H Document No. 685070	Amendment to address DP&I comments provided on 14 August 2012.	EPA, NOW, BSC and OEH	Approval of the ROMP remained pending up until the NSW Minister for Planning granted approval of the CGM's modified Development Consent on 22 July 2014.
All	BOMP-A Document No. 676690	New Biodiversity Offset Management Plan (BOMP) prepared to reflect the Development Consent as modified on 22 July 2014 and the approved CGM Extension Modification	OEH and DP&E	10 September 2015

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1 INTRODUCTION

The Cowal Gold Mine (the CGM) is located approximately 38 kilometres (km) north-east of West Wyalong in New South Wales (NSW) (Figure 1). Barrick (Cowel) Pty Ltd (Barrick) is the owner and operator of the CGM. Barrick is a wholly owned subsidiary of Barrick (Australia Pacific) Pty Ltd.

Development Consent for the CGM (including the Bland Creek Palaeochannel Borefield water supply pipeline) was granted by the NSW Minister for Urban Affairs and Planning under Part 4 of the NSW *Environmental Planning and Assessment Act, 1979* (EP&A Act) on 26 February 1999 (DA 14/98). Development Consent (DA 2011/64) for the operation of the eastern saline borefield was granted by the Forbes Shire Council on 20 December 2010.

Barrick was granted approval by the NSW Minister for Planning to modify the Development Consent (DA 14/98) for the CGM Extension Modification under Section 75W of the EP&A Act on 22 July 2014. The CGM Extension Modification involves the continuation and extension of open pit mining and processing operations at the CGM for an additional operational life of approximately 5 years (i.e. to 2024). The general arrangement of the approved CGM is provided in Figure 2.

A copy of the Development Consent (DA 14/98) for the CGM (as modified on 22 July 2014) is available on the Barrick website (www.barrick.com).

A Rehabilitation and Offset Management Plan (ROMP) has previously been prepared by Barrick in 2010 to reflect the Development Consent as modified in March 2010. The ROMP was prepared in consultation with the NSW Environment Protection Authority (EPA), NSW Office of Environment and Heritage (OEH), NSW Office of Water (NOW), Bland Shire Council (BSC) and to the satisfaction of the then NSW Department of Industry and Investment (DII). Comments on the ROMP were not received from the then NSW Department of Planning and Infrastructure (DP&I) until 14 August 2012. The ROMP was subsequently revised to address the DP&I's comments and submitted to the DP&I for approval in August 2013. Approval of the ROMP by the NSW Department of Planning Environment (DP&E) remained pending up until the NSW Minister for Planning granted approval of the modified Development Consent on 22 July 2014.

This Biodiversity Offset Management Plan (BOMP) supersedes the former ROMP.

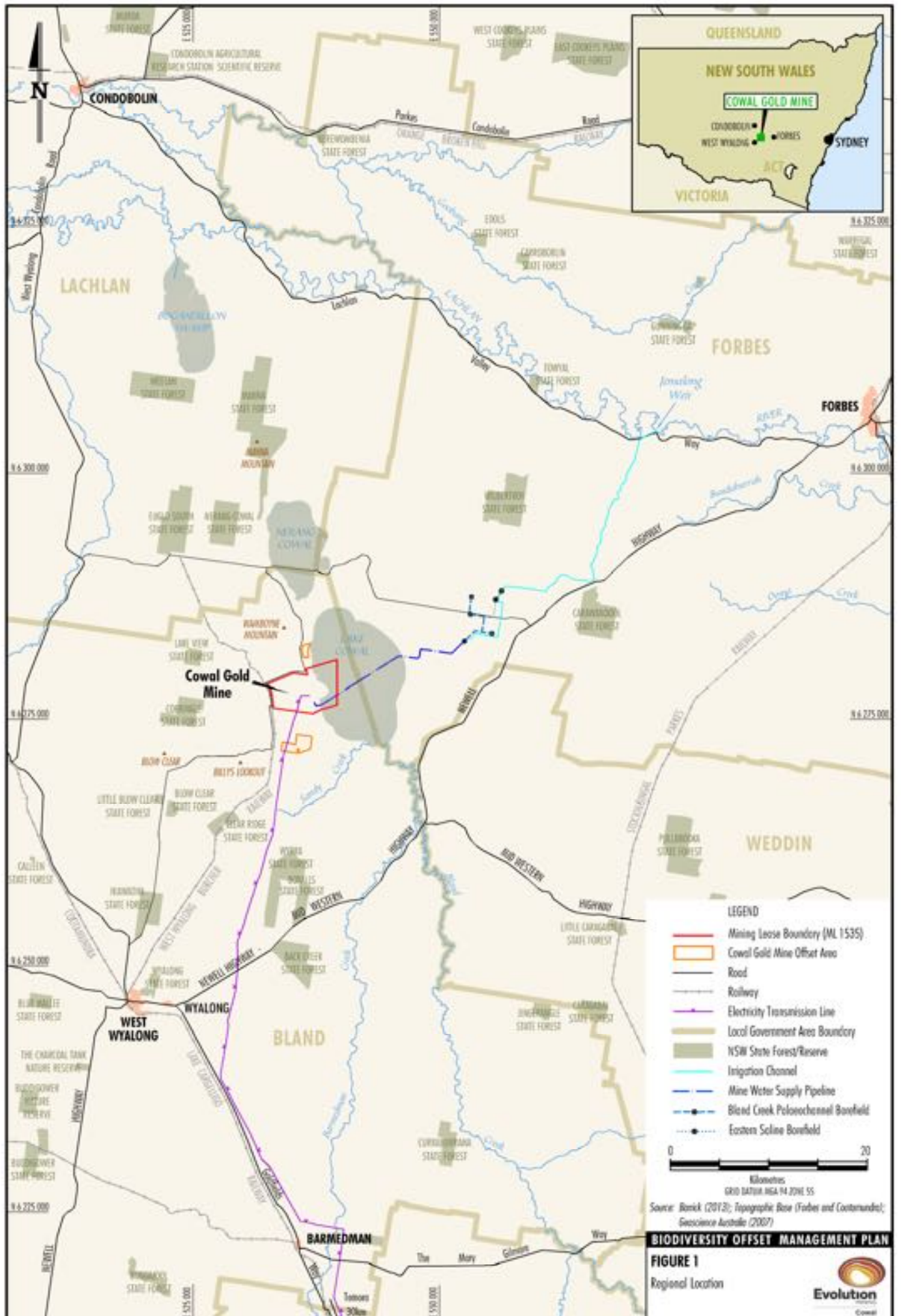
1.1 PURPOSE AND SCOPE

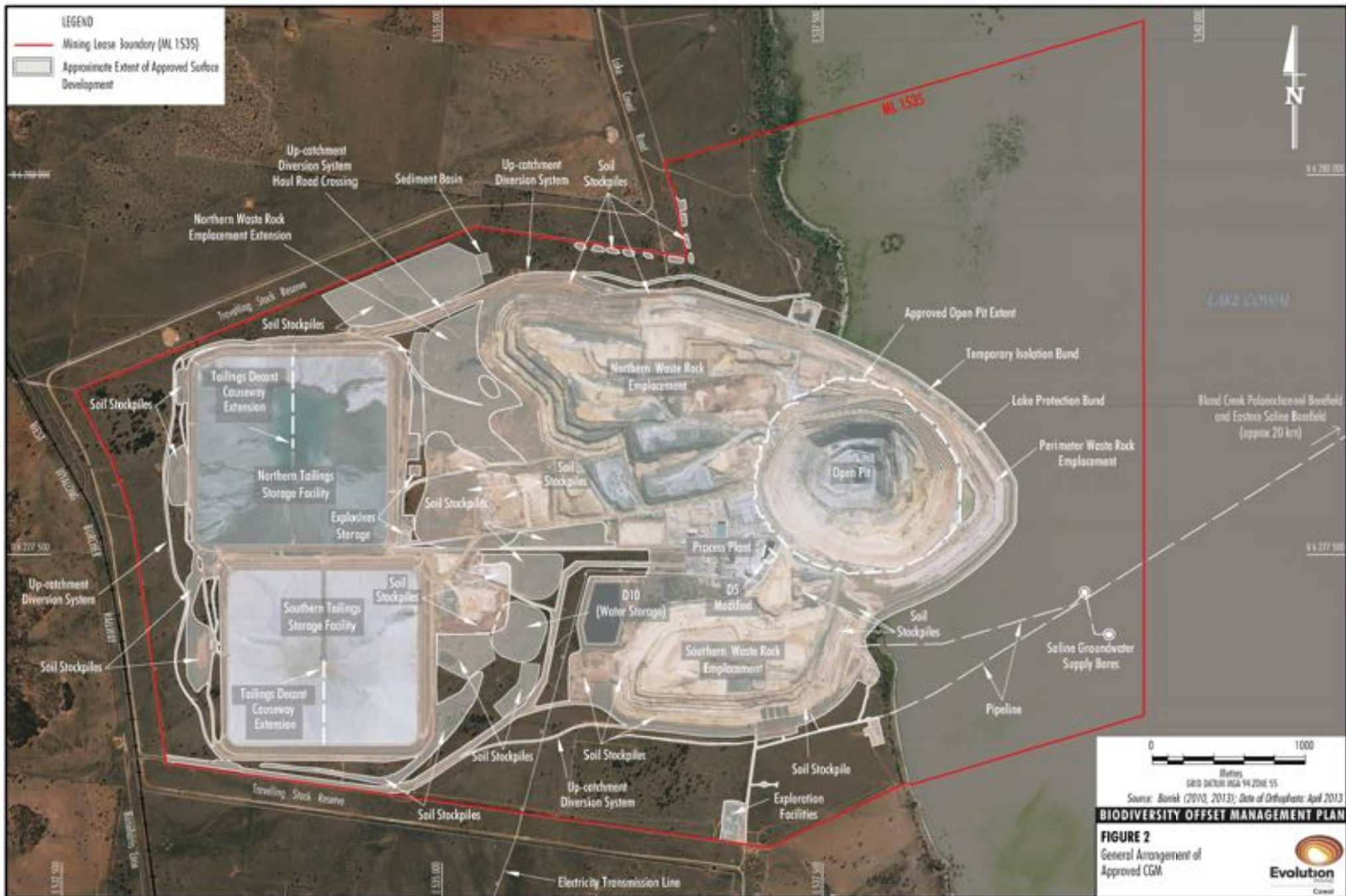
This BOMP has been prepared by Barrick in accordance with the requirements of Condition 3.4(c) of the Development Consent and to reflect the approved biodiversity offset strategy described in the CGM Extension Modification Environmental Assessment (the CGM Extension Modification EA) (Barrick, 2013).

This BOMP is relevant to the CGM's Northern and Southern Offset Areas (refer to Section 4.1).

The objective of this BOMP is to fulfil the relevant requirements of the Development Consent Conditions (Section 2.1) by providing a comprehensive description of the CGM's biodiversity offset strategy. The objectives for the CGM's biodiversity offset strategy are detailed in Section 4.2. This BOMP has been prepared in consideration of the DP&I's (2014) draft *Hunter Valley Coal Mines Best Practice Guidelines for Biodiversity Offset Management Plans*.

The BOMP forms a part of the CGM's Environmental Management Strategy prepared in accordance with Development Consent Condition 9.1(a). A plan showing the CGM's environmental management system including the relationship between the environmental management plans and monitoring programmes required under the Development Consent is provided in Attachment 1.





1.2 STRUCTURE OF THIS BOMP

An overview of the main text sections of this BOMP is presented below:

- Section 1: Provides an introduction to the BOMP, including the purpose, scope and structure of the BOMP.
- Section 2: Identifies the Development Consent and consultation requirements relevant to this BOMP and describes the relevant governmental and regulatory agency plans and strategies.
- Section 3: Describes the existing environment of the offset areas.
- Section 4: Describes the CGM's biodiversity offset strategy including a description of the offset areas, the offset objectives, the short, medium and long-term management measures, how the offset strategy will be integrated with the CGM's rehabilitation programme, the offset monitoring programme, the performance indicators and completion criteria, and the long-term protection and conservation bond requirements.
- Section 5: Describes the potential risks to successful implementation of the offset strategy, and describes the contingency measures that would be implemented to mitigate these risks.
- Section 6: Outlines reporting and review requirements for the BOMP.
- Section 7: Details the community consultation mechanism in place at the CGM.
- Section 8: Lists the references cited within this BOMP.
- Section 9: Lists the abbreviations and acronyms cited within this BOMP.

2 REQUIREMENTS FOR THE BOMP

Details of the Development Consent requirements and the regulatory agency consultation requirements relevant to this BOMP are described in Sections 2.1 and 2.2. In addition, a number of regional, state and commonwealth polices and plans are relevant to this BOMP and are summarised in Section 2.3.

2.1 DEVELOPMENT CONSENT CONDITIONS

This BOMP has been prepared in accordance with the requirements of Condition 3.4(c) of the Development Consent. Conditions 3.4(a), (b) and (d) are also relevant to this BOMP. The requirements of the Development Consent are summarised in Table 1, along with the relevant section of this BOMP in which the requirements are addressed.

**Table 1
Requirements of the Development Consent**

Development Consent Condition	Section
3.4 Biodiversity Offset Strategy	
<i>(c) The Applicant shall prepare and implement a Biodiversity Offset Management Plan for the development to the satisfaction of the Secretary. This plan must be prepared in consultation with OEH and include:</i>	This BOMP
<i>(i) a description of the short, medium, and long term measures that would be implemented to:</i>	Section 4.3
<ul style="list-style-type: none"> • <i>implement the biodiversity offset strategy;</i> 	Section 4.3.1
<ul style="list-style-type: none"> • <i>manage the remnant vegetation in the offset areas; and</i> 	Section 4.4
<ul style="list-style-type: none"> • <i>integrate the implementation of the biodiversity offset strategy to the greatest extent practicable with the rehabilitation of the site.</i> 	Sections 4.3.10 and 4.6 and Appendix A
<i>(iii) detailed performance and completion criteria for evaluating the performance of the biodiversity offset strategy, and triggering remedial action (if necessary);</i>	
<i>(iv) a detailed description of the measures that would be implemented for:</i>	Section 4.3.1
<ul style="list-style-type: none"> • <i>enhancing the quality of existing vegetation and fauna habitat in the biodiversity offset areas;</i> 	Section 4.3.2
<ul style="list-style-type: none"> • <i>creating native vegetation and fauna habitat in the biodiversity offset areas;</i> 	Section 4.3.3
<ul style="list-style-type: none"> • <i>maximising the salvage of resources from the disturbance areas on site, including the vegetative and soil resources – for beneficial use in the biodiversity offset areas;</i> 	Section 4.3.4
<ul style="list-style-type: none"> • <i>collecting and propagating seed;</i> 	Section 4.3.5
<ul style="list-style-type: none"> • <i>controlling weeds and feral pests;</i> 	Section 4.3.6
<ul style="list-style-type: none"> • <i>controlling erosion;</i> 	Section 4.3.7
<ul style="list-style-type: none"> • <i>managing any grazing;</i> 	Section 4.3.8
<ul style="list-style-type: none"> • <i>controlling access; and</i> 	Section 4.3.9
<ul style="list-style-type: none"> • <i>bushfire management.</i> 	
<i>(v) a seasonally-based program to monitor and report on the effectiveness of these measures, and progress against the detailed performance and completion criteria;</i>	Section 4.5
<i>(vi) a description of the potential risks to successful implementation of the biodiversity offset strategy, and the contingency measures that would be implemented to mitigate these risks; and</i>	Section 5
<i>(vii) details of who would be responsible for monitoring, reviewing, and implementing the plan.</i>	Section 6

Table 1 (continued)
Requirements of the Development Consent

Development Consent Condition	Section										
<p>3.4 Biodiversity Offset Strategy (continued)</p> <p>(a) <i>The Applicant shall implement the biodiversity offset strategy summarised in Table 2, shown conceptually in Appendix 4, and described in detail in the EIS to the satisfaction of the Secretary.</i></p> <p><i>Table 2: Summary of Biodiversity Offset Strategy</i></p> <table border="1"> <thead> <tr> <th align="center">Area</th> <th align="center">Minimum Size</th> </tr> </thead> <tbody> <tr> <td>Northern Offset Area</td> <td align="center">110 ha</td> </tr> <tr> <td>Southern Offset Area</td> <td align="center">100 ha</td> </tr> <tr> <td>Southern Offset Area Extension (Mod 11)</td> <td align="center">230 ha</td> </tr> <tr> <td>Total</td> <td align="center">440 ha</td> </tr> </tbody> </table>	Area	Minimum Size	Northern Offset Area	110 ha	Southern Offset Area	100 ha	Southern Offset Area Extension (Mod 11)	230 ha	Total	440 ha	Section 4.1
Area	Minimum Size										
Northern Offset Area	110 ha										
Southern Offset Area	100 ha										
Southern Offset Area Extension (Mod 11)	230 ha										
Total	440 ha										
<p>(b) <i>By the end of July 2015, unless the Secretary agrees otherwise, the Applicant shall make suitable arrangements to provide appropriate long term protection of the biodiversity offset areas in Table 2 to the satisfaction of the Secretary.</i></p>	Section 4.7										
<p>(d) <i>By the end of July 2015, unless otherwise agreed with the Secretary, the Applicant shall lodge a Conservation Bond with the Department to ensure that the biodiversity offset strategy is implemented in accordance with the performance and completion criteria in the Biodiversity Offset Management Plan. The sum of the bond shall be determined by:</i></p> <p><i>(i) calculating the full cost of implementing the biodiversity offset strategy (other than land acquisition costs); and</i></p> <p><i>(ii) employing a suitably qualified and experienced person to verify the calculated cost to the satisfaction of the Secretary.</i></p> <p><i>The calculation of the Conservation Bond must be submitted to the Department for approval at least 1 month prior to the lodgement of the bond.</i></p> <p><i>If the offset strategy is completed generally in accordance with the completion criteria in the Biodiversity Offset Management Plan to the satisfaction of the Secretary, the Secretary will release the bond.</i></p> <p><i>If the offset strategy is not completed generally in accordance with the completion criteria in the Biodiversity Offset Management Plan, the Secretary will call in all, or part of, the conservation bond, and arrange for the completion of the relevant works.</i></p> <p><i>Note: Alternative funding arrangements for long-term management of the biodiversity offset strategy, such as provision of capital and management funding as agreed by OEH as part of a Biobanking Agreement or transfer to conservation reserve estate can be used to reduce the liability of the conservation and biodiversity bond. The sum of the bond may be reviewed in conjunction with any revision to the Biodiversity Offset Management Plan.</i></p>	Section 4.8										

In addition to the above, other Development Consent Conditions relevant to preparation of this BOMP include:

- Condition 9.1(c) outlines the revision requirements for the BOMP. This condition is addressed in Section 6.5.
- Condition 9.1(b) which establishes the Annual Review reporting requirements. This condition is described in Section 6.2.
- Condition 9.2(a) which identifies the requirements for an Independent Environmental Audit (IEA) and an Independent Monitoring Panel (IMP). These conditions are described in Sections 6.3 and 6.4.
- Condition 9.1(d) which outlines the requirements for a Community Environmental Monitoring and Consultative Committee (CEMCC). This condition is addressed in Section 7.

2.2 REGULATORY CONSULTATION

As described in Section 1, the former ROMP was prepared in 2010 in consultation with the EPA, OEH, NOW, BSC and to the satisfaction of the former DII. Comments on the ROMP were not received from the then DP&I until 14 August 2012. The ROMP was subsequently revised to address the DP&I's comments and submitted to the DP&I for approval in August 2013. Approval of the ROMP by the DP&E remained pending up until the NSW Minister for Planning granted approval of the modified Development Consent on 22 July 2014.

In accordance with the modified requirements of Development Consent Condition 3.4(c), the OEH is the only relevant consultation agency for the BOMP. Accordingly, this BOMP has been prepared in consultation with the OEH and revised where relevant to address OEH's review comments.

2.3 RELEVANT PLANS/STRATEGIES

A number of state and regional plans and strategies are relevant to this BOMP including those summarised below. The integration of this BOMP with these plans and strategies is recognised as important. Where practicable and appropriate, management recommendations resulting from the plans/strategies have been incorporated into this BOMP.

Barrick is required to take into consideration the latest versions of the Jemalong Land and Water Management Plan, the Lake Cowal Land and Water Management Plan, the Mid Lachlan Regional Vegetation Management Plan, and any future catchment/land and water management plans that may become relevant to the area in accordance with the requirements of Development Consent Condition 4.6.

However the Mid Lachlan Regional Vegetation Management Plan, referred to in Condition 4.6, was repealed with effect from 1 December 2005. The Mid Lachlan Regional Vegetation Management Plan was however considered during the development of the Lachlan Catchment Action Plan (Lachlan Catchment Management Authority [LCMA], 2006). The Lachlan Catchment Action Plan and the Jemalong Land and Water Management Plan and Lake Cowal Land and Water Management Plan are described further below.

Jemalong Land and Water Management Plan

The Jemalong Land and Water Management Plan (Jemalong Land and Water Management Plan Steering Plan Committee [JLWMPSPC], 2000) provides for the alleviation of land and water degradation, improvement of natural resource management and sustainability of agriculture and the environment in the Jemalong Irrigation District. The plan recommends the remediation of any degraded lands and the reduction of water erosion and sedimentation to reduce salinisation of land and waterbodies (JLWMPSPC, 2000). This BOMP details the measures relevant to revegetation of historically cleared land in Section 4.3.2 and outlines the erosion control measures to be implemented in the offset areas in Section 4.3.6.

Lake Cowal Land and Water Management Plan

The Lake Cowal Land and Water Management Plan (Australian Water Technologies Pty Ltd, 1999) aims include maintaining vegetation cover and maintaining soil structure of Lake Cowal's ecosystem (Australian Water Technologies Pty Ltd, 1999). Although the offset areas are not located within Lake Cowal, the Northern Offset Area is located adjacent to the western side of the lake. Measures that will be implemented to regenerate (and/or revegetate) the Northern Offset Area are described in Section 4.3 of this BOMP.

Lachlan Catchment Action Plan

The Lachlan Catchment Action Plan provides a framework for the investment in works, projects, planning and research that are considered necessary to achieve sustainable and productive landscapes in the catchment (LCMA, 2006). Consistent with the Natural Resources Commission Standards, the Lachlan Catchment Action Plan provides specific catchment and management targets, which reflect broader state-based targets (LCMA, 2006).

The themes underpinning Lachlan Catchment Action Plan management targets relevant to the BOMP include biodiversity, native vegetation and land management. The offset strategy objectives and management measures (in particular the enhancement and revegetation measures) outlined in Section 4.3 of this BOMP are considered to address these themes.

An updated Lachlan Catchment Action Plan was submitted to the Minister for Primary Industries on 1 February 2013.

Draft New South Wales Biodiversity Strategy 2010-2015

A *Draft New South Wales Biodiversity Strategy 2010-2015* (the Strategy) has been prepared by the former Department of Environment, Climate Change and Water (DECCW) and former DII. The Strategy aims to provide a framework to coordinate and guide investment in biodiversity conservation in NSW.

The Strategy outlines priorities for management of priority terrestrial ecosystems including Grassy Woodlands (which occur within the offset areas) and freshwater wetlands in NSW (including the Lachlan River wetlands of which Lake Cowal is a part). The CGM biodiversity offset strategy (Section 4) and this BOMP is considered consistent with the objectives for these priority ecosystems.

The OEH is currently developing a new NSW Biodiversity Strategy. Upon finalisation, the NSW Biodiversity Strategy will be considered in subsequent revisions of this BOMP.

3 EXISTING ENVIRONMENT

3.1 LAND USE HISTORY

The majority of the land associated with the offset areas has been cleared and extensively grazed, except for the hill area (Fellmans Hill) within the Southern Offset Area (Figure 3). Cenwest Environmental Services (2009) described that the effects of previous pastoral practices are evident within the Southern Offset Area including extensive grazing (now ceased), partial clearing by logging, ringbarking and past shooting.

Grazing has been excluded from the original offset areas since 2010. Periodic grazing was conducted within the Southern Offset extension area (i.e. the area east of Fellmans Hill) for a two month period between April 2012 to June 2013. Some farm dams remain within both the Northern and Southern Offset Areas.

As a part of the CGM's Remnant Vegetation Enhancement Programme (RVEP), Barrick established four RVEP areas (Figure 3) in areas surrounding the CGM (on Barrick-owned land) containing remnant vegetation and/or Lake Cowal wetland in accordance with the CGM's Flora and Fauna Management Plan (FFMP) and the CGM's Land Management Plan (LMP).

The RVEP areas are managed to conserve and enhance remnant vegetation and wildlife values around Lake Cowal. A portion of RVEP Area 1 is incorporated in the Southern Offset Area (Figure 3). Management of this remnant vegetation patch within the Southern Offset Area will be undertaken in accordance with the measures outlined in this BOMP.

However, the remaining RVEP areas will be managed in accordance with the measures detailed in the FFMP and LMP and accordingly are not addressed further in this BOMP.

3.2 CLIMATE

The closest Commonwealth Bureau of Meteorology (BoM) weather stations to the offset areas are the West Wyalong Airport Automatic Weather Station (AWS) (050017) and Wyalong Post Office (073054). A summary of the historical meteorological data for these BoM stations is provided in Table 2.

The warmest months within the region are November through to March, with cooler temperatures occurring from May to September (BoM, 2014). Mean maximum temperature ranges from 14.3 degrees Celsius (°C) in July to 34.1°C in January at the West Wyalong Airport AWS and 14.1°C in July to 32.8°C at the Wyalong Post Office (BoM, 2014). Mean minimum temperature ranges from 3.0°C in July to 18.2°C in January at the West Wyalong Airport AWS and 3.0°C in July to 17.6°C in January at the Wyalong Post Office (BoM, 2014).

Mean annual rainfall is approximately 452 millimetres (mm) at the West Wyalong Airport AWS, with the most rain occurring in December (mean rainfall 52.6 mm) and in February (mean rainfall 52.0 mm) and the least amount of rainfall occurring in April (mean rainfall 19.3 mm) (BoM, 2014). Mean annual rainfall is approximately 479 mm at the Wyalong Post Office, with the most rain occurring in October (mean rainfall 45.7 mm) and the least amount of rainfall occurring in April (mean rainfall 35.0 mm) (BoM, 2014).

Relative humidity is variable and temperature dependant. Relative humidity at the West Wyalong Airport AWS varies from 48% in January and December to 90% in July at 9.00 am and 25% in January to 62% in June and July at 3.00 pm (BoM, 2014). Relative humidity at the Wyalong Post Office varies from 54% in January and December to 87% in June and July at 9.00 am and 32% in January to 62% in July at 3.00 pm (BoM, 2014). Evaporation fluctuates between summer and winter and on average exceeds rainfall by more than four-fold (BoM, 2014).



Table 2
Historical Meteorological Data Summary

Month	Rainfall (mm)		Temperature (degrees Celsius [°C])				Relative Humidity (percent [%])			
	West Wyalong Airport AWS ¹	Wyalong Post Office ²	West Wyalong Airport AWS ¹		Wyalong Post Office ³		West Wyalong Airport AWS ⁴		Wyalong Post Office ⁵	
			Min.	Max.	Min.	Max.	9 am	3 pm	9 am	3 pm
January	20.6	41.5	18.2	34.1	17.6	32.8	48	25	54	32
February	52.0	39.1	17.9	32.2	17.5	31.9	58	33	61	35
March	38.7	38.5	14.3	28.7	14.5	28.7	61	33	62	37
April	19.2	35.0	9.5	24.0	10.0	23.7	62	38	66	43
May	27.4	39.0	5.6	19.1	6.8	18.7	74	47	78	51
June	39.1	42.7	4.1	15.0	4.2	14.9	88	62	87	61
July	40.7	41.7	3.0	14.3	3.0	14.1	90	62	87	62
August	35.3	38.7	3.4	16.1	3.9	16.0	80	53	79	53
September	33.7	36.8	5.8	20.6	6.2	19.5	67	44	69	46
October	49.0	45.7	8.7	24.1	9.4	23.4	55	36	58	39
November	46.2	36.6	13.0	28.5	12.6	27.3	54	31	58	35
December	52.6	43.9	15.1	30.8	15.4	30.6	48	28	54	34
Annual Average	452.5	479.2	9.9	24.0	10.1	23.5	65	41	68	44

Source: BOM (2014)

¹ For the period 1999 to October 2014.

² For the period 1895 to October 2014.

³ For the period 1950 to October 2014.

⁴ For the period 1999 to 2010.

⁵ For the period 1970 to 2010.

3.3 LAND RESOURCES

Landforms and Topography

The land within the offset areas is characterised by flat to gently undulating topography, with exception of Fellmans Hill within the Southern Offset Area which is approximately 272 metres (m) Australian Height Datum (AHD) (Figure 3). The Northern Offset Area is located adjacent to the western edge of the ephemeral Lake Cowal (Figure 3).

Geology and Soils

The geology found across the Forbes region forms part of the Lachlan Fold Belt (King, 1998). The majority of the Northern Offset Area is located within the Marsden Soil Landscape (within the Gilgai Soil Landscape group) (Figure 4) which is characterised by quaternary alluvium comprising salts, silts, clays and gravels (King, 1998). The dominant soils of the Marsden Soil Landscape are red, brown and grey clays which generally have a low to moderate erodibility and erosion hazard (King, 1998). The Marsden Soil Landscape landform typically includes broad alluvial plains and floodplains and presence of gilgais (King, 1998).

The Southern Offset Area includes the Manna Mountain Soil Landscape associated with the Fellmans Hill landform and the Boxalls Soil Landscape on the footslopes beneath the hill landform (King, 1998) (Figure 4). Siliceous sands soil are typical of the Manna Mountain soil landscape, with red podzolic soils, brown earths, Aeolian sands/earthy sands and red/yellow solodic soils associated with the Boxalls soil landscape (King, 1998). The Manna Mountain landscape soils are classified as having a very high to extreme erosion hazard, and the Boxalls landscape soils are classified as having a high erosion hazard (King, 1998).

3.4 FLORA

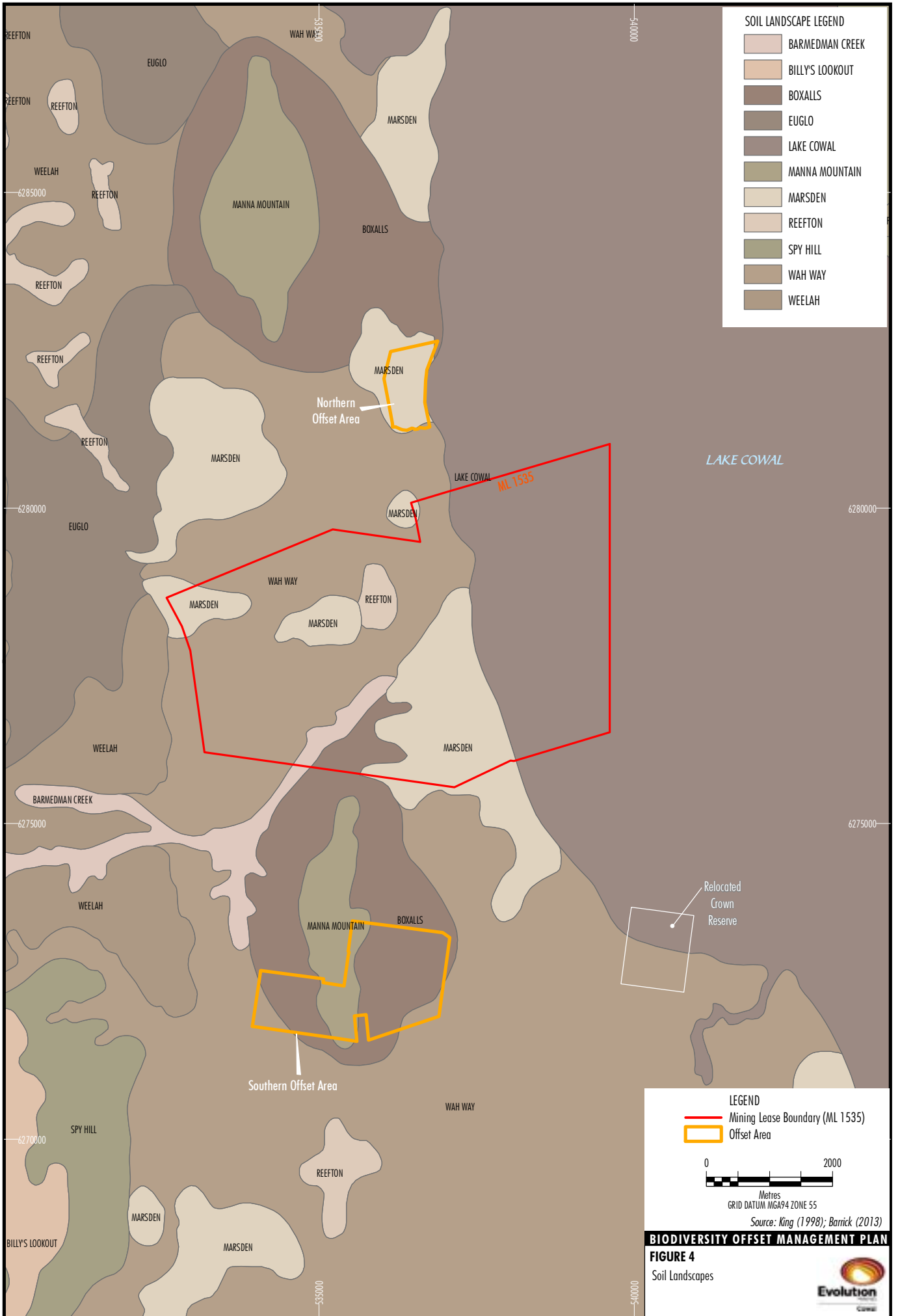
Vegetation Communities

Australian Museum Business Services (AMBS) conducted flora survey and mapping of the offset areas and surrounds throughout 2011 and 2012. AMBS (2012) mapped the following vegetation communities within the Northern Offset Area (Figure 5):

- Weeping Myall – Belah – Poplar Box Scrubland and Woodland (*Acacia pendula/Casuarina cristata/ Eucalyptus populnea*);
- Inland Grey Box – Belah – Poplar Box (*E. microcarpa/Casuarina cristata/E. populnea*);
- Spear Grass – Windmill Grass Grassland (*Austrostipa scabra/Chloris truncata*); and
- Sedgeland/Herbfield.

AMBS (2012) mapped the following vegetation communities within the Southern Offset Area (AMBS, 2012) (Figure 5):

- Dwyer’s Red Gum – Black Cypress Pine Woodland (*E. dwyeri/Callitris endlicheri*);
- Inland Grey Box – Belah – Poplar Box (*E. microcarpa/Casuarina cristata/E. populnea*);
- Weeping Myall – Belah – Poplar Box Scrubland and Woodland (*A. pendula/Casuarina cristata/ E. populnea*);
- Spear Grass – Windmill Grass Grassland (*Austrostipa scabra/Chloris truncata*);



SOIL LANDSCAPE LEGEND


- BARMEDMAN CREEK
- BILLYS LOOKOUT
- BOXALLS
- EUGLO
- LAKE COWAL
- MANNA MOUNTAIN
- MARSDEN
- REEFTON
- SPY HILL
- WAH WAY
- WEELAH

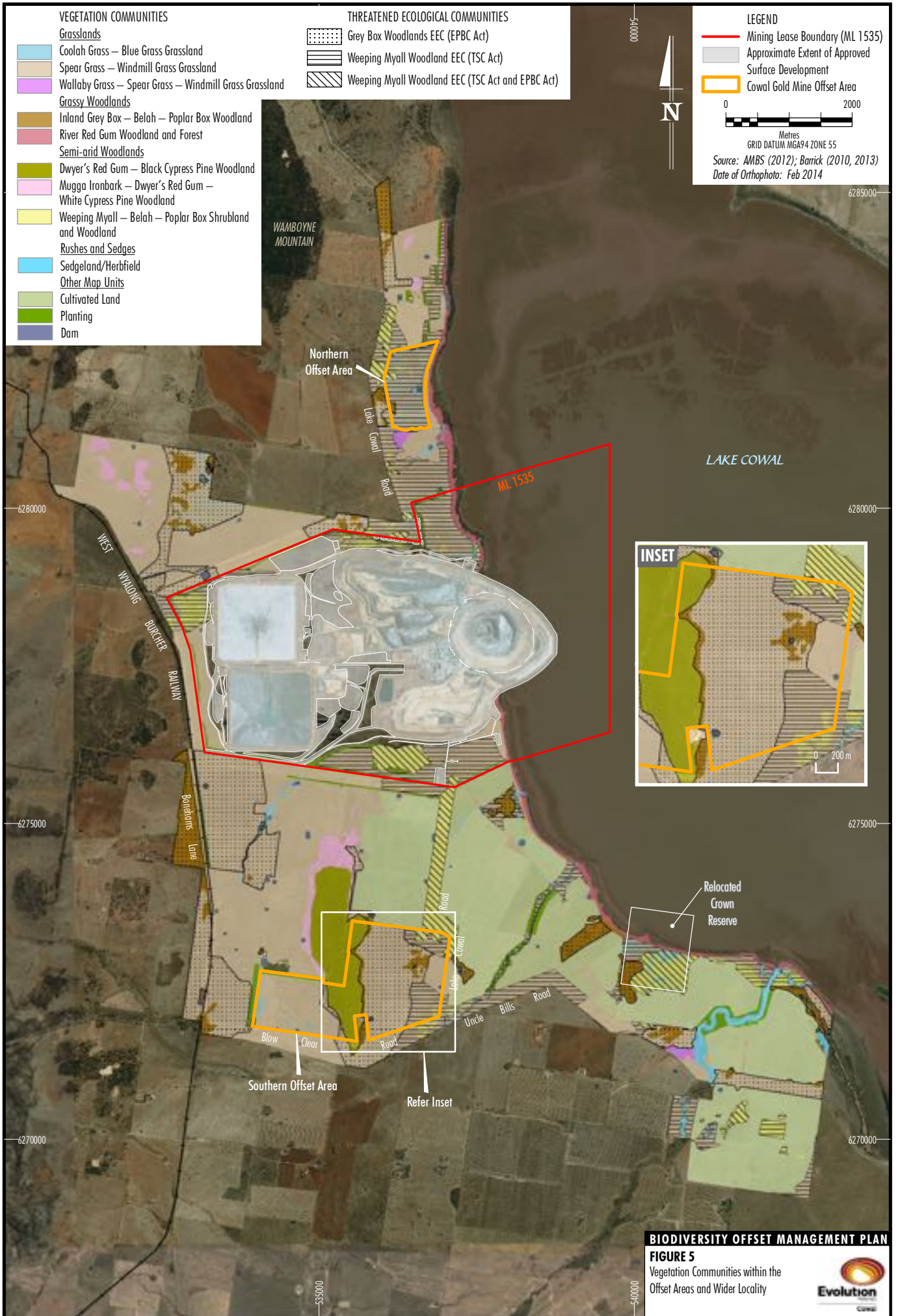
LEGEND

- Mining Lease Boundary (ML 1535)
- Offset Area

0
0
2000
 Metres
 GRID DATUM WGA84 ZONE 55
 Source: King (1998); Barrick (2013)

BIODIVERSITY OFFSET MANAGEMENT PLAN
FIGURE 4
 Soil Landscapes





- Coolah Grass – Blue Grass Grassland (*Walwhalleya proluta/Dichantheum sericeum*);
- Sedgeland/Herbfield; and
- Plantings.

Threatened Ecological Communities

The following threatened ecological communities have been mapped by AMBS (2012) within the Northern Offset Area (Figure 5):

- *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* (Weeping Myall Woodland EEC) listed under the NSW *Threatened Species Conservation Act, 1995* (TSC Act);
- *Weeping Myall Woodland* EEC listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act, 1999* (EPBC Act); and
- *Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-Eastern Australia* (Grey Box Woodlands EEC) listed under the EPBC Act.

The following threatened ecological communities have been mapped by AMBS (2012) within the Southern Offset Area (Figure 5):

- Grey Box Woodlands EEC listed under the EPBC Act;
- Weeping Myall Woodland EEC listed under the TSC Act; and
- Weeping Myall Woodland EEC listed under the EPBC Act.

A summary of the approximate area of the vegetation communities and EEC patches within each offset area is provided in Tables 3 and 4.

Table 3
Vegetation Communities Mapped within the Offset Areas

Vegetation Community¹	Condition¹	Northern Offset Area (approx. ha)	Southern Offset Area (approx. ha)	Approx. Total Area (ha) within Offset Areas
Weeping Myall – Belah – Poplar Box Scrubland and Woodland	Moderate	3	7	10
Inland Grey Box – Belah – Poplar Box	Moderate	1	14	15
Dwyer’s Red Gum – Black Cypress Pine Woodland	Moderate	-	50	50
Spear Grass – Windmill Grass Grassland	Moderate	65	285	350
Coolah Grass – Blue Grass Grassland	Poor	-	4	4
Sedgeland/Herbfield	Moderate	7.5	0.5	8
Plantings	Moderate	-	3	3

¹ AMBS (2012).

Table 4
Approximate Area of EEC's Mapped within the Offset Areas

EEC ¹	Condition ¹	Northern Offset Area (approx. ha)	Southern Offset Area (approx. ha)	Approx. Total Area (ha) within Offset Areas
Weeping Myall Woodland (TSC Act)	Moderate	71	42	113
Weeping Myall Woodland (TSC Act and EPBC Act)		3	6	9
Grey Box Woodlands (EPBC Act)		1	149	150

¹ AMBS (2012).

Threatened Flora

Large populations (over 4,000 plants) of the threatened flora species *Pilularia novae-hollandiae* (Austral Pillwort) were recorded from gilgai within the Northern Offset Area in 1998 (Bower, 1998) (Figure 6).

No flora species of state or national conservation significance were found by AMBS (2012) during their surveys throughout 2011 and 2012.

Broad Fauna Habitat Types

The following fauna habitat types have been mapped within the Northern Offset Area (AMBS, 2012) (Figure 7):

- Western Slopes Grasslands;
- Riverine Plain Woodlands;
- Floodplain Transition Woodlands; and
- Inland Floodplain Swamps.

The following fauna habitat types have been mapped within the Southern Offset Area (AMBS, 2012) (Figure 7):

- Western Slopes Grasslands;
- Inland Rocky Hill Woodlands;
- Riverine Plain Woodlands;
- Riverine Plain Grasslands;
- Floodplain Transition Woodlands; and
- Inland Floodplain Swamps.





3.5 FAUNA

Threatened Fauna

The Grey-crowned Babbler (eastern subspecies) (*Pomatostomus temporalis temporalis*) has been recorded within the Southern Offset Area both in the form of sightings and observed nests based on survey records from 1989 to 2013 (Figure 8 [as reproduced from Resource Strategies [2013]). Two sightings of the Grey-crowned Babbler (eastern subspecies) (*Pomatostomus temporalis temporalis*) have also been recorded immediately south of the Northern Offset Area (Figure 8, as reproduced from Resource Strategies [2013]). The offset areas are also considered to contain potential habitat for threatened species, such as the Square-tailed Kite (*Lophoictinia isura*), Spotted Harrier (*Circus assimilis*), Little Eagle (*Hieraaetus morphnoides*), Superb Parrot (*Polytelis swainsonii*), Yellow-bellied Sheath-tail-bat (*Saccolaimus flaviventris*), Corben's Long-eared Bat (*Nyctophilus corbeni*), Little Pied Bat (*Chalinolobus picatus*) and Inland Forest Bat (*Vespadelus baverstocki*) (Resource Strategies, 2013).

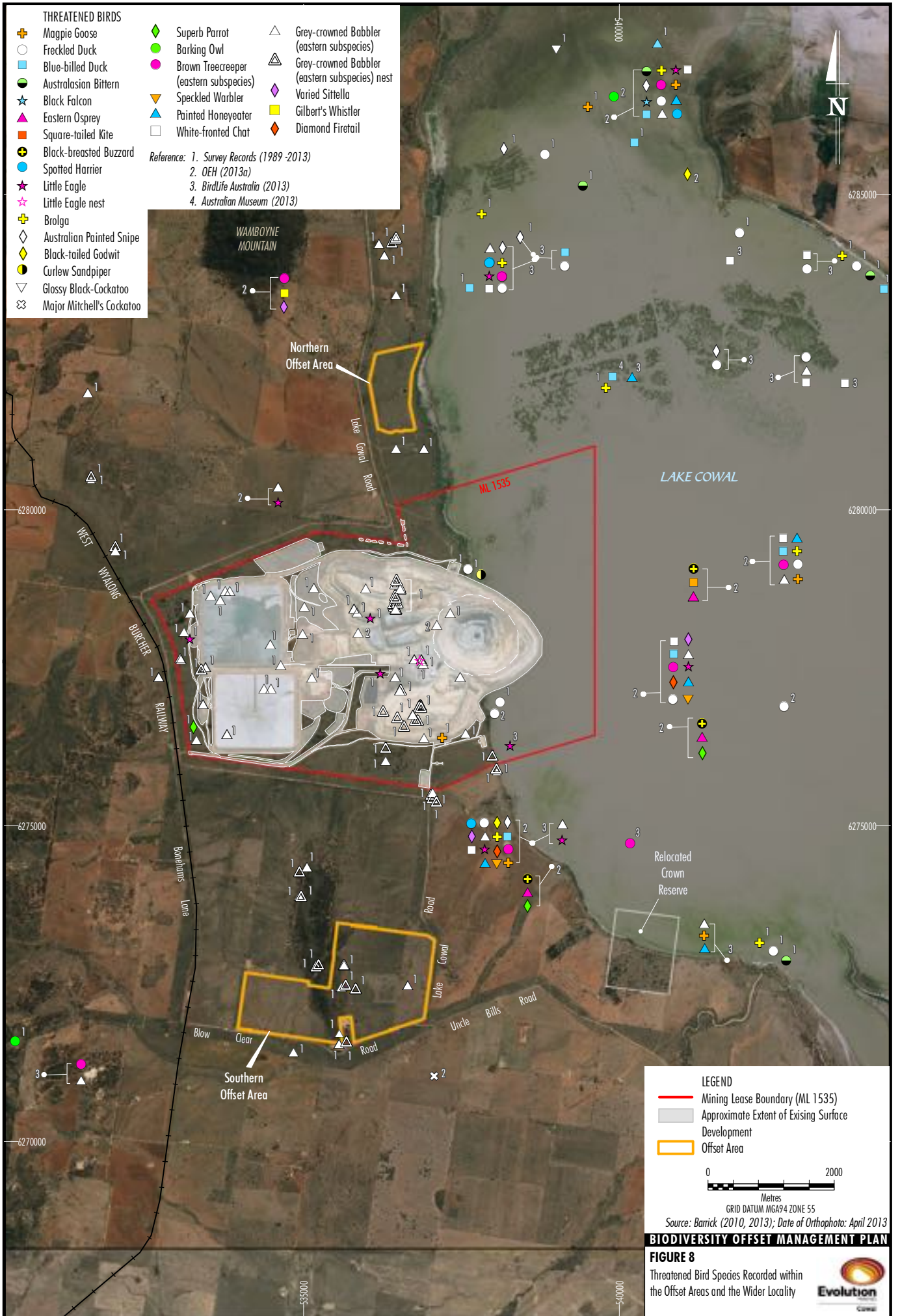
3.6 INTRODUCED SPECIES

Weed Species

Three noxious weeds listed under the NSW *Noxious Weeds Act, 1993* for the Bland Shire have been recorded in the offset areas or similar adjacent habitat, namely, African Boxthorn (*Lycium ferocissimum*), the Bathurst Burr (*Xanthium spinosum*) and Galvanised Burr (*Sclerolaena birchii*) (Carnegie Natives, 2013; FloraSearch, 2009).

Pest Species

The introduced fauna species that have been recorded on lands surrounding the offset areas (including within ML 1535) since 2005 include one bird species, seven mammal species and three plague locust species (Resource Strategies, 2013). These species include the Common Starling (*Sturnus vulgaris*), European Red Fox (*Vulpes vulpes*), European Rabbit (*Orytolagus cuniculus*), Feral Cat (*Felis catus*), Wild Dog (*Canis familiaris*), Feral Pig (*Sus scrofa* sp.), Brown Hare (*Lepus capensis*), House Mouse (*Mus musculus*) and plague locust species including the Australian Plague Locust (*Chortoicetes terminifera*), Migratory Locust (*Locusta migratoria*) and the Spur-throated Locust (*Austracris guttulosa*).

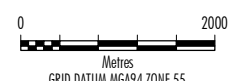


THREATENED BIRDS

- | | | |
|-----------------------------|--|--|
| ✚ Magpie Goose | ◇ Superb Parrot | △ Grey-crowned Babbler (eastern subspecies) |
| ○ Freckled Duck | ● Barking Owl | △ Grey-crowned Babbler (eastern subspecies) nest |
| □ Blue-billed Duck | ● Brown Treecreeper (eastern subspecies) | ◇ Varied Sittella |
| ● Australasian Bittern | ● Speckled Warbler | ■ Gilbert's Whistler |
| ★ Black Falcon | ▲ Painted Honeyeater | ◆ Diamond Firetail |
| ▲ Eastern Osprey | □ White-fronted Chat | |
| ■ Square-tailed Kite | | |
| ✚ Black-breasted Buzzard | | |
| ● Spotted Harrier | | |
| ★ Little Eagle | | |
| ★ Little Eagle nest | | |
| ✚ Brolga | | |
| ◇ Australian Painted Snipe | | |
| ◇ Black-tailed Godwit | | |
| ● Curlew Sandpiper | | |
| ▽ Glossy Black-Cockatoo | | |
| ⊗ Major Mitchell's Cockatoo | | |

Reference: 1. Survey Records (1989-2013)
 2. OEH (2013a)
 3. BirdLife Australia (2013)
 4. Australian Museum (2013)

- LEGEND**
- Mining Lease Boundary (ML 1535)
 - Approximate Extent of Existing Surface Development
 - Offset Area



GRID DATUM MGA94 ZONE 55

BIODIVERSITY OFFSET MANAGEMENT PLAN

FIGURE 8

Threatened Bird Species Recorded within the Offset Areas and the Wider Locality



4 BIODIVERSITY OFFSET STRATEGY

The biodiversity offset strategy involves the conservation and management of two designated offset areas located on land owned by Barrick, herein referred to as the Northern and the Southern Offset Areas (Figure 9).

The biodiversity offset strategy includes:

- a description of the offset (Section 4.1);
- objectives (Section 4.2);
- short, medium and long-term management measures and performance criteria (Section 4.3);
- a description of how the strategy integrates with the CGM's rehabilitation programme (Section 4.4);
- a monitoring programme (Section 4.5);
- revegetation and regeneration performance indicators and completion criteria (Section 4.6); and
- details of the long-term protection mechanism for the offset areas (Section 4.7); and
- the conservation bond requirements relevant to implementation of the biodiversity offset strategy (Section 4.8).

4.1 DESCRIPTION OF THE OFFSET

4.1.1 Location and Tenure

The Northern and the Southern Offset Areas are located near the CGM on land owned by Barrick (Figure 9) (Table 5).

**Table 5
Land Tenure of Offset Areas**

Offset Area	Land Tenure
Northern Offset Area	<ul style="list-style-type: none"> • Lot 8, DP 753097; and • Lot 1, DP 530299.
Southern Offset Area	<ul style="list-style-type: none"> • Lot 19, DP 753083; and • Lot 18, DP 753083.

Easements for the Temora to CGM electricity transmission line (ETL) and the Moomba to Sydney natural gas pipeline traverse through Lot 19, DP 753083 of the Southern Offset Area (Figure 9).

The area within these easements will not be subject to this BOMP and are managed in accordance with the terms and conditions set by the relevant managing authority for the infrastructure.



4.1.2 Management Areas

Barrick will implement the biodiversity offset strategy outlined in Table 6 and as shown on Figure 9.

Table 6
Biodiversity Offset Strategy Management Areas

Management Area	Description	Minimum Size
Enhancement Area	Enhancement through natural regeneration and management for conservation.	340 ha
Revegetation Area	Re-establishment of woodland in cleared agricultural land by revegetation.	100 ha
Total Area Conserved		440 ha

Two types of management areas have been defined, namely, the Offset Enhancement Areas and an Offset Revegetation Area (Table 6) as shown on Figure 9.

Given vegetation survey and mapping conducted by AMBS (2012) mapped the Grey Box Woodlands EEC listed under the EPBC Act and the Weeping Myall Woodland EEC listed under both the EPBC Act and TSC Act within the Southern Offset Area extension area (i.e. the area east of Fellmans Hill) (Figure 5), and the Weeping Myall Woodland EEC listed under both EPBC and TSC Acts in the Northern Offset Area, these areas have been defined as Offset Enhancement Areas (Figure 9). The previously cleared agricultural land mapped as Spear Grass – Windmill Grass Grassland by AMBS (2012) to the west of Fellmans Hill in the Southern Offset Area (Figure 5) has been identified as the Offset Revegetation area (Figure 9).

Short, medium and long-term measures that will be implemented within the management areas are detailed in Section 4.3.

4.2 OFFSET OBJECTIVES

The objectives for the biodiversity offset areas are to:

- secure the tenure of the offset areas for long-term conservation purposes (excluding the land within the ETL and gas pipeline easements);
- enhance flora and fauna habitats within the offset areas, including increasing the area of Myall woodland through regeneration and revegetation;
- establish native vegetation characteristic of a Eucalypt woodland in the previously cleared agricultural land comprising Spear Grass – Windmill Grassland within the Revegetation Area of the Southern Offset Area (Figure 5); and
- improve the flora value of the land in the offset areas in the medium to long-term.

The biodiversity offset strategy will be considered complete when monitoring data indicates the completion criteria (Section 4.6) have been met.

4.3 SHORT, MEDIUM AND LONG-TERM MANAGEMENT MEASURES

This section details the short, medium and long-term measures that will be implemented to achieve the offset objectives (Section 4.2). For the purpose of this biodiversity offset strategy, short, medium and long-term periods have been defined as:

- Short-term – initial three year period of implementation of biodiversity offset strategy (i.e. from June 2015 up to the end of May 2018).
- Medium-term – period from June 2018 to the end of approved mining operations (i.e. up to end 2024).
- Long-term – period after the end of mining operations up to when the completion criteria are met.

Criteria to assess the performance or success of the short, medium and long-term management measures have been developed and are detailed in Section 4.3.10. A review of the progress against the performance criteria will be undertaken annually and reported in the Annual Review.

4.3.1 Remnant Vegetation Enhancement

This section provides a description of the measures and procedures that will be implemented to facilitate the natural regeneration of remnant vegetation within the Offset Enhancement Areas (Figure 9). It is anticipated that these measures will assist natural regeneration of Myall Woodland within the Northern and Southern Offset Areas, and natural regeneration of Grey Box Woodland within the Southern Offset Area.

The following measures will be undertaken to facilitate natural regeneration of canopy, understorey and ground strata flora species within the Northern and Southern Offset Areas:

- fencing to exclude grazing;
- provision of signage to restrict access;
- removal of unnecessary fencing;
- soil erosion management;
- control of animal pests;
- control of weeds;
- selective use of native plant fertiliser;
- vehicle access management; and
- habitat enhancement.

These measures are described below.

Fencing to Exclude Grazing

Livestock will not be permitted to graze in the offset areas. Fencing of the offset areas will be undertaken to prevent the entry of livestock (e.g. sheep, cattle, horses, etc.). Regular inspections will be undertaken to maintain the integrity of the fencing as described in Section 4.5.1. If at any time, stock is observed within the offset areas, the stock will be removed from the area immediately.

Provision of Signage

Signs restricting access to authorised persons and denoting a restricted conservation area will be placed on access gates and perimeter fencing of the offset areas to restrict unauthorised or recreational access and minimise the potential for disturbance to the offset areas.

Removal of Unnecessary Fencing

Fencing within the offset areas that is unnecessary to prevent the uncontrolled entry of livestock will be removed from within the offset areas.

Soil Erosion Management

The following measures will be used to control and remedy erosion within the offset areas:

- fencing to exclude grazing;
- restricting vehicle access to authorised personnel and to existing access tracks only;
- controlling animal pests;
- use of soil ameliorants (e.g. gypsum or lime) where necessary;
- selective plantings; and/or
- use of temporary surface water management structures (e.g. silt fences and temporary sediment traps [such as hay bales]).

However, consistent with the recommendations of DnA Environmental (2014), no deep-ripping for any revegetation activities will be undertaken in the Northern Offset Area due to the occurrence of potentially highly sodic soils (Section 5).

Control of Animal Pests and Weeds

Animal pest and weed control will be conducted as described in Section 4.3.5.

Selective Use of Native Plant Fertiliser

Native plant fertiliser may be used to improve native vegetation regeneration if monitoring indicates poor regeneration within the Enhancement Areas.

Vehicle Access Management

Vehicular movement through the offset areas can result in soil compaction, spread of weeds and vegetation disturbance. To minimise the degree of disturbance, vehicle access to the offset areas shall be restricted to authorised personnel and existing access tracks and for bushfire management purposes.

As described above, signage will be placed on access gates and perimeter fencing to restrict unauthorised access.

Habitat Enhancement

Habitat enhancement activities undertaken within the offset areas will involve increasing fauna habitat and nesting resources within the offset areas by:

- salvaging large hollows and logs from vegetation clearance activities at the CGM;

- placement of nest boxes in suitable habitat for birds and arboreal mammals;
- placement of roosting boxes in suitable habitat for bats; and
- if necessary, planting additional foraging resources (i.e. selected local native trees, shrubs and grasses) and hollow-developing tree species.

Revegetation within Enhancement Areas – Contingency Measures

Revegetation activities may be undertaken within Enhancement Areas, in addition to the enhancement measures, where natural regeneration is poor or insufficient to meet completion criteria. Revegetation activities within the Offset Enhancement Areas will consider the vegetation composition of any identified EEC's where the proposed revegetation area is within or adjacent to the EEC extent. Revegetation of unnecessary access tracks may also be undertaken.

The annual offset monitoring programme will be conducted to identify areas within the Enhancement Areas which may benefit from selective plantings.

4.3.2 Revegetation Implementation

This section provides a description of the revegetation measures and procedures that will be undertaken within the Offset Revegetation Area (Figure 9).

The Offset Revegetation Area is located in previously-cleared cultivated paddocks comprising Spear Grass – Windmill Grassland (Figure 5 and 9). Revegetation activities will aim to re-establish woodland vegetation by selective planting native species characteristic of the surrounding existing remnant patches. Revegetation implementation will involve the following general measures:

- site preparation works;
- select revegetation methods;
- select timing for revegetation;
- select revegetation species; and
- maintenance measures.

These measures are described further below.

Barrick proposes to engage Greening Australia during 2015 to prepare a seed supply and planting implementation strategy for the offset areas (and the CGM's rehabilitation programme within Mining Lease [ML] 1535). The strategy will include implementation plans/programmes for:

- seed collection/harvesting;
- seed processing and storage;
- seed propagation;
- site preparation and planting (including determination of planting density); and
- maintenance (including supplementary plantings and weed and pest control).

Once developed, outcomes from Greening Australia's seed supply and planting implementation strategy will be incorporated in this BOMP where relevant.

Site Preparation

Initial preparation of the area prior to revegetation may include (but not necessarily be limited to):

- soil fertility analysis to identify any potential limiting factors to plant growth;
- ripping to improve water infiltration and root establishment;
- application of soil ameliorant and/or fertiliser if required;
- control of weeds; and
- use of temporary surface water management structures (e.g. silt fences and temporary sediment traps [such as hay bales]) to control erosion and water runoff.

Revegetation Methods

Revegetation will be undertaken via direct seeding and/or planting of nursery-raised tubestock seedlings.

Revegetation activities will be implemented by a suitably qualified person(s) and co-ordinated by the CGM's Environmental Manager or delegate.

Revegetation Timing

Revegetation activities will predominantly be undertaken in autumn to improve the opportunity for plant establishment due to expected lower temperatures. Revegetation activities may also be undertaken on a campaign basis at other times of the year, when climatic conditions are favourable.

Revegetation Species

Canopy, sub-canopy, understorey and ground strata flora species will be included in the revegetation programme and will be selected based on one or more of the following criteria:

- endemic to the area (as a result, the plant species would be well adapted to the local climate and natural climatic variability) and/or suited to edaphic conditions;
- consideration of EEC composition;
- structural characteristics (e.g. provide soil stabilisation); and
- potential to offer habitat resources for native wildlife (e.g. breeding, roosting/nesting or foraging resources).

Table 7 presents a provisional list of native species that may potentially be suitable for revegetation of the offset areas, and includes canopy, sub-canopy, understorey and ground strata species.

Table 7
Provisional List of Species for Revegetation of Offset Areas

Scientific Name	Common Name	Scientific Name	Common Name
<i>Eucalyptus populnea</i> ssp. <i>bimbil</i>	Bimble Box	<i>Rumex tenax</i>	Shiny Dock
<i>Eucalyptus microcarpa</i>	Grey Box	<i>Chloris truncata</i>	Windmill Grass
<i>Eucalyptus sideroxylon</i>	Mugga Ironbark	<i>Bothriochloa macra</i>	Redleg Grass
<i>Casuarina cristata</i>	Belah	<i>Danthonia</i> sp.	Wallaby Grasses
<i>Callitris endlicheri</i>	Black Cypress Pine	<i>Enteropogon acicularis</i>	Curly Windmill Grass
<i>Callitris glaucophylla</i>	White Cypress Pine	<i>Eragrostis parviflora</i>	Weeping Lovegrass
<i>Acacia pendula</i>	Myall	<i>Austrostipa scabra</i>	Speargrass
<i>Acacia doratoxylon</i>	Lancewood	<i>Austrostipa densifolia</i>	Foxtail Speargrass
<i>Acacia stenophylla</i>	River Cooba	<i>Sida intricata</i>	-
<i>Alectryon oleifolius</i>	Rosewood	<i>Marsilea drummondii</i>	Common Nardoo
<i>Geijera parviflora</i>	Wilga	<i>Eragrostis australasica</i>	Canegrass
<i>Rumex brownii</i>	Slender Dock	<i>Muehlenbeckia florulenta</i>	Lignum

Source: After Anne Clements and Associates (1995), Charles Sturt University (1997).

The location in which particular species will be planted will be determined in consideration of the existing occurrence of each vegetation community, as well as slope, elevation and soil conditions.

As a component of Greening Australia's seed supply and planting implementation strategy, the above provisional species list will be refined and a revegetation species list will be developed for both the Northern and Southern Offset Areas.

Maintenance

A variety of maintenance activities will be conducted from the onset of revegetation to facilitate the revegetation establishment. Routine maintenance measures may include, but not necessarily be limited to:

- application of supplementary fertilisers;
- control of erosion and sedimentation;
- the use of tree guards to provide protection against wind, frost, vermin and herbivores;
- supplementary plantings to replace any losses;
- weed and feral animal control; and
- supplementary watering (if necessary).

4.3.3 Salvage and Re-use of Material for Habitat Enhancement

A Vegetation Clearance Protocol (VCP) has been developed for the CGM and is described in detail in the CGM's Flora and Fauna Management Plan (FFMP).

The VCP includes preliminary and secondary habitat assessments that involve the inspection of all trees and potential habitat features (by a suitably qualified person) located within the proposed disturbance area for features with the potential to provide roosting and/or nesting resources for birds, bats and arboreal mammals (e.g. hollows, openings, cracks and/or loose bark). The selection, re-location and/or storage of suitable habitat features for will be guided by the Environmental Manager (or delegate) in consultation with a suitably qualified person.

Where practicable, vegetation clearance operations will be managed to maximise the salvage and re-use of cleared vegetative material and habitat resources/features. Habitat resources/features will be clearly marked (with flagging tape or similar) for salvage/relocation in the offset areas (or the Remnant Vegetation Enhancement Programme [RVEP] areas or for use in the CGM's rehabilitation programme). Salvaged material will be collected and either transferred to the offset areas (or RVEP or on-site rehabilitation areas) immediately following VCP works or stockpiled on-site and delineated to prevent disturbance. Vegetative material unsuitable for habitat enhancement or the CGM rehabilitation programme may be mulched and stockpiled on-site or removed from site.

4.3.4 Collection and Propagation of Seed for Revegetation Works

The habitat assessment phases of the VCP also involves examining trees for their provision of seed for use in the CGM's offset revegetation or on-site rehabilitation programme.

As described in Section 4.3.2, Barrick proposes to engage Greening Australia to prepare a seed supply and planting implementation strategy for the offset areas and the CGM's rehabilitation programme within ML 1535. The strategy will include implementation plans/programmes for seed collection/harvesting and seed propagation.

Once developed, outcomes from Greening Australia's seed supply and planting implementation strategy will be incorporated in this BOMP where relevant.

4.3.5 Weed and Feral Pest Control

Controlling Weeds

A Land Management Plan (LMP) has been developed for the CGM and is applicable to all Barrick-owned land, including the offset and RVEP areas. Section 6 of the LMP outlines Barrick's weed management strategy and procedures that will be implemented in accordance with the requirements of BSC. The LMP weed management strategy involves:

- identification of weeds by annual site inspections and recording weed presence in an annual weed survey report;
- 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 and around wetland areas will be strictly controlled);
- implementing follow-up site inspections to determine the effectiveness of the weed control measures; and
- prevention of the establishment of new weeds on Barrick-owned land by minimising seed transport of weed species (measures may include the use of vehicle hygiene/wash down procedures for vehicles entering the offset areas [if considered necessary by the Environmental Manager or delegate]).

These components of the weed management strategy are described below in relation to the offset areas.

Weed Control Methods

The control of declared noxious weeds is required under the NSW *Noxious Weeds Act, 1993*. Any noxious weeds identified within the offset areas will be controlled in accordance with its NSW Department of Primary Industries (DPI) (Agriculture) control class. Barrick will notify the BSC if a noxious weed with a W1 classification is identified within the offset areas.

Mechanical and/or hand removal of identified weeds and/or recommended chemical (herbicide) application will be used to control weed incursion. These weed control methods will generally be undertaken when conditions are favourable (i.e. after rainfall and before flower set).

Non-chemical weed control methods that may be implemented within the offset areas include:

- hand weeding;
- mulching and smothering;
- slashing and mowing;
- burning (if necessary); and
- weed seed collection.

Typical herbicide application techniques that will be considered include:

- spraying (spot application or over a broad area of infestation);
- cut and paint (applied to weed trees);
- stem injection (applied to weed trees);
- frilling (application to a series of notches around the trunk of a large weed plant); and
- stem-painting (useful for vines and smaller weed plants).

Empty herbicide containers will be removed from the offset areas and managed in accordance with the CGM's Hazardous Waste and Chemical Management Plan.

Revegetation may be also used as a weed management tool.

Monitoring the Success of Weed Control Activities

As described in Section 4.5.1, Ecosystem Function Analysis (EFA) monitoring will be undertaken at the Northern and Southern Offset Area monitoring site quadrats and will include recording the presence and abundance of weed species along the monitoring transects. Photographic monitoring will also be undertaken to monitor weed presence over time. These monitoring techniques will be undertaken annually as part of the offset monitoring programme (Section 4.5) and are considered consistent with the DPI's *Guidelines for Monitoring Weed Control* (Auld, 2009).

In addition to the above, an annual weed survey of all Barrick-owned lands will be undertaken to identify and record areas requiring weed control. An annual weed survey report will be prepared which will include mapping (and photographic records) of weed control areas, identification of weeds of concern and a description of management/control measures required. The weed survey report will be used to inform weed control programmes and track the progress of weed management in the offset areas.

Follow-up inspections of areas where weed control has been undertaken will be conducted two months following implementation of the weed control measures to assess the success of the measures.

The results of the annual weed surveys, including any weed management activities undertaken within the offset areas, will be reported annually in the Annual Review (Section 6.2).

Vehicle Access Management

As discussed in Section 4.3.1, to minimise seed transport of weed species, vehicle access to the offset areas will be restricted to authorised personnel and will be restricted to existing access tracks only.

Controlling Feral Pests

'Declared pests' are those with a Pest Control Order declared by the Minister under the *Local Land Services Act, 2013*. Vertebrate animals with Pest Control Orders under the *Local Land Services Act, 2013* are rabbits, feral pigs, wild dogs and foxes. These animals are subject to mandatory control by the landholder under the *Local Land Services Act, 2013*.

To avoid and mitigate impacts from introduced fauna and pest species, Barrick will undertake pest control operations within the offset areas. The DPI's (2014) *Vertebrate Pest Control Manual* will be used as a guide for pest control activities in consultation with the Riverina Local Land Services (LLS) and NSW DPI (Agriculture) when necessary.

Pest control activities within the offset areas will involve:

- regular property inspections to assess the status of pest populations;
- mandatory pest control for declared pests (i.e. rabbits, feral pigs, wild dogs and foxes) in accordance with Pest Control Orders under the *Local Land Services Act, 2013*, and management of plague locust species including the Australian Plague Locust, Migratory Locust and the Spur-throated Locust;
- inspections to assess the effectiveness of control measures implemented and review of these measures if necessary; and
- documenting pest sightings and control measures in a Pest Register and marking the location of sightings on a map.

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 capture, handling, destruction and control of feral cats within the offset areas (and on all Barrick-owned lands). The *Threat Abatement Plan for Predation by the European Red Fox* (DEWHA, 2008b) and the *Vertebrate Pest Control Manual* (DPI, 2014) will be used to guide fox control within the offset areas (and on all Barrick-owned lands).

The management measures that will be implemented to control declared pests and other relevant introduced animal species are outlined in Table 8.

In addition, Barrick will consult with the EPA regarding the management of common invasive native birds (e.g. Noisy Miners [*Manorina melanocephala*] and Currawongs [*Strepera sp.*]).

Pest control operations for the offset areas will be reported annually in the Annual Review (Section 6.2).

**Table 8
Pest Management**

Species	Status	Method of Control²
European Rabbit ¹ (<i>Oryctolagus cuniculus</i>)	Declared pest	<ul style="list-style-type: none"> • baiting rabbits with 1080 and pindone poisoned carrot; and • ripping of rabbit warrens.
European Red Fox ¹ (<i>Vulpes vulpes</i>)	Declared pest	<ul style="list-style-type: none"> • fox baiting; and • implementing a shooting programme.
Feral Pig (<i>Sus scrofa</i> sp.)	Declared pest	<ul style="list-style-type: none"> • feral pig trapping.
Wild Dog (<i>Canis familiaris</i>)	Declared pest	<ul style="list-style-type: none"> • wild dog trapping; • wild dog baiting with 1080; and/or • implementing a shooting programme.
Feral Cat (<i>Felis catus</i>) ¹	Nuisance animal	<ul style="list-style-type: none"> • feral cat baiting; and • implementing a shooting programme.
Plague locust species	Nuisance animal	<ul style="list-style-type: none"> • LLS approved insecticide application.

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

² DPI (2014).

4.3.6 Erosion Control

The offset monitoring programme includes monitoring and reporting of erosion incidence at the offset monitoring sites and includes a description of erosion type and a measurement of severity. The offset monitoring programme is described in Section 4.5.

For areas identified to require erosion control, measures may include, but not necessarily be limited to:

- use of soil ameliorants (e.g. gypsum or lime) where necessary;
- use of temporary surface water management structures (e.g. silt fences and temporary sediment traps [such as hay bales]) to control erosion and water runoff;
- brush matting to restrict resource loss and promote vegetation establishment; and
- supplementary seeding or plantings if necessary.

Any erosion control works undertaken in the offset areas will be reported annually in the Annual Review (Section 6.2).

4.3.7 Management of Grazing

Grazing and cropping activities will be excluded within the offset areas and vegetation clearance restricted.

As described in Section 4.3.1, livestock will not be permitted to graze in the offset areas and the integrity of the fencing will be regularly monitored. If at any time, stock is observed within the offset areas, the stock will be removed from the area immediately.

The concept of preventing livestock from entering areas of remnant vegetation to encourage natural regeneration is a widely accepted practice and is recommended by the Jemalong Land and Water Management Plan (JLWMPSPC, 2000) and Lake Cowal Land and Water Management Plan (Australian Water Technologies Pty Ltd, 1999) and the Draft NSW Biodiversity Strategy (Section 2.3).

4.3.8 Access Control

As described in Section 4.3.1, access to the offset areas will be restricted to authorised personnel.

The offset area fenceline will be subject to inspections and maintenance (when required).

4.3.9 Bushfire Management

The CGM implements bushfire management measures for all Barrick-owned lands which will include the offset areas in consultation with the NSW Rural Fire Service, Riverina LLS and BSC. The bushfire prevention measures and fuel management measures relevant to the offset areas are outlined below.

Bushfire prevention measures will include:

- educating employees and contractors on general fire awareness and response procedures;
- fire track and fire break maintenance;
- 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.

Appropriate fuel management strategies that may be implemented include:

- fuel management by means other than burning, including methods such as slashing, pruning, mulching or other operations (i.e. ploughing, herbicide application and rolling);
- fuel management via burning where conventional fuel management strategies are inappropriate, impractical or not successful (undertaken in consultation with relevant authorities); and
- maintaining designated fire breaks.

Any bushfire prevention or fuel management measures on Barrick-owned land will consider potential ecological impacts of the measures, and will be implemented outside the boundary of the offset areas, where practicable.

4.3.10 Biodiversity Offset Strategy Performance and Completion Criteria

Table 9 outlines the performance and completion criteria for the biodiversity offset strategy management measures relevant to short, medium and long-term timeframes of the strategy (Section 4.3). A review of the progress against the performance and completion criteria will be undertaken annually and reported in the Annual Review (Section 6.2).

**Table 9
Biodiversity Offset Strategy Performance and Completion Criteria**

Action	Pre-2015 (completed actions)	Year 1 (June 2015 to May 2016)	Year 2 (June 2016 to May 2017)	Year 3 (June 2017 to May 2018)	Medium-term (June 2018 to End 2024)	Long-term (2025 to when completion criteria are met)	Completion Criteria
Offset Area Protection (Sections 4.7 and 4.8)							
Offset Area Protection	In accordance with Development Consent Condition 3.4(b), Barrick has commenced making suitable arrangements for the long-term protection of the Offset areas. Barrick submitted a final draft of a Voluntary Planning Agreement (VPA) between Barrick and the NSW Minister for Planning to the then DP&I in January 2013.	The VPA between Barrick and the NSW Minister Planning has been lodged with prior to the end of July 2015 (unless otherwise agreed with the Secretary of the DP&E) (Section 4.7).	-	-	-	-	Offset areas are secured via VPA (or other mechanism agreed with the Secretary of the DP&E).
Offset Implementation Costs and Conservation Bond	Barrick has engaged Greening Australia to calculate an estimate of the cost to implement the offset strategy incorporated in the former ROMP. Greening Australia's cost estimate was used to inform the conservation bond amount proposed to support the draft VPA lodged with the then DP&I in January 2013.	The conservation bond has been calculated and lodged with the DP&E prior to the end of July 2015 (unless the Secretary agrees otherwise) and is to the satisfaction of the Secretary of the DP&E (Section 4.8).	-	-	-	-	The Conservation Bond has been lodged with the DP&E.

Table 9 (continued)
Biodiversity Offset Strategy Performance and Completion Criteria

Action	Pre-2015 (completed actions)	Year 1 (June 2015 to May 2016)	Year 2 (June 2016 to May 2017)	Year 3 (June 2017 to May 2018)	Medium-term (June 2018 to End 2024)	Long-term (2025 to when completion criteria are met)	Completion Criteria
Remnant Vegetation Enhancement (Section 4.3.1)							
Perimeter Fencing to exclude grazing.	Majority of offset areas have been fenced to exclude livestock grazing (with exception of the Southern Offset Area extension).	The perimeter boundary of the offset areas has been fenced.	-	-	-	-	Offset areas are fenced.
Removal of unnecessary fencing	-	Unnecessary fencing has been identified for removal.	Unnecessary fencing within the offset areas has been removed.	-	-	-	No redundant fencing remains within Offset Areas.
Signage installation and access control	-	Signage on access gates and perimeter fencing has been installed and access restricted to authorised personnel only.	Annual inspection of signage and maintenance undertaken as required.	Annual inspection of signage and maintenance undertaken as required.	Annual inspection of signage and maintenance undertaken as required.	Annual inspection of signage and maintenance undertaken as required.	Signage installed.
Erosion control (see below)	-	-	-	-	-	-	-
Weed control (see below)	-	-	-	-	-	-	-
Feral animal pest control (see below)	-	-	-	-	-	-	-
Habitat Enhancement (nest and roosting boxes)	-	Suitable locations for nest and roosting boxes have been determined and arrangements for construction of the boxes have been made.	Commence installation of nest and roosting boxes.	Inspect and maintain as required. Observations of usage have been documented in the Annual Review.	Inspect and maintain as required. Observations of usage have been documented in the Annual Review.	Inspect and maintain as required. Observations of usage have been documented in the Annual Review.	Nest and roosting boxes installed.

Table 9 (continued)
Biodiversity Offset Strategy Performance and Completion Criteria

Action	Pre-2015 (completed actions)	Year 1 (June 2015 to May 2016)	Year 2 (June 2016 to May 2017)	Year 3 (June 2017 to May 2018)	Medium-term (June 2018 to End 2024)	Long-term (2025 to when completion criteria are met)	Completion Criteria
Revegetation within Offset Enhancement Areas	-	Identify areas within Offset Enhancement Areas considered to require revegetation plantings.	Refer to Revegetation Implementation measures below.	-	-	-	-
		Develop a revegetation species list relevant to the proposed revegetation areas.	Refer to Revegetation Implementation measures below.	-	-	-	-
Use of Native Fertiliser	-	Identify requirement for use of native fertiliser in Offset Areas.	Apply native fertiliser as required to enhance/improve native vegetation regeneration.	Continue.	Continue.	Continue.	-
Southern Offset Area Extension Monitoring Site(s)	-	Location of additional monitoring site(s) within the Southern Offset Area extension have been identified.	Monitoring of additional site(s) commenced.	Continue.	Continue.	Continue.	-
Remnant Vegetation Enhancement Area Monitoring	-	-	Monitor remnant vegetation regeneration progress in accordance with offset monitoring programme and track progress against offset performance indicators and completion criteria (refer Section 4.6 and Appendix A).	Continue.	Continue.	Continue.	Refer Section 4.6 and Appendix A.

Table 9 (continued)
Biodiversity Offset Strategy Performance and Completion Criteria

Action	Pre-2015 (completed actions)	Year 1 (June 2015 to May 2016)	Year 2 (June 2016 to May 2017)	Year 3 (June 2017 to May 2018)	Medium-term (June 2018 to End 2024)	Long-term (2025 to when completion criteria are met)	Completion Criteria
Revegetation Implementation (Section 4.3.2)							
Greening Australia Seed Supply and Planting Implementation Strategy	-	Engage Greening Australia to prepare Seed Supply and Planting Implementation Strategy (refer Section 4.3.2).	Implement Strategy including any ongoing maintenance works.	Continue.	Continue.	Continue.	-
Revegetation Species	-	Develop/refine revegetation species lists for Offset Revegetation Area and for Offset Enhancement Areas.	Species list complete.	-	-	-	-
Site preparation	-	-	Commence site preparation works.	-	-	-	-
Maintenance	-	-	-	Commence maintenance measures as required based on monitoring.	Continue as required.	Continue as required.	Maintenance measures no greater than that of reference sites.

Table 9 (continued)
Biodiversity Offset Strategy Performance and Completion Criteria

Action	Pre-2015 (completed actions)	Year 1 (June 2015 to May 2016)	Year 2 (June 2016 to May 2017)	Year 3 (June 2017 to May 2018)	Medium-term (June 2018 to End 2024)	Long-term (2025 to when completion criteria are met)	Completion Criteria
Revegetation Performance Monitoring	-	-	-	<p>Monitor revegetation performance in accordance with offset monitoring programme and track progress against offset performance indicators and completion criteria (refer Section 4.6 and Appendix A).</p> <p>Based on monitoring results, implement management/contingency measures as required to improve revegetation success (e.g. installation of tree guards, supplementary planting and watering [if necessary]).</p>	Continue.	Continue.	Refer Section 4.6 and Appendix A.

Table 9 (continued)
Biodiversity Offset Strategy Performance and Completion Criteria

Action	Pre-2015 (completed actions)	Year 1 (June 2015 to May 2016)	Year 2 (June 2016 to May 2017)	Year 3 (June 2017 to May 2018)	Medium-term (June 2018 to End 2024)	Long-term (2025 to when completion criteria are met)	Completion Criteria
Salvage and Re-use of Material for Habitat Enhancement (Section 4.3.3)							
Installation of salvaged material	-	Determine suitable location(s) for salvaged material.	Commence re-location.	Continue re-location of salvaged material as required.	Continue re-location of salvaged material as required.	-	Complete.
Collection and Propagation of Seed for Revegetation Works (Section 4.3.4)							
Collection of seed during implementation of CGM's VCP.	-	-	Collect seed from relevant species from species list.	Continue.	Continue.	-	Complete.
Seed Propagation	-	-	Conduct seed propagation as per Greening Australia's Seed Supply and Planting Implementation Strategy.	Continue.	Continue.	-	Complete.
Weed Control (Section 4.3.5)							
Weed survey and mapping	The Offset areas are currently subject to annual weed survey programme and major weed species are mapped and controlled as required, with results reported in the CGM's Annual Review.	Continue annual weed survey, mapping and reporting.	Continue.	Continue.	Continue.	Continue.	Weed survey and mapping completed as required.

Table 9 (continued)
Biodiversity Offset Strategy Performance and Completion Criteria

Action	Pre-2015 (completed actions)	Year 1 (June 2015 to May 2016)	Year 2 (June 2016 to May 2017)	Year 3 (June 2017 to May 2018)	Medium-term (June 2018 to End 2024)	Long-term (2025 to when completion criteria are met)	Completion Criteria
Control of major weed occurrences	Weed control is currently undertaken in accordance with the requirements of this BOMP and the CGM's Land Management Plan.	Areas requiring weed control within the Offset Areas have been identified and control and recording measures have been undertaken in accordance with the measures described in Section 4.3.5 of this BOMP.	Continue.	Continue.	Continue.	Continue.	Major weed occurrences are controlled.
Feral Pest Control (Section 4.3.5)							
Control of Feral Animal Pests	Pest control is currently undertaken in accordance with the requirements of this BOMP and the CGM's Land Management Plan.	Continue.	Continue.	Continue.	Continue.	Continue.	Declared pests are controlled as required.
Erosion Control (Section 4.3.6)							
Inspection of Offset Areas for Presence of Major Erosion and Control of Erosion.	-	Areas requiring erosion control have been identified and control measures commenced.	Annually inspection undertaken and control measures undertaken as required.	-	-	-	Erosion controlled as required.
Management of Grazing (Section 4.3.7)							
Exclusion of Grazing	Grazing of original Offset Areas was excluded in 2010.	Install fencing around perimeter of Southern Offset Area extension to exclude livestock grazing.	Conduct regular inspections to confirm livestock absent from Offset Areas.	Continue.	Continue.	Continue.	Livestock absent from Offset Areas.

Table 9 (continued)
Biodiversity Offset Strategy Performance and Completion Criteria

Action	Pre-2015 (completed actions)	Year 1 (June 2015 to May 2016)	Year 2 (June 2016 to May 2017)	Year 3 (June 2017 to May 2018)	Medium-term (June 2018 to End 2024)	Long-term (2025 to when completion criteria are met)	Completion Criteria
Access Control (Section 4.3.8)							
Perimeter Fence and Gate Inspection and Maintenance.	Perimeter fencing of original Offset Areas was completed in 2013.	Complete installation of perimeter fencing around Southern Offset Area extension.	Conduct regular inspections of fence and gates and maintain as required.	Continue.	Continue.	Continue.	Offset Areas are fenced.
Bushfire Management (Section 4.3.9)							
Bushfire management	Bushfire prevention and fuel management measures are currently undertaken on all Barrick-owned lands including the Offset Areas, in accordance with the CGM's Land Management Plan and this BOMP.	Continue bushfire prevention and fuel management measures as required in consultation with the NSW Rural Fire Service, the Riverina LLS and the BSC.	Continue.	Continue.	Continue.	Continue.	Bushfire management is undertaken as required using ecologically appropriate methods.

4.4 INTEGRATION WITH CGM REHABILITATION PROGRAMME

As described in the CGM's Rehabilitation Management Plan (RMP), a key rehabilitation objective for the CGM includes revegetating the new landforms with selected native and/or endemic vegetation that is suited to the physiographic and hydrological features of each landform, and which expand on the areas of remnant endemic vegetation in the surrounding landscape.

Accordingly, the provisional revegetation species lists for the CGM rehabilitation programme (provided in the RMP) have been developed to include common local endemic species generally associated with remnant hill and slope vegetation communities which occur in the Southern Offset Area (and other areas in the local landscape) (e.g. Dwyer's Red Gum [*Eucalyptus dwyeri*], Black Cypress Pine [*Callitris endlicheri*] and Mugga Ironbark [*Eucalyptus sideroxylon*]). Other species characteristic of the vegetation communities within the offset areas are also included in revegetation species lists for the CGM including Grey Box (*Eucalyptus microcarpa*), Bimble Box or Poplar Box (*Eucalyptus populnea*), Wilga (*Geijera parviflora*), Western Rosewood (*Alectryon oleifolius*), Hooked Needlewood (*Hakea tephrosperma*), Spear Grass (*Austrostipa scabra* subsp. *falcata* and *scabra*) and Windmill Grass (*Chloris truncata*).

Areas of remnant vegetation on slope and hill areas within the Southern Offset Area and grassland areas within and surrounding the Southern Offset Area have been selected as a suitable reference sites against which the performance of rehabilitation of the CGM's key final landforms will be assessed (DnA Environmental, 2011).

Dwyer's Red Gum (*Eucalyptus dwyeri*), Grey Box (*Eucalyptus microcarpa*), Mugga Ironbark [*Eucalyptus sideroxylon*], Green Wattle (*Acacia deanei*), Spearwood (*Acacia doratoxylon*) and Wedge-leaf Hopbush (*Dodonaea viscosa* subsp. *cuneata*) which are typical of the vegetation communities occurring on hill and slope areas of Fellmans Hill within the Southern Offset Area have also been used in the Northern Waste Rock Emplacement Rehabilitation Trial at the CGM.

The above mentioned measures will aim to integrate rehabilitation of the CGM with the CGM's Biodiversity Offset Strategy and provide continuity between the CGM's rehabilitated final landforms and the offset areas.

4.5 OFFSET MONITORING PROGRAMME

An offset monitoring programme has been developed for the offset areas (as required by Development Consent Condition 3.4(c)(v)), and is consistent with the methodology implemented for the CGM's on-site rehabilitation programme (as described in the RMP).

The offset monitoring programme has been developed to:

- track the progress of the offset revegetation and regeneration against performance indicators and completion criteria (Section 4.6);
- to monitor the effectiveness of the short, medium and long-term measures (Section 4.3); and
- to determine the requirement for any ameliorative/contingency measures.

Monitoring will be undertaken annually during operations and for five years following mine closure. At this time, a review of the monitoring frequency will be undertaken based on the performance of the revegetation and regeneration and an appropriate monitoring frequency determined. The frequency will be determined by a suitably qualified person(s) and in consultation with the relevant regulatory authorities.

Revegetation and regeneration performance within the offset areas will be considered to be satisfactory when the monitoring data indicates the completion criteria (Section 4.6) have been met.

A summary of the results of the offset monitoring programme and any offset management works or contingency/amelioration measures undertaken will be provided in the Annual Review (Section 6.2).

4.5.1 Monitoring Methodology

The offset monitoring programme methodology has been independently developed to assess the performance of the offset areas.

The monitoring methodology includes a combination of (DnA Environmental, 2011):

- Landscape Function Analysis (LFA indicators) (which includes measurement of soil erosion type and severity);
- accredited soil analyses indicators; and
- an assessment of ecosystem characteristics using an adaptation of methodologies derived by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) *Methodology for the Grassy Box Woodlands Benchmarking Project in Southern NSW Murray-Darling Basin* (Gibbons, 2002) and the associated Biometric Model *Rapidly quantifying reference conditions in modified landscapes* (Gibbons *et al.*, 2008).

The methodology has been prepared in consideration of the former DII's (2010) draft Rehabilitation and Environmental Management Plan (REMP) Guidelines. The methodology includes qualitative and quantitative performance indicators and completion criteria developed from relevant reference sites.

DnA Environmental (2011) has prepared a report *Rehabilitation monitoring methodology and determination of completion criteria: ecosystem sustainability for the Cowal Gold Mine January 2011* which provides a detailed description of the methodology.

Aspects of the monitoring methodology will be refined to align with the methodology within the DRE's (2013) *ESG3: Mining Operations Plan (MOP) Guidelines* (MOP Guidelines) (e.g. incorporation of the updated rehabilitation phases). Once revision of the methodology is complete, this BOMP will be revised to incorporate any changes.

A summary of the monitoring methodology components is provided below.

Landscape Function Analysis

LFA is one of three components of the EFA tool developed by the CSIRO that aims to measure the progression of revegetation/rehabilitation towards a self-sustaining ecosystem.

LFA indices can be used to demonstrate that an area is on a trajectory towards a self-sustaining landscape, that is, the landscape contains processes operating to maintain the biogeochemical 'engine-room' of a landscape (Tongway and Hindley, 2004). The EFA methodology is described in detail in *Assessing Rehabilitation Success Version 1.1* (Tongway, 2001), *Landscape Function Analysis: Procedures for Monitoring and Assessing Landscapes with Special Reference to Minesites and Rangelands Version 3.1* (Tongway and Hindley, 2004), and *Landscape Function Analysis Field Procedures* (Tongway, 2008).

In accordance with the LFA methodology, the LFA monitoring results will be used to assess whether revegetation and regeneration areas are on a trajectory towards a self-sustaining landscape representative of the selected reference sites. Relevant LFA performance indicators and completion criteria are detailed in Section 4.6.

Soil Analyses

Soil samples are taken using a core sampler within a monitoring quadrat at each offset monitoring site. At least 12 cores are taken at each site and soil samples sent to a National Association of Testing Authorities accredited laboratory for analysis.

Soil samples are analysed for the following parameters: pH, electrical conductivity, available calcium, magnesium, potassium, ammonia, sulphur, organic matter, exchangeable sodium, calcium, magnesium, potassium, hydrogen, aluminium, cation exchange capacity, available and extractable phosphorus, micronutrients (zinc, manganese, iron, copper, boron) and total carbon and nitrogen. Exchangeable sodium percentages are also calculated as a measure of sodicity or dispersion.

Ecological Assessment

In addition to LFA, various biodiversity components are assessed to monitor the successional phases/changes of plant development and to identify the requirements for ameliorative measures and guide adaptive management. The rapid ecological assessment provides quantitative data that measures changes in:

- floristic diversity including species area curves and growth forms (using full floristic sampling);
- ground cover diversity and abundance (including presence and abundance of weed species);
- vegetation structure and habitat characteristics (including ground cover, cryptogams, logs, rocks, litter, projected foliage cover at various height increments);
- understorey density and growth (including established shrubs, direct seeding and tubestock plantings and tree regeneration);
- overstorey characteristics including tree density, health and survival; and
- other habitat attributes such as the presence of hollows, mistletoe and the production of buds, flowers and fruit.

Permanent transects and photo-points (as described below) have also been established to record changes in these attributes over time.

An assessment of these ecological components will be described in detail in an annual monitoring report (Section 6.1).

The monitoring methodology described above may be revised (in consultation with relevant regulatory authorities) should an alternative method be required to adequately assess revegetation or regeneration performance.

Monitoring Quadrats

The monitoring methodology components described above are undertaken within 20 m x 50 m monitoring quadrats established at each offset monitoring sites (Section 4.5.2) and reference sites (Section 4.6.1). An LFA transect is established along the 20 m downslope boundary of the quadrat. Vegetation monitoring is undertaken within 1 m x 1 m subquadrats at 5 m intervals along the 50 m transect which runs perpendicular to the LFA transect.

The transect and quadrat boundary points are marked with pegs (and flagging tape) and global positioning system details recorded at each peg to ensure the location of the quadrat and transects is consistent over time.

Permanent photopoints have been established at the monitoring quadrats to monitor the changes that occur over time. The methodology for photographic monitoring is consistent with the NSW National Parks and Wildlife Service (2003) *Conservation Management Note 9 – Photographic Monitoring*. Photos are taken annually during spring and during a similar time of day (for consistence of light conditions).

After each photographic monitoring event, the photographs will be compared to the photographs from the previous monitoring periods. The following elements will be noted:

- plant establishment;
- the status of weeds;
- natural regeneration performance; and
- presence of habitat features (e.g. logs, litter, rocks).

Current aerial photography may also be reviewed to track regeneration and/or revegetation performance over time.

Visual Monitoring

Visual monitoring will be conducted regularly to evaluate the effectiveness of the biodiversity offset strategy measures against the performance criteria and to determine the need for additional measures.

Visual monitoring will include (but not be limited to) observations of:

- the status of perimeter fencing and gates;
- incidence of erosion;
- the status of declared or perceived pest populations (including foxes, feral cats, feral goats, rabbits and feral pigs) within the offset areas;
- evidence of any unauthorised stock grazing, such as pugging or scats;
- the status of noxious and environmental weeds within the offset areas; and
- bushfire fuel loads.

Preliminary Site Inspection

A preliminary site inspection of the offset areas was undertaken by DnA Environmental and Barrick representatives in spring 2010 to determine the need for specific management measures (e.g. erosion control; control of weeds or pests; fencing removal; revegetation requirements or site preparation requirements).

Outcomes from the inspection indicated that in the Northern Offset Area, ripping prior to revegetation activities should not be undertaken due to the occurrence of potentially highly sodic soils (DnA Environmental, 2014). Ripping was identified as likely to compromise gilgais and the high species richness recorded in the Northern Offset Area, which may decrease the ecological function and high conservation significance of the Northern Offset Area (DnA Environmental, 2014).

4.5.2 Monitoring Sites

The following monitoring sites have been selected by DnA Environmental to assess revegetation and/or regeneration performance within the offset areas and are shown on Figure 10:

- Offset 01 and Offset 02 – Southern Offset Area; and
- Offset 03 and Offset 04 – Northern Offset Area.

An additional monitoring site(s) will be established in the Southern Offset Area extension (i.e. the area east of Fellmans Hill) in 2015 and will be determined by a suitably qualified person.

4.6 PERFORMANCE INDICATORS AND COMPLETION CRITERIA

Overall completion criteria for the offset areas include:

- Long-term protection of the offset areas for conservation purposes has been established.
- Woodland areas contain flora species characteristic of endemic native vegetation communities.
- The area of Myall woodland has been increased within the offset areas.
- Habitats available to flora and fauna are enhanced/improved.

To support the overall completion criteria above, DnA Environmental (2011; 2014) has developed detailed qualitative and quantitative performance indicators and completion criteria for assessing revegetation and regeneration performance within the offset areas (Table 10).

Table 10
Revegetation and/or Regeneration Performance Indicators and Completion Criteria

Stage of Ecosystem Development	Aspect or Ecosystem Component	Completion Criteria	Performance Indicators
Landform establishment and stability	Landform slope, gradient	Landform suitable for final land use and generally compatible with surrounding topography	Slope angle consistent with design
	Landform function	Landform is functional and indicative of a landscape on a trajectory towards a self-sustaining ecosystem	LFA Stability; LFA Infiltration; LFA Nutrient Cycling; and LFA Landscape Organisation
	Action erosion	Areas of active erosion are limited	Number of rills/gullies; cross-sectional area of rills Presence/absence of sheet erosion
Growth medium development	Soil chemical and physical properties and amelioration	Soil properties are suitable for the establishment and maintenance of selected vegetation species	pH; Electrical Conductivity; Organic Matter; Phosphorus; Nitrate; Cation Exchange Capacity; and Exchangeable Sodium Percentage
Ecosystem establishment	Vegetation diversity	Vegetation contains a diversity of species comparable to that of the local remnant vegetation	Diversity of shrubs and juvenile trees; total species richness; native species richness; exotic species richness
	Vegetation density	Vegetation contains a density of species comparable to that of the local remnant vegetation	Density of shrubs and juvenile trees
	Ecosystem composition	The vegetation is comprised by a range of growth forms comparable to that of the local remnant vegetation	Trees; shrubs; sub-shrubs; herbs; grasses; reeds; ferns; aquatic



Table 10 (continued)
Revegetation and/or Regeneration Performance Indicators and Completion Criteria

Stage of Ecosystem Development	Aspect or Ecosystem Component	Completion Criteria	Performance Indicators
Ecosystem development and habitat complexity	Protective ground cover	Ground layer contains protective ground cover and habitat structure comparable to that of the local remnant vegetation	Litter cover; annual plants; cryptogam cover; rock; log; bare ground; perennial plant cover (< 0.5 m); total ground cover
	Ground cover diversity	Vegetation contains a diversity of species per square metre comparable to that of the local remnant vegetation	Native understorey abundance; exotic understorey abundance
		Native ground cover abundance is comparable to that of the local remnant vegetation	Percent ground cover provided by native vegetation <0.5 m tall
	Ecosystem growth and natural recruitment	The vegetation is maturing and/or natural recruitment is occurring at rates similar to those of the local remnant vegetation	Shrubs and juvenile trees 0-0.5 m in height; Shrubs and juvenile trees 0.5-1 m in height; Shrubs and juvenile trees 1-1.5 m in height; Shrubs and juvenile trees 1.5-2 m in height; Shrubs and juvenile trees >2.0 m in height
Ecosystem stability	Ecosystem structure	The vegetation is developing in structure and complexity comparable to that of the local remnant vegetation	Foliage cover 0.5-2 m; foliage cover 2-4 m; foliage cover 4-6 m; foliage cover >6 m
	Tree diversity	Vegetation contains a diversity of maturing tree and shrub species comparable to that of the local remnant vegetation	Tree diversity
	Tree density	Vegetation contains a density of maturing tree and shrub species comparable to that of the local remnant vegetation	Tree/shrub density; average diameter at breast height
	Ecosystem health	The vegetation is in a condition comparable to that of the local remnant vegetation	Live trees; healthy trees; medium health; advanced dieback; dead trees; mistletoe; flowers/fruit (trees)

After: DnA Environmental (2014).

The indicator and criteria set has been based on the five major stages of ecosystem development consistent with the former DII's (2010) *Rehabilitation and Environmental Management Plan (REMP) Guidelines Consultation Draft V2.0 June 2010* (draft REMF Guidelines).

The five 'stages of ecosystem development' as described in the draft REMF Guidelines (DII, 2010) have since been revised by the DRE to include six 'rehabilitation phases'. Barrick proposes to revise the structure of its performance indicators and completion criteria set (Table 10) to align with and reflect the rehabilitation phases as defined in the DRE's (2013) MOP Guidelines. This BOMP will be revised to incorporate the revised indicator and criteria set, once complete.

Monitoring results from the selected reference sites have been used to develop quantitative performance indicator and completion criteria values against which monitoring data from offset monitoring sites will be compared. These quantitative performance indicators and completion criteria are detailed in Appendix A.

In developing the set of indicators and completion criteria, DnA Environmental has identified Completion Performance Indicators and Desirable Performance Indicators. Completion Performance Indicators are the completion criteria required to be met. Desirable Performance Indicators are not considered fundamental in achieving offset objectives (and are unlikely to impact meeting completion criteria), however provide an indication of desirable ranges. For example, monitoring results may not yet fall within reference site ranges but may be within desirable levels.

It is also important to note that the criteria against which monitoring sites are assessed against will be dynamic throughout time, to best represent seasonal and climatic conditions. The biodiversity offset strategy will be considered complete when the monitoring data indicates the completion criteria have been met.

4.6.1 Reference Sites

Reference sites have been selected representative of the objectives for the offset areas (Section 4.2):

- Offset Revegetation Area - establish native vegetation characteristic of a Eucalypt woodland in cleared agricultural land; and
- Offset Enhancement Areas - enhance flora/and fauna habitats within the offset areas, including increasing the area of Myall woodland through regeneration and revegetation.

Reference sites RHill 02, RHill 03 and RHill 06 (Figure 10) are relevant to the Offset Revegetation Area and the remnant vegetated hill areas of the Enhancement Area within the Southern Offset Area (DnA Environmental, 2014). These sites are representative woodlands occurring on low ridges, hills and elevated land (DnA Environmental, 2014). These communities are dominated by Dwyer's Red Gum (*Eucalyptus dwyeri*), Spearwood (*Acacia doratoxylon*), Black Cypress Pine (*Callitris endlicheri*) and Mugga Ironbark (*Eucalyptus sideroxylon*) on the rockier ridge tops and intergrade with Bimble Box or Poplar Box (*Eucalyptus populnea*), Grey Box (*Eucalyptus microcarpa*), and White Cypress Pine (*Callitris glaucophylla*) woodlands on the lower parts of the slope (DnA Environmental, 2014).

Reference sites RSlope 01 and RSlope 02 (Figure 10) are relevant to the Offset Enhancement Area within the Northern Offset Area and are representative of Weeping Myall (*Acacia pendula*) Belah (*Casuarina cristata*) woodlands occurring on flat to gently undulating slopes (DnA Environmental, 2014).

A detailed description of the offset area reference sites is provided in Table 11.

Table 11
Description of Offset Area Reference Sites

Reference Site ¹	Description
RHill 02	This site is located on the western side of Fellmans Hill at the transition from bushland to grassland. The site has a small stand of <i>Eucalyptus sideroxylon</i> at one end and with the remainder being open grassland with some scattered shrubs. <i>Austrostipa scabra</i> is dominant within the understorey with some bare crusted soil between the tussocks. The extent of the bare patches is declining and the shrubs have grown as the site recovers from heavy grazing pressure. In 2013 the shrubs have continued to grow and despite the prolonged dry it continued to have a good cover of a diverse range of native grasses and forbs.
RHill 03	This site is located on the north west side of Fellmans Hill north of the Southern Offset Area. It is open woodland dominated by <i>E. dwyeri</i> and <i>Acacia doratoxylon</i> . The understorey is dominated by <i>Austrostipa densiflora</i> and <i>Gonocarpus elatus</i> but in good seasons it may contain a range of native wildflowers. The site has not been grazed since 2004 with scattered grass tussocks and a lot of leaf litter covering the ground but has shown signs of extreme stress as a result of the continuing drought up until 2010. While species diversity improved in 2010, the sites were very dry and low in diversity in 2011 and 2012 but there were some <i>A. doratoxylon</i> seedlings. Kangaroos continued to create a lot of disturbance and combined with the dry conditions species diversity was very low.
RHill 06	This site is located within Grey Box woodland on the Travelling Stock Route along Blow Clear Road, immediately west of Spring Creek and the Clear Ridge Road intersection. First established in 2013 as a reference site, it is open woodland with scattered mature <i>E. microcarpa</i> , <i>Callitris glaucophylla</i> and <i>Geijera parviflora</i> which are in variable health. There is scattered but sparse shrub cover which is dominated by <i>Senna artemisioides</i> along with some <i>Callitris glaucophylla</i> regeneration. The site has an excellent diversity of native grasses with 15 different species identified in 2013. The site has been grazed sporadically by travelling stock.

Table 11 (continued)
Description of Offset Area Reference Sites

Reference Site ¹	Description
RSlope 01	Regrowth <i>A. pendula</i> woodland situated amongst some gilgais depressions on a section of the Travelling Stock Route south of ML 1535. The understorey is variable with patches of bare compacted soil, and tall scattered tussocks of <i>Austrostipa blackii</i> . <i>Atriplex semibaccata</i> , <i>Enchylaena tomentosa</i> and <i>Einadia nutans</i> were dominant, but <i>Rhodanthe corymbifolia</i> and <i>Ptilotus exaltatus</i> were common. There were stockcamps beneath the trees and the site is grazed intermittently by travelling stock. In 2011 the site was drier and lower in plant diversity. The dry conditions have persisted into 2013 and combined with increased grazing pressure by macropods the site was lower in plant diversity.
RSlope 02	This site is situated within the Wilga woodland area on ML 1535 and has been fenced off since 2004. The site is open regrowth woodland dominated by various age classes of <i>Casuarina cristata</i> and <i>A. pendula</i> , including one old growth <i>C. cristata</i> tree and some scattered <i>A. pendula</i> regeneration. Water filled gilgais are common and these are dominated by <i>Lachnagrostis filiformis</i> and <i>Eleocharis</i> species. There are bare patches surrounding the <i>A. pendula</i> saplings and various chenopods are beginning to colonise beneath the <i>C. cristata</i> trees. In 2011 the site was drier and lower in plant diversity. The dry conditions have persisted into 2013 and combined with increased grazing pressure by macropods the site was lower in plant diversity.

¹ Figure 10

Source: DnA Environmental (2014).

4.7 LONG-TERM PROTECTION

In accordance with Development Consent Condition 3.4(b), Barrick has made arrangements to provide appropriate long-term protection for the offset areas to the satisfaction of the Secretary of the DP&E. A Voluntary Planning Agreement (VPA) is being established between Barrick (Cowal) Pty Ltd and the Minister for Planning for providing long-term protection of the CGM's offset areas. Drafts of the relevant VPA documents were submitted to the then DP&I for review in January 2013. As required by Condition 3.4(b), Barrick will finalise the VPA with the DP&E prior to the end of July 2015 (unless otherwise agreed with the Secretary).

4.8 CONSERVATION BOND

As required by Development Consent Condition 3.4(d), Barrick will lodge a conservation bond with the DP&E by the end of July 2015 to ensure the biodiversity offset strategy is implemented in accordance with the performance indicators and completion criteria.

The sum of the bond will be determined by:

- a) calculating the full cost of implementing the biodiversity offset strategy (other than land acquisition costs); and
- b) employing a suitably qualified quantity surveyor to verify the calculated costs, to the satisfaction of the Secretary of the DP&E.

The calculation of the conservation bond will be submitted to the DP&E for approval at least one month prior to lodgement of the bond (i.e. by the end of June 2015).

If the biodiversity offset strategy is completed generally in accordance with the completion criteria in this BOMP to the satisfaction of the Secretary of the DP&E, the Secretary will release the bond.

If the biodiversity offset strategy is not completed generally in accordance with the completion criteria in this BOMP, the Secretary of the DP&E will call in all, or part of, the conservation bond, and arrange for completion of the relevant works.

5 POTENTIAL RISKS AND RISK TREATMENT/CONTINGENCY MEASURES

The following key threats have been identified as having the potential to restrict achievement of the completion criteria and successful implementation of the biodiversity offset strategy:

- unplanned fires;
- access to seed supply for revegetation;
- deep-ripping of ground surface prior to revegetation within the Northern Offset Area resulting in disturbance of highly sodic soils;
- livestock entry resulting in damage to revegetation plantings;
- weed and/or pest infestation;
- drought resulting in revegetation failure;
- unauthorised access and clearing; and
- failure of non-local seed.

The management measures detailed in Section 4.3 will be implemented where necessary to mitigate the impacts of these threats as much as possible.

These threats will most likely have an impact on revegetation seed supply and survival rates of planted tubestock. Contingency measures to address this key threat are outlined below.

Limited Revegetation Seed Supply

Should seed numbers be insufficient for growing suitable seed stock, the following contingency measures may be considered in consultation with the OEH:

- Deferment of planting to the subsequent year.
- Sourcing of alternative locally occurring plants that meet structural requirements of the ecosystems into which they are to be planted (e.g. an alternative subdominant eucalypt). However, substitution of key species is not deemed acceptable.
- Sourcing of specified species from outside of the local area and surrounds (i.e. elsewhere in the region). Such seed is to be sourced from similar listed vegetation communities and areas with similar rainfall/temperature gradients to the offset areas.

Broadscale Plant Losses within Offset Revegetation Area

Should planted tubestock numbers be insufficient to meet completion criteria, the following contingency measures may be considered in consultation with the OEH:

- replacement planting within the subsequent year; and
- amendment to planting specifications.

These risks/threats will be addressed in Greening Australia's seed supply and planting implementation strategy (Section 4.3.2).

6 REPORTING AND REVIEW

6.1 OFFSET MONITORING REPORT

Barrick will continue to engage independent rehabilitation specialists to conduct the annual offset monitoring programme in accordance with this BOMP and to prepare an annual report detailing the results of the offset monitoring programme. The annual monitoring report will include (but not be limited to):

- an overview of the monitoring programme methodology;
- a detailed description of the monitoring results for the offset areas;
- a comparison of the monitoring results against the revegetation and regeneration performance indicators and completion criteria;
- a discussion of any trends in the monitoring data; and
- any recommendations to improve performance and any remedial or contingency measures required.

Barrick's Environmental Manager (or delegate) will be responsible for:

- tracking revegetation and/or regeneration progress against performance indicators and completion criteria;
- assessing the suitability of the planting specifications;
- evaluating the effectiveness of the offset management measures; and
- identifying the requirement for intervention or contingency measures.

The annual monitoring report will also be used to inform the CGM's external reporting and review requirements including:

- the Annual Review reporting requirements;
- the IEA process;
- the IMP inspection, review and reporting process; and
- the CEMCC community consultation process.

These processes are described in more detail in Sections 6.2 to 6.4 below and Section 7. The review requirements for this BOMP are outlined in Section 6.5.

6.2 ANNUAL REVIEW

An Annual Review will be prepared in accordance with the requirements of Consent Condition 9.1 and will be submitted to the Secretary of the DP&E by the end of July each year, or as otherwise agreed with the Secretary. Development Consent Condition 9.1 is reproduced below:

9.1 Environmental Management

b) Annual Review

By the end of July each year, or as otherwise agreed with the Secretary, the Applicant shall review the environmental performance of the development to the satisfaction of the Secretary. This review must:

- (i) describe the development that was carried out in the previous calendar year, and the development that is proposed to be carried out over the next year;*
- (ii) include a comprehensive review of the monitoring results and complaints records of the development over the previous calendar year, which includes a comparison of these results against the:

 - *the relevant statutory requirements, limits or performance measures/criteria;*
 - *the monitoring results of previous years; and*
 - *the relevant predictions in the EIS;**
- (iii) identify any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance;*
- (iv) identify any trends in the monitoring data over the life of the development,*
- (v) identify any discrepancies between the predicted and actual impacts of the development, and analyse the potential cause of any significant discrepancies; and*
- (vi) describe what measures will be implemented over the next year to improve the environmental performance of the development.*

The Annual Review will report on the following aspects relevant to this BOMP:

- biodiversity offset strategy works conducted during the previous calendar year and the works proposed for the next reporting period;
- results of offset monitoring programme and discussion of progress against performance indicators and completion criteria;
- any maintenance or contingency measures implemented during the previous calendar year to remediate poor revegetation and/or regeneration within the offset areas and recommended changes to techniques based on monitoring results; and
- any trends occurring and the effectiveness of the offset management measures.

In accordance with Development Consent Condition 9.4(a)(vii), the Annual Review will be made publicly available on Barrick's website.

6.3 INDEPENDENT ENVIRONMENTAL AUDIT

An IEA will be conducted in accordance with Development Consent Condition 9.2(a) and may include offset related issues. Condition 9.2(a) is reproduced below.

9.2 *Independent Auditing and Review*

(a) Independent Environmental Audit

- (i) By the end of July 2016, and every 3 years thereafter, unless the Secretary directs otherwise, the Applicant shall commission and pay the full cost of an Independent Environmental Audit of the development. This audit must:

 - *Be conducted by a suitably qualified, experienced and independent team of experts whose appointment has been endorsed by the Secretary;*
 - *Include consultation with relevant regulatory agencies, BSC and CEMCC;**

- *Assess the environmental performance of the development and assess whether it is complying with the requirements in this consent and any other relevant approvals (such as environment protection licences and/or mining lease (including any assessment, plan or program required under this consent));*
- *Review the adequacy of any approved strategy, plan or program required under this consent or the abovementioned approvals; and*
- *Recommend measures or actions to improve the environmental performance of the development, and/or strategy, plan or program required under this consent.*

Note: This audit team must be led by a suitably qualified auditor, and include ecology and rehabilitation experts, and any other fields specified by the Secretary.

- (ii) *Within 3 months of commissioning this audit, or as otherwise agreed by the Secretary, the Applicant shall submit a copy of the audit report to the Secretary, together with its response to any recommendations contained in the audit report, and a timetable for the implementation of these recommendations as required. The applicant must implement these recommendations, to the satisfaction of the Secretary.*

In accordance with the recommendations from the IMP's *Third Annual Report of the Independent Monitoring Panel for the Cowal Gold Project (October 2007)*, Barrick will continue to conduct IEA's annually, instead of triennially as defined in Condition 9.2(a)(i).

6.4 INDEPENDENT MONITORING PANEL

An IMP has been established in accordance with Development Consent Condition 9.2(b) to review the IEA's (Section 6.3), Annual Reviews (Section 6.2) and all environmental monitoring procedures (including offset monitoring results). Development Consent Condition 9.2(b) is reproduced below:

9.2 Independent Auditing and Review

(b) Independent Monitoring Panel

- (i) *The Applicant shall at its own cost establish an Independent Monitoring Panel prior to commencement of construction. The Applicant shall contribute \$30,000 per annum for the functioning of the Panel, unless otherwise agreed by the Secretary. The annual payment shall be indexed according to the Consumer Price Index (CPI) at the time of payment. The first payment shall be paid by the date of commencement of construction and annually thereafter. Selection of the Panel representatives shall be agreed by the Secretary in consultation with relevant government agencies and the CEMCC. The Panel shall at least comprise two duly qualified independent environmental scientists and a representative of the Secretary.*
- (ii) *The panel shall:*
- *provide an overview of the annual reviews and independent audits required by conditions 9.1(b) and 9.2(a) above;*
 - *regularly review all environmental monitoring procedures undertaken by the Applicant, and monitoring results; and*
 - *provide an Annual State of the Environment Report for Lake Cowal with particular reference to the on-going interaction between the mine and the Lake and any requirements of the Secretary. The first report shall be prepared one year after commencement of construction. The report shall be prepared annually thereafter unless otherwise directed by the Secretary and made publicly available on the Applicant's website for the development within two weeks of the report's completion.*

6.5 REVIEW OF THIS BOMP

In accordance with the requirements of Condition 9.1(c) of the Development Consent, this BOMP will be reviewed within three months of the submission of:

- an Annual Review under Condition 9.1(b);
- an incident report under Condition 9.3(a);
- an audit under Condition 9.2(a);
- an Annual State of the Environment Report (prepared by the IMP) under Condition 9.2(b);
- the approval of any modification to the conditions of the Development Consent; or
- any direction of the Secretary under Condition 1.1(c).

Where this review leads to revisions of the BOMP, then within four weeks of the review, the revised BOMP will be submitted for the approval of the Secretary of the DP&E (unless otherwise agreed with the Secretary). The revision status of this BOMP is indicated on the title page of each copy.

This BOMP (and all other CGM environmental management plans required under the Development Consent) will be made publicly available on Barrick's website (www.barrick.com), in accordance with Condition 9.4(a)(iii) of the Development Consent. A hard copy of the BOMP will also be kept at the CGM.

7 COMMUNITY CONSULTATION

7.1 COMMUNITY ENVIRONMENTAL MONITORING AND CONSULTATIVE COMMITTEE

A CEMCC has been established for the CGM in accordance with Development Consent Condition 9.1 (d). Development Consent Condition 9.1 (d) is reproduced below.

9.1 Environmental Management

(d) Community Environmental Monitoring and Consultative Committee

(i) *The Applicant shall establish and operate a Community Environmental Monitoring and Consultative Committee (CEMCC) for the development to the satisfaction of the Secretary. This CEMCC must:*

- *be comprised of an independent chair and at least 2 representatives of the Applicant, 1 representative of BSC, 1 representative of the Lake Cowal Environmental Trust (but not a Trust representative of the Applicant), 4 community representatives (including one member of the Lake Cowal Landholders Association);*
- *be operated in general accordance with the Guidelines for Establishing and Operating Community Consultative Committees for Mining Projects (Department of Planning, 2007, or its latest version).*
- *monitor compliance with conditions of this consent and other matters relevant to the operation of the mine during the term of the consent.*

Note: The CEMCC is an advisory committee. The Department and other relevant agencies are responsible for ensuring that the Applicant complies with this consent.

(ii) *The Applicant shall establish a trust fund to be managed by the Chair of the CEMCC to facilitate the functioning of the CEMCC, and pay \$2000 per annum to the fund for the duration of gold processing operations. The annual payment shall be indexed according to the Consumer Price Index (CPI) at the time of payment. The first payment shall be made by the date of the first Committee meeting. The Applicant shall also contribute to the Trust Fund reasonable funds for payment of the independent Chairperson, to the satisfaction of the Secretary.*

As required, the CEMCC is comprised of:

- four community representatives (including one member of the Lake Cowal Landholders Association);
- one representative of the Lake Cowal Foundation;
- one representative of the Wiradjuri Condobolin Corporation;
- one representative of the BSC;
- an independent chairperson; and
- two representatives of Barrick.

The CEMCC will continue to provide opportunities for members of the community to attend CEMCC meetings to discuss specific issues relevant to them. This will be achieved by landholders making a request to the CEMCC regarding a particular issue, or by the landowner registering a complaint in the complaints register. Landowners who register complaints may be invited to join in discussion of the issue at the next CEMCC meeting.

8 REFERENCES

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9 LIST OF ABBREVIATIONS AND ACRONYMS

AHD	Australian Height Datum
AMBS	Australian Museum Business Services
AWS	Automatic Weather Station
Barrick	Barrick (Cowal) Pty Ltd
BoM	Commonwealth Bureau of Meteorology
BOMP	Biodiversity Offset Management Plan
BSC	Bland Shire Council
CEMCC	Community Environmental Monitoring and Consultative Committee
CGM	Cowal Gold Mine
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DA	Development Application
DEC	NSW Department of Environment and Conservation (former)
DECCW	NSW Department of Environment, Climate Change and Water (former)
DEWHA	Commonwealth Department of the Environment, Water, Heritage and the Arts
DII	NSW Department of Industry and Investment (former)
DP	Deposited Plan
DP&E	NSW Department of Planning and Environment
DP&I	NSW Department of Planning and Infrastructure (former)
DPI	NSW Department of Primary Industries
DRE	Division of Resources and Energy within the NSW Department of Trade and Investment, Regional Infrastructure and Services
EA	Environmental Assessment
EEC	endangered ecological community
EFA	Ecosystem Function Analysis
EIS	<i>Cowal Gold Project Environmental Impact Statement (North Limited, 1998)</i>
EP&A Act	<i>NSW Environment Planning & Assessment Act, 1979</i>
EPA	Environment Protection Authority

EPBC Act	Commonwealth <i>Environment Protection and Biodiversity Conservation Act, 1999</i>
FFMP	Flora and Fauna Management Plan
ha	hectare
IEA	Independent Environmental Audit
IMP	Independent Monitoring Panel
JLWMPSPC	Jemalong Land and Water Management Plan Steering Plan Committee
km	kilometre
LCMA	Lachlan Catchment Management Authority
LFA	Landscape Function Analysis
LLS	Local Land Services
LMP	Land Management Plan
m	metre
mm	millimetre
ML	Mining Lease
MOP	Mining Operations Plan
NOW	NSW Office of Water
NSW	New South Wales
OEH	NSW Office of Environment and Heritage
REMP	Rehabilitation and Environmental Management Plan
RMP	Rehabilitation Management Plan
ROMP	Rehabilitation and Offset Management Plan
RVEP	Remnant Vegetation Enhancement Programme
sp.	species
TSC Act	NSW <i>Threatened Species Conservation Act, 1995</i>
VCP	Vegetation Clearance Protocol
VPA	Voluntary Planning Agreement
°C	degrees Celsius

< less than
> more than
% percent

APPENDIX A
QUANTITATIVE PERFORMANCE INDICATORS AND COMPLETION CRITERIA

Appendix A Performance Indicators and Completion Criteria

Hierarchy of Ecosystem Succession	Aspect or Ecosystem Component	Completion Criteria	Performance Indicators	Completion Performance Indicators Description	Desirable Performance Indicators Description	Unit of Measurement	Hill Ecosystem Range 2013		Slopes Ecosystem Range 2013	
							Lower	Upper	Lower	Upper
<i>Performance indicators are quantified by the range of values obtained from replicated reference sites</i>										
Phase 2: Landform establishment and stability	Landform slope, gradient	Landform suitable for final land use and generally compatible with surrounding topography	Slope		Landform is generally compatible within the context of the local topography.	< Degrees (18°)	2	7	1	4
	Landform function	Landform is functional and performing as it was designed to do	LFA Stability	Based on key physical, biological and chemical characteristics the LFA stability index provides an indication of the sites stability and that it is comparable to or trending towards that of the local remnant vegetation		%	64.1	73.0	60.5	71.0
			LFA Infiltration	Based on key physical, biological and chemical characteristics the LFA infiltration index provides an indication of the sites infiltration capacity and that it is comparable to or trending towards that of the local remnant vegetation		%	40.3	50.8	36.4	39.5
			LFA Nutrient recycling	Based on key physical, biological and chemical characteristics the LFA nutrient recycling index provides an indication of the sites ability to recycle nutrient and that it is comparable to or trending towards that of the local remnant vegetation		%	41.8	46.5	34.6	39.5
			LFA Landscape organisation	The Landscape Organisation Index provides a measure of the ability of the site to retain resources and that it is comparable to that of the local remnant vegetation		%	92	100	58.0	100.0
	Active erosion	Areas of active erosion are limited	No. Rills/Gullies	Provides an assessment of the number of gullies or rills occurring in a 50m transect and that these are limited and stabilising		No.	0	0	0	0
			Cross-sectional area of rills		Provides an assessment of the extent of soil loss due to gully and rill erosion and that it is limited and/or is stabilising	m ²	0	0	0	0

**Appendix A
Performance Indicators and Completion Criteria (Continued)**

Hierarchy of Ecosystem Succession	Aspect or Ecosystem Component	Completion Criteria	Performance Indicators	Completion Performance Indicators Description	Desirable Performance Indicators Description	Unit of Measurement	Hill Ecosystem Range 2013		Slopes Ecosystem Range 2013	
							Lower	Upper	Lower	Upper
<i>Performance indicators are quantified by the range of values obtained from replicated reference sites</i>										
Phase 3: Growth medium development	Soil chemical, physical properties and amelioration	Soil properties are suitable for the establishment and maintenance of selected vegetation species	pH	pH is typical of that of the surrounding landscape or falls within desirable ranges provided by the agricultural industry		pH (5.6 - 7.3)	4.4	5.7	7.75	8.34
			EC		Electrical Conductivity is typical of that of the surrounding landscape or fall within desirable ranges provided by the agricultural industry	< dS/m (<0.150)	0.039	0.079	0.281	0.518
			Organic Matter	Organic Carbon levels are typical of that of the surrounding landscape, increasing or fall within desirable ranges provided by the agricultural industry		% (>4.5)	3.7	12.1	2.2	2.8
			Phosphorous		Available Phosphorus is typical of that of the surrounding landscape or fall within desirable ranges provided by the agricultural industry	ppm (50)	13.4	18.9	10.5	11.8
			Nitrate	Nitrate levels are typical of that of the surrounding landscape or fall within desirable ranges provided by the agricultural industry		ppm (>12.5)	1.4	4.2	1.6	2.0
			CEC		Cation Exchange Capacity is typical of that of the surrounding landscape or fall within desirable ranges provided by the agricultural industry	Cmol+/kg (>14)	7.3	10.8	33.2	34.6
			ESP		Exchangeable Sodium Percentage (a measure of sodicity) is typical of that of the surrounding landscape or fall within desirable ranges provided by the agricultural industry	% (<5)	1.0	7.2	3.4	11.1

**Appendix A
Performance Indicators and Completion Criteria (Continued)**

Hierarchy of Ecosystem Succession	Aspect or Ecosystem Component	Completion Criteria	Performance Indicators	Completion Performance Indicators Description	Desirable Performance Indicators Description	Unit of Measurement	Hill Ecosystem Range 2013		Slopes Ecosystem Range 2013	
							Lower	Upper	Lower	Upper
<i>Performance indicators are quantified by the range of values obtained from replicated reference sites</i>										
Phase 4: Ecosystem and Landuse Establishment	Vegetation diversity	Vegetation contains a diversity of species comparable to that of the local remnant vegetation	Diversity of shrubs and juvenile trees	The diversity of shrubs and juvenile trees with a stem diameter < 5cm is comparable to that of the local remnant vegetation		species/area	2	4	2	3
				The percentage of shrubs and juvenile trees with a stem diameter < 5cm dbh which are local endemic species and these percentages are comparable to the local remnant vegetation		% population	100	100	97	100
			Total species richness		The total number of live plant species provides an indication of the floristic diversity of the site and is comparable to the local remnant vegetation	No./area	9	53	30	34
			Native species richness		The total number of live native plant species provides an indication of the native plant diversity of the site and that it is greater than or comparable to the local remnant vegetation	>No./area	8	43	26	29
			Exotic species richness	The total number of live exotic plant species provides an indication of the exotic plant diversity of the site and that it is less than or comparable to the local remnant vegetation		<No./area	1	10	4	5
			Density of shrubs and juvenile trees	The density of shrubs or juvenile trees with a stem diameter < 5cm is comparable to that of the local remnant vegetation		No./area	35	70	34	60
	Ecosystem composition	The vegetation is comprised by a range of growth forms comparable to that of the local remnant vegetation	Trees	The number of tree species regardless of age comprising the vegetation community is comparable to that of the local remnant vegetation		No./area	2	4	0	2
			Shrubs	The number of shrub species regardless of age comprising the vegetation community is comparable to that of the local remnant vegetation		No./area	2	2	1	2

Appendix A
Performance Indicators and Completion Criteria (Continued)

Hierarchy of Ecosystem Succession	Aspect or Ecosystem Component	Completion Criteria	Performance Indicators	Completion Performance Indicators Description	Desirable Performance Indicators Description	Unit of Measurement	Hill Ecosystem Range 2013		Slopes Ecosystem Range 2013	
<i>Performance indicators are quantified by the range of values obtained from replicated reference sites</i>							Lower	Upper	Lower	Upper
Phase 4: Ecosystem and Landuse Establishment (Cont.)	Ecosystem composition (Cont.)		Sub-shrubs		The number of sub-shrub species comprising the vegetation community is comparable to that of the local remnant vegetation	No./area	0	7	6	7
			Herbs	The number of herbs or forb species comprising the vegetation community is comparable to that of the local remnant vegetation		No./area	3	23	11	16
			Grasses		The number of grass species comprising the vegetation community is comparable to that of the local remnant vegetation	No./area	2	17	7	8
			Reeds		The number of reed, sedge or rush species comprising the vegetation community is comparable to that of the local remnant vegetation	No./area	0	2	1	2
			Ferns		The number of ferns comprising the vegetation community is comparable to that of the local remnant vegetation	No./area	0	0	0	1
			Aquatic		The number of aquatic plants comprising the vegetation community is comparable to that of the local remnant vegetation	No./area	0	0	0	0
Phase 5: Ecosystem and Landuse Development	Protective ground cover	Ground layer contains protective ground cover and habitat structure comparable with the local remnant vegetation	Litter cover		Percent ground cover provided by dead plant material is comparable to that of the local remnant vegetation.	%	64	79	55	73
			Annual plants		Percent ground cover provided by live annual plants is comparable to that of the local remnant vegetation	<%	0	6	0	1

Appendix A
Performance Indicators and Completion Criteria (Continued)

Hierarchy of Ecosystem Succession	Aspect or Ecosystem Component	Completion Criteria	Performance Indicators	Completion Performance Indicators Description	Desirable Performance Indicators Description	Unit of Measurement	Hill Ecosystem Range 2013		Slopes Ecosystem Range 2013	
							Lower	Upper	Lower	Upper
<i>Performance indicators are quantified by the range of values obtained from replicated reference sites</i>										
Phase 5: Ecosystem and Landuse Development (Cont.)	Protective ground cover (Cont.)		Cryptogam cover		Percent ground cover provided by cryptogams (e.g. mosses, lichens) is comparable to that of the local remnant vegetation	%	3	11	7	10
			Rock		Percent ground cover provided by stones or rocks (> 5cm diameter) is comparable to that of the local remnant vegetation	%	0	3	0	1
			Log		Percent ground cover provided by fallen branches and logs (>5cm) is comparable to that of the local remnant vegetation	%	2	6	0	2
			Bare ground		Percentage of bare ground is less than or comparable to that of the local remnant vegetation	< %	3	8	4	17
			Perennial plant cover (< 0.5m)		Percent ground cover provided by live perennial vegetation (less than 50cm in height) is comparable to that of the local remnant vegetation	%	3	23	14	19
			Total Ground Cover		Total groundcover is the sum of protective ground cover components (as described above) and that it is comparable to that of the local remnant vegetation	%	92	97	84	97
		Ground cover diversity	Vegetation contains a diversity of species per square meter comparable to that of the local remnant vegetation	Native understorey abundance		The abundance of native species per square metre averaged across the site provides an indication of the heterogeneity of the site and that it is has more than or an equal number of native species as the local remnant vegetation	> species/m ²	1.6	7.2	3.8

**Appendix A
Performance Indicators and Completion Criteria (Continued)**

Hierarchy of Ecosystem Succession	Aspect or Ecosystem Component	Completion Criteria	Performance Indicators	Completion Performance Indicators Description	Desirable Performance Indicators Description	Unit of Measurement	Hill Ecosystem Range 2013		Slopes Ecosystem Range 2013	
							Lower	Upper	Lower	Upper
<i>Performance indicators are quantified by the range of values obtained from replicated reference sites</i>										
Phase 5: Ecosystem and Landuse Development (Cont.)	Ground cover diversity (Cont.)		Exotic understorey abundance		The abundance of exotic species per square metre averaged across the site provides an indication of the heterogeneity of the site and that it has less than or an equal number of exotic species as the local remnant vegetation	< species/m ²	0.2	0.4	0.2	0.4
	Native ground cover abundance	Native ground cover abundance is comparable to that of the local remnant vegetation	Percent ground cover provided by native vegetation <0.5m tall	The percent ground cover abundance of native species (<0.5m) as a result of summing the total Braun-blanket scores compared to exotic species is comparable to that of the local remnant vegetation		%	93.8	97.2	92.9	97.6
	Ecosystem growth and natural recruitment	The vegetation is maturing and/or natural recruitment is occurring at rates similar to those of the local remnant vegetation	shrubs and juvenile trees 0 - 0.5m in height	The number of shrubs or juvenile trees less than 0.5m in height provides an indication of establishment success and/or natural ecosystem recruitment and that it is comparable to that of the local remnant vegetation		No./area	2	17	6	11
			shrubs and juvenile trees 0.5 - 1m in height		The number of shrubs or juvenile trees 0.5-1m in height provides an indication of establishment success, growth and/or natural ecosystem recruitment and that it is comparable to that of the local remnant vegetation	No./area	2	22	5	12
			shrubs and juvenile trees 1 - 1.5m in height		The number of shrubs or juvenile trees 1-1.5m in height provides an indication of establishment success, growth and/or natural ecosystem recruitment and that it is comparable to that of the local remnant vegetation	No./area	1	6	5	9

**Appendix A
Performance Indicators and Completion Criteria (Continued)**

Hierarchy of Ecosystem Succession	Aspect or Ecosystem Component	Completion Criteria	Performance Indicators	Completion Performance Indicators Description	Desirable Performance Indicators Description	Unit of Measurement	Hill Ecosystem Range 2013		Slopes Ecosystem Range 2013	
							Lower	Upper	Lower	Upper
<i>Performance indicators are quantified by the range of values obtained from replicated reference sites</i>										
Phase 5: Ecosystem and Landuse Development (Cont.)	Ecosystem growth and natural recruitment (Cont.)		shrubs and juvenile trees 1.5 - 2m in height	The number of shrubs or juvenile trees 1.5-2m in height provides an indication of establishment success, growth and/or natural ecosystem recruitment and that it is comparable to that of the local remnant vegetation		No./area	0	7	4	7
			shrubs and juvenile trees >2m in height		The number of shrubs or juvenile trees >2m in height provides an indication of establishment success, growth and/or natural ecosystem recruitment and that it is comparable to that of the local remnant vegetation	No./area	0	70	14	21
	Ecosystem structure	The vegetation is developing in structure and complexity comparable to that of the local remnant vegetation	Foliage cover 0.5 - 2 m	Projected foliage cover provided by perennial plants in the 0.5 - 2m vertical height stratum indicates the community structure is comparable to that of the local remnant vegetation		% cover	0	14	6	14
			Foliage cover 2 - 4m		Projected foliage cover provided by perennial plants in the 2 - 4m vertical height stratum indicates the community structure is comparable to that of the local remnant vegetation	% cover	0	19	0	5
			Foliage cover 4 - 6m		Projected foliage cover provided by perennial plants in the 4 -6m vertical height stratum indicates the community structure is comparable to that of the local remnant vegetation	% cover	0	13	0	7

**Appendix A
Performance Indicators and Completion Criteria (Continued)**

Hierarchy of Ecosystem Succession	Aspect or Ecosystem Component	Completion Criteria	Performance Indicators	Completion Performance Indicators Description	Desirable Performance Indicators Description	Unit of Measurement	Hill Ecosystem Range 2013		Slopes Ecosystem Range 2013		
							Lower	Upper	Lower	Upper	
<i>Performance indicators are quantified by the range of values obtained from replicated reference sites</i>											
Phase 5: Ecosystem and Landuse Development (Cont.)	Ecosystem structure (Cont.)		Foliage cover >6m	Projected foliage cover provided by perennial plants greater than 6m vertical height stratum indicates the community structure is comparable to that of the local remnant vegetation		% cover	6	32	0	20	
	Tree diversity	Vegetation contains a diversity of maturing tree and shrubs species comparable to that of the local remnant vegetation	Tree diversity		The diversity of trees or shrubs with a stem diameter greater than 5cm is comparable to the local remnant vegetation. Species used will be endemic to the local area	species/area	2	5	1	2	
				The percentage of maturing trees and shrubs with a stem diameter greater than 5cm dbh which are local endemic species and these percentages are comparable to the local remnant vegetation		%	100	100	100	100	
	Tree density	Vegetation contains a density of maturing tree and shrubs species comparable to that of the local remnant vegetation	Tree density		The density of shrubs or trees with a stem diameter > 5cm is comparable to that of the local remnant vegetation	No./area	6	31	5	14	
			Average dbh		Average tree diameter of the tree population provides a measure of age, (height) and growth rate and that it is trending towards that of the local remnant vegetation	cm	16	49	14	26	
	Ecosystem health	The vegetation is in a condition comparable to that of the local remnant vegetation.	Live trees		The percentage of the tree population which are live individuals and that the percentage is comparable to the local remnant vegetation		% population	57	100	79	80
			Healthy trees		The percentage of the tree population which are in healthy condition and that the percentage is comparable to the local remnant vegetation		% population	13	67	0	50

**Appendix A
Performance Indicators and Completion Criteria (Continued)**

Hierarchy of Ecosystem Succession	Aspect or Ecosystem Component	Completion Criteria	Performance Indicators	Completion Performance Indicators Description	Desirable Performance Indicators Description	Unit of Measurement	Hill Ecosystem Range 2013		Slopes Ecosystem Range 2013	
							Lower	Upper	Lower	Upper
<i>Performance indicators are quantified by the range of values obtained from replicated reference sites</i>										
Phase 5: Ecosystem and Landuse Development (Cont.)	Ecosystem health (Cont.)		Medium health		The percentage of the tree population which are in a medium health condition and that the percentage is comparable to the local remnant vegetation	% population	33	52	29	40
			Advanced dieback		The percentage of the tree population which are in a state of advanced dieback and that the percentage is comparable to the local remnant vegetation	% population	0	7	0	40
			Dead Trees		The percentage of the tree population which are dead (stags) and that the percentage is comparable to the local remnant vegetation	% population	0	43	20	21
			Mistletoe		The percentage of the tree population which have mistletoe provides an indication of community health and habitat value and that the percentage is comparable to the local remnant vegetation	% population	0	0	0	20
			Flowers/fruit: Trees	The percentage of the tree population with reproductive structures such as buds, flowers or fruit provides evidence that the ecosystem is maturing, capable of recruitment and can provide habitat resources comparable to that of the local remnant vegetation		% population	0	50	0	7

Source: DnA Environmental (2014).

ATTACHMENT 1
CGM ENVIRONMENTAL MANAGEMENT SYSTEM

