APPENDIX C
Biodiversity Assessment Report and
Biodiversity Offset Report

COWAL GOLD OPERATIONS
PROCESSING RATE MODIFICATION
Environmental Assessment
2018
COWAL GOLD OPERATIONS PROCESSING RATE MODIFICATION

BIODIVERSITY ASSESSMENT REPORT
AND BIODIVERSITY OFFSET STRATEGY

PREPARED BY
RESOURCE STRATEGIES

MARCH 2018
Project No. HAL-16-41
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EXECUTIVE SUMMARY

This Biodiversity Assessment Report and Biodiversity Offset Strategy was prepared for a Modification to the Cowal Gold Operations (CGO) located approximately 38 kilometres (km) north-east of West Wyalong in New South Wales (NSW). Evolution Mining (Cowal) Pty Limited (Evolution) is proposing changes to the CGO to accommodate an increase to the CGO's approved ore processing rate (i.e. the Modification).

Approval is being sought for the Modification under Section 75W of the NSW Environmental Planning and Assessment Act, 1979 and under the Commonwealth Environment Protection and Biodiversity Conservation Act, 1999 (EPBC Act).

This Biodiversity Assessment Report and Biodiversity Offset Strategy was prepared in accordance with the NSW Framework for Biodiversity Assessment (FBA) and the NSW Biodiversity Offset Policy for Major Projects (the NSW Offset Policy). The FBA requires the use of an online program (the OEH Biobanking Credit Calculator for Major Projects and BioBanking [the OEH Biobanking Credit Calculator]) to assess biodiversity impacts and determine the biodiversity offset requirements for those impacts. There are three stages described in this document:

- Stage 1 involves summarising the biodiversity values of the disturbance area that are inputs into the OEH Biobanking Credit Calculator;
- Stage 2 involves assessing the potential impacts on biodiversity, describing impact avoidance and mitigation measures and determining the offset requirements; and
- Stage 3 involves describing how impacts on biodiversity would be offset (i.e. the Biodiversity Offset Strategy).

Stage 1 Biodiversity Assessment

This assessment uses the results of flora and fauna surveys undertaken by AMBS Ecology & Heritage (AMBS) during August, September and November 2017 and January 2018. The surveys were conducted in consideration of the relevant State and Commonwealth survey guidelines and included targeted searches for potentially occurring threatened species and communities listed under the NSW Biodiversity Conservation Act, 2016 (BC Act), NSW Fisheries Management Act, 1994 (FM Act) and EPBC Act.

In addition to the recent surveys, the assessment considers the results of many past flora and fauna surveys that have been undertaken in the locality, mainly associated with environmental assessments for various developmental stages of the CGO as well as for ongoing monitoring and management.

The modified approximate extent of surface development is represented by two Biodiversity Assessment Report Footprints (BAR Footprints), one covering modifications at the mine site and the other covering a duplication of the current pipeline which traverses Lake Cowal.

The BAR Footprints are predominantly located on land which has been historically cleared for cropping or grazing livestock and comprises native grassland. The Modification would result in the removal of approximately 286.7 hectares (ha) of native vegetation, of which most (approximately 91 percent [%] [260.8 ha]) is derived grassland in low/moderate condition.

No threatened flora species listed under the BC Act or EPBC Act have been recorded within the BAR Footprints.
Despite past disturbances to the native vegetation (historic clearance and livestock grazing), some semi-cleared woodland and derived native grassland in the BAR Footprints meets the criteria for endangered ecological communities (EECs) listed under the BC Act and EPBC Act. The Modification would clear:

- approximately 30 ha of *Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions* EEC listed under the BC Act;
- approximately 11.5 ha of *Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia* EEC listed under the EPBC Act;
- approximately 4.5 ha of *Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions* EEC listed under the BC Act; and
- approximately 1.5 ha of *Weeping Myall Woodlands EEC listed under the EPBC Act*.

The *Aquatic Ecological Community in the Natural Drainage System of the Lowland Catchment of the Lachlan River Endangered Ecological Community* listed under the FM Act includes Lake Cowal in the listing and is therefore present along part of the pipeline duplication.

One species credit species (as defined by the FBA) has been recorded inside the BAR Footprints during past or previous surveys (*Superb Parrot [Polytelis swainsonii]*)). Potential breeding habitat for the Superb Parrot does occur in the River Red Gum Forest (Moderate Condition) (LA191) along the edge of Lake Cowal and approximately 0.4 ha occurs in the BAR Footprint associated with the pipeline duplication.

**Stage 2 Impact Assessment**

The likely direct, indirect and cumulative impacts on biodiversity have been assessed within this report and impact avoidance and mitigation measures have been identified and described. There are a number of existing measures which are implemented the CGO to minimise impacts on biodiversity that would be continued for the Modification.

The result of running the OEH Biobanking Credit Calculator is that the Modification requires a Biodiversity Offset Strategy which accounts for a total of 3,687 ecosystem credits and 7 species credits for the Superb Parrot as listed in Table ES-1.

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<th>Credit Type</th>
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<td>Ecosystem Credits (including credits for EECs)</td>
<td>286.7</td>
<td>3,687</td>
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<td>Superb Parrot Species Credits</td>
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**Stage 3 Biodiversity Offset Strategy**

The existing Biodiversity Offset Strategy for the CGO would be augmented with an additional Biodiversity Offset Strategy for the Modification. Evolution has elected to address the offset requirements by offsetting through four additional offset areas on land owned by Evolution.

The four proposed offset areas have a combined area of 486.5 ha and provide a like-for-like offset outcome. Ecosystem and species credits generated from the four proposed offset areas would meet (and exceed) the credit requirements of the Modification.
1 INTRODUCTION

1.1 PROJECT OVERVIEW

Evolution Mining (Cowal) Pty Limited (Evolution) is the owner and operator of the Cowal Gold Operations (CGO) located approximately 38 kilometres (km) north-east of West Wyalong in New South Wales (NSW) (Figures 1, 2a and 2b).

Recent feasibility studies have identified potential opportunities to maximise the ore processing capacity of the CGO’s existing processing plant. On this basis, Evolution proposes to modify Development Consent (DA 14/98) under Section 75W of the NSW Environmental Planning and Assessment Act, 1979 (EP&A Act) to increase the CGO’s approved ore processing rate of 7.5 million tonnes per annum (Mtpa) to 9.8 Mtpa (herein referred to as the Modification).

The main activities associated with development of the Modification would include (Figures 2a and 2b):

- increasing the ore processing rate from 7.5 Mtpa to 9.8 Mtpa;
- modification of the existing Tailings Storage Facilities (TSFs) to form one larger TSF, which would also accommodate mine waste rock (herein referred to as the Integrated Waste Landform [IWL]);
- relocation of water management infrastructure (i.e. the Up-Catchment Diversion System and approved location for contained water storage D10) and other ancillary infrastructure (e.g. internal roads and soil and ore stockpiles) elsewhere within Mining Lease (ML) 1535 and Mining Lease Application (MLA) 1;
- installation of a secondary crushing circuit within the existing process plant area;
- duplication of the existing water supply pipeline across Lake Cowal;
- increased annual extraction of water from the CGO’s external water supply sources;
- increased consumption of process reagents (including cyanide) and other process consumables;
- an increase in the average and peak workforce employed at the CGO;
- relocation of a travelling stock reserve (TSR) and Lake Cowal Road; and
- provision of crushed rock material to local councils to assist with road base supplies.

1.2 GENERAL DESCRIPTION OF THE BIODIVERSITY ASSESSMENT REPORT FOOTPRINTS

The modified approximate extent of surface development is represented by two Biodiversity Assessment Report Footprints (BAR Footprints) shown on Figures 3a and 3b, namely:

1. BAR Footprint associated with the mine site; and
2. BAR Footprint associated with the pipeline duplication.

Two BAR Footprints are required as the assessment approach varies slightly for site-based developments (such as the modification at the mine site) and linear shaped developments (such as the pipeline duplication).
LEGEND
- Mining Lease Boundary (ML 1535)
- Mining Lease Application (MLA 1)
- Exploration Licence (EL)
- National Park & Nature Reserve
- State Forest
- Local Government Area Boundary
- Electricity Transmission Line
- Railway

Source: © NSW Department of Finance, Services & Innovation (2017); Office of Environment & Heritage NSW (2017)
Bland Creek Palaeochannel Borefield and Eastern Saline Borefield (approx 20 km)

LAKE COWAL

BURCHER         RAILWAY

WEST          WYALONG

Travelling Stock Reserve

MLA 1
Northern Waste Rock Emplacement (308 m AHD)
Up-catchment Diversion System
Process Plant
Electricity Transmission Line
Temporary isolation bund
Lake Protection bund
Perimeter Waste Rock Emplacement
Soil Stockpiles
Realigned Travelling Stock Reserve
Northern Tailings Storage Facility (240.5 m AHD)
Southern Tailings Storage Facility (248.4 m AHD)
Southern Soil Stockpile
Relocated Magazine Location
Relocated Explosives Compound
Relocated D10 Dam
Realigned Up-Catchment Diversion
Northern Waste Rock Emplacement (328 m AHD)
Southern Waste Rock Emplacement (285 m AHD)
Southern Soil Stockpile
Primary Crushing Circuit
Integrated Waste Landform (245 m AHD)
Up-catchment Diversion System
Haul Road Crossing
Realigned Lake Cowal Road
Bonehams Lane
Corringle Lane

Integrated Waste Landform Perimeter

CWO PROCESSING RATE MODIFICATION
Cowal Gold Operations
General Arrangement - Mine Site

Figure 2a

Source: Evolution (2018); © NSW Department of Finance, Services & Innovation (2017)
Orthophoto: Evolution (Oct 2017)
Indicative Pipeline Duplication

LEGEND

Approximate Extent of Approved
Surface Development

Indicative Pipeline Duplication

Source: Evolution (2018); © NSW Department of Finance,
Services & Innovation (2017)
Orthophoto: Evolution (Oct 2017)
LEGEND
- MLA 1
- Mining Lease Boundary (ML 1535)
- Mining Lease Application Boundary (MLA 1)
- Approximate Extent of Approved Surface Development
- BAR Footprint - Mine Site
- BAR Footprint - Pipeline

Source: Evolution (2018); © NSW Department of Finance, Services & Innovation (2017)
Orthophoto: Evolution (Oct 2017)

Figure 3a
It should also be noted that the BAR Footprints are indicative and may vary slightly following further detailed mine planning and particularly the detailed design of supporting infrastructure. While some changes to the BAR Footprints would be expected over the life of the mine, any such changes are expected to be minor and therefore would have no material impact on biodiversity values.

1.3 ASSESSMENT REQUIREMENTS/APPROACH

This document was prepared in accordance with the Secretary’s Environmental Assessment Requirements (SEARs). In general, the objectives of this assessment were to:

- provide an assessment of the likely adverse impacts of the Modification on terrestrial flora and fauna in accordance with the NSW Framework for Biodiversity Assessment (FBA) (NSW Office of Environment and Heritage [OEH], 2014a) as required by the SEARs; and
- describe an additional Biodiversity Offset Strategy in accordance with the NSW Biodiversity Offsets Policy for Major Projects (the NSW Offset Policy) (OEH, 2014b) as required by the SEARs.

The FBA (OEH, 2014a) outlines the methodology which underpins the NSW Offset Policy (OEH, 2014b). The NSW Offset Policy commenced on 1 October 2014 for a transitional period, after which it would be reviewed (OEH, 2014b). During the transitional period, there is some flexibility in the policy’s application to address any technical or administrative issues (OEH, 2014b). This report was prepared during the transitional period.

This Biodiversity Assessment Report and Biodiversity Offset Strategy has been prepared by Jamie Gleeson (Resource Strategies), who is an accredited assessor according to section 142B(1)(c) of the NSW Threatened Species Conservation Act, 1995 (TSC Act) (assessor accreditation number 0056). This Biodiversity Assessment Report and Biodiversity Offset Strategy was peer reviewed by Dr Colin Driscoll (Hunter Eco) (Appendix G) who is also an accredited assessor (assessor accreditation number 0011).

The FBA (OEH, 2014a) requires the use of an online program (calculator) to assess biodiversity impacts and determine the biodiversity offset requirements for those impacts. The OEH Biobanking Credit Calculator for Major Projects and BioBanking (Version 4.1)¹ (the OEH Biobanking Credit Calculator) was used as part of this assessment.

The threatened species assessment has been undertaken in accordance with the FBA (OEH, 2014a) rather than the Draft Guidelines for Threatened Species Assessment (Department of Environment and Conservation [DEC], and Department of Primary Industries [DPI], 2005), which would otherwise apply to EP&A Act Part 3A Modifications. Assessments of Significance in accordance with section 5A of the EP&A Act are not required for EP&A Act Part 3A Modifications.

Environment Protection and Biodiversity Conservation Act, 1999

The Cowal Gold Project was referred under the Environment Protection and Biodiversity Conservation Act, 1999 (EPBC Act) in August 2001 (EPBC 2001/421). On 29 September 2001, the Commonwealth Minister for the Environment and Heritage decided that the Cowal Gold Project was not a ‘controlled action’, with the consequence that no approval under the EPBC Act was required.

¹ According to the OEH website the OEH Biobanking Credit Calculator is version 4.1, however, according to the OEH Biodiversity Credit Report attached to this report the Calculator was version 4.0.
The Modification was referred under the EPBC Act on 1 August 2017 and was determined to be a ‘controlled action’ on the 6 November 2017 due to likely significant impacts on the Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia Endangered Ecological Community (EEC) listed under the EPBC Act (Grey Box EEC listed under the EPBC Act) (2017/7989) (controlling provision threatened species and communities). The Modification is to be assessed under the assessment bilateral agreement with NSW (the NSW Assessment Bilateral Agreement – dated 26 February 2015). Accordingly, this document provides an assessment of impacts on the relevant threatened species and communities listed under the EPBC Act.

1.4 STRUCTURE OF THIS ASSESSMENT

This document is structured as required by the FBA (OEH, 2014a). There are three stages described in this document:

- Stage 1 involves summarising the biodiversity values of the BAR Footprints that are inputs into the OEH Biobanking Credit Calculator (e.g. landscape features, native vegetation and threatened species) (Stage 1 for the mine site is provided in Section 2 and Stage 1 for the pipeline duplication is provided in Section 3);
- Stage 2 involves assessing the potential impacts on biodiversity, describing impact avoidance and mitigation measures and determining the offset requirements (Section 4); and
- Stage 3 involves describing the Biodiversity Offset Strategy (Section 5).

1.5 INFORMATION SOURCES USED IN THIS ASSESSMENT

This assessment uses the results of detailed flora and fauna survey work undertaken by AMBS Ecology & Heritage (AMBS) (2018a) (Attachment A) and AMBS (2018b) (Attachment B). These and other information sources are referenced throughout this assessment. The Archived Biometric and Threatened Species Profiles Datasets (OEH, 2017a) were used as required by the FBA (OEH, 2014a).
2 STAGE 1 – BIODIVERSITY ASSESSMENT MINE SITE

Stage 1 of the biodiversity assessment involves summarising the biodiversity values of the BAR Footprints that are inputs into the OEH Biobanking Credit Calculator. This section provides information on the application of the site-based assessment on the mine site. Landscape features are described in Section 2.1, native vegetation is described in Section 2.2, and threatened species relevant to the BAR Footprint associated with the mine site are described in Section 2.3.

2.1 LANDSCAPE FEATURES

Landscape features relevant to the Modification (such as regional setting and biodiversity links) are described in this sub-section.

2.1.1 Regional Setting and Landscape

The BAR Footprint associated with the mine site is located within the regions listed in Table 1.

<table>
<thead>
<tr>
<th>Boundary</th>
<th>BAR Footprint Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interim Biogeographic Regionalisation for Australia (IBRA) Region</td>
<td>NSW South Western Slopes</td>
</tr>
<tr>
<td>IBRA Sub-region</td>
<td>Lower Slopes</td>
</tr>
<tr>
<td>Catchment Management Authority (CMA)*</td>
<td>Lachlan</td>
</tr>
<tr>
<td>CMA Sub-region</td>
<td>Lower Slopes - Lachlan</td>
</tr>
<tr>
<td>Local Government Area (LGA)</td>
<td>Bland</td>
</tr>
<tr>
<td>Mitchell Landscape</td>
<td>Ardlethan Hills (approximately 85%) and Bimbi Plains (approximately 15%)</td>
</tr>
</tbody>
</table>

* The OEH Biobanking Credit Calculator uses superseded CMA regions not up-to-date Local Land Service Regions.

2.1.2 Landscape Value Score

A site-based assessment was undertaken. Under the FBA (OEH, 2014a), two circles are used for the purpose of the site-based assessment (an outer circle and inner circle) (Figure 4). For the purpose of this assessment, a 5,000 hectare (ha) outer circle and a 500 ha inner circle was adopted (based on standard circle sizes in the FBA [OEH, 2014a]).

The extent of native vegetation in the outer circle was informed by AMBS (2018a) (Attachment A) and OEH (2015a) (Figure 4) and it was assumed that all native vegetation is in moderate to good condition (except that confirmed to be in low condition by AMBS) (Figure 4). The approved CGO footprint within the circles was assumed cleared for the purpose of the assessment.

In summary, the outer circle contains approximately 6-10 % of native vegetation cover before development and the same after development. The inner circle contains approximately 6-10 % of native vegetation cover before development and less than 5 % after development.

Regionally or State Significant Biodiversity Links

The Modification would not impact a state or regionally significant biodiversity link. Drainage lines (and riparian buffer distances based on Strahler stream ordering) are shown on Figure 5 from the DPI – Water (2017). None are relevant to the BAR Footprint associated with the mine site.
LEGEND
- Mining Lease Boundary (ML 1535)
- Mining Lease Application Boundary (MLA 1)
- Approximate Extent of Approved Surface Development

BAR Footprint - Mine Site
- Wetland in the Directory of Important Wetlands Australia
- 50 m Buffer of a Wetland in the Directory of Important Wetlands Australia
- Middle Stream Order
- 1st Order
- 2nd Order
- 3rd Order
- 4th Order
- 5th Order
- 6th Order
- 7th Order

Source: Evolution (2018); © NSW Department of Planning and Environment (2017); Department of Finance, Services & Innovation (2017); Crown Lands and Water - a Division of the NSW Department of Industry (2013); Office of Environment and Heritage NSW; Australian Government Department of the Environment (2017)
Orthophoto: Evolution (Oct 2017); Department of Finance, Services & Innovation (2017)
2.2 NATIVE VEGETATION

Historically, the BAR Footprints comprise former cleared and semi-cleared farmland that was used for grazing of predominantly native pastures by livestock. Grazing and cropping is still undertaken in areas outside of ML 1535. The original native tree cover has largely been removed except for scattered individual trees and patches of remnant vegetation.

2.2.1 Plant Community Types/Biometric Vegetation Types

AMBS (2018a) (Attachment A) conducted flora surveys within the BAR Footprints (including surrounds) and developed vegetation community mapping. Sites sampled by AMBS (2018a) (Attachment A) are shown on Figures 6a and 6b. Vegetation communities were classified by AMBS (2018a) (Attachment A) according to the NSW Biometric Vegetation Types (BVTs) and are shown on Figures 7a and 7b.

The vegetation communities are herein referred to using the BVT number as the inputs and outputs of the OEH Biobanking Credit Calculator are required to be BVT rather than Plant Community Types (PCT) (although the FBA [OEH, 2014a] contains continuous reference to PCTs). AMBS (2018a) (Attachment A) provides detailed profiles of each vegetation community.

The areas of each BVT in the BAR Footprint associated with the mine site are provided in Table 2.

### Table 2

<table>
<thead>
<tr>
<th>#</th>
<th>Vegetation Community</th>
<th>PCT</th>
<th>Area (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Grassy Woodlands – Floodplain Transition Woodlands</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2a</td>
<td>Inland Grey Box - White Cypress Pine Woodland (Semi Cleared in Moderate Condition) (LA152)</td>
<td>82</td>
<td>6.5&lt;sup&gt;A&lt;/sup&gt;</td>
</tr>
<tr>
<td>2b</td>
<td>Inland Grey Box - White Cypress Pine Woodland (Derived Grassland in Low Condition) (LA152)</td>
<td>23.5&lt;sup&gt;B&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Semi-arid Woodland (Grassy sub–formation) – Northwest Floodplain Woodlands</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Belah Woodland (Low Condition) (LA105)</td>
<td></td>
<td>16.5</td>
</tr>
<tr>
<td></td>
<td><strong>Semi-arid Woodland (Scrubby sub–formation) – Inland Rocky Hill Woodlands</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Dwyer’s Red Gum - White Cypress Pine - Currawang Woodland (Moderate Condition) (LA144)</td>
<td>185</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td><strong>Grasslands – Western Slopes Grasslands</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6a</td>
<td>Highly Modified Derived Grasslands (Moderate Condition) (LA138)</td>
<td>250</td>
<td>63.5</td>
</tr>
<tr>
<td>6b</td>
<td>Highly Modified Derived Grasslands (Low Condition) (LA138)</td>
<td></td>
<td>170.5</td>
</tr>
<tr>
<td></td>
<td><strong>Total Native Vegetation</strong></td>
<td></td>
<td>281.5</td>
</tr>
<tr>
<td></td>
<td><strong>Cleared Land (non-native)</strong></td>
<td></td>
<td>10</td>
</tr>
<tr>
<td></td>
<td><strong>Plantings</strong></td>
<td></td>
<td>8.5</td>
</tr>
<tr>
<td></td>
<td><strong>Total BAR Footprint Associated with the Mine Site</strong></td>
<td></td>
<td>300</td>
</tr>
</tbody>
</table>

<sup>A</sup> 6.5 ha equivalent to the Grey Box EEC listed under the EPBC Act and the NSW Biodiversity Conservation Act, 2016 (BC Act).

<sup>B</sup> 23.5 ha equivalent to the Grey Box EEC listed under the BC Act, including approximately 5 ha equivalent to the Grey Box EEC listed under the EPBC Act.

The BAR Footprint associated with the mine site is predominantly (approximately 78%) Highly Modified Derived Grasslands (LA138) (Plate 1). These derived grasslands are mostly native but are highly disturbed such that AMBS (2018a) (Attachment A) could not determine the original BVT which would have occurred prior to clearing. The Highly Modified Derived Grasslands were likely (prior to historic clearing) a variety of vegetation types that occur in the general locality.
LEGEND

Mining Lease Boundary (ML 1535)
Approximate Extent of Approved Surface Development
Mining Lease Application Boundary (MLA 1)
FBA Plot

Threatened Ecological Communities

Grey Box Woodland EEC (BC Act and EPBC Act)
Grey Box Woodland EEC (BC Act)
Weeping Myall Woodland EEC (BC Act and EPBC Act)
Weeping Myall Woodland EEC (BC Act)

VEGETATION MAPPING

Semi-arid Woodlands (Grassy sub-formation) - Riverine Plain Woodlands
Weeping Myall Open Woodland (Semi Cleared in Moderate Condition) (LA212)
Weeping Myall Open Woodland (Semi Cleared in Low Condition) (LA212)
Weeping Myall Open Woodland (Derived Grassland in Low Condition) (LA212)
Grassy Woodlands - Floodplain Transition Woodlands
Inland Grey Box - White Cypress Pine Woodland (Semi Cleared in Moderate Condition) (LA152)
Inland Grey Box - White Cypress Pine Woodland (Derived Grassland in Low Condition) (LA152)
Forested Wetlands - Inland Riverine Forests
River Red Gum Forest (Moderate Condition) (LA191)
Semi-arid Woodlands (Grassy sub-formation) - Northwest Floodplain Woodlands
Belah Woodland (Low Condition) (LA105)
Semi Arid Woodland (Shrubby sub-formation) - Inland Rocky Hill Woodlands
Dwyer's Red Gum - White Cypress Pine - Carrawong Woodland (Moderate Condition) (LA144)

Grasslands - Western Slopes Grasslands
Highly Modified Derived Grasslands (Moderate Condition) (LA138)
Highly Modified Derived Grasslands (Low Condition) (LA138)
Other Map Units

Source: © NSW Department of Finance, Services & Innovation (2017)
Orthophoto: Evolution (Oct 2017)

Threatened Ecological Communities
Grey Box Woodland EEC (BC Act and EPBC Act)

Flora Survey Sites
- Mine Site

REFER FIGURE 6b

Figure 6a
LEGEND

Mining Lease Boundary (ML 1535)
Mining Lease Application Boundary (MLA)
Approximate Extent of Approved
Surface Development
BAR Footprint - Mine Site
BAR Footprint - Pipeline
Threatened Ecological Communities
Grey Box Woodland EEC (BC Act and EPBC Act)
Grey Box Woodland EEC (BC Act)
Weeping Myall Woodland EEC (BC Act and EPBC Act)
Weeping Myall Woodland EEC (BC Act)

VEGETATION MAPPING

1a  Semi-ard Woodlands (Grassy sub-formation) - Riverine Plain Woodlands
1b  Weeping Myall Open Woodland (Semi Cleared in Moderate Condition) (LA212)
1c  Weeping Myall Open Woodland (Semi Cleared in Low Condition) (LA212)
2a  Inland Grey Box - White Cypress Pine Woodland (Semi Cleared in Moderate Condition) (LA152)
2b  Inland Grey Box - White Cypress Pine Woodland (Derived Grassland in Low Condition) (LA152)
3  River Red Gum Forest (Moderate Condition) (LA109)
4  Semi-ard Woodlands (Grassy sub-formation) - Northwest Floodplain Woodlands
5  Dwyer’s Red Gum - White Cypress Pine – Camphor Woodland (Moderate Condition) (LA144)

Grasslands - Western Slopes Grasslands
6a  Highly Modified Derived Grasslands (Moderate Condition) (LA138)
6b  Highly Modified Derived Grasslands (Low Condition) (LA138)

Other Map Units

A  Plantings
B  Lake Bed
D  Cleared

Threatened Flora Species

#  Austral Pillwort

Source: Evolution (2018); © NSW Department of Finance, Services & Innovation (2017)
Orthophoto: Evolution (Oct 2017)

Reference: OEH (2017)

Location: Lake Cowal - Mine Site

Figure 7a
LEGEND
Approximate Extent of Approved
Surface Development
BAR Footprint - Pipeline
Threatened Ecological Communities
Weeping Myall Woodland EEC (BC Act and EPBC Act)
Weeping Myall Woodland EEC (BC Act)

VEGETATION MAPPING
Semi-arid Woodlands - Grass sub-formation - Riverine Plain Woodlands
1a
Weeping Myall Open Woodland (Semi Cleared in Moderate Condition) (LA212)
1b
Weeping Myall Open Woodland (Semi Cleared in Low Condition) (LA212)
1c
Weeping Myall Open Woodland (Derived Grassland in Low Condition) (LA212)
Forested Wetlands - Inland Riverine Forests
3
River Red Gum Forest (Moderate Condition) (LA191)
Other Map Units
B
Lake Bed
C
Cropping
Threatened Flora Species
Austrostipa wakoolica

Reference: 3. OEH (2017)

Note: There are no references 1 and 2 on this figure.

Source: © NSW Department of Finance, Services & Innovation (2017)
Orthophoto: Evolution (Oct 2017)
Plate 1 Example of LA138 a Derived Grassland Community Characterised by a Mixed Assemblage of Perrenial Native Grasses and Annual Exotic Herbs and Grasses

2.2.2 Threatened Ecological Communities

AMBS (2018a) (Attachment A) undertook targeted surveys for potentially occurring threatened ecological communities listed under the BC Act or EPBC Act in accordance with relevant listing advice.

The Inland Grey Box woodland and derived grassland in the BAR Footprint associated with the mine site (Vegetation Community 2a and 2b – approximately 30 ha) represents the Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions listed under the BC Act (Grey Box EEC listed under the BC Act) (Table 3) (Plate 2). Approximately 11.5 ha of the Grey Box EEC listed under the BC Act also meets the criteria for the Grey Box EEC listed under the EPBC Act as described and mapped by AMBS (2018a) (Attachment A) (Table 3).

The site condition (from plot data) of Vegetation Community 2a (Inland Grey Box - White Cypress Pine Woodland [Semi Cleared in Moderate Condition] [LA152]) indicates the understorey comprises 2-4% cover of native grasses, 2-10% cover of other native plants (e.g. herbs) and 10-20% cover of weeds. The site condition (from plot data) of Vegetation Community 2b (Inland Grey Box - White Cypress Pine Woodland [Derived Grassland in Low Condition] [LA152]) indicates the understorey comprises a greater cover of weeds (15-35% cover).
Table 3
Threatened Ecological Communities in the BAR Footprint Associated with the Mine Site

<table>
<thead>
<tr>
<th>Threatened Ecological Community</th>
<th>Conservation Status</th>
<th>2a Inland Grey Box - White Cypress Pine Woodland (Semi Cleared in Moderate Condition) (LA152)</th>
<th>2b Inland Grey Box - White Cypress Pine Woodland (Derived Grassland in Low Condition) (LA152)</th>
<th>Area (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions (Grey Box EEC listed under the BC Act)</td>
<td>-</td>
<td>6.5</td>
<td>23.5</td>
<td>30</td>
</tr>
<tr>
<td>Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia (Grey Box EEC listed under the EPBC Act)</td>
<td>E</td>
<td>6.5</td>
<td>5</td>
<td>11.5</td>
</tr>
</tbody>
</table>

1 Threatened status under the BC Act and/or EPBC Act (current as at March 2018).
E = Endangered

Source: AMBS (2018a) (Attachment A)

Plate 2 Example of Grey Box EEC listed under the BC Act and EPBC Act in the BAR Footprint
2.2.3 Vegetation Zones

The vegetation communities described in Section 2.2.1 were grouped into vegetation zones according to their condition. Table 4 outlines the vegetation zones present in the BAR Footprint associated with the mine site, the relevant BVT, condition, site value score (i.e. the quantitative measure of vegetation condition), area and patch size. The site value score is automatically calculated in the OEH Biobanking Credit Calculator based on the floristic plot data collected by AMBS (2018a) (Attachment A).

The patch size for each vegetation zone (other than vegetation in low condition) was greater than 1,000 ha (i.e. connecting with vegetation outside of the BAR Footprint) (Table 4).

Table 4
Vegetation Zones in the BAR Footprint Associated with the Mine Site

<table>
<thead>
<tr>
<th>Vegetation Zone</th>
<th>#</th>
<th>Vegetation Community</th>
<th>PCT</th>
<th>Area (ha)</th>
<th>Condition Class</th>
<th>Site Value Score</th>
<th>Patch Size</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Grassy Woodlands – Floodplain Transition Woodlands</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>2a</td>
<td>Inland Grey Box - White Cypress Pine Woodland (Semi Cleared in Moderate Condition) (LA152)</td>
<td>82</td>
<td>6.5</td>
<td>Moderate/Good</td>
<td>47.74</td>
<td>&gt;1,001</td>
</tr>
<tr>
<td>4</td>
<td>2b</td>
<td>Inland Grey Box - White Cypress Pine Woodland (Derived Grassland in Low Condition) (LA152)</td>
<td></td>
<td>23.5</td>
<td>Low</td>
<td>27.60</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Semi-arid Woodland (Grassy sub-formation) – Northwest Floodplain Woodlands</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td>Belah Woodland (Low Condition) (LA105)</td>
<td>55</td>
<td>16.5</td>
<td>Low</td>
<td>34.00</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Semi-arid Woodland (Scrubby sub-formation) – Inland Rocky Hill Woodlands</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>5</td>
<td>Dwyer's Red Gum - White Cypress Pine - Currawang Woodland (Moderate Condition) (LA144)</td>
<td>185</td>
<td>1</td>
<td>Moderate/Good</td>
<td>27.60</td>
<td>&gt;1,001</td>
</tr>
<tr>
<td><strong>Grasslands – Western Slopes Grasslands</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>6a</td>
<td>Highly Modified Derived Grasslands (Moderate Condition) (LA138)</td>
<td>250</td>
<td>63.5</td>
<td>Moderate/Good</td>
<td>30.00*</td>
<td>&gt;1,001</td>
</tr>
<tr>
<td>8</td>
<td>6b</td>
<td>Highly Modified Derived Grasslands (Low Condition) (LA138)</td>
<td></td>
<td>170.5</td>
<td>Low</td>
<td>30.67*</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>281.5</strong></td>
<td></td>
</tr>
</tbody>
</table>

* The OEH Biobanking Credit Calculator does not contain benchmark data for LA138 and therefore the more conservative benchmarks for LA152 and LA105 were used. A consistent approach was applied to the offset area calculations.

2.2.4 Vegetation Condition

Site condition data was collected by AMBS (2018a) (Attachment A) at each FBA Plot location (Figures 6a and 6b).

2.2.5 Vegetation Impacts that Require Further Consideration

The FBA (OEH, 2014a) describes that some threatened ecological communities require further consideration (by the NSW Government) in addition to the OEH Biobanking Credit Calculator. None of the vegetation communities present in the BAR Footprint associated with the mine site (Section 2.2.1) are communities that require further consideration.
2.3 THREATENED SPECIES

Threatened species relevant to the Modification are identified in this sub-section. This sub-section refers to the threatened species that are:

- ecosystem credit species (i.e. species that can be predicted to be present based on habitat assessment); and/or
- species credit species (i.e. species that cannot be predicted by habitat surrogates) (OEH, 2014a)

Threatened species that are ecosystem credit species and/or species credit species are predetermined by OEH in the OEH Biobanking Credit Calculator and Archived Biometric and Threatened Species Profiles Datasets (OEH, 2017a).

2.3.1 Habitat Features for Particular Species Credit Species

The OEH Biobanking Credit Calculator identifies specific habitat features for particular species credit species and the FBA (OEH, 2014a) requires the assessor to evaluate if any of those habitat features occur on site. Habitat features from the OEH Biobanking Credit Calculator are listed in Table 5, along with the relevance of the habitat features to the BAR Footprint associated with the mine site.

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Conservation Status</th>
<th>Habitat Feature (OEH Biobanking Credit Calculator)</th>
<th>Potentially Relevant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flora</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spiny Peppercress</td>
<td>Lepidium aschersonii</td>
<td>V</td>
<td>On ridges of gilgai clays.</td>
<td>Yes</td>
</tr>
<tr>
<td>Winged Peppercress</td>
<td>Lepidium monoplocoides</td>
<td>E</td>
<td>Land containing seasonally damp or waterlogged sites.</td>
<td>Yes</td>
</tr>
<tr>
<td>Amphibian</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sloane’s Froglet</td>
<td>Crinia sloanei</td>
<td>V</td>
<td>Land within 50 meters (m) of identified breeding habitat.</td>
<td>Yes</td>
</tr>
<tr>
<td>Birds</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grey Falcon</td>
<td>Falco hypoleucos</td>
<td>E</td>
<td>Land within 100 m of riparian woodland on inland rivers containing mature living eucalypts or isolated paddock trees overhanging water or dry watercourses.</td>
<td>Yes</td>
</tr>
<tr>
<td>Black-breasted Buzzard</td>
<td>Hamirostra melanosternon</td>
<td>V</td>
<td>Land within 40 m of riparian woodland on inland watercourses/waterholes containing dead or dying eucalypts.</td>
<td>Yes</td>
</tr>
</tbody>
</table>

1 Threatened fauna species status under the BC Act and/or EPBC Act (current as at March 2018). V = Vulnerable; E = Endangered

2.3.2 Targeted Surveys for Threatened Species

The FBA (OEH, 2014a) only requires targeted surveys for threatened fauna species which are species credit species because ecosystem credit species are predicted to occur solely based on habitat. All threatened flora species are species credit species. A list of candidate species credit species requiring survey was produced by the OEH Biobanking Credit Calculator (Table 6).
Table 6
Threatened (Species Credit) Species Survey Timing - BAR Footprint Associated with the Mine Site

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Conservation Status</th>
<th>Survey Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>BC Act</td>
<td>EPBC Act</td>
</tr>
<tr>
<td><strong>Flora</strong></td>
<td></td>
<td>V</td>
<td>E</td>
</tr>
<tr>
<td>A spear-grass</td>
<td>Austrostipa metatoris</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>A spear-grass</td>
<td>Austrostipa wakoolica</td>
<td>E</td>
<td>E</td>
</tr>
<tr>
<td>Narrow Goodenia</td>
<td>Goodenia macbarronii*</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Pine Donkey Orchid</td>
<td>Diuris tricolor</td>
<td>V</td>
<td>-</td>
</tr>
<tr>
<td>Silky Swainson-pea</td>
<td>Swainsona sericea</td>
<td>V</td>
<td>-</td>
</tr>
<tr>
<td>Slender Darling Pea</td>
<td>Swainsona murrayana</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>Spiny Peppercress</td>
<td>Lepidium aschersonii</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>Winged Peppercress</td>
<td>Lepidium monoplocoides</td>
<td>E</td>
<td>E</td>
</tr>
<tr>
<td>Woolly Ragwort</td>
<td>Senecio garlandii</td>
<td>V</td>
<td>-</td>
</tr>
<tr>
<td><strong>Amphibian</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sloane's Froglet</td>
<td>Crinia sloanei</td>
<td>V</td>
<td>-</td>
</tr>
<tr>
<td><strong>Birds</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black-breasted Buzzard</td>
<td>Hamirostra melanosternon</td>
<td>V</td>
<td>-</td>
</tr>
<tr>
<td>Grey Falcon</td>
<td>Falco hypoleucos</td>
<td>E</td>
<td>-</td>
</tr>
<tr>
<td><strong>Mammals</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Koala</td>
<td>Phascolarctos cinereus</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>Brush-tailed Phascogale</td>
<td>Phascogale tapoatafa*</td>
<td>V</td>
<td>-</td>
</tr>
</tbody>
</table>

**LEGEND**
- Highlighted month is the month in which targeted surveys were undertaken for the relevant species by AMBS (2018a) (Attachment A)
- V = Vulnerable; E = Endangered
- * Goodenia macbarronii is no longer listed as threatened in NSW.
- ^ The Brush-tailed Phascogale is not known to occur in the region (Section 2.3.4.1).
2.3.3 Targeted Surveys for Threatened Flora Species

The potential presence of threatened flora species within the BAR Footprints was determined by recent surveys, a review of previous surveys and a review of database records.

2.3.3.1 Recent Flora Surveys

In 2017, AMBS (2018a) (Attachment A) undertook vegetation mapping in the BAR Footprints and surrounds, this also included targeted surveys for potentially detectable species such as *Austrostipa metatoris*.

Flora surveys were conducted in August, September and November 2017 by AMBS (2018a) (Attachment A). AMBS (2018a) (Attachment A) undertook targeted surveys for the flora species listed in Table 6 in accordance with the FBA (OEH, 2014a) and the following relevant survey guidelines:

- *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (Working Draft)* (DEC, 2004); and

All potentially occurring threatened flora species listed under the EPBC Act were also targeted during the surveys.

No threatened flora species were recorded during these surveys by AMBS (2018a) (Attachment A). It is noted that the OEH Biobanking Credit Calculator does not require targeted surveys for the Austral Pillwort (*Pilularia novae-hollandiae*) which is a threatened flora species listed as ‘Endangered’ under the BC Act and EPBC Act. This species has been previously recorded in ML1535, but not since 2003 (Figure 7a). Despite this, AMBS (2018a) (Attachment A) undertook targeted surveys for the Austral Pillwort though it was not found.

2.3.3.2 Previous Flora Surveys

Flora studies undertaken in the broader Lake Cowal catchment that are applicable to BAR Footprints and surrounds are outlined in Table 7.

*Regional Studies (Between 1987 and 2008)*

<table>
<thead>
<tr>
<th>Surveys</th>
<th>Timing</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regional studies</td>
<td>Between 1987 and 2008</td>
<td>Sivertsen and Metcalfe (1995); Austin et al. (2000); Benson (2008)</td>
</tr>
<tr>
<td>Flora species recorded within ML 1535 and surrounds before operations</td>
<td>Between 1969 and 2003</td>
<td>Vestjens (1977); Anne Clements and Associates (1995); Charles Sturt University (1997); Bower (1997; 1998a; 1998b; 2003a; 2003b; 2003c)</td>
</tr>
<tr>
<td>Flora surveys for the Cowal Gold Mine E42 Modification Environmental Assessment (Barrick, 2008a)</td>
<td>2008</td>
<td>FloraSearch (2008)</td>
</tr>
</tbody>
</table>

**Flora Species Recorded within ML 1535 and Surrounds before Operations (Between 1969 and 2003)**


Bower (Orchid Research and FloraSearch) has conducted a number of targeted threatened species searches within ML 1535 and surrounds. Further targeted threatened species searches were conducted at the approved CGO and pipeline (Bower, 1997, 1998a, 1998b, 2003a; Barrick, 2003a), along the Temora to Cowal electricity transmission line (ETL) (Bower, 2003b; Country Energy, 2004) and along the approved CGO access road upgrade (Bower, 2003b).

**Flora Surveys for the CGO E42 Modification Environmental Assessment (2008)**

FloraSearch (2008) undertook flora and vegetation surveys within ML 1535 for the CGO E42 Modification Environmental Assessment. The survey focused on mapping vegetation communities, assessing the condition of vegetation communities, recording flora species and targeted searches for threatened flora species within the proposed disturbance area for the CGO E42 Modification. Methods involved quadrat sampling and random meander searches.

**Flora Species Recorded During Monitoring (2008 to present)**

DnA Environmental has undertaken flora monitoring within and surrounding the CGO. Monitoring has been undertaken for the CGO Remnant Vegetation Enhancement Program (RVEP), within the CGO Compensatory Wetland and within rehabilitation areas. These are described in more detail below.
Remnant Vegetation Enhancement Program


Compensatory Wetland

DnA Environmental (2011b, 2012b, 2013b, 2014b, 2015b, 2016b) has undertaken surveys within the compensatory wetland at Lake Cowal in accordance with the Cowal Gold Project Compensatory Wetland Management Plan (Barrick, 2003c). The monitoring has been undertaken at 12 monitoring sites on an annual basis during late spring (October/November) since 2005 to monitor changes in vegetation cover, species diversity and to determine the extent of regeneration, if any, occurring within monitoring sites.

Rehabilitation Areas

DnA Environmental (2011c, 2012c, 2013c, 2014c, 2015c, 2016c, 2017b) has undertaken monitoring of the revegetation on the post-mine landforms since 2010. The aim of the monitoring is to follow and analyse the progressive rehabilitation of mining disturbed areas to establish sustainable endemic vegetation communities which are appropriate for the topography and slope of the rehabilitated landforms. Rehabilitation trials have been conducted at; two sites along the Lake Foreshore and five on the outer walls of the southern and northern TSFs. Additionally, rehabilitation trials have been established on the southern waste rock emplacement; the northern waste rock emplacement and perimeter waste rock emplacement (DnA Environmental, 2011c, 2012c, 2013c and 2014c).

Flora Surveys in 2012

Flora surveys were undertaken by the Australian Museum Business Services (2012) within and surrounding ML 1535 within Evolution-owned lands between October 2011 and September 2012. Targeted searches for potential threatened flora species were undertaken at all full floristic survey sites (AMBS, 2012). Incidental searches were also undertaken at rapid data points and condition assessment sites.

Austral Pillwort Monitoring

DnA Environmental (2012d, 2013d, 2015d, 2016d and 2017c) undertook annual monitoring for the Austral Pillwort within ML 1535 and surrounds. No Austral Pillwort have been found.

2.3.3.3 Flora Database Records

The BioNet Atlas of NSW Wildlife (OEH, 2017b) and Atlas of Living Australia Website (Atlas of Living Australia, 2017) was reviewed for nearby threatened flora species records. In addition, a Protected Matters Search was undertaken for threatened flora species listed under the EPBC Act that are predicted to occur (Department of the Environment and Energy [DEE], 2017).
2.3.3.4 Results - Threatened Flora Species Records

The threatened species database and literature search results are provided in Attachment C. No flora species threatened under the BC Act or EPBC Act have been recorded within the BAR Footprints (Figures 7a and 7b). A previous record of *Austrostipa wakoolica* was specifically avoided during the design of the pipeline duplication (Figure 7b).

2.3.4 Targeted Surveys for Threatened Fauna Species

2.3.4.1 Recent Fauna Surveys

AMBS (2018a) (Attachment A) undertook targeted surveys for threatened fauna species listed under the BC Act and/or EPBC Act, including the list of candidate species credit species requiring survey produced by the OEH Biobanking Credit Calculator (Table 6).

Threatened fauna species were targeted in accordance with the survey timing, techniques and effort described within the following survey guidelines:

- **Threatened Species Survey and Assessment Guidelines: Field Survey Methods for Fauna – Amphibians** (Department of Environment, Climate Change and Water [DECC], 2009).
- **Survey Guidelines for Australia’s Threatened Bats** (Department of the Environment, Water, Heritage and the Arts [DEWHA], 2010a).
- **Survey Guidelines for Australia’s Threatened Birds** (DEWHA, 2010b).
- **Survey Guidelines for Australia’s Threatened Mammals** (Department of Sustainability, Environment, Water, Population and Communities [DSEWPaC], 2011a).
- **Survey Guidelines for Australia’s Threatened Reptiles** (DSEWPaC, 2011b).

*Brush-tailed Phascogale*

A habitat assessment for the Brush-tailed Phascogale was undertaken along with spotlighting. However, trapping for the Brush-tailed Phascogale was not undertaken as this species is highly unlikely to use the habitat in the BAR Footprints as:

- The Brush-tailed Phascogale is not known to occur in the region. In NSW, the Brush-tailed Phascogale is mainly found east of the Great Dividing Range although there are occasional records west of the Great Dividing Range (OEH, 2017c).
- It is likely that the OEH Biobanking Credit Calculator is predicting the species occurrence based on a single historic record of this species within 200 km of the CGO (Figure 8) (OEH, 2017b). However, the record is from 1919 made by the South Australian Museum from population that is no longer extant (OEH, 2017b).
- The many previous fauna surveys (Section 2.3.4) have not recorded any evidence of this species.
Superb Parrot

The OEH Biobanking Credit Calculator does not require targeted surveys for the Superb Parrot (*Polytelis swainsonii*) (a dual ecosystem/species credit species) which has been previously recorded at the CGO. Despite this, AMBS (2018a) (Attachment A) undertook targeted surveys for the Superb Parrot.

### 2.3.4.2 Previous Fauna Surveys

A large number of fauna surveys have been conducted in the broader Lake Cowal catchment and are applicable to BAR Footprints and surrounds (Table 8). The surveys listed in Table 8 are discussed below.

#### Table 8

<table>
<thead>
<tr>
<th>Surveys</th>
<th>Timing</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fauna surveys for the CGO E42 Modification Environmental Assessment (Barrick, 2008a)</td>
<td>2008</td>
<td>Western Research Institute (2008).</td>
</tr>
<tr>
<td>Targeted fauna surveys and habitat mapping</td>
<td>2012</td>
<td>Kerle (2013a); Kerle (2013b).</td>
</tr>
</tbody>
</table>

### Regional Studies (Between 1987 and 2008)

In the late 1980s, Goldney and Bowie (1987) consolidated existing vertebrate species data in their report to the Commonwealth Government, providing a status assessment of all vertebrate fauna in the Central Western Region. More recently, Goldney *et al.* (2008) have mapped the distribution and assessed the status of nearly 600 vertebrate fauna species in the Lachlan Catchment.
Fauna Species Recorded within ML 1535 and Surrounds before Operations (between 1969 and 1997)

The first documented fauna surveys of Lake Cowal and surrounds (fish, amphibians, reptiles, birds and mammals) were carried out by the Commonwealth Scientific and Industrial Research Organisation Scientist Vestjens (1977) in the northern half of Lake Cowal from 1969 to 1976. Vestjens (1977) surveyed for a week every month (except in 1974 and 1975 when the area was visited three and five times, respectively). The methods included survey by canoe, vehicle and on foot. The surveys covered a filling and drying cycle of Lake Cowal.

Gunninah Consultants (1995) undertook extensive surveys in ML 1535 and surrounds for fish, amphibians, reptiles, birds and mammals. The surveys involved 515 trap nights with 103 ‘A size’ Elliot traps, 85 trap nights with 17 pitfall traps, 22 person-hours spotlighting, Anabat\textsuperscript{TM} detecting, amphibian call recording, habitat searches and waterbird counts.

Young (1979) conducted fish surveys of Lake Cowal across a range of habitats, and Pease and Grinberg (1995) and Scribner and Kathuria (1996) provided summaries of fish recorded at Lake Cowal during commercial fishing activities. Commercial fishing for native fin-fish ceased in NSW on 1 September 2010 but had not been carried out at Lake Cowal since the mid-1990s.

Mount King Ecological Surveys (1997) and Greg Richards and Associates (1997a, 1997b) conducted fauna and bat surveys and assessments of the proposed Temora to Cowal ETL. This ETL traverses ML 1535.

Waterbird Monitoring (1989 to present)

Monitoring of wetland bird species diversity and abundance and their breeding success has been conducted three times a year at Lake Cowal since 1989. Studies associated with the monitoring of waterbirds, including breeding events on Lake Cowal, were consolidated in the Australian Museum Business Services (2013) Lake Cowal Waterbird Monitoring (1989 to 2012) Compilation Report.

Gell and Peak (2013, 2014, 2015, 2016, 2017a and 2017b) has continued monitoring waterbird species along transects T1, T2, T7 and T8 at Lake Cowal.


Targeted surveys for threatened fauna species (amphibians, reptiles, birds and mammals [including bats]) were conducted within ML 1535 in 2003 by Cenwest Environmental Services, Charles Sturt University and Greg Richards and Associates as part of the TSMP (Barrick, 2003a).

These surveys involved herpetological searches, bird census surveys, call broadcasting, spotlighting, targeted searches, Anabat\textsuperscript{TM} detecting and harp trapping. Lake Cowal was dry during these surveys.

Additional targeted surveys for threatened species were also conducted for the approved CGO access road (Barrick, 2003d) and the Temora to Cowal ETL (Country Energy, 2004) by Cenwest Environmental Services, Charles Sturt University and Greg Richards and Associates, using similar methods.

Fauna Surveys for the CGO E42 Modification Environmental Assessment (2008)

In autumn 2008, Western Research Institute (2008) undertook fauna surveys within ML 1535. Western Research Institute also undertook targeted searches for threatened fauna species.
Methods used included spotlighting on foot, spotlighting by vehicle, herpetological searches, bird surveys, call playback, opportunistic observations and interpreting tracks and traces of fauna. A habitat assessment was also conducted. Lake Cowal was dry during these surveys.

Cenwest Environmental Services (2009) used these data in the Cowal Gold Mine E42 Modification – Modified Request Fauna Assessment.

**Fauna Species Recorded within ML 1535 During Operations (2005 to present)**

Fauna species were recorded during the following activities:

- pre-clearance fauna surveys within ML 1535 (Barrick, 2005a-z and zi, 2006a-c, 2007a-f, 2008b, 2009a-b, 2010a, 2012a, 2013b and 2014); and

These activities are described below.

**Monitoring at the Tailings Storage Facilities**


**Pre-Clearance Fauna Surveys within ML 1535**

Vegetation clearance for areas that are approved to be cleared within ML 1535 is undertaken in accordance with the Vegetation Clearance Protocol which requires Evolution to identify any habitat features present within approved clearance areas. If habitat features are present, a secondary habitat assessment is conducted, which involves further surveys of areas deemed as containing fauna habitat (i.e. trees with hollows, bat presence, etc.). The results of these surveys, including any sightings of threatened species) are recorded within a Vegetation Clearance Protocol report. To date, Evolution has compiled 41 Vegetation Clearance Protocol reports (Barrick, 2005a-z and zi, 2006a-c, 2007a-f, 2008b, 2009a-b, 2010a, 2012a, 2013b and 2014).

**Observations of Fauna within ML 1535 Reported Annually**

A requirement of the CGO annual review is to report on any fauna deaths within ML 1535 during the reporting period (Barrick, 2005ziii, 2006d, 2007g, 2008c, 2009c, 2010b, 2011, 2012b, 2013, 2014, 2015, Evolution, 2016c and 2017d). This includes reporting the deaths of any threatened fauna species recorded within ML 1535.
**Amphibian Survey (2011)**

In January 2011, Cenwest Environmental Services (2011) undertook an amphibian survey at 15 sites within ML 1535 and the immediate surrounds under conditions when Lake Cowal was nearly full. Sites were located within ML 1535 and immediately surrounding ML 1535, including: along the Temporary Isolation Bund and Lake Cowal interface and the area between the Temporary Isolation Bund and the Lake Protection Bund, lignum areas within Lake Cowal, farm dams, regrowth woodland, offset areas and creek lines. All native frogs, including threatened species were targeted.

Methods included the use of spotlighting on foot, spotlighting by vehicle, call playback, opportunistic observations, listening for and interpreting frog calls, searching for egg masses and dip netting for tadpoles. A habitat assessment of all survey sites was also conducted.

**Fish Surveys (2011, 2012, 2016 and 2017)**

Fish surveys in Lake Cowal were undertaken by frc Environmental (2011 and 2012) in February 2011 and July 2012. Surveys were conducted within six 200 square metre sites in 2011: two sites within the Compensatory Wetland, two sites within the outer areas of ML 1535 (Enhancement Wetland) and two comparative sites outside ML 1535. An additional two sites near the shoreline of Lake Cowal within ML 1535 (New Lake Foreshore) were also surveyed in 2012.

The sites surveyed allowed for a broad comparison of aquatic habitat and fish communities, including each of the habitat types present in the ephemeral lake (cane grass, lignum and bare substrate) and key habitats of targeted threatened species, where possible.

Fish communities were surveyed using a combination of electrofishing and baited traps. At each site, the species present, the abundance of each species in relation to its life history stage (juvenile, intermediate, or adult) and the apparent health of individuals were recorded. A habitat assessment of all survey sites was also conducted.

frc Environmental (2016 and 2017) undertook targeted fish surveys in December 2016 and August 2017. No threatened species of fish were recorded and diversity of fish species in Lake Cowal in the surveys was lower than that found by historical studies (frc Environmental, 2017).

**Targeted Fauna Surveys and Habitat Mapping (2012)**

Kerle (2013a) undertook targeted fauna surveys and habitat mapping within and surrounding ML 1535 from 28 to 31 August 2012. These fauna surveys specifically targeted the Superb Parrot since the species is known to occur in the locality.

**2.3.4.3 Fauna Database Records**

The *BioNet Atlas of NSW Wildlife* (OEH, 2017b), *Atlas of Living Australia Website* (Atlas of Living Australia, 2017) and *Birdlife Australia Atlas Database* (Birdlife Australia, 2017) was reviewed for nearby threatened fauna species records. In addition, a Protected Matters Search was undertaken for threatened fauna species listed under the EPBC Act that are predicted to occur (DEE, 2017).

An error was found in the *BioNet Atlas of NSW Wildlife* (OEH, 2017b). A total of 365 records at Location Key LEXK99072200 came from a 1997 list of species from CSIRO that was not a record list i.e. it included species that may occur. OEH (pers. comm. 2017) will remove the records from the *BioNet Atlas of NSW Wildlife*. 
2.3.4.4 Results - Threatened Fauna Species Records

The threatened species database and literature search results are provided in Attachment C. Threatened fauna species records in the BAR Footprints and surrounds are shown on Figures 9a, 9b, 10a and 10b. Threatened fauna species recorded in the BAR Footprint associated with the mine site are (Figure 9a):

- Grey-crowned Babbler (eastern subspecies) (*Pomatostomus temporalis subsp. temporalis*) (an ecosystem credit species);
- Superb Parrot (a dual ecosystem/species credit species);
- Little Eagle (*Hieraaetus morphnoides*) (an ecosystem credit species); and
- Black Falcon (*Falco subniger*) (an ecosystem credit species).

2.3.5 Ecosystem Credit Species

A total of four ecosystem credit species are listed in Table 9 from the OEH Biobanking Credit Calculator. Table 9 shows that the Little Pied Bat is the predicted threatened species with lowest \( T_G \) (i.e. 0.475\(^2\)). The Little Pied Bat has been recorded at Wamboynne Mountain (OEH, 2017b).

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Conservation Status(^1)</th>
<th>TS Offset Multiplier</th>
<th>( T_G ) Value</th>
<th>Presence in the BAR Footprint (Figure 9a)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Birds</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Major Mitchell's Cockatoo</td>
<td><em>Lophochroa leadbeateri</em></td>
<td>V - Yes</td>
<td>0.525</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Swift Parrot</td>
<td><em>Lathamus discolor</em></td>
<td>E CE Yes</td>
<td>0.75</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Grey-crowned Babbler (eastern subspecies)</td>
<td><em>Pomatostomus temporalis subsp. temporalis</em></td>
<td>V - Yes</td>
<td>0.75</td>
<td>Recorded in the BAR Footprint</td>
<td></td>
</tr>
<tr>
<td><strong>Mammals</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Little Pied Bat</td>
<td><em>Chalinolobus picatus</em></td>
<td>V - Yes</td>
<td>0.475</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

\(^1\) Threatened species status under the BC Act (current as at March 2018). V = Vulnerable, E = Endangered

Threatened species status under the EPBC Act (current as at March 2018). CE = Critically Endangered

The species with the lowest \( T_G \) value influences the offset multiplier designated to each vegetation zone. Table 10 identifies the vegetation zones along with the associated ecosystem credit species that have been identified as having the lowest \( T_G \) value for that zone (for all zones the lowest \( T_G \) is 0.475 – the Little Pied Bat).

\(^2\) \( T_G \) value is defined by OEH (2014a) as *the ability of a species to respond to improvement in site value or other habitat improvement at an offset site with management actions. \( T_G \) is based on an assessment of effectiveness of management actions, life history characteristics, naturally very rare species, and very poorly known species.*
LEGEND

Approximate Extent of Approved
Surface Development
BAR Footprint - Pipeline
Threatened Bird Species

Reference:
2. OEH (2017)
3. OEH (2017)
4. AMBS (2013)

Note: There are no references 2 and 4 on this figure.

Source: © NSW Department of Finance, Services & Innovation (2017)
Orthophoto: Evolution (Oct 2017)

Figure 9b
Figure 10a

 Threatened Amphibian and Bat Species Recorded within the Wider Locality
 - Mine Site

**Reference:**
2. OEH (2017)
4. NSW Government (2017)
5. Survey Records (1989 - 2013)

**Note:** There are no references 2, 4 and 5 on this figure.

**Source:** Evolution (2018); © NSW Department of Planning and Environment (2017); Department of Finance, Services & Innovation (2017)

**Orthophoto:** Evolution (Oct 2017)
### Table 10
**Vegetation Zones and Predicted Threatened Species - BAR Footprint Associated with the Mine Site**

<table>
<thead>
<tr>
<th>Vegetation Zone Number</th>
<th>Vegetation Community</th>
<th>Predicted Threatened Species with Lowest $T_G$ Value</th>
<th>Species $T_G$ Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Grassy Woodlands – Floodplain Transition Woodlands</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2a</td>
<td>Inland Grey Box – White Cypress Pine Woodland (Semi Cleared in Moderate Condition) (LA152)</td>
<td>Little Pied Bat</td>
<td>0.475</td>
</tr>
<tr>
<td>2b</td>
<td>Inland Grey Box – White Cypress Pine Woodland (Semi Cleared in Low Condition) (LA152)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Forested Wetlands – Inland Riverine Forests</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>River Red Gum Forest (Moderate Condition) (LA 189)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Semi-arid Woodlands (Grassy sub-formation) – Northwest Floodplain Woodlands</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Belah Woodland (Low Condition) (LA105)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Semi-arid Woodlands (Shrubby sub-formation) – Inland Rocky Hill Woodlands</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Dwyer’s Red Gum – White Cypress Pine – Currawang Woodland (Moderate Condition) (LA144)</td>
<td>Little Pied Bat</td>
<td>0.475</td>
</tr>
<tr>
<td><strong>Grasslands – Western Slopes Grasslands</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6a</td>
<td>Highly Modified Derived Grasslands (Moderate Condition) (LA138)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>6b</td>
<td>Highly Modified Derived Grasslands (Low Condition) (LA138)</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Ecosystem species cannot be added to the OEH Biobanking Credit Calculator, however there are some species that have been recorded locally but are not predicted to occur within the OEH Biobanking Credit Calculator. These species are discussed below.

**Little Eagle and Black Falcon**

Two ecosystem species recorded in the BAR Footprint associated with the mine site (Little Eagle and Black Falcon, both ‘Vulnerable’ under the BC Act) (Figure 9a) were not predicted to occur within the OEH Biobanking Credit Calculator (i.e. the species are not listed in Table 9). The Little Eagle has a $T_G$ value of 0.775 (OEH, 2017a) and therefore it would not increase the ecosystem credit requirement as the lowest $T_G$ value is 0.475 (Table 9). The Black Falcon does not have a $T_G$ value (OEH, 2017a).

**Superb Parrot**

One dual ecosystem/species credit species recorded in the BAR Footprint associated with the mine site (the Superb Parrot) (Figures 11a and 11b) was also not predicted to occur within the OEH Biobanking Credit Calculator (i.e. the species is not listed in Table 9). This species has a $T_G$ value of 0.575 (OEH, 2017a) and therefore it would not increase the ecosystem credit requirement as the lowest $T_G$ value is 0.475 (Table 9).

2.3.6 Species Credit Species

No species credit species have been recorded in the BAR Footprint associated with the mine site. As described in Section 2.3.2, while not predicted to occur in the locality by the OEH Biobanking Credit Calculator, the Superb Parrot (a dual ecosystem/species credit species) has been previously recorded at the CGO (Figure 9a). This species is a species credit species for breeding habitat (not foraging habitat).
Potential breeding habitat for the Superb Parrot does not occur in the BAR Footprint associated with the mine site, however the pipeline duplication does traverse potential foraging and breeding habitat for the Superb Parrot, along the foreshores of Lake Cowal (Figures 11a and 11b) (Section 3.3.4).

2.3.7 Species That Cannot Withstand Loss

No species credit species (those that cannot withstand loss) are relevant to the BAR Footprint associated with the mine site.

2.3.8 Impacts on Species That Require Further Consideration

The FBA (OEH, 2014a) describes that some threatened species require further consideration (by the NSW Government) in addition to the OEH Biobanking Credit Calculator. No species relevant to the BAR Footprint associated with the mine site require further consideration.

2.3.9 EPBC Act Threatened Species and Communities

Threatened Species

No flora species threatened under the EPBC Act have been recorded within the BAR Footprints (Figures 7a and 7b).

The FBA assessment of the BAR Footprint associated with the mine site included the following two threatened fauna species under the EPBC Act:

- Swift Parrot (*Lathamus discolor*) (ecosystem credit species) (Table 9); and
- Superb Parrot (dual ecosystem/species credit species).

These species are discussed below.

Swift Parrot

The Swift Parrot has not been recorded during extensive field surveys at the CGO (Section 2.3.4). This species is not likely to be adversely impacted by the Modification.

Superb Parrot

As detailed in Section 2.3.6, the Superb Parrot (Vulnerable under the EPBC Act) was recorded within the BAR Footprints (Figure 9a). Impacts on this species are further assessed in Section 4.2.

Other Threatened Species

The following EPBC Act listed threatened species have survey and/or database records in the wider locality of (but not within) the BAR Footprints (Figure 9a):

- Malleefowl;
- Australasian Bittern;
- Curlew Sandpiper; and
- Painted Honeyeater.

These species are discussed below.
LEGEND

- Mining Lease Boundary (ML 1535)
- Mining Lease Application Boundary (MLA 1)
- Approximate Extent of Approved Surface Development
- BAR Footprint - Mine Site
- BAR Footprint - Pipeline
- Superb Parrot Recorded Location
- Superb Parrot Potential Breeding Habitat
- Forested Wetlands - Inland Riverine Forests
- River Red Gum Forest (Moderate Condition) (LA191)

Source: Evolution (2018); © NSW Department of Finance, Services & Innovation (2017)
Orthophoto: Evolution (Oct 2017)

Note: There are no references 1, 2 or 6 on this figure.

Reference:
3. OEH (2017)
4. AMBS (2018a)
5. AMBS (2013)
7. AMBS (2018b)

Figure 11a
LEGEND

- Approximate Extent of Approved Surface Development
- BAR Footprint - Pipeline
- SUPERB PARROT POTENTIAL BREEDING HABITAT
- Forested Wetlands - Inland Riverine Forests
- River Red Gum Forest (Moderate Condition) (LA191)

Source: © NSW Department of Finance, Services & Innovation (2017)
Orthophoto: Evolution (Oct 2017)
Malleefowl

The database record for the Malleefowl as shown on Figure 9a is from 1997 (Atlas of Living Australia, 2017). The validity of the record is doubtful given the absence of suitable habitat for this species. This ecosystem credit species is not likely to be adversely impacted by the Modification, and as stated in Section 2.3.5, ecosystem species cannot be added to the OEH Biobanking Credit Calculator.

Australasian Bittern

The Australasian Bittern has not been recorded within the BAR Footprints or during extensive field surveys at the CGO (Section 2.3.4). This species was recorded within Lake Cowal during Lake Cowal bird monitoring in January 1994 (Australian Museum Business Services, 2013). This species credit species is not likely to be adversely impacted by the Modification.

Curlew Sandpiper

This species was recorded in the surrounds of the Modification area during Lake Cowal bird monitoring on a single occasion, with 12 individuals being recorded during October 2001 (Figure 9a) (Australian Museum Business Services, 2013). In addition, a database record from 1997 for this species exists within 100 m of the eastern part of the Modification area within Lake Cowal (Figure 9a) (OEH, 2017b). This ecosystem credit species is not likely to be adversely impacted by the Modification, and as stated in Section 2.3.5, ecosystem species cannot be added to the OEH Biobanking Credit Calculator.

Painted Honeyeater

The Painted Honeyeater has not been recorded within the BAR Footprints or during extensive field surveys at the CGO (Section 2.3.4). The Painted Honeyeater was recorded by Vestjens (1977) in the north-eastern portion of Lake Cowal (Figure 9a). There are also database records within Lake Cowal (Atlas of Living Australia, 2017 and OEH, 2017b). This species credit species is not likely to be adversely impacted by the Modification.

Threatened Ecological Communities

AMBS (2018a) (Attachment A) undertook targeted surveys for potentially occurring threatened ecological communities listed under the BC Act or EPBC Act in accordance with relevant listing advice. Threatened ecological communities listed under the EPBC Act are shown on Figures 12a and 12b. Approximately 11.5 ha of Grey Box EEC listed under the EPBC Act would be cleared for the Modification in the BAR Footprint associated with the mine site (Figure 12a).

2.3.10 FM Act Threatened Species and Communities

Threatened species and communities listed under the NSW Fisheries Management Act, 1994 (FM Act) are discussed in Section 3.3.8.

2.3.11 Credit Summary - BAR Footprint Associated with the Mine Site

A summary of the credit requirements for the BAR Footprint associated with the mine site are provided in Table 11. The credit report is provided in Attachment D.
Table 11
Ecosystem Credit Requirements – BAR Footprint Associated with the Mine Site

<table>
<thead>
<tr>
<th>#</th>
<th>Vegetation Community</th>
<th>PCT</th>
<th>Clearance Area (ha)</th>
<th>Credit Requirement (Attachment D)</th>
<th>Credits from BVTs able to be retired to address the Ecosystem Credit Requirement (Attachment D)</th>
<th>Offset Location</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Grassy Woodlands – Floodplain Transition Woodlands</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2a</td>
<td>Inland Grey Box - White Cypress Pine Woodland (Semi Cleared in Moderate Condition) (LA152)</td>
<td>82</td>
<td>6.5&lt;sup&gt;A&lt;/sup&gt;</td>
<td>816</td>
<td>LA 152, LA 153, LA 154, LA162, LA 163, LA 175, LA 178, LA 194, LA 195</td>
<td>Lower Slopes - Lachlan</td>
</tr>
<tr>
<td></td>
<td>Inland Grey Box - White Cypress Pine Woodland (Derived Grassland in Low Condition) (LA152)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2b</td>
<td>23.5&lt;sup&gt;B&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Semi-arid Woodland (Grassy sub–formation) – Northwest Floodplain Woodlands</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Belah Woodland (Low Condition) (LA105)</td>
<td>55</td>
<td>16.5</td>
<td>193</td>
<td>LA 105</td>
<td>Lower Slopes - Lachlan</td>
</tr>
<tr>
<td></td>
<td><strong>Semi-arid Woodland (Scrubby sub–formation) – Inland Rocky Hill Woodlands</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Dwyer’s Red Gum - White Cypress Pine - Currawang Woodland (Moderate Condition) (LA144)</td>
<td>185</td>
<td>1</td>
<td>18</td>
<td>LA 144, LA 204, LA 220, LA 122, LA 126, LA 141, LA 142, LA 143, LA 147, LA 148, LA 149, LA 181, LA 184, LA 200, LA237, LA 249, LA 270, LA 253, LA 254, LA 269, LA 267</td>
<td>Lower Slopes - Lachlan</td>
</tr>
<tr>
<td></td>
<td><strong>Grasslands – Western Slopes Grasslands</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6a</td>
<td>Highly Modified Derived Grasslands (Moderate Condition) (LA138)</td>
<td>250</td>
<td>63.5</td>
<td>2,532</td>
<td>LA 138, LA 244, LA 238</td>
<td>Lower Slopes - Lachlan</td>
</tr>
<tr>
<td>6b</td>
<td>Highly Modified Derived Grasslands (Low Condition) (LA138)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>6b</td>
<td>170.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>281.5</strong></td>
<td><strong>3,559</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A  6.5 ha equivalent to the Grey Box EEC listed under the EPBC Act and BC Act.
B  23.5 ha equivalent to the Grey Box EEC listed under the BC Act, including approximately 5 ha equivalent to the Grey Box EEC listed under the EPBC Act.
Threatened Ecological Communities

EPBC Act
- Mine Site

Figure 12a
LEGEND

- Approximate Extent of Approved Surface Development
- BAR Footprint - Pipeline

VEGETATION MAPPING
- Semi-arid Woodlands (Grassy sub-formation) - Riverine Plain Woodlands
- Weeping Myall Open Woodland (Semi Cleared in Moderate Condition) (LA212)
- Weeping Myall Open Woodland (Semi Cleared in Low Condition) (LA212)

Source: © NSW Department of Finance, Services & Innovation (2017)
Orthophoto: Tushion (Oct 2017)

REFER FIGURE 12a

CGO PROCESSING RATE MODIFICATION
Threatened Ecological Communities
EPBC Act
-Pipeline

Figure 12b
3 STAGE 1 – BIODIVERSITY ASSESSMENT – PIPELINE DUPLICATION

This section provides information on the application of the linear shaped development assessment for the pipeline duplication. The BAR Footprint associated with the pipeline duplication is approximately 6 m wide.

3.1 LANDSCAPE FEATURES

Landscape features relevant to the BAR Footprint associated with the pipeline duplication are described in this sub-section.

3.1.1 Regional Setting and Landscape

The BAR Footprint associated with the pipeline duplication is located within the regions listed in Table 12 and shown on Figure 13.

Table 12
Regional Setting and Landscape Associated with the Pipeline Duplication

<table>
<thead>
<tr>
<th>Boundary</th>
<th>BAR Footprint Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBRA Region</td>
<td>NSW South Western Slopes</td>
</tr>
<tr>
<td>IBRA Sub-region</td>
<td>Lower Slopes</td>
</tr>
<tr>
<td>CMA</td>
<td>Lachlan</td>
</tr>
<tr>
<td>CMA Sub-region</td>
<td>Lower Slopes - Lachlan</td>
</tr>
<tr>
<td>LGA</td>
<td>Forbes Shire Council</td>
</tr>
<tr>
<td>Mitchell Landscape</td>
<td>Cowal Lakes, Swamps and Lunettes;</td>
</tr>
<tr>
<td></td>
<td>Lachlan – Bland Channels and Floodplains; and</td>
</tr>
<tr>
<td></td>
<td>Ardlethan Hills</td>
</tr>
</tbody>
</table>

3.1.2 Landscape Value Score

The ‘linear shaped developments or multiple fragmentation impacts (Major Project module)’ in the OEH Biobanking Credit Calculator was used to assess the landscape value score for the Modification in consideration of the FBA (OEH, 2014a), Framework for Biodiversity Assessment – Linear Module (OEH, 2015b) and Credit Calculator for Major Projects and BioBanking Operational Manual (OEH, 2016a).

In order to determine the landscape value score for the BAR Footprint associated with the pipeline duplication, the following landscape attributes were entered into the OEH Biobanking Credit Calculator:

- percent native vegetation cover (6-10% before and 6-10% after);
- connectivity value (the connectivity value score is 12.5); and
- area to perimeter ratio (74 before and 74 after).

The extent of native vegetation in the buffer area was informed by AMBS (2018a) (Attachment A) and OEH (2015a) (Figure 13) and it was assumed that all native vegetation is in moderate to good condition (except that confirmed to be in low condition by AMBS) (Figure 13). The approved CGO within the buffer area was assumed cleared for the purpose of the assessment.
**State and Regionally Significant Biodiversity Links**

The BAR Footprint associated with the pipeline duplication traverses Lake Cowal (Figure 14). Lake Cowal/Wilbertroy Wetlands (NSW040) is a wetland on the Directory of Important Wetlands of Australia (DIWA) (DEE, 2018a) (Figure 14). According to the FBA (2014a), impacts on a wetland in the DIWA correspond to impacts on a state significant biodiversity link (with a maximum connectivity value score of 12.5 [FBA, 2014a]).

Given the state significant biodiversity link category is triggered, assessments on lesser links (regionally significant biodiversity link, very large area biodiversity link, large area biodiversity link or local area biodiversity link) are not required.

### 3.1.3 Impacts on Landscape Features that Require Further Consideration

According to the FBA (2014a), impacts on state significant biodiversity links require further consideration. Further assessment is provided in Section 4.1.4.

### 3.2 NATIVE VEGETATION

Native vegetation relevant to the BAR Footprint associated with the pipeline duplication is described in this sub-section based on detailed flora survey work undertaken by AMBS (2018a) (Attachment A).

#### 3.2.1 Plant Community Types/Biometric Vegetation Types

As described in Section 2.2.1, AMBS (2018a) (Attachment A) conducted flora surveys within the BAR Footprints and developed vegetation community mapping. Sites sampled by AMBS (2018a) (Attachment A) are shown on Figure 6a and 6b. Vegetation communities are shown on Figures 7a and 7b.

The area of each vegetation community in the BAR Footprint associated with the pipeline duplication is provided in Table 13. In summary, the BAR Footprint associated with the pipeline duplication is 15.2 ha in size, comprising 5.2 ha of native vegetation. The remaining 10 ha is composed of lake bed (8.5 ha) and land that has been cleared or is used for cropping (1.5 ha).

<table>
<thead>
<tr>
<th>#</th>
<th>Vegetation Community</th>
<th>PCT</th>
<th>Area (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1a</td>
<td>Weeping Myall Open Woodland (Semi Cleared in Moderate Condition) (LA212)</td>
<td>26</td>
<td>1.3 A, B</td>
</tr>
<tr>
<td>1b</td>
<td>Weeping Myall Open Woodland (Semi Cleared in Low Condition) (LA212)</td>
<td></td>
<td>0.2 A, B</td>
</tr>
<tr>
<td>1c</td>
<td>Weeping Myall Open Woodland (Derived Grassland in Low Condition) (LA212)</td>
<td></td>
<td>3 A</td>
</tr>
<tr>
<td>2</td>
<td>River Red Gum Forest (Moderate Condition) (LA191)</td>
<td></td>
<td>0.4</td>
</tr>
<tr>
<td>6b</td>
<td>Highly Modified Derived Grasslands (Low Condition) (LA138)</td>
<td></td>
<td>0.3</td>
</tr>
</tbody>
</table>

**Total Native Vegetation**

- 5.2

**Cleared Land/Cropping**

- 1.5

**Lake Bed**

- 8.5

**Total BAR Footprint for the Pipeline Duplication**

- 15.2

A Equivalent to the Myall Woodland EEC listed under the BC Act.

B Equivalent to the Myall Woodland EEC listed under the EPBC Act as it is part of a patch that is >0.5 ha in size.
3.2.2 Threatened Ecological Communities

AMBS (2018a) (Attachment A) undertook targeted surveys for potentially occurring threatened ecological communities listed under the BC Act or EPBC Act in accordance with relevant listing advice.

The Weeping Myall (*Acacia pendula*) woodland and derived grassland in the BAR Footprint associated with the pipeline duplication (Vegetation Community 1a, 1b and 1c) represents the *Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions* listed under the BC Act (Myall Woodland EEC listed under the BC Act) (approximately 4.5 ha). Approximately 1.5 ha of the Myall Woodland EEC listed under the BC Act also meets the criteria for the Weeping Myall Woodlands listed under the EPBC Act (Myall Woodland EEC listed under the EPBC Act) (Table 14) (Plate 3).

Table 14
Threatened Ecological Communities in the BAR Footprint Associated with the Pipeline Duplication

<table>
<thead>
<tr>
<th>Threatened Ecological Community</th>
<th>Conservation Status</th>
<th>1a Weeping Myall Open Woodland (Semi Cleared in Moderate Condition) (LA212)</th>
<th>1b Weeping Myall Open Woodland (Semi Cleared in Low Condition) (LA212)</th>
<th>1c Weeping Myall Open Woodland (Derived Grassland in Low Condition) (LA212)</th>
<th>Area (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions (Myall Woodland EEC listed under the BC Act)</td>
<td>E</td>
<td>1.3</td>
<td>0.2</td>
<td>3</td>
<td>4.5</td>
</tr>
<tr>
<td>Weeping Myall Woodlands (Myall Woodland EEC listed under the EPBC Act)</td>
<td>E</td>
<td>1.3</td>
<td>0.2*</td>
<td>N/A</td>
<td>1.5</td>
</tr>
</tbody>
</table>

* Threatened status under the BC Act and/or EPBC Act (current as at March 2018).

E = Endangered

* Equivalent to the Myall Woodland EEC listed under the EPBC Act as it is part of a patch that is >0.5 ha in size.

The site condition (plot data) collected in Vegetation Community 1a (Weeping Myall Open Woodland [Semi Cleared in Moderate Condition] [LA212]) indicates the understorey comprises a nil-negligible cover of native grasses, 14-18% cover of other native plants (e.g. herbs) and 20-76% cover of weeds (mostly non-native grasses).

The site condition (plot data) collected in Vegetation Community 1b (Weeping Myall Open Woodland [Semi Cleared in Low Condition] [LA212]) indicates the understorey comprises a nil-negligible cover of native grasses, 42% cover of other native plants (e.g. herbs) and 6% cover of weeds.

The site condition (plot data) collected in Vegetation Community 1c (Weeping Myall Open Woodland [Derived Native Grassland in Low Condition] [LA212]) indicates the understorey comprises 14-62% cover of native grasses, 16-34% cover of other native plants (e.g. herbs) and 2-36% cover of weeds.
The vegetation communities described in Section 3.2.1 were grouped into vegetation zones according to their condition. Table 15 outlines the vegetation zones present in the BAR Footprint associated with the pipeline duplication, relevant PCT/BVT, condition, site value score (i.e. the quantitative measure of vegetation condition), area and patch size.

The patch size for two vegetation zones were greater than 1,000 ha (i.e. connecting with vegetation outside the BAR Footprint associated with the pipeline duplication, both were woodlands in moderate to good condition) (Table 15). One vegetation zone was derived native grassland in low condition with a current site value score of less than 17, namely the 0.3 ha of Highly Modified Derived Grasslands (Low Condition) (LA138) (Table 15). As such, this community does not require ecosystem credits.

### 3.2.3 Vegetation Zones

Site condition data was collected by AMBS (2018a) (Attachment A) at each FBA Plot location (Figures 6a and 6b)

### 3.2.4 Vegetation Condition

No threatened ecological communities described in the FBA (OEH, 2014a) and listed under the BC Act or EPBC Act were mapped by AMBS (2018a) (Attachment A) within the BAR Footprints.
Table 15
Vegetation Zones in the BAR Footprint Associated with the Pipeline Duplication

<table>
<thead>
<tr>
<th>Vegetation Zone</th>
<th>#</th>
<th>Vegetation Community</th>
<th>PCT</th>
<th>Area (ha)</th>
<th>Condition Class</th>
<th>Site Value Score</th>
<th>Patch Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semi-arid Woodlands Formation (Grassy Sub-formation) – Riverine Plain Woodlands</td>
<td>1</td>
<td>1a Weeping Myall Open Woodland (Semi Cleared in Moderate Condition) (LA212)</td>
<td>26</td>
<td>1.3</td>
<td>Moderate/Good</td>
<td>51.33</td>
<td>&gt;1001</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>1b and 1c Weeping Myall Open Woodland (Semi Cleared in Low Condition) (LA212) and Weeping Myall Open Woodland (Derived Grassland in Low Condition) (LA212)</td>
<td>3.2</td>
<td>Low</td>
<td>48.89</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Forested Wetlands – Inland Riverine Forests</td>
<td>3</td>
<td>3 River Red Gum Forest (Moderate Condition) (LA191)</td>
<td>249</td>
<td>0.4</td>
<td>Moderate/Good</td>
<td>54.17</td>
<td>&gt;1001</td>
</tr>
<tr>
<td>Grasslands – Western Slopes Grasslands</td>
<td>4</td>
<td>6b Highly Modified Derived Grasslands (Low Condition) (LA138)</td>
<td>250</td>
<td>0.3</td>
<td>Low</td>
<td>15.33*</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td>5.2</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* This vegetation zone has a current site value score of less than 17. As such, this community does not require ecosystem credits.

^ Zone 2 comprises Vegetation community 1b and 1c because both are in low condition and therefore must be grouped in the OEH Biobanking Credit Calculator.

3.3 THREATENED SPECIES

Threatened species relevant to the BAR Footprint associated with the pipeline duplication are identified in this sub-section.

3.3.1 Habitat Features for Particular Species Credit Species

Habitat features from the OEH Biobanking Credit Calculator are listed in Table 16, along with the relevance of the habitat features to the BAR Footprint associated with the pipeline duplication.

Table 16
Threatened (Species Credit) Species Habitat Features - BAR Footprint Associated with the Pipeline Duplication

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Conservation Status</th>
<th>Habitat Feature (OEH Biobanking Credit Calculator)</th>
<th>Potentially Relevant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amphibian</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sloane’s Froglet</td>
<td>Crinia sloanei</td>
<td>V</td>
<td>Land within 50 m of identified breeding habitat.</td>
<td>Yes</td>
</tr>
<tr>
<td>Birds</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grey Falcon</td>
<td>Falco hypoleucos</td>
<td>E</td>
<td>Land within 100 m of riparian woodland on inland rivers containing mature living eucalypts or isolated paddock trees overhanging water or dry watercourses.</td>
<td>Yes</td>
</tr>
</tbody>
</table>

* Threatened fauna species status under the BC Act and/or EPBC Act (current as at March 2018). V = Vulnerable; E = Endangered
3.3.2 Targeted Surveys for Threatened Species

A list of candidate species credit species requiring survey was produced by the OEH Biobanking Credit Calculator (Table 17). All species credit species requiring survey were surveyed by AMBS (2018a) (Attachment A).

The OEH Biobanking Credit Calculator does not require targeted surveys for the Superb Parrot (a dual ecosystem/species credit species) which has been previously recorded at the CGO (Figure 9a). Despite this, AMBS (2018a) (Attachment A) undertook targeted surveys for the Superb Parrot.

3.3.3 Ecosystem Credit Species

A total of 25 ecosystem credit species are listed in Table 18 from the OEH Biobanking Credit Calculator. Table 18 shows that the Barking Owl (Ninox connivens) is the predicted threatened species with lowest $T_G$ (i.e. 0.325). There are database records of the Barking Owl in the wider locality (OEH, 2017b) (Figure 9a).
Table 17
Threatened (Species Credit) Species Survey Timing - BAR Footprint Associated with the Pipeline Duplication

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Conservation Status</th>
<th>Survey Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>BC Act</td>
<td>EPBC Act</td>
</tr>
<tr>
<td><strong>Flora</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A spear-grass</td>
<td>Austrostipa wakoolica</td>
<td>E</td>
<td>E</td>
</tr>
<tr>
<td>Silky Swainson-pea</td>
<td>Swainsona sericea</td>
<td>V</td>
<td>-</td>
</tr>
<tr>
<td>Small Scurf-pea</td>
<td>Cullen parvum</td>
<td>E</td>
<td>-</td>
</tr>
<tr>
<td><strong>Amphibian</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sloane’s Froglet</td>
<td>Crinia sloanei</td>
<td>V</td>
<td>-</td>
</tr>
<tr>
<td><strong>Birds</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grey Falcon</td>
<td>Falco hypoleucos</td>
<td>E</td>
<td>-</td>
</tr>
<tr>
<td><strong>Mammals</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Koala</td>
<td>Phascolarctos cinereus</td>
<td>V</td>
<td>V</td>
</tr>
</tbody>
</table>

**LEGEND**
Highlighted month is the month in which targeted surveys were undertaken for the relevant species by AMBS (2018a) (Attachment A)

1 Threatened fauna species status under the BC Act and/or EPBC Act (current as at March 2018). V = Vulnerable; E = Endangered
Table 18
Ecosystem Species from the OEH Biobanking Credit Calculator – BAR Footprint Associated with the Pipeline Duplication

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Conservation Status¹</th>
<th>T₀ Value</th>
<th>Presence in the BAR Footprint (Figures 9a, 9b, 10a and 10b)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Birds</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freckled Duck</td>
<td>Stictonetta naevosa</td>
<td>V</td>
<td>0.75</td>
<td></td>
</tr>
<tr>
<td>Square-tailed Kite</td>
<td>Lophoictinia isura</td>
<td>V</td>
<td>0.725</td>
<td></td>
</tr>
<tr>
<td>Spotted Harrier</td>
<td>Circus assimilis</td>
<td>V</td>
<td>0.725</td>
<td></td>
</tr>
<tr>
<td>Little Eagle</td>
<td>Hieraaetus morphnoides</td>
<td>V</td>
<td>0.725</td>
<td></td>
</tr>
<tr>
<td>Broga</td>
<td>Grus rubicunda</td>
<td>V</td>
<td>0.75</td>
<td></td>
</tr>
<tr>
<td>Bush Stone-curlew</td>
<td>Burhinus grallarius</td>
<td>E</td>
<td>0.375</td>
<td></td>
</tr>
<tr>
<td>Australian Painted Snipe</td>
<td>Rostratula australis</td>
<td>E, E</td>
<td>0.75</td>
<td></td>
</tr>
<tr>
<td>Major Mitchell's Cockatoo</td>
<td>Lophochroa leadbeateri</td>
<td>V</td>
<td>0.525</td>
<td></td>
</tr>
<tr>
<td>Turquoise Parrot</td>
<td>Neophema pulchella</td>
<td>V</td>
<td>0.55</td>
<td>Database record in Lake Cowal</td>
</tr>
<tr>
<td>Swift Parrot</td>
<td>Lathamus discolor</td>
<td>V, CE</td>
<td>0.75</td>
<td>Database record in Lake Cowal</td>
</tr>
<tr>
<td>Barking Owl</td>
<td>Ninox connivens</td>
<td>V</td>
<td>0.325</td>
<td>Database record in Lake Cowal</td>
</tr>
<tr>
<td>Brown Treecreeper (eastern subspecies)</td>
<td>Climacteris picumnus victoriae</td>
<td>V</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>Black-chinned Honeyeater</td>
<td>Melithreptus gularis</td>
<td>V</td>
<td>0.75</td>
<td></td>
</tr>
<tr>
<td>Painted Honeyeater</td>
<td>Grantiella picta</td>
<td>V</td>
<td>0.75</td>
<td></td>
</tr>
<tr>
<td>Pied Honeyeater</td>
<td>Certhionyx variegatus</td>
<td>V</td>
<td>0.75</td>
<td></td>
</tr>
<tr>
<td>Hooded Robin (south-eastern form)</td>
<td>Melanodryas cucullata</td>
<td>V</td>
<td>0.6</td>
<td></td>
</tr>
<tr>
<td>Flame Robin</td>
<td>Petroica phoenicea</td>
<td>V</td>
<td>0.75</td>
<td></td>
</tr>
<tr>
<td>Scarlet Robin</td>
<td>Petroica boodang</td>
<td>V</td>
<td>0.75</td>
<td></td>
</tr>
<tr>
<td>Grey-crowned Babbler</td>
<td>Pomatostomus temporalis</td>
<td>V</td>
<td>0.75</td>
<td>Recorded in the BAR Footprint</td>
</tr>
<tr>
<td>Varied Sittella</td>
<td>Daphoenositta chrysoptera</td>
<td>V</td>
<td>0.75</td>
<td></td>
</tr>
<tr>
<td>Diamond Firetail</td>
<td>Stagonopleura guttata</td>
<td>V</td>
<td>0.75</td>
<td></td>
</tr>
<tr>
<td><strong>Mammals</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spotted-tailed Quoll</td>
<td>Dasyurus maculatus</td>
<td>V, E</td>
<td>0.375</td>
<td></td>
</tr>
<tr>
<td>Corben's Long-eared Bat</td>
<td>Nyctophilus corbeni</td>
<td>V, V</td>
<td>0.475</td>
<td></td>
</tr>
<tr>
<td>Little Pied Bat</td>
<td>Chalinolobus picatus</td>
<td>V</td>
<td>0.475</td>
<td></td>
</tr>
<tr>
<td>Yellow-bellied Sheath-tail-bat</td>
<td>Saccolaimus flaviventris</td>
<td>V</td>
<td>0.45</td>
<td>Recorded in the BAR Footprint</td>
</tr>
</tbody>
</table>

¹ Threatened species status under the BC Act (current as at March 2018). V= Vulnerable, E = Endangered

Table 19 identifies the vegetation zones along with the associated ecosystem credit species that have been identified as having the lowest T₀ value for that zone (for all zones the lowest T₀ is 0.325). The species with the lowest T₀ value influences the offset multiplier designated to each vegetation zone.
Table 19
Vegetation Zones and Predicted Threatened Species - BAR Footprint Associated with the Pipeline Duplication

<table>
<thead>
<tr>
<th>Vegetation Zone Number</th>
<th>Vegetation Community</th>
<th>Predicted Threatened Species with Lowest $T_G$ Value</th>
<th>Species $T_G$ Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Grassy Woodlands – Floodplain Transition Woodlands</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>1a Weeping Myall Open Woodland (Semi Cleared in Moderate Condition) (LA212)</td>
<td>Bush Stone-curlew</td>
<td>0.375</td>
</tr>
</tbody>
</table>
| 2 | 1b Weeping Myall Open Woodland (Semi Cleared in Low Condition) (LA212)  
1c Weeping Myall Open Woodland (Derived Grassland in Low Condition) (LA212) | - | - |
| **Forested Wetlands – Inland Riverine Forests** | | | |
| 3 | 3 River Red Gum Forest (Moderate Condition) (LA 189) | Barking Owl | 0.325 |
| **Grasslands – Western Slopes Grasslands** | | | |
| 4 | 6b Highly Modified Derived Grasslands (Low Condition) (LA138) | N/A | N/A |

**Superb Parrot**

One dual ecosystem/species credit species recorded in the BAR Footprint associated with the pipeline duplication (the Superb Parrot) (Figure 9a) was also not predicted to occur within the OEH Biobanking Credit Calculator (i.e. the species is not listed in Table 18). This species has a $T_G$ value of 0.575 (OEH, 2017a) and therefore it would not increase the ecosystem credit requirement as the lowest $T_G$ value is 0.325 (Table 18).

### 3.3.4 Species Credit Species

As described in Section 2.3.2, while not predicted to occur in the locality by the OEH Biobanking Credit Calculator, the Superb Parrot (a dual ecosystem/species credit species) has been previously recorded at the CGO (Figure 9a). There is no evidence of Superb Parrot nesting in the BAR Footprints or in the surrounds from the extensive monitoring and field surveys which have been undertaken at the CGO (Section 2.3.4). However, potential breeding habitat for the Superb Parrot does occur in the BAR Footprint associated with the pipeline duplication. The River Red Gum Forest (Moderate Condition) (LA 189) contains River Red Gum (*Eucalyptus camaldulensis*) with numerous hollows over 5 centimetres (cm) wide, as such this vegetation community is considered potential foraging and breeding habitat for the Superb Parrot (Table 20) (Figures 11a and 11b).

Table 20
Relevant Species Credit Species

<table>
<thead>
<tr>
<th>Species</th>
<th>Presence</th>
<th>Conservation Status (^1)</th>
<th>Potential Habitat</th>
<th>Clearance Area (ha) (^2)</th>
<th>$T_G$ Score</th>
<th>Credit Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Superb Parrot</td>
<td>Yes</td>
<td>E CE</td>
<td>River Red Gum Forest (Moderate Condition) (LA191)</td>
<td>0.4</td>
<td>1.8</td>
<td>7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td>0.4</td>
<td>1.8</td>
<td>7</td>
</tr>
</tbody>
</table>

\(^1\) Threatened species status under the BC Act (current as at March 2016). E = Endangered  
\(^2\) Threatened species status under the EPBC Act (current as at March 2016). CE = Critically Endangered
No other species credit species are relevant to the BAR Footprint associated with the pipeline duplication.

It is recognised that Lake Cowal provides habitat for waterbirds when the lake is inundated. Species credit species previously recorded at Lake Cowal are: the Australasian Bittern (*Botaurus poiciloptilus*), Australian Painted Snipe (*Rostratula australis*), and White-bellied Sea-Eagle (*Haliaeetus leucogaster*) (Attachment C).

None of these species credit species are likely to be adversely impacted by the pipeline duplication. Similar to the existing pipeline, the duplicated pipeline would be buried. Should Lake Cowal contain water at the time of construction, the pipeline would be placed on the lake bed before being buried once lake levels subside and ground conditions allow burial of the pipeline.

Grazing and opportunistic cropping within the full storage water line of Lake Cowal (outside of ML 1535) occur when the lake has receded, and moisture and market conditions are suitable.

### 3.3.5 Species That Cannot Withstand Loss

The Superb Parrot (the only relevant species credit species) is not a species that cannot withstand loss as classified by OEH (2017a).

### 3.3.6 Impacts on Species That Require Further Consideration

No species relevant to the BAR Footprint associated with the pipeline duplication require further consideration.

### 3.3.7 EPBC Act Threatened Species and Communities

#### Threatened Species

No flora species threatened under the EPBC Act have been recorded within the BAR Footprints (Figures 7a and 7b).

The FBA assessment of the BAR Footprint associated with the pipeline duplication included the following five threatened fauna species under the EPBC Act:

- Australian Painted Snipe (*Rostratula australis*) (ecosystem credit species) (Table 18);
- Swift Parrot (*Lathamus discolor*) (ecosystem credit species) (Table 18);
- Superb Parrot (dual ecosystem/species credit species);
- Spotted-tailed Quoll (*Dasyurus maculatus*) (ecosystem credit species) (Table 18); and
- Corben's Long-eared Bat (*Nyctophilus corbeni*) (ecosystem credit species) (Table 18).

These species are discussed below.

#### Australian Painted Snipe

The Australian Painted Snipe has several records from the Lake Cowal area, however it has not been recorded during extensive field surveys at the CGO. Therefore, this species is not likely to be adversely impacted by the Modification. Despite this, potential impacts on this species habitat are accounted for in the credit calculation because the species is included in Table 18.
**Swift Parrot**

The Swift Parrot has not been recorded during extensive field surveys at the CGO (Section 2.3.4). This species is not likely to be adversely impacted by the Modification. Despite this, potential impacts on this species habitat are accounted for in the credit calculation because the species is included in Table 18.

**Superb Parrot**

As detailed in Section 2.3.6, the Superb Parrot (Vulnerable under the EPBC Act) was recorded within the BAR Footprints (Figure 9a). Impacts on this species are further assessed in Section 4.2.

**Spotted-tailed Quoll**

A single record of the Spotted-tailed Quoll exists within the wider CGO surrounds from 1997 (Atlas of Living Australia, 2017). Validity of this record is questionable as it is not recognised habitat for the species. Extensive surveys have not recorded the species within the Modification Area. This species is not likely to be adversely impacted by the Modification. Despite this, potential impacts on this species habitat are accounted for in the credit calculation because the species is included in Table 18.

**Corben’s Long-eared Bat**

* Nyctophilus * sp./spp. have been recorded within the CGO at the tailing storage facilities (Donato Environmental Services, 2006, 2007, 2008b, 2008c, 2009, 2010a, 2010b, 2011a, 2012a, 2012b, 2013a and b). However, it is uncertain whether or not this species occurs in the surrounds since * Nyctophilus * spp. calls are unable to be identified at the species level using current Anabat™ technology. The records are indeterminate as to what species may or may not be present. Hence a conservative position has been adopted and the Corben’s Long-eared Bat is assessed as being present, even though this may not be the case. Potential impacts on this species habitat are accounted for in the credit calculation because the species is included in Table 18.

**Threatened Ecological Communities**

AMBS (2018a) (Attachment A) undertook targeted surveys for potentially occurring threatened ecological communities listed under the BC Act or EPBC Act in accordance with relevant listing advice. Approximately 1.5 ha of Myall Woodland EEC listed under the EPBC Act would be cleared for the Modification in the BAR Footprint associated with the pipeline duplication (Figures 12a and 12b).

### 3.3.8 FM Act Threatened Species and Communities

**Threatened Species**

The Macquarie Perch (*Macquaria australasica*) and Silver Perch (*Bidyanus bidyanus*) were recorded within the Lachlan River Catchment area between 1947 and 1992 (Pease and Grinberg, 1995). No threatened fish species were recorded within Lake Cowal during targeted surveys in February 2011 or July 2012 surveys (undertaken in conditions when Lake Cowal was nearly full) by frc Environmental (2011, 2012).

Recent surveys of fish communities in Lake Cowal undertaken by frc Environmental in December 2016 and August 2017 recorded no threatened species (frc Environmental, 2016 and 2017).
The Freshwater Threatened Species Distribution Maps (Department of Primary Industries Fishing, 2018) indicate that one other species listed under the FM Act has a distribution that includes the locality, i.e. the Western Olive Perchlet (Ambassis agassizii) population. However, the Western Olive Perchlet population is now found only at a few sites in the Darling River drainage.

**Threatened Ecological Communities**

The Aquatic Ecological Community in the Natural Drainage System of the Lowland Catchment of the Lachlan River Endangered Ecological Community (Lachlan River Catchment EEC) is listed under the FM Act and includes Lake Cowal in the listing (DPI Threatened Species Unit, 2006).

The dynamics of the Lake Cowal system have been modified significantly by a number of factors including agricultural land use within the catchment, clearing, levee construction and modifications to flood entry and exit points and the construction of the Jemalong-Wyldes Plains irrigation system, including the Jemalong Weir (Resource Strategies et al., 1997 in North Limited, 1998). European Carp (Cyprinus carpio), a recognised threat to the Lachlan River Catchment EEC have, at times, also been recorded in plague proportions in Lake Cowal.

Grazing and opportunistic cropping within the full storage water line of Lake Cowal (outside of ML 1535) occur when the lake has receded, and moisture and market conditions are suitable.

### 3.3.9 Credit Summary

A summary of the ecosystem credit requirements for the BAR Footprint associated with the pipeline duplication are provided in Table 21. The credit report is provided in Attachment E.
Table 21
Ecosystem Credit Requirements - BAR Footprint Associated with the Pipeline Duplication

<table>
<thead>
<tr>
<th>#</th>
<th>Vegetation Community</th>
<th>PCT</th>
<th>Clearance Area (ha)</th>
<th>Credit Requirement (Attachment E)</th>
<th>Credits from BVTs able to be retired to address the Ecosystem Credit Requirement (Attachment E)</th>
<th>Offset Location</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Semi-arid Woodlands (Grassy sub-formation) – Riverine Plain Woodlands</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1a</td>
<td>Weeping Myall Open Woodland (Semi Cleared in Moderate Condition) (LA212)</td>
<td>26</td>
<td>1.3&lt;sup&gt;A&lt;/sup&gt;</td>
<td>51</td>
<td>LA 212</td>
<td>Lower Slopes - Lachlan</td>
</tr>
<tr>
<td>1b</td>
<td>Weeping Myall Open Woodland (Semi Cleared in Low Condition) (LA212)</td>
<td></td>
<td>3.2&lt;sup&gt;B&lt;/sup&gt;</td>
<td>58</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1c</td>
<td>Weeping Myall Open Woodland (Derived Grassland in Low Condition) (LA212)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Forested Wetlands – Inland Riverine Forests</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>River Red Gum Forest (Moderate Condition) (LA191)</td>
<td>249</td>
<td>0.4</td>
<td>19</td>
<td>LA 191, LA 263</td>
<td>Lower Slopes - Lachlan</td>
</tr>
<tr>
<td></td>
<td><strong>Grasslands – Western Slopes Grasslands</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6b</td>
<td>Highly Modified Derived Grasslands (Low Condition) (LA138)</td>
<td>250</td>
<td>0.3</td>
<td>0&lt;sup&gt;*&lt;/sup&gt;</td>
<td>LA 138, LA 244, LA 238</td>
<td>Lower Slopes - Lachlan</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td>5.2</td>
<td>128</td>
<td></td>
</tr>
</tbody>
</table>

<sup>*</sup> This vegetation zone has a current site value score of less than 17. As such, this community does not require ecosystem credits.

<sup>A</sup> Equivalent to the Myall Woodland EEC listed under the BC Act and EPBC Act

<sup>B</sup> Equivalent to the Myall Woodland EEC listed under the BC Act and 0.2 ha equivalent to the Myall Woodland EEC listed under the EPBC Act

In addition to the ecosystem credits in Table 21, the BAR Footprint associated with the pipeline duplication also requires 7 species credits for the Superb Parrot (Attachment E).
4 STAGE 2 – IMPACT ASSESSMENT

The potential impacts from the CGO on flora and fauna have been identified in various environmental impact assessments prepared over the past 20 years. An Environmental Impact Statement (EIS) (North Limited, 1998) was prepared for the CGO which includes a Species Impact Statement; a document that specifically identifies the potential and likely impacts from the CGO on threatened species and their habitat (Resource Strategies et al., 1997). In recognition of the potential impacts to Lake Cowal, the EIS also includes a document titled *Ecological Study - An Ecosystem Perspective on Post-Mining Conservation Values Associated with Cowal Gold Project* (Goldney et al., 1997) which provides an analysis of the long-term compatibility of the rehabilitated Project with the ephemeral lake system. More recent environmental impact assessments have been prepared for modifications to the CGO (Cenwest Environmental Services, 2011; FloraSearch, 2011; Western Research Institute, 2008; FloraSearch, 2008; Resource Strategies, 2013).

The CGO operates under various conditions (i.e. Consent Conditions) applied by the NSW Government. A number of management actions, protocols and monitoring programmes are being undertaken in accordance with the Consent Conditions and the environmental performance of the CGO is reported annually to the NSW Government.

4.1 IMPACT ASSESSMENT AND MEASURES TO AVOID AND MINIMISE IMPACTS

4.1.1 Measures to Avoid and Minimise Impacts

A number of mitigation measures applicable to flora and fauna have been developed for the approved CGO (that are also relevant to the Modification) as described in Table 22. Many of these measures are described in the *Cowal Gold Operations Rehabilitation Management Plan* (RMP) (Evolution, 2017b), *Cowal Gold Operations Flora and Fauna Management Plan* (Evolution, 2016b) and *Cowal Gold Project Implementation of the Threatened Species Management Protocol* (Barrick, 2003b). The measures described below would apply as appropriate to the Modification.

**Table 22**

<table>
<thead>
<tr>
<th>Measure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rehabilitation of the post-mine landforms (including waste rock emplacements)</td>
<td>The RMP (Evolution, 2017b) describes the rehabilitation objectives and strategies for the CGO. The CGO rehabilitation philosophy is to operate as a non-intrusive land user and to create stable rehabilitated landforms that increase the areas of endemic vegetation in the mine area and the status of land-lake habitats. Surface development areas associated with the CGO are progressively rehabilitated and revegetated with species characteristic of native species endemic to the local area. Landforms are revegetated with selected species of native and/or endemic vegetation that are both suitable to the physiographic and hydrological features of each landform, and which expand the areas of remnant endemic vegetation that currently exist in the immediate region (Evolution, 2017b). Permanent monitoring plots within remnant and rehabilitation areas have been established throughout the CGO and are monitored annually.</td>
</tr>
<tr>
<td>Rehabilitation of the final void</td>
<td>Rehabilitation objectives for the final void are to leave the void surrounds safe (for humans and stray stock) and create habitat opportunities for waterbirds at the approximate level at which void water will reach equilibrium, where feasible (Evolution, 2017b).</td>
</tr>
</tbody>
</table>
Table 22 (Continued)
Existing Impact Avoidance and Mitigation Measures at the CGO

<table>
<thead>
<tr>
<th>Measure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rehabilitation of the approved TSFs</strong></td>
<td>The rehabilitation objectives for the tailings storage facilities are to:</td>
</tr>
<tr>
<td></td>
<td>• establish permanently stable landforms;</td>
</tr>
<tr>
<td></td>
<td>• during operations, stabilise batters so they provide minimal habitat value for bird life (i.e.</td>
</tr>
<tr>
<td></td>
<td>rock mulch or pasture cover);</td>
</tr>
<tr>
<td></td>
<td>• post-operations, to establish vegetative communities (including Eucalypt and Riverine</td>
</tr>
<tr>
<td></td>
<td>Woodland species and understory species such as Rush and pasture species) which are suited to</td>
</tr>
<tr>
<td></td>
<td>the hydrological features and substrate materials of the landform; and</td>
</tr>
<tr>
<td></td>
<td>• exclude grazing and agricultural production.</td>
</tr>
</tbody>
</table>

**Vegetation Clearance**

<table>
<thead>
<tr>
<th>Measure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delineation of disturbance area</td>
<td>Clearance activities are restricted to areas occupied by the mine activities, buildings and</td>
</tr>
<tr>
<td></td>
<td>paved surface, and those necessary for fire control (Evolution, 2016b).</td>
</tr>
<tr>
<td>Pre-clearance surveys</td>
<td>Pre-clearance surveys are undertaken in areas that are approved to be cleared and consist of</td>
</tr>
<tr>
<td></td>
<td>preliminary habitat assessment to identify any habitat features present and secondary habitat</td>
</tr>
<tr>
<td></td>
<td>assessment which involves further surveys of areas deemed as potentially containing fauna</td>
</tr>
<tr>
<td></td>
<td>habitat (i.e. trees with hollows, bat presence, etc.) (Evolution, 2016b).</td>
</tr>
<tr>
<td>Fauna management strategies</td>
<td>Involves management strategies to minimise the impact of clearing activities on resident fauna</td>
</tr>
<tr>
<td></td>
<td>in the short-term (including capture and removal of animal[s] found during pre-clearance</td>
</tr>
<tr>
<td></td>
<td>surveys to alternative suitable habitat) and minimise the loss of habitat in the long-term</td>
</tr>
<tr>
<td></td>
<td>(including the placement of nesting boxes in suitable habitat for birds and arboreal mammals)</td>
</tr>
<tr>
<td></td>
<td>(Evolution, 2016b).</td>
</tr>
</tbody>
</table>

**Vegetation clearance**

<table>
<thead>
<tr>
<th>Measure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Specific Management Measures Applicable to Flora and Fauna</strong></td>
<td></td>
</tr>
<tr>
<td>Vehicle speed limits and road signage</td>
<td>Speed limits are imposed on vehicles using roads and tracks within ML 1535 (Evolution, 2016b).</td>
</tr>
<tr>
<td></td>
<td>Signposting has been installed to remind personnel of the danger of vehicles to wildlife (Evolution, 2016b).</td>
</tr>
<tr>
<td>Threatened Species Management Protocol</td>
<td>The TSMP was developed to minimise potential impacts of the approved CGO on threatened flora</td>
</tr>
<tr>
<td></td>
<td>and fauna species known and/or considered possible to occur in the disturbance area and/or</td>
</tr>
<tr>
<td></td>
<td>immediate surrounds (Barrick, 2003b). The TSMP includes provisions for targeted searches prior</td>
</tr>
<tr>
<td></td>
<td>to construction and proposed mitigation measures where threatened flora or fauna species are</td>
</tr>
<tr>
<td></td>
<td>found (Barrick, 2003b). The TSMP also includes management strategies prepared for threatened</td>
</tr>
<tr>
<td></td>
<td>species which have been recorded in the course of targeted surveys or for which habitat</td>
</tr>
<tr>
<td></td>
<td>resources typically associated with the lifecycle components of a threatened species have</td>
</tr>
<tr>
<td></td>
<td>identified (Barrick, 2003b).</td>
</tr>
<tr>
<td>Mechanisms to keep fauna away from the tailings storage facilities</td>
<td>Mechanisms have been developed to keep fauna away from the approved CGO tailings storage</td>
</tr>
<tr>
<td></td>
<td>facilities and include (Evolution, 2016b):</td>
</tr>
<tr>
<td></td>
<td>• minimising the area of open water in the tailings dams;</td>
</tr>
<tr>
<td></td>
<td>• fencing to prevent both medium and large terrestrial fauna and amphibians, from entering</td>
</tr>
<tr>
<td></td>
<td>the area;</td>
</tr>
<tr>
<td></td>
<td>• making the area non-conducive to the establishment of wildlife habitats, as far as possible;</td>
</tr>
<tr>
<td></td>
<td>• use of current best practice methods for avifauna deterrence.</td>
</tr>
<tr>
<td>Cyanide destruction process</td>
<td>Cyanide levels in the aqueous component of the tailings slurry do not exceed: 20 mg CN_{WAD}/L</td>
</tr>
<tr>
<td></td>
<td>(90 percentile over six months) and 30 mg CN_{WAD}/L (maximum permissible limit at any time),</td>
</tr>
<tr>
<td></td>
<td>at the process plant. This level is in accordance with industry experience that indicates bird</td>
</tr>
<tr>
<td></td>
<td>mortalities approach zero at levels of cyanide exposure below 50 mg/L CN_{WAD} (Evolution,</td>
</tr>
<tr>
<td></td>
<td>2016b).</td>
</tr>
<tr>
<td>Monitoring of fauna usage of the final void</td>
<td>A post, a closure monitoring programme to monitor fauna usage of the final void at the</td>
</tr>
<tr>
<td></td>
<td>approved CGO would be developed (Evolution, 2016b). The monitoring programme would be</td>
</tr>
<tr>
<td></td>
<td>developed as a component of the long-term land use strategy (Evolution, 2016b).</td>
</tr>
</tbody>
</table>
Table 22 (Continued)
Existing Impact Avoidance and Mitigation Measures at the CGO

<table>
<thead>
<tr>
<th>Measure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitoring of fauna usage of the tailings storage facilities</td>
<td>The perimeter of the TSFs are patrolled twice a day to observe and record fauna usage of the storages and whether deaths or other effects or incidents are occurring. Usage of the TSFs by bat fauna is also monitored.</td>
</tr>
<tr>
<td>Remnant Vegetation Enhancement</td>
<td>Four Remnant Vegetation Enhancement Areas have been established in accordance with the RVEP (Figure 15) to improve the quality of habitat available to flora and fauna, expand the extent of remnant vegetation, increase the diversity and/or abundance of native flora and fauna within the enhancement areas and significantly contribute to the conservation of regional biodiversity (Evolution, 2016b).</td>
</tr>
<tr>
<td>Protection of Remnant Vegetation within ML 1535</td>
<td>Areas of woodland (Myall Woodland EEC) located near the southern boundary of ML 1535 was fenced and sign posted in 2005 and protected from disturbance (Evolution, 2016b).</td>
</tr>
<tr>
<td>CGO Compensatory Wetland</td>
<td>Management of an area of existing wetland within ML1535 during operation and following closure of the mine (Barrick, 2003c) (Figure 15).</td>
</tr>
<tr>
<td>General Management</td>
<td></td>
</tr>
<tr>
<td>Dust control</td>
<td>The mitigation and management measures for windblown and mine generated dust at the approved CGO are presented in the Cowal Gold Operations Air Quality Management Plan. Control measures to suppress dust include watering disturbed surfaces.</td>
</tr>
<tr>
<td>Noise management</td>
<td>A range of noise control measures are implemented at the CGO to minimise noise emissions. Examples include the restriction of truck movements, adjustment of reversing alarms, scheduling the use of noisy equipment, directing noise emissions away from any sensitive areas and keeping equipment well maintained (Evolution, 2016b).</td>
</tr>
<tr>
<td>Blasting management</td>
<td>A number of measures to minimise the impact of blasting activities are implemented at the approved CGO. These include eliminating secondary blasting, varying the direction of initiation, keeping face heights to a practical minimum, and exercising strict control over the burden, spacing and orientation of all blast drill holes (Evolution, 2016b).</td>
</tr>
<tr>
<td>Pest (animal and vermin) control</td>
<td>Pest control activities are implemented at the CGO and include (Evolution, 2016b): regular inspections to assess the status of pest populations within ML1535 and Evolution-owned land; mandatory pest control for declared pests; and inspections to assess the effectiveness of control measures implemented and a review of these measures if necessary.</td>
</tr>
<tr>
<td>Weed management</td>
<td>Evolution currently manage weeds at the CGO to minimise the possibility of new weed incursion and controlling the spread of any existing noxious weeds within ML1535 and Evolution-owned land (Evolution, 2016b).</td>
</tr>
<tr>
<td>Site water management</td>
<td>Measures have been developed for the CGO for the management and monitoring of surface water and groundwater quality and quantity within and around the mine site (Evolution, 2017c). Management strategies to prevent the degradation of the quality of water in Lake Cowal during the mine operation phase include a variety of erosion, sediment and salinity control measures.</td>
</tr>
</tbody>
</table>

4.1.2 Direct Impacts and Measures to Avoid and Minimise Impacts

4.1.2.1 Land Clearance

The additional surface disturbance associated with the Modification is predominantly located on land which has been historically cleared for cropping or grazing livestock and comprises native grassland. The Modification would result in the removal of 286.7 ha of native vegetation, of which most (91%) is derived grassland in low/moderate condition (260.8 ha).
The modified Project components have been proposed to avoid clearance of remnant woodland where there was opportunity, namely:

- the relocated magazine and relocated explosives compound (Figure 2a) were positioned to avoid the need to clear extant woodland vegetation within ML 1535 (Figure 7a); and
- the pipeline duplication was positioned to avoid the need to clear extant woodland vegetation within road easements (Figure 7b).

The largest additional surface disturbance associated with the Modification is for a proposed soil stockpile, which again is mostly Highly Modified Derived Grasslands (Low Condition) (LA138) (Figures 2a and 7a). This soil stockpile would be used temporarily during operations to assist with management of soil for rehabilitation purposes. After rehabilitation is complete the soil stockpile would be removed.

The other main additional surface disturbance associated with the Modification is associated with the IWL and would result in clearance of small already fragmented areas of woodland and grassland around the approved disturbance areas (Table 23). The IWL, however, cannot be designed to avoid clearance of the already highly fragmented woodland areas (Figure 7a).

**Belah Woodland**

Condition 3.2 (a) (ii) requires no topsoil stockpiles to be located in the area of Belah Woodland (Low Condition) (LA105) mapped by AMBS (2018a) (Attachment A). It is recognised that a portion of this Belah Woodland (Low Condition) (LA105) would be cleared for the Modification (approximately 16.5 ha) (Figure 7a).

**CGO Compensatory Wetland**

The proposed pipeline duplication will traverse the CGO Compensatory Wetland described within the Cowal Gold Project Compensatory Wetland Management Plan (Barrick, 2003c) (Figure 15). Disturbance to the CGO Compensatory Wetland would be managed in accordance with the approved Cowal Gold Project Compensatory Wetland Management Plan (Evolution, 2003c). These management measures may include:

- limiting vehicular access during construction to reduce the degree of disturbance;
- planting of native species to enhance the regeneration of native species; and
- implementing pest and weed control.

4.1.2.1 *State Environmental Planning Policy (SEPP) 44 - Koala Habitat*

The CGO on the western side of Lake Cowal is located within the Local Government Area of Bland, which is not listed in Schedule 1 of State Environmental Planning Policy (SEPP) 44 - Koala Habitat. Therefore SEPP 44 does not apply to the clearance at the mine site.

The pipeline duplication on the eastern side of Lake Cowal is located within the Local Government Area of Forbes which is listed in SEPP 44. Of the SEPP 44 preferred feed trees, only River Red Gum (*E. camaldulensis*) is present along the pipeline duplication within River Red Gum Forest (Moderate Condition) (LA191).

---

3 *Condition 3.2 (a) (ii) states: The Applicant shall not locate topsoil stockpiles within any area of Wilga Woodland (now mapped as Belah Woodland (Low Condition) (LA105) by AMBS [2018a]) in the DA area as identified in Figure 3-13 in the 1998 EIS (Appendix 3)*
Less than 0.4 ha of River Red Gum Forest (Moderate Condition) (LA191) which meets the definition of potential koala habitat would be cleared for the pipeline duplication within the Local Government Area of Forbes.

No Koalas have been recorded in the River Red Gum Forest associated with the pipeline duplication (Figures 10a and 10b), therefore no core koala habitat would be cleared.

4.1.2.2 Groundwater Drawdown

Future water demand would be met (in part) by sourcing water from Lachlan River regulated flows (licensed extraction purchased on the open market). Given the provisions inherent in the Water Management Act, 2000 regarding environmental flows, the impact of sourcing additional regulated flow from the Lachlan River would be neutral because if not extracted by Evolution for use at CGO the licenses could be either purchased and the same water extracted by others or the water could be used by the existing licence holders if they were unable to sell the water on the open market.

No groundwater-dependent ecosystems have been previously recorded at the CGO or surrounds. BoM GDE Atlas has mapped aquatic GDEs in Lake Cowal and Terrestrial GDEs in vicinity of the CGO. Coffey (2018) has reviewed these and concluded that these ecosystems are unlikely to be groundwater dependent.
### Table 23

#### Vegetation Clearance Summary

<table>
<thead>
<tr>
<th>#</th>
<th>Vegetation Community</th>
<th>PCT</th>
<th>Area (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Semi-arid Woodlands Formation (Grassy Sub-formation) – Riverine Plain Woodlands</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1a</td>
<td>Weeping Myall Open Woodland (Semi Cleared in Moderate Condition) (LA212)</td>
<td>26</td>
<td>1.3&lt;sup&gt;A, B&lt;/sup&gt;</td>
</tr>
<tr>
<td>1b</td>
<td>Weeping Myall Open Woodland (Semi Cleared in Low Condition) (LA212)</td>
<td></td>
<td>0.2&lt;sup&gt;A, B&lt;/sup&gt;</td>
</tr>
<tr>
<td>1c</td>
<td>Weeping Myall Open Woodland (Derived Grassland in Low Condition) (LA212)</td>
<td></td>
<td>3&lt;sup&gt;A&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td><strong>Grassy Woodlands – Floodplain Transition Woodlands</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2a</td>
<td>Inland Grey Box - White Cypress Pine Woodland (Semi Cleared in Moderate Condition) (LA152)</td>
<td>82</td>
<td>6.5&lt;sup&gt;C&lt;/sup&gt;</td>
</tr>
<tr>
<td>2b</td>
<td>Inland Grey Box - White Cypress Pine Woodland (Derived Grassland in Low Condition) (LA152)</td>
<td></td>
<td>23.5&lt;sup&gt;D&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td><strong>Forested Wetlands - Inland Riverine Forests</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>River Red Gum Forest (Moderate Condition) (LA191)</td>
<td>249</td>
<td>0.4</td>
</tr>
<tr>
<td></td>
<td><strong>Semi-arid Woodland (Grassy sub-formation) – Northwest Floodplain Woodlands</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Belah Woodland (Low Condition) (LA105)</td>
<td>55</td>
<td>16.5</td>
</tr>
<tr>
<td>5</td>
<td>Dwyer's Red Gum - White Cypress Pine - Currawang Woodland (Moderate Condition) (LA144)</td>
<td>185</td>
<td>1</td>
</tr>
<tr>
<td>6a</td>
<td>Highly Modified Derived Grasslands (Moderate Condition) (LA138)</td>
<td>250</td>
<td>63.5</td>
</tr>
<tr>
<td>6b</td>
<td>Highly Modified Derived Grasslands (Low Condition) (LA138)</td>
<td></td>
<td>170.8</td>
</tr>
<tr>
<td></td>
<td><strong>Total Native</strong></td>
<td></td>
<td>286.7</td>
</tr>
<tr>
<td></td>
<td>Native Vegetation in Moderate Condition</td>
<td></td>
<td>1.4 (0.5%)</td>
</tr>
<tr>
<td></td>
<td>Semi Cleared Native Vegetation in Moderate Condition</td>
<td></td>
<td>7.8 (2.7%)</td>
</tr>
<tr>
<td></td>
<td>Native Vegetation in Low Condition</td>
<td></td>
<td>16.5 (5.7%)</td>
</tr>
<tr>
<td></td>
<td>Semi Cleared Native Vegetation in Low Condition</td>
<td></td>
<td>0.2 (0.1%)</td>
</tr>
<tr>
<td></td>
<td>Derived Grassland in Moderate Condition</td>
<td></td>
<td>63.5 (22%)</td>
</tr>
<tr>
<td></td>
<td>Derived Grassland in Low Condition</td>
<td></td>
<td>197.3 (69%)</td>
</tr>
<tr>
<td></td>
<td>Cleared Land (non-native)</td>
<td></td>
<td>11.5</td>
</tr>
<tr>
<td></td>
<td>Plantings</td>
<td></td>
<td>8.5</td>
</tr>
<tr>
<td></td>
<td>Lake Bed</td>
<td></td>
<td>8.5</td>
</tr>
<tr>
<td></td>
<td><strong>Total BAR Footprints</strong></td>
<td></td>
<td>315.2</td>
</tr>
</tbody>
</table>

A  Equivalent to the Myall Woodland EEC listed under the BC Act.
B  Equivalent to the Myall Woodland EEC listed under the EPBC Act.
C  6.5 ha equivalent to the Grey Box EEC listed under the EPBC Act and BC Act.
D  23.5 ha equivalent to the Grey Box EEC listed under the BC Act, including approximately 5 ha equivalent to the Grey Box EEC listed under the EPBC Act.

#### 4.1.3 Indirect Impacts and Measures to Avoid and Minimise Impacts

The following potential indirect impacts are assessed below:

- fauna interaction with the tailing storage facilities/IWL;
- hydrology, sedimentation and runoff;
- introduced flora and fauna;
- noise and dust;
- artificial lighting;
- bushfire risk; and
- fauna interaction with the final void.
4.1.3.1  Fauna Interaction with the Integrated Waste Landform

As part of the approved CGO, the tailings (finely ground rock residue left after the flotation and leaching processes), is treated to destroy cyanide to prescribed limits (less than 20 mg/L for 90% of the time and no greater than 30 mg/L) and pumped to one of two TSFs (Figure 2a).

Between 2006 and 2018 interaction of fauna with tailings storage surfaces at the CGO have been monitored and reported biennially (Donato Environmental Services, 2006 to 2017a). During this period no fauna deaths have been attributed to cyanide toxicity associated with the TSFs (Donato Environmental Services, 2006 to 2017a).

To accommodate the increased annual volume of tailings resulting from the increased ore processing rate, Evolution proposes to modify/expand the size of the existing TSFs to form one tailings storage facility. The landform would also integrate with the existing mine waste rock emplacement and would be known as an IWL (Figure 2a).

It is possible that more birds and bats will interact with the IWL compared to the existing TSFs due to the overall greater size of the IWL. During construction of the IWL (before it is covered with tailings), there are aspects which may attract birds such as shallow rainfall ponds on uneven ground, regrowth vegetation (such as herbs and grass) and platforms created by the existing TSF walls.

Despite the potential for increased visitation to the IWL, no birds and bats are expected to be affected by cyanide in the IWL. The Modification would involve no change to the cyanide leaching circuit or cyanide destruction method. WAD cyanide concentrations within the proposed IWL will be destroyed to within existing prescribed limits.

As described in Table 22, the Flora and Fauna Management Plan (Evolution, 2016b) provides mechanisms to keep fauna away from the TSFs, including minimising the area of open water in the tailings dams, fencing and ensuring the area is non-conducive to the establishment of wildlife habitats. These mechanisms would also be applied to the IWL.

In addition to the above, the following measures would be adopted relevant to ensuring the IWL is less conducive to the establishment of wildlife habitats:

- vegetation would be removed and topsoil stripped within the IWL footprint during its construction;
- the IWL floor would be contoured during its construction to reduce island formation and number of rainfall-derived ponds;
- vegetation regrowth within the IWL prior to commencement and during tailings discharge would be managed by herbicide use;
- following construction of the IWL, bare ground within the IWL active cell would be covered with tailings as soon as practical using a low throughput tailings pipeline with moveable spigots to enable flexibility in direction and location of spigot discharge; and
- if aquatic algae, vegetation or macroinvertebrate species are present in rainfall-derived ponds within the IWL, tailings discharge into rainfall-derived ponds would suppress the unwanted habitat resources.

The Flora and Fauna Management Plan (Evolution, 2016b) provides methods for monitoring the daily and seasonal fauna usage of the existing TSFs. These methods would be revised to provide a monitoring programme which enables fauna usage (e.g. species, number, location, habits) to be documented during construction and operation of the IWL.
4.1.3.2 Hydrology, Sedimentation and Runoff

The Modification would involve the relocation of water management infrastructure (i.e. the Up-Catchment Diversion System and approved location for contained water storage D10) and other ancillary infrastructure (e.g. access roads and soil stockpiles). This infrastructure is proposed to be located elsewhere within ML 1535 and in a new mining lease to the north-west (Figure 2a).

Runoff from the additional proposed soil stockpiles would be directed to a sediment dam constructed at the eastern boundary. No indirect adverse impacts on surrounding vegetation are likely to occur.

4.1.3.3 Introduced Flora and Fauna

AMBS (2018a) (Attachment A) recorded seven introduced fauna species, including:

- Red Fox (*Vulpes vulpes*);
- Feral Cat (*Felis catus*);
- Dog (*Canis lupus familiaris*);
- European Hare (*Lepus europaeus*);
- Cattle (*Bos taurus*);
- House Mouse (*Mus musculus*); and
- Common Starling (*Sturnus vulgaris*).

With the existing measures to prevent and control introduced flora and fauna species at the CGO (Evolution, 2016b), it is unlikely that the potential for introduced flora and fauna species would increase as a result of the Modification.

The Threat Abatement Plan for Predation by the European Red Fox (DEWHA, 2008a) and Threat Abatement Plan for Predation by Feral Cats (DEWHA, 2008b) are considered as part of the pest control programmes.

4.1.3.4 Noise and Dust

The Modification is not likely to materially change the noise or dust emissions from the CGO. Development of the IWL would involve waste rock being transported and emplaced as part of embankment construction. Additional dust emissions associated with this activity would be controlled via additional watering of work areas. Potential noise and dust impacts on flora and fauna as a result of the Modification would be substantially the same as the CGO and would be managed in accordance with the air and noise management plans (Evolution, 2015; Evolution, 2016b).

4.1.3.5 Artificial Lighting

There would be no change to the use of fixed artificial lighting at the CGO as a result of the Modification, however there would be additional mobile fleet lighting (e.g. haul trucks) on the western portion of ML1535 whilst construction of the IWL embankments is ongoing. Potential artificial lighting impacts on fauna as a result of the Modification would be substantially the same as the CGO.
4.1.3.6 **Bushfire Risk**

Bushfire risk as a result of the Modification would be substantially the same at the CGO. Existing bushfire management measures would continue to be implemented.

4.1.3.7 **Fauna Interaction with the Final Void**

The Modification would involve no change to the extent and depth of the open pit. The Modification does not involve a change to the CGO final void, and therefore there is no change to fauna interaction with the final void.

4.1.4 **Impacts on Landscape Features that Require Further Consideration**

According to the FBA (2014a), impacts on state significant biodiversity links require further consideration. Additional information required for impacts on important wetlands:

(a) the category of wetland that is being impacted by the Major Project
(b) whether the wetland itself, and/or its buffer area, is being impacted
(c) the extent of impact to the wetland or buffer area
(d) the condition of the area of the wetland or buffer area subject to the impact
(e) any indirect impacts on wetlands, or on wetlands or watercourses downstream of the proposed development
(f) the measures proposed to minimise the impact on the biodiversity values of the wetland area

(a) the category of wetland that is being impacted by the Major Project

Lake Cowal/Wilbertroy Wetlands (NSW040) is listed on the DIWA (DEE, 2018a). Wetland types associated with Lake Cowal/Wilbertroy Wetlands (NSW040) are (DEE, 2018a):

- **B3** Inland deltas (permanent).
- **B6** Seasonal/intermittent freshwater lakes (>8 ha), floodplain lakes.
- **B13** Shrub swamps; shrub-dominated freshwater marsh, shrub carr, alder thicket on inorganic soils.
- **B14** Freshwater swamp forest; seasonally flooded forest, wooded swamps; on inorganic soils.

(b) whether the wetland itself, and/or its buffer area, is being impacted

As part of the Modification, the water supply pipeline which already exists across Lake Cowal would be duplicated along its length, up to Bore 4 of the Bland Creek Palaeochannel Borefield (Figure 2b).

Disturbance within the pipeline corridor would be up to approximately 6 m wide, and approximately 1 m deep. Soil would then be backfilled to ground level, and any excess soil would be spread over the pipeline disturbance area.

Should Lake Cowal contain water at the time of construction, the pipeline would be laid onto the lake bed via boat. Once Lake Cowal has sufficiently dried to allow construction activities, excavation would be conducted within the pipeline disturbance corridor and the pipeline placed within the excavated channel.
The vegetation in the pipeline disturbance area would be left to naturally regenerate. Visual inspections for weeds and weed control would occur monthly until native vegetation cover is similar to adjacent vegetation.

Potential adverse impacts from erosion on adjacent vegetation would be minimised by back filling the excavated channel as soon as practicable. If monthly visual inspections identify a risk to adjacent vegetation from erosion, corrective measures would be implemented (active revegetation or use of temporary sediment control structures).

(c) the extent of impact to the wetland or buffer area

As stated above, the duplicated pipeline would be buried similar to the existing pipeline. Should Lake Cowal contain water at the time of construction, the pipeline would be placed on the lake bed before being buried once lake levels subside and ground conditions allow burial of the pipeline.

(d) the condition of the area of the wetland or buffer area subject to the impact

Grazing and opportunistic cropping within the full storage water line of Lake Cowal (outside of ML 1535) occurs when the lake has receded, and moisture and market conditions are suitable.

(e) any indirect impacts on wetlands, or on wetlands or watercourses downstream of the proposed development

Due to the minor nature of the works involved in duplicating the pipeline, its construction is unlikely to have any indirect impacts on Lake Cowal or its ecology. A potential minor risk of indirect impacts in the short-term (following burial of the pipeline) from incursion by weeds and erosion would be managed.

(f) the measures proposed to minimise the impact on the biodiversity values of the wetland area

As described above, should Lake Cowal contain water at the time of construction, the pipeline (600 mm diameter) would be laid onto the lake bed via boat. Once Lake Cowal has sufficiently dried to allow construction activities, excavation would be conducted within the pipeline disturbance corridor and the pipeline placed within the excavated channel.

The vegetation in the pipeline disturbance area would be left to naturally regenerate. Visual inspections for weeds and weed control would occur monthly until native vegetation cover is similar to adjacent vegetation.

Potential adverse impacts from erosion on adjacent vegetation would be minimised by filling the excavated channel. If the monthly visual inspections identify a risk to adjacent vegetation from erosion, corrective measures would be implemented (active revegetation or use of temporary sediment control structures).

4.1.5 Cumulative Impacts

Cumulative impacts are considered to be the total impact on the environment that would result from the incremental impacts of the Modification added to other existing impacts. They include direct and indirect impacts. In this assessment cumulative impacts from proposed (but not yet existing) developments in the local area are also considered.

Prior to the CGO, the surrounding locality comprised former cleared and semi-cleared farmland that was used for grazing of native and introduced pastures by livestock. Grazing and cropping remains the predominant land use in areas outside of ML 1535. The original native tree cover had largely been removed except for scattered individual trees and patches of remnant vegetation.
Since commencing operations, the CGO has resulted in the clearance of native vegetation and fauna habitat mostly within ML1535. In addition to this vegetation clearing, the CGO has resulted in approximately 440 ha of biodiversity offsets which have already been established. The existing biodiversity offsets are comprised of two areas, both located less than 5 km from the CGO (i.e. Offset Area 1 and Offset Area 2) (Section 5.1).

The potential cumulative impact on threatened species and communities has been considered and it has been concluded that the change in potential cumulative impacts on threatened species and communities arising from the Modification is considered to be minimal due to the localised nature of the works compared to the wider distribution of the species, their habitats and communities.

The Modification would result in the removal of 286.7 ha of native vegetation, of which most (91%) is derived grassland in low/moderate condition (260.8 ha). The existing Biodiversity Offset Strategy for the CGO would be augmented with an additional Biodiversity Offset Strategy for the Modification. Evolution has elected to address the offset requirements through offsetting four additional land based offset areas. The four proposed offset areas have a combined area of 486.5 ha.

4.2 EPBC ACT THREATENED SPECIES AND COMMUNITIES

Application of the FBA (2014a) and OEH Biobanking Credit Calculator identifies all relevant threatened species and communities that may be impacted by a development. The Modification was determined to be ‘controlled action’ due to likely significant impacts on the Grey Box EEC listed under the EPBC Act). Based on the extensive surveys described in Section 2.3, relevant EPBC Act listed threatened species and communities likely to be adversely impacted by the Modification are:

- Grey Box EEC;
- Weeping Myall Woodlands EEC; and
- Superb Parrot.

These EPBC Act listed threatened species and communities are further discussed below.

The significance of residual impacts on MNES has been assessed in accordance with the Matters of National Environmental Significance Significant Impact Guidelines 1.1 (DEE, 2013). This assessment has been prepared in consideration of relevant Commonwealth guidelines and policy statements including listing advice, conservation advice recovery plans and threat abatement plans. The Species Profiles and Threats Database (DEE, 2018b) was reviewed and considered.

**Grey Box EEC**

This assessment has been prepared in consideration of the guide to the identification, assessment and management of the Grey Box EEC listed under the EPBC Act (DSEWPaC, 2012a), Commonwealth listing advice (Threatened Species Scientific Committee [TSSC], 2010), and approved conservation advice (DEWHA, 2010c).

**Targeted Surveys**

The EPBC Act referral (Evolution, 2017) stated that the previous vegetation mapping prepared by Australian Museum Business Services (2012), and preliminary results from AMBS (pers. comm.) indicate that approximately 14.5 ha of the Grey Box EEC listed under the EPBC Act may occur within the BAR Footprints.

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4 Note that this area was refined by more recent contemporary mapping by AMBS (2018a) (Attachment A).
AMBS (2018a) (Attachment A) undertook contemporary targeted surveys for the Grey Box EEC to update the mapping from 2012. Details of the scope, timing and methodology for the surveys, and how they are consistent with published Australian Government guidelines and policy statements, are provided in Attachment A.

**Occurrence**

Grey Box EEC listed under the EPBC Act occurs as semi cleared woodland and derived grassland within the BAR Footprint associated with the mine site (AMBS, 2018a) (Attachment A) (Figure 12a).

**Impact Alternatives, Avoidance and Mitigation Measures**

There are no alternatives or impact avoidance measures relevant to the Grey Box EEC listed under the EPBC Act that would be impacted by the Modification. However, impacts on Grey Box EEC would be mitigated by:

- excluding livestock from the land between the re-aligned TSR and the proposed stockpile (comprising approximately 55 ha of the Grey Box EEC) (Table 24) which is predicted to be effective because grazing is a recognised threat to the Grey Box EEC (DEWHA, 2010c);
- implementing weed control measures at the mine site (and within the land between the re-aligned TSR and the proposed stockpile) (Section 4.1.3.3) which is predicted to be effective because invasion by weeds is a recognised threat to the Grey Box EEC (DEWHA, 2010c);
- collecting seed stock from species characteristic of the Grey Box EEC from areas to be cleared (where available) for use in the mine rehabilitation programme (Section 4.4);
- delineation of disturbance areas (Table 22) and showing the area of Grey Box EEC within the mining lease area on future mine plans to reduce the risk of accidental clearance (Section 4.4); and
- the mine rehabilitation programme would aim to re-establish vegetation including the use of species characteristic of the Grey Box EEC (Section 4.4).

The measures above are consistent with relevant conservation advice for the Grey Box EEC listed under the EPBC Act (DSEWPaC, 2012a; DEWHA, 2010c), as the measures aim to minimise impacts on adjacent occurrences of the community, including the management of potential adverse impacts from weeds, runoff and livestock. The Species Profiles and Threats Database (DEE, 2018b) states that no Threat Abatement Plans are relevant to the Grey Box EEC.

**Nature and Extent of the Likely Direct, Indirect and Consequential Impacts, including Short-term and Long-term Impacts**

The outcome of the mitigation measures (above) is that the Modification would clear approximately 11.5 ha of Grey Box EEC listed under the EPBC Act, comprising semi cleared woodland (approximately 6.5 ha) (Plate 2) and derived grassland (approximately 5 ha) (Figure 12a) (AMBS, 2018a) (Attachment A).

Approximately 2.2 ha of Grey Box EEC would be lost to the soil stockpile, approximately 7.5 ha would be lost from clearing for the re-aligned road and approximately 1.8 for the IWL. The proposed stockpile would be temporary as soil from the stockpile would be used for mine rehabilitation works (i.e. the stockpile would eventually be removed and the stockpile area rehabilitated and revegetated).

---

5 The EPBC Act referral stated a higher quantity of Grey Box EEC (14.5 ha) based on previous vegetation mapping prepared by Australian Museum Business Services (2012), and preliminary results from AMBS (pers. comm.).
Grey Box EEC adjacent to the areas to be disturbed is in derived native grassland form. No indirect adverse impacts on this occurrence are likely to occur given weeds would be controlled and runoff from the additional proposed soil stockpiles would be directed to a sediment dam constructed at the eastern boundary. Further, livestock would be excluded from the land between the re-aligned TSR and the proposed stockpile (comprising approximately 55 ha of the Grey Box EEC) thus promoting a positive benefit to the occurrence of the Grey Box EEC (Table 22).

The consequence of the Modification is a 11.5 ha short and long-term reduction in a poor example of the Grey Box EEC mostly adjacent to the operating CGO, with the original tree and shrub layer largely removed and a long history of grazing.

**Unpredictable or Irreversible Impacts**

No potential impacts on the Grey Box EEC from the Modification are likely to be unpredictable. Clearance of an EEC is assumed to be irreversible for the purpose of the assessment (despite mine rehabilitation), hence an offset is provided (Section 5.2).

**Significant Residual Adverse Impacts**

The reduction of these patches of Grey Box EEC listed under the EPBC Act would not significantly adversely impact the overall occurrence of the Grey Box EEC in the local area, and a significant impact on the Grey Box EEC is unlikely, given:

- The occurrences of Grey Box EEC within the BAR Footprint associated with the mine site are degraded, and relatively small (approximately 11.5 ha) (Plate 2), adjacent to the approved mining area and isolated from other occurrences of the EEC.
- Much larger areas of Grey Box EEC occur to the south of ML 1535 (including within the proposed offset areas [Section 5.2]).

The impacts on the Grey Box EEC would be localised and negligible on a regional, state and national scale. The change in potential cumulative impacts on the Grey Box EEC arising from the Modification is considered to be minimal because of the localised nature of the works compared to the wider distribution of the community.

Despite this, an offset would be provided for impacts on the Grey Box EEC (Section 5.2).

**Application of the FBA and Offset Details**

Ecosystem credits have been calculated for impacts on Grey Box EEC listed under the EPBC Act (Section 4.5). A Biodiversity Offset Strategy for the Modification is described in Section 5.2. Proposed Offset Area 6 contains approximately 165.5 ha of Grey Box EEC represented by Inland Grey Box - White Cypress Pine Woodland (LA152) (the same BVT that would be cleared for the Modification).

**Weeping Myall Woodlands EEC**

This assessment has been prepared with consideration of Policy Statement 3.17 for the Weeping Myall Woodlands EEC listed under the EPBC Act (DEWHA, 2009), Commonwealth listing advice (TSSC, 2009), and approved conservation advice (DEWHA, 2008c).
Targeted Surveys

The EPBC Act referral (Evolution, 2017) stated that the Weeping Myall Woodlands EEC listed under the EPBC Act had not been mapped within the BAR Footprints, however, previous vegetation mapping prepared by Australian Museum Business Services (2012), and preliminary results from AMBS (pers. comm.) indicate that patches of Weeping Myall Woodland EEC may occur within the immediate surrounds.

AMBS (2018a) (Attachment A) undertook targeted surveys for the Weeping Myall Woodlands EEC. Details of the scope, timing and methodology for the surveys, and how they are consistent with published Australian Government guidelines and policy statements, are provided in Attachment A.

Occurrence

Weeping Myall Woodlands EEC listed under the EPBC Act occur as semi cleared woodland and derived grassland (Figures 12a and 12b) (Plate 3).

Impact Alternatives, Avoidance and Mitigation Measures

The relocated magazine and relocated explosives compound (Figure 2a) were positioned to avoid the need to clear Weeping Myall Woodlands EEC within ML 1535 (Figure 12a). The area of Weeping Myall Woodlands EEC within the mining lease area would be shown on future mine plans to reduce the risk of accidental clearance (Section 4.4).

Weeping Myall Woodlands EEC occur within the BAR Footprint for the pipeline duplication. The pipeline duplication was positioned to minimise the need to clear Weeping Myall Woodlands EEC within road easements (Figure 12b). Where clearance is required, those areas would be delineated to reduce the risk of accidental clearance (Table 22).

Similar to the existing pipeline, the duplicated pipeline would be buried. The vegetation in the pipeline disturbance area would be left to naturally regenerate. Visual inspections for weeds and weed control (control methods consistent with an approved management plan [Evolution, 2016b]) would occur monthly until native vegetation cover is similar to adjacent vegetation.

If monthly visual inspections identify a risk on adjacent vegetation from erosion, corrective measures would be implemented (active revegetation or use of temporary sediment control structures).

Weed management is predicted to be effective in reducing risks to the Weeping Myall Woodlands EEC as invasion by weeds is a recognised threat to the Weeping Myall Woodlands EEC (DEWHA, 2008c). The above measures are consistent with the approved conservation advice (DEWHA, 2008c) as protecting remnants from weeds including the speedy eradication of any new invasions is a priority recovery and threat abatement action relevant to the Weeping Myall Woodlands EEC listed under the EPBC Act.

The Species Profiles and Threats Database (DEE, 2018b) states that no Threat Abatement Plans are relevant to the Weeping Myall Woodlands EEC, other than the Cane Toad which is not relevant to the location of the CGO.

Nature and Extent of the Likely Direct, Indirect and Consequential Impacts, including Short-term and Long-term Impacts

The outcome of the avoidance and mitigation measures (above) is that the Modification would involve the clearance of approximately 1.5 ha of Weeping Myall Woodlands EEC (AMBS, 2018a) (Attachment A) (Plate 3). The BAR Footprint associated with the pipeline duplication is approximately 6 m wide.
A may be a potential indirect impact to the Weeping Myall Woodlands EEC in the short-term (following burial of the pipeline) from incursion by weeds and erosion. However, these potential indirect impacts would be managed.

The consequence of the Modification is a 1.5 ha reduction in a poor example of the Weeping Myall Woodlands EEC on the side of an existing road with the original tree and shrub layer largely removed. The vegetation in the pipeline disturbance area would be left to naturally regenerate in the long-term.

**Significant Residual Adverse Impacts**

The reduction of Weeping Myall Woodlands EEC listed under the EPBC Act would not significantly adversely impact the overall occurrence of the Weeping Myall Woodlands EEC in the local area (after DEE, 2013). A significant impact on the Weeping Myall Woodlands EEC is unlikely, given the occurrences of Weeping Myall Woodlands EEC within the BAR Footprint associated with the pipeline duplication are degraded, relatively small (multiple patches totalling approximately 1.5 ha) and narrow, and at the side of an existing road (Figure 12b) (after DEE, 2013).

The impacts on the Weeping Myall Woodlands EEC would be localised and negligible on a regional, state and national scale. Despite this, an offset would be provided for impacts on the Weeping Myall Woodlands EEC listed under the EPBC Act (Section 5.2.4).

The change in potential cumulative impacts on the Weeping Myall Woodlands EEC arising from the Modification is considered to be minimal because of the localised nature of the works compared to the wider distribution of the community.

**Unpredictable or Irreversible Impacts**

No potential impacts on the Weeping Myall Woodlands EEC from the Modification are likely to be unpredictable. Clearance of an EEC is assumed to be irreversible for the purpose of the assessment (though vegetation in the pipeline disturbance area would be left to naturally regenerate), hence an offset is provided (Section 5.2).

**Application of the FBA and Offset Details**

Credits have been calculated for impacts on Weeping Myall Woodlands EEC listed under the EPBC Act (Section 4.5). A Biodiversity Offset Strategy for the Modification is described in Section 5.2. Proposed Offset Area 6 contains approximately 1.5 ha of Weeping Myall Woodlands EEC listed under the EPBC Act represented by Weeping Myall Open Woodland (Derived Grassland in Moderate Condition) (LA212) (the same BVT that would be cleared for the Modification).

**Superb Parrot**

This assessment has been prepared with consideration of the conservation advice for the Superb Parrot (TSSC, 2016) and the national recovery plan (Baker-Gabb, 2011).

In NSW, the Superb Parrot is widespread west of the Great Dividing Range, mostly in the Darling Riverina Plains, Brigalow Belt South, Cobar Peneplain, Riverina and NSW South Western Slopes bioregions (Baker-Gabb, 2011).

Lake Cowal is not within a known breeding area for the Superb Parrot (after Baker-Gabb, 2011), however, in the Riverina the birds nest in the hollows of large trees (dead or alive) mainly in tall riparian River Red Gum Forest or Woodland (Baker-Gabb, 2011). Therefore, it is conservatively assumed that the River Red Gum along Lake Cowal could provide potential breeding habitat (in addition to foraging habitat).
The Superb Parrot feeds in trees and understorey shrubs and on the ground and their diet consists mainly of grass seeds and herbaceous plants (DEE, 2018b). Most Superb Parrots undertake regular seasonal movements between breeding and non-breeding areas, which could be associated with food supply (TSSC, 2016; Baker-Gabb, 2011).

**Targeted Surveys**

AMBS (2018a) (Attachment A) undertook targeted surveys for the Superb Parrot listed under the EPBC Act. Details of the scope, timing and methodology for the surveys, and how they are consistent with published Australian Government guidelines and policy statements, are provided in Attachment A.

**Occurrence**

AMBS (2018a) (Attachment A) recorded the Superb Parrot on 17 occasions during the surveys. Past surveys have also recorded the species. A group of Superb Parrots were observed flying over-head during the pre-clearance surveys in 2005 (Barrick, 2005a) and again in 2008 foraging on mistletoe within ML 1535 (Barrick, 2008b). A flock of 12 to 15 birds was sighted in 2012 from the trees that have been planted around ML 1535 (Kerle, 2013a). There are also OEH (2017) database records from 1995 which are sourced from the NSW Bird Atlassers and Illawarra Bird Observers Club as reported in Gunninah Consultants (1995).

AMBS (2018a) (Attachment A) recognise all of the native vegetation communities in the BAR Footprints as potential foraging habitat for the Superb Parrot (approximately 25.9 ha of woodland and 260.8 ha of derived grassland). Potential breeding habitat for the Superb Parrot is assumed to occur in the River Red Gum Forest (LA191) along the edge of Lake Cowal, noting however, there is no evidence of Superb Parrot nesting in the BAR Footprints or surrounds from the extensive monitoring and field surveys which have been undertaken at the CGO (Section 2.3.4). No habitat in the BAR Footprints is likely to be critical to the survival of the species.

**Impact Alternatives, Avoidance and Mitigation Measures**

The CGO Vegetation Clearance Protocol would continue to be implemented for the Modification and therefore the potential for land clearing activities to adversely impact Superb Parrot would likely be minimal.

The measures above are consistent with relevant conservation advice for the Superb Parrot (TSSC, 2016; Baker-Gabb, 2011), as the measures aim to minimise impacts on adjacent occurrences of habitat for the Superb Parrot. The *Species Profiles and Threats Database* (DEE, 2018b) states that no *Threat Abatement Plans* are relevant to the Superb Parrot.

**Nature and Extent of the Likely Direct, Indirect and Consequential Impacts, including Short-term and Long-term Impacts**

The outcome of the mitigation measures (above) is that the approximately 0.4 ha of potential breeding habitat for the Superb Parrot in the River Red Gum Forest (Moderate Condition) (LA191) along the edge of Lake Cowal would be cleared for the pipeline duplication.

A potential minor risk of indirect impacts on the River Red Gum Forest in the short-term (following burial of the pipeline) from incursion by weeds and erosion would be managed (see above description for Weeping Myall Woodlands EEC). However, AMBS (2018a) (Attachment A) describe that where the community has been recently actively grazed on the eastern side of Lake Cowal, the midstorey and understorey have been largely replaced by annual and perennial exotics.
The consequence of Modification is a 0.4 ha reduction in potential breeding habitat for the Superb Parrot, which may or may not be used by the species as breeding habitat. The vegetation in the pipeline disturbance area would be left to naturally regenerate in the long-term.

Potential direct and indirect impacts from the Modification are further described in Sections 4.1.2 and 4.1.3.

**Significant Residual Adverse Impacts**

Although some foraging and potential breeding habitat for the Superb Parrot may be disturbed by the Modification, the area to be disturbed is not considered material or crucial to the viability of the local populations of these species. The Modification is unlikely to significantly adversely impact the lifecycle of the Superb Parrot (after DEE, 2013) given the similar more extensive habitat resources occur in the wider surrounds. The impacts on the Superb Parrot would be localised and negligible on a regional, state and national scale.

**Unpredictable or Irreversible Impacts**

No potential impacts on the Superb Parrot from the Modification are likely to be unpredictable. Clearance of habitat for the Superb Parrot is assumed to be irreversible for the purpose of the assessment (though vegetation in the pipeline disturbance area would be left to naturally regenerate), hence an offset is provided (Section 5.2).

**Application of the FBA and Offset Details**

Ecosystem and species credits have been calculated for impacts on the Superb Parrot. Ecosystem credits would be retired to account for impacts on Superb Parrot foraging habitat (all the native vegetation communities in the BAR Footprints) and species credits would also be retired to account for impacts on Superb Parrot breeding habitat.

A Biodiversity Offset Strategy for the Modification is described in Section 5.2. Proposed Offset Area 3 contains potential breeding habitat equivalent to that which would be cleared (i.e. River Red Gum Forest [Moderate Condition] [LA191] along the edge of Lake Cowal). There is 13.5 ha of River Red Gum Forest [Moderate Condition] [LA191] within Proposed Offset Area 3.

**Other Species**

*Austrostipa wakoolica*

*Austrostipa wakoolica* was recorded on the opposite side of the road to the proposed pipeline duplication (Figure 7b). No disturbance would be required on the southern side of Websters Road for the pipeline duplication associated with the Modification, and the known record of *Austrostipa wakoolica* in this location (Figure 7b) would be avoided.

As previously described, visual inspections for weeds and weed control would occur monthly until native vegetation cover is similar to adjacent vegetation. If the monthly visual inspections identify a risk on adjacent vegetation from erosion, corrective measures would be implemented (active revegetation or use of temporary sediment control structures).

**Migratory Species**

The EPBC Act controlling provision for the Modification is ‘threatened species and communities’. Migratory species listed under the EPBC Act are not a relevant controlling provision. The EPBC Act referral (Evolution, 2017) provided an assessment of the impacts on migratory species and concluded that the Modification is not likely to significantly impact any migratory species.
4.3 FM ACT THREATENED SPECIES AND COMMUNITIES

An assessment is provided below in consideration of the Department of Primary Industries Fisheries (2013) *DPI Fisheries Policy and Guidelines for Fish Habitat Conservation and Management (Update 2013)*. As described in Section 4.1.4, the pipeline across Lake Cowal would be duplicated. No significant impacts on any threatened species or ecological communities (the Lachlan River Catchment EEC, or potentially occurring threatened fish [Section 3.3.8]) are likely to occur due to the minor nature of the works involved in duplicating the pipeline. A potential minor risk of indirect impacts in the short-term (following burial of the pipeline) from incursion by weeds and erosion would be managed. No offset under Department of Primary Industries Fisheries (2013) is considered necessary as potential impacts on Lake Coal from the duplicated pipeline can be mitigated as per the existing pipeline.

4.4 SUMMARY OF THE IMPACT AVOIDANCE AND MITIGATION MEASURES

Table 24 provides a summary of additional impact avoidance and mitigation measures for the Modification.

**Table 24**  
Additional Impact Avoidance and Mitigation Measures for the Modification

<table>
<thead>
<tr>
<th>Measure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design – Impact Avoidance</td>
<td>The relocated magazine and relocated explosives compound (Figure 2a) are positioned to avoid the need to clear extant woodland vegetation (Weeping Myall Woodlands EEC) within ML 1535 (Figure 7a). The pipeline duplication is positioned to avoid the need to clear extant woodland vegetation (Weeping Myall Woodlands EEC) within road easements (Figure 7b).</td>
</tr>
<tr>
<td>Revegetation of the post-mine landforms</td>
<td>The mine rehabilitation programme would aim to re-establish vegetation including the use of species characteristic of the Grey Box EEC and Weeping Myall Woodlands EEC listed under the EPBC Act.</td>
</tr>
<tr>
<td>Vegetation Clearance Protocol - Delineation of disturbance area</td>
<td>The area of Grey Box EEC and Weeping Myall Woodlands EEC listed under the EPBC Act within the mining lease areas would be shown on future mine plans to reduce the risk of accidental clearance.</td>
</tr>
<tr>
<td>Fencing</td>
<td>Fencing would be installed either side of the re-aligned Travelling Stock Reserve (TSR) consistent with the existing TSR. The purpose of the fencing is primarily to contain livestock which are periodically moved along the TSR. The fencing along the TSR would also exclude livestock from the land between the re-aligned TSR and the proposed stockpile. There is approximately 55 ha of Grey Box EEC listed under the EPBC Act in this location mapped by AMBS (2018a) (Attachment A).</td>
</tr>
<tr>
<td>Seed Collection</td>
<td>Evolution has an existing seed collection programme that would be used to mitigate the loss of the Grey Box EEC listed under the EPBC Act. This would extend to collecting seed stock from species characteristic of the Grey Box EEC and Weeping Myall Woodlands EEC listed under the EPBC Act from areas to be cleared (where available).</td>
</tr>
</tbody>
</table>
| Mechanisms to keep fauna away from the tailings storage facilities | The following measures would be adopted relevant to making the IWL less conducive to the establishment of wildlife habitats:  
  - vegetation would be removed and topsoil stripped within the IWL during its construction;  
  - the IWL floor would be contoured during its construction to reduce island formation and number of rainfall-derived ponds (where possible);  
  - vegetation regrowth within the IWL prior to commencement and during tailings discharge would be managed by herbicide use;  
  - following construction of the IWL, bare ground within the IWL would be covered with tailings as soon as practical using a low throughput tailings pipeline with moveable spigots to enable flexibility in direction and location of spigot discharge; and  
  - if aquatic algae, vegetation or macroinvertebrate species are present in rainfall-derived ponds within the IWL, tailings discharge into rainfall-derived ponds would suppress unwanted habitat resources. |
The existing Cowal Gold Operations Flora and Fauna Management Plan (Evolution, 2016b) and Cowal Gold Project Implementation of the Threatened Species Management Protocol (Barrick, 2003b) would be updated to incorporate the Modification and the additional impact avoidance and mitigation measures (where appropriate to each document). The Cowal Gold Operations Flora and Fauna Management Plan is approved by DP&E and prepared in consultation with DPI (Fisheries) and OEH.

Annual monitoring for the Austral Pillwort as outlined in the existing Cowal Gold Mine Flora and Fauna Management Plan (Evolution, 2016b) would be discontinued on the basis that the monitoring since 2012 (DnA Environmental, 2012d, 2013d, 2015d, 2016d and 2017c) and surveys by AMBS (2018a) (Attachment A) have not detected the presence of the species.

4.5 BIODIVERSITY CREDIT REPORT – SUMMARY OF CREDIT REQUIREMENTS

Table 25 provides a summary of the ecosystem credit requirements for the Modification (i.e. the sum of the ecosystem credit requirements for the mine site [Table 11] and pipeline duplication [Table 21]).

<table>
<thead>
<tr>
<th>#</th>
<th>Vegetation Community</th>
<th>PCT</th>
<th>Clearance Area (ha)</th>
<th>Credit Requirement (Attachments D and E)</th>
<th>Credits from BVTs able to be retired to address the Ecosystem Credit Requirement (Attachments D and E)</th>
<th>Offset Location (Attachments D and E)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1a</td>
<td>Weeping Myall Open Woodland (Semi Cleared in Moderate Condition) (LA212)</td>
<td>26</td>
<td>1.3 A, B</td>
<td>51</td>
<td>LA 212</td>
<td>Lower Slopes - Lachlan</td>
</tr>
<tr>
<td>1b</td>
<td>Weeping Myall Open Woodland (Semi Cleared in Low Condition) (LA212)</td>
<td></td>
<td>0.2 A, B</td>
<td>58</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1c</td>
<td>Weeping Myall Open Woodland (Derived Native Grassland in Low Condition) (LA212)</td>
<td></td>
<td>3 A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2a</td>
<td>Inland Grey Box - White Cypress Pine Woodland (Semi Cleared in Moderate Condition) (LA152)</td>
<td>82</td>
<td>6.5 C</td>
<td>816</td>
<td>LA 152, LA 153, LA 154, LA162, LA 163, LA175, LA 178, LA 194, LA 195</td>
<td>Lower Slopes - Lachlan</td>
</tr>
<tr>
<td>2b</td>
<td>Inland Grey Box - White Cypress Pine Woodland (Derived Grassland in Low Condition) (LA152)</td>
<td></td>
<td>23.5 D</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>River Red Gum Forest (Moderate Condition) (LA191)</td>
<td>249</td>
<td>0.4</td>
<td>19</td>
<td>LA 191, LA 263</td>
<td>Lower Slopes - Lachlan</td>
</tr>
<tr>
<td>4</td>
<td>Belah Woodland (Low Condition) (LA105)</td>
<td>55</td>
<td>16.5</td>
<td>193</td>
<td>LA 105</td>
<td>Lower Slopes - Lachlan</td>
</tr>
</tbody>
</table>
### Table 25 (Continued)

**Ecosystem Credit Requirements**

<table>
<thead>
<tr>
<th>#</th>
<th>Vegetation Community</th>
<th>PCT</th>
<th>Clearance Area (ha)</th>
<th>Credit Requirement (Attachments D and E)</th>
<th>Credits from BVTs able to be retired to address the Ecosystem Credit Requirement (Attachments D and E)</th>
<th>Offset Location (Attachments D and E)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Semi-arid Woodland (Scrubby sub-formation) – Inland Rocky Hill Woodlands</td>
<td>185</td>
<td>1</td>
<td>18</td>
<td>LA 144, LA 204, LA 220, LA 122, LA 126, LA 141, LA 142, LA 143, LA 147, LA 148, LA 149, LA 181, LA 184, LA 200, LA 237, LA 249, LA 270, LA 253, LA 254, LA 269, LA 267</td>
<td>Lower Slopes - Lachlan</td>
</tr>
<tr>
<td>6a</td>
<td>Highly Modified Derived Grasslands (Moderate Condition) (LA138)</td>
<td>250</td>
<td>63.5</td>
<td>679</td>
<td>LA 138, LA 244, LA 238</td>
<td>Lower Slopes - Lachlan</td>
</tr>
<tr>
<td>6b</td>
<td>Highly Modified Derived Grasslands (Low Condition) (LA138)</td>
<td>170.8</td>
<td>1,853</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>286.7</td>
<td>3687</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A: Equivalent to the Myall Woodland EEC listed under the BC Act.
B: Equivalent to the Myall Woodland EEC listed under the EPBC Act.
C: 6.5 ha equivalent to the Grey Box EEC listed under the BC Act and BC Act.
D: 23.5 ha equivalent to the Grey Box EEC listed under the BC Act, including approximately 5 ha equivalent to the Grey Box EEC listed under the EPBC Act.

Table 26 provides a summary of the Modification species credit requirements.

### Table 26

**Species Credit Requirements**

<table>
<thead>
<tr>
<th>Species</th>
<th>Clearance Area (ha)</th>
<th>Credit Requirement (Attachment E)</th>
<th>Offset Location (OEH, 2014a)</th>
<th>Offset Size (ha)</th>
<th>Offset Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Superb Parrot</td>
<td>0.4</td>
<td>7</td>
<td>Anywhere in NSW</td>
<td>1</td>
<td>1:2.5</td>
</tr>
</tbody>
</table>

1. Calculated in accordance with the *BioBanking Assessment Methodology 2014*, or its revision (OEH, 2014c) where: size of the offset area = species credits required divided by 7.1.
2. The species credit requirements can overlap with other species credit requirements and the ecosystem credit requirements (i.e., the requirements are not mutually exclusive).
5  STAGE 3 – BIODIVERSITY OFFSET STRATEGY

The existing Biodiversity Offset Strategy for the CGO is described in Section 5.1 and the additional Biodiversity Offset Strategy for the Modification is described in Section 5.2. Measures that are proposed to avoid and mitigate impacts from the Modification on terrestrial flora and fauna are described in Sections 4.1.1 and 4.5.

5.1 EXISTING BIODIVERSITY OFFSET REQUIREMENTS

Evolution has two existing offset areas for the CGO. One offset area is located approximately 1 km north of ML 1535 (the Northern Offset Area) (Offset Area 2) and the other is located approximately 3 km south of ML 1535 (the Southern Offset Area) (Offset Area 1) (Figure 15). The CGO existing offset areas total approximately 440 ha (Table 27).

<table>
<thead>
<tr>
<th>Area</th>
<th>Minimum Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Offset Area 1 Southern Offset Area (Enhancement Area) (including 230 ha CGO Mod 11 Extension)</td>
<td>260 ha</td>
</tr>
<tr>
<td>Southern Offset Area (Revegetation Area)</td>
<td>100 ha</td>
</tr>
<tr>
<td>Offset Area 2 Northern Offset Area (Enhancement Area)</td>
<td>80 ha</td>
</tr>
<tr>
<td>Total</td>
<td>440 ha</td>
</tr>
</tbody>
</table>

Source: CGO DA 14/98 Consent Condition 3.4.

The objectives for the existing CGO 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 within the Revegetation Area of the Southern Offset Area; and
- improve the flora value of the land in the CGO existing offset areas in the medium to long-term.

Two types of management areas have been defined in order to facilitate the management of native vegetation and habitat in the CGO existing offset areas, namely, Enhancement Areas and a Revegetation Area (Table 27).

The management of the existing CGO offset areas is described in the *Cowal Gold Operations Biodiversity Offset Management Plan* (Evolution, 2016a). Management measures include:

- fencing to exclude grazing;
- provision of signage to restrict access;
- soil erosion management;
- control of animal pests and weeds;
- vehicle access management; and
- habitat enhancement (e.g. nest boxes).
Refer Figure 16

Offset Area 1
Offset Area 2
Offset Area 3
Offset Area 4
Offset Area 5
Offset Area 6

Northern Offset Area (2)
Southern Offset Area (1)

LEGEND
- Mining Lease Boundary (NL 1535)
- Mining Lease Application Boundary (MLA 1)
- Approximate Extent of Approved Surface Development
- Existing Offset Area
- Proposed Offset Area
- BAR Footprint - Mine Site
- BAR Footprint - Pipeline
- Local Management Initiatives
- Remnant Vegetation Enhancement Program Areas
- Compensatory Wetland

Source: Evolution (2018); © NSW Department of Planning and Environment (2017), Department of Finance, Services & Innovation (2017)
Orthophoto: Evolution (Oct 2017)

Figure 15

CGO PROCESSING RATE MODIFICATION
Existing Approved and Proposed Biodiversity Offset Areas
5.2 PROPOSED BIODIVERSITY OFFSET STRATEGY

This section describes the proposed biodiversity offset strategy, which aims to address residual impacts from the Modification that cannot be avoided or mitigated.

5.2.1 Offset Approach

A biodiversity offset strategy has been prepared in accordance with the NSW Offset Policy (OEH, 2014b) and FBA (OEH, 2014a). The NSW Offset Policy (OEH, 2014b) requires like-for-like offset outcomes which mean:

- species credit species must be offset with the same species credit species;
- BVTs must be offset with closely related BVTs (Credits from BVTs able to be retired to address the Ecosystem Credit Requirements are listed in the credit report [Attachments D and E] and re-stated in Table 25).

Evolution has elected to address the offset requirements by offsetting through land based offset areas. Evolution proposes creating four new spatially separated offset areas (Figures 15 to 17). The additional offset areas were created to meet the like-for-like offset requirement of the NSW Offset Policy (OEH, 2014b), rather than expanding the existing Offset Areas. As required by the FBA (OEH, 2014a), the Biobanking Assessment Methodology 2014 (OEH, 2014c) and Credit Calculator were used to assess the biodiversity values of the land-based offset areas.

5.2.2 Offset Identification

AMBS (2018b) (Attachment B) undertook surveys in the proposed offset areas in September 2016, November and December 2017 and January 2018. The surveys included identification of vegetation communities and collection of condition data. Fauna surveys were undertaken concurrently with the flora surveys, and involved searching and listening for the Superb Parrot.

The proposed offset areas (including a general description of the vegetation communities present) are described in Table 28. Proposed offset areas 3 to 6 have a combined area of approximately 486.5 ha.
LEGEND

- Proposed Offset Area
- Threatened Species Records
- Superb Parrot Recorded Location
- Austrostipa wakoolica
- Euphorbia amara
- Threatened Ecological Communities

**Vegetation Communities**

- Weeping Myall Woodland EEC (BC Act and EPBC Act)
- Weeping Myall Woodland EEC (BC Act)

**Vegetation MAPPING**

- Semi-arid Woodlands (Grassy sub-formations) - Riverine Plain Woodlands
- Weeping Myall Open Woodland (Derived Grassland in Moderate Condition) (LA212)
- Forested Wetlands - Inland Riverine Forests
- River Red Gum Forest (Moderate Condition) (LA191)
- River Red Gum Forest (Derived Grassland in Moderate Condition) (LA193)

**Other Map Units**

- Belah Woodland (Semi Cleared in Moderate Condition) (LA105)
- Belah Woodland (Derived Grassland in Moderate Condition) (LA105)
- Grasslands - Western Slopes Grasslands
- Highly Modified Derived Grasslands (Low Condition) (LA138)
- Grey Woodlands - Riverine Transition Woodlands
- Poplar Box - Belah Woodland (Semi Cleared in Moderate Condition) (LA175)
- Poplar Box - Belah Woodland (Derived Grassland in Moderate Condition) (LA175)
- Semi and Woodland (Semi Cleared sub-formation) - Inland Rocky Hill Woodlands
- Green Mallee - White Cypress Pine Woodland (Moderate Condition) (LA148)
- Other Map Units

**Reference:** 7. AMBS (2018b)

**Note:** There are no references 1 - 6 on this figure.

Source: © NSW Department of Finance, Services & Innovation (2017)

Orthophoto: Evolution (Oct 2017)

**Figure 16**

Vegetation Communities - Proposed Biodiversity Offset Areas 3, 4, 5
LEGEND
- Mining Lease Boundary (ML 1535)
- Approximate Extent of Approved
  Surface Development
- Remnant Vegetation Enhancement Program Area
- Existing Offset Area
- Proposed Offset Area
- Threatened Species Records
  - Superb Parrot Recorded Location
- Threatened Ecological Communities
- Grey Box Woodland EEC (BC Act and EPBC Act)

VEGETATION MAPPING
- Grassy Woodlands - Floodplain Transition Woodlands
- Inland Grey Box - Poplar Box - White Cypress Pine
  (Derived Grassland in Low Condition) (LA152)
- Grasslands - Western Slopes Grasslands
- Newly Modified Derived Grasslands (Low Condition)
  (LA138)
- Freshwater Wetlands - Inland Floodplain Swamps
- Shallow freshwater mixed marsh sedgeland
  (Moderate Condition) (LA198)
- Other Map
  - Cleared

Reference: 3. OEH (2017)
7. ANRS (2018b)

Note: There are no references 1 - 2 and 4 - 6 on this figure.

Source: Evolution (2018); © NSW Department of Planning and
Environment (2017); Department of Finance, Services &
Innovation (2017)

Orthophoto: Evolution (Oct 2017)
Table 28
Offset Identification

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Proposed Offset Area 3</th>
<th>Proposed Offset Area 4</th>
<th>Proposed Offset Area 5</th>
<th>Proposed Offset Area 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lot and DP</td>
<td>Lot 7 DP753097</td>
<td>Lot 58 DP753124</td>
<td>Lot 30 DP753124</td>
<td>Lot 22 DP753083</td>
</tr>
<tr>
<td>Lot 29 DP753097</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Major Catchment Area</td>
<td>Lachlan</td>
<td>Lachlan</td>
<td>Lachlan</td>
<td>Lachlan</td>
</tr>
<tr>
<td>LGA</td>
<td>Bland</td>
<td>Bland</td>
<td>Bland</td>
<td>Bland</td>
</tr>
<tr>
<td>IBRA Subregion</td>
<td>Lower Slopes</td>
<td>Lower Slopes</td>
<td>Lower Slopes</td>
<td>Lower Slopes</td>
</tr>
<tr>
<td>Mitchell Landscape</td>
<td>Ardlethan Hills and</td>
<td>Ardlethan Hills and</td>
<td>Ardlethan Hills</td>
<td>Ardlethan Hills</td>
</tr>
<tr>
<td></td>
<td>Bimbi Plains</td>
<td>Bimbi Plains</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Land type</td>
<td>Freehold</td>
<td>Freehold</td>
<td>Freehold</td>
<td>Freehold</td>
</tr>
<tr>
<td>Owner</td>
<td>Evolution</td>
<td>Evolution</td>
<td>Evolution</td>
<td>Biobanking Agreement</td>
</tr>
<tr>
<td>Location</td>
<td>North of ML1535</td>
<td>North of ML1535</td>
<td>North-west of ML1535</td>
<td>South of ML1535</td>
</tr>
<tr>
<td>Total Area (ha)</td>
<td>88</td>
<td>157</td>
<td>39.5</td>
<td>202</td>
</tr>
<tr>
<td>Area Native Vegetation (ha)</td>
<td>86.8*</td>
<td>157</td>
<td>39.5</td>
<td>201.3*</td>
</tr>
</tbody>
</table>

General Description

- Offset Area 3 is composed primarily of Belah Woodland and Derived Grassland.
- Offset Area 3 also contains Weeping Myall Derived Grassland and both River Red Gum Woodland and Derived Grassland.
- Offset Area 4 is composed entirely of Moderate Condition Poplar Box Communities of Woodland and Derived Grassland structures.
- Green Mallee – White Cypress Pine Woodland comprises the largest extent of vegetation in Offset Area 5, with the remaining being Highly Modified Derived Grassland.
- Large portion of Inland Grey Box - White Cypress Pine Woodland Derived Grassland with small areas of shallow freshwater mixed marsh sedgeland and Highly Modified Derived Grasslands.

| Land Use History            | Grazing livestock       | Grazing livestock       | Grazing livestock       | Grazing livestock       |
| Proposed Security Mechanism| Biobanking Agreement    | Biobanking Agreement    | Biobanking Agreement    | Biobanking Agreement    |

Table 29
Change in Site Value Scores Relevant to the Offset Areas

<table>
<thead>
<tr>
<th>Vegetation Zone Number</th>
<th>Vegetation Community</th>
<th>BVT</th>
<th>Area (ha)</th>
<th>Condition</th>
<th>Current Site Value</th>
<th>Future Site Value</th>
<th>Gain In Site Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proposed Offset Area 3</td>
<td>1</td>
<td>LA212</td>
<td>20^</td>
<td>Moderate</td>
<td>44.67</td>
<td>68.22</td>
<td>23.55</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>LA191</td>
<td>13.5</td>
<td>Moderate</td>
<td>70.83</td>
<td>87.85</td>
<td>17.02</td>
</tr>
</tbody>
</table>

* the remainder is cleared land.

5.2.3 Site Values

Table 29 identifies the change in site value score of each vegetation zone located in the proposed offset areas based on data collected by AMBS (2018b) (Attachment B) and calculated by the OEH Biobanking Credit Calculator.
Table 29 (Continued)
Change in Site Value Scores Relevant to the Offset Areas

<table>
<thead>
<tr>
<th>Vegetation Zone Number</th>
<th>Vegetation Community</th>
<th>BVT</th>
<th>Area (ha)</th>
<th>Condition</th>
<th>Current Site Value</th>
<th>Future Site Value</th>
<th>Gain In Site Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>3b River Red Gum Forest (Derived Grassland in Moderate Condition)</td>
<td>LA191</td>
<td>6</td>
<td>Moderate</td>
<td>28.12</td>
<td>55.64</td>
<td>27.52</td>
</tr>
<tr>
<td>4</td>
<td>4b Belah Woodland (Semi Cleared in Moderate Condition)</td>
<td>LA105</td>
<td>4.8</td>
<td>Moderate</td>
<td>68.67</td>
<td>82.67</td>
<td>14.00</td>
</tr>
<tr>
<td>5</td>
<td>4c Belah Woodland (Derived Grassland in Moderate Condition)</td>
<td>LA105</td>
<td>42.5</td>
<td>Moderate</td>
<td>58.00</td>
<td>81.33</td>
<td>23.33</td>
</tr>
</tbody>
</table>

**Proposed Offset Area 4**

| 1                      | 7a Poplar Box - Belah Woodland (Semi Cleared in Moderate Condition)                    | LA175 | 62        | Moderate         | 58.85             | 80.90             | 22.05              |
| 2                      | 7b Poplar Box - Belah Woodland (Derived Grassland in Moderate Condition)              | LA175 | 95        | Moderate         | 32.81             | 61.37             | 28.56              |

**Proposed Offset Area 5**

| 1                      | 6b Highly Modified Derived Grasslands (Low Condition)                                  | LA138 | 9         | Low              | 35.33             | 42.33             | 7.00               |
| 2                      | 8 Green Mallee - White Cypress Pine Woodland (Moderate Condition)                      | LA148 | 30.5      | Moderate         | 73.44             | 92.36             | 18.92              |

**Proposed Offset Area 6**

| 1                      | 6b Highly Modified Derived Grasslands (Low Condition)                                  | LA138 | 29        | Low              | 37.33             | 40.00             | 2.67               |
| 2                      | 2b Inland Grey Box - White Cypress Pine Woodland (Derived Grassland in Low Condition)  | LA152 | 165.5a    | Low              | 25.52             | 46.01             | 20.49              |
| 3                      | 9 Shallow freshwater mixed marsh sedgeland (Moderate Condition)                        | LA198 | 6.8       | Moderate         | 54.35             | 66.67             | 12.32              |

**Total** | **484.6** |

A  Equivalent to the Myall Woodland EEC listed under the EPBC Act and BC Act.
B  Equivalent to the Grey Box EEC listed under the EPBC Act and BC Act.

5.2.4  Ecosystem Credits

Ecosystem credits generated from proposed offset areas 3, 4, 5 and 6 are summarised in Table 30.

Ecosystem credits generated from the proposed offset areas would meet (and exceed) the credit requirements of the Modification. Table 31 provides a reconciliation of the ecosystem credits required, available and additional to that required for the Modification. Under the NSW Biobanking Offset Scheme, the additional credits (2,069 ecosystem credits) could be sold and/or used to offset a future development.

As described in Section 2.2.1, the Highly Modified Derived Grasslands (LA138) were likely (prior to historic clearing) a variety of vegetation types that occur in the general locality. Given this, ecosystem credits from a variety of vegetation types (in better condition) would be used to offset impacts on the more highly modified derived grasslands. This would provide a better conservation outcome than including greater areas of Highly Modified Derived Grasslands (LA138) within the offset areas.
Threatened Ecological Communities

Ecosystem credits have been calculated for threatened ecological communities in the proposed offset areas. Threatened ecological communities in the proposed offset areas are summarised in Table 32. Plate 4 shows an example of Myall Woodland EEC listed under the BC Act and EPBC Act in Offset Area 3 and Plate 5 shows an example of Grey Box EEC listed under the BC Act and EPBC Act in Offset Area 6.

The site condition (plot data) collected by AMBS (2018b) (Attachment B) in the Grey Box EEC indicates the understorey comprises 2-32% cover of native grasses, 0-12% cover of other native plants (e.g. herbs) and greater than 75% cover of weeds. The site condition (plot data) collected in the Myall Woodland EEC indicates the understorey comprises a 30-40% cover of native grasses, 4-22% cover of other native plants (e.g. herbs) and 0-46% cover of weeds.

Superb Parrot Foraging Habitat

Approximately 106 ha of woodland and 324.5 ha of derived grassland in the offset areas provide potential foraging habitat for the Superb Parrot as mapped by AMBS (2018b) (Attachment B). Ecosystem credits have been calculated for these areas of potential foraging habitat for the Superb Parrot.
## Table 30
Ecosystem Credits Generated from Proposed Offset Areas

<table>
<thead>
<tr>
<th>Vegetation Zone Number</th>
<th>Vegetation Community</th>
<th>BVT</th>
<th>Proposed Offset Areas 3</th>
<th>Proposed Offset Area 4</th>
<th>Proposed Offset Area 5</th>
<th>Proposed Offset Area 6</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Area (ha)</td>
<td>Credits (Attachment F1)</td>
<td>Area (ha)</td>
<td>Credits (Attachment F2)</td>
<td>Area (ha)</td>
</tr>
<tr>
<td>Semi-arid Woodlands Formation (Grassy sub-formation) – Riverine Plain Woodlands</td>
<td>1</td>
<td>Weeping Myall Open Woodland</td>
<td>LA212</td>
<td>20</td>
<td>305</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Forested Wetlands - Inland Riverine Forests</td>
<td>3</td>
<td>River Red Gum Forest</td>
<td>LA191</td>
<td>19.5</td>
<td>292</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Semi-arid Woodland (Grassy sub-formation) – Northwest Floodplain Woodlands</td>
<td>4</td>
<td>Belah Woodland</td>
<td>LA105</td>
<td>47.3</td>
<td>714</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Grasslands – Western Slopes Grasslands</td>
<td>6</td>
<td>Highly Modified Derived Grasslands</td>
<td>LA138</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Grassy Woodlands – Floodplain Transition Woodlands</td>
<td>7</td>
<td>Poplar Box - Belah Woodland</td>
<td>LA175</td>
<td>0</td>
<td>0</td>
<td>157</td>
<td>1,694</td>
</tr>
<tr>
<td>2</td>
<td>Inland Grey Box - White Cypress Pine Woodland</td>
<td>LA152</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Semi-arid Woodland (Scrubby sub-formation) – Inland Rocky Hill Woodlands</td>
<td>8</td>
<td>Green Mallee - White Cypress Pine Woodland</td>
<td>LA148</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Freshwater Wetlands - Inland Floodplain Swamps</td>
<td>9</td>
<td>Shallow freshwater mixed marsh sedgeland</td>
<td>LA198</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>86.8</td>
<td>1,311</td>
<td>157</td>
<td>1,694</td>
<td>39.5</td>
</tr>
</tbody>
</table>

A Equivalent to the Myall Woodland EEC listed under the EPBC Act and BC Act.
B Equivalent to the Grey Box EEC listed under the EPBC Act and BC Act.
### Table 31
Reconciliation of the Ecosystem Credits Required, Available and Additional

<table>
<thead>
<tr>
<th>Vegetation Zone Number</th>
<th>Vegetation Community</th>
<th>BVT</th>
<th>Ecosystem Credits Required (Table 25)</th>
<th>Ecosystem Credits to be Retired (Table 30)</th>
<th>Additional Credits Not Required*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Weeping Myall Open Woodland</td>
<td>LA212</td>
<td>109</td>
<td>109 (LA212 in Offset Area 3)^A</td>
<td>196 (LA212 in Offset Area 3)^A</td>
</tr>
<tr>
<td>2</td>
<td>Inland Grey Box - White Cypress Pine Woodland</td>
<td>LA152</td>
<td>816</td>
<td>816 (LA152 in Offset Area 6)^B</td>
<td>1,079 (LA152)^B</td>
</tr>
<tr>
<td>3</td>
<td>River Red Gum Forest</td>
<td>LA191</td>
<td>19</td>
<td>19 (LA191 in Offset Area 3)</td>
<td>273 (LA191 in Offset Area 3)</td>
</tr>
<tr>
<td>4</td>
<td>Belah Woodland</td>
<td>LA105</td>
<td>193</td>
<td>193 (LA105 in Offset Area 3)</td>
<td>521 (LA105)</td>
</tr>
<tr>
<td>5</td>
<td>Dwyer's Red Gum - White Cypress Pine - Currawang Woodland</td>
<td>LA144</td>
<td>18</td>
<td>18 (LA148 in Offset Area 5)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Highly Modified Derived Grasslands</td>
<td>LA138</td>
<td>2,532</td>
<td>50 (LA138 in Offset Area 5)</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>241 (LA138 in Offset Area 6)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1,694 (LA175 in Offset Area 4)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>282 (LA148 in Offset Area 5)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>76 (LA198 in Offset Area 6)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>189 (LA152 in Offset Area 6)^B</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td><strong>3,687</strong></td>
<td><strong>3,687</strong></td>
<td><strong>2,069</strong></td>
</tr>
</tbody>
</table>

* Under the NSW Biobanking Offset Scheme, these additional credits could be sold and/or used to offset a future development.
A Equivalent to the Myall Woodland EEC listed under the EPBC Act and BC Act.
B Equivalent to the Grey Box EEC listed under the EPBC Act and BC Act.
## Table 32

Threatened Ecological Communities in the Proposed Offset Areas

<table>
<thead>
<tr>
<th>Threatened Ecological Communities</th>
<th>Offset Area</th>
<th>Area (ha)</th>
<th>Ecosystem Credits (Attachments F1 and F4)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>THREATENED COMMUNITIES UNDER THE BC ACT</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2b Inland Grey Box - White Cypress Pine Woodland (LA152)</td>
<td>Offset Area 6</td>
<td>165.5</td>
<td>2,084</td>
</tr>
<tr>
<td><strong>Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1d Weeping Myall Open Woodland (Derived Grassland in Moderate Condition) (LA212)</td>
<td>Offset Area 3</td>
<td>20</td>
<td>305</td>
</tr>
<tr>
<td><strong>THREATENED COMMUNITIES UNDER THE EPBC ACT</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2b Inland Grey Box - White Cypress Pine Woodland (LA152)</td>
<td>Offset Area 6</td>
<td>165.5</td>
<td>2,084</td>
</tr>
<tr>
<td><strong>Weeping Myall Woodlands</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1d Weeping Myall Open Woodland (Derived Grassland in Moderate Condition) (LA212)</td>
<td>Offset Area 3</td>
<td>1.5^</td>
<td>~23*</td>
</tr>
</tbody>
</table>

* Calculated by dividing 305 credits by 20 ha (which equals 15.25 credits per ha) multiplied by 1.5 ha.

^ There is also 18.5 ha of Weeping Myall Open Woodland (Derived Grassland in Moderate Condition) (LA212) that currently does not meet the criteria for the Myall Woodland EEC listed under the EPBC Act but is likely to in the future.

![Plate 4 Example of Myall Woodland EEC listed under the BC Act and EPBC Act in Offset Area 3](image)
5.2.5 Species Credits

In February 2018, AMBS (2018b) (Attachment B) undertook targeted threatened fauna surveys in the proposed offset areas. Threatened flora and fauna recorded in the offset areas are shown on Figures 16 and Figure 17.

The Superb Parrot was recorded relatively frequently during surveys by AMBS (2018b) (Attachment B) (Figures 16 and Figure 17). Proposed Offset Area 3 contains potential breeding habitat for the Superb Parrot equivalent to that which would be cleared (i.e. River Red Gum Forest [Moderate Condition] [LA191] along the edge of Lake Cowal) (Figure 18; Plate 6). There are 13.5 ha of River Red Gum Forest (Moderate Condition) (LA191) within Proposed Offset Area 3 which would produce 96 Superb Parrot species credits.

Plate 5 Example of Grey Box EEC listed under the BC Act and EPBC Act in Offset Area 6
Figure 18

LEGEND

- Proposed Offset Area
- Threatened Species Records
- Superb Parrot Recorded Location

SUPERB PARROT POTENTIAL BREEDING HABITAT

- Forested Wetlands - Inland Riverine Forests
- River Red Gum Forest (Moderate Condition) (LA191)

Source: © NSW Department of Finance, Services & Innovation (2017)
Orthophoto: Evolution (Oct 2017)

Note: There are no references 1 - 6 on this figure.

Reference: 7. AMBS (2018b)
A total of 7 Superb Parrot species credits would be required for the Modification. Under the NSW Biobanking Offset Scheme, the remaining 89 Superb Parrot species credits could be sold and/or used to offset a future development. The conservation benefit would be conservation and ongoing management of River Red Gum Forest which provides potential foraging and breeding habitat for the Superb Parrot.

AMBS (2018b) (Attachment B) also recorded *Tylophora linearis* and *Austrostipa wakoolica* in the proposed offset areas (Figure 16). Species credits could be generated for these species and sold and/or used to offset a future development.

### 5.2.6 Long-term Security of the Proposed Offset Areas

As required by the FBA (OEH, 2014a), the *Biobanking Assessment Methodology 2014* (OEH, 2014c) and Credit Calculator were used to assess the biodiversity values of the land-based offset areas. The *Biobanking Assessment Methodology 2014* (OEH, 2014c) is used to assess the biodiversity values of a biobank site for the purpose of entering into a Biobanking Agreement - an agreement between the Minister for the Environment and the landowner to establish a BioBank site. The Biobanking Agreement is registered on the title of the property so is transferred to new owners if the property is sold.
5.2.7 Management of the Proposed Offset Areas

Consistent with the existing CGO offset areas (Section 5.2.2), management measures for the proposed offset areas would include:

- fencing to exclude grazing;
- provision of signage to restrict access; and
- control of animal pests and weeds.

The proposed offset areas would be managed according to the requirements in the agreement for long-term security. The biodiversity credit report for the proposed offset areas (Attachments F1, F2, F3 and F4) lists the following required management measures:

- excluding commercial apiaries;
- control of feral and/or over-abundant native herbivores; and
- maintenance of natural flow regimes.

The improvement in condition of the vegetation in the proposed offset areas would be monitored according to the requirements in the agreement for long-term security.

5.3 NSW OFFSET POLICY PRINCIPLES

Table 33 provides a reconciliation of the Biodiversity Offset Strategy against the offset principles from the NSW Offset Policy (OEH, 2014b).

Table 33
Reconciliation of the Offset Areas against the NSW Offset Policy Principles

<table>
<thead>
<tr>
<th>NSW Offset Policy Principles</th>
<th>Elements of the Modification Offset that address these Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principle 1: Before offsets are considered, impacts must first be avoided and unavoidable impacts minimised through mitigation measures. Only then should offsets be considered for the remaining impacts.</td>
<td>Impact avoidance and mitigation measures are described in Sections 4.1.1 and 4.5.</td>
</tr>
<tr>
<td>Principle 2: Offset requirements should be based on a reliable and transparent assessment of losses and gains.</td>
<td>The offset requirements have been calculated using the OEH Biobanking Credit Calculator and the FBA (OEH, 2014a).</td>
</tr>
<tr>
<td>Principle 3: Offsets must be targeted to the biodiversity values being lost or to higher conservation priorities.</td>
<td>The offset strategy described for the Modification has been developed in accordance with the requirements of the FBA to target biodiversity values that would be lost as a result of the Modification.</td>
</tr>
<tr>
<td>Principle 4: Offsets must be additional to other legal requirements.</td>
<td>The implementation of the offset strategy is beyond existing requirements.</td>
</tr>
<tr>
<td>Principle 5: Offsets must be enduring, enforceable and auditable.</td>
<td>The implementation of the offset strategy is likely to be a condition of Development Consent. Any offset areas would be secured as required.</td>
</tr>
<tr>
<td>Principle 6: Supplementary measures can be used in lieu of offsets.</td>
<td>Supplementary measures are not proposed.</td>
</tr>
</tbody>
</table>

5.4 COMMONWEALTH OFFSET REQUIREMENTS

A reconciliation of the Biodiversity Offset Strategy against the Commonwealth offset principles (DSEWPaC, 2012b) is presented in Table 34.
### Table 34
Reconciliation of the Biodiversity Offset Strategy against the Commonwealth Offset Principles

<table>
<thead>
<tr>
<th>Offset Principles</th>
<th>Elements of the Modification Offset that Address these Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deliver an overall conservation outcome that improves or maintains the viability of the aspect of the environment that is protected by national environmental law and affected by the action.</td>
<td>The offsets directly contribute to the ongoing viability of the specific protected matter impacted i.e. ‘like for like’ outcome. The residual impacts on Grey Box EEC and Weeping Myall EEC are offset with the same BVT (LA152 and LA212, respectively) which has been confirmed to meet the criteria for the EPBC Act listed threatened ecological communities. Impacts on potential breeding habitat for the Superb Parrot would be offset with conservation and management of similar potential breeding habitat for the Superb Parrot (same BVT [LA191]). The conservation benefit from the offset areas would be the long-term security and management of larger areas of Grey Box EEC, Weeping Myall EEC and potential foraging and breeding habitat for the Superb Parrot, than would be disturbed by the Modification.</td>
</tr>
<tr>
<td>Be built around direct offsets but may include other compensatory measures.</td>
<td>Evolution has elected to address the offset requirements by offsetting through four additional land based offset areas (Section 5.2).</td>
</tr>
<tr>
<td>Be in proportion to the level of statutory protection that applies to protected matters.</td>
<td>The NSW Offset Policy (OEH, 2014b), which was applied to the Modification, accounts for the level of statutory protection (vulnerable to critically endangered) of the relevant protected matters in calculating the offset requirement. The land-based offset areas would satisfy 100% of the offset requirements for each threatened species and community potentially impacted by the Modification.</td>
</tr>
<tr>
<td>Be of a size and scale proportionate to the impacts on the protected matter.</td>
<td>The size and scale of the offset was determined using the NSW Offset Policy (OEH, 2014b). This takes into consideration specific attributes of the relevant protected matters and its habitat and the quality and importance of the habitat.</td>
</tr>
<tr>
<td>Effectively account for and manage the risks of the offset not succeeding.</td>
<td>The implementation of the offset strategy is likely to be a condition of Development Consent (DA 14/98).</td>
</tr>
<tr>
<td>Be additional to what is already required, determined by law or planning regulations or agreed to under other schemes or programs.</td>
<td>The implementation of the offset strategy is beyond existing requirements, in that it is not part of any private conservation reserve system. The enduring protection that would be applied to the biodiversity offset areas is new and additional under duty of care or any environmental planning laws.</td>
</tr>
<tr>
<td>Be efficient, effective, transparent, proportionate, scientifically robust and reasonable.</td>
<td>The size and scale of the offset was determined using the NSW Offset Policy (OEH, 2014b).</td>
</tr>
<tr>
<td>Have transparent governance arrangements including being able to be readily measured, monitored, audited and enforced.</td>
<td>The proposed offset areas would be secured using an agreement between the Minister for the Environment and a landholder to permanently protect and manage an area of land.</td>
</tr>
</tbody>
</table>

1 DSEWPaC, 2012b.
6 CONCLUSION

The Modification would result in the removal of 286.7 ha of native vegetation, of which most (91%) is derived grassland in low/moderate condition (260.8 ha). The result of running the OEH Biobanking Credit Calculator is that the Modification requires a Biodiversity Offset Strategy which accounts for a total of 3,687 ecosystem credits and 7 species credits for the Superb Parrot.

The existing Biodiversity Offset Strategy for the CGO would be augmented with an additional Biodiversity Offset Strategy for the Modification. Evolution has elected to address the offset requirements by offsetting through four additional offset areas on land owned by Evolution.

The four proposed offset areas have a combined area of 486.5 ha and provide a like-for-like offset outcome. Ecosystem and species credits generated from the four proposed offset areas would meet (and exceed) the credit requirements of the Modification.
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